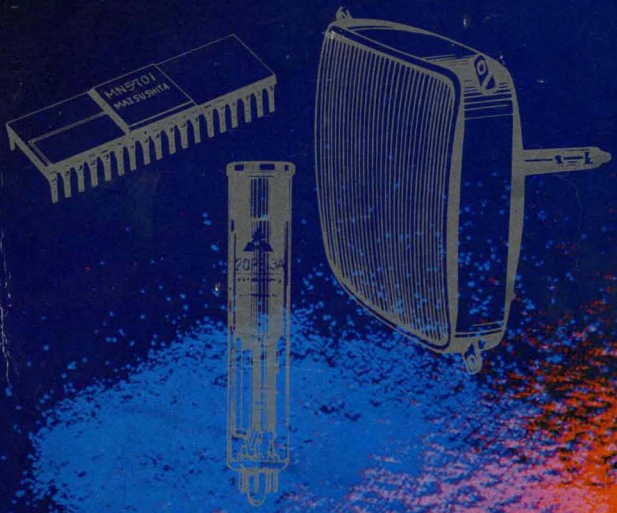
MATSUSHITA ELECTRONICS 1974

SEMICONDUCTORS
CATHODE RAY TUBES
ELECTRON TUBES



1974 MATSUSHITA ELECTRONICS

Main Factory Site in Takatsuki

Semiconductor Plant in Nagaokakyo

Semiconductor Plant in Okayama

Color Picture Tube Plant in Utsunomiya

Electron Tube Plant in Kyoto

With this catalog we wish to introduce our contribution to the "Benefits from Electronics for Everyone." And this, of course, means we wish to offer our customers active electronic components of high quality and performance.

The catalog you have before you is the fourth edition covering our electronic components. It contains the most up-to-date description of all our products. We have tried to present the information you need to understand what we have to offer in the field of active electronic components. Please feel free to address any inquiries you may have to our sales offices, representatives or distributors.

As always, Matsushita Electronics Corporation wishes to offer you still better service to satisfy your quality and performance requirements.

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(DIGITAL MONOLITHIC INTEGRATED CIRCUITS : BIPOLAR)

(DIGITAL MONOLITHIC INTEGRATED CIRCUITS : MOS)

※ Maintenance △ Preliminary

CATHODE RAY TUBES

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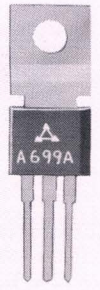
SEMICONDUCTORS

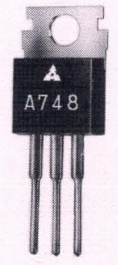
TYPE INDEX OF TRANSISTORS

Type No.	Structure	Drawing No.	UHF		VHF						UHF/VHF/HF Power			HF						Video	AF			Switching	Page
			T	V	T	V		F		M				S	W	MW・LW									
			Amp	Mix Osc	RF	Mix Osc	IF	RF	Conv	IF	UHF	VHF	HF	RF	Conv	RF	Conv	IF		Low Noise	Amp	Output		
2SA100	Ge PNP D	T-5														●								26
2SA101	Ge PNP D	T-5																●						26
2SA102	Ge PNP D	T-5														●	●							26
2SA103	Ge PNP D	T-5												●	●	●	●							26
2SA104	Ge PNP D	T-5								●				●	●	●	●							26
2SA341	Ge PNP A	T-6														●	●							26
2SA342	Ge PNP A	T-6														●	●							26
2SA546	Si PNP EP	T-12																			●	●		14
2SA546A	Si PNP EP	T-12																			●	●		14
2SA547	Si PNP EP	T-14																			●	●		14
2SA547A	Si PNP EP	T-14																			●	●		14
2SA550	Si PNP EP	T-9																		●	●			12
2SA550A	Si PNP EP	T-9																		●	●			12
2SA564	Si PNP EP	T-24																		●	●			12
2SA564A	Si PNP EP	T-24																		●	●			12
2SA637	Si PNP TP	T-9																					●	12
2SA666	Si PNP EP	T-24																		●				12
2SA666A	Si PNP EP	T-24																		●				12
2SA683	Si PNP EP	T-25																			●	●		14
2SA684	Si PNP EP	T-25																			●	●		14
2SA685	Si PNP TP	T-24																					●	12
2SA699	Si PNP EP	T-30																				●		14
2SA699A	Si PNP EP	T-30																				●		14
2SA719	Si PNP EP	T-24																			●	●		14
2SA720	Si PNP EP	T-24																			●	●		14
2SA721	Si PNP EP	T-24																		●				12
2SA722	Si PNP EP	T-24																		●				12
2SA730	Si PNP EP	T-26																			●	●		14
2SA731	Si PNP EP	T-26																			●	●		14
2SA748	Si PNP EP	T-31																				●		14
2SA749	Si PNP EP	T-24																					●	12
2SA751	Si PNP EP	T-27																			●	●		14
2SA752	Si PNP EP	T-27																			●	●		14

2SA564

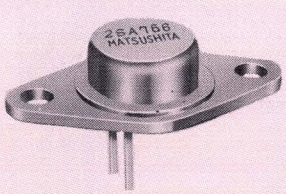


2SA699A

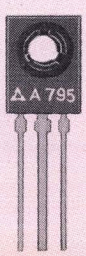


2SA748

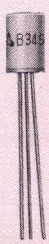
Type No.	Structure	Drawing No.	UHF TV Amp	UHF TV Mix Osc	VHF TV RF	VHF TV Mix Osc	VHF TV IF	VHF FM RF	VHF FM Conv	VHF FM IF	UHF/VHF/HF Power UHF	UHF/VHF/HF Power VHF	UHF/VHF/HF Power HF	HF SW RF	HF SW Conv	HF MW·LW RF	HF MW·LW Conv	HF MW·LW IF	HF Video	AF Low Noise	AF Amp	AF Output	Switching	Page
2SA766	Si PNP DM	T-21																				●	●	19
2SA777	Si PNP EP	T-25																			●			19
2SA794	Si PNP EP	T-35																			●			19
2SA795	Si PNP P	T-34																				●		19
2SA838	Si PNP EP	T-24						●	●	●				●	●	●	●	●						17
2SB126	Ge PNP A	T-16																				●		33
2SB126A	Ge PNP A	T-16																				●		33
2SB127	Ge PNP A	T-16																				●		33
2SB127A	Ge PNP A	T-16																				●		33
2SB128	Ge PNP A	T-16																				●		33
2SB128A	Ge PNP A	T-16																				●		33
2SB170	Ge PNP A	T-2																			●			31
2SB171	Ge PNP A	T-2																			●			31
2SB172	Ge PNP A	T-2																				●		33
2SB173	Ge PNP A	T-2																		●	●			31
2SB175	Ge PNP A	T-2																			●			31
2SB176	Ge PNP A	T-2																				●		33
2SB177	Ge PNP A	T-2																				●		33
2SB178	Ge PNP A	T-4																				●		33
2SB178A	Ge PNP A	T-4																				●		33
2SB324	Ge PNP A	T-3																				●		33
2SB345	Ge PNP A	T-3																			●			31
2SB346	Ge PNP A	T-3																			●			31
2SB347	Ge PNP A	T-3																		●	●			31
2SB348	Ge PNP A	T-3																		●	●			31
2SB371	Ge PNP A	T-3																				●		33
2SB449	Ge PNP A	T-16																				●		33
2SB473	Ge PNP A	T-20																				●		33
2SB475	Ge PNP A	T-3																				●		33
2SB476	Ge PNP A	T-12																				●		33
2SB481	Ge PNP A	T-20																				●		33
2SB493	Ge PNP A	T-15																				●		33



2SA766

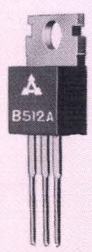


2SA795

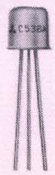


2SB345

Type No.	Structure	Drawing No.	UHF		VHF						UHF/VHF/HF Power			HF							AF			Switching	Page
			T	V	T	V		F	M					S	W	MW・LW				Video	Low Noise	Amp	Output		
			Amp	Mix Osc	RF	Mix Osc	IF	RF	Conv	IF	UHF	VHF	HF	RF	Conv	RF	Conv	IF							
2SB512	Si PNP EM	T-32																					●		19
2SB512A	Si PNP EM	T-32																					●		19
2SB513	Si PNP EM	T-33																					●		19
2SB513A	Si PNP EM	T-33																					●		19
2SB532	Si PNP EM	T-19																					●		19
2SC98	Si NPN EP	T-9																						●	17
2SC99	Si NPN EP	T-9																						●	17
2SC316	Si NPN P	T-9																			●	●			17
2SC456	Si NPN EP	T-11											●												25
2SC477	Si NPN EP	T-6				●	●	●	●	●															17
2SC478	Si NPN EP	T-9											●												25
2SC526	Si NPN EM	T-12																		●					19
2SC538	Si NPN EP	T-9																				●			17
2SC538A	Si NPN EP	T-9																				●			17
2SC539	Si NPN EP	T-9																			●	●			17
2SC562	Si NPN P	T-7					●																		17
2SC563	Si NPN EP	T-7				●	●																		17
2SC563A	Si NPN EP	T-7					●																		17
2SC571	Si NPN EP	T-12										●													25
2SC572	Si NPN EP	T-23										●													25
2SC573	Si NPN EP	T-23										●													25
2SC582	Si NPN TM	T-21																					●		19
2SC583	Si NPN EP	T-6	●																						17
2SC585	Si NPN EP	T-22										●													25
2SC644	Si NPN EP	T-24																			●	●			17
2SC645	Si NPN EP	T-10						●	●	●				●	●	●	●	●							17
2SC647	Si NPN TM	T-16																					●		19
2SC696	Si NPN EP	T-12											●									●	●		19
2SC696A	Si NPN EP	T-12											●									●	●		19
2SC697	Si NPN EP	T-14											●										●		19
2SC697A	Si NPN EP	T-14											●										●		19
2SC731	Si NPN EP	T-13									●														25
2SC761	Si NPN P	T-6	●		●	●																			17



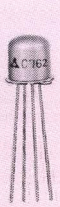
2SB512A



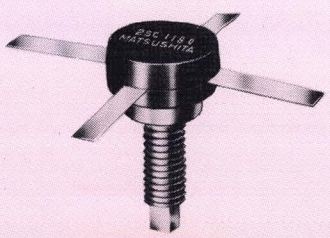
2SC538A

2SC644

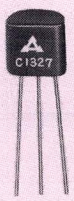
Type No.	Structure	Drawing No.	UHF		VHF			HF			UHF/VHF/HF Power			HF							AF			Switching	Page
			T	V	T	V		F	M					S	W	MW・LW									
			Amp	Mix Osc	RF	Mix Osc	IF	RF	Conv	IF	UHF	VHF	HF	RF	Conv	RF	Conv	IF	Video	Low Noise	Amp	Output		
2SC762	Si NPN P	T-6		●	●	●																			17
2SC821	Si NPN EP	T-13										●													25
2SC822	Si NPN EP	T-13										●													25
2SC828	Si NPN EP	T-24																			●				17
2SC828A	Si NPN EP	T-24																			●				17
2SC829	Si NPN EP	T-24						●	●	●				●	●	●	●	●							17
2SC840	Si NPN TM	T-21																				●			19
2SC840A	Si NPN TM	T-21																				●			19
2SC901	Si NPN TM	T-16																						●	21
2SC901A	Si NPN TM	T-16																						●	21
2SC947	Si NPN P	T-6		●		●																			17
2SC948	Si NPN P	T-6		●																					17
2SC1012	Si NPN TP	T-12																	●						17
2SC1012A	Si NPN TP	T-12																	●						17
2SC1033	Si NPN TP	T-9																						●	17
2SC1033A	Si NPN TP	T-9																						●	17
2SC1047	Si NPN EP	T-24						●	●																17
2SC1073	Si NPN EP	T-28									●														25
2SC1074	Si NPN EP	T-28									●														25
2SC1075	Si NPN EP	T-28									●														25
2SC1076	Si NPN EP	T-28									●														25
2SC1190	Si NPN EP	T-28										●													25
2SC1191	Si NPN EP	T-29										●													25
2SC1192	Si NPN EP	T-29										●													25
2SC1215	Si NPN EP	T-24		●		●																			17
2SC1226	Si NPN EP	T-30																				●			21
2SC1226A	Si NPN EP	T-30																				●			21
2SC1303	Si NPN EP	T-13										●													25
2SC1317	Si NPN EP	T-24																			●	●			21
2SC1318	Si NPN EP	T-24																			●	●			21
2SC1326	Si NPN EP	T-12									●														25
2SC1327	Si NPN EP	T-24																		●					17
2SC1328	Si NPN EP	T-24																		●					17



2SC762

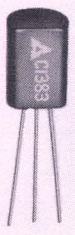


2SC1190

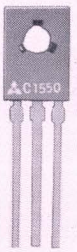


2SC1327

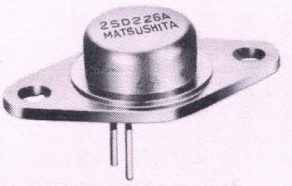
Type No.	Structure	Drawing No.	UHF T Amp	UHF V Mix Osc	VHF T RF	VHF T Mix Osc	VHF V IF	HF F RF	HF F Conv	HF F IF	UHF/VHF/HF Power UHF	UHF/VHF/HF Power VHF	UHF/VHF/HF Power HF	HF S RF	HF W Conv	HF MW・LW RF	HF MW・LW Conv	HF MW・LW IF	HF Video	AF Low Noise	AF Amp	AF Output	Switching	Page
2SC1346	Si NPN EP	T-26																			●	●		21
2SC1347	Si NPN EP	T-26																			●	●		21
2SC1354	Si NPN EP	T-29										●												25
2SC1359	Si NPN EP	T-24						●	●	●				●	●	●	●	●						17
2SC1360	Si NPN EP	T-25					●																	17
2SC1383	Si NPN EP	T-25																			●	●		21
2SC1384	Si NPN EP	T-25																			●	●		21
2SC1398	Si NPN EP	T-31																				●		21
2SC1405	Si NPN EP	T-36										●												25
2SC1406	Si NPN EP	T-27																			●	●		21
2SC1407	Si NPN EP	T-27																			●	●		21
2SC1446	Si NPN TP	T-32																				●		21
2SC1450	Si NPN DM	T-21																				●	●	21
2SC1501	Si NPN TP	T-34																				●		21
2SC1509	Si NPN EP	T-25																			●			21
2SC1518	Si NPN EP	T-25																				●		21
2SC1547	Si NPN P	T-6	●	●	●	●																		17
2SC1550	Si NPN TP	T-34																	●					21
2SC1565	Si NPN P	T-34																				●		21
2SC1566	Si NPN TP	T-35																	●					21
2SC1567	Si NPN EP	T-35																			●			21
2SC1568	Si NPN EP	T-35																				●		21
2SC1573	Si NPN TP	T-25																			●		●	17
2SC1620	Si NPN EP	T-36									●													25
2SD189	Si NPN TM	T-16																				●		21
2SD189A	Si NPN TM	T-16																				●		21
2SD198	Si NPN TM	T-16																				●		21
2SD199	Si NPN PM	T-16																					●	21
2SD200	Si NPN PM	T-17																					●	21
2SD200A	Si NPN PM	T-17																					●	21
2SD226	Si NPN TM	T-21																				●		21
2SD226A	Si NPN TM	T-21																				●		21
2SD226B	Si NPN TM	T-21																				●		21



2SC1383



2SC1550



2SD226A

Type No.	Structure	Drawing No.	UHF		VHF						UHF/VHF/HF Power			HF					Video	AF			Switching	Page
			TV		TV			FM						SW		MW・LW								
			Amp	Mix Osc	RF	Mix Osc	IF	RF	Conv	IF	UHF	VHF	HF	RF	Conv	RF	Conv	IF		Low Noise	Amp	Output		
2SD246	Si NPN PM	T-17																					●	21
2SD299	Si NPN PM	T-17																					●	21
2SD300	Si NPN PM	T-17																					●	23
2SD312	Si NPN TM	T-17																					●	23
2SD317	Si NPN TJ	T-32																				●		23
2SD317A	Si NPN TJ	T-32																				●		23
2SD318	Si NPN TJ	T-33																				●		23
2SD318A	Si NPN TJ	T-33																				●		23
2SD319	Si NPN DJ	T-18																				●		23
2SD321	Si NPN TM	T-16																					●	23
2SD324	Si NPN TM	T-21																				●		23
2SD334	Si NPN DJ	T-16																				●		23
2SD350	Si NPN PM	T-19																					●	23
2SD352	Ge NPN A	T-3																				●		33
2SD365	Si NPN TM	T-32																				●		23
2SD365A	Si NPN TM	T-32																				●		23
2SD366	Si NPN TM	T-33																				●		23
2SD366A	Si NPN TM	T-33																				●		23
2SD367	Ge NPN A	T-3																				●		33
2SD379	Si NPN EM	T-19																				●		23
2SD380	Si NPN PM	T-19																					●	23
2SD389	Si NPN TJ	T-32																				●		23
2SD389A	Si NPN TJ	T-32																				●		23
2SD390	Si NPN TJ	T-33																				●		23
2SD390A	Si NPN TJ	T-33																				●		23
2SD418	Si NPN TM	T-19																					●	23

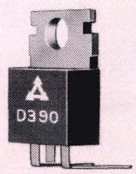
A ; Alloy　　D ; Drift　　EP; Epitaxial Planar　　P ; Planar　　TP; Triple Diffused Planar

AD; Alloy Diffused　　DJ; Diffused Junction　　EM; Epitaxial Mesa　　TM; Triple Diffused Mesa　　TJ; Triple Diffused Junction

DM; Double Diffused Mesa　　PM; Emitter Planar Collector Mesa

2SD321

2SD389



2SD390

CROSS REFERENCE GUIDE

(SILICON TRANSISTORS)

Type No.	Matsushita Nearest Equivalent	Page
2N327A	2SA564A	17
2N328A	2SA564A	17
2N329A	2SA564A	17
2N330A	2SA564A	17
2N923	2SA564A	17
2N1429	2SA550	17
2N2175	2SA550	17
2N2176	2SA550	17
2N2177	2SA550	17
2N2178	2SA550	17
2N2181	2SA564	17
2N2182	2SA564	17
2N2219	2SC696	19
2N2222	2SC1318	21
2N2274	2SA550	17
2N2275	2SA550	17
2N2276	2SA564	17
2N2277	2SA564	17
2N2278	2SA550	17
2N2279	2SA550	17
2N2332	2SA564	17
2N2333	2SA564	17
2N2334	2SA564	17
2N2337	2SA564	17
2N2372	2SA564	17
2N2373	2SA564	17
2N2377	2SA550	17
2N2906	2SA550	17
2N3053	2SC696	19
2N3054	2SD226A	21
2N3055	2SD319	23
2N3317	2SA564	17
2N3318	2SA564	17
2N3335	2SA564	17
2N3391A	2SC828A	17
2N3404	2SC1347	21
2N3405	2SC1347	21
2N3414	2SC1317	21
2N3415	2SC1317	21
2N3416	2SC1318	21
2N3440	2SC1012A	17
2N3444	2SC696	19
2N3566	2SC828A	17
2N3569	2SC1318	21
2N3638	2SA719	19

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2N3642	2SC828A	17
2N3643	2SC829	17
2N3644	2SA564A	17
2N3645	2SA720	19
2N3693	2SC829	17
2N3702	2SA719	19
2N3703	2SA720	19
2N3704	2SC1318	21
2N3708	2SC538A	17
2N3710	2SC828A	17
2N3903	2SC828A	17
2N3905	2SA564A	17
2N3925	2SC572	25
2N3927	2SC573	25
2N3948	2SC731	25
2N4040A	2SD317A	23
2N4106	2SB324	33
2N4248	2SA564A	17
2N4314	2SA546	19
2N4428	2SC1326	25
2N4403	2SA720	19
2N4427	2SC571	25
2N4428	2SC1326	25
2N4636	2SA546	19
2N4637	2SA546A	19
2N4916	2SA550A	17
2N5086	2SA666	17
2N5087	2SA666A	17
2N5209	2SC644	17
2N5210	2SC644	17
2N5232A	2SC1318	21
2N5355	2SA719	19
2N5449	2SC1318	21
2N5824	2SC828A	17
2N5825	2SC828A	17
2N5869	2SC647	19
2N5870	2SD189	21
2N5873	2SD189	21
2N5874	2SD334	23
2N5882	2SD319	23
2N6010	2SC1318	21
2N6021	2SB512A	19
2N6022	2SB512A	19
2N6023	2SB512	19
2N6081	2SC1190	25

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2N6082	2SC1191	25
2N6084	2SC1192	25
2N6121	2SD317	23
2N6122	2SD317	23
2N6123	2SD317A	23
2N6124	2SB512	19
2N6125	2SB512	19
2N6126	2SB512A	19
40243	2SC762	17
A413	2SC563	17
A415	2SC829	17
A466	2SC562	17
A467	2SC762	17
A484	2SC562	17
A702	2SD199	21
A705	2SD200	21
A2667	2SC562	17
AD162	2SB481	33
ASY26	2SB324	33
BC107	2SC538A	17
BC147	2SC828	17
BC158	2SA564A	17
BC178/9	2SA550A	17
BDY82	2SB512	19
BDY83	2SB512	19
BF115	2SC645	17
BF167	2SC562	17
BF173	2SC563	17
BF179	2SC1012A	17
BF180	2SC761	17
BF181	2SC762	17
BF182	2SC947	17
BF183	2SC948	17
BF195	2SC829	17
BF200	2SC762	17
BF235	2SC829	17
BU105	2SD200	21
BU108	2SD299/300	21/23
D400	2SC1226A	21
D4102	2SA699A	19
DTS701	2SD199	21
DTS702	2SD200	21
DTS704	2SD199	21
DTS801	2SD199	21
ECG107	2SC645	17

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ECG123A	2SC828	17
ECG154	2SC456	25
ECG159	2SA564	17
ECG163	2SC901	21
ECG175	2SD226A	21
GE-12	2SC582	19
GE-17	2SC538A	17
GE-20	2SC828A	17
GE-21	2SA564	17
GE-23	2SD226A	21
HEP50	2SC829	17
HEP56	2SC645	17
HEP57	2SA564	17
HEP240	2SC582	19
HEP241	2SC840A	19
HEP254	2SD324	23
HEP703	2SD226A	21
HEP706	2SC1012A	17
HEP707	2SD198	21
HEP709	2SC562	17
HEP712	2SC456	25
HEP728	2SC828A	17
HEP738	2SC538A	17
MJ400	2SD200	21
MJ1800	2SD199	21
MJ2251	2SC582	19
MJ2252	2SD198	21
MJ2253	2SD226A	21
MJ2254	2SC840A	19
MJ3026	2SD312	23
D40D1	2SC1226A	21
D43C8	2SA547	19
D43C8	2SA547	19
D44C8	2SD226A	21
MJ3027	2SD312	23
MJ3029	2SD321	23
MJ3202	2SC582	19
MJ3701	2SD226	21
MJ8400	2SD300	23
MJE370	2SA564	17
MM1559	2SC1354	25
MPS918	2SC948	17
MPS3638A	2SA564A	17
MPS3643	2SC829	17
MPS3693	2SC829	17

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MPS6512	2SC829	17
MPS6512/3/4	2SC828A	17
MPS6513	2SC538A	17
MPS6515	2SC538A	17
MPS6517/8	2SA550A	17
MPS6519	2SA564	17
MPS6520	2SC538A	17
MPS6522	2SA666	17
MPS6523	2SA666	17
MPS6542	2SC762	17
MPS6543	2SC1215	17
MPS6544	2SC563A	17
MPS6545	2SC1360	17
MPS6548	2SC948	17
MPS6560	2SC1317	21
MPS6561	2SC1317	21
MPS6567	2SC829	17
MPSA-55	2SA684	19
MPS-H20	2SC563	17
MPS-H32	2SC562	17
MPSU04	2SC582	19
PFB1400	2SD324	23
OC25	2SB126A	33
SE1001	2SC829	17
SE5006	2SC829	17
SE5025	2SC829	17
SE5030	2SC948	17

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SE5055	2SC562	17
SE6002	2SC538A	17
SE7056	2SC1012A	17
SK3018	2SC538A	17
SK3020	2SC828	17
SK3021	2SC582	19
SK3024	2SC828A	17
SK3025	2SA564A	17
SK3028	2SD226A	21
SK3040	2SC582	19
SK5798	2SA564A	17
SKA1117	2SC828A	17
SKA1416	2SC829	17
SKA4074/5/6	2SC829	17
SKA4525	2SC829	17
SKA4768	2SC829	17
SPQ8075	2SC828A	17
SPS-1847	2SC582	19
SPS-4399	2SC829	17
SPS4423	2SC829	17
SX3826	2SC829	17
TIS38	2SA550A	17
TIS85	2SC562	17
TIS86	2SC948	17
TIS87	2SC563A	17
TA2700	2SC582	19

(INTEGRATED CIRCUITS: DIGITAL)

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DTμL9099	DN1099	89
DTμL9930	DN1930	79
DTμL9932	DN1932	79
DTμL9933	DN1933	79
DTμL9935	DN1935	79

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DUμL9937	DN1937	81
DTμL9944	DN1944	81
DTμL9946	DN1946	83
DTμL9949	DN1949	83
DTμL9961	DN1961	83
DTμL9962	DN1962	85
DTμL9963	DN1963	85

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CA3044	AN220	55
CA3064	AN222	55

Type No.	Matsushita Nearest Equivalent	Page
CA3065	AN241	61
MC1352	AN238S	61

TRANSISTORS

(SILICON TRANSISTORS : SMALL SIGNAL)

Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)																			
							Bias I_{CBO}		Bias h_{FE}					Bias f_T					Condition				NF	※NV	
	V_{CBO}	＊V_{CEO} V_{CER}	V_{EBO}	I_C	P_C	T_j	V_{CB}	max.	V_{CB} ＊V_{CE}	I_E ＊I_C	min.	typ.	max.	V_{CB}	I_E ＊I_C	min.	typ.	max	V_{CB} ＊V_{CE}	I_E ＊I_C	f	Grounded Configuration	typ.	max.
	(V)	(V)	(V)	(mA)	(mW)	(℃)	(V)	(μA)	(V)	(mA)				(V)	(mA)	(MHz)	(MHz)	(MHz)	(V)	(mA)	(KHz)		＊(mV) (dB)	＊(mV) (dB)
2SA550	−25	−25	-5	-100[1]	300	175	−10	−1	−5	2	40	250	520											16[8]
2SA550A	−45	−45	-5	-100[1]	300	175	−10	−1	−5	2	40	250	520											
2SA564	−25	−25	-5	-100[1]	250	125	−10	−1	−5	2	65		700	-10	1		80							
2SA564A	−45	−45	-5	-100[1]	250	125	−10	−1	−5	2	65		700	-10	1		80							
2SA637※	-150	＊[7] −150	-5	−50	300	175	-100	−1	＊-3	＊-15	30			-10	＊-10	40								
2SA666	−25	−25	-5	-100[1]	150	125	−10	−1	−5	2	90	250	520						-5	0.2	0.1			16[8]
2SA666A	−45	−45	-5	-100[1]	150	125	−10	−1	−5	2	90	250	520						-5	0.2	0.1			16[8]
2SA685	-150	＊[7] −150	-5	−50	300	125	-100	−1	＊-3	＊-15	30			-10	＊-10	40								
2SA721	−35	−35	-5	-100[1]	150	125	−10	-0.1	−5	2	260		1040	-5	10		250		＊-10	＊-1	Flat			＊＊[10] 150
2SA722	−55	−55	-5	-100[1]	150	125	−10	-0.1	−5	2	260		1040	-5	10		250		＊-10	＊-1	Flat			＊＊[10] 150
2SA749	-100	-100	-5	−50	250	125	−50	-0.1	＊-1	＊-20	50	80		-10	＊-10	40								
2SA838△	−30	−20	-5	−30	250	125	−10	-0.1	−10	1	50	100	220	-10	1	150	300		-10	1	5MHz		2.8	4
2SC98	20	15	5	100	300	175	20	0.1	0.35	＊10	30		60	2	＊10		350							
2SC99	20	15	5	100	300	175	20	0.1	0.35	＊10	40		120	2	＊10		350							
2SC316※	45	45	5	100[1]	300	175	10	0.01						5	＊0.5		50		＊5	10μA	0.01 ～10			4[11]
2SC477※	50		5	30	140	175	10	1	10	＊1	40	85	170	10	＊1	150	230							
2SC538	25	25	5	100[1]	300	175	10	1	5	−2	90	250	700											
2SC538A	45	45	5	100[1]	300	175	10	1	5	−2	90	250	700											
2SC539※	25	25	5	100[1]	300	175	10	1	5	−2	90	250	700						5	-0.2	0.03 ～15	E		4[6]
2SC562	40	30	4	25	130	175	10	1	10	−4	26			10	−4	220	330	500						
2SC563	40	25	4	25	145	175	40	10	10	−7	38			10	−5	360	550	820						
2SC563A	40	40	4	25	300	175	40	10	10	−7	38			10	−5	360	550	820						
2SC583	30	15	2.5	50[1]	200	200			＊1	＊2	25		150	5	＊2	1000								
2SC644	30	25	5	100[1]	150	125	10	1	5	−2	90		700						5	-0.2	0.1			5[6]
2SC645	30		5	30	140	175	10	1	10	＊1	40		250	10	＊1	150	200							
2SC761	30	20	3	20	150	175			10	−2	25			10	−2	450	675	950						
2SC762	30	20	3	20	150	175			10	−2	25			10	−2	450	600	770						
2SC828	30	25	5	100[1]	250	125	10	1	5	−2	65		700						5	-0.2	1		6[6]	
2SC828A	45	45	5	100[1]	250	125	10	1	5	−2	65		700						5	-0.2	1		6[6]	
2SC829	30	20	5	30	250	125	10	1	10	−1	40		500											
2SC947	25	20	3	15	150	175			10	−2	10	20		10	−3	400	650	1000						
2SC948	25	20	3	15	150	175			10	−3	10	24		10	−3	700	800							
2SC1012	165	＊165[9]	5	60	2500[4]	175	12	2	＊20	＊40	20			10	−10	80								
2SC1012A	250	＊250[9]	5	60	2500[4]	175			＊20	＊40	20			10	−10		100							
2SC1033	200	150	5	25	300	175	12	2	＊10	＊5	30													
2SC1033A	250	200	5	25	300	175	12	2	＊10	＊5	20													
2SC1047	30	20	3	15	150	125			6	−1	40		500	6	−1	450	650							
2SC1215	30	20	3	50	200	125			10	−2	25			10	−15	600	1200	1600						
2SC1327	35	35	5	100[1]	150	125	10	0.1	5	−2	260		1040	5	−10		250		＊10	＊1	Flat			＊＊[10] 150
2SC1328	55	55	5	100[1]	150	125	10	0.1	5	−2	260		1040	5	−10		250		＊10	＊1	Flat			＊＊[10] 150
2SC1359	30	20	5	30	250	125	10	0.1	10	−1	50	100	220	10	＊1	150	300		10	−1	5MHz		2.8	4
2SC1360	50	45	4	50	650	135	20	0.1	10	−10	20	50	100	10	−10	300	500							
2SC1547△	30	20	3	20	150	150	25	0.1	10	−2	20			10	−2		900		11		800M		4	6
2SC1573	250	200	5	100[1]	600	135	12	2	＊10	＊5	30			10	−10	50	80							

※ Maintenance, △ Preliminary 1) I_{CM} 2) hrb/ω 3) Rg=10KΩ 4) Tc≦125℃ 5) R_{BE}≦3KΩ 6) Rg=2KΩ 7) R_{BE}≦30KΩ

Bias		Zrb			Bias	Cre	*Cob			Condition		|yfe|				Bias		$V_{CE(sat)}$		Use	Drawing No.	Type No.
V_{CE} (V)	I_E (mA)	f (MHz)	typ. (Ω)	max. (Ω)	V_{CB} (V)	I_E (mA)	f (MHz)	typ. (pF)	max. (pF)	V_{CB} (V)	I_E (mA)	f (MHz)	Grounded Configuration	min. (m℧)	typ. (m℧)	I_C (mA)	I_B (mA)	typ. (V)	max. (V)			
																−50	-2.5	-0.3		General	T-9	2SA550
																−50	-2.5	-0.3		General	T-9	2SA550A
																−50	-2.5	-0.3		General	T-24	2SA564
																−50	-2.5	-0.3		General	T-24	2SA564A
					−10	0	1		*10							−15	− 1		-1.0	Switching	T-9	2SA637※
																−50	-2.5	-0.3		Low noise	T-24	2SA666
																−50	-2.5	-0.3		Low noise	T-24	2SA666A
					−10	0	1		*10							−15	− 1		− 1	Switching	T-24	2SA685
																-100	−10		-0.6	Low noise	T-24	2SA721
																-100	−10		-0.6	Low noise	T-24	2SA722
																−50	− 5		-0.3	Switching	T-24	2SA749
−10	1	2	25	50	−10	1	10.7	1.2	2											RF Amp.	T-24	2SA838△
																100	10		0.6	Switching	T-9	2SC98
																100	10		0.6	Switching	T-9	2SC99
																10	1		1.2	Low noise	T-9	2SC316※
10	− 1	2	18	40	10	− 1	0.5	0.5	0.8											RF Amp.	T-6	2SC477※
																100	10	0.21	0.32	General	T-9	2SC538
																100	10	0.21	0.32	General	T-9	2SC538A
																100	10	0.21	0.32	Low noise	T-9	2SC539※
					10	− 1		0.15	0.22	10	− 4	35	E	70	95	10	1	1.5		VIF (AGC)	T-7	2SC562
					10	− 1		0.23	0.32	5	− 7	35	E	110	140	10	1	0.15		VIF Amp.	T-7	2SC563
					10	− 1		0.23	0.32	5	− 7	35	E	110	140	10	1	0.15		VIF Amp.	T-7	2SC563A
					5	2			0.8											UHF Amp.	T-6	2SC583
																50	10	0.14		Low noise	T-24	2SC644
10	− 1	2	22	50	10	− 1	0.5	0.65	1.2							10	1	0.1		RF Amp.	T-10	2SC645
					10	− 1	10.7	0.28	0.35							10	1	3		UHF Amp.	T-6	2SC761
					10	− 1	10.7	0.28	0.35							10	1	3		VHF Amp.	T-6	2SC762
																50	5	0.14		General	T-24	2SC828
																50	5	0.14		Gene ral	T-24	2SC828A
10	− 1			60	10	− 1		1.3	1.6							10	1	0.1		RF Amp.	T-24	2SC829
					10	− 1	10.7	0.33								10	1	0.6		UHF Mix.	T-6	2SC947
					10	− 1	10.7	0.33								10	1	0.6		UHF Osc.	T-6	2SC948
10	−10	5	60ps[2]	100ps[2]	20	−10	0.5		3.0							10	2		1.0	Video out.	T-12	2SC1012
					20	−10	0.5		3.0							60	10		10	Video out.	T-12	2SC1012A
																5	1		1.0	Switching	T-9	2SC1033
																5	1		1.0	Switching	T-9	2SC1033A
					6	− 1	10.7	0.88	1.0							10	1	0.1		RF Amp.	T-24	2SC1047
					30	− 1	10.7	1.0	1.5							10	1	0.1		UHF Osc.	T-24	2SC1215
																100	10		0.6	Low noise	T-24	2SC1327
																100	10		0.6	Low noise	T-24	2SC1328
10	− 1	2	22	50	10	− 1	10.7	0.9	1.5							10	1	0.1		RF Amp.	T-24	2SC1359
					10	− 1	10.7		0.96	1.5						20	2		0.4	VIF Amp.	T-25	2SC1360
					10	0	1	*0.8												UHF Amp.	T-6	2SC1547△
					10	0	1	*5	*10							50	5		1.0	AF Amp.	T-25	2SC1573

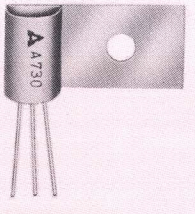
8) R_G=50KΩ 9) R_{BE}=1KΩ 10) R_G=100KΩ V_G=80dB 11) R_S=10KΩ

(SILICON TRANSISTORS : LARGE SIGNAL)

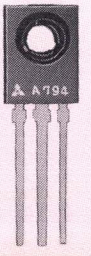
Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)													
	V_{CBO}	V_{CEO} ＊V_{CES} ＃V_{CER}	V_{EBO}	I_C	P_C	T_j	Bias V_{CB}	I_{CBO} max.	Bias V_{CE} ＊V_{CB}	h_{FE} I_E ＊I_C	min.	typ.	max.	Bias V_{CE} ＊V_{CB}	h_{FE} I_E ＊I_C	min.	typ.	Bias V_{CE} ＊V_{CB}	V_{BE} ＊$V_{BE(sat)}$ I_E ＊I_C	max.
	(V)	(V)	(V)	(A)	(W)	(℃)	(V)	(μA)	(V)	(A)				(V)	(A)			(V)	(A)	(V)
2SA546	−70	−60	−5	−1	1.2[6]	175	−30	−3	−3	＊-0.1	30	80	173	−3	＊-1.0	25		−3	＊-0.1	-0.8
2SA546A	−90	−80	−5	−1	1.2[6]	175	−30	−3	−3	＊-0.1	30	80	173	−3	＊-1.0	25		−3	＊-0.1	-0.8
2SA547	−70	−60	−5	−1	10[4]	175	−30	−3	−3	＊-0.1	30	80	173	−3	＊-1.0	25		−3	＊-0.1	-0.8
2SA547A	−90	−80	−5	−1	10[4]	175	−30	−3	−3	＊-0.1	30	80	173	−3	＊-1.0	25		−3	＊-0.1	-0.8
2SA683	−30	−25	−5	−1.5[7]	1[6]	135	−20	−0.1	−10	＊-0.5	60	160	340	−5	＊-1.0	50	100	I_B=-50mA	＊-0.5	＊-1.2
2SA684	−60	−50	−5	−1.5[7]	1[6]	135	−20	−0.1	−10	＊-0.5	60	160	340	−5	＊-1.0	50	100	I_B=-50mA	＊-0.5	＊-1.2
2SA699	−40	−20	−5	−3[7]	10[4]	150	−20	−1	−5	＊-1	30	120	220					I_B=-0.2A	＊-2.0	＊-1.5
2SA699A	−50	−40	−5	−3[7]	10[4]	150	−20	−1	−5	＊-1	30	120	220					I_B=-0.2A	＊-2.0	＊-1.5
2SA719	−30	−25	−5	−1[7]	0.4	125	−20	−0.1	−10	＊-0.15	60	160	340	−10	＊-0.5	40	90	I_B=-50mA	＊-0.5	＊-1.5
2SA720	−60	−50	−5	−1[7]	0.4	125	−20	−0.1	−10	＊-0.15	60	160	340	−10	＊-0.5	40	90	I_B=-50mA	＊-0.5	＊-1.5
2SA730	−30	−25	−5	−1[7]	0.6	125	−20	−0.1	−10	＊-0.15	60	160	340	−10	＊-0.5	40	90	I_B=-50mA	＊-0.5	＊-1.5
2SA731	−60	−50	−5	−1[7]	0.6	125	−20	−0.1	−10	＊-0.15	60	160	340	−10	＊-0.5	40	90	I_B=-50mA	＊-0.5	＊-1.5
2SA748	−70	−50	−5	−3[7]	15[4]	150	−40	−1	−5	＊-0.1	30			−5	＊-1.0	30	130	I_B=-0.2mA	＊-2.0	＊-1.5
2SA751	−30	−25	−5	−1.5[7]	1	135	−20	−0.1	−10	＊-0.5	60	160	340	−5	＊-1.0	50	100	I_B=-50mA	＊-0.5	＊-1.2
2SA752	−60	−50	−5	−1.5[7]	1	135	−20	−0.1	−10	＊-0.5	60	160	340	−5	＊-1.0	50	100	I_B=-50mA	＊-0.5	＊-1.2
2SA766	-150	＃-150[9]	−5	−1.2[7]	20[5]	150	−60	−30	−5	＊-0.1	30		150	−5	＊-0.5	30		−5	＊-0.1	-0.8
2SA777	−80	−80	−5	−1[7]	0.75	135	−20	−0.1	−10	＊-0.15	65	160	330	−5	＊-0.5	50	100	I_B=-50mA	＊-0.5	＊-1.2
2SA794	−100	−100	−5			150			−10	＊-0.15	65	160	330	−5	＊-0.5	50	100	I_B=-50mA	＊-0.5	＊-1.2
2SA795	−150	−150	−5	−0.5[7]	10[8]	150	−60	−30	−10	＊-0.1	50		240	−10	＊-0.01	50		−10	＊0.01	-0.8
2SB512	−60	−60	−5	−3	25[4]	150	−20	−30	−3	＊-0.1	40			−3	＊-1.0	30	60	−3	＊-1.0	-1.4
2SB512A	−80	−80	−5	−3	25[4]	150	−20	−30	−3	＊-0.1	40			−3	＊-1.0	30	60	−3	＊-1.0	-1.4
2SB513	−60	−60	−5	−3	25[4]	150	−20	−30	−3	＊-0.1	40			−3	＊-1.0	30	60	−3	＊-1.0	-1.4
2SB513A	−80	−80	−5	−3	25[4]	150	−20	−30	−3	＊-0.1	40			−3	＊-1.0	30	60	−3	＊-1.0	-1.4
2SB532	−80	−80	−5	−7[7]	60[3]	150	−50	−1mA	−4	＊-1	30		180	−4	＊-4.0	30		−4	＊-4.0	-1.5
2SC526※	165	150	5	55m	2.3[4]	175	12	2	＊20	−45m	20									
2SC582	300	＃300[1]	3	0.15[7]	6.5[2]	150	300	100	＊10	−0.05	30	65	150					10	＊0.05	0.7
2SC647	80	80	5	5	50[3]	150	80	10mA	4	＊0.1	20	40		4	＊4.0	20	40	4	＊4.0	1.5
2SC696	100	60	5	3	1.2[6]	175	30	3	3	−0.1	30		173	3	−1.0	28		3	−0.1	0.8
2SC696A	130	80	5	3[7]	1.2[6]	175	30	3	3	−0.1	30		173	3	−1.0	28		3	−0.1	0.8
2SC697	100	60	5	3[7]	10[4]	175	30	3	3	−0.1	30		173	3	−1.0	28		3	−0.1	0.8
2SC697A	130	80	5	3[7]	10[4]	175	30	3	3	−0.1	30		173	3	−1.0	28		3	−0.1	0.8
2SC840	100	60	5	3[6]	20[4]	150	100	5mA	3	＊0.1	30			3	＊1.0	30		3	＊1.0	1.5
2SC840A	150	100	5	3[6]	20[4]	150	100	5mA	3	＊0.1	30			3	＊1.0	30		3	＊1.0	1.5

1) R_{BE}=3KΩ 2) T_C=70℃ 3) T_C=75℃ 4) T_C=25℃ 5) T_C=80℃ 6) With cooling fin 7) I_{CM} 8) T_C=90℃ 9) R_{BE}=5KΩ

2SA684



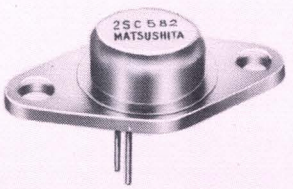
2SA730



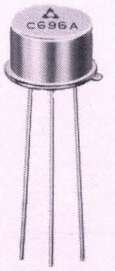
2SA794

Bias		$V_{CE(sat)}$	Bias		f_T ※$f_{\alpha e}$		t_f			Use	Drawing No.	Type No.
I_C (A)	I_B (A)	max. (V)	V_{CE} ＊V_{CB} (V)	I_E ＊I_C (A)	min. ＊(KHz) (MHz)	typ. ＊(KHz) (MHz)	Condition	typ. (μS)	max. (μS)			
−1	−0.1	−0.8	−10	0.05		80				General	T-12	2SA546
−1	−0.1	−0.8	−10	0.05		80				General	T-12	2SA546A
−1	−0.1	−0.8	−10	0.05		80				General	T-14	2SA547
−1	−0.1	−0.8	−10	0.05		80				General	T-14	2SA547A
−0.5	-0.05	−0.4	−10	0.05		200				General	T-25	2SA683
−0.5	-0.05	−0.4	−10	0.05		200				General	T-25	2SA684
−2	−0.2	−1.0	−5	0.5		150				AF Out.	T-30	2SA699
−2	−0.2	−1.0	−5	0.5		150				AF Out.	T-30	2SA699A
−0.5	-0.05	−0.6	−10	0.05		200				General	T-24	2SA719
−0.5	-0.05	−0.6	−10	0.05		200				General	T-24	2SA720
−0.5	-0.05	−0.6	−10	0.05		200				General	T-26	2SA730
−0.5	-0.05	−0.6	−10	0.05		200				General	T-26	2SA731
−2	−0.2	−1.0	−5	＊-0.5		150				AF Out.	T-31	2SA748
−0.5	-0.05	−0.4	−10	0.05		200				General	T-27	2SA751
−0.5	-0.05	−0.4	−10	0.05		200				General	T-27	2SA752
−1	−0.1	−1.0	＊-10	0.1		20				Vert. Out.	T-21	2SA766
−0.5	-0.05	−0.4	＊-10	0.05		120				AF Amp.	T-25	2SA777
−0.5	-0.05	−0.4	＊-10	0.05		120				AF Amp.	T-35	2SA794
-0.25	-0.025	−10								AF Out.	T-34	2SA795
−2	−0.4	−1.0	−10	＊-0.2		※＊70				AF Out.	T-32	2SB512
−2	−0.4	−1.0	−10	＊-0.2		※＊70				AF Out.	T-32	2SB512A
−2	−0.4	−1.0	−10	＊-0.2		※＊70				AF Out.	T-33	2SB513
−2	−0.4	−1.0	−10	＊-0.2		※＊70				AF Out.	T-33	2SB513A
−5	−0.5	−1.5	−10	＊-0.5		10				AF Out.	T-19	2SB532
			＊10	−0.01		250				Video Out.	T-12	2SC526※
			＊10	−0.05		35				AF Out.	T-21	2SC582
5	1.0	1.6	10	−0.5		43				AF Out.	T-16	2SC647
2	0.4	0.8	10	−0.05	35					General	T-12	2SC696
2	0.4	0.8	10	−0.05	35					General	T-12	2SC696A
2	0.4	0.8	10	−0.05	35					General	T-14	2SC697
2	0.4	0.8	10	−0.05	35					General	T-14	2SC697A
2	0.4	1.5	10	−0.05		50				AF Out.	T-21	2SC840
2	0.4	1.5	10	−0.05		50				AF Out.	T-21	2SC840A

2SA719



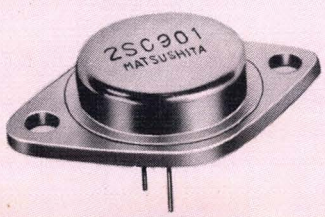
2SC582



2SC696A

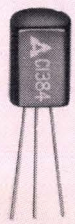
Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)													
	V_{CBO}	V_{CEO} *V_{CES} #V_{CER}	V_{EBO}	I_C	P_C	T_j	Bias V_{CB}	I_{CBO} max.	Bias V_{CE} *V_{CB}	I_E *I_C	h_{FE} min.	typ.	max.	Bias V_{CE} *V_{CB}	I_E *I_C	h_{FE} min.	typ.	Bias V_{CE} *V_{CB}	I_E *I_C	V_{BE} *$V_{BE(sat)}$ max.
	(V)	(V)	(V)	(A)	(W)	(℃)	(V)	(μA)	(V)	(A)				(V)	(A)			(V)	(A)	(V)
2SC901	200	*200	6	5	50[3]	150	150	15mA	4	*5.0	14	25						4	*5.0	1.5
2SC901A	250	*250	6	5	50[3]	150	150	15mA	4	*5.0	14	25						4	*5.0	1.5
2SC1226	40	20	5	3[6]	10[4]	150	20	1	5	*1	30	120	220					I_B=0.2A	*2	*1.5
2SC1226A	50	40	5	3[6]	10[4]	150	20	1	5	*1	30	120	220					I_B=0.2A	*2	*1.5
2SC1317	30	25	5	1[6]	0.4	125	20	0.1	10	*0.15	60	160	340	10	*0.5	40	90	I_B=50mA	*0.5	*1.5
2SC1318	60	50	5	1[6]	0.4	125	20	0.1	10	*0.15	60	160	340	10	*0.5	40	90	I_B=50mA	*0.5	*1.5
2SC1346	30	25	5	1[6]	0.6	125	20	0.1	10	*0.15	60	160	340	10	*0.5	40	90	I_B=50mA	*0.5	*1.5
2SC1347	60	50	5	1[6]	0.6	125	20	0.1	10	*0.15	60	160	340	10	*0.5	40	90	I_B=50mA	*0.5	*1.5
2SC1383	30	25	5	1.5[6]	1[5]	135	20	0.1	10	*0.5	60	160	340	5	*1.0	50	100	I_B=50mA	*0.5	*1.2
2SC1384	60	50	5	1.5[6]	1[5]	135	20	0.1	10	*0.5	60	160	340	5	*1.0	50	100	I_B=50mA	*0.5	*1.2
2SC1398	70	50	5	3[6]	15[4]	150	40	1.0	5	*0.1	30			5	*1.0	30	130	I_B=0.2mA	*2.0	*1.5
2SC1406	30	25	5	1.5[6]	1	135	20	0.1	10	*0.5	60	160	340	5	*1.0	50	100	I_B=50mA	*0.5	*1.2
2SC1407	60	50	5	1.5[6]	1	135	20	0.1	10	*0.5	60	160	340	5	*1.0	50	100	I_B=50mA	*0.5	*1.2
2SC1446	300	#300[1]	5	0.15[6]	10[2]	150	300	100	10	*0.01	30			10	*0.05	30		10	*0.05	1.2
2SC1450	150	#150[12]	5	1.2[6]	20[10]	150	60	30	5	*0.1	45		150	5	*0.5	45		5	*0.1	0.8
2SC1501	300	#300[1]	5	0.15[6]	10[2]	150	300	100	10	*0.01	30			10	*0.05	30		10	*0.05	1.2
2SC1509	80	80	5	1[6]	0.75	135	20	0.1	10	*0.15	65	160	330	5	*0.5	50	100	I_B=50mA	*0.5	*1.2
2SC1518	25	20	5	1.5[6]	0.75	135	25	0.1	2	*0.5	65	160	330	2	*1.0	50	100	I_B=50mA	*0.5	*1.2
2SC1550	250	250	5	0.1	10[4]	150	250	100	50	*0.005	50		250	10	*0.03	30		10	*0.03	1.2
2SC1565	150	150	5	0.5[6]	10[9]	150	60	30	10	*0.1	60		240	10	*0.01	50		10	*0.01	0.8
2SC1566△	250	250	5	0.15[6]	4[4]	150			20	*0.04	40			50	*0.005	30		20	*0.04	1.2
2SC1567	100	100	5	1[6]	5[5]	150			10	*0.15	65	160	330	5	*0.5	50	100	I_B=50mA	*0.5	*1.2
2SC1568	18	18	5	2[6]	4[4]	150	18	0.1	2	*0.5	90	200	450	2	*1.5	50	100	I_B=50mA	*0.5	*1.2
2SD189	80	80	5	5	50[3]	150	80	5mA	4	*1	40		210	4	*4.0	20		4	*4.0	1.5
2SD189A	100	100	5	5	50[3]	150	100	5mA	4	*1	40		210	4	*4.0	20		4	*4.0	1.5
2SD198	300	#300[7]	6	1	25[3]	150	150	5mA	5	*0.1	35		330	5	*0.3	30		5	*0.1	1.5
2SD199	800	#700[8]	6	0.5[6]	25[3]	150	800	1mA	10	*0.02	25			10	*0.2	30				
2SD200	1500	*1500	5	2.5[6]	10[9]	115	1500	1mA	5	*2		2.5						I_B=1A	*2.0	*1.5
2SD200A	1500	*1500	5	2.5[6]	10[9]	115	1500	1mA	5	*2		2.5						I_B=1A	*2.0	*1.5
2SD226	40	40	8	3[6]	25[4]	150	20	30	3	*0.1	40			3	*1.0	20		3	*1.0	1.4
2SD226A	60	60	8	3[6]	25[4]	150	20	30	3	*0.1	40			3	*1.0	20		3	*1.0	1.4
2SD226B	80	80	8	3[6]	25[4]	150	20	30	3	*0.1	40			3	*1.0	30		3	*1.0	1.4
2SD246※	1500	*1500	5	4.5[6]	16[9]	115	1500	1mA	5	*4.0	2							I_B=2A	*4.5	*1.6
2SD299	1500	*1500	5	5[6]	16[9]	115	1500	1mA	5	*4.0	2							I_B=2A	*4.5	*1.6

1) R_{BE}=3KΩ 2) T_C=70°C 3) T_C=75°C 4) T_C=25°C 5) with cooling fin 6) I_{CM} 7) R_{BE}=500Ω 8) R_{BE}=220Ω



2SC901

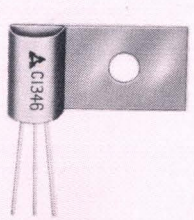
2SC1317



2SC1384

Bias		$V_{CE(sat)}$	Bias		f_T ※$f_{\alpha e}$		t_f			Use.	Drawing No.	Type No.
I_C (A)	I_B (A)	max. (V)	V_{CE} ※V_{CB} (V)	I_E ※I_C (A)	min. ※(KHz) (MHz)	typ. ※(KHz) (MHz)	Condition	typ. (μS)	max. (μS)			
2	1.0	1.6					I_C=5A, I_{B1}=0.8A, $-V_{BB}$=5V, R_B=0.5Ω	0.3	1.0	Hor. Out.	T-16	2SC901
2	1.0	1.6					I_C=5A, I_{B1}=0.8A, $-V_{BB}$=5V, R_B=0.5Ω	0.3	1.0	Hor. Out.	T-16	2SC901A
2	0.2	1.0	5	−0.5		150				AF Out.	T-30	2SC1226
2	0.2	1.0	5	−0.5		150				AF Out.	T-30	2SC1226A
0.5	0.05	0.6	10	−0.05		200				General	T-24	2SC1317
0.5	0.05	0.6	10	−0.05		200				General	T-24	2SC1318
0.5	0.05	0.6	10	−0.05		200				General	T-26	2SC1346
0.5	0.05	0.6	10	−0.05		200				General	T-26	2SC1347
0.5	0.05	0.4	※10	−0.05		200				General	T-25	2SC1383
0.5	0.05	0.4	※10	−0.05		200				General	T-25	2SC1384
2	0.2	1	5	※0.5		150				AF Out.	T-31	2SC1398
0.5	0.05	0.4	※10	−0.05		200				General	T-27	2SC1406
0.5	0.05	0.4	※10	−0.05		200				General	T-27	2SC1407
0.1	0.01	5	30	−0.02		55				AF Out.	T-32	2SC1446
1	0.1	1.0	※10	−0.1		15				Vert. Out.	T-21	2SC1450
0.1	0.01	5	30	−0.02		55				General	T-34	2SC1501
0.5	0.05	0.4	※10	0.05		120				AF Amp.	T-25	2SC1509
1	0.05	0.5	※10	−0.05		150				DC-DC Conv.	T-25	2SC1518
0.05	0.005	2	30	−0.02	70	100				Video Out.	T-34	2SC1550
0.25	0.025	10								AF Out.	T-34	2SC1565
0.1	0.01	1	※10	−0.01	80	100				Video Out.	T-35	2SC1566△
0.5	0.05	0.4	※10	−0.05		120				AF Amp.	T-35	2SC1567
1	0.05	0.5	※ 6	−0.05		150				AF Out.	T-35	2SC1568
5	1.0	2	10	−0.5		12				AF Out.	T-16	2SD189
5	1.0	2	10	−0.5		12				AF Out.	T-16	2SD189A
1	0.1	5	10	※0.1		25				AF Out.	T-16	2SD198
0.5	0.05	10	10	※0.1		7				Vert. Out.	T-16	2SD199
2	1.0	5					I_C=2.5A, I_{Bend}=1.1A, $-V_{BE}$=5V	0.7		Hor. Out.	T-17	2SD200
2	1.0	5					I_C=2.5A, I_{Bend}=1.1A, $-V_{BE}$=5V	0.7		Hor. Out.	T-17	2SD200A
2	0.4	1	10	※0.2		※※25				AF Out.	T-21	2SD226
2	0.4	1	10	※0.2		※※25				AF Out.	T-21	2SD226A
2	0.4	1	10	※0.2		※※25				AF Out.	T-21	2SD226B
4.5	2.0	10					I_C=4A, I_{Bend}=2.5A, R_B=0.5Ω, L_B=10μH		1.0	Hor. Out.	T-17	2SD246※
4.5	2.0	10					I_C=4A, I_{Bend}=2.5A, R_B=0.5Ω, L_B=10μH		1.0	Hor. Out.	T-17	2SD299

9) T_C=90°C 10) T_C=80°C 11) R_{BE}=5KΩ



2SC1346

2SC1518

2SD198

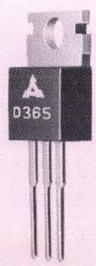
Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)												
	V_{CBO}	V_{CEO} *V_{CES} #V_{CER}	V_{EBO}	I_C	P_C	T_j	Bias V_{CB} *V_{CE}	I_{CBO} max.	Bias V_{CE} *V_{CB}	h_{FE} I_E *I_C	min.	typ	max.	Bias V_{CE} *V_{CB}	h_{FE} I_E *I_C	min.	typ.	Bias V_{CE} *V_{CB}	V_{BE} *$V_{BE(sat)}$ I_E *I_C	max.
	(V)	(V)	(V)	(A)	(W)	(℃)	(V)	(μA)	(V)	(A)				(V)	(A)			(V)	(A)	(A)
2SD300	1500	*1500	5	5[6]	16[9]	115	1500	1mA	10	*2.5	3		8					I_B=2A	*4.5	*1.6
2SD312	800	#600[11]	6	1.0[6]	25[10]	150	800	1mA	10	*0.02	25			10	*0.6	30				
2SD317	60	60	8	3	25[4]	150	20	30	3	*0.1	40			3	*1	30	60	3	*1.0	1.4
2SD317A	80	80	8	3	25[4]	150	20	30	3	*0.1	40			3	*1	30	60	3	*1.0	1.4
2SD318	60	60	8	3	25[4]	150	20	30	3	*0.1	40			3	*1	30	60	3	*1.0	1.4
2SD318A	80	80	8	3	25[4]	150	20	30	3	*0.1	40			3	*1	30	60	3	*1.0	1.4
2SD319	110	80	7	30[6]	100[4]	150	40	30	4	*1	40		200	4	*5	20		4	*5.0	2.0
2SD321	250	*250	6	15[6]	60[3]	150	250	2mA	5	*5	25		100					I_B=1A	*5.0	*2.0
2SD324	300	#300[1]	3	0.15[6]	10[2]	150	300	100	10	*10mA	30			10	*0.05	50		10	*0.05	1.2
2SD334	110	80	7	6	75[4]	150	110	1mA	4	*1	40		260					4	*1.0	2.5
2SD350	1500	700	5	11[6]	22[9]	115	1500	1mA	10	*4	3		8					I_B=2A	*4.5	*1.6
2SD365	60	60	5	3	25[4]	150	20	30	3	*0.1	40			3	1	30	60	3	1	1.4
2SD365A	80	80	5	3	25[4]	150	20	30	3	*0.1	40			3	1	30	60	3	1	1.4
2SD366	60	60	5	3	25[4]	150	20	30	3	*0.1	40			3	1	30	60	3	1	1.4
2SD366A	80	80	5	3	25[4]	150	20	30	3	*0.1	40			3	1	30	60	3	1	1.4
2SD379	80	80	5	7[6]	60[3]	150	50	1mA	4	*1	30		180	4	*4	30		4	*4.0	1.5
2SD380	1500	700	5	13[6]	50[3]	130	1500	1mA	10	*5	5		15					I_B=1A	*5.0	*1.6
2SD389	60	60	8	3	25[4]	150	20	30	3	*1	30		160	3	*0.1	40		3	1	1.2
2SD389A	80	80	8	3	25[4]	150	20	30	3	*1	30		160	3	*0.1	40		3	1	1.2
2SD390	60	60	8	3	25[4]	150	20	30	3	*1	30		160	3	*0.1	40		3	1	1.2
2SD390A	80	80	8	3	25[4]	150	20	30	3	*1	30		160	3	*0.1	40		3	1	1.2
2SD418△	1000	500	5	10[6]	80[4]	150	*1000	1mA	5	*5	6.5		30					I_B=2.5A	*7.5	*3.0

1) R_{BE}=3KΩ 2) T_C=70℃ 3) T_C=75℃ 4) T_C=25℃ 5) With cooling fin 6) I_{CM} 7) R_{BE}=500Ω 8) R_{BE}=220Ω

(SILICON JUNCTION FET)

Type No.	Absolute Maximum Ratings (Ta=25℃)									I_{DS}	
	V_{DSO}	V_{DGO}	I_{DSO}	I_{DGO}	I_{GSO}	T_{opr} *P_T	T_{stg}	Bias V_{DS}	V_{GS}	R_L	max.
	(V)	(V)	(mA)	(mA)	(mA)	(℃)	(℃)	(V)	(V)	(KΩ)	(mA)
2SK50	10	10	2	2	2	−10～+70	−20～+80	4.5	0	2.2±1%	1.0
2SK56△	10	10	10		10	*100mW	−55～+125	5	0		10

2SD312



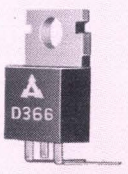
2SD365

2SD334

Bias		$V_{CE(sat)}$	Bias		f_T ※$f_{\alpha e}$		t_f			Use.	Drawing No.	Type No.
I_C (A)	I_B (A)	max. (V)	V_{CE} (V)	I_E *I_C (A)	min. *(KHz) (MHz)	typ. *(KHz) (MHz)	Condition	typ. (μS)	max. (μS)			
2.5	0.85	10					I_C=4A, I_{Bend}=2.5A, R_B=0.5Ω, L_B=10μH		1.0	Hor. Out.	T-17	2SD300
1	0.1	10	10	*0.1		5				Vert. Out.	T-17	2SD312
2	0.4	1	10	*0.2		※*25				AF Out.	T-32	2SD317
2	0.4	1	10	*0.2		※*25				AF Out.	T-32	2SD317A
2	0.4	1	10	*0.2		※*25				AF Out.	T-33	2SD318
2	0.4	1	10	*0.2		※*25				AF Out.	T-33	2SD318A
5	0.5	2	10	*0.5		1				AF Out.	T-18	2SD319
5	1.0	1					I_C=5A, I_{Bend}=0.8A, R_B=0.5Ω, $-V_{BB}$=5V		1.0	Switching	T-16	2SD321
0.1	0.01	10								AF Out.	T-21	2SD324
5	0.5	2	10	*0.5		※*25				AF Out.	T-16	2SD334
4.5	2	7					I_C=4A, I_{Bend}=2.5A, L_B=10μH		1.0	Switching	T-19	2SD350
2	0.4	1.0	10	*0.2		※*70				AF Out.	T-32	2SD365
2	0.4	1.0	10	*0.2		※*70				AF Out.	T-32	2SD365A
2	0.4	1.0	10	*0.2		※*70				AF Out.	T-33	2SD366
2	0.4	1.0	10	*0.2		※*70				AF Out.	T-33	2SD366A
5	0.5	1.5	10	*0.5		10				AF Out.	T-19	2SD379
5	1	10					I_C=5A, I_{Bend}=1.5A, L_B=5μH		0.9	Switching	T-19	2SD380
2	0.4	1	10	*0.2		※*25				AF Out.	T-32	2SD389
2	0.4	1	10	*0.2		※*25				AF Out.	T-32	2SD389A
2	0.4	1	10	*0.2		※*25				AF Out.	T-33	2SD390
2	0.4	1	10	*0.2		※*25				AF Out.	T-33	2SD390A
4	1	1.0					I_C=5A, I_{B1}=1A, $-I_{B2}$=1A	1.5		Switching	T-19	2SD418△

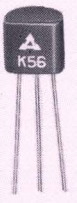
9) T_C=90℃ 10) T_C=100℃ 11) R_{BE}=560Ω

Electrical Characteristics (Ta=25℃)									Structure	Drawing No.	Type No.
Bias			gm		Bias			NV *NF			
V_{DS} (V)	V_{GS} (V)	f (KHz)	R_L (KΩ)	min. (μ℧)	V_{DS} (V)	C_O *I_{DS} (pF)	R_L *f (KΩ)	max. (μV)			
4.5	0	1	2.2±1%	350	4.5	7.0	2.2±1%	4	N-channel	T-24	2SK50
5.0	0	1000		4000	5	*1mA	*100MHz	*4.5dB	N-channel	T-24	2SK56△



2SD366

2SD380



2SK56

(SILICON MOS FET)

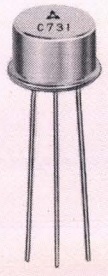
Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)																
							Bias			I_{DSS}		Bias			V_{G1SC}	Bias			V_{G2SC}			Bias I_{G1SS}		
	V_{DS}	V_{G1S}	V_{G2S}	I_D	P_T	T_{Ch}	V_{DS}	V_{G1S}	V_{G2S}	min.	max.	V_{DS}	V_{G2S}	I_D	max.	V_{DS}	V_{G1S}	I_D	max.	V_{G1S}	V_{DS} V_{G2S}	max.
	(V)	(V)	(V)	(mA)	(mW)	(℃)	(V)	(V)	(V)	(mA)	(mA)	(V)	(V)	(μA)	(V)	(V)	(V)	(μA)	(V)	(V)	(V)	(pA)
3SK32※	20	−10~+8	−10~+8	15	170	125	10	0	5	0	5	10	5	50	−2.5	10	0	50	−2.5	−10	0	100
3SK39	20	±8	±8	24	250	150	10	0	5	1	24	10	5	50	−3.0	10	0	50	−3.0	±8	0	20nA
3SK49△	20	±8	±8	30	350	150	10	0	5	3	30	10	5	50	−3.0	10	0	50	−3.0	±8	0	20nA

(SILICON TRANSISTORS : TRANSMITTING)

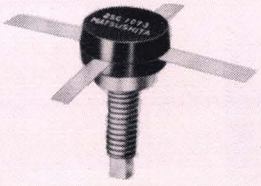
Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)								
							Bias	I_{CBO}	Bias	h_{FE}			Bias f_T		
	V_{CBO}	V_{CEO} *V_{CES}	V_{EBO}	I_C	P_C	T_j	V_{CB} *V_{CE}	max.	V_{CE} *V_{CB}	I_E *I_C	min.	typ.	V_{CE}	I_E	min. *typ.
	(V)	(V)	(V)	(A)	(W)	(℃)	(V)	(μA)	(V)	(A)			(V)	(A)	(MHz)
2SC456	50	*50	1.5	0.6[1]	0.75	175	12	1	6	−0.08		12			
2SC478	50	*50	1.5	0.12[1]	0.3	175	12	1	12	−0.02	10	20	12	−0.02	100
2SC571※	36	18	4.0	1.5[1]	6[2]	175	20	5	13.5	*0.1		70	13.5	−0.1	250
2SC572※	36	18	4.0	3.0[1]	10[2]	175	20	5	13.5	*0.2		80	13.5	−0.15	250
2SC573※	36	18	4.0	4.0[1]	20[2]	175	20	10	13.5	*0.4		80	13.5	−0.3	250
2SC585※	65	40	4.0	3.0[1]	20[2]	175	30	12	*28	−0.2		80	28	−0.15	250
2SC731	40	20	4.0	1.0[1]	2.5[2]	175	20	1	13.5	*0.1	20		10	−0.03	*700
2SC821	40	20	4.0	0.6[1]	2.5[2]	175	20	1	13.5	*0.1	20		10	−0.03	350
2SC822	40	20	4.0	0.8[1]	2.5[2]	175	20	1	13.5	*0.1	20		10	−0.03	400
2SC1073	36	18	4.0	1.5[1]	2[2]	175	20	5	13.5	*0.1	20	70	13.5	−0.1	*1000
2SC1074	36	18	4.0	2.0[1]	10[2]	175	20	5	13.5	*0.2	15	50	13.5	−0.15	*700
2SC1075	36	18	4.0	4.0[1]	20[2]	175	20	10	13.5	*0.4	15	60	13.5	−0.3	*800
2SC1076	36	18	4.0	6.0[1]	30[2]	175	20	30	13.5	*0.6	15	50	13.5	−0.5	*800
2SC1190	36	18	4.0	5.0[1]	30[2]	175	20	100	13.5	*0.4	10	50	10	−0.3	*600
2SC1191	36	18	4.0	7.0[1]	45[2]	175	20	500	13.5	*0.8	10	50			
2SC1192	36	18	4.0	10[1]	60[2]	175	20	1mA	13.5	*1.0	10	60	10	−1	*350
2SC1303	40	20	4.0	0.5[1]	0.6[2]	175	20	1.0	13.5	*0.1	20	70	10	−0.03	350
2SC1326	55	30		0.4[1]	5[2]	175	*28	20	5	*0.05		30	15	−0.025	*700
2SC1354	55	35	4.0	10[1]	60[2]	175	20	1mA	13.5	*1.0	10	50			
2SC1405	36	18	4.0	1.5[1]	10[2]	175	20	50	10	*0.1		40			
2SC1620	36	18	3.0	1.2[1]	10[2]	175	15	100	13.5	*0.1	10	50			

1) I_{CM} 2) T_C=25°C

3SK49



2SC731

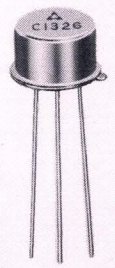


2SC1073

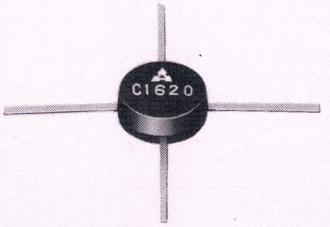
Bias	I_{G2SS}		Bias		$\|y_{fs}\|$				Bias	C_{rss}			Bias	G_{PS}					Structure	Drawing No.	Type No.
V_{G2S} (V)	V_{DS} V_{G1S} (V)	max. (pA)	V_{DS} (V)	V_{G2S} (V)	I_{DS} (mA)	f (KHz)	min. (m℧)	max. *typ. (m℧)	V_{DS} (V)	V_{G1S} V_{G2S} (V)	f (KHz)	typ. (mpF)	V_{DS} (V)	I_D (mA)	V_{G2S} (V)	f (MHz)	min. (dB)	typ. (dB)			
−10	0	100	10	5	5	455	5	10	10	−10	455	35	10	8	5	200	15	25	N channel	T-8	3SK32※
± 8	0	20nA	10	5	5	455	7	18	10	− 8	455	10	10	8	5	200	18		N channel	T-8	3SK39
± 8	0	20nA	10	5	5	455		*15	10	− 8	455	10	15		7	200	17	19.5	N Channel	T-8	3SK49△

Bias	C_{ob}		Bias	$r_{bb'}$			Condition			Po	η	Use	Drawing No.	Type No.
V_{CE} (V)	I_E (mA)	max. *typ. (pF)	V_{CE} (V)	I_E (A)	typ. (Ω)	max. (Ω)	fop (MHz)	V_{CC} (V)	Pin (W)	min. (W)	min. *typ. (%)			
12	− 1	15					27	12		0.5	45	HF Out.	T-12	2SC456
12	− 1	8					27	12		0.1	49	HF Out.	T-9	2SC478
13.5	0	15					175	13.5	0.125	1.0	60	VHF Out.	T-12	2SC571※
13.5	0	35	13.5	−0.15	5	15	175	13.5	1.0	4.0	70	VHF Out.	T-23	2SC572※
13.5	0	35	13.5	−0.3	4.5	15	175	13.5	4.0	12.0	80	VHF Out.	T-23	2SC573※
30	0	20	28	−0.25	6.5	15						VHF Out.	T-22	2SC585※
10	0	10					500	13.5	0.3	1.0	*60	UHF Out.	T-13	2SC731
10	0	10	10	−0.03	15	50	175	15	0.25	1.0		VHF Out.	T-13	2SC821
10	0	10	10	−0.03	15	50	175	15	0.5	1.7		VHF Out.	T-13	2SC822
13.5	0	10					500	13.5	0.4	1.6	*60	UHF Out.	T-28	2SC1073
13.5	0	25					500	13.5	1.0	3.2	*60	UHF Out.	T-28	2SC1074
13.5	0	25					500	13.5	3.0	7.0	*60	UHF Out.	T-28	2SC1075
13.5	0	30					500	13.5	6	14	*60	UHF Out.	T-28	2SC1076
13.5	0	* 17					175	13.5	4.0	15	*60	VHF Out.	T-28	2SC1190
10	0	* 50					175	13.5	8.0	25	*60	VHF Out.	T-29	2SC1191
10	0	*100					175	13.5	14	35	*60	VHF Out.	T-29	2SC1192
10	0	10	10	−0.03	15	50	175	15	0.05	0.5		VHF Out.	T-12	2SC1303
30	0	3					400	28	0.1	1.0	45	UHF Out.	T-12	2SC1326
							175	24	8.0	35	50	VHF Out.	T-29	2SC1354
							175	13.5	0.35	3.0	*60	VHF Out.	T-36	2SC1405
							500	13.5	0.6	2.2	*60	UHF Out.	T-36	2SC1620

2SC1192



2SC1326



2SC1620

(Ⓩ-SERIES TRANSISTORS FOR THE COMMUNICATIONS INDUSTRY)

Ⓩ—Series Silicon transistors are high reliability types assembled with specially selected materials in specially controlled process to provide optimum reliability for the communications industry.

The inspections and the quality control are performed in accordance with the U.S military standard MIL-S-19500E, MIL-STD-750B and MIL-STD-202D.

(Metal type)

Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)																	
	V_{CBO}	V_{CEO} *V_{CER}	V_{EBO}	I_C	P_C	Tj	Bias I_{CBO}		Bias I_{CEO} *I_{EBO}		Bias h_{FE}					Bias V_{BE}				Bias $V_{CE(Sat)}$			
							V_{CB}	max.	V_{CE} *V_{EB}	max.	V_{CE}	I_C	min.	typ.	max.	V_{CB} *V_{CE}	I_C	typ.	max.	I_C	I_B	typ.	max.
	(V)	(V)	(V)	(mA)	(mW)	(℃)	(V)	(μA)	(V)	(μA)	(V)	(mA)				(V)	(mA)	(V)	(V)	(mA)	(mA)	(V)	(V)
2SA546Ⓩ	−70	−60	−5	-3A[1]	1.2W[2]	175	−30	−0.1	−60	−50	−3	−100	38		115	*−3	-100		−0.8	−1A	−100		−0.8
2SA546AⓏ	−90	−80	−5	-3A[1]	1.2W[2]	175	−30	−0.1	−80	−50	−3	−100	38		115	*−3	-100		−0.8	−1A	−100		−0.8
2SA547Ⓩ	−70	−60	−5	-3A[1]	10W[3]	175	−30	−0.1	−60	−50	−3	−100	38		115	*−3	-100		−0.8	−1A	−100		−0.8
2SA550Ⓩ	−25	−25	−5	-100[1]	300	175	−10	−0.1	−25	−10	−5	2	130		520					−50	−2.5	−0.3	
2SA550AⓏ	−45	−45	−5	-100[1]	300	175	−10	−0.1	−45	−10	−5	2	130		520					−50	−2.5	−0.3	
2SC538Ⓩ	25	25	5	100[1]	300	175	10	0.1	25	10	5	−2	130	250	520					100	10	0.21	0.32
2SC538AⓏ	45	45	5	100[1]	300	175	10	0.1	45	10	5	−2	130	250	520					100	10	0.21	0.32
2SC562Ⓩ	40	30	4	25	130	175	10	0.1	30	10	10	4	26			*2	10		0.95	10	1	1.5	
2SC563Ⓩ	40	25	4	25	145	175	10	0.1	25	10	10	7	38			*10	7	0.9		10	1	0.15	
2SC563AⓏ	40	40	4	25	300[2]	175	10	0.1	40	10	10	7	38			*10	7	0.9		10	1	0.15	
2SC583Ⓩ	30	15	2.5	50[1]	200	175	10	0.1	15	10	1	2	25		150								
2SC645Ⓩ	30	25	5	30	140	175	10	0.1	25	10	10	1	70		250					10	1		0.1
2SC696Ⓩ	100	60	5	3A[1]	1.2W[2]	175	30	0.1	60	50	3	100	38		115	3	100		0.8	2A	400		0.8
2SC696AⓏ	130	80	5	3A[1]	1.2W[2]	175	30	0.1	80	50	3	100	38		115	3	100		0.8	2A	400		0.8
2SC697Ⓩ	100	60	5	3A[1]	10W[3]	175	30	0.1	60	50	3	100	38		115	3	100		0.8	2A	400		0.8
2SC697AⓏ	130	80	5	3A[1]	10W[3]	175	30	0.1	80	50	3	100	38		115	*3	100		0.8	2A	400		0.8
2SC761Ⓩ	30	20	3	20	150	175	10	0.1	20	10	10	2	40			*7	12	0.75	1.0	10	1	3	
2SC762Ⓩ	30	20	3	20	150	175	10	0.1	20	10	10	2	75			*7	12	0.75	1.0	10	1	3	
2SC947Ⓩ	25	20	3	15	150	175	10	0.1	25	10	10	2	10	20		*10	2	0.77		10	1	0.6	
2SC948Ⓩ	25	20	3	15	150	175	10	0.1	25	10	10	3	10	25		*10	3	0.77		10	1	0.6	
2SC1012Ⓩ	165	165	5	60	2.5W[3]	175	12	0.2	165	50	20	40	20			*20	40		1.2	10	2		1.0
2SC1012AⓏ	250	250	5	60	2.5W[3]	175	12	0.2	250	50	20	40	20			*20	40		1.2	60	10		10.0
2SC1033Ⓩ	200	150	5	25	300	175	12	0.2	150	50	10	5	30							5	1		1.0
2SC1033AⓏ	250	200	5	25	300	175	12	0.2	200	50	10	5	20							5	1		1.0
2SC1547Ⓩ△	30	20	3	20	150	175	25	0.1	20	10	10	3	20										
2SD198Ⓩ	300	*300[7]	6	1A	25W[4]	150	300	500	150	1m	5	0.1	60		200	*5	100		1.5	1A	100		5
2SD226Ⓩ	40	40	8	3A[1]	25W[3]	150	20	3	*10	*30	3	1A	30		100	*3	1A		1.4	2A	400		1
2SD319Ⓩ	110	80	7	30A[1]	100W[3]	150	40	5	40	50	4	5A	30		50	*4	5A		2.0	5A	500		2
2SD334Ⓩ	110	80	7	6A	75W[3]	150	40	5	40	50	4	1A	70		150	*4	1A		2.5	5A	500		2

(Plastic type)

Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)																	
	V_{CBO}	V_{CEO} *V_{CER}	V_{EBO}	I_C	P_C	Tj	Bias I_{CBO}		Bias I_{CEO}		Bias h_{FE}					Bias V_{BE}				Bias $V_{CE(Sat)}$			
							V_{CB}	max.	V_{CE}	max.	V_{CE}	I_C	min.	typ.	max.	V_{CB}	I_E	typ.	max.	I_C	I_B	typ.	max.
	(V)	(V)	(V)	(mA)	(mW)	(℃)	(V)	(μA)	(V)	(μA)	(V)	(mA)				(V)	(mA)	(V)	(V)	(mA)	(mA)	(V)	(V)
2SA564Ⓩ	−25	−25	−5	−100[1]	250	125	−10	−0.1	−25	−10	−5	2	130	250	520					−100	−10	−0.21	−0.32
2SA564AⓏ	−45	−45	−5	−100[1]	250	125	−10	−0.1	−45	−10	−5	2	130	250	520					−100	−10	−0.21	−0.32
2SC828Ⓩ	30	25	5	100[1]	250	125	10	0.1	25	10	5	−2	130	250	520					100	10	0.21	0.32
2SC828AⓏ	45	45	5	100[1]	250	125	10	0.1	45	10	5	−2	130	250	520					100	10	0.21	0.32
2SC829Ⓩ	30	20	5	30	250	125	10	0.1	20	10	10	−1	70		250								
2SC1047Ⓩ	30	20	3	15	150	125	10	0.1	20	10	6	−1	65		260	6	−1	0.72					
2SC1215Ⓩ	30	20	3	50	200	125	10	0.1	20	10	10	−2	25			10	−2	0.72					

1) I_{CM} 2) With cooling fin 3) Tc=25℃ 4) Tc=75℃ 5) Rg=2KΩ 6) Rg=50Ω 7) R_{BE}=500Ω

Bias f_T				Bias NF					Bias C_{re}					Bias Z_{rb}				Bias P_G * $\lvert Y_{fe} \rvert$					Use.	Drawing No.	Type No.
V_{CB} *V_{CE} (V)	I_E *I_C (mA)	min. (MHz)	typ. *max. (MHz)	V_{CE} (V)	I_C (mA)	f (MHz)	typ. (dB)	max. (dB)	V_{CB} (V)	I_E (mA)	f (MHz)	typ. (pF)	max. (pF)	V_{CB} (V)	I_E (mA)	f (MHz)	max. (Ω)	V_{CB} (V)	I_E (mA)	f (MHz)	min. (dB) *(mU)	typ. (dB) *(mU)			
*-10	*-50		80																				General	T-12	2SA546Ⓩ
*-10	*-50		80																				General	T-12	2SA546AⓏ
*-10	*-50		80																				General	T-14	2SA547Ⓩ
*-10	*-1		120																				General	T-9	2SA550Ⓩ
*-10	*-1		120																				General	T-9	2SA550AⓏ
5	−2		180																				General	T-9	2SC538Ⓩ
5	−2		180																				General	T-9	2SC538AⓏ
10	−4	220	330						10	−1		0.15	0.22					10	−4		*70	*90	VIF (AGC)	T-7	2SC562Ⓩ
10	−5	360	550						10	−1		0.23	0.32					5	−7		*110	*140	VIF Amp.	T-7	2SC563Ⓩ
10	−5	360	550						10	−1		0.23	0.32					5	−7		*110	*140	VIF Amp.	T-7	2SC563AⓏ
5	−2	1000							5	−2			0.8										UHF Amp.	T-6	2SC583Ⓩ
10	−1	150	200						10	−1		0.65	1.2	10	−1	2	50						RF Amp.	T-10	2SC645Ⓩ
10	*50	35																					General	T-12	2SC696Ⓩ
10	*50	35																					General	T-12	2SC696AⓏ
10	*50	35																					General	T-14	2SC697Ⓩ
10	−50	35																					General	T-14	2SC697AⓏ
10	−2	450	*950						10	−1		0.35	0.4					10	−2			12	UHF Amp.	T-6	2SC761Ⓩ
10	−2	450	*770						10	−1		0.35	0.4					10	−2			11	VHF Amp.	T-6	2SC762Ⓩ
10	−3	400	650						10	−1		0.33						10	−2			11	UHF Mix.	T-6	2SC947Ⓩ
10	−3	700	800						10	−1		0.33						10	−3			13	UHF Osc.	T-6	2SC948Ⓩ
10	−10	80	100						20	−10			3.0										Video Out.	T-12	2SC1012Ⓩ
10	−10	80	100						20	−10			3.0										Video Out.	T-12	2SC1012AⓏ
10	−10		150																				Switching	T-9	2SC1033Ⓩ
10	−10		150																				Switching	T-9	2SC1033AⓏ
10	−3		900	*11		800	4	6	10	0		0.13						11		800	14	16	UHF Amp.	T-6	2SC1547Ⓩ△
*10	*100		25																				AF Out.	T-16	2SD198Ⓩ
*10	*200		△25K																				AF Out.	T-21	2SD226Ⓩ
*10	*500		1																				AF Out.	T-18	2SD319Ⓩ
*10	*500		△25K																				AF Out.	T-16	2SD334Ⓩ

Bias f_T				Bias NF					Bias C_{re}					Bias Z_{rb}				Bias P_G					Use.	Drawing No.	Type No.
V_{CB} *V_{CE} (V)	I_E *I_C (mA)	min. (MHz)	typ. (MHz)	V_{CE} *V_{CB} (V)	I_C *I_E (mA)	f (MHz)	typ. (dB)	max. (dB)	V_{CB} (V)	I_E (mA)	f (MHz)	typ. (pF)	max. (pF)	V_{CB} (V)	I_E (mA)	f (MHz)	max. (Ω)	V_{CB} (V.)	I_E (mA)	f (MHz)	min. (dB)	typ. (dB)			
−10	1		80	−5	−0.2	0.001	6 [5]																General	T-24	2SA564Ⓩ
−10	1		80	−5	−0.2	0.001	6 [5]																General	T-24	2SA564AⓏ
10	−2		220	5	0.2	0.001	6 [5]																General	T-24	2SC828Ⓩ
10	−2		220	5	0.2	0.001	6 [5]																General	T-24	2SC828AⓏ
10	−1	150	230											10	−1	2	60						RF Amp.	T-24	2SC829Ⓩ
6	−1	450	650	*6	*−1	100	3.3 [6]	5.0 [6]	6	−1	10.7	0.8	1.0					6	−1	100	20	24	RF Amp.	T-24	2SC1047Ⓩ
10	−10	650	1200						10	−1	10.7	1.0	1.5					10	−1	200		20	UHF Osc.	T-24	2SC1215Ⓩ

(Metal type : Transmitting)

Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)								
							Bias	I_{CBO} *I_{CEO}	Bias		h_{FE}		Bias	f_T	
	V_{CBO} (V)	V_{CEO} *V_{CES} (V)	V_{EBO} (V)	I_C (A)	P_C (W)	T_j (℃)	V_{CB} *V_{CE} (V)	max. (μA)	V_{CE} *V_{CB} (V)	I_E *I_C (A)	min.	typ.	V_{CE} (V)	I_E (A)	min. *typ. (MHz)
2SC731Ⓩ	40	20	4.0	1.0 1)	2.5 3)	175	20	1	13.5	*0.1	20	70	10	−0.03	*700
2SC821Ⓩ	40	20	4.0	0.6 1)	2.5 3)	175	20	1	13.5	*0.1	20	70	10	−0.03	350
2SC822Ⓩ	40	20	4.0	0.8 1)	2.5 3)	175	20	1	13.5	*0.1	20	70	10	−0.03	400
2SC1303Ⓩ	40	20	4.0	0.5 1)	0.6 3)	175	20	1	13.5	*0.1	20	70	10	−0.03	350
2SC1326Ⓩ	55	30		0.4 1)	5 3)	175	*28	20	5	*0.05		30	15	−0.025	*700

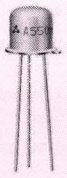
(Plastic type : Transmitting)

Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)								
							Bias	I_{CBO} *I_{CEO}	Bias		h_{FE}		Bias	f_T	
	V_{CBO} (V)	V_{CEO} *V_{CES} (V)	V_{EBO} (V)	I_C (A)	P_C (W)	T_j (℃)	V_{CB} *V_{CE} (V)	max. (μA)	V_{CE} *V_{CB} (V)	I_E *I_C (A)	min	typ.	V_{CE} (V)	I_E (A)	min. *typ. (MHz)
2SC1073Ⓩ	36	18	4.0	1.5 1)	2 3)	175	20	5	13.5	*0.1	20	70	13.5	−0.1	*1000
2SC1074Ⓩ	36	18	4.0	2.0 1)	10 3)	175	20	5	13.5	*0.2	15	50	13.5	−0.15	* 700
2SC1075Ⓩ	36	18	4.0	4.0 1)	20 3)	175	20	10	13.5	*0.4	15	60	13.5	−0.3	* 800
2SC1076Ⓩ	36	18	4.0	6.0 1)	30 3)	175	20	30	13.5	*0.6	15	50	13.5	−0.5	* 800
2SC1190Ⓩ	36	18	4.0	5.0 1)	30 3)	175	20	100	13.5	*0.4	10	50	10	−0.3	* 600
2SC1191Ⓩ	36	18	4.0	7.0 1)	45 3)	175	20	500	13.5	*0.8	10	50			
2SC1192Ⓩ	36	18	4.0	10 1)	60 3)	175	20	1mA	13.5	*1.0	10	60	10	−1	* 350
2SC1354Ⓩ	55	35	4.0	10 1)	60 3)	175	20	1.0	13.5	*1.0	10	50			
2SC1405Ⓩ	36	18	4.0	1.5 1)	10 3)	175	20	50	10	*0.1		40			
2SC1620Ⓩ	36	18	3.0	1.2 1)	10 3)	175	15	100	13.5	*0.1	10	50			

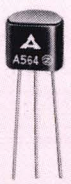
(Metal type : MOS FET)

Type No.	Absolute Maximum Ratings (Ta=25℃)						Electrical Characteristics (Ta=25℃)														
							Bias		I_{DSS}			Bias			V_{G1SC}		Bias			V_{G2SC}		Bias	I_{G1SS}		
	V_{DS} (V)	V_{G1S} (V)	V_{G2S} (V)	I_D (mA)	P_T (mW)	T_{Ch} (℃)	V_{DS} (V)	V_{G1S} (V)	V_{G2S} (V)	min. (mA)	max. (mA)	V_{DS} (V)	V_{G2S} (V)	I_D (μA)	max. (V)	V_{DS} (V)	V_{G1S} (V)	I_D (μA)	max (V)	V_{G1S} (V)	V_{DS} V_{G2S} (V)	max. (nA)
3SK39Ⓩ	20	±8	±8	24	250	−55~150	10	0	5	1	24	10	5	50	−3	10	0	50	−3	±8	0	20
3SK49Ⓩ△	20	±8	±8	30	350	−55~150	10	0	5	3	30	10	5	50	−3	10	0	50	−3	±8	0	20

1) I_{CM} 2) With cooling fin 3) T_C=25℃ 4) T_C=75℃ 5) Rg=2KΩ 6) Rg=50Ω



2SA550Ⓩ



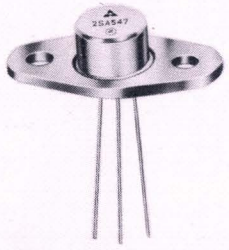
2SA564Ⓩ

2SA546Ⓩ

Bias		C_{ob}	Bias		r_{bb}		Condition			P_O	η	Use.	Drawing No.	Type No.
V_{CE} (V)	I_E (mA)	max. *typ. (pF)	V_{CE} (V)	I_E (A)	typ. (Ω)	max. (Ω)	f_{OP} (MHz)	V_{CC} (V)	Pin (W)	min. (W)	min. *typ. (%)			
10	0	10					500	13.5	0.3	1.0	*60	UHF Out.	T-13	2SC731Ⓩ
10	0	10	10	−0.03	15	50	175	15	0.25	1.0		VHF Out.	T-13	2SC821Ⓩ
10	0	10	10	−0.03	15	50	175	15	0.5	1.7		VHF Out.	T-13	2SC822Ⓩ
10	0	10	10	−0.03	15	50	175	15	0.05	0.5		VHF Out.	T-12	2SC1303Ⓩ
30	0	3					400	28	0.1	1.0	45	UHF Out.	T-12	2SC1326Ⓩ

Bias		C_{ob}	Bias		$r_{bb'}$		Condition			P_O	η	Use.	Drawing No.	Type No.
V_{CE} (V)	I_E (mA)	max. *typ. (pF)	V_{CE} (V)	I_E (mA)	typ. (Ω)	max. (Ω)	f_{OP} (MHz)	V_{CC} (V)	Pin (W)	min. (W)	min. *typ. (%)			
13.5	0	10					500	13.5	0.4	1.6	*60	UHF Out.	T-28	2SC1073Ⓩ
13.5	0	25					500	13.5	1.0	3.2	*60	UHF Out.	T-28	2SC1074Ⓩ
13.5	0	25					500	13.5	3.0	7.0	*60	UHF Out.	T-28	2SC1075Ⓩ
13.5	0	30					500	13.5	6.0	14.0	*60	UHF Out.	T-28	2SC1076Ⓩ
13.5	0	* 17					175	13.5	4.0	15.0	*60	VHF Out.	T-28	2SC1190Ⓩ
10	0	* 50					175	13.5	8.0	25.0	*60	VHF Out.	T-29	2SC1191Ⓩ
10	0	*100					175	13.5	14.0	35.0	*60	VHF Out.	T-29	2SC1192Ⓩ
							175	24	8.0	35.0	50	VHF Out.	T-29	2SC1354Ⓩ
							175	13.5	0.35	3.0	*60	VHF Out.	T-36	2SC1405Ⓩ
							500	13.5	0.6	2.2	*60	UHF Out.	T-36	2SC1620Ⓩ

Bias		I_{G2SS}	Bias			$\lvert y_{fs} \rvert$			Bias	C_{rss}			Bias			P_G			Structure	Drawing No.	Type No.
V_{G2S} (V)	V_{DS} V_{G1S} (V)	max. (nA)	V_{DS} (V)	V_{G2S} (V)	I_D (mA)	f (KHz)	min. (m℧)	max. *typ. (m℧)	V_{DS} (V)	V_{G1S} V_{G2S} (V)	f (KHz)	typ. (mpF)	V_{DS} (V)	I_D (mA)	V_{G2S} (V)	f (MHz)	min. (dB)	typ. (dB)			
±8	0	20	10	5	5	455	7	18	10	−8	455	10	10	8	5	200	18		N channel	T-8	3SK39Ⓩ
±8	0	20	10	5	5	455		*15	10	−8	455	10	15	8	7	200	17	19.5	N channel	T-8	3SK49ⓏΔ



2SA547Ⓩ

2SC538Ⓩ

3SK49Ⓩ

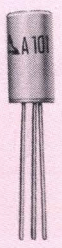
(GERMANIUM TRANSISTORS : H.F. AMPLIFICATION)

Type No.	Absolute Maximum Ratings (Ta=25℃)					Electrical Characteristics (Ta=25℃)									
						Bias	I_{CBO}	Bias	h_{fe}			Bias	$f_{\alpha b}$		
	V_{CBO}	V_{EBO}	I_C	P_C	T_j	V_{CB}	max.	V_{CB}	I_E	min.	typ.	V_{CB}	I_E	min.	typ.
	(V)	(V)	(mA)	(mW)	(℃)	(V)	(μA)	(V)	(mA)			(V)	(mA)	(MHz)	(MHz)
2SA100	−40	−0.7	−10	60	75	−10	−16	− 6	1	80		− 6	1	10	
2SA101	−40	−0.7	−10	60	75	−10	−16	− 6	1	12					
2SA102	−40	−0.7	−10	60	75	−10	−16	− 6	1	12	40	− 6	1	20	25
2SA103	−40	−0.7	−10	60	75	−10	−16	− 6	1	25	50	− 6	1	30	35
2SA104	−40	−0.7	−10	60	75	−10	−16	− 6	1	30	100	− 6	1	40	50
2SA341※	−20	−0.5	−10	63	75	− 6	−13	− 6	1	40					
2SA342	−20	−0.5	−10	63	75	− 6	−13								

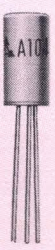
(GERMANIUM TRANSISTORS : L.F. AMPLIFICATION)

Type No.	Absolute Maximum Ratings (Ta=25℃)					Electrical Characteristics (Ta=25℃)					
						Bias	I_{CBO}	Bias	h_{fe}		
	V_{CBO}	V_{EBO}	I_C	P_C	T_j	V_{CB}	max.	V_{CB}	I_E	min.	typ.
	(V)	(V)	(mA)	(mW)	(℃)	(V)	(μA)	(V)	(mA)		
2SB170※	−30		−100	125	85	−10	−12	− 6	1	20	30
2SB171	−30		−100	125	85	−10	−12	− 6	1	40	60
2SB173	−30		−100	125	85	−10	−12	− 6	1	40	100
2SB175	−30		−100	125	85	−10	−12	− 6	1	55	100
2SB345	−32	−10	−100	500[1]	85	−10	−10	− 5	2	65	90
2SB346	−32	−10	−100	500[1]	85	−10	−10	− 5	2	80	120
2SB347	−32	−10	−100	500[1]	85	−10	−10	− 5	2	65	90
2SB348	−32	−10	−100	500[1]	85	−10	−10	− 5	2	80	120

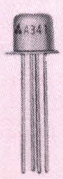
1) with cooling fin 12.5㎠ 2) Rg=500Ω 3) Rg=2KΩ



2SA101



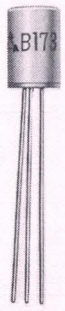
2SA104



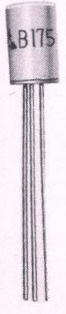
2SA341

Bias		rbb	Bias		Cob	Condition			PG				Use	Drawing No.	Type No.
V_{CB} (V)	I_E (mA)	max. (Ω)	V_{CB} (V)	I_E (mA)	max. (pF)	V_{CB} (V)	I_E (mA)	f (MHz)	Grounded Configuration	min. (dB)	typ. (dB)	max. (dB)			
−6	1	180											RF Amp.	T-5	2SA100
			−6	1	5	−6	1	0.455	E	21	24	29	IF Amp.	T-5	2SA101
−6	1	30	−6	1	5								MW Conv.	T-5	2SA102
−6	1	30	−6	1	5								RF IF Amp.	T-5	2SA103
−6	1	30	−6	1	5								RF IF Amp.	T-5	2SA104
													RF Amp.	T-6	2SA341※
						−6	1	100		10		20	RF Amp.	T-6	2SA342

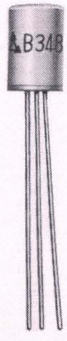
max.	Bias		$f_{\alpha e}$	Bias		NF		Use	Drawing No.	Type No.
	V_{CB} (V)	I_E (mA)	min. (KHz)	V_{CB} (V)	I_E (mA)	f (KHz)	max. (dB)			
40				−2	0.5	1	16	AF Amp.	T-2	2SB170※
85				−2	0.5	1	16	AF Amp.	T-2	2SB171
220				−2	0.5	1	6	Low noise	T-2	2SB173
360				−2	0.5	1	16	AF Amp.	T-2	2SB175
180	−2	10	10	−5	0.5	1	10 [2]	AF Amp.	T-3	2SB345
270	−2	10	10	−10	0.5	1	10 [2]	AF Amp.	T-3	2SB346
180	−2	10	10	−10	0.5	0.1	15 [3]	Low noise	T-3	2SB347
270	−2	10	10	−10	0.5	0.1	15 [3]	Low noise	T-3	2SB348



2SB173



2SB175



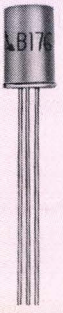
2SB348

(GERMANIUM TRANSISTORS : L.F. POWER AMPLIFICATION)

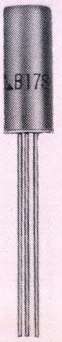
Type No.	Absolute Maximum Ratings (Ta=25℃)					Electrical Characteristics (Ta=25℃)			
						Bias	I_{CBO}	Bias	
	V_{CBO} (V)	V_{EBO} (V)	I_C (A)	P_C (W)	T_j (℃)	V_{CB} (V)	max. (μA)	V_{CB} (V)	I_E (A)
2SB126	−32	−10	−3.5	30[1]	90	−14	−220	−1	1
2SB126A	−60	−20	−3.5	30[1]	90	−14	−220	−1	1
2SB127	−32	−10	−3.5	30[1]	90	−14	−220	−1	1
2SB127A	−60	−20	−3.5	30[1]	90	−14	−220	−1	1
2SB128	−80	−40	−6.0	30[1]	90	−14	−220	−1	1
2SB128A	−120	−60	−6.0	30[1]	90	−14	−220	−1	1
2SB172	−32	−10	−0.3[4]	0.125	85	−10	−12	−1	I_B=−2mA
2SB176	−32	−10	−0.3[4]	0.125	85	−10	−12	−1	I_B=−2mA
2SB177※	−60	−10	−0.3[4]	0.125	85	−10	−12	−1	I_B=−2mA
2SB178	−20	−6	−0.5[4]	0.55[2]	85	−12	−20	0	0.05
2SB178A	−40	−6	−0.5[4]	0.55[2]	85	−12	−20	0	0.05
2SB324	−32	−10	−1.0	0.65[2]	90	−10	−10	0	0.05
2SB371※	−32	−10	−0.2	0.5[2]	75	−10	−15	0	0.05
2SB449	−50	−20	−3.5	22.5[3]	100	−14	−3mA	0	1.0
2SB473	−32	−10	−1.5[4]	4.3[5]	90	−10	−15	0	0.05
2SB475	−25	−6	−0.5[4]	0.15	85	−12	−20	−0.5	0.15
2SB476	−20	−10	−2.0	6[5]	85	−20	−500	0	2.0
2SB481	−32	−10	−3.0[4]	6[5]	90			0	0.1
2SB493	−40	−14	−5.0[4]	9[5]	90	−40	−1 mA	0	3.0
2SB533	−20	−10	−2.0	6[5]	85	−20	−200	0	2.0
2SD352	32	10	1.0	0.65[2]	90	10	25	0	−0.05
2SD367※	25	6	0.5[4]	0.15	85	12	20	0.5	−0.15

1) $T_C \leqq 45$℃ 2) With cooling fin 12.5㎠ 3) $T_C \leqq 50$℃ 4) I_{CM} 5) $T_C \leqq 25$℃

2SB128

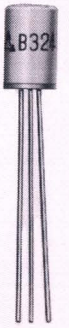


2SB176

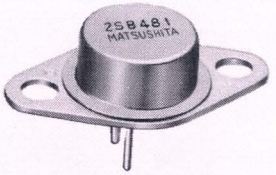


2SB178

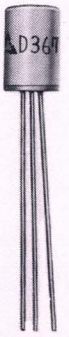
h_{FE}			Bias		h_{FE}		Bias		$f_{\alpha e}$ *f_T	Use.	Drawing No.	Type No.
min.	typ.	max.	V_{CB} (V)	I_E (A)	min.	typ.	V_{CE} *V_{CB} (V)	I_E (mA)	#typ. min. (KHz)			
20	35	55	−1	3	15	25	−6	1	#6	High Po.	T-16	2SB126
20	35	55	−1	3	15	25	−6	1	#6	High Po.	T-16	2SB126A
45	75	130	−1	3	34	55	−6	1	#6	High Po.	T-16	2SB127
45	75	130	−1	3	34	55	−6	1	#6	High Po.	T-16	2SB127A
20	40	55	−1	6	16	27				High Po.	T-16	2SB128
20	40	55	−1	6	16	27				High Po.	T-16	2SB128A
35	50	63								Low Po.	T-2	2SB172
57	90	140								Low Po.	T-2	2SB176
30	90	140								Low Po.	T-2	2SB177※
47		500	0	0.3	56					Medium Po.	T-4	2SB178
47		500	0	0.3	56					Medium Po.	T-4	2SB178A
50		295	0	0.3	53		−2	10	10	Medium Po.	T-3	2SB324
90		218	0	0.2	50		−2	10	10	Medium Po.	T-3	2SB371※
25	45	165	0	3.0	20	35	−2	500	7	High Po.	T-16	2SB449
40	80	305	0	0.5	51	80	−2	100	10	High Po.	T-20	2SB473
46		334								Medium Po.	T-3	2SB475
40	75						*−2	100	*300	DC Conv.	T-12	2SB476
35		170	0	1.0	36		−2	100	10	High Po.	T-20	2SB481
40							*−2	100	*300	DC Conv.	T-15	2SB493
75							*−2	100	*300	DC Conv.	T-12	2SB533
63		295	0	−0.3	69		2	−10	10	Medium Po.	T-3	2SD352
46		334					2	−10	#30	Medium Po.	T-3	2SD367※



2SB324



2SB481



2SD367

DIODES

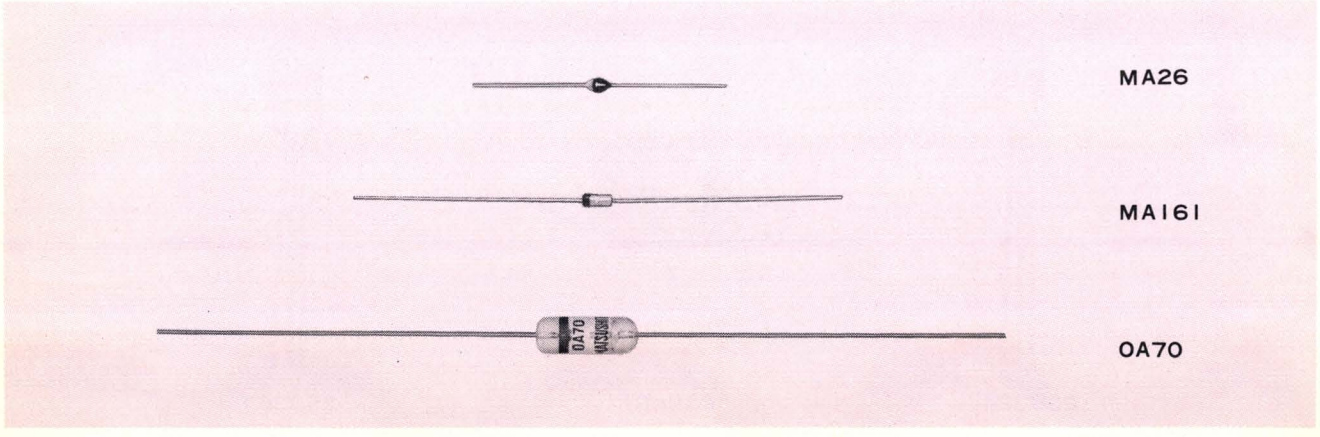
(GERMANIUM DIODES)

Type No.	Absolute Maximum Ratings (Ta=25℃)						Bias I_F		Bias I_R		Bias I_R	
	V_R	I_F	I_{FM}	I_{surge}	T_j	T_{stg}	V_F	min.	V_R	max.	V_R	max.
	(V)	(mA)	(mA)	(mA)	(℃)	(℃)	(V)	(mA)	(V)	(μA)	(V)	(μA)
OA70	15	50	150	400		−55～+75	1	4	10	150	22.5	800
OA79	30	35	100	200		−55～+75	1	2	10	18	45	340
OA81	90	50	150	500		−55～+75	1	3	10	11	70	150
OA85	90	50	150	500		−55～+75	1	5	10	7	70	81
OA90	15	50	150	400		−55～+75	1	4	10	150	22.5	800
OA91	90	50	150	500		−55～+75	1	3	10	11	75	185
OA95	90	50	150	500		−55～+75	1	5	10	7	75	110
OA99	30	35	100	200		−55～+75	1	2	10	18	45	340
MA23	30	100			75	−55～+75			30	300		
MA25	30	100			75	−55～+75			30	200		

(SILICON DIODES)

Type No.	Absolute Maximum Ratings (Ta=25℃)							Bias I_R		Bias I_R	
	V_R	I_F	I_{FM}	I_{surge}	T_j	T_{opr}	T_{stg}	V_R	max.	V_R	max.
	(V)	(mA)	(mA)	(mA)	(℃)	(℃)	(℃)	(nA)	(nA)	(V)	(μA)
MA26		20					−30～+ 75				
MA26W		30					−55～+110				
MA53	20	100			100	60	−55～+100	15	100		
MA56	20	100				−25～+85	−55～+100	15	100		
MA150	35	100	225	500	200		−55～+200	15	25	35	100 [1]
MA161	50	100	225	500	200		−55～+200	15	25	50	5
MA162	75	100	225	500	200		−55～+200	20	25	75	5

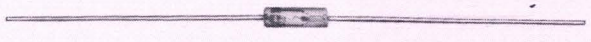
1) Ta=150℃



Electrical Characteristics (Ta=25℃)									Use.	Drawing No.	Type No.
Bias I_R		Condition			η	Bias	V_F				
V_R (V)	max. (μA)	f (MHz)	R_L (KΩ)	C_L (pF)	min. (%)	I_F (mA)	min. (mV)	max. (mV)			
		30	3.9	10	50				Detector	D-1	OA70
		10.7	33	330	76				Detector	D-1	OA79
100	275								General	D-1	OA81
100	250								General	D-1	OA85
		30	3.9	10	50				Detector	D-2	OA90
100	275								General	D-2	OA91
100	250								General	D-2	OA95
		10.7	33	330	76				Detector	D-2	OA99
						1	120	185	AVC	D-3	MA23
						3	95	145	AVC	D-3	MA25

Electrical Characteristics (Ta=25℃)													Use	Drawing No.	Type No.
Bias	V_F		Bias	C		Condition	r_f		Condition		t_{rr}				
I_F (mA)	min. (V)	max. (V)	V_R (V)	f (MHz)	max. (pF)	I_F (mA)	f (MHz)	max. (Ω)	V_R (V)	R_L (Ω)	I_F~I_R (mA)	max. (nS)			
1.5	0.56	0.61											AVC	D-6	MA26
3.0	1.19	1.29											AVC	D-6	MA26W
100		1.0	10	1	2.0	10	100	1					Switching	D-7	MA53
100		1.0	15	1	2.0	3	100	0.85					Switching	D-7	MA56
100		1.2	0	1	2.0				1	100	10~1	10	Switching	D-9	MA150
100		1.2	0	1	2.0				1	100	10~1	4	Switching	D-9	MA161
100		1.2	0	1	2.0				1	100	10~1	4	Switching	D-9	MA162

MA56



OA99

OA79

(SILICON RECTIFIERS)

Type No.	Electrical Characteristics (Ta=25℃)								
	V_R (KV)	I_F (mA)	I_{FM} (mA)	I_{surge} (A)	T_j (℃)	T_{opr} (℃)	T_{stg} (℃)	Bias I_R V_R (KV)	max. (μA)
MA242/R	90V	1.5A	14A[1]	100[2]			−55～+150	90V	3mA
MA242C/CR	90V	3.0A	3A		175	55	−20～+175	90V	3mA
MA615	9	5	100			−55～+75	−55～+125	9	0.3
MA619	12	5	100			−55～+75	−55～+125	12	0.3
MA622	13	5	100			−55～+75	−55～+125	13	0.3
MA625	15	5	100			−55～+75	−55～+125	15	0.3
MA630	18	5	100			−55～+75	−55～+125	18	0.3
MA715	9	5	100			−55～+85	−55～+125	9	0.3
MA720	13	5	100			−55～+85	−55～+125	13	0.3
MA725	15	5	100			−55～+85	−55～+125	15	0.3
MA730	15	5	100			−55～+85	−55～+125	15	0.3

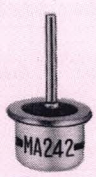
1) with cooling fin 2) ≦0.1sec 3) ≦0.2sec

(VARIABLE CAPACITANCE DIODES)

Type No.	Absolute Maximum Ratings (Ta=25℃)											
	V_R (V)	I_F (mA)	T_j (℃)	T_{stg} (℃)	Bias I_R V_R (V)	max. (nA)	Bias B_{VR} I_R (μA)	min. (V)	Condition C_{d1} V_R (V)	f (MHz)	min. (pF)	max. (pF)
MA320	28	20	60	−55～+80	28	10	50	30	25	1	1.81	2.73
MA340	25		80	−55～+80	25	100			2	1	10.5	16.0

(PIN DIODE)

Type No.	Absolute Maximum Ratings (Ta=25℃)											
	V_R (V)	I_F (mA)	P (mW)	T_j (℃)	T_{stg} (℃)	Bias I_R V_R (V)	max. (μA)	Bias I_R V_R (V)	max. (nA)	Bias V_F I_F (mA)	typ. (V)	max. (V)
MA550	30	100	120	100	−55～+100	30	50	10	100	100	0.95	1.2



MA242

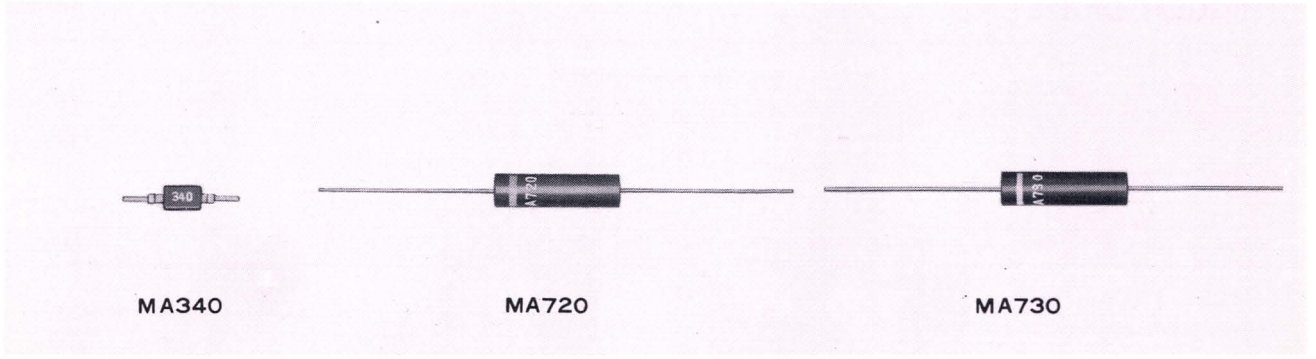
MA320

MA622

Electrical Characteristics (Ta=25℃)										Use	Drawing No.	Type No.
Condition I_R			Bias V_F		Bias V_F		Condition t_{rr}					
V_R (KV)	T_j (℃)	max. (μA)	I_F (mA)	max. (V)	I_F (A)	max. (V)	I_F (mA)	I_R (mA)	max. (nS)			
			1.5A[3]	0.95	10[3]	1.15				Rectifier for	D-4	MA242/R
			3.0A	1.0	10	1.1				Alternator	D-5	MA242C/CR
9	80	5	25	18			2	4	350		D-10	MA615
12	80	5	25	24			2	4	350		D-10	MA619
13	80	5	25	26			2	4	350		D-10	MA622
15	80	5	25	30			2	4	350	High Voltage	D-10	MA625
18	80	5	25	36			2	4	350	Rectifier for	D-10	MA630
9	80	3	25	18			2	4	250	Color TV	D-11	MA715
13	80	3	25	24			2	4	250		D-11	MA720
15	80	3	25	30			2	4	250		D-11	MA725
15	80	3	25	36			2	4	250		D-11	MA730

Electrical Characteristics (Ta=25℃)											Use	Drawing No.	Type No.
Condition		C_{d2}			C_{d1}/C_{d2}		Condition			R_S			
V_R (V)	f (MHz)	min. (pF)	typ. (pF)	max. (pF)	min.	max.	f (MHz)	C_d (pF)	V_R (V)	max. (Ω)			
3	1	9.45	11.5	13.48	4	6	470	9		1.2	UHF/VHF	D-7	MA320
10	1	3.3		5.7	2.5	3.4	470	9		1.2	UHF/VHF	D-7	MA340

Electrical Characteristics (Ta=25℃)												Use	Drawing No.	Type No.
Condition C_R				Condition r_{f1}				Condition r_{f2}						
V_R (V)	f (MHz)	typ. (pF)	max. (pF)	I_F (mA)	f (MHz)	typ. (Ω)	max. (Ω)	I_F (mA)	f (MHz)	min. (KΩ)	typ. (KΩ)			
30	1	0.5	1	20	100	4	10	0	100	1.0	3	UHF AGC	D-8	MA550



MA340 MA720 MA730

THYRISTORS

(SILICON CONTROL RECTIFIERS)

Type No.	Absolute Maximum Ratings (Ta=25℃)										Condition		
	I_O (A)	$I_{F(Peak)}$ (A)	I_{Surge} (A)	$V_{FO(Peak)}$ (V)	$V_{RO(Peak)}$, ※$V_{RX(Peak)}$ (V)	$V_{RO(Peak)}$ (V)	$V_{GF(Peak)}$ (V)	$P_{G(Peak)}$ (W)	P_G (W)	T_j (℃)	V_F (V)	T_C (℃)	$*I_{FX}$ max. (mA)
2SF248	6.4	10	50[1]	200	200	500 [2]	10	5.	0.5	125	200	125	5
2SF1060※	2		20[1]	200	200	300 [2]	10	0.5	0.1	110	200	110	*1 [4]
M21C	0.2		8	200	* 200 [6]	300 [2]	6	0.1	0.01	110	200	110	* 0.05[6]
M23C	2		20	200	* 200 [6]	300 [2]	6	0.5	0.1	110	200	110	* 0.1 [6]

1) non repetitive 20msec 2) non repetitive 10msec 3) I_F =10A, I_{RM} =5A, dv/dt=20V/μs, T_j =125℃ 4) R_{GK} =220Ω 5) R_L =100Ω

(SILICON CONTROL SWITCH)

Type No.	Individual	Absolute Maximum Ratings (Ta=25℃)										I_{CER}			I_{EBO}	
		V_{CBO} (V)	V_{CER}[1] (V)	V_{CEO} (V)	V_{EBO} (V)	I_E (mA)	I_{EM}[2] (mA)	I_C (mA)	I_{CM} (mA)	P_{tot} (mW)	T_j (℃)	T_{stg} (℃)	Bias		max. (nA)	Bias	max. (μA)
3SF11	NPN	70	70		5	−100	−500	50	100	250	150	−55～+175	V_{CE} (V) 70	R_{BE} (KΩ) 10	100	V_{ER} (V) 5	1
	PNP	−70		−70	−70	100	500									$-V_{EB}$ (V) 70	0.1

1) R_{BE} =10KΩ 2)t pulse≦1msec, duty=0.05

(BI-DIRECTIONAL TRIODE THYRISTORS)

Type No.	Absolute Maximum Ratings (Ta=25℃)						Conditon I_{DRM}			Condition V_{TM}	
	$I_{T(RMS)}$ (A)	I_{TSM} (A)	V_{DRM} (V)	P_{GM} (W)	P_{GAV} (W)	T_j (℃)	V_{DRM} (V)	T_j (℃)	max. (mA)	I_{TM} (A)	max. (V)
2SM58※	10	80[1]	±200[1]	5	0.5	100	200	100	2	14	1.65
2SM79※	2	20[2]	±200[2]	2	0.2	100	200	100	1	4	1.6
2SM125△	10	80	±200	5	0.5	110	200	110	2	14	1.65
2SM151△	3	30[3]	±200	1	0.1	110	200	110	0.1	5	2.0
M28C△	1	20	±200	1	0.1	110	200	110	0.1	2	2.0

1) Tc<70°C 2) Tc<75°C 3) Tb<63°C

(TRIGGER DIODE)

Type No.	Absolute Maximum Ratings (Ta=25℃)				Electrical Characteristics (Ta=25℃)										Application	Drawing No.	Type No
	P_{AV} (mW)	I_{PM} (A)	T_{opr} (℃)	T_{stg} (℃)	Bias I (μA)	V_{BO} min. (V)	V_{BO} max. (V)	Bias V (V)	I_{BO} typ. (μA)	I_{BO} max. (μA)	Condition V_O	V_O min. (V)	V_O typ. (V)	$\Delta V_{BO}/\Delta t$ (%/℃)			
MA61	150	2[1]	60	−55～+125	I_{BO}	24	36	V_{BO}	1	100	Fig.2	4	6.3	0.1	Trigger	S-5	MA61

1) Ta=50℃, t<10μs, f=60Hz

Electrical Characteristics (Ta=25℃)												Structure	Drawing No.	Type No.
Condition I_{RO} *I_{RX}			Bias V_F		Bias I_{GT}		Bias V_{GT}		I_H	t_{off}	$R_{th\text{-}m}$ *typ. max.			
V_R (V)	T_C (℃)	max. (mA)	I_F (A)	max. (V)	V_F (V)	max. (mA)	V_F (V)	max. (V)	typ. (V)	max. (μS)	(℃/W)			
200	125	5	20	2.3	6	25	6	2.5	10	25[3]	3	Pgate PNPN	S-1	**2SF248**
200	110	*1 [4]	6	1.7	6	3[5]	6	0.84[5]	10		9.8	Pgate PNPN	S-2	**2SF1060※**
200	110	*0.05 [6]	1	1.6	6	1[6]	6	0.8 [6]	3.0[6]		*60	Pgate PNPN	S-6	**M21C**
200	110	*0.1[6]	4	2.2	6	1[6]	6	0.8 [6]	2.0[6]		10	Pgate PNPN	S-7	**M23C**

6) R_{GK} =1KΩ

Electrical Characteristics (Ta=25℃)																	Structure	Drawing No.	Type No
		h_{FE}			Bias V_{AE}					Bias I_H					t_{off}				
Bias		min.	typ.	max.	I_A (mA)	I_C (mA)	R_{BE} (KΩ)	typ. (V)	max. (V)	R_{BE} (KΩ)	I_C (mA)	$-V_{BB}$ (V)	typ. (mA)	max. (mA)	R_{BE} (KΩ)	typ. (μS)	max. (μS)			
V_{CE} (V)	I_C (mA)																		
2	10	50	180		50	0	10	1.05	1.4	10	10	2	0.5	1	10	6	12	PNPN	S-4	**3SF11**
V_{CB} (V)	I_E (mA)																		
0	1	0.19	1.1	2.5															

Electrical Characteristics (Ta=25℃)							Structure	Drawing No.	Type No.
Condition I_{GT}			Condition V_{GT}			Rth(j-m)			
V_D (V)		max. (mA)	V_D (V)		max. (V)	max. (℃/W)			
6	Fig. 1	50	6	Fig. 1	3	2.2	NPNPN	S-1	**2SM58※**
6	Fig. 1	10	6	Fig. 1	2	9.6	NPNPN	S-2	**2SM79※**
6	Fig. 1	50	6	Fig. 1	3	2.0	NPNPN	S-3	**2SM125△**
6	Fig. 1	30	6	Fig. 1	2	8.0	NPNPN	S-7	**2SM151△**
6	Fig. 1	20	6	Fig. 1	2	10	NPNPN	S-7	**M28C△**

Fig. 1

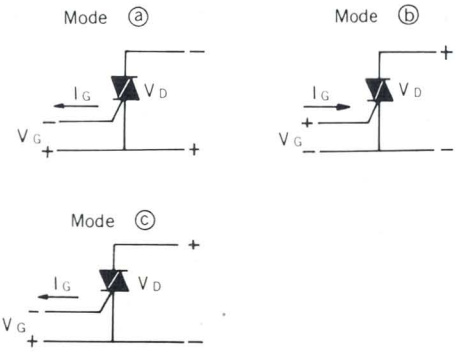
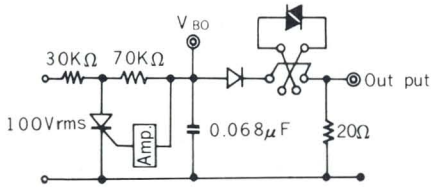


Fig. 2



OPTO ELECTRONIC DEVICES

(RED LIGHT EMITTING DIODES : GaAsP)

Type No.	Absolute Maximum Ratings (Ta=25℃)						B		λP	
	V_R	I_F	I_{FM}	P	T_{opr}	T_{stg}	I_F	typ.	I_F	typ.
	(V)	(mA)	(mA)	(mW)	(℃)	(℃)	(mA)	(f_{t-L})	(mA)	(Å)
LN11	3	75	100	150	−25～+100	−55～+100	50	3000	50	6600
LN11W	3	75	100	150	−25～+100	−55～+100	50	3000	50	6600
LN12	3	30	40	60	−25～+100	−55～+100	20	1500	20	6600
LN12W	3	30	40	60	−25～+100	−55～+100	20	1500	20	6600
LN13	3	30	40	60	−25～+100	−55～+100	20	800	20	6600
LN21	3	65	80	130	−25～+100	−55～+100	50	6000	50	6700
LN21W	3	65	80	130	−25～+100	−55～+100	50	6000	50	6700
LN22	3	25	35	50	−25～+100	−55～+100	20	3000	20	6700
LN22W	3	25	35	50	−25～+100	−55～+100	20	3000	20	6700
LN23	3	25	35	50	−25～+100	−55～+100	20	1500	20	6700
LN24	3	30	35	60	−25～+85	−30～+100	20	500	20	6700

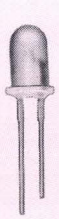
(GREEN LIGHT EMITTING DIODES : GaP)

Type No.	Absolute Maximum Ratings (Ta=25℃)						B		λP	
	V_R	I_F	I_{FM}	P	T_{opr}	T_{stg}	I_F	typ.	I_F	typ.
	(V)	(mA)	(mA)	(mW)	(℃)	(℃)	(mA)	(f_{t-L})	(mA)	(Å)
LN32	3	30	40	80	−25～+85	−30～+100	20	1200	20	5600
LN34△	3	30	35	80	−25～+85	−30～+100	20	300	20	5600

(GREEN LIGHT EMITTING DIODE : CONVERTER TYPE)

Type No.	Absolute Maximum Ratings (Ta=25℃)					Item	B.P0		λP		△λ	
	V_R	I_F	P	T_{opr}	T_{stg}		$I_{F(DC)}$	typ.	$I_{F(DC)}$	typ.	$I_{F(DC)}$	typ.
	(V)	(mA)	(mW)	(℃)	(℃)		(mA)		(mA)	(Å)	(mA)	(Å)
LN30(MEL4720)	3	100	150	−25～+75	−30～+100	Visible Light	100	150f_{t-L}	100	5400	100	150
						Infrared	100	2.0mW	100	9500	100	500

LN21



LN21W

LN23

Electrical Characteristics (Ta=25℃)										Use	Drawing No.	Type No.
△λ		V_F			Bias I_R		Bias	C				
I_F (mA)	typ. (Å)	I_F (mA)	typ. (V)	max. (V)	V_R (V)	max. (μA)	V_R (V)	f (MHz)	typ. (pF)			
50	200	75	1.75	2.0	3	10	0	1	60	Indicator	O-1	LN11
50	200	75	1.75	2.0	3	10	0	1	60	Indicator	O-1	LN11W
20	200	30	1.75	2.0	3	10	0	1	50	Indicator	O-2	LN12
20	200	30	1.75	2.0	3	10	0	1	50	Indicator	O-2	LN12W
20	200	30	1.75	2.0	3	10	0	1	50	Indicator	O-2	LN13
50	200	65	1.80	2.0	3	10	0	1	20	Indicator	O-3	LN21
50	200	65	1.80	2.0	3	10	0	1	20	Indicator	O-3	LN21W
20	200	25	1.75	2.0	3	10	0	1	20	Indicator	O-4	LN22
20	200	25	1.75	2.0	3	10	0	1	20	Indicator	O-4	LN22W
20	200	25	1.75	2.0	3	10	0	1	20	Indicator	O-4	LN23
20	200	30	1.75	2.0	3	10	0	1	20	Indicator	O-7	LN24△

Electrical Characteristics (Ta=25℃)										Use	Drawing No.	Type No.
△λ		V_F			Bias I_R		Bias	C				
I_F (mA)	typ. (Å)	I_F (mA)	typ. (V)	max. (V)	V_R (V)	max. (μA)	V_R (V)	f (MHz)	typ. (pF)			
20	300	30	2.2	2.6	3	10	0	1	60	Indicator	O-4	LN32△
20	300	30	2.2	2.6	3	10	0	1	60	Indicator	O-7	LN34△

Electrical Characteristics (Ta=25℃)														Use	Drawing No.	Type No.
V_F			I_R		C_O			t_r			t_f					
$I_{F(DC)}$ (mA)	typ. (V)	max. (V)	V_R (V)	max. (μA)	V_R (V)	f (MHz)	typ. (pF)	I_F (mA)			I_F (mA)					
100	1.25	1.5	3	10	0	1	70	100	<5mS	<2μS	100	<2μS		Indicator	O-5	LN30
								100	<2mS		100	<1μS				

LN30

LN24

LN32

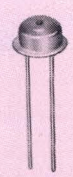
(INFRARED LIGHT EMITTING DIODES: GaAs)

Type No.	Absolute Maximum Ratings (Ta=25℃)						P_O		λ_P		$\triangle\lambda$	
	V_R	I_F	I_{FM}	P	T_{opr}	T_{stg}	$I_{F(DC)}$	typ.	$I_{F(DC)}$	typ.	$I_{F(DC)}$	typ.
	(V)	(mA)	(A)	(mW)	(℃)	(℃)	(mA)	(mW)	(mA)	(Å)	(mA)	(Å)
LN51(MEL4715)	5	100	2[1]	150	−25~+100	−30~+125	100	6.0	100	9500	100	500
LN52	3	100	2[1]	150	−25~+ 80	−30~+100	100	6.0	100	9500	100	500
LN53	3	50	1[1]	75	−25~+ 85	−30~+100	50	1.2	50	9500	50	500
LN60	3	50	1[1]	75	−25~+ 85	−30~+100	50	3.5	50	9500	50	500
LN70(MEL4710)	5	75	1[1]	125	−25~+100	−30~+125	75	1.0	75	9100	75	400

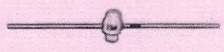
1) f=100Hz, duty Cycle 0.1%

(PHOTO TRANSISTORS)

Type No.	Absolute Maximum Ratings (Ta=25℃)					I_{CEO}			$I_{CE(L)}$	
	V_{CEO}	V_{ECO}	P_C	T_{opr}	T_{stg}	V_{CE}	typ.	max.	V_{CE}	L
	(V)	(V)	(mW)	(℃)	(℃)	(V)	(μA)	(μA)	(V)	(Lux)
PN100	20	5	50	−25~+85	−40~+100	20	0.05	10	10	500
PN101(MEL4750)	30	5	100	−30~+125	−55~+100	10	0.02	1.0	10	500
PN110	20	5	100	−25~+85	−40~+100	20	0.05	10	10	500
PN110W	20	5	100	−25~+85	−40~+100	20	0.05	10	10	500
PN111	20	5	100	−25~+85	−40~+100	20	0.05	10	10	500
PN111W	20	5	100	−25~+85	−40~+100	20	0.05	10	10	500
PN140	20	5	50	−25~+85	−30~+100	10	0.008	10	10	250



LN52



LN53

LN60

V_F			I_R		C_O			t_R		t_f		R_S		Use.	Drawing No.	Type No.
I_F (mA)	typ. (V)	max. (V)	V_R (V)	max. (μA)	V_R (V)	f (MHz)	typ. (pF)	I_F (mA)	typ. *nS (μS)	I_F (mA)	typ. *nS (μS)	I_F (mA)	typ. (Ω)			
100	1.25	1.5	5	10	0	1	75	100	1.0	100	1.0	100	0.8	Electronic Isolators	O-5	**LN51**
100	1.25	1.6	3	10	0	1	50	100	1.0	100	1.0	100	0.8	Electronic Isolators	O-6	**LN52**
50		1.5	3	10	0	1	50	100	1.0	100	1.0	50	1.2	Electronic Isolators	O-7	**LN53**
50	1.2	1.5	3	10	0	1	50	100	1.0	100	1.0	50	1.2	Electronic Isolators	O-8	**LN60**
75	1.25	1.5	5	10	0	1	60	100	*80	100	*50	75	0.8	Electronic Isolators	O-5	**LN70**

		λP			t_r			t_f			Use.	Drawing No.	Type No.
min. (mA)	typ. (mA)	V_{CE} (V)	L (Lux)	typ. (Å)	V_{CE} (V)	R_L (Ω)	typ. (μS)	V_{CE} (V)	R_L (Ω)	typ. (μS)			
0.2	1.0	10	500	8000	10	100	4	10	100	4	Detector	O-9	**PN100**
2.0	6.0	10	500	8000	10	100	3	10	100	3	Detector	O-5	**PN101**
0.8	2.0	10	500	8000	10	100	4	10	100	4	Detector	O-10	**PN110**
0.8	2.0	10	500	8000	10	100	4	10	100	4	Detector	O-10	**PN110W**
4.5	6.0	10	500	8000	10	100	5	10	100	6	Detector	O-10	**PN111**
4.5	6.0	10	500	8000	10	100	5	10	100	6	Detector	O-10	**PN111W**
0.6	1.8	10	250	8000	10	100	4	10	100	4	Detector	O-11	**PN140**

PN100

PN110W

PN140

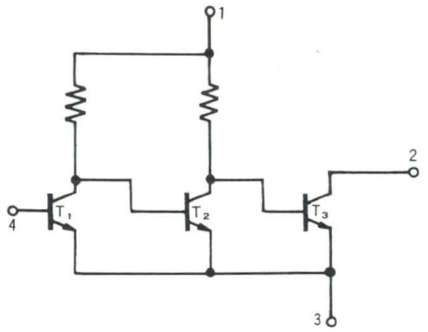
LINEAR·MONOLITHIC INTEGRATED CIRCUITS

(FOR RADIO, AUDIO)

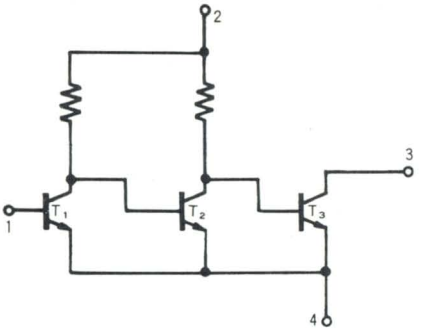
Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
OM200	Hearing Aid	V_{1-3}	5	V	I_2	$V_{2-1}=5V$			10	μA
		$-V_{4-3}$		V	I_4	$-V_{4-3}=5V$			10	μA
		I_2, I_4	5	mA	Itot	$V_{1-3}=1.3V, I_2=0.7mA$			1.2	mA
		P_T	25	mW	PG	$V_{1-3}=1.3V, I_2=0.7mA$	75			dB
		Topr	80	℃	Dtot	f=1KHz, Po=0.2mW			10	%
		Tstg	−20～80	℃						
AN127	Low-level AF Amp.	V_{2-4}	5	V	I_1	$-V_{1-4}=5V$			10	μA
		V_{3-4}		V	I_3	$V_{3-2}=5V$			10	μA
		$-V_{1-4}$		V	Itot	$V_{2-4}=1.3V, I_3=0.7mA$			1.2	mA
		I_1	10	mA	R_F				750	KΩ
		I_3	25	mA	PG	$V_{2-4}=1.3V, I_3=0.7mA$	75			dB
		P_T	70	mW	Dtot	f=1KHz, Po=0.2mW			10	%
		Topr	−20～100	℃	NF	$V_{2-4}=1.3V, I_3=0.7mA$ f=400～3200Hz			6	dB
		Tstg	−65～100	℃						
AN136	AF High-Gain Pre-Amp.	V_{3-2}	9.5	V	h_{FE}	$I_{10}=100\mu A, V_{10-7}=0V$	40			
		V_{5-2}		V						
		V_{8-7}	6	V	V_{3-2}	$I_3=7mA, V_{5-2}=7V$		0.8	1.2	V
		V_{9-10}		V						
		I_3	20	mA	G_V	Vcc=7V, Vo=1V f=1KHz	93			dB
		I_4, I_7	3	mA						
		$-I_9, -I_{10}$	10	mA	NF	Vcc=7V, R_S=2KΩ f=30～15000Hz		2.5	4	dB
		P_T	160	mW						
		Topr	−20～75	℃	V_{3-2}	Vcc=7V, I_9=200μA	3.4	3.8	4.2	V
		Tstg	−20～80	℃						
AN203	AM/FM IF Amp.	V_{CEX}	13.5	V	I_{CBO}	$V_{CB}=10V$			1	μA
		V_{5-4}	10	V	V_{8-4}	$V_{5-4}=4V$	1.2		1.6	V
		V_{EBO}	5	V	$V_{O(AM)}$	Vi=26dB, MOD. 400Hz 30% V_{5-4}=4V, f=455KHz	15			mV
		I_C	3	mA						
		P_T	200	mW	$V_{O(FM)}$	Vi=40dB, MOD. 400Hz 30% V_{5-4}=4V, f=10.7MHz	17	35	63.5	mV
		Topr	−20～75	℃						
		Tstg	−65～150	℃						
AN204※	Dual Pre-Amp.	V_{6-12}	15	V	I_6	Vcc=12V	2.5		10	mA
		I_6	15	mA	V_{1-12}		3.5		8	V
		P_T	200	mW	V_{11-12}		3.5		8	V
		Topr	−20～75	℃	V_N	Vcc=12V, R_S=2.2KΩ			9	mV
		Tstg	−65～150	℃						
AN210	AM/FM IF Amp.	V_{CEX}	13.5	V	I_{CBO}	$V_{CB}=10V$			1	μA
		V_{5-4}	10	V	V_{8-4}	$V_{5-4}=4V$	1.2		1.6	V
		V_{EBO}	6	V	$V_{O(AM)}$	V_{5-4}=4V, f=455KHz Vi=40dB, MOD. 400Hz 30%	4			mV
		I_C	5	mA						
		P_T	250	mW	$V_{O(FM)}$	V_{5-4}=4V, f=10.7MHz Vi=30dB, MOD. 400Hz 30%	7.6	20	51	mV
		Topr	−20～75	℃						
		Tstg	−65～150	℃						

※ Maintenance

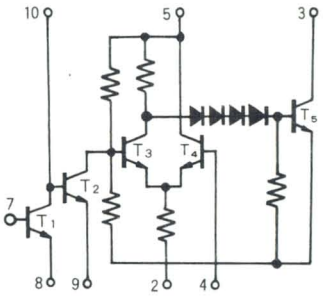
OM200 (Envelope I −5)



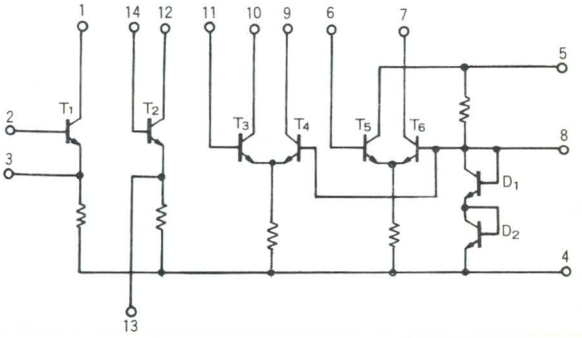
AN127 (Envelope I −2)



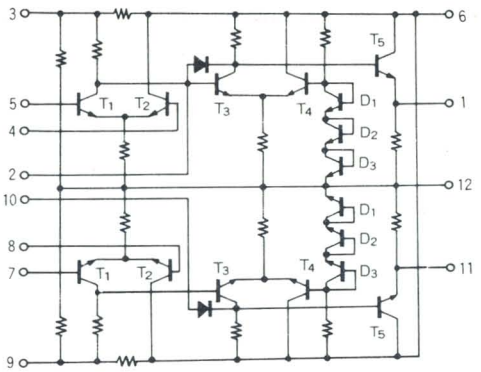
AN136 (Envelope I −3)



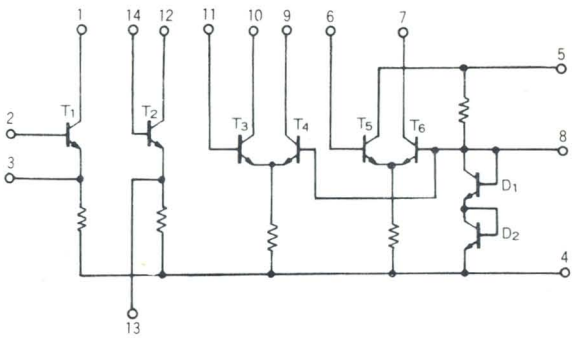
AN203 (Envelope I −7)



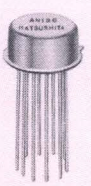
AN204 (Envelope I −4)



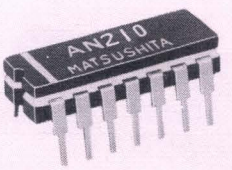
AN210 (Envelope I −7)



AN127



AN136

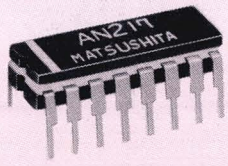


AN210

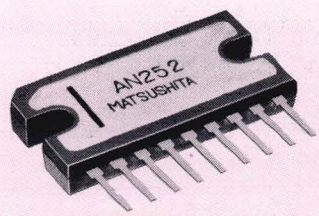
Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN211	FM Multiplex Demodulator	V_{2-12}	12	V	V_{CC}		6	9	12	V
		I_{12}	25	mA	Ch. Sep. (f=1KHz)	Vi=300mV, Vcc=9V MOD=100%	35	45		dB
		P_T	250	mW	Ch. Bal.	Vi=300mV, f=1KHz Vcc=9V			2	dB
		Topr	−20～75	℃	ON, OFF LEVEL	V_{CC}=9V (V_{11-12})	45	75	120	mV
		Tstg	−65～150	℃						
AN214	4.4-Watt Audio Power Amp.	V_{9-2}	18	V	P_O	Vcc=13V, f=1KHz Dtot=10%, R_L=4Ω	4	4.4		W
		Itot	1.2	A	V_O	f=1KHz, Vi=10mV R_L=4Ω	1.25	1.7	2.25	V
		P_T	4.5	W	Dtot	f=1KHz, Po=1W R_L=4Ω		0.3	1.5	%
		Topr	−20～70	℃	V_N	Rg=10KΩ, R_L=4Ω		1	4.5	mV
		Tstg	−55～150	℃	I_{CQ}	V_{CC}=13V	10	20	50	mA
AN215	Audio Pre-Amp. Power Amp.	V_{2-1}, V_{16-1}	12	V	P_O	Vcc=6V Dtot=10%, R_L=8Ω	1			W
		V_{3-13}	12	V	V_O	Vcc=6V Vi=0.1mV, R_L=8Ω	0.63	1	1.6	V
		Itot (Peak)	1	A	Dtot	Vcc=6V Vo=1V, R_L=8Ω			1.5	%
		P_T	2	W	V_N	Vcc=6V Rg=1KΩ, R_L=8Ω			16	mV
		Topr	−20～70	℃	I_{CQ}	V_{CC}=6V			80	mA
		Tstg	−55～150	℃						
AN217	AM/FM IF Amp. AM RF↓Converter	V_{CC}	9.5	V	$V_{O(AM)}$	V_{CC}=6V, f=2MHz MOD. Vi=36dB 400Hz 30%	14.5	30	42	mV
		V_{CEX}	16	V	$V_{O(FM)}$	V_{CC}=6V, f=10.7MHz MOD. Vi=40dB 400Hz 30%	17	40	76	mV
		Itot	40	mA	Itot	V_{CC}=6V	6	20	40	mA
		P_T	400	mW						
		Topr	−20～75	℃						
		Tstg	−65～150	℃						
AN219△	FM Tuner System	V_{5-4}	8	V	I_1	V_{1-2}=10V			1.2	μA
		Itot	20	mA	I_{11}	V_{11-4}=4V	0.3	1	1.5	mA
		P_T	200	mW	I_{14}	V_{14-4}=4V	0.3	1.1	1.6	mA
		Topr	−20～75	℃	V_{12-4}	V_{5-4}=4V	1.1	1.4	1.7	V
		Tstg	−65～150	℃	Itot	V_{5-4}=4V	2	5	9	mA
					$V_{O(FM)}$	f=100MHz, Vi=100μV MOD. 400Hz 30%		15		mV
AN252△	3 Watt Audio Power Amp.	V_{8-4}	18	V	P_O	Vcc=13V, f=1KHz Dtot=10%, R_L=4Ω	2.5	3		W
		Itot	2	A	G_V	f=1KHz, Vi=10mV R_L=4Ω	45	46	47	dB
		P_T	4.5	W	Dtot	f=1KHz, Po=0.5W R_L=4Ω		0.4	1.5	%
		Topr	−30～75	℃	V_N	Rg=10KΩ, R_L=4Ω			2	mV
		Tstg	−55～150	℃	I_{CQ}	V_{CC}=13V	7	15	40	mA

△ Preliminary

AN214

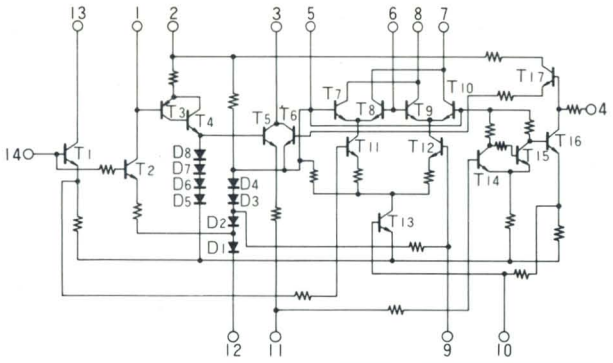


AN217

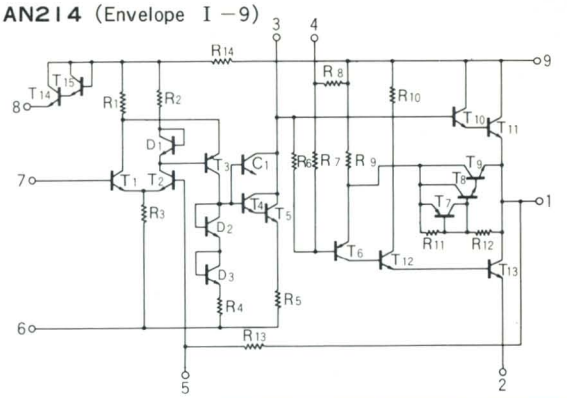


AN252

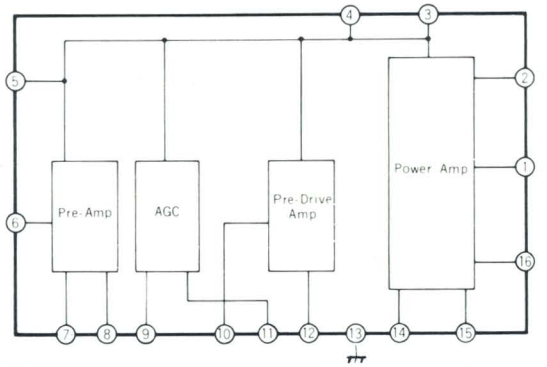
AN211 (Envelope −7)



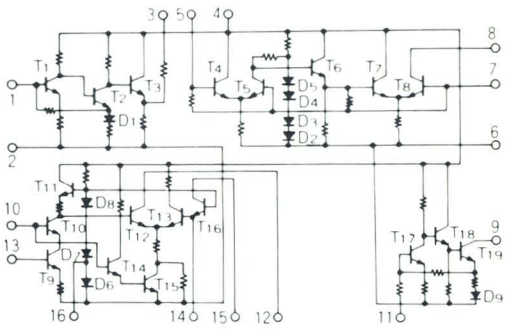
AN214 (Envelope I −9)



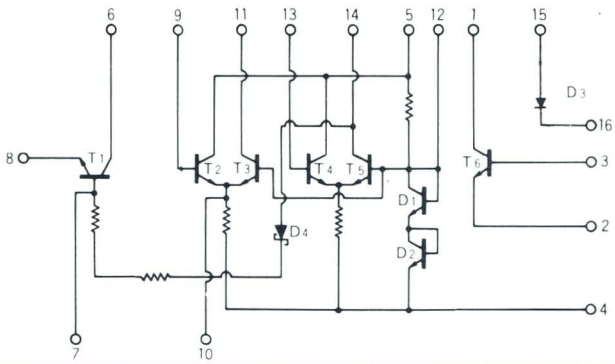
AN215 (Envelope I −10)



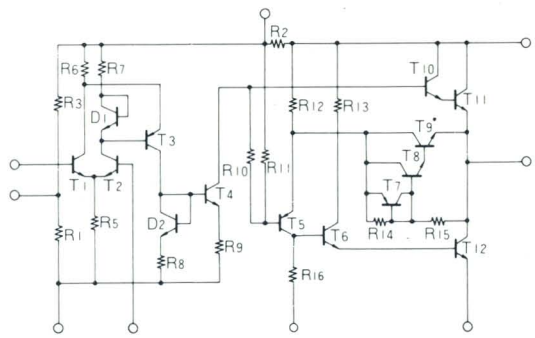
AN217 (Envelope I −8)



AN219 (Envelope))

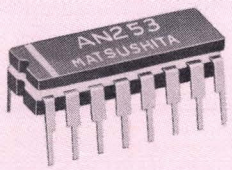


AN252 (Envelope I −9)

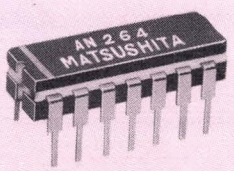


Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN253	AM/FM IF Amp. AF Driver	V_{CC}	7.5	V	$V_{O(AM)}$	V_{CC}=5V, f=455Hz MOD. Vi=30dB 400Hz 30%	2.2	3.5	5.6	mV
		V_{CER}	14	V	$V_{O(FM)}$	V_{CC}=5V, f=10.7MHz MOD. Vi=20dB 400Hz 30%	1.8	3	5	mV
		Itot	40	mA	Itot	V_{CC}=5V	5.4	15	23.5	mA
		P_T	300	mW	V_N	V_{CC}=5V, R_S=5KΩ		0.4		mV
		Topr	−20～75	℃						
		Tstg	−65～150	℃						
AN258△	FM Stereo Muting System	V_{4-7}	11	V	$I_{14(ON)}$	V_{4-6}=85mV V_{4-6}=−85mV	400			μA
		Itot	22	mA	$I_{14(OFF)}$	V_{4-6}=55mV V_{4-6}=−55mV			10	μA
		P_T	250	mW	$V_{4-6(ON)}$	V_{4-6}=240mV V_{4-6}=−245mV	1			V
		Topr	−20～75	℃	$V_{4-6(OFF)}$	V_{4-6}=185mV V_{4-6}=−190mV			0.5	V
		Tstg	−65～150	℃	$G_{V(FM)}$	V_{CC}=8V f=10.7MHz		30		dB
					$S_{(MUT)}$	V_{CC}=8V		70		dB
AN260	AM/FM IF Amp. AM Mix. Osc. Tuning Meter Driver	V_{8-6}	9	V	I_1	V_{CC}=6V			1	μA
		V_{CEO}	13.5	V	I_{10}	V_{CC}=6V	0.4	2.2	4.4	mA
		V_{CEX}	14	V	I_7	V_{CC}=6V	0.25	1.4	3	mA
		V_{EBO}	5	V	V_{13-4}	V_{CC}=6V	1.4	1.5	1.6	V
		I_C	5	mA	Itot	V_{CC}=6V	4.5	15	28	mA
		Itot	30	mA	I_5	V_{CC}=6V	0.4	0.5	0.6	mA
		P_T	300	mW	$V_{O(AM)}$	V_{CC}=6V, f=455KHz Vi=100μV MOD. 400Hz, 30%	7	10	14	mV
		Topr	−20～75	℃	$V_{O(FM)}$	V_{CC}=6V, f=10.7MHz Vi=100μV MOD. 400Hz, 30%	8	13	16	mV
		Tstg	−65～150	℃						
AN264	Dual Low Noise Pre-Amp.	V_{8-1}	24	V	Itot	V_{CC}=18V	3		13	mA
		Itot	16	mA	G_V(open)	V_{CC}=18V, f=1KHz V_O=1V rms	65	70		dB
		P_T	400	mW	Dtot	V_{CC}=18V, f=1KHz V_O=1V rms, G_V=34dB		0.03	0.1	%
		Topr	−20～75	℃	V_O	V_{CC}=18V, f=1KHz G_V=34dB, Dtot=1%	3			Vrms
		Tstg	−65～150	℃	V_N	V_{CC}=18V, R_S=2.2KΩ G_V=76dB, BW=30Hz～65KHz		12	18	mVrms
					Z_{IN}	V_{CC}=18V f=1MHz, G_V=34dB	50	100		KΩ
AN270 △ (AN370)△	Low Noise Pre-Amp.	V_{CC}	20 (24)	V	Itot	V_{CC}=9V (20V)		1.3 (3.1)	2.3 (5)	mA
		P_T	100 (140)	mW	G_V(open)	V_{CC}=9V (20V), f=1KHz Vi=0.1mV	75 (75)	80		dB
		Topr	−20～75	℃	Dtot	V_{CC}=9V (20V), f=1KHz, Vo=0.3V (1.0V)		0.07	0.2 (0.1)	%
		Tstg	−55～125	℃	V_O	V_{CC}=9V (20V), f=1KHz Dtot=1%	1.5 (4.5)	2		Vrms
					V_{NI}	V_{CC}=9V, Rg=2.2KΩ		0.8	1.5	μVrms
					V_{NO}	V_{CC}=(20V), Rg=47KΩ		(20)	(25)	mVrms
					R_1+R_7		65		300	KΩ

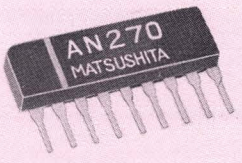
△ Preliminary



AN253

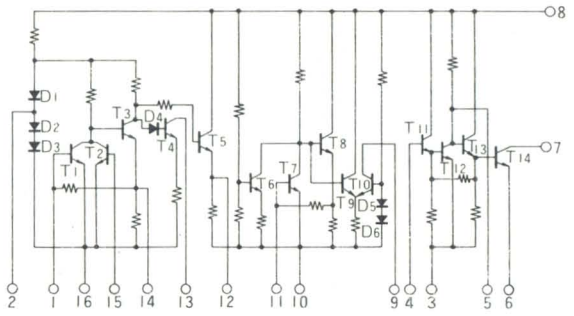


AN264

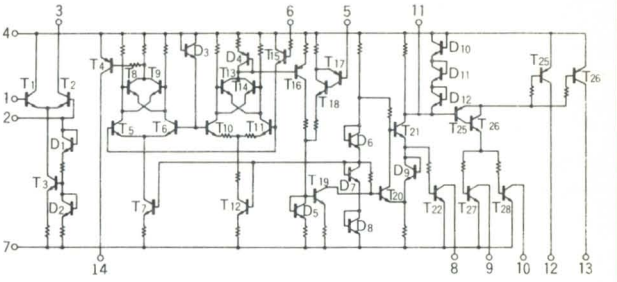


AN270

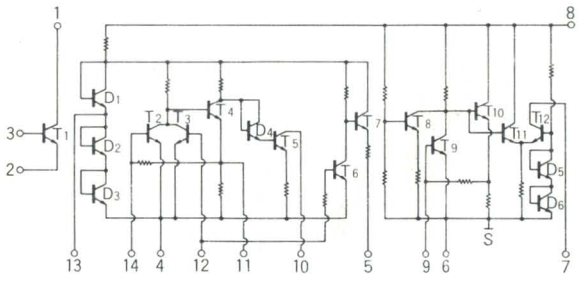
AN253 (Envelope I −8)



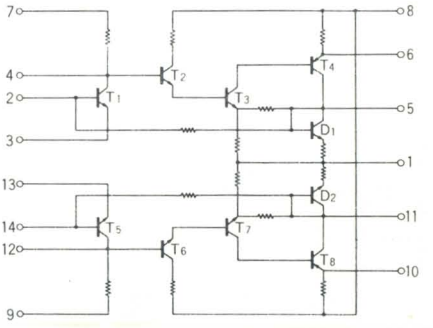
AN258 (Envelope I −7)



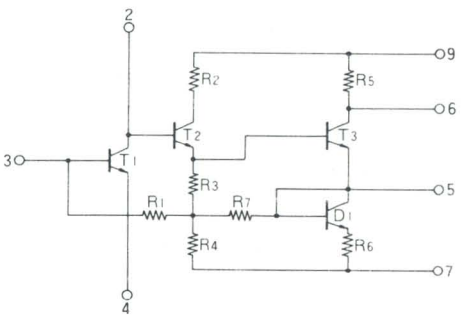
AN260 (Envelope I −7)



AN264 (Envelope I −7)

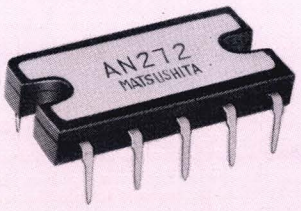


AN270, AN370 (Envelope I −11)

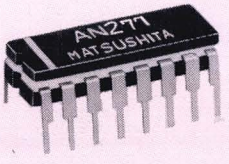


Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN272△	5-Watt Audio Power Amp.	V_{CC}	34	V	P_O	V_{CC}=20V, Dtot=5% f=1KHz	4.5	5		W
		Itot	2	A	G_V	V_{CC}=20V, Vi=30mV f=1KHz	38	40		dB
		P_T	6	W	Dtot	V_{CC}=20V, f=1KHz Po=1W		0.3	1	%
		Topr	−20～75	℃	V_N	V_{CC}=20V, Rg=50KΩ		0.7	2	mV
		Tstg	−55～150	℃	I_{CQ}	V_{CC}=20V,	10	20	50	mW
AN274 (AN374)	AF Power Amp.	V_{2-10}	16	V	I_{CQ}	V_{2-10}=10V, R=1～3KΩ	(5)	10 (12)	(22)	mA
		Itot	0.25 (1)	A	V_O	V_{2-10}=10V Vi=10mV rms, f=1KHz	0.6	0.8		V
		P_T	0.65 (1.55)	W	P_O	V_{2-10}=10V Vi=100mV rms, f=1KHz	0.85	1.3		W
		Topr	−20～+65	℃	Dtot	V_{2-10}=10V Po=50mVrms, f=1KHz		0.5	1.5	%
		Tstg	−55～+150	℃	V_N	V_{2-10}=10V, Rg=2.2KΩ (Rg=51KΩ)		0.2 (0.5)	0.42 (1)	mV
AN277	AM/FM IF Amp. AM RF Converter	V_{4-6}	9.5	V	$V_{O(AM)}$	V_{CC}=8.2V MOD.400Hz 30% f=450KHz, Vi=33μV	10		20	mV
		V_{CEX}	16	V	$V_{O(FM)}$	V_{CC}=8.2V MOD.400Hz 30% f=10.7MHz, Vi=200μV	4.5		18	mV
		Itot	40	mA	Itot	V_{CC}=8.2V	6	25	40	mA
		P_T	400	mW						
		Topr	−20～75	℃						
		Tstg	−65～150	℃						
AN353	AM/FM IF Amp. Meter Driver	V_{CC}	5.5	V	I_1	V_{CC}=4V, R=200Ω	200			mV
		V_{CER}	11	V	Itot	V_{CC}=4V	10		20	mA
		Itot	30	mA	$V_{O(FM)}$	V_{CC}=4V, Vi=200μV MOD. 400Hz 30%	4.25		10.1	mV
		P_T	165	mW	$V_{omax.(FM)}$	V_{CC}=4V, Vi=40mV MOD. 400Hz 30%	7		17	mV
		Topr	−20～75	℃	$G_{(FM)}$	V_{CC}=4V→2V Vi=200μV			15	dB
		Tstg	−55～125	℃	$G_{(FM)}$	V_{CC}=4V→5V Vi=200μV			11	dB

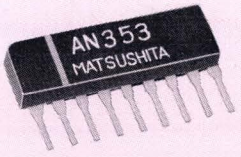
△ Preliminary



AN272

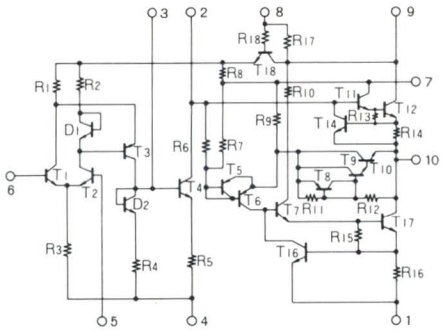


AN277

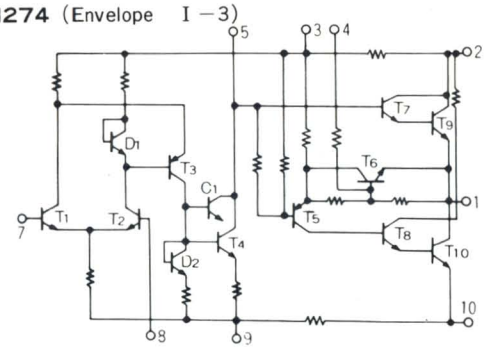


AN353

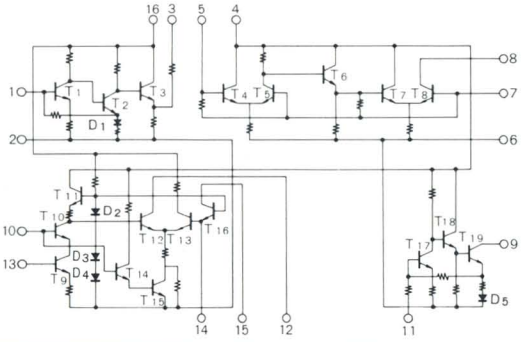
AN272 (Envelope I −12)



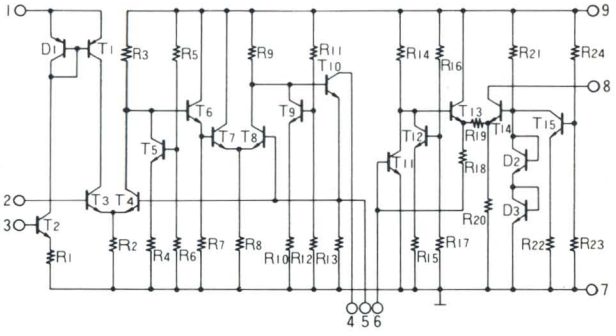
AN274 (Envelope I −3)



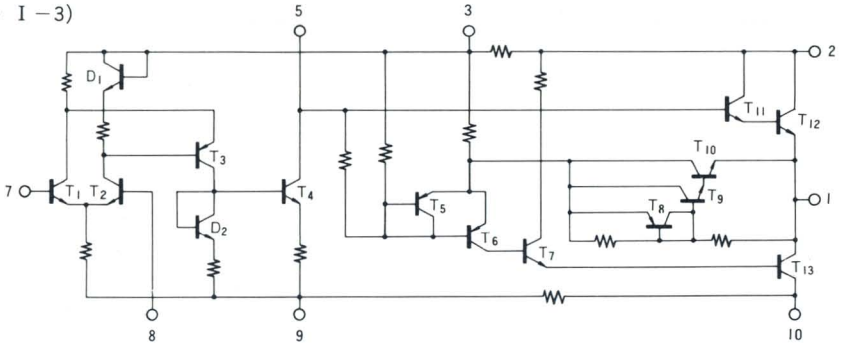
AN277 (Envelope I −8)



AN353 (Envelope I −11)

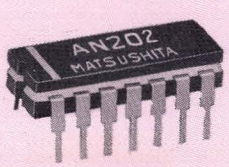


AN374 (Envelope I −3)

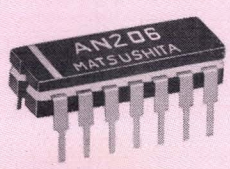


(FOR TV)

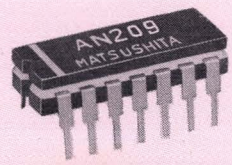
Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN202	TV Def.Signal Processing Circuit	V_{12-5}	14	V	I_7	$V_{CC}=12V$	13.5	16	18.5	mA
		V_{13-5}		V	Vsync.			10		Vp-p
		V_{14-5}		V	V_{13}	$V_{CC}=12V$, $R_{13-5}=1.7K\Omega$		2.5		V
		I_6	150	mA	$\lvert\triangle f_H\rvert V_{CC}$	$V_{CC}=9.6\sim14.4V$			60	Hz
		I_8	70	mA	T_H	$V_{CC}=12V$	23	24	26	μsec
		P_T	445	mW	$\lvert\triangle f_V\rvert V_{CC}$	$V_{CC}=9.6\sim14.4V$			2	Hz
		Topr	−20~70	℃	T_V	$V_{CC}=12V$	800	950	1100	μsec
		Tstg	−40~150	℃						
AN205	TV Video Signal Processing Circuit	V_{1-14}	7	V	I_{11}	$V_{CC}=12V$, $V_2=2.6V$, $V_6=0$	13	16.4	19.6	mA
		V_{2-14}	−6~10	V	V_6	$V_{CC}=12V$, AGC Operate	−0.9	−1.0	−1.1	V
		V_{4-14}	6	V	G_V	$V_{CC}=12V$, $V_6=-0.5V$ $Vin=0.3Vrms$, $f=1MHz$	2.16	2.4	2.66	times
		V_{5-14}		V	V_{13}	$V_{CC}=12V$, $V_6=-2V$ $R_L=12K\Omega$	9.5	10.4	11	V
		V_{6-14}	−10~6	V						
		V_{11-14}	15.6	V	V_3	$V_{CC}=12V$, $V_4=3V$ $V_6=-2V$ $3-14: 4.7K\Omega$	6.4	7.1	7.8	V
		I_{12-14}	6	V						
		I_8, I_{12}	150	mA	G_{IF}	$V_{CC}=12V$		50		times
		I_{10}	±10	mA	V_1	$V_{CC}=12V$, $V_2=2.5V$ $V_6=-4V$, $\frac{1-14}{3-14}: \frac{5.6K\Omega}{4.7K\Omega}$	9.5	10.4	11	V
		P_T	445	mW						
		Topr	−20~70	℃	G_{RF}	$V_{CC}=12V$		50		times
		Tstg	−40~150	℃						
AN206	FM IF and AF Preamp. (Ratio Det.)	V_{9-8}	15	V	I_{CC}	$V_{CC}=11V$, $f=4.5MHz$ $Vi=80dB\mu$	15	19	25	mA
		V_{10-14}		V	Vi(lim.)		30	43	50	dBμ
		V_{11-14}		V	$V_{O(AF)}$		250	300	430	mV
		I_9	10	mA	G_V			73		dB
		I_{10}, I_{11}	30	mA	AMR			45		dB
		P_T	375	mW	Dtot			0.5		%
		P_T	50 (T_{16})	mW	I_{CEO}	T_{16} $V_{CE}=15V$			10	μA
		Topr	−20~60	℃	h_{FE}	T_{16} $V_{CE}=5V$, $I_E=1mA$	30	50	120	
		Tstg	−40~150	℃						
AN209	Tuning Indicator	V_{1-14}	35	V	I_4	$V_{4-14}=20V$	6.6		10	mA
		V_{2-14}		V	V_9	$V_{4-14}=20V$, $I_5=80\mu A$			1	V
		V_{4-14}	20	V	V_9	$V_{4-14}=20V$, $V_5=0$	17.5			V
		P_T	250	mW	V_3	$V_{4-14}=20V$, $I_{12}=10\mu A$ $I_3=6.8mA$			3.5	V
		Topr	−20~80	℃						
		Tstg	−40~150	℃	V_3	$V_{4-14}=20V$, $I_{12}=20\mu A$ $I_3=10\mu A$	35			V



AN202

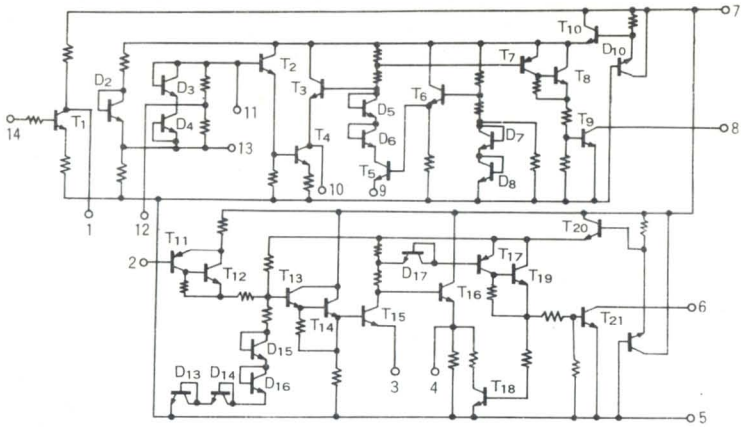


AN206

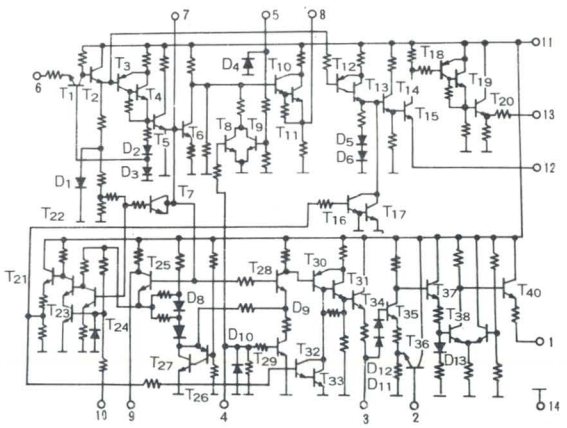


AN209

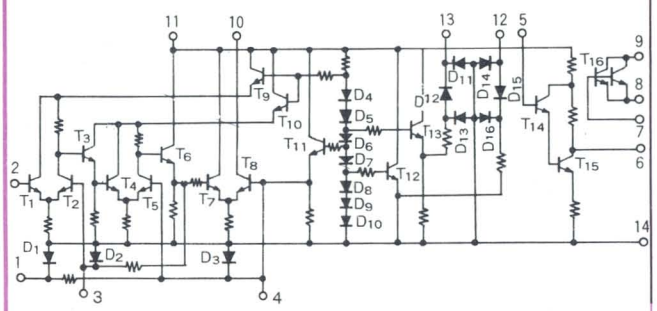
AN202 (Envelope I−7)



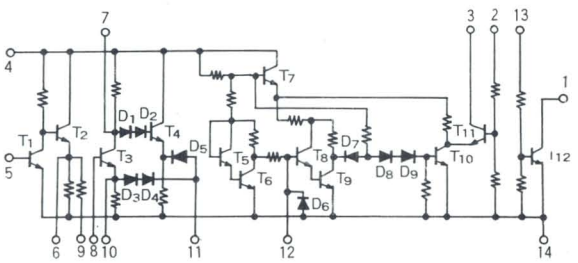
AN205 (Envelope I−7)



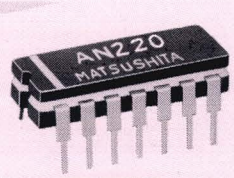
AN206 (Envelope I−7)



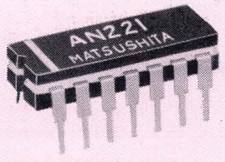
AN209 (Envelope I−7)



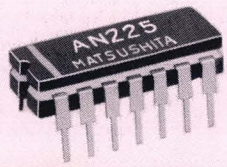
Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN220	Automatic Fine Tuning Combination	V_{4-13}	+20, 0	V	Itot	V_{CC}=30V, R_S=1.5KΩ	12	12.5	13.5	mA
		V_{7-13}	+12, 0	V	I_T	V_{14-13}=9V	2.5	4	5.5	mA
		V_{8-13}	+12, 0	V	V_{14-13}	V_{CC}=30V, R_S=1.5KΩ	10.5	11.2	12	V
		I_{14}	+50, −50	mA	I_4		1	2	4	mA
		I_4	+20, −20	mA	V_{7-13}		5	6.5	8	V
		P_T	445	mW	V_{8-13}		5	6.5	8	V
		Topr	−20~70	℃	V_{7-8}		−1.5	0	1.5	V
		Tstg	−40~150	℃	Vi (lim.)	f=58.75MHz		90	120	mV
AN221	Automatic Fine Tuning Combination	V_{1-12}	11.2	V	Itot	V_{CC}=24V, R_S=820Ω	14	15.6	17.5	mA
		V_{2-12}	+5, −5	V	I_T	V_{3-12}=9V	4.3	6.25	7.8	mA
		V_{4-2}	+15, 0	V	I_4	V_{CC}=24V, R_S=820Ω	1	2	4	mA
		V_{7-2}	+5, −2	V	V_{7-12}		5	6.5	8	V
		I_4	+20, −20	mA	V_7		6			V_{P-P}
		I_8	+2, −0.2	mA	$G_{V(1)}$	Vcc=24V, Rs=820Ω, f=58.75 MHz, Vi=10mVrms	20			dB
		Itot	37	mA	V_4(max.)	Vcc=24V, Rs=820Ω f=58.75MHz, Vi=200mVrms	1.7			Vrms
		P_T	445	mW	$G_{V(2)}$	V_{CC}=24V, R_S=820Ω f=1KHz, Vi=10mVrms	30			dB
		Topr	−20~70	℃	Ri	V_{CC}=24V, R_S=820Ω f=58.75MHz		1		KΩ
		Tstg	−40~150	℃	Ci	Pin_{11-12}		5		pF
AN222	Automatic Fine Tuning Combination	V_{4-13}	+20, 0	V	Itot	V_{CC}=30V, R_S=1.5KΩ	11.5	12.1	12.7	mA
		V_{7-13}	+12, 0	V	I_T	V_{14-13}=10.5V	4	6.5	9.5	mA
		V_{8-13}	+12, 0	V	V_{14-13}	V_{CC}=30V, R_S=1.5KΩ	10.9	11.8	12.8	V
		I_{14}	+50, −50	mA	I_4		1	2	4	mA
		I_4	+20, −20	mA	V_{7-13}		5	6.9	8	V
		P_T	445	mW	V_{8-13}		5	6.9	8	V
		Topr	−20~70	℃	V_{7-8}		−1	0	1	V
		Tstg	−40~150	℃	Vi (lim.)	f=58.75MHz		18		mV
AN225 AN227	Color Demodulator	V_{14-7}	+30	V	Itot	R_L=3.3KΩ	13.5	18	22.5	mA
		I_{14}	+30	mA	V_{14-7}		18	24	30	V
		V_{12-7}	+11.5, +1.5	V	$V_{1,2,4}$	R_L=3.3KΩ	12	14.4	17	V
		V_{13-7}	+11.5, +1.5	V	$\|\triangle V_0\|$max.	R_L=3.3KΩ		0.3	2	V
		I_1, I_2, I_4	+0,1, −40	mA	V_{B-Y}	Vrf=1Vp-p, Vchr.=0.2Vp-p R_L=5.6KΩ		10		Vp-p
		I_{12}, I_{13}	+1, −1	mA	G_{G-Y}	Vrf=1Vp-p, Vchr.=0.2Vp-p R_L=5.6KΩ		28.5		dB
		$R_{1,2,4}$	3	KΩ	E_{B-Y}/E_{R-Y}	Vrf=1Vp-p, Vchr.=0.2Vp-p R_L=5.6KΩ		83		%
		P_T	445	mW	E_{G-Y}/E_{R-Y}	Vrf=1Vp-p, Vchr.=0.2Vp-p R_L=5.6KΩ		40		%
		Topr	−20~70	℃	ϕ_{G-Y}	Vrf=1Vp-p, Vchr.=0.2Vp-p R_L=5.6KΩ		237		degrees
		Tstg	−40~150	℃	Vu max.	Vrf=1Vp-p Vchr.=0 R_L=5.6KΩ			500	mVp-p



AN220

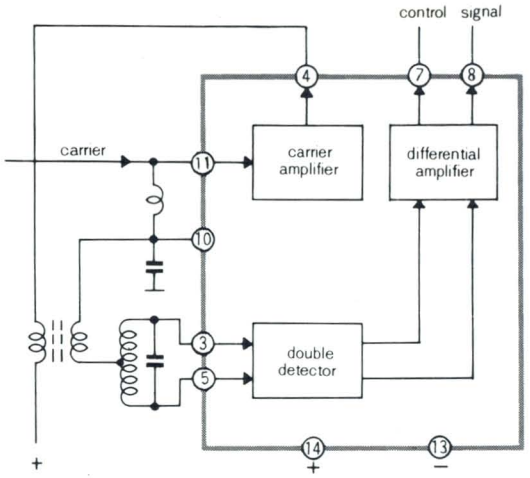


AN221

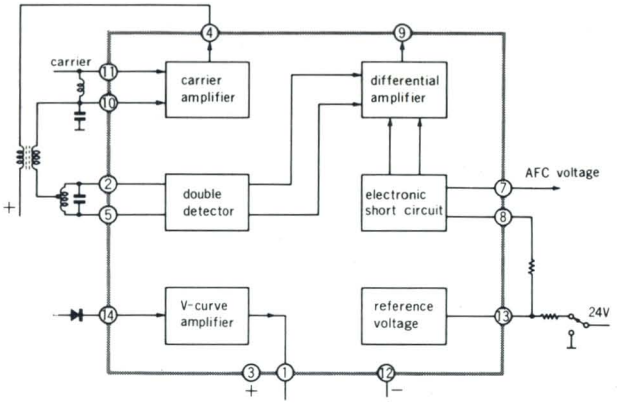


AN225

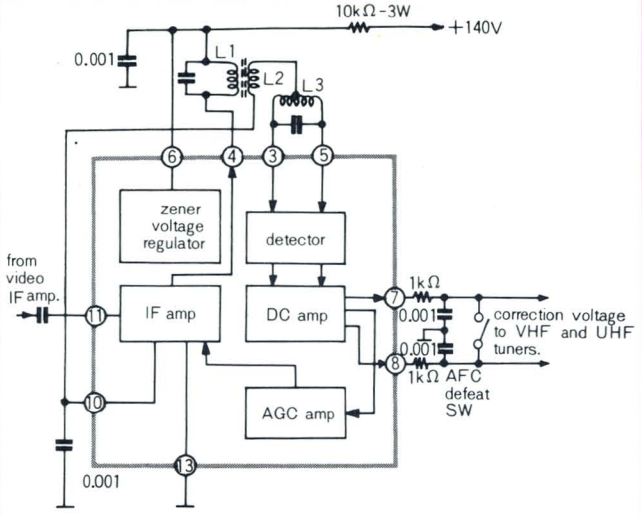
AN220 (Envelope I−7)



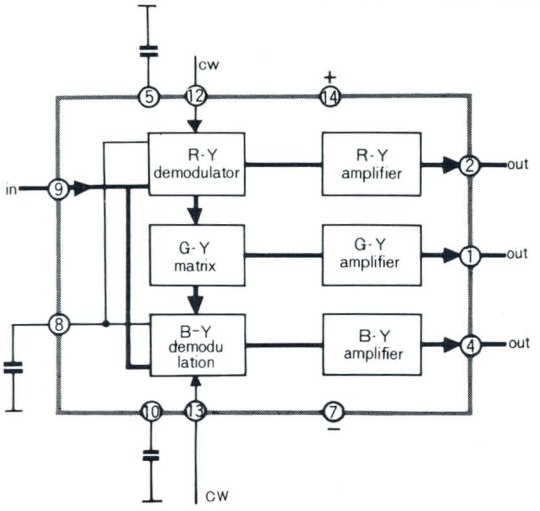
AN221 (Envelope I−7)



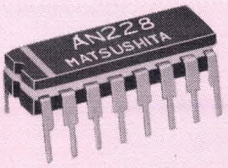
AN222 (Envelope I−7)



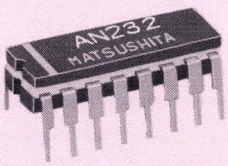
AN225, AN227 (Envelope I−7)



Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	Condition	min.	typ.	max.	Unit.
AN228 AN229 AN230 AN231	Video Jungle Combination	V_{1-9}	+15.6	V	Itot		14	18	22	mA
		I_1	+41(AN228/229/231) +50(AN230)	mA	V_{1-9}		9.6	12	14.4	V
		V_{3-9} V_{13-9}	+30, 0	V	V_{10-9}	AN228/230/231 AN229		1.8 1		Vp-p
		V_{16-9}	+30, 0 V_{1-9}, 0(AN229)	V	V_{13-9}	AN228/230/231 AN229		7.2 1.36		Vp-p
		V_{2-9} V_{5-9}	V_{1-9} − 5	V	B		4.5			MHz
		V_{8-9} V_{10-9}	V_{1-9}, − 5	V	G_{10-12}	AN228/230/231 AN229(V_{10-9}=11～10V)	1.12 1.46	1.2 1.57	1.28 1.68	times
		P_{T5} P_{T-7}	60 45	mW	G_{10-14}	AN228/230/231 AN229(V_{10-9}=11～10V)	2.4 3.5	3 3.9	3.6 4.3	times
		I_3 I_4	+10, −0.1 +0.1, −10	mA	G_{10-11}	V_{10-9}=(11～10V) Pin⑩→⑪Gain		0.99		times
		I_6 I_{14}	+ 1, −10	mA	V_{6-9}	R_{6-9}=3.3KΩ V_{10-9}=9V	9			V
		I_5 I_{10}, I_{15}	+ 1, −0.1	mA	V_{4-9}	R_{4-9}=10KΩ, V_{5-9}=3.2V V_{6-9}=6V	8.4			V
		I_{13}	+20, 0	mA	V_{2-9}	AN228/230 negative going AN229/231 positive going	9.3 1.04	9.8 1.3	10.3 1.55	V
		I_{16}	+10, 0 0, −10(AN229)	mA	V_{8-9}	AN229 AN230/231	3.99 3	4.2 3.2	4.41 3.4	V
		P_T	490	mW	V_{16-9}	AN229positive going(fixed) AN 228/230/231negative going		7.5	≦30	V
		Topr	−20～70	℃	G_{RF}	Pin⑥→④Gain R_{4-9}=10KΩ, V_{4-9}=3V		80		times
		Tstg	−40～150	℃	G_{IF}	Pin⑩→⑥Gain R_{6-9}=3.3KΩ, V_{6-9}=3V	500			times
AN232	Deflection Combination				I tot		16.8	21	25.2	mA
					V_{15-4}		9.6	12	14.4	V
		V_{15-4}	+15.6	V	V_9	negative going	6.2		8.2	Vp-p
		I_{15}	+41	mA	V_{10}	positive going		3.8		Vp-p
		V_{3-4}, V_{5-4} I_{16-4}	+30, 0	V	$\lvert\triangle f_H\rvert V_{CC}$	V_{15-4}=12V±20%			−55	Hz
		V_{11-4} I_{13-4}	+ 5, 0	V	$\lvert\triangle f_H\rvert Ta$	Ta=−20～60℃		50		Hz
		V_{9-4}	V_{15-4}, −5	V	T_H	horizontal oscillator		24.2		μsec
		V_{10-4}	V_{15-4}, 0	V	Hpull in(1)	synchronized	300			Hz
		V_{14-4}	+ 5, − 5	V	Hpull in(2)	synchronized	800			Hz
		I_3, I_5	+150, − 1	mA	f_{VO}	vertical oscillator		55.5		Hz
		P_T	490	mW	$\lvert\triangle f_V\rvert V_{CC}$	V_{15-4}=12V±20%	0	2	4	Hz
		Topr	−20～70	℃	$\lvert\triangle f_V\rvert Ta$	Ta=−20～60℃		2		Hz
		Tstg	−40～150	℃	T_V	vertical oscillator		600		μsec
					β	horizontal oscillator		810		Hz/v
					μ	sawtooth 4.65Vp-p flyback pulse with 12μsec		4		V/μsec

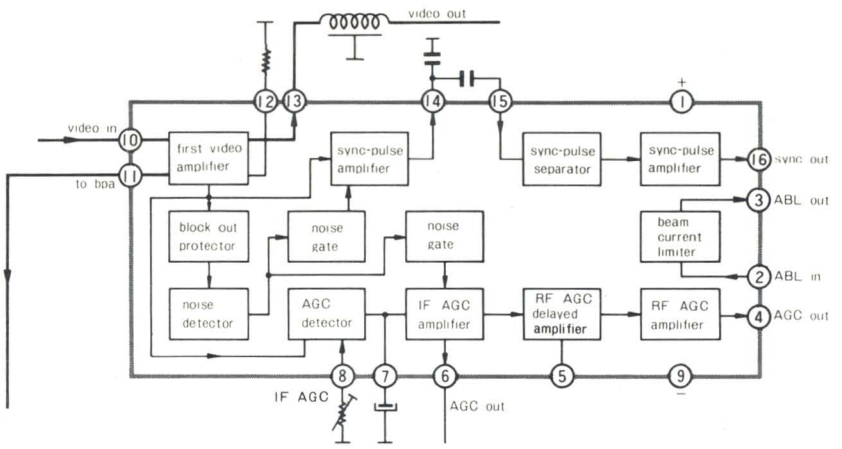


AN228

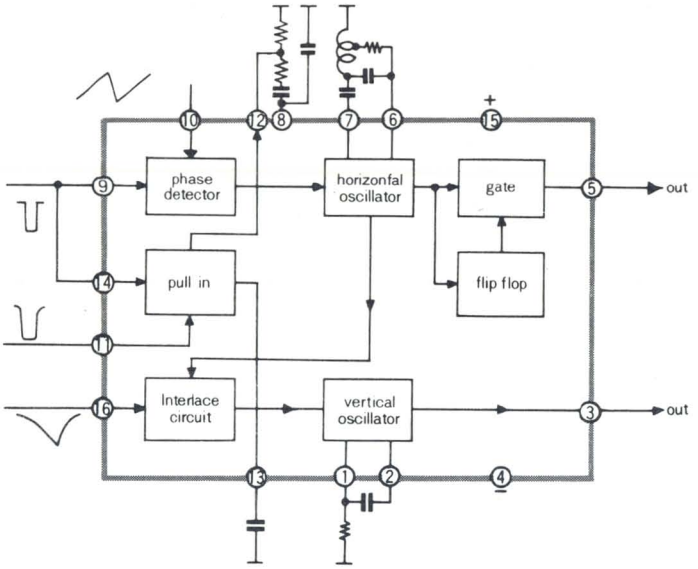


AN232

AN228, AN229, AN230, AN231 (Envelope I −8)

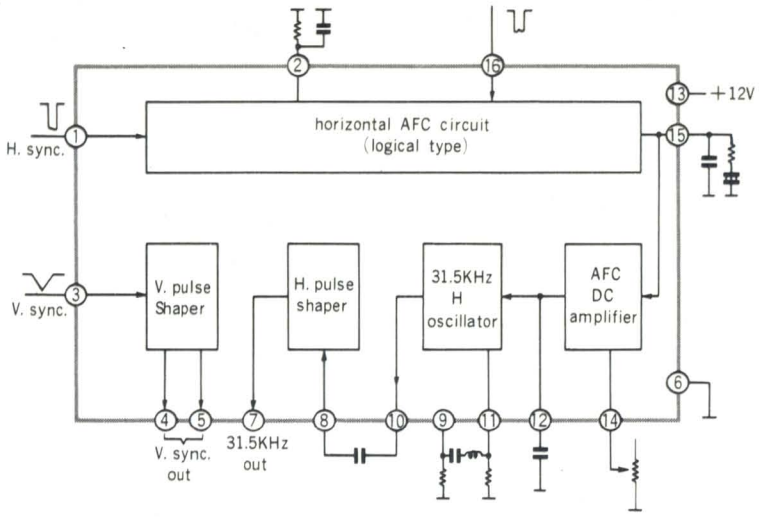


AN232 (Envelope I −8)

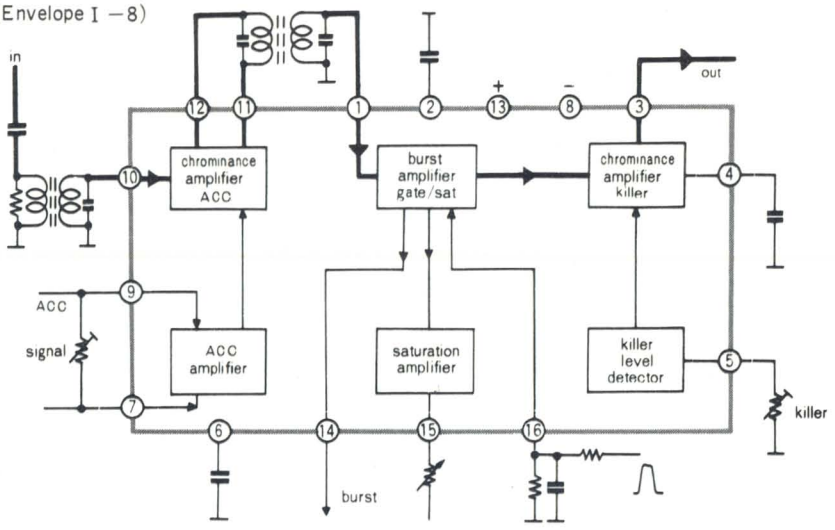


Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN233	Deflection Combination	V_{13-6}	15.6	V	Itot	f_H=31.5KHz	18.5	23.5	28	mA
		V_{1-6} V_{2-6} V_{8-6}	+5, −	V	V_{15-6}	t_P=+0.3μsec		5.6		V
		V_{3-6} V_{16-6}	−, −5	V	V_{15-6}	t_P=0		5.3		V
		V_{10-6}	V_{13-6}, −	V	G_{15-12}			30		times
		V_{14-6}	+12, −5	V	f_{HO}		29	31.5	35	KHz
		I_{9}, I_{11}	+0.1, −30	mA	T_H		6	9	13.5	KHz
		Itot	34	mA	β		100	124	150	Hz/v
		P_T	490	mW	V_{5-6}	V_3=1V			0.6	V
		Topr	−20~70	℃	V_{7-6}	V_8=2.5V			0.6	V
		Vstg	−40~150	℃						
AN234 AN235	Chrominance Combination	I_{13-8}	+15.6	V	Itot	V_{11-8}=V_{12-8}=12V, $-I_3$=1.4mA, $-I_{14}$=2.3mA	22	27.5	33	mA
		I_{13}	+41	mA	V_{13-8}		9.6	12	14.4	V
		V_{11-8} V_{12-8}	+15.6, 0	V	V_3	color sat. control set for max. output		1.1		Vp-p
		V_{15-8}	+5, −5	V	V_{14}	Chroma output is V_3 (1.1Vpp)		0.7		Vp-p
		V_{16-8}	+6, −5	V	V_{15-8}	color sat. control set of max. output		3.6		V
		I_3	+0.1, −10	mA		color sat. control set for max. −6dB output		2		V
		I_{11}, I_{12}	+10, 0	mA		color sat. control set for max. −40dB output		0.8		V
		I_{14}	+0.1, −10	mA		Chroma output is V_3 −6dB		26		dB
		I_{15}	+3, −0.1	mA	△V_3 V_{CC}	V_{13-8}=12V±20%			10	%
		I_{16}	+2, −0.1	mA	D. G			5.5		%
		P_T	490	mW	D. P			1		degrees
		Topr	−20~70	℃						
		Tstg	−40~150	℃						
	AN234				Gν	V_{7-8}=V_{9-8}=4V, V_{10}=3mVrms		40		dB
	AN235					V_{7-8}=V_{9-8}=4V, V_{10}=6mVrms		34		dB
AN236 AN237	Reference Combination	V_{1-5}	15.6	V	Itot	V_{1-5}=V_{14-5}=12V, V_{10-5}=2V	21.5	27	32.5	mA
		I_1	41	mA	V_{1-5}		9.6	12	14.4	V
		V_{10-5}	+5, −5	V	R_{APC}	burst input=0.5Vp-p	±600			Hz
		V_{14-5}	+15.6, 0	V		burst input=0.5Vp-p		2.25		degrees 100Hz
		I_3, I_4	+1, −1	mA	μ	burst input=0.5Vp-p		3		mV degrees
		I_6	+1, −1	mA	β	V_{12-11}=±20mV	9.5	13		Hz mV
		I_7, I_8	+10, −10	mA	V_{14}	500Ω connected between Terminal 14 and 1	1	1.3		Vp-p
		I_{10}	+3, −0.1	mA	△fosc V_{CC}	V_{1-5}=12V±20%			100	Hz
		I_{14}	+10, 0	mA	△fosc Ta	Ta=−20~70℃			200	Hz
		P_T	490	mW	V_{8-7}	burst input=0, V_{10-5}=1.5V, 100KΩ connected between Terminal 8 and 7		20		mV
		Topr	−20~70	℃						
		Tstg	−40~150	℃						
	AN236				△V_{8-7}	burst input=0.5Vp-p, R_1=10KΩ, R_2=100KΩ, C_1=3.3μF, C_2=10μF		+230		mV
	AN237							−230		mV

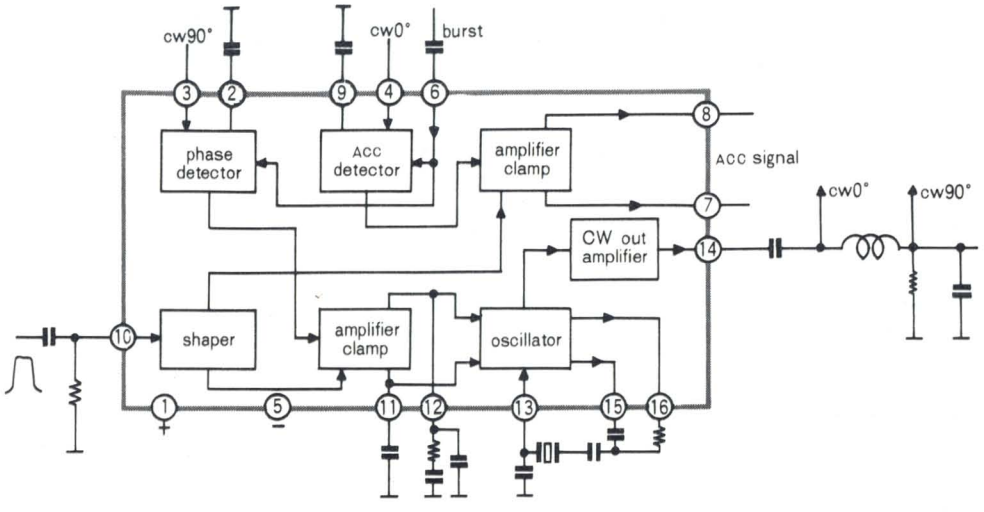
AN233 (Envelope I −8)



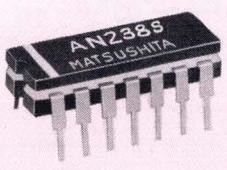
AN234, AN235 (Envelope I −8)



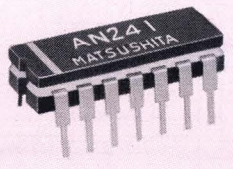
AN236, AN237 (Envelope I −8)



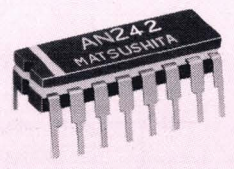
Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	Condition	min.	typ.	max.	Unit.
AN238S	Video IF Combination	V_{11-4}	+18	V	Itot	$V_7=V_8=12V$		28	35	mA
		$V_{7,8-4}$	+18	V	V_{11-4}	$V_7=V_8=12V$	9.6	12	14.4	V
		V_{5-4}	V_{11-4}, −20	V	G_V	f=58.75MHz	38		44	dB
		V_{6-4}	+10, 0	V	$V_{12(max.)}$	$V_{13-4}=6.5V$		9.5		V
		V_{13-4}	+10, 0	V	$V_{12(min.)}$	$V_{13-4}=6.5V$		0.3		V
		I_5	+0.5, −2	mA	g_{11}	f=58.75MHz		167		m℧
		Itot	37	mA	C_{11}	f=58.75MHz		8		pF
		P_T	445	mW	$\|Y_{12}\|$	f=58.75MHz		≪1.0		μ℧
		Topr	−20~70	℃	R_{22}	f=58.75MHz		12		KΩ
		Tstg	−40~150	℃	C_{22}	f=58.75MHz		4.6		pF
AN240 AN241	Sound Channel Combination (Def.Peak Det.)	I_5	50	mA	I_5	$V_{5-3}=+9V$	10	16	24	mA
		I_1, I_2	+1, −0.1	mA	$Vi_{(lim)}$	f=4.5MHz, FM=400Hz ±25KHz(FM)		250	400	μV
		I_6, I_7	+1, −1	mA	AMR	f=4.5MHz30%(AM)	40	50		dB
		I_8	+0.5, −6	mA	V_{OAF}	f=4.5MHz, Vi=100mV △f=±25KHz, FM=400Hz	0.5	0.8		Vrms
		I_{12}	+0.5, −6	mA	$R_{O(7)}$			7.5		KΩ
		P_T	445	mW	G_{AF}	Vi=0.1V rms, f=400Hz	17.5	20	23	dB
		Topr	−20~70	℃	Dtot (1)			1.5		%
		Tstg	−40~150	℃	Dtot (2)	Dtot=5%, f=400Hz	2	2.5		Vrms
	AN241				V_{5-3}		10.3	11.2	12.2	V
AN242	Color Demodulator	V_{16-9}	15.6	V	I_{16}	$V_{16-9}=12V$, $V_{5-9}=10.5V$ $V_{6-4}=2V$	24	30	36	mA
		I_{16}	41	mA	$V_{11,13,15}$	$V_{16-9}=12V$ $V_{6-9}=2V$	4.85	5.4	5.95	V
		V_{3-9} V_{4-9}	9.5, −1.5	V	V_{B-Y}	$V_{16-9}=12V$ Vchroma=0.5Vp-p	5.6	7		Vp-p
		V_{5-9}	V_{16-9}, −5	V	G_{B-Y}	$V_{16-9}=12V$	11	14	17	times
		V_{6-9}	+5, −5	V	$\frac{E_{B-Y}}{E_{R-Y}}$	Vchroma=0.3Vp-p	108	120	132	%
		V_{7-9}	V_{16-9}, 0	V	$\frac{E_{G-Y}}{E_{R-Y}}$	$V_{CW}=1Vp-p$	32	40	48	%
		I_8	+0.1, −10	mA	ϕ_{G-Y}	$V_6=1Vp-p$(H pulse)	227	237	247	degrees
		I_8	+5	mA peak	$\|Vu\|$max.	$V_{16-9}=12V$			35	mVp-p
		I_{11}, I_{13}, I_{15}	+1, −2	mA	$\frac{\|V_{13-11}\|}{\|V_{13-15}\|}$	$V_{16-9}=12V$ $V_{16-9}=2V$			0.3	V
		P_T	490	mW	$\triangle\frac{\|V_{13-11}\|}{\|V_{13-15}\|}\frac{Vcc}{Vcc}$	$V_{16-9}=12V\pm20\%$			35	mV
		Topr	−20~70	℃	$\triangle\frac{\|V_{13-11}\|}{\|V_{13-15}\|}\frac{Ta}{Ta}$	$V_{16-9}=12V$ Ta=−20~70℃			60	mV
		Tstg	−40~150	℃	G_{5-8}	$V_{16-9}=12V$, $V_{5-9}=10.5V$ f−0.5MHz	1.9	2.1	2.3	times
					B	$V_{16-9}=12V$ $V_{5-9}=10.5V$	4.5			MHz



AN238S

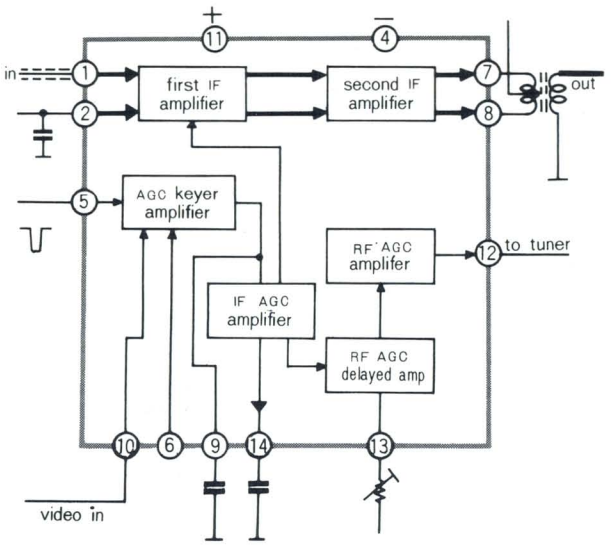


AN241

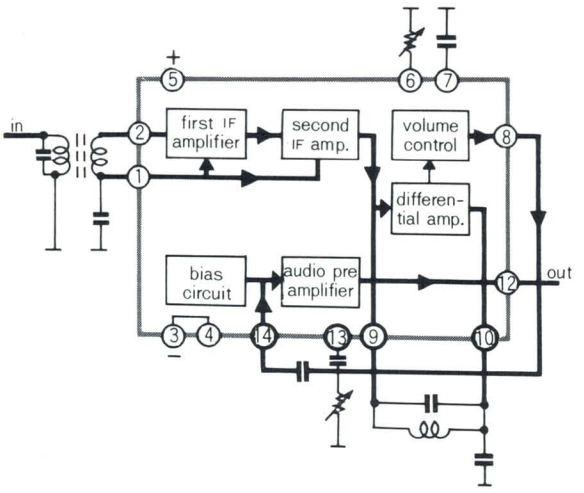


AN242

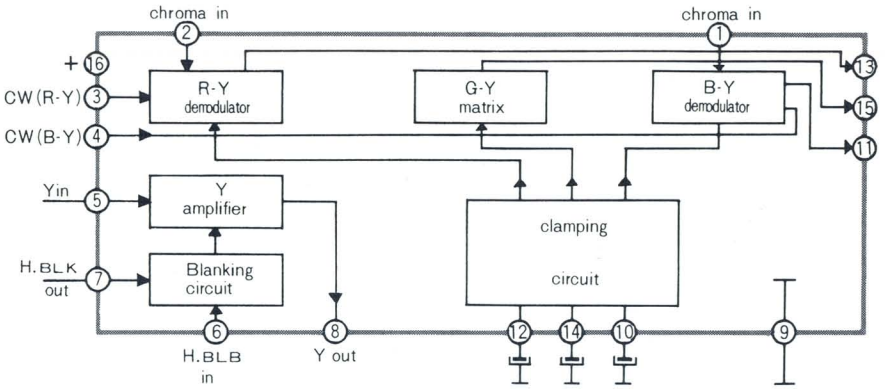
AN238S (Envelope I－7)



AN240, AN241 (Envelope I－7)

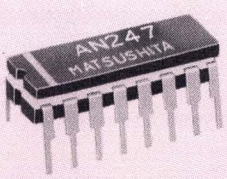


AN242 (Envelope I－8)

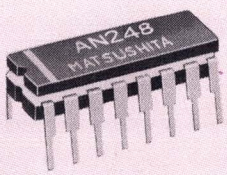


Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	Condition	min.	typ.	max.	Unit.
AN247△	Video IF Combination	$V_{2,14-15}$	+14.4	V	Itot	$V_{1-15}=V_{16-15}=V_{14-15}=12V$ $V_{2-15}=10V$		17	20.5	mA
		$V_{1,16-15}$	+14.4	V	A_P	f=58MHz		50		dB
		V_{12-15}	+10, 0	V	G_R	f=58MHz	60			dB
		V_{8-15}	+14.4, 0	V	g_{11}	f=58MHz Pin ③		0.85		m℧
		V_{11-15}	+14.4, 0	V	b_{11}	f=58MHz Pin ③		3.15		m℧
		I_3	+3, −3	mA	g_{22}	f=58MHz Pin ①		12		μ℧
		I_4	+0.1, −30	mA	b_{22}	f=58MHz Pin ①		360		μ℧
		I_7	+3, −0.1	mA	$\|Y_{12}\|$	f=58MHz			0.01	μ℧
		I_9	+3, −50	mA	$\|Y_{21}\|$	f=58MHz		300		μ℧
		I_{12}	+3, −1	mA	$V_{9-15(max.)}$			9		V
		I_{13}	+3, −3	mA	$V_{9-15(min.)}$				0.2	V
		Itot	34	mA	$V_{4-15(max.)}$			10		V
		P_T	490	mW	$V_{4-15(min.)}$				0.2	V
		Topr	−20~70	℃	$V_{5-15(max.)}$			11		V
		Tstg	−40~150	℃	$V_{5-15(min.)}$				0.2	V
AN248△	Video IF Combination	V_{14-3}	14.4	V	Itot	$V_{14-3}=12V$		39	47	mA
		V_{1-2}	+0.5, −0.5	V	V_{9-3}	$V_{14-3}=12V$		6		V
		V_{6-7}	−5	V	V_{10-3}	$V_{14-3}=12V$		6		V
		V_{8-10}	−5	V	$\frac{\triangle V_{9-3}}{\triangle Ta}$	Ta=−20~70℃			±2	mV/℃
		I_1	+3, −0.1	mA	$\frac{\triangle V_{10-3}}{\triangle Ta}$	Ta=−20~70℃			±2	mV/℃
		I_2	+3, −0.1	mA	V_{IN}	fo=58.75MHz, fs=400Hz m=80%		20		mVrms
		I_4	+1, −10	mA	V_{O-N}	fo=58.75MHz, fs=400Hz m=40%, Vin=20mV		500		mVrms
		I_6	+3, −0.1	mA	BW_{-N}			6		MHz
		I_9	+1, −10	mA	CR				10	mVrms
		I_{10}	+1, −10	mA	DG_{-N}				5	%
		I_{11}	+0.1, −10	mA	DP_{-N}				3	degrees
		Itot	44	mA	Ri	f=58MHz Pin ①		3.5		KΩ
		P_T	640	mW	Ci	f=58MHz Pin ①		9		pF
		Topr	−20~70	℃	$V_{O\ (AFT)}$			80		mVrms
		Tstg	−40~150	℃						

△ Preliminary

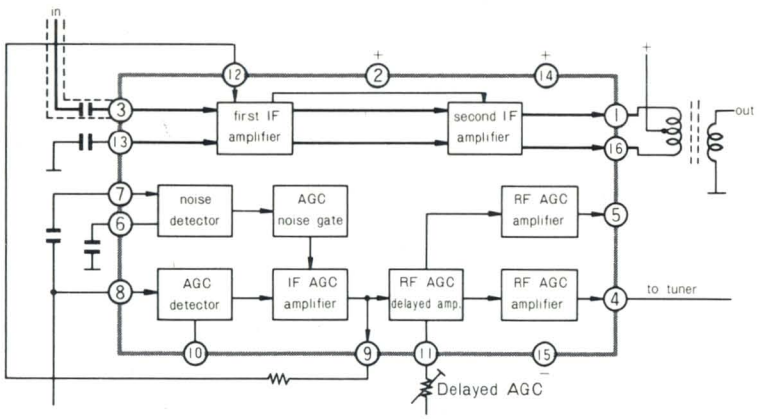


AN247

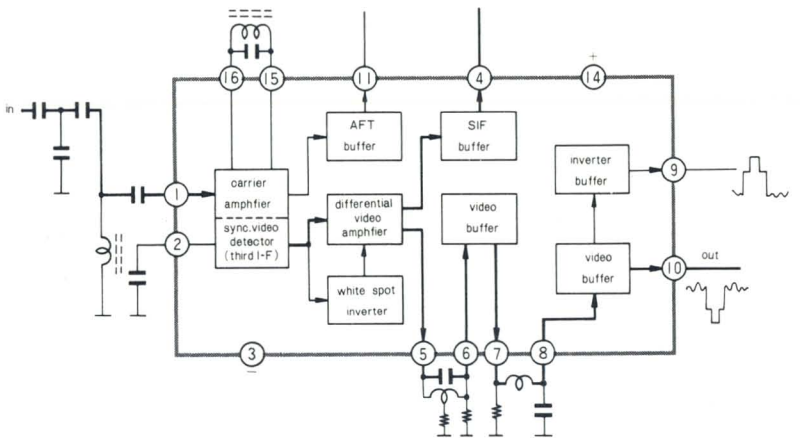


AN248

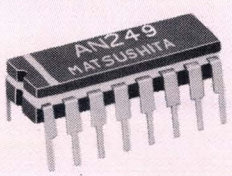
AN247 (Envelope I −8)



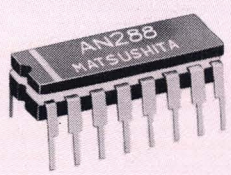
AN248 (Envelope I −8)



Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN249	Video Jungle Combination	V_{1-8}	14.4	V	Itot		25.5	32	38.5	mA
		I_1	50	mA	V_{1-8}		9.6	12	14.4	V
		V_{5-8}	+1.2, 0	V	V_{6-8}	I_5=1mA, 16V−⑥: 910Ω ①−⑨: 270KΩ, ⑦−⑧: 240Ω	4.9	6	7.4	V
		V_{6-8}	+20, 0	V	A_{2-6}	I_5=1mA, 16V−⑥: 910Ω V_2=1V_{PP}, ⑦−⑧: 240Ω	7.4	8.3	9.2	times
		V_{10-8}	+29, 0	V	B_{2-6}	−3dB point	6.4	7.5		MHz
		V_{13-8}	+2, 0	V	DG_{2-6}	I_5=1mA, 16V−⑥: 910Ω V_2=1V_{PP}, ⑦−⑧: 240Ω		4		%
		V_{14-8}	+24, 0	V	A_{2-3} A_{2-4}	V_{2-8}=3.5V, V_2=1V_{PP} ③−⑧: 2.7KΩ, ④−⑧: 1.5KΩ	1.9	2.1	2.3	times
		V_{16-8}	+14.4, 0	V	B_{2-4}	V_{2-8}=3.5V, V_2=1V_{PP} ④−⑧: 1.5KΩ	10			MHz
		I_2	+1, 0	mA	DG_{2-4}	V_{2-8}=3.5V, V_2=1Vp-p ④−⑧: 1.5KΩ		1		%
		I_5	+1.5, 0	mA	DP_{2-4}	V_{2-8}=3.5V, V_2=1Vp-p ④−⑧: 1.5KΩ		1.1		degrees
		I_6	+18, 0	mA	$V_{13-8(S)}$	$I_{14}\cong 0$, when V_{13-8} is more than $V_{13-8(S)}$		1.2		V
		P_T	490	mW	A_{13-14}	⑭−20V: 10KΩ	100	145		times
		Topr	−20~ 70	℃	$V_{16-8(S)}$	V_{15-8}=0.2V, when V_{16-8} is more than $V_{16-8(S)}$		9.4		V
		Tstg	−40~ 150	℃	$Ri_{(2-8)}$	f=3.6MHz		40		KΩ
					$C_{O(2-8)}$	f=3.6MHz		9		pF
AN288 AN289	Color Processing Combination	V_{8-10}	+14.4	V	Itot		21.5	28	34.5	mA
		I_8	44.5	mA	V_{8-10}		9.6	12	14.4	V
		V_{2-10}	−5	V	V_9	burst output=2Vp-p		1.2		Vp-p
		V_{6-10}, V_{7-10}	V_{8-10}, 0	V	V_{R-Y} V_{B-Y}	burst output=2Vp-p	0.8			Vp-p
		V_{9-10}	+17, 0	V		tint control range		100		degrees
		V_{13-10}	V_{3-10}, −5	V		−3dB down from maximum output		23		dB
		V_{14-10}	+2.5, 0	V	V_{CW}	color killer "ON"	0.7			Vp-p
		V_{15-10}	+10, 0	V	f_{CW}	color killer "ON" AN288 AN289	3.18 —	3.58 —	3.98 —	MHz
		I_1, I_5, I_{13} I_{14}, I_{15}, I_{16}	+3, −0.1	mA	$\lvert\triangle V_9\rvert V_{CC}$	V_{2-10}=3Vp-pG pulse 5μs width V_{8-10}=12V±20%	−2.5		+2.5	dB
		I_2	+10, −1	mA (peak)	$\lvert\triangle\phi_{R-Y}\rvert V_{CC}$	V_{8-10}=12V±20%			5	degrees
		I_3, I_{11}	+0.1, −10	mA	color killer	V_{8-10}=12V±20%		2		dB
		I_4, I_{12}	+0.1, −3	mA	$\lvert\triangle V_9\rvert$ Ta	Ta=−20~70℃			2.4	dB
		P_T	640	mW	$\lvert\triangle\phi_{R-Y}\rvert$ Ta	Ta=−20~70℃			15	degrees
		Topr	−20~ 70	℃	D·G			6		%
		Tstg	−40~ 150	℃	D·P			4		degrees

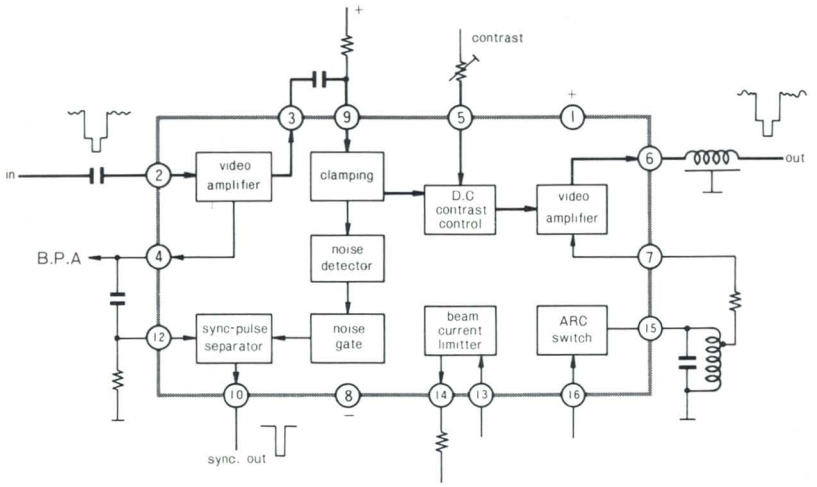


AN249

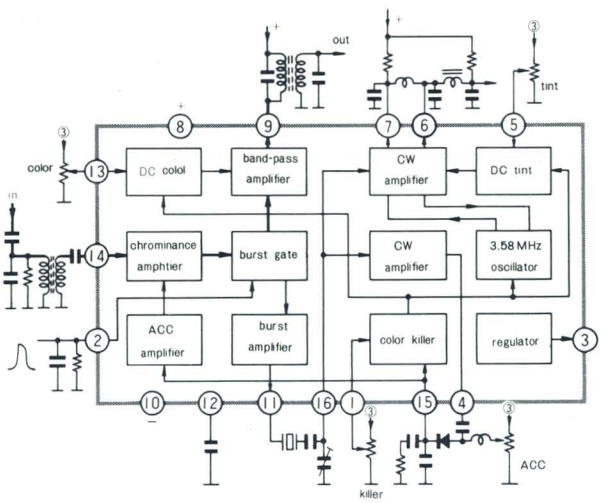


AN288

AN249 (Envelope I −8)

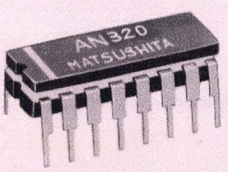


AN288, AN289 (Envelope I −8)

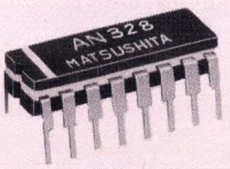


Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	Condition	min.	typ.	max.	Unit.
AN320△	Tuning system Combination	V_{16-3}	+21	V	I_{16}	$V_{CC}=24V$, $R_S=270\Omega$ $V_{1-3}=5.6V$, $V_{10-3}=V_{16-3}$	13	20	27	mA
		V_{1-3}	+10, 0	V	I_{10}	〃	1	1.9	3.5	mA
		V_{4-3}	+10, 0	V	I_4	〃	0.4	0.65	1	mA
		$V_{6,8-3}$	+7, 0	V	Vi (lim.)	f=58.75MHz		80		mVrms
		V_{7-3}	+10, 0	V	Vo	f=58.75MHz Vi=180mV		2.1		Vrms
		V_{10-3}	+20, 0	V	Ri	f=58.75MHz Pin⑦		1.7		kΩ
		V_{14-3}	+7, 0	V	Ci	〃		5.5		pF
		I_2	+1, −1	mA	Ro	f=58.75MHz Pin⑩		1.8		kΩ
		I_4	+0.1, −3	mA	Co	〃		4.5		pF
		I_5	+3, −2	mA	$V_{12,13-3}$		6	6.5	7	V
		I_{15}	+3, −3	mA	V_{12-13}	S_1,S_2 OFF	−0.7	0	+0.7	V
		Itot	30	mA	V_{12-13}	S_1,S_2 ON	−0.1	0	+0.1	V
		P_T	640	mW	$t_{(R-G)}$		8	11	14	μsec
		Topr	−20~70	℃	t (max.)		28	33	38	μsec
		Tstg	−40~150	℃	S_{ML}			0.1		μs/mV
AN328 AN331	Video Jungle Combination	V_{1-9}	+15.6	V	Itot		14	18	22	mA
		I_1	+41	mA	V_{1-9}		9.6	12	14.4	V
		V_{3-9} V_{13-9}	+30, 0 +24, 0	V	V_{15-9}	AN328 AN331		0.48		V
		V_{16-9}	+30, 0	V	V_{13-9}	AN328		7.2		Vp-p
		V_{2-9} V_{5-9}	V_{1-9}, −5	V	B		4.5			MHz
		V_{8-9} V_{10-9}	V_{1-9}, −5	V	G_{10-12}	$V_{10-9}=11\sim10V$ Pin⑩→⑫Gain	1.12	1.2	1.28	times
		P_{T5} P_{T7}	60 45	mW	G_{10-14}	$V_{10-9}=10.2\sim11.2V$ Pin⑩→⑭Gain	2.2	2.7	3.3	times
		I_3 I_4	+10, −0.1 +0.1, −10	mA	G_{10-11}	$V_{10-9}=11\sim10V$ Pin⑩→⑪Gain		0.99		times
		I_6 I_{14}	+1, −10	mA	V_{6-9}	$R_{6-9}=3.3K\Omega$ $V_{10-9}=9V$	9			V
		I_5 I_{10}, I_{15}	+1, −0.1	mA	V_{4-9}	$R_{4-9}=10K\Omega$, $V_{5-9}=3.2V$ $V_{6-9}=6V$	8.4			V
		I_{13}	+20, 0	mA	V_{2-9}	$V_{3-9}=6V$, $R_{1-3}=3.3K\Omega$ positive going	1.04	1.3	1.55	V
		I_{16}	+10, 0	mA	V_{8-9}		2.54	2.7	2.86	V
		P_T	490	mW	V_{16-9}	negative going			≦30	V
		Topr	−20~70	℃	G_{RF}	Pin⑥→④Gain $R_{4-9}=10K\Omega$, $V_{4-9}=3V$		80		times
		Tstg	−40~150	℃	G_{2-3}	$R_{1-3}=3.3K\Omega$		54		times

△ Preliminary

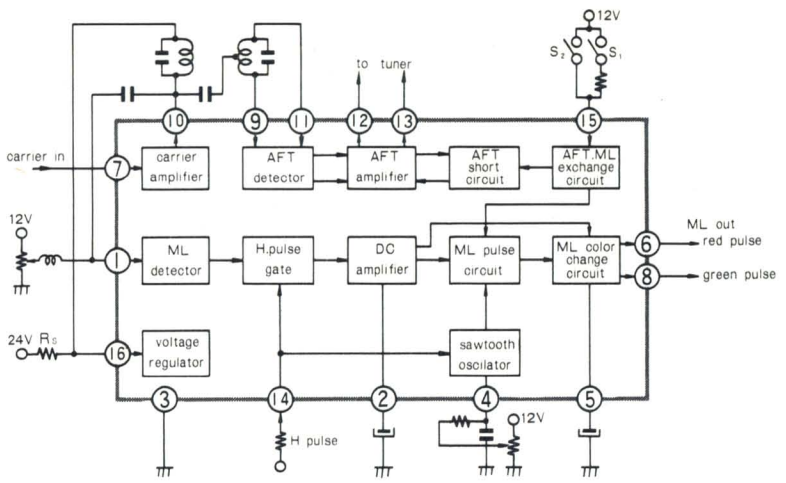


AN320

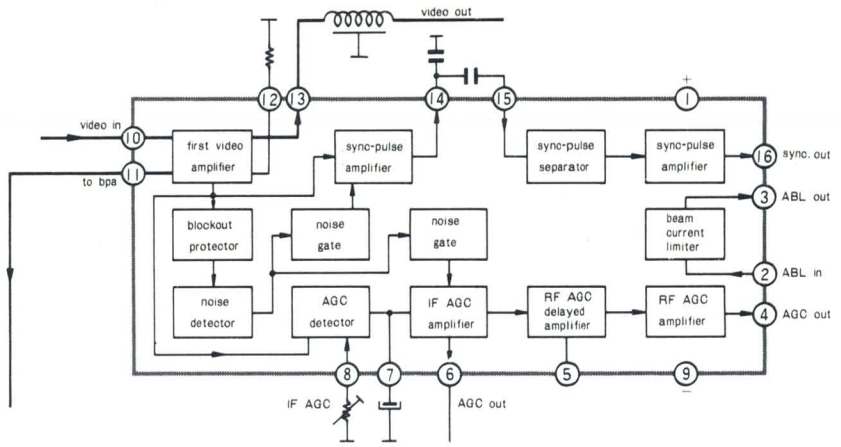


AN328

AN320 (Envelope I −8)



AN328 , AN331 (Envelope I −8)



Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN332※ AN334	Deflection Combination	V_{15-4}	15.6	V	Itot		20	25	30	mA
		I_{15}	41	mA	V_{15-4}		9.6	12	14.4	V
		V_{3-4} V_{5-4}	+30, 0	V	V_9	negative going	6.2		8.2	Vp-p
		V_{16-4}	V_{15-4}+2, 0	V	V_{10}	positive going		3.8		Vp-p
		V_{11-4} V_{13-4}	+ 5 , 0	V	$\lvert\triangle f_H\rvert V_{CC}$	V_{15-4}=12V±20%	−10		30	Hz
		V_{9-4}	V_{15-4}, −5	V	$\lvert\triangle f_H\rvert Ta$	Ta=−20~70℃		75		Hz
		V_{10-4}	V_{15-4}, 0	V	τ_H		22.7	24.2	25.7	μsec
		V_{12-4}	+15, 0	V	H pull in			±150		Hz
		I_3,I_5	+150, −1	mA	H hold			±500		Hz
		I_1,I_9	+0.1, −10	mA	β			810		Hz/V
		I_2,I_8,I_{10}	+10, −10	mA	μ			4		V/μsec
		I_7,I_{11}	+ 1 , − 1	mA	f_{VO}		52	55	58	Hz
		P_T	490	mW	$\lvert\triangle f_V\rvert V_{CC}$	V_{15-4}=12V±20%	0	0.5	1.5	Hz
		Topr	−20~70	℃	$\lvert\triangle f_V\rvert Ta$	Ta=−20~70℃		1.5	3	Hz
		Tstg	−40~150	℃	τ_V			630		μsec
AN333	Deflection Combination	V_{13-6}	15.6	V	Itot	f_H=31.5KHz	14	19	24	mA
		V_{1-6} V_{14-6}	V_{13-6}, − 5	V	V_{13-6}			12		V
		V_{2-6} V_{3-6}	−, − 5	V	V_{15-6}			4.9		V
		V_{8-6}	+ 5 , −	V	G_{15-12}			30		times
		V_{10-6}	V_{13-6}, −	V	f_{HO}		29	31.5	35	KHz
		V_{15-6}	V_{13-6}, 0	V	T_H		6	9	13.5	μsec
		V_{16-6}	+15.6, 0	V	β		100	124	150	Hz/V
		I_9,I_{11}	+0.1, −30	mA	V_{5-6}	I_3=1mA			0.6	V
		Itot	34	mA	V_{7-6}	V_8=2.5 V			0.6	V
		P_T	490	mW	$V_{16-6(ON)}$	R_{13-16}=22KΩ V_{5-6}=0V I_2=0.5mA			0.6	V
		Topr	−20~70	℃	$V_{16-6(OFF)}$		11			V
		Tstg	−40~150	℃	$V_{16-6(ON)}$	R_{13-16}=22KΩ			0.6	V
					$V_{16-6(OFF}$	V_{1-6}=5V	11			V

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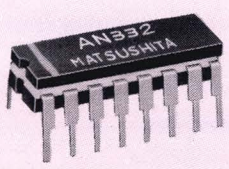
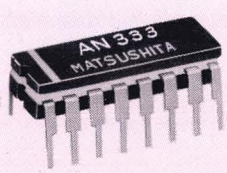
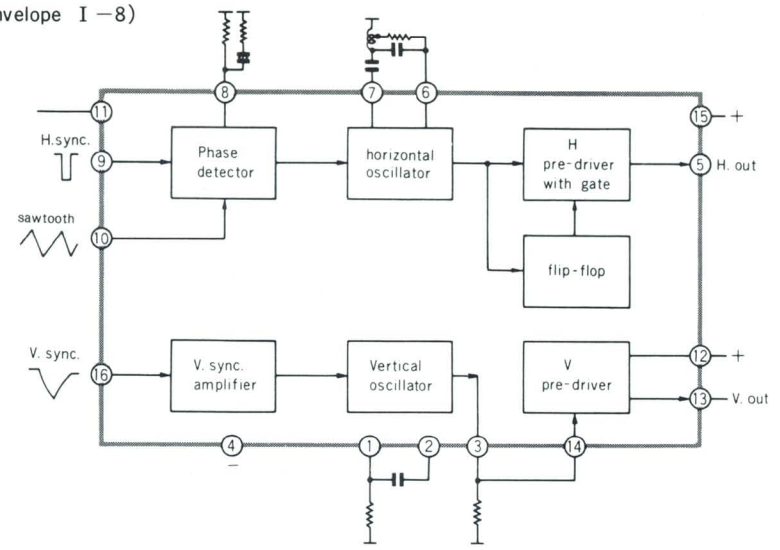


AN332

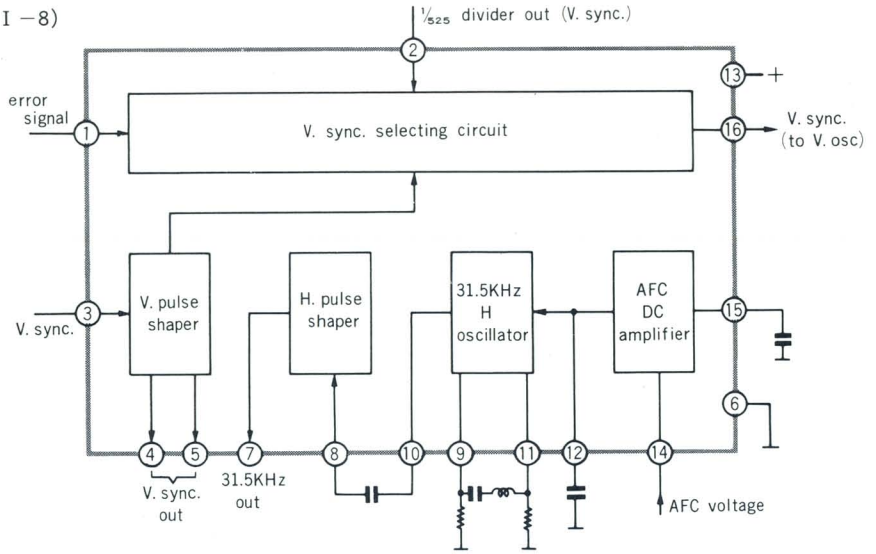


AN333

AN332, AN334 (Envelope I −8)

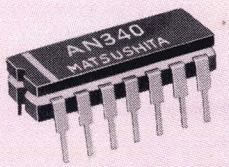


AN333 (Envelope I −8)

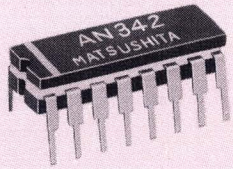


Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN340△	Sound channel Combination (Def. Peak Det.)	V_{1-3}	+5, −5	V	Itot	$V_{5-3}=+12V$	18	27	40	mA
		V_{2-3}	+4, −5	V	$V_{i\ (lim)}$	$f_O=4.5MHz$ $f_m=400Hz$ $\triangle f=\pm 25KHz$ (FM)		100	300	μV
		V_{4-3}	+6, 0	V	AMR	$f_O=4.5MHz$ 30% (AM)	40	55		dB
		V_{7-3}	V_{5-3}, 0	V	$\|Gm\|_{(IF)}$	f=4.5MHz		550		m℧
		V_{9-3}	+4, 0	V	$\theta_{(IF)}$	f=4.5MHz		46		degrees
		V_{10-3}	+4, −5	V	C_{fb}	f=4.5MHz		<0.02		pF
		V_{14-3}	+3, −5	V	Ri	f=4.5MHz		17		K
		I_1	+1, −0.1	mA	Ci	f=4.5MHz		4.7		pF
		I_2	+1, −0.1	mA	Att	$f_O=4.5MHz$, $f_m=400Hz$ $\triangle f=\pm 25KHz$, $V_i=100mV$	80	90		dB
		I_9	+1, −1	mA	$V_{O(O)}$			20		μV
		I_{10}	−1, −0.1	mA	$V_{O(AF)}$		0.4	0.6		Vrms
		Itot	50	mA	$R_{O(7)}$			6.2		KΩ
		P_T	445	mW	$R_{O(8)}$			300		Ω
		Topr	−20~70	℃	$G_{(AF)}$	$V_i=0.1Vrms$ f=400Hz	17.5	20		dB
		Tstg	−40~150	℃	Dtot	$V_o=2Vrms$ f=400Hz		1.5		%
AN342 AN343	Color Demodulator	V_{16-9}	14.4	V	$\triangle\|V_{13-11}\|/V_{CC}$ $\triangle\|V_{13-15}\|/V_{CC}$	$V_{16-9}=12V\pm 20\%$			50	mV
		V_{1-9} V_{2-9}	+8, −2.5	V	$\triangle\|V_{13-11}\|/Ta$ $\triangle\|V_{13-15}\|/Ta$	Ta=−20~70℃			60	mV
		V_{3-9} V_{4-9}	+9.5, −1.5	V	E_{B-Y} / E_{R-Y}	AN342	135	150	165	%
		V_{5-9}	V_{16-9}, 0	V		AN343	91	106	121	%
		V_{6-9}	+5, −5	V	E_{G-Y} / E_{R-Y}	AN342	32	40	48	%
		V_{7-9}	V_{16-9}, 0	V		AN343	24	30	36	%
		$I_{1,2,3,4}$	+1, −1	mA	ϕ_{G-Y}		227	238	247	degrees
		I_5	+1, −0.1	mA	G_{R-Y}			23		dB
		I_6	+3, −1	mA	Vu (max.)				50	mV
		I_7	+5, 0	mA	G_{5-8}			6		dB
		I_8	+0.2, −5	mA	B		4.5			MHz
		Itot	41	mA	Itot	$V_{5-9}=10V$, $V_6=3V_{P-P}$ Hpulse	17.6	22	26.4	mA
		P_T	490	mW	V_{16-9}		9.6	14	14.4	V
		Topr	−20~70	℃	V_{13-9}	$V_{6-9}=3V_{P-P}$. H pulse	5.7	6	6.3	V
		Tstg	−40~150	℃	V_{13-11}	$V_{6-9}=3$Vp-p, H pulse			50	mV

△ Preliminary

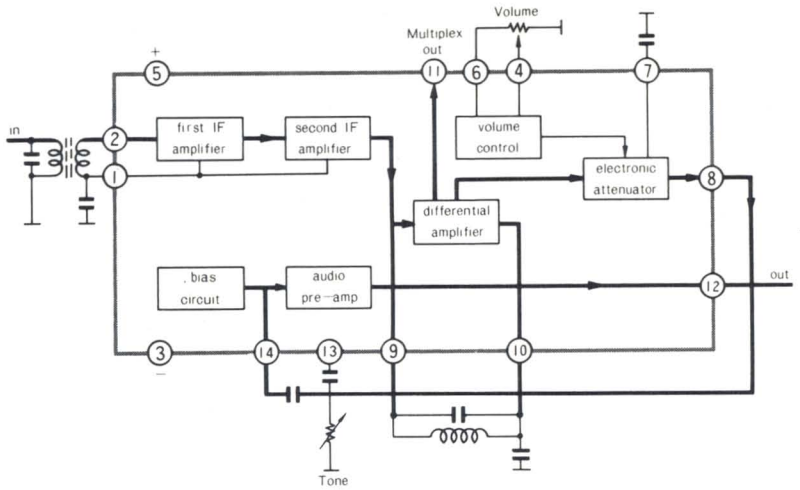


AN340

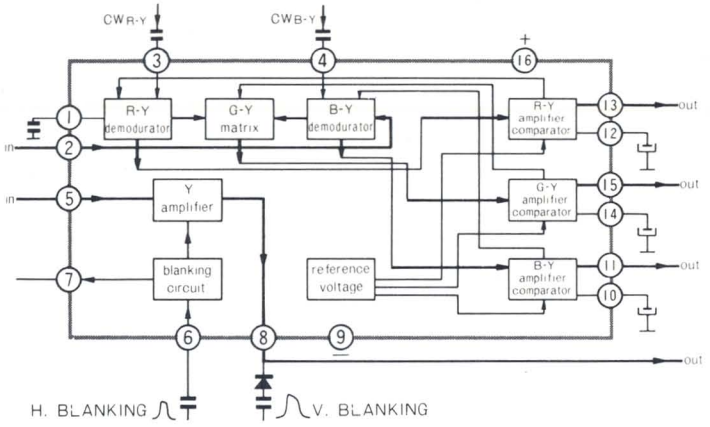


AN342

AN340 (Envelope I −7)



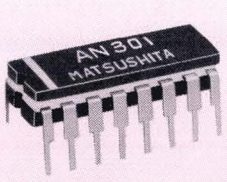
AN342, AN343 (Envelope I −8)



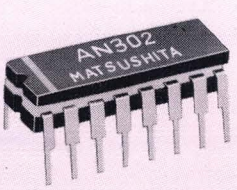
(FOR VTR)

Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max	Unit
AN301	VTR Servo Control Signal Process Circuit	V_{1-4}	15.6	V	I_1	$V_1=12V$	18.5	23.3	28	mA
		Itot	45	mA	G_{V15-16}	$V_{16}=1V_{P-P}$	3	3.5	4	
		V_{7-4}	−12	V	Vo sync 13	$V_{16}=1V_{P-P}$	8.4			Vp-p
		V_{11-4}	−12	V	$V_{IN\,16}$	V_{16}=Pulse 60Hz	3	7.6	20	mVp-p
		I_8	−10	mA	T_{WR9}	$V_{16}=1V_{P-P}$ 60Hz	25	27.5	30	msec
		I_9	−10	mA	G_{V2-3}	$V_3=5mV_{P-P}$		150		times
		I_{13}	−10.3	mA	$V_{IN\,3}$	V_3=Pulse 30Hz	0.6	0.9	1.5	mVp-p
		P_T	550	mW	T_{WP8}	$V_3=5mV_{P-P}$ 30Hz	26	29	31	msec
		Topr	−10~60	℃						
		Tstg	−40~150	℃						
AN302	VTR Video AGC Circuit	V_{12-4}	15.6	V	Itot	$V_{12-4}=12V$	15	25	38	mA
		V_{13-4}	0~12	V	V_{11}	$V_{12-4}=12V$	2	3	4	V
		I_1	−5	mA	A_{AGC} ⑦	$V_{12-4}=12V$ Vi=0.5Vp-p	1	1.3	1.8	Vp-p
		I_4	−45	mA	C_{AGC} ⑦	f=10KHz −10~+5dB		0.5	1	dB
		I_7	−5	mA	G_{AGC} ⑦	$V_{12-4}=12V$, f=10KHz Vi=0.1V_{P-P}		22		dB
		I_{14}	−5.5	mA	SN_{AGC} ⑦	$V_{12-4}=12V$, Video signal 0.15V_{P-P}	45	50		dB
		Itot	45	mA	G_f	$V_{12-4}=12V$, f_1=1MHz f_2=5MHz, Vi=0.1V_{P-P}		0.5		dB
		P_T	490	mW	G_{EH}	$V_{12-4}=12V$, Vi=0.3V_{P-P} f_1=10KHz, f_2=2MHz	7.1	8	8.5	dB
		Topr	−10~70	℃	G_{EL}	$V_{12-4}=12V$, f=10KHz Vi=0.3V_{P-P}	8	10	12	dB
		Tstg	−40~150	℃	D_{AGC}	$V_{12-4}=12V$, f=10KHz Vi=0.5V_{P-P}		0.5	1.5	%
AN303 △	VTR Noise Suppression Circuit	V_{9-14}	14.4	V	SN impr.			4		dB
		I_7	−30	mA	Vo(max.)	f=10KHz	3.4			Vp-p
		I_8	−30	mA	Dtot	f=10KHz, Vi=0.3V_{P-P}			1	%
		Itot	100	mA	HA	f=3MHz, Vi=3mV_{P-P}	36			dB
		P_T	1.44	W	VA_1	f=10KHz, Vi=0.3V_{P-P}	1.8	2	2.5	Vp-p
		Topr	−20~70	℃	MA	f=3MHz, Vi=0.5V_{P-P}	1.4			Vp-p
		Tstg	−40~150	℃	Sq	f=3MHz, $P_O=3V_{P-P}$			−50	dB

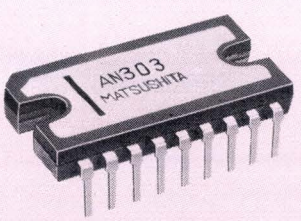
△ Preliminary



AN301

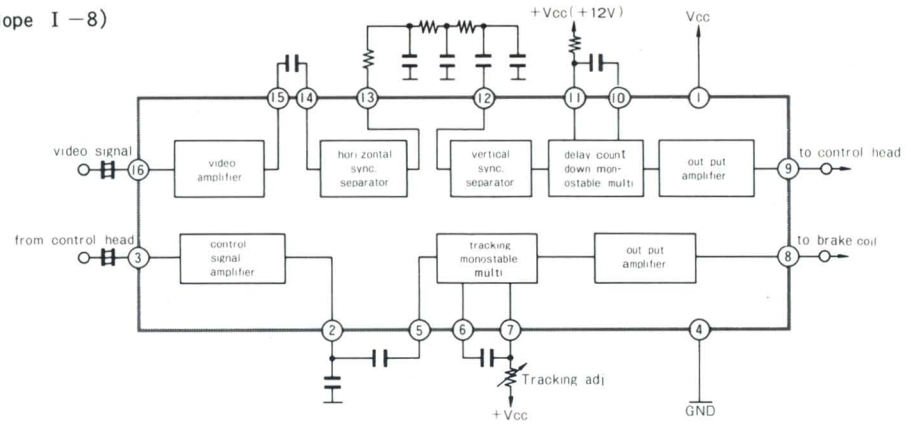


AN302

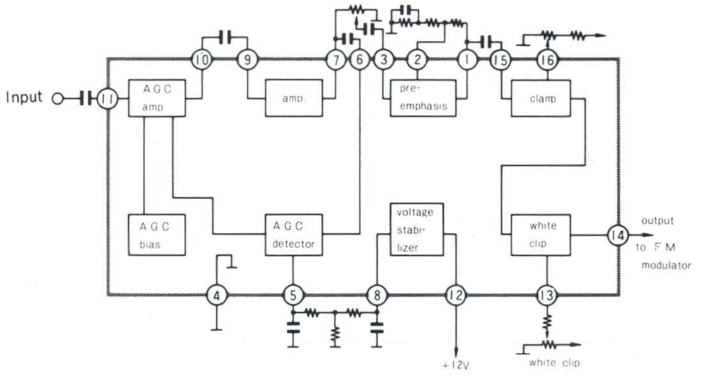


AN303

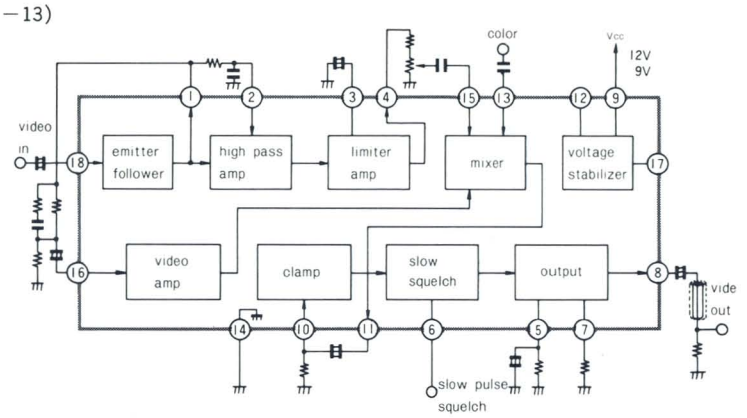
AN301 (Envelope I −8)



AN302 (Envelope I −8)

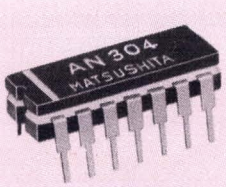


AN303 (Envelope I −13)

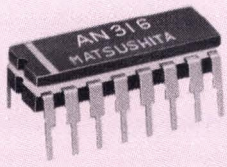


Type No.	Application	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
AN304	VTR Video FM Limiter Circuit	V_{12-4}	15.6	V	I_{12}	$V_{12-4}=12V$	15	25	30	mA
		V_{7-5}	+12	V	$V_{8(P-P)}$	pin⑧ 1 KΩ GND	1	1.2		V
		V_{7-6}	+30	V	G_V	$V_{12-4}=12V$, f=4 MHz, $Vi=0.14mV_{P-P}$	1			Vp-p
		V_{6-5}	− 5	V	Vo(f)/Vo(2f)	$V_{12-4}=12V$, f=4 MHz, $Vi=100mV_{P-P}$	40			dB
		I_7	+20	mA	Vo(f)/Vo(2f)	$V_{12-4}=12V$, f=4 MHz, $Vi=10mV_{P-P}$	40			dB
		I_8	− 5	mA	Vo(f)/Vo(2f)	$V_{12-4}=12V$, f=4 MHz, $Vi=1.0V_{P-P}$	40			dB
		I tot	30	mA	Vo(f)/Vo(2f)	$V_{12-4}=12V$, f=4 MHz, $Vi=100mV_{P-P}$, Ta=70℃		41		dB
		P_T	490	mW	Vo(f)/Vo(2f)	$V_{12-4}=12V$, f=4 MHz, $Vi=100mV_{P-P}$, Ta=−20℃		48		dB
		$P_{T(T30)}$	50	mW	h_{FE}	$V_{12-4}=12V$	40		200	
		Topr	−20~70	℃						
		Tstg	−40~150	℃						
AN316△	VTR Dropout Compensation Circuit	V_{16-6}	14.4	V	I_{16}	$V_{16-6}=12V$	18	25	37	mA
		V_{5-6}	3	V	V_{13-6}		4.7	5.6	6.6	V
		V_{15-6}	5	V	Vi(max.)	$V_{16-6}=12V$, f=4MHz, $V_O=Po(max.)$			400	mVp-p
		I_6	+1, −40	mA	V_{OC}	$V_{16-6}=12V$, f=4MHz, Vi=70mV	135	180	225	mVrms
		I_9	+1, −5	mA	G_C	$V_{16-6}=12V$, f=4MHz, Vi=70mV		8.7		dB
		I_{15}	+6, −1	mA	Gfc	Vi=70mV, f=3MHz, Vi=70mV, f=10MHz		−5		dB
		Itot	40	mA	SN_C	V_{OC}/V_O(at Vi=0)		50		dB
		P_T	485	mW	Vrd	$V_{7-6}=30mVrms$, f=4MHz		1	1.5	mVrms
		Topr	−20~70	℃	Vrc	$V_{2-6}=70mVrms$, f=4MHz		1	1.5	mVrms
		Tstg	−40~150	℃	Vd	Vi=200mVp-p, f=4MHz, Drop Out time=3H	20	35	55	mVp-p
AN605	VTR Automatic Tape Loading Circuit	(Schmidt) V_{7-14}	15	V	$V_{IN(ON)}$	$V_{7-14}=12V$	3.6	4	4.4	V
		V_{IN}	10	V	$V_{IN(OFF)}$	$V_{7-14}=12V$	3.6	4	4.4	V
		$I_{O(ON)}$	−40	mA	$V_{O(ON)}$	$I_{O(ON)}=-20mA$, $V_{IN}=3.6V$		0.2	0.4	V
		$V_{O(ON)}$	15	V	Z_{IN}	$V_{IN}=5V$		10		MΩ
		(DC Amp) I_1	1	mA	$V_{IN(ON)}$		0		0.3	V
		I_2	1	mA	$I_{IN(OFF)}$		0.1			mA
		V_{2-14}	15	V	$V_{O(ON)}$	$I_{O(ON)}=-2mA$, $V_{IN}=0.3V$		0.2	1	V
		P_T	490	mW	Itot			20		mA
		Topr	−10~65	℃						
		Tstg	−65~150	℃						

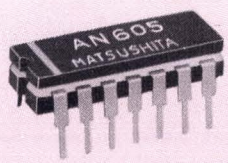
△ Preliminary



AN304

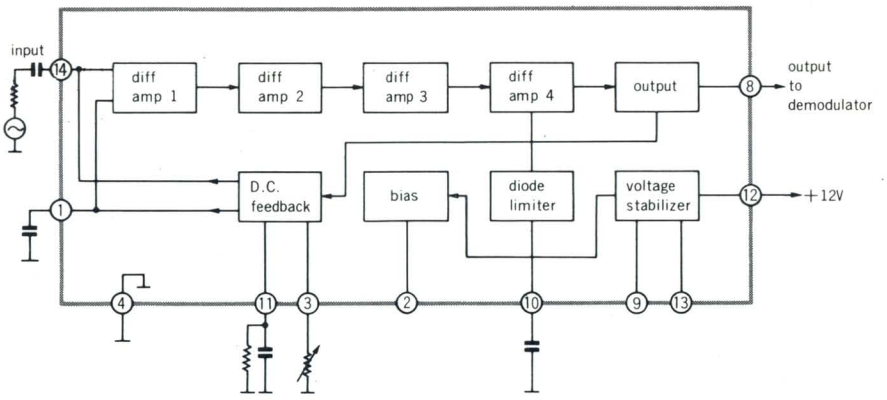


AN316

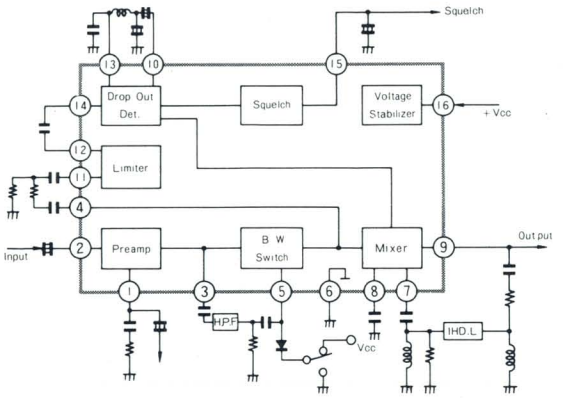


AN605

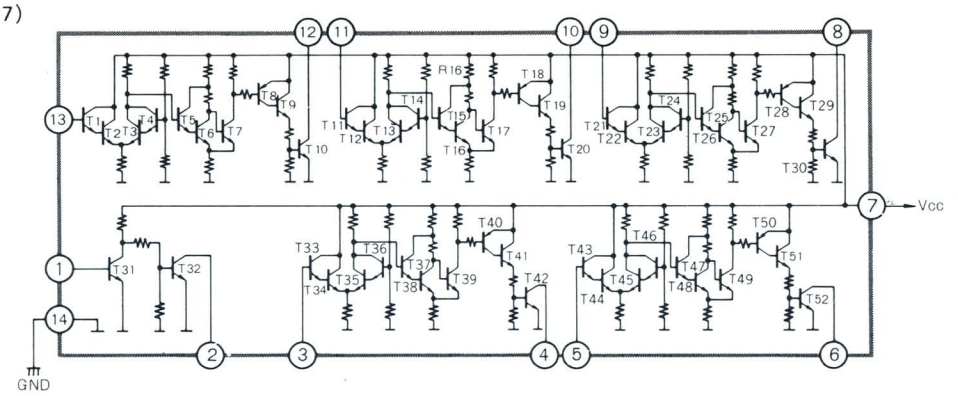
AN304 (Envelope I −7)



AN316 (Envelope I −8)



AN605 (Envelope I −7)

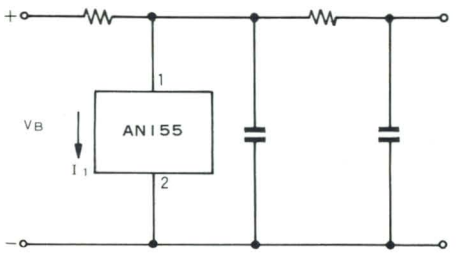


(MISCELLANEOUS TYPE)

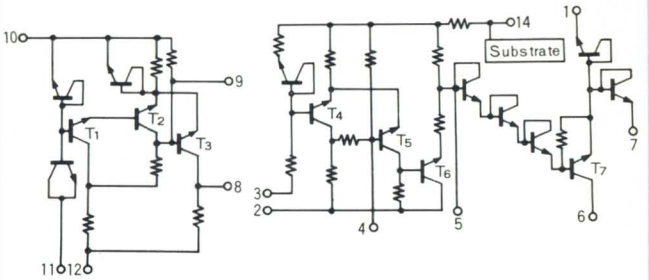
Type No.	Application	Absolute Maximum Ratings (Ta=25°C)			Electrical Characteristics (Ta=25°C)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit.
AN155	Voltage Stabilizer	I_1	7.2	mA	V_{1-2}	I=5mA	31		35	V
		P_T	250	mW	r_{1-2}	I=5mA, f=1KHz		12	25	Ω
		Topr	0～150	°C	$\triangle V_{1-2}$ / $\triangle Ta$	I=5mA, Ta=10～50°C	−3.1		1.55	mV/°C
		Tstg	−20～150	°C						
AN208※	Protect Circuit for Battery	V_{2-1}	16	V	R_{ACP}	V battery=16.6V	5.17		11.23	KΩ
		V_{12-10}	25	V	R_{ADP}	V battery=11V	17.8		33.8	KΩ
		I_6, I_8	50	mA	$\triangle V_{ADP}$		3			V
		P_T	300	mW	I_{OFF}	leakage current at cut off condition			4	mA
		Topr	−20～75	°C						
		Tstg	−40～150	°C						
AN603	Tachometer for Mobile	V_{CC}	18	V	V_{11-3}	V_{CC}=13.5V	5.95	6.3	6.65	V
		V_{4-3}	+6.3, −10	V	$\triangle V_{5-3}$	V_{CC}=13.5V	1.2			V
		V_{11-3}	+5.9, 0	V	V_{10-3}	V_{CC}=13.5V	2.03	2.26	2.49	V
		V_{surge}	+300, −300	V	V_{1-3}	V_{CC}=13.5V	1.3	1.6	1.9	V
		I_{tot}	−120	mA	$\triangle V_{10-3}$	V_{CC}=10～16V	−0.1		0.1	V
		P_T	370	mW	I_9	V_{CC}=13.5V, V_{IN}=0.5Vp-p, f=200Hz		18		mA
		Topr	−30～85	°C	$\triangle I_9$	V_{CC}=10～16V			0.72	mA
		Tstg	−65～150	°C	$\triangle V'_{10-3}$	Ta=−30～80°C V_{CC}=13.5V		−20		mV
					$\triangle I_9'$	Ta=−30～80°C V_{CC}=13.5V		−0.36		mA
					$\triangle \tau$	Ta=−30～80°C V_{CC}=13.5V		−40		μsec
AN610△	Balanced Modulator	$V_{7,8-11}$	14.4	V	$h_{FE(T8)}$		40	100	300	
		I_7	+10, −0.1	mA	$h_{FE(T7)}$		40	100	300	
		I_8	+10, −0.1	mA	I_8-I_7		−100	0	100	μA
		I_{12}	+0.1, −10	mA						
		I_{13}	+0.1, −10	mA						
		Itot	15	mA						
		P_T	400	mW						
		Topr	−20～70	°C						
		Tstg	−55～150	°C						
AN902	Multi Transistor	V_{CBO}	25	V	I_{CBO}	V_{CB}=10V, I_E=0			1	μA
		I_{CM}	100	mA	I_{EBO}	V_{EB}=5V, I_C=0			1	μA
		P_T	300	mW	$V_{CE(sat)}$	I_C=100mA, I_B=10mA			1.4	V
		Topr	−20～100	°C	h_{FE}	V_{CE}=5V, I_E=2mA	40			
		Tstg	−35～125	°C						
AN903 AN904 AN905	Differential Amp.	Topr	−20～70	°C	I_{5-4}	V_{5-4}=10V, I_3=0			1	μA
		Tstg	−40～150	°C	I_{3-4}	V_{3-4}=5V, I_5=0			1	μA
		P_T	445	mW	$V_{5-3(sat)}$	I_4=0.5mA, I_5=5mA			0.6	V
		V_{CBO}	30	V	h_{FE}	V_{5-3}=2V, I_3=−1mA	40			
	AN903	V_{EBO}	5	V	G_V	V_{11-4}=12V, V_{9-14}=5V		1		times
	AN905	I_{CM}	30	mA	G_V	V_{11-4}=12V, V_{9-14}=5V		27		times
AN915	Multi Transistor	V_{CBO}	30	V	I_{CBO}	V_{CB}=30V			1	μA
		I_{CM}	+30, −0.1	mA	I_{EBO}	V_{EB}=3V			1	μA
		P_T	445	mW	$V_{CE(sat)}$	I_C=5mA, I_B=0.5mA			0.6	V
		Topr	−20～70	°C	h_{FE}	V_{CE}=2V, I_E=−1mA			40	
		Tstg	−40～150	°C						

※ Maintenance △ Preliminary

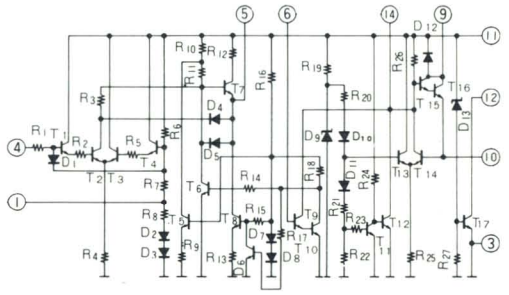
AN155 (Envelope I −1)



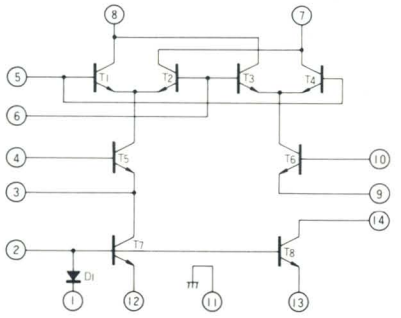
AN208 (Envelope I −7)



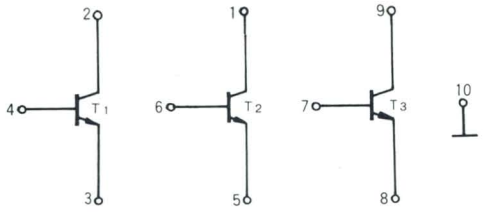
AN603 (Envelope I −7)



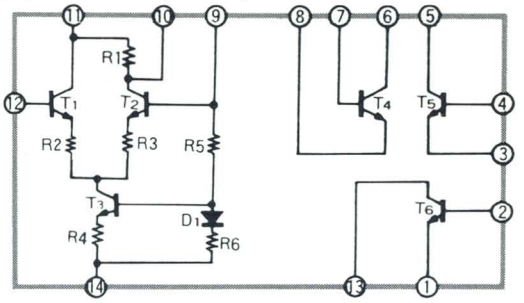
AN610 (Envelope I −7)



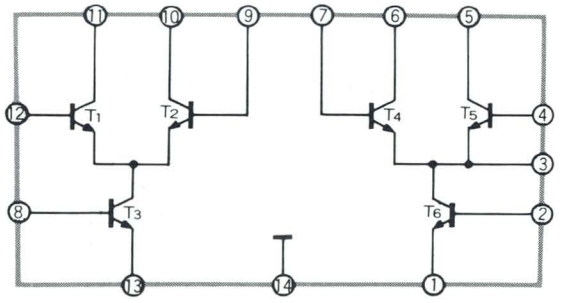
AN902 (Envelope I −3)



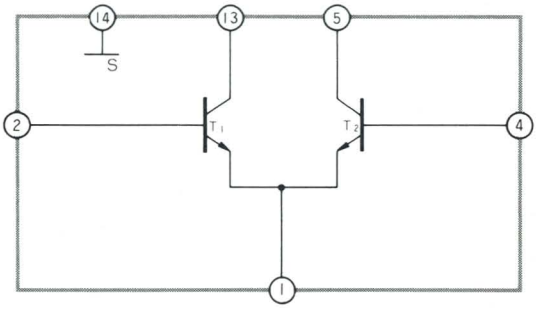
AN903, AN905 (Envelope I −7)
(AN905 : without R_2 and R_3)



AN904 (Envelope I −7)



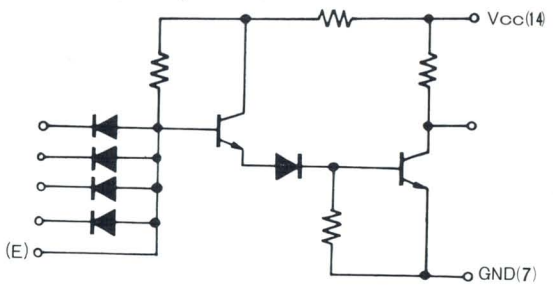
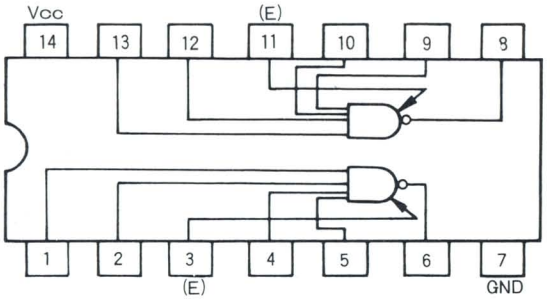
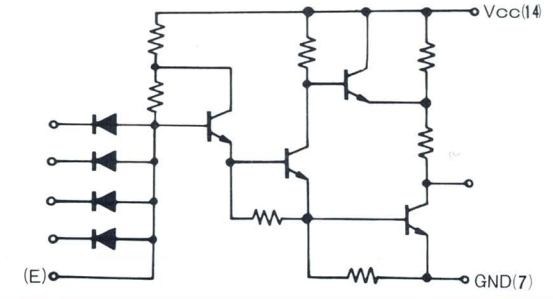
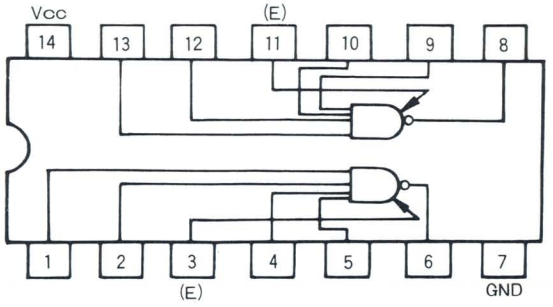
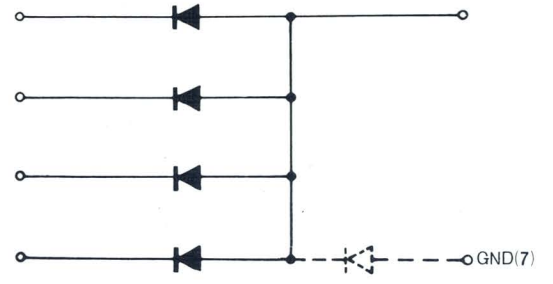
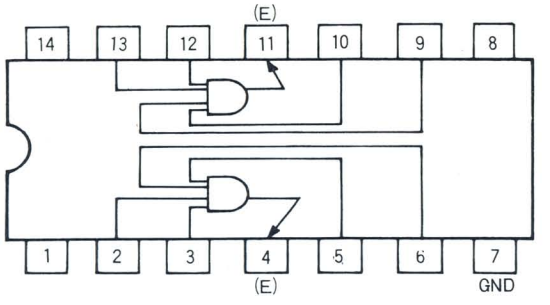
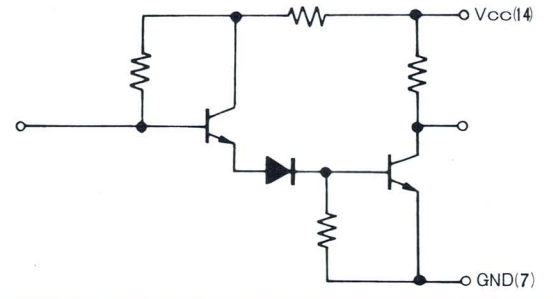
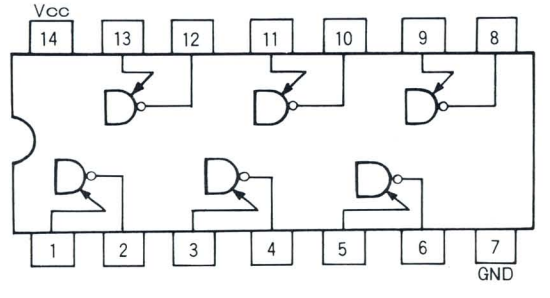
AN915 (Envelope I −7)



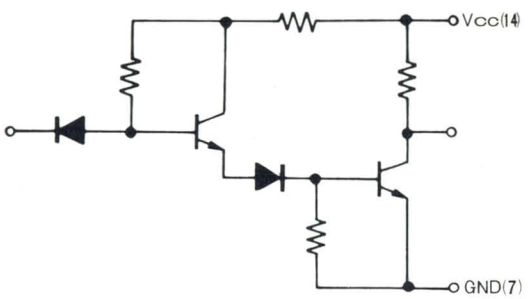
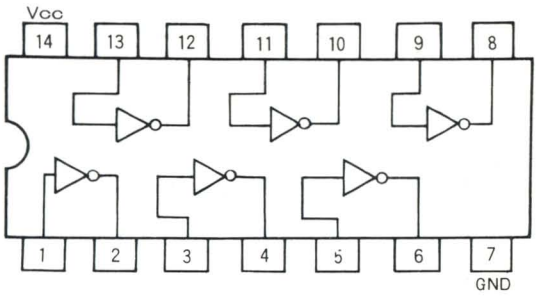
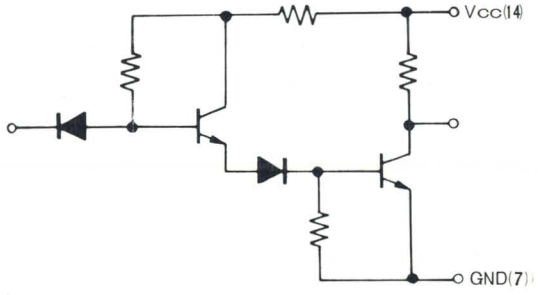
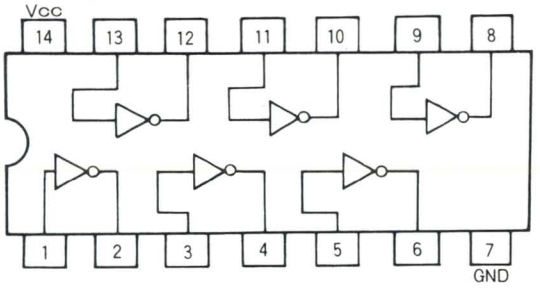
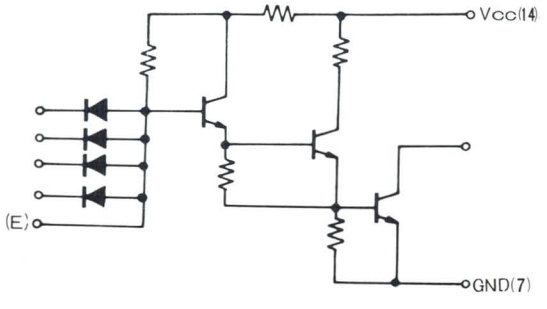
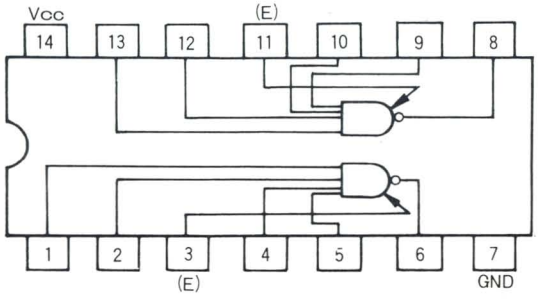
DIGITAL·MONOLITHIC INTEGRATED CIRCUITS

(BIPOLAR)

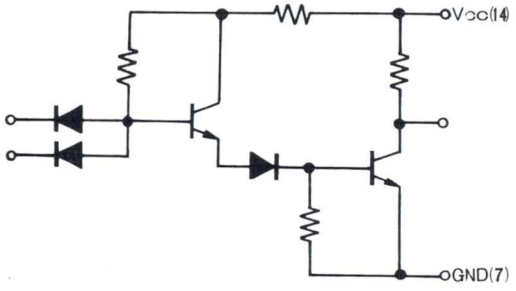
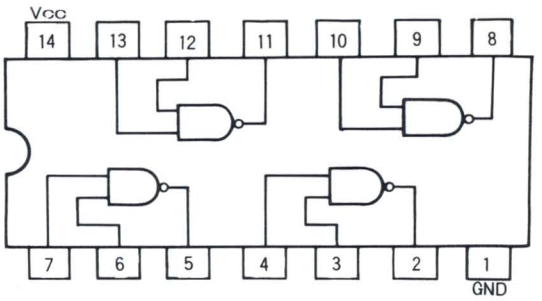
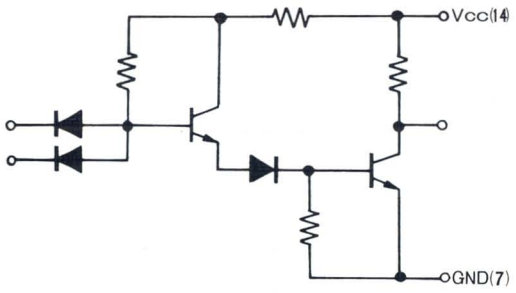
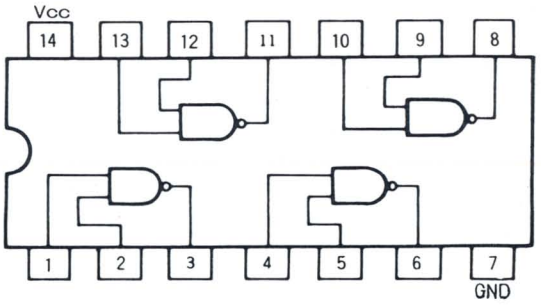
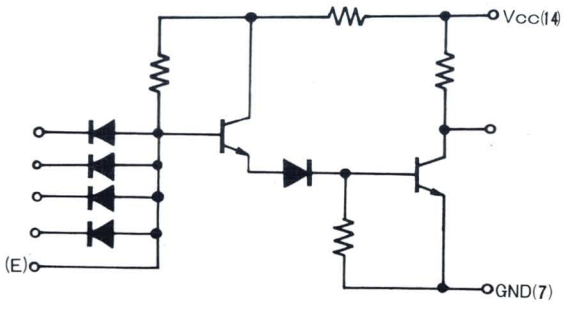
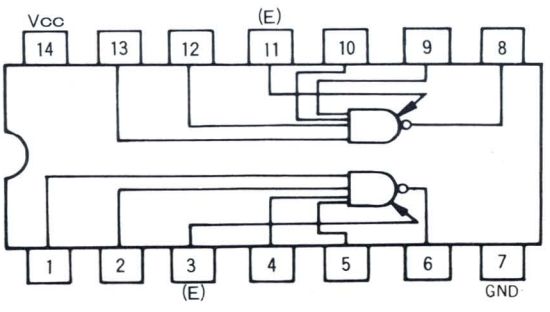
Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	V_{CC} (V)	Condition	min.	max.	Unit.
DN1930	Dual 4-Input Expandable NAND Gate				V_{OL}	4.5	$V_{IH}=1.9V, I_0=12mA$		0.4	V
					V_{OH}		$V_{IL}=1.1V, I_O=-0.12mA$	2.6		V
		V_{CC}	−0.5～8	V	I_{IL}	5.5	$V_{IH}=4V, V_I=0$		−1.6	mA
		V_I	−1.5～5.5	V	I_{IH}		$V_{IL}=0, V_I=4V$		2	μA
		V_0	6	V	I_{OS}		$V_{IL}=0, V_0=0$		−1.34	mA
		I_I	−10～1	mA	I_{OH}	4.5	$V_{IL}=0, V_0=4.5V$		50	μA
		I_0	30	mA	$V_{OH(E)}$		$V_{IL(E)}=1.8V, I_0=-0.12mA$	2.6		V
		P_T	250	mW	I_{CCL}	5			6.5	mA
		Topr	0～75	℃	I_{CCH}	8	$V_{IL}=0$		5.5	mA
		Tstg	−65～150	℃	t_{pdL}	5	$R=400\Omega, C=50pF$	10	30	nsec
					t_{pdH}		$R=3.9K\Omega, C=30pF$	25	80	nsec
					P_T			17 (typ.)		mW
					FO				8	
DN1932	Dual 4-Input Expandable NAND Gate Buffer				V_{OL}	4.5	$V_{IH}=1.9V, I_0=36mA$		0.4	V
					V_{OH}		$V_{IL}=1.1V, I_0=-2.5mA$	2.6		V
		V_{CC}	−0.5～8	V	I_{IL}	5.5	$V_{IH}=4V, V_I=0$		−1.6	mA
		V_I	−1.5～5.5	V	I_{IH}		$V_{IL}=0, V_I=4V$		2	μA
		V_0	6	V	I_{OS}		$V_{IL}=0, V_0=0$	−18		mA
		I_I	−10～1	mA	I_{OH}	4.5	$V_{IL}=0, V_0=4.5V$		50	μA
		I_0	150	mA	$V_{OH(E)}$		$V_{IL(E)}=1.8V, I_0=-2.5mA$	2.6		V
		P_T	250	mW	I_{CCL}	5			26.6	mA
		Topr	0～75	℃	I_{CCH}	8	$V_{IL}=0$		6	mA
		Tstg	−65～150	℃	t_{pdL}	5	$R=150\Omega, C=500pF$	15	40	nsec
					t_{pdH}		$R=510\Omega, C=500pF$	25	80	nsec
					P_T			52 (typ.)		mW
					FO				25	
DN1933	Dual 4-Input Expander	V_I	−1.5～5.5	V	V_F		$V_{IL}=0, I_0=2mA$	0.68	0.82	V
		I_I	−10～1	mA	I_{IR}		$V_{IL}=0, V_I=4V$		2	μA
		Topr	0～75	℃	I_{OR}		$V_0=4V$		10	μA
		Tstg	−65～150	℃						
DN1935	Expandable Hex Inverter				V_{OL}	4.5	$V_{IH}=2.55V, I_0=12mA$		0.4	V
		V_{CC}	−0.5～8	V	V_{OH}		$V_{IL}=1.92V, I_0=-0.12mA$	2.6		V
		V_I	−1.5～5.5	V	I_{IL}	5.5	$V_I=0.65V$		−1.6	mA
		V_0	6	V	I_{OS}		$V_{IL}=0.82V, V_0=0$		−1.34	mA
		I_I	−10～1	mA	I_{OH}	4.5	$V_{IL}=0.82V, V_0=4.5V$		50	μA
		I_0	30	mA	I_{CCL}	5			19.5	mA
		P_T	250	mA	I_{CCH}	8	$V_{IL}=0.65V$		16.5	mA
		Topr	0～75	℃	t_{pdL}		$R=400\Omega, C=50pF$	10	30	nsec
		Tstg	−65～150	℃	t_{pdH}		$R=3.9K\Omega, C=30pF$	25	80	nsec
					P_T			51 (typ.)		mW
					FO				8	

Circuit Schematic	Terminal Connection (Top View)
DN1930 (Envelope I−7) 	
DN1932 (Envelope I−7) 	
DN1933 (Envelope I−7) 	
DN1935 (Envelope I−7) 	

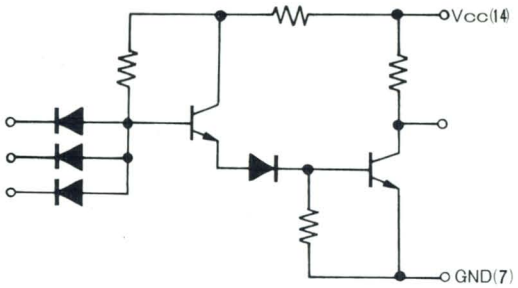
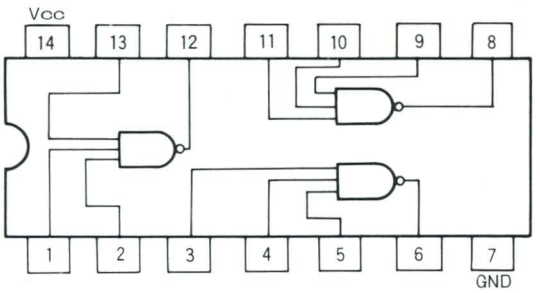
Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	V_{CC} (V)	Condition	min.	max.	Unit.
DN1936	Hex Inverter				V_{OL}	4.5	$V_{IH}=1.9V, I_0=12mA$		0.4	V
					V_{OH}		$V_{IL}=1.1V, I_0=-0.12mA$	2.6		V
		V_{CC}	−0.5～8	V	I_{IL}	5.5	$V_I=0$		−1.6	mA
		V_I	−1.5～5.5	V	I_{IH}		$V_I=4V$		2	μA
		V_0	6	V	I_{OS}		$V_{IL}=0, V_0=0$		−1.3	mA
		I_I	−10～1	mA	I_{OH}	4.5	$V_{IL}=0, V_0=4.5V$		50	μA
		I_0	30	mA	I_{CCL}	5			19.5	mA
		P_T	250	mW	I_{CCH}	8	$V_{IL}=0$		16.5	mA
		Popr	0～75	℃	t_{pdL}	5	$R=400\Omega, C=50pF$	10	30	nsec
		Tstg	−65～150	℃	t_{pdH}		$R=3.9K\Omega, C=30pF$	25	80	nsec
					P_T			51 (typ.)		mW
					FO				8	
DN1937	Fast Hex Inverter				V_{OL}	4.5	$V_{IH}=1.9V, I_0=11mA$		0.4	V
					V_{OH}		$V_{IL}=1.1V, I_0=-0.5mA$	2.6		mA
		V_{CC}	−0.5～8	V	I_{IL}	5.5	$V_I=0$		−1.6	mA
		V_I	−1.5～5.5	V	I_{IH}		$V_I=4V$		2	μA
		V_0	6	V	I_{OS}		$V_{IL}=0, V_0=0$		−4	mA
		I_I	−10～1	mA	I_{OH}	4.5	$V_0=4.5V$		50	μA
		I_0	30	mA	I_{CCL}	5			32.1	mA
		P_T	250	mW	I_{CCH}	8	$V_{IL}=0$		16.5	mA
		Topr	0～75	℃	t_{pdL}	5	$R=400\Omega, C=50pF$	10	30	nsec
		Tstg	−65～150	℃	t_{pdH}		$R=3.9K\Omega, C=30pF$	15	50	nsec
					P_T			75 (typ.)		mW
					FO				7	
DN1944	Dual 4-Input Expandable NAND Power Gate				V_{OL}	4.5	$V_{IH}=1.9V, I_0=40mA$		0.4	V
					V_{OH}	5.5	$V_{IL}=0, I_0=5mA$	6		V
		V_{CC}	−0.5～8	V	I_{IL}		$V_{IH}=4V, V_I=0$		1.6	mA
		V_I	−1.5～5.5	V	I_{IH}		$V_{IL}=0, V_I=4V$		2	μA
		V_0	6	V	I_{OH}		$V_{IL}=1.1V, V_0=4.5V$		50	μA
		I_I	−10～1	mA	$I_{OH(E)}$		$V_{IL(V)}=1.8mA, V_0=4.5V$		50	μA
		I_0	150	mA	I_{CCL}	5			20	mA
		P_T	250	mW	I_{CCH}	8	$V_{IL}=0$		6	mA
		Topr	0～75	℃	t_{pdL}	5	$R=150\Omega, C=100pF$	10	35	nsec
		Tstg	−65～150	℃	t_{pdH}		$R=510\Omega, C=20pF$	15	50	nsec
					P_T			40 (typ.)		mW
					FO				27	

Circuit Schematic	Terminal Connection (Top View)
DN1936 (Envelope I −7) 	
DN1937 (Envelope I −7) 	
DN1944 (Envelope I −7) 	

Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	V_{CC} (V)	Condition	min.	max.	Unit.
DN1946	Quadruple 2-Input NAND Gate				V_{OL}	4.5	$V_{IH}=1.9V, I_O=12mA$		0.4	V
					V_{OH}		$V_{IL}=1.1V, I_O=-0.12mA$	2.6		V
		V_{CC}	−0.5～8	V	I_{IL}	5.5	$V_{IH}=4V, V_I=0$		−1.6	mA
		V_I	−1.5～5.5	V	I_{IH}		$V_{IL}=0, V_I=4V$		2	μA
		V_O	6	V	I_{OS}		$V_{IL}=0, V_O=0$		−1.34	mA
		I_F	−10～1	mA	I_{OH}	4.5	$V_{IL}=0, V_O=4.5V$		50	μA
		I_O	30	mA	I_{CCL}	5			13	mA
		P_T	250	mW	I_{CCH}	8	$V_{IL}=0$		11	mA
		Topr	0～75	℃	t_{pdL}	5	$R=400\Omega, C=50pF$	10	30	nsec
		Tstg	−65～150	℃	t_{pdH}		$R=3.9K\Omega, C=30pF$	25	80	nsec
					P_T			34 (typ.)		mW
					FO				8	
DN1949	Fast Quadruple 2-Input NAND Gate				V_{OL}	4.5	$V_{IH}=1.9V, I_O=11mA$		0.4	V
					V_{OH}		$V_{IL}=1.1V, I_O=-0.5mA$	2.6		V
		V_{CC}	−0.5～8	V	I_{IL}	5.5	$V_{IH}=4V, V_I=0$		−1.6	mA
		V_I	−1.5～5.5	V	I_{IH}		$V_{IL}=0, V_I=4V$		2	μA
		V_O	6	V	I_{OS}		$V_{IL}=0, V_O=0$		−4	mA
		I_F	−10～1	mA	I_{OH}	4.5	$V_{IL}=0, V_O=4.5V$		50	μA
		I_O	30	mA	I_{CCL}	5			21.4	mA
		P_T	250	mW	I_{CCH}	8	$V_{IL}=0$		11	mA
		Topr	0～75	℃	t_{pdL}	5	$R=400\Omega, C=50pF$	10	30	nsec
		Tstg	−65～150	℃	t_{pdH}		$R=3.9K\Omega, C=30pF$	15	50	nsec
					P_T			50 (typ.)		mW
					FO				7	
DN1961	Fast Dual 4-Input Expandable NAND Gate				V_{OL}	4.5	$V_{IH}=1.9V, I_O=11mA$		0.4	V
					V_{OH}		$V_{IL}=1.1V, I_O=-0.5mA$	2.6		V
		V_{CC}	−0.5～8	V	I_{IL}	5.5	$V_{IH}=4V, V_I=0$		−1.6	mA
		V_I	−1.5～5.5	V	I_{IH}		$V_{IL}=0, V_I=4V$		2	μA
		V_O	6	V	I_{OS}		$V_{IL}=0, V_O=0$		−4	mA
		I_{IH}	−10～1	mA	I_{OH}	4.5	$V_{IL}=0, V_O=4.5V$		50	μA
		I_O	30	mA	$V_{OH(E)}$		$I_{IL(E)}=1.8mA, I_O=-0.5mA$	2.6		V
		P_T	250	mW	I_{CCL}	5			10.7	mA
		Topr	0～75	℃	I_{CCH}	8	$V_{IL}=0$		5.5	mA
		Tstg	−65～150	℃	t_{pdL}	5	$R=400\Omega, C=50pF$	10	30	nsec
					t_{pdH}		$R=3.9K\Omega, C=30pF$	15	50	nsec
					P_T			25 (typ.)		mW
					FO				7	

Circuit Schematic	Terminal Connection (Top View)
DN1946 (Envelope I −7) 	
DN1949 (Envelope I −7) 	
DN1961 (Envelope I −7) 	

Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	V_{CC} (V)	Condition	min.	max.	Unit.
DN1962	Triple 3-Input NAND Gate				V_{OL}	4.5	V_{IH}=1.9V, I_0=12mA		0.4	V
					V_{OH}		V_{IL}=1.1V, I_0=−0.12mA	2.6		V
		V_{CC}	−0.5~8	V	I_{IL}	5.5	V_{IH}=4V, V_I=0		−1.6	mA
		V_I	−1.5~5.5	V	I_{IH}		V_{IL}=0, V_I=0		2	μA
		V_0	6	V	I_{OS}		V_{IL}=0, V_0=0		−1.34	mA
		I_I	−10~1	mA	I_{OH}	4.5	V_{IL}=0, V_0=4.5V		50	μA
		I_0	30	mA	I_{CCL}	5			9.75	mA
		P_T	250	mW	I_{CCH}	8	V_{IL}=0		8.25	mA
		Topr	0~75	℃	t_{pdL}	5	R=400Ω, C=50pF	10	30	nsec
		Tstg	−65~150	℃	t_{pdH}		R=3.9KΩ, C=30pF	25	80	nsec
					P_T				25.5 (typ.)	mW
					FO				8	
DN1963	Fast Triple 3-Input NAND Gate				V_{OL}	4.5	V_{IH}=1.9V, I_0=11mA		0.4	V
					V_{OH}		V_{IL}=1.1V, I_0=−0.5mA	2.6		V
		V_{CC}	−0.5~8	V	I_{IL}	5.5	V_{IH}=4V, V_I=0		−1.6	mA
		V_I	−1.5~5.5	V	I_{IH}		V_{IL}=0, V_I=4V		2	μA
		V_0	6	V	I_{OS}		V_{IL}=0, V_0=0		−4	mA
		I_I	−10~1	mA	I_{OH}	4.5	V_{IL}=0, V_0=4.5V		50	μA
		I_0	30	mA	I_{CCL}	5			16.1	mA
		P_T	250	mW	I_{CCH}	8	V_{IL}=0		8.25	mA
		Topr	0~75	℃	t_{pdL}	5	R=400Ω, C=50pF	10	30	nsec
		Tstg	−65~150	℃	t_{pdH}		R=3.9KΩ, C=30pF	15	50	nsec
					P_T				37.5 (typ.)	mW
					FO				7	
DN1093	Dual J/K Clocked Flip-Flop (Separate Clock)				V_{OL}	4.5	V_{IL}=1.1V, V_{IH}=1.9V I_0=16.8mA		0.4	V
					V_{OH}		V_{IL}=1.1V, V_{IH}=1.9V I_0=−0.12mA	2.6		V
					$I_{IL\ J/K}$	5.5	V_{IH}=4V, V_I=0		−1.07	mA
		V_{CC}	−0.5~8	V	$I_{IH\ J/K}$		V_{IL}=0, V_I=4V		2	μA
		V_I	−1.5~5.5	V	I_{ILT}		V_{IL}=1.1V, V_I=0		−3.2	mA
		V_0	6	V	I_{IHT}	4	V_{IL}=0, V_I=4V		10	μA
		I_I	−10~1	mA	I_{ILSD}	5.5	V_{IL}=0, V_I=0		−3.2	mA
		I_0	30	mA	I_{IHSD}		V_{IL}=0, V_I=4V		2	μA
		P_T	250	mW	I_{OS}		V_{IL}=0, V_0=0	−0.6	−2.25	mA
		Topr	0~75	℃	I_{OH}		V_{IL}=0, V_0=5.5V		50	μA
		Tstg	−65~150	℃	$I_{CC(IH)}$	5			28	mA
					$I_{CC(IL)}$	8	V_{IL}=0		40	mA
					t_{pdL}	5	R=330Ω, C=50pF	30	80	nsec
					t_{pdH}		R=2KΩ, C=30pF	30	80	nsec
					P_T				96 (typ.)	mW
					FO				12	

Circuit Schematic	Terminal Connection (Top View)
DN1962 (Envelope I −7)	
	
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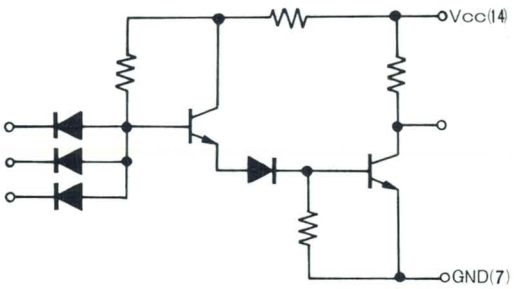	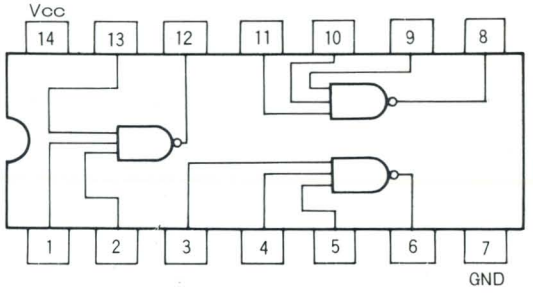
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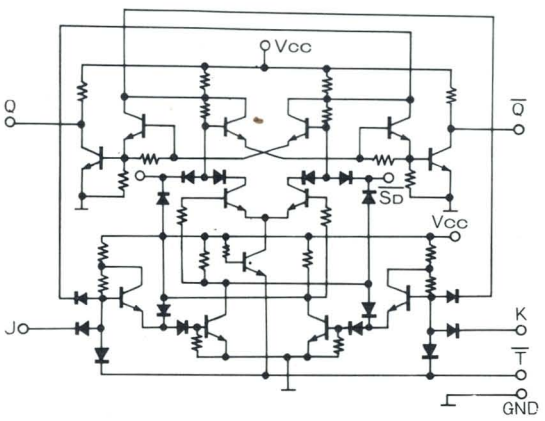
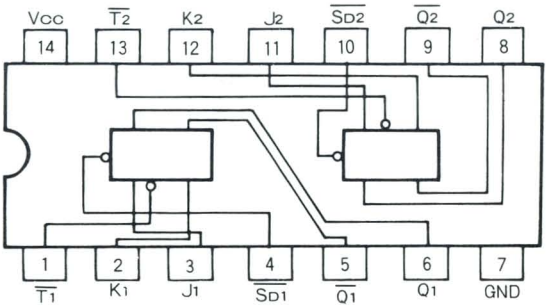
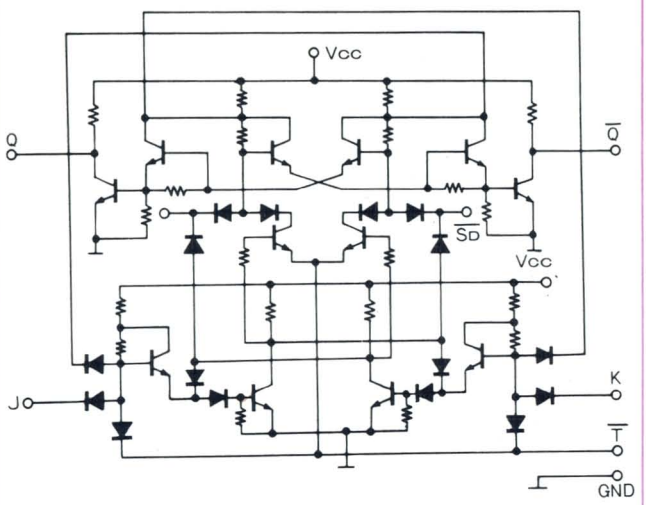
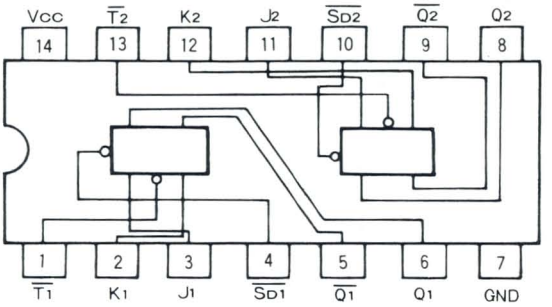
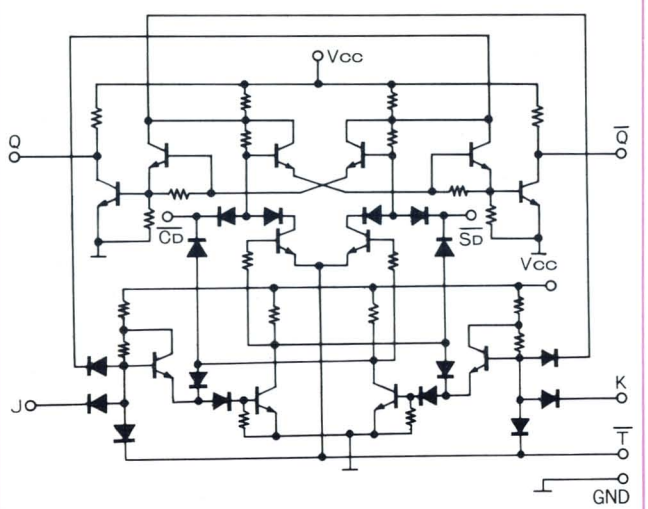
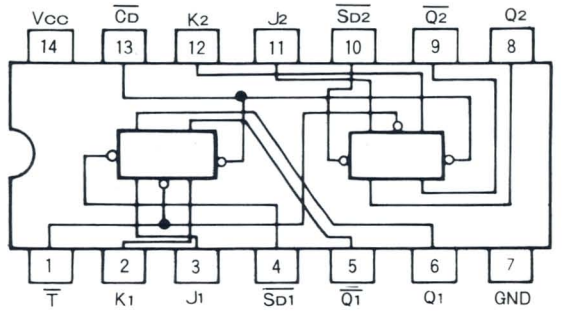
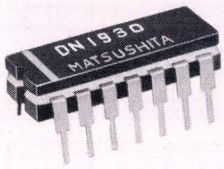
	

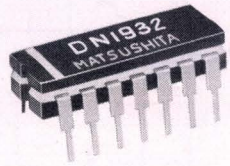
Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	V_{CC} (V)	Condition	min.	max.	Unit.
DN1094					V_{OL}	4.5	V_{IL}=1.1V, V_{IH}=1.9V I_0=15.4mA		0.4	V
					V_{OH}		V_{IL}=1.1V, V_{IH}=1.9V I_0=−0.5mA	2.6		V
					$I_{IL\ J\ K}$	5.5	V_{IH}=4V, V_I=0		−1.0	mA
		V_{CC}	−0.5～8	V	$I_{IH\ J\ K}$		V_{IL}=0, V_I=4V		2	μA
	Fast	V_I	−1.5～5.5	V	I_{ILT}		V_{IL}=1.1V, V_I=0		−3.2	mA
	Dual J/K	V_0	6	V	I_{IHT}		V_{IL}=0, V_I=4V		10	μA
	Clocked	I	−10～1	mA	I_{ILSD}		V_{IL}=0, V_I=0		−3.2	mA
	Flip-Flop	I_0	30	mA	I_{IHSD}		V_{IL}=0, V_I=4V		2	μA
	(Separate	P_T	250	mW	I_{OS}		V_{IL}=0, V_0=0	−2.1	−4.7	mA
	Clock)	Topr	0～75	℃	I_{OH}		V_{IL}=0, V_0=5.5V		50	μA
		Tstg	−65～150	℃	$I_{CC(IH)}$	5			32.4	mA
					$I_{CC(IL)}$	8	V_{IL}=0		40	mA
					t_{pdL}	5	R=330Ω, C=50pF	30	75	nsec
					t_{pdH}		R=2KΩ, C=30pF	30	65	nsec
					P_T			104 (typ.)		mW
					FO				11	
DN1097					V_{OL}	4.5	V_{IL}=1.1V, V_{IH}=1.9V I_0=15.4mA		0.4	V
					V_{OH}		V_{IL}=1.1V, V_{IH}=1.9V I_0=−0.5mA	2.6		V
					$I_{IL\ J\ K}$	5.5	V_{IH}=4V, V_I=0		−1.07	mA
					$I_{IH\ J\ K}$		V_{IL}=0, V_I=4V		2	μA
	Fast	V_{CC}	−0.5～8	V	I_{ILT}		V_{IL}=1.1V, V_I=0		−6.4	mA
	Dual J/K	V_I	−1.5～5.5	V	I_{IHT}		V_{IL}=0, V_I=4V		20	μA
	Clocked	V_0	6	V	I_{ILSD}		V_{IL}=0, V_I=0		−3.2	mA
	Flip-Flop	I_I	−10～1	mA	I_{IHSD}		V_{IL}=0, V_I=4V		2	μA
	(Common	I_0	30	mA	I_{ILCD}		V_{IL}=0, V_I=0		−6.4	mA
	Clock	P_T	250	mW	I_{IHCD}		V_{IL}=0, V_I=4V		4	μA
	and	Topr	0～75	℃	I_{OS}		V_{IL}=0, V_0=0	−2.1	−4.7	mA
	Clear)	Tstg	−65～150	℃	I_{OH}		V_{IL}=0, V_0=5.5V		50	μA
					$I_{CC(IH)}$	5			32.4	mA
					$I_{CC(IL)}$	8	V_{IL}=0		32	mA
					t_{pdL}	5	R=330Ω C=50pF	30	75	nsec
					t_{pdH}		R=2KΩ C=30pF	30	65	nsec
					P_T			104 (typ.)		mW
					FO				11	

Circuit Schematic	Terminal Connection (Top View)
DN1094 (Envelope I −7) 	
DN1097 (Envelope I −7) 	

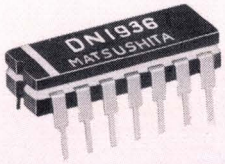
Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	V_{CC} (V)	Condition	min.	max.	Unit.
DN1099	Dual J/K Clocked Flip-Flop (Common Clock and Clear)				V_{OL}	4.5	$V_{IL}=1.1V$, $V_{IH}=1.9V$ $I_0=16.8mA$		0.4	V
					V_{OH}		$V_{IL}=1.1V$, $V_{IH}=1.9V$ $I_0=-0.18mA$	2.6		V
					$I_{IL\ J/K}$	5.5	$V_{IH}=4V$, $V_I=0$		−1.07	V
					$I_{IH\ J/K}$		$V_{IL}=0$, $V_I=4V$		2	μA
		V_{CC}	−0.5~8	V	I_{ILT}		$V_{IL}=1.1V$, $V_I=0$		−6.4	mA
		V_I	−1.5~5.5	V	I_{IHT}	4	$V_{IL}=0$, $V_I=4V$		20	μA
		V_0	6	V	I_{ILSD}	5.5	$V_{IL}=0$, $V_I=0$		−3.2	mA
		I_I	−10~1	mA	I_{IHSD}		$V_{IL}=0$, $V_I=4V$		2	μA
		I_0	30	mA	I_{ILCD}		$V_{IL}=0$, $V_I=0$		−6.4	mA
		P_T	250	mW	I_{IHCD}		$V_{IL}=0$, $V_I=4V$		4	μA
		Topr	0~75	℃	I_{OS}		$V_{IL}=0$, $V_0=0$	−0.6	−2.25	mA
		Tstg	−65~150	℃	I_{OH}		$V_{IL}=0$, $V_0=5.5V$		50	μA
					$I_{CC(IH)}$	5			28	mA
					$I_{CC(IL)}$	8	$V_{IL}=0$		32	mA
					t_{pdL}	5	$R=330\Omega$, $C=50pF$	30	80	nsec
					t_{pdH}		$R=2K\Omega$, $C=30pF$	30	80	nsec
					P_T			96 (typ.)		mW
					FO				12	



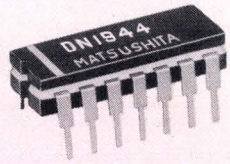
DN1930



DN1932

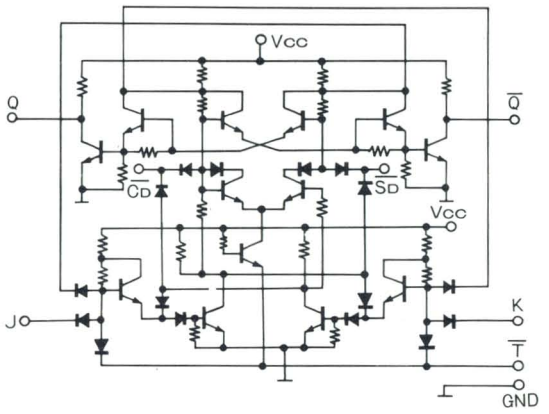


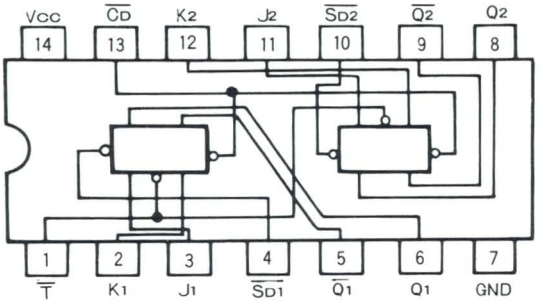
DN1936

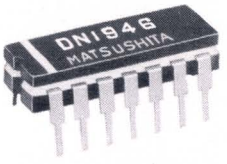


DN1944

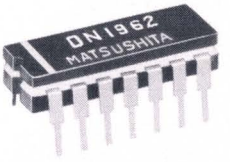
Circuit Schematic	Terminal Connection (Top View)
DN1099 (Envelope I－7)	



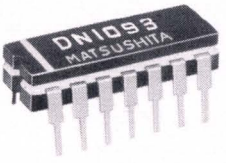




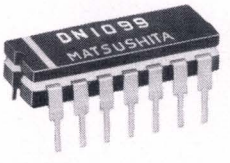
DN1946



DN1962

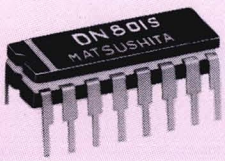


DN1093

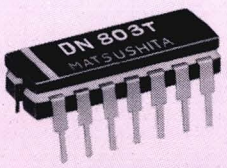


DN1099

Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit.	Item	Condition	min.	typ.	max.	Unit
DN801S	BCD-7 Segment Decorder Recorder Driver for LED	V_{CC}	8	V	$V_{OH(a\sim g)}$	$V_{CC}=4.5V, I_O=-7mA$ $V_{IH}=1.9V, V_{IL}=0.9V$	1.8			V
		V_{IN}	5.5	V	$V_{OH(RBO)}$	$V_{CC}=4.5V, I_O=0.12mA$ $V_{IH}=1.9V, V_{IL}=0.9V$	2.6			V
		P_O	6	mW	$V_{OL(a\sim g)}$	$V_{CC}=4.5V, I_O=5mA$ $V_{IH}=1.9V, V_{IL}=0.9V$			1	V
		P_T	400	mW	$V_{OL(RBO)}$	$V_{CC}=4.5V, I_O=5mA$ $V_{IL}=0.9V$			0.4	V
		Topr	0 ~ 75	℃	I_{IH} (A,B,C,D / RBI)	$V_{CC}=5.5V, V_I=4V$ $V_{CC}=5.5V, V_I=5.5V$			10 30	μA
		Tstg	−55 ~ 150	℃	I_{IL} (A,B,C,D,RBI / RBO)	$V_{CC}=5.5V, V_I=0.4V$			−16 −3.2	mA
DN803T DN804 DN806	Diode Arrays	V_R(DN803T)	50	V	V_R(DN803T)	$I_R=10\mu A$	50			V
		V_R (DN804 / DN806)	40	V	V_R (DN804 / DN806)	$I_R=10\mu A$	40			V
		I_F	200	mA	V_F	$I_F=200mA$			1.3	V
		I_{FM}	400	mA	V_F	$I_F=400mA$ $f=1MHz$, duty 50%			1.6	V
		P_T (Ta<70℃)	500	mW	Vsub	$I_{SUB}=10\mu A$	60			V
		Topr	−55 ~ 125	℃	t_{rr}	$I_F=100mA, R_L=100\Omega$ $I_R=100mA, ir=10mA$		5	10	nsec
		Tstg	−55 ~ 150	℃	Cj	$V_R=0, f=1MHz$		4		pF
DN805	Toggle Flip-Flop				V_{OL}	$V_{CC}=16V, I_{OL}=1mA$			0.4	V
		V_{CC}	16	V	V_{OL}	$V_{CC}=4V, I_{OL}=1mA$			0.4	V
		I_1	16	V	V_{OH}	$V_{CC}=16V, I_{OH}=-1.1mA$	12			V
		I_C	5	mA	V_{OH}	$V_{CC}=4V, I_{OH}=-0.2mA$	2.2			V
		P_T	200	mW	I_{CCL}	$V_{CC}=16V$			15	mA
		Topr	−20 ~ 75	℃	I_{CCL}	$V_{CC}=4V$			3.5	mA
		Tstg	−55 ~ 150	℃	I_{CCH}	$V_{CC}=16V$			15	mA
					I_{CCH}	$V_{CC}=4V$			3.5	mA
					fmax	$V_{IN}=3.5Vp\text{-}p$ (OFF set 0.5V) duty 30%		1		MHz



DN801S

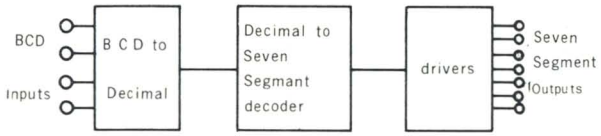


DN803T

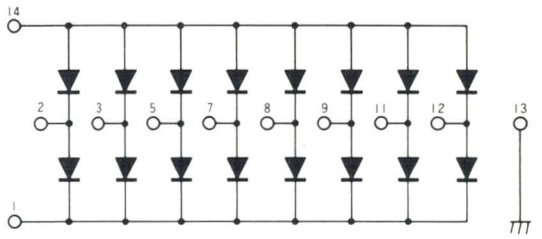
DN805

Circuit Schematic

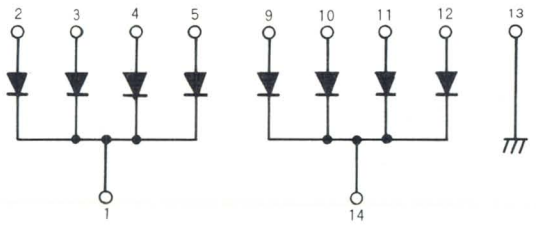
DN801S (Envelope I－8)



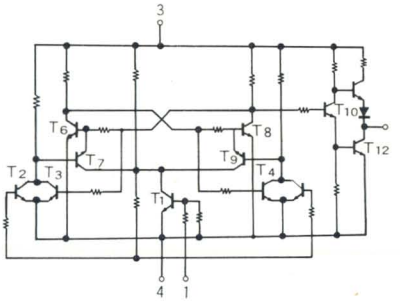
DN803T (Envelope I－7)



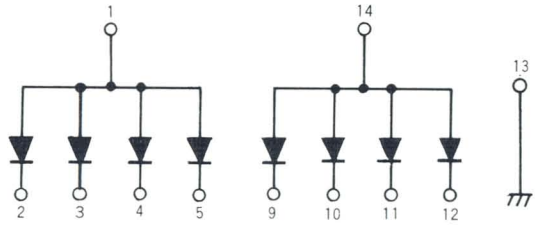
DN804 (Envelope I－7)



DN805 (Envelope I－2)

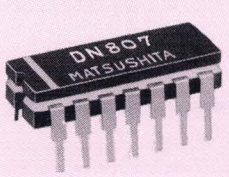


DN806 (Envelope I－7)

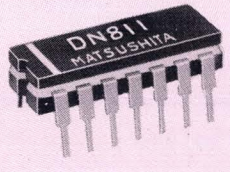


Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
DN807	Quad Transistor Arrays				V_{CBO}	$I_C=100\mu A, I_E=0$	70			V
					V_{CEO}	$I_C=10mA, I_B=0$	30			V
					V_{EBO}	$I_E=100\mu A, I_C=0$	5			V
					I_{CBO}	$V_{CB}=40V, I_E=0$			10	μA
		V_{CBO}	70	V	$V_{CE(sat)}$	$I_C=30mA, I_B=3mA$			0.3	V
		V_{CEO}	30	V		$I_C=100mA, I_B=10mA$			0.4	
		V_{EBO}	5	V		$I_C=500mA, I_B=50mA$			0.8	
		I_C	600	mA	h_{FE}	$V_{CE}=1V, I_C=30mA$	30			
		P_T	600	mW		$V_{CE}=1V, I_C=100mA$	30			
		Topr	0 ~ 75	℃		$V_{CE}=1V, I_C=500mA$	20			
		Tstg	−55~150	℃	f_T	$V_{CE}=10V, I_C=50mA$		300		MHz
					t_{ON}	$I_C=500mA, V_{CC}=15V$ $I_B=50mA, V_{BE(OFF)}=-0.9V$ $R_L=28\Omega, C_I=15pF$		25	40	nsec
					t_{OFF}	$I_C=500mA, V_{CC}=15V$ $I_B=50mA, I_{B(OFF)}=-50mA$ $R_L=28\Omega, C_L=15pF$		40	70	nsec
DN811△	Twelve or Sixteen Counter	V_{CC}	15	V	V_{OL}	$V_{CC}=15V, I_{OL}=6mA$ $V_{IT}=0, V_{IS}=15V$			0.4	V
		V_I	15	V	V_{OL}	$V_{CC}=9V, I_{OL}=5mA$ $V_{IT}=0, V_{IS}=9V$			0.4	V
		V_O	15	V	V_{OH}	$V_{CC}=15V, I_{OH}=-1mA$ $V_{IT}=0, V_{IS}=15V$	13			V
		P_T	450	mW	V_{OH}	$V_{CC}=9V, I_{OH}=-1mA$ $V_{IT}=0, V_{IS}=9V$	7			V
		Topr	−20~75	℃	V_{IL}				0.5	V
		Tstg	−55~150	℃	V_{IL}		4			V
					$-I_{IL}$	$V_{CC}=15V, V_{IN}=0$			1.5	mA
					I_{IH}	$V_{CC}=15V, V_{IN}=15V$			100	μA
					I_{CC}	$V_{CC}=15V, V_{IT}=0 \quad V_{IS}=0$			30	mA
DN820 DN821 DN822	Diode Matrix	I_R	3	mA	V_R	$I_R=10\mu A$	6.5			V
		I_F	10	mA		$I_R=3mA$	6.8			V
		V_O	15	V	V_F	$I_F=5mA$			1	V
		(Note) V_{CC}	15	V	(Note) I_{OS}	$V_{CC}=15V, V_O=0$	5.8		10	mA
		P_T	400	mW	Vsub	$Isub=10\mu A$	15			V
		Topr	0 ~ 75	℃						
		Tstg	−55~150	℃						

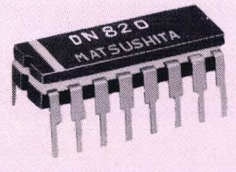
Note: only to DN820 and DN822 △ Preliminary



DN807



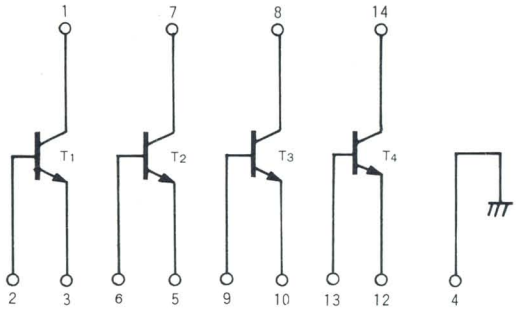
DN811



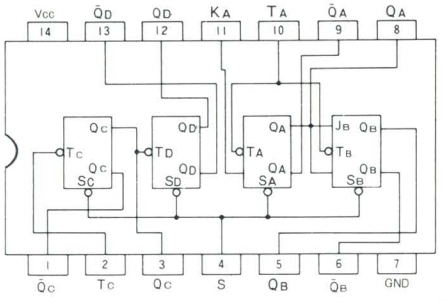
DN820

Circuit Schematic

DN807 (Envelope I −7)

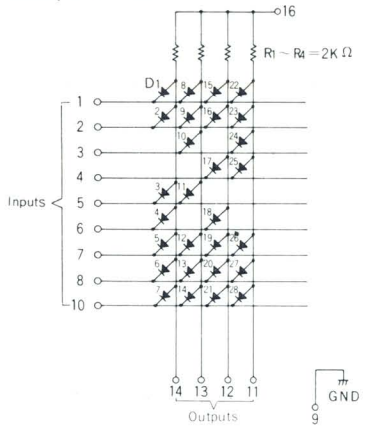


DN811 (Envelope I −7)

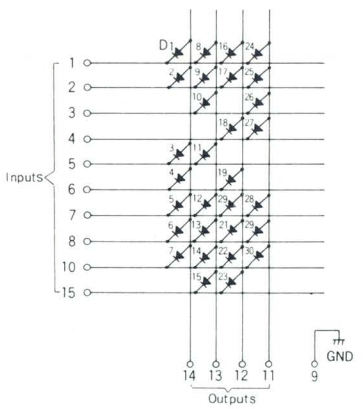


(Top View)

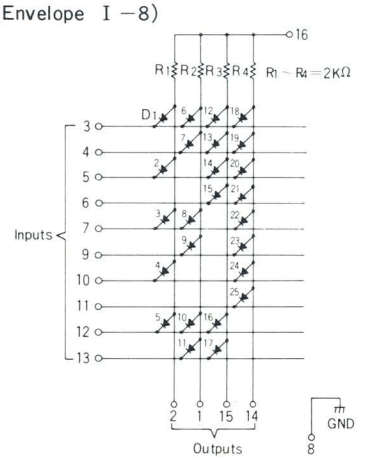
DN820 (Envelope I −8)



DN821 (Envelope I −8)



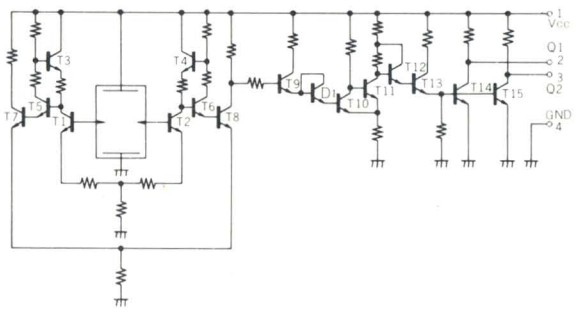
DN822 (Envelope I −8)



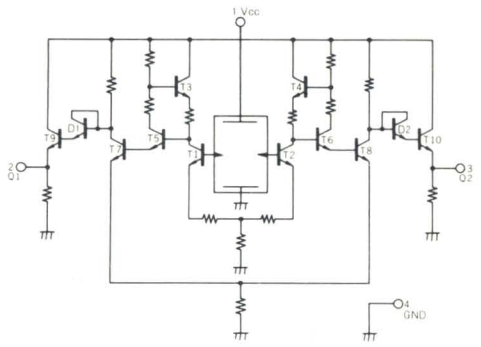
Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	condition	min.	typ.	max.	Unit
DN830	Switching type Hall IC	V_{CC}	6	V	$B_{(H\to L)}$	$V_{CC}=5V$			750	gauss
		I_{CC}	15	mA	$B_{(L\to H)}$	$V_{CC}=5V$	100			gauss
		V_O	6	V	V_{OL}	$V_{CC}=5V, I_{OL}=12mA$, $B=750gauss$			0.4	V
		I_O	15	mA	V_{OH}	$V_{CC}=5V, I_{OH}=-100\mu A$ $B=100gauss$	2.4			V
		P_T	90	mW	$-I_{OS}$	$V_{CC}=5V, V_O=0, B=0$			1.34	mA
		Topr	−20~75	℃	I_{CCH}	$V_{CC}=5V, B=0$			10.0	mA
		Tstg	−55~125	℃	I_{CCL}	$V_{CC}=5V, B=750gauss$			13.5	mA
DN831	Linear type Hall IC	V_{CC}	6	V	B offset	$V_{CC}=5V, V_{Q1}=V_{Q2}$	−350		+350	gauss
		I_{CC}	15	mA	V_{OH}	$V_{CC}=5V, I_{OH}=-10mA$, $B=+500gauss$	2.4			V
		V_O	6	V	V_{OL}	$V_{CC}=5V, I_{OL}=0.1mA$, $B=\pm 500gauss$			0.5	V
		I_O	−15~4.4	mA	V_{OL}	$V_{CC}=5V, I_{OL}=-2mA$, $B=\pm 500gauss$			0.5	V
		P_T	90	mW	I_{CC}	$V_{CC}=5V$			13.5	mA
		Topr	−20~75	℃						
		Tstg	−55~125	℃						
DN850	Monostable Multivibrator	V_{CC}	15	V	V_{IH}	$V_{CC}=12V$	3			V
		I_{CC}	60	mW	V_{IL}	$V_{CC}=12V$			0.6	V
		V_I	15	V	V_{OH}	$V_{CC}=12V, I_O=-1mA$	9			V
		I_{OL}	10	mA	V_{OL}	$V_{CC}=12V, I_O=5mA$			0.4	V
		I_{OH}	−10	mA	tof	$V_{CC}=12V, t_O=10\mu sec$		0.05		μsec
		P_T	400	mW	tor			0.2		μsec
		Topr	−20~75	℃	I_{CCH}	$V_{CC}=12V$	2	4	6	mA
		Tstg	−55~150	℃	I_{CCL}	$V_{CC}=12V$	10	19	25	mA
DN851	4 Bit Reversible Binary Counter	V_{CC}	8	V	V_{OL}	$V_{CC}=4.5V, I_{OL}=6mA$			0.4	V
		I_{CC}	100	mA	V_{OH}	$V_{CC}=4.5V, I_{OH}=-0.12mA$	2.6			V
		V_O	5.5	V	I_{IL}	$V_{CC}=5.5V, V_{IL}=0$	0		−9	mA
		V_I	5.5	V	I_{IH}	$V_{CC}=5.5V, V_{IH}=4V$			24	μA
		I_I	+1, −20	mA	V_{CPOL}	$V_{CC}=4.5V$ $I_{CPOL}=12mA, V_{up\,IL}=0.6V$			0.4	V
		I_O	20	mA	V_{CPOH}	$I_{CPOH}=-0.12mA$, $V_{up\,IL}=0.6V, V_{CC}=4.5V$	2.6			V
		P_T	400	mW	$I_{up\,IL}$ / $I_{dn\,IL}$	$V_{up(dn)\,IL}=0V, V_{CC}=5.5V$ Output "HHHH"/"LLLL".	0		−10	mA
		Topr	−10~75	℃	$I_{up\,IH}$ / $I_{dn\,IH}$	$V_{up(dn)\,IH}=5.5V, V_{CC}=5.5V$			50	μA
		Tstg	−65~150	℃	I_{CLI}	$V_{CC}=5.5V$	0.3			mA
					I_{CC}	Output "LLLL". $V_{CC}=5V$			45	mA
DN852	Binary to Octuple Decoder	V_{CC}	8	V	V_{OL}	$V_{CC}=4.5V, I_{OL}=5mA$ $V_{IH}=1.9V, V_{IL}=1.1V$			0.15	V
		I_{CC}	100	mA	I_{OH}	$V_{CC}=5.5V, V_{OH}=35V$ $V_{IH}=1.9V, V_{IL}=1.1V$			10	μA
		V_{OH}	40	V	I_{IL}	$V_{CC}=5.5V, V_{IL}=0$ $V_{IH}=4V$	0		−1.6	mA
		I_{OL}	30	mA	I_{IH}	$V_{CC}=5.5V, V_{IH}=4V$ $V_{IL}=0$			2	μA
		I_{OH}	−5	mA	I_{CC}	$V_I=$ open, $V_{CC}=5V$			27	mA
		P_T	400	mW						
		Topr	−20~75	℃						
		Tstg	−65~150	℃						

Circuit Schematic

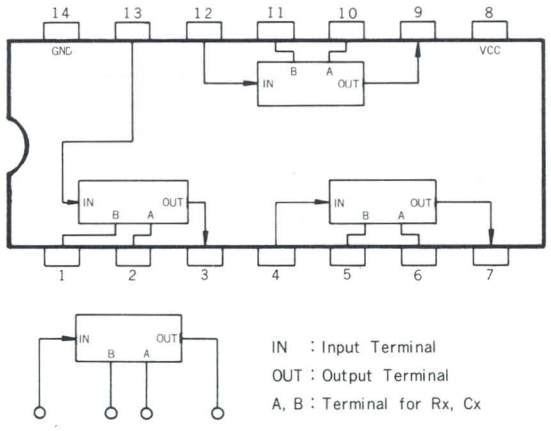
DN830 (Envelope I－6)



DN831 (Envelope I－6)



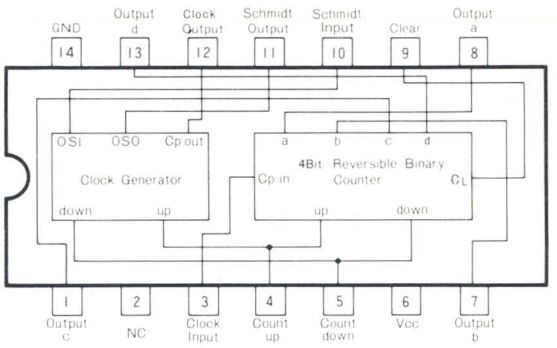
DN850 (Envelope I－7)



IN : Input Terminal
OUT : Output Terminal
A, B : Terminal for Rx, Cx

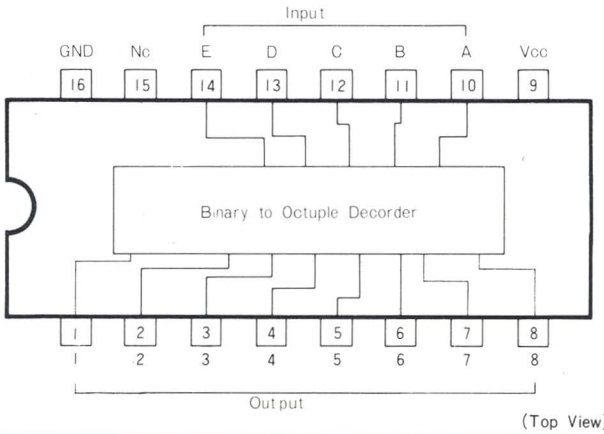
(Top View)

DN851 (Envelope I－7)



(Top View)

DN852 (Envelope I－8)

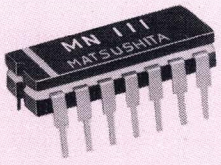


(Top View)

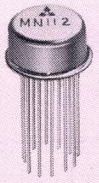
(MOS)

Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
MN111※	Vertical Automatic Sync. Circuit for TV	V_{DD}	−30	V	I_{DD}	$V_{DD}=-24V$	−4	−6	−8	mA
		V_{IN}	−30	V	V_{IH}	$V_{DD}=-24V$			−3	V
		V_F	0.3	V	V_{IL}	$V_{DD}=-24V$	−8			V
		P_T	250	mW	V_{VOH}	$V_{DD}=-24V$ $R_L=12K\Omega$			−4	V
		Topr	−30~70	℃	V_{VOL}	$V_{DD}=-24V$ $R_L=12K\Omega$	−22		−24	V
		Tstg	−55~125	℃	V_{HOH}	$V_{DD}=-24V$ $R_L=47K\Omega$			−4	V
					V_{HOL}	$V_{DD}=-24V$ $R_L=47K\Omega$	−22		−24	V
MN112	Vertical Automatic Sync. Circuit for TV	V_{DD}	−30	V	I_{DD}	$V_{DD}=-24V$	−4	−6	−8	mA
		V_{IN}	−30	V	V_{IH}	$V_{DD}=-24V$			−3	V
		V_F	0.3	V	V_{IL}	$V_{DD}=-24V$	−8			V
		P_T	250	mW	V_{VOH}	$V_{DD}=-24V$ $R_L=12K\Omega$			−4	V
		Topr	−30~70	℃	V_{VOL}	$V_{DD}=-24V$ $R_L=12K\Omega$	−22		−24	V
		Tstg	−55~125	℃	V_{HOH}	$V_{DD}=-24V$ $R_L=47K\Omega$			−4	V
					V_{HOL}	$V_{DD}=-24V$ $R_L=47K\Omega$	−22		−24	V
MN115 / MN116	$\frac{1}{2}, \frac{1}{525} / \frac{1}{2}, \frac{1}{625}$ Frequency Divider	V_{DD}	−15	V	I_{DD}	$V_{DD}=-12V$			−10	mA
		V_{IN}	−15	V	V_{IH}	$V_{DD}=-12V$			−2	V
		V_F	0.3	V	V_{IL}	$V_{DD}=-12V$	−6			V
		P_T	250	mW	V_{VOH}	$V_{DD}=-12V$ $R_L=10K\Omega$			−1	V
		Topr	−30~70	℃	V_{VOL}	$V_{DD}=-12V$ $R_L=10K\Omega$	−9			V
		Tstg	−55~125	℃	V_{HOH}	$V_{DD}=-12V$ $R_L=10K\Omega$			−1	V
					V_{HOL}	$V_{DD}=-12V$ $R_L=10K\Omega$	−9			V

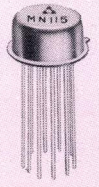
※ Maintenance



MN111



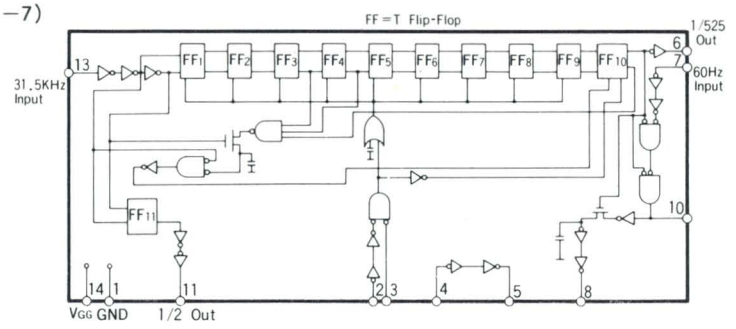
MN112



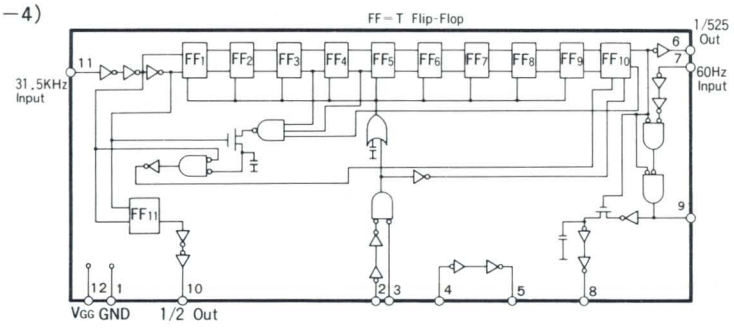
MN115

Block Diagram

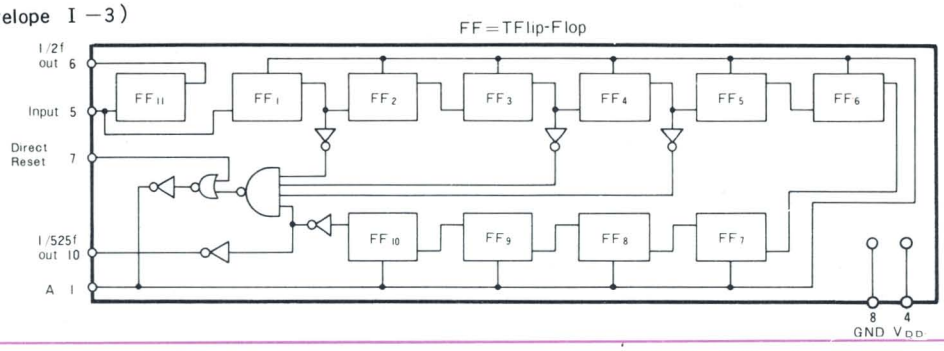
MN111 (Envelope I −7)



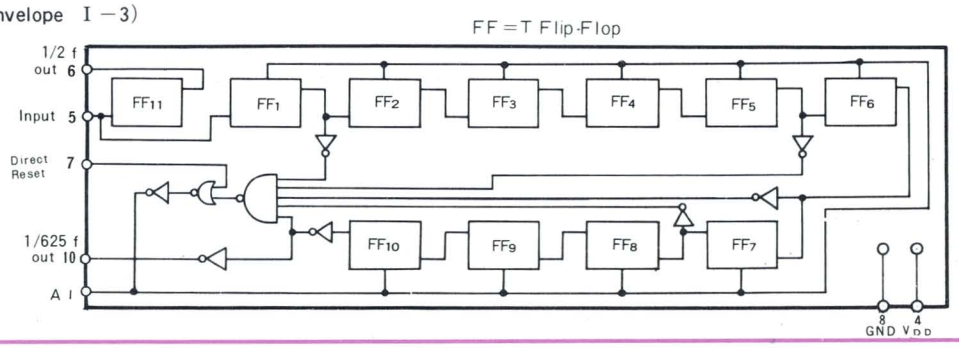
MN112 (Envelope I −4)



MN115 (Envelope I −3)



MN116 (Envelope I −3)



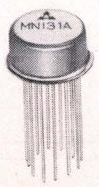
Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
MN131A	3+2+1 Binary Frequency Divider	V_{GG}	−33	V	I_{GG}	$V_{GG}=-30V$			7	mA
		V_{DD}	−20	V	V_{IH}	$V_{GG}=-30V$			−2.5	V
		V_{IN}	−25	V	V_{IL}	$V_{GG}=-30V$	−9			V
		V_F	0.3	V	V_{OH}	$V_{DD}=-13V$, $R_L=20K\Omega$			−1	V
		P_T	250	mW	V_{OL}	$V_{DD}=-13V$, $R_L=20K\Omega$	−11			V
		Topr	−30~75	℃	f_{IN}	$V_{GG}=-30V$	DC		100	KHz
		Tstg	−55~125	℃	V_N	$V_{GG}=-30V$, H, L level	1.5			V
MN132P	3+2+1 Binary Frequency Divider	V_{GG}	−33	V	I_{GG}	$V_{GG}=-30V$			7	mA
		V_{DD}	−20	V	V_{IH}	$V_{GG}=-30V$			−2.5	V
		V_{IN}	−25	V	V_{IL}	$V_{GG}=-30V$	−9			V
		V_F	0.3	V	V_{OH}	$V_{DD}=-13V$, $R_L=20K\Omega$			−1	V
		P_T	250	mW	V_{OL}	$V_{DD}=-13V$, $R_L=20K\Omega$	−11			V
		Topr	−30~75	℃	f_{IN}	$V_{GG}=-30V$	DC		100	KHz
		Tstg	−55~125	℃	V_N	$V_{GG}=-30V$, H, L level	1.5			V
MN1003△	1024Bit P-Channel Dynamic RAM	(Note 1) V_{TE}	−25~0.3	V	I_{BB}	$V_{SS}=16V$, $V_{BB}-V_{SS}=3\sim4V$, $V_{DD}=0V$			100	μA
		P_T	850	mW	$I_{DD}(av)$	$t_c=500nsec$, $t_{precharge}=180nsec$			(Note 2) 18	mA
		Topr	0~70	℃	I_{OH}	$R_L=100\Omega$	600		3000	μA
		Tstg	−55~125	℃	V_{OH}	$R_L=100\Omega$	60		300	mV
					I_{OL}	Note 3				
					V_{OL}	Note 3				
					$P_T(av)$	All cell out put in "1" State.			330	mW
					$P_T(st.by)$				3	mW
					t_{AC}		300			nsec
					t_C		500			nsec
					$t_{refresh}$	0~70℃			2	msec

Note 1. All input or output voltages with respect to the most positive supply voltage, V_{BB}.

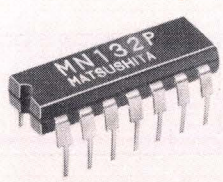
Note 2. The peak value of I_{DD} is 48 mA max.

Note 3. The low output current, I_{OL}, is the leakage current of the MN1003 plus external noise coupled into the output line from the clocks. V_{OL} equals I_{OL} across the load resistor, $R_L=100\Omega$.

△ Preliminary

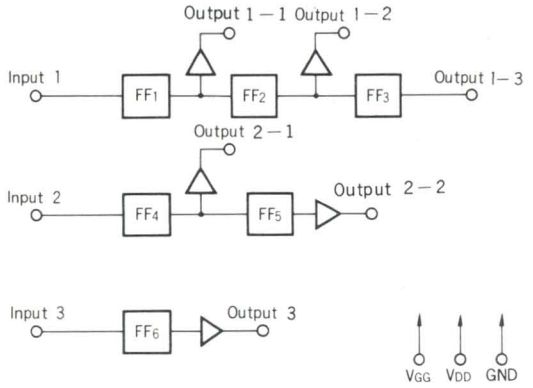


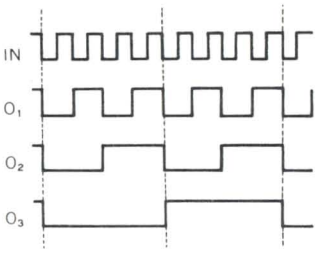
MN131A

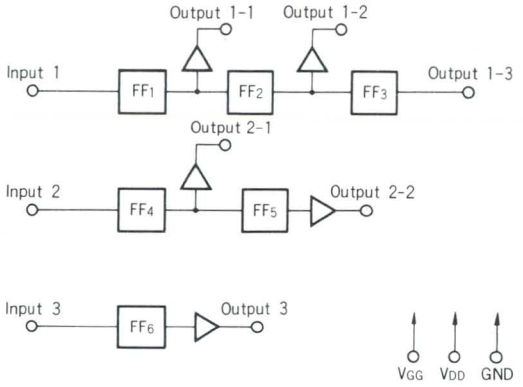


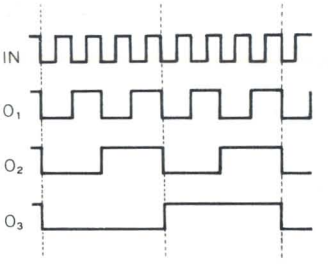
MN132P

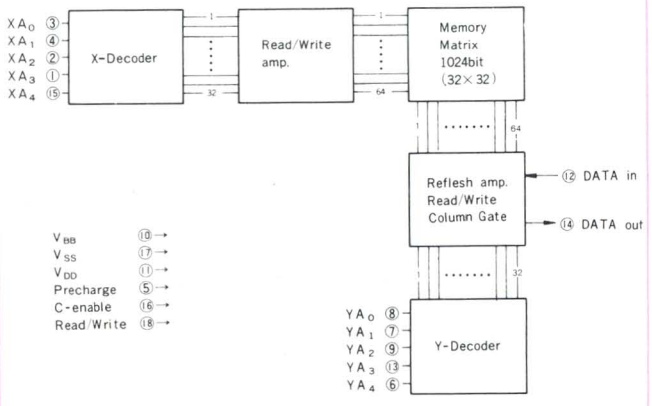
Block Diagram	Timing Diagram
MN131A (Envelope I −4)	**MN131A**
MN132P (Envelope I −14)	**MN132P**
MN1003 (Envelope I −17)	





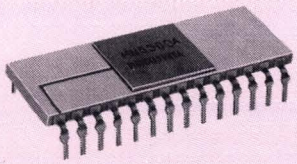




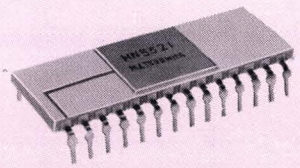


Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)						
		Item	Rating	Unit	Item	Condition		min.	typ.	max.	Unit
MN1200△ Series	4096 Bit Static ROM	V_{TE} (Note 1)	−20~0.3	V	V_{IH}	Note 2 or 3		+0.3		−2	V
		P_T	700	mW	V_{IL}			−4.2		−10	V
		Topr	−30~70	℃	V_{OH}	Note 2 or 3	$I_{OH}=-100\mu A$		−0.5	−1.5	V
		Tstg	−55~125	℃	V_{OL}		$I_{OL}=1.6mA$	−4.55	−5.7		V
					I_{OH}		$V_O=-5V$	−2			mA
					I_{OL}		$V_O=-4.55V$	1.6	4		mA
					Tacc	Note 2			0.7		μsec
						Note 3			1		
					I_{DD1}	Note 2 or 3			−12		mA
					I_{DD2}	Note 2			−9		mA
						Note 3			−6		
					I_{GG}	Note 2 or 3				−100	μA
					P_T	Note 2			300		mW
						Note 3			200		
		Note 1. Input voltage and supply voltages.									
		Note 2. $V_{DD1}=-14V\pm5\%$, $V_{DD2}=-14V\pm5\%$, $V_{GG}=-14V\pm5\%$									
		Note 3. $V_{DD1}=-14V\pm5\%$, $V_{DD2}=-5V\pm5\%$, $V_{GG}=-14V\pm5\%$									
MN5500A	8-Digit 1Chip Desk-Top Calculator	V_{GG}	−15	V	I_{GG}	all clear			−150	−600	μA
		V_{DD}	−10	V	I_{DD}				−3.5	−7	mA
		V_{IN}	−10	V	P_T				28		mW
		V_F	0.3	V	V_{IH}			0		−1.5	V
		V_{CP}	−15	V	V_{IL}			−3.5		−7	V
		Topr	−30~70	℃	V_{OH}					−1	V
		Tstg	−55~125	℃	V_{OL}			−5			V
MN5521△	8-Digit 1Memory Desk-Top Calculator	V_{GG}	−15	V	I_{GG}	all clear			−200	−600	μA
		V_{DD}	−10	V	I_{DD}				−4.3	−7	mA
		V_{IN}	−10	V	P_T				30		mW
		V_F	0.3	V	V_{IH}			0		−1.5	V
		V_{CP}	−15	V	V_{IL}			−3.5		−7	V
		Topr	−30~70	℃	V_{OH}					−1	V
		Tstg	−55~125	℃	V_{OL}			−5			V

△ Preliminary



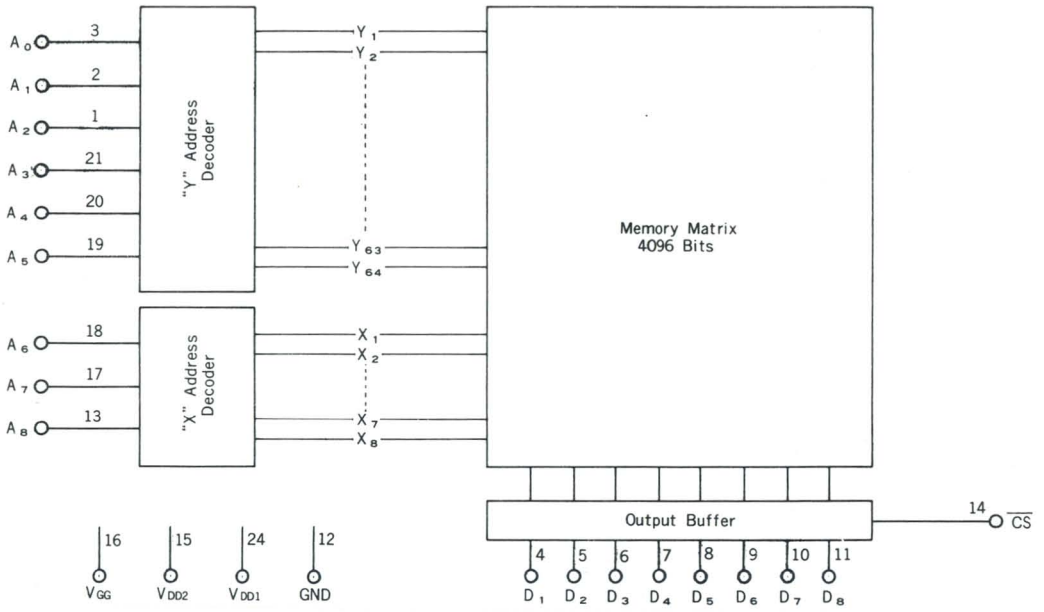
MN5500A



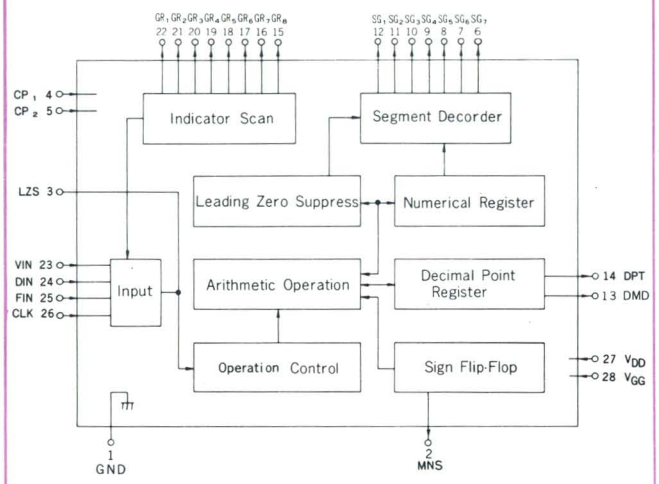
MN5521

Circuit Schematic

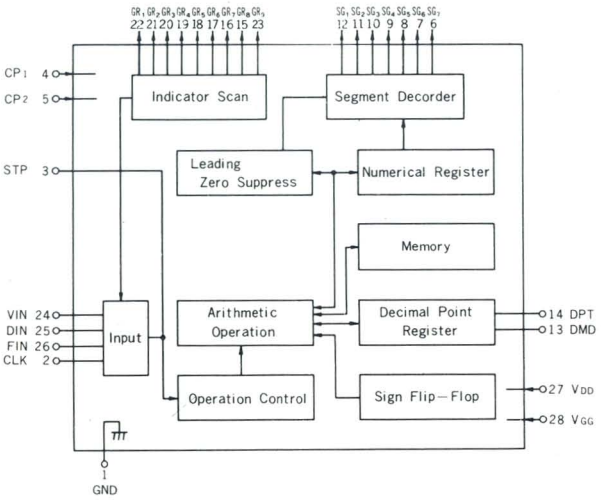
MN1200 Series (Envelope I −21)



MN5500A (Envelope I −16)

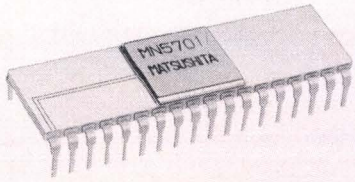


MN5521 (Envelope I −16)

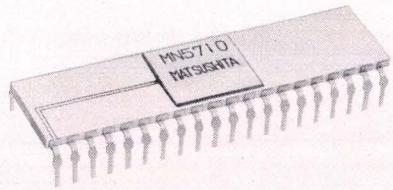


Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
MN5530△✳	8 Digit 1 Chip Desk TOP Calculator Internal Clock Generator Display Tube Direct Drive	V_{GG}	−15	V	I_{GG}	all clear		400		μA
		V_{DD}	−10	V	I_{DD}	all clear		4		mA
		V_{IN}	−30	V	V_{IH}	Except clear key	0		−3.5	V
		V_F	0.3	V	V_{IL}	Except clear key	−6		−30	V
		Topr	−30~70	℃	V_{O1H}	I_O=0.3mA, Segment Output			−1	V
		Tstg	−55~125	℃	V_{O2H}	I_O=3mA, Grid Scan Output		−2		V
					V_{OL}	Display Tube Direct Drive	−30			V
MN5701△	12 Digit 1 Memory Desk Top Calculator	V_{GG}	−15	V	I_{GG}	V_{DD}=−6 V		2		mA
		V_{DD}	−10	V	I_{DD}	V_{GG}=−12V		10		mA
		V_{IN}	−10	V	P_T	V_{CP}=−12V		80		mW
		V_F	0.3	V	V_{IH}		0		−1.5	V
		V_{CP}	−15	V	V_{IL}		−3.5		−7	V
		Topr	−30~70	℃	V_{OH}				−1	V
		Tstg	−55~125	℃	V_{OL}		−5			V
MN5710△	16 Digit 1 Memory Desk Top Calculator	V_{GG}	−15	V	I_{GG}	V_{DD}=−6 V		2		mA
		V_{DD}	−10	V	I_{DD}	V_{GG}=−12V		10		mA
		V_{IN}	−10	V	P_T	V_{CP}=−12V		80		mW
		V_F	0.3	V	V_{IH}		0		−1.5	V
		V_{CP}	−15	V	V_{IL}		−3.5		−7	V
		Topr	−30~70	℃	V_{OH}				−1	V
		Tstg	−55~125	℃	V_{OL}		−5			V
MN6031	4 Digit Decimal UP/Down Counter	V_{GG}	−20	V	I_{GG}			2		mA
		V_{DD}	−15	V	I_{DD}			2		mA
		V_{IN}	−17	V	P_T			65		mW
		V_F	0.3	V	V_{IH}		0		−1	V
		P_T	200	mW	V_{IL}		−4.5		−10	V
		Topr	−30~70	℃	V_{OH}		0		−0.5	V
		Tstg	−55~125	℃	V_{OL}		−4.5		−5	V

△ Preliminary ✳ Envelope I −22



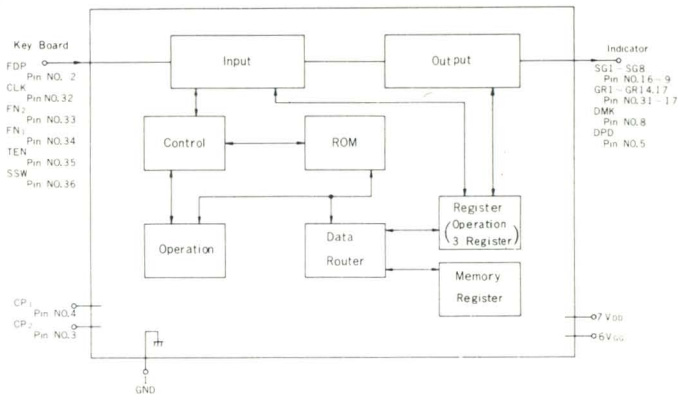
MN5701



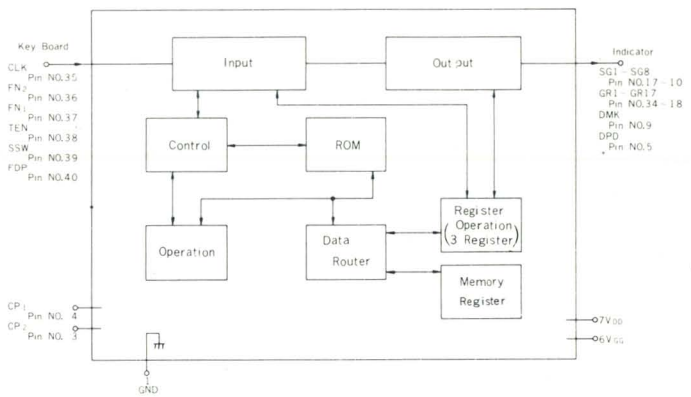
MN5710

Circuit Schematic

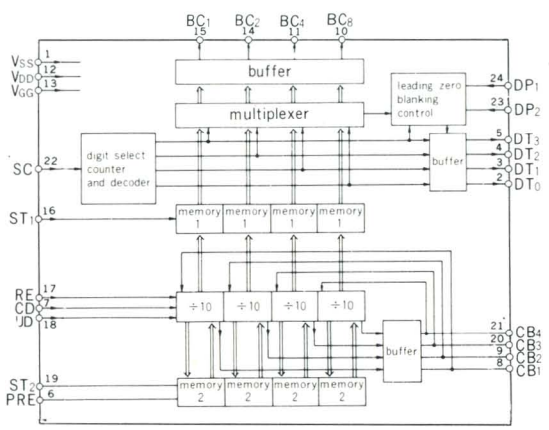
MN5701 (Envelope I – 18)



MN5710 (Envelope I – 19)

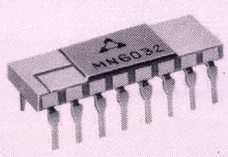


MN6031 (Envelope I – 15)

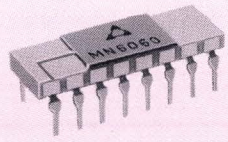


Type No.	Function	Absolute Maximum Ratings (Ta=25℃)			Electrical Characteristics (Ta=25℃)					
		Item	Rating	Unit	Item	Condition	min.	typ.	max.	Unit
MN6032	A/D Converter	V_{GG}	−20	V	I_{GG}			6		mA
		V_{IN}	−17	V	P_T			100		mW
		V_F	0.3	V	V_{IH}		0		−1	V
		P_T	250	mW	V_{IL}		−4.5		−10	V
		Topr	−30~70	℃	V_{OH}		0		−0.6	V
		Tstg	−55~125	℃	V_{OL}		−5.5		−10	V
					I_{OH}		0.5			mA
					I_{OL}		0.5			mA
MN6050△	CMOS Quartz Watch Circuit with Stepping Motor Driver	V_{TE}	3.2~−0.3	V	V_{DD}	$V_{SS}=0$	1.1		3.2	V
		Topr	−30~70	℃	I_{DD}	$V_{DD}=1.5$ V, fxtal =32.786KHz NO LOAD			8	μA
		Tstg	−55~125	℃	I_L	$V_{DD}=1.5$ V			1	mA
					R_L	$V_{DD}=1.5$ V			800	Ω
					t_W	$V_{DD}=1.5$ V, fxtal =32.786KHz			15.6	msec
MN6060△	Sync. Signal Generator for TV Camera	V_{GG}	−21	V	I_{GG}			−13	−16	mA
		V_{DD}	−15	V	I_{DD}	$V_{SS}=0$ V, Output Terminal Open		−20		μA
		V_{IN}	−15	V	P_T	$V_{DD}=-5$ V, Output Terminal Open		220	280	mW
		V_F	0.3	V	I_{OH}	$V_{GG}=-17$V, $V_O=-1$V	−0.3			mA
		I_O	±1	mA	I_{OL}	$V_O=-3.5$V	0.3			mA
		P_T	500	mW	f_{HI}	Color Operation		2.045		MHz
		Topr	−30~70	℃		B/W Operation		2.0475		
		Tstg	−55~125	℃	C_I				20	pF

△ Preliminary



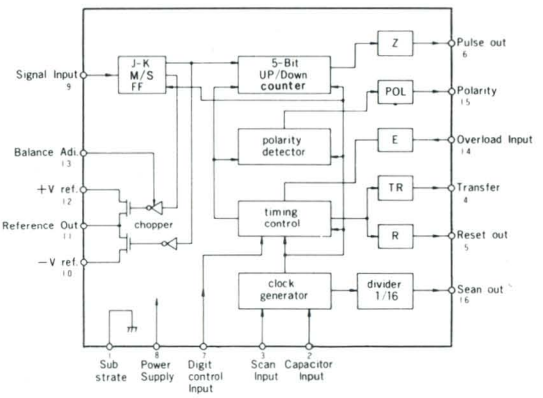
MN6032



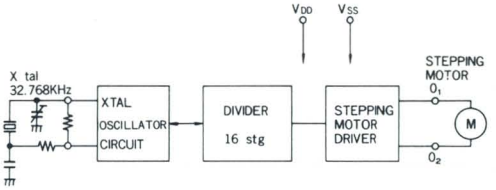
MN6060

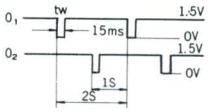
Circuit Schematic

MN6032 (Envelope I −20)

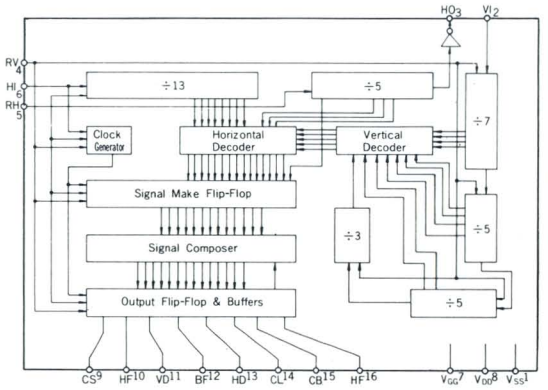


MN6050 (Envelope I −23)





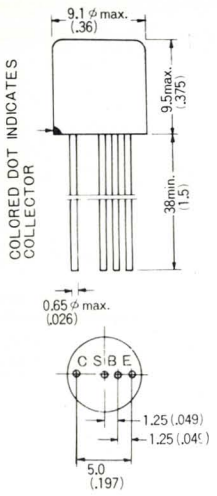
MN6060 (Envelope I −20)



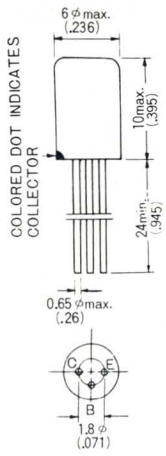
OUTLINE DRAWINGS

Unit : mm (inch)

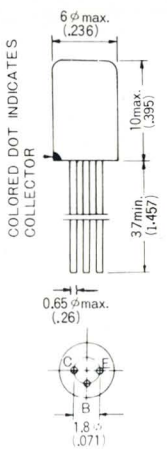
T-1 (TO-7)



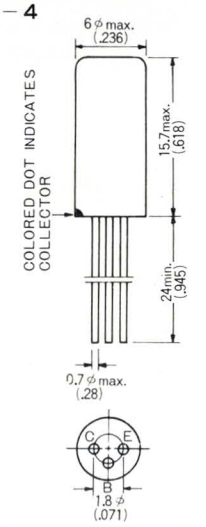
T-2 (TO-1)



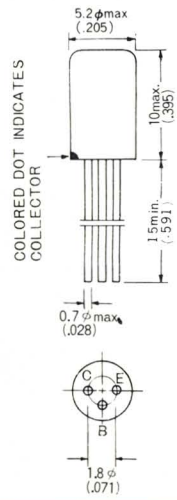
T-3 (TO-1)



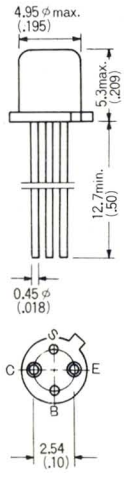
T-4



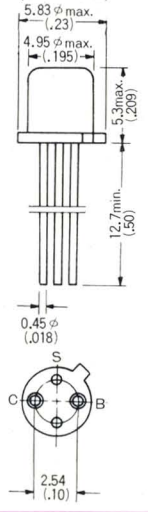
T-5 (TO-1)



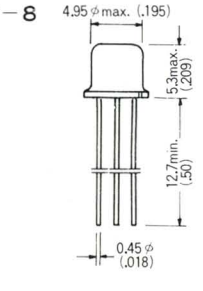
T-6 (TO-72)



T-7 (TO-72)

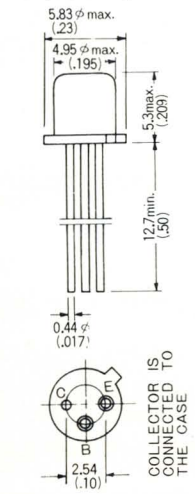


T-8

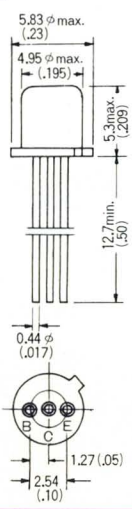


	1	2	3	4
3SK32	Gate 1	Gate 2	Drain	Source
3SK39 3SK49	Drain	Gate 2	Gate 1	Source

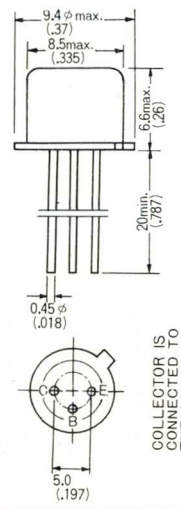
T-9 (TO-18)



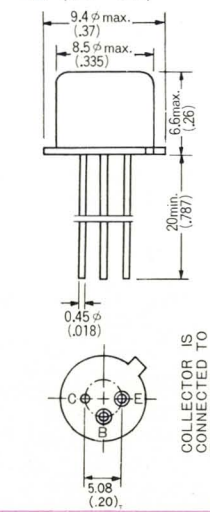
T-10



T-11 (TO-5)

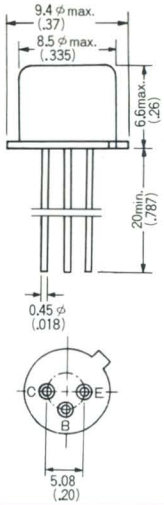


T-12 (TO-39)

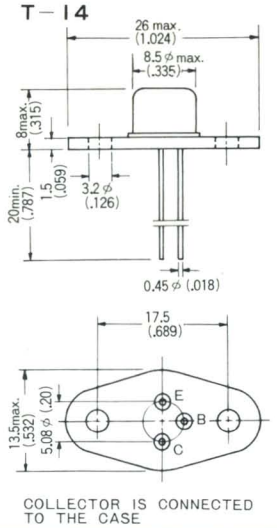


Unit : mm (inch)

T-13 (TO-39)

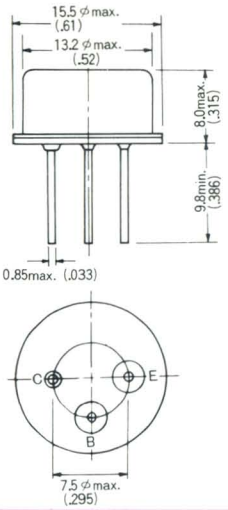


T-14

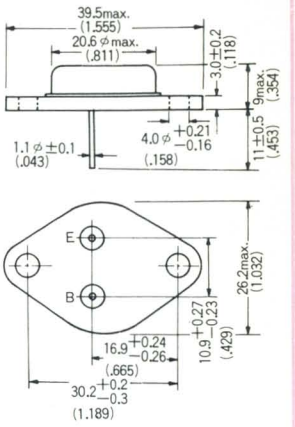


COLLECTOR IS CONNECTED TO THE CASE

T-15 (TO-8)

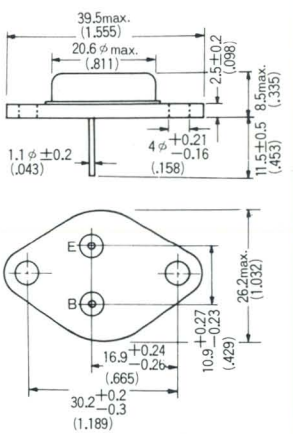


T-16 (TO-3)



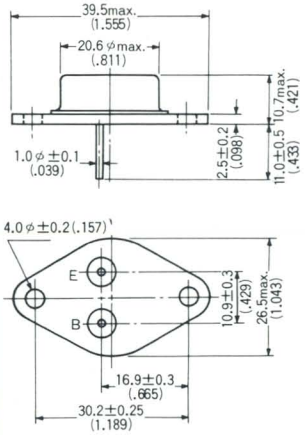
COLLECTOR IS CONNECTED TO THE CASE

T-17 (TO-3)



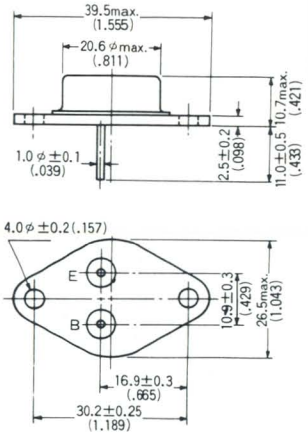
COLLECTOR IS CONNECTED TO THE CASE

T-18



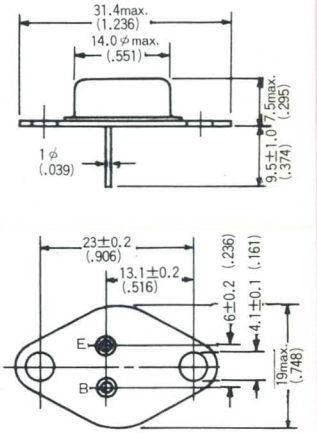
COLLECTOR IS CONNECTED TO THE CASE

T-19



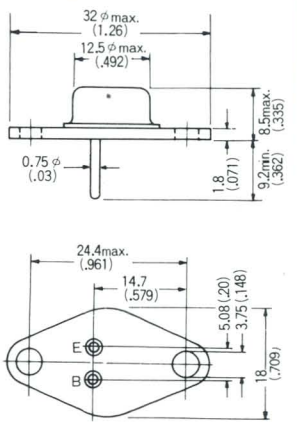
COLLECTOR IS CONNECTED TO THE CASE

T-20



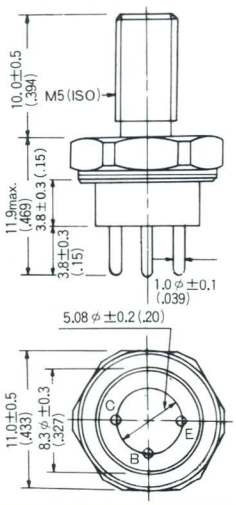
COLLECTOR IS CONNECTED TO THE CASE

T-21 (TO-66)

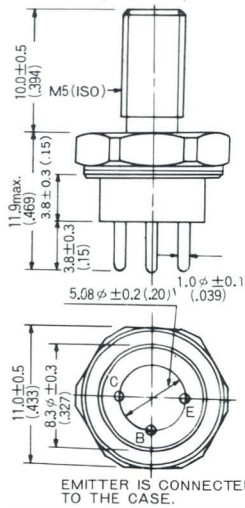


COLLECTOR IS CONNECTED TO THE CASE

T-22 (TO-60)

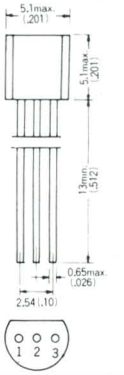


T-23 (TO-60)



EMITTER IS CONNECTED TO THE CASE.

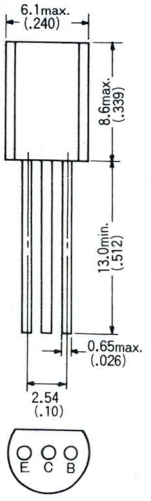
T-24 (TO-92)



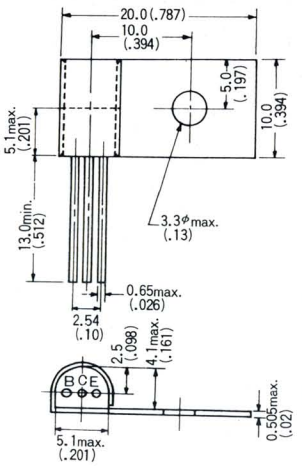
	1	2	3
GENERAL	Emitter	Collector	Base
2SK50	Source	Gate	Drain
2SK56	Gate	Source	Drain

Unit : mm (inch)

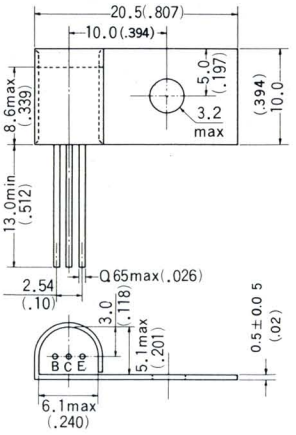
T-25



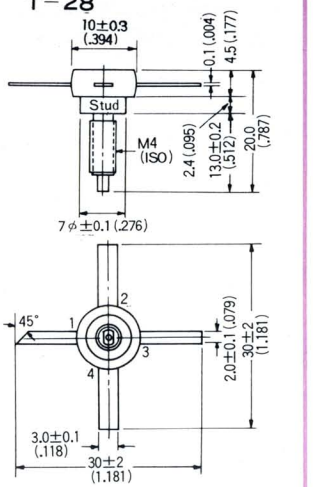
T-26



T-27

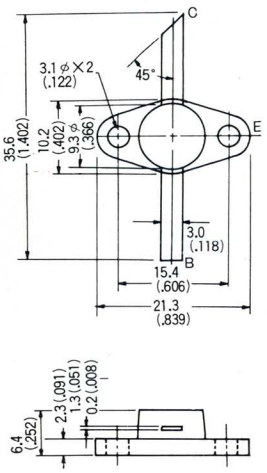


T-28

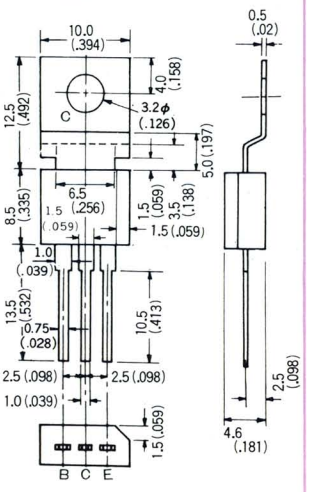


1. COLLECTOR 3. BASE
2. EMITTER(STUD) 4. EMITTER(STUD)

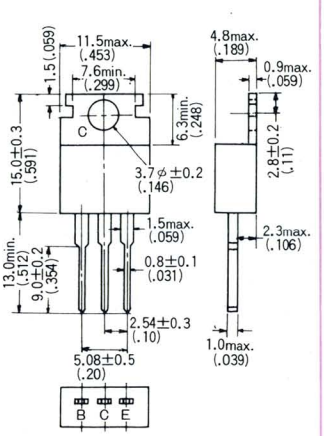
T-29



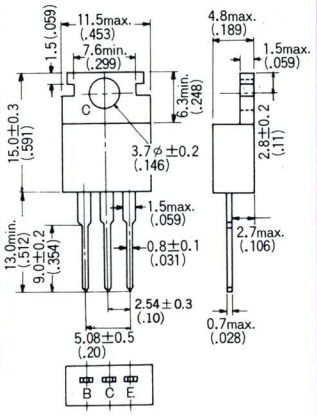
T-30



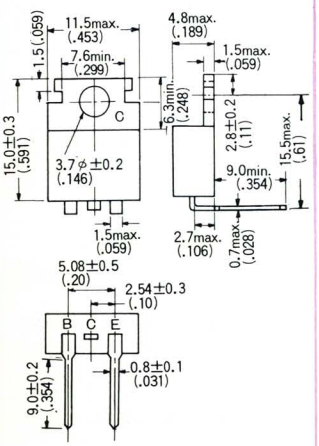
T-31



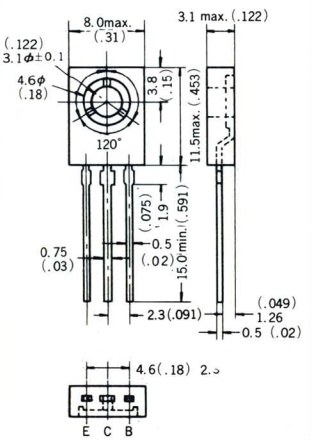
T-32



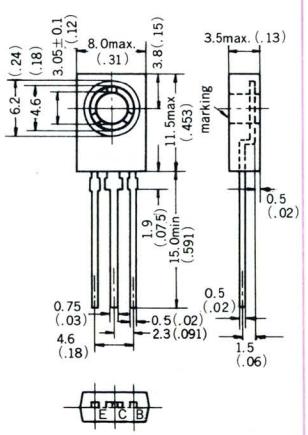
T-33



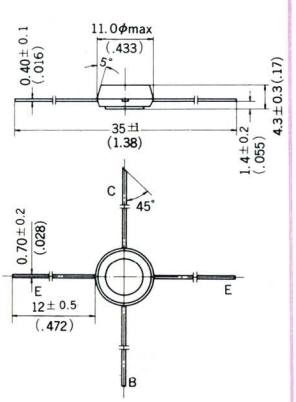
T-34 (TO-126)



T-35 (TO-126)

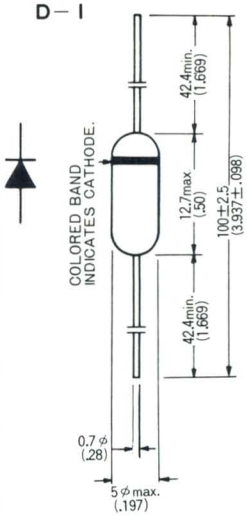


T-36

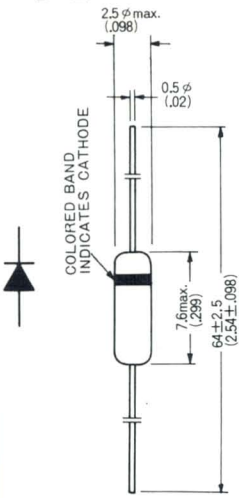


Unit : mm (inch)

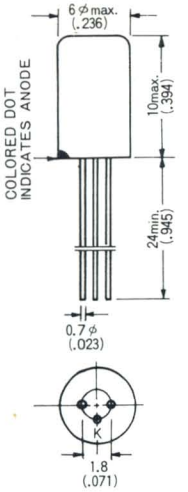
D-1



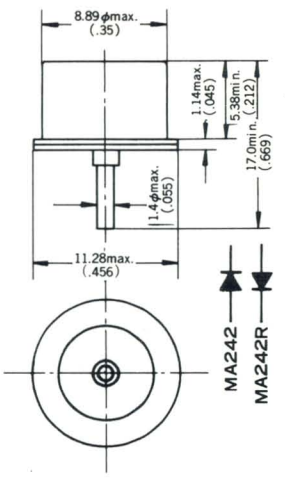
D-2



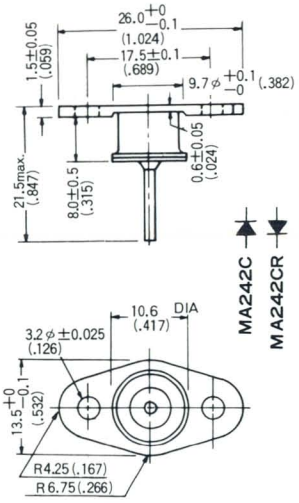
D-3



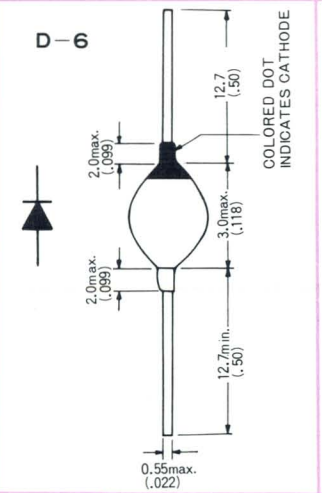
D-4



D-5

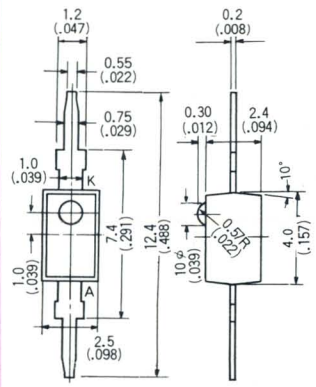


D-6



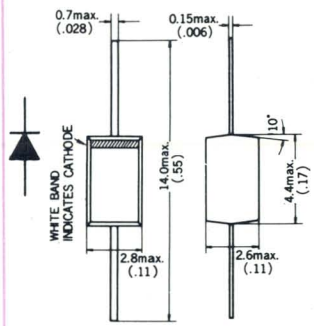
COLOR INDICATION	MA26	Yellow
	MA26W	White

D-7

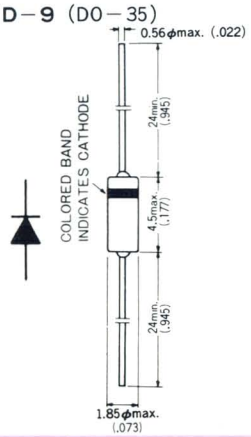


COLOR INDICATION	MA53	Brown
	MA56	Blue
	MA320/340	Black

D-8

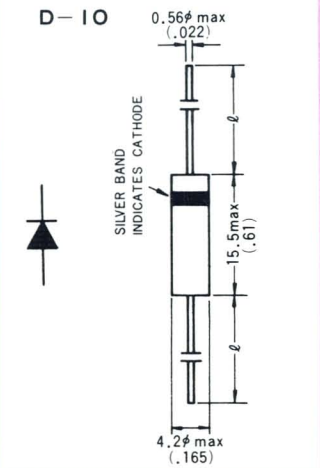


D-9 (DO-35)



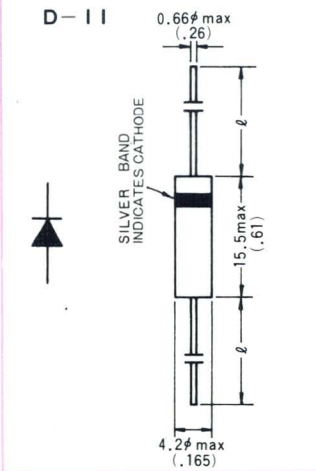
COLOR INDICATION	MA150	White
	MA161	Green
	MA162	Violet

D-10



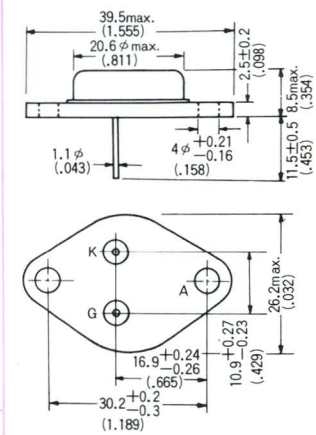
ℓ = 16.5min. (.65)	MA615/619/622
ℓ = 18.5min. (.728)	MA625/630

D-11



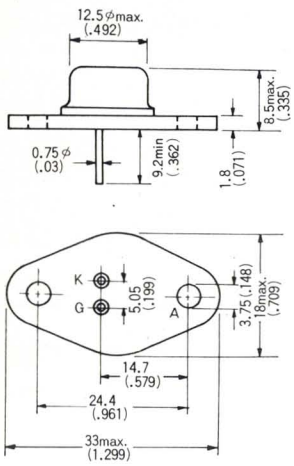
ℓ = 16.5min. (.65)	MA715/720/725
ℓ = 18.5min. (.728)	MA730

S-1

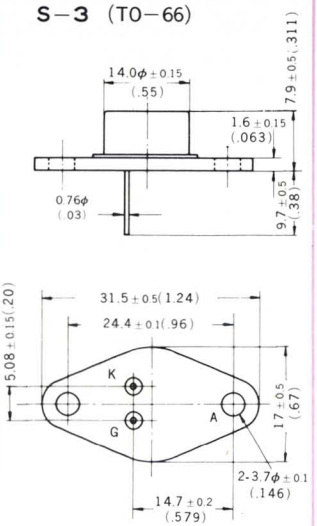


Unit : mm (inch)

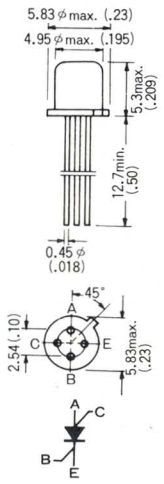
S-2 (TO-66)



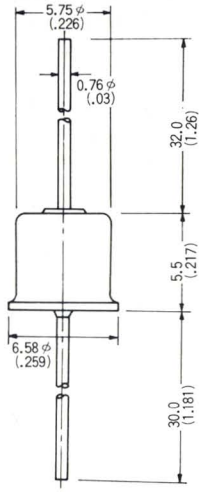
S-3 (TO-66)



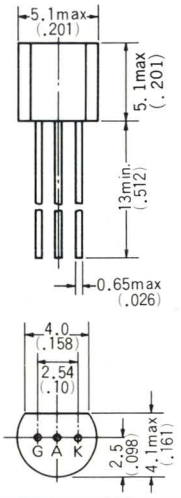
S-4 (TO-72)



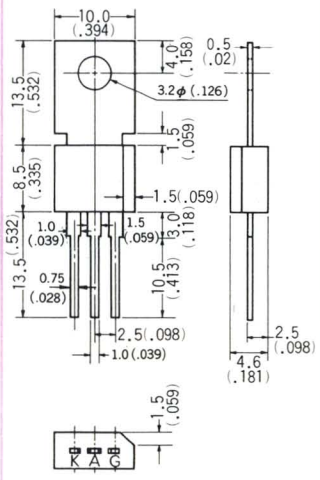
S-5



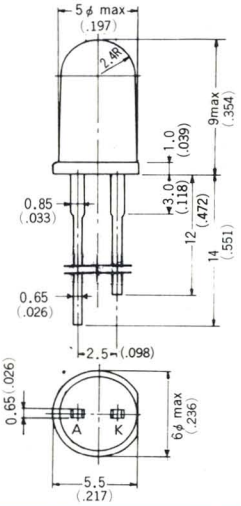
S-6



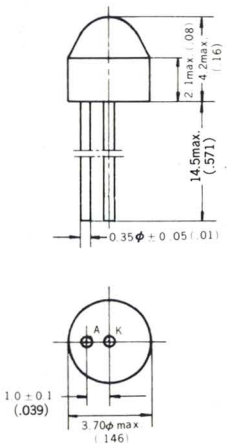
S-7



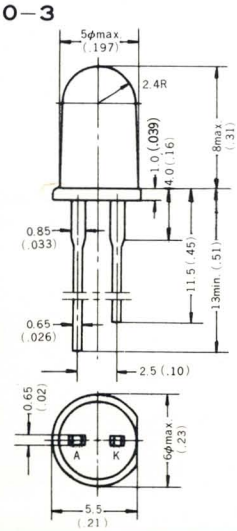
O-1



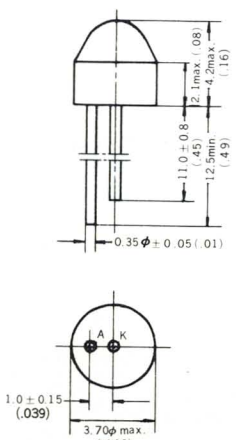
O-2



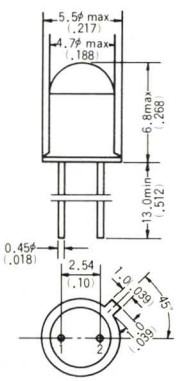
O-3



O-4

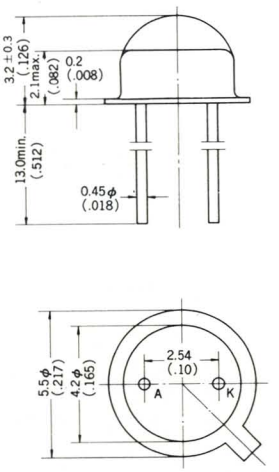


O-5



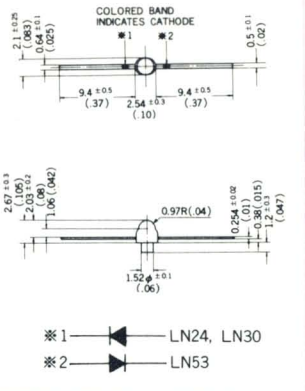
	1	2
LN30/51	A(CASE)	K
LN70	K(CASE)	A
LN101	C(CASE)	E

O-6



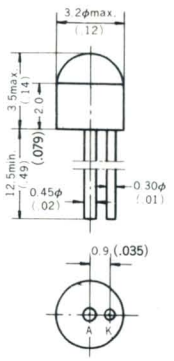
Unit : mm (inch)

O-7

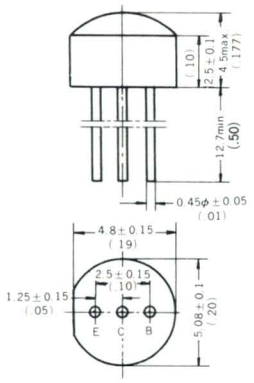


COLOR INDICATION	LN24/30	Black
	LN53	Red

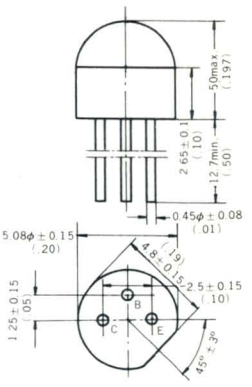
O-8



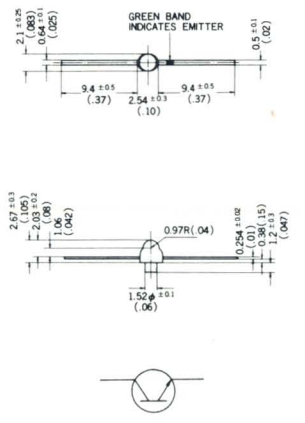
O-9



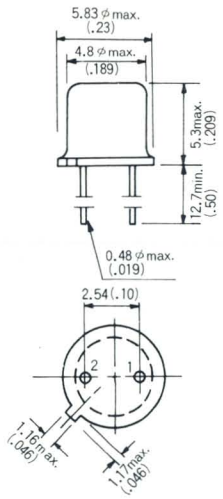
O-10



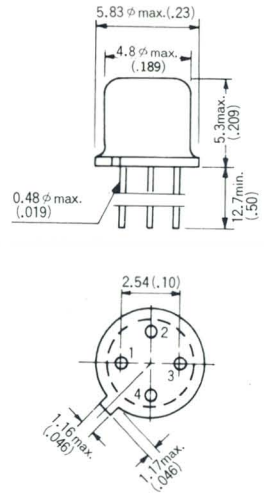
O-11



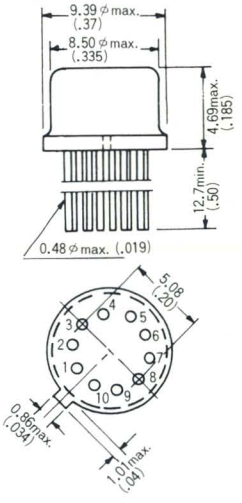
I-1 (TO-18・2 pin)



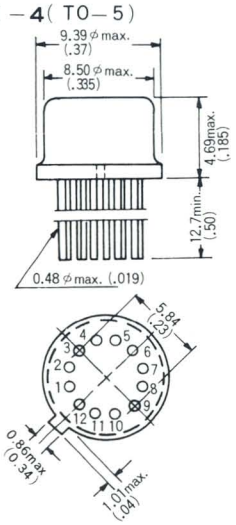
I-2 (TO-72)



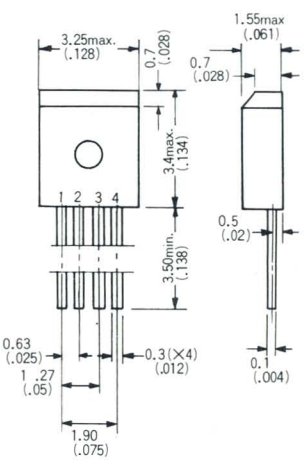
I-3 (TO-5)



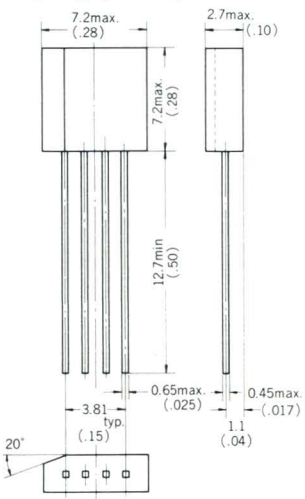
I-4 (TO-5)



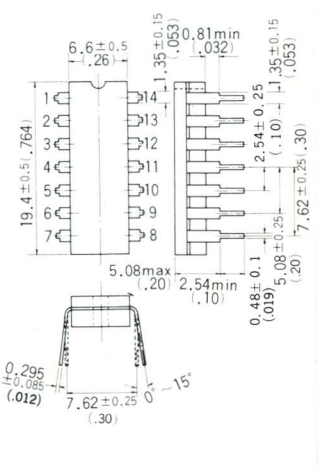
I-5 (U-38)



I-6 (Plastic)

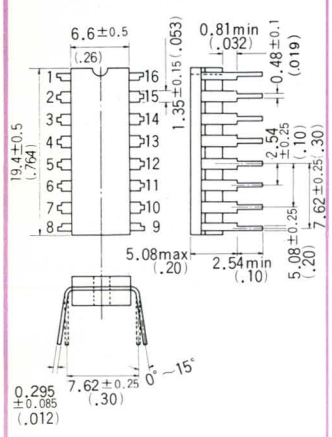


I-7 (Ceramic)

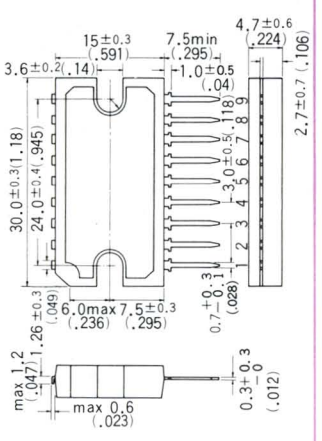


Unit : mm (inch)

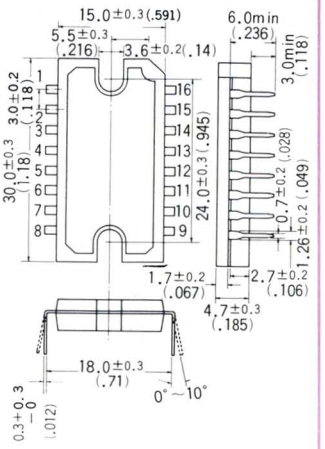
I－8 (Ceramic)



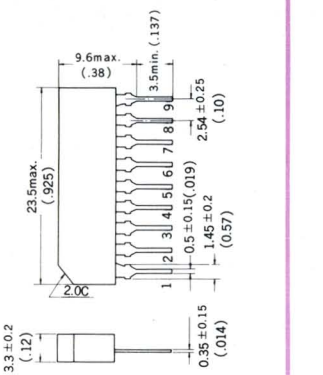
I－9 (Plastic)



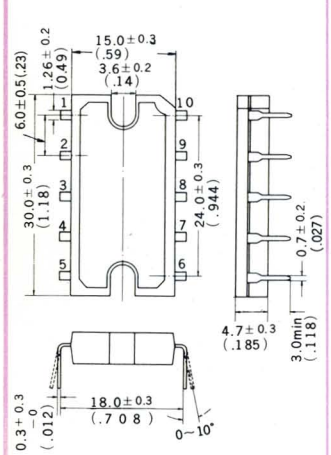
I－10 (Plastic)



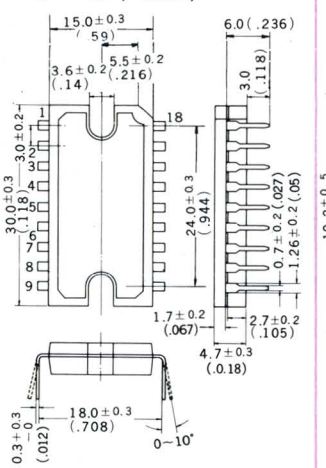
I－11 (Plastic)



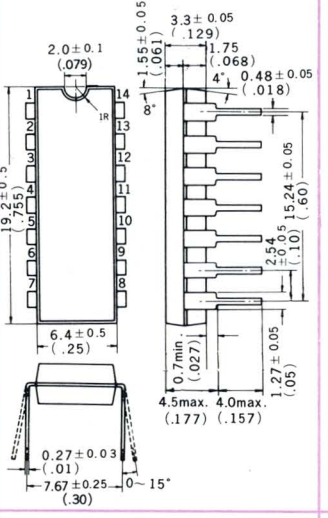
I－12 (Plastic)



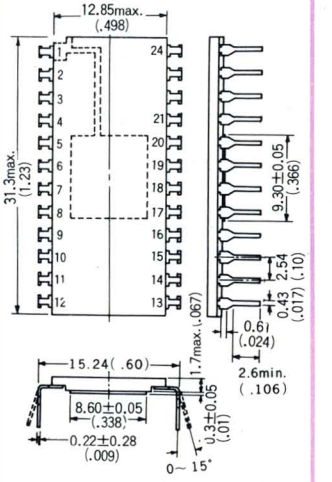
I－13 (Plastic)



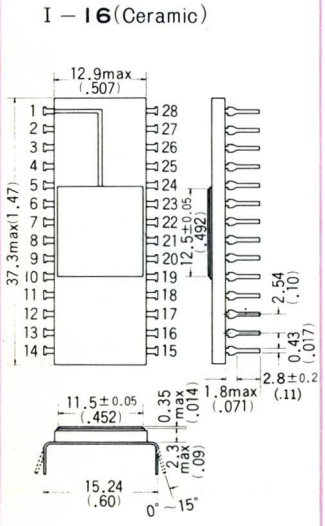
I－14 (Plastic)



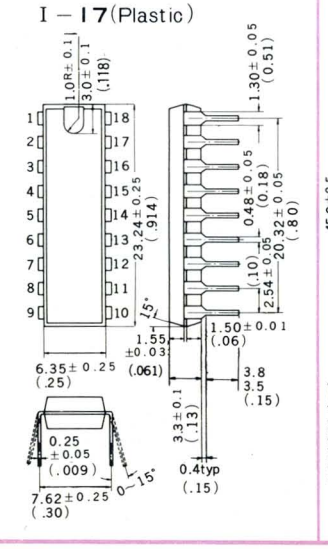
I－15 (Ceramic)



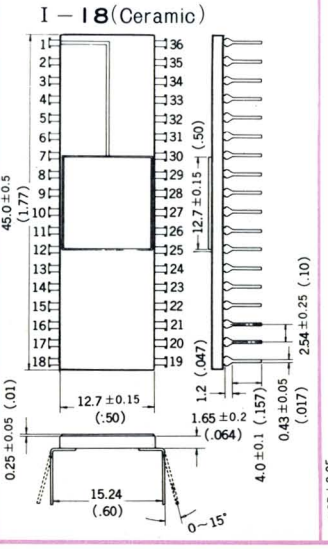
I－16 (Ceramic)



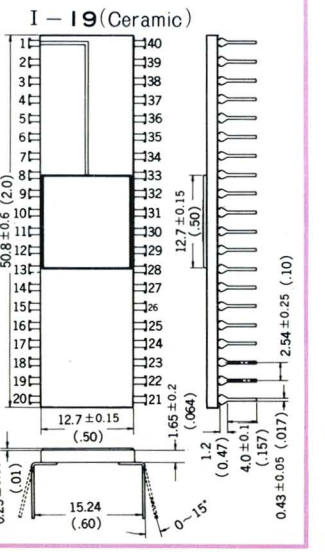
I－17 (Plastic)



I－18 (Ceramic)

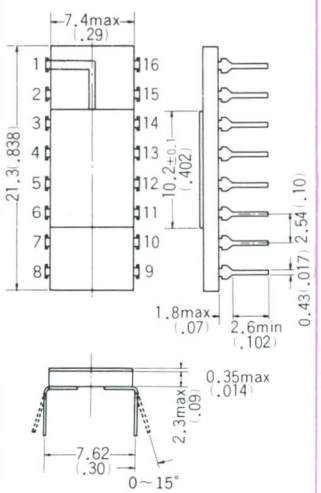


I－19 (Ceramic)

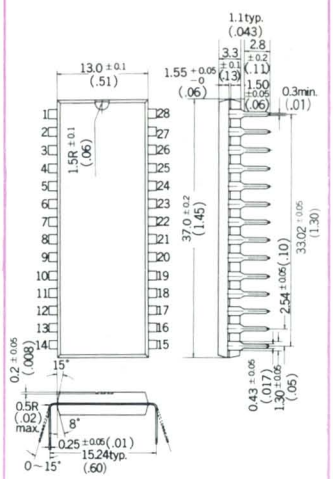


Unit : mm (inch)

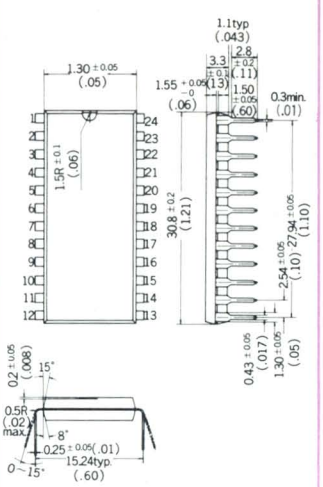
I－20(Ceramic)



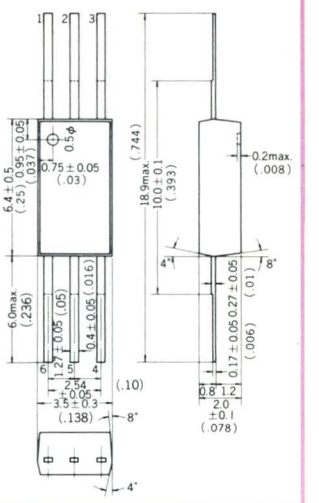
I－21(Plastic)



I－22(Plastic)



I－23(Plastic)



CATHODE RAY TUBES

QUICK REFERENCE SHEET (COLOR PICTURE TUBES)

Screen Size (Visual Size)	Deflection Angle & Neck Diameter (mm)	Reinforcement Method	Uni-potential Focus Lens Type		Bi-potential Focus Lens Type	
			Type No.	Page	Type No.	Page
5" (4.5V)	55° – 20.0φ	None			▼ 140AGB22	119
8" (7V)	70° – 29.1φ	T–Band Bonded Frame	☆▼ 200HB22 ▼ 200KB22	119		
	90° – 29.1φ	Bonded Frame			▼ 200LB22	119
10" (9V)	90° – 36.5φ	Bonded Frame	☆▼ 250RB22A	119		
13" (12V)	90° – 36.5φ	Bonded Frame	☆▼ 320CB22A ⊙ ▼ 320AGB22	119	☆▼ 320NB22A	119
14" (13V)	90° – 36.5φ	Bonded Frame	☆▼ 370ACB22 ⊙ ▼ 370AKB22 ⊙ ▼ 370BGB22	119	⊙5▼ 370BRB22	119
	110° – 29.1φ	Bonded Frame			⊙ ▲ 370AXB22	119
16" (15V)	90° – 36.5φ	Bonded Frame	☆▲ 420AB22 ⊙ ▲ 420NB22 ⊙ ▲ 420ACB22	119	⊙5▲ 420AHB22	119
	110° – 29.1φ	Bonded Frame			⊙ ▲ 420XB22	119
17" (16V)	90° – 36.5φ	Bonded Frame			☆▼ 440ASB22A	121
18" (17V)	90° – 36.5φ	Bonded Frame	☆▲ 470BYB22	121	☆▲ 470BXB22 ⊙ ▲ 470CTB22 ⊙5▲ 470EJB22	121
	110° – 29.1φ	Bonded Frame			⊙ ▲ 470CZB22 ⊙ ••• 470ESB22	121
19" (18V)	90° – 36.5φ	None			☆▲ 490CHB22A	121
		Bonded Frame			☆▲ 490BKB22B	121
		Bonded Plate			☆▲ 490ASB22A	121
20" (19V)	90° – 36.5φ	None Bonded Frame			☆▲ 510ACB22A ☆▲ 510AEB22A ⊙ ▲ 510CEB22 ⊙5▲ 510FLB22	121
	110° – 29.1φ	Bonded Frame			⊙ ▲ 510DTB22 ⊙ ••• 510FUB22	121
22" (20V)	90° – 36.5φ	None			⊙☆▲ 550EB22	121
22" (21V)	90° – 36.5φ	None			▲ 560DB22	121
		Push Through			▲ 560KB22	121
	110° – 29.1φ	Bonded Frame			⊙ ▲ 560EB22	121

⊙ : Negative guard band concept with black surround screen.

☆ : Maintenance type.

5 : 5 Electrode gun.

▼ : Delta gun type (Blue gun down)

▲ : Delta gun type (Blue gun up)

••• : In Line gun type.

QUICK REFERENCE SHEET (MONOCHROME PICTURE TUBES)

Screen Size (Visual Size)	Deflection Angle & Neck Diameter (mm)	Reinforcement Method	Heater: 2.0V— 85mA 2.8V—107mA		Heater: 12.0V—67mA 12.6V—64mA			
			EC2: 80V～300V	Page	EC2: 100～130V	Page	EC2: 250～400V	Page
1.5" (1.4V)	36°－13φ	None	☆1VABP4 ☆1VACP4	123				
3" (2.9V)	50°－13φ	None	☆85GB4	123				
4.5" (4V)	55°－20φ	None					110CB4	123
5" (4.5V)	55°－20φ	None					140AKB4	123
	70°－20φ	None					☆140FB4	
6" (5.5V)	70°－20φ	None					☆150ACB4	123
9" (8.5V)	90°－20φ	None					230AHB4	123
		Bonded Frame			230ANB4 230AYB4	123	230ADB4	123
10" (9V)	90°－20φ	T－Band						
11" (10V)	90°－20φ	Bonded Frame					☆280VB4	123
12" (12V)	90°－20φ	Bonded Frame			310FDB4	123		
		T－Band			310GUB4 310HCB4	123		
	110°－20φ	Bonded Frame						
		T－Band						
14" (13V)	90°－20φ	T－Band			340AYB4 340AZB4	125		
		Bonded Frame			340AHB4	125		
	110°－20φ	Bonded Frame						
16" (15V)	114°－28.6φ	None						
		Bonded Frame						
	110°－20φ	None						
		Bonded Frame						
17" (16V)	114°－28.6φ	Bonded Frame						
19" (18V)	114°－28.6φ	None						
		Bonded Frame						
20" (19V)	114°－28.6φ	None						
		Bonded Frame						
21" (20V)	114°－28.6φ	Bonded Frame						
23" (22V)	110°－28.6φ	None						
		Bonded Frame						

☆ : Maintenance type.

Heater: 6.3V－300mA						Heater: 4.2V－450mA				Screen Size
EC2: 60V	Page	EC2: 100～200V	Page	EC2: 300～500V	Page	EC2: 60V	Page	EC2: 120～200V	Page	(Visual Size)
										1.5" (1.4V)
										3" (2.9V)
										4.5" (4V)
										5" (4.5V)
										6" (5.5V)
		230ARB4	123					230AEB4	123	9" (8.5V)
		240MB4	123							10" (9V)
								☆280UB4	123	11" (10V)
		310CYB4	123					310EDB4	123	12" (12V)
		310GZB4	123					☆310FJB4 310GDB4	123	
										14" (13V)
		340NB4	125					☆340FB4	125	
				☆400ADB4	125					
				400CDB4	125					16" (15V)
								☆400BGB4	125	
								☆400CHB4	125	
440GB4	125					440ANB4	125			17" (16V)
				☆470LB4	125					19" (18V)
				☆A47-23W	125					
500WB4	125									20" (19V)
500XB4	125					500JB4	125			
☆520AB4	125									21" (20V)
				☆590GB4	125					23" (22V)
				☆A59-11W	125	☆590YB4	125			

COLOR PICTURE TUBES

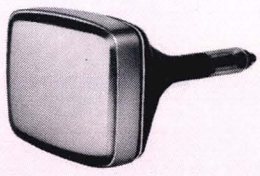
Screen Size (Visual Size)	Type No. 1)	Tube Constructions 2)								Heating 5)	
		Deflection Angle (degrees)	Neck Dia. (mm)	Gun 3) Type	Reinforcement 4) Method	Overall Length (mm)	Trio Dot Pitch (mm)	Light Transmission (%)	Base Connection No.	Ef (V)	If (mA)
5" (4.5V)	▼140AGB22	55	20.0	BPF	None	237±7.0	0.44	76.0	Fig. 1	2.8	321
8" (7V)	☆▼200HB22	70	29.1	UPF	T−Band	293±7.0	0.55	66.0	Fig. 2	12.6	192
	▼200KB22				Bonded Frame						
	▼200LB22	90	29.1	BPF	Bonded Frame	252.3±7.0	0.55	66.0	13C	6.3	900
10" (9V)	☆▼250RB22A	90	36.5	UPF	Bonded Frame	305.3±9.5	0.61	64.5	14BH	6.3	900
13" (12V)	☆▼320NB22A	90	36.5	BPF	Bonded Frame	347.3±9.5	0.61	62.0	14BE	6.3	900
	☆▼320CB22A			UPF				48.0	14BH		
	⊙ ▼320AGB22							87.0			
14" (13V)	☆▼370ACB22	90	36.5	UPF	Bonded Frame	365.8±9.5	0.61	57.0	14BH	6.3	900
	⊙ ▼370AKB22							86.0			
	⊙ ▼370BGB22										
	⊙5 ▼370BRB22			BPF		370.8±9.5			Fig. 3		
	⊙ ▲370AXB22	110	29.1	BPF	Bonded Frame	294.5±9.5	0.61	86.0	13C	6.3	900
16" (15V)	☆▲420AB22	90	36.5	UPF	Bonded Frame	397.3±9.5	0.61	56.0	14BH	6.3	900
	⊙ ▲420NB22							86.0			
	⊙ ▲420ACB22										
	⊙5 ▲420AHB22			BPF		402.3±9.5			Fig. 3		
	⊙ ▲420XB22	110	29.1	BPF	Bonded Frame	314.9±9.5	0.61	86.0	13C	6.3	900

1) ⊙ : Negative guard band concept with black suround screen.
☆ : Maintenance type.
▼ : Delta gun type (Blue gun down).
▲ : Delta gun type (Blue gun up).
•••: In line gun type.
5 : 5 Electrode gun.

2) Deflection method : Magnetic
Focusing method : Electrostatic.
Glass bulb : Increased X-ray absorption.

3) Gun type UPF : Uni-potential focus lens.
BPF : Bi-potential focus lens.

140AGB22



200KB22

370AKB22
370BRB22

Maximum Ratings (Design Max.)					Typical Operating Conditions				Drawing No.	Type No.
Eb (kV)	Focus Voltage E_{c3} or E_{c4} (V)	E_{c2} Peak[6] ※E_{c2}' (V)	E_{c1} or ※Ek (V)	Ia total[7] (μA)	Eb (kV)	Focus Voltage E_{c3} or E_{c4} (V)	E_{c2} ※E_{c2}' (V)	E_{c1}[8] or ※Ek (V)		
9.5～14.5	3200	1000	−400～0	145	12	2280～2700	175～480	S− 40	1	▼140AGB22
14～18	−550～1100	1000	−300～0	350	16	−75～ 400	220～470	S− 60	2	☆▼200HB22
									3	▼200KB22
16～20	4300	1000	−400～0	350	18	3020～3600	110～250	S− 60	4	▼200LB22
16～22	−550～1100	1000	−400～0	500	18	−75～ 400	190～410	S− 80	5	☆▼250RB22A
16～24	5200	1000	−400～0	650	20	3360～4000	200～520	R−100	6	☆▼320NB22A
	−550～1100					−75～ 400	225～470	S− 90		☆▼320CB22A
										⊙ ▼320AGB22
16～24	−550～1100	1000	−400～0	700	20	−75～ 400	150～390	S−100	7	☆▼370ACB22
										⊙ ▼370AKB22
									8	⊙ ▼370BGB22
19～24	6200	1000 ※1000	※0～400	650	22	4580～5280	320～575 ※0～400	※S−100	7	⊙[5]▼370BRB22
19～24	5280			650	22	3700～4400	200～430	S−100	9	⊙ ▲370AXB22
20～26	−550～1100	1000	−400～0	700	22	−75～ 400	150～390	S−100	10	☆▲420AB22
										⊙ ▲420NB22
									11	⊙ ▲420ACB22
19～26	6700	1000 ※1000	※0～400	650	24	5000～5760	320～575 ※0～400	※S−100	12	⊙[5]▲420AHB22
19～26	5700	1000	−400～0	650	24	4030～4800	200～430	R−100	13	⊙ ▲420XB22

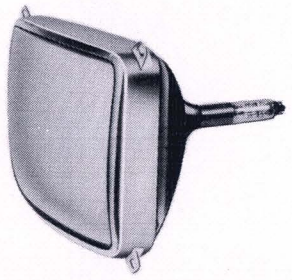
4) Reinforcement method : The bonded frame type tubes are provided with metal mounting lugs to facilitate mounting into the cabinet.

5) Heater voltage under standby condition : 63% of normal heater voltage.

6) E_{c2} peak Including video signal voltage.

7) Ia total : Long term average value.

8) E_{c1} R : Visual extinction of focused raster.
S : Visual extinction of focused spot.



420NB22
420AHB22

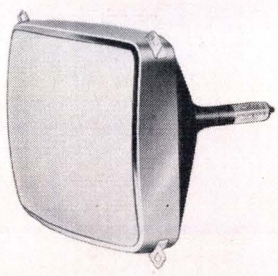
420XB22

Screen Size (Visual Size)	Type No. [1]	Tube Constructions [2]								Heating [5]	
		Deflection Angle (degrees)	Neck Dia. (mm)	Gun [3] Type	Reinforcement [4] Method	Overall Length (mm)	Trio Dot Pitch (mm)	Light Transmission (%)	Base Connection No.	Ef (V)	If (mA)
17" (16V)	☆▼440ASB22A	90	36.5	BPF	Bonded Frame	414.6±9.5	0.71	58.5	14BE	6.3	900
18" (17V)	☆▲470BYB22	90	36.5	UPF	Bonded Frame	425.1±9.5	0.70	66.5	14BH	6.3	900
	☆▲470BXB22			BPF				54.5	14BE		
	⊙ ▲470CTB22							85.5			
	⊙5▲470EJB22					430.1±9.5			Fig. 3		
	⊙ ▲470CZB22	110	29.1	BPF	Bonded Frame	335.6±9.5	0.61	85.5	13C	6.3	900
	⊙ •••470ESB22					328.6±9.5	H0.74 V0.95	85.5	Fig. 4	6.3	900
19" (18V)	☆▲490ASB22A	90	36.5	BPF	Bonded Plate	451.4±9.5	0.61	48.5	14BE	6.3	900
	☆▲490BKB22B				Bonded Frame	446.5±9.5		55.0			
	☆▲490CHB22A				None	446.5±9.5					
20" (19V)	☆▲510ACB22A	90	36.5	BPF	None	453.7±9.5	0.61	53.5	14BE	6.3	900
	☆▲510AEB22A				Bonded Frame						
	⊙ ▲510CEB22							85.0			
	⊙5▲510FLB22					458.7±9.5			Fig. 3		
	⊙ ▲510DTB22	110	29.1	BPF	Bonded Frame	357.2±9.5	0.61	85.0	13C	6.3	900
	⊙ •••510FUB22					350.2±9.5	H0.77 V1.06	85.0	Fig. 4	6.3	900
22" (20V)	⊙☆▲550EB22	90	36.5	BPF	None	475.9±9.5	0.64	85.0	14BE	6.3	900
22" (21V)	▲560DB22	90	36.5	BPF	None	472.2±9.5	0.68	52.0	14BE	6.3	900
	▲560KB22				Push Through						
	⊙ ▲560EB22	110	29.1	BPF	Bonded Frame	380.2±9.5	0.69	85.0	13C	6.3	900

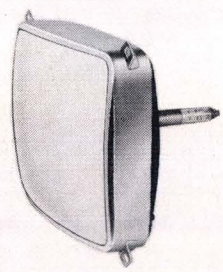
1) ⊙ : Negative guard band concept with black surround screen.
☆ : Maintenance type.
▼ : Delta gun type (Blue gun down).
▲ : Delta gun type (Blue gun up)
••• : In line gun type.
5 : 5 Electrode gun.

2) Deflection method : Magnetic.
Focusing method : Electrostatic.
Glass bulb : Increased X-ray absorption.

3) Gun type UPF : Uni-potential focus lens.
BPF : Bi-potential focus lens.



470CTB22
470EJB22



470CZB22

Maximum Ratings (Design Max.)					Typical Operating Conditions				Drawing No.	Type No.
Eb (kV)	Focus Voltage E_{c3} or E_{c4} (V)	E_{c2} Peak[6] ※E_{c2}'	E_{c1} or ※Ek (V)	Ia total[7] (μA)	Eb (kV)	Focus Voltage E_{c3} or E_{c4} (V)	E_{c2} ※E_{c2}' (V)	E_{c1}[8] or ※Ek (V)		
20～26	5700	1000	−400～0	700	24	4030～4800	200～520	R−100	14	☆▼440ASB22
20～26	550～1100	1000	−400～0	700	24	−75～ 400	150～390	R−105	15	☆▲470BYB22
20～27.5	6000	1000	−400～0	700	25	4200～5000	200～520	R−100	15	☆▲470BXB22
20～27.5	6000	1000	−400～0	750	25	4200～5000	200～520	R−100	15	⊙ ▲470CTB22
20～27.5	7000	1000 ※1000	※0～400	750	25	5200～6000	430～760 ※0～400	※S−130	15	⊙[5]▲470EJB22
19～26	5700	1000	−400～0	750	24	4020～4800	200～430	R−100	16	⊙ ▲470CZB22
20～27	7000	1000	−400～0	720	25	5200～6050	345～760	※S−100	17	⊙•••470ESB22
20～27.5	6000	1000	−400～0	750	25	4200～5000	200～520	R−100	18	☆▲490ASB22A
									19	☆▲490BKB22B
									20	☆▲490CHB22A
20～27.5	6000	1000	−400～0	750	25	4200～5000	200～520	R−100	21	☆▲510ACB22A
									22	☆▲510AEB22A
									22	⊙ ▲510CEB22
	7000	1000 ※1000	※0～400	750	25	5200～6000	430～760 ※0～400	※S−130	22	⊙[5]▲510FLB22
19～26	5700	1000	−400～0	750	24	4020～4800	200～430	R−100	23	⊙ ▲510DTB22
20～27	7000	1000	−400～0	720	25	5200～6050	345～760	※S−100	24	⊙•••510FUB22
20～27.5	6000	1000	−400～0	1000	25	4200～5000	200～520	R−100	25	⊙☆▲550EB22
20～27.5	6000	1000	−400～0	1000	25	4200～5000	200～520	R−100	26	▲560DB22
									27	▲560KB22
20～27.5	6000	1000	−400～0	1000	25	4200～5000	200～430	S−100	28	⊙ ▲560EB22

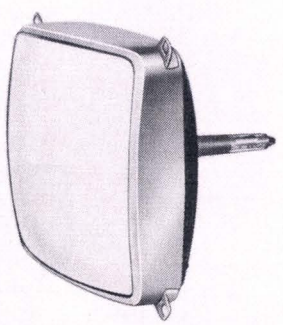
4) Reinforcement Method : The bonded frame type tubes are provided with metal mounting lugs to facilitate mounting into the cabinet.

5) Heater voltage under standby condition : 63% of normal heater voltage.

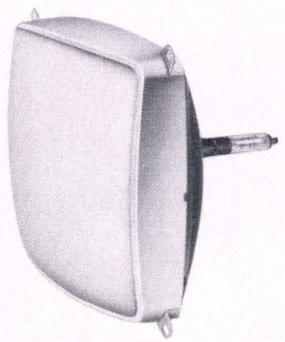
6) E_{c2} peak : Including video signal voltage.

7) Ia total : Long term average value.

8) E_{c2} R : Visual extinction of focused raster.
S : Visual extinction of focused spot.



510DTB22



560EB22

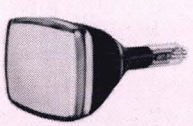
MONOCHROME PICTURE TUBES

Screen Size (Visual Size)	Type No. 1)	Tube Constructions 2)							Heating 5)	
		Deflection Angle (degrees)	Neck Dia. (mm)	Gun 3) Type	Reinforcement 4) Method	Overall Length (mm)	Light Transmission (%)	Base Connection No.	Ef (V)	If (mA)
1.5" (1.4V)	☆● 1VABP4	36	13.0	UPF	None	118max.	88	Fig. 6	2.0	85
	☆● 1VACP4			BPF				Fig. 5	2.0	85
3" (2.9V)	☆● 85GB4	50	13.0	UPF	None	147max.		Fig. 6	2.8	107
4.5" (4V)	110CB4	55	20.0	TPF	None	177max.	80	7GT	12.6	64
5" (5V)	140AKB4	55	20.0	TPF	None	202max.	70	7GT	12.6	64
	☆ 140FB4	70	20.0	TPF	None	163max.	80	7GT	12.6	64
6" (5.5V)	☆ 150ACB4	70	20.0	TPF	None	174max.	70	7GT	12.6	64
9" (8.5V)	● 230ADB4	90	20.0	TPF	Bonded Frame	199max.	53.5	7GT	12.6	64
	● 230AHB4				None					
	● 230AEB4			UPF	Bonded Frame	220max.	53.5	7GR	4.2	450
	● 230ARB4								6.3	300
	● 230ANB4								12.6	64
	● 230AYB4								12.0	67
10" (9V)	240MB4	90	20.0	UPF	T−Band	221max.	53.5	7GR	6.3	300
11" (10V)	☆ 280UB4	90	20.0	UPF	Bonded Frame	250max.	49.5	7GR	4.2	450
	☆ 280VB4			TPF	Bonded Frame	231.4max.	49.5	7GT	12.6	64
12" (12V)	310FDB4	90	20.0	UPF	Bonded Frame	280max.	49.5	7GR	12.6	64
	310HCB4				T−Band					
	310GUB4								12.0	67
	310GZB4	110	20.0	UPF	T−Band	242max.	49.5	7GR	6.3	300
	310CYB4				Bonded Frame					
	310EDB4								4.2	450
	310GDB4				T−Band					
	☆ 310FJB4									

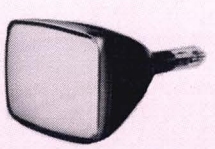
1) ● : Ultra-rectangular Tube.
☆ : Maintenance type.

2) Deflection method : Magnetic.
Focusing method : Electrostatic.

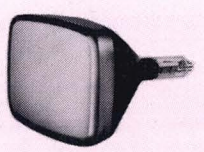
3) Gun type TPF : Tri-potential focus lens.
UPF : Uni-potential focus lens.
BPF : Bi-potential focus lens.



110CB4



140AKB4



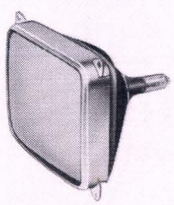
150ACB4

Maximum Ratings (Design Max.)				Typical Operating Conditions (Cathode Drive)				Drawing No.	Type No.
Eb (kV)	Focus Voltage E_{c3} or E_{c4} (V)	E_{c2} (V)	Ek (V)	Eb (kV)	Focus Voltage E_{c3} or E_{c4} (V)	E_{c2} (V)	Ek 6) (V)		
4.0～6.0	− 50～ 100	70～100	0～ 80	5	0～ 80	80	8～25	29	☆● 1VABP4
4.0～6.0	−	70～100	0～ 80	5	400～580	120	13～47		☆● 1VACP4
5.0～7.5	−550～1100	150～450	0～100	6	0～200	300	22～42	30	☆● 85GB4
5.5～7.5	−550～1100	250～440	0～125	6	0～300	300	12～30	31	110CB4
7～10	−550～1100	250～550	0～125	8	0～400	400	21～41	32	140AKB4
6～10	−550～1100	250～440	0～125	8	0～300	300	14～32	33	☆ 140FB4
5.5～7.5	−550～1100	250～550	0～125	6	0～400	400	21～41	34	☆ 150ACB4
7～13	−550～1100	250～550	0～125	10	0～400	400	21～41	36	● 230ADB4
								35	● 230AHB4
7～13	−550～1100	80～250	0～154	10	0～400	120	31～51	36	● 230AEB4
									● 230ARB4
									● 230ANB4
									● 230AYB4
7～13	−550～1100	100～250	0～154	10	0～400	140	31～51	37	240MB4
9～14	−550～1100	80～250	0～154	11	0～400	120	31～51	38	☆ 280UB4
9～14	−550～1100	250～550	0～125	11	0～400	400	21～41		☆ 280VB4
9～16	−550～1100	80～250	0～154	12	0～400	120	31～51	39	310FDB4
								40	310HCB4
		60～130	−2～+250		−130～+170	110	48～74		310GUB4
9～14	−550～1100	80～250	0～154	11	0～400	120	31～51	42	310GZB4
								41	310CYB4
									310EDB4
								42	310GDB4
9～16	−550～1100	150～400	0～154	11	0～400	200	35～55		☆ 310FJB4

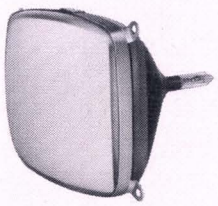
4) Reinforcement method : The bonded frame type tubes are provided with metal mounting lugs to facilitate mounting into the cabinet.

5) Heater Voltage under standby condition : 63% of normal heater voltage.

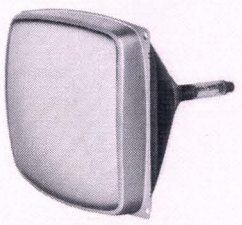
6) Ek : Visual extinction of focused raster.



230ADB4



310GUB4
310HCB4



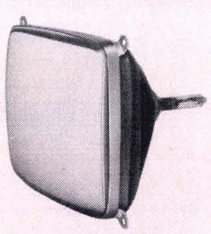
310FDB4

Screen Size (Visual Size)	Type No. [1]	Tube Constructions [2]							Heating [5]	
		Deflection Angle (degrees)	Neck Dia. (mm)	Gun [3] Type	Reinforcement [3] Method	Overall Length (mm)	Light Transmission (%)	Base Connection No.	Ef (V)	If (mA)
14" (13V)	● 340AHB4	90	20	UPF	Bonded Frame	287max.	48	7GR	12.6	64
	● 340AZB4				T−Band				12.0	67
	● 340AYB4									
	☆ ● 340FB4	110	20	UPF	Bonded Frame	249max.	48	7GR	4.2	450
	● 340NB4								6.3	300
16" (15V)	☆ 400ADB4	114	28.6	UPF	None	265±7	49.5	8HR	6.3	300
	400CDB4				Bonded Frame	265±7				
	☆ 400BGB4	110	20	UPF	None	284.3max.	49.5	7GR	4.2	450
	☆ 400CHB4				Bonded Frame					
17" (16V)	● 440ANB4	114	28.6	UPF	Bonded Frame	284±7	46.0	8HR	4.2	450
	● 440GB4								6.3	300
19" (18V)	☆ A47-23W	114	28.6	UPF	Bonded Frame	289±7	44.5	8HR	6.3	300
	☆ 470LB4				None					
20" (19V)	● 500WB4	114	28.6	UPF	None	311±7	44.0	8HR	6.3	300
	● 500XB4				Bonded Frame					
	● 500JB4								4.2	450
21" (20V)	☆ 520AB4	114	28.6	UPF	Bonded Frame	321.3±7	42.5	8HR	6.3	300
23" (22V)	☆ 590GB4	110	28.6	UPF	None	358±8	41.0	8HR	6.3	300
	☆ A59-11W				Bonded Frame					
	☆ 590YB4								4.2	450

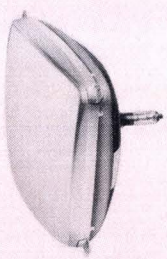
1) ● : Ultra-rectangular tube.
☆ : Maintenance type.

2) Deflection method : Magnetic.
Focusing method : Electrostatic.

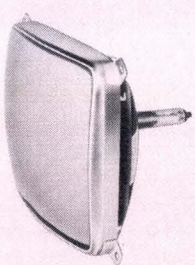
3) Gun type UPF : Uni-potential focus lens.



340AYB4



400CDB4



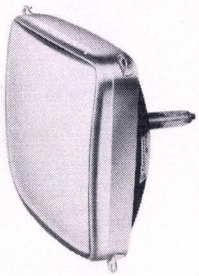
440GB4

Maximum Ratings (Design Max.)				Typical Operating Conditions (Cathode Drive)				Drawing No.	Type No.
Eb (kV)	Focus Voltage Ec3 or Ec4 (V)	Ec2 (V)	Ek (V)	Eb (kV)	Focus Voltage Ec3 or Ec4 (V)	Ec2 (V)	Ek[6] (V)		
9～16	−550～1100	80～250	0～154	12	0～400	120	31～51	43	●340AHB4
								44	●340AZB4
		60～130	0～250		−130～+170	110	48～74	45	●340AYB4
9～16	−550～1100	80～250	0～154	12	0～400	120	31～51	46	☆ ●340FB4
									●340NB4
9～16	−550～1100	300～600	0～165	12	0～400	400	36～66	47	☆ 400ADB4
								48	400CDB4
9～16	−550～1100	80～250	0～154	12	0～400	120	31～51	49	☆ 400BGB4
								50	☆ 400CHB4
11～20	−550～1100	40～ 80	0～154	16	0～400	60	34～58	51	●440ANB4
									●440GB4
11～20	−550～1100	300～600	0～165	16	0～400	400	36～66	52	☆ A47-23W
								53	☆ 470LB4
11～20	−550～1100	40～ 80	0～154	16	0～400	60	34～58	54	●500WB4
								55	●500XB4
									●500JB4
11～20	−550～1100	40～ 80	0～154	16	0～400	60	34～58	56	☆ 520AB4
11～20	−550～1100	300～600	0～165	18	0～400	500	45～79	57	☆ 590GB4
								58	☆ A59-11W
11～22	−550～1100	40～ 80	0～154	18	0～400	60	34～58		☆ 590YB4

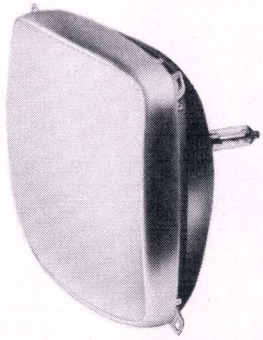
4) Reinforcement method : The bonded frame type tubes are provided with metal mounting lugs to facilitate mounting into the cabinet.

5) Heater Voltage under standby condition : 63% of normal heater voltage.

6) Ek : Visual extion of focused raster.



500XB4



A59-11W

INSTRUMENT CATHODE RAY TUBES

Screen Size [1]		Frequency Range (MHz)	Type No. [2]	Tube Constructions [3]							Optical Data	
				Outside Face Dimension (mm)	Overall Length (mm max.)	Post-acceleration	Side Contact Pin	Neck Dia. (mm)	Internal Graticule	Metal back	Phospor [4] Color	Phospor [4] Persistence
1.5″	R	—	40GB1	37φ	120	—	—	37	—	—	Green	Medium short
	S	~ 5	40DB31	36×29	180	—	—	20	○	—	Green	Medium short
3″	R	~ 5	75AJB1	76φ	287	—	—	35	—	—	Green	Medium short
		~ 10	3BKP31	76.8φ	296	Helical	—	51	—	—	Green	Medium short
4″	R	~ 15	100DB31	100φ	348	Scan mag.	—	51	○	○	Green	Medium short
	S	~ 30	120ADB31	97.5×85.5	329.5	Scan mag.	—	51	○	○	Green	Medium short
		~ 50	110DB31	98×75	395	Scan mag.	○	51	○	○	Green	Medium short
5″	R	~ 5	130ACB31	133φ	375	—	—	35	—	—	Green	Medium short
		~ 10	130AWB31	133φ	335	—	—	51	—	—	Green	Medium short
			☆130QB31	133φ	388	Helical	—	51	—	—	Green	Medium short
			☆130AGB31	133φ	418	Helical	—	51	—	○	Green	Medium short
		~100	130AVB31	133φ	460	Scan mag.	○	51	○	○	Green	Medium short
	S	~ 50	☆140VB31	117.5×97.5	420.5	Scan mag.	○	51	○	○	Green	Medium short
			140AEB31	117.5×97.5	413.5	Scan mag.	○	51	—	○	Green	Medium short
			140AMB31A	117.5×97.5	413.5	Scan mag.	○	51	○	○	Green	Medium short
			140ARB31A	117.5×97.5	413.5	Scan mag.	○	51	○	○	Green	Medium short
		~100	140RB31A	118×86	460	Scan mag.	○	51	○	○	Green	Medium short
		~250	140UB31A	118×86	460	Scan mag.	○	51	○	○	Green	Medium short

1) R : Round, S : Square 2) ☆ : Maintenance type

3) Deflection method : Electro-static, Focusing method : Electro-static.

40GB1

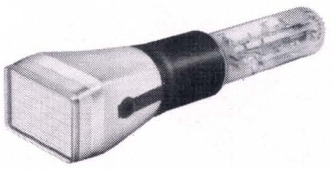
40DB31

130AWB31

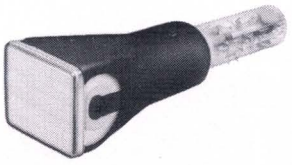
Absolute Max. Ratings			Typical Operating Conditions 5)								Line 6) Width	Drawing No.	Type No.
							Deflection Factor (V/cm)		Min. Useful Scanning Area (mm)				
V PDA (V)	V accel (V)	V foc (V)	V PDA (V)	V accel (V)	V foc (V)	− V cut-off (V)	Y	X	Y	X			
−	1500	1200	−	800	170	10～26	68.0	68.0	30	30	0.27	59	40GB1
−	2500	1000	−	1500	440～530	26～58	15.0	23.0	18	27	0.24	60	40DB31
−	2500	1000	−	1500	257～387	42.5～67.5	18.7	27.2	57	68	0.20	61	75AJB1
5000	1600	1000	4000	1000	35～165	30～60	12.2	35.7	45	60	0.30	62	3BKP31
6600	2200	2200	6000	1500	255～345	18～54	5.85	18.8	60	75	0.32	63	100DB31
11000	2200	2200	10000	1500	380～480	30～70	6.3	13.5	64	80	0.25	64	120ADB31
13000	2200	2200	10000	1500	450～550	23～68	4.55	17.0	48	80	0.30	65	110DB31
−	2500	1000	−	1500	257～387	42.5～67.5	12.5	16.0	100	100	0.30	66	130ACB31
−	2200	2200	−	2000	220～370	25～66	12.9	28.5	80	100	0 28	67	130AWB31
8000	2500	1500	2000	500/2000	270～360	45～75	4.3	10.0	70	100	0.35	68	☆130QB31
8800	3300	1650	4000	1000	250～350	45～75	8.5	18.0	80	100	0.35		☆130AGB31
16500	2500	2500	15000	1500	375～625	40～90	2.9	10.95	60	100	0.30	69	130AVB31
12500	2200	2200	10000	1500	450～550	23～68	4.25	15.5	80	100	0.30	70	☆140VB31
12500	2200	2200	10000	1500	450～550	23～68	4.25	15.5	80	100	0.30	71	140AEB31
12500	2200	2200	10000	1500	450～550	23～68	4.25	15.5	80	100	0.30		140AMB31A
16500	2200	2200	15000	1800	540～660	32～79	6.00	18.5	80	100	0.23	72	140ARB31A
19000	2500	2500	18000	2200	550～920	64～143	4.25	16.1	60	100	0.22	73	140RB31A
19000	2500	2500	18000	2200	550～920	64～143	4.25	16.1	60	100	0.22	74	140UB31A

4) Other phosphors are available. 5) Heating : Indirect heating Vf=6.3V If =0.3A (40DB31 : Vf=2.8V, If=0.107A)

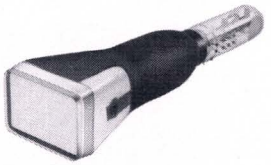
6) Measured with shrinking raster method in the center of the screen at a screen current 10μA.



110DB31



140ARB31A

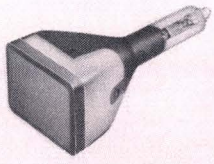


140UB31A

HIGH SPEED READING/PRINTING TUBES (FIBER OPTICS TYPE)

Type No.	Tube Constructions							Optical Data		
	Face	Min. Useful Fiber Optics Screen Area (mm×mm)	Deflection		Focusing Method	Overall Length (mm)	Neck Dia. (mm)	phosphor 1)		Light Transmission of Fiber (%)
			Angle (deg.)	Method				Color	Persistence	
75ANB11	Flat	54×40	50	mag.	sta.	140.5±9.5	20	Blue	Medium Short	55
250JB11	Flat	175×3	50	mag.	mag.	515±10	36.5	Blue	Medjum Short	64
250UB11					sta.	401.5±10				
250WB11	Flat	210×9.6	55	mag.	mag.	522.5±10	36.5	Blue	Medium Short	60
250VB11					sta.	417±10				
250YB48	Prism	175×3	50	mag.	mag.	513±10	36.5	Yellowish Green	Short	—
250ZB48		210×3	55			526.5±10				

1) Other phosphors are available. 2) Heating : Indirect heating Vf=6.3V, If=0.3A



75ANB11

250WB11

Absolute Maximum Ratings				Typical Operating Conditions [2]						Drawing No.	Type No.
Va (V)	Vfoc (V)	Vc2 (V)	Screen Loading (ave.) (mW/cm^2)	Va (V)	Vfoc (V)	Vc2 (V)	Max. [3] Anode Current (Peak) (μA)	$-V_{cut\text{-}off}$ (V)	line [4] Width (ave.) (mm)		
15000	1100	550	3	12000	0～400	400	—	20～40	0.120	75	75ANB11
18000	—	650	11	15000	—	250	100	53～82	0.065	76	250JB11
18000	4800	650	11	15000	2800～4000	300	100	38～68	0.090	77	250UB11
18000	—	650	11	15000	—	250	100	53～82	0.065	78	250WB11
18000	4800	650	11	15000	2800～4000	300	100	38～68	0.090	79	250VB11
18000	—	650	11	15000	—	250	100	53～82	0.065	80	250YB48
										81	250ZB48

3) To prevent the cathode from damage by over loading, anode current should not exceed the specified value.

4) Measured with shrinking raster method in the center of the screen at a beam current 5μA (75ANB11 : 50μA).

250VB11

250YB48

HIGH RESOLUTION DISPLAY TUBES

MONOCHROME TUBES

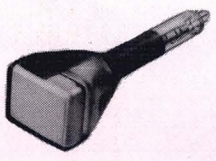
Screen Size (Visual Size)	Type No.	Tube Constructions							
		Deflection Angle (deg.)	Neck Dia. (mm)	Gun Type	Reinforcement Method	Screen Curvature (mm)	Overall Length (mm)	Light Trans-mission (%)	Base Connec-tion No.
1.5"(1.4V)	40CB4	36	13	BPF	—	Flat	114max.	79	—
3" (2.9V)	85HB4	50	13	BPF	—	1500	147max.	75	—
7" (6V)	M17-141W	70	28.6	UPF	Bonded Faceplate	Flat	232 ±8	80	8HR
9" (8.5V)	230BAB39	90	28.6	UPF	Bonded Frame	686	245.5±8	53.5	8HR
14" (13V)	340BAB39	90	28.6	UPF	T−band	770	310.5±8	48	8HR

1) Other phosphors are available.
2) Deflection method : Magnetic
   Focusing method : Electrostatic

COLOR TUBES (Three gun shadowmask type)

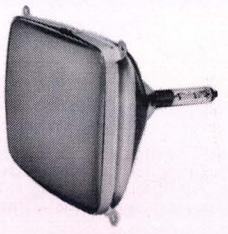
Screen Size (Visual Size)	Type No.	Tube Constructions						Optical Data		
		Deflection Angle (deg.)	Neck Dia. (mm)	Reinforcement Method	Screen Curvature (mm)	Overall Length (mm)	Base Connec-tion No.	Trio Dot Pitch (mm)	Array	Light Trans-misson (%)
5"(4.5V)	140AUB22	55	20.0	Non-reflection Bonded Faceplate	Flat	242±9	Fig. 1	0.27	112,000	76
14"(13V)	⊙370BUB22	90	36.5	Bonded Frame	575	365.8±9.5	14BE	0.31	690,000	86
16"(15V)	⊙420AJB22	90	36.5	Bonded Frame	653	397.3±9.5	14BE	0.31	910,000	86
22"(20V)	⊙550FB22	90	36.5	Bonded Frame	776	475.9±9.5	14BE	0.31	1,900,000	85

1) Phoshor : Red, Green & Blue, Other phosphors are available.
2) ⊙ : Negative guard band concept with black surround screen.
3) Deflection method : Magnetic.
   Focusing method : Electrostatic.
   Focus lens : Bipotential.



40CB4

230BAB39



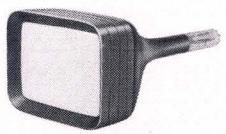
340BAB39

Heating		Maximum Ratings			Typical Operating Conditions					Drawing No.	Type No.
Ef (V)	If (mA)	Eb (kV)	E_{C3} or E_{C4} (V)	E_{C2} (V)	Eb (kV)	E_{C3} or E_{C4} (V)	E_{C2} (V)	E_{C1} (V)	Resolution (lines)		
2.8	107	6	750	150	5	400～580	120	−13～−43	500	82	**40CB4**
2.8	107	7.5	850	450	6	510～690	300	−18～−57	700	83	**85HB4**
6.3	300	18	1000	800	16	0～400	600	−40～−90	1200	84	**M17-141W**
6.3	300	18	1000	800	16	0～400	600	−37～−87	1700	85	**230BAB39**
6.3	300	18	1000	800	16	0～400	600	−37～−87	1800	86	**340BAB39**

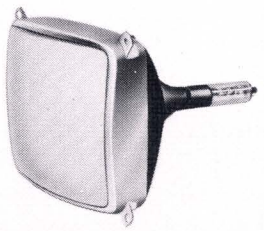
Heating		Maximum Ratings			Typical Operating Conditions					Drawing No.	Type No.
Ef (V)	If (mA)	Eb (kV)	E_{C3} (V)	Ia 4) (μA)	Eb (kV)	E_{C3} (V)	E_{C2} (V)	E_{C1} or ※Ek (V)	Resolution 5)		
2.8	321	14.5	3200	145①	12	2280～2700	170～480	−40	350①	87	**140AUB22**
6.3	900	27.5	6000	500②	25	4200～5000	700～1400	※55	80②	88	**⊙370BUB22**
6.3	900	27.5	6000	500②	25	4200～5000	700～1400	※55	90②	89	**⊙420AJB22**
6.3	900	27.5	6000	750①	25	4200～5000	650～1450	※75	150②	90	**⊙550FB22**

4) Ia ①: Total anode current (long term avarage value)
②: Peak anode current for each gun (duty factor under 25%)

5) Resolution ①: Number of lines.
②: Displayable number of characters in horizontal width.



140AUB22



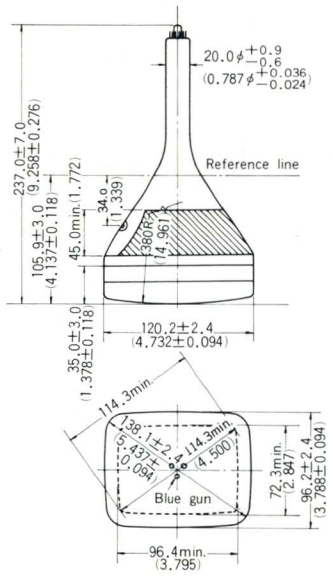
370BUB22

550FB22

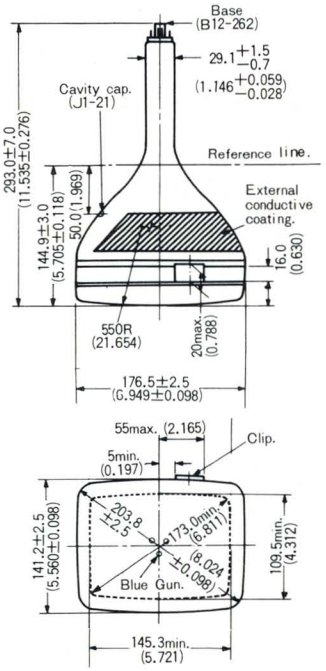
OUTLINE DRAWINGS (COLOR PICTURE TUBES)

Unit : mm (inch)

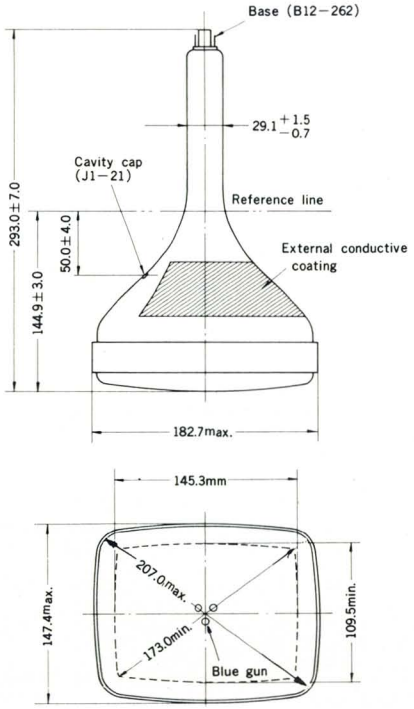
(1) I40AGB22,



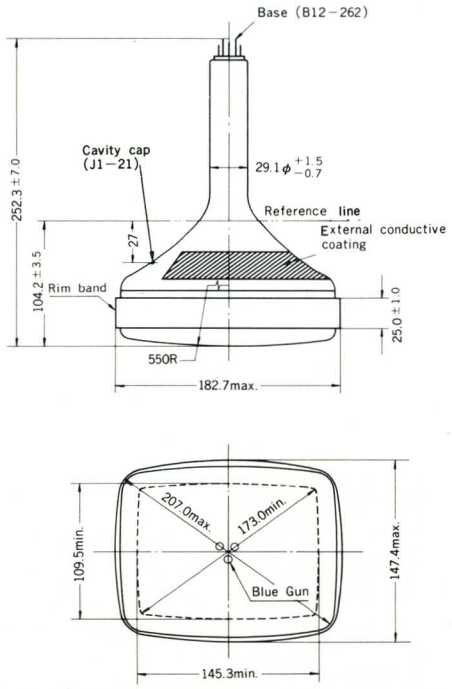
(2) 200HB22



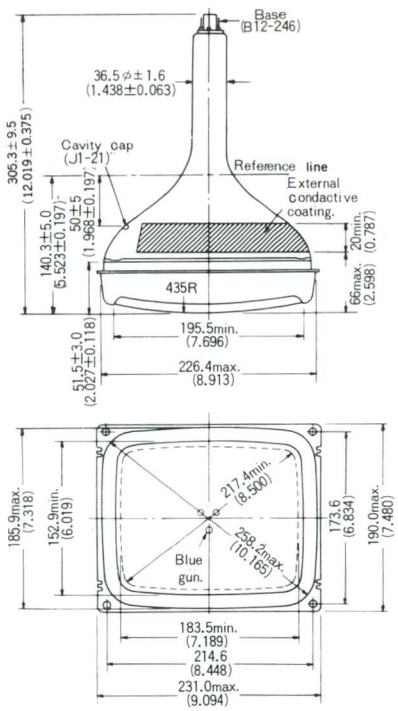
(3) 200KB22



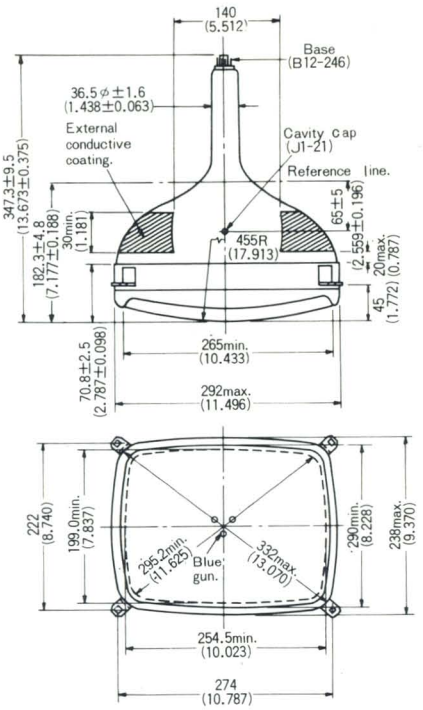
(4) 200LB22



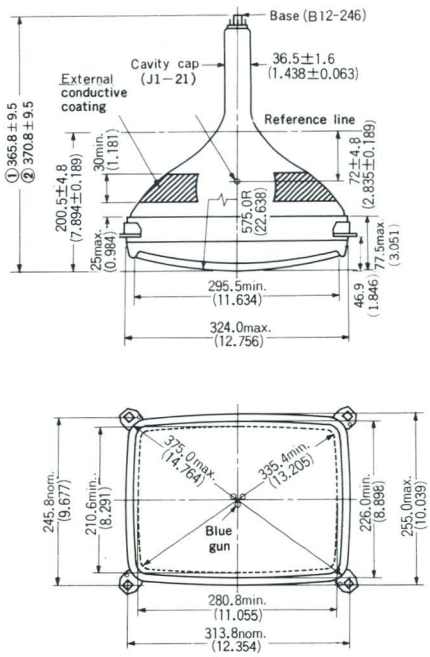
(5) 250RB22A



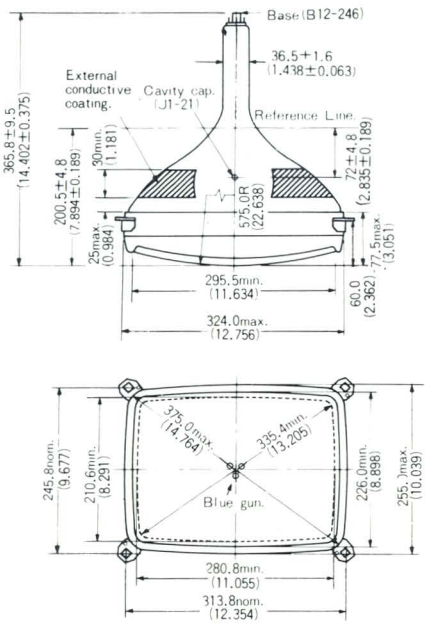
(6) 320NB22A, 320CB22A , 320AGB22



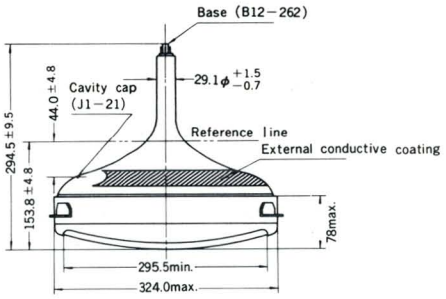
(7) ① 370ACB22, 370AKB22
② 370BRB22

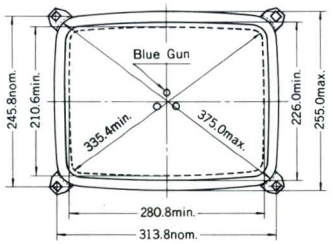


(8) 370BGB22

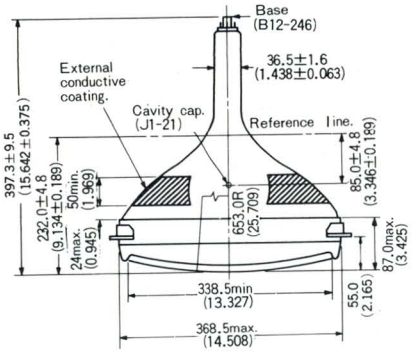


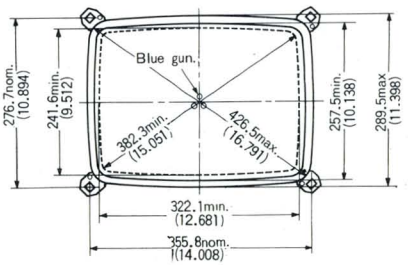
(9) 370AXB22



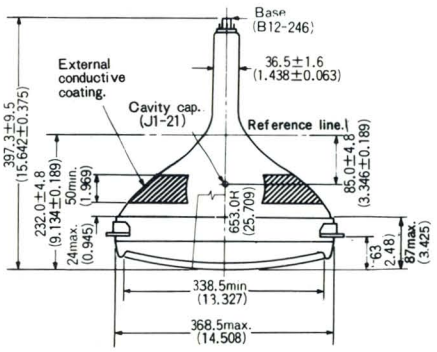


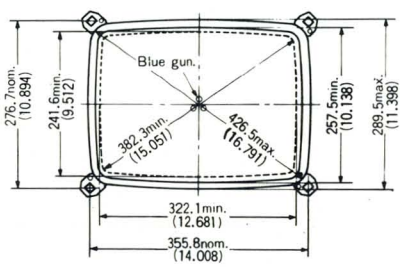
(10) 420AB22, 420NB22



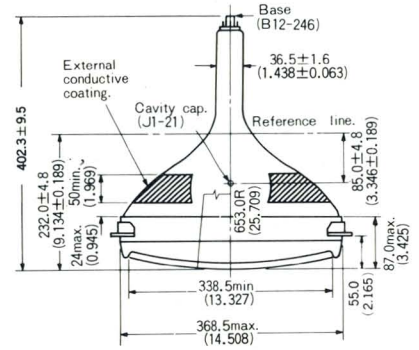


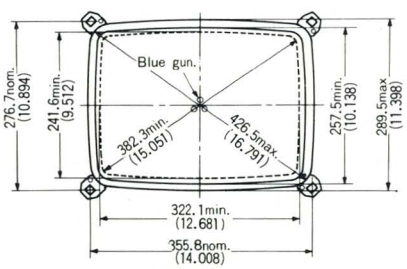
(11) 420ACB22



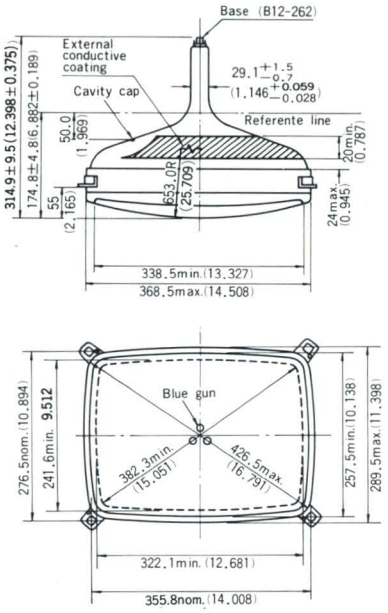


(12) 420AHB22

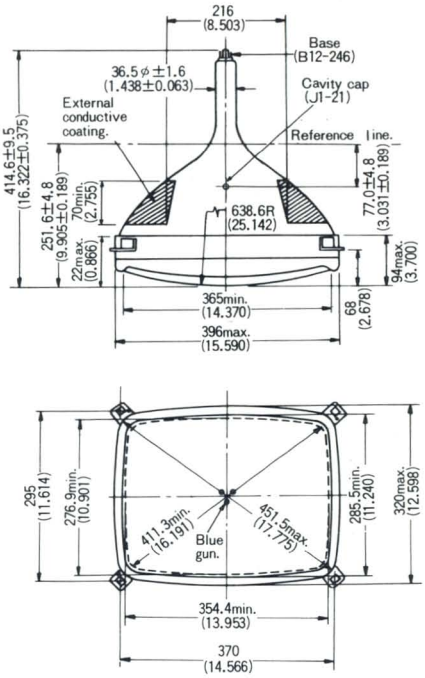




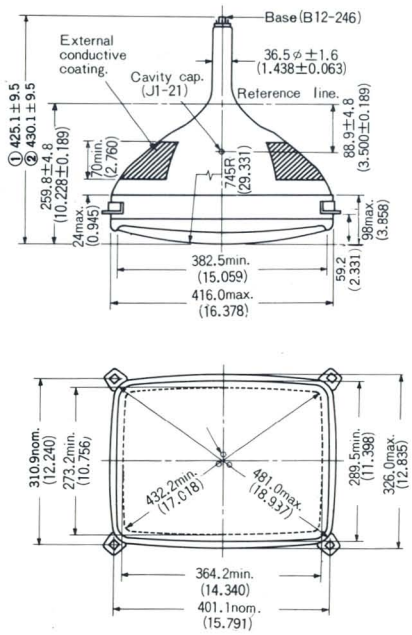
(13) 420XB22



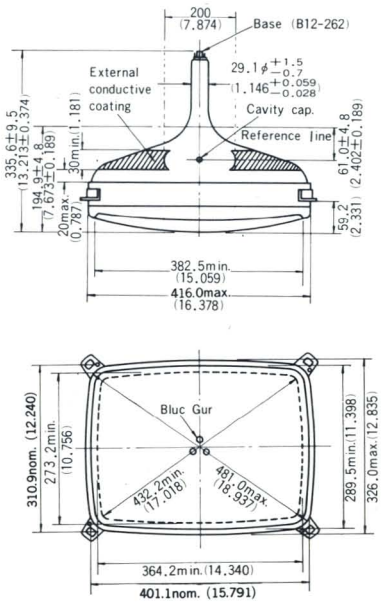
(14) 440ASB22



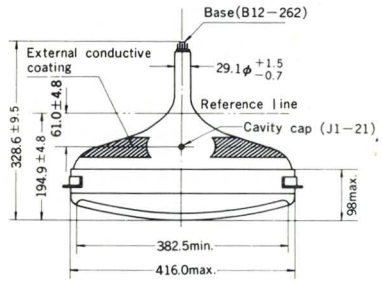
(15) ① 470BXB22, 470BYB22, 470CTB22 ② 470EJB22

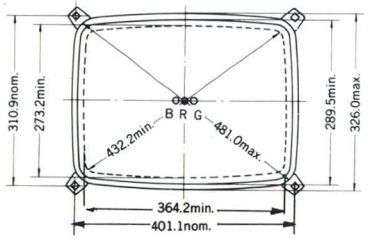


(16) 470CZB22

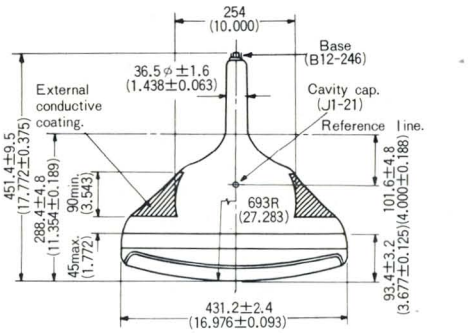


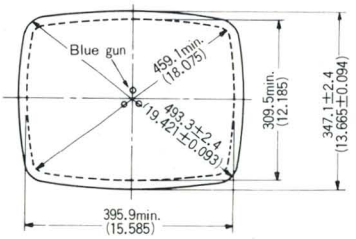
(17) 470ESB22



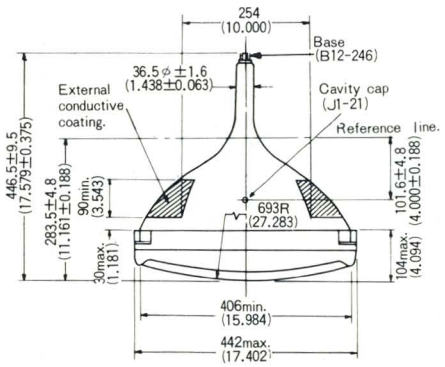


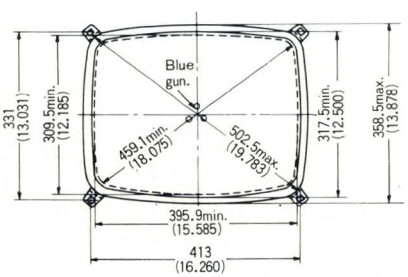
(18) 490ASB22A



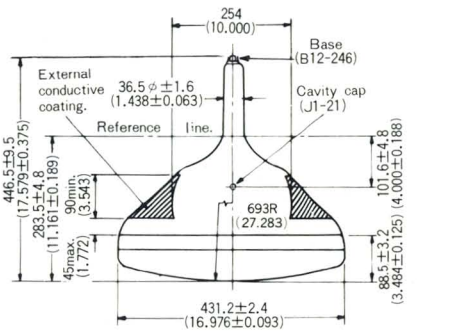


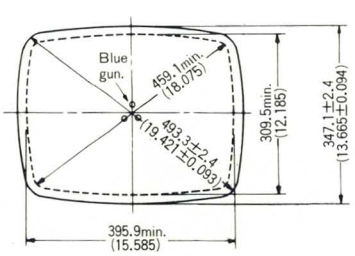
(19) 490BKB22B



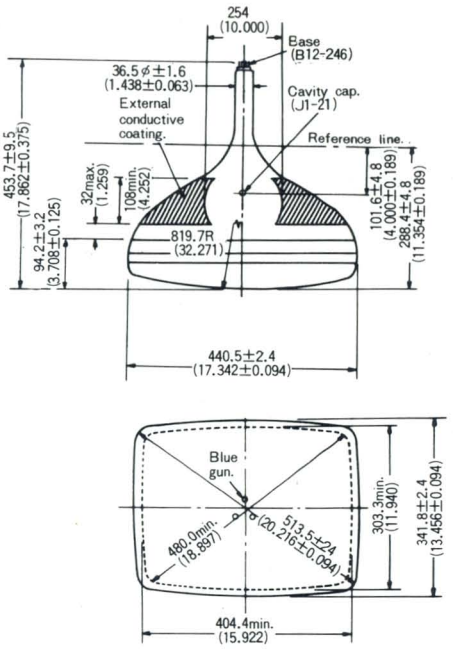


(20) 490CHB22A

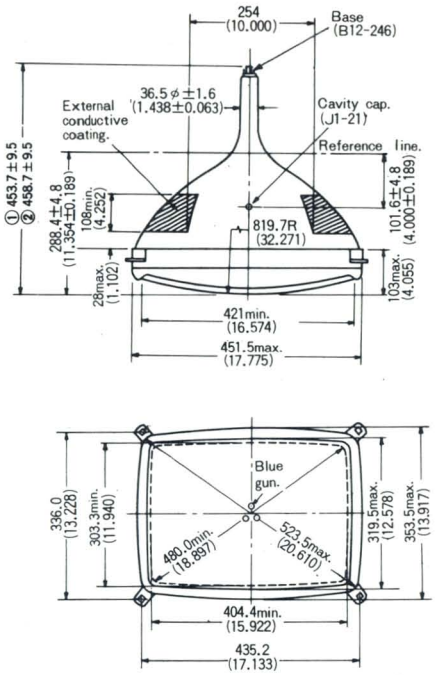




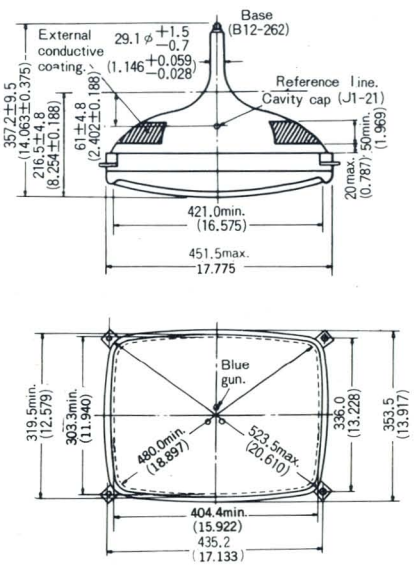
(21) 510ACB22A



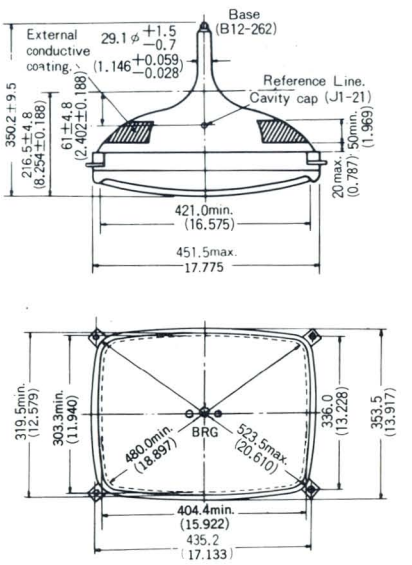
(22) ① 510AEB22A, 510CEB22
② 510FLB22



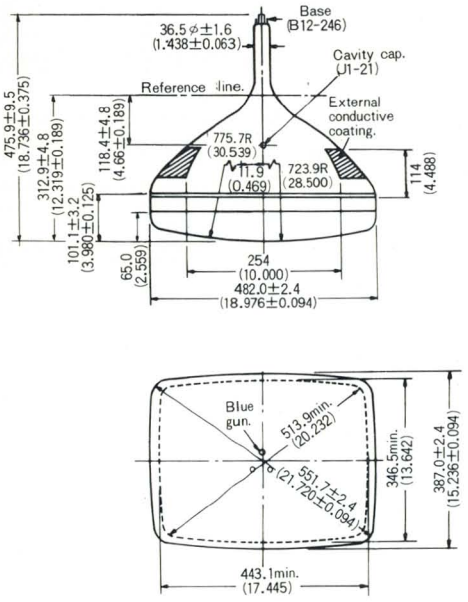
(23) 510DTB22



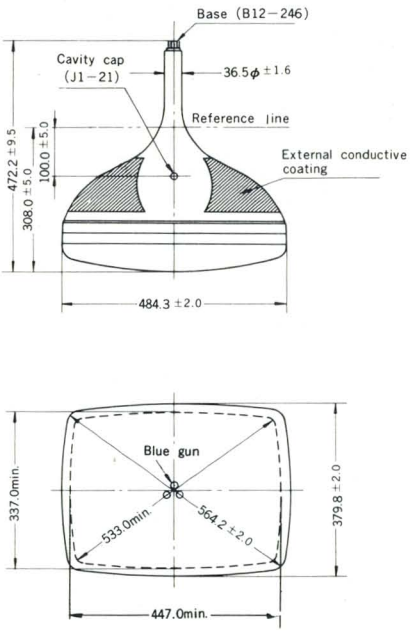
(24) 510FUB22



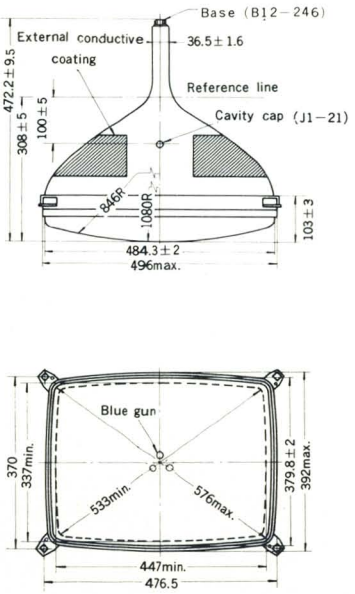
(25) 550EB22



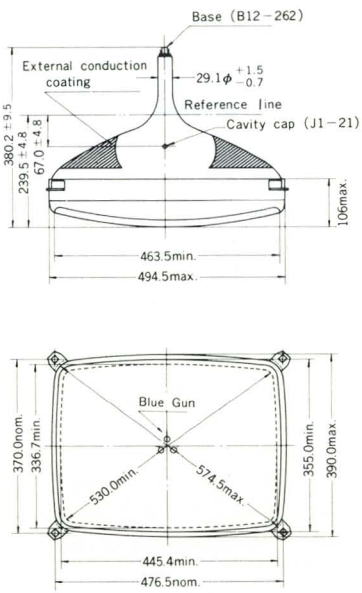
(26) 560DB22



(27) 560KB22

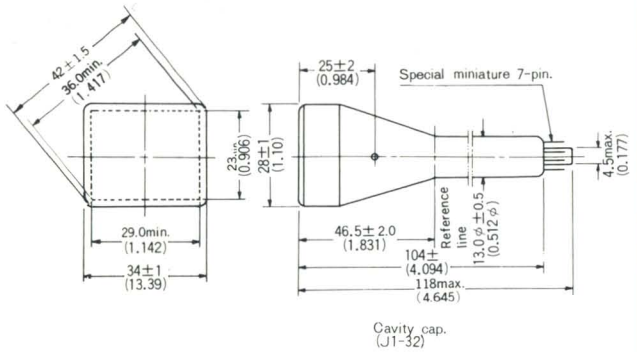


(28) 560EB22

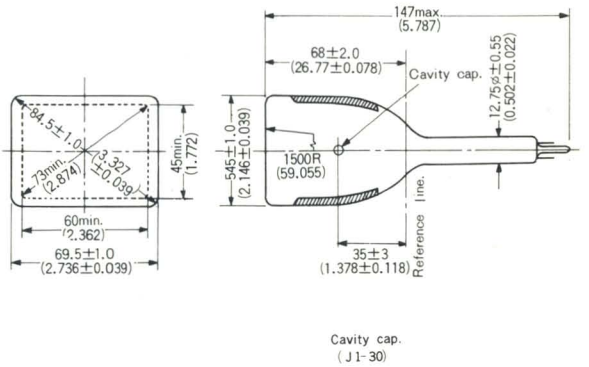


Unit : mm (inch)

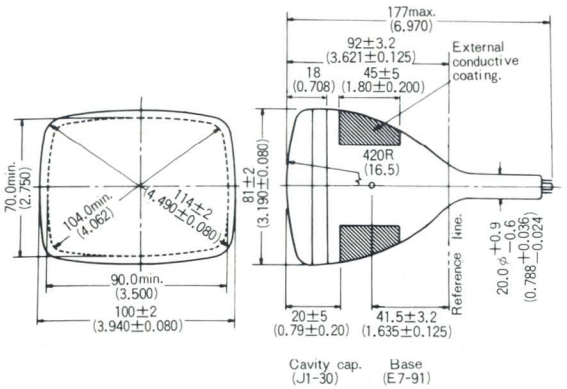
(29) 1VABP4, 1VACP4



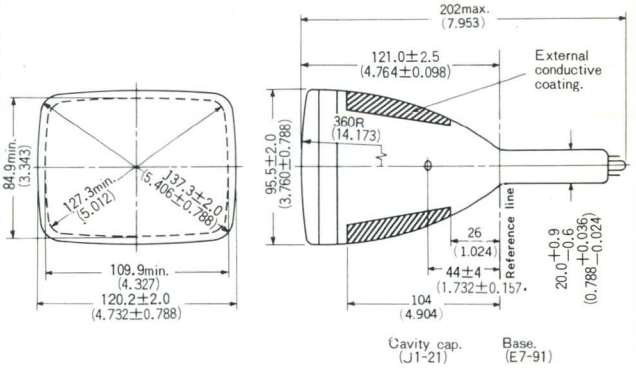
(30) 85GB4



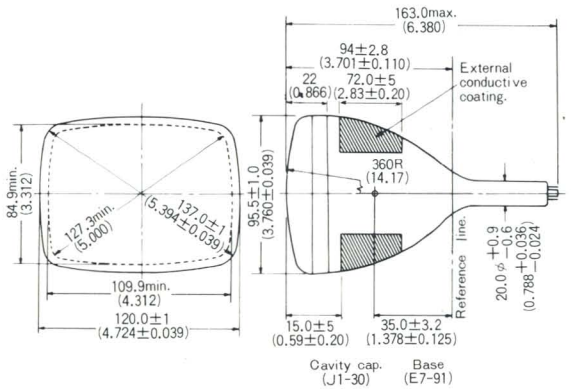
(31) 110CB4



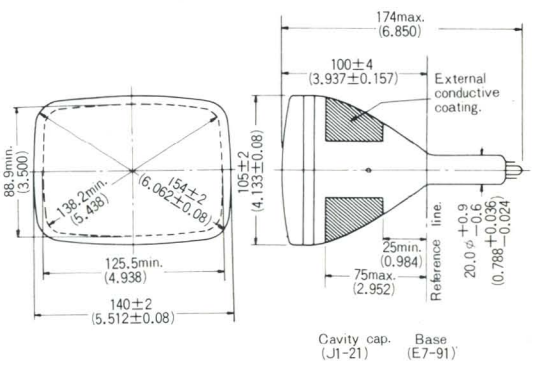
(32) 140AKB4



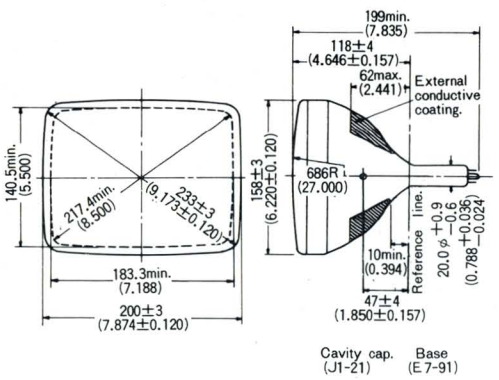
(33) 140FB4



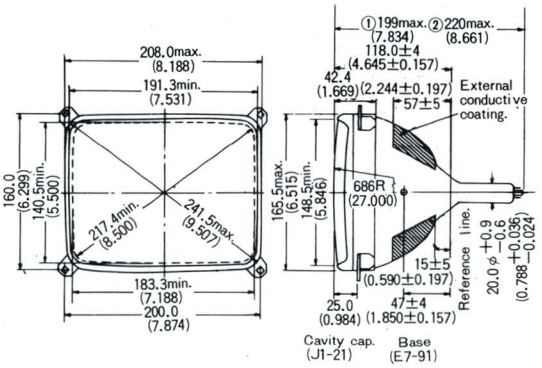
(34) 150ACB4



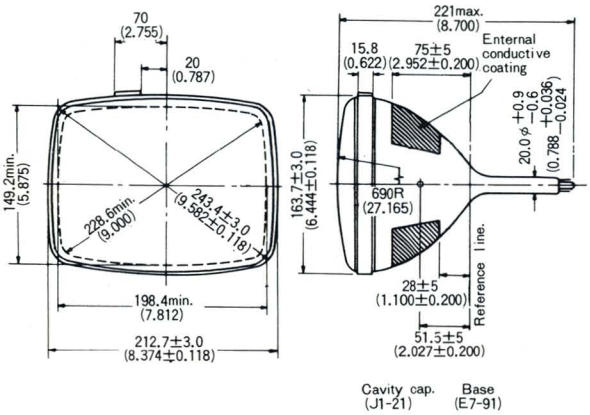
㉟ 230AHB4



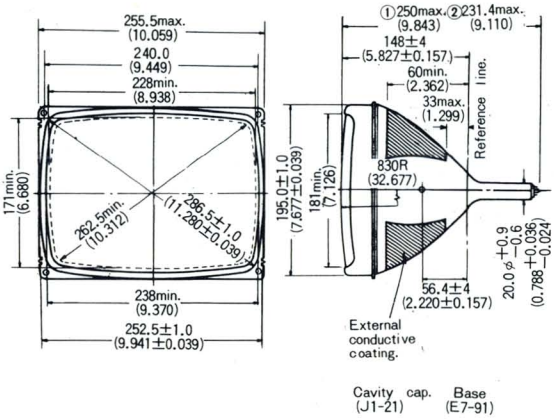
㊱ ① 230ADB4, 230AYB4
② 230AEB4, 230ARB4, 230ANB4



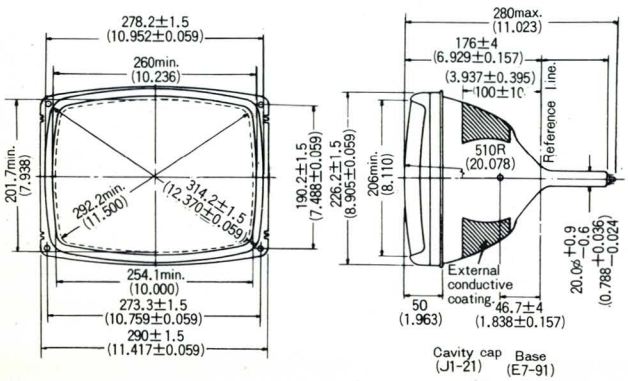
㊲ 240MB4



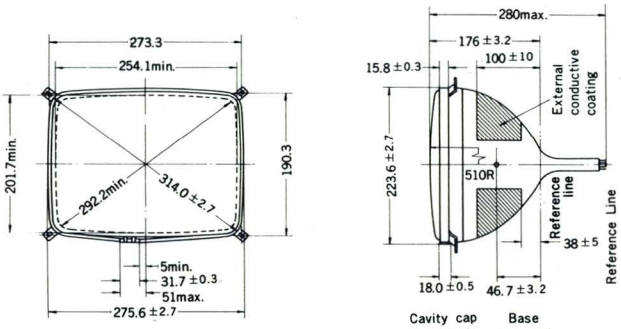
㊳ ① 280VB4, 280UB4



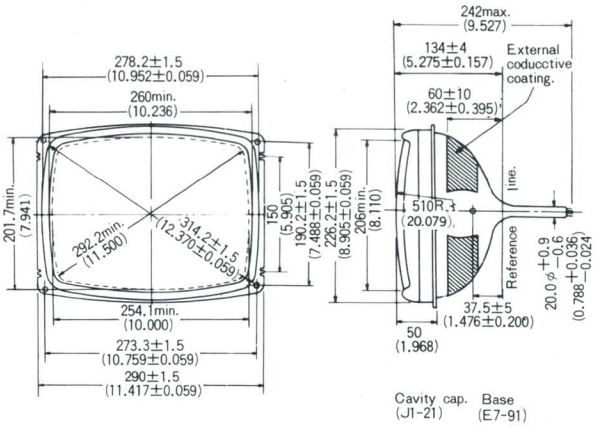
㊴ 310FDB4



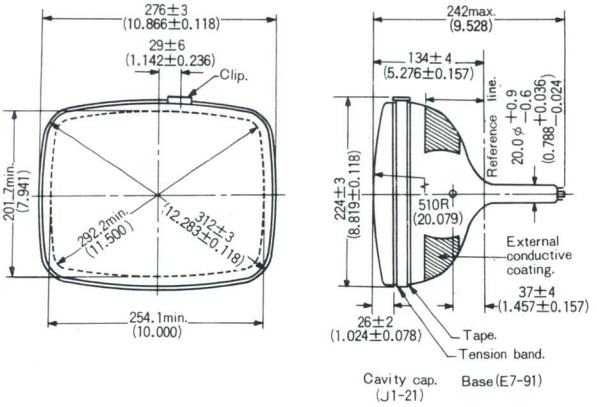
㊵ 310HCB4, 310GUB4



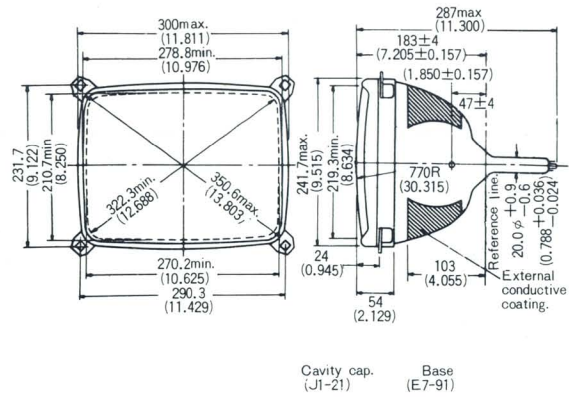
(41) 310CYB4, 310EDB4



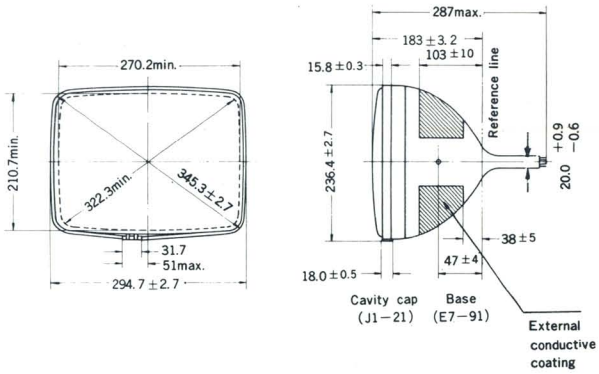
(42) 310GDB4, 310GZB4, 310FJB4



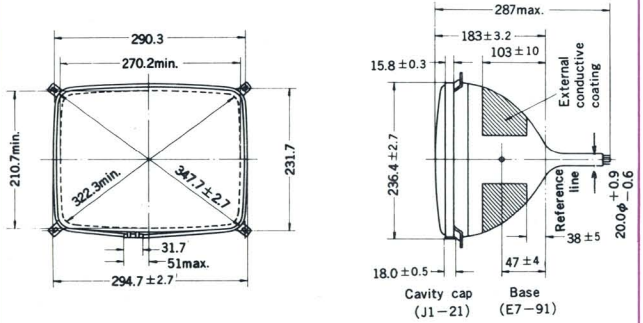
(43) 340AHB4



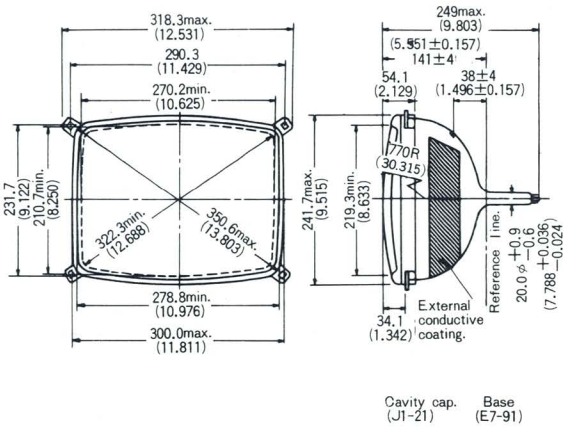
(44) 340AZB4



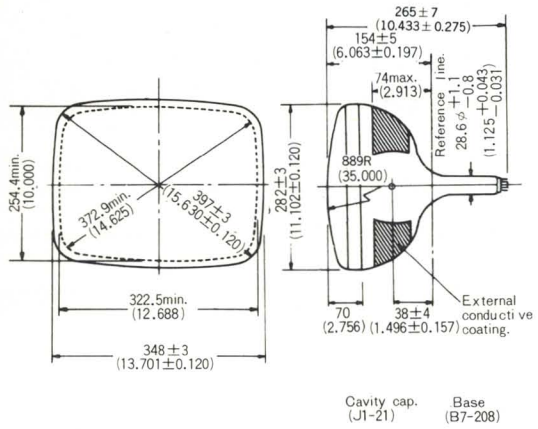
(45) 340AYB4



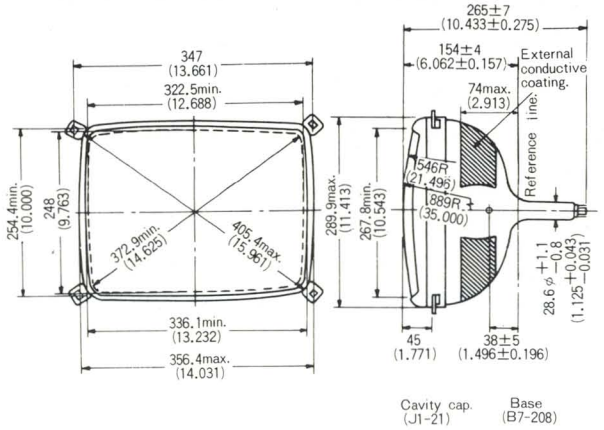
(46) 340FB4, 340NB4



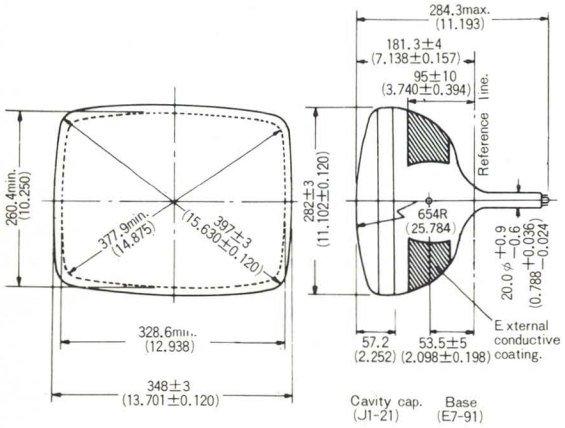
(47) 400ADB4



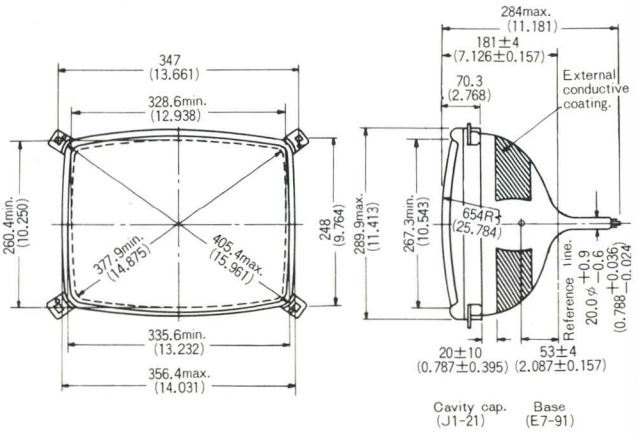
(48) 400CDB4



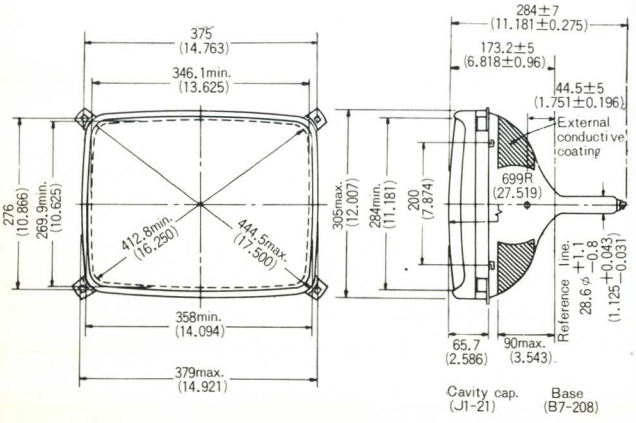
(49) 400BGB4



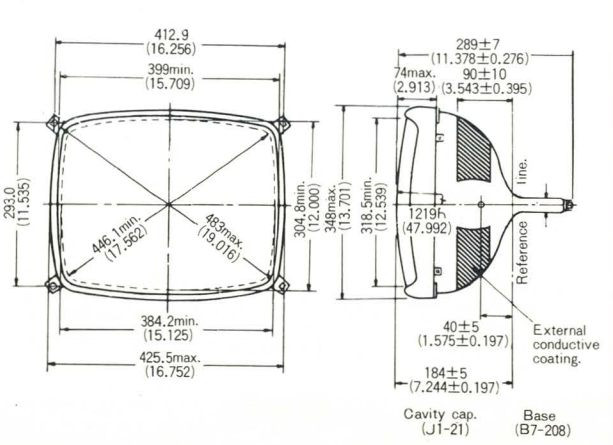
(50) 400CHB4



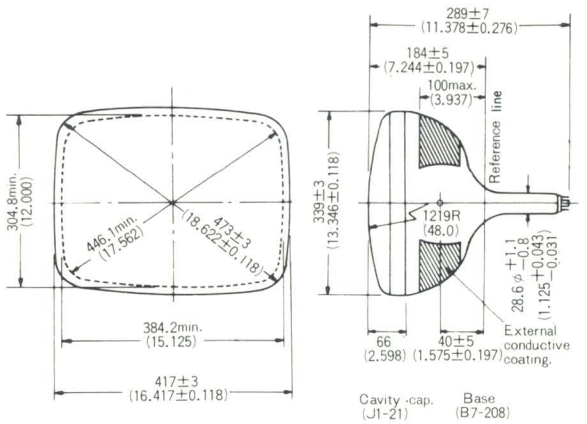
(51) 440ANB4, 440GB4



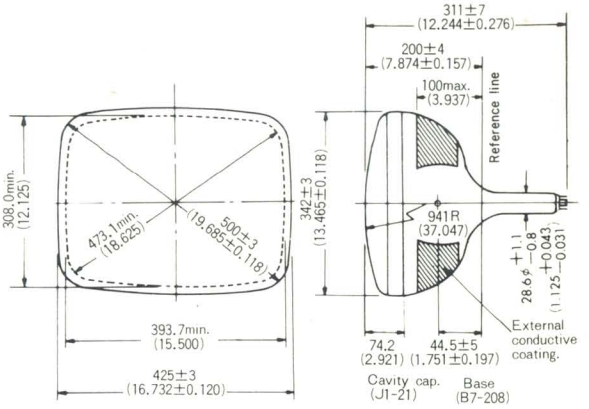
(52) A47-23W



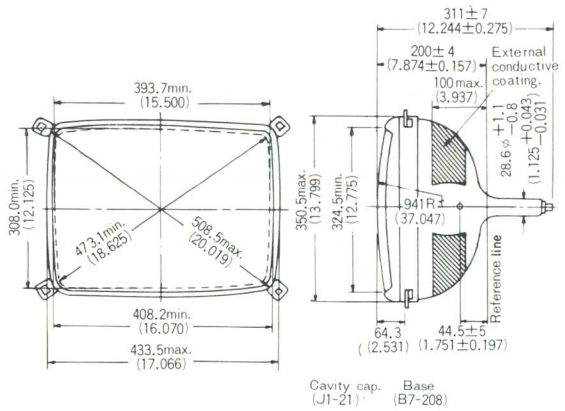
(53) 470LB4



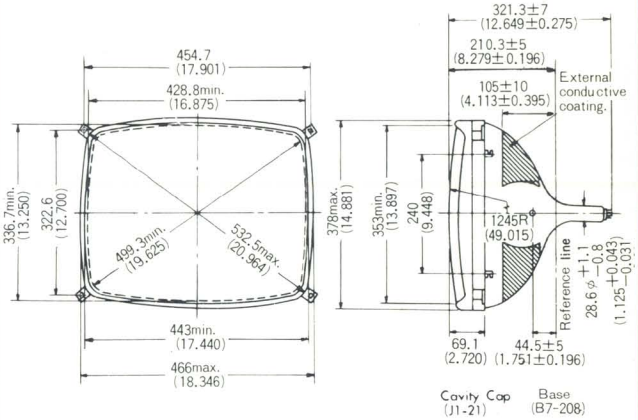
(54) 500WB4



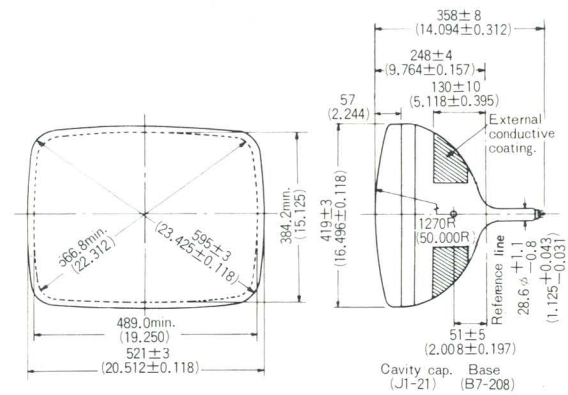
(55) 500JB4, 500XB4



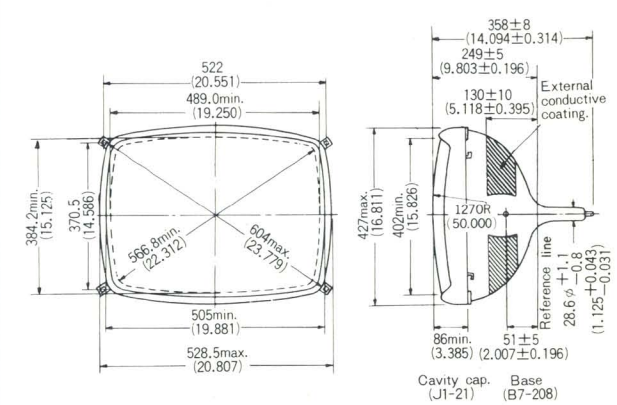
(56) 520AB4



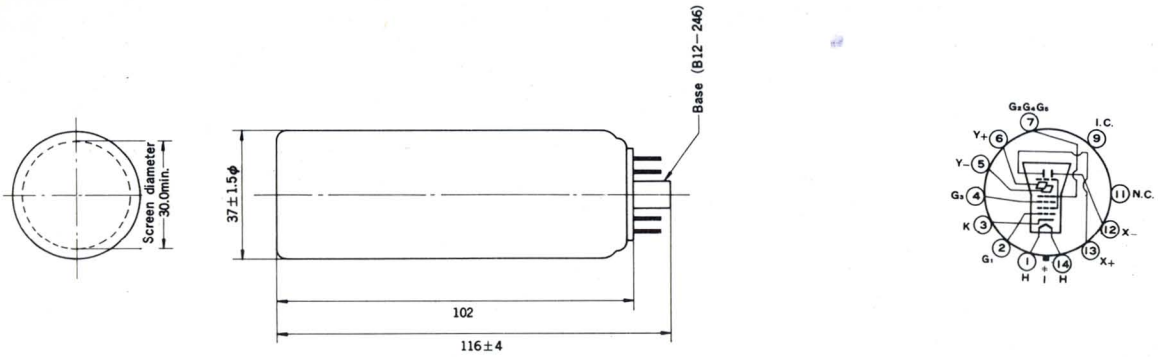
(57) 590GB4



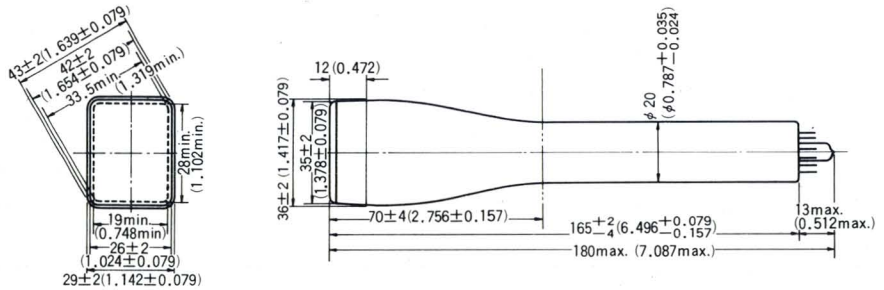
(58) A59-11W, 590YB4



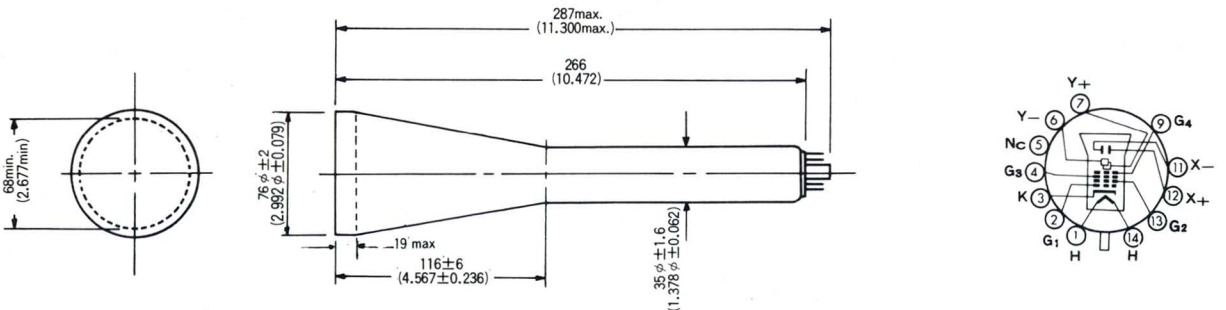
(59) 40GBI



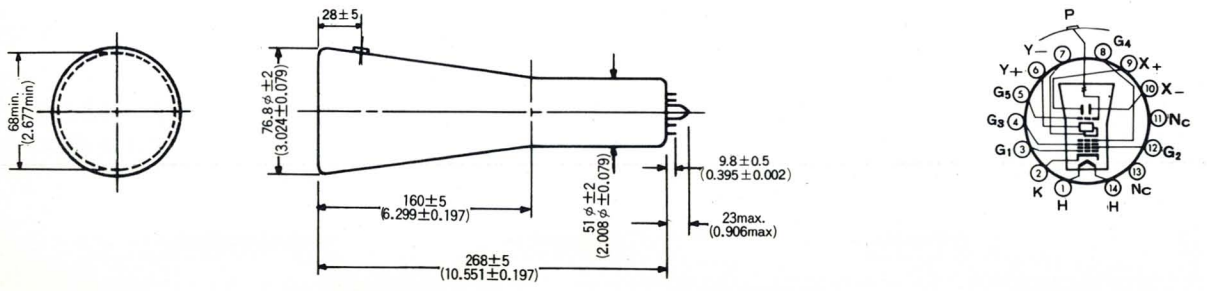
(60) 40DB31



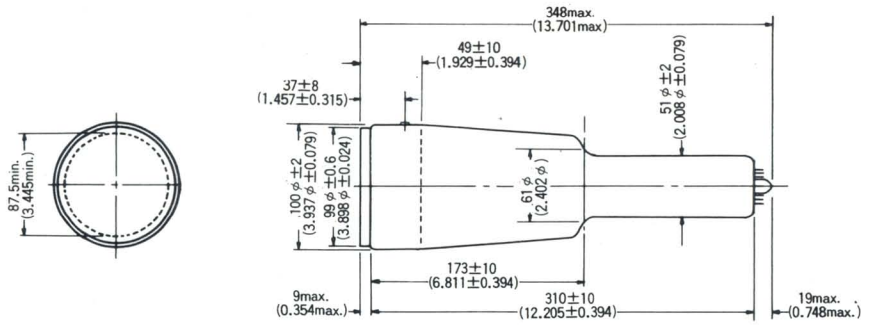
(61) 75AJB1



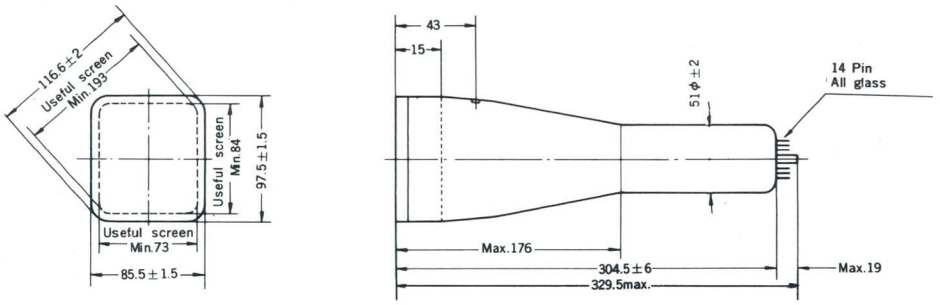
(62) 3BKP31



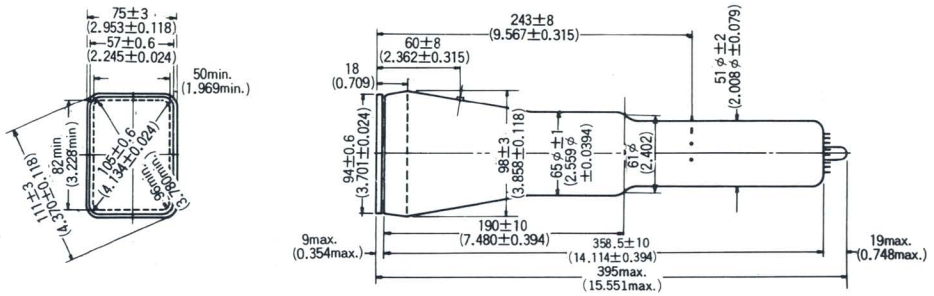
(63) 100DB31



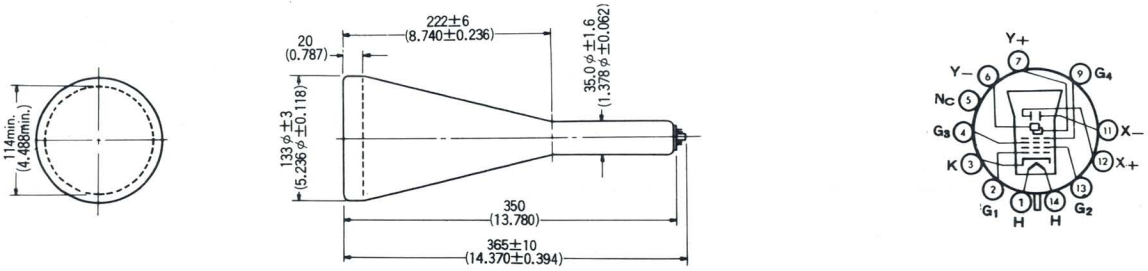
(64) 120ADB31



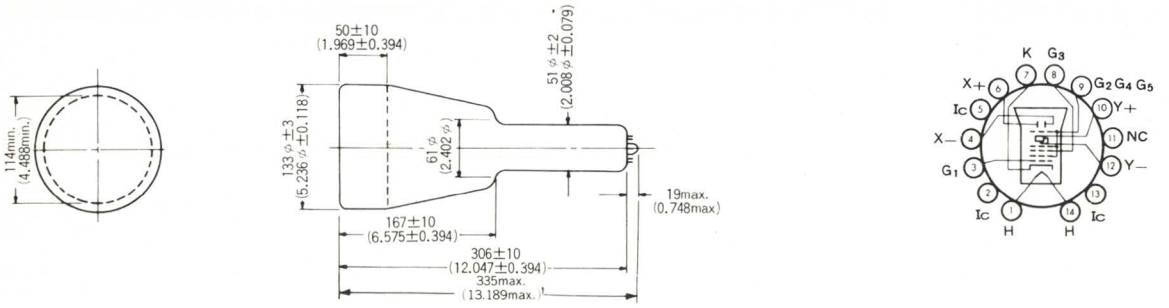
(65) 110DB31



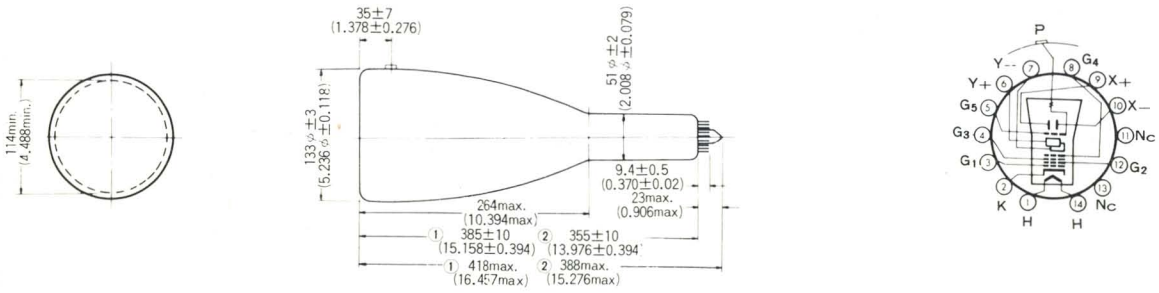
(66) 130ACB31



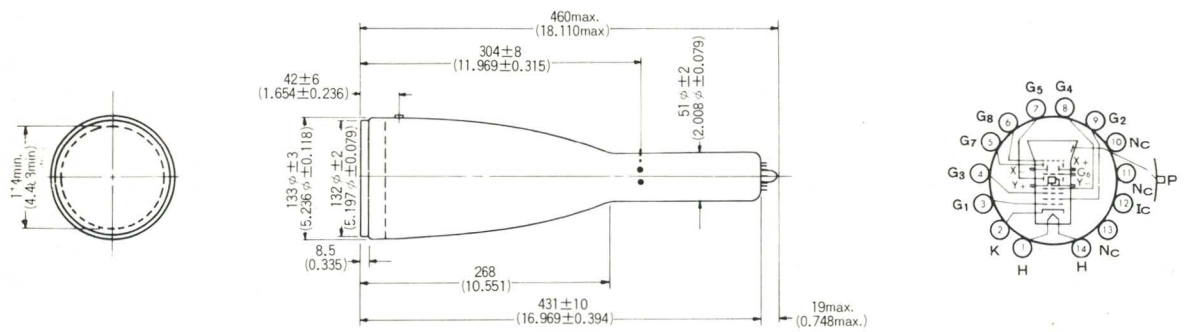
(67) I30AWB31



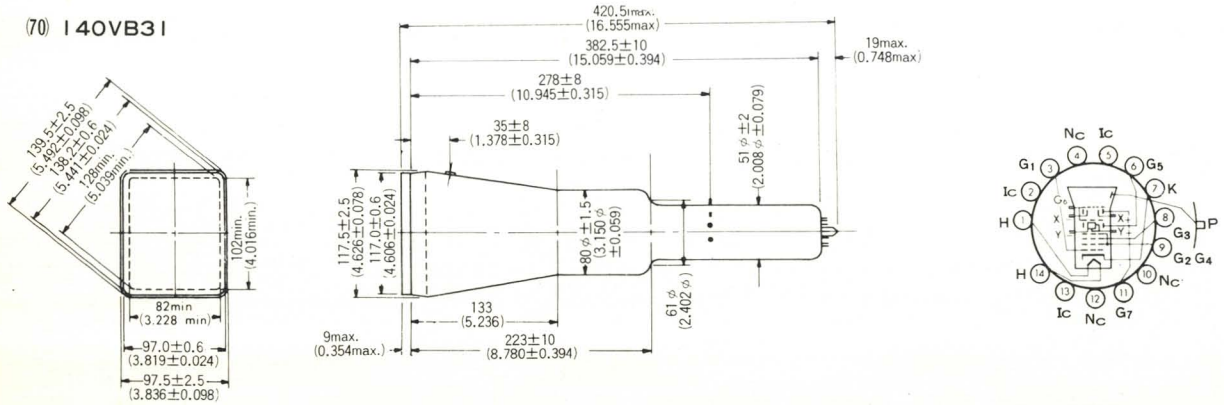
(68) ① I30AGB31 ② I30QB31



(69) I30AVB31

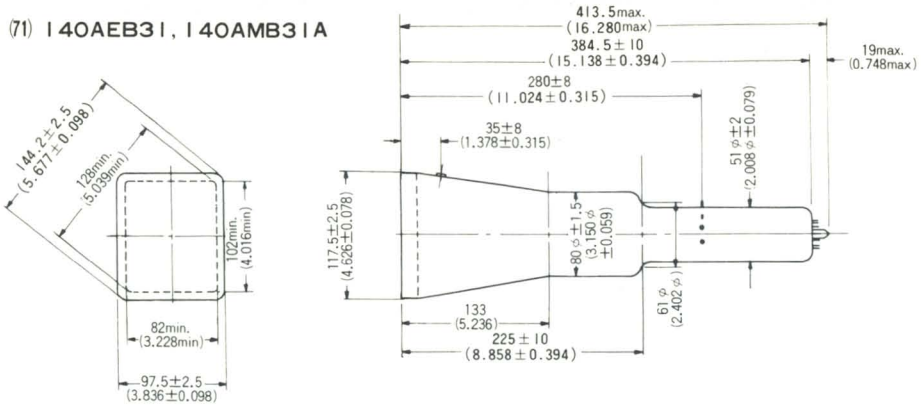


(70) I40VB31

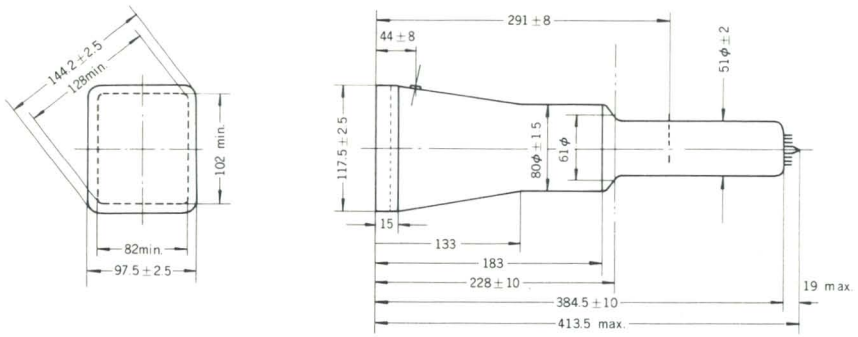


Unit : mm (inch)

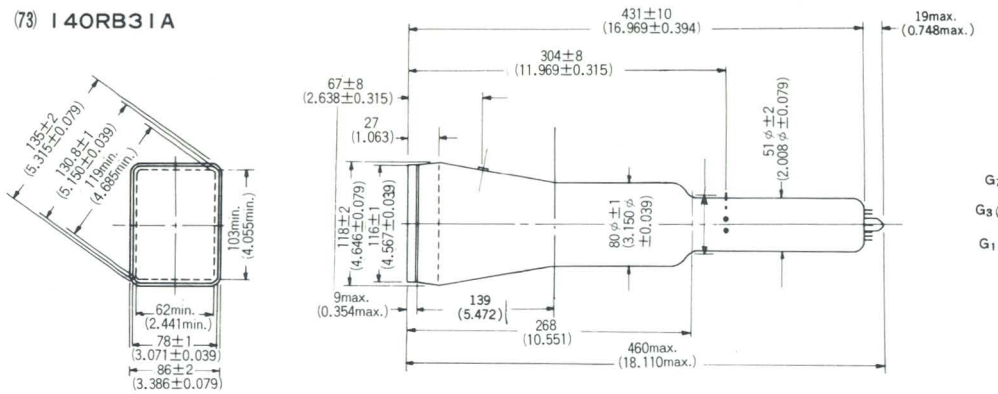
(71) I40AEB31, I40AMB31A



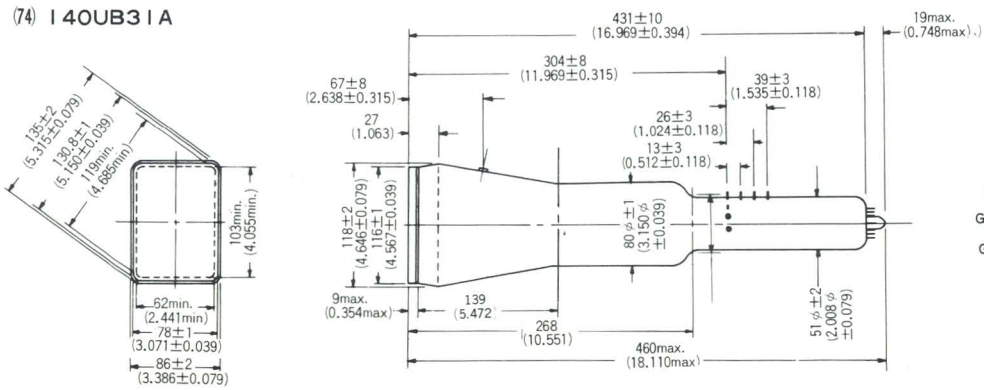
(72) I40ARB31A



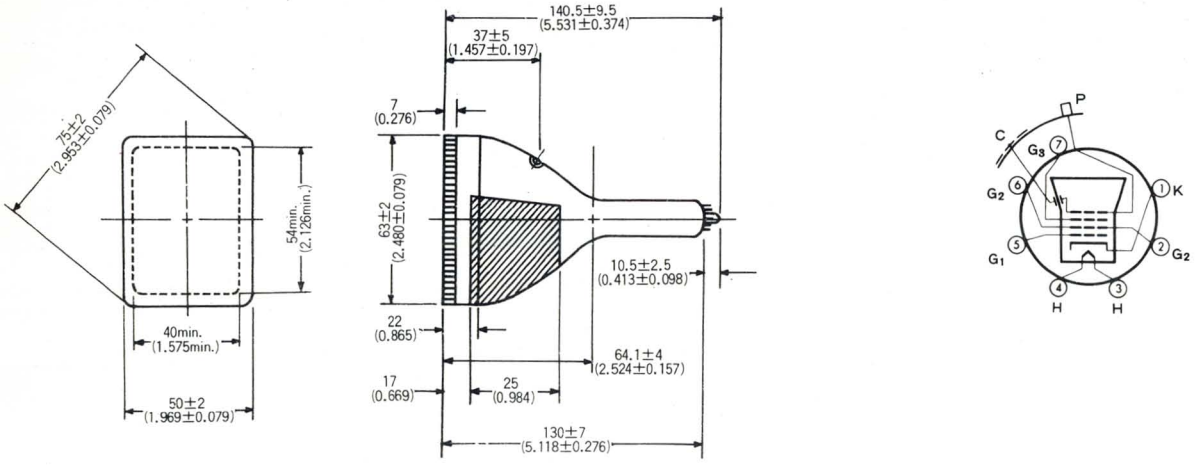
(73) I40RB31A



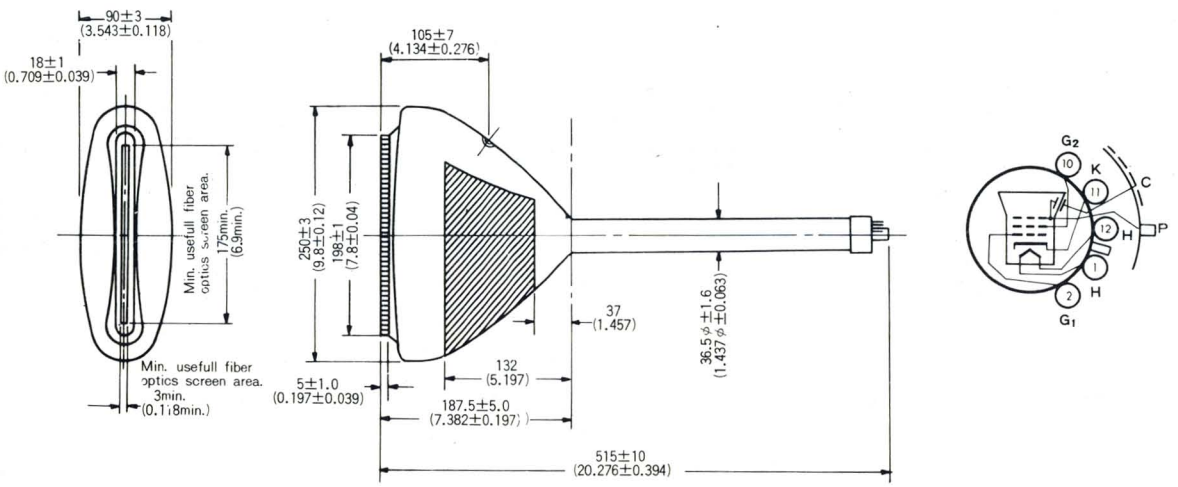
(74) I40UB31A



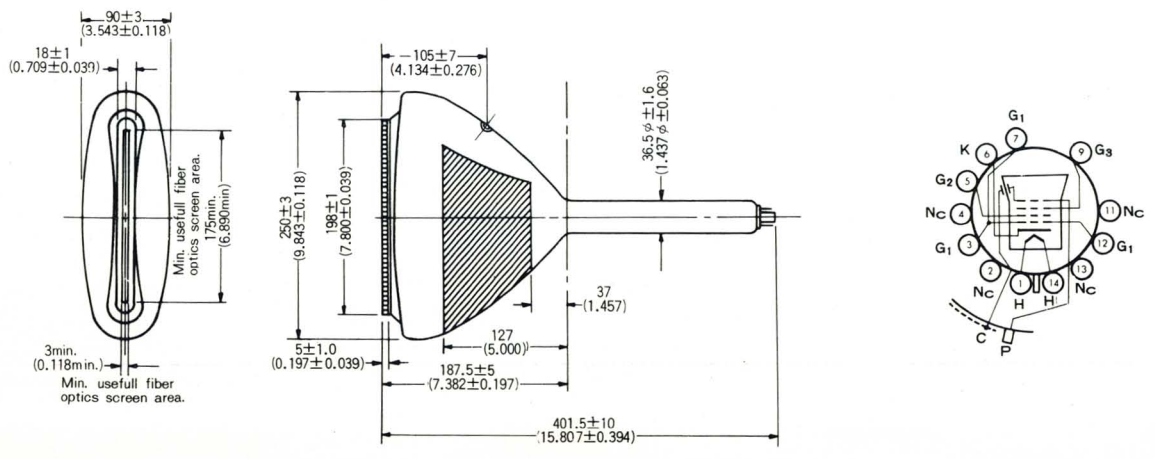
(75) 75ANB11



(76) 250JB11

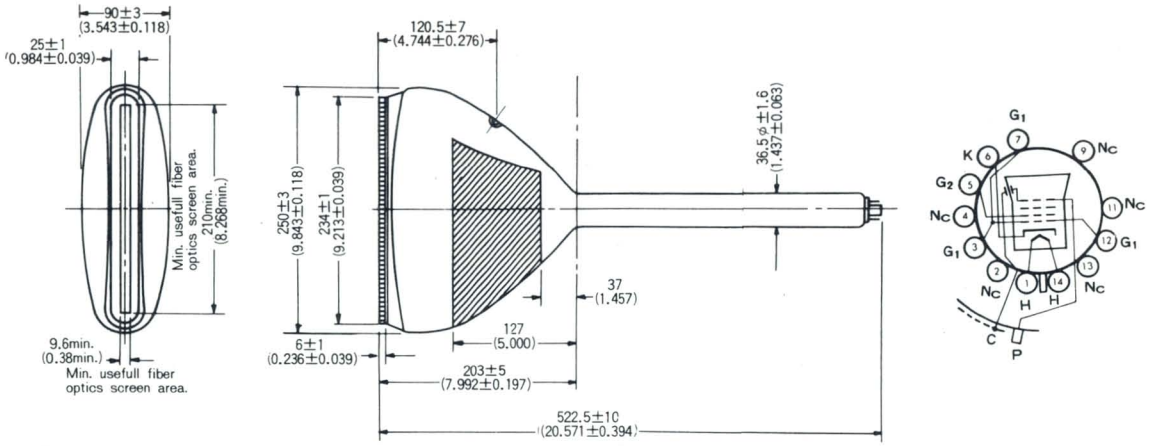


(77) 250UB11

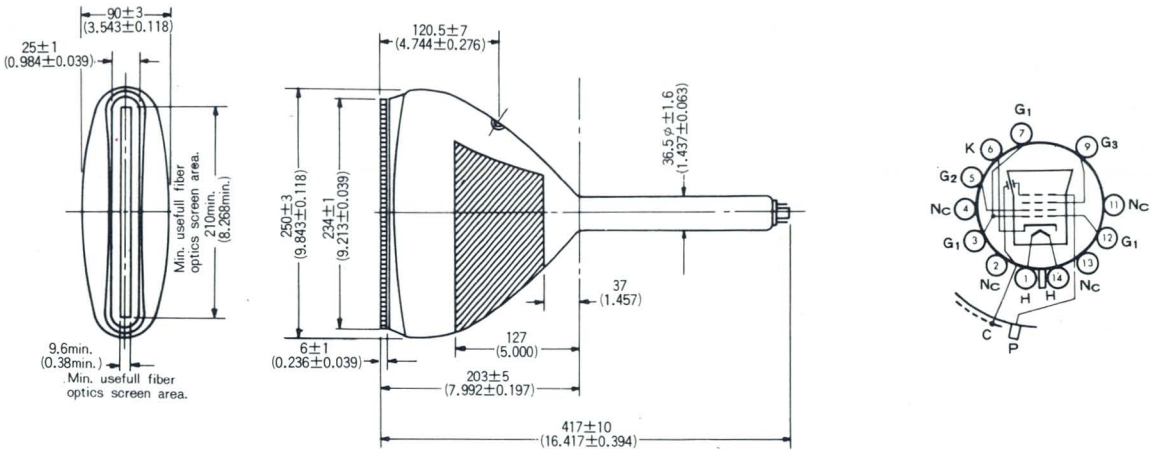


Unit : mm (inch)

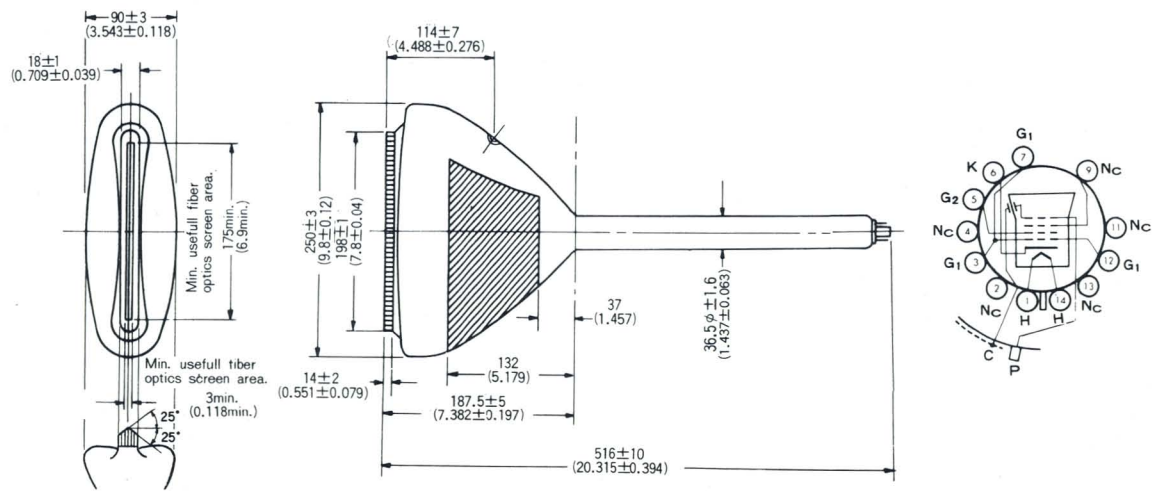
(78) 250WB11



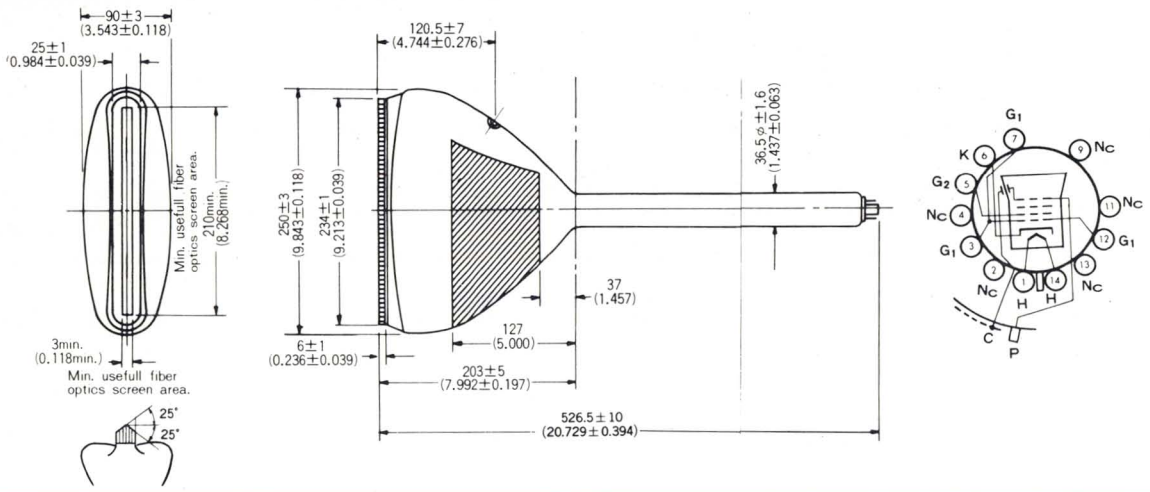
(79) 250VB11



(80) 250YB48

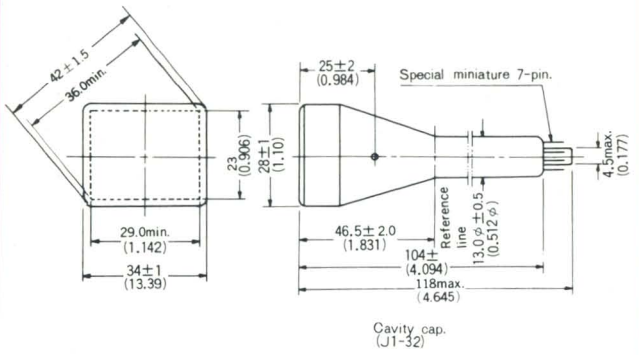


(81) 250ZB48


90±3
(3.543±0.118)
25±1
(0.984±0.039)
Min. usefull fiber optics screen area.
210min.
(8.268min.)
3min.
(0.118min.)
Min. usefull fiber optics screen area.
25°
25°
120.5±7
(4.744±0.276)
250±3
(9.843±0.118)
234±1
(9.213±0.039)
36.5φ±1.6
(1.437±0.063)
37
(1.457)
127
(5.000)
6±1
(0.236±0.039)
203±5
(7.992±0.197)
526.5±10
(20.729±0.394)
G1
K
G2
Nc
G1
Nc
Nc
Nc
Nc
G1
Nc
H
H
C
P

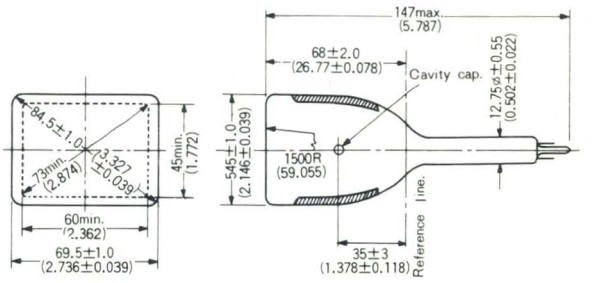
Unit : mm (inch)

(82) 40CB4



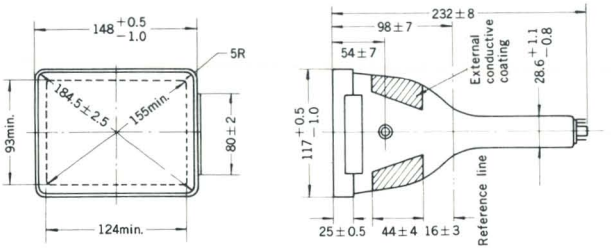
Cavity cap.
(J1-32)

(83) 85HB4



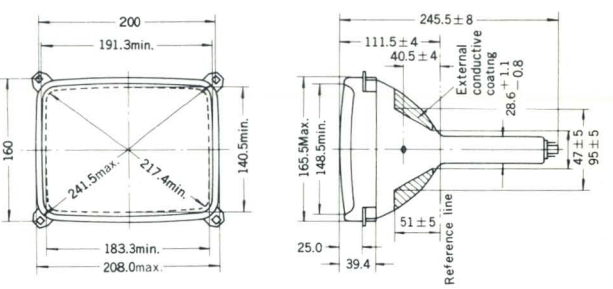
Cavity cap.
(J1-30)

(84) M17-141W



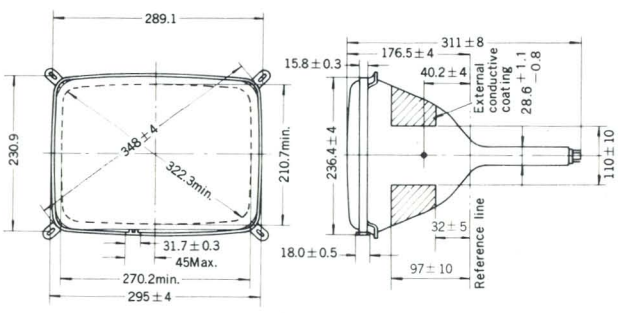
Cavity cap (J1−21) Base (B7−208)

(85) 230BAB39



Cavity cap (J1−21) Base (B7−208)

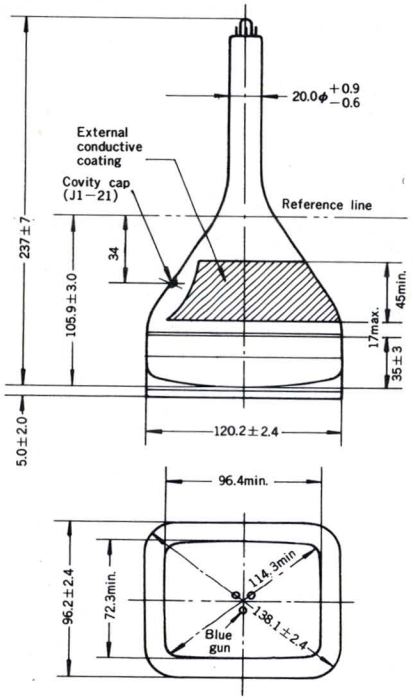
(86) 340BAB39



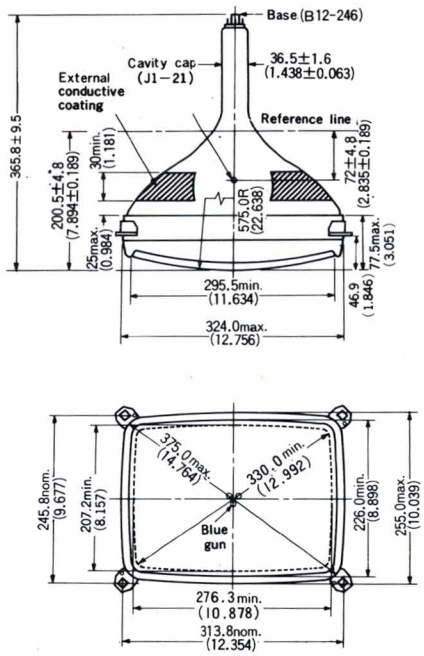
Cavity cap (J1−21) Base (B7−208)

Unit : mm (inch)

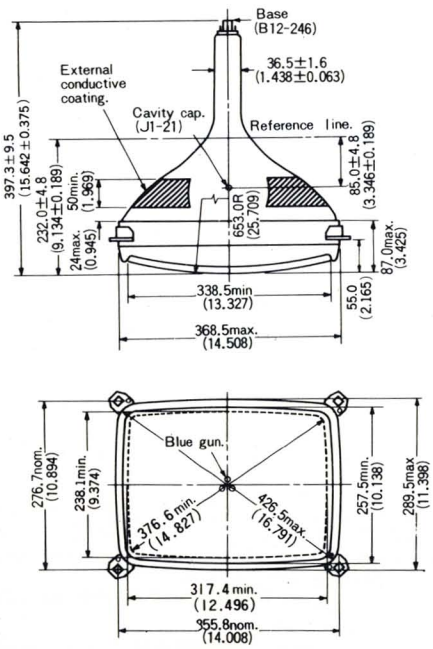
(87) I40AUB22



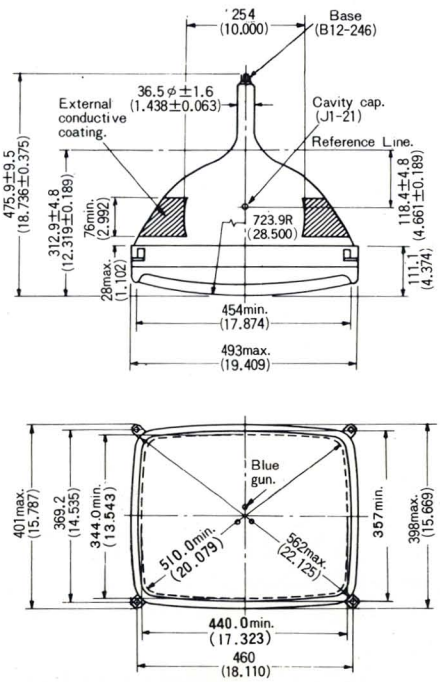
(88) 370BUB22



(89) 420AJB22



(90) 550FB22



BASE CONNECTIONS

(COLOR PICTURE TUBES)

Unit : mm (inch)

Fig. 1

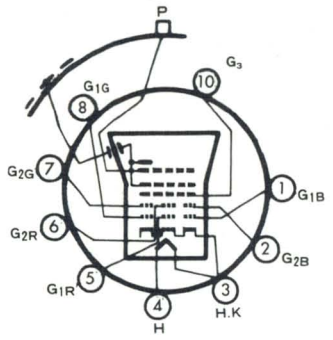


Fig. 2

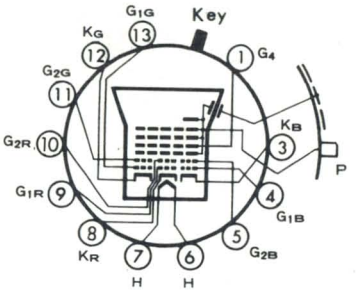


Fig. 3

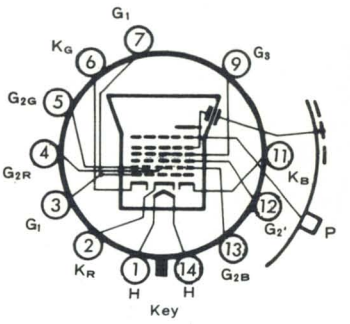
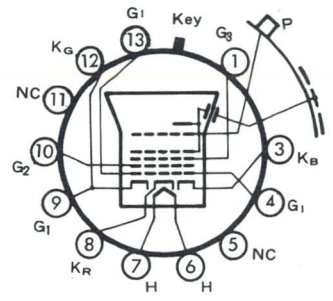
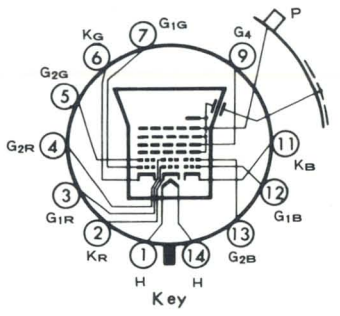


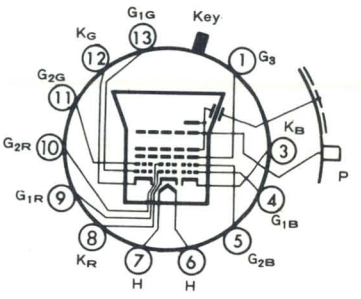
Fig. 4



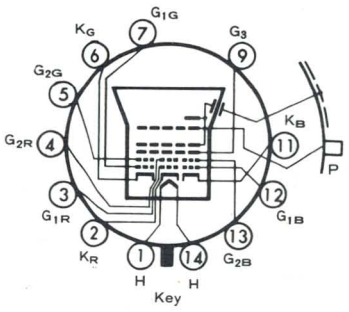
14BH



13C



14BE



Unit : mm (inch)

7GT

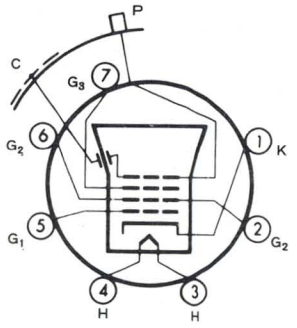


Fig. 5

7GR

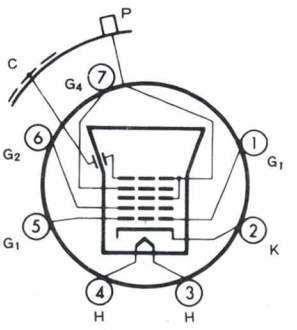
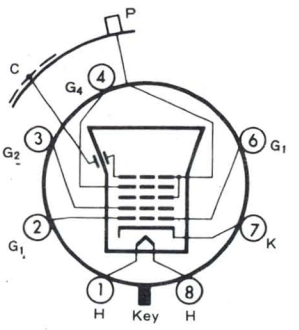
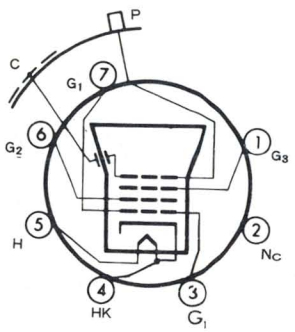
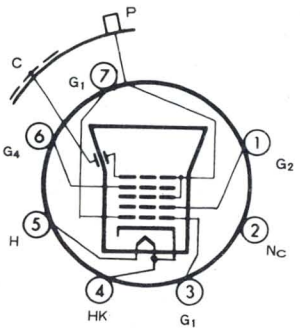


Fig. 6

8HR







ELECTRON TUBES

PREFERRED TYPES (RECEIVING TUBES)

Application		Monochrome TV Set				Color TV Set	
		Without Transformer			With Transformer	Without Transformer	
		300mA	450mA	600mA	6.3V	300mA	450mA
TUNER	RF AMP.	4GK5 4HA5	3GK5 3HA5	2GK5 2HA5	6GK5 6HA5	4GK5 4HA5	3GK5 3HA5
	OSC., MIXER	7GS7 8GJ7	5GS7 5GJ7	4GS7 4GJ7	6GS7 6GJ7	7GS7 8GJ7	5GS7 5GJ7
VIDEO	IF AMP.	6EH7 6EJ7	4EH7 4EJ7	3EH7 3EJ7	6EH7 6EJ7	6EH7 6EJ7	4EH7 4EJ7
	AMP.	11LY6 12BY7A 15DQ8	8LS6 10DX8 11MS8	12BY7A	6DX8 12BY7A	11LY6 12BY7A 15DQ8	8LS6 10DX8
SOUND	IF AMP.	6BX6 9GH8A	6GH8A	5GH8A	6BX6 6GH8A	6BX6	6GH8A
	DET.	6DT6A	4DT6A	3DT6A	6DT6A	6DT6A	4DT6A
	AMP. OUTPUT	16A8	11BM8	8B8	6BM8	16A8	11BM8
SYNC., SEPARATOR AMP. AGC		6AB8 9GH8A 15DQ8	6GH8A 10DX8	4BL8 5GH8A	6AB8 6GH8A	6JX8 9GH8A 12FQ7 15DQ8	6GH8A 8FQ7 10DX8
VERT. DEF.	OSC.	18GV8	11MS8	9GV8	6GV8	9GH8A 12FQ7	6GH8A 8FQ7
	OUTPUT	18GV8	11MS8	9GV8	6GV8	15CW5	10CW5
HORIZ. DEF.	OSC., AFC	8A8 9JW8	6GH8A 6LX8	4BL8 5GH8A	6BL8 6GH8A	12FQ7	8FQ7
	OUTPUT	25E5 29KQ6	21KQ6 38HE7	12B-B14 12G-B3	6CM5	29KQ6 40KG6A	21KQ6
DAMPER.		17Z3 30AE3	20AQ3 38HE7	16AQ3	6AL3 6R3	30AE3 42EC4A	20AQ3
EHT RECT.		1BK2 1S2 1S2A 1X2B	1BK2 1S2 1S2A 1X2B	1BK2 1S2 1S2A 1X2B	1BK2 1S2 1S2A 1X2B	3CU3 3CU3A 3CV3 3CV3A	3CU3 3CU3A 3CV3 3CV3A
SHUNT REGULATOR						6BK4B 6BK4C/ oEL4A	6BK4B 6BK4C/6EL4A
FOCUS RECT.						1X2B	1X2B
COLOR CIRCUIT						6AL5 6BX6 9AQ8 9GH8A 12BH7A 15DQ8	4EJ7 6GH8A 8FQ7 10DX8

RECEIVING TUBES (TV SET)

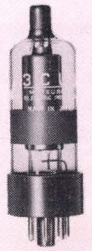
Type No.			Base Connections	Drawing No.	Heating			Classification by Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
1BK2		NT	9Y	21-7	Filament	1.4	550	Diode	HV Rect.	Cp-f1.2	—	—
1S2	DY86	NT	9DT	21-31	Cathode	1.4	550	Diode	HV Rect.	Cp-k1.55	—	—
1S2A	DY87	NT	9DT	21-31	Cathode	1.4	550	Diode	HV Rect.	Cp-k1.55	—	—
1X2B		NT	9Y	21-7	Filament	1.25	200	Diode	HV Rect.	Cp-f1.0	—	—
⊙2GK5		MT	7FP	18-2	Cathode	2.3	600	Triode ×	RF Amp.	0.52△	5.0△	3.5△
⊙2HA5/2HM5	XC900	MT	7GM	18-1	Cathode	2.4	600	Triode ×	RF Amp.	0.35△	4.5△	3.0△
3CU3		GT	8MK	29-02	Filament	3.15	280	Diode	HV Rect.	Cp-fis1.5	—	—
3CU3A		GT	8MK	29-02	Filament	3.15	280	Diode	HV Rect.	Cp-fis1.5	—	—
3CV3		GT	8EZ	20-16A	Cathode	3.15	270	Diode	HV Rect.	Cp-k 1.6	—	—
3CV3A		GT	8EZ	29-16A	Cathode	3.15	270	Diode	HV Rect.	Cp-k1.6	—	—
3DT6A		MT	7EN	18-2	Cathode	3.15	600	Pentode #	FM Det.	0.02△	5.8△	—
⊙3EH7	XF183	NT	9AQ	21-12	Cathode	3.6	600	Pentode b	RF, IF Amp.	0.0055	9.5	3.0
⊙3EJ7	XF184	NT	9AQ	21-12	Cathode	3.6	600	Pentode #	RF, IF Amp.	0.0055	10.0	3.0
⊙3GK5		MT	7FP	18-2	Cathode	2.8	450	Triode	RF Amp.	0.52△	5.0△	3.5△
⊙3HA5/3HM5	LC900	MT	7GM	18-1	Cathode	2.7	450	Triode ×	RF Amp.	0.35△	4.5△	3.0△
⊙3HQ5		MT		18-2	Cathode	2.8	450	Triode ×	RF Amp.	0.52△	5.0△	3.5△
4BL8	XCF80	NT	9DC	21-2	Cathode	4.5	600	Triode ◇ Pentode #	Sync. Separator Osc. AF, RF Amp.	1.5 max.0.025	2.5 5.2	1.8 3.4
4DT6A		MT	7EN	18-2	Cathode	4.2	450	Pentode #	FM Det.	0.02△	5.8	—
⊙4EH7	LF183	NT	9AQ	21-12	Cathode	4.6	450	Pentode b	RF, IF Amp.	0.0055	9.5	3.0
⊙4EJ7	LF184	NT	9AQ	21-12	Cathode	4.6	450	Pentode #	RF, IF Amp.	0.0055	10.0	3.0
⊙4GJ7	XCF801	NT	9QA	21-20	Cathode	4.1	600	Triode ◇ Pentode #	Osc. Mixer	1.8△ max. 0.012△	3.3△ 6.2△	1.7△ 3.7△
⊙4GK5		MT	7FP	18-2	Cathode	4.0	300	Triode ×	RF Amp.	0.52△	5.0△	3.5△
⊙4GS7		NT	9GF	21-2	Cathode	4.0	600	Triode ◇ Pentode #	Osc. Mixer	2.0 0.012	2.4 6.0	1.25 3.6
⊙4HA5/4HM5	PC900	MT	7GM	18-1	Cathode	3.9	300	Triode ×	RF Amp.	0.35△	4.5△	3.0△
⊙4R-HH15		NT	9AJ =9DE	21-2	Cathode	4.0	600	Twin-Triode ◇	RF Amp.	(Unit 1) 0.9△ (Unit 2) 0.9△	3.8△ 6.3△	1.3△ 2.4△

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7-pin Miniature Tube NT…9-pin Miniature Tube) #…Sharp-Cutoff
b…Remote-Cutoff ○…Semi Remote-Cuttoff ×…High-μ ◇…Medium-μ ✣…Low-μ ◈…Design Maximum Value
△…With External Shield □…Absolute Maximum Value


1BK2


1S2


1X2B


3CU3A


3CV3A

Maximum Ratings (Design-Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	Ec2 (V)	Pp (w)	Ik (mA)	Eb (V)	Ec2 (V)	Ec1,Rk (V)(Ω)	Ib (mA)	Ic2 (mA)	μ	Gm (μU)	rp (kΩ)	Po (w)		Matsushita
epx=24kV◈		Ib=44mA◈		Max. DC Output Current=0.88mA◈										1BK2
epx=27kV▣		Ib=40mA		Max. DC Output Current=0.8mA										1S2
epx=27kV▣		Ib=40mA		Max. DC Outpu' Current=0.8mA										1S2A
epx=22kV▣		Ib=45mA◈		Max. DC Output Current=0.5mA◈										1X2B
200◈	—	2.5◈	22◈	135	—	−1	11.5	—	78	15000	5.4	—		2GK5⊙
200◈	—	2.2◈	20◈	135	—	−1	11.5	—	76	14500	—	—		2HA5/2HM5⊙
epx=33kV◈		Ib=100mA◈		Max. DC Output Current=2.0mA◈										3CU3
epx=33kV◈		Ib=100mA◈		Max. DC Output Current=2.0mA◈ X-Ray Radiation 25mR/Hmax.										3CU3A
epx=35kV◈		Ib=100mA		Max. DC Output Current=1.9mA◈										3CV3
epx=35kV◈		Ib=100mA		Max. DC Output Current=1.9mA◈ X-Ray Radiation 25mR/Hmax.										3CV3A
330◈	Ecc2=330V◈	1.7◈	—	150	100	560	155	1.8	—	1350	150	—	Ec3=0, Gm(g3-p)=515μU	3DT6A
250	250	2.5	20	200	90	−2	12	4.5	—	12500	500	—	Ec3=0	3EH7⊙
250	250	2.5	25	200	200	−2.5	10	4.1	—	15000	380	—	Ec3=0	3EJ7⊙
200◈	—	2.5◈	22◈	135	—	−1	11.5	—	70	14000	5.4	—		3GK5⊙
200◈	—	2.2◈	20◈	135	—	−1	11.5	—	76	14500	—	—		3HA5/3HM5⊙
200	—	2.5◈	22◈	135	—	0	11.5	—	70	14000	—	—		3HQ5⊙
250	—	1.5	14	100	—	−2	14	—	20	5000	—	—		4BL8
250	175	1.7	14	170	170	−2	10	2.8	—	6200	400	—		
330◈	Ecc2=330V◈	1.7◈	—	150	100	560	1.55	1.8	—	1350	150	—	Ec3=0 Gm(g3-p)=515μU	4DT6A
250	250	2.5	20	200	90	−2	12	4.5	—	12500	500	—	Ec3=0	4EH7⊙
250	250	2.5	25	200	200	−2.5	10	4.1	—	15000	380	—	Ec3=0	4EJ7⊙
125	—	1.5	20	100	—	−3	15	—	20	9000	—	—		4GJ7⊙
250	250	2.0	18	170	120	−1.4	10	3	—	11000	min.350	—		
200◈	—	2.5◈	22◈	135	—	−1	11.5	—	78	15000	5.4	—		4GK5⊙
125	—	1.5	15	100	—	−3	14	—	17	5500	—	—		4GS7⊙
250	150	2.0	18	170	150	−1.2	10	3.3	—	12000	min.350	—		
200◈	—	2.2	20◈	135	—	−1	11.5	—	76	14500	—	—		4HA5/4HM5⊙
165◈	—	1.7	22◈	90	—	143	7	—	44	8000	—	—		4R-HH15⊙

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated.

3GK5

4DT6A

4EH7

4EJ7

4HA5/4HM5

Type No.			Base Connections	Drawing No.	Heating			Classification by Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
5GH8A		NT	9MP	21-2	Cathode	4.7	600	Triode	Sync. Separator	2.0	2.4	1.1
								Pentode #	Osc. Amp.	0.012	5.8	3.5
⊙5GJ7	LCF801	NT	9QA	21-20	Cathode	5.4	450	Triode ◇	Osc.	1.8△	3.3△	1.7△
								Pentode #	Mixer	max. 0.012△	6.2△	3.7
⊙5GS7		NT	9GF	21-2	Cathode	5.4	450	Triode ◇	Osc.	2.0	2.4	1.25
								Pentode #	Mixer	0.012	6.0	3.6
5GX7		MT	9QA	21-2	Cathode	5.4	450	Triode ◇	Osc.	1.2	2.3	1.9
								Pentode #	VHF Mixer	0.05	5.4	3.3
5HG8	LCF86	NT	9MP	21-2	Cathode	5.4	450	Triode ◇	Osc.	2.0	2.4	1.25
								Pentode #	Mixer	0.012	5.8	3.5
5LJ8		MT	9GF	21-2	Cathode	5.4	450	Triode ◇	Osc.	1.4	2.4	1.5
								Pentode #	VHF Mixer	0.015	6.0	3.4
6AB8	ECL80	NT	9AT	21-3	Cathode	6.3	300	Triode ◇	AF Amp.	0.9	2.1	0.8
								Pentode #	Sync Separator Power Amp.	max. 0.2	4.3	4.8
6AF9		Decal 10Pin	10L	21-4	Cathode	6.3	810	Duplex.	Video Amp.	(Unit 1) 0.105	12.0	7.0
								Pentode #	Sync. Separator Amp.	(Unit 2) 0.14	10.0	11.0
6AL3	EY88	NT	9CB	21-11	Cathode	6.3	1.55A	Diode	Damper	Cp-all 8.6	Ck-f 2.0	—
6AL5	EAA91	MT	6BT	18-1	Cathode	6.3	300	Twin-Diode	Det.	C_1P-_2P 0.068	Cp-all 2.5	Ck-all 3.4
6BK4B		GT	8GC	38-19 38-29A	Cathode	6.3	200	Beam Triode	HV Shunt Regulator	0.03	2.6	1.0
6BK4C/ 6EL4A		GT	8GC	38-19 38-29A	Cathode	6.3	200	Beam Triode	HV Shunt Regulator	0.03	2.6	1.0
6BL8	ECF80	NT	9DC	21-2	Cathode	6.3	430	Triode ◇	AF, RF Amp.	1.5	2.5	1.8
								Pentode #	Sync Separator	max. 0.025	5.2	3.4
6BX6	EF80	NT	9AQ	21-3	Cathode	6.3	300	Pentode #	RF, IF Amp.	0.007	6.9	3.1
6CL8A		MT	9FX	21-2	Cathode	6.3	450	Triode	Osc.	1.8	2.8	1.5
								Pentode	VHF Mixer	—	5.0	2.0
6CM5	EL36	GT	8GT	29-12A	Cathode	6.3	1.25A	Beam Power Tube	Horiz Def Power Amp.	max. 1.1	17.5	8.0
6CW5	EL86	NT	9CV	21-4	Cathode	6.3	760	Beam Power Tube	Vert. Def. Power Amp.	max. 0.6	13	6.8
⊙6DJ8	ECC88	NT	9AJ =9DE	21-2	Cathode	6.3	365	Twin-Triode ◇	RF Amp.	(Unit 1) 1.4△	3.3△	2.5△
										(Unit 2) 1.4△	6.0△	3.2△
6DT6A		MT	7EN	18-2	Cathode	6.3	300	Pentode #	FM Det.	0.02△	5.8△	—
6DX8	ECL84	NT	9HX	21-3	Cathode	6.3	720	Triode	Sync. Separator	2.7	3.8	2.3
								Pentode #	Video Amp.	max. 0.1	8.7	4.2
6EA8		NT	9DC	21-2	Cathode	6.3	450	Triode.	Sync. Separator	1.9	3.0	1.9
								Pentode #	Osc. Amp.	max. 0.01	15.0	3.4
6EC4A	EY500A	Magnoval	9-14	38-02	Cathode	6.3	2.1A	Diode	Damper	Cp-K13	Ck-f 3.7	—

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7pin Miniature Tube NT…9-pin Miniature Tube) #…Sharp-Cutoff
b…Remote-Cutoff ○…Semi Remoto-Cutoff ×…High-μ ◇…Medium-μ ⊹…Low-μ ◈…Design Maximum Value
△…With External Shield ▣…Absolute Maximum Value


5GH8A


5GS7


6BK4C/6EL4A


6BL8

Maximum Ratings (Design-Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	E_{c1} (V)	Pp (W)	Ik (mA)	Eb (V)	E_{c2} (V)	E_{c1}, RK (V)(Ω)	Ib (mA)	I_{c2} (mA)	μ	Gm (μ℧)	rp (kΩ)	Po (W)		Matsushita
125	—	1.5	15	100	—	−3	14	—	17	5700	—	—		5GH8A
250	150	2.0	18	170	150	−1.2	10	3.3	—	12000	min. 350	—		
125	—	1.0	20	100	—	−3	15	—	20	9000	—	—		5GJ7◎
250	250	2.0	18	170	120	−1.4	10	3	—	11000	min. 350	—		
125	—	1.5	15	100	—	−3	14	—	17	5500	—	—		5GS7◎
250	150	2.0	18	170	150	−1.2	10	3.3	—	12000	min. 350	—		
275	—	1.5	20	125	—	68	13	—	40	8500	4.7	—		5GX7
275	275	2.2	20	125	125	−1.0	8	2.5	—	11000	—	—		
125	—	1.5	15	100	—	−3	14	—	17	5700	—	—		5HG8
250	150	2.0	18	170	150	−1.2	10	3.3	—	12000	min. 350	—		
280	—	2.0	20	150	—	68	13	—	40	8500	5.0	—		5LJ8
280	280	2.0	20	150	125	33	14	4	—	14000	—	—		
200	—	1.0	8	100	—	0	8	—	20	1900	—	—		6AB8
400	250	3.5	25	200	200	−8	17.5	3.3	—	3300	150	1.4	$E_{c3}=0$ $R_L=11k\Omega$	
250	250	5.1	60	80	180	−1.3	65	18.5	—	29000	32	—		6AF9◎
250	250	1.5	15	150	150	−2.1	10	3.0	—	8500	160	—		
epx=7.5kV◈ Pp=5W		Ib=220mA ehk=6.6kV		—	—	—	—	—	—	—	—	—		6AL3
epx=330V		Ib=54mA		Maximum DC Output Current=9mA										6AL5
Ebb=◈ 60kV	Ec= −135◈	40◈	Ib=1.6◈	—	—	—	—	—	200	—	—	—		6BK4B
Ebb=◈ 60kV	Ec= −135◈	40◈	Ib=1.6◈	—	—	—	—	—	2000	X Ray Radiation 0.5mR/Hmax.				6BK4C
250	—	1.5	14	100	—	−2	14	—	20	5000	—	—		6BL8
250	175	1.7	14	170	170	−2	10	2.8	—	6200	400	—		
300	300	2.5	15	170	170	−2	10	2.5	—	7400	500	—	$E_{c3}=0$	6BX6
330	—	2.5	—	125	—	−1.0	14	—	40	8000	5.0	—		6CL8A
330	330	2.5	—	125	125	−1.0	12	4.0	—	6500	—	—		
(250 (epx=7kV)	250	12.0	200	100	100	−8.2	100	7	—	14000	5	—		6CM5
250	250	12.0	100	170	170	−12.5	70	3.5	—	11000	26	5.1		6CW5
130	—	1.8	25	90	—	−1.3	15	—	33	12500	—	—		6DJ8◎
330◈	E_{cc_2}= 330V◈	1.7	—	150	100	560	1.55	1.8	—	1350	150	—	$E_{c3}=0$, GM (gop)=515μΩ	6DT6A
250	—	1.0	12	200	—	−1.7	3	—	65	3000	—	—		6DX8
250	250	4.0	40	170	170	−2.1	18	3	—	11000	min. 100	—		
330	—	2.5	—	150	—	56	18	—	40	8500	5.0	—		6EA8
330	330	3.1	—	125	125	−1	12	4	—	6400	200	—		
Ebb=▣ (epx=7kV)	ehk= 6.3kV	11▣	Ib=440	—	—	—	—	—	—	—	—	—		6EC4A

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated


6BX6


6CW5


6DT6A


6DX8

Type No.			Base Connections	Drawing No.	Heating			Classification by Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
⊙6 E H 7	EF183	NT	9AQ	21-12	Cathode	6.3	300	Pentode ᵇ	RF, IF Amp.	0.0055	9.5	3.0
⊙6 E J 7	EF184	NT	9AQ	21-12	Cathode	6.3	300	Pentode #	RF, IF Amp.	0.0055	10.0	3.0
6FQ7/ 6CG7		NT	9LP	21-3	Cathode	6.3	600	Twin-Triode ◇	Horiz. & Vert.	(Unit 1) 3.6	2.4	0.34
									Osc.	(Unit 2) 3.8	2.4	0.26
6 G H 8 A		NT	9DC	21-2	Cathode	6.3	450	Triode ◇	Sync. Separator	1.7	3.0	1.4
								Pentode #	Osc. Amp.	max. 0.02	5.0	2.6
⊙6 G J 7	ECF801	NT	9QA	21-20	Cathode	6.3	390	Triode ◇	Osc.	1.8△	3.3△	1.7△
								Pentode #	Mixer	max. 0.012△	6.2△	3.7△
⊙6 G K 5		MT	7FP	18-2	Cathode	6.3	180	Triode ×	RF Amp.	0.52△	5.0△	3.5△
6 G K 6		NT	9GK	21-4	Cathode	6.3	760	Power Pentode	Power Amp. Vert. Def.	max. 0.14	10.0	7.0△
⊙6 G S 7		NT	9GF	21-2	Cathode	6.3	365	Triode ◇	Osc.	2.0	2.4	1.25
								Pentode *	Mixer	0.012	6.0	3.6
6 G U 7		NT	9LP	21-3	Cathode	6.3	600	Twin-Triode	Vert.Def.Amp.	(Unit 1) 3.0	3.4	0.44
										(Unit 2) 3.0	3.6	0.34
6 G X 7		MT	9QA	21-2	Cathode	6.3	400	Triode ◇	Osc.	1.2	2.3	1.9
								Pentode #	VHF Mixer	0.005	5.4	3.3
6 G V 8	ECL85	NT	9LY	21-4	Cathode	6.3	900	Triode ×	Vert. Def. Osc.	—	—	—
								Beam Power Tube	Video Amp. Power Amp.	—	—	—
⊙6HA5/ 6HM5	EC900	MT	7GM	18-1	Cathode	6.3	185	Triode ×	RF Amp.	0.35△	4.5△	3.0△
6 H B 7		NT	9QA	21-1	Cathode	6.3	450	Triode ◇	Sync. Separator	1.9	3.0	1.9
								Pentode #	Osc. Amp.	max. 0.01	5.0	3.4
⊙6 H G 8	ECF86	NT	9MP	21-2	Cathode	6.3	365	Triode ◇	Osc.	2.0	2.4	1.1
								Pentode #	Mixer	0.012	5.8	3.5
⊙6 H Q 5		MT	7GM	18-2	Cathode	6.3	180	Triode ×	RF Amp.	0.52△	5.0△	3.5△
6 J X 8	ECH84	NT	10-54	21-3	Cathode	6.3	300	Triode	Sync. Amp.	1.1	3.0	—
								Heptode ◇	Sync. Separator	0.009	—	—
6 K E 8		MT	9DC	21-2	Cathode	6.3	400	Triode	Osc.	1.3	2.4	2.0
								Pentode ◇	VHF Mixer	0.015	5.0	3.4
6 K G 6 A	EL509	Mag-noval	9RJ	38-01	Cathode	6.3	2.0A	Beam Power Tube	Horiz. Def. Power Amp.	2.5	—	—
6 K Z 8		NT	9FZ	21-2	Cathode	6.3	450	Triode ◇	Osc.	1.6△	3.2△	1.8△
								Pentode #	Mixer	max. 0.01△	5.5△	3.4△
6 L F 6		Mag-noval	12GW	38-01	Cathode	6.3	(2A)	Beam Power Tube	Horiz. Def. Power Amp.	—	—	—
6 L J 8		MT	9GF	21-2	Cathode	6.3	400	Triode	Osc.	1.4	2.4	1.5
								Pontode	VHF Mixer	0.015	6.0	3.4

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7-pin Miniature Tube NT…9-pin Miniature Tube) #…Sharp-Cutoff
b…Remote-Cutoff ○…Semi Remote-Cutoff ×…High-μ ◇…Medium-μ ✣…Low-μ ◈…Design Maximum Value
△…With External Shield ▣…Absolute Maximum Value


6EH7


6EJ7


6GH8A


6HA5/6HM5

Maximum Ratings (Design-Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	E_{C2} (V)	Pp (W)	Ik (mA)	Eb (V)	E_{C2} (V)	E_{C1}, RK (V)(Ω)	Ib (mA)	I_{C2} (mA)	μ	Gm (μ℧)	rp (kΩ)	Po (W)		Matsushita
250	250	2.5	20	200	90	−2	12	4.5	—	12500	500	—	$E_{C3}=0$	6 E H 7⊙
330	250	2.5	25	200	200	−2.5	10	4.1	—	15000	380	—	$E_{C3}=0$	6 E J 7⊙
330◈	—	4.0◈	22◈	250	—	−8	9	—	20	2600	7.7	—		6FQ7/ 6CG7
330	—	2.5	—	125	—	−1	13.5	—	46	8500	5.4	—		6GH8A
350	330	2.5	20	125	125	−1	12	4	—	7500	200	—		
125	—	1.5	20	100	—	−3	15	—	20	9000	—	—		6 G J 7⊙
250	250	2.0	18	170	120	−1.4	10	3	—	11000	min. 350	—		
200◈	—	2.5◈	22◈	135	—	−1	11.5	—	78	15000	5.4	—		6 G K 5⊙
330◈	330	13.2	65	250	250	−7.3	48	5.5	—	11300	38	5.7	$R_L=5.2k\Omega$	6 G K 6
125	—	1.5	15	100	—	−3	14	—	17	5500	—	—		6 G S 7⊙
250	150	2.0	18	170	150	−1.2	10	3.3	—	12000	min. 350	—		
450	—	3.5	20	250	—	−10.5	11.5	—	16.5	3100	5.3	—		6 G U 7
275	—	1.5	20	125	125	68	13	—	40	8500	4.7	—		6 G X 7
275	275	2.2	20	125	125	−1.0	8	2.5	—	11000	—	—		
250	—	0.5	15	100	—	−0.85	5	—	60	5500	11	—		6 G V 8
250	250	7.0	75	170	170	−15	41	2.5	—	7300	26	—		
200◈	—	2.2◈	20◈	135	—	−1	11.5	—	76	14500	—	—		6HA5/ 6HM5⊙
330	—	2.5	—	150	—	0	18	—	40	8500	5.0	—		6 H B 7
330	330	3.1	—	125	125	−1	12	4	—	6400	200	—		
125	—	1.5	15	100	—	−3	14	—	17	5700	—	—		6 H G 8⊙
250	150	2.0	18	170	150	−1.2	10	3.3	—	12000	min. 350	—		
200	—	2.5◈	22◈	135	—	0	11.5	—	70	14000	—	—		6 H Q 5⊙
250	—	1.3	10	50	—	0	3	—	50	3700	—	—		6 J X 8
250	$E_{c2+4}=250$	1.7	12.5	135	$E_{c2+4}=14$	0	1.7	$I_{c2+4}=0.9$	—	2200	—	—	$E_{C3}=0$	
280	—	2.0	20	125	—	68	13	—	40	8000	5.0	—		6 K E 8
280	280	2.0	20	125	125	33	10	2.8	—	12000	—	—		
◈ (ep=8kV)	275	40◈	500	50	175	−10	800	70	—	—	—	—		6KG6A
330	—	2.5	—	125	—	−1	13.5	—	46	8500	5.4	—		6 K Z 8
330	$E_{cc_2}=330$	2.5	—	125	125	−1	12	—	—	7500	200	—		
◈ (ep=8kV)	275	40◈	—	50	175	−10	800	70	—	—	—	—		6 L F 6
280	—	2.0	20	150	—	68	13	—	40	8500	5.4	—		6 L J 8
280	280	2.0	20	150	125	33	14	4.0	—	14000	—	—		

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated.

6HG8

6HQ5

6KG6A

6LF6

Type No.			Base Connections	Drawing No.	Heating			Classification by Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
6LM8		MT	9AE =9DC	21-2	Cathode	6.3	450	Triode◇	General Purpose Amp.	1.8	3.2	1.9
								Pentode#	Burst Amp.	0.015	5.5	3.8
6LN8	LCF80	NT	9DC	21-2	Cathode	6.3	450	Triode◇	Sync. Separator. Osc.	max.1.5	2.5	1.8
								Pentode#	RF Amp. Conv	max.0.025	5.2	3.4
6LX8	LCF802	NT	9DC	21-2	Cathode	6.3	450	Triode×	Sync. Separator	1.5	2.4	Cg-f max. 0.1
								Pentode	Horiz. Osc.	0.06	5.4	Cg-f max. 0.1
6R3	EY81	NT	9CB	21-8	Cathode	6.3	810	Diode	Damper	Cp-all 6.4	Ck-f 2.8	—
⊙6Y9	EFL200	Decal 10pin	10-55	21-4	Cathode	6.3	810	Duplex-Pentode#	Video Amp.	(Unit 1) 0.105	12.0	7.0
									Sync. Separator Amp.	(Unit 2) 0.14	10.0	7.0
⊙7DJ8	PCC88	NT	9AJ =9DE	21-2	Cathode	7.2	300	Twin-Triode◇	RF Amp.	(Unit 1) 1.4⧋	3.3⧋	2.5⧋
										(Unit 2) 1.4⧋	6.0⧋	3.7⧋
⊙7GS7		NT	9GF	21-2	Cathode	7.6	300	Triode◇	Osc.	2.0	2.4	1.25
								Pentode#	Mixer	0.012	6.0	3.6
⊙7HG8	PCF86	NT	9MP	21-2	Cathode	7.6	300	Triode◇	Osc.	2.0	2.4	1.1
								Pentode	Mixer.	0.012	5.8	3.5
8A8		NT	9DC	21-2	Cathode	8.4	300	Triode◇	Sync. Separator Osc.	1.5	2.5	1.8
								Pentode#	RF Amp.	max.0.025	5.2	3.4
8B8	XCL82	NT	9EX	21-4	Cathode	8.0	600	Triode×	AF Amp.	4.4	2.7	4.3
								Power Pentode	Vert. Def., Power Amp.	max.0.3	9.3	8.0
8CW5	XL86	NT	9CV	21-4	Cathode	8.0	600	Beam Power Tube	Vert. Def., Power Amp.	max.0.6	13.0	6.8
8FQ7 8CG7		NT	9LP	21-3	Cathode	8.4	450	Twin-Triode◇	Horiz. & Vert. Osc.	(Unit 1) 3.6	2.4	0.34
										(Unit 2) 3.8	2.4	0.26
⊙8GJ7	PCF801	NT	9QA	21-20	Cathode	7.6	300	Triode◇	Osc.	1.8⧋	3.3⧋	1.7⧋
								Pentode#	Mixer.	max. 0.012⧋	6.2⧋	3.7⧋
8LS6		NT	9GK	21-3	Cathode	7.5	450	Pentedo#	Video Amp.	0.075	7.2	4.2
9A8	PCF80	NT	9DC	21-2	Cathode	9.0	300	Triode◇	Sync. Separator Osc.	1.5	2.5	1.8
								Pentode#	RF IF Amp.	max.0.025	5.2	3.4
9AQ8	PCC85	NT	9AJ =9DE	21-2	Cathode	9.0	300	Twin-Triode◇	Osc., Mixer	1.5	3.0	1.2
9GH8A		NT	9DC	21-2	Cathode	9.45	300	Triode◇	Sync. Separator	1.7	3.0	1.4
								Pentode#	Horiz. Osc.	max.0.02	5.0	2.6
9GV8	XLC85	NT	9LY	21-4	Cathode	8.8	600	Triode×	Vert, Def, Osc.	1.4	2.4	1.5
								Pentode	Vert Def., Power Amp.	0.015	6.0	3.4
9JW8	PCF802	NT	9DC	21-2	Cathode	9.0	300	Triode×	Sync. Separator	1.5	2.4	Cg-f max. 0.1
								Pentode#	Horiz. Osc.	0.06	5.4	Cg-f max. 0.1

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7-pin Miniature Tube NT…9-pin Miniature Tube) #…Sharp-Cutof
b…Remote-Cutoff ○…Semi Remote-Cutoff ×…High-μ ◇…Medium-μ ✣…Low-μ ◈…Design Maximum Value
⧋…With External Shield ⧈…Absolute Maximum Value


6LN8


6LX8


7GS7


7HG8

Maximum Ratings (Design-Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	E_{c1} (V)	Pp (W)	Ik (mA)	Eb (V)	E_{c2} (V)	E_{c1}, RK (V)(Ω)	Ib (mA)	I_{c2} (mA)	μ	Gm (μ℧)	rp (kΩ)	Po (W)		Matsushita
330	—	2.5	—	125	—	−1.0	13.5	—	46	8500	5.4	—		6 L M 8
350	330	2.5	—	125	125	−2.0	12	4.0	—	6000	—	—		
250	—	1.5	14	100	—	−2	14	—	20	5000	—	—		6 L N 8
250	175	1.7	14	170	170	−2	10	2.8	—	6200	400	—		
250	—	1.4	10	200	—	−2	3.5	—	70	3500	—	—		6 L X 8
250	250	1.2	15	100	100	−1	6	1.7	—	5500	400	—		
epx=5kV Pp=3.5W		Ib=150mA ehk=5kV		—	—	—	—	—	—	—	—	—		6 R 3
250	250	5.1	60	170	170	−2.7	30	7.2	—	22000	32	—		6 Y 9⊙
250	250	1.5	15	150	150	−2.1	10	3	—	8500	160	—		
130	—	1.8	25	90	—	−1.3	15	—	33	12500	—	—		7 D J 8⊙
125	—	1.5	15	100	—	−3	14	—	17	5500	—	—		7 G S 7⊙
250	150	2.0	18	170	150	−1.2	10	3.3	—	12000	—	—		
125	—	1.5	15	100	—	−3	14	—	17	5700	—	—		7 H G 8⊙
250	150	2.0	18	170	150	−1.2	10	3.3	—	12000	min. 350	—		
250	—	1.5	14	100	—	−2	14	—	20	5500	—	—		8 A 8
250	175	1.7	14	170	170	−2	10	2.8	—	6200	400	—		
250	—	1.0	15	100	—	0	3.5	—	70	2200	—	—		8 B 8
250	250	Vert. Out. 5 AF Out. 7	50	170	170	−11.5	41	9	—	7500	16	3.2		
250	250	12.0	100	170	170	−12.5	70	3.5	—	11000	26	5.1	R_L=2kΩ	8 C W 5
330◈	—	4.0◈	22◈	250	—	−8	9	—	20	2600	7.7	—		8FQ7/ 8CG7
125	—	1.5	20	100	—	−3	15	—	20	9000	—	—		8 G J 7⊙
250	250	2.0	18	170	120	−1.4	10	3	—	11000	min. 350	—		
180◈	180◈	5◈	—	110	110	65	14	3.2	36	11000	54	—		8 L S 6⊙
250	—	1.5	14	100	—	−2	14	—	20	5000	—	—		9 A 8
250	175	1.7	14	170	170	−2	10	2.8	—	6200	400	—		
250	—	2.5	15	170	—	−1.5	10	—	50	6200	—	—		9 A Q 8
330	—	2.5	—	125	—	−1	13.5	—	46	8500	5.4	—		9 G H 8 A
350	330	2.5	20	125	125	−1	12	4	—	7500	200	—		
250	—	0.5	15	100	—	180	5	—	60	5500	—	—		9 G V 8
250	250	7.0	75	170	170	345	200	2.5	—	7300	26	—		
250	—	1.4	10	200	—	−2	3.5	—	70	3500	—	—		9 J W 8
250	250	1.2	15	100	100	−1	6	1.7	—	5500	400	—		

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated.


8A8


8FQ7/8CG7


8GJ7


9AQ8


9GH8A

Type No.			Base Connections	Drawing No.	Heating			Classification by Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
10CW5	LL86	NT	9CV	21-4	Cathode	10.3	450	Beam Power Tube	Vert. Def., Power Amp.	max. 0.6	13.0	6.8
10DX8	LCL84	NT	9HX	21-3	Cathode	10.2	450	Triode ×	Sync. Separator	2.7	3.8	2.3
								Pentode #	Video Amp.	max. 0.1	8.7	4.2
10GK6		NT	9GK	21-4	Cathode	10.6	450	Power Pentode	Power Amp. Video Amp.	max. 0.14	10.0	7.0
10GV8	LCL85	NT	9LY	21-4	Cathode	10.6	450	Triode ×	Vert. Def., Osc	—	—	—
								Beam Power Tube	Vert. Def., Power Amp.	—	—	—
⊙11AF9		Decal 10Pin	10L	21-4	Cathode	11.5	450	Dulplex	Video Amp.	(Unit 1) 0.105	12.0	7.0
								Pentode #	Sync. Separator Amp.	(Unit 2) 0.14	10.0	11.0
11BM8	LCL82	NT	9EX	21-4	Cathode	10.7	450	Triode ×	AF Amp.	4.4	2.7	4.3
								Power Pentode	Vert. Def., Power Amp.	max. 0.3	9.3	8.0
11LY6		NT	9GK	21-3	Cathode	11.0	300	Pentode #	Video Amp.	0.075	9.5	3.8
11MS8		NT	9LY	21-4	Cathode	11.4	450	Triode ×	Vert. Def., Osc.	1.8	2.9	2.2
								Pentode	Vert. Def., Amp.	max. 0.6	14.5	8.0
11R3	LY81	NT	9CB	21-8	Cathode	11.3	450	Diode	Damper	Cp-all 6.4	Ck-f 2.8	—
⊙11Y9	LFL200	Decal 10Pin	10-55	21-4	Cathode	11.5	450	Duplex Pentode #	Video Amp.	(Unit 1) 0.105	12.0	7.0
									Sync. Separator, Amp.	(Unit 2) 0.14	10.0	11.0
12AT7	ECC81	NT	9A	21-2	Cathode	6.3	300	Twin-Triode ×	RF Amp.	(Unit 1) 1.5	2.2	0.5
						12.6	150			(Unit 2) 1.5	2.2	0.4
12B-B14		Mag-noval	9NH	29-51	Cathode	12.6	600	Beam Power Tube	Horiz. Def. Power Amp.	max. 1.4	17.5	7.7
12BH7A		NT	9A	21-3	Cathode	6.3	600	Twin-Triode ◇	Vert. Def.	(Unit 1) 2.6	3.2	0.5
						12.6	300		Amp.	(Unit 2) 2.6	3.2	0.4
12BY7A		NT	9BF	21-3	Cathode	6.3 12.6	600 300	Pentode #	Video Amp.	0.063	10.2	3.5
12FQ7		NT	9LP	21-3	Cathode	12.6	300	Twin-Triode ◇	Horiz & Vert.	(Unit 1) 3.6	2.4	0.34
									Osc.	(Unit 2) 3.8	2.4	0.26
12G-B3		GT	8GT	29-12A	Cathode	12.6	600	Beam Power Tube	Horiz. Def. Power Amp.	max. 1.1	17.5	7.7
12G-B7		GT	8GT	38-32	Cathode	12.6	600	Beam Power Tube	Horiz. Def. Power Amp.	max. 1.4	17.5	7.7
12R-K19		NT	9CB	21-11	Cathode	12.6	600	Diode	Damper	Cp-all 8.5	Ck-f 3.0	—
14GW8	PCL86	NT	9LZ	21-4	Cathode	14.5	300	Triode ×	AF Pre-Amp.	1.4	2.3	2.5
								Pentode	Power Amp.	max. 0.4	10.0	10.0
15CW5	PL84	NT	9CV	21-4	Cathode	15.0	300	Beam Power Tube	Vert. Def., Power Amp.	max. 0.6	13.0	6.8
15DQ8	PCL84	NT	9HX	21-3	Cathode	13.7	300	Triode ×	Sync. Separator	2.7	3.8	2.3
								Pentode #	Video Amp.	max. 0.1	8.7	4.2

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7-pin Miniature Tube NT…9-pin Miniature Tube) #…Sharp-Cutoff
b…Remote-Cutoff ○…Semi Remote-Cutoff ×…High-μ ◇…Medium-μ ⊕…Low-μ ◈…Design Maximum Value
⧋…With External Shield ▣…Absolute Maximum Value

11AF9

11BM8

12BH7A

Maximum Ratings (Design-Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	E_{C1} (V)	Pp (W)	Ik (mA)	Eb (V)	E_{C2} (V)	E_{C1}, RK (V)(Ω)	Ib (mA)	I_{C2} (mA)	μ	Gm ($\mu\Omega$)	rp (kΩ)	Po 6(W)		Matsushita
250	250	12.0	100	170	170	−12.5	70	3.5	—	11000	26	5.1	R_L=2kΩ	10CW5
250	—	1.0	12	200		−1.7	3	—	65	3000	—	—		10DX8
250	250	4.0	40	170	170	−2.1	18	3	—	11000	min. 100	—		
330	330	13.2	65	250	250	−7.3	48	5.5	—	11300	38	5.7	R_L=5.2kΩ	10GK6
250	—	0.5	15	100	—	−0.85	5	—	60	5500	11	—		10GV8
250	250	7.0	75	170	170	−15	41	2.5	—	7300	26	—		
250	250	5.1	60	80	180	−1.3	65	18.5	—	29000	32	—		11AF9⊙
250	250	1.5	15	150	150	−2.1	10	3.0	—	8500	160	—		
250	—	1.0	15	100	—	−0	3.5	—	70	2200	—	—		11BM8
250	250	Vert. Out. 5 AF Out. 7	50	170	170	−11.5	41	9	—	7500	16	3.2	R_L=3.25kΩ	
330◈	190◈	6.5◈	—	250	180	100	26	5.75	—	11000	89	—		11LY6
250◈	—	0.5◈	15◈	100	—	−0.85	5	—	60	5500	11	—		11MS8
250◈	200◈	6.0◈	70◈	120	110	−10	50	3	—	8500	13	—		
epx=5kV Pp=3.5W		Ib=150mA ehk=5kV		—	—	—	—	—	—	—	—	—		11R3
250	250	5.1	60	170	170	−2.7	30	7.2	—	22000	32	—		11Y9⊙
250	250	1.5	15	150	150	−2.1	10	3	—	8500	160	—		
300	—	2.5	—	250	—	200	10	—	60	5500	10.9	—		12AT7
700 (ep=7kV)	250	13.0	100	100	100	−7.7	100	7	—	14000	5.3	—		12B-B14
300	—	3.5	20	250	—	−10.5	11.5	—	16.5	3100	5.3	—		12BH7A
300◈	190◈	6.5◈	—	250	180	100	26	5.75	—	11000	93	—		12BY7A
300◈	—	4.0◈	22◈	250	—	−8	9	—	20	2600	7.7	—		12FQ7
600▣ (ep=6.6kV)▣	220▣	11.0▣	165▣	100	100	−7.7	100	7	—	14000	5.3	—		12G-B3
770▣ (ep=7.7kV)▣	275▣	16.5▣	220▣	100	100	−7.7	100	7	—	14000	5.3	—		12G-B7
epx=5.5kV		6.5◈	Ib=◈ 200	—	—	—	—	—	—	—	—	—		12R-K19
300	—	0.5	4	250	—	−1.9	1.2	—	100	1600	—	—		14GW8
300	300	9.0	55	250	250	−7	36	6	—	10000	48	4	R_L=7kΩ	
250	250	12.0	100	170	170	−12.5	70	3.5	—	11000	26	5.1	R_L=2kΩ	15CW5
250	—	1.0	12	200	—	−1.7	3	—	65	3000	—	—		15DQ8
250	250	4.0	40	170	170	−2.1	18	3	—	11000	min. 100	—		

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated.

12FQ7

15CW5

15DQ8

Type No.			Base Connections	Drawing No.	Heating			Classification by Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
16A8	PCL82	NT	9EX	21-4	Cathode	16.0	300	Triode ×	AF Amp.	4.4	2.7	4.3
								Power Pentode	Vert. Def., Power Amp.	max. 0.3	9.3	8.0
16AQ3	XY88	NT	9CB	21-11	Cathode	16.0	600	Diode	Damper	Cp-all 8.6	Ck-f 2.0	—
16GK6		NT	9GK	21-4	Cathode	16.0	300	Power Pentode	Power. Amp. Video Amp.	max. 0.14	10.0	7.0
⊙16Y9	PFL200	Decal 10pin	10-55	21-4	Cathode	17.0	300	Duplex-Pentode #	Video Amp.	(Unit 1) 0.105	12.0	7.0
									Sync. Separator, Amp.	(Unit 2) 0.14	10.0	11.0
17A8		NT	9DC	21-2	Cathode	18.0	150	Triode ◇	Sync. Separator, Osc.	1.5	2.5	1.8
								Pentode #	RF, IF Amp.	max. 0.025	5.2	3.4
17Z3	PY81	NT	9CB	21-8	Cathode	17.0	300	Diode	Damer	Cp-all 6.4	Ck-f 2.8	—
18GV8	PLC85	NT	9LY	21-4	Cathode	17.3	300	Triode ×	Vert. Def., Osc.	—	—	—
								Beam Power Tube	Vert. Def. Power Amp.	—	—	—
20AQ3	LY88	NT	9CB	21-11	Cathode	20.2	450	Diode	Damper	Cp-all 8.6	Ck-f 2.0	—
20LF6		Mag noval	12GW	38-01	Cathode	20.0	600	Beam Power Tube	Horiz. Def. Power Amp.	2.5	—	—
21KQ6	LL521	Mag noval	9RJ	29-01	Cathode	21.5	450	Beam Power Tube	Horiz. Def. Power Amp.	1.5	27.0	11.0
25E5	PL36	GT	8GT	29-12A	Cathode	25.0	300	Beam Power Tube	Horiz. Def. Power Amp.	max. 1.1	17.5	8.0
25HX5		Mag noval	9SB	29-44	Cathode	25.0	300	Beam Power Tube	Vert Def. Power Amp.	max. 1.1	17.3	7.7
29KQ6	PL521	Mag noval	9RJ	29-01	Cathode	30.0	300	Beam Power Tube	Horiz. Def. Power Amp.	1.5	27.0	11.0
29LE6		Mag noval	9RJ	29-01	Cathode	30.0	300	Beam Power Tube	Horiz. Def. Power Amp.	1.5	27.0	11.0
30AE3	PY88	NT	9CB	21-11	Cathode	30.0	300	Diode	Damer.	Ca-all 8.6	Ck-f 2.0	—
34R3		NT	9CB	21-8	Cathode	34.0	150	Diode	Damer	Cp-all 6.4	Ck-f 2.8	—
33HE7Ⓕ		Duo-decar	12FS	38-57	Cathode	33.6	450	Diode	Damper	Cp-(h+k) 7.0	Ck-(p+h) 7.0	Ch-k1.6
								Beam Power Tube	Horiz. Def., Amp.	0.38	0.38	8.0
38HE7		Duo-decar	12FS	38-57	Cathode	37.8	450	Diode	Damper	Cp-(h+k) 7.0	Ck-(p+h) 8.0	Ch-k1.6
								Beam Power Tube	Horiz. Def., Amp.	0.38	19.38	8.0
40KG6A	PL509	Mag noval	9RJ	38-01	Cathode	40.0	300	Beam Power Tube	Horiz. Def. Power Amp.	2.5	—	—
42EC4A	PY500A	Mag noval	9-14	38-02	Cathode	42.0	300	Diode	Damper	Cp-k13	Ck-f 3.7	—
50JY6		GT	8MG	29-12A	Cathode	50.0	150	Beam Power Tube	Vert. Def. Power Amp.	1.1	17.5	8.0

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7pin Miniature Tube NT…9pin Miniature Tube) #…Sharp-Cutoff
b…Remote-Cotoff ○…Semi Remote-Cutoff ×…High-μ ◇…Medium-μ ✣…Low-μ ◈…Design Maximum Value
⧋…Wih External Shield ▣…Absolute Maximum Value

16A8

16AQ3

18GV8

21KQ6

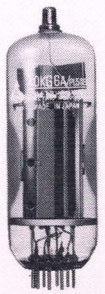
Maximum Ratings (Design-Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	E_{c1} (V)	Pp (W)	Ik (mA)	Eb (V)	E_{c2} (V)	E_{c1}, RK (V)(Ω)	Ib (mA)	I_{c2} (mA)	μ	Gm (μ℧)	rp (kΩ)	Po (W)		Matsushita
250	—	1.0	15	100	—	9	3.5	—	70	2200	—	—		16A8
250	250	Vert. Out.5 AF Out. 7	50	170	170	−11.5	41	9	—	7500	16	3.2	L_L=3.25kΩ	
epx=7.5kV▣ Pp=5W		Ib=220mA ehk=6.6kV		—	—	—	—	—	—	—	—	—		16AQ3
330	330	13.2	65	250	250	−7.3	48	5.5	—	11300	38	5.7	R_L=5.2kΩ	16GK6
250	250	5.1	60	80	80	−1.3	30	7.2	—	22000	32	—		16Y9◎
250	250	1.5	15	150	150	−2.1	10	3	—	8500	160	—		
250	—	1.5	14	100	—	−2	14	—	20	5000	—	—		17A8
250	175	1.7	14	170	170	−2	10	2.8	—	6200	400	—		
epx=5kV Pp=3.5W		Ib=150mA ehk=5kV		—	—	—	—	—	—	—	—	—		17Z3
250	—	0.5	15	100	—	−0.85	5	—	60	5500	11	—		18GV8
250	250	7.0	75	170	170	−15	41	2.5	—	7300	26	—		
epx=7.5kV▣ Pp=5W		Ib=220mA ehk=6.6kV		—	—	—	—	—	—	—	—	—		20AQ3
(ep=◈ 8kV)	275	40◈	—	50	175	−10	800	70	—	—	—	—		20LF6
275 (ep=6.5kV)	275◈	17.0◈	275◈	40	E_{cc_2}=135	0	450	35	—	—	—	—	Separated G_3 type as snivets counter measure E_{c_2}=0, R_{g_2}=820Ω	21KQ6
250 (ep=7kV)	250	12.0	200	100	100	−8.2	100	7	—	14000	5	—		25E5
400◈	300◈	14.0◈	220◈	100	100	−8.2	100	7	—	14000	5	—		25HX5
275◈ (ep=6.5kV)	275◈	17.0◈	275◈	40	E_{cc_2}=135	0	450	35	—	—	—	—	Separated G_3 type as snivets counter measure E_{c_3}=0, R_{g_2}=820Ω	29KQ6
275 (ep=6.5kV)	275	20.0	275	40	E_{cc_2}=135	0	450	35	—	—	—	—	Separated G_3 type as snivets counter measure E_{c_3}=0 R_{g_2}=820Ω	29LE6
epx=7.5kV▣ Pp=5W		Ib=220mA ehk=6.6k		—	—	—	—	—	—	—	—	—		30AE3
epx=5kV Pp=3.5W		Ib=150mA ehk=5kV		—	—	—	—	—	—	—	—	—		34R3
epx=4.2kV	—	Ib=1200mA	Ib=200mA	21	—	—	350	—	—	—	—	—		33HE7Ⓕ
500◈ (ep=5kV)	150◈	10◈	230◈	130	130	−22	60	2.8	4.2	8800	6.2	—		
epx=4.2kV	—	Ib=1200mA	Ib=200mA	21	—	—	350	—		—	—	—		38HE7
500◈ (ep=5kV)	150◈	10◈	230◈	130	130	−22	60	2.8	—	8800	6.2	—		
(ep=8kV)◈	275	40◈	500	50	175	−10	800	70	—	—	—	—		40KG6A
epx=7kV▣	ehk=6.3kV	11▣	Ib=440	—	—	—	—	—	—	—	—	—		42EC4A
275◈ (ep=7kV)	275◈	13.0◈	220◈	100	100	−8.2	100	7	—	14000	5	—	Separated G_1 type as snivets counter measure E_{c_2}=0	50JY6

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated.

25E5


30AE3

33HE7Ⓕ



40KG6

42EC4

RECEIVING TUBES (FM/AM RADIO SET)

Type No.			Base Connections	Drawing No.	Heating			Classification by Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
6AQ8	ECC85	NT	9AJ = 9DE	21-2	Cathode	6.3	435	Twin-Triode×	RF Amp. Conv	1.5	3.0	1.2
6AR5		MT	6CC	18-3	Cathode	6.3	400	Power Pentode	Power Amp.	—	—	—
6AV6	EBC91	MT	7BT	18-2	Cathode	6.3	300	Twin-Diode Triode×	Det. AF Amp.	— 2.0	— 2.2	— 0.8
6BA6	EF93	MT	7BK	18-2	Cathode	6.3	300	Pentodeᵇ	RF Amp.	0.0035	5.5	5.0
6BE6	EK90	MT	7CH	18-2	Cathode	6.3	300	Heptode	Conv.	C_{g_3-P} max.0.3	C_{g_3}-all 7	C_{g_3}-all5.5 C_p-all 8
6BM8	ECL82	NT	9EX	21-4	Cathode	6.3	740	Triode× Power Pentode	AF Amp. Power Amp.	4.4 max.0.3	2.7 9.3	4.3 8.0
6X4	EZ90	MT	5BS	21-3	Cathode	6.3	600	Twin-Diode	FW Rect.	—	—	—
12AV6	HBC91	MT	7BT	18-2	Cathode	12.6	150	Twin-Diode Triode×	Det. AF Amp.	— 2.0	— 2.2	— 0.8
12BA6	HF93	MT	7BK	18-2	Cathode	12.6	150	Pentode	RF Amp.	0.0035	5.5	5.0
12BE6	HK90	MT	7CH	18-2	Cathode	12.6	150	Heptode	Conv.	C_{g_3-p} max. 0.3	C_{g_3}-all 7	C_{g_3}-all5.5 C_p-all 8
12DT8		NT	9AJ = 9DE	21-2	Cathode	12.6	150	Twin-Triode×	FM RF Amp. Osc.,Mixer	1.6⧋	2.7⧋	2.6
17EW8	HCC85	NT	9AJ = 9DE	21-2	Cathode	17.5	150	Twin-Triode×	RF Amp.Conv.	1.5	3	1.2
30A5	HL94	MT	7CV	18-3	Cathode	30.0	150	Beam Power Tube	Power Amp.	0.3	12	5.8
30M-P27		MT	7CV	18-3	Cathode	30.0	150	Beam Power Tube	Power Amp.	0.32	12.5	5.8
35C5		MT	7CV	18-3	Cathode	35.0	150	Beam Power Tube	Power Amp.	0.6	12	9
35W4	HY90	MT	5BQ	18-3	Cathode	35.0	150	Diode	FW Rect.	—	—	—
50BM8		NT	9EX	21-4	Cathode	50.0	100	Triode Pentode×	AF Amp. Vert.Def. Power Amp.	4.4 max.0.3	2.7 9.3	4.3 8.0
50C5	HL92	NT	7CV	18-3	Cathode	50.0	150	Beam Power Tube	Power Amp.	0.6	13	8.5
50EH5		MT	7CV	18-3	Cathode	50.0	150	Power Pentode	Power Amp.	0.65	17	9
50H-B26		Mag. noval	10-53	29-44	Cathode	50.0	150	Beam Power Tube	Power Amp.	max.1.1	17.3	7.7

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7-pin Miniature Tude NT…9-pin Miniature Tube) #…Sharp-Cutoff
b… Remote-Cutoff ○…Semi Remote-Cutoff ×…High-μ ◇…Medium-μ ✣…Low-μ ◈…Design Maximum Value
⧋…With External Shield ⧈…Absolute Maximum Value


6AQ8


12AV6


12BA6


12BE6


30A5

Maximum Ratings (Design Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	Ec2 (V)	Pp (W)	Ik (mA)	Eb (V)	Ec2 (V)	Ec1, Rk (V) (Ω)	Ib (mA)	Ic2 (mA)	μ	Gm (μ℧)	rp (kΩ)	Po (W)		Matsushita
300	—	2.5	15	250	—	−2.3	10	—	57	5900	—	—		6AQ8
250	250	8.5	—	250	250	—	32	5.5	—	2300	68	3.4	R_L=7.6KΩ	6AR5
—	—	—	Ib=1	10	—	—	2	—	—	—	—	—		6AV6
300	—	0.55	—	250	—	−2	1.2	—	100	1600	62.5	—		
330◈	330◈	3.4◈	—	250	100	68	11	4.2	—	4400	1MΩ	—	E_{c_3}=0V	6BA6
330	$E_{cc_2+_4}$=330	1.1	15.5	250	100	10Vrms	2.9	$I_{c_2+_4}$=6.8	—	Gc=470	1MΩ	—	E_{c_3}=−1.5, R_{g_3}=20kΩ, I_{c_1}=0.5mA	6BE6
300	—	1	15	100	—	0	3.5	—	70	2200	—	—		6BM8
300	300	Vert. Out5 AF Out7	50	170	170	−11.5	41	9	—	7500	16	3.2	R_L=3.25KΩ	
epx=1.25kV◈		Ib=245mA◈		Maximum DC Output Current=90mA							—	—		6X4
—	—	—	Ib=1	10	—	—	2	—	—	—	—	—		I2AV6
330	—	0.55	—	250	—	−2	1.2	—	100	1600	62.5	—		
330◈	330◈	3.4◈	—	250	100	68	11	4.2	—	4400	1MΩ	—	E_{c_3}=0V	I2BA6
330	$E_{cc_2+_4}$=330	1.1	15.5	250	100	10Vrms	2.9	$I_{c_2+_4}$=6.8	—	Gc=475	1MΩ	—	E_{c_3}=−1.5, R_{g_3}=20KΩ, I_{c_1}=0.5mA	I2BE6
300	—	2.5	—	250	—	200	10	—	60	5500	10.9	—		I2DT8
250	—	2.5	15	170	—	−1.5	10	—	50	6200	—	—		I7EW8
150	150	—	100	100	100	−6.7	43	3	—	9200	22	1.9	R_L=2.4KΩ	30A5
165◈	165◈	10◈	110◈	130	110	−9	64	2.5	—	10000	20	4	R_L=1.6KΩ	30M-P27
150◈	130◈	5.2◈	—	110	110	−7.5	40	3	—	5800	13	1.5	R_L=2.5KΩ	35C5
epx=330V		Ib=600mA		Maximum DC Output Current=100mA								—		35W4
250	—	1	15	100	—	0	3.5	—	70	2200	—	—		50BM8
250	250	7	50	170	170	−11.5	41	9	—	7500	16	3.2	R_L=3.25KΩ	
150◈	130◈	7◈	—	120	110	−8	49	4	—	7500	—	2.3	R_L=2.5KΩ	50C5
150◈	130◈	5.5◈	—	115	115	62	42	11.5	—	14600	11	1.4	R_L=3KΩ	50EH5
350	300	18	220◈	130	130	−12	123	8.5	—	15000	4	8	R_L=0.8KΩ	50H-B26

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated.

30M-P27

35W4

50BM8

50H-B26

RECEIVING TUBES (HI-FI SET)

Type No.			Base Connections	Drawing No.	Heating			Classification by Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type.	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
5AR4	GZ34	GT	5DA	32-1	Cathode	5.0	1.9A	Twin-Diode	FW Rect.	—	—	—
6AU6		MT	7BK	18-2	Cathode	6.3	300	Pentode #	AF RF Amp.	0.0035	5.5	5
6AU6A		MT	7BK	18-2	Cathode	6.3	300	Pentode #	AF RF Amp.	0.005	5.5	5
6BQ5	EL84	NT	9CV	21-4	Cathode	6.3	760	Power Pentode	Power Amp.	max 0.5	10.8	6.5
6CA4	EZ81	NT	9M	21-4	Cathode	6.3	1.0A	Twin-Diode	FW Rect.	—	—	—
6CA7	EL34	GT	8EP	32-2	Cathode	6.3	1.5A	Power Pentode	Power Amp.	max.1.1	15.2	8.4
12AU6		MT	7BK	18-2	Cathode	12.6	150	Pentode #	AF RF AMP.	0.005	5.5	5.0
12AU7	ECC82	NT	9A	21-2	Cathode	6.3 12.6	300 150	Twin-Tride◇	AF Amp.	(Unit 1) 1.5 (Unit 2) 1.5	1.8 1.8	0.37 0.25
12AX7	ECC83	NT	9A	21-2	Cathode	6.3 12.6	300 150	Twin-Triode×	AF Amp.	(Unit 1) 1.6 (Unit 2) 1.6	1.6 1.6	0.46 0.34
12AX7A		NT	9A	21-2	Cathode	6.3 12.6	300 150	Twin-Triode ×	AF Amp.	(Unit 1) 1.6 (Unit 2) 1.6	1.6 1.6	0.46 0.34
7189		NT	9CV	21-4	Cathode	6.3	760	Power Pentode	Power Amp.	max. 0.5	10.8	6.5
PF86	PF86	NT	9BJ = 9CB	21-2	Cathode	4.5	300	Pentode	AF Amp.	max .0.05	4	5

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7-pin Miniature Tube NT…9-pin Miniature Tube) #…Sharp-Cutoff
b…Remote-Cutoff ○…Semi Remote-Cutoff ×…High-μ ◇…Medium-μ ✣…Low-μ ◈…Design Maximum Value
⚠…With External Shield ▣…Absolute Maximum Value

MISCELLANEOUS (OTHER APPLICATION)

Type No.			Base Connections	Drawing No.	Heating			Classification dy Construction	Application	Without External Shield Capacitances in pF		
Matsushita	European	●			Type	Ef (V)	If (mA)			Cpg (Approx.)	Cin (Approx.)	Cout (Approx.)
6360	QQE03/12	NT	9PW	21-4	Cathode	6.3 12.6	820 410	Twin Beam Power Tube	RF Power Amp (C.C.S)	max.0.1	6.2	2.6
S2001		GT	Special	38-22B	Cathode	6.3	1.0A	Beam Power Tube	RF Power Amp. (C.C.S)	max.0.24	13.5	8.5

★…Tentative Data ⊙…Frame Grid Tube ●…(MT…7-pin Miniature Tube NT…9-pin Miniature Tube) #…Sharp-Cutoff
b…Remote-Cutoff ○…Semi Remote Cutoff ×…High-μ ◇…Medium-μ ✣…Low-μ ◈…Design Maximum Value
⚠…With External Shield ▣…Absolute Maximum Value

5AR4


6BQ5

Maximum Ratings (Design-Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	Ec2 (V)	Pp (W)	Ik (mA)	Eb (V)	Ec2 (V)	Ec1 Rk (V) (Ω)	Ib (mA)	Ic2 (mA)	μ	Gm (μ℧)	rp (kΩ)	Po (W)		Matsushita
epx=1.5kV		Ib=750mA		Maximum DC Output Current=250mA										5 A R 4
330	330	3.5	—	250	150	68	10.6	4.3	—	5200	1000	—		6 A U 6
330	330	3.5	—	250	150	68	10.6	4.3	—	5200	—	—		6AU6A
300	300	12	65	250	250	−7.3	48	5.5	—	11300	38	6	R_L=5.2kΩ	6 B Q 5
epx=1.3kV		Ib=500mA		Maximum DC Output Current=180mA										6 C A 4
800	500	27.5	150	250	265	−13.5	100	14.9	—	12500	17	11	R_L=2kΩ	6 C A 7
330	330	3.5	—	250	150	68	10.6	4.3	—	5200	—	—		12AU6
300	—	2.75	20	250	—	−8.5	10.5	—	17	2200	77	—		12AU7
300	—	1	8	250	—	−2	1.2	—	100	1600	62.5	—		12AX7
330	—	1.2	—	250	—	−2	1.2	—	100	1600	—	—		12AX7A
400	300	12	65	250	250	−7.3	48	5.5	—	11300	40	6	R_L=5.2kΩ	7 1 8 9
300	200	1	6	250	140	−2	3.0	0.6	—	2000	2.5MΩ	—	E_{C3}=0	P F 8 6

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated.

Maximum Ratings (Design-Center Value)				Typical Operation and Characteristics									Remarks	Type No.
Eb (V)	Ec2 (V)	P (W)	Ik (mA)	Eb (V)	Ec2 (V)	Ec1 Rk (V) (Ω)	Ib (mA)	Ic2 (mA)	μ	Gm (μ℧)	rp (kΩ)	po (w)		Matsushita
300□	200□	2×5□	—	Ebb=300	175	−40	2×37.5	2.3	—	F=200 MHz	—	14.5	I_{C2}=2×0.9mA	6 3 6 0
600□	250□	27□	—	600	200	−70	150	10	—	F=60 MHz	—	63	I_{C1}=2.8mA	S200 1

LC···The LC (Limited Connection) shown in the base connection drawing should be used only for the cases particularly indicated.

6CA7

12AX7

OPERATING EXAMPLES (AF POWER TUBES)

Type No.	Classification by operation	Connection	Eb (V)	E_{c2} (V)	E_{c1} (V)	Ib (mA)	b sig (mA)	I_{G2} (mA)	I_{G2} sig (mA)	Esig (rms) (V)	R_L (kΩ)	P_O (w)	KF (%)	Pf (w)
*6AQ5	A_1 S		250	250	−12.5	45	47	4.5	7	8.8	5	4.5	8	2.84
	AB_1 PP		250	250	−15	35 ×2	39.5×2	2.5×2	6.5×2	10.6	10	10	5	
	A_1 S	Triode Connect.	250		−17.5	31	34			12.4	3	1.1	9	
	AB_1 PP		250		−22.5	16 ×2	22.5×2			15.9	7	3.1	4	
*6AR5	A_1 S		250	250	−18	32	33	5.5	10	12.7	7.6	3.4	11	2.52
	AB_1 PP		250	250	−25	17.5×2	27×2	4 ×2	8.5×2	17.7	11	7.5	5	
	A_1 S	Triode Connect.	250		−22.5	25	26			15.9	4	0.9	6	
	AB_1 PP		250		−27.5	14 ×2	17.5×2			19.4	9	2.3	3	
*6BM8	A_1 S		272	272 R_{g2} =2200Ω	650Ω※	28	27	6.5	10.8	9.5	8	3.5	10	4.91
	AB_1 PP		250	200	220Ω※	28 ×2	31 ×2	5.8×2	13 ×2	12.5	10	10.5	4.8	
I6A8	A_1 S		200		−17	35	36			12	3	1.5	8	4.8
*50BM8	AB_1 PP	Triode Connect.	200		−19	20 ×2	33 ×2			13.4	4	4	4	5.0
*6BQ5	A_1 S		250	250	−7.3	48	49.5	5.5	10.8	4.3	5.2	5.7	10	4.79
	AB_1 PP		300	300	130Ω※	36 ×2	46 ×2	4 ×2	11 ×2	10	8	17	4	
	B_1 PP		300	300	−14.7	7.5×2	46 ×2	0.8×2	11 ×2	10	8	17	4	
	A_1 S	Triode Connect.	250		270Ω※	34	36			6.7	3.5	1.95	9	
	AB_1 PP		300		270Ω※	24 ×2	26 ×2			10	10	5.2	2.5	
*6CA7	A_1 S		250	265	−13.5	100	104	14.9	25	8.7	2	11	10	9.45
	AB_1 PP		Ebb375	470Ω▲	130Ω※	75 ×2	95 ×2	11.5×2	22.5×2	21	3.4	35	5	
	B_1 PP		Ebb800	750Ω▲	−39	25 ×2	91 ×2	3 ×2	19 ×2	23.4	11	100	5	
	A_1 S	Triode Connect.	Ebb375		270Ω※	70	73			18.9	3	6	8	
	AB_1 PP		Ebb400		270Ω※	65 ×2	71 ×2			22	5	16.5	3	
6CM5	B_1 PP	Triode Connect.	300	150	−29	18 ×2	100 ×2	0.5×2	19 ×2	20	3.5	44.5	7.2	7.88
25E5	B_1 PP		250		−45	20 ×2	70 ×2			32	3	16.4	4	7.5
*6CW5	A_1 S		170	170Ω▲	−12.5	70	70	5	22	7	2.4	5.6	10	
	AB_1 PP		250	200	150Ω※	50 ×2	55 ×2	2 ×2	13 ×2	13	5.5	18.5	4.5	4.79
10CW5	P		300		120Ω※	66	64			5.4	1	4.5	9.3	4.77
15CW5	A_1 S	Triode Connect.	170		−15.1	50	62			10.8	1.2	2.1	10	4.5
	AB_1 PP		170		270Ω※	32.5×2	36 ×2			13.4	3.5	3.9	3.8	

※ ..... Cathode Resistance

6BM8

6BQ5

6CA7

Type No.	Classification by operation	Connection	Eb (V)	E_{c2} (V)	E_{c1} (V)	Ib (mA)	Ib sig (mA)	I_{G2} (mA)	I_{G2} sig (mA)	Esig (V)	R_L (kΩ)	Po (w)	KF (%)	Pf (w)
*50C5	A_1 S		120	110	− 8	49	50	4	8.5	5.7	2.5	2.3	10	7.5
	AB_1 PP		100	100	− 9	26 ×2	35 ×2	2.5×2	11 ×2	6.4	3	3.3	4	
	A_1 S	Triode Connect.	100		− 7.5	40	41			5.3	1	0.4	4	
	AB_1 PP		100		−11.5	15 ×2	20 ×2			8.1	3	1	2	
*30A5	A_1 S		100	100	− 6.7	43	43	3	11	4.3	2.4	1.9	10	4.5
	AB_1 PP		100	100	− 9	23 ×2	42 ×3	2 ×2	12 ×2	6.4	3	4.3	4	
	A_1 S	Triode Connect.	100		− 8	35	36			5.6	1.5	0.5	5	
	AB_1 PP		100		−11.5	14 ×2	19 ×2			8.1	4	1.2	2	
*30M-P27	A_1 S		130	110	− 9	64	64	2.5	17	6.4	1.6	4	12	4.5
	A_1 PP		130	110	− 9	65 ×2	64.7×2	2.5×2	8.5×2	6.4	3.2	8.25	8	
35C5	A_1 S		110	110	− 7.5	40	41	3	7	5.3	2.5	1.5	10	5.25
	AB_1 PP		100	100	− 9	24 ×2	31 ×2	2 ×2	10 ×2	6.4	3	2.5	4	
	A_1 S	Triode Connect.	100		− 7.5	34	35			5.3	1	0.3	4	
	AB_1 PP		100		−11.5	14 ×2	17 ×2			8.1	3	0.7	2	
*35EH5	A_1 S		110	115	62Ω※	42	42	11.5	14.5	2.1	3	1.4	7	5.25
*50EH5	AB_1 PP		140	120	68Ω※	23.5×2	26.5×2	5.5×2	8.85×2	6.67	6	3.8	5	7.5
*7189	A_1 S		250	250	− 7.3	48	49.5	5.5	10.8	4.3	5.2	5.7	10	4.79
	B_1 PP		400	300	−15	7.5×2	52.5×2	0.8×2	12.5×2	10.5	8	24	4	
	A_1 S	Triode Connect.	250		270Ω※	34	36			6.7	3.5	1.95	9	
	AB_1 PP		300		270Ω※	24 ×2	26 ×2			10	10	5.2	2.5	

※·····Cathode Resistance

30M-P27

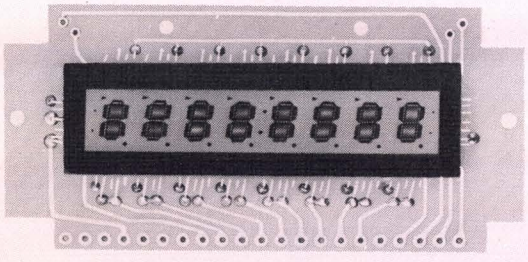
50EH5

NUMERIC DISPLAY PANEL

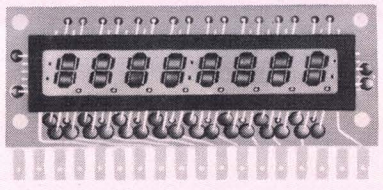
FLANDIPAK※

Type No.	Indication	Digit	Color	Outline Dimensions		Heigt of Ciphers	
				Length mm (inch)	Height mm (inch)	Numeral mm (inch)	Decimal Point mm (inch)
CD801	Numeral 0~9	8	Neon Red	107Max. (4.213)	51Max. (2.008)	Approx. 8 (0.315)	Approx. 1.1 (0.043)
	Decimal point						
CD802	Numeral 0~9	8	Neon Red	75Max. (2.953)	36Max. (1.417)	Approx. 6.5 (0.256)	Approx. 0.8 (0.031)
	Decimal point						
CD1201	Numeral 0~9	12	Neon Red	131Max. (5.157)	47.5Max. (1.870)	Approx. 8 (0.315)	Approx. 1.1 (0.043)
	Decimal point						

※Registered Trade Mark for Numerical Display Panel.

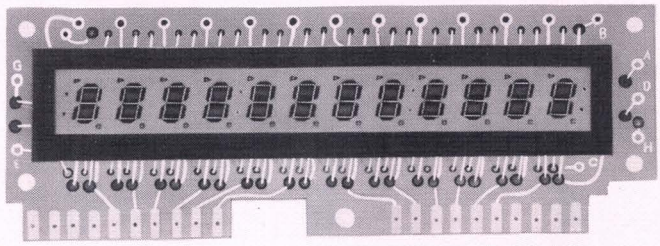


CD801



CD802

Features	Cathode	Absolute Maximam Ratings		Typical Operating Conditions						Type No.
		Cathode Current I_K (mApp)	tp (μs)	eb	I_K Segment (mApp)	Rk (kΩ)	tp(A) (μs)	tp(K) (μs)	Du	
· High-Brightness	Ko~9	0.4 ~0.9	50~400	190	0.65	82	160	120	1/10	CD801
· High-Reliability	Kdp	0.25~0.55			0.4	130				
· High-Brightness	Ko~9	0.2 ~0.55	100~250	190	0.35	150	200	150	1/10	CD802
· High-Raliability	Kdp	0.2 ~0.55			0.35	150				
· High-Brightness	Ko~9	0.4 ~0.9	50~400	190	0.7	82	160	120	1/14	CD1201
· High-Raliability	Kdp	0.3 ~0.75			0.5	100				



CD1201

VIDICONS

Type No.	General Data										
	Focusing methode	Deflection methode	Bulb Diameter (inch)	Greatest Diameter mm (inch)	Overall Length mm (inch)	Heater Voltage (V)	Heater Current (mA)	Grid No.6 Voltage (V)	Grid No.5 Voltage (V)	Grid No.4 Voltage (V)	Grid No.3 Voltage (V)
20PE11	Magnetic	Magnetic	(2/3)	19.6 (0.772)	108 (4.252)	6.3	110	—	—	750	750
20PE13A	Magnetic	Magnetic	(2/3)	19.6 (0.772)	108 (4.252)	6.3	95	—	—	750	750
20PE14	Electrostatic	Magnetic	(2/3)	19.6 (0.772)	108 (4.252)	6.3	95	600	350	350	350
※1 S4071	Magnetic	Magnetic	(2/3)	19.6 (0.772)	108 (4.252)	6.3	95	—	—	750	750
7262A	Magnetic	Magnetic	(1)	28.6 (1.126)	130 (5.118)	6.3	95	—	—	750	750
7735A	Magnetic	Magnetic	(1)	28.6 (1.126)	159 (6.260)	6.3	600	—	—	750	750
8507	Magnetic	Magnetic	(1)	28.6 (1.126)	159 (6.260)	6.3	600	—	—	1000	1000
8541	Magnetic	Magnetic	(1)	28.6 (1.126)	159 (6.260)	6.3	95	—	—	1000	1000
※2 S4070	Magnetic Electrostatic	Magnetic	(1)	28.6 (1.126)	164 (6.457)	6.3	95	1350	1000	750	1350

Type No.	Typical Operating Conditions										
	Scanned Target Area mm^2 ($inch^2$)	Target Temperature (℃)	Grid No.6 Voltage (V)	Grid No.5 Voltage (V)	Grid No.4 Voltage (V)	Grid No.3 Voltage (V)	Grid No.2 Voltage (V)	Grid No.1 Voltage for Cutoff (V)	Gamma	Field Strength of focusing (G)	Field Strength of Alignment Coil (G)
20PE11	6.6×8.8 (0.26×0.346)	25～35	—	—	250～300		300	−20～−80	0.74	50	0～4
20PE13A	6.6×8.8 (0.26×0.346)	25～35	—	—	400	300	300	−35～−80	0.74	50～56	0～4
20PE14	6.6×8.8 (0.26×0.346)	25～35	500	300	35～55	300	300	−30～−80	0.74	—	0～4
※1 S4071	6.6×8.8 (0.26×0.346)	25～35	—	—	400	300	300	−35～−80	0.74	50～56	0～4
7262A	9.5×12.7 (0.374×0.5)	25～35	—	—	250～300		300	−45～−100	0.74	40	0～4
7735A	9.5×12.7 (0.374×0.5)	25～35	—	—	250～300		300	−45～−100	0.74	40	0～4
8507	9.5×12.7 (0.374×0.5)	25～35	—	—	500	300	300	−45～−100	0.74	38～44	0～4
8541	9.5×12.7 (0.374×0.5)	25～35	—	—	500	300	300	−45～−100	0.74	38～44	0～4
※2 S4070	9.5×12.7 (0.374×0.5)	25～35	1200	800	600	1200	300	−45～−100	0.74	41～51	0～4


20PE11


20PE13A


20PE14


S4071


7262A

Absolute Maximum Ratings										Type No.
Grid No.2 Voltage (V)	Grid No.1 Voltage Negative Value (V)	Grid No.1 Voltage Positive Value (V)	Heater Negative with respect to Cathode (V)	Heater Positve with respect to Cathode (V)	Target Voltage (V)	Dark Current (μA)	Peak Output Current (μA)	Illumination (ℓx)	Temperature (°C)	
350	−300	0	125	10	80	0.15	0.5	10000	70	20PE11
350	−300	0	125	10	80	0.15	0.5	10000	70	20PE13A
350	−200	0	125	10	80	0.15	0.5	10000	70	20PE14
350	−300	0	125	10	80	0.15	0.5	10000	70	※1 S4071
750	−300	0	125	10	100	0.25	0.55	10000	70	7262A
750	−300	0	125	10	100	0.25	0.55	10000	70	7735A
750	−300	0	125	10	100	0.25	0.55	10000	70	8507
750	−300	0	125	10	100	0.25	0.55	10000	70	8541
750	−300	0	125	10	100	0.25	0.55	10000	70	※2 S4070

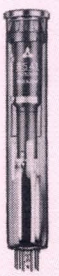
					Type No.
Center Resolution (TV lines)	Face Plate Illumination (ℓx)	Target Voltage (V)	Dark Current (μA)	Signal Current (μA)	
500	10	10~45	0.02	0.22	20PE11
650	10	10~45	0.02	0.22	20PE13A
550	10	10~45	0.02	0.22	20PE14
650	10	10~45	0.02	0.22	※1 S4071
600	10	10~45	0.02	0.3	7262A
600	10	10~45	0.02	0.3	7735A
800	10	10~45	0.02	0.3	8507
800	10	10~45	0.02	0.3	8541
400	30	30~55	0.05	0.2	※2 S4070

※1 S4071 is for two vidicon color camera tube.

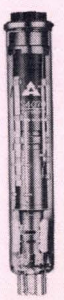
※2 S4070 is single tube color vidicon.

7735A

8507



8541



S4070

SILICON VIDICON

Type No.	General Data									
	Focusing method	Deflection methode	Bulb Diameter (inch)	Greatest Diameter mm (inch)	Orerall Length mm (inch)	Heater Voltage (V)	Heater Current (mA)	Grid No.4 Voltage (V)	Grid No.3 Voltage (V)	Grid No.2 Voltage (V)
20PE15	Magnetic	Magnetic	(⅔)	19.6 (0.772)	108 (4.252)	6.3	95	350	350	350
25PE14	Magnetic	Magnetic	(1)	28.6 (1.126)	130 (5.118)	6.3	95	550	550	350

Type No.										
	Scanned Target Area mm^2 ($inch^2$)	Target Tem-perature (℃)	Grid No.4 Voltage (V)	Grid No.3 Volt ge (V)	Grid No.2 Voltage (V)	Grid No.1 Voltage for Cutoff (V)	Gamma	Field strength of focusing (G)	Field strength of Align-ment Coil (G)	Center Resolution (TV lines)
20PE15	6.6 8.8 (0.26×0.346)	25～35	300	240	300	−35～−80	0.95～1	Approx. 48	0～4	450
25PE14	9.5×12.7 (0.374×0.5)	25～35	300	240	300	−45～−100	0.95～1	Approx. 38	0～4	550

20PE15

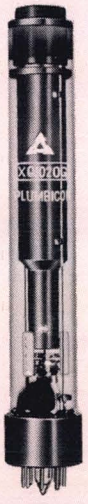
25PE14

Absolute Maximum Ratings									Type No.
Grid No.1 Voltage Negative Value (V)	Grid No.1 Voltage Positive Value (V)	Heater Negative with respect to Cathode (V)	Heater Positive with respect to Cathode (V)	Target Voltage (V)	Dark Current (μA)	Peak Output Current(2) (μA)	Illumination (ℓx)	Temperature (℃)	
150	0	125	10	60	—	0.5	500000	70	20PE15
150	0	125	10	60	—	0.75	500000	70	25PE14

				Type No.
Face Plate Illumination (ℓx)	Target Voltage (V)	Dark Current (μA)	Signal Current (μA)	
1	10～15	0.01	0.3	20PE15
1	10～15	0.02	0.55	20PE14

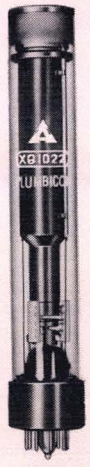
PLUMBICON※

Type No.	General Data									
	Focusing Method	Deflection Method	Bulb Diameter mm	Heater Voltage (V)	Heater Current (mA)	Normal Scanned Area mm² (inch²)	Signal Electrode Voltage (V)	Grid No. 4 Voltage (V)	Grid No. 3 Voltage (V)	Grid No. 2 Voltage (V)
XQ1020	Magnetic	Magnetic	30	6.3	300	12.8×17.1 (0.504×0.673)	45	675	600	300
XQ1020L	Magnetic	Magnetic	30	6.3	300	12.8×17.1 (0.504×0.673)	45	675	600	300
XQ1020R	Magnetic	Magnetic	30	6.3	300	12.8×17.1 (0.504×0.673)	45	675	600	300
XQ1020G	Magnetic	Magnetic	30	6.3	300	12.8×17.1 (0.504×0.673)	45	675	600	300
XQ1020B	Magnetic	Magnetic	30	6.3	300	12.8×17.1 (0.504×0.673)	45	675	600	300
XQ1025L	Magnetic	Magnetic	30	6.3	300	12.8×17.1 (0.504×0.673)	45	675	600	300
XQ1025R	Magnetic	Magnetic	30	6.3	300	12.8×17.1 (0.504×0.673)	45	675	600	300
XQ1022	Magnetic	Magnetic	30	6.3	300	Circle of 18mm(0.709) Diameter	(1) 15～45	675	600	300



XQ1020
XQ1020L,R,G,B

XQ1025L,R



XQ1022

Typical Operating Conditions and Performance								Typial Application	Type No.
Grid No. 1 Voltage for Cutoff (V)	Sensitivity (μA/ m)	Dark Current (nA)	Modulation depth at 400 TV Lines at center of picture (%)	Limiting Resolution (TV Lines)	Gamma of Transfer Charact-ristics	Decay Lag (%) 60msec	Decay Lag (%) After 200msec		
−30～−100	(2) Min. 325	Max. 3	(4) Typ. 40	≧600	0.95±0.05	(5) Max. 5	(5) Max. 2	Monochrome	XQ1020
−30～−100	(2) Min. 325	Max. 3	(4) Typ. 40	≧600	0.95±0.05	(5) Max. 5	(5) Max. 2	Luminance channel	XQ1020L
−30～−100	(2) Min. 70	Max. 3	(4) Typ. 35	≧600	0.95±0.05	(5) Max. 5	(5) Max. 2	Red channel	XQ1020R
−30～−100	(2) Min. 130	Max. 3	(4) Typ. 40	≧600	0.95±0.05	(5) Max. 5	(5) Max. 2	Green channel	XQ1020G
−30～−100	(2) Min. 35	Max. 3	(4) Typ. 50	≧600	0.95±0.05	(5) Max. 6	(5) Max. 3	Blue channei	XQ1020B
−30～−100	(2) Typ. 450	Max. 3	(4) Typ. 55	≧700	0.95±0.05	(5) Typ. 3	(5) Typ. 1.5	Luminance channel	XQ1025L
−30～−100	(2) Typ. 160	Max. 3	(4) Typ. 55	≧700	0.95±0.05	(5) Typ. 5	(5) Typ. 2	Red channel	XQ1025R
−30～−100	(3) Min. 200	Max. 3	(4) Min. 30	—	0.95±0.05	(6) Typ. 5	(6) Typ. 2	X-ray application	XQ1022

※Registered Trade Mark for T.V. Camera Tube

(1) The target voltage should be adjusted to the value indicated by the tube manufacturer on the test sheet as delivered each individual tube.

(2) Measuring Conditions:
Illumination 4.54 lx at black body color temperature of 2854 °K; The appropriate filter inserted in the light-path, the signal current obtaine in nA is a measure of the color sensitivity expressed in μA per lumen of white light befor the filter.

Filters used: XQ1020R, XQ1025R Schott OG2 thickness 3mm
XQ1020G Schott VG9 thickness 1mm
XQ1020B Schott BG12 thickness 3mm

(3) Sensitivity measured with a fluorescent light source having P20 distribution.

(4) Measuring Conditions:

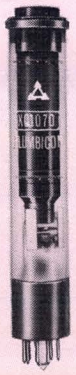
	XQ1025, L, R XQ1020, XQ1020L, G	XQ1020R, B	XQ1022
High-light Signal Current Is	0.3μA	0.15μA	0.1μA
Beam Current I beam	0.6μA	0.3μA	0.5μA

(5) Measuring Conditions:
A light source with a color temperature of 2854 °K and appropriate filter inserted in light-path for tubes XQ1020R, G B and XQ1025R.

	XQ1020 XQ1020L, R, G, B	XQ1025L	XQ1025R
High-light Signal Current Is	0.1μA	0.3μA	0.15μA
Beam Current I beam	0.1μA	0.6μA	0.3μA

(6) Measured with a signal current of 0.1μA and a beem current of 0.5μA.
Fluorescent light source having P20 distribution.

Type No.	General Data									
	Focusing Method	Deflection Methode	Bulb Diameter (inch)	Heater Voltage (V)	Heater Current (mA)	Normal Scanned Area mm² (inch²)	Signal Electrode Voltage (V)	Grid No. 4 Voltage (V)	Grid No. 3 Voltage (V)	Grid No. 2 Voltage (V)
XQ1070	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1070L	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1070R	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1070G	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1070B	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1071	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1071L	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1071R	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1071G	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1071B	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	45	960	600	300
XQ1072	Magnetic	Magnetic	(1.0)	6.3	95	9.5×12.7 (0.374×0.500)	(1) 15～45	960	600	300



XQ1070
XQ1070L,R,G,B

XQ1071
XQ1071L,R,G,B

XQ1072

Typical Operating Conditions and Performance									Type No.
Grid No. 1 Voltage for Cutoft (V)	Sensitivity (μA/ℓm)	Dark Current (nA)	Modulation depth at 400 TV lines at Center of Picture %	Limiting Resolution TV Lines)	Gamma of Transfer Charactristics	Decay Lag %		Typical Application	
						After 60msec	After 200msec		
−35～−100	(2) Min. 325	Max. 3	(4) Typ. 40	≧750	0.95±0.05	(5) Max. 7	(5) Max. 2.5	Monochrome	XQ1070
−35～−100	(2) Min. 325	Max. 3	(4) Typ. 40	≧750	0.95±0.05	(5) Max. 7	(5) Max. 2.5	Luminance channel	XQ1070L
−35～−100	(2) Min. 70	Max. 3	(4) Typ. 35	≧750	0.95±0.05	(5) Max. 11	(5) Max. 4	Red channel	XQ1070R
−35～−100	(2) Min. 130	Max. 3	(4) Typ. 40	≧750	0.95±0.05	(5) Max. 7	(5) Max. 2.5	Green channel	XQ1070G
−35～−100	(2) Min. 35	Max. 3	(4) Typ. 45	≧750	0.95±0.05	(5) Max. 11	(5) Max. 4	Blue channel	XQ1070B
−35～−100	(2) Min. 325	Max. 3	(4) Typ. 40	≧750	0.95±0.05	(5) Max. 5	(5) Max. 2	Monochrome	XQ1071
−35～−100	(2) Min. 325	Max. 3	(4) Typ. 40	≧750	0.95±0.05	(5) Max. 5	(5) Max. 2	Luminance channel	XQ1071L
−35～−100	(2) Min. 70	Max. 3	(4) Typ. 35	≧750	0.95±0.05	(5) Max. 5	(5) Max. 2	Red channel	XQ1071R
−35～−100	(2) Min. 130	Max. 3	(4) Typ. 40	≧750	0.95±0.05	(5) Max. 5	(5) Max. 2	Green channel	XQ1071G
−35～−100	(2) Min. 35	Max. 3	(4) Typ. 45	≧750	0.95±0.05	(5) Max. 6	(5) Max. 3	Blue channel	XQ1071B
−30～−100	(3) Min. 200	Max. 3	(4) Min. 25	≧600	0.95±0.05	(5) Max. 10	(5) Max. 4	X-ray application	XQ1072

(1) The target voltage should be adiusted to the value indicated by the tube manufacturer on the test sheet as delivered each individual tube.

(2) Measuring Conditions:
Illumination 8.15 lx at black body color temperature of 2854°K: The appropriate filter inserted in the light-path, the signal current obtained in nA is a measure of the color sensitivity expressed in μA per lumen of white light before the filter.

Filters used: XQ1070R, XQ1071R Schott OG2 thickness 3mm
XQ1070G, XQ1071G Schott VG9 thickness 3mm
XQ1070B, XQ1071B Schott BG12 thickness 3 mm

(3) Sensitivity measured with a fluorescent light source having P20 distribution.

(4) Measuring Conditions:

	XQ1070, XQ1070L, G XQ1071, XQ1071L, G	XQ1070R, B XQ1071R, B	XQ1072
High-light Signal Current Is	0.2μA	0.1μA	0.1μA
Beam Current I beam	0.4μA	0.2μA	0.5μA

(5) Measuring Conditions:

A light source with a color temperature of 2854°K and appropriate filter inserted in light-path for tubes XQ1070R, G, B.

	XQ1070R, B	XQ1070 XQ1070L, G	XQ1071 XQ1071L, R, G, B	XQ1072
High-light Signal Current Is	0.02μA	0.04μA	0.1μA	0.1μA
Beam Current I beam	0.2 μA	0.4 μA	0.1μA	0.1μA

Type No.	General Data					Typical Operating Conditions and Performance								
	Focusing Method	Deflection Method	Bulb Diameter (inch)	Heater Voltage (V)	Heater Current (mA)	Normal Scanned Area mm² (inch²)	Signal Electrode Voltage (V)	Cathode Voltage (V)		Grid No. 6 Voltage (V)	Grid No. 5 Voltage (V)	Grid No. 4+2 Voltage (V)	Grid No. 3 Voltage (V)	
								During Readout Mode	During A.C.T. Mode				During Readout Mode	During A.C.T. Mode
XQ1080	Magnetic	Magnetic	1.0	6.3	95	9.5×12.7 (0.374×0.500)	45	0	0 ~ 15 (1)	750	475	300	250	0 ~ 30 (1)
XQ1080L	Magnetic	Magnetic	1.0	6.3	95	9.5×12.7 (0.374×0.500)	45	0	0 ~ 15 (1)	750	475	300	250	0 ~ 30 (1)
XQ1080R	Magnetic	Magnetic	1.0	6.3	95	9.5×12.7 (0.374×0.500)	45	0	0 ~ 15 (1)	750	475	300	250	0 ~ 30 (1)
XQ1080G	Magnetic	Magnetic	1.0	6.3	95	9.5×12.7 (0.374×0.500)	45	0	0 ~ 15 (1)	750	475	300	250	0 ~ 30 (1)
XQ1080B	Magnetic	Magnetic	1.0	6.3	95	9.5×12.7 (0.374×0.500)	45	0	0 ~ 15 (1)	750	475	300	250	0 ~ 30 (1)

Notes

(1) Pulse amplitude settings

Cathode pulse Vk : Adjusted to obtain an A.C.T. limiting level at 1.3 to 1.5 times I sp.

Gvid no. 3 pulse : Adjusted for maximum and most uniform A.C.T. action over the total scanned area.

Grid no. 1 pulse : Adjusted for proper handling of a highlight with a diameter of 10% of picture height and with a brightness corresponding to 32 times peak signal white (I sp).

N.B. Extention of the A.C.T. range can be obtained by increasing the grid no. 1 pulse; This may, howeuer, introduce dark current.

(2) Adjusted with the A.C.T. made inoperative, e.g. by setting the cathode pulse to 15V.

The control grid voltage is adjusted to produce a beam current just sufficient to allow a peak signal curreut of twice the typical value, I sp, as observed and measured on a waveform oscilloscope. This amount of beam current is termed Ibp.

(3) Typical beam current, signal current and pulse settings(1)

	XQ1080 XQ1080L	XQ1080R	XQ1080G	XQ1080B
Isp	200nA	100nA	200nA	100nA
Ibp	400nA	200nA	400nA	200nA
A.C.T. level (peak)	280nA	140nA	280nA	140nA
Cathode pulse Vkp	10V	5V	10V	5V
Grid no. 1 pulse Vg_1p	40V	30V	40V	30V
Grid no. 3 pulse Vg_3p	220 to 250V	220 to 250V	220 to 250V	220 to 250V

XB1080
XB1080L, R, G, B.

Typecal Operating Conditions and Performance											Type No.
Grid No. 1 Voltage (V)			Grid No. 1 Voltage for Cut-off (V)	Sensitivity (μA/lm)	Dark Current (nA)	Modulation depth at 400 TV lines at Center of Picture (%)	Limiting Resolution (TV Lines)	Gamma of Transfer Characteristics	Highlight Handling (Lens Stops)	Decay Lag (%)	
During ReadOut Mode	During A.C.T. Mode	Blanking on Grid No. 1 Peak								After 60msec	After 200msec	
See note 2	See note 1	50	−45 ~ −110	(4) Min. 325	Max. 3	(5) Typ. 40	≧750	0.95±0.05	(1) ≧5	(6) Typ. 1.5	(6) Typ. 0.6	XQ1080
See note 2	See note 1	50	−45 ~ −110	(4) Min. 325	Max. 3	(5) Typ. 40	≧750	0.95±0.05	(1) ≧5	(6) Typ. 1.5	(6) Typ. 0.6	XQ1080L
See note 2	See note 1	50	−45 ~ −110	(4) Min. 70	Max. 3	(5) Typ. 35	≧750	0.95±0.05	(1) ≧5	(6) Typ. 2.5	(6) Typ. 1	XQ1080R
See note 2	See note 1	50	−45 ~ −110	(4) Min. 130	Max. 3	(5) Typ. 40	≧750	0.95±0.05	(1) ≧5	(6) Typ. 1.5	(6) Typ. 0.6	XQ1080G
See note 2	See note 1	50	−45 ~ −110	(4) Min. 35	Max. 3	(5) Typ. 45	≧750	0.95±0.05	(1) ≧5	(6) Typ. 3.5	(6) Typ. 2	XQ1080B

(4) Measuring conditions.

Illumination 8.15lx at black body temperature of 2854°K; The appropriate filter inserted in the light path filters used:

Filterused: XQ1080R Schott OG570 thickness 3mm.

XQ1080G Schott VG9 thickness 1mm.

XQ1080B Schott BG12 thickness 3mm.

(5) Measuring conditions.

	XQ1080 XQ1080L	XQ1080R	XQ1080G	XQ1080B
Highlight signal current Isp	0.2μA	0.1μA	0.2μA	0.1μA
Beam current Ibp	0.4μA	0.2μA	0.4μA	0.2μA

(6) Measuring conditions.

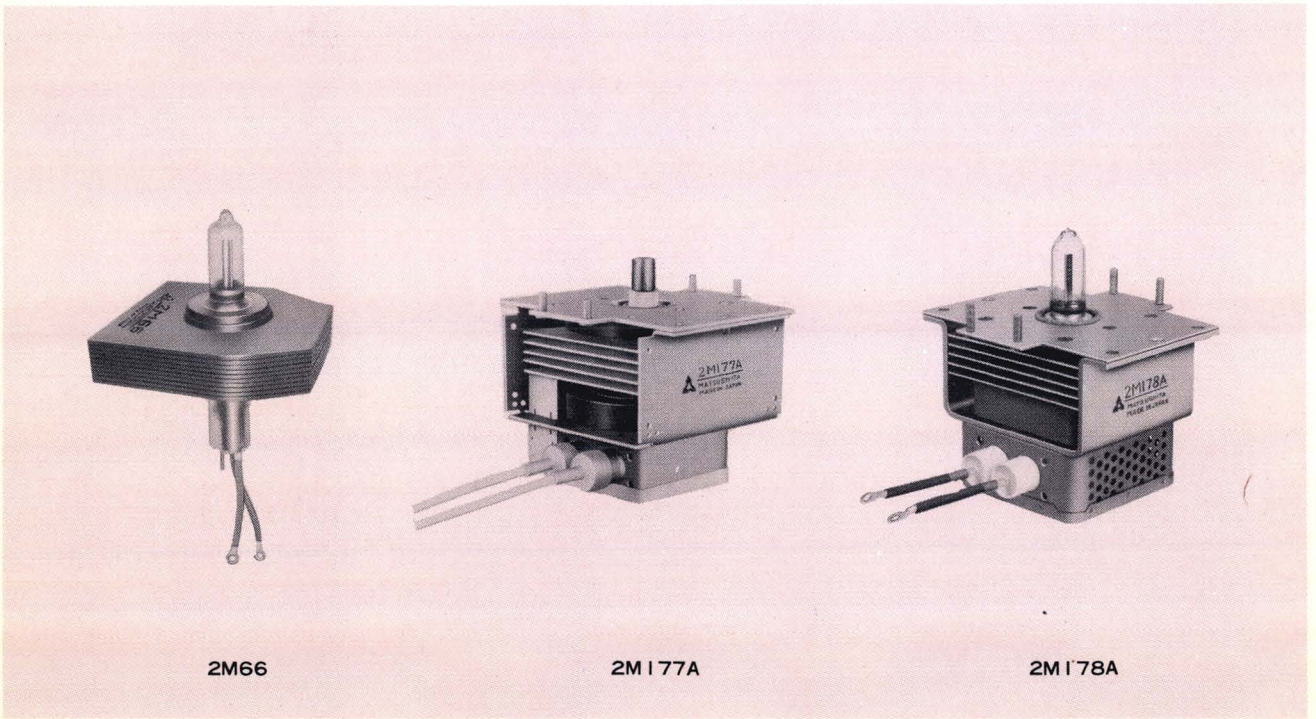
A light source with a color temperature of 2854°K and appropriate filter inserted in the light path for the chrominance tubes R, G and B.

	XQ1080 XQ1080L	XQ1080R	XQ1080G	XQ1080B
High light signal current Is	0.2μA	0.1μA	0.2μA	0.1μA
Beam current Ib	0.4μA	0.2μA	0.4μA	0.2μA

CONTINUOUS-WAVE MAGNETRON

Type No.	Typical Operating Conditions							RF Output	Mounting Position
	f (MHz)	Po (W)	Ef (V)	If (A)	ebm (kV)	Ib (mA)	Cooling Air Quantity (ℓ /min)		
2M66	2450	800	3.0	13.5	4.0	300	700	Probe	Cathode Vertical
2M77	2450	800	3.1	13.5	4.1	300	700	Probe	Cathode Vertical
2M78A	2450	500	3.2	14.5	2.8	278	600	Probe	Cathode Vertical
2M88	2450	800	3.1	13.5	4.1	300	700	Probe	Cathode Vertical
2M177A	2450	830	3.1	14.2	4.1	300	1100	Probe	Cathode Vertical
2M178A	2450	600	3.2	14.5	3.3	300	600	Probe	Cathode Vertical
2M53-M	2450	800	3.1	13.5	4.1	300	1500	Probe	Cathode Vertical
2M75-M	2450	200	3.1	14.0	2.4	150	200	Coaxal	Cathode Vertical
2M175	2450	200 100	3.5 3.5	15.3 15.3	2.2 2.1	175 100	200 100	Coaxal	Cathode Vertical

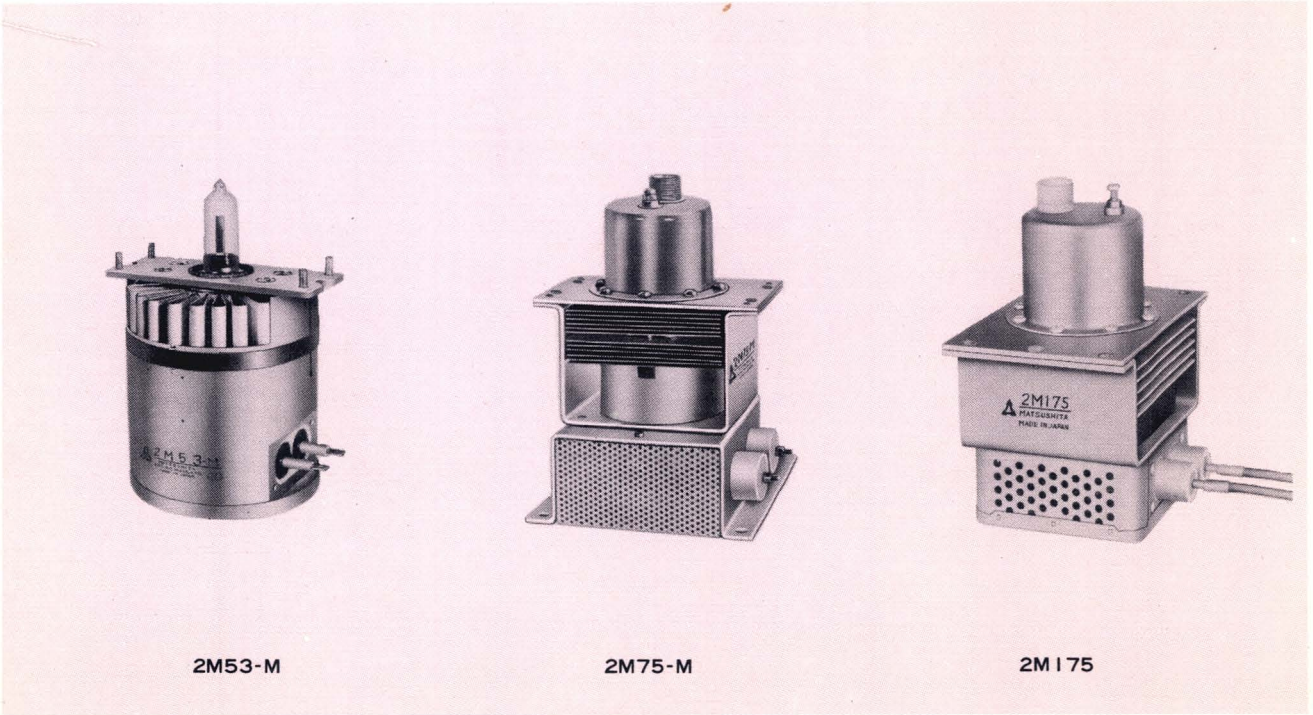
Po : Power Output into matched load.



2M66 2M177A 2M178A

Mechanical Characteristics				Absolute Maximum Ratings									Application	Type No.
RF Coupler	Magnet	Net weight (kg)	Cooling Anode		Ef (V)	tK (sec)	ebm (kV)	Ib DC (mA)	Pi (w)	Tp (℃)	Tk (℃)	σ_L		
See attached drawing	Electro Magnet	0.65	Air (Transverse flow)	Min.	2.7	5	—	—	—	—	—	—	Microwave Oven	2M66
				Max.	3.3	—	4.5	350	1400	140	300	4		
See attached drawing	Permanent Magnet	2.5	Air (Transverse flow)	Min.	2.8	5	—	—	—	—	—	—	Microwave Oven	2M77
				Max.	3.4	—	4.5	350	1400	140	300	4		
See attached drawing	Permanent Magnet	2.0	Air (Transverse flow)	Min.	2.85	0	—	—	—	—	—	—	Microwave Oven	2M78A
				Max.	3.55	—	3.3	350	1000	150	300	4		
See attached drawing	Permanent Magnet	3.0	Air (Transverse flow)	Min.	2.8	5	—	—	—	—	—	—	Microwave Oven	2M88
				Max.	3.4	—	4.5	350	1400	140	300	4		
See attached drawing	Permanent Magnet	2.0	Air (Transverse flow)	Min.	2.8	3	—	—	—	—	—	—	Microwave Oven	2M177A
				Max.	3.4	—	4.5	350	1400	150	300	4		
See attached drawing	Permanent Magnet	2.0	Air (Axial flow)	Min.	2.85	—	—	—	—	—	—	—	Microwave Oven	2M178A
				Max.	3.55	0	3.8	350	1200	150	300	4		
See attached drawing	Permanent Magnet	2.0	Air (Transverse flow)	Min.	2.8	5	—	—	—	—	—	—	Microwave Oven	2M53-M
				Max.	3.4	—	4.5	350	1400	140	300	4		
See attached drawing	Permanent Magnet	2.0	Air (Transverse flow)	Min.	3.05	0	—	—	—	—	—	—	Medical	2M75-M
				Max.	3.75	—	3.0	200	600	140	300	2		
See attached drawing	Permanent Magnet	2.0	Air (Transverse flow)	Min.	3.15	0	—	—	—	—	—	—	Medical	2M175
				Max.	3.85	—	3.0	200	600	150	300	2		

σ_L : Voltage Standing wave ratio.



2M53-M

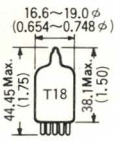
2M75-M

2M175

OUTLINE DRAWINGS (RECEIVING TUBES)

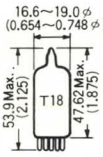
Unit : mm (inch)

18-1



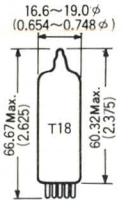
2 H A 5
3 H A 5
4 H A 5
6 A L 5
6 H A 5
6 A K 5

18-2



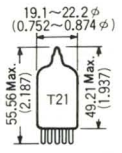
2GK5
3GK5
3HQ5
4GK5
6AU6
6BA6
6BE6
6GK5
6HQ5
12BA6
3DT6A
4DT6A
6AV6
6DT6A
12AU6
12AV6
12BE6

18-3



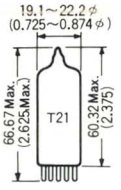
5 A Q 5
6 A Q 5
6 A R 5
6 X 4
3 0 A 5
30M-P27
3 5 C 5
35EH5
3 5 W 4
5 0 C 5
50EH5

21-2



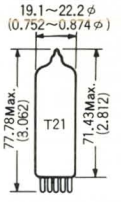
4BL8
4GS7
4R-HH15
5GH8A
5GS7
5GX7
5HG8
5LJ8
6AQ8
6CL8A
6DJ8
6EA8
6BL8
6GH8A
6GS7
6GX7
6HB7
6HG8
6KE8
6KZ8
6LJ8
6LM8
6LN8
6LX8
7DJ8
7HG8
7GS7
8 A 8
9 A 8
9AQ8
9GH8A
9JW8
12AT7
12AU7
12AX7
12DT8
18A8
17EW8
PF86

21-3



6BX6
6FQ7
6GU7
FQ7
10DX8
12BY7A
15DQ8
6AB8
6DX8
6JX8
8LS6
12BH7A
12FQ7
11LY6

21-4



6AF9
6BM8
6BQ5
6CA4
6CW5
6GK6
6GV8
6 Y 9
8 B 8
8CW5
9GV8
10CW5
10GK6
10GV8
11AF9
11BM8
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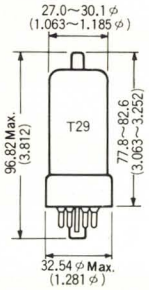
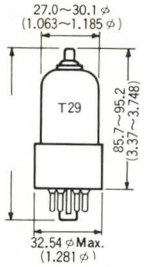
16Y9
18GV8
50BM8
6360
7189

29-02



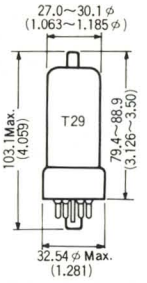
3 C U A
3 C U 3 A

29-12A



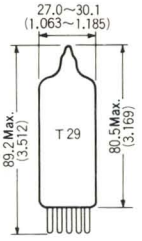
6 C M 5
12G-B3
2 5 E 5
5 0 J Y 6

29-16A



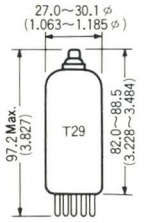
3 C V 3
3 C V 3 A

29-44



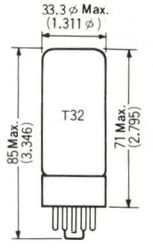
50H-B26
25HX5

29-51



12B-B14

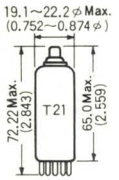
32-1



5 A R 4

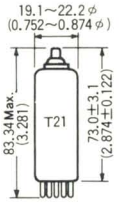
Unit : mm (inch)

21-7



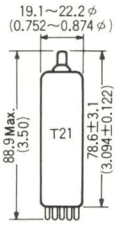
1 B K 2
1 X 2 B

21-8



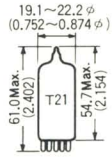
6 R 3
1 1 R 3
1 7 Z 3
3 4 R 3

21-11



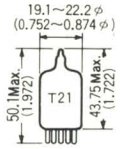
6 A L 3
1 6 A Q 3
2 0 A Q 3
3 0 A E 3

21-12



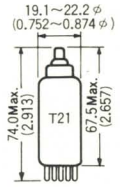
3 E H 7
3 E J 7
4 E H 7
4 E J 7
6 E H 7
6 E J 7

21-20



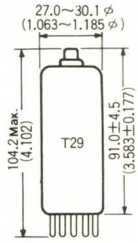
4 G J 7
5 G J 7
6 G J 7
8 G J 7

21-31



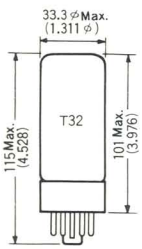
1 S 2
1 S 2 A

29-01



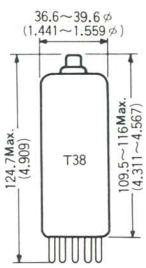
2 1 K Q 6
2 9 K Q 6
2 9 L E 6

32-2



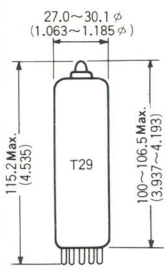
6 C A 7

38-01



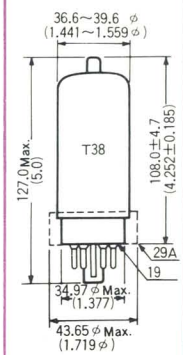
6 K G 6 A
6 L F 6
2 0 L F 6
4 0 K G 6 A

38-02



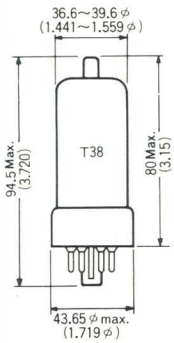
6 E C 4 A
4 2 E C 4 A

38-19
38-29A



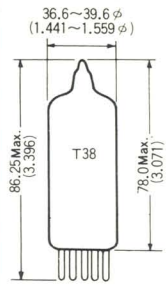
6 B K 4 B
6BK4C/6EL4A

38-03



S 2 0 0 1

38-57

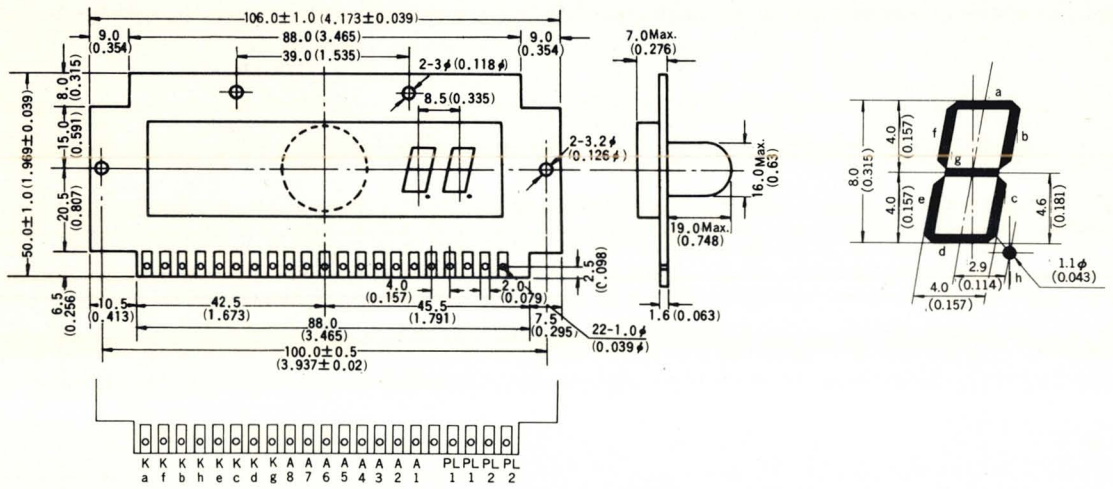


33HE7 Ⓕ
38EH7

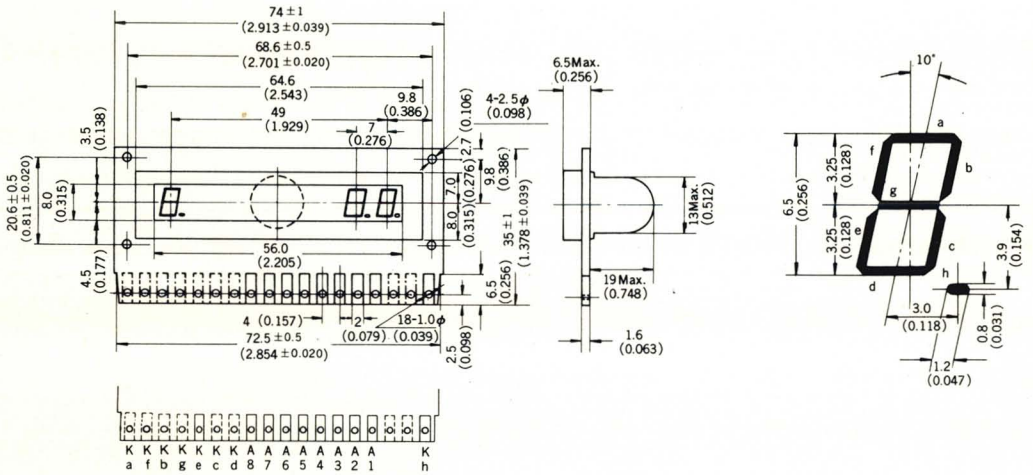
FLANDIPAK※

Unit : mm (inch)

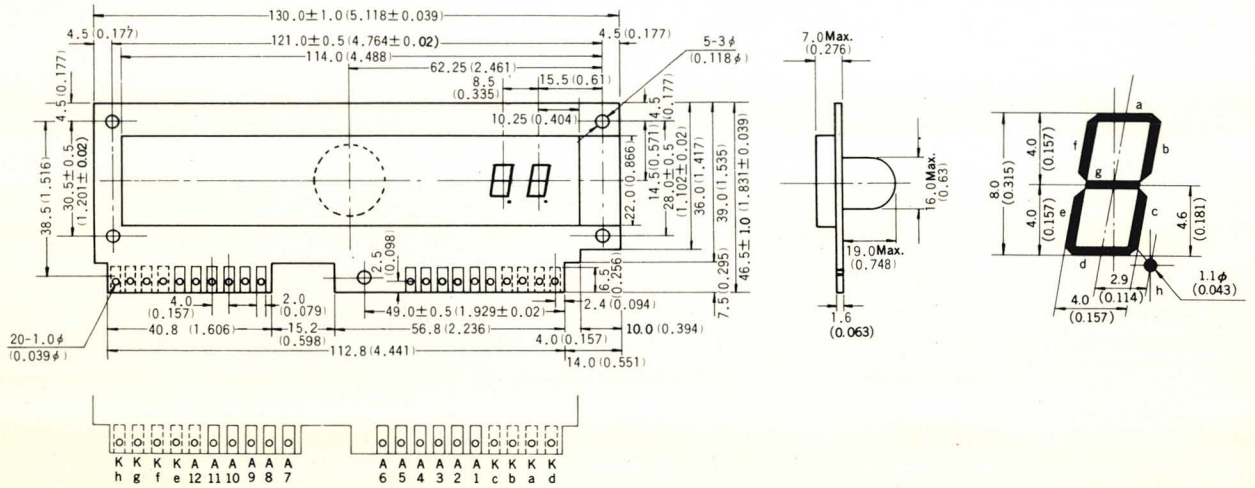
CD801



CD802

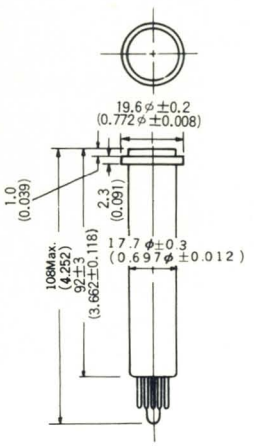


CD1201

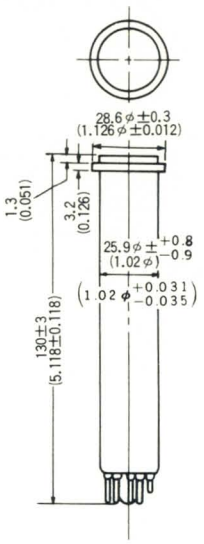


(VIDICONS)

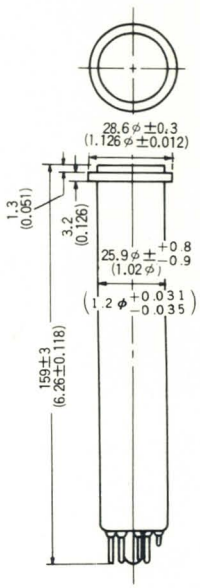
Unit : mm (inch)



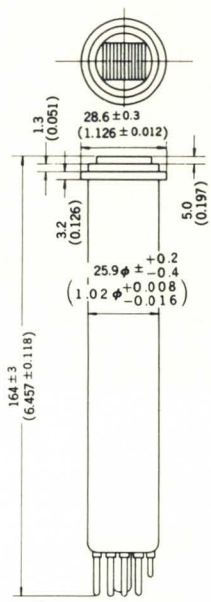
20PE11
20PE13A
20PE14
S4071



7262A

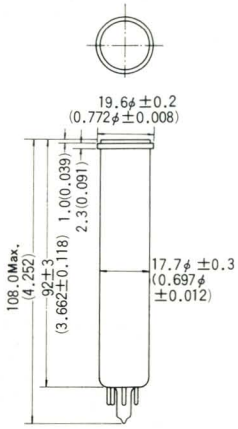


7735A
8507
8541

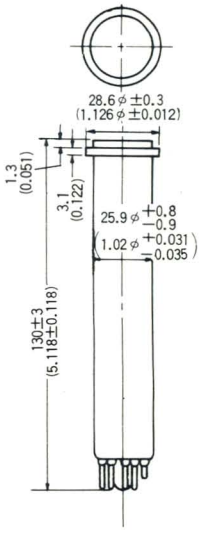


S4070

(SILICON VIDICONS)



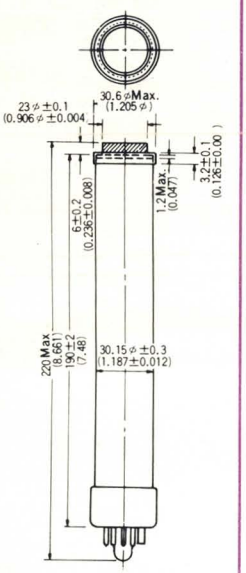
20PE15



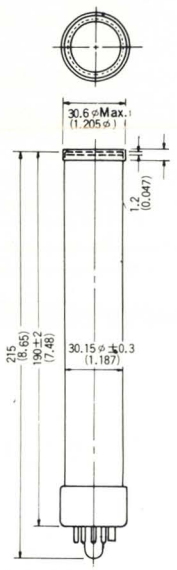
25PE14

(PLUMBICON※)

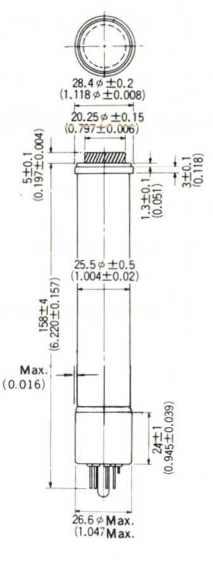
Unit : mm (inch)



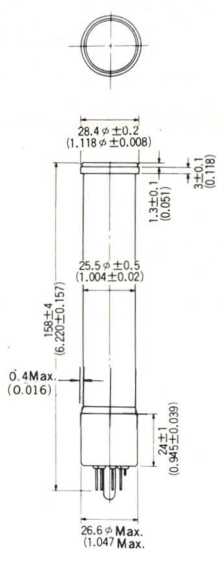
XQ1020
XQ1020L.R.G.B
XQ1025L.R



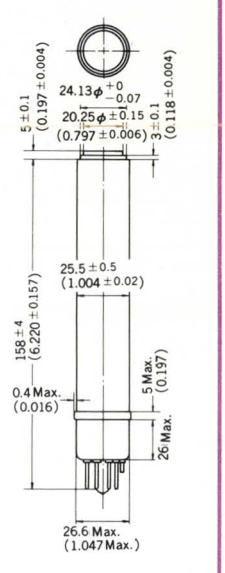
XQ1022



XQ1070
XQ1070L.R.G.B
XQ1071
XQ1071L.R.G.B



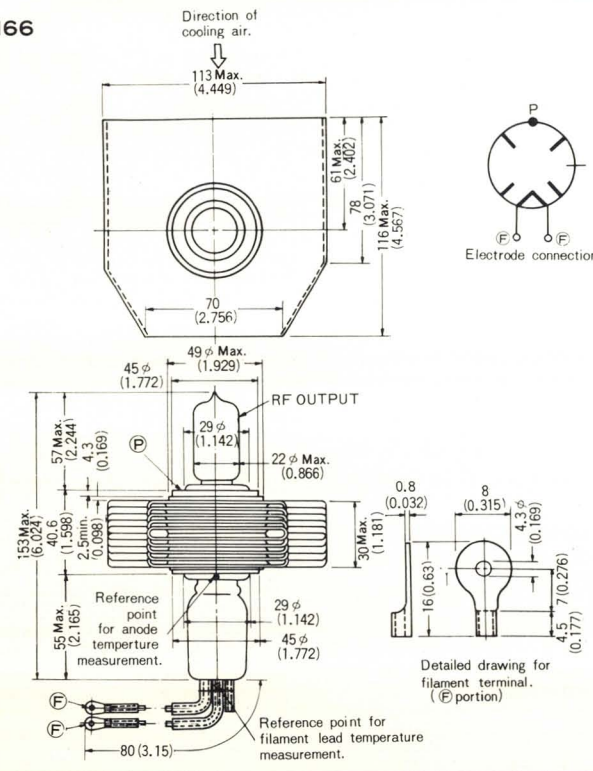
XQ1072

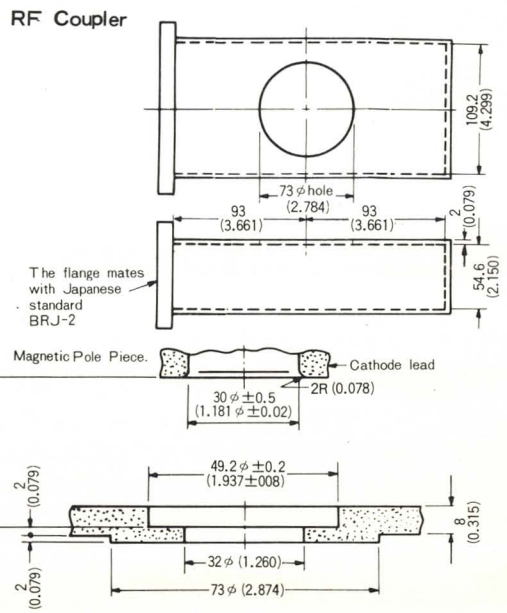


XQ1080
XQ1080L.R.G.B

(CONTINUOUS-WAVE MAGNETRONS)

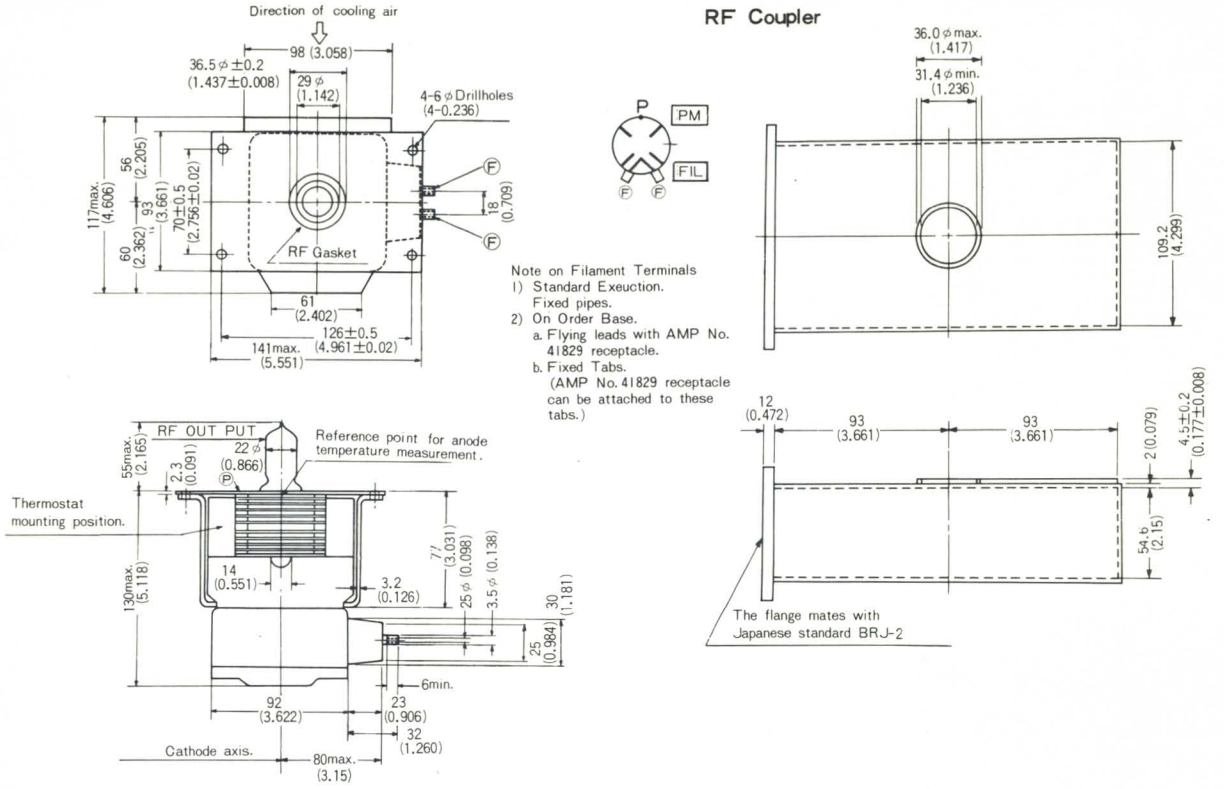
2M66



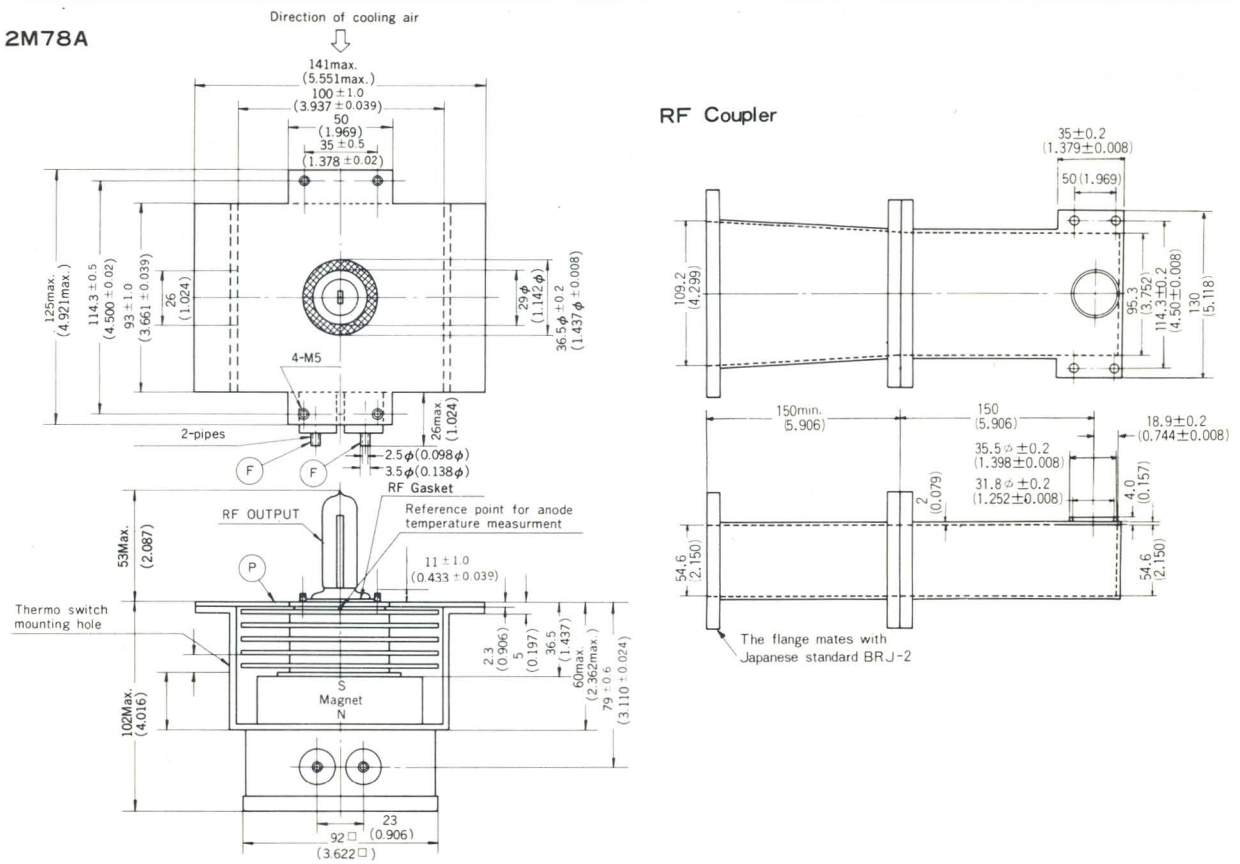


Unit : mm (inch)

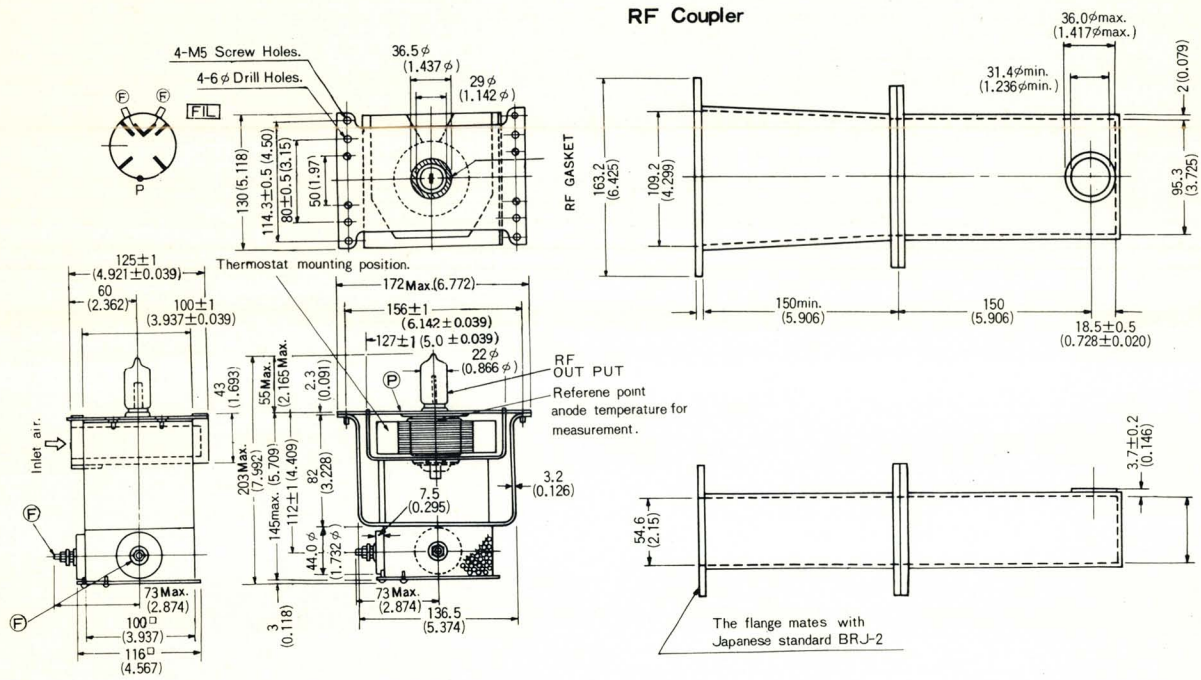
2M77



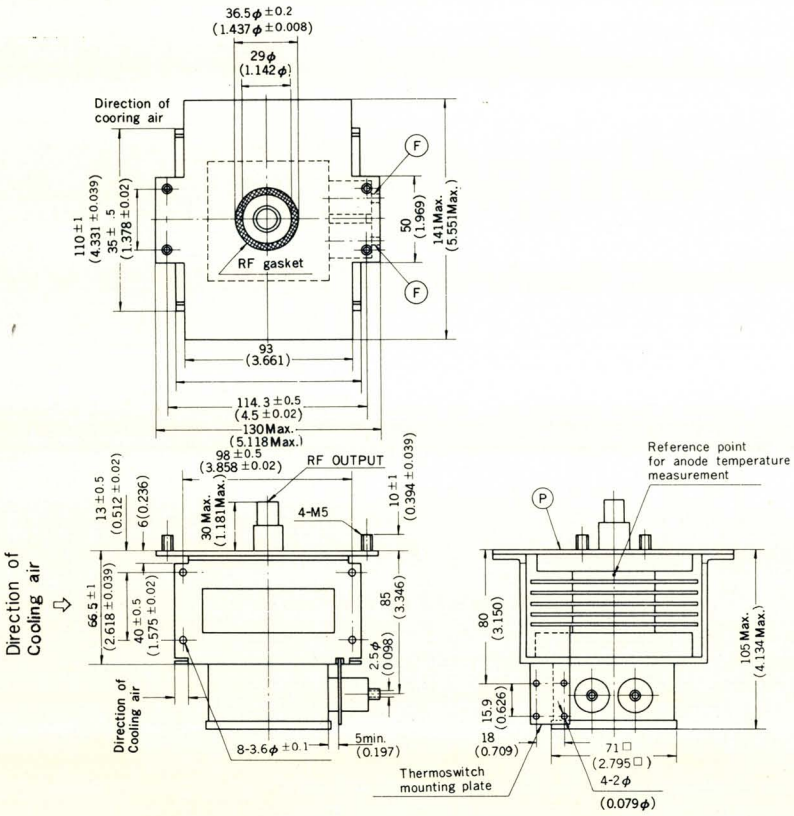
2M78A



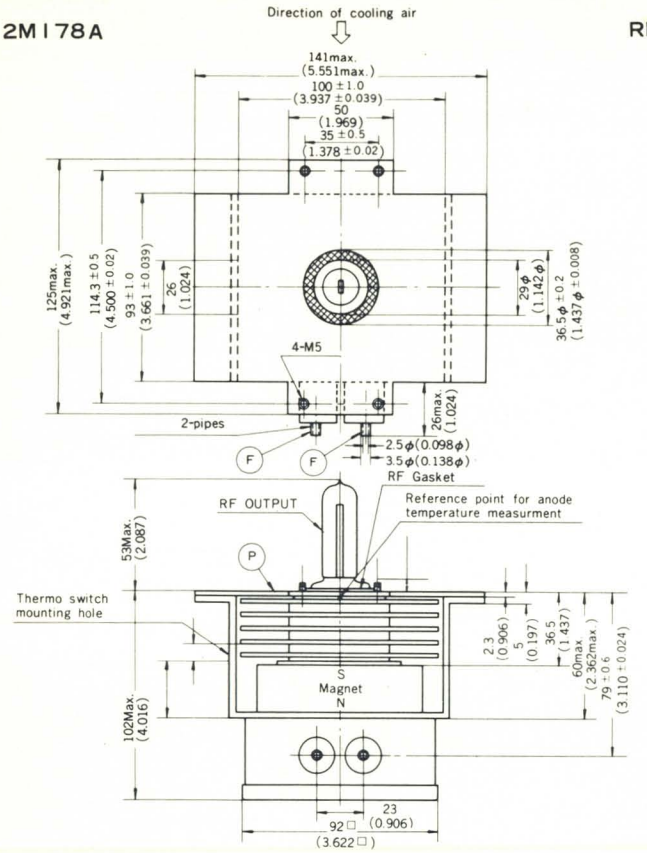
2M88


RF Coupler
4-M5 Screw Holes.
4-6φ Drill Holes.
FIL
Thermostat mounting position.
RF OUT PUT
Referene point anode temperature for measurement.
RF GASKET
Inlet air.
The flange mates with Japanese standard BRJ-2

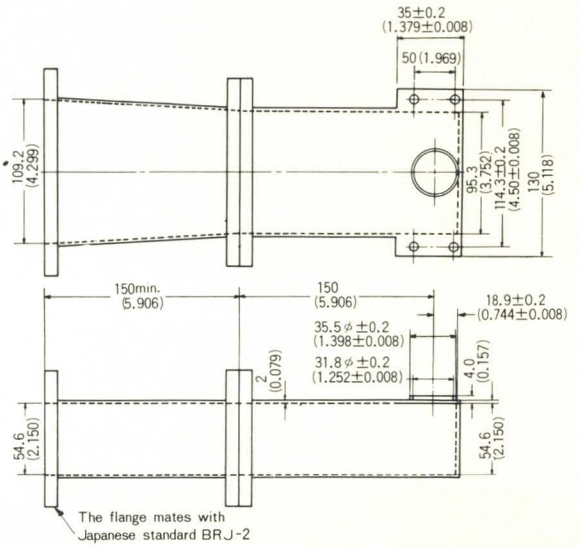
2M177A


Direction of cooring air
RF gasket
RF OUTPUT
4-M5
Direction of Cooling air
Reference point for anode temperature measurement
Thermoswitch mounting plate
8-3.6φ ±0.1

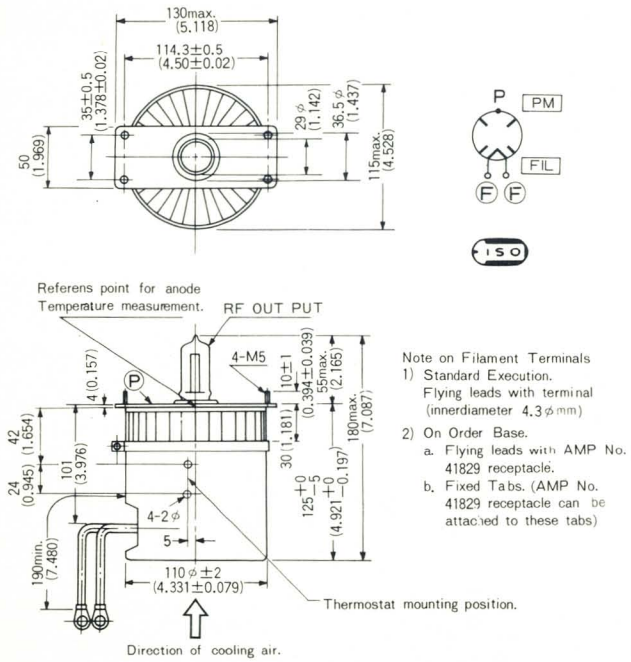
2M178A



RF Coupler

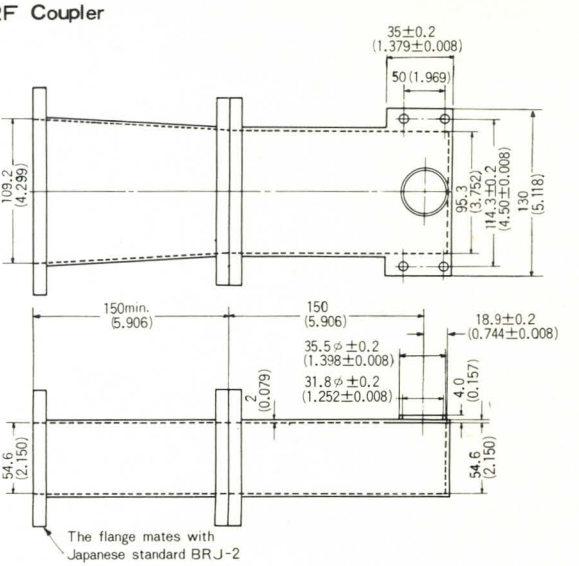


2M53-M



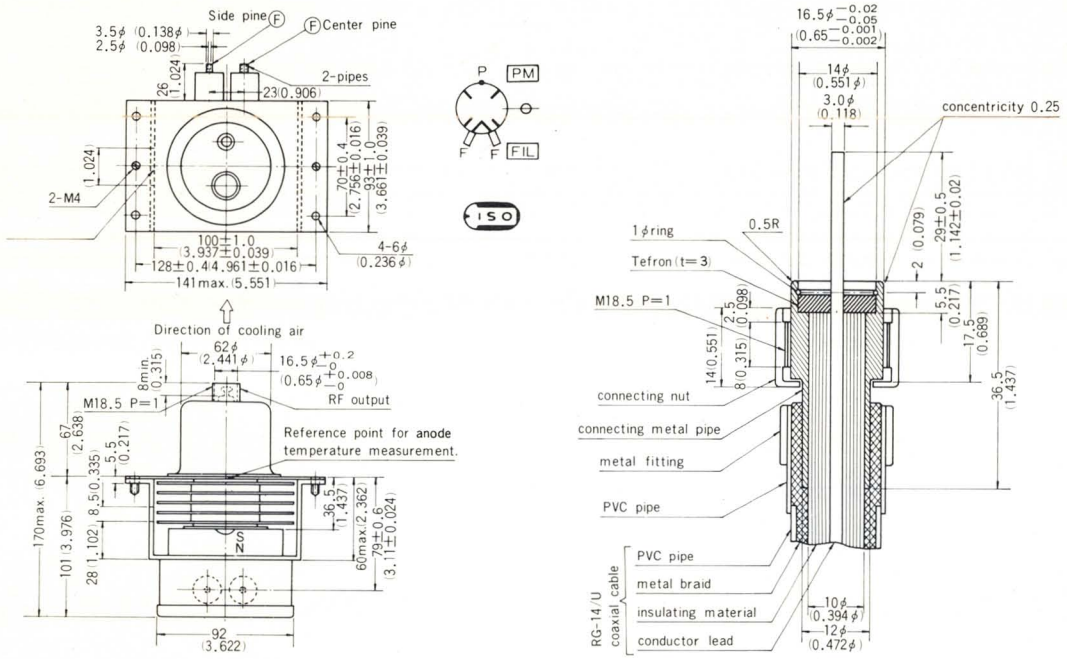
Note on Filament Terminals
1) Standard Execution.
Flying leads with terminal
(innerdiameter 4.3φmm)
2) On Order Base.
a. Flying leads with AMP No.
41829 receptacle.
b. Fixed Tabs. (AMP No.
41829 receptacle can be
attached to these tabs)

RF Coupler

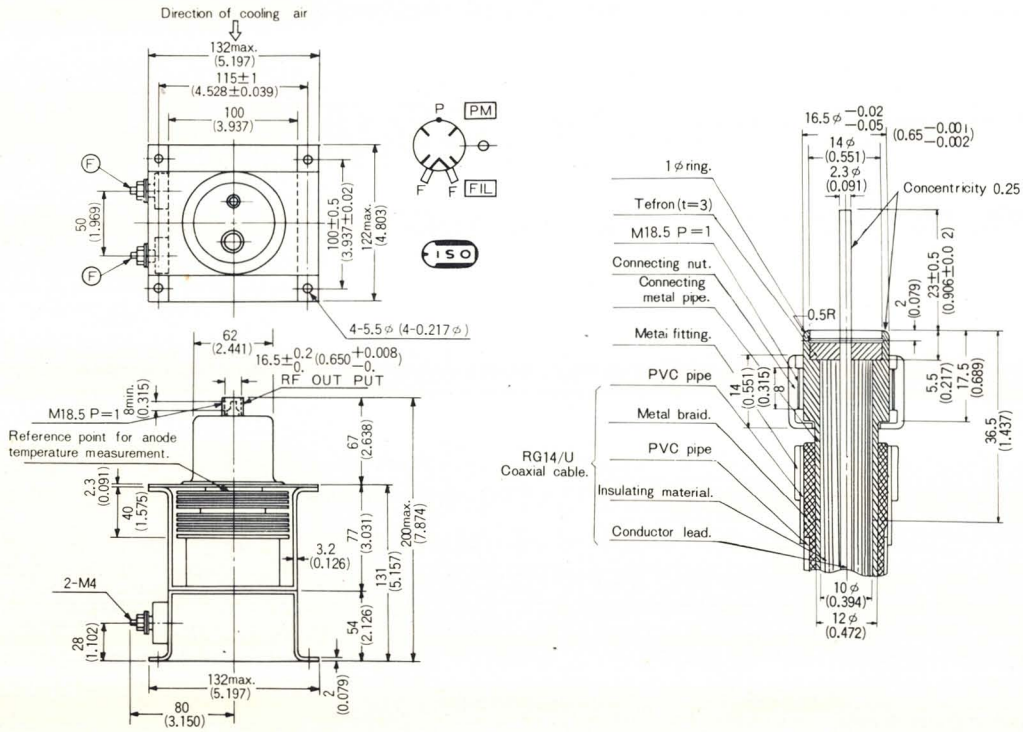


Unit : mm (inch)

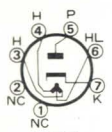
2M75-M



2M175

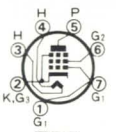


BASE CONNECTIONS (RECEIVING TUBES)



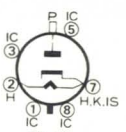
5BQ

3 5 W 4



7BZ

5 A Q 5
6 A Q 5

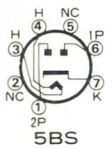


8EZ

3 C V 3
3 C V 3 A

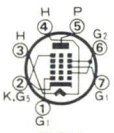
9AQ

3 E H 7
3 E J 7
4 E H 7
4 E J 7
6 B X 6
6 E H 7
6 E J 7



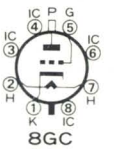
5BS

6 X 4



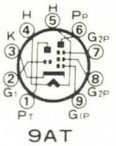
7CH

6 B E 6
12 B E 6



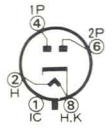
8GC

6 B K 4
6 B K 4 B
6BK4C/6EL4A



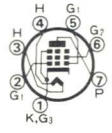
9AT

6 A B 8



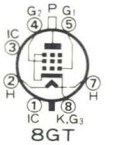
5DA

5 A R 4



7CV

3 0 A 5
30M·P27
3 5 C 5
5 0 C 5
5 0 E H 5

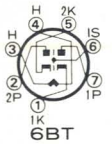


8GT

6 C M 5
12 G·B 3
2 5 E 5

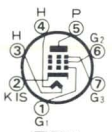
9BF

12 BY 4 A



6BT

6 A L 5

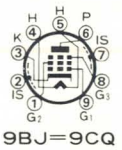


7EN

3 D T 6 A
4 D T 6 A
6 D T 6 A

8MG

5 0 J Y 6

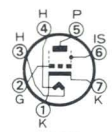


9BJ=9CQ

P F 8 6

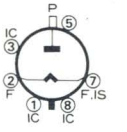
6CC

6 A R 5



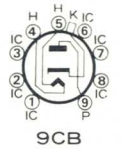
7FP

2 G K 5
3 G K 5
4 G K 5
6 G K 5



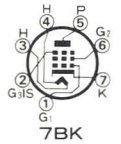
8MK

3 C U 3
3 C U 3 A



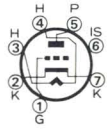
9CB

6 A L 3
6 R 3
11 R 3
16 A Q 3
17 Z 3
20 A Q 3
30 A E 3
34·R 3



7BK

6 A U 6
6 B E 6
12 A U 6
12 B A 6

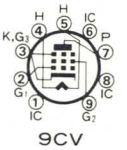


7GM

2HA5/2HM5
3HA5/3HM5
4HA5/4HM5
6HA5/6HM5
2 H Q 5
3 H Q 5
4 H Q 5
6 H Q 5

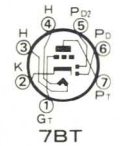
9A

12 AU 7
12 AX 7
12 AX 7 A
12 BH 7 A



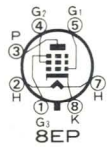
9CV

6 B Q 5
6 C W 5
6 E A 8
8 C W 5
10 C W 5
15 C W 5
7 1 8 9



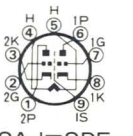
7BT

6 A V 6
12 A V 6



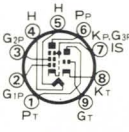
8EP

6 C A 7



9AJ=9DE

4R·HH15
6 A Q 8
6 D J 8
7 D J 8
9 A Q 8
12 DT 8
17 E W 8

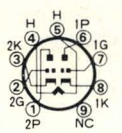


9DC

4 B L 8
6 GH 8 A
6 L N 8
6 L X 8
8 A 8
9 A 8
9 GH 8 A
9 J W 8
17 A 8

9DT

1 S 2
1 S 2 A

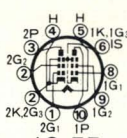


9LP

6 F Q 7
6 G U 7
8 F Q 7
12FQ7

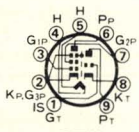
9RJ

6KG4A
21KQ6
29KQ6
40KG6A
29LE6



10-55

6 Y 9
1 1 Y 9
1 6 Y 9



9EX

6 B M 8
8 B 8
11BM8
1 6 A 8
50BM8

9LY

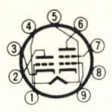
6 G V 8
9 G V 8
10GV8
11MS8
18GV8

9SB

25HX5

12FS

33HE7 (F)
38HE7



9FX

6CL8A

9M

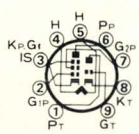
6 C A 4

9Y

1 B K 2
1 X 2 B

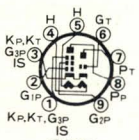
12GW

6 L F 6
20LF6



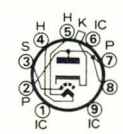
9FZ

6 K Z 8
9 K Z 8



9MP

5GA8H
5 H G 8
6 H G 8
7 H G 8

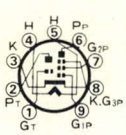


9-14

6 E C 4 A
42EC4A

19

S 2001



9GF

4 G S 7
5 G S 7
5 L J 8
6 G S 7
6 L J 8
7 G S 7

9NH

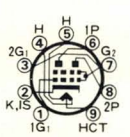
12B-B141

10L

6 A F 9
11AF9

9GK

6 G K 6
8 L S 6
10GK6
16GK6
11LY6

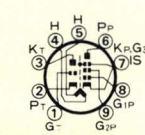


9PW

6 3 6 0

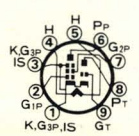
10-53

50H-B26



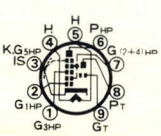
9HX

6 D X 8
10DX8
15DQ8



9QA

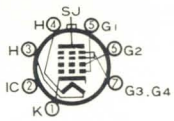
4 G J 7
5 G J 7
5 G X 7
6 G J 7
6 G X 7
6 H B 7
8 G J 7



10-54

6 J X 8

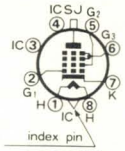
(VIDICONS)



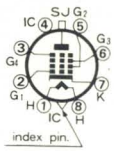
20PE11

20PE13A

20PE14

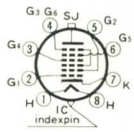


7262A
7735A



8507

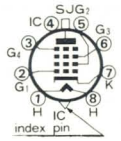
8541



S4070

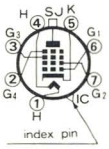
(SILICON VIDICONS)

20PE15

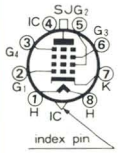


25PE14

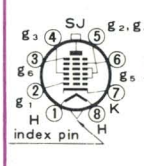
(PLUMBICON※)



XQ1020
XQ1020L.R.G.B
XQ1022
XQ1025
XQ1025R



XQ1070
XQ1070L.R.G.B
XQ1071
XQ1070L.R.G.B
XQ1072



XQ1080
XQ1080L.R.G.B

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