



Distributor Handbook

Version 1.1



Distribution Handbook

Version 1.1

SHARP reserves the right to make changes in specifications described herein at any time and without notice in order to improve design or reliability. SHARP does not assume any responsibility for the use of any circuitry described; no circuit patent licenses are implied. SHARP assumes no responsibility for damage caused by misuse or improper use of devices.

LIFE SUPPORT POLICY

SHARP components should not be used in medical devices with life support functions, safety equipment (or similar applications where component failure would result in loss of life or physical harm), aerospace equipment, telecommunication equipment (trunk lines) or nuclear power control equipment. Contact a SHARP representative or sales office before using SHARP devices for any applications other than those recommended by SHARP.

LIMITED WARRANTY

SHARP warrants to its Customer that the Products will be free from defects in material and workmanship under normal use and service for a period of one year from the date of invoice. Customer's exclusive remedy for breach of this warranty is that SHARP will either (i) repair or replace, at its option, any Product which fails during the warranty period because of such defect (if Customer promptly reported the failure to SHARP in writing) or, (ii) if SHARP is unable to repair or replace, refund the purchase price of the Product upon its return to SHARP. This warranty does not apply to any Product which has been subjected to misuse, abnormal service or handling, or which has been altered or modified in design or construction, or which has been serviced or repaired by anyone other than SHARP. The warranties set forth herein are in lieu of, and exclusive of, all other warranties, express or implied. ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE AND FITNESS FOR A PARTICULAR PURPOSE, ARE SPECIFICALLY EXCLUDED. In no event will SHARP be liable, or in any way responsible, for any incidental or consequential economic or property damage.

The above warranty is also extended to Customers of SHARP authorized distributors with the following exception: reports of failures of Products during the warranty period and return of Products that were purchased from an authorized distributor must be made through the distributor. In case SHARP is unable to repair or replace such Products, refunds will be issued to the distributor in the amount of distributor cost.

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SHARP's Profile

Founded in 1912 in Tokyo, Japan
Business Creed – “Sincerity and Creativity”
Employees Worldwide as of April 1, 1998 – 60,700
Number of Manufacturing Sites – 28 in 15 countries
Net Sales in FY'97 - \$ 13.7 Billion (consolidated)
Net Income in FY'97 - \$189 Million (consolidated)
Total Assets - \$11.7 Billion
Capital Investment in FY'97 - \$1.32 Billion
R&D Investment in FY'97 – 1.0 Billion

Future Plans

SHARP will continue to advance and strengthen its value-added electronic components in areas such as:

- Super Mobile LCDs
- Low-Temp poly-silicon LCDs
- Plasma-addressed liquid crystals (PALC)
- Thin film solar cells

Continuous grain silicon (CGS) that allows LSIs to be integrated with a TFT LCD.

SHARP will develop a number of networkable products incorporating IrDA technology designed to take advantage of the shift to digital broadcast

Capital spending to continue:

- Mie Plan #2 for LCDs – online in Dec '98
- Shinjo Plant #3 – world's largest solar cell plant
- Fukuyama Fab #4 – for ICs
- Upgrading and expanding manufacturing systems

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Finding Information – What you can find with it

SHARP SMA Hot Line 1 (877) 343-2181

Helps Customer as a FTM, Data Sheets, Application Notes

Fast Fax 1 (800) 833-9437

Order Data Sheets or Application Notes delivered to your Fax machine

Fulfillment Center 1 (800) 642-0261

Order any catalog or documentation see Extranet for complete list

Consumer Hot Line 1 (800) 237-4277

SHARP help line for Microwaves, TVs,

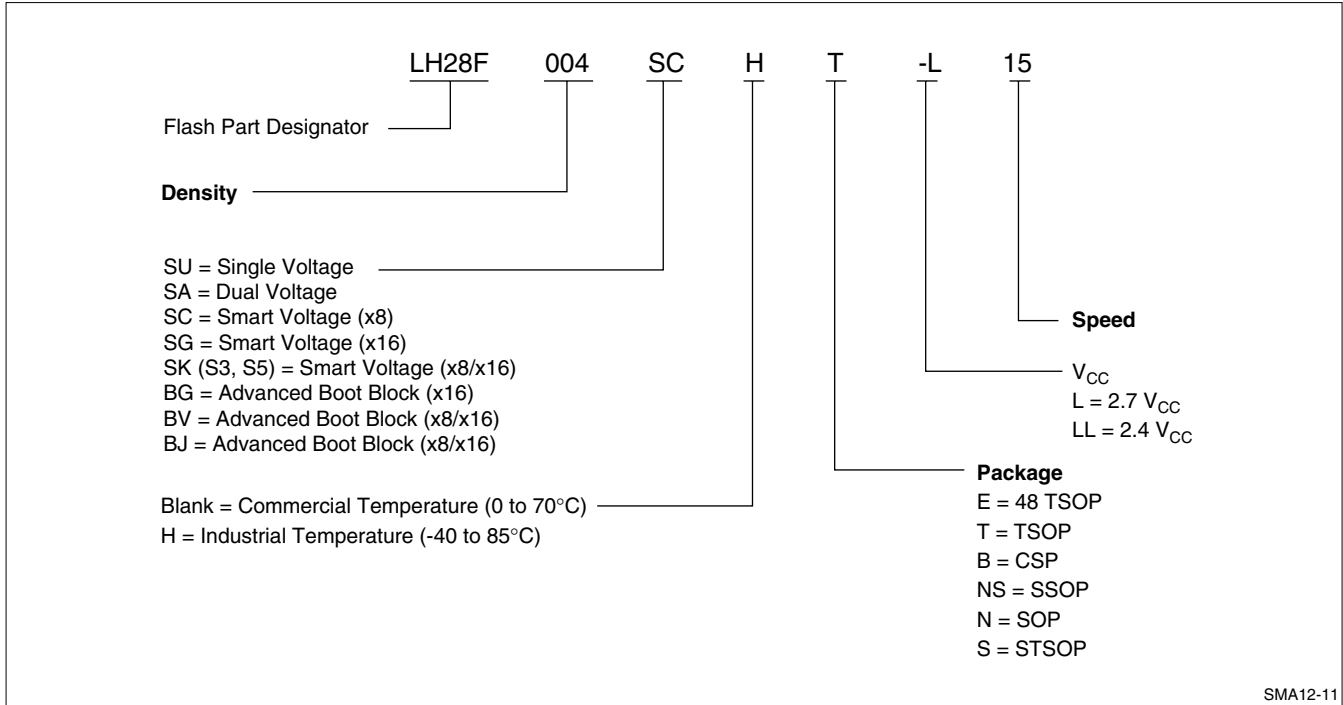
Extranet: <https://enet.sharpmeg.com>

Presentations, Pricing, Cross-Reference Materials, and Articles on what is new at SHARP.

FLASH

LH28Fxxxxx

Part Number Key:



Available Products:

	Capacity	Access Time	Configuration
Smart Voltage	2M to 32M	70ns (5V) to 150ns (3V)	x8, x16, x8/x16
3V Only	16M	120ns to 150ns	1Mx16/2M x 8
5V/12V	8M	70ns to 120ns	x8, x8/x16
Page Mode	16M 3V	120/50ns	x8/x16
Packages Supported – SOP, SSOP, TSOP, STSOP, CSP, BGA			

Applications:

Industrial/Medical	Consumer	Communications	Office Automation
Medical Equipment	Digital Cameras	Cable Modems	Laser Printers
Instrumentation	Set Top Box	Routers	Copiers
Vertical PDAs	Digital TVs	Cellular Phones	Fax/MFP

Lead Time:

A 16 to 16 week turn around time

Competition:

Intel – good quality, similar pricing to SHARP, good technology

AMD – good technology, most aggressive on price, good support lower tier customers

Flash Cross Reference:

		SHARP Flash	Intel Flash	AMD Flash
4M	Single Volt	LH28F004SUT	E28F004BV	
4M	Single Volt	LH28F400SUT	E28F400BV	
4M	Single Volt	LH28F400SUE	E28F400CV	AM29F400-E
4M	Single Volt	LH28F400SUN	PA28F400BV	AM29F400-S
16M	Single Volt	LH28F016SUT	E28F016SV	
8M	Dual Volt	LH28F008SAT	E28F00SA	
8M	Dual Volt	LH28F008SAN	PA28F008SA	
8M	Dual Volt	LH28F008SAR	F28F008SA	
16M	Dual Volt	LH28F016SAT	E28F016SA	
16M	Dual Volt	LH28F016SAN	DA28F016SA	
4M	Smart Volt	LH28F004SCT	E28F004S5/E28F004S3	
4M	Smart Volt	LH28F004SCN	PA28F004S5/ E28F004S3	
8M	Smart Volt	LH28F008SCT	E28F008S3/ E28F008S5	AM29F080-E
8M	Smart Volt	LH28F008SCR	F28F008S3/F28F008S5	AM29F080-F
8M	Smart Volt	LH28F008SCN	PA28F008S3/ PA28F008S5	AM29F080-S
8M	Smart Volt	LH28F800SGE	E28F800CV	AM29F080-E
8M	Smart Volt	LH28F800SGN	PA28F800BVAM29F080-S	
8M	Smart Volt	LH28F009SCT-V	E28F008S5	AM28F800-E
8M	Smart Volt	LH28F008SCN-V	PA28F008S5	AM28F080-S
8M	Smart Volt	LH28F008SCR-V	F28F008S5	AM28F080-F
8M	Smart Volt	LH28F008SCT-T	E28F008S3	
8M	Smart Volt	LH28F008SCN-T	PA28F008S3	
8M	Smart Volt	LH28F008SCR-T	F28F008S3	
16M	Smart Volt	LH28F016SCT	E28F016S5, E28F016S3	
16M	Smart Volt	LH28F016SCN	PA28F016S5, PA28F016S3	
16M	Smart Volt	LH28F160S3T	E28F160S3	
16M	Smart Volt	LH28F160S3NS	DA28F160S3	
16M	Smart Volt	LH28F160S5T	E28F160S5	
16M	Smart Volt	LH28F160S5NS	DA28F160S5	
32M	Smart Volt	LH28F320S3NS	DA28F320S3	
32M	Smart Volt	LH28F320S5NS	DA28F320S5	
4M	Adv Boot Block	LH28F400BGE	E28F400CV,E28F400B3,E28F400B5	AM29F400A-E
8M	Adv Boot Block	LH28F800BGE	E28F800CV,E28F800B3,E28F800B5	AM29F800A-E
16M	Adv Boot Block	LH28F160BGE	E28F160CV,E28F160B3,E28F160B5	

For More Details:

Flash Quick Reference Guide contains all active P/N, access times, organizations, voltages and packages. Documentation Order Number – SMT98170
Code Transfer Booklet Guide for how to send code to SHARP FTP site. Documentation Order Number – SMT98007

Product Description:

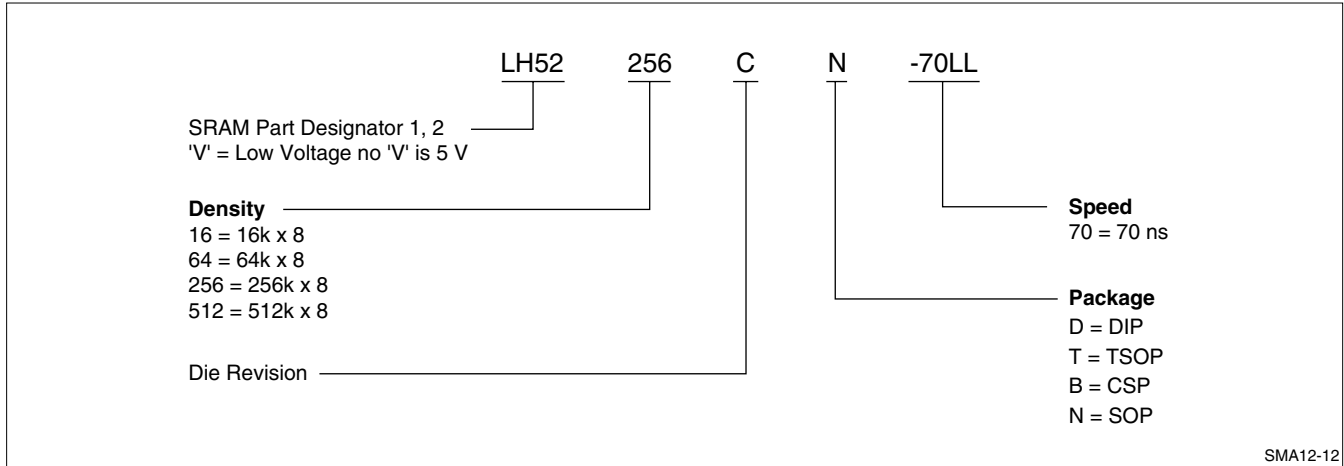
Flash is non-volatile memory, it can be written to (programmed) and erased. We have smart voltage Flash that operates at both 3V and 5V, we have boot block and single voltage devices. Densities from 2M bit to 32M bit currently and 64M bit in Q4 99. Data I/O and BP Microsystems programmers among others support SHARP Flash. On the Web page we have third party programmers listed, www.sharpsma.com. Note: SHARP Flash is NOR based.

SRAM

LH51xxxxx

LH52xxxxx

Part Number Key:



Available Products:

	Capacity	Access Time	Configuration
Ultra Low Power	16K to 2M	70ns to 300ns	x4, x8, x16
3V and lower 16K to 2M	70ns to 500ns	x8, x16	
Commodity	64K to 256K	70ns to 100ns	x8

*Available in industrial and wide temperatures

Applications:

Industrial/Medical

Medical Equipment
 Instrumentation
 Vertical PDAs

Consumer

Global Position System
 Set Top Box
 Digital TVs

Communications

Pagers
 Handheld Electronics
 Cellular Phones

Office Automation

Laser Printers
 Copiers
 Fax/MFP

Lead Time:2 Months

Competition:Samsung, Toshiba, Hitachi, Cypress.

SRAM Cross Reference:

	SHARP	Samsung	Toshiba	Hitachi
8Kx8	LH5168	KM6264	TC5565	HM6264A/B
32Kx8	LH52256	KM62256A	TC55257B	HM62256B/HY62256A
128Kx8	LH52D100	KM681000A	TC551001A	HM628128/HM6281128B

For More Details:Downloading the Memory Availability Guide from the Extranet for a full listing of available SRAM.

Product Description:

SHARP offers slow, low power SRAM, in access times of 70 ns, 85 ns and 100 ns. Densities are 16K, 64K/256K/1M and 2M bits. Uniqueness of SHARP SRAM is the Low Voltage Operation of 5V, 2.7V middle of 99. Packages SRAM is offered is: DIP, SKDIP, SOP, TSOP, STSOP and CSP
SRAM is Volatile memory, if the power is stopped to this memory device, loses what was stored inside the memory.

MROM

LH53xxxxx

Available Products:

	Capacity	Access Time	Configuration
CMOS 5V	256K to 128M	90ns to 150ns	sx8, x16
3V	1M/2M/4M/8M	100ns to 500ns	x8, x16
	16M/32M/64M	100ns to 120ns	x8, x16, x32
Flash Compatible Pinout	1M to 16M	100ns to 150ns	x8, x16
Page Mode	8M	120/50ns to 150/70ns	x8, x16
	16M/32M/64M	120/50ns to 100/30ns	x16, x32

Applications:

Industrial/Medical	Consumer	Communications	Office Automation
Medical Equipment	Global Position System	Pagers	Laser Printers
Instrumentation	Set Top Box	Handheld Electronics	Copiers
Vertical PDAs	Digital TVs	Cellular Phones	Fax/MFP

Lead Time:

4 - 6 weeks turn around time

Competition:

Samsung – good quality, similar pricing to SHARP, good technology, same product offering as SHARP
 Macronix – good technology, most aggressive on price, okay deliveries, similar product offering as SHARP

SHARP MROM to Flash Cross Reference:

	SHARP Mask ROM	SHARP Flash	Intel Flash	AMD Flash
1M	LH531V00T	28F010		AM28F010A
1M	LH53V1R00T	28F001BX-T/B		AM29F010
2M	LH532100BT	LH28F020SUT-N	28F020	AM28F020
2M	LH53V2R00T	LH28F020SUT-L		
4M	LH534A00T			AM28F040
4M	LH534800T	LH28F004SUT-N	28F004BX-T/B	
4M	LH53V4B00T	LH28F004SUT-L	28F0048L-T/B	
8M	LH53FV8P00T	LH28F800SUT		
16M	LH53FV16P00T	LH28F016SUT	28F016SV	

For More Details:

MROM Quick Reference Guide contains all active part numbers, access times, organizations, voltages and packages. Documentation Order Number – SMT97021-A
 Code Transfer Booklet, this simple booklet is a guide for a Customer to follow on how to send code to SHARP FTP site. Documentation Order Number – SMT98007

Product Description:

A Mask ROM is a non-volatile memory IC. This read only memory IC is manufactured with the Customers code etched into the silicon. So each Customers code placed into a MROM, makes the MROM a Custom IC. MROMs have been traditionally used as storage memory devices. SHARP has many different MROM Product Lines, a popular one is the Flash Pin Compatible MROM product line. Design Engineers can design with SHARP Flash then move to MROM for mass production, for the cost savings. Savings of half price at densities larger then 8M bit. Another Product line is the JEDEC standard Eprom pinout, we can replace the Eprom socket with a MROM.

FIFO

LH54xxxx

Available Products:

	Capacity	Access Time	Configuration
3.3V	9K to 72K	20ns to 35ns	512K x 18 to 4K x 18
	72K to 144K	20ns to 35ns	2K x 36 to 4K to 36
Shallow	0.5K	20ns to 35ns	64 x 9
Deep (available in extended temp)	4K to 72K	15ns to 50ns	512 x 9 to 8K x 9
Bi-directional 5V and 3.3V	72K	18ns cycle	256 x 36 x 2 to 1K x 36 x 2
Wide Word	36K	20ns cycle	1K x 36
Clocked Synch	9K to 72K	20ns cycle	512 x 18, 4K x 18

Applications:

ATM Switch
 Shared Memory Access
 Video Multiplexor
 Flight Simulator
 VME Board

Lead Time:

2 to 4 week turn around time

Competition:

IDT and Cypress are the biggest competitors. Both are highly leveraged with SRAM's and other system components. Both have Large, broad-line IC supplier with memory.

Future Roadmap:

4K x 18, 3.3V-LVTTL I/O, 66.7 MHz, Q2 99 – Standard x18
 1K x 36, 3.3V-LVTTL I/O, 66.7 MHz, Q2 99 – Unidirectional

For More Details:

Recommended documentation is the FIFO Cross Reference Guide. It contains all active part numbers, with crosses to the Competition. Documentation Order Number – SMT97013

Product Description:

FIFO stands for “First In, First Out”. A FIFO is a memory circuit which connects two digital systems and serves as a temporary storage place for information being sent from one system to the other. The sending system can send several data words, and the FIFO will store them until the receiving system is ready to accept them. The data words will be given to the receiving system in the same order, as they were stored, that is, “First In, First out.” FIFO is a volatile memory, only used for temporary storage.

Stack Chip

LRSxxxxx

Available Products:

	Access Time (ns)		Configuration	
	Flash	SRAM	Flash	SRAM
4M/1M	150	85	x8	x8
8M/1M	120 to 150	70 to 85	x8, x16	x8, x16
8M/2M	120 to 150	70 to 85	x8, x16	x8, x16
16M/2M	120 to 150	70 to 85	x8, x16	x8, x16

	Density	Access Time	Organizations
ROM/RAM	1M /256K	500ns/500ns	x8
	2M/256K	500ns/500ns	x8
	2M/1M	250ns/500ns	x8
	4M/2M	250ns/500ns	x8

Applications:

Consumer

- Cellular Phone
- Pagers
- Handheld PC

Industrial

- Test Equipment
- Medical

Lead Time:

Stock to 120 Days

Competition:

Hitachi, Mitsubishi, Toshiba, Fujitsu, Cypress

For More Details:

See the web site at www.sharpsma.com

Product Description:

Stack Chip is a combination of two IC's in one package. SHARP Stack Chip combinations consist of SRAM/FLASH and SRAM/MROM. This is a PCB space saving solutions for Designers. SHARP can customize the combinations of SHARP SRAM/FLASH or MROM.

4-bit Microcontroller

SM5Kxx SM56xx SM59xx SM35xx

Available Products:

Product Family	ROM Options	RAM Options	LCD	A/D	Part Number
Controller Series	2K x 8 to 8K x 8	128 x 4 to 256 x 4		10-bit	SM5K
LCD Driver Series	2K x 8 to 8K x 8	48 x 4 to 192 x 4	84-256 seg		SM5Lxx, SM39xx
Data Bank Series	6K x 23 to 24K x 23	512K x 8 to 8K x 8	480-3K seg		SM35xx

Applications:

Industrial/Medical	Consumer	Communications	Office Automation
Medical Equipment	Games	Cable Modems	Laser Printers
Instrumentation	Battery Charger	Routers	Copiers
Vertical PDAs	Watch	Cellular Phones	Fax/MFP

Development Tools:

- SME-50 Emulator expedites the development of 4-bit MCU programs
- Evaluation Boards provide the functions of the MCU running in the user's system
- Piggyback Chips are available for some versions
- OTP available for SM5K Series

Features:

- C-like Programming language for SM5K Series
- OTPs available for development purposes of SM5K Series
- Direct LCD display drive capability/Multiple channels of 10-bit A/D
- SM35xx Series offers access to external memory
- Low Voltage/Power Operation

Lead Time:

A 2 month turn around time

Competition:

NEC – US Market Leader
Hitachi - #2 in US Market

For More Details:

Recommended downloading the MCU Presentation from Extranet. The presentation has a good outline of all the MCU's SHARP offers.

Product Description:

SHARP has a Series of 4 bit Microcontrollers. Many functions built-in: remote control, real time clock, A/D Converters and LCD Drivers. This all offered in a Low Powered IC.

8-bit Microcontroller

SM85xx, LU85xxxx

Available Products:

Product Family	ROM Option	RAM Option	LCD	A/D	Part Number
General Purpose	40Kx8 to 60Kx8	1Kx8 to 2Kx8		8chx10-bit	SM85xx
Hand-held System/ Communication	16Kx8	2Kx8	956seg	8chx10-bit	SM8511
Small Graphic Display Systems/Games	4Kx8	1Kx8	32Kseg		SM8521
General Purpose/ Vending	48Kx8 MTP	1.5 Kx8		8chx10-bit	LU8540M0

Applications:

Industrial/Medical

Camera Lens Control
Servo Motion Control
Vertical PDAs
Vending Machines

Consumer

Games
Battery Charger
Watch

Communications

Cable Modems
Routers
Cellular Phones

Office Automation

Laser Printers
Copiers
Fax/MFP

Features:

LU8500F0 Flash version available for development of SM85 Series
SM85xx Series for Low-Power Applications
Built-in 8 channel 10 bit A/D converter/Access to external memory
SM8521 with built-in LCD controller w/2MB external memory
C-Compiler and ICE (In Circuit Emulator) development System
Low cost MTP versions w/in-circuit reprogramability

Development Tools:

In-Circuit Emulator with Emulation Pod expedites the development of 8 bit MCU programs
Yokogawa Development System supports SM8506
A Low Cost ROM ICE System is also currently under development
LU8500F0 Flash version 8 bit MCU is available for development of SM8500 Series
IAR Embedded Workbench/C-Compiler (Available 9/99)
Metalink ICE (Available 12/99)

Lead Time:

A 2 month turn around time for Masked ROM parts
N+3 lead time for quantities

Competition:

Intel – good technology, market leader

For More Details:

Recommended downloading the Extranet MCU Presentation for a full listing of the 8 bit Microcontrollers.

Product Description:

SHARP offers low power 8 bit MCU, with 8 channel 10 bit A/D converter. These 8 bit microcontroller have built-in LCD controllers, a cost savings of buying a controller and space in a handheld unit. The 8 bit MCU has built-in Flash Memory and MTP (Multiple Time Programming) available, Customer can use this memory to read and write and rewrite too. This Microcontroller Series is Registered Based, bit, byte or word operations.

16-bit Microcontroller

SM6004xx SM6006xx

Available Products:

Product Family	ROM Option	RAM Option	LCD	A/D	Part Number
General Purpose	60Kx8 to 124Kx8	2Kx8 to 3.5Kx8		8chx10-bit	SM6004/06
Handheld PDA	—	—	1024x256	8chx10-bit	SM6010

Applications:

Industrial/Medical	Consumer	Communications	Office Automation
Camera Lens Control	Games	Cable Modems	Laser Printers
Servo Motion Control	Battery Charger	Routers	Copiers
Vertical PDAs	Telephone ID	Cellular Phones	Fax/MFP

Features:

- LU600F0 Flash version available for development purpose
- Low Voltage (2.5V) and High Speed (10MHz at 2.5V, 30MHz at 5V)
- High Speed Multiplication & Division 16bit x 16bit = 1us & 32bit/16bit=3.9us
- Multifunctional Timer/Built-in A/D, D/A and real-time output
- Access to external memory 16MB
- SM6010 Romless version with built-in LCD controller

Development Tools:

- ROM-ICE Development System is available for Software Development
- LU6000F0 Flash Version 16 bit MCU is available for development of SM6000 Series
- IAR Embedded Workbench/C-Compiler (Available 5/99)
- Metalink ICE (Available 9/99)
- Yokagowa ICE

Lead Time:

A 2 month turn around time

Competition:

Intel – good technology, market leader

For More Details:

Recommended downloading the Extranet MCU Presentation for a full listing of the 16 bit Microcontrollers.

Product Description:

SHARP offers low power 16 bit MCU, with 8 channel 10 bit A/D converter. These 16 bit microcontroller have built-in LCD controllers, (a cost savings of buying a controller and the space in a handheld unit). The 16 bit MCU has built-in Flash Memory and MTP (Multiple Time Programming) available, Customer can use this memory to read and write and rewrite to. This Microcontroller Series is Registered Based, bit, byte or word operations.

ARM Products

System on Chip Design LH777xxx
 LU7xxx – S/W, H/W

Available Products and Tools:

Part Numbers	Part Description	Package Type	Suggested 1K Resale	Disti Cost	Design WIN Cost
IC Products					
LH77710B	ARM7DI CPU	144 QFP	18.50	15.50	\$12.50
LH77790B	ARM7DI MCU + LCD controller	176 TQFP	16.25	13.00	\$11.00
LH79402	ARM7TDMI MCU + 8K cache	176 TQFP	15.00	12.00	\$10.50
Support Tools					
LU7006H4A	ARM Embedded ICE Module	Box	1,995.00	1,895.00	1,695.00
LU7790H2A	790 HDTK (790H2BK2) + SDK (7V211H1)	Kit	2,495.00	2,395.00	2,095.00
LU7V211H2	ARM Software Tools (rev2.11)	Box	995.00	945.00	795.00
LU7790H6A	LU7790H2A + LU7006H4A	Kit	3,995.00	3,895.00	3,395.00
LU7790H2BK2	790 HDTK	Box	1,500.00	1,500.00	1,500.00
LU7790H2D1A	790 HDTK Daughtercard	Card	199.00	150.00	150.00
LU79402H2BK2	402 HDTK	Board	995.00	945.00	895.00

Competition:

Feature	790 & Competitors			402 & Competitors		
	SHARP LH77790	Cirrus 7100	Motorola MC68328	SHARP LH79402	Hitachi SH3(7708)	Motorola MCF5307
Architecture	32-bit RISC	32-bit RISC	16-bit CISC	32-bit RISC	32-bit RISC	32-bit RISC
Core	ARM7DI	ARM710	68000	ARM7TDMI	SH	ColdFire (V3)
Clock (MHz) 5V/3.3V	25/16.7	18.4	16/16	66	100	90
Voltage (Volts)	5/3.3	3.3	5/3.3	2.5-3.6	2.5/3.3	3.3
Dhrystone 2.1 (MIPS) 5V/3.3V	7.1/5.1	14	2.7/2.7	60	100	75
Memory Controllers	SRAM/ DRAM	SRAM/ DRAM	No DRAM	SRAM/ FPM/EDO	SRAM/ DRAM/ SDRAM	SRAM/ FPM/EDO/ SDRAM
LCD Controller: Passive 3-bit Color Support (Max.)	QVGA	No	No	n/a	n/a	n/a
LCD Controller: Practical Resolution (Max.)	VGA	1/2 VGA	1/2 VGA	n/a	n/a	n/a
UARTs	3	1	1	3	No	3
Counters/Timers	3	2	1	3	3	2
PWMs	3	No	1	1	No	No
10K unit price	\$12.74	\$15.00	\$10.00	\$11.76	\$17.85	\$17.21

Key Competitive Advantages:

Low power consumption, industry leading MIPS/watt, maximizes battery life
Low cost, industry leading MIPS/\$, allows for high performance in cost sensitive applications
Industry leading code density allows for small application size (Thumb core)/7T = Thumb
Best available tools set in the industry allows for rapid development of hardware and software
SHARP commitment to a standard product line of ARM based ICS allows for full upward migration path with higher levels of system integration

Applications:**Industrial/Medical**

Medical Equipment
Instrumentation
Vertical PDAs
Bar Code Scanners
Test Equipment

Consumer

Internet Appliances
Set Top Box
Digital TVs
Handheld/eBooks

Communications

Cable Modems
ATM, ISDN, xDSL
Smart Phones
2-way Pagers
LAN bridges,
routers, hubs

Office Automation

Screen Phones
Digital Copiers
Laser & Ink Jet Printers
Fax & MFP

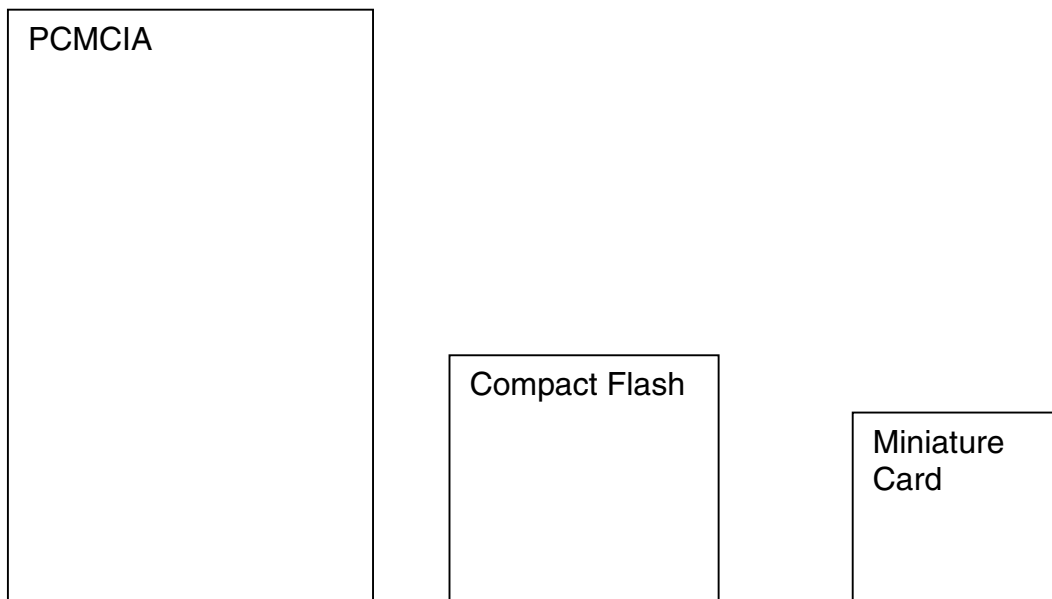
Flash Cards

Overview

Products Overview:

Flash Card Description	Features	Application
PCMCIA Flash and MROM Cards Personal Computer Memory Card International Assoc. 473 Companies	L W H 85.6 x 54.0 x 3.3 (Type1) 85.6 x 54.0 x 5.0 (Type 2) 85.6 x 54.0 x 10.5 (Type 3) Random Access by Byte High Speed Random Access	Note PC Network Bridge Measurement Equipment Digital Camera Medical Game
Miniature Flash and MROM Cards MCIF: Miniature Card Implement's Forum 58 Companies	33.0 x 38.0 x 3.5 60 +3 terminals Random Access by Byte Compatible with FTL equipment (ex. Windows 95 revised)	Digital Camera Handheld PC PDA Voice Recorder Game Cellular Phone
Compact Flash Cards CFA: Compact Flash Association 70 Companies	L W H 36.4 x 42.8 x 3.3 50 terminals ATA Interface (Good Compatibility) Access Units: 512 byte Min. Suitable for Serial Data Processing	Digital Camera Handheld PC PDA Voice Recorder Game Cellular Phone

Product Category by Size of Card:



For More Details:

There is a Flash Card Presentation kit, that contains mechanical samples and presentation information for any Customer. Data Sheets, Reliability Data and Roadmaps to the future. Currently All PCMCIA and Miniature Flash Cards are supported on the Data I/O and BP Microsystems equipment.
Compact Flash can be programmed by any laptop.

Compact Flash

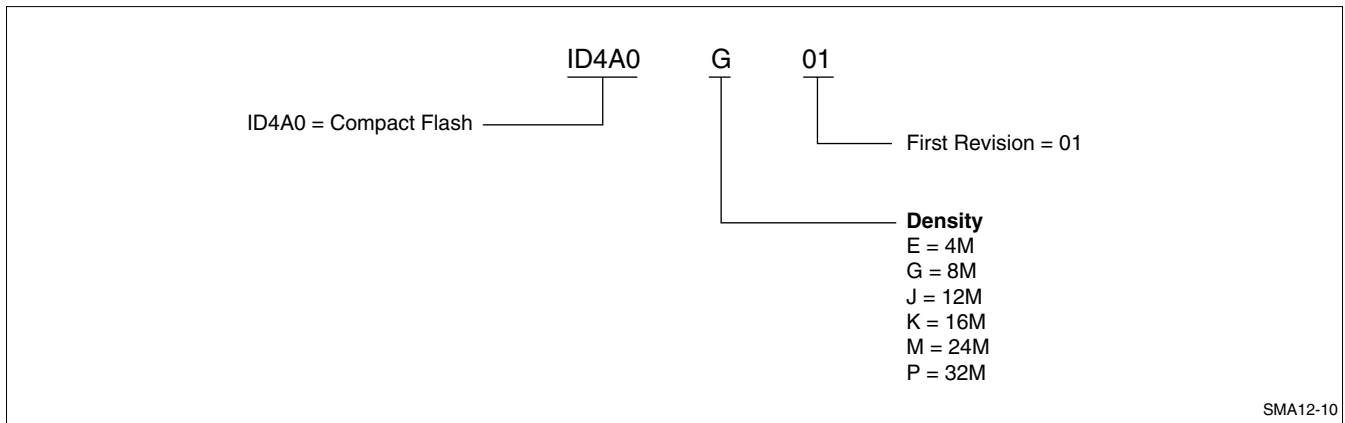
ID4A0xxx

Available Products:

Part Number	Density	Voltage
ID4A0E01	4M Byte	3V,5 V
ID4A0G01	8M Byte	
ID4A0J01	12M Byte	
ID4A0K01	16M Byte	
ID4A0M01	24M Byte	
ID4A0P01	32M Byte	

*Developing 48M/64M and 128M Byte

Part Number Key:



Applications:

Consumer

- Cellular Phone
- Pagers
- Handheld PC

Industrial

- Test Equipment
- Medical
- Digital Camera

Lead Time:

2 months

Competition:

Sandisk – first to market, most aggressive on price, Leader in market
 Hitachi – good technology, aggressive on price
 Simple Technology – Aggressive in Retail Market

Compact Flash Cross-References:

	SHARP	Sandisk	Hitachi	Smart Modular	Simple Tech
4M	ID4AXE01	SDCFB-04-101		SmartCPT04	STI-CFAD/4
8M	ID4AXG01	SDCFB-08-101	HB286008C	SmartCPT08	STI-CFAD/8
12M	ID4AXJ01	SDCFB-10-101	HB286015C	SmartCPT12	STI-CFAD/12
16M	ID4AXK01	SDCFB-15-101	HB286030C	SmartCPT16	STI-CFAD/16
24M	ID4AXM01	SDCFB-20-101		SmartCPT24	STI-CFAD/24
32M	ID4AXP01	SDCFB-24-101		SmartCPT32	STI-CFAD/32
48M	ID4AXS01*				
64M	ID4AXU01 *				

*Mass production in February 1999

For More Details:

Flash Quick Reference Guide contains all active part numbers, access times, organizations, voltages, drawing dimensions. Documentation Order Number – SMT98170
 Presentations on Extranet
 Flash Card mechanical sample folder

Product Description:

SHARP became a member of the Compact Flash Association in Late 1998. SHARP manufactures Compact Flash 4M Byte through 32M Byte, and started mass production in September 1998. Samples are available, the data sheets are on the Web and Fast Fax. This is SHARPs first ATA Card. Note SHARP Compact Flash uses NAND Flash inside, we currently use Toshiba Flash. A ATA Compact Flash Card is designed to operate just like a IDE hard drive. No Formatting is necessary, because the controller inside is very intelligent. It has error cell correction features, so you don't have to worry about bad cells in the Flash being written too.
 ATA = AT Attachment standard. This is equivalent to the IDE standard for a Harddrive, this standard is used in Cameras, laptops and other mobile equipment.

Miniature Flash Card

ID340xxx/ID341xxx

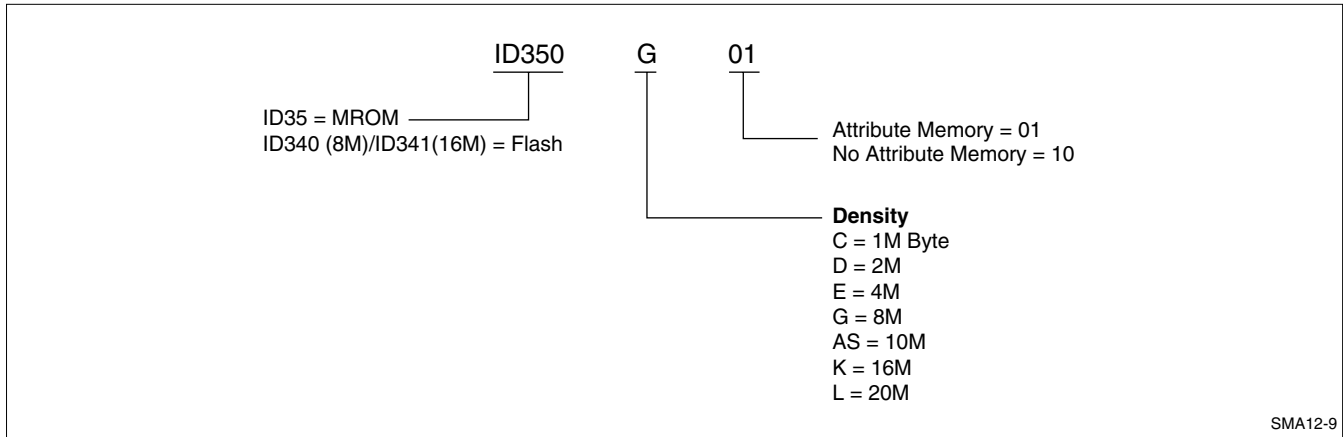
Miniature MROM Card

ID350xxx

Available Products:

	5V Access Time	3V Access Time
2M Byte = ID340D01 and ID341D01	100ns	150ns
4M Byte = ID340D01 and ID341D01	100ns	150ns
8M Byte = ID341G01	100ns	150ns
16M Byte = ID341K01	100ns	150ns

Part Number Key:



Applications:

Consumer

- Cellular Phone
- Pagers
- Handheld PC

Industrial

- Test Equipment
- Medical
- Digital Camera

Lead Time:

2 months

Competition:

- Intel – first to market, most aggressive on price, Leader in market
- Smart Modular – good technology, aggressive on price, Second in market
- Simple Technology – strength retail, and internet sales

Flash Miniature Card Cross-References:

	SHARP	Intel	Simple Tech
2M	ID340D01	IFM002A	STI-MCFL/2
4MB	ID341E01	IFM004A	STI-MCFL/4
8MB	ID341G01	IFM008A	STI-MCFL/8
16MB	ID341K01	IFM016A	STI-MCFL/16

For More Details:

Flash Quick Reference Guide contains all active part numbers, access times, organizations, voltages, drawing dimensions. Documentation Order Number – SMT98170
Presentations on Extranet
Flash Card mechanical sample folder available

Product Description:

SHARP is a member of the MCIF, Miniature Card Implementers Forum. The Product Line contains 4 devices, the 2M Byte, 4M Byte, 8M Byte and the 16M Byte. This Flash Card needs to be formatted prior to programming, it is supported on the Data I/O PSX500. The Controller inside the Card is not as intelligent as the Compact Flash Card. So this card is not a Plug N Play like the Compact Flash. A driver needs to be downloaded for this card to work in a PC environment. The Driver can be found on the M-Systems Web Page www.m-sys.com, go to there technical support to download the driver. The Miniature Card is a Linear Flash Card. SHARP is the only supplier of MROM Miniature Cards.

Flash PCMCIA Card

ID240xxx, ID245xxx, ID243xxx, ID244xxx

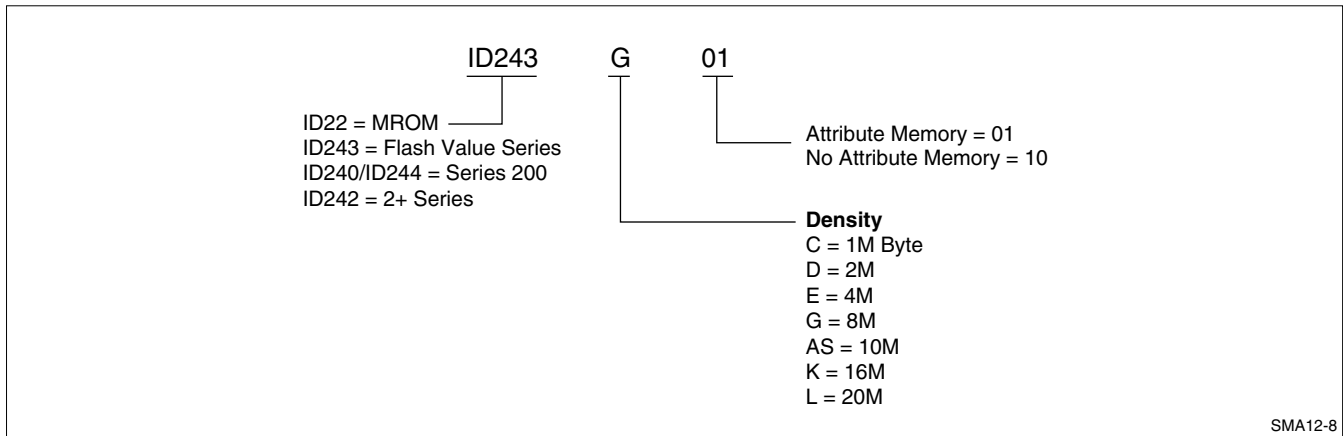
MROM PCMCIA Card

ID22xxxx

Available Products:

	Density	Part Number Series
Value Series 100	2M/4M/6M/8M/16M	ID243 – 8M Flash/ID245 – 16M Flash
Series 200	1M/2M/4M/8M/16M/20M	ID240 – 8M and 16M SA
Series 200	2M/4M/8M/16M/20M	ID244 – 8M and 16M SC
2+ Series	2M/4M/8M/10M/16M/20M	ID242 – 8M and 16M SC

Part Number Key:



Applications:

Consumer

- Cellular Phone
- Pagers
- Handheld PC

Industrial

- Test Equipment
- Medical
- Digital Camera

Lead Time:

2 months

Competition:

Intel – most aggressive on price, Leader in market

Flash PCMCIA Cross-References:

	SHARP	Intel	Description
2MB	ID243D01	IMC002FLSC	Value Series 100
4MB	ID243E01	IMC004FLSC	Value Series 100
6MB	ID243F01		
8MB	ID243G01	IMC008FLSC	Value Series 100
16MB	ID243K01	IMC016FLSC	Value Series 100
32MB	ID243P01		
2MB	ID240D01	IMC002FLSA	Series 200
4MB	ID240E01	IMC004FLSA	Series 200
8MB	ID240G01		
10MB	ID240H01	IMC010FLSA	Series 200
16MB	ID240K01		
20MB		IMC020FLSA	Series 200
2MB	ID242D01		
4MB	ID242E01	IMC004FLSP	Series 2+
8MB	ID242G01	IMC008FLSP	Series 2+
10MB	ID242H01		
16MB	ID242K01		
20MB	ID242L01	IMC020FLSP	Series 2+
40MB		IMC040FLSP	Series 2+

For More Details:

Flash Quick Reference Guide contains all active part numbers, access times, organizations, voltages, drawing dimensions. Order Number – SMT98170
 Presentations on Extranet
 Flash Card mechanical sample folder available

Product Description:

SHARP Linear PCMCIA card comes in one package, Type I. A driver needs to be downloaded from the Web, to make this card to work within a PC environment. The Driver can be found on the M-Systems Web Page www.m-sys.com, go to there technical support to download the driver. PCMCIA stands for, Personal Computer Memory Card International Association, founded in 1989, created to make a standards for cards. This Card has a switch on the side that can lock the card and keep it from being written over. Also SHARP offers MROM PCMCIA, this is a more cost effective solution if code does not need to be rewritten.

Flash Memory Modules

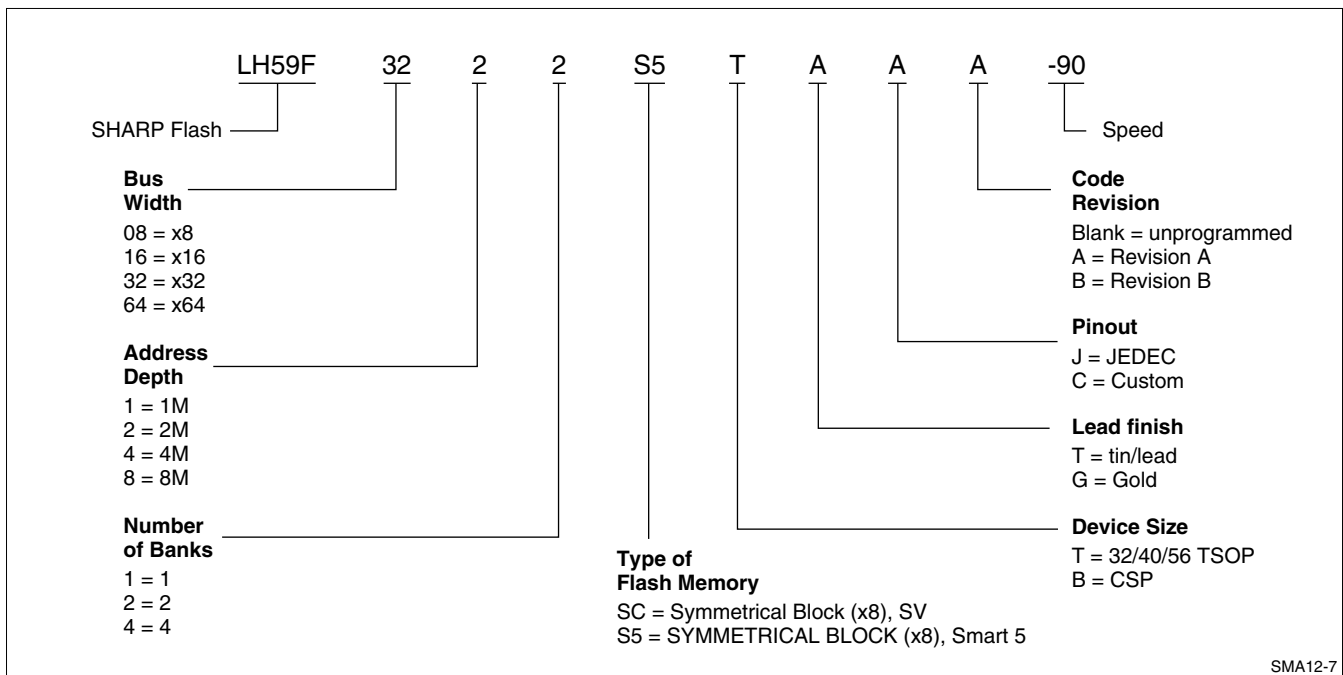
LH59Fxxxxxxx

Available Products:

80 pin SIMM Flash Modules

Density	Organization		Pinout
4M Byte	1M x 32	LH28F008SC	JEDEC Standard
8M Byte	2 x 1M x 32	LH28F008SA	Custom
	2 x 1M x 32	LH28F008S	JEDEC Standard
	2M x 32	LH28F150S5	JEDEC Standard
16M Byte	2 x 2M x 32	LH28F160S5	JEDEC Standard

Part Number Key:



Future Product:

80pin SIMM Flash Modules

Density	Organization		Pinout
2M Byte	512K x 32	LH28F400SC	JEDEC Standard
16M Byte	4 x 1M x 32	LH28F008SC	JEDEC Standard

168pin DIMM Flash Modules

Density	Organization		Pinout
8M Byte	1M x 64	LH28F008SC	JEDEC Standard
16M Byte	2M x 64	LH28F160S5	JEDEC Standard
32M Byte	4M x 64	LH28F320S5	JEDEC Standard

Applications:

- Medical Equipment
- Personal Computers
- Industrial Equipment
- Measurement Equipment
- Printers
- Routers

Module Advantages:

- One design gives customers multiple end products
- OEM can hit different price/performance points
- Allows customers to offer options or upgrades of system features

Features:

- Upgradeability
- Multiple density and speed options in same form factor through the use of presence detect pins.

Lead Time:

2 month turn around time

For More Details:

See the Extranet for Product Marketing Presentation
 The Flash Module Kit – Order number IC416, call Mark Hampson for approval

Competition:

Smart Modular, Kingston

RF Products

LNB for Satellite Receiving System – BSIHxxxx

Available Products:

LNB for Satellite Receiving System

	Reception System	Input Frequency
Compact Ku-band LNB	DBS, FSS, ECS, Telecom	10.95 to 12.75 GHz
LNB with built-in Polarizer	DBS	10.95 to 11.7 GHz
LNBF (with built-in feedhorn)	DBS	10.95 to 11.7 GHz
LNBF (with built-in feedhorn)	DBS	11.7 to 12.2 GHz
LNBF (with built-in feedhorn)	DBS	12.2 to 12.7 GHz
C-band LNB	TVRO	3.7 to 4.2 GHz

Applications:

Satellite Systems for Home or Commercial
VSAT

Features:

Wide band type receiving all broadcasting channels (analog & digital) of Astra
Originally developed feed-horn waveguide makes the wide-band, low-noise characteristics possible.
Compact and lightweight package thanks to high density multilayer PCB
Low consumption current design for energy saving (110mA (TYP.))

Lead Time:

12 to 16 week turn around time

Competition:

Alps, Japan – most serious competitor, currently has Direct TV business, and other partial DSS Business
Gardner, Dallas Tx – old C Band supplier, now very aggressive Ku band supplier. Big advantage: lead time
MTI, Taiwan – Cheap and most unreliable product
Cal Amp – Very aggressive in MDU market

For More Details:

Recommended documentation is reviewing the Presentation on the Extranet and Electronic Components 98' 10 catalog

Product Description:

The LNB (Low Noise Blockdown Converter) is an outdoor RF component that provides the first frequency down conversion of the downlink satellite signal. Maintaining the stability of that converted signal is essential to providing the best possible signal to the consumer's house for processing. Most suitable for receiving the Astra Satellite, which is the most popular European broadcasting satellite. This unitized LNB has an originally developed feed-horn and polarizer to receive both horizontal and vertical polarized waves.

RF Products

Digital CATV Tuners – VH2Fxxxx (Cable TV Tuners)

Electronic Tuners – VTSTxxxx

Available Products:

Product Type	Description
VTSxxx Series, NTSC and PAL with/without PLL	FCC, FTZ, CISPR, CCIR, Wide range of types SAA, BS905
CASDxxx Series, Single Conversion with/without Return Path	IF Output, I2C Bus PLL
CADDxxx Series, Double Conversion with/without Return Path	IF Output, 3-wire PLL
RFSxxx Series, Combined Tuner/ Demodulator/Modulator	PLL-tuned, 181 channels, NTSC, I2C + 3-wire interfaces
Television Modulators	With antenna input. Some models PLL tuned. NTSC, PAL, B/G/I/K

Applications:

TV for Home or Commercial

Digital CATV Tuners Features:

- Miniaturization for thin and compact configuration of onboard sets
- Low power consumption design for improved energy saving performance
- Built-in SAW filter for superior jamming wave exclusion performance
- Single Conversion – VH2F Series (Available)
- Double Conversion – VH1B Series (IF output)
- VH1B Series (I/Q output) (Available)
- Both provide full CATV frequency capability (88-862 MHz)
- 12mm height of VH2F package makes it ideal for PCI and ISA cards
- Excellent phase noise and rejection
- Testing software available

Electronic Tuner Features:

- Miniature size achieved using thin profile, low height design in industry standard tuners (terminal shape and terminal pin arrays)
- Series provides models corresponding to domestic product standards of Europe, China, Japan and the United States.

Lead Time:

A 12 - 16 week turn around time

Competition:

Panasonic, Japan – leading supplier of double conversion tuners
Temic, Germany – very aggressively priced single conversion tuner
Philips – dominates the analog combination tuner market, as well as the PC tuner market. SHARP has the edge on them in price, but not functionality.

For More Details:

Recommended documentation is reviewing the Presentation on the Extranet and Electronic Components 98' 10 catalog

Product Description:

A cable modem system could deliver digital access speeds of more than 27 Mbps several hundred times more bandwidth than the faster modems (28.8 kbps) can deliver now over dial up telephone lines. A cable modem will operate much like today's fast PC modems: once the bits get inside the modem they are processed exactly like data on any other digital network. This is made possible by popular digital modulation techniques. The downstream transmission (headend to user) is 64/256 QAM (Quadrature Amplitude Modulation). The upstream or return path transmission (user to headend) is QPSK (Quadrature Phase Shift Keying) or 16 QAM.

Cable Standards:

MCNS (Multichannel Cable Network Systems). Consortium of MSO's defining the interfacing specifications for high speed data over cable.
DAVIC (Digital Audio/Visual Council). Industry standard for creating end to end interoperability of broadcast and multimedia communication
Open Cable defines interoperability of new generation, digital STB's Patterned after the MCNS document.

RF Products

Tuner for Satellite Receiving System - BSFxxxx

Available Products:

Tuner for Satellite Receiving System	Package Size and Inputs	Input Range
DBS Tuner with FM Demodulator	35cc, 22cc types, single and dual input	950 to 2150 MHz
DBS Tuner, Double – Conversion	IF Output	950 to 2050 MHz
DBS Tuner, Single Conversion	IF Output	950 to 2150 MHz
DBS Tuner	I/Q Output	950 to 2150 MHz

Applications:

Satellite Systems for Home or Commercial

Features of DBS Tuner for Analog Broadcasting:

Super compact size to facilitate to make the VCR with the built-in BS compact and to build into the television set

A “flat type” 13mm high, which is best suited for thin type equipment, is also available.

Low-Voltage drive, low-power consumption design

Design with the built-in digital AFC output and keyed AFC circuit suitable for HDTV

A complete series of models designed for various input conditions

Features of Digital DBS Tuners:

DBS tuner for digital broadcasting features high quality of signal transmission and improved elimination ability of various kinds of rejection thanks to using SHARP’s original ICs.

Features of Digital DBS Tuners:

Built-in digital decoding circuit

Low distortion design

High linearity AGC circuit built in

High rejection elimination ability against alternate modulation rejection/image rejection/IF rejection

Lead Time:

12 to 16 weeks

Competition:

Alps, Japan

Mitsumi, Japan – not a serious threat to our core business

Rockwell – provides a direct conversion IC solution that is approx \$1 less than our modular solution.

Other direct conversion IC suppliers: Analog Devices, Maxim, LSI Logic, NEC

For More Details:

Recommended documentation is reviewing the Presentation on the Extranet and Electronic Components 98' 10 catalog

Product Description:

DBS Tuners with Built-in FM Demodulator, SHARP has a Wide line-up of DBS Tuners to cover worldwide broadcasting regulations, and specifications for satellite receiving systems.

RF Products

Remote Control - RMxxxx

Available Products:

Remote Control
Television Remote Control 12, 24, 36, 44 button matrix Configured to requirements

Applications:

DVD, CD Player
TV, VCR, Set Top Box
Air Conditioner
Lighting

Features

Simple Command Transmission
Visible Response (On/Off, Play, Record etc.)
Small Data Packet (Low Data Rate)
Long Range
Application Specific Code

Lead Time:

A 6 to 8 week turn around time

Competition:

HP and Toshiba

For More Details:

Recommended documentation is reviewing the Presentation on the Extranet and Electronic Components 98' 10 catalog

Product Description:

What is CE Remote – One way Communication (Uni-Directional), Command & Control for Home Appliance (No feedback from HA), One-to-One Transmission, Typically over 10m Distance (Japanese Manufacturers' Internal Standard: 7m), Variety of Code Format, Low Data Rate (below 1 kbps), Sub-carrier base Amplitude Shift Keying (30kHz~56.8kHz)(56.8kHz is popular in North America).
In an attempt to shorten development time, mechanical parts used in SHARP's standard cabinet remote control series have been unified. Four major cabinet sizes are manufactured in this series, each with a corresponding number of maximum keys (24, 36, 40, 44). Also available is a thin, compact "card type" remote control which concentrates all fundamental functions into 12 easy-to-use keys.
Possible to set the number of keys required for each application
Possible to design the indication plate
Thin, compact design

IrDA Products

Communication Modules

RY5xxxx, GP1Hxxx, GL1Fxxxx, IS1Uxxxx

IrDA Control
GP2WxxxxYK

IrDA Data
GP2WxxxxYP

Infrared LED
GL5xxx
GL710

Photodetectors
PD4xxxx

Available Products:

Product	Data Rate	Packages
IrDA Data		
RY5xxxx Series Communication modules and Encoder/Decoder IC, ASK and IrDA	ASK up to 38.4kbps, 1 meter; IrDA data up to 4M bps, 1 meter, 3.3V ~ 5V	Tx, Rx, IC, Transceivers, bi-directions
GP1Hxxx Series Communication modules IrDA	IrDA data up to 115.2 kbps, 20 cm and 1 meter modes, 2.7V ~ 5V	Transceiver, bi-directional
GL1Fxxx, IS1Uxxx Series Communication modules IrDA	IrDA data up to 115.2 kbps, 1 meter, 3V and 5V	Tx, Rx units
GL5xxxx Series Infrared LED	IrDA 1.0, 115.2 kbps, IrDA 1.1, 4M bps	5mm
PD4xxxx Series Photodetectors	IrDA 1.0, 115.2 kbps, IrDA 1.1, 4M bps	5mm, Right Angle
IrDA Control		
GL710 Infrared LED	IrDA control 75 kbps, -10 meter	5mm, Right Angle
GP2Wxxx Series IrDA Control Transceivers Communication LZ85xxx and Encoder/Decoder ICs	IrDA control 75 kbps, -10 meter	Transceivers, ICs

Applications:

Data	Mobile Communication	IrDA Control
Digital (Printer/Scanner)	Phones, Pagers	Multi-media PC (Web-TV)
Network (IR Adapter)	Digital Cameras	DVD, Set Top Box
PC (Desktop, Notebook, Mobile)	Windows CD Apps	Mouse, Keyboard, Gamepad

IrDA Data Features:

- Easy to Maintain (Assembly/Failure Analysis/Service Parts)
- Lower Current Consumption (LED)
- Fewer External Passives
- Emitter/Receiver in One Compact Featured Package
- IrDA Compliant, 2,400 bps up to 4Mbps
- Compatible and SHARP ASK
- IrDA 1.0/IrDA 1.1 Technologies Became Common for PCs, IrDA 1.2a Low Power Option Newly Developed for Telecommunication Products 20cm Range Option

Mobile Communications Features:

Industry's Smallest Package Design for IrDA data
Size 8.7(W) x 4.2 (D) x 3.15 (H) mm
Wide Range Operating Voltage (Vcc=2.7V ~5.5V)
Built-in Stand by Mode Function (typ. 50ns at stand by mode)
Lowest Current Consuming Device
Capable for either top-view or side-view
Leadless SMD Package

IrDA Control (formerly IrBus/CIR) Features:

New Standard for Command and Control Devices by SHARP, Intel, Microsoft and HP
Wireless Simultaneous Command and Control for PC Peripherals
Visible Response
Corresponding Feedback (Bi-Directional, Simultaneous Operation)
Small Data Packets
Long Range, Quick Response (typ. 8m, 13.8 msec)
Data Rate: 75 kbps

Lead Time:

Some devices from stock
Production ~ 3 months

Competition:

Hewlett Packard
Vishay Telefunken
Novalog

For More Details:

Recommended documentation is reviewing the Presentation on the Extranet and Electronic Components 98' 10 catalog
www.irda.org

Product Description:

Three Infrared Communication Technologies, Consumer Electronic Remote Control, IrDA Standards and IrDA Control These devices can send data to another device without any wire connections. These devices are wireless data transmitters and receivers.

CCD Products

CCD Cameras
YH7B5x/YH8B5x

CCD Modules
YHG7B1x/YH8B1x

CCD Chip Sets
YH7S5x

Available Products:

CCD Sensor/Peripherals

Resolution	TV Std.	Type
1/5" Format		
362 x 582	NTSC, EIA	Color, B/W
512 x 492	NTSC	Color
512 x 582	PAL	Color
1/4" Format		
512 x 492	NTSC, EIA	Color, B/W
512 x 582	PAL, CCIR	Color, B/W
659 x 494	VGA, Prog. Scan	Color
768 x 494	NTSC, EIA	Color, B/W
752 x 582	PAL, CCIR	Color, B/W
1/3" Format		
512 x 492	NTSC, EIA	Color, B/W
512 x 582	PAL, CCIR	Color, B/W
659 x 494	VGA, Prog. Scan	Color
768 x 494	NTSC, EIA	Color, B/W
752 x 582	PAL, CCIR	Color, B/W
1174 x 884	N/A	Color

CCD Color Cameras and
CCD Color Camera Modules (with or without lens)

YH7Bxxx/YH7Cxxx/YH78xxx
YH7Bxxx/YH7Cxxx/YH7Sxxx

TV System	Output Signal	Iris Control
NTSC/PAL	Composite, Y/C	EE, Mechanical

Applications:

Surveillance

Security

Education

Remote Classrooms
Microscopes

Commercial

Dental/Medical
Automotive
Recreational Vehicles

Features:

- Flicker free/Hunting free
 - Fast Frame rate – Stable video data for compression
- Privacy Shutter for protection of privacy
- Compact base (d=50 mm) will fit on narrow monitor top
- Soft base provides camera stability

Lead Time:

2 month turn around time

Competition:

	Video Price	Color	Video Clarity	Notes
Philips	\$85	Excellent	Very Good	Video conference Leader
SHARP	\$85	Very Good	Excellent	Flicker-free
Sony	\$90	Fair	Good	Poor in low-light
Panasonic	\$95	Good	Fair	Strong in high-end cameras
Toshiba	\$90	Good	Good	Currently not widely used

For More Details:

- See the Extranet for Product Marketing Presentation
- Book “Designing with CCDs” — Ref No. SMT93021
- CCD Catalog — Ref. No. HT961D

Product Description:

Taking full advantage of its own highly sensitive CCD and miniaturization technologies including SMT, SHARP offers very compact CCD camera module for multi-media image capture. A separable module type, which consists of a very compact camera board (CCD board) and a single signal processing board (SPB), and a CCD integrated module type are available to provide system design for various applications. In addition, widely accepted video output (Composite, Y/C) will minimize design lead time of host system realizing short time to market

SHARP has developed a color CCD camera unit, which is best, suited for desktop video conferencing (DTVC) applications. Available in an attractive enclosure, its compact design allows for easy system integration with immediate savings in development cost and time. With built-in enhanced Auto Gain control (AGC) the camera offers a superior quality video and is also a suitable camera for video compression. Its new “flicker-less” function will dramatically eliminate the flickering seen on the monitor from the fluorescent lights. Various available configurations with an optional microphone make this high performance camera very flexible for your desired system requirements.

Opto Electronics

Voltage Regulators/Solid State Relays

PQxxxx/Sxxxxx

Available Products:

Low Power Loss Regulators PQxxxxx
Package: TO-220, Full Mold, SC-63, SOT-23L
Voltage Drop (V): 0.5 Max.
Features: Built in, on/off control circuit, reset signal circuit, etc.

Solid State Relays Sxxxxx
DIP Package Type, Viso: 4.0 kVrms
SIP Package Type, Viso: 4.0 kVrms

Applications:

Computer Motherboards
Power Supplies
3.3V and 3.0V available for Pentium
Variable Type Available (Cyril)
Cellular Phone
Set Top Box
PDAs/Handheld Powered Products

Features Low Power Loss Regulators:

Low Noise and Ripple Voltage
Energy Efficient
Power loss is 1/5 of general purpose 3 terminal type
Fixed and Variable Output Voltage
No Heat Sink Required
Thermal Shut Down Feature Available

Lead Time:

2 month turn around time

Competition:

Hewlett Packard – wide product line, aggressive price
Toshiba

For More Details:

Good Documentation to use as reference, Opto electronic/Power Devices 98', Reference number HT311S and Electronic Components Reference number HT974D.
Our Web site www.sharpsma.com has an online cross-reference to competitor Photo couplers and other opto components.

Product Description:

We have Solid State Relays in 100V and 200V compact lines, some with built-in zero-cross circuit. We have three Categories of Regulators; Chopper, Low Voltage and Primary. Our Regulators have low power characteristics; low noise and ripple voltage. There are many applications in PC environment and power supplies.

Regulator Categories

Chopper	PQ1Cxx
Low Voltage	PQxxxx
Primary	PQ1PFxx/PDxx

Opto Electronics

Photocoupler PCxxxx /Sxxxxx

Available Products:

Photocouplers PCxxxx/Sxxxxx	
Single Phototransistor	Mini-flat SMD, DIP 6-Pin, DIP 4-Pin, Special DIP 6-Pin
Darlington Phototransistor	Mini-flat SMD, DIP 6-Pin, DIP 4-Pin
Bi-Directional Linear Output	Mini-flat SMD, DIP 6-Pin
Photothyristor Couplers	Mini-flat SMD, DIP 5-Pin, DIP 6-Pin, DIP 8-Pin
OPIC	Mini-flat SMD, DIP 6-Pin, DIP 8-Pin
Photocoupler Categories	
Single and Darlington and Transistor Output	PC3xx/7xx/8xx
OPIC Photocoupler	PC4xx/9xx/6Nxx
Phototriac Coupler	S1xx/S2xx
Photothyristor Coupler	SxxMDxx/SxxMExx

Applications:

Photocoupler – used where signals must pass between two circuits, but must maintain high electrical isolation

- Changing logic levels between circuits
- Blocking noise transmission
- Isolating logic level from AC line voltage
- Industrial controls
- Modems
- Power supplies

Features of Photocouplers:

Since photocouplers are used in AC line-powered circuits, they are subject to safety tests:

- Underwriters Laboratory (UL)
- Canadian Standards Association (CSA)
- Verband Deutsch Electrotechniker (VDE)
- High Isolation Voltage
- Using Double Transfer Mold Technology Viso > 5000 V
- Compact SMD Type Automatic Mounting
- Wide Product Line-up With Approved Safety Standards
- Variety of Outputs

Lead Time:

A 2 Month turn around time

Competition:

Hewlett Packard – wide product line, aggressive on price
Toshiba – wide product line

For More Details:

Good Documentation to use as reference, Optoelectronic/Power Devices 98', Reference number HT311S and Electronic Components Reference number HT974D.
Our Web site www.sharpsma.com has an online cross-reference to competitor Photo couplers and other opto components.

Product Description:

SHARP has a very large line of Photocouplers. These products can be used in industrial controls and used to block noise transmissions.

Opto Electronics

Photointerrupters

GPxxxx

(OPIC Photointerrupter/ Fiber Optics Cables/Transmitters Receivers)

Available Products:

	Detect/Emit Gap	Slit Width
Photointerrupters (Transmissive) GP1xxx		
Single Phototransistor (mm)	0.9 to 5.0	0.15 to no slit
Darlington Transistor (mm)	0.9 to 10.0	0.15 to 2.0
With IC Functionality (mm)	0.9 to 10.0	0.25 to 2.5
Photointerrupters (Reflective) GP2xxx		
Optimum Checking Distance (Light Modulation type) (mm)		2 to 15
Focal Distance (Without modulation) (mm)		1 to 7

Application:

PC Peripherals

CD-ROM/DVD-ROM
 Mouse, Floppy Disk Drive

Office Automation

Printer
 Copier

Audio Visual

Audio, VCR
 Camcorder
 Home Theater System

Features of Photointerrupters:

- Variety of Shapes and Outputs
- Ultra-compact Models
- Using two-layer Resin Mold
- High-functional Models Using OPIC Technology
- Models With Leadless Chips
- Suitable for High-Density Mounting
- High Resolution Models

Lead Time:

2 month turn around time

Competition:

Hewlett Packard – wide product line, aggressive price
 Toshiba

For More Details:

Good Documentation to use as reference, Optoelectronic/Power Devices 98', Reference number HT311S and Electronic Components Reference number HT974D.

Our Web site www.sharpsma.com has an online cross-reference to competitor Photo couplers and other opto components

Product Description:**Advantages of SHARP**

Injection mold technology for supplying subminiature sensor

PCB/PCB – less photointerrupters with connector

Photointerrupters with light modulation function

Photointerrupters with encoder function

Case type photointerrupters

Opto Electronics

Laser Diodes

LT0xxxxxx/SHODAxxxxx

Available Products:

	Wavelength (nm)	Optical Output (mW)
Visible Laser Diodes	635 and 650	3 to5
Infrared Laser Diodes	780 to 830	20 to 80

Application:

DVD, DVD-ROM Players
 DVD-RAM Players
 CD-R (Compact Disc Recorder)

Features:

High power, low noise and short wavelength types are included in products line-up
 High precision package is employed. Built-in PIN photodiodes enable easy control of optical power output
 Long life, high reliability
 Stable single transverse mode, low threshold current

Lead Time:

12 to 14 week lead time

Competition:

Hitachi, Rolm, Sony, Sanyo, Toshiba

For More Details:

Recommend documentation is the Extranet Presentation and Electronic Components catalog
 Laser Diode Catalog and Data Book

Product Description:

Laser Diode denotes a device, which uses a semiconductor p-n junction in a laser system.
 Cross Reference list being developed

Opto Electronics

Hologram Laser Unit
LT0Hxxxx

Available Products:

Wavelength (nm)	780
Optical Output (mW)	5

Application:

DVD, DVD-ROM Players
DVD-RAM Players
CD-R (Compact Disc Recorder)

Features:

By using hologram, conventional optical pickup functions of prism, photodiode and laser diode have been integrated in single package.
Enable easier assembling and adjustment of optical pickup, as well as making the unit compact

Lead Time:

A 12 to 14 week turn around time

Competition:

None

For More Details:

Extranet Presentations and Electronic Components catalog.
Laser Diode/Hologram Laser Data Book

Product Description:

The hologram laser combines hologram technology with semiconductor laser technology. It was first conceived for use in the optical pickup of CD players to achieve lower component count, reduced form factor, and lighter weight. The hologram laser replaces the conventional prism (used to bend optical paths) with a hologram grating. This dramatically simplifies the pickup's optical system construction. By integrating a photodiode with the semiconductor laser chip in a single package, component count is reduced further.

Opto Electronics

LEDs

IR LED – GLxxx LED – LTxxxx/GMxxx

Available Products:

Type	Part No.	Description
AlGaInP LED Lamps	LT1Zxx	Color: Red, Orange, Sunset Orange, Amber, Yellow-Green, Green
Chip LED Device	LTxx	Color: Red, Red (HL), Sunset orange, Yellow, Yellow-green, Green Lens type: Colorless transparency, Milky Diffusion, Color Diffusion
Dichromatic LED Lamps	GLxxx	Luminous Intensity: (mcd) -0 to 600. Lens type: Colored diffusion, Colored transparency, Colorless transparency, Milky diffusion
Dot Matrix LED	LT50xx/LT51xx	No. of dots: 5x7, 8x8, 16x16, 24x24 Colors: Red, Sunset Orange, yellow, Yellow-green, Green, Yellow-green+Red
Dot Matrix LED Unit	LT15xx/LT14xx	
LED Array	LT46xx/LT45xx	Illuminance length (mm): 105 to 258 Colors: Red (HL), Yellow-green
LED for Bar Graphic Display	GL112/107/105	Color: Red, Yellow, Yellow-green + Red Lens Type: Case mold, All Resin No. of dots - 5,7,12
LED Lamp	GL5U/H/T/6U/ LT95/LT3/GL6H/U /GL8T/U/H	Color-Red, Sunset orange, Yellow, Yellow-green, Green
LED Large Lamp	LT95/GL7/LT96	Colors: Red (SL), Red (HL), Red, Sunset orange, Yellow, Yellow-green, Yellow-green + Red (SL), Yellow-green + Red (HL), Yellow-green + Red Lens type: Colored diffusion, Colorless transparency, Milky diffusion
LED Panel Display	LT92/99/93/94/ LT40	Type: Case mold, Mold built-in reflector, Thin case mold, insert mold Colors: Red, Yellow-green (HL), Yellow, Yellow-green+Red Display format: 40 x 2, 16 x 2, 20 x 2
Mini-mold LED Lamp	LT1xxx11A,21A,G L1xx111/112/211/ 212/135/136.	Colors: Red, Red (HL), Sunset orange, Yellow, Yellow-green Lens type: Colored diffusion, Colorless transparency
Numeric LED	GL9xx/GL8xx	Structure Mold Type, Substrate Type Colors: Red, Sunset Orange, Yellow, Yellow-green, Green, Yellow-green+Red, Yellow-green +Red (HL) Luminosity: High & Super Luminosity & Dichromatic
Solid State Lamp (lamp cluster)	LT66xx/67/86	Colors: Yellow-green+Red (SL), Yellow-green+Red (HL)
Infrared LEDs(Top & Side Viewing)	GLxxx	Packaging: Epoxy resin, Resin stem, Resin with lens, Bi-directional resin with lens, Metal TO-18 Wavelength 950 nm

Application:**Indoor/Outdoor Signs**

Highway Signs
Sports Stadiums
Public Transportation

Automotive

Tail Lights
Turn Signals
Dashboard Clusters

Features of LED's:

Brightness: measured in millicandela (mcd)
Wavelength (Color): measured in nanometers (nm)
6~660nm = Red
6~590nm = Yellow
6~555nm = Green
6~470nm = Blue
Size (typical 3mm or 5mm)

Lead Time:

A 12 to 14 week turn around time

Competition:

Hewlett Packard – wide product line, aggressive on price
Toshiba – wide product line

For More Details:

Good Documentation to use as reference, Chip LED Devices, Ref. No. HT309S, Optoelectronic Devices Ref. No. HT-314S and Electronic Components Reference number HT974D.
Our Web site www.sharpsma.com has an online cross-reference to competitor Photo couplers and other opto components.

Product Description:

Light Emitting Diodes (LED)

LCD Overview

Small LCD:

Product Category	Display Diagonal
Electroluminescent	4.7" ~ 10.4"
Sub-VGA Color (Passive)	5.0" ~ 6.5"
Sub-VGA Monochrome (Passive)	2.8" ~ 5.7"
Small TFT LCD Module (NTSC)	3.0" ~ 6.4"

Large LCD:

Product Category	Display Diagonal
Middle Passive LCD	6.0" ~ 17.7"
Middle TFT LCD	6.4" ~ 12.1"

Monitor LCD:

Product Category	Display Diagonal
Large TFT LCD	13.8" ~ 18.1"
Middle TFT LCD	6.4" ~ 12.1"

Inverters – Power the LCD:

Endicott Research Group, Inc (ERG)	www.EGRPower.com
Linfinity Microelectronics	www.linfinity.com
O2 Micro	www.occ.com/02micro/
TDK	http://corp.tdk.com/industry/index.html
Xentek Power Systems	www.xentek.com/

Controller Cards:

These are needed to change the signal from Analog to Digital and back to drive the LCD.

Advantech	www.advantech.com
Applied Data System	www.flatpanels.com
View-Tek	www.view-tek.com

See www.sharpsma.com Web Page for more links to other suppliers

Backlighting Manufacturers:

JKL Components Corp.	www.jkllamps.com
Visualux Ltd.	www.visualux.com

See www.sharpsma.com Web Page for more links to other suppliers

Touchscreen:

Resistive	
Touch Technology	www.touchtechnology.com
Elographics	www.elotouch.com
Captive	
Touch Technology	www.touchtechnology.com
Micro Touch	www.microtouch.com

See www.sharpsma.com Web Page for more links to other suppliers

Electroluminescent LCD

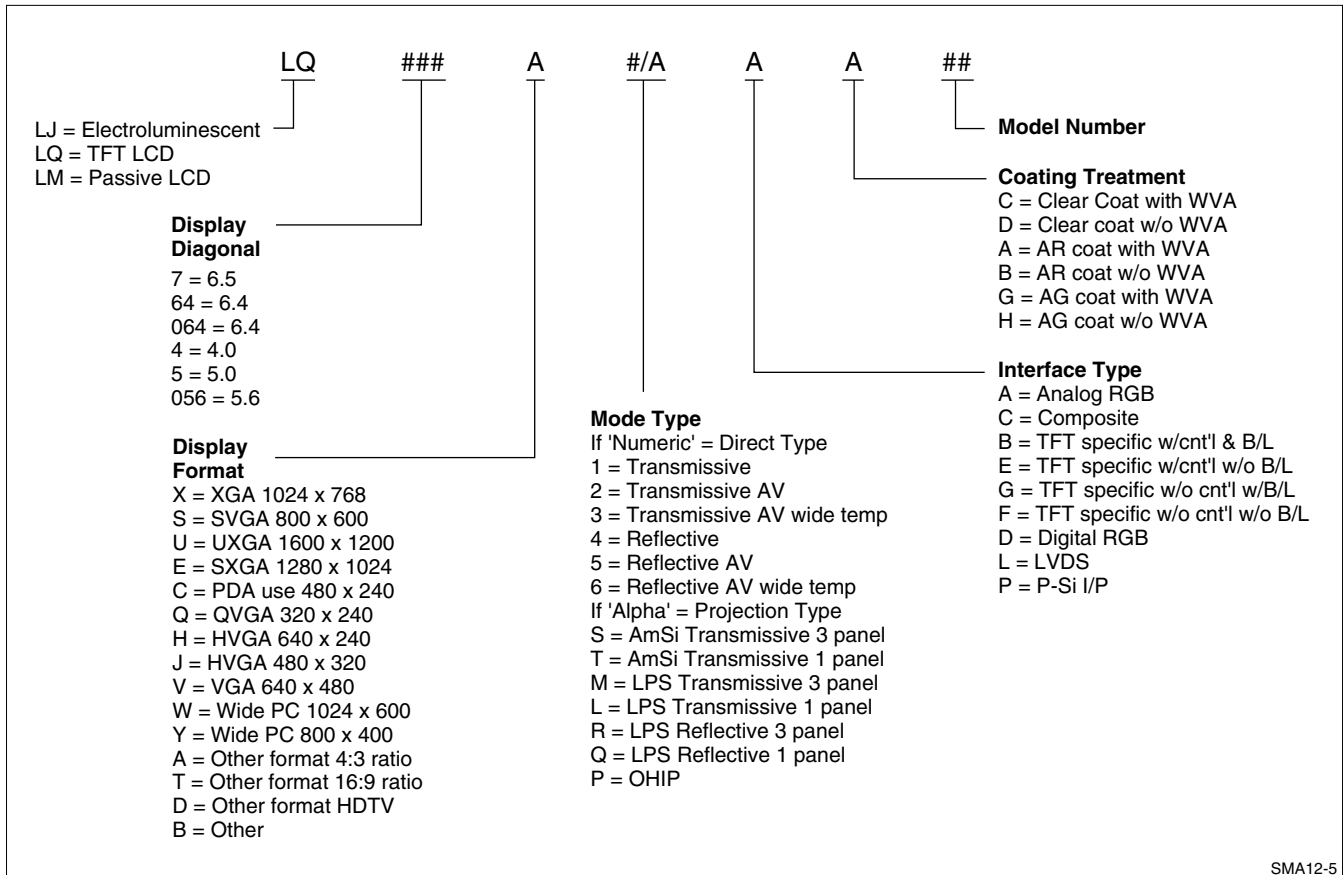
(Passive, Black and Yellow)

Sizes 10.4" and below

Available Products:

Part Number	Display Diagonal	Display Format	Brightness (nits)
LJ32H028	4.7"	320 x 240	35
LJ64EU34	8.9"	640 x 400	35
LJ64H034	8.9"	640 x 400	35
LJ64H051	9.4"	640 x 480	35
LJ64K052	9.4"	640 x 480	16
LJ64H052	10.4"	640 x 480	35
LJ64K052	10.4"	640 x 480	16

Part Number Key:



Applications:

Medical
Instrumentation
Kiosk
ATM

Features:

Extended Temp -20 to +80 C
High Speed Response
High Durability
Wide Viewing Cone

Competition:

Planar

For More Details:

Extranet for LCD Marketing Presentation
CD-ROM for Marketing Presentation and Roadmaps

Product Description:

Electroluminescent LCDs are Black and Yellow displays. They are used in Medical because of the viewing cone is so wide, and they are rugged.

Sub-VGA Color LCD

(Passive, Color)

Sizes 6.5" and below

Sub-VGA Monochrome LCD

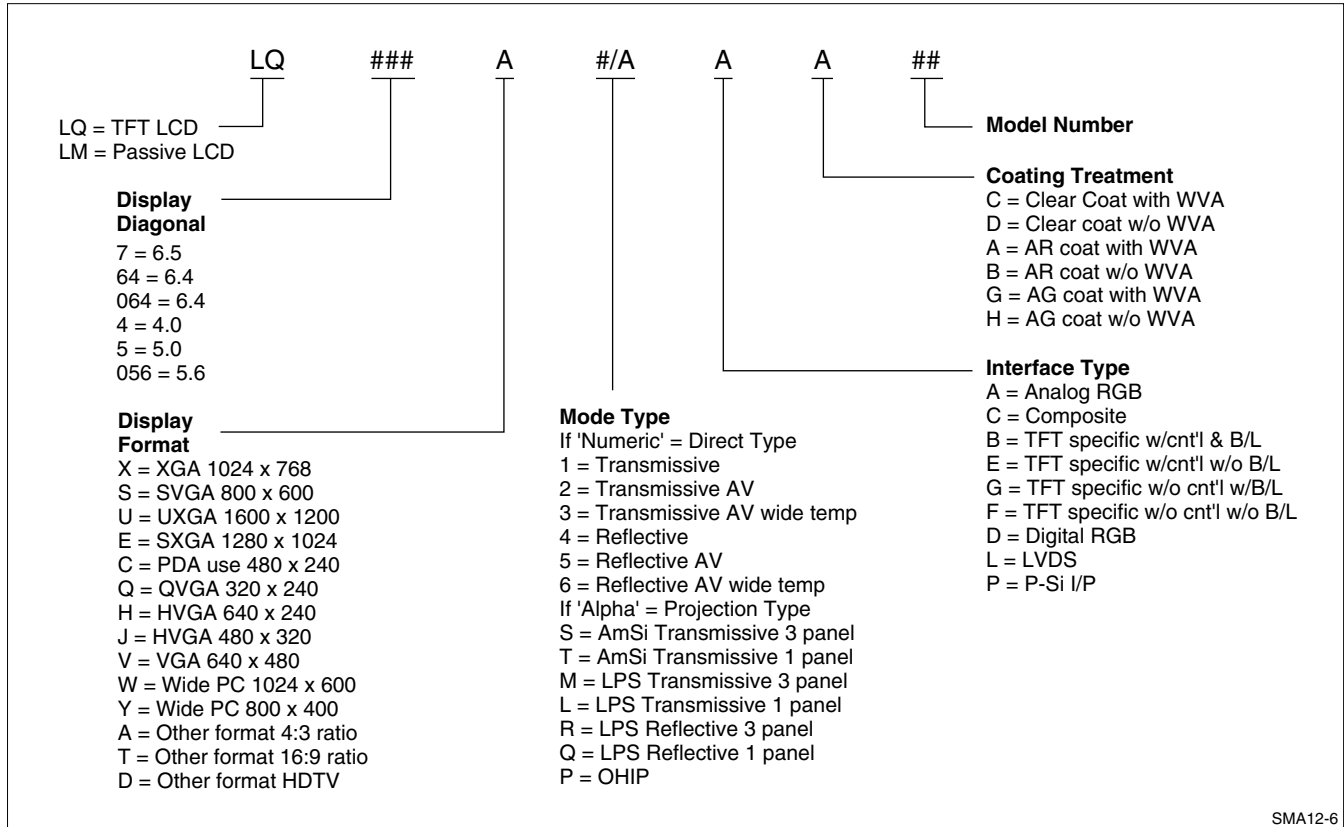
(Passive, Black and White)

Sizes 5.7" and below

Available Products:

	Part Number	Display Diagonal	Display Format	Brightness (nits)
SUB VGA Color	LM5Q31/32	5.0"	320 x 240	150/120
	LM6Q32	5.5"	320 x 240	150
	LM6Q35/40	5.5"	320 x 240	220
	LM057QC1J01	5.7"	320 x 240	200
	LM7M632	6.5"	640 x 240	150
SUB VGA Mono	LM24022	2.8"	240 x 160	10
	LM320081	4.7"	320 x 240	Not Available
	LM32K101	4.7"	320 x 240	50
	LM32P18	4.7"	320 x 240	70
	LM24014H	5.17"	240 x 64	Not Available
	LM24014W	5.17"	240 x 128	Not Available
	LM24P20	5.7"	320 x 240	50
	LM32007P	5.7"	320 x 240	70
	LM32019P	5.7"	320 x 240	70
	LM32019T	5.7"	320 x 240	100
	LM32K071	5.7"	320 X 240	60
	LM32P07	5.7"	320 X 240	60
	LM32P073	5.7"	320 X 240	60
	LM5H40TA	(DMTN Technology) – Wide Viewing Cone, High Contrast, Low Power, Fast Response		
	LM4Q40TA	(DMTN Technology) – Wide Viewing Cone, High Contrast, Low Power, Fast Response		

Part Number Key:



Applications:

- Medical
- Instrumentation
- Kiosk
- ATM

Features:

Sub-VGA Color

- Low Power
- Fast Response
- Cost more than the Sub-Mono's LCD
- Colors (4096 and more on certain models)

Sub-VGA Monochrome

- Low Power
- Fast Response
- Gray Scale
- Cost Effective LCD

Competition:

- Kyocera, Optrex

For More Details:

Extranet for LCD Marketing Presentation
CD-ROM for Marketing Presentation and Roadmaps

Product Description:

SUB –VGA Monochrome LCD is a Black and White display, with less than 640 x 480 Display format. These displays are cost effective for applications in Instrumentation, Kiosk, ATM and Medical.
SUB –VGA Color LCD is a with same technology as Sub-Monochrome but with Colors, with less than 640 x 480 Display format. These displays are cost effective for applications in Instrumentation, Kiosk, ATM and Medical.

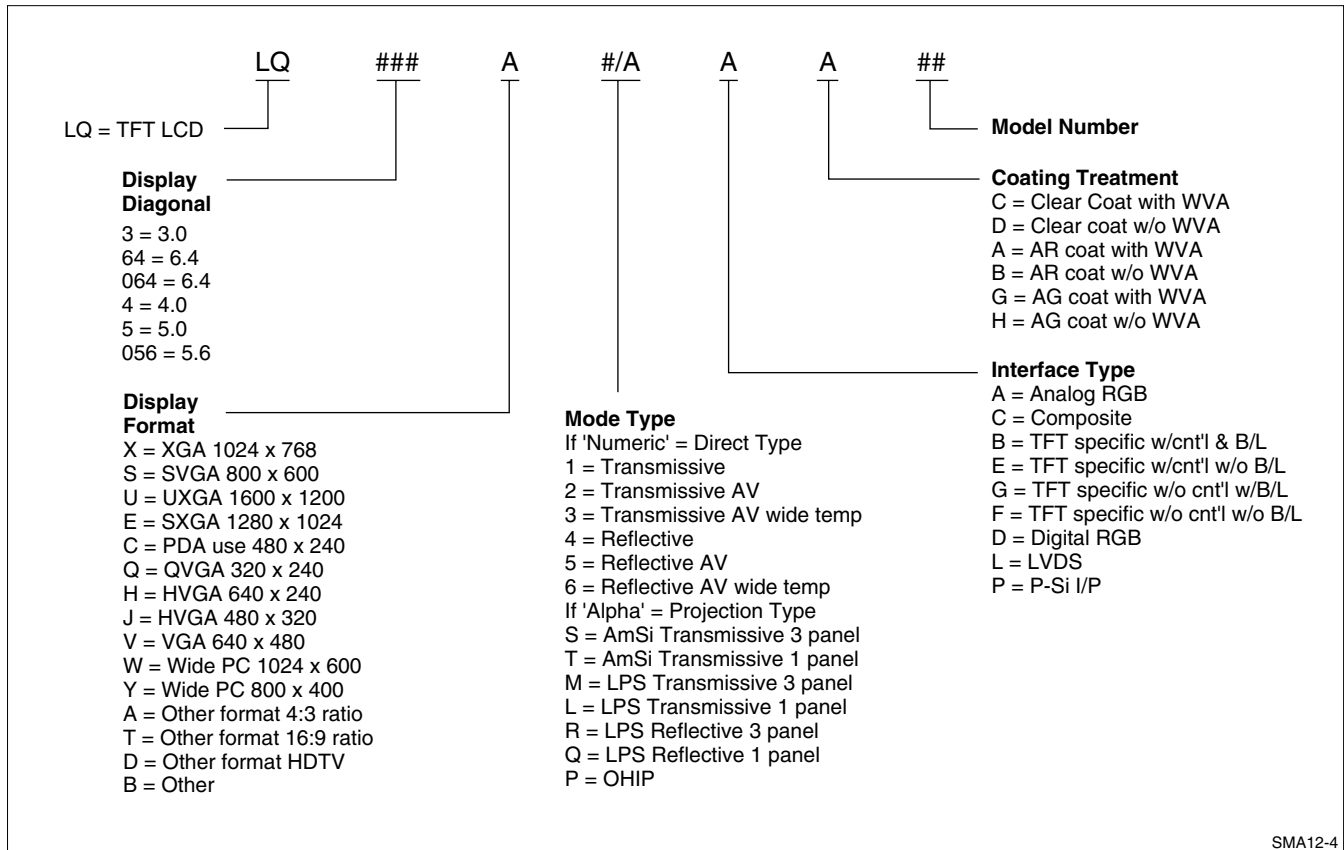
Small TFT LCD Modules

(NTSC ready, inverter and Controller included)
 Sizes below 6.4"

Available Products:

Part Number	Display Diagonal	Display Format	Brightness (nits)
3LU8E	3.0"	128 x 234	400
64LU7E	6.4"	640 x 234	120
LQ5AW136	5.0"	320 x 234	300
LQ056A3CH01	5.6"	320 x 234	300
LQ064xxxxxx	6.4"	480 x 234	350

Part Number Key:



SMA12-4

Applications:

- | | |
|------------------------------|--------------------|
| Medical | Desktop PC/Monitor |
| Research/Measuring Equipment | Automotive |
| Notebook PC | Games |
| Financial | Cameras |

Features:

- Superior display quality
- High Speed Response
- High Luminance and long life time
 - Least amount of backlight needed
- Low Heat
- Less backlight tubes (in most cases) than competitors
- Low Power Consumption
- Thin, lightweight, compact and durable
- High Contrast
- Very good Aperture Ratio, better than Competitors

Competition:

NEC, Toshiba, LG

For More Details:

- Extranet for LCD Marketing Presentation
- CD-ROM for Marketing Presentation and Roadmaps

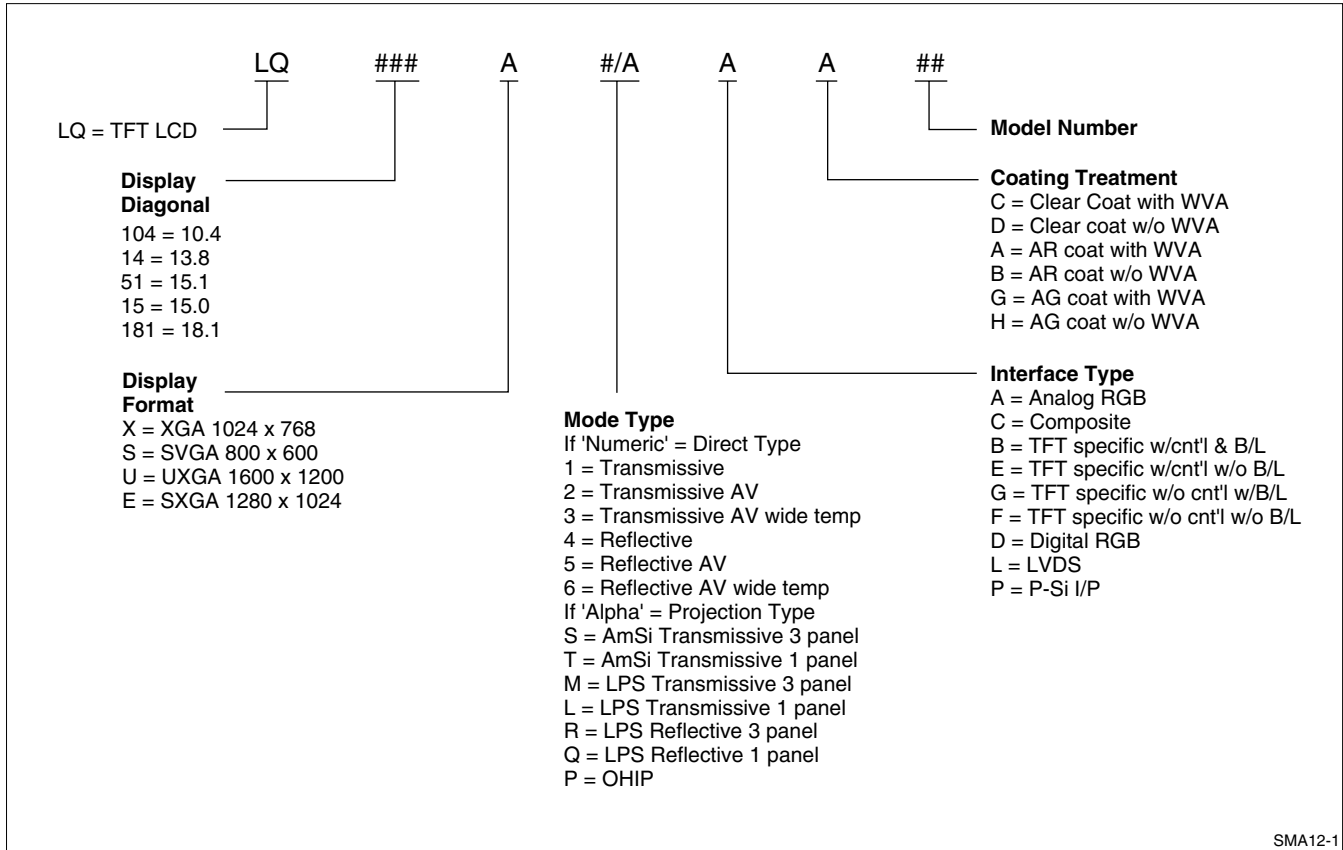
Large Passive LCD

Sizes Between 6.0" to 17.7"

Available Products:

	Part Number	Display Diagonal	Display Format	Brightness (nits)
VGA Monochrome (Black and white)	LM64K112	6.0" Mono Passive	640 x 480 wide temp	65
	LM64P11	6.0" Mono Passive	640 x 480	80
	LM64K104	7.4" Mono Passive	640 x 480 wide temp	50
	LM64P101	7.4" Mono Passive	640 x 480	70
	LM64P122	8.0" Mono Passive	640 x 480	80
	LM64K83/837	9.4" Mono Passive	640 x 480	45
	LM64P83L	9.4" Mono Passive	640 x 480	65
	LM64P89L	10.4" Mono Passive	640 x 480	75
Color STN	LM8V30	7.7"	640 x 480	70
	LM8V302	7.7"	640 x 480	120
	LM8V31	7.7"	640 x 480	55
	LM8M64	8.1"	640 x 240	110
	LM10V332	10.4"	640 x 480	160
	LM12S402	12.1"	800 x 600	100
	LM12S49	12.1"	800 x 600	180
	LM15X80	15.0"	1024 x 768	200
	LM18X94	17.7"	1024 x 768	200

Part Number Key:



Applications:

- Point of Sale (POS)
- Portable
- Amusement
- Measuring Instruments

- Factory Automation
- Mobile Handheld PC
- ATM Banking

Features:

- Superior display quality
- High Luminance and long life time backlights (CCFT)
- Thin, lightweight, compact and durable
- High Contrast (SHARP Addressing), better then competitors
- Low Power
- Cost effective LCD
- Fast Response Time
- VGA-Monochrome part numbers above have gray scaling

Competition:

Kyocera, Optrex, Sanyo, Hitachi

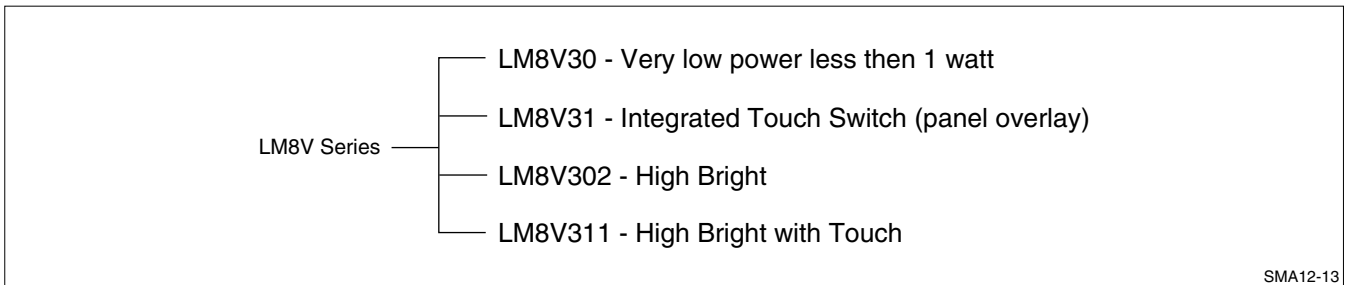
For More Details:

Extranet for LCD Marketing Presentation
CD-ROM for Marketing Presentation and Roadmaps

Product Description:

Middle Passive category consists of all LCDs Passive 6.0 to 12.1 inches. Passives are LCDs that control the LCD cell with Capacitors, high contrast, low power. All Passives are manufactured in Nara, Japan.

Special Note:



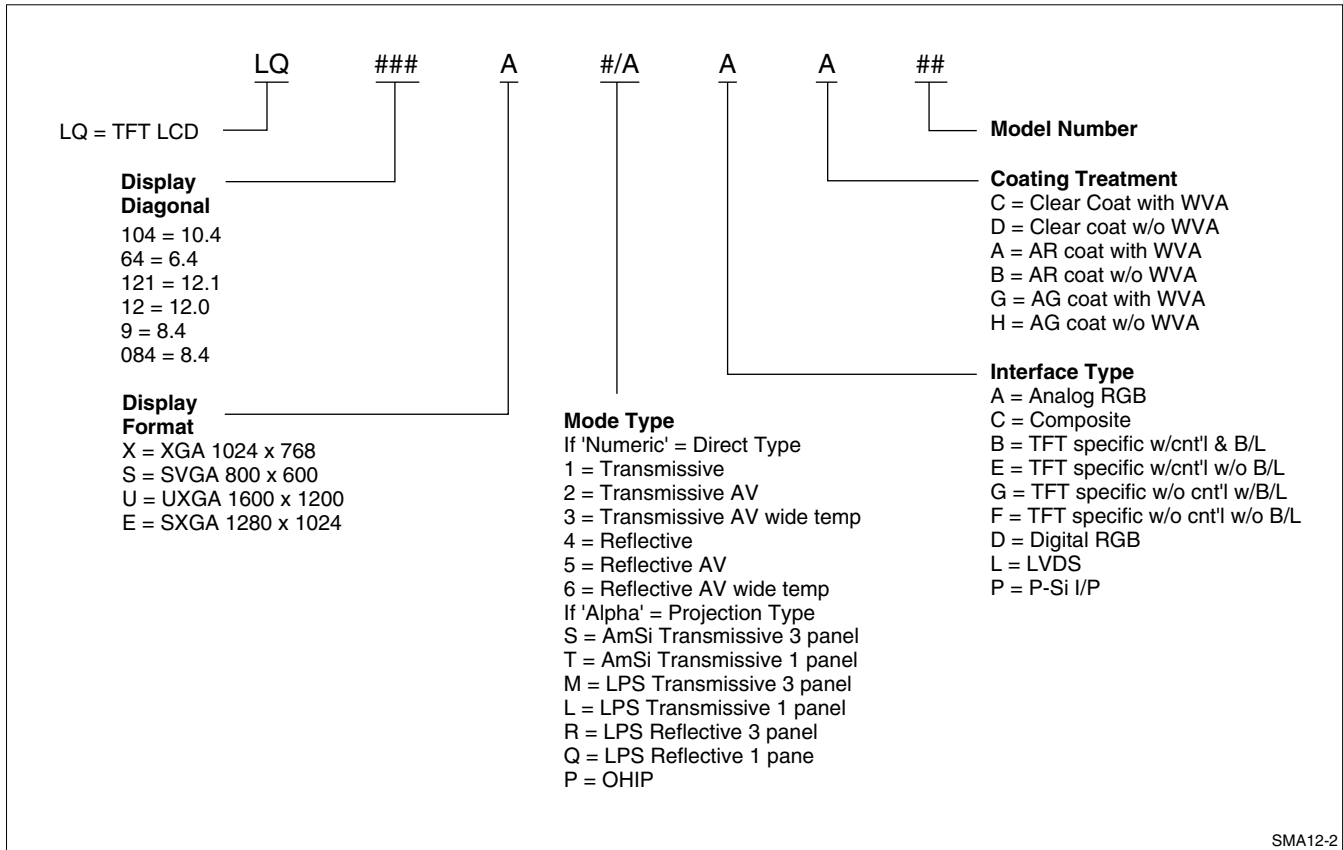
Large TFT LCD

Sizes Between 6.4" to 12.1"

Available Products:

Part Number	Display Diagonal	Display Format	Brightness (nits)	NOTES
LQ64D343	6.4" TFT	640 x 480	300	
LQ084V1DG21	8.4" TFT	640 x 480	300	
LQ9D340	8.4" TFT	640 x 480	115	
LQ104V1DG11	10.4" TFT	640 x 480	350	
LQ104V1DC31	10.4" TFT	640 x 480	Not Applicable	
LQ10D367	10.4" TFT	640 x 480	200	
LQ10D421	10.4" TFT	640 x 480	300	
LQ121S1DG11	12.1" TFT	800 x 600	250	
LQ12S41	12.1" TFT	800 x 600	270	Reversible scan (turn LCD). Better view cone than DG11

Part Number Key:



Applications:

Medical
Research/Measuring Equipment
Notebook PC

Features:

Superior display quality
High Speed Response
High Luminance and long life time
Least amount of backlight needed
Less backlight tubes (in most cases) than competitors
Low Power Consumption
Thin, lightweight, compact and durable
High Contrast – ie: 300:1 - black versus white, better than Competitors 150:1
Very good Aperture Ratio, better than Competitors
Replaceable backlights

Competition:

NEC, Mitsubishi, Toshiba

For More Details:

Extranet for LCD Marketing Presentation
CD-ROM for Marketing Presentation and Roadmaps

Product Description:

Large TFT (Thin Film Transistor) category consists of all LCDs TFT 6.4 to 12.1 inches.

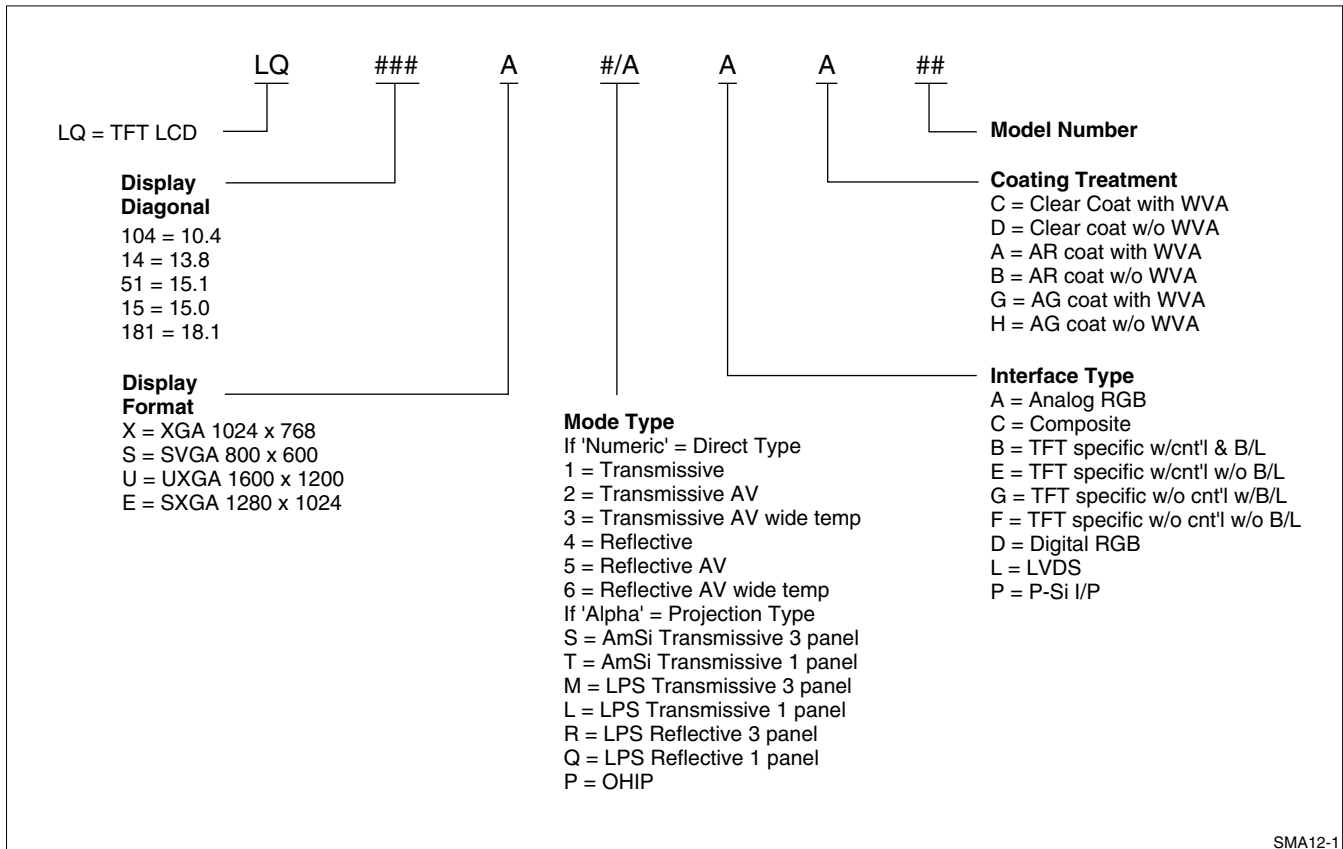
Monitor TFT LCD

Sizes above 12.1"

Available Products:

Part Number	Display Diagonal	Display Format	Brightness (nits)
LQ181EIDG01	18.1" Large TFT	1280 x 1024	180
LQ15X01W	15.0" Large TFT	1024 x 768	200
LQ150X1DG11	15.0" Large TFT	1024 x 768	200
LQ14D412	13.8" Large TFT	640 x 480	180

Part Number Key:



SMA12-1

Applications:

- Medical
- Research/Measuring Equipment
- Desktop PC/Monitor
- Financial

Features:

Superior display quality
High Speed Response
High Luminance and long life time
Least amount of backlight needed
Less backlight tubes (in most cases) than competitors
Low Power Consumption
Thin, lightweight, compact and durable
High Contrast – ie: 300:1 - black versus white, better than Competitors 150:1
Very good Aperture Ratio, better than Competitors
Replaceable backlights

Competition:

NEC, Samsung, Hitachi, Toshiba, Fujitsu

For More Details:

Extranet for LCD Marketing Presentation
CD-ROM for Marketing Presentation and Roadmaps

Product Description:

Monitor TFT (Thin Film Transistor) category consists of all LCDs larger than 12.1 inches.

Backlight Replacement Cross Reference:

Display Part Number	CCFT Replacement
LM64P64	LFOM2270
LM64P64	LFOM2271
LM64P70/LM64P702/LM64P761/ LM64P762	LFOM2349
LM64P701/LM64P763	LFOM2350
LM64P62	LFOM2351
LM64P723/LM64P727	LFOM2405
LM64P725	LFOM2466
LM64P722	LFOM2475
LM64P80/LM64P81/LM64P803	LFOM2476
LM64P805/LM64P815	LFOM2477
LM64P723	LFOM2574
LM64C05P	LFOM2825
LM64C08P/LM64C09P	LFOM2827
LM64P83/LM64K83/LM64K836	LFOM2838
LM64P831/LM64P833	LFOM2839
LM64P835/LM64P839	LFOM2840
LM64P90/LM64K90	LFOM2841
LM64P10/K10/LM64P101/ LM64K101	LFOM2949
LM64P837/LM64838	LFOM2950
LM64C91	LFOM2951
LM64C82	LFOM2952
LM64C14P	LFOM2955
LM64C15P	LFOM2956
LM64010P/LM64P10/LM64K10	LFOM2963
LM64007P/LM64P07/LM64K07	LFOM2964
LM64007T	LFOM2965
LM64C142	LFOM2972
LM64P122	LFOM2974
LM64P74	LFOM2975

Display Part Number	CCFT Replacement
LM64P89	LFOM2994
LM64K11	LFOM2995
LM64C35P	LFOM2997
LM64C03P	LFOM30004
LM64C353	LFOM3005
LM64C21P	LFOM3006
LM64P11	LFOM3016
LM64C20P	LFOM3019
LM64P89L	LFOM3039
LM64P83L	LFOM3040
LQ10D011/LQ10H11	LQ0B101
LQ10D016	LQ0B104
LQ9D011	LQ0B106
LQ10DH15	LQ0B107
LQ10D021/LQ10D311	LQ0B109
LQ10M Series	LQ0B111
LQ12D011 (w/o inverter)	LQ0B113
LQ9D01A	LQ0B114
LQ9D021	LQ0B116
LQ94D02 Series	LQ0B117
LQ12D011 (w/o inverter)	LQ0B118
LQ9D041	LQ0B120
LQ14D311/LQ14M211	LQ0B126
LQ14M211/311	LQ0B126
LQ10D32 series/S01	LQ0B128
LQ9D16 Series	LQ0B130
LQ64D14 Series	LQ0B132
LQ14D41 Series	LQ0B137
LQ14X01	LQ0B152
LQ9RA03	LQ571571

Display P/N	CCFT Replacment Backlight
LQ10D011	LQ0B101
LQ10D015/018	LQ0B107
LQ10D131	LQ0B124
LQ14D311	LQ0B126
LQ10D32x	LQ0B128
LQ9D161	LQ0B130
LQ64D141	LQ0B132
LQ10D34x	LQ0B133
LQ11S01	LQ0B136
LQ14D41x	LQ0B137
LQ14X03/E/F	LQ0B144
LQ12X12	LQ0B151
LQ14X01	LQ0B152
LQ9D342/340	LQ0B159
LQ10S21	LQ0B160
LQ11S30/31/33	LQ0B179
LQ12S01/08	LQ0B180
LQ12S02	LQ0B181
LQ12S31	LQ0B184
LQ10D41/42/421	LQ0B192
LQ64D34/341	LQ0B197
LQ10D367	LQ0B200
LQ15X01	LQ0B206
LQ16X11/14	LQ0B213
LQ12S41	LQ0B217
LQ15X01W	LQ0B220
LQ4RA01/02, 4NC01/02	LQ0B1
LQ6RA01/02, 6NC01/02	LQ0B4
LQ5RA43	LQ0B10
LQ3FN30	LQ0DDB0002
LQ181E1DG01/11	LQ0DDB5131
LQ104V1DG11	LQ0DDB9000
	NL-RA01
LQ0B01	LQ0J06
LQ0B04	LQ0J04

Part Number Quick Reference:

	Description
3LU	Small TFT (3" Integrated Monitor)
4LU	Small TFT (4" Integrated Monitor)
5LU	Small TFT (5" Integrated Monitor)
64LU	Small TFT (6.4" Integrated Monitor)
6LU	Small TFT (6" Integrated Monitor)
7LU	Small TFT (7" Integrated Monitor)
AA	LCD Backlight/Inverter Drivers
BS	Blue Sens. PD
BSC	LNB
BSF	Tuner
CADD	TV Tuner
CASD	CATV Tuner
E22	Modulator
E23	Modulator
GL	IR LED
GL1	Bar Graph/LED
GL1F	IR LED for data Communication
GP	OPIC Photointerrupt/Fib Optic Cable/Trans/Recs
GP1H	Transceivers for IrDA
GP2W	Transceivers for IrDA
ID	Flash/MROM Cards
IR3	Laser Diode Driver
IR3P3	Bipolar
IR3P6/7	CDC CDS IC
IR3P8/9	CDC
IR3P96	CDC Comp
IR3Y	Visual Equip/ Bipolar/ LCD Driver
IR3Y17	CCD Signal Processor
IR94	Regulators/Bipolar
IS1U	OPIC Light Det.
JY	MODs
LF	Glass Cell Only
LF0B	EL Backlight
LF0M	CCFT Backlight/Input & Output Connector/Cable Assy
LH15	LCD Driver/ASIC
LH28	Flash
LH505	8 bit A/D & 8 bit D/A
LH51	SRAMs
LH52	SRAMs
LH53	MROMs

	Description
LH54	Bi-FIFO/FIFO
LH5P	PSRAM
LH64	DRAM
LH6P82	512Kx16 PSRAM
LH7	ARM7 RISC Processor/MCU & LCD
LH9	IC for PC Modem
LHF	Flash
LJ	EL Display
LM3	320 x 240 LCD
LM4	LCD Module/ DMTN
LM5	DMTN
LM64C	Passive Color LCD
LM64K	Monochrome LCD
LM64P	LCD Module
LM6Q	5.5" QVGA DMTN
LM7	LCD Module
LM80C	Passive Color LCD
LM8M	LCD Module
LM8V	7.7" Passive Color LCD
LQ039	3.9" HR TFT
LQ025	2.5" HR TFT
LQ084V	8.4" TFT - (1xCCFT), VGA
LQ0B	Backlight Assemblies
LQ0J	Inverter
LQ18	TFT Displays
LQ10	TFT Displays
LQ11	TFT Displays
LQ12	TFT Displays
LQ13	TFT Displays
LQ14X	TFT Displays
LQ14D	TFT Displays
LQ15	TFT Displays
LQ4	4" TFT Displays
LQ5	5" TFT Displays
LQ6	5.7" TFT Displays
LQ64	6.4" TFT Displays
LQ9	8.4" TFT Displays
LR0	V driver for CCD/DSP/ AWB EE Control
LR366	CCD
LR37	Special Function IC/Visual Equip IC
LR382	CCD IC

	Description
LR39	Special Function IC/ Voice Synthesizer IC
LR4	Special Function IC
LR6	Special Function IC/ Visual Equip IC
LT	LED/Hall Device/ Backlights/Laser
LU Except LU59002	DSP Micorprocessor
LU7	ARM Development Box/Software
LZ	CCD/Syn. Signal Gen/CCD Timing
LZ2	CCD Sensors
LZ93F	CCD Timing Generator
LZ93N	CCD Signal Generator
NLR	SVGA A/D Board
PC	Photocoupler

	Description
PD	Photodiode
PD	PIN Diode
PQ	Regulator
PT	Phototransistor
RFS	Combination Tuner
RY3	RF Transceiver Module
RY5	IR Data Communication
RY6	IR Data Communication Unit, 4M
S	Solid State Relay/Phototriac Coupter/Phothyristor Coupler
SM	Microcontroller Units
SME	Microcontroller Units
VT	Analog Cable Tuner
YH	CCD Mod/Camera/Cable



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