

LDB901 Demo Board

for 10BASE-T and AUI applications

General Description

The LDB901 Demo Board is a complete working platform that allows system designers to test device performance and functionality prior to board prototyping. The LDB901 can be used to evaluate the LXT901, LXT907, LXT901A, LXT907A or LXT908 Universal Ethernet Transceivers with a few minor modifications to the board.

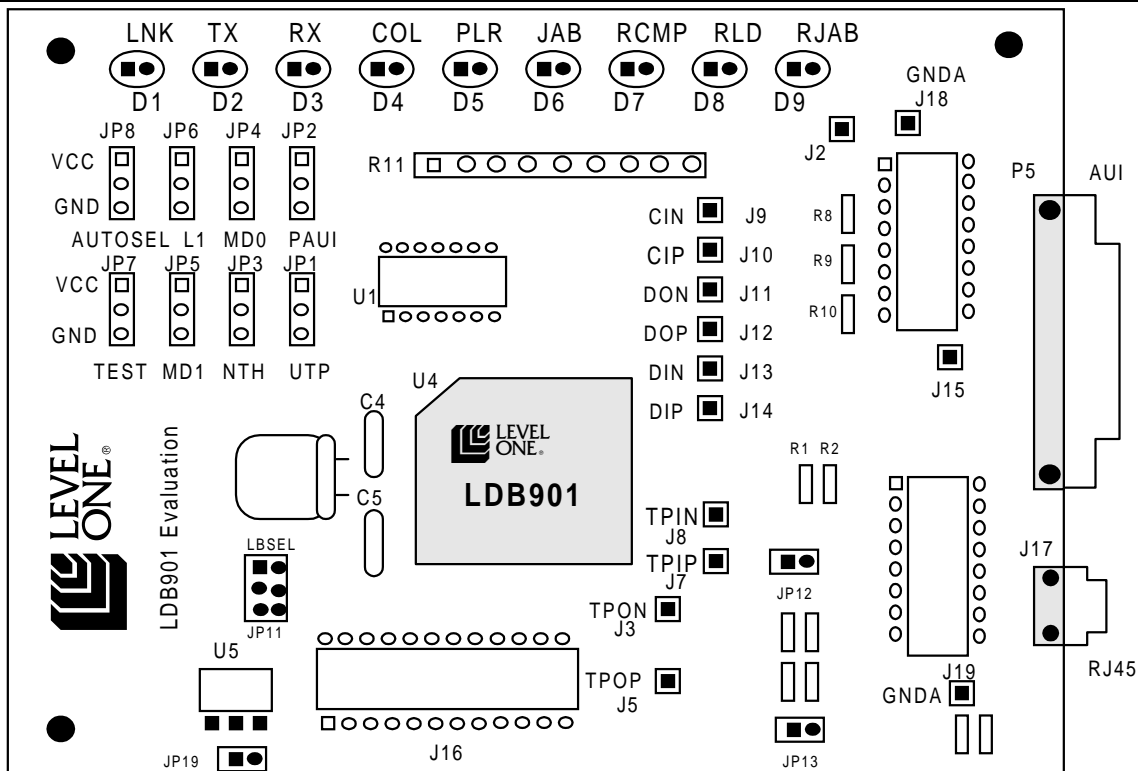
The LDB901 is designed to interface most standard controllers to either 10BASE-T cable or 10BASE-2/10BASE-5 Attachment Unit Interface (AUI) drop cable. The Demo Board supports standard 10Mbps operation or full duplex 20Mbps operation. The LDB901 is configured with a complete set of LED status indicators for major functions. A single 5V supply is required for operation with provision for conversion to 3.3V.

This document describes typical Demo Board setup and operating procedures. Before using the Demo Board, review the applicable Universal Ethernet Transceiver data sheet for device functionality and specifications.

Features

- Quick setup for complete system demonstration
- Auto/Manual port (AUI/RJ45) Selection
- Supports standard 10Mbps operation or full duplex 20Mbps operation
- Single 5V Operation
- 4 MAC Controller Capability Modes
- LED indicators for major functions
- Loopback Mode
- Power Down Mode
- Integrated Manchester Encoder/Decoder
- Remote Signaling for LXT901/LXT907 only
- 150Ω Termination for LXT901 and LXT901A only
- SQE Disable for LXT907, LXT907A and LXT908 only

LDB901 Demo Board



EQUIPMENT AND SETUP

Equipment Requirements

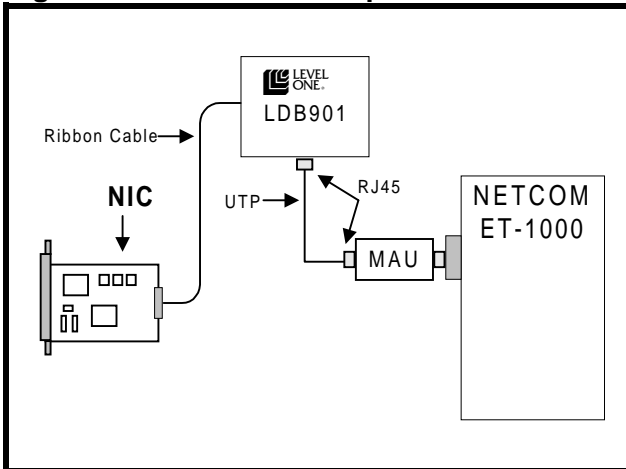
The LDB901 Demo Board includes all the components needed for a successful evaluation. However, the following additional equipment is recommended:

- NetCom System ET-1000 transceiver test box
- MAU
- NIC
- Category 3 or 5 Unshielded Twisted-Pair (UTP) cable
- Ribbon cable

Test Setup

Figure 1 shows a typical test setup for the basic operation of the LDB901. The LDB901 is connected to a Network Interface Card (NIC) on the back-end of the board via ribbon cable. The TP cable is connected to a MAU via an RJ45 connector. The MAU plugs into an ET-1000 NetCom Transceiver Test Box via a 15-pin AUI connector.

Figure 1: Basic Test Setup



Power Supply

The LDB901 Demo Board requires a single 5V power supply.

Power Supply Option

The LDB901 is designed with a voltage regulator (JP19) that can be jumpered to supply either 5V or 3.3V to the LXT901, LXT907, LXT901A, LXT907A or LXT908 devices. If pins 1 and 2 are jumpered, 5V operation is selected. If pins 2 and 3 are jumpered, the power supply is converted to 3.3V. Table 1 shows configuration of the jumper circuitry for the transceiver power supply options.

Signal Attenuation Circuitry

Signal attenuation circuitry (JP20, JP21 and JP22) is provided for 3.3V operation. During 3.3V operation these jumpers should be left open to enable signal attenuation. During 5V operation the jumpers should be installed to bypass signal attenuation.

Table 1: Power Supply Configuration

Jumper	Jumper Placement	
	5V Operation	3.3V Operation
JP19	Jumper pins 1 & 2	Jumper pins 2 & 3
JP20	Jumper Installed	Jumper Open
JP21	Jumper Installed	Jumper Open
JP22	Jumper Installed	Jumper Open

Configuration Options

The LDB901 Demo Board can be configured for evaluation of either the LXT901, LXT907, LXT901A, LXT907A or LXT908 Universal Transceivers with a few minor modifications.

Magnetics

The LDB901 is supplied from the factory with magnetics recommended for the applicable transceiver ordered. Jumpers JP12 and JP13 select the magnetics termination circuitry. These two jumpers and the magnetics themselves are the only modifications required to set up the various Ethernet Transceivers. Configuration for the various evaluation setups are described below.

LXT901/901A and LXT907/907A Evaluation

Leave both jumpers open when evaluating the LXT901, LXT907, LXT901A, or LXT907A. This configuration requires magnetics with a 1: $\sqrt{2}$ ratio for the transmit transformer and a 1:1 ratio for the receive transformer. Table 2 lists some suitable magnetics.

Table 2: LXT901/901A and LXT907/907A Suitable Magnetics

	Manufacturer	Part Number
TP Transformers	Belfuse	A553-0716
	Fil-Mag	23Z128SM
	Valor	PT4069

LXT908 Evaluation

Jumper both JP12 and JP13 when evaluating the LXT908. This configuration requires magnetics with a 1:2 ratio for the transmit transformer and a 1:1 ratio for the receive transformer. Table 3 lists some suitable magnetics.

Table 3: LXT908 Suitable Magnetics

	Manufacturer	Part Number
TP Transformers	Belfuse	S553-5999-52
	Fil-Mag	23Z118
	Valor	ST4152

TEST POINTS

There are 16 Test Points on the LDB901 Demo Board. Table 4 describes these.

Table 4: LDB901 Test Point Descriptions

Label	Ref Des	Description
GND	J1	Ground.
VCCD	J2	Digital Power Inputs.
TPON	J3	Twisted-Pair Output Negative - Differential output to the TP cable.
TPOP	J5	Twisted-Pair Output Positive - Differential output to the TP cable.
TPIP	J7	Twisted-Pair Input Positive - Differential input from the TP cable.
TPIN	J8	Twisted-Pair Input Negative - Differential input from the TP cable.
CIN	J9	AUI Collision Negative - Differential input to the CI circuit.
CIP	J10	AUI Collision Positive - Differential input to the CI circuit.
DON	J11	AUI Output Negative - Differential output to the AUI transceiver cable.
DOP	J12	AUI Output Positive - Differential output to the AUI transceiver cable.
DIN	J13	AUI Input Negative - Differential input for the AUI transceiver DI circuit.
DIP	J14	AUI Input Positive - Differential input for the AUI transceiver DI circuit.
VCCA	J15	Analog Power Inputs.
RJ45	J17	RJ45 Connector.
GNDA	J18	Analog Ground.
GNDA	J19	Analog Ground.

JUMPERS

There are 17 jumpers on the LDB901 Demo Board. There are nine 3-pin jumpers that can be set High by placing a jumper across pins 1 and 2 or can be set Low by placing a jumper across pins 2 and 3. There are seven 2-pin jumpers that are either installed or left open and one 3X2 Header (JP11). Table 5 describes these jumpers and their functions.

Table 5: LDB901 Jumper Descriptions

Ref Des	Symbol	Function
JP1	UTP (901) DSQE (907/908)	Unshielded Twisted-Pair: Selects media termination for LXT901 only. Set High to select 100Ω termination for unshielded TP. Set Low to select 150Ω termination for shielded TP. Signal Quality Error Disable: Disables SQE for LXT907 and LXT908 only. Set High to disable SQE. Set Low to enable SQE.
JP2	PAUI	Port/AUI Selection: Selects active port. Set High to select AUI port. Set Low to select TP port. If Automatic Port Selection is enabled, PAUI is ignored.
JP3	NTH	Normal Threshold: Set High to select normal TP squelch threshold. Set Low to reduce normal threshold by 4.5dB.
JP4	MDO	Mode Select 0: Selects controller compatibility mode as specified in Table 6.
JP5	MD1	Mode Select 1: Selects controller compatibility mode as specified in Table 6.
JP6	LI	Link Test Enable: Set High to enable link integrity test. Set Low, link integrity test is disabled.
JP7	TEST	Test: Connect to VCC.
JP8	AUTOSEL	Automatic Port Select: With jumper installed automatic port selection is enabled. (When automatic port selection is enabled, the LDB901 defaults to the Twisted-Pair port until the link integrity test fails.) With the jumper open, manual port selection is enabled and PAUI (JP2) determines the active port.
JP9	PDN	Power Down: This jumper enables Power Down Mode. With the jumper open, Power Down Mode is disabled.
JP10	FDE	Full Duplex: This jumper enables Full Duplex Mode. With the jumper open, the LDB901 operates in normal half duplex mode.
JP11	LBK	Loopback: If jumpers are placed in pin 3 and 5, standard loopback function is enabled. Data transmitted from the back-end is internally looped back through the device and returned to the back-end.
JP12	-	Transformer Termination: JP12 and JP13 selects transformer termination. Leave both jumpers open when evaluating LXT901 or LXT907. This configuration requires magnetics with a 1:√2 ratio for the transmit transformer and a 1: 1 ratio for the receive transformer. Install both jumpers when evaluating LXT908. This configuration requires magnetics with a 1:2 ratio for the transmit transformer and a 1:1 ratio for the receive transformer.
JP13	-	
JP19	-	Voltage Regulator: Jumpers installed on pins 1 and 2 selects 5V operation. Jumpers installed on pins 2 and 3 converts to 3.3V. ¹
JP20	-	Voltage Dividers: When jumpers are left open, attenuates the transmitted signals for 3.3V operation. When the jumpers are installed, attenuation circuitry is bypassed.
JP21		
JP22		

1. JP20, JP21 and JP22 must be left open when operating at 3.3V.

MAC Controller Capability Modes

There are 4 Controller Capability Modes that can be selected by placing a jumper in the appropriate pins on JP4 and JP5. See Table 6 for Control Mode jumper placement.

Table 6: LDB901 MAC Controller Compatibility Modes

Controller Mode	Controller Manufacturer	JP4 (MD1)	JP5 (MD0)
Mode 1	For Motorola 68EN360, MPC860, AMD AM7990 or compatible controllers	Pins 2 and 3 (Low)	Pins 2 and 3 (Low)
Mode 2	For Intel 82596 or compatible controllers	Pins 2 and 3 (Low)	Pins 1 and 2 (High)
Mode 3	For Fujitsu MB86950, MB86960 or compatible controllers (Seeq 8005) ¹	Pins 1 and 2 (High)	Pins 2 and 3 (Low)
Mode 4	For National Semiconductor 8390 or compatible controllers (TI TMS380C26)	Pins 1 and 2 (High)	Pins 1 and 2 (High)

1. SEEQ controllers require inverters on CLKI, LBK, RCLK and COL in Mode 3.

LED INDICATORS

There are 9 status LEDs on the Demo Board. Remote capability is provided only on the LXT901 and LXT907. LEDs D7, D8 and D9 should be ignored for LXT901A, LXT907A and LXT908. Refer to Table 7 for LED descriptions.

Table 7: LDB901 LED Descriptions

Label	Ref Des	Description
LNK	D1	Link. Indicates Link connection
TX	D2	Transmit Data. Indicates data being transmitted
RX	D3	Receive Data. Indicates data being received
COL	D4	Collision. Indicates collision
PLR	D5	Polarity Reverse. Indicates reversed polarity on the TP input
JAB	D6	Jabber. Indicates Jabber state
RCMP	D7	Remote Signaling Compatibility. Indicates remote signaling compatibility. Ignore for LXT901A, LXT907A and LXT908
RLD	D8	Remote Link Down. Indicates remote link failure. Ignore for LXT901A, LXT907A and LXT908
RJAB	D9	Remote Jabber. Indicates remote device in Jabber Mode. Ignore for LXT901A, LXT907A and LXT908

BILL OF MATERIALS

Table 8: LDB901 Bill of Materials

Item	Qty	Reference	Description
1	8	C1, C2, C10, C11, C12, C13, C14, C15	0.1uF / 50V
2	4	C3, C7, C8, C9	10uF / 6V, Tantalum
3	3	C4, C5, C6	18pF
4	1	D1	LED, Green
5	5	D2, D3, D4, D5, D6	LED, Red
6	3	D7, D8, D9	LED, Yellow
7	9	JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP19	Header 3-pin
8	7	JP9, JP10, JP12, JP13, JP20, JP21, JP22	Header 2-pin
9	1	J16	24-pin DIP Socket
10	1	J17	RJ45
11	15	J1, J2, J3, J5, J7, J8, J9, J10, J11, J12, J13, J15, J17, J18, J19	Test Point (black)
12	1	P5	Connector DB15 (right angle)
13	2	R1, R2, R12, R13, R14, R15, R16, R17	50Ω / 1%
14	2	L1, L2	Ferrite Bead
15	2	R3, R5	25Ω / 1%
16	2	R4, R6	21Ω / 1%
17	1	R7	12.4kΩ / 1%
18	3	R8, R9, R10	78Ω / 1%
19	1	R11	330Ω / 1%
20	4	R21, R23, R24, R26	1kΩ
21	2	R22, R25	2.2kΩ
22	1	U1	7405
23	1	U2	<u>TP Transformers</u> A553-0716-00 for LXT901PC, LXT901APC, LXT907PC or LXT907APC TD74-1406Q for LXT908PC
24	1	U4	LXT901PC, LXT901APC, LXT907PC, LXT907APC or LXT908PC
25	1	Y1	Crystal, 20MHz
26	1	JP11	3X2 Header
27	1	J14	Test Point (red)

NOTES

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Revision	Date	Status
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1.1	07/97	Correct note 1 in Table 5 and updated Table 8 (Bill of Materials).
1.0	06/97	Product Release

This product is covered by one or more of the following patents. Additional patents pending.
2002382-1; 5,008,637; 5,028,888; 5,057,794; 5,059,924; 5,068,628; 5,077,529; 5,084,866; 5,148,427; 5,153,875; 5,157,690; 5,159,291; 5,162,746;
5,166,635; 5,181,228; 5,204,880; 5,249,183; 5,257,286; 5,267,269; 5,267,746; 5,461,661; 5,493,243; 5,534,863; 5,574,726; 5,581,585; 5,608,341

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