

#### DESCRIPTION

The LX5248/49 IC is a Low Voltage Differential (LVD) Terminator designed to comply with the LVD termination specification in the SPI-2 document. The LX5248/49 is designed specifically for LVD applications. Because the LX5248/49 supports only LVD, it has lower output capacitance than multimode terminators such as the LX5240.

The LX5248/49 Utilizes Linfinity's UltraMAX Technology which delivers the ultimate in SCSI bus performance while saving component cost and board area. Elimination of the external capacitors also mitigates the need for a lengthy capacitor selection process. The individual high bandwidth drivers also maximize channel separation and reduces channel-to-channel noise and cross talk. The high-bandwidth UltraMAX architecture insures ULTRA-2 performance, while providing a clear migration path to ULTRA-3 and beyond.

**When The LX5248/49 Is Enabled, The Differential Sense (DIFFSENSE) Pin Supplies A Voltage Between 1.2V And 1.4V.**

In application, the terminator DIFFSENSE output is connected to the system DIFFSENSE line. If there are no single ended or HVD devices attached to the system the LVD output will be enabled. If the DIFFSENSE line is LOW, indicating a single ended device, the LX5248/49 output will be HiZ. If the DIFFSENSE line is HIGH, indicating a high voltage differential device the LX5248/49 output will be HiZ.

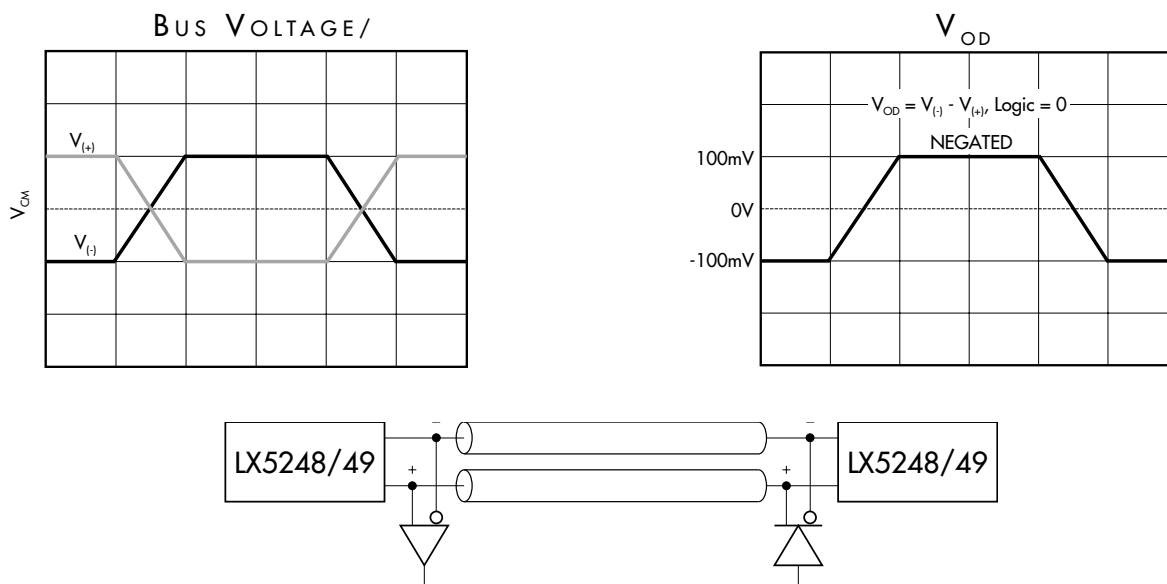
**The LX5248/49 IC Has A TTL Compatible DISCONNECT Pin.** The LX5248/49 is active LOW. During sleep mode, power dissipation is reduced to a meager 5µA, while also placing all outputs in a HI Z state. Also during sleep mode, the DIFFSENSE function is disabled and is placed in a HI Z state.

#### KEY FEATURES

- 2.5pF Typical Disabled Output Capacitance
- Fast Response, No External Capacitors Required
- 5µA Supply Current In Disconnect Mode
- 20mA Supply Current During Normal Operation
- Logic Command Disconnects All Termination Lines
- Diffsense Line Driver
- Current Limit And Thermal Protection
- Compliant with SP1-2 (Ultra2) and SP1-3 (Ultra 160)
- Pin Compatible With Industry Standard Multi-Mode Terminators
- For UCC5240 Pin Compatible LVD ONLY Terminator (See LX5245/5246)

**NOTE:** For current data & package dimensions, visit our web site: <http://www.linfinity.com>.

#### PRODUCT HIGHLIGHT



#### PACKAGE ORDER INFORMATION

$T_A$ (°C)	DB Plastic SSOP 36-pin	PW Plastic TSSOP 24-pin	PW Plastic TSSOP 28-pin
0 to 70K	LX5249CDBK	LX5249CPWK	LX5248CPW

Note: All surface-mount packages are available in Tape & Reel.  
Append the letter "T" to part number. (i.e. LX5249CPWT)

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#### ABSOLUTE MAXIMUM RATINGS (Note 1)

TermPwr Voltage .....	+6.5V
Signal Line Voltage .....	0V to 6.5V
Differential Voltage .....	0V to 6.5V
Operating Junction Temperature	
Plastic (PW Package) .....	150°C
Storage Temperature Range .....	-65°C to 150°C
Lead Temperature (Soldering, 10 seconds) .....	300°C

Note 1. Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

#### THERMAL DATA

##### DB PACKAGE:

THERMAL RESISTANCE-JUNCTION TO AMBIENT, $\theta_{JA}$	50°C/W
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##### PW PACKAGE:

THERMAL RESISTANCE-JUNCTION TO AMBIENT, $\theta_{JA}$	100°C/W
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Junction Temperature Calculation:  $T_J = T_A + (P_D \times \theta_{JA})$ .

The  $\theta_{JA}$  numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

MASTER / SLAVE FUNCTION TABLE

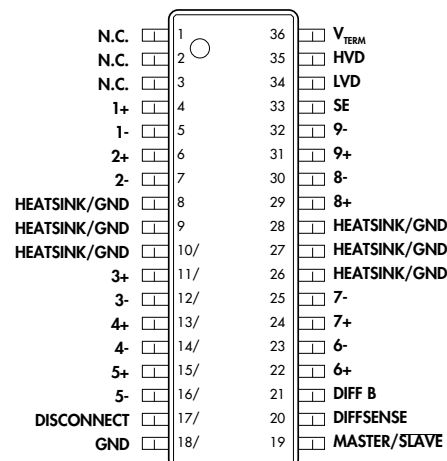
MASTER / SLAVE	DIFFSENSE Status	Output Current
L*	Hi Z	0mA
H	1.3V	15mA Source
Open (Pull-up)	1.3V	15mA Source

\* When in Low state, terminator will detect state of DIFFSENSE line.

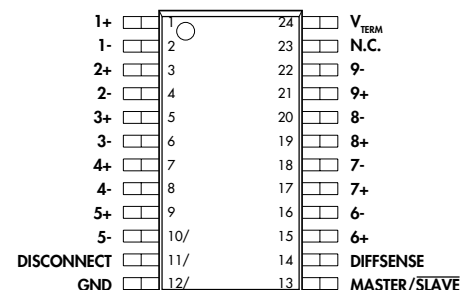
DIFFSENSE / POWER UP / POWER DOWN FUNCTION TABLE

LX5248/LX5249 DISCONNECT	DIFFSENSE	Outputs		Quiescent Current
		Status	Type	
L	L < 0.5V	Disable	HiZ	2mA
L	0.7V to 1.9V	Enable	LVD	21mA
L	H > 2.4V	Disable	HiZ	2mA
H	X	Disable	HiZ	10µA
Open	X	Disable	HiZ	10µA

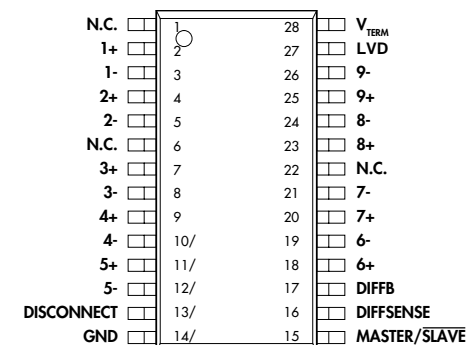
#### PACKAGE PIN OUTS



LX5249C ("N.C." = No Internal Connection)  
DB PACKAGE (Top View)



LX5249CPW ("N.C." = No Internal Connection)  
PW PACKAGE (Top View)



LX5248CPW ("N.C." = No Internal Connection)  
PW PACKAGE (Top View)

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## RECOMMENDED OPERATING CONDITIONS (Note 2)

Parameter	Symbol	Recommended Operating Conditions			Units
		Min.	Typ.	Max.	
TermPwr Voltage	$V_{TERM}$	3.0		5.25	V
Signal Line Voltage		0		5.0	V
Disconnect Input Voltage		0		$V_{TERM}$	V
Operating Junction Temperature Range					
LX5248 / LX5249		0		70	°C

Note 2. Range over which the device is functional.

## ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply over the operating ambient temperature range of  $0^{\circ}\text{C} \leq T_A \leq 70^{\circ}\text{C}$ . TermPwr = 3.3V, DISCONNECT: LX5248/49 = L. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter	Symbol	Test Conditions	LX5248 / 5249			Units
			Min.	Typ.	Max.	
► <b>LVD Terminator Section</b>						
TermPwr Supply Current	LVD I <sub>CC</sub>	All term lines = Open DISCONNECT: LX5248/49 = H		21 5	25 10	mA μA
Common Mode Voltage	V <sub>CM</sub>		1.125	1.25	1.375	V
Offset Voltage (Fail Safe Bias Voltage)	V <sub>FSB</sub>	Open circuit between - and + (see Note 3)	100	112	125	mV
Differential Terminator Impedance	Z <sub>D</sub>	V <sub>OD</sub> = -1V to 1V	100	105	110	Ω
Common Mode Impedance	Z <sub>CM</sub>	0V to 2.5V	100	200	300	Ω
Output Capacitance	C <sub>O</sub>	DISCONNECT: LX5248/49 = H		2.5		pF
Output Leakage	I <sub>LEAK</sub>	DISCONNECT: LX5248/49 = H, V <sub>LINE</sub> = 0 to 4V, T <sub>A</sub> =25°C DISCONNECT: LX5248/49 = H, V <sub>TERM</sub> = 0V, V <sub>LINE</sub> = 2.7V		0 1	2	μA μA
Mode Change Delay	t <sub>DF</sub>	DIFFSENSE = 1.4V to 0V	100	150		ms
► <b>DIFFSENSE Section</b>						
DIFFSENSE Output Voltage	V <sub>DIFF</sub>		1.2	1.3	1.4	V
DIFFSENSE Output Source Current	I <sub>DIFF</sub>	DIFFSENSE = 0V	5.0		15.0	mA
DIFFSENSE Sink Current	I <sub>SINK (DIFF)</sub>	V <sub>IN</sub> = 2.75V			200	μA
DIFFSENSE Output Leakage	I <sub>SINK (DIFF)</sub>	DISCONNECT: LX5248/49 = H, T <sub>A</sub> = 25°C			10	μA
► <b>DISCONNECT Section</b>						
DISCONNECT Threshold	V <sub>TH</sub>		0.8		2.0	V
Input Current	I <sub>IL</sub>	DISCONNECT: LX5248/49 = 0V			10	μA
► <b>MASTER / SLAVE Section</b>						
MASTER / SLAVE Threshold	V <sub>TH (MS)</sub>		0.8		2.0	V
Input Current	I <sub>IL (MS)</sub>	MASTER / SLAVE: LX5248/49 = 0V			10	μA

Note 3. Open circuit failsafe voltage.

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#### BLOCK DIAGRAM

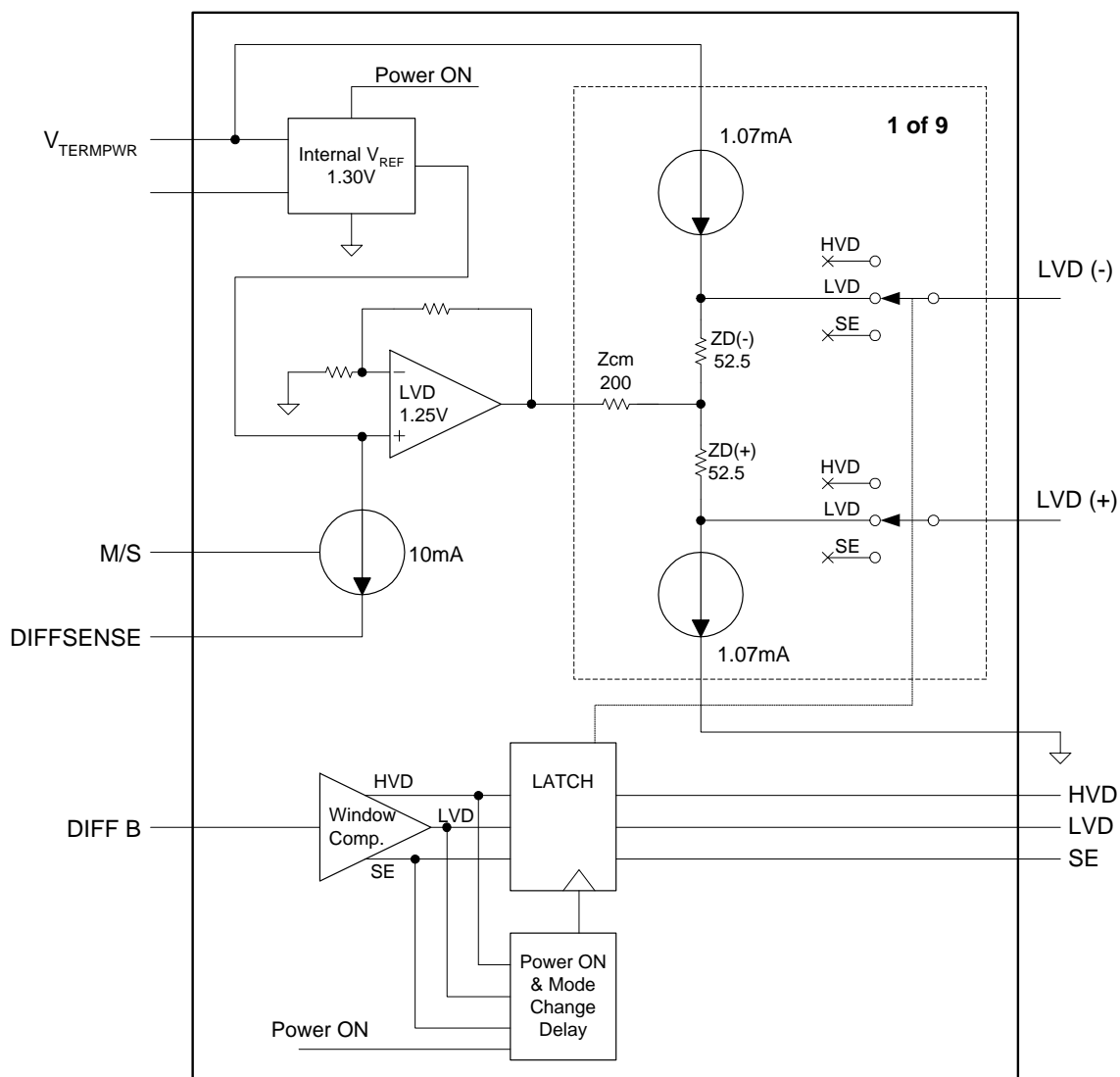


FIGURE 1 — LX5248 / 5249 Block Diagram

## 9-LINE LVD SCSI TERMINATOR

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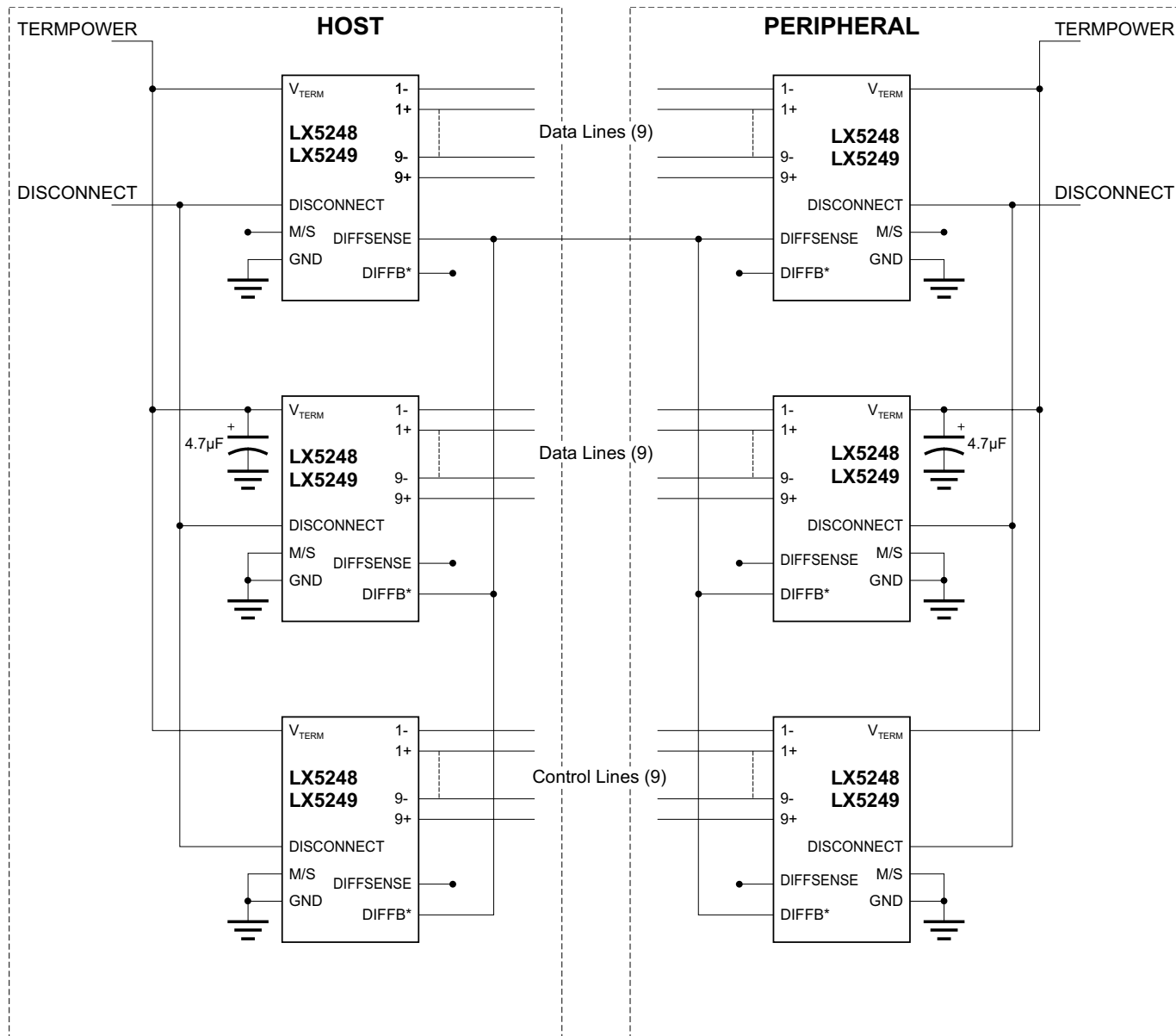
## FUNCTIONAL PIN DESCRIPTION

Pin Designator	Description
1-, 2-, 3-, 4-, 5-, 6-, 8-, 8-, 9-/	Negative signal termination lines.
1+, 2+, 3+, 4+, 5+, 6+, 7+, 8+, 9+/-	Positive signal termination lines.
$V_{TERM}$	Power supply pin for terminator. Connect to SCSI bus TERMPWR. Must be decoupled by one 4.7 $\mu$ F low-ESR capacitor for every three terminator devices. It is absolutely necessary to connect this pin to the decoupling capacitor through a very low impedance (big traces on PCB). Keeping distances very short from the decoupling capacitors to the $V_{TERM}$ pin is also critical. The value of the decoupling capacitor is somewhat layout dependant and some applications may benefit from high-frequency decoupling with 0.1 $\mu$ F capacitors right at $V_{TERM}$ pin.
DISCONNECT/	Enables / disables terminator. See Power Down Function Table for logic level per device.
GND/	Terminator ground pin. Connect to ground.
MASTER / SLAVE/	Sometimes referred to as M/S pin in this data sheet. Used to select which terminator is the controlling device. MASTER/SLAVE pin High or Open enables the DIFFSENSE output drive. Please see MASTER/SLAVE Function Table.
DIFFSENSE/	This is a dual function pin. It drives the SCSI bus DIFFSENS line. It is also the sense pin to detect the SCSI bus mode (LVD, SE or HVD). DIFFSENSE output drive can be disabled with Low level on the MASTER/SLAVE pin. Please see DIFFSENSE and MASTER/SLAVE Function Tables. Internally connected to DIFFB pin through 20kOhm resistor.
DIFFB/	Internally connected to DIFFSENSE pin through 20kOhm resistor. It can be used as a mode sense pin when the device is a non-controlling terminator (MASTER/SLAVE pin is Low). An RC filter (20kOhm / 0.1 $\mu$ F) is not required on the LX5249, as it has an internal timer.
SE/	Single-ended output; when High, terminator is operating in SE mode.
LVD/	Low Voltage Differential output. When High, terminator is operating in LVD mode.
HVD/	High Voltage Differential output. When High, terminator is operating in HVD mode.
HEATSINK/	Attached to die mounting pad, but not bonded to GND pin. Pins should be considered a heat sink only, and not a true ground connection. It is recommended that these pins be connected to ground, but can be left floating.

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#### APPLICATION SCHEMATIC



**FIGURE 2 — LX5248 / 5249 Application Schematic**

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