LX5250/5252

9-Line Multimode SCSI Terminator

PRODUCTION DATA SHEET

DESCRIPTION

The LX5250/52 is a multimode SCSI terminator that is compatible with the SCSI SPI-2 (Ultra2 SCSI), SCSI SPI-3 (Ultra3 SCSI or Ultra160 SCSI), and SCSI SPI-4 (Ultra320) specifications developed by the T10 standards committee for low voltage differential (LVD) termination, while providing backwards compatibility to the SCSI, SCSI-2, and SPI single-ended specifications. Multimode compatibility permits the use of legacy devices on the bus without hardware alterations. Automatic mode selection is achieved through voltage detection on the Diffsense line.

The LX5250/52 utilizes an industry standard LVD architecture. The individual high bandwidth drivers maximize channel separation, reduce channel-to-channel noise and cross talk to insure Ultra320 performance.

When the LX5250/52 is enabled, the differential sense (DIFFSENSE) pin supplies a voltage between 1.2V and 1.4V. In application this pin is tied to the DIFFSENSE input of the corresponding LVD transceivers. This action enables the LVD transceiver function. DIFFSENSE is capable of supplying a maximum of 10mA.

Tying the DIFFSENSE pin high places the LX5250/52 in a HI Z state indicating the presence of an HVD device. Tying the pin low places the part in a single-ended mode while also signaling the multimode transceiver to operate in a single-ended mode.

Recognizing the needs of portable and configurable peripherals, the LX5250/52 has a TTL compatible sleep/disable mode. During this sleep/disable mode, power dissipation is reduced to a meager 15uA while also placing all outputs in a HI Z state. Also during sleep/disable mode, the DIFFSENSE function is disabled and is placed in a HI Z state.

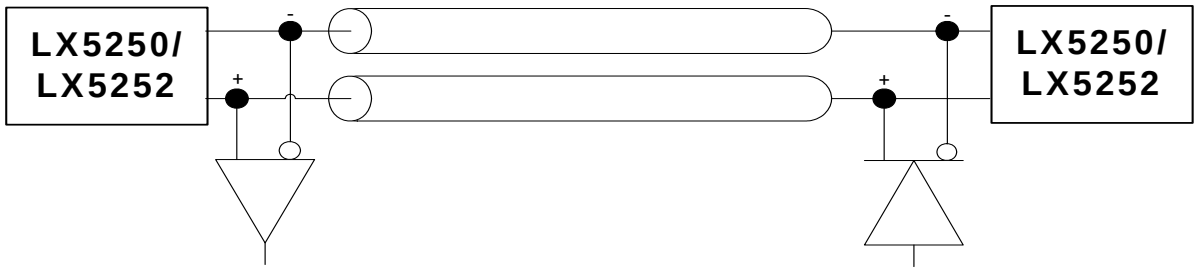
The LX5250/52 also provides a master / slave function. Driving this pin high or floating the pin enables the 1.3V DIFFSENSE reference. Driving the pin low disables the on board DIFFSENSE reference and enables use of an external master reference device.

IMPORTANT: For the most current data, consult *MICROSEMI*'s website: **http://www.microsemi.com**

KEY FEATURES

- Compliant with SCSI SPI-2 (Ultra2), SPI-3 (Ultra160), and SPI-4 (Ultra320)
- Auto-Selectable LVD or Single-Ended Termination
- Fast Response, No Output Capacitors Required
- Compatible with Active Negation Drivers
- 15µA Supply Current in Disconnect Mode
- Logic Command Disconnects All Termination Lines
- Diffsense Line Driver
- Ground Driver Integrated for Single-Ended Operation
- Current Limit and Thermal Protection
- Hot-Swap Compatible (Single-Ended)
- Available in 36-pin QSOP and 28-pin TSSOP package
- LX5250, 36-pin QSOP: Pin Compatible With DS2118, UCC5630A and UCC5672
- LX5250 28-pin TSSOP: Pin Compatible with DS2119, and UCC5672

PRODUCT HIGHLIGHT



PACKAGE ORDER INFO

T_A (°C)	DB QSOP 36-Pin RoHS Compliant / Pb-free Transition DC: 0535	PW TSSOP 28-Pin RoHS Compliant / Pb-free Transition DC: 0518
0 to 70	LX5250CDB LX5252CDB	LX5250CPW -

Note: Available in Tape & Reel.
Append the letters "TR" to the part number. (i.e. LX5250CDB-TR)

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ABSOLUTE MAXIMUM RATINGS

Term Power (V_{TERM}) .....-0.3V to 7V
Operating Junction Temperature .....150°C
Storage Temperature Range.....-65°C to 150°C
RoHS / Pb-free Peak Package Solder Reflow Temperature
(40 second maximum exposure)..... 260°C (+0, -5)

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

THERMAL DATA

DB **36 Pin QSOP**

THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	53.9°C/W

PW **28 Pin TSSOP**

THERMAL RESISTANCE-JUNCTION TO AMBIENT, θ_{JA}	100°C/W

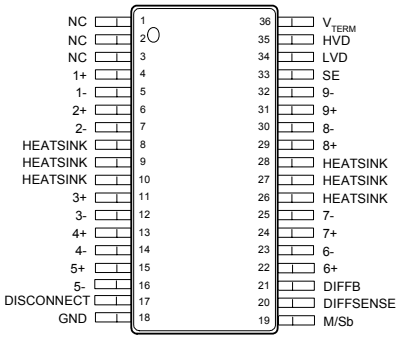
Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.
The θ_{JA} numbers are guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow. θ_{JA} can vary significantly depending on mounting technique. (See Application Notes Section: Thermal considerations)

MASTER/SLAVE FUNCTION TABLE

Master/Slave	DIFFSENSE Status	
L*	HI Z	0mA
H	1.3V	10mA Source
Open (Pull-Up)	1.3V	10mA Source

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

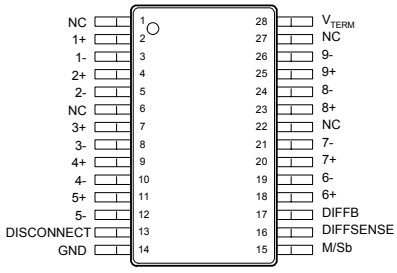
PACKAGE PIN OUT



LX5250/5252

DB PACKAGE
(Top View)

N/C = Not internally connected



LX5250 ONLY

PW PACKAGE
(Top View)

N/C = Not internally connected

RoHS / Pb-free 100% Matte Tin Lead Finish

DIFFSENSE/POWER UP/POWER DOWN FUNCTION TABLE

LX5250 DISCONNECT	LX5252 DISCONNECT	DIFFSENSE	Outputs		Quiescent Current
			Status	Type	
L	H	< 0.5V	Enable	SE	55mA
L	H	0.7V – 1.9V	Enable	LVD	35mA
L	H	> 2.4V	Disable	HI-Z	8mA
H or Open	L or Open	X	Disable	HI-Z	10µA

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RECOMMENDED MAX OPERATING CONDITIONS

Parameter		Symbol	LX5250/52 Min	LX5250/52 Typ	LX5250/52 Max	Units
VTerm	LVD	V_{TERM}	2.9		5.25	V
	SE		3.5		5.25	
Signal Line Voltage			0		5.0	V
Disconnect Input Voltage			0		V_{TERM}	V
Operating Junction Temperature		T_J	0		125	°C

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, the following specifications apply over the operating ambient temperature 0°C ≤ T_A ≤ 70°C, VTerm = 4.75V. For the LX5250, DISCONNECT = L; for the LX5252, DISCONNECT = H.

Parameter	Symbol	Test Conditions	LX5250/52 Min	LX5250/52 Typ	LX5250/52 Max	Units
LVD Terminator Section						
VTerm Supply Current	LVD_{ICC}	All term lines open		35	45	mA
		LX5250: DISCONNECT > 2.0V; LX5252: $\overline{\text{DISCONNECT}}$ < 0.8V		15	35	µA
Common Mode Voltage	V_{CM}		1.125	1.25	1.375	V
Offset Voltage	V_{OS}	Open circuit between (-) and (+) terminals	100	112	125	mV
Differential Terminator Impedance	Z_O	V_{OUT} Differential = -1V to +1V	100	105	110	Ω
Common Mode Impedance	Z_{CM}	0.5V to 2V	110	150	195	Ω
Output Capacitance (Note 1)	C_O	LX5250: DISCONNECT > 2.0V; LX5252: $\overline{\text{DISCONNECT}}$ < 0.8V			3	pF
Mode Change Delay	t_{DF}	Diffsense = 1.4V to 0V	100	115	300	ms
Diffsense Section						
Diffsense Output Voltage	V_{DIFF}		1.2	1.3	1.4	V
Diffsense Output Source Current	I_{DIFF}	V_{DIFF} = 0V	5		15	mA
Diffsense Sink Current	$I_{SINK(DIFF)}$	V_{DIFF} = 2.75V	20		200	µA
Single Ended Section						
VTerm Supply Current	SE_{ICC}	All tem lines = Open, Master/Slave = 0V		55	75	mA
		All tem lines = 0.2V, Master/Slave = 0V		250	290	mA
		LX5250: DISCONNECT > 2.0V; LX5252: $\overline{\text{DISCONNECT}}$ < 0.8V		15	35	µA
Termination Output High Voltage	V_O		2.5	2.85	3.1	V
Output Current	I_O	V_{OUT} = 0.2V	18.5	22.5	24	mA
Sink Current	I_{SINK}	V_{OUT} = 4V, All lines	40	65		mA
Output Capacitance (Note 1)	C_O	DISC > 2.0V			3	pF
Output Leakage	I_{DDQ}	LX5250: DISCONNECT > 2.0V; LX5252: $\overline{\text{DISCONNECT}}$ < 0.8V, V_{LINE} = 0 to 4V, T_A = 25°			2	µA
	I_{HP}	LX5250: DISCONNECT > 2.0V; LX5252: $\overline{\text{DISCONNECT}}$ < 0.8V, V_{TERM} = Open, V_{LINE} = 2.7V, T_A = 25°		1		µA
Ground Driver Impedance	Z_G	I = 1mA			100	Ω

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ELECTRICAL CHARACTERISTICS

Unless otherwise specified, the following specifications apply over the operating ambient temperature 0°C ≤ T_A ≤ 70°C, VTerm = 4.75V. For the LX5250, DISCONNECT = L; for the LX5252, DISCONNECT = H.

Parameter	Symbol	Test Conditions	LX5250/52 Min	LX5250/52 Typ	LX5250/52 Max	Units
DISCONNECT Section						
Disconnect Thresholds	V_{TH}		0.8		2.0	V
Input Current	I_{IL}	LX5250: DISCONNECT = 0V; LX5252: $\overline{\text{DISCONNECT}}$ = 2.4V			10	µA
	I_{IH}	LX5250: DISCONNECT = 2.4V; LX5252: $\overline{\text{DISCONNECT}}$ = 0V		100		nA
MASTER/SLAVE Section						
Master/Slave Thresholds	$V_{TH(MS)}$		0.8		2.0	V
Input Current	$I_{IL(MS)}$	Master/Slave = 0V			10	µA
	$I_{IH(MS)}$	Master/Slave = 2.4V		100		nA

Note 1: Guaranteed by design.

BLOCK DIAGRAM

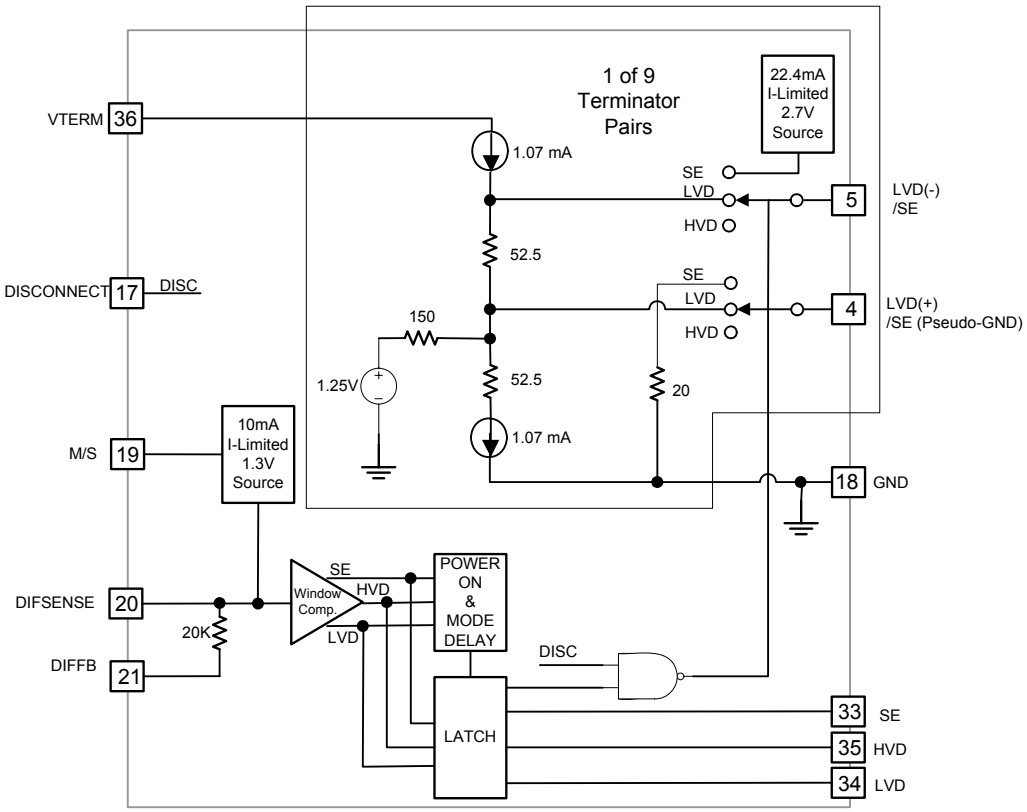

Figure 1 – LX5250/52 Block Diagram; 36-pin version shown

FUNCTIONAL PIN DESCRIPTION

PIN NAME	DESCRIPTION
1-, 2-, 3-, 4-, 5-, 6-, 7-, 8-, 9-	Negative signal termination lines for LVD mode. Signal termination lines for SE mode.
1+, 2+, 3+, 4+, 5+, 6+, 7+, 8+, 9+	Positive signal termination lines for LVD mode. Psuedo-ground lines for SE mode.
V_{TERM}	Power supply pin for terminator. Connect to SCSI bus VTERM. Must be decoupled by one 4.7µF 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 to PCB). Keeping distances very short from the decoupling capacitors is somewhat layout dependent and some applications may benefit from high frequency decoupling with 0.1µF capacitors at V_{TERM} pin.
DISCONNECT	Enables/Disables terminator. See Power Down Function Table for logic levels for LX5250 and LX5252.
GND	Terminator ground pin. Connect to ground.
MASTER/SLAVE	Sometimes referred to as M/S pin in this datasheet. Used to select which terminator is the controlling device. M/S 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 M/S pin. Please see DIFFSENSE and MASTER/SLAVE Function Tables. Internally connected to DIFFB pin through a 20K Ω resistor.
DIFFB	Internally connected to DIFFSENSE pin through a 20K Ω resistor. It can be used as a mode sense pin when the device is non-controlling terminator (M/S is low). An RC filter (50K Ω resistor & 4.7µF) is not required on the LX5250 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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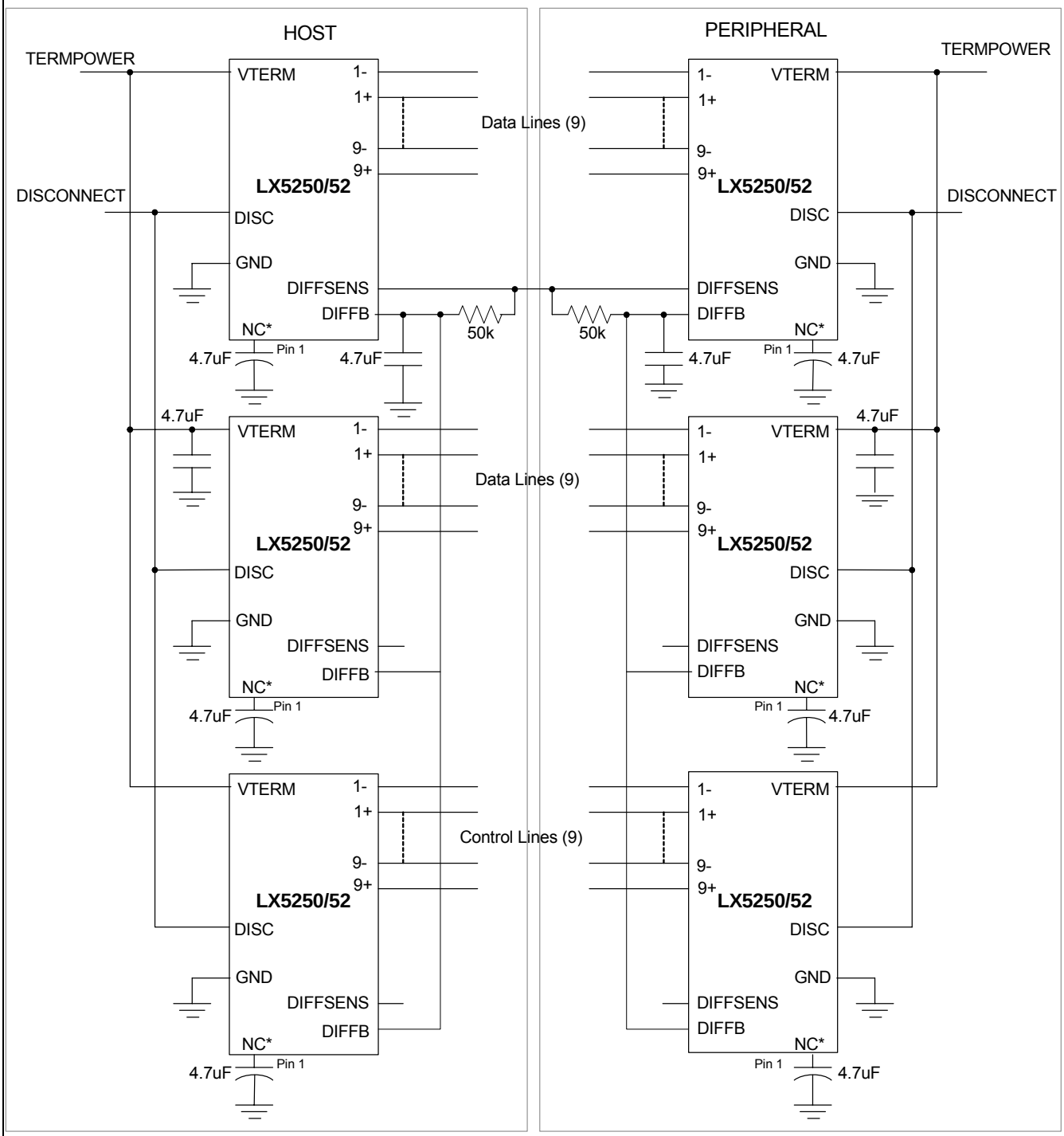
APPLICATION SCHEMATIC



*The capacitor on pin 1 can be placed on the LX5250CDB, LX5250CPW, or LX5252CDB to be pin-compatible with other devices, but is not required.

Figure 2 – Application Diagram

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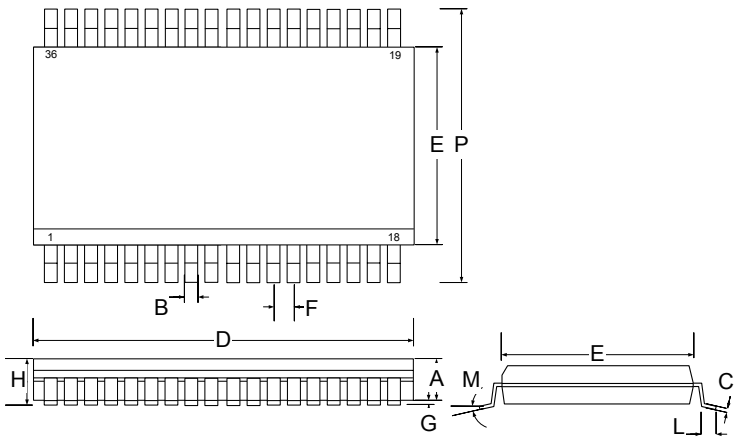
MECHANICAL DRAWINGS

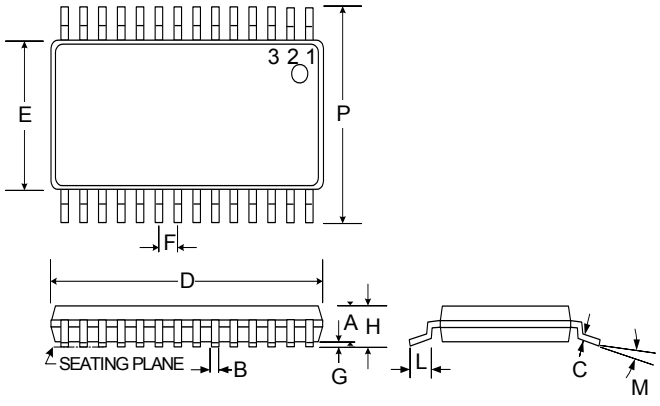
DB — 36-Pin Quarter Size Outline Package (QSOP)



Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.14	2.54	0.084	0.100
B	0.29	0.51	0.011	0.020
C	0.23	0.32	0.009	0.0125
D	15.20	15.40	0.598	0.606
E	7.40	7.60	0.291	0.299
F	0.80 BSC		0.031 BSC	
G	0.10	0.30	0.004	0.012
H	2.44	2.64	0.096	0.104
L	0.51	1.01	0.020	0.040
M	0°	8°	0°	8°
P	10.11	10.51	0.398	0.004
*LC	–	0.10	–	0.004

*Lead Coplanarity

PW — 28-Pin Thin Small Shrink Outline (TSSOP)



Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.85	0.95	0.033	0.037
B	0.19	0.30	0.007	0.012
C	0.09	0.20	0.003	0.008
D	9.60	9.80	0.378	0.390
E	4.30	4.50	0.169	.176
F	0.65 BSC		0.025 BSC	
G	0.05	0.15	0.002	0.005
H	–	1.10	–	0.043
L	0.50	0.75	0.020	0.030
M	0°	8°	0°	8°
P	6.25	6.50	0.246	0.256
*LC	–	0.10	–	0.004

Note:

1. Dimensions do not include mold flash or protrusions; these shall not exceed 0.155mm(.006") on any side. Lead dimension shall not include solder coverage.

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NOTES