SLLS039B - OCTOBER 1980 - REVISED MAY 1995

- Meets or Exceeds the Requirements of ANSI Standards EIA/TIA-422-B and RS-485 and ITU Recommendation V.11.
- Designed for Multipoint Transmission on Long Bus Lines in Noisy Environments
- 3-State Outputs
- Common-Mode Output Voltage Range of -7 V to 12 V
- Active-High Enable
- Thermal Shutdown Protection
- Positive- and Negative-Current Limiting
- Operates From Single 5-V Supply
- Low Power Requirements
- Functionally Interchangeable With MC3487

description

The SN75174 is a monolithic quadruple differential line driver with 3-state outputs. It is designed to meet the requirements of ANSI Standards EIA/TIA-422-B and RS-485 and ITU Recommendation V.11. The device is optimized for balanced multipoint bus transmission at rates up to 4 megabaud. Each driver features wide positive and negative common-mode output voltage ranges making it suitable for party-line applications in noisy environments.

N PACKAGE (TOP VIEW)									
1A [1Y [1Z [1,2EN [2Z [2Y [2A [GND [3 4 5 6	16 V _{CC} 15 4A 14 4Y 13 4Z 12 3,4EN 11 3Z 10 3Y 9 3A							
	W PAC (TOP V								
1A [1Y [NC [1,2EN [2Z [NC [2Y [GND [4 5 6 7 8	20 V _{CC} 19 4A 18 4Y 17 NC 16 4Z 15 3,4EN 14 3Z 13 NC 12 3Y 11 3A							

NC - No internal connection

The SN75174 provides positive- and negative-current limiting and thermal shutdown for protection from line fault conditions on the transmission bus line. Shutdown occurs at a junction temperature of approximately 150°C. This device offers optimum performance when used with the SN75173 or SN75175 quadruple differential line receivers.

The SN75174 is characterized for operation from 0°C to 70°C.

FUNCTION TABLE (each driver)								
INPUT	ENABLE	OUTI	PUTS					
	ENADLE	Y	Z					
Н	Н	Н	L					
L	н	L	Н					
Х	L	Z	Z					

H = TTL high level, X = irrelevant,

L = TTL low level, Z = high impedance (off)



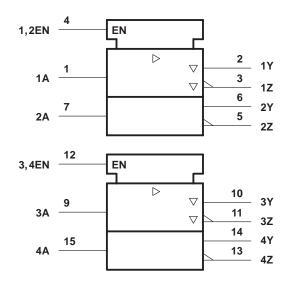
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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



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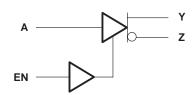
logic symbol[†]

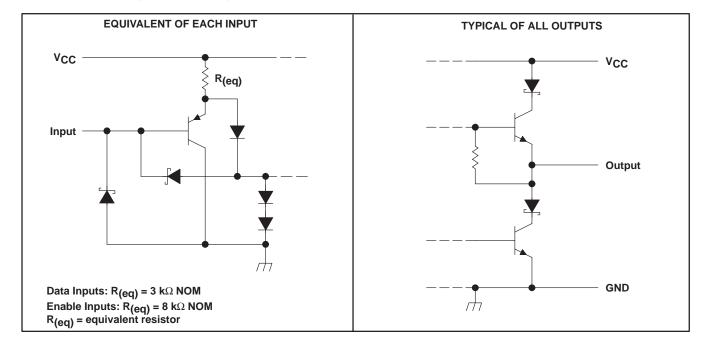


[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

schematics of inputs and outputs

logic diagram, each driver (positive logic)







SLLS039B - OCTOBER 1980 - REVISED MAY 1995

absolute maximum ratings over operating free-air temperature (unless otherwise noted)[†]

Supply voltage, V _{CC} (see Note 1)	
Output voltage range, V _O	10 V to 15 V
Input voltage, V _I	5.5 V
Continuous total dissipation	. See Dissipation Rating Table
Operating free-air temperature range, T _A	0°C to 70°C
Storage temperature range, T _{stg}	65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C

† Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: All voltage values are with respect to the network ground terminal.

PACKAGE	$T_A \le 25^{\circ}C$ POWER RATING	DERATING FACTOR ABOVE T _A = 25°C	T _A = 70°C POWER RATING
DW	1125 mW	9.0 mW/°C	720 mW
N	1150 mW	9.2 mW/°C	736 mW

DISSIPATION RATING TABLE

recommended operating conditions

	MIN	NOM	MAX	UNIT
Supply voltage, V _{CC}	4.75	5	5.25	V
High-level input voltage, VIH	2			V
Low-level input voltage, VIL			0.8	V
Common-mode output voltage, V _{OC}		_	7 to 12	V
High-level output current, I _{OH}			-60	mA
Low-level output current, IOL			60	mA
Operating free-air temperature, T _A	0		70	°C



SLLS039B - OCTOBER 1980 - REVISED MAY 1995

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

	PARAMETER	TEST	MIN	TYP†	MAX	UNIT	
VIK	Input clamp voltage	lı = –18 mA			-1.5	V	
Vон	High-level output voltage	$V_{IH} = 2 V,$ $I_{OH} = -33 \text{ mA}$	V _{IL} = 0.8 V,		3.7		V
VOL	Low-level output voltage	V _{IH} = 2 V, I _{OL} = 33 mA	V _{IL} = 0.8 V,		1.1		V
VO	Output voltage	I ^O = 0		0		6	V
VOD1	Differential output voltage	I ^O = 0		1.5	6	6	V
VOD2	Differential output voltage	R _L = 100 Ω,	See Figure 1	1/2 V _{OD1} or 2 [‡]			V
		R _L = 54 Ω,	See Figure 1	1.5	2.5	5	V
V _{OD3}	Differential output voltage	See Note 2		1.5		5	V
$\Delta VOD $	Change in magnitude of differential output voltage§					±0.2	V
Voc	Common-mode output voltage¶	$R_L = 54 \Omega$ or 100 Ω, See Figure 1				+3 -1	V
∆ Vocl	Change in magnitude of common-mode output voltage§]				±0.2	V
lO	Output current with power off	V _{CC} = 0,	$V_{O} = -7 V$ to 12 V			±100	μA
I _{OZ}	High-impedance-state output current	$V_0 = -7 V \text{ to } 1$	2 V			±100	μA
ЧΗ	High-level input current	VI = 2.7 V				20	μA
Ι _{ΙL}	Low-level input current	V _I = 0.5 V				-360	μA
los		V _O = - 7 V				-180	
	Short-circuit output current	VO = VCC			180	mA	
		V _O = 12 V			500		
		Nalaad	Outputs enabled		38	60	A
ICC	Supply current (all drivers)	No load	Outputs disabled		18	40	mA

[†] All typical values are at $V_{CC} = 5$ V and $T_A = 25^{\circ}C$.

[‡] The minimum V_{OD2} with a 100- Ω load is either 1/2 V_{OD1} or 2 V, whichever is greater.

§ Δ|V_{OD}| and Δ|V_{OC}| are the changes in magnitude of V_{OD} and V_{OC}, respectively, that occur when the input is changed from a high level to a low level.

In ANSI Standard EIA/TIA-422-B, V_{OC}, which is the average of the two output voltages with respect to ground, is called output offset voltage, V_{OS}.

NOTE 2: See EIA Standard RS-485.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

	PARAMETER	TEST (MIN	TYP	MAX	UNIT	
td(OD)	Differential-output delay time	R _I = 54 Ω,	See Figure 2		45	65	ns
tt(OD)	Differential-output transition time	KL = 54 32,	See Figure 2		80	120	ns
^t PZH	Output enable time to high level	RL = 110 Ω,	See Figure 3		80	120	ns
t _{PZL}	Output enable time to low level	R _L = 110 Ω,	See Figure 4		55	80	ns
^t PHZ	Output disable time from high level	RL = 110 Ω,	See Figure 3		75	115	ns
t _{PLZ}	Output disable time from low level	RL = 110 Ω,	See Figure 3		18	30	ns



SLLS039B - OCTOBER 1980 - REVISED MAY 1995

SYMBOL EQUIVALENTS									
DATA SHEET PARAMETER	EIA/TIA-422-B	RS-485							
VO	V _{oa} , V _{ob}	V _{oa,} V _{ob}							
IVOD1	Vo	Vo							
IVOD2	V _t (R _L = 100 Ω)	$V_t (R_L = 54 \Omega)$							
IVOD3		V _t (Test Termination) Measurement 2)							
	$ V_t - \overline{V}_t $	$ V_t - \overline{V}_t $							
V _{OC}	V _{os}	V _{OS}							
	$ V_{OS} - \overline{V}_{OS} $	V _{os} – V _{os}							
IOS	I _{sa} , I _{sb}								
IO	l _{xa} , l _{xb}	l _{ia} ,l _{ib}							

PARAMETER MEASUREMENT INFORMATION

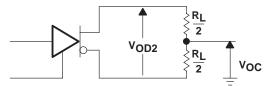
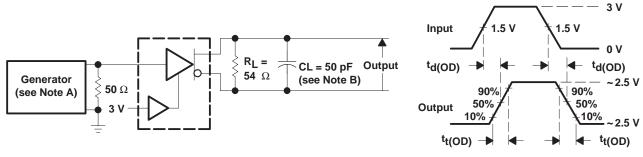


Figure 1. Differential and Common-Mode Output Voltages





VOLTAGE WAVEFORMS

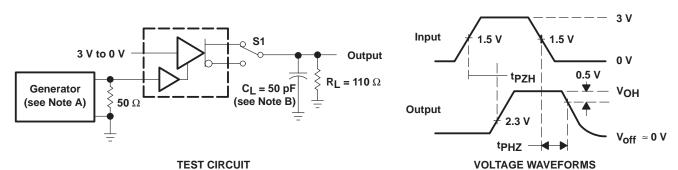
- NOTES: A. The input pulse is supplied by a generator having the following characteristics: $t_f \le 5$ ns, $t_f \le 5$ ns, PRR ≤ 1 MHz, duty cycle = 50%, $Z_O = 50 \Omega$.
 - B. CL includes probe and stray capacitance.

Figure 2. Differential-Output Test Circuit and Voltage Waveforms



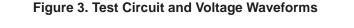
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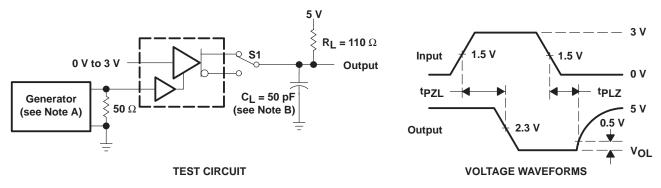
PARAMETER MEASUREMENT INFORMATION



NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 1 MHz, duty cycle = 50%, t_r \leq 5 ns, t_f \leq 5 ns, Z_O = 50 Ω .

B. CL includes probe and stray capacitance.



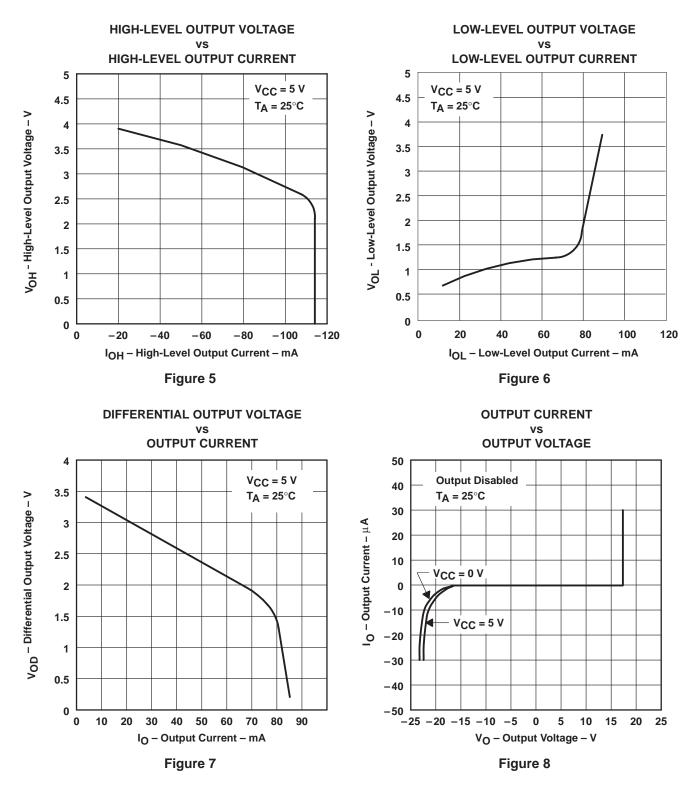


- NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR \leq 1 MHz, duty cycle = 50%, t_f \leq 5 ns, t_f \leq 5 ns, Z_O = 50 Ω .
 - B. CL includes probe and stray capacitance.

Figure 4. Test Circuit and Voltage Waveforms



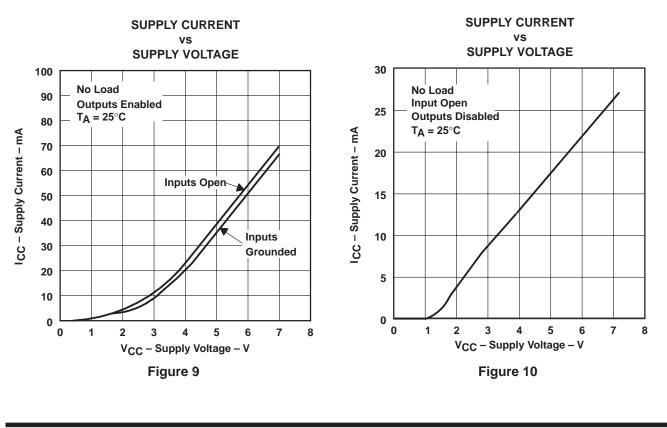
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TYPICAL CHARACTERISTICS

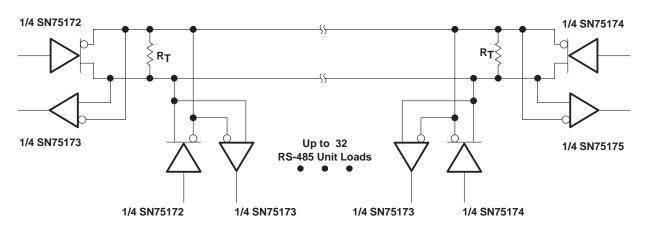


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TYPICAL CHARACTERISTICS

APPLICATION INFORMATION



NOTE: The line length should be terminated at both ends in its characteristic impedance (R_T = Z_O). Stub lengths off the main line should be kept as short as possible.





PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
SN75174DW	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75174DWG4	ACTIVE	SOIC	DW	20	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75174DWR	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75174DWRE4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75174DWRG4	ACTIVE	SOIC	DW	20	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN75174J	OBSOLETE	CDIP	J	16		TBD	Call TI	Call TI
SN75174N	ACTIVE	PDIP	Ν	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
SN75174NE4	ACTIVE	PDIP	Ν	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type

⁽¹⁾ The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

⁽²⁾ Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details. **TBD**: The Pb-Free/Green conversion plan has not been defined.

Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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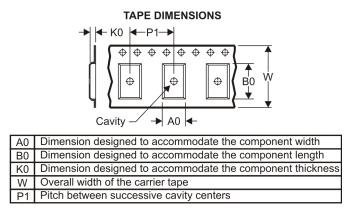
PACKAGE MATERIALS INFORMATION

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TAPE AND REEL INFORMATION





QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75174DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.0	2.7	12.0	24.0	Q1
SN75174DWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.1	2.65	12.0	24.0	Q1

TEXAS INSTRUMENTS

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PACKAGE MATERIALS INFORMATION

27-May-2011



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75174DWR	SOIC	DW	20	2000	346.0	346.0	41.0
SN75174DWR	SOIC	DW	20	2000	346.0	346.0	41.0

J (R-GDIP-T**) 14 LEADS SHOWN

CERAMIC DUAL IN-LINE PACKAGE



NOTES: A. All linear dimensions are in inches (millimeters).

- B. This drawing is subject to change without notice.
- C. This package is hermetically sealed with a ceramic lid using glass frit.
- D. Index point is provided on cap for terminal identification only on press ceramic glass frit seal only.
- E. Falls within MIL STD 1835 GDIP1-T14, GDIP1-T16, GDIP1-T18 and GDIP1-T20.

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



NOTES:

- A. All linear dimensions are in inches (millimeters).B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- \triangle The 20 pin end lead shoulder width is a vendor option, either half or full width.



DW (R-PDSO-G20)

PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).

D. Falls within JEDEC MS-013 variation AC.



LAND PATTERN DATA



NOTES:

- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Refer to IPC7351 for alternate board design.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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