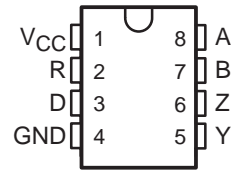


# SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

SLLS003E – OCTOBER 1985 – REVISED JUNE 1998

- Meets or Exceeds the Requirements of TIA/EIA-422-B, TIA/EIA-485-A, and ITU Recommendation V.11
- Bus Voltage Range . . . -7 V to 12 V
- Positive- and Negative-Current Limiting
- Driver Output Capability . . . 60 mA Max
- Driver Thermal-Shutdown Protection
- Receiver Input Impedance . . . 12 k $\Omega$  Min
- Receiver Input Sensitivity . . .  $\pm 200$  mV
- Receiver Input Hysteresis . . . 50 mV Typ
- Operates From Single 5-V Supply
- Low Power Requirements

D OR P PACKAGE  
(TOP VIEW)



## description

The SN75179B is a differential driver and receiver pair designed for balanced transmission-line applications and meets TIA/EIA-422-B, TIA/EIA-485-A, and ITU Recommendation V.11. It is designed to improve the performance of full-duplex data communications over long bus lines.

The SN75179B driver output provides limiting for both positive and negative currents. The receiver features high input impedance, input hysteresis for increased noise immunity, and input sensitivity of  $\pm 200$  mV over a common-mode input voltage range of -7 V to 12 V. The driver provides thermal shutdown for protection from line fault conditions. Thermal shutdown is designed to occur at a junction temperature of approximately 150°C. The SN75179B is designed to drive current loads of up to 60 mA maximum.

The SN75179B is characterized for operation from 0°C to 70°C.

## Function Tables

### DRIVER

INPUT D	OUTPUTS	
	Y	Z
H	H	L
L	L	H

### RECEIVER

DIFFERENTIAL INPUTS A - B	OUTPUT R
$V_{ID} \geq 0.2$ V	H
$-0.2$ V < $V_{ID} < 0.2$ V	?
$V_{ID} \leq -0.2$ V	L
Open	?

H = high level, L = low level, ? = indeterminate



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

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.

 **TEXAS  
INSTRUMENTS**

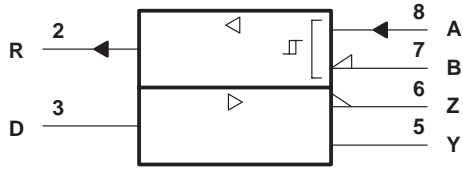
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1998, Texas Instruments Incorporated

# SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

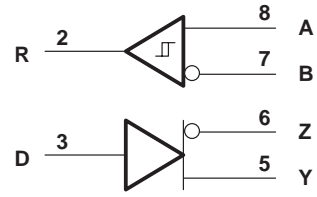
SLLS003E – OCTOBER 1985 – REVISED JUNE 1998

## logic symbol†

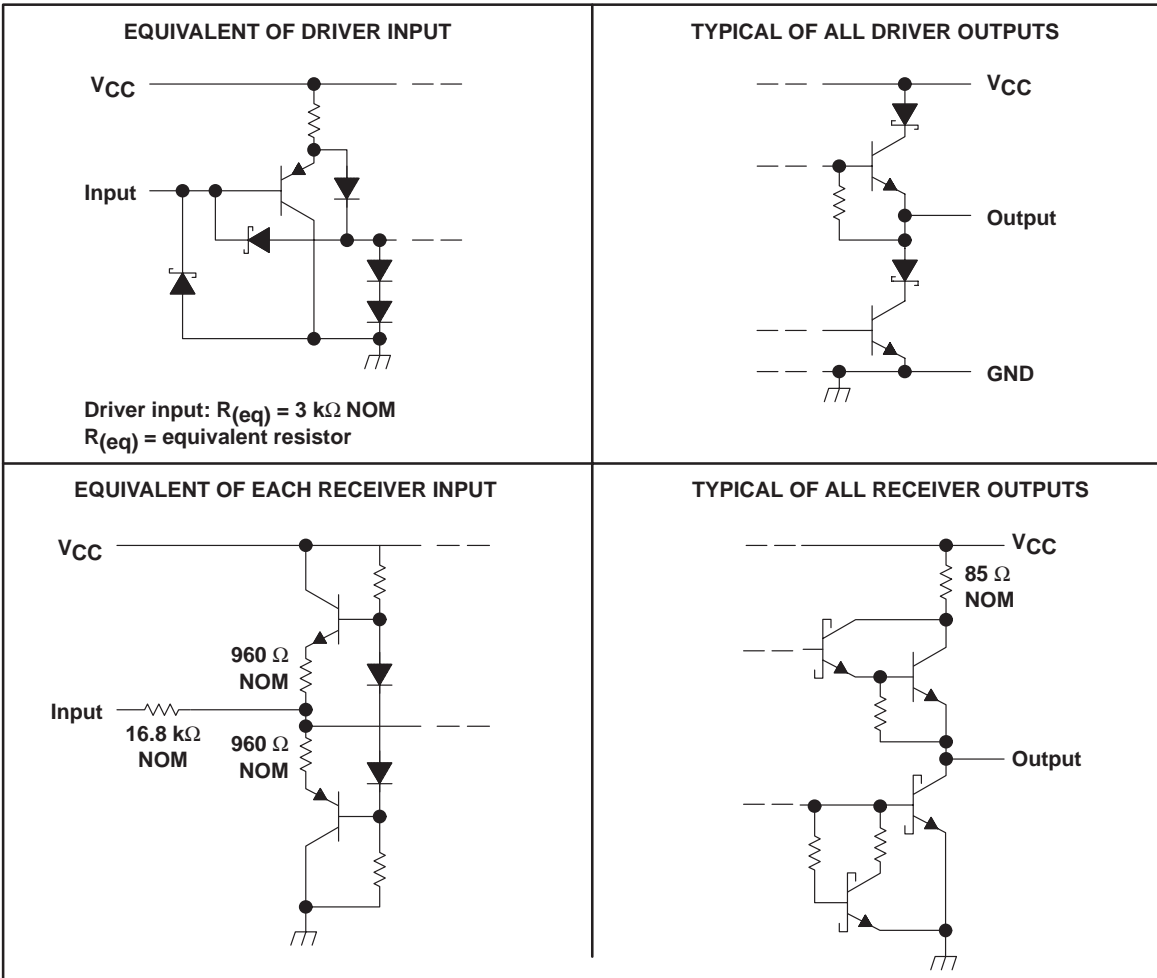


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagram (positive logic)



## schematics of inputs and outputs



# SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

SLLS003E – OCTOBER 1985 – REVISED JUNE 1998

## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

Supply voltage, $V_{CC}$ (see Note 1) .....	7 V
Voltage range at any bus terminal .....	–10 V to 15 V
Differential input voltage, $V_{ID}$ (see Note 2) .....	±25 V
Package thermal impedance, $\theta_{JA}$ (see Note 3):	D package .....
	P package .....
197°C/W	104°C/W
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.

- NOTES:
1. All voltage values, except differential input voltage, are with respect to network ground terminal.
  2. Differential input voltage is measured at the noninverting input with respect to the corresponding inverting input.
  3. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

## recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, $V_{CC}$		4.75	5	5.25	V
High-level input voltage, $V_{IH}$	Driver	2			V
Low-level input voltage, $V_{IL}$	Driver	0.8			V
Common-mode input voltage, $V_{IC}$		–7‡		12	V
Differential input voltage, $V_{ID}$		±12			V
High-level output current, $I_{OH}$	Driver	–60			mA
	Receiver	–400			µA
Low-level output current, $I_{OL}$	Driver	60			mA
	Receiver	8			
Operating free-air temperature, $T_A$		0		70	°C

‡ The algebraic convention, where the less positive (more negative) limit is designated minimum, is used in this data sheet for common-mode input voltage and threshold voltage.



# SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

SLLS003E – OCTOBER 1985 – REVISED JUNE 1998

## DRIVER SECTION

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

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$V_{IK}$ Input clamp voltage	$I_I = -18 \text{ mA}$			-1.5	V
$V_O$ Output voltage	$I_O = 0$	0		6	V
$ V_{OD1} $ Differential output voltage	$I_O = 0$	1.5		6	V
$ V_{OD2} $ Differential output voltage	$R_L = 100 \Omega$ , See Figure 1	$1/2 V_{OD1}$ or $2\ddagger$			V
	$R_L = 54 \Omega$ , See Figure 1	1.5	2.5	5	V
$ V_{OD3} $ Differential output voltage	See Note 4	1.5		5	V
$\Delta V_{OD} $ Change in magnitude of common-mode output voltage§				$\pm 0.2$	V
$V_{OC}$ Common-mode output voltage	$R_L = 54 \Omega$ or $100 \Omega$ , See Figure 1			$\begin{matrix} 3 \\ -1 \end{matrix}$	V
$\Delta V_{OC} $ Change in magnitude of common-mode output voltage§				$\pm 0.2$	V
$I_O$ Output current	$V_{CC} = 0$ , $V_O = -7 \text{ V to } 12 \text{ V}$			$\pm 100$	$\mu\text{A}$
$I_{IH}$ High-level input current	$V_I = 2.4 \text{ V}$			20	$\mu\text{A}$
$I_{IL}$ Low-level input current	$V_I = 0.4 \text{ V}$			-200	$\mu\text{A}$
$I_{OS}$ Short-circuit output current	$V_O = -7 \text{ V}$			-250	mA
	$V_O = V_{CC}$ or $12 \text{ V}$			250	
$I_{CC}$ Supply current (total package)	No load		57	70	mA

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

‡ The minimum  $V_{OD2}$  with  $100\text{-}\Omega$  load is either  $1/2 V_{OD2}$  or  $2 \text{ V}$ , whichever is greater.

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

NOTE 4: See TIA/EIA-485-A, Figure 3.5, Test Termination Measurement 2.

## switching characteristics, $V_{CC} = 5 \text{ V}$ , $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{d(OD)}$ Differential output delay time	$R_L = 54 \Omega$ , See Figure 3		15	22	ns
$t_{t(OD)}$ Differential output transition time			20	30	ns

## Symbol Equivalents

DATA-SHEET PARAMETER	TIA/EIA-422-B	TIA/EIA-485-A
$V_O$	$V_{Oa}, V_{Ob}$	$V_{Oa}, V_{Ob}$
$ V_{OD1} $	$V_o$	$V_o$
$ V_{OD2} $	$V_t (R_L = 100 \Omega)$	$V_t (R_L = 54 \Omega)$
$ V_{OD3} $		$V_t$ (Test Termination Measurement 2)
$\Delta V_{OD} $	$  V_t  -  \bar{V}_t  $	$  V_t  -  \bar{V}_t  $
$V_{OC}$	$ V_{os} $	$ V_{os} $
$\Delta V_{OC} $	$ V_{os} - \bar{V}_{os} $	$ V_{os} - \bar{V}_{os} $
$I_{OS}$	$ I_{sa} ,  I_{sb} $	
$I_O$	$ I_{xa} ,  I_{xb} $	$I_{ia}, I_{ib}$



## RECEIVER SECTION

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

PARAMETER	TEST CONDITIONS	MIN	TYP†	MAX	UNIT
$V_{IT+}$ Positive-going input threshold voltage	$V_O = 2.7\text{ V}$ , $I_O = -0.4\text{ mA}$			0.2	V
$V_{IT-}$ Negative-going input threshold voltage	$V_O = 0.5\text{ V}$ , $I_O = 8\text{ mA}$	-0.2‡			V
$V_{hys}$ Hysteresis voltage ( $V_{IT+} - V_{IT-}$ )			50		mV
$V_{OH}$ High-level output voltage	$V_{ID} = 200\text{ mV}$ , $I_{OH} = -400\text{ }\mu\text{A}$ , See Figure 2		2.7		V
$V_{OL}$ Low-level output voltage	$V_{ID} = -200\text{ mV}$ , $I_{OL} = 8\text{ mA}$ , See Figure 2			0.45	V
$I_I$ Line input current	Other input at 0 V, See Note 5			1	mA
				-0.8	
$r_i$ Input resistance			12		k $\Omega$
$I_{OS}$ Short-circuit output current		-15		-85	mA
$I_{CC}$ Supply current (total package)	No load		57	70	mA

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

‡ The algebraic convention, where the less positive (more negative) limit is designated minimum, is used in this data sheet for common-mode input voltage and threshold voltage levels only.

NOTE 5: Refer to TIA/EIA-422-B for exact conditions.

switching characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$ Propagation delay time, low- to high-level output	$V_{ID} = -1.5\text{ V}$ to $1.5\text{ V}$ ,		19	35	ns
$t_{PHL}$ Propagation delay time, high- to low-level output	$C_L = 15\text{ pF}$ , See Figure 4		30	40	

## PARAMETER MEASUREMENT INFORMATION

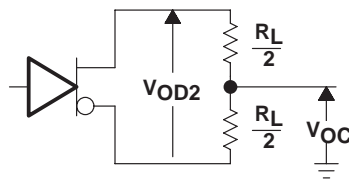


Figure 1. Driver  $V_{DD}$  and  $V_{OC}$

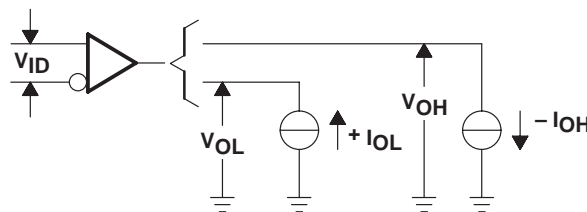
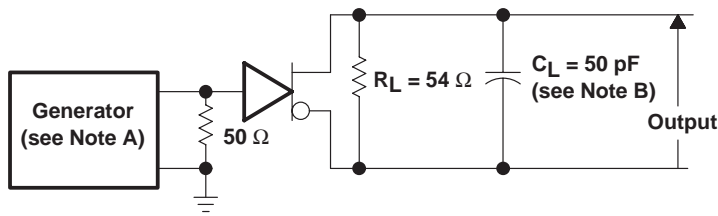


Figure 2. Receiver  $V_{OH}$  and  $V_{OL}$

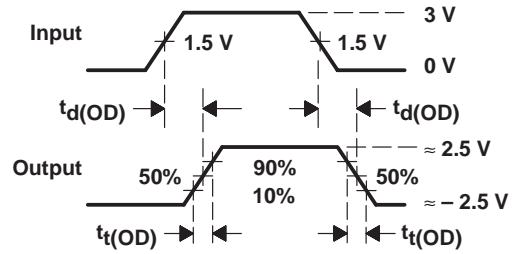
# SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

SLLS003E – OCTOBER 1985 – REVISED JUNE 1998

## PARAMETER MEASUREMENT INFORMATION (CONTINUED)



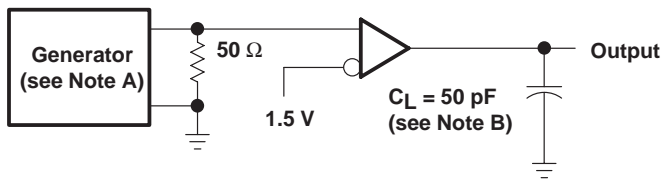
TEST CIRCUIT



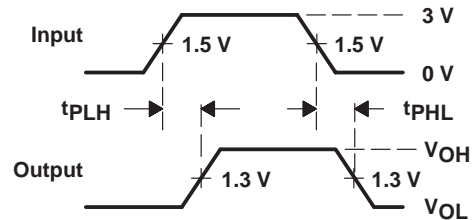
VOLTAGE WAVEFORMS

- NOTES: A. The input pulse is supplied by a generator having the following characteristics:  $\text{PRR} \leq 1 \text{ MHz}$ , 50% duty cycle,  $t_r \leq 6 \text{ ns}$ ,  $t_f \leq 6 \text{ ns}$ ,  $Z_O = 50 \Omega$ .  
B.  $C_L$  includes probe and jig capacitance.

Figure 3. Driver Test Circuit and Voltage Waveforms



TEST CIRCUIT

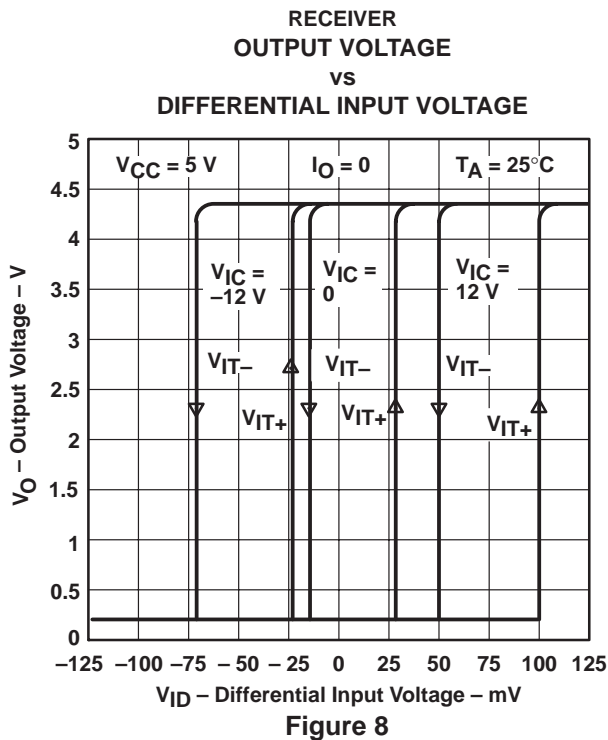
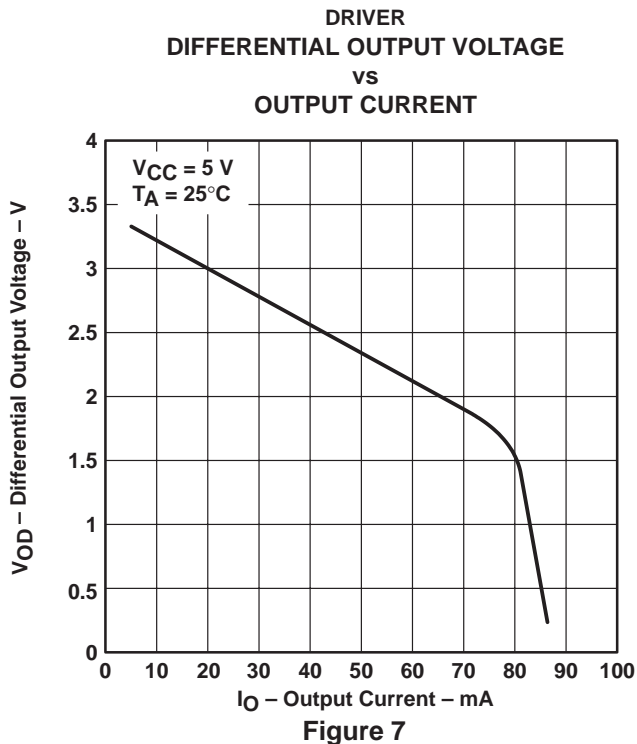
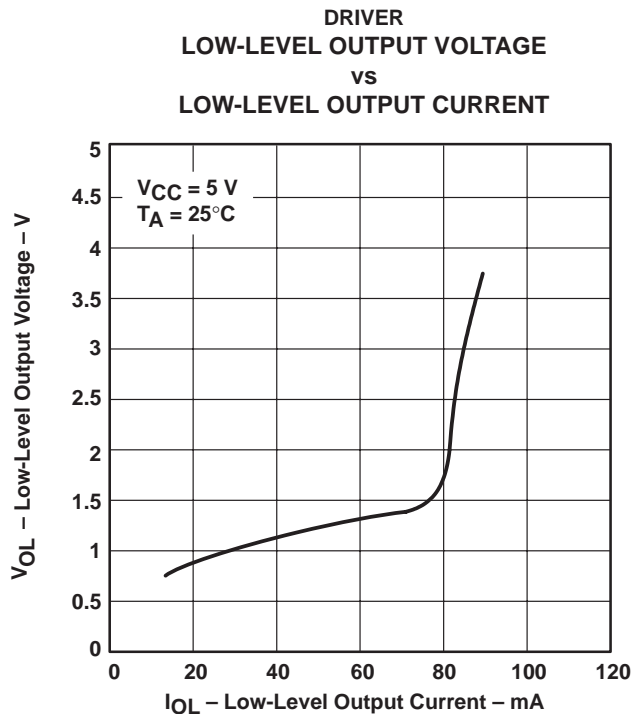
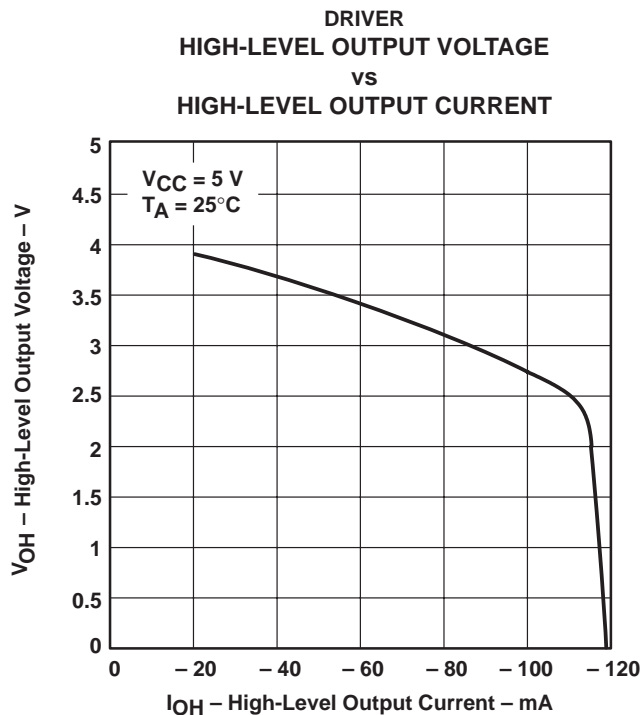


VOLTAGE WAVEFORMS

- NOTES: A. The input pulse is supplied by a generator having the following characteristics:  $\text{PRR} \leq 1 \text{ MHz}$ , 50% duty cycle,  $t_r \leq 6 \text{ ns}$ ,  $t_f \leq 6 \text{ ns}$ ,  $Z_O = 50 \Omega$ .  
B.  $C_L$  includes probe and jig capacitance.

Figure 4. Receiver Test Circuit and Voltage Waveforms

TYPICAL CHARACTERISTICS



# SN75179B DIFFERENTIAL DRIVER AND RECEIVER PAIR

SLLS003E – OCTOBER 1985 – REVISED JUNE 1998

## TYPICAL CHARACTERISTICS

HIGH-LEVEL OUTPUT VOLTAGE  
vs  
HIGH-LEVEL OUTPUT CURRENT

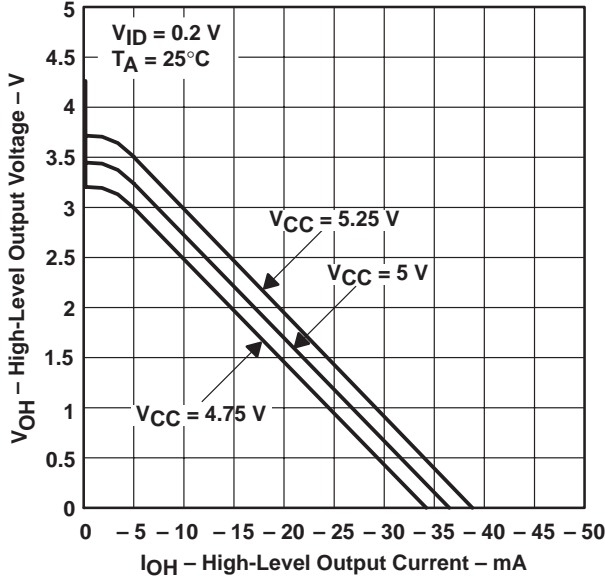


Figure 9

HIGH-LEVEL OUTPUT VOLTAGE  
vs  
FREE-AIR TEMPERATURE

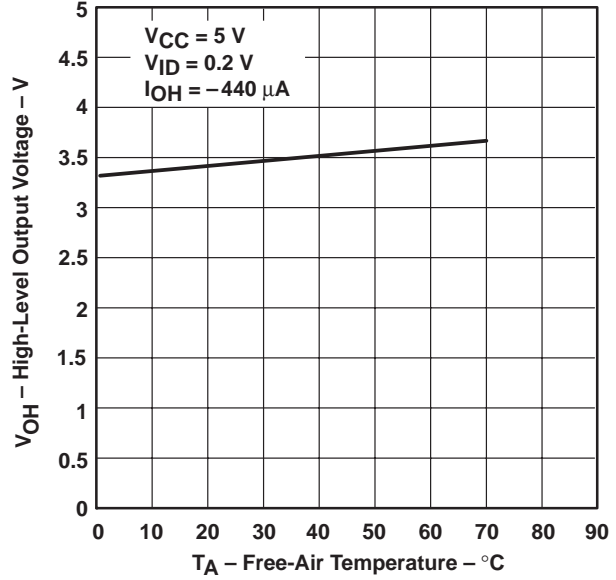


Figure 10

RECEIVER  
LOW-LEVEL OUTPUT VOLTAGE  
vs  
LOW-LEVEL OUTPUT CURRENT

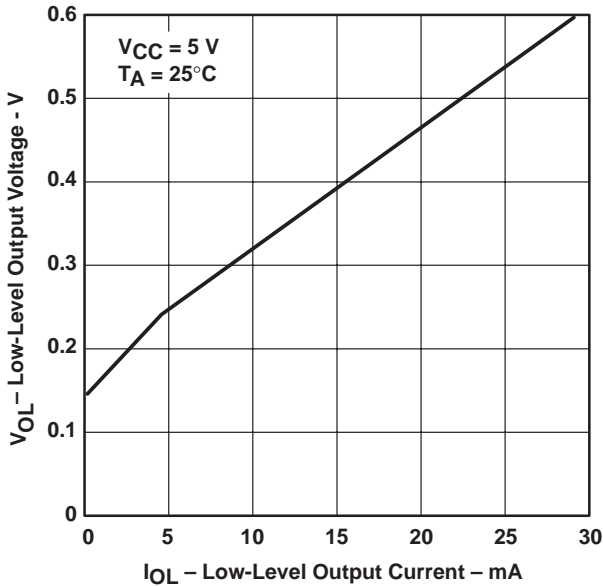


Figure 11

RECEIVER  
LOW-LEVEL OUTPUT VOLTAGE  
vs  
FREE-AIR TEMPERATURE

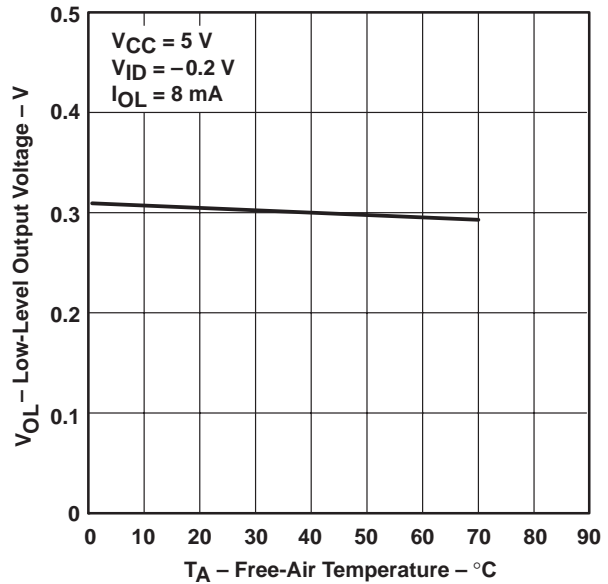


Figure 12

## IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are utilized to the extent TI deems necessary to support this warranty. Specific testing of all parameters of each device is not necessarily performed, except those mandated by government requirements.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such semiconductor products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, warranty or endorsement thereof.