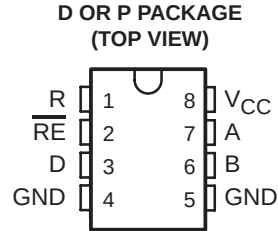


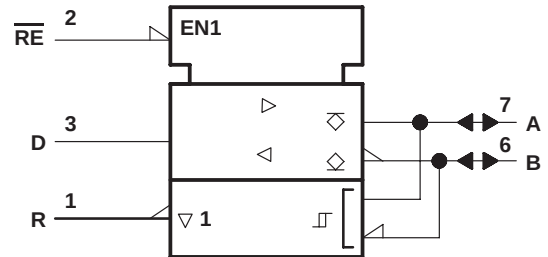
SN65076B, SN75076B DIFFERENTIAL BUS TRANSCEIVERS

SLLS061 – D3407, JANUARY 1990

- Bidirectional Transceiver
- Designed for Multipoint Transmission in Noisy Environments Such as Automotive Applications
- 3-State Driver and Receiver Outputs
- Individual Driver and Receiver Enables
- Wide Positive and Negative Input/Output Bus Voltage Ranges
- Driver Output Capability . . . ± 10 mA Max
- Thermal Shutdown Protection
- Driver Positive and Negative Current Limiting
- Receiver Input Impedance . . . 12 k Ω Min
- Receiver Input Sensitivity . . . ± 200 mV
- Receiver Input Hysteresis . . . 50 mV Typ
- Operates From Single 5-V Supply
- Low Power Requirements



logic symbol†



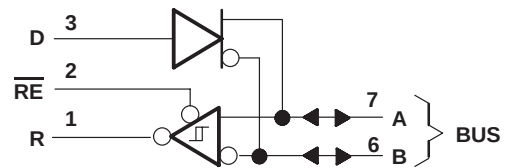
† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

description

The SN65076B and SN75076B differential bus transceivers are monolithic integrated circuits designed for bidirectional data communication on multipoint bus transmission lines. They are designed for noisy environments, where a low-impedance termination to ground is required.

The SN65076B and SN75076B combine a differential line driver and a differential input line receiver, both of which operate from a single 5-V power supply. The receiver has an active-low enable. The driver differential outputs and the receiver differential inputs are connected internally to form differential input/output (I/O) bus ports that are designed to offer minimum loading to the bus whenever the driver is disabled or $V_{CC} = 0$. These ports feature wide positive and negative common-mode voltage ranges making the device suitable for party-line applications.

logic diagram (positive logic)



Function Tables

DRIVER

INPUT D	OUTPUTS	
	A	B
H	H	L
L	L†	H†

† These levels assume that the open-collector outputs (A) and the open-emitter outputs (B) are connected to a pullup and pulldown resistor, respectively.

RECEIVER

DIFFERENTIAL INPUTS A – B	ENABLE RE	OUTPUT R
$V_{ID} \geq 0.2$ V	L	L
-0.2 V $< V_{ID} < 0.2$ V	L	?
$V_{ID} \leq -0.2$ V	L	H
X	H	Z

H = high level, L = low level, ? = indeterminate;
X = irrelevant, Z = high impedance (off)

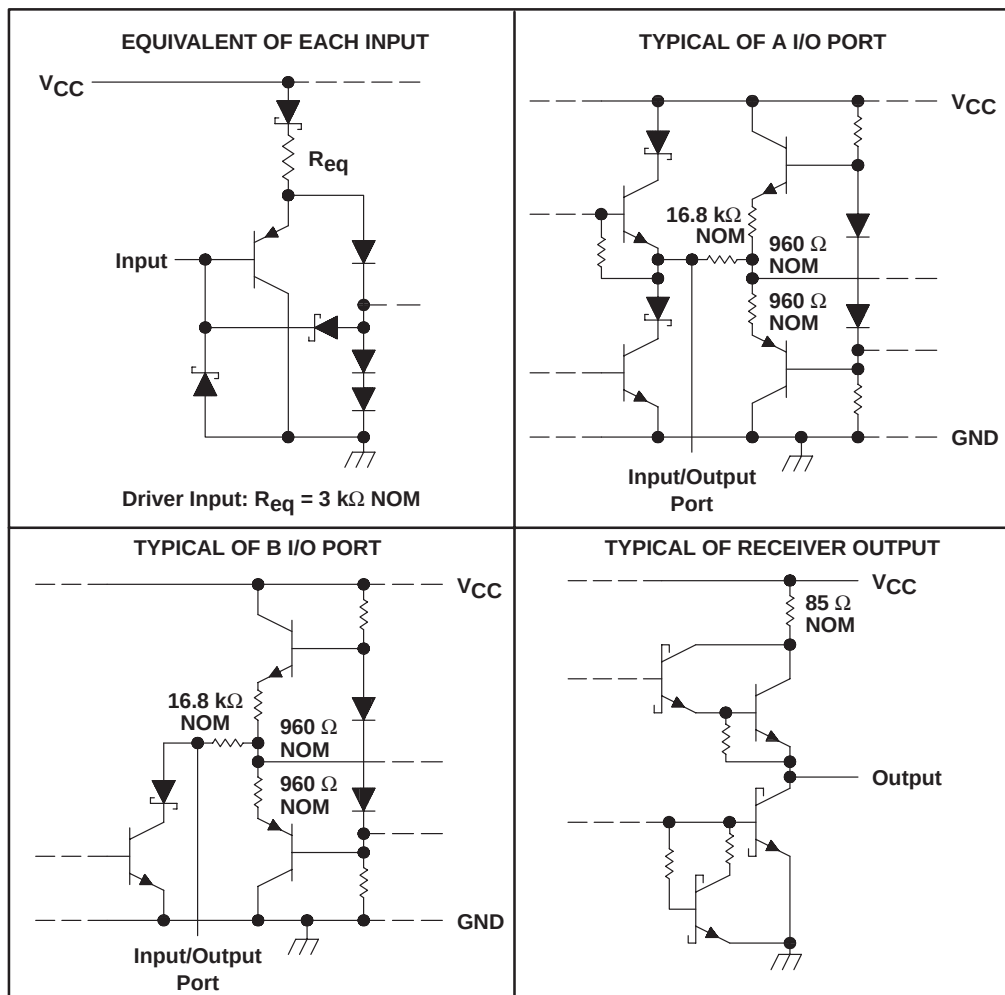
SN65076B, SN75076B DIFFERENTIAL BUS TRANSCEIVERS

SLLS061 – D3407, JANUARY 1990

description (continued)

The driver is designed to handle loads up to 10 mA of sink and source current. The driver features positive- and negative-current limiting and thermal shutdown for protection from line fault conditions. Thermal shutdown is designed to occur at a junction temperature of approximately 150°C in the P package and 170°C in the D package. The receiver features a minimum input impedance of 12 kΩ, an input sensitivity of ±200 mV, and a typical input hysteresis of 50 mV.

The SN65076B is characterized for operation from –40°C to 105°C and the SN75076B is characterized for operation from 0°C to 70°C.



SN65076B, SN75076B DIFFERENTIAL BUS TRANSCEIVERS

SLLS061 – D3407, JANUARY 1990

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
Enable input voltage	5.5 V
Continuous total power dissipation	See Dissipation Rating Table
Operating free-air temperature range: SN65076B	–40°C to 105°C
SN75076B	0°C to 70°C
Storage temperature range	–65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from the case for 10 seconds	260°C

NOTE 1: All voltage values, except differential input/output bus voltage, are with respect to network ground terminal.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING	$T_A = 105^\circ\text{C}$ POWER RATING
D	725 mW	5.8 mW/°C	464 mW	261 mW
P	1100 mW	8.8 mW/°C	702 mW	396 mW

recommended operating conditions

		MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}		4.75	5	5.25	V
Voltage at any bus terminal (separately or common mode), V_I or V_{IC}				12	V
				–7	V
High-level input voltage, V_{IH}	D and $\overline{RE}$	2			V
Low-level input voltage, V_{IL}	D and $\overline{RE}$			0.8	V
Differential input voltage, V_{ID} (see Note 2)				±12	V
High-level output current, I_{OH}	Driver (A)			–10	mA
	Receiver			–400	µA
Low-level output current, I_{OL}	Driver (B)			10	mA
	Receiver			8	mA
Operating free-air temperature, T_A	SN65076B	–40		105	°C
	SN75076B	0		70	°C

NOTE 2: Differential-input/output bus voltage is measured at the noninverting terminal A with respect to the inverting terminal B.



SN65076B, SN75076B

DIFFERENTIAL BUS TRANSCEIVERS

SLLS061 – D3407, JANUARY 1990

DRIVER SECTION

electrical characteristics over recommended ranges of supply voltage and operating free-air temperature

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
V_{IK}	Input clamp voltage	$I_I = -18 \text{ mA}$		-1.5	V
V_O	Output voltage	$V_I = 2 \text{ V}$, $I_O = 0$	0	6	V
V_{OD1}	Differential output voltage	$I_O = 0$	1.5	6	V
V_{OD2}	Differential output voltage	See Figure 1	1.5	5	V
I_O	Output current	$V_I = 0.8 \text{ V}$	$V_O = 12 \text{ V}$		1
			$V_O = -7 \text{ V}$		-0.8
I_{IH}	High-level input current	$V_I = 2.4 \text{ V}$		20	μA
I_{IL}	Low-level input current	$V_I = 0.4 \text{ V}$		-400	μA
I_{OS}	Short-circuit output current	$V_O = -7 \text{ V}$		-250	mA
		$V_O = 0$		-150	
		$V_O = V_{CC}$		250	
		$V_O = 12 \text{ V}$		250	
I_{CC}	Supply current (total package)	No load		30	mA

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

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{on}	Differential-output turn-on time	See Figure 3		60	90	ns
t_{off}	Differential-output turn-off time			75	110	ns

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_{T+}	Positive-going input threshold voltage	$V_O = 2.7\text{ V}$,	$I_O = -0.4\text{ mA}$			0.2	V
V_{T-}	Negative-going input threshold voltage	$V_O = 0.5\text{ V}$,	$I_O = 8\text{ mA}$	$-0.2^{\ddagger}$			V
V_{hys}	Hysteresis ($V_{T+} - V_{T-}$)				50		mV
V_{IK}	Enable-input clamp voltage	$I_I = -18\text{ mA}$				-1.5	V
V_{OH}	High-level output voltage	$V_{ID} = -200\text{ mV}$, See Figure 2	$I_{OH} = -400\text{ }\mu\text{A}$,	2.7			V
V_{OL}	Low-level output voltage	$V_{ID} = -200\text{ mV}$, See Figure 2	$I_{OL} = 8\text{ mA}$,			0.45	V
I_{OZ}	High-impedance-state output current	$V_O = 0.4\text{ V to }2.4\text{ V}$				± 20	μA
I_I	Line input current	Other input = 0 V , $V_I = -7\text{ V}$,	$V_I = 12\text{ V}$, See Note 3			1 -0.8	mA
I_{IH}	High-level enable-input current	$V_{IH} = 2.7\text{ V}$				20	μA
I_{IL}	Low-level enable-input current	$V_{IL} = 0.4\text{ V}$				-100	μA
r_i	Input resistance			12			$\text{k}\Omega$
I_{OS}	Short-circuit output current			-15		-85	mA
I_{CC}	Supply current (total package)	No load				30	mA

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

[‡] The algebraic convention, in which the less-positive (more-negative) limit is designated minimum, is used in this data sheet for threshold voltage levels only.

NOTE 3: This applies for both power on and power off.

switching characteristics, $V_{CC} = 5\text{ V}$, $C_L = 15\text{ pF}$, $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high level output	$V_{ID} = 0\text{ to }3\text{ V}$, See Figure 4			21	35	ns
t_{PHL}	Propagation delay time, high-to-low level output				23	35	ns
t_{PZH}	Output enable time to high level	See Figure 5			10	20	ns
t_{PZL}	Output enable time to low level				12	20	ns
t_{PHZ}	Output disable time from high level	See Figure 5			20	35	ns
t_{PLZ}	Output disable time from low level				17	25	ns

SN65076B, SN75076B DIFFERENTIAL BUS TRANSCEIVERS

SLLS061 – D3407, JANUARY 1990

PARAMETER MEASUREMENT INFORMATION

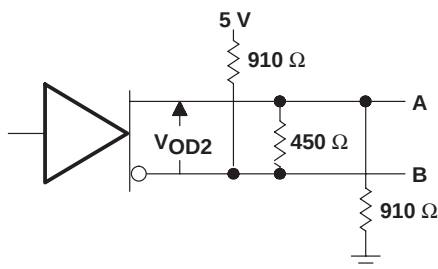


Figure 1. Driver V_{OD2}

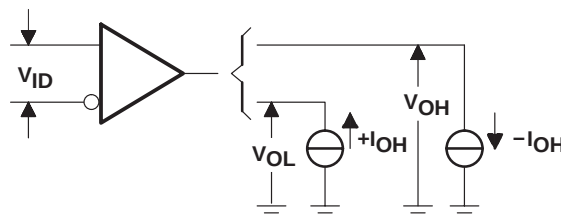
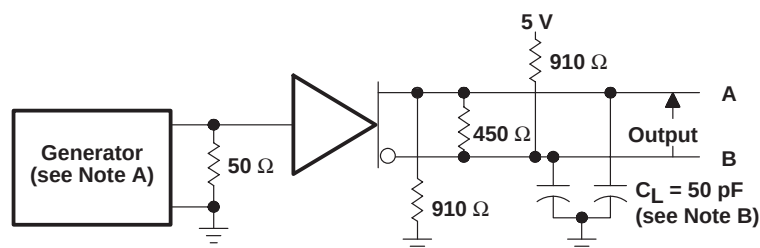
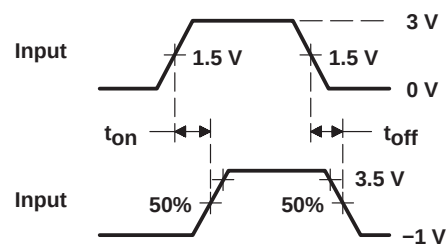


Figure 2. Receiver V_{OH} and V_{OL}

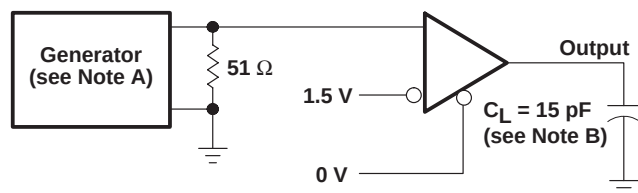


TEST CIRCUIT

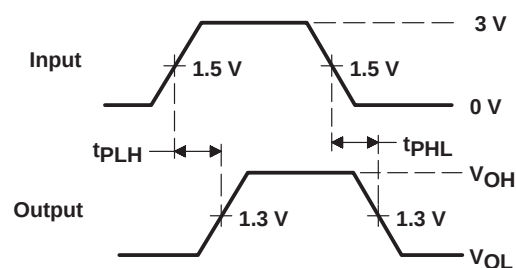


VOLTAGE WAVEFORMS

Figure 3. Driver Differential-Output Delay Times



TEST CIRCUIT



VOLTAGE WAVEFORMS

Figure 4. Receiver Test Circuit and Voltage Waveforms Propagation Delay Times

NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR $\leq$ 500 kHz, 50% duty cycle, $t_r \leq$ 6 ns, $t_f \leq$ 6 ns, $Z_O = 50 \Omega$.
B. C_L includes probe and jig capacitance.

PARAMETER MEASUREMENT INFORMATION

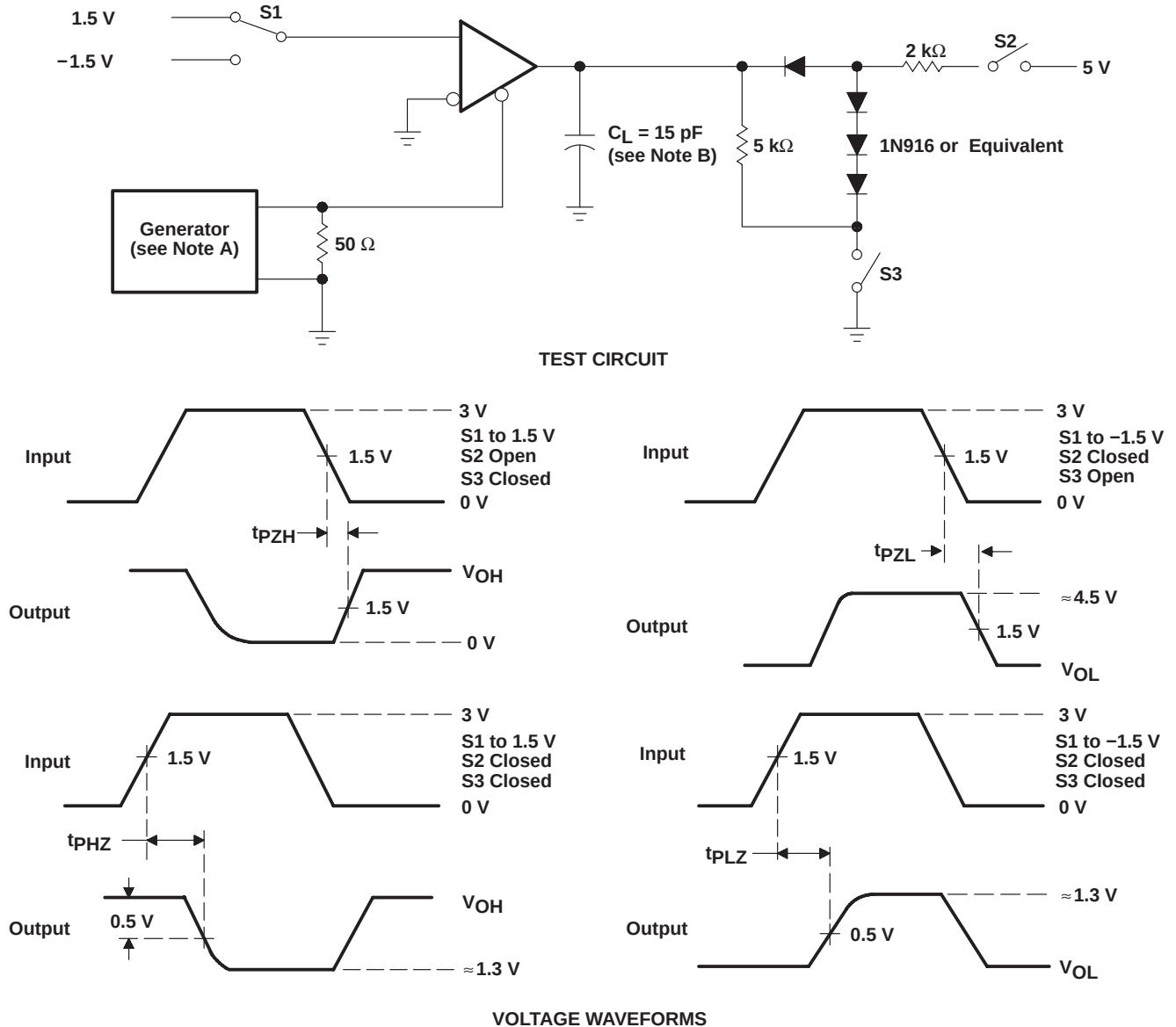


Figure 5. Receiver Output Enable and Disable Times

- NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR $\leq$ 500 kHz, 50% duty cycle, $t_r \leq$ 6 ns, $t_f \leq$ 6 ns, $Z_O = 50 \Omega$.
 B. C_L includes probe and jig capacitance.

SN65076B, SN75076B DIFFERENTIAL BUS TRANSCEIVERS

SLLS061 – D3407, JANUARY 1990

TYPICAL CHARACTERISTICS

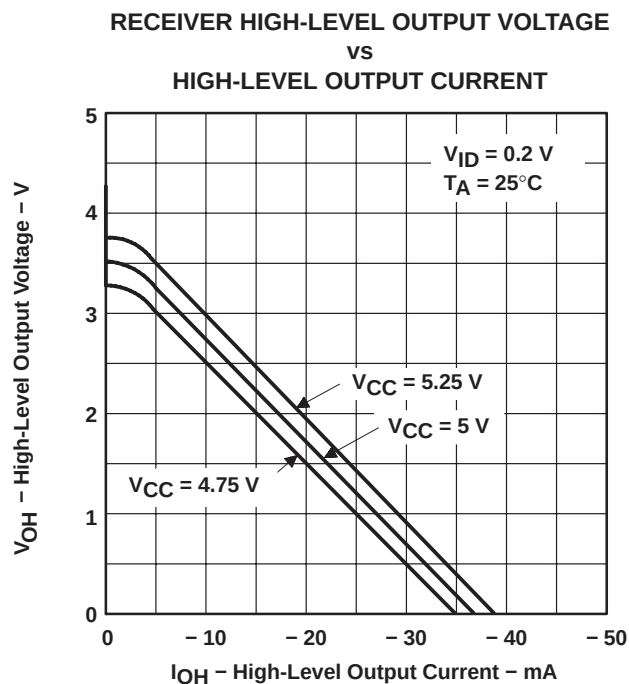


Figure 6

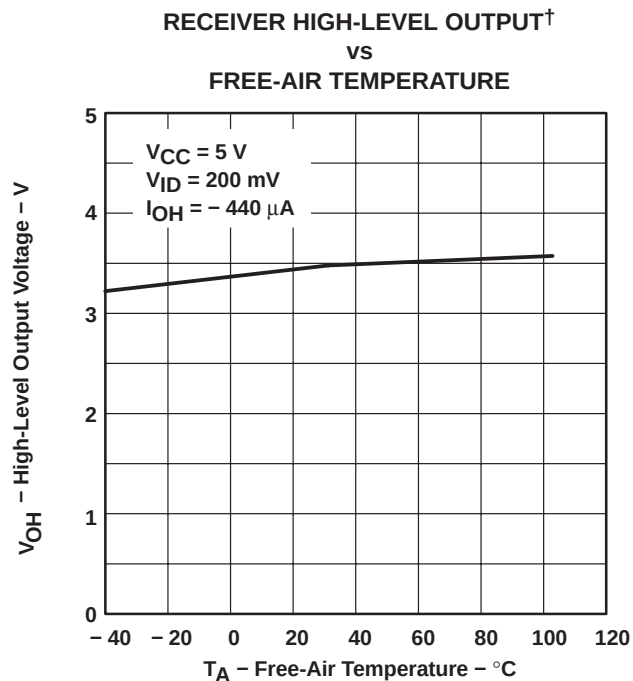


Figure 7

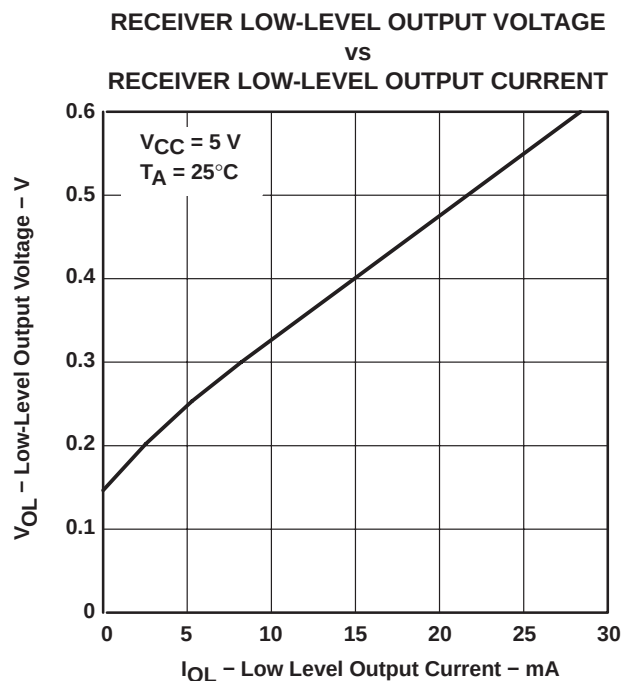


Figure 8

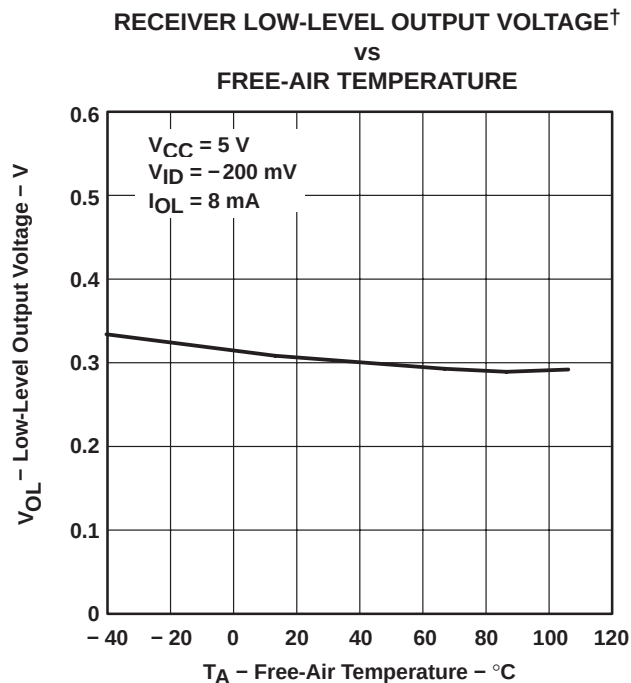


Figure 9

[†] Only the 0°C to 70°C portion of the curve applies for the SN75076B.

TYPICAL CHARACTERISTICS

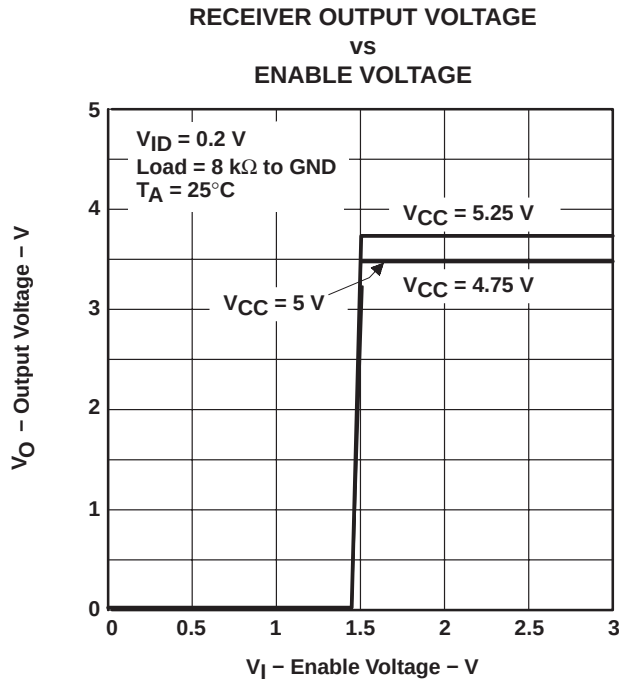


Figure 10

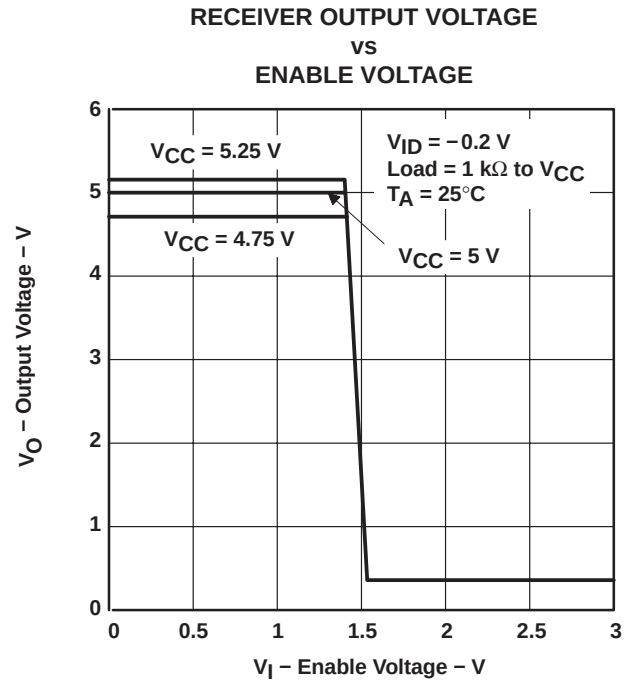


Figure 11

APPLICATION INFORMATION

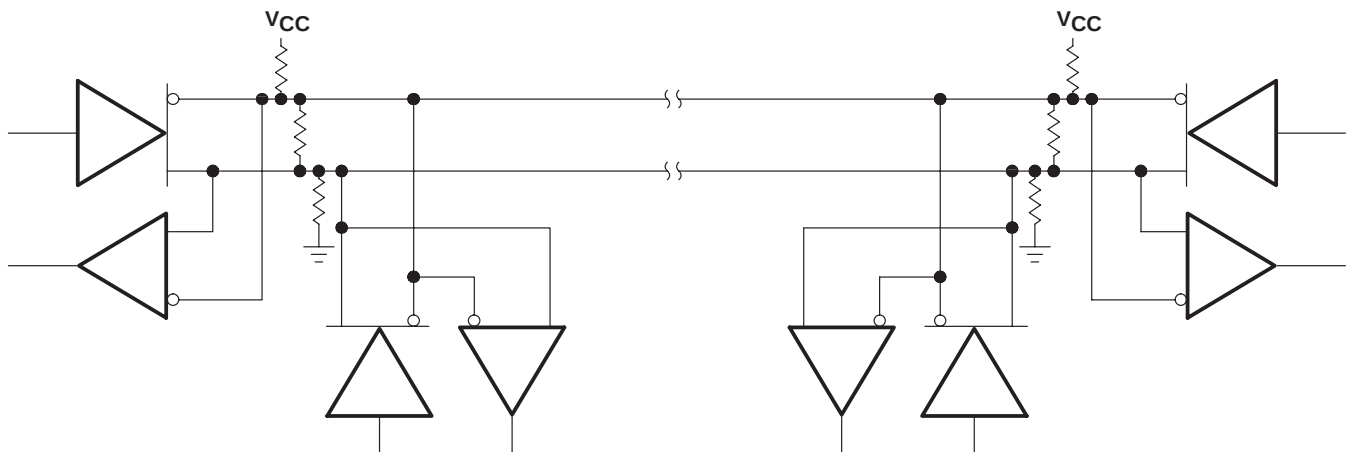


Figure 12. Typical Application Circuit

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