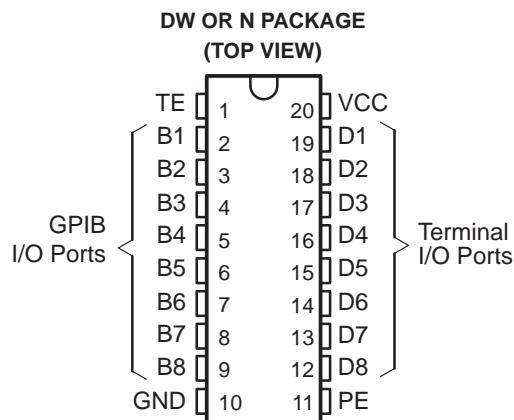


- Meets IEEE Standard 488-1978 (GPIB)
- 8-Channel Bidirectional Transceiver
- Power-Up/Power-Down Protection (Glitch Free)
- High-Speed, Low-Power Schottky Circuitry
- Low Power Dissipation . . . 72 mW Max Per Channel
- Fast Propagation Times . . . 22 ns Max
- High-Impedance pnp Inputs
- Receiver Hysteresis . . . 650 mV Typ
- Open-Collector Driver Output Option
- No Loading of Bus When Device Is Powered Down ( $V_{CC} = 0$ )



### description

The SN75160B 8-channel general-purpose interface bus (GPIB) transceiver is a monolithic, high-speed, low-power Schottky device designed for two-way data communications over single-ended transmission lines. It is designed to meet the requirements of IEEE Standard 488-1978. The transceiver features driver outputs that can be operated in either the passive-pullup or 3-state mode. If talk enable (TE) is high, these ports have the characteristics of passive-pullup outputs when pullup enable (PE) is low and of 3-state outputs when PE is high. Taking TE low places these ports in the high-impedance state. The driver outputs are designed to handle loads up to 48 mA of sink current.

Output glitches during power up and power down are eliminated by an internal circuit that disables both the bus and receiver outputs. The outputs do not load the bus when  $V_{CC} = 0$ . When combined with the SN75161B or SN75162B management bus transceivers, the pair provides the complete 16-wire interface for the IEEE-488 bus.

The SN75160B is characterized for operation from 0°C to 70°C.

### Function Tables

EACH DRIVER			OUTPUT
INPUTS	OUTPUT		B
D	TE	PE	
H	H	H	H
L	H	X	L
H	X	L	Z†
X	L	X	Z†

EACH RECEIVER			OUTPUT
INPUTS	OUTPUT		D
B	TE	PE	
L	L	X	L
H	L	X	H
X	H	X	Z

H = high level, L = low level, X = irrelevant, Z = high impedance

† This is the high-impedance state of a normal 3-state output modified by the internal resistors to  $V_{CC}$  and GND.

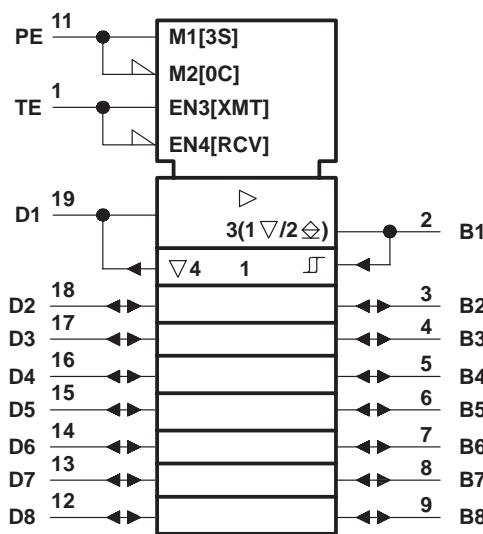


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

**SN75160B**  
**OCTAL GENERAL-PURPOSE**  
**INTERFACE BUS TRANSCEIVER**

SLLS004B – OCTOBER 1985 – REVISED MAY 1995

logic symbol†

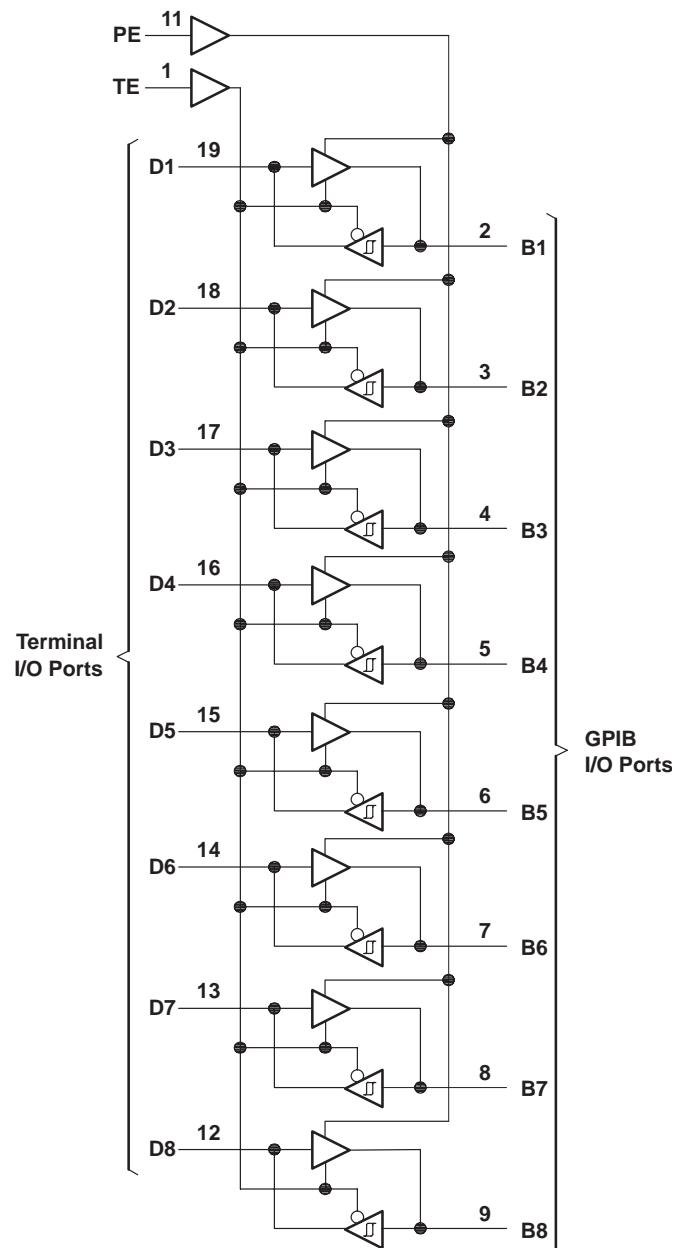


† This symbol is in accordance with ANSI/IEEE Std 91-1984  
 and IEC Publication 617-12.

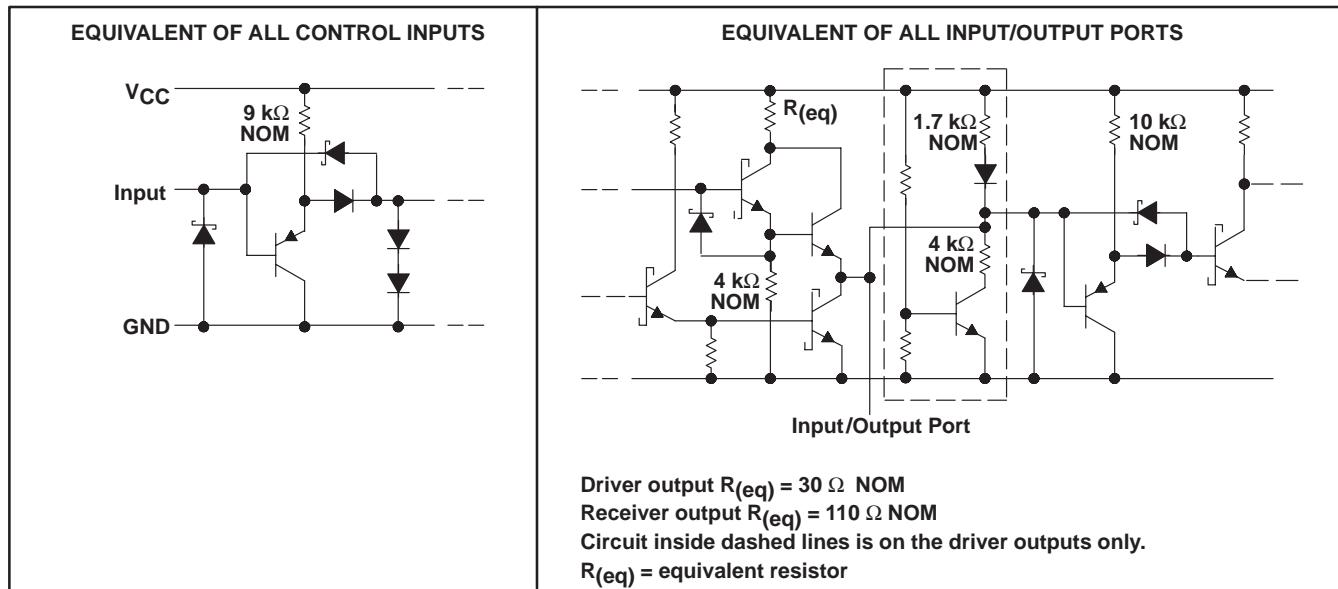
▽ Designates 3-state outputs

△ Designates passive-pullup outputs

logic diagram (positive logic)



### schematics of inputs and outputs



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

Supply voltage, $V_{CC}$ (see Note 1)	7 V
Input voltage, $V_I$	5.5 V
Low-level driver output current, $I_{OL}$	100 mA
Continuous total power 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

<sup>†</sup> 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 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
DW	1125 mW	9.0 mW/°C	720 mW
N	1150 mW	9.2 mW/°C	736 mW

**SN75160B**  
**OCTAL GENERAL-PURPOSE**  
**INTERFACE BUS TRANSCEIVER**

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**recommended operating conditions**

		MIN	NOM	MAX	UNIT
Supply voltage, $V_{CC}$		4.75	5	5.25	V
High-level input voltage, $V_{IH}$		2			V
Low-level input voltage, $V_{IL}$			0.8		V
High-level output current, $I_{OH}$	Bus ports with pullups active			-5.2	mA
	Terminal ports			-800	$\mu A$
Low-level output current, $I_{OL}$	Bus ports		48		mA
	Terminal ports		16		
Operating free-air temperature, $T_A$		0	70		$^{\circ}C$

**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		$I_I = -18 \text{ mA}$			-0.8	-1.5	V
$V_{hys}$ Hysteresis voltage ( $V_{IT+} - V_{IT-}$ )		Bus		See Figure 8	0.4	0.65	V
$V_{OH}$ High-level output voltage		Terminal	$I_{OH} = -800 \mu A$ , TE at 0.8 V		2.7	3.5	V
		Bus	$I_{OH} = -5.2 \text{ mA}$ , PE and TE at 2 V		2.5	3.3	
$V_{OL}$ Low-level output voltage		Terminal	$I_{OL} = 16 \text{ mA}$ , TE at 0.8 V		0.3	0.5	V
		Bus	$I_{OL} = 48 \text{ mA}$ , TE at 2 V		0.35	0.5	
$I_I$ Input current at maximum input voltage	Terminal	$V_I = 5.5 \text{ V}$			0.2	100	$\mu A$
$I_{IH}$ High-level input current	Terminal	$V_I = 2.7 \text{ V}$			0.1	20	$\mu A$
$I_{IL}$ Low-level input current	Terminal	$V_I = 0.5 \text{ V}$			-10	-100	$\mu A$
$V_{I/O(bus)}$ Voltage at bus port		Driver disabled	$I_{I(bus)} = 0$		2.5	3.0	3.7
			$I_{I(bus)} = -12 \text{ mA}$				-1.5
$I_{I/O(bus)}$ Current into bus port		Power on	$V_{I(bus)} = -1.5 \text{ V to } 0.4 \text{ V}$		-1.3		mA
			$V_{I(bus)} = 0.4 \text{ V to } 2.5 \text{ V}$		0	-3.2	
			$V_{I(bus)} = 2.5 \text{ V to } 3.7 \text{ V}$			2.5	
			$V_{I(bus)} = 3.7 \text{ V to } 5 \text{ V}$		0	2.5	
			$V_{I(bus)} = 5 \text{ V to } 5.5 \text{ V}$		0.7	2.5	
		Power off	$V_{CC} = 0$ , $V_{I(bus)} = 0 \text{ to } 2.5 \text{ V}$			-40	
$I_{OS}$ Short-circuit output current		Terminal			-15	-35	-75
		Bus			-25	-50	-125
$I_{CC}$ Supply current		No load	Receivers low and enabled		70	90	mA
			Drivers low and enabled		85	110	
$C_{I/O(bus)}$ Bus-port capacitance		$V_{CC} = 0 \text{ to } 5 \text{ V}$ , $V_{I/O} = 0 \text{ to } 2 \text{ V}$ , $f = 1 \text{ MHz}$			16		pF

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



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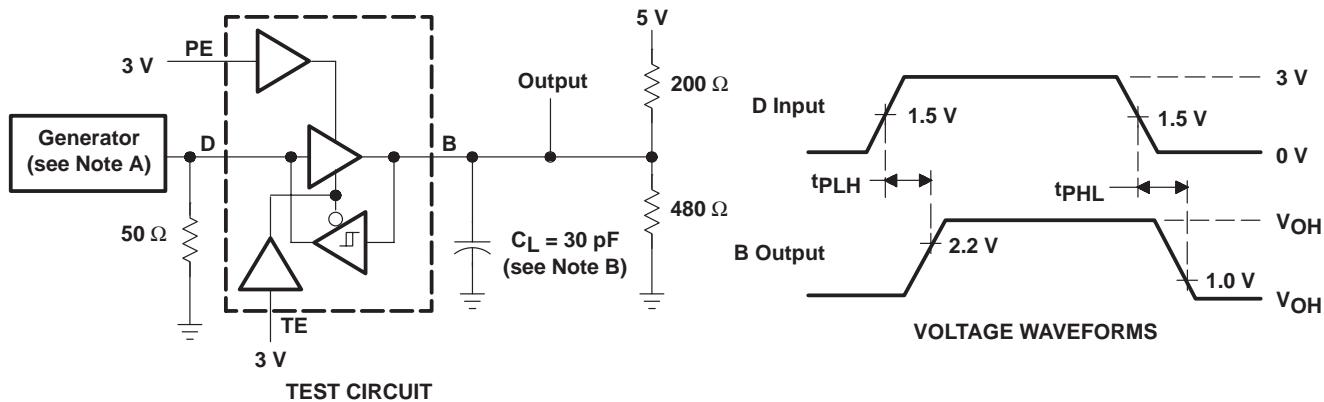
**switching characteristics,  $V_{CC} = 5$  V,  $C_L = 15$  pF,  $T_A = 25^\circ\text{C}$  (unless otherwise noted)**

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t <sub>PLH</sub> Propagation delay time, low- to high-level output	Terminal	Bus	$C_L = 30$ pF, See Figure 1	14	20		ns
t <sub>PHL</sub> Propagation delay time, high- to low-level output				14	20		
t <sub>PLH</sub> Propagation delay time, low- to high-level output	Bus	Terminal	$C_L = 30$ pF, See Figure 2	10	20		ns
t <sub>PHL</sub> Propagation delay time, high- to low-level output				15	22		
t <sub>PZH</sub> Output enable time to high level	TE	BUS	See Figure 3	25	35		ns
t <sub>PHZ</sub> Output disable time from high level				13	22		
t <sub>PZL</sub> Output enable time to low level				22	35		
t <sub>PLZ</sub> Output disable time from low level				22	32		
t <sub>PZH</sub> Output enable time to high level	TE	Terminal	See Figure 4	20	30		ns
t <sub>PHZ</sub> Output disable time from high level				12	20		
t <sub>PZL</sub> Output enable time to low level				23	32		
t <sub>PLZ</sub> Output disable time from low level				19	30		
t <sub>en</sub> Output pullup enable time	PE	Bus	See Figure 5	15	22		ns
t <sub>dis</sub> Output pullup disable time				13	20		

**SN75160B**  
**OCTAL GENERAL-PURPOSE**  
**INTERFACE BUS TRANSCEIVER**

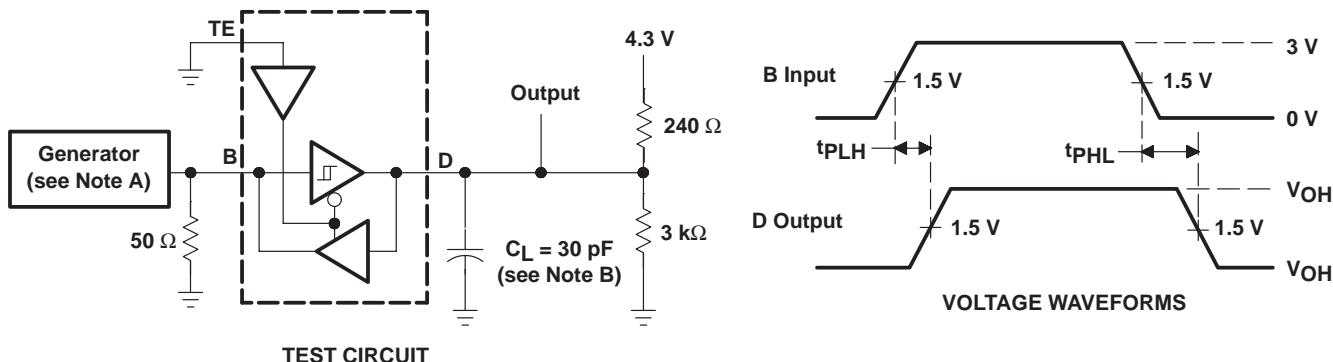
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**PARAMETER MEASUREMENT INFORMATION**



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

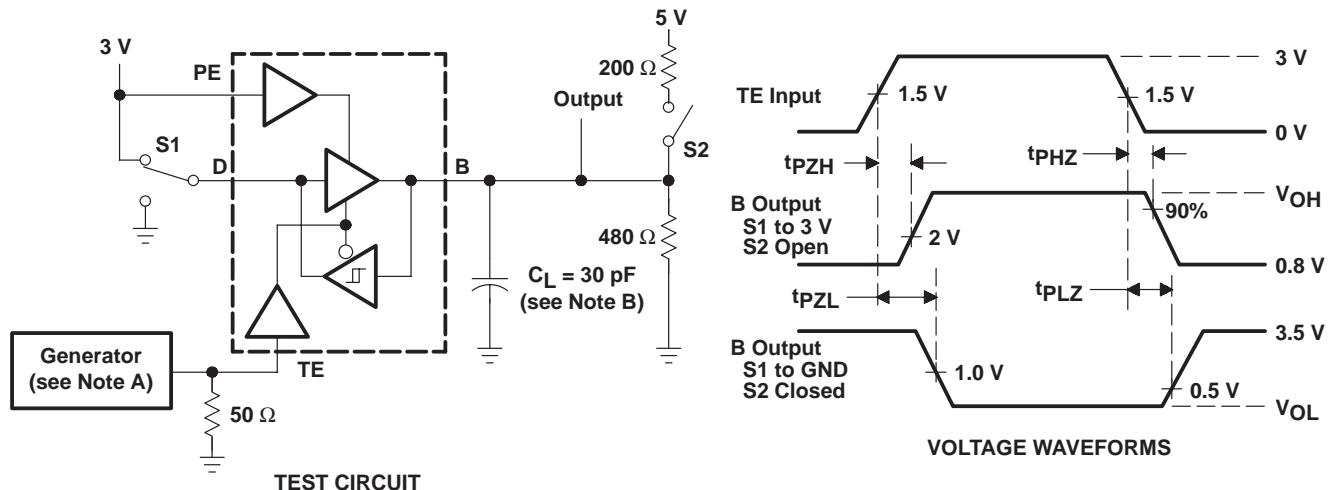
**Figure 1. Terminal-to-Bus Test Circuit and Voltage Waveforms**



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

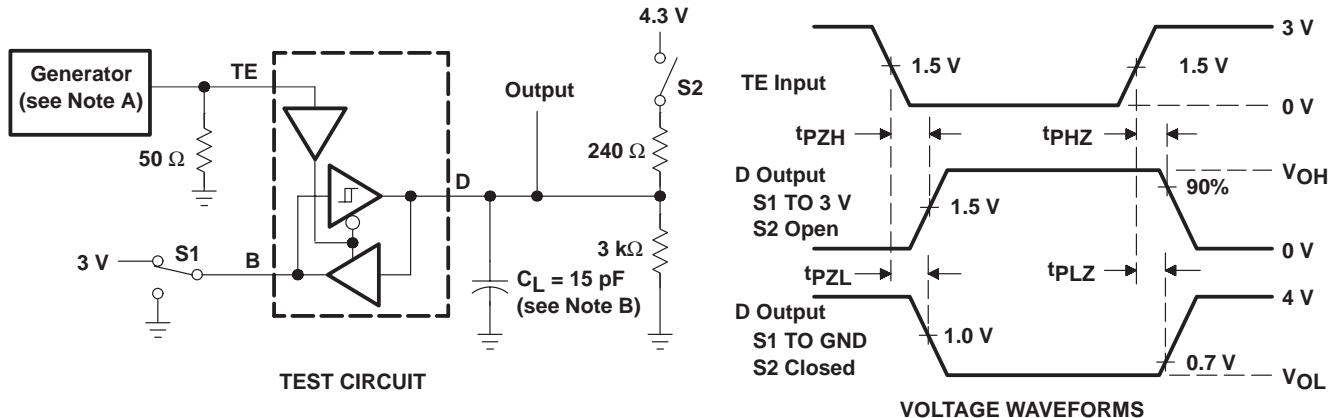
**Figure 2. Bus-to-Terminal Test Circuit and Voltage Waveforms**

## PARAMETER MEASUREMENT INFORMATION



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

**Figure 3. TE-to-Bus Test Circuit and Voltage Waveforms**



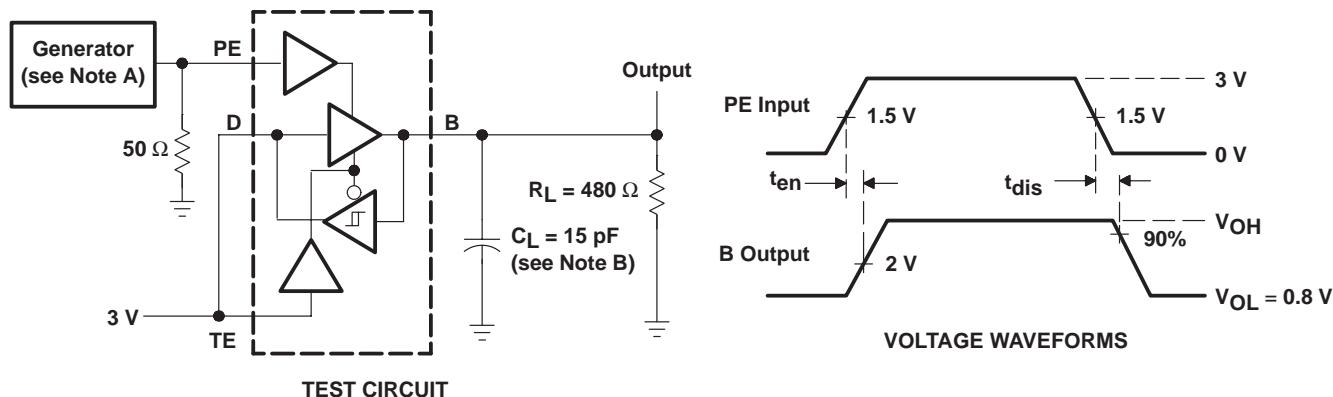
NOTES: A. The input pulse is supplied by a generator having the following characteristics: PRR  $\leq$  1 MHz, 50% duty cycle,  $t_r \leq 6$  ns,  $t_f \leq$  ns,  $Z_O = 50 \Omega$ .  
 B.  $C_L$  includes probe and jig capacitance.

**Figure 4. TE-to-Terminal Test Circuit and Voltage Waveforms**

**SN75160B**  
**OCTAL GENERAL-PURPOSE**  
**INTERFACE BUS TRANSCEIVER**

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**PARAMETER MEASUREMENT INFORMATION**



**Figure 5. PE-to-Bus Pullup Test Circuit and Voltage Waveforms**

### TYPICAL CHARACTERISTICS

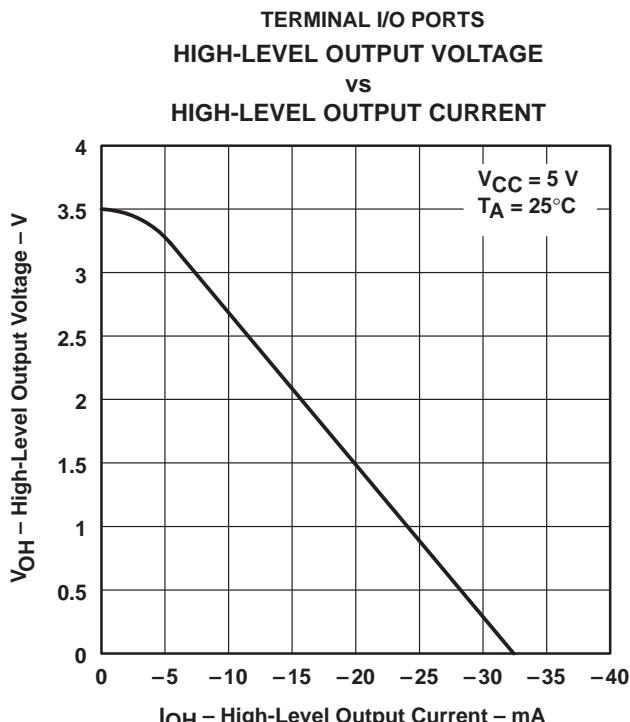


Figure 6

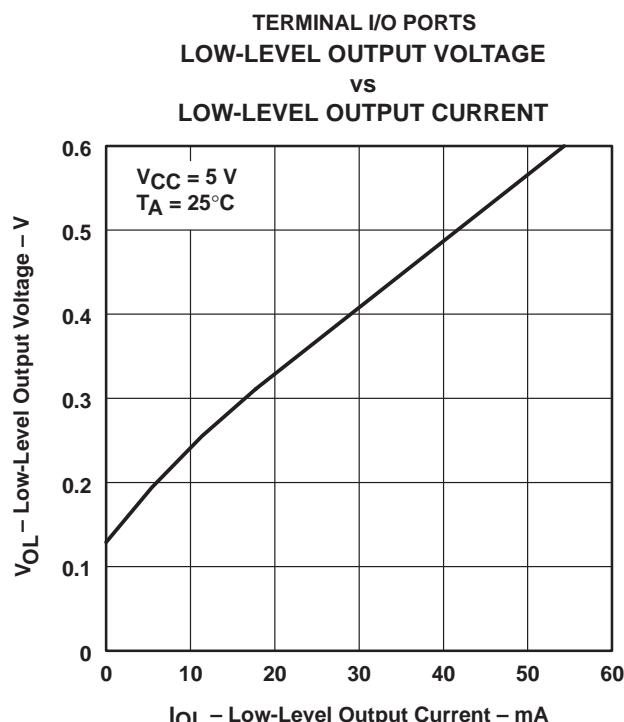


Figure 7

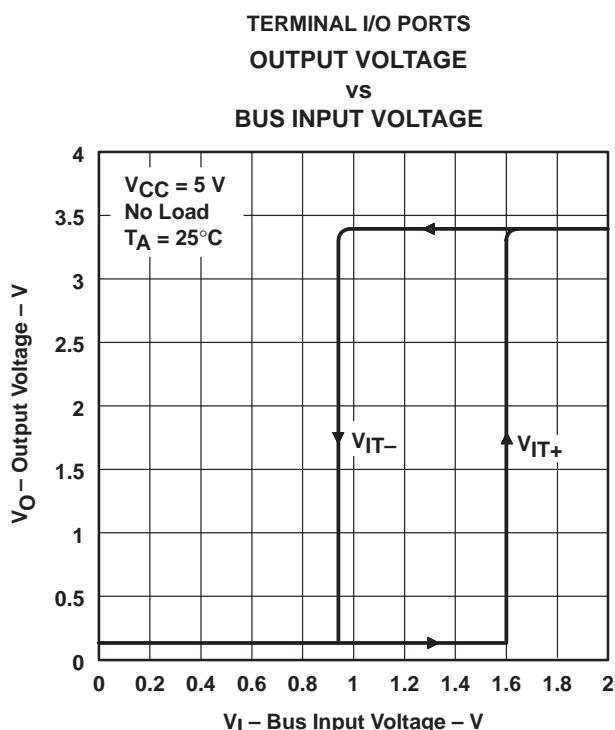


Figure 8

**SN75160B**  
**OCTAL GENERAL-PURPOSE**  
**INTERFACE BUS TRANSCEIVER**

SLLS004B – OCTOBER 1985 – REVISED MAY 1995

**TYPICAL CHARACTERISTICS**

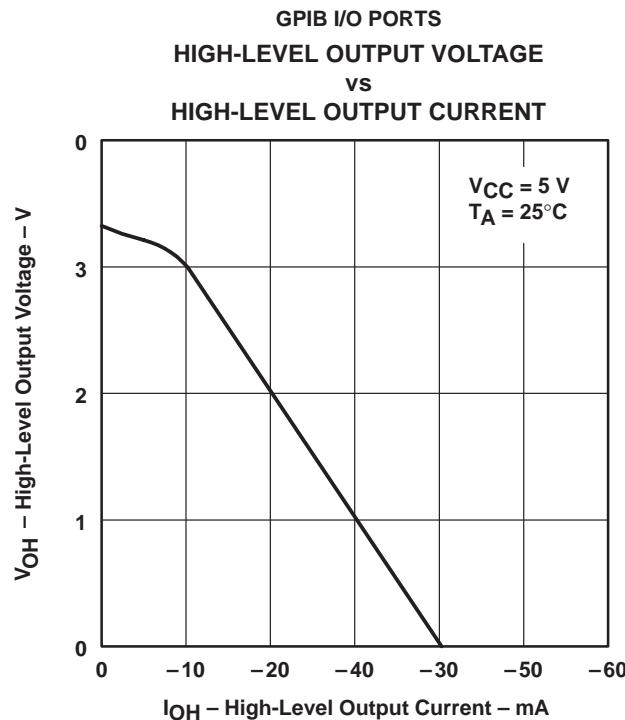


Figure 9

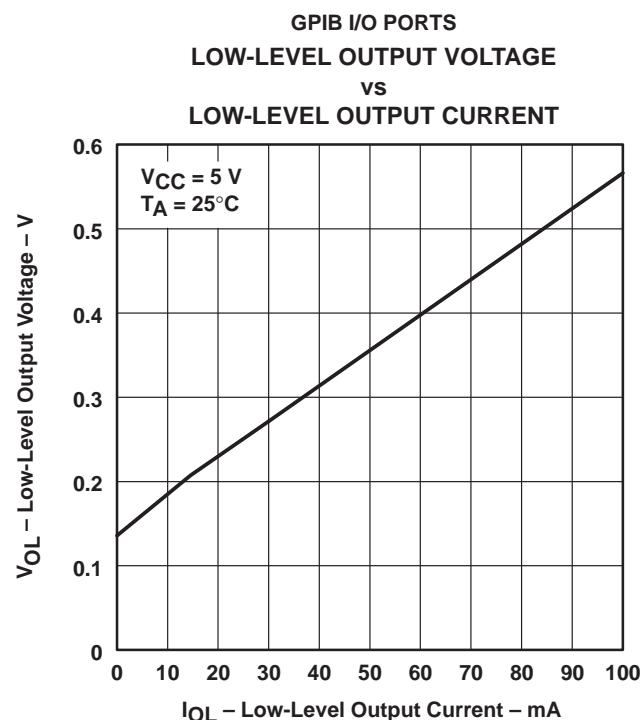


Figure 10

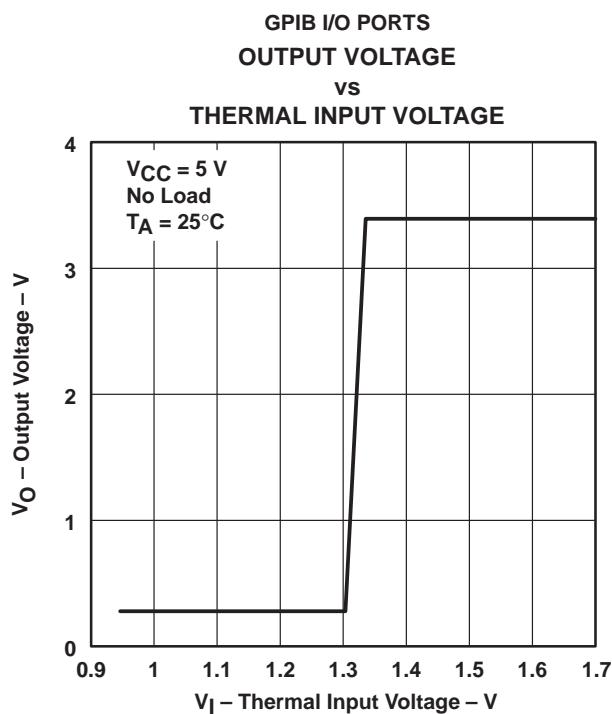


Figure 11

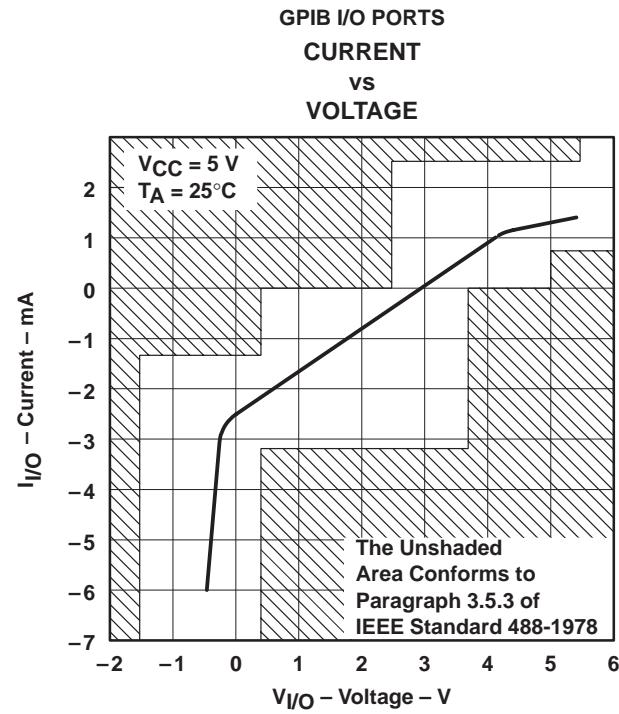


Figure 12

**PACKAGING INFORMATION**

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">SN75160BDW</a>	Active	Production	SOIC (DW)   20	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75160B
SN75160BDW.A	Active	Production	SOIC (DW)   20	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75160B
SN75160BDWE4	Active	Production	SOIC (DW)   20	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75160B
SN75160BDWG4	Active	Production	SOIC (DW)   20	25   TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75160B
<a href="#">SN75160BDWR</a>	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75160B
SN75160BDWR.A	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75160B
SN75160BDWRE4	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75160B
SN75160BDWRG4	Active	Production	SOIC (DW)   20	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	SN75160B
<a href="#">SN75160BN</a>	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN75160BN
SN75160BN.A	Active	Production	PDIP (N)   20	20   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN75160BN

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

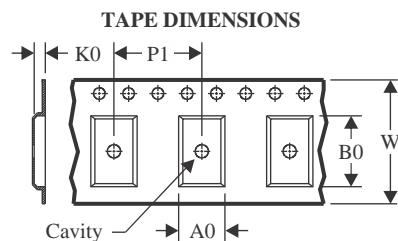
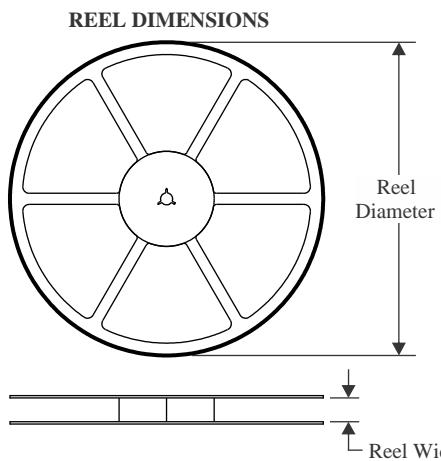
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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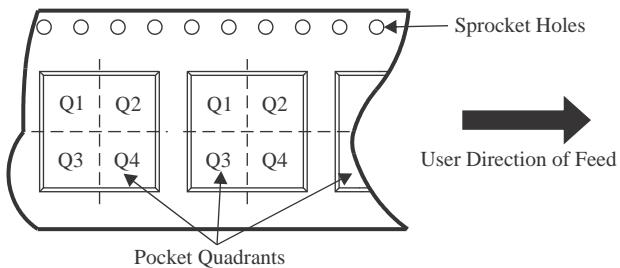
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## TAPE AND REEL INFORMATION



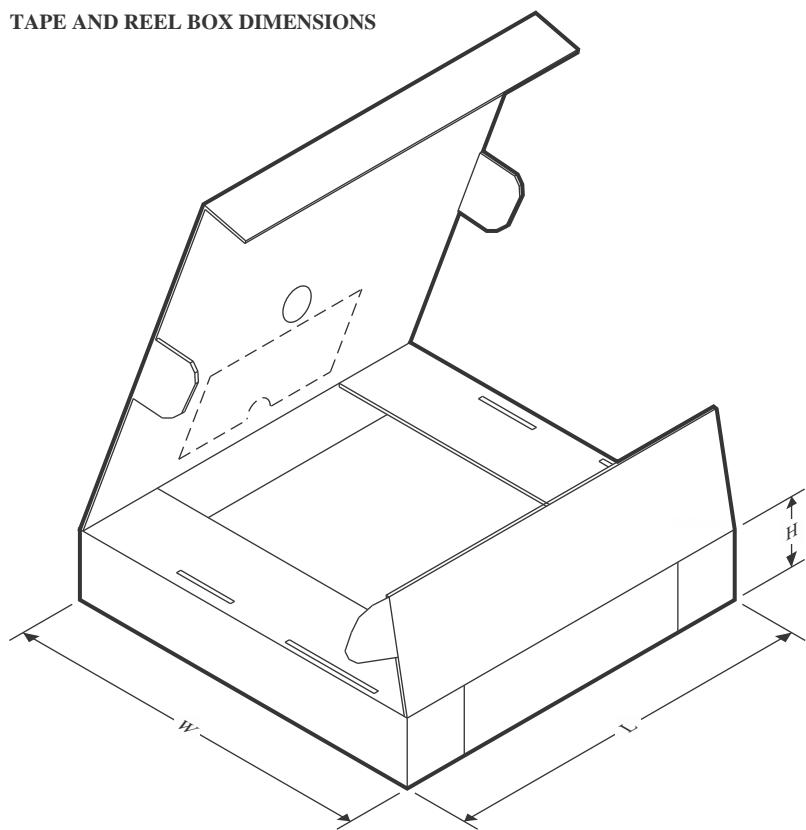
A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**



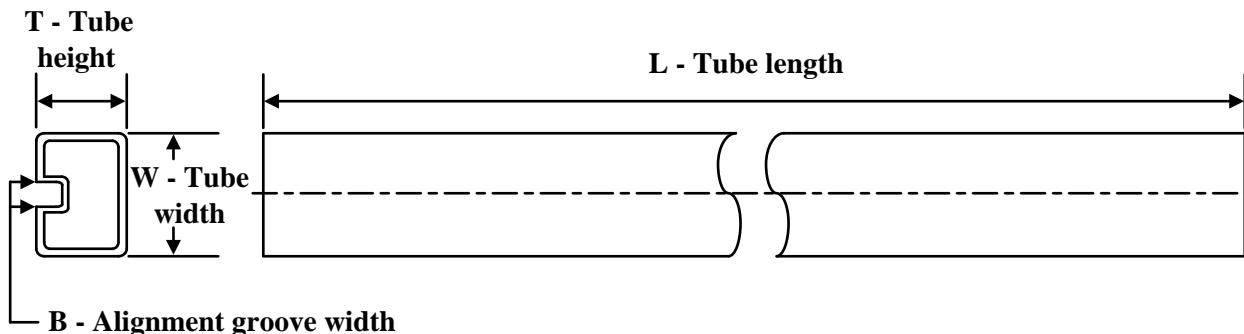
\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN75160BDWR	SOIC	DW	20	2000	330.0	24.4	10.8	13.3	2.7	12.0	24.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75160BDWR	SOIC	DW	20	2000	356.0	356.0	45.0

**TUBE**


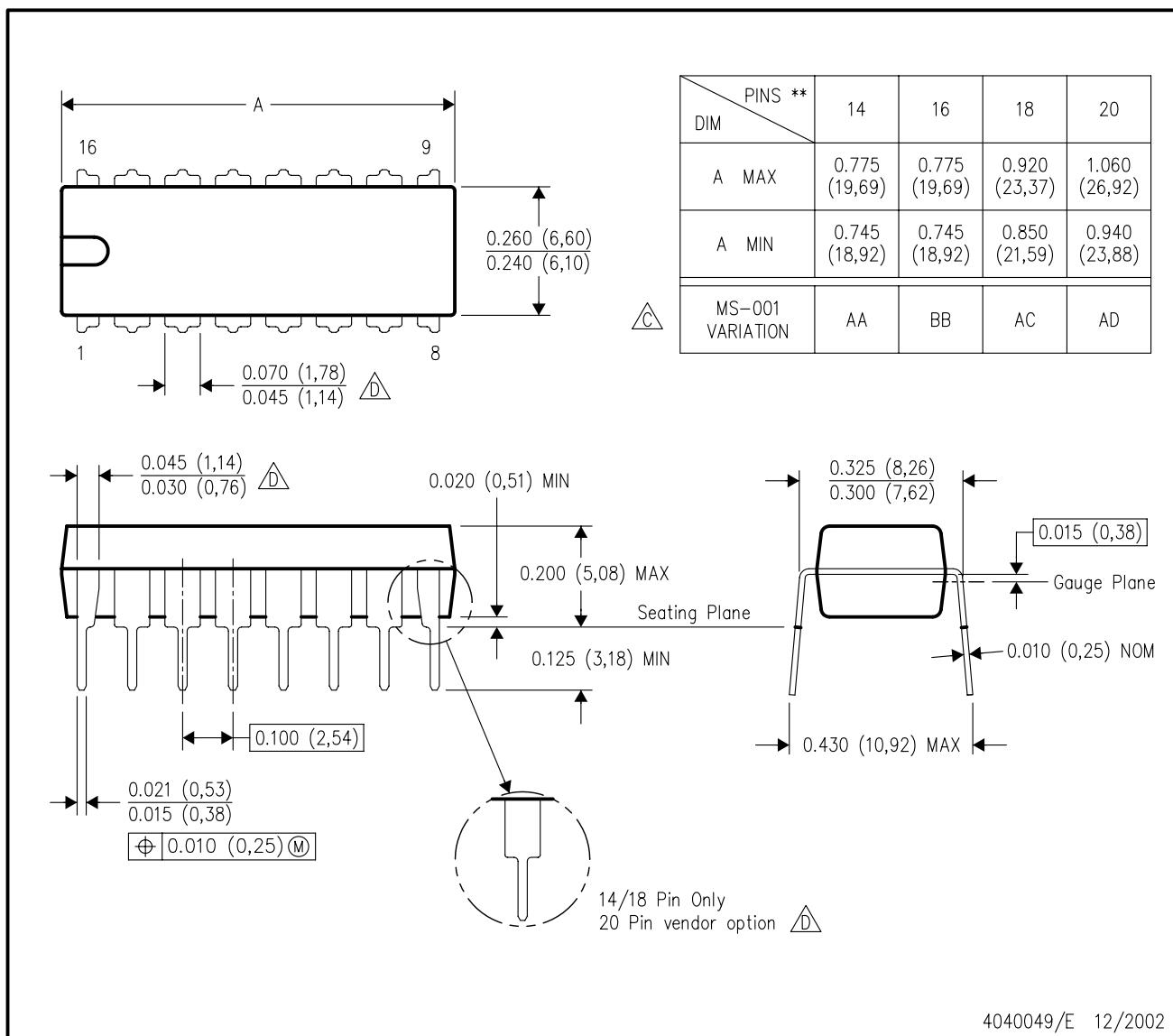
\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T ( $\mu$ m)	B (mm)
SN75160BDW	DW	SOIC	20	25	507	12.83	5080	6.6
SN75160BDW	DW	SOIC	20	25	506.98	12.7	4826	6.6
SN75160BDW.A	DW	SOIC	20	25	506.98	12.7	4826	6.6
SN75160BDW.A	DW	SOIC	20	25	507	12.83	5080	6.6
SN75160BDWE4	DW	SOIC	20	25	506.98	12.7	4826	6.6
SN75160BDWE4	DW	SOIC	20	25	507	12.83	5080	6.6
SN75160BDWG4	DW	SOIC	20	25	506.98	12.7	4826	6.6
SN75160BDWG4	DW	SOIC	20	25	507	12.83	5080	6.6
SN75160BN	N	PDIP	20	20	506	13.97	11230	4.32
SN75160BN.A	N	PDIP	20	20	506	13.97	11230	4.32

## N (R-PDIP-T\*\*)

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



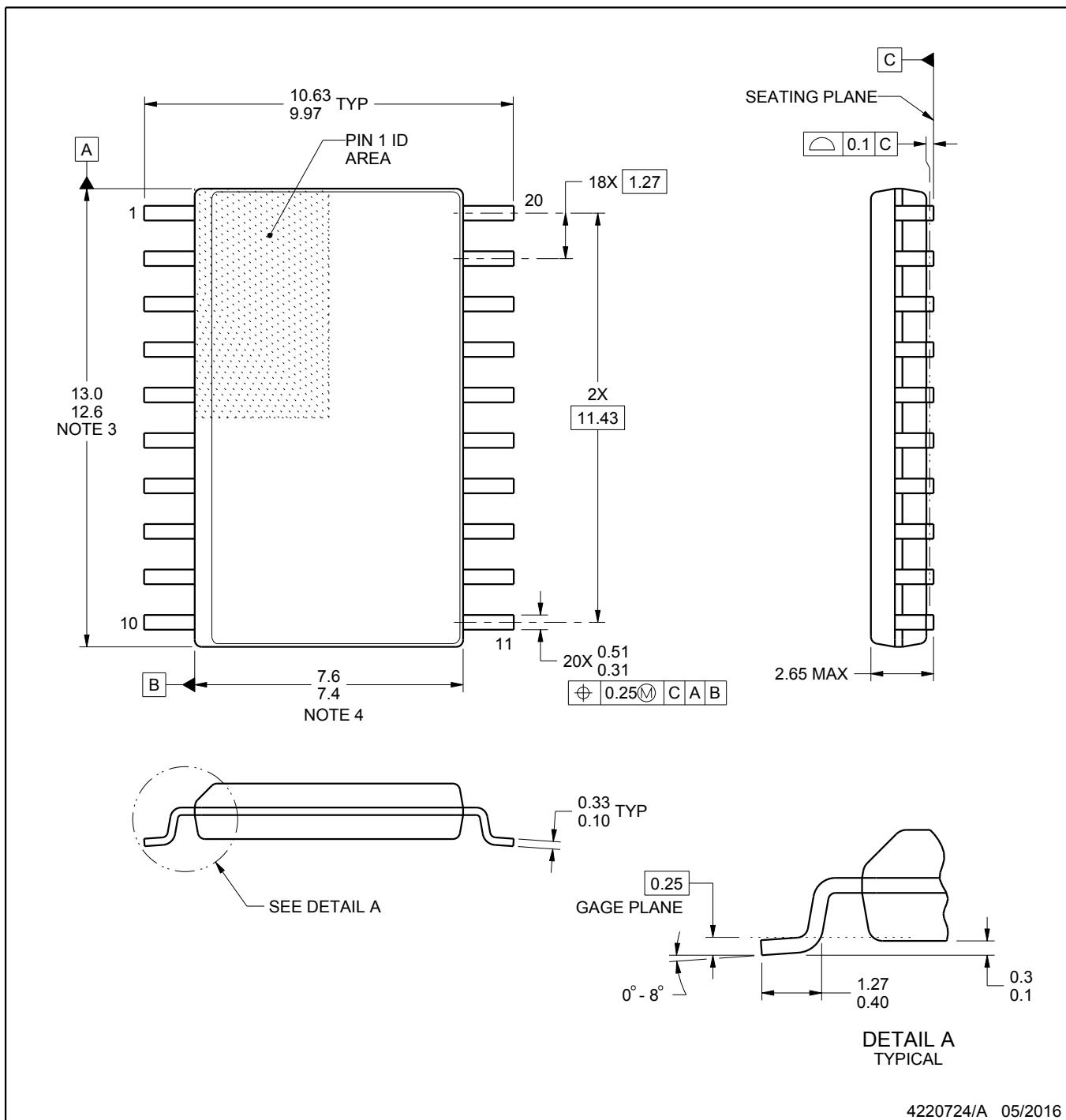
# PACKAGE OUTLINE

DW0020A



SOIC - 2.65 mm max height

SOIC



## NOTES:

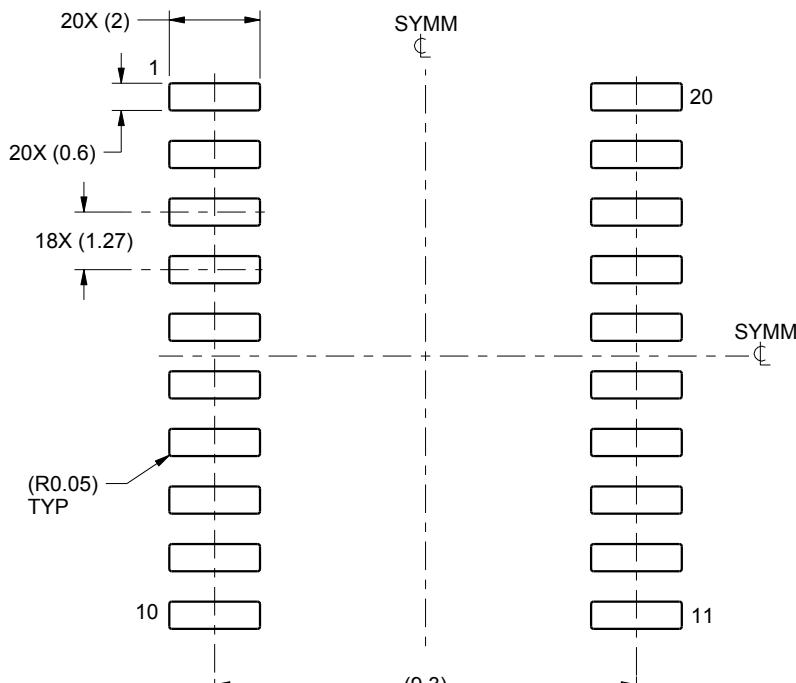
1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm per side.
5. Reference JEDEC registration MS-013.

# EXAMPLE BOARD LAYOUT

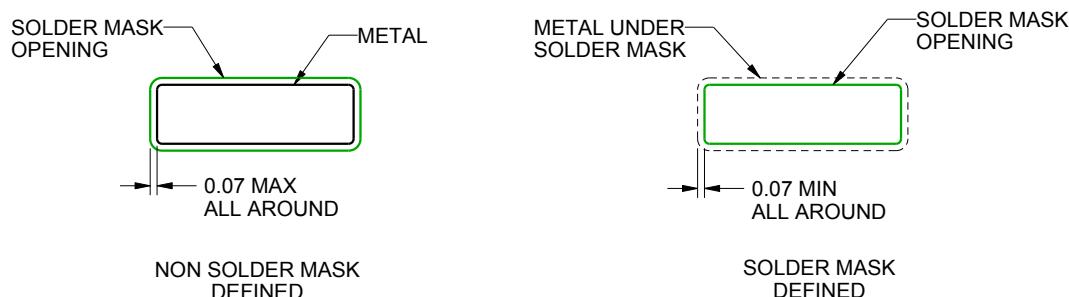
DW0020A

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:6X



SOLDER MASK DETAILS

4220724/A 05/2016

NOTES: (continued)

6. Publication IPC-7351 may have alternate designs.

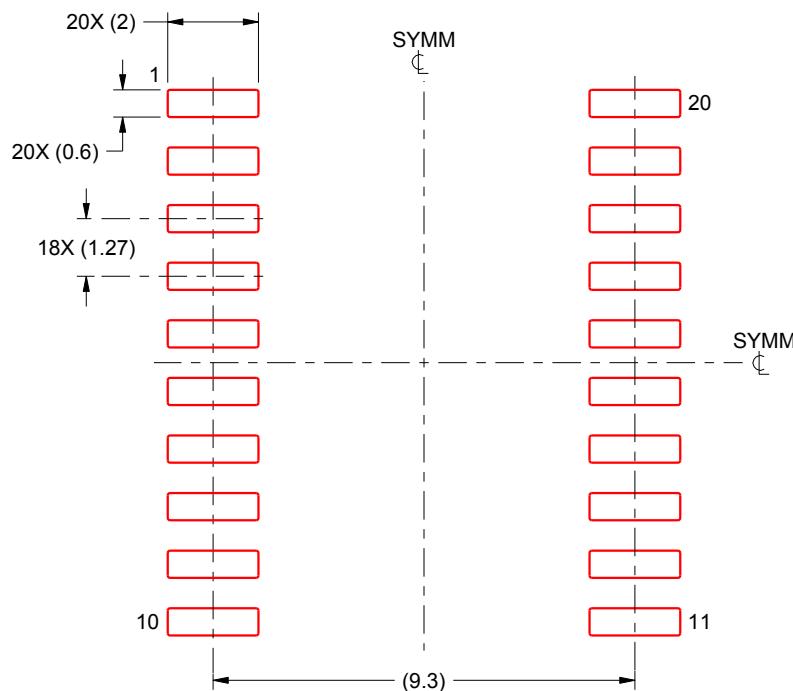
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DW0020A

SOIC - 2.65 mm max height

SOIC



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:6X

4220724/A 05/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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