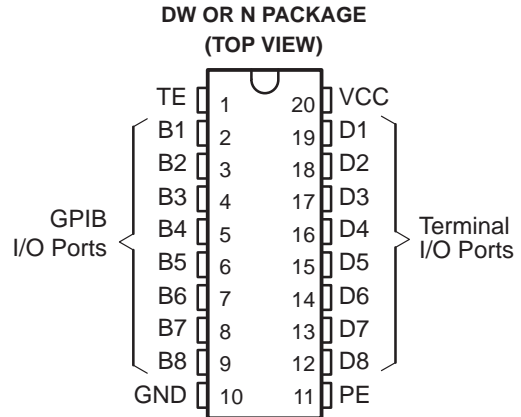


- Meets IEEE Standard 488-1978 (GPIB)
- 8-Channel Bidirectional Transceiver
- Power-Up/Power-Down Protection (Glitch Free)
- High-Speed, Low-Power Schottky Circuitry
- Low Power Dissipation . . . 72 mW Max Per Channel
- Fast Propagation Times . . . 22 ns Max
- High-Impedance pnp Inputs
- Receiver Hysteresis . . . 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 | | | |
|-------------|----|----|--------|
| INPUTS | | | OUTPUT |
| D | TE | PE | B |
| H | H | H | H |
| L | H | X | L |
| H | X | L | Z† |
| X | L | X | Z† |

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

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

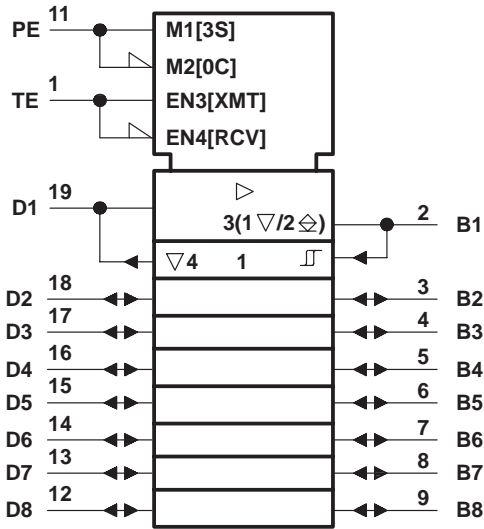
† This is the high-impedance state of a normal 3-state output modified by the internal resistors to V_{CC} and GND.



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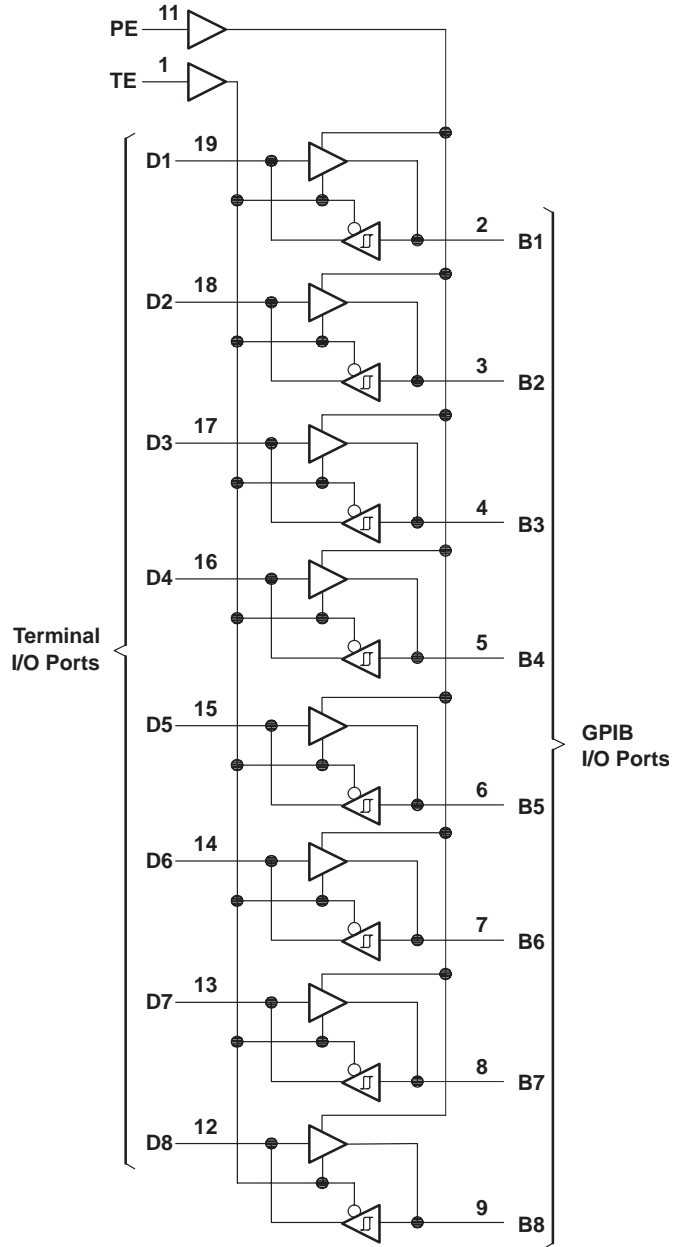
SN75160B
OCTAL GENERAL-PURPOSE
INTERFACE BUS TRANSCEIVER
 SLLS004B – OCTOBER 1985 – REVISED MAY 1995

logic symbol†

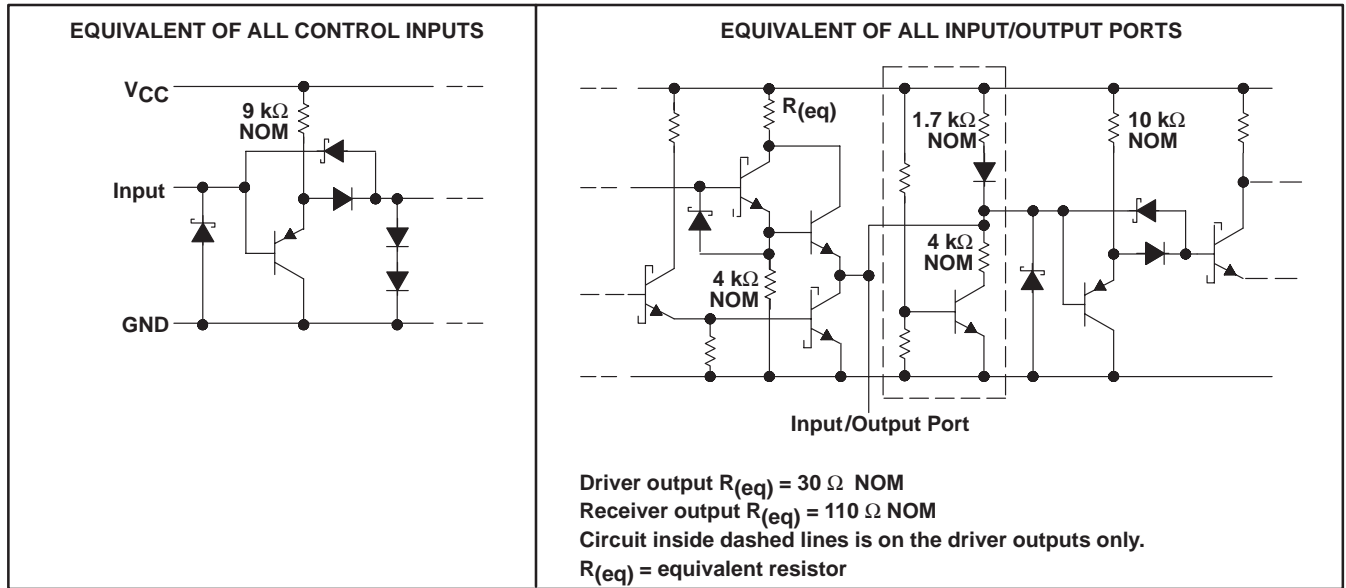


† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.
 ▽ Designates 3-state outputs
 ◇ Designates passive-pullup outputs

logic diagram (positive logic)



schematics of inputs and outputs



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

| | |
|--|------------------------------|
| 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 |

† 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

SLLS004B – OCTOBER 1985 – REVISED MAY 1995

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 | μ 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 | $I_I = -18$ 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 | $I_{OH} = -800$ μ A, TE at 0.8 V | 2.7 | 3.5 | | V |
| | | Bus | $I_{OH} = -5.2$ mA, PE and TE at 2 V | 2.5 | 3.3 | | |
| V_{OL} | Low-level output voltage | Terminal | $I_{OL} = 16$ mA, TE at 0.8 V | 0.3 | 0.5 | | V |
| | | Bus | $I_{OL} = 48$ mA, TE at 2 V | 0.35 | 0.5 | | |
| I_I | Input current at maximum input voltage | Terminal | $V_I = 5.5$ V | | 0.2 | 100 | μ A |
| I_{IH} | High-level input current | Terminal | $V_I = 2.7$ V | | 0.1 | 20 | μ A |
| I_{IL} | Low-level input current | Terminal | $V_I = 0.5$ V | | -10 | -100 | μ A |
| $V_{I/O(bus)}$ | Voltage at bus port | Driver disabled | $I_{I(bus)} = 0$ | 2.5 | 3.0 | 3.7 | V |
| | | | $I_{I(bus)} = -12$ mA | | | -1.5 | |
| $I_{I/O(bus)}$ | Current into bus port | Power on | Driver disabled | $V_{I(bus)} = -1.5$ V to 0.4 V | -1.3 | | mA |
| | | | | $V_{I(bus)} = 0.4$ V to 2.5 V | 0 | -3.2 | |
| | | | | $V_{I(bus)} = 2.5$ V to 3.7 V | | 2.5 | |
| | | | | $V_{I(bus)} = 3.7$ V to 5 V | 0 | 2.5 | |
| | | | | $V_{I(bus)} = 5$ V to 5.5 V | 0.7 | 2.5 | |
| | | Power off | $V_{CC} = 0$, $V_{I(bus)} = 0$ to 2.5 V | | -40 | | |
| I_{OS} | Short-circuit output current | Terminal | | -15 | -35 | -75 | mA |
| | | 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 | $V_{CC} = 0$ to 5 V, $V_{I/O} = 0$ to 2 V, $f = 1$ MHz | | | 16 | | pF |

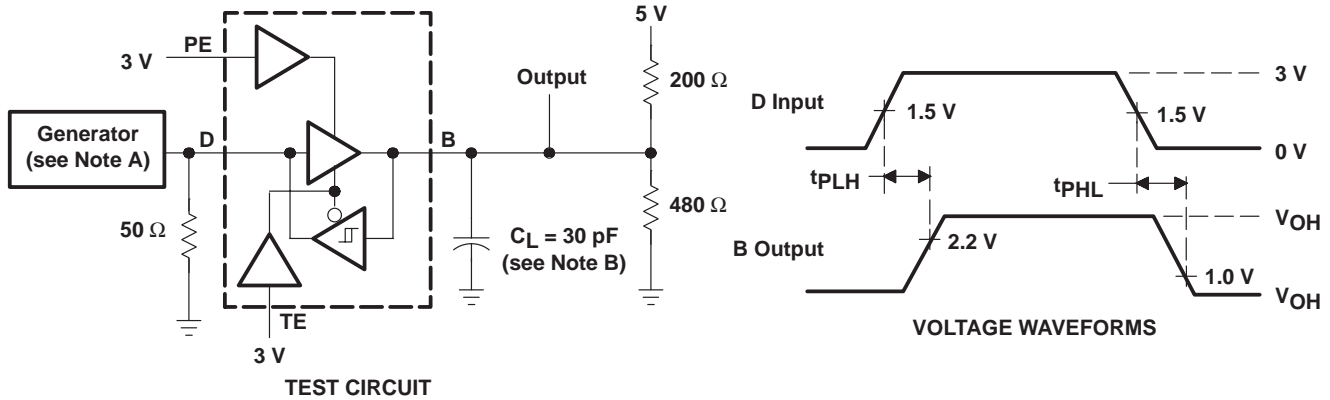
† All typical values are at $V_{CC} = 5$ V, $T_A = 25^{\circ}$ C.



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

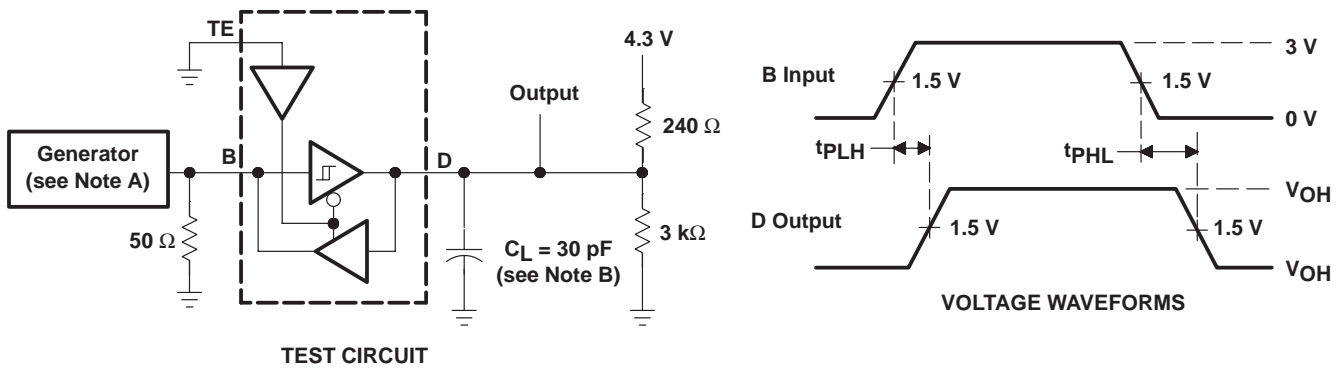
| PARAMETER | | FROM (INPUT) | TO (OUTPUT) | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|-----------|---|--------------|-------------|--|-----|-----|-----|------|
| t_{PLH} | Propagation delay time, low- to high-level output | Terminal | Bus | $C_L = 30\text{ pF}$, See Figure 1 | | 14 | 20 | ns |
| t_{PHL}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

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.

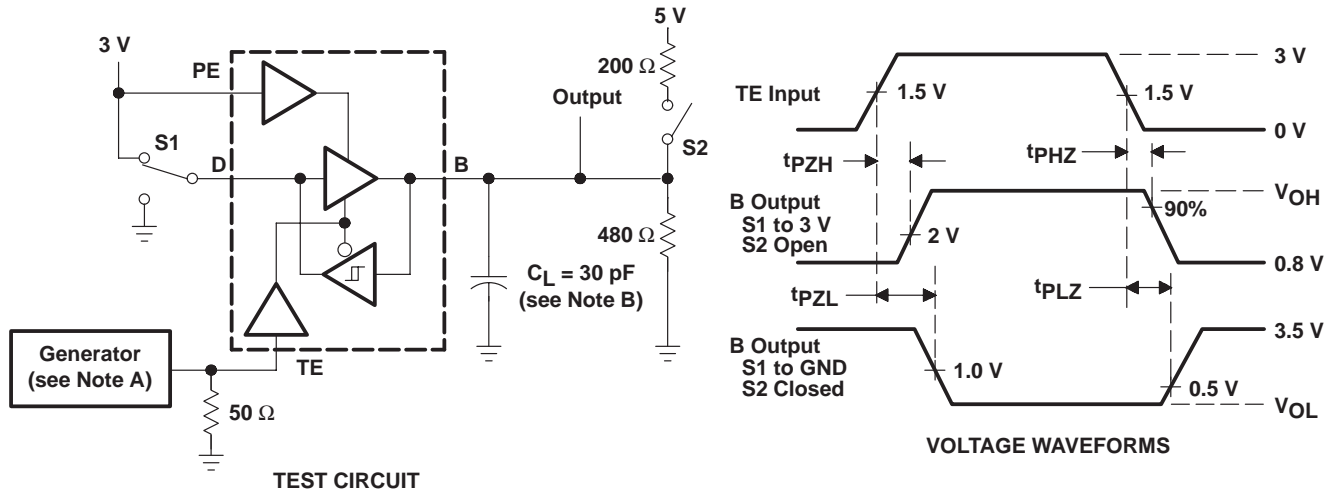
Figure 1. Terminal-to-Bus Test Circuit and Voltage Waveforms



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

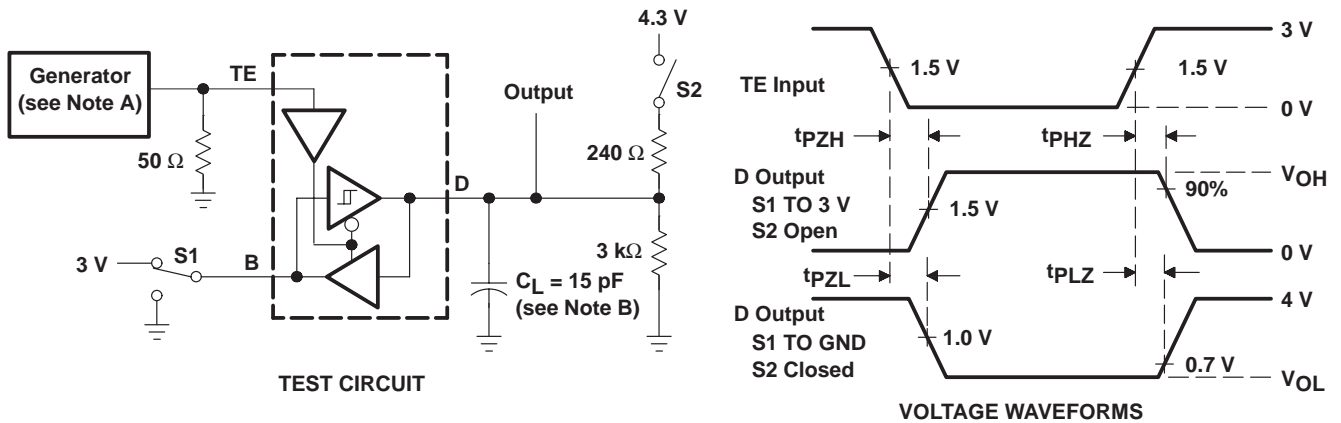
Figure 2. Bus-to-Terminal Test Circuit and Voltage Waveforms

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.

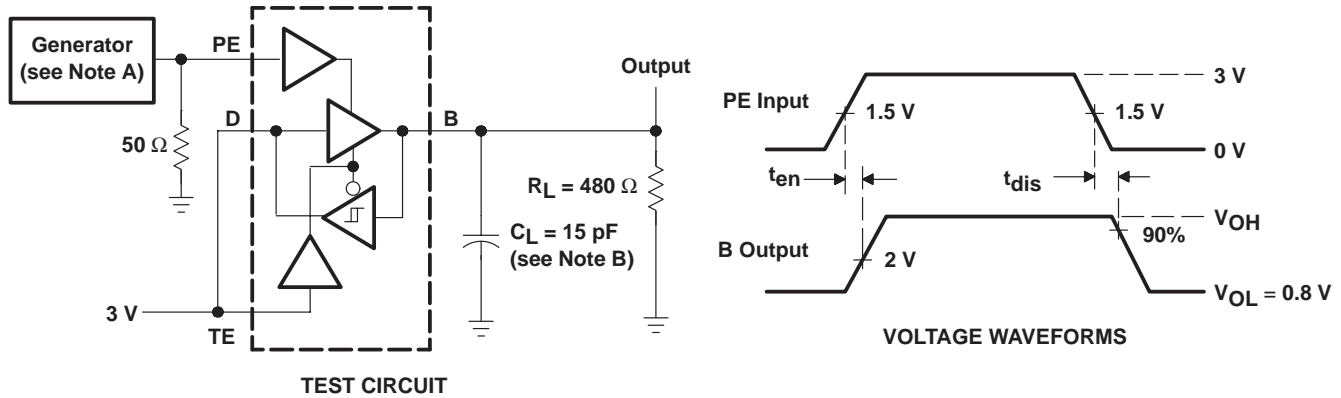
Figure 3. TE-to-Bus Test Circuit and Voltage Waveforms



- 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

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, $Z_0 = 50 \Omega$.
 B. C_L includes probe and jig capacitance.

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

TYPICAL CHARACTERISTICS

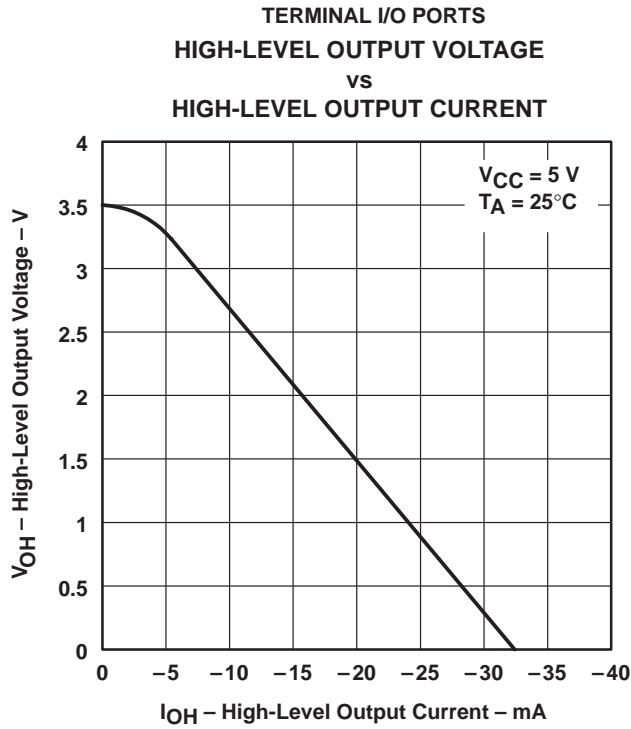


Figure 6

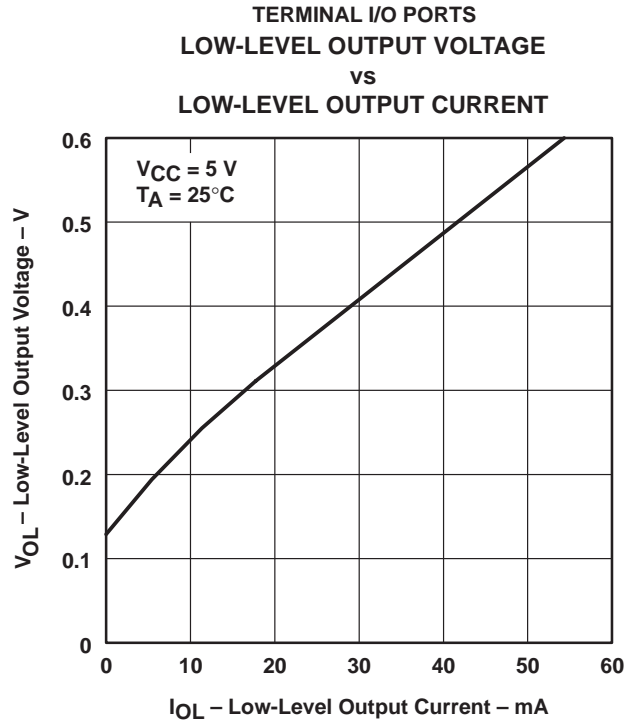


Figure 7

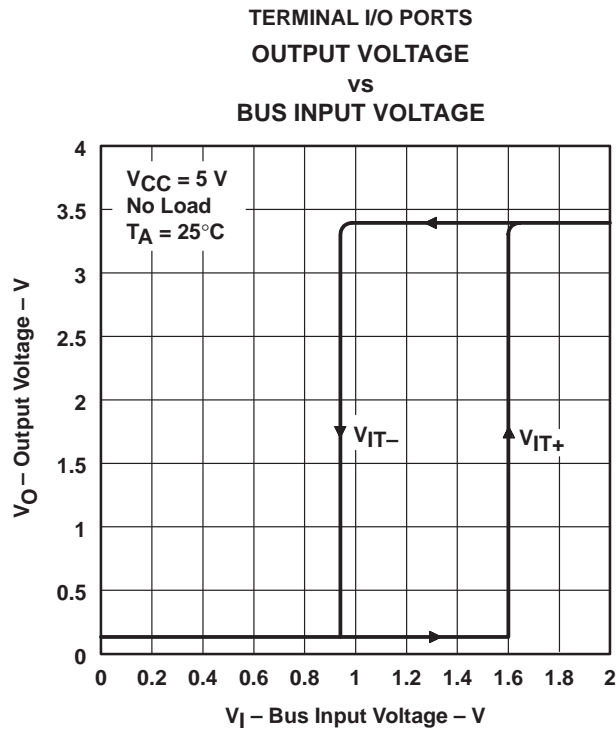


Figure 8

TYPICAL CHARACTERISTICS

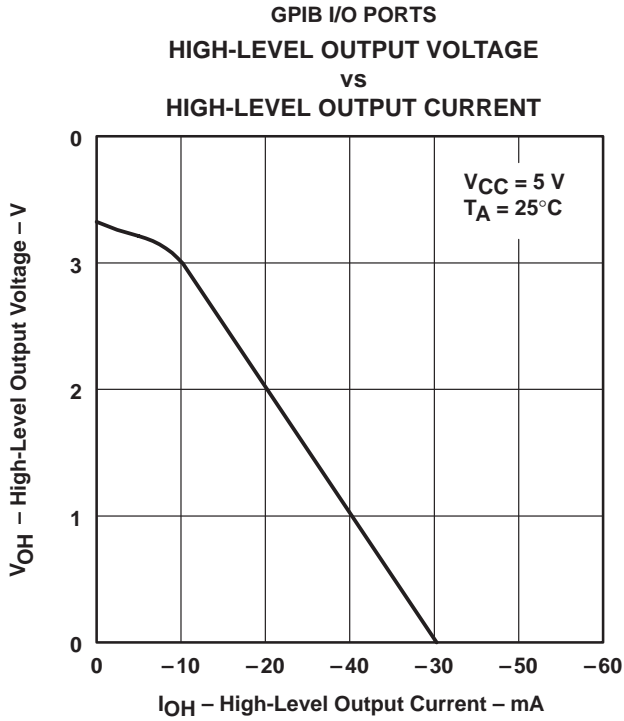


Figure 9

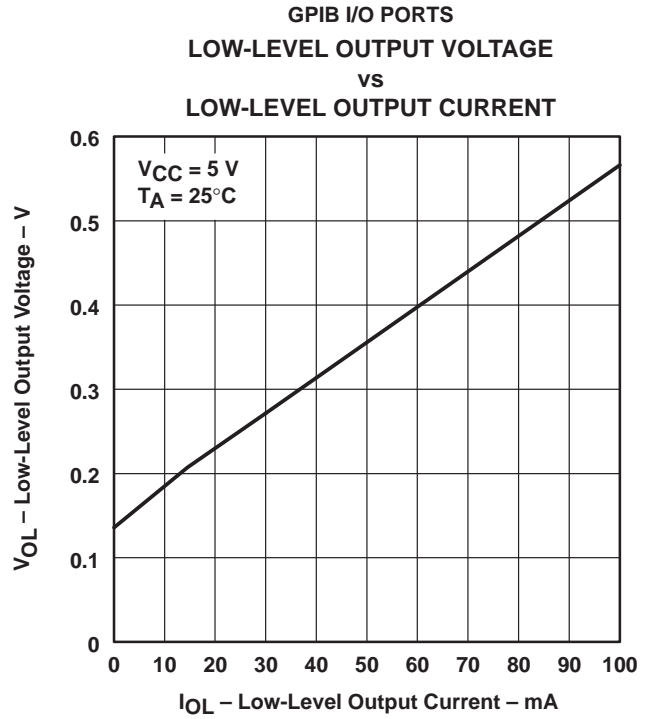


Figure 10

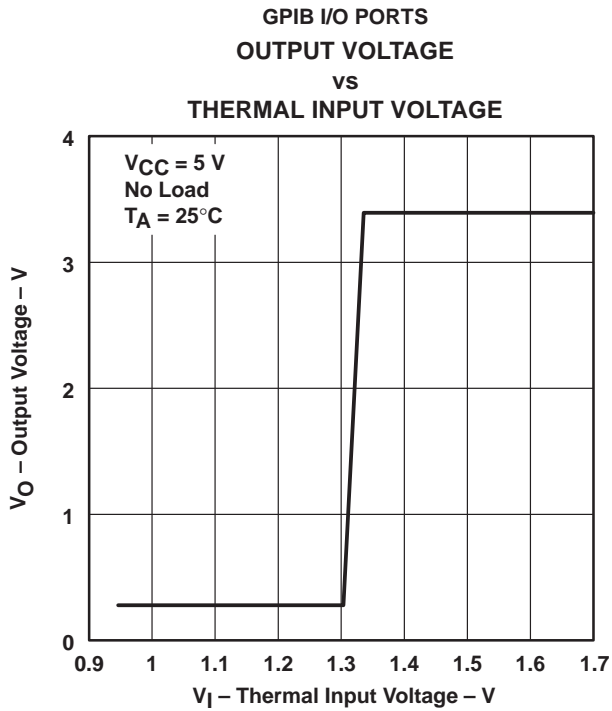


Figure 11

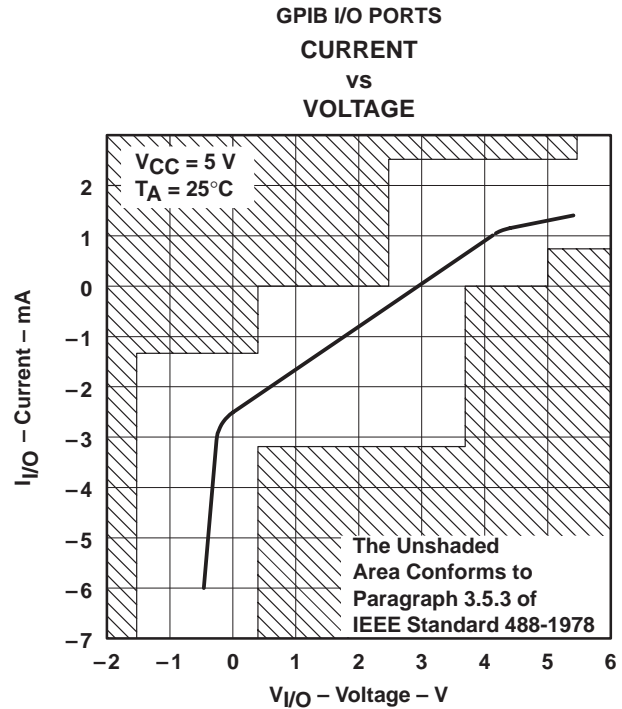


Figure 12

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