

3.3 V Differential Multipoint Low Voltage M-LVDS Driver Receiver

UM3400S8 SOP8

UM3401S8 SOP8

General Description

The UM340XS8 Series are pure 3.3V supply differential Multipoint Low Voltage (M-LVDS) line Drivers and Receivers. Devices UM3400S8 and UM3401S8 are TIA/EIA-899 compliant. UM3400S8 offers the Type 1 receiver threshold at 0.0V. UM3401S8 offers the Type 2 receiver threshold at 0.1 V.

These devices have Type 1 and Type 2 receivers that detect the bus state with as little as 50 mV of differential input voltage over a common-mode voltage range of -1V to 3.4V. The Type 1 receivers have near zero thresholds (± 50 mV) and exhibit 25 mV of differential input voltage hysteresis to prevent output oscillations with slowly changing signals or loss of input. Type 2 receivers include an offset threshold to provide a detectable voltage under open-circuit, idle-bus, and other faults conditions. UM3400S8 and UM3401S8 support Simplex or Half Duplex bus configurations.

Applications

- Low-Power High-Speed Short-Reach Alternative to TIA/EIA-485
- Backplane or Cabled Multipoint Data and Clock Transmission
- Cellular Base Stations
- Central-Office Switches
- Network Switches and Routers

Features

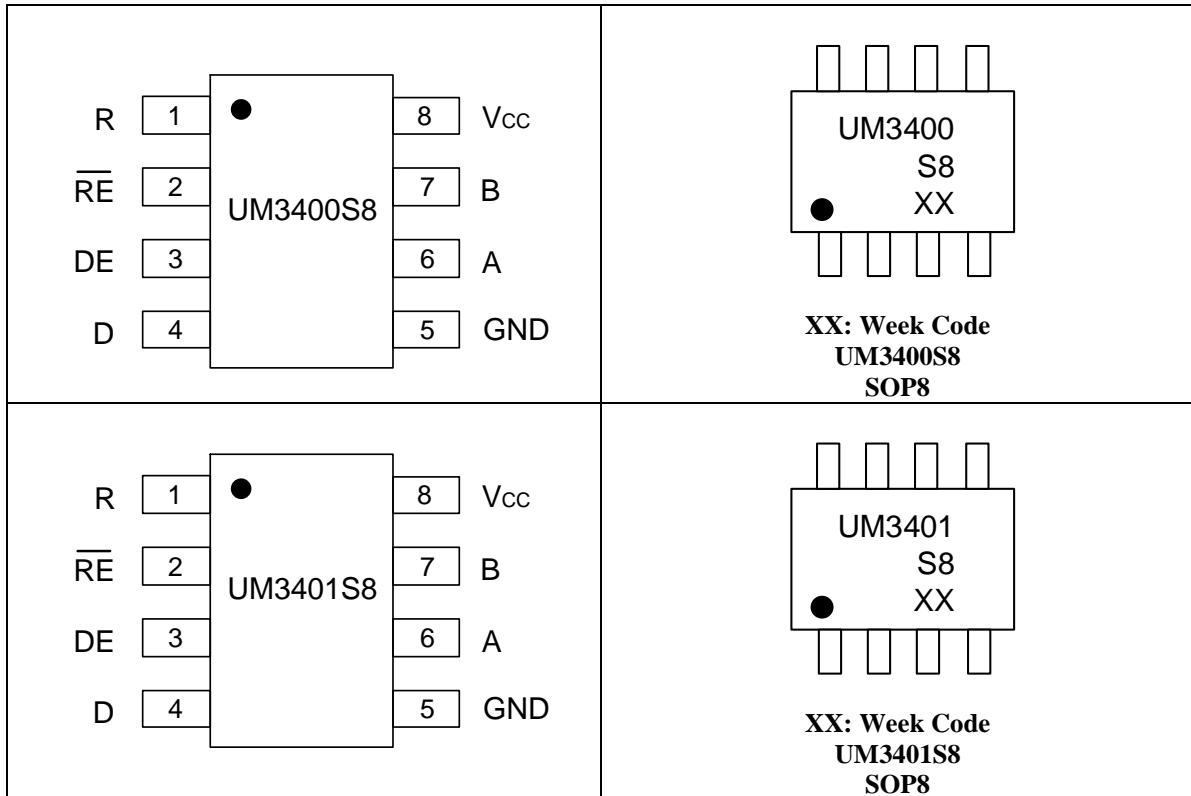
- Low-Voltage Differential 30 Ω to 55 Ω Line Drivers and Receivers for Signaling Rates Up to 100 Mbps
- Type 1 Receivers Incorporate 25 mV of Hysteresis
- Type 2 Receivers Provide an Offset (100 mV) Threshold to Detect Open-Circuit and Idle-Bus Conditions
- Meets or Exceeds the M-LVDS Standard TIA/EIA-899 for Multipoint Data Interchange
- Controlled Driver Output Voltage Transition Times for Improved Signal Quality
- -1 V to 3.4 V Common-Mode Voltage Range Allows Data Transfer With up to 2 V of Ground Noise
- Bus Pins High Impedance When Disabled or $V_{CC} \leq 1.5$ V
- M-LVDS Bus Power Up/Down Glitch Free
- Operating range: $V_{CC} = 3.3 \pm 10\%$ V (3.0 to 3.6V)
- Operation from -40 $^{\circ}$ C to 85 $^{\circ}$ C
- Latch-Up Performance Exceeds 200mA
- These are Pb-Free Devices

Ordering Information

| Part Number | Temp. Range | Marking Code | Package Type | Shipping Qty |
|-------------|------------------|--------------|--------------|-------------------------------|
| UM3400S8 | -40 °C to +85 °C | UM3400S8 | SOP8 | 3000pcs/13Inch Tape & Reel |
| UM3401S8 | -40 °C to +85 °C | UM3401S8 | SOP8 | 3000pcs/13Inch Tape & Reel |

Pin Configurations

Top View



Pin Description

| Number | Name | I/O Type | Open Default | Function |
|--------|-----------------|---------------------|--------------|---|
| 1 | R | LVC MOS Output | | Receiver Output Pin |
| 2 | \overline{RE} | LVC MOS Input | HIGH | Receiver Enable Input Pin (LOW = Active, HIGH = High Z Output) |
| 3 | DE | LVC MOS Input | LOW | Driver Enable Input Pin (LOW = High Z Output, HIGH=Active) |
| 4 | D | LVC MOS Input | | Driver Input Pin |
| 5 | GND | | | Ground Supply pin. Pin must be connected to power supply to guarantee proper operation. |
| 6 | A | M-LVDS Input/Output | | Transceiver True Input /Output Pin |
| 7 | B | M-LVDS Input/Output | | Transceiver Invert Input /Output Pin |
| 8 | V _{CC} | | | Power Supply pin. Pin must be connected to power supply to guarantee proper operation. |

Absolute Maximum Ratings (Note1, 2)

| Symbol | Parameter | | Value | Unit |
|------------------|---|------------------------|------------------------------|------|
| V _{CC} | Supply Voltage | | -0.3 to 4.0 | V |
| V _{IN} | Input Voltage | D, DE, \overline{RE} | -0.3 to 4.0 | V |
| | | A, B (3400, 3401) | -1.8 to 4.0 | |
| V _{OUT} | Output Voltage | R | -0.3 to V _{CC} +0.3 | V |
| | | A, B | -1.8 to 4.0 | |
| T _A | Operating Temperature Range, Industrial | | -40 to 85 | °C |
| T _{stg} | Storage Temperature Range | | -65 to 150 | °C |

Note1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Note2: Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and not valid simultaneously. If stress limits are exceeded device functional operation is not implied, damage may occur and reliability may be affected.

Thermal Characteristics

| Symbol | Thermal Metric | Value | Unit |
|---------------|--|-------|------|
| θ_{JA} | Junction-to-ambient thermal resistance | 110 | °C/W |
| θ_{JC} | Junction-to-case thermal resistance | 54 | |

Electrical Characteristics (Static)

$V_{CC} = 3.3 \pm 10\% \text{ V}$ (3.0 to 3.6V), $GND = 0 \text{ V}$, $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$ (See Notes 1, 2, 3)

| Symbol | Parameter | Min | Typ | Max | Unit |
|---------------------|---|--------------|-----|-------------|---------------|
| I_{CC} | Receiver Disabled and Driver Enabled. \overline{RE} and DE at V_{CC} ; $R_L = 50 \Omega$; All others open | | 13 | 22 | mA |
| | Driver and Receiver Disabled. \overline{RE} at V_{CC} ; DE at 0 V; $R_L = \text{No Load}$; All others open | | 1 | 4 | |
| | Driver and Receiver Enabled. \overline{RE} at 0 V; DE at V_{CC} ; $R_L = 50 \Omega$; All others open | | 16 | 24 | |
| | Receiver Enabled and Driver Disabled. \overline{RE} at 0v; DE at 0 V; $R_L = 50 \Omega$; All others open | | | 13 | |
| V_{IH} | Input HIGH Voltage | 2 | | V_{CC} | V |
| V_{IL} | Input LOW Voltage | GND | | 0.8 | V |
| V_{BUS} | Voltage at any bus terminal V_A, V_B | -1.4 | | 3.8 | V |
| $ V_{ID} $ | Magnitude of differential input voltage | 0.05 | | V_{CC} | V |
| Driver | | | | | |
| $ V_{AB} $ | Differential output voltage magnitude (see Figure 2) | 480 | | 650 | mV |
| $\Delta V_{AB} $ | Change in Differential output voltage magnitude between logic states (see Figure 2) | -50 | | 50 | mV |
| $V_{OS(SS)}$ | Steady state common mode output voltage (see Figure 3) | 0.8 | | 1.2 | V |
| $\Delta V_{OS(SS)}$ | Change in Steady state common mode output voltage between logic states (see Figure 3) | -50 | | 50 | mV |
| $V_{OS(PP)}$ | Peak-to-peak common-mode output voltage (see Figure 3) | | | 150 | mV |
| V_{AOC} | Maximum steady-state open-circuit output voltage (see Figure 7) | 0 | | 2.4 | V |
| V_{BOC} | Maximum steady-state open-circuit output voltage (see Figure 7) | 0 | | 2.4 | V |
| $V_{P(H)}$ | Voltage overshoot, low-to-high level output (see Figure 5) | | | $1.2V_{SS}$ | V |
| $V_{P(L)}$ | Voltage overshoot, high-to-low level output (see Figure 5) | $-0.2V_{SS}$ | | | V |
| I_{IH} | High-level input current (D, DE) $V_{IH} = 2 \text{ V}$ | 0 | | 10 | μA |
| I_{IL} | Low-level input current (D, DE) $V_{IL} = 0.8 \text{ V}$ | 0 | | 10 | μA |
| $ I_{OS} $ | Differential short-circuit output current magnitude (see Figure 4) | | | 24 | mA |

Electrical Characteristics (Static) — continued

$V_{CC} = 3.3 \pm 10\% V$ (3.0 to 3.6V), $GND = 0 V$, $T_A = -40^\circ C$ to $+85^\circ C$ (See Notes 1, 2, 3)

| Receiver | | | | | |
|----------------------|--|------------------------------|-----|-----|---------|
| Symbol | Parameter | Min | Typ | Max | Unit |
| V_{IT+} | Positive-going Differential Input voltage Threshold (See Figure 9 & Tables 1 and 2) | Type1 | | 50 | mV |
| | | Type2 | | 150 | |
| V_{IT-} | Negative-going Differential Input voltage Threshold (See Figure 9 & Tables 1 and 2) | Type1 | -50 | | mV |
| | | Type2 | 50 | | |
| V_{HYS} | Differential Input Voltage Hysteresis (See Figure 9) | Type1 | | 25 | mV |
| | | Type2 | | 0 | |
| V_{OH} | High-level output voltage ($I_{OH} = -8 mA$) | 2.4 | | | V |
| V_{OL} | Low-level output voltage ($I_{OH} = 8 mA$) | | | 0.4 | V |
| I_{IH} | \overline{RE} High-level input current ($V_{IH} = 2 V$) | -10 | | 0 | μA |
| I_{IL} | \overline{RE} Low-level input current ($V_{IL} = 0.8 V$) | -10 | | 0 | μA |
| I_{OZ} | High-impedance state output current ($V_O = 0 V$ or $3.6 V$) | -10 | | 15 | μA |
| C_A/C_B | Input Capacitance $V_I = 0.4 \sin(30E^6\pi t) + 0.5 V$, other outputs at 1.2V using HP4194A impedance analyzer (or equivalent) | | 3 | | pF |
| C_{AB} | Differential Input Capacitance $V_{AB} = 0.4 \sin(30E^6\pi t) V$, other outputs at 1.2 V using HP4194A impedance analyzer (or equivalent) | | | 2.5 | pF |
| $C_{A/B}$ | Input Capacitance Balance, (C_A/C_B) | 99 | | 101 | % |
| Bus Input and Output | | | | | |
| I_A | Input Current Receiver or Transceiver with Driver Disabled | $V_A=3.8V, V_B=1.2V$ | 0 | 32 | μA |
| | | $V_A=0V$ or $2.4V, V_B=1.2V$ | -20 | 20 | |
| | | $V_A = -1.4V, V_B=1.2V$ | -32 | 0 | |
| I_B | Input Current Receiver or Transceiver with Driver Disabled | $V_B=3.8V, V_A=1.2V$ | 0 | 32 | μA |
| | | $V_B=0V$ or $2.4V, V_A=1.2V$ | -20 | 20 | |
| | | $V_B = -1.4V, V_A=1.2V$ | -32 | 0 | |
| I_{AB} | Differential Input Current Receiver or Transceiver with driver disabled (I_A-I_B); $V_A = V_B, -1.4 \leq V_A \leq 3.8 V$ | -4 | | 4 | μA |
| $I_{A(OFF)}$ | Input Current Receiver or Transceiver Power Off $0V \leq V_{CC} \leq 1.5$ | $V_A=3.8V, V_B=1.2V$ | 0 | 32 | μA |
| | | $V_A=0V$ or $2.4V, V_B=1.2V$ | -20 | 20 | |
| | | $V_A = -1.4V, V_B=1.2V$ | -32 | 0 | |
| $I_{B(OFF)}$ | Input Current Receiver or Transceiver Power Off $0V \leq V_{CC} \leq 1.5$ | $V_B=3.8V, V_A=1.2V$ | 0 | 32 | μA |
| | | $V_B=0V$ or $2.4V, V_A=1.2V$ | -20 | 20 | |
| | | $V_B = -1.4V, V_A=1.2V$ | -32 | 0 | |
| $I_{AB(OFF)}$ | Receiver Input or Transceiver Input/Output Power Off Differential Input Current; (I_A-I_B) $V_A = V_B, 0 \leq V_{CC} \leq 1.5 V, -1.4 \leq V_A \leq 3.8 V$ | -4 | | 4 | μA |
| C_A | Transceiver Input Capacitance with Driver Disabled $V_A = 0.4 \sin(30E^6\pi t) + 0.5 V$ using HP4194A impedance analyzer (or equivalent); $V_B = 1.2 V$ | | 5 | | pF |
| C_B | Transceiver Input Capacitance with Driver Disabled $V_B = 0.4 \sin(30E^6\pi t) + 0.5 V$ using HP4194A impedance analyzer (or equivalent); $V_A = 1.2 V$ | | 5 | | pF |
| C_{AB} | Transceiver Differential Input Capacitance with Driver Disabled $V_A = 0.4 \sin(30E^6\pi t) + 0.5 V$ using HP4194A impedance analyzer (or equivalent); $V_B = 1.2 V$ | | | 3.0 | pF |
| $C_{A/B}$ | Transceiver Input Capacitance Balance with Driver Disabled, (C_A/C_B) | 99 | | 101 | % |

Electrical Characteristics (Static) — continued

$V_{CC} = 3.3 \pm 10\% V$ (3.0 to 3.6V), $GND = 0 V$, $T_A = -40^\circ C$ to $+85^\circ C$ (See Notes 1, 2, 3)

| ESD And Latch Up Performance | | | | | |
|------------------------------|-------------------------|---|----------------|---------|----|
| Symbol | Parameter | | Value | Unit | |
| $V_{(ESD)}$ | Electrostatic discharge | Human Body Model (JEDEC Standard 22, Method A114-A) | A, B | ± 8 | kV |
| | | | All Other Pins | ± 4 | |
| Latch Up Performance | JEDEC Standard No.78D | | ± 200 | mA | |

Note1: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm.

Note2: See Figure 1. DC Measurements reference.

Note3: Typ value at 25 °C and 3.3V V_{CC} supply voltage

Electrical Characteristics (Dynamic)

$V_{CC} = 3.3 \pm 10\% V$ (3.0 to 3.6 V), $GND = 0 V$, $T_A = -40^\circ C$ to $+85^\circ C$ (Note 1,2)

| Symbol | Parameter | Min | Typ | Max | Unit |
|-------------------|--|-------|-----|-----|------|
| Driver | | | | | |
| t_{PLH}/t_{PHL} | Propagation Delay (See Figure 5) | 2.0 | 2.5 | 3.5 | ns |
| t_{PHZ}/t_{PLZ} | Disable Time HIGH or LOW state to High Impedance (See Figure 6) | | | 7 | ns |
| t_{PZH}/t_{PZL} | Enable Time High Impedance to HIGH or LOW state (See Figure 6) | | | 7 | ns |
| $t_{SK(P)}$ | Pulse Skew ($t_{PLH} - t_{PHL}$) (See Figure 5) | | | 350 | ps |
| $t_{SK(PP)}$ | Device to Device Skew similar path and conditions (See Figure 5) | | | 0.9 | ns |
| $t_{JIT(PER)}$ | Period Jitter RMS, 50 MHz (Source t_r/t_f 0.5 ns, 10 and 90 % points, 30k samples. Source jitter de-embedded from Output values) (See Figure 8) | | 2 | 3 | ps |
| $t_{JIT(PP)}$ | Peak-to-peak Jitter, 100 Mbps 2^{15} -1 PRBS (Source t_r/t_f 0.5 ns, 10 and 90% points, 100k samples. Source jitter de-embedded from Output values) (See Figure 8) | | 30 | 130 | ps |
| t_r/t_f | Differential Output rise and fall times (See Figure 5) | 0.5 | | 1 | ns |
| Receiver | | | | | |
| t_{PLH}/t_{PHL} | Propagation Delay (See Figure 10) | 2 | 3.6 | 6 | ns |
| t_{PHZ}/t_{PLZ} | Disable Time HIGH or LOW state to High Impedance (See Figure 11) | | | 10 | ns |
| t_{PZH}/t_{PZL} | Enable Time High Impedance to HIGH or LOW state (See Figure 11) | | | 15 | ns |
| $t_{SK(P)}$ | Pulse Skew ($t_{PLH} - t_{PHL}$) (See Figure 10), $C_L=15pF$ | Type1 | 100 | 300 | ps |
| | | Type2 | 500 | 850 | |
| $t_{SK(PP)}$ | Device to Device Skew similar path and conditions (See Figure 10) $C_L=15pF$ | | | 1 | ns |
| $t_{JIT(PER)}$ | Period Jitter RMS, 50 MHz (Source: $V_{ID} = 200 mV_{pp}$ f $V_{CM} = 1 V$, t_r/t_f 0.5 ns, 10 and 90 % points, 30k samples. Source jitter de-embedded from Output values) (See Figure 12) | | 4 | 7 | ps |
| $t_{JIT(PP)}$ | Peak-to-peak Jitter, 100 Mbps 2^{15} -1 PRBS (Source t_r/t_f 0.5 ns, 10 and 90% points, 100k samples. Source jitter de-embedded from Output values) (See Figure 12) | Type1 | 200 | 700 | ps |
| | | Type2 | 225 | 800 | |
| t_r/t_f | Differential Output rise and fall times (See Figure 12), $C_L=15pF$ | 2.3 | | 3.5 | ns |

Note1: Device will meet the specifications after thermal equilibrium has been established when

mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lpm.

Note2: Typ value at 25 °C and 3.3 V_{CC} supply voltage.

Parameter Measurement Information

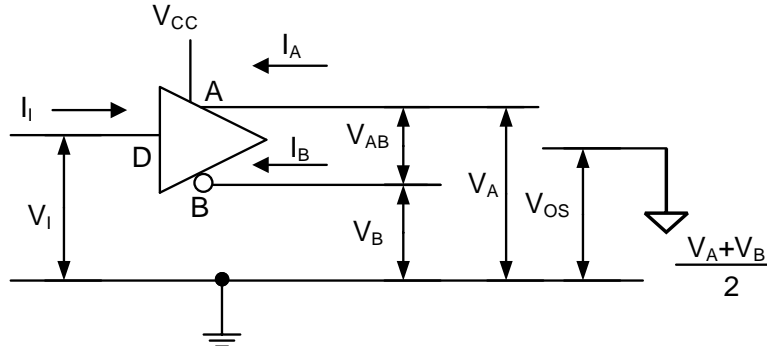
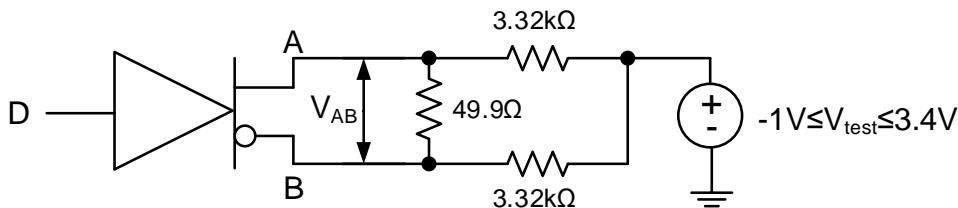
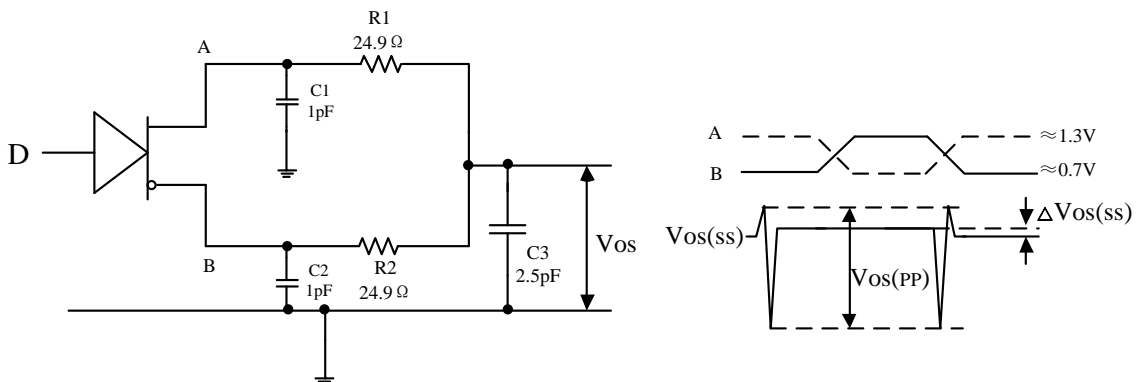


Figure 1. Driver Voltage and Current Definitions



Notes: A. All resistors are 1% tolerance.

Figure 2. Differential Output Voltage Test Circuit



Notes: A. All input pulses are supplied by a generator having the following characteristics:

t_r or $t_f \leq 1\text{ns}$, pulse frequency = 500 kHz, duty cycle = $50 \pm 5\%$.

B. C1, C2 and C3 include instrumentation and fixture capacitance within 2 cm of the D.U.T. and are 20% tolerance.

C. R1 and R2 are metal film, surface mount, 1% tolerance, and located within 2 cm of the D.U.T.

D. The measurement of $V_{OS(PP)}$ is made on test equipment with a -3 dB bandwidth of at least 1 GHz.

Figure 3. Test Circuit and Definitions for the Driver Common-Mode Output Voltage

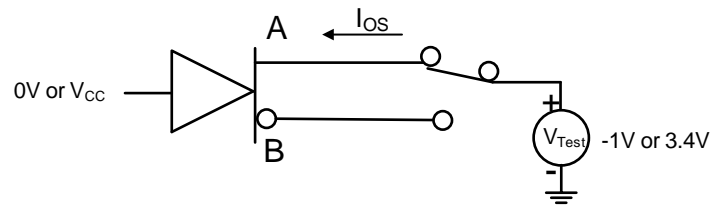
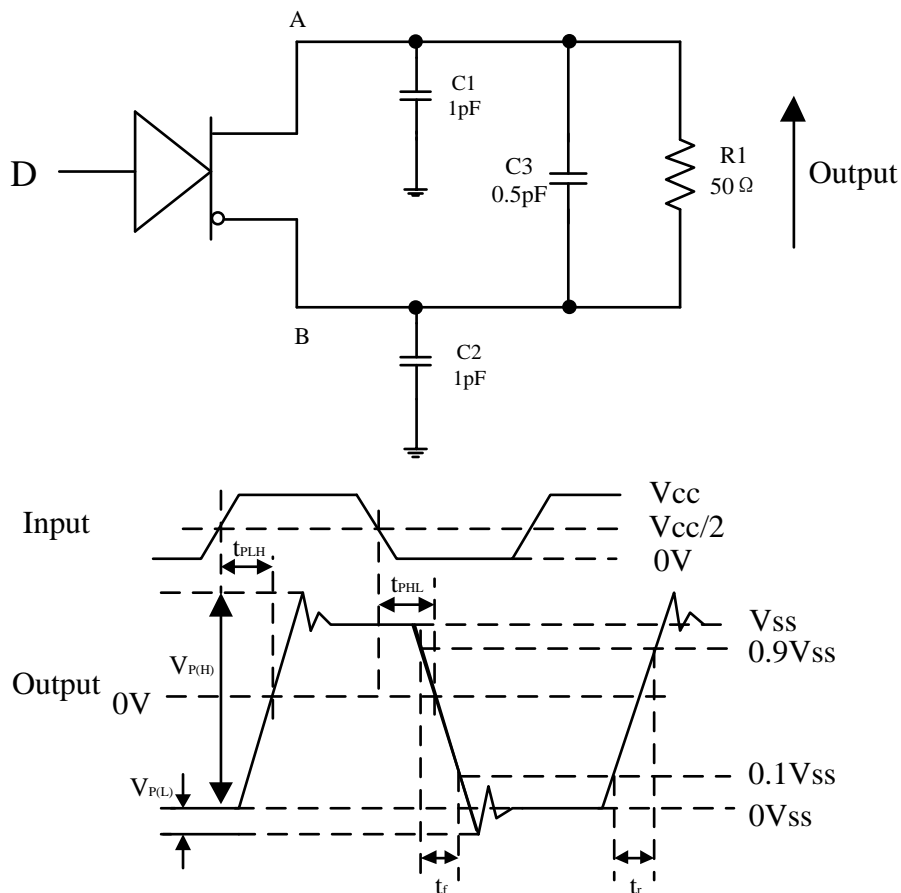
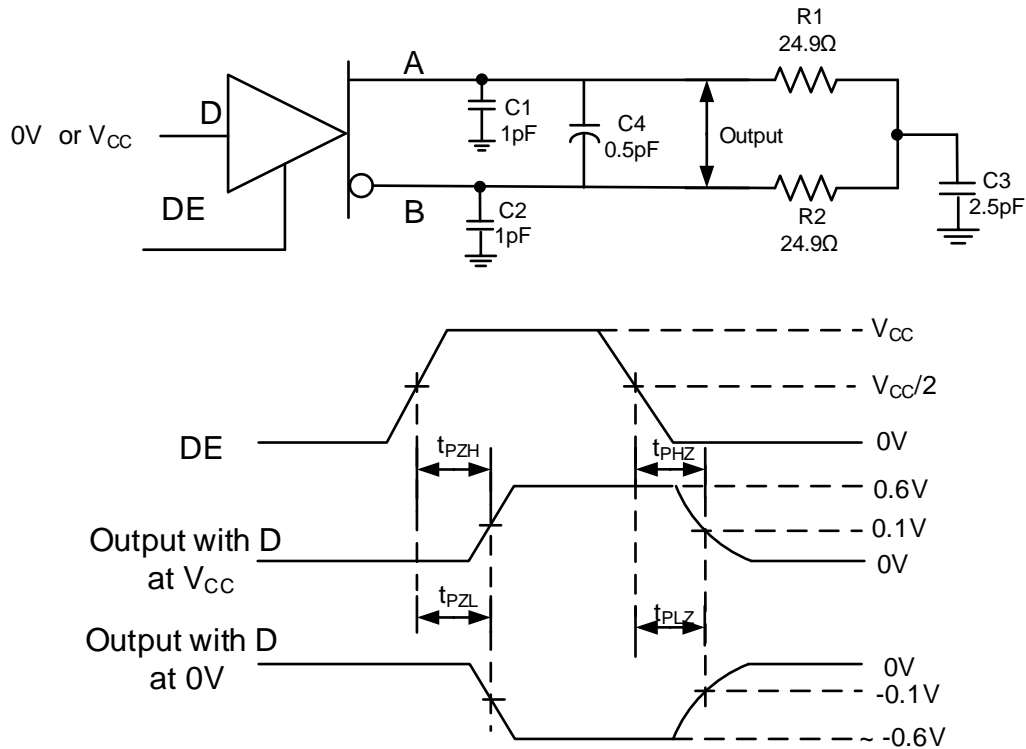


Figure 4. Driver Short-Circuit Test Circuit



- Notes:
- A. All input pulses are supplied by a generator having the following characteristics:
 t_r or $t_f \leq 1\text{ns}$, frequency = 500 kHz, duty cycle = $50 \pm 5\%$.
 - B. C1, C2 and C3 include instrumentation and fixture capacitance within 2 cm of the D.U.T. and are 20%.
 - C. R1 is a metal film, surface mount, and 1% tolerance and located within 2 cm of the D.U.T.
 - D. The measurement is made on test equipment with a -3 dB bandwidth of at least 1 GHz.

Figure 5. Driver Test Circuit, Timing, and Voltage Definitions for the Differential Output Signal



- Notes:
- A. All input pulses are supplied by a generator having the following characteristics:
 t_r or $t_f \leq 1\text{ns}$, frequency = 500 kHz, duty cycle = $50 \pm 5\%$.
 - B. C1, C2 and C3 include instrumentation and fixture capacitance within 2 cm of the D.U.T. and are 20%.
 - C. R1 and R2 are metal film, surface mount, and 1% tolerance and located within 2 cm of the D.U.T.
 - D. The measurement is made on test equipment with a -3 dB bandwidth of at least 1 GHz.

Figure 6. Driver Enable and Disable Time Circuit and Definitions

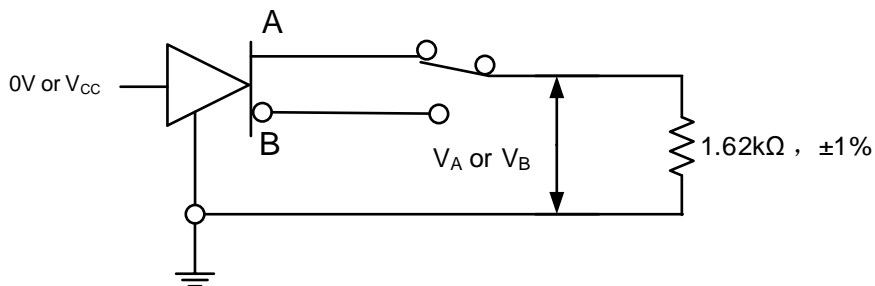
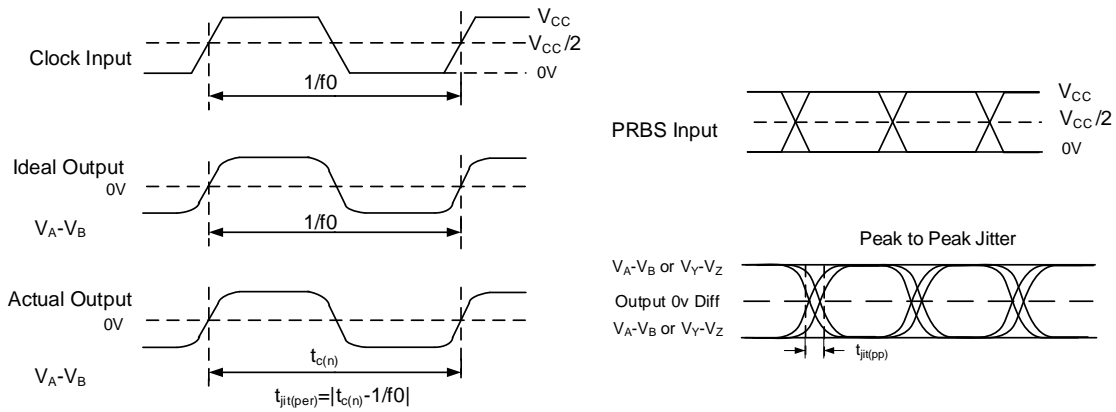


Figure 7. Maximum Steady State Output Voltage



- Notes:
- A. All input pulses are supplied by an Agilent 8304A Stimulus System.
 - B. The measurement is made on a TEK TDS6604 running TDSJIT3 application software
 - C. Period jitter is measured using a 50 MHz 50 \pm 1% duty cycle clock input.
 - D. Peak-to-peak jitter is measured using a 100 Mbps $2^{15}-1$ PRBS input.

Figure 8. Driver Jitter Measurement Waveforms

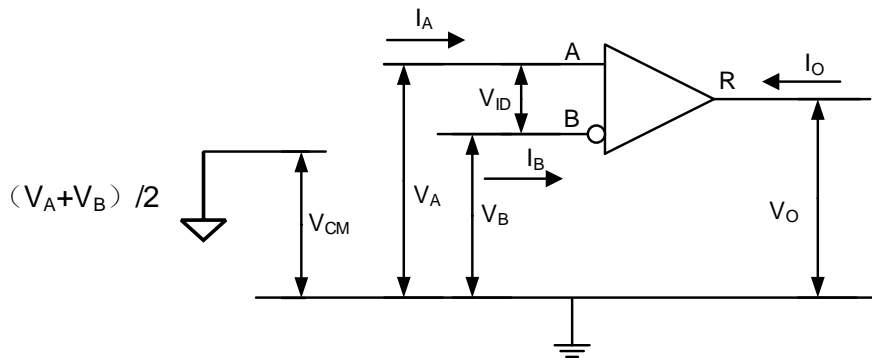
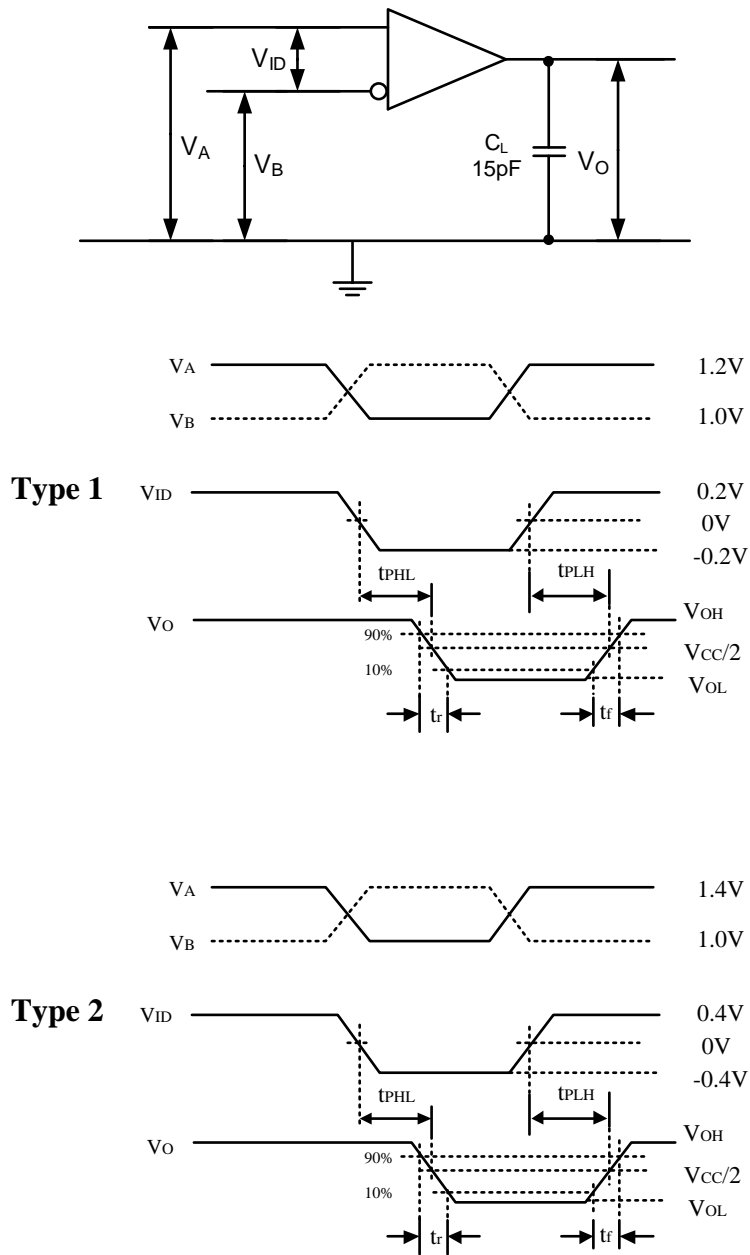
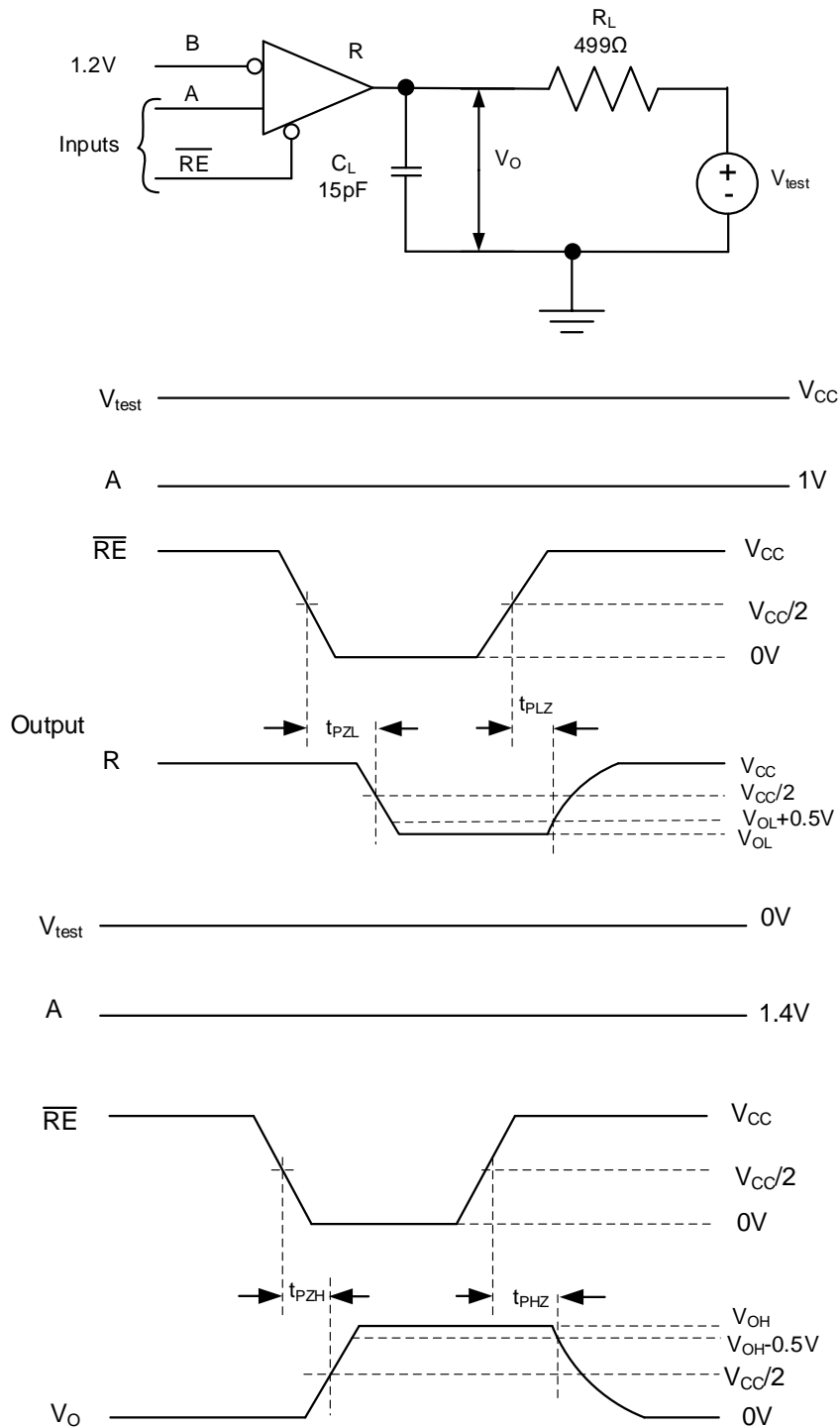


Figure 9. Receiver Voltage and Current Definitions



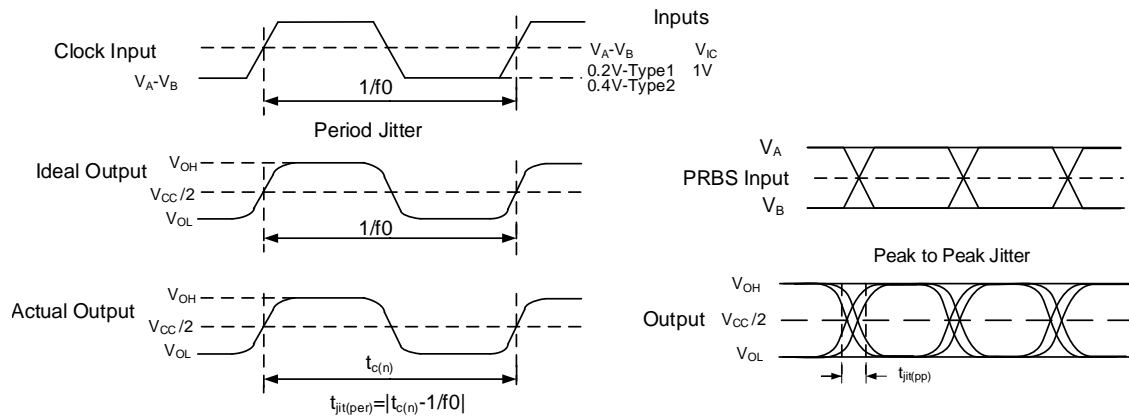
- Notes: A. All input pulses are supplied by a generator having the following characteristics:
 t_r or $t_f \leq 1$ ns, frequency = 1 MHz, duty cycle = $50 \pm 5\%$. C_L is a combination of a 20%-tolerance, low-loss ceramic, surface-mount capacitor and fixture capacitance within 2 cm of the D.U.T.
- B. The measurement is made on test equipment with a -3 dB bandwidth of at least 1 GHz.

Figure 10. Receiver Timing Test Circuit and Waveforms



- Notes: A. All input pulses are supplied by a generator having the following characteristics:
 t_r or $t_f \leq 1$ ns, frequency = 500 kHz, duty cycle = $50 \pm 5\%$.
 B. R_L is 1% tolerance, metal film, surface mount, and located within 2 cm of the D.U.T.
 C. C_L is the instrumentation and fixture capacitance within 2 cm of the DUT and 20%.

Figure 11. Receiver Enable/Disable Time Test Circuit and Waveforms



- Notes:
- A. All input pulses are supplied by an Agilent 8304A Stimulus System.
 - B. The measurement is made on a TEK TDS6604 running TDSJIT3 application software
 - C. Period jitter is measured using a 50 MHz 50 \pm 1% duty cycle clock input.
 - D. Peak-to-peak jitter is measured using a 100 Mbps $2^{15}-1$ PRBS input.

Figure 12. Receiver Jitter Measurement Waveforms

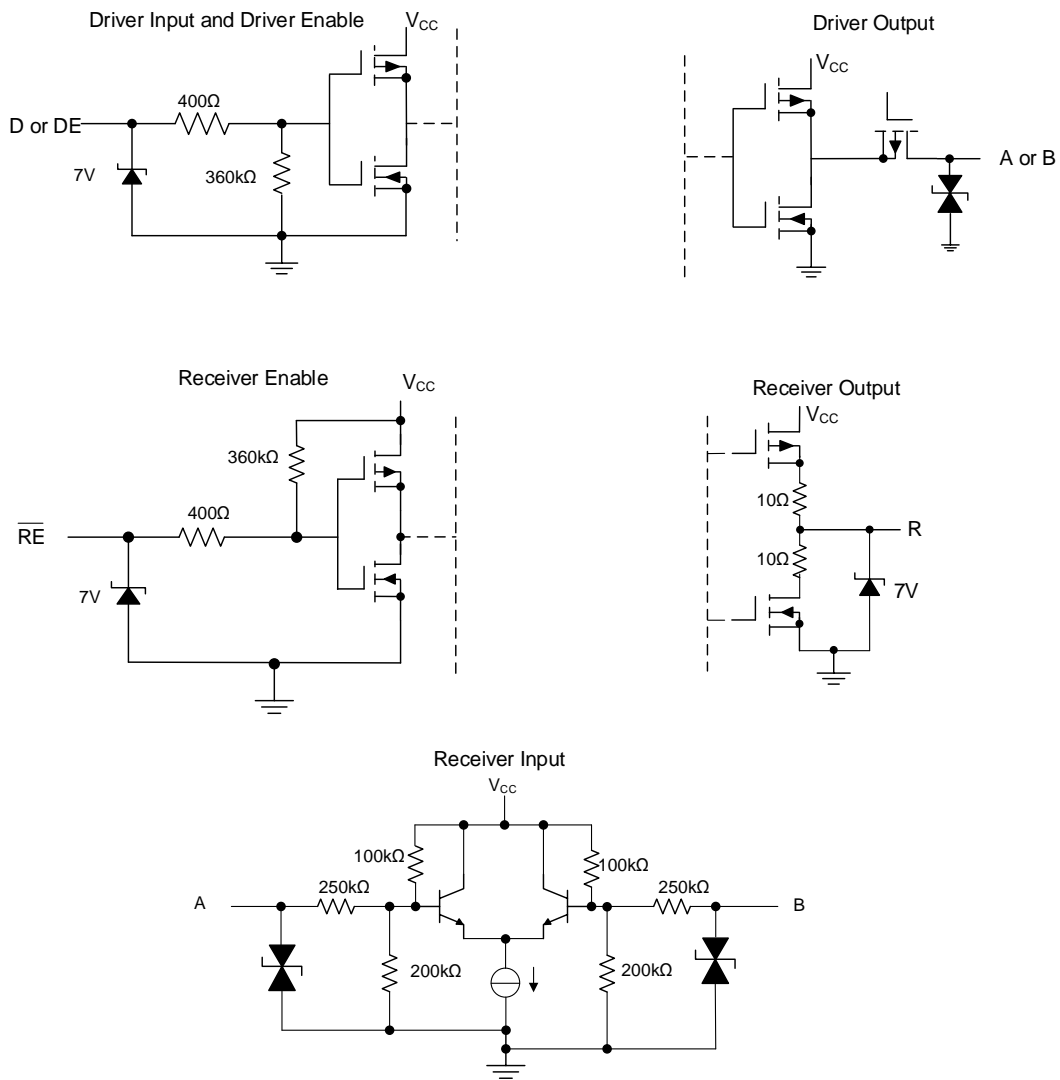


Figure 13. Equivalent Input and Output Schematic Diagrams

Table 1. Type1 Receiver Input Threshold Test Voltages

| Applied Voltages | | Resulting Differential Input Voltage | Resulting Common-Mode Input Voltage | Receiver Output (Note1) |
|------------------|----------|--------------------------------------|-------------------------------------|-------------------------|
| V_{IA} | V_{IB} | V_{ID} | V_{IC} | |
| 2.400 | 0.000 | 2.400 | 1.200 | H |
| 0.000 | 2.400 | -2.400 | 1.200 | L |
| 3.425 | 3.375 | 0.050 | 3.400 | H |
| 3.375 | 3.425 | -0.050 | 3.400 | L |
| -0.975 | -1.025 | 0.050 | -1.000 | H |
| -1.025 | -0.975 | -0.050 | -1.000 | L |

Note1: H = High level, L = Low level, output state assumes receiver is enabled ($\overline{RE}=L$)

Table 2. Type2 Receiver Input Threshold Test Voltage

| Applied Voltages | | Resulting Differential Input Voltage | Resulting Common-Mode Input Voltage | Receiver Output (Note) |
|------------------|-----------------|--------------------------------------|-------------------------------------|------------------------|
| V _{IA} | V _{IB} | V _{ID} | V _{IC} | |
| 2.400 | 0.000 | 2.400 | 1.200 | H |
| 0.000 | 2.400 | -2.400 | 1.200 | L |
| 3.475 | 3.325 | 0.150 | 3.400 | H |
| 3.425 | 3.375 | 0.050 | 3.400 | L |
| -0.925 | -1.075 | 0.150 | -1.000 | H |
| -0.975 | -1.025 | 0.050 | -1.000 | L |

Note: H = High level, L = Low level, output state assumes receiver is enabled ($\overline{RE}=L$)

Device function

Table 3. Device function Table

| | | | | |
|---------------------------------|---|-----------------|---------------|--------------|
| Type 1 Receiver (UM3400) | Inputs | | Output | |
| | $V_{ID} = V_A - V_B$ | \overline{RE} | R | |
| | $V_{ID} \geq 50 \text{ mV}$ | L | H | |
| | $-50 \text{ mV} < V_{ID} < 50 \text{ mV}$ | L | ? | |
| | $V_{ID} \leq -50 \text{ mV}$ | L | L | |
| | X | H | Z | |
| | X | Open | Z | |
| | Open | L | ? | |
| Type 2 Receiver (UM3401) | Inputs | | Output | |
| | $V_{ID} = V_A - V_B$ | \overline{RE} | R | |
| | $V_{ID} \geq 150 \text{ mV}$ | L | H | |
| | $50 \text{ mV} < V_{ID} < 150 \text{ mV}$ | L | ? | |
| | $V_{ID} \leq 50 \text{ mV}$ | L | L | |
| | X | H | Z | |
| | X | Open | Z | |
| | Open | L | L | |
| Driver | Input | Enable | Output | |
| | D | DE | A / Y | B / Z |
| | L | H | L | H |
| | H | H | H | L |
| | Open | H | L | H |
| | X | Open | Z | Z |
| | X | L | Z | Z |

H = High, L = Low, Z = High Impedance, X = Don't Care, ? = Indeterminate

Applications Information

Receiver Input Threshold (Failsafe)

The MLVDS standard defines a type 1 and type 2 receiver. Type 1 receivers include no provisions for failsafe and have their differential input voltage thresholds near zero volts. Type 2 receivers have their differential input voltage thresholds offset from zero volts to detect the absence of a voltage difference. The impact to receiver output by the offset input can be seen in Table 3 and Figure 14.

Table 3. Receiver Input Threshold Requirements

| Receiver Type | Output Low | Output High |
|---------------|---|---|
| Type 1 | $-2.4\text{ V} \leq V_{ID} \leq -0.05\text{ V}$ | $0.05\text{ V} \leq V_{ID} \leq 2.4\text{ V}$ |
| Type 2 | $-2.4\text{ V} \leq V_{ID} \leq 0.05\text{ V}$ | $0.15\text{ V} \leq V_{ID} \leq 2.4\text{ V}$ |

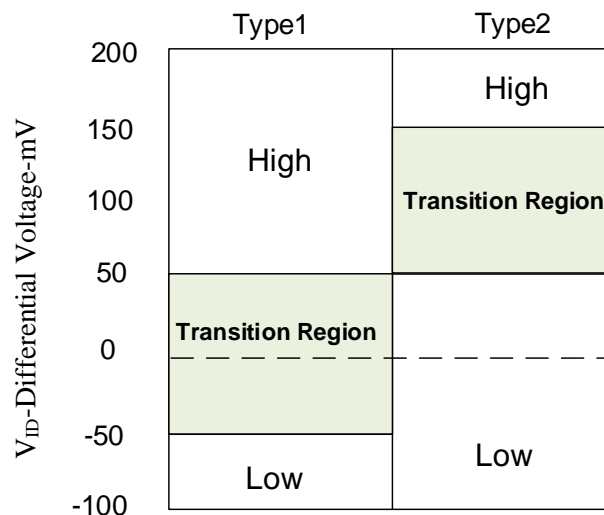


Figure 14. Receiver Differential Input Voltage Showing Transition Regions by Type

Live Insertion/Glitch-Free Power Up/Down

The UM3400/3401 provides a glitch-free power up/down feature that prevents the M-LVDS outputs of the device from turning on during a power up or power down event. This is especially important in live insertion applications, when a device is physically connected to an M-LVDS multipoint bus and V_{CC} is ramping. While the M-LVDS interface for these devices is glitch free on power up/down, the receiver output structure is not. The glitch on the R pin is independent of the RE voltage. Any complications or issues from this glitch are easily resolved in power sequencing or system requirements that suspend operation until V_{CC} has reached a steady state value.

Simplex Theory Configurations: Data flow is unidirectional and Point-to-Point from one Driver to one Receiver. UM3400 and UM3401 devices provide a high signal current allowing long drive runs and high noise immunity. Single terminated interconnects yield high amplitude levels. Parallel terminated interconnects yield typical MLVDS amplitude levels and minimizes reflections. See Figures 15 and 16. A UM3400 and UM3401 can be used as the driver or as a receiver.

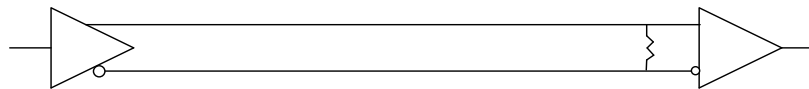


Figure 15. Point-to-Point Simplex Single Termination

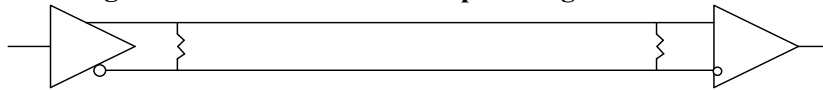


Figure 16. Parallel-Terminated Simplex

Simplex Multidrop Theory Configurations: Data flow is unidirectional from one Driver with one or more Receivers Multiple boards required. Single terminated interconnects yield high amplitude levels. Parallel terminated interconnects yield typical MLVDS amplitude levels and minimizes reflections. On the Evaluation Test Board, Headers P1, P2, and P3 may be used as need to interconnect transceivers to a each other or a bus. See Figures 20 and 21. A UM3400 and UM3401 can be used as the driver or as a receiver.

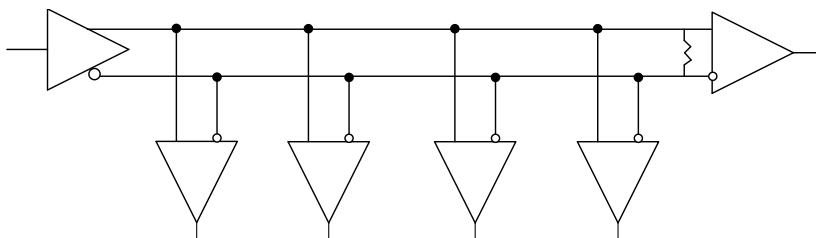


Figure 17. Multidrop or Distributed Simplex with Single Termination

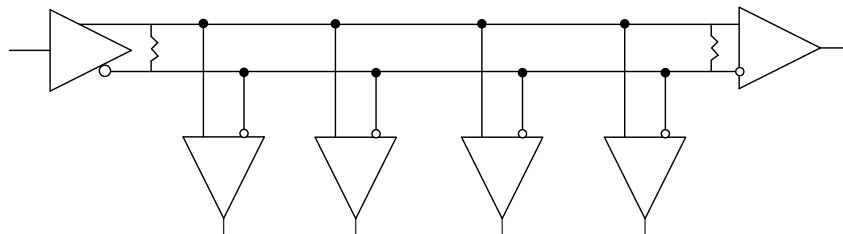


Figure 18. Multidrop or Distributed Simplex with Double Termination

Half Duplex Multinode Multipoint Theory Configurations: Data flow is unidirectional and selected from one of multiple possible Drivers to multiple Receivers. One “Two Node” multipoint connection can be accomplished with a single evaluation test board. More than Two Nodes requires multiple evaluation test boards. Parallel terminated interconnects yield typical MLVDS amplitude levels and minimizes reflections. Parallel terminated interconnects yield typical LMVDS amplitude levels and minimizes reflections. On the Test Board, Headers P1, P2, and P3 may be used as need to interconnect transceivers to each other or a bus. See Figure 19. A UM3401 can be used as the driver or as a receiver.

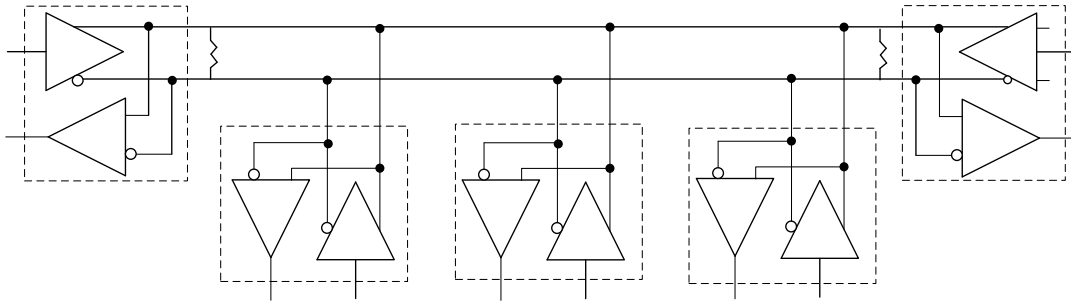
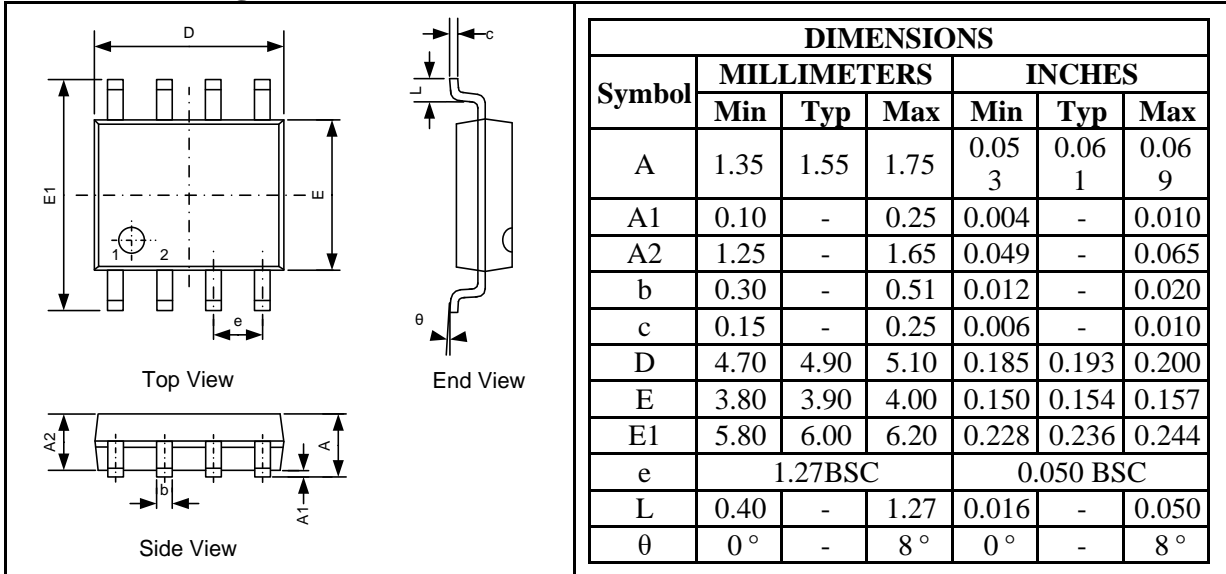


Figure 19. Multinode Multipoint Half Duplex (Requires Double Termination)

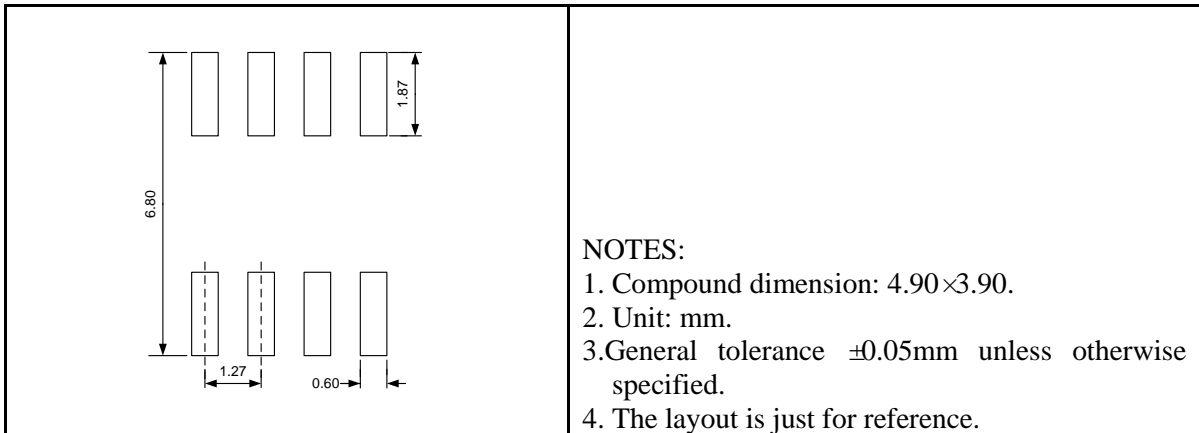
Package Information

UM3400 SOP8

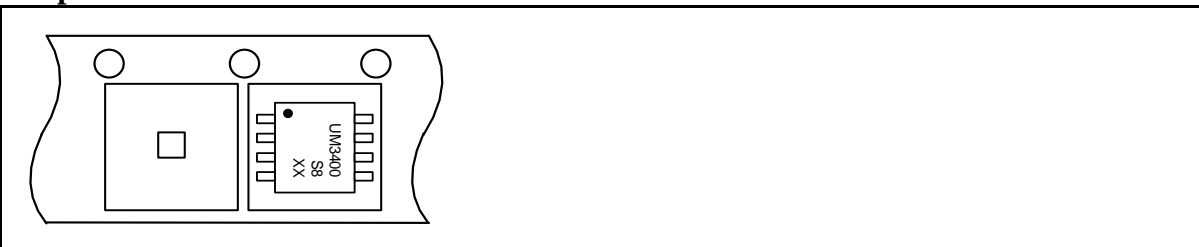
Outline Drawing



Land Pattern

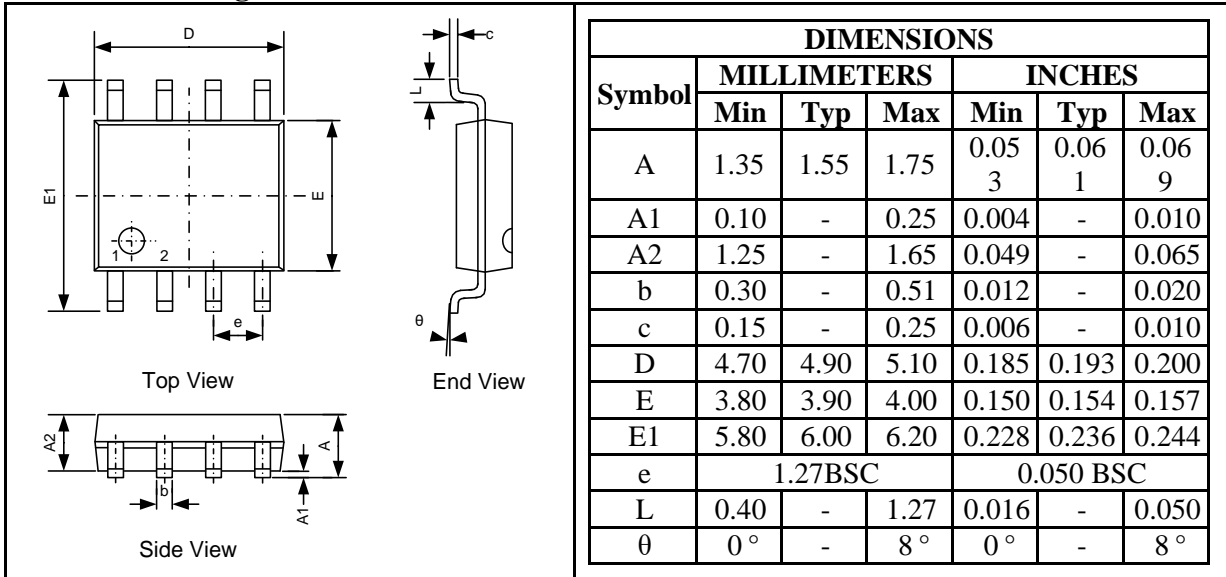


Tape and Reel Orientation

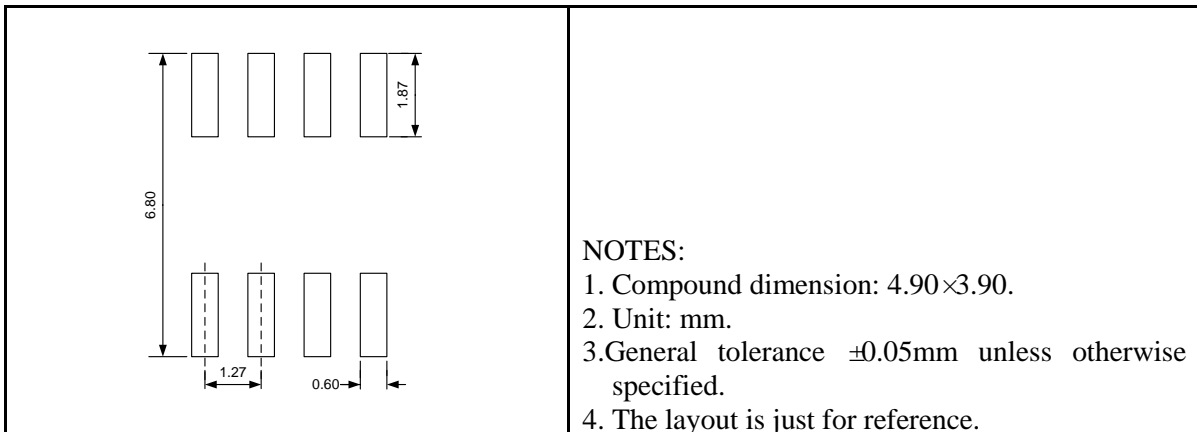


UM3401 SOP8

Outline Drawing



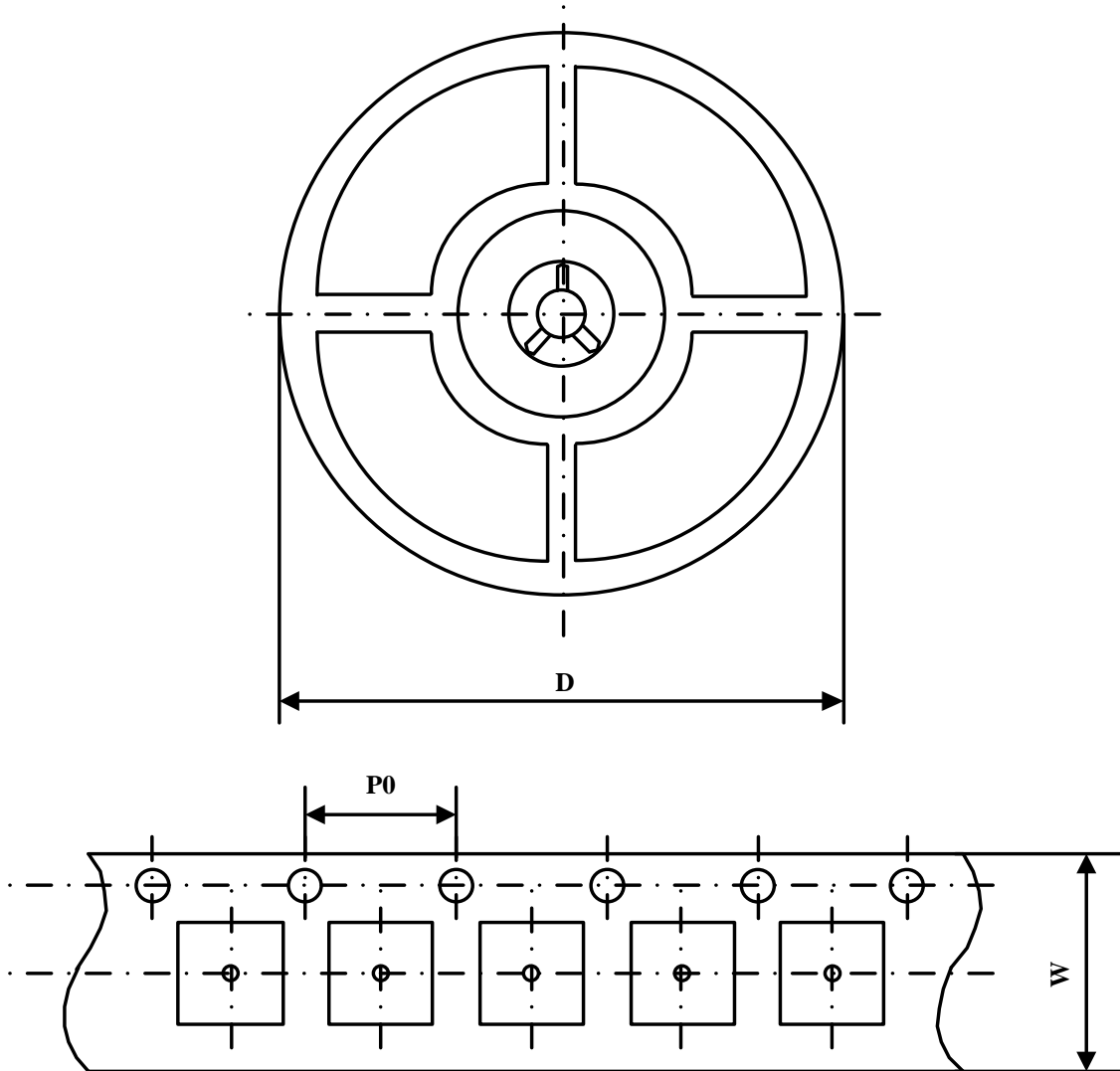
Land Pattern



Tape and Reel Orientation



Packing Information



| Part Number | Package Type | Carrier Width(W) | Pitch(P0) | Reel Size(D) |
|-------------|--------------|------------------|-----------|--------------|
| UM400S8 | SOP8 | 12 mm | 4 mm | 330 mm |
| UM3401S8 | SOP8 | 12 mm | 4 mm | 330 mm |

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