



+5V, Fail-Safe, 20Mbps, Profibus RS-485/ RS-422 Transceivers

MAX3460-MAX3464

General Description

The MAX3460–MAX3464 are high-speed differential bus transceivers for RS-485 and RS-422 communications. They are designed to meet TIA/EIA-422-B, TIA/EIA-485-A, V.11, and X.27 standards. The transceiver complies with the Profibus specification providing +2.1V output level with a 54Ω load, 20Mbps data rate, and output skew less than 2ns. Each part contains one three-state differential line driver and one differential input line receiver. The devices operate from a +5V supply and feature true fail-safe circuitry, which guarantees a logic-high receiver output when the receiver inputs are open or shorted. This enables all receiver outputs on a terminated bus to output logic highs when all transmitters are disabled.

All devices feature a 1/4 standard unit load receiver input impedance that allows 128 transceivers on the bus. Driver and receiver propagation delays are guaranteed under 20ns for multidrop, clock distribution applications. Drivers are short-circuit current limited and are protected against excessive power dissipation by thermal shutdown circuitry. The driver and receiver feature active-high and active-low enables, respectively, that can be connected together externally to serve as a direction control.

Applications

High-Speed RS-485 Communications
High-Speed RS-422 Communications
Level Translators
Industrial-Control Local Area Networks
Profibus Applications

Features

- ◆ Recommended for Profibus Applications
- ◆ Guaranteed 20Mbps Data Rate
- ◆ 20ns Transmitter and Receiver Propagation Delay
- ◆ 2ns Transmitter and Receiver Skew
- ◆ High Differential Driver Output Level (2.1V on 54Ω)
- ◆ Hot-Swap Versions
- ◆ 1μA Shutdown Supply Current
- ◆ Low Supply Current Requirements (2.5mA typ)
- ◆ Allow Up to 128 Transceivers on the Bus
- ◆ True Fail-Safe Receiver while Maintaining EIA/TIA-485 Compatibility
- ◆ Designed for Multipoint Transmissions on Long or Noisy Bus Lines
- ◆ Full Duplex and Half Duplex Versions Available
- ◆ Phase Controls to Correct for Twisted-Pair Reversal for 14-Pin Versions
- ◆ Current-Limiting and Thermal Shutdown for Driver Overload Protection

Ordering Information

| PART | TEMP RANGE | PIN-PACKAGE |
|------------|----------------|----------------|
| MAX3460CSD | 0°C to +70°C | 14 SO |
| MAX3460CPD | 0°C to +70°C | 14 Plastic DIP |
| MAX3460ESD | -40°C to +85°C | 14 SO |
| MAX3460EPD | -40°C to +85°C | 14 Plastic DIP |

Ordering Information continued at end of data sheet.

Pin Configurations appear at end of data sheet.

Selector Guide

| PART NUMBER | HALF/FULL DUPLEX | RECEIVER/DRIVER ENABLE | LOW-POWER SHUTDOWN | HOT SWAP | RECEIVER/DRIVER PHASE SELECT | INDEPENDENT SHDN PIN | PIN COUNT |
|-------------|------------------|------------------------|--------------------|----------|------------------------------|----------------------|-----------|
| MAX3460 | Full | Yes | Yes | Yes | Yes | Yes | 14 |
| MAX3461 | Full | Yes | Yes | No | Yes | Yes | 14 |
| MAX3462 | Full | No | No | No | No | No | 8 |
| MAX3463 | Half | Yes | Yes | Yes | No | No | 8 |
| MAX3464 | Half | Yes | Yes | No | No | No | 8 |



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ABSOLUTE MAXIMUM RATINGS

| | | | |
|--|------------------------------|---|---|
| Supply Voltage (V_{CC}) to GND | -0.3V to +6V | Continuous Power Dissipation ($T_A = +70^\circ\text{C}$) | |
| Control Input Voltage (\overline{RE} , DE, DI, SHDN, TXP, RXP) to GND..... | -0.3V to ($V_{CC} + 0.3V$) | 8-Pin SO (derate 5.88mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)..... | 471mW |
| Driver Output Voltage (Y, Z) to GND..... | -8V to +13V | 8-Pin DIP (derate 9.09mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)..... | 727mW |
| Receiver Input Voltage (A, B) to GND..... | -8V to +13V | 14-Pin SO (derate 8.33mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)..... | 667mW |
| Differential Driver Output Voltage (Y - Z)..... | $\pm 8V$ | 14-Pin DIP (derate 10mW/ $^\circ\text{C}$ above $+70^\circ\text{C}$)..... | 800mW |
| Differential Receiver Input (A - B)..... | $\pm 8V$ | Operating Temperature Range | |
| Receiver Output Voltage (RO)..... | -0.3V to ($V_{CC} + 0.3V$) | MAX346_C_..... | 0°C to $+70^\circ\text{C}$ |
| Output Driver Current (Y, Z) | $\pm 250\text{mA}$ | MAX346_E_..... | -40°C to $+85^\circ\text{C}$ |
| | | Junction Temperature | $+150^\circ\text{C}$ |
| | | Storage Temperature Range | -65°C to $+150^\circ\text{C}$ |
| | | Lead Temperature (soldering, 10s) | $+300^\circ\text{C}$ |

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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

($V_{CC} = +5V \pm 5\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted. Typical values are at $V_{CC} = +5V$ and $T_A = +25^\circ\text{C}$.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|-----------------|--|-----------------------------------|------|----------|------------------|
| Power-Supply Range | V_{CC} | | 4.75 | | 5.25 | V |
| DRIVER | | | | | | |
| Differential Driver Output (no load) | V_{OD} | Figure 5, $R = \infty$ | | | V_{CC} | V |
| Differential Driver Output | V_{OD} | Figure 5, $R = 27\Omega$ | 2.1 | | | V |
| Change in Magnitude of Differential Output Voltage | ΔV_{OD} | Figure 5, $R = 50\Omega$ or 27Ω (Note 2) | | | 0.2 | V |
| Driver Common-Mode Output Voltage | V_{OC} | Figure 5, $R = 50\Omega$ or 27Ω | | | 3 | V |
| Change in Magnitude of Common-Mode Voltage | ΔV_{OC} | Figure 5, $R = 50\Omega$ or 27Ω (Note 2) | | | 0.2 | V |
| Input High Voltage | V_{IH} | DE, DI, \overline{RE} , SHDN | 2.0 | | | V |
| Input Low Voltage | V_{IL} | DE, DI, \overline{RE} , SHDN | | | 0.8 | V |
| Input Hysteresis | V_{HYS} | DE, DI, \overline{RE} , SHDN | | 50 | | mV |
| Output Leakage (Y and Z) Full Duplex | I_O | DE = GND, $V_{CC} =$ GND or +5.25V | $V_{IN} = +12V$ $V_{IN} = -7V$ | | +125 | μA |
| Input Current | I_{IN} | DI, \overline{RE} , DE, SHDN | | | ± 1 | μA |
| Pulldown Current | | RXP = TXP = V_{CC} | 5 | 15 | 30 | μA |
| Driver Short-Circuit Output Current (Note 3) | I_{OSD} | $0 \leq V_{OUT} \leq 12V$, output low $-7V \leq V_{OUT} \leq V_{CC}$, output high | | | +250 | mA |
| Driver Short-Circuit Foldback Output Current (Note 3) | I_{OSFD} | $(V_{CC} - 1V) \leq V_{OUT} \leq 12V$, output low $-7V \leq V_{OUT} \leq 1V$, output high | +25 | | -25 | mA |
| Thermal Shutdown Threshold | | | | 140 | | $^\circ\text{C}$ |
| RECEIVER | | | | | | |
| Differential Input Capacitance | $C_{A, B}$ | | | 8 | | pF |
| Input Current (A and B) Full Duplex | $I_{A, B}$ | DE = GND, $V_{CC} =$ GND or 5.25V | $V_{IN} = +12V$ $V_{IN} = -7V$ | | 250 | μA |
| Receiver Differential Threshold Voltage | V_{TH} | $-7V \leq V_{CM} \leq 12V$ | | -200 | -125 -50 | mV |

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ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = +5V \pm 5\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted. Typical values are at $V_{CC} = +5V$ and $T_A = +25^\circ C$.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|-----------------|--|----------------|-----|----------|-----------|
| Receiver Input Hysteresis | ΔV_{TH} | $V_A + V_B = 0$ | | 20 | | mV |
| Receiver Output High Voltage | V_{OH} | $I_O = -4mA$, $V_A - V_B = V_{TH}$ | $V_{CC} - 1.5$ | | | V |
| Receiver Output Low Voltage | V_{OL} | $I_O = 4mA$, $V_B - V_A = V_{TH}$ | | | 0.4 | V |
| Three-State Output Current at Receiver | I_{OZR} | $0 \leq V_O \leq V_{CC}$ | | | ± 1 | μA |
| Receiver Input Resistance | R_{IN} | $-7V \leq V_{CM} \leq 12V$ | 48 | | | $k\Omega$ |
| Receiver Output Short-Circuit Current | I_{OSR} | $0 \leq V_{RO} \leq V_{CC}$ | ± 7 | | ± 95 | mA |
| SUPPLY CURRENT | | | | | | |
| Normal Operation (static condition) | I_Q | No load, $DI = V_{CC}$ or $DI = GND$ | | 2.5 | 4 | mA |
| Supply Current in SHDN | I_{SHDN} | $DE = GND$ and $\overline{RE} = V_{CC}$, or $SHDN = V_{CC}$ | | 1 | 10 | μA |
| SWITCHING CHARACTERISTICS | | | | | | |
| Driver Propagation Delay | t_{PLH} | Figures 6 and 7, $R_{DIFF} = 54\Omega$, $C_L = 50pF$ | | | 20 | ns |
| | t_{PHL} | | | | | |
| Driver Differential Output Rise or Fall Time | t_R | Figures 6 and 7, $R_{DIFF} = 54\Omega$, $C_L = 50pF$ | | | 20 | ns |
| | t_F | | | | | |
| Driver Output Skew $ t_{PLH} - t_{PHL} $ | t_{SKEW} | Figures 6 and 7, $R_{DIFF} = 54\Omega$, $C_L = 50pF$, $TXP = GND$ or floating | | | 2 | ns |
| Maximum Data Rate | | | 20 | | | Mbps |
| Driver Enable to Output High | t_{ZH} | Figures 8 and 9, S2 closed, $R_L = 500\Omega$, $C_L = 50pF$ | | | 100 | ns |
| Driver Enable to Output Low | t_{ZL} | Figures 8 and 9, S1 closed, $R_L = 500\Omega$, $C_L = 50pF$ | | | 100 | ns |
| Driver Disable Time from Low | t_{LZ} | Figures 8 and 9, S1 closed, $R_L = 500\Omega$, $C_L = 50pF$ | | | 100 | ns |
| Driver Disable Time from High | t_{HZ} | Figures 8 and 9, S2 closed, $R_L = 500\Omega$, $C_L = 50pF$ | | | 100 | ns |
| Receiver Propagation Delay | t_{PLH} | Figure 10, $C_L = 15pF$ (Note 4) | | | 20 | ns |
| | t_{PHL} | | | | | |
| Receiver Output Skew $ t_{PLH} - t_{PHL} $ | t_{SKEW} | Figure 10, $C_L = 15pF$, $RXP = GND$ or floating (Note 4) | | | 2 | ns |
| Receiver Enable to Output Low | t_{ZL} | Figures 8 and 11, $R_L = 1k\Omega$, $C_L = 15pF$, S1 closed (Note 4) | | | 100 | ns |
| Receiver Enable to Output High | t_{ZH} | Figures 8 and 11, $R_L = 1k\Omega$, $C_L = 15pF$, S2 closed (Note 4) | | | 100 | ns |
| Receiver Disable Time from Low | t_{LZ} | Figures 8 and 11, $R_L = 1k\Omega$, $C_L = 15pF$, S1 closed (Note 4) | | | 100 | ns |
| Receiver Disable Time from High | t_{HZ} | Figures 8 and 11, $R_L = 1k\Omega$, $C_L = 15pF$, S2 closed (Note 4) | | | 100 | ns |

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ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = +5V \pm 5\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted. Typical values are at $V_{CC} = +5V$ and $T_A = +25^\circ C$.) (Note 1)

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|-----------------|--|-----|-----|-----|---------|
| Time to Shutdown | t_{SHDN} | (Note 5) | 50 | | 800 | ns |
| Driver Enable from Shutdown to Output High | $t_{ZH} (SHDN)$ | Figures 8 and 9, $R_L = 500\Omega$, $C_L = 50pF$, S2 closed (Note 5) | | | 4 | μs |
| Driver Enable from Shutdown to Output Low | $t_{ZL} (SHDN)$ | Figures 8 and 9, $R_L = 500\Omega$, $C_L = 50pF$, S1 closed (Note 5) | | | 4 | μs |
| Receiver Enable from Shutdown to Output High | $t_{ZH} (SHDN)$ | Figures 8 and 11, $R_L = 1k\Omega$, $C_L = 15pF$, S2 closed (Notes 4, 5) | | | 4 | μs |
| Receiver Enable from Shutdown to Output Low | $t_{ZL} (SHDN)$ | Figures 8 and 11, $R_L = 1k\Omega$, $C_L = 15pF$, S1 closed (Notes 4, 5) | | | 4 | μs |

Note 1: All currents into the device are positive; all currents out of the device are negative. All voltages are referenced to device ground, unless otherwise noted.

Note 2: ΔV_{OD} and ΔV_{OC} are the changes in V_{OD} and V_{OC} , respectively, when the DI input changes state.

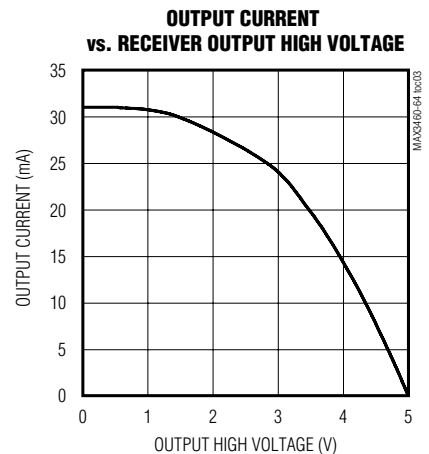
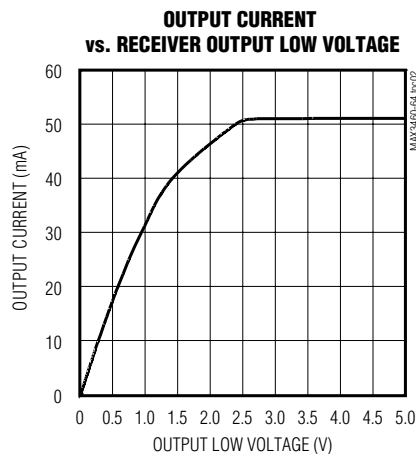
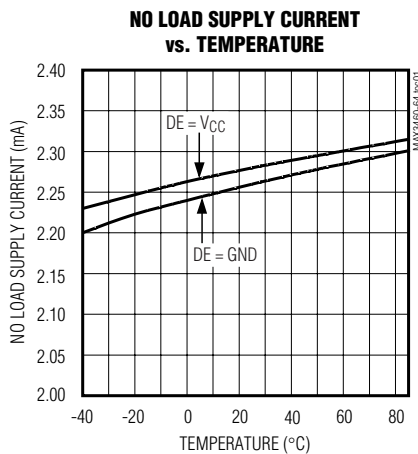
Note 3: The short-circuit output current applies to peak current just prior to foldback-current limiting; the short-circuit foldback output current applies during current limiting to allow a recovery from bus contention.

Note 4: Capacitive load includes test probe and fixture capacitance.

Note 5: Shutdown is enabled by bringing \overline{RE} high and DE low or by bringing SHDN high. If the enable inputs are in this state for less than 50ns, the device is guaranteed not to enter shutdown. If the enable inputs are in this state for at least 800ns, the device is guaranteed to have entered shutdown.

Typical Operating Characteristics

($V_{CC} = +5V$, $T_A = +25^\circ C$, unless otherwise noted.)

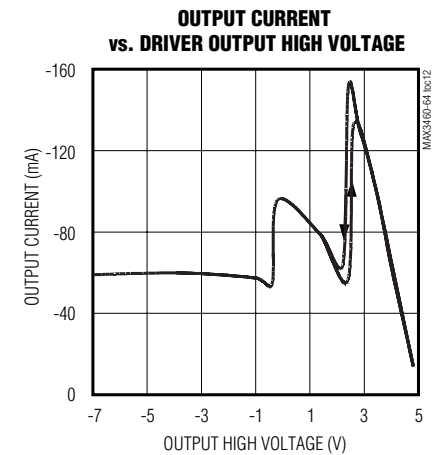
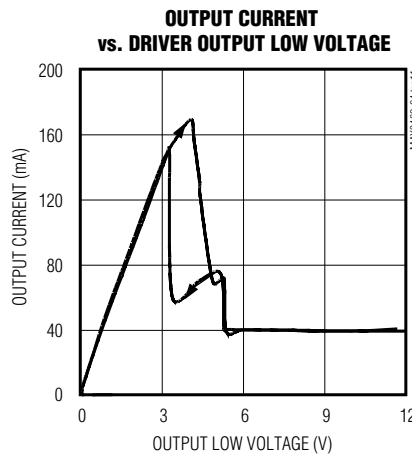
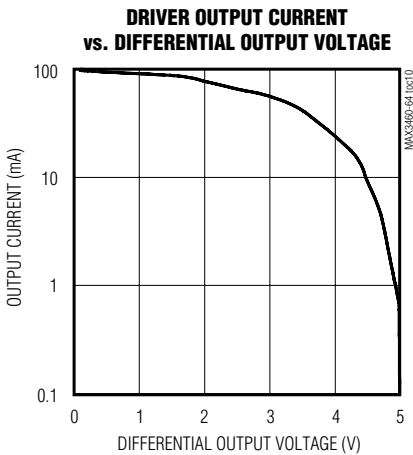
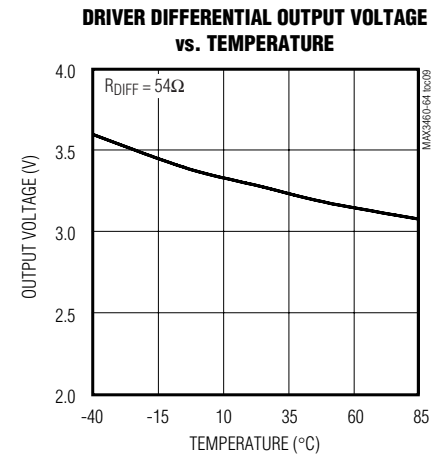
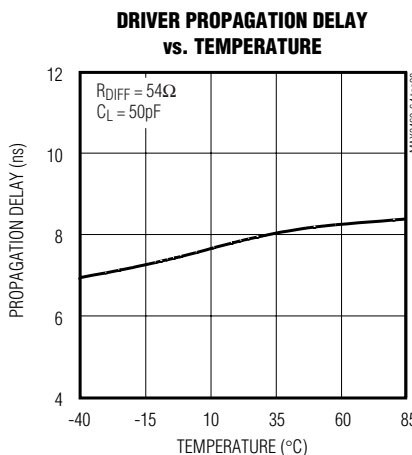
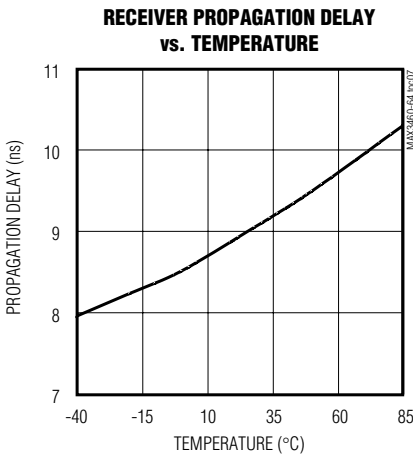
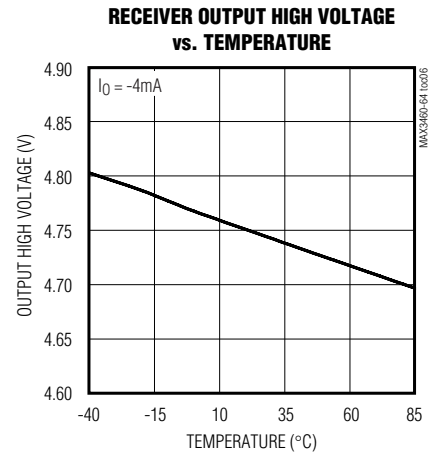
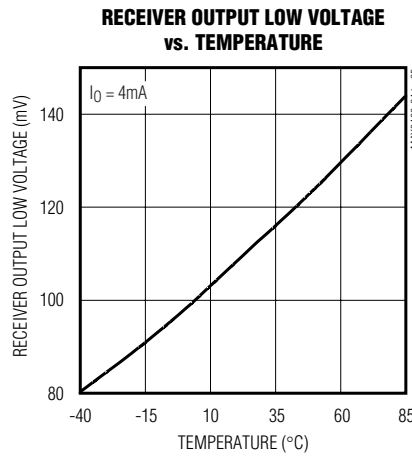
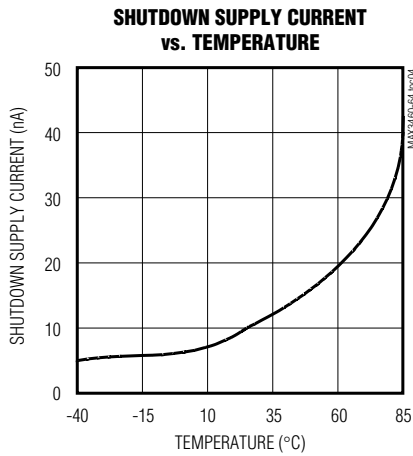


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Typical Operating Characteristics (continued)

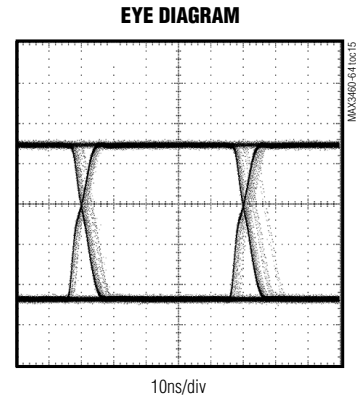
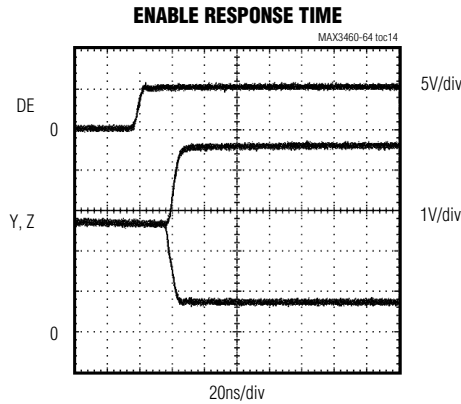
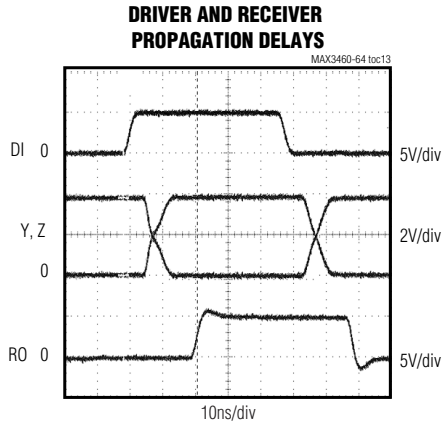
($V_{CC} = +5V$, $T_A = +25^\circ C$, unless otherwise noted.)



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Typical Operating Characteristics (continued)

(V_{CC} = +5V, T_A = +25°C, unless otherwise noted.)



Pin Description

| PIN | | | NAME | FUNCTION |
|---------------------|---------|---------------------|-----------------|--|
| MAX3460/ MAX3461 | MAX3462 | MAX3463/ MAX3464 | | |
| FULL DUPLEX | | HALF DUPLEX | | |
| 1 | — | — | SHDN | Shutdown. Drive SHDN high to enter low-power shutdown mode. |
| 2 | 2 | 1 | RO | Receiver Output. When \overline{RE} is low and $(A - B) \geq -50\text{mV}$, RO is high; if $(A - B) \leq -200\text{mV}$, RO is low. |
| 3 | — | 2 | \overline{RE} | Receiver Output Enable. Drive \overline{RE} low to enable RO; RO is high impedance when \overline{RE} is high. Drive \overline{RE} high and DE low to enter low-power shutdown mode. |
| 4 | — | 3 | DE | Driver Output Enable. Drive DE high to enable driver output. These outputs are high impedance when DE is low. Drive \overline{RE} high and DE low to enter low-power shutdown mode. |
| 5 | 3 | 4 | DI | Driver Input. With DE high, a low on DI forces the noninverting output low and the inverting output high. Similarly, a high on DI forces the noninverting output high and the inverting output low. |
| 6, 7 | 4 | 5 | GND | Ground |
| 8 | — | — | TXP | Transmitter Phase. Connect TXP to GND, or leave unconnected for normal transmitter phase/polarity. Connect TXP to V _{CC} to invert the transmitter phase/polarity. TXP has an internal 15 μA pulldown. |
| 9 | 5 | — | Y | Noninverting Driver Output |
| 10 | 6 | — | Z | Inverting Driver Output |
| 11 | 7 | — | B | Inverting Receiver Input |
| 12 | 8 | — | A | Noninverting Receiver Input |
| 13 | — | — | RXP | Receiver Phase. Connect RXP to GND, or leave unconnected for normal receiver phase/polarity. Connect RXP to V _{CC} to invert the receiver phase/polarity. RXP has an internal 15 μA pulldown. |
| 14 | 1 | 8 | V _{CC} | Positive Supply: $+4.75\text{V} \leq V_{CC} \leq +5.25\text{V}$. Bypass V _{CC} to GND with a 0.1 μF capacitor. |
| — | — | 7 | B | Inverting Receiver Input and Inverting Driver Output |
| — | — | 6 | A | Noninverting Receiver Input and Noninverting Driver Output |

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Function Tables

MAX3460-MAX3464

MAX3460/MAX3461

| TRANSMITTING | | | | | |
|-----------------|----|---------------|------|----------|--------|
| INPUTS | | | | OUTPUTS | |
| \overline{RE} | DE | DI | SHDN | Z | Y |
| X | 1 | 1 | 0 | 0 | 1 |
| X | 1 | 0 | 0 | 1 | 0 |
| 0 | 0 | X | 0 | High-Z | High-Z |
| 1 | 0 | X | X | Shutdown | |
| X | X | X | 1 | Shutdown | |
| RECEIVING | | | | | |
| INPUTS | | | | OUTPUT | |
| \overline{RE} | DE | A-B | SHDN | RO | |
| 0 | X | $\geq -0.05V$ | 0 | 1 | |
| 0 | X | $\leq -0.2V$ | 0 | 0 | |
| 0 | X | Open/Shorted | 0 | 1 | |
| 1 | 1 | X | 0 | High-Z | |
| 1 | 0 | X | X | Shutdown | |
| X | X | X | 1 | Shutdown | |

MAX3462

| TRANSMITTING | | |
|---------------|---------|---|
| INPUT | OUTPUTS | |
| DI | Z | Y |
| 1 | 0 | 1 |
| 0 | 1 | 0 |
| RECEIVING | | |
| INPUTS | OUTPUT | |
| A-B | RO | |
| $\geq -0.05V$ | 1 | |
| $\leq -0.2V$ | 0 | |
| Open/Shorted | 1 | |

MAX3463/MAX3464

| TRANSMITTING | | | | |
|-----------------|----|---------------|----------|--------|
| INPUTS | | | OUTPUTS | |
| \overline{RE} | DE | DI | B | A |
| X | 1 | 1 | 0 | 1 |
| X | 1 | 0 | 1 | 0 |
| 0 | 0 | X | High-Z | High-Z |
| 1 | 0 | X | Shutdown | |
| RECEIVING | | | | |
| INPUTS | | | OUTPUT | |
| \overline{RE} | DE | A-B | RO | |
| 0 | X | $\geq -0.05V$ | 1 | |
| 0 | X | $\leq -0.2V$ | 0 | |
| 0 | X | Open/Shorted | 1 | |
| 1 | 1 | X | High-Z | |
| 1 | 0 | X | Shutdown | |

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Pin Configurations and Typical Operating Circuit

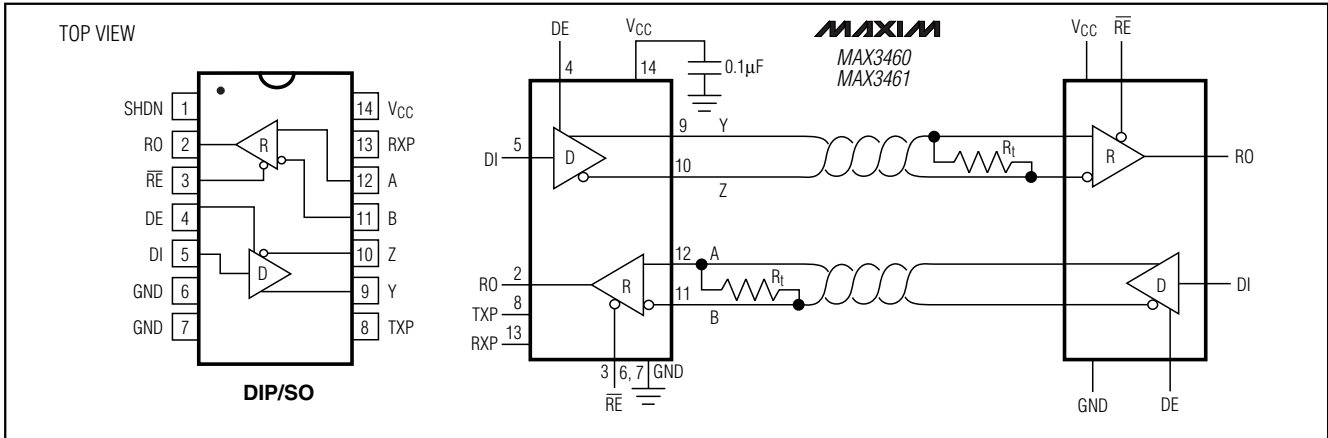


Figure 1. MAX3460/MAX3461 Pin Configuration and Typical Full-Duplex Operating Circuit

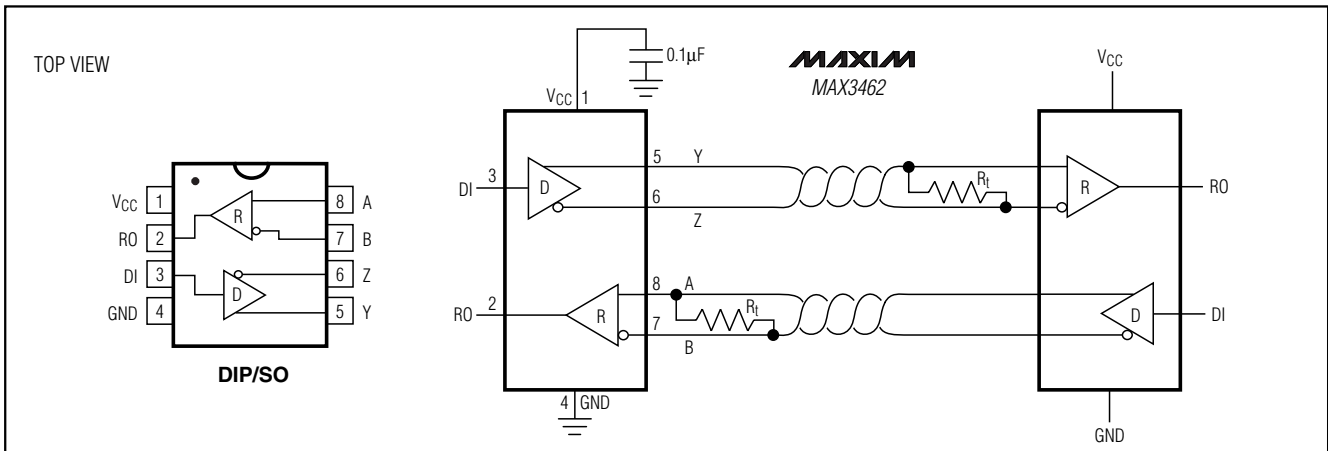


Figure 2. MAX3462 Pin Configuration and Typical Full-Duplex Operating Circuit

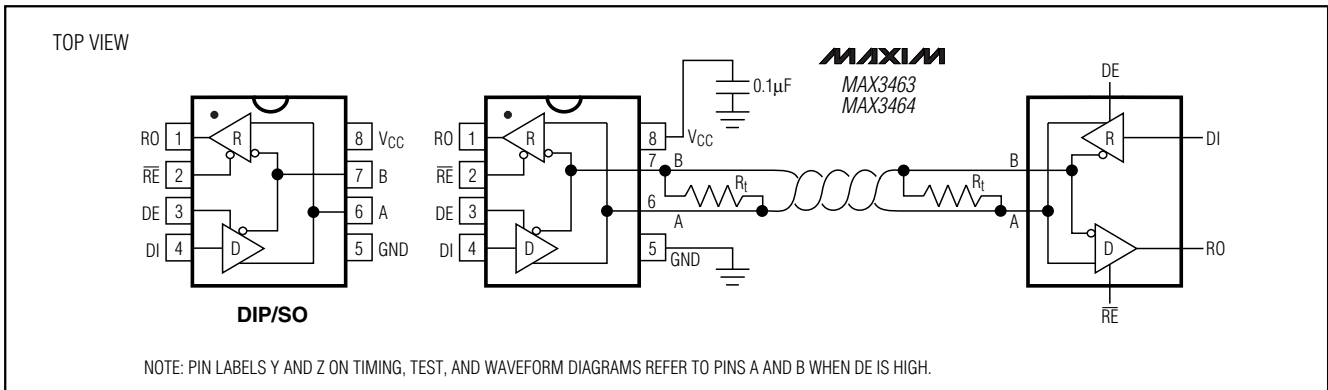


Figure 3. MAX3463/MAX3464 Pin Configuration and Typical Full-Duplex Operating Circuit

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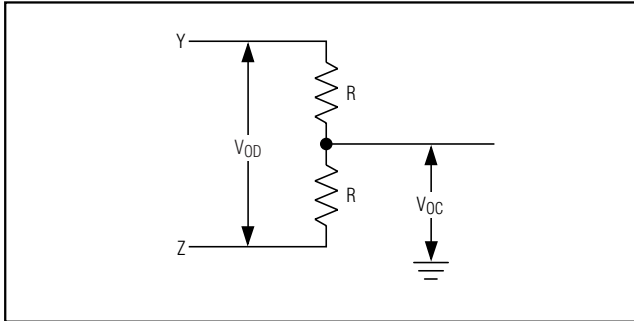


Figure 5. Driver DC Test Load

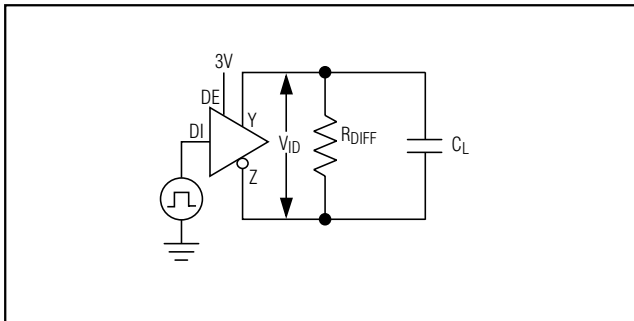


Figure 6. Driver Timing Test Circuit

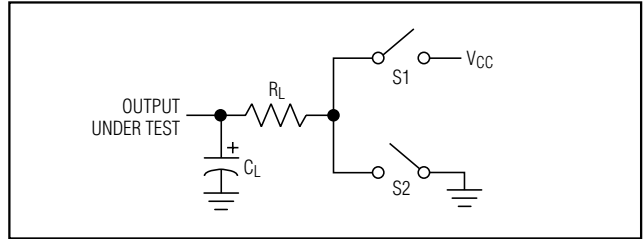


Figure 8. Enable/Disable Timing Test Load

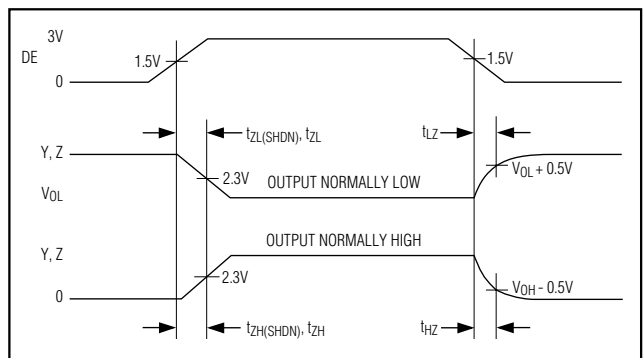


Figure 9. Driver Enable and Disable Times

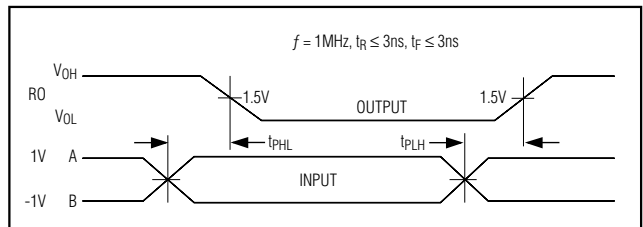


Figure 10. Receiver Propagation Delays

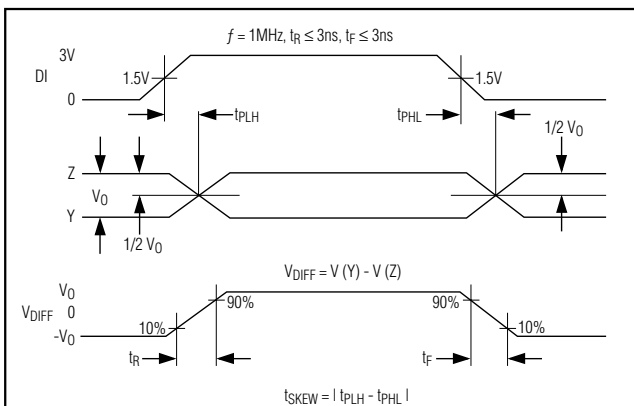


Figure 7. Driver Propagation Delays

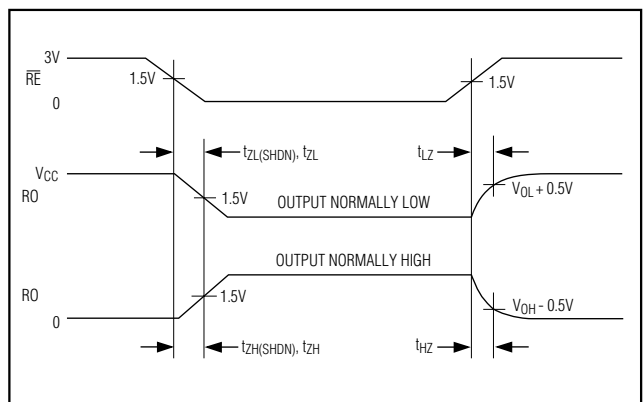


Figure 11. Receiver Enable and Disable Times

+5V, Fail-Safe, 20Mbps, Profibus RS-485/ RS-422 Transceivers

MAX3460-MAX3464

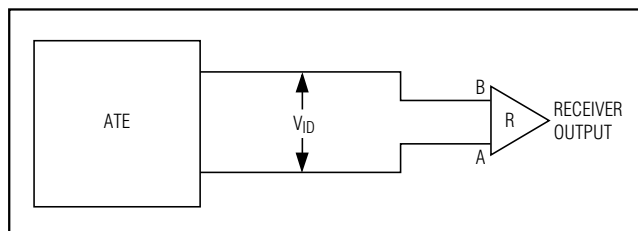


Figure 12. Receiver Propagation Delay Test Circuit

Applications Information

128 Transceivers on the Bus

The standard RS-485 receiver input impedance is $12k\Omega$ (one-unit load), and the standard driver can drive up to 32 unit loads. The MAX3460-MAX3464 family of transceivers has a 1/4-unit-load receiver input impedance ($48k\Omega$), allowing up to 128 transceivers to be connected in parallel on one communication line. Any combination of these devices and/or other RS-485 transceivers with a total of 32 unit loads or less can be connected to the line.

Low-Power Shutdown Mode (except MAX3462)

Low-power shutdown mode is initiated by bringing SHDN high (MAX3460/MAX3461), or both \overline{RE} high and DE low. In shutdown, the devices typically draw only $1\mu A$ of supply current. \overline{RE} and DE can be driven simultaneously; the parts are guaranteed not to enter shutdown if \overline{RE} is high and DE is low for less than 50ns. If the inputs are in this state for at least 800ns, the parts are guaranteed to enter shutdown.

Driver Output Protection

Two mechanisms prevent excessive output current and power dissipation caused by faults or by bus contention. The first, a foldback current limit on the output stage, provides immediate protection against short circuits over the whole common-mode voltage range (see *Typical Operating Characteristics*). The second, a thermal shutdown circuit, forces the driver outputs into a

high-impedance state if the die temperature exceeds $+140^\circ C$.

Propagation Delay

Many digital encoding schemes depend on the difference between the driver and receiver propagation delay times. Typical propagation delays are shown in the *Typical Operating Characteristics*. The difference in receiver delay times, $t_{PLH} - t_{PHL}$, is a maximum of 2ns. The driver skew time $t_{PLH} - t_{PHL}$ is also a maximum of 2ns.

Typical Applications

The MAX3460-MAX3464 transceivers are designed for bidirectional data communications on multipoint bus transmission lines. Figures 13 and 14 show typical network applications circuits. To minimize reflections, the line should be terminated at both ends in its characteristic impedance, and stub lengths off the main line should be kept as short as possible.

Profibus Termination

The MAX3460-MAX3464 are designed for driving Profibus termination networks. With a worst-case loading of two termination networks with 220Ω termination impedance and 390Ω pullups and pulldowns, the drivers can drive $V_{A-B} > 2.1V$ output.

Chip Information

TRANSISTOR COUNT: 610

PROCESS: BiCMOS

Ordering Information (continued)

| PART | TEMP RANGE | PIN-PACKAGE |
|------------|--------------------------------|----------------|
| MAX3461CSD | $0^\circ C$ to $+70^\circ C$ | 14 SO |
| MAX3461CPD | $0^\circ C$ to $+70^\circ C$ | 14 Plastic DIP |
| MAX3461ESD | $-40^\circ C$ to $+85^\circ C$ | 14 SO |
| MAX3461EPD | $-40^\circ C$ to $+85^\circ C$ | 14 Plastic DIP |
| MAX3462CSA | $0^\circ C$ to $+70^\circ C$ | 8 SO |
| MAX3462CPA | $0^\circ C$ to $+70^\circ C$ | 8 Plastic DIP |
| MAX3462ESA | $-40^\circ C$ to $+85^\circ C$ | 8 SO |
| MAX3462EPA | $-40^\circ C$ to $+85^\circ C$ | 8 Plastic DIP |
| MAX3463CSA | $0^\circ C$ to $+70^\circ C$ | 8 SO |
| MAX3463CPA | $0^\circ C$ to $+70^\circ C$ | 8 Plastic DIP |
| MAX3463ESA | $-40^\circ C$ to $+85^\circ C$ | 8 SO |
| MAX3463EPA | $-40^\circ C$ to $+85^\circ C$ | 8 Plastic DIP |
| MAX3464CSA | $0^\circ C$ to $+70^\circ C$ | 8 SO |
| MAX3464CPA | $0^\circ C$ to $+70^\circ C$ | 8 Plastic DIP |
| MAX3464ESA | $-40^\circ C$ to $+85^\circ C$ | 8 SO |
| MAX3464EPA | $-40^\circ C$ to $+85^\circ C$ | 8 Plastic DIP |

+5V, Fail-Safe, 20Mbps, Profibus RS-485/ RS-422 Transceivers

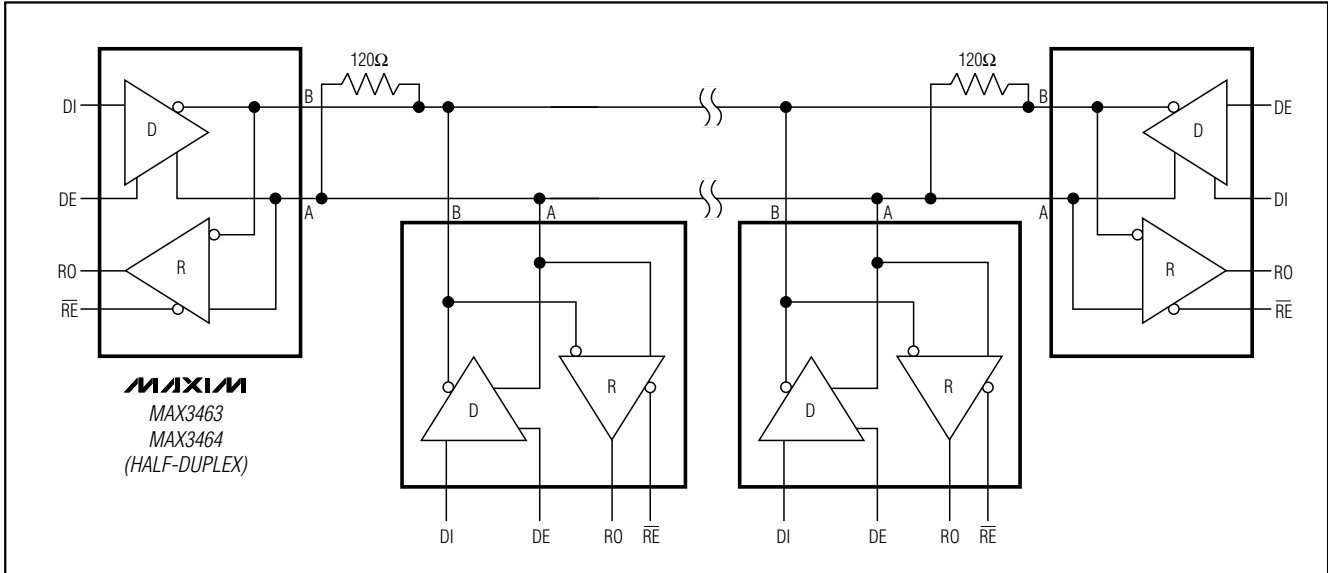


Figure 13. Typical Half-Duplex RS-485 Network

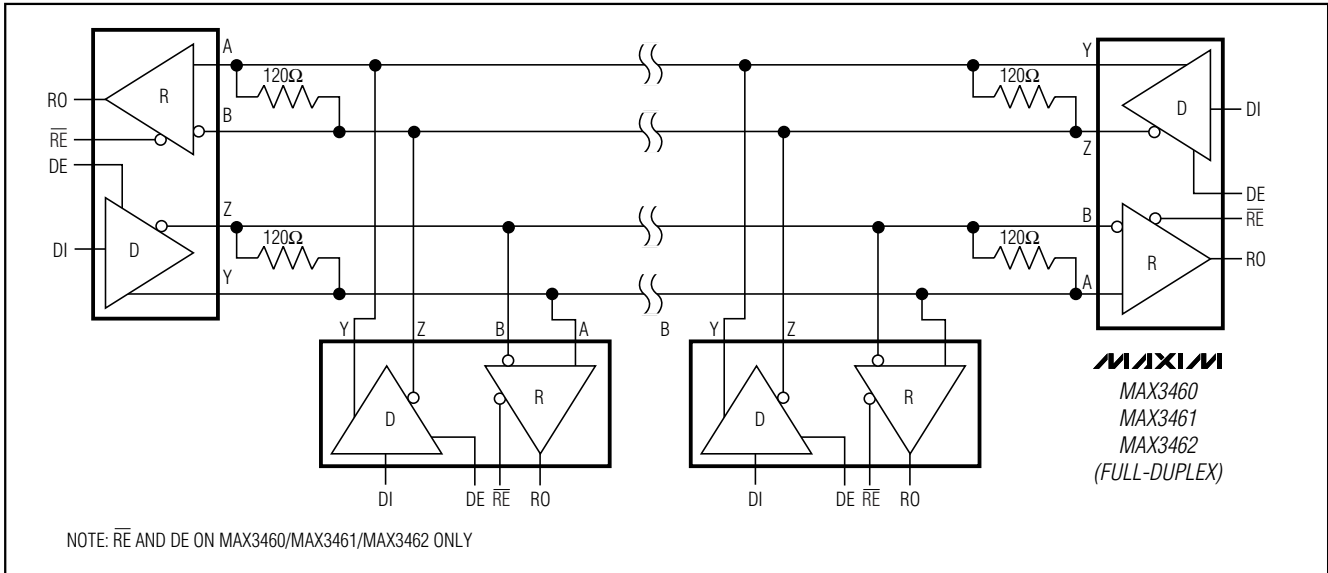


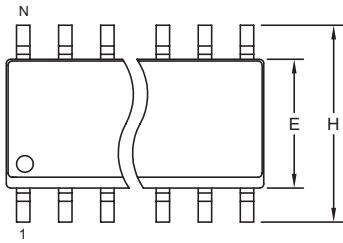
Figure 14. Typical Full-Duplex RS-485 Network

+5V, Fail-Safe, 20Mbps, Profibus RS-485/ RS-422 Transceivers

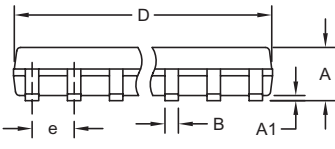
Package Information

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to www.maxim-ic.com/packages.)

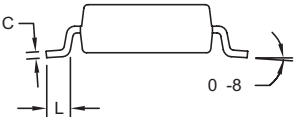
MAX3460-MAX3464



TOP VIEW



FRONT VIEW



SIDE VIEW


NOTES:

1. D&E DO NOT INCLUDE MOLD FLASH.
2. MOLD FLASH OR PROTRUSIONS NOT TO EXCEED 0.15mm (.006").
3. LEADS TO BE COPLANAR WITHIN 0.10mm (.004").
4. CONTROLLING DIMENSION: MILLIMETERS.
5. MEETS JEDEC MS012.
6. N = NUMBER OF PINS.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.053 | 0.069 | 1.35 | 1.75 |
| A1 | 0.004 | 0.010 | 0.10 | 0.25 |
| B | 0.014 | 0.019 | 0.35 | 0.49 |
| C | 0.007 | 0.010 | 0.19 | 0.25 |
| e | 0.050 BSC | | 1.27 BSC | |
| E | 0.150 | 0.157 | 3.80 | 4.00 |
| H | 0.228 | 0.244 | 5.80 | 6.20 |
| L | 0.016 | 0.050 | 0.40 | 1.27 |

VARIATIONS:

| DIM | INCHES | | MILLIMETERS | | N | MS012 |
|-----|--------|-------|-------------|-------|----|-------|
| | MIN | MAX | MIN | MAX | | |
| D | 0.189 | 0.197 | 4.80 | 5.00 | 8 | AA |
| D | 0.337 | 0.344 | 8.55 | 8.75 | 14 | AB |
| D | 0.386 | 0.394 | 9.80 | 10.00 | 16 | AC |



PROPRIETARY INFORMATION

TITLE:
PACKAGE OUTLINE, .150" SOIC

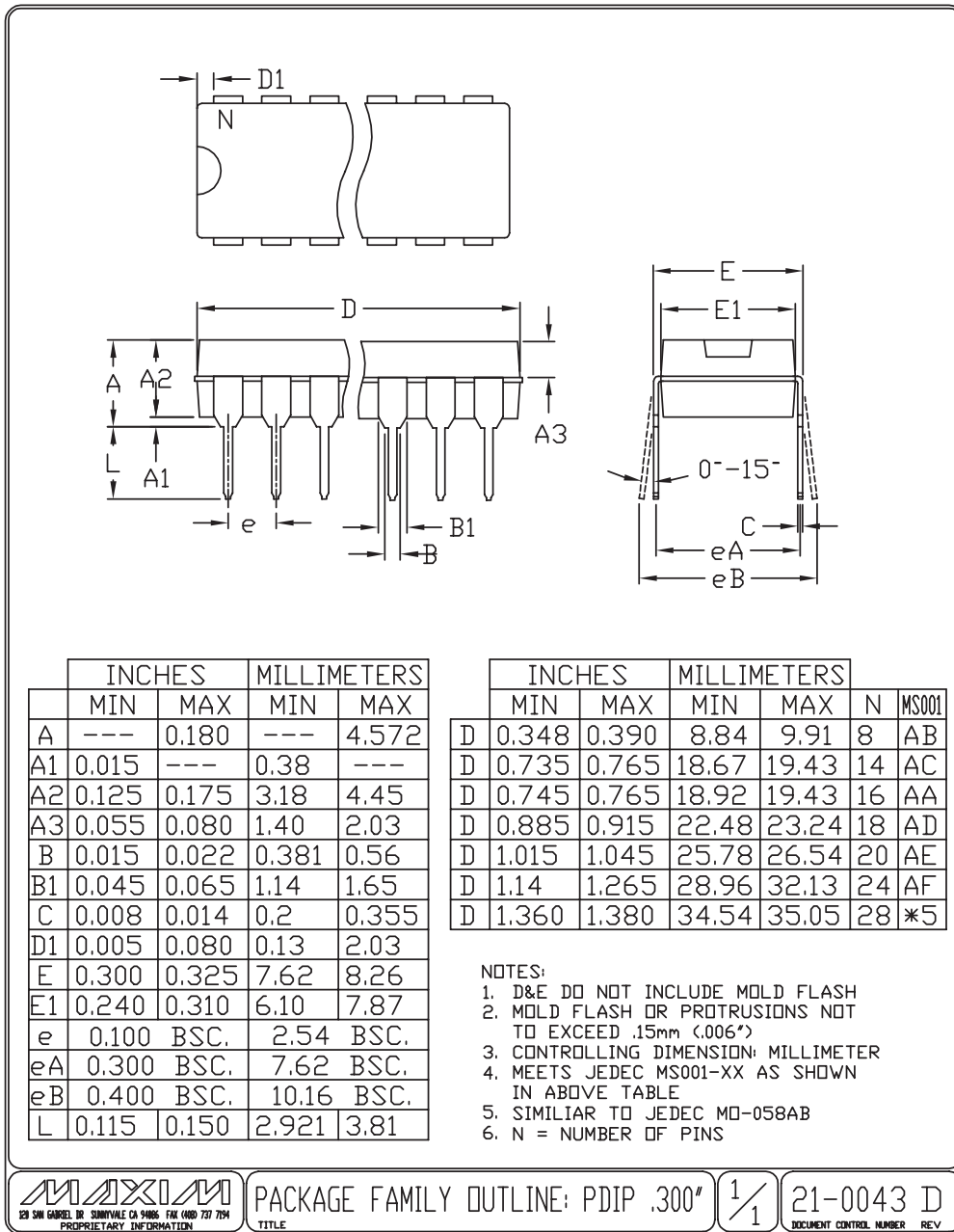
| | | | |
|----------|---------------------------------|-----------|-----|
| APPROVAL | DOCUMENT CONTROL NO. 21-0041 | REV. B | 1/1 |
|----------|---------------------------------|-----------|-----|

SOICN LEPS

+5V, Fail-Safe, 20Mbps, Profibus RS-485/ RS-422 Transceivers

Package Information (continued)

(The package drawing(s) in this data sheet may not reflect the most current specifications. For the latest package outline information, go to www.maxim-ic.com/packages.)



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