



# ZT3070E, ZT3071E, ZT3072E, ZT3073E, ZT3074E, ZT3075E, ZT3076E, ZT3077E, ZT3078E

## Low Power 3V 250kbps/500kbps/16Mbps RS485 Transceivers



### Features

- Meets or exceeds the requirements of ANSI Standard TIA/EIA-485-A and ISO 8482:1987(E) specifications for  $V_{CC}$  at  $+3.3V \pm 10\%$
- Low quiescent current – 0.5mA typ., 1.5mA max.
- Low shutdown current (where applicable) - 0.05 $\mu$ A typical, 10 $\mu$ A max.
- Guaranteed standard data rate 250kbps, 500kbps, or 16Mbps
- True Fail-Safe (Open and Short) Receiver
- -7V to +12V common-mode input voltage range
- Half-Duplex or Full-Duplex configuration
- Allows up to 1/8 unit load (256 devices) on the same common bus
- Controlled driver output slew rate and receiver input filtering
- Active-high driver enable and active-low receiver enable
- ESD Protection on bus terminals  $\pm 15kV$  Human Body Model (HBM)
- Drop-in Replacements for MAX3070E, MAX3071E, MAX3072E, MAX3073E, MAX3074E, MAX3075E, MAX3076E, MAX3077E, MAX3078E

### General Description

The ZT3070E series devices are 3V differential data line transceivers for RS485/RS422 communication that consist of one driver and one receiver with high level of ESD protection. They are designed for balanced transmission lines interface that meet ANSI standard TIA/EIA-485-A and ISO 8482:1987(E) specifications.

The ZT3070E series devices span out with half or full duplex, data rate guaranteed at 250kbps, 500kbps or 16Mbps, and allow 1/8 unit load that fan out 256 devices sharing a common bus. The I/Os are enhanced-electrostatic discharge (ESD) protected, exceeding  $\pm 15kV$  Human Body Model (HBM).

### Applications

- RS-422/RS-485 communications
- Utility meters
- Industrial process control
- Building automation
- Level translators
- Transceivers for EMI-sensitive applications
- Routers and HUBs
- Industrial-controlled Local Area Networks
- Industrial PCs, embedded PCs and peripherals
- Industrial, security CATV and camera applications

### Product Selection Guide And Cross Reference

| Part Number | Duplex | Data Rate (Mbps) | # of Tx/Rx on Bus | Slew Rate Limit | Low-Power Shutdown | Tx/ Rx Enable | Package Types                 | Pin-to-Pin Cross Reference |
|-------------|--------|------------------|-------------------|-----------------|--------------------|---------------|-------------------------------|----------------------------|
| ZT3070E     | Full   | 0.250            | 256               | Yes             | Yes                | Yes           | 14-PDIP,<br>14-nSOIC          | MAX3070E                   |
| ZT3071E     | Full   | 0.250            | 256               | Yes             | No                 | No            | 8-PDIP, 8-nSOIC, 8-MSOP       | MAX3071E                   |
| ZT3072E     | Half   | 0.250            | 256               | Yes             | Yes                | Yes           | 8-nSOIC,<br>8-MSOP            | MAX3072E                   |
| ZT3073E     | Full   | 0.5              | 256               | Yes             | Yes                | Yes           | 14-PDIP,<br>14-nSOIC          | MAX3073E                   |
| ZT3074E     | Full   | 0.5              | 256               | Yes             | No                 | No            | 8-PDIP,<br>8-nSOIC,<br>8-MSOP | MAX3074E                   |
| ZT3075E     | Half   | 0.5              | 256               | Yes             | Yes                | Yes           | 8-PDIP,<br>8-nSOIC,<br>8-MSOP | MAX3075E                   |
| ZT3076E     | Full   | 16               | 256               | No              | Yes                | Yes           | 14-PDIP,<br>14-nSOIC          | MAX3076E                   |
| ZT3077E     | Full   | 16               | 256               | No              | No                 | No            | 8-PDIP,<br>8-nSOIC,<br>8-MSOP | MAX3077E                   |
| ZT3078E     | Half   | 16               | 256               | No              | Yes                | Yes           | 8-PDIP,<br>8-nSOIC,<br>8-MSOP | MAX3078E                   |



## Absolute Maximum Ratings

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

Power Supply, ( $V_{CC}$ ).....-0.3V to +7.0V

### Input Voltages

DI, DE,  $\overline{RE}$  ..... -0.3V to ( $V_{CC} + 0.3V$ )

Differential Input Voltage, ( $V_{ID}$ ) ..... -12V to +12V

A, B ( $V_I$ ) ..... -9V to +13V

### Output Voltages

RO ..... -0.3V to +6.0V

Y, Z (A & B on Half Duplex) ..... -9V to +13.0V

Operating Temperature.....-40°C to +85°C

Storage Temperature.....-65°C to +150°C

### Power Dissipation Per Package

8-pin PDIP (derate 9.09mW/°C above +70°C) ..... 722mW

8-pin nSOIC (derate 6.14mW/°C above +70°C) ..... 500mW

8-pin MSOP (derate 4.85mW/°C above +70°C).....400mW

14-pin PDIP (derate 10.00mW/°C above +70°C) ..... 800mW

14-pin nSOIC (derate 8.33mW/°C above +70°C) .... 667mW

## Storage Considerations

Storage in a low humidity environment is preferred. Large high density plastic packages are moisture sensitive and should be stored in Dry Vapor Barrier Bags. Prior to usage, the parts should remain bagged and stored below 40°C and 60%RH. If the parts are removed from the bag, they should be used within 168 hours or stored in an environment at or below 20%RH. If the above conditions cannot be followed, the parts should be baked for 12 hours at 125°C in order to remove moisture prior to soldering. Zywyn ships product in Dry Vapor Barrier Bags with a humidity indicator card and desiccant pack. The humidity indicator should be below 30%RH. The MSL of this product is 3.

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## DC Electrical Characteristics

Unless otherwise stated,  $V_{CC} = +3.3V$ ,  $T_A = T_{min}$  to  $T_{max}$ , typical values apply at  $V_{CC} = +3.3V$  and  $T_A = 25^\circ C$ .

| Parameter  | Condition  | Min          | Typ   | Max      | Units |
|--|--|--------------|-------|----------|-------|
| <b>Operating Voltage &amp; Temperature</b>                           |  |              |       |          |       |
| Temperature  | Industrial Grade   | -40          | 25    | 85       | °C    |
| $V_{CC}$ Voltage Range   |  | 3.0          | 3.3   | 3.6      | V     |
| <b>Supply Current</b>  |  |              |       |          |       |
| $I_{CC}$ , Tx and Rx active  | DI= $V_{CC}$ /GND, DE= $V_{CC}$ , $\overline{RE}$ =GND, RS485 I/O=Open               |              | 0.5   | 1.5      | mA    |
| $I_{CC}$ , Tx active   | DI= $V_{CC}$ /GND, DE= $V_{CC}$ , $\overline{RE}$ = $V_{CC}$ , RS485 I/O=Open        |              | 0.5   | 1.5      | mA    |
| $I_{CC}$ , Rx active   | DI= $V_{CC}$ /GND, DE=GND, $\overline{RE}$ =GND, RS485 I/O=Open                      |              | 0.5   | 1.5      | mA    |
| $I_{SD}$ , Shutdown Current  | DI= $V_{CC}$ /GND, DE = GND, $\overline{RE} = V_{CC}$ , RS485 I/O=Open               |              | 0.05  | 10       | µA    |
| <b>TTL LOGIC Input, Driver</b>                                       |  |              |       |          |       |
| Input Threshold Low, $V_{IL}$  | $V_{CC} = +5.0V$ , DE, DI, and $\overline{RE}$                                       |              | 1.4   | 0.8      | V     |
| Input Threshold High, $V_{IH}$                                       | $V_{CC} = +5.0V$ , DE, DI, and $\overline{RE}$                                       | 2            | 1.4   |          | V     |
| <b>TTL LOGIC Output, Receiver</b>                                    |  |              |       |          |       |
| Output Voltage Low, $V_{OL}$   | $I_{OUT} = +4mA$ , Input Differential Voltage = 200mV                                |              |       | 0.4      | V     |
| Output Voltage High, $V_{OH}$  | $I_{OUT} = -4mA$ , Input Differential Voltage = 200mV                                | $V_{CC}-0.3$ |       |          | V     |
| Output Leakage Current   | Receiver Outputs Disabled, $V_{OUT} = 0.4V$ to $2.4V$                                |              | ±0.05 | ±1       | µA    |
| Short Circuit Current  | $V_{OUT} = 0V$ to $V_{CC}$   |              |       | ±95      | mA    |
| <b>Receiver Input</b>  |  |              |       |          |       |
| Input Current  | DE = 0V, $V_{CC} = 0V$ to $3.6V$ , $V_{IN} = +12V$                                   |              |       | 125      | µA    |
|  | DE = 0V, $V_{CC} = 0V$ to $3.6V$ , $V_{IN} = -7V$                                    |              |       | -75      | µA    |
| Differential Threshold Voltage, $V_{TH}$                             | $V_{CM} = 0V$ , $V_{CC}=+5.0V$ , $T_A=25^\circ C$                                    | -0.2         |       | 0.2      | V     |
| Input Hysteresis   | $V_{CM} = 0V$  |              | 20    |          | mV    |
| Input Resistance, $R_{IN}$   | $V_{CM} = -7V$ to $+12V$   | 96           |       |          | kΩ    |
| <b>Transmitter Output</b>  |  |              |       |          |       |
| Differential Output Voltage, $V_{OD1}$                               | No Load  |              |       | $V_{CC}$ | V     |
| Differential Output Voltage, $V_{OD2}$                               | With $R_L = 50\Omega$ , Refer to Figure 1. (RS422)                                   | 2            |       | $V_{CC}$ | V     |
|  | With $R_L = 27\Omega$ , Refer to Figure 1. (RS485)                                   | 1.5          |       | $V_{CC}$ | V     |
| Driver Common Mode Output, $V_{OC}$                                  | With $R_L = 27\Omega$ or $50\Omega$ . $C_L = 50pF$ . Refer to Figure 3.              |              |       | 3        | V     |
| Change in Voltage Magnitude for Differential States, $\Delta V_{OD}$ | Differential Output Voltage, with $R_L = 27\Omega$ or $50\Omega$ , Refer to Figure 1 |              |       | 0.2      | V     |
| Change in Voltage Magnitude for Common Mode States, $\Delta V_{OC}$  | Common-Mode Output Voltage, with $R_L = 27\Omega$ or $50\Omega$ . Refer to Figure 2. |              |       | 0.2      | V     |
| Transmitter Short-Circuit Current                                    | $V_{OUT} = -7V$ to $+12V$ . Refer to Figure 7.                                       | -250         |       | 250      | mA    |
| Output Leakage Current, Full Duplex                                  | $V_{IN} = +12V$ , DE=GND, $V_{CC}=0V$ or $3.6V$                                      |              |       | 125      | µA    |
|  | $V_{IN} = -7V$ , DE=GND, $V_{CC}=0V$ or $3.6V$                                       | -100         |       |          | µA    |

**AC Electrical Characteristics (ZT3076E, ZT3077E, ZT3078E)**

Unless otherwise stated,  $V_{CC} = +3.3V$ ,  $T_A = T_{min}$  to  $T_{max}$ , typical values apply at  $V_{CC} = +3.3V$  and  $T_A = 25^\circ C$ .

| Parameter  | Condition   | Min | Typ      | Max | Units |
|--|---|-----|----------|-----|-------|
| <b>Transmitter Timing</b>                        |   |     |          |     |       |
| Transmitter Propagation $t_{PLH}$                | $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ . Refer to Figure 4.                 |     | 35       | 75  | ns    |
| Transmitter Propagation $t_{PHL}$                | $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ . Refer to Figure 4.                 |     | 35       | 75  | ns    |
| Transmitter Output Skew $t_{SK}$                 | $ t_{PLH} - t_{PHL} $   |     | 3        | 15  | ns    |
| Transmitter Rise/Fall Time                       | $t_r$ , $t_f$ , $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ , Refer to Figure 4. |     | 15       | 25  | ns    |
| Transmitter Output Enable                        | To Output HIGH, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.     |     | 200      |     | ns    |
|  | To Output LOW, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.      |     | 200      |     | ns    |
| Transmitter Output Disable                       | From Output HIGH, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.   |     | 200      |     | ns    |
|  | From Output LOW, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.    |     | 200      |     | ns    |
| <b>Receiver Timing</b>                           |   |     |          |     |       |
| Receiver Propagation $t_{PLH}$                   | $C_L = 15pF$ , Refer to Figure 9.   |     | 50       | 100 | ns    |
| Receiver Propagation $t_{PHL}$                   | $C_L = 15pF$ , Refer to Figure 9.   |     | 50       | 100 | ns    |
| Differential Receiver Skew $t_{SK}$              | $ t_{PLH} - t_{PHL} $   |     | 30       |     | ns    |
| Receiver Output Enable                           | To Output HIGH, $C_L = 15pF$ . Refer to Figure 10.                        |     | 50       |     | ns    |
|  | To Output LOW, $C_L = 15pF$ . Refer to Figure 11.                         |     | 50       |     | ns    |
| Receiver Output Disable                          | From Output HIGH, $C_L = 15pF$ . Refer to Figure 10.                      |     | 50       |     | ns    |
|  | From Output LOW, $C_L = 15pF$ . Refer to Figure 11.                       |     | 50       |     | ns    |
| <b>Shutdown Timing (ZT3076E and ZT3078 ONLY)</b> |   |     |          |     |       |
| Time to Shutdown, $t_{SHDN}$                     |   |     | 50       | 600 | ns    |
| Transmitter Enable from SHUTDOWN to Output HIGH  | $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.                     |     | 200      |     | ns    |
| Transmitter Enable from SHUTDOWN to Output LOW   | $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.                     |     | 200      |     | ns    |
| Receiver Enable from SHUTDOWN to Output HIGH     | $C_L = 15pF$ , $R_L = 1k\Omega$ . Refer to Figure 11.                     |     | 200      |     | ns    |
| Receiver Enable from SHUTDOWN to Output LOW      | $C_L = 15pF$ , $R_L = 1k\Omega$ . Refer to Figure 11.                     |     | 200      |     | ns    |
| <b>Transceiver Throughput</b>                    |   |     |          |     |       |
| Maximum Data Rate                                | $R_L = 54\Omega$ , $C_L = 50pF$ , $T_A = 25^\circ C$ .                    | 16  |          |     | Mbps  |
| <b>ESD Tolerance</b>                             |   |     |          |     |       |
| ESD HBM  | RS485 Inputs and Outputs  |     | $\pm 15$ |     | kV    |
| ESD HBM <sup>(1)</sup>                           | All Pins  |     | $\pm 4$  |     | kV    |

(1) Tested in accordance with JEDEC Standard 22, Test Method A114-A and IEC 60749-26

**AC Electrical Characteristics (ZT3073E, ZT3074E, and ZT3075E)**

Unless otherwise stated,  $V_{CC} = +3.3V$ ,  $T_A = T_{min}$  to  $T_{max}$ , typical values apply at  $V_{CC} = +3.3V$  and  $T_A = 25^\circ C$ .

| Parameter  | Condition   | Min | Typ      | Max | Units |
|--|---|-----|----------|-----|-------|
| <b>Transmitter Timing</b>                        |   |     |          |     |       |
| Transmitter Propagation $t_{PLH}$                | $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ . Refer to Figure 4.                 | 180 |          | 800 | ns    |
| Transmitter Propagation $t_{PHL}$                | $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ . Refer to Figure 4.                 | 180 |          | 800 | ns    |
| Transmitter Output Skew $t_{SK}$                 | $ t_{PLH} - t_{PHL} $   |     |          | 100 | ns    |
| Transmitter Rise/Fall Time                       | $t_r$ , $t_f$ , $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ , Refer to Figure 4. | 200 |          | 800 | ns    |
| Transmitter Output Enable                        | To Output HIGH, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.     |     | 200      |     | ns    |
|  | To Output LOW, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.      |     | 200      |     | ns    |
| Transmitter Output Disable                       | From Output HIGH, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.   |     | 200      |     | ns    |
|  | From Output LOW, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.    |     | 200      |     | ns    |
| <b>Receiver Timing</b>                           |   |     |          |     |       |
| Receiver Propagation $t_{PLH}$                   | $C_L = 15pF$ , Refer to Figure 9.   |     |          | 200 | ns    |
| Receiver Propagation $t_{PHL}$                   | $C_L = 15pF$ , Refer to Figure 9.   |     |          | 200 | ns    |
| Differential Receiver Skew $t_{SK}$              | $ t_{PLH} - t_{PHL} $   |     | 30       |     | ns    |
| Receiver Output Enable                           | To Output HIGH, $C_L = 15pF$ . Refer to Figure 10.                        |     | 50       |     | ns    |
|  | To Output LOW, $C_L = 15pF$ . Refer to Figure 11.                         |     | 50       |     | ns    |
| Receiver Output Disable                          | From Output HIGH, $C_L = 15pF$ . Refer to Figure 10.                      |     | 50       |     | ns    |
|  | From Output LOW, $C_L = 15pF$ . Refer to Figure 11.                       |     | 50       |     | ns    |
| <b>Shutdown Timing (ZT3073E and ZT3075 ONLY)</b> |   |     |          |     |       |
| Time to Shutdown, $t_{SHDN}$                     |   |     | 50       | 600 | ns    |
| Transmitter Enable from SHUTDOWN to Output HIGH  | $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.                     |     | 200      |     | ns    |
| Transmitter Enable from SHUTDOWN to Output LOW   | $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.                     |     | 200      |     | ns    |
| Receiver Enable from SHUTDOWN to Output HIGH     | $C_L = 15pF$ , $R_L = 1k\Omega$ . Refer to Figure 11.                     |     | 200      |     | ns    |
| Receiver Enable from SHUTDOWN to Output LOW      | $C_L = 15pF$ , $R_L = 1k\Omega$ . Refer to Figure 11.                     |     | 200      |     | ns    |
| <b>Transceiver Throughput</b>                    |   |     |          |     |       |
| Maximum Data Rate                                | $R_L = 54\Omega$ , $C_L = 50pF$ , $T_A = 25^\circ C$ .                    | 0.5 |          |     | Mbps  |
| <b>ESD Tolerance</b>                             |   |     |          |     |       |
| ESD HBM  | RS485 Inputs and Outputs  |     | $\pm 15$ |     | kV    |
| ESD HBM <sup>(1)</sup>                           | All Pins  |     | $\pm 4$  |     | kV    |

(1) Tested in accordance with JEDEC Standard 22, Test Method A114-A and IEC 60749-26

## AC Electrical Characteristics (ZT3070E, ZT3071E and ZT3072E)

Unless otherwise stated,  $V_{CC} = +3.3V$ ,  $T_A = T_{min}$  to  $T_{max}$ , typical values apply at  $V_{CC} = +3.3V$  and  $T_A = 25^\circ C$ .

| Parameter   | Condition   | Min  | Typ      | Max  | Units |
|---|---|------|----------|------|-------|
| <b>Transmitter Timing</b>                         |   |      |          |      |       |
| Transmitter Propagation $t_{PLH}$                 | $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ . Refer to Figure 4.                 | 250  | 800      | 1500 | ns    |
| Transmitter Propagation $t_{PHL}$                 | $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ . Refer to Figure 4.                 | 250  | 800      | 1500 | ns    |
| Transmitter Output Skew $t_{SK}$                  | $ t_{PLH} - t_{PHL} $   |      |          | 200  | ns    |
| Transmitter Rise/Fall Time                        | $t_r$ , $t_f$ , $R_{DIFF} = 54\Omega$ , $C_L = 50pF$ , Refer to Figure 4. | 350  |          | 1600 | ns    |
| Transmitter Output Enable                         | To Output HIGH, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.     |      | 200      |      | ns    |
|   | To Output LOW, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.      |      | 200      |      | ns    |
| Transmitter Output Disable                        | From Output HIGH, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.   |      | 200      |      | ns    |
|   | From Output LOW, $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.    |      | 200      |      | ns    |
| <b>Receiver Timing</b>                            |   |      |          |      |       |
| Receiver Propagation $t_{PLH}$                    | $C_L = 15pF$ , Refer to Figure 9.   |      |          | 200  | ns    |
| Receiver Propagation $t_{PHL}$                    | $C_L = 15pF$ , Refer to Figure 9.   |      |          | 200  | ns    |
| Differential Receiver Skew $t_{SK}$               | $ t_{PLH} - t_{PHL} $   |      | 30       |      | ns    |
| Receiver Output Enable                            | To Output HIGH, $C_L = 15pF$ . Refer to Figure 10.                        |      | 50       |      | ns    |
|   | To Output LOW, $C_L = 15pF$ . Refer to Figure 11.                         |      | 50       |      | ns    |
| Receiver Output Disable                           | From Output HIGH, $C_L = 15pF$ . Refer to Figure 10.                      |      | 50       |      | ns    |
|   | From Output LOW, $C_L = 15pF$ . Refer to Figure 11.                       |      | 50       |      | ns    |
| <b>Shutdown Timing (ZT3070E and ZT3072E ONLY)</b> |   |      |          |      |       |
| Time to Shutdown, $t_{SHDN}$                      |   |      | 50       | 600  | ns    |
| Transmitter Enable from SHUTDOWN to Output HIGH   | $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 5.                     |      | 200      |      | ns    |
| Transmitter Enable from SHUTDOWN to Output LOW    | $C_L = 50pF$ , $R_L = 110\Omega$ . Refer to Figure 6.                     |      | 200      |      | ns    |
| Receiver Enable from SHUTDOWN to Output HIGH      | $C_L = 15pF$ , $R_L = 1k\Omega$ . Refer to Figure 11.                     |      | 200      |      | ns    |
| Receiver Enable from SHUTDOWN to Output LOW       | $C_L = 15pF$ , $R_L = 1k\Omega$ . Refer to Figure 11.                     |      | 200      |      | ns    |
| <b>Transceiver Throughput</b>                     |   |      |          |      |       |
| Maximum Data Rate                                 | $R_L = 54\Omega$ , $C_L = 50pF$ , $T_A = 25^\circ C$ .                    | 0.25 |          |      | Mbps  |
| <b>ESD Tolerance</b>                              |   |      |          |      |       |
| ESD HBM   | RS485 Inputs and Outputs  |      | $\pm 15$ |      | kV    |
| ESD HBM <sup>(1)</sup>                            | All Pins  |      | $\pm 4$  |      | kV    |

(1) Tested in accordance with JEDEC Standard 22, Test Method A114-A and IEC 60749-26

## Pin Description

| Pin Numbers |             |          | Name            | Description  |
|-------------|-------------|----------|-----------------|--|
| Half Duplex | Full Duplex |          |                 |  |
| ZT3072E     | ZT3071E     | ZT3070E  |                 |  |
| ZT3075E     | ZT3074E     | ZT3073E  |                 |  |
| ZT3078E     | ZT3077E     | ZT3076E  |                 |  |
| 1           | 2           | 2        | RO              | Receiver Output. If A>B by 200mV, then RO = HIGH; If A<B by 200mV, then RO = LOW   |
| 2           | n/a         | 3        | $\overline{RE}$ | Receiver Output Enable Low active input RO is high-Z when $\overline{RE}$ = HIGH   |
| 3           | n/a         | 4        | DE              | Driver Output Enable. The transmitter outputs, Y and Z, are enabled when DE = HIGH. The outputs are high-Z when DE = LOW |
| 4           | 3           | 5        | DI              | Driver Input. A low on DI forces output Y low and output Z high. A high on DI will bring output Y high and output Z low  |
| 5           | 4           | 6, 7     | GND             | Analog Ground  |
| n/a         | 5           | 9        | Y               | Non-inverting transmitter output   |
| n/a         | 6           | 10       | Z               | Inverting transmitter output   |
| 6           | n/a         | n/a      | A               | Non-inverting transmitter output and non-inverting receiver input.   |
| n/a         | 8           | 12       | A               | Non-inverting receiver input.  |
| 7           | n/a         | n/a      | B               | Inverting transmitter output and inverting receiver input.   |
| n/a         | 7           | 11       | B               | Inverting receiver input   |
| 8           | 1           | 14       | VCC             | Power Supply Input, 5V $\pm$ 10%   |
| n/a         | n/a         | 1, 8, 13 | NC              | No Connect, Not internally connected.  |

## Circuit Description

The ZT307xE family are low-power transceivers for RS-485 and RS-422 communications. The RS-485 standard is ideal for multi-drop applications and for long-distance interfaces. The TIA/EIA-485 specification allows up to 256 drivers and 256 receivers to be connected to a data bus, making it an ideal choice for multi-drop applications. RS-485 transceivers are equipped with a wide (-7V to +12V) common mode range to accommodate ground potential differences since the cabling can be as long as 4,000 feet. As RS-485 is a differential interface, data is virtually immune to noise in the transmission line.

The ZT3070E, ZT3071E, ZT3072E, ZT3073E, ZT3074E, and ZT3075E are slew-rate limited, minimizing EMI and reducing reflections caused by improperly terminated cables.

### RS-485 Transmitters

Each device in the ZT307xE family contains a differential output line transmitter that can drive voltage into multiple loads on a terminated two-wire pair, and a receiver that accepts a differential voltage down to 200mV. The transmitter's differential output can comply with RS-485 and also RS-422 standards. The typical voltage output swing with no load is 0V to  $V_{CC}$ . With worst case loading of 54 ohms across the differential outputs, the drivers can maintain greater than 1.5V voltage levels, which is more than adequate for a differential receiver to acknowledge a logic state. The 54 ohms is the equivalent of two 120 ohm termination resistors placed on each side of the transmission line and the input impedance of 256 receivers on the line.

The ZT3072E, ZT3075E, and ZT3078E transmitter have an enable control line which is active HIGH. A logic HIGH on DE (pin 3) will enable the differential outputs. A logic LOW on DE (pin 3) will disable the transmitter outputs. While disabled, the transmitter outputs are in high impedance.

### RS-485 Receivers

Each transceiver contains one differential receiver that has an input sensitivity of 200mV. The input impedance of the receivers is typically 96 kohms. A wide common mode range of -7V to +12V allows for large ground potential differences between systems.

The ZT3072E, ZT3075E, and ZT3078E receivers have an enable control input. A logic LOW on  $\overline{RE}$  will enable the receiver, a logic HIGH on  $\overline{RE}$  will disable the receiver. The receivers are equipped with the fail-safe feature, which guarantees that the receiver output will be in a HIGH state when the input is left unconnected. This applies for both cases where the receiver inputs are either shorted or open.

The ZT3076E, ZT3077E, and ZT3078E can transmit and receive at data rates up to 16Mbps. The ZT3070E, ZT3071E, and ZT3072E are specified for data rates up to 250kbps and the ZT3073E, ZT3074E, and ZT3075E are specified for data rates up to 500kbps.

## Bus Configuration

The ZT3070E, ZT3071E, ZT3073, ZT3074E, ZT3076E, and ZT3077E are full-duplex transceivers, while the ZT3072E, ZT3075E, and ZT3078E are half-duplex.

For full duplex, the devices are used as a four-wire bus transceiver with a configuration that the transmitters and receivers are moving data independent of each other. Transmit can occur on a dedicated two-wire pair and receive can occur on an adjacent two-wire pair, with each pair transferring data at up to 16Mbps.

Half duplex is a configuration where the transmitter outputs are connected to its receiver inputs. This application is common for two-wire interfaces where either the transmitter is active or the receiver is active. It is common to connect the enable inputs for the transmitter and receiver together so that a logic HIGH will enable the transmitter and disable the receiver. Conversely, a logic LOW will disable the transmitter and enable the receiver. Half-duplex configurations and these devices are designed for bidirectional data transmission on multipoint twisted-pair cables for applications, such as digital motor controllers, remote sensors and terminals, industrial process control, security stations and environmental control systems.

### ESD Immunity

Electro-Static Discharge (ESD) is an important factor when implementing a serial port into a system, especially in harsh environmental conditions. These industrial strength devices provide extra protection against ESD and are intended for harsh environments where high-speed data communication is important.

All of the ZT307xE family of transceivers incorporate internal protection structures on all pins to protect against ESD charges encountered during handling and assembly. The driver outputs and receiver inputs have extra protection against static electricity as they are directly interfacing to the outside environment. As such, these pins against ESD of  $\pm 15kV$  without damage in all states of the transceiver's operation from normal to powered down. After multiple ESD events, Zywyn's ZT307xE family of transceivers keep working without latchup. These devices eliminate the need for external transient suppressor diodes and the associated high capacitance loading, allowing reliable high-speed data communications.

The Human Body Model has been the generally accepted ESD testing method for semiconductors. This test is intended to simulate the human body's potential to store electrostatic energy and discharge it to an integrated circuit upon close proximity or contact. This method will test the IC's capability to withstand an ESD transient during normal handling such as in manufacturing areas where the ICs tend to be handled frequently.

## Function Table

## ZT3072E/ZT3075E/ZT3078E

| DRIVER      |              |         |   | RECEIVER                                    |                           |              |
|-------------|--------------|---------|---|---|---------------------------|--------------|
| Input<br>DI | Enable<br>DE | Outputs |   | Differential Inputs<br>$V_{ID} = V_A - V_B$ | Enable<br>$\overline{RE}$ | Output<br>RO |
|             |              | A       | B |   |                           |              |
| H           | H            | H       | L | $V_{ID} \leq -0.2V$                         | L                         | L            |
| L           | H            | L       | H | $-0.2V < V_{ID} < +0.2V$                    | L                         | U            |
| X           | L            | Z       | Z | $+0.2V \leq V_{ID}$                         | L                         | H            |
| Open        | H            | H       | L | X   | H                         | Z            |
| X           | Open         | Z       | Z | X   | Open                      | Z            |

## ZT3071E/ZT3074E/ZT3077E

| DRIVER      |         |   | RECEIVER                                    |              |
|-------------|---------|---|---|--------------|
| Input<br>DI | Outputs |   | Differential Inputs<br>$V_{ID} = V_A - V_B$ | Output<br>RO |
|             | Y       | Z |   |              |
| H           | H       | L | $V_{ID} \leq -0.2V$                         | L            |
| L           | L       | H | $-0.2V < V_{ID} < +0.2V$                    | U            |
| X           | Z       | Z | $+0.2V \leq V_{ID}$                         | H            |
| Open        | H       | L | X   | Z            |
| X           | Z       | Z | X   | Z            |

## ZT3070E/ZT3073/ZT3076E

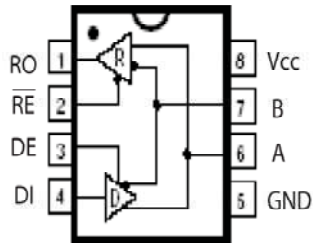
| DRIVER      |              |         |   | RECEIVER                                    |                           |              |
|-------------|--------------|---------|---|---|---------------------------|--------------|
| Input<br>DI | Enable<br>DE | Outputs |   | Differential Inputs<br>$V_{ID} = V_A - V_B$ | Enable<br>$\overline{RE}$ | Output<br>RO |
|             |              | Y       | Z |   |                           |              |
| H           | H            | H       | L | $V_{ID} \leq -0.2V$                         | L                         | L            |
| L           | H            | L       | H | $-0.2V < V_{ID} < +0.2V$                    | L                         | U            |
| X           | L            | Z       | Z | $+0.2V \leq V_{ID}$                         | L                         | H            |
| Open        | H            | H       | L | X   | H                         | Z            |
| X           | Open         | Z       | Z | X   | Open                      | Z            |

Note:

H = High Level; L = Low Level; Z = High Impedance; X = Irrelevant; U = Undetermined State.

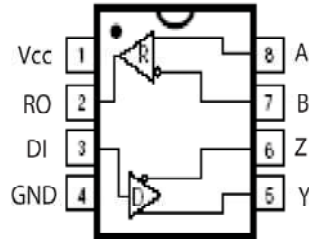
## Pin Configuration

ZT3072E/ZT3075E/ZT3078E



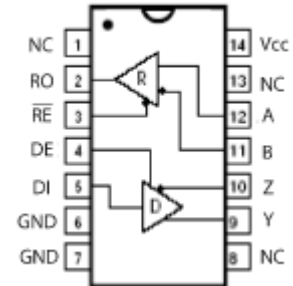
8-Pin PDIP/nSOIC/  
MSOP

ZT3071E/ZT3074E/ZT3077E



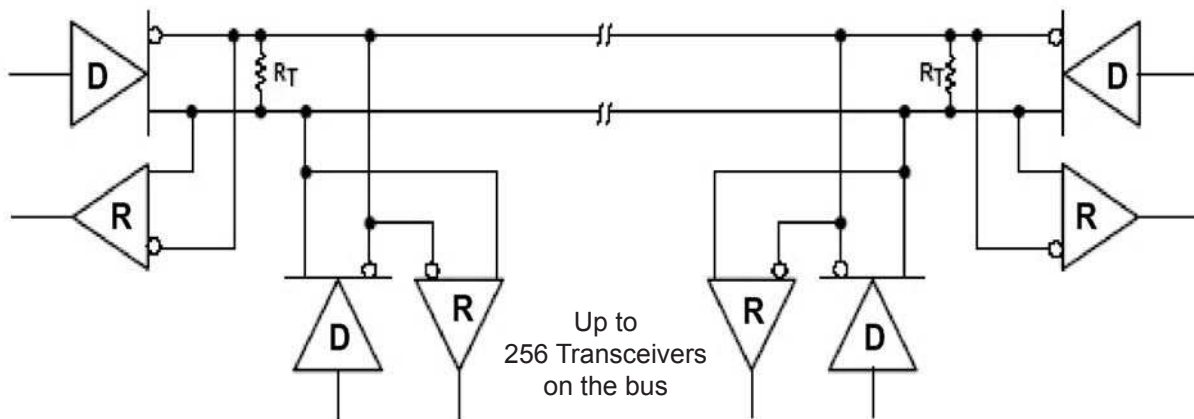
8-Pin PDIP/nSOIC/  
MSOP

ZT3070E/ZT3073E/ZT3076E



14-Pin PDIP/nSOIC

## Typical Application Circuits



### Notes:

- A. The bus should be terminated at both ends in its characteristic impedance of  $R_T = Z_O$ .
- B. Stub lengths off the main bus should be kept as short as possible.
- C. Can connect up to 256 devices on the same common bus

## Typical Test Circuits

Notes:

- A. The test load capacitance includes probe and test jig capacitance, unless otherwise specified.
- B. The signal generator had the following characteristics:  
Pulse rate = Data rate at 50% duty cycle,  $Z_0 = 50\Omega$ ,  $t_r$  &  $t_f < 6\text{ns}$ , unless otherwise specified.

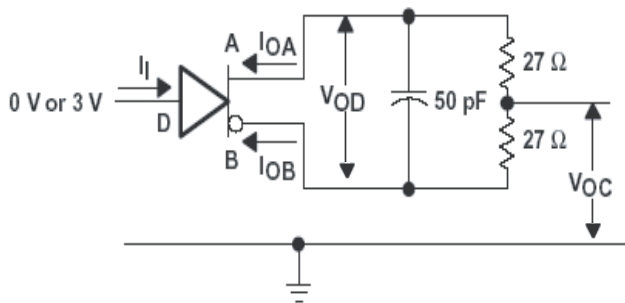


Figure 1. Driver Test Circuit,  $V_{OD}$  and  $V_{OC}$  Without Common-Mode Loading

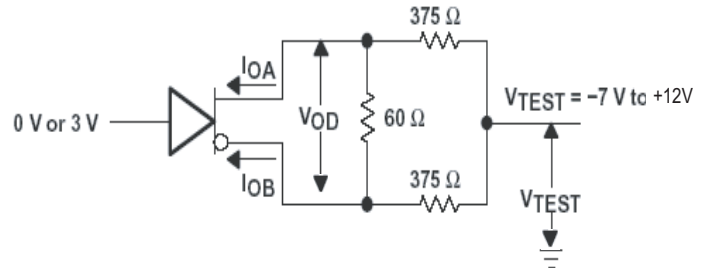


Figure 2. Driver Test Circuit,  $V_{OD}$  With Common-Mode Loading

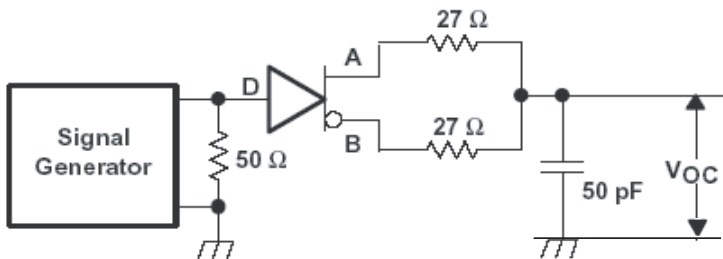


Figure 3. Driver Common-Mode Output Voltage ( $V_{OC}$ ) Test Circuit and Waveforms

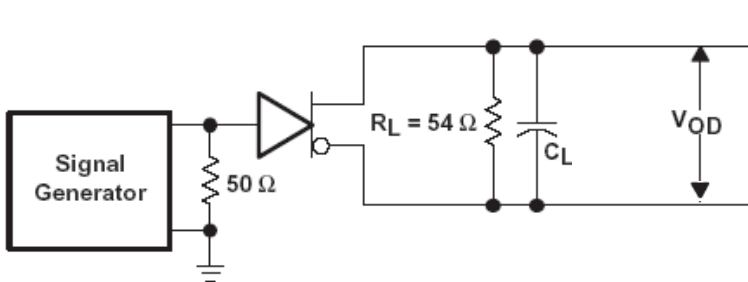
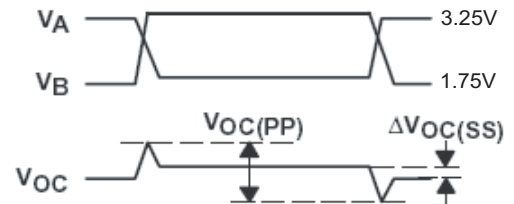


Figure 4. Driver Differential Output Voltage ( $V_{OD}$ ) Switching Test Circuit and Waveforms

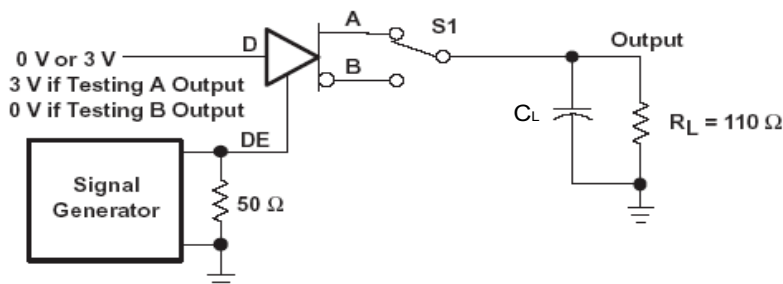
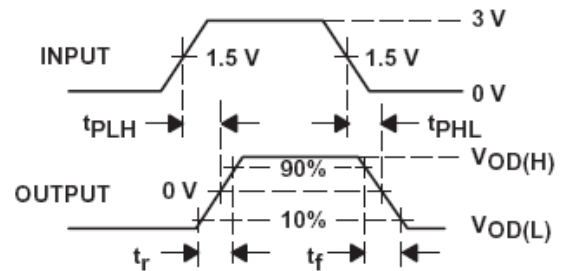
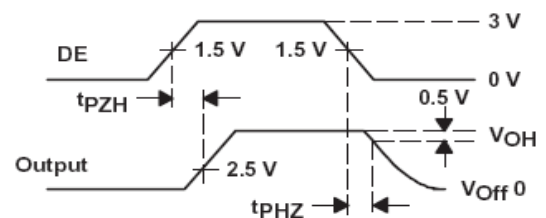


Figure 5. Driver Enable/Disable Test Circuit and Waveforms, High Output



Typical Test Circuits

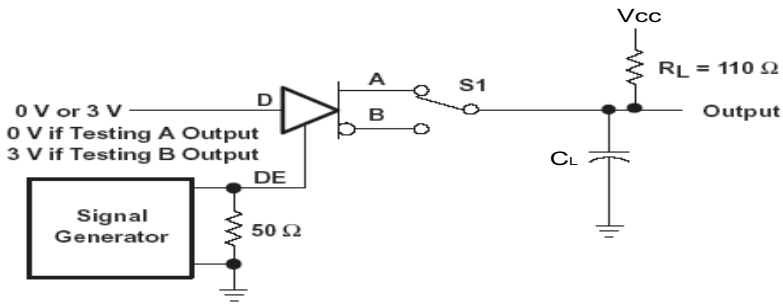


Figure 6. Driver Enable/Disable Test Circuit and Waveforms, Low Output

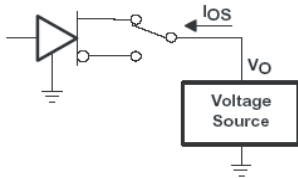


Figure 7. Driver Short-Circuit Test Configuration

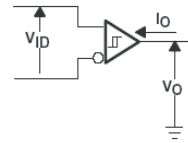


Figure 8. Receiver Parameter Definitions

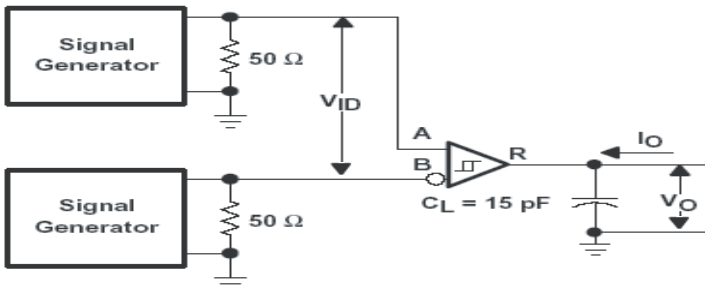


Figure 9. Receiver Propagation ( $t_{PLH}$  and  $t_{PHL}$ ) Test Circuit and Waveforms

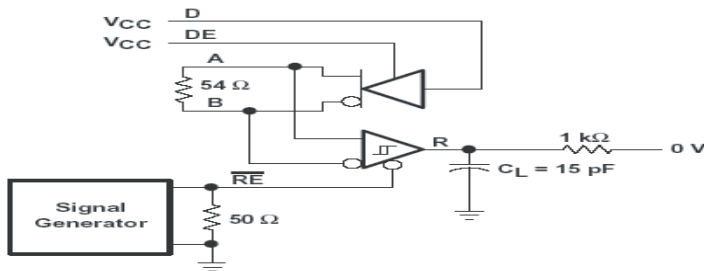
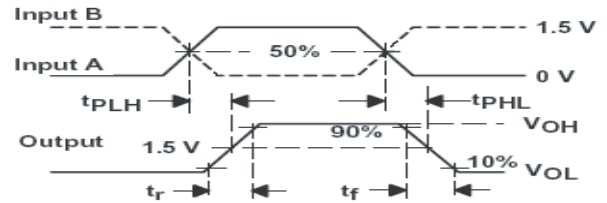


Figure 10. Receiver Output Enable/Disable Test Circuit and Waveforms, Data Output High

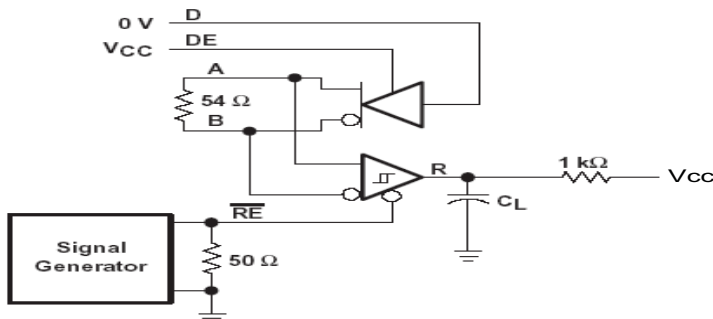
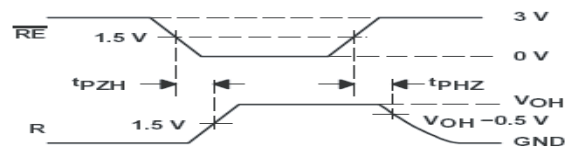
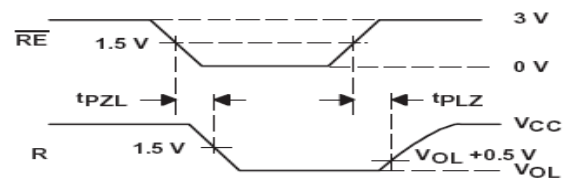
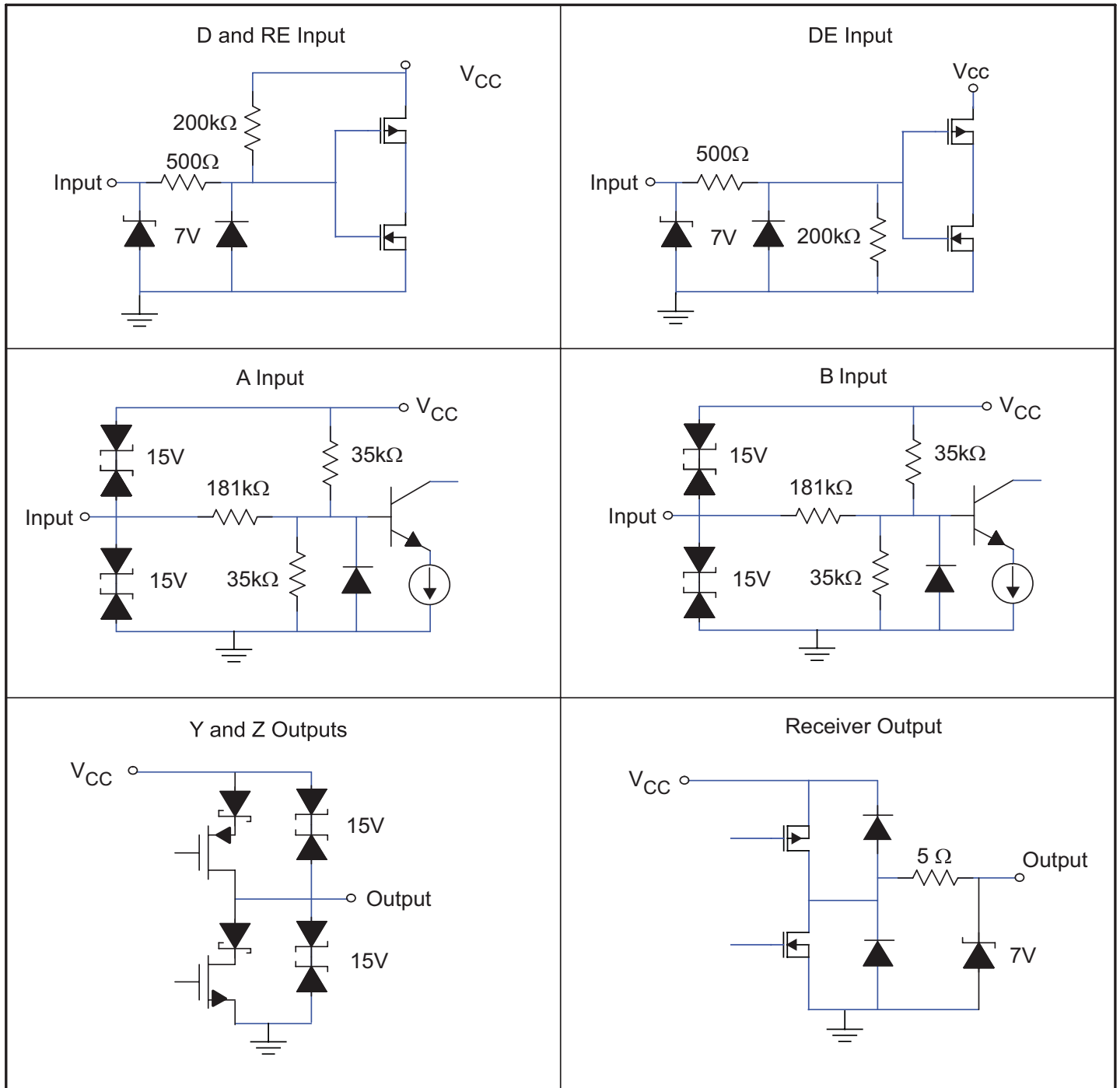


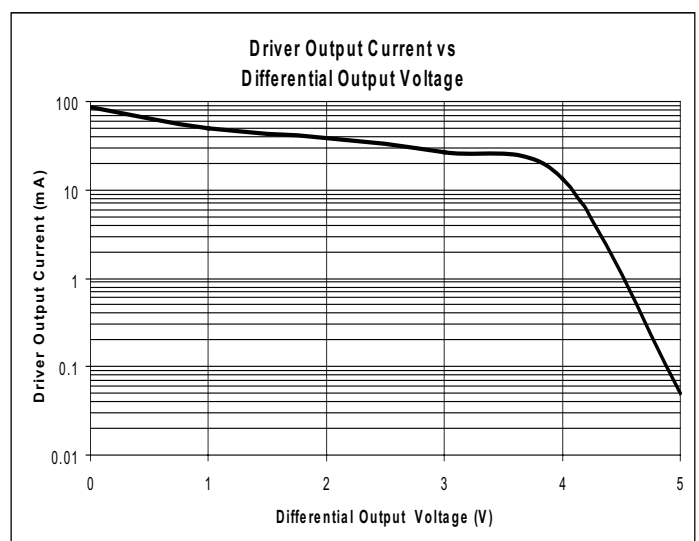
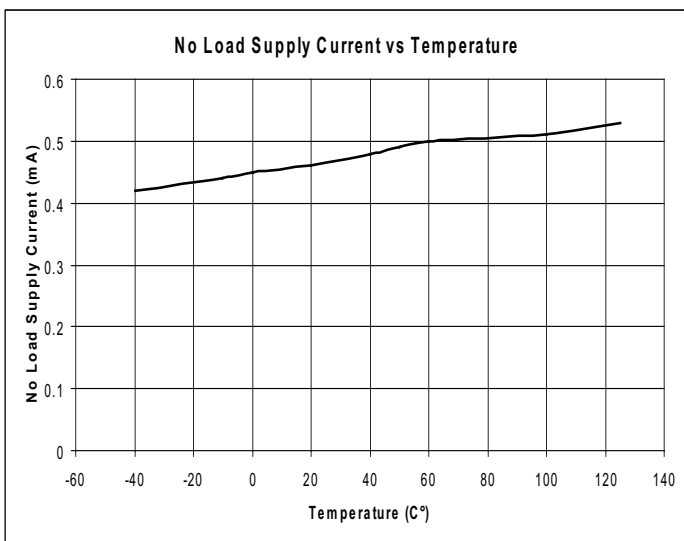
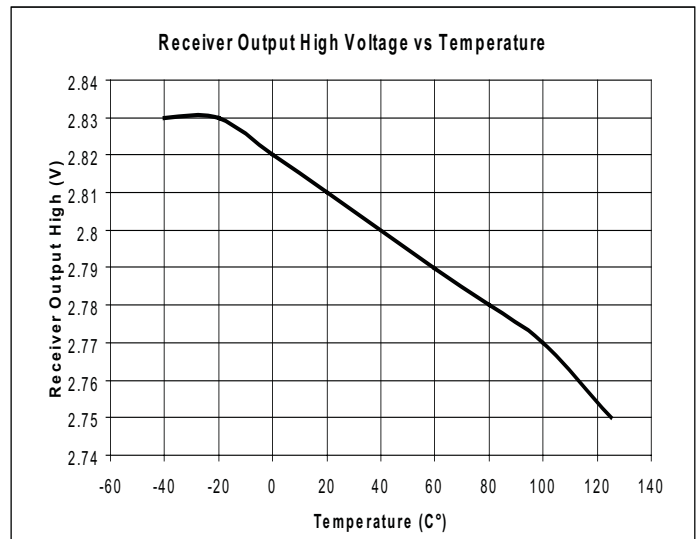
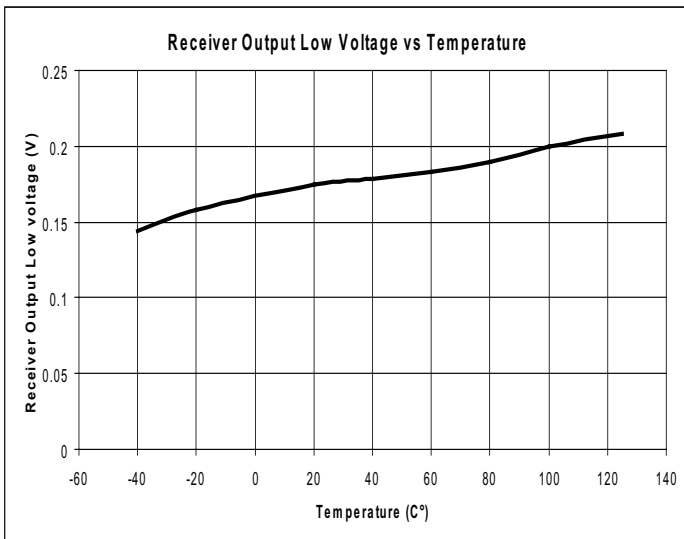
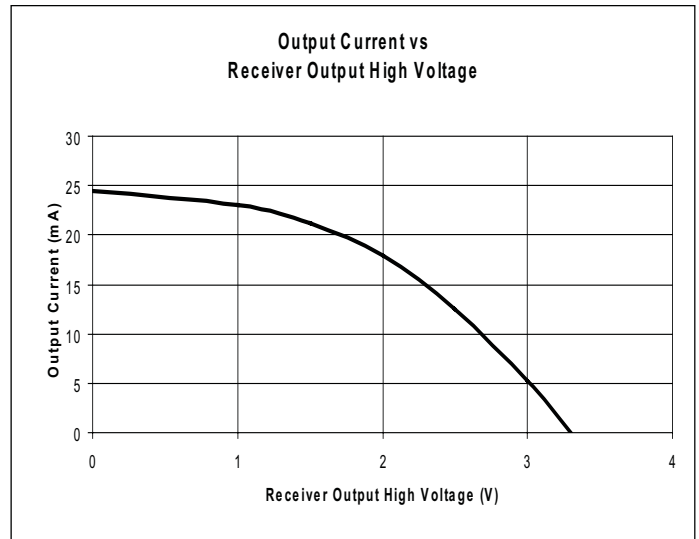
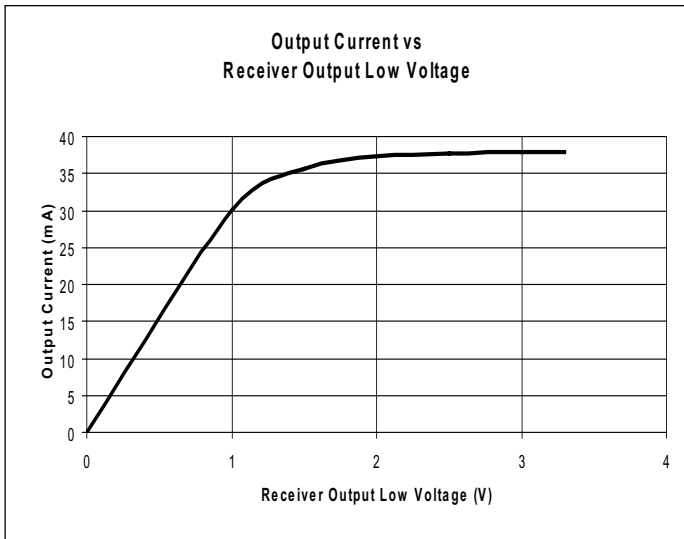
Figure 11. Receiver Output Enable/Disable Test Circuit and Waveforms, Data Output Low



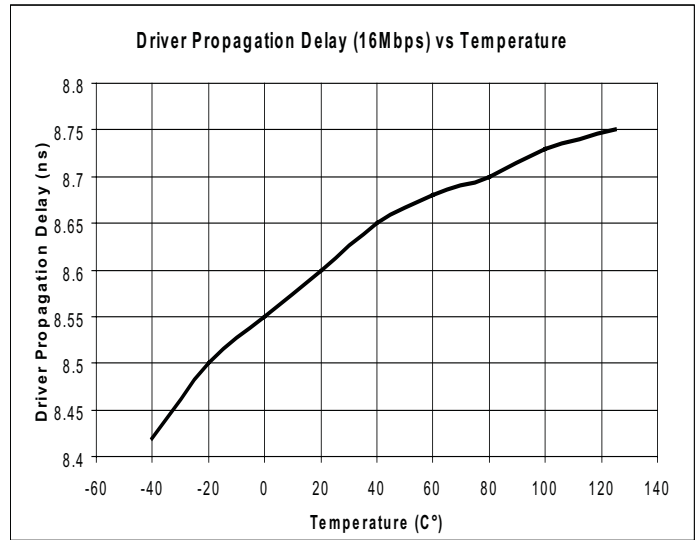
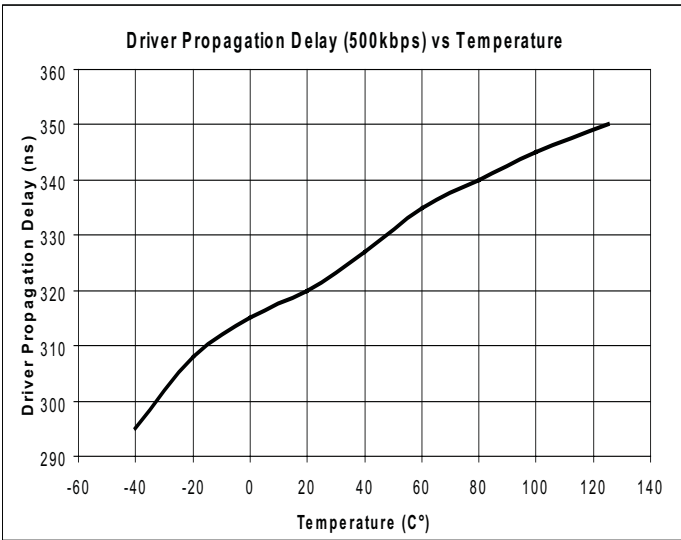
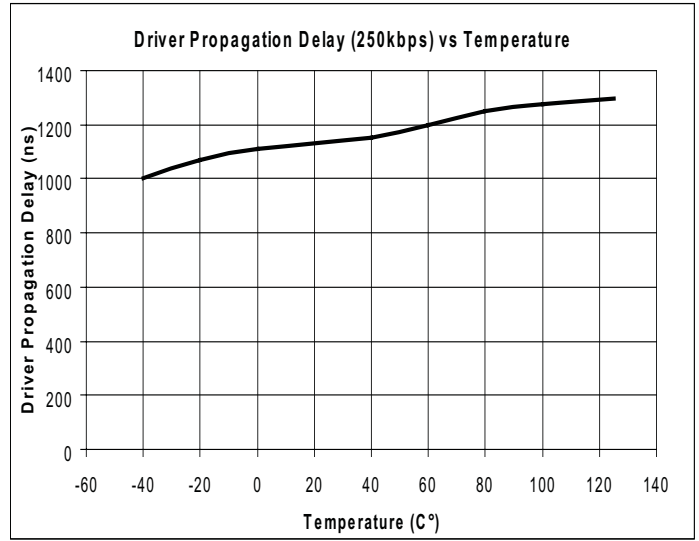
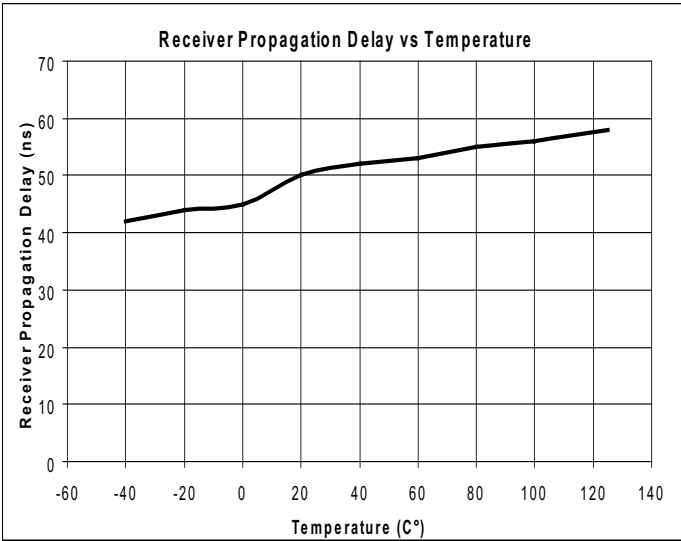
Equivalent Input and Output Schematic Diagrams



Typical Performance Characteristics



Typical Performance Characteristics



Package Information

**NOTE :**

- CONTROLLING DIMENSION : INCH
- LEAD FRAME MATERIAL : C194
- DIMENSION D AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.010" [0.25mm]
- DIMENSION "b1" DO NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSIONS SHALL NOT EXCEED 0.010" [0.25mm]. DISTANCE BETWEEN LEADS INCLUDING DAMBAR PROTRUSIONS TO BE 0.006" [0.13mm] MINIMUM.
- TOLERANCE : ±0.010" [0.25mm] UNLESS OTHERWISE SPECIFIED.
- OTHERWISE DIMENSION FOLLOW ACCEPTABLE SPEC.
- REFERENCE DOCUMENT : JEDEC SPEC MS-001-BA
- BOTTOM E-PIN INDENT ARE MARKED AS BELOW:

| SYMBOLS | DIMENSIONS IN MILLIMETERS |      |      | DIMENSIONS IN INCHES |       |       |
|---------|---------------------------|------|------|----------------------|-------|-------|
|         | MIN                       | NOM  | MAX  | MIN                  | NOM   | MAX   |
| A       | 3.6                       | 3.9  | 4.2  | 0.142                | 0.154 | 0.165 |
| A1      | 0.38                      | —    | —    | 0.015                | —     | —     |
| A2      | 3.25                      | 3.30 | 3.45 | 0.128                | 0.130 | 0.136 |
| b       | 0.38                      | 0.48 | 0.56 | 0.015                | 0.019 | 0.022 |
| b1      | 1.48                      | 1.58 | 1.88 | 0.058                | 0.062 | 0.074 |
| b2      | 0.813                     | 0.99 | 1.14 | 0.032                | 0.039 | 0.045 |
| C       | 0.20                      | 0.25 | 0.30 | 0.008                | 0.010 | 0.012 |
| D       | 9.12                      | 9.30 | 9.53 | 0.359                | 0.366 | 0.375 |
| E       | 7.62                      | 7.87 | 8.26 | 0.300                | 0.310 | 0.325 |
| E1      | 6.20                      | 6.35 | 6.60 | 0.244                | 0.250 | 0.260 |
| e       | —                         | 2.54 | —    | —                    | 0.100 | —     |
| eB      | 8.38                      | —    | 9.40 | 0.330                | —     | 0.370 |
| L       | 3.18                      | —    | —    | 0.125                | —     | —     |
| S       | 0.71                      | 0.84 | 0.97 | 0.028                | 0.033 | 0.038 |

**8-pin PDIP**

|             |          |  |             |
|-------------|----------|--|-------------|
| CUSTOMER :  |          | ZYWYN CORPORATION                            |             |
| APPROVED BY | DATE     | TITLE :                                      |             |
| DRAW BY:    | 01/24/00 | 8L P-DIP PACKAGE OUTLINE DRAWING FOR MITSUMI |             |
| CHECK BY:   | 01/28/00 | DWG. NO. PO-DIP-019                          |             |
| APPROVAL:   | 01/27/00 | REV. 0                                       |             |
| APPROVAL:   | 1/27/00  | UNIT :                                       | SCALE : 6/1 |
|             |          | SHEET 1 OF 1                                 |             |

**TOP E-PIN INDENT #0.079**  
**BOTTOM E-PIN INDENT #0.118 NOTE 9**

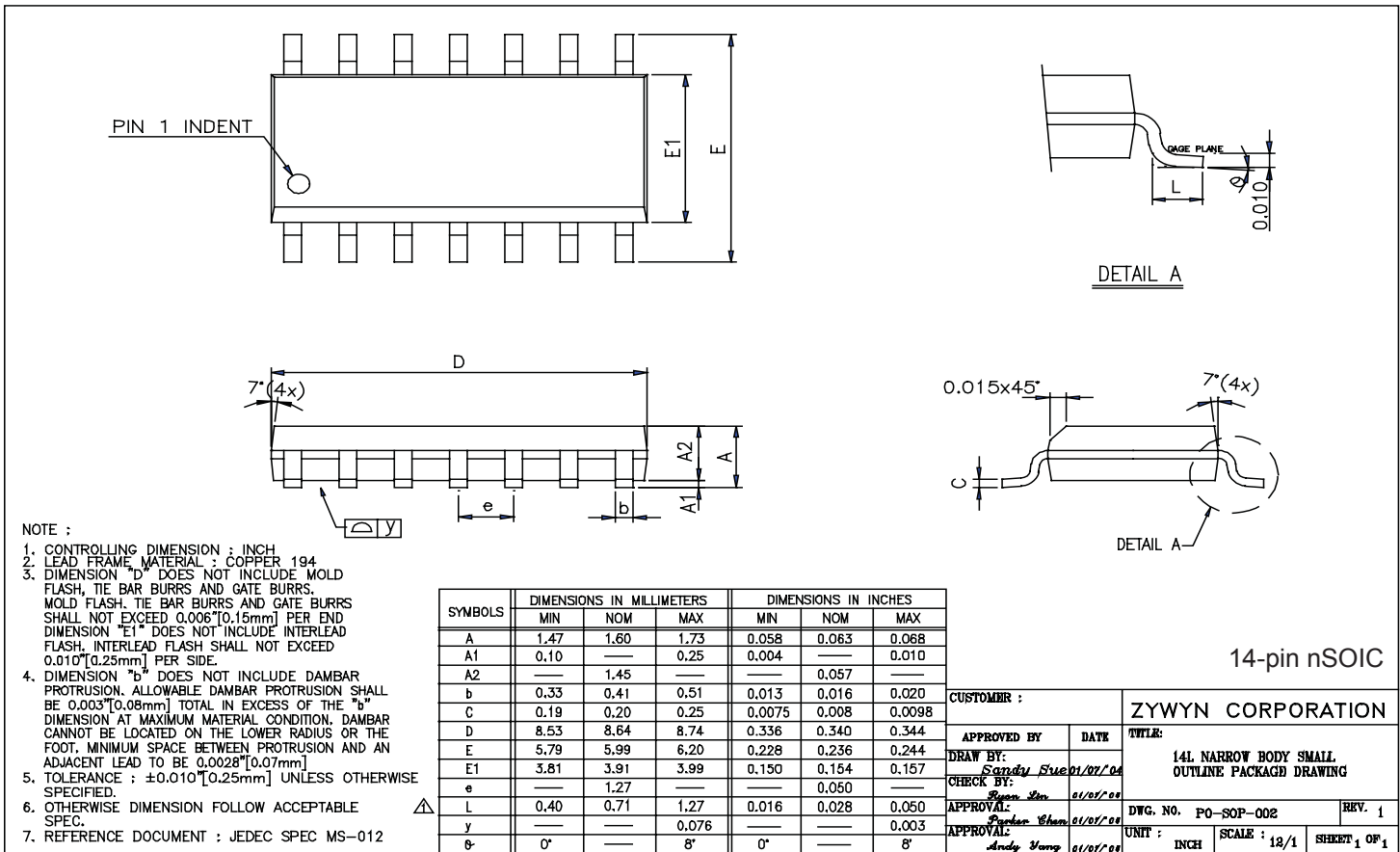
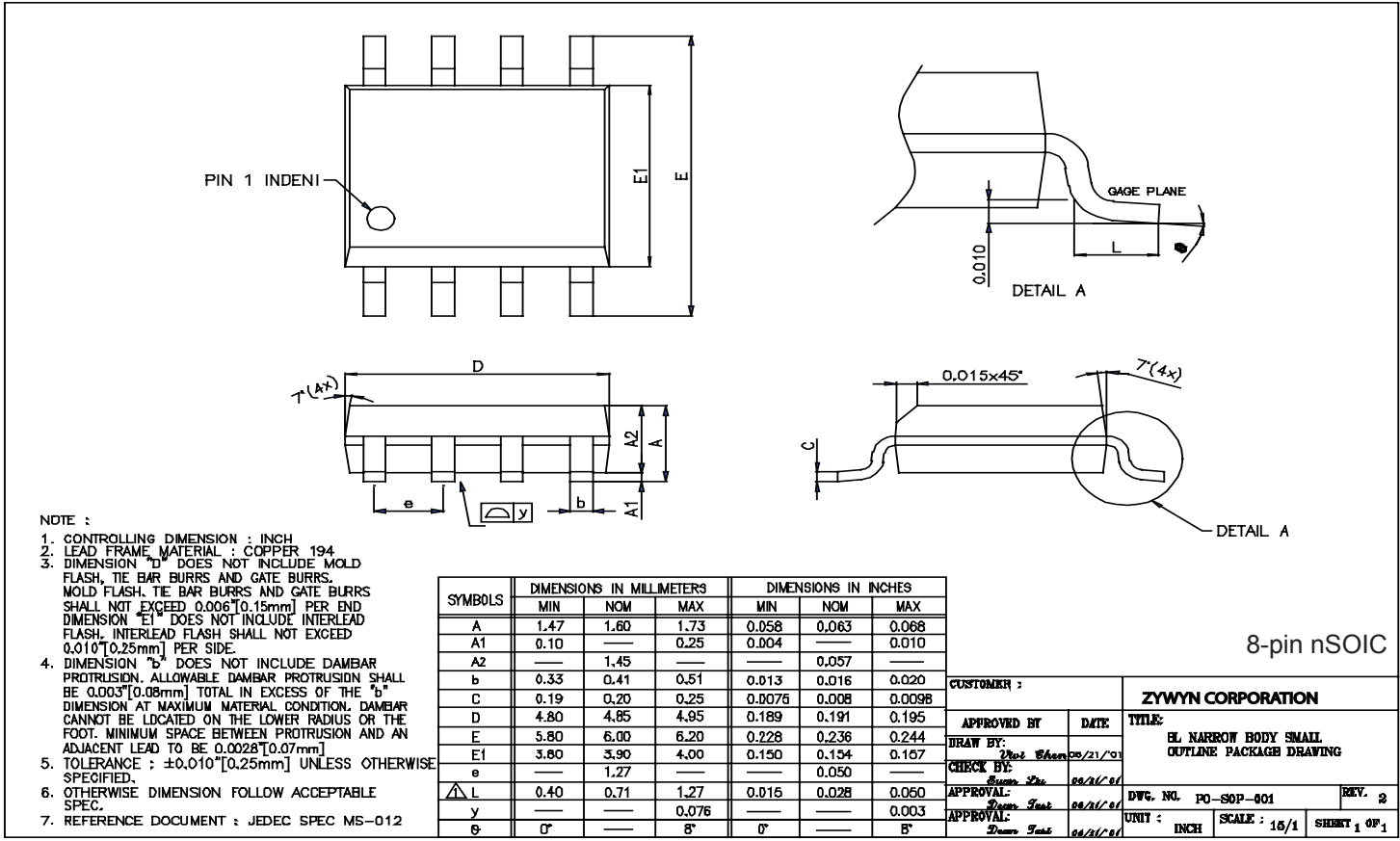
**NOTE :**

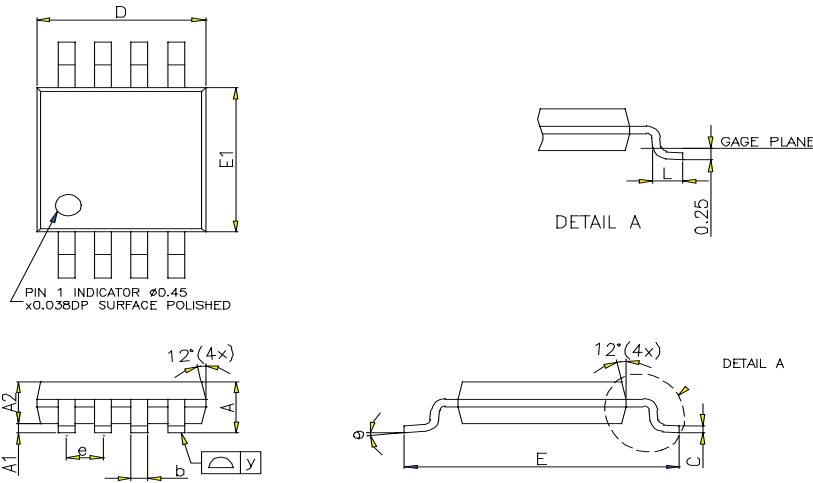
- CONTROLLING DIMENSION : INCH
- LEAD FRAME MATERIAL : C194
- PACKAGE DIMENSION EXCLUDE MOLDING FLASH
- AFTER SOLDER PLATING LEAD THICKNESS WILL BE 0.013" MAX
- AFTER SOLDER DIPPING LEAD THICKNESS WILL BE 0.020" MAX
- THE MAX. ALLOWABLE MOLDING FLASH IS 0.010"
- TOLERANCE : 0.002" UNLESS OTHERWISE SPECIFIED
- OTHERWISE DIMENSION FOLLOW ACCEPTABLE SPEC
- THE BOTTOM E-PIN INDENT IS MARKED AS BELOW :

| SYMBOLS | DIMENSIONS IN MILLIMETERS |       |       | DIMENSIONS IN INCHES |       |       |
|---------|---------------------------|-------|-------|----------------------|-------|-------|
|         | MIN                       | NOM   | MAX   | MIN                  | NOM   | MAX   |
| A       | —                         | —     | 4.57  | —                    | —     | 0.180 |
| A1      | 0.38                      | —     | —     | 0.015                | —     | —     |
| A2      | 3.25                      | 3.30  | 3.45  | 0.128                | 0.130 | 0.136 |
| B       | 0.26                      | 0.46  | 0.56  | 0.014                | 0.018 | 0.022 |
| B1      | 1.14                      | 1.27  | 1.52  | 0.045                | 0.050 | 0.060 |
| C       | 0.20                      | 0.25  | 0.33  | 0.008                | 0.010 | 0.013 |
| D       | 18.19                     | 19.15 | 19.30 | 0.744                | 0.754 | 0.760 |
| D1      | 0.81                      | 1.19  | 1.47  | 0.032                | 0.047 | 0.058 |
| E       | 7.62                      | —     | 8.26  | 0.300                | —     | 0.325 |
| E1      | 6.35                      | 6.50  | 6.65  | 0.250                | 0.256 | 0.262 |
| e       | —                         | 2.54  | —     | —                    | 0.100 | —     |
| L       | 3.18                      | —     | —     | 0.125                | —     | —     |
| eB      | 8.63                      | —     | 9.65  | 0.340                | —     | 0.380 |

**14-pin PDIP**

|             |          |                                   |             |
|-------------|----------|-----------------------------------|-------------|
| CUSTOMER :  |          | ZYWYN CORPORATION                 |             |
| APPROVED BY | DATE     | TITLE :                           |             |
| DRAW BY:    | 05/12/00 | 14L P-DIP PACKAGE OUTLINE DRAWING |             |
| CHECK BY:   | 05/12/00 | DWG. NO. PO-DIP-002               |             |
| APPROVAL:   | 05/12/00 | REV. 0                            |             |
| APPROVAL:   | 05/12/00 | UNIT :                            | SCALE : 4/1 |
|             |          | SHEET 1 OF 1                      |             |





























- NOTE :
1. CONTROLLING DIMENSION : mm
  2. LEAD FRAME MATERIAL : OLIN C7025
  3. DIMENSION "b" DOES NOT INCLUDE MOLD FLASH, TIE BAR BURRS AND GATE BURRS. MOLD FLASH, TIE BAR BURRS AND GATE BURRS SHALL NOT EXCEED 0.006[0.15mm] PER END. DIMENSION "e1" DOES NOT INCLUDE INTERLEAD FLASH. INTERLEAD FLASH SHALL NOT EXCEED 0.010[0.25mm] PER SIDE.
  4. DIMENSION "b" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.003[0.08mm] TOTAL IN EXCEED OF THE "b" DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD TO BE 0.0028[0.07mm].
  5. TOLERANCE : ±0.010[0.25mm] UNLESS OTHERWISE SPECIFIED.
  6. OTHERWISE DIMENSION FOLLOW ACCEPTABLE SPEC.

| SYMBOLS | DIMENSIONS IN MILLIMETERS |      |       | DIMENSIONS IN INCHES |        |       |
|---------|---------------------------|------|-------|----------------------|--------|-------|
|         | MIN                       | NOM  | MAX   | MIN                  | NOM    | MAX   |
| A       | 0.81                      | 1.02 | 1.10  | 0.032                | 0.040  | 0.043 |
| A1      | 0.05                      | —    | 0.15  | 0.002                | —      | 0.006 |
| A2      | 0.76                      | 0.86 | 0.95  | 0.030                | 0.034  | 0.037 |
| b       | 0.28                      | 0.30 | 0.38  | 0.011                | 0.012  | 0.015 |
| c       | 0.13                      | 0.15 | 0.23  | 0.005                | 0.006  | 0.009 |
| D       | 2.90                      | 3.00 | 3.10  | 0.114                | 0.118  | 0.122 |
| E       | 4.80                      | 4.90 | 5.00  | 0.189                | 0.193  | 0.197 |
| E1      | 2.90                      | 3.00 | 3.10  | 0.114                | 0.118  | 0.122 |
| e       | —                         | 0.65 | —     | —                    | 0.0256 | —     |
| L       | 0.40                      | 0.53 | 0.66  | 0.016                | 0.021  | 0.026 |
| y       | —                         | —    | 0.076 | —                    | —      | 0.003 |
| Ø       | 0°                        | 3°   | 6°    | 0°                   | 3°     | 6°    |

|                       |            |                                 |             |
|-----------------------|------------|---------------------------------|-------------|
| CUSTOMER :            |            | ZYWYN CORPORATION               |             |
| APPROVED BY           | DATE       | TITLE :                         |             |
| DRAW BY: Sandy Sue    | 03/01/08   | 8L MSOP PACKAGE OUTLINE DRAWING |             |
| CHECK BY: Parker Chen | 03/02/08   | DWG. NO.                        | PO-MSOP-001 |
| APPROVAL: Andy Yang   | 03/04/08   | REV.                            | 2           |
| APPROVAL: CK Yeh      | 03-05-0006 | UNIT :                          | mm          |
|                       |            | SCALE :                         | 15/1        |
|                       |            | SHEET                           | 1 OF 1      |

## Ordering Information

| Part Number | Temperature Range | Package Type (Green)  | MOQ/Tube | MOQ/T&R |
|-------------|-------------------|---|----------|---------|
| ZT3070LEEN  | -40°C to +85°C    | 14-pin Nsoic   | 100      | 2500    |
| ZT3070LEEP  | -40°C to +85°C    | 14-pin PDIP    | 60       | N/A     |
| ZT3071LEEN  | -40°C to +85°C    | 8-pin Nsoic    | 100      | 2500    |
| ZT3071LEEP  | -40°C to +85°C    | 8-pin PDIP     | 60       | N/A     |
| ZT3071LEEU  | -40°C to +85°C    | 8-pin MSOP     | 50       | 2500    |
| ZT3072LEEN  | -40°C to +85°C    | 8-pin Nsoic    | 100      | 2500    |
| ZT3072LEEP  | -40°C to +85°C    | 8-pin PDIP     | 60       | N/A     |
| ZT3072LEEU  | -40°C to +85°C    | 8-pin MSOP     | 50       | 2500    |
| ZT3073LEEN  | -40°C to +85°C    | 14-pin Nsoic   | 100      | 2500    |
| ZT3073LEEP  | -40°C to +85°C    | 14-pin PDIP    | 60       | N/A     |
| ZT3074LEEN  | -40°C to +85°C    | 8-pin Nsoic    | 100      | 2500    |
| ZT3074LEEP  | -40°C to +85°C    | 8-pin PDIP     | 60       | N/A     |
| ZT3074LEEU  | -40°C to +85°C    | 8-pin MSOP     | 50       | 2500    |
| ZT3075LEEN  | -40°C to +85°C    | 8-pin Nsoic    | 100      | 2500    |
| ZT3075LEEP  | -40°C to +85°C    | 8-pin PDIP     | 60       | N/A     |
| ZT3075LEEU  | -40°C to +85°C    | 8-pin MSOP     | 50       | 2500    |
| ZT3076LEEN  | -40°C to +85°C    | 14-pin Nsoic   | 100      | 2500    |
| ZT3076LEEP  | -40°C to +85°C    | 14-pin PDIP   | 60       | N/A     |
| ZT3077LEEN  | -40°C to +85°C    | 8-pin Nsoic  | 100      | 2500    |
| ZT3077LEEP  | -40°C to +85°C    | 8-pin PDIP   | 60       | N/A     |
| ZT3077LEEU  | -40°C to +85°C    | 8-pin MSOP   | 50       | 2500    |
| ZT3078LEEN  | -40°C to +85°C    | 8-pin Nsoic  | 100      | 2500    |
| ZT3078LEEP  | -40°C to +85°C    | 8-pin PDIP   | 60       | N/A     |
| ZT3078LEEU  | -40°C to +85°C    | 8-pin MSOP   | 50       | 2500    |

Please contact the factory for pricing, availability on Tape-and-Reel and Die Sales options.

Part Marking Information

**TOPSIDE MARK INSTRUCTIONS:**

Line 1: Zywyn (logo)  
 Line 2: Zywyn Part Number "ZT3071LEEN"  
 Line 3: Date Code: (Last 2 digits of Prod. Year & Prod. Work Week)  
 Note: Pin # 1 "△" Indicator Required

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**BOTTOMSIDE MARK INSTRUCTIONS:**

Line 1: Country of Origin (optional if Country of Origin is in Ejector Pin)  
 Line 2: Lot Number

8/14-pin PDIP or 8/14-pin nSOIC

**TOPSIDE MARK INSTRUCTIONS:**

Line 1: Zywyn Part Name "ZT30"  
 Line 2: Zywyn Part Number "78LU"  
 Line 3: Date Code: (Last 2 digits of Prod. Year & Prod. Work Week)  
 Note: Pin # 1 "○" Indicator Required if no mold dimple

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**BOTTOMSIDE MARK INSTRUCTIONS:**

Line 1: Country of Origin (optional if Country of Origin is in Ejector Pin)  
 Line 2: Lot Number

8-pin MSOP

**Zywyn Corporation**

Headquarters and Sales Office

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Email: sales@zywyn.com • www.zywyn.com

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