钛地半导体
Tudi Semiconductor

# Product Specification

## TUDI-ADM3490E

3.3 V, ±15 kV ESD-Protected, Half- and Full-Duplex, RS-485/RS-422 Transceivers

网址 www.sztdbdt.com

**用芯智造·卓越品质**

**semiconductor device manufacturer**

- Design
- research and development
- production
- and sales

## Features

- TIA/EIA RS-485/RS-422 compliant
- ±15 kV ESD protection on RS-485 input/output pins
- Data rates :12Mbps
- Up to 32 nodes on the bus
- Receiver open-circuit, fail-safe design
- Outputs high-Z when disabled or powered off
- Common-mode input range: -7 V to +12 V
- Thermal shutdown and short-circuit protection

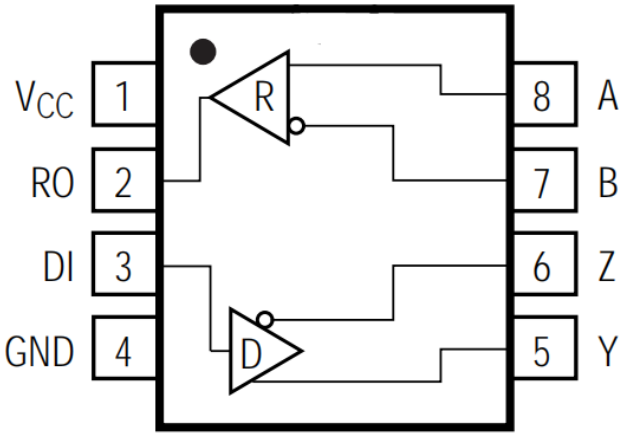



Figure 1. Pin Diagram

## Description

The ADM3490E is a low-power, 3.3V, bidirectional data transceiver with ±15 kVSD protection for full-duplex communication on a multi-node bus. They are designed for balanced data transmission and are compliant with TIA/EIA standard RS-48 and RS-22. The full-duplex ADM3490E transceivers feature useful differential line driver outputs and receiver inputs.

The receiver impedance of devices is 12 kΩ, allowing for a maximum of 32 transceivers on the bus. Since only one driver can be enabled at any time, disabled or driver outputs are tristated to avoid bus contention.

## Applications

- Power/energy metering
- Telecommunications
- EMI-sensitive systems
- Industrial control
- Local area networks

# Pin description

| Pin number | Pin name | Pin function |
|---|---|---|
| 1 | VCC | Power supply:3.0V VCC 5.5V |
| 2 | RO | Receiver output. If A-B is greater than or equal to +200mV,RO output is high level;if A-B is less than or equal to-200mV,RO output is low level. |
| 3 | DI | DI driver input.A low level on DI causes the in-phase terminal Y output to be low and the out-of-phase terminal Z output to be high;a high level on DI causes the in-phase terminal Y output to be high and the out-of-phase terminal Z output to be low. |
| 4 | GND | Landing |
| 5 | Y | Drive in-phase output terminal |
| 6 | Z | The inverting output of the driver |
| 7 | B | Receiver inverting input |
| 8 | A | Receiver in-phase input |

# Extreme parameter

| Parameter | Symbol | Big or small | Unit |
|---|---|---|---|
| Welding temperature range | | 300 | ℃ |
| Operating temperat-ure range | | -40~125 | ℃ |
| Storage operating temperature range | | -60~150 | ℃ |
| Continuous power consumption | SOP8 | 400 | mW |
| | DIP8 | 700 | mW |
| Supply voltage | VCC | +7 | V |
| Control the port voltage | DI | -0.3~VCC+0.3 | V |
| Bus-side input vol-tage | A、B | -8~13 | V |
| Receiver output vo-ltage | RO | -0.3~VCC+0.3 | V |

The maximum limit parameter value is the value beyond which irreversible damage to the device may occur. Under these conditions, the device will not function properly and continuous operation at the maximum allowable rating may affect the reliability of the device. All voltage reference points are ground.

| Parameter | Symbol | Test condition | Minimum | Typical case | Maximum | Unit |
|---|---|---|---|---|---|---|
| supply current | | | | | | |
| Supply current | Icc | DI=0 or VCC | | 240 | 400 | μA |
| ESD protect | | | | | | |
| A、B、Y、Z | | Mannequin (HBM) | | ±16 | | KV |
| Other ports | | Mannequin (HBM) | | ±6 | | KV |
| Drive switch characteristics | | | | | | |
| Drive input to output propagation delay(low to hi-gh) | tDPLH | RDIFF=54 Ω, CL1=CL2=100pF (see Figure 3 and Figure 4) | | 15 | 35 | ns |
| Drive input to output propagation delay(high to low) | tDPHL | | | 15 | 35 | ns |
| \|tDPLH-tDPHL | tSKEW1 | | | 7 | 10 | ns |
| Rise time /fall time | tDR,tDF | | | 10 | 25 | ns |
| Acceptor The propagation delay from input to output is from low to high | tRPLH | See Figure 5 and Figure 6 VID 2.0V; The rise and fall time VID is less than 15ns | 20 | 60 | 90 | ns |
| Acceptor The propagation delay from input to output is from high to low | tRPHL | | 20 | 60 | 90 | ns |
| tRPLH-tRPHL | tSKEW2 | | | 7 | 10 | ns |
| DC electrical characteristics of the driver | | | | | | |
| High-level input | VIH | DI | 2.0 | | | V |
| Low level input | VIL | DI | | | 0.8 | V |
| Logic input current | IIN1 | DI | -2 | | 2 | μA |
| Differential output of the driver(non-loaded) | VoD1 | | | 5 | | V |
| Drive differential output | VoD2 | Graph 2,RL=27Ω | 1.5 | | VCC | V |
| | | Graph 2,RL=50Ω | 2 | | VCC | |
| The current output is short-circuited to high | IosD1 | Short circuit to 0V~12V | 35 | | 250 | mA |
| The current output is short-circuited to low | IosD2 | Short circuit to-7V~oV | -250 | | -35 | mA |
| Change in the amplitude of the output voltage (NOTE1) | △VoD | Graph 2,RL=27Ω | | | 0.2 | V |
| 0utput common mode voltage | Voc | Graph 2,RL=27Ω | | | 3 | V |
| Change in the amplitude of the common-mode output voltage(NOTE1) | △Voc | Graph 2,RL=27Ω | | | 0.2 | V |

| Parameter | Symbol | Test condition | Minimum | Typical case | Maximum | Unit |
|---|---|---|---|---|---|---|
| DC electrical characteristics of the receiver | | | | | | |
| Positive input threshold voltage | VIT+ | -7V≤VcM≤12V | | | +200 | mV |
| Reverse input th-reshold voltage | VIT- | 7V≤VcM≤12V | -200 | | | mV |
| Enter the hyster-esis voltage | Vhys | -7V≤VCM≤12V | 10 | 30 | | mV |
| Input current(A,B) | IIN2 | VCC=0 or 3.3V VIN=12 V | | | 125 | μA |
| | | VCC=0 or 3.3V VIN =-7 V | -100 | | | μA |
| Three state input leakage current | IozR | 0.4V<Vo<2.4V | | | ±1 | μA |
| Receiver input resistance | RIN | -7V≤VcM≤12V | 96 | | | kΩ |
| Receiver short circuit current | IosR | 0V≤Vo≤VCC | ±7 | | ±95 | mA |
| High level output voltage | VoH | IoUT=-4mA, VID=+200 mV | VCC-1.5 | | | V |
| Low level output voltage | VoL | IoUT=+4mA, VID=-200 mV | | | 0.4 | V |

(If not otherwise specified, VCC=3. 3V±10%, Temp=TMIN~TMAX, typical value is VCC=+3. 3 V, Temp = 25 )

## Test Circuit

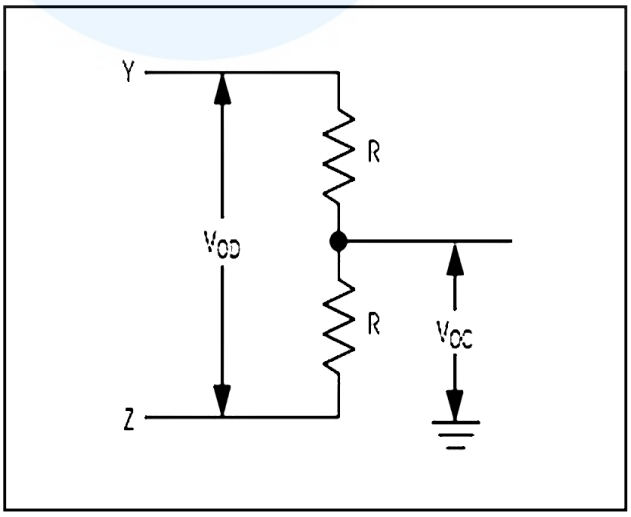



Figure 2 DC test load of the driver

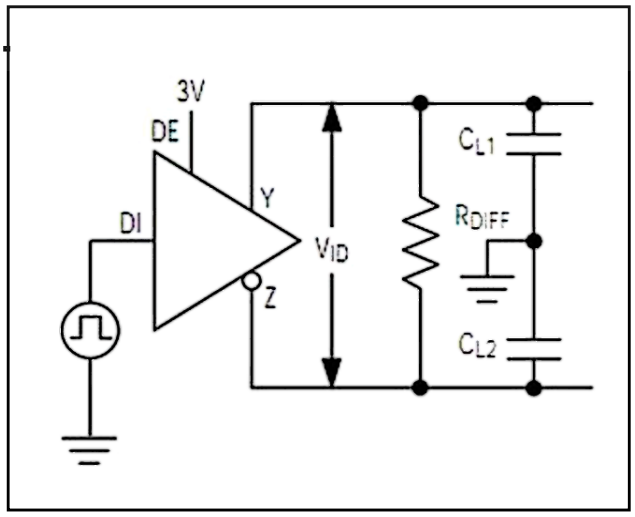



Figure 3 Driver timing test circuit

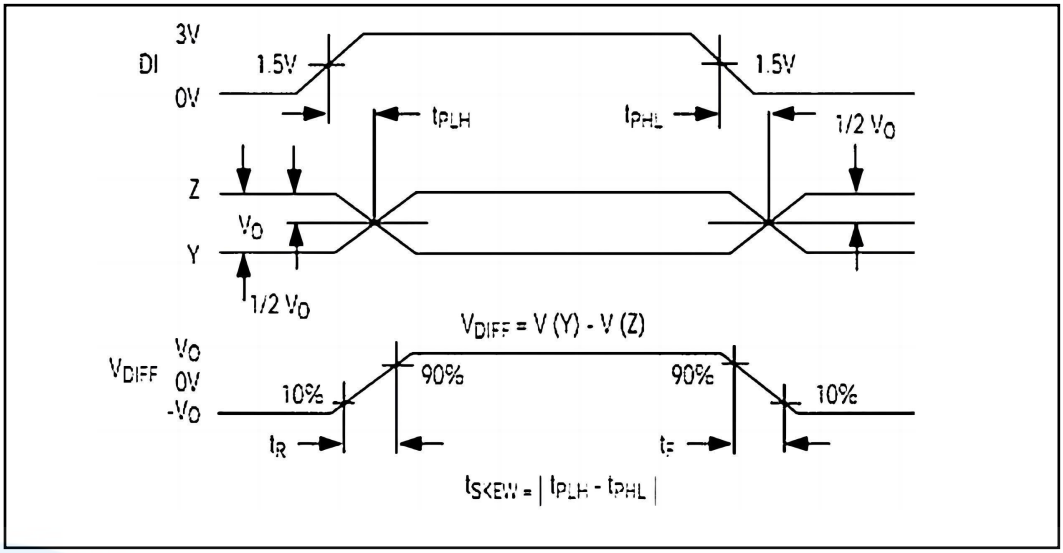



Figure 4 Driver propagation delay

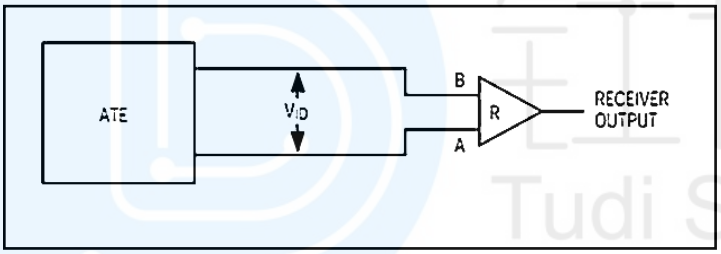



Figure 5 Receiver propagation delay test circuit

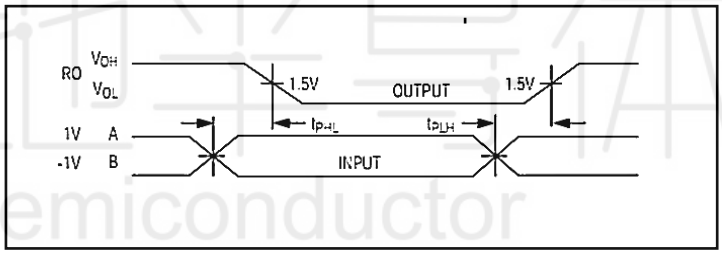



Figure 6 Receiver propagation delay timing

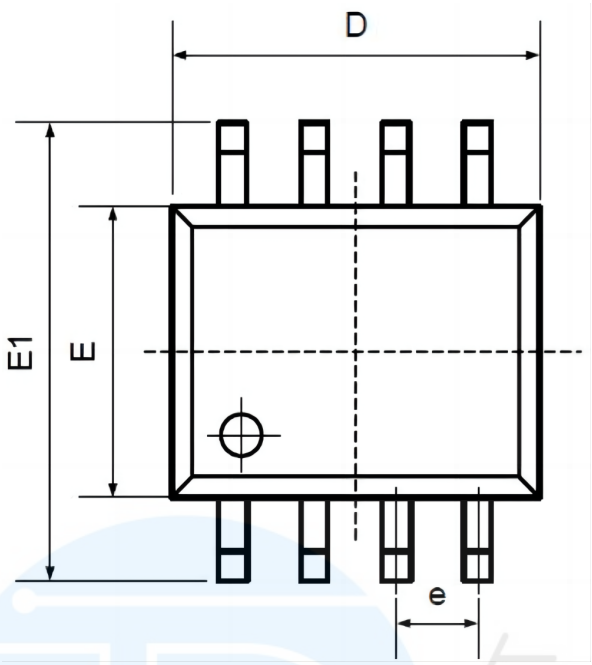
# Additional description

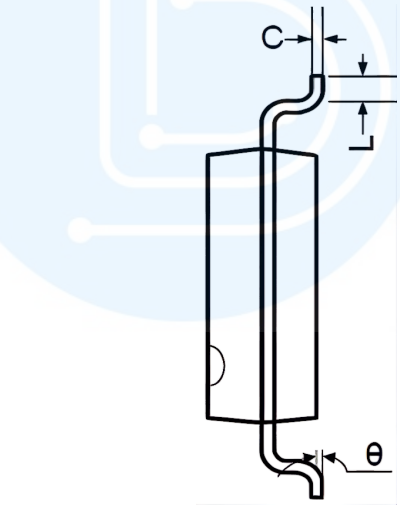
| resume |
| --- |
| The 3490E is a full-duplex, high-speed transceiver for RS-485/RS-422 communication, incorporating driver and a receiver. It features fail-safe, overvoltage protection, and overcurrent protection. The 3490E achieves error-free data transmission up to 12Mbps. |
| **The bus is connected to 32 transceivers** |
| The input impedance of the standard RS485 receiver is 12kΩ (1 unit load), and the standard driver can drive up to 32 unit loads. The receiver of the 3490E transceiver has an input impedance of 1/8 unit load (96kΩ), allowing up 32 transceivers to be connected in parallel on the same communication bus. These devices can be combined arbitrarily, or combined with other RS485 transceivers as long as the total load does not exceed 32 unit loads, they can be connected to the same bus. |
| **Drive output protection** |
| Protection against excessive output current and dissipation by fault or bus contention is provided by overcurrent and overvoltage protection mechanisms, with fast short-circuit protection throughout the common-mode voltage range (see Typical Operating Characteristics). |

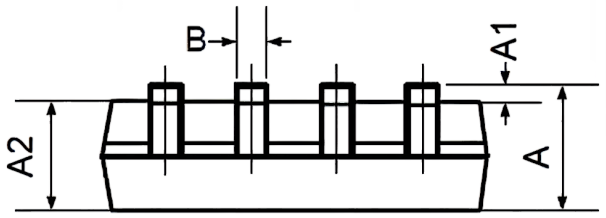
# Order information

| Order Number | Package | Package Quantity | Marking On The park | Temperature |
|---|---|---|---|---|
| ADM3490EARZ-REEL-TUDI | SOP8 | Tape,Reel,2500 | ADM3490EARZ | - 40°C to 85°C |
| ADM3490EANZ-TUDI | DIP8 | Tube,50,A box of 2000 | ADM3490EANZ | |

# Package SOP8

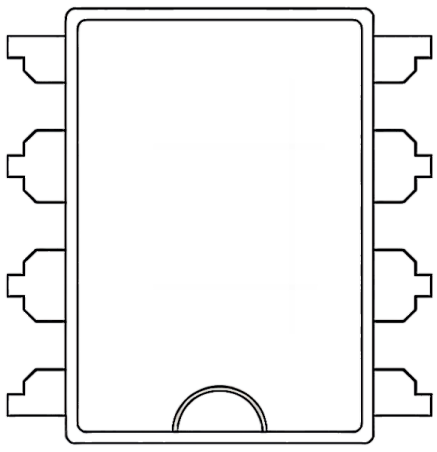


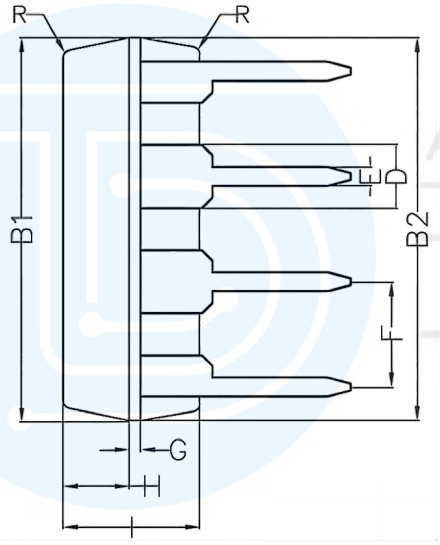



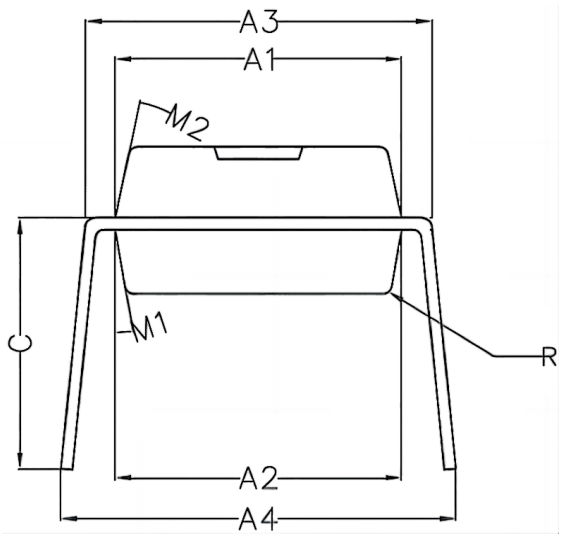




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| B | 0.330 | 0.510 | 0.013 | 0.020 |
| C | 0.190 | 0.250 | 0.007 | 0.010 |
| D | 4.780 | 5.000 | 0.188 | 0.197 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.300 | 0.228 | 0.248 |
| e | 1.270TYP | | 0.050TYP | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

# Package DIP8






| Symbol | Min | Non | Max |
|---|---|---|---|
| A1 | 6.28 | 6.33 | 6.38 |
| A2 | 6.33 | 6.38 | 6.43 |
| A3 | 7.52 | 7.62 | 7.72 |
| A4 | 7.80 | 8.40 | 9.00 |
| B1 | 9.15 | 9.20 | 9.25 |
| B2 | 9.20 | 9.25 | 9.30 |
| C | | 5.57 | |
| D | | 1.52 | |
| E | 0.43 | 0.45 | 0.47 |
| F | | 2.54 | |
| G | | 0.25 | |
| H | 1.54 | 1.59 | 1.64 |
| 工 | 3.22 | 3.27 | 3.32 |
| R | | 0.20 | |
| M1 | 9° | 10° | 11° |
| M2 | 11° | 12° | 13° |

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