



## ±15kV ESD-Protected, Slew-Rate-Limited, Low-Power, RS-485/RS-422 Transceivers

### General Description

The MAX481E, MAX483E, MAX485E, MAX487E–MAX491E, and MAX1487E are low-power transceivers for RS-485 and RS-422 communications in harsh environments. Each driver output and receiver input is protected against ±15kV electro-static discharge (ESD) shocks, without latchup. These parts contain one driver and one receiver. The MAX483E, MAX487E, MAX488E, and MAX489E feature reduced slew-rate drivers that minimize EMI and reduce reflections caused by improperly terminated cables, thus allowing error-free data transmission up to 250kbps. The driver slew rates of the MAX481E, MAX485E, MAX490E, MAX491E, and MAX1487E are not limited, allowing them to transmit up to 2.5Mbps.

These transceivers draw as little as 120µA supply current when unloaded or when fully loaded with disabled drivers (see *Selector Guide*). Additionally, the MAX481E, MAX483E, and MAX487E have a low-current shutdown mode in which they consume only 0.5µA. All parts operate from a single +5V supply.

Drivers are short-circuit current limited, and are protected against excessive power dissipation by thermal shutdown circuitry that places their outputs into a high-impedance state. The receiver input has a fail-safe feature that guarantees a logic-high output if the input is open circuit.

The MAX487E and MAX1487E feature quarter-unit-load receiver input impedance, allowing up to 128 transceivers on the bus. The MAX488E–MAX491E are designed for full-duplex communications, while the MAX481E, MAX483E, MAX485E, MAX487E, and MAX1487E are designed for half-duplex applications. For applications that are not ESD sensitive see the pin-function-compatible MAX481, MAX483, MAX485, MAX487–MAX491, and MAX1487.

### Applications

Low-Power RS-485 Transceivers  
Low-Power RS-422 Transceivers  
Level Translators  
Transceivers for EMI-Sensitive Applications  
Industrial-Control Local Area Networks

### Next-Generation Device Features

- ◆ **For Fault-Tolerant Applications:**  
**MAX3430: ±80V Fault-Protected, Fail-Safe, 1/4-Unit Load, +3.3V, RS-485 Transceiver**  
**MAX3080–MAX3089: Fail-Safe, High-Speed (10Mbps), Slew-Rate-Limited, RS-485/RS-422 Transceivers**
- ◆ **For Space-Constrained Applications:**  
**MAX3460–MAX3464: +5V, Fail-Safe, 20Mbps, Profibus, RS-485/RS-422 Transceivers**  
**MAX3362: +3.3V, High-Speed, RS-485/RS-422 Transceiver in a SOT23 Package**  
**MAX3280E–MAX3284E: ±15kV ESD-Protected, 52Mbps, +3V to +5.5V, SOT23, RS-485/RS-422 True Fail-Safe Receivers**  
**MAX3030E–MAX3033E: ±15kV ESD-Protected, +3.3V, Quad RS-422 Transmitters**
- ◆ **For Multiple Transceiver Applications:**  
**MAX3293/MAX3294/MAX3295: 20Mbps, +3.3V, SOT23, RS-485/RS-422 Transmitters**
- ◆ **For Fail-Safe Applications:**  
**MAX3440E–MAX3444E: ±15kV ESD-Protected, ±60V Fault-Protected, 10Mbps, Fail-Safe RS-485/J1708 Transceivers**
- ◆ **For Low-Voltage Applications:**  
**MAX3483E/MAX3485E/MAX3486E/MAX3488E/MAX3490E/MAX3491E: +3.3V Powered, ±15kV ESD-Protected, 12Mbps, Slew-Rate-Limited, True RS-485/RS-422 Transceivers**

### Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
MAX481ECPA	0°C to +70°C	8 Plastic DIP
MAX481ECSA	0°C to +70°C	8 SO
MAX481EEPA	-40°C to +85°C	8 Plastic DIP
MAX481EESA	-40°C to +85°C	8 SO
MAX483ECPA	0°C to +70°C	8 Plastic DIP
MAX483ECSA	0°C to +70°C	8 SO
MAX483EEPA	-40°C to +85°C	8 Plastic DIP
MAX483EESA	-40°C to +85°C	8 SO

Ordering Information continued at end of data sheet.

Selector Guide appears at end of data sheet.

MAX481E/MAX483E/MAX485E/MAX487E–MAX491E/MAX1487E



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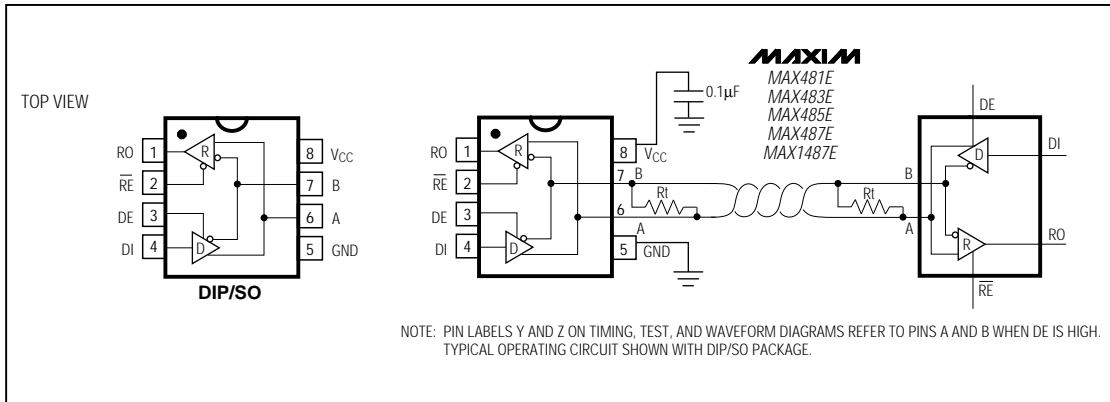


Figure 1. MAX481E/MAX483E/MAX485E/MAX487E/MAX1487E Pin Configuration and Typical Operating Circuit

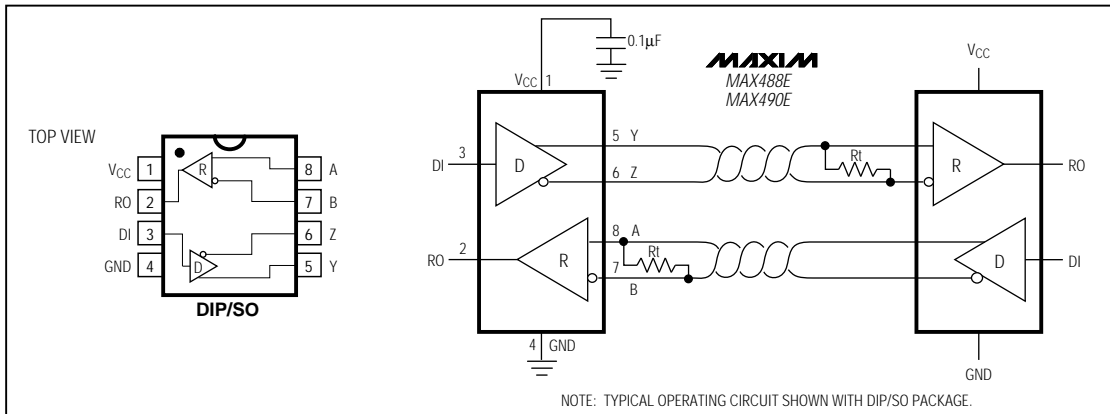


Figure 2. MAX488E/MAX490E Pin Configuration and Typical Operating Circuit

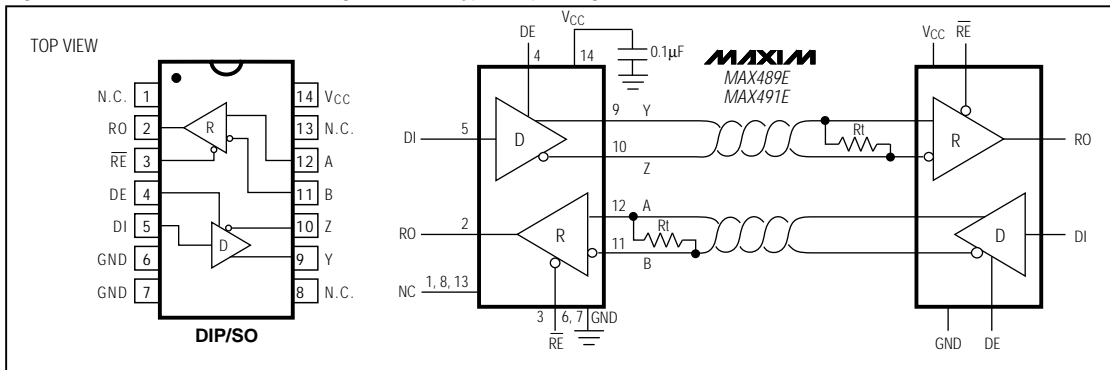


Figure 3. MAX489E/MAX491E Pin Configuration and Typical Operating Circuit

*±15kV ESD-Protected, Slew-Rate-Limited,  
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MAX481E/MAX483E/MAX485E/MAX487E-MAX491E/MAX1487E

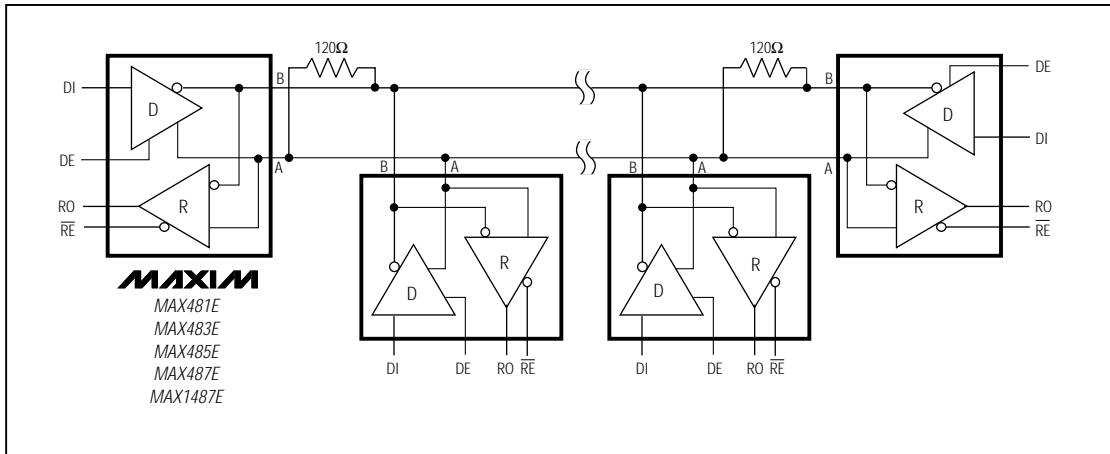


Figure 25. MAX481E/MAX483E/MAX485E/MAX487E/MAX1487E Typical Half-Duplex RS-485 Network

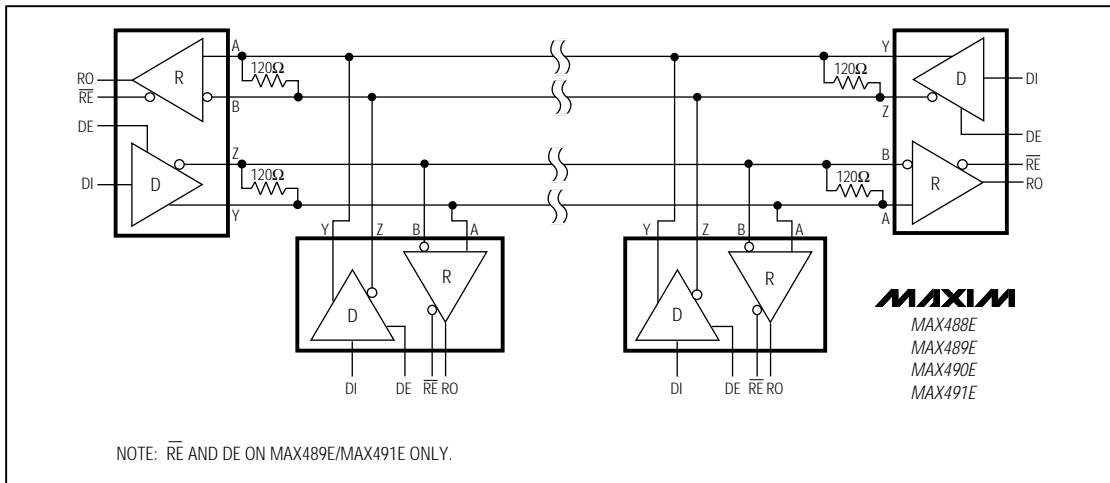


Figure 26. MAX488E-MAX491E Full-Duplex RS-485 Network

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*Ordering Information (continued)*

PART	TEMP RANGE	PIN-PACKAGE
<b>MAX485ECPA</b>	0°C to +70°C	8 Plastic DIP
MAX485ECSA	0°C to +70°C	8 SO
MAX485ECPA	-40°C to +85°C	8 Plastic DIP
MAX485EESA	-40°C to +85°C	8 SO
<b>MAX487ECPA</b>	0°C to +70°C	8 Plastic DIP
MAX487ECSA	0°C to +70°C	8 SO
MAX487ECPA	-40°C to +85°C	8 Plastic DIP
MAX487EESA	-40°C to +85°C	8 SO
<b>MAX488ECPA</b>	0°C to +70°C	8 Plastic DIP
MAX488ECSA	0°C to +70°C	8 SO
MAX488ECPA	-40°C to +85°C	8 Plastic DIP
MAX488EESA	-40°C to +85°C	8 SO
<b>MAX489ECPD</b>	0°C to +70°C	14 Plastic DIP
MAX489ECSA	0°C to +70°C	14 SO

PART	TEMP RANGE	PIN-PACKAGE
MAX489ECPD	-40°C to +85°C	14 Plastic DIP
MAX489EESD	-40°C to +85°C	14 SO
<b>MAX490ECPA</b>	0°C to +70°C	8 Plastic DIP
MAX490ECSA	0°C to +70°C	8 SO
MAX490ECPA	-40°C to +85°C	8 Plastic DIP
MAX490EESA	-40°C to +85°C	8 SO
<b>MAX491ECPD</b>	0°C to +70°C	14 Plastic DIP
MAX491ECSA	0°C to +70°C	14 SO
MAX491ECPD	-40°C to +85°C	14 Plastic DIP
MAX491EESD	-40°C to +85°C	14 SO
<b>MAX1487ECPA</b>	0°C to +70°C	8 Plastic DIP
MAX1487ECSA	0°C to +70°C	8 SO
MAX1487ECPA	-40°C to +85°C	8 Plastic DIP
MAX1487EESA	-40°C to +85°C	8 SO

*Selector Guide*

PART NUMBER	HALF/FULL DUPLEX	DATA RATE (Mbps)	SLEW-RATE LIMITED	LOW-POWER SHUTDOWN	RECEIVER/ DRIVER ENABLE	QUIESCENT CURRENT (µA)	NUMBER OF TRANSMITTERS ON BUS	PIN COUNT
<b>MAX481E</b>	Half	2.5	No	Yes	Yes	300	32	8
<b>MAX483E</b>	Half	0.25	Yes	Yes	Yes	120	32	8
<b>MAX485E</b>	Half	2.5	No	No	Yes	300	32	8
<b>MAX487E</b>	Half	0.25	Yes	Yes	Yes	120	128	8
<b>MAX488E</b>	Full	0.25	Yes	No	No	120	32	8
<b>MAX489E</b>	Full	0.25	Yes	No	Yes	120	32	14
<b>MAX490E</b>	Full	2.5	No	No	No	300	32	8
<b>MAX491E</b>	Full	2.5	No	No	Yes	300	32	14
<b>MAX1487E</b>	Half	2.5	No	No	Yes	230	128	8

*Chip Information*

TRANSISTOR COUNT: 295

*Package Information*

For the latest package outline information, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages).

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