



钜地半导体  
Tudi Semiconductor

## Product Specification

TUDI-MAX490

Low-Power, Slew-Rate-Limited RS-485/RS-422 Transceivers

网址 [www.sztdbdt.com](http://www.sztdbdt.com) Q

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**semiconductor device  
manufacturer**

- Design
- research and development
- production
- and sales



## Features

- Strong anti-noise capability;
- Integrated transient voltage suppression function;
- Data transmission rate can reach 2.5M in an electrical noise environment;
- 4.5V~5.5V power supply, full-duplex;
- Fail-Safe feature;
- 1/8 unit load, allowing a maximum of 256 devices to be connected to the bus;
- Short-circuit output protection for the driver;
- Open-uit fail-safe protection for the receiver;
- A, B port protection: HBM  $\pm 15KV$ ;

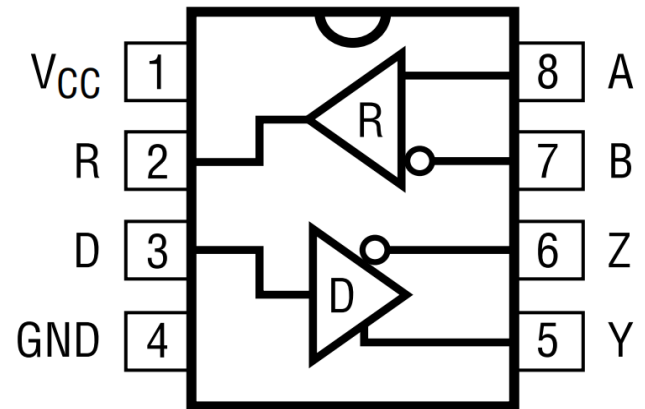


Figure 1. Pin Diagram

## Description

The MAX490 is a low-power transceiver for RS-485 and RS-422 communication. Each device contains a and a receiver. The MAX490 ' s driver has an unrestricted slew rate, so they can transmit up to 2.5Mbps. These transivers consume supply current between 120 $\mu A$  and 500 $\mu A$  when idle or fully loaded with the driver disabled. All devices operate from a single 5 supply. The drivers have short-circuit current limiting and are protected by a thermal shutdown circuit that places the driver output into a high-impedance state to prevent excessive power. The receiver inputs have a fail-safe feature that guarantees the output to be logic high if the input is open. Use the MAX490 for full-duplex communication.

## Applications

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



## Pin description

Pin number	Pin name	Pin function
1	VCC	Power supply:4.5V VCC 5.5V
2	R	Receiver output.
3	D	Driver Input
4	GND	Landing
5	Y	Driver in-phase output terminal
6	Z	Driver inverting output
7	B	Receiver inverting input
8	A	Receiver in-phase input

## AbsoluteRating

parameter	symbol	size	Unit
supply voltage	VCC	+7	V
Control port voltage	D	-0.3~VCC+0.3	V
bus-side input voltage	A、B	-8~13	V
Receiver output voltage	R	-0.3~VCC+0.3	V
operating temperature range		-40~85	
Storage operating temperature range		-60~150	
welding temperature range		300	
continuous power consumption	SOP8	400	mW
	DIP8	700	mW

Unless otherwise specified, VCC is 5V  $\pm 10\%$ , with temperature ranging from TMIN to TMAX. Typical operating conditions are VCC= +5V and 25°C

NOTE1:  $\Delta VOD$  and  $\Delta VOC$  represent the amplitude variations of VOD and VOC respectively, caused by state changes in the input signal DI.

The maximum limit parameters are values beyond which the device can be damaged in an irreversible manner. Operation of the device under these conditions is not intended to be and continuous operation at the maximum rated limits may affect device reliability. All voltages are referenced to ground.



## FunctionTable

Send Function Table					
input	D	1	0	X	X
output	Y	H	L	Z	Z(shutdown)
	Z	L	H	Z	
Receive Function Table					
input	A-B	-50mV	-200mV	Open/short circuit	X
output	R	H	L	H	Z

Note:X:Any level;Z:High impedance.

## Drive switch characteristics

Parameter	symbol	Test condition	Minimum	Typical case	Maximum	Unit
Input to output propagation delay (low to high)	tDPLH	RDIF=54 Ω,CL1=CL2=100pF(see Figure 3 and Figure 4)		12	35	ns
Input to output propagation delay(high to low)	tDPHL			12	35	ns
tDPLH-tDPHL	tsKEW1			7	10	ns
Rise time/fall time	tDR,tDF			10	25	ns

## ESD Protect

Parameter	symbol	Test condition	Minimum	Typicalcase	Maximum	Unit
A、B、Y、Z		Human bodymodel		±15		KV
Other ports		Human bodymodel		±6		KV





## DC Electrical Characteristics of the Receiver

Parameter	symbol	Test condition	Minimum	Typical case	Maximum	Unit
Input current(A,B)	In2	VCC=0 or 5V			125	uA
		VCC=0 or 5V	-100			uA
Forward input threshold voltage	VIT+	-7V VcM 12V			-50	mV
Reverse input threshold voltage	VIT-	-7V Vcm 12V	-200			mV
Input hysteresis voltage	Vhys	-7V Vcm 12V	10	30		mV
High level output voltage	VoH	IoUT = -4mA, VD = +200 mV	VCC-1.5			V
Low level output voltage	VoL	IoUT = +4mA, VID = -200 mV			0.4	V
Three state input leakage current	IozR	0.4V < Vo < 2.4V			±1	uA
Input resistance of receiver	RIn	-7V Vcm 12V	96			kS
Receiver short circuit current	IosR	OV Vo VCC	±7		±95	mA

Unless otherwise specified, VCC is 5V ±10%, with temperature ranging from TMIN to TMAX. Typical operating conditions are VCC= +5V and 25°C.

## Receiver switch characteristic

Parameter	symbol	Test condition	Minimum	Typical case	Maximum	Unit	
Propagation delay from receiver input to	tRPLH	See Figure 5 and Figure 6 VD 2.0V; rising and falling edge time Vm 15ns	20	60	90	ns	
The propagation delay from receiver	tRPHL		20	60	90	ns	
tRPLH-tRPHL	tsKEW2			7	10	ns	



## Supply Current

Parameter	symbol	Test condition	Minimum	Typicalcase	Maximum	Unit
Supply current	Icc	DI=0 or VCC		220	400	uA

## Explanation

### Resume

The 490 is a full-duplex high-speed RS-485/RS-422 transceiver with integrated driver and receiver,featuring fail-safe operation,overvoltage and overcurrent protection.It delivers error-free data transmission at speeds up to 2.5Mbps.

### Failure Safety

When the receiver input is short-circuited or open-circuited,or when all drivers connected to the terminal matching transmission line are disabled(idle),the 490 ensures a logic high level at the receiver output.This is achieved by setting the receiver input thresholds to-10mV and-200mV respectively.If the differential receiver input voltage(A-B)is -10mV,RO is a logic high level;if the voltage(A-B)is -200mV,RO is a logic low level.Based on the receiver thresholds,a logic high level with a minimum noise tolerance of 50mV can be achieved.The-10mV to-200mV threshold voltage complies with the $\pm 200\text{mV}$  requirement of the EIA/TIA-485 standard.

### 256 Transceivers on the Bus

A standard RS485 receiver has an input impedance of 12k (1 unit load),while a standard driver can support up to 32 unit loads.The 490 transceiver's receiver features an 1/8 unit load input impedance (96k ),enabling up to 256 transceivers to be connected in parallel on the same communication bus .These devices can be configured individually or combined with other RS485 transceivers, provided the total load does not exceed 32 unit loads.

### drive output protection

The overcurrent and overvoltage protection mechanism prevents excessive output current and power consumption caused by faults or bus conflicts,and provides rapid short-circuit protection across the entire common-mode voltage range(referencing typical operating characteristics).



## TestCircuit

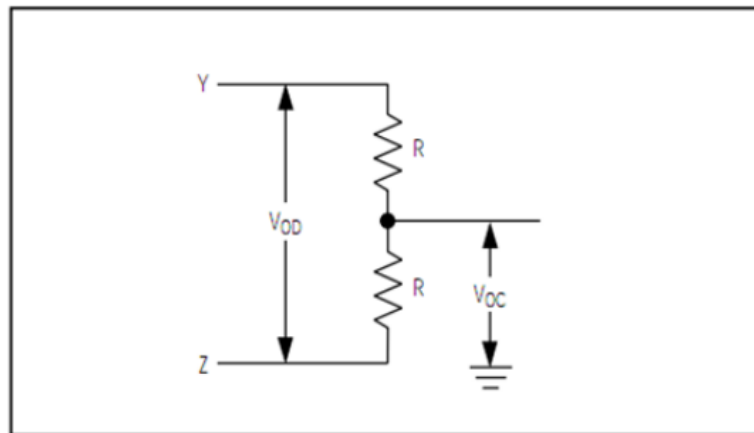


Figure 2 DC Test Load of the Driver

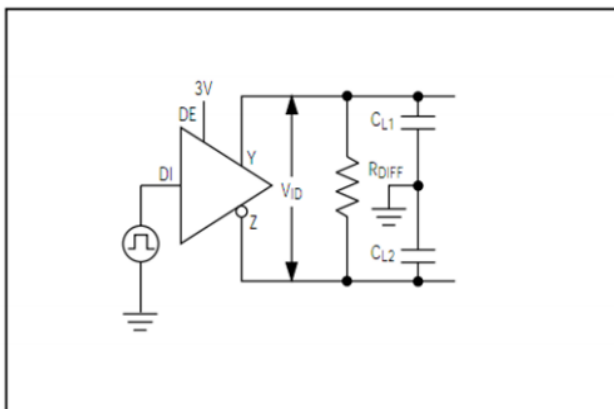


Figure 3. Driver Timing Test Circuit

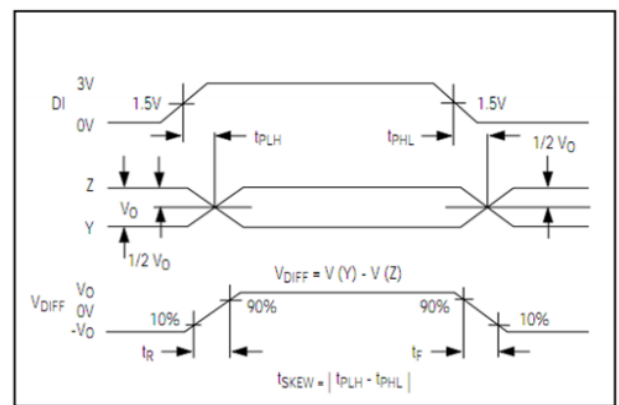


Figure 4 Propagation Delay of Driver

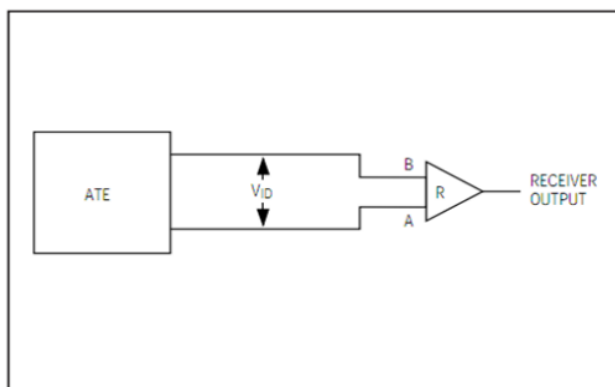


Figure 5 Receiver Propagation Delay Test Circuit

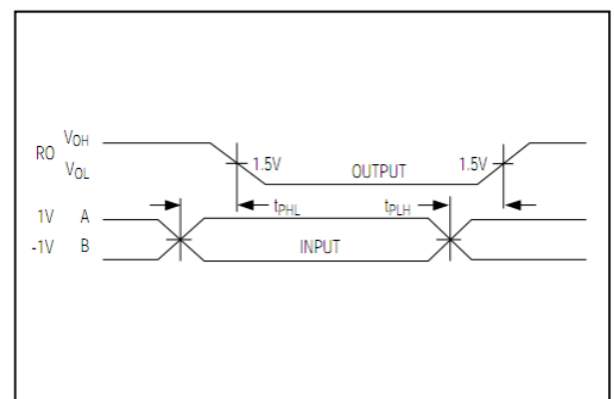
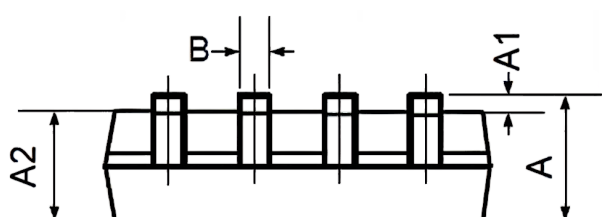
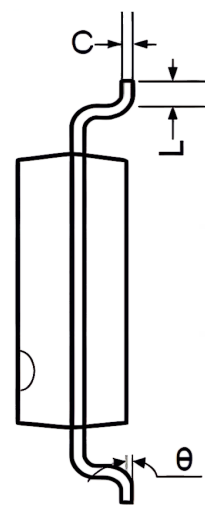
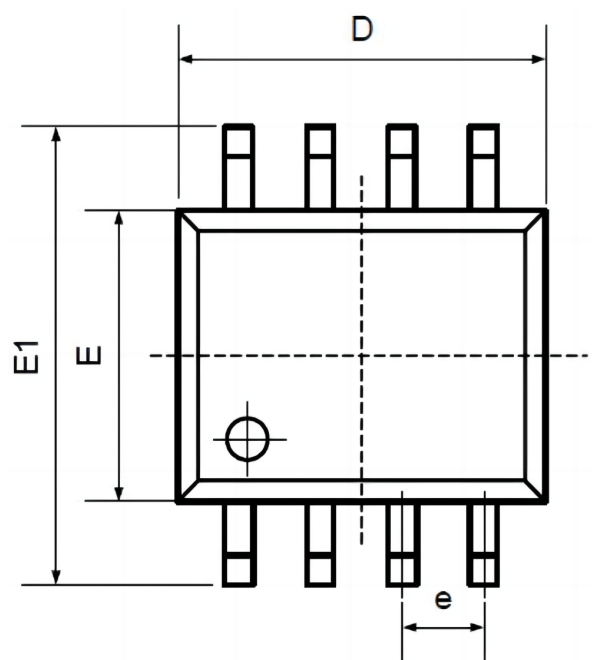


Figure 6 Receiver Propagation Delay Sequence

## Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
MAX490CPA-TUDI	DIP8	Tube,50,A box of 2000	MAX490CPA	0°C to 70°C
MAX490CSA-TUDI	SOP8	Tape,Reel,2500	MAX490CSA	
MAX490CUA-TUDI	MSOP8	Tape,Reel,2500	490CUA	
MAX490EPA-TUDI	DIP8	Tube,50,A box of 2000	MAX490EPA	- 40°C to 85°C
MAX490ESA-TUDI	SOP8	Tape,Reel,2500	MAX490ESA	

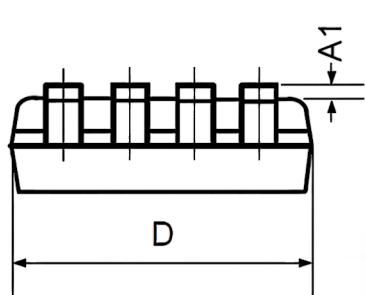
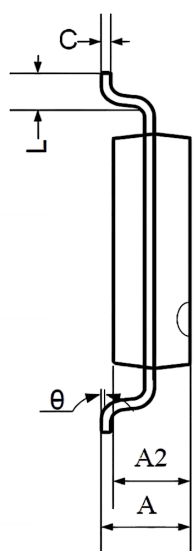
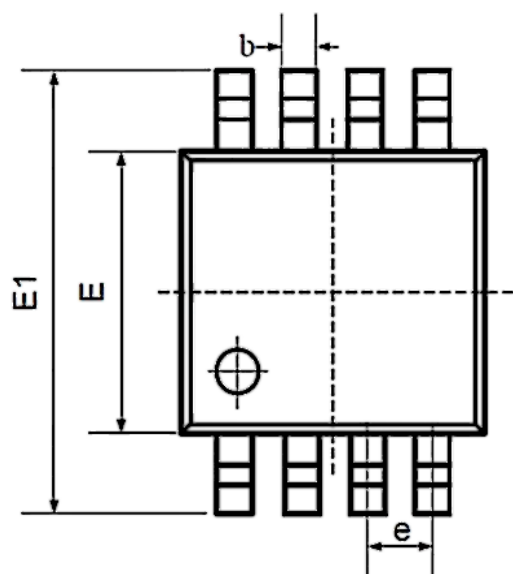
## Package SOP8



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°

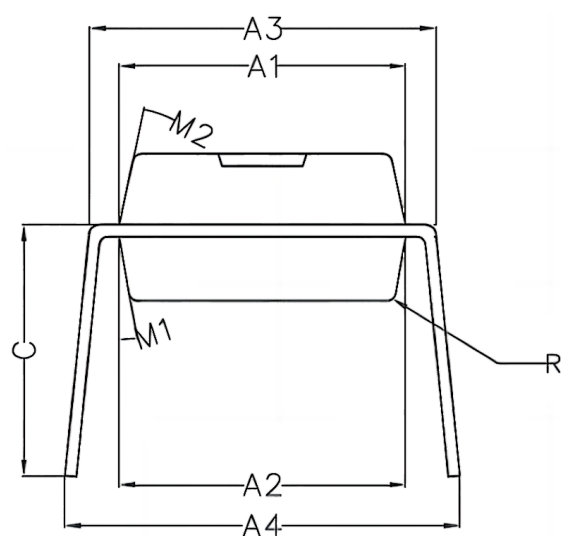
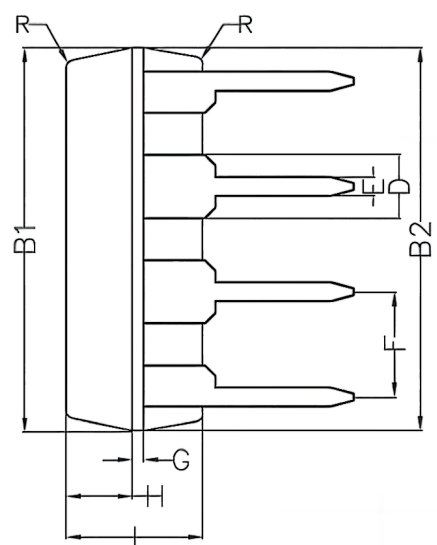
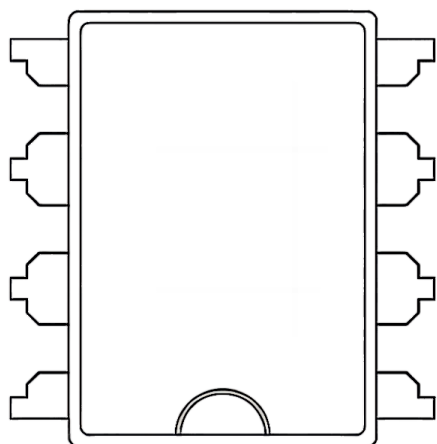


## Package MSOP8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.800	1.200	0.031	0.047
A1	0.000	0.200	0.000	0.008
A2	0.760	0.970	0.030	0.038
b	0.30 TYP		0.012 TYP	
C	0.15 TYP		0.006 TYP	
D	2.900	3.100	0.114	0.122
e	0.65 TYP		0.026 TYP	
E	2.900	3.100	0.114	0.122
E1	4.700	5.100	0.185	0.201
L	0.410	0.650	0.016	0.026
θ	0°	6°	0°	6°

## 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
I	3.22	3.27	3.32
R		0.20	
M1	9°	10°	11°
M2	11°	12°	13°





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