



钲地半导体
Tudi Semiconductor

Product Specification

TUDI-LTC490

Differential Driver and Receiver Pair

网址 www.sztdbdt.com Q

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**semiconductor device
manufacturer**

- Design
- research and development
- production
- and sales



Features

- Low Power: $I_{CC} = 300\mu A$ Typical
- Designed for RS485 or RS422 Applications
- Single 5V Supply
- $-7V$ to $12V$ Bus Common Mode Range Permits $\pm 7V$ Ground Difference Between Devices on the Bus
- Thermal Shutdown Protection
- Power-Up/-Down Glitch-Free Driver Outputs Permit Live Insertion or Removal of Package
- Driver Maintains High Impedance with the Power Off
- Combined Impedance of a Driver Output and Receiver Allows up to 32 Transceivers on the Bus
- $70mV$ Typical Input Hysteresis
- $28ns$ Typical Driver Propagation Delays with $5ns$ Skew for $2.5MB$ Operation

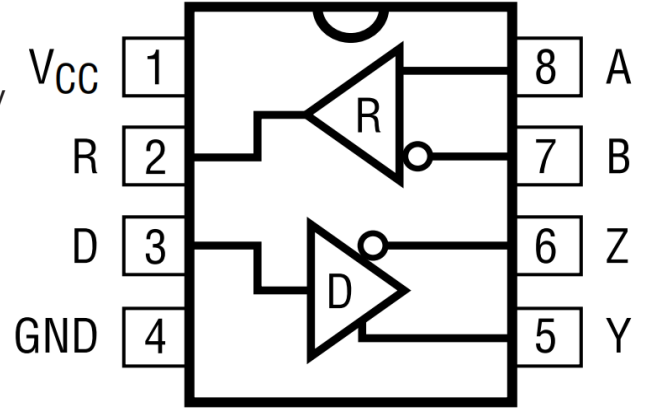


Figure 1. Pin Diagram

Description

The 490 is a low power differential bus/line transceiver designed for multipoint data transmission standard RS485 applications with extended common mode range ($12V$ to $-7V$). It also meets the requirements of RS422.

The CMOS design offers significant power savings over its bipolar counterpart without sacrificing ruggedness against overload or ESD damage. Excessive power dissipation caused by bus contention or faults is prevented by a thermal shutdown circuit which forces the driver outputs into a high impedance state.

The receiver has a fail safe feature which guarantees a high output state when the inputs are left open. Both AC and DC specifications are guaranteed from $0^{\circ}C$ to $70^{\circ}C$ and $4.75V$ to $5.25V$ supply voltage range.

Applications

- Low Power RS485/RS422 Transceiver
- Level Translator



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

NOTE1: ΔVOD and ΔVOC 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
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	20	60	90	ns
The propagation delay from receiver	tRPHL		20	60	90	ns
tRPLH-tRPHL	tsKEW2	Vm 15ns		7	10	ns



Supply Current

Parameter	symbol	Test condition	Minimum	Typicalcase	Maximum	Unit
Supply current	I _{cc}	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 to12Mbps.

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

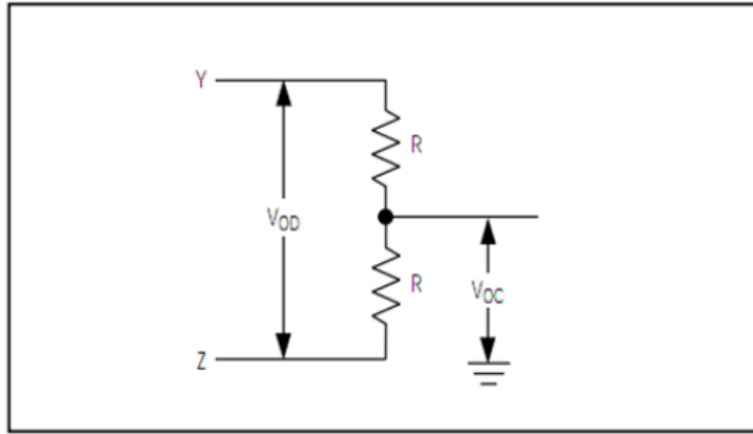


Figure 2 DC Test Load of the Driver

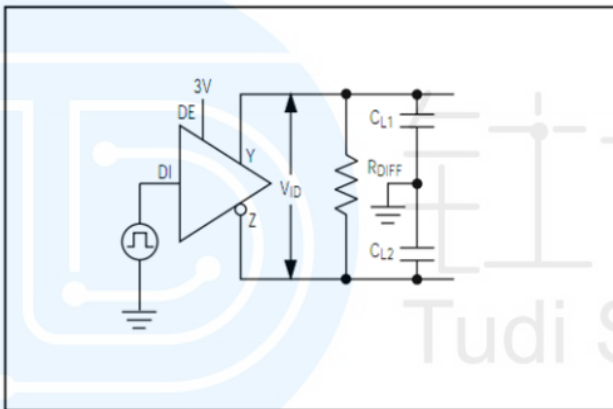


Figure 3. Driver Timing Test Circuit

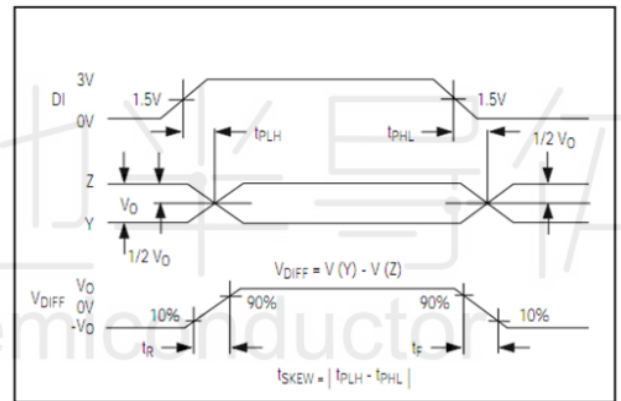


Figure 4 Propagation Delay of Driver

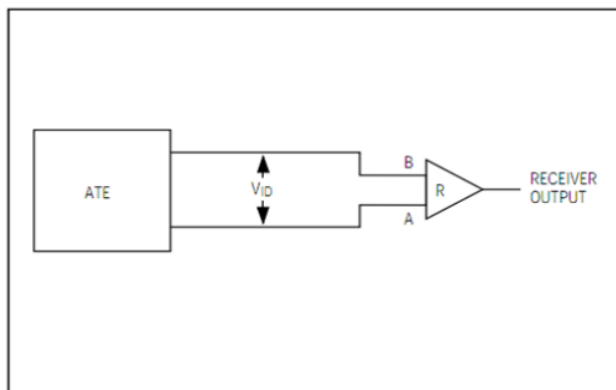


Figure 5 Receiver Propagation Delay Test Circuit

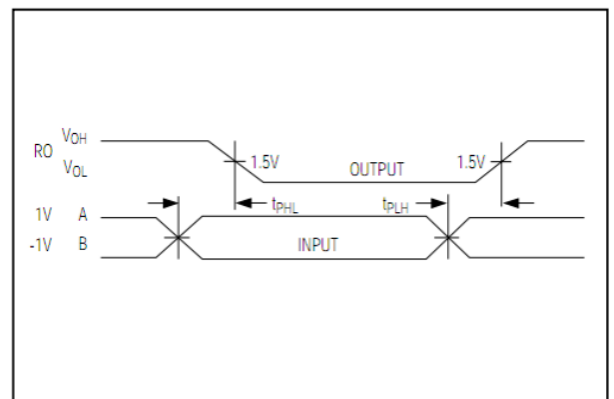


Figure 6 Receiver Propagation Delay Sequence

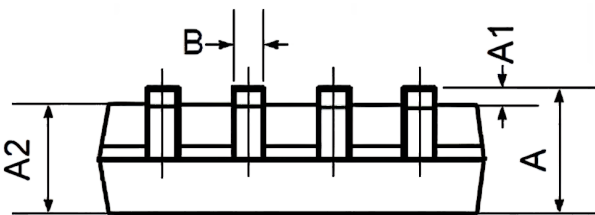
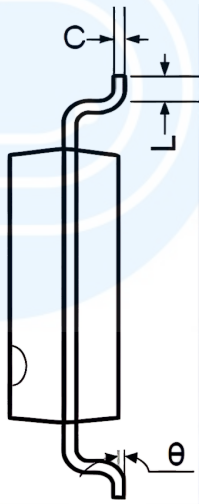
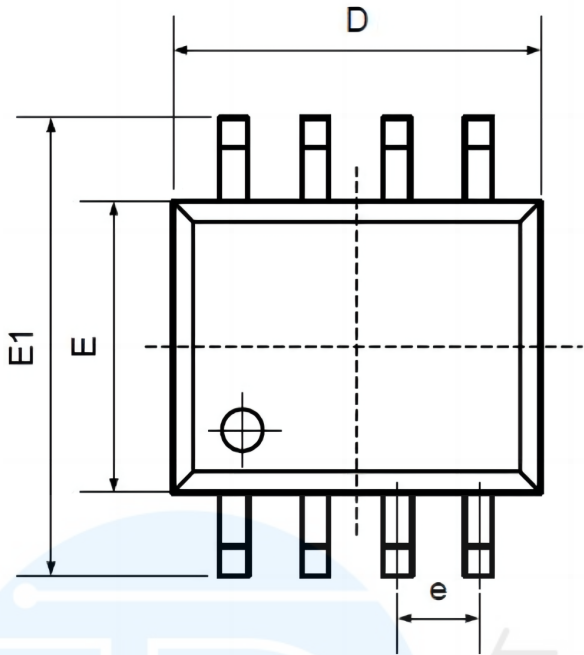


Order information

Order Number	Package	Package Quantity	Marking On The park	Temperature
LTC490CS8-TUDI	SOP8	Tape,Reel,2500	490	0°C to 70°C
LTC490CN8-TUDI	DIP8	Tube,50,A box of 2000	LTC490CN8	
LTC490IS8-TUDI	SOP8	Tape,Reel,2500	490I	- 40°C to 85°C
LTC490IN8-TUDI	DIP8	Tube,50,A box of 2000	LTC490IN8	



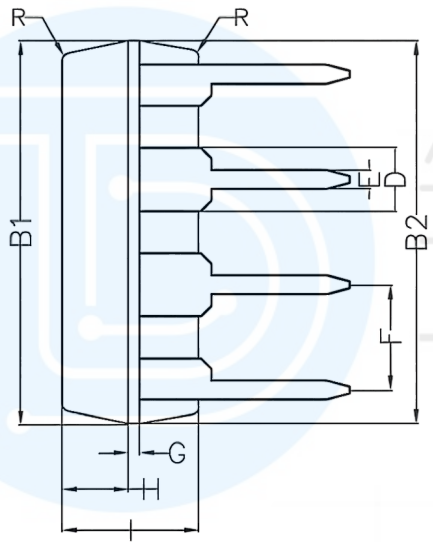
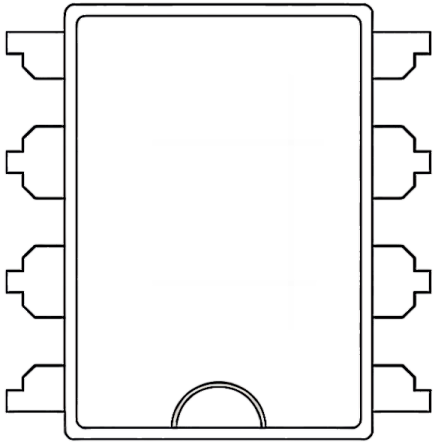
Package SOP8



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



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