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Product Specification

XBLW MAX490

High-speed Transceiver

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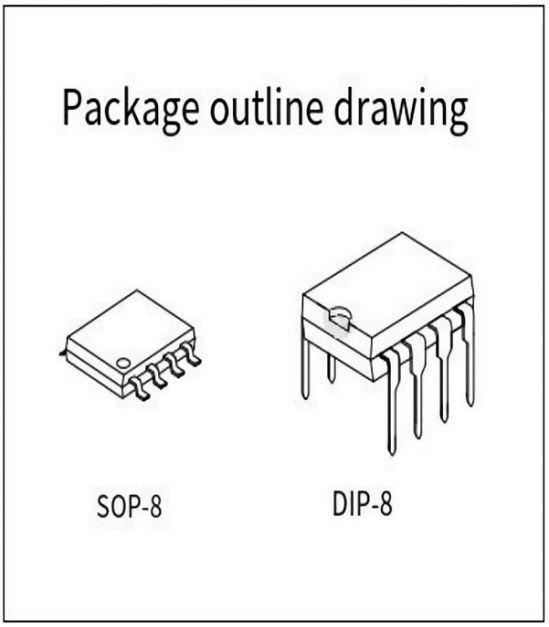
Description

The MAX490, which is used for RS-485/RS-422 communication, is a high-speed transceiver with full-duplex communication that includes a driver and a receiver. When the receiver input is open or shorted, it ensures that the receiver output is at a logic high level. If all transmitters attached to the terminated matching bus are disabled (high-impedance), the receiver will output a logic high level.

The MAX490 has a low-rate driver that can reduce EMI and reflections caused by improper terminal matching cables, and achieve error-free data transfer rates up to 2.5Mbps. In addition, the MAX490 has a 1/8 unit load input impedance, and up to 256 transmitters and receivers can be attached to the bus.



Feature:

- Wide power range, full duplex
- Up to 256 transceivers are allowed to be attached on the bus
- Powerful swing rate control function helps to achieve error-free data transmission
- Provide a standard SOP-8 and DIP-8 package

Applications

- Industrial control
- Security system
- Power inverter
- POS machine
- Lighting system

Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW MAX490ESA	SOP-8	MAX490ESA	Tape	2500Pcs/Reel
XBLW MAX490EPA	DIP-8	MAX490EPA	Tube	2000Pcs/Box

Pin logic diagram and description

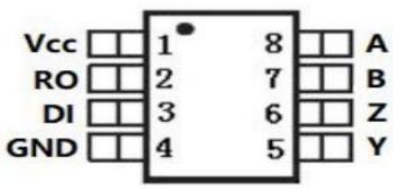


Figure 1: Pin diagram of MAX490

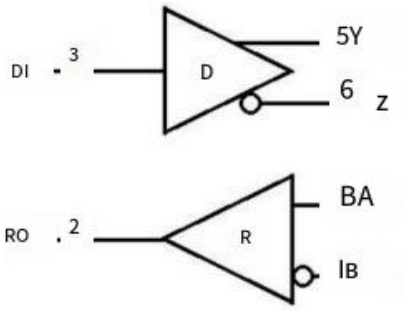


Figure 2: MAX490 logic diagram

Pin Description

lead Full duplex	Name	Function
1	VCC	Positive phase supply end :3.0 ≦VCC≦5.5V
2	RO	Receiver output. If A-B ≧ -50mV, RO output is high; If A-B ≦ -200mV, RO output is low
3	DI	Drive input. The low level on the DI forces the same phase output to be low level and the reverse phase output to be high level. Similarly, a high level on the DI will force the in-phase output to be high and the anti-phase output to be low
4	GND	Ground
5	Y	Drive in-phase output end
6	Z	Drive inverting output end
7	B	Receiver inverting input
8	A	Receiver in-phase input

Absolute maximum rating

Project	Symbol	Parameter	unit
Supply voltage	VCC	+ 7	V
Drive input voltage	DI	-0.3 to VCC+0.3	V
Drive output voltage	Y, Z	-8 to + 1 3	V
Receiver input voltage	A, B	-8 to + 1 3	V
Receiver output voltage	RO	-0.3 ~ VCC+0.3	V
Continuous power consumption	SOP8	471	mW
Operating temperature range		0 ~ +70	℃
Storage temperature		-65 ~ +150	℃
Welding temperature, 10S	TLEAD	245	℃

Note:

Any application attempt above the absolute maximum rating has the potential to cause permanent damage to the product, and the absolute maximum rating does not mean that the product will function properly under conditions other than the calibrated electrical characteristics.

Dc electrical characteristics (unless otherwise stated, VCC=+5V±5,TA=TMIN ~ TMAX, typical values at VCC=+5V,TA= 25℃) (Note 1)

Parameter	Symbol	Test condition		MIN	TYP	MAX	Units
Drives							
Supply voltage	VCC			3.0		5.5	V
Differential driver output (no load)	V_{OD1}	Figure 4		1.5		5	V
Differential driver output	V_{OD2}	Figure 4, R=50Ω(RS-422)		2.0		5	V
		Figure 4, R=27Ω(RS-485)		1.5		5	
Amplitude change in differential output voltage (Note 2)	ΔV_{OD}	Figure 4, R=50Ω or R=27Ω				0.2	V
Drive common mode output voltage	V_{OC}	Figure 4, R=50Ω or R=27Ω		1		3	V
Amplitude change in common mode voltage (Note 2)	ΔV_{OC}	Figure 4, R=50Ω or R=27Ω				0.2	V
Input high voltage	V_{IH1}	DE,DI,/RE		2.0			V
Input low voltage	V_{IL1}	DE,DI,/RE				0.8	V
DI input lag	V_{HYS}				100		mV
Input current (A,B) full duplex	I_{IN4}	DE=GND	VIN= 12V			125	μA
		VCC=GND or 5.25V	VIN=-7V	- 75			
Drive short circuit output current	I_{OSD}	-7V≦VOUT ≦VCC		- 250			mA
		0V≦VOUT ≦ 12V				250	
		0V≦VOUT ≦VCC		±25			
Receiver							
Receiver differential threshold voltage	V_{TH}	-7V≦VCM≦ 12V		- 200	- 110	- 50	mV
Receiver input lag	ΔV_{TH}				30		mV
Receiver output high voltage	V_{OH}	IO=-4mA,VID=-50mV		V_{CC} -1.5			V
Receiver output low voltage	V_{OL}	IO=4mA,VID=-200mV				0.4	V
Three state output current at receiver end	I_{OZR}	0.4V≦VO ≦2.4V				±1	μA
Receiver input impedance	R_{IN}	-7V≦VCM≦ 12V		96			KΩ
Receiver output short-circuit current	I_{OSR}	0V≦VRO≦VCC		±7		±95	mA
Supply current							
Static working current	I_{CC}	No load, DI=0 or VCC			270	600	μA
ESD electrostatic protection							
ESD HBM		ESD HBM				3000	V

Note 1: All current into the device is positive and all current out of the device is negative; All voltages, if without exception, are stated to be correct.

Note 2: When the DI input changes state, ΔV_{OD} and ΔV_{OC} are V_{OD} and V_{OC} changes, respectively.

Note 3: Maximum current is used for peak current only before feedback current limit, minimum current is used during current limit.

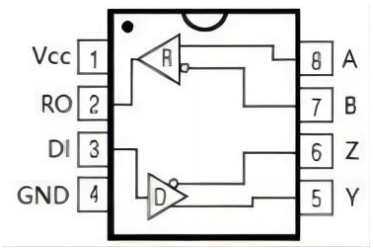
Conversion characteristics (If not stated otherwise, VCC = + 5V ± 5 %, TA = TMIN ~ TMAX, typical value at VCC = + 5V, TA=25℃)

Parameter	Symbol	Condition	MIN	TYP	MAX	Units
Drive input to output	T_{DPLH}	Figures 5和6，RDIFF=54Ω CL1=CL2=100pF	250	720	900	ns
	T_{DPHL}		250	720	900	
Drive output |t DPLH - t DPHL|	T_{DHKEW}	Figures 5和6，RDIFF=54Ω CL1=CL2=100pF		- 3	±100	ns
Drive up or down time	t_{DR}, t_{DF}	Figures 5和6，RDIFF=54Ω CL1=CL2=100pF	200	530	750	ns
Maximum data rate	F_{MAX}				2.5	M
Receiver input to output	T_{RPLH} T_{RPHL}	Figures 7 and 8, rise and fall times, | VID ≥2.0V VID ≦ 15ns		127	200	ns
Differential receiver |t DPLH - t DPHL|	T_{RSKD}	FIG. 7 and 8, rise and fall times of | VID ≥2.0V VID ≦ 15ns		3	±30	ns

Feature Sheet

Send		
Type	Output	
DI	B	A
1	0	1
0	1	0

Receive	
Input	Output
A-B	RO
P - 0.05 - V	1
0.2 V or less	0
Open/shorted	1



DIP/SOP

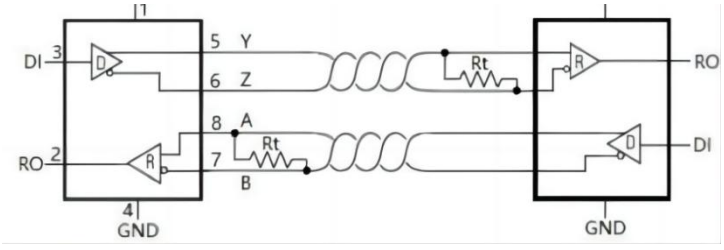


Figure 3: MAX490 typical full duplex application circuit

Expatiate

The MAX490 high-speed transceiver for RS-485 / RS-422 communication contains a drive and receiver. It has a failure protection circuit to ensure that the receiver output logic high level when the receiver input is open or short circuit. If all senders attached to the terminal match bus are disabled (high resistance), the receiver will output the logic high level. MAX490 With a low pendulum rate drive, it can reduce EMI and reflection due to improper cable termination, enabling error-free data transmission of up to 2 . 5 Mbps. MAX490 Is a full-duplex transceiver.

Receiver input filtering

When working in the MAX490 in 2 . 5 Mbps mode，
its receiver also includes the input filtering function in addition to having the input lag.
This filtering function improves the noise suppression ability of differential signals that rise and fall slowly.
The filter increases the receiver transmission delay by 25%.

Fail protect

The MAX490 ensures that the receiver output logic high level when the receiver input is short circuit or open circuit, or when all drives attached to the terminal matching transmission line are disabled. This was achieved by setting the receiver input threshold to-50 mV and-200 mV, respectively. If the differential receiver input voltage (A-B) is greater than or equal to-50 mV, RO is logic high level; if the voltage (A-B) is less than or equal to-200 mV, RO is logic low level.
When all the transmitters attached to the terminal matching bus are disabled, the receiver differential input voltage is pulled to 0V through the terminal resistance. According to the receiver threshold, a logical high level with a 50 mV minimum noise tolerance can be achieved. Unlike previous failure protection devices, the-50 mV to-200 mV threshold voltage meets the EIA / TIA-485 standard of ± 200 mV

256 transceivers are attached to the bus

The standard RS-485 receiver has an input impedance of 12 kΩ (1 unit load), and the standard drive drives up to 32 unit loads. MAX490 The receiver of the transceiver has a 1 / 8 unit of load input impedance (96 kΩ), allowing up to 256 transceivers to be attached in parallel to the same communication bus. These devices may be combined arbitrarily or with other RS-485 transceivers and may be attached to the same bus as long as the total load does not exceed 32 unit loads.

Reduce EMI and reflection

MAX490 Low pendulum rate drive can reduce the EMI, and reduce the reflection caused by inappropriate terminal matching cable, figure 9 shows the high frequency harmonic element in amplitude is lower than the general case, the drive along the time related to the length of the terminal, the following equation represents the relationship: Length=tRISE/(10×1.5ns/ft), tRISE is the drive along the time.

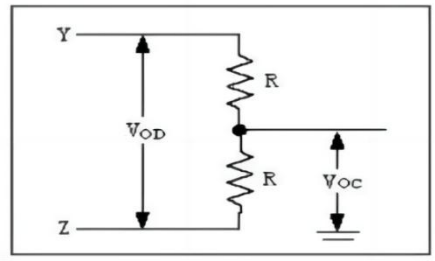


Figure 4: Drive DC test load

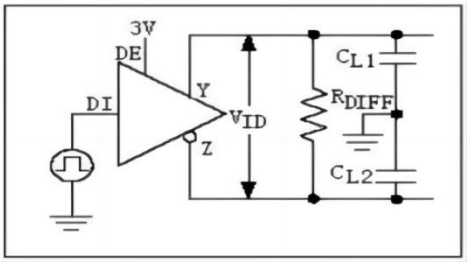


Figure 5: Drive timing test circuit

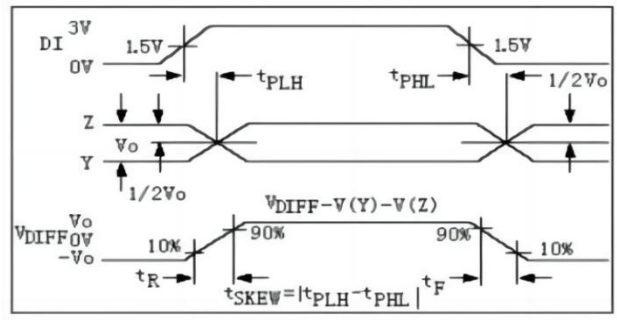


Figure 6: Driver propagation delay

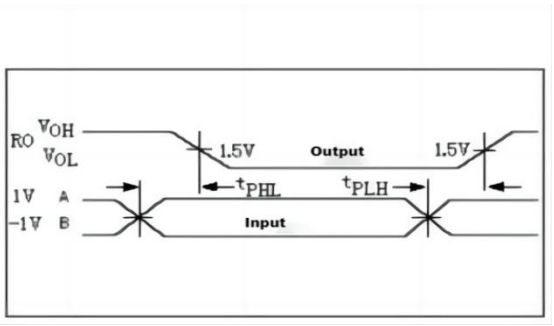


Figure 7: Receiver propagation delay

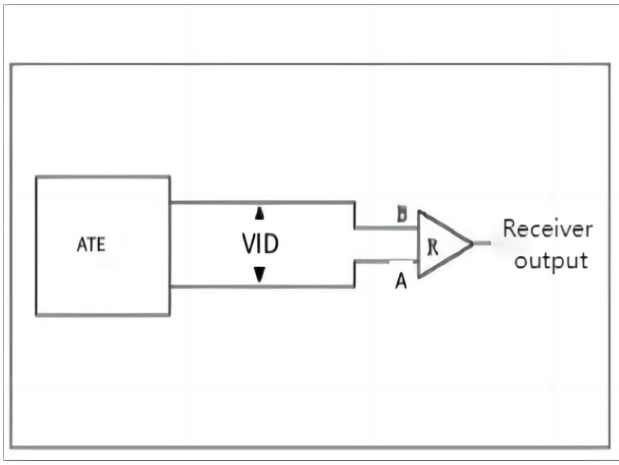


Figure 8: Receiver propagation delay test circuit

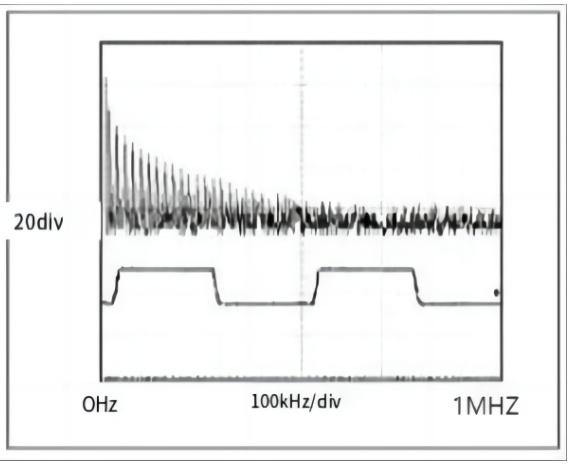


Figure 9: MAX490 driver when transmitting 20kHz signal FFT diagram of output waveform

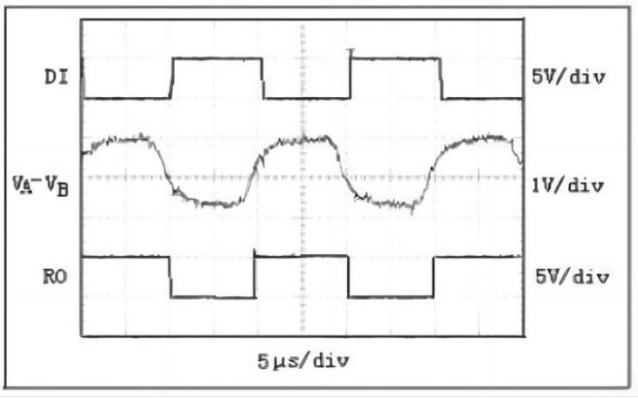
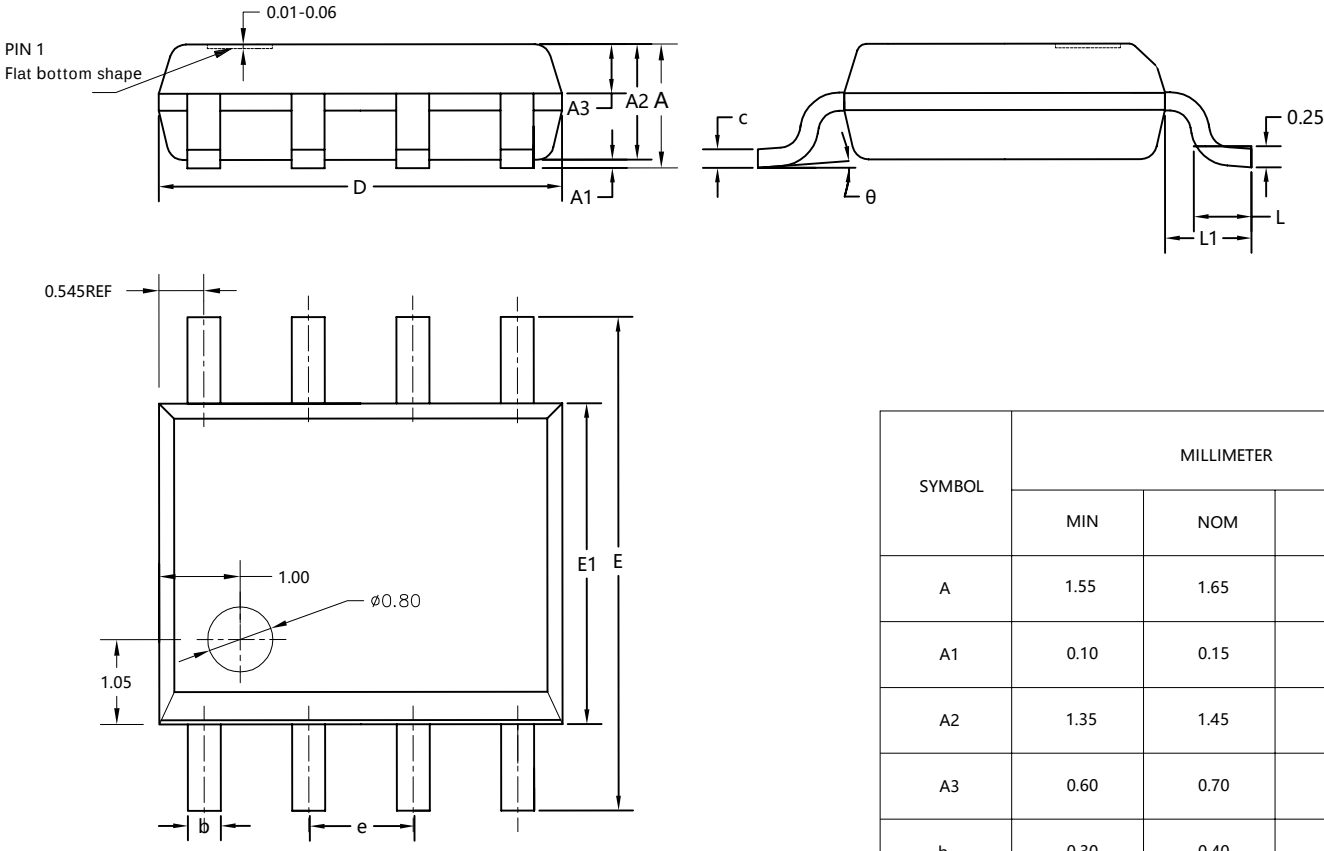


Figure 10: Driving 4000 ft cable at 50kHz MAX490 system differential voltage linear transponder

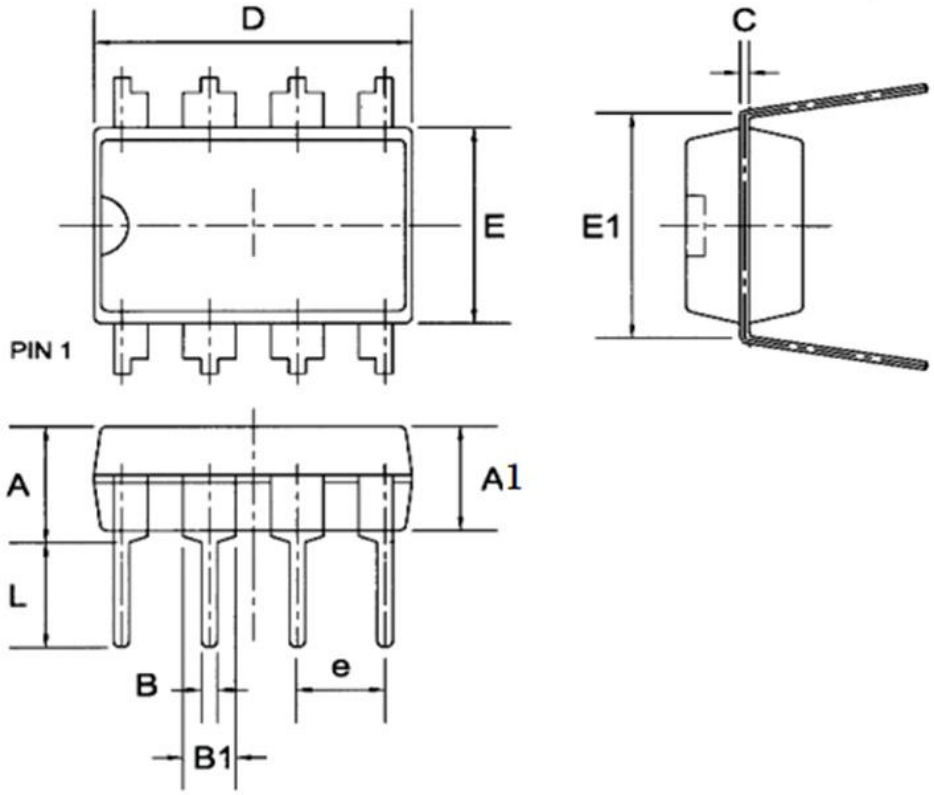
Package Outline Dimensions

SOP-8



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.55	1.65	1.75
A1	0.10	0.15	0.20
A2	1.35	1.45	1.55
A3	0.60	0.70	0.80
b	0.30	0.40	0.50
c	0.17	0.20	0.25
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.50	0.60	0.70
L1	1.05REF		
θ	0°	4°	8°

DIP-8



Symbol	Dimensions in Millimeters		
	Min	Nom	Max
A	--	--	4.31
A1	3.15	3.30	3.65
B	0.38	0.46	0.51
B1	1.27	1.55	1.77
C	0.20	0.25	0.30
D	8.95	9.40	9.45
E	6.15	6.20	6.65
E1	--	7.60	--
e	--	2.54	--
L	3.00	3.30	3.60

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