ZHHXDZ 海芯电子有限公司

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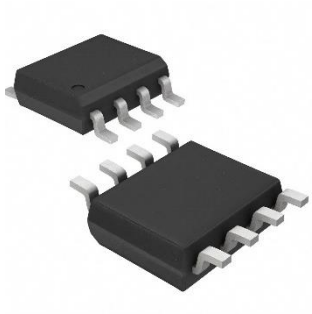
HX481-S High speed bus transceiver

The HX481-S is a high-speed RS485/RS-422 transceiver circuit that operates on a +5V power supply with half-duplex functionality. It features one driver and one receiver, achieving transmission speeds of up to 10Mbps. The circuit includes ±15KV ESD protection to safeguard the chip from electrostatic discharge.Both the driver and receiver have enable pins (DE and RE). When these pins are disabled, the output enters a high-resistance state. Additionally, the HX481-S incorporates a fail-safe circuit that ensures correct output in open or short circuits at the receiver input. The receiver's input impedance is 1/8 unit load, allowing for a maximum of 256 transceivers on the same bus.



SOP-8

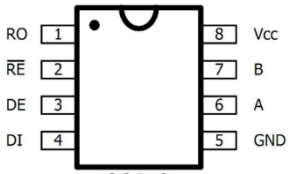
Characteristic

- Tri state output.
- Electrostatic Discharge (ESD): A/B ± 15KV, compliant with Human Body Mode (HBM) standards.
- The bus allows up to 256 transceivers to be connected.
- Maximum data speed of 10 Mbps
- Adopting SOP8 encapsulation.

Application

- Industrial control
- RS485/RS422
- interfaceIndustrial motor drive
- Automated HVAC system

Chip Pin Description		
ID	NUME	Function
1	RO	Receiver data output
2	$\overline{RE}$	The receiver output is effective at low levels and high when high.
3	DE	SET: High valid when DE low, output high
4	DI	Drive data input
5	GND	Ground
6	A	Driver data output, receiver data input
7	B	Driver data output, receiver data input
8	Vcc	power supply



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Driver Truth Table			
Input	Enable	Output	
DI	DE	A	B
H	H	H	L
L	H	L	H
X	L	Z	Z

Receiver Truth Table			
Input			Output
$\overline{RE}$	DE	A-B	RO
L	X	≥-50mV	H
L	X	≤-200mV	L
L	X	open circuit	H
L	X	short circuit	H
H	H	X	Z
H	L	X	Z

Dc Electrical Parameter Limiting Parameter				
SYMBOL	PARAMETER NAME	MIN	MAX	UNIT
VCC	Supply voltage		+6.0	V
DE，RE	Control input voltage	-0.5	+6.0	V
DI	Drive input voltage	-0.5	+6.0	V
A,B	Drive output voltage/receive input voltage	-7.0	+12.0	V
RO	Receiving output voltage	-0.3	Vcc+0.3	V
TSTG	Storage temperature range	-55	+150	℃
TOP	Operating temperature range	-40	+85	℃
TMOP	Maximum operating temperature range	-55	+125	℃
P_D	SOP-8 (+70℃ or above)		470	mW
T_L	Solder temperature (10 seconds)		+300	℃

DC characteristics (unless otherwise specified, Vcc=5V ± 5%, TA=25 ℃) 2							
ARGUMENT	SYMBOL	Test condition		MIN	TYP	MAX	UNIT
Working voltage range	Vcc			4.5		5.5	V
Driver differential output (no load)	VOD1	-		-		5	V
Driver differential output (with load)	VOD2	R=54ΩorR=27Ω Figure 1		1.5		-	V
AVDV_DO_Driver1	ΔV_{OD}			-		0.2	V
Driver common mode output voltage	VOC			1		3	V
ΔVCOM_DRV1	ΔV_{OC}					0.2	V
Input high voltage	VIH	DE,RE ,DI		2			V
Input undervoltage	VIL	DE,RE ,DI				0.8	V
Input current	IIN1	DE,RE ,DI				±2	uA
Input current (A, B)	IIN2	DE=0V,Vcc=5V	V_{IN}=5V		40	90	uA
			V_{IN}=0V		60	100	
Receiver differential input threshold voltage	VTH	-7V ≤V_{CM}≤+12V		-200		-50	mV
Receiver input delay	ΔV_{TH}				25		mV
Receiver output high level	VOH	I_O=-8mA		4			V
Receiver output low level	VOL	I_O=8mA				0.4	V
RT-HI-OC	IOZR	0.4V ≤V_o≤2.4V				1	uA
Receiver input impedance	RIN	-7V ≤V_{CM}≤+12V		96			kΩ
No load operating current	ICC	no-load	DE = Vcc		480	600	uA
		RE=DI=GND or Vcc	DE=GND		450	600	uA
Receiver output short-circuit current	IOSR	0V ≤VRO≤VCC				95	mA
ESD protection		Between A/B, human body mode		±8	±15		kV

Switch characteristics not specified otherwise Vcc=5V±5%，TA=25℃						
Parameter	Symbol	Test Conditions	MIN	TYP	MAX	UNIT
Drive input to output	tDPLH	R_{DIFF}=50Ω C_{L1}=C_{L2}=100Pf Figure3，5		34	60	nS
	tDPHL			34	60	nS
Driver output offset tDPLH – tDPHL	tDSKEW			-2.5	±10	nS
Drive up and down time	tDR			10	25	nS
	tDF			10	25	nS
Driver enables high output	tDZH	C_L 00pF Figure4,6 S2 close			150	nS
Driver enables output to be low	tDZL	C_L=100pF Figure4,6 S1 close			150	nS
Drive from low to off	tDLZ	C_L=15pF Figure4,6 S1 close			100	nS
Drive from high to off	tDHZ	C_L=15pF Figure4,6 S2 close			100	nS
Receiver input to output	tRPLH	| V_{ID} | ≥2.0V;V_{ID} Rising and falling time≤15nS Figure 7,9			150	nS
	tRPHL				150	nS
Differential receiver offset	tRSKEW			0	±10	nS
The receiver stays on until output is low	tRZL	C_L=100pF Figure 2,8		20	50	nS
Enable the receiver to output high	tRZH	C_L=100pF Figure 2,8		20	50	nS
Receiver from low to off	tRLZ	C_L=100pF Figure 2,8		20	50	nS
Receiver from high to off	tRHZ	C_L=100pF Figure 2,8		20	50	nS

Driver output short-circuit current	IOD	Short circuit current between A/B		-	100	mA
Maximum data speed	fMAX		10	-	-	Mbps

Notes: 1 Δ VOD and Δ VOC respectively represent the changes in VOD and VOC when DI changes.
2 When the current flows into the device, it is positive, and when it flows out of the device, it is negative; Unless otherwise specified, all voltages are referenced to ground.

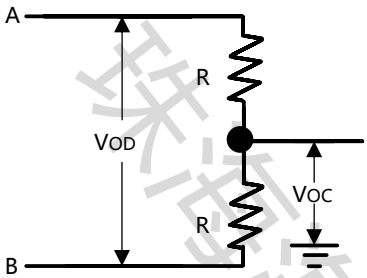


Figure 1 DC characteristic test load of driver

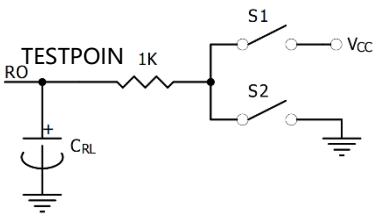


Figure 2 Receiver Enable/Off Switch Characteristics Test Load

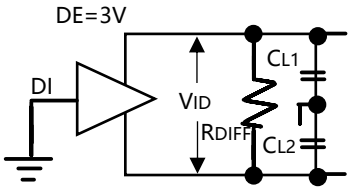


Figure 3 Driver switch characteristic test circuit

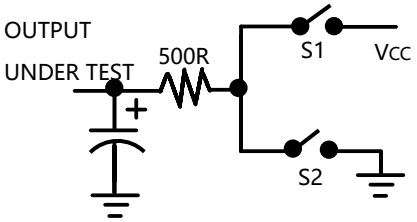


Figure 4 Driver Enable/Off Switch Characteristics Test Load

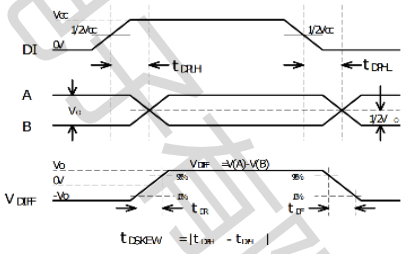


Figure 5 Drive transmission delay

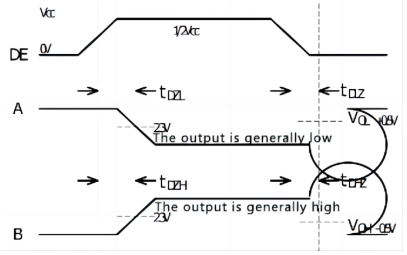


Figure 6 Driver Enable/Off Timing

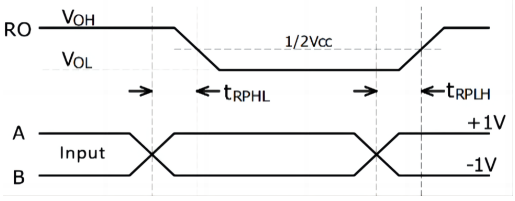
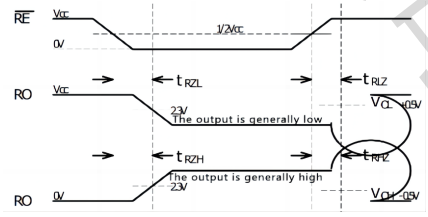


Figure 7 Receiver transmission delay



Figur e 8 Receiver Enable/Off Timing

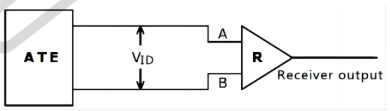
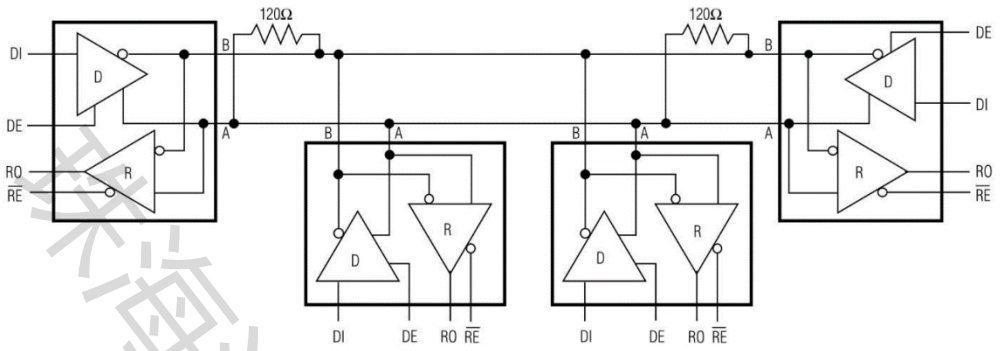


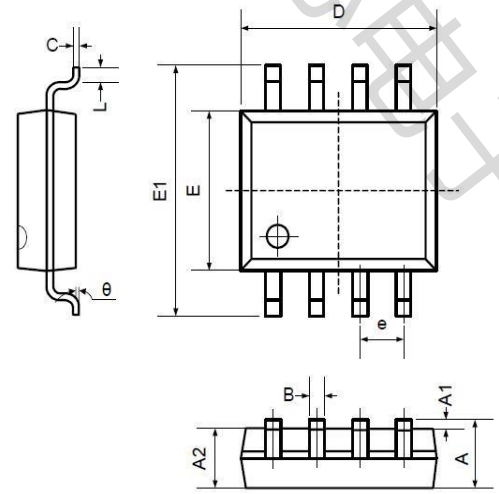
Figure 9 Receiver Transmission Delay Test

Typical Application

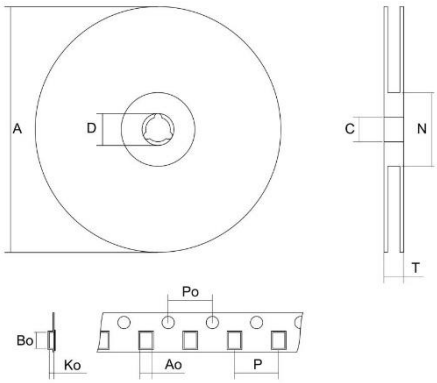


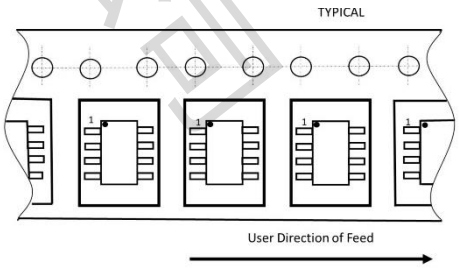
Packaging and packaging

SOP8 (Package Outline Dimensions)



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°





Packaging Method	Number
Braid	2500PCS/Disk