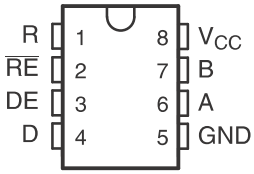
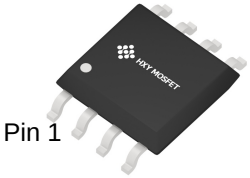
DESCRIPTION

The SP485EN-L/TR is low-power transceivers for RS-485 and RS-422 communication.
IC contains one driver and one receiver.
The driver slew rates of the SP485EN-L/TR is not limited,allowing them to transmit up to 2.5Mbps.
These transceivers draw between 120µA and 500µA of supply current when unloaded or fully loaded with disabled drivers. 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 the driver 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 SP485EN-L/TR is designed for half-duplex applications.

PIN CONFIGURATION



SOP-8(SOIC-8)



FEATURES

- Low Quiescent Current: 300µA
- -7V to +12V Common-Mode Input Voltage Range
- Three-State Outputs
- 30ns Propagation Delays, 5ns Skew
- Full-Duplex and Half-Duplex Versions Available
- Operate from a Single 5V Supply
- Allows up to 32 Transceivers on the Bus
- Data rate: 2,5 Mbps
- Current-Limiting and Thermal Shutdown for Driver Overload Protection

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 12V
Control Input Voltage -0.5V to (V_{CC} + 0.5V)

Driver Input Voltage (DI) -0.5V to (V_{CC}+ 0.5V)

Driver Output Voltage (A, B) -8V to +12.5V
Receiver Input Voltage (A, B) -8V to +12.5V
Receiver Output Voltage (RO) -0.5V to (V_{CC}+0.5V)

Continuous Power Dissipation (T_A= +70°C)
8-Pin SO (derate 5.88mW/°C above +70°C) 471mW
Operating Temperature Ranges0°C to +70°C
Storage Temperature Range -65°C to +160°C
Lead Temperature (soldering, 10sec) +300°C

APPLICATIONS

- Industrial Networks
- Utility Meters
- Motor Control

DC ELECTRICAL CHARACTERISTICS

(V_{CC} = 5V ±5%, T_A = T_{MIN} to T_{MAX}, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Differential Driver Output (no load)	V_{OD1}					5	V
Differential Driver Output (with load)	V_{OD2}	R = 50Ω (RS-422)		2			V
		R = 27Ω (RS-485), Figure 4		1.5		5	
Change in Magnitude of Driver Differential Output Voltage for Complementary Output States	ΔV_{OD}	R = 27Ω or 50Ω, Figure 4				0.2	V
Driver Common-Mode Output Voltage	V_{OC}	R = 27Ω or 50Ω, Figure 4				3	V
Change in Magnitude of Driver Common-Mode Output Voltage for Complementary Output States	ΔV_{OD}	R = 27Ω or 50Ω, Figure 4				0.2	V
Input High Voltage	V_{IH}	DE, DI, $\overline{RE}$		2.0			V
Input Low Voltage	V_{IL}	DE, DI, $\overline{RE}$				0.8	V
Input Current	I_{IN1}	DE, DI, $\overline{RE}$				±2	μA
Input Current (A, B)	I_{IN2}	DE = 0V;	V_{IN} = 12V			1.0	mA
		V_{CC} = 0V or 5.25V,	V_{IN} = -7V			-0.8	
Receiver Differential Threshold Voltage	V_{TH}	-7V ≤ V_{CM} ≤12V		-0.2		0.2	V
Receiver Input Hysteresis	ΔV_{TH}	V_{CM} = 0V			70		mV
Receiver Output High Voltage	V_{OH}	I_O = -4mA, VID = 200mV		3.5			V
Receiver Output Low Voltage	V_{OL}	I_O = 4mA, VID = -200mV				0.4	V
Three-State (high impedance) Output Current at Receiver	I_{OZR}	0.4V ≤ V_O ≤ 2.4V				±1	μA
Receiver Input Resistance	R_{IN}	-7V ≤ V_{CM} ≤ 12V					kΩ

DC ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 5V ±5%, T_A = T_{MIN} to T_{MAX}, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
No-Load Supply Current	I_{CC}	DE = V_{CC}		500	900	
		$\overline{RE}$ = 0V or V_{CC}		300	500	μA
		DE = 0V				
Driver Short-Circuit Current,						
	I_{OSD1}	-7V ≤ V_O ≤ 12V (Note 4)	35		250	mA
V_O = High						
Driver Short-Circuit Current,						
	I_{OSD2}	-7V ≤ V_O ≤12V (Note 4)	35		250	mA
V_O = Low						
Receiver Short-Circuit Current	I_{OSR}	0V ≤ V_O ≤ V_{CC}	7		95	mA

SWITCHING CHARACTERISTICS

(V_{CC} = 5V ±5%, T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Notes 1, 2)

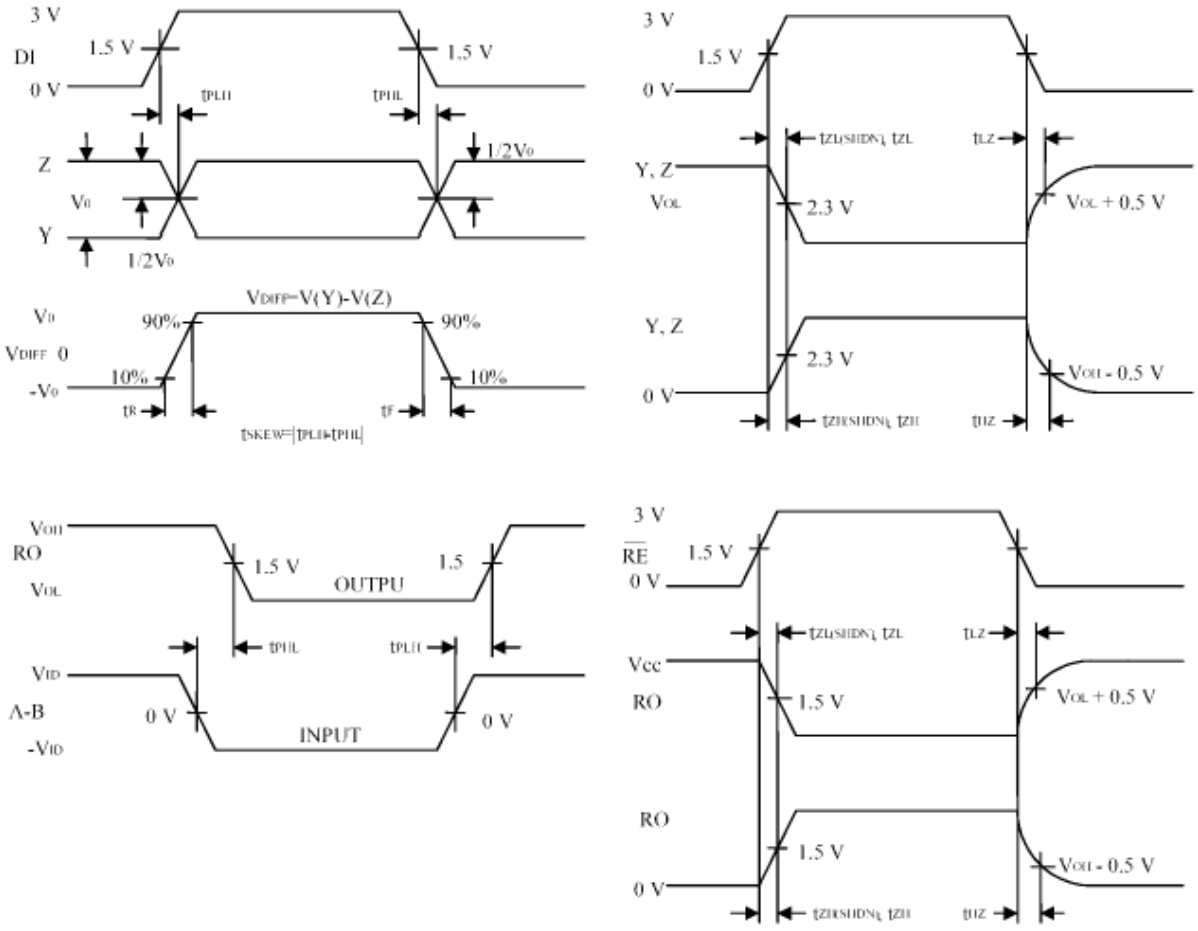
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Driver Input to Output	t_{PLH}	R_{DIFF} = 54Ω	10	30	60	ns
	t_{PHL}	C_{L1} = C_{L2} = 100pF	10	30	60	
Driver Output Skew to Output	t_{SKEW}	R_{DIFF} = 54Ω, CL1 = CL2 = 100pF		5	10	ns
Driver Enable to Output High	t_{ZH}	C_L= 100pF, S2 closed		40	70	ns
Driver Enable to Output Low	t_{ZL}	C_L= 100pF, S1 closed		40	70	ns
Driver Disable Time from Low	t_{LZ}	C_L= 15pF, S1 closed		40	70	ns
Driver Disable Time from High	t_{HZ}	C_L= 15pF, S2 closed		40	70	ns
| tPLH - tPHL | Differential	t_{SKD}	R_{DIFF} = 54Ω		13		ns
Receiver Skew		C_{L1} = C_{L2} = 100pF				
Receiver Enable to Output Low	t_{ZL}	C_{RL} = 15pF, S1 closed		20	50	ns
Receiver Enable to Output High	t_{ZH}	C_{RL} = 15pF, S2 closed		20	50	ns
Receiver Disable Time from Low	t_{LZ}	C_{RL} = 15pF, S1 closed		20	50	ns
Receiver Disable Time from High	t_{HZ}	C_{RL} = 15pF, S2 closed		20	50	ns
Maximum Data Rate	f_{MAX}		2.5			Mbps

TABLEOF SP485EN OPERATION

Transmission					**Receipt**			
Inputs			**Outputs** X		**Inputs**			**Outputs**
RE	DE	DI	Z	Y	RE	DE	A-B	RO
X	1	1	0	1	0	0	+0.2V	1
X	1	0	1	0	0	0	-0.2V	0
0	0	X	Z	Z	0	0	open	1
1	0	X	Z	Z	1	0	X	Z

X-don’t care
Z-high resistance

OPERATIONTIMINGDIAGRAMSOF SP485EN

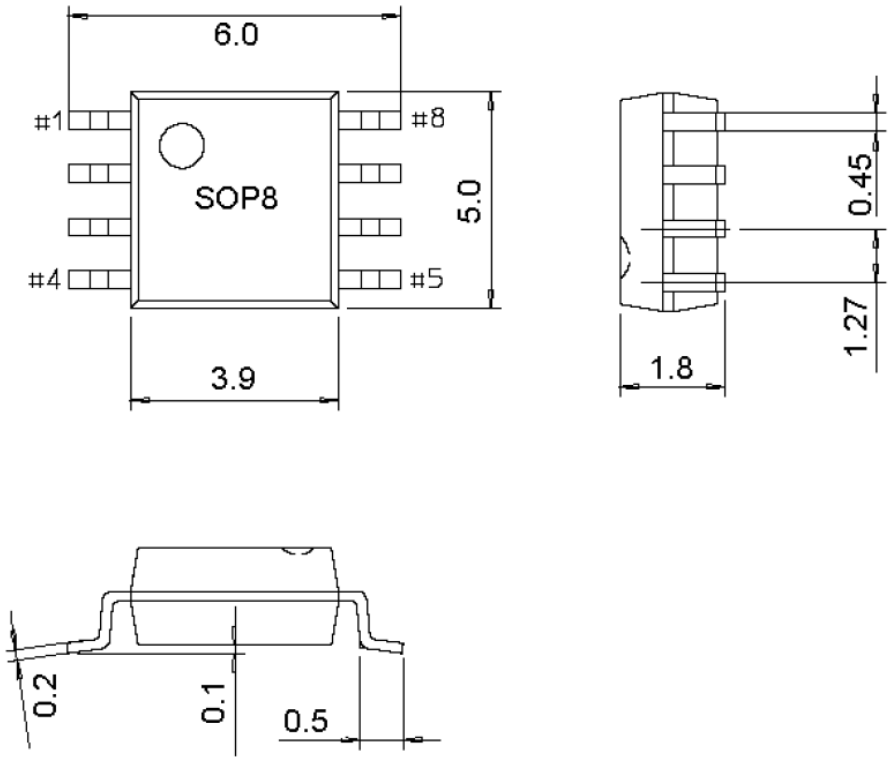


ORDERING GUIDE

Model	Package Description	Qty(PCS)
SP485EN	SOP-8(SOIC-8)	3000

PACKAGE OUTLINE DIMENSIONS

SOP-8(SOIC-8)



Attention

■ Any and all HUA XUAN YANG ELECTRONICS products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.

■ HUA XUAN YANG ELECTRONICS assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein.

■ Specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

■ HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could
give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

■ In the event that any or all HUA XUAN YANG ELECTRONICS products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

■ Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

■ Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the HUA XUAN YANG ELECTRONICS product that you intend to use.