DESCRIPTION

SP3485EN is an RS-485 transceiver with a 3.3V power supply, half duplex, low power consumption, and fully functional compliance with TIA/EIA-485 standards. SP3485EN includes a driver and a receiver, both of which can be independently enabled and disabled. When both are disabled, both the driver and receiver output a high resistance state. SP3485EN has a 1/8 load and allows 256 SP3485EN transceivers to be connected together on the same communication bus. Can achieve error free data transmission up to 12Mbps.
The working voltage range of SP3485EN is 3.0~3.6 V, and it has functions such as fail safe, over temperature protection, current limiting protection, and overvoltage protection.

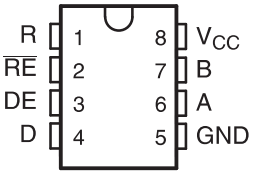
ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 7V
Control Input Voltage -0.3V to +7V
Driver Input Voltage (DI) -0.3V to +7V

Driver Output Voltage (A, B) -7V to +13V
Receiver Input Voltage (A, B) -7V to +13V
Receiver Output Voltage (RO) -0.3V to +7V

Continuous Power Dissipation (T_A= +70°C)
8-Pin SO (derate 5.88mW/°C above +70°C) 400mW
Operating Temperature Ranges0°C to +70°C
Storage Temperature Range -65°C to +150°C
Lead Temperature (soldering, 10sec) +300°C

PIN CONFIGURATION



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FEATURES

- 3.3V power supply, half-duplex
- 1/8 unit load, allowing up to 256 devices to be connected to the bus
- Driver short circuit output protection
- Over temperature protection function
- Low power shutdown function
- Receiver open circuit failure protection
- Has strong noise resistance
- Integrated transient voltage resistance function
- The data transmission rate in an electrical noise environment can reach 12Mbps

APPLICATIONS

- Industrial Networks
- Utility Meters
- Motor Control

DC ELECTRICAL CHARACTERISTICS

(V_{CC} = 3.3V ±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}				3.3		V
Differential Driver Output (with load)	V_{OD2}	R = 54Ω (RS-422)		1.5		VCC	V
		R = 100Ω (RS-485)		2		VCC	
Change in Magnitude of Driver Differential Output Voltage for Complementary Output States	ΔV_{OD}	R = 54Ω				0.2	V
Driver Common-Mode Output Voltage	V_{OC}	R = 54Ω				3	V
Change in Magnitude of Driver Common-Mode Output Voltage for Complementary Output States	ΔV_{OD}	R = 54				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			125	μA
		V_{CC} = 0V or 3.3V,	V_{IN} = -7V	-100			
Receiver Differential Threshold Voltage	V_{TH}	-7V ≤ V_{CM} ≤12V		-0.2		0.2	V
Receiver Input Hysteresis	ΔV_{TH}	V_{CM} = 0V		10	30		mV
Receiver Output High Voltage	V_{OH}	I_O = -2.5mA, VID = 200mV		VCC-1.5			V
Receiver Output Low Voltage	V_{OL}	I_O = 2.5mA, 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		96			kΩ

DC ELECTRICAL CHARACTERISTICS (continued)

(V_{CC} = 3.3V ±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}		520	800	
		$\overline{RE}$ = 0V or V_{CC}		540	700	μA
		DE = 0V				
Driver Short-Circuit Current,	I_{OSD}				±250	mA

SWITCHING CHARACTERISTICS

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

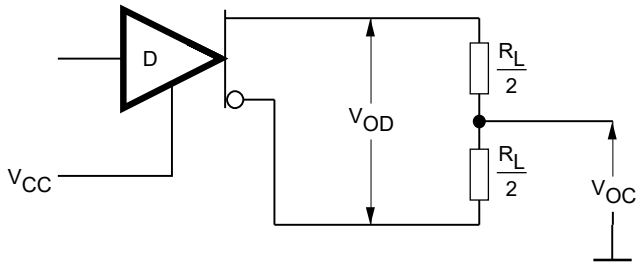
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Driver Input to Output	t_{PLH}	R_{DIFF} = 27Ω		8	35	ns
	t_{PHL}	C_{L1} = C_{L2} = 100pF		8	35	
Driver Output Skew to Output	t_{SKEW}	R_{DIFF} = 60Ω, CL1 = CL2 = 100pF		10	35	ns
Driver Enable to Output High	t_{ZH}	C_L= 110pF, S2 closed		20	90	ns
Driver Enable to Output Low	t_{ZL}	C_L= 110pF, S1 closed		20	90	ns
Driver Disable Time from Low	t_{LZ}	C_L= 110pF, S1 closed		20	80	ns
Driver Disable Time from High	t_{HZ}	C_L= 110pF, S2 closed		20	80	ns
| tPLH - tPHL | Differential	t_{SKD}	R_{DIFF} = 54Ω		7	10	ns
Receiver Skew		C_{L1} = C_{L2} = 100pF				
Receiver Enable to Output Low	t_{ZL}	C_{RL} = 15pF, S1 closed		20	45	ns
Receiver Enable to Output High	t_{ZH}	C_{RL} = 15pF, S2 closed		20	45	ns
Receiver Disable Time from Low	t_{LZ}	C_{RL} = 15pF, S1 closed		200	1400	ns
Receiver Disable Time from High	t_{HZ}	C_{RL} = 15pF, S2 closed		200	1400	ns

TABLEOF SP3485EN OPERATION

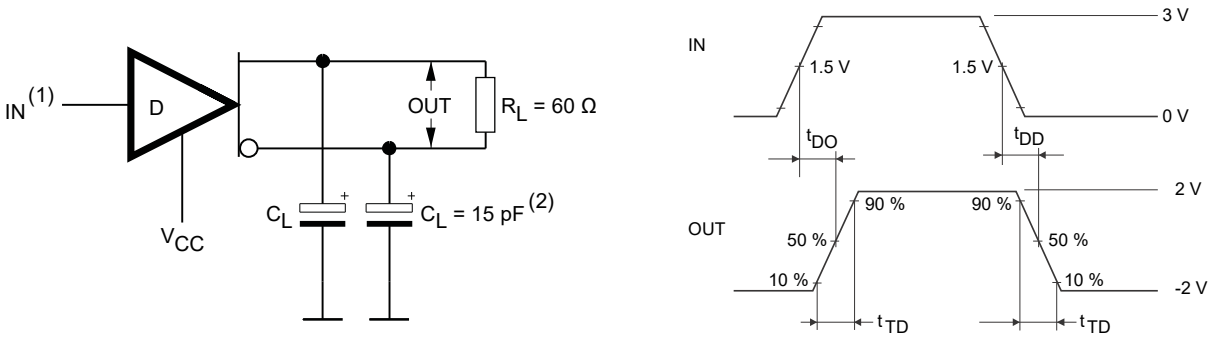
Transmission					**Receipt**			
Inputs			**Outputs** X		**Inputs**			**Outputs**
RE	DE	DI	A	B	RE	DE	A-B	RO
X	1	1	H	L	0	X	≥+0.2V	H
X	1	0	L	H	0	X	≤-0.2V	L
0	0	X	Z	Z	0	X	On/Short Circuit	H
1	0	X	Z(shutdown)		1	X	X	Z

X-Any level
Z-High resistance

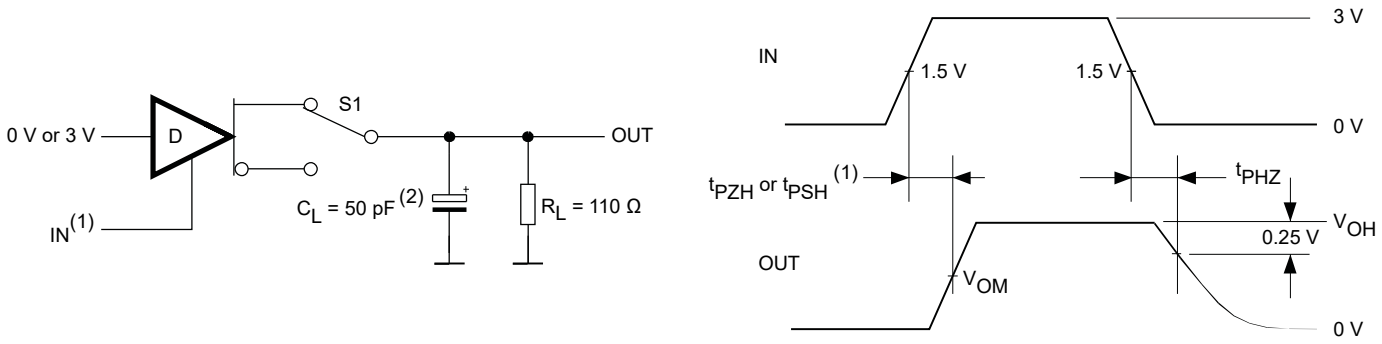
TEST CIRCUITS



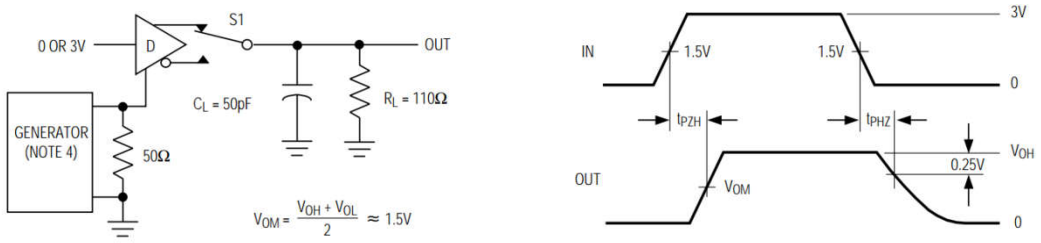
Driver and VOC test load



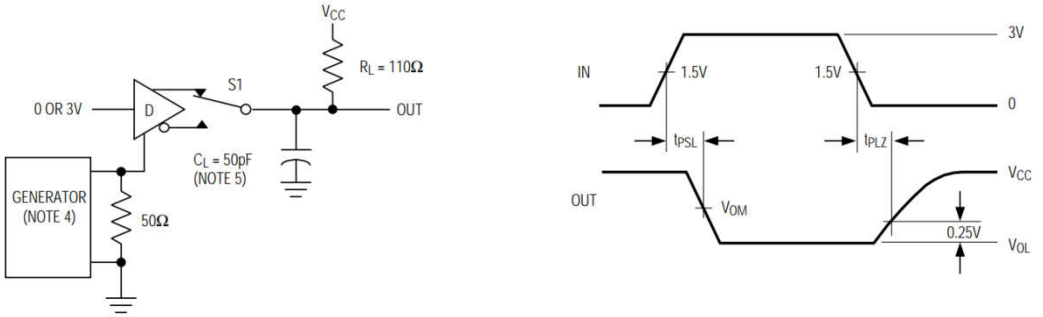
Driver differential delay and transition time



Drive propagation delay



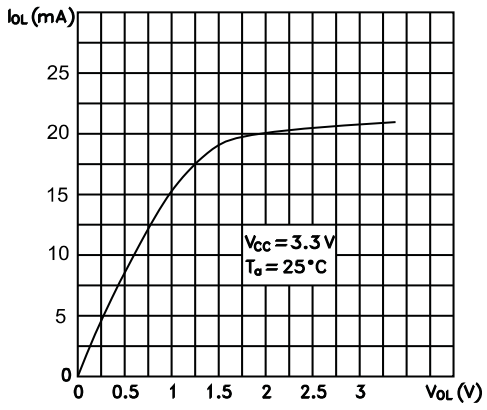
Drive enable and disable time



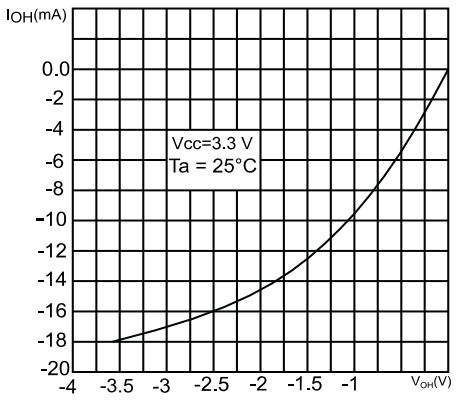
Drive enable and disable times test circuit (pull-up configuration)

TYPICAL CHARACTERISTICS

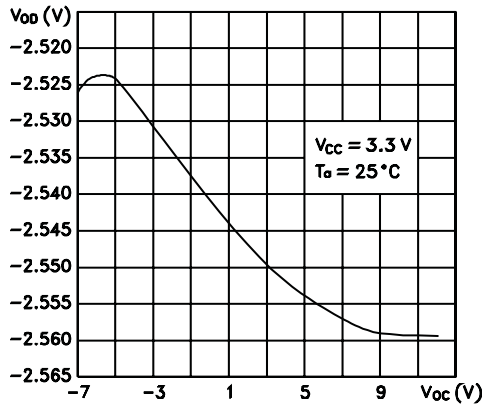
Receiver output current vs. output low voltag



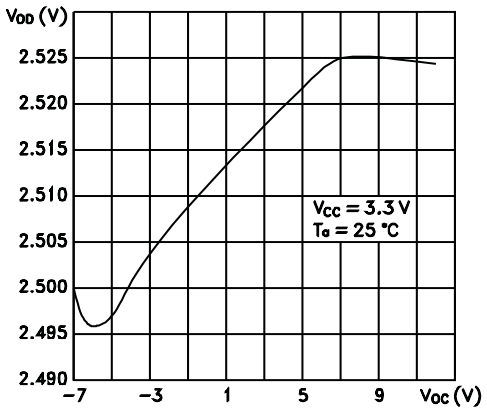
Receiver output current vs. output high voltag



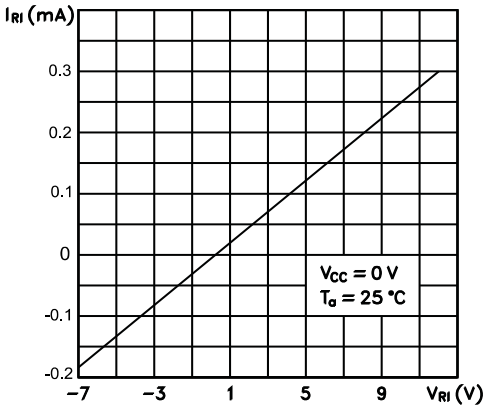
Low level driver output capability



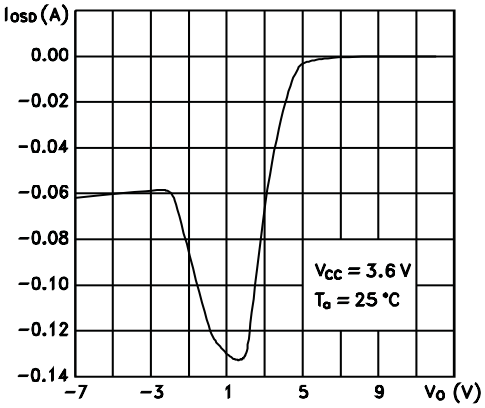
High level driver output capability



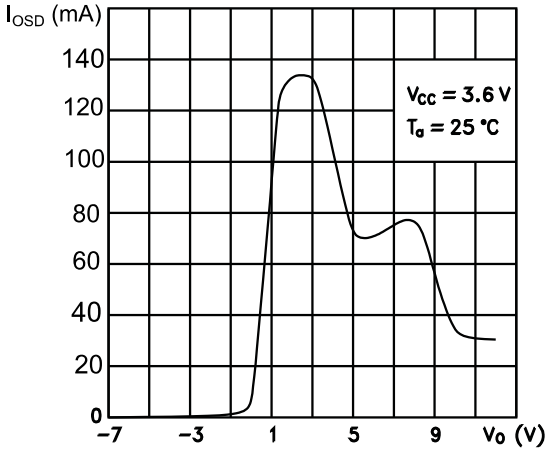
Receiver input characteristics



Driver short-circuit current



Driver short-circuit current



PACKAGE OUTLINE DIMENSIONS

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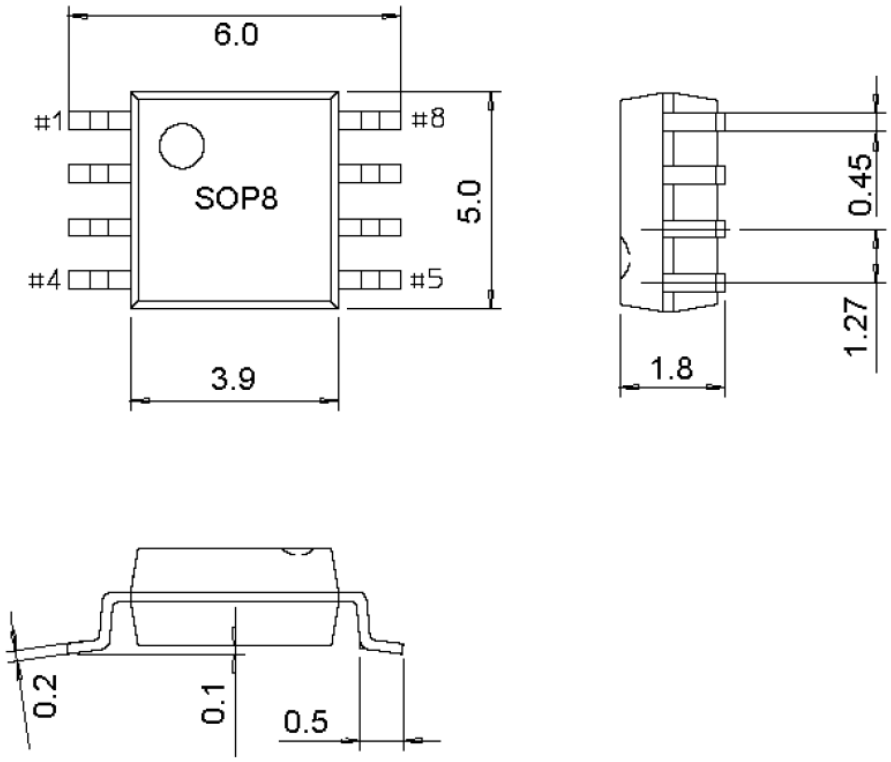

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