DESCRIPTION

The HSN65LBC184DRG4 is a half-duplex RS-485 transceiver with ±15kV IEC 61000-4-2 contact discharge protection. The HSN65LBC184DRG4 contains one driver and one receiver. The device features fail-safe circuitry, which guarantees a logic-high receiver output when the receiver inputs are open or shorted. This means that the receiver output will be logic high even if all transmitters on a terminated bus are disabled.

The H SN65LBC184DRG4 features reduced slew-rate driver that minimizes EMI and reduces reflections caused by improperly terminated cables, allowing error-free data transmission up to 500kbps. The HSN65LBC184DRG4 has a 1/8-unit load receiver input impedance that allows up to 256 transceivers on the bus.

FEATURES

TIA/EIA RS-485/RS-422 compliant ESD protection

Integrated Transient Voltage Suppression

Contact discharge ±15 KV

Data rates: 500 kbps

Half-duplex Reduced slew rates for low EMI

Common-mode input range: −7 V to +12 V

APPLICATIONS

RS-485 Communications

Level Translators

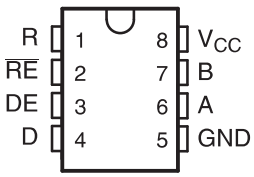
Transceivers for EMI-Sensitive Applications

Industrial Control Local Area Networks

Energy Meter Networks

Lighting Systems

PIN CONFIGURATION



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Pin Functions

PIN		I/O	DESCRIPTION
NAME	NO.		
A	6	Bus input/output	Driver output or receiver input (complementary to B)
B	7	Bus input/output	Driver output or receiver input (complementary to A)
D	4	Digital input	Driver data input
DE	3	Digital input	Active-HIGH driver enable
GND	5	Reference potential	Local device ground
R	1	Digital output	Receiver data output
$\overline{RE}$	2	Digital input	Active-LOW receiver enable
V_{CC}	8	Supply	4.75-V to 5.25-V supply

FEATUER DESCRIPTION

Transmitting				
Inputs			Outputs	
/RE	DE	DI	B	A
X	1	1	0	1
X	1	0	1	0
0	0	X	High-Z	High-Z
1	0	X	Shutdown	

Receiving			
Inputs		Outputs	
/RE	DE	A-B	RO
0	X	≥-0.05V	1
0	X	≤-0.2V	0
0	X	Open/shorted	1
1	1	X	High-Z
1	0	X	Shutdown

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	Units
Power Supply	V_{CC}	+7	V
Control Input Voltage	/RE, DE	-0.3 to V_{CC}+0.3	V
Transmitter Input Voltage	DI	-0.3 to V_{CC}+0.3	V
Transmitter Output Voltage	A, B	-8 to +13	V
Receiver Input Voltage	A, B	-8 to +13	V
Receiver Output Voltage	RO	-0.3 to V_{CC}+0.3	V
Operating Temperature	--	-25 to +85	℃

RECOMMENDED OPERATING CONDITIONS

（V_{CC}=+5V±5%, T_A=-40℃～+85℃， Typical Values are V_{CC}=+5V and T_A=25℃）（Note 1）

Parameter	Symbol	Conditions		MIN	TYP	MAX	UNITS
Power Supply	Vcc			4.5		5.5	V
Driver							
Differential Driver Output (no load)	V_{OD1}	Figure 1				5	V
Differential Driver Output	V_{OD2}	Figure 1, R = 27 Ω		1.5			V
Change in Magnitude of Differential Output Voltage (Note 2)	ΔV_{OD}	Figure 1, R = 27 Ω				0.2	V
Driver Common-mode Output Voltage	V_{OC}	Figure 1, R = 27 Ω				3	V
Change in Magnitude of Common-Mode	ΔV_{OC}	Figure 1, R = 27 Ω				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 Hysteresis	V_{HYS}				100		mV
Input Current (A and B)	I_{IN4}	DE = GND, V_{CC} = GND or 5.25V	V_{IN} = 12 V			125	μA
			V_{IN} = -7 V			-75	
Driver Short-Circuit Output Current	I_{OSD}	-7V ≦ V_{OUT} ≦ V_{CC}		-100			mA
		0V ≦ V_{OUT} ≦ 12V				100	
Receiver							
Receiver Differential Threshold Voltage	V_{TH}	-7V ≦ V_{CM} ≦ 12V		-200	-125	-50	mV
Receive Input Hysteresis	$\triangle V_{TH}$				40		mV
Receiver Output High Voltage	V_{OH}	I_O = -4 mA, V_{ID} = -50 mV		V_{CC}-1.5			V
Receiver Output Low Voltage	V_{OL}	I_O = 4 mA, V_{ID} = -200 mV				0.4	V
Three-State Output Current at Receiver	I_{OZR}	0.4V ≦ V_O ≦ 2.4V				±1	μA
Receive Input Resistance	R_{IN}	-7V ≦ V_{CM} ≦ 12V		96			kΩ
Receiver Output Short-Circuit Current	I_{OSR}	0V ≦ V_{RO} ≦ V_{CC}		±7		±95	mA
Supply Current							
Supply Current	I_{CC}	No load; /RE = DI = GND or V_{CC}	DE = V_{CC}		150	600	μA
			DE = GND		185	600	μA
Supply Current in Shutdown Mode	I_{SHDN}	DE = GND, /RE = V_{CC}, DI = V_{CC} or GND				10	μA

Note 1：All currents into the device are positive. All currents out of the device are negative. All voltages are referred to device ground unless otherwise noted.

Note 2：$\triangle V_{OD}$ and $\triangle V_{OC}$ are the changes in V_{OD} and V_{OC}, respectively, when the DI input changes state.

SWITCHING CHARACTERISTICS

（V_{CC}=+5V±5%, TA=-40℃～+85℃， Typical Values are V_{CC}=+5V and TA＝25℃）

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNITS
Driver Input to Output	T_{DPLH}	Figure 3 and 5, R_{DIFF} = 54 Ω C_{L1} = C_{L2} = 100 pF		450	800	ns
	T_{DPHL}			450	800	
Driver Output Skew $\|T_{DPLH} - T_{DPHL}\|$	T_{DSKEW}	Figure 3 and 5, R_{DIFF} = 54 Ω C_{L1} = C_{L2} = 100 pF			100	ns
Driver Rise or Fall Time	T_{DR}, T_{DF}	Figure 3 and 5, R_{DIFF} = 54 Ω C_{L1} = C_{L2} = 100 pF		150	500	ns
Maximum Data Rate	F_{MAX}		500			kbps
Driver Enable to Output High	T_{DZH}	Figure 4 and 6, C_L = 100 pF, S2			200	ns
Driver Enable to Output	T_{DZL}	Figure 4 and 6, C_L = 100 pF, S1			200	ns
Driver Disable Time from Low	T_{DLZ}	Figure 4 and 6, C_L = 15 pF, S1			300	ns
Driver Disable Time from High	T_{DHZ}	Figure 4 and 6, C_L = 15 pF, S2			300	ns
Receiver Input to Output	T_{RPLH} T_{RPHL}	Figure 7 and 9, $\|V_{ID}\| \geq 2.0V$, rise and fall time of $V_{ID} \leqq 1$ 5ns		450	800	ns
$\|T_{RPLH} - T_{RPHL}\|$ Differential Receiver Skew	T_{RSKD}	Figure 7 and 9, $\|V_{ID}\| \geq 2.0V$, rise and fall time of$V_{ID} \leqq$15ns		30		ns
Receiver Enable to Output Low	T_{RZL}	Figure 2 and 8, C_L = 100 pF, S1		20	50	ns
Receiver Enable to Output High	T_{RZH}	Figure 2 and 8, C_L = 100 pF, S2 Closed		20	50	ns
Receiver Disable Time from Low	T_{RLZ}	Figure 2 and 8, C_L = 100 pF, S1 Closed		80	150	ns
Receiver Disable Time from High	T_{RHZ}	Figure 2 and 8, C_L = 100 pF, S2 Closed		80	150	ns
Time to Shutdown	T_{SHDN}			50	300	ns
Driver Enable from Shutdown to Output High	$T_{DZH(SHDN)}$	Figure 4 and 6, C_L = 15 pF, S2 Closed			200	ns
Driver Enable from Shutdown to Output Low	$T_{DZL(SHDN)}$	Figure 4 and 6, C_L = 15 pF, S1 Closed			200	ns
Receiver Enable from Shutdown to Output High	$T_{RZH(SHDN)}$	Figure 2 and 8, C_L = 100 pF, S2 Closed			300	ns
Receiver Enable from Shutdown to Output Low	$T_{RZL(SHDN)}$	Figure 2 and 8, C_L = 100 pF, S1 Closed			300	ns

TEST CIRCUITS AND TIMING DIAGRAMS

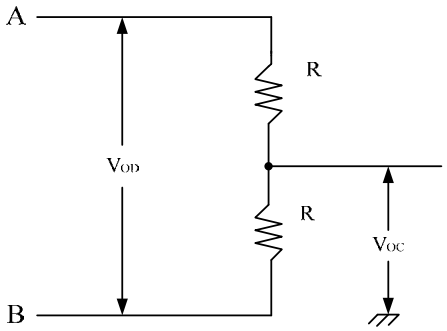

Figure 1: Driver DC Test Load

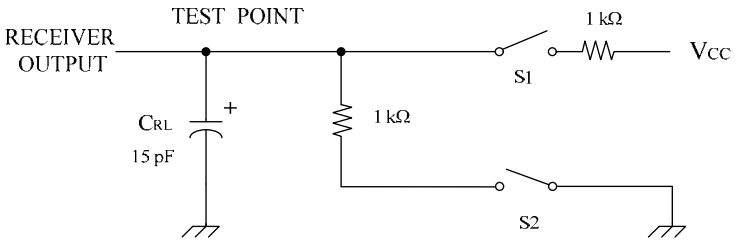

Figure 2: Receiver Enable/Disable Timing Test Load

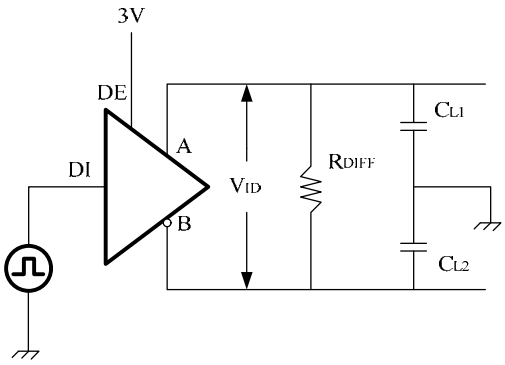

Figure 3: Driver Timing Test Circuit

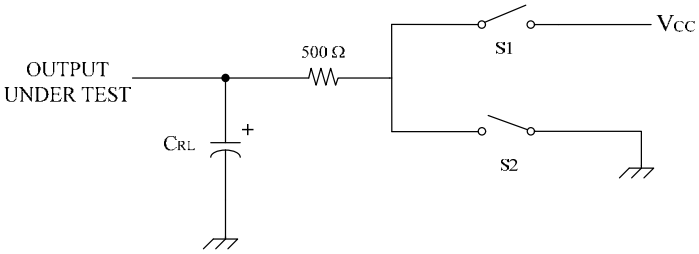

Figure 4: Driver Enable/Disable Timing test Load

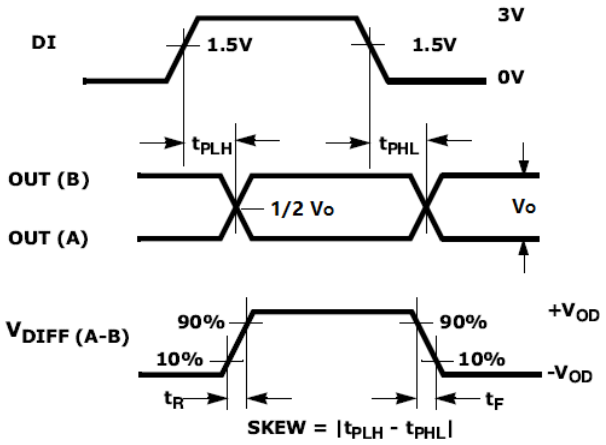

Figure 5: Driver Propagation Delays

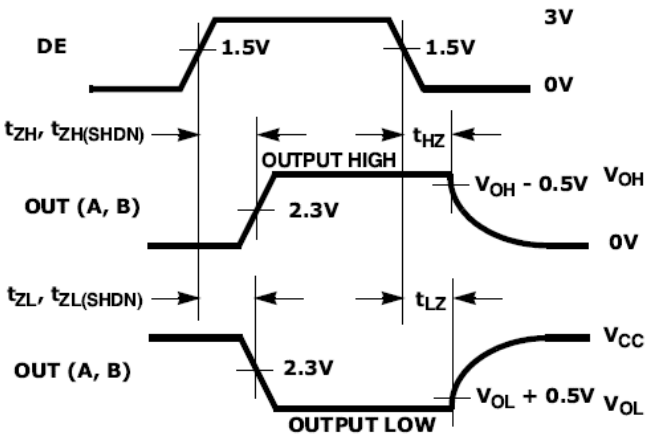

Figure 6: Driver Enable and Disable Times

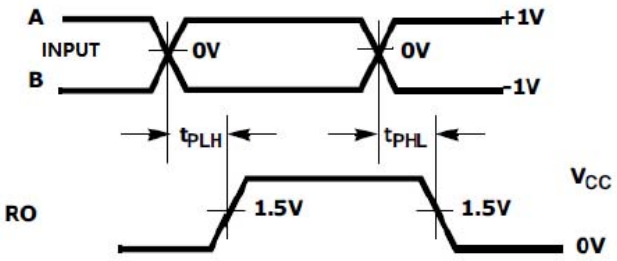

Figure 7: Receiver Propagation Delays

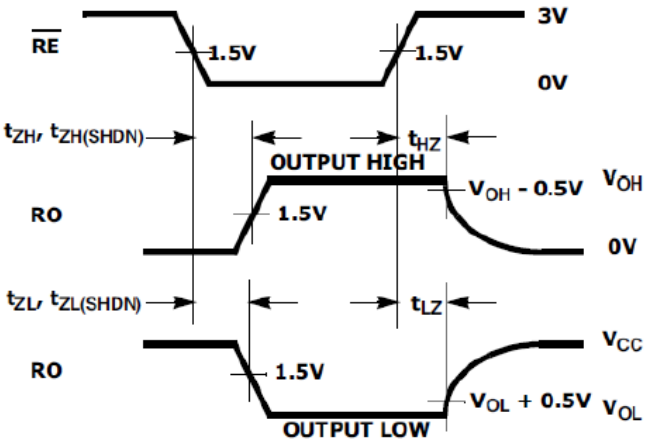

Figure 8: Receiver Enable and Disable Times

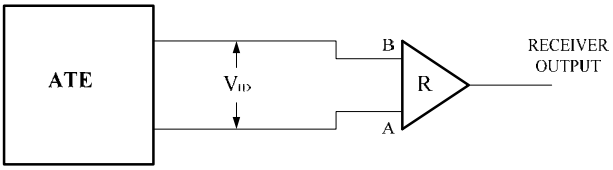

Figure 9: Receiver Propagation Delay Test Circuit

PACKAGE OUTLINE DIMENSIONS

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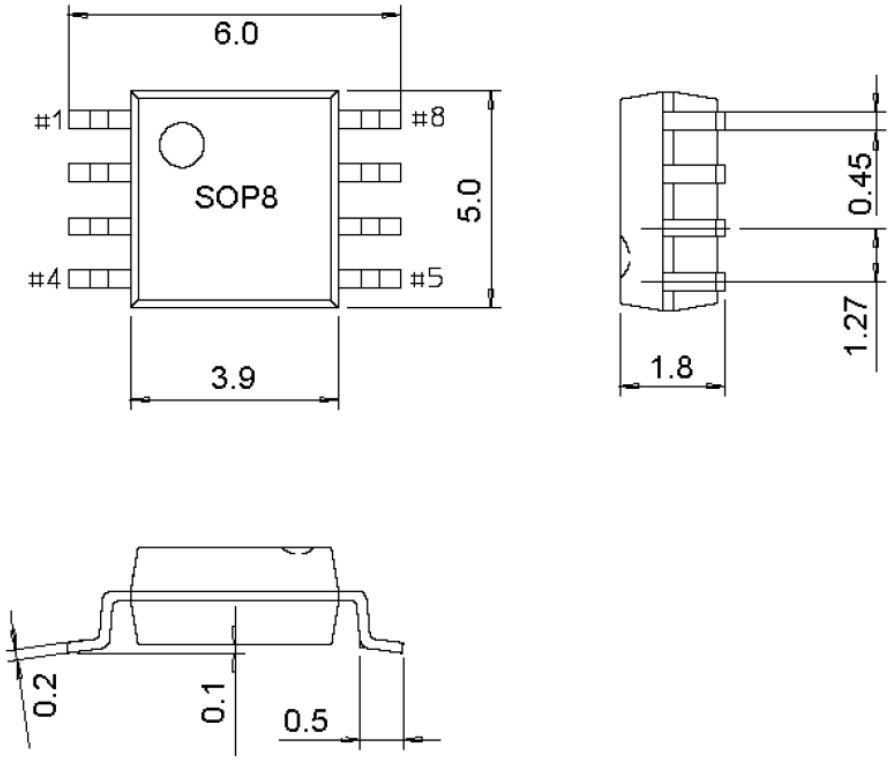

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