With fail-safe function (Fail-Safe), low power consumption, limited slew rate RS-485 transceiver

product description

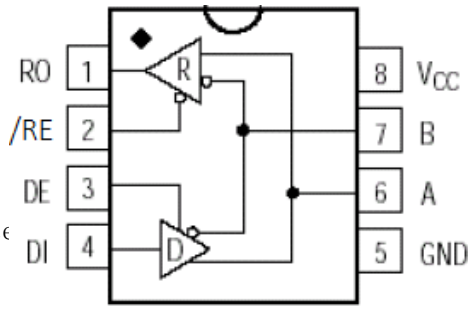
BL1585B is a 5V power supply, half-duplex RS-485 transceiver, the chip contains a driver and a receiver. The BL1585B uses a slew-rate-limited driver, which can significantly reduce EMI and reflections caused by improperly terminated cables, and realize
Now up to 500kbps error-free data transmission. BL1585B has a built-in fail-safe circuit to ensure that the output of the receiver is in a logic high state when the input of the receiver is open or short-circuited.

BL1585B receiver is 1/8 unit load, allowing up to 256 transceivers to be connected to the bus to realize half-duplex communication. BL1585B I/O pins have ± 15kV IEC 61000-4-2 contact discharge protection capability.

Product Features

- +5V working voltage
- Built-in fail-safe circuit
- Up to 500kbps transfer rate
- Allows up to 256 transceivers on the bus
- With ± 15kV IEC 61000-4-2 Contact discharge prote
- SOP8 package

Block Diagram



Application field

- smart meter
- industrial control
- security monitor

Pin definition

serial number	name	function
1	RO	receiver output
2	/RE	Receiver output enable. RO output is valid when /RE is low level; RO is high impedance state when /RE is high level
3	DE	Driver output enable. The driver output is valid when DE is high level, and the output is high impedance state when DE is low level
4	DI	drive input
5	GND	grounding
6	A	Receiver non-inverting input and driver non-inverting output
7	B	Receiver inverting input and driver inverting output
8	V_{CC}	power supply

Driver Truth Table

enter			output	
/RE	DE	DI	A	B
x	1	1	1	0
x	1	0	0	1
0	0	x	High-Z	High-Z
1	0	x	Shutdown（ High-Z ）	

Receiver value-added table

enter			output
/RE	DE	AB	RO
0	x	>-50mV	1
0	x	<-200mV	0

0	x	open / short	1
1	1	x	High-Z
1	0	x	Shutdown（ High-Z ）

Limit parameter

parameters	the symbol	limit value	unit
Operating Voltage	V_{CC}	+7	V
Control input voltage	/RE, DE	-0.3 to V_{CC}+0.3	V
Driver input voltage	DI	-0.3 to V_{CC}+0.3	V
Driver output voltage	A, B	-8~+13	V
Receiver input voltage	A, B	-8~+13	V
Receiver output voltage	RO	-0.3 to V_{CC}+0.3	V

temperature range

Operating temperature	-40~+85 ℃
storage temperature	-65~+150 ℃

DC Electrical Characteristics

（VCC =+5V ± 5% ,TA = -40℃ ~ +85℃, typical value at VCC = +5V, TA = 25℃)(Note 1)

parameter	symbol	Test Conditions	minimum value	typical value	maximum value	unit
Operating Voltage	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=27Ω	1.5			V
The magnitude of the differential output voltage Variation (Note 2)	ΔV_{OD}	Figure 1, R=27Ω			0.2	V

Driver Common Mode Output Voltage	VOC_	Figure 1, R=27Ω	1.0		3.0	V
Amplitude variation of common mode voltage (Note 2)	ΔV_{OC}	Figure 1, R=27Ω			0.2	V
input high voltage	V_	DE,DI,/RE	2.0			V
input low voltage	VIL_	DE,DI,/RE			0.8	V

DI input hysteresis	V_{HYS}				100		mV
Input Current（A，B）	I_{IN4}	DE=GND V_{CC} =GND or 5.25V	V_{IN} =12V			125	μA
			V_{IN} =-7V	-75			
Driver short circuit output current	I_{OSD}	-7V ≦ V_{OUT} ≦ V_{CC}		-100			mA
		0V ≦ VOUT ≦ 12V				100	
receiver							
Receiver Differential Threshold Voltage	$V_{TH\_}$	-7V ≦ VCM ≦ 12V		-200	-125	-50	mV
Receiver Input Hysteresis	△ V_{TH}				40		mV
Receiver output high voltage	V_{OH}	I_O =-8mA, V_{ID} =-50mV		4.0			V
Receiver output low voltage	V_{OL}	I_O =8mA,V_{ID} =-200mV				0.4	V
Receiver Tri-State Output Current	$QUR_{\_}$					±1	μA
Receiver input impedance	R_{IN}	-7V ≦ VCM ≦ 12V		96			KΩ
Receiver output short circuit current	$OSR_{\_}$	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
Standby Mode Supply Current	I_{SHDN}	DE=GND, /RE=VCC , DI=V_{CC} or GND				10	μA

Note 1：All currents into the device are positive and all currents out of the device are negative; all voltages are to ground unless otherwise specified. Note 2：When DI input changes state, △ V_{OD} and △ V_{OC} $V_{OD\_}$ and V_{OC} amount of change.

transmission characteristics

（VCC=+5V±5%, TA=-40℃ ~ +85℃，the typical value is VCC=+5V，TA＝25℃）

parameter	symbol	cond itio	minimu m	typica l	maximu m	unit

		n	value	value	value	
Driver input to output delay	wxya _	Figures 3 and 5, R_{DIFF} =54Ω C_{L1} =C_{L2} =100pF		450	800	ns
	t_{DPHL}			450	800	
Driver output delay difference $\|T_{DPLH} - T_{DPHL}\|$	tDSKEW _	Figures 3 and 5, R_{DIFF} =54Ω C_{L1} =C_{L2} =100pF			100	ns
Driver Rise or Fall Time	t_{DR}, t_{DF}	Figures 3 and 5, R_{DIFF} =54Ω C_{L1} =C_{L2} =100pF		150	500	ns
maximum rate	F_{MAX}		500			kbps

Driver Enable to Output High	wxya _	Figures 4 and 6, C_L =100pF S2 Closed			200	ns
Driver Enable to Input low level	wxya _	Figures 4 and 6, C_L =100pF S1 Closed			200	ns
drives the output low from the to off time	lm w	Figures 4 and 6, C_L =15pF S1 Closed			300	ns
drives the output high from the to off time	wxya _	Figures 4 and 6, C_L =15pF S2 Closed			300	ns
Receiver input and output delay	t_{RPLH} tRPHL _	7 and 9, _ ; rise and fall time of VID ≦ 15ns		450	800	ns
$\|T_{RPLH} - T_{RPHL}\|$ Difference between receiver input and output delay	t_{RSKD}	7 and 9, _ ; rise and fall time of VID ≦ 15ns		30		ns
Receiver Enable to Input out low	wxya _	Figures 2 and 8, C_{RL} =15pF S1 Closed		20	50	ns
Receiver Enable to Input high	wxya _	Figures 2 and 8, C_{RL} =15pF S2 Closed		20	50	ns
receiver outputs low from the to shutdown	lm w	Figures 2 and 8, C_{RL} =15pF S1 Closed		80	150	ns
Receiver output high from to shutdown	wxya _	Figures 2 and 8, C_{RL} =15pF S2 Closed		80	150	ns
circuit off time	t_{SHDN}			50	300	ns
Driver Enable from Standby	$t_{DZH(SHDN)}$	Figures 4 and 6, C_L =100pF S2			200	ns

to Output High		Closed				
from standby to output low driver enable	$t_{DZL(SHDN)}$	Figures 4 and 6, C_L =100pF S1 Closed			200	ns
Receiver Enable from Standby to Output High	$t_{RZH(SHDN)}$	Figures 2 and 8, C_{RL} =15pF S2 Closed			300	ns
Receiver Enable from Standby to Output Low	$t_{RZL(SHDN)}$	Figures 2 and 8, C_{RL} =15pF S1 Closed			300	ns

test circuit

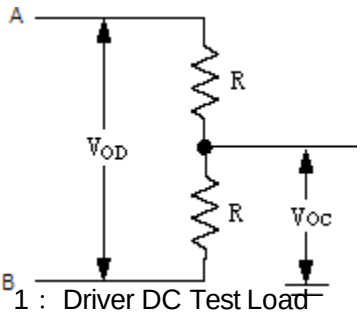


Figure 1： Driver DC Test Load

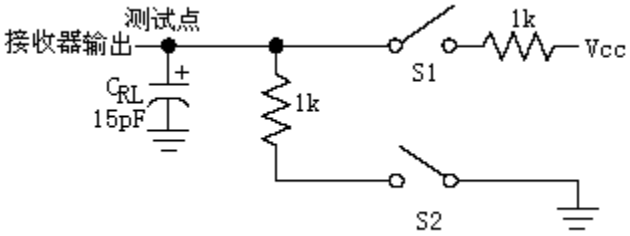


Figure 2： Receiver Enable/Disable Timing Test load

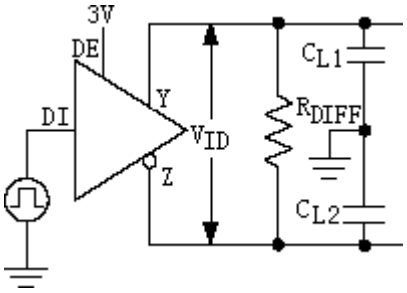


图 3：Driver Timing Test Circuit

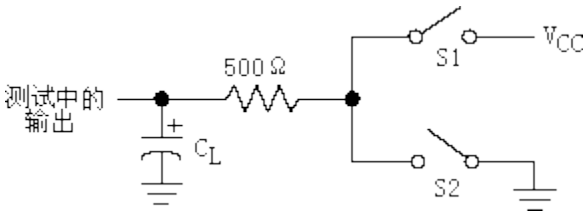


图 4：Driver Enable/Disable Timing Test Load

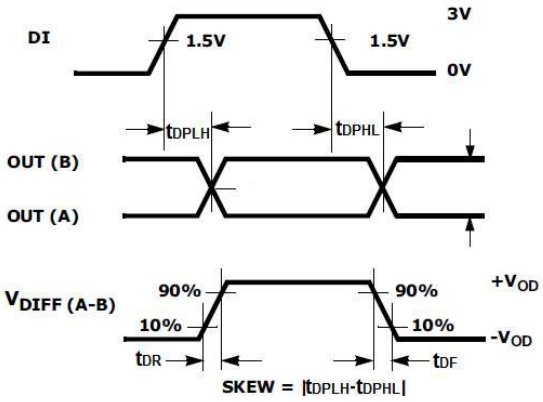


图 5：Driver Propagation Delays

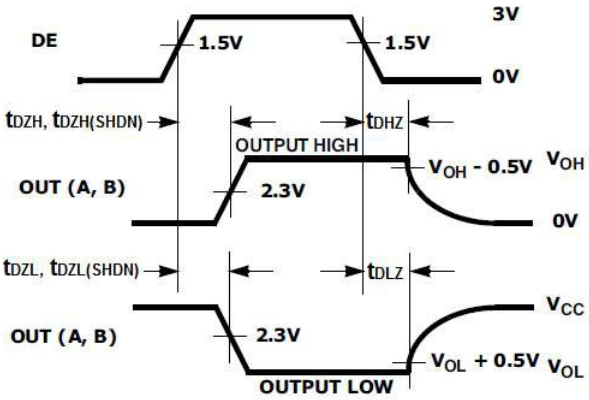


图 6：Driver Enable and Disable Times

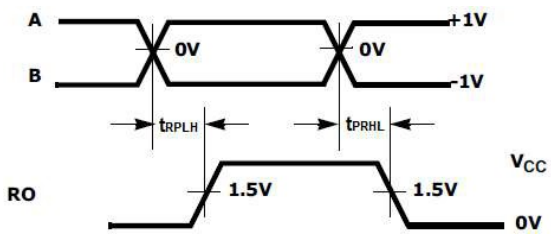


Figure 7： Receiver Propagation Delays

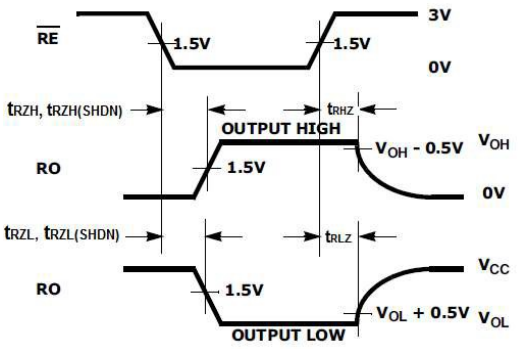


Figure 8： Receiver Enable and Disable Times

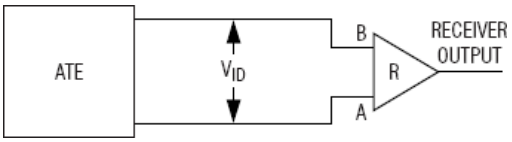


Figure 9： Receiver Propagation Delay Test Circuit

Typical Application Diagram

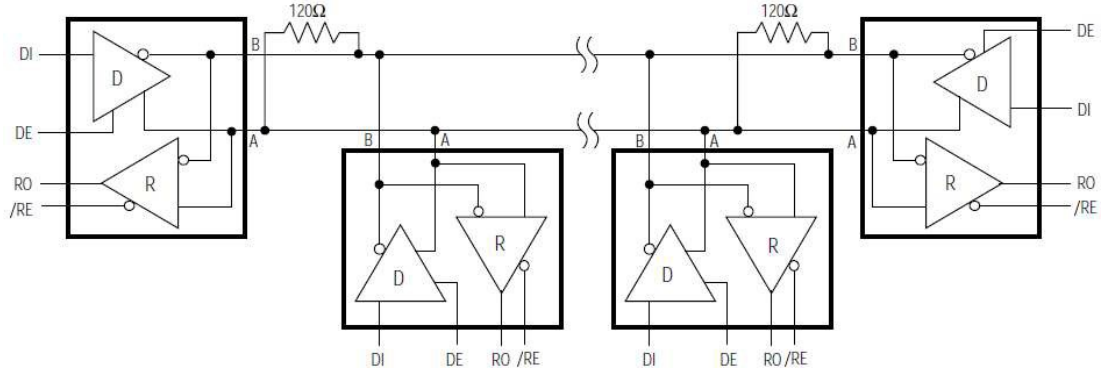
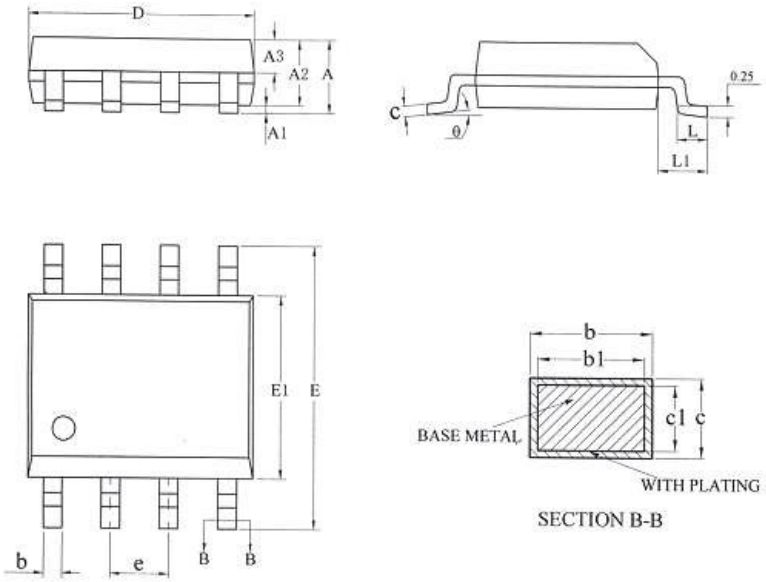


Figure 10 Typical half-duplex RS-485 network

Package size (SOP8)



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.77
A1	0.08	0.18	0.28
A2	1.20	1.40	1.60
A3	0.55	0.65	0.75
b	0.39	—	0.48
b1	0.38	0.41	0.43
c	0.21	—	0.26
c1	0.19	0.20	0.21
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.70	3.90	4.10
e	1.27BSC		
L	0.50	0.65	0.80
L1	1.05BSC		
θ	0	—	8°