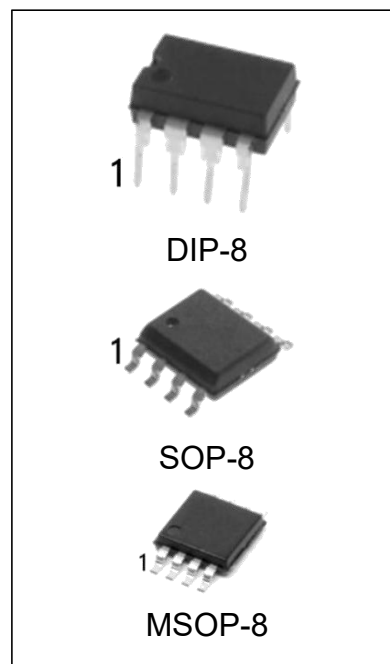


Feature

- Fail-safe circuitry
- Low power consumption
- Up to 128 transceivers can be attached to the bus
- Maximum transmission rate: 10Mbps
- ESD: $\geq \pm 15\text{kV}$
- DIP-8, SOP-8, MSOP-8, Package

Applications

- RS-485 Communications
- Level Translators
- Security Equipment
- Industrial Control Equipment
- Watt-hour meter



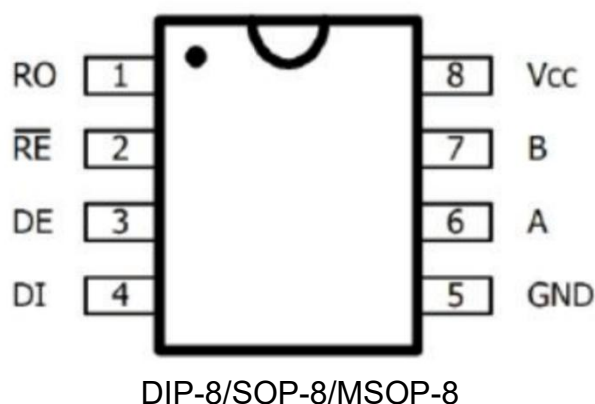
Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
SN65176BPG	DIP-8	65176B	TUBE	2000pcs/reel
SN65176BDRG	SOP-8	65176B	REEL	2500pcs/reel
SN65176BDGKRG	MSOP-8	65176B	REEL	3000pcs/reel
SN75176BPG	DIP-8	75176B	TUBE	2000pcs/reel
SN75176BDRG	SOP-8	75176B	REEL	2500pcs/reel
SN75176BDGKRG	MSOP-8	75176B	REEL	3000pcs/reel

General Description

The SN65176B/75176B is high-speed transceivers for RS-485 communication, which contain one driver and one receiver. The SN65176B/75176B feature 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 a logic high if all transmitters on a terminated bus are disabled (high impedance). The SN65176B/75176B driver slew rates are not limited, making transmit speeds up to 10Mbps possible.. And this device has a 1/8-unit-load receiver input impedance that allows up to 128 transceivers on the bus.

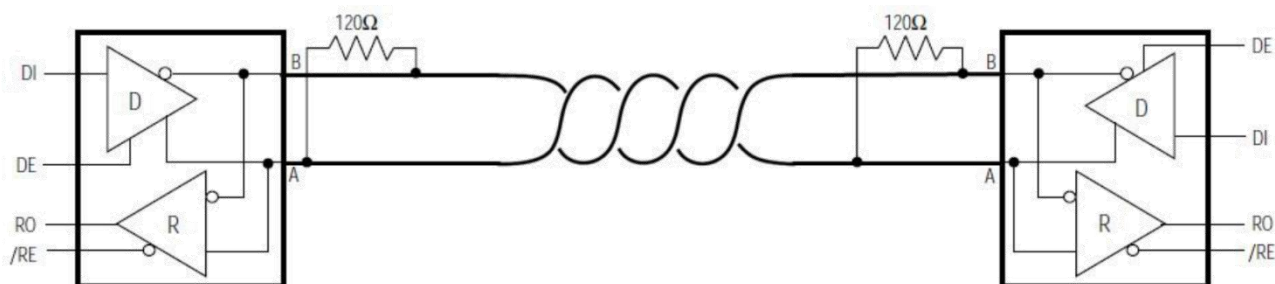
Pin Assignment



Pin Description

PIN	NAME	FUNCTION
1	RO	Receiver Output, When RE is low and if A - B \geq -50mV, RO will be high; if A - B \leq -200mV, RO will below.
2	/RE	Receiver Output Enable. Drive RE low to enable RO; RO is high impedance when RE is high. Drive RE high and DE low to enter low-power shutdown mode.
3	DE	Driver Output Enable. Drive DE high to enable driver outputs. These outputs are high impedance when DE is low. Drive RE high and DE low to enter low-power shutdown mode.
4	DI	Driver Input. With DE high, a low on DI forces noninverting output low and inverting output high.
5	GND	Ground
6	A	Noninverting Receiver Input and Noninverting Driver Output
7	B	Inverting Receiver Input and Inverting Driver Output
8	VCC	Positive Supply

Typical application circuit



Absolute Maximum Ratings (TA=25°C)

PARAMETER		MIN	MAX	UNITS
Supply Voltage (V _{CC})		-	+7V	V
Control Input Voltage (/RE, DE)		-0.3	V _{CC} +0.3V	V
Driver Input Voltage (DI)		-0.3	V _{CC} +0.3V	V
Driver Output Voltage (A,B)		-13V	+13V	V
Receiver Input Voltage (A,B)		-13V	+13V	V
Receiver Output Voltage (R _O)		-0.3	V _{CC} +0.3V	V
Operating Temperature (T _{OPR})	SN75176B	0	+70	°C
	SN65176B	-40	+85	°C
Storage Temperature (T _{STG})		-65	+150	°C
Lead Temperature (Soldering, 10 seconds)		-	+245	°C

Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

DC ELECTRICAL CHARACTERISTICS ($V_{CC}=5V$, $T_A=25^{\circ}C$) ⁽¹⁾

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Differential Driver Output (no load)	V_{OD1}	$R=27\Omega$, Figure 1		-	-	V_{CC}	V
Differential Driver Output	V_{OD2}			1.8	-	-	V
Change in Magnitude of Differential Output Voltage	ΔV_{OD}			-	-	0.2	V
Driver Common-Mode Output Voltage	V_{OC}			1.0	-	3.0	V
Change in Magnitude of Common-Mode Voltage ⁽²⁾	ΔV_{OC}			-	-	0.2	V
Input High Voltage	V_{IH}	DE, DI, /RE		2.0	-	-	V
Input Low Voltage	V_{IL}	DE, DI, /RE		-	-	0.8	V
DI Input Hysteresis	V_{HYS}	-		-	100	-	mV
Driver Input Current (A And B)	I_{IN1}	$V_{IN}=12V$	DE=0V,	-	-	150	μA
		$V_{IN}=-7V$	$V_{CC}=0V/5.25V$	-150	-	-	μA
Driver Short-Circuit Output Current ⁽³⁾	I_{OSD}	A and B Short-Circuit		-100	-	100	mA
Receiver Differential Threshold Voltage	V_{TH}	$-7V \leq V_{CM} \leq 12V$		-200	-125	-50	mV
Receiver Input Hysteresis	ΔV_{TH}	-		-	40	-	mV
Receiver Output High Voltage	V_{OH}	$I_O=-4mA$, $V_{ID}=-50mV$		$V_{CC}-1$	-	-	V
Receiver Output Low Voltage	V_{OL}	$I_O=4mA$, $V_{ID}=-200mV$		-	-	0.4	V
Three-State Output Current at Receiver	I_{OZR}	$0.4V \leq V_O \leq 2.4V$		-	-	± 1	μA
Receiver Input Resistance	R_{IN}	$-7V \leq V_{CM} \leq 12V$		96	-	-	K Ω
Receiver Output Short -Circuit Current	I_{OSR}	$0V \leq V_{RO} \leq V_{CC}$		± 7	-	± 100	mA
Supply Current	I_{CC}	DE=VCC	No Load	-	450	900	μA
		DE=GND	/RE=DI=VCC/GND	-	450	600	μA
Supply Current in Shutdown Mode	I_{SHDN}	DE=GND, /RE=VCC, DI=VCC/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: ΔV_{OD} and ΔV_{OC} are the changes in V_{OD} and V_{OC} , respectively, when the DI input changes state.

Note 3: Maximum current level applies to peak current just prior to foldback-current limiting; minimum current level applies during current limiting.

Switching Characteristics (VCC=5V, TA=25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Driver Input to Output	t_{DPLH}	Figure 3 and 5, $R_{DIFF}=54\Omega$ $C_{L1}=C_{L2}=100pF$	-	30	60	ns
	t_{DPHL}		-	30	60	ns
Driver Output Skew $ T_{DPLH} - T_{DPHL} $	t_{DSKEW}		-	-	20	ns
Driver Rise or Fall Time	t_{DR}, t_{DF}		-	30		ns
Maximum Data Rate	F_{MAX}	-	10	-	-	Mbps
Driver Enable to Output High	t_{DZH}	Figure 4 and 6, $C_L=100pF$ S2 closed	-	-	70	ns
Driver Disable Time from High	t_{DHZ}		-	-	70	ns
Driver Enable to Output Low	t_{DZL}	Figure 4 and 6, $C_L=100pF$ S1 closed	-	-	70	ns
Driver Disable Time from Low	t_{DLZ}		-	-	70	ns
Receiver Input to Output	t_{RPLH} t_{RPHL}	Figure 7 and 9, $ V_{ID} \geq 2.0V$, rise and fall time of $V_{ID} \leq 15ns$	-	90	250	ns
$ T_{RPLH} - T_{RPHL} $ Differential Receiver Skew	t_{RSKD}		-	30	-	ns
Receiver Enable to Output Low	t_{RZL}	Figure 2 and 8, $C_{RL}=15pF$ S1 closed	-	30	70	ns
Receiver Disable Time from Low	t_{RLZ}		-	30	70	ns
Receiver Enable to Output High	t_{RZH}	Figure 2 and 8, $C_{RL}=15pF$ S2 closed	-	30	70	ns
Receiver Disable Time from High	t_{RHZ}		-	30	70	ns
Time to Shutdown	t_{SHDN}	-	-	200	600	ns

Function Tables

Transmitting

INPUTS			OUTPUTS	
/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	

Receiving

INPUTS			OUTPUT
/RE	DE	A-B	RO
0	X	$\geq -0.05V$	1
0	X	$\leq -0.2V$	0
0	X	Open/shorted	1
1	1	X	High-Z
1	0	X	Shutdown

Test circuit

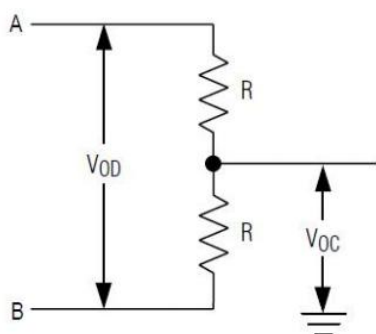


Figure 1. Driver DC Test Load

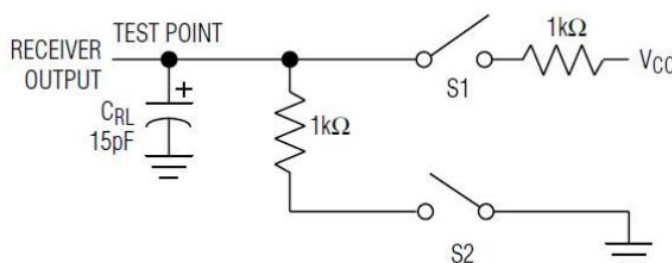


Figure 2. Receiver Enable/Disable Timing Test Load

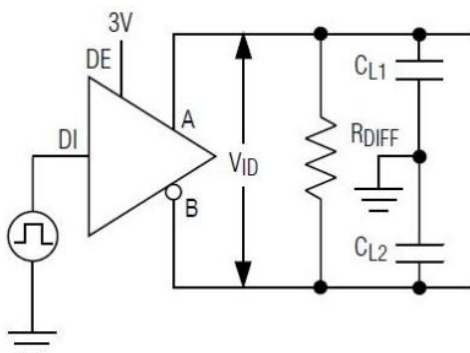


Figure 3. Driver Timing Test Circuit

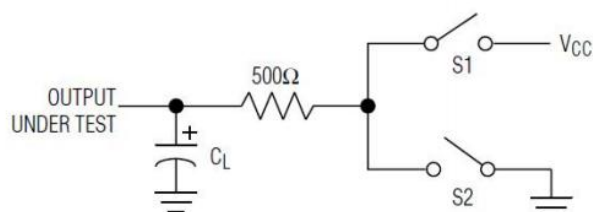


Figure 4. Driver Enable/Disable Timing Test Load

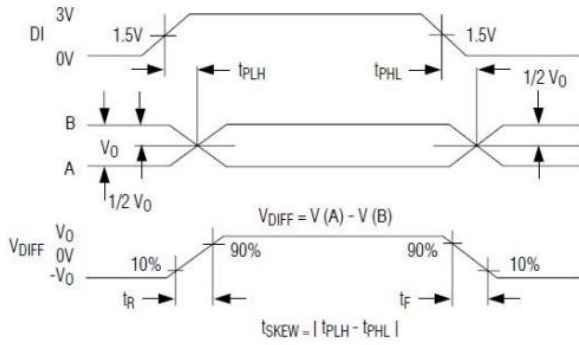


Figure 5. Driver Propagation Delays

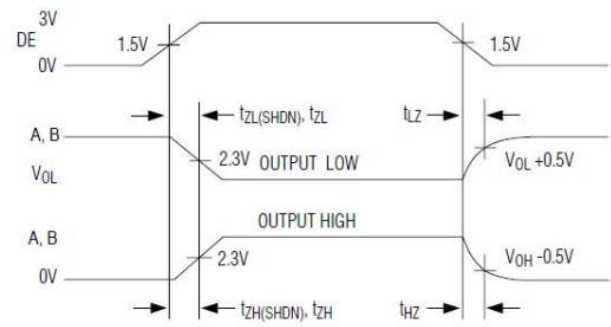


Figure 6. Driver Enable and Disable Times

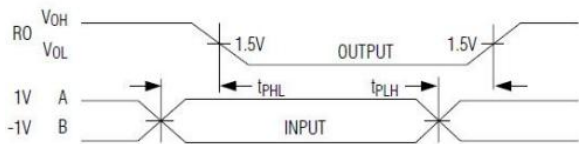


Figure 7. Receiver Propagation Delays

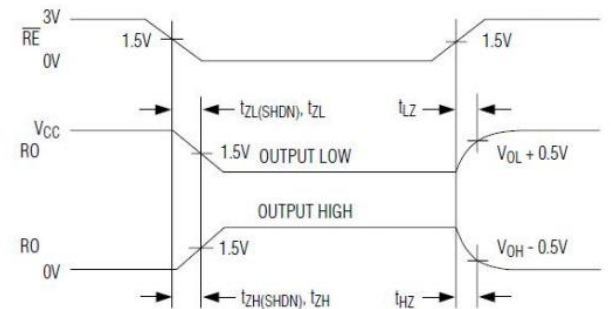
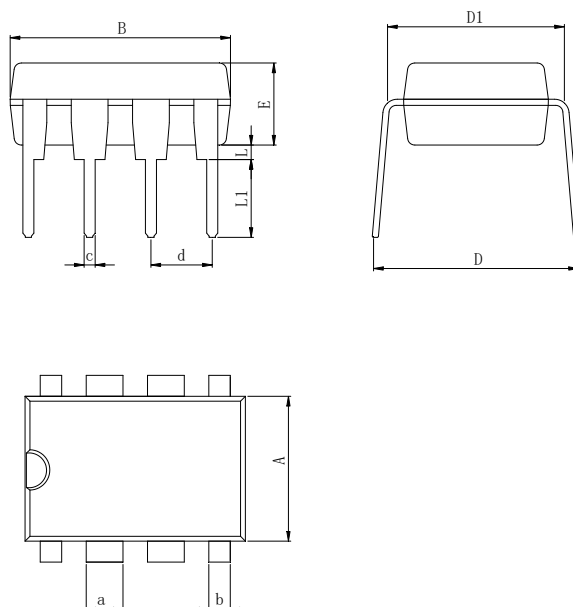


Figure 8. Receiver Enable and Disable Times

Physical Dimensions

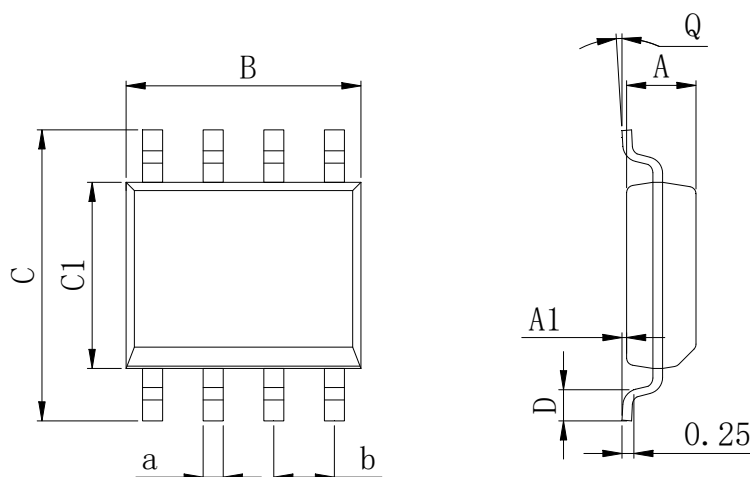
DIP-8



Dimensions In Millimeters(DIP-8)

Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	9.00	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

SOP-8 (150mil)

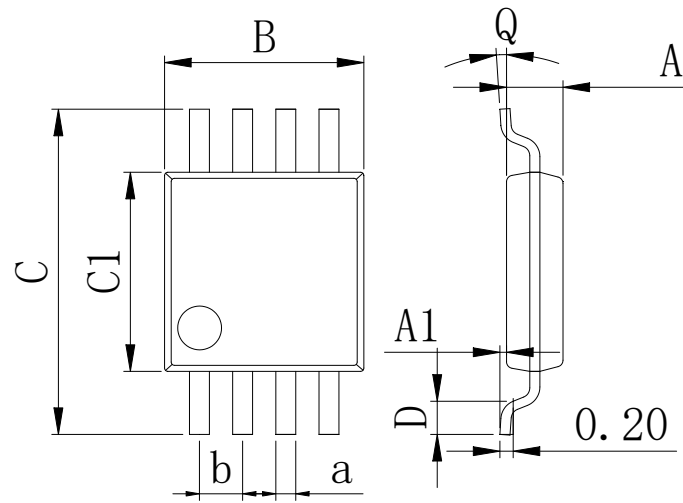


Dimensions In Millimeters(SOP-8)

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

Physical Dimensions

MSOP-8



Dimensions In Millimeters(MSOP-8)

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.80	0.05	2.90	4.75	2.90	0.35	0°	0.25	0.65 BSC
Max:	0.90	0.20	3.10	5.05	3.10	0.75	8°	0.35	

Revision History

DATE	REVISION	PAGE
2014-1-5	New	1-11
2024-1-2	Document Reformatting	1-11

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