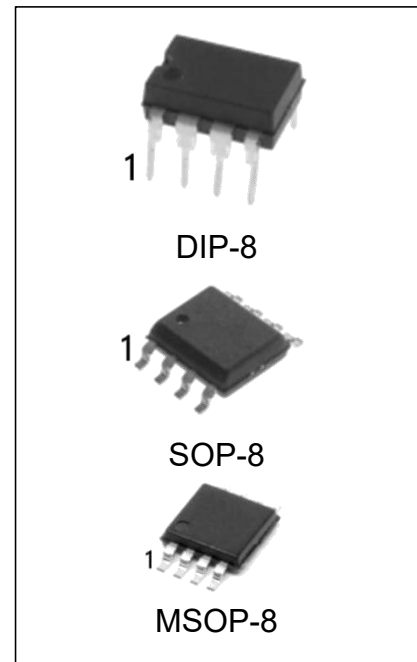


Feature

- 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



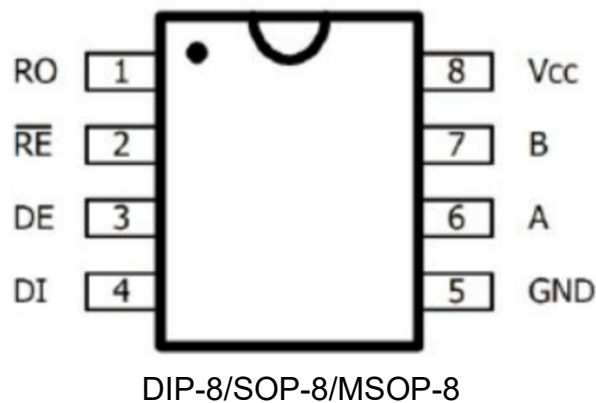
Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
H485EIN	DIP-8	H485EI	TUBE	2000pcs/reel
H485EIM/TR	SOP-8	H485EI	REEL	2500pcs/reel
H485EIMM/TR	MSOP-8	H485EI	REEL	3000pcs/reel
H485ECN	DIP-8	H485EC	TUBE	2000pcs/reel
H485ECM/TR	SOP-8	H485EC	REEL	2500pcs/reel
H485ECMM/TR	MSOP-8	H485EC	REEL	3000pcs/reel

General Description

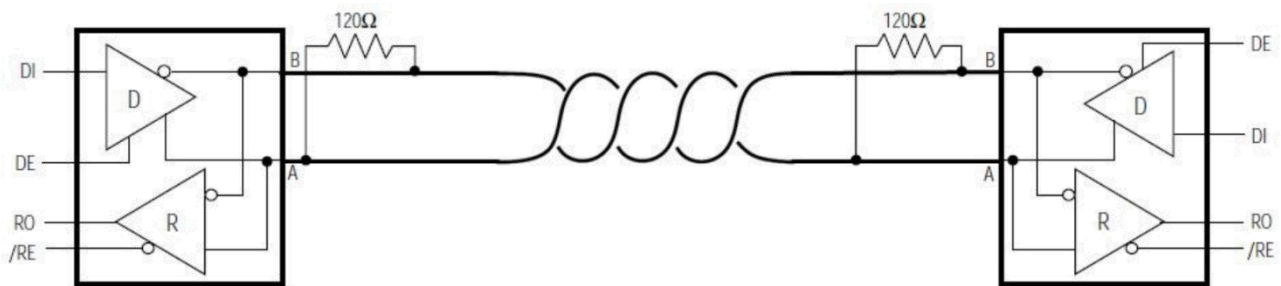
The H485E is high-speed transceivers for RS-485 communication, which contain one driver and one receiver. The H485E feature fail-safe circuitry, which guarantees a logic-high receiver output when the receiver inputs are open or shorted. This means that the receiver output will be a logic high if all transmitters on a terminated bus are disabled (high impedance). The H485E 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 $A - B \geq -50\text{mV}$, RO will be high; if $A - B \leq -200\text{mV}$, 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})	H485EC	0	+70	°C
	H485EI	-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 Ω , Figure 1		-	-	VCC	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}	VIN=12V	DE=0V, Vcc=0V/5.25V	-	-	150	μA
		VIN=-7V		-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}	IO=-4mA, VID=-50mV		VCC-1	-	-	V
Receiver Output Low Voltage	V_{OL}	IO=4mA, VID=-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/ RE=DI	-	450	900	μA
		DE=GND	=VCC/G ND	-	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, RDIFF=54Ω 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} ≥ 2.0V, rise and fall time of V _{ID} ≤ 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

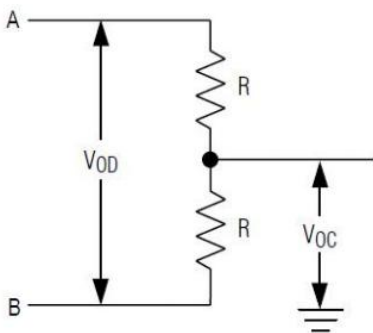


Figure 1. Driver DC Test Load

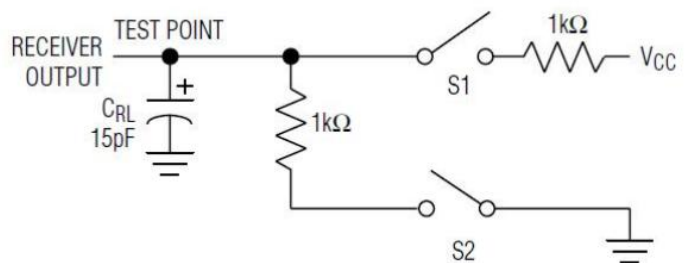


Figure 2. Receiver Enable/Disable Timing Test Load

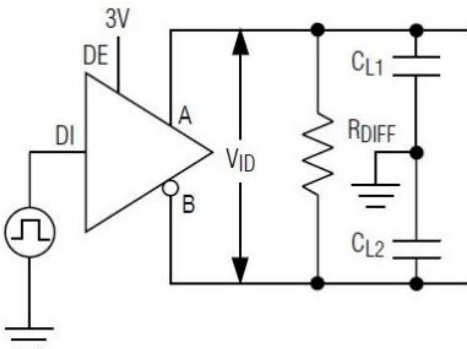


Figure 3. Driver Timing Test Circuit

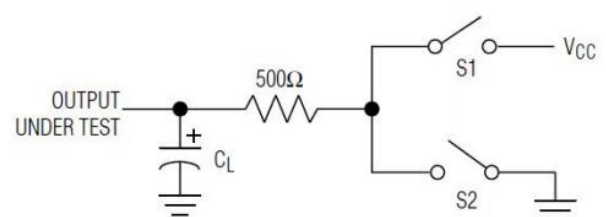


Figure 4. Driver Enable/Disable Timing Test Load

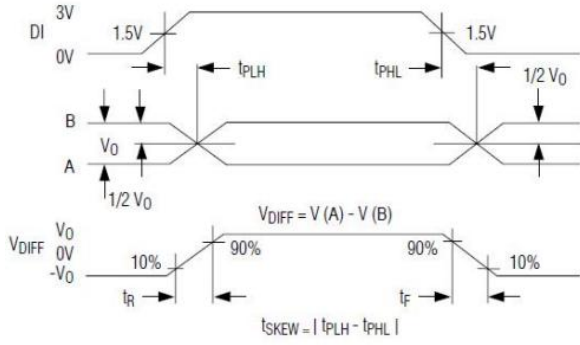


Figure 5. Driver Propagation Delays

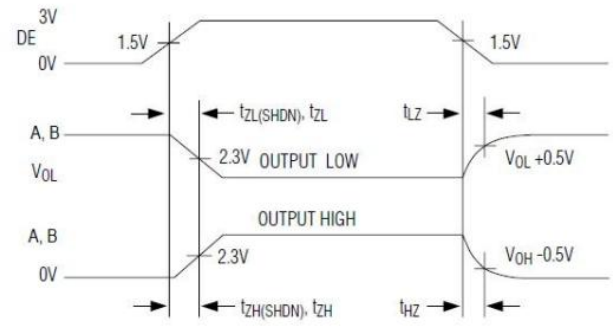


Figure 6. Driver Enable and Disable Times

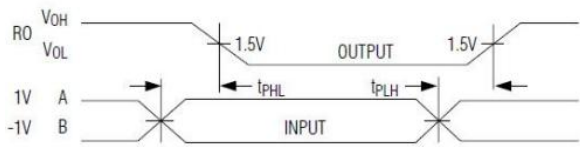


Figure 7. Receiver Propagation Delays

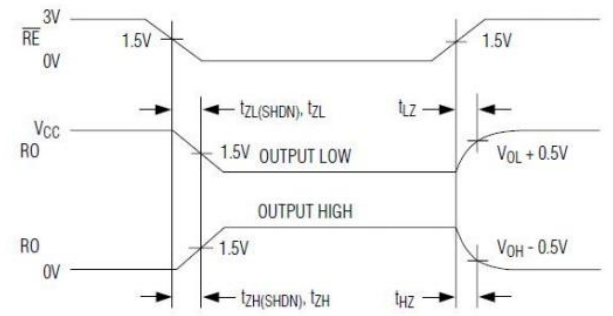
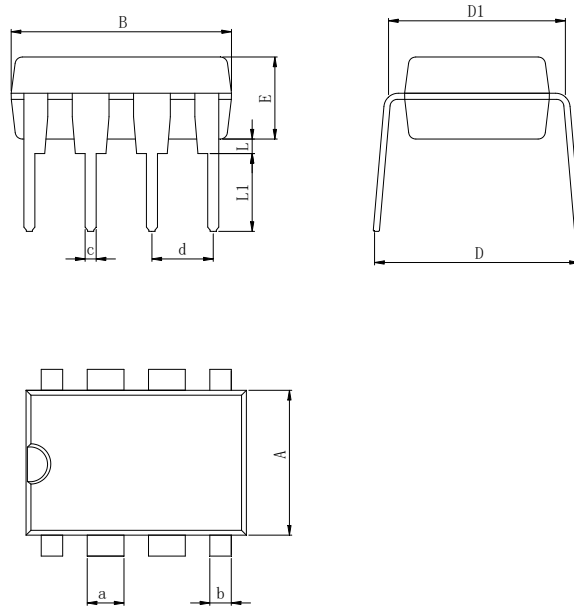


Figure 8. Receiver Enable and Disable Times

Physical Dimensions

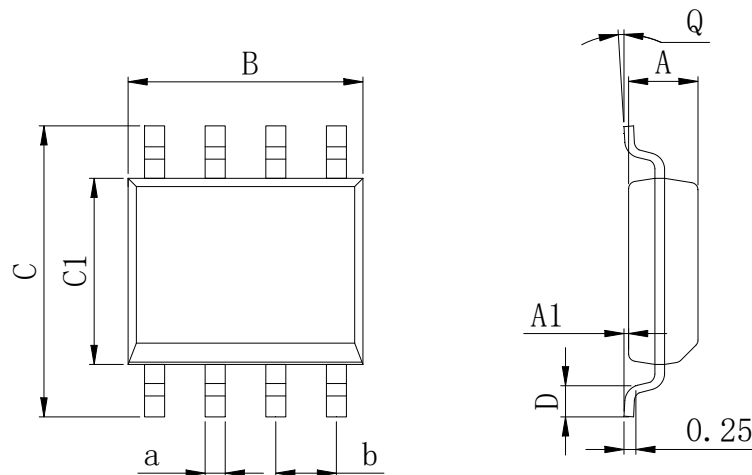
DIP-8



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)

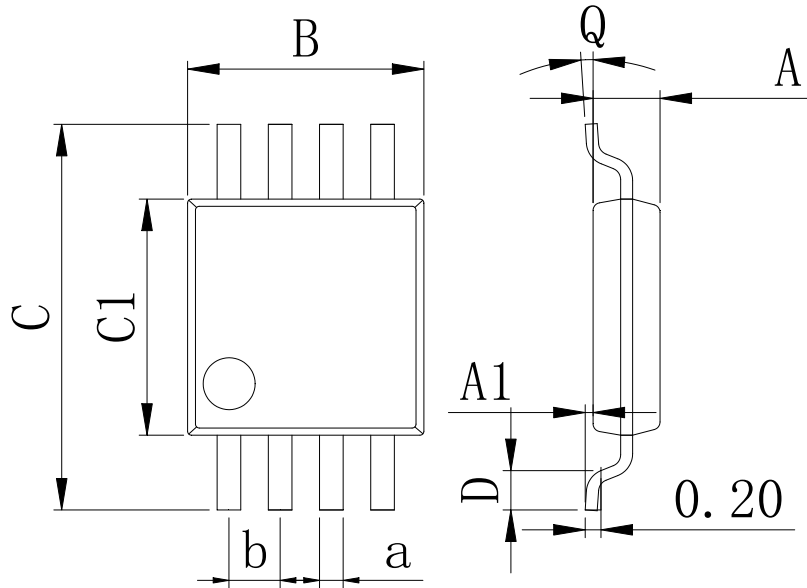


Dimensions In Millimeters(SOP-8)

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
2014-10-11	New	1-11
2023-9-11	Updated DIP-8 dimension、 Add annotation for Maximum Ratings.	3、 8

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