

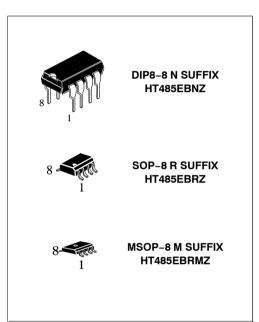
CMOS – Low-Power, Slew-Rate-Limited RS-485/RS-422 Transceivers (compatible to MAX485&SP485)

GENERAL DESCRIPTION

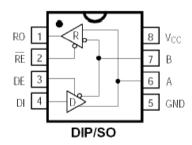
The HT485 is low-power transceivers for RS-485 and RS-422 communication. IC contains one driver and one receiver. The driver slew rates of the HT485 is not limited, allowing them to transmit up to 2.5Mbps. These transceivers draw between $120\mu\text{A}$ and $500\mu\text{A}$ of supply current when unloaded or fully loaded with disabled drivers. All parts operate from a single 5V supply. Drivers are short-circuit current limited and are protected against excessive power dissipation by thermal shutdown circuitry that places the driver outputs into a high-impedance state. The receiver input has a fail-safe feature that guarantees a logic-high output if the input is open circuit. The HT485 is designed for half-duplex applications.

FEATURES

- Extended ESD Protection for RS-485/RS-422 I/OPins ±15kV Using Human Body Model
- Low Quiescent Current: 300µA
- -7V to +12V Common-Mode Input Voltage Range
- Three-State Outputs
- 30ns Propagation Delays, 5ns Skew
- Full-Duplex and Half-Duplex Versions Available
- Operate from a Single 5V Supply
- Allows up to 32 Transceivers on the Bus
- Data rate: 2,5 Mbps
- Current-Limiting and Thermal Shutdown for Driver Overload Protection







ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 12V Control Input Voltage -0.5V to (V_{CC} + 0.5V) Driver Input Voltage (DI) -0.5V to (V_{CC} + 0.5V) Driver Output Voltage (A, B) -8V to +12.5V Receiver Output Voltage (A, B) -8V to +12.5V Continuous Power Dissipation 8-Pin Plastic DIP (derate 9.09mW/°C) 727mW 8-Pin SO (derate 5.88mW/°C) 471mW Operating Temperature Ranges-40°C to +85°C Storage Temperature Range -65°C to +160°C Lead Temperature (soldering, 10sec) +300°C



DC ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Differential Driver Output (no load)	VOD1				5	V	
Differential Driver Output	VOD2	$R = 50\Omega (RS-422)$		2			V
(with load)		$R = 27\Omega$ (RS-485), F	igure 4	1.5		5	
Change in Magnitude of Driver Differential Output Voltage for Complementary Output States	ΔVOD	R = 27Ω or 50Ω , Figure 4				0.2	V
Driver Common-Mode Output Voltage	VOC	R = 27Ω or 50Ω , Figure 4				3	V
Change in Magnitude of Driver Common-Mode Output Voltage for Complementary Output States	ΔVOC	R = 27Ω or 50Ω , Figure 4				0.2	>
Input High Voltage	VIH	DE, DI, RE		2.0			V
Input Low Voltage	VIL	DE, DI, RE				8.0	V
Input Current	IIN1	DE, DI, RE				±2	μΑ
Input Current	IIN2	DE = 0V; VIN = 12V				1.0	mΑ
(A, B)		VCC = 0V or 5.25V, VIN = -7V				-0.8	
Receiver Differential Threshold Voltage	VTH	-7V ≤ V _{CM} ≤12V		-0.2		0.2	V
Receiver Input Hysteresis	ΔVTH	VCM = 0V			70		mV
Receiver Output High Voltage	VOH	IO = -4mA, VID = 200mV		3.5			V
Receiver Output Low Voltage	VOL	IO = 4mA, VID = -200mV				0.4	V
Three-State (high impedance) Output Current at Receiver	IOZR	0.4V ≤ VO ≤ 2.4V				±1	μA
Receiver Input Resistance	RIN	-7V ≤ VCM ≤ 12V					kΩ

DC ELECTRICAL CHARACTERISTICS (continued)

($Vcc = 5V \pm 5\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.) (Notes 1, 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TY P	MAX	UNIT S
No-Load Supply Current	ICC	DE = V _{CC}		500	900	
(Note 3)		RE = 0V or VCC		300	500	μΑ
		DE = 0V				
Driver Short-Circuit Current,						
	IOSD1	-7V ≤ VO ≤ 12V (Note 4)	35		250	mA
VO = High						
Driver Short-Circuit Current,						
	IOSD2	-7V ≤ VO ≤12V (Note 4)	35		250	mA
VO = Low						
Receiver Short-Circuit Current	IOSR	$0V \le VO \le VCC$	7		95	mA



SWITCHING CHARACTERISTICS

($Vcc = 5V \pm 5\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.) (Notes 1, 2)

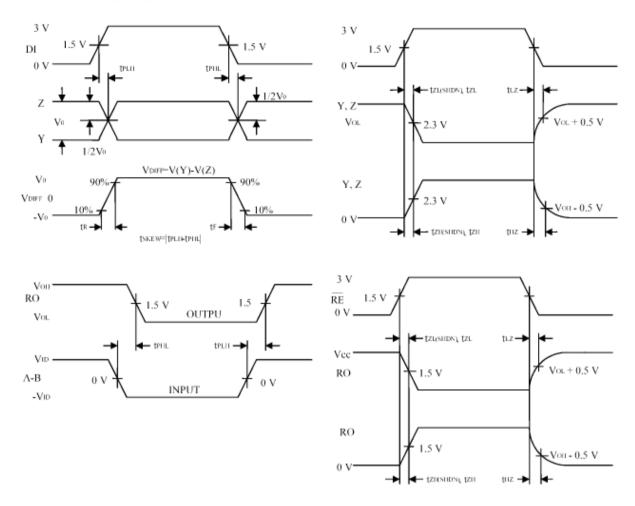
PARAMETER	SYMBO L	CONDITIONS	MIN	TY P	MAX	UNITS
Driver Input to Output	tPLH	RDIFF = 54Ω	10	30	60	ns
	tPHL	CL1 = CL2 = 100pF	10	30	60	
Driver Output Skew to Output	tSKEW	RDIFF = 54Ω , CL1 = CL2 = $100pF$		5	10	ns
Driver Enable to Output High	tZH	CL= 100pF, S2 closed		40	70	ns
Driver Enable to Output Low	tZL	CL= 100pF, S1 closed		40	70	ns
Driver Disable Time from Low	tLZ	CL= 15pF, S1 closed		40	70	ns
Driver Disable Time from High	tHZ	CL= 15pF, S2 closed		40	70	ns
tPLH - tPHL Differential	tSKD	RDIFF = 54Ω		13		ns
Receiver Skew		CL1 = CL2 = 100pF				
Receiver Enable to Output Low	tZL	CRL = 15pF, S1 closed		20	50	ns
Receiver Enable to Output High	tZH	CRL = 15pF, S2 closed		20	50	ns
Receiver Disable Time from Low	tLZ	CRL = 15pF, S1 closed		20	50	ns
Receiver Disable Time from High	tHZ	CRL = 15pF, S2 closed		20	50	ns
Maximum Data Rate	fMAX		2.5			Mbps

Notes:

- 1. All currents into device pins are positive; all currents out of device pins are negative. All voltages are referenced to device ground unless otherwise specified.
- 2. All typical specifications are given for VCC = 5V and TA = +25°C
- 3. Supply current specification is valid for loaded transmitters when DE = 0V
- 4. Applies to peak current. See Typical Operating Characteristics.



Operation timing diagrams



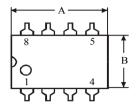
Transmission			Receipt					
	Inputs		Outp	uts X		Inputs		Outputs
RE	DE	DI	Z	Y	RE	DE	A-B	RO
Х	1	1	0	1	0	0	+0.2V	1
Х	1	0	1	0	0	0	-0.2V	0
0	0	Х	Z	Z	0	0	open	1
1	0	Х	Z	Z	1	0	Х	Z

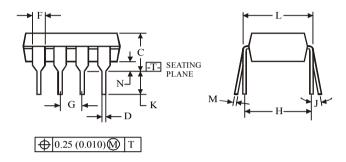
X-don't care

Z-high resistance



(DIP8)





NOTES:

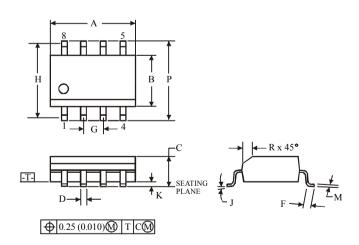
1. Dimensions "A", "B" do not include mold flash or protrusions.

Maximum mold flash or protrusions 0.25 mm (0.010) per side.



	Dimension, mm					
Symbol	MIN MAX					
A	8.51 10.16					
В	6.1 7.11					
C	5.33					
D	0.36 0.56					
F	1.14 1.78					
G	2.54					
Н	7.62					
J	0° 10°					
K	2.92	3.81				
L	7.62 8.26					
M	0.2 0.36					
N	0.38					

(SOP8)



NOTES:

- 1. Dimensions A and B do not include mold flash or protrusion.
- 2. Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B 0.25 mm (0.010) per side.



	Dimension, mm				
Symbol	MIN MAX				
A	4.8	5			
В	3.8	4			
C	1.35 1.75				
D	0.33 0.51				
F	0.4	1.27			
G	1.27				
Н	5.72				
J	0° 8°				
K	0.1 0.25				
M	0.19 0.25				
P	5.8 6.2				
R	0.25 0.5				