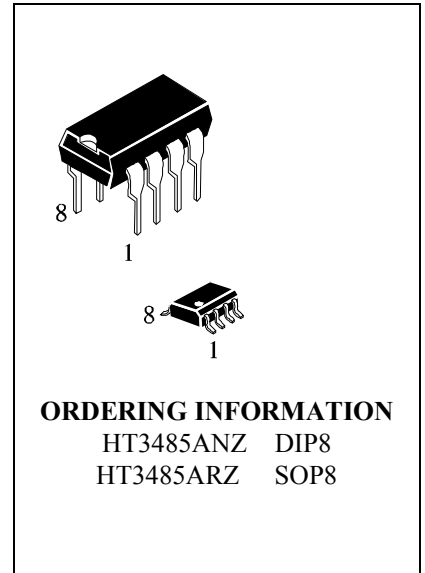


Low-Power, Slew-Rate-Limited RS-485/RS-422 Transceivers

General Description

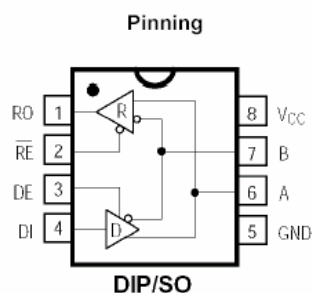
The HT3085 is low-power transceivers for RS-485-3.3 and RS-422-3.3 communication. IC contains one driver and one receiver. The driver slew rates of the HT3485 is not limited, allowing them to transmit up to 2.5Mbps.

These transceivers draw between 120 μ A and 500 μ A of supply current when unloaded or fully loaded with disabled drivers. All parts operate from a single 3.3V 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.



Features

- Low Quiescent Current: 300 μ A
- -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 3.3V Supply
- Allows up to 32 Transceivers on the Bus
- Data rate: 2,5 Mbps
- Current-Limiting and Thermal Shutdown for Driver Overload Protection
- The transmitter outputs and receiver inputs are protected to ± 15 kV Air ESD.



ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 7V	Continuous Power Dissipation ($T_A = +70^\circ\text{C}$)
Control Input Voltage -0.3V to 7V	8-Pin Plastic DIP (derate 9.09mW/ $^\circ\text{C}$ above +70 $^\circ\text{C}$) 727mW
Driver Input Voltage (DI) -0.3V to 7V	8-Pin SOP (derate 5.88mW/ $^\circ\text{C}$ above +70 $^\circ\text{C}$) 471mW
Driver Output Voltage (A, B) -7.5V to +12.5V	Operating Temperature Ranges 0 $^\circ\text{C}$ to +70 $^\circ\text{C}$
Receiver Input Voltage (A, B) -7.5V to +12.5V	Storage Temperature Range -65 $^\circ\text{C}$ to +160 $^\circ\text{C}$
Receiver Output Voltage (RO) -0.3V to ($V_{CC}+0.3\text{V}$)	Lead Temperature (soldering, 10sec) +300 $^\circ\text{C}$

DC ELECTRICAL CHARACTERISTICS

($V_{CC} = 3.3\text{V} \pm 10\%$, $T_A = T_{\text{MIN}}$ to T_{MAX} , unless otherwise noted.) (Notes 1, 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Differential Driver Output (no load)	V_{OD1}		2			V
Differential Driver Output (with load)	V_{OD2}	R = 100 (RS-422)	1			V
		R = 54 (RS-485), Figure 4	0.8			
Change in Magnitude of Driver Differential Output Voltage for Complementary Output States	ΔV_{OD}	R = 54 or 50, Figure 4			0.2	V
Driver Common-Mode Output Voltage	V_{OC}	R = 54 or 100, Figure 4			2	V
Change in Magnitude of Driver Common-Mode Output Voltage for Complementary Output States	ΔV_{OD}	R = 54 or 100, Figure 4			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
Input Current	I_{IN1}	DE, DI, RE			± 2	μA
Input Current (A, B)	I_{IN2}	DE = 0V; $V_{IN} = 12\text{V}$			1.0	mA
		$V_{CC} = 0\text{V}$ or 5.25V, $V_{IN} = -7\text{V}$			-0.8	
Receiver Differential Threshold Voltage	V_{TH}	$-7\text{V} \leq V_{CM} \leq 12\text{V}$	-0.2		0.2	V
Receiver Input Hysteresis	ΔV_{TH}	$V_{CM} = 0\text{V}$		70		mV
Receiver Output High Voltage	V_{OH}	$I_o = -1.5\text{mA}$, VID = 200mV	2.5			V
Receiver Output Low Voltage	V_{OL}	$I_o = 2.5\text{mA}$, VID = -200mV			0.4	V
Three-State (high impedance) Output Current at Receiver	I_{OZR}	$0.4\text{V} \leq V_o \leq 2.4\text{V}$			± 1	μA
Receiver Input Resistance	R_{IN}	$-7\text{V} \leq V_{CM} \leq 12\text{V}$	12			k

DC ELECTRICAL CHARACTERISTICS (continued)

($V_{CC} = 3.3V \pm 10\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.) (Notes 1, 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
No-Load Supply Current (Note 3)	I _{CC}	DE = V _{CC}		500	800	μA
		RE = 0V or V _{CC}		300	400	
		DE = 0V				
Driver Short-Circuit Current,						
	I _{OSD1}	-7V ≤ V _O ≤ 12V (Note 4)			250	mA
V _O = High						
Driver Short-Circuit Current,						
	I _{OSD2}	-7V ≤ V _O ≤ 12V (Note 4)			250	mA
V _O = Low						
Receiver Short-Circuit Current	I _{OSR}	0V ≤ V _O ≤ V _{CC}	±6.5		95	mA

SWITCHING CHARACTERISTICS

($V_{CC} = 3.3V \pm 10\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise noted.) (Notes 1, 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Driver Input to Output	t _{PLH}	R _{DIFF} = 54Ω	10	30	60	ns
	t _{PHL}	C _{L1} = C _{L2} = 100pF	10	30	60	
Driver Output Skew to Output	t _{SKEW}	R _{DIFF} = 54Ω, C _{L1} = C _{L2} = 100pF		5	10	ns
Driver Enable to Output High	t _{ZH}	C _L = 100pF, S2 closed		45	90	ns
Driver Enable to Output Low	t _{ZL}	C _L = 100pF, S1 closed		45	90	ns
Driver Disable Time from Low	t _{LZ}	C _L = 15pF, S1 closed		40	80	ns
Driver Disable Time from High	t _{HZ}	C _L = 15pF, S2 closed		40	80	ns
t _{PLH} - t _{PHL} Differential	t _{SKD}	R _{DIFF} = 54Ω		13		ns
Receiver Skew		C _{L1} = C _{L2} = 100pF				
Receiver Enable to Output Low	t _{ZL}	C _{RL} = 15pF, S1 closed			50	ns
Receiver Enable to Output High	t _{ZH}	C _{RL} = 15pF, S2 closed		20	50	ns
Receiver Disable Time from Low	t _{LZ}	C _{RL} = 15pF, S1 closed		20	50	ns
Receiver Disable Time from High	t _{HZ}	C _{RL} = 15pF, S2 closed		20	50	ns
Maximum Data Rate	f _{MAX}		2.5			Mbps

Note 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.

Note 2: All typical specifications are given for $V_{CC} = 3.3V$ and $T_A = +25^\circ C$.

Note 3: Supply current specification is valid for loaded transmitters when DE = 0V.

Note 4: Applies to peak current. See *Typical Operating Characteristics*.

Test Circuits

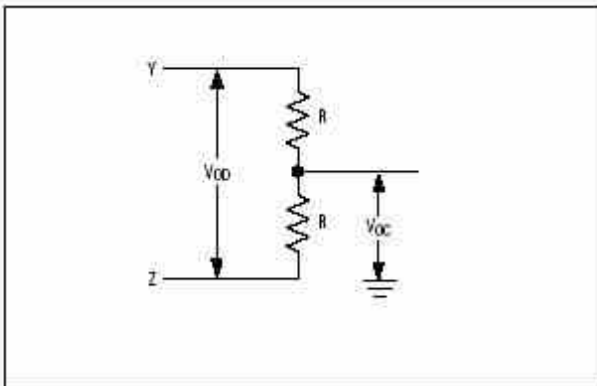


Figure 4. Driver DC Test Load

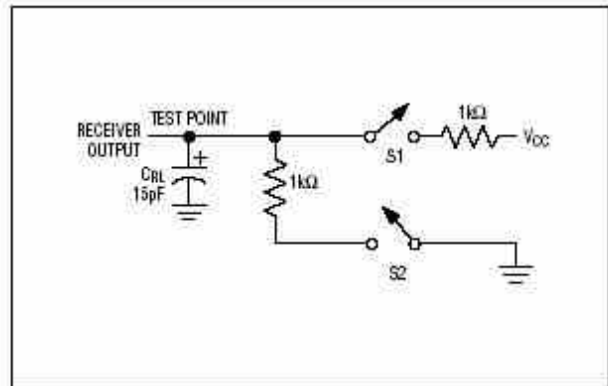


Figure 5. Receiver Timing Test Load

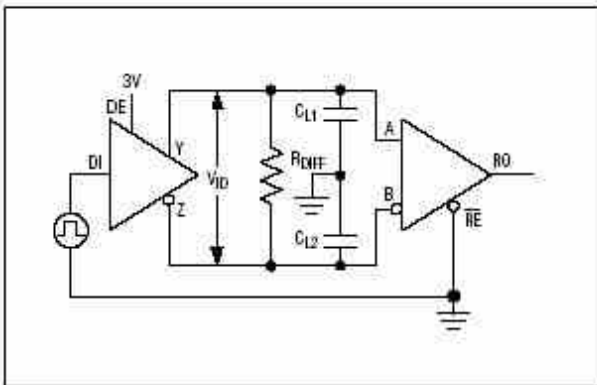


Figure 6. Driver/Receiver Timing Test Circuit

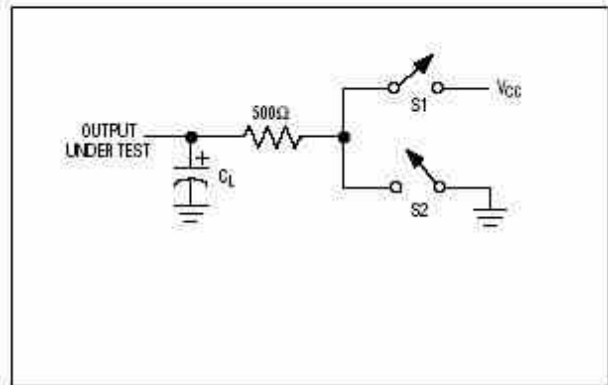


Figure 7. Driver Timing Test Load

Operation timing diagrams of HT3485

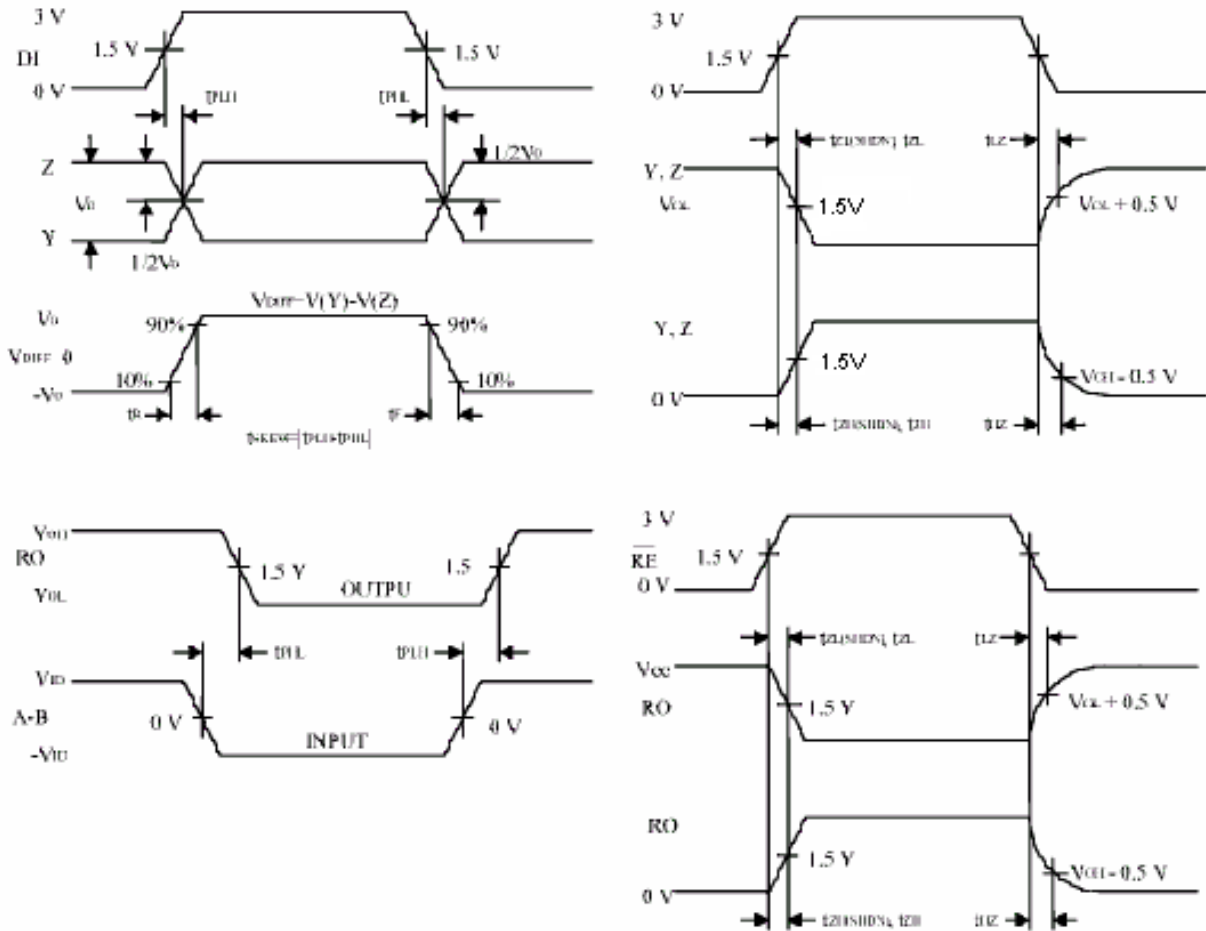
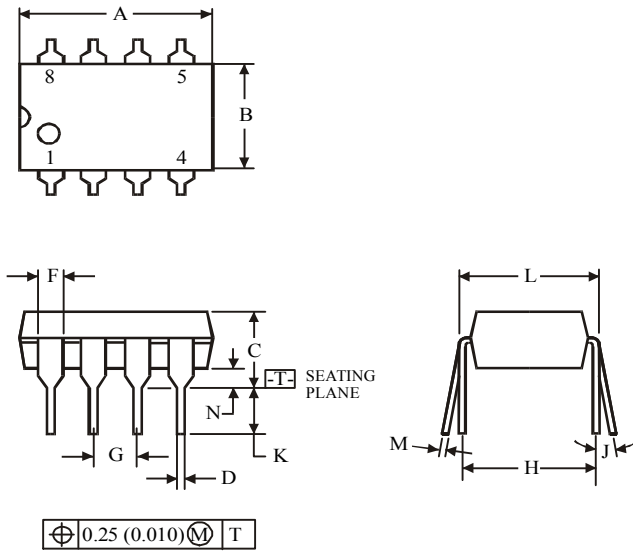
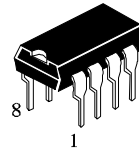


Table of ILX 3485 operation

Transmitting					Receiving			
Inputs			Outputs X		Inputs			Outputs
RE	DE	DI	Z	Y	RE	DE	A-B	RO
X	1	1	0	1	0	0	+0.2V	1
X	1	0	1	0	0	0	-0.2V	0
0	0	X	Z	Z	0	0	open	1
1	0	X	Z	Z	1	0	X	Z

X-don't care
Z-high impedance

(DIP8)

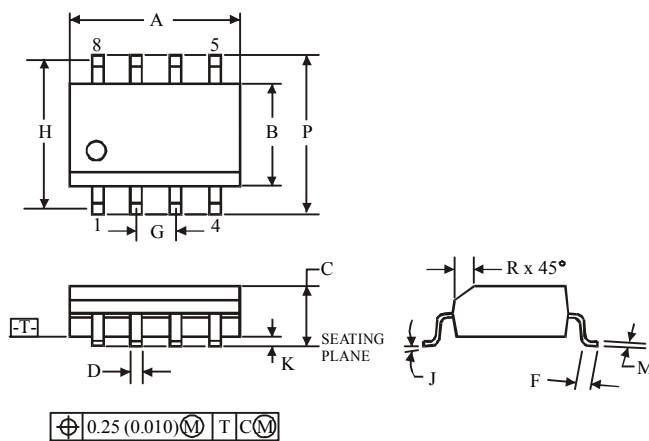
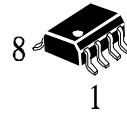


Symbol	Dimension, mm	
	MIN	MAX
A	8.51	10.16
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	

NOTES:

- Dimensions "A", "B" do not include mold flash or protrusions.
Maximum mold flash or protrusions 0.25 mm (0.010) per side.

(SOP8)



Symbol	Dimension, mm	
	MIN	MAX
A	4.8	5
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	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

NOTES:

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

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