



ST485

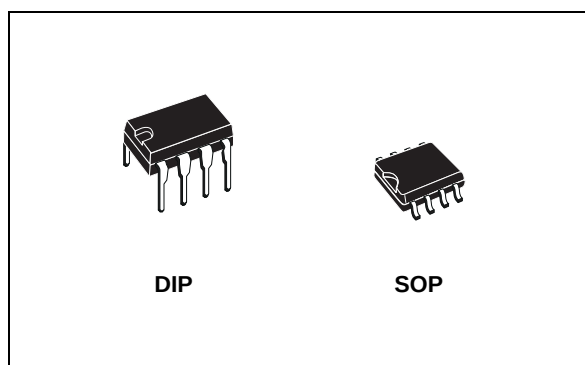
LOW POWER RS-485/RS-422 TRANSCEIVER

- LOW QUIESCENT CURRENT: 300 μ A
- DESIGNED FOR RS-485 INTERFACE APPLICATIONS
- -7V TO 12V COMMON MODE INPUT VOLTAGE RANGE
- DRIVER MAINTAINS HIGH IMPEDANCE IN 3-STATE OR WITH THE POWER OFF
- 70mV TYPICAL INPUT HYSTERESIS
- 30ns PROPAGATION DELAYS, 5ns SKEW
- OPERATE FROM A SINGLE 5V SUPPLY
- CURRENT LIMITING AND THERMAL SHUTDOWN FOR DRIVER OVERLOAD PROTECTION
- ALLOWS UP TO 64 TRANSCEIVERS ON THE BUS

DESCRIPTION

The ST485 is a low power transceiver for RS-485 and RS-422 communication. Each part contains one driver and one receiver.

This transceiver draws 300 μ A (typ.) of supply current when unloaded or fully loaded with disabled drivers.



It operates from a single 5V supply.

Driver is short-circuit current limited and is protected against excessive power dissipation by thermal shutdown circuitry that places the driver outputs into a high-impedance state.

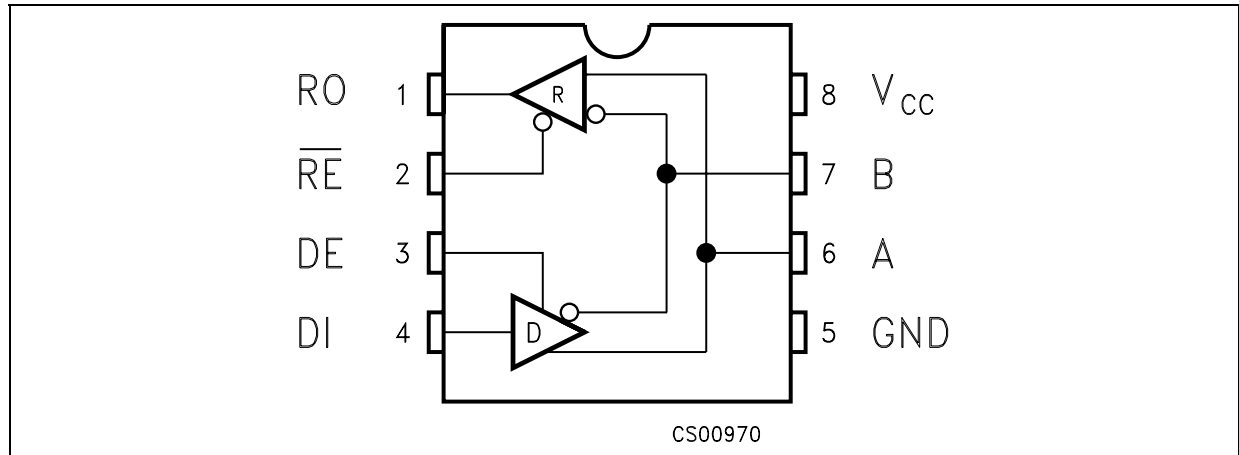
The ST485 is designed for bi-directional data communications on multipoint bus transmission line (half-duplex applications).

The ST485 is available in three temperature range: commercial (0°C to 70°C), industrial (-40°C to 85°C) and automotive (-55°C to 125°C)

ORDERING CODES

Type	Temperature Range	Package	Comments
ST485CN	0 to 70 °C	DIP-8	50parts per tube / 40tube per box
ST485BN	-40 to 85 °C	DIP-8	50parts per tube / 40tube per box
ST485XN	-55 to 125 °C	DIP-8	50parts per tube / 40tube per box
ST485CD	0 to 70 °C	SO-8 (Tube)	100parts per tube / 20tube per box
ST485BD	-40 to 85 °C	SO-8 (Tube)	100parts per tube / 20tube per box
ST485XD	-55 to 125 °C	SO-8 (Tube)	100parts per tube / 20tube per box
ST485CDR	0 to 70 °C	SO-8 (Tape & Reel)	2500 parts per reel
ST485BDR	-40 to 85 °C	SO-8 (Tape & Reel)	2500 parts per reel
ST485XDR	-55 to 125 °C	SO-8 (Tape & Reel)	2500 parts per reel

PIN CONFIGURATION



PIN DESCRIPTION

PIN N°	SYMBOL	NAME AND FUNCTION
1	RO	Receiver Output
2	RE	Receiver Output Enable
3	DE	Driver Output Enable
4	DI	Driver Input
5	GND	Ground
6	A	Non-inverting Receiver Input and Non-inverting Driver Output
7	B	Inverting Receiver Input and Inverting Driver Output
8	V _{CC}	Supply Voltage

TRUTH TABLE (DRIVER)

INPUTS			OUTPUTS	
RE	DE	DI	B	A
X	H	H	L	H
X	H	L	H	L
X	L	X	Z	Z

X= Don't Care; Z=High Impedance

TRUTH TABLE (RECEIVER)

INPUTS			OUTPUT
RE	DE	A-B	RO
L	L	$\geq +0.2V$	H
L	L	$\leq -0.2V$	L
L	L	INPUTS OPEN	H
H	L	X	Z

X= Don't Care; Z=High Impedance

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	12	V
V _I	Control Input Voltage (RE, DE)	-0.5 to (V _{CC} + 0.5)	V
V _{DI}	Driver Input Voltage (DI)	-0.5 to (V _{CC} + 0.5)	V
V _{DO}	Driver Output Voltage (A, B)	± 14	V
V _{RI}	Receiver Input Voltage (A, B)	± 14	V
V _{RO}	Receiver Output Voltage (RO)	-0.5 to (V _{CC} + 0.5)	V

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

DC ELECTRICAL CHARACTERISTICS

($V_{CC} = 5V \pm 5\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise specified. Typical values are referred to $T_A = 25^\circ C$)
(See Note 1)

Symbol	Parameter	Test Conditions	Value					Unit
			-40 to 85 °C			-55 to 125 °C		
			Min.	Typ.	Max.	Min.	Max.	
V _{OD1}	Differential Driver Output (No Load)				5		5	V
V _{OD2}	Differential Driver Output (With Load)	R _L = 27Ω (RS-485) (See Fig.1) R _L = 50Ω (RS-422) (See Fig.1)	1.5		5 5	1.4	5 5	V V
ΔV _{OD}	Change in Magnitude of Driver Differential Output Voltage for Complementary Output States	R _L = 27Ω or 50Ω (See Fig. 1)			0.2		0.2	V
V _{OC}	Driver Common-Mode Output Voltage	R _L = 27Ω or 50Ω (See Fig. 1)			3		3	V
ΔV _{OC}	Change in Magnitude of Driver Common-Mode Output Voltage for Complementary Output States	R _L = 27Ω or 50Ω (See Fig. 1)			0.2		0.2	V
V _{IH}	Input High Voltage	RE, DE, DI	2.0			2.0		V
V _{IL}	Input Low Voltage	RE, DE, DI			0.8		0.8	V
I _{IN1}	Input Current	RE, DE, DI			± 2		± 2	μA
I _{IN2}	Input Current (A, B)	V _{CM} = 0V or 5.25V V _{DE} = 0V V _{IN} = 12V V _{IN} = -7V			1 -0.8		1 -0.8	mA mA
V _{TH}	Receiver Differential Threshold Voltage	V _{CM} = -7 to 12V	-0.2		0.2	-0.2	0.2	V
ΔV _{TH}	Receiver Input Hysteresis	V _{CM} = 0V		70				mV
V _{OH}	Receiver Output High Voltage	I _O = -4mA V _{ID} = 200mV	3.5			3.4		V
V _{OL}	Receiver Output Low Voltage	I _O = 4mA V _{ID} = -200mV			0.4		0.55	V
I _{OZR}	3-State (High Impedance) Output Current at Receiver	V _O = 0.4 to 2.4V			± 1		± 1	μA
R _{IN}	Receiver Input Resistance	V _{CM} = -7 to 12V	24			24		KΩ
I _{CC}	No Load Supply Current (Note 2)	V _{RE} = 0V or V _{CC} V _{DE} = V _{CC} V _{DE} = 0V		400 300	900 500		900 500	μA μA
I _{OSD1}	Driver Short-Circuit Current, V _O =High	V _O = -7 to 12V (Note 3)	35		250	35	250	mA
I _{OSD2}	Driver Short-Circuit Current, V _O =Low	V _O = -7 to 12V (Note 3)	35		250	35	250	mA
I _{OSR}	Receiver Short-Circuit Current	V _O = 0V to V _{CC}	7		95	7	95	mA

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 specified.

Note 2: Supply current specification is valid for loaded transmitters when $V_{DE} = 0V$

Note 3: Applies to peak current. See typical Operating Characteristics.

DRIVER SWITCHING CHARACTERISTICS

($V_{CC} = 5V \pm 5\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise specified. Typical values are referred to $T_A = 25^\circ C$)
(See Note 1)

Symbol	Parameter	Test Conditions	Value					Unit
			-40 to 85 °C			-55 to 125 °C		
			Min.	Typ.	Max.	Min.	Max.	
t _{PLH} t _{PHL}	Propagation Delay Input to Output	R _{DIFF} = 54Ω C _{L1} = C _{L2} = 100pF (See Fig. 3 and 5)	10	30	60		70	ns
t _{SK}	Output Skew to Output	R _{DIFF} = 54Ω C _{L1} = C _{L2} = 100pF (See Fig. 3 and 5)		5	10		10	ns
t _{TLH} t _{THL}	Rise or Fall Time	R _{DIFF} = 54Ω C _{L1} = C _{L2} = 100pF (See Fig. 3 and 5)	3	15	40	3	45	ns
t _{PZH}	Output Enable Time	C _L = 100pF S2 = Closed (See Fig. 4 and 6)		70	90		90	ns
t _{PZL}	Output Enable Time	C _L = 100pF S1 = Closed (See Fig. 4 and 6)		70	90		90	ns
t _{PLZ}	Output Disable Time	C _L = 15pF S1 = Closed (See Fig. 4 and 6)		70	90		90	ns
t _{PHZ}	Output Disable Time	C _L = 15pF S2 = Closed (See Fig. 4 and 6)		70	90		90	ns

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 specified.

RECEIVER SWITCHING CHARACTERISTICS

($V_{CC} = 5V \pm 5\%$, $T_A = T_{MIN}$ to T_{MAX} , unless otherwise specified. Typical values are referred to $T_A = 25^\circ C$)
(See Note 1)

Symbol	Parameter	Test Conditions	Value					Unit
			-40 to 85 °C			-55 to 125 °C		
			Min.	Typ.	Max.	Min.	Max.	
t _{PLH} t _{PHL}	Propagation Delay Input to Output	R _{DIFF} = 54Ω C _{L1} = C _{L2} = 100pF (See Fig. 3 and 7)	20	130	210		230	ns
t _{SKD}	Differential Receiver Skew	R _{DIFF} = 54Ω C _{L1} = C _{L2} = 100pF (See Fig. 3 and 7)		13				ns
t _{PZH}	Output Enable Time	C _{RL} = 15pF S1 = Closed (See Fig. 2 and 8)		20	50		56	ns
t _{PZL}	Output Enable Time	C _{RL} = 15pF S2 = Closed (See Fig. 2 and 8)		20	50		56	ns
t _{PLZ}	Output Disable Time	C _{RL} = 15pF S1 = Closed (See Fig. 2 and 8)		20	50		56	ns
t _{PHZ}	Output Disable Time	C _{RL} = 15pF S2 = Closed (See Fig. 2 and 8)		20	50		56	ns
f _{MAX}	Maximum Data Rate		2.5			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 specified.

TEST CIRCUITS AND TYPICAL CHARACTERISTICS

Figure 1 : Driver DC Test Load

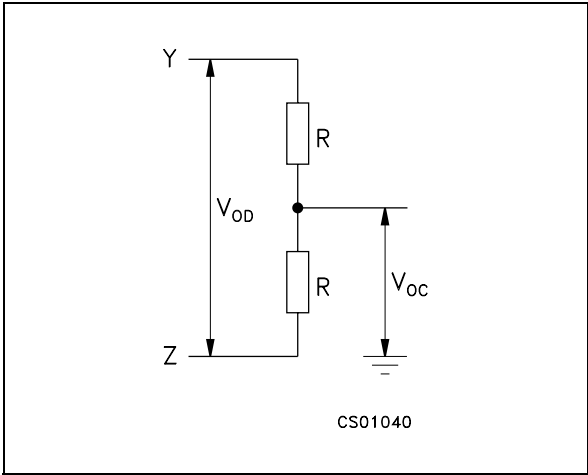


Figure 3 : Drive/Receiver Timing Test Circuit

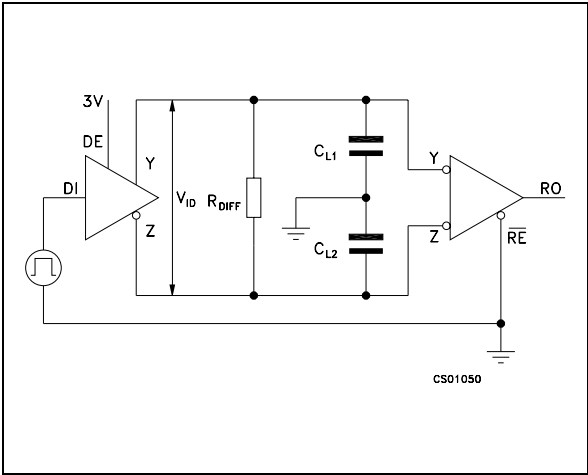


Figure 2 : Receiver Timing Test Load

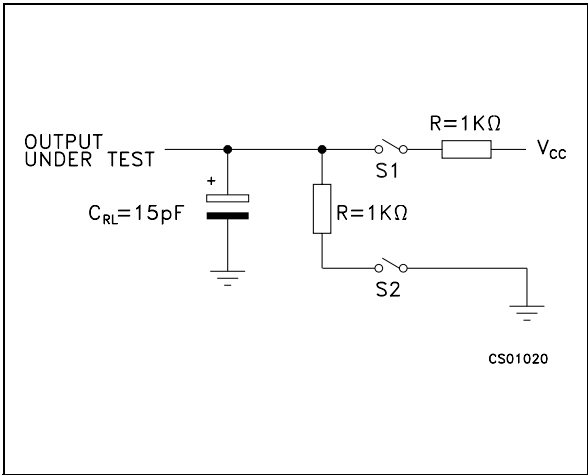


Figure 4 : Driver Timing Test Load

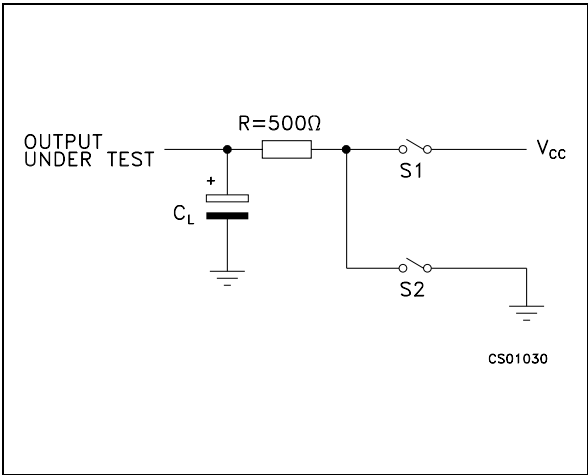


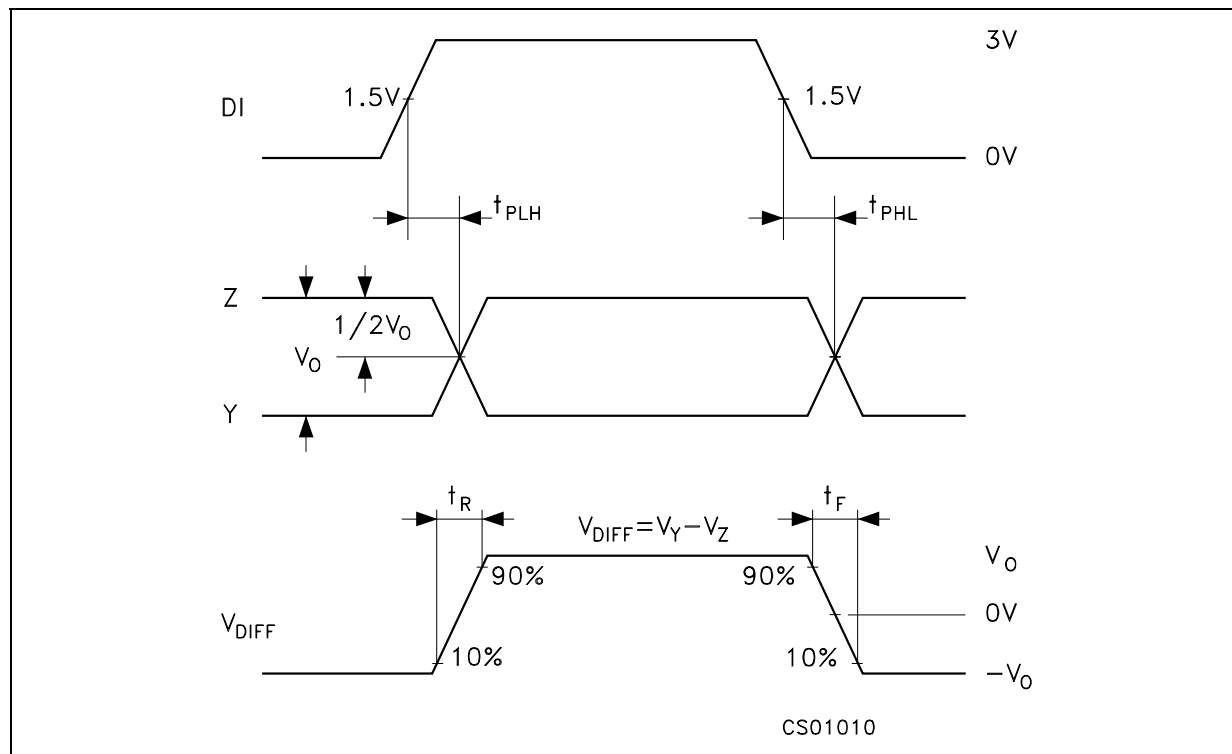
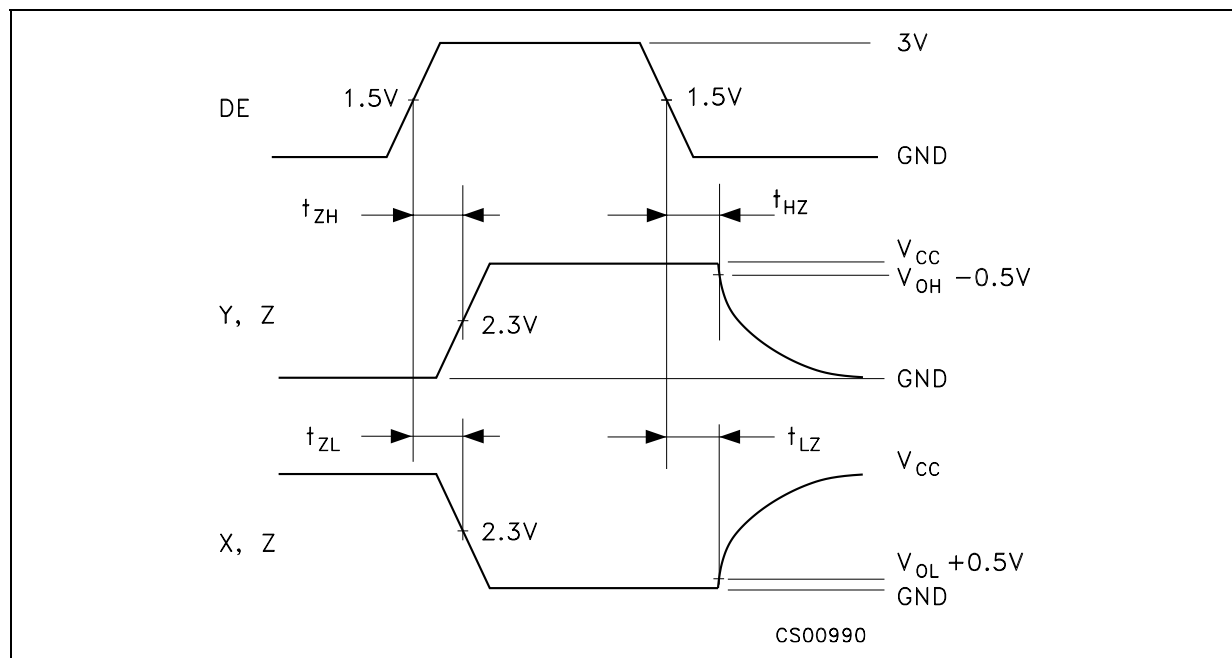
Figure 5 : Driver Propagation Delay**Figure 6 : Driver Enable and Disable Time**

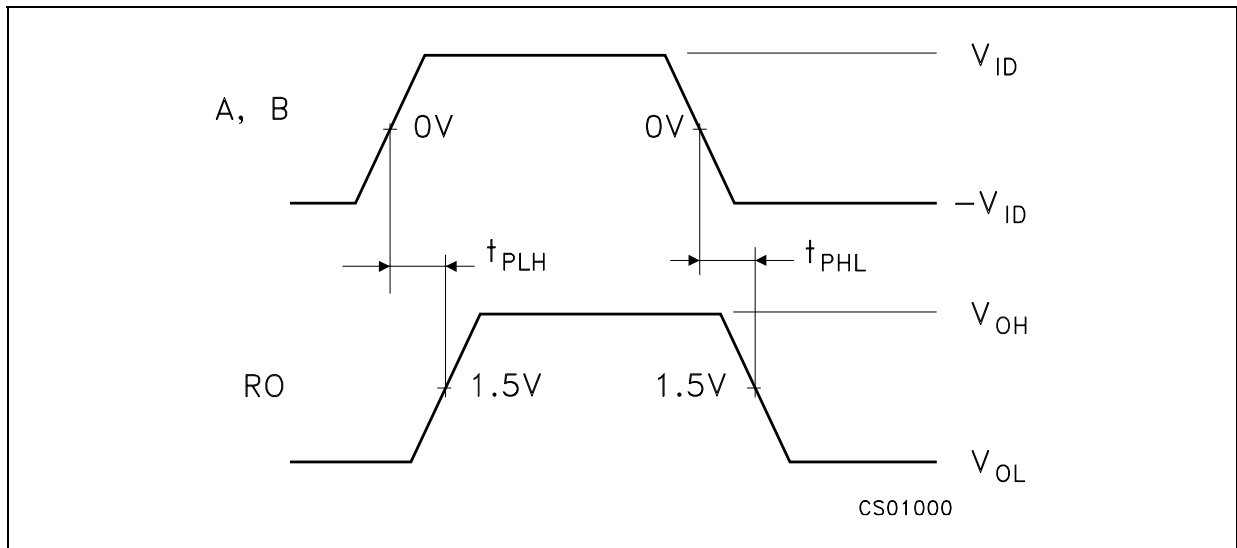
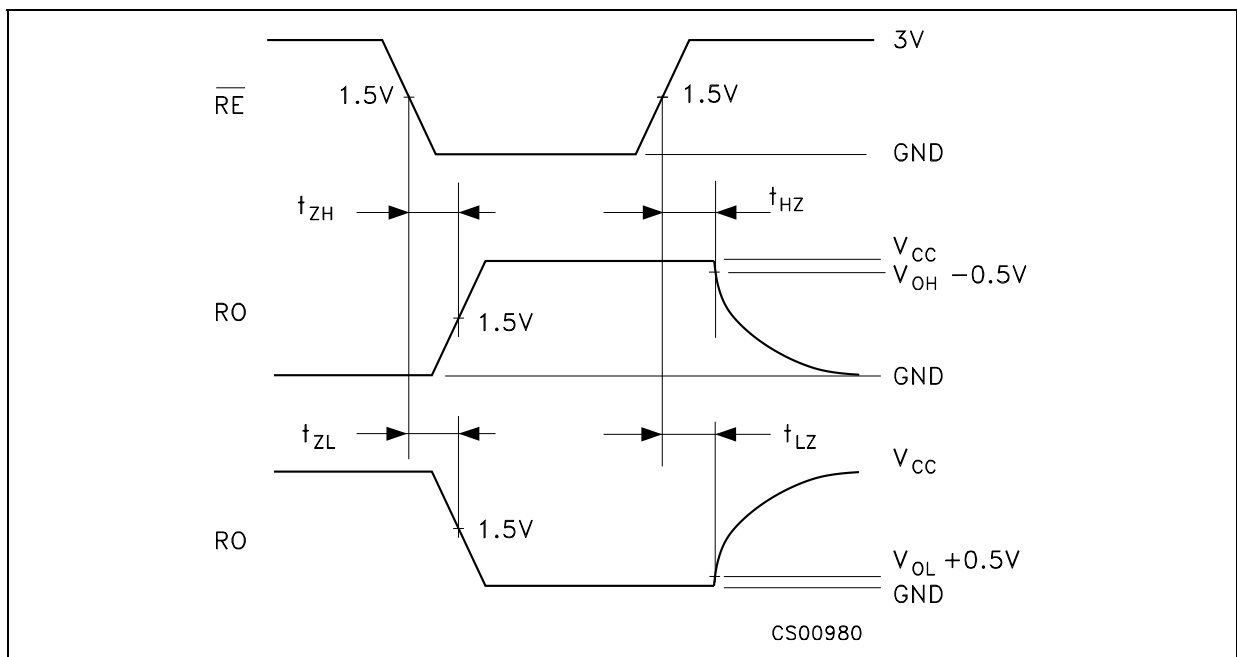
Figure 7 : Receiver Propagation Delay**Figure 8 : Receiver Enable and Disable Time**

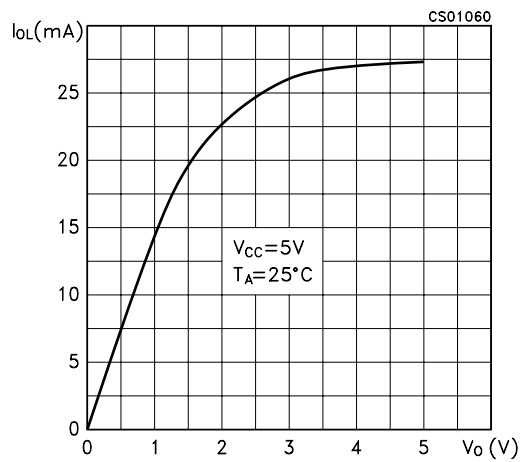
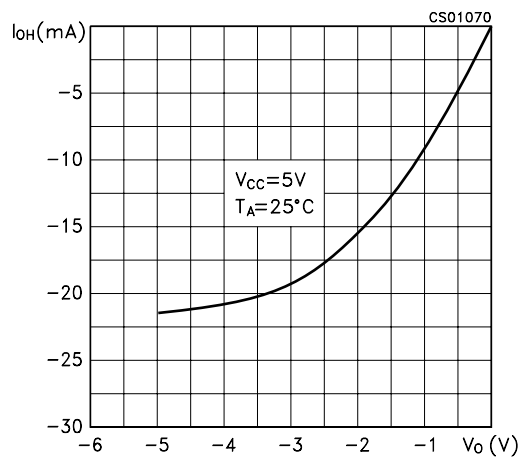
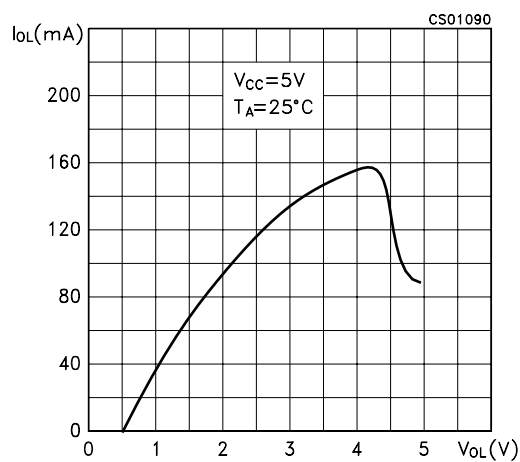
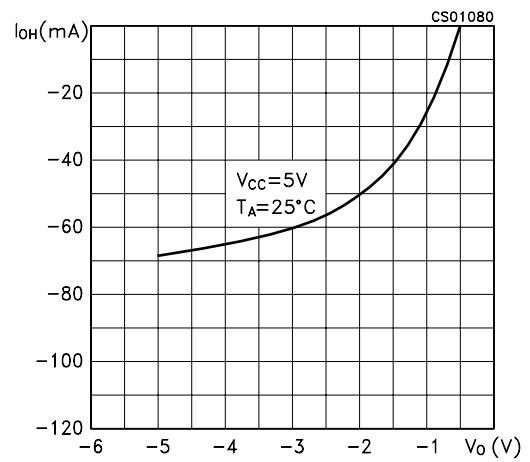
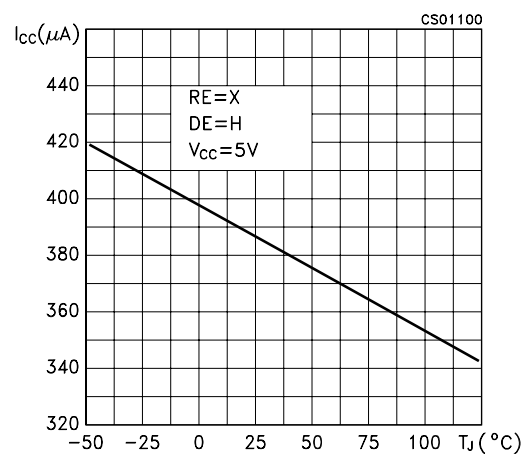
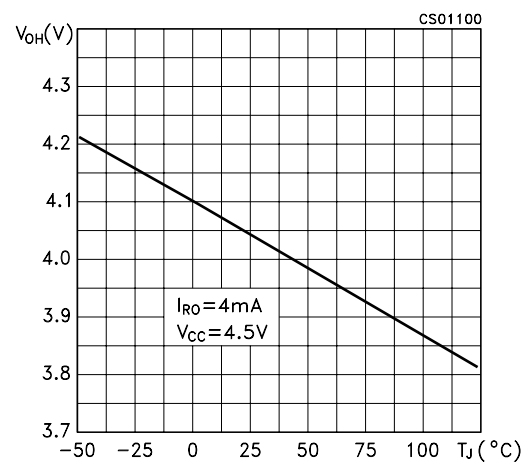
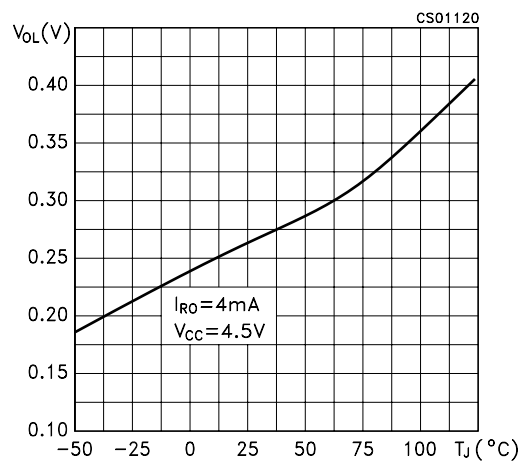
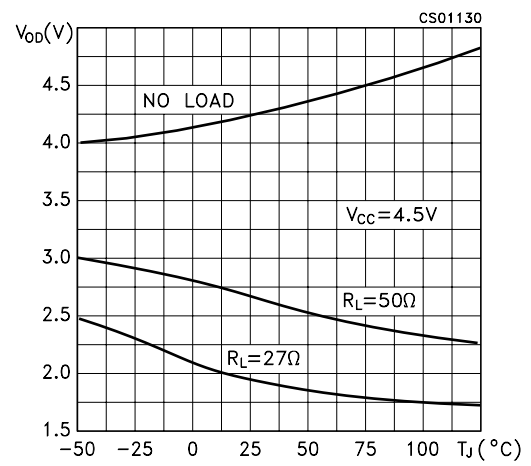
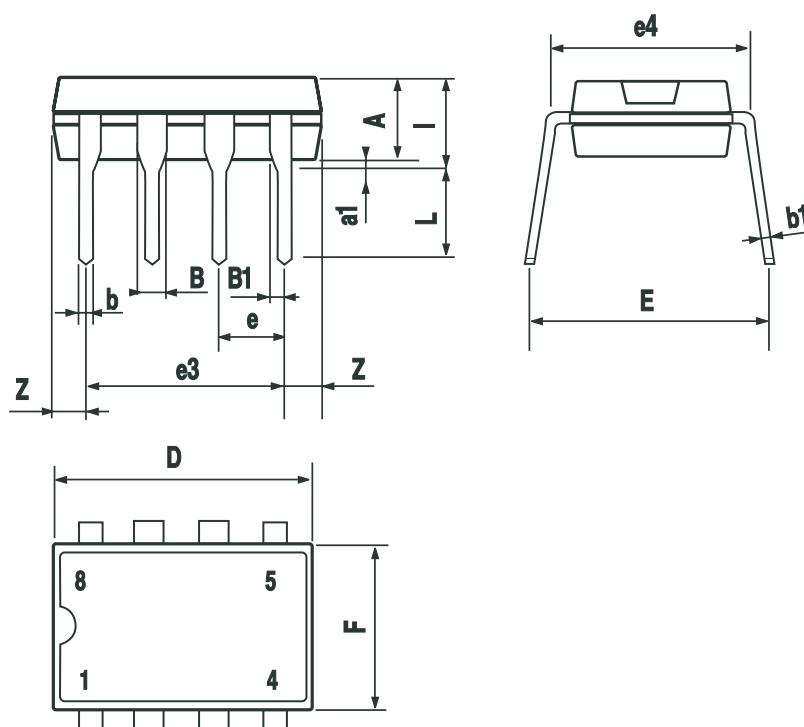
Figure 9 : Receiver Output Current vs Output Low Voltage**Figure 10 : Receiver Output Current vs Output High Voltage****Figure 11 : Driver Output Current vs Output Low Voltage****Figure 12 : Driver Output Current vs Output High Voltage****Figure 13 : Supply Current vs Temperature****Figure 14 : Receiver High Level Output Voltage vs Temperature**

Figure 15 : Receiver Low Level Output Voltage vs Temperature**Figure 16 : Differential Driver Output Voltage vs Temperature**

Plastic DIP-8 MECHANICAL DATA

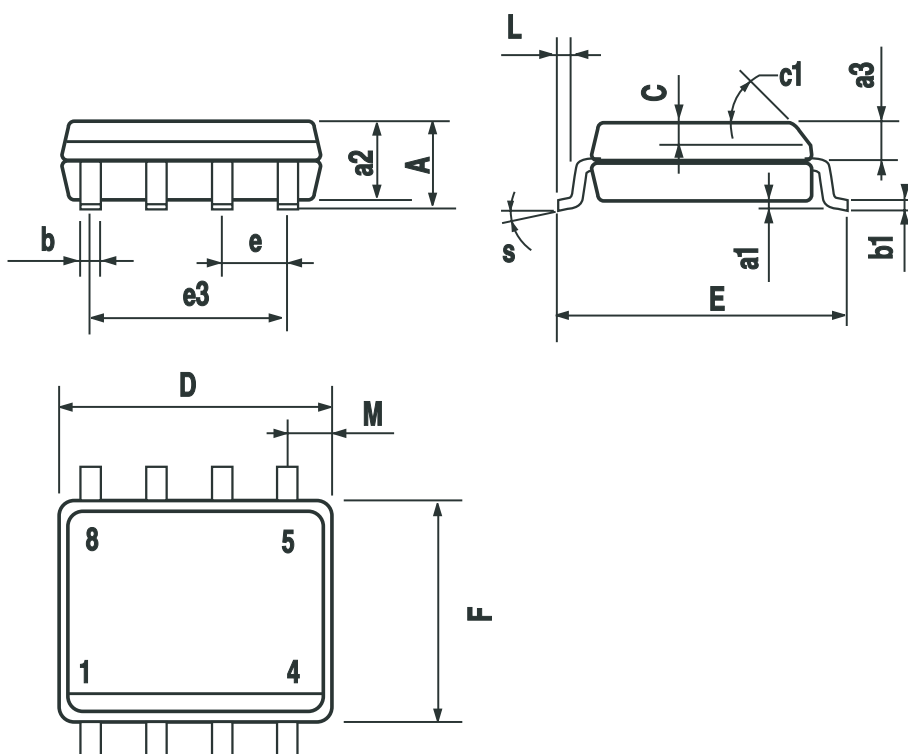
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063



P001F

SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45° (typ.)					
D	4.8		5.0	0.189		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.149		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8° (max.)					



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