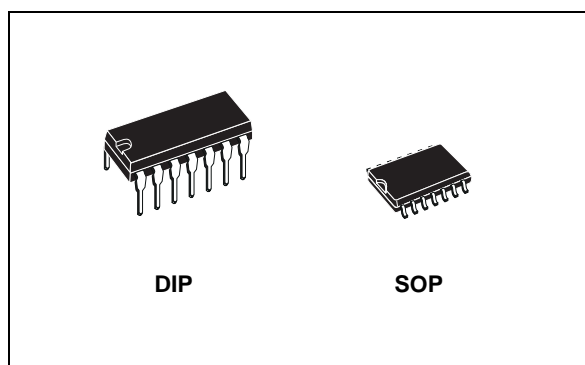




ST491A

LOW POWER HIGH SPEED RS-485/RS-422 TRANSCEIVER

- LOW SUPPLY CURRENT: 5mA MAX
- DESIGNED FOR RS485 INTERFACE APPLICATIONS
- -7 TO 12 COMMON MODE INPUT VOLTAGE RANGE
- 70mV TYPICAL INPUT HYSTERESIS
- DESIGNED FOR 25Mbps OPERATION
- OPERATE FROM SINGLE 5 SUPPLY
- ± 4 kV ESD PROTECTION
- CURRENT LIMITING AND THERMAL SHUTDOWN FOR DRIVER OVERLOAD PROTECTION



DESCRIPTION

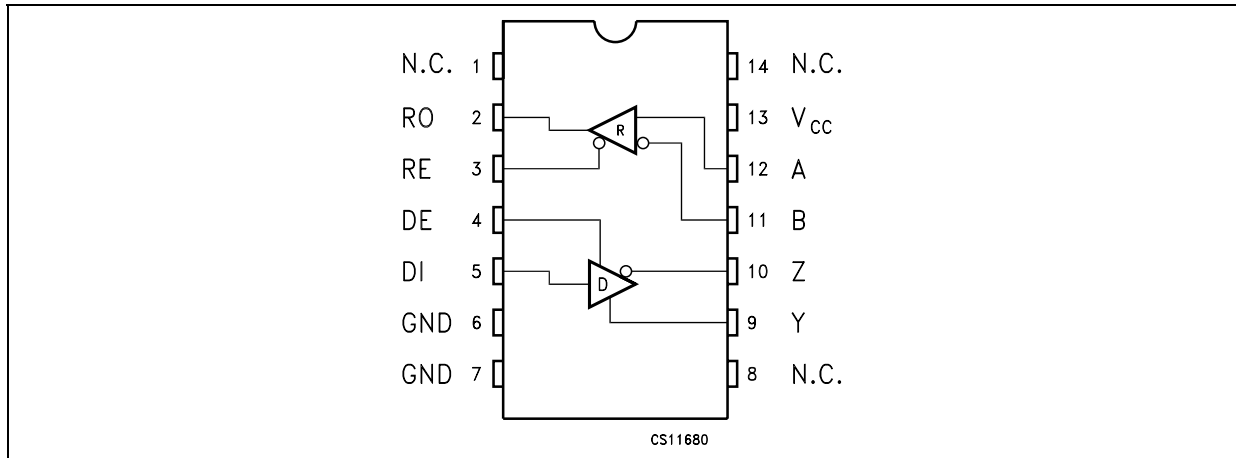
The ST491A is a low power transceiver for RS-485 and RS-422 communications. The device contains one driver and one receiver in full duplex configuration. The ST491A draws 5mA (typ.) of supply current when unloaded and operates from a single 5V supply.

Driver is short-circuit current limited and is protected against excessive power dissipation by thermal shutdown circuitry that place the driver outputs into a high-impedance state. The receiver input has a fail-safe feature that guarantees a logic high output if both inputs are open circuit.

ORDERING CODES

Type	Temperature Range	Package	Comments
ST491ACN	0 to 70 °C	DIP-14	25parts per tube / 40tube per box
ST491ABN	-40 to 85 °C	DIP-14	25parts per tube / 40tube per box
ST491ACD	0 to 70 °C	SO-14 (Tube)	50parts per tube / 20tube per box
ST491ABD	-40 to 85 °C	SO-14 (Tube)	50parts per tube / 20tube per box
ST491ACDR	0 to 70 °C	SO-14 (Tape & Reel)	2500 parts per reel
ST491ABDR	-40 to 85 °C	SO-14 (Tape & Reel)	2500 parts per reel

PIN CONFIGURATION



PIN DESCRIPTION

PIN N°	SYMBOL	NAME AND FUNCTION
1	NC	Not Connected
2	RO	Receiver Output.
3	RE	Receiver Output Enable
4	DE	Driver Output Enable
5	DI	Inverting Driver Input.
6	GND	Ground
7	GND	Ground
8	NC	Not Connected
9	Y	Non-inverting Driver Output
10	Z	Inverting Driver Output
11	B	Inverting Receiver Input
12	A	Non-inverting Receiver Input
13	NC	Not Connected
14	V _{CC}	Supply Voltage

TRUTH TABLE (DRIVER)

INPUT		OUTPUTS	
DI	DE	Y	Z
L	H	L	H
H	H	H	L
X	L	Z	Z

X= Don't Care; Z=High Impedance

TRUTH TABLE (RECEIVER)

INPUT		OUTPUT
A-B	RE	RO
≥ -0.2V	L	H
between -0.2V to 0.2V	L	?
≤ -0.2V	L	L
OPEN	L	H
X	H	Z

?= Irrelevant; X= Don't Care; Z=High Impedance

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	7	V
V_{DI}	Driver Input Voltage	-0.5 to 7	V
V_Y, V_Z	Driver Output Voltage	-7.5 to 12.5	V
V_A, V_B	Receiver Input Voltage	-7.5 to 12.5	V
V_{RO}	Receiver Output Voltage	-0.3 to ($V_{CC} + 0.3$)	V
ESD	Human Body Model	3.5	KV

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

ELECTRICAL CHARACTERISTICS

$V_{CC} = 4.5V$ to $5.5V$, $T_A = -40$ to $85^\circ C$, unless otherwise specified. Typical values are referred to $T_A = 25^\circ C$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SUPPLY}	No Load Supply Current			2	5	mA
C_{IN}	Input Capacitance			1.8		pF
C_{YZ}	Driver Output Capacitance			1.2		pF
C_{OUT}	Output Capacitance			2.3		pF

TRANSMITTER ELECTRICAL CHARACTERISTICS

$V_{CC} = 4.5V$ to $5.5V$, $T_A = -40$ to $85^\circ C$, unless otherwise specified. Typical values are referred to $T_a = 25^\circ C$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{OD1}	Differential Drive Output (No load)				V_{CC}	V
V_{OD2}	Differential Drive Output (With Load)	$R_L = 54\Omega$ (RS-422) (Figure 1)	1.5	2.6	5	V
V_{OD3}	Differential Drive Output (With Load)	$R_L = 100\Omega$ (RS-422) (Figure 1)	2	3		V
ΔV_{OD}	Change in magnitude of Driver Differential Output Voltage for Complementary Output States (Note1)	$R_L = 54\Omega$ or 100Ω (Figure 1)		0	0.2	V
V_{OC}	Driver Common Mode Output Voltage	$R_L = 54\Omega$ (Figure 1)	1		3	V
ΔV_{OC}	Change in magnitude of Driver Common Mode Output Voltage (Note1)	$R_L = 54\Omega$ (Figure 1)		0	0.2	V
I_{OFF}	Power Off Output Current	$V_{CC} = 0V$ $V_O = -7V$ to $12V$			± 100	μA
I_{OSD}	Driver Short Circuit Output Current	$V_O = -7V$ to $12V$	± 35		± 250	mA
V_{IL}	Input Logic Threshold Low				0.8	V
V_{IH}	Input Logic Threshold High		2			V

RECEIVER ELECTRICAL CHARACTERISTICS

$V_{CC} = 4.5V$ to $5.5V$, $T_A = -40$ to $85^\circ C$, unless otherwise specified. Typical values are referred to $T_a = 25^\circ C$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
I_{IN}	Input Current (A, B)	other input=0V $V_{CC} = 0$ or $5.25V$	$V_{IN}=12V$		0.5	1	mA
			$V_{IN}=-7V$		-0.35	-0.8	mA
V_{TH}	Receiver Differential Threshold Voltage	$V_{CM} = -7V$ to $12V$	-0.2		0.2	V	
ΔV_{TH}	Receiver Input Hysteresis	$V_{CM} = 0V$		70		mV	
V_{OH}	Receiver Output High Voltage	$I_{OUT} = -8mA$, $V_{ID} = 200mV$	3.5	4.7		V	
V_{OL}	Receiver Output Low Voltage	$I_{OUT} = 8mA$, $V_{ID} = -200mV$		0.3	0.5	V	
R_{RIN}	Receiver Input Resistance	$V_{CM} = -7V$ to $12V$	12	24		K Ω	

DRIVER SWITCHING CHARACTERISTICS

$V_{CC} = 4.5V$ to $5.5V$, $T_A = -40$ to $85^\circ C$, unless otherwise specified. Typical values are referred to $T_a = 25^\circ C$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
D_R	Maximum Data Rate	Jitter <5%	25	50		Mbps
t_{PLH} t_{PHL}	Propagation Delay Input to Output	$R_L = 54\Omega$ $C_{L1}=C_{L2}=50pF$, (Figure 1)		10	16	ns
t_{SKEW}	Differential Output Delay Skew	$R_L = 54\Omega$ $C_{L1}=C_{L2}=50pF$, (Figure 1)		1	3	ns
t_{TLH} t_{THL}	Rise or Fall Differential Time	$R_L = 54\Omega$ $C_{L1}=C_{L2}=50pF$, (Figure 1)		8	12	ns
t_{PZL}	Output Enable Time	$C_L = 50pF$ S1 Closed		14	25	ns
t_{PZH}	Output Enable Time	$C_L = 50pF$ S2 Closed		14	25	ns
t_{PHZ}	Output Disable Time	$C_L = 15pF$ S2 Closed		10	25	ns
t_{PLZ}	Output Disable Time	$C_L = 15pF$ S1 Closed		16	25	ns

RECEIVER SWITCHING CHARACTERISTICS

$V_{CC} = 4.5V$ to $5.5V$, $T_A = -40$ to $85^\circ C$, unless otherwise specified. Typical values are referred to $T_a = 25^\circ C$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_{PLH} t_{PHL}	Propagation Delay Input to Output	$C_L = 15pF$ (Figures 2,4)		19	30	ns
t_{SKD}	$ t_{PLH} - t_{PHL} $ Receiver Output Skew	$C_L = 15pF$ (Figures 2,4)		1	3	ns
t_{TLH} t_{THL}	Rise or Fall Time	$C_L = 15pF$ (Figures 2,4)		6		ns
t_{PZL}	Output Enable Time	$C_{RL} = 15pF$ S1 Closed		6	12	ns
t_{PZH}	Output Enable Time	$C_{RL} = 15pF$ S2 Closed		7	12	ns
t_{PHZ}	Output Disable Time	$C_{RL} = 15pF$ S2 Closed		6	12	ns
t_{PLZ}	Output Disable Time	$C_{RL} = 15pF$ S1 Closed		6	12	ns

TEST CIRCUITS AND TYPICAL CHARACTERISTICS

Figure 1 : Driver DC Test Load

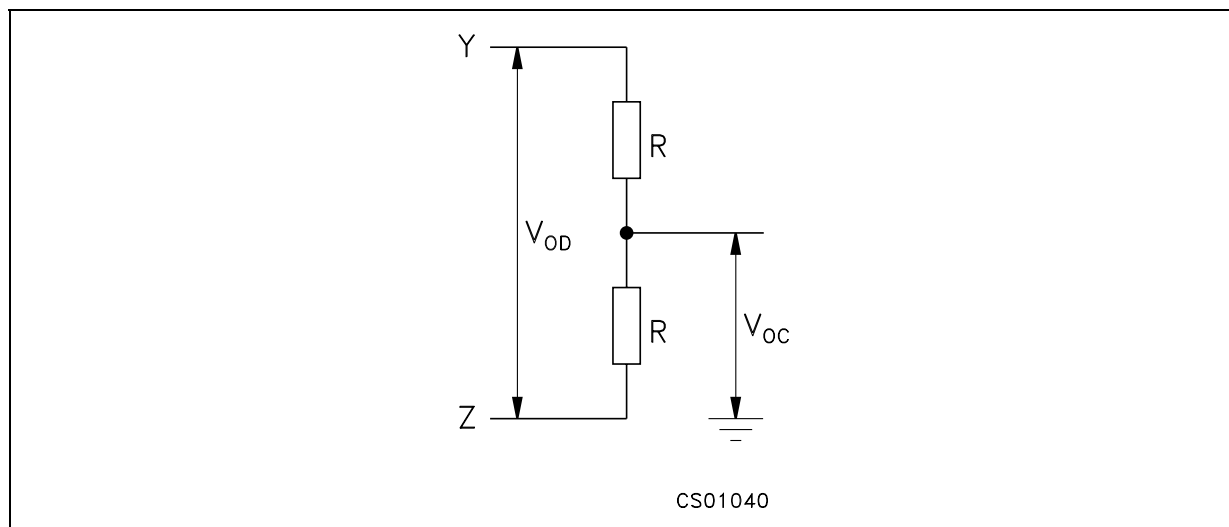


Figure 2 : Receiver Timing Test Load

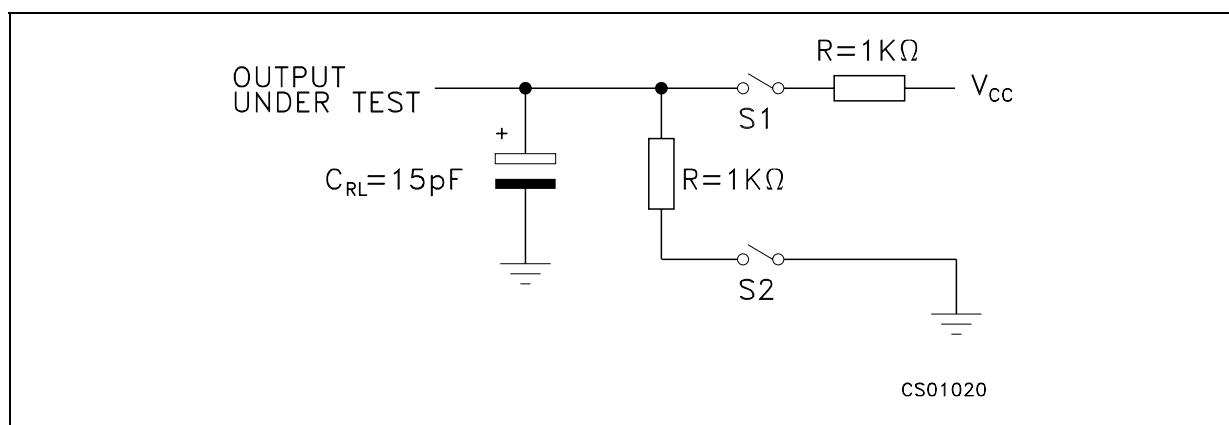


Figure 3 : Driver/Receiver Timing Test Circuit

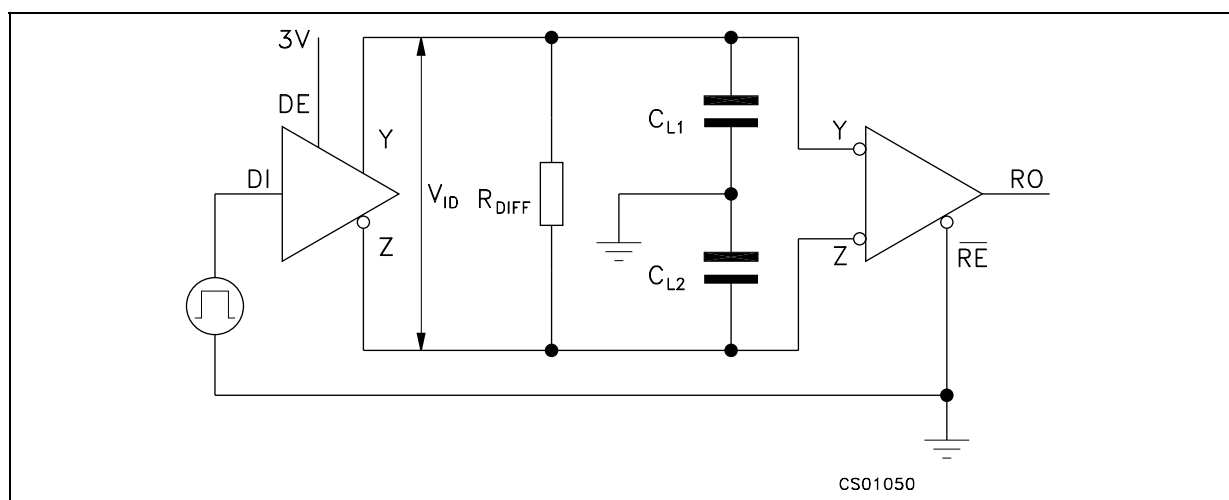


Figure 4 : Driver Timing Test Load

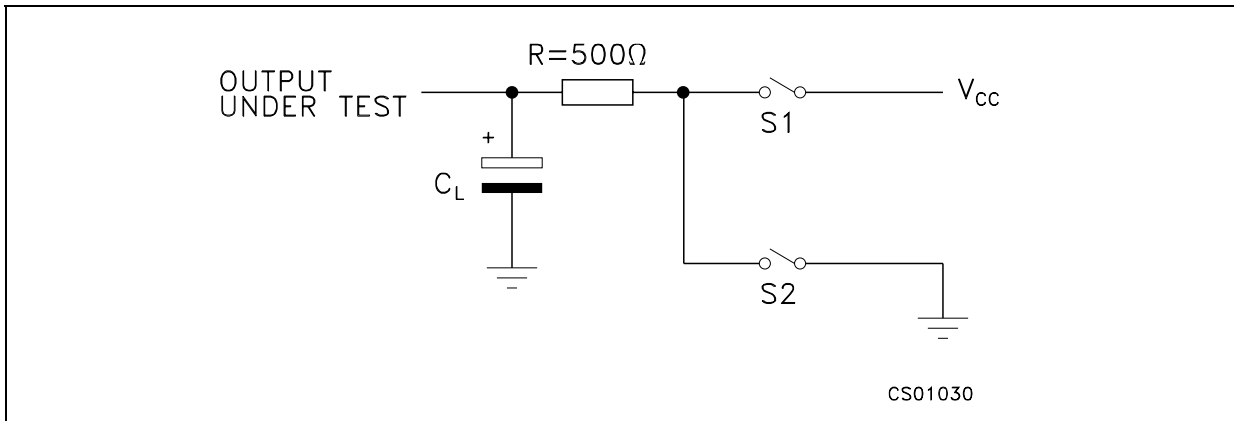


Figure 5 : Driver Propagation Delay

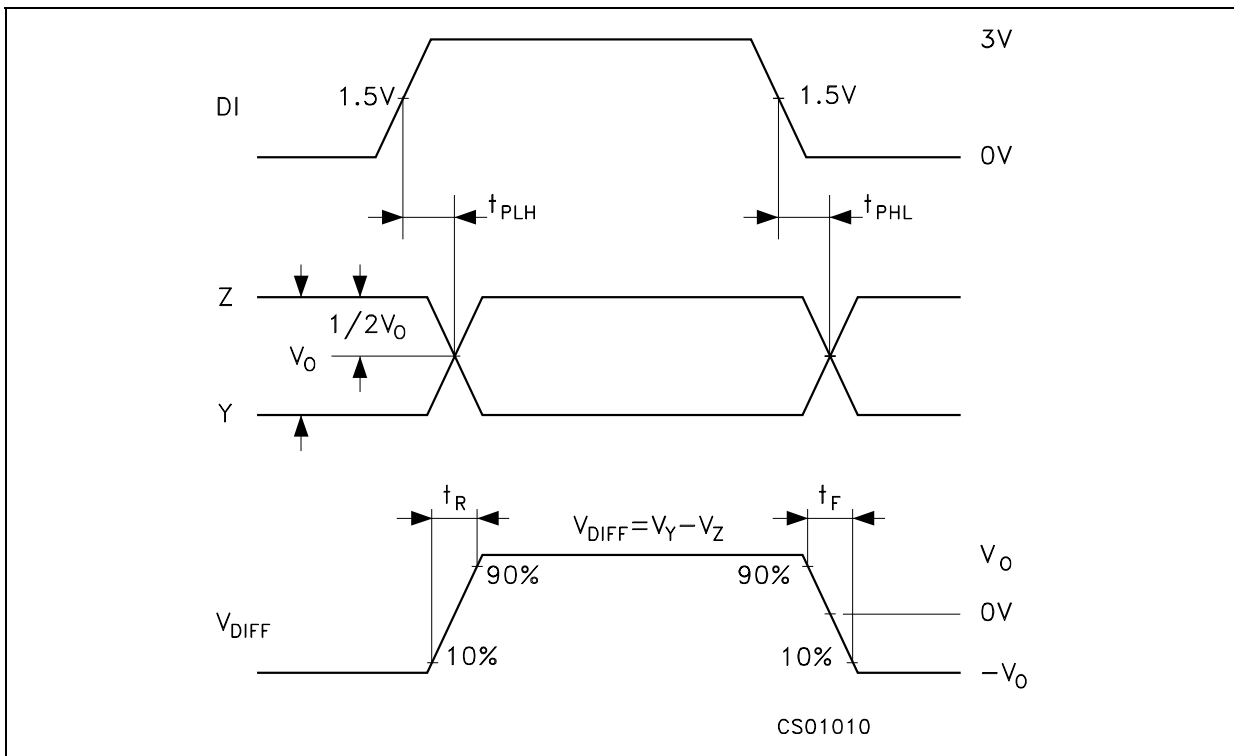


Figure 6 : Receiver Propagation Delay

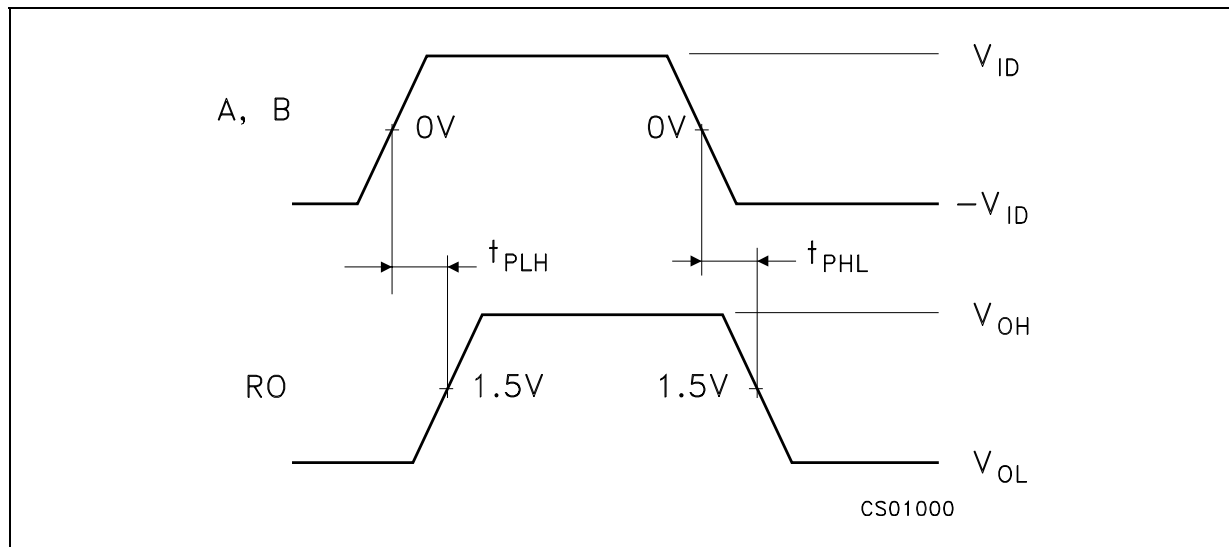


Figure 7 : Receiver Output Current vs Output Voltage (Output Low)

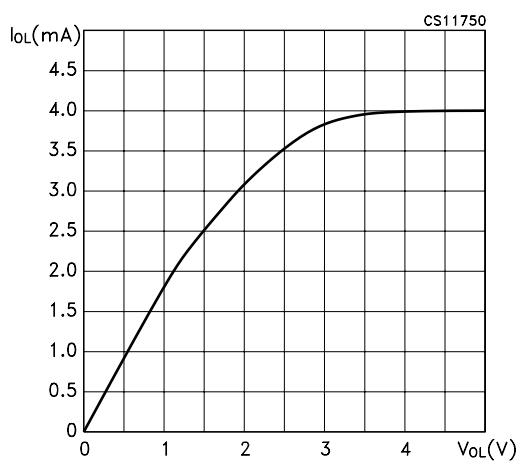


Figure 8 : Receiver Output Current vs Output Voltage (Output High)

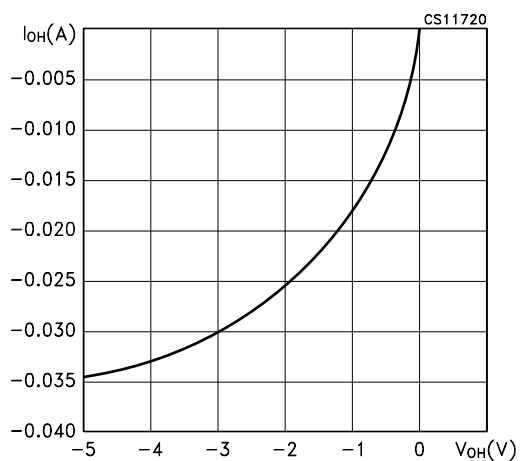


Figure 9 : Driver Diff. Output Voltage vs Common Mode Voltage (Diff. Output Low)

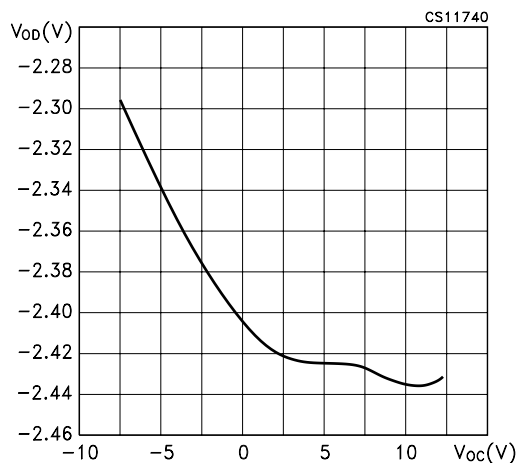


Figure 10 : Driver Diff. Output Voltage vs Common Mode Voltage (Diff. Output High)

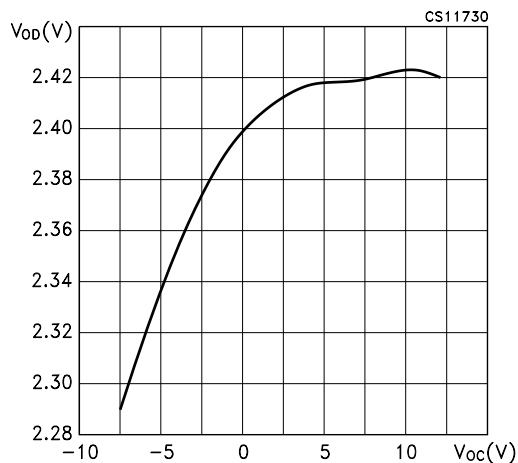


Figure 11 : Driver Short Circuit Current vs Line Voltage (Output High)

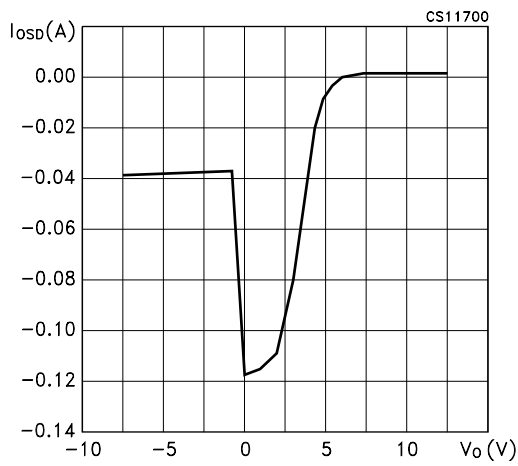


Figure 13 : Receiver Input Current vs Input Voltage

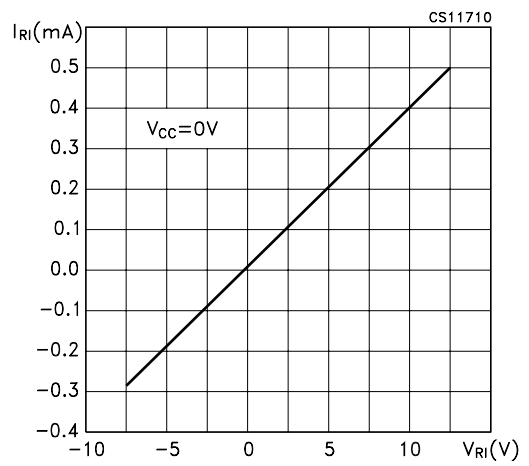
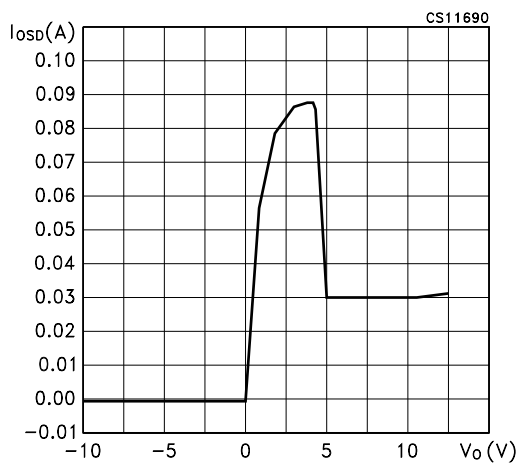
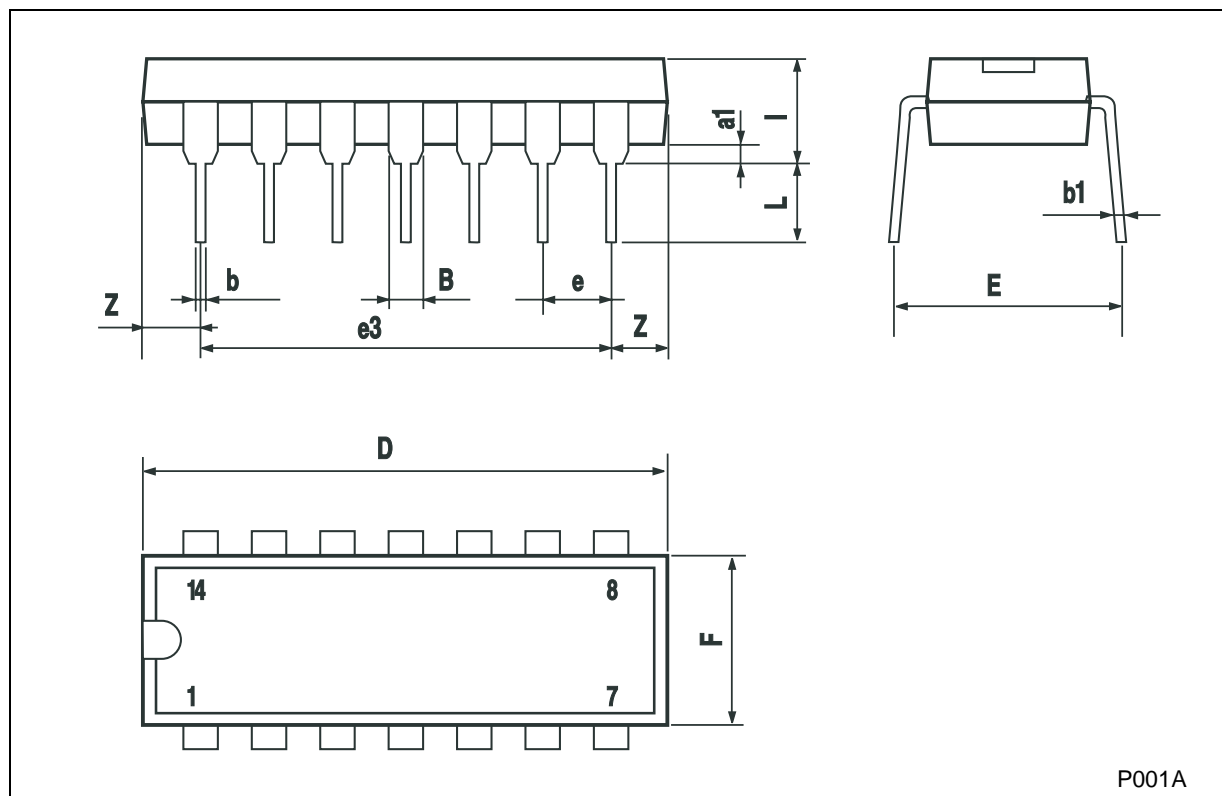


Figure 12 : Driver Short Circuit Current vs. Line Voltage (Output Low)



Plastic DIP-14 MECHANICAL DATA						
---------------------------------------	--	--	--	--	--	--

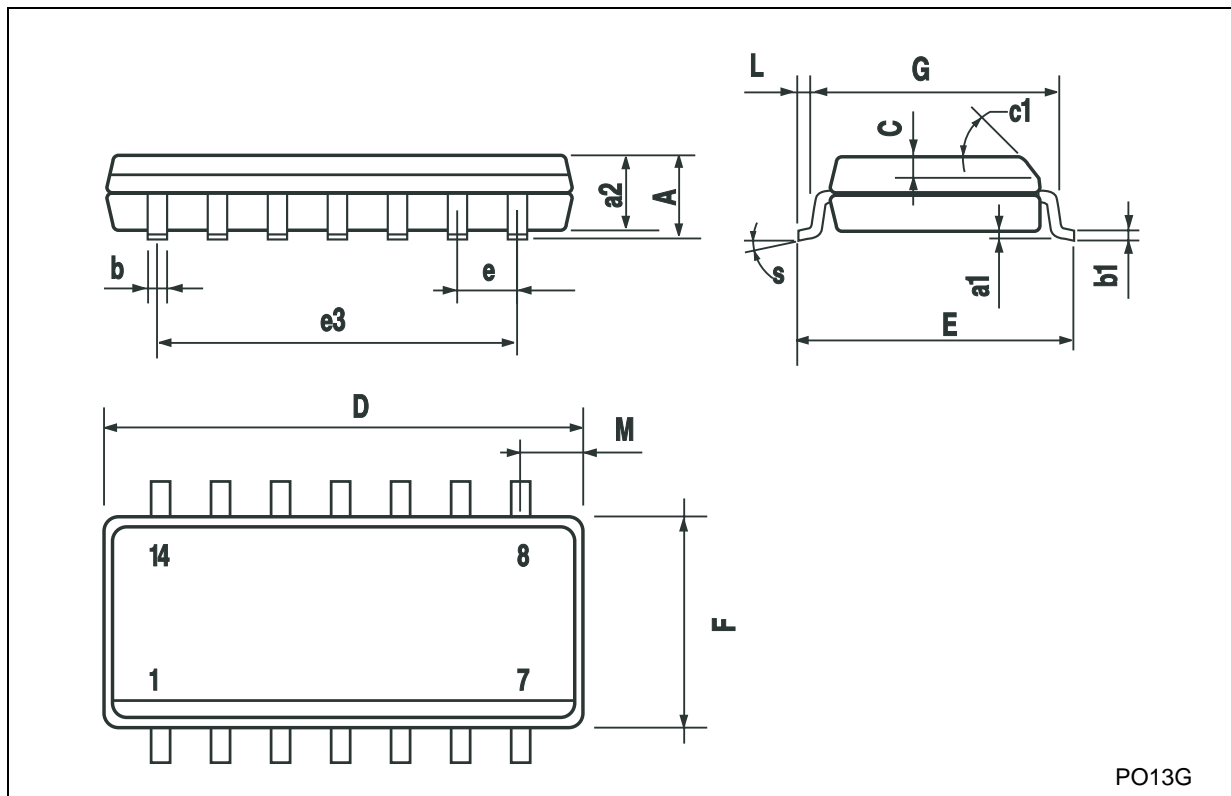
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	1.39		1.65	0.055		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



P001A

SO-14 MECHANICAL DATA

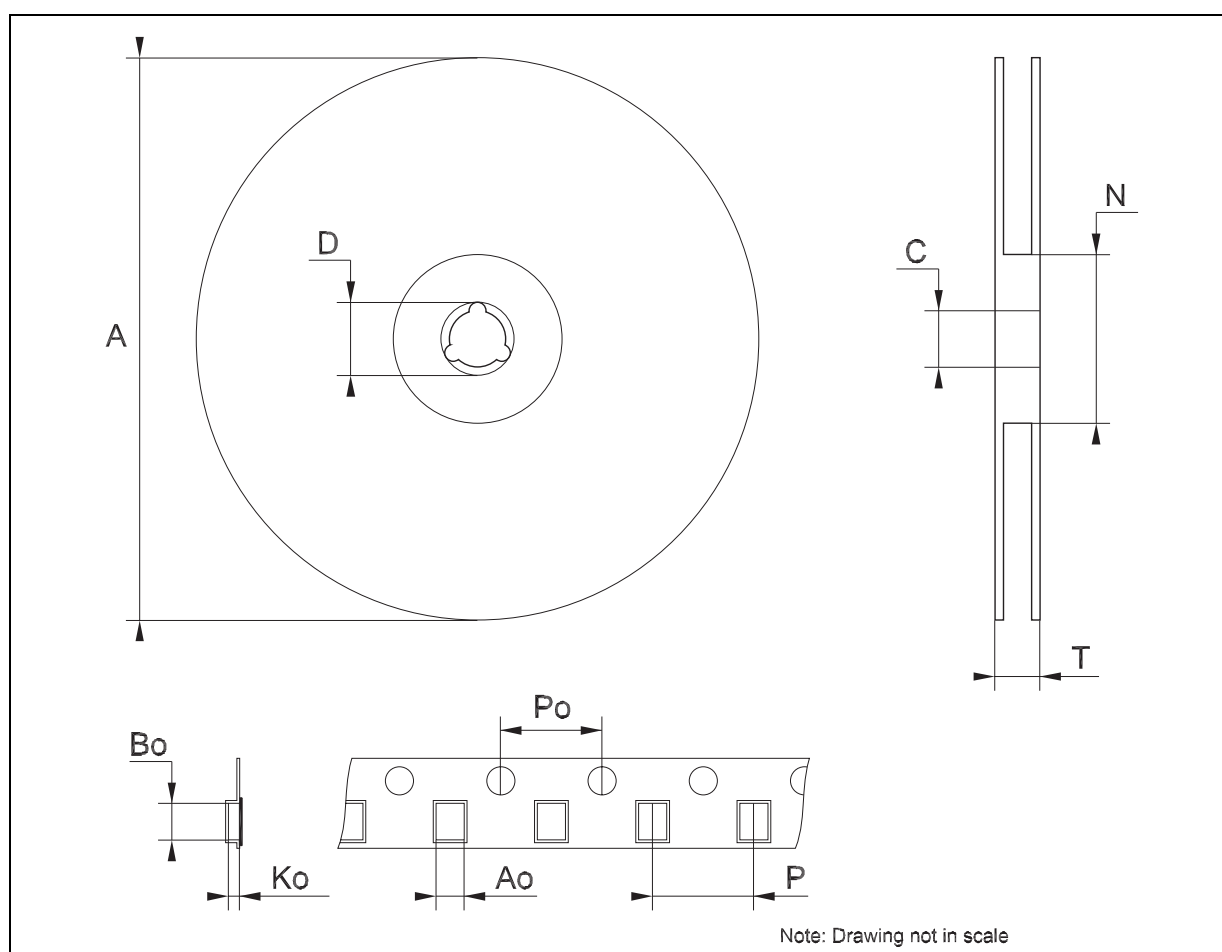
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.68			0.026
S	8° (max.)					



PO13G

Tape & Reel SO-14 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			330			12.992
C	12.8		13.2	0.504		0.519
D	20.2			0.795		
N	60			2.362		
T			22.4			0.882
Ao	6.4		6.6	0.252		0.260
Bo	9		9.2	0.354		0.362
Ko	2.1		2.3	0.082		0.090
Po	3.9		4.1	0.153		0.161
P	7.9		8.1	0.311		0.319



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>