



# ST3232

## 3 TO 5.5V, LOW POWER, UP TO 400KBPS, RS-232 DRIVERS AND RECEIVERS

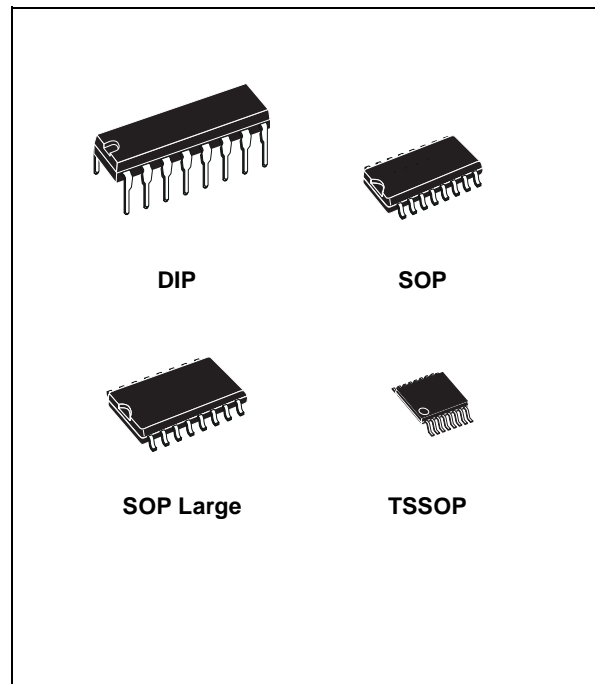
- 300 $\mu$ A SUPPLY CURRENT
- 300Kbps MINIMUM GUARENTEED DATA RATE
- 6V/ $\mu$ s MINIMUM GUARANTEED SLEW RATE
- MEET EIA/TIA-232 SPECIFICATIONS DOWN TO 3V
- AVAILABLE IN DIP-16, SO-16, SO-16 LARGE AND TSSOP16

### DESCRIPTION

The ST3232 is a 3V powered EIA/TIA-232 and V.28/V.24 communication interface with low power requirements, high data-rate capabilities. ST3232 has a proprietary low dropout transmitter output stage providing true RS-232 performance from 3 to 5.5V supplies. The device requires only four small 0.1 $\mu$ F standard external capacitors for operations from 3V supply.

The ST3232 has two receivers and two drivers.

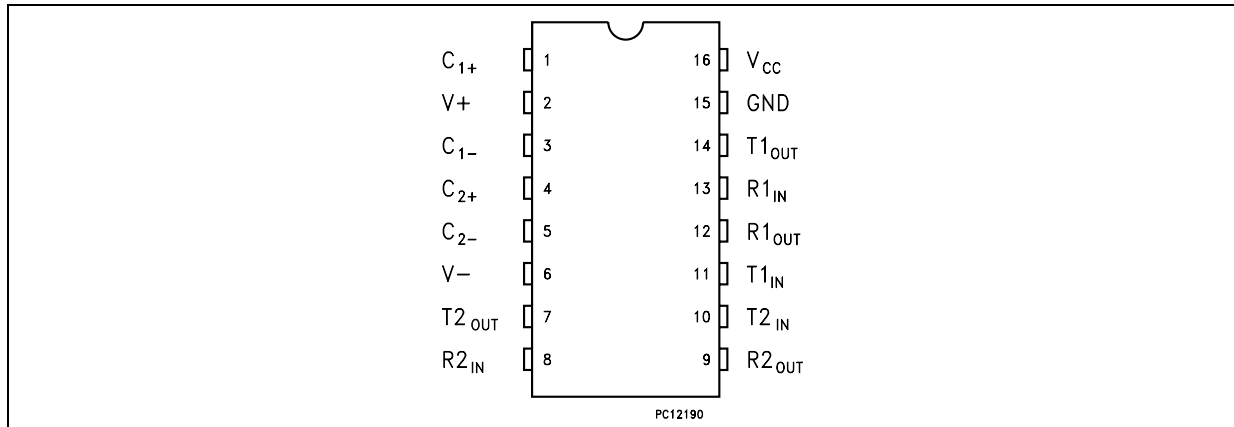
The device is guaranteed to run at data rates of 250Kbps while maintaining RS-232 output levels. Typical applications are Notebook, Subnotebook and Palmtop Computers, Battery Powered Equipment, Hand-Held Equipment, Peripherals and Printers.



### ORDERING CODES

Type	Temperature Range	Package	Comments
ST3232CN	0 to 70 °C	DIP-16	25parts per tube / 40tube per box
ST3232BN	-40 to 85 °C	DIP-16	25parts per tube / 40tube per box
ST3232CD	0 to 70 °C	SO-16 (Tube)	50parts per tube / 20tube per box
ST3232BD	-40 to 85 °C	SO-16 (Tube)	50parts per tube / 20tube per box
ST3232CDR	0 to 70 °C	SO-16 (Tape & Reel)	2500 parts per reel
ST3232BDR	-40 to 85 °C	SO-16 (Tape & Reel)	2500 parts per reel
ST3232CW	0 to 70 °C	SO-16 Large (Tube)	49parts per tube / 25tube per box
ST3232BW	-40 to 85 °C	SO-16 Large (Tube)	49parts per tube / 25tube per box
ST3232CWR	0 to 70 °C	SO-16 Large (Tape & Reel)	1000 parts per reel
ST3232BWR	-40 to 85 °C	SO-16 Large (Tape & Reel)	1000 parts per reel
ST3232CTR	0 to 70 °C	TSSOP16 (Tape & Reel)	2500 parts per reel
ST3232BTR	-40 to 85 °C	TSSOP16 (Tape & Reel)	2500 parts per reel

**PIN CONFIGURATION**



**PIN DESCRIPTION**

PIN N°	SYMBOL	NAME AND FUNCTION
1	C <sub>1+</sub>	Positive Terminal for the first Charge Pump Capacitor
2	V+	Doubled Voltage Terminal
3	C <sub>1-</sub>	Negative Terminal for the first Charge Pump Capacitor
4	C <sub>2+</sub>	Positive Terminal for the second Charge Pump Capacitor
5	C <sub>2-</sub>	Negative Terminal for the second Charge Pump Capacitor
6	V-	Inverted Voltage Terminal
7	T <sub>2_OUT</sub>	Second Transmitter Output Voltage
8	R <sub>2_IN</sub>	Second Receiver Input Voltage
9	R <sub>2_OUT</sub>	Second Receiver Output Voltage
10	T <sub>2_IN</sub>	Second Transmitter Input Voltage
11	T <sub>1_IN</sub>	First Transmitter Input Voltage
12	R <sub>1_OUT</sub>	First Receiver Output Voltage
13	R <sub>1_IN</sub>	First Receiver Input Voltage
14	T <sub>1_OUT</sub>	First Transmitter Output Voltage
15	GND	Ground
16	V <sub>CC</sub>	Supply Voltage

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.3 to 6	V
V+	Doubled Voltage Terminal	(V <sub>CC</sub> - 0.3) to 7	V
V-	Inverted Voltage Terminal	0.3 to -7	V
V+ + V-		13	V
T <sub>IN</sub>	Transmitter Input Voltage Range	-0.3 to 6	V
R <sub>IN</sub>	Receiver Input Voltage Range	± 25	V
T <sub>OUT</sub>	Transmitter Output Voltage Range	± 13.2	V
R <sub>OUT</sub>	Receiver Output Voltage Range	-0.3 to (V <sub>CC</sub> + 0.3)	V
t <sub>SHORT</sub>	Transmitter Output Short to GND Time	Continuous	

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied. V+ and V- can have a maximum magnitude of +7V, but their absolute addition can not exceed 13 V.

**ELECTRICAL CHARACTERISTICS**

( $C_1 - C_4 = 0.1\mu\text{F}$ ,  $V_{CC} = 3\text{V}$  to  $5.5\text{V}$ ,  $T_A = -40$  to  $85^\circ\text{C}$ , unless otherwise specified.  
Typical values are referred to  $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>SUPPLY</sub>	V <sub>CC</sub> Power Supply Current	No Load $V_{CC} = 3\text{V} \pm 10\%$ $T_A = 25^\circ\text{C}$		0.3	1	mA
		No Load $V_{CC} = 5\text{V} \pm 10\%$ $T_A = 25^\circ\text{C}$		1	2	mA

**LOGIC INPUT ELECTRICAL CHARACTERISTICS**

( $C_1 - C_4 = 0.1\mu\text{F}$ ,  $V_{CC} = 3\text{V}$  to  $5.5\text{V}$ ,  $T_A = -40$  to  $85^\circ\text{C}$ , unless otherwise specified.  
Typical values are referred to  $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>TIL</sub>	Input Logic Threshold Low	T-IN (Note 1)			0.8	V
V <sub>TIH</sub>	Input Logic Threshold High	$V_{CC} = 3.3\text{V}$	2			V
		$V_{CC} = 5\text{V}$	2.4			V
I <sub>IL</sub>	Input Leakage Current	T-IN		$\pm 0.01$	$\pm 1$	$\mu\text{A}$

Note 1: Transmitter input hysteresis is typically 250mV

**TRANSMITTER ELECTRICAL CHARACTERISTICS**

( $C_1 - C_4 = 0.1\mu\text{F}$  tested at  $V_{CC} = 3\text{V}$  to  $5.5\text{V}$ ,  $T_A = -40$  to  $85^\circ\text{C}$ , unless otherwise specified.  
Typical values are referred to  $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>TOUT</sub>	Output Voltage Swing	All Transmitter outputs are loaded with $3\text{K}\Omega$ to GND	$\pm 5$	$\pm 5.4$		V
R <sub>TOUT</sub>	Transmitter Output Resistance	$V_{CC} = V_+ = V_- = 0\text{V}$ $V_{OUT} = \pm 2\text{V}$	300	10M		$\Omega$
I <sub>TSC</sub>	Output Short Circuit Current	$V_{CC} = 3\text{V}$ to $5\text{V}$ $V_{OUT} = \pm 12\text{V}$			$\pm 60$	mA

**RECEIVER ELECTRICAL CHARACTERISTICS**

( $C_1 - C_4 = 0.1\mu\text{F}$  tested at  $V_{CC} = 3\text{V}$  to  $5.5\text{V}$ ,  $T_A = -40$  to  $85^\circ\text{C}$ , unless otherwise specified.  
Typical values are referred to  $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>RIN</sub>	Receiver Input Voltage Operating Range		-25		25	V
V <sub>RIL</sub>	RS-232 Input Threshold Low	$T_A = 25^\circ\text{C}$ $V_{CC} = 3.3\text{V}$	0.6	1.2		V
		$T_A = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$	0.8	1.5		V
V <sub>RIH</sub>	RS-232 Input Threshold High	$T_A = 25^\circ\text{C}$ $V_{CC} = 3.3\text{V}$		1.5	2.4	V
		$T_A = 25^\circ\text{C}$ $V_{CC} = 5\text{V}$		1.8	2.4	V
V <sub>RIHYS</sub>	Input Hysteresis			0.3		V
R <sub>RIN</sub>	Input Resistance	$T_A = 25^\circ\text{C}$	3	5	7	K $\Omega$
V <sub>ROL</sub>	TTL/CMOS Output Voltage Low	I <sub>OUT</sub> = 1.6mA			0.4	V
V <sub>ROH</sub>	TTL/CMOS Output Voltage High	I <sub>OUT</sub> = -1mA	$V_{CC}-0.6$	$V_{CC}-0.1$		V

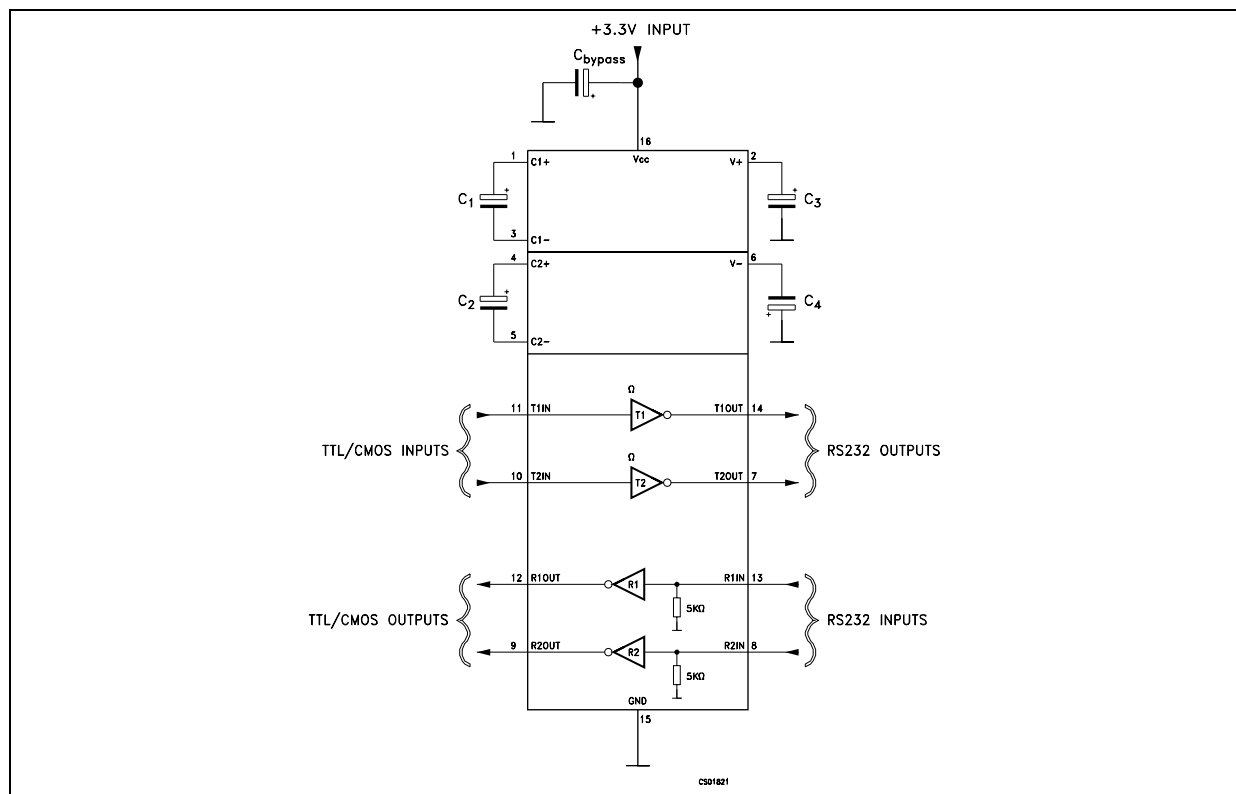
**TIMING CHARACTERISTICS**

( $C_1 - C_4 = 0.1\mu\text{F}$ ,  $V_{CC} = 3\text{V to } 5.5\text{V}$ ,  $T_A = -40 \text{ to } 85^\circ\text{C}$ , unless otherwise specified.  
 Typical values are referred to  $T_A = 25^\circ\text{C}$ )

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$D_R$	Data Transfer Rate	$R_L = 3\text{K}\Omega$ $C_{L2} = 1000\text{pF}$ one transmitter switching	300	400		Kbps
$t_{PHLR}$ $t_{PLHR}$	Propagation Delay Input to Output	$R_{XIN} = R_{XOUT}$ $C_L = 150\text{pF}$		0.2		$\mu\text{s}$
$ t_{PHLT} - t_{THL} $	Transmitter Propagation Delay Difference	(Note 1)		100		ns
$ t_{PHLR} - t_{THR} $	Receiver Propagation Delay Difference			50		ns
$S_{RT}$	Transition Slew Rate	$T_A = 25^\circ\text{C}$ $R_L = 3\text{K}\Omega \text{ to } 7\text{K}\Omega$ $V_{CC} = 3.3\text{V}$ measured from +3V to -3V or -3V to +3V $C_L = 150\text{pF to } 1000\text{pF}$ $C_L = 150\text{pF to } 2500\text{pF}$	6 4		30 30	$\text{V}/\mu\text{s}$ $\text{V}/\mu\text{s}$

Transmitter Skew is measured at the transmitter zero cross points

**APPLICATION CIRCUITS**

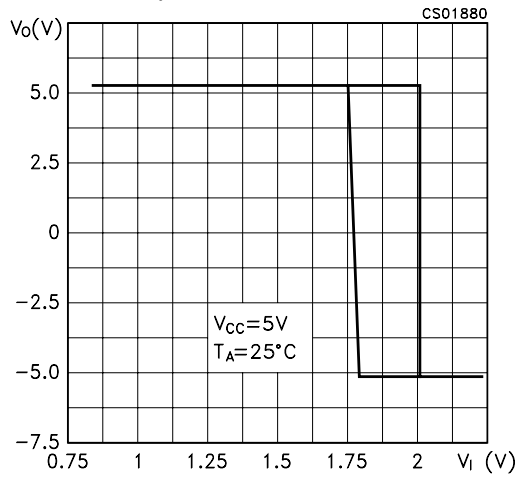


**CAPACITANCE VALUE ( $\mu\text{F}$ )**

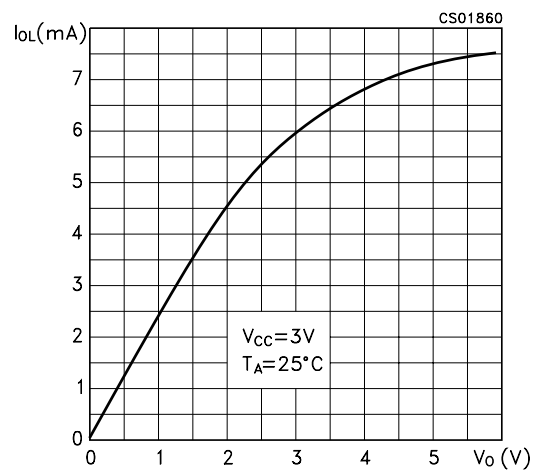
$V_{CC}$	C1	C2	C3	C4	$C_{bypass}$
3.0 to 3.6	0.1	0.1	0.1	0.1	0.1
4.5 to 5.5	0.047	0.33	0.33	0.33	0.33

**TYPICAL PERFORMANCE CHARACTERISTICS** (unless otherwise specified  $T_j = 25^\circ\text{C}$ )

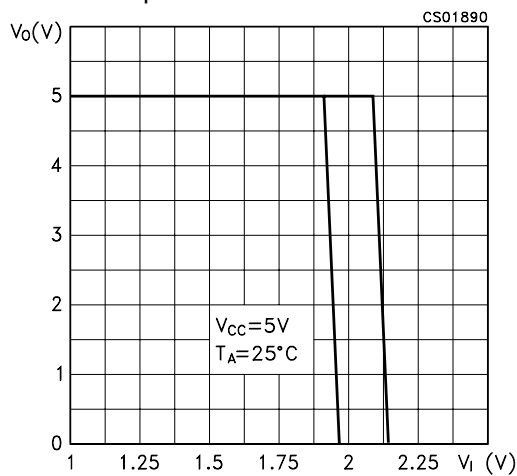
**Figure 1 :** Driver Voltage Transfer Characteristics for Transmitter Inputs



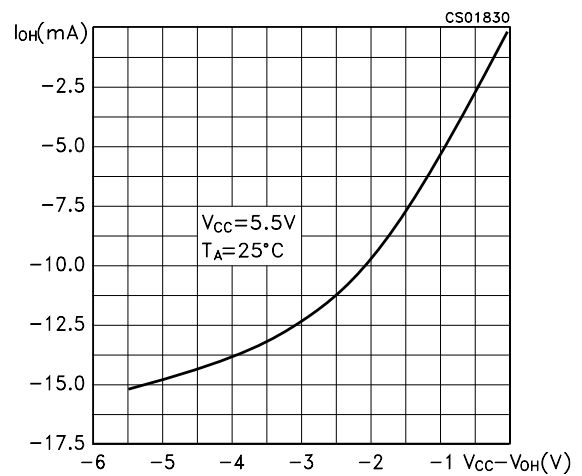
**Figure 4 :** Output Current vs Output Low Voltage



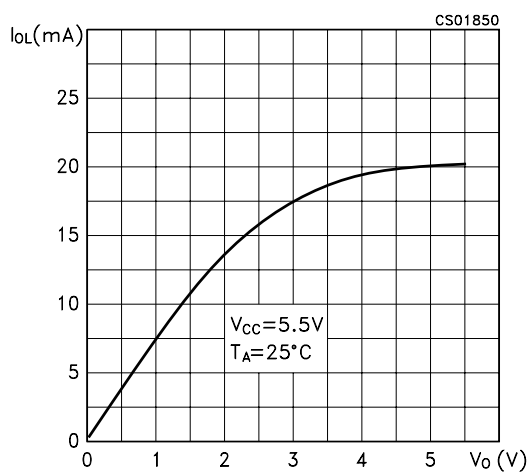
**Figure 2 :** Driver Voltage Transfer Characteristics for Receiver Inputs



**Figure 5 :** Output Current vs Output High Voltage



**Figure 3 :** Output Current vs Output Low Voltage



**Figure 6 :** Output Current vs Output High Voltage

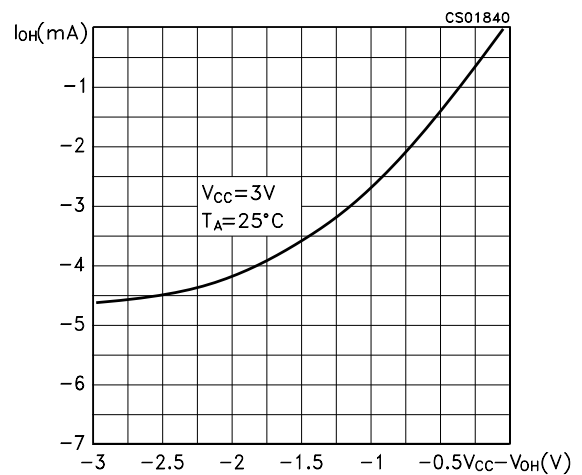
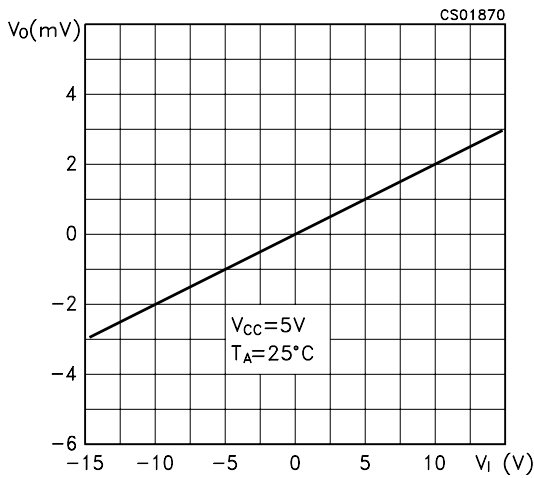
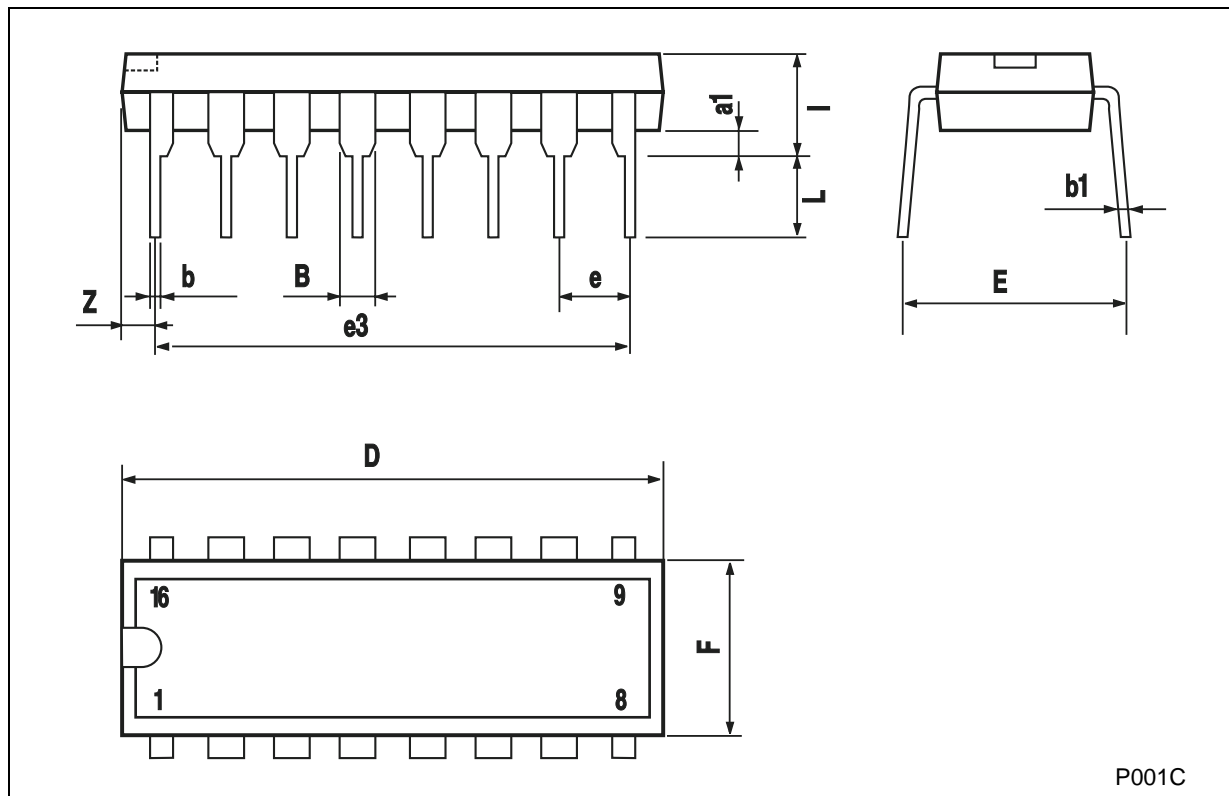


Figure 7 : Receiver Input Resistance



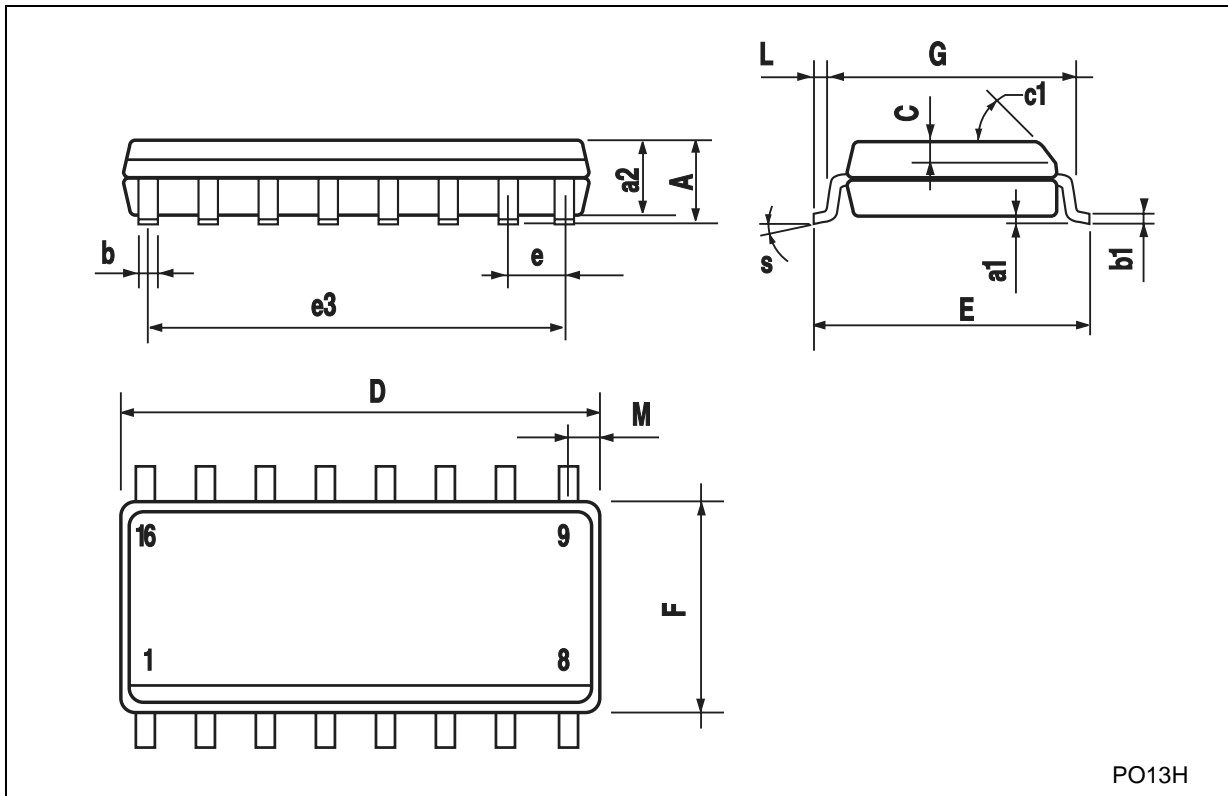
### Plastic DIP-16 (0.25) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		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		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



**SO-16 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	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
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			0.62			0.024
S	8° (max.)					

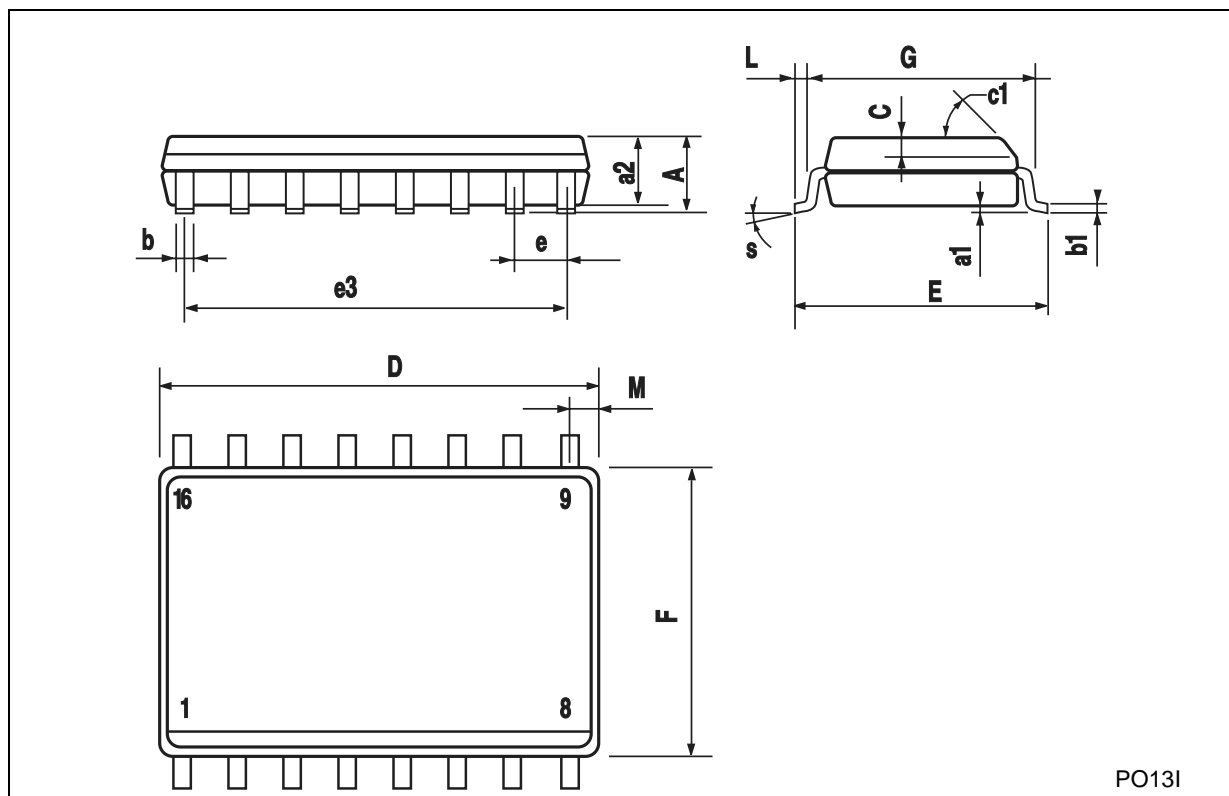


PO13H



## SO-16L MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.2	0.004		0.008
a2			2.45			0.096
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.012
C		0.5			0.020	
c1	45° (typ.)					
D	10.1		10.5	0.397		0.413
E	10.0		10.65	0.393		0.419
e		1.27			0.050	
e3		8.89			0.350	
F	7.4		7.6	0.291		0.300
G						
L	0.5		1.27	0.020		0.050
M			0.75			0.029
S	8° (max.)					



PO131

**TSSOP16 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0089
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030



0080338D

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

© 2002 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>



This datasheet has been download from:

[www.datasheetcatalog.com](http://www.datasheetcatalog.com)

Datasheets for electronics components.