



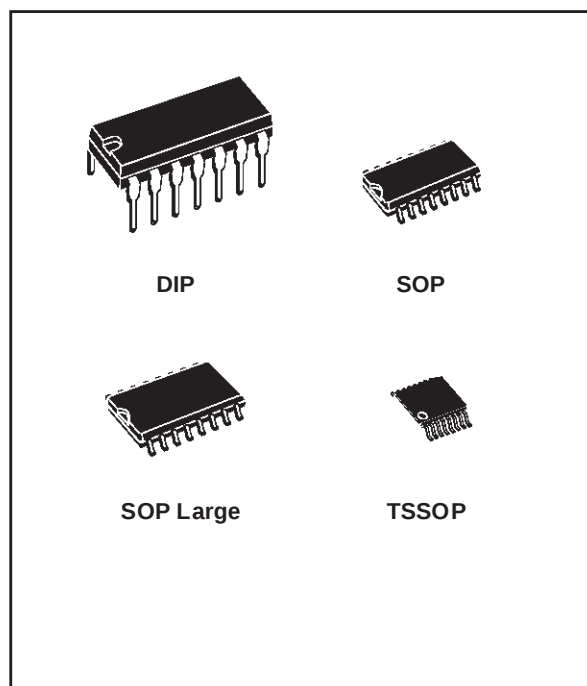
ST232A

VERY HIGH SPEED, ULTRA LOW POWER CONSUMPTION 5V POWERED RS-232 DRIVERS AND RECEIVERS

- SUPPLY VOLTAGE RANGE: 4.5 TO 5.5V
- SUPPLY CURRENT NO LOAD (TYP): 1.5mA
- TRANSMITTER OUTPUT VOLTAGE SWING (TYP): $\pm 9V$
- TRANSITION SLEW RATE (TYP): 12V/ μs
- RECEIVER PROPAGATION DELAY (TYP): 0.1 μs
- RECEIVER INPUT VOLTAGE RANGE: $\pm 30V$
- DATA RATE (TYP): 400Kbp/s
- OPERATING TEMPERATURE RANGE:
-40 TO 85 °C, 0 TO 70°C

DESCRIPTION

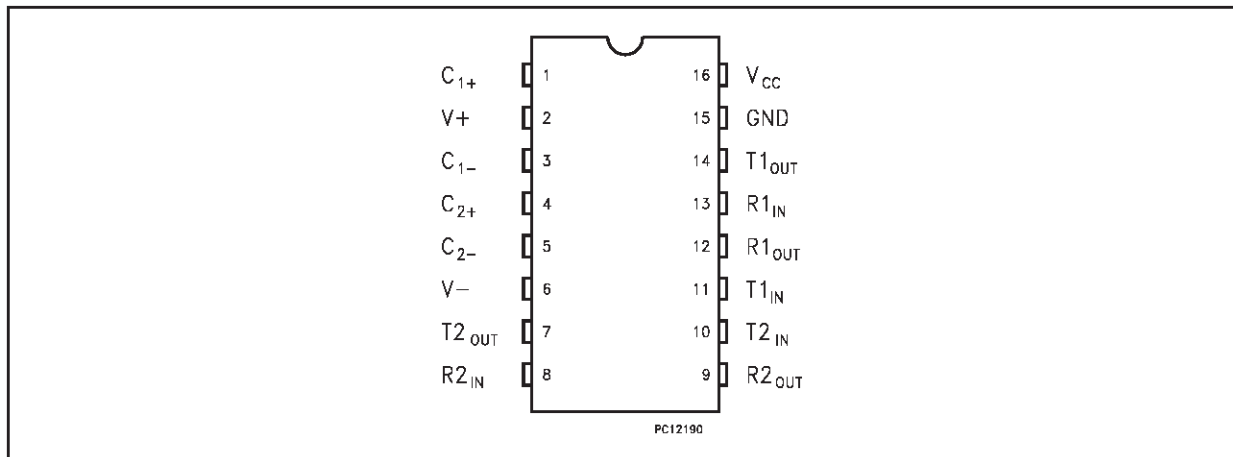
The ST232A is a 2 driver, 2 receiver device following EIA/TIA-232 and V.28 communication standard. It is particularly suitable for applications where $\pm 12V$ is not available. The ST232 uses a single 5V power supply and only four external capacitors (0.1 μF). Typical application are in: Portable Computers, Low Power Modems, Interfaces Translation, Battery Powered RS-232 Networks.



ORDERING CODES

Type	Temperature Range	Package	Comments
ST232ACN	0 to 70 °C	DIP-16	25parts per tube / 40tube per box
ST232ABN	-40 to 85 °C	DIP-16	25parts per tube / 40tube per box
ST232ACD	0 to 70 °C	SO-16 (Tube)	49parts per tube / 25tube per box
ST232ABD	-40 to 85 °C	SO-16 (Tube)	49parts per tube / 25tube per box
ST232ACDR	0 to 70 °C	SO-16 (Tape & Reel)	2500 parts per reel
ST232ABDR	-40 to 85 °C	SO-16 (Tape & Reel)	2500 parts per reel
ST232ACW	0 to 70 °C	SO-16 Large (Tube)	50parts per tube / 20tube per box
ST232ABW	-40 to 85 °C	SO-16 Large (Tube)	50parts per tube / 20tube per box
ST232ACWR	0 to 70 °C	SO-16 Large (Tape & Reel)	1000 parts per reel
ST232ABWR	-40 to 85 °C	SO-16 Large (Tape & Reel)	1000 parts per reel
ST232ACTR	0 to 70 °C	TSSOP16 (Tape & Reel)	2500 parts per reel
ST232ABTR	-40 to 85 °C	TSSOP16 (Tape & Reel)	2500 parts per reel

PIN CONFIGURATION



PIN DESCRIPTION

PIN N°	SYMBOL	NAME AND FUNCTION
1	C ₁ ⁺	Positive Terminal for the first Charge Pump Capacitor
2	V ⁺	Doubled Voltage Terminal
3	C ₁ ⁻	Negative Terminal for the first Charge Pump Capacitor
4	C ₂ ⁺	Positive Terminal for the second Charge Pump Capacitor
5	C ₂ ⁻	Negative Terminal for the second Charge Pump Capacitor
6	V ⁻	Inverted Voltage Terminal
7	T ₂ _{OUT}	Second Transmitter Output Voltage
8	R ₂ _{IN}	Second Receiver Input Voltage
9	R ₂ _{OUT}	Second Receiver Output Voltage
10	T ₂ _{IN}	Second Transmitter Input Voltage
11	T ₁ _{IN}	First Transmitter Input Voltage
12	R ₁ _{OUT}	First Receiver Output Voltage
13	R ₁ _{IN}	First Receiver Input Voltage
14	T ₁ _{OUT}	First Transmitter Output Voltage
15	GND	Ground
16	V _{CC}	Supply Voltage

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	-0.3 to 6	V
V ⁺	Extra Positive Voltage	(V _{CC} - 0.3) to 13.2	V
V ⁻	Extra Negative Voltage	0.3 to -13.2	V
T _{IN}	Transmitter Input Voltage Range	-0.3 to (V _{CC} + 0.3)	V
R _{IN}	Receiver Input Voltage Range	± 30	V
T _{OUT}	Transmitter Output Voltage Range	± 15	V
R _{OUT}	Receiver Output Voltage Range	-0.3 to (V _{CC} + 0.3)	V
T _{SCTOUT}	Short Circuit Duration on T _{OUT}	infinite	

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

ELECTRICAL CHARACTERISTICS

($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 5V \pm 10\%$, $T_A = -40$ to 85°C , unless otherwise specified.
Typical values are referred to $T_A = 25^\circ\text{C}$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SUPPLY}	V_{CC} Power Supply Current	No Load		1.5	4	mA

TRANSMITTER ELECTRICAL CHARACTERISTICS

($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 5V \pm 10\%$, $T_A = -40$ to 85°C , unless otherwise specified.
Typical values are referred to $T_A = 25^\circ\text{C}$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
T_{TOUT}	Output Voltage Swing	All Transmitter outputs are loaded with $3K\Omega$ to GND	± 5	± 9		V
I_{TIL}	Logic Pull-Up Current	$T_{\text{IN}} = 0V$		5	40	μA
V_{TIL}	Input Logic Threshold Low		0.8	1.4		V
V_{TIH}	Input Logic Threshold High			1.4	2	V
SR_T	Transition Slew Rate	$T_A = 25^\circ\text{C}$, $V_{CC} = 5V$ $R_L = 3$ to $7K\Omega$, $C_L = 50$ to 2500pF (Note1)	6	12	30	$V/\mu\text{s}$
D_R	Data Rate	(Note 2)	200	400		Kbits/s
R_{TOUT}	Transmitter Output Resistance	$V_{CC} = V+ = V- = 0V$ $V_{\text{OUT}} = \pm 2V$	300	10M		Ω
I_{SC}	Transmitter Output Short Circuit Current	one T_{XOUT} to GND	± 7	± 22		mA
t_{dT}	Propagation Delay Time	TTL-CMOS IN to RS-232 OUT $C_L = 150\text{pF}$ (50% to 50%)		1.3	3.5	μs

Note 1: Measured from 3V to -3V or from -3V to 3V.

Note2: One transmitter output is loaded with $R_L = 3K\Omega$ to $7K\Omega$, $C_L = 50$ to 1000pF

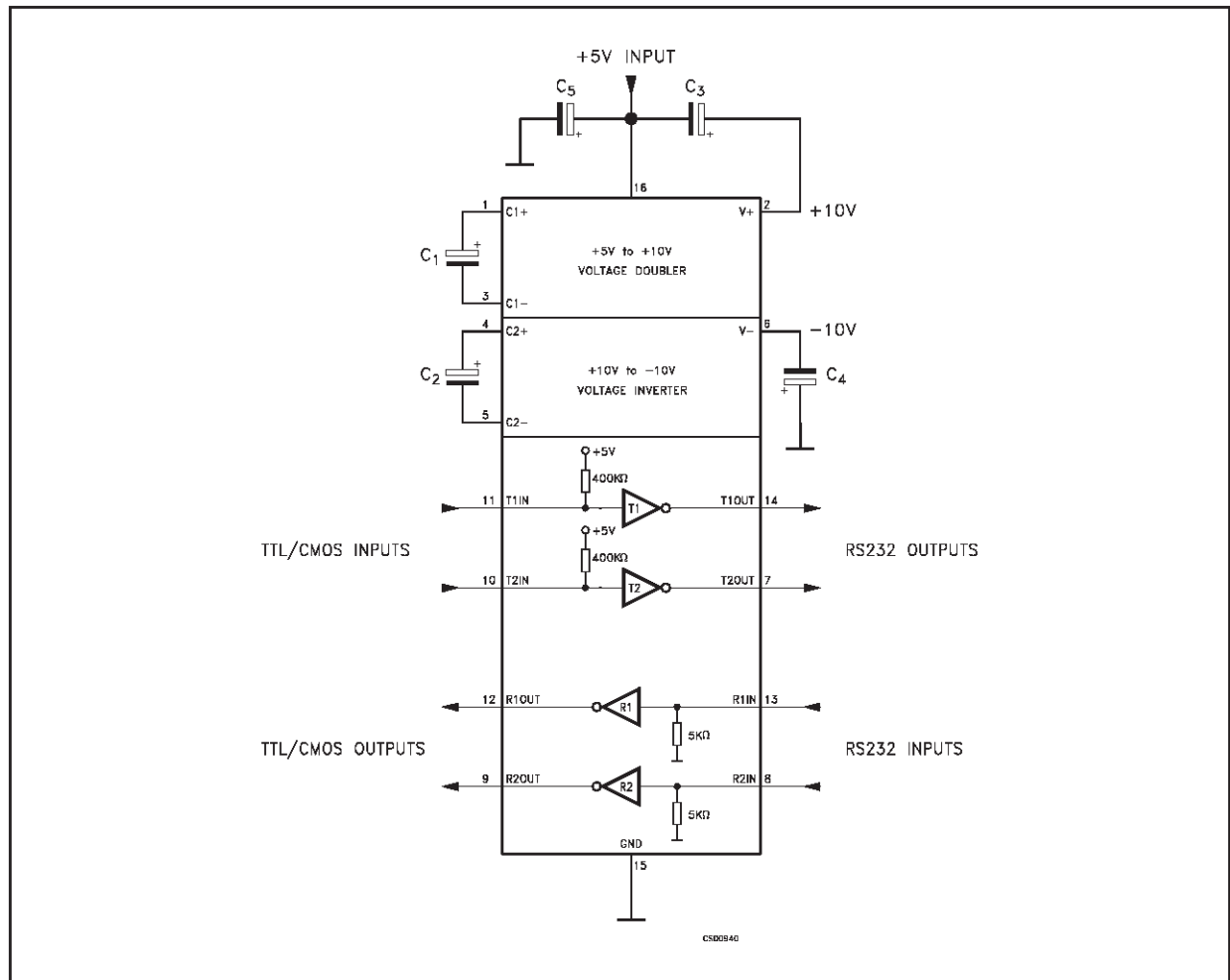
RECEIVER ELECTRICAL CHARACTERISTICS

($C_1 - C_4 = 0.1\mu\text{F}$, $V_{CC} = 5V \pm 10\%$, $T_A = -40$ to 85°C , unless otherwise specified.
Typical values are referred to $T_A = 25^\circ\text{C}$)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{RIN}	Receiver Input Voltage Operating Range		-30		30	V
R_{RIN}	RS-232 Input Resistance	$T_A = 25^\circ\text{C}$	3	5	7	$K\Omega$
V_{RIL}	RS-232 Input Threshold Low		0.8	1.3		V
V_{RIH}	RS-232 Input Threshold High			1.8	2.4	V
V_{RIHYS}	RS-232 Input Hysteresis	$V_{CC} = 5V$	0.2	0.5	1	V
V_{ROL}	TTL/CMOS Output Voltage Low	$I_{\text{OUT}} = 3.2\text{mA}$ (to V_{CC})		0.2	0.4	V
V_{ROH}	TTL/CMOS Output Voltage High	$I_{\text{OUT}} = 1\text{mA}$ (to GND)	3.5	$V_{CC}-0.2$		V
I_{SCR}	Receiver Output Short Circuit Current	to GND to V_{CC}	2 10	10 30		mA mA
t_{dR}	Propagation Delay Time	$C_L = 150\text{pF}$ (Note 1)		0.1	0.5	μs

Note 1: RS-232 IN to TTL-CMOS OUT (from 50% to 50%)

APPLICATION CIRCUITS (note 1, note 2)



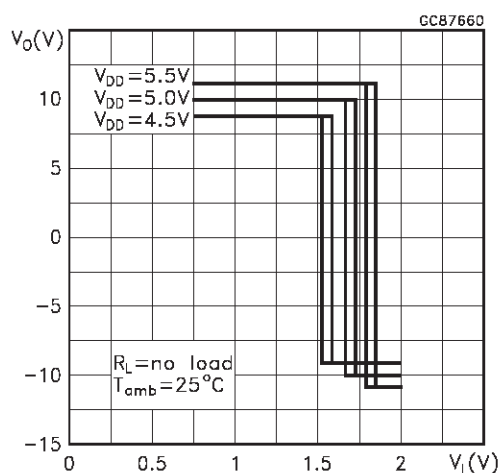
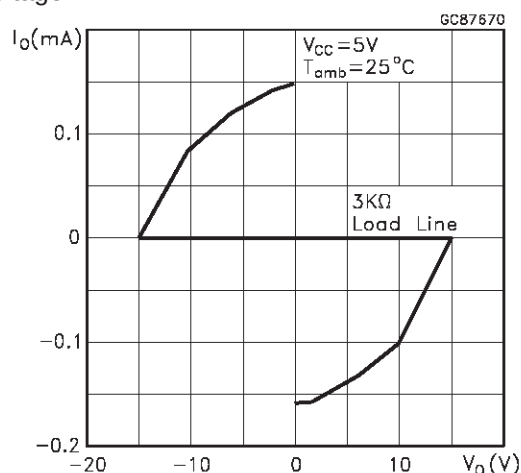
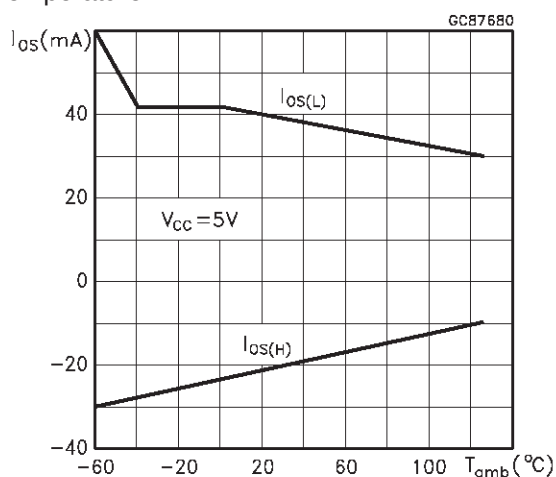
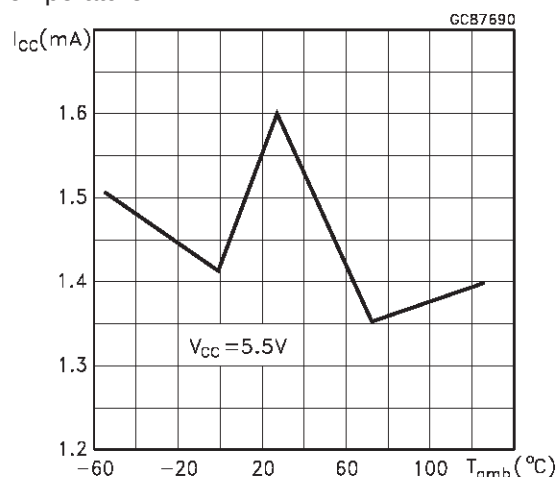
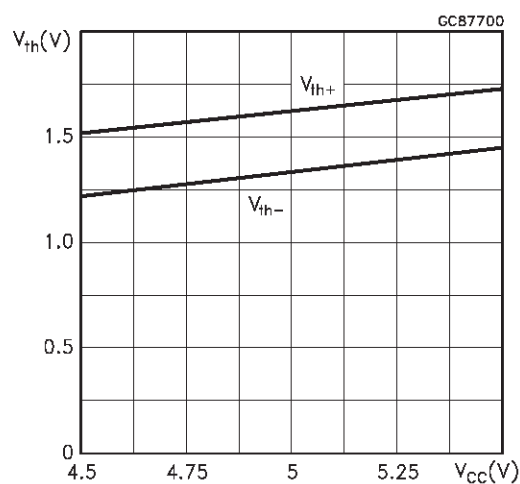
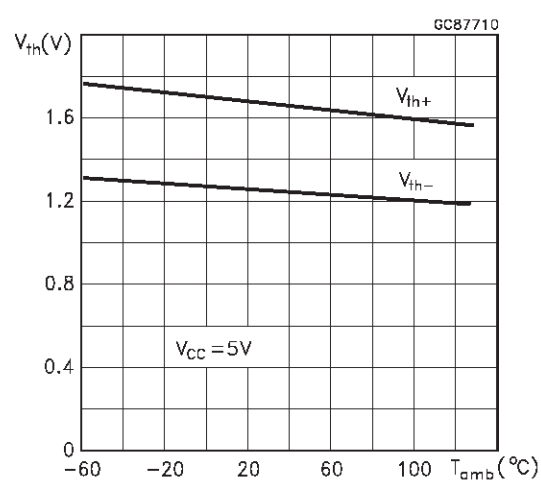
Note 1: C₁₋₄ capacitors can even be 1μF ones.

Note 2: C₁₋₄ can be common or biased capacitors.

CAPACITANCE VALUE (μF)

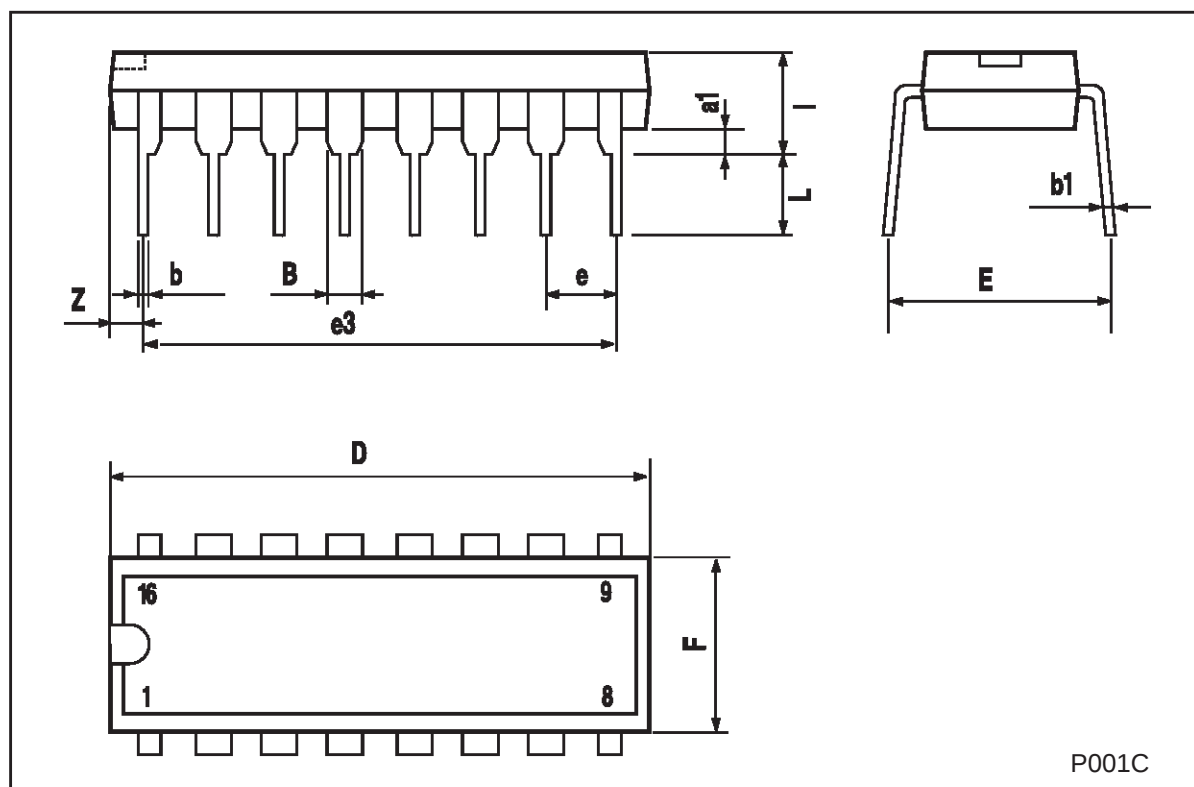
C1	C2.	C3	C4	C5
0.1	0.1	0.1	0.1	0.1

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

Figure 1 : Driver Voltage Transfer Characteristics

Figure 4 : Driver Output Current vs Output Voltage

Figure 2 : Drive Short Circuit Output Current vs Temperature

Figure 5 : Driver Short Circuit Supply Current vs Temperature

Figure 3 : Receiver Threshold vs Supply Voltage

Figure 6 : Receiver Threshold vs Temperature


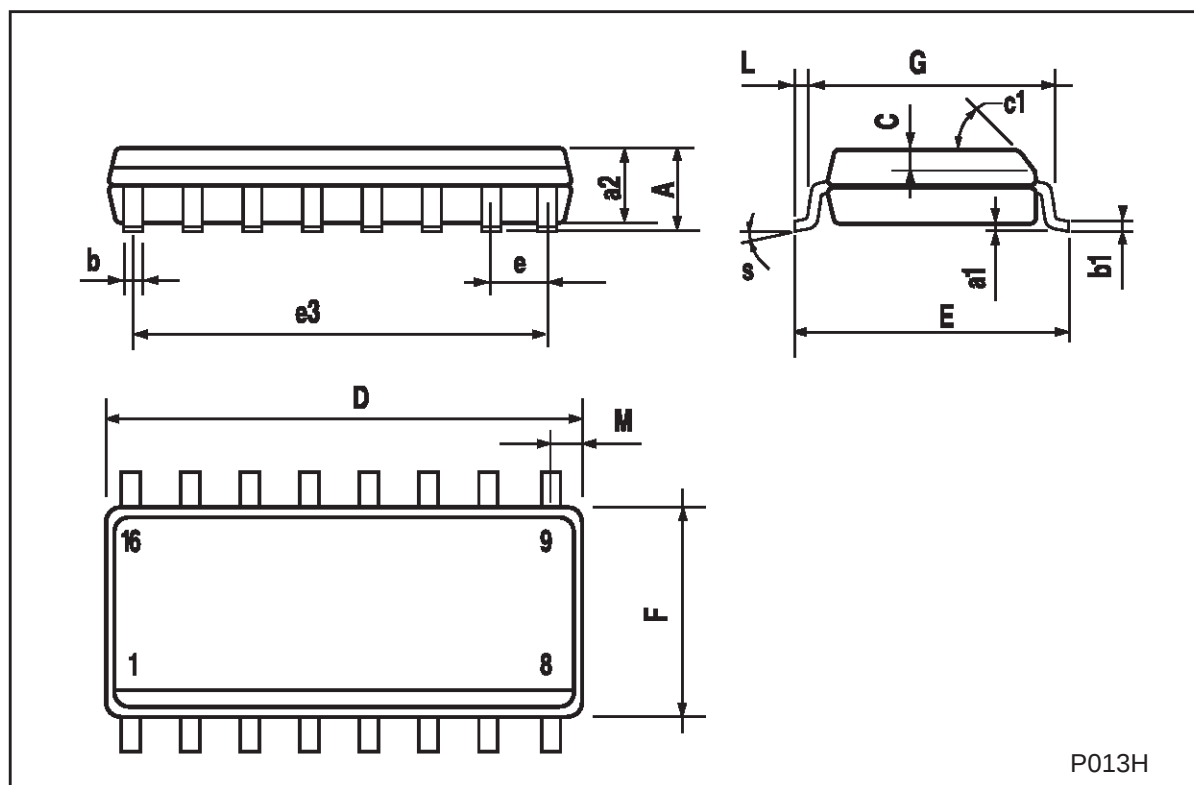
Plastic DIP-16 (0.25) MECHANICAL DATA

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



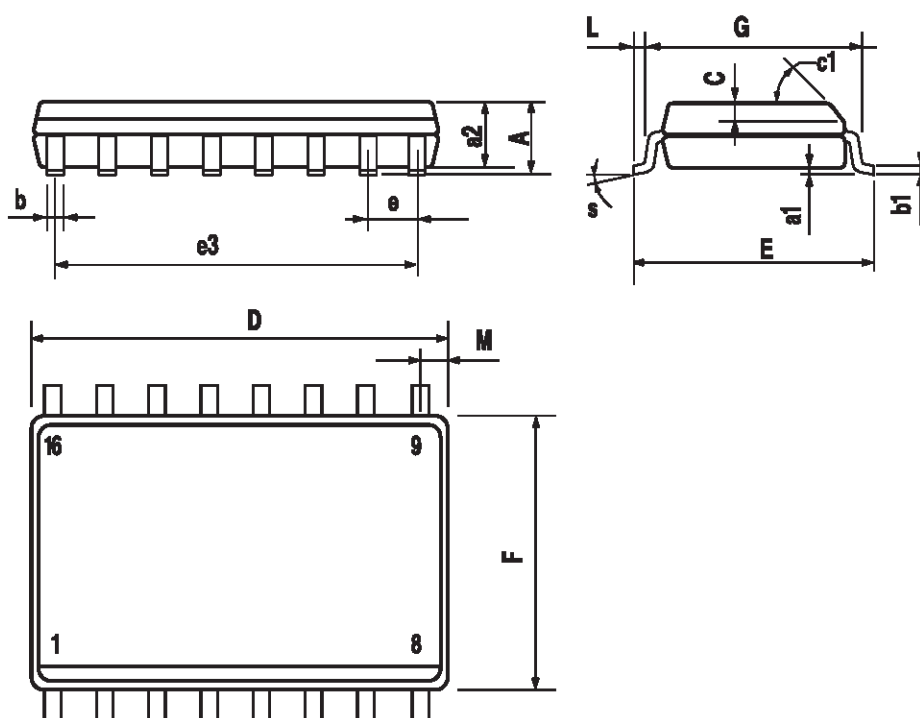
SO-16 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.004		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.)					



SO16L MECHANICAL DATA

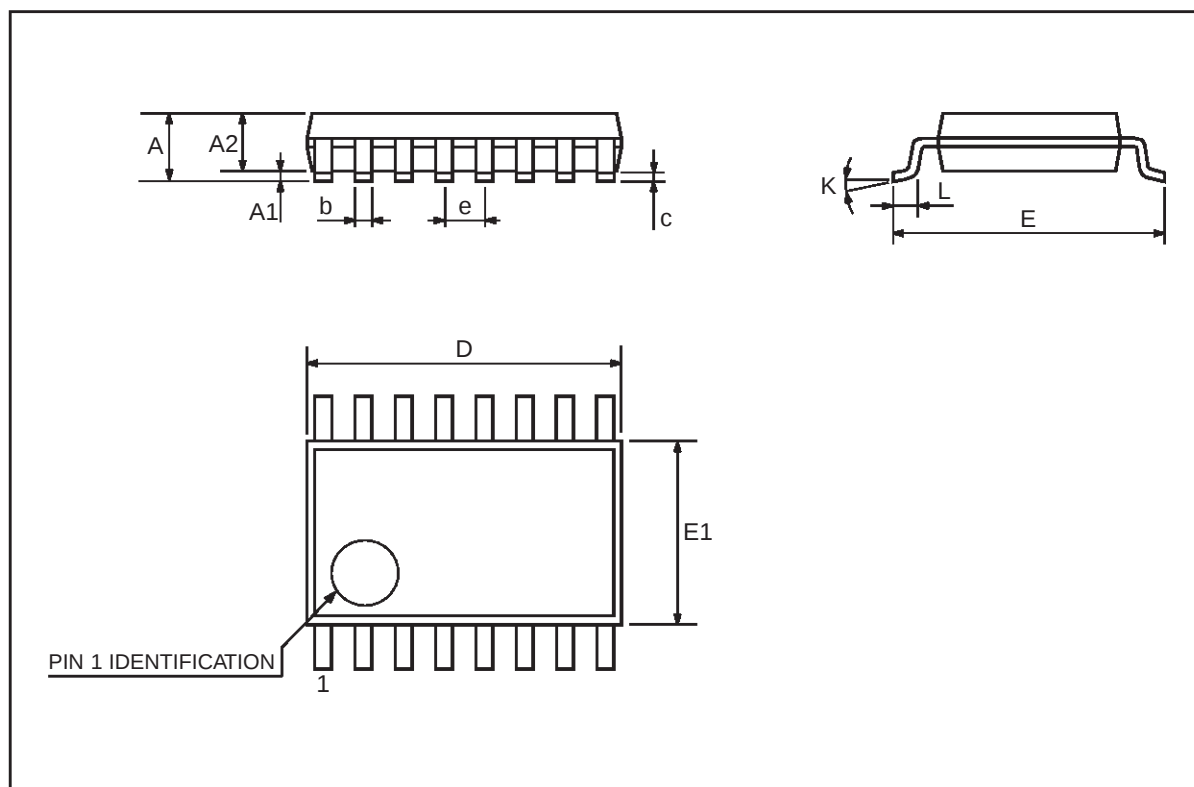
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.2	0.004		0.008
a2			2.45			0.096
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.012
C		0.5			0.020	
c1	45 (typ.)					
D	10.1		10.5	0.397		0.413
E	10.0		10.65	0.3.93		0.419
e		1.27			0.050	
e3		8.89			0.350	
F	7.4		7.6	0.291		0.300
L	0.5		1.27	0.020		0.050
M			0.75			0.029
S	8 (max.)					



P013I

TSSOP16 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.1			0.433
A1	0.05	0.10	0.15	0.002	0.004	0.006
A2	0.85	0.9	0.95	0.335	0.354	0.374
b	0.19		0.30	0.0075		0.0118
c	0.09		0.20	0.0035		0.0079
D	4.9	5	5.1	0.193	0.197	0.201
E	6.25	6.4	6.5	0.246	0.252	0.256
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°	4°	8°	0°	4°	8°
L	0.50	0.60	0.70	0.020	0.024	0.028



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

© 2000 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

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

© <http://www.st.com>

