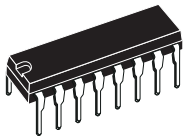
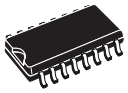
ST3232

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

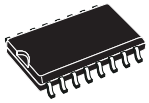
- 300µA SUPPLY CURRENT
- 300Kbps MINIMUM GUARENTEED DATA RATE
- 6V/µs MINIMUM GUARANTEED SLEW RATE
- MEET EIA/TIA-232 SPECIFICATIONS DOWN TO 3V
- AVAILABLE IN DIP-16, SO-16, SO-16 LARGE AND TSSOP16



DIP



SOP



SOP Large

TSSOP

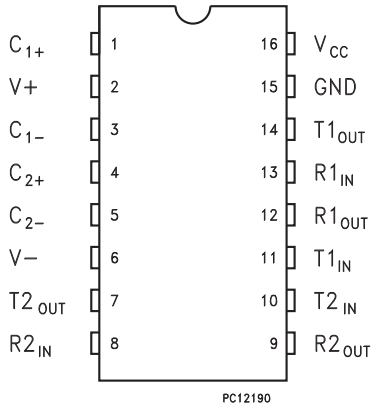
DESCRIPTION

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 0.1µF 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_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	$T2_{OUT}$	Second Transmitter Output Voltage
8	$R2_{IN}$	Second Receiver Input Voltage
9	$R2_{OUT}$	Second Receiver Output Voltage
10	$T2_{IN}$	Second Transmitter Input Voltage
11	$T1_{IN}$	First Transmitter Input Voltage
12	$R1_{OUT}$	First Receiver Output Voltage
13	$R1_{IN}$	First Receiver Input Voltage
14	$T1_{OUT}$	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+	Doubled Voltage Terminal	(V_{CC} - 0.3) to 7	V
V-	Inverted Voltage Terminal	0.3 to -7	V
V+ +|V-|		13	V
T_{IN}	Transmitter Input Voltage Range	-0.3 to 6	V
R_{IN}	Receiver Input Voltage Range	± 25	V
T_{OUT}	Transmitter Output Voltage Range	± 13.2	V
R_{OUT}	Receiver Output Voltage Range	-0.3 to (V_{CC} + 0.3)	V
t_{SHORT}	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 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SUPPLY}	V_{CC} Power Supply Current	No Load V_{CC} = 3V ±10% T_A = 25°C		0.3	1	mA
		No Load V_{CC} = 5V ±10% T_A = 25°C		1	2	mA

LOGIC INPUT ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{TIL}	Input Logic Threshold Low	T-IN (Note 1)			0.8	V
V_{TIH}	Input Logic Threshold High	V_{CC} = 3.3V V_{CC} = 5V	2 2.4			V V
I_{IL}	Input Leakage Current	T-IN		± 0.01	± 1	µA

Note 1: Transmitter input hysteresis is typically 250mV

TRANSMITTER ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF tested at V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{TOUT}	Output Voltage Swing	All Transmitter outputs are loaded with 3KΩ to GND	± 5	± 5.4		V
R_{TOUT}	Transmitter Output Resistance	V_{CC} = V+ = V- = 0V V_{OUT} = ± 2V	300	10M		Ω
I_{TSC}	Output Short Circuit Current	V_{CC} = 3V to 5V V_{OUT} = ± 12V			± 60	mA

RECEIVER ELECTRICAL CHARACTERISTICS

(C_1 - C_4 = 0.1µF tested at V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{RIN}	Receiver Input Voltage Operating Range		-25		25	V
V_{RIL}	RS-232 Input Threshold Low	T_A = 25°C V_{CC} = 3.3V T_A = 25°C V_{CC} = 5V	0.6 0.8	1.2 1.5		V V
V_{RIH}	RS-232 Input Threshold High	T_A = 25°C V_{CC} = 3.3V T_A = 25°C V_{CC} = 5V		1.5 1.8	2.4 2.4	V V
V_{RIHYS}	Input Hysteresis			0.3		V
R_{RIN}	Input Resistance	T_A = 25°C	3	5	7	KΩ
V_{ROL}	TTL/CMOS Output Voltage Low	I_{OUT} = 1.6mA			0.4	V
V_{ROH}	TTL/CMOS Output Voltage High	I_{OUT} = -1mA	V_{CC}-0.6	V_{CC}-0.1		V

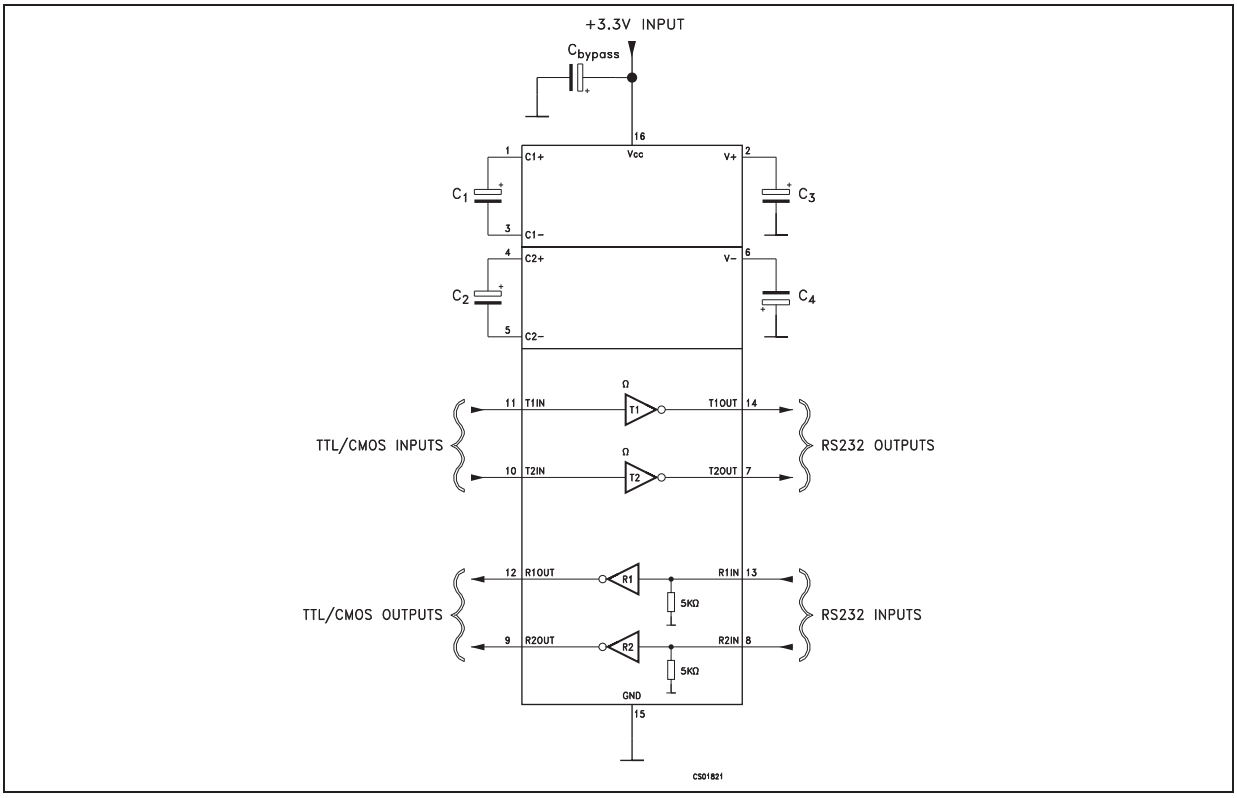
TIMING CHARACTERISTICS

(C_1 - C_4 = 0.1µF, V_{CC} = 3V to 5.5V, T_A = -40 to 85°C, unless otherwise specified.
Typical values are referred to T_A = 25°C)

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

Transmitter Skew is measured at the transmitter zero cross points

APPLICATION CIRCUITS



CAPACITANCE VALUE (µF)

V_{CC}	C1	C2	C3	C4	Cbypass
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°C)

Figure 1 : Driver Voltage Transfer Characteristics for Trasmitter Inputs

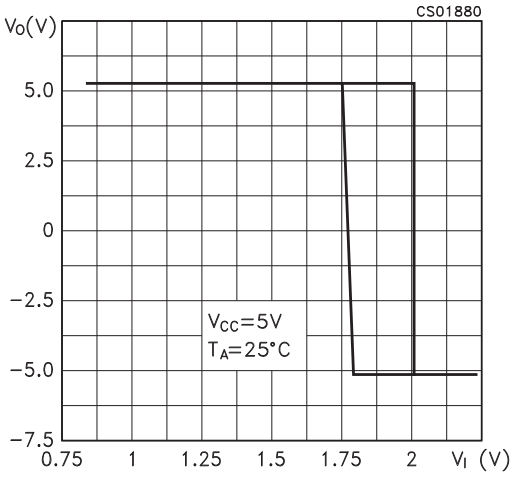


Figure 2 : Driver Voltage Transfer Characteristics for Receiver Inputs

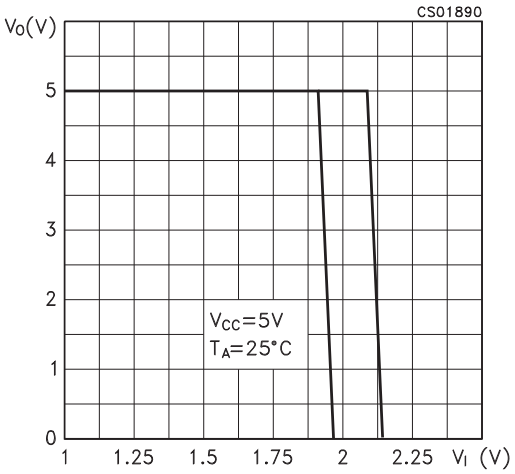


Figure 3 : Output Current vs Output Low Voltage

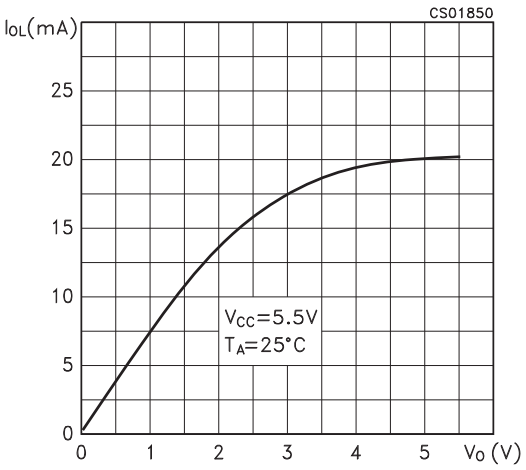


Figure 4 : Output Current vs Output Low Voltage

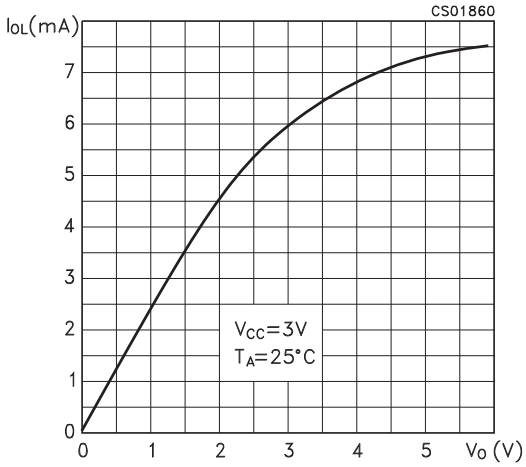


Figure 5 : Output Current vs Output High Voltage

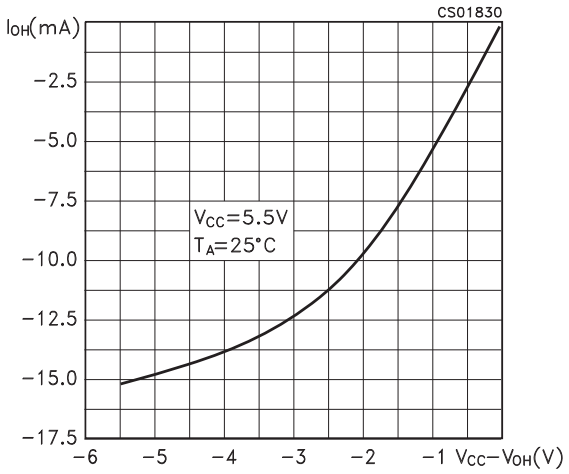


Figure 6 : Output Current vs Output High Voltage

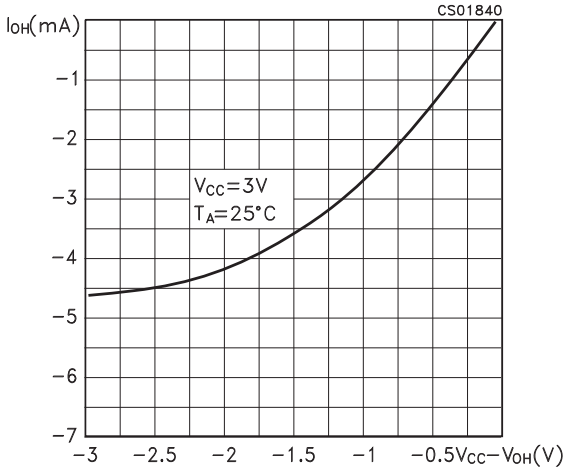
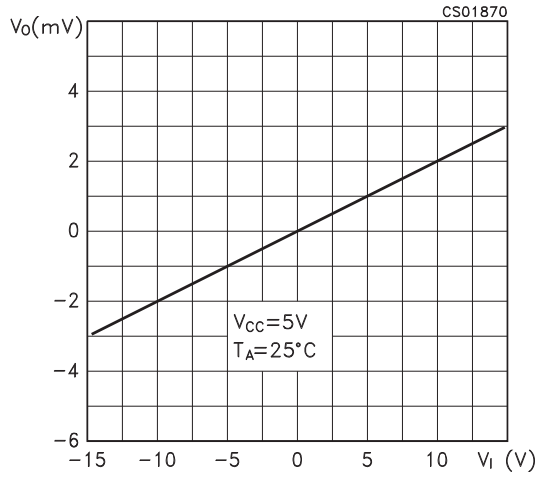
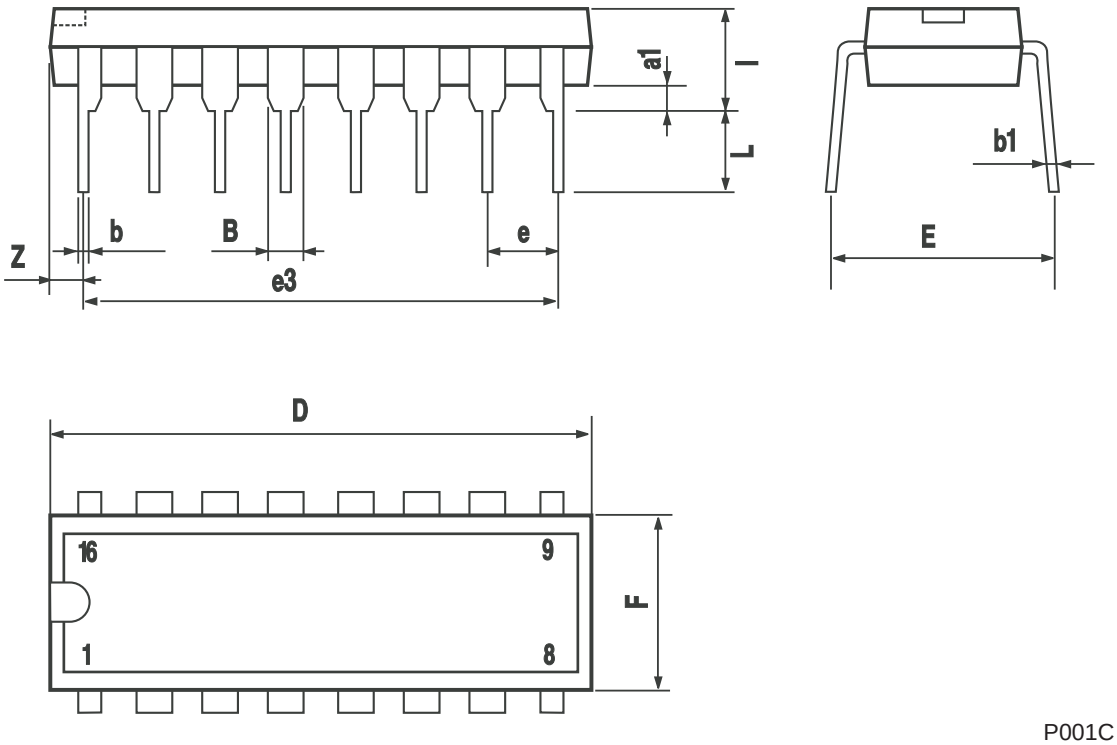


Figure 7 : Receiver Input Resistance



Plastic DIP-16 (0.25) MECHANICAL DATA

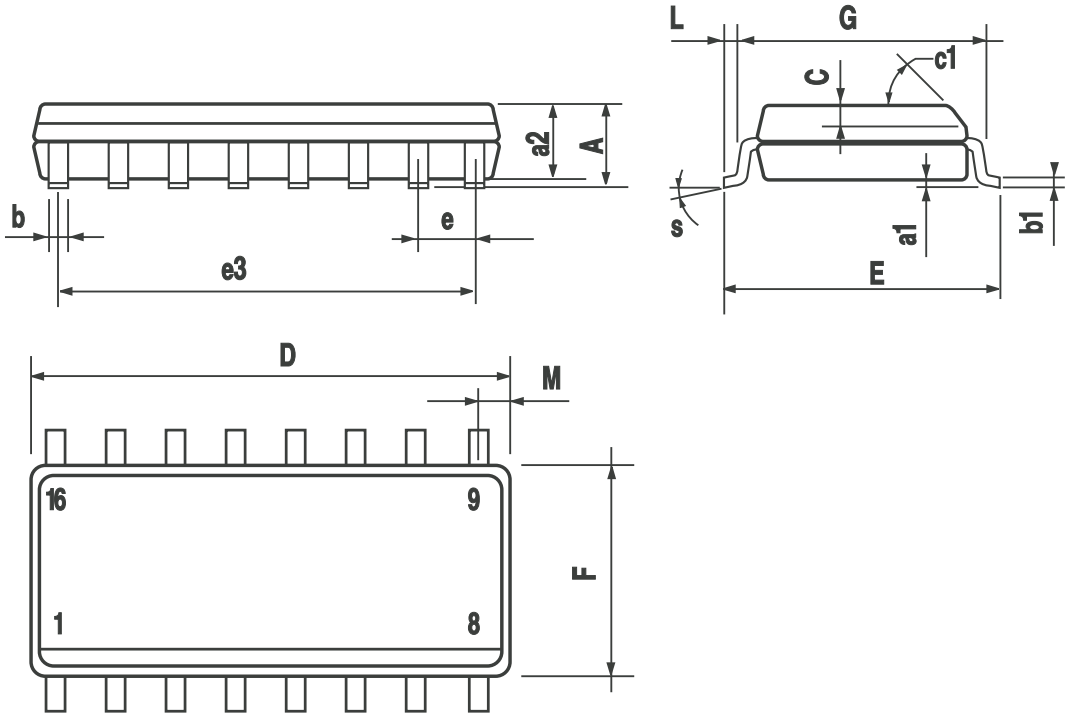
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

SO-16 MECHANICAL DATA

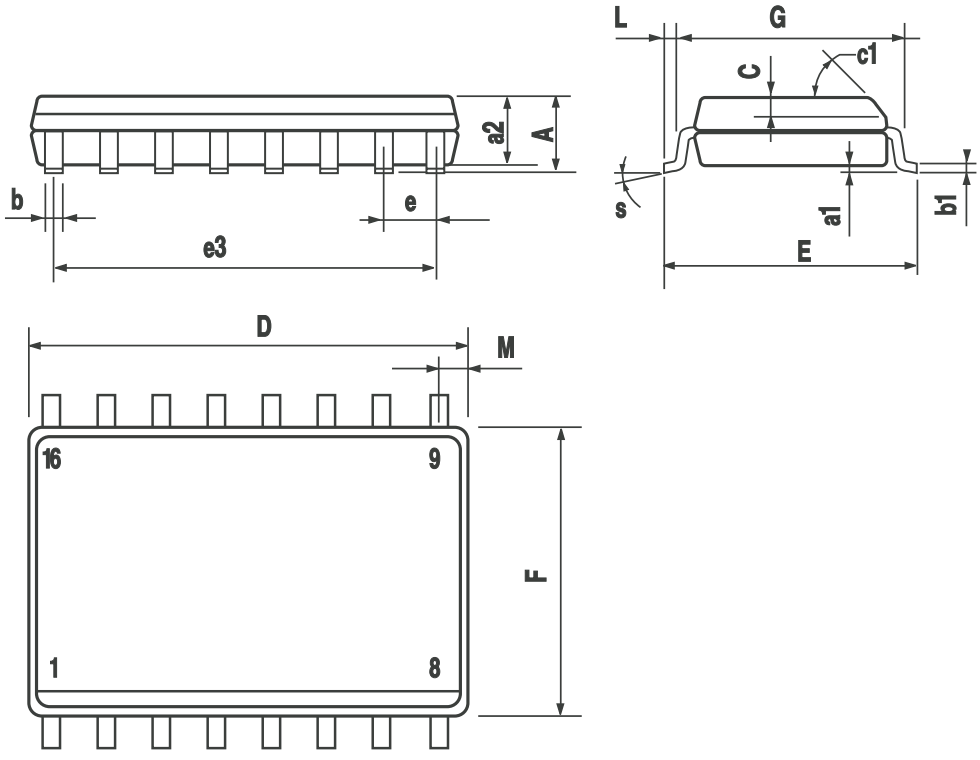
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
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.)					



PO13I

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