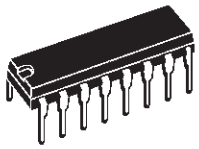
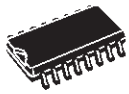
ST232

5V POWERED MULTI-CHANNEL RS-232 DRIVERS AND RECEIVERS

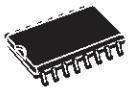
- SUPPLY VOLTAGE RANGE: 4.5 TO 5.5V
- SUPPLY CURRENT NO LOAD (TYP): 5mA
- TRANSMITTER OUTPUT VOLTAGE SWING (TYP): ±7.8V
- CONTROLLED OUTPUT SLEW RATE
- RECEIVER INPUT VOLTAGE RANGE: ±30V
- DATA RATE (TYP): 220Kbps
- OPERATING TEMPERATURE RANGE: -40 TO 85 °C, 0 TO 70 °C
- COMPATIBLE WITH MAX232 AND MAX202



N
(Plastic Package)



D
(Micro Package)



W
(Micro Package Large)



T
(TSSOP Package)

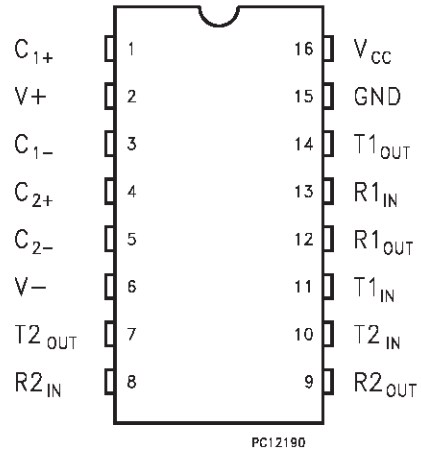
DESCRIPTION

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

ORDER CODES

Type	Temperature Range	Package	Comments
ST232CN	0 to 70 °C	DIP-16	25 parts per tube / 40 tube per box
ST232BN	-40 to 85 °C	DIP-16	25 parts per tube / 40 tube per box
ST232CD	0 to 70 °C	SO-16 (Tube)	50 parts per tube / 20 tube per box
ST232BD	-40 to 85 °C	SO-16 (Tube)	50 parts per tube / 20 tube per box
ST232CDR	0 to 70 °C	SO-16 (Tape & Reel)	2500 parts per reel
ST232BDR	-40 to 85 °C	SO-16 (Tape & Reel)	2500 parts per reel
ST232CW	0 to 70 °C	SO-16 Large (Tube)	49 parts per tube / 25 tube per box
ST232BW	-40 to 85 °C	SO-16 Large (Tube)	49 parts per tube / 25 tube per box
ST232CWR	0 to 70 °C	SO-16 Large (Tape & Reel)	1000 parts per reel
ST232BWR	-40 to 85 °C	SO-16 Large (Tape & Reel)	1000 parts per reel
ST232CT	0 to 70 °C	TSSOP16 (Tube)	only for samples
ST232BT	-40 to 85 °C	TSSOP16 (Tube)	only for samples
ST232CTR	0 to 70 °C	TSSOP16 (Tape & Reel)	2500 parts per reel
ST232BTR	-40 to 85 °C	TSSOP16 (Tape & Reel)	2500 parts per reel

PIN CONFIGURATION



PIN DESCRIPTION

PIN No	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 (Note 1)

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.3 to 6	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	(V+ + 0.3) to (V- - 0.3)	V
R_{OUT}	Receiver Output Voltage Range	-0.3 to (V_{CC} + 0.3)	V
T_{SCTOUT}	Short Circuit Duration on T_{OUT}	infinite	
T_{stg}	Storage Temperature Range	-65 to +150	°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.
Note1: No external supply can be applied to V+ terminal and V- terminal.

ELECTRICAL CHARACTERISTICS

(C_1 -C_4 = 0.1µF, V_{CC} = 5V ± 10% T_A = -40 to 85 °C, unless otherwise specified.
Typical Valus are referred to T_A = 25 °C)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
I_{SUPPLY}	V_{CC} Power Supply Current	No Load, T_A = 25 °C		5	10	mA

TRANSMITTER ELECTRICAL CHARACTERISTICS

(C_1 -C_4 = 0.1µF, V_{CC} = 5V ± 10%, T_A = -40 to 85 °C, unless otherwise specified.
Typical Valus are referred to T_A = 25 °C)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
V_{TOUT}	Output Voltage Swing	All Transmitter outputs are loaded with 3KΩ to GND	±5	±7.8		V
I_{TIL}	Logic Pull-Up Current	T_{IN} = 0 V		15	200	µA
V_{TIL}	Input Logic Threshold Low				0.8	V
V_{TIH}	Input Logic Threshold High		2			V
SR_T	Transition Slew Rate	T_A = 25 °C, V_{CC} = 5 V, R_L = 3 to 7 KΩ, C_L= 50 to 2500 pF (Note 1)		7	30	V/µs
D_R	Data Rate	(Note 2)	120	220		Kbits/s
R_{TOUT}	Transmitter Output Resistance	V_{CC} = V+ = V- = 0V V_{OUT} = ± 2 V	300			Ω
I_{SC}	Transmitter Output Short Circuit Current	one T_{XOUT} to GND		±10	±60	mA

Note 1: Measured from 3V to -3V or from -3V to 3V.
Note 2: One trasmitter output is loaded with R_L = 3KΩ to 7KΩ, C_L = 50 to 1000pF

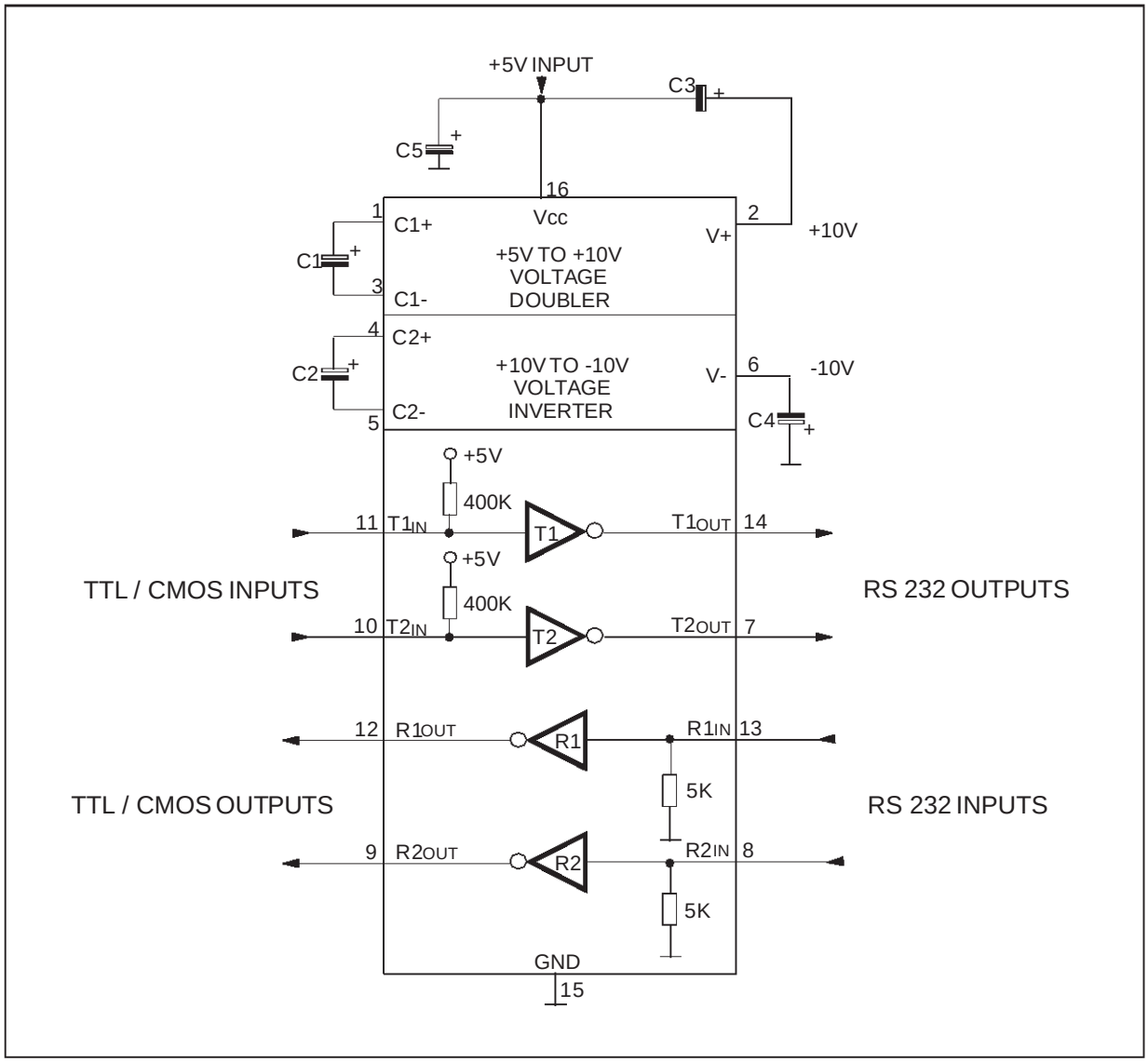
RECEIVER ELECTRICAL CHARACTERISTICS

(C_1 -C_4 = 0.1µF, V_{CC} = 5V ± 10%, T_A = -40 to 85 °C, unless otherwise specified.
Typical Valus are referred to T_A = 25 °C)

Symbol	Parameter	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
V_{RIN}	Receiver Input Voltage Operating Range		-30		30	V
R_{RIN}	RS-232 Input Resistance	T_A = 25 °C, V_{CC} = 5 V, V_{RIN} = 5 V	3	5	7	KΩ
V_{RIL}	RS-232 Input Logic Threshold Low	T_A = 25 °C, V_{CC} = 5 V	0.8	1.2		V
V_{RIH}	RS-232 Input Logic Threshold High	T_A = 25 °C, V_{CC} = 5 V		1.7	2.4	V
V_{RIHYS}	RS-232 Input Hysteresis	V_{CC} = 5 V	0.2	0.5	1	V
V_{ROL}	TTL/CMOS Output Voltage Low	I_{OUT} = 3.2mA (to V_{CC})			0.4	V
V_{ROH}	TTL/CMOS Output Voltage High	I_{OUT} = 1mA (to GND)	3.5	V_{CC}-0.4		V
t_{dR}	Propagation Delay Time	C_L=150pF (Note 1)		0.3	1	µs
I_{SCR}	Receiver Output Short Circuit Current			±10		mA

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

APPLICATION CIRCUITS (note 1, note 2)

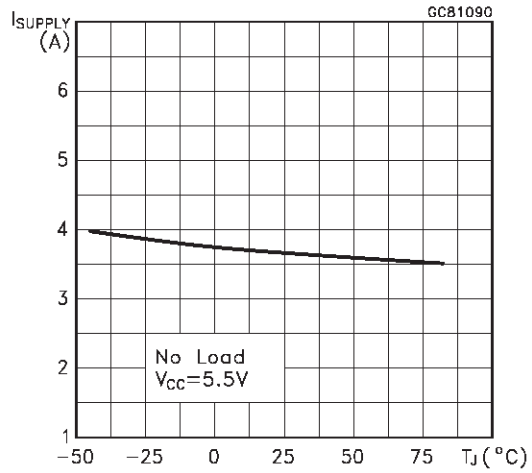


Note 1: $C_{1\text{-}4}$ capacitors can even be 1 µF ones.
Note 2: $C_{1\text{-}4}$ can be common or biased capacitors.

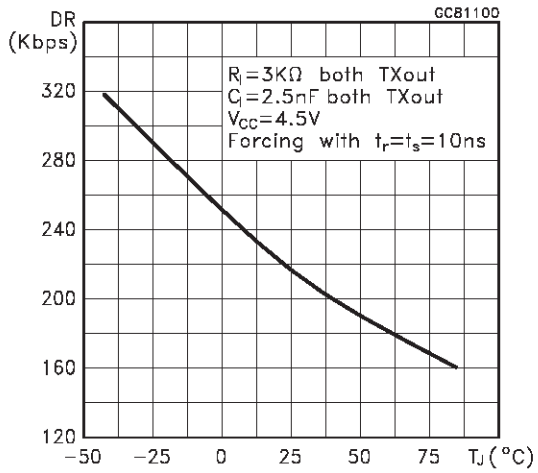
Capacitance Value (µF)

C1	C2	C3	C4	C5
0.1	0.1	0.1	0.1	0.1

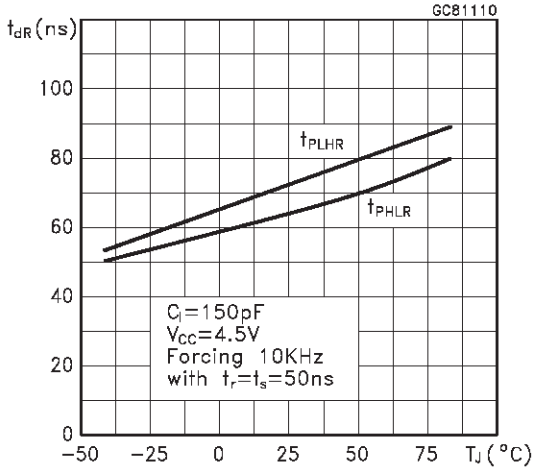
Supply Current vs Temperature



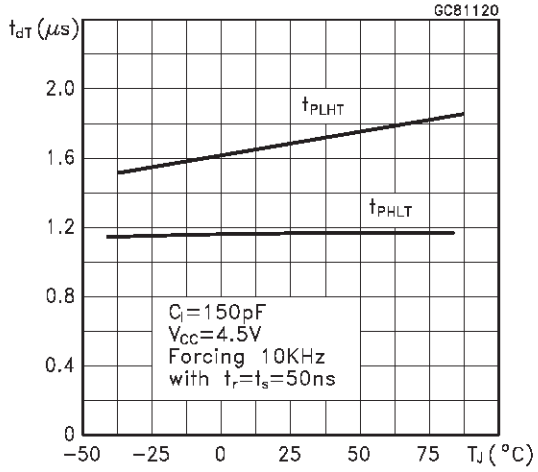
Data Rate vs Temperature



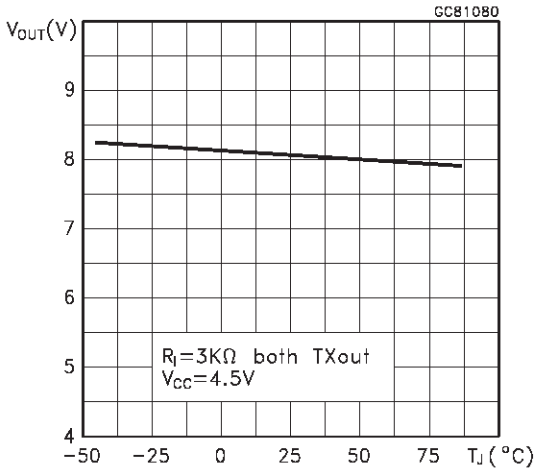
Receiver Propagation Delay



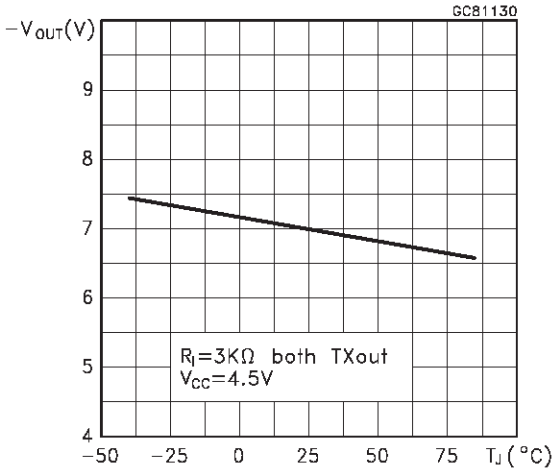
Driver Propagation Delay



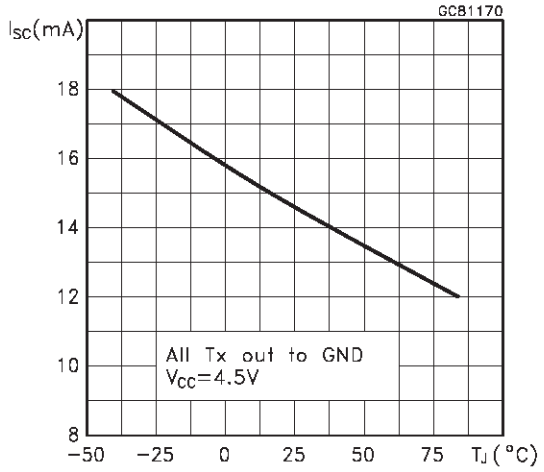
High Level Output Voltage Swing vs Temperature



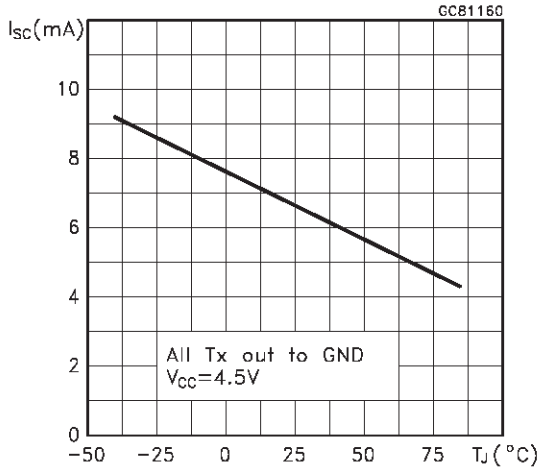
Low Level Output Voltage Swing vs Temperature



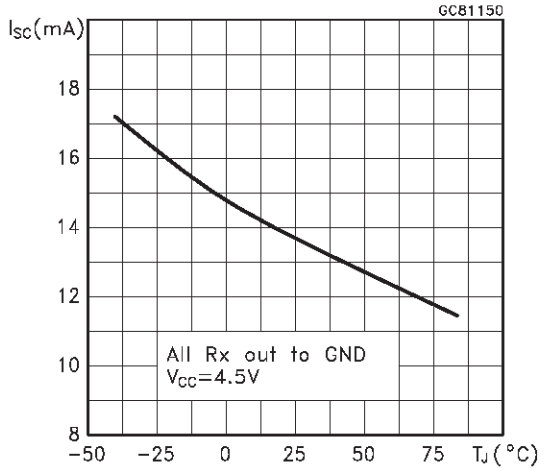
High Level Trasmitter Output Short Circuit Current vs Temperature



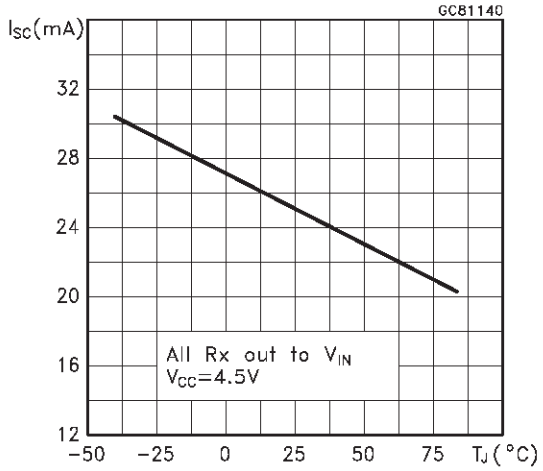
Low Level Trasmitter Output Short Circuit Current vs Temperature



High Level Receiver Output Short Circuit Current vs Temperature

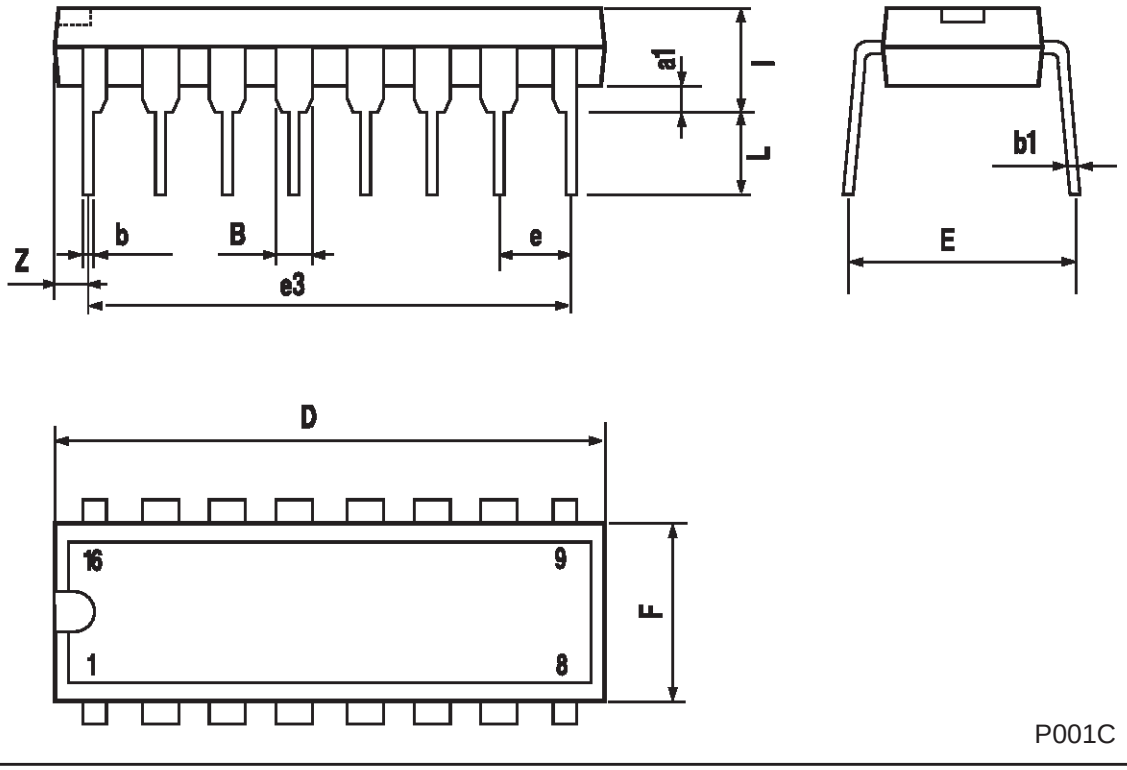


Low Level Receiver Output Short Circuit Current vs Temperature



Plastic DIP-16 (0.25) MECHANICAL DATA

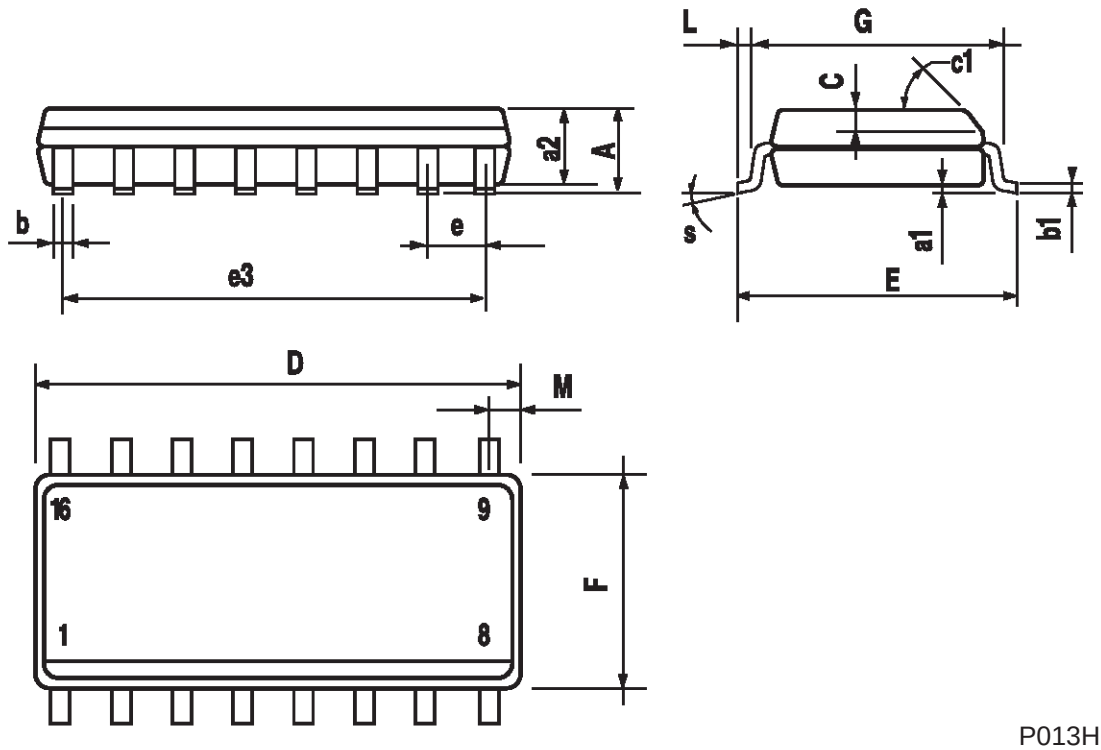
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

SO-16 MECHANICAL DATA

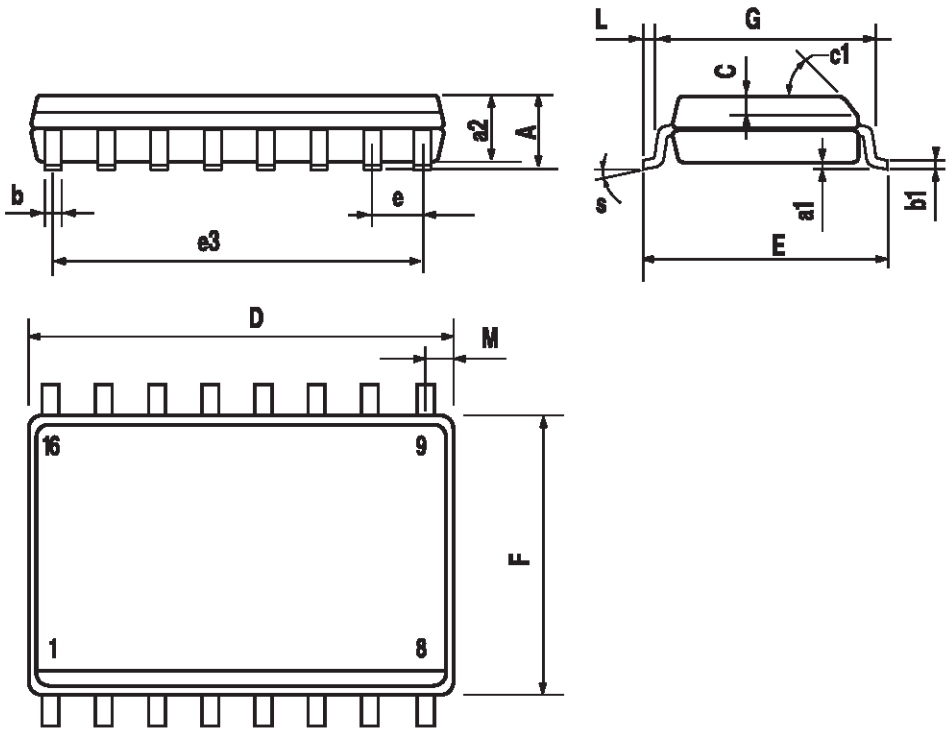
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.004		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45 (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
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.)					



P013H

SO16L MECHANICAL DATA

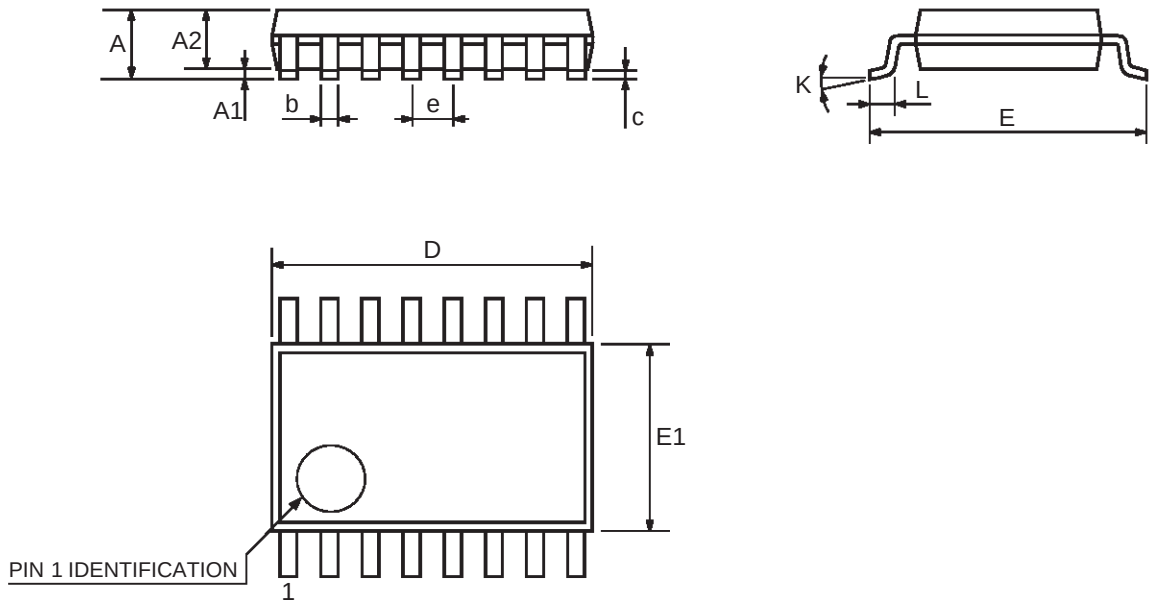
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.2	0.004		0.008
a2			2.45			0.096
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.012
C		0.5			0.020	
c1	45 (typ.)					
D	10.1		10.5	0.397		0.413
E	10.0		10.65	0.3.93		0.419
e		1.27			0.050	
e3		8.89			0.350	
F	7.4		7.6	0.291		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^o	4^o	8^o	0^o	4^o	8^o
L	0.50	0.60	0.70	0.020	0.024	0.028



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