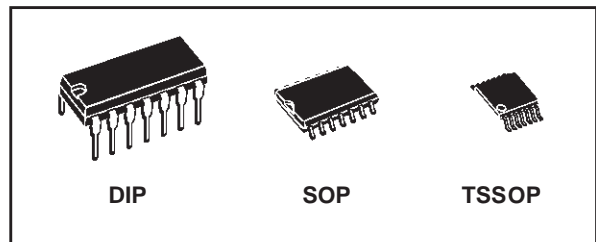




# 74ACT10

## TRIPLE 3-INPUT NAND GATE

- HIGH SPEED:  $t_{PD} = 4.5ns$  (TYP.) at  $V_{CC} = 5V$
- LOW POWER DISSIPATION:  
 $I_{CC} = 4\mu A$ (MAX.) at  $T_A=25^\circ C$
- COMPATIBLE WITH TTL OUTPUTS  
 $V_{IH} = 2V$  (MIN.),  $V_{IL} = 0.8V$  (MAX.)
- $50\Omega$  TRANSMISSION LINE DRIVING CAPABILITY
- SYMMETRICAL OUTPUT IMPEDANCE:  
 $|I_{OH}| = I_{OL} = 24mA$  (MIN)
- BALANCED PROPAGATION DELAYS:  
 $t_{PLH} \cong t_{PHL}$
- OPERATING VOLTAGE RANGE:  
 $V_{CC}$  (OPR) = 4.5V to 5.5V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 10
- IMPROVED LATCH-UP IMMUNITY



### ORDER CODES

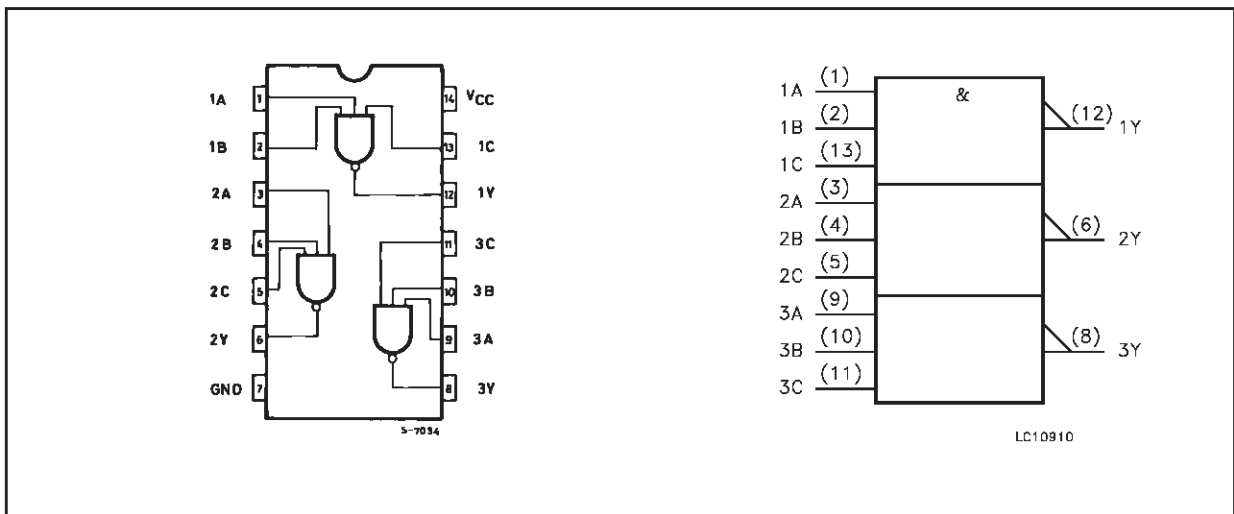
PACKAGE	TUBE	T & R
DIP	74ACT10B	
SOP	74ACT10M	74ACT10MTR
TSSOP		74ACT10TTR

### DESCRIPTION

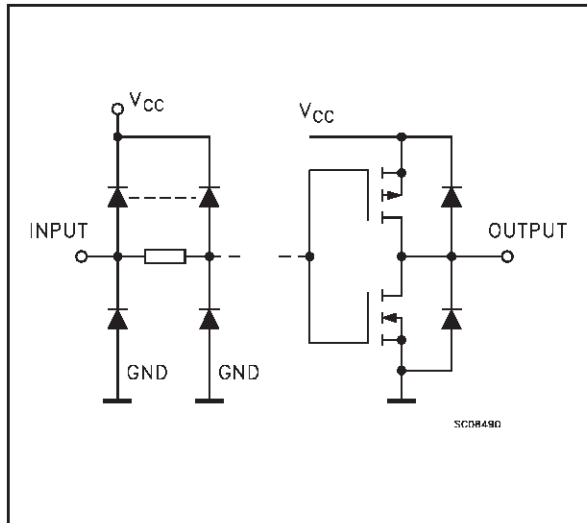
The 74ACT10 is an advanced high-speed CMOS TRIPLE 3-INPUT NAND GATE fabricated with sub-micron silicon gate and double-layer metal wiring C<sup>2</sup>MOS technology. The internal circuit is composed of 3 stages including buffer output, which enables high noise immunity and stable output.

The device is designed to interface directly High Speed CMOS systems with TTL, NMOS and CMOS output voltage levels. All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

### PIN CONNECTION AND IEC LOGIC SYMBOLS



### INPUT AND OUTPUT EQUIVALENT CIRCUIT



### PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1, 3, 9	1A to 3A	Data Inputs
2, 4, 10	1B to 3B	Data Inputs
13, 5, 11	1C to 3C	Data Inputs
12, 6, 8	1Y to 3Y	Data Outputs
7	GND	Ground (0V)
14	V <sub>CC</sub>	Positive Supply Voltage

### TRUTH TABLE

A	B	C	Y
L	X	X	H
X	L	X	H
X	X	L	H
H	H	H	L

X : Don't Care

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to +7	V
V <sub>I</sub>	DC Input Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
V <sub>O</sub>	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	± 20	mA
I <sub>OK</sub>	DC Output Diode Current	± 20	mA
I <sub>O</sub>	DC Output Current	± 50	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	± 150	mA
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
T <sub>L</sub>	Lead Temperature (10 sec)	300	°C

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

### RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	4.5 to 5.5	V
V <sub>I</sub>	Input Voltage	0 to V <sub>CC</sub>	V
V <sub>O</sub>	Output Voltage	0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time V <sub>CC</sub> = 4.5 to 5.5V (note 1)	8	ns/V

1) V<sub>IN</sub> from 0.8V to 2.0V

**DC SPECIFICATIONS**

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V <sub>IH</sub>	High Level Input Voltage	4.5	V <sub>O</sub> = 0.1 V or V <sub>CC</sub> -0.1V	2.0	1.5		2.0		2.0		V
		5.5		2.0	1.5		2.0		2.0		
V <sub>IL</sub>	Low Level Input Voltage	4.5	V <sub>O</sub> = 0.1 V or V <sub>CC</sub> -0.1V		1.5	0.8		0.8		0.8	V
		5.5			1.5	0.8		0.8		0.8	
V <sub>OH</sub>	High Level Output Voltage	4.5	I <sub>O</sub> =-50 μA	4.4	4.49		4.4		4.4		V
		5.5	I <sub>O</sub> =-50 μA	5.4	5.49		5.4		5.4		
		4.5	I <sub>O</sub> =-24 mA	3.86			3.76		3.7		
		5.5	I <sub>O</sub> =-24 mA	4.86			4.76		4.7		
V <sub>OL</sub>	Low Level Output Voltage	4.5	I <sub>O</sub> =50 μA		0.001	0.1		0.1		0.1	V
		5.5	I <sub>O</sub> =50 μA		0.001	0.1		0.1		0.1	
		4.5	I <sub>O</sub> =24 mA			0.36		0.44		0.5	
		5.5	I <sub>O</sub> =24 mA			0.36		0.44		0.5	
I <sub>I</sub>	Input Leakage Current	5.5	V <sub>I</sub> = V <sub>CC</sub> or GND			± 0.1		± 1		± 1	μA
I <sub>CCT</sub>	Max I <sub>CC</sub> /Input	5.5	V <sub>I</sub> = V <sub>CC</sub> - 2.1V		0.6			1.5		1.6	mA
I <sub>CC</sub>	Quiescent Supply Current	5.5	V <sub>I</sub> = V <sub>CC</sub> or GND			4		40		80	μA
I <sub>OLD</sub>	Dynamic Output Current (note 1, 2)	5.5	V <sub>OLD</sub> = 1.65 V max					75		50	mA
I <sub>OHD</sub>			V <sub>OHD</sub> = 3.85 V min					-75		-50	mA

1) Maximum test duration 2ms, one output loaded at a time

2) Incident wave switching is guaranteed on transmission lines with impedances as low as 50Ω

**AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 50 pF, R<sub>L</sub> = 500 Ω, Input t<sub>r</sub> = t<sub>f</sub> = 3ns)**

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time	5.0(*)		1.5	4.5	9.0	1.0	10.0	1.0	10.0	ns

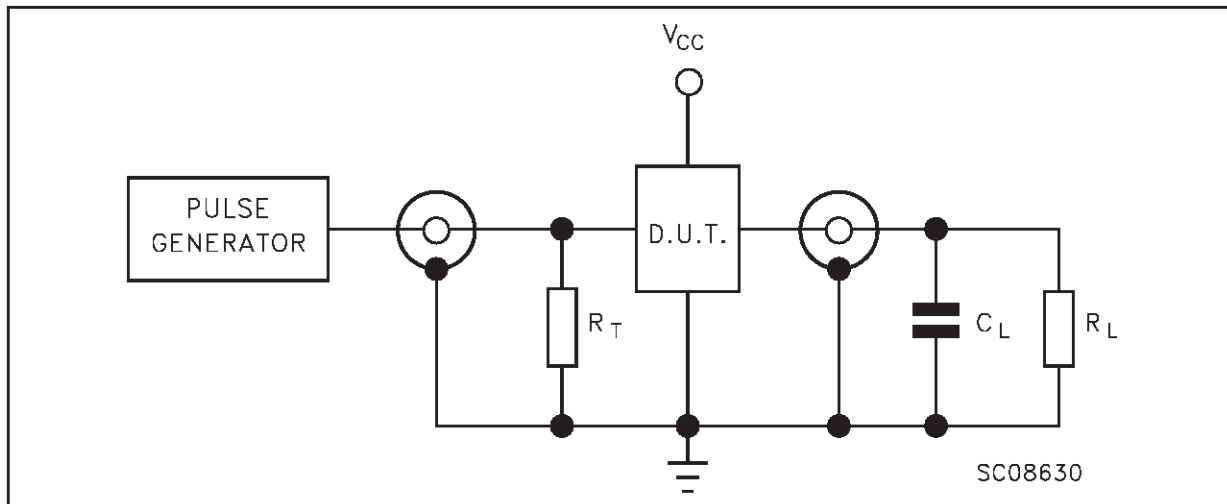
(\*) Voltage range is 5.0V ± 0.5V

**CAPACITIVE CHARACTERISTICS**

Symbol	Parameter	Test Condition		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
C <sub>IN</sub>	Input Capacitance	5.0			4.0						pF
C <sub>PD</sub>	Power Dissipation Capacitance (note 1)	5.0	f <sub>IN</sub> = 10MHz		37.0						pF

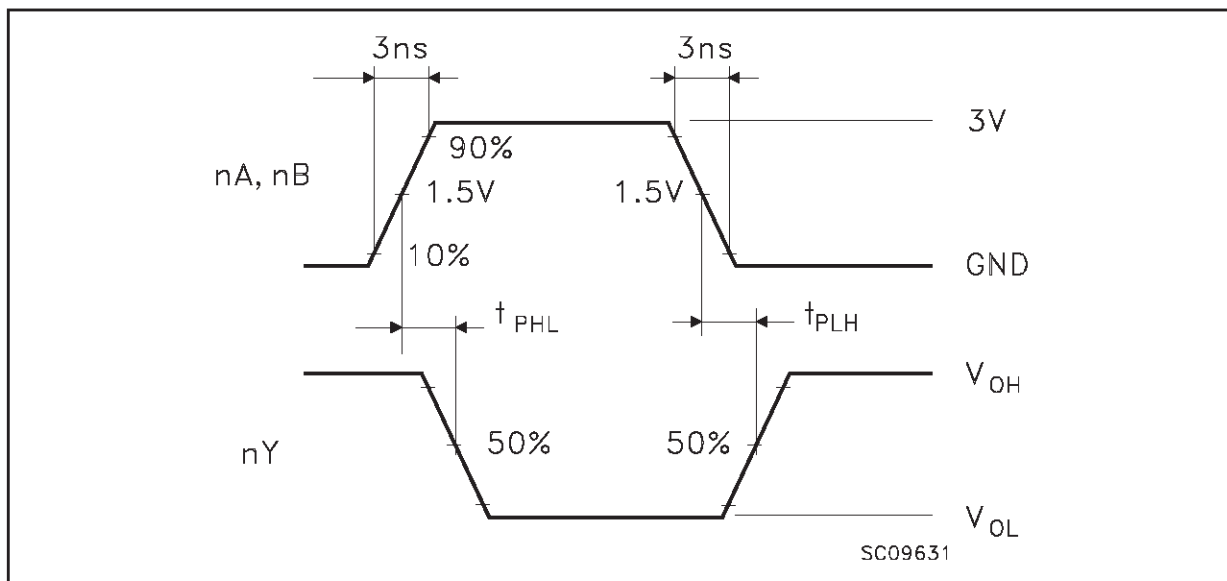
1) C<sub>PD</sub> is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. I<sub>CC(oper)</sub> = C<sub>PD</sub> × V<sub>CC</sub> × f<sub>IN</sub> + I<sub>CC</sub>/3 (per gate)

TEST CIRCUIT



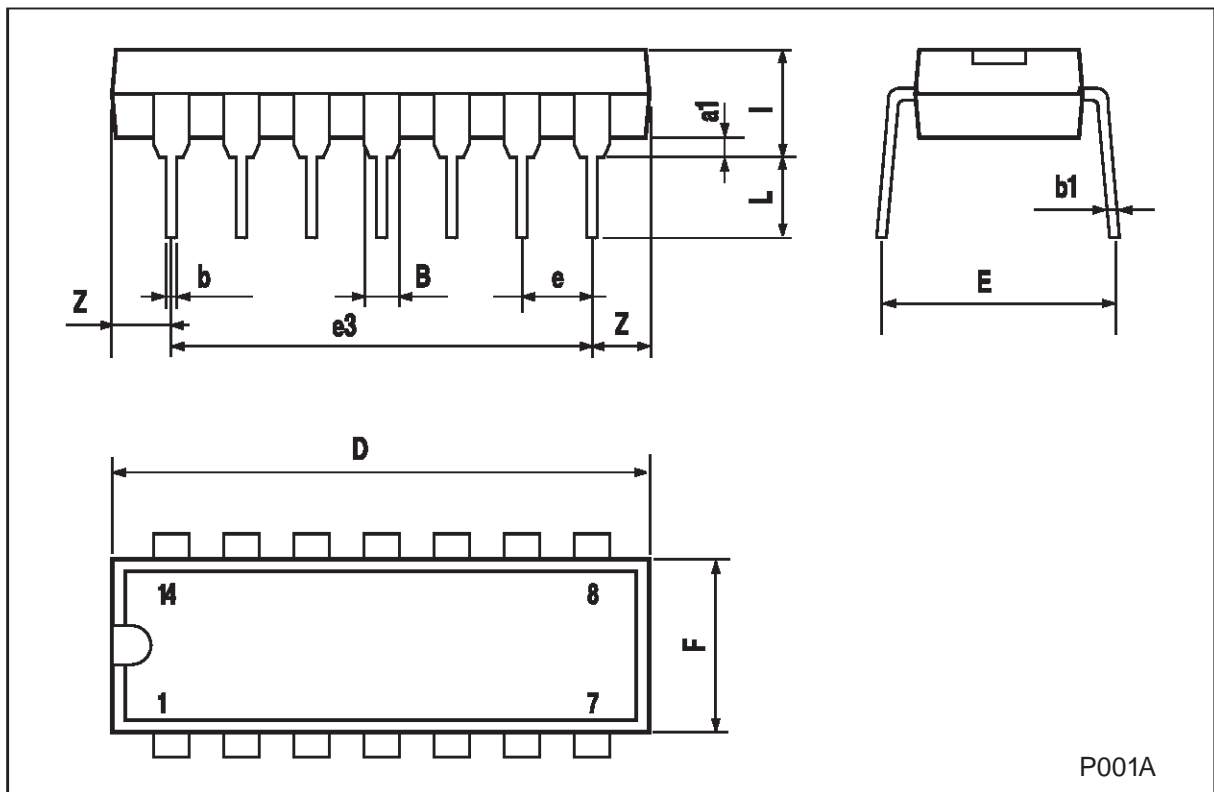
$C_L = 50\text{pF}$  or equivalent (includes jig and probe capacitance)  
 $R_L = R_1 = 500\Omega$  or equivalent  
 $R_T = Z_{OUT}$  of pulse generator (typically  $50\Omega$ )

WAVEFORM: PROPAGATION DELAYS (f=1MHz; 50% duty cycle)



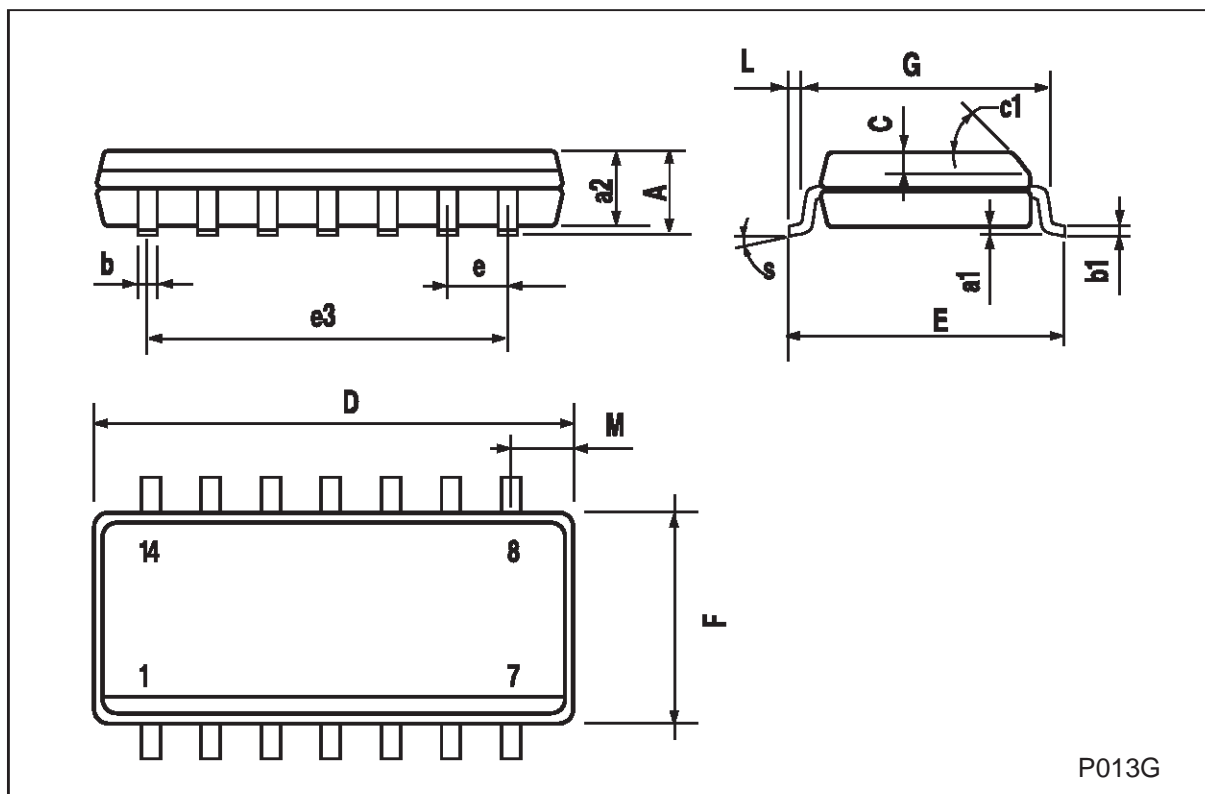
**Plastic DIP-14 MECHANICAL DATA**

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
l			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



### SO-14 MECHANICAL DATA

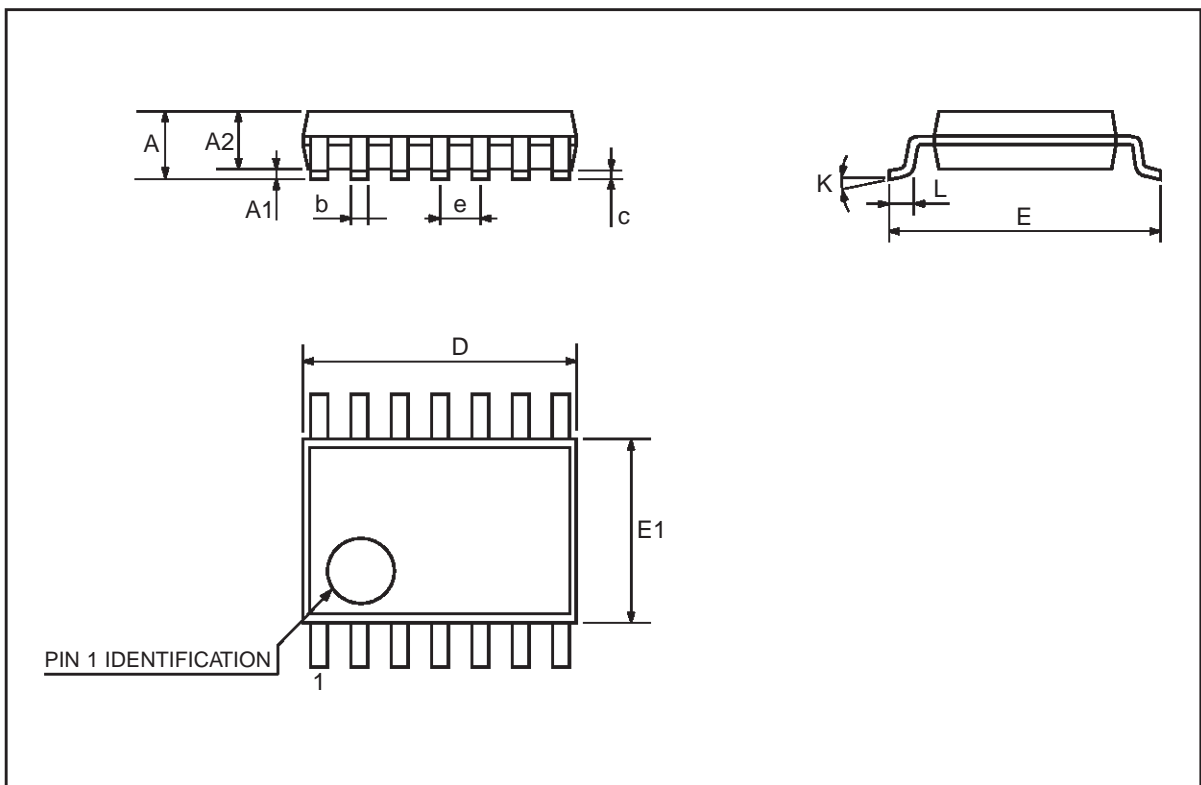
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45 (typ.)					
D	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
F	3.8		4.0	0.149		0.157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



P013G

**TSSOP14 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



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