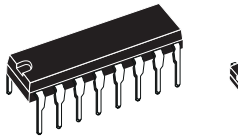
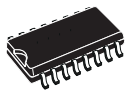
74AC157

QUAD 2 CHANNEL MULTIPLEXER

- HIGH SPEED: t_{PD} = 4ns (TYP.) at V_{CC} = 5V
- LOW POWER DISSIPATION: I_{CC} = 4µA(MAX.) at T_A=25°C
- HIGH NOISE IMMUNITY: $V_{NIH} = V_{NIL}$ = 28 % V_{CC} (MIN.)
- 50Ω 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) = 2V to 6V
- PIN AND FUNCTION COMPATIBLE WITH 74 SERIES 157
- IMPROVED LATCH-UP IMMUNITY



DIP



SOP

TSSOP

ORDER CODES

PACKAGE	TUBE	T & R
DIP	74AC157B	
SOP	74AC157M	74AC157MTR
TSSOP		74AC157TTR

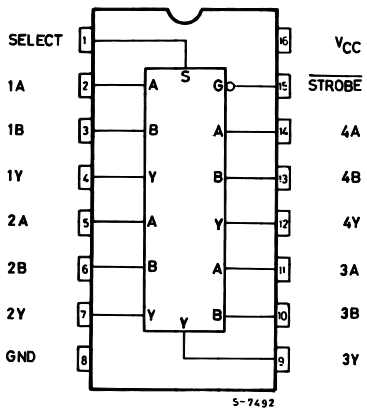
DESCRIPTION

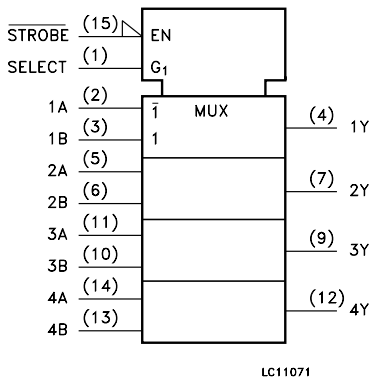
The 74AC157 is an advanced high-speed CMOS QUAD 2-CHANNEL MULTIPLEXER fabricated with sub-micron silicon gate and double-layer metal wiring C^2MOS tecnology.

It consists of four 2-input digital multiplexer with common SELECT and $\overline{\text{STROBE}}$ inputs. It is a non-inverting multiplexer. When the $\overline{\text{STROBE}}$ input is held high selection of data is inhibit and all the outputs become low. The SELECT decoding determines whether the A or B inputs get routed to their corresponding Y outputs.

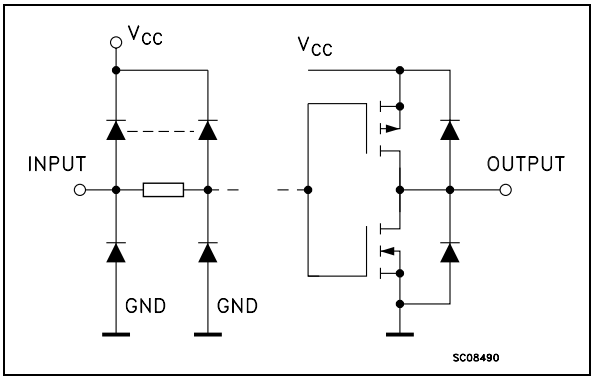
All inputs and outputs are equipped with protection circuits against static discharge, giving them 2KV ESD immunity and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS





INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

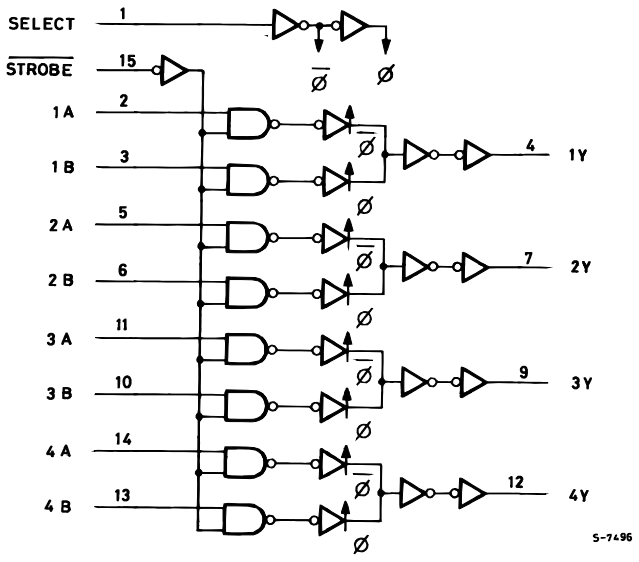
PIN No	SYMBOL	NAME AND FUNCTION
1	SELECT	Common Data Select Inputs
2, 5, 11, 14	1A to 4A	Data Inputs From Source A
3, 6, 10, 13	1B to 4B	Data Inputs From Source B
4, 7, 9, 12	1Y to 4Y	Multiplexer Outputs
15	$\overline{\text{STROBE}}$	Strobe Input
8	GND	Ground (0V)
16	V_{CC}	Positive Supply Voltage

TRUTH TABLE

INPUTS				OUTPUT
$\overline{\text{STROBE}}$	SELECT	A	B	Y
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

X : Don't Care

LOGIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	-0.5 to +7	V
V_I	DC Input Voltage	-0.5 to V_{CC} + 0.5	V
V_O	DC Output Voltage	-0.5 to V_{CC} + 0.5	V
I_{IK}	DC Input Diode Current	± 20	mA
I_{OK}	DC Output Diode Current	± 20	mA
I_O	DC Output Current	± 50	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 200	mA
T_{stg}	Storage Temperature	-65 to +150	°C
T_L	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_{CC}	Supply Voltage	2 to 6	V
V_I	Input Voltage	0 to V_{CC}	V
V_O	Output Voltage	0 to V_{CC}	V
T_{op}	Operating Temperature	-55 to 125	°C
dt/dv	Input Rise and Fall Time V_{CC} = 3.0, 4.5 or 5.5V (note 1)	8	ns/V

1) V_{IN} from 30% to 70% of V_{CC}

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
V_{IH}	High Level Input Voltage	3.0	V_O = 0.1 V or V_{CC}-0.1V	2.1	1.5		2.1		2.1		V
		4.5		3.15	2.25		3.15		3.15		
		5.5		3.85	2.75		3.85		3.85		
V_{IL}	Low Level Input Voltage	3.0	V_O = 0.1 V or V_{CC}-0.1V		1.5	0.9		0.9		0.9	V
		4.5			2.25	1.35		1.35		1.35	
		5.5			2.75	1.65		1.65		1.65	
V_{OH}	High Level Output Voltage	3.0	I_O=-50 µA	2.9	2.99		2.9		2.9		V
		4.5	I_O=-50 µA	4.4	4.49		4.4		4.4		
		5.5	I_O=-50 µA	5.4	5.49		5.4		5.4		
		3.0	I_O=-12 mA	2.56			2.46		2.46		
		4.5	I_O=-24 mA	3.86			3.76		3.76		
		5.5	I_O=-24 mA	4.86			4.76		4.76		
V_{OL}	Low Level Output Voltage	3.0	I_O=50 µA		0.002	0.1		0.1		0.1	V
		4.5	I_O=50 µA		0.001	0.1		0.1		0.1	
		5.5	I_O=50 µA		0.001	0.1		0.1		0.1	
		3.0	I_O=12 mA			0.36		0.44		0.44	
		4.5	I_O=24 mA			0.36		0.44		0.44	
		5.5	I_O=24 mA			0.36		0.44		0.44	
I_I	Input Leakage Current	5.5	V_I = V_{CC} or GND			± 0.1		± 1		± 1	µA
I_{CC}	Quiescent Supply Current	5.5	V_I = V_{CC} or GND			4		40		80	µA
I_{OLD}	Dynamic Output Current (note 1, 2)	5.5	V_{OLD} = 1.65 V max					75		75	mA
I_{OHD}			V_{OHD} = 3.85 V min					-75		-75	mA

1) Maximum test duration 2ms, one output loaded at time
2) Incident wave switching is guaranteed on trasmission lines with impedances as low as 50Ω

AC ELECTRICAL CHARACTERISTICS (C_L = 50 pF, R_L = 500 Ω, Input $t_r = t_f$ = 3ns)

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
t_{PLH} t_{PHL}	Propagation Delay Time SELECT to Y	3.3(*)		1.5	6.5	11.0	1.5	12.0	1.5	12.0	ns
		5.0(**)		1.5	5.0	8.5	1.5	9.5	1.5	9.5	
t_{PLH} t_{PHL}	Propagation Delay Time $\overline{\text{STROBE}}$ to Y	3.3(*)		1.5	6.5	11.0	1.5	12.0	1.5	12.0	ns
		5.0(**)		1.5	5.5	9.0	1.5	10.0	1.5	10.0	
t_{PLH} t_{PHL}	Propagation Delay Time A, B to Y	3.3(*)		1.5	5.0	8.0	1.5	9.0	1.5	9.0	ns
		5.0(**)		1.5	4.0	6.5	1.5	7.0	1.5	7.0	

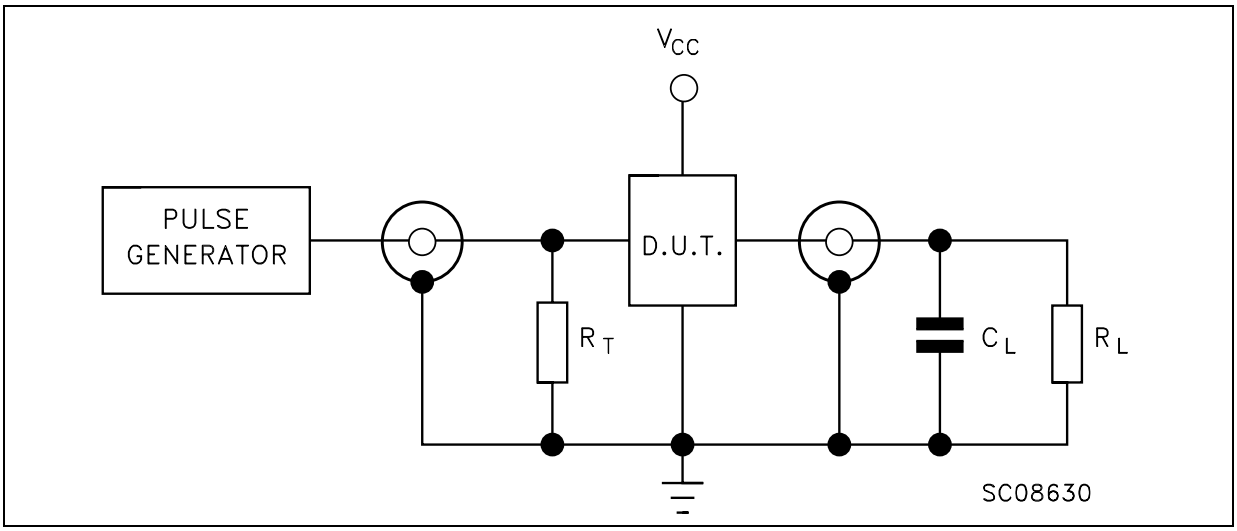
(*) Voltage range is 3.3V ± 0.3V
(**) Voltage range is 5.0V ± 0.5V

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Test Condition		Value							Unit
		V_{CC} (V)		T_A = 25°C			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.	
C_{IN}	Input Capacitance	5.0			5						pF
C_{PD}	Power Dissipation Capacitance (note 1)	5.0	f_{IN} = 10MHz		33						pF

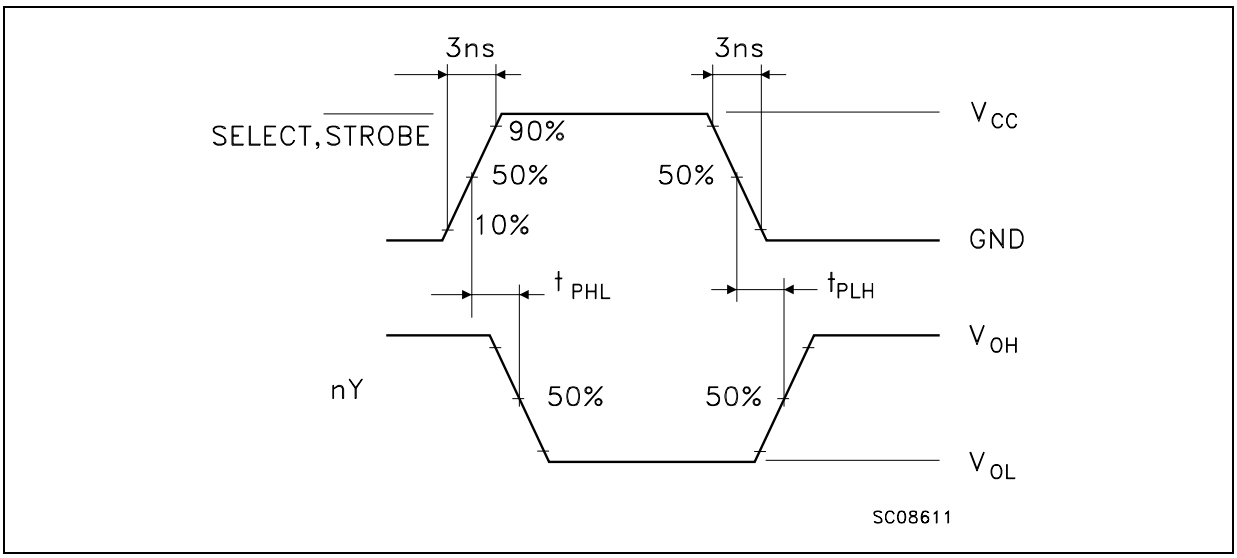
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/n$ (per circuit)

TEST CIRCUIT

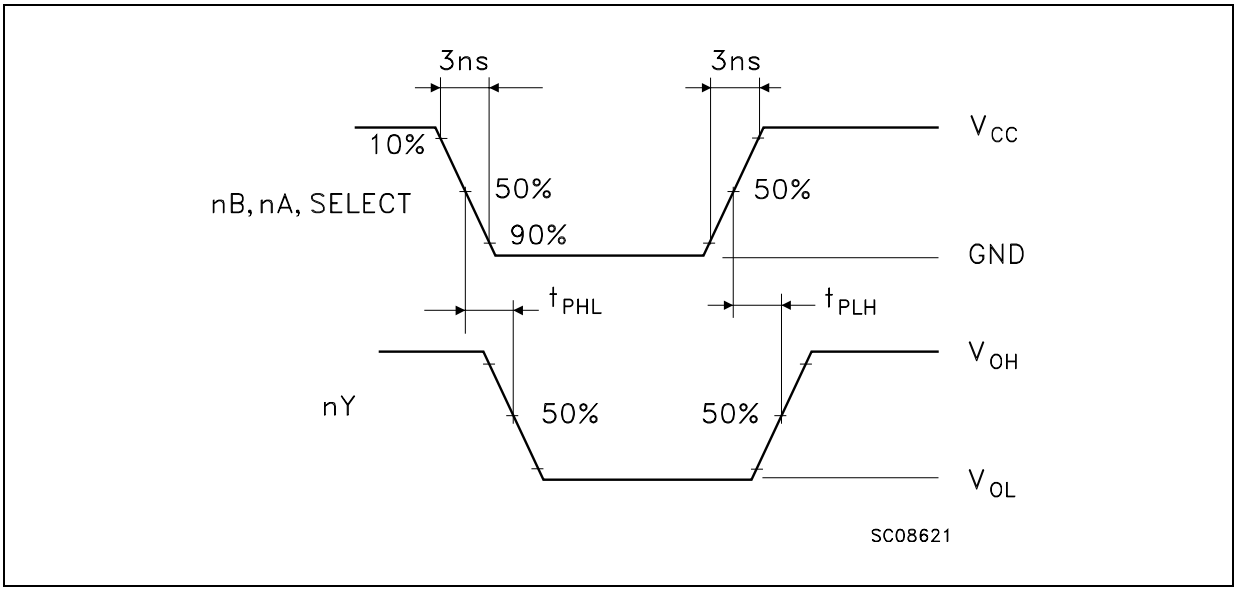


C_L = 50pF or equivalent (includes jig and probe capacitance)
$R_L = R_1$ = 500Ω or equivalent
$R_T = Z_{OUT}$ of pulse generator (typically 50Ω)

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

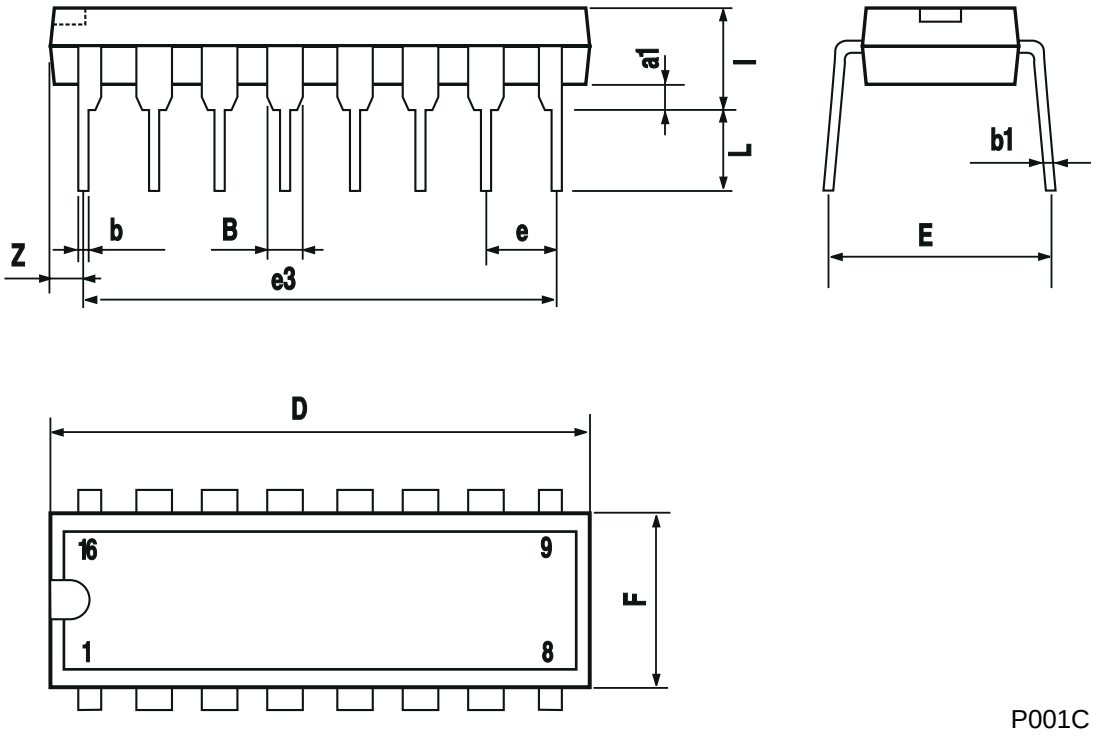


WAVEFORM 2: PROPAGATION DELAYS FOR NON-INVERTING CONDITIONS (f=1MHz; 50% duty cycle)



Plastic DIP-16 (0.25) MECHANICAL DATA

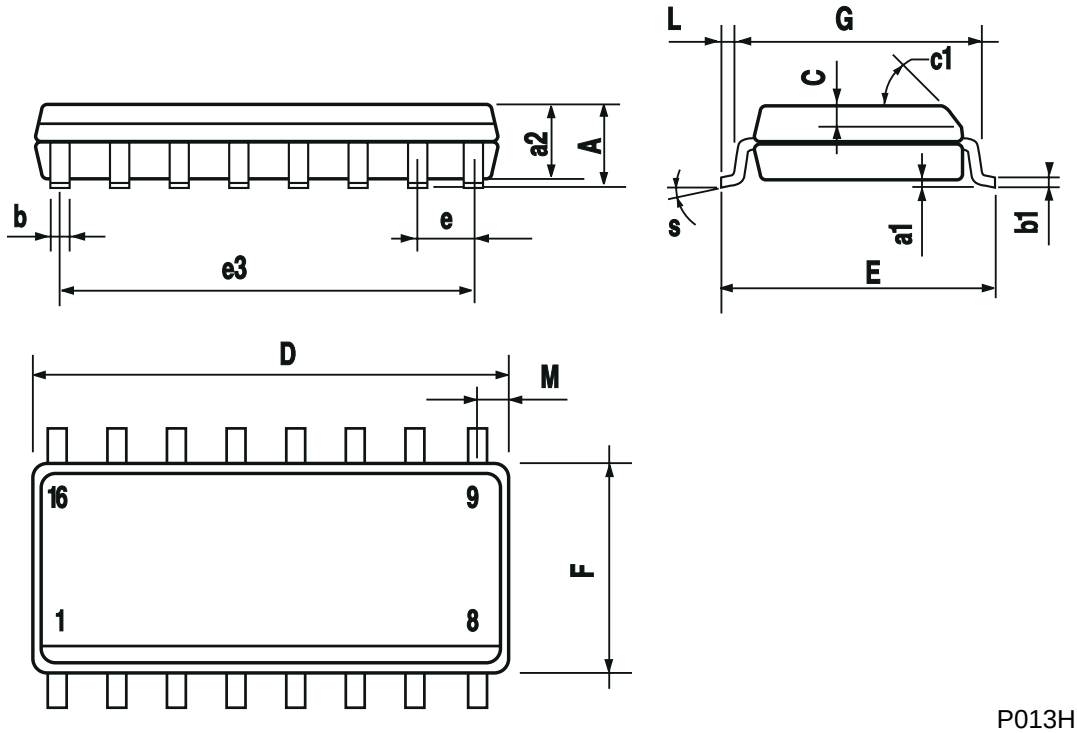
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

SO-16 MECHANICAL DATA

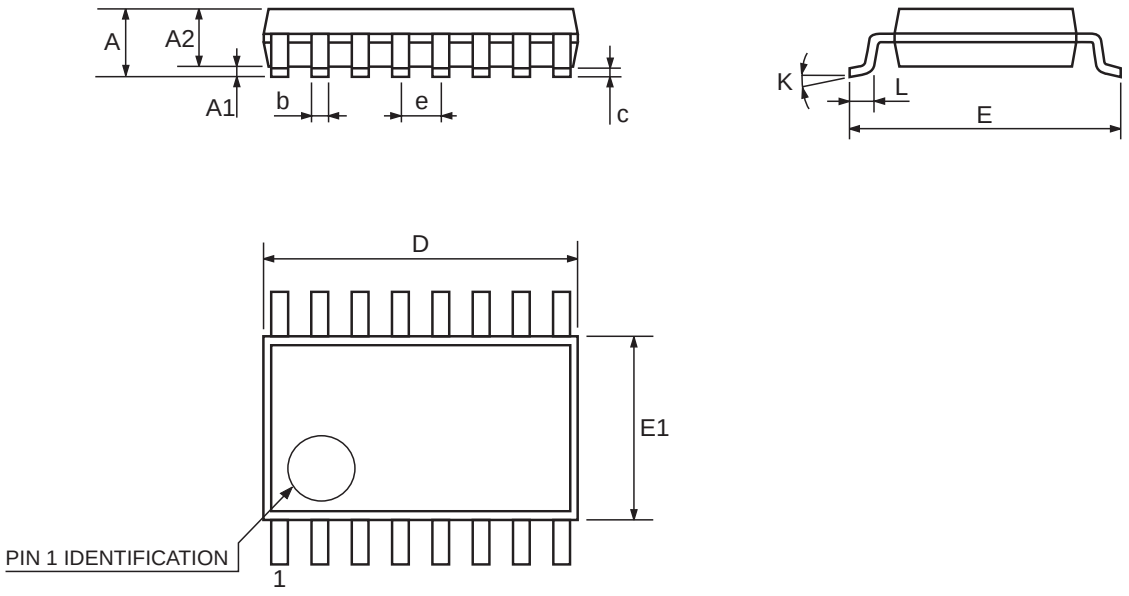
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.004		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45 (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157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

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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