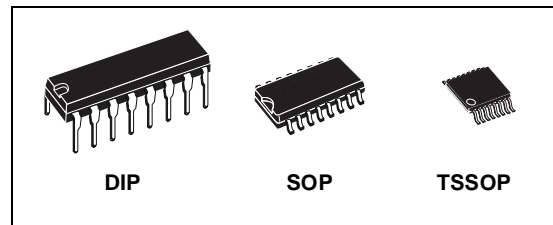


BCD TO DECIMAL DECODER

- HIGH SPEED :
 $t_{PD} = 14\text{ns (TYP.) at } V_{CC} = 6\text{V}$
- LOW POWER DISSIPATION:
 $I_{CC} = 4\mu\text{A (MAX.) at } T_A = 25^\circ\text{C}$
- HIGH NOISE IMMUNITY:
 $V_{NIH} = V_{NIL} = 28\% V_{CC} \text{ (MIN.)}$
- SYMMETRICAL OUTPUT IMPEDANCE:
 $|I_{OH}| = I_{OL} = 4\text{mA (MIN)}$
- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \cong t_{PHL}$
- WIDE OPERATING VOLTAGE RANGE:
 $V_{CC} \text{ (OPR)} = 2\text{V to } 6\text{V}$
- PIN AND FUNCTION COMPATIBLE WITH
 74 SERIES 42



ORDER CODES

PACKAGE	TUBE	T & R
DIP	M74HC42B1R	
SOP	M74HC42M1R	M74HC42RM13TR
TSSOP		M74HC42TTR

DESCRIPTION

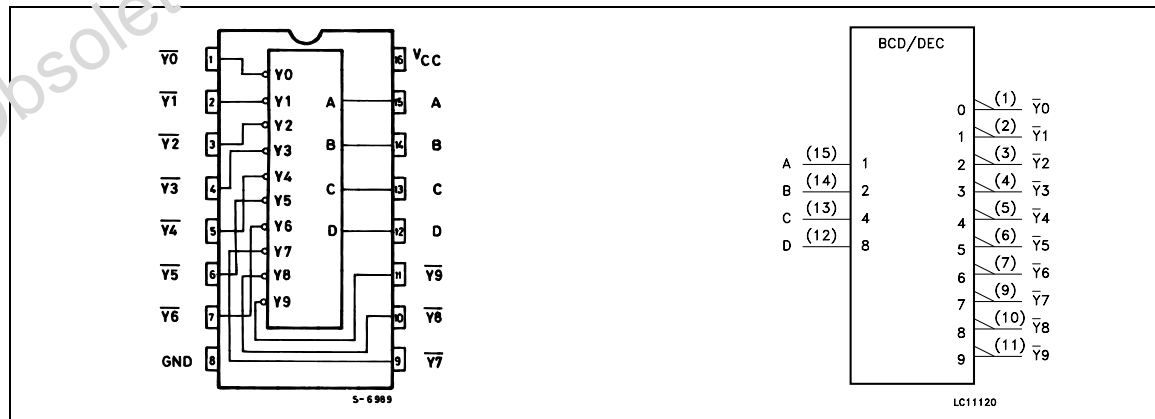
The M74HC42 is an high speed CMOS BCD TO DECIMAL DECODER fabricated with silicon gate C²MOS technology.

A BCD code applied to the four inputs A-D selects one of ten decimal outputs Y₀ - Y₉, which goes low to fifteen gives a high level at all outputs. This device also can be used as a 3 to LINE

DECODER, when the D input is assigned as a disable input. This device is useful for code conversion, address decoding, memory selection, demultiplexing, or readout decoding.

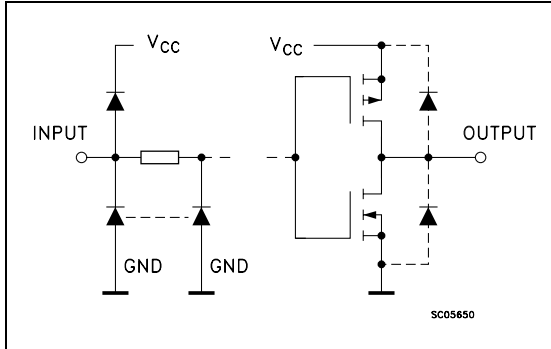
All inputs are equipped with protection circuits against static discharge and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS



M74HC42

INPUT AND OUTPUT EQUIVALENT CIRCUIT



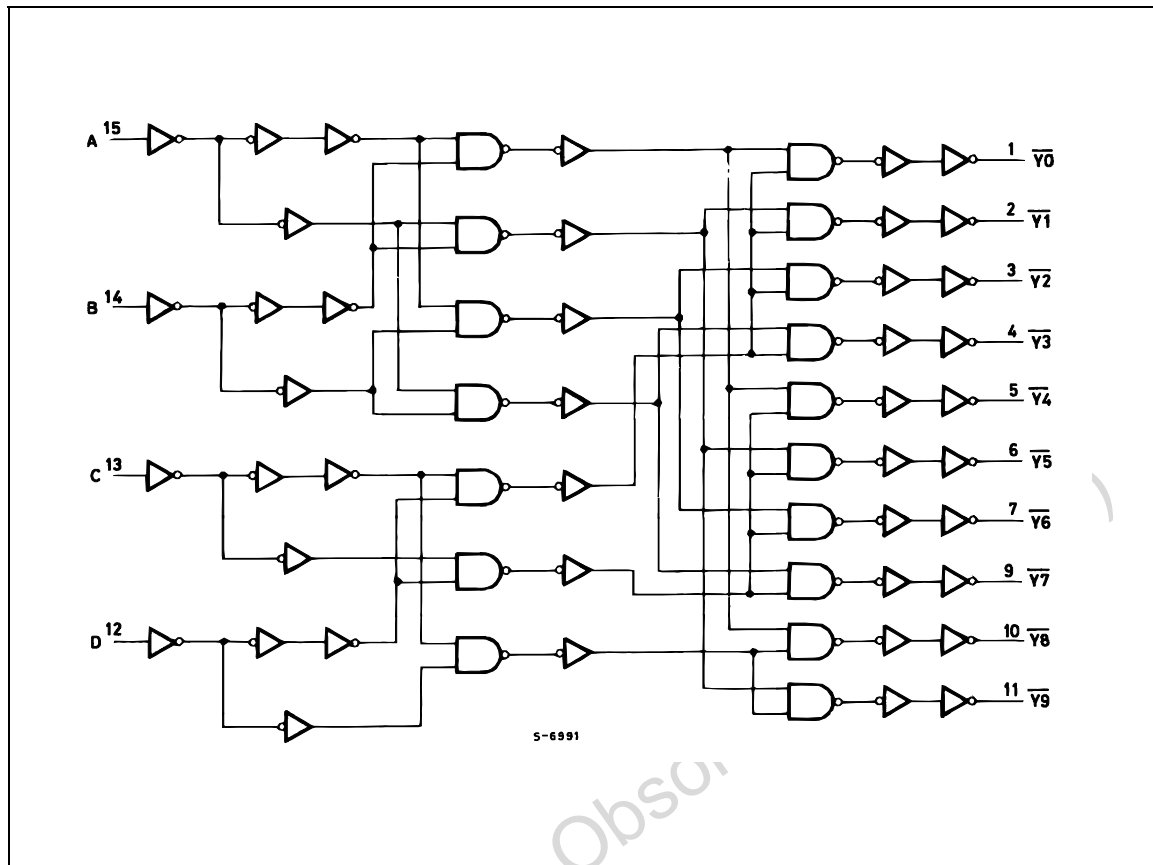
PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
15, 14, 13, 12	A, B, C, D	Data Inputs
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	\bar{Y}_0 TO \bar{Y}_9	Multiplexer Outputs
8	GND	Ground (0V)
16	Vcc	Positive Supply Voltage

FUNCTIONAL TABLE

CODE No	BCD INPUTS				DECIMAL OUTPUTS									
	D	C	B	A	\bar{Y}_0	\bar{Y}_1	\bar{Y}_2	\bar{Y}_3	\bar{Y}_4	\bar{Y}_5	\bar{Y}_6	\bar{Y}_7	\bar{Y}_8	\bar{Y}_9
0	L	L	L	L	L	H	H	H	H	H	H	H	H	H
1	L	L	L	H	H	L	H	H	H	H	H	H	H	H
2	L	L	H	L	H	H	L	H	H	H	H	H	H	H
3	L	L	H	H	H	H	H	L	H	H	H	H	H	H
4	L	H	L	L	H	H	H	H	L	H	H	H	H	H
5	L	H	L	H	H	H	H	H	H	L	H	H	H	H
6	L	H	H	L	H	H	H	H	H	H	L	H	H	H
7	L	H	H	H	H	H	H	H	H	H	H	L	H	H
8	H	L	L	L	H	H	H	H	H	H	H	H	L	H
9	H	L	L	H	H	H	H	H	H	H	H	H	H	L
10	H	L	H	L	H	H	H	H	H	H	H	H	H	H
11	H	L	H	H	H	H	H	H	H	H	H	H	H	H
12	H	H	L	L	H	H	H	H	H	H	H	H	H	H
13	H	H	L	H	H	H	H	H	H	H	H	H	H	H
14	H	H	H	L	H	H	H	H	H	H	H	H	H	H
15	H	H	H	H	H	H	H	H	H	H	H	H	H	H

LOGIC DIAGRAM



This logic diagram has not be used to estimate propagation delays

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	± 25	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 50	mA
P_D	Power Dissipation	500(*)	mW
T_{stg}	Storage Temperature	-65 to +150	$^{\circ}C$
T_L	Lead Temperature (10 sec)	300	$^{\circ}C$

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

(*) 500mW at 65 $^{\circ}C$; derate to 300mW by 10mW/ $^{\circ}C$ from 65 $^{\circ}C$ to 85 $^{\circ}C$

M74HC42

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	
t_r t_f	Input Rise and Fall Time	$V_{CC} = 2.0V$	0 to 1000	ns
		$V_{CC} = 4.5V$	0 to 500	ns
		$V_{CC} = 6.0V$	0 to 400	ns

DC SPECIFICATIONS

Symbol	Parameter	Test Condition		Value						Unit	
				$T_A = 25^\circ C$			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
V_{IH}	High Level Input Voltage	V_{CC} (V)		1.5			1.5		1.5	V	
				3.15			3.15		3.15		
				4.2			4.2		4.2		
V_{IL}	Low Level Input Voltage	V_{CC} (V)				0.5		0.5		V	
						1.35		1.35			1.35
						1.8		1.8			1.8
V_{OH}	High Level Output Voltage	V_{CC} (V)	$I_O = -20 \mu A$	1.9	2.0		1.9		1.9	V	
				4.4	4.5		4.4		4.4		
				5.9	6.0		5.9		5.9		
				4.18	4.31		4.13		4.10		
				5.68	5.8		5.63		5.60		
V_{OL}	Low Level Output Voltage	V_{CC} (V)	$I_O = 20 \mu A$		0.0	0.1		0.1		V	
					0.0	0.1		0.1			0.1
					0.0	0.1		0.1			0.1
					0.17	0.26		0.33			0.40
					0.18	0.26		0.33			0.40
I_I	Input Leakage Current	6.0	$V_I = V_{CC}$ or GND			± 0.1		± 1		± 1	μA
I_{CC}	Quiescent Supply Current	6.0	$V_I = V_{CC}$ or GND			4		40		80	μA

AC ELECTRICAL CHARACTERISTICS ($C_L = 50$ pF, Input $t_r = t_f = 6$ ns)

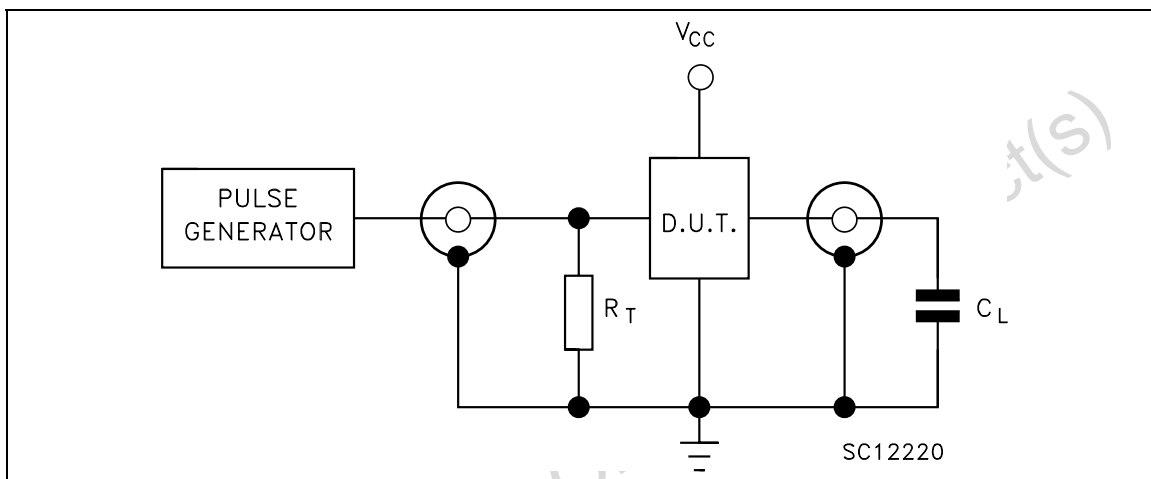
Symbol	Parameter	Test Condition		Value						Unit	
				$T_A = 25^\circ C$			-40 to 85°C		-55 to 125°C		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t_{TLH} t_{THL}	Output Transition Time	V_{CC} (V)			30	75		95		110	ns
					8	15		19		22	
					7	13		16		19	
t_{PLH} t_{PHL}	Propagation Delay Time	V_{CC} (V)			64	130		165		195	ns
					16	26		33		39	
					14	22		28		33	

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	10		10		10	pF
C _{PD}	Power Dissipation Capacitance (note 1)	5.0			60						pF

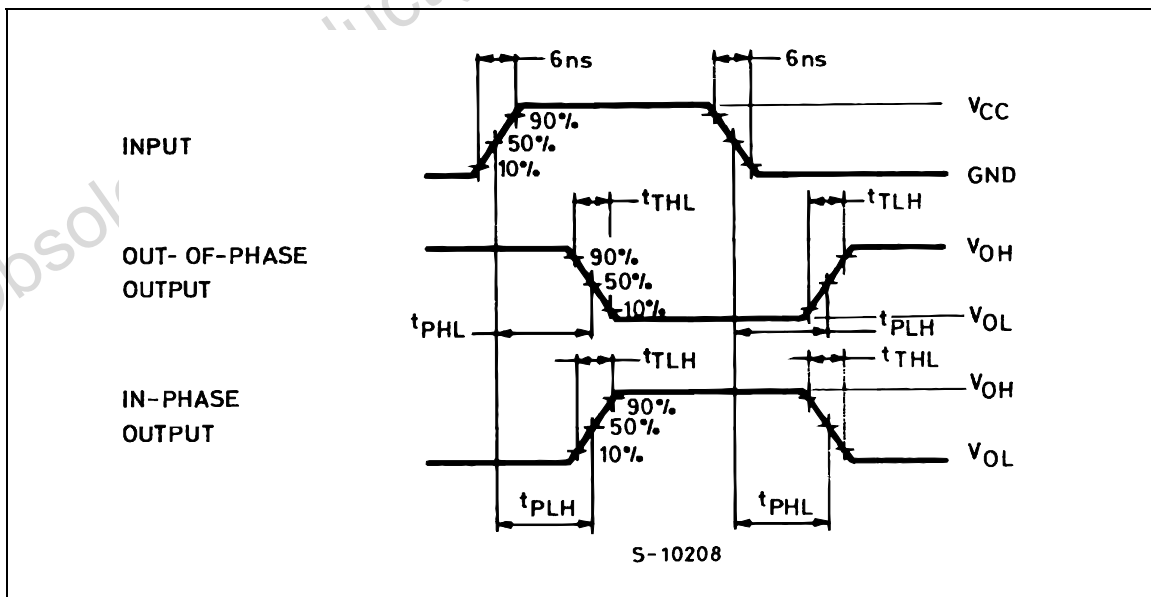
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}$

TEST CIRCUIT



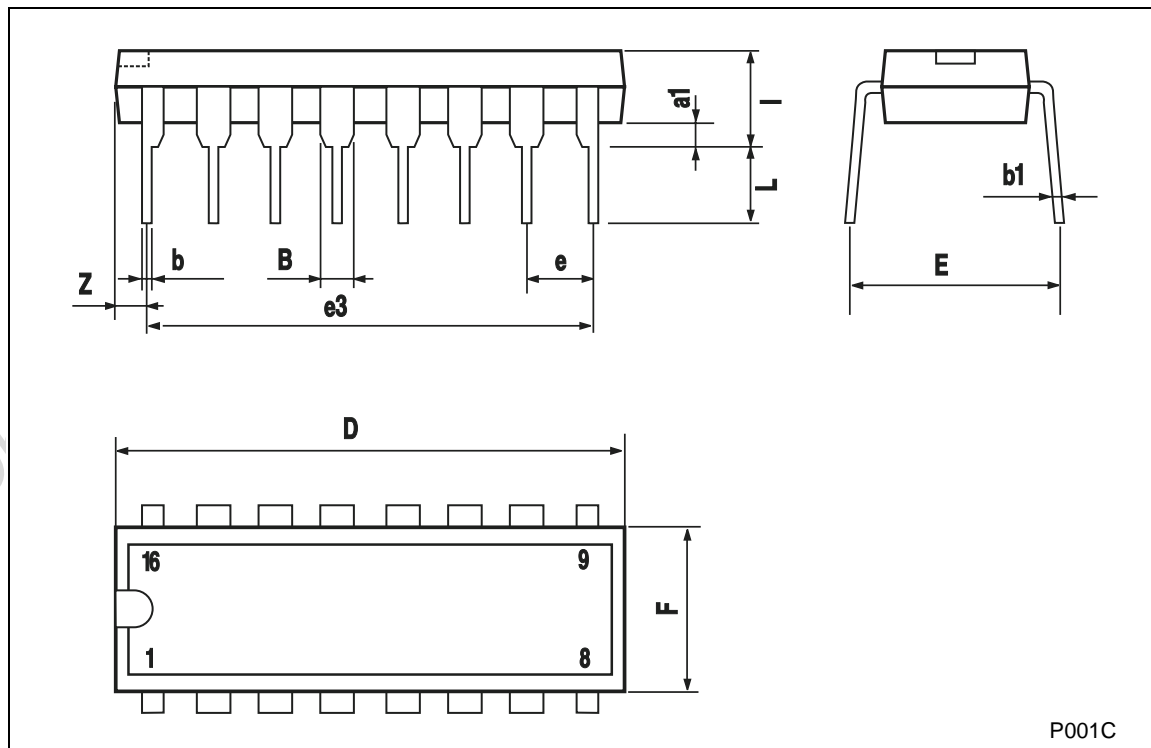
C_L = 50pF or equivalent (includes jig and probe capacitance)
 R_T = Z_{OUT} of pulse generator (typically 50Ω)

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



Plastic DIP-16 (0.25) MECHANICAL DATA

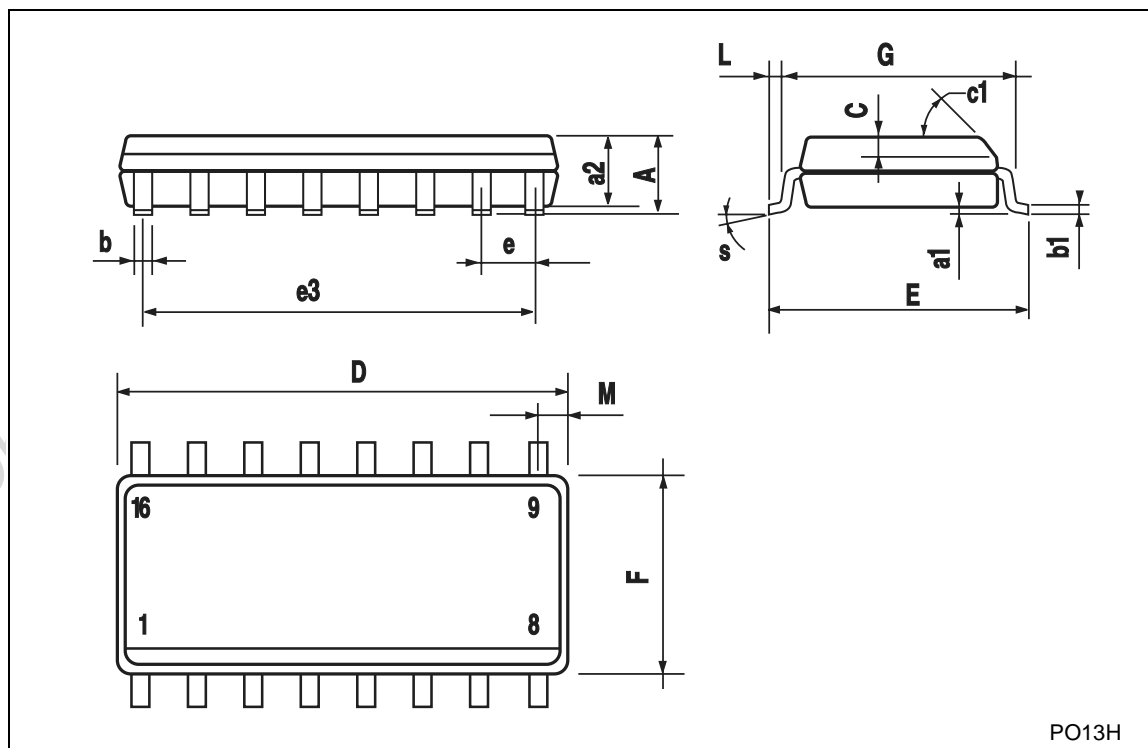
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

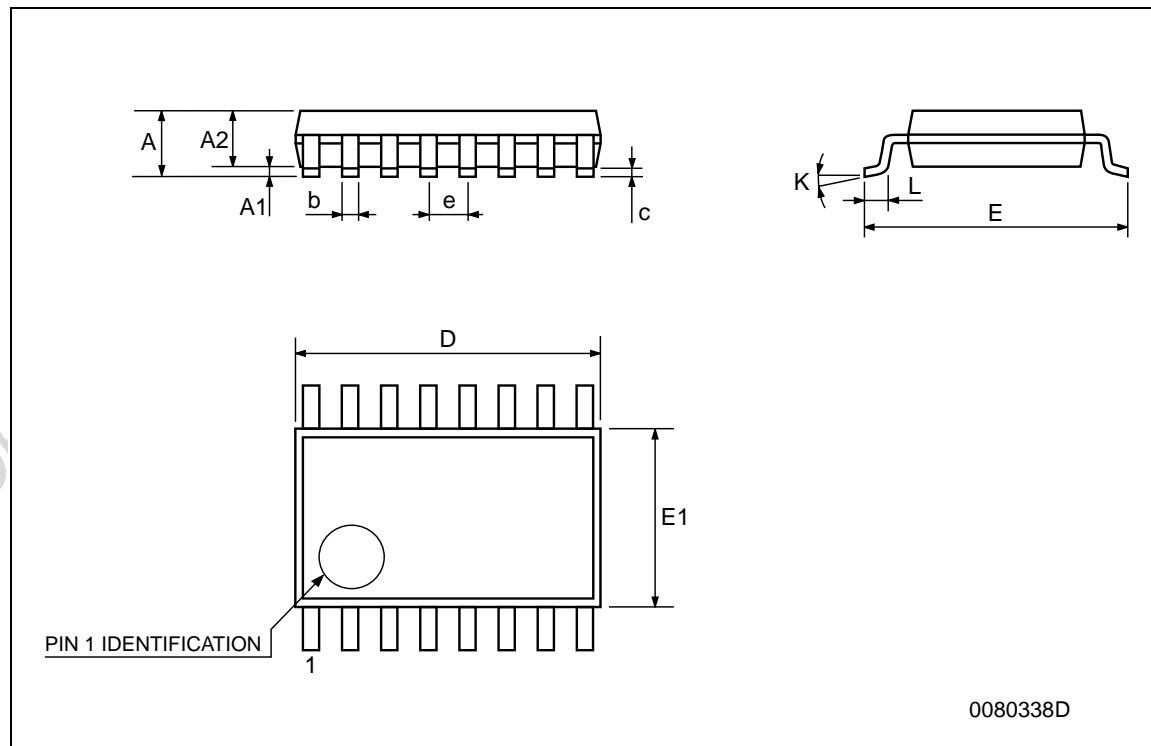
SO-16 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		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.)					



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



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