



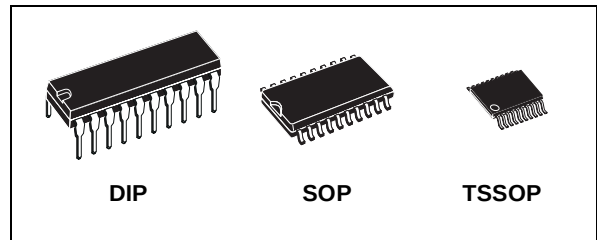
M74HCT240

OCTAL BUS BUFFER WITH 3 STATE OUTPUTS (INVERTED)

- HIGH SPEED:
 $t_{PD} = 15 \text{ ns (TYP.)}$ at $V_{CC} = 4.5V$
- LOW POWER DISSIPATION:
 $I_{CC} = 4\mu A(\text{MAX.})$ at $T_A = 25^\circ C$
- COMPATIBLE WITH TTL OUTPUTS :
 $V_{IH} = 2V (\text{MIN.})$ $V_{IL} = 0.8V (\text{MAX})$
- BALANCED PROPAGATION DELAYS:
 $t_{PLH} \cong t_{PHL}$
- SYMMETRICAL OUTPUT IMPEDANCE:
 $|I_{OH}| = I_{OL} = 6mA (\text{MIN})$
- PIN AND FUNCTION COMPATIBLE WITH
74 SERIES 240

DESCRIPTION

The 74HCT240 is an advanced high-speed CMOS OCTAL BUS BUFFER (3-STATE) fabricated with silicon gate C²MOS technology.
 $\overline{G}$ control input governs four BUS BUFFERS.

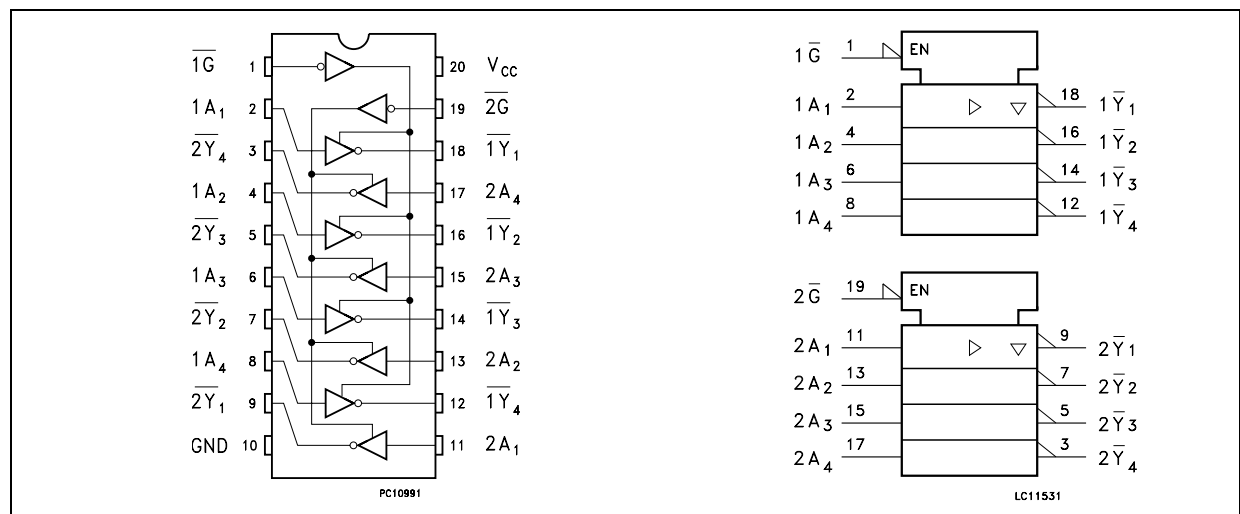


ORDER CODES

PACKAGE	TUBE	T & R
DIP	M74HCT240B1R	
SOP	M74HCT240M1R	M74HCT240RM13TR
TSSOP		M74HCT240TTR

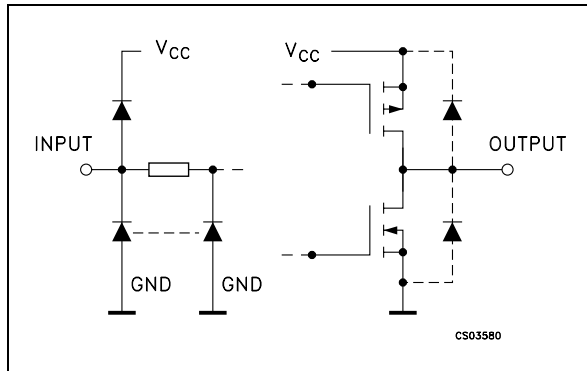
All inputs are equipped with protection circuits against static discharge and transient excess voltage.

PIN CONNECTION AND IEC LOGIC SYMBOLS



M74HCT240

INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1	$\overline{1G}$	Output Enable Input
2, 4, 6, 8	1A1 to 1A4	Data Inputs
9, 7, 5, 3	2Y1 to 2Y4	Data Outputs
11, 13, 15, 17	2A1 to 2A4	Data Inputs
18, 16, 14, 12	1Y1 to 1Y4	Data Outputs
19	$\overline{2G}$	Output Enable Input
10	GND	Ground (0V)
20	V _{CC}	Positive Supply Voltage

TRUTH TABLE

INPUTS		OUTPUT
$\overline{G}$	A _n	$\overline{Y_n}$
L	L	H
L	H	L
H	X	Z

X : Don't Care
Z : High Impedance

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	± 35	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current	± 70	mA
P _D	Power Dissipation	500(*)	mW
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.

(*) 500mW at 65 °C; derate to 300mW by 10mW/°C from 65°C to 85°C

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	4.5 to 5.5	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} = 4.5 to 5.5V)	0 to 500	ns

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	4.5 to 5.5		2.0			2.0		2.0		V
V _{IL}	Low Level Input Voltage	4.5 to 5.5				0.8		0.8		0.8	V
V _{OH}	High Level Output Voltage	4.5	I _O =-20 μA	4.4	4.5		4.4		4.4		V
			I _O =-6.0 mA	4.18	4.31		4.13		4.10		
V _{OL}	Low Level Output Voltage	4.5	I _O =20 μA		0.0	0.1		0.1		0.1	V
			I _O =6.0 mA		0.17	0.26		0.33		0.40	
I _I	Input Leakage Current	5.5	V _I = V _{CC} or GND			± 0.1		± 1		± 1	μA
I _{OZ}	High Impedance Output Leakage Current	5.5	V _I = V _{IH} or V _{IL} V _O = V _{CC} or GND			± 0.5		± 5		± 10	μA
I _{CC}	Quiescent Supply Current	5.5	V _I = V _{CC} or GND			4		40		80	μA
Δ I _{CC}	Additional Worst Case Supply Current	5.5	Per Input pin V _I = 0.5V or V _I = 2.4V Other Inputs at V _{CC} or GND			2.0		2.9		3.0	mA

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

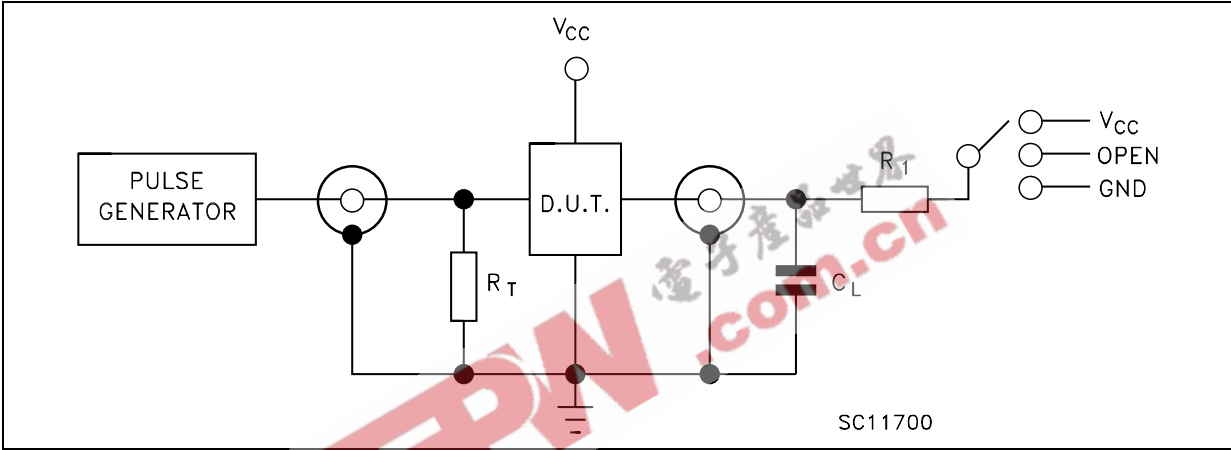
Symbol	Parameter	Test Condition			Value						Unit	
		V _{CC} (V)	C _L (pF)		T _A = 25°C			-40 to 85°C		-55 to 125°C		
					Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t _{TLH} t _{THL}	Output Transition Time	4.5	50			7	12		15		18	ns
t _{PLH} t _{PHL}	Propagation Delay Time	4.5	50			15	22		28		33	ns
		4.5	150			21	30		38		45	
t _{PZL} t _{PZH}	Output Enable Time	4.5	50	R _L = 1 KΩ		17	30		38		45	ns
		4.5	150			23	38		48		57	
t _{PLZ} t _{PHZ}	Output Disable Time	4.5	50	R _L = 1 KΩ		16	30		38		45	ns

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	10		10		10	pF
C _{OUT}	Output Capacitance				10						pF
C _{PD}	Power Dissipation Capacitance (note 1)				33						pF

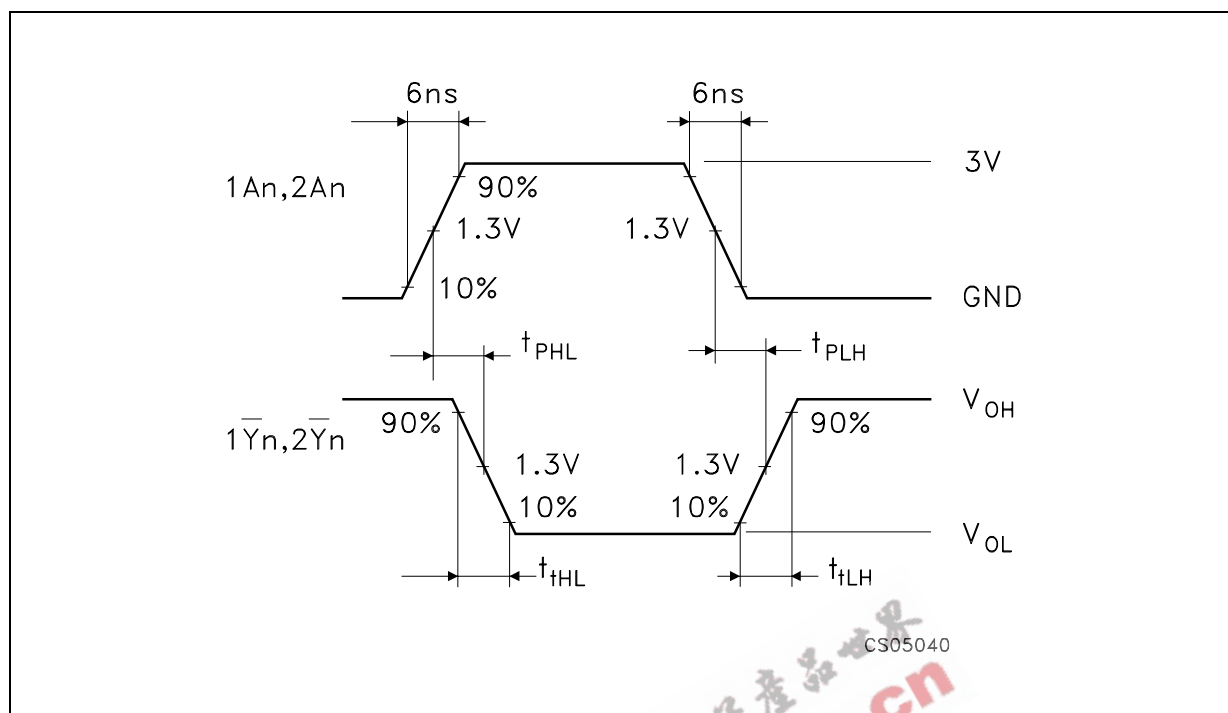
1) C_{PD} is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation. $I_{CC(opr)} = C_{PD} \times V_{CC} \times f_{IN} + I_{CC}/8$ (per circuit)

TEST CIRCUIT



TEST	SWITCH
t _{PLH} , t _{PHL}	Open
t _{PZL} , t _{PLZ}	V _{CC}
t _{PZH} , t _{PHZ}	GND

C_L = 50pF/150pF or equivalent (includes jig and probe capacitance)
R₁ = 1KΩ or equivalent
R_T = Z_{OUT} of pulse generator (typically 50Ω)



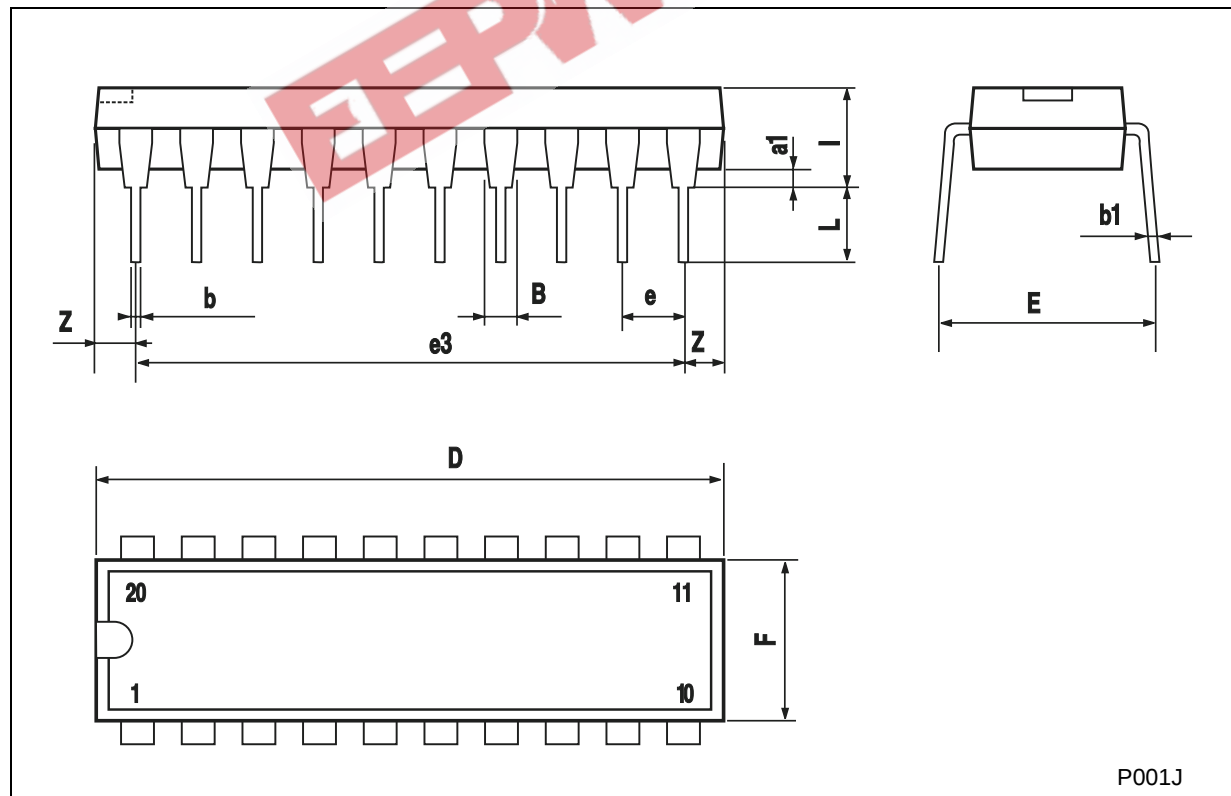
The timing diagram illustrates the relationship between the input signals, the output signal, and the clock signal for the CS04090 device. The signals are shown over two clock cycles, each with a 6 ns period.

- Input Signals:**
 - $1\bar{G}, 2\bar{G}$: A square wave signal that transitions from 3V to GND and back. The transition time is marked as 6 ns. The signal levels are 90% (1.3V) and 10% (1.3V).
 - $1\bar{Y}_n, 2\bar{Y}_n$: A square wave signal that transitions from GND to V_{OH} and back. The transition time is marked as 6 ns. The signal levels are 90% (1.3V) and 10% (1.3V).
 - $1\bar{Y}_n, 2\bar{Y}_n$: A square wave signal that transitions from V_{CC} to V_{OL} and back. The transition time is marked as 6 ns. The signal levels are 90% (1.3V) and 10% (1.3V).
- Output Signal:**
 - The output signal is shown as a square wave that transitions from V_{OH} to V_{OL} and back. The transition time is marked as 6 ns. The signal levels are 90% (1.3V) and 10% (1.3V).
 - The output signal is labeled V_{OH} and V_{OL} with a tolerance of $\pm 0.3V$.
- Timing Parameters:**
 - t_{PZH} : Propagation delay from the input signal $1\bar{G}, 2\bar{G}$ to the output signal V_{OH} .
 - t_{PHZ} : Propagation delay from the input signal $1\bar{G}, 2\bar{G}$ to the output signal V_{OL} .
 - t_{PZL} : Propagation delay from the input signal $1\bar{Y}_n, 2\bar{Y}_n$ to the output signal V_{OH} .
 - t_{PLZ} : Propagation delay from the input signal $1\bar{Y}_n, 2\bar{Y}_n$ to the output signal V_{OL} .

CS04090

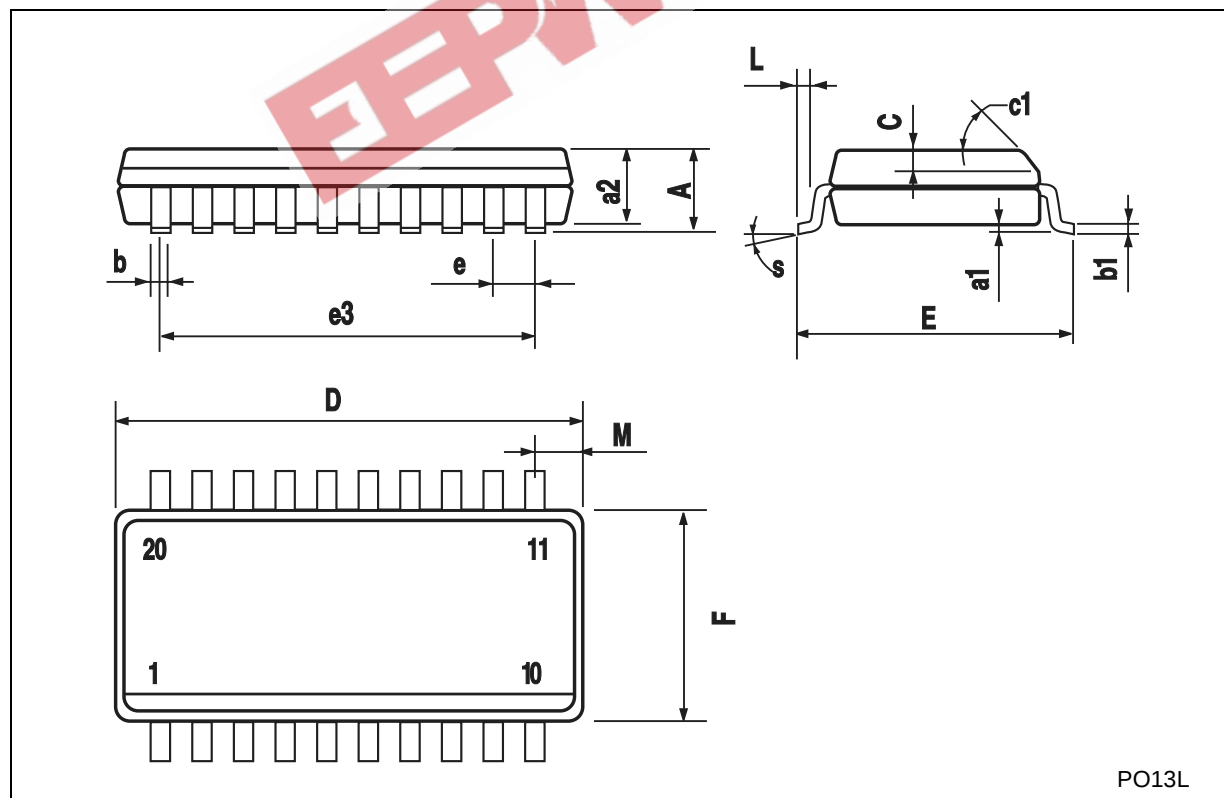
Plastic DIP-20 (0.25) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
a1	0.254			0.010		
B	1.39		1.65	0.055		0.065
b		0.45			0.018	
b1		0.25			0.010	
D			25.4			1.000
E		8.5			0.335	
e		2.54			0.100	
e3		22.86			0.900	
F			7.1			0.280
I			3.93			0.155
L		3.3			0.130	
Z			1.34			0.053



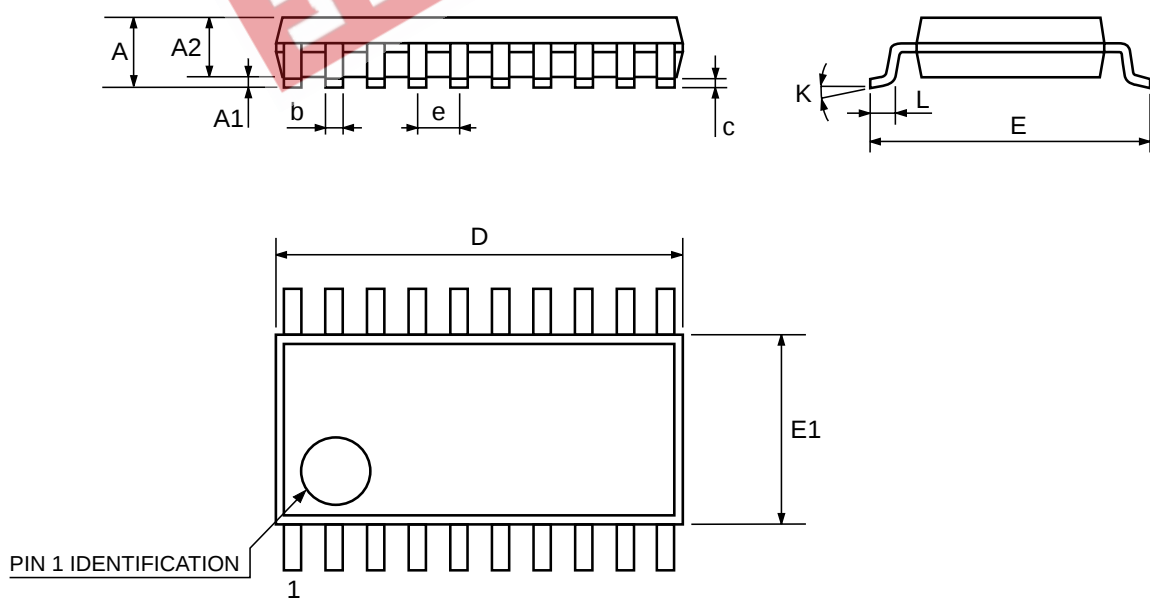
SO-20 MECHANICAL DATA

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	12.60		13.00	0.496		0.512
E	10.00		10.65	0.393		0.419
e		1.27			0.050	
e3		11.43			0.450	
F	7.40		7.60	0.291		0.300
L	0.50		1.27	0.020		0.050
M			0.75			0.029
S	8° (max.)					



TSSOP20 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	6.4	6.5	6.6	0.252	0.256	0.260
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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