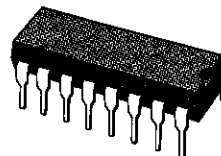
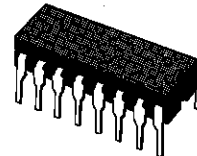


3 TO 8 LINE DECODER/LATCH

- **HIGH SPEED**
 $t_{PD} = 22 \text{ ns (TYP.) AT } V_{CC} = 5 \text{ V}$
- **LOW POWER DISSIPATION**
 $I_{CC} = 4 \mu\text{A (MAX.) at } T_A = 25^\circ\text{C}$
- **HIGH NOISE IMMUNITY**
 $V_{NIH} = V_{NIL} = 28 \% V_{CC} \text{ (MIN.)}$
- **OUTPUT DRIVE CAPABILITY**
10 LSTTL LOADS
- **SYMMETRICAL OUTPUT IMPEDANCE**
 $|I_{OH}| = I_{OL} = 4 \text{ mA (MIN.)}$
- **BALANCED PROPAGATION DELAYS**
 $t_{PLH} = t_{PHL}$
- **WIDE OPERATING VOLTAGE RANGE**
 $V_{CC(OPR)} = 2 \text{ V to } 6 \text{ V}$
- **PIN AND FUNCTION COMPATIBLE WITH**
54/74LS131



B1R
(Plastic Package)



F1R
(Ceramic Package)



M1R
(Micro Package)



C1R
(Chip Carrier)

ORDER CODES :

M54HC131F1R
M74HC131B1R

M74HC131M1R
M74HC131C1R

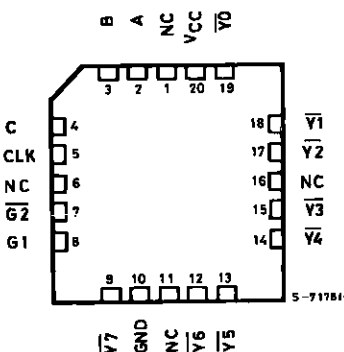
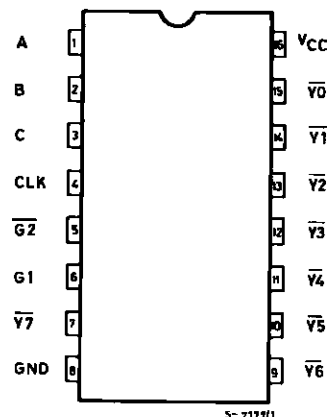
DESCRIPTION

The M54/74HC131 is a high speed CMOS 3 TO 8 LINE DECODER/LATCH fabricated in silicon gate C2MOS technology.

It has the same high speed performance of LSTTL combined with true CMOS low power consumption. This device is a DECODER/LATCH capable of selecting arbitrarily one of eight outputs by three binary inputs A, B, and C, in this case, the selected output is at logic "low".

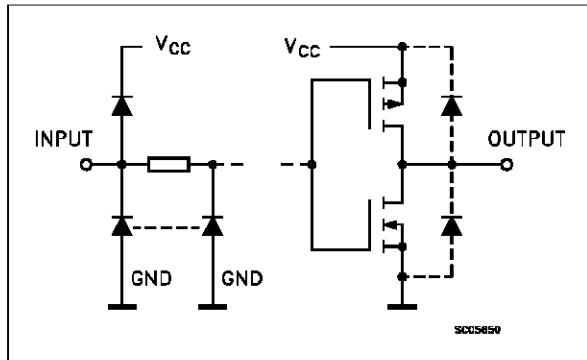
Also, when ENABLE input G1 is set low or ENABLE input $\overline{G2}$ is set high, selection is inhibited regardless of other input signals and all the outputs are at high. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

PIN CONNECTIONS (top view)



NC =
No Internal
Connection

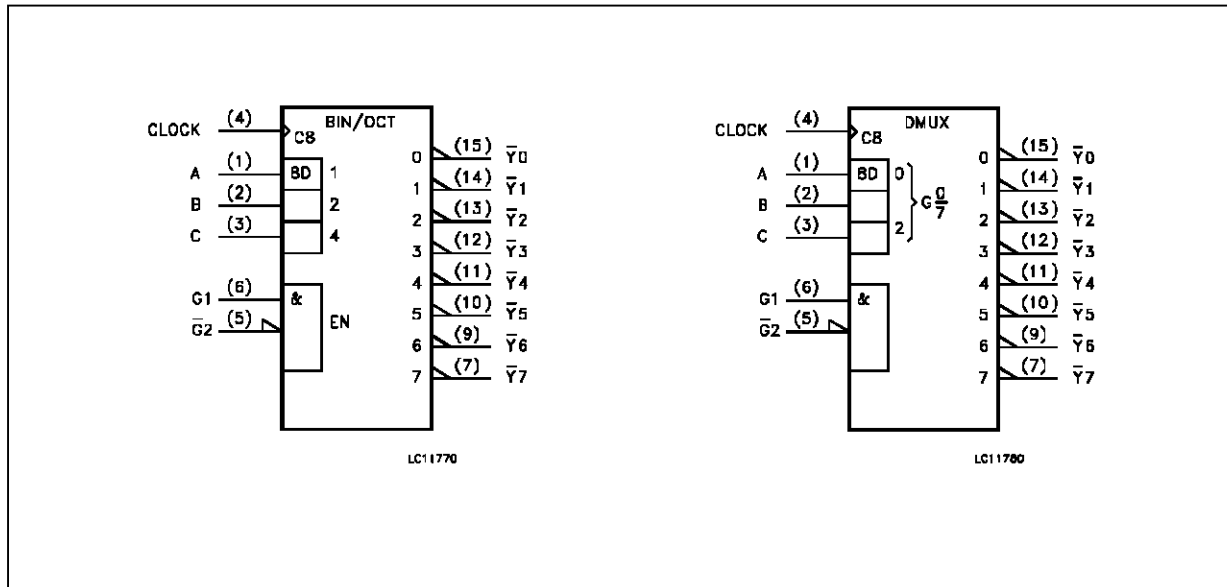
INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1, 2, 3	A, B, C	Data Inputs
4	CLK	Clock Input (LOW to HIGH, Edge-triggered)
5	$\overline{G2}$	Enable (Active LOW)
6	G1	Enable (Active HIGH)
9, 10, 11, 12, 13, 14, 15, 7	$\overline{Y0}, \overline{Y1}, \overline{Y2}, \overline{Y3}, \overline{Y4}, \overline{Y5}, \overline{Y6}, \overline{Y7}$	Data Outputs
8	GND	Ground (0V)
16	V _{CC}	Positive Supply Voltage

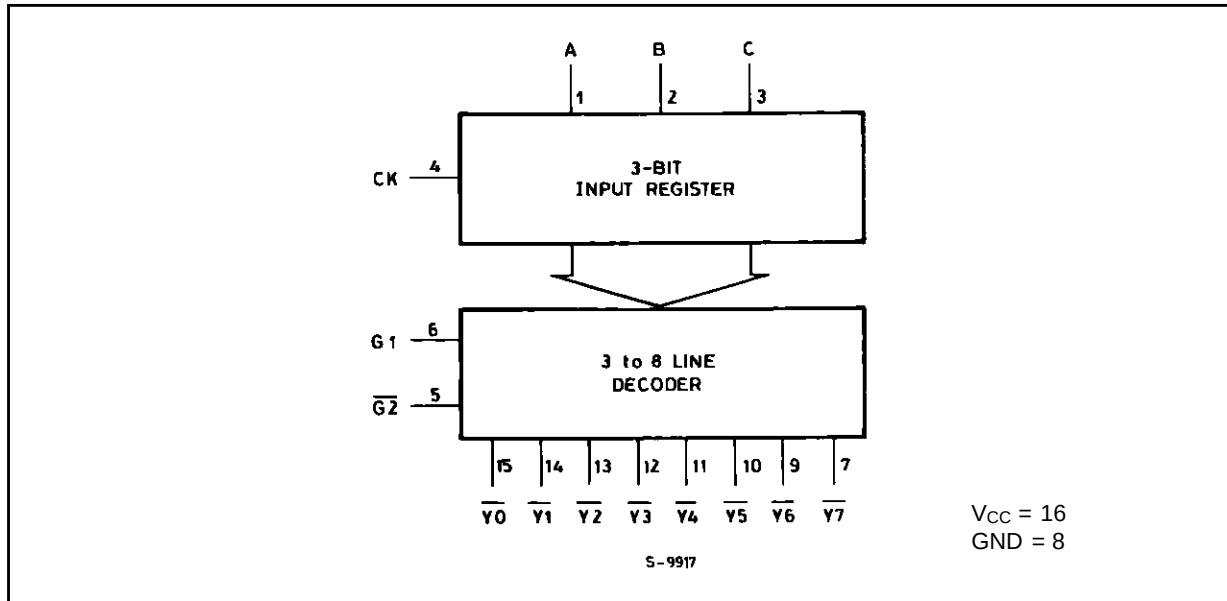
IEC LOGIC SYMBOL



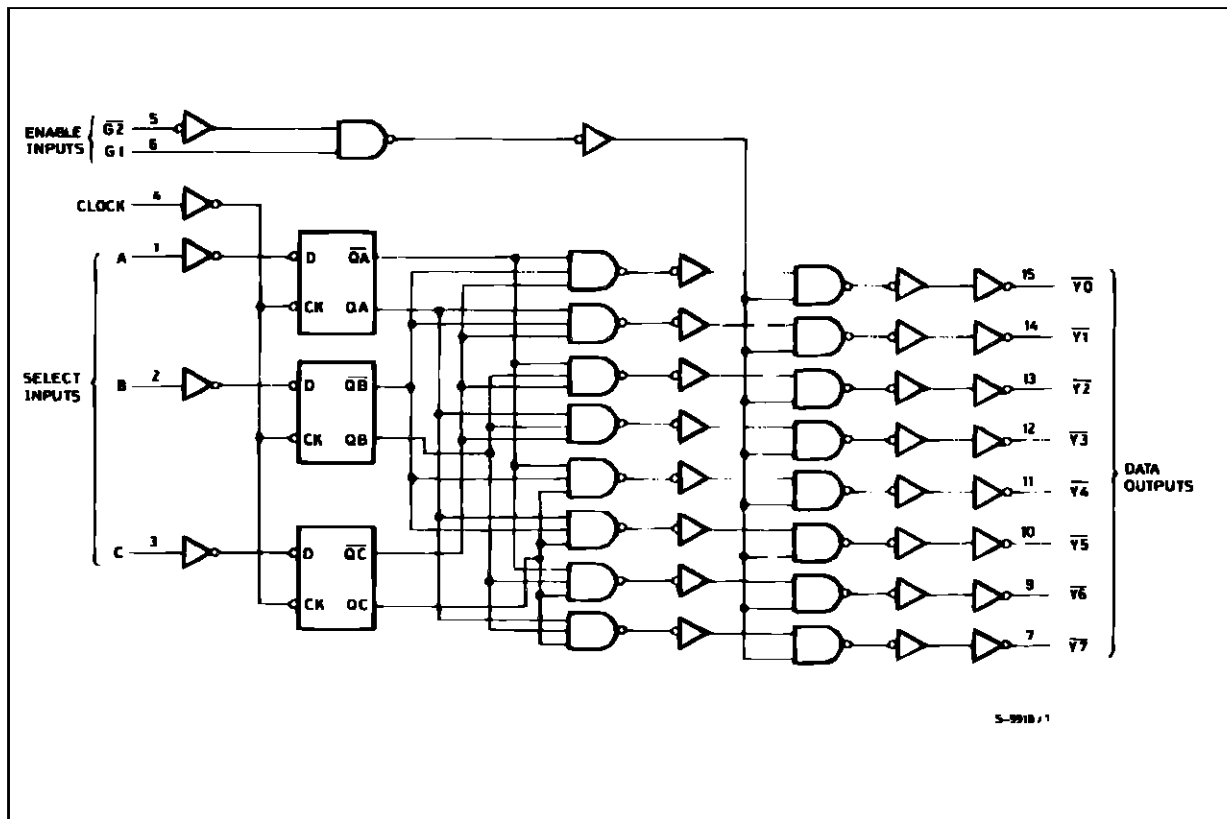
TRUTH TABLE

INPUTS						OUTPUTS							
CLK	ENABLE		SELECT										
	G1	$\overline{G2}$	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	X	H	X	X	X	H	H	H	H	H	H	H	H
X	L	X	X	X	X	H	H	H	H	H	H	H	H
	H	L	L	L	L	L	H	H	H	H	H	H	H
	H	L	L	L	H	H	L	H	H	H	H	H	H
	H	L	L	H	L	H	H	L	H	H	H	H	H
	H	L	L	H	H	H	H	H	L	H	H	H	H
	H	L	H	L	L	H	H	H	H	L	H	H	H
	H	L	H	L	H	H	H	H	H	H	L	H	H
	H	L	H	H	L	H	H	H	H	H	H	L	H
	H	L	H	H	H	H	H	H	H	H	H	H	L
L	H	L	X	X	X	Outputs corresponding to stored address L: all others H							

BLOCK DIAGRAM



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 Source Sink Current Per Output Pin	± 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	°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 condition is not implied.

(*) 500 mW: ≡ 65 °C derate to 300 mW by 10mW/°C: 65 °C to 85 °C

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: M54HC Series M74HC Series		-55 to +125 -40 to +85	°C °C
t _r , t _f	Input Rise and Fall Time	V _{CC} = 2 V	0 to 1000	ns
		V _{CC} = 4.5 V	0 to 500	
		V _{CC} = 6 V	0 to 400	

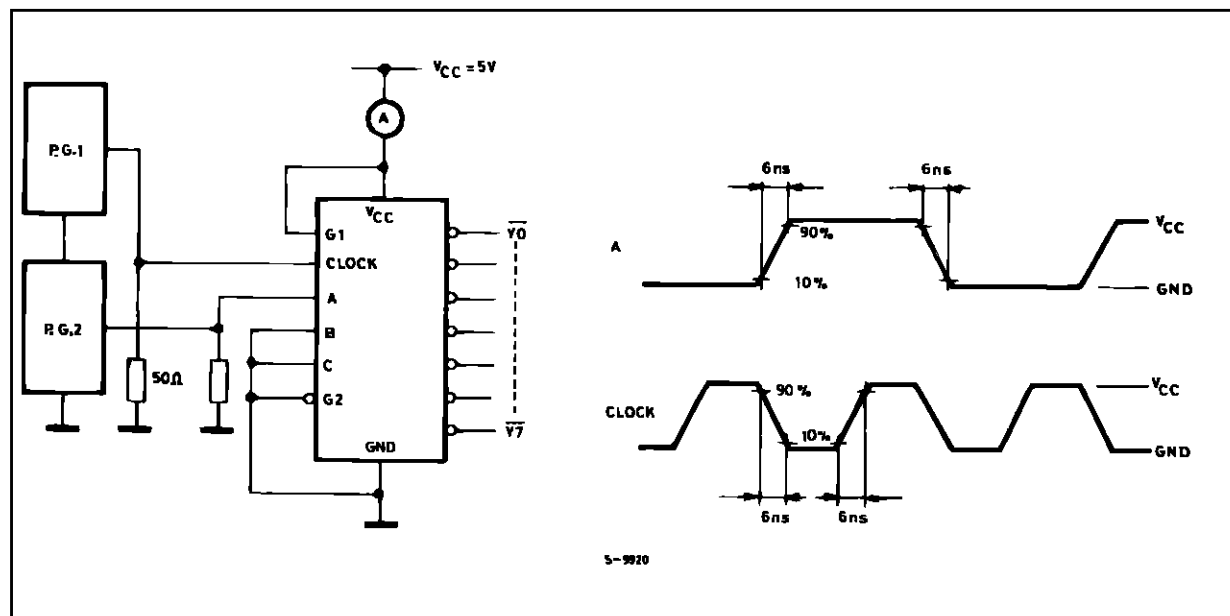
DC SPECIFICATIONS

Symbol	Parameter	Test Conditions			Value						Unit	
		V _{CC} (V)		T _A = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC			
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.		
V _{IH}	High Level Input Voltage	2.0		1.5			1.5		1.5		V	
		4.5		3.15			3.15		3.15			
		6.0		4.2			4.2		4.2			
V _{IL}	Low Level Input Voltage	2.0				0.5		0.5		0.5	V	
		4.5				1.35		1.35		1.35		
		6.0				1.8		1.8		1.8		
V _{OH}	High Level Output Voltage	2.0	V _I = V _{IH} or V _{IL}	I _O =-20 µA	1.9	2.0		1.9		1.9	V	
		4.5			4.4	4.5		4.4		4.4		
		6.0			5.9	6.0		5.9		5.9		
		4.5		I _O =-4.0 mA	4.18	4.31		4.13		4.10		
		6.0		I _O =-5.2 mA	5.68	5.8		5.63		5.60		
V _{OL}	Low Level Output Voltage	2.0	V _I = V _{IH} or V _{IL}	I _O = 20 µA		0.0	0.1		0.1		V	
		4.5				0.0	0.1		0.1			
		6.0				0.0	0.1		0.1			
		4.5		I _O = 4.0 mA		0.17	0.26		0.33			0.40
		6.0		I _O = 5.2 mA		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 ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

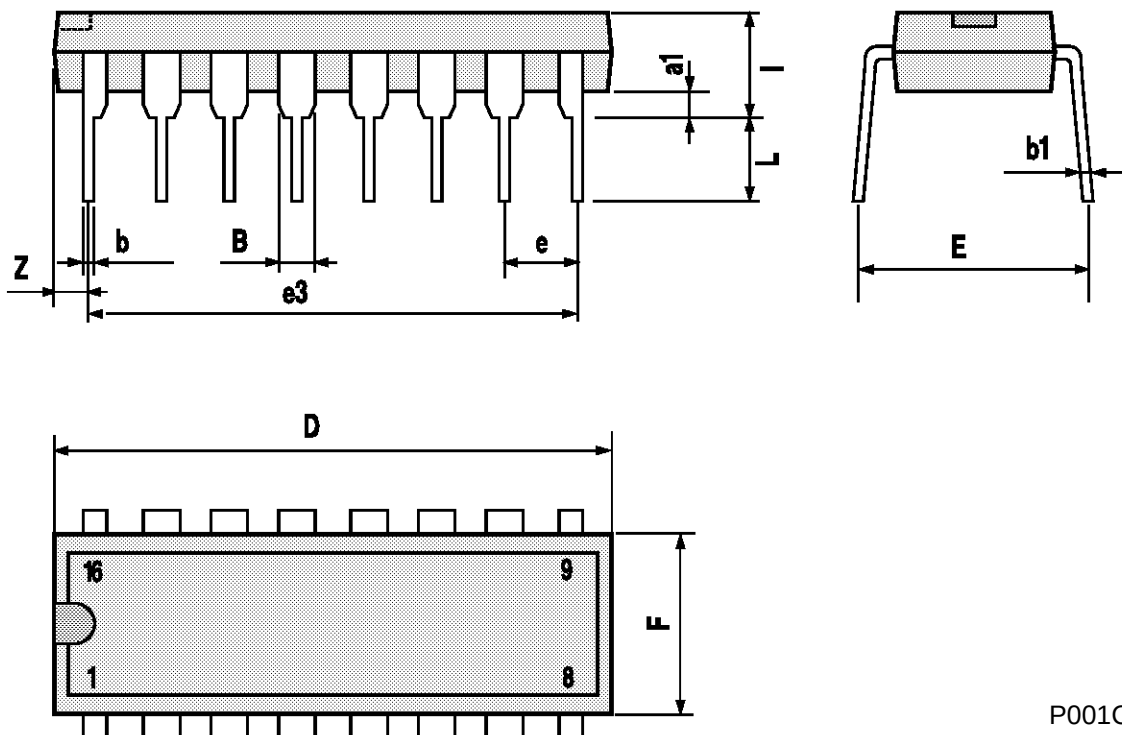
Symbol	Parameter	Test Conditions		Value						Unit	
		V _{CC} (V)		T _A = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t _{TLH} t _{THL}	Output Transition Time	2.0			30	75		95		110	ns
		4.5			8	15		19		22	
		6.0			7	13		16		19	
t _{PLH} t _{PHL}	Propagation Delay Time (CLOCK - $\bar{Y}_n$)	2.0			78	200		250		300	ns
		4.5			26	40		50		60	
		6.0			22	34		43		51	
t _{PLH} t _{PHL}	Propagation Delay Time (G - $\bar{Y}_n$)	2.0			60	140		175		210	ns
		4.5			15	28		35		42	
		6.0			13	24		30		36	
t _{W(H)} t _{W(L)}	Minimum Pulse Width (CLOCK)	2.0			20	75		95		110	ns
		4.5			6	15		19		22	
		6.0			6	13		16		19	
t _s	Minimum Set-up Time	2.0			25	50		65		75	ns
		4.5			5	10		13		15	
		6.0			5	9		11		13	
t _h	Minimum Hold Time	2.0				0		0		0	ns
		4.5				0		0		0	
		6.0				0		0		0	
C _{IN}	Input Capacitance				5	10		10		10	pF
C _{PD} (*)	Power Dissipation Capacitance				37						pF

(*) 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. $I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}$

SWITCHING CHARACTERISTICS TEST CIRCUIT
INPUT WAVEFORM


Plastic DIP16 (0.25) MECHANICAL DATA

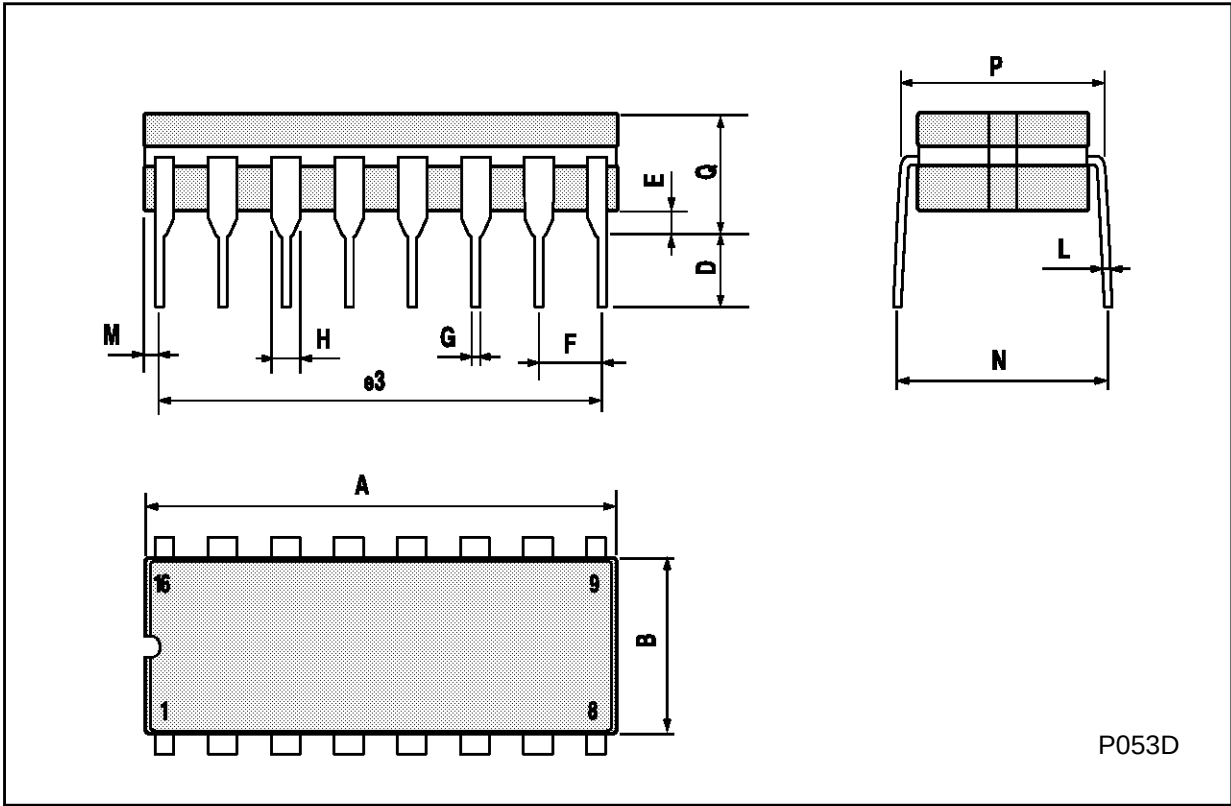
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



P001C

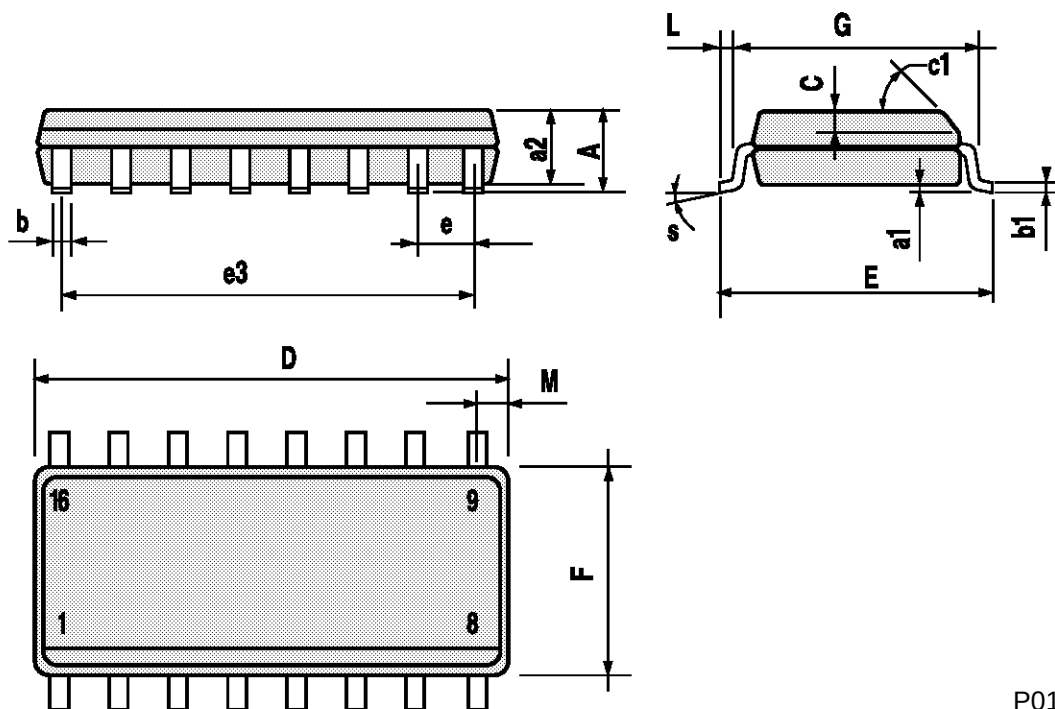
Ceramic DIP16/1 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			20			0.787
B			7			0.276
D		3.3			0.130	
E	0.38			0.015		
e3		17.78			0.700	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
H	1.17		1.52	0.046		0.060
L	0.22		0.31	0.009		0.012
M	0.51		1.27	0.020		0.050
N			10.3			0.406
P	7.8		8.05	0.307		0.317
Q			5.08			0.200



SO16 (Narrow) MECHANICAL DATA

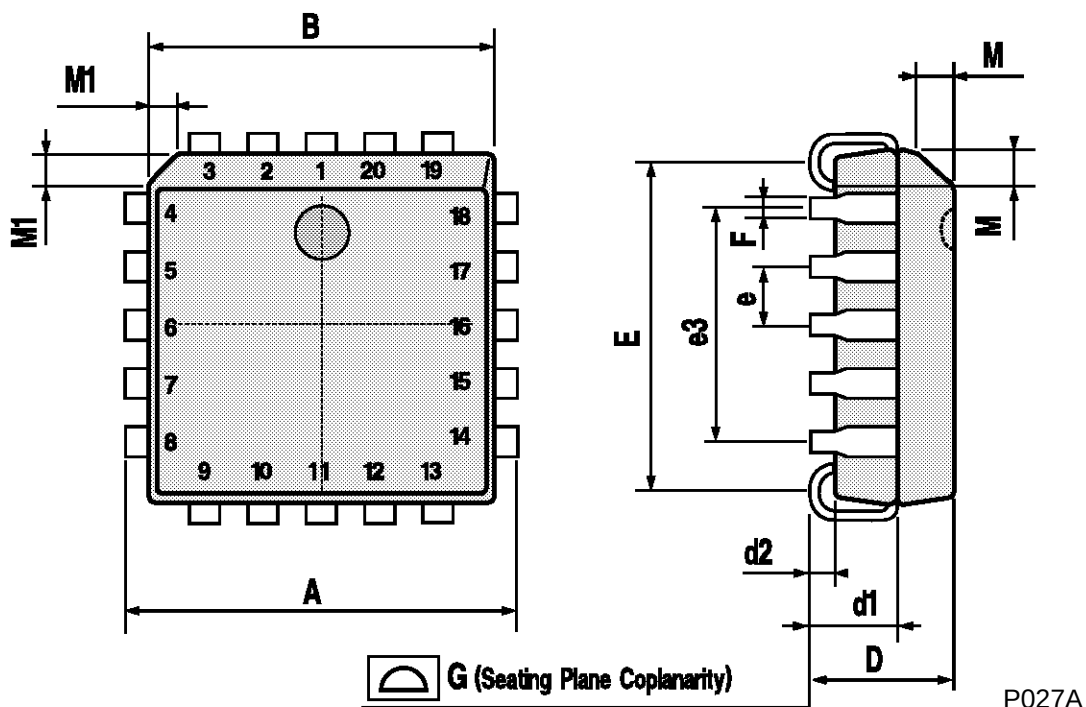
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.004		0.007
a2			1.65			0.064
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157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

PLCC20 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	9.78		10.03	0.385		0.395
B	8.89		9.04	0.350		0.356
D	4.2		4.57	0.165		0.180
d1		2.54			0.100	
d2		0.56			0.022	
E	7.37		8.38	0.290		0.330
e		1.27			0.050	
e3		5.08			0.200	
F		0.38			0.015	
G			0.101			0.004
M		1.27			0.050	
M1		1.14			0.045	



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