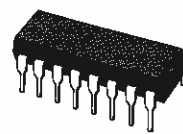




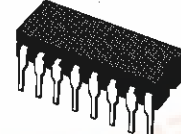
M54HC283
M74HC283

4 BIT BINARY FULL ADDER

- HIGH SPEED
 $t_{PD} = 17 \text{ ns (TYP.) AT } V_{CC} = 5 \text{ V}$
- LOW POWER DISSIPATION
 $I_{CC} = 4 \mu\text{A (MAX.) AT } 25^\circ\text{C}$
- 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
 $V_{CC} \text{ (OPR)} = 2 \text{ V TO } 6 \text{ V}$
- FULL-CARRY LOOK-AHEAD ACROSS THE FOUR BITS
- PARTIAL LOOK-AHEAD WITH THE ECONOMY OF RIPPY CARRY
- PIN AND FUNCTION COMPATIBLE WITH 54/74LS283



B1R
(Plastic Package)



F1R
(Ceramic Package)



M1R
(Micro Package)



C1R
(Chip Carrier)

ORDER CODES :

M54HC283F1R	M74HC283M1R
M74HC283B1R	M74HC283C1R

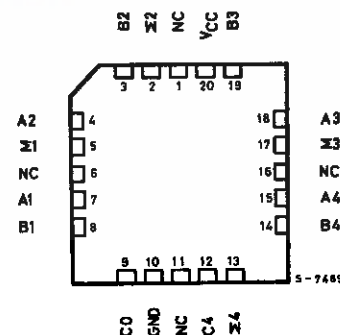
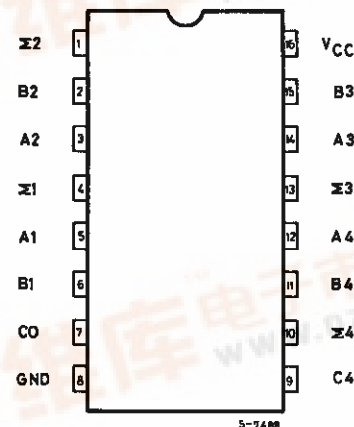
DESCRIPTION

The M54/74HC283 is a high speed CMOS 4-BIT BINARY FULL ADDER fabricated in silicon gate C²MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption.

Sum (Σ) outputs are provided for each bit and a resultant carry (C4) is obtained from the fourth bit. This adder features full internal look ahead across all four bits. A 4 x n binary adder is easily built up by cascading without any additional logic.

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

PIN CONNECTIONS (top view)



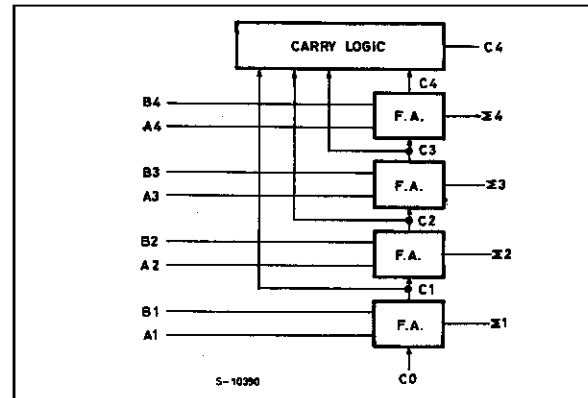
NC =
No Internal
Connection

M54/M74HC283

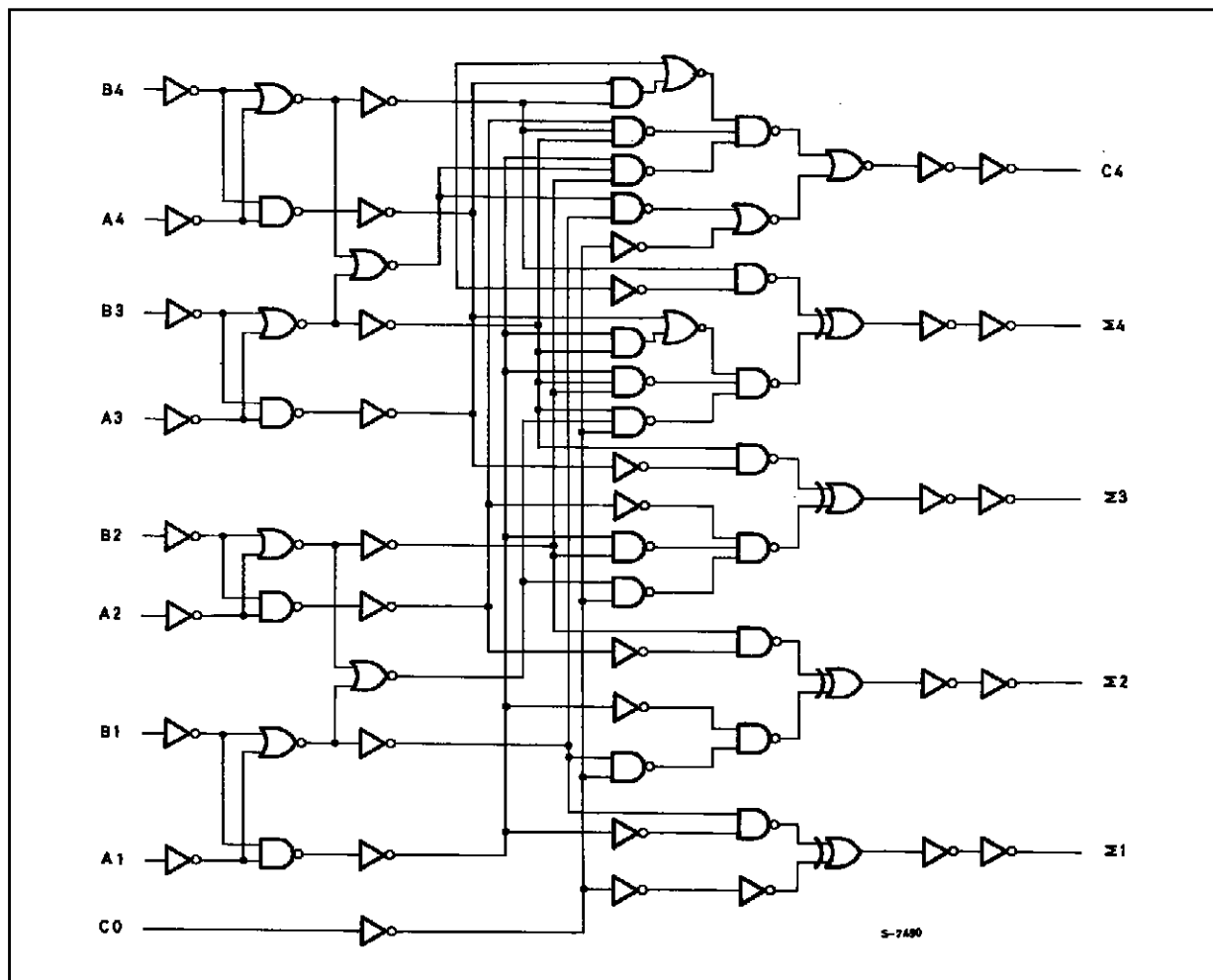
TRUTH TABLE (1 bit)

INPUTS			OUTPUTS	
B _n	A _n	C _{n-1}	Σ _n	C _n
L	L	L	L	L
L	L	H	H	L
L	H	L	H	L
L	H	H	L	H
H	L	L	H	L
H	L	H	L	H
H	H	L	L	H
H	H	H	H	H

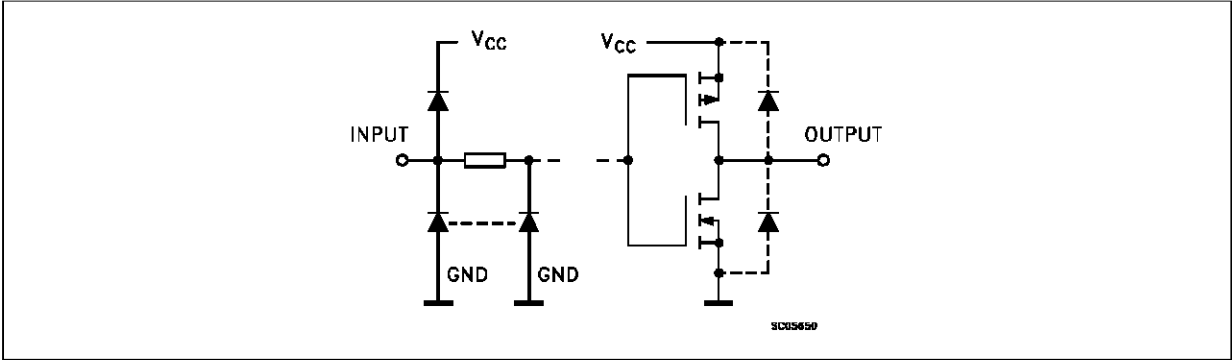
BLOCK DIAGRAM



LOGIC DIAGRAM



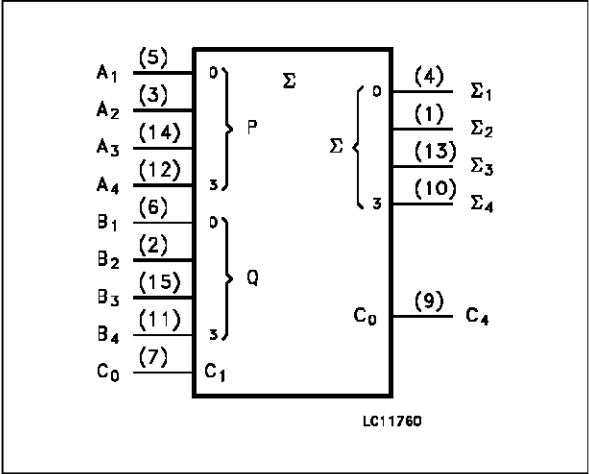
INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
4, 1, 13, 10	$\Sigma 1$ to $\Sigma 4$	Sum Outputs
5, 3, 14, 12	A1 to A4	A Operand Inputs
6, 2, 15, 11	B1 to B4	B Operand Inputs
7	C0	Carry Input
9	C4	Carry Output
8	GND	Ground (0V)
16	VCC	Positive Supply Voltage

IEC LOGIC SYMBOL



ABSOLUTE MAXIMUM RATING

Symbol	Parameter	Value	Unit
VCC	Supply Voltage	-0.5 to +7	V
VI	DC Input Voltage	-0.5 to VCC + 0.5	V
VO	DC Output Voltage	-0.5 to VCC + 0.5	V
IIK	DC Input Diode Current	± 20	mA
IOK	DC Output Diode Current	± 20	mA
IO	DC Output Source Sink Current Per Output Pin	± 25	mA
ICC or IGND	DC VCC or Ground Current	± 50	mA
PD	Power Dissipation	500 (*)	mW
Tstg	Storage Temperature	-65 to +150	°C
TL	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: $\pm 65^{\circ}\text{C}$ derate to 300 mW by 10mW/°C: 65°C to 85°C

M54/M74HC283

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	ns
		V _{CC} = 4.5 V	
		V _{CC} = 6 V	

DC SPECIFICATIONS

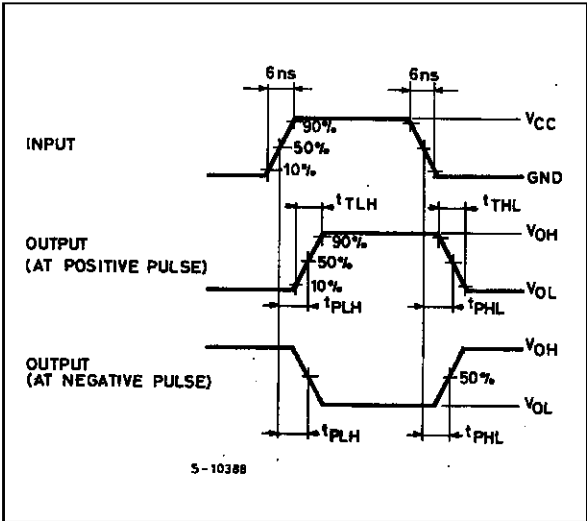
Symbol	Parameter	Test Conditions		Value								Unit
		V _{CC} (V)		T _A = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC			
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.		
V _{IH}	High Level Input Voltage	2.0		1.5			1.5		1.5		V	
		4.5		3.15			3.15		3.15			
		6.0		4.2			4.2		4.2			
V _{IL}	Low Level 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		0.1	V
		4.5				0.0	0.1		0.1		0.1	
		6.0				0.0	0.1		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 pF, Input t_r = t_f = 6 ns)

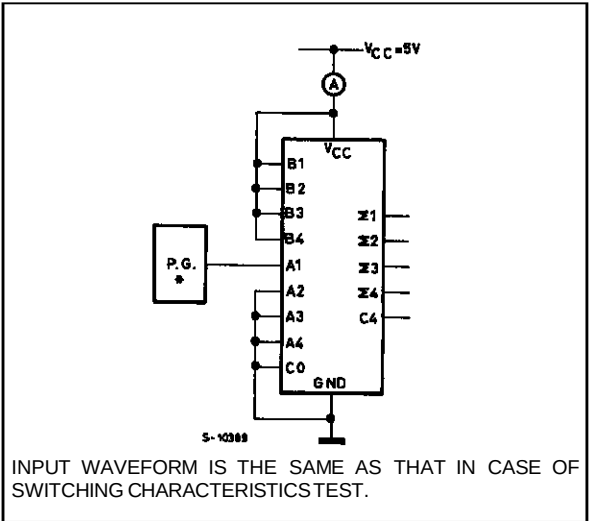
Symbol	Parameter	Test Conditions		Value						Unit	
		V _{CC} (V)		T _A = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t _{TLH} t _{THL}	Output Transition Time	2.0			30	75		95		110	ns
		4.5			8	15		19		22	
		6.0			7	13		16		19	
t _{PLH} t _{PHL}	Propagation Delay Time (A _n , B _n - Σ _n)	2.0			95	210		265		315	ns
		4.5			27	42		53		63	
		6.0			22	36		45		54	
t _{PLH} t _{PHL}	Propagation Delay Time (A _n , B _n - C ₄)	2.0			80	195		245		295	ns
		4.5			25	39		49		59	
		6.0			20	33		42		50	
t _{PLH} t _{PHL}	Propagation Delay Time (C ₀ - Σ _n)	2.0			60	150		190		225	ns
		4.5			20	30		38		45	
		6.0			17	26		32		38	
t _{PLH} t _{PHL}	Propagation Delay Time (C ₀ - C ₄)	2.0			60	150		190		225	ns
		4.5			20	30		38		45	
		6.0			17	26		32		38	
C _{IN}	Input Capacitance				5	10		10		10	pF
C _{PD} (*)	Power Dissipation Capacitance				126						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} • V_{CC} • f_{IN} + I_{CC}

SWITCHING CHARACTERISTICS
TEST WAVEFORM



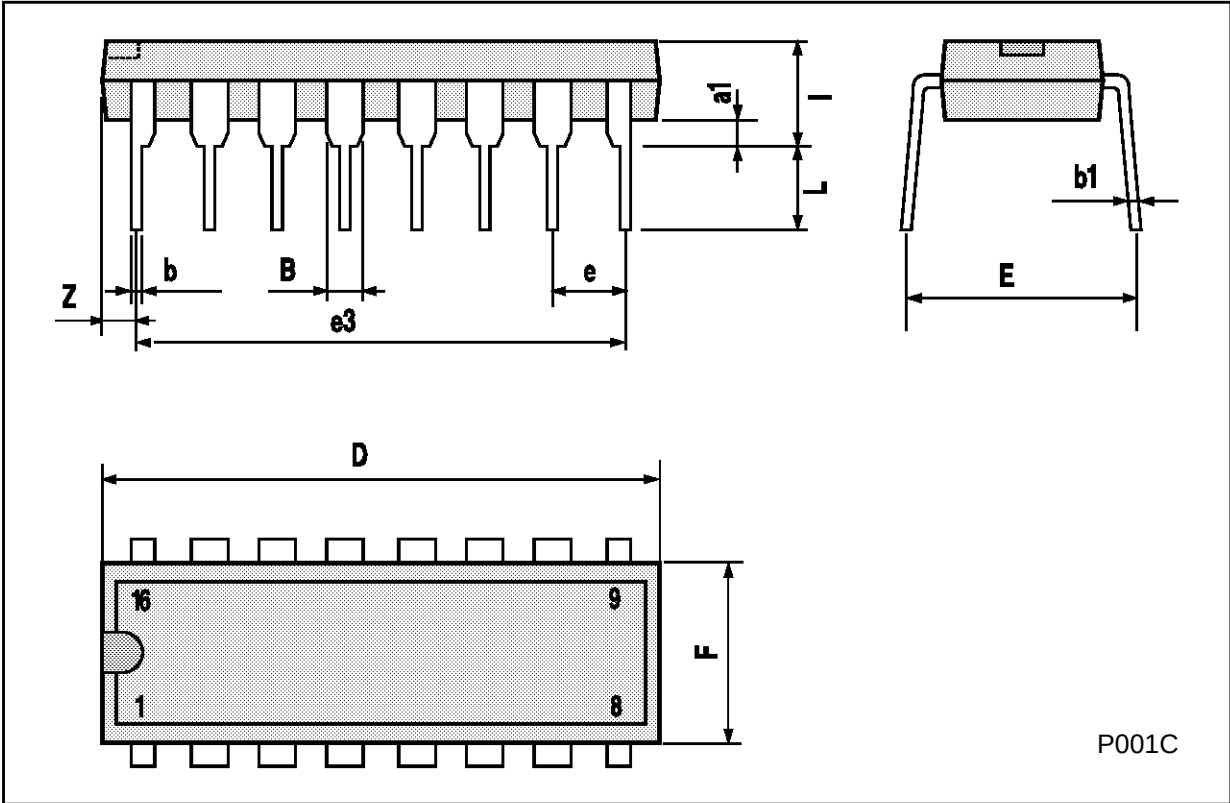
TEST CIRCUIT I_{CC} (Opr.)



INPUT WAVEFORM IS THE SAME AS THAT IN CASE OF SWITCHING CHARACTERISTIC TEST.

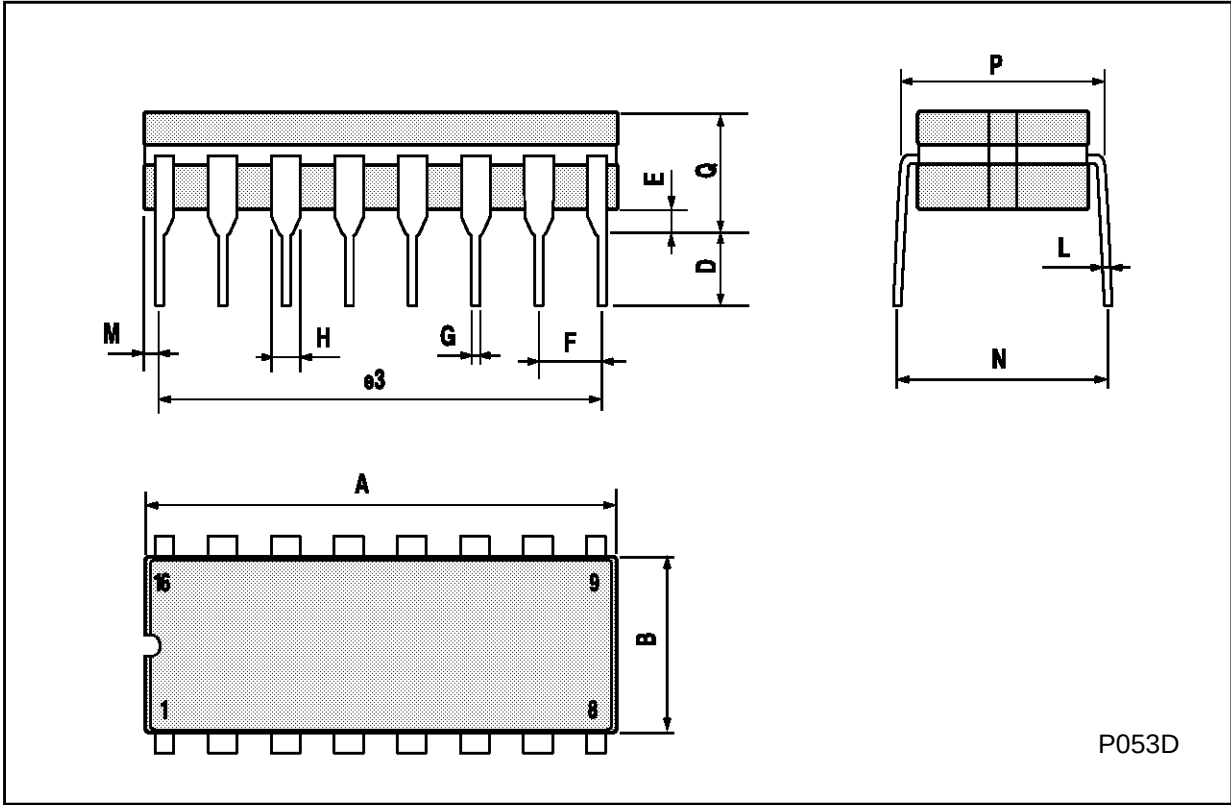
Plastic DIP16 (0.25) MECHANICAL DATA

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



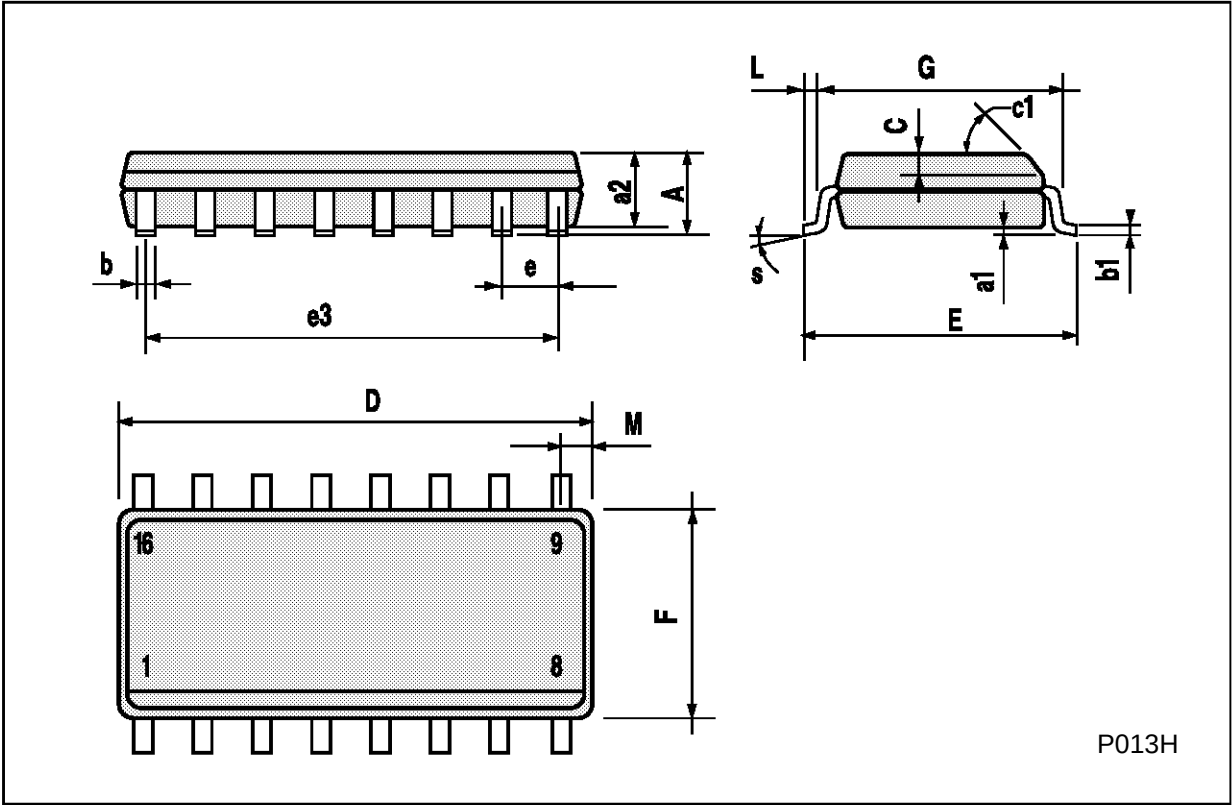
Ceramic DIP16/1 MECHANICAL DATA

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



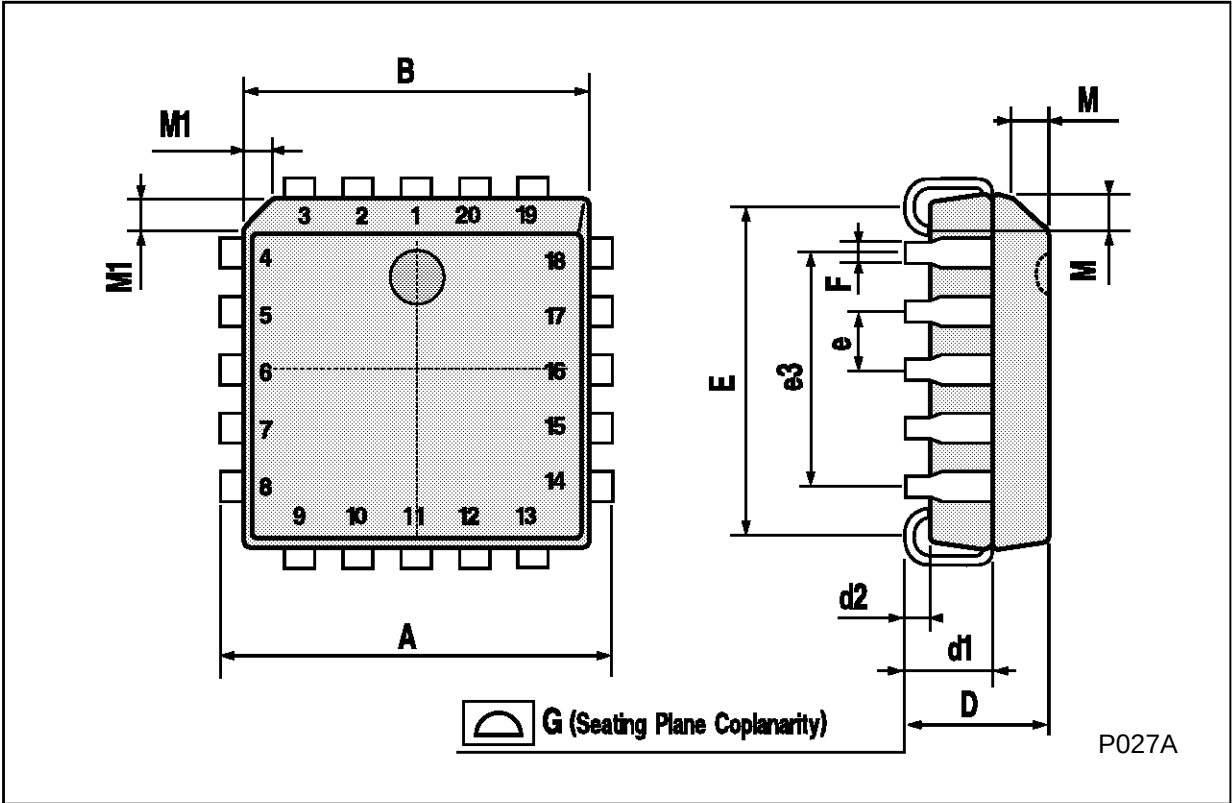
SO16 (Narrow) MECHANICAL DATA

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.)					



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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