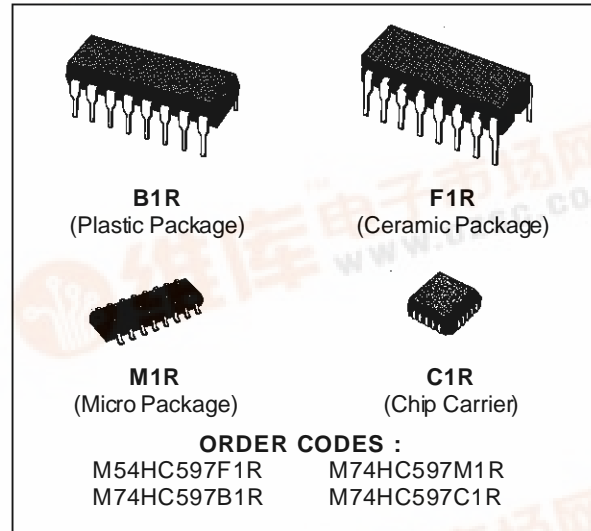




**M54HC597**  
**M74HC597**

## 8 BIT LATCH/SHIFT REGISTER

- HIGH SPEED  
 $f_{MAX} = 60 \text{ MHz (TYP.) AT } V_{CC} = 5 \text{ V}$
- LOW POWER DISSIPATION  
 $I_{CC} = 4 \mu\text{A (MAX.) AT } T_A = 25 \text{ }^\circ\text{C}$
- 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  
 $V_{CC} \text{ (OPR)} = 2 \text{ V TO } 6 \text{ V}$
- PIN AND FUNCTION COMPATIBLE  
WITH 54/74LS597



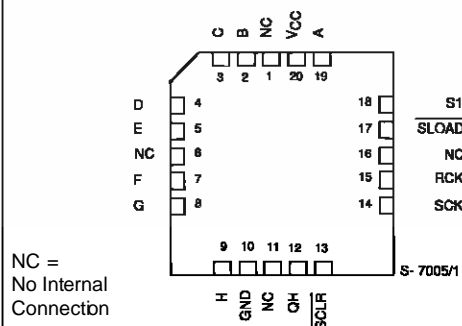
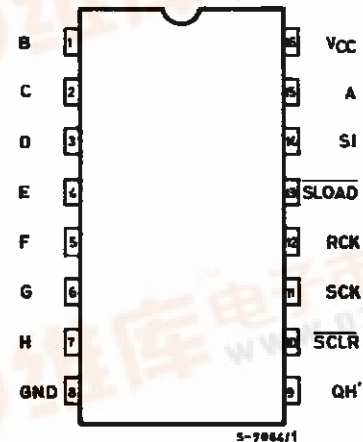
### DESCRIPTION

The M54/74HC597 is a high speed CMOS 8-BIT LATCH/SHIFT REGISTER fabricated in silicon gate C<sup>2</sup>MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption.

This device comes in a 16-pin package and consists of an 8-bit storage latch feeding a parallel-in, serial-out 8-bit shift register. Both the storage register and shift register have positive-edge triggered clocks. The shift register also has direct load (from storage) and clear inputs.

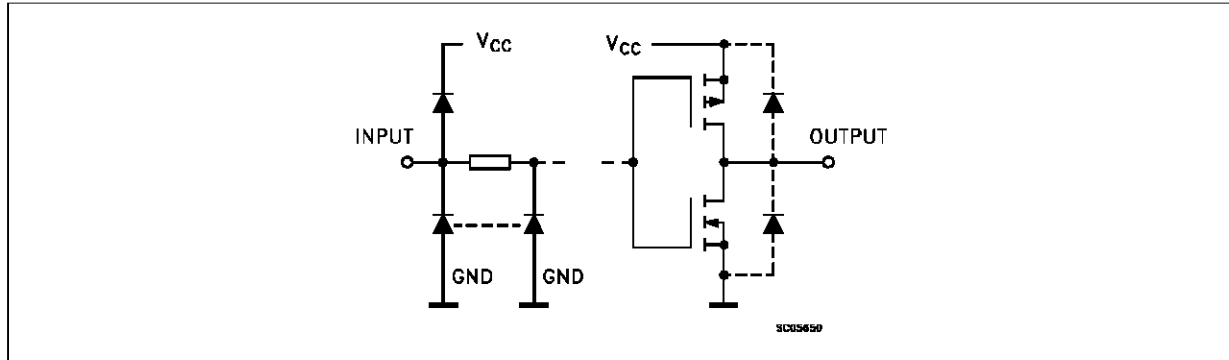
All inputs are equipped with protection circuits against static discharge and transient voltage excess.

### PIN CONNECTIONS (top view)



# M54/M74HC597

## INPUT AND OUTPUT EQUIVALENT CIRCUIT

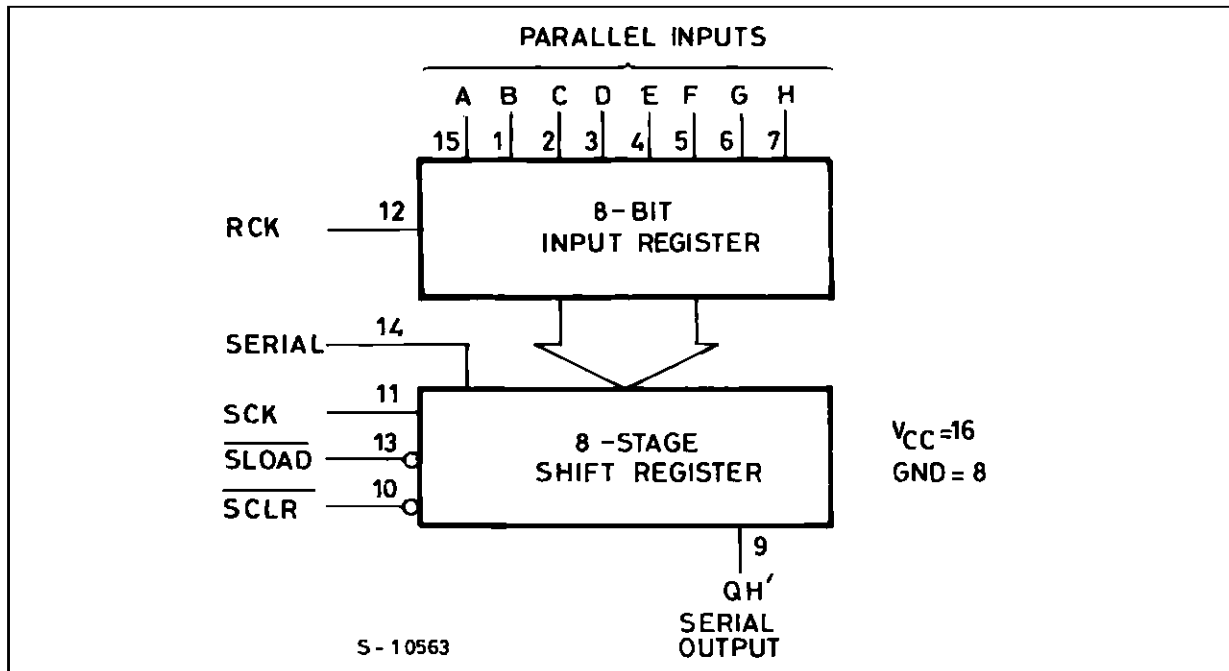


## TRUTH TABLE

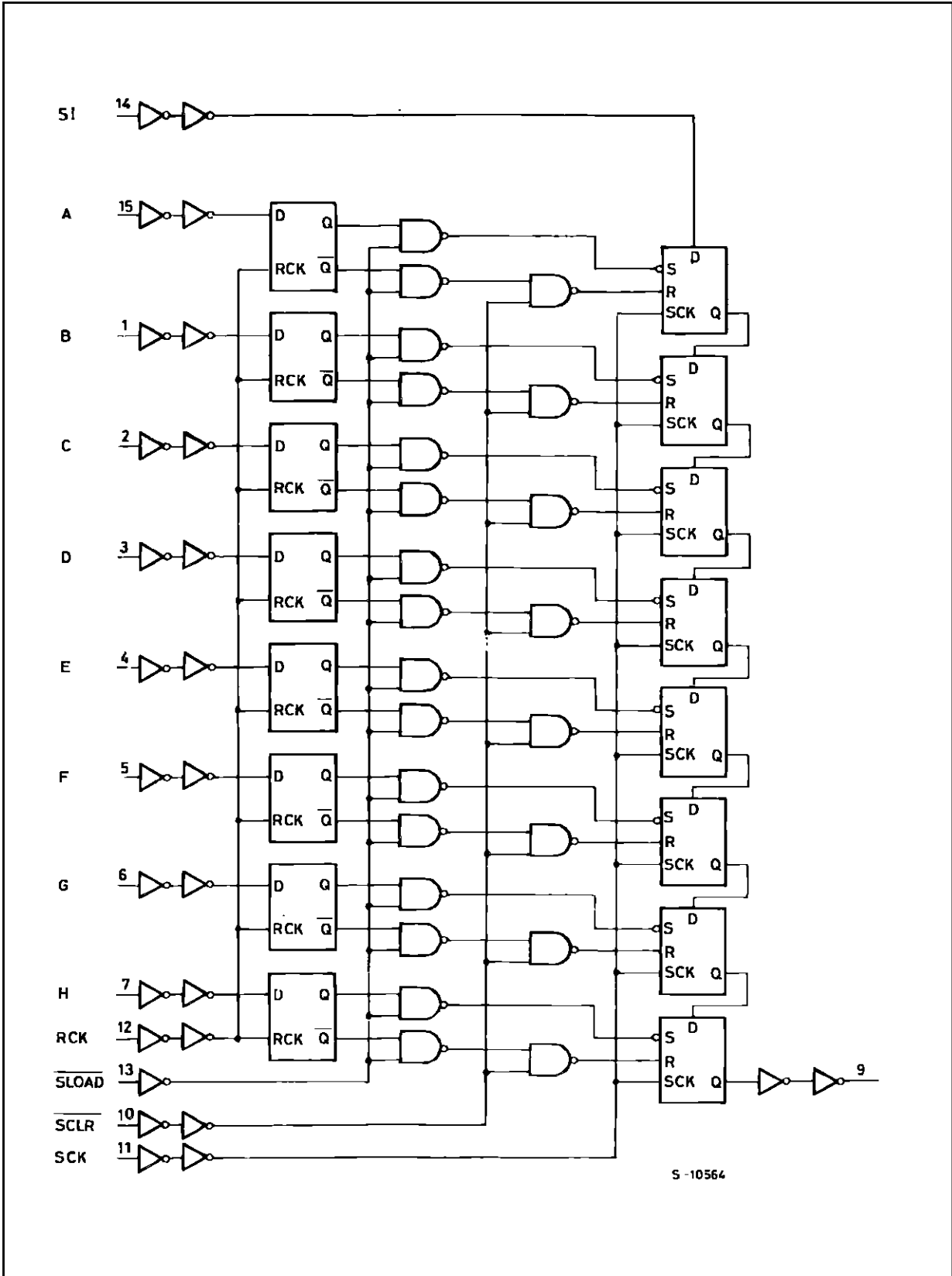
INPUTS					OUTPUT
SI	SCK	SCLR	SLOAD	RCK	
X	X	L	H	X	S.R. IS CLEARED TO "L"
X	X	H	L	X	INPUT REGISTER DATA IS STORED INTO S.R.
L	┌	H	H	X	FIRST STAGE OF S.R. BECOMES "L" OTHER STAGES STORE THE DATA OF PREVIOUS STAGE, RESPECTIVELY
H	┌	H	H	X	FIRST STAGE OF S.R. BECOMES "H" OTHER STAGES STORE THE DATA OF PREVIOUS STAGE, RESPECTIVELY
X	└	H	H	X	STATE OF S.R IS NOT CHANGED
X	X	X	X	┌	INPUT DATA ON A ~ H LINE IS STORED INTO INPUT REGISTER
X	X	X	X	└	STORAGE REGISTER STATE IS NOT CHANGED

X: DON'T CARE

## LOGIC DIAGRAM

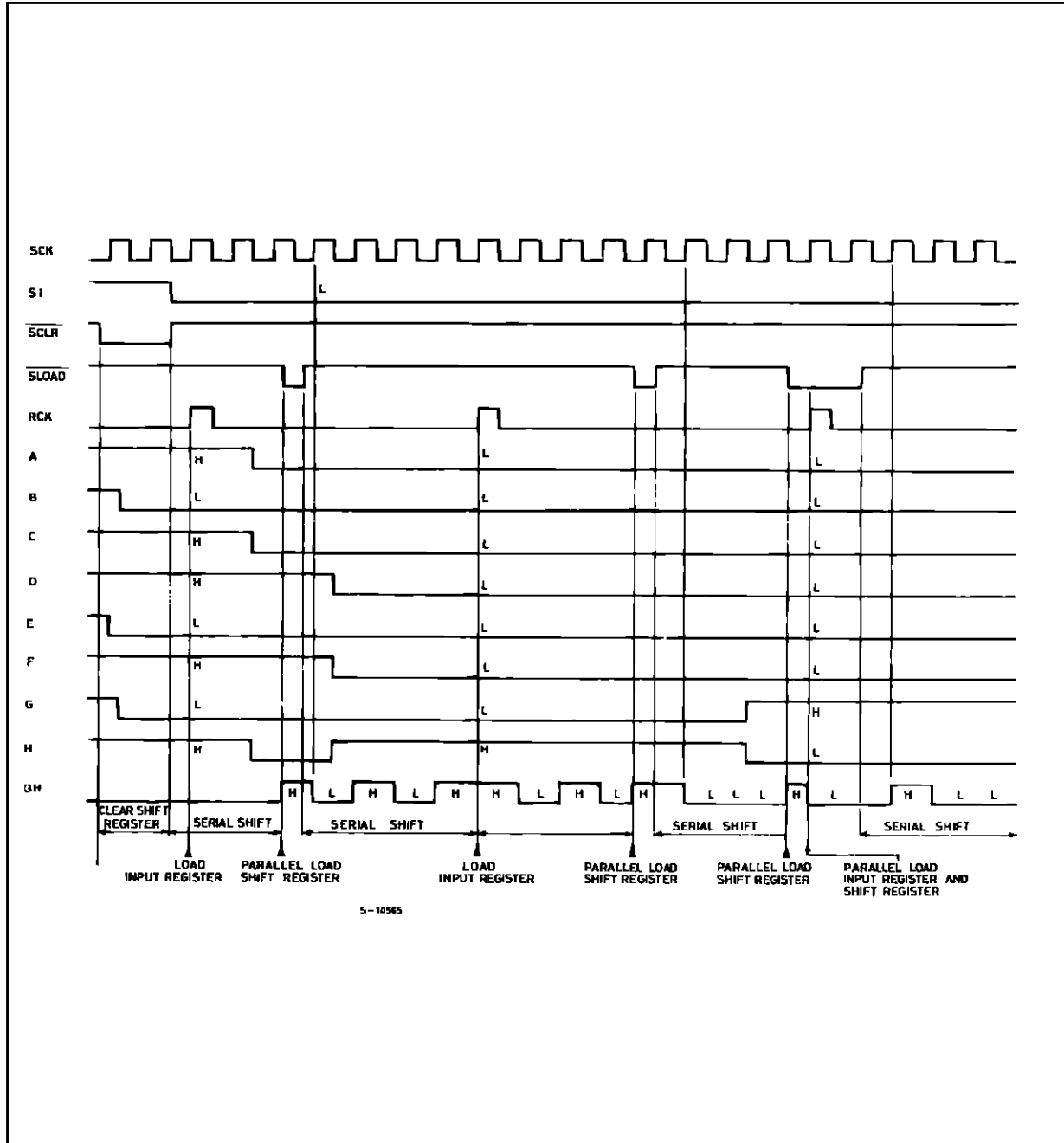


LOGIC DIAGRAM



# M54/M74HC597

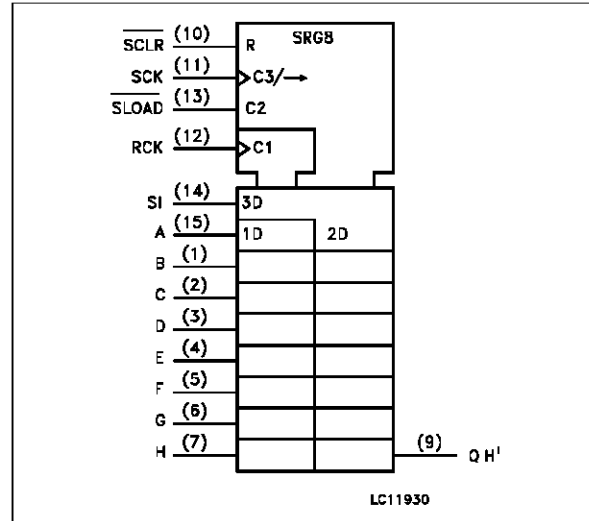
## TIMING CHART



**PIN DESCRIPTION**

PIN No	SYMBOL	NAME AND FUNCTION
9	QH'	Serial Data Outputs
10	SCLR	Asynchronous Reset Input (Active LOW)
11	SCK	Shift Clock Input (LOW to HIGH Edge-triggered)
12	RCK	Storage Clock Input (LOW to HIGH Edge-triggered)
13	SLOAD	Parallel Data Input (Active LOW)
10	SI	Serial Data Input
15, 1, 2, 3, 4, 5, 6, 7	A to H	Parallel Data Inputs
8	GND	Ground (0V)
16	V <sub>CC</sub>	Positive Supply Voltage

**IEC LOGIC SYMBOL**



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to +7	V
V <sub>I</sub>	DC Input Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
V <sub>O</sub>	DC Output Voltage	-0.5 to V <sub>CC</sub> + 0.5	V
I <sub>IK</sub>	DC Input Diode Current	± 20	mA
I <sub>OK</sub>	DC Output Diode Current	± 20	mA
I <sub>O</sub>	DC Output Source Sink Current Per Output Pin	± 25	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	± 50	mA
P <sub>D</sub>	Power Dissipation	500 (*)	mW
T <sub>stg</sub>	Storage Temperature	-65 to +150	°C
T <sub>L</sub>	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 <sub>CC</sub>	Supply Voltage	2 to 6	V
V <sub>I</sub>	Input Voltage	0 to V <sub>CC</sub>	V
V <sub>O</sub>	Output Voltage	0 to V <sub>CC</sub>	V
T <sub>op</sub>	Operating Temperature: <b>M54HC Series</b> <b>M74HC Series</b>	-55 to +125 -40 to +85	°C °C
t <sub>r</sub> , t <sub>f</sub>	Input Rise and Fall Time	V <sub>CC</sub> = 2 V: 0 to 1000 V <sub>CC</sub> = 4.5 V: 0 to 500 V <sub>CC</sub> = 6 V: 0 to 400	ns

## M54/M74HC597

### DC SPECIFICATIONS

Symbol	Parameter	Test Conditions		Value						Unit		
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC			
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.	
V <sub>IH</sub>	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 <sub>IL</sub>	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 <sub>OH</sub>	High Level Output Voltage	2.0	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>O</sub> = -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 <sub>O</sub> = -4.0 mA	4.18	4.31		4.13		4.10		
		6.0			I <sub>O</sub> = -5.2 mA	5.68	5.8		5.63			5.60
V <sub>OL</sub>	Low Level Output Voltage	2.0	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub>	I <sub>O</sub> = 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 <sub>O</sub> = 4.0 mA	0.17	0.26		0.33		0.40		
		6.0			I <sub>O</sub> = 5.2 mA	0.18	0.26		0.33		0.40	
I <sub>I</sub>	Input Leakage Current	6.0	V <sub>I</sub> = V <sub>CC</sub> or GND			±0.1		±1		±1	μA	
I <sub>CC</sub>	Quiescent Supply Current	6.0	V <sub>I</sub> = V <sub>CC</sub> or GND			4		40		80	μA	

### AC ELECTRICAL CHARACTERISTICS (C<sub>L</sub> = 50 pF, Input t<sub>r</sub> = t<sub>f</sub> = 6 ns)

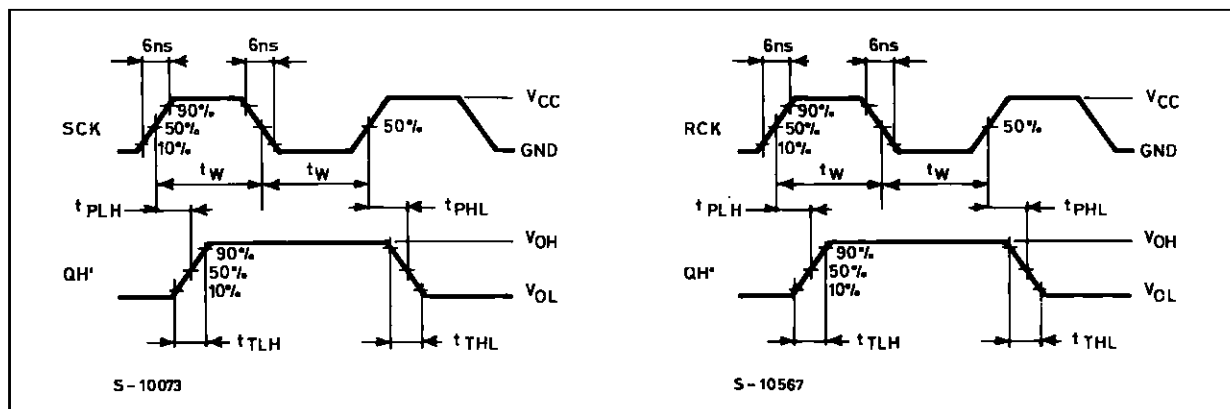
Symbol	Parameter	Test Conditions		Value						Unit	
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t <sub>TLH</sub> t <sub>THL</sub>	Output Transition Time	2.0			30	75		95		115	ns
		4.5			8	15		19		23	
		6.0			7	13		16		20	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time (SCK - QH')	2.0			78	145		180		220	ns
		4.5			20	29		36		44	
		6.0			16	25		31		37	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time (SCLR - QH')	2.0			90	175		220		265	ns
		4.5			24	35		44		53	
		6.0			20	30		37		45	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time (SLOAD - QH')	2.0			80	175		220		265	ns
		4.5			22	35		44		53	
		6.0			18	30		37		45	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time (RCK - QH')	2.0			112	210		265		315	ns
		4.5	SLOAD = "L"		30	42		53		63	
		6.0			24	36		45		54	

**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)		$T_A = 25\text{ }^\circ\text{C}$ 54HC and 74HC			$-40\text{ to }85\text{ }^\circ\text{C}$ 74HC		$-55\text{ to }125\text{ }^\circ\text{C}$ 54HC		
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.
$f_{MAX}$	Maximum Clock Frequency	2.0		6.0	12		4.8		4.0		ns
		4.5		30	48		24		20		
		6.0		35	50		28		24		
$t_{W(H)}$ $t_{W(L)}$	Propagation Delay Time (SCK, RCK)	2.0			20	75		95		110	ns
		4.5			7	15		19		22	
		6.0			4	13		16		19	
$t_{W(L)}$	Propagation Delay Time (SCLR, SLOAD)	2.0			25	75		95		110	ns
		4.5			7	15		19		22	
		6.0			5	13		16		19	
$t_s$	Minimum Set-up Time (RCK - SLOAD)	2.0			48	100		125		150	ns
		4.5			12	20		25		30	
		6.0			10	17		21		26	
$t_s$	Minimum Set-up Time (SI, SCK)	2.0			20	75		95		110	ns
		4.5			5	15		19		22	
		6.0			4	13		16		19	
$t_s$	Minimum Set-up Time (PI - RCK)	2.0			20	75		95		110	ns
		4.5			5	15		19		22	
		6.0			4	13		16		19	
$t_r$	Minimum Hold Time	2.0				0		0		0	ns
		4.5				0		0		0	
		6.0				0		0		0	
$t_{REM}$	Propagation Delay Time (SCLR, SLOAD)	2.0			12	75		95		115	ns
		4.5			4	15		19		23	
		6.0			3	13		16		20	
$C_{IN}$	Input Capacitance				5	10		10		10	pF
$C_{PD} (*)$	Power Dissipation Capacitance				60						pF

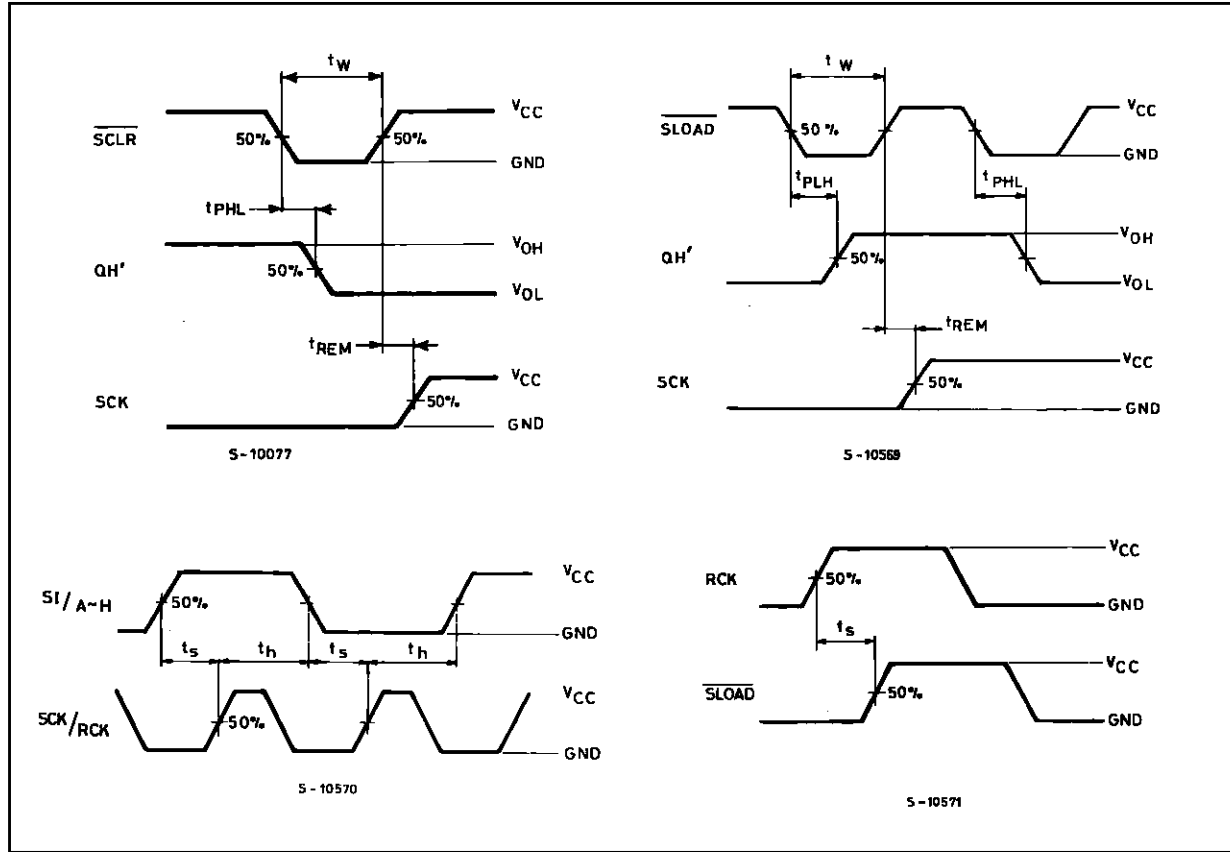
(\*)  $C_{PD}$  is defined as the value of the IC's internal equivalent capacitance which is calculated from the operating current consumption without load. (Refer to Test Circuit). Average operating current can be obtained by the following equation.  $I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} +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

**SWITCHING CHARACTERISTICS TEST WAVEFORM**

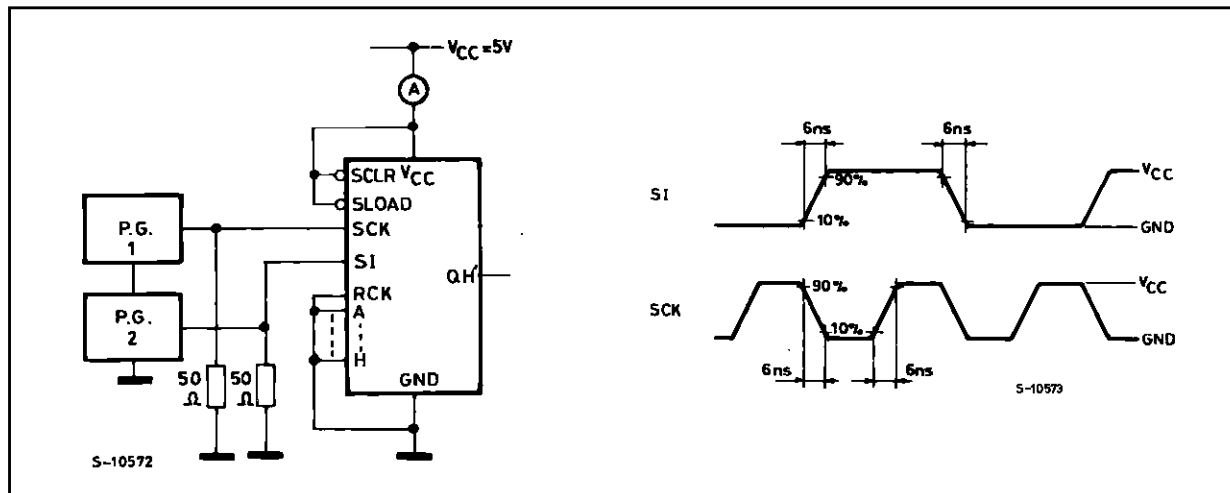


# M54/M74HC597

## TEST WAVEFORM (continued)

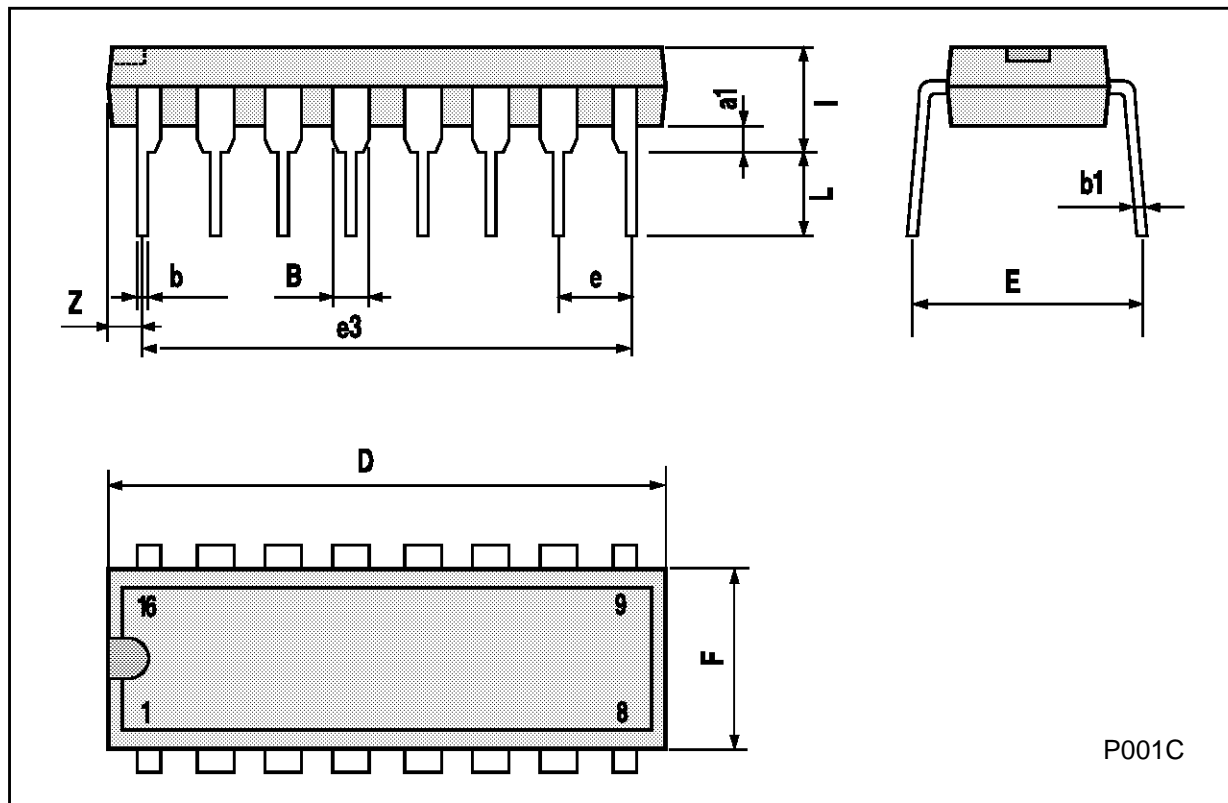


## TEST CIRCUIT $I_{CC}$ (Opr.)



## 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

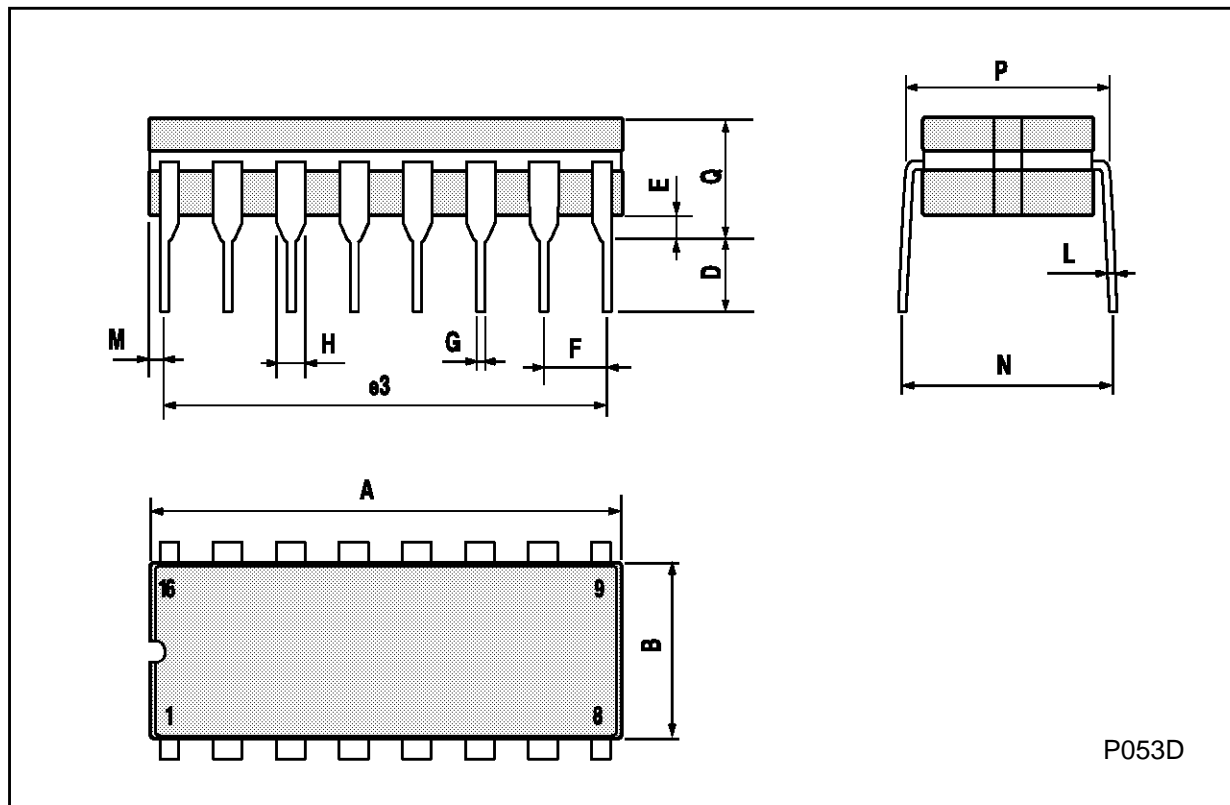


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M54/M74HC597

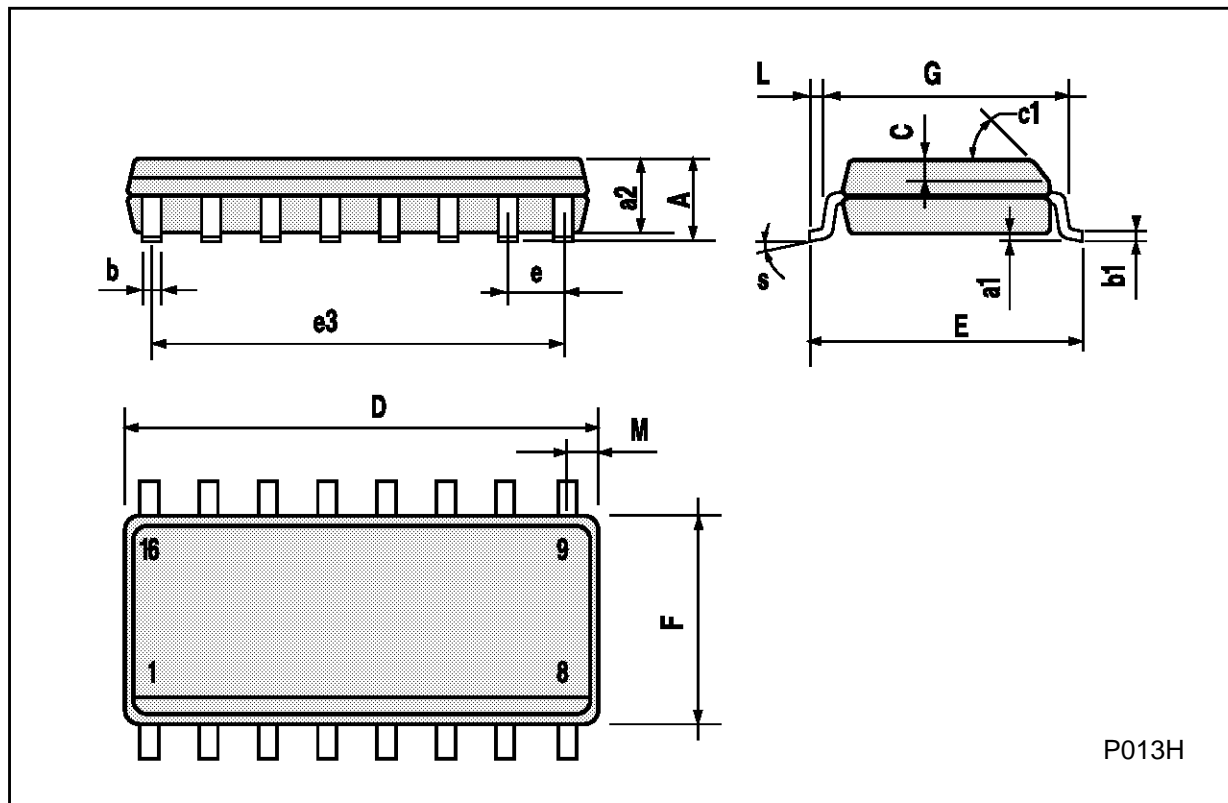
Ceramic DIP16/1 MECHANICAL DATA

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



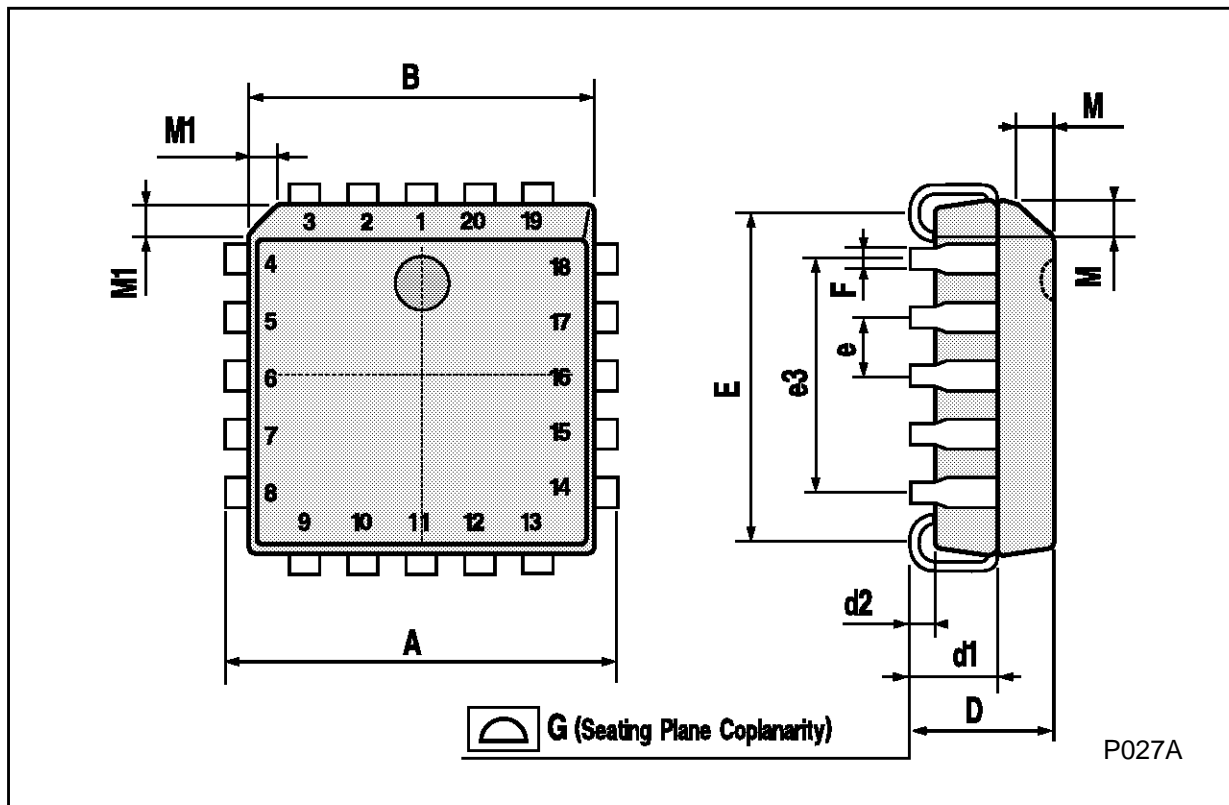
## SO16 (Narrow) MECHANICAL DATA

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	



P027A

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