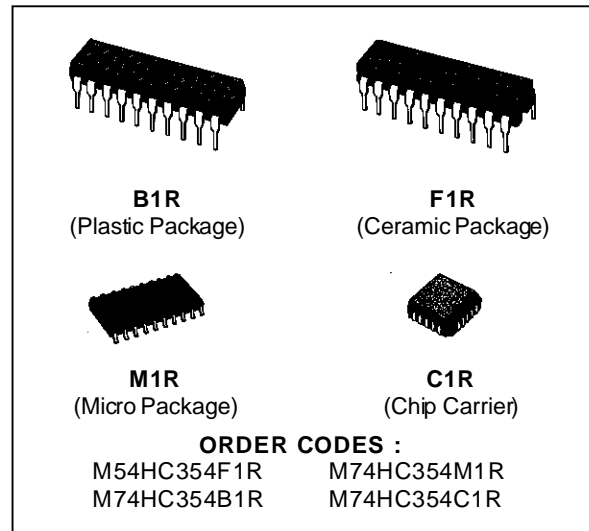


## 8 CHANNEL MULTIPLEXER/REGISTER (3 STATE)

- HIGH SPEED  
 $t_{PD} = 24 \text{ ns (TYP.) AT } V_{CC} = 5 \text{ V}$
- 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  
 15 LSTTL LOADS
- SYMMETRICAL OUTPUT IMPEDANCE  
 $|I_{OH}| = I_{OL} = 6 \text{ mA (MIN.)}$
- 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 54/74LS354



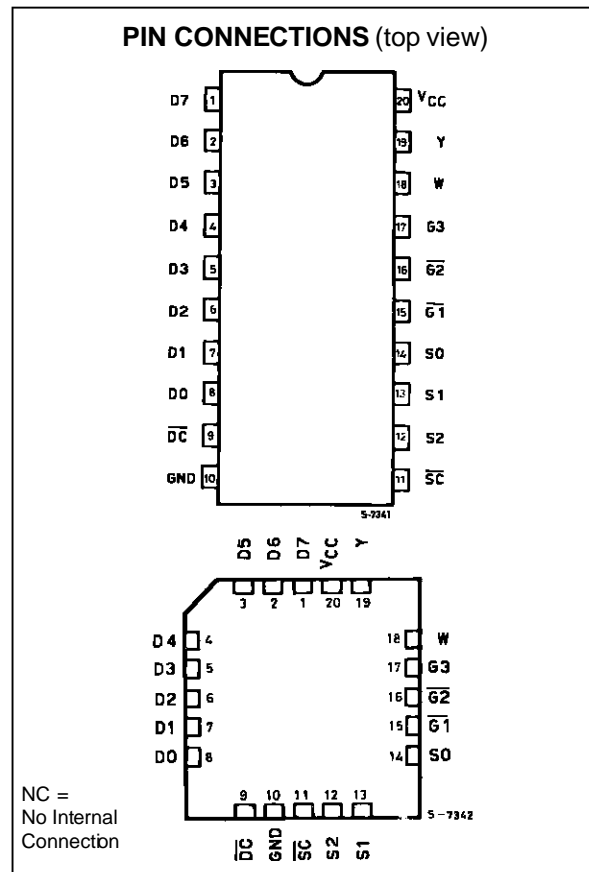
### DESCRIPTION

The M54/74HC354 is a high speed CMOS 8-CHANNEL MULTIPLEXER/REGISTER (3-state) fabricated in silicon gate C<sup>2</sup>MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low consumption.

This device contains an 8 channel digital multiplexer with an 8-bit input data register and a 3-bit address input register with 3-state outputs. The one of eight input data will be provided on the Y output pin (non-inverted output) and W output pin (inverted output) determined by the address data.

The information at the data inputs (D0 to D7) is stored in the 8-bit latch at the negative pulse on  $\overline{DC}$  input. The information at the address inputs (S0 to S2) is stored in the 3-bit latch at the negative pulse on  $\overline{SC}$  input. These outputs are disabled to be high-impedance when input G1 is held high, input G2 is held high or input G3 is held low. This device is suitable for interfacing with bus lines in a bus organized system.

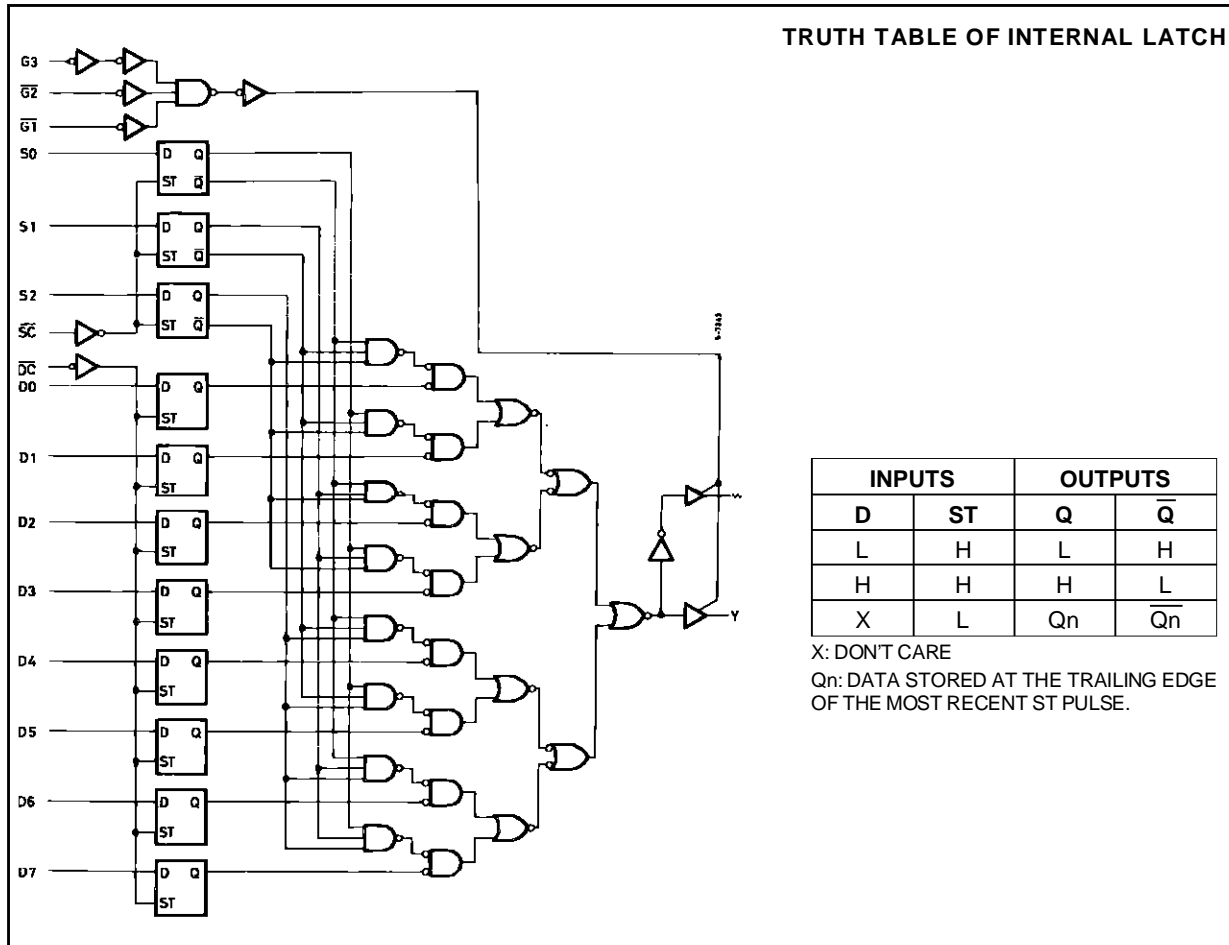
The M54/74HC354 is similar in function to the M54/74HC356, which has an 8-bit flip-flop as the data register instead of an 8-bit latch. All inputs are equipped with protection circuits against static discharge and transient excess voltage.



INPUT AND OUTPUT EQUIVALENT CIRCUIT



LOGIC DIAGRAM



TRUTH TABLE OF INTERNAL LATCH

INPUTS		OUTPUTS	
D	ST	Q	$\bar{Q}$
L	H	L	H
H	H	H	L
X	L	Q <sub>n</sub>	$\bar{Q}_n$

X: DON'T CARE  
 Q<sub>n</sub>: DATA STORED AT THE TRAILING EDGE OF THE MOST RECENT ST PULSE.

TRUTH TABLE

SELECT *			INPUTS				OUTPUTS	
S2	S1	S0	DC	OUTPUT ENABLES			W	Y
				G1	G2	G3		
X	X	X	X	H	X	X	Z	Z
X	X	X	X	X	H	X	Z	Z
X	X	X	X	X	X	L	Z	Z
L	L	L	L	L	L	H	D0	D0
L	L	L	H	L	L	H	D0n	D0n
L	L	H	L	L	L	H	D1	D1
L	L	H	H	L	L	H	D1n	D1n
L	H	L	L	L	L	H	D2	D2
L	H	L	H	L	L	H	D2n	D2n
L	H	H	L	L	L	H	D3	D3
L	H	H	H	L	L	H	D3n	D3n
H	L	L	L	L	L	H	D4	D4
H	L	L	H	L	L	H	D4n	D4n
H	L	H	L	L	L	H	D5	D5
H	L	H	H	L	L	H	D5n	D5n
H	H	L	L	L	L	H	D6	D6
H	H	L	H	L	L	H	D6n	D6n
H	H	H	L	L	L	H	D7	D7
H	H	H	H	L	L	H	D7n	D7n

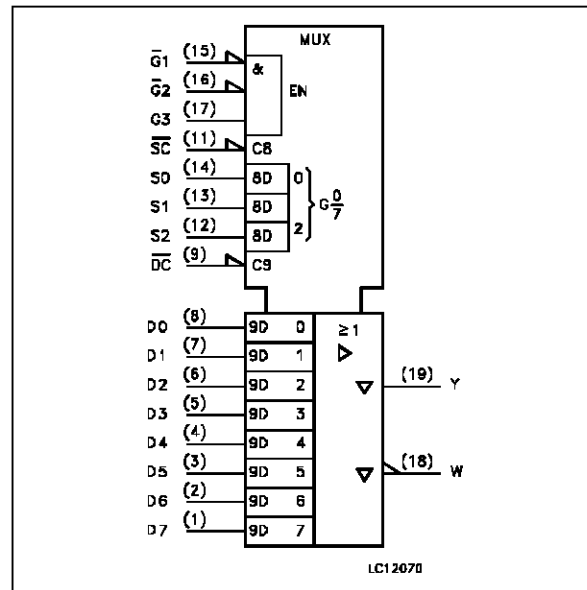
X: DON'T CARE Z: HIGH IMPEDANCE \*: THIS COLUMN SHOWS THE INPUT ADDRESS SETUP WITH SC LOW

D0n....D7n: THE LEVEL OF STEADY-STATE INPUTS AT INPUT DO THROUGH D7, RESPECTIVELY, BEFORE THE MOST RECENT LOW TO HIGH TRANSITION OF DATA CONTROL

PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
8, 7, 6, 5, 4, 3, 2, 1	D0 to D7	Data Inputs
9	DC	Data Enable Input (Active LOW)
11	SC	Latch Enable Input (Active LOW)
14, 13, 12	S0, S1, S2	Select Inputs
15, 16	G1, G2	Output Enable Inputs (Active LOW)
17	G3	Output Enable Input (Active HIGH)
18	W	3 State Multiplexer Output (Active LOW)
19	Y	3 State Multiplexer Output (Active HIGH)
10	GND	Ground (0V)
20	Vcc	Positive Supply Voltage

IEC LOGIC SYMBOL



## M54/M74HC354

### ABSOLUTE MAXIMUM RATING

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	± 35	mA
I <sub>CC</sub> or I <sub>GND</sub>	DC V <sub>CC</sub> or Ground Current	± 70	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 V <sub>CC</sub> = 4.5 V V <sub>CC</sub> = 6 V	0 to 1000 0 to 500 0 to 400	ns

## 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> = -6.0 mA	4.18	4.31		4.13		4.10			
		6.0		I <sub>O</sub> = -7.8 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		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> = 6.0 mA		0.17	0.26		0.33		0.40		
		6.0		I <sub>O</sub> = 7.8 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>OZ</sub>	3 State Output Off State Current	6.0	V <sub>I</sub> = V <sub>IH</sub> or V <sub>IL</sub> V <sub>O</sub> = V <sub>CC</sub> or GND				±0.5		±5.0		±10	μA
I <sub>CC</sub>	Quiescent Supply Current	6.0	V <sub>I</sub> = V <sub>CC</sub> or GND				4		40		80	μA

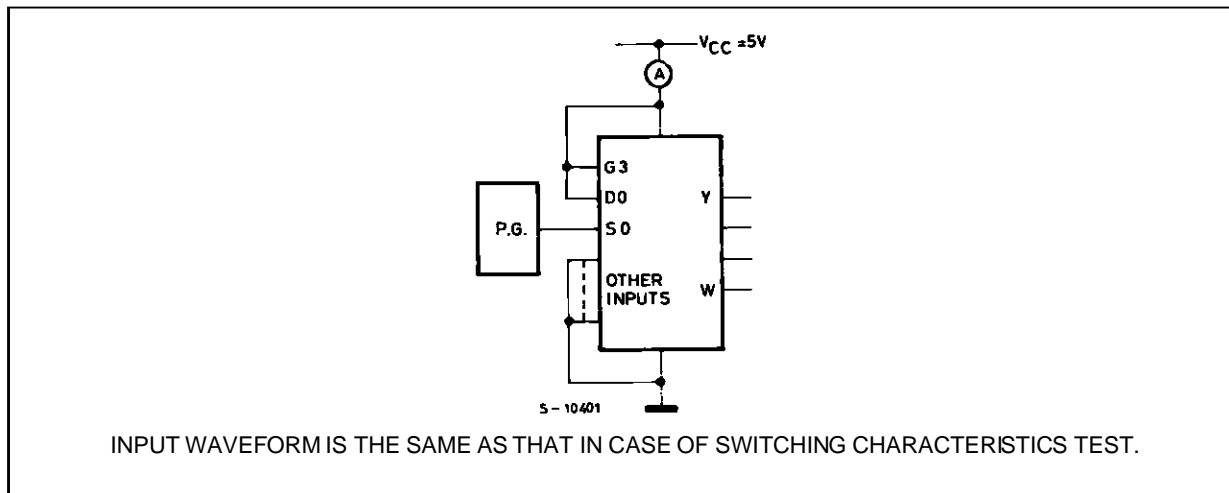
# M54/M74HC354

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

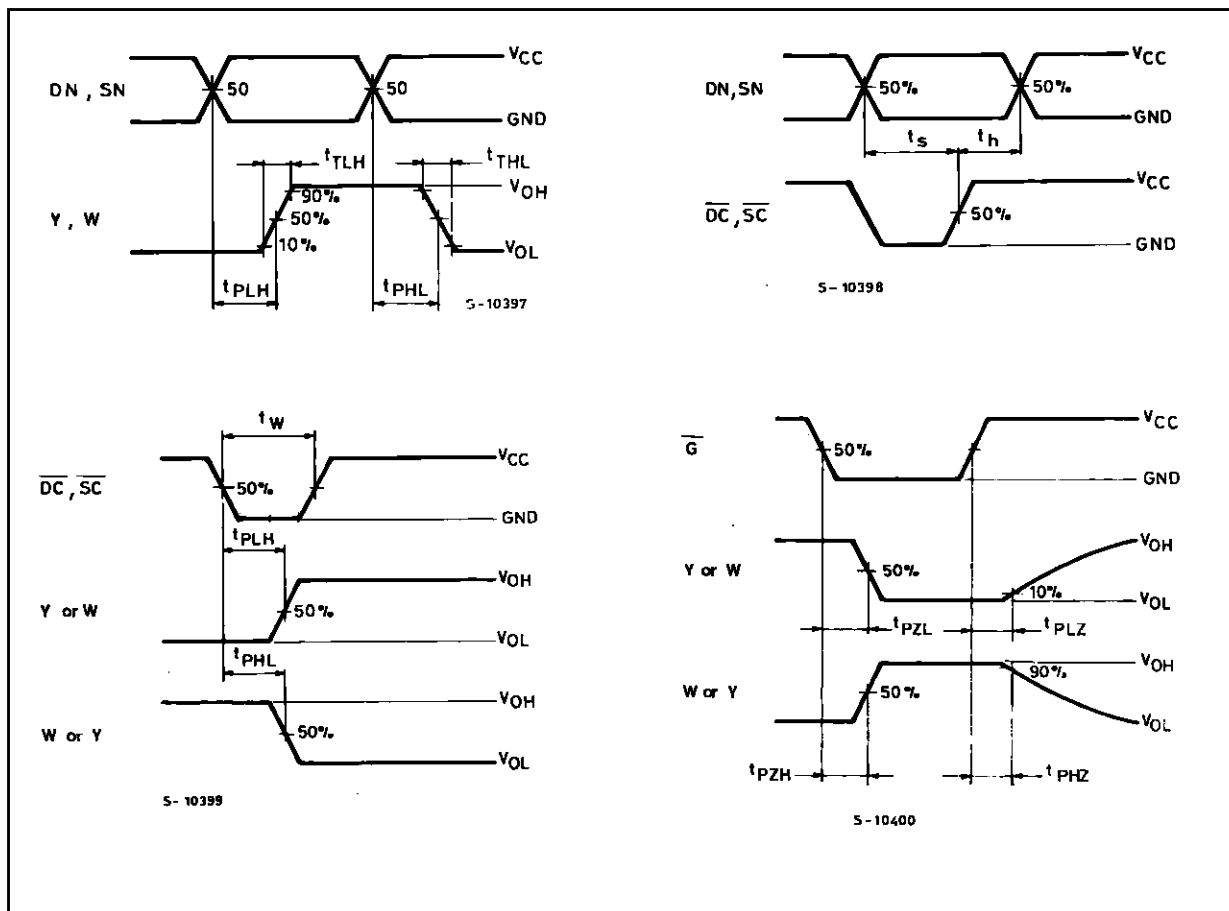
Symbol	Parameter	Test Conditions			Value						Unit	
		V <sub>CC</sub> (V)	C <sub>L</sub> (pF)		T <sub>A</sub> = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC		
					Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t <sub>TLH</sub> t <sub>THL</sub>	Output Transition Time	2.0	50		25	60		75		90	ns	
		4.5		7	12		15		18			
		6.0		6	10		13		15			
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time (Dn, DC - Y, W)	2.0	50		83	210		265		315	ns	
		4.5		26	42		53		63			
		6.0		21	36		45		54			
		2.0	150		99	250		315		375	ns	
		4.5		31	50		63		75			
		6.0		25	43		54		64			
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time (Sn - Y, W)	2.0	50		98	260		325		390	ns	
		4.5		30	52		65		78			
		6.0		25	44		55		66			
		2.0	150		114	300		375		450	ns	
		4.5		35	60		75		90			
		6.0		29	51		64		77			
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time (SC - Y, W)	2.0	50		102	270		340		405	ns	
		4.5		31	54		68		81			
		6.0		27	46		58		69			
		2.0	150		118	310		390		465	ns	
		4.5		36	62		78		93			
		6.0		31	53		66		79			
t <sub>PZL</sub> t <sub>PZH</sub>	3 State Output Enable Time	2.0	50	R <sub>L</sub> = 1 KΩ	44	125		155		190	ns	
		4.5			14	25		31		38		
		6.0			12	21		26		32		
		2.0	150	R <sub>L</sub> = 1 KΩ	60	165		205		250	ns	
		4.5			19	33		41		50		
		6.0			16	28		35		43		
t <sub>PLZ</sub> t <sub>PHZ</sub>	3 State Output Disable Time	2.0	50	R <sub>L</sub> = 1 KΩ	42	155		195		235	ns	
		4.5			20	31		39		47		
		6.0			17	26		33		40		
t <sub>W(L)</sub>	Minimum Pulse Width (DC) (SC)	2.0	50		18	75		95		110	ns	
		4.5		6	15		19		22			
		6.0		6	13		16		19			
t <sub>s</sub>	Minimum Set-up Time (Dn) (Sn)	2.0	50		10	50		65		75	ns	
		4.5		3	10		13		15			
		6.0		3	9		11		13			
t <sub>h</sub>	Minimum Hold Time (Dn) (Sn)	2.0	50			5		5		5	ns	
		4.5			5		5		5			
		6.0			5		5		5			
C <sub>IN</sub>	Input Capacitance				5	10		10		10	pF	
C <sub>PD</sub> (*)	Power Dissipation Capacitance				77						pF	

(\*) C<sub>PD</sub> 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<sub>CC(opr)</sub> = C<sub>PD</sub> • V<sub>CC</sub> • f<sub>IN</sub> + I<sub>CC</sub>

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

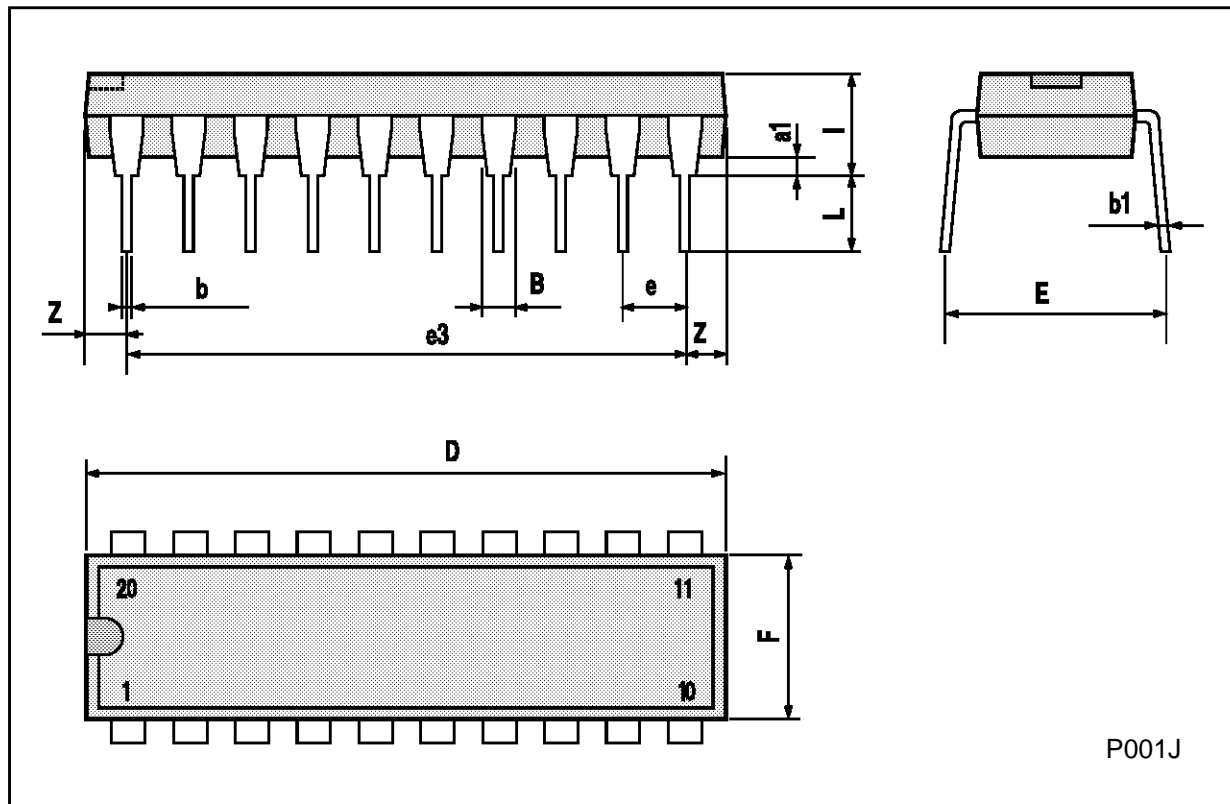


SWITCHING CHARACTERISTICS TEST WAVEFORM



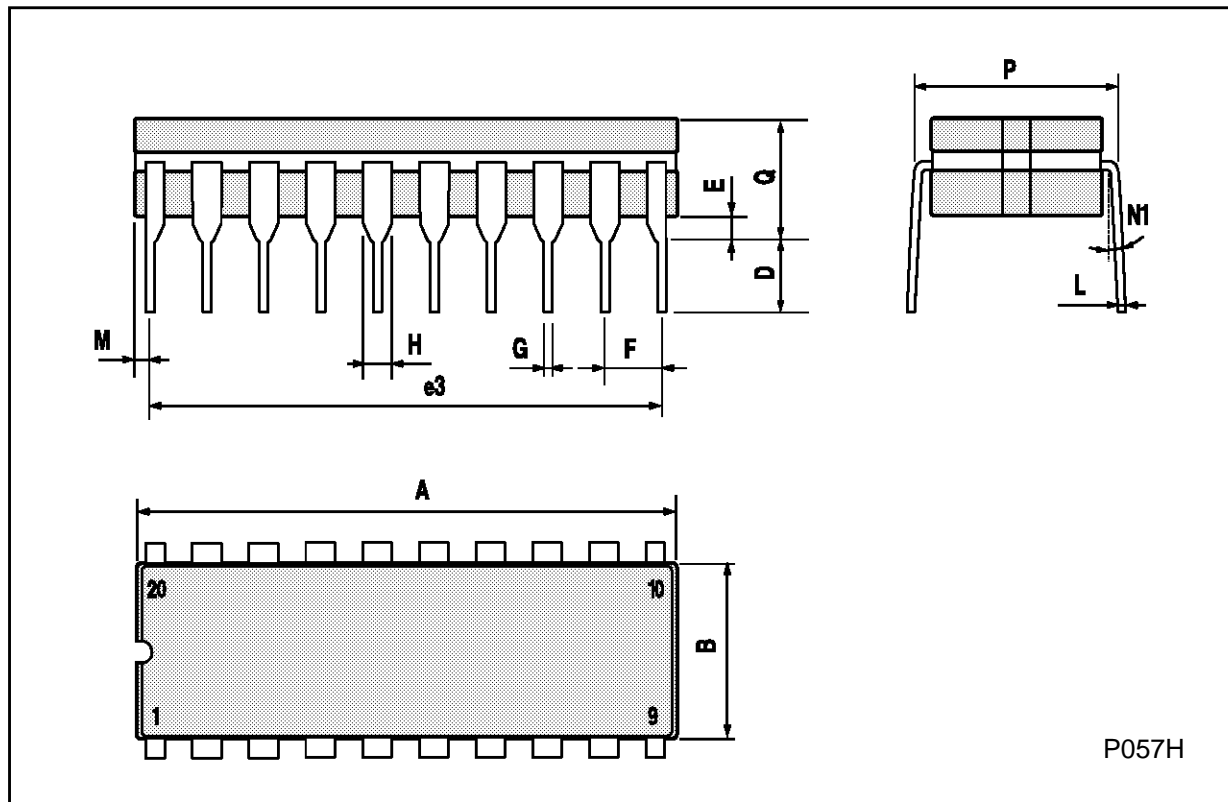
**Plastic DIP20 (0.25) MECHANICAL DATA**

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



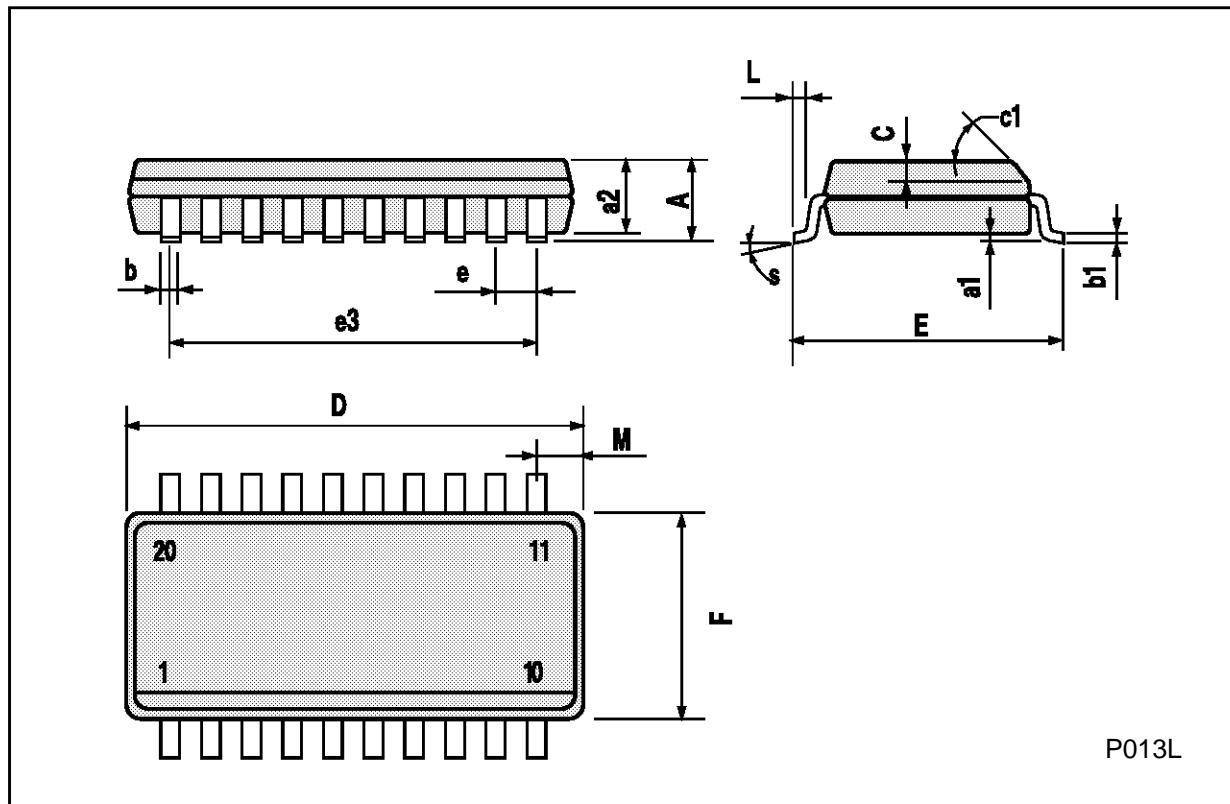
## Ceramic DIP20 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			25			0.984
B			7.8			0.307
D		3.3			0.130	
E	0.5		1.78	0.020		0.070
e3		22.86			0.900	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
I	1.27		1.52	0.050		0.060
L	0.22		0.31	0.009		0.012
M	0.51		1.27	0.020		0.050
N1	4° (min.), 15° (max.)					
P	7.9		8.13	0.311		0.320
Q			5.71			0.225



**SO20 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.10		0.20	0.004		0.007
a2			2.45			0.096
b	0.35		0.49	0.013		0.019
b1	0.23		0.32	0.009		0.012
C		0.50			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		0.299
L	0.50		1.27	0.19		0.050
M			0.75			0.029
S	8° (max.)					



P013L

## 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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