

**OCTAL BUS BUFFER WITH 3 STATE OUTPUTS**  
**HC240HV: INVERTED - HC241HV NON INVERTED**

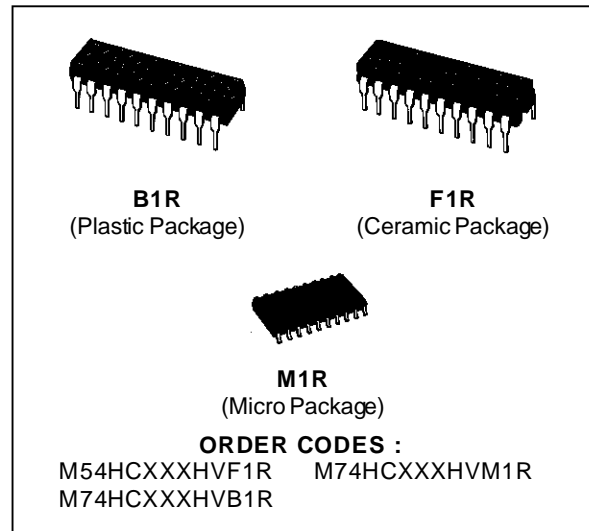
- HIGH SPEED  
t<sub>PD</sub> = 12 ns (TYP.) at V<sub>CC</sub> = 5V
- LOW POWER DISSIPATION  
I<sub>CC</sub> = 4 μA (MAX.) at T<sub>A</sub> = 25 °C
- HIGH NOISE IMMUNITY  
V<sub>NIH</sub> = V<sub>INL</sub> = 28 % V<sub>CC</sub> (MIN.)
- OUTPUT DRIVE CAPABILITY  
15 LSTTL LOADS
- SYMMETRICAL OUTPUT IMPEDANCE  
|I<sub>OH</sub>| = I<sub>OL</sub> = 6 mA (MIN)
- BALANCED PROPAGATION DELAYS  
t<sub>PLH</sub> = t<sub>PHL</sub>
- SAME FUNCTION OF HC240/241 PLUS HIGH TO LOW LEVEL LOGIC CONVERSION CAPABILITY
- LATCH UP FREE OPERATION ALSO WHEN V<sub>IH</sub> IS HIGHER THAN V<sub>CC</sub>

**DESCRIPTION**

The M54/74HC240HV and HC241HV are high speed CMOS OCTAL BUS BUFFERS fabricated in silicon gate C<sup>2</sup>MOS technology.

They have the same high speed performance of LSTTL combined with true CMOS low power consumption.

Performing the same function of their non HV counterpart, they have a particular input configuration which allows all inputs to be driven by



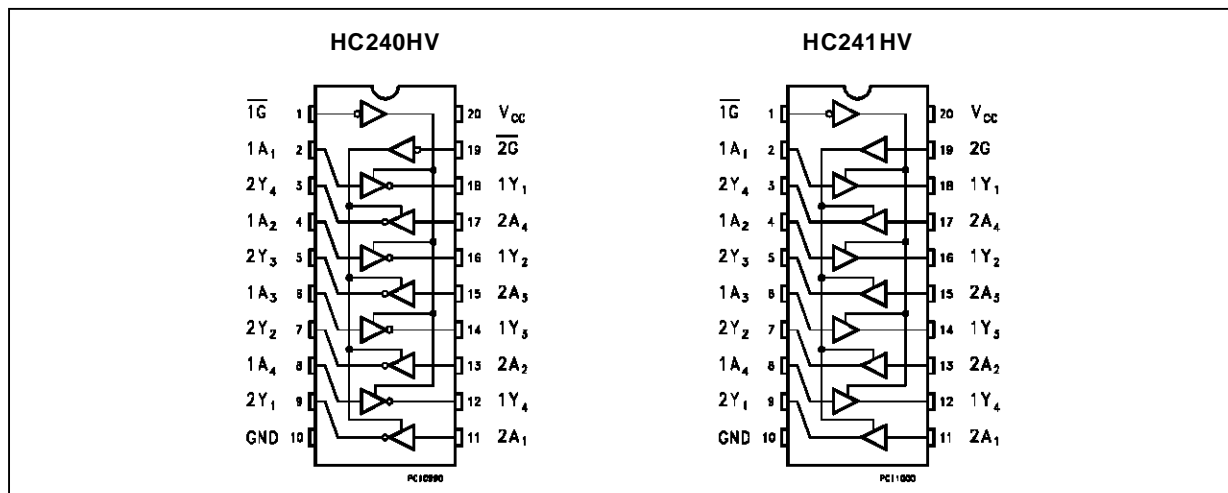
logic levels exceeding the supply voltage.

This makes them particularly suitable in systems where mixed 3V/5V logic devices need to be interfaced.

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

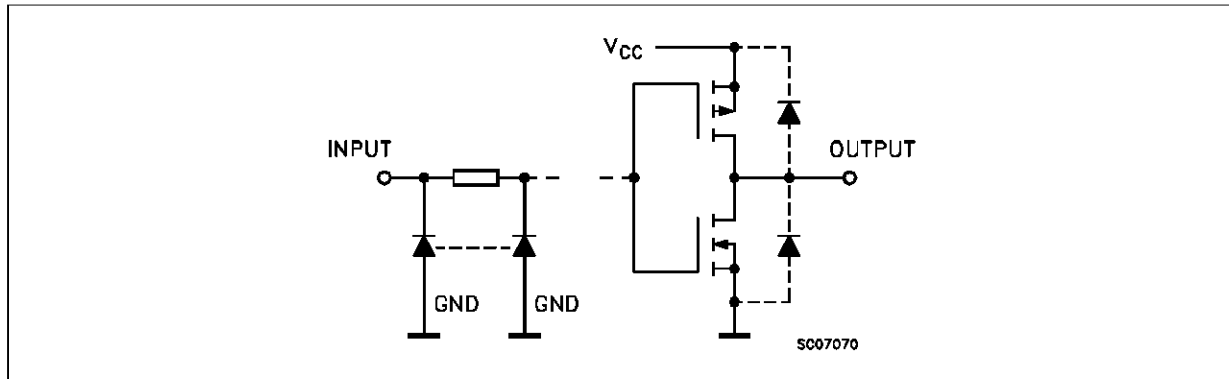
**NOTE: BOTH DEVICES DO NOT MEET 2KV ESD RATING**

**PIN CONNECTION (top view)**



# M54/M74HC240HV/241HV

## INPUT AND OUTPUT EQUIVALENT CIRCUIT



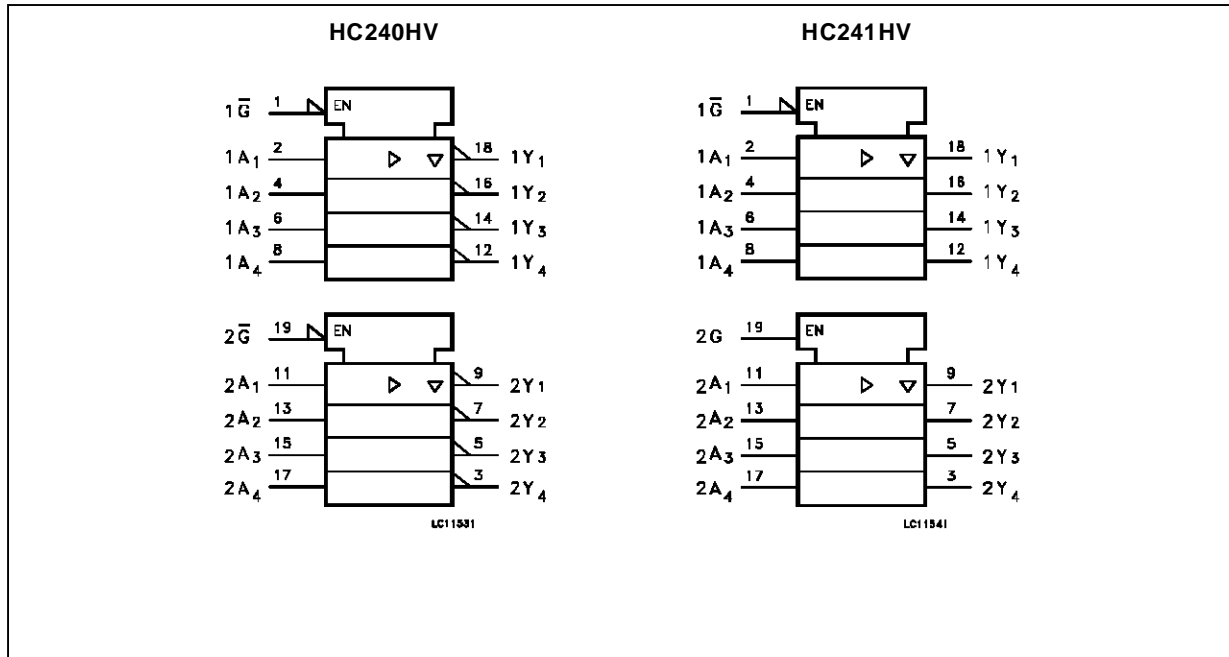
### PIN DESCRIPTION (HC240HV)

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

### PIN DESCRIPTION (HC241HV)

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11, 13, 15, 17	2A <sub>1</sub> to 2A <sub>4</sub>	Data Inputs
18, 16, 14, 12	1Y <sub>1</sub> to 1Y <sub>4</sub>	Data Outputs
19	2G	Output Enabel Input
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20	V <sub>CC</sub>	Positive Supply Voltage

## IEC LOGIC SYMBOLS



**TRUTH TABLE**

INPUT			OUTPUT	
$\bar{G}$	G (HC241)	An	$\bar{Y}_n$ (HC240HV)	Yn (HC241HV)
L	H	L	H	L
L	H	H	L	H
H	L	X	Z	Z

X: "H" or "L"

Z: High impedance

**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	-0.5 to 13	V
V <sub>I</sub>	DC Input Voltage	-0.5 to 13	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	± 100	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	± 100	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 12	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**

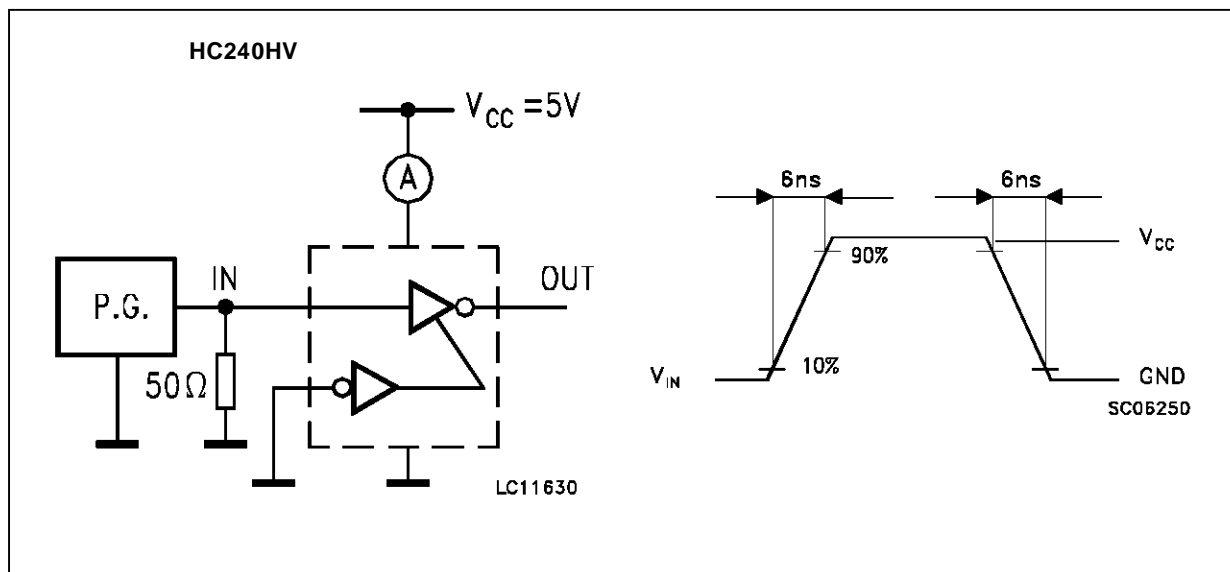
Symbol	Parameter	Test Conditions		Value						Unit		
		V <sub>CC</sub> (V)		T <sub>A</sub> = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC			
				Min.	Typ.	Max.	Min.	Max.	Min.		Max.	
V <sub>IH</sub>	High Level Input Voltage	2.0		1.5			1.5		1.5		V	
		4.5		3.15			3.15		3.15			
		6.0		4.2			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	12.0	V <sub>I</sub> = V <sub>CC</sub> or GND				±0.1		±1		±1	μA
I <sub>IH</sub>	Input Leakage Current	2.0	V <sub>I</sub> = 12 V				±0.1		±1		±1	μA
I <sub>OZ</sub>	3 State Output Off State Current	12.0	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		±10	μA
I <sub>CC</sub>	Quiescent Supply Current	12.0	V <sub>I</sub> = V <sub>CC</sub> or GND				8		80		160	μA

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

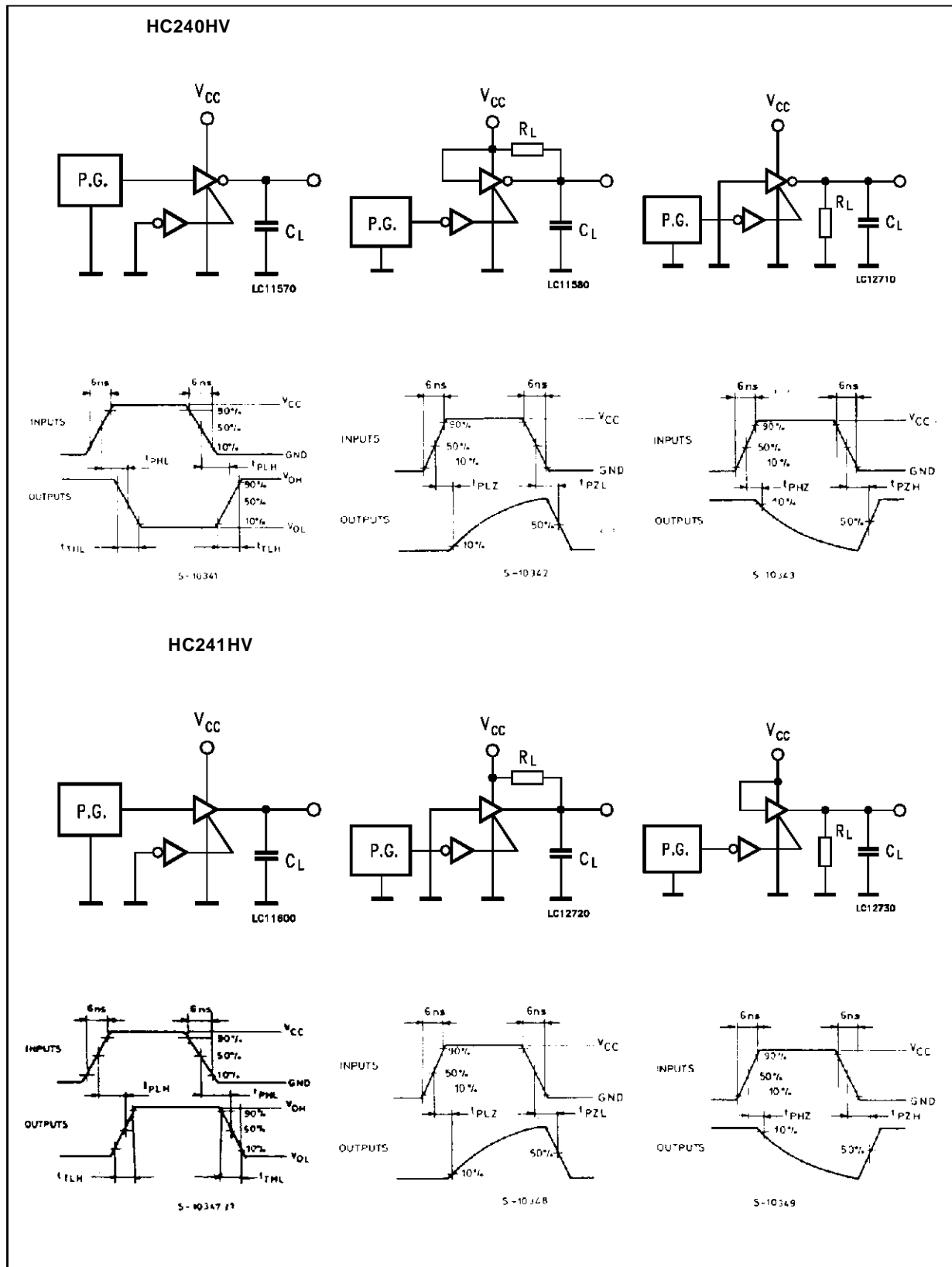
Symbol	Parameter	Test Conditions			Value						Unit	
		V <sub>CC</sub> (V)	C <sub>L</sub> (pF)		T <sub>A</sub> = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC		
					Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t <sub>TLH</sub> t <sub>THL</sub>	Output Transition Time	2.0	50		25	60		75		90	ns	
		4.5		7	12		19		18			
		6.0		6	10		13		15			
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay Time	2.0	50		40	110		140		165	ns	
		4.5		13	22		28		33			
		6.0		11	19		24		28			
		2.0	150		52	135		170		205	ns	
		4.5		17	27		34		41			
		6.0		14	23		29		35			
t <sub>PZL</sub> t <sub>PZH</sub>	Output Enable Time	2.0	50	R <sub>L</sub> = 1KΩ		52	135		170		205	ns
		4.5			17	27		34		41		
		6.0			14	23		29		35		
		2.0	150	R <sub>L</sub> = 1KΩ		63	165		205		250	ns
		4.5			21	33		41		50		
		6.0			18	28		35		43		
t <sub>PLZ</sub> t <sub>PHZ</sub>	Output Disable Time	2.0	50	R <sub>L</sub> = 1KΩ		40	135		170		205	ns
		4.5			19	27		34		41		
		6.0			15	23		29		35		
C <sub>IN</sub>	Input Capacitance				5	10		10		10	pF	
C <sub>OUT</sub>	Output Capacitance				10						pF	
C <sub>PD</sub> (*)	Power Dissipation Capacitance				33						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>/8 (per circuit)

TEST CIRCUIT I<sub>cc</sub> (Opr.)

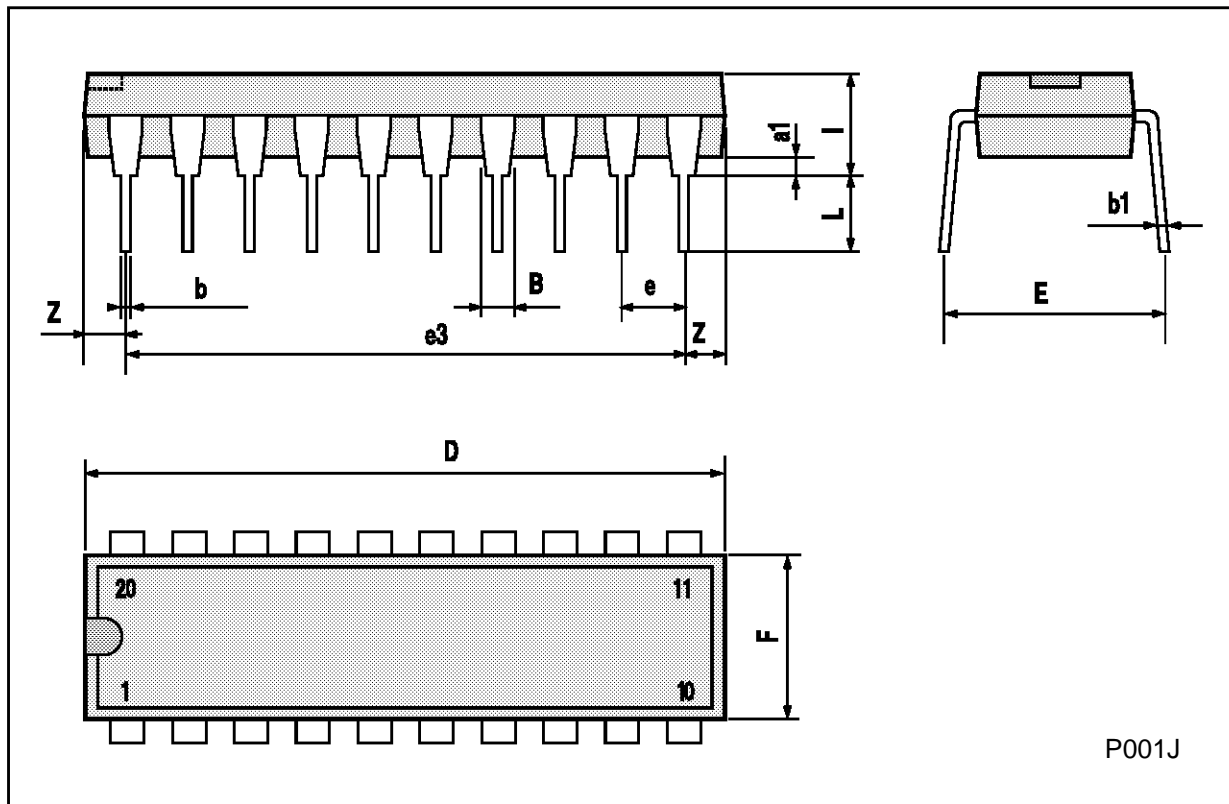


SWITCHING CHARACTERISTICS TEST CIRCUIT



**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



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Ceramic DIP20 MECHANICAL DATA

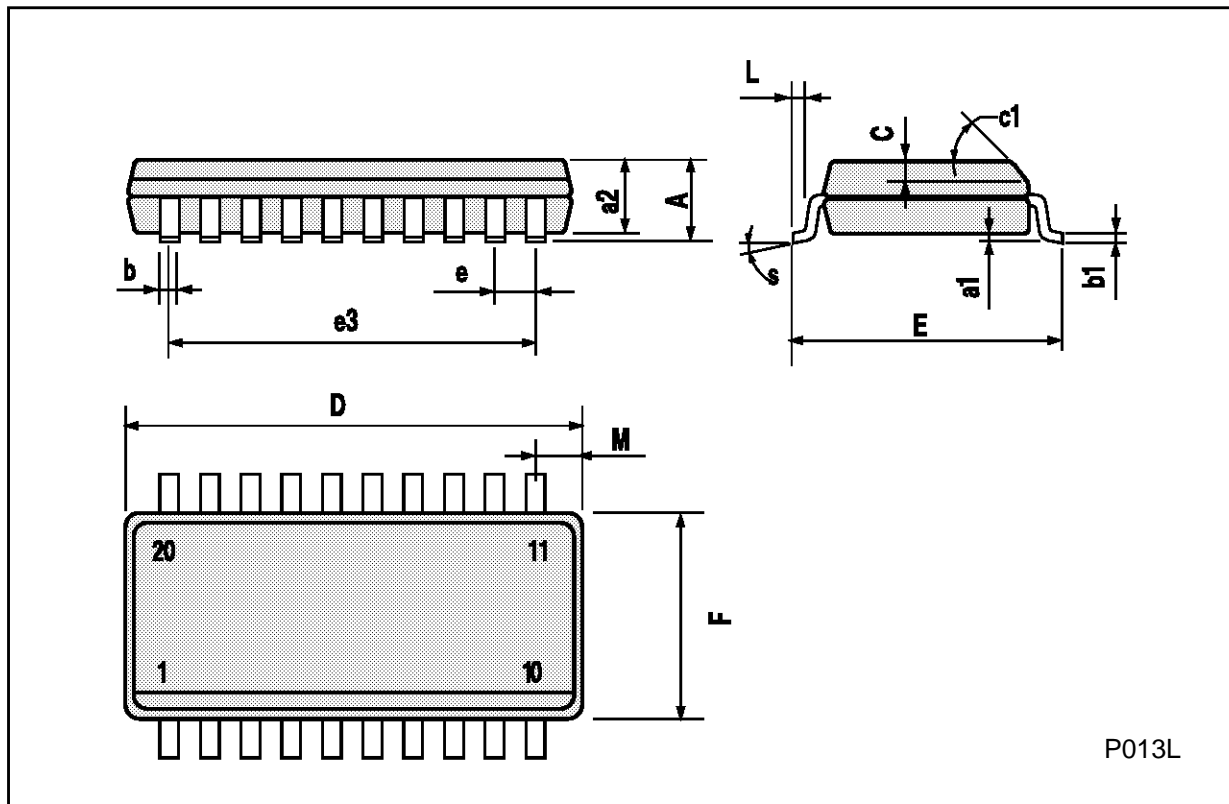
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			25			0.984
B			7.8			0.307
D		3.3			0.130	
E	0.5		1.78	0.020		0.070
e3		22.86			0.900	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
I	1.27		1.52	0.050		0.060
L	0.22		0.31	0.009		0.012
M	0.51		1.27	0.020		0.050
N1	4° (min.), 15° (max.)					
P	7.9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

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