

OCTAL BUS BUFFER WITH 3 STATE OUTPUTS

HC240HV: INVERTED - HC241HV NON INVERTED

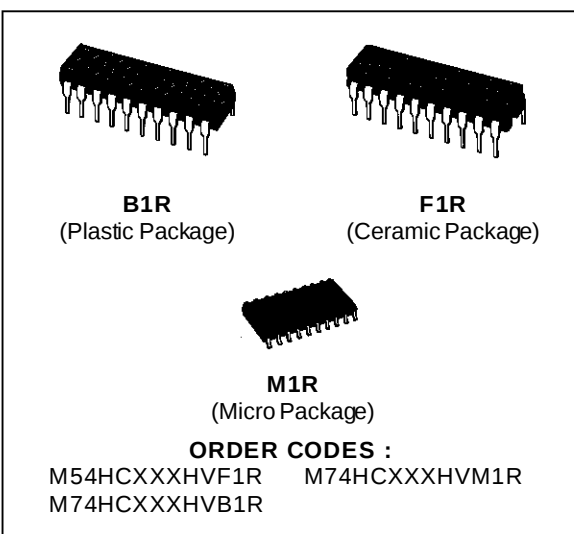
- **HIGH SPEED**
 $t_{PD} = 12 \text{ ns (TYP.) at } V_{CC} = 5V$
- **LOW POWER DISSIPATION**
 $I_{CC} = 4 \mu A \text{ (MAX.) at } T_A = 25^\circ C$
- **HIGH NOISE IMMUNITY**
 $V_{NIH} = V_{NIL} = 28 \% V_{CC} \text{ (MIN.)}$
- **OUTPUT DRIVE CAPABILITY**
15 LSTTL LOADS
- **SYMMETRICAL OUTPUT IMPEDANCE**
 $|I_{OH}| = I_{OL} = 6 \text{ mA (MIN)}$
- **BALANCED PROPAGATION DELAYS**
 $t_{PLH} = t_{PHL}$
- **SAME FUNCTION OF HC240/241 PLUS HIGH TO LOW LEVEL LOGIC CONVERSION CAPABILITY**
- **LATCH UP FREE OPERATION ALSO WHEN V_{IH} IS HIGHER THAN V_{CC}**

DESCRIPTION

The M54/74HC240HV and HC241HV are high speed CMOS OCTAL BUS BUFFERS fabricated in silicon gate C²MOS 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



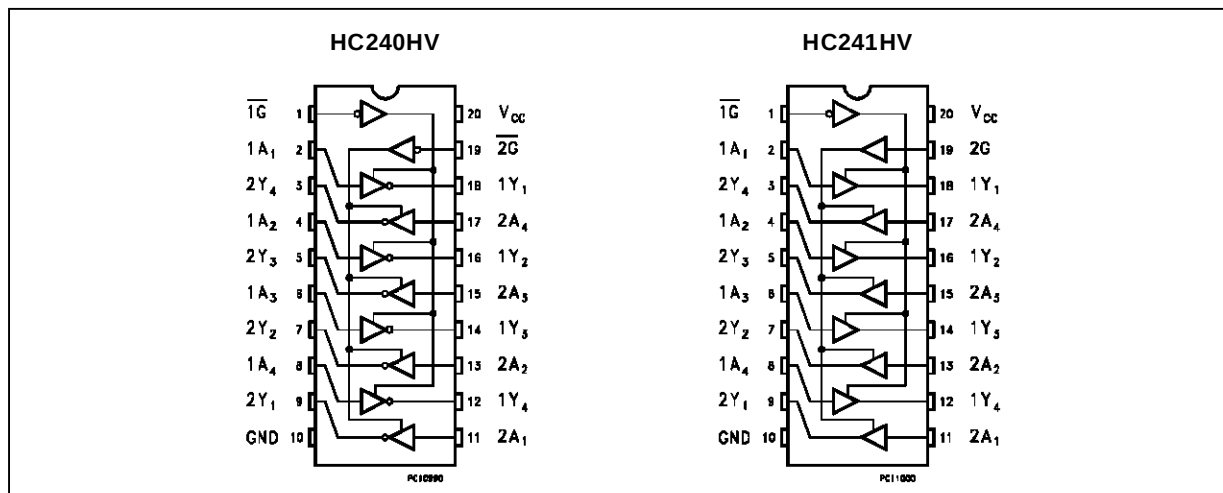
logic levels exceeding the supply voltage.

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

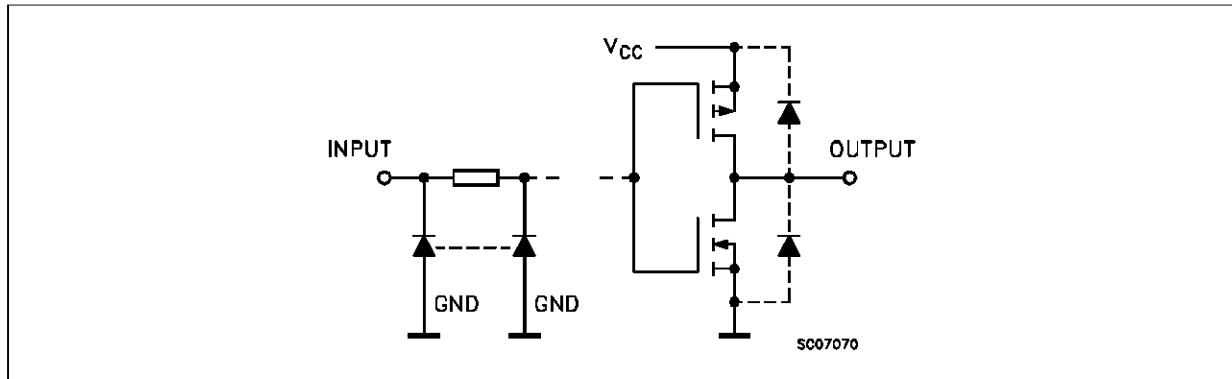
All inputs are equipped with protection circuits against static discharge and transient excess voltage.

NOTE: BOTH DEVICES DO NOT MEET 2KV ESD RATING

PIN CONNECTION (top view)



INPUT AND OUTPUT EQUIVALENT CIRCUIT



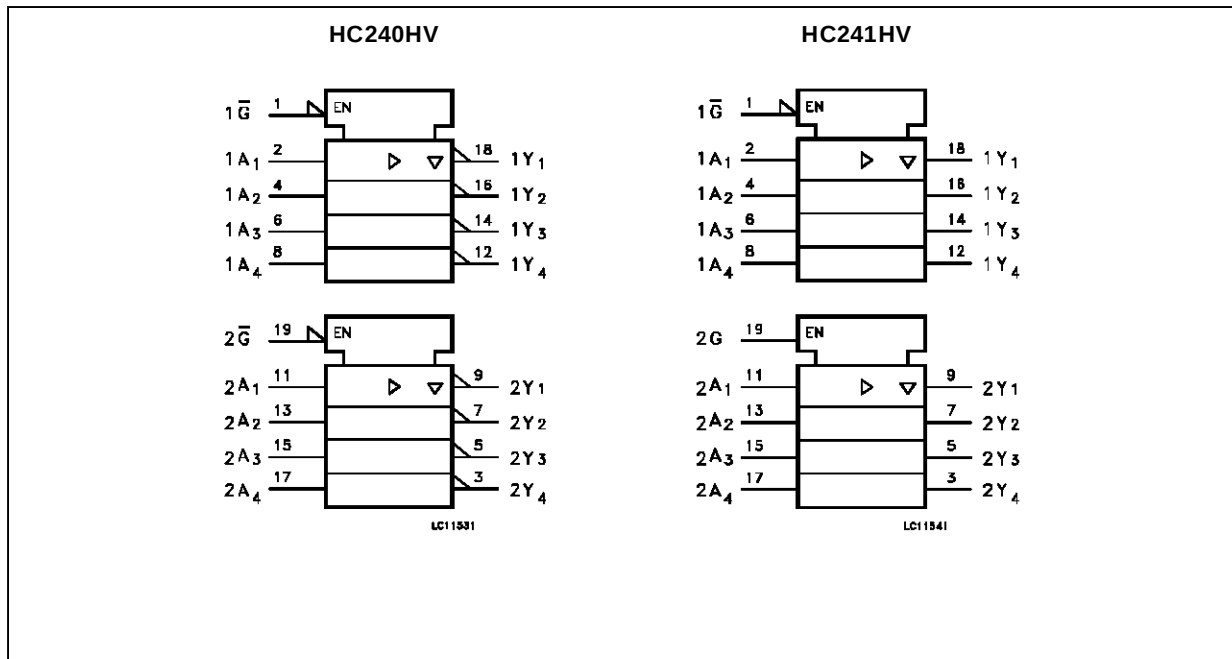
PIN DESCRIPTION (HC240HV)

PIN No	SYMBOL	NAME AND FUNCTION
1	$\overline{1G}$	Output Enable Input
2, 4, 6, 8	1A1 to 1A4	Data Inputs
9, 7, 5, 3	2Y1 to 2Y4	Data Outputs
11, 13, 15, 17	2A1 to 2A4	Data Inputs
18, 16, 14, 12	1Y1 to 1Y4	Data Outputs
19	$\overline{2G}$	Output Enabel Input
10	GND	Ground (0V)
20	V _{CC}	Positive Supply Voltage

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IEC LOGIC SYMBOLS



TRUTH TABLE

INPUT			OUTPUT	
$\overline{G}$	G (HC241)	An	$\overline{Yn}$ (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_{CC}	Supply Voltage	-0.5 to 13	V
V_I	DC Input Voltage	-0.5 to 13	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	± 100	mA
I_O	DC Output Source Sink Current Per Output Pin	± 35	mA
I_{CC} or I_{GND}	DC V_{CC} or Ground Current	± 100	mA
P_D	Power Dissipation	500 (*)	mW
T_{stg}	Storage Temperature	-65 to +150	$^{\circ}C$
T_L	Lead Temperature (10 sec)	300	$^{\circ}C$

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

(*) 500 mW: $\pm 65^{\circ}C$ derate to 300 mW by 10mW/ $^{\circ}C$: $65^{\circ}C$ to $85^{\circ}C$

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	2 to 6	V
V_I	Input Voltage	0 to 12	V
V_O	Output Voltage	0 to V_{CC}	V
T_{op}	Operating Temperature: M54HC Series M74HC Series	-55 to +125 -40 to +85	$^{\circ}C$ $^{\circ}C$
t_r, t_f	Input Rise and Fall Time	$V_{CC} = 2\text{ V}$ $V_{CC} = 4.5\text{ V}$ $V_{CC} = 6\text{ V}$	0 to 1000 0 to 500 0 to 400
			ns

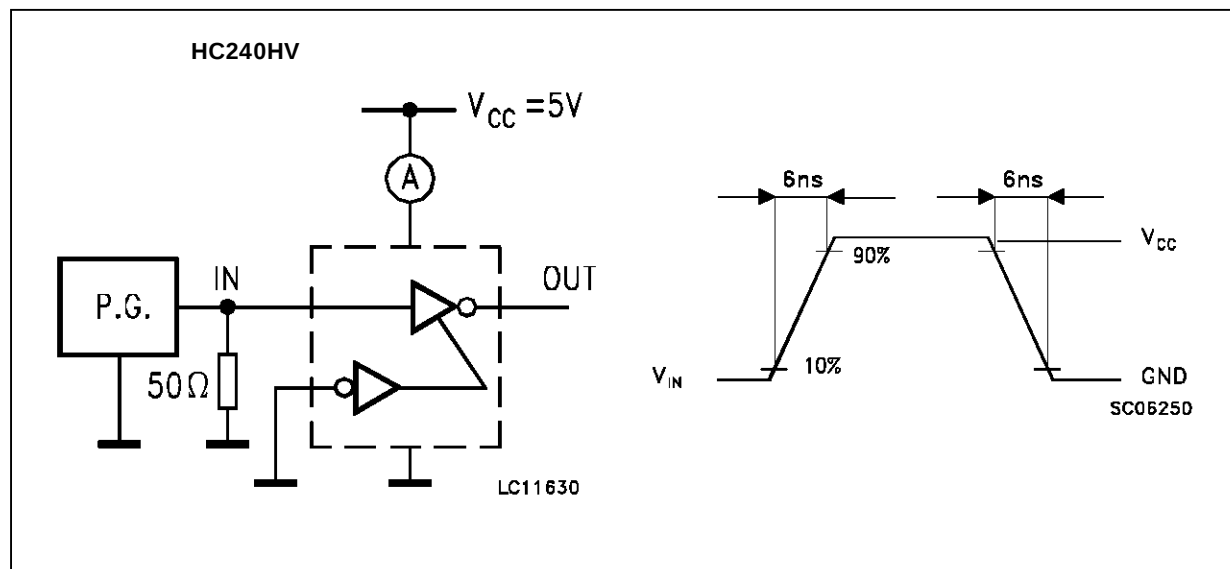
DC SPECIFICATIONS

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 =-6.0 mA		4.18	4.31		4.13		4.10			
		6.0		I _O =-7.8 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 = 6.0 mA			0.17	0.26		0.33			0.40	
		6.0		I _O = 7.8 mA			0.18	0.26		0.33			0.40	
I _I	Input Leakage Current	12.0	V _I = V _{CC} or GND				±0.1		±1		±1	μA		
I _{IH}	Input Leakage Current	2.0	V _I = 12 V				±0.1		±1		±1	μA		
I _{OZ}	3 State Output Off State Current	12.0	V _I = V _{IH} or V _{IL} V _O = V _{CC} or GND				±0.5		±5		±10	μA		
I _{CC}	Quiescent Supply Current	12.0	V _I = V _{CC} or GND				8		80		160	μA		

AC ELECTRICAL CHARACTERISTICS ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

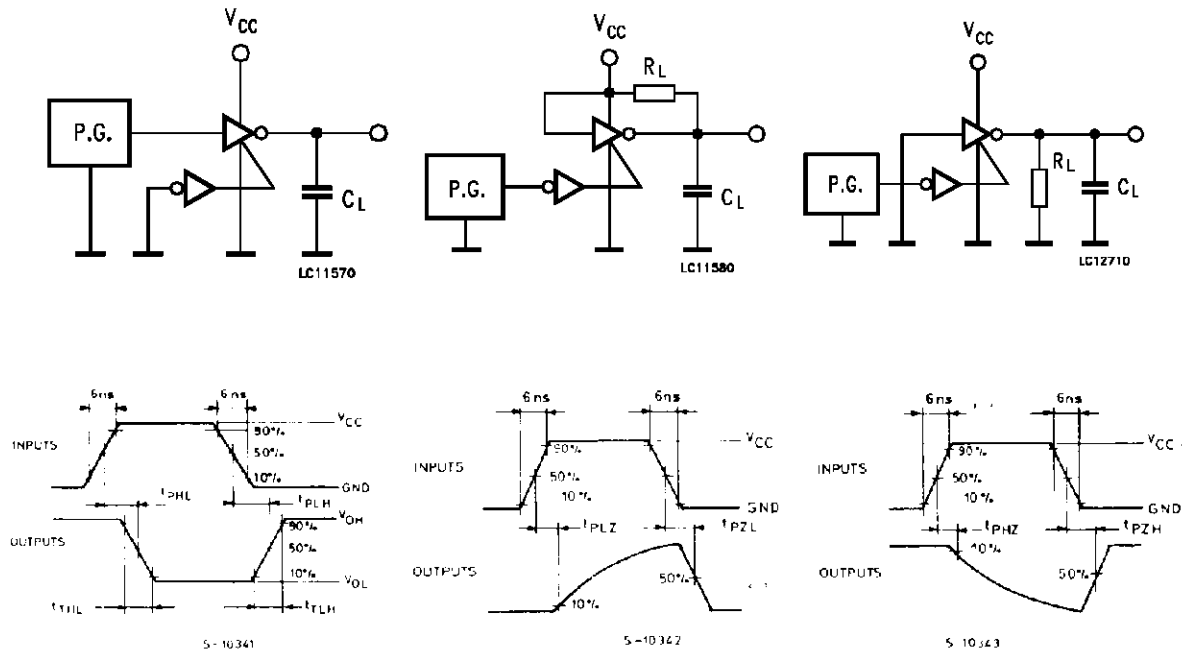
Symbol	Parameter	Test Conditions			Value						Unit	
		V _{CC} (V)	C _L (pF)		T _A = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC		
					Min.	Typ.	Max.	Min.	Max.	Min.		Max.
t _{TLH} t _{THL}	Output Transition Time	2.0 4.5 6.0	50			25 7 6	60 12 10		75 19 13		90 18 15	ns
t _{PLH} t _{PHL}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

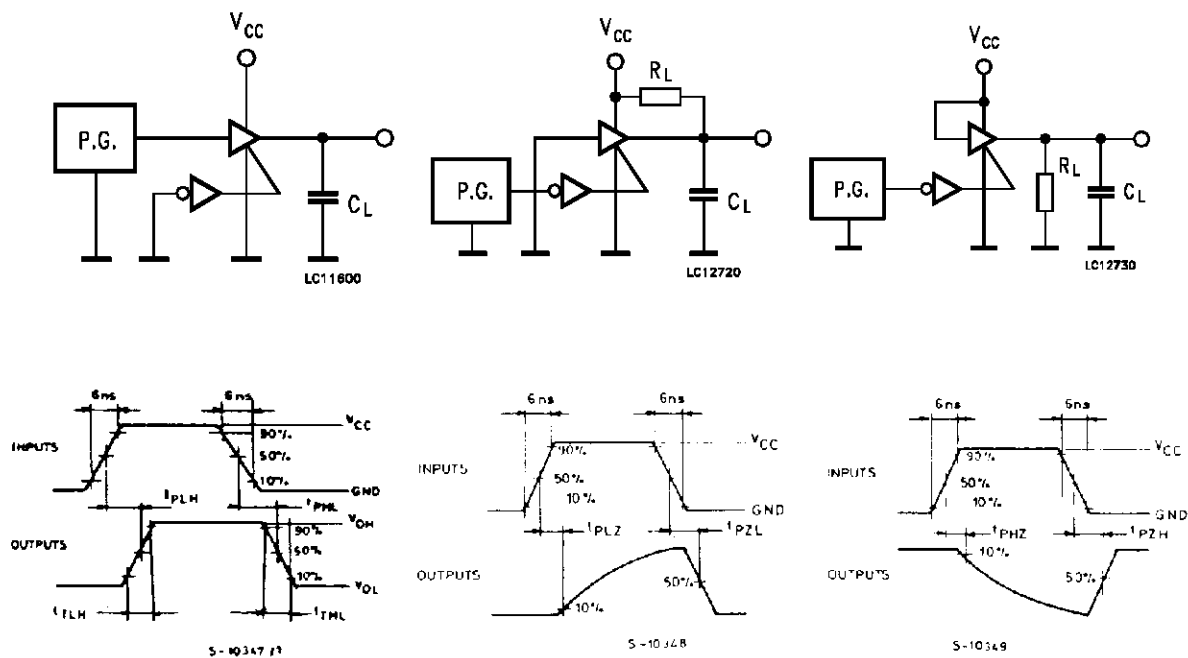
TEST CIRCUIT I_{CC} (Opr.)

SWITCHING CHARACTERISTICS TEST CIRCUIT

HC240HV

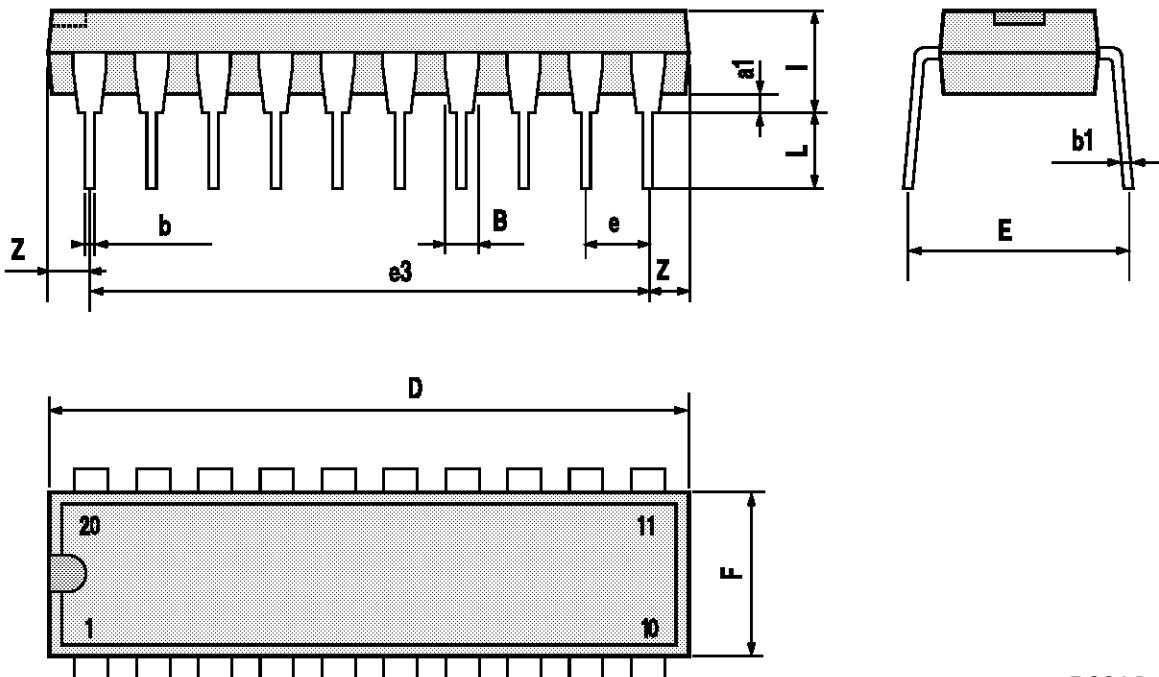


HC241HV



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



P001J

Ceramic DIP20 MECHANICAL DATA

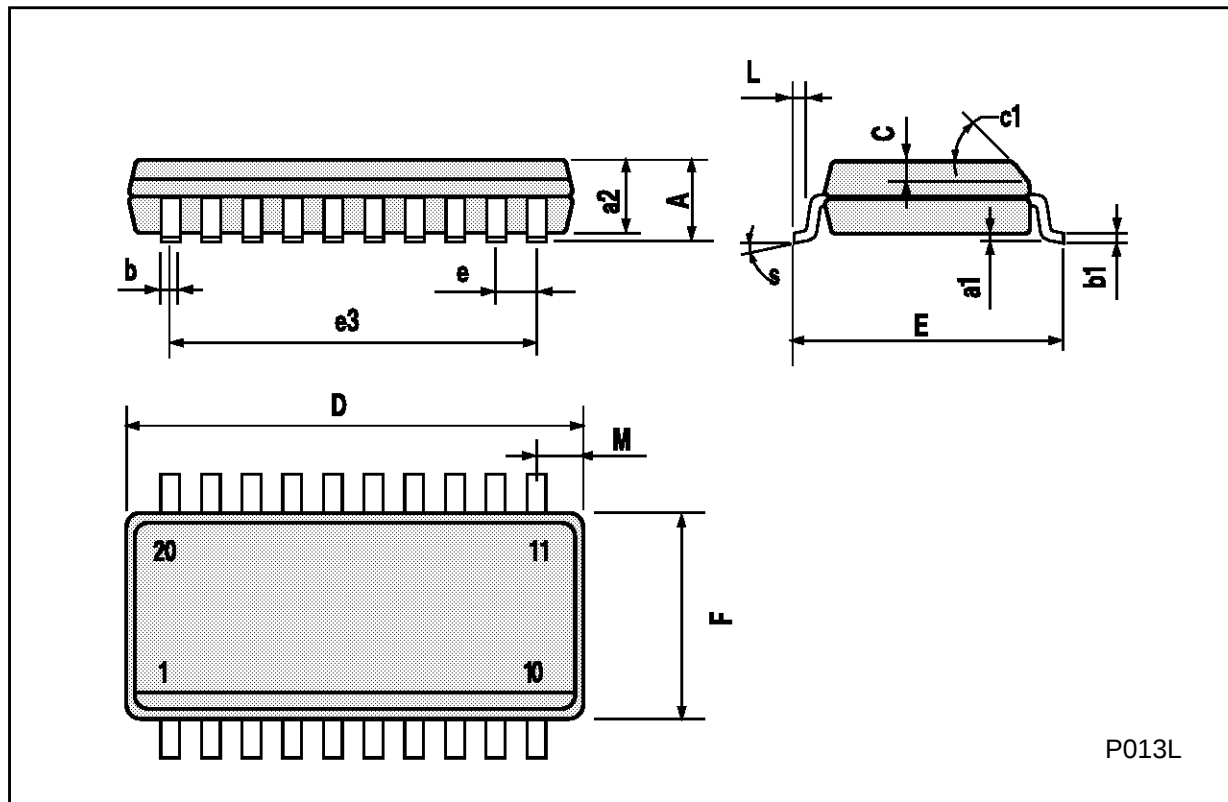
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			25			0.984
B			7.8			0.307
D		3.3			0.130	
E	0.5		1.78	0.020		0.070
e3		22.86			0.900	
F	2.29		2.79	0.090		0.110
G	0.4		0.55	0.016		0.022
I	1.27		1.52	0.050		0.060
L	0.22		0.31	0.009		0.012
M	0.51		1.27	0.020		0.050
N1	4° (min.), 15° (max.)					
P	7.9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



P057H

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.)					



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