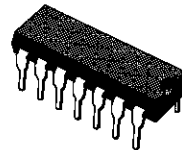
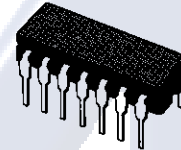


DUAL J-K FLIP FLOP WITH PRESET AND CLEAR

- **HIGH SPEED**
 $f_{MAX} = 75 \text{ MHz (TYP.) AT } V_{CC} = 5 \text{ V}$
- **LOW POWER DISSIPATION**
 $I_{CC} = 2 \mu\text{A (MAX.) AT } T_A = 25^\circ\text{C}$
- **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**
 $V_{CC} \text{ (OPR)} = 2 \text{ V TO } 6 \text{ V}$
- **PIN AND FUNCTION COMPATIBLE WITH**
54/74LS73



B1R
(Plastic Package)



F1R
(Ceramic Package)



M1R
(Micro Package)



C1R
(Chip Carrier)

ORDER CODES :

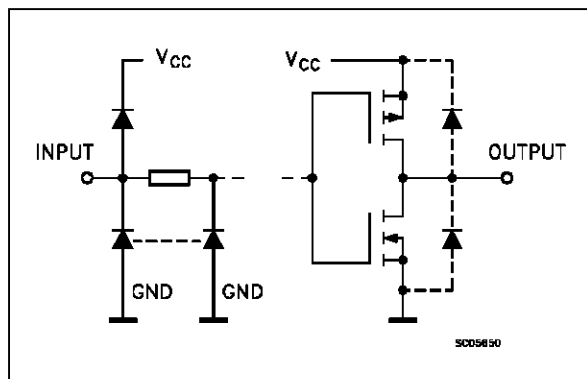
M54HC73F1R
M74HC73B1R

M74HC73M1R
M74HC73C1R

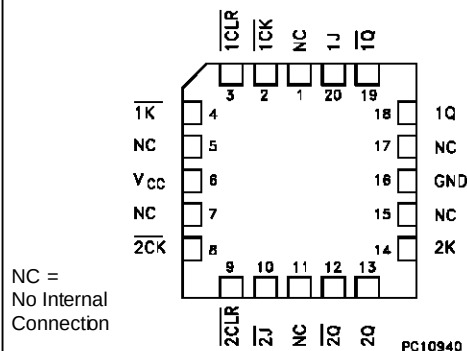
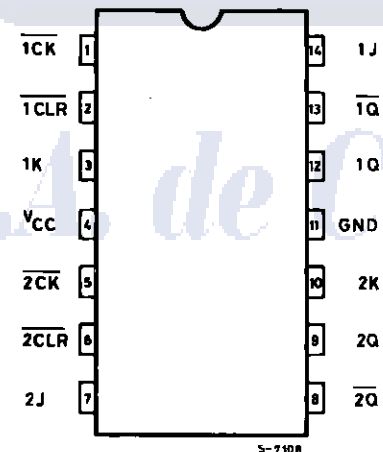
DESCRIPTION

The M54/74HC73 is a high speed CMOS DUAL J-K FLIP FLOP WITH CLEAR fabricated in silicon gate C²MOS technology. It has the same high speed performance of LSTTL combined with true CMOS low power consumption. Depending on the logic level applied to J and K inputs, this device changes state on the negative going transition of clock input pulse (CK). The clear function is accomplished independently of the clock condition when the clear input (CLR) is taken low. All inputs are equipped with protection circuits against static discharge and transient excess voltage.

INPUT AND OUTPUT EQUIVALENT CIRCUIT



PIN CONNECTIONS (top view)



NC =
No Internal
Connection

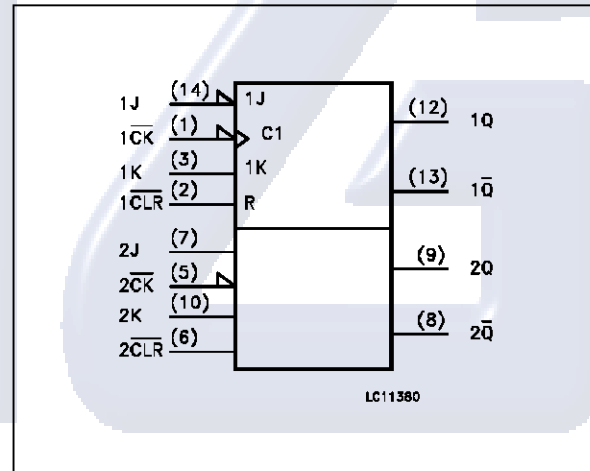
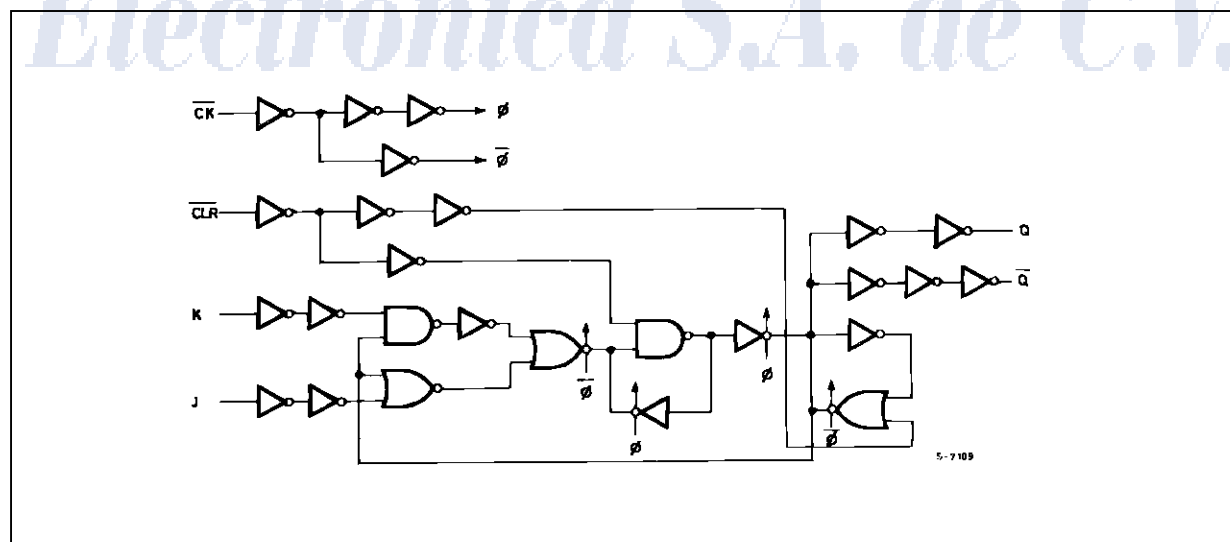
M54/M74HC73**TRUTH TABLE**

INPUTS				OUTPUTS		FUNCTION
CLR	J	K	CK	Q	$\bar{Q}$	
L	X	X	X	L	H	CLEAR
H	L	L	$\downarrow$	Q_n	$\bar{Q}_n$	NO CHANGE
H	L	H	$\downarrow$	L	H	--
H	H	L	$\downarrow$	H	L	--
H	H	H	$\downarrow$	$\bar{Q}_n$	Q_n	TOGGLE
H	X	X	$\downarrow$	Q_n	$\bar{Q}_n$	NO CHANGE

X: Don't Care

PIN DESCRIPTION

PIN No	SYMBOL	NAME AND FUNCTION
1, 5	1CK, 2CK	Clock Input
2, 6	1CLR, 2CLR	Asynchronous Reset Inputs
12, 9	1Q, 2Q	True Flip-Flop Outputs
13, 8	1 $\bar{Q}$, 2 $\bar{Q}$	Complement Flip-Flop Outputs
14, 7, 3, 10	1J, 2J, 1K, 2K	Synchronous Inputs; Flip-Flop 1 And 2
11	GND	Ground (0V)
4	V _{CC}	Positive Supply Voltage

IEC LOGIC SYMBOL**LOGIC DIAGRAM**

M54/M74HC73**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V _{CC}	Supply Voltage	-0.5 to +7	V
V _I	DC Input Voltage	-0.5 to V _{CC} + 0.5	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	± 20	mA
I _O	DC Output Source Sink Current Per Output Pin	± 25	mA
I _{CC} or I _{GND}	DC V _{CC} or Ground Current	± 50	mA
P _D	Power Dissipation	500 (*)	mW
T _{stg}	Storage Temperature	-65 to +150	°C
T _L	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 _{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	0 to 1000	ns
		V _{CC} = 4.5 V	0 to 500	
		V _{CC} = 6 V	0 to 400	

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M54/M74HC73**DC SPECIFICATIONS**

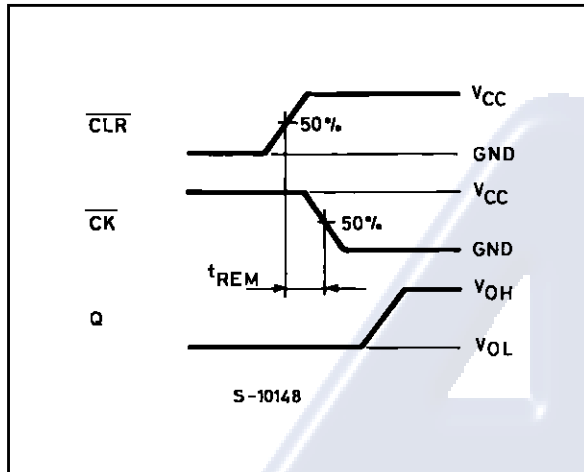
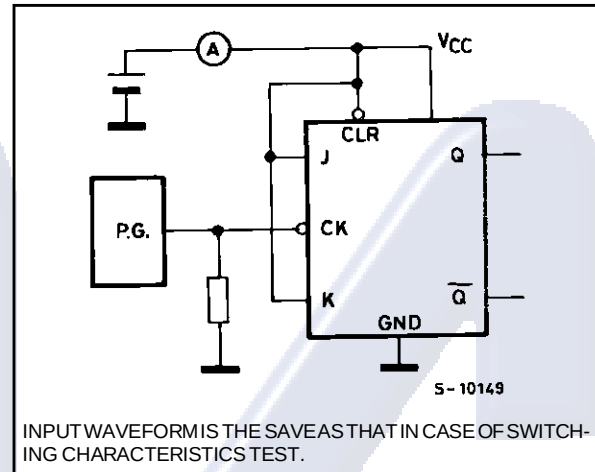
Symbol	Parameter	Test Conditions		Value								Unit
		V _{CC} (V)		T _A = 25 °C 54HC and 74HC			-40 to 85 °C 74HC		-55 to 125 °C 54HC			
				Min.	Typ.	Max.	Min.	Max.	Min.	Max.		
V _{IH}	High Level Input Voltage	2.0		1.5			1.5		1.5		V	
		4.5		3.15			3.15		3.15			
		6.0		4.2			4.2		4.2			
V _{IL}	Low Level 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
		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			2		20		40	μA	

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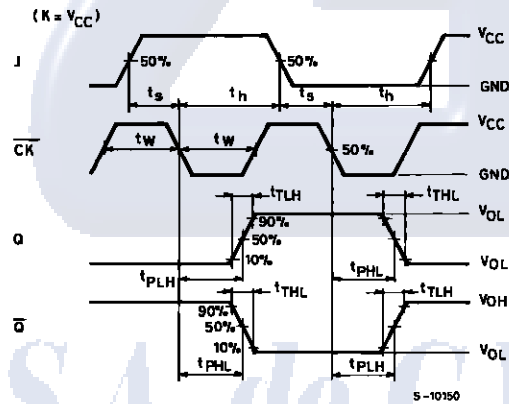
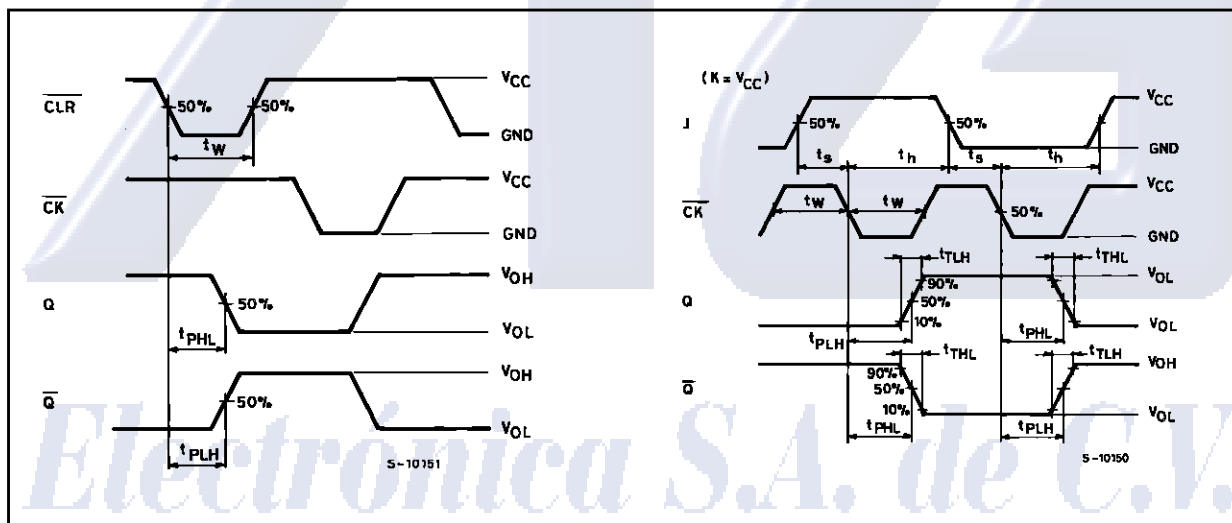
M54/M74HC73**AC ELECTRICAL CHARACTERISTICS** ($C_L = 50 \text{ pF}$, Input $t_r = t_f = 6 \text{ ns}$)

Symbol	Parameter	Test Conditions		Value						Unit	
		V _{CC} (V)		T _A = 25 °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 (CLOCK - Q)	2.0			42	125		155		190	ns
		4.5			14	25		31		38	
		6.0			12	21		26		32	
t _{PLH} t _{PHL}	Propagation Delay Time (CLEAR - Q)	2.0			54	145		180		220	ns
		4.5			18	29		36		44	
		6.0			15	25		31		37	
f _{MAX}	Maximum Clock Frequency	2.0		6	15		4.8		4		MHz
		4.5		30	60		24		20		
		6.0		35	80		28		24		
t _{W(H)} t _{W(L)}	Minimum Pulse Width (CLOCK)	2.0			18	75		95		110	ns
		4.5			6	15		19		22	
		6.0			6	13		16		19	
t _{W(L)}	Minimum Pulse Width (CLEAR)	2.0			21	75		95		110	ns
		4.5			7	15		19		22	
		6.0			6	13		16		19	
t _s	Minimum Set-up Time	2.0			30	75		95		110	ns
		4.5			8	15		19		22	
		6.0			6	13		16		19	
t _h	Minimum Hold Time	2.0				0		0		0	ns
		4.5				0		0		0	
		6.0				0		0		0	
t _{REM}	Minimum Removal Time	2.0			25	75		95		110	ns
		4.5			7	15		19		22	
		6.0			6	13		16		19	
C _{IN}	Input Capacitance				5	10		10		10	pF
C _{PD} (*)	Power Dissipation Capacitance				35						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. $I_{CC(opr)} = C_{PD} \cdot V_{CC} \cdot f_{IN} + I_{CC}/2$ (per FLIP/FLOP)

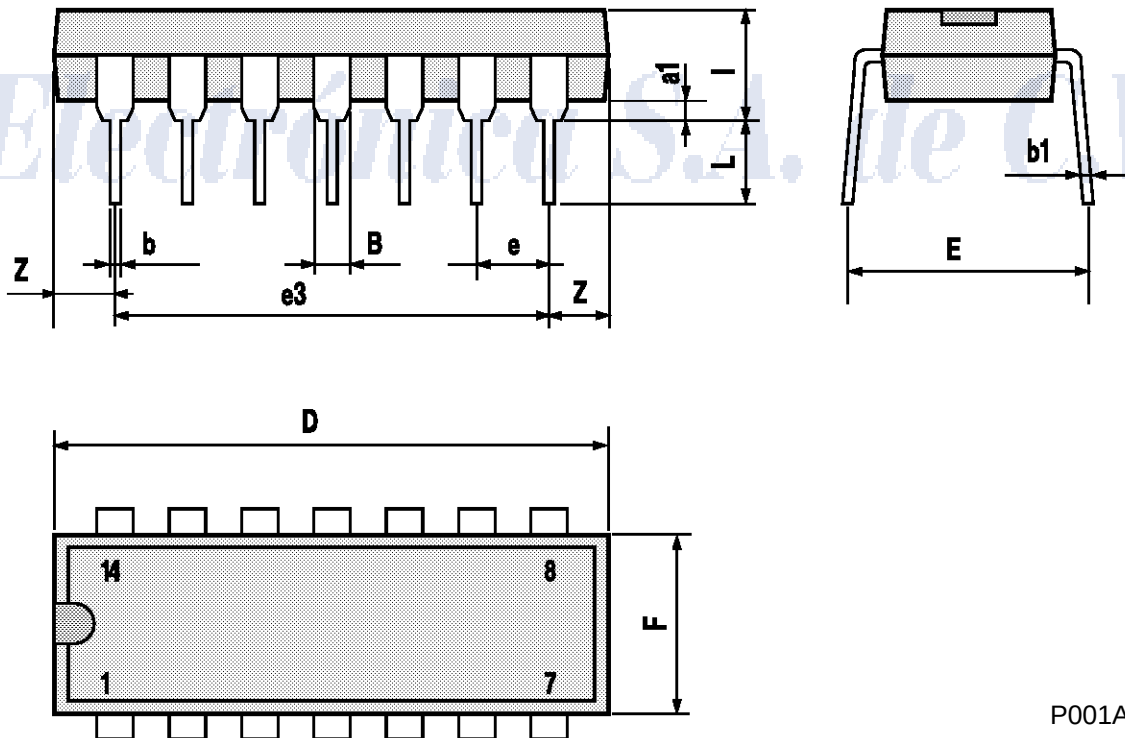
M54/M74HC73**SWITCHING CHARACTERISTICS TEST****TEST CIRCUIT I_{CC} (Opr.)**

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

SWITCHING CHARACTERISTICS TEST WAVEFORM

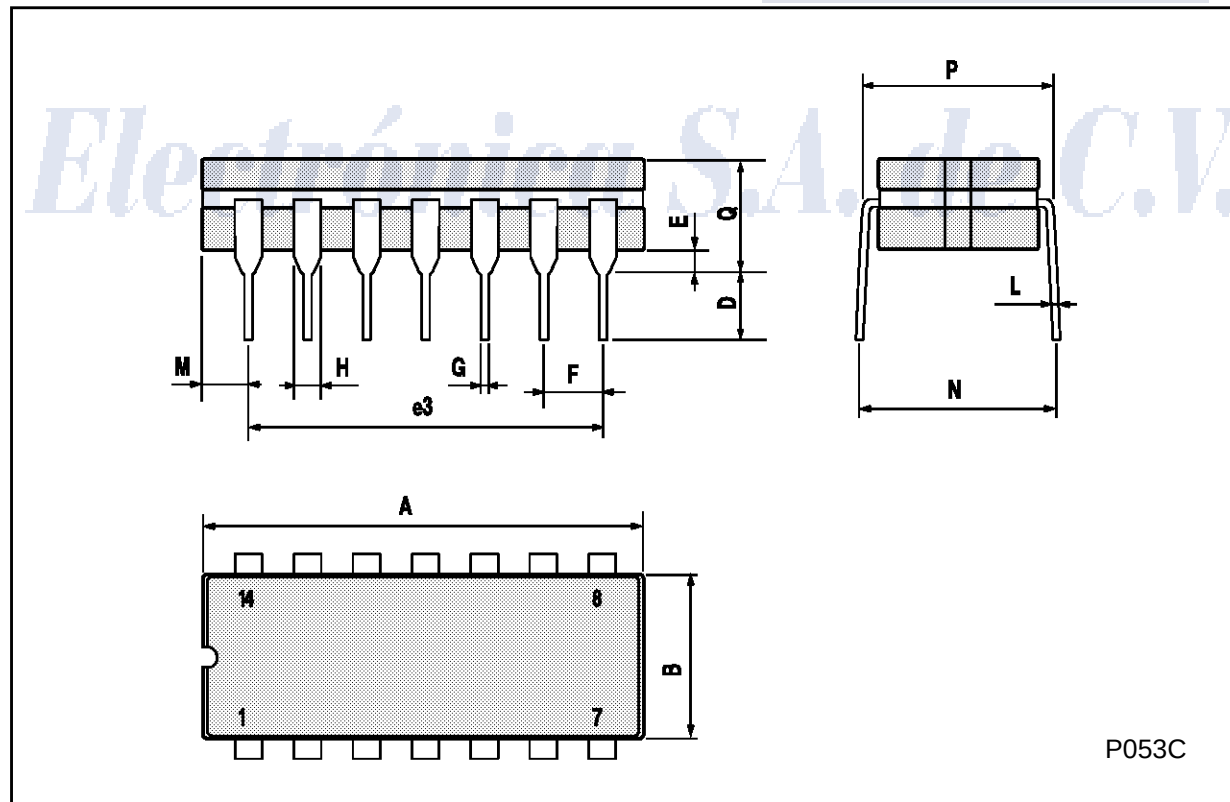
M54/M74HC73**Plastic DIP14 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	1.39		1.65	0.055		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		15.24			0.600	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z	1.27		2.54	0.050		0.100



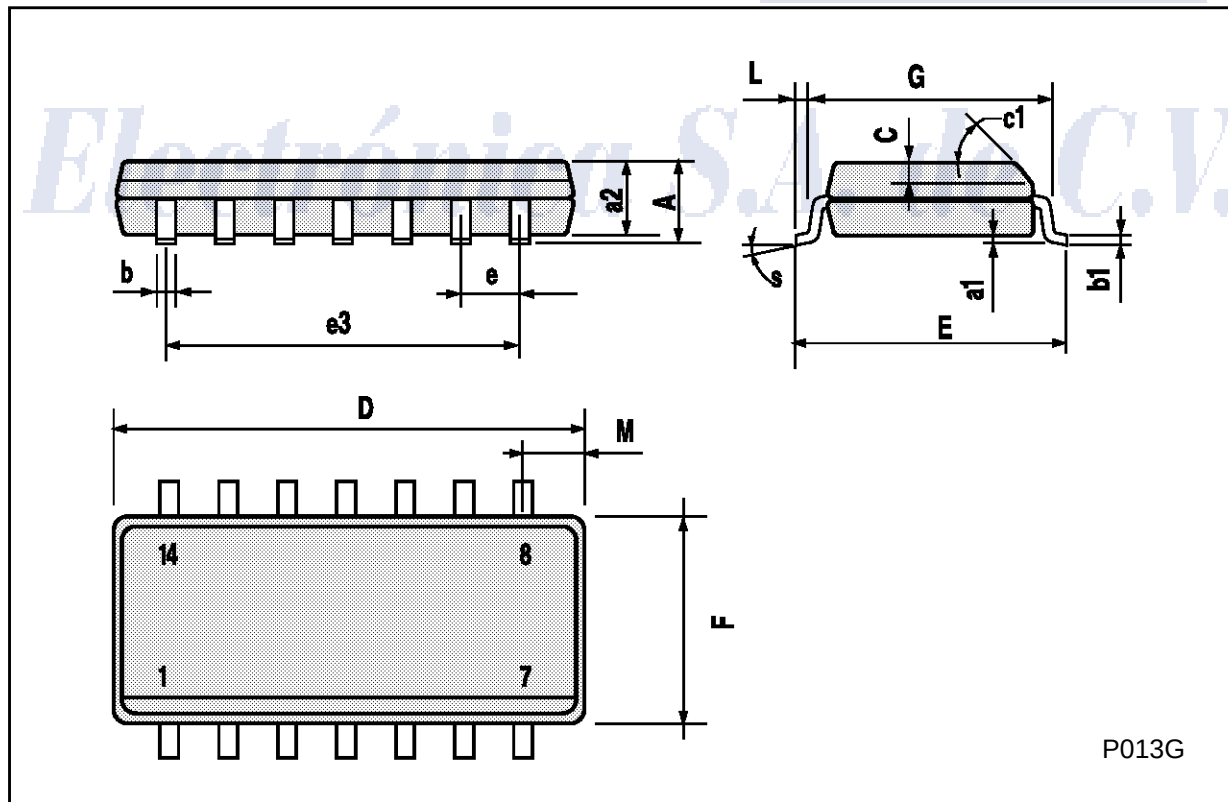
M54/M74HC73**Ceramic DIP14/1 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			20			0.787
B			7.0			0.276
D		3.3			0.130	
E	0.38			0.015		
e3		15.24			0.600	
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	1.52		2.54	0.060		0.100
N			10.3			0.406
P	7.8		8.05	0.307		0.317
Q			5.08			0.200



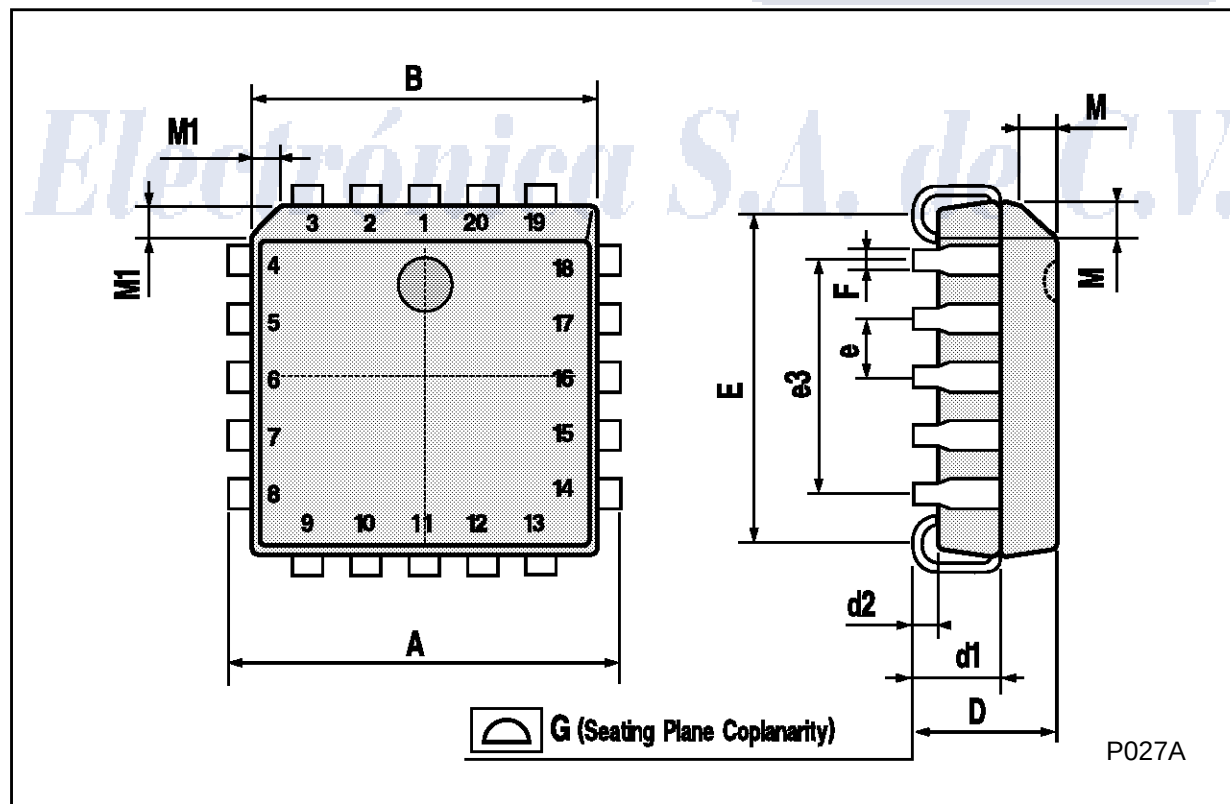
M54/M74HC73**SO14 MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.2	0.003		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	8.55		8.75	0.336		0.344
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		7.62			0.300	
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			0.68			0.026
S	8° (max.)					



M54/M74HC73**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	



M54/M74HC73

AG

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