

Absolute Maximum Ratings (Notes 1 & 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CC})	-0.5 to +7.0V
DC Input Voltage (V_{IN})	-1.5 to $V_{CC} + 1.5V$
DC Output Voltage (V_{OUT})	-0.5 to $V_{CC} + 0.5V$
Clamp Diode Current (I_{IK}, I_{OK})	± 20 mA
DC Output Current, per pin (I_{OUT})	± 25 mA
DC V_{CC} or GND Current, per pin (I_{CC})	± 50 mA
Storage Temperature Range (T_{STG})	-65°C to +150°C
Power Dissipation (P_D) (Note 3)	600 mW
S.O. Package only	500 mW
Lead Temp. (T_L) (Soldering 10 seconds)	260°C

Operating Conditions

	Min	Max	Units
Supply Voltage (V_{CC})	2	6	V
DC Input or Output Voltage (V_{IN}, V_{OUT})	0	V_{CC}	V
Operating Temp. Range (T_A)			
MM74HC	-40	+85	°C
MM54HC	-55	+125	°C
Input Rise or Fall Times (t_r, t_f)			
$V_{CC} = 2.0V$		1000	ns
$V_{CC} = 4.5V$		500	ns
$V_{CC} = 6.0V$		400	ns

DC Electrical Characteristics (Note 4)

Symbol	Parameter	Conditions	V_{CC}	$T_A = 25^\circ C$			74HC		54HC		Units
							$T_A = -40$ to $85^\circ C$		$T_A = -55$ to $125^\circ C$		
				Typ	Guaranteed Limits						
V_{IH}	Minimum High Level Input Voltage		2.0V		1.5	1.5	1.5		V		
			4.5V		3.15	3.15	3.15	V			
			6.0V		4.2	4.2	4.2	V			
V_{IL}	Maximum Low Level Input Voltage**		2.0V		0.5	0.5	0.5		V		
			4.5V		1.35	1.35	1.35	V			
			6.0V		1.8	1.8	1.8	V			
V_{OH}	Minimum High Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 20 \mu A$	2.0V	2.0	1.9	1.9	1.9		V		
			4.5V	4.5	4.4	4.4	4.4	V			
			6.0V	6.0	5.9	5.9	5.9	V			
		$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 4.0$ mA $ I_{OUT} \leq 5.2$ mA	4.5V	4.2	3.98	3.84	3.7	V			
			6.0V	5.7	5.48	5.34	5.2	V			
V_{OL}	Maximum Low Level Output Voltage	$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 20 \mu A$	2.0V	0	0.1	0.1	0.1		V		
			4.5V	0	0.1	0.1	0.1	V			
			6.0V	0	0.1	0.1	0.1	V			
		$V_{IN} = V_{IH}$ or V_{IL} $ I_{OUT} \leq 4.0$ mA $ I_{OUT} \leq 5.2$ mA	4.5V	0.2	0.26	0.33	0.4	V			
			6.0V	0.2	0.26	0.33	0.4	V			
I_{IN}	Maximum Input Current	$V_{IN} = V_{CC}$ or GND	6.0V		± 0.1	± 1.0	± 1.0	μA			
I_{CC}	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND $I_{OUT} = 0 \mu A$	6.0V		4.0	40	80	μA			

Note 1: Absolute Maximum Ratings are those values beyond which damage to the device may occur.

Note 2: Unless otherwise specified all voltages are referenced to ground.

Note 3: Power Dissipation temperature derating — plastic "N" package: -12 mW/°C from 65°C to 85°C; ceramic "J" package: -12 mW/°C from 100°C to 125°C.

Note 4: For a power supply of $5V \pm 10\%$ the worst case output voltages (V_{OH} , and V_{OL}) occur for HC at 4.5V. Thus the 4.5V values should be used when designing with this supply. Worst case V_{IH} and V_{IL} occur at $V_{CC} = 5.5V$ and 4.5V respectively. (The V_{IH} value at 5.5V is 3.85V.) The worst case leakage current (I_{IN} , I_{CC} , and I_{OZ}) occur for CMOS at the higher voltage and so the 6.0V values should be used.

** V_{IL} limits are currently tested at 20% of V_{CC} . The above V_{IL} specification (30% of V_{CC}) will be implemented no later than Q1, CY'89.

AC Electrical Characteristics $V_{CC} = 5V$, $T_A = 25^\circ C$, $C_L = 15\text{ pF}$, $t_r = t_f = 6\text{ ns}$

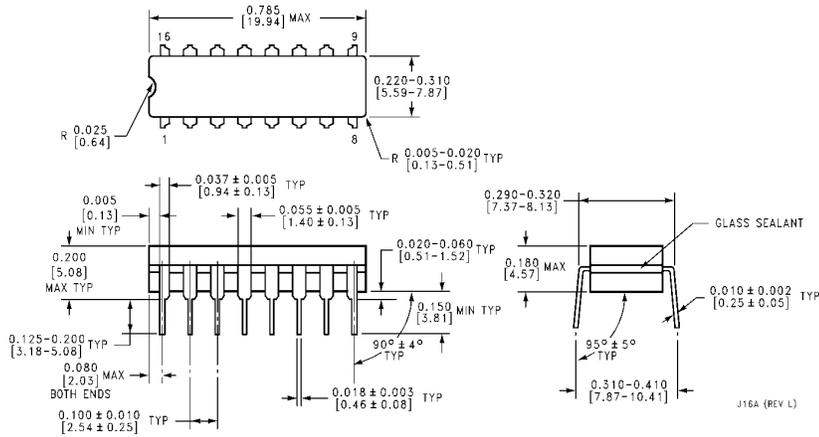
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Data to Q		14	23	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Data to \bar{Q}		10	20	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Enable to Q		16	27	ns
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Enable to \bar{Q}		11	23	ns
t_s	Minimum Set Up Time			20	ns
t_H	Minimum Hold Time		-2	0	ns
t_W	Minimum Pulse Width			16	ns

AC Electrical Characteristics $C_L = 50\text{ pF}$, $t_r = t_f = 6\text{ ns}$ (unless otherwise specified)

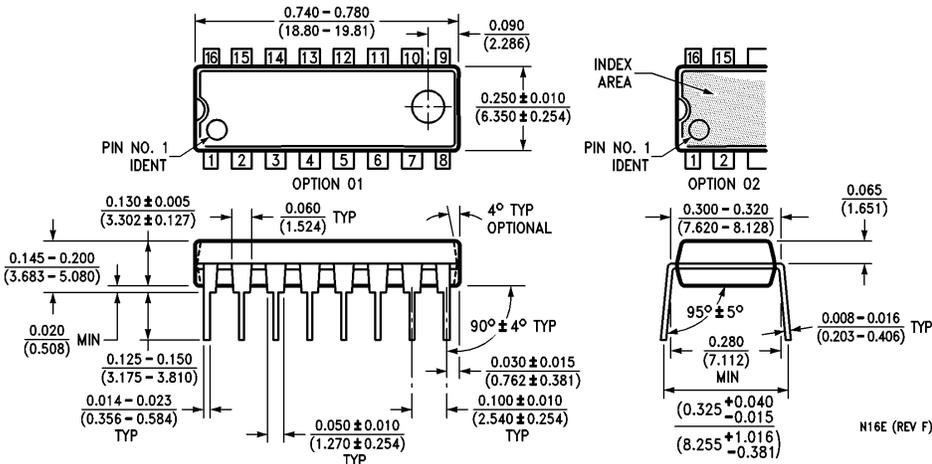
Symbol	Parameter	Conditions	V_{CC}	$T_A = 25^\circ C$		74HC $T_A = -40\text{ to }85^\circ C$		54HC $T_A = -55\text{ to }125^\circ C$		Units
				Typ	Guaranteed Limits	Guaranteed Limits	Guaranteed Limits			
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Data to Q		2.0V	37	125	156	188	ns		
			4.5V	15	25	32	38	ns		
			6.0V	14	24	27	32	ns		
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Data to \bar{Q}		2.0V	29	110	138	165	ns		
			4.5V	12	22	28	33	ns		
			6.0V	11	19	24	29	ns		
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Enable to Q		2.0V	40	145	181	218	ns		
			4.5V	18	29	36	44	ns		
			6.0V	16	25	31	38	ns		
t_{PHL} , t_{PLH}	Maximum Propagation Delay, Enable to \bar{Q}		2.0V	36	125	156	188	ns		
			4.5V	15	25	31	38	ns		
			6.0V	14	22	28	33	ns		
t_s	Minimum Set Up Time Data to Enable		2.0V	40	100	125	150	ns		
			4.5V	10	20	25	30	ns		
			6.0V	9	17	21	25	ns		
t_H	Minimum Hold Time Enable to Data		2.0V	-10	0	0	0	ns		
			4.5V	-2	0	0	0	ns		
			6.0V	-2	0	0	0	ns		
t_W	Minimum Enable Pulse Width		2.0V	40	80	100	120	ns		
			4.5V	11	16	20	24	ns		
			6.0V	9	14	18	21	ns		
t_{TLH} , t_{THL}	Maximum Output Rise and Fall Time		2.0V	25	75	95	110	ns		
			4.5V	7	15	19	22	ns		
			6.0V	6	13	16	19	ns		
C_{PD}	Power Dissipation Capacitance (Note 5)	(per commonly clocked latched pair)		40				pF		
C_{IN}	Maximum Input Capacitance			5	10	10	10	pF		

Note 5: C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

Physical Dimensions inches (millimeters)



**Order Number MM54HC75J or MM74HC75J
NS Package J16A**



**Order Number MM54HC75N
NS Package N16E**

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National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: (800) 272-9959
Fax: (800) 737-7018

National Semiconductor Europe
Fax: (+49) 0-180-530 85 86
Email: onjwge@tevm2.nsc.com
Deutsch Tel: (+49) 0-180-530 85 85
English Tel: (+49) 0-180-532 78 32
Français Tel: (+49) 0-180-532 93 58
Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
19th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
Tel: 81-043-299-2309
Fax: 81-043-299-2408

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