

## MM74HC573 3-STATE Octal D-Type Latch

### General Description

The MM74HC573 high speed octal D-type latches utilize advanced silicon-gate P-well CMOS technology. They possess the high noise immunity and low power consumption of standard CMOS integrated circuits, as well as the ability to drive 15 LS-TTL loads. Due to the large output drive capability and the 3-STATE feature, these devices are ideally suited for interfacing with bus lines in a bus organized system.

When the LATCH ENABLE(LE) input is HIGH, the Q outputs will follow the D inputs. When the LATCH ENABLE goes LOW, data at the D inputs will be retained at the outputs until LATCH ENABLE returns HIGH again. When a HIGH logic level is applied to the OUTPUT CONTROL OC input, all outputs go to a HIGH impedance state, regardless of what signals are present at the other inputs and the state of the storage elements.

The 74HC logic family is speed, function and pinout compatible with the standard 74LS logic family. All inputs are protected from damage due to static discharge by internal diode clamps to  $V_{CC}$  and ground.

### Features

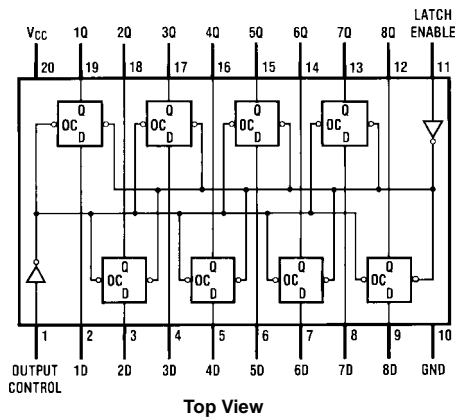
- Typical propagation delay: 18 ns
- Wide operating voltage range: 2 to 6 volts
- Low input current: 1  $\mu$ A maximum
- Low quiescent current: 80  $\mu$ A maximum (74HC Series)
- Compatible with bus-oriented systems
- Output drive capability: 15 LS-TTL loads

### Ordering Code:

Order Number	Package Number	Package Description
MM74HC573WM	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
MM74HC573SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
MM74HC573MTC	MTC20	20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
MM74HC573N	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Devices also available in Tape and Reel. Specify by appending the suffix letter "X" to the ordering code.

### Connection Diagram



### Truth Table

Output Control	Latch Enable	Data	Output
L	H	H	H
L	H	L	L
L	L	X	$Q_0$
H	X	X	Z

H = HIGH Level  
L = LOW Level  
 $Q_0$  = Level of output before steady-state input conditions were established.  
Z = High Impedance  
X = Don't Care

**Absolute Maximum Ratings** (Note 1)

(Note 2)

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 ( $I_{IK}, I_{OK}$ )	$\pm 20$ mA
DC Output Current, per pin ( $I_{OUT}$ )	$\pm 35$ mA
DC $V_{CC}$ or GND Current, per pin ( $I_{CC}$ )	$\pm 70$ 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 Temperature ( $T_L$ )	
(Soldering 10 seconds)	260°C

**Recommended 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 Temperature Range ( $T_A$ )	-40	+85	°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

**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.

**DC Electrical Characteristics** (Note 4)

Symbol	Parameter	Conditions	$V_{CC}$	$T_A = 25^\circ C$		$T_A = -40$ to $85^\circ C$	$T_A = -55$ to $125^\circ C$	Units
				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 6.0$ mA $ I_{OUT}  \leq 7.8$ 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 6.0$ mA $ I_{OUT}  \leq 7.8$ 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		$\pm 0.1$	$\pm 1.0$	$\pm 1.0$	$\mu A$
$I_{OZ}$	Maximum 3-STATE Output Leakage Current	$V_{OUT} = V_{CC}$ or GND $OC = V_{IH}$	6.0V		$\pm 0.5$	$\pm 5.0$	$\pm 10$	$\mu A$
$I_{CC}$	Maximum Quiescent Supply Current	$V_{IN} = V_{CC}$ or GND $I_{OUT} = 0 \mu A$	6.0V		8.0	80	160	$\mu A$
$\Delta I_{CC}$	Quiescent Supply Current per Input Pin	$V_{CC} = 5.5V$ $V_{IN} = 2.4V$ or 0.4V (Note 4)	OE	1.0	1.5	1.8	2.0	mA
			LE	0.6	0.8	1.0	1.1	mA
			DATA	0.4	0.5	0.6	0.7	mA

**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.

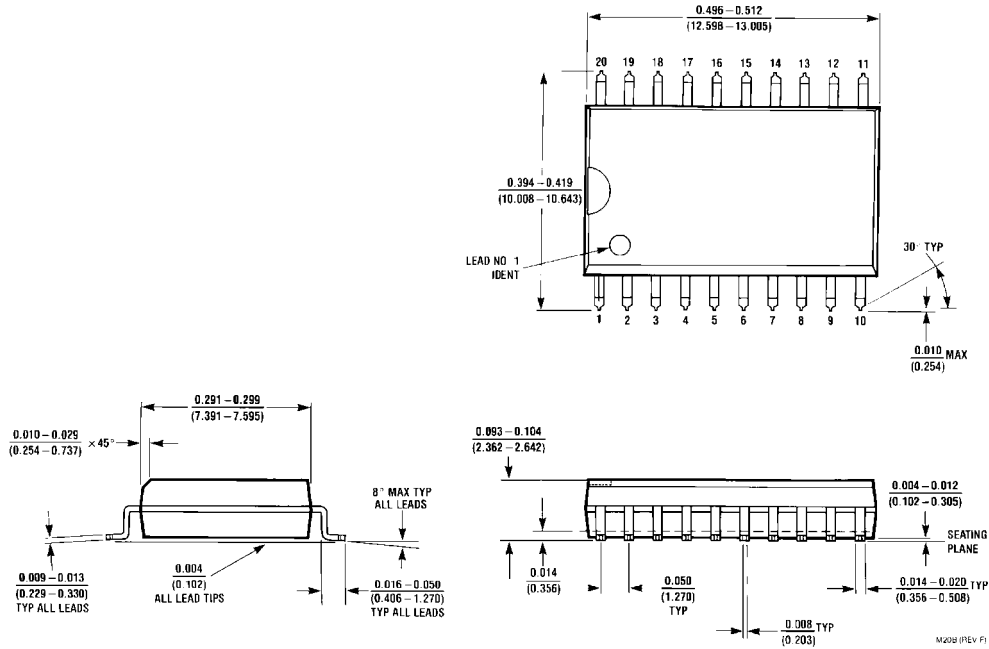
AC Electrical Characteristics															
$V_{CC} = 5V, T_A = 25^\circ C, t_r = t_f = 6 ns$															
Symbol	Parameter	Conditions	Typ	Guaranteed Limit	Units										
$t_{PHL}, t_{PLH}$	Maximum Propagation Delay, Data to Q	$C_L = 45 pF$	16	20	ns										
$t_{PHL}, t_{PLH}$	Maximum Propagation Delay, LE to Q	$C_L = 45 pF$	14	22	ns										
$t_{PZH}, t_{PZL}$	Maximum Output Enable Time	$R_L = 1 k\Omega$ $C_L = 45 pF$	15	27	ns										
$t_{PHZ}, t_{PLZ}$	Maximum Output Disable Time	$R_L = 1 k\Omega$ $C_L = 5 pF$	13	23	ns										
$t_S$	Minimum Set Up Time, Data to LE		10	15	ns										
$t_H$	Minimum Hold Time, LE to Data		2	5	ns										
$t_W$	Minimum Pulse Width, LE or Data		10	16	ns										
AC Electrical Characteristics															
Symbol	Parameter	Conditions	$V_{CC}$	$T_A = 25^\circ C$				Units							
				Typ	Guaranteed Limits										
$t_{PHL}, t_{PLH}$	Maximum Propagation Delay Data to Q	$C_L = 50 pF$	2.0V	45	110	138	165	ns							
			2.0V	58	150	188	225	ns							
		$C_L = 150 pF$	4.5V	17	22	28	33	ns							
			4.5V	21	30	38	40	ns							
			6.0V	15	19	24	29	ns							
$t_{PHL}, t_{PLH}$	Maximum Propagation Delay, LE to Q	$C_L = 50 pF$	2.0V	46	115	138	165	ns							
			2.0V	60	155	194	233	ns							
		$C_L = 150 pF$	4.5V	14	23	29	35	ns							
			4.5V	21	31	47	47	ns							
			6.0V	12	20	25	30	ns							
$t_{PZH}, t_{PZL}$	Maximum Output Enable Time	$R_L = 1 k\Omega$	2.0V	55	140	175	210	ns							
									$C_L = 50 pF$	2.0V	67	180	225	270	ns
		$C_L = 150 pF$	4.5V	15	28	35	42	ns							
			4.5V	24	36	45	54	ns							
		$C_L = 50 pF$	6.0V	14	24	30	36	ns							
$t_{PHZ}, t_{PLZ}$	Maximum Output Disable Time	$R_L = 1 k\Omega$	2.0V	40	125	156	188	ns							
			$C_L = 50 pF$	4.5V	13	25	31	38	ns						
		6.0V		12	21	27	32	ns							
		$C_L = 150 pF$		4.5V	10	15	19	22	ns						
			6.0V	9	13	16	19	ns							
$t_S$	Minimum Set Up Time Data to LE		2.0V	30	75	95	110	ns							
			4.5V	10	15	19	22	ns							
			6.0V	9	13	16	19	ns							
$t_H$	Minimum Hold Time LE to Data		2.0V		25	31	38	ns							
			4.5V		5	6	7	ns							
			6.0V		4	5	6	ns							
$t_W$	Minimum Pulse Width LE, or Data		2.0V	30	80	100	120	ns							
			4.5V	9	16	20	24	ns							
			6.0V	8	14	18	20	ns							
$t_{TLH}, t_{THL}$	Maximum Output Rise and Fall Time, Clock	$C_L = 50 pF$	2.0V	25	60	75	90	ns							
			4.5V	7	12	15	18	ns							
			6.0V	6	10	13	15	ns							
$C_{PD}$	Power Dissipation Capacitance (Note 5) (per latch)	OC = $V_{CC}$	5				pF								
		OC = GND	52				pF								
$C_{IN}$	Maximum Input Capacitance		5	10	10	10	pF								

## AC Electrical Characteristics (Continued)

Symbol	Parameter	Conditions	V <sub>CC</sub>	T <sub>A</sub> = 25°C		T <sub>A</sub> = -40 to 85°C	T <sub>A</sub> = -55 to 125°C	Units
				Typ	Guaranteed Limits			
C <sub>OUT</sub>	Maximum Output Capacitance			15	20	20	20	pF

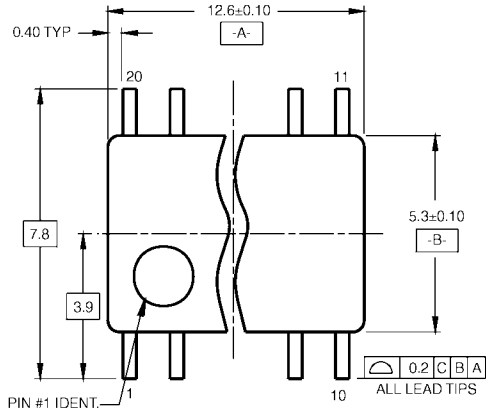
**Note 5:** C<sub>PD</sub> determines the no load dynamic power consumption,  $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$ , and the no load dynamic current consumption,  $I_S = C_{PD} V_{CC} f + I_{CC}$ .

**Physical Dimensions** inches (millimeters) unless otherwise noted



**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide  
Package Number M20B**

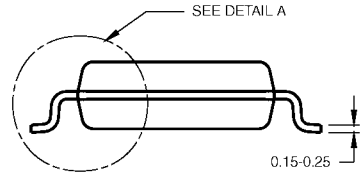
**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS



DETAIL A

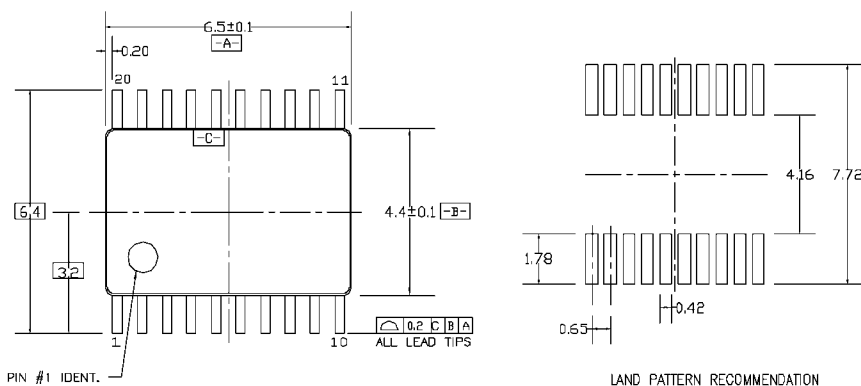
NOTES:

- A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M20DRevB1

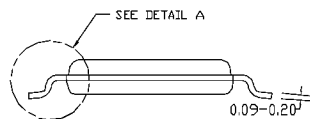
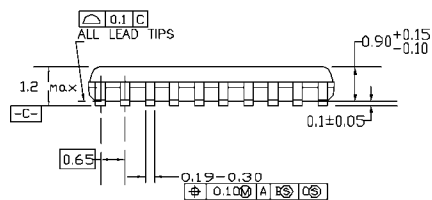
**20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide Package Number M20D**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



PIN #1 IDENT.

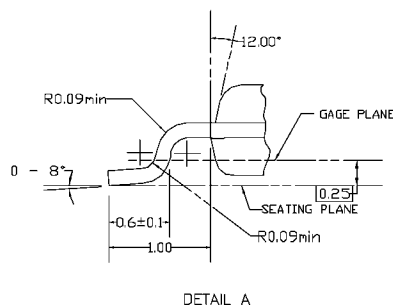
LAND PATTERN RECOMMENDATION



DIMENSIONS ARE IN MILLIMETERS

NOTES:

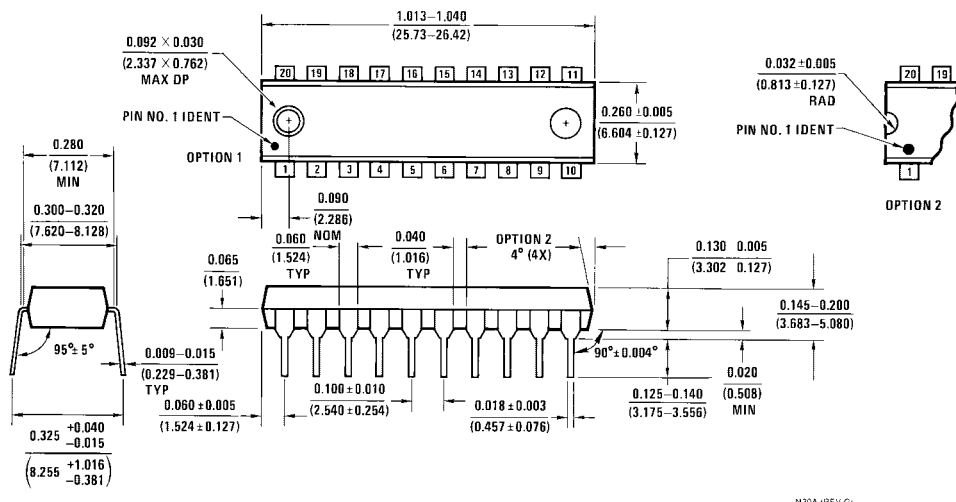
- A. CONFORMS TO JEDEC REGISTRATION MO-153, VARIATION AC, REF NOTE 6, DATE 7/93.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLDS FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.



MTC20REVD1

**20-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide  
Package Number MTC20**

**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide Package Number N20A

N20A (REV G)

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