



September 1986  
Revised February 2000

# DM74ALS374

## Octal 3-STATE D-Type Edge-Triggered Flip-Flop

### General Description

This 8-bit register features totem-pole 3-STATE outputs designed specifically for driving highly-capacitive or relatively low-impedance loads. The high-impedance state and increased high-logic-level drive provides this register with the capability of being connected directly to and driving the bus lines in a bus-organized system without need for interface or pull-up components. It is particularly attractive for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight flip-flops of the DM74ALS374 are edge-triggered D-type flip-flops. On the positive transition of the clock, the Q outputs will be set to the logic states that were set up at the D inputs.

A buffered output control input can be used to place the eight outputs in either a normal logic state (HIGH or LOW logic levels) or a high-impedance state. In the high-impedance state the outputs neither load nor drive the bus lines significantly.

The output control does not affect the internal operation of the flip-flops. That is, the old data can be retained or new data can be entered even while the outputs are OFF.

### Features

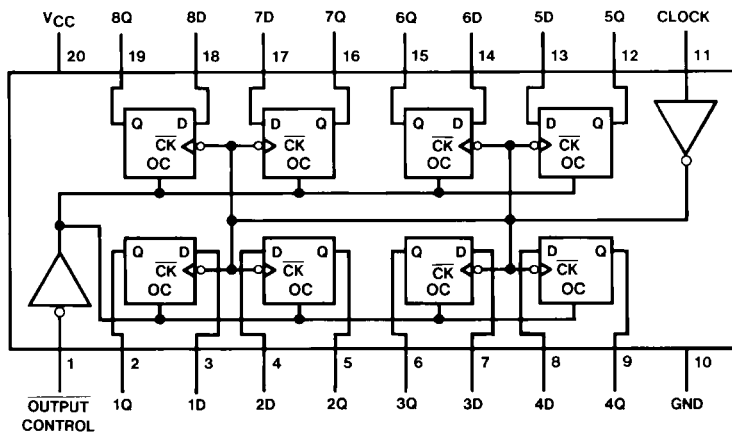
- Switching specifications at 50 pF
- Switching specifications guaranteed over full temperature and  $V_{CC}$  range
- Advanced oxide-isolated, ion-implanted Schottky TTL process
- Functionally and pin-for-pin compatible with LS TTL counterpart
- Improved AC performance over DM74LS374 at approximately half the power
- 3-STATE buffer-type outputs drive bus lines directly

### Ordering Code:

Order Number	Package Number	Package Description
DM74ALS374WM	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
DM74ALS374SJ	M20D	20-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
DM74ALS374N	N20A	20-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300 Wide

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

### Connection Diagram



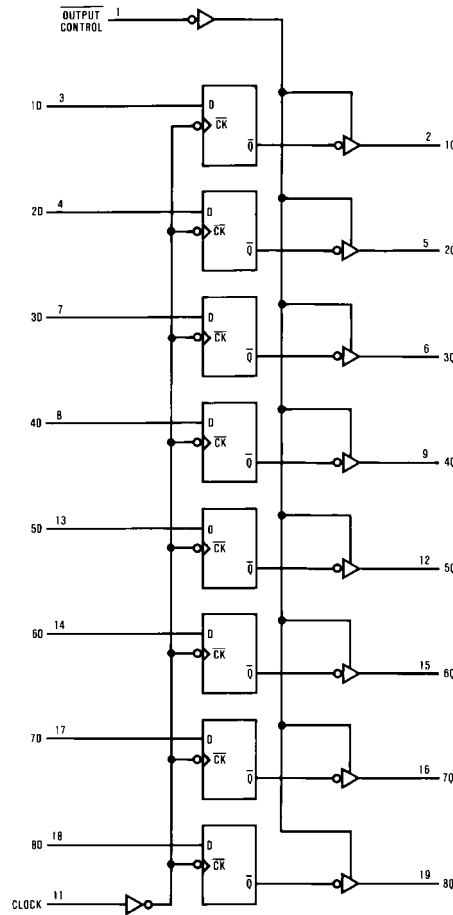
DM74ALS374 Octal 3-STATE D-Type Edge-Triggered Flip-Flop

### Function Table

Output Control	Clock	D	Output Q
L	↑	H	H
L	↑	L	L
L	L	X	Q <sub>0</sub>
H	X	X	Z

L = LOW State  
 H = HIGH State  
 X = Don't Care  
 ↑ = Positive Edge Transition  
 Z = High Impedance State  
 Q<sub>0</sub> = Previous Condition of Q

### Logic Diagram



**Absolute Maximum Ratings**(Note 1)

Supply Voltage	7V
Input Voltage	7V
Voltage Applied to Disabled Output	5.5V
Operating Free Air Temperature Range	0°C to +70°C
Storage Temperature Range (Note 2)	-65°C to +150°C
Typical $\theta_{JA}$	
N Package	60.0°C/W
M Package	79.0°C/W

**Note 1:** The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Note 2:** This product meets application requirements of 500 temperature cycles from -65°C to +150°C.

**Recommended Operating Conditions**

Symbol	Parameter	Min	Nom	Max	Units
$V_{CC}$	Supply Voltage	4.5	5	5.5	V
$V_{IH}$	HIGH Level Input Voltage	2			V
$V_{IL}$	LOW Level Input Voltage			0.8	V
$I_{OH}$	HIGH Level Output Current			-2.6	mA
$I_{OL}$	LOW Level Output Current			24	mA
$f_{CLOCK}$	Clock Frequency	0		35	MHz
$t_W$	Width of Clock Pulse	HIGH	14		ns
		LOW	14		ns
$t_{SU}$	Data Setup Time (Note 3)	10 $\uparrow$			ns
$t_H$	Data Hold Time (Note 3)	0 $\uparrow$			ns
$T_A$	Free Air Operating Temperature	0		70	°C

**Note 3:** The (1) arrow indicates the positive edge of the Clock is used for reference.

**DC Electrical Characteristics**

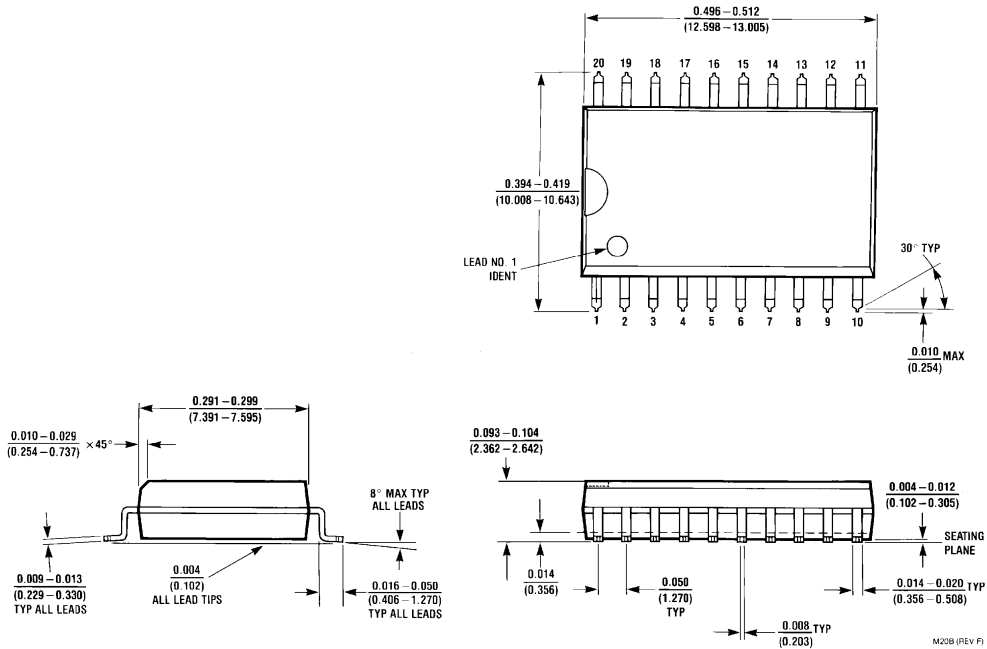
over recommended operating free air temperature range. All typical values are measured at  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_{IK}$	Input Clamp Voltage	$V_{CC} = 4.5V$ , $I_I = -18 mA$			-1.5	V
$V_{OH}$	HIGH Level Output Voltage	$V_{CC} = 4.5V$	$I_{OH} = \text{Max}$	2.4	3.2	V
		$V_{CC} = 4.5V \text{ to } 5.5V$	$I_{OH} = -400 \mu A$	$V_{CC} - 2$		V
$V_{OL}$	LOW Level Output Voltage	$V_{CC} = 4.5V$	$I_{OL} = 12 mA$	0.25	0.4	V
			$I_{OL} = 24 mA$	0.35	0.5	V
$I_I$	Input Current @ Max. Input Voltage	$V_{CC} = 5.5V$ , $V_{IH} = 7V$			0.1	mA
$I_{IH}$	HIGH Level Input Current	$V_{CC} = 5.5V$ , $V_{IH} = 2.7V$			20	$\mu A$
$I_{IL}$	LOW Level Input Current	$V_{CC} = 5.5V$ , $V_{IL} = 0.4V$			-0.2	mA
$I_O$	Output Drive Current	$V_{CC} = 5.5V$ , $V_O = 2.25V$	-30		-112	mA
$I_{OZH}$	OFF-State Output Current, HIGH Level Voltage Applied	$V_{CC} = 5.5V$ , $V_O = 2.7V$			20	$\mu A$
$I_{OZL}$	OFF-State Output Current, LOW Level Voltage Applied	$V_{CC} = 5.5V$ , $V_O = 0.4V$			-20	$\mu A$
$I_{CC}$	Supply Current	$V_{CC} = 5.5V$ Outputs Open	Outputs HIGH	11	19	mA
			Outputs LOW	19	28	mA
			Outputs Disabled	20	31	mA

## AC Electrical Characteristics

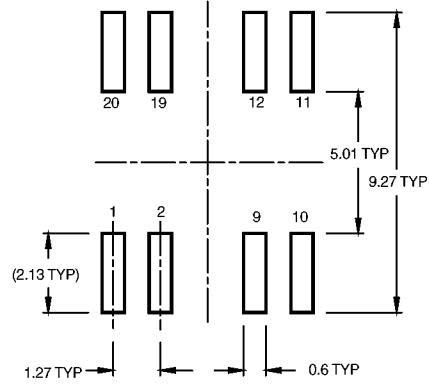
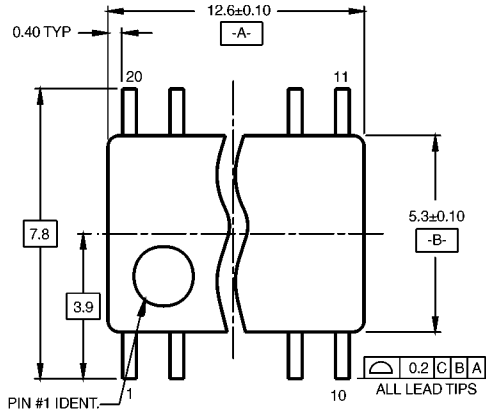
Symbol	Parameter	Conditions	From	To	Min	Max	Units
$f_{MAX}$	Maximum Clock Frequency	$V_{CC} = 4.5V$ to $5.5V$			35		MHz
$t_{PLH}$	Propagation Delay Time LOW-to-HIGH Level Output	$R_L = 500\Omega$ $C_L = 50$ pF	Clock	Any Q	3	12	ns
$t_{PHL}$	Propagation Delay Time HIGH-to-LOW Level Output		Clock	Any Q	5	16	ns
$t_{PZH}$	Output Enable Time to HIGH Level Output		Output Control	Any Q	5	17	ns
$t_{PZL}$	Output Enable Time to LOW Level Output		Output Control	Any Q	7	18	ns
$t_{PHZ}$	Output Disable Time from HIGH Level Output		Output Control	Any Q	2	10	ns
$t_{PLZ}$	Output Disable Time from LOW Level Output		Output Control	Any Q	3	18	ns

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

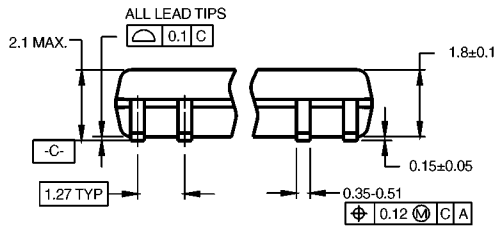


**20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide  
Package Number M20B**

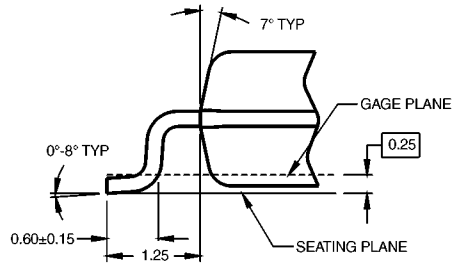
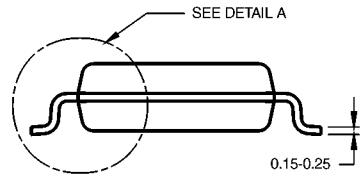
**Physical Dimensions** inches (millimeters) unless otherwise noted (Continued)



**LAND PATTERN RECOMMENDATION**



DIMENSIONS ARE IN MILLIMETERS



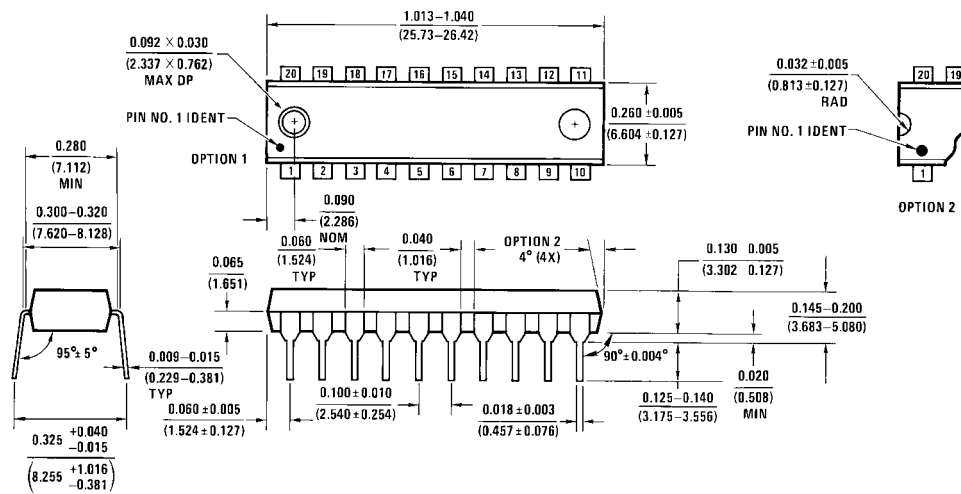
**DETAIL A**

- 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)



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

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