



October 1986  
Revised February 2000

# DM74ALS576A

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

### General Description

These 8-bit registers feature 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 provide these registers 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. They are particularly attractive for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

The eight flip-flops of the DM74ALS576A are edge-triggered inverting D-type flip-flops. On the positive transition of the clock, the  $\bar{Q}$  outputs will be set to the complement of 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

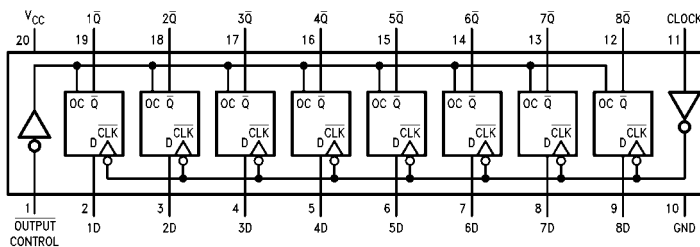
- Switching specifications at 50 pF
- Switching specifications guaranteed over full temperature and  $V_{CC}$  range
- Advanced oxide-isolated, ion-implanted Schottky TTL process
- 3-STATE buffer-type outputs drive bus lines directly

### Ordering Code:

Order Number	Package Number	Package Description
DM74ALS576AWM	M20B	20-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300 Wide
DM74ALS576AN	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



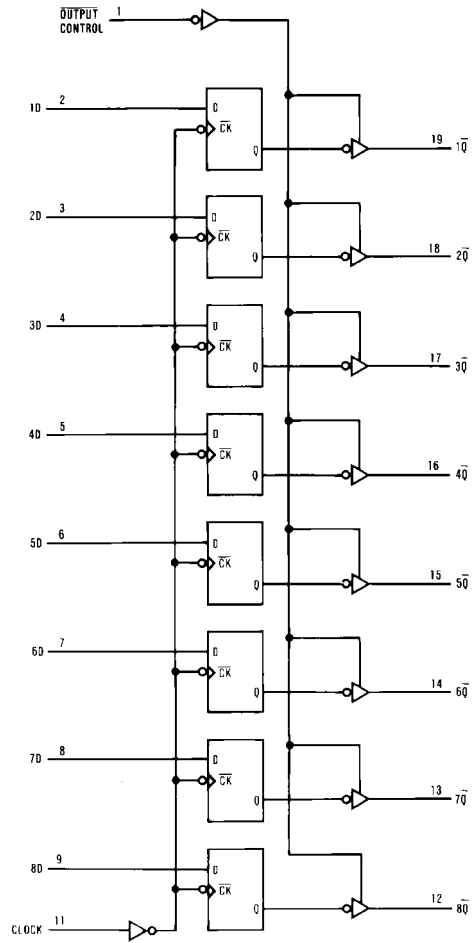
DM74ALS576A Octal D-Type Edge-Triggered Flip-Flop with 3-STATE Outputs

Function Table

Output Control	Clock	D	Output Q   $\bar{Q}$
L	$\uparrow$	H	L
L	$\uparrow$	L	H
L	L	X	$\bar{Q}_0$
H	X	X	Z

L = LOW State  
 H = HIGH State  
 X = Don't Care  
 $\uparrow$  = Positive Edge Transition  
 Z = High Impedance State  
 $\bar{Q}_0$  = Previous Condition of  $\bar{Q}$

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	-65°C to +150°C
Typical $\theta_{JA}$	
N Package	56.0°C/W
M Package	75.0°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.

**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		30	MHz
$t_w$	Width of Clock Pulse	HIGH	16.5		ns
		LOW	16.5		ns
$t_{SU}$	Data Setup Time (Note 2)	15 $\uparrow$			ns
$t_H$	Data Hold Time (Note 2)	0 $\uparrow$			ns
$T_A$	Free Air Operating Temperature	0		70	°C

**Note 2:** The ( $\uparrow$ ) arrow indicates the positive edge of the Clock is used for reference.

**Electrical Characteristics**

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

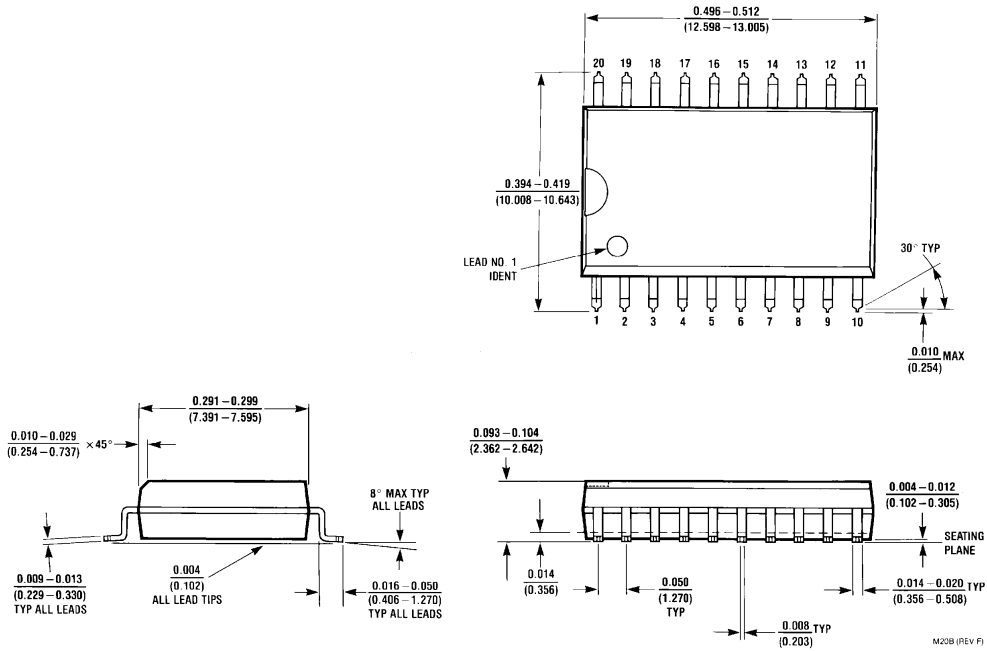
Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_{IK}$	Input Clamp Voltage	$V_{CC} = 4.5V$ , $I_I = -18\text{ mA}$			-1.2	V
$V_{OH}$	HIGH Level Output Voltage	$V_{CC} = 4.5V$ $V_{IL} = V_{IL\text{ Max}}$	$I_{OH} = \text{Max}$	2.4	3.2	V
		$V_{CC} = 4.5V$ to $5.5V$	$I_{OH} = -400\ \mu A$	$V_{CC} - 2$		V
$V_{OL}$	LOW Level Output Voltage	$V_{CC} = 4.5V$ $V_{IH} = 2V$	$I_{OL} = 24\text{ mA}$	0.35	0.5	V
$I_I$	Input Current @ Maximum 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	$V_{CC} = 5.5V$ , $V_{IH} = 2V$ $V_O = 2.7V$			20	$\mu A$
$I_{OZL}$	OFF-State Output Current LOW Level Voltage Applied	$V_{CC} = 5.5V$ , $V_{IH} = 2V$ $V_O = 0.4V$			-20	$\mu A$
$I_{CC}$	Supply Current	$V_{CC} = 5.5V$ Outputs OPEN	Outputs HIGH	10	18	mA
			Outputs LOW	15	24	mA
			Outputs Disabled	16	30	mA

## Switching Characteristics

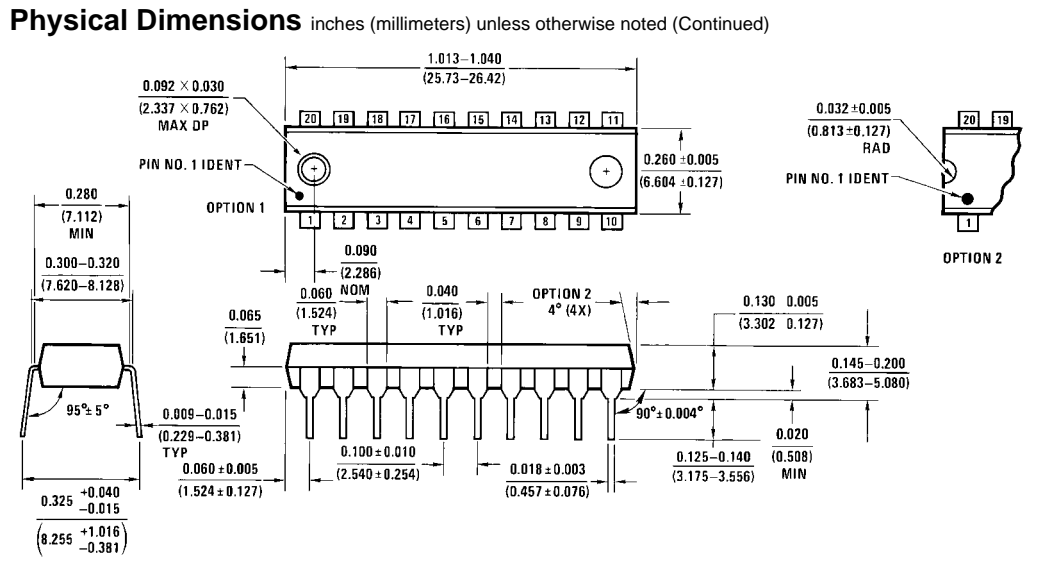
over recommended operating free air temperature range

Symbol	Parameter	Conditions	From	To	Min	Max	Units
$f_{MAX}$	Maximum Clock Frequency	$V_{CC} = 4.5V$ to $5.5V$			30		MHz
$t_{PLH}$	Propagation Delay Time LOW-to-HIGH Level Output	$R_L = 500\Omega$ $C_L = 50$ pF	Clock	Any $\bar{Q}$	4	14	ns
$t_{PHL}$	Propagation Delay Time HIGH-to-LOW Level Output		Clock	Any $\bar{Q}$	4	14	ns
$t_{PZH}$	Output Enable Time to HIGH Level Output		Output Control	Any $\bar{Q}$	4	18	ns
$t_{PZL}$	Output Enable Time to LOW Level Output		Output Control	Any $\bar{Q}$	4	18	ns
$t_{PHZ}$	Output Disable Time from HIGH Level Output		Output Control	Any $\bar{Q}$	2	10	ns
$t_{PLZ}$	Output Disable Time from LOW Level Output		Output Control	Any $\bar{Q}$	3	15	ns

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



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



N20A (REV G)

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

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