

DM64ALS374A/DM74ALS374A Octal TRI-STATE® D-Type Edge-Triggered Flip-Flop

General Description

These 8-bit registers feature totem-pole TRI-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 ALS374A 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.

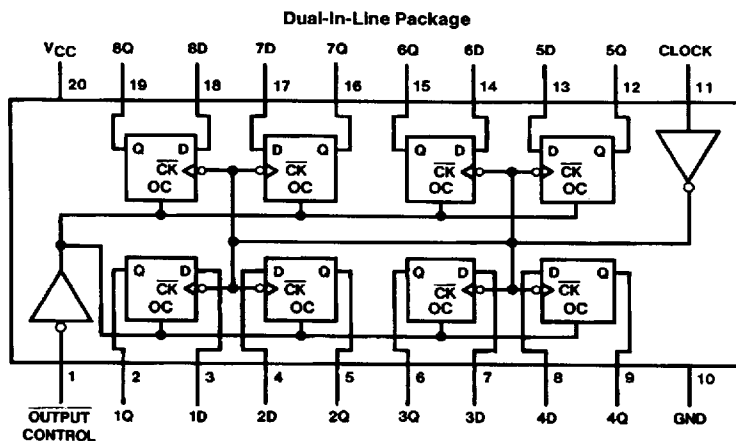
The output control does not affect the internal operation of the flip-flops. That is, the old data can be retained or new data can be entered even while the outputs are off.

The DM64ALS374A version features the same performance as the standard version DM74ALS374A with a guarantee over an extended temperature range (-40°C to $+85^{\circ}\text{C}$).

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 LS374 at approximately half the power
- TRI-STATE buffer-type outputs drive bus lines directly
- DM64ALS374A guarantee over extended temperature -40°C to $+85^{\circ}\text{C}$

Connection Diagram



Order Number DM64ALS374AN, DM64ALS374AWM, DM74ALS374AWM, DM74ALS374AN or DM74ALS374ASJ
See NS Package Number M20B, M20D or N20A

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Absolute Maximum Ratings

Supply Voltage	7V
Input Voltage	7V
Voltage Applied to Disabled Output	5.5V
Operating Free Air Temperature Range	
DM64ALS	-40°C to +85°C
DM74ALS	0°C to +70°C
Storage Temperature Range	-65°C to +150°C
Typical θ_{JA}	
N Package	60.0°C/W
M Package	79.0°C/W

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

Note: 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" table 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	DM64ALS374A			DM74ALS374A			Units
		Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage	4.5	5	5.5	4.5	5	5.5	V
V_{IH}	High Level Input Voltage	2			2			V
V_{IL}	Low Level Input Voltage			0.8			0.8	V
I_{OH}	High Level Output Current			-2.6			-2.6	mA
I_{OL}	Low Level Output Current			24			24	mA
f_{CLOCK}	Clock Frequency	0		35	0		35	MHz
t_W	Width of Clock Pulse	High	14		14			ns
		Low	14		14			ns
t_{SU}	Data Setup Time	10 $\uparrow$			10 $\uparrow$			ns
t_H	Data Hold Time	0 $\uparrow$			0 $\uparrow$			ns
T_A	Free Air Operating Temperature	-40		85	0		70	°C

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	$V_{CC} = 4.5V$, $I_I = -18\text{ mA}$			-1.5	V
V_{OH}	High Level Output Voltage	$V_{CC} = 4.5V$, $I_{OH} = \text{Max}$	2.4	3.2		V
		$V_{CC} = 4.5V$ to $5.5V$, $I_{OH} = -400\text{ }\mu A$	$V_{CC} - 2$			V
V_{OL}	Low Level Output Voltage	$V_{CC} = 4.5V$, $I_{OL} = 12\text{ mA}$		0.25	0.4	V
		$I_{OL} = 24\text{ mA}$		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	μA
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	μA
I_{OZL}	Off-State Output Current, Low Level Voltage Applied	$V_{CC} = 5.5V$, $V_O = 0.4V$			-20	μA
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

Switching Characteristics over recommended operating free air temperature range (Note 1)

Symbol	Parameter	Conditions	From	To	DM64ALS374A		DM74ALS374A		Units
					Min	Max	Min	Max	
f_{MAX}	Maximum Clock Frequency	$V_{CC} = 4.5V$ to $5.5V$ $R_L = 500\Omega$ $C_L = 50$ pF			35		35		MHz
t_{PLH}	Propagation Delay Time Low to High Level Output		Clock	Any Q	3	12	3	12	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		Clock	Any Q	5	16	5	16	ns
t_{PZH}	Output Enable Time to High Level Output		Output Control	Any Q	3	17	3	17	ns
t_{PZL}	Output Enable Time to Low Level Output		Output Control	Any Q	5	18	5	18	ns
t_{PHZ}	Output Disable Time from High Level Output		Output Control	Any Q	1	10	1	10	ns
t_{PLZ}	Output Disable Time from Low Level Output		Output Control	Any Q	2	18	2	18	ns

Note 1: See Section 5 for test waveforms and output load.

Function Table

Output Control	Clock	D	Output Q
L	↑	H	H
L	↑	L	L
L	L	X	Q_0
H	X	X	Z

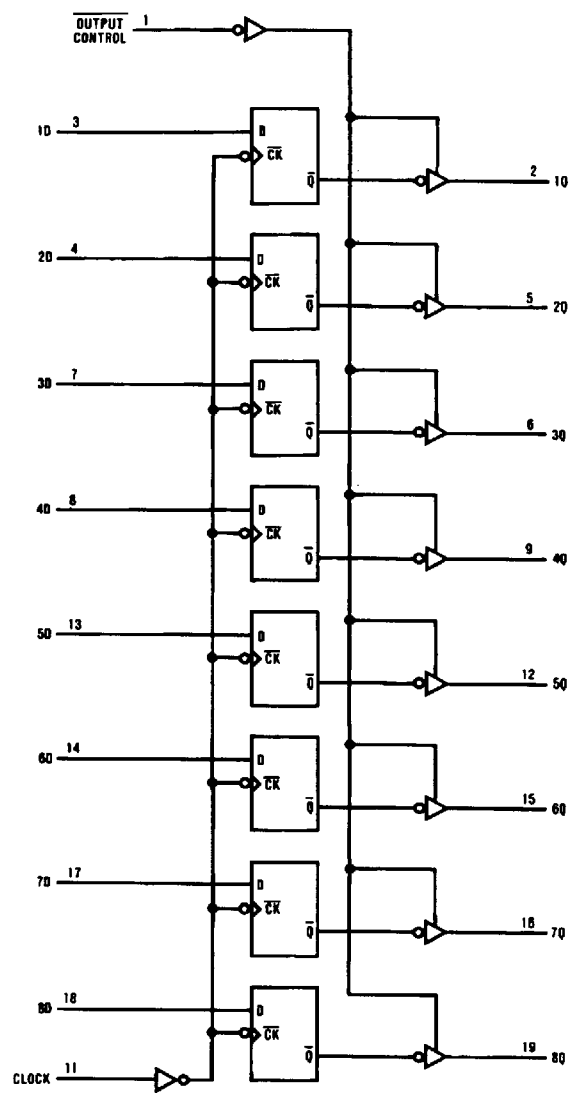
L = Low State, H = High State, X = Don't Care

↑ = Positive Edge Transition

Z = High Impedance State

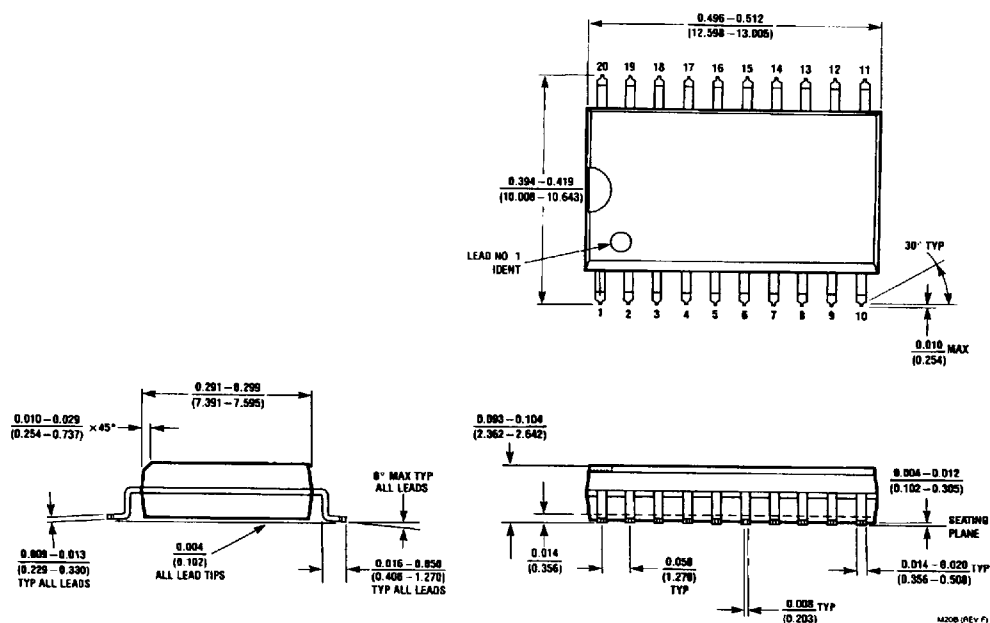
Q_0 = Previous Condition of Q

Logic Diagram

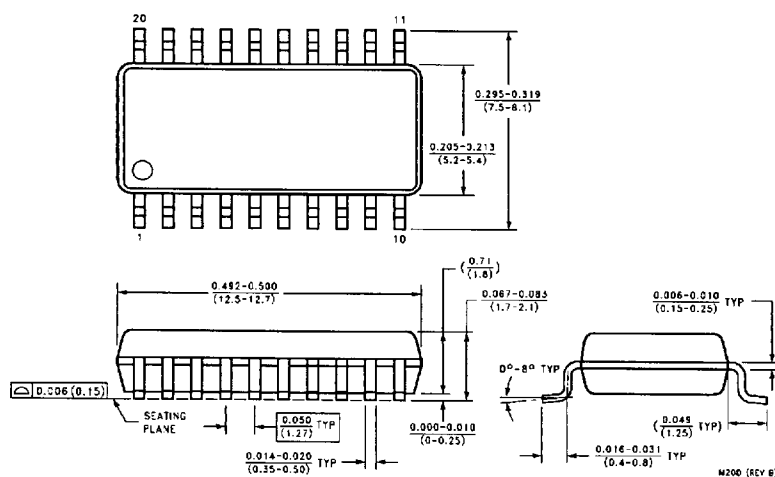


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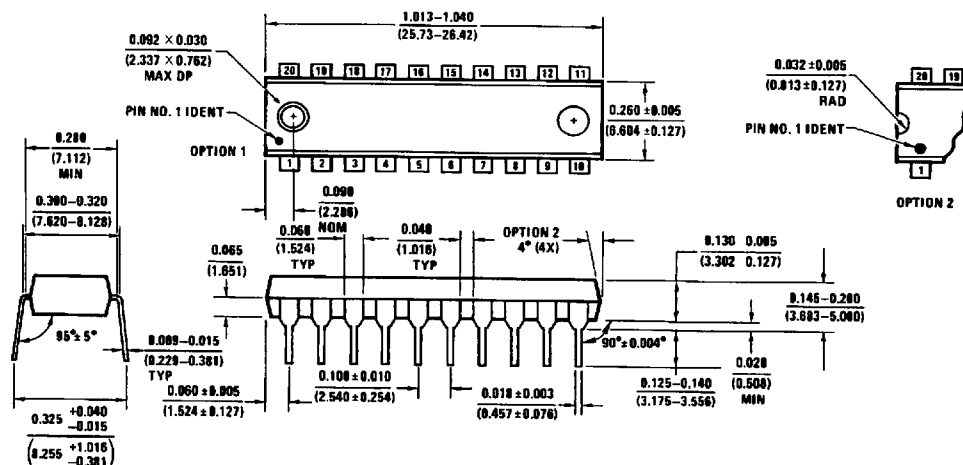
Physical Dimensions inches (millimeters)



S.O. Package (M)
Order Number DM64ALS374AWM, DM74ALS374AWM
NS Package Number M20B



Small Outline Package (SJ)
Order Number DM74ALS374ASJ
NS Package Number M20D

Physical Dimensions inches (millimeters) (Continued)

H20A INEV G

Molded Dual-In-Line Package (N)
Order Number DM64ALS374AN, DM74ALS374AN
NS Package Number N20A

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National Semiconductor Corporation
1111 West Bardin Road
Arlington, TX 76017
Tel: 1(800) 272-9959
Fax: 1(800) 737-7018

<http://www.national.com>

National Semiconductor Europe

Europe Fax: +49 (0) 180-530 85 86
Email: europe.support@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.**

Hong Kong Ltd.
13th Floor, Straight Block,
Ocean Centre, 5 Canton Rd.
Tsimshatsui, Kowloon
Hong Kong
Tel: (852) 2737-1600
Fax: (852) 2736-9960

**National Semiconductor
Japan Ltd.**

Japan Ltd.
Tel: 81-043-299-2308
Fax: 81-043-299-2408

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