

DM74ALS564A 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 ALS564A 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.

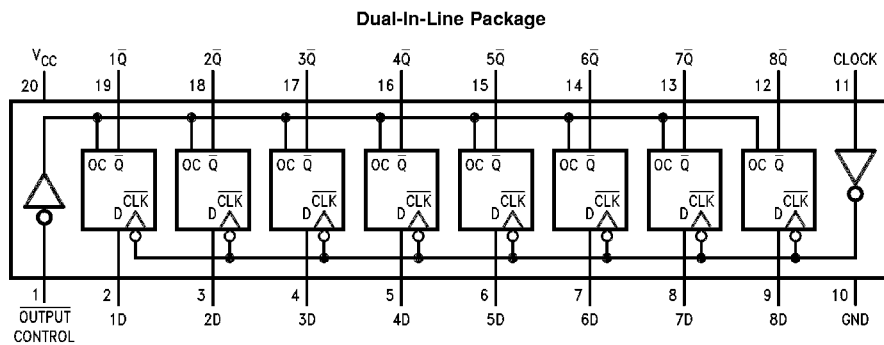
A buffered output control input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state the outputs neither load nor drive the bus lines significantly.

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

Connection Diagram



Order Number DM74ALS564AWM or DM74ALS564AN
See Package Number M20B or N20A

DM74ALS564A Octal D-Type Edge-Triggered Flip-Flop with 3-STATE Outputs

564A

Function Table

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

L = Low State, H = High State, X = Don't Care
↑ = Positive Edge Transition
Z = High Impedance State
 \bar{Q}_0 = Previous Condition of \bar{Q}

Absolute Maximum Ratings (Note 2)

Supply Voltage	7V	DM74ALS	0°C to +70°C
Input Voltage	7V	Storage Temperature Range	-65°C to +150°C
Voltage Applied to Disabled Output	5.5V	Typical θ_{JA}	
Operating Free Air Temperature Range		N Package	56.0°C/W
		M Package	75.0°C/W

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	14		ns
		Low	14		ns
t_{SU}	Data Setup Time (Note 3)	15 \uparrow			ns
t_H	Data Hold Time (Note 3)	0 \uparrow			ns
T_A	Free Air Operating Temperature	0		70	°C

Note 1: This product meets application requirements of 500 temperature cycles from -65°C to +150°C.

Note 2: 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.

Note 3: 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	$V_{CC} = 4.5V$, $I_I = -18 mA$			-1.2	V	
V_{OH}	High Level Output Voltage	$V_{CC} = 4.5V$ $V_{IL} = V_{IL Max}$	$I_{OH} = Max$	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	$V_{CC} = 4.5V$	$I_{OL} = 12 mA$		0.25	0.4	
		$V_{IH} = 2V$	$I_{OL} = 24 mA$		0.35	0.5	
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	$V_{CC} = 5.5V$, $V_{IH} = 2V$ $V_O = 2.7V$			20	μA	
I_{OZL}	Off-State Output Current Low Level Voltage Applied	$V_{CC} = 5.5V$, $V_{IH} = 2V$ $V_O = 0.4V$			-20	μA	
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

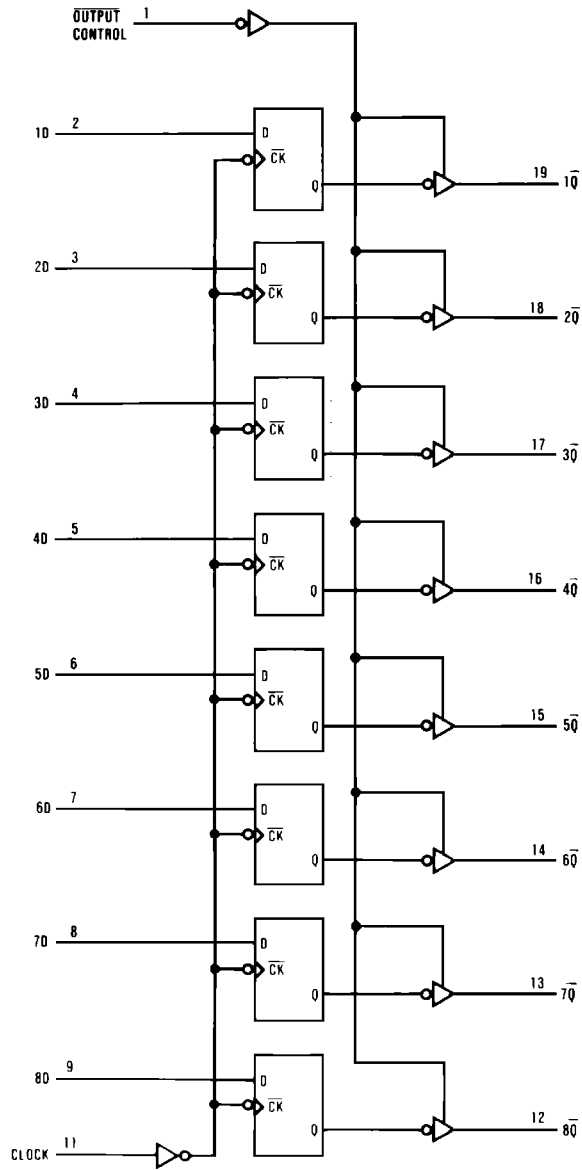
over recommended operating free air temperature range (Note 4)

Symbol	Parameter	Conditions	From	To	Min	Max	Units
f_{MAX}	Maximum Clock Frequency	$V_{CC} = 4.5V$ to $5.5V$ $R_L = 500\Omega$ $C_L = 50$ pF			30		MHz
t_{PLH}	Propagation Delay Time Low to High Level Output		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

Note 4: See Section 5 for test waveforms and output load.

Book
Extract
End

Logic Diagram

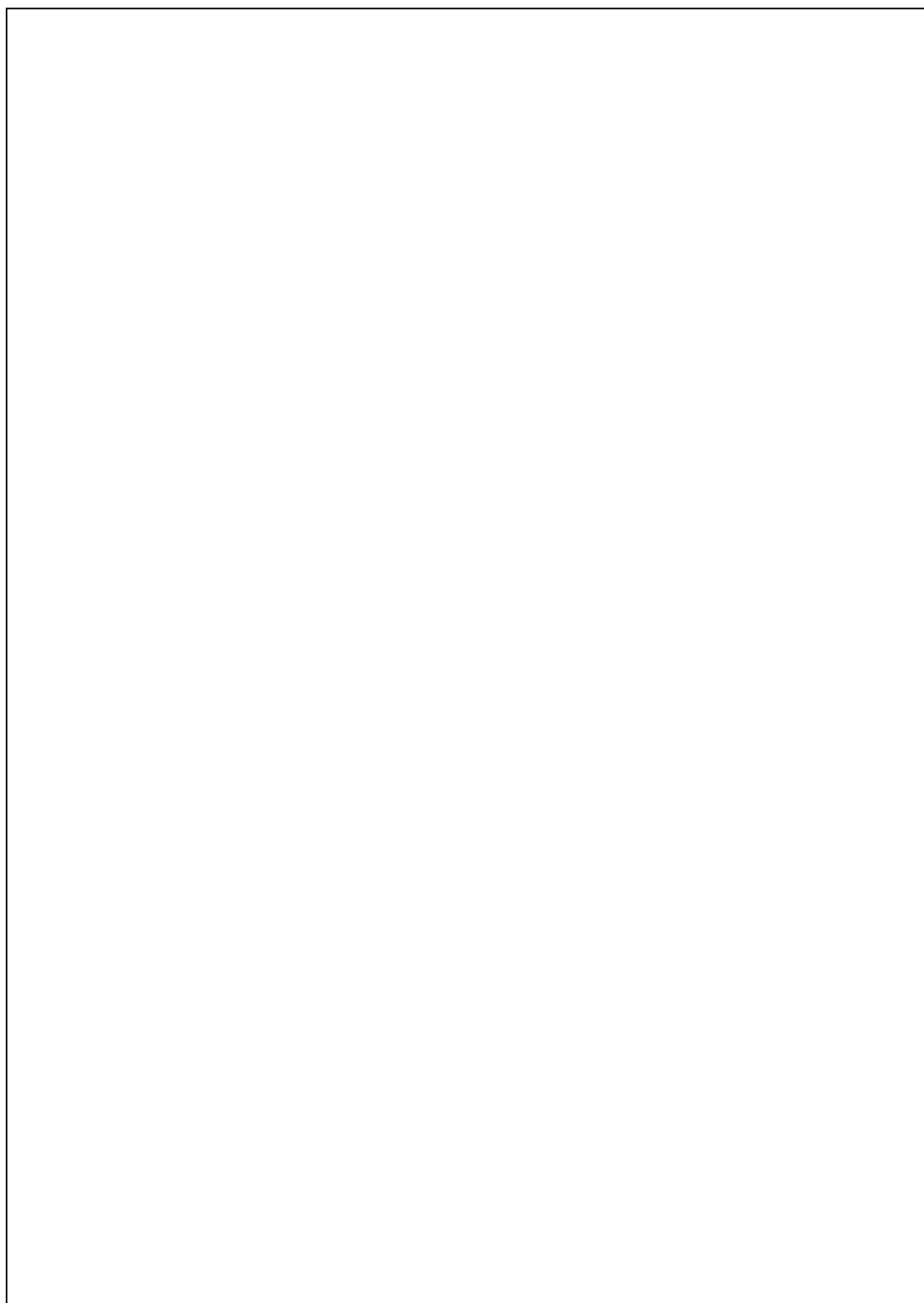


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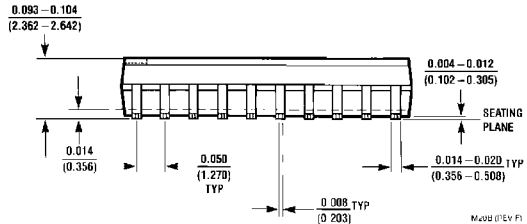
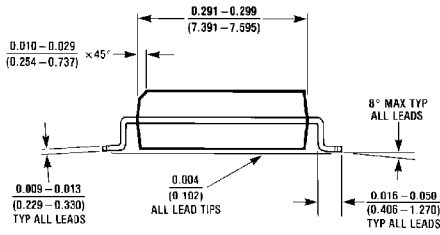
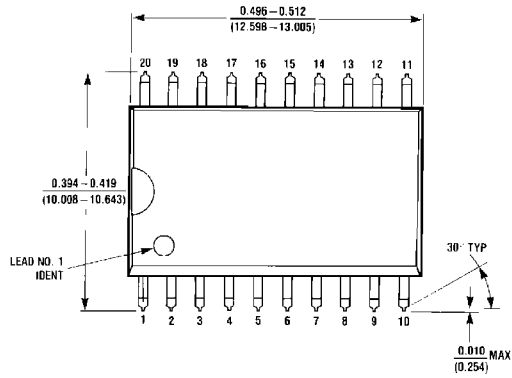
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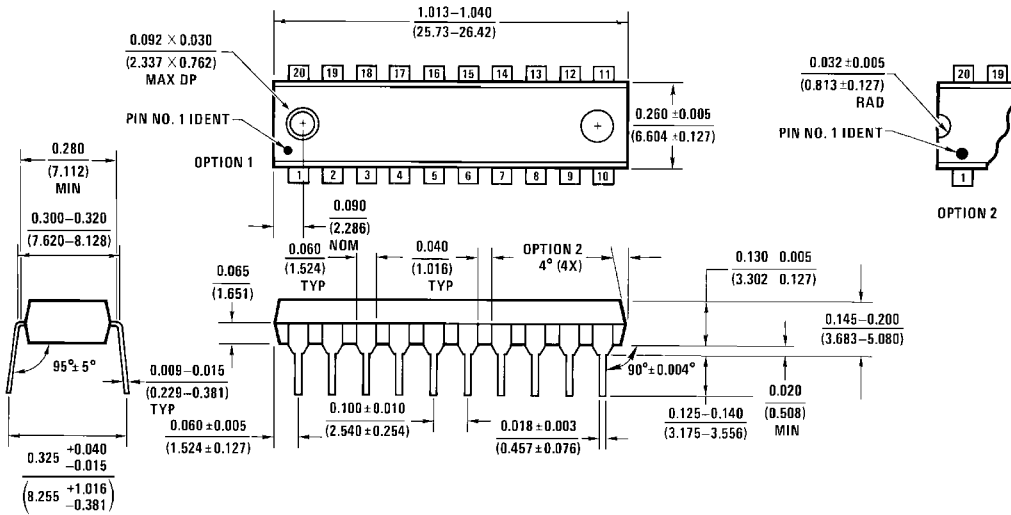
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Physical Dimensions inches (millimeters) unless otherwise noted



S.O. Package (M)
Order Number DM74AL564AWM
Package Number M20B



Molded Dual-In-Line Package (N)
Order Number DM74ALS564AN
Package Number N20A

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