

DM74ALS574A Octal D-Type Edge-Triggered Flip-Flop with TRI-STATE® Outputs

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 ALS574A 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.

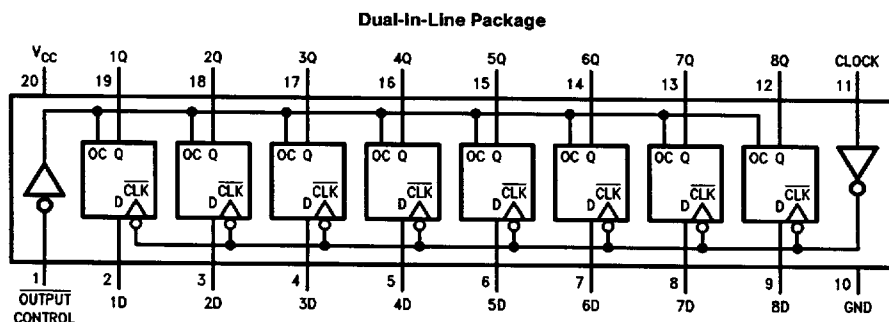
A buffered output control input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or a high-impedance state. In the high-impedance state the outputs neither load nor drive the bus lines significantly.

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 equivalent with LS374
- Improved AC performance over LS374 at approximately half the power
- TRI-STATE buffer-type outputs drive bus lines directly

Connection Diagram



Order Number DM74ALS574AWM, DM74ALS574AN or DM74ALS574ASJ
See NS Package Number M20B, M20D or N20A

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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

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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	0°C to +70°C
DM74ALS	
Storage Temperature Range	−65°C to +150°C
Typical θ_{JA}	
N Package	56.0°C/W
M Package	75.0°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	DM74ALS574A			Units
		Min	Nom	Max	
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	15 $\uparrow$			ns
t_H	Data Hold Time	0 $\uparrow$			ns
T_A	Free Air Operating Temperature	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 $V_{CC} = 5V$, $T_A = 25^\circ C$.

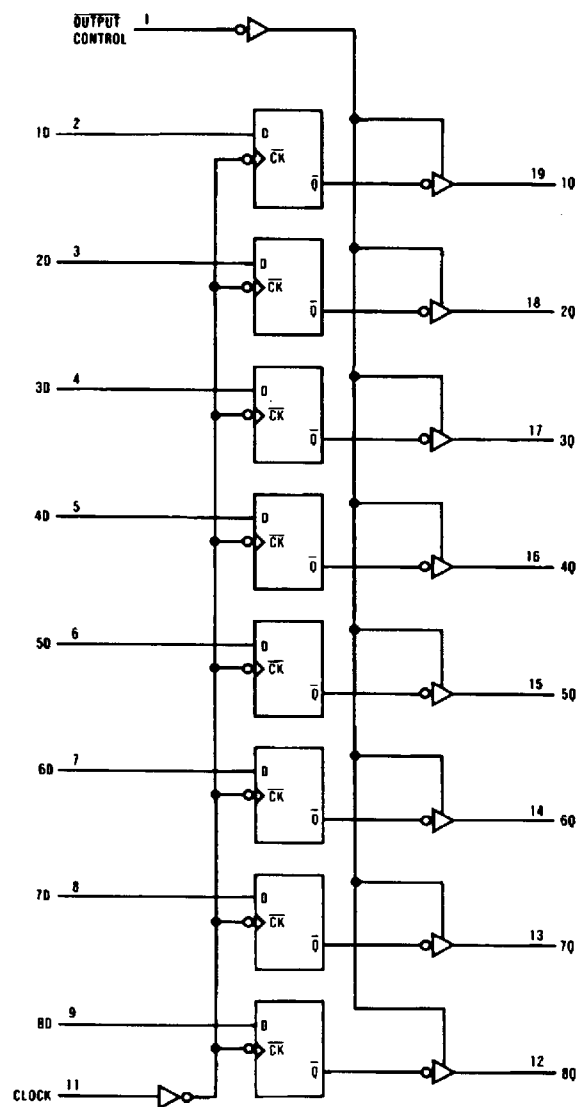
Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IK}	Input Clamp Voltage	$V_{CC} = 4.5V$, $I_I = -18\text{ mA}$			−1.2	V
V_{OH}	High Level Output Voltage	$V_{CC} = 4.5V$ $V_{IL} = V_{IL\text{ Max}}$	$I_{OH} = \text{Max}$	2.4	3.2	V
		$V_{CC} = 4.5V\text{ to }5.5V$	$I_{OH} = -400\text{ }\mu A$	$V_{CC} - 2$		V
V_{OL}	Low Level Output Voltage	$V_{CC} = 4.5V$ $V_{IH} = 2V$	74ALS $I_{OL} = 12\text{ mA}$	0.25	0.4	V
			74ALS $I_{OL} = 24\text{ mA}$	0.35	0.5	V
I_I	Input Current at 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	11	18	mA
			Outputs Low	17	27	mA
			Outputs Disabled	17	28	mA

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

Symbol	Parameter	Conditions	From	To	DM74ALS574A		Units
					Min	Max	
f_{MAX}	Maximum Clock Frequency	$V_{CC} = 4.5V$ to $5.5V$ $R_L = 500\Omega$ $C_L = 50 pF$			35		MHz
t_{PLH}	Propagation Delay Time Low to High Level Output		Clock	Any Q	4	14	ns
t_{PHL}	Propagation Delay Time High to Low Level Output		Clock	Any Q	4	14	ns
t_{PZH}	Output Enable Time to High Level Output		Output Control	Any Q	4	18	ns
t_{PZL}	Output Enable Time to Low Level Output		Output Control	Any Q	4	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	2	12	ns

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

Logic Diagram



TL/F/6110-2

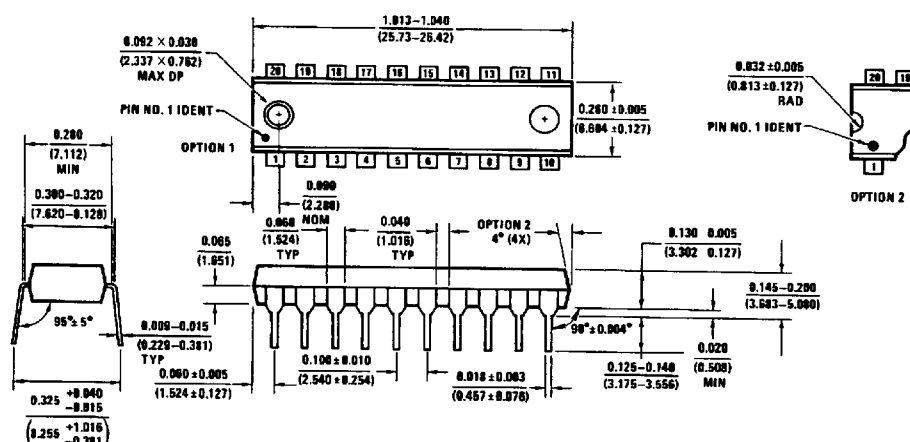
Physical Dimensions inches (millimeters)

S.O. Package (M)
 Order Number DM64ALS574AWM or DM74ALS574AWM
 NS Package Number M20B

Small Outline Package (SJ)
 Order Number DM64ALS574ASJ or DM74ALS574ASJ
 NS Package Number M20D

The diagrams show the physical dimensions for two integrated circuit packages. The top diagram is for the S.O. Package (M), showing a top view with dimensions 0.496-0.512 (12.988-13.005) and 0.291-0.298 (7.391-7.585), and a side view with dimensions 0.010-0.029 (0.254-0.737) and 0.009-0.013 (0.229-0.330). The bottom diagram is for the Small Outline Package (SJ), showing a top view with dimensions 0.492-0.500 (12.5-12.7) and 0.295-0.319 (7.5-8.1), and a side view with dimensions 0.014-0.020 (0.35-0.50) and 0.006-0.010 (0.15-0.25). Both diagrams include lead counts (20 leads for M, 16 leads for SJ) and a 30° TYP lead angle for the S.O. package.

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Physical Dimensions inches (millimeters) (Continued)

Molded Dual-In-Line Package (N)
Order Number DM64ALS574AN or DM74ALS574AN
NS Package Number N20A

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