

September 1986 Revised July 2001

DM7474

Dual Positive-Edge-Triggered D-Type Flip-Flops with Preset, Clear and Complementary Outputs

General Description

This device contains two independent positive-edge-triggered D-type flip-flops with complementary outputs. The information on the D input is accepted by the flip-flops on the positive going edge of the clock pulse. The triggering occurs at a voltage level and is not directly related to the

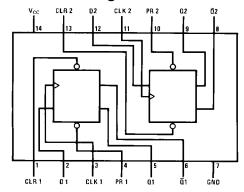
transition time of the rising edge of the clock. The data on the D input may be changed while the clock is LOW or HIGH without affecting the outputs as long as the data setup and hold times are not violated. A LOW logic level on the preset or clear inputs will set or reset the outputs regardless of the logic levels of the other inputs.

Ordering Code:

Order Number	Package Number	Package Description
DM7474M	M14A	14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
DM7474N	N14A	14-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



Function Table

		Inp	uts		Out	puts
	PR	CLR	CLK	D	Q	Q
	L	Н	Х	Х	Н	L
	Н	L	Х	Х	L	Н
	L	L	Х	Х	H (Note 1)	H (Note 1)
	Н	Н	1	Н	Н	L
	Н	Н	1	L	L	Н
	Н	Н	L	Х	Q_0	\overline{Q}_0
ш	- HIGH I 44	io Lovol				

- H = HIGH Logic Level X = Either LOW or HIGH Logic Level
- L = LOW Logic Level
- ${\ \ } \ =$ Positive–going transition of the clock. Q₀ = The output logic level of Q before the indicated input conditions were

Note 1: This configuration is nonstable; that is, it will not persist when either the preset and/or clear inputs return to their inactive (HIGH) level.

Absolute Maximum Ratings(Note 2)

Supply Voltage 7V Input Voltage 5.5V Operating Free Air Temperature Range $0^{\circ}\text{C to } + 70^{\circ}\text{C}$ Storage Temperature Range $-65^{\circ}\text{C to } + 150^{\circ}\text{C}$

7V

5.5V

6°C to +70°C

70 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 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		4.75	5	5.25	V
V _{IH}	HIGH Level Inpo	HIGH Level Input Voltage				V
V _{IL}	LOW Level Inpu	ıt Voltage			0.8	V
I _{OH}	HIGH Level Output Current				-0.4	mA
I _{OL}	LOW Level Out	LOW Level Output Current			16	mA
f _{CLK}	Clock Frequency (Note 4)		0		15	MHz
t _W	Pulse Width	Clock HIGH	30			
	(Note 4)	Clock LOW	37			
		Clear LOW	30			ns
		Preset LOW	30			
t _{SU}	Input Setup Time (Note 3)(Note 4)		20↑			ns
t _H	Input Hold Time (Note 3)(Note 4)		5↑			ns
T _A	Free Air Operating Temperature		0		70	°C

Note 3: The symbol (1) indicates the rising edge of the clock pulse is used for reference.

Note 4: $T_A = 25^{\circ}C$ and $V_{CC} = 5V$.

Electrical Characteristics

over recommended operating free air temperature range (unless otherwise noted)

Symbol	Parameter	Conditions		Min	Typ (Note 5)	Max	Units
VI	Input Clamp Voltage	$V_{CC} = Min, I_I = -12 \text{ mA}$				-1.5	V
V _{OH}	HIGH Level	V _{CC} = Min, I _{OH} = Max		2.4	3.4		V
	Output Voltage	$V_{IL} = Max, V_{IH} = Min$		2.4	3.4		V
V _{OL}	LOW Level	V _{CC} = Min, I _{OL} = Max	V _{CC} = Min, I _{OL} = Max		0.2	0.4	V
	Output Voltage	$V_{IH} = Min, V_{IL} = Max$			0.2	0.4	V
I	Input Current @ Max Input Voltage	$V_{CC} = Max, V_I = 5.5V$				1	mA
I _{IH}	HIGH Level	V _{CC} = Max	D			40	
	Input Current	$V_1 = 2.4V$	Clock			80	^
			Clear			120	μΑ
			Preset			40	
I _{IL}	LOW Level	V _{CC} = Max	D			-1.6	
	Input Current	$V_I = 0.4V$	Clock			-3.2	mA
		(Note 8)	Clear			-3.2	IIIA
			Preset			-1.6	
Ios	Short Circuit Output Current	V _{CC} = Max (Note 6)	•	-18		-55	mA
Icc	Supply Current	V _{CC} = Max (Note 7)			17	30	mA

Note 5: All typicals are at $V_{CC} = 5V$, $T_A = 25$ °C.

Note 6: Not more than one output should be shorted at a time.

 $\textbf{Note 7:} \ \text{With all outputs open, I}_{CC} \ \text{is measured with the Q and } \overline{\textbf{Q}} \ \text{outputs HIGH in turn. At the time of measurement the clock is grounded.}$

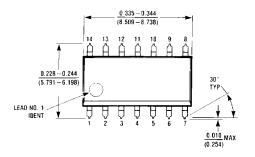
 $\textbf{Note 8:} \ \textbf{Clear} \ \textbf{is tested} \ \textbf{with preset HIGH} \ \textbf{and preset is tested} \ \textbf{with clear HIGH}.$

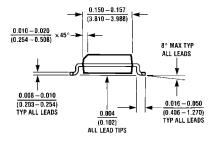
Switching Characteristics

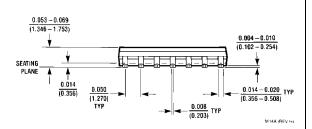
at $V_{CC} = 5V$ and $T_A = 25^{\circ}C$

Symbol	Parameter	From (Input)	$R_L = 400\Omega$	Units	
Symbol	Farameter	To (Output)	Min	Max	Office
f _{MAX}	Maximum Clock Frequency		15		MHz
t _{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Preset to Q		40	ns
t _{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Preset to Q		25	ns
t _{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Clear to Q		40	ns
t _{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Clear to Q		25	ns
t _{PHL}	Propagation Delay Time HIGH-to-LOW Level Output	Clock to Q or Q		40	ns
t _{PLH}	Propagation Delay Time LOW-to-HIGH Level Output	Clock to Q or Q		25	ns

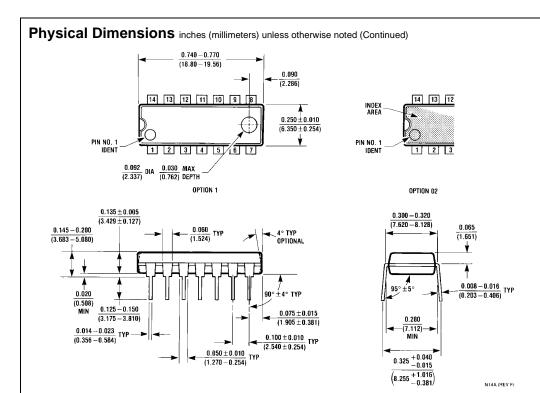
Physical Dimensions inches (millimeters) unless otherwise noted







14-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow Package Number M14A



14-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide Package Number N14A

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