FAIRCHILD SEMICONDUCTOR™

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DM7473
Dual Master-Slave J-K Flip-Flops with Clear and Complementary Outputs

General Description

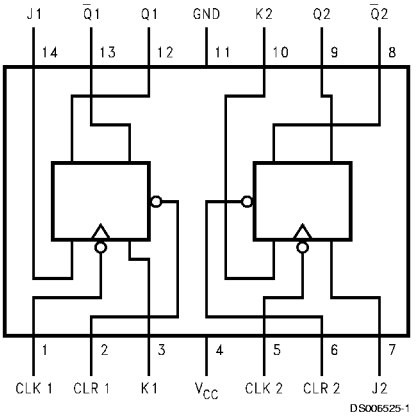
This device contains two independent positive pulse triggered J-K flip-flops with complementary outputs. The J and K data is processed by the flip-flops after a complete clock pulse. While the clock is low the slave is isolated from the master. On the positive transition of the clock, the data from the J and K inputs is transferred to the master. While the clock is high the J and K inputs are disabled. On the negative transition of the clock, the data from the master is transferred to the slave. The logic states of the J and K inputs must not be allowed to change while the clock is high. Data transfers to the outputs on the falling edge of the clock pulse. A low logic level on the clear input will reset the outputs regardless of the logic states of the other inputs.

Features

- Alternate Military/Aerospace device (5473) is available. Contact a Fairchild Semiconductor Sales Office/Distributor for specifications.

Connection Diagram

Dual-In-Line Package



Order Number 5473DMQB, 5473FMQB, DM5473J, DM5473W or DM7473N
See Package Number J14A, N14A or W14B

Function Table

Inputs				Outputs	
CLR	CLK	J	K	Q	$\overline{Q}$
L	X	X	X	L	H
H	⎍	L	L	Q_0	$\overline{Q}_0$
H	⎍	H	L	H	L
H	⎍	L	H	L	H
H	⎍	H	H	Toggle	

H = High Logic Level
L = Low Logic Level
X = Either Low or High Logic Level
⎍ = Positive pulse data. the J and K inputs must be held constant while the clock is high. Data is transferred to the outputs on the falling edge of the clock pulse.
Q_0 = The output logic level before the indicated input conditions were established.
Toggle = Each output changes to the complement of its previous level on each high level clock pulse.

Absolute Maximum Ratings (Note 1)

Supply Voltage	7V
Input Voltage	5.5V
Operating Free Air Temperature Range	
DM54 and 54	−55°C to +125°C
DM74	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

Recommended Operating Conditions

Symbol	Parameter		DM5473			DM7473			Units
			Min	Nom	Max	Min	Nom	Max	
V_{CC}	Supply Voltage		4.5	5	5.5	4.75	5	5.25	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				−0.4			−0.4	mA
I_{OL}	Low Level Output Current				16			16	mA
f_{CLK}	Clock Frequency (Note 6)		0		15	0		15	MHz
t_W	Pulse Width (Note 6)	Clock High	20			20			ns
		Clock Low	47			47			
		Clear Low	25			25			
t_{SU}	Input Setup Time (Notes 2, 6)		0↑			0↑			ns
t_H	Input Hold Time (Notes 2, 6)		0↓			0↓			ns
T_A	Free Air Operating Temperature		−55		125	0		70	°C

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" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.*

Electrical Characteristics

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

Symbol	Parameter	Conditions		Min	Typ (Note 3)	Max	Units
V_I	Input Clamp Voltage	V_{CC} = Min, I_I = −12 mA				−1.5	V
V_{OH}	High Level Output Voltage	V_{CC} = Min, I_{OH} = Max V_{IL} = Max, V_{IH} = Min		2.4	3.4		V
V_{OL}	Low Level Output Voltage	V_{CC} = Min, I_{OL} = Max V_{IH} = Min, V_{IL} = Max			0.2	0.4	V
I_I	Input Current @ Max Input Voltage	V_{CC} = Max, V_I = 5.5V				1	mA
I_{IH}	High Level Input Current	V_{CC} = Max V_I = 2.4V	J, K			40	μA
			Clock			80	
			Clear			80	
I_{IL}	Low Level Input Current	V_{CC} = Max V_I = 0.4V	J, K			−1.6	mA
			Clock			−3.2	
			Clear			−3.2	
I_{OS}	Short Circuit Output Current	V_{CC} = Max (Note 4)	DM54	−20		−55	mA
			DM74	−18		−55	
I_{CC}	Supply Current	V_{CC} = Max, (Note 5)			18	34	mA

Note 2: The symbol (↑, ↓) indicates the edge of the clock pulse is used for reference: (↑) for rising edge, (↓) for falling edge.

Note 3: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 4: Not more than one output should be shorted at a time.

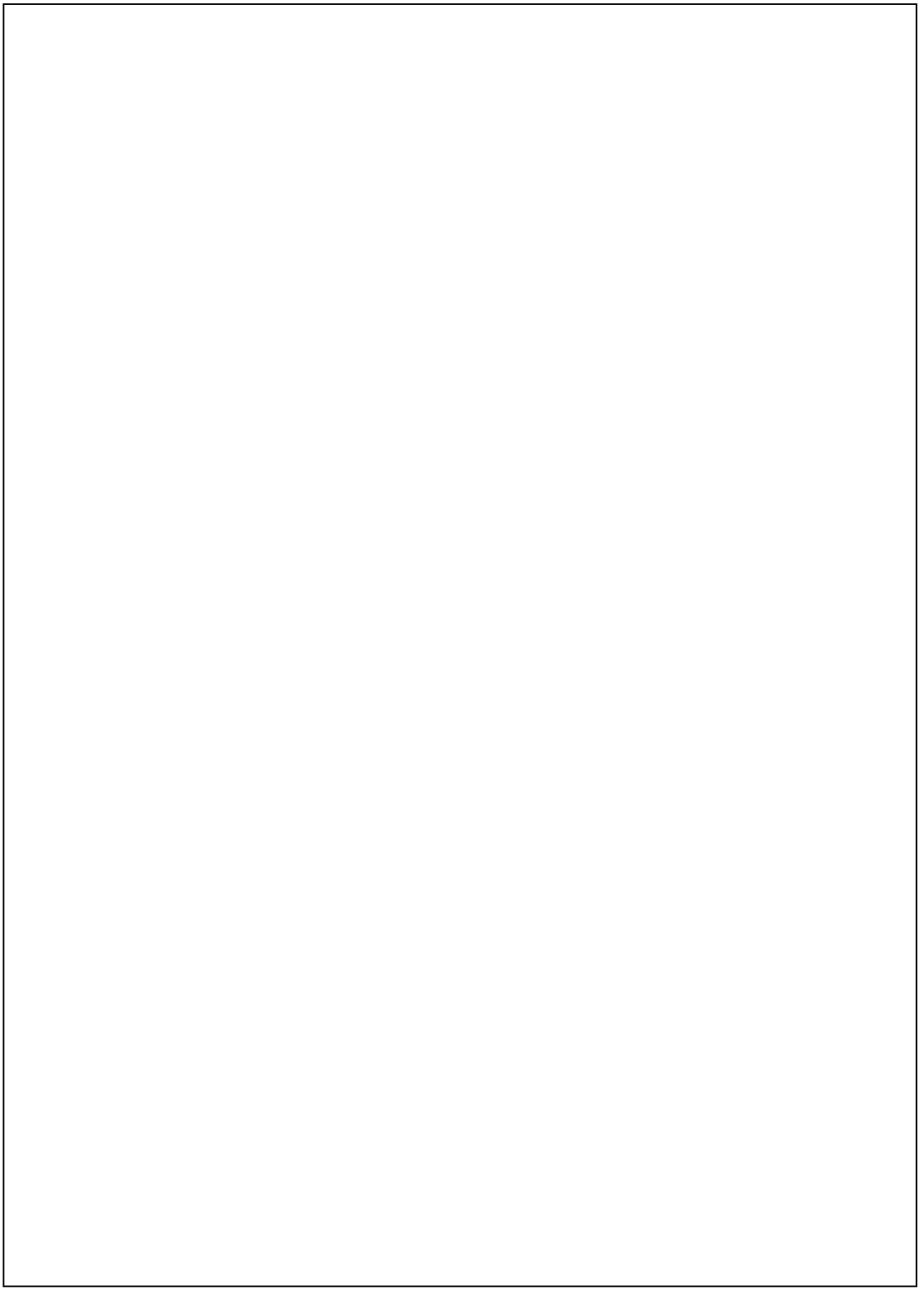
Note 5: With all outputs open, I_{CC} is measured with the Q and $\overline{Q}$ outputs high in turn. At the time of measurement the clock input grounded.

Note 6: T_A = 25°C and V_{CC} = 5V.

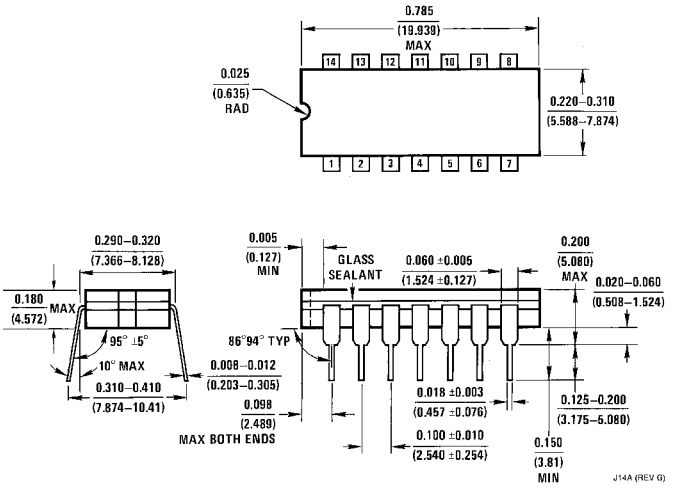
Switching Characteristics

at V_{CC} = 5V and T_A = 25°C

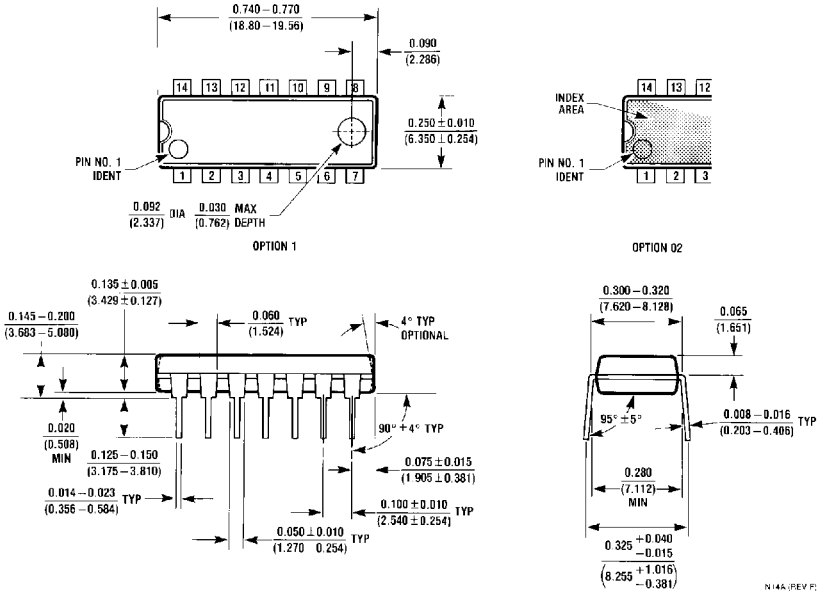
Symbol	Parameter	From (Input) To (Output)	R_L = 400Ω, C_L = 15 pF		Units
			Min	Max	
f_{MAX}	Maximum Clock Frequency		15		MHz
t_{PHL}	Propagation Delay Time High to Low Level Output	Clear to Q		40	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Clear to $\overline{Q}$		25	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Clock to Q or $\overline{Q}$		40	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Clock to Q or $\overline{Q}$		25	ns



Physical Dimensions inches (millimeters) unless otherwise noted

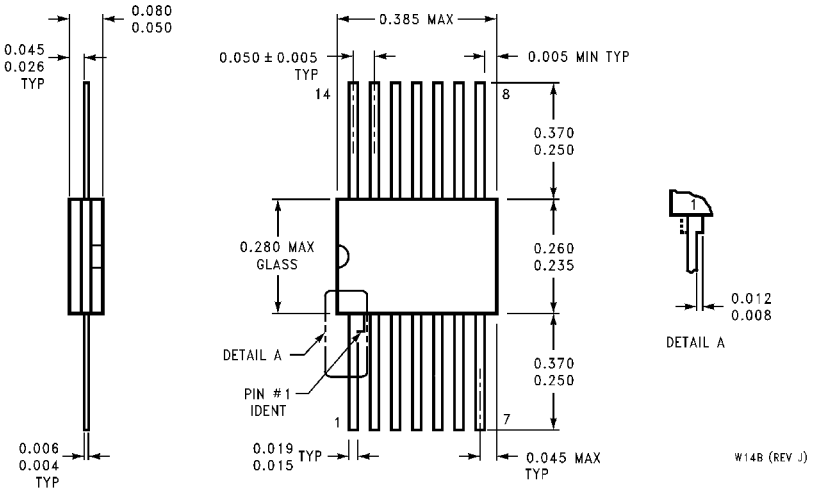


14-Lead Ceramic Dual-In-Line Package (J)
Order Number 5473DMQB or DM5473J
Package Number J14A



14-Lead Molded Dual-In-Line Package (N)
Order Number DM7473N
Package Number N14A

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



14-Lead Ceramic Flat Package (W)
Order Number 5473FMQB or DM5473W
Package Number W14B

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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