

DM54LS75/DM74LS75 Quad Latches

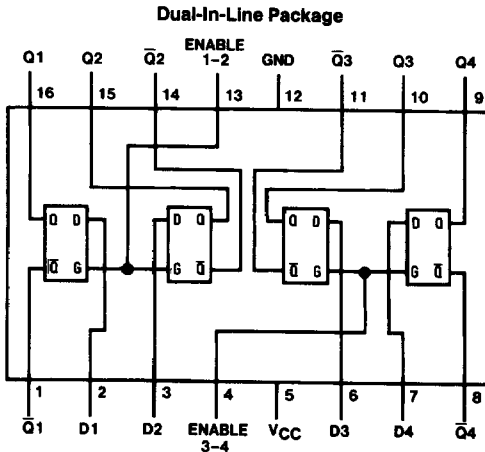
General Description

These latches are ideally suited for use as temporary storage for binary information between processing units and input/output or indicator units. Information present at a data (D) input is transferred to the Q output when the enable is high, and the Q output will follow the data input as long as the enable remains high. When the enable goes low,

the information (that was present at the data input at the time the transition occurred) is retained at the Q output until the enable is permitted to go high.

These latches feature complementary Q and \bar{Q} outputs from a 4-bit latch, and are available in 16-pin packages.

Connection Diagram



TL/F/6374-1

Order Number **DM54LS75J**, **DM54LS75W**,
DM74LS75M or **DM74LS75N**

See NS Package Number **J16A**, **M16A**, **N16A** or **W16A**

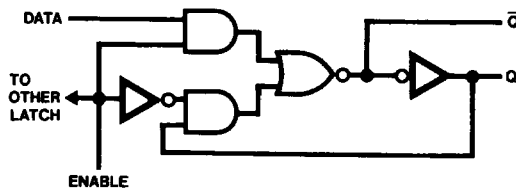
Function Table (Each Latch)

Inputs		Outputs	
D	Enable	Q	\bar{Q}
L	H	L	H
H	H	H	L
X	L	Q_0	\bar{Q}_0

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

Q_0 = The Level of Q Before the High-to-Low Transition of ENABLE

Logic Diagram (Each Latch)



TL/F/6374-2

Absolute Maximum Ratings (Note)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	7V
Input Voltage	7V
Operating Free Air Temperature Range	
DM54LS	−55°C to +125°C
DM74LS	0°C to +70°C
Storage Temperature Range	−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	DM54LS75			DM74LS75			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			0.7			0.8	V
I _{OH}	High Level Output Current			−0.4			−0.4	mA
I _{OL}	Low Level Output Current			4			8	mA
t _W	Enable Pulse Width (Note 4)	20			20			ns
t _{SU}	Setup Time (Note 4)	20			20			ns
t _H	Hold Time (Note 4)	0			0			ns
T _A	Free Air Operating Temperature	−55		125	0		70	°C

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

Symbol	Parameter	Conditions	Min	Typ (Note 1)	Max	Units	
V _I	Input Clamp Voltage	V _{CC} = Min, I _I = −18 mA			−1.5	V	
V _{OH}	High Level Output Voltage	V _{CC} = Min, I _{OH} = Max V _{IL} = Max, V _{IH} = Min	DM54	2.5	3.5	V	
			DM74	2.7	3.5		
V _{OL}	Low Level Output Voltage	V _{CC} = Min, I _{OL} = Max V _{IL} = Max, V _{IH} = Min	DM54		0.25	0.4	V
			DM74		0.35	0.5	
			DM74	I _{OL} = 4 mA, V _{CC} = Min		0.25	
I _I	Input Current @ Max Input Voltage	V _{CC} = Max, V _I = 7V	D		0.1	mA	
			Enable		0.4		
I _{IH}	High Level Input Current	V _{CC} = Max, V _I = 2.7V	D		20	μA	
			Enable		80		
I _{IL}	Low Level Input Current	V _{CC} = Max, V _I = 0.4V	D		−0.4	mA	
			Enable		−1.6		
I _{OS}	Short Circuit Output Current	V _{CC} = Max (Note 2)	DM54	−20	−100	mA	
			DM74	−20	−100		
I _{CC}	Supply Current	V _{CC} = Max (Note 3)		6.3	12	mA	

Note 1: All typicals are at V_{CC} = 5V, T_A = 25°C.

Note 2: Not more than one output should be shorted at a time, and the duration should not exceed one second.

Note 3: I_{CC} is measured with all outputs open and all inputs grounded.

Note 4: T_A = 25°C and V_{CC} = 5V.

Switching Characteristics at $V_{CC} = 5V$ and $T_A = 25^\circ C$ (See Section 1 for Test Waveforms and Output Load)

Symbol	Parameter	From (Input) To (Output)	$R_L = 2\text{ k}\Omega$				Units
			$C_L = 15\text{ pF}$		$C_L = 50\text{ pF}$		
			Min	Max	Min	Max	
t_{PLH}	Propagation Delay Time Low to High Level Output	D to Q		27		30	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	D to Q		17		25	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	D to \bar{Q}		20		25	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	D to \bar{Q}		15		20	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Enable to Q		27		30	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Enable to Q		25		30	ns
t_{PLH}	Propagation Delay Time Low to High Level Output	Enable to \bar{Q}		30		30	ns
t_{PHL}	Propagation Delay Time High to Low Level Output	Enable to \bar{Q}		15		20	ns