



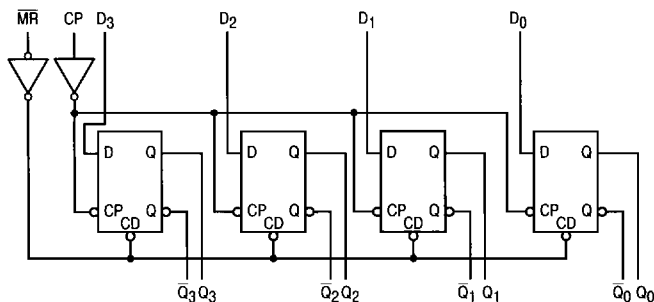
Quad D-Type Positive Edge-Triggered Flip-Flop

ELECTRICALLY TESTED PER:
MIL-M-38510/34104

The 54F175 is a high-speed quad D flip-flop. The device is useful for general flip-flop requirements where clock and clear inputs are common. The information on the D inputs is stored during the LOW to HIGH clock transition. Both true and complemented outputs of each flip-flop are provided. A Master Reset input resets all flip-flops, independent of the Clock or D inputs when LOW.

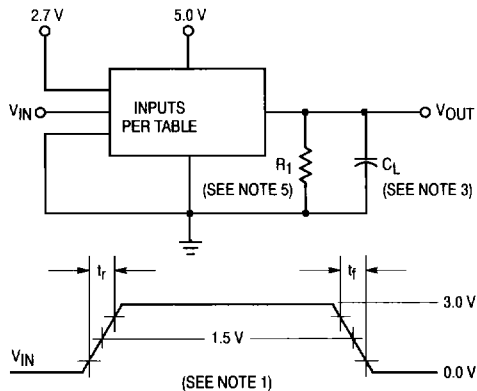
- Edge-Triggered D-Type Inputs
- Buffered Positive Edge-Triggered Clock
- Asynchronous Common Reset
- True and Complemented Output

LOGIC DIAGRAM



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

AC TEST CIRCUIT



REFERENCE TO NOTES ON PAGE 4-92

Military 54F175



AVAILABLE AS:

- 1) JAN: JM38510/34104BXA
- 2) SMD: N/A
- 3) 883: 54F175/BXAJC

X = CASE OUTLINE AS FOLLOWS:
PACKAGE: CERDIP: E
CERFLAT: F
LCC: 2

THE LETTER "M" APPEARS
BEFORE THE / ON LCC.

PIN ASSIGNMENTS

FUNCT.	DIL 620-09	FLATS 650-05	LCC 756A-02	BURN-IN (COND. A)
MR	1	1	2	GND
Q ₀	2	2	3	OPEN
Q ₀ -bar	3	3	4	OPEN
D ₀	4	4	5	V _{CC}
D ₁	5	5	7	V _{CC}
Q ₁	6	6	8	OPEN
Q ₁ -bar	7	7	9	OPEN
GND	8	8	10	GND
CP	9	9	12	V _{CC}
Q ₂	10	10	13	OPEN
Q ₂ -bar	11	11	14	OPEN
D ₂	12	12	15	V _{CC}
D ₃	13	13	17	V _{CC}
Q ₃	14	14	18	OPEN
Q ₃ -bar	15	15	19	OPEN
V _{CC}	16	16	20	V _{CC}

BURN-IN CONDITIONS:
V_{CC} = 5.0 V MIN/6.0 V MAX

FUNCTIONAL DESCRIPTION

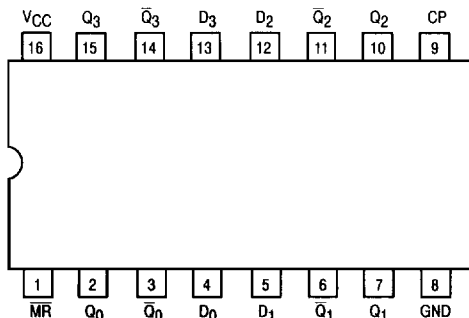
The F175 consists of four edge-triggered D flip-flops with individual D inputs and Q and \bar{Q} outputs. The Clock and Master Reset are common. The four flip-flops will store the state of their individual D inputs on the LOW to HIGH clock (CP) transition, causing individual Q and \bar{Q} outputs to follow. A LOW input on the Master Reset (\bar{MR}) will force all Q outputs LOW and \bar{Q} outputs HIGH independent of Clock or Data inputs. The F175 is useful for general logic applications where a common Master Reset and Clock are acceptable.

TRUTH TABLE

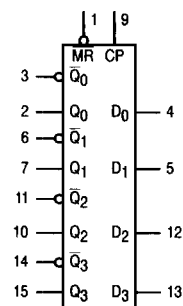
Inputs		Outputs	
@ $t_n, \bar{MR} = H$		@ t_{n+1}	
D_n		Q_n	\bar{Q}_n
L		L	H
H		H	L

t_n = Bit time before clock pulse
 t_{n+1} = Bit time after clock pulse
 H = High Voltage Level
 L = LOW Voltage Level

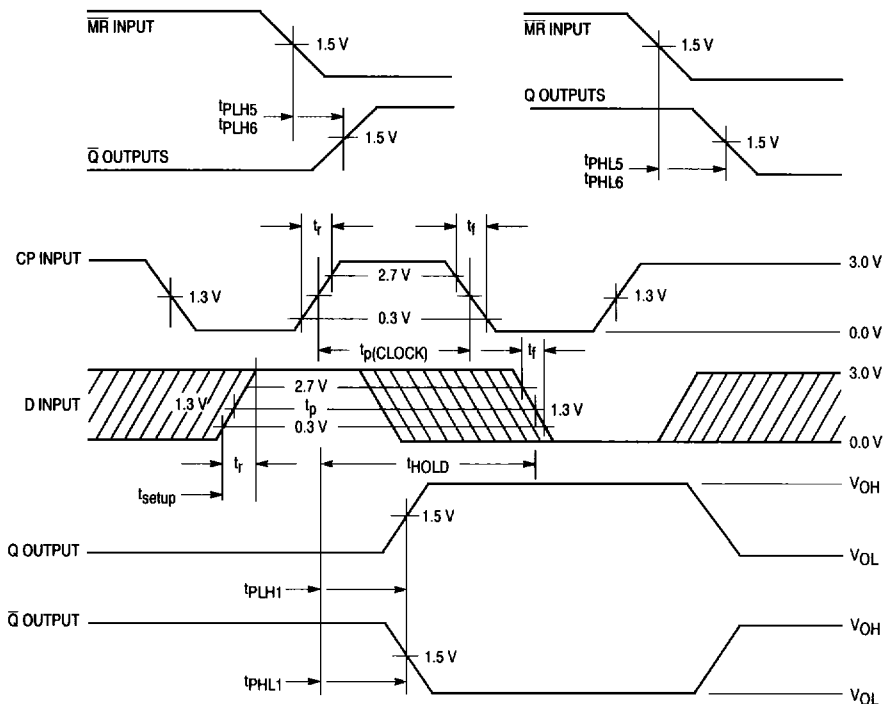
CONNECTION DIAGRAM



LOGIC SYMBOL



WAVEFORMS



The shaded areas indicate when the input is permitted to change for predictable output performance.

Symbol	Parameter	Limits						Unit	Test Condition (Unless Otherwise Specified)
		+ 25°C		+ 125°C		- 55°C			
		Subgroup 1		Subgroup 2		Subgroup 3			
		Min	Max	Min	Max	Min	Max		
V _{OH}	Logical "1" Output Voltage	2.5		2.5		2.5		V	V _{CC} = 4.5 V, I _{OH} = -1.0 mA, V _{IN} = 2.0 V or 0.8 V per truth table.
V _{OL}	Logical "0" Output Voltage		0.5		0.5		0.5	V	V _{CC} = 4.5 V, I _{OL} = 20 mA, V _{IN} = 2.0 V or 0.8 V per truth table.
V _{IC}	Input Clamping Voltage		-1.2					V	V _{CC} = 4.5 V, I _{IN} = -18 mA, other inputs are open.
I _{IH}	Logical "1" Input Current		20		20		20	μA	V _{CC} = 5.5 V, V _{IH} = 2.7 V, other inputs are open.
I _{IHH}	Logical "1" Input Current		100		100		100	μA	V _{CC} = 5.5 V, V _{IHH} = 7.0 V, other inputs are open.
I _{IL}	Logical "0" Input Current (MR, CP, D)	-0.03	-0.6	-0.03	-0.6	-0.03	-0.6	mA	V _{CC} = 5.5 V, V _{IL} = 0.5 V, other inputs are open.
I _{OD}	Diode Current	60		60		60		mA	V _{CC} = 4.5 V, MR = 0 V, V _{IN} = 5.5 V, other inputs are open, V _{OUT} = 2.5 V.
I _{OS}	Output Short Circuit Current	-60	-150	-60	-150	-60	-150	mA	V _{CC} = 5.5 V, V _{IN(D)} = 0 V, other data inputs are open, MR & CR = (See Note 9), V _{OUT} = 0 V.
I _{CC}	Power Supply Current		34		34		34	mA	V _{CC} = 5.5 V, V _{IN} = 4.5 V, CP = (See Note 10), other inputs are open.
V _{IH}	Logical "1" Input Voltage	2.0		2.0		2.0		V	V _{CC} = 4.5 V.
V _{IL}	Logical "0" Input Voltage		0.8		0.8		0.8	V	V _{CC} = 4.5 V.
t _s (H) t _s (L)	Set Up Time, D High or Low to CP	3.0		3.0		3.0		ns	V _{CC} = 5.0 V, C _L = 50 pF. (Information only, No Testing Required).
t _h (H) t _h (L)	Hold Time, D High or Low to CP	1.0		1.0		1.0		ns	V _{CC} = 5.0 V, C _L = 50 pF. (Information only, No Testing Required).
t _{rec}	Recovery Time MR to CP	5.0		5.0		5.0		ns	V _{CC} = 5.0 V, C _L = 50 pF. (Information only, No Testing Required).
	Functional Tests	Subgroup 7		Subgroup 8A		Subgroup 8B			per Truth Table with V _{CC} = 4.5 V, (Repeat at) V _{CC} = 5.5 V, V _{INL} = 0.5 V, and V _{INH} = 2.5 V.

54F175

Symbol	Parameter	Limits						Unit	Test Condition (Unless Otherwise Specified)
		+ 25°C		+ 125°C		- 55°C			
		Subgroup 9		Subgroup 10		Subgroup 11			
		Min	Max	Min	Max	Min	Max		
t _{PHL1}	Propagation Delay /Data-Output Clock to Q _n	4.0	8.5	3.5	10.5	3.5	10.5	ns	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.
t _{PLH1}	Propagation Delay /Data-Output Clock to Q _n	4.0	6.5	3.5	8.5	3.5	8.5	ns	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.
t _{PHL2}	Propagation Delay /Data-Output Clock to Q _n	4.0	8.5	3.5	10.5	3.5	10.5	ns	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.
t _{PLH2}	Propagation Delay /Data-Output Clock to Q _n	4.0	6.5	3.5	8.5	3.5	8.5	ns	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.
t _{PHL5}	Propagation Delay /Data-Output MR to Q _n	4.5	11.5	4.5	15	4.5	15	ns	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.
t _{PLH5}	Propagation Delay /Data-Output MR to Q _n	4.0	8.0	4.0	10	4.0	10	ns	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.
t _{PHL6}	Propagation Delay /Data-Output MR to Q _n	4.5	11.5	4.5	15	4.5	15	ns	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.
t _{PLH6}	Propagation Delay /Data-Output MR to Q _n	4.0	8.0	4.0	10	4.0	10	ns	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.
f _{MAX}	Maximum Clock Frequency	100		80		80		MHz	V _{CC} = 5.0 V, C _L = 50 pF, R ₁ = 499 Ω ± 5.0%.

NOTES:

- Input pulse has the following characteristics:
t_r = t_f ≤ 2.5 ns, PRR ≤ 1.0 MHz, or as specified in table 1, PRR (Subgroups 10 and 11) have a duty cycle 50 ± 15%, t_p = 5.0 ns (Min).
- Inputs not under test are at GND, (see Note 8).
- C_L = 50 pF ± 10% including scope probe, wiring and stray capacitance, without package in test fixture.
- Voltage measurements are to be made with respect to network ground terminal.
- R₁ = 499 Ω ± 5.0%.
- f_{MAX} minimum limit specified is the input pulse. The output frequency shall be 1/2 the input frequency.
- Clock, Clear and Set inputs need to be in the proper configuration for specified output conditions.
- Terminal conditions (pins not designated may be High ≥ 2.0 V, Low ≤ 0.8 V, or open).
- Apply all voltages, then apply 3.0 V, 0 V, 3.0 V to MR, then apply 3.0 V, 0 V, 3.0 V to CP, then make measurement.
- Apply all voltages, then apply 3.0 V, 0 V, 3.0 V to CP, then make measurement.