

C²MOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC40H175P/F

TC40H175 QUAD D-TYPE FLIP-FLOP

The TC40H175 is a quad D-type flip-flop having common CLOCK and common CLEAR input.

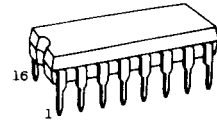
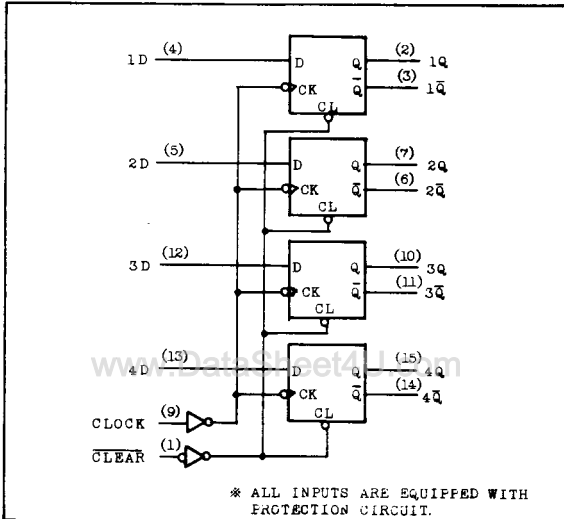
The logical input applied to data input is transmitted to outputs Q and \bar{Q} at the rising edge of CLOCK input.

When CLEAR input is set to "L" level, output Q goes to "L" level and output \bar{Q} to "H" level, respectively.

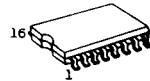
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{DD}	V _{SS} -0.5 ~ V _{SS} +10	V
Input Voltage	V _{IN}	V _{SS} -0.5 ~ V _{DD} +0.5	V
Output Voltage	V _{OUT}	V _{SS} -0.5 ~ V _{DD} +0.5	V
Input Current	I _{IN}	±10	mA
Power Dissipation	PD	300(DIP)/180(MFP)	mW
Storage Temperature	T _{stg}	-65 ~ 150	°C
Lead Temp./Time	T _{sol}	260°C • 10 sec	

LOGIC DIAGRAM

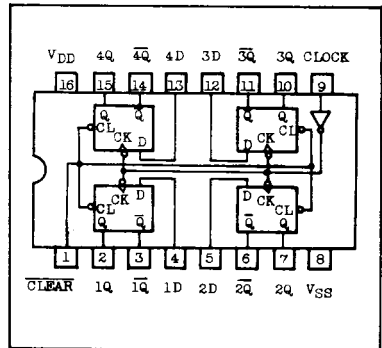


DIP16 (3D16A-P)



MFP16 (F16GC-P)

PIN CONNECTION



TRUTH TABLE

INPUTS			OUTPUTS	
CLEAR	CLOCK	DATA	Q	\bar{Q}
L	X	X	L	H
H		H	H	L
H		L	L	H
H		X	No Change	No Change

X = Don't Care

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RECOMMENDED OPERATING CONDITIONS (V_{SS}=0.0V)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V _{DD}	-	2.0	-	8.0	V
Input Voltage	V _{IN}	-	0	-	V _{DD}	V
Operating Temperature	T _{opr}	-	-40	-	85	°C

ELECTRICAL CHARACTERISTICS (V_{SS}=0.0V)

CHARACTERISTIC	SYMBOL	TEST CONDITION	V _{DD} (V)	-40°C		25°C			85°C		UNIT
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High Level Output Voltage	V _{OH}	I _{OUT} < 1μA V _{IN} =V _{SS} , V _{DD}	5	4.95	-	4.95	5.0	-	4.95	-	V
Low Level Output Voltage	V _{OL}	I _{OUT} < 1μA V _{IN} =V _{SS} , V _{DD}	5	-	0.05	-	0.0	0.05	-	0.05	V
High Level Output Current	I _{OH}	V _{OH} =4.6V V _{IN} =V _{SS} , V _{DD}	5	-0.52	-	-0.44	-	-	-0.36	-	mA
Low Level Output Current	I _{OL}	V _{OL} =0.4V V _{IN} =V _{SS} , V _{DD}	5	1.4	-	1.1	-	-	0.8	-	mA
Input Voltage	"H" Level V _{IH}	I _{OUT} < 1μA V _{OUT} =0.5V V _{OUT} =4.5V	5	4.0	-	4.0	-	-	4.0	-	V
	"L" Level V _{IL}		5	-	1.0	-	-	1.0	-	1.0	V
Input Current	"H" Level I _{IH}	V _{IH} =8.0V	8	-	0.3	-	10 ⁻⁵	0.3	-	1.0	μA
	"L" Level I _{IL}	V _{IL} =0.0V	8	-	-0.3	-	-10 ⁻⁵	-0.3	-	-1.0	μA
Quiescent Supply Current	I _{DD}	*V _{IN} =V _{SS} , V _{DD}	5	-	12.5	-	10 ⁻³	12.5	-	75	μA

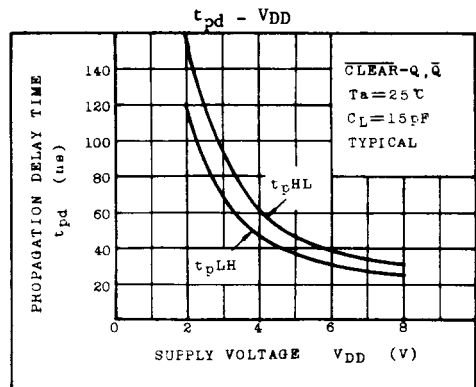
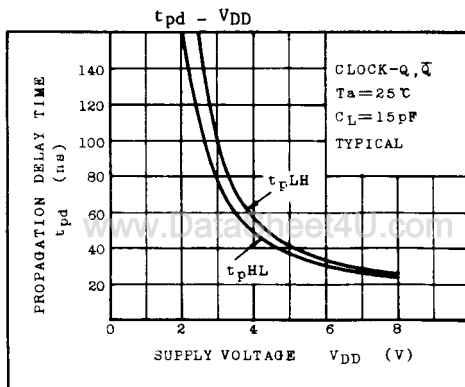
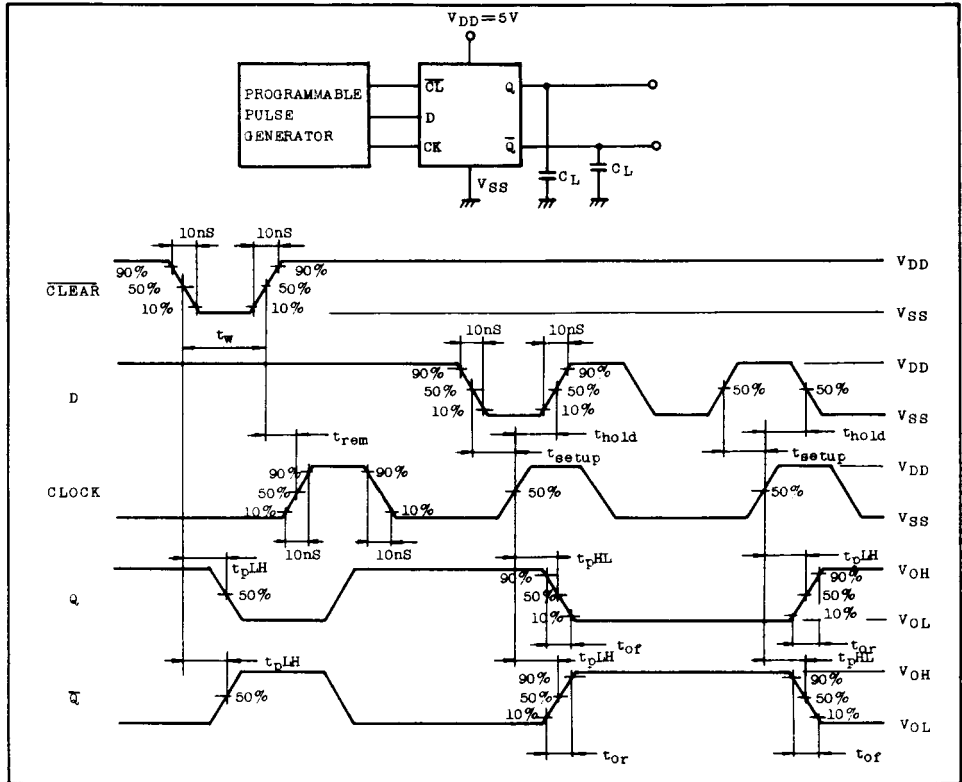
*All valid input combinations.

SWITCHING CHARACTERISTICS (T_a=25°C, V_{SS}=0.0V, C_L=15pF)

CHARACTERISTIC	SYMBOL	TEST CONDITION	V _{DD}	MIN.	TYP.	MAX.	UNIT		
Output Rise Time	t _{or}		5	-	18	35	ns		
Output Fall Time	t _{of}		5	-	17	30			
Propagation Delay Time	(Low-High)	t _{pLH}	CLOCK - Q, \bar{Q}	5	-	42	63	ns	
	(High-Low)	t _{pHL}		5	-	38	57		
	(Low-High)	t _{pLH}		CLEAR - Q, \bar{Q}	5	-	35		53
	(High-Low)	t _{pHL}			5	-	45		68
Min. Width of Pulse	t _w	CLEAR	5	-	13	24	ns		
Max. Clock Rise Time	t _{rD}		5	1.0	7.0	-	μs		
Max. Clock Fall Time	t _{fD}								
Min. Data Hold Time	t _{hold}		5	-	-	5	ns		
Min. Data Setup Time	t _{set-up}	D-CLOCK	5	-	-	25	ns		
Input Capacitance	C _{IN}			-	5	-	pF		
Max. Clock Frequency	f _{MAXφ}		5	10	20	-	MHz		
Min. Clear Removal Time	t _{rem}		5		17	25	ns		

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SWITCHING TIME TEST CIRCUIT AND WAVEFORM



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