

# TC40H390P/F

C<sup>2</sup>MOS DIGITAL INTEGRATED CIRCUIT  
SILICON MONOLITHIC

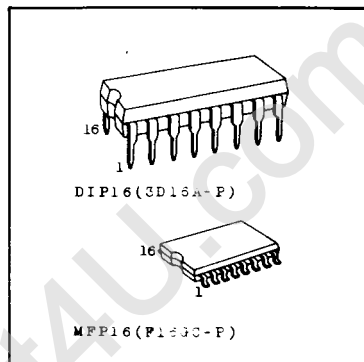
## TC40H390 DUAL DECADE COUNTER

The TC40H390 is a dual decade counter with CLEAR function, and can be used as a binary/quinary/decimal counter. The CLEAR input is active at "H" level, and the CLOCK input is triggered at the falling edge of CLOCK.

For using a TC40H390 as a decimal counter, output QA shall be connected to input B directly.

For using a TC40H390 as a quinary counter, input clock signal shall be applied to input B directly.

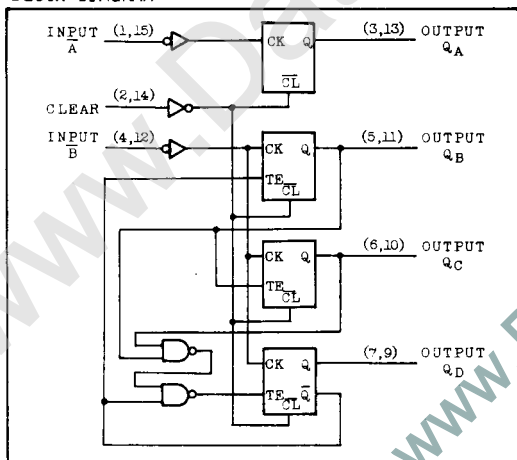
The function and pin assignment of this counter are the same as those of the TTL74390 and the LSTTL74LS390.



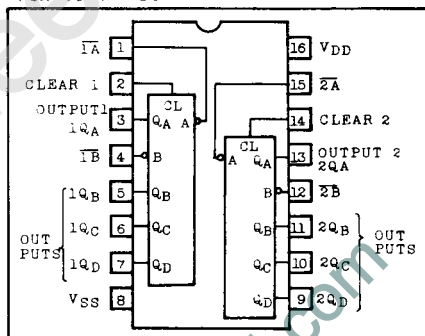
### MAXIMUM RATINGS

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

### BLOCK DIAGRAM



### PIN CONNECTION



### COUNT SEQUENCE

(1)QA, IN<sub>B</sub> Connection (2)QD, IN<sub>A</sub> Connection

COUNT	OUTPUT				COUNT	OUTPUT			
	QA	QB	QC	QD		QB	QC	QD	QA
0	L	L	L	L	0	L	L	L	L
1	H	L	L	L	1	H	L	L	L
2	L	H	L	L	2	L	H	L	L
3	H	H	L	L	3	H	H	L	L
4	L	L	H	L	4	L	L	H	L
5	H	L	H	L	5	L	L	L	H
6	L	H	H	L	6	H	L	L	H
7	H	H	H	L	7	L	H	L	H
8	L	L	L	H	8	H	H	L	H
9	H	L	L	H	9	L	L	H	H

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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 CONCITION	$V_{DD}$ (V)	-40°C		25°C			85°C		UNIT
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High Level Output Voltage	$V_{OH}$	$ I_{OUT}  < 1\mu A$ $V_{IN}=V_{SS}$	5	4.95	—	4.95	—	—	4.95	—	V
Low Level Output Voltage	$V_{OL}$	$ I_{OUT}  < 1\mu A$ $V_{IN}=V_{DD}$	5	—	0.05	—	0.0	0.05	—	0.05	
High Level Output Current	$I_{OH}$	$V_{OH}=4.6V$ $V_{IN}=V_{SS}$	5	-0.52	—	-0.44	—	—	-0.36	—	mA
Low Level Output Current	$I_{OL}$	$V_{OL}=0.4V$ $V_{IN}=V_{DD}$	5	1.4	—	1.1	—	—	0.8	—	
High Level Input Voltage	$V_{IH}$	$ I_{OUT}  < 1\mu A$ $V_{OUT}=0.5V$	5	4.0	—	4.0	—	—	4.0	—	V
Low Level Input Voltage	$V_{IL}$	$V_{OUT}=4.5V$ $V_{IN}=V_{SS}, V_{DD}$									
Input Current "H" Level	$I_{IH}$	$V_{IH}=8.0$	8	—	0.3	—	$10^{-5}$	0.3	—	1.0	$\mu A$
Input Current "L" Level	$I_{IL}$	$V_{IL}=0.0V$	8	—	-0.3	—	$-10^{-5}$	-0.3	—	-1.0	
Quiescent Supply Current	$I_{DD}$	$*V_{IN}=V_{SS}, V_{DD}$	5	—	12.5	—	$10^{-3}$	12.5	—	75	$\mu A$

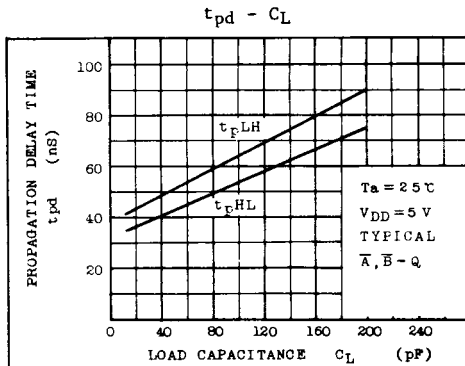
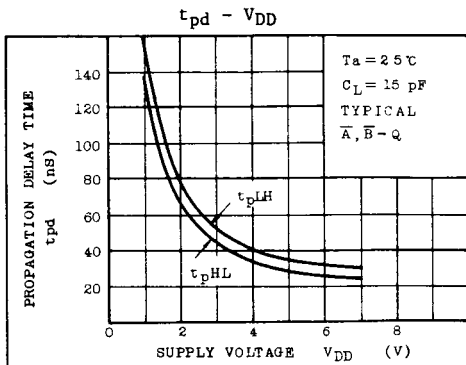
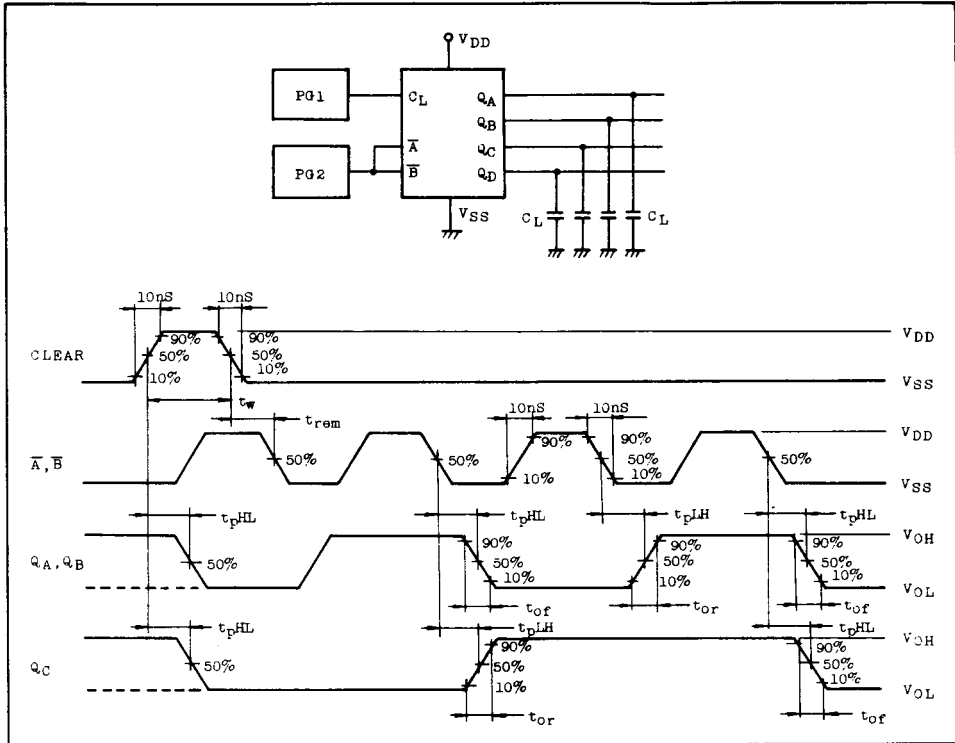
\* All valid input combinations.

SWITCHING CHARACTERISTICS ( $T_a=25^\circ C$ ,  $V_{SS}=0V$ ,  $V_{DD}=5V$ ,  $C_L=15pF$ )

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Rise Time	$t_{or}$	CLCOK - Q	—	18	35	ns
Output Fall Time	$t_{of}$		—	15	30	
Propagation Delay Time	Low-High Level $t_{pLH}$ High-Low Level $t_{pHL}$	CLEAR - Q	—	42	63	ns
High-Low Level Propagation Delay Time	$t_{pHL}$		—	36	54	
Maximum Clock Rise/Fall Time	$t_{r\phi}$ $t_{f\phi}$		1.0	100	—	$\mu s$
Minimum Clear Pulse Width	$t_w$		—	20	35	ns
Minimum Clear Removal Time	$t_{rem}$		—	10	20	ns
Maximum Clock Frequency	$f_{MAX}$		15	30	—	MHz
Input Capacitance	$C_{IN}$		—	5	—	

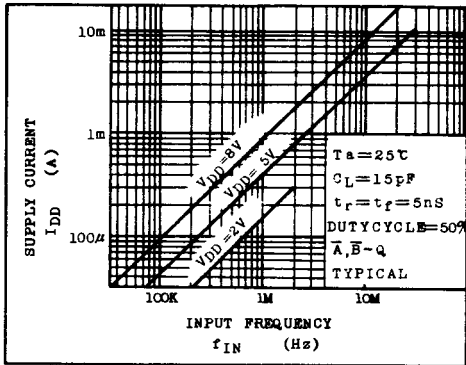
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## SWITCHING TIME TEST CIRCUIT AND WAVEFORM

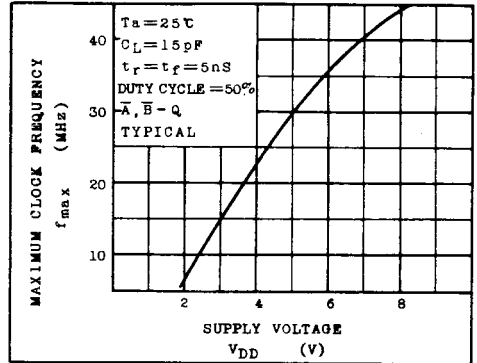


# TC40H390P/F

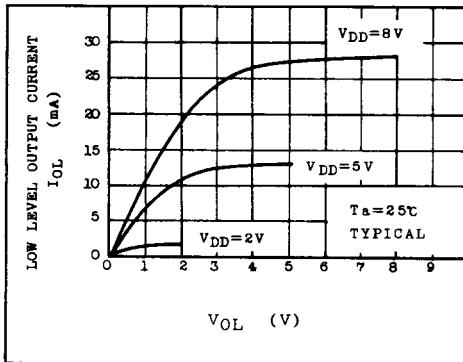
$I_{DD} - f_{IN}$



$f_{max} - V_{DD}$



$I_{OL} - V_{OL}$



$I_{OH} - (V_{DD} - V_{OH})$

