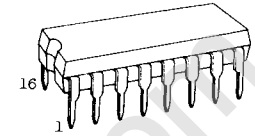
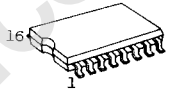
TC4518BP/BF, TC4520BP/BF

TC4518BP/TC4518BF DUAL BCD UP COUNTER
TC4520BO/TC4520BF DUAL BINARY UP COUNTER

TC4518BP/BF and TC4520BP/BF are up counters of BCD or 4 bit binary.
Since both of TC4518BP/BF and TC4520BP/BF contain two independent circuits of counters with the same functions in one package, counting or frequency division of two BCD digits or eight binary bits can be achieved with one IC. The counters can be reset to "0" (Q0 ∿ Q3="L") by giving "H" level signal to RESET input regardless of other inputs.
The counting condition is changed by the rising edge of CLOCK input if ENABLE="H" or by the falling edge of ENABLE if CLOCK="L".



DIP16(3D16A-P)

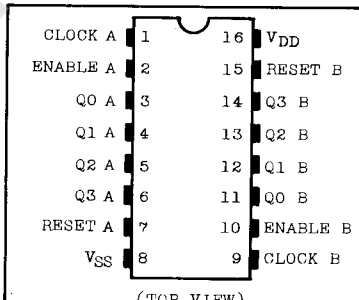


MFP16(F16GC-P)

ABSOLUTE MAXIMUM RATINGS

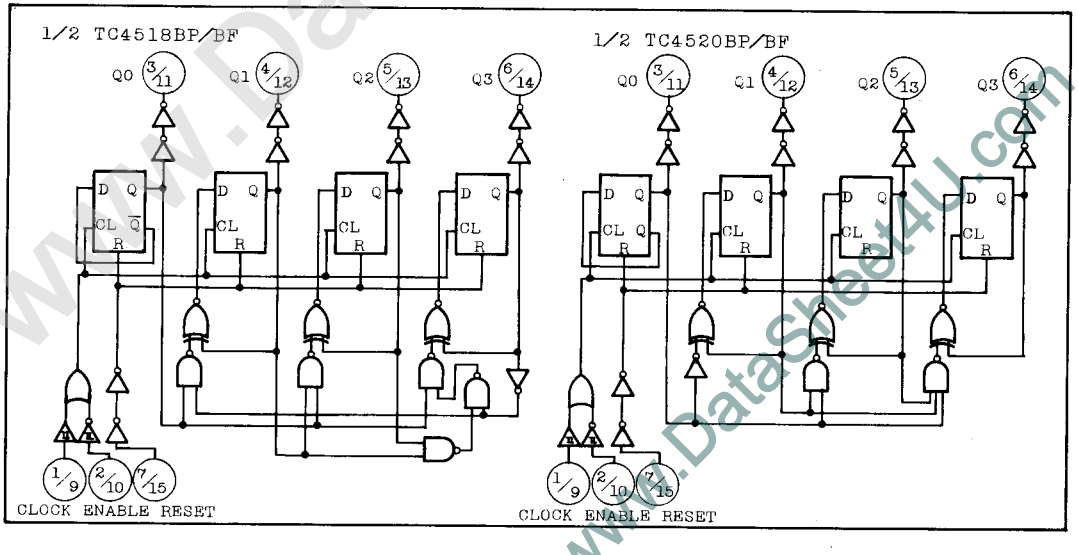
CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	V_{SS}-0.5 ∿ V_{SS}+20	V
Input Voltage	V_{IN}	V_{SS}-0.5 ∿ V_{DD}+0.5	V
Output Voltage	V_{OUT}	V_{SS}-0.5 ∿ V_{DD}+0.5	V
DC Input Current	I_{IN}	±10	mA
Power Dissipation	P_D	300(DIP)/180(MFP)	mW
Operating Temperature Range	T_A	-40 ∿ 85	°C
Storage Temperature Range	T_{stg}	-65 ∿ 150	°C
Lead Temp./Time	T_{sol}	260°C • 10sec	

PIN ASSIGNMENT



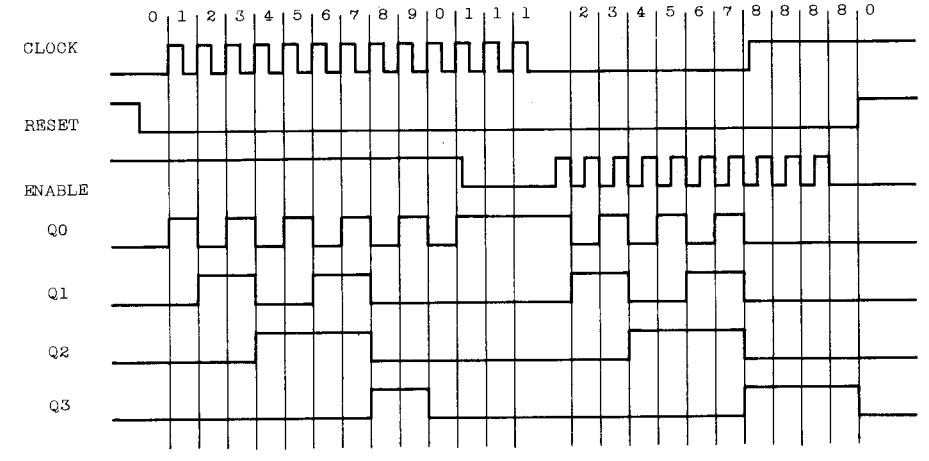
(TOP VIEW)

LOGIC DIAGRAM

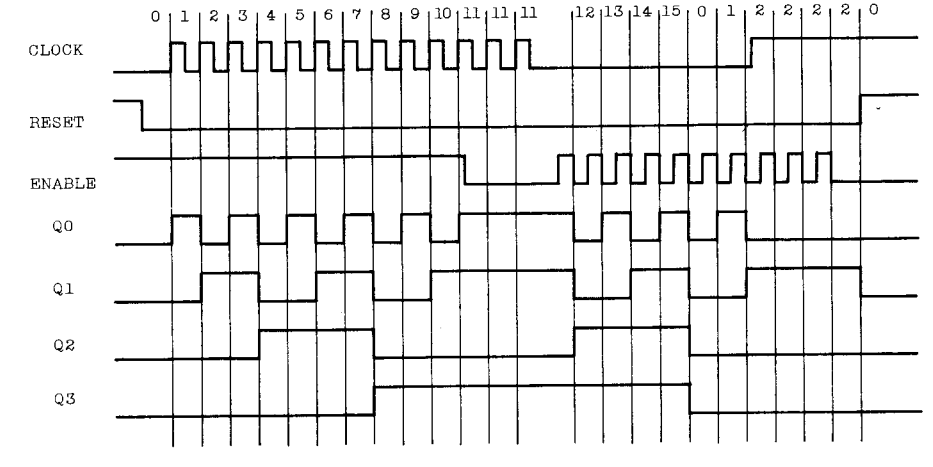


TIMING CHART

TC4518BP/BF



TC4520BP/BF



RECOMMENDED OPERATING CONDITIONS (V_{SS}=0V)

CHARACTERISTIC	SYMBOL		MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	V_{DD}		3	-	18	V
Input Voltage	V_{IN}		0	-	V_{DD}	

STATIC ELECTRICAL CHARACTERISTICS (V_{SS}=0V)

CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD} (V)	-40°C MIN.	-40°C MAX.	25°C MIN.	25°C TYP.	25°C MAX.	85°C MIN.	85°C MAX.	UNIT
High-Level Output Voltage	V_{OH}	$\|I_{OUT}\|$<1μA V_{IN}=V_{SS}, V_{DD}	5	4.95	-	4.95	5.00	-	4.95	-	V
			10	9.95	-	9.95	10.00	-	9.95	-	
			15	14.95	-	14.95	15.00	-	14.95	-	
Low-Level Output Voltage	V_{OL}	$\|I_{OUT}\|$<1μA V_{IN}=V_{SS}, V_{DD}	5	-	0.05	-	0.00	0.05	-	0.05	
			10	-	0.05	-	0.00	0.05	-	0.05	
			15	-	0.05	-	0.00	0.05	-	0.05	
Output High Current	I_{OH}	V_{OH}=4.6V	5	-0.61	-	-0.51	-1.0	-	-0.42	-	mA
		V_{OH}=2.5V	5	-2.5	-	-2.1	-4.0	-	-1.7	-	
		V_{OH}=9.5V	10	-1.5	-	-1.3	-2.2	-	-1.1	-	
		V_{OH}=13.5V	15	-4.0	-	-3.4	-9.0	-	-2.8	-	
		V_{IN}=V_{SS}, V_{DD}									
Output Low Current	I_{OL}	V_{OL}=0.4V	5	0.61	-	0.51	1.2	-	0.42	-	
		V_{OL}=0.5V	10	1.5	-	1.3	3.2	-	1.1	-	
		V_{OL}=1.5V	15	4.0	-	3.4	12.0	-	2.8	-	
		V_{IN}=V_{SS}, V_{DD}									
Input High Voltage	V_{IH}	V_{OUT}=0.5V, 4.5V	5	3.5	-	3.5	2.75	-	3.5	-	V
		V_{OUT}=1.0V, 9.0V	10	7.0	-	7.0	5.5	-	7.0	-	
		V_{OUT}=1.5V,13.5V	15	11.0	-	11.0	8.25	-	11.0	-	
		$\|I_{OUT}\|$<1μA									
Input Low Voltage	V_{IL}	V_{OUT}=0.5V, 4.5V	5	-	1.5	-	2.25	1.5	-	1.5	
		V_{OUT}=1.0V, 9.0V	10	-	3.0	-	4.0	3.0	-	3.0	
		V_{OUT}=1.5V,13.5V	15	-	4.0	-	6.75	4.0	-	4.0	
		$\|I_{OUT}\|$<1μA									
Input Current "H" Level	I_{IH}	V_{IH}=18V	18	-	0.1	-	10^{-5}	0.1	-	1.0	μA
Input Current "L" Level	I_{IL}	V_{IL}=0V	18	-	-0.1	-	-10^{-5}	-0.1	-	-1.0	
Quiescent Device Current	I_{DD}	V_{IN}=V_{SS}, V_{DD}	5	-	5	-	0.005	5	-	150	
			10	-	10	-	0.010	10	-	300	
		*	15	-	20	-	0.015	20	-	600	

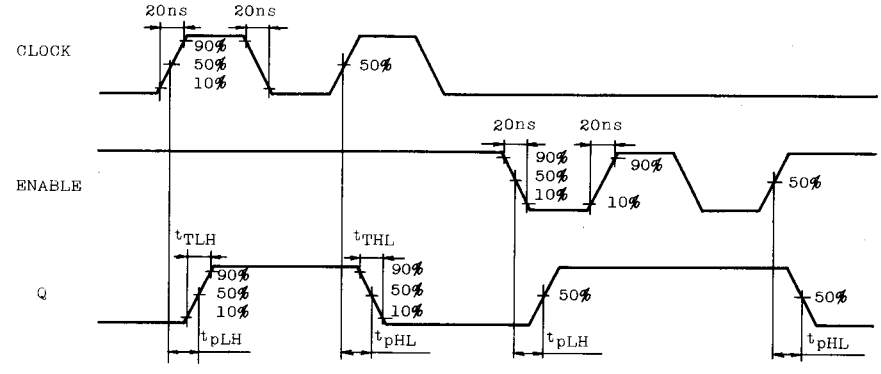
* All valid input combinations.

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{SS}=0V, C_L=50pF)

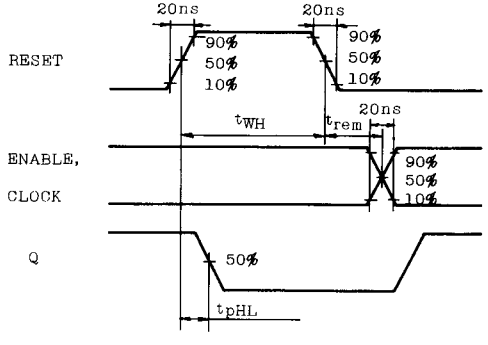
CHARACTERISTIC	SYMBOL	TEST CONDITION	V_{DD}(V)	MIN.	TYP.	MAX.	UNIT
Output Transition Time	t_{TLH} t_{THL}		5	-	70	200	ns
			10	-	35	100	
			15	-	30	80	
Propagation Delay Time (CLOCK, ENABLE - Q)	t_{pLH} t_{pHL}		5	-	160	560	
			10	-	75	230	
			15	-	60	160	
Propagation Delay Time (RESET - Q)	t_{pHL}		5	-	110	560	
			10	-	55	230	
			15	-	40	160	
Max. Clock Frequency	f_{CL}		5	1.5	6	-	MHz
			10	3	14	-	
			15	4	18	-	
Max. Clock Input Rise/ Fall Time	t_{rCL} t_{fCL}		5	No Limit			μs
			10				
			15				
Max. Input Rise/Fall Time (ENABLE)	t_r t_f		5	No Limit			
			10				
			15				
Min. Clock Pulse Width	t_W		5	-	30	200	ns
			10	-	15	100	
			15	-	10	70	
Min. Pulse Width (ENABLE)	t_W		5	-	35	250	
			10	-	20	110	
			15	-	15	80	
Min. Pulse Width (RESET)	t_{WH}		5	-	45	250	
			10	-	20	110	
			15	-	15	80	
Min. Removal Time	t_{rem}		5	-	-	0	
			10	-	-	0	
			15	-	-	0	
Input Capacitance	C_{IN}			-	5	7.5	pF

WAVEFORMS FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

WAVEFORM 1

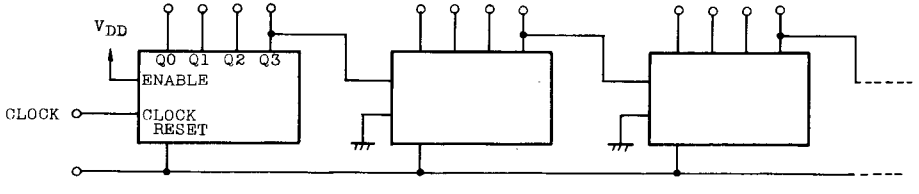


WAVEFORM 2



APPLICATION CIRCUIT

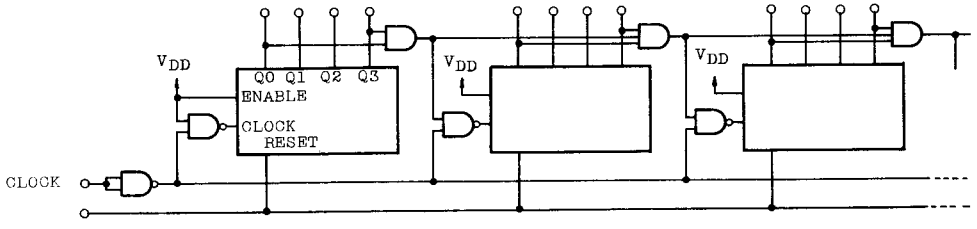
(1) RIPPLE CARRY UP COUNTER



APPLICATION CIRCUIT (Continued)

(2) PARALLEL CARRY UP COUNTER

TC4518BP/BF



TC4520BP/BF