

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC4538BP, TC4538BF

TC4538BP/TC4538BF DUAL PRECISION
RETRIGGERABLE/RESETTABLE MONOSTABLE MULTIVIBRATOR

The TC4538BP/BF is the retriggerable / resettable monostable multivibrator and the trigger operation can be made at either the leading or trailing edge by 2 inputs of A and B. Since the output monostable pulse width is decided by time constant of the external reistor (R_X) and the external capacitor (C_X), it becomes possible to set a broad range of output pulse widths.

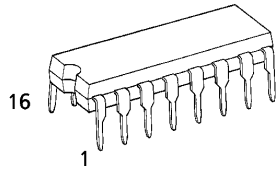
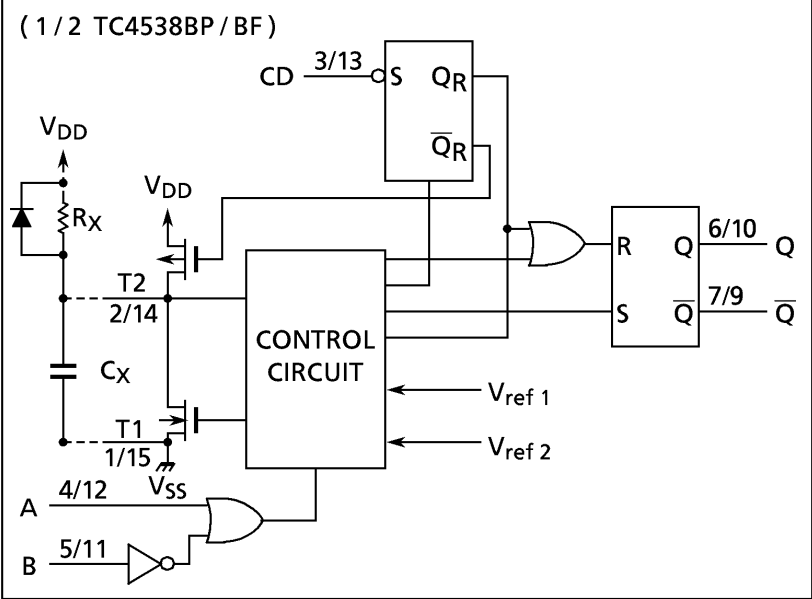
FEATURE :

- $t_{wOUT}=10ms\pm5\%$ (at $R_X=100k\Omega$, $C_X=0.1\mu F$, $V_{DD}=10V$)

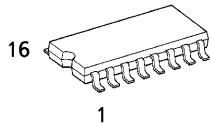
MAXIMUM RATINGS

CHARACTERISTIC	SYMBOL	RATING	UNIT
DC Supply Voltage	V_{DD}	$V_{SS}-0.5\sim V_{SS}+20$	V
Input Voltage	V_{IN}	$V_{SS}-0.5\sim V_{DD}+0.5$	V
Output Voltage	V_{OUT}	$V_{SS}-0.5\sim V_{DD}+0.5$	V
DC Input Current	I_{IN}	± 10	mA
Power Dissipation	P_D	300 (DIP) / 180 (SOIC)	mW
Operating Temperature Range	T_{opr}	$-40\sim85$	$^{\circ}C$
Storage Temperature Range	T_{stg}	$-65\sim150$	$^{\circ}C$

LOGIC DIAGRAM

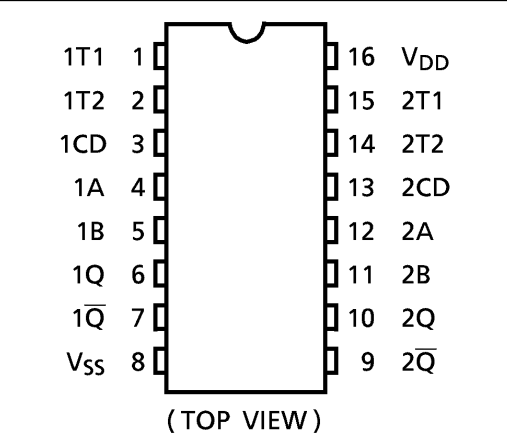


P (DIP16-P-300-2.54A)
Weight : 1.00g (Typ.)



F (SOP16-P-300-1.27)
Weight : 0.18g (Typ.)

PIN ASSIGNMENT

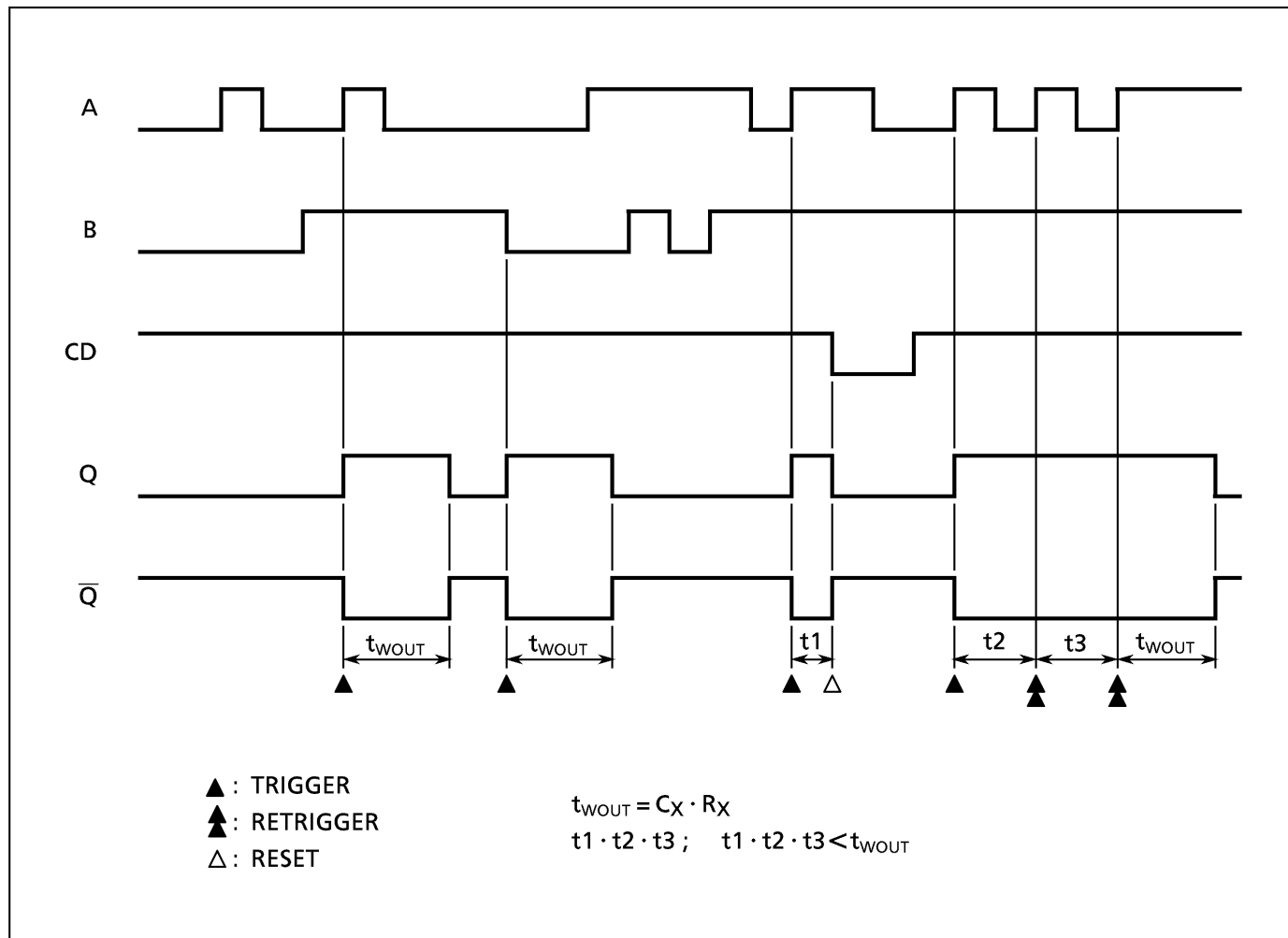


TRUTH TABLE

INPUTS			OUTPUTS		NOTE
A	B	CD	Q	$\bar{Q}$	
	H	H			OUTPUT ENABLE
	L	H	L	H	INHIBIT
H		H	L	H	INHIBIT
L		H			OUTPUT ENABLE
*	*	L	L	H	INHIBIT

* Don't Care

TIMING CHART



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

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
DC Supply Voltage	V_{DD}		3	—	18	V
Input Voltage	V_{IN}		0	—	V_{DD}	V
External Resistance	R_X		5	—	1000	$k\Omega$
External Capacitance	C_X		No Limits			μF

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

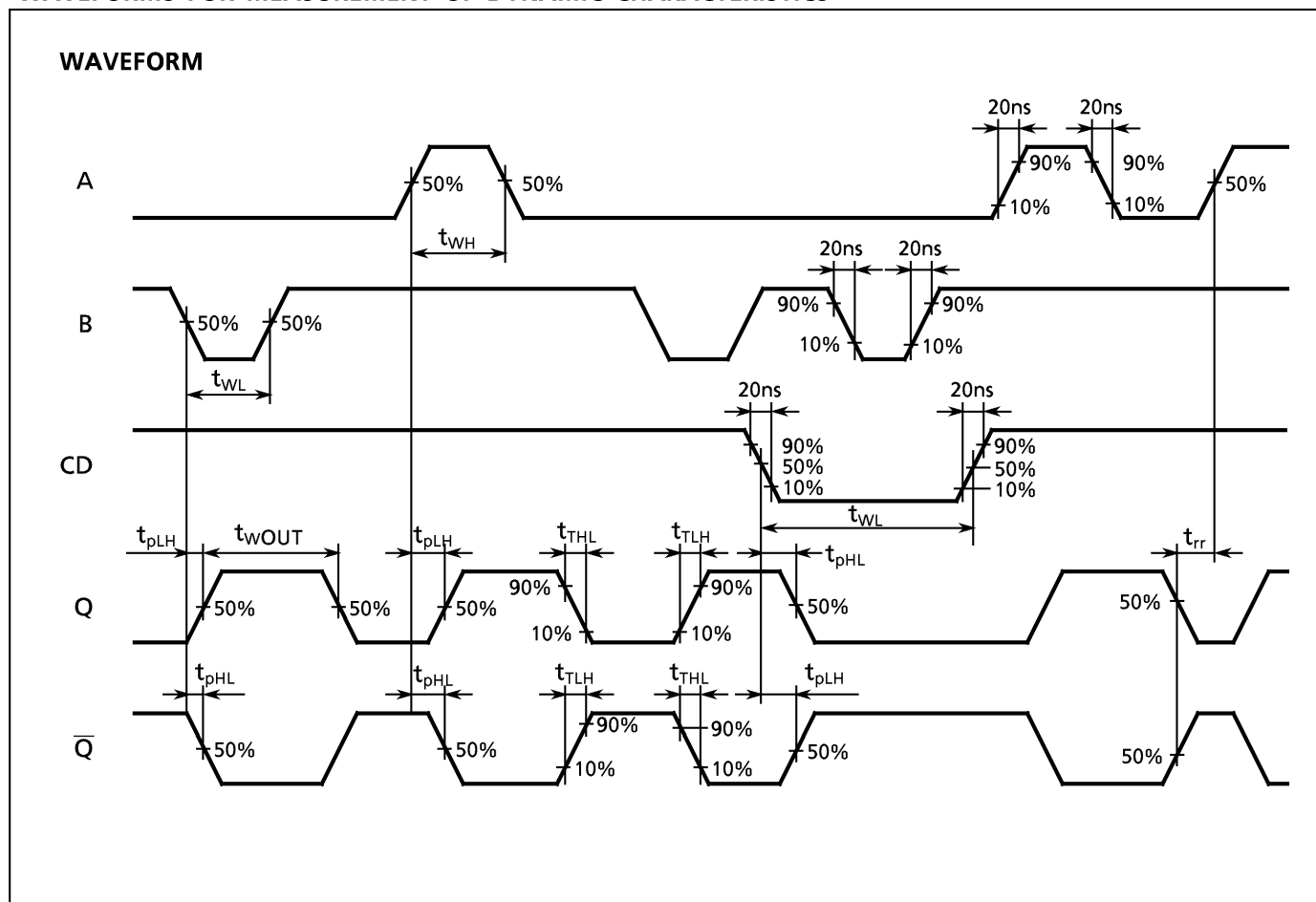
CHARACTERISTIC	SYM-BOL	TEST CONDITION	V_{DD} (V)	- 40°C		25°C			85°C		UNIT
				MIN.	MAX.	MIN.	TYP.	MAX.	MIN.	MAX.	
High-Level Output Voltage	V_{OH}	$ I_{OUT} < 1\mu A$ $V_{IN} = V_{SS}, V_{DD}$	5	4.95	—	4.95	5.00	—	4.95	—	V
			10	9.95	—	9.95	10.00	—	9.95	—	
			15	14.95	—	14.95	15.00	—	14.95	—	
Low-Level Output Voltage	V_{OL}	$ I_{OUT} < 1\mu A$ $V_{IN} = V_{SS}, V_{DD}$	5	—	0.05	—	0.00	0.05	—	0.05	V
			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	-2.50	—	-2.10	-4.0	—	-1.70	—	
		$V_{OH} = 9.5V$	10	-1.50	—	-1.30	-2.2	—	-1.10	—	
		$V_{OH} = 13.5V$	15	-4.00	—	-3.40	-9.0	—	-2.80	—	
		$V_{IN} = V_{SS}, V_{DD}$									
Output Low Current	I_{OL}	$V_{OL} = 0.4V$	5	0.61	—	0.51	1.5	—	0.42	—	mA
		$V_{OL} = 0.5V$	10	1.50	—	1.30	3.8	—	1.10	—	
		$V_{OL} = 1.5V$	15	4.00	—	3.40	15.0	—	2.80	—	
		$V_{IN} = V_{SS}, V_{DD}$									
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	5.50	—	7.0	—	
		$V_{OUT} = 1.5V, 13.5V$	15	11.0	—	11.0	8.25	—	11.0	—	
		$ I_{OUT} < 1\mu A$									
Input Low Voltage	V_{IL}	$V_{OUT} = 0.5V, 4.5V$	5	—	1.5	—	2.25	1.5	—	1.5	V
		$V_{OUT} = 1.0V, 9.0V$	10	—	3.0	—	4.50	3.0	—	3.0	
		$V_{OUT} = 1.5V, 13.5V$	15	—	4.0	—	6.75	4.0	—	4.0	
		$ I_{OUT} < 1\mu A$									
Input Current	"H" Level	I_{IH}	$V_{IH} = 18V$	18	—	0.1	—	10^{-5}	0.1	—	μA
	"L" Level	I_{IL}	$V_{IL} = 0V$	18	—	-0.1	—	-10^{-5}	-0.1	—	
Quiescent Supply Current	I_{DD}	$V_{IN} = V_{SS}, V_{DD} *$	5	—	5	—	0.005	5	—	150	μA
			10	—	10	—	0.010	10	—	300	
			15	—	20	—	0.015	20	—	600	

* All valid input combinations.

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta = 25°C, Vss = 0V, CL = 50pF)

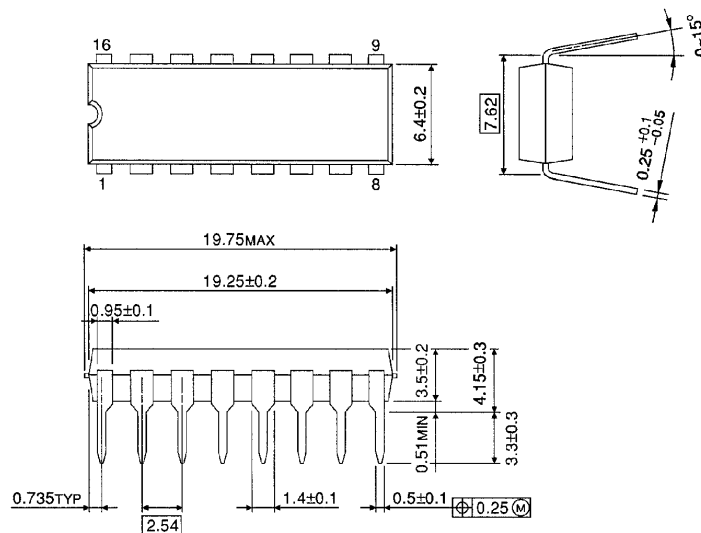
CHARACTERISTIC	SYMBOL	TEST CONDITION	$V_{DD}(V)$	MIN.	TYP.	MAX.	UNIT
Output Transition Time (Low to High)	t_{TLH}		5	—	80	200	ns
			10	—	50	100	
			15	—	40	80	
Output Transition Time (High to Low)	t_{THL}		5	—	80	200	ns
			10	—	50	100	
			15	—	40	80	
Propagation Delay Time (A, B - Q, $\bar{Q}$)	t_{PLH} t_{PHL}		5	—	380	760	ns
			10	—	150	300	
			15	—	100	220	
Propagation Delay Time (CD - Q,)	t_{PLH} t_{PHL}		5	—	280	560	ns
			10	—	110	250	
			15	—	75	190	
Min. Input Pulse Width (A, B)	t_{WH} t_{WL}		5	—	60	120	ns
			10	—	30	60	
			15	—	25	50	
Min. Pulse Width (CD)	t_{WL}		5	—	95	190	ns
			10	—	45	90	
			15	—	35	70	
Min. Retrigger Time	t_{rr}		5	—	0	—	ns
			10	—	0	—	
			15	—	0	—	
Output Pulse Width	t_{WOUT}	$R_X = 100k\Omega$ $C_X = 0.002\mu F$	5	—	206	—	μs
			10	—	204	—	
			15	—	205	—	
		$R_X = 100k\Omega$ $C_X = 0.1\mu F$	5	9.30	9.95	10.40	ms
			10	9.50	10.00	10.50	
			15	9.55	10.05	10.65	
		$R_X = 100k\Omega$ $C_X = 10\mu F$	5	—	0.98	—	s
			10	—	1.00	—	
			15	—	1.01	—	
Pulse Width Match between circuits in the same package	Δt_{WOUT}	$\frac{t_{WOUT}(Q2) - t_{WOUT}(Q1)}{t_{WOUT}(Q1)} \times 100$	5	—	± 1	—	%
			10	—	± 1	—	
			15	—	± 1	—	
Input Capacitance	C_{IN}			—	5	7.5	pF

WAVEFORMS FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS



DIP 16PIN PACKAGE DIMENSIONS (DIP16-P-300-2.54A)

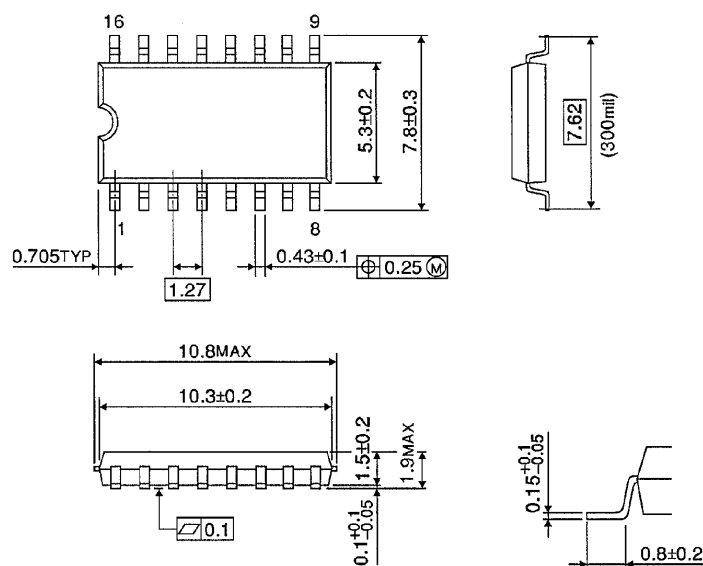
Unit in mm



Weight : 1.00g (Typ.)

SOP 16PIN (200mil BODY) PACKAGE DIMENSIONS (SOP16-P-300-1.27)

Unit in mm



Weight : 0.18g (Typ.)

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000707EBA

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