MN4538B/MN4538BS

Dual Precision Monostable Multivibrators

■ Description

The MN4538B/S are monostable multivibrators with the capability of reset and re-trigger.

Trigger can be performed from both the positive and negative going edge of the input pulse.

A wide range of precise output pulses can be obtained since the width and precision of the output pulse are defined by external C_t and R_t.

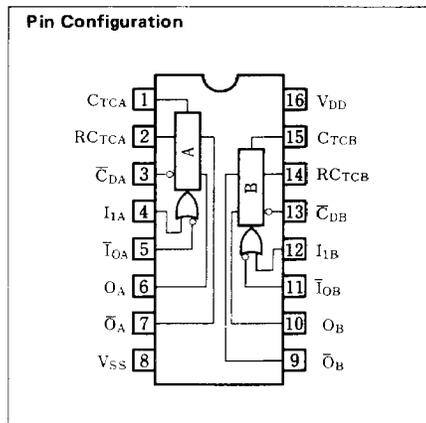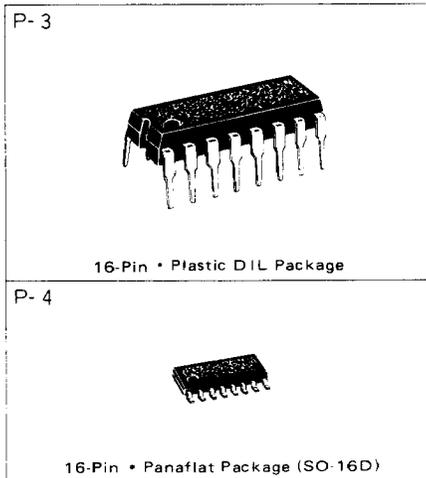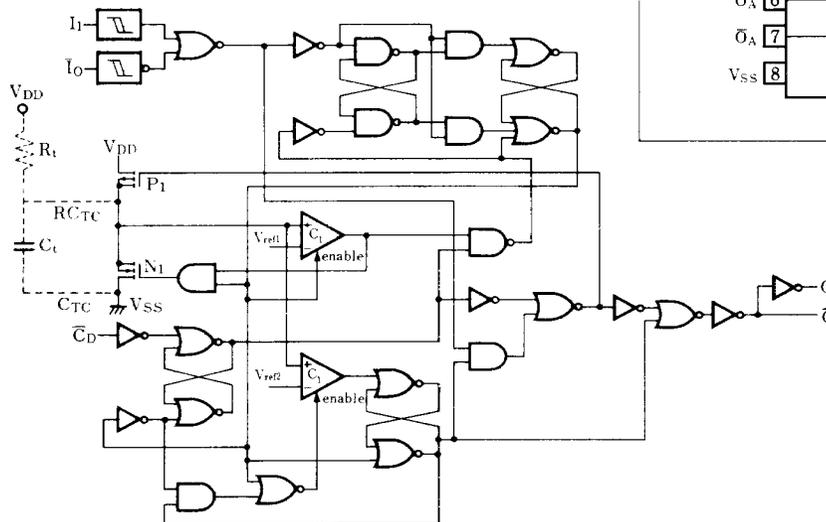Output pulse width control is more precisely performed, due to linear CMOS technology.

Total power supply voltage range is obtained as $t_{WO} = R_r \cdot C_t$ and no other coefficient is included.

The MN4538B/S are equivalent to MOTOROLA MC14538B.

P-3

16-Pin · Plastic DIL Package

P-4

16-Pin · Panaflat Package (SO-16D)

■ Truth Table

Input			Output	
$\overline{I}_0$	I_1	$\overline{C}_D$	O	$\overline{O}$
⎼⎇	L	H	⊓	⊔
H	⎇⎼	H	⊓	⊔
×	×	L	L	H

Pin Configuration

Pin		Pin	
C_{TCA}	1	16	V_{DD}
RC_{TCA}	2	15	C_{TCB}
$\overline{C}_{DA}$	3	14	RC_{TCB}
I_{1A}	4	13	$\overline{C}_{DB}$
$\overline{I}_{0A}$	5	12	I_{1B}
O_A	6	11	$\overline{I}_{0B}$
$\overline{O}_A$	7	10	O_B
V_{SS}	8	9	$\overline{O}_B$

■ Logic Diagram (1/2)

Panasonic

■ Maximum Ratings (Ta＝25℃)

Item		Symbol	Ratings	Unit
Supply Voltage		V_{DD}	$-0.5\sim+18$	V
Input Voltage		V_I	$-0.5\sim V_{DD}+0.5^*$	V
Output Voltage		V_O	$-0.5\sim V_{DD}+0.5^*$	V
Peak Input · Output Current		$\pm I_I$	max. 10	mA
Power Dissipation (per package)	Ta＝$-40\sim+60$℃	P_D	max. 400	mW
	Ta＝$+60\sim+85$℃		Decrease up to 200mW rating at 8mW/℃	
Power Dissipation (per output terminal)		P_D	max. 100	mW
Operating Ambient Temperature		Topr	$-40\sim+85$	℃
Storage Temperature		Tstg	$-65\sim+150$	℃

* $V_{DD}+0.5V$ should be under 18V

■ DC Characteristics ($V_{SS}=0V$)

Item	V_{DD} (V)	Symbol	Conditions		Ta＝-40℃ min.	Ta＝-40℃ max.	Ta＝25℃ min.	Ta＝25℃ max.	Ta＝85℃ min.	Ta＝85℃ max.	Unit
Quiescent Power Supply Current	5	I_{DD}	$V_I=V_{SS}$ or V_{DD}		—	20	—	20	—	150	μA
	10				—	40	—	40	—	300	
	15				—	80	—	80	—	600	
Output Voltage Low Level	5	V_{OL}	$V_I=V_{SS}$ or V_{DD} $\lvert I_O\rvert<1\mu A$		—	0.05	—	0.05	—	0.05	V
	10				—	0.05	—	0.05	—	0.05	
	15				—	0.05	—	0.05	—	0.05	
Output Voltage High Level	5	V_{OH}	$V_I=V_{SS}$ or V_{DD} $\lvert I_O\rvert<1\mu A$		4.95	—	4.95	—	4.95	—	V
	10				9.95	—	9.95	—	9.95	—	
	15				14.95	—	14.95	—	14.95	—	
Input Voltage Low Level	5	V_{IL}	$\lvert I_O\rvert<1\mu A$	$V_O=0.5V$ or $4.5V$	—	1.5	—	1.5	—	1.5	V
	10			$V_O=1V$ or $9V$	—	3	—	3	—	3	
	15			$V_O=1.5V$ or $13.5V$	—	4	—	4	—	4	
Input Voltage High Level	5	V_{IH}	$\lvert I_O\rvert<1\mu A$	$V_O=0.5V$ or $4.5V$	3.5	—	3.5	—	3.5	—	V
	10			$V_O=1V$ or $9V$	7	—	7	—	7	—	
	15			$V_O=1.5V$ or $13.5V$	11	—	11	—	11	—	
Output Current Low Level	5	I_{OL}	$V_O=0.4V$, $V_I=0$ or $5V$		0.52	—	0.44	—	0.36	—	mA
	10		$V_O=0.5V$, $V_I=0$ or $10V$		1.3	—	1.1	—	0.9	—	
	15		$V_O=1.5V$, $V_I=0$ or $15V$		3.6	—	3	—	2.4	—	
Output Current High Level	5	$-I_{OH}$	$V_O=4.6V$, $V_I=0$ or $5V$		0.52	—	0.44	—	0.36	—	mA
	10		$V_O=9.5V$, $V_I=0$ or $10V$		1.3	—	1.1	—	0.9	—	
	15		$V_O=13.5V$, $V_I=0$ or $15V$		3.6	—	3	—	2.4	—	
Output Current High Level	5	$-I_{OH}$	$V_O=2.5V$, $V_I=0$ or $5V$		1.7	—	1.4	—	1.1	—	mA
Input Leakage Current	15	$\pm I_I$	$V_I=0$ or $15V$		—	0.3	—	0.3	—	1	μA

■ **Switching Characteristics** $(\text{Ta}=25°C, \text{Vss}=0\text{V}, C_L=50\text{pF})$

Item	$V_{DD}(V)$	Symbol	min.	typ.	max.	Unit
Output Rise Time	5	t_{TLH}	—	60	180	ns
	10		—	30	90	
	15		—	20	60	
Output Fall Time	5	t_{THL}	—	60	180	ns
	10		—	30	90	
	15		—	20	60	
Propagation Delay Time $\bar{I}_0, I_1 \to O$	5	t_{PHL}	—	150	450	ns
	10		—	70	210	
	15		—	40	120	
Propagation Delay Time $\bar{I}_0, I_1 \to O$	5	t_{PLH}	—	150	450	ns
	10		—	70	210	
	15		—	40	120	
Propagation Delay Time $\bar{C}_D \to O$	5	t_{PHL}	—	150	450	ns
	10		—	70	210	
	15		—	40	120	
Propagation Delay Time $C_D \to \bar{O}$	5	t_{PLH}	—	150	450	ns
	10		—	70	210	
	15		—	40	120	
Recovery Time $\bar{C}_D \to \bar{I}_0, I_1$	5	t_{RCD}	—	0	—	ns
	10		—	0	—	
	15		—	0	—	
Recovery Time $O, \bar{O} \to \bar{I}_0, I_1$	5	t_{RO}	—	0	—	ns
	10		—	0	—	
	15		—	0	—	
Minimum Pulse Width I_0	5	t_{WIOL}	—	60	180	ns
	10		—	30	90	
	15		—	20	60	
Minimum Pulse Width I_1	5	t_{WI1L}	—	60	180	ns
	10		—	30	90	
	15		—	20	60	
Minimum Pulse Width $\bar{C}_D$	5	t_{WCDL}	—	40	120	ns
	10		—	20	60	
	15		—	15	45	
Output Pulse Width $(Rt=100k\Omega, Ct=0.002\mu F)$	5	t_{WO}	—	208	—	μs
	10		—	208	—	
	15		—	208	—	
Output Pulse Width $(Rt=100k\Omega, Ct=0.1\mu F)$	5	t_{WO}	—	10.4	—	ns
	10		—	10.4	—	
	15		—	10.4	—	
Output Pulse Width $(Rt=100k\Omega, Ct=10\mu F)$	5	t_{WO}	—	1.04	—	s
	10		—	1.04	—	
	15		—	1.04	—	
Input Capacitance		C_I	—	—	7.5	pF
External Timing Resistance		Rt	5	—	1000	$k\Omega$
External Timing Capacitance		Ct	2000	—	no limit	pF

• Dynamic Signal Waveforms
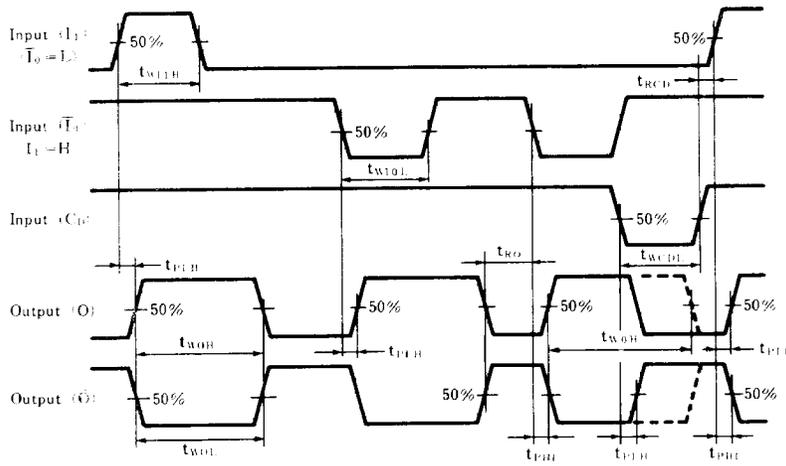
■ Timing Diagram
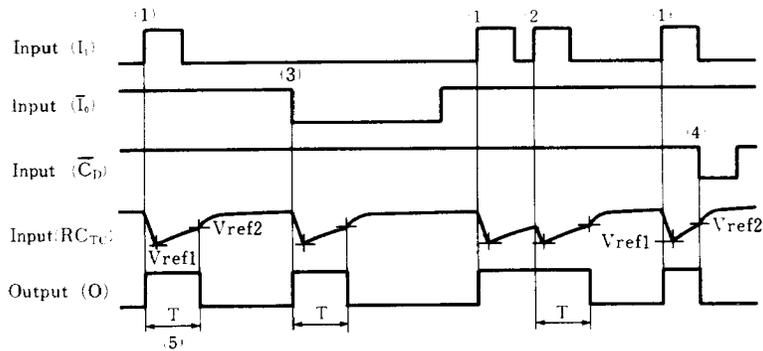
(1) Positive edge triggering
(2) Positive edge re-triggering(pulse lengthening)
(3) Negative edge triggering
(4) Reset (pulse shortening)
(5) T=Rt×Ct