

# Dual precision monostable multivibrator

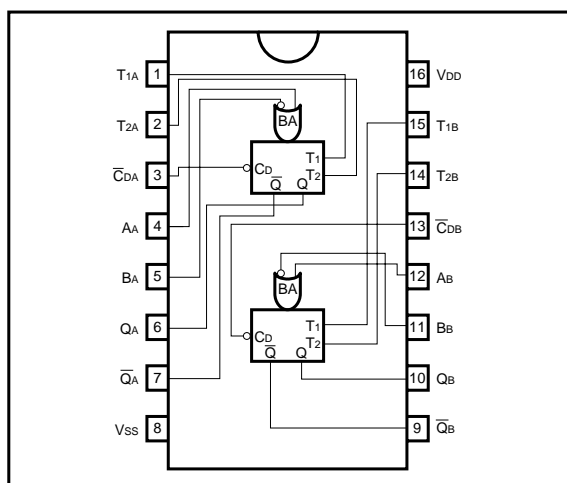
## BU4538B

The BU4538B is a monostable multivibrator that can be reset and retriggered. It is triggered from either edge of an input pulse. As the output pulse width and accuracy are determined by the external timing constants  $C_x$  and  $R_x$ , a wide range of accurate output pulse widths is available. Linear CMOS technology makes it possible to control the output pulse width with greater accuracy. Determination is made based on  $t_{WOUT} = R_x \cdot C_x$  throughout the entire power supply voltage range, eliminating the necessity for other coefficients.

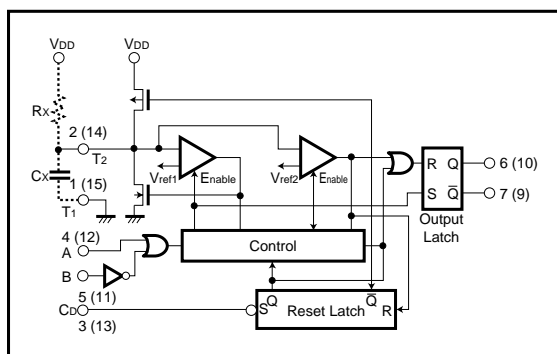
### ●Features

- 1) Low power dissipation.
- 2) Wide range of operating power supply voltages.
- 3) High input impedance.
- 4) High fan-out.
- 5) Direct drive of 2 L-TTL inputs and 1 LS-TTL input.

### ●Block diagram



### ●Logic circuit diagram



### ●Truth table

INPUT			OUTPUT	
A	B	C <sub>D</sub>	Q	$\bar{Q}$
	H	H		
	L	H	L	H
H		H	L	H
L		H		
X	X	L	L	H

●Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$ )

Parameter	Symbol	Limits	Unit
Power supply voltage	$V_{DD}$	$-0.3 \sim +18$	V
Power dissipation	$P_d$	1000 (DIP)	mW
Operating temperature	$T_{opr}$	$-40 \sim +85$	$^\circ\text{C}$
Storage temperature	$T_{stg}$	$-55 \sim +150$	$^\circ\text{C}$
Input voltage	$V_{IN}$	$-0.3 \sim V_{DD} + 0.3$	V

●Electrical characteristics

DC characteristics (unless otherwise noted,  $T_a = 25^\circ\text{C}$ ,  $V_{SS} = 0\text{V}$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	$V_{DD}$ (V)	Conditions
Input high level voltage	$V_{IH}$	3.5	—	—	V	5	—
		7.0	—	—		10	
		11.0	—	—		15	
Input low level voltage	$V_{IL}$	—	—	1.5	V	5	—
		—	—	3.0		10	
		—	—	4.0		15	
Input high level current	$I_{IH}$	—	—	0.3	$\mu\text{A}$	15	$V_{IH} = 15\text{V}$
Input low level current	$I_{IL}$	—	—	-0.3	$\mu\text{A}$	15	$V_{IL} = 0\text{V}$
Output high level voltage	$V_{OH}$	4.95	—	—	V	5	$I_O = 0\text{mA}$
		9.95	—	—		10	
		14.95	—	—		15	
Output low level voltage	$V_{OL}$	—	—	0.05	V	5	$I_O = 0\text{mA}$
		—	—	0.05		10	
		—	—	0.05		15	
Output high level current	$I_{OH}$	-0.16	—	—	mA	5	$V_{OH} = 4.6\text{V}$
		-0.4	—	—		10	$V_{OH} = 9.5\text{V}$
		-1.2	—	—		15	$V_{OH} = 13.5\text{V}$
Output low level current	$I_{OL}$	0.44	—	—	mA	5	$V_{OL} = 0.4\text{V}$
		1.1	—	—		10	$V_{OL} = 0.5\text{V}$
		3.0	—	—		15	$V_{OL} = 1.5\text{V}$
Static current dissipation	$I_{DD}$	—	—	20	$\mu\text{A}$	5	$V_I = V_{DD}$ or GND
		—	—	40		10	
		—	—	80		15	

Switching characteristics (unless otherwise noted, Ta = 25°C, CL = 50pF, VSS = 0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	VDD (V)	Conditions
Output rise time	t <sub>TLH</sub>	—	100	—	ns	5	—
		—	50	—		10	
		—	40	—		15	
Output fall time	t <sub>THL</sub>	—	100	—	ns	5	—
		—	50	—		10	
		—	40	—		15	
Propagation delay time A, B to Q, $\bar{Q}$	t <sub>PLH</sub> t <sub>PHL</sub>	—	300	—	ns	5	—
		—	150	—		10	
		—	100	—		15	
Propagation delay time C <sub>D</sub> to Q, $\bar{Q}$	t <sub>PLH</sub> t <sub>PHL</sub>	—	250	—	ns	5	—
		—	125	—		10	
		—	95	—		15	
Minimum input pulse width	t <sub>WIN</sub>	—	50	—	ns	5	—
		—	30	—		10	
		—	25	—		15	
Output pulse width 1	t <sub>WOUT1</sub>	185	200	215	μs	5	Cx = 2000pF, Rx = 100kΩ
		185	200	215		10	
		185	200	215		15	
Output pulse width 2	t <sub>WOUT2</sub>	8.8	9.4	10.0	ms	5	Cx = 0.1μF, Rx = 100kΩ
		8.8	9.4	10.0		10	
		8.8	9.4	10.0		15	
Minimum retrigger time	t <sub>rr</sub>	—	0	—	ns	5	—
		—	0	—		10	
		—	0	—		15	
Input capacitance	C <sub>IN</sub>	—	5	—	pF	—	—

## ●Recommended operating conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
External timing resistance	R <sub>x</sub>	5	—	1000	kΩ	—
External timing capacitance	C <sub>x</sub>	No Limit			pF	—

The timing diagram illustrates the relationship between the clock signal  $Cb$  and the data signals  $A$  and  $B$  to produce the output  $Q$  and its complement  $\bar{Q}$ . The clock signal  $Cb$  is shown as a series of pulses. The data signals  $A$  and  $B$  are shown as digital signals that change at various points in time. The output  $Q$  and  $\bar{Q}$  are shown as digital signals that change at the clock edges of  $Cb$ . The diagram includes several time intervals:  $t_w$  (setup and hold times),  $t_s$  (setup time),  $t_h$  (hold time),  $t_2$  (propagation delay from clock to  $Q$ ),  $t_3$  (propagation delay from clock to  $\bar{Q}$ ), and  $t_w$  (output delay).

$$t_1, t_2, t_3 < t_w$$

●Electrical characteristic curve

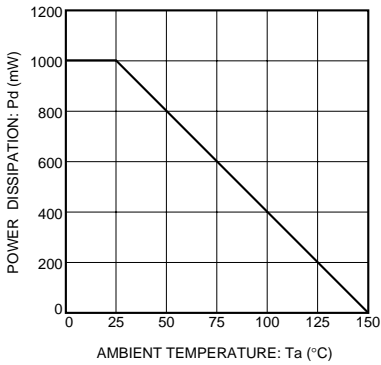
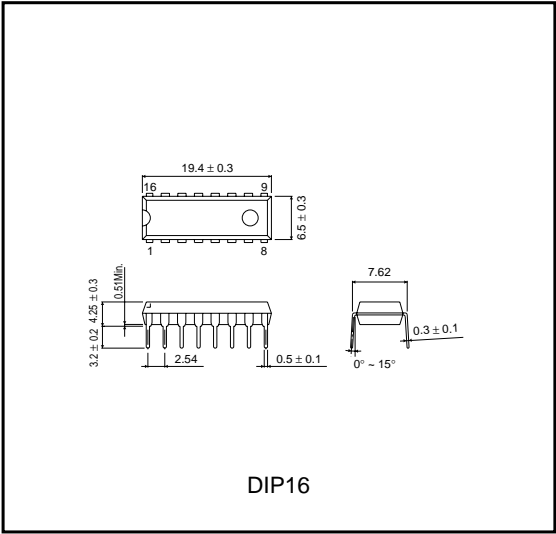


Fig. 2 Power dissipation vs. Ta

●External dimensions (Units: mm)



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