

## CMOS DUAL MONOSTABLE MULTIVIBRATOR

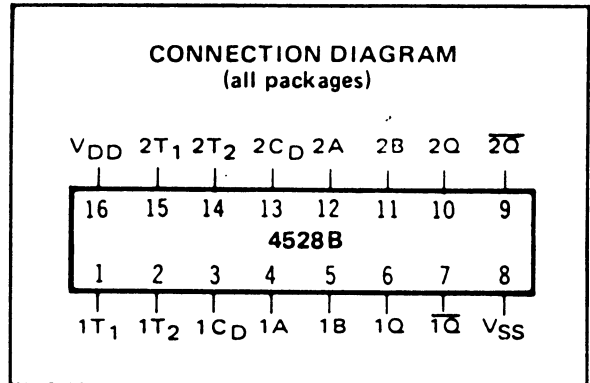
### FEATURES

- ◆ Two Independent Multivibrators on One Chip
- ◆ Triggerable from Leading- or Trailing-Edge Pulse
- ◆ Retriggerable
- ◆ Resettable
- ◆ Q and  $\bar{Q}$  Buffered Outputs Available
- ◆ Wide Range of Output Pulse Widths

### DESCRIPTION

The 4528B Dual Multivibrator provides stable retriggerable/resettable one-shot operation for any fixed-voltage timing application. Timing for the circuit is controlled by an external resistor-capacitor combination ( $R_x$ - $C_x$ ). Adjustment of these components permits generation of output pulse widths from nanoseconds to minutes. Leading-edge and trailing-edge Trigger inputs are provided, and both positive-going and negative-going pulses are available from complementary outputs.

Timing pulses may be terminated at any time by applying a low logic level to the Reset input  $C_D$ .



### RECOMMENDED OPERATING CONDITIONS

For maximum reliability:

DC Supply Voltage	$V_{DD} - V_{SS}$	3 to 15	Vdc
Operating Temperature	$T_A$		
C		-55 to +125	°C
E		-40 to +85	°C

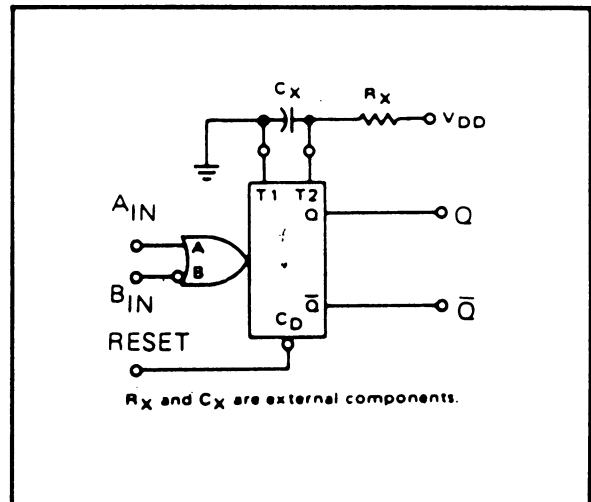
### FUNCTION TABLE

INPUTS			OUTPUTS	
$C_D$	A	B	Q	$\bar{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	↑	H	⎓	⎓
H	L	↓	⎓	⎓

- H = High Level (Steady State)
- L = Low Level (Steady State)
- ↑ = Transition, Low-to-High
- ↓ = Transition, High-to-Low
- X = Irrelevant (Inc. Transitions)
- ⎓ = One High-Level Pulse
- ⎓ = One Low-Level Pulse

### BLOCK DIAGRAM

(one of two devices)



## ELECTRICAL CHARACTERISTICS

STATIC CHARACTERISTICS<sup>1</sup>

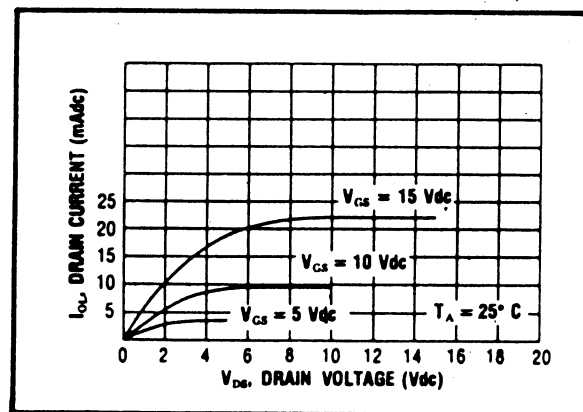
PARAMETER	V <sub>DD</sub> (Vdc)	CONDITIONS	T <sub>LOW</sub> <sup>2</sup>		+25°C			T <sub>HIGH</sub> <sup>2</sup>		Units
			Min.	Max.	Min.	Typ.	Max.	Min.	Max.	
QUIESCENT DEVICE CURRENT	I <sub>DD</sub>	V <sub>IN</sub> = V <sub>SS</sub> or V <sub>DD</sub> All valid input combinations	-	5	-	0.05	5	-	150	μAdc
			-	10	-	0.1	10	-	300	
			-	20	-	0.2	20	-	600	
			-	-	-	-	-	-	-	

NOTES: <sup>1</sup> Remaining Static Electrical Characteristics are listed under "4000B Series Family Specifications".

<sup>2</sup> T<sub>LOW</sub> = -55°C for C  
= -40°C for E  
T<sub>HIGH</sub> = +125°C for C  
= + 85°C for E

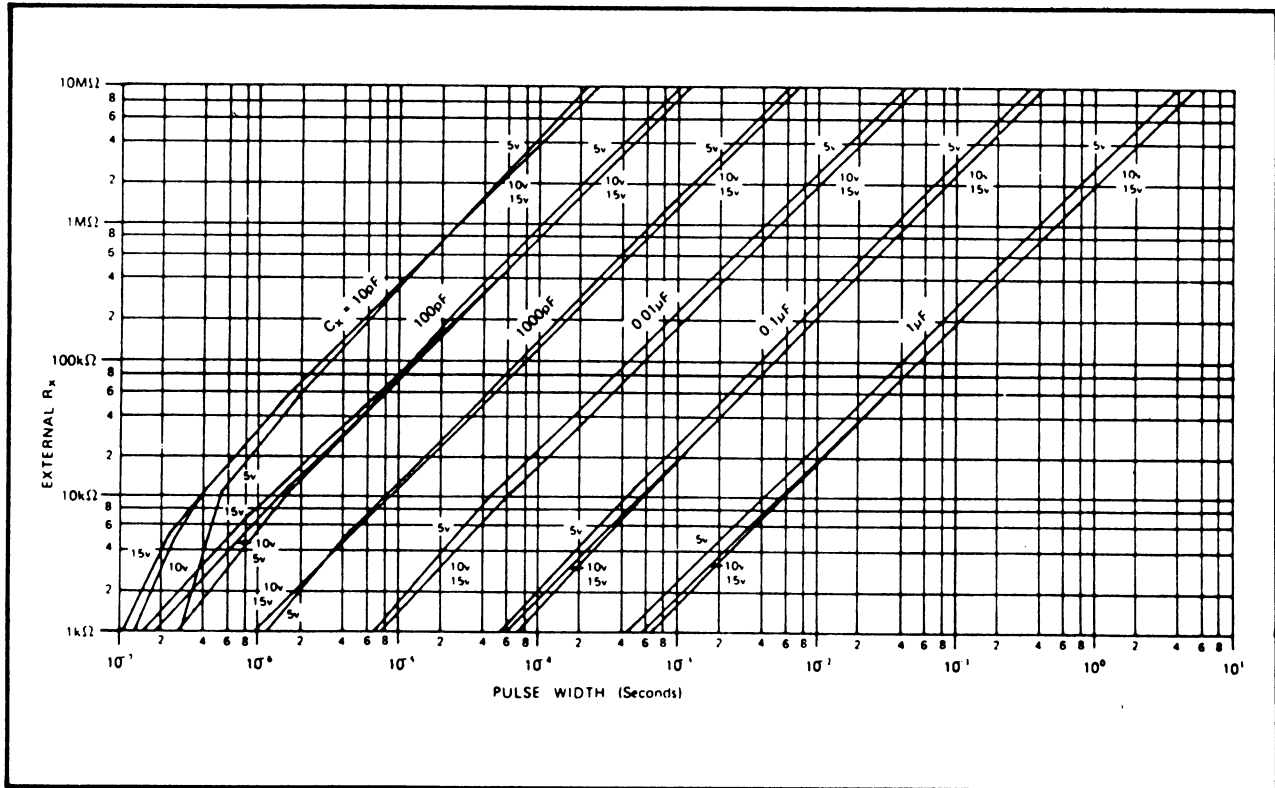
DYNAMIC CHARACTERISTICS (C<sub>L</sub> = 50pF, T<sub>A</sub> = 25°C)

PARAMETER	C <sub>x</sub> (pF)	R <sub>x</sub> (kΩ)	V <sub>DD</sub> (Vdc)	Min.	Typ.	Max.	Units				
PROPAGATION DELAY TIME	t <sub>PLH</sub> , t <sub>PHL</sub>	15 5	5	-	270	540	ns				
				-	90	180					
				-	70	140					
				From A or B	1000 10	5	5	-	510	1020	ns
								-	170	340	
								-	120	240	
From C <sub>D</sub>	15 5	5	5					-	270	540	ns
								-	90	180	
								-	70	140	
				From C <sub>D</sub>	1000 10	5	5	-	550	1100	ns
								-	300	600	
								-	250	500	
OUTPUT TRANSITION TIME	t <sub>TLH</sub> , t <sub>THL</sub>	- -	5					-	130	260	ns
								-	65	130	
								-	50	100	
				Note: $\bar{Q}$ Output	t <sub>TLH</sub>	15 5	5	-	130	260	ns
								-	65	130	
								-	50	100	
From C <sub>D</sub>	1000 10	5	5					-	270	540	ns
								-	240	480	
								-	220	440	
				MINIMUM INPUT PULSE WIDTH A or B Input	PW <sub>in</sub>	- -	5	-	70	140	ns
							10	-	30	60	
							15	-	25	50	
OUTPUT PULSE WIDTH MATCH Same package	ΔPW <sub>out</sub>	1000 10	5	-	± 7.5	± 15	%				
			10	-	± 10	± 20					
			15	-	± 10	± 20					
			Different packages	1000 10	5	-	-	± 50	%		
					10	-	-	± 50			
					15	-	-	± 50			

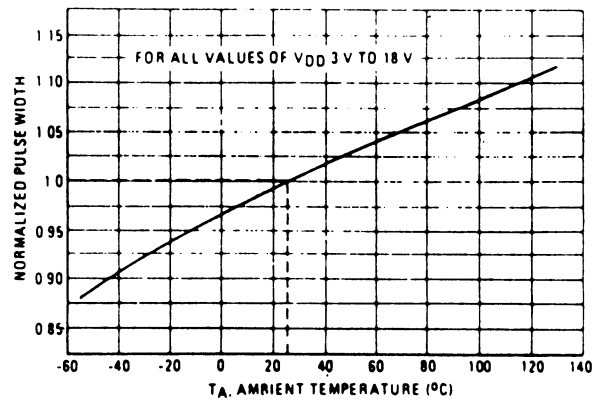
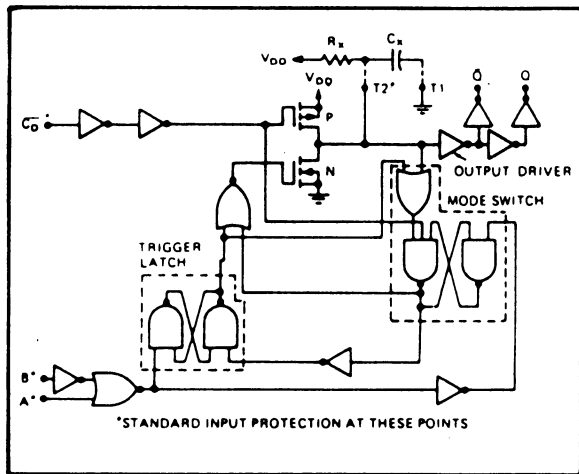


Typical N-Channel  
Sink Current Characteristics

4528B PULSE WIDTH VS.  $R_X$ ,  $C_X$ ,  $V_{DD}$



LOGIC DIAGRAM



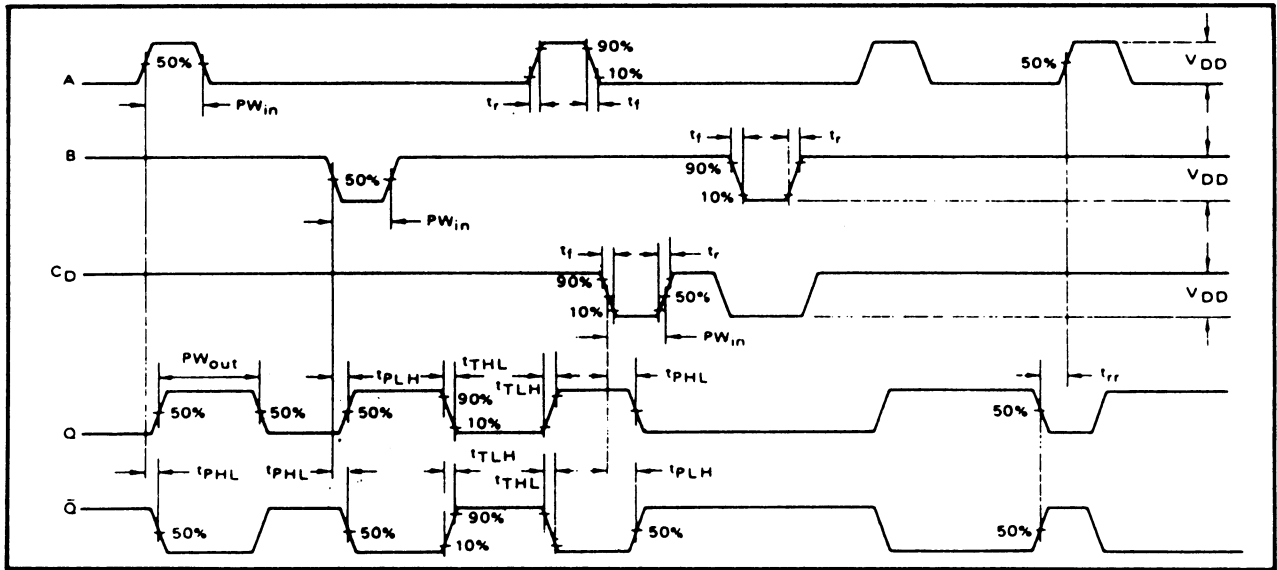
Normalized Pulse Width versus Temperature

Notes:

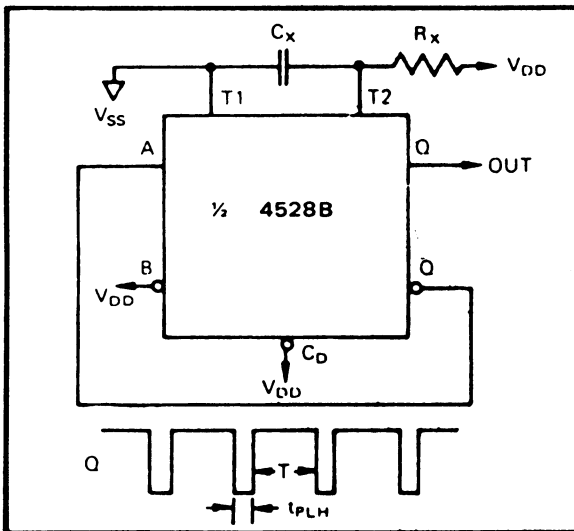
There is no effective maximum limit on  $R_x$ ; recommended minimum value for  $R_x$  is  $1K\Omega$ . There are no restrictions on the value of  $C_x$ .

For proper operation all unused inputs should be tied to a logic level. The mode point ( $T_2$ ) of a unused half of device should be tied high through an external resistor to  $V_{DD}$ .

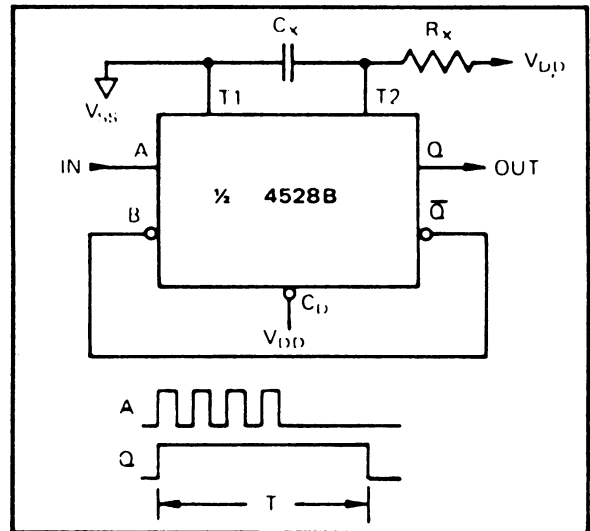
AC TEST WAVEFORMS



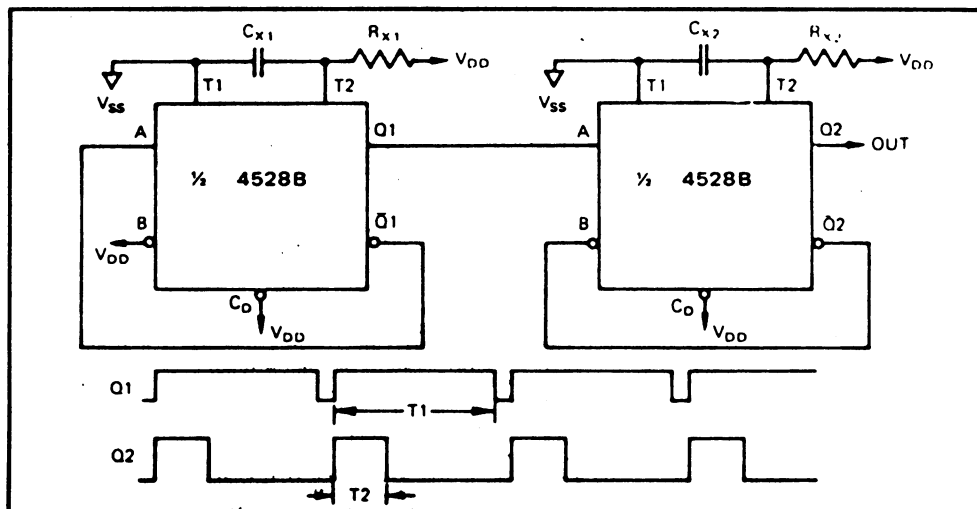
APPLICATIONS INFORMATION



Astable Operation



Connection for Non-Retriggerable Operation



Astable Multivibrator with Adjustable Period and Duty Cycle