FAIRCHILD
SEMICONDUCTOR ™

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CD4528BC
Dual Monostable Multivibrator

General Description

The CD4528BC is a dual monostable multivibrator. Each device is retriggerable and resettable. Triggering can occur from either the rising or falling edge of an input pulse, resulting in an output pulse over a wide range of widths. Pulse duration and accuracy are determined by external timing components R_x and C_x.
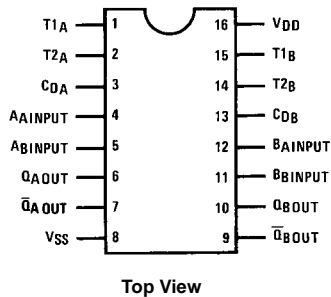
Features

■ Wide supply voltage range: 3.0V to 18V
■ Separate reset available
■ Quiescent current = 5.0 nA/package (typ.) at 5.0 V_{DC}
■ Diode protection on all inputs
■ Triggerable from leading or trailing edge pulse
■ Capable of driving two low-power TTL loads or one low-power Schottky TTL load over the rated temperature range

Ordering Code:

| Order Number	Package Number	Package Description
CD4528BCM	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
CD4528BCN	N16E	16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide

Connection Diagram

Pin		Pin	
$T1_A$	1	16	V_{DD}
$T2_A$	2	15	$T1_B$
C_{DA}	3	14	$T2_B$
A_A INPUT	4	13	C_{DB}
A_B INPUT	5	12	B_A INPUT
Q_A OUT	6	11	B_B INPUT
$\overline{Q}_A$ OUT	7	10	Q_B OUT
V_{SS}	8	9	$\overline{Q}_B$ OUT

Top View

Truth Table

Inputs			Outputs	
Clear	A	B	Q	$\overline{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↓	⎍	⎁
H	↑	H	⎍	⎁

H = HIGH Level
L = LOW Level
↑ = Transition from LOW-to-HIGH
↓ = Transition from HIGH-to-LOW
⎍ = One HIGH Level Pulse
⎁ = One LOW Level Pulse
X = Irrelevant

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Block Diagram

Logic Diagram

(½ of Device Shown)
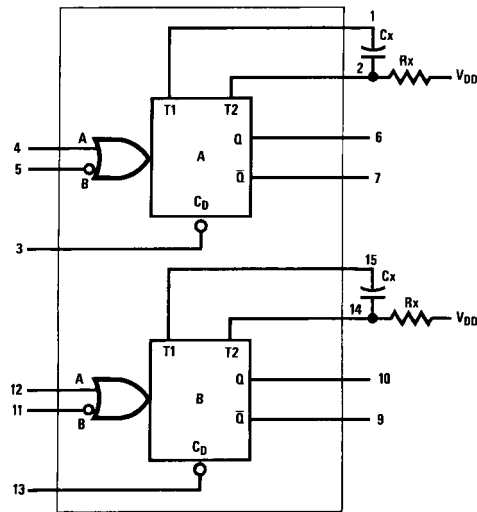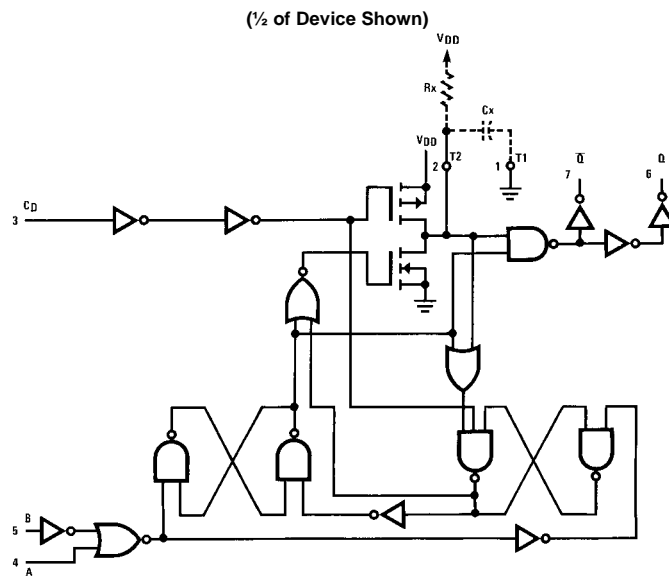
Note: Externally ground pins 1 and 15 to pin 8.

Absolute Maximum Ratings(Note 1)

(Note 2)

DC Supply Voltage (V_{DD})	−0.5 V_{DC} to +18 V_{DC}
Input Voltage, All Inputs (V_{IN})	−0.5 V_{DC} to V_{DD} +0.5 V_{DC}
Storage Temperature Range (T_S)	−65°C to +150°C
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Lead Temperature (T_L)	
(Soldering, 10 seconds)	260°C

Recommended Operating Conditions (Note 2)

DC Supply Voltage (V_{DD})	3V to 15V
Input Voltage (V_{IN})	0V to V_{DD} V_{DC}
Operating Temperature Range (T_A)	−55°C to +125°C

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range", they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 2: V_{SS} = 0V unless otherwise specified.

DC Electrical Characteristics (Note 3)

Symbol	Parameter	Conditions	−55°C Min	−55°C Max	+25°C Min	+25°C Typ	+25°C Max	+125°C Min	+125°C Max	Units
I_{DD}	Quiescent Device Current	V_{DD} = 5V		5		0.005	5		150	μA
		V_{DD} = 10V		10		0.010	10		300	
		V_{DD} = 15V		20		0.015	20		600	
V_{OL}	LOW Level Output Voltage	V_{DD} = 5V		0.05			0.05		0.05	V
		V_{DD} = 10V		0.05			0.05		0.05	
		V_{DD} = 15V		0.05			0.05		0.05	
V_{OH}	HIGH Level Output Voltage	V_{DD} = 5V	4.95		4.95	5.0		4.95		V
		V_{DD} = 10V	9.95		9.95	10.0		9.95		
		V_{DD} = 15V	14.95		14.95	15.0		14.95		
V_{IL}	LOW Level Input Voltage	V_{DD} = 5V, V_O = 0.5V or 4.5V		1.5		2.25	1.5		1.5	V
		V_{DD} = 10V, V_O = 1V or 9V		3.0		4.50	3.0		3.0	
		V_{DD} = 15V, V_O = 1.5V or 13.5V		4.0		6.75	4.0		4.0	
V_{IH}	HIGH Level Input Voltage	V_{DD} = 5V, V_O = 0.5V or 4.5V	3.5		3.5	2.75		3.5		V
		V_{DD} = 10V, V_O = 1V or 9V	7.0		7.0	5.50		7.0		
		V_{DD} = 15V, V_O = 1.5V or 13.5V	11.0		11.0	8.25		11.0		
I_{OL}	LOW Level Output Current (Note 4)	V_{DD} = 5V, V_O = 0.4V	0.64		0.51	0.88		0.36		mA
		V_{DD} = 10V, V_O = 0.5V	1.6		1.3	2.25		0.9		
		V_{DD} = 15V, V_O = 1.5V	4.2		3.4	8.8		2.4		
I_{OH}	HIGH Level Output Current (Note 4)	V_{DD} = 5V, V_O = 4.6V	−0.25		−0.2	−0.36		−0.14		mA
		V_{DD} = 10V, V_O = 9.5V	−0.62		−0.5	−0.9		−0.35		
		V_{DD} = 15V, V_O = 13.5V	−1.8		−1.5	−3.5		−1.1		
I_{IN}	Input Current	V_{DD} = 15V, V_{IN} = 0V		−0.1		-10^{-5}	−0.1		−1.0	μA
		V_{DD} = 15V, V_{IN} = 15V		0.1		10^{-5}	0.1		1.0	

Note 3: V_{SS} = 0V unless otherwise specified.

Note 4: I_{OH} and I_{OL} are tested one output at a time.

CD4528BC

AC Electrical Characteristics (Note 5)

$T_A = 25°C$, $C_L = 50$ pF, $R_L = 200$ kΩ, Input $t_r = t_f = 20$ ns, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_r	Output Rise Time	$t_r = (3.0$ ns/pF$)$ $C_L + 30$ ns, $V_{DD} = 5.0$V		180	400	
		$t_r = (1.5$ ns/pF$)$ $C_L + 15$ ns, $V_{DD} = 10.0$V		90	200	ns
		$t_r = (1.1$ ns/pF$)$ $C_L + 10$ ns, $V_{DD} = 15.0$V		65	160	
t_f	Output Fall Time	$t_f = (1.5$ ns/pF$)$ $C_L + 25$ ns, $V_{DD} = 5.0$V		100	200	
		$t_f = (0.75$ ns/pF$)$ $C_L + 12.5$ ns, $V_{DD} = 10$V		50	100	ns
		$t_f = (0.55$ ns/pF$)$ $C_L + 9.5$ ns, $V_{DD} = 15.0$V		35	80	
t_{PLH} t_{PHL}	Turn-Off, Turn-On Delay A or B to Q or $\overline{Q}$ Cx = 15 pF, Rx = 5.0 kΩ	t_{PLH}, $t_{PHL} = (1.7$ ns/pF$)$ $C_L + 240$ ns, $V_{DD} = 5.0$V		230	500	
		t_{PLH}, $t_{PHL} = (0.66$ ns/pF$)$ $C_L + 8$ ns, $V_{DD} = 10.0$V		100	250	ns
		t_{PLH}, $t_{PHL} = (0.5$ ns/pF$)$ $C_L + 65$ ns, $V_{DD} = 15.0$V		65	150	
	Turn-Off, Turn-On Delay A or B to Q or $\overline{Q}$ Cx = 100 pF, Rx = 10 kΩ	t_{PLH}, $t_{PHL} = (1.7$ ns/pF$)$ $C_L + 620$ ns, $V_{DD} = 5.0$V		230	500	
		t_{PLH}, $t_{PHL} = (0.66$ ns/pF$)$ $C_L + 257$ ns, $V_{DD} = 10.0$V		100	250	ns
		t_{PLH}, $t_{PHL} = (0.5$ ns/pF$)$ $C_L + 185$ ns, $V_{DD} = 15.0$V		65	150	
t_{WL} t_{WH}	Minimum Input Pulse Width A or B Cx = 15 pF, Rx = 5.0 kΩ	$V_{DD} = 5.0$V		60	150	
		$V_{DD} = 10.0$V		20	50	ns
		$V_{DD} = 15$V		20	50	
	Cx = 1000 pF, Rx = 10 kΩ	$V_{DD} = 5.0$V		60	150	
		$V_{DD} = 10.0$V		20	50	ns
		$V_{DD} = 15.0$V		20	50	
PW_{OUT}	Output Pulse Width Q or $\overline{Q}$ For Cx < 0.01 µF (See Graph for Appropriate V_{DD} Level) Cx = 15 pF, Rx = 5.0 kΩ	$V_{DD} = 5.0$V		550		
		$V_{DD} = 10.0$V		350		ns
		$V_{DD} = 15.0$V		300		
	For Cx > 0.01 µF Use $PW_{out} = 0.2$ Rx Cx In $[V_{DD} - V_{SS}]$ Cx = 10,000 pF, Rx = 10 kΩ	$V_{DD} = 5.0$V	15	29	45	
		$V_{DD} = 10.0$V	10	37	90	µs
		$V_{DD} = 15.0$V	15	42	95	
t_{PLH} t_{PHL}	Reset Propagation Delay, t_{PLH}, t_{PHL} Cx = 15 pF, Rx = 5.0 kΩ	$V_{DD} = 5.0$V		325	600	
		$V_{DD} = 10.0$V		90	225	ns
		$V_{DD} = 15.0$V		60	170	
	Cx = 1000 pF, Rx = 10 kΩ	$V_{DD} = 5.0$V		7.0		
		$V_{DD} = 10.0$V		6.7		µs
		$V_{DD} = 15.0$V		6.7		
t_{RR}	Minimum Retrigger Time Cx = 15 pF, Rx = 5.0 kΩ	$V_{DD} = 5.0$V		0		
		$V_{DD} = 10.0$V		0		
		$V_{DD} = 15.0$V		0		
	Cx = 1000 pF, Rx = 10 kΩ	$V_{DD} = 5.0$V		0		ns
		$V_{DD} = 10.0$V		0		
		$V_{DD} = 15.0$V		0		
	Pulse Width Match between Circuits in the Same Package Cx = 10,000 pF, Rx = 10 kΩ	$V_{DD} = 5.0$V		6	25	
		$V_{DD} = 10.0$V		8	35	%
		$V_{DD} = 15.0$V		8	35	

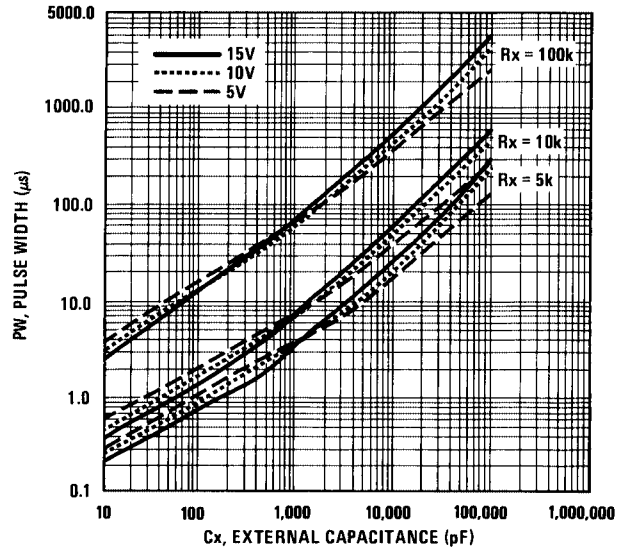**Note 5:** AC parameters are guaranteed by DC correlated testing.

Pulse Widths
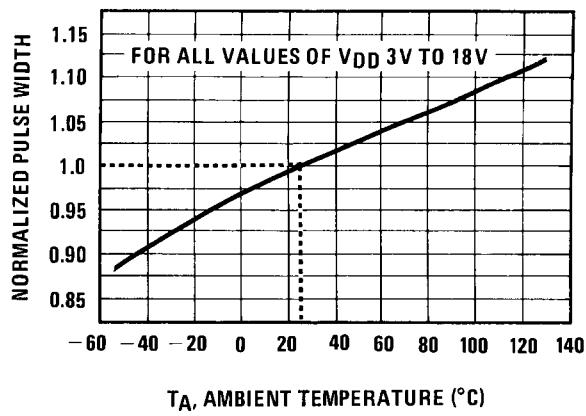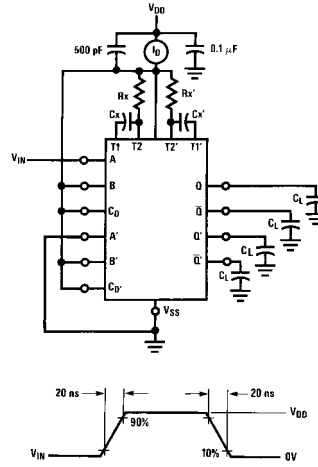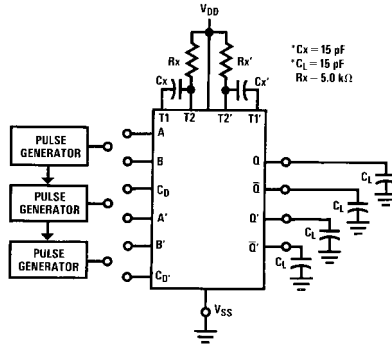

FIGURE 1. Pulse Width vs Cx

FIGURE 2. Normalized Pulse Width vs Temperature

AC Test Circuits and Waveforms

Duty Cycle = 50%

FIGURE 3. Power Dissipation Test Circuit and Waveforms

*Cx = 15 pF
*CL = 15 pF
Rx = 5.0 kΩ

*Includes capacitance of probes, wiring, and fixture parasitic.
Note: AC test waveforms for PG1, PG2, and PG3 in Figure 4.

Input Connections

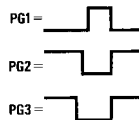| Characteristics	C_D	A	B
t_{PLH}, t_{PHL}, t_r, t_f, PW_{out}, PW_{in}	V_{DD}	PG1	V_{DD}
t_{PLH}, t_{PHL}, t_r, t_f, PW_{out}, PW_{in}	V_{DD}	V_{SS}	PG2
$t_{PLH(R)}$, $t_{PHL(R)}$, PW_{in}	PG3	PG1	PG2

FIGURE 4. AC Test Circuit

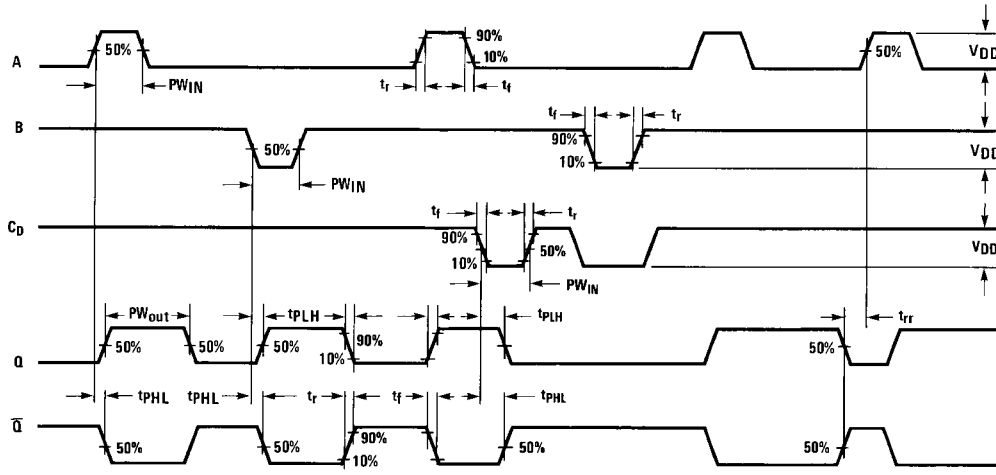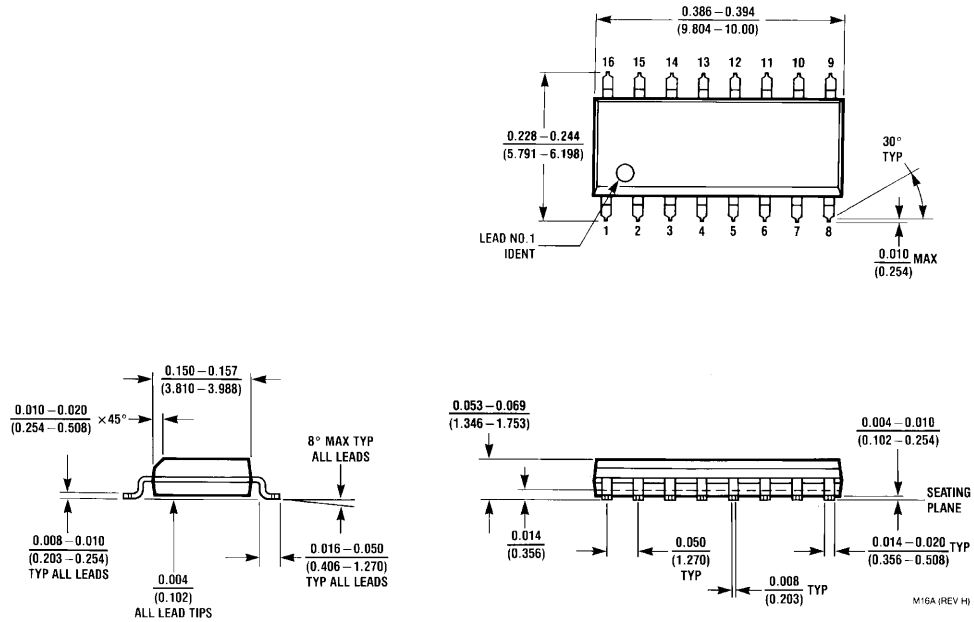## AC Test Circuits and Waveforms (Continued)

FIGURE 5. AC Test Waveforms

Physical Dimensions inches (millimeters) unless otherwise noted

0.386 − 0.394
(9.804 − 10.00)

16 15 14 13 12 11 10 9

0.228 − 0.244
(5.791 − 6.198)

30°
TYP

LEAD NO.1
IDENT

1 2 3 4 5 6 7 8

0.010 MAX
(0.254)

0.150 − 0.157
(3.810 − 3.988)

0.010 − 0.020
(0.254 − 0.508) ×45°

8° MAX TYP
ALL LEADS

0.008 − 0.010
(0.203 − 0.254)
TYP ALL LEADS

0.004
(0.102)
ALL LEAD TIPS

0.016 − 0.050
(0.406 − 1.270)
TYP ALL LEADS

0.053 − 0.069
(1.346 − 1.753)

0.004 − 0.010
(0.102 − 0.254)

SEATING
PLANE

0.014
(0.356)

0.050
(1.270)
TYP

0.008 TYP
(0.203)

0.014 − 0.020 TYP
(0.356 − 0.508)

M16A (REV H)

**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M16A**

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)

16-Lead Plastic Dual-In-Line Package (PDIP), JEDEC MS-001, 0.300" Wide
Package Number N16E

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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