FAIRCHILD
SEMICONDUCTOR™

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CD4528BC
Dual Monostable Multivibrator

General Description

The CD4528B 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 Rx and Cx.

Features

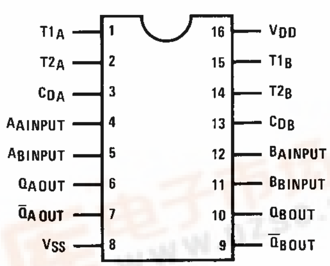
- Wide supply voltage range: 3.0V to 18V
- Separate reset available
- Quiescent current = 5.0 nA/package (typ.) at 5.0 V_{DC}
- Diode protection on all inputs
- Triggerable from leading or trailing edge pulse
- Capable of driving two low-power TTL loads or one low-power Schottky TTL load over the rated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

Devices also available in Tape and Reel. Specify by appending the suffix letter “X” to the ordering code.

Connection Diagram



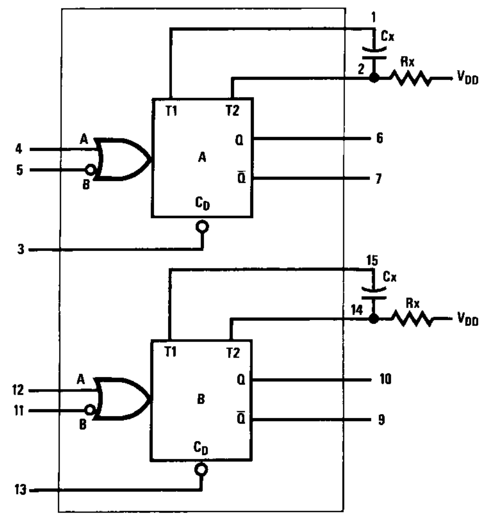
Top View

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	⊓	⊔

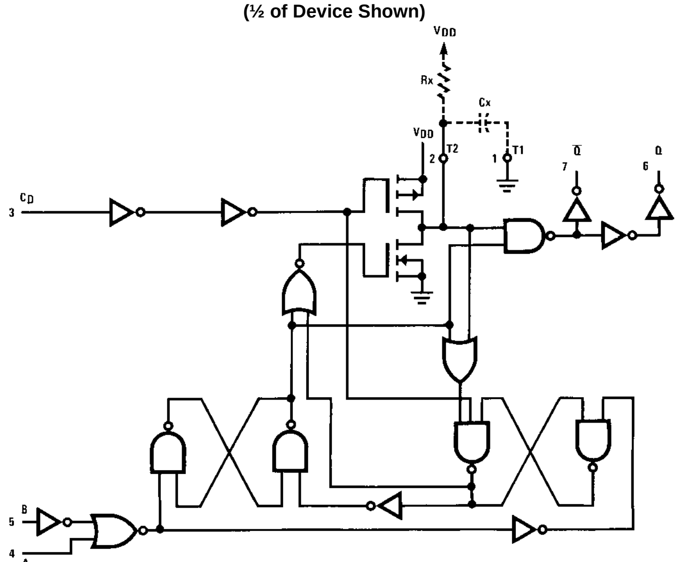
H = HIGH Level
L = LOW Level
↑ = Transition from LOW-to-HIGH
↓ = Transition from HIGH-to-LOW
⊓ = One HIGH Level Pulse
⊔ = One LOW Level Pulse
X = Irrelevant

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)	–40°C to +85°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	–40°C		+25°C			+85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	V_{DD} = 5V		20		0.005	20		150	µA
		V_{DD} = 10V		40		0.010	40		300	µA
		V_{DD} = 15V		80		0.015	80		600	µA
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
		V_{DD} = 15V		0.05			0.05		0.05	V
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
		V_{DD} = 15V	14.95		14.95	15.0		14.95		V
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
		V_{DD} = 15V, V_O = 1.5V or 13.5V		4.0		6.75	4.0		4.0	V
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
		V_{DD} = 15V, V_O = 1.5V or 13.5V	11.0		11.0	8.25		11.0		V
I_{OL}	LOW Level Output Current (Note 4)	V_{DD} = 5V, V_O = 0.4V	0.52		0.44	0.88		0.36		mA
		V_{DD} = 10V, V_O = 0.5V	1.3		1.1	2.25		0.9		mA
		V_{DD} = 15V, V_O = 1.5V	3.6		3.0	8.8		2.4		mA
I_{OH}	HIGH Level Output Current (Note 4)	V_{DD} = 5V, V_O = 4.6V	–0.2		–0.16	–0.36		–0.12		mA
		V_{DD} = 10V, V_O = 9.5V	–0.5		–0.4	–0.9		–0.3		mA
		V_{DD} = 15V, V_O = 13.5V	–1.4		–1.2	–3.5		–1.0		mA
I_{IN}	Input Current	V_{DD} = 15V, V_{IN} = 0V		–0.3		-10^{-5}	–0.3		–1.0	µA
		V_{DD} = 15V, V_{IN} = 15V		0.3		10^{-5}	0.3		1.0	µA

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

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

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

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

Pulse Widths

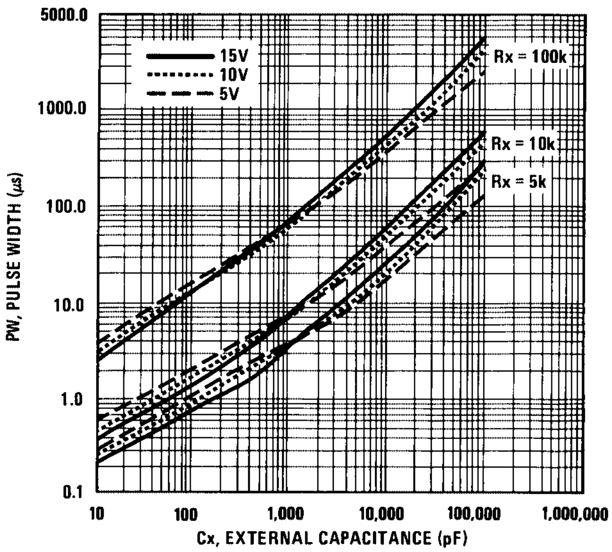


FIGURE 1. Pulse Width vs Cx

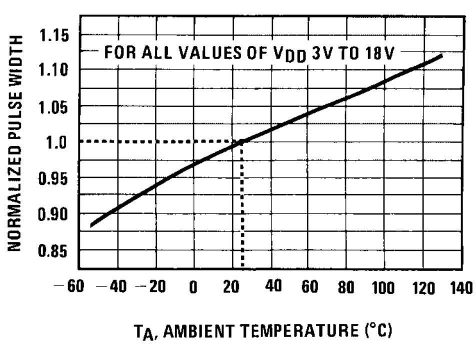
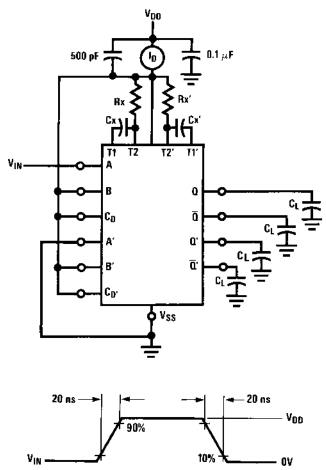


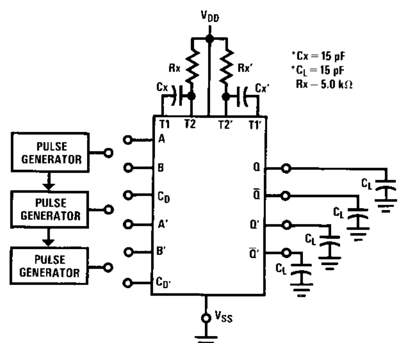
FIGURE 2. Normalized Pulse Width vs Temperature

AC Test Circuits and Waveforms



Duty Cycle = 50%

FIGURE 3. Power Dissipation Test Circuit and Waveforms



*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

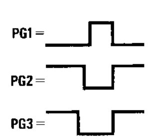


FIGURE 4. AC Test Circuit

AC Test Circuits and Waveforms (Continued)

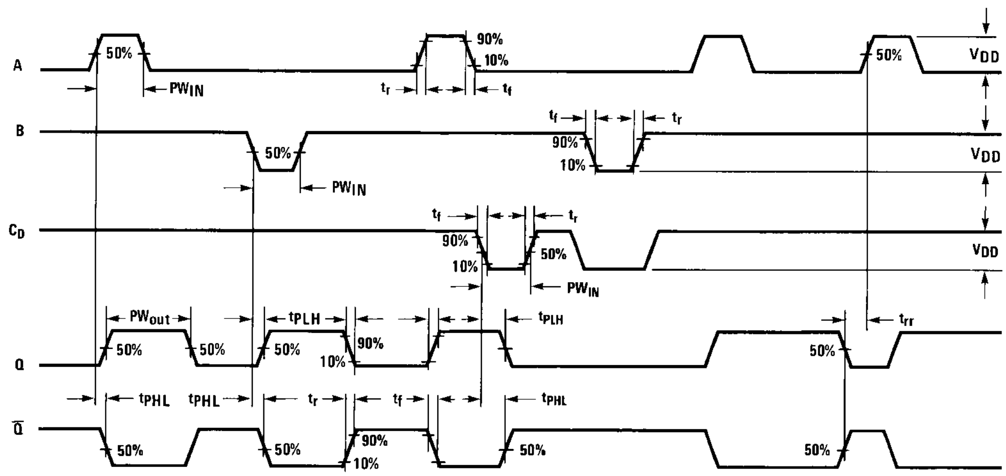
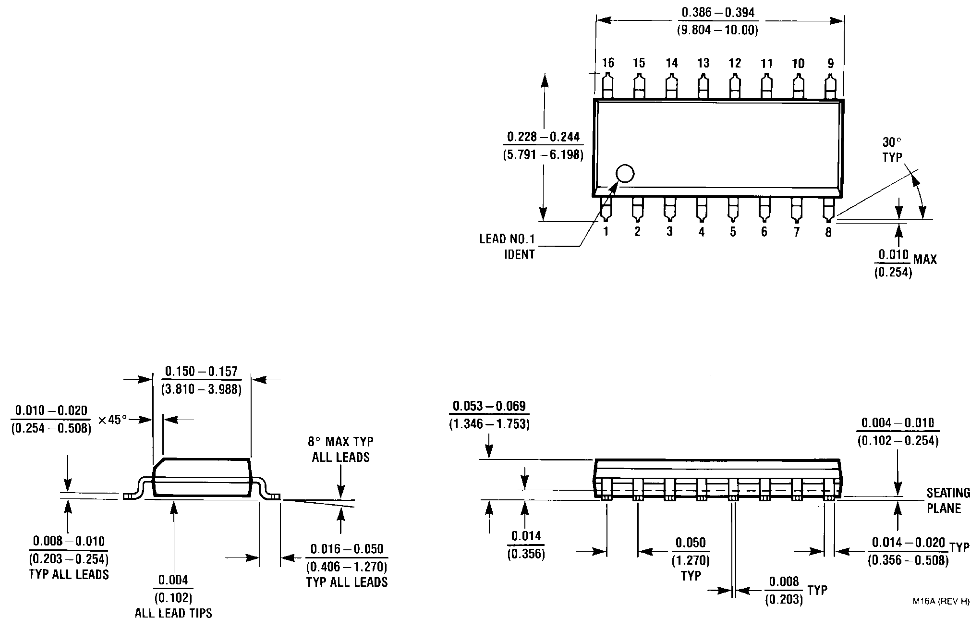


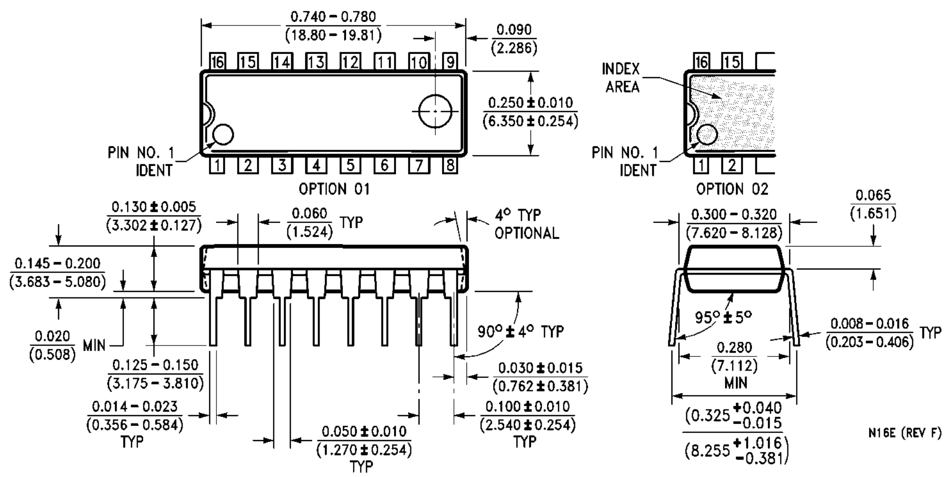
FIGURE 5. AC Test Waveforms

Physical Dimensions inches (millimeters) unless otherwise noted



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