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.

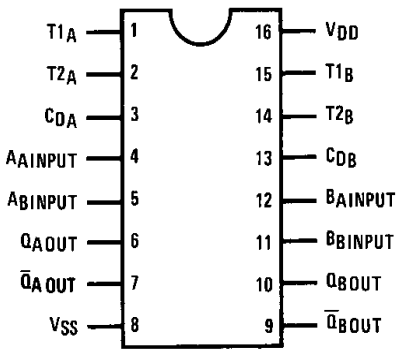
Features

- 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 INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4528BE	DIP16L	CD4528	TUBE	1000/box
CD4528BM/TR	SOP16L	CD4528	REEL	2500/reel

Connection Diagram



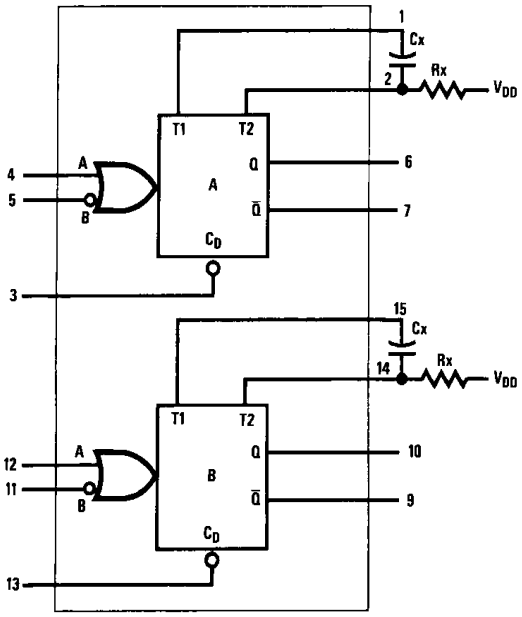
Top View

Truth Table

Inputs			Outputs	
Clear	A	B	Q	Q
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↓	⎍	⎎
H	↑	H	⎍	⎎

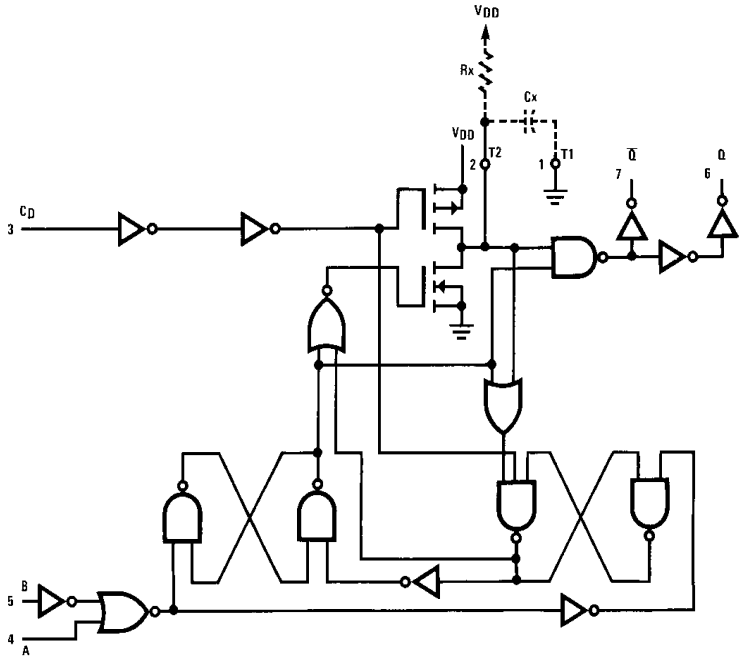
H = HIGH Level
L = LOW Level
↑ = Transition from LOW-to-HIGH
↓ = Transition from HIGH-to-LOW
⎍ = One HIGH Level Pulse
⎎ = One LOW Level Pulse
X = Irrelevant

Block Diagram



Logic Diagram

(½ of Device Shown)



Note: Externally ground pins 1 and 15 to pin 8.

Absolute Maximum Ratings

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

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

DC Electrical Characteristics (Note 1)

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	V_{DD} = 5V, V_O = 0.4V	0.52		0.44	0.88		0.36		mA
	(Note 2)	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	V_{DD} = 5V, V_O = 4.6V	−0.2		−0.16	−0.36		−0.12		mA
	(Note 2)	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 1: V_{SS} = 0V unless otherwise specified.

Note 2: I_{OH} and I_{OL} are tested one output at a time.

AC Electrical Characteristics (Note 3)

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 3: AC parameters are guaranteed by DC correlated testing.

Pulse Widths

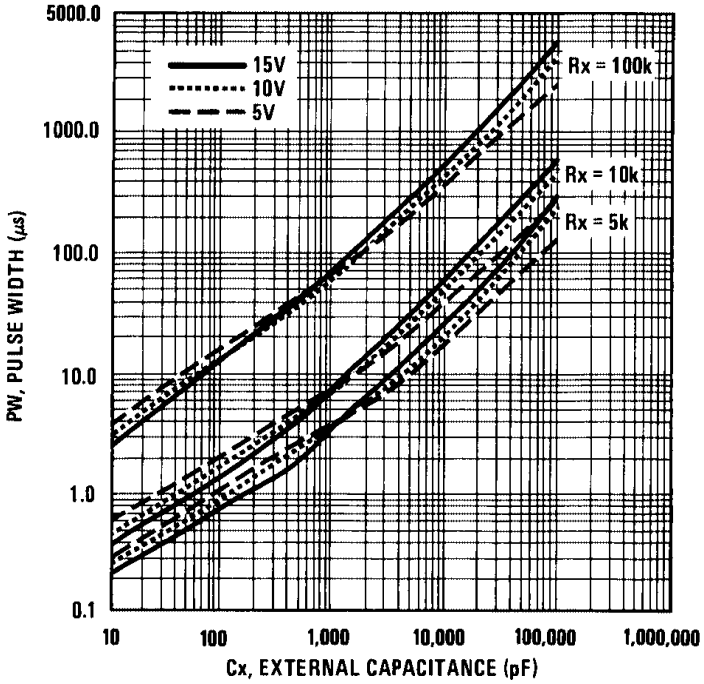


FIGURE 1. Pulse Width vs Cx

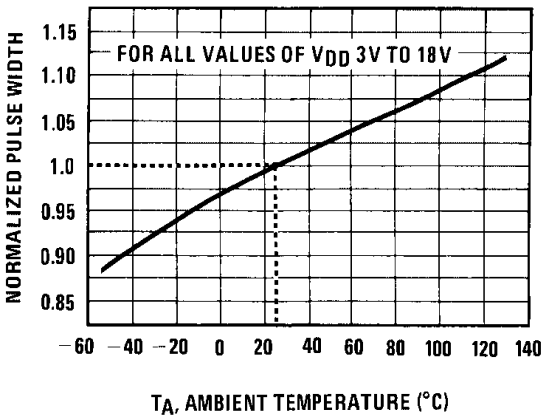
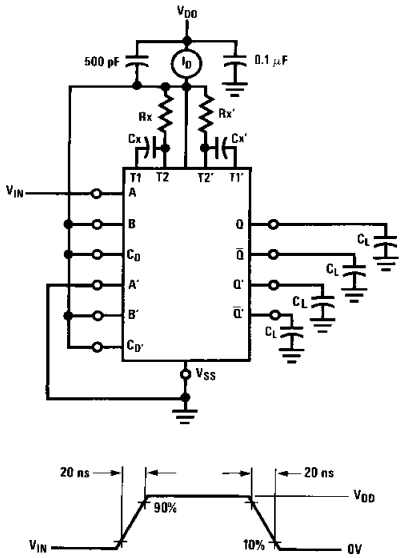


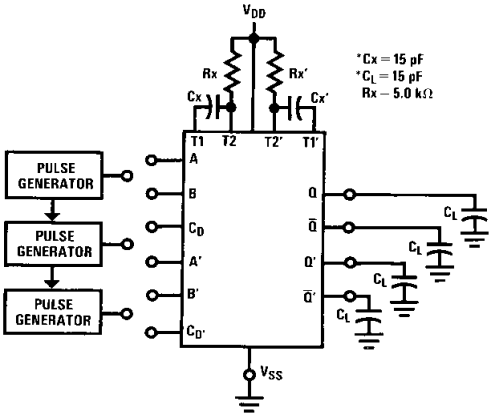
FIGURE 2. Normalized Pulse Width vs Temperature

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

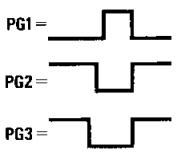


FIGURE 4. AC Test Circuit

AC Test Circuits and Waveforms (Continued)

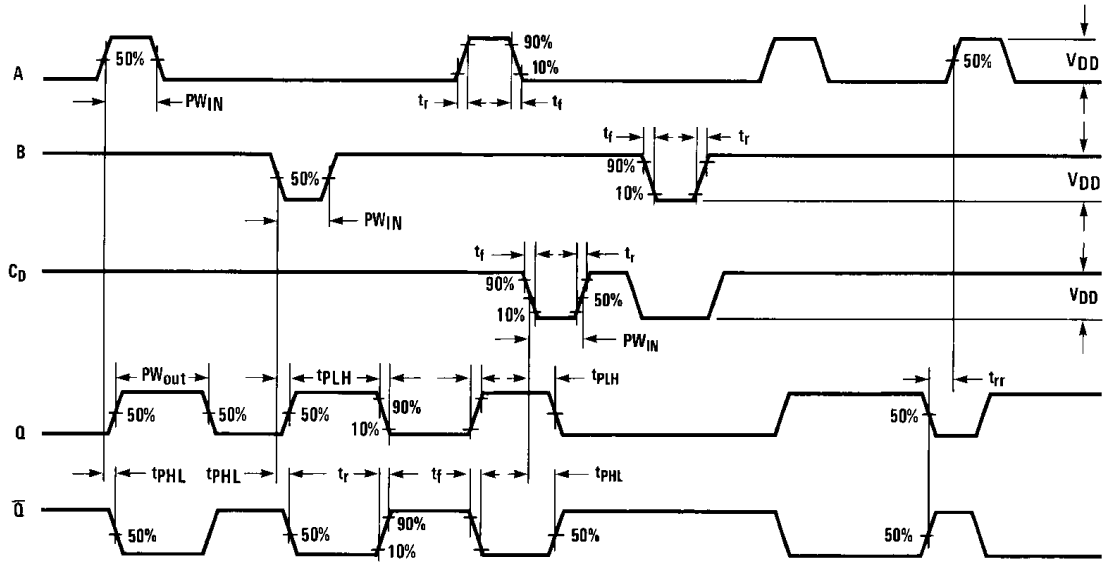
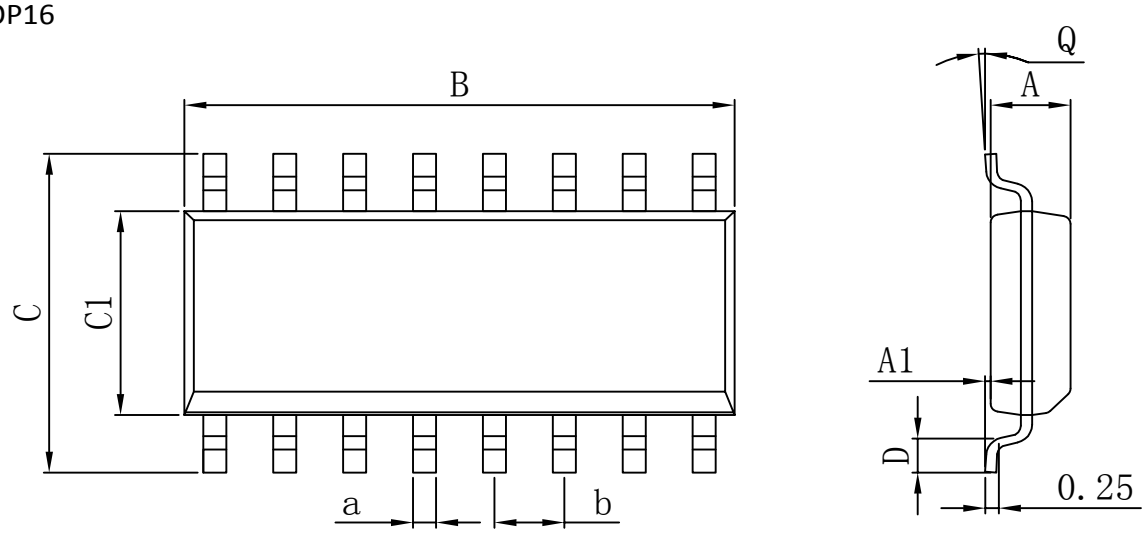


FIGURE 5. AC Test Waveforms

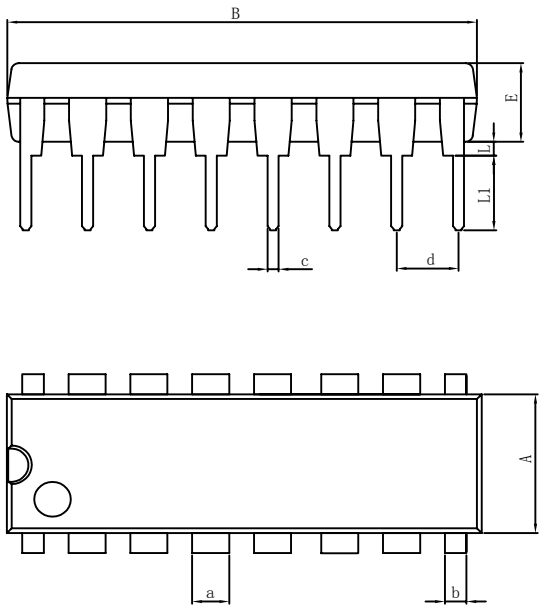
PACKAGE

SOP16



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	4.520	4.620	D	0.400	0.950
A1	0.100	0.250	Q	0°	8°
B	9.800	10.00	a	0.420 TYP	
C	5.800	6.250	b	1.270 TYP	
C1	3.800	4.000			

DIP16



Dimensions In Millimeters					
Symbol :	Min :	Max :	Symbol :	Min :	Max :
A	6.100	6.680	L	0.500	0.800
B	18.940	19.560	a	1.524 TYP	
D	8.200	9.200	b	0.889 TYP	
D1	7.42	7.820	c	0.457 TYP	
E	3.100	3.550	d	2.540 TYP	
L	0.500	0.800			

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