

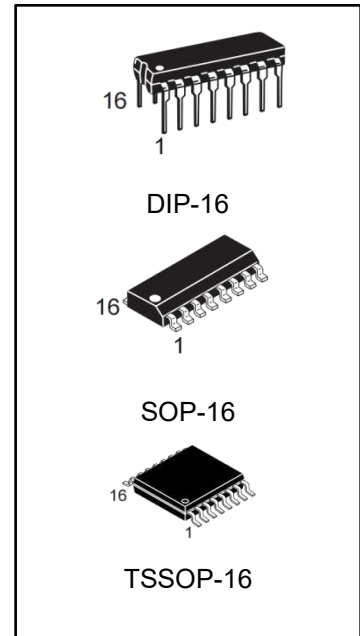
Dual Monostable Multivibrator

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

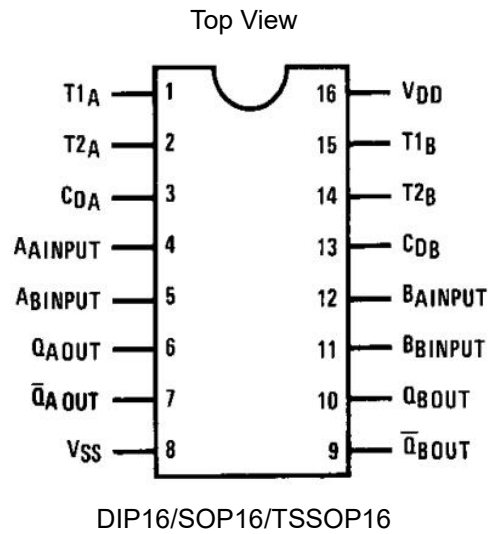
- Wide supply voltage range: 3.0V to 18V
- Separate reset available
- Quiescent current = 5.0 nA/package (typ.) at 5.0 VDC
- Diode protection on all inputs
- Triggerable from leading or trailing edge pulse
- Capable of driving two low-power TTL loads or one low power Schottky TTL load over the rated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



Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4528BE	DIP-16	CD4528BE	TUBE	1000pcs/box
CD4528BM/TR	SOP-16	CD4528B	REEL	2500pcs/reel
CD4528BMT/TR	TSSOP-16	CD4528B	REEL	2500pcs/reel

Connection Diagram



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

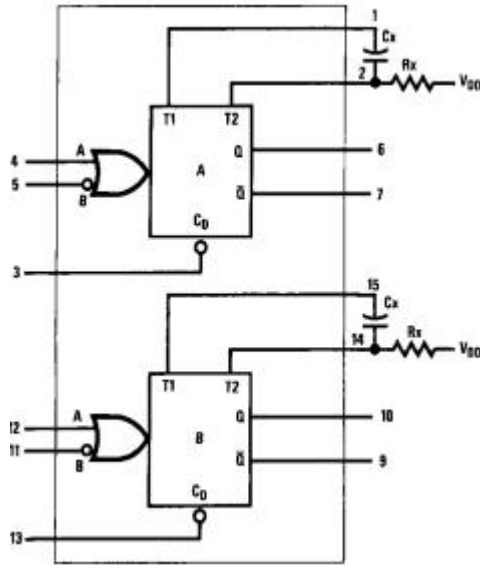
↓ = Transition from HIGH-to-LOW

= One HIGH Level Pulse

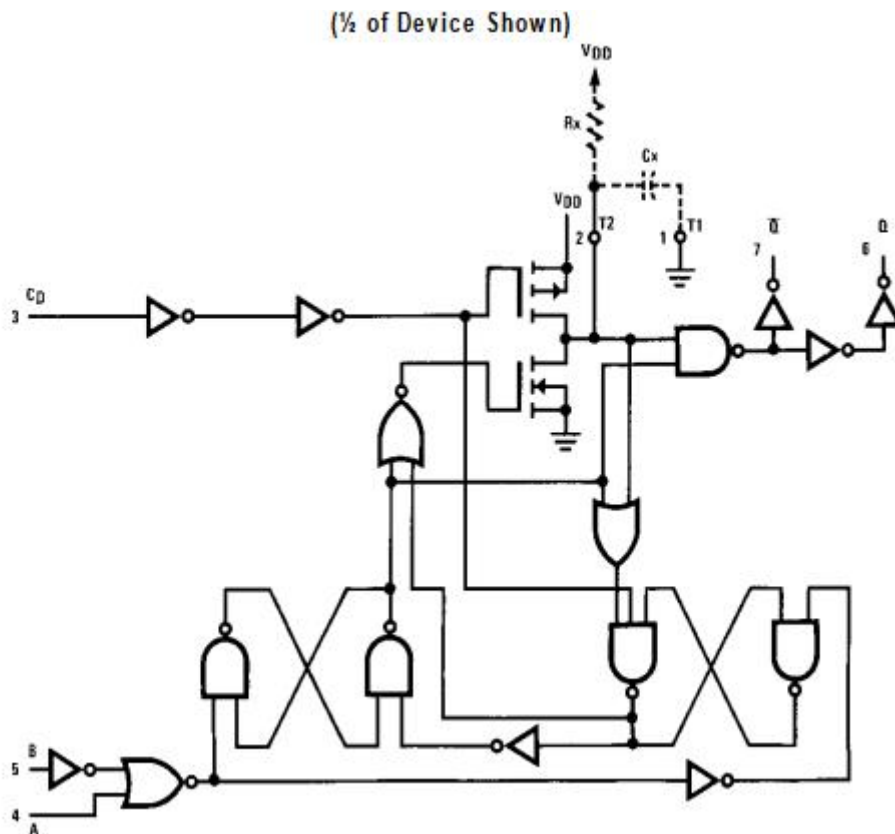
= One LOW Level Pulse

X = Irrelevant

Block Diagram



Logic Diagram



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

Absolute Maximum Ratings

Condition		Min	Max	UNITS
DC Supply Voltage(V_{DD})		-0.5	+18	V_{DC}
Input Voltage, All Inputs(V_{IN})		-0.5	+0.5	V_{DC}
Storage Temperature Range(T_S)		-65	+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

Condition		Min	Max	UNITS
DC Supply Voltage(V_{DD})		3	15	V
Input Voltage, (V_{IN})		0 to V_{DD} V_{DC}		-
Operating Temperature Range(T_A)		-40	+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 (Note 2)	$V_{DD} = 5V, V_O = 0.4V$	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 2)	$V_{DD} = 5V, V_O = 4.6V$	-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 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)

 $T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ k}\Omega$, Input $t_r = t_f = 20\text{ ns}$, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_r	Output Rise Time	$t_r = (3.0\text{ ns/pF}) C_L + 30\text{ ns}$, $V_{DD} = 5.0\text{V}$		180	400	ns
		$t_r = (1.5\text{ ns/pF}) C_L + 15\text{ ns}$, $V_{DD} = 10.0\text{V}$		90	200	ns
		$t_r = (1.1\text{ ns/pF}) C_L + 10\text{ ns}$, $V_{DD} = 15.0\text{V}$		65	160	ns
t_f	Output Fall Time	$t_f = (1.5\text{ ns/pF}) C_L + 25\text{ ns}$, $V_{DD} = 5.0\text{V}$		100	200	ns
		$t_f = (0.75\text{ ns/pF}) C_L + 12.5\text{ ns}$, $V_{DD} = 10\text{V}$		50	100	ns
		$t_f = (0.55\text{ ns/pF}) C_L + 9.5\text{ ns}$, $V_{DD} = 15.0\text{V}$		35	80	ns
t_{PLH} t_{PHL}	Turn-Off, Turn-On Delay A or B to Q or \bar{Q} $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$	$t_{PLH}, t_{PHL} = (1.7\text{ ns/pF}) C_L + 240\text{ ns}$, $V_{DD}=5.0\text{V}$		230	500	ns
		$t_{PLH}, t_{PHL} = (0.66\text{ ns/pF}) C_L + 8\text{ ns}$, $V_{DD}=10.0\text{V}$		100	250	ns
		$t_{PLH}, t_{PHL} = (0.5\text{ ns/pF}) C_L + 65\text{ ns}$, $V_{DD}= 15.0\text{V}$		65	150	ns
	Turn-Off, Turn-On Delay A or B to Q or \bar{Q} $C_x = 100\text{ pF}$, $R_x = 10\text{ k}\Omega$	$t_{PLH}, t_{PHL} = (1.7\text{ ns/pF}) C_L + 620\text{ ns}$, $V_{DD}=5.0\text{V}$		230	500	ns
		$t_{PLH}, t_{PHL} = (0.66\text{ ns/pF}) C_L + 257\text{ ns}$, $V_{DD}=10.0\text{V}$		100	250	ns
		$t_{PLH}, t_{PHL} = (0.5\text{ ns/pF}) C_L + 185\text{ ns}$, $V_{DD}= 15.0\text{V}$		65	150	ns
t_{WL} t_{WH}	Minimum Input Pulse Width A or B $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$	$V_{DD} = 5\text{V}$		60	150	ns
		$V_{DD} = 10.0\text{V}$		20	50	ns
	$C_x = 1000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 15\text{V}$		20	50	ns
		$V_{DD} = 5\text{V}$		60	150	ns
		$V_{DD} = 10.0\text{V}$		20	50	ns
		$V_{DD} = 15\text{V}$		20	50	ns
PW_{OUT}	Output Pulse Width Q or \bar{Q} For $C_x < 0.01\text{ }\mu\text{F}$ (See Graph for Appropriate V_{DD} Level) $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$	$V_{DD} = 5\text{V}$		550		ns
		$V_{DD} = 10.0\text{V}$		350		ns
		$V_{DD} = 15\text{V}$		300		ns
	For $C_x > 0.01\text{ }\mu\text{F}$ Use $PW_{out} = 0.2 R_x C_x \ln [V_{DD} - V_{SS}]$ $C_x = 10,000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 5\text{V}$	15	29	45	μs
		$V_{DD} = 10.0\text{V}$	10	37	90	μs
$V_{DD} = 15\text{V}$	15	42	95	μs		
t_{PLH} t_{PHL}	Reset Propagation Delay, t_{PLH} , t_{PHL} $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$	$V_{DD} = 5\text{V}$		325	600	ns
		$V_{DD} = 10.0\text{V}$		90	225	ns
		$V_{DD} = 15\text{V}$		60	170	ns
	$C_x = 1000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 5\text{V}$		7.0		μs
		$V_{DD} = 10.0\text{V}$		6.7		μs
		$V_{DD} = 15\text{V}$		6.7		μs
t_{RR}	Minimum Retrigger Time $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$	$V_{DD} = 5\text{V}$		0		ns
		$V_{DD} = 10.0\text{V}$		0		ns
		$V_{DD} = 15\text{V}$		0		ns
	$C_x = 1000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 5\text{V}$		0		ns
		$V_{DD} = 10.0\text{V}$		0		ns
		$V_{DD} = 15\text{V}$		0		ns
Pulse Width Match between Circuits in the Same Package $C_x = 10,000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 5\text{V}$		6	25	%	
	$V_{DD} = 10.0\text{V}$		8	35	%	
	$V_{DD} = 15\text{V}$		8	35	%	

Note 3: AC parameters are guaranteed by DC correlated testing

Pulse Widths

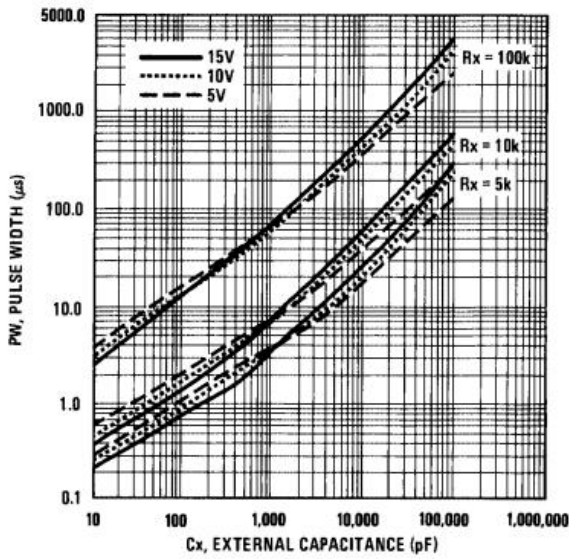


FIGURE 1. Pulse Width vs Cx

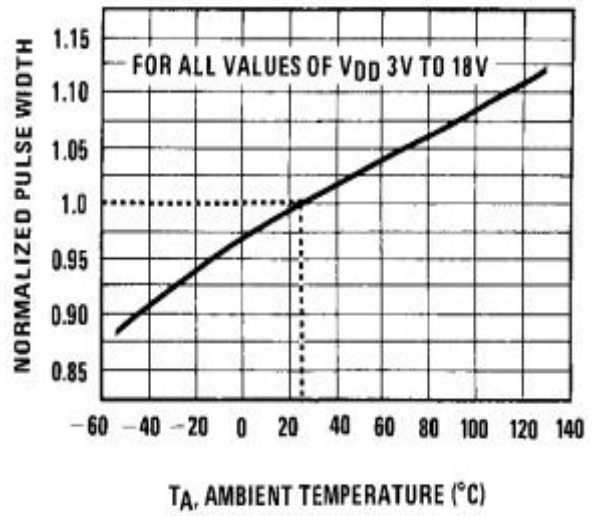
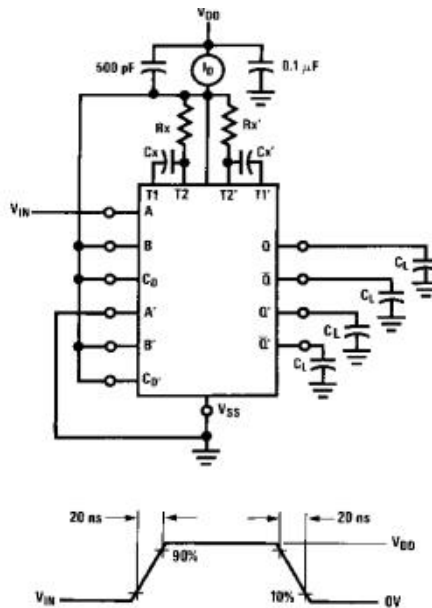


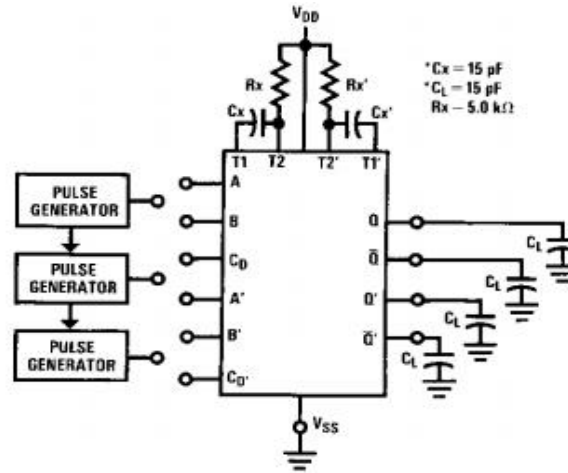
FIGURE 2. Normalized Pulse Width vs Temperature

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	CD	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

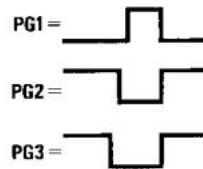


FIGURE 4.AC Test Circuit

AC Test Circuits and Waveforms (Continued)

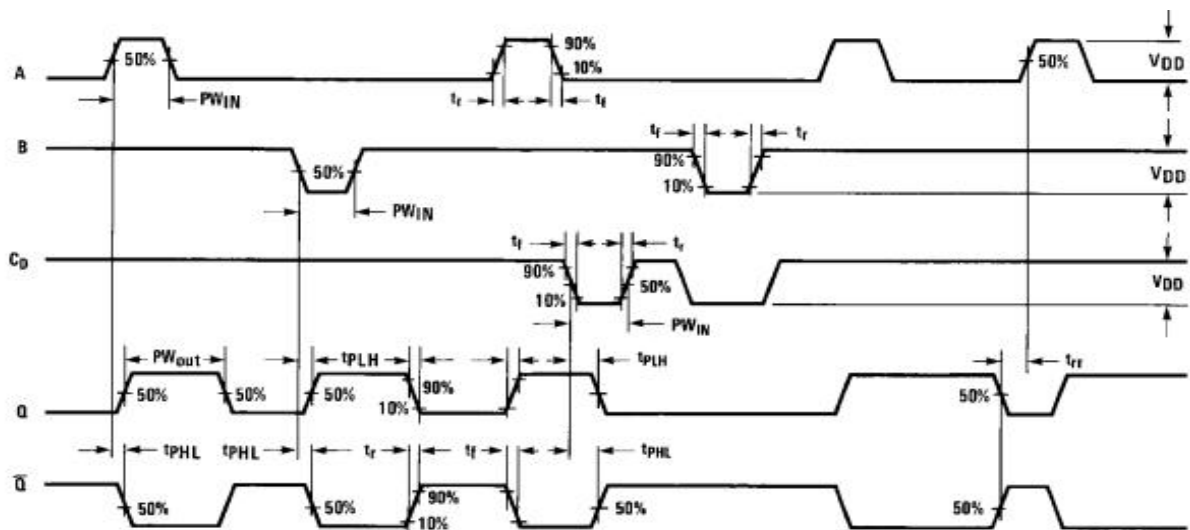
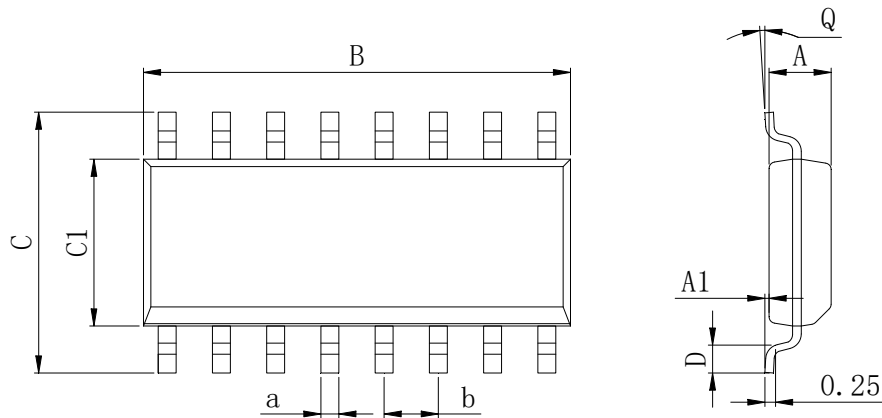


FIGURE 5. AC Test Waveforms

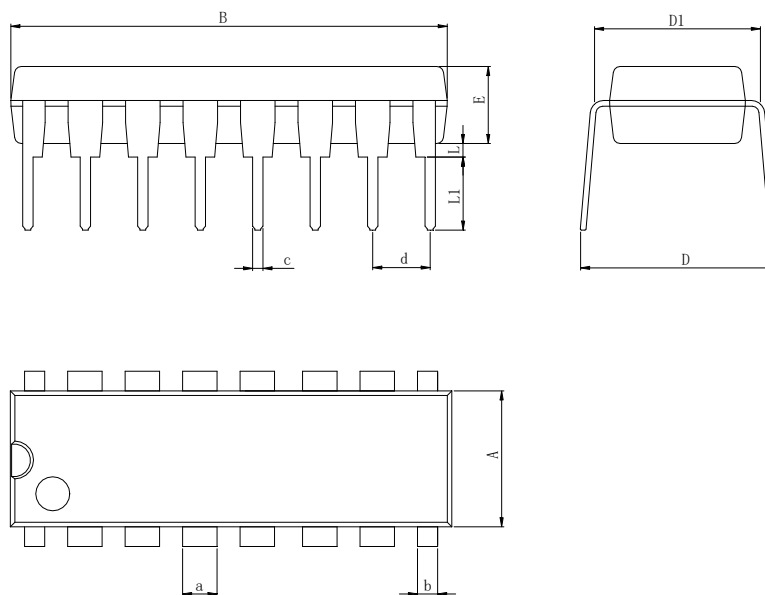
Physical Dimensions

SOP16



Dimensions In Millimeters(SOP16)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	9.80	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	10.0	6.20	4.00	0.80	8°	0.45	

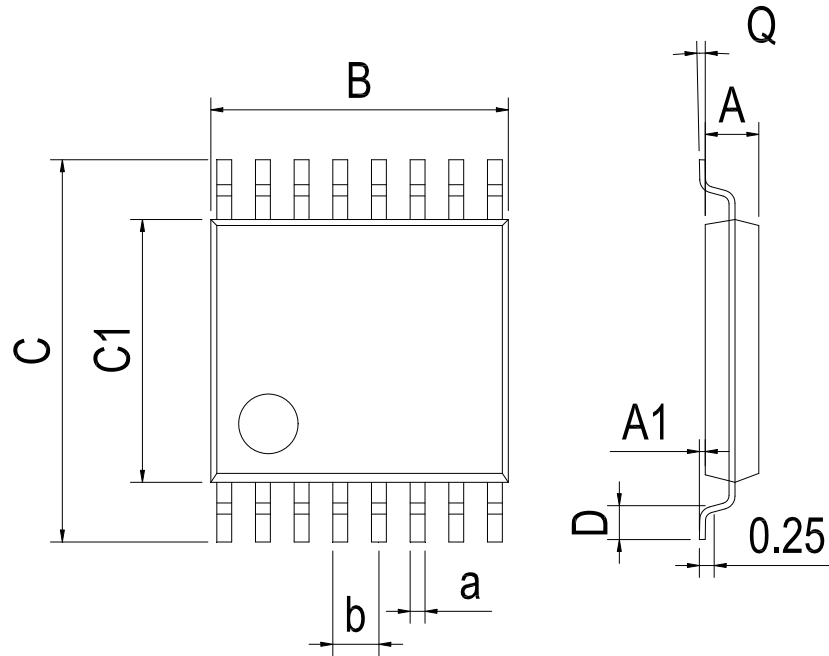
DIP16



Dimensions In Millimeters(DIP16)											
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	18.94	8.40	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	19.56	9.00	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

Physical Dimensions

TSSOP16



Dimensions In Millimeters(TSSOP16)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max:	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	

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[74LVC1G175GS,132](#) [74LVX74MTCX](#) [TC7WZ74FK,LJ\(CT](#) [MM74HCT273WM](#) [SN74LVC74AD](#) [SN74HC273DWR](#) [M74HC374RM13TR](#)
[M74HC175B1R](#) [M74HC174RM13TR](#)