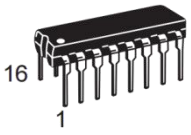
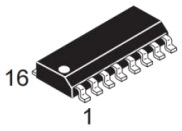
Dual Monostable Multivibrator

General Description

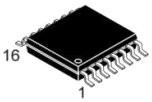
The CD4528B is a dual monostable multivibrator. Each device is retriggerable and resettable. Triggering can occur from either the rising or falling edge of an input pulse, resulting in an output pulse over a wide range of widths. Pulse duration and accuracy are determined by external timing components Rx and Cx.



DIP-16



SOP-16



TSSOP-16

Features

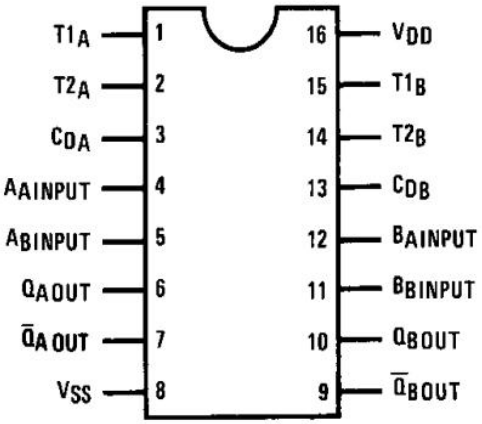
- Wide supply voltage range: 3.0V to 18V
- Separate reset available
- Quiescent current = 5.0 nA/package (typ.) at 5.0 VDC
- Diode protection on all inputs
- Triggerable from leading or trailing edge pulse
- Capable of driving two low-power TTL loads or one low
- power Schottky TTL load over the rated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

Top View



DIP16/SOP16/TSSOP16

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

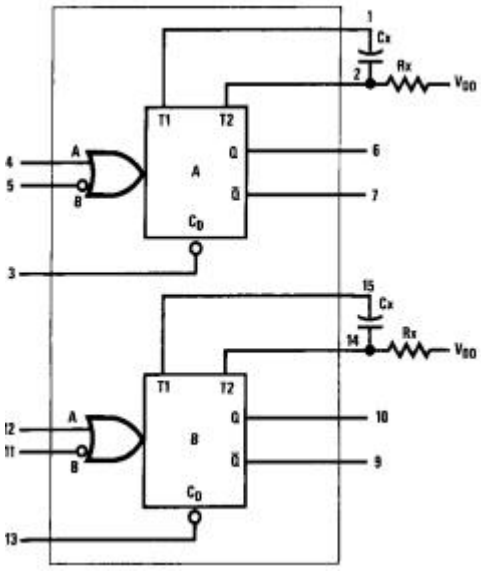
↓=Transition from HIGH-to-LOW

= One HIGH Level Pulse

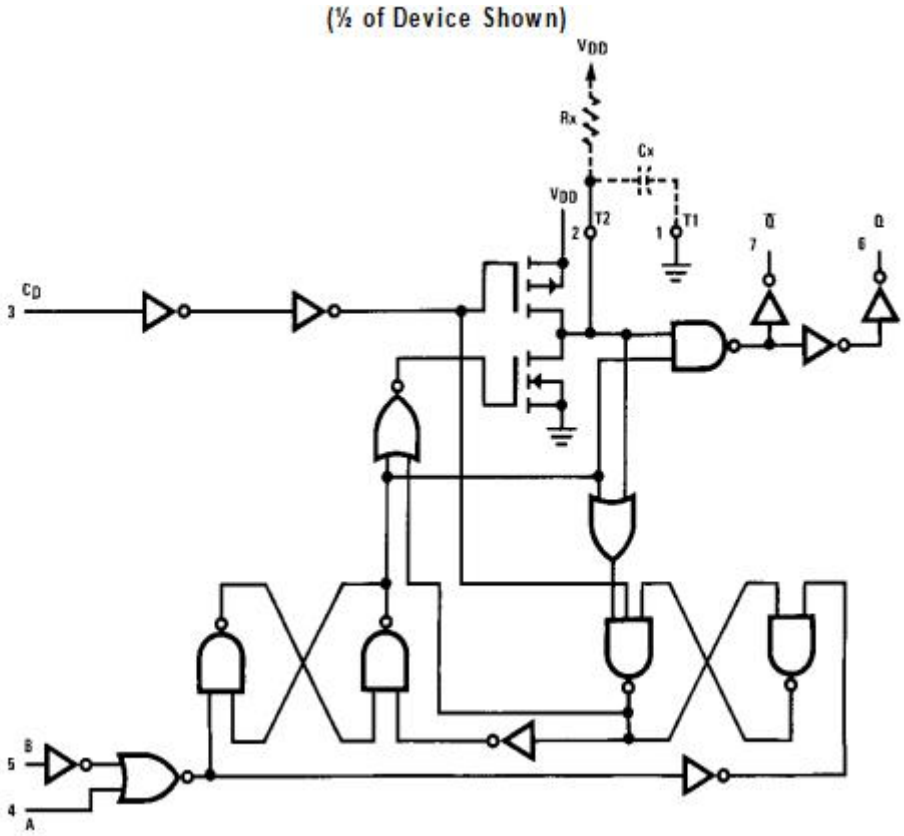
=One LOW Level Pulse

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°C, C_L = 50 pF, R_L = 200 kΩ, Input tr = tf = 20 ns, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
tr	Output Rise Time	tr = (3.0 ns/pF) C_L + 30 ns, V_{DD} = 5.0V		180	400	ns
		tr = (1.5 ns/pF) C_L + 15 ns, V_{DD} = 10.0V		90	200	ns
		tr = (1.1 ns/pF) C_L + 10 ns, V_{DD} = 15.0V		65	160	ns
tf	Output Fall Time	tf = (1.5 ns/pF) C_L + 25 ns, V_{DD} = 5.0V		100	200	ns
		tf = (0.75 ns/pF) C_L + 12.5 ns, V_{DD} = 10V		50	100	ns
		tf = (0.55 ns/pF) C_L + 9.5 ns, V_{DD} = 15.0V		35	80	ns
t_{PLH} t_{PHL}	Turn-Off, Turn-On Delay	t_{PLH},t_{PHL} = (1.7 ns/pF) C_L + 240 ns, V_{DD}=5.0V		230	500	ns
	A or B to Q or $\bar{Q}$	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 $\bar{Q}$	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} = 5V		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} = 5V		60	150	ns
		V_{DD} =10.0V		20	50	ns
		V_{DD} =15V		20	50	ns
PW_{OUT}	Output Pulse Width Q or $\bar{Q}$	V_{DD} = 5V		550		ns
	For Cx < 0.01 µF (See Graph for Appropriate VDD Level)	V_{DD} =10.0V		350		ns
	Cx = 15 pF, Rx = 5.0 kΩ	V_{DD} =15V		300		ns
	For Cx > 0.01 µF Use	V_{DD} = 5V	15	29	45	µs
	PWout = 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} =15V	15	42	95	µs
t_{PLH}	Reset Propagation Delay,	V_{DD} = 5V		325	600	ns
t_{PHL}	tPLH, tPHL	V_{DD} =10.0V		90	225	ns
	Cx = 15 pF, Rx = 5.0 kΩ	V_{DD} =15V		60	170	ns
	Cx = 1000 pF, Rx = 10 kΩ	V_{DD} = 5V		7.0		µs
		V_{DD} =10.0V		6.7		µs
		V_{DD} =15V		6.7		µs
t_{RR}	Minimum Retrigger Time	V_{DD} = 5V		0		ns
	Cx = 15 pF, Rx = 5.0 kΩ	V_{DD} =10.0V		0		ns
		V_{DD} =15V		0		ns
	Cx = 1000 pF, Rx = 10 kΩ	V_{DD} = 5V		0		ns
		V_{DD} =10.0V		0		ns
		V_{DD} =15V		0		ns
Pulse Width Match between Circuits		V_{DD} = 5V		6	25	%
in the Same Package		V_{DD} =10.0V		8	35	%
Cx = 10,000 pF, Rx = 10 kΩ		V_{DD} =15V		8	35	%

Note 3: AC parameters are guaranteed by DC correlated testing

Pulse Widths

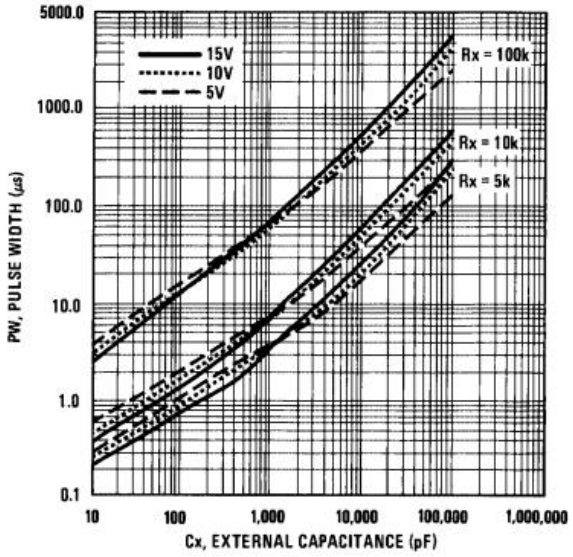


FIGURE 1. Pulse Width vs Cx

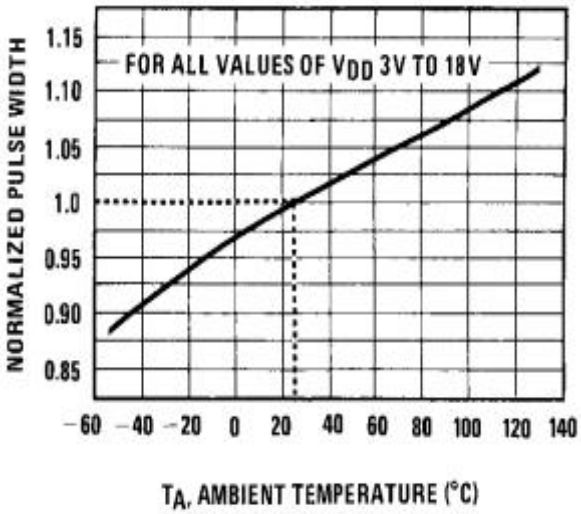
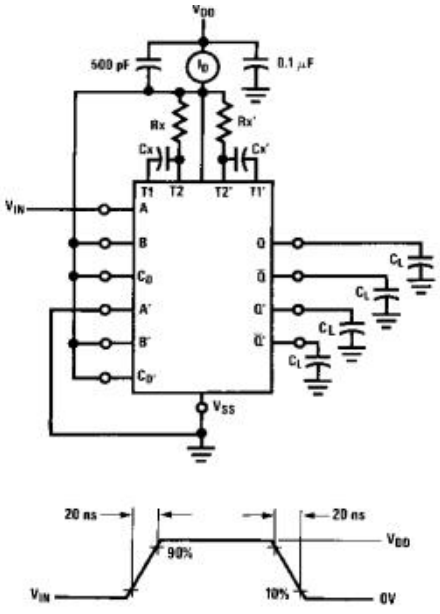


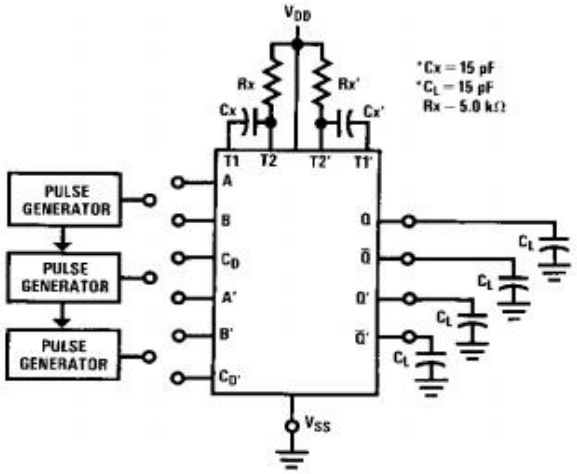
FIGURE 2. Normalized Pulse Width vs Temperature

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}, tr, tf, PWout, PWin	V_{DD}	PG1	VDD
t_{PLH}, t_{PHL}, tr, tf, PWout, PWin	V_{DD}	V_{SS}	PG2
$t_{PLH(R)}$, $t_{PHL(R)}$, PWin	PG3	PG1	PG2

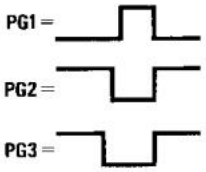


FIGURE 4.AC Test Circuit

AC Test Circuits and Waveforms (Continued)

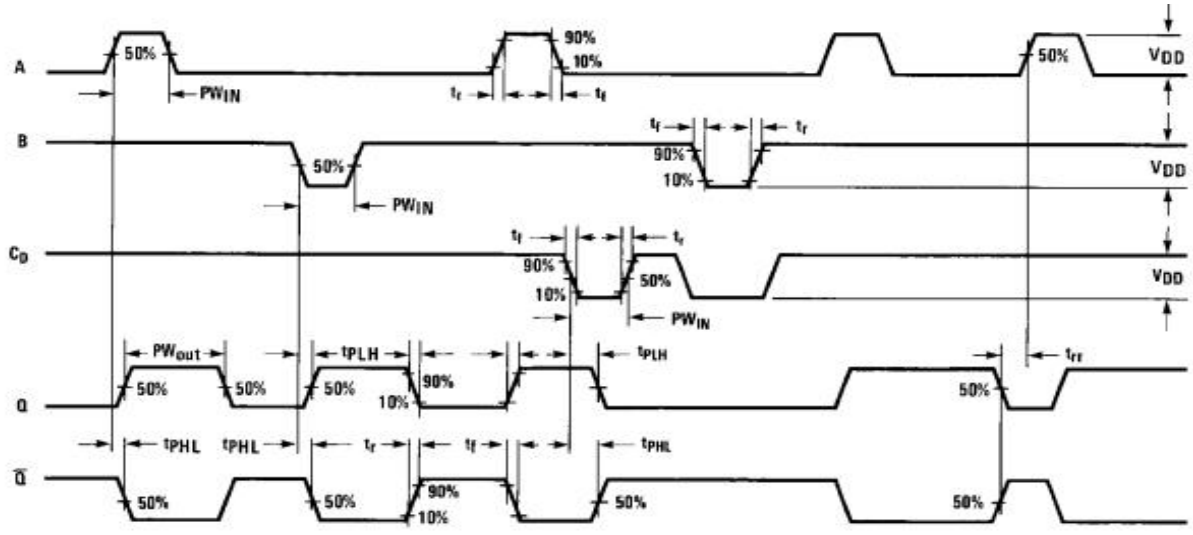
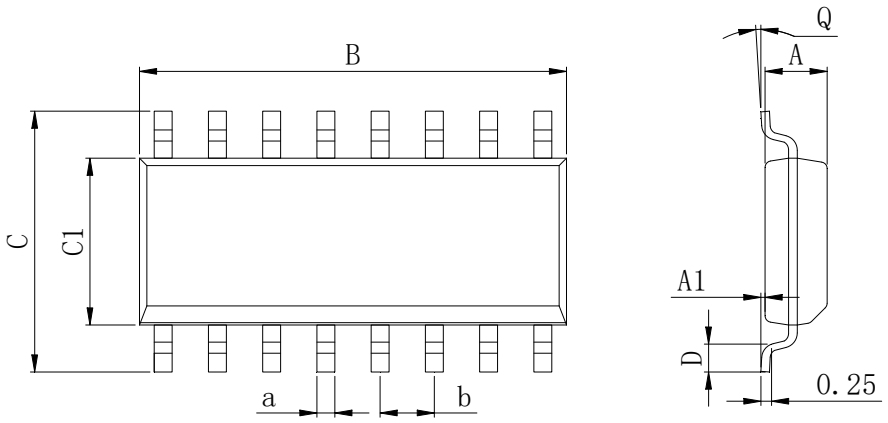


FIGURE 5. AC Test Waveforms

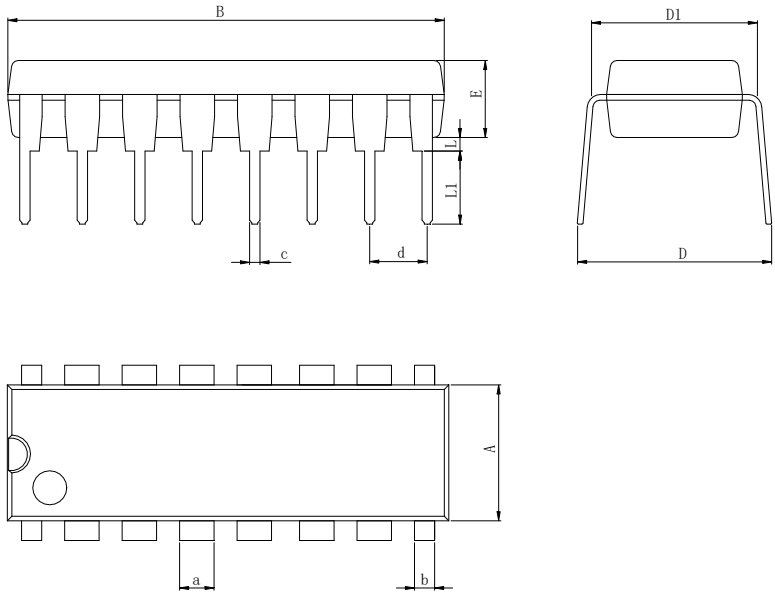
Physical Dimensions

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	

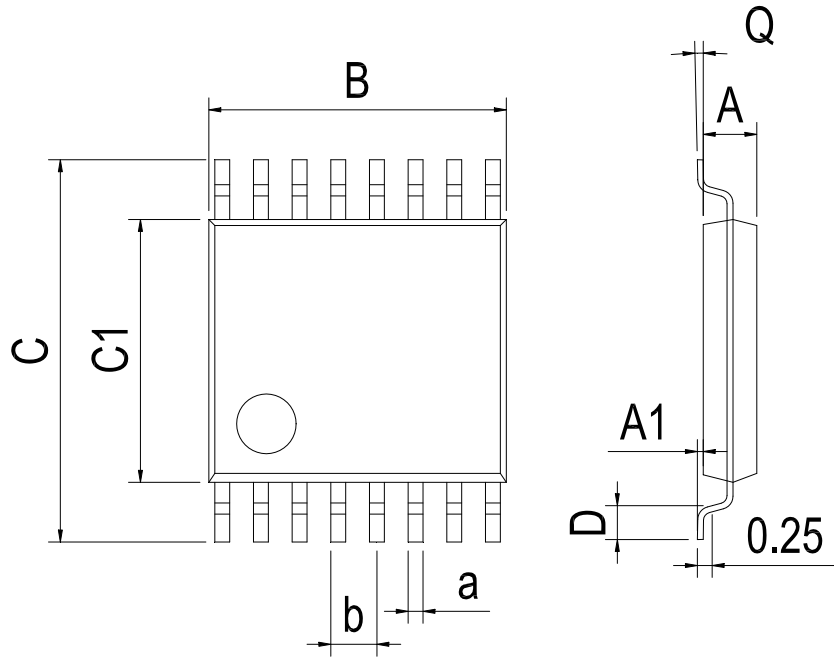
DIP16



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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