# Dual Mono stable Multi vibrator

General Description

The CD4528B is a dual mono stable multi vibrator. Each device is re trigger able and reset table. 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
- Trigger able 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
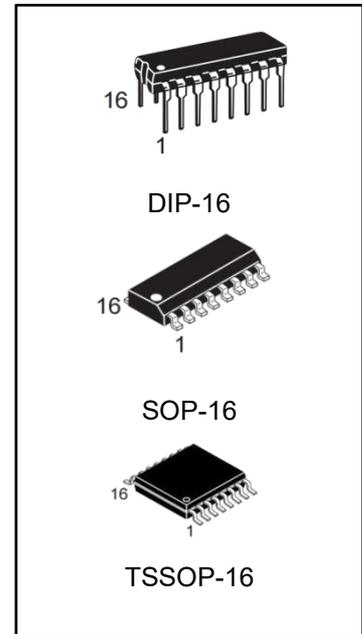
Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4528BE/ CD4528BN	DIP-16	CD4528B	TUBE	1000pcs/box
CD4528BM/TR	SOP-16	CD4528B	REEL	2500pcs/reel
CD4528BMT/TR	TSSOP-16	CD4528B	REEL	2500pcs/reel

Connection Diagram

Top View

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

DIP-16/SOP-16/TSSOP-16
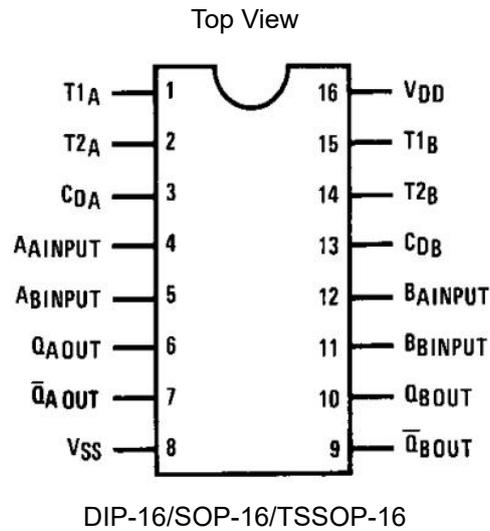
Truth Table

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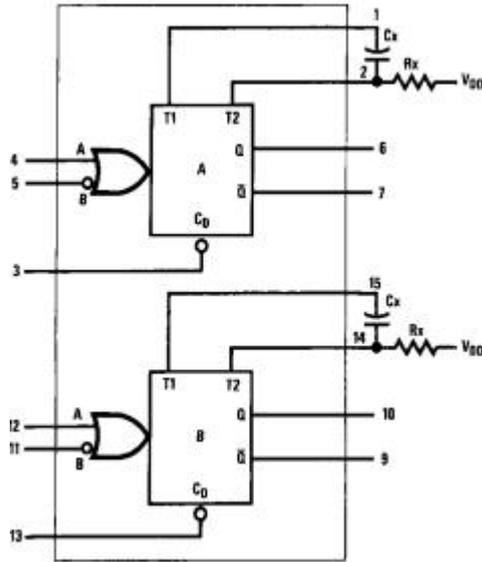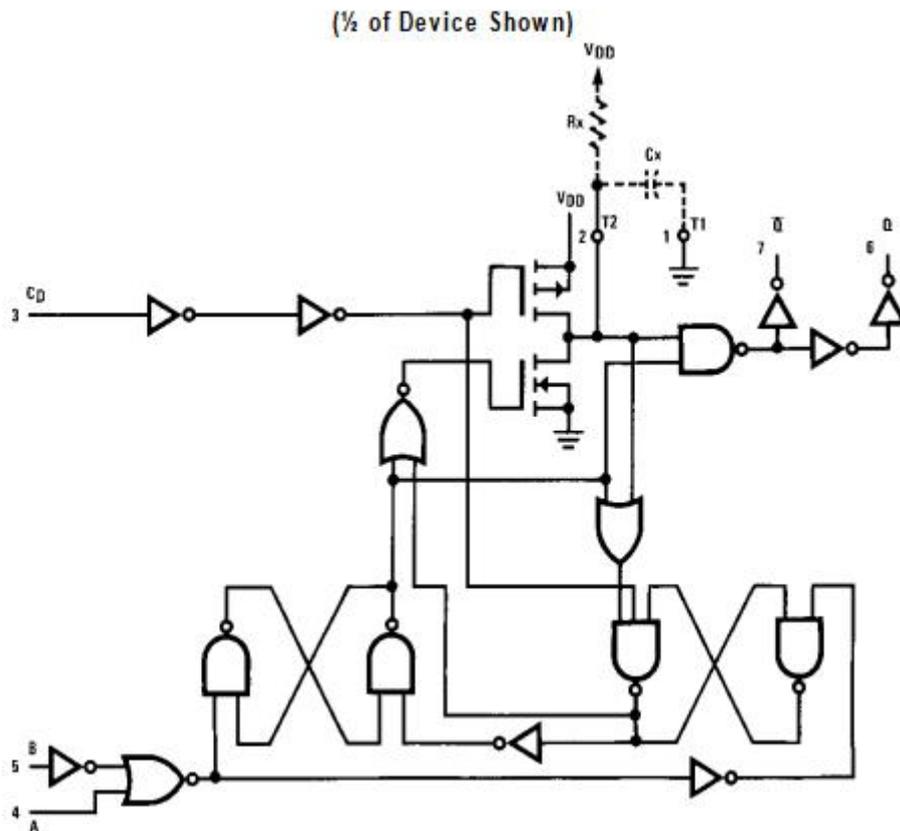
Note: Externally ground pins 1 and 15 to pin 8.

Absolute Maximum Ratings

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)		-	245	°C

Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but specific performance is not ensured.

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 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}=5.0V		230	500	ns
		t_{PLH},t_{PHL} = (0.66 ns/pF) C_L + 8 ns, V_{DD}=10.0V		100	250	ns
		t_{PLH},t_{PHL} = (0.5 ns/pF) C_L+ 65 ns, V_{DD} = 15.0V		65	150	ns
	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}=5.0V		230	500	ns
		t_{PLH},t_{PHL} = (0.66 ns/pF) C_L + 257 ns, V_{DD}=10.0V		100	250	ns
		t_{PLH},t_{PHL} = (0.5 ns/pF) C_L+ 185 ns, V_{DD}= 15.0V		65	150	ns
t_{WL} t_{WH}	Minimum Input Pulse Width A or B Cx = 15 pF, Rx = 5.0 kΩ	V_{DD} = 5V		60	150	ns
		V_{DD} =10.0V		20	50	ns
		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 $\overline{Q}$ For Cx < 0.01 µF (See Graph for Appropriate VDD Level) Cx = 15 pF, Rx = 5.0 kΩ	V_{DD} = 5V		550		ns
		V_{DD} =10.0V		350		ns
		V_{DD} =15V		300		ns
	For Cx > 0.01 µF Use PWout = 0.2 Rx Cx In [V_{DD} - V_{SS}] Cx = 10,000 pF, Rx = 10 kΩ	V_{DD} = 5V	15	29	45	µs
		V_{DD} =10.0V	10	37	90	µs
		V_{DD} =15V	15	42	95	µs
t_{PLH} t_{PHL}	Reset Propagation Delay, tPLH, tPHL Cx = 15 pF, Rx = 5.0 kΩ	V_{DD} = 5V		325	600	ns
		V_{DD} =10.0V		90	225	ns
		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 Cx = 15 pF, Rx = 5.0 kΩ	V_{DD} = 5V		0		ns
		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 in the Same Package Cx = 10,000 pF, Rx = 10 kΩ	V_{DD} = 5V		6	25	%
		V_{DD} =10.0V		8	35	%
		V_{DD} =15V		8	35	%

Note 3: AC parameters are guaranteed by DC correlated testing

Pulse Widths
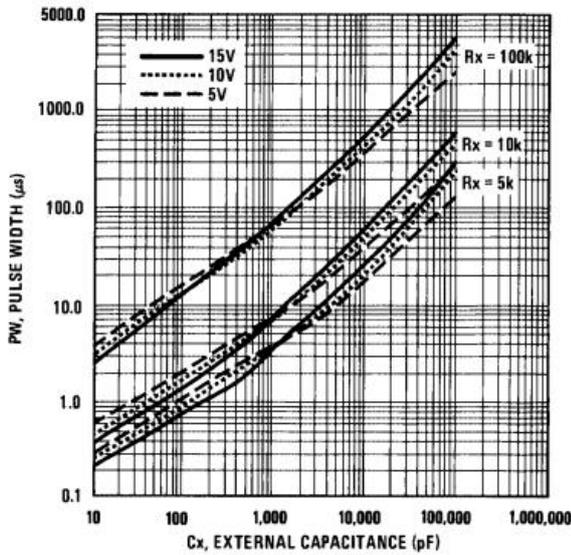
FIGURE 1. Pulse Width vs Cx
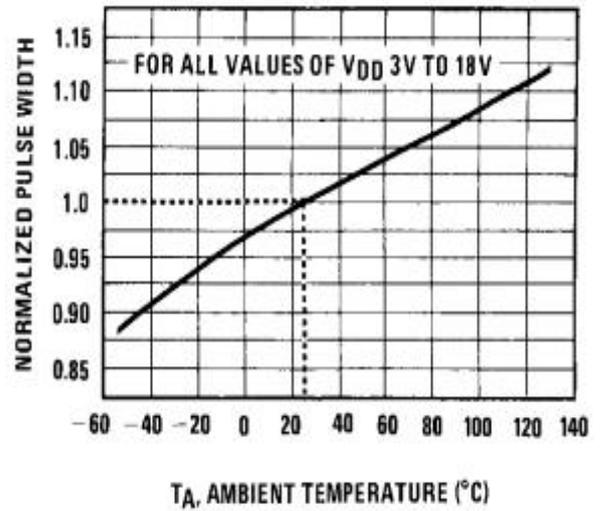
FIGURE 2. Normalized Pulse Width vs Temperature

AC Test Circuits and Wave forms
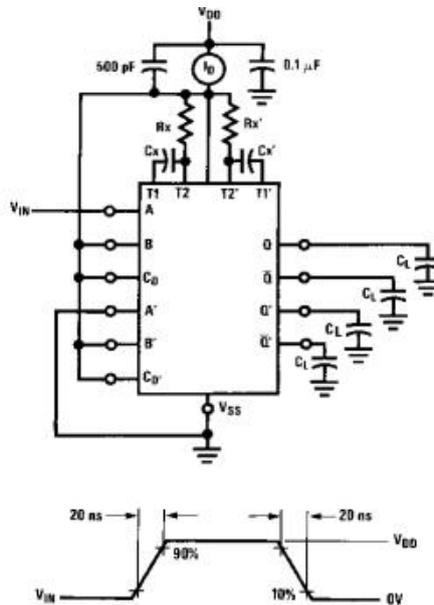
Duty Cycle = 50%

FIGURE 3. Power Dissipation Test Circuit and Waveforms

*Cx = 15 pF
*C_L = 15 pF
Rx – 5.0 kΩ
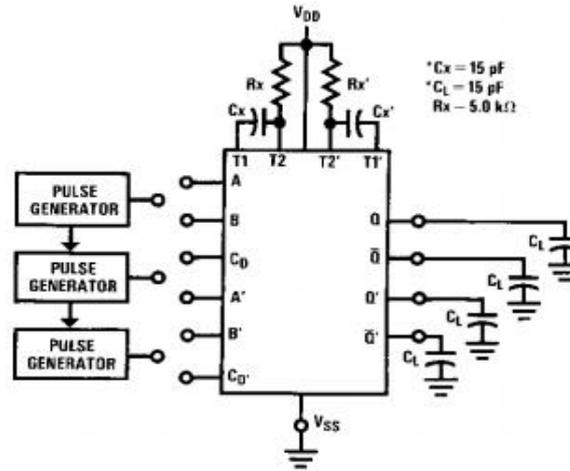
*Includes capacitance of probes, wiring, and fixture parasitic.

Note: AC test waveforms for PG1, PG2, and PG3 in Figure 4.

Input Connections

| Characteristics	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
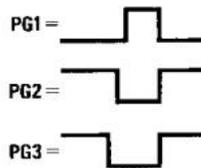
FIGURE 4.AC Test Circuit

## AC Test Circuits and Wave forms (Continued)
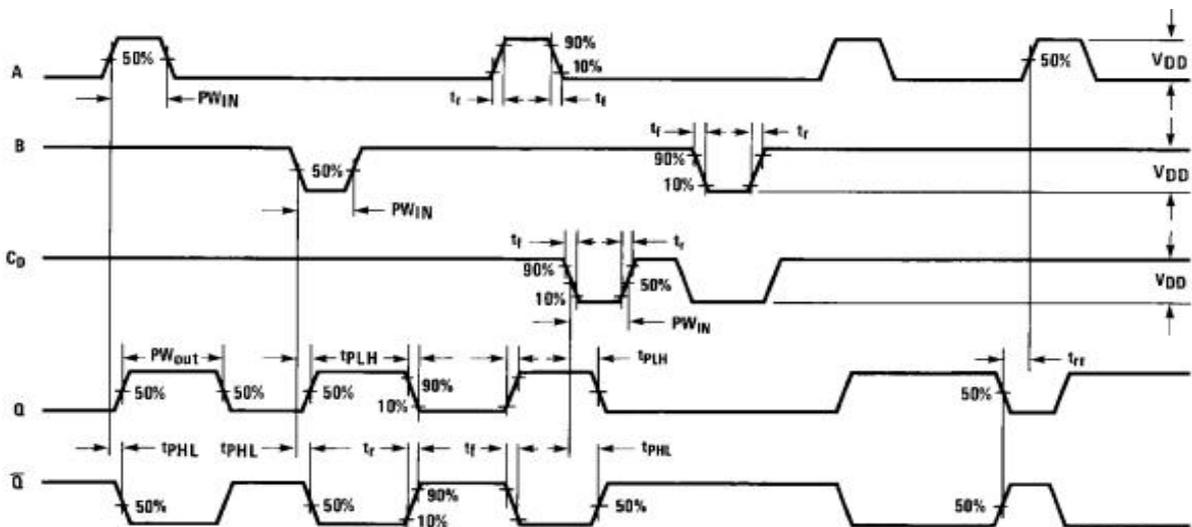
FIGURE 5. AC Test Waveforms

Physical Dimensions

SOP-16
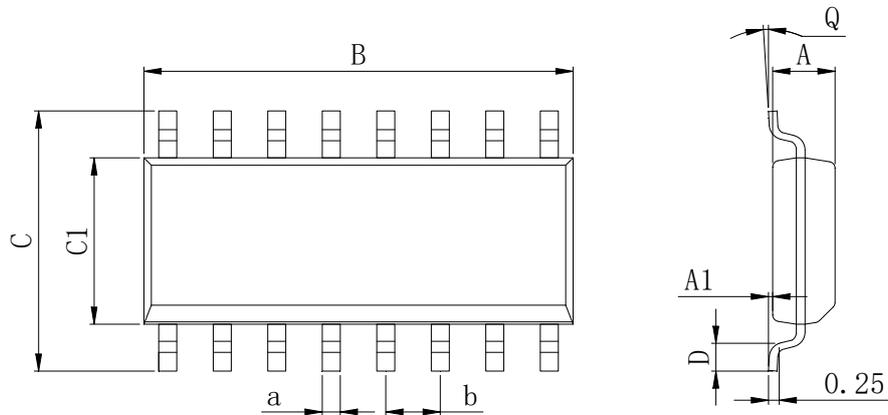
Dimensions In Millimeters(SOP-16)								
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	9.80	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	10.0	6.20	4.00	0.80	8°	0.45	

DIP-16
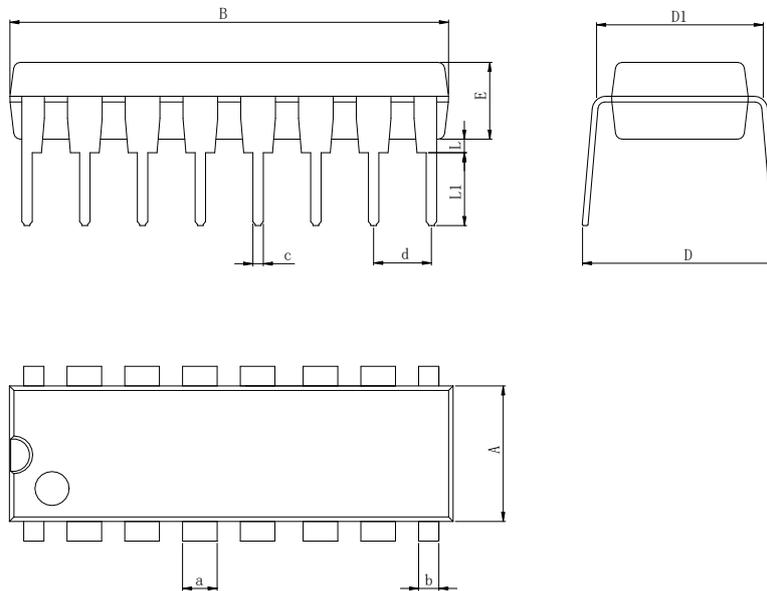
Dimensions In Millimeters(DIP-16)										
Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	18.94	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	19.56	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

Physical Dimensions

TSSOP-16
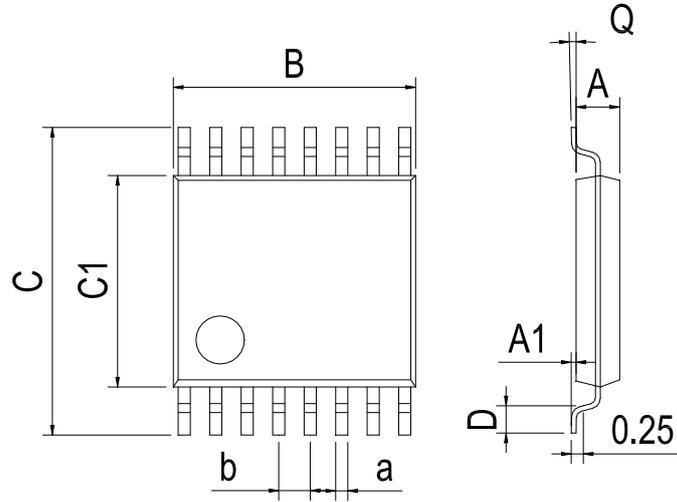
Dimensions In Millimeters(TSSOP-16)								
Symbol：	A	A1	B	C	C1	D	Q	a	b
Min：	0.85	0.05	4.90	6.20	4.30	0.40	0°	0.20	0.65 BSC
Max：	0.95	0.20	5.10	6.60	4.50	0.80	8°	0.25	

Revision History

DATE	REVISION	PAGE
2014-6-12	New	1-11
2023-11-15	Modify the package dimension diagram TSSOP-16、Update encapsulation type、Update Lead Temperature、Updated DIP-16 dimension、Add annotation for Maximum Ratings、Update DIP Package New Model	1、4、8、9

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