

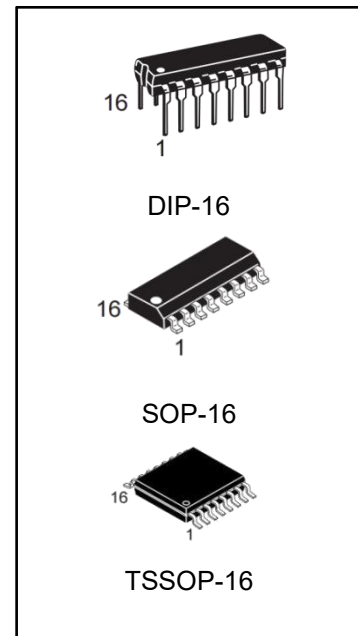
Dual Mono stable Multi vibrator

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.

Features

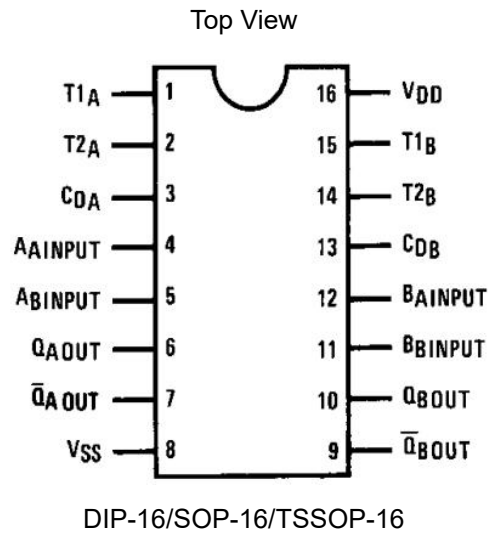
- Wide supply voltage range: 3.0V to 18V
- Separate reset available
- Quiescent current = 5.0 nA/package (typ.) at 5.0 VDC
- Diode protection on all inputs
- Trigger able from leading or trailing edge pulse
- Capable of driving two low-power TTL loads or one low power Schottky TTL load over the rated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



Truth Table

Inputs			Outputs	
Clear	A	B	Q	\bar{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

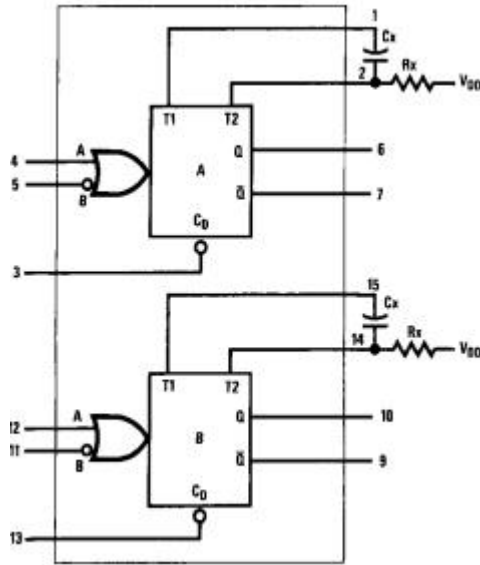
↓ = Transition from HIGH-to-LOW

⌋ = One HIGH Level Pulse

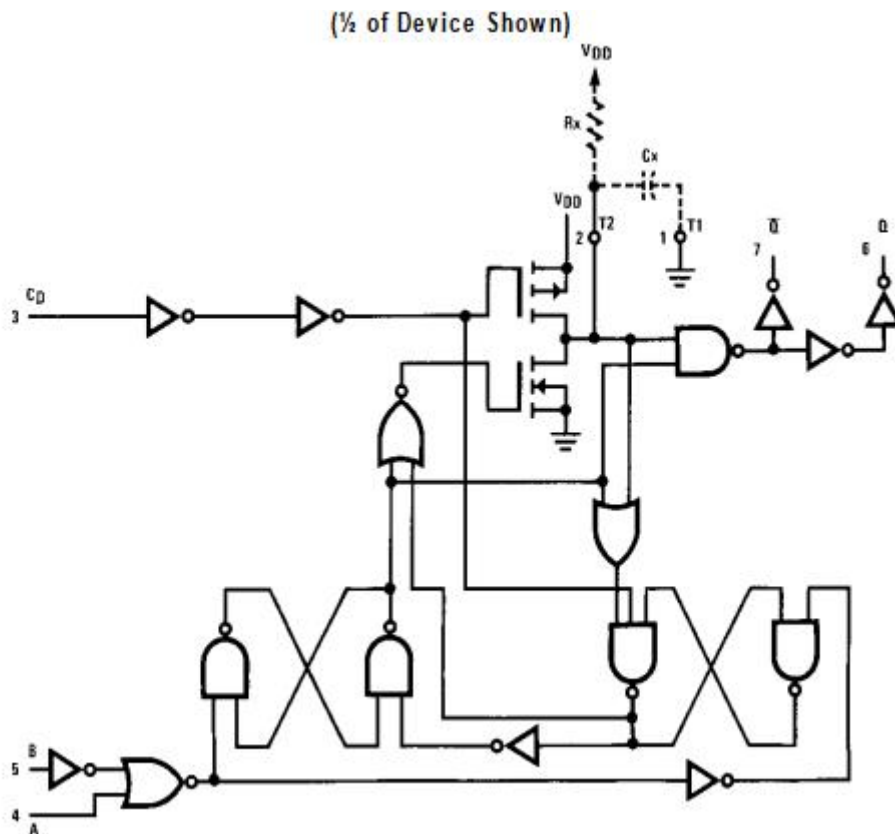
⌋ = One LOW Level Pulse

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	$^{\circ}C$
Power Dissipation(P_D)	Dual-In-Line	-	700	mW
	Small Outline	-	500	mW
Lead Temperature(T_L)(Soldering, 10 seconds)		-	245	$^{\circ}C$

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	$^{\circ}C$

DC Electrical Characteristics (Note 1)

Symbol	Parameter	Conditions	40 $^{\circ}C$		25 $^{\circ}C$			85 $^{\circ}C$		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 $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$ $C_x = 1000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 5\text{V}$		60	150	ns
		$V_{DD} = 10.0\text{V}$		20	50	ns
		$V_{DD} = 15\text{V}$		20	50	ns
		$V_{DD} = 5\text{V}$		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) $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$ For $C_x > 0.01\text{ }\mu\text{F}$ Use $PW_{out} = 0.2 R_x C_x \ln [V_{DD} - V_{SS}]$ $C_x = 10,000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 5\text{V}$		550		ns
		$V_{DD} = 10.0\text{V}$		350		ns
		$V_{DD} = 15\text{V}$		300		ns
		$V_{DD} = 5\text{V}$	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} $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$ $C_x = 1000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 5\text{V}$		325	600	ns
		$V_{DD} = 10.0\text{V}$		90	225	ns
		$V_{DD} = 15\text{V}$		60	170	ns
		$V_{DD} = 5\text{V}$		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 $C_x = 15\text{ pF}$, $R_x = 5.0\text{ k}\Omega$ $C_x = 1000\text{ pF}$, $R_x = 10\text{ k}\Omega$	$V_{DD} = 5\text{V}$		0		ns
		$V_{DD} = 10.0\text{V}$		0		ns
		$V_{DD} = 15\text{V}$		0		ns
		$V_{DD} = 5\text{V}$		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

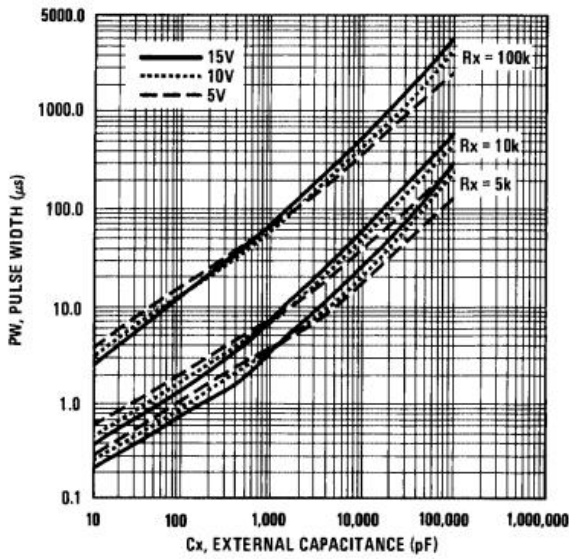


FIGURE 1. Pulse Width vs Cx

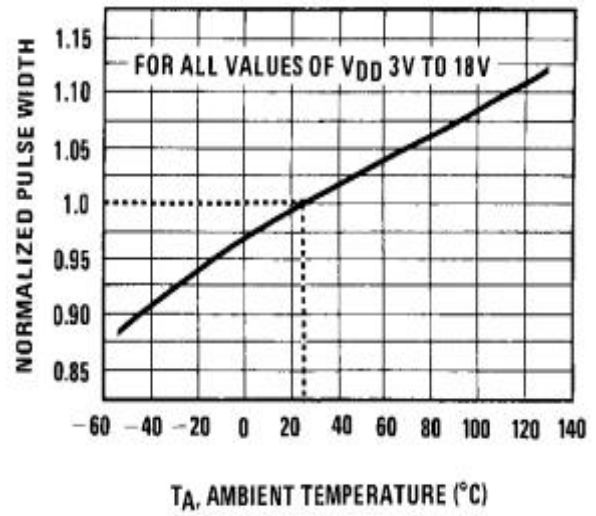
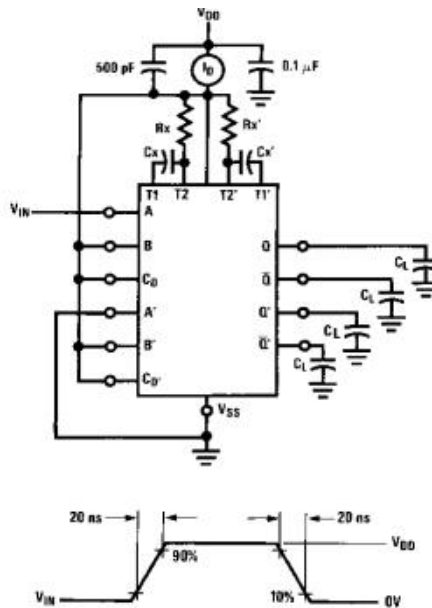


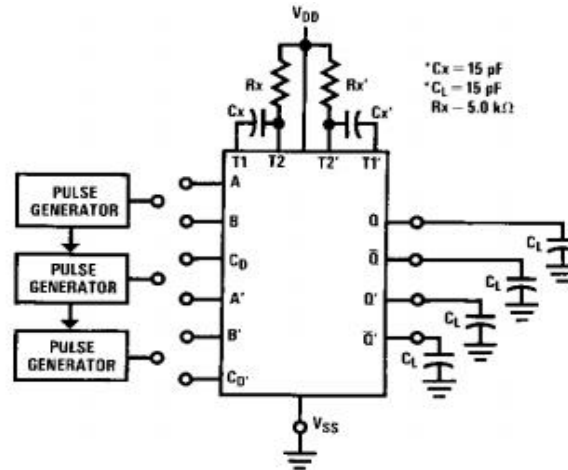
FIGURE 2. Normalized Pulse Width vs Temperature

AC Test Circuits and Wave forms



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

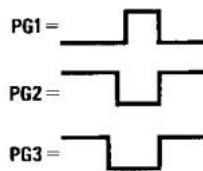


FIGURE 4.AC Test Circuit

AC Test Circuits and Wave forms (Continued)

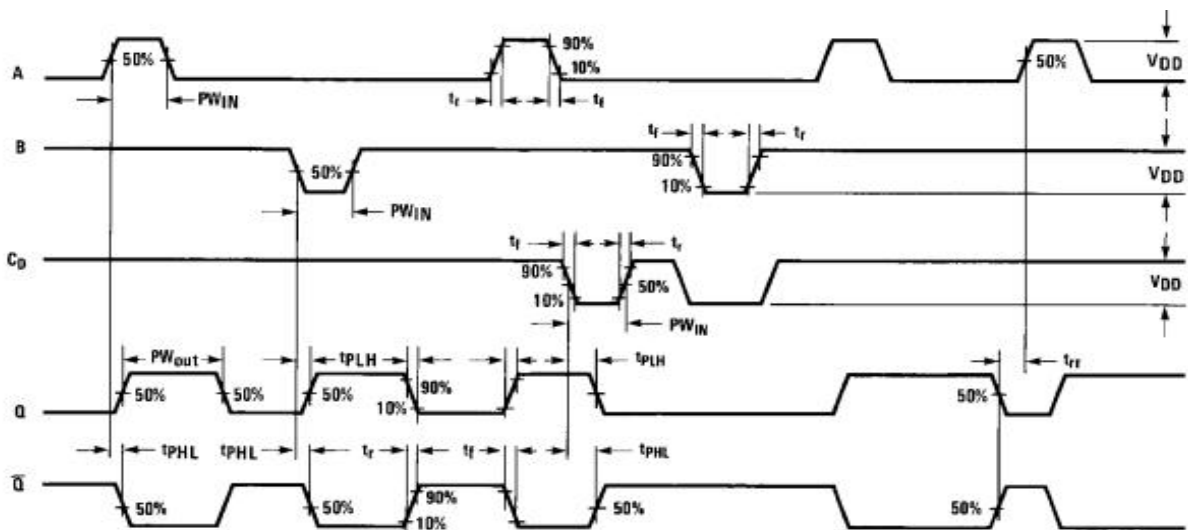
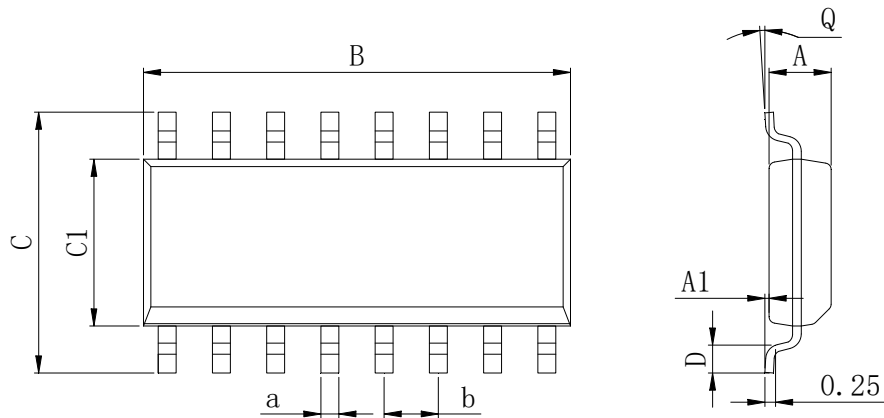


FIGURE 5. AC Test Waveforms

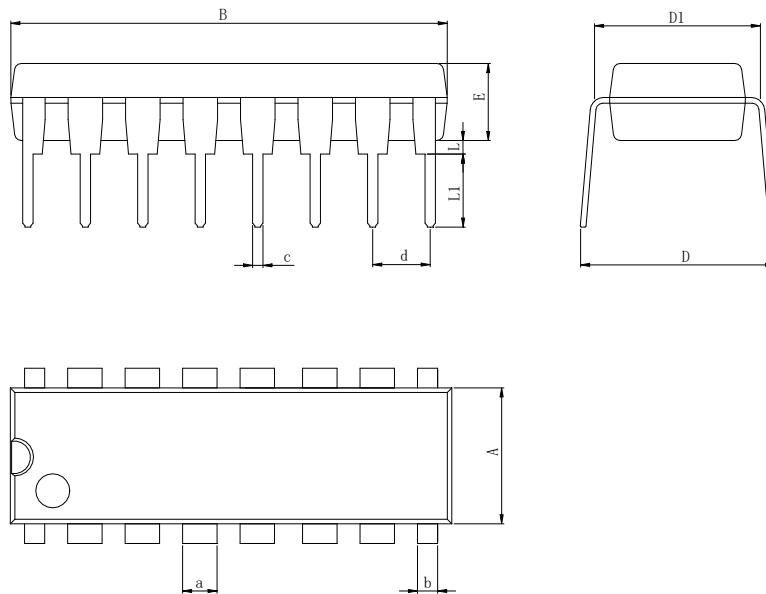
Physical Dimensions

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	

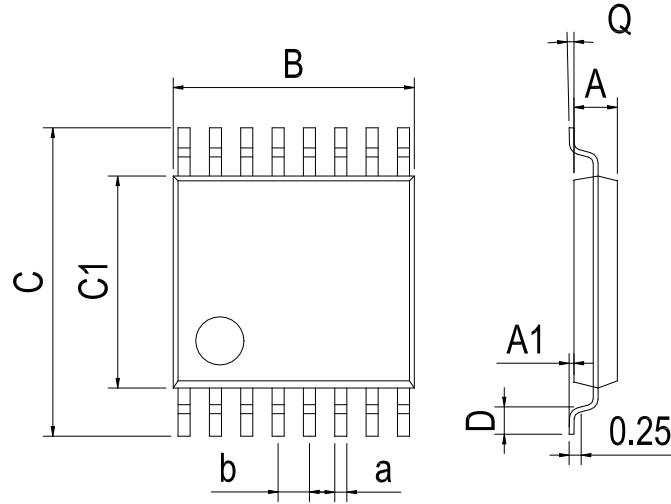
DIP-16



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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