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

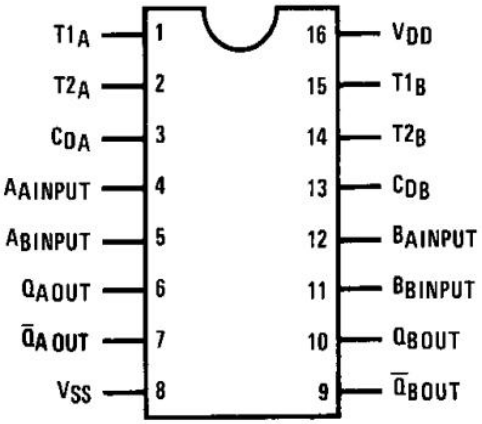
- Wide supply voltage range: 3.0V to 15V
- Separate reset available
- Quiescent current = 5.0 nA/package (typ.) at 5.0 VDC
- Diode protection on all inputs
- Trigger able from leading or trailing edge pulse
- Capable of driving two low-power TTL loads or one low
- power Schottky TTL load over the rated 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



DIP-16/SOP-16/TSSOP-16

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

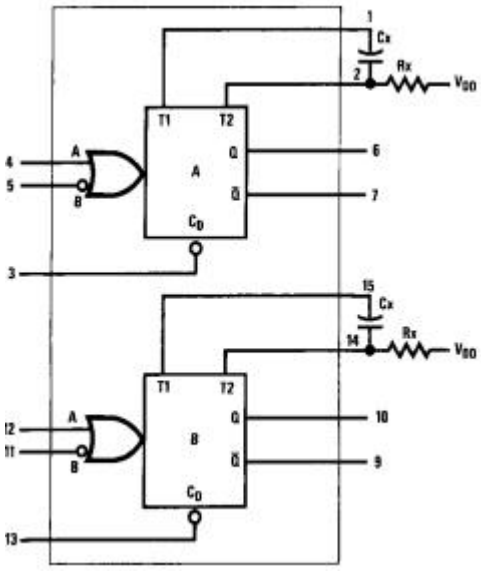
↓=Transition from HIGH-to-LOW

⎍= One HIGH Level Pulse

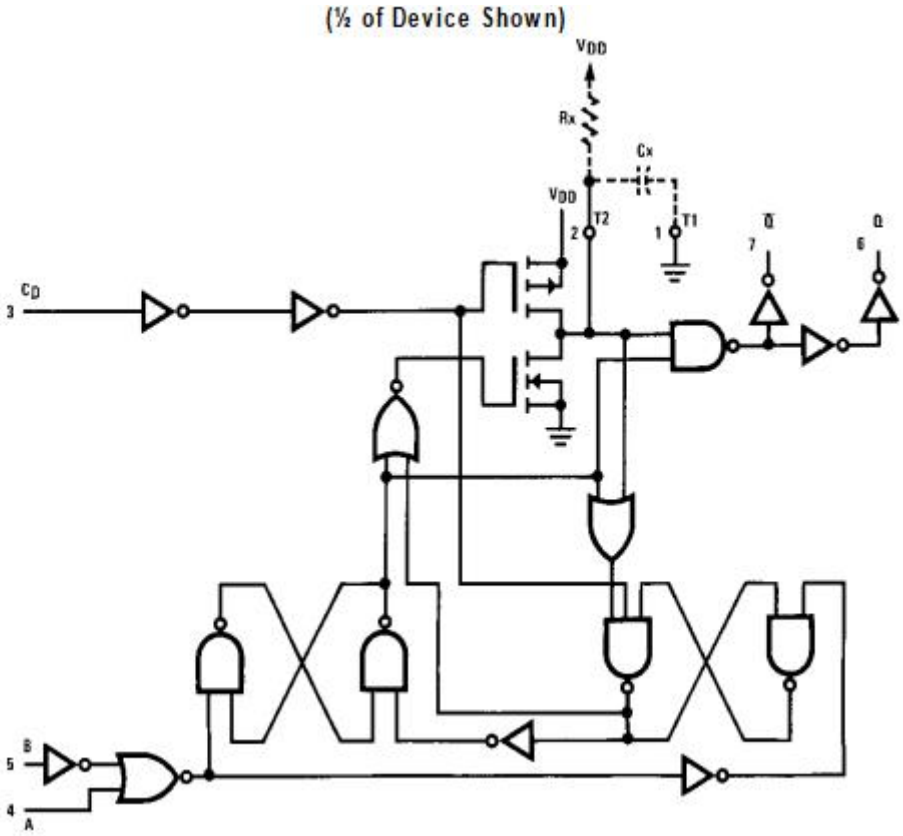
⎌=One LOW Level Pulse

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	+15	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

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	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

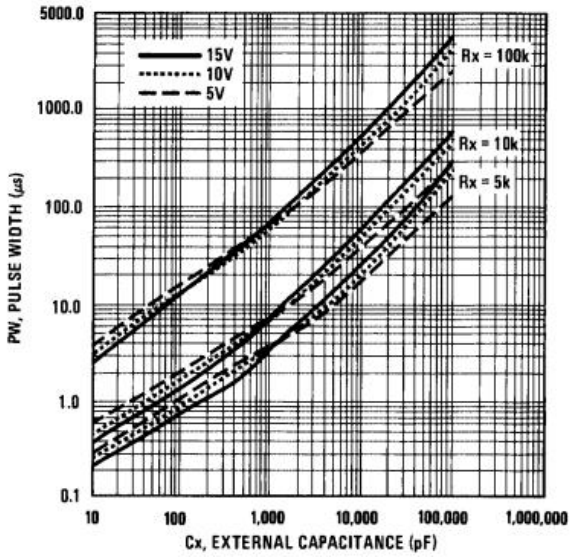


FIGURE 1. Pulse Width vs Cx

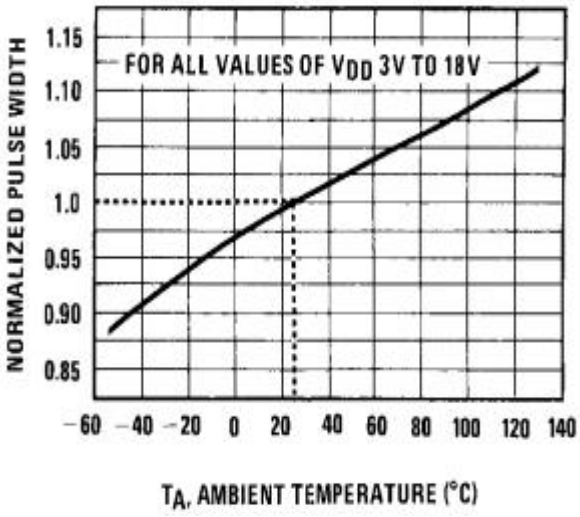
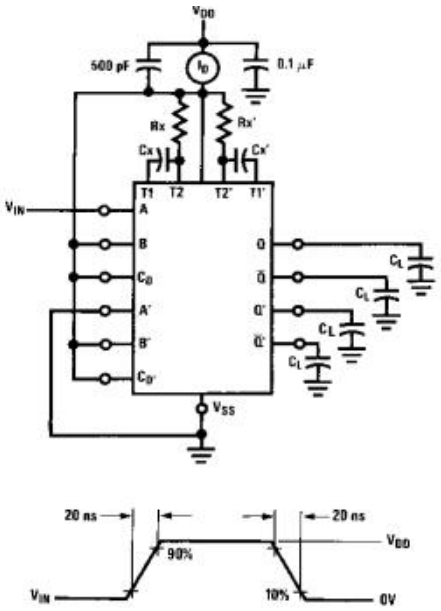


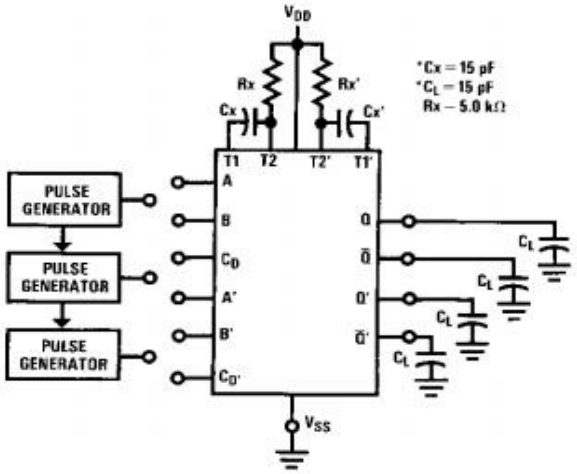
FIGURE 2. Normalized Pulse Width vs Temperature

AC Test Circuits and 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}, 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

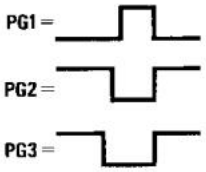


FIGURE 4.AC Test Circuit

AC Test Circuits and Wave forms (Continued)

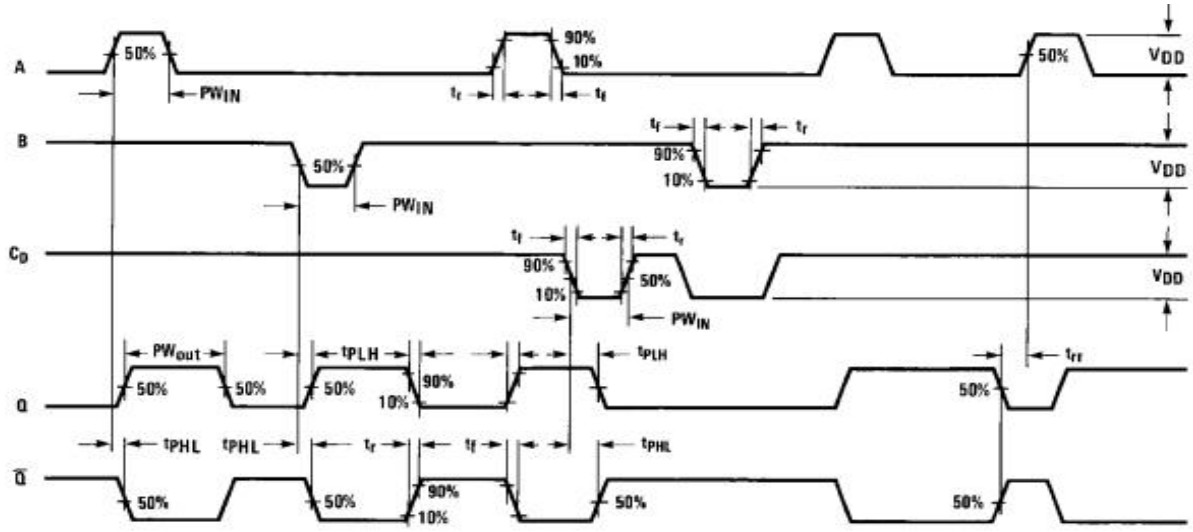
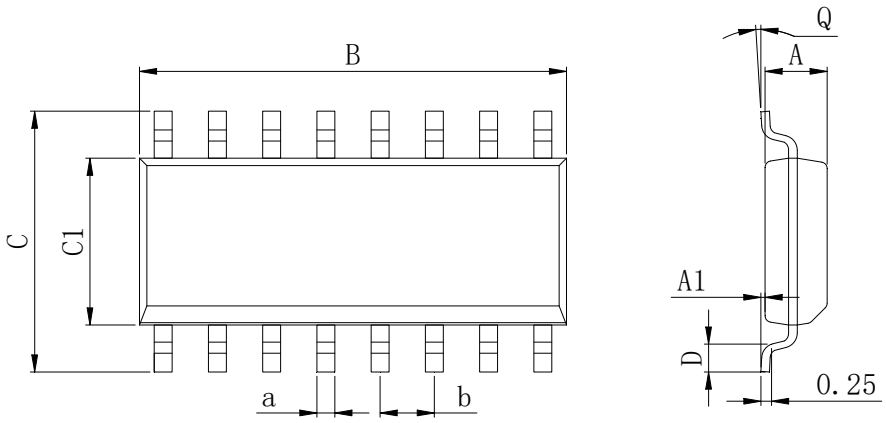


FIGURE 5. AC Test Waveforms

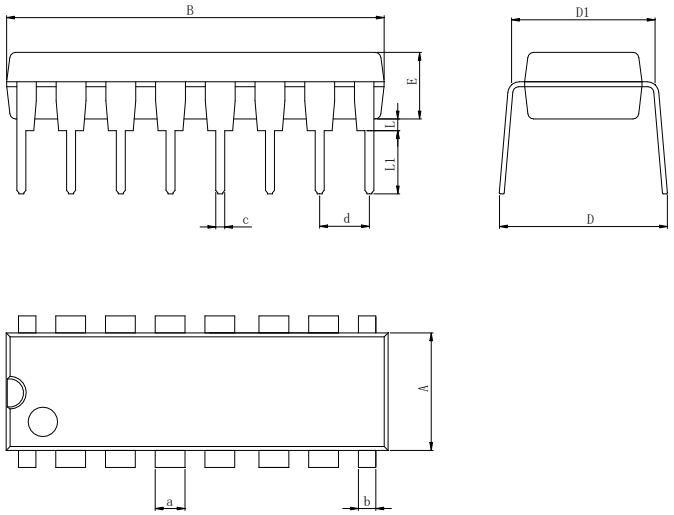
Physical Dimensions

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	

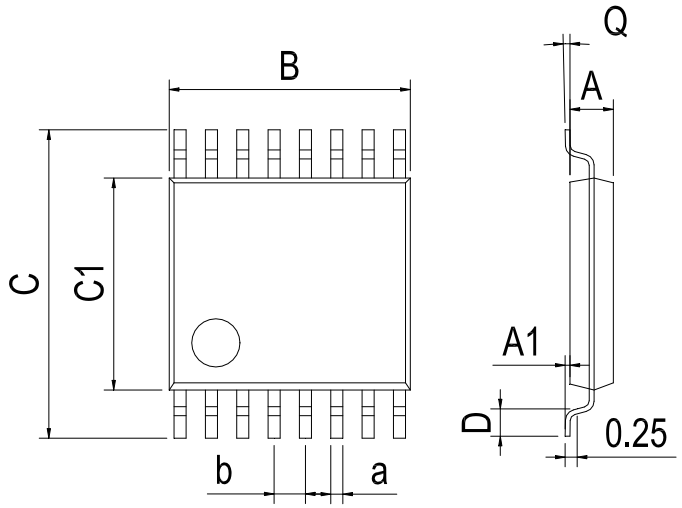
DIP-16



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

REVISION NUMBER	DATE	REVISION	PAGE
V1.0	2014-6	New	1-11
V1.1	2019-9	Modify the package dimension diagram TSSOP-16、Updated DIP-16 dimension、Add annotation for Maximum Ratings	4、8、9
V1.2	2023-8	Update encapsulation type、Update Lead Temperature	1
V1.3	2024-12	Update supply voltage range	1

IMPORTANT STATEMENT:

Huaguan Semiconductor reserves the right to change its products and services without notice. Before ordering, the customer shall obtain the latest relevant information and verify whether the information is up to date and complete. Huaguan Semiconductor does not assume any responsibility or obligation for the altered documents.

Customers are responsible for complying with safety standards and taking safety measures when using Huaguan Semiconductor products for system design and machine manufacturing. You will bear all the following responsibilities: Select the appropriate Huaguan Semiconductor products for your application; Design, validate and test your application; Ensure that your application meets the appropriate standards and any other safety,security or other requirements. To avoid the occurrence of potential risks that may lead to personal injury or property loss.

Huaguan Semiconductor products have not been approved for applications in life support, military, aerospace and other fields, and Huaguan Semiconductor will not bear the consequences caused by the application of products in these fields. All problems, responsibilities and losses arising from the user's use beyond the applicable area of the product shall be borne by the user and have nothing to do with Huaguan Semiconductor, and the user shall not claim any compensation liability against Huaguan Semiconductor by the terms of this Agreement.

The technical and reliability data (including data sheets), design resources (including reference designs), application or other design suggestions, network tools, safety information and other resources provided for the performance of semiconductor products produced by Huaguan Semiconductor are not guaranteed to be free from defects and no warranty, express or implied, is made. The use of testing and other quality control technologies is limited to the quality assurance scope of Huaguan Semiconductor. Not all parameters of each device need to be tested.

The documentation of Huaguan Semiconductor authorizes you to use these resources only for developing the application of the product described in this document. You have no right to use any other Huaguan Semiconductor intellectual property rights or any third party intellectual property rights. It is strictly forbidden to make other copies or displays of these resources. You should fully compensate Huaguan Semiconductor and its agents for any claims, damages, costs, losses and debts caused by the use of these resources. Huaguan Semiconductor accepts no liability for any loss or damage caused by infringement.