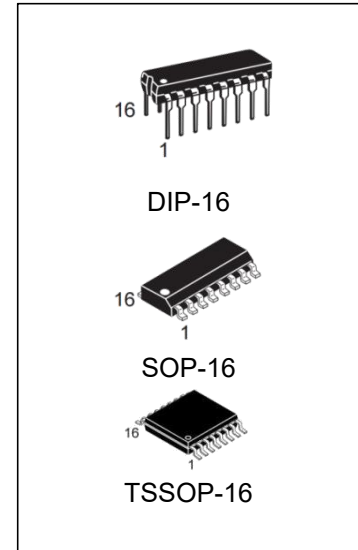


CD4017B Decade Counter/Divider with 10 Decoded Outputs
CD4022B Divide-by-8 Counter/Divider with 8 Decoded Outputs
Features

- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45 VDD (typ.)
- Low power: Fan out of 2 driving 74L
- TTL compatibility or 1 driving 74LS
- Medium speed operation 5.0 MHz (typ.): with 10V VDD
- Low power: 10 μ W (typ.)
- Fully static operation


Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4017BE/ CD4017BN	DIP-16	CD4017B	TUBE	1000pcs/box
CD4017BM/TR	SOP-16	CD4017B	REEL	2500pcs/reel
CD4017BMT/TR	TSSOP-16	CD4017B	REEL	2500pcs/reel
CD4022BE/ CD4022BN	DIP-16	CD4022B	TUBE	1000pcs/box
CD4022BM/TR	SOP-16	CD4022B	REEL	2500pcs/reel
CD4022BMT/TR	TSSOP-16	CD4022B	REEL	2500pcs/reel

General Description

The CD4017B is a 5-stage divide-by-10 Johnson counter with 10 decoded outputs and a carry out bit. The CD4022B is a 4-stage divide-by-8 Johnson counter with 8 decoded outputs and a carry-out bit. These counters are cleared to their zero count by a logical “1” on their reset line. These counters are advanced on the positive edge of the clock signal when the clock enable signal is in the logical “0” state.

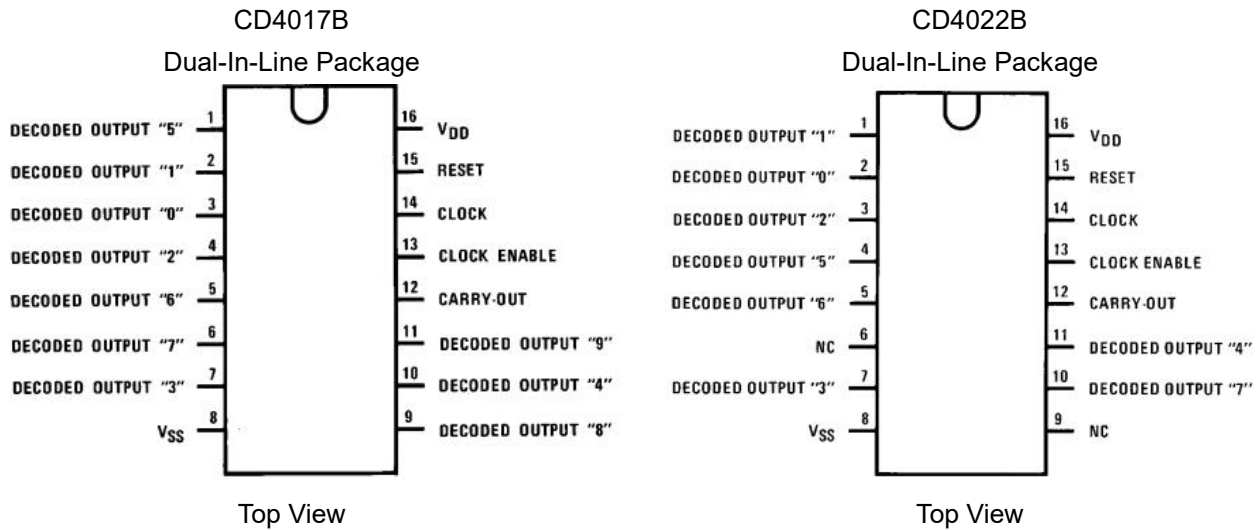
The configuration of the CD4017B and CD4022B permits medium speed operation and assures a hazard free counting sequence. The 10/8 decoded outputs are normally in the logical “0” state and go to the logical “1” state only at their respective time slot. Each decoded output remains high for 1 full clock cycle.

The carry-out signal completes a full cycle for every 10/8 clock input cycles and is used as a ripple carry signal to any succeeding stages.

Applications

- Automotive
- Instrumentation
- Medical electronics
- Alarm systems
- Industrial electronics
- Remote metering

Connection Diagrams



Absolute Maximum Ratings (Notes 1 & 2)

Condition	Min	Max	UNITS
DC Supply Voltage (V_{DD})	-0.5	+18	V
Input Voltage (V_{IN})	-0.5	+0.5	V
Storage Temperature (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 (Note 2)

Condition	Min	Max	UNITS
DC Supply Voltage (V_{DD})	+3	+15	V
Input Voltage (V_{IN})	0 to V_{DD}		-
Operating Temperature Range (T_A)	-40	+85	°C

DC Electrical Characteristics CD4017B, CD4022B (Note 2)

Symbol	Parameter	Conditions	-40°C		+25°			+85°C		Units
			Min	Max	Min	Typ	Max	Min	Max	
I _{DD}	Quiescent Device Current	V _{DD} = 5V		20		0.5	20		150	mA
		V _{DD} = 10V		40		1.0	40		300	mA
		V _{DD} = 15V		80		5.0	80		600	mA
V _{OL}	Low Level Output Voltage	I _{OL} < 1.0 μA								
		V _{DD} = 5V		0.05		0	0.05		0.05	V
		V _{DD} = 10V		0.05		0	0.05		0.05	V
		V _{DD} = 15V		0.05		0	0.05		0.05	V
V _{OH}	High Level Output Voltage	I _{OH} < 1.0 μA								
		V _{DD} = 5V	4.95		4.95	5		4.95		V
		V _{DD} = 10V	9.95		9.95	10		9.95		V
		V _{DD} = 15V	14.95		14.95	15		14.95		V
V _{IL}	Low Level Input Voltage	I _{IL} < 1.0 mA								
		V _{DD} = 5V, V _O = 0.5V or 4.5V		1.5			1.5		1.5	V
		V _{DD} = 10V, V _O = 1.0V or 9.0V		3.0			3.0		3.0	V
		V _{DD} = 15V, V _O = 1.5V or 13.5V		4.0			4.0		4.0	V
V _{IH}	High Level Input Voltage	I _{IH} < 1.0 mA								
		V _{DD} =5V, V _O =0.5V or 4.5V	3.5		3.5			3.5		V
		V _{DD} =10V, V _O =1.0V or 9.0V	7.0		7.0			7.0		V
		V _{DD} =15V, V _O =1.5V or 13.5V	11.0		11.0			11.0		V
I _{OL}	Low Level Output Current (Note 3)	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 3)	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: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed, they are not meant to imply that the devices should be operated at these limits. The table of "Recommended Operating Conditions" and "Electrical Characteristics" provides conditions for actual device operation.

Note 2: VSS e 0V unless otherwise specified.

Note 3: I_{OL} and I_{OH} are tested one output at a time

AC Electrical Characteristics*
 $T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ k}$, t_{rCL} and $t_{fCL} = 20\text{ ns}$, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
CLOCK OPERATION							
t_{PHL} , t_{PLH}	Propagation Delay Time Carry Out Line	$V_{DD} = 5V$		415	800	ns	
		$V_{DD} = 10V$		160	320	ns	
		$V_{DD} = 15V$		130	250	ns	
	Carry Out Line	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$	$C_L = 15\text{ pF}$		240	480	ns
					85	170	ns
					70	140	ns
Decode Out Lines	$V_{DD} = 5V$		500	1000	ns		
	$V_{DD} = 10V$		200	400	ns		
	$V_{DD} = 15V$		160	320	ns		
t_{TLH} , t_{THL}	Transition Time Carry Out and Decode Out Lines t_{TLH}	$V_{DD} = 5V$		200	360	ns	
		$V_{DD} = 10V$		100	180	ns	
		$V_{DD} = 15V$		80	130	ns	
	t_{THL}	$V_{DD} = 5V$		100	200	ns	
		$V_{DD} = 10V$		50	100	ns	
		$V_{DD} = 15V$		40	80	ns	
f_{CL}	Maximum Clock Frequency	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$	Measured with Respect to Carry Output Line	1.0	2	MHz	
				2.5	5	MHz	
				3.0	6	MHz	
t_{WL} , t_{WH}	Minimum Clock Pulse Width	$V_{DD} = 5V$		125	250	Ns	
		$V_{DD} = 10V$		45	90	Ns	
		$V_{DD} = 15V$		35	70	ns	
t_{rCL} , t_{fCL}	Clock Rise and Fall Time	$V_{DD} = 5V$			20	μs	
		$V_{DD} = 10V$			15	μs	
		$V_{DD} = 15V$			5	μs	
t_{SU}	Minimum Clock Inhibit Data Setup Time	$V_{DD} = 5V$		120	240	Ns	
		$V_{DD} = 10V$		40	80	Ns	
		$V_{DD} = 15V$		32	65	ns	
C_{IN}	Average Input Capacitance			5	7.5	pF	

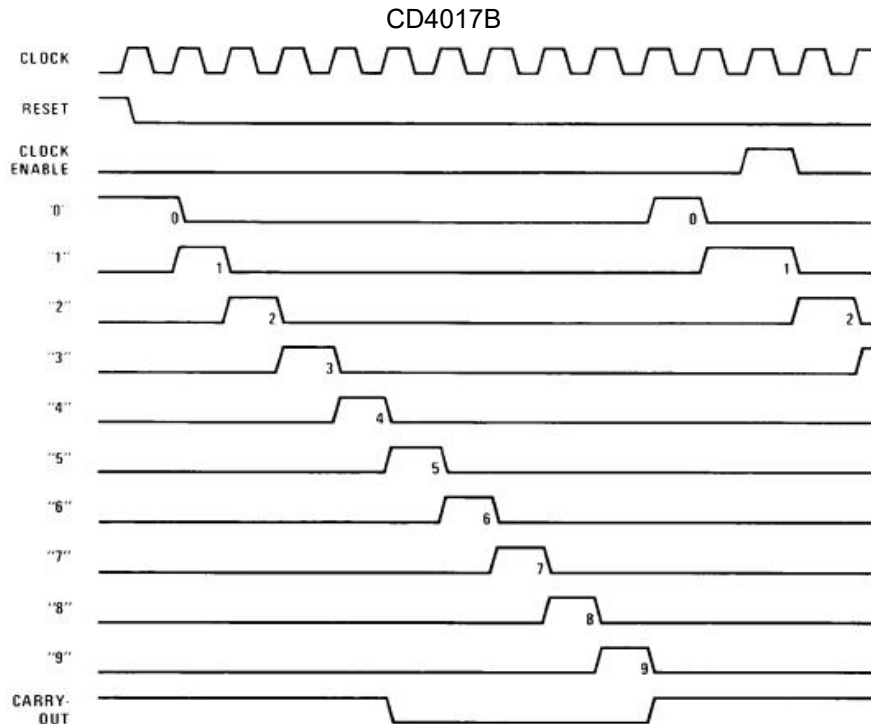
AC Electrical Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
RESET OPERATION							
t_{PHL}, t_{PLH}	Propagation Delay Time Carry Out Line	$V_{DD} = 5\text{V}$		415	800	ns	
		$V_{DD} = 10\text{V}$		160	320	ns	
		$V_{DD} = 15\text{V}$		130	250	ns	
	Carry Out Line	$V_{DD} = 5\text{V}$ $V_{DD} = 10\text{V}$ $V_{DD} = 15\text{V}$	$C_L = 15\text{ pF}$		240	480	ns
					85	170	ns
					70	140	ns
Decode Out Lines	$V_{DD} = 5\text{V}$		500	1000	ns		
	$V_{DD} = 10\text{V}$		200	400	ns		
	$V_{DD} = 15\text{V}$		160	320	ns		
t_w	Minimum Reset Pulse Width	$V_{DD} = 5\text{V}$		200	400	ns	
		$V_{DD} = 10\text{V}$		70	140	ns	
		$V_{DD} = 15\text{V}$		55	110	ns	
t_{REM}	Minimum Reset Removal Time	$V_{DD} = 5\text{V}$		75	150	ns	
		$V_{DD} = 10\text{V}$		30	60	ns	
		$V_{DD} = 15\text{V}$		25	50	ns	

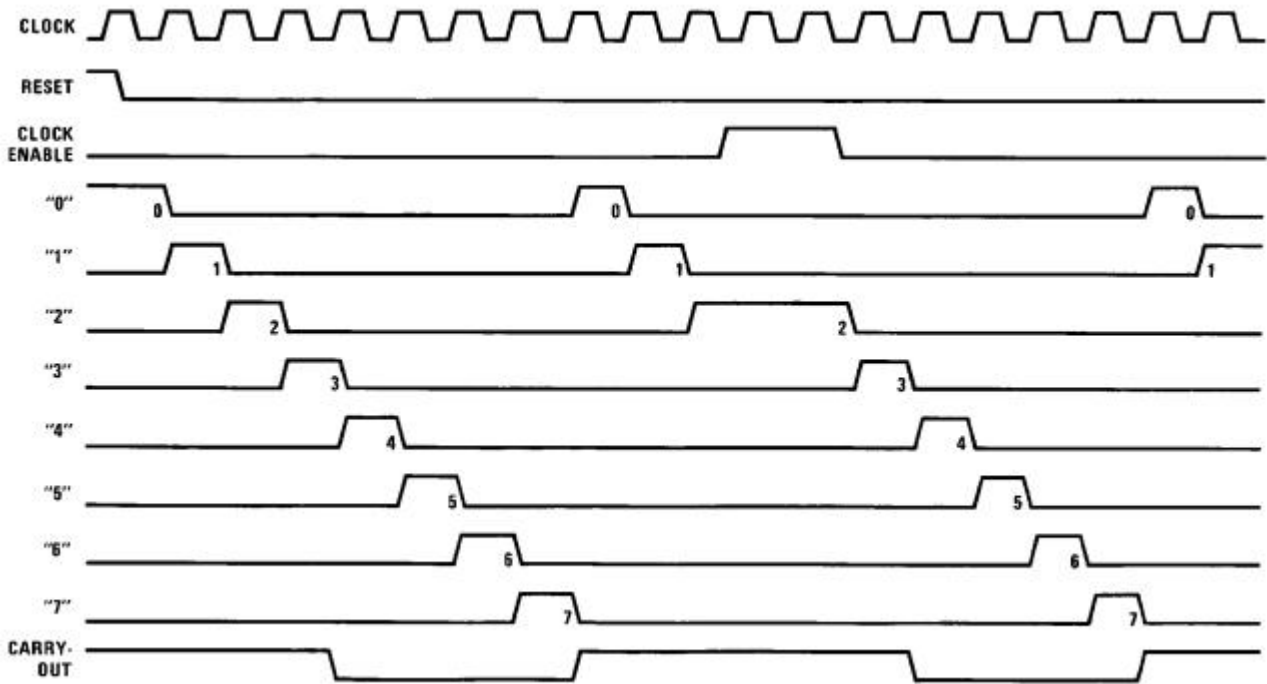
*AC Parameters are guaranteed by DC correlated testing.

Timing Diagrams



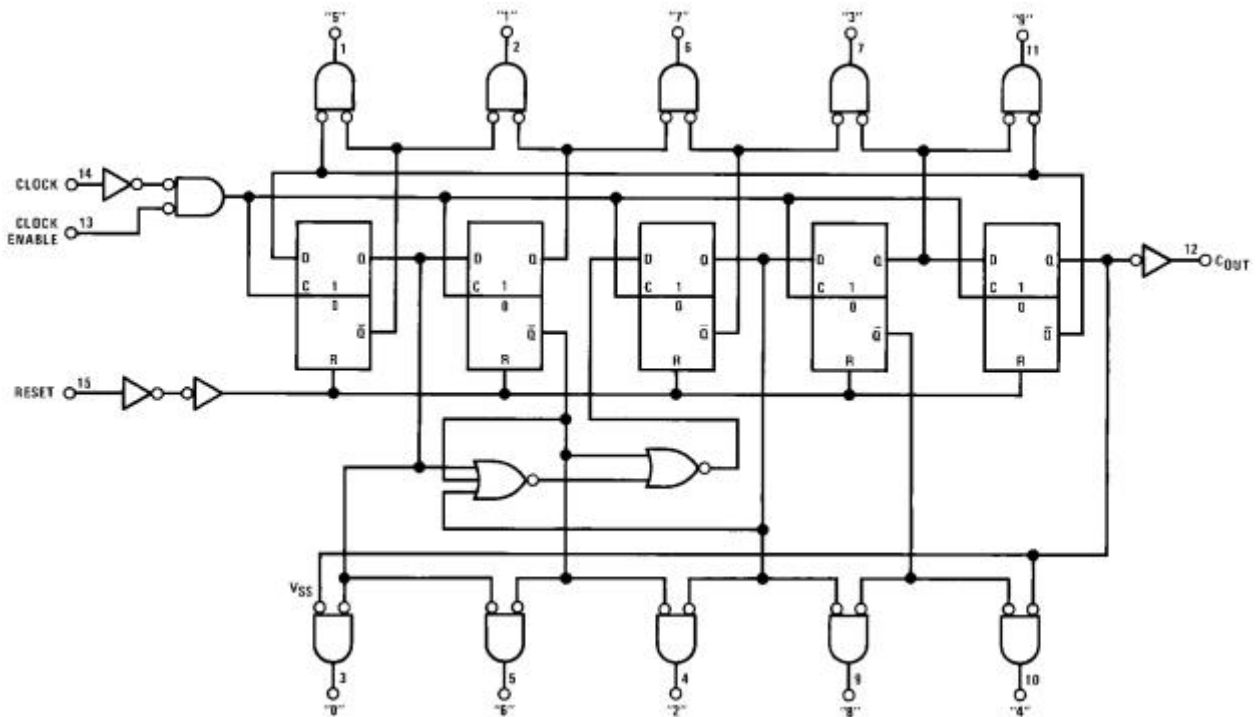
Timing Diagrams (Continued)

CD4022B



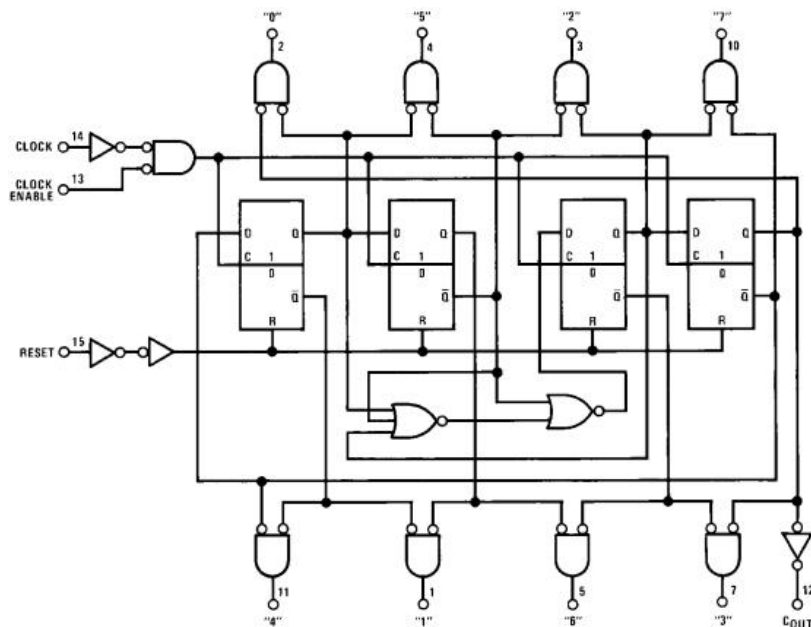
Logic Diagrams

CD4017B



Terminal No. 8 = GND
Terminal No. 16 = V_{DD}

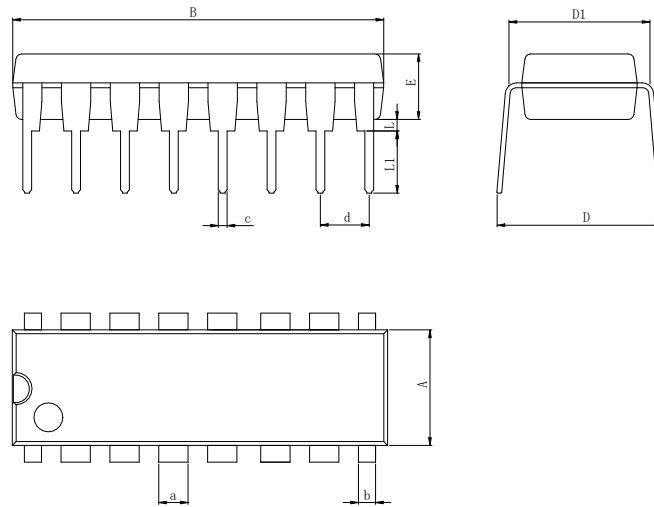
CD4022B



Terminal No. 16 = V_{DD}
Terminal No. 8 = GND

Physical Dimensions

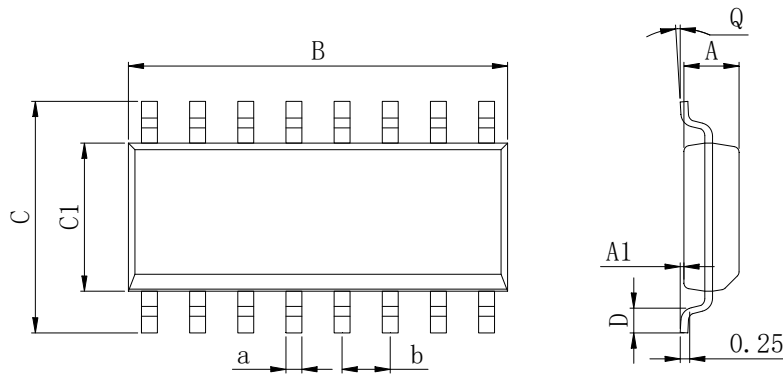
DIP-16



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	

SOP-16

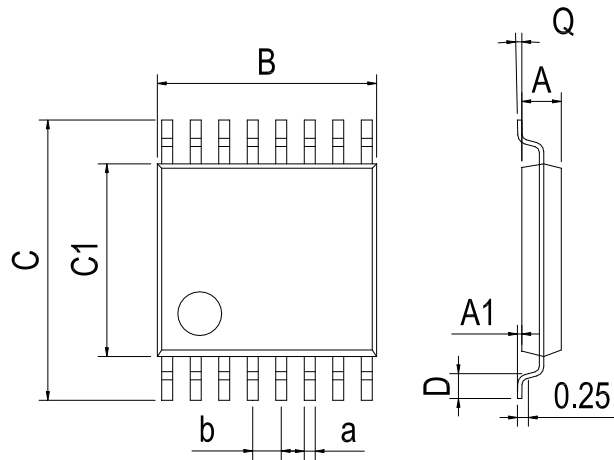


Dimensions In Millimeters(SOP-16)

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	

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
2014-6-7	New	1-12
2023-11-13	Modify the package dimension diagram SSOP-16、 Update encapsulation type、 Update Lead Temperature、 Updated DIP-16 dimension、 Add annotation for Maximum Ratings、 Update DIP Package New Model	1、 3、 9、 11

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.