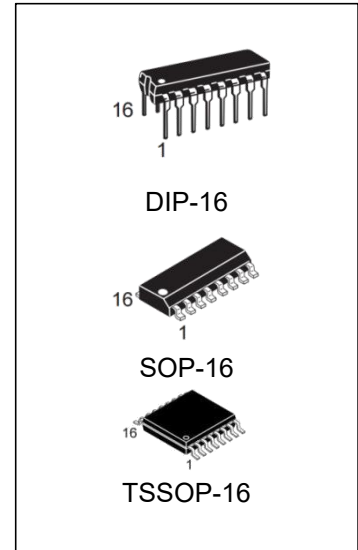


CD4017B Decade Counter/Divider with 10 Decoded Outputs

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.

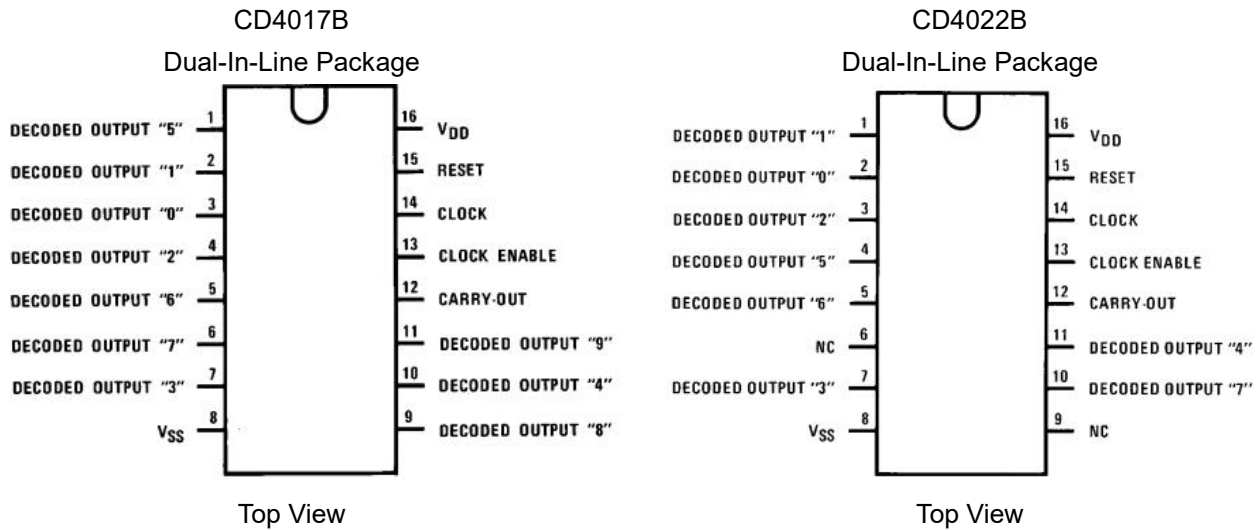
The configuration of the CD4017B and CD4022B permits medium speed operation and assures a hazard free counting sequence. The 10/8 decoded outputs are normally in the logical “0” state and go to the logical “1” state only at their respective time slot. Each decoded output remains high for 1 full clock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

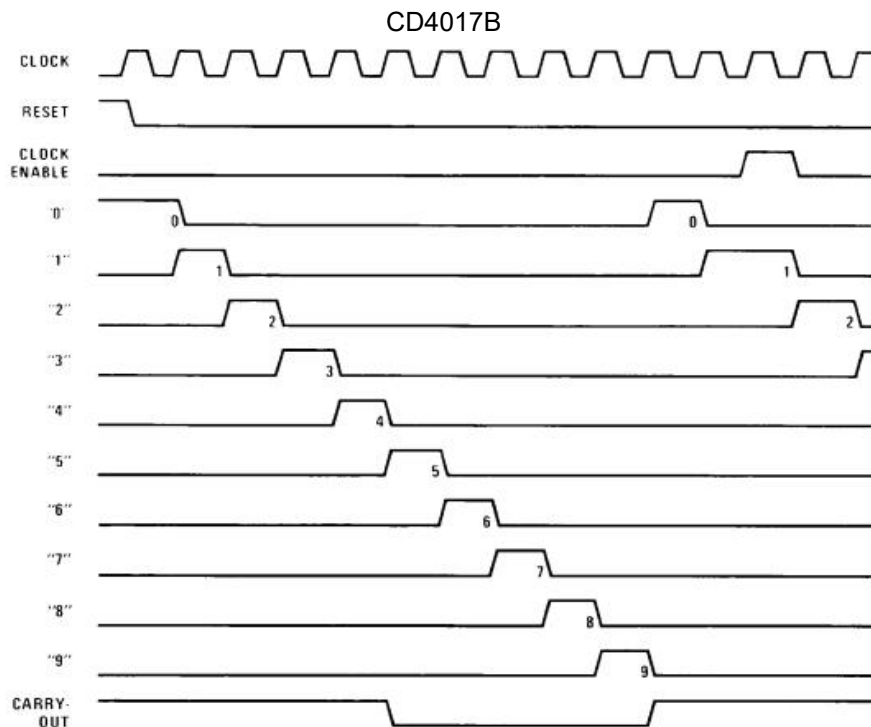
AC Electrical Characteristics

$T_A = 25^\circ\text{C}$, $C_L = 50\text{ pF}$, $R_L = 200\text{ k}$, 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	

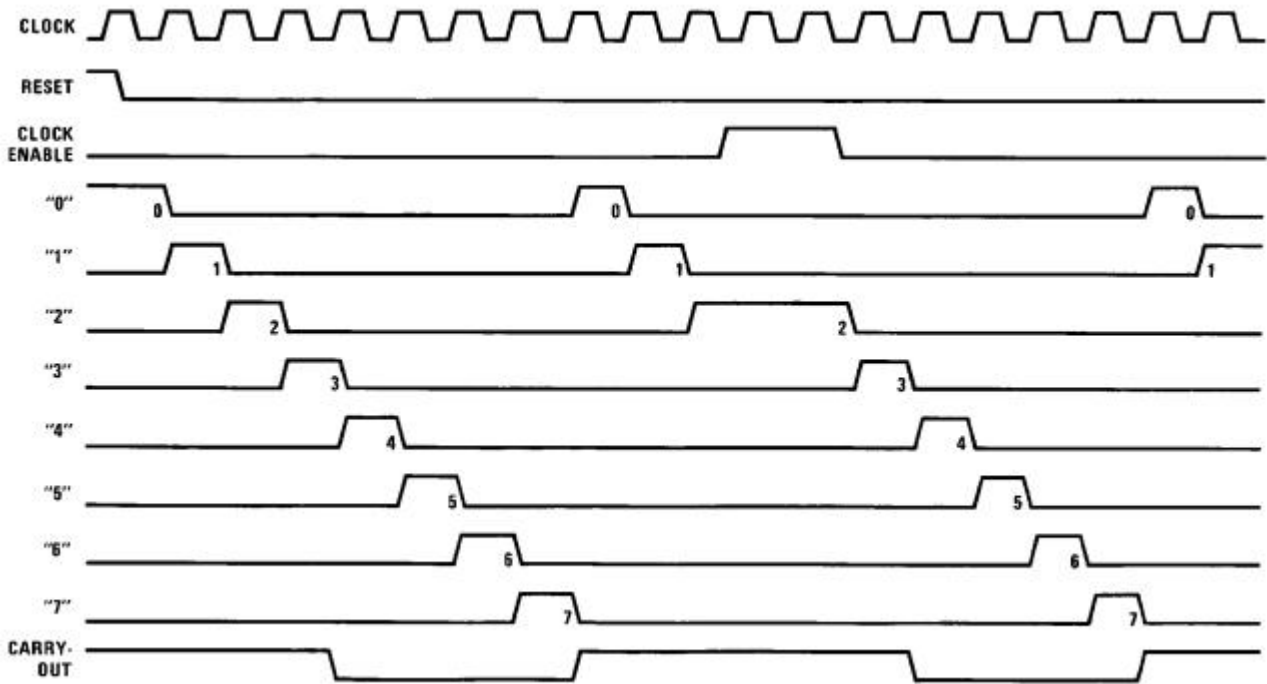
*AC Parameters are guaranteed by DC correlated testing.

Timing Diagrams



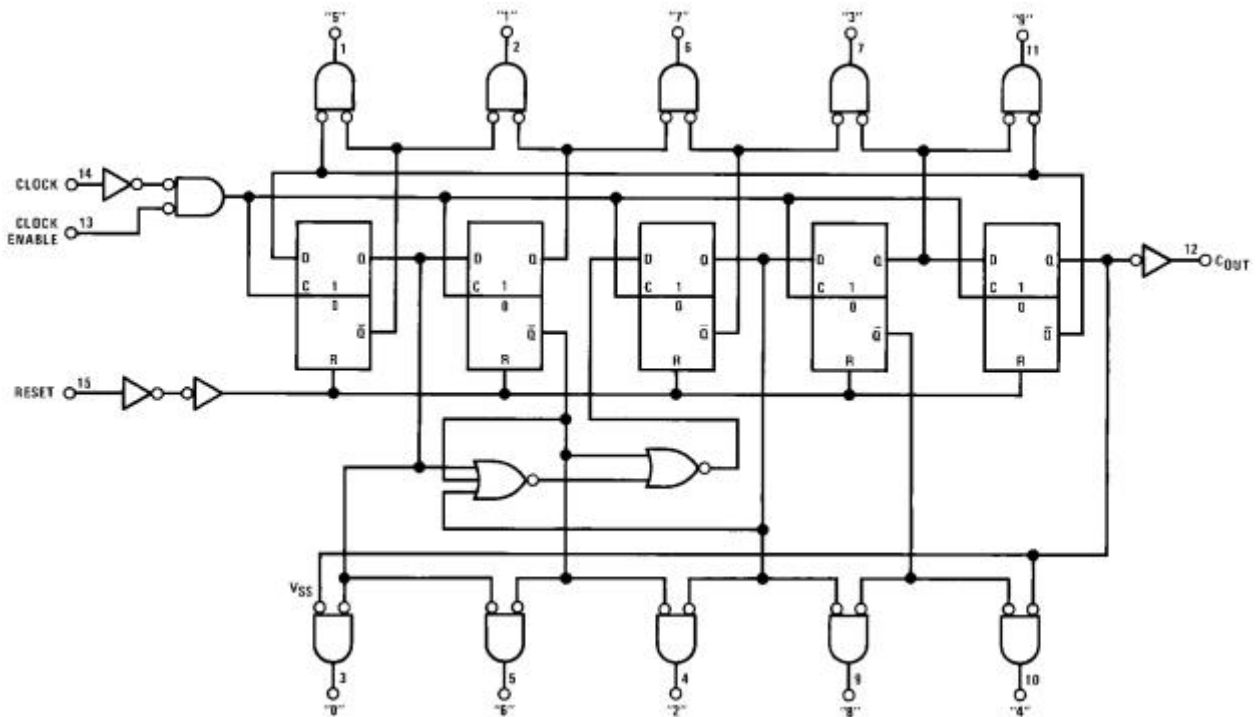
Timing Diagrams (Continued)

CD4022B



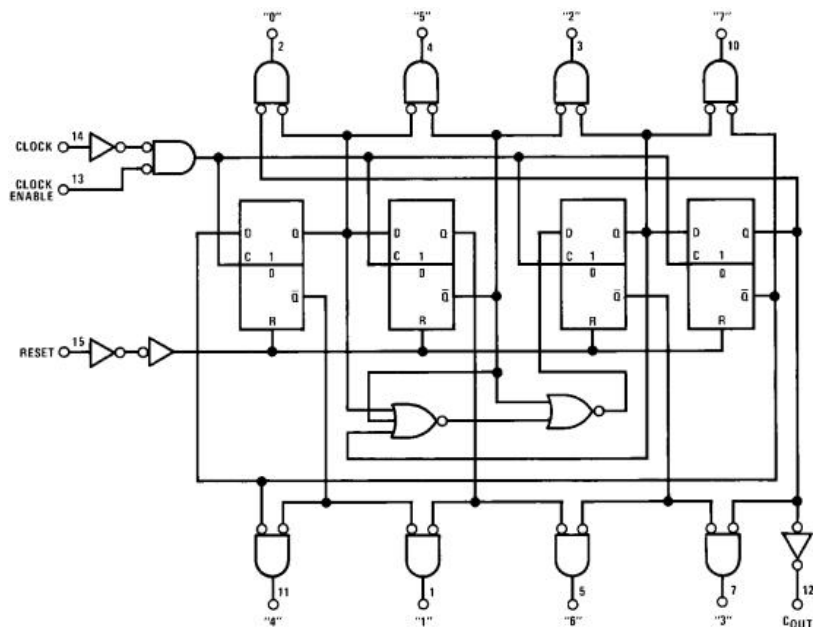
Logic Diagrams

CD4017B



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

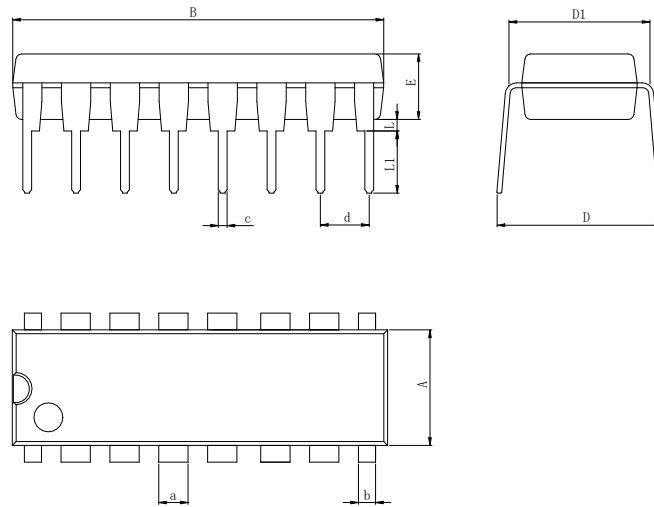
CD4022B



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

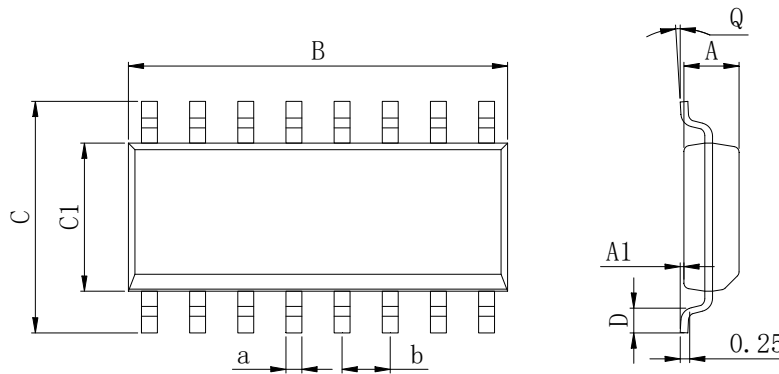
Physical Dimensions

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	

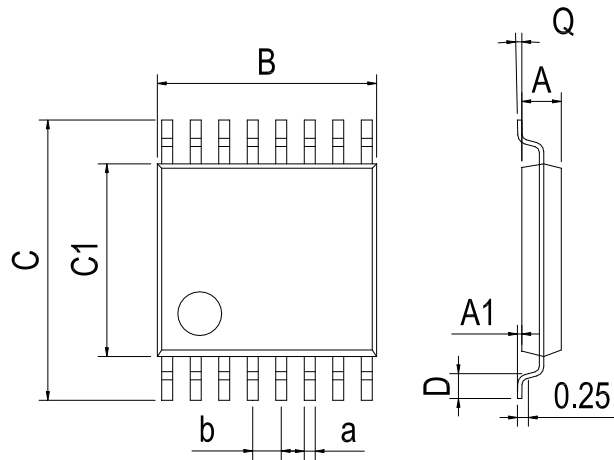
SOP-16



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

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[74HC4040D.653](#) [74HC4060D.653](#) [74HCT4040D.653](#)