12-Stage Ripple Carry Binary Counters

General Description

The CD4040B is a 12-stage ripple carry binary counter. The counters are advanced one count on the negative transition of each clock pulse. The counters are reset to the zero state by a logical “1” at the reset input independent of clock.

DIP-16

SOP-16

TSSOP-16

Features

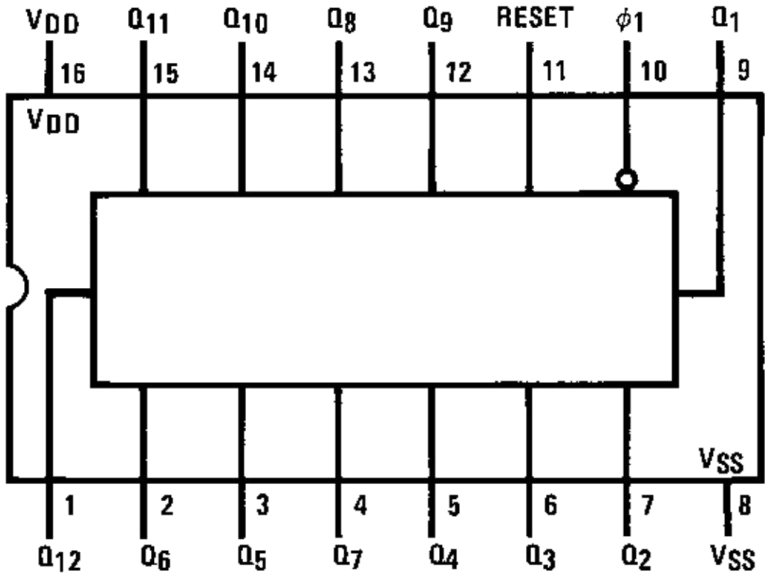
- Wide supply voltage range: 1.0V to 15V
- High noise immunity: 0.45 V_{DD} (typ.)
- Low power TTL compatibility: Fan out of 2 driving 74L or 1 driving 74LS
- Medium speed operation: 8 MHz typ. at V_{DD}=10V
- Schmitt trigger clock input

Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4040BE/ CD4040BN	DIP-16	CD4040B	TUBE	1000pcs/box
CD4040BM/TR	SOP-16	CD4040B	REEL	2500pcs/reel
CD4040BMT/TR	TSSOP-16	CD4040B	REEL	2500pcs/reel

Connection Diagrams

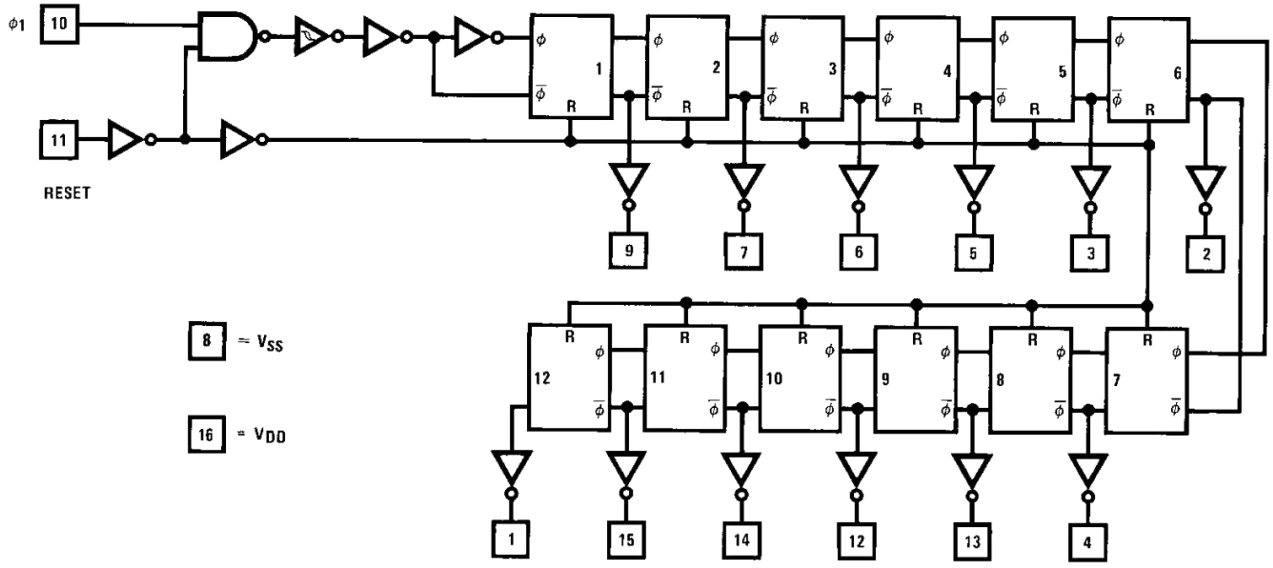
Pin Assignments for DIP, SOP and TSSOP



CD4040B

Top View

Schematic Diagrams



CD4040B

Absolute Maximum Ratings

Conditions		Min	Max
Supply Voltage (V_{DD})		- 0.5V	18V
Input Voltage (V_{IN})		-0.5V	V_{DD} + 0.5V
Storage Temperature Range (T_S)		-65 ℃	150 ℃
Package Dissipation (P_D)	Dual-In-Line	700 mW	
	Small Outline	500 mW	
Lead Temperature (T_L) (Soldering, 10 seconds)		-	260 ℃

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

Conditions	Min	Max
Supply Voltage (V_{DD})	3V	15V
Input Voltage (V_{IN})	0V	V_{DD}
Operating Temperature Range (T_A)	-40 ℃	85 ℃

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 tables of "Recom- mended Operating Conditions" and "Electrical Characteristics" provide con- ditions for actual device operation.

Note 2: V_{SS} = 0V unless otherwise specified.

DC Electrical Characteristics (Note 2)

Symbol	Parameter	Conditions	-40℃		+25℃			+85℃		Units
			Min	Max	Min	Typ	Max	Min	Max	
I_{DD}	Quiescent Device Current	V_{DD}=5V,V_{IN}=V_{DD} or V_{SS}		20			20		150	μA
		V_{DD}=10V,V_{IN}=V_{DD} or V_{SS}		40			40		300	
		V_{DD}=15V,V_{IN}=V_{DD} or V_{SS}		80			80		600	
V_{OL}	LOW Level Output Voltage	V_{DD}=5V		0.05		0	0.05		0.05	V
		V_{DD}=10V		0.05		0	0.05		0.05	
		V_{DD}=15V		0.05		0	0.05		0.05	
V_{OH}	HIGH Level Output Voltage	V_{DD}=5V	4.95		4.95	5		4.95		V
		V_{DD}=10V	9.95		9.95	10		9.95		
		V_{DD}=15V	14.95		14.95	15		14.95		
V_{IL}	LOW Level Input Voltage	V_{DD}=5V,V_O=0.5V or 4.5V		1.5		2	1.5		1.5	V
		V_{DD} =10V,V_O =1.0V or 9.0V		3.0		4	3.0		3.0	
		V_{DD}=15V,V_O=1.5V or 13.5V		4.0		6	4.0		4.0	
V_{IH}	HIGH Level Input Voltage	V_{DD}=5V,V_O=0.5V or 4.5V	3.5		3.5	3		3.5		V
		V_{DD}=10V,V_O=1.0V or 9.0V	7.0		7.0	6		7.0		
		V_{DD}=15V,V_O=1.5V or 13.5V	11.0		11.0	9		11.0		
I_{OL}	LOW Level Output Current	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		
		V_{DD}=15V,V_O=1.5V	3.6		3.0	8.8		2.4		
I_{OH}	HIGH Level Output Current	V_{DD}=5V,V_O=4.6V	-0.52		-0.44	-0.88		-0.36		mA
		V_{DD}=10V,V_O=9.5V	-1.3		-1.1	-2.25		-0.9		
		V_{DD}=15V,V_O=13.5V	-3.6		-3.0	-8.8		-2.4		
I_{IN}	Input Current	V_{DD}=15V,V_{IN}=0V		-0.30		-10^{-5}	-0.30		-1.0	μA
		V_{DD}=15V,V_{IN}=15V		0.30		10^{-5}	0.30		1.0	

AC Electrical Characteristics (Note 3)

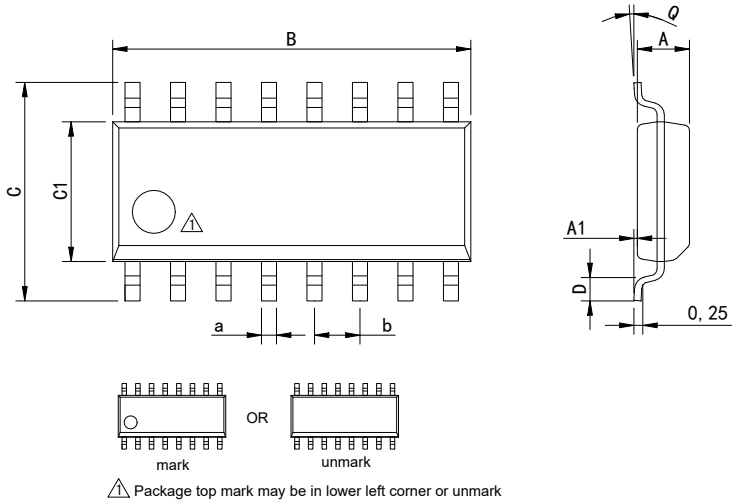
T_A =25℃, CL =50 pF, RL= 200k, tr = tf =20 ns, unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
tPHL1, tPLH1	Propagation Delay Time to Q1	V_{DD} = 5V V_{DD} = 10V V_{DD} = 15V		250 100 75	550 210 150	ns
tPHL, tPLH	Interstage Propagation Delay Time from Qn to Qn+1	V_{DD} = 5V V_{DD} = 10V V_{DD} = 15V		150 60 45	330 125 90	ns
tTHL, tTLH	Transition Time	V_{DD} = 5V V_{DD} = 10V V_{DD} = 15V		100 50 40	200 100 80	ns
tWL, tWH	Minimum Clock Pulse Width	V_{DD} = 5V V_{DD} = 10V V_{DD} = 15V		125 50 40	335 125 100	ns
trCL, tfCL	Maximum Clock Rise and Fall Time	V_{DD} = 5V V_{DD} = 10V V_{DD} = 15V			No Limit No Limit No Limit	ns
fCL	Maximum Clock Frequency	V_{DD} = 5V V_{DD} = 10V V_{DD} = 15V	1.5 4 5	4 10 12		MHz
tPHL(R)	Reset Propagation Delay	V_{DD} = 5V V_{DD} = 10V V_{DD} = 15V		200 100 80	450 210 170	ns
tWH(R)	Minimum Reset Pulse Width	V_{DD} = 5V V_{DD} = 10V V_{DD} = 15V		200 100 80	450 210 170	ns
CIN	Average Input Capacitance	Any Input		5	7.5	pF
CPD	Power Dissipation Capacitance			50		pF

Note 3: AC Parameters are guaranteed by DC correlated testing.

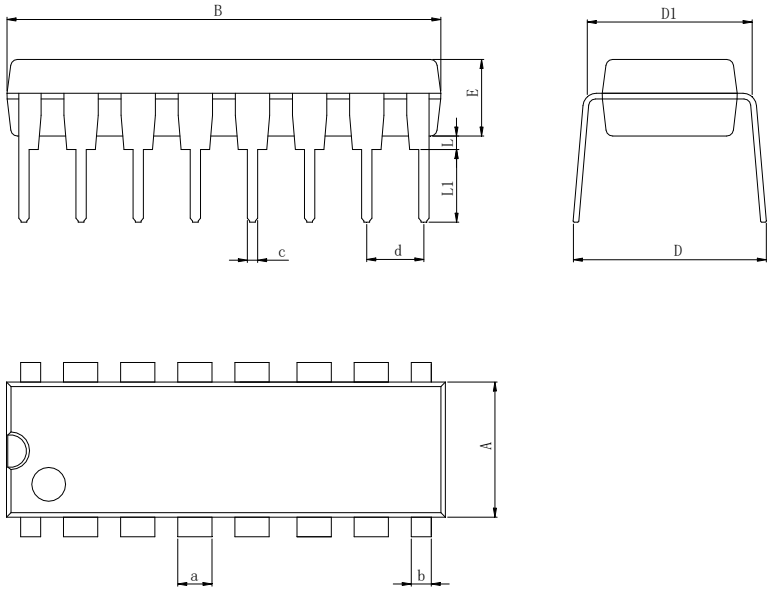
Physical Dimensions

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	

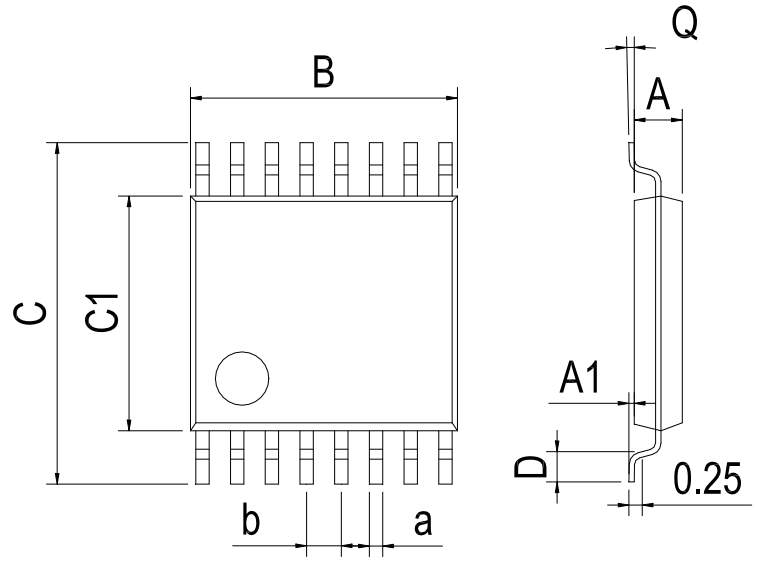
DIP-16



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	2012-3-	New	1-8
V1.1	2018-11	Modify the package dimension diagramTSSOP-16、Updated DIP-16 dimension	5、6
V1.2	2021-6	Add annotation for Maximum Ratings、Update encapsulation type、Update DIP Package New Model	1、3
V1.3	2024-10	Update Lead Temperature	3
V1.4	2025-11	Update important statements、Update SOP-16 Dimension drawing	5、8

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