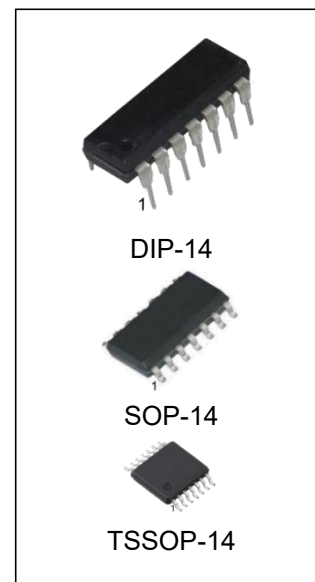


7-Stage Ripple Carry Binary Counter

Features

- Wide supply voltage range: 3.0V to 15V
- High noise immunity: 0.45 V_{DD} (typ.)
- Low power TTL compatibility: Fan out of 2 driving 74L or 1 driving 74LS
- High speed: 12 MHz (typ.)
input pulse rate $V_{DD} - V_{SS} = 10V$
- Fully static operation



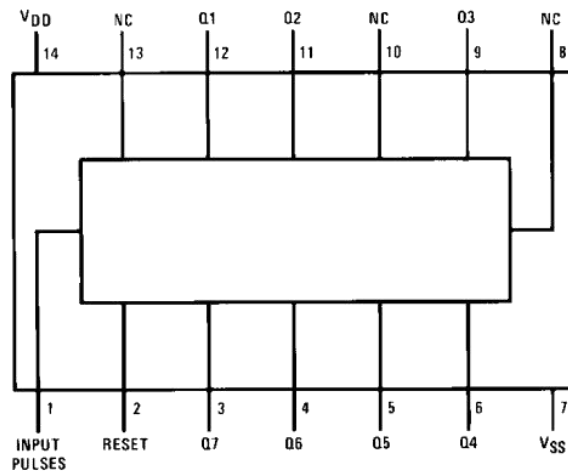
Ordering Information

DEVICE	Package Type	MARKING	Packing	Packing Qty
CD4024BE/ CD4024BN	DIP-14	CD4024B	TUBE	1000pcs/box
CD4024BM/TR	SOP-14	CD4024B	REEL	2500pcs/reel
CD4024BMT/TR	TSSOP-14	CD4024B	REEL	2500pcs/reel

General Description

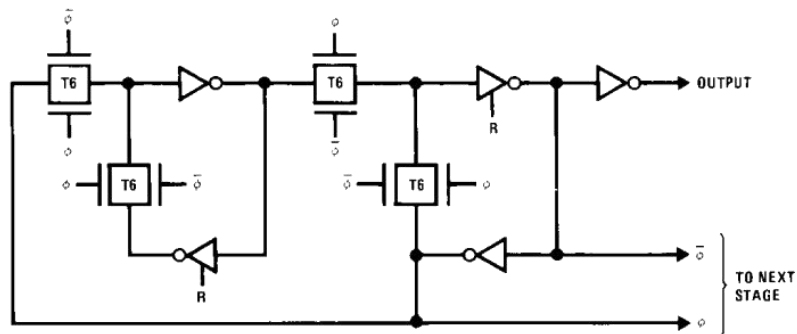
The CD4024B is a 7-stage ripple-carry binary counter. Buffered outputs are externally available from stages 1 through 7. The counter is reset to its logical "0" stage by a logical "1" on the reset input. The counter is advanced one count on the negative transition of each clock pulse.

Connection Diagram

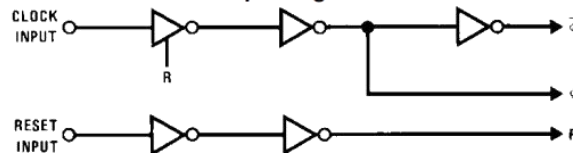


Top View

Logic Diagrams

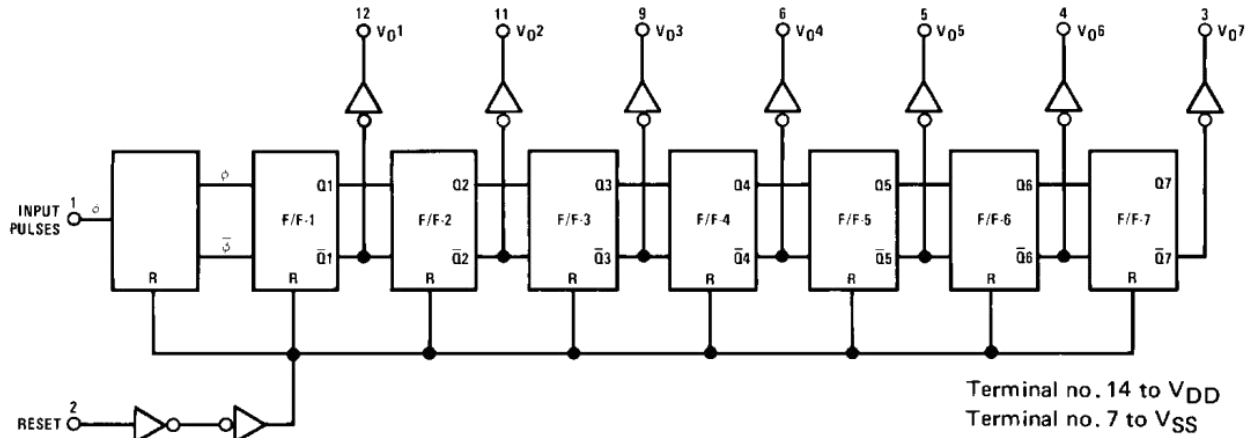


Input Logic



Flip-flop logic (1 of 7 identical stages).

Block Diagram



Absolute Maximum Ratings

Condition		Min	Max	UNITS
DC Supply Voltage (V_{DD})		-0.5	18	V
Input Voltage (V_{IN})		-0.5	0.5	V
Storage Temperature Range (T_S)		-65	150	°C
Power Dissipation (P_D)	Dual-In-Line	-	700	mW
	Small Outline	-	500	mW
Lead Temperature (Soldering, 10 seconds)		-	260	°C

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

Recommended Operating Conditions

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

DC Electrical Characteristics

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		5		0.3	5		150	μA
		V _{DD} = 10V		10		0.5	10		300	
		V _{DD} = 15V		20		0.7	20		600	
V _{OL}	LOW Level Output Voltage	I _O < 1 μA								V
		V _{DD} = 5V		0.05		0	0.05		0.05	
		V _{DD} = 10V		0.05		0	0.05		0.05	
V _{OH}	HIGH Level Output Voltage	I _O < 1 μA								V
		V _{DD} = 5V	4.95		4.95	5		4.95		
		V _{DD} = 10V	9.95		9.95	10		9.95		
V _{IL}	LOW Level Input Voltage	I _O < 1 μA								V
		V _{DD} = 5V, V _O = 0.5V or 4.5V		1.5			1.5		1.5	
		V _{DD} = 10V, V _O = 1.0V or 9.0V		3.0			3.0		3.0	
V _{IH}	HIGH Level Input Voltage	I _O < 1 μA								V
		V _{DD} = 5V, V _O = 0.5V or 4.5V	3.5		3.5			3.5		
		V _{DD} = 10V, V _O = 1.0V or 9.0V	7.0		7.0			7.0		
I _{OL}	LOW Level Output Current (Note 3)	V _{DD} = 5V, V _O = 0.4V	0.64		0.51	0.88		0.36		mA
		V _{DD} = 10V, V _O = 0.5V	1.6		1.3	2.25		0.9		
		V _{DD} = 15V, V _O = 1.5V	4.2		3.4	8.8		2.4		
I _{OH}	HIGH Level Output Current (Note 3)	V _{DD} = 5V, V _O = 4.6V	-0.64		-0.51	-0.88		-0.36		mA
		V _{DD} = 10V, V _O = 9.5V	-1.6		-1.3	-2.25		-0.9		
		V _{DD} = 15V, V _O = 13.5V	-4.2		-3.4	-8.8		-2.4		
I _{IN}	Input Current	V _{DD} = 15V, V _{IN} = 0V		-0.1		-10 ⁻⁵	-0.1		-1.0	μA
		V _{DD} = 15V, V _{IN} = 15V		0.1		10 ⁻⁵	0.1		1.0	

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

AC Electrical Characteristics (Note 4)

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

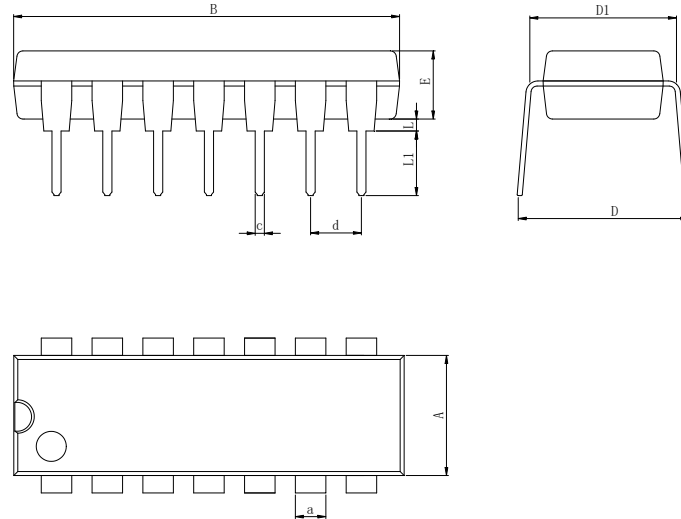
Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{PHL} , t_{PLH}	Propagation Delay Time to Q1 Output	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		185 85 70	350 125 100	ns
t_{THL} , t_{TLH}	Transition Time	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		100 50 40	200 100 80	ns
t_{WL} , t_{WH}	Minimum Input Pulse Width	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		75 40 35	200 110 90	ns
t_{RCL} , t_{FCL}	Input Rise and Fall Time	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$			15 10 8	μs
f_{CL}	Maximum Input Pulse Frequency	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$	1.5 4 5	5 12 15		MHz
t_{PHL}	Reset Propagation Delay Time	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		185 85 70	350 125 100	ns
t_{WH}	Reset Minimum Pulse Width	$V_{DD} = 5V$ $V_{DD} = 10V$ $V_{DD} = 15V$		185 85 70	350 125 100	ns
C_{IN}	Input Capacitance (Note 5)	Any Input		5	7.5	pF

Note 4: AC Parameters are guaranteed by DC correlated testing.

Note 5: Capacitance is guaranteed by periodic testing

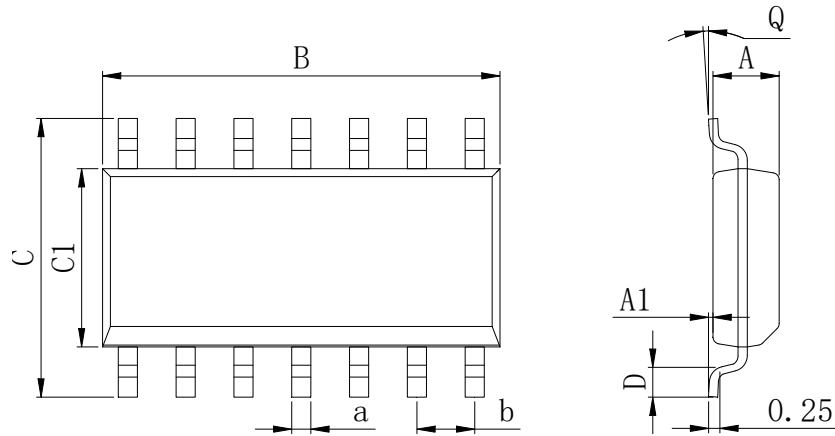
Physical Dimensions

DIP-14



Dimensions In Millimeters(DIP-14)										
Symbol:	A	B	D	D1	E	L	L1	a	c	d
Min:	6.10	18.94	8.10	7.42	3.10	0.50	3.00	1.50	0.40	2.54 BSC
Max:	6.68	19.56	10.9	7.82	3.55	0.70	3.60	1.55	0.50	

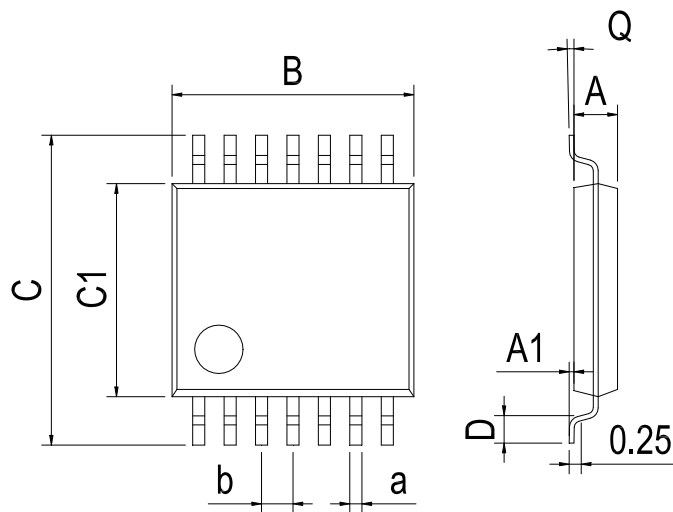
SOP-14



Dimensions In Millimeters(SOP-14)									
Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	8.55	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	8.75	6.20	4.00	0.80	8°	0.45	

Physical Dimensions

TSSOP-14



Dimensions In Millimeters(TSSOP-14)									
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
2019-1-13	New	1-9
2024-10-25	Update Lead Temperature	3

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