

CD4017

Decade Counter with 10 Decoded Outputs

1. General Description

1.1 Description

CD4017 is 5-stage Johnson counters having 10 decoded outputs. Inputs include a CLOCK, a RESET, and a CLOCK INHIBIT signal. Schmitt trigger action in the CLOCK input circuit provides pulse shaping that allows unlimited clock input pulse rise and fall times.

These counter is advanced one count at the positive clock signal transition if the CLOCK INHIBIT signal is low. Counter advancement via the clock line is inhibited when the CLOCK INHIBIT signal is high. A high RESET signal clears the counter to its zero count. Use of the Johnson counter configuration permits high-speed operation, 2-input decode-gating and spike-free decoded outputs. Anti-lock gating is provided thus assuring proper counting sequence. The decoded outputs are normally low and go high only at their respective decoded time slot. Each decoded output remains high for one full clock cycle. A CARRY-OUT signal completes one cycle every 10 clock input cycles in the CD4017 and is used to ripple-

clock the succeeding device in a multi-device counting chain.

1.2 Features

- Fully static operation
- 100% tested for quiescent current at 15V
- Standardized symmetrical output characteristics
- Maximum input current of 1 μ A at 16V and 25 $^{\circ}$ C
- 5V and 10V parametric ratings

1.3 Device Information

PART NUMBER	PACKAGE
CD4017	DIP
	SOP
	TSSOP

2. Pin Description and Functional Diagram

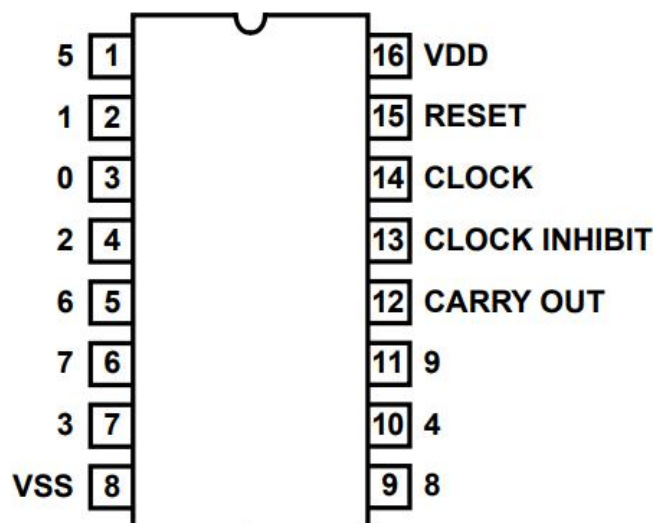


Figure 2.1 Top View

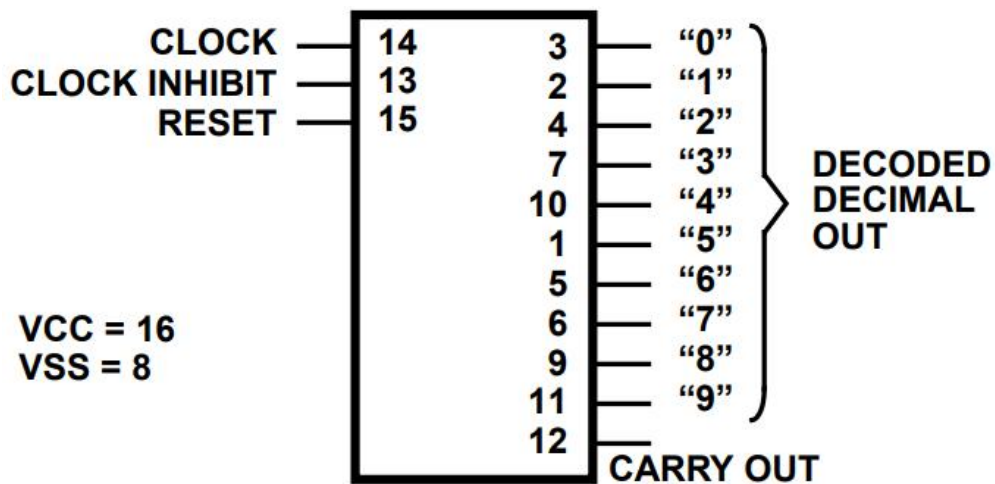


Figure 2.2 Functional Diagram

PIN No.	NAME	I/O	FUNCTION
1	5	O	Decode Output
2	1	O	Decode Output
3	0	O	Decode Output
4	2	O	Decode Output
5	6	O	Decode Output
6	7	O	Decode Output
7	3	O	Decode Output
8	VSS	-	Ground
9	8	O	Decode Output
10	4	O	Decode Output
11	9	O	Decode Output
12	CARRY OUT	O	Carry Output
13	CLOCK INHIBIT	I	Register Clock Inhibit
14	CLOCK	I	Register Clock Input
15	RESET	I	Register Reset
16	VDD	-	Supply Voltage

3. System Diagram

3.1 Logic Diagram

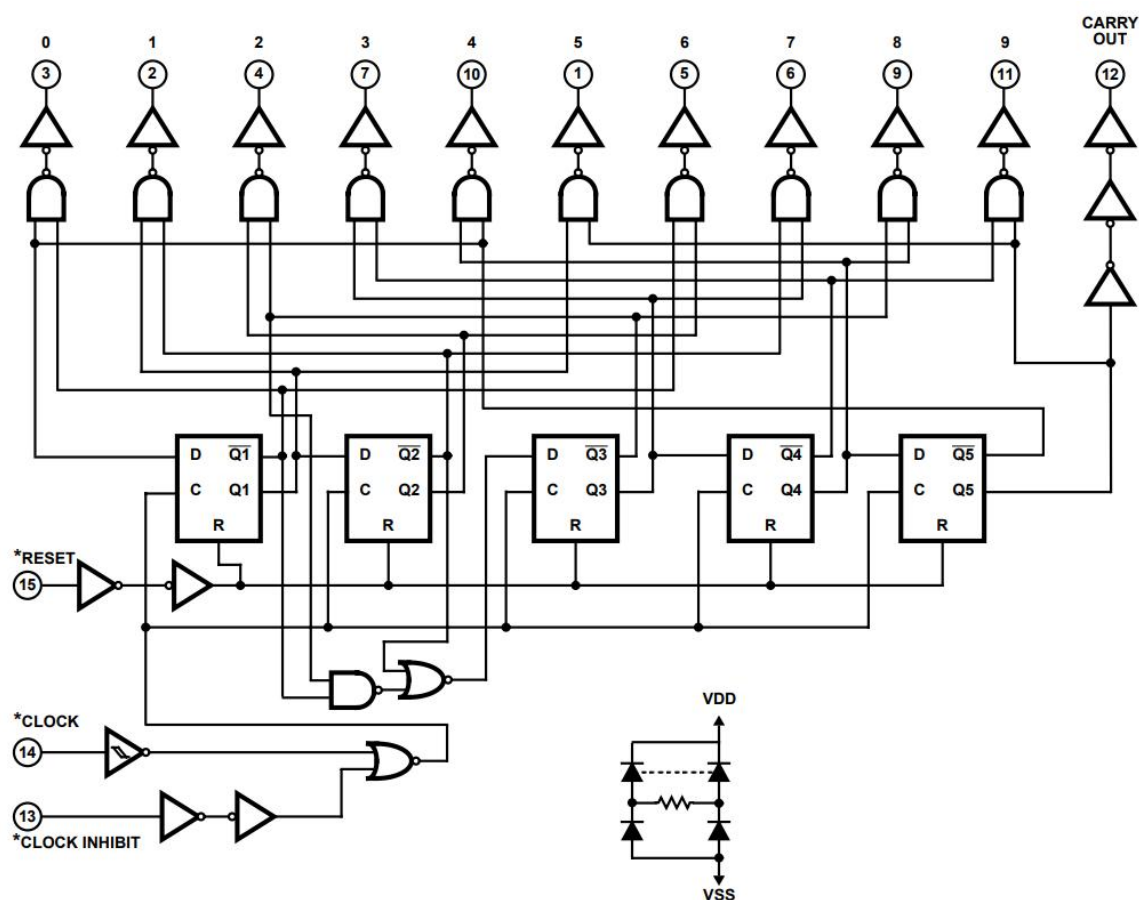


Figure 3.1: CD4017 Logic Diagram

3.2 Truth Table

Input			FUNCTION
RESET	CLOCK	CLOCKINHIBIT	
1	X	X	Pin '0'=CARRY OUT=H, Pin '1' to Pin '9'=L
0	1	↓	Counter Carry
0	↑	0	Counter Carry
0	0	X	No Changes
0	X	1	No Changes
0	1	↑	No Changes
0	↓	0	No Changes

X = Don't Care, 1 ≡ High State, 0 ≡ Low State, ↑=positive-going transition, ↓=negative-going transition



4. Specifications

4.1 Absolute Maximum Ratings

Symbol	Parameter	MIN	MAX	Unit
V _{DD}	DC Supply Voltage Range (Voltage Referenced to VSS Terminals)	-0.5	16	V
V _I	Input Voltage Range, All Inputs	0.5	V _{DD} +0.5	V
P _D	Power Dissipation		500	mW
T _J	Junction Temperature		125	°C
T _{OP}	Operating Temperature	-40	85	°C

Absolute maximum ratings are those values beyond which the device could be permanently damaged. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions.

4.2 Electrical Characteristics

4.2.1 DC Specifications

(T_a=25°C, voltages are referenced to VSS (ground=0V), unless otherwise specified)

Symbol	Parameter	Test Condition			MIN	TYP	MAX	Unit
		V _O	V _{IN}	V _{DD}				
I _{DD}	Supply Current	--	0,5	5	--	--	5	uA
		--	0,10	10	--	--	5	uA
		--	0,15	15	--	--	5	uA
I _{OL}	Low Level Output Current	0.4	0,5	5	1	3	--	mA
		0.5	0,10	10	4	8	--	mA
I _{OH}	High Level Output Current	4.6	0,5	5	-1	-2	--	mA
		2.5	0,5	5	-4	-8	--	mA
		9.5	0,10	10	-2	-4	--	mA
V _{OL}	Low Level Output Voltage	--	0,5	5	--	0	0.05	V
		--	0,10	10	--	0	0.05	V
V _{OH}	High Level Output Voltage	--	0,5	5	4.95	5	--	V
		--	0,10	10	9.95	10	--	V
V _{IL}	Low Level Input Voltage	0.5,4.5	--	5	--	--	1.5	V
		1,9	--	10	--	--	3	V
V _{IH}	High Level Input Voltage	0.5,4.5	--	5	3.5	--	--	V
		1,9	--	10	7	--	--	V
I _{IN}	Input Leakage Current	--	0,16	16	--	--	±1	uA

5. Timing Diagrams

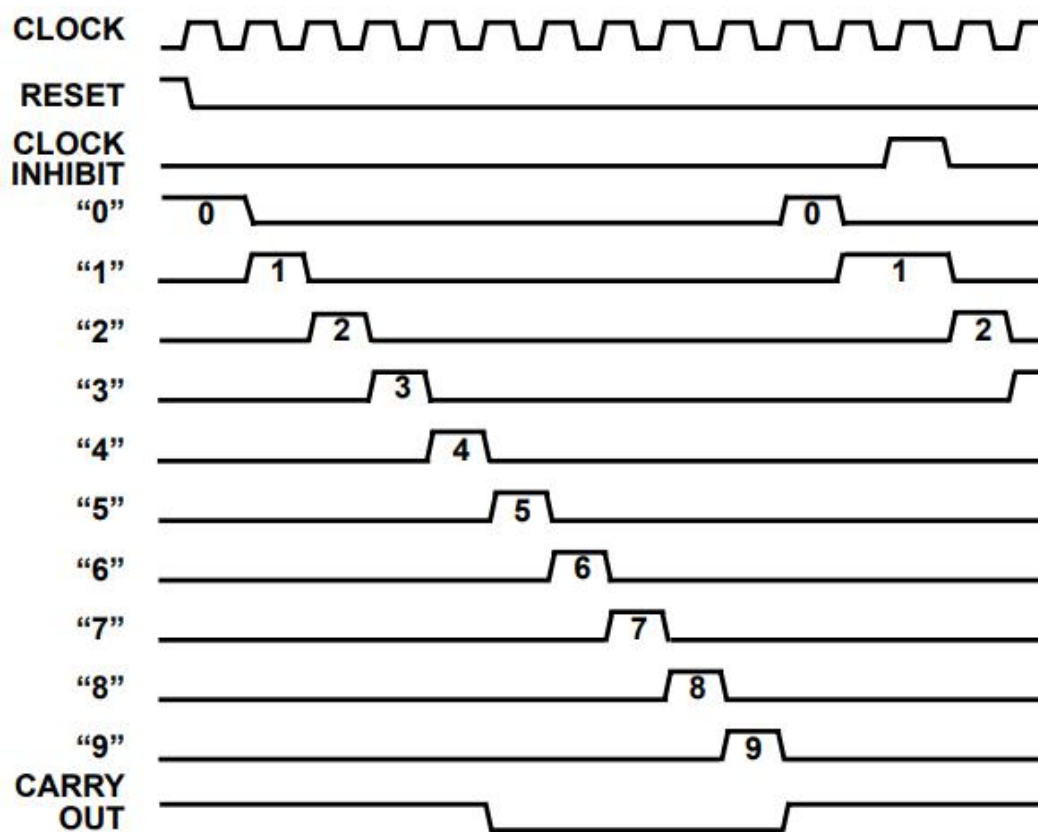


Figure 5.1: Timing diagrams for CD4017

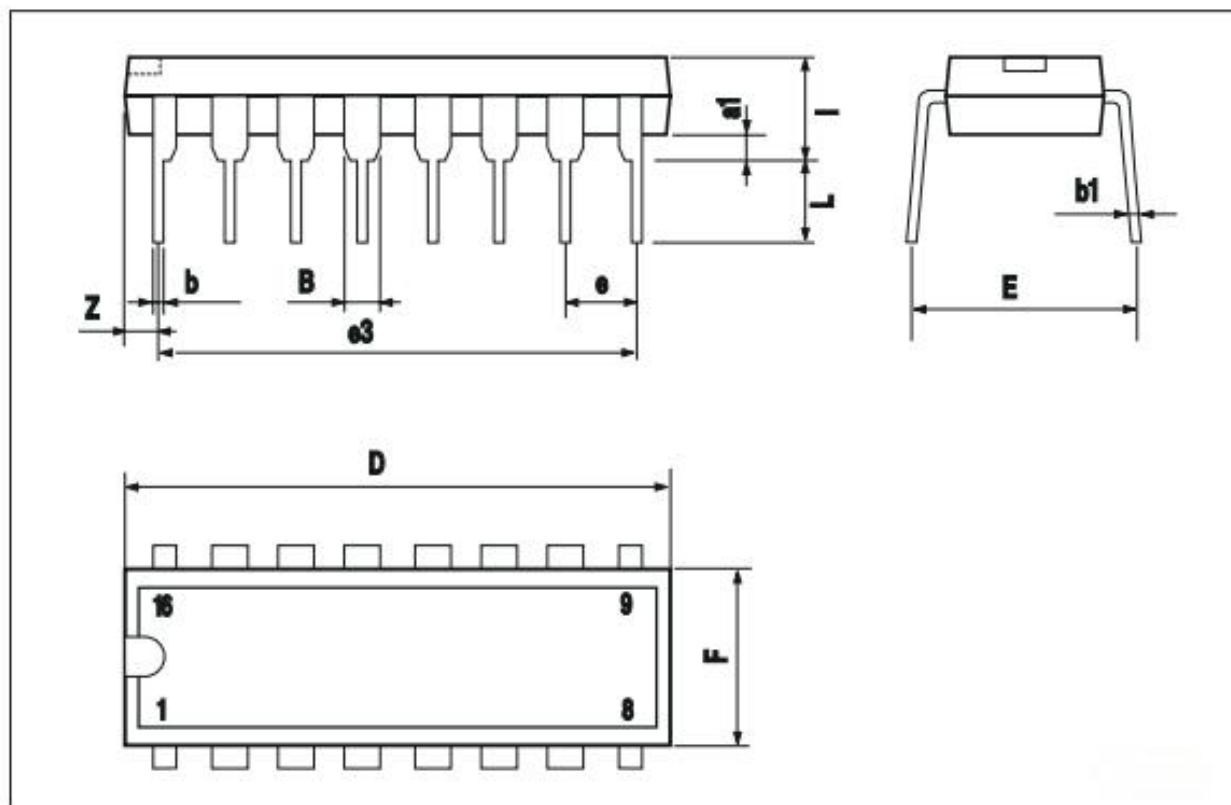
6. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
CD4017ND16ATBE	DIP	16	Tube	25
CD4017NS16ARDQ	SOP	16	Tape & Reel	4000
CD4017TS16ARDQ	TSSOP	16	Tape & Reel	4000

7. Package Information

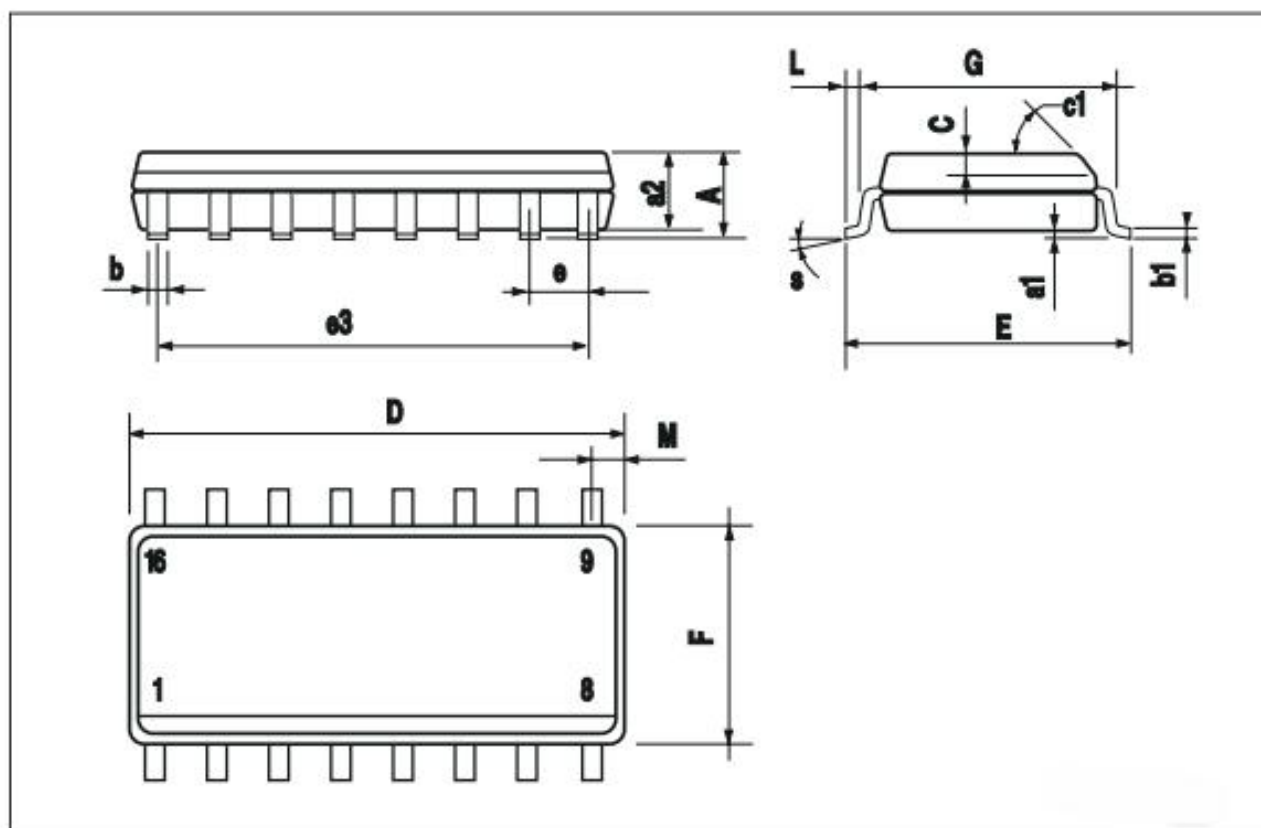
7.1 DIP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
I			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050



7.2 SOP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.068
a1	0.1		0.25	0.004		0.010
a2			1.64			0.063
b	0.35		0.46	0.013		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.019	
c1	45° (typ.)					
D	9.8		10	0.385		0.393
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.149		0.157
G	4.6		5.3	0.181		0.208
L	0.5		1.27	0.019		0.050
M			0.62			0.024
S	8° (max.)					



7.3 TSSOP16

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.2			0.047
A1	0.05		0.15	0.002	0.004	0.006
A2	0.8	1	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.012
c	0.09		0.20	0.004		0.0079
D	4.9	5	5.1	0.193	0.197	0.201
E	6.2	6.4	6.6	0.244	0.252	0.260
E1	4.3	4.4	4.48	0.169	0.173	0.176
e		0.65 BSC			0.0256 BSC	
K	0°		8°	0°		8°
L	0.45	0.60	0.75	0.018	0.024	0.030

