CD4015 CMOS Dual 4-Stage Static Shift Register

1. General Description

1.1 Description

CD4015 consists of two identical, independent, 4-stage serial-input/parallel output registers. Each register has independent CLOCK and RESET inputs as well as a single serial DATA input. “Q” outputs are available from each of the four stages on both registers. All register stages are D-type, master-slave flip-flops. The logic level present at the DATA input is transferred into the first register stage and shifted over one stage at each positive-going clock transition. Resetting of all stages is accomplished by a high level on the reset line.Register expansion to 8 stages using one CD4015 package, or to more than 8 stages using additional CD4015’s is possible.

All inputs are protected against static discharge with diodes to VDD and VSS.

1.2 Features

- Fully static operation
- 8 Master-Slave flip-flops plus input and output buffering
- 100% tested for quiescent current at 18V
- Standardized symmetrical output characteristics
- Maximum input current of 1μA at 18V and 25℃
- 5V,10V, and 15V parametric ratings

1.3 Device Information

PART NUMBER	PACKAGE
CD4015	DIP
	SOP
	TSSOP

2. Pin Description and Functional Diagram

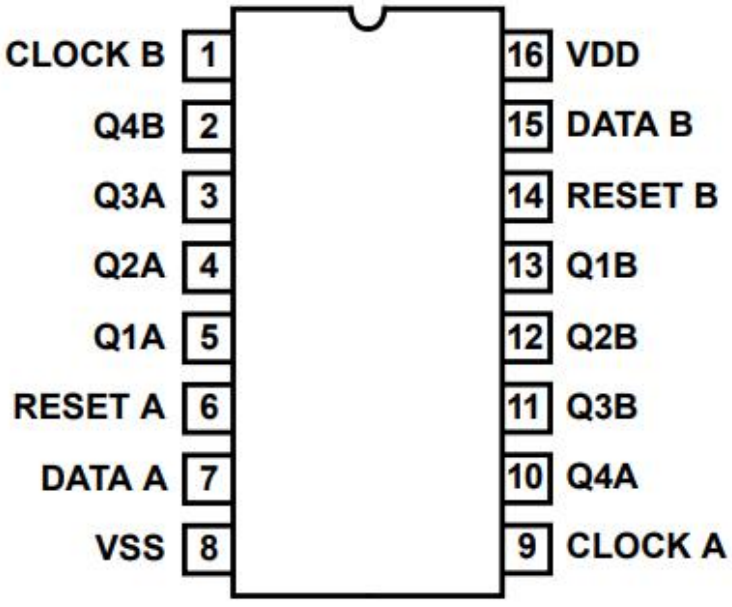


Figure 2.1 Top View

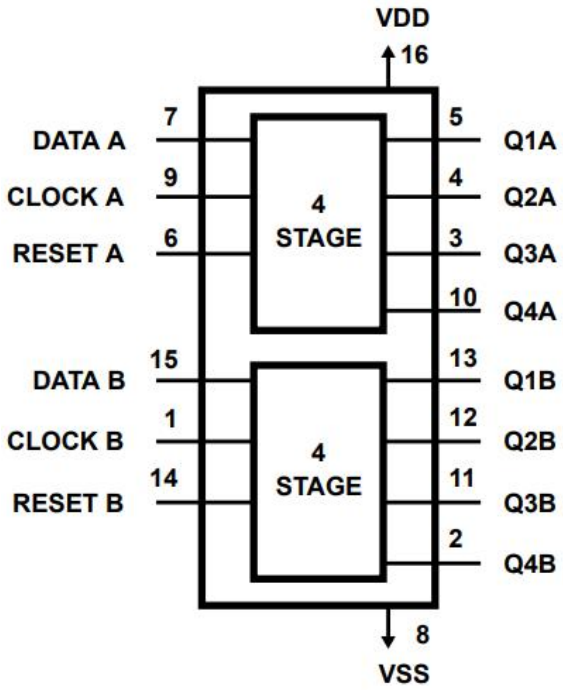


Figure 2.2 Functional Diagram

PIN No.	NAME	I/O	FUNCTION
1	CLOCK B	I	Register B Clock Input
2	Q4B	O	Register B Output
3	Q3A	O	Register A Output
4	Q2A	O	Register A Output
5	Q1A	O	Register A Output
6	RESET A	I	Register A Reset Input
7	DATA A	I	Register A Data Input
8	VSS		Ground
9	CLOCK A	I	Register A Clock Input
10	Q4A	O	Register A Output
11	Q3B	O	Register B Output
12	Q2B	O	Register B Output
13	Q1B	O	Register B Output
14	RESET B	I	Register B Reset Input
15	DATA B	I	Register B Data Input
16	VDD		Supply Voltage

3. System Diagram

3.1 Logic Diagram

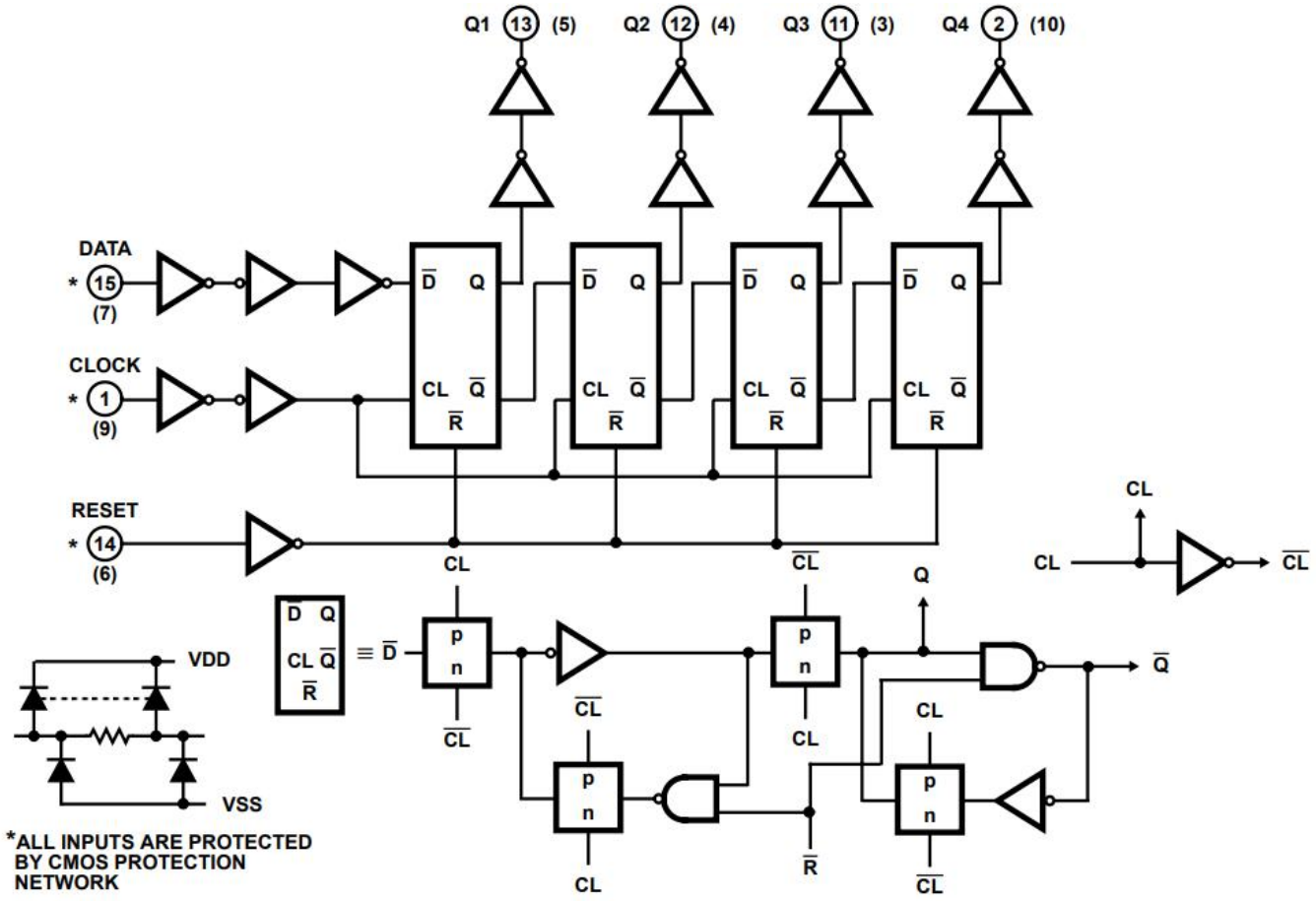


Figure 3.1：CD4015 Logic Diagram

3.2 Truth Table

Input			Output	
Clock	D	R	Q1	Qn
↑	0	0	0	Qn-1
↑	1	0	1	Qn-1
↓	X	0	Q1	Qn
X	X	1	0	0

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	20	V
V_I	Input Voltage Range, All Inputs	0.5	VDD+0.5	V
P_D	Power Dissipation		500	mW
T_J	Junction Temperature		125	℃
T_{OP}	Operating Temperature	-40	85	℃

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℃, voltages are referenced to VSS (ground=0V), unless otherwise specified)

Symbol	Parameter	Test Condition			MIN	TYP	MAX	Unit
		VO	VIN	VDD				
I_{DD}	Supply Current	--	0,5	5	--	0	1	uA
		--	0,10	10	--	0	1	uA
		--	0,18	18	--	0	1	uA
I_{OL}	Low Level Output Current	0.4	0,5	5	1.5	3	--	mA
		0.5	0,10	10	3.5	7	--	mA
		1.5	0,15	15	14	28	--	mA
I_{OH}	High Level Output Current	4.6	0,5	5	-0.5	-1	--	mA
		2.5	0,5	5	-2.5	-5	--	mA
		9.5	0,10	10	-1	-2	--	mA
		13.5	0,15	15	-4	-8	--	mA
V_{OL}	Low Level Output Voltage	--	0,5	5	--	0	0.05	V
		--	0,10	10	--	0	0.05	V
		--	0,15	15	--	0	0.05	V
V_{OH}	High Level Output Voltage	--	0,5	5	4.95	5	--	V
		--	0,10	10	9.95	10	--	V
		--	0,15	15	14.95	15	--	V
V_{IL}	Low Level Input Voltage	0.5,4.5	--	5	--	--	1.5	V
		1,9	--	10	--	--	3	V
		1.5,13.5	--	15	--	--	4	V
V_{IH}	High Level Input Voltage	0.5,4.5	--	5	3.5	--	--	V
		1,9	--	10	7	--	--	V
		1.5,13.5	--	15	11	--	--	V
I_{IN}	Input Leakage Current	--	0,18	18	--	0	±1	uA

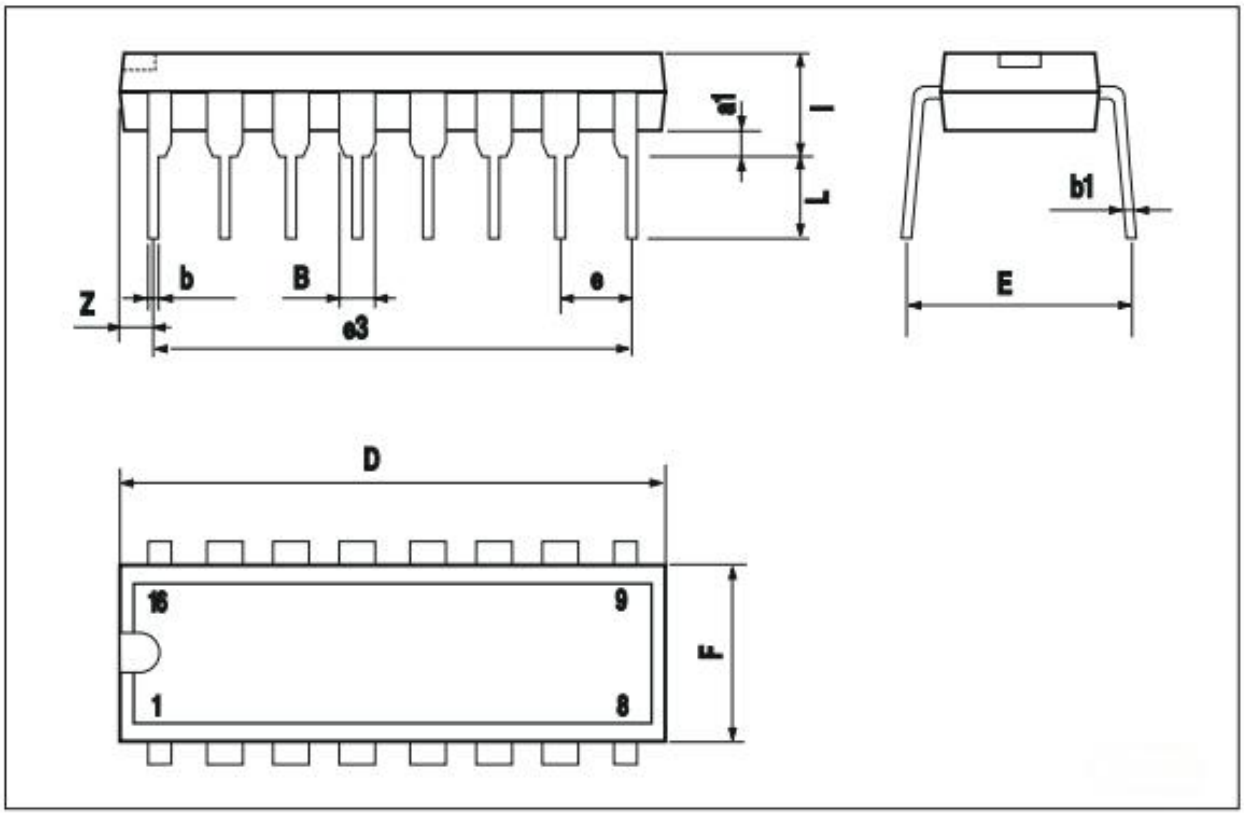
5. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
CD4015ND16ATBE	DIP	16	Tube	25
CD4015NS16ARDQ	SOP	16	Tape & Reel	4000
CD4015TS16ARDQ	TSSOP	16	Tape & Reel	4000

6. Package Information

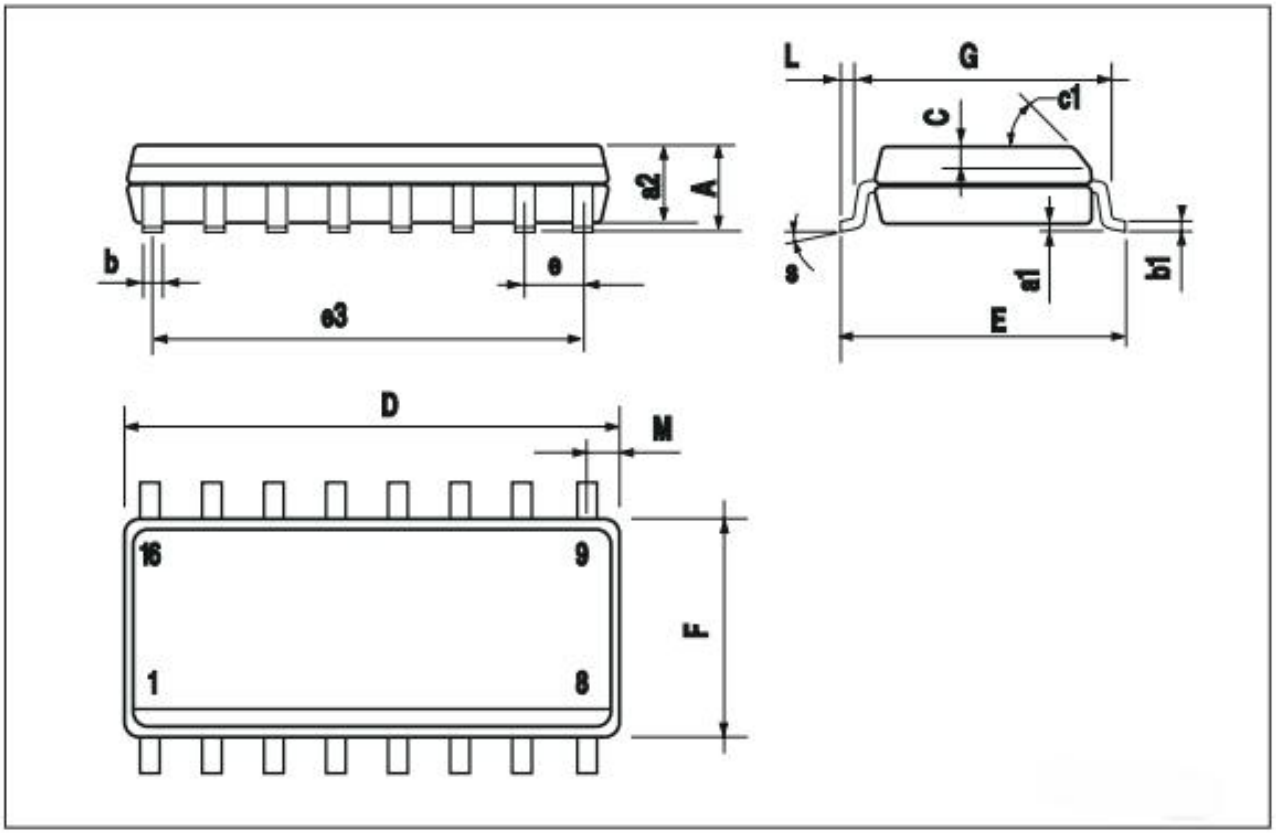
6.1 DIP16

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



6.2 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.)					



6.3 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

