CD4094 CMOS 8-Stage Shift-and-Store Bus Register

1. General Description

1.1 Description

CD4094 is an 8-stage serial shift register having a storage latch associated with each stage for strobing data from the serial input to parallel buffered 3-state outputs. The parallel outputs may be connected directly to common bus lines. Data is shifted on positive clock transitions. The data in each shift register stage is transferred to the storage register when the STROBE input is high, Data in the storage register appears at the outputs whenever the OUTPUT-ENABLE signal is high.

1.2 Features

- 3-state parallel outputs for connection to common bus
- Separate serial outputs synchronous to both positive and negative clock edges for cascading
- Standardized,symmetrical output characteristics
- 100% tested for quiescent current at 18 V
- Maximum input current of 1 μA at 18 V and 25°C
- 5V,10V, and 15V parametric ratings

1.3 Device Information

PART NUMBER	PACKAGE
CD4094	DIP
	SOP
	TSSOP

2. Pin Description and Functional Diagram

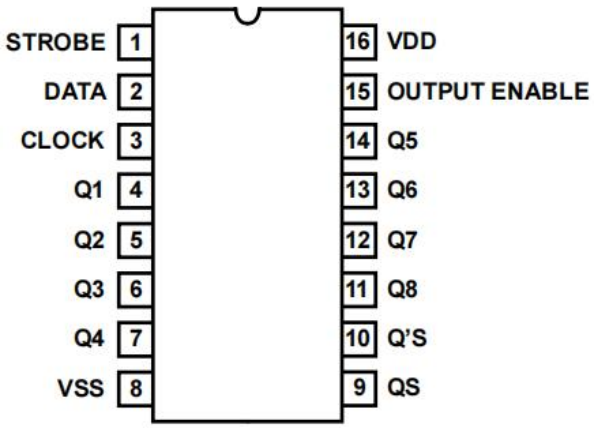


Figure 2.1 Top View

PIN No.	NAME	I/O	FUNCTION
1	STROBE	I	Latch Input
2	DATA	I	Serial Data Input
3	CLOCK	I	Serial Clock Input
4	Q1	O	Parallel Output
5	Q2	O	Parallel Output
6	Q3	O	Parallel Output
7	Q4	O	Parallel Output
8	VSS	-	Ground
9	Qs	O	Serial Data Output
10	Q's	O	Serial Data Output
11	Q8	O	Parallel Output
12	Q7	O	Parallel Output
13	Q6	O	Parallel Output
14	Q5	O	Parallel Output
15	OUTPUT ENABLE	I	Output Enable Input
16	VDD	-	Supply Voltage

3. System Diagram

3.1 Logic Diagram

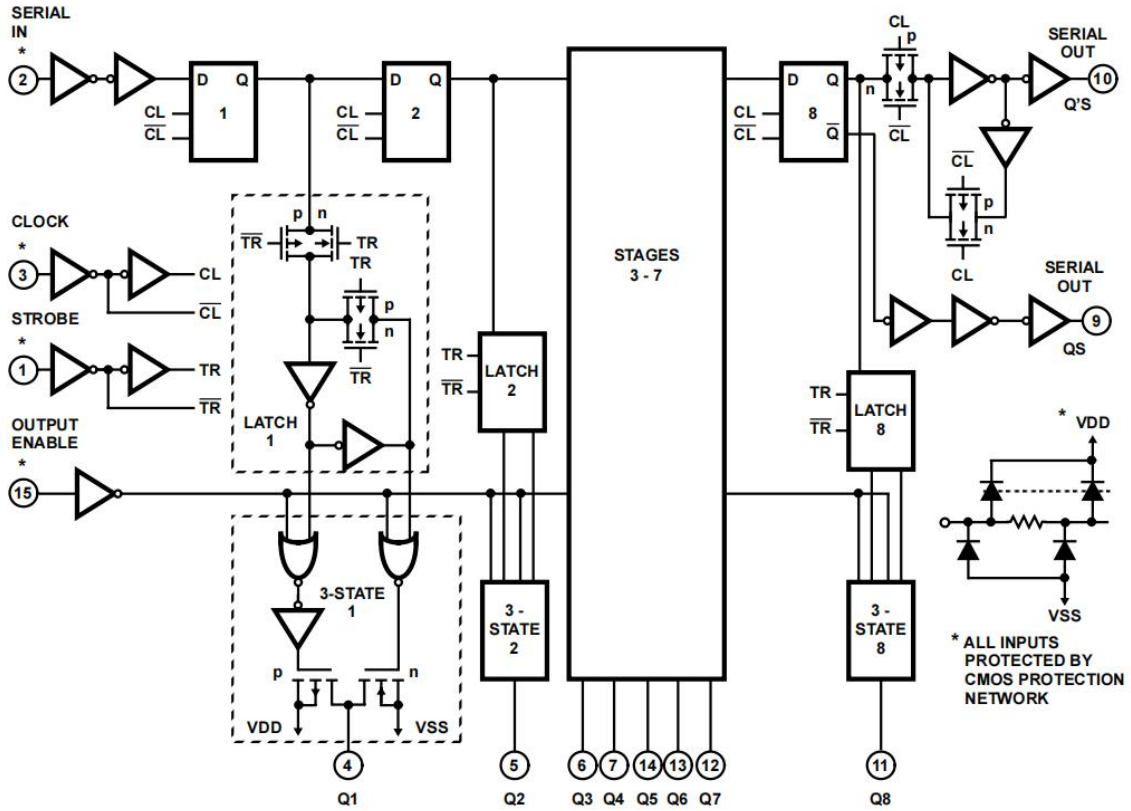


Figure 3.1：CD4013 Logic Diagram

3.2 Function Table

Input				Parallel Outputs		Serial Outputs	
CLOCK	Output Enable	Strobe	Data	Q1	QN	QS	Q'S
↑	0	X	X	OC	OC	Q7	NC
↓	0	X	X	OC	OC	NC	Q7
↑	1	0	X	NC	NC	Q7	NC
↑	1	1	0	0	QN-1	Q7	NC
↑	1	1	1	1	QN-1	Q7	NC
↓	1	1	1	NC	NC	NC	Q7

X = don't care, NC=No Change,OC=Open Circuit,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
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 normal operating conditions.

4.2 Electrical Characteristics

(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	2	uA
I_{OL}	Low Level Output Current	0.4	0,5	5	1.5	3	--	mA
		0.5	0,10	10	4	8	--	mA
		1.5	0,15	15	15	30	--	mA
I_{OH}	High Level Output Current	4.6	0,5	5	-1.2	-2.4	--	mA
		2.5	0,5	5	-5	-10	--	mA
		9.5	0,10	10	-2.5	-5	--	mA
		13.5	0,15	15	-9	-18	--	mA
V_{OL}	Low Level Output Voltage	--	0,5	5	--	0	0.05	V
		--	0,10	10	--	0	0.05	V
V_{OL}	Low Level Output Voltage	--	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
I_{OUT}	3-State Output Leakage Current	0,18	0,18	18	--	0	±2	uA

5. Timing Diagrams

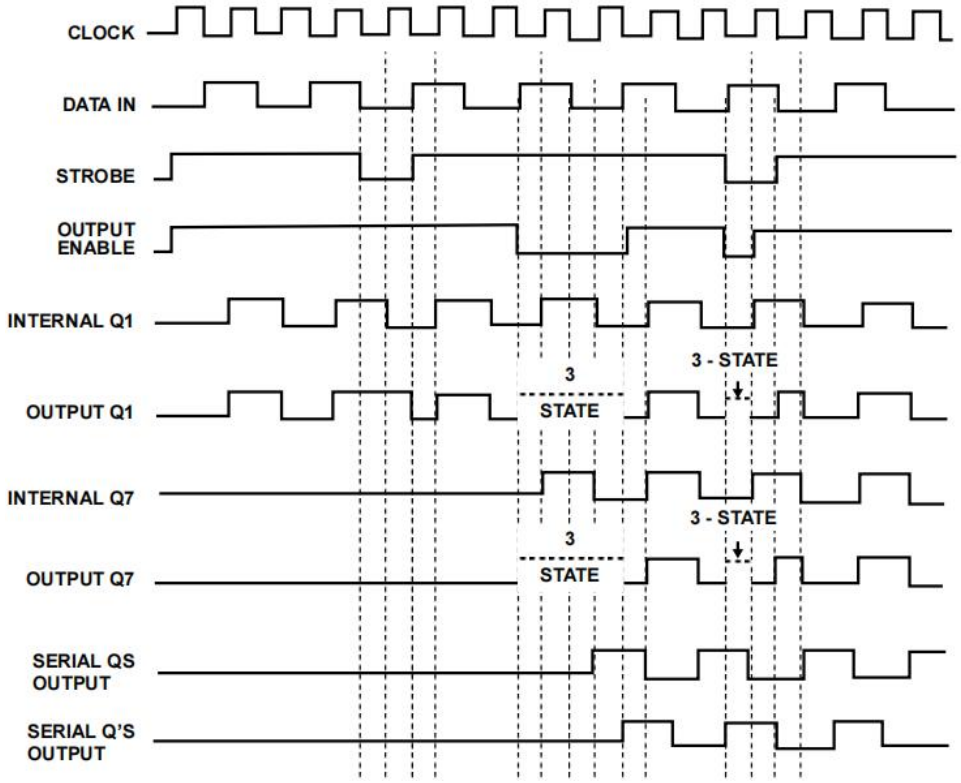


Figure 5.1：Timing diagrams for CD4094

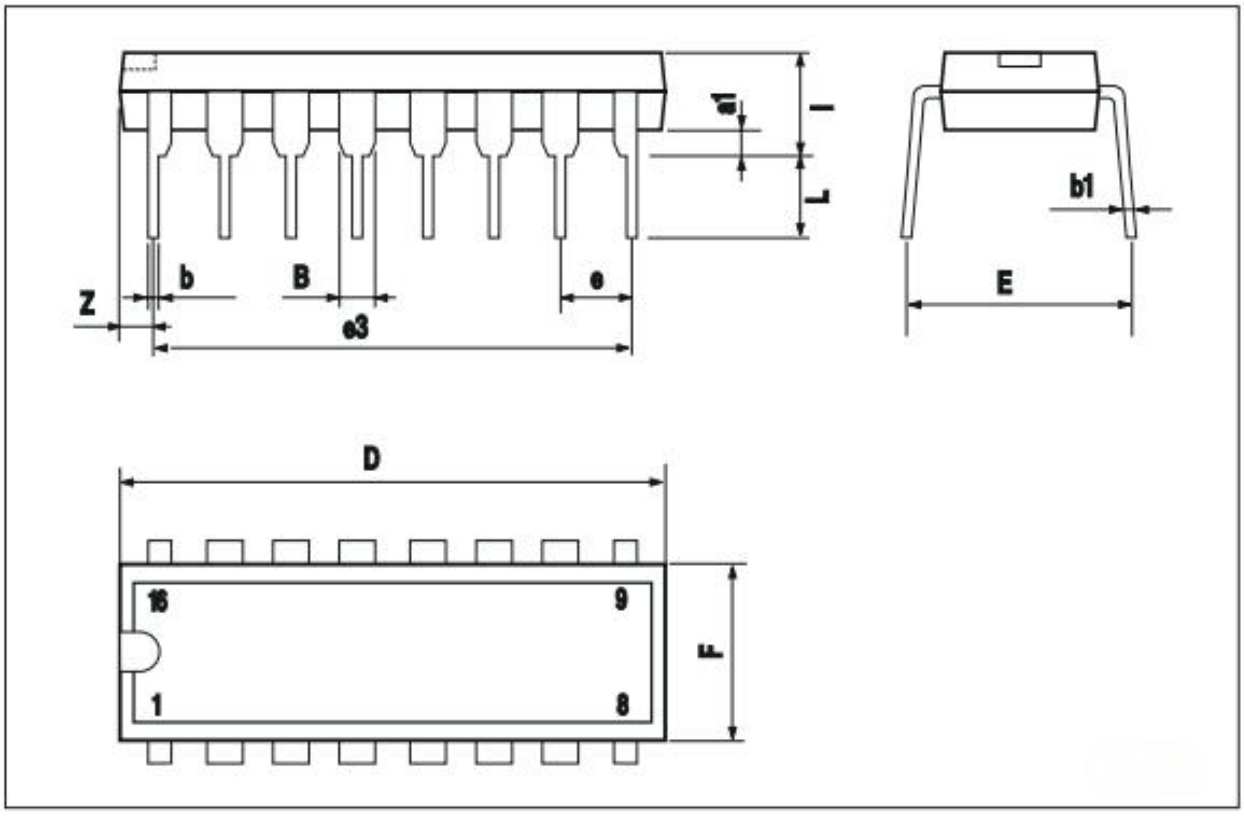
6. Ordering Information

Orderable Device	Package Type	Pins	Packing	Package Qty
CD4094ND16ATBE	DIP	16	Tube	25
CD4094NS16ARDQ	SOP	16	Tape & Reel	4000
CD4094TS16ARDQ	TSSOP	16	Tape & Reel	4000

7. Package Information

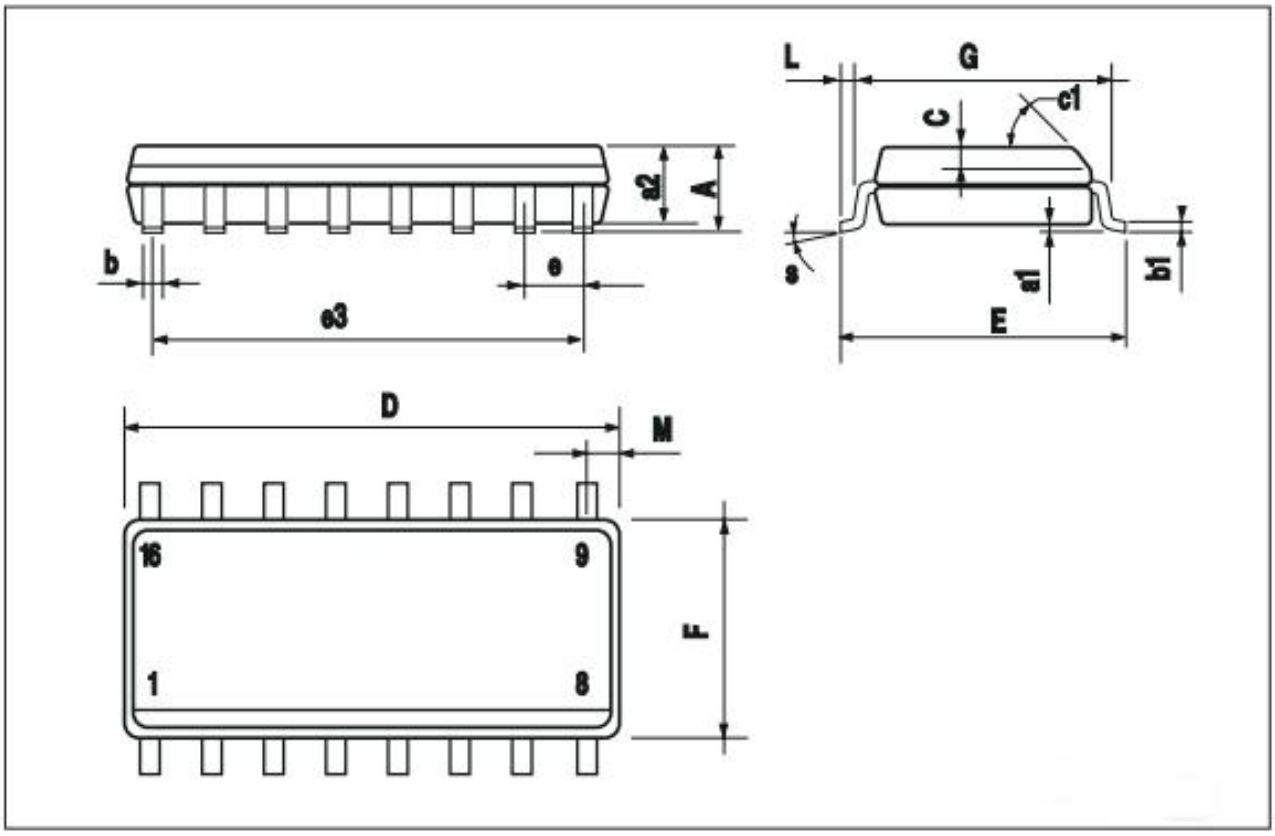
7.1 DIP16

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

