

CD4093

DATASHEET

Specification Revision History:

Version	Date	Description
V1.0	2019/05	New
V1.1	2021/06	Modify Ordering Information
V1.2	2025/02	Modify Ordering Information
V1.3	2025/03	Add application precautions and overall typesetting.

General Description

The CD4093 consists of four Schmitt trigger circuits. Each circuit functions as a two input NAND gate with Schmitt trigger action on both inputs. The gate switches at different points for positive and negative going signals. The difference between the positive voltage (V_P) and the negative voltage (V_N) is defined as hysteresis voltage (V_H)

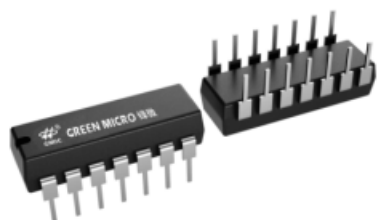
Features

- Schmitt trigger action on each input with no external components
- Hysteresis Voltage Typically 1.3V at VDD=5V and 2.3V at VDD=10V
- No limit on input rise and fall times
- Standardized symmetrical output characteristics
- 100% tested for quiescent current at 18V
- Maximum input current of 1uA at 18V and 25°C
- 5V,10V, and 15V parametric ratings

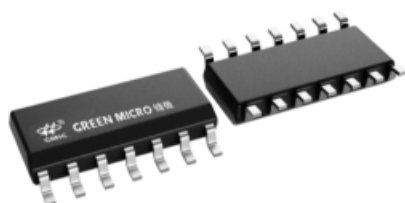
Device Information

PART NUMBER	PACKAGE
CD4093	DIP
	SOP
	TSSOP

The appearance of the product



DIP-14



SOP-14



TSSOP-14

Ordering Information

名称	封装	打印名称	包装	包装数量
CD4093BM(GMIC)	SOP-14	CD4093 190	编带	2500PCS/盘
CD4093BE(GMIC)	DIP-14	CD4093 190	管装	1000PCS/盒
CD4093BPW(GMIC)	TSSOP-14	CD4093 190	编带	2500PCS/盘
CD4093(GMIC)	SOP-14	CD4093 90	编带	2500PCS/盘
CD4093(GMIC)	DIP-14	CD4093 90	管装	1000PCS/盒
CD4093(GMIC)	TSSOP-14	CD4093 90	编带	2500PCS/盘

Pin Description and Functional Diagram

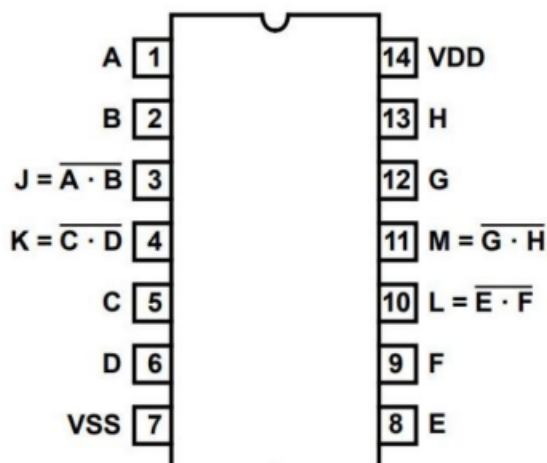


Figure 2.1 Top View

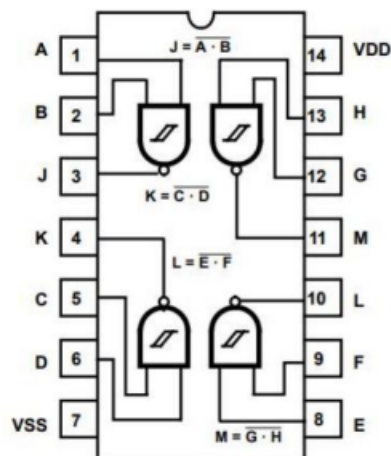
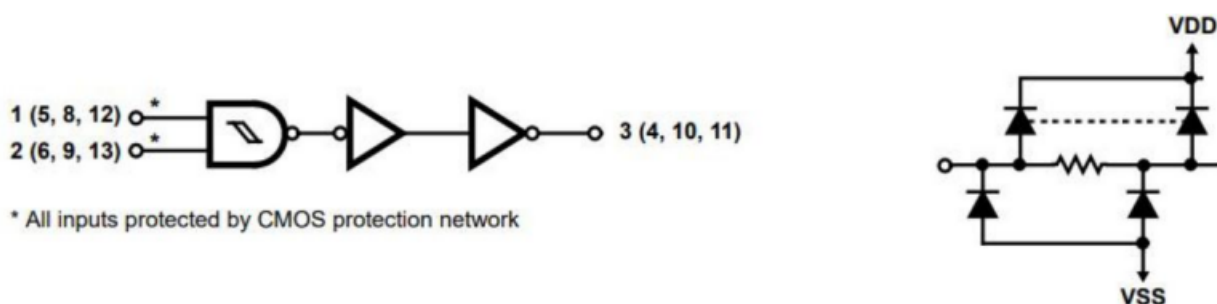


Figure 2.2 Functional Diagram

PIN No.	NAME	I/O	FUNCTION
1	A	I	Data Input A
2	B	I	Data Input B
3	J	O	Data Output $J = A \cdot B$
4	K	O	Data Output $K = C \cdot D$
5	C	I	Data Input C
6	D	I	Data Input D
7	VSS		Ground
8	E	I	Data Input E
9	F	I	Data Input F
10	L	O	Data Output $L = E \cdot F$
11	M	O	Data Output $M = G \cdot H$
12	G	I	Data Input G
13	H	I	Data Input H
14	VDD		Supply Voltage

System Diagram

Logic Diagram



* All inputs protected by CMOS protection network

Figure 3.1: CD4093 Logic Diagram

Truth Table

Input		Output
A	B	J
0	0	1
0	1	1
1	0	1
1	1	0

1≡High State, 0≡Low State(one of four gates)

Specifications

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	$V_{DD}+0.5$	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 normal operating conditions.

Electrical Characteristics

DC Specifications

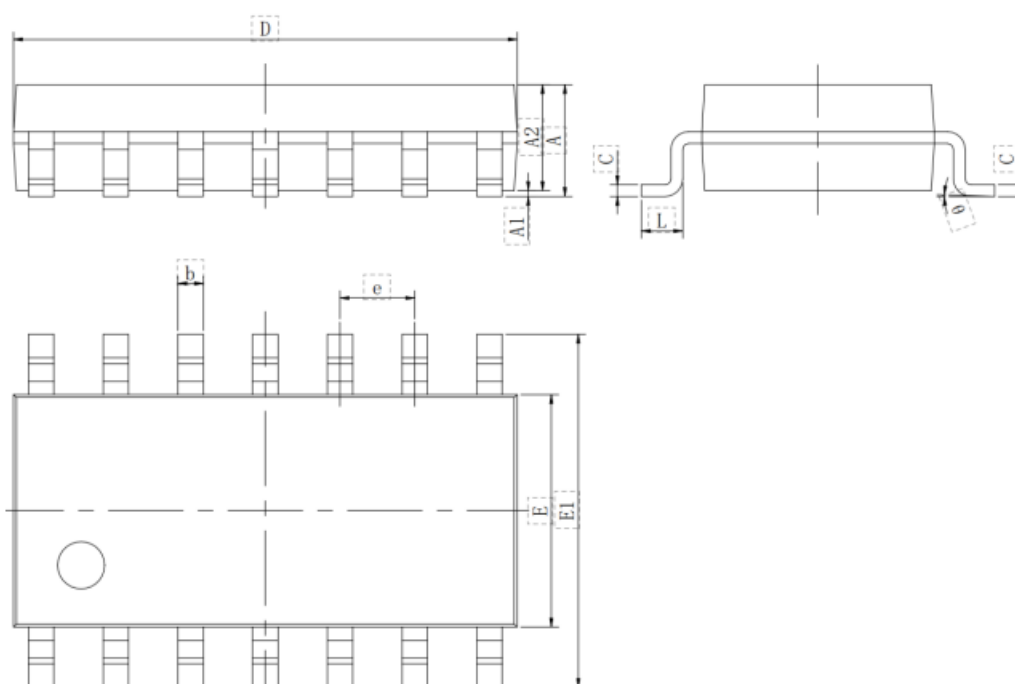
(T_a=25°C, voltages are referenced to VSS (ground=0V), unless otherwise specified)

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
V _{P(MIN)}	Positive trigger threshold voltage	--	--	5	2.6	3.3	--	V
		--	--	10	5.0	6.3	--	V
		--	--	15	6.3	9.1	--	V
V _{P(MAX)}	Positive trigger threshold voltage	--	--	5	--	3.3	4.0	V
		--	--	10	--	6.3	7.5	V
		--	--	15	--	9.1	12.0	V
V _{N(MIN)}	Negative trigger threshold voltage	--	--	5	1.0	2.0	--	V
		--	--	10	2.5	4.0	--	V
		--	--	15	4.0	6.0	--	V
V _{N(MAX)}	Negative trigger threshold voltage	--	--	5	--	2.0	2.8	V
		--	--	10	--	4.0	5.2	V
		--	--	15	--	6.0	7.4	V
V _{H(MIN)}	Hysteresis voltage	--	--	5	0.5	1.3	--	V
		--	--	10	1.2	2.3	--	V
		--	--	15	1.5	3.1	--	V
V _{H(MAX)}	Hysteresis voltage	--	--	5	--	1.3	2.0	V
		--	--	10	--	2.3	3.4	V
		--	--	15	--	3.1	4.5	V
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	-0.5	-1.5	--	mA
		2.5	0,5	5	-3	-6	--	mA
		9.5	0,10	10	-1.5	-3.5	--	mA
		13.5	0,15	15	-6.	-13	--	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
I _{IN}	Input Leakage Current	--	0,18	18	--	0	±1	uA

Outline Dimensions

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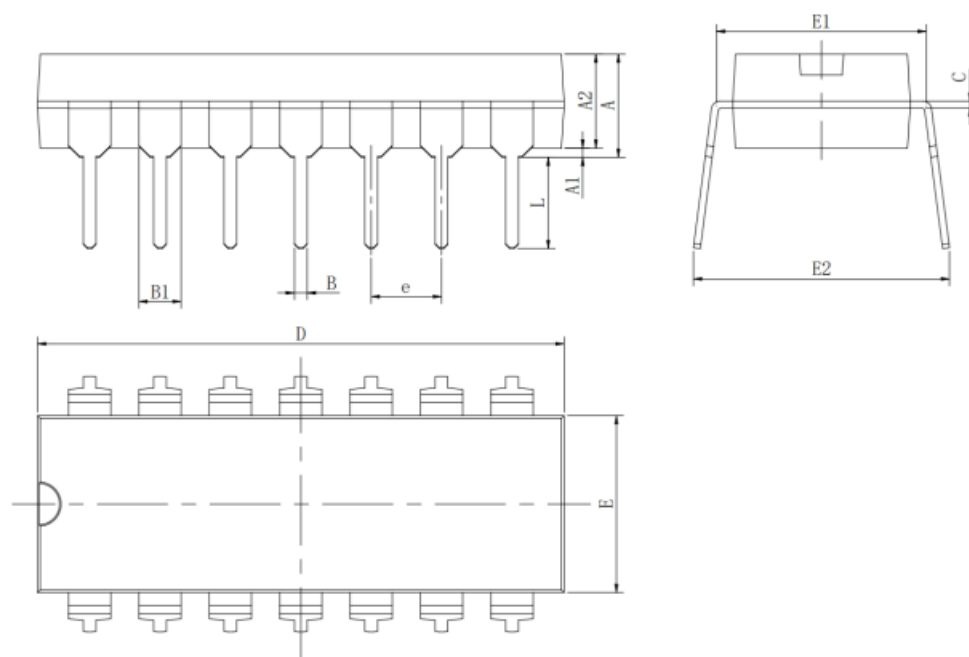
Unit : mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	8.360	8.760	0.329	0.345
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0 °	8 °	0 °	8 °

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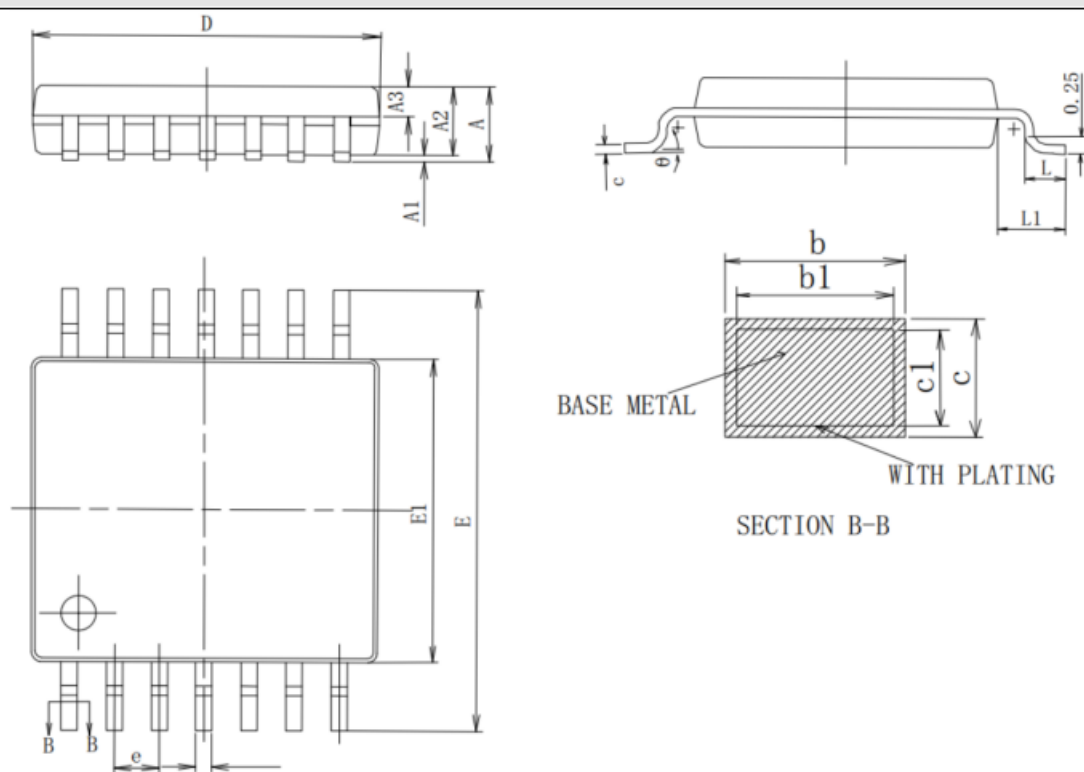
Unit:mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

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Unit:mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.20
A1	0.05	—	0.15
A2	0.90	1.00	1.05
A3	0.39	0.44	0.49
b	0.20	—	0.28
b1	0.19	0.22	0.25
c	0.13	—	0.17
cl	0.12	0.13	0.14
D	4.90	5.00	5.10
E1	4.30	4.40	4.50
E	6.20	6.40	6.60
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00BSC		
θ	0	—	8°

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