



CD4044

Quad R/S latch with 3-state outputs

Product Specification

Specification Revision History:

Version	Date	Description
2023-04-A1	2023-04	New



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1、General Description

The CD40193 is a quad R/S latch with 3-state outputs.

Features:

- Supply voltage range: 3V to 15V
- Temperature range: -40°C to +125°C
- Packaging information: DIP16/SOP16/TSSOP16

Ordering Information:

Tube packing specifications:

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
CD4044DA16.TB	DIP16	CD4044	25 PCS/tube	40 tube/box	1000 PCS/box	Dimensions of plastic enclosure: 19.0mm×6.4mm Pin spacing: 2.54mm
CD4044SA16.TB	SOP16	CD4044	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
CD4044TA16.TB	TSSOP16	CD4044	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Reel packing specifications:

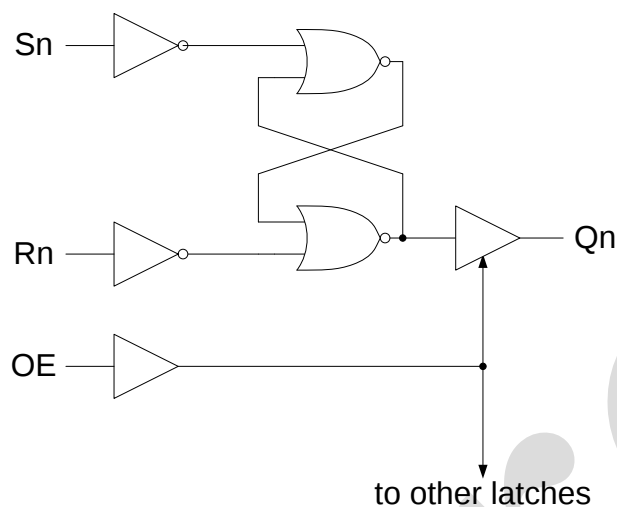
Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
CD4044SA16.TR	SOP16	CD4044	4000PCS/reel	8000PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
CD4044TA16.TR	TSSOP16	CD4044	5000PCS/reel	10000PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.



2、Block Diagram And Pin Description

2.1、Block Diagram



2.2、Pin Configurations

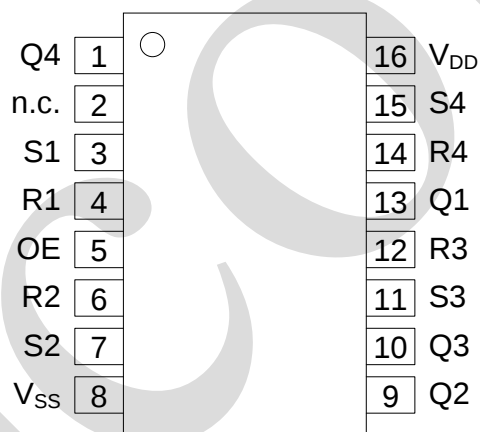


Figure 2. Pin configurations



2.3、Pin Description

Pin No.	Pin Name	Description
1	Q4	3-state buffered latch output
2	n.c.	not connected
3	S1	set input (active LOW)
4	R1	reset input (active LOW)
5	OE	common output enable input
6	R2	reset input (active LOW)
7	S2	set input (active LOW)
8	V _{SS}	ground supply voltage
9	Q2	3-state buffered latch output
10	Q3	3-state buffered latch output
11	S3	set input (active LOW)
12	R3	reset input (active LOW)
13	Q1	3-state buffered latch output
14	R4	reset input (active LOW)
15	S4	set input (active LOW)
16	V _{DD}	supply voltage

2.4、Function Table

Input			Output
OE	Sn	Rn	Qn
L	X	X	Z
H	L	H	H
H	X	L	L
H	H	H	latched

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care; Z=high impedance state;

3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltages are referenced to V_{SS} (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions		Min.	Max.	Unit
supply voltage	V _{DD}	-		-0.5	+18	V
input voltage	V _I	all inputs		-0.5	V _{DD} +0.5	V
DC input current	I _{IK}	any one input		-	±10	mA
storage temperature	T _{stg}	-		-65	+150	°C
soldering temperature	T _L	10s	DIP	245		°C
			SOP/TSSOP	260		



3.2、Recommended Operating Conditions

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{DD}	-	3	-	15	V
ambient temperature	T_{amb}	in free air	-40	-	+125	°C

3.3、Electrical Characteristics

3.3.1、DC Characteristics 1

($T_{amb}=-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, voltages are referenced to V_{SS} (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{DD}	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	5V	-	3.5	-	-	V
		10V	-	7	-	-	V
		15V	-	11	-	-	V
LOW-level input voltage	V_{IL}	5V	-	-	-	1.5	V
		10V	-	-	-	3	V
		15V	-	-	-	4	V
HIGH-level output voltage	V_{OH}	5V	$ I_O <1\mu\text{A}$	4.95	-	-	V
		10V	$ I_O <1\mu\text{A}$	9.95	-	-	V
		15V	$ I_O <1\mu\text{A}$	14.95	-	-	V
LOW-level output voltage	V_{OL}	5V	$ I_O <1\mu\text{A}$	-	-	0.05	V
		10V	$ I_O <1\mu\text{A}$	-	-	0.05	V
		15V	$ I_O <1\mu\text{A}$	-	-	0.05	V
HIGH-level output current	I_{OH}	5V	$V_O=4.6\text{V}$	-	-	-0.34	mA
		5V	$V_O=2.5\text{V}$	-	-	-1.3	mA
		10V	$V_O=9.5\text{V}$	-	-	-0.55	mA
		15V	$V_O=13.5\text{V}$	-	-	-1.65	mA
LOW-level output current	I_{OL}	5V	$V_O=0.4\text{V}$	0.34	-	-	mA
		10V	$V_O=0.5\text{V}$	0.46	-	-	mA
		15V	$V_O=1.5\text{V}$	1.4	-	-	mA
input leakage current	I_I	15V	$V_I=15\text{V}$ or GND	-	-	± 2	μA
supply current	I_{DD}	5V	$V_I=5\text{V}$ or GND; $I_O=0\text{A}$	-	-	7.5	μA
		10V	$V_I=10\text{V}$ or GND; $I_O=0\text{A}$	-	-	15	μA
		15V	$V_I=15\text{V}$ or GND; $I_O=0\text{A}$	-	-	30	μA



3.3.2、DC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, voltages are referenced to V_{SS} (ground=0V), unless otherwise specified.)

Parameter	Symbol	V_{DD}	Conditions	Min.	Typ.	Max.	Unit
HIGH-level input voltage	V_{IH}	5V	-	3.5	-	-	V
		10V	-	7	-	-	V
		15V	-	11	-	-	V
LOW-level input voltage	V_{IL}	5V	-	-	-	1.5	V
		10V	-	-	-	3	V
		15V	-	-	-	4	V
HIGH-level output voltage	V_{OH}	5V	$ I_O < 1\mu\text{A}$	4.95	-	-	V
		10V	$ I_O < 1\mu\text{A}$	9.95	-	-	V
		15V	$ I_O < 1\mu\text{A}$	14.95	-	-	V
LOW-level output voltage	V_{OL}	5V	$ I_O < 1\mu\text{A}$	-	-	0.05	V
		10V	$ I_O < 1\mu\text{A}$	-	-	0.05	V
		15V	$ I_O < 1\mu\text{A}$	-	-	0.05	V
HIGH-level output current	I_{OH}	5V	$V_O = 4.6\text{V}$	-	-	-0.3	mA
		5V	$V_O = 2.5\text{V}$	-	-	-1.15	mA
		10V	$V_O = 9.5\text{V}$	-	-	-0.45	mA
		15V	$V_O = 13.5\text{V}$	-	-	-1.4	mA
LOW-level output current	I_{OL}	5V	$V_O = 0.4\text{V}$	0.29	-	-	mA
		10V	$V_O = 0.5\text{V}$	0.38	-	-	mA
		15V	$V_O = 1.5\text{V}$	1.2	-	-	mA
input leakage current	I_I	15V	$V_I = 15\text{V}$ or GND	-	-	± 4	μA
supply current	I_{DD}	5V	$V_I = 5\text{V}$ or GND; $I_O = 0\text{A}$	-	-	7.5	μA
		10V	$V_I = 10\text{V}$ or GND; $I_O = 0\text{A}$	-	-	15	μA
		15V	$V_I = 15\text{V}$ or GND; $I_O = 0\text{A}$	-	-	30	μA



3.3.3、AC Characteristics 1

($T_{amb} = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, $V_{SS} = 0\text{V}$, unless otherwise specified.)

Parameter	Symbol	V_{DD}	Conditions	Min.	Typ.	Max.	Unit
HIGH to LOW propagation delay time	t_{PHL}	5V	Rn to Qn See Figure 4	-	90	185	ns
		10V		-	40	80	ns
		15V		-	30	60	ns
LOW to HIGH propagation delay time	t_{PLH}	5V	Sn to Qn See Figure 4	-	90	180	ns
		10V		-	40	80	ns
		15V		-	30	60	ns
transition time	t_{THL}, t_{TLH}	5V	See Figure 4	-	60	120	ns
		10V		-	30	60	ns
		15V		-	20	40	ns
HIGH to OFF-state propagation delay	t_{PHZ}	5V	OE to Qn See Figure 5	-	50	100	ns
		10V		-	30	60	ns
		15V		-	20	40	ns
LOW to OFF-state propagation delay	t_{PLZ}	5V		-	30	60	ns
		10V		-	25	50	ns
		15V		-	20	40	ns
OFF-state to HIGH propagation delay	t_{PZH}	5V		-	50	100	ns
		10V		-	25	50	ns
		15V		-	20	40	ns
OFF-state to LOW propagation delay	t_{PZL}	5V		-	50	95	ns
		10V		-	25	45	ns
		15V		-	20	35	ns
pulse width	t_w	5V	Sn input LOW; minimum width	30	15	-	ns
		10V		20	10	-	ns
		15V		16	8	-	ns
		5V	Rn input LOW; minimum width;	30	15	-	ns
		10V		20	10	-	ns
		15V		16	8	-	ns



3.3.4、AC Characteristics 2

($T_{amb} = -40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$, $V_{SS} = 0\text{V}$, unless otherwise specified.)

Parameter	Symbol	V_{DD}	Conditions	Min.	Typ.	Max.	Unit
HIGH to LOW propagation delay time	t_{PHL}	5V	Rn to Qn See Figure 4	-	-	222	ns
		10V		-	-	96	ns
		15V		-	-	72	ns
LOW to HIGH propagation delay time	t_{PLH}	5V	Sn to Qn See Figure 4	-	-	216	ns
		10V		-	-	96	ns
		15V		-	-	72	ns
transition time	t_{THL}, t_{TLH}	5V	See Figure 4	-	-	144	ns
		10V		-	-	72	ns
		15V		-	-	48	ns
HIGH to OFF-state propagation delay	t_{PHZ}	5V	OE to Qn See Figure 5	-	-	120	ns
		10V		-	-	72	ns
		15V		-	-	48	ns
LOW to OFF-state propagation delay	t_{PLZ}	5V		-	-	72	ns
		10V		-	-	60	ns
		15V		-	-	48	ns
OFF-state to HIGH propagation delay	t_{PZH}	5V		-	-	120	ns
		10V		-	-	60	ns
		15V		-	-	48	ns
OFF-state to LOW propagation delay	t_{PZL}	5V		-	-	120	ns
		10V		-	-	54	ns
		15V		-	-	42	ns
pulse width	t_w	5V	Sn input LOW; minimum width	36	-	-	ns
		10V		24	-	-	ns
		15V		20	-	-	ns
		5V	Rn input LOW; minimum width;	36	-	-	ns
		10V		24	-	-	ns
		15V		20	-	-	ns



4、Testing Circuit

4.1、AC Testing Circuit

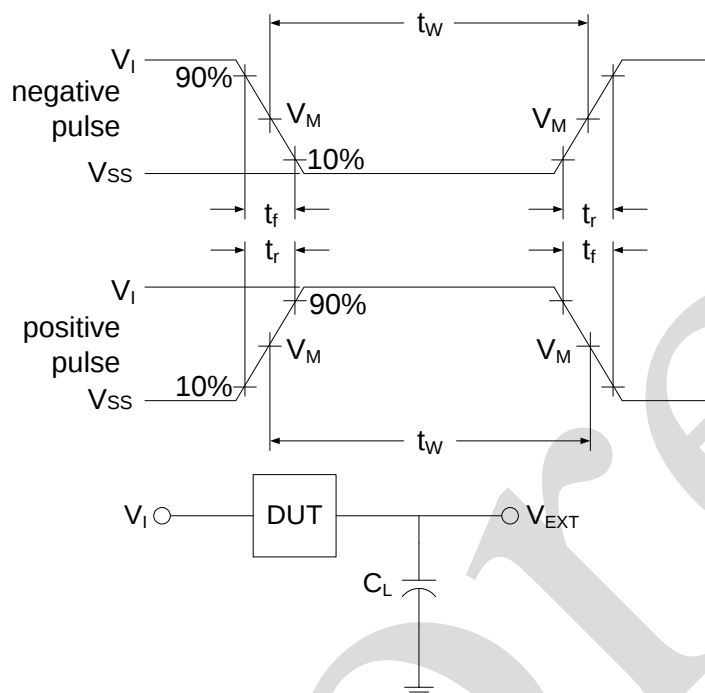


Figure 3. Load circuit

C_L includes probe and jig capacitance.

4.2、Test Data

Supply voltage	Input		Load	V_{EXT}		
V_{DD}	V_I	$t_r = t_f$	C_L	t_{PLH}/t_{PHL}	t_{PLZ}/t_{PZL}	t_{PHZ}/t_{PZH}
5V to 15V	V_{DD}	$\leq 20\text{ns}$	50pF	Open	V_{DD}	V_{SS}

4.3、AC Testing Waveforms

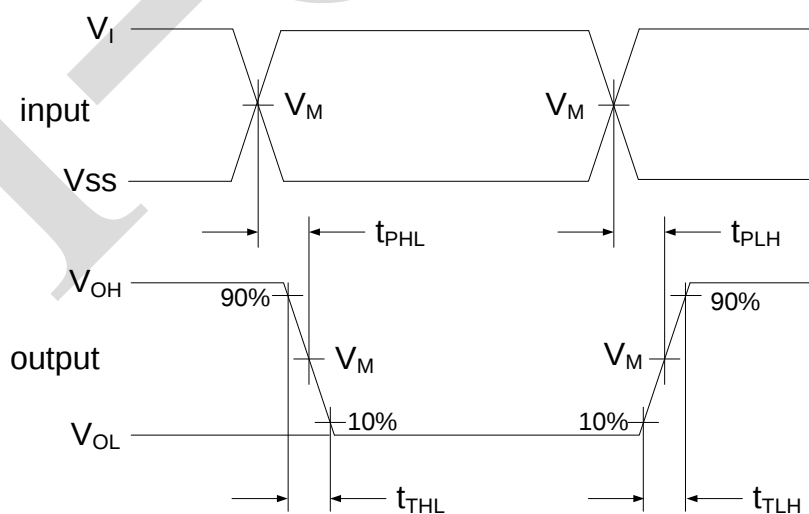


Figure 4. Propagation delay, output transition time

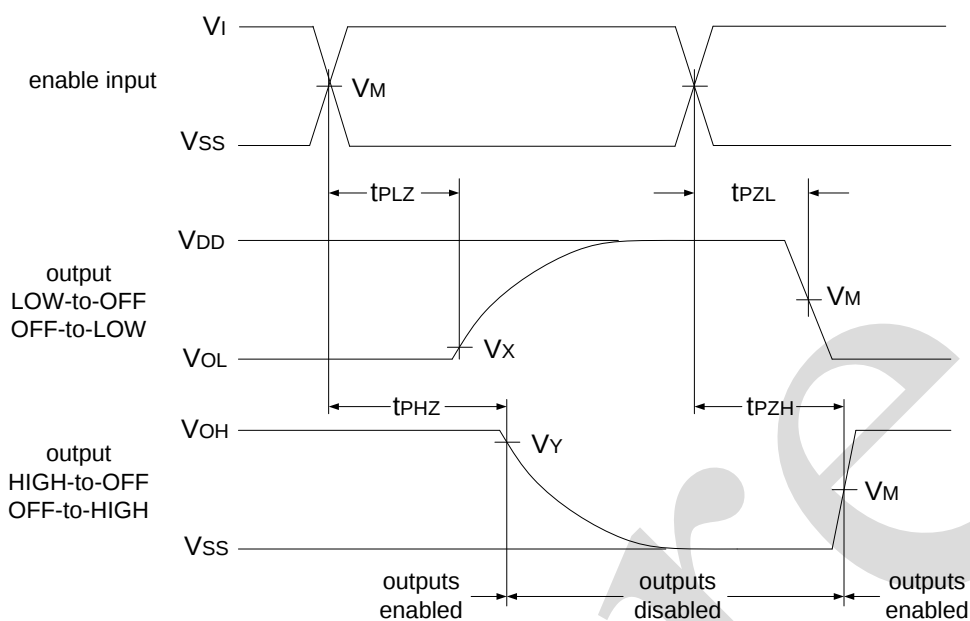


Figure 5. 3-state enable and disable times

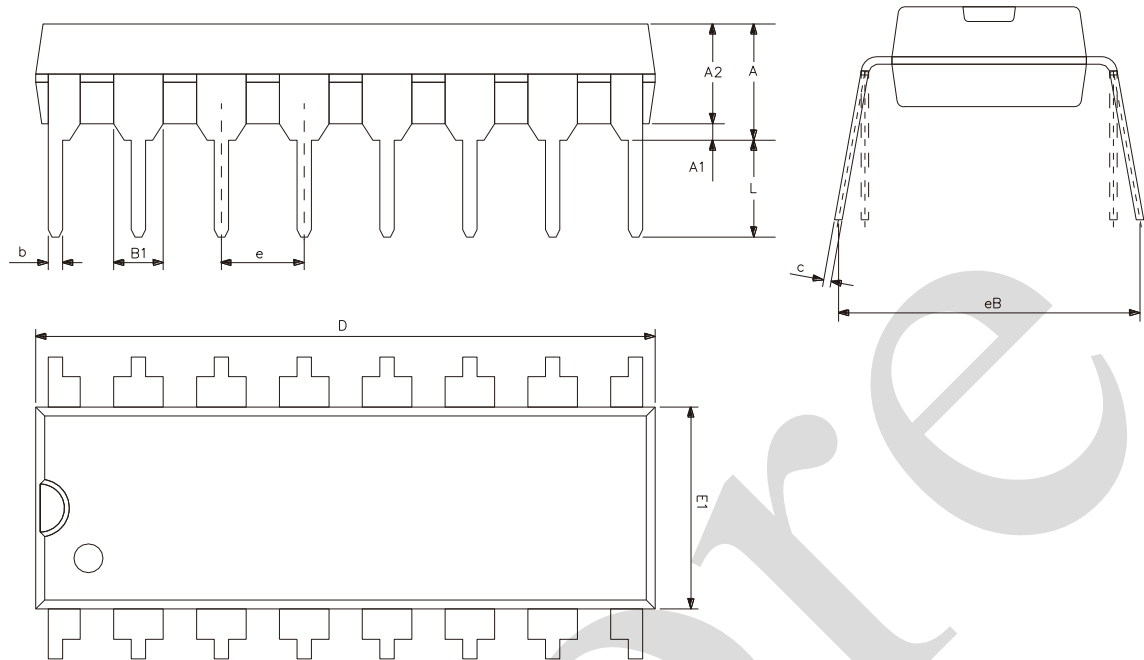
4.4、Measurement Points

Supply voltage	Input	Output		
V_{DD}	V_M	V_M	V_X	V_Y
5V to 15V	$0.5 \times V_{DD}$	$0.5 \times V_{DD}$	$0.1 \times V_{DD}$	$0.9 \times V_{DD}$



5、Package Information

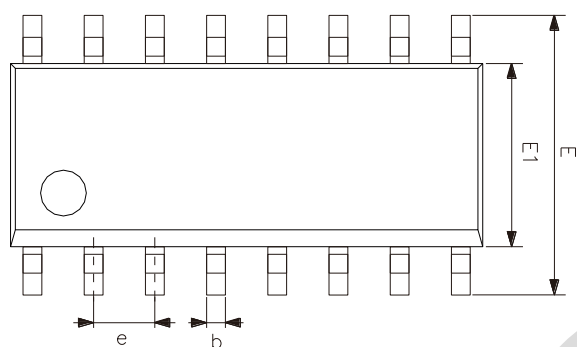
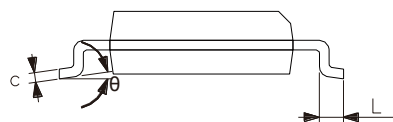
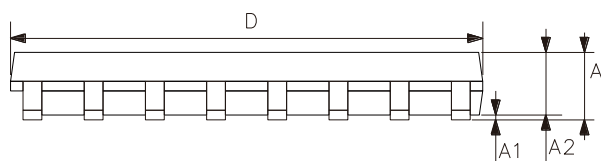
5.1、DIP16



Symbol	Dimensions (mm)	
	Min.	Max.
A2	3.20	3.60
A1	0.51	-
A	3.60	5.33
L	3.00	3.60
b	0.36	0.56
B1	1.52	
D	18.80	19.94
E1	6.20	6.60
e	2.54	
c	0.20	0.36
eB	7.62	9.30



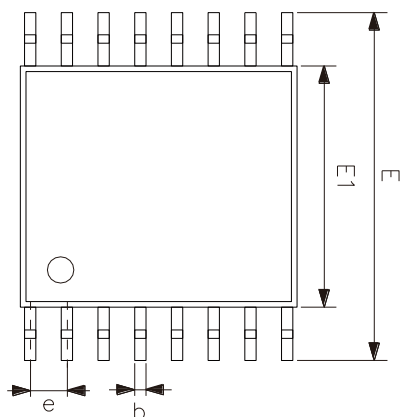
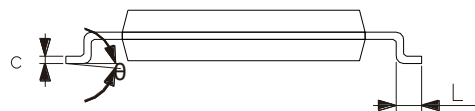
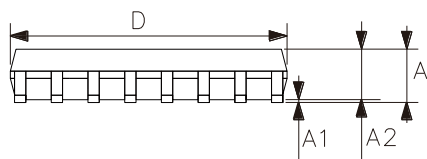
5.2、SOP16



Symbol	Dimensions (mm)	
	Min.	Max.
A	1.35	1.80
A1	0.10	0.25
A2	1.25	1.55
b	0.33	0.51
c	0.19	0.25
D	9.50	10.10
E	5.80	6.30
E1	3.70	4.10
e	1.27	
L	0.35	0.89
θ	0°	8°



5.3、TSSOP16



Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
θ	0°	8°



6、Statements And Notes

6.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

6.2、Notes

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