



# **CD2399**

## **Echo Processor IC**

### **Product Specification**

**Specification Revision History :**

<b>Version</b>	<b>Date</b>	<b>Description</b>
2013-02-A1	2013-02	Increase in the number and history
2013-12-A2	2013-12	Maximum output voltage



## 1、General Description

CD2399 is an echo audio processor IC utilizing CMOS Technology which is equipped with ADC and DAC, high sampling frequency and an internal memory of 44K digital processing is used to generate the delay time, it also features an internal VCO circuit in the system clock, thereby, making the frequency easily adjustable. CD2399 boast of very low distortion (THD< 0.5%)and very low noise( $N_0 < -90\text{dBV}$ ),thus producing high quality audio output. The pin assignments and application circuit are optimized for easy PCB layout and cost saving advantage.

### Features:

- CMOS Technology
- Least External Components
- Auto Reset Function
- Low Noise,  $N_0 < -90\text{dBV}$
- Low Distortion, THD< 0.5%
- External Adjustable VCO
- Available in 16 pins, DIP or SOP package

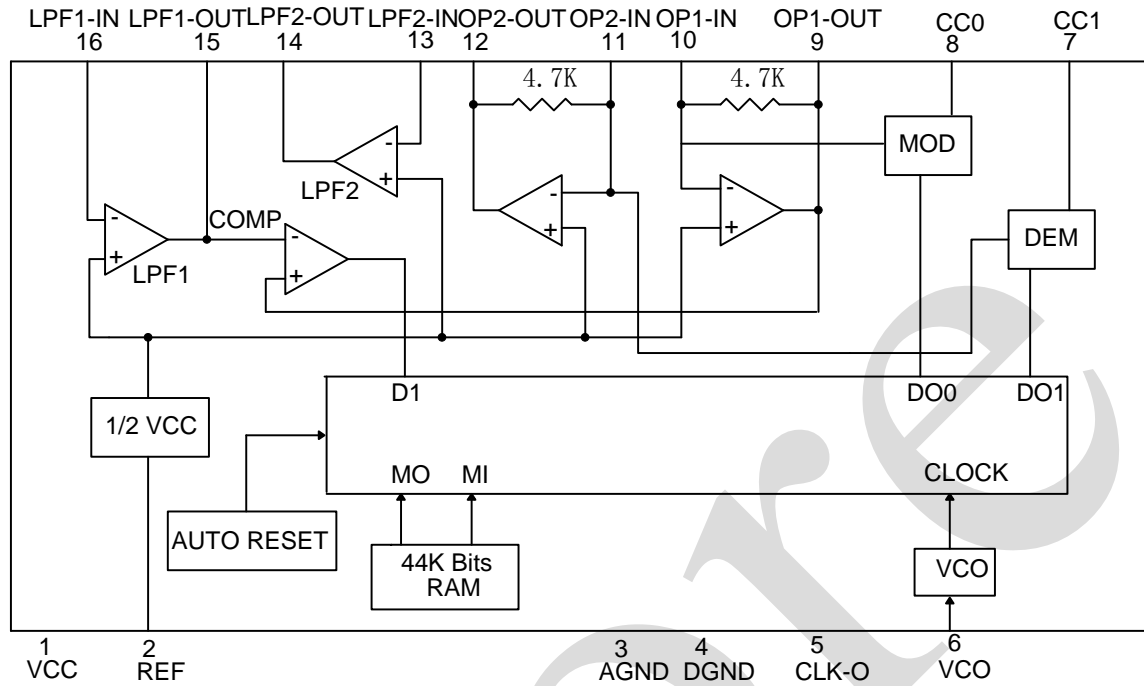
### Applications:

- Video Tape Recorder
- Video Compact Disk
- Television
- CD Player
- Car Stereo
- KARAOKE Mixer
- Electronic Musical Instrument
- Audio Equipment with Echo Processo

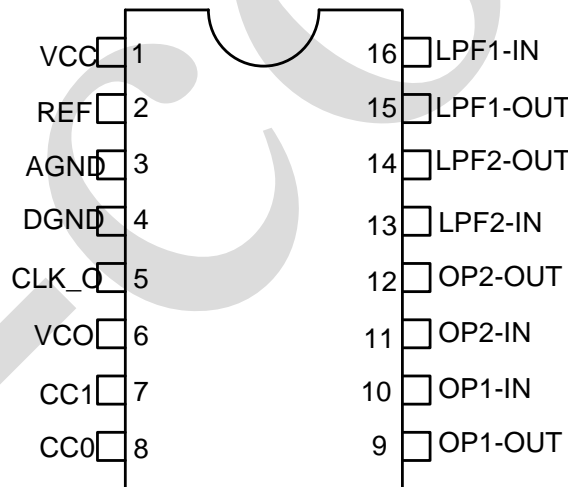


2、Block Diagram And Pin Description

2.1、Block Diagram



2.2、Pin Configurations



2.3、Pin Description

Pin No.	Pin Name	I/O	Function
1	VCC	—	Analog supply voltage input
2	REF	—	Analog reference voltage (=1/2VCC)
3	AGND	—	Analog ground
4	DGND	—	Digital ground
5	CLK-O	O	System clock output pin
6	VCO	I	Frequency adjustment pin
7	CC1	—	Current control 1
8	CC0	—	Current control 0



9	OP1-OUT	O	OP amplifier1 output
10	OP1-IN	I	OP amplifier1 input
11	OP2-IN	I	OP amplifier2 input
12	OP2-OUT	O	OP amplifier2 output
13	LPF2-IN	I	Low pass filter 2 input pin
14	LPF2-OUT	O	Low pass filter 2 output pin
15	LPF1-OUT	O	Low pass filter 1 output pin
16	LPF1-IN	I	Low pass filter 1 input pin

### 3、Electrical Parameter

#### 3.1、 Absolute Maximum Ratings(Ta=25°C,unless otherwise specified)

Parameter	Symbol	Value	Unit
Supply voltage	V <sub>CC</sub>	6.5	V
Supply current	I <sub>CC</sub>	100	mA
Power Dissipation	P <sub>D</sub>	1.7	W
Operation Temperature	T <sub>OPR</sub>	-20~+85	°C
Storage temperature	T <sub>STG</sub>	-25~+125	°C

#### 3.2、 Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Units
Supply voltage	V <sub>CC</sub>	4.5	5	5.5	V
Clock frequency	f <sub>CK</sub>		4	5	MHz

#### 3.3、 Electrical Characteristics

##### 3.3.1 AC Characteristics(unless otherwise

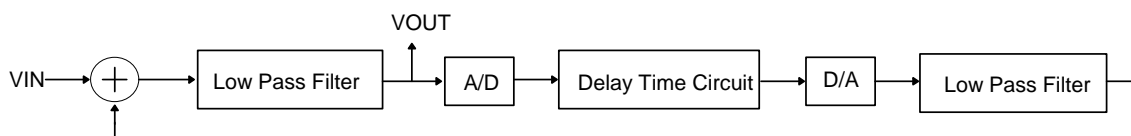
specified: V<sub>CC</sub>=5.0V, f<sub>in</sub>=1KHz, V<sub>i</sub>=100mVrms, f<sub>CK</sub>=4MHz, Ta=25°C )

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Units
Supply voltage	V <sub>CC</sub>		4.5	5.0	5.5	V
Supply current	I <sub>CC</sub>			30	40	mA
Voltage gain	G <sub>V</sub>	RL=47KΩ		-0.5	2.5	dB
Maximum output voltage	V <sub>OMAX</sub>	THD=1%	1.5	2	2.5	Vpp
Output distortion	THD	filter=Audio		0.3	1.0	%
Output noise voltage	N <sub>O</sub>	filter=A-weighting		-90	-80	dBV
Power supply rejection ratio	PSRR	ΔV <sub>CC</sub> = -20dBV(0.1Vrms) f=100Hz		-40	-30	dB

### 4、 Function Description

#### 4.1、 Echo mode

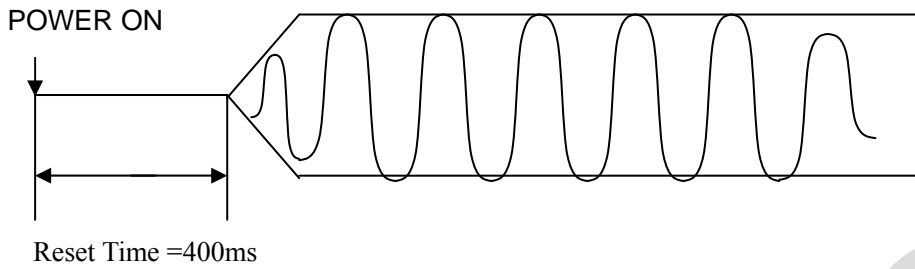
Please refer to the diagram below:





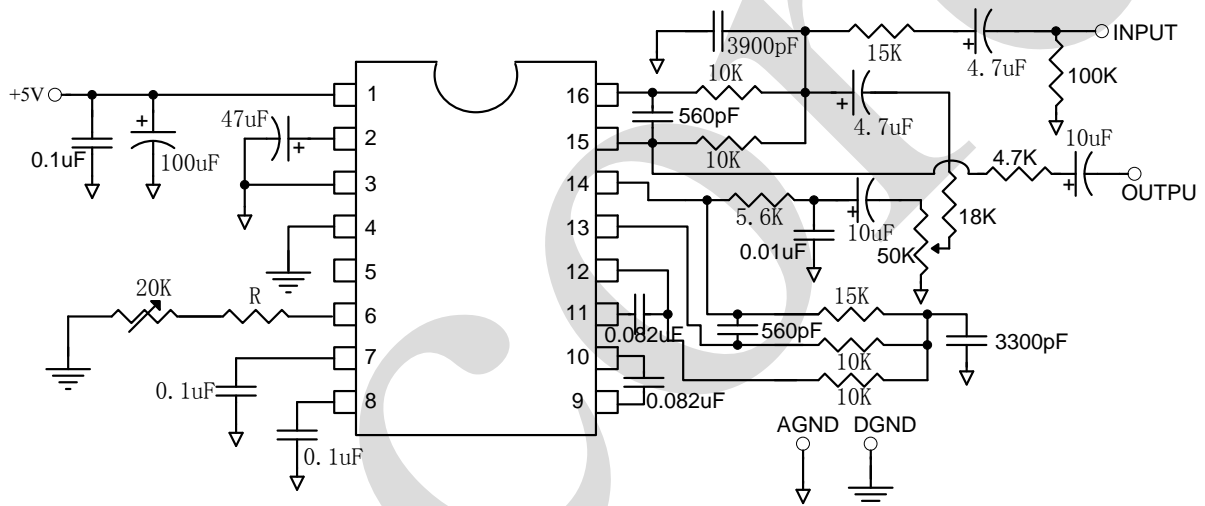
### 4.2、 Auto reset function

The waveform of the signal during Power ON is given below:



## 5、 Typical Application Circuit And Application Note

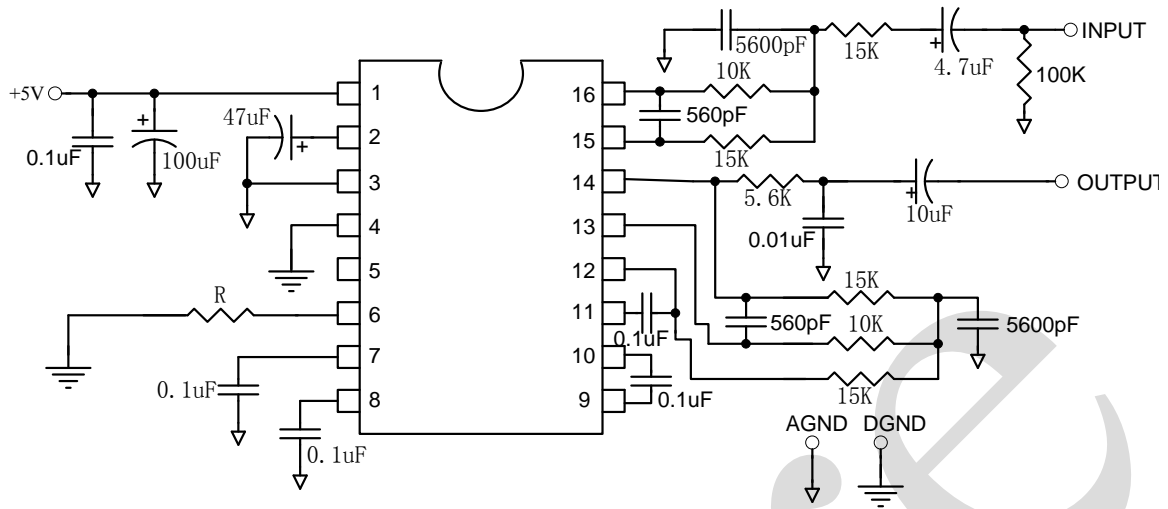
### 5.1、 CD2399 Echo Application Circuit



Note: External Resistor having a value of 10K ~ 50K may be used. The recommended Resistor Value(R) is 10KΩ. When the value of the Resistor(R) increases, the range of the Delay Time also increases.



5.2、CD2399 Surround/Delay Application Circuit



Note: Please refer to table 1 for the Resistor/Delay Time values

Table 1: Resistor/Delay Time values

<b>R</b>	27.6K	21.3K	17.2K	14.3K	12.1K	10.5K	9.2K	8.2K
<b>fck</b>	2.0M	2.5M	3.0M	3.5M	4.0M	4.5M	5.0M	5.5M
<b>td</b>	342ms	273ms	228ms	196ms	171ms	151ms	136.6ms	124.1ms
<b>THD</b>	1.0%	0.8%	0.63%	0.53%	0.46%	0.41%	0.36%	0.33%

<b>R</b>	7.2K	6.4K	5.8K	5.4K	4.9K	4.5K	4K	3.4K
<b>fck</b>	6.0M	6.5M	7.0M	7.5M	8.0M	8.5M	9.0M	10M
<b>td</b>	113.7ms	104.3ms	97.1ms	92.2ms	86.3ms	81ms	75.9ms	68.1ms
<b>THD</b>	0.29%	0.27%	0.25%	0.25%	0.23%	0.22%	0.21%	0.19%

<b>R</b>	2.8K	2.4K	2K	1.67K	1.47K	1.28K	1.08K	894
<b>fck</b>	11M	12M	13M	14M	15M	16M	17M	18M
<b>td</b>	61.6ms	56.6ms	52.3ms	48.1ms	45.8ms	43ms	40.6ms	38.5ms
<b>THD</b>	0.18%	0.16%	0.15%	0.15%	0.15%	0.15%	0.14%	0.14%

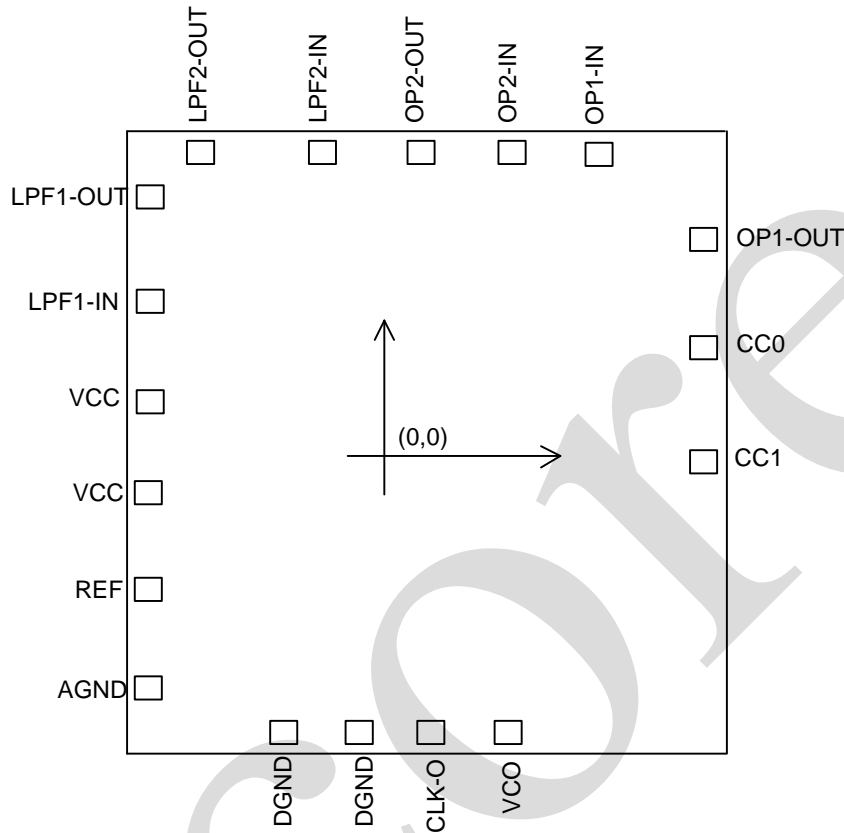
<b>R</b>	723	519	288	0.5
<b>fck</b>	19M	20M	21M	22M
<b>td</b>	36.6ms	34.4ms	32.6ms	31.3ms
<b>THD</b>	0.14%	0.13%	0.13%	0.13%

Note: R=External Resistor (ohms), please refer to CD2399 Surround/Delay Time Application Circuit  
 fck=Clock Frequency(Hz)  
 td=Delay Time  
 THD=Total Harmonic Distortion



### 6、 Pad Diagram And Pad Location

#### 6.1、 Pad Diagram



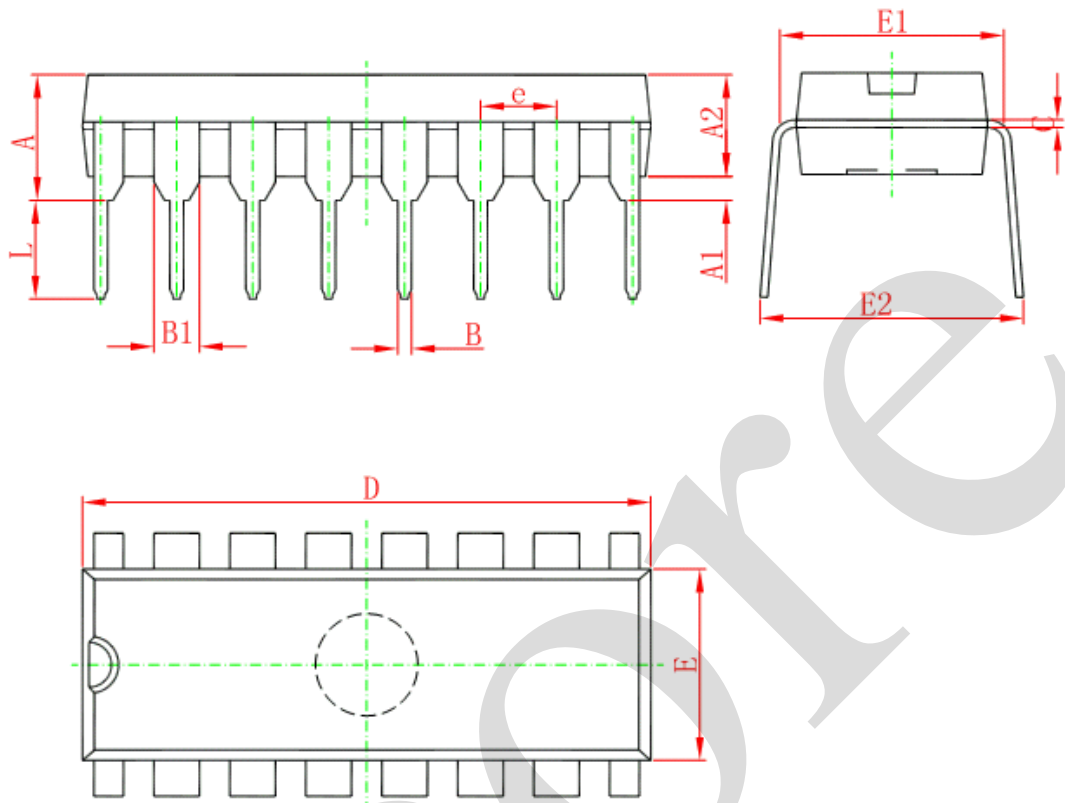
#### 6.2、 Pad Location (UNIT: μm)

PAD NAME	X	Y	PAD NAME	X	Y
VCC	55.0	674.7	CC0	2240.7	1043.9
VCC	55.0	885.5	OP1-OUT	2240.7	1286.5
REF	55.0	496.4	OP1-IN	1819.2	1597.4
AGND	55.0	165.2	OP2-IN	1505.2	1597.4
DGND	692.9	55.0	OP2-OUT	1222.7	1597.4
DGND	893.0	55.0	LPF2-IN	870.5	1597.4
CLK-O	1075.3	55.0	LPF2-OUT	285.0	1597.4
VCO	1317.7	55.0	LPF1-OUT	55.0	1430.5
CC1	2240.7	798.5	LPF1-IN	55.0	1078.3



### 7、Package Information

#### 7.1、DIP16

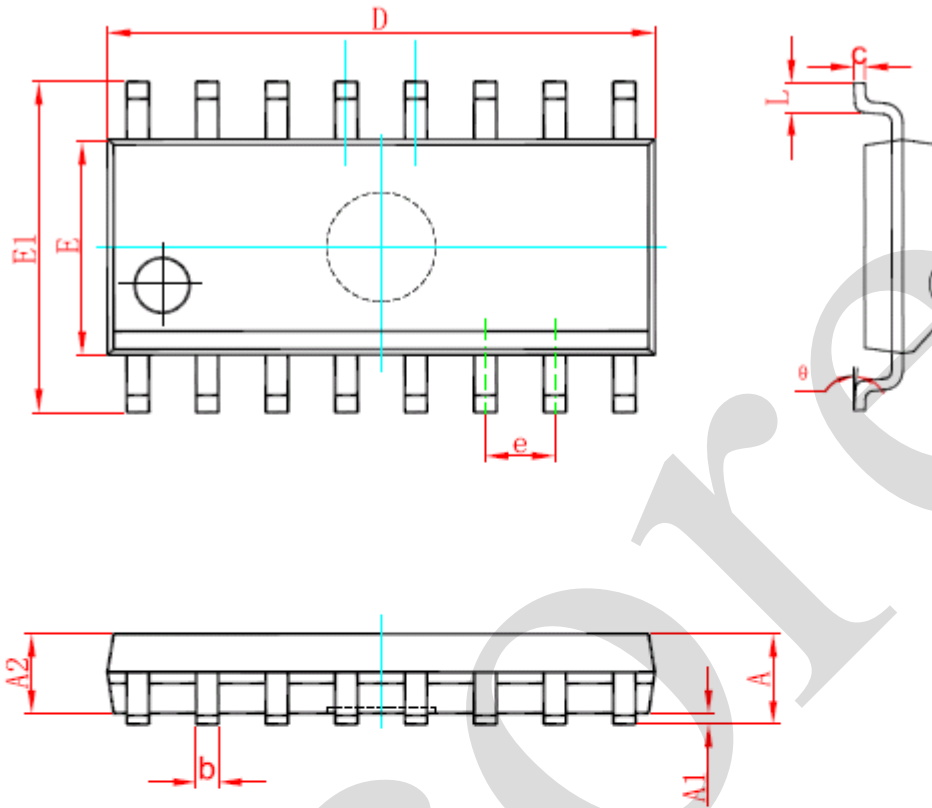


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524 (BSC)		0.060 (BSC)	
C	0.204	0.360	0.008	0.014
D	18.800	19.200	0.740	0.756
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312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





7.2、SOP16



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	9.800	10.200	0.386	0.402
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°



## 8、 Statements And Notes:

### 8.1、 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
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。					

### 8.2、 Notion:

Recommended carefully reading this information before the use of this product;

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The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.