



AiP8280A/B

2.7V to 120V, 1.1MHz, High Precision High-side Current Sense Amplifier

Product Specification

Specification Revision History:

Version	Date	Description
2024-08-A0	2024-08	New
2025-12-A1	2025-12	Modify the parameters



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1、General Description

The AiP8280A/B is a high-side current sense amplifier, which operates from a single 2.7V to 30V supply and can measure voltage drops across shunt resistors over a wide common-mode range from 2.7 V to 120 V.

The AiP8280A/B has five gain options: 20V/V, 50V/V, 100V/V, 200V/V, and 500V/V. The current measurement accuracy is achieved thanks to the combination of an ultra-low offset voltage of $\pm 150\mu\text{V}$, a small gain error of $\pm 0.5\%$, and a high DC CMRR of 140dB. The AiP8280A/B is not only designed for DC current measurement, but also for high-speed applications with a high bandwidth of 1.1MHz (at gain of 20V/V).

The AiP8280A/B enables accurate current sensing over the extended operating temperature range of -40°C to $+125^{\circ}\text{C}$. Under typical conditions, the device draws a $350\mu\text{A}$ supply current.

Features:

- Common-mode voltage:
2.7V to 120V
- Accuracy
Gain:
 - Gain error: $\pm 0.5\%$ (max.)
 - Gain drift: $\pm 20\text{ ppm}/^{\circ}\text{C}$ (max.)Offset:
 - Offset voltage: $\pm 150\mu\text{V}$ (max.)
 - Offset drift: $\pm 1\mu\text{V}/^{\circ}\text{C}$ (max.)
- CMRR:
120-dB DC (Min.)
72-dB AC at 50 kHz
- High bandwidth: 1.1 MHz
- Available gains:
AiP8280A1/B1: 20V/V
AiP8280A2/B1: 50V/V
AiP8280A3/B1: 100V/V
AiP8280A4/B1: 200V/V
AiP8280A5/B1: 500V/V
- Quiescent current: $350\mu\text{A}$ (typ.)
- Temperature range: -40°C to 125°C
- Package information: SOT353, SOT23-5
- ESD level: 6KV- HBM



Ordering Information:

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP8280A1GC353.TR	SOT353	JCXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm
AiP8280A2GC353.TR	SOT353	JDXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm
AiP8280A3GC353.TR	SOT353	JEXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm
AiP8280A4GC353.TR	SOT353	JFXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm
AiP8280A5GC353.TR	SOT353	JGXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.1mm×1.3mm Pin spacing: 0.65mm
AiP8280A1GB235.TR	SOT23-5	JCXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8280A2GB235.TR	SOT23-5	JDXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8280A3GB235.TR	SOT23-5	JEXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8280A4GB235.TR	SOT23-5	JFXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8280A5GB235.TR	SOT23-5	JGXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm



AiP8280B1GB235.TR	SOT23-5	KLXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8280B2GB235.TR	SOT23-5	KMXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8280B3GB235.TR	SOT23-5	KNXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8280B4GB235.TR	SOT23-5	KPXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm
AiP8280B5GB235.TR	SOT23-5	KQXX	3000 PCS/reel	30000 PCS/box	Dimensions of plastic enclosure: 2.9mm×1.6mm Pin spacing: 0.95mm

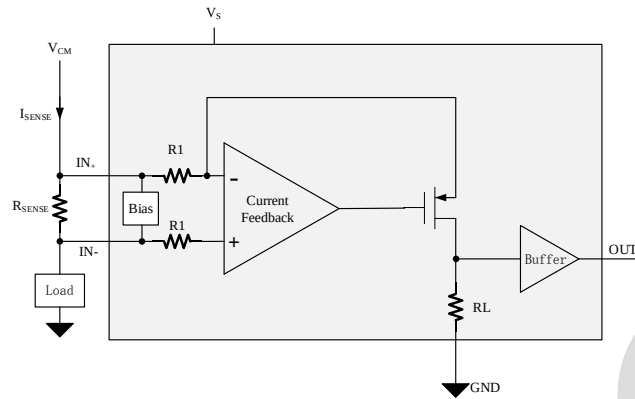
Note 1: “XX” refers to variable content, meaning year and package batch serial number.

Note 2: 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

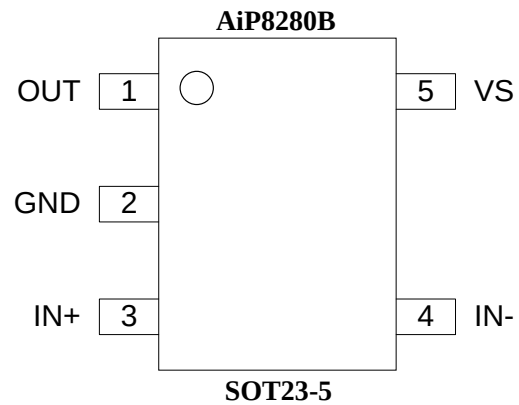
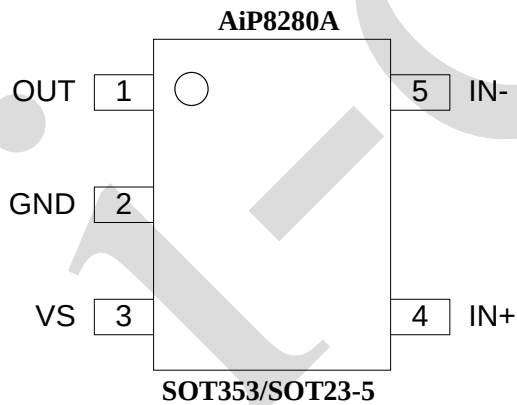


AiP8280A/B Type List

Product	Gain	R1	RL
AiP8280A1/B1	20	25K	500K
AiP8280A2/B2	50	10K	500K
AiP8280A3/B3	100	10K	1M
AiP8280A4/B4	200	5K	1M
AiP8280A5/B5	500	2K	1M

$$OUT = \frac{R_L}{R_1} (I_{SENSE} * R_{SENSE})$$

2.2、Pin Configurations





2.3、Pin Description

Pin No.		Pin Name	IO	Description
AiP8280A	AiP8280B			
1	1	OUT	O	Output voltage
2	2	GND	Ground	Ground
3	5	VS	Power	Power supply
4	3	IN+	I	Connect to supply side of shunt resistor
5	4	IN-	I	Connect to load side of shunt resistor

3、Electrical Parameter

3.1、Absolute Maximum Ratings

($T_{amb}=25^{\circ}\text{C}$, unless otherwise specified)

Characteristic	Symbol	Conditions	Min.	Max.	Unit
Supply Voltage	V_S	-	-0.3	33	V
Input Voltage	V_{IN+}, V_{IN-}	$V_{IN+}-V_{IN-}$	-30	30	V
		$(V_{IN+}+V_{IN-})/2$	-17	122	V
Ambient Temperature	T_{amb}	-	-40	125	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-	-65	150	$^{\circ}\text{C}$
ESD Level	HBM	-	-	± 6	kV
Soldering Temperature	T_L	10s	260		$^{\circ}\text{C}$

3.2、Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Common-Mode Input Voltage	V_{CM}	V_S	48	120	V
Supply Voltage	V_S	2.7	5	30	V

3.3、Electrical Characteristics

($T_{amb}=25^{\circ}\text{C}$, $V_S=5\text{V}$, $V_{SENSE}=V_{IN+}-V_{IN-}=0.5\text{V}/\text{Gain}$, $V_{CM}=V_{IN-}=48\text{V}$, unless otherwise specified)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Input						
Common-Mode Rejection Ratio	CMRR	V _{CM} =2.7V to 120V, T _{amb} =-40℃ to +125℃	120	140	-	dB
		f=50kHz	-	72	-	dB
Offset Voltage, Input Referred	V _{OS}	-	-	15	±150	μV
Offset Voltage Drift	dV _{OS} /dT	T _{amb} =-40℃ to +125℃	-	-	1	μV/℃
Power Supply Rejection Ratio, Input Referred	PSRR	V _S =2.7V to 20V, T _{amb} =-40℃ to +125℃	-	1	±10	μV/V
Input Bias Current	I _B	I _{B+} , V _{SENSE} =0mV	10	15	25	μA
		I _{B-} , V _{SENSE} =0mV	10	15	25	μA
Output						
Gain	G	AiP8280A1/B1	-	20	-	V/V
		AiP8280A2/B2	-	50	-	

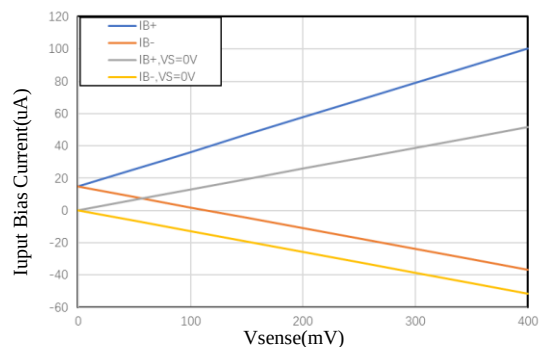


		AiP8280A3/B3	-	100	-	
		AiP8280A4/B4	-	200	-	
		AiP8280A5/B5	-	500	-	
Gain Error	E _G	GND+50mV≤V _{OUT} ≤V _S -200mV	-	0.1	±0.5	%
Gain Error Temperature Drift	E _G TC	T _{amb} =-40℃ to +125℃	-	2.5	20	ppm/℃
Nonlinearity error	-	-	-	0.01	-	%
Maximum Capacitor Load	C _{LOAD}	No sustained oscillations, no isolation resistor	-	500	-	pF
Voltage Output						
Output Swing from Power Rail	V _{OH}	R _{LOAD} =10kΩ, -40℃ to +125℃	-	V _S -0.07	V _S -0.2	V
Output Swing from Ground Rail	V _{OL}	R _{LOAD} =10kΩ, V _{SENSE} =0V, -40℃ to +125℃	-	0.005	0.025	V
Frequency Response						
Bandwidth	BW	AiP8280A1/B1, C _{LOAD} =5pF, V _{SENSE} =200mV	-	1100	-	kHz
		AiP8280A2/B2, C _{LOAD} =5pF, V _{SENSE} =80mV	-	1100	-	
		AiP8280A3/B3, C _{LOAD} =5pF, V _{SENSE} =40mV	-	900	-	
		AiP8280A4/B4, C _{LOAD} =5pF, V _{SENSE} =20mV	-	850	-	
		AiP8280A5/B5, C _{LOAD} =5pF, V _{SENSE} =8mV	-	800	-	
Swing Rate	SR	-	-	2.4	-	V/μs
Settling Time		V _{OUT} =4V ±0.1V step, output settles to 0.5%	-	9	-	μs
		V _{OUT} =4V ±0.1V step, output settles to 1%	-	5	-	
Noise RTI						
Voltage noise density	V _{en}	f =1 kHz	-	50	-	nV /√Hz
Power Supply						
Power Supply Voltage	V _S	T _{amb} =-40℃ to +125℃	2.7	-	30	V
Quiescent Current	I _Q	-	-	350	500	μA
		T _{amb} =-40℃ to +125℃	-	-	600	

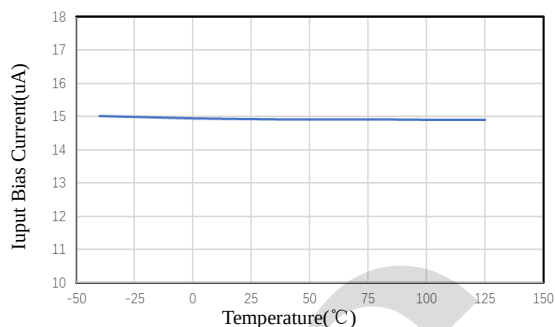


4、Characteristic Curve

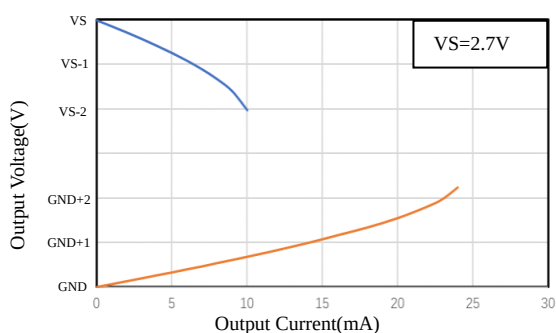
($T_{amb}=25^{\circ}\text{C}$, $V_S=5\text{V}$, $V_{SENSE}=V_{IN+}-V_{IN-}=0.5\text{V}/\text{Gain}$, $V_{CM}=V_{IN-}=48\text{V}$, unless otherwise specified)



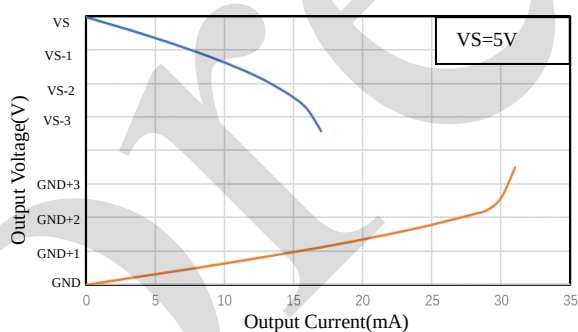
Input Bias Current vs Vsense, A3 devices



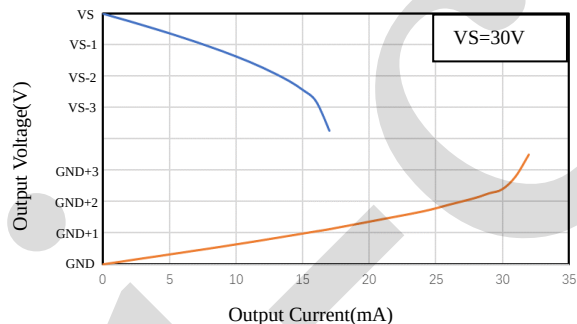
Input Bias Current vs Temperature



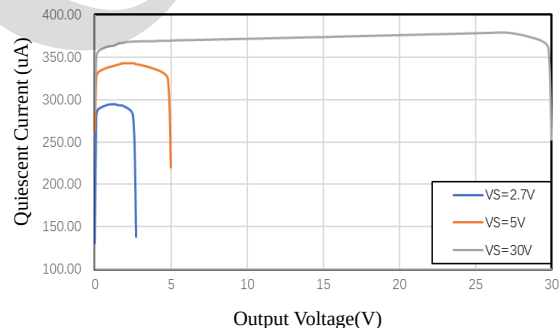
Output Voltage vs Output Current



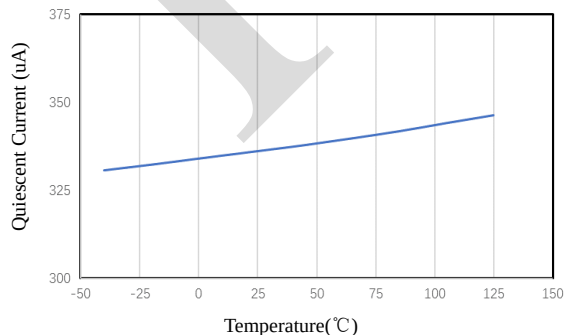
Output Voltage vs Output Current



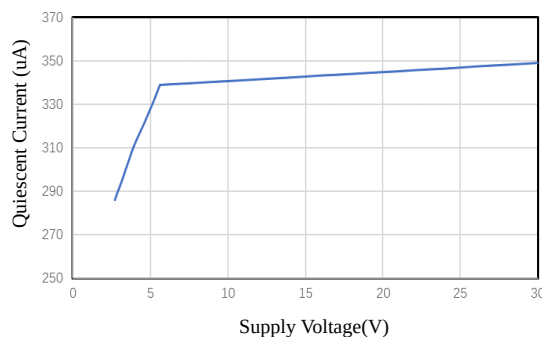
Output Voltage vs Output Current



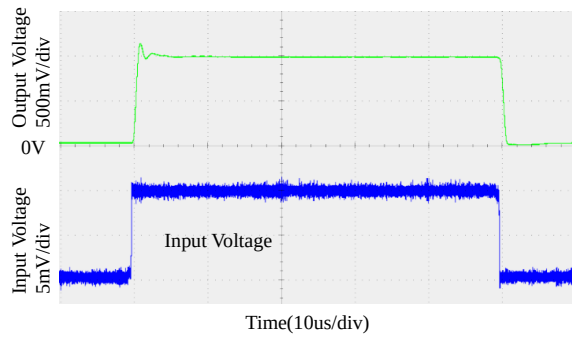
Quiescent Current vs Output Voltage



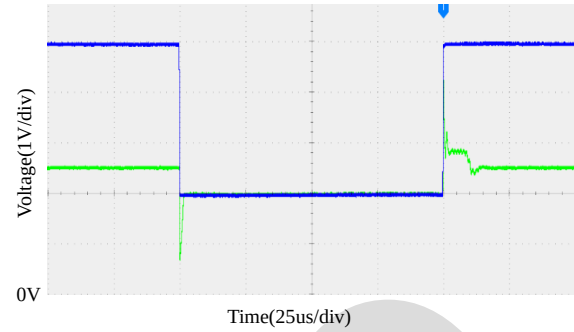
Quiescent Current vs Temperature



Quiescent Current vs Supply Voltage



Step Response,A3 devices



Supply Transient Response,A3 devices

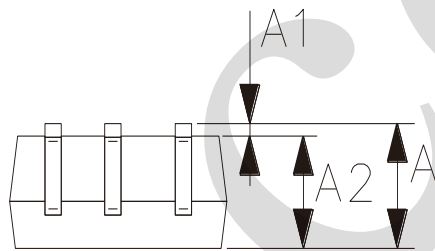
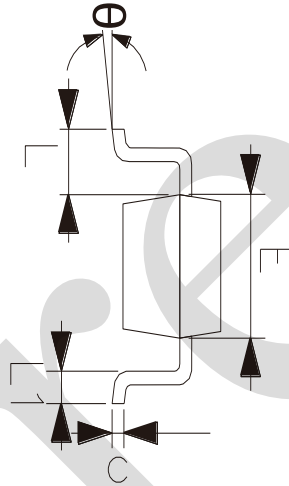
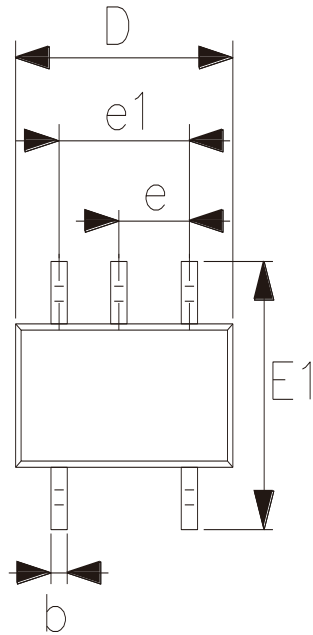
5、Power Supply Recommendations

The input circuitry of the AiP8280A/B device can accurately measure beyond the power-supply voltage. The power supply can be 30 V, whereas the load power-supply voltage at IN+ and IN- can go up to 120V. The output voltage range of the OUT pin is limited by the voltage on the VS pin and the device swing to supply specification.



6、Package Information

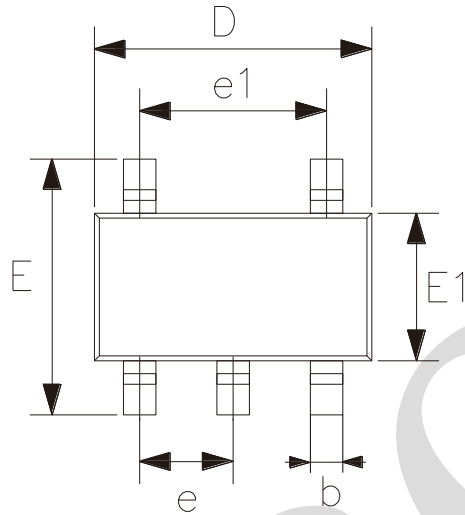
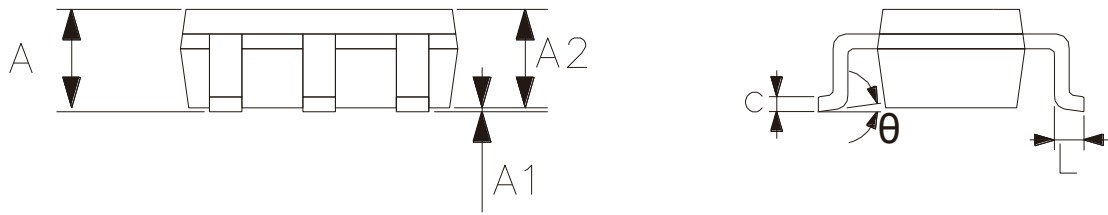
6.1、SOT353



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	0.90	1.10
A1	0.00	0.10
A2	0.90	1.00
b	0.15	0.35
c	0.11	0.175
D	2.00	2.20
E	1.15	1.35
E1	2.15	2.45
e	0.65	
e1	1.20	1.40
L	0.525	
L1	0.26	0.46
θ	0°	8°



6.1、SOT23-5



2023/12/A	Dimensions In Millimeters	
Symbol	Min.	Max.
A	—	1.26
A1	0.00	0.12
A2	1.00	1.20
b	0.30	0.50
c	0.10	0.20
D	2.82	3.02
E	2.60	3.00
E1	1.50	1.70
e	0.95	
e1	1.80	2.00
L	0.30	0.60
θ	0°	8°



7、Statements And Notes

7.1、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.									

7.2、Notes

We recommend you to read this chapter carefully before using this product.

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