Overvoltage protection chip which has withstand voltage of 32V

1 Features

- Over-voltage protection :6.1V/12V
- OVP response time :100ns
- input voltage tolerance up to 32V
- Integrated short-circuit protection
- Integrated over-temperature protection
- Package：SOT-23-3

2 Applications

- Low-Power Handheld Devices
- Mobile phones, tablets and other portable devices

3 Description

The IP2610 is an integrated IC with input overvoltage protection.

Input voltage tolerance up to 32V. When the input voltage is detected to be greater than the OVP protection threshold, the integrated power tube can be quickly shut down to prevent the input high voltage from damaging the device on the output.

The IP2610 has integrated over-temperature protection and shuts down the power tube output when the internal temperature of the chip is detected.

Directory

4 Modify records

NOTE：The page numbers of the previous version may differ from the page numbers of the current version.

Changed Version V1.00 to Version V1.01	Page
● Update pin description	4

Changed Version V1.01 to Version V1.02 (June 2023)	Page
● Chapter 10 increases the maximum continuous current parameter	5

Changed Version V1.02 to Version V1.03 (July 2024)	Page
● Modify package size	11

5 Simplify the application schematic

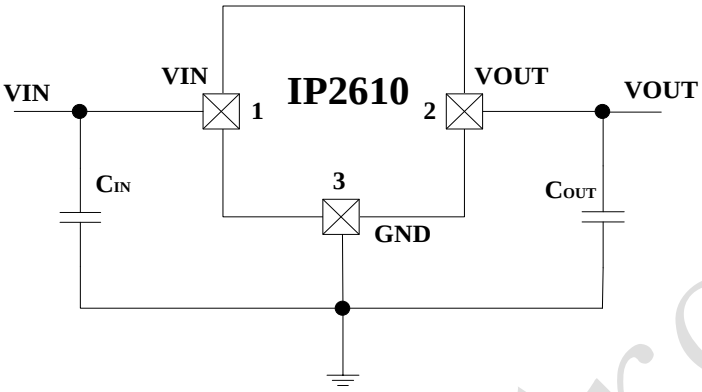


Figure1 IP2610 Simplify the application schematic

6 Common Custom Product Description

Name	Description
IP2610	Standard IP2610（6.1V overvoltage protection）
IP2610H	12V overvoltage protection

7 Pin Description

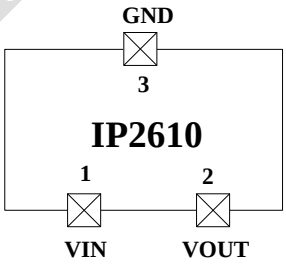


Figure2 Pin of IP2610

7.1 Pin Description

Pin name	Pin number	Description
1	VIN	Input pin
2	VOUT	Output pin
3	GND	Ground pin

8 Internal block diagram of the chip

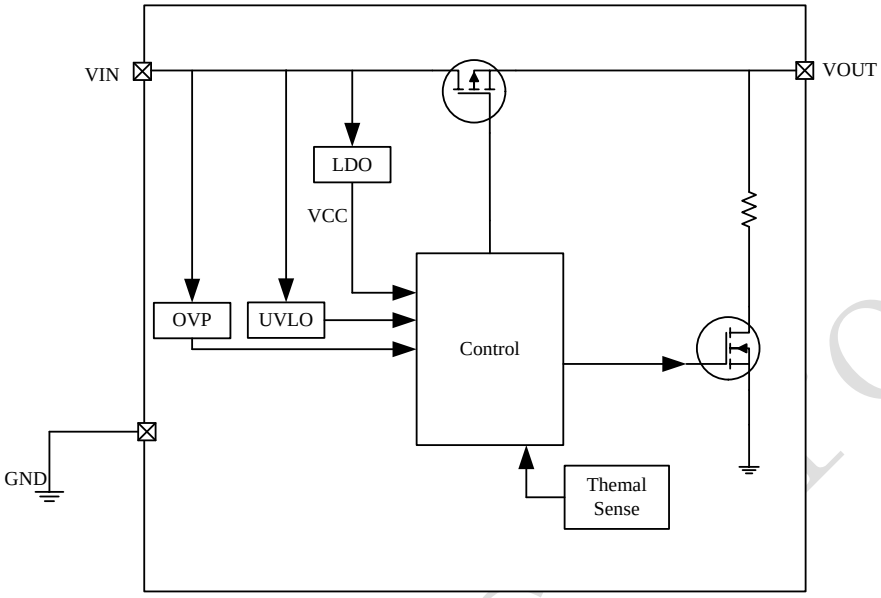


Figure3 Internal block diagram of IP2610

9 Limit parameters

Parameter	Symbol	Value	Units
Input voltage Range	V_{IN}	-0.3 ~ 36	V
Output voltage Range	V_{OUT}	-0.3 ~ 20	V
Junction temperature Range	T_J	-40 ~ 150	℃
Storage Temperature Range	T_{stg}	-65 ~ 150	℃
Package Thermal Resistance	θ_{JA}	220	℃/W
Human Body Model (HBM)	ESD	4	KV

*Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to Absolute Maximum Rated conditions for extended periods may affect device reliability.

10 Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}	2	5	36	V
MAX Continuous Output current	I_{OUT}			1	A

*Devices' performance cannot be guaranteed when working beyond those Recommended Operating Conditions.

11 Electrical Characteristics

Unless otherwise specified，T_A=25℃，V_{IN}=5V

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Voltage						
Startup delay time	T_{DE}	VIN rises from 0V to 5V in 1uS		10		μs
Input quiescent current	I_{DD}	VIN=5V，no load at the output		250		μA
On-resistance	R_{DSON}	VIN=5V，IOUT=0.5A		350		mΩ
Input overvoltage protection						
OVP voltage	V_{OVP}	VIN rises from 5V to 7V	5.9	6.1	6.3	V
OVP hysteresis voltage	V_{OVP_HYS}	VIN drops from 7V to 5V		300		mV
OVP response time	$t_{PD(OVP)}$			0.1	0.3	μs
OVP Recovery time	$t_{REC(OVP)}$			7		μs
Output short-circuit protection						
Short-circuit protection threshold	V_{SCP}	VIN-VOUT>1V		1		V
Short-circuit protection response time	T_{SC}			400		μs
Short-circuit protection recovery time	$t_{REC(SCP)}$			5		ms
Thermal shutdown junction temperature	T_{OTP}	Rising temperature	130	140	150	℃
Thermal shutdown hysteresis	ΔT_{OTP}		30	40	50	℃

12 Function description

12.1 Input overvoltage protection

When the input voltage exceeds the set V_{OVP}, the internal power tube will turn off within 100ns, turning off the output. When the input voltage drops to V_{OVP_HYS}, the output is turned back on.

12.2 Output short-circuit protection

When the output is shorted, the IP2610 enters the protected state and hiccups restart until the output short circuit state is canceled.

12.3 Over-temperature protection

When the chip junction temperature is detected to be greater than 140 °, it will enter the over-temperature protection state. Close internal power tube and stop the output.

12.4 Apply curves

Figure4 VIN power-on start（VIN=5V）

Figure5 VIN powered off（VIN=5V-0V）

Figure6 VIN voltage protection（VIN=5V-7V）

Figure7 VIN voltage recovery（VIN=7V-5V）

12.5 Temperature characteristic curve

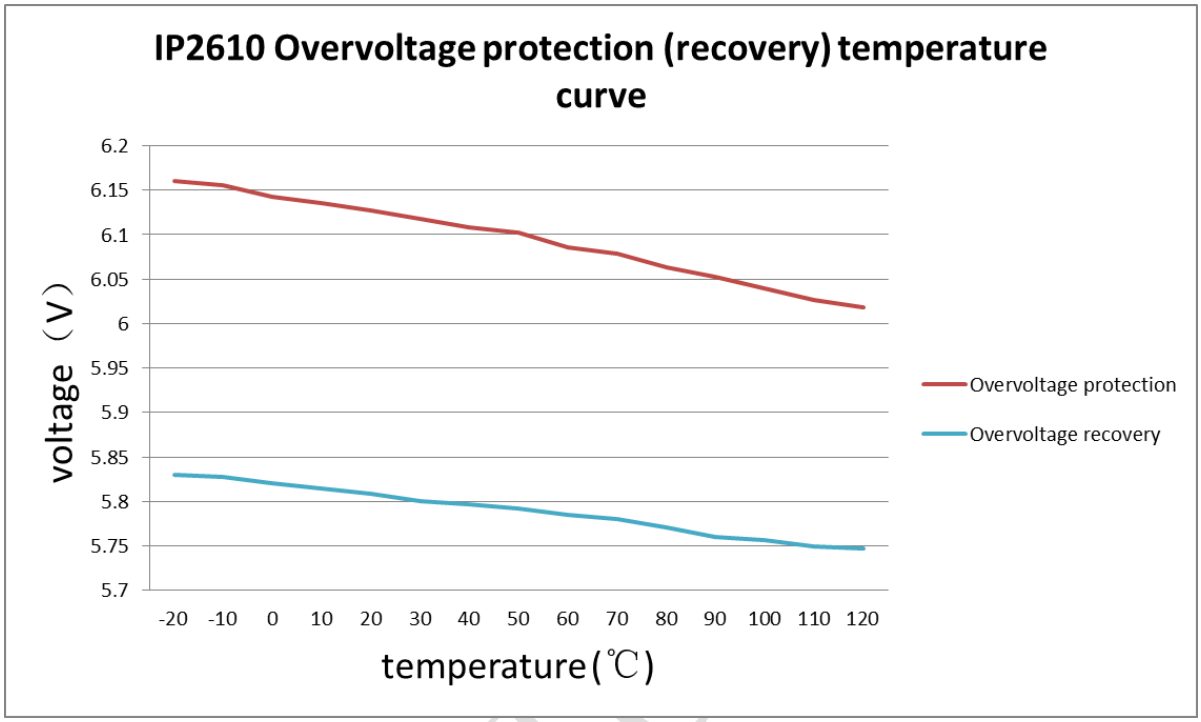
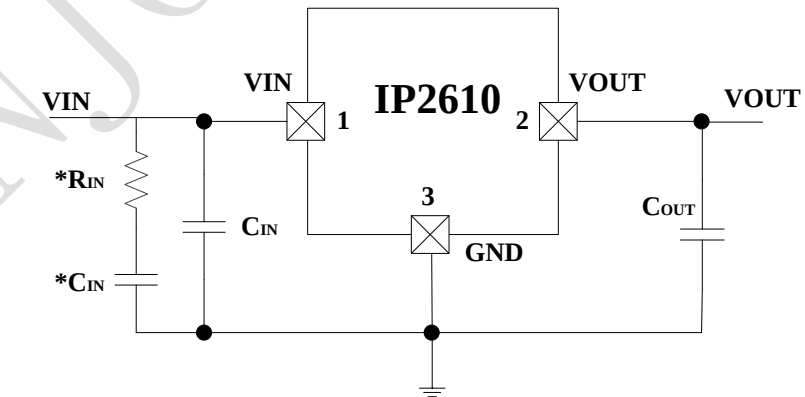


Figure8 voltage protection (recovery) temperature curve

13 Typical application schematic



***There are more than 24V plugs that need to add *CIN, *RIN**
It is recommended that *CIN=1uF, *RIN=2R

Figure9 Typical application schematic

14 BOM

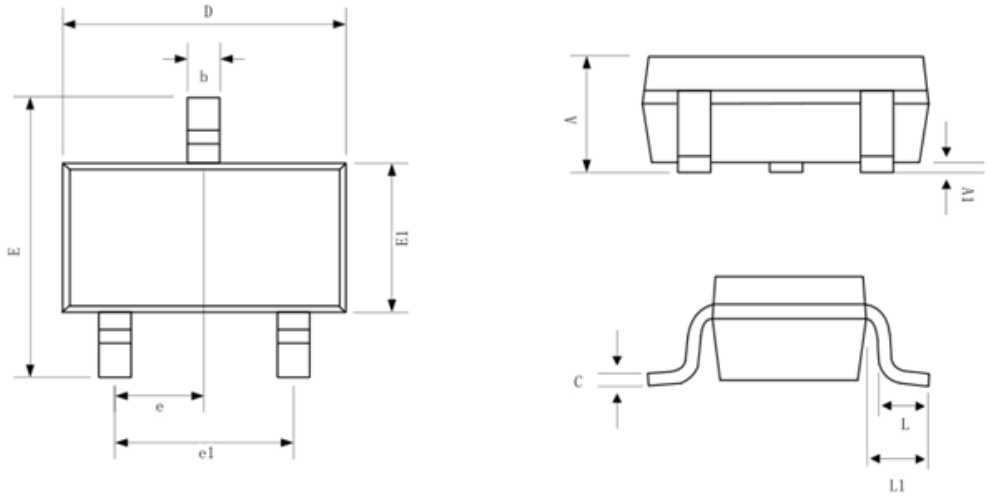
Number	Component name	Model & Specification	Units	amount	location	note
1	IC	IP2610	PCS	1	U1	
2	SMD capacitors	0603 104 50V 10%	PCS	2	C1、C2	

15 Silk screen instructions

Explain:
1、2610 --Product name
2、XXXX --Product number
3、○ --Pin1 position

Figure10 Screen printing

16 Package



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.000	--	1.250
A1	0.000	0.050	0.100
b	0.300	0.400	0.500
c	0.100	0.150	0.200
D	2.800	2.900	3.000
E	2.600	2.800	3.000
E1	1.500	1.600	1.700
e	0.950BSC		
e1	1.900BSC		
L	0.400	0.500	0.600
L1	0.600REF		

Figure11 IP2610 SOT23-3 Package outline dimension

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