30V input withstand voltage overvoltage protection chip supporting TYPE_C port

1 Features

- **Input overvoltage protection voltage 6V**
- **Input overvoltage protection shutdown time 100ns**
- **30V input withstand voltage**
- **Support TYPE_C port charge/discharge function**
- **Integrated short-circuit protection**
- **Integrated over-temperature protection**
- **Package: SOT23-3**

2 Typical Applications

- **Low-power handheld devices**
- **Portable devices such as cell phones, tablets, etc.**

3 Description

The IP2615 is an integrated IC with input overvoltage protection.

The IP2615 has an input withstand voltage of 30V; when an input voltage greater than the OVP protection threshold is detected, it can quickly shut down the internal integrated power tubes, preventing the input high voltage from damaging the devices on the output

The IP2615 has integrated over-temperature protection, which also shuts down the power tube outputs when the internal temperature of the chip is detected to be too high.

The IP2615 has integrated short circuit protection, when a short circuit exists in the output, it will enter the protection state and hiccup and restart until the output short circuit state is undone;

IP2615 supports TYPE_C charging and discharging function, support charging and discharging voltage range:3.5V-6V.

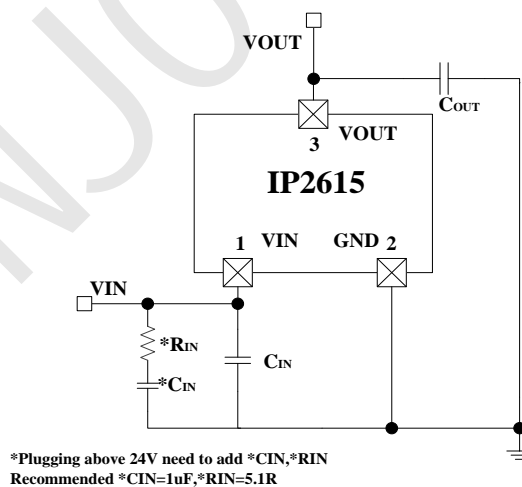## 4 Simplify the application schematic

Figure 1 IP2615 Simplify the application schematic

Directory

5 Modify records

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

Initial release version V1.00（2024.3）

6 Model Description

Model Name	Description
IP2615	Standard model (6V overvoltage protection)

7 PIN Description
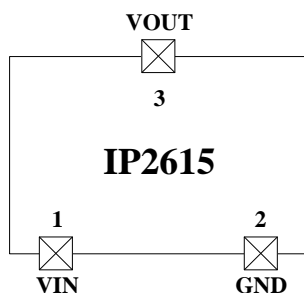
Figure 2 Pin of IP2615

7.1 PIN Description

Pin Num	Pin Name	Pin Description
1	VIN	Input Pins
2	GND	power ground
3	VOUT	output pin

8 Functional Block Diagram
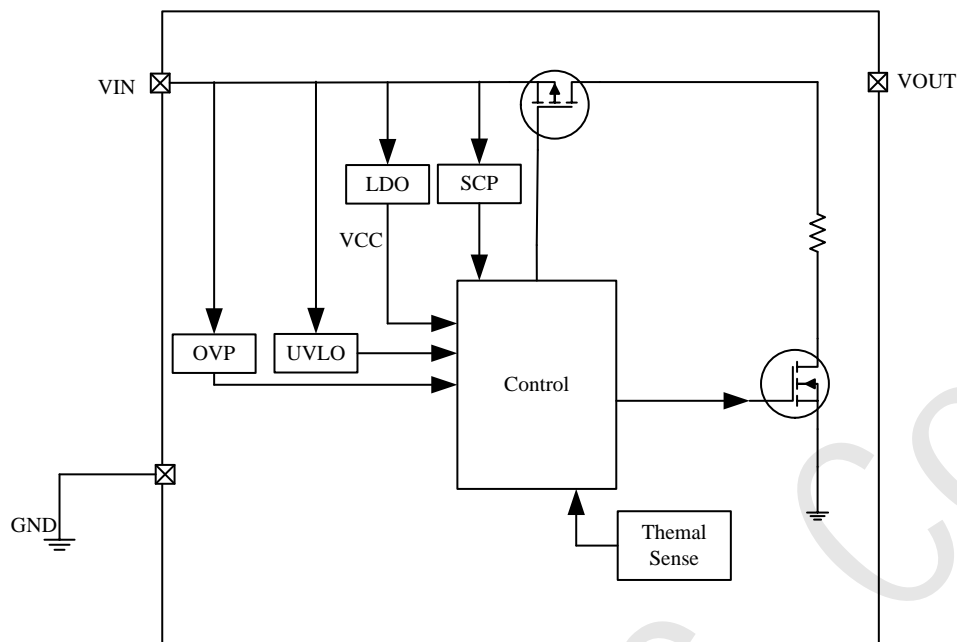
Figure 3 IP2615 Functional Block Diagram

9 Limit parameters

Parameters	Symbol	Value	Unit
VIN Voltage Range	V_{IN}	-0.3 ~ 33	V
VOUT Voltage Range	V_{OUT}	-0.3 ~ 9	V
Junction Temperature Range	T_J	-40 ~ 150	°C
Storage Temperature Range	T_{stg}	-65 ~ 150	°C
Junction Temperature(junction to ambient)	θ_{JA}	220	°C/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}	3	5	30	V

*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.	Unit
Input Voltage						
startup time	T_{DE}	VIN rises from 0V to 5V in 1uS		10		ms
Power-on quiescent current	I_{DD}	VIN=5V, no load on outputs		380		μA
on-resistance	R_{DSON}	VIN=5V，IOUT=0.5A		200	250	mΩ
Input overvoltage protection						
VIN overvoltage threshold	V_{OVP}	VIN rises from 5V to 7V	5.8	6	6.2	V
VIN overvoltage hysteresis	V_{OVP_HYS}	VIN drops from 7V to 5V		200		mV
VIN overvoltage response time	$t_{PD(OVP)}$			100	200	ns
OVP recovery time	$t_{REC(OVP)}$			100		ms
Output short circuit protection						
Short circuit protection threshold	V_{SCP}	VIN-VOUT>0.5V		0.35	0.5	V
Short circuit protection response time	T_{SC}			200		ns
Short circuit protection recovery time	$t_{REC(SCP)}$			10		ms
Thermal shutdown temperature	T_{OTP}	rising temperature	130	140	150	℃
Thermal shutdown temperature hysteresis	ΔT_{OTP}		30	40	50	℃
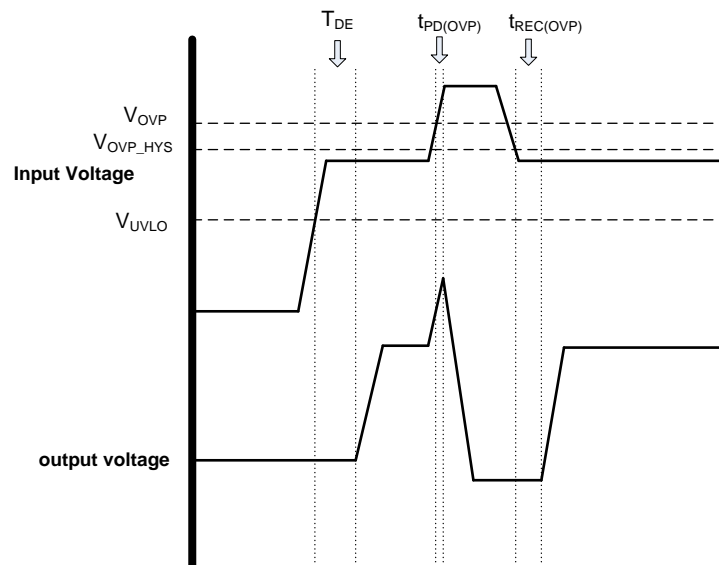
Figure 4 timing chart

12 Function Description

12.1 Input overvoltage protection

When the input voltage exceeds the set VOVP, then the internal power tubes will turn off within 100ns, turning off the output. When the input voltage drops to VOVP_HYS, it will turn the output back on.

12.2 Output short circuit protection

When a short circuit exists in the output, the IP2615 enters a protection state, hiccups and restarts with a restart period of 10ms, turning the output on for 350us each time. until the output short circuit state is undone.

12.3 Over-temperature protection

When the chip junction temperature is detected to be greater than 140 degrees, it will enter the over-temperature protection state, turn off the internal power tubes and stop the output.

12.4 Support TPYE_C port charging and discharging

Support TYPE_C port bi-directional charging and discharging, charging and discharging voltage range:3.5V~6V

12.5 Application curves

Blue VIN, Green VOUT, Red IOUT
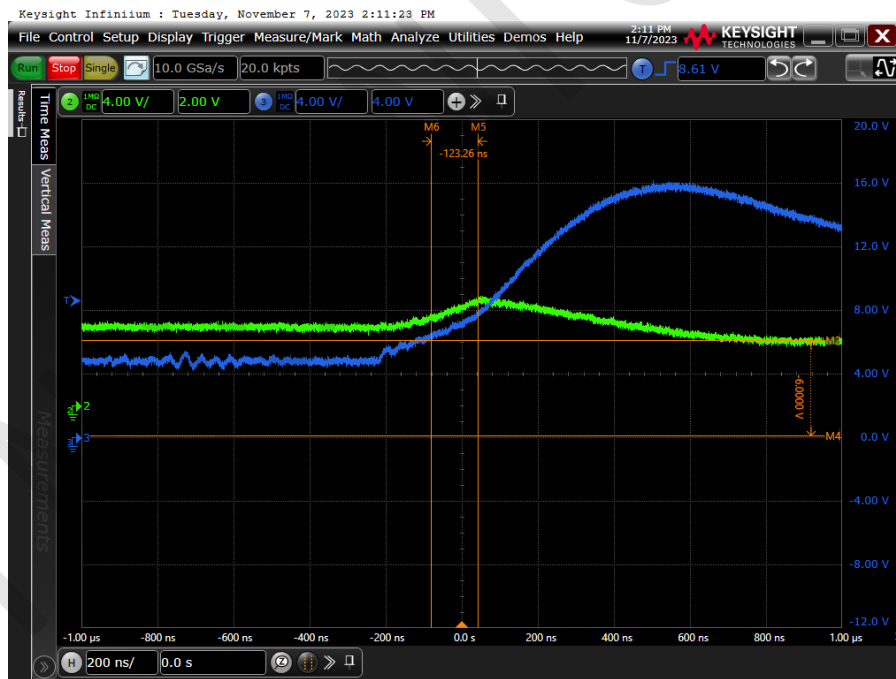

Figure 5 VIN normal power-up start (VIN=5V)

Figure 6 VIN overvoltage protection (VIN=5V-15V)

Figure 7 VIN overvoltage recovery (VIN=15V-5V)

Figure 8 Short circuit hiccup reboot

12.6 Temperature Characterization Curve

IP2615 Overvoltage protection (recovery) temperature profile

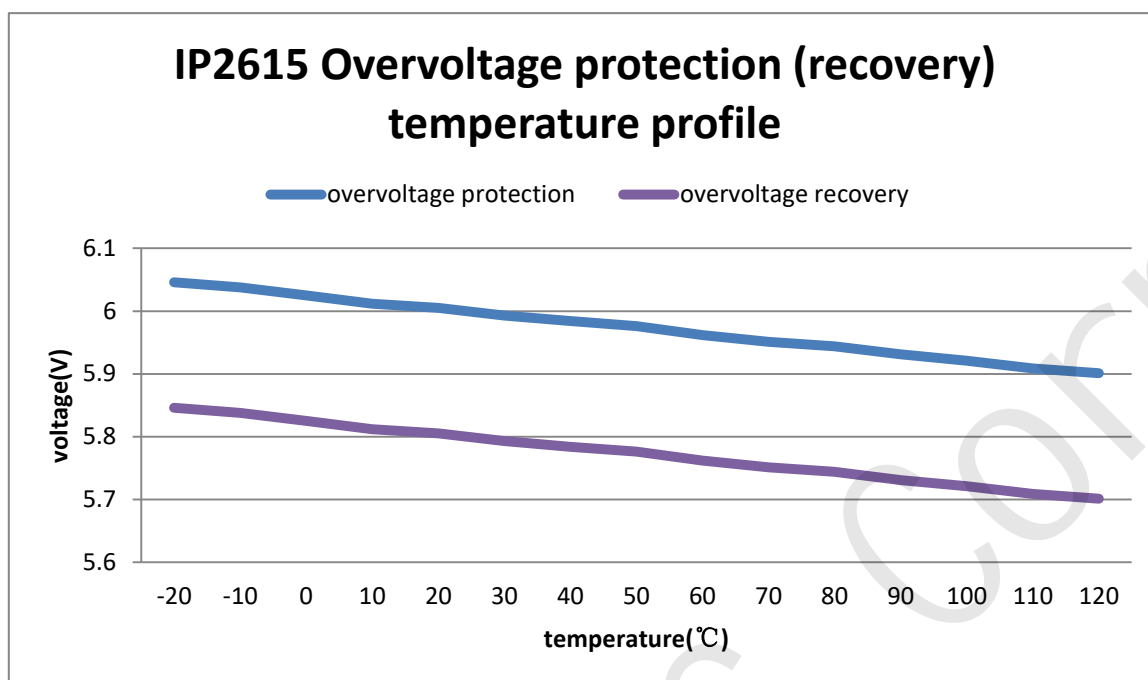— overvoltage protection   — overvoltage recovery

Figure 9 Overvoltage protection (recovery) temperature profile

13 Typical Application Schematic
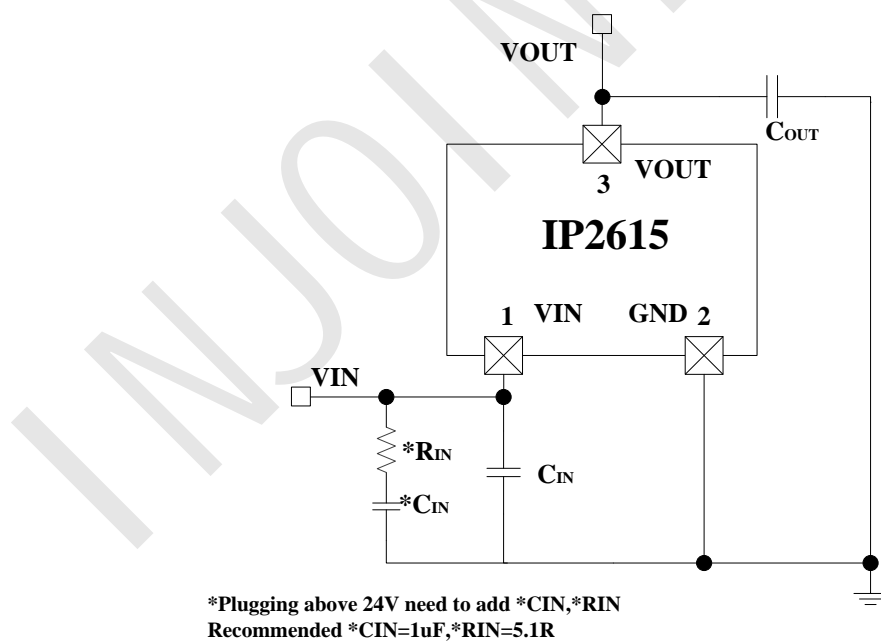
Figure 10 Typical Application Schematic

14 BOM

No.	Part Name	Type &Specification	Units	Quantity	Location	Note
1	IC	IP2615	PCS	1	U1	
2	SMD capacitors	0603 104 50V 10%	PCS	2	C_{IN}、C_{OUT}	
3	SMD capacitors	0603 1uF 50V 10%	PCS	1	$*C_{IN}$	
4	SMD resistors	0603 5.1Ω	PCS	1	$*R_{IN}$	

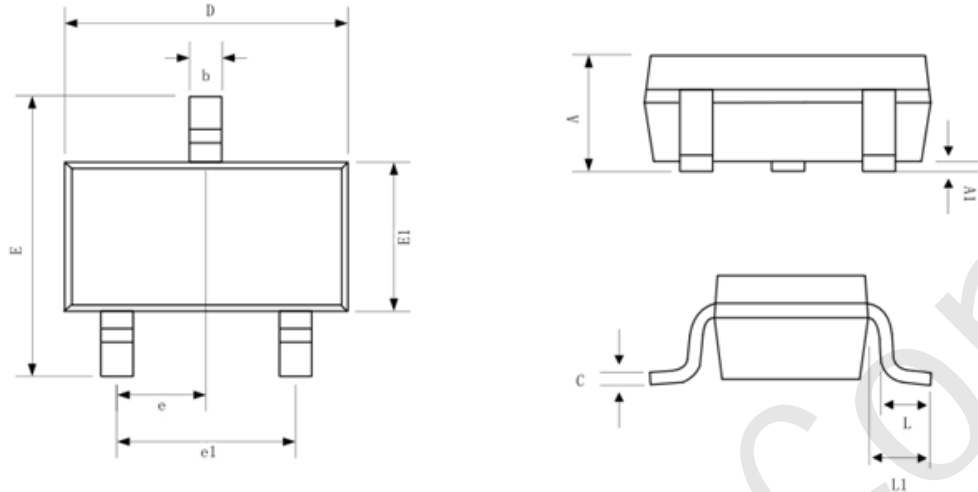## 15 Silkscreen


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Instruction:
1、2615  --Product name
2、XXXX  --Product number
3、○     --PIN1 Position
```

Figure 11 IP2615 Chip Silkscreen Description

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		

Figure 12 IP2615 SOT23-3 Package Dimensions

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