

Integrated IC for overvoltage and overcurrent protection

1 Features

- Over-voltage protection: 6.1V
- OVP response time :300ns
- input voltage tolerance up to 32V
- overcurrent protection:1.0A
- Soft start to suppress inrush current
- Soft shutdown to suppress voltage spikes
- Integrated over-temperature protection
- EN enabled
- FLAG indicates output
- Package: SOT-23-6

2 Applications

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

3 Description

4 Simplify the application schematic

The IP2603 is a highly integrated IC with input undervoltage , overvoltage , output overcurrent, and short-circuit 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.

IP2603 integrates output overcurrent and short-circuit protection; When the output current is detected to be greater than the overcurrent protection threshold, or there is a short circuit in the output, the internal power tube will be turned off to protect the system from damage;

The IP2603 has integrated over-temperature protection and shuts down the power tube output when the internal temperature of the chip is detected.

IP2603 supports EN enable function; When the EN pin is low and there is no abnormal state, open the power tube from VIN to VOUT and supply power normally; When the EN pin is high, the internal power tube will be turned off and the VOUT output will be disconnected;

IP2603 supports FLAG output function, when the power tube is turned on, FLAG output low level; When the power tube is closed, the FLAG output is high resistance;

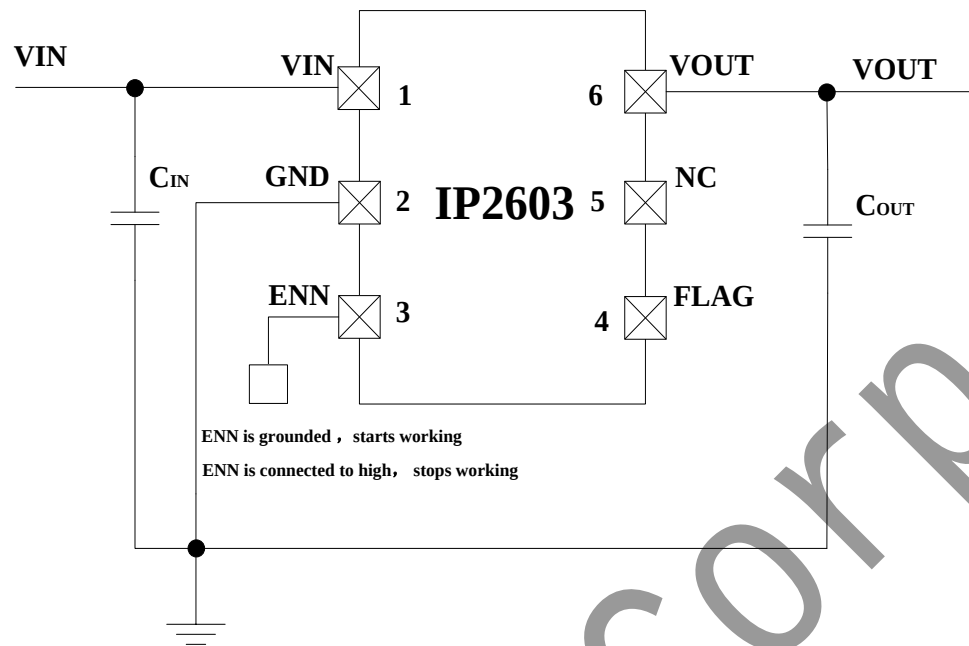


Figure1 IP2603 Simplify the application schematic

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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 (2022.8)

INJOINIC Corp.

6 Common Custom Product Description

Name	Description
IP2603	Standard IP2603 (6.1V overvoltage protection, 1.0A overcurrent protection)

7 Pin Description

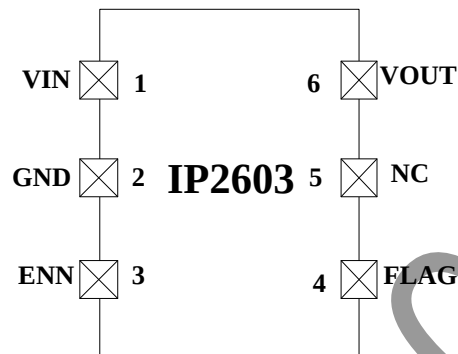


Figure2 Pin of IP2603

7.1 Pin Description

Pin name	Pin number	Description
1	VIN	Input pin
2	GND	Ground pin
3	ENN	Enable pin
4	FLAG	Status indicator pin
5	NC	Unused
6	VOUT	Output pin

8 Internal block diagram of the chip

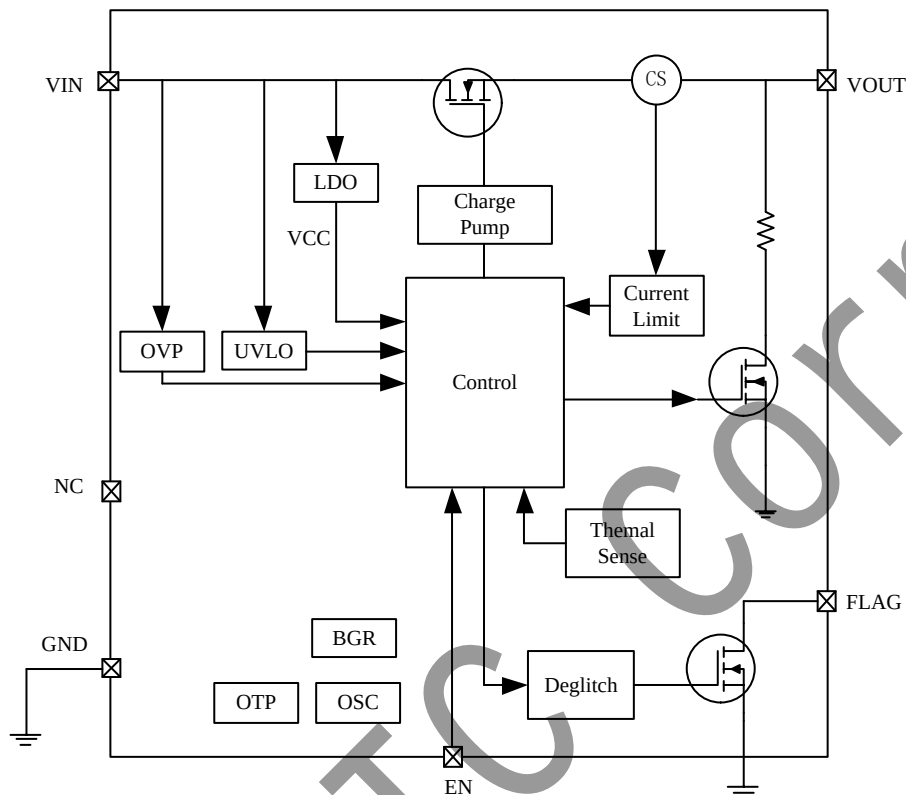


Figure3 Internal block diagram of IP2603

9 Limit parameters

Parameter	Symbol	Value	Units
Input voltage Range	V_{IN}	-0.3 ~ 32	V
Output voltage Range	V_{OUT}	-0.3~20	V
ENN、FLAG Voltage range	V	-0.3 ~ 8	V
Junction temperature Range	T_J	-40 ~ 150	°C
Storage Temperature Range	T_{stg}	-60 ~ 150	°C
Package Thermal Resistance	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}	3.6	5	30	V
Output current	I_{out}	0	1.0		A

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

11 Electrical Characteristics

Unless otherwise specified, $T_A=25^{\circ}\text{C}$, $V_{IN}=5\text{V}$

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Input Voltage						
Input undervoltage threshold	V_{UVLO}	VIN drops	3.4	3.6	3.8	V
Input undervoltage hysteresis	V_{UV_HYS}			500		mV
Startup delay time	T_{DE}			15		ms
Boot quiescent current	I_{DD}	ENN low, VIN=5V, No load at the output, No LED		600		μA
Shutdown quiescent current	I_{STDBY}	ENN high, VIN=5V, No load at the Output		30		μA
On-resistance	$R_{DS(on)}$	VIN=5V, IOUT=1A		80		m Ω
Input overvoltage protection						
OVP voltage	V_{OVP}	VIN rises from 5V to 7V		6.1		V
OVP hysteresis voltage	V_{OVP_HYS}	VIN drops from 7V to 5V		800		mV
OVP response time	$t_{PD(OVP)}$			300		ns
OVP Recovery time	$t_{REC(OVP)}$			8		ms
Output overcurrent protection						
OCP threshold	I_{OCP}			1.0		A
OCP response time	t_{OC}			4		ms
OCP Recovery time	$t_{REC(OCP)}$			500		ms
Output short-circuit protection						
Short-circuit protection threshold	V_{SCP}	VIN-VOUT>500mV		500		mV

Short-circuit protection response time	T_{SC}			500		μs
Short-circuit protection recovery time	$t_{REC(SCP)}$			16		ms
Thermal shutdown junction temperature	T_{OTP}	Rising temperature	130	140	150	$^{\circ}C$
Thermal shutdown hysteresis	ΔT_{OTP}		30	40	50	$^{\circ}C$
Logic						
EN enable time	$t_{EN(ON)}$			16		ms
EN disable time	$t_{EN(OFF)}$			30		μs
EN high level threshold	$V_{EN(high)}$		1.6			V
EN low level threshold	$V_{EN(low)}$				1.4	V

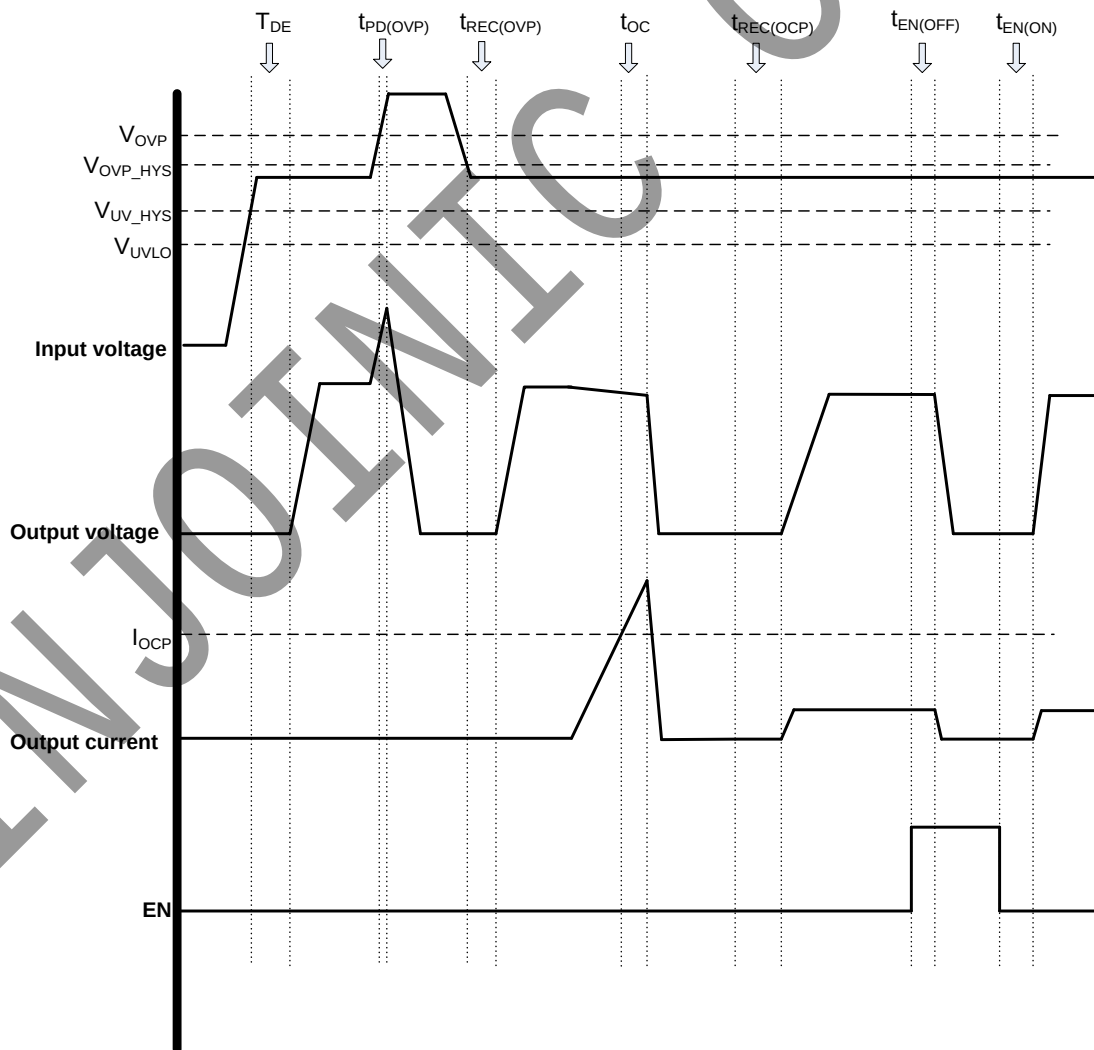


Figure 4 Timing diagram

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 300ns, turning off the output. When the input voltage drops to V_{OVP_HYS} , the output is turned back on.

12.2 Output Overcurrent Protection

When the output load exceeds the I_{OCP} , the IP2603 enters a protected state and restarts with hiccups until the output load drops below the overcurrent threshold.

12.3 Output short-circuit protection

When the output is shorted, the IP2603 enters the protected state and hiccups restart until the output short circuit state is canceled.

12.4 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. When it drops to 100° , turn the output back on.

12.5 EN Enable function

When the EN PIN is low, IP2603 works normally; When the EN PIN is high, the IP2603 stops working.

12.6 FLAG status indication

The FLAG pin outputs a low level in normal operation and a high impedance state in the protection state.

12.7 Apply curves



Figure 5 VIN power-on start (VIN=5V)



Figure 6 VIN voltage protection (VIN=5V-7V)



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



Figure 8 Output overcurrent protection (IOUT=0.9A-1.2A)



Figure 9 EN enabled



Figure 10 EN disable

12.8 Temperature characteristic curve

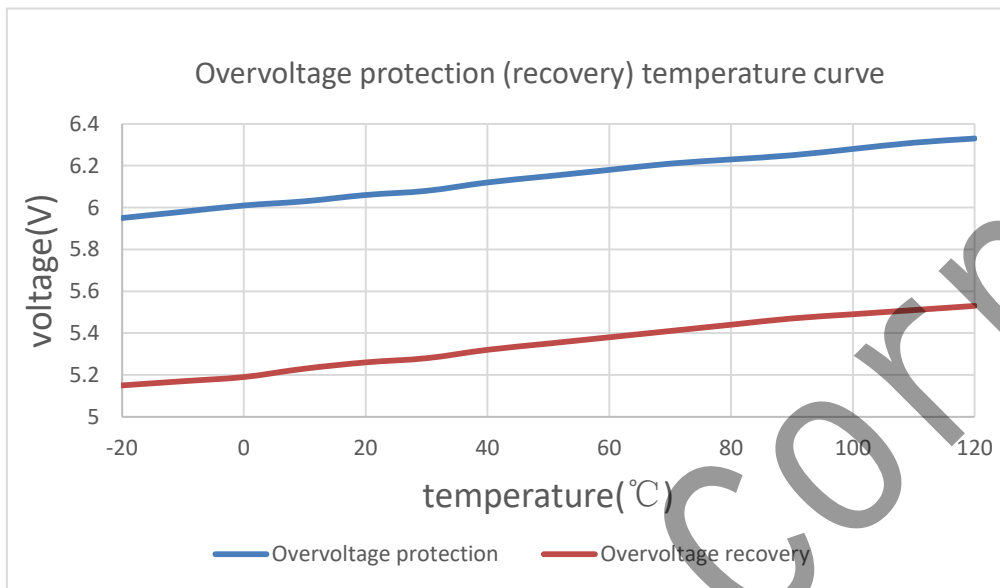


Figure 11 Overvoltage protection (recovery) temperature curve

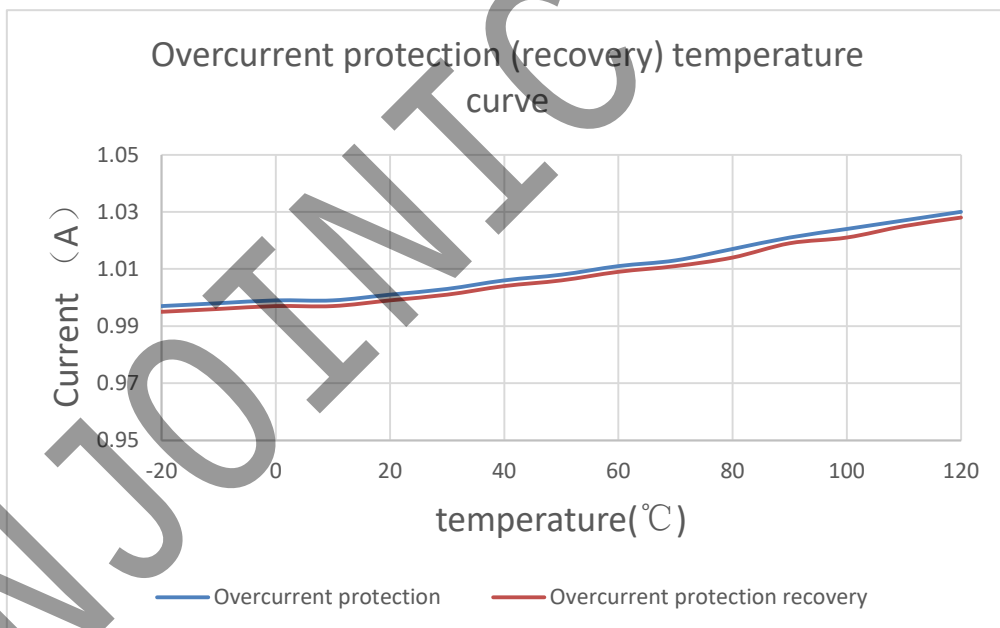


Figure 12 Overcurrent protection (recovery) temperature curve

13 Typical application schematic

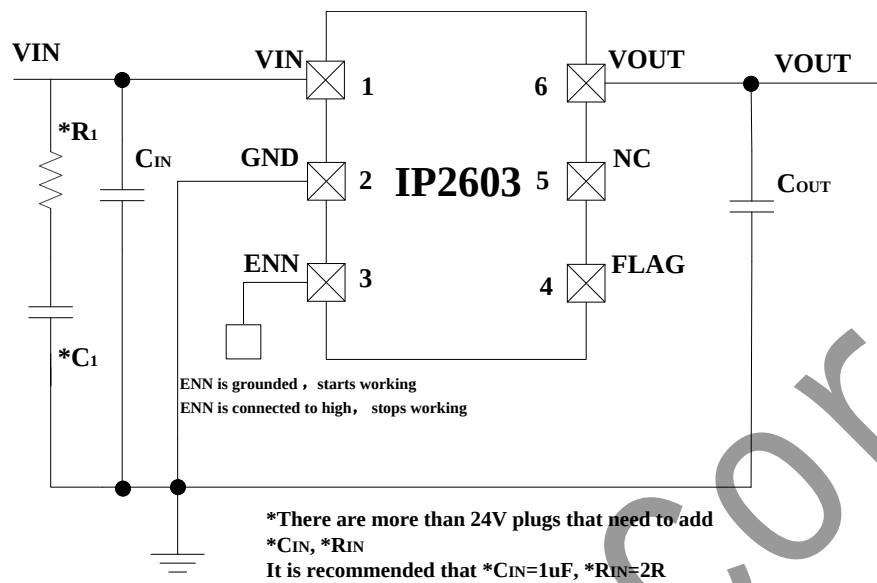
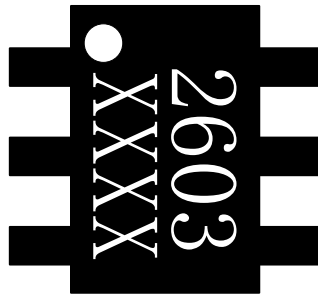


Figure 13 Typical application schematic

14 BOM

Number	Component name	Model & Specification	Units	amount	location	note
1	IC	IP2603	PCS	1	U ₁	
2	SMD capacitors	0603 104 25V 10%	PCS	2	C _{IN} 、C _{OUT}	
3	SMD capacitors	0603 1uF 25V 10%	PCS	1	*C ₁	
4	SMD resistors	0603 5.1Ω 5%	PCS	1	*R ₁	

15 Silk screen instructions



Explain:

- 1、2603 --Product name
- 2、XXXX --Product number
- 3、○ --Pin1 position

Figure14 IP2603 Screen printing

16 Package

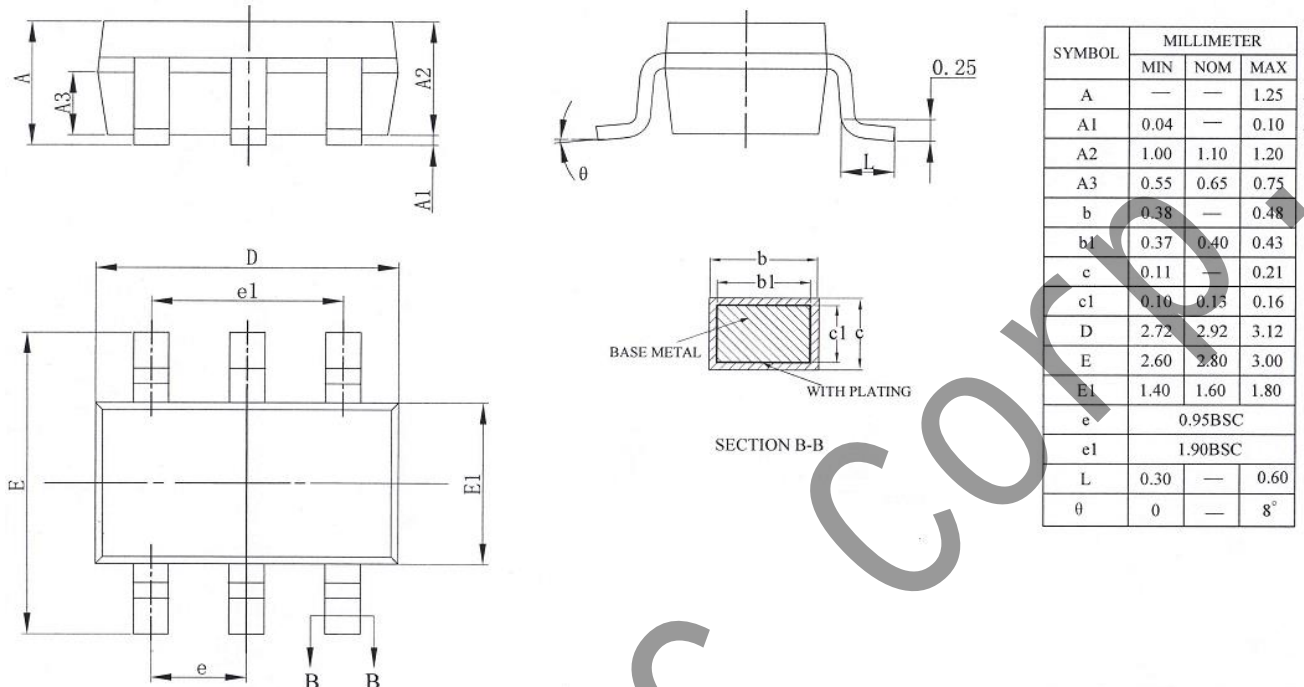


Figure15 IP2603 SOT23-6 Package outline dimension

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