Single-cell lithium battery synchronous switch step-down 4.8A charging IC with integrated input fast charging protocol

1. Features

- ✧ Inout voltage range:5V~12V
- ✧ The maximum charging current of battery input is 4.8A@9V/2A
- ✧ The output battery voltage VSET pin can be set（4.2V/4.35V/4.4V/4.5V）
- ✧ The charging current ISET pin can be set (set the input current)
- ✧ Power MOS integrated built-in
- ✧ High-efficiency synchronous step-down charging:
  94%，VIN=5V，BAT=3.7V，IBAT=4A
  93.5%，VIN=9V，BAT=3.7V，IBAT=4A
  93%，VIN=12V，BAT=3.7V，IBAT=4A
- ✧ Support Type-C PD input fast charge protocol
- ✧ Support Huawei FCP, Samsung AFC, MTK PE+1.1/2.0 input fast charge protocol
- ✧ Support low current adapter, self-adaptive adjustment of charging current
- ✧ Support charging 1~2 LED status indication, intelligently identify the number of LED lights
- ✧ Support charging NTC temperature protection
- ✧ Support input over-voltage protection, IC over-temperature protection
- ✧ Support I2C
- ✧ ESD 4KV
- ✧ Package 5 mm × 5 mm 0.5pitch QFN32

2. Application

- **Bluetooth speakers, POS machines, electronic cigarettes**

3. Overview

IP2315 is an efficient synchronous buck conversion charging IC that integrates MOS and input fast charging protocol.

IP2315 input voltage range is 5V~12V; IP2315 integrates Type-C PD, Huawei FCP, Samsung AFC, MTK PE+1.1/2.0 input fast charging protocol, can apply for 9V or 12V voltage from the adapter to reduce the charging time; IP2315 can pass The IP2315 can set the charging current at the input via the ISET pin. When inputting 9V/2A, the maximum charging current of the battery terminal is 3.7V/4.8A; IP2315 can be compatible with low-current adapters. When the output load capacity of the adapter is insufficient, the charging current is adaptively reduced to ensure no Pull the adapter;

The output battery voltage of the IP2315 can be set to flow via the VSET pin., supporting 4.2V/4.35V/4.4V/4.5V lithium batteries; IP2315 switching frequency is 500kHz.

IP2315 switching frequency 500kHz, high conversion efficiency, when VIN=12V, BAT=3.7V, IBAT=4.5A, the efficiency is 93%;

IP2315 supports 1~2 LED status indication, can automatically identify the number of connected LED lights;

IP2315 supports charging NTC temperature protection, with input over-voltage protection, IC over-temperature protection.

IP2315 supports I2C interface.

Contents

4. Record

Note: The page numbers of previous versions may be different from those of the current version.

Change page numbers for version V1.17 to V1.18 (June 2024)	Page
● Modified the description of charging NTC protectiom	25
Change page numbers for version V1.16 to V1.17 (August 2023)	**Page**
● Modified the description of charging NTC protectiom	11
Change page numbers for version V1.15 to V1.16 (May 2023)	**Page**
● The standby current is expanded to 200μA	10
Change page numbers for version V1.14 to V1.15 (April 2023)	**Page**
● Modify datasheet format	
● Update the I2C register description	15

5. Simplified application

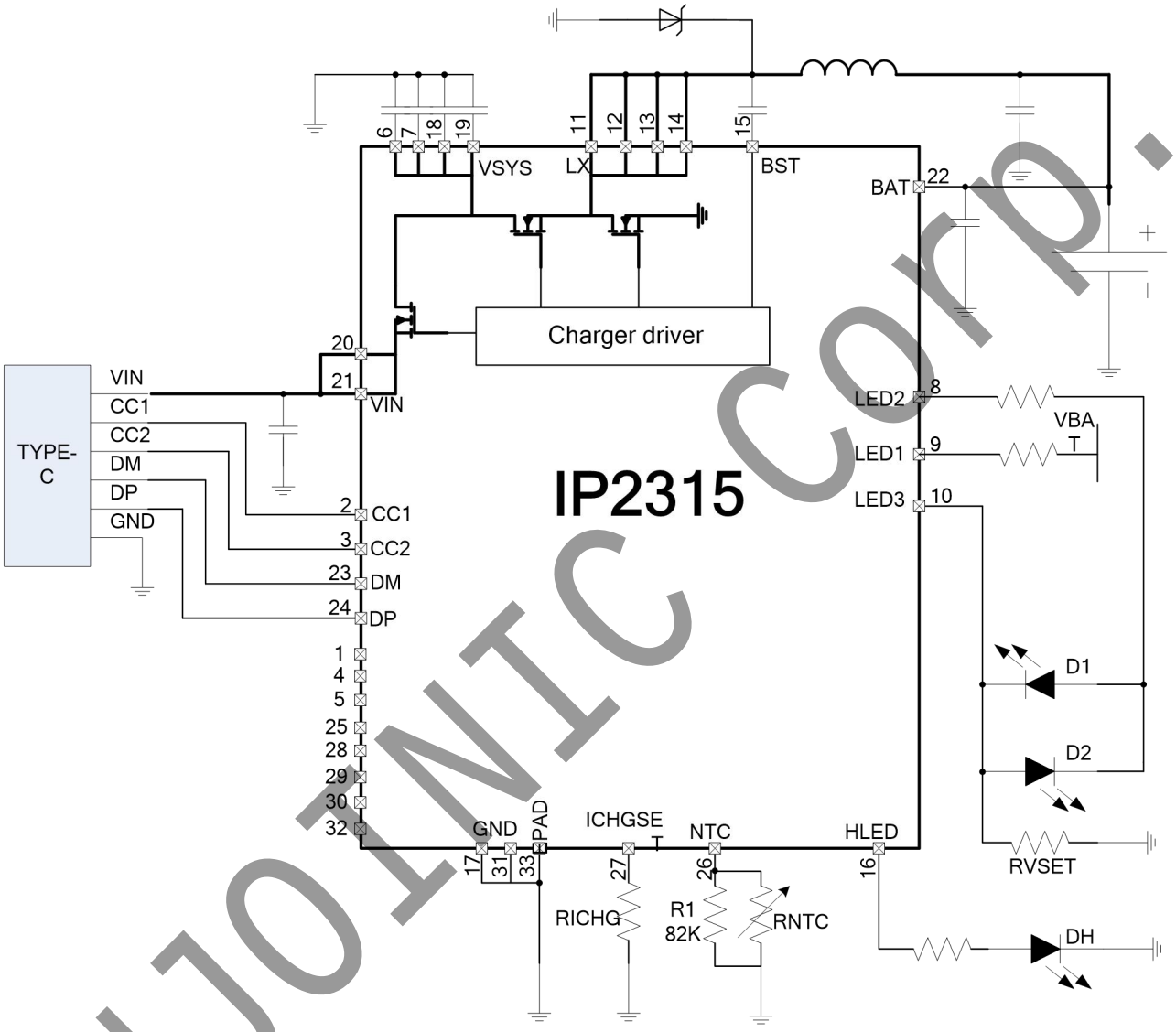


Figure 1 IP2315 Simplified application

6. Pin Description

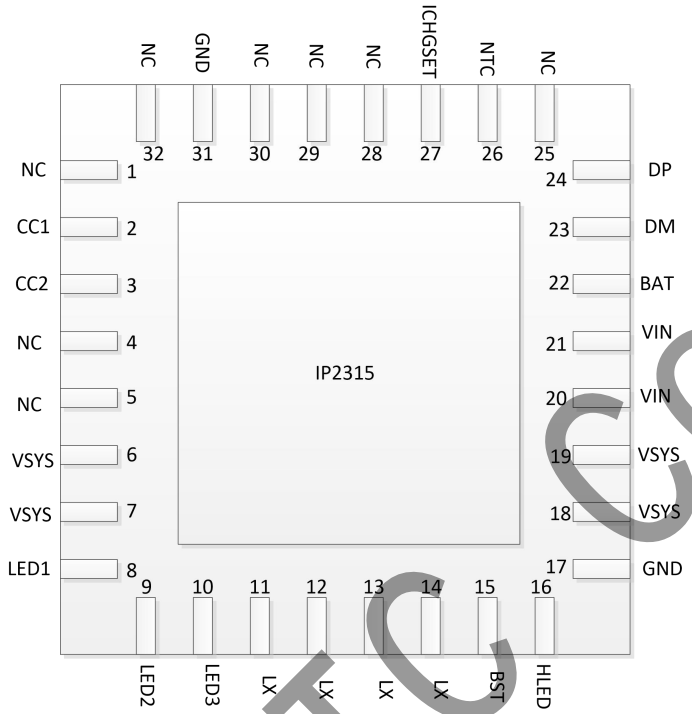


Figure 2 IP2315 pin diagram

6.1. Pin description

Pin Num	Pin Name	Definition
1、4、5、25、28、29、30、32	NC	Pin suspension
2	CC1	USB C port detection pin CC1
3	CC2	USB C port detection pin CC2
6、7、18、19	VSYS	Input the intermediate node. A capacitor is required
8	LED1	Power light drive pin L1，IThe I2C model serves as the I2C_SCL
9	LED2	Power light drive pin L2，IThe I2C model serves as the I2C_SDA
10	LED3	Power light drive pin L2，Multiplex VSET
11、12、13、14	LX	DCDC switch node, connected to the inductor
15	BST	Internal high voltage drive, connect capacitor to LX
16	HLED	Fast charging status indicator
20、21	VIN	Input pin
22	BAT	Battery voltage detection pin, connected to the positive battery terminal
23	DM	USB C port fast charge and intelligent identification DM
24	DP	USB C port fast charge and intelligent recognition of DP
26	NTC	Thermistor detection pin
27	ICHGSET	Charge current setting pin
17、31	GND	GND pin,keep contact with GND
33(EPAD)	GND	System ground and heat dissipation ground, need to keep good contact with GND

7. Common Custom Product Description

<table>
<tr><th>Part No.</th><th>function description</th></tr>
<tr><td>IP2315</td><td>Standard IP2315.
1、 Charging current Constant input current；

2、 Pin 27 The relationship between the ICHGSET external resistor RICHG and the set charging current is changed：

<table>
<tr><th>RICHG Resistance value</th><th>Input charging current</th></tr>
<tr><td>15K</td><td>0.5A</td></tr>
<tr><td>33K</td><td>0.8A</td></tr>
<tr><td>51K</td><td>1.0A</td></tr>
<tr><td>75K</td><td>1.2A</td></tr>
<tr><td>100K</td><td>1.5A</td></tr>
<tr><td>120K</td><td>1.8A</td></tr>
<tr><td>135K</td><td>2.1A</td></tr>
<tr><td>160K</td><td>2.4A</td></tr>
<tr><td>180K</td><td>2.8A</td></tr>
<tr><td>200K</td><td>3A</td></tr>
</table>
The charging current setting is not linear and can only be selected from the above gear；</td></tr>
<tr><td>IP2315_IBAT</td><td>Modify the following parameters based on standard IP2315：
1、充电电流从原来的恒定输入电流，改到恒定电池电流；

2、 Pin 27 The relationship between the ICHGSET external resistor RICHG and the set charging current is changed：

<table>
<tr><th>RICHG Resistance value</th><th>Battery end charging current</th></tr>
<tr><td>15K</td><td>1.0A</td></tr>
<tr><td>33K</td><td>1.6A</td></tr>
<tr><td>51K</td><td>2.0A</td></tr>
<tr><td>75K</td><td>2.4A</td></tr>
<tr><td>100K</td><td>3.0A</td></tr>
<tr><td>120K</td><td>3.6A</td></tr>
<tr><td>135K</td><td>4.2A</td></tr>
<tr><td>160K</td><td>4.8A</td></tr>
</table>
The charging current setting is not linear and can only be selected from the above gear；</td></tr>
</table>

IP2315_18W	Modify the following parameters based on standard IP2315： 1、Cancel the function of pin 27 to set the charging current, and fix the charging input current to 5V/3A, 9V/2A, 12V/1.5A;

8. Limit parameters

Parameter	Symbol	Value	Unit
Input voltage range	V_{IN}	-0.3 ~ 16	**V**
Junction temperature range	T_J	-40 ~ 150	℃
Storage temperature range	Tstg	-60 ~ 150	℃
Thermal resistance (junction temperature to environment)	θ_{JA}	26	**℃/W**
Human Body Model (HBM)	ESD	4	**KV**

*Stresses higher than the values listed in the Absolute Maximum Ratings section may cause permanent damage to the device. Excessive exposure under any absolute maximum rating conditions may affect the reliability and service life of the device.

9. Recommended working conditions

Parameter	Symbol	Min	Typical	Max	Unit
Input voltage	V_{IN}、V_{BUS}	4.5	5	14	V
Battery voltage	V_{BAT}	3.0	3.7	4.5	V

*Beyond these operating conditions, device operating characteristics cannot be guaranteed.

10.Electrical characteristics

Unless otherwise specified, TA=25℃, L=2.2uH

Parameter	Symbol	Test Conditions	Min	Typical	Max	Unit
Charging system						
Input voltage	V_{IN}		4.5	5/7/9/12	13	V
Input overvoltage threshold	V_{IN_OV}		13	14	15	V
UVLO	V_{SYS_UV}	V_{IN}=5V，V_{BAT} =3.7V	4.45	4.55	4.65	V
	V_{SYS_UV}	V_{IN}=7V，V_{BAT} =3.7V	6.45	6.55	6.65	V
	V_{SYS_UV}	V_{IN}=9V，V_{BAT} =3.7V	8.45	8.55	8.65	V
	V_{SYS_UV}	V_{IN}=12V，V_{BAT} =3.7V	11.3	11.4	11.5	V
Charging constant voltage	V_{TRGT}	R_{VSET} = NC	4.16	4.2	4.24	V
		R_{VSET} = 120K	4.31	4.35	4.39	V
		R_{VSET} = 68K	4.36	4.4	4.44	V
		R_{VSET} = 10K	4.46	4.5	4.54	V
Constant charge current	I_{CC_VIN}	R_{ICHG}=51K， V_{BAT} =3.7V	800	1000	1200	mA
Trickle charge current	I_{TRKL}	V_{IN}=5V，V_{BAT} <2.4V	50	75	100	mA
		V_{IN}=5V，2.4V<= V_{BAT} <3.0V		I_{CC}/10		mA
Trickle cut-off voltage	V_{TRKL}		2.95	3.0	3.05	V
Stop charging current	$I_{STOP-BAT}$	V_{IN}=5V	100	300	500	mA
Recharge threshold	V_{RCH}		4.08	4.1	4.13	V
End charing time	T_{END}		20	24	27	Hour
NTC pin output current	I_{NTC}		19	20	21	uA
stand-by current	$I_{STANDBY}$	V_{IN}=0V，V_{BAT} <3.7V		60	200	uA
Charge conversion efficiency	η	V_{BAT}=3.7V，V_{IN}=5V，$I_{CHG-BAT}$=4A	92	93	94	%
		V_{BAT}=3.7V，V_{IN}=9V，$I_{CHG-BAT}$=4A	91.5	92.5	93.5	%

		V_{BAT}=3.7V，V_{IN}=12V，$I_{CHG-BAT}$=4A	91	92	93	%
operating frequency	Fs	Boost switching frequency	450	500	550	KHz
NMOS On resistance	R_{DSON}	Top tube		9	11	mΩ
NMOS On resistance		Down tube		9	11	mΩ
LED display drive current	I_{L1} I_{L2} I_{L3}	Voltage drop 10%		7	9	mA
Thermal shut down temperature	T_{OTP}	Rising temperature	130	140	150	℃
Thermalshut down hysteresis	ΔT_{OTP}			40		℃

11.Function description

11.1. Synchronous switch step-down conversion

IP2315 has a constant current and constant voltage lithium battery charging management system that supports a synchronous switch structure. It can automatically match different charging voltage specifications.

When the battery voltage is less than 2.4V, a small current trickle linear charge is used. When the input is below 6V, the linear charge current is 75mA. When the battery voltage is greater than 6V, the linear charge current is reduced to 35mA;

When the battery voltage is less than 2.4V, a small current trickle switch is used for charging, and the trickle switch charging current is one-tenth of the set constant current charging current;

When the battery voltage is greater than 3V, enter constant current charging and charge with the set constant current charging current;

When the battery voltage is close to the set rechargeable battery voltage, it enters constant voltage charging;

After entering the constant voltage charging, when the battery terminal charging current is less than the stop charging current (300mA), the charging current will be reduced to 0 every 1 minute, and the battery voltage will be checked. If the battery voltage is greater than the stop charging voltage, it is considered fully charged. Stop charging and switch to full charge indicator.

After the charging is completed, if the battery voltage is lower than 4.1V, restart the battery charging.

IP2315 uses switch charging technology with a switching frequency of 500kHz.

IP2315 will automatically adjust the charging current to adapt to adapters with different load capacities.

11.2. Input fast charge protocol

IP2315 integrates input fast charge protocol, supports Type-C PD, Huawei FCP, Samsung AFC, MTK PE+1.1/2.0 input fast charge protocol, and can apply for more power from the adapter to reduce charging time.

11.3. Charging protection

IP2315 has perfect protection function. The built-in soft-start function prevents faults caused by excessive inrush current during start-up, and integrates input over-voltage, under-voltage, and over-temperature protection functions to ensure stable and reliable operation of the system.

- IP2315 integrates VIN input under-voltage protection. The VIN input loop will automatically adjust the

charging current. When the IP2315 detects that the VSYS voltage is too low, it will reduce the charging current to ensure that the adapter will not be pulled dead. VIN input gear has 4 gears of 5V/7V/9V/12V, and the corresponding input undervoltage gear will be automatically selected according to the applied input voltage

- IP2315 integrates VIN input overvoltage protection, when IP2315 detects that the input voltage is too high, it will stop charging
- IP2315 integrates NTC temperature protection function, with NTC thermistor, normal charging when the temperature is detected in the range of 0~55 degrees; when the temperature is higher than 55 degrees or lower than 0 degrees, the charging stops.
- IP2315 integrated charging timeout protection: when the charging time exceeds 24 hours, the charging will be forcibly stopped.
- IP2315 integrated over-temperature protection function: when IP2315 detects that the chip temperature reaches 135℃, it will stop charging; when the temperature drops to 85℃, IP2315 will consider the temperature to return to normal and restart charging;

11.4. Constant voltage charging voltage (battery type) selection

IP2315 supports the selection of the corresponding battery type by connecting a pull-down resistor of different resistance to LED3 (pin 10), which is multiplexed with LED3 display output:

Pull-down resistor RVSET on LED3 (pin 10)	Battery type selection (full battery voltage)
10K	4.5V
68K	4.4V
120K	4.35V
NC	4.2V

11.5. Constant current charging current setting

IP2315 can set the constant current charging current (input current) by connecting different resistors to ICHGSET (pin 27). The relationship between the external resistor RICHG and the set charging current is as follows:

R_{ICHG} resistor	IP2315 INPUT charging current
15K	0.5A
33K	0.8A
51K	1.0A
75K	1.2A
100K	1.5A

120K	1.8A
135K	2.1A
160K	2.4A
180K	2.8A
200K	3A
>300K or NC	3.2A

For IP2315_IBAT , ICHGSET (pin 27) sets the battery terminal charging current:

RICHG resistor	IP2315_IBAT charging current
15K	1.0A
33K	1.6A
51K	2.0A
75K	2.4A
100K	3.0A
120K	3.6A
135K	4.2A
160K	4.8A

The IP2315_18W model does not have the ICHGSET (pin 27) function to set the charging current. The fixed position of the charging current of IP2315_18W: 5V/3A, 9V/2A, 12V/1.5A; (input current)

11.6. NTC

IP2315 supports NTC protection function. It detects the battery temperature through the NTC pin. When the detected temperature exceeds the set temperature, it will stop charging

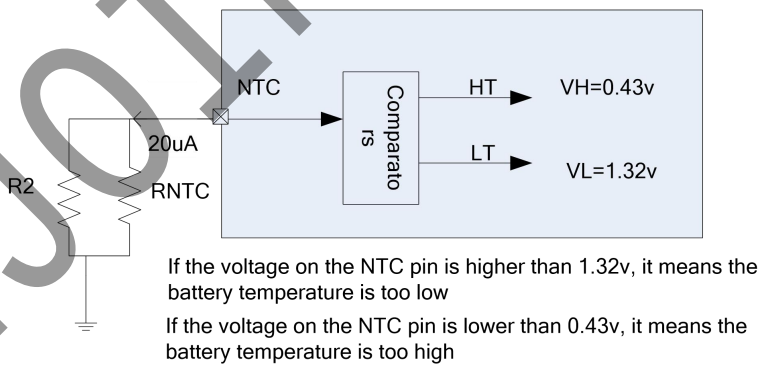


Figure 3 NTC diagram

- When NTC detects that the temperature is within the range of 0~55 degrees, it is charged normally. When the temperature is higher than 55 degrees, or lower than 0 degrees, stop charging.
- If the NTC function is not needed, the NTC can be grounded with a 51K resistor, and the NTC pin cannot be floating, otherwise it may cause abnormal charging.。

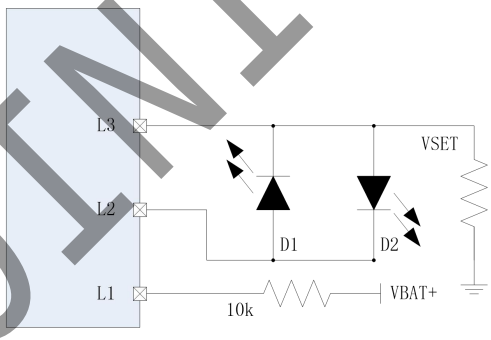
- Discharge a current of 20uA from NTC, and connect a resistor to GND on NTC. The voltage drop generated by this current on the resistor can determine the temperature range.

E.g: RNTC=100K @25℃ thermistor (B=4100), R2=82K, corresponding temperature and NTC voltage:

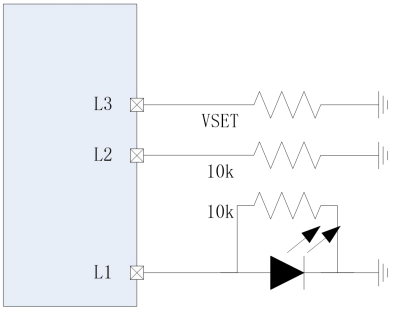
Temperature(°C)	Internal judgment voltage (V)
-20	1.52
-15	1.49
-10	1.44
0	1.32
43	0.60
45	0.56
50	0.49
55	0.43
60	0.38
65	0.33

11.7. Charging LED indication

IP2315 can flexibly support one or two battery indicator lamps. Through the built-in intelligent recognition algorithm, it can automatically identify several external battery indicator LED.



2 LEDs mode



1 LED mode

2 LEDs mode display mode is：

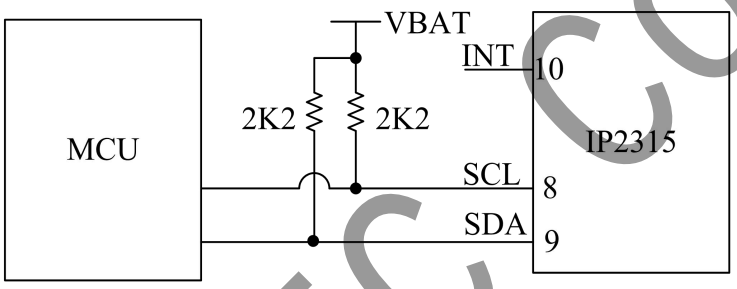
Charging：D1 on，D2 off；
full：D1 off，D2 on；

1 LED mode display mode is：
Charing：Blink for 2.0s(1.0s on, 1.0s off)；
full：always on

11.8. I2C

IP2315 has I2C function, the connection method is as follows：

The I2C (pin 8 and pin 9) of IP2315 and the lamp display are multiplexed. When the VIN is powered on, it will enter the I2C mode only when pin 8 and pin 9 detect high level, otherwise it will enter the lamp display mode.



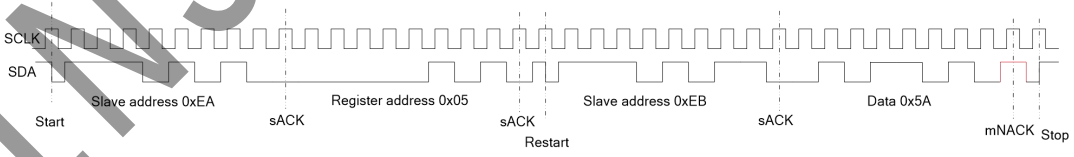
12C mode supports up to 400Kbps, 8bit register address, 8bit register data, sending and receiving are MSB, I2C device address: write 0XEA, read 0xEB

E.g:

Write data 0X5A to the 0×05

I2C WRITE

Read data back from 0×05



I2C Read

Special note: At the end of the I2C read data, when the last BYTE is read, the NACK signal must be given, otherwise the IP2315 will think that the MCU needs to continue to read the data, and the next SCLK will output the next data, which is not normal Receiving the STOP signal may cause the I2C bus to be pulled off.

*Reserved registers cannot write data at will, and cannot change the original value, otherwise

unpredictable results will occur. The operation of the register must be carried out in accordance with read-modify-write. Only the used bits are modified, and the values of other unused bits cannot be modified.

11.8.1. SYS_CTL1

Register address= 0x01

Bit(s)	Name	Description	R/W
7:1		Reserved	
0		Charging enable 0:disable 1:enable	R/W

11.8.2. RELOAD_EN

Register address = 0x0F

Bit(s)	Name	Description	R/W
7	Reload_en	Whether to reset the register bit default value when VIN is inserted into boot 0: registers are not reset and can be retained 1: The register is reset to the factory setting	R/W
6:0		Reserved	

11.8.3. ICHSET_CTL

Register address = 0x1E

Bit(s)	Name	Description	R/W
7:6		Reserved	
5:3		ICHGSET pin sets the charging current 000（At the same time put 0x74[6]=1）: disable, set charging current 101: enable, set the charging current through the ICHGSET pin	R/W
2:0		Reserved	

11.8.4. CHG_ISET_5V

Register address = 0x26

Bit(s)	Name	Description	R/W
7		Reserved	
6:0	ISET	Set the charging current when 5v input input current:Ichg=ISET*0.025A	R/W

		BAT current:Ichg=ISET*0.05A	

11.8.5. CHG_ISET_5V_TypeC

Register address = 0x27

Bit(s)	Name	Description	R/W
7		Reserved	
6:0	ISET	Set the charging current at 5V input when TypeC is connected Input current: Ichg=ISET*0.025A Current at BAT: Ichg=ISET*0.05A Both Reg0x26 and reg0x27 are the current when setting 5V input, the difference is that 0x27 sets the 5V input charging current with TypeC connection, while reg0x26 sets the 5V input without TypeC connection; It is recommended that in practical applications, to modify 5V input charging current, reg0x26 and reg0x27 are modified at the same time, so that regardless of TypeC connection, 5V charging current is the same;	R/W

11.8.6. CHG_ISET_7V

Register address = 0x28

Bit(s)	Name	Description	R/W
7		Reserved	
6:0	ISET	Set the charging current when 7v input input current:Ichg=ISET*0.025A BAT current:Ichg=ISET*0.05A	R/W

11.8.7. CHG_ISET_9V

Register address = 0x29

Bit(s)	Name	Description	R/W
7	CCLP	In the case of fast charging (input voltage higher than 5V is considered as fast charge) charging loop selection 1: Input loop 0: BAT loop (Address selected by 5V charging loop = 0x20[1])	
6:0	ISET	Set the charging current when 9v input input current:Ichg=ISET*0.025A BAT current:Ichg=ISET*0.05A	R/W

11.8.8. CHG_ISET_12V

Register address = 0x2A

Bit(s)	Name	Description	R/W
7		Reserved	
6:0	ISET	Set the charging current when 12v input input current:Ichg=ISET*0.025A BAT current:Ichg=ISET*0.05A	R/W

11.8.9. CHG_NTC

Register address = 0x2F

Bit(s)	Name	Description	R/W
7:6	NTC_HT	Set the NTC high temperature protection threshold during charging: 00：0.38V——60°C 01：0.43V——55°C 10：0.49V——50°C 11：0.56V——45°C	R/W
5:4	NTC_LT	Set the NTC low temperature protection threshold during charging: 00：1.32V——0°C 01：1.44V——-10°C 10：1.49V——-15°C 11：1.52V——-20°C	R/W
3:0		Reserved	

11.8.10. PD_ISET_EN

Register address = 0x74

Bit(s)	Name	Description	R/W
7		Reserved	
6	PD_ISET_EN	The current setting function of PD handshake was enabled 0：disable 1：enable Only after this position is enabled, the charging current can be set through the register of reg 0x28-reg 0x2A in the successful state of PD communication	R/W
5:0		Reserved	

11.8.11. PD_SINK_MAX

Register address = 0x79

Bit(s)	Name	Description	R/W
7		Reserved	
6：5	PD_SINK_MAX	Set the maximum voltage for PD protocol input requests 00：The maximum required voltage is 12V 01：The maximum required voltage is 12V 10：The maximum required voltage is 7V 11：Will not apply for fast charge, only 5V charge After the modification, it will not take effect immediately, and the set voltage will be re-applied when PD shakes hands next time	R/W
5:0		Reserved	

11.8.12. BATVADC_DAT0

Register address = 0xA0

Bit(s)	Name	Description	R/W
7:0	BATVADC[7:0]	Low 8bit of BATVADC data	

11.8.13. BATVADC_DAT1

Register address = 0xA1

Bit(s)	Name	Description	R/W
7:3			
2:0	BATVADC[10:8]	High 3bit of BATVADC data，LSB=4.296875mv VBAT=(BATVADC_DAT1*256+BATVADC_DAT0)*LSB mv	R

11.8.14. SYSVADC_DAT0

Register address = 0xA2

Bit(s)	Name	Description	R/W
7:0	SYSVADC[7:0]	Low 8bit of SYSVADC data	

11.8.15. SYSVADC_DAT1

Register address = 0xA3

Bit(s)	Name	Description	R/W
7:3			
2:0	SYSVADC[10:8]	High 3bit of SYSVADC data，LSB=4.296875mv	R

		VSYS=6*(SYSVADC_DAT1*256+SYSVADC_DAT0)*LSB mv	

11.8.16. CHG_STAT

Register address = 0xC7

Bit(s)	Name	Description	R/W
7		Reserved	
6	Chg_end	Full flag 0：Charing 1：full	R
5:0		Reserved	

12.Layout note

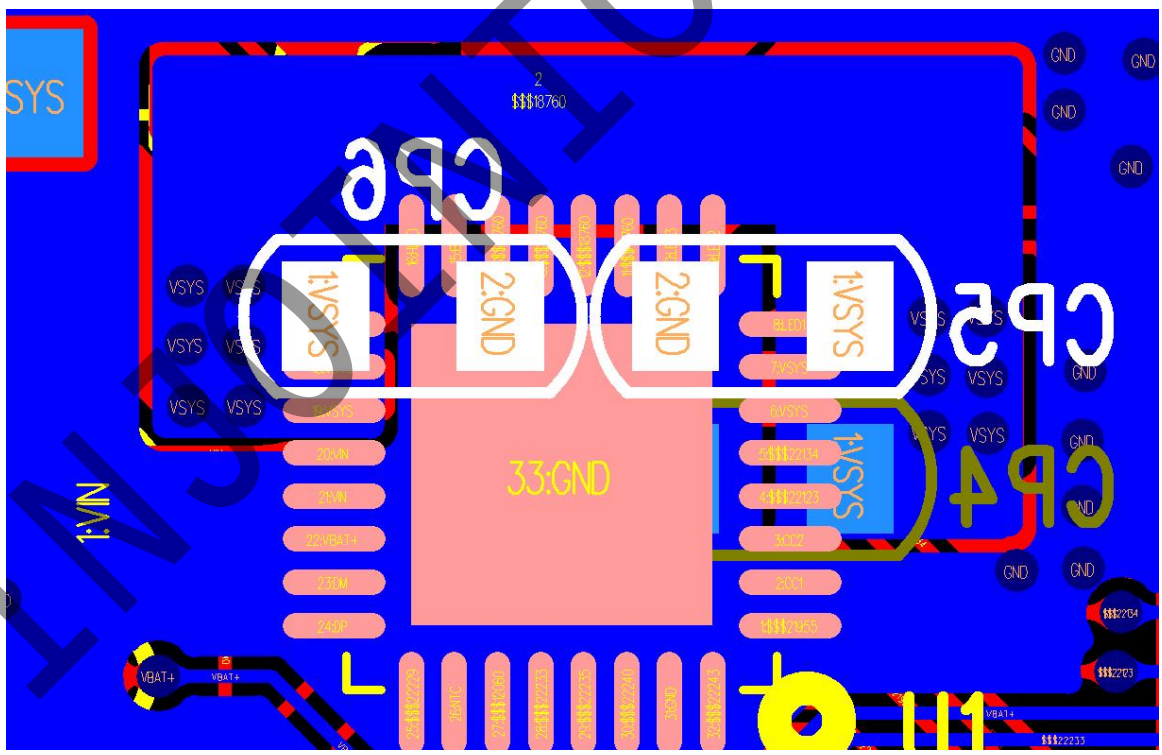
Only a few precautions that may affect the function and performance are listed. If there are other precautions, additional documents will be added.

VSYScapacitors position

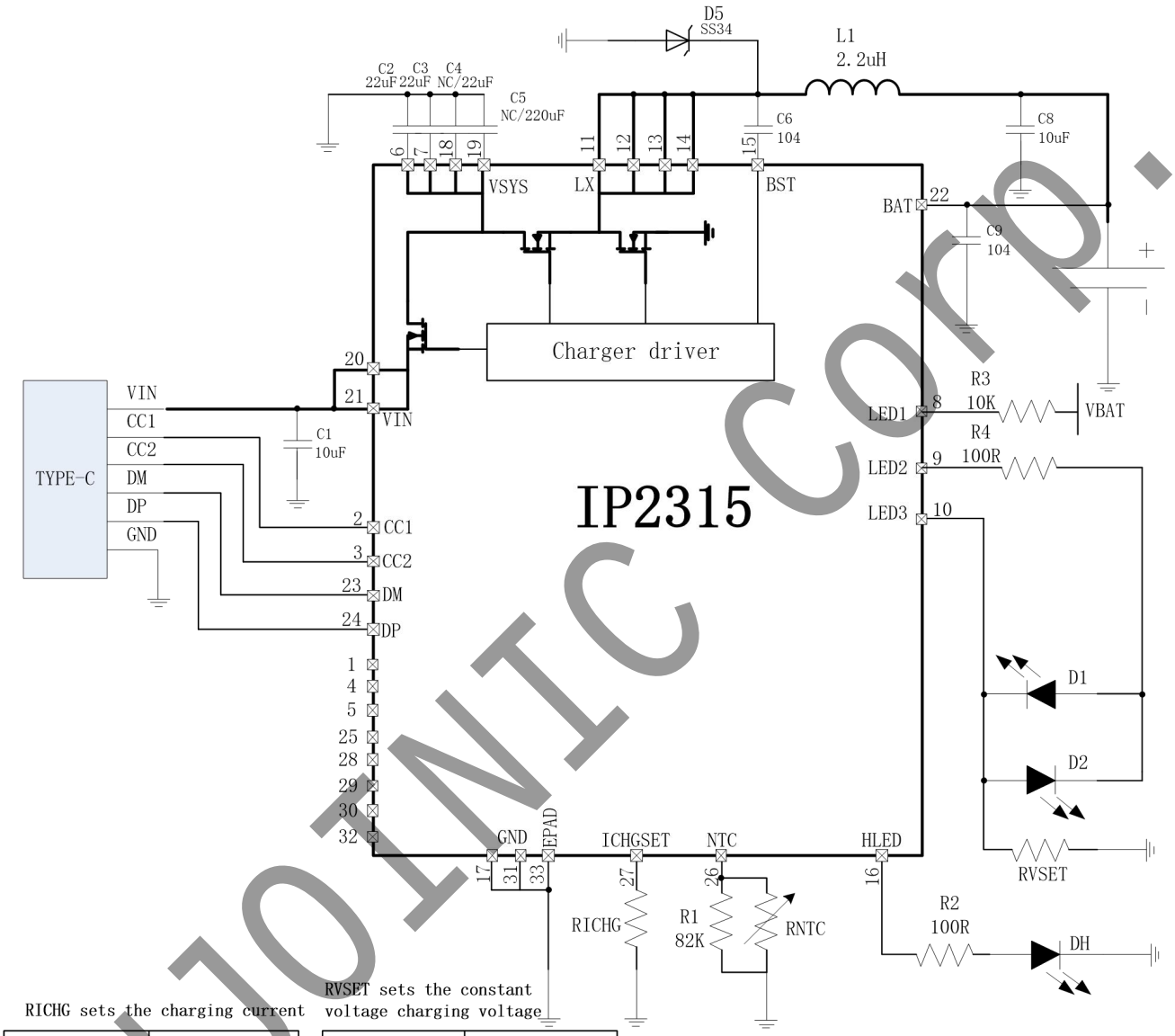
The working power and current of the chip are relatively large, and the position of the capacitor on the VSYS network will affect the stability of the DCDC operation. The capacitor on the VSYS network needs to be as close as possible to the VSYS pin and EPAD of the IC, and a large area of copper should be laid, and more vias should be added to reduce the area of current circulation between the capacitor and the IC and reduce parasitic parameters.

The VSYs pins are distributed on both sides of the chip, and capacitors need to be placed near the pins on both sides, and pass through the PCB with a wide width (not less than 100mil)

The copper plating connects the VSYS pins on both sides together. VSYS pins need to be placed nearby 22uF capacitors, the capacitor location is close to the IP2315 pin (the 6th, 7th and 18th, 19th pin each one), it is recommended that the capacitor be placed directly on the chip Both are on the back, as shown



13.Typical application schematic diagram



RICHG sets the charging current

RICHG Resistance	Set charging current
51K	1000mA
100K	1500mA
150K	2100mA
200K	3000mA

RVSET sets the constant voltage charging voltage

RVSET Resistance	constant charging voltage
10K	4.5V
68K	4.4V
120K	4.35V
NC	4.2V

14.BOM

Num	Component name	Model & Specification	Unit	用量	position
1	SMD IC	QFN32 IP2315	U1	1	
2	SMD capacitors	0805 10uF 10% 25V	C1 C8	2	
3	SMD capacitors	0805 22uF 10% 25V	C2 C3	2	
4	SMD capacitors	0603 104 10% 25V	C6 C9	2	
5	Electrolytic capacitors.	NC/220uF 25V 10%	C5	0	Reserved
6	SMD resistance	0603R 82K 5%	R1	1	
7	SMD resistance	0603R 100R 5%	R2 R4	2	
8	SMD resistance	0603R 10K 5%	R3	1	
9	SMD resistance	0603R 1%	RVSET RICHG	2	Adjust the charging output voltage and charging current.
10	Schottky diodes.	SS34	D5	1	
11	SMDLED	0603	D1 D2 DH	3	Battery indicator and fast charge indicator
12	inductor.	2.2uH 10*10	L1	1	

Recommended inductor model

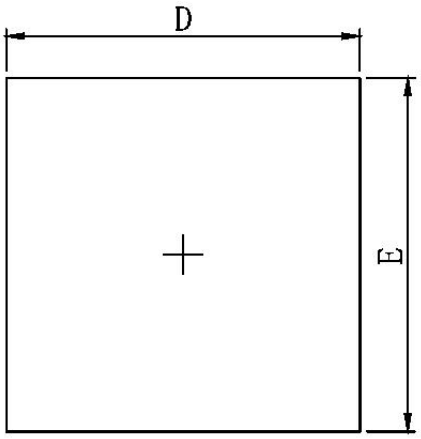
DARFON PIN	Thickness (mm)	Inductance (uH)	Tolerance	DC Resistance (mΩ)		Heat Rating Current DC Amp.	Saturation Current DC Amps.	Measuring Condition
				Typ.	Max.	Idc(A)Max.	Isat(A)Max.	
SPM70702R2MESQ	5	2.2	±20%	9	10.2	10.5	13.5	100kHz/1.0V
SPM10102R2MESN	4	2.2	±20%	6	7	12	18	100kHz/1.0V
SHC1004-2R2M	4	2.2	±20%	7	9	12	24	

15.Silkscreen

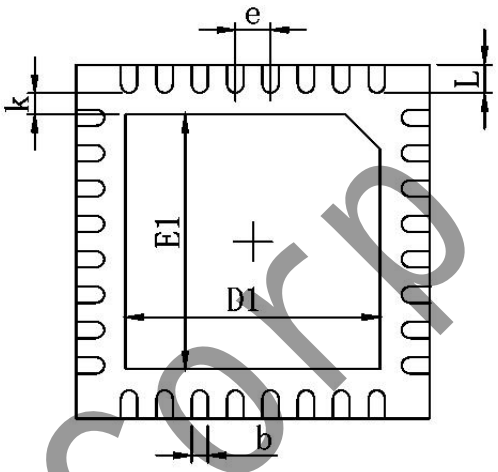
Instructions：

1、 ——Injoinic logo
2、IP2315 ——Product name
3、XXXXXXX ——Product number
4、◯ ——Pin1 position

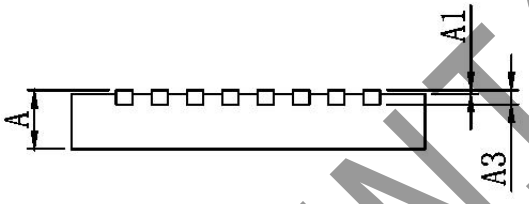
16.Package information



TOP VIEW



BOTTOM VIEW



SIDE VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	4.924	5.076	0.194	0.200
E	4.924	5.076	0.194	0.200
D1	3.300	3.500	0.130	0.138
E1	3.300	3.500	0.130	0.138
k	0.200MIN.		0.008MIN.	
b	0.200	0.300	0.008	0.012
e	0.500TYP.		0.020TYP.	
L	0.324	0.476	0.013	0.019

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