英集芯科技 INJOINIC TECHNOLOGY

IP5568U

Support wireless charging automatic wake up TX、SCP、

Bi-directional PD3.0 and Fast Charge protocol Power Bank SOC

1 Features

- **Support multiple ports +wirelss charging simultaneously**
  - ✧ 2 USB A output ports，1 USB B input port
  - ✧ 1 USB C input/output port，wireless charging TX
- **5W/10W/15W wireless charging TX/RX**
  - ✧ Compliant with the WPC V1.2.4 specification，support 5W/7.5W/10W/15W TX
  - ✧ integrate full bridge driver，integrate voltage/current demodulator
  - ✧ support FOD function
  - ✧ Support wireless charging, USB output or input work simultaneously
  - ✧ support 1~3 coils
- **Fast charge**
  - ✧ Every port support fast charge
  - ✧ Support QC2.0/QC3.0 output
  - ✧ Support FCP/AFC input/output
  - ✧ Support SCP(10V@2.25A) output
  - ✧ Support USB C DRP input/output
  - ✧ PDO：5V@2.4A 9V@2.22A 12V@1.67A 3.3V~11V@2A
  - ✧ Support BC1.2/Apple/Samsung
- **Integrated USB PD2.0/PD3.0 protocol**
  - ✧ Support PD2.0 input/output protocol
  - ✧ Support PD3.0 input/output and PPS output protocol
  - ✧ Support 5V/9V/12V voltage input/output
  - ✧ PPS support 3.3~11V adjustable voltage with 20mV/step
- **Charger**
  - ✧ Up to 5A charging current at battery port
  - ✧ Adaptive charging current adjustment
  - ✧ Support 4.2V/4.3V/4.35V/4.4V battery
- **Boost**
  - ✧ Output current：5V@3.1A 9V@2.22A 12V@1.67A
  - ✧ Up to 95%@5V/2A efficiency with synchronous switching
  - ✧ Support line compensate
- **Battery level display**
  - ✧ Integrated 14bit ADC and coulometer
  - ✧ Support 1/2/4 LED battery level indicator
  - ✧ Support 88/188 nixie tube
  - ✧ Auto recognition of LED number
  - ✧ Adjustable battery level curve
- **Others**
  - ✧ Supports automatic detection of wireless charging devices
  - ✧ Supports automatic detection of FOD thresholds
  - ✧ Supports the selection of magnetic and pop-up window functions
  - ✧ Support auto detect of plug in and out
  - ✧ Fast charge status indicator
  - ✧ Enter standby mode automatically in light load
  - ✧ Integrated torch-light driver
- **Multiple protection,high reliability**
  - ✧ Inuput overvoltage and undervoltage protection
  - ✧ Output overcurrent,overvoltage and short circuit protection
  - ✧ Battery overcharge,over discharge and overcurrent protection
  - ✧ Over temperature protection
  - ✧ 4KV ESD,Input voltage up to 20V（including CC pins）
- **Low BOM cost**
  - ✧ Integrated switch power MOSFET
  - ✧ Single inductor for charging and discharging
- **Package size：8mm × 8mm 0.4pitch QFN64**

2 Applications

Power bank with wireless charging

3 Power bank with wireless charging Description

IP5568U is a power management SOC. It integrates wireless charging TX, QC2.0 / QC3.0 / SCP output fast charging protocol, FCP / AFC / input and output fast charging protocol, USB C / PD2.0 / PD3.0 input and output protocol, USB C PD3.0 PPS output protocol, and BC1.2 / apple / Samsung mobile phone charging protocol. It integrates the functions of synchronous up / down converter, lithium battery charging management, battery power indication, etc. to provide a complete power solution for fast charging mobile power bank. Two USB A ports, one USB B port and one USB C port can be connected at the same time,any single USB port can support fast charging. When two or more output ports are used at the same time, only 5V is supported. IP5568U supports wireless charging and simultaneous use of USB port, which only supports 5V.

Only one inductor is needed to realize the function of buck and boost, and only a few peripheral devices are needed in the application, which effectively reduces the size of the overall PCB and reduces the cost of BOM.

The synchronous switch boost system of IP5568U can provide the maximum output capacity of 22.5W, which can maintain the efficiency of more than 90% even when the battery voltage is low.

IP5568U charger provides charging current up to 5.0A. Built in IC temperature, battery temperature and input voltage control loop, intelligent regulation of charging current.

IP5568U integrates a 14bit ADC, which can accurately measure battery voltage and current. The algorithm of remaining battery capacity of IP5568U can accurately obtain battery level information. The battery level curve can be customized to accurately display the remaining battery capacity.

IP5568U supports 1 / 2 / 4 LED battery level indicator, and 88/188 digital tube battery level indicator. IP5568U supports lighting function and supports buttons.

Contents

4 Reversion History

Release version V1.00（2023 Apr）	Page
● Preliminary release	1

Change version V1.00 to V1.01（2024 Sep）	Page
● Principle diagram added Q value PIN selection	34

5 Typical Application

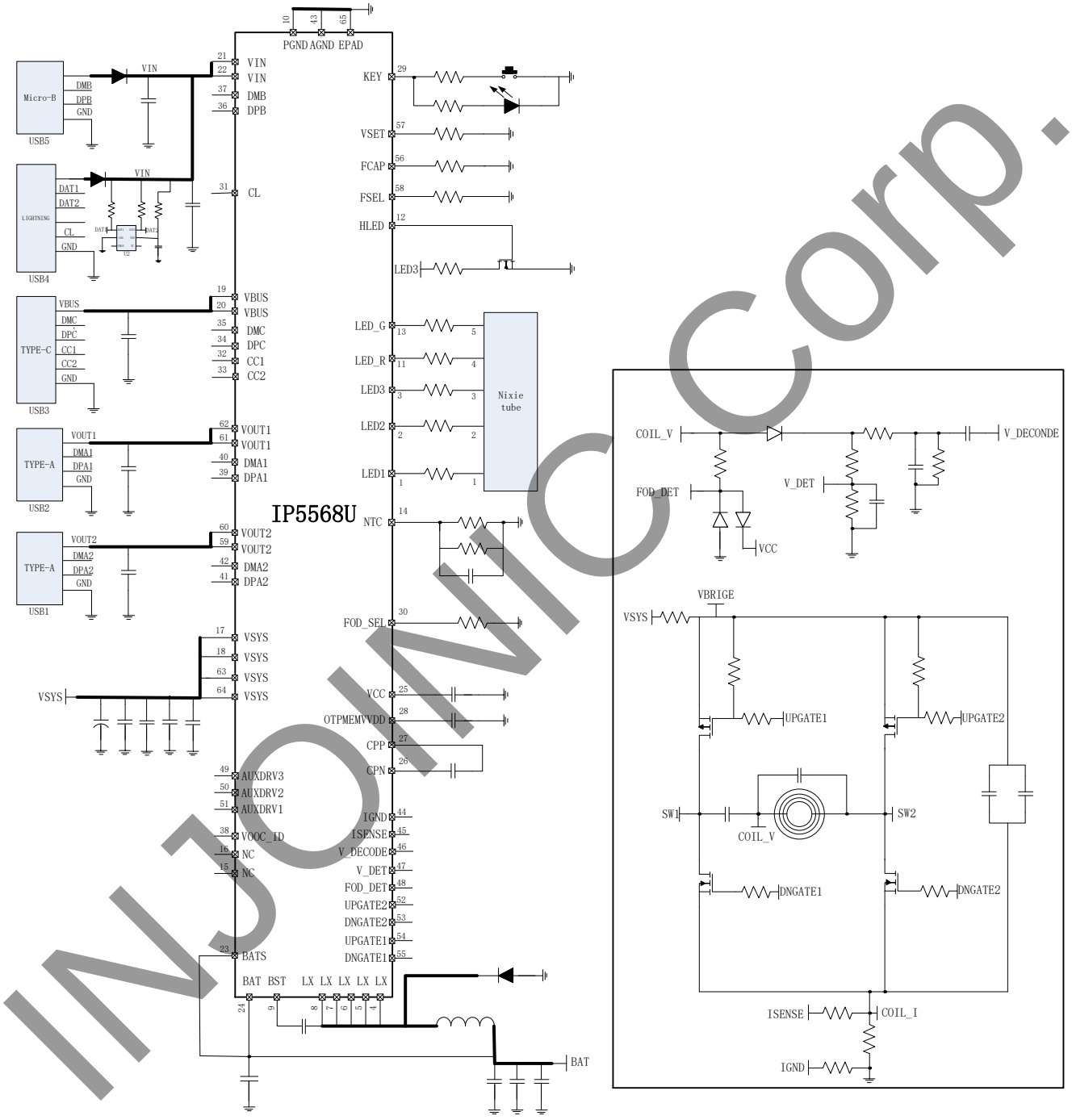


Figure 1 Simplified Application Diagram

6 IP Series Products List

6.1 Power Bank IC

IC Part No.	Charge/Boost Power		Main feature								Package	
	Boost Power	Charge Power	LED number	I2C	DCP	USB C	QC	PD3.0 /PPS	Super charge	UF CS	Package	Compatibility
IP5303T	5V/1A	5V/1A	1,2	-	-	-	-	-	-	-	ESOP8	PIN2PIN
IP5305T	5V/1A	5V/1A	1,2,3,4	√	-	-	-	-	-	-	ESOP8	
IP5306	5V/2.4A	5V/2A	1,2,3,4	√	-	-	-	-	-	-	ESOP8	
IP5306H	5V/2.4A	5V/2A	1,2,3,4	√	-	-	-	-	-	-	ESOP8	
IP5306P	5V/2.1A	5V/2A	1,2,4	√	-	-	-	-	-	-	ESOP8	
IP5316	5V/2.4A	5V2.4A	1,2,4	√	√	√	-	-	-	-	ESSOP10	
IP5326	5V/2.4A	5V2.4A	1,2,4	√	√	√	-	-	-	-	QFN16	
IP5407	5V/2.4A	5V/2A	1,2,4	-	√	-	-	-	-	-	ESOP8	-
IP5407H	5V/2.4A	5V/2.1A	1,2,4	-	√	-	-	-	-	-	ESOP8	
IP5209	5V/2.4A	5V/2.1A	3,4,5	√	√	-	-	-	-	-	QFN24	
IP5189T	5V/2.1A	5V/2A	1,2,3,4	√	√	-	-	-	-	-	QFN24	
IP5218	5V/1A	5V/1A	1,2,3,4	-	-	√	-	-	-	-	QFN16	
IP5219	5V/2.4A	5V/2A	1,2,3,4	√	-	√	-	-	-	-	QFN24	
IP5310	5V/3.1A	5V/2.6A	1,2,3,4	√	√	√	-	-	-	-	QFN32	
IP5506	5V/2.4A	5V/2A	Nixie Tube	-	-	-	-	-	-	-	ESOP16	
IP5508	5V/2.4A	5V/2A	Nixie Tube	-	√	-	-	-	-	-	QFN32	
IP5320	5V/3.1A	5V/2.6A	Nixie Tube	√	√	√	-	-	-	-	QFN28	
IP5330	5V/3.1A	5V/2.6A	Nixie Tube	-	√	√	-	-	-	-	QFN32	
IP5328P	20W	18W	1,2,3,4	√	√	√	√	√	-	-	QFN40	
IP5353	22.5W	18W	4	√	√	√	√	√	√	-	QFN32	
IP5355	22.5W	18W	4	√	√	double	√	√	√	-	QFN32	
IP5356	22.5W	18W	Nixie Tube	√	√	double	√	√	√	-	QFN40	PIN2PIN
IP5356H	22.5W	18W	Nixie Tube	√	√	double	√	√	√	-	QFN40	
IP5356M	22.5W	18W	Nixie Tube	√	√	double	√	√	√	-	QFN40	
IP5358	22.5W	18W	Nixie Tube	-	√	√	√	√	√	-	QFN48	
IP5561	22.5W	18W	Nixie Tube	-	√	√	√	√	√	-	QFN48	
IP5568	22.5W	18W	Nixie Tube	-	√	√	√	√	√	-	QFN64	
IP5568U	22.5W	18W	Nixie Tube	-	√	√	√	√	√	-	QFN64	
IP5385	65W	65W	Nixie Tube	√	√	double	√	√	√	√	QFN48	
IP5386	45W	45W	Nixie Tube	√	√	double	√	√	√	-	QFN48	
IP5389	100W	100W	Nixie Tube	√	√	double	√	√	√	-	QFN64	
IP5389H	100W	100W	Nixie Tube	√	√	double	√	√	√	-	QFN64	

7 PIN Definition

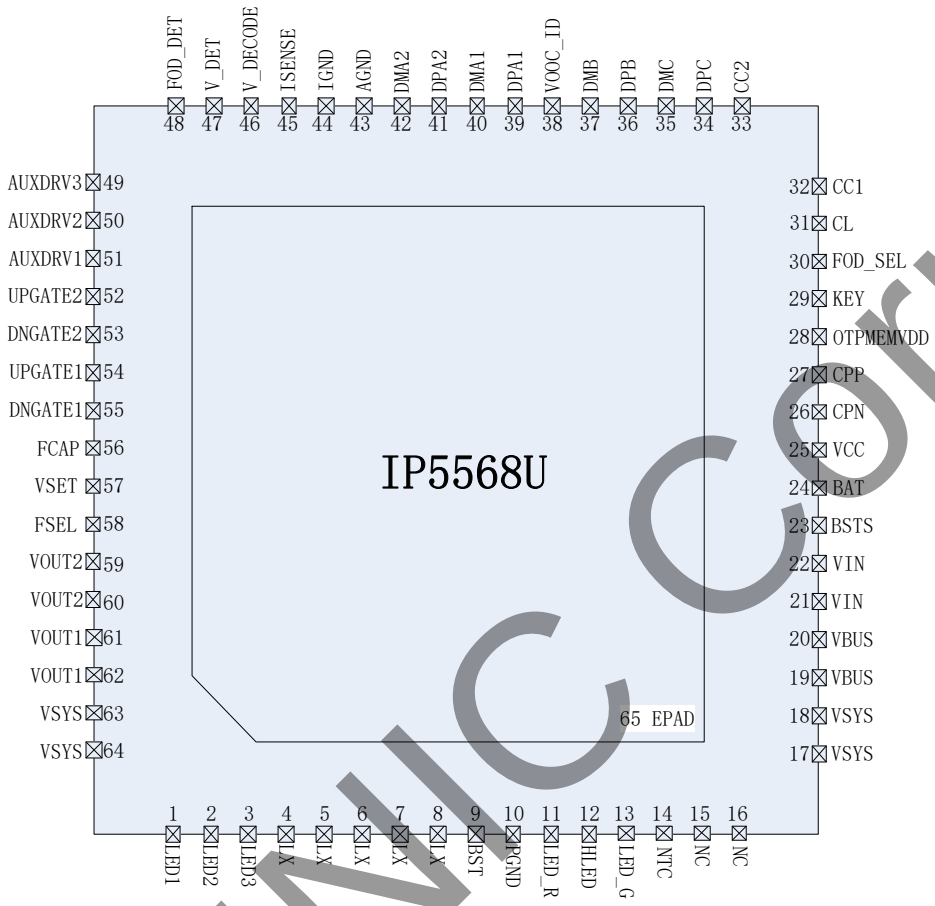


Figure 2 IP5568U Pin Assignments

7.1 IP5568U PIN Functions

PIN Num	PIN Name	DESCRIPTION
1	LED1	Battery level display drive pin LED1
2	LED2	Battery level display drive pin LED2
3	LED3	Battery level display drive pin LED3
4、5、6、7、8	LX	DCDC switch node, connect to inductor
9	BST	Internal high voltage drive, serial capacitor to LX
10	PGND	Power Ground
11	LED_R	Wireless charging status indicator driver pin/ Battery level display drive pin
12	HLED	Fast charge status indicator drive pin
13	LED_G	Wireless charging status indicator driver pin/ Battery level display drive pin

14	NTC	NTC pin
15	NC	Not connected
16	NC	Not connected
17、18、63、64	VSYS	Public Node of system power input and output
19、20	VBUS	VBUS port power pin
21、22	VIN	BIN power pin
23	BATS	Battery voltage sense pin
24	BAT	Battery supply pin
25	VCC	3.1V Voltage output pin
26	CPN	Internal chargepump flying capacitor connection pin
27	CPP	Internal chargepump flying capacitor connection pin，Connect 100nF capacitor between CPP and CPN
28	OTPMEMVDD	Internal chargepump output pin，connect 2.2uF capacitorto GND
29	KEY	Key detect pin, reused as WLED torch light function.
30	FOD_SEL	FOD threshold selection pin
31	CL	CC signal of lightning input port, connecting the 8th pin of Apple lightning input port
32	CC1	VBUS port CC1 pin
33	CC2	VBUS port CC2 pin
34	DPC	VBUS port DP pin
35	DMC	VBUS port DM pin
36	DPB	VIN port port DP pin
37	DMB	VIN port DM pin
38	VOOC_ID	VOOC ID pin
39	DPA1	VOUT1 port DP pin
40	DMA1	VOUT1 port DM pin
41	DPA2	VOUT2 port DP pin
42	DMA2	VOUT2 port DM pin
43	AGND	Analog ground
44	IGND	Wireless charging Current communication/demodulation sense pin
45	ISENSE	Wireless charging Current communication/demodulation sense pin
46	V_DECODE	Wireless charging voltage communication/demodulation pin
47	V_DET	Wireless charging Coil voltage detect input
48	FOD_DET	Wireless charging FOD detect pin
49	AUXDRV3	Wireless charging multi coil control pin3

50	AUXDRV2	Wireless charging multi coil control pin2
51	AUXDRV1	Wireless charging multi coil control pin1
52	UPGATE2	Wireless charging H brige PMOS driver pin 2
53	DNGATE2	Wireless charging H brige NMOS driver pin 2
54	UPGATE1	Wireless charging H brige PMOS driver pin 1
55	DNGATE1	Wireless charging H brige NMOS driver pin 1
56	FCAP	Battery capacity selection, different resistance connection, different battery capacity can be selected
57	VSET	Battery voltage selection, different resistance connection, different charging battery voltage can be selected
58	FSEL	magnetic and pop-up window functions selection pin
59、60	VOUT2	VOUT2 output port power pin
61、62	VOUT1	VOUT1 output port power pin
65(EPAD)	GND	GROUND

8 Block diagram

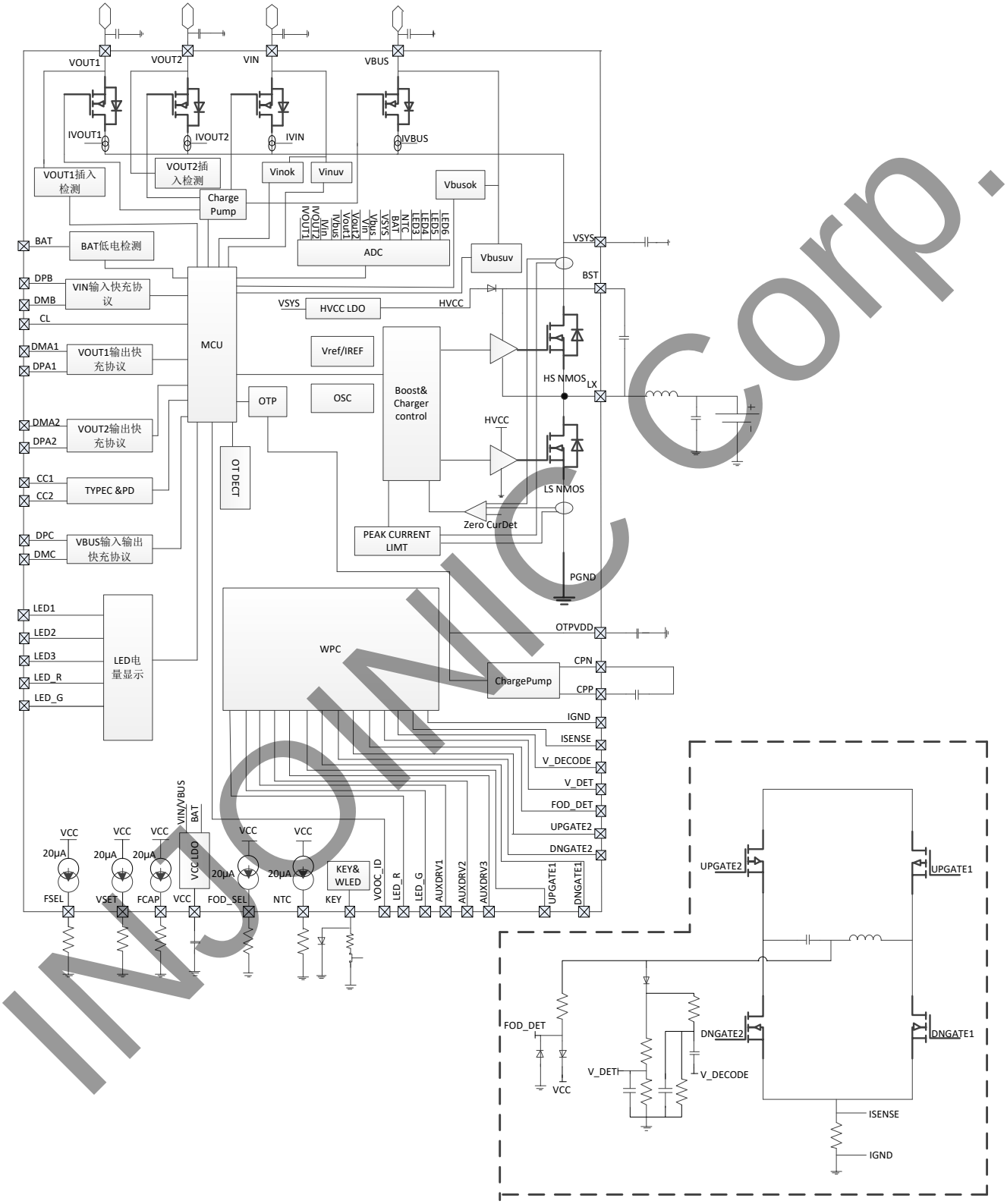


Figure 3 Block diagram

9 Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Input Voltage Range	V_{IN}, V_{BUS}	-0.3 ~ 16	**V**
Junction Temperature Range	T_J	-40 ~ 150	℃
Storage Temperature Range	Tstg	-60 ~ 150	℃
Thermal Resistance (Junction to Ambient)	θ_{JA}	26	**℃/W**
ESD (Human Body Model)	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.

*Voltages are referenced to GND unless otherwise noted.

10 Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}, V_{BUS}	4.5	5/9/12	14	V
Battery Voltage	Vbat	3.0	3.7	4.4	V

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

11 Electrical Characteristics

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

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Charging System						
Input voltage	V_{IN} V_{BUS}		4.5	5/9/12	14	V
Input Over Voltage	V_{IN} V_{BUS}		13.5	14.5	15.5	V
Constant Charge Voltage	V_{TRGT}	R_{VSET} = 115kΩ	4.16	4.20	4.24	V
		R_{VSET} = 82kΩ	4.26	4.30	4.34	V
		R_{VSET} = 51kΩ	4.31	4.35	4.39	V
		R_{VSET} = 20kΩ	4.36	4.40	4.44	V
Charge Current	I_{CHRG}	VIN =5V, input current	1.7	2.0	2.3	A
		VBUS =5V, input current	2.3	2.6	2.9	A

		VIN or VBUS >=9V, input current	1.7	2.0	2.3	A
		VIN or VBUS >=12V, input current	1.3	1.5	1.7	A
Trickle Charge Current	I_{TRKL}	VIN=5V，BAT<1.5V	70	120	170	mA
		VIN=5V，1.5V<=BAT<3.0V	100	200	400	mA
Trickle Charge Stop Voltage	V_{TRKL}		2.9	3.0	3.1	V
Charge Stop Current	I_{STOP}	VIN=5V, battery current	250	400	550	mA
Recharge Voltage Threshold	V_{RCH}		4.05	4.10	4.15	V
Charge Safety Time	T_{END}		20	24	27	Hour
Boost System						
Battery operation voltage	V_{BAT}		3.0		4.5	V
Battery input current	I_{BAT}	VBAT=3.7V ， VSYS=5.1V ， fs=325KHz,Iout=0mA		15		mA
DC output voltage	QC2.0 V_{OUT}	V_{OUT}=5V@1A	4.95	5.12	5.25	V
		V_{OUT}=9V@1A	8.70	9.00	9.30	V
		V_{OUT}=12V@1A	11.60	12.00	12.40	V
	QC3.0 V_{OUT}	@1A	4.95		12.25	V
	QC3.0 Step			200		mV
Output voltage ripple	ΔV_{OUT}	VBAT=3.7V，VOUT=5.0V，fs=325KHz		100		mV
		VBAT=3.7V，VOUT=9.0V，fs=325KHz		150		mV
		VBAT=3.7V，VOUT=12V，fs=325KHz		200		mV
Boost output current	I_{out}	V_{OUT}=5V		3.1		A
		V_{OUT}=9V		2.22		A
		V_{OUT}=12V		1.67		A
Boost efficiency	η_{out}	V_{BAT}=3V，V_{OUT}=5V，I_{OUT}=2A		94		%
		V_{BAT}=3V，V_{OUT}=9V，I_{OUT}=2A		92		%
		V_{BAT}=3V，V_{OUT}=12V，I_{OUT}=1.5A		91		%
Boost	I_{shut}	VBAT=3.7V，Vout=5V	3.4	3.8	4.2	A

overcurrent shut down threshold		VBAT=3.7V，Vout=9V	2.25	2.60	2.90	A
		VBAT=3.7V，Vout=12V	1.7	1.9	2.2	A
Output light load shutdown current	I_{LOAD}	VBAT=3.7V	50	80	100	mA
Load overcurrent detect time	T_{UVD}	Duration of output voltage under 4.2V，output voltage setting >=5v		30		ms
Load short circuit detect time	T_{OCD}	Duration of output current above 4.4A, output voltage setting >=5v	150		200	us
Control System						
Switch frequency	fs	Discharge switch frequency	300	325	350	KHz
		Charge switch frequency	450	500	550	KHz
NMOS on resistance	r_{DSON}	Upper NMOS		9	11	mΩ
NMOS on resistance		Lower NMOS		9	11	mΩ
VCC output voltage	V_{CC}	VBAT=3.7V	2.95	3.1	3.25	V
Battery port standby current	I_{STB}	VIN=0V, VBAT=3.7V, average current		80		μA
VCC output current	I_{LDO}	VBAT=3.7V	40	50	60	mA
LED light driving current	I_{WLED}		10	15	20	mA
LED display driving current	I_{LED1} I_{LED2} I_{LED3}	Voltage decrease 10%	5	7	9	mA
Light load shut down detect time	$T1_{load}$	boost Iout current continued lessthan 80mA	25	32	44	s
Output port light load shut down detect time	$T2_{load}$	Vout1/Vout2/VBUS output current continued lessthan 80mA	14	16	18	s
Short press on key wake up time	$T_{OnDebounce}$		60		500	ms
Time of WLED turn on	$T_{Keylight}$	Long press key time	1.2	2	3	s
Thermal shut down temperature	T_{OTP}	Rising temperature	130	140	150	℃
Thermal shut down hysteresis	ΔT_{OTP}			40		℃

12 Function Description

12.1 Low power lock out and activation

The first time IP5568U access to the battery, IC is in lock out state, battery level indicator LED will flash four times, or the digit 0 of the nixie tube flashes 4 times for prompt; Under non-charging state, if the battery voltage is too low to trigger the low power shutdown, IP5568U will enter lock out state too.

In low battery state, to decrease the quiescent power, IP5568U do not support plug in detect function or key press activation function. During which, key press action will not trigger boost output, and battery level indicator LED will flash four times

Under the lock out state, only by entering charging status can activate IP5568U 's full function.

12.2 Charge

IP5568U integrated a constant current and constant voltage Li battery charging management system with synchronous switch, adaptive to various charging voltage.

When the battery voltage is lower than 3V, trickle charging 200mA charging current is applied; when the battery voltage is higher than 3V, enters constant current charging stage, the maximum charging current at battery port is 5.0A; when the battery voltage is near the preset battery voltage, enters constant voltage charging stage; when the charging current is less than 400mA and battery voltage is near the constant voltage charging stage, the charging process is stopped. When the charging stage is accomplished, once the battery voltage falls under 4.1V, battery charging stage will be restarted.

IP5568U adopted switch charging technology, switch frequency is 500kHz. During 5V input voltage, maximum input power is 10W; During the fast charging state, maximum input power is 18W. The highest charging current is up to 5.0A, charging efficiency can be up to 94%, such can reduce 3/4 charging time.

IP5568U supports charging the battery and phone at the same time,output voltage is 5V.

12.3 Boost

IP5568U Integrated a synchronized switch converter which supports high voltage output, providing 3.3V~12V output voltage output, load capacity can be: 5V/3.1A, 9V/2.22A and 12V/1.67A. 325kHz switching frequency. Internal soft start function. In avoid of large rush current causing device failure at start up stage, built-in overcurrent, short circuit, overvoltage and over temperature protection function, make insurance of the stability and reliability of power system.

Boost system output current can be auto-modulated according to the temperature, ensuring the IC is under the preset temperature.

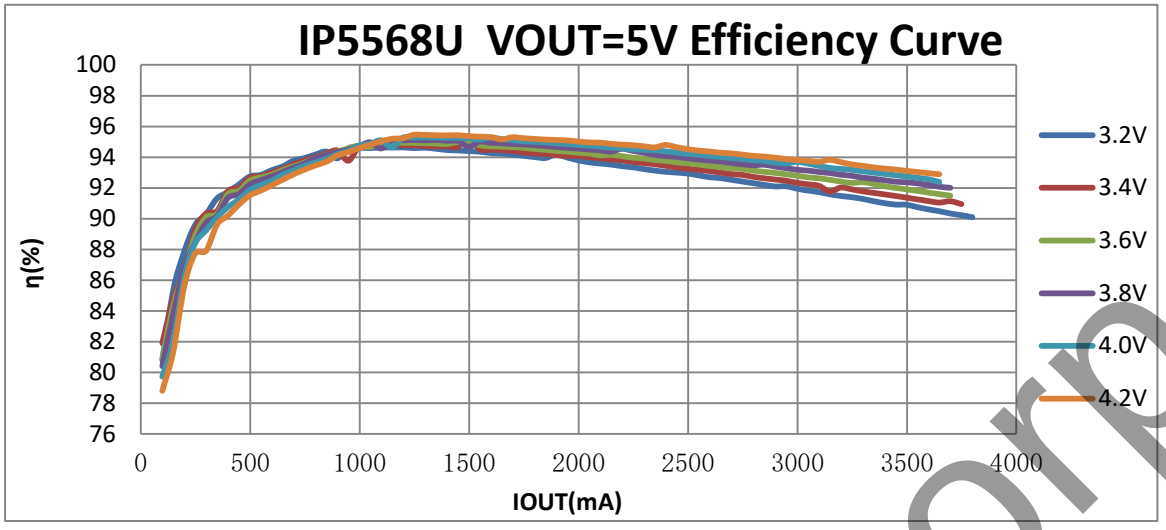


Figure 4 IP5568U VOUT=5V Efficiency Curve

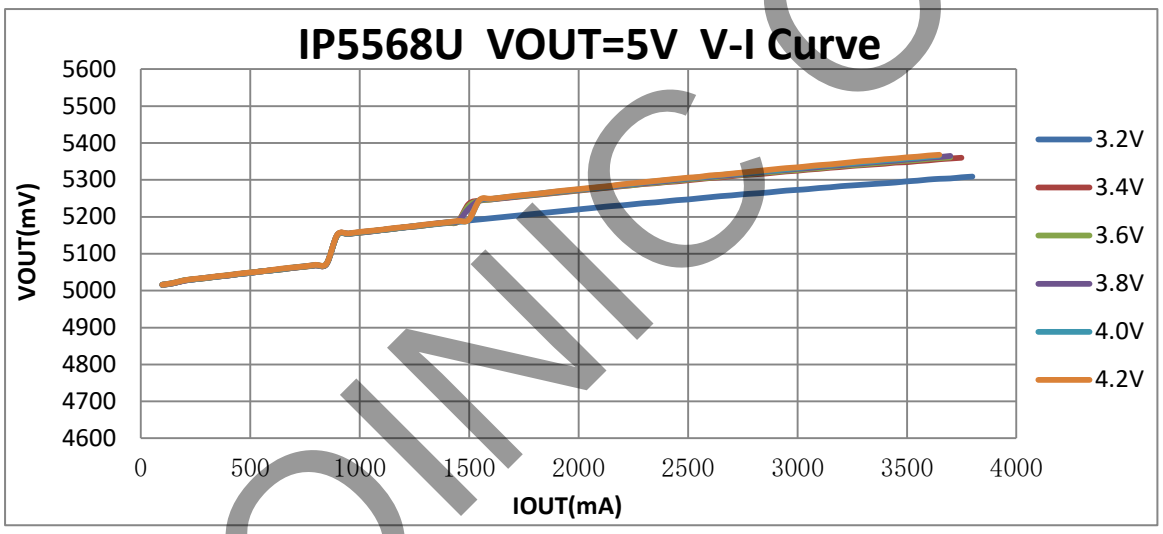


Figure 5 IP5568U VOUT=5V V-I Curve

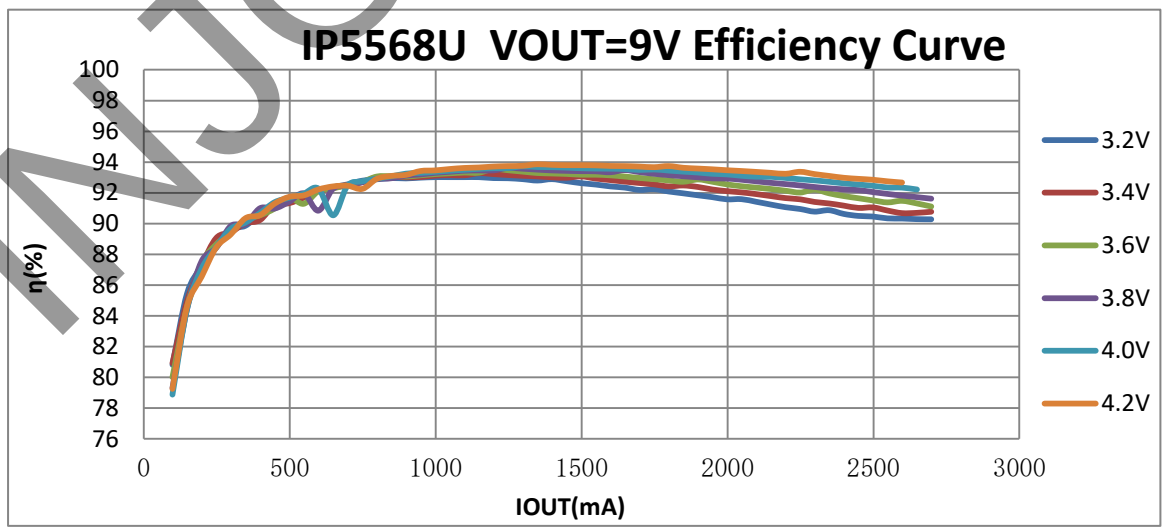


Figure 6 IP5568 VOUT=9V Efficiency Curve

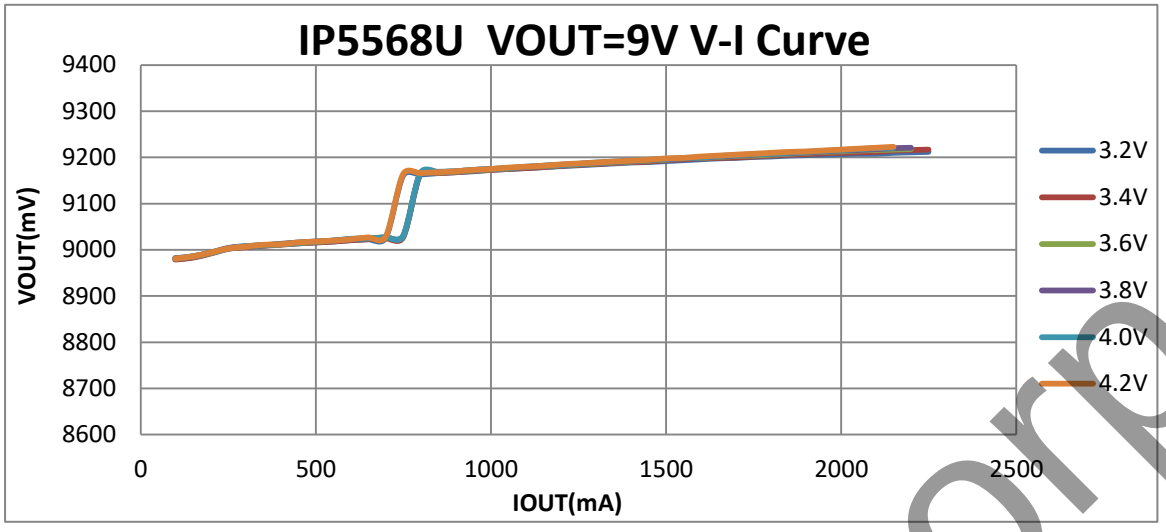


Figure 7 IP5568U VOUT=9V V-I Curve

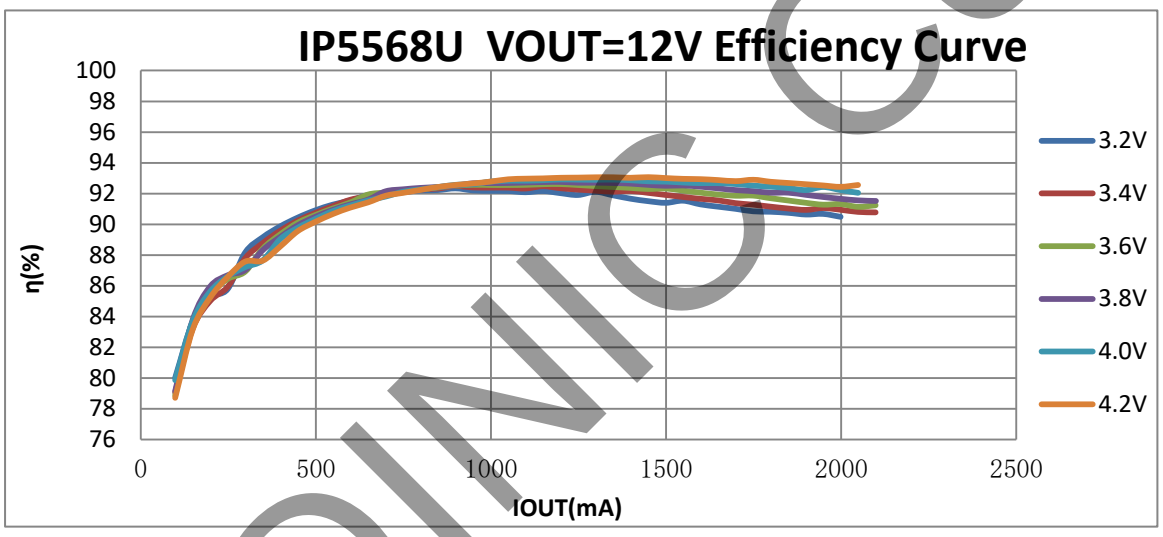


Figure 8 IP5568U VOUT=12V Efficiency Curve

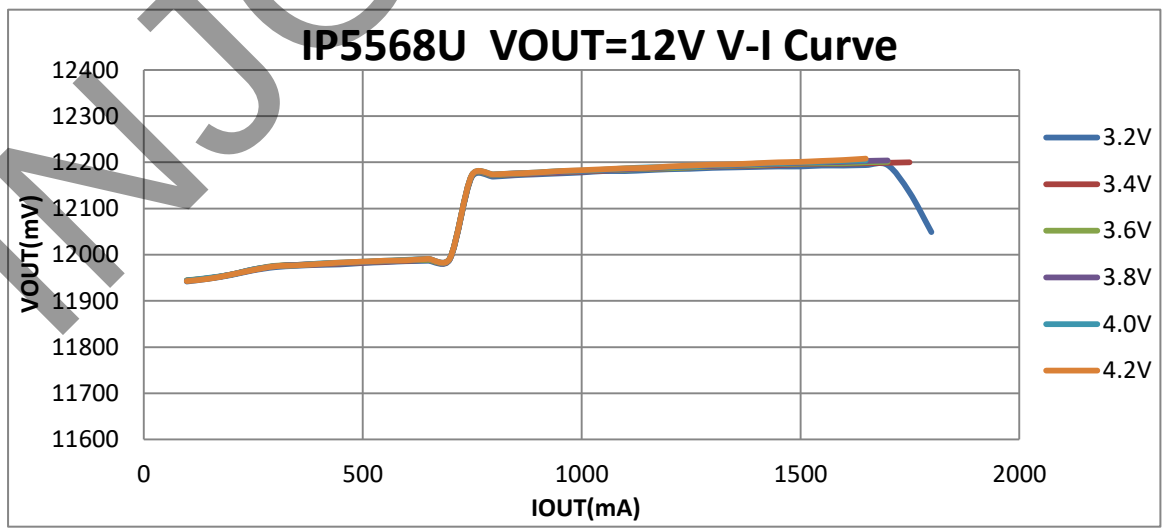


Figure 9 IP5568U VOUT=12V V-I Curve

12.4 USB C

IP5568U integrated USB C DRP port, auto-switching the internal pull-up and pull-down circuit on CC1 and CC2 by distinguishing the role of the attached device. Support Try.SRC function, when the attached device is also DRP device, IP5568U will supply power for the opposite device.

When worked as DFP, the output current can be set as three levels; when worked as UFP, the current capability from the opposite device can be detected.

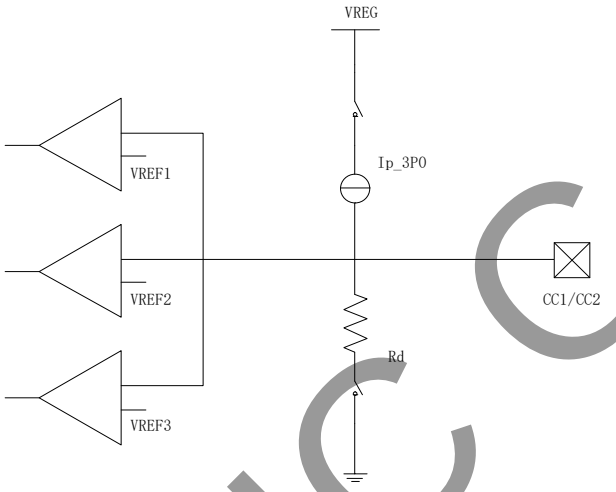


Figure 10 CC internal circuit

Chart 1 Pull-up and pull-down ability:

Name	Value
Ip_3P0	330μA
Rd	5.1kΩ

Chart 2 Comparator Threshold of pull-up Ip

	Minimum Voltage	Maximum Voltage	Threshold
Powered cable/adapter（vRa）	0.00V	0.75V	0.80V
Sink（vRd）	0.85V	2.45V	2.60V
No connect(vOPEN)	2.75V		

Chart 3 Comparator Threshold of Pull-down Resistor Rd

Detection	Min voltage	Max voltage	Threshold
vRa	-0.25V	0.15V	0.20V
vRd-Connect	0.25V	2.04V	
vRd-USB	0.25V	0.61V	0.66V
vRd-1.5	0.70V	1.16V	1.23V
vRd-3.0	1.31V	2.04V	

Figure 4-36 DRP Timing

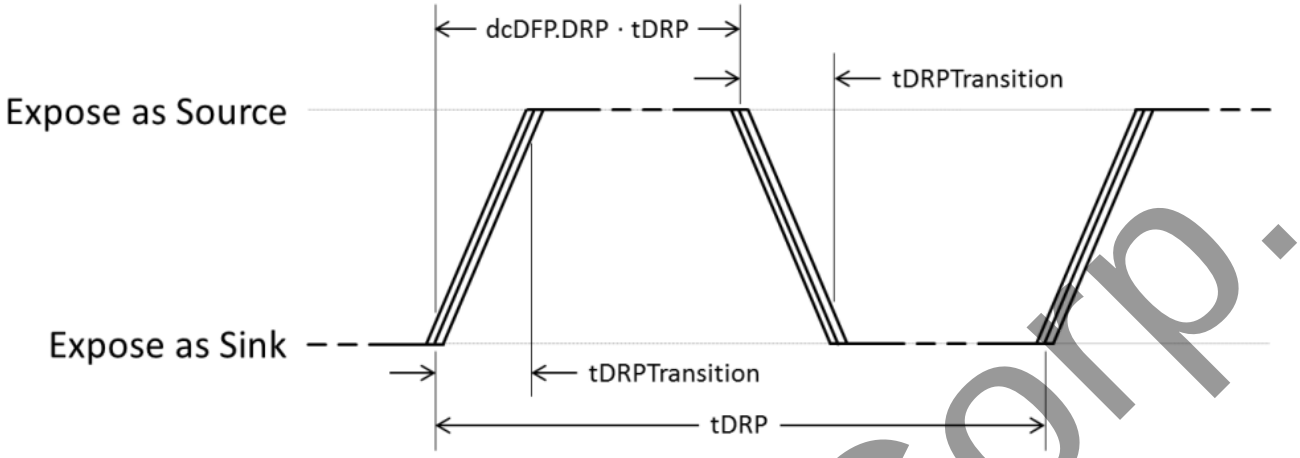


Figure 11 USB C detects cycle

Chart 4 USB C detects cycle

	Minimum	Maximum	Description
tDRP	50ms	100ms	The period a DRP shall complete a Source to Sink and back advertisement
dcSRC.DRP	30%	70%	The percent of time that a DRP shall advertise Source during tDRP
tDRPTransition	0ms	1ms	The time a DRP shall complete transitions between Source and Sink roles during role resolution
tDRPTry	75ms	150ms	Wait time associated with the Try.SRC state
tDRPTryWait	400ms	800ms	Wait time associated with the Try.SNK state

Figure 4-16 Connection State Diagram: DRP with Accessory and Try.SRC Support

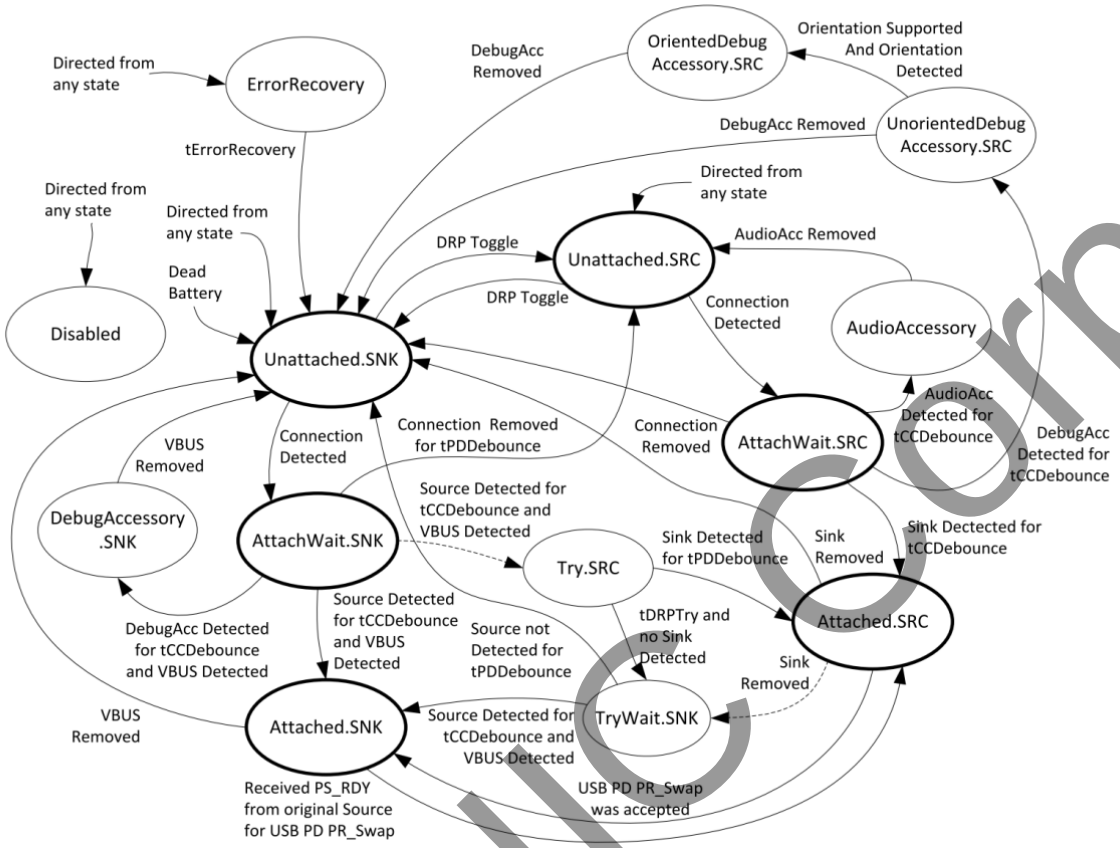


Figure 12 USB C detects state transition

12.5 USB C PD

IP5568U integrated USB C Power Delivery PD2.0/PD3.0/PPS (Programmable Power Supply) protocol, integrate physical (PHY) layer for data transmitting/receiving across the cc wire, hardware biphase mark coding (BMC) module and hardware CRC protect the data integrity.

IP5568U support PD2.0/PD3.0 bi-directional input/output and PPS output protocol. Input and output voltage support 5V/9V/12V. Output source cap: 5V@2.4A，9V@2.22A，12V@1.67A ，PPS 3.3V~11V@2A, Support up to 20W power level.

12.6 Fast Charge Protocol

IP5568U support multi fast charge protocols: QC2.0/QC3.0, FCP, AFC, SCP, Apple, Samsung.

Input QC2.0/QC3.0 protocol is not support for charging the power bank. External fast charging protocol IC is not supported.

Input fast charge protocol of FCP, AFC are supported for charging the power bank.

If the power bank is to charge for the phone, when IP5568U enter discharge mode, it will detect the fast charge type and request on DP, DM, which support fast charge for devices of QC2.0/QC3.0, FCP, AFC,SCP,and Apple 2.4A mode, Samsung 2.0A mode and BC1.2 1.0A mode.

For Apple 2.4A mode: DP=DM=2.7V

For Samsung 2.0A mode: DP=DM=1.2V

For BC1.2 1.0A mode: DP short to DM

Under BC1.2 mode, when the DP voltage is detected in the range of 2V~0.325V for 1.25s, fast charge will be initially determined, then the short status between DP and DM will be disconnected, and DM pull-down 20kΩ to GND at the same time. After which, if in the following 2ms the DP voltage is in range of 2V~0.325V and DM lower than 0.325V, fast charge handshake is accomplished successfully. Then QC2.0/QC3.0 device can request for desired voltage according to the QC standards. Any time DP lower than 0.325V will force to exit the fast charge mode, the ouput voltage will fall back to default 5V.

Chart 5 QC2.0/QC3.0 output voltage request rule

DP	DM	Result
0.6V	GND	5V
3.3V	0.6V	9V
0.6V	0.6V	12V
0.6V	3.3V	Continuous Mode
3.3V	3.3V	sustain

Continuous mode is supported by QC3.0, voltage can be adjusted by 200mV/step according to QC3.0 request under the continues mode.

Chart 6 Fast charging protocol supported by each port of IP5568U

protocol	VOUT1	VOUT2	VIN	VBUS output	VBUS input
QC2.0	√	√	-	√	-
QC3.0	√	√	-	√	-
AFC	√	√	√	√	√
FCP	√	√	√	√	√
SCP	√	√	-	-	-
PD2.0	-	-	-	√	√
PD3.0	-	-	-	√	√
PPS	-	-	-	√	-

supported：√

not supported：-

12.7 Charge and Discharge Path Management

Standby:

If VIN or VBUS is attached ， IP5568U will start the charging process directly.

If USB C UFP device is attached on VBUS or sink device is attached on VOUT port, IP5568U will start discharge function automatically.

If key is pressed, the VOUT1、VOUT2 and VBUS port will open only when load is detected on the according port, or the output on these port will be closed.

Discharge:

In the case of no key action, only the output path of the output port plugged in the electrical equipment will be opened; the output path of the output port not connected to the equipment will not be opened. When the output current of the opened output port is less than about 80mA, it will automatically

close after a period of time.

Any port of VOUT1, VOUT2 and VBUS can support the output fast charging protocol. However, since this application is a single inductance application, it can only support one voltage output, so it can only support the fast charging output when only one output port is open. When two or three outlets are used at the same time, the quick charge function will be automatically turned off.

According to the connection shown in the "typical application diagram", when any output port has entered the fast charging output mode, when the other output port is plugged in with electrical equipment, all the output ports will be closed first, the high-voltage fast charging function will be closed, and then the output ports with equipment will be opened. In this case, all the output ports only support the charging of apple, Samsung and bc1.2 modes. When the number of electrical equipment is reduced to only one, after 16 seconds, all output ports will be closed first, the high-voltage fast charging function will be turned on, and then the output port of the last electrical equipment will be turned on, so as to reactivate the equipment to request fast charging. When only one output port is open and the total output current is less than about 80mA for about 32s, the output port and discharge function will be closed and the standby mode will be entered.

When the wireless charging TX, VOUT1, VOUT2, and VBUS have any two outputs at the same time, the boost output can only be 5V.

When the wireless charging TX, VOUT1, VOUT2, and VBUS have only one outputs, boost can output the quick charging.

TX can only transmit 10W/15W power when VOUT1, VOUT2 and VBUS are shut down.

Charging：

Any port of VIN port and VBUS port can be charged by inserting the power supply. If both ports are connected to the power supply for charging, the first inserted power supply will be used for charging.

In the single charging mode, the fast charging mode of the power supply will be automatically identified, and the appropriate charging voltage and current will be automatically matched

When only VIN and TX work, and VIN can apply for 9V high voltage, the wireless charging TX can transmit 10w power. When VIN can apply 12V high voltage, the wireless charging TX can transmit 15W power.

When only VBUS and TX work, and VBUS can apply for 9V high voltage, the wireless charging TX can transmit 10W power. When VBUS can apply 12V high voltage, the wireless charging TX can transmit 15w power.

Charging and discharging at the Same Time：

When the charging power supply and the electrical equipment are plugged in at the same time, the charging and discharging mode will be automatically entered. In this mode, the chip will automatically turn off the internal fast charge input request. When the VSYS voltage is only 5V, turn on the discharge path to supply power to the electrical equipment; if the vsys voltage is greater than 5.8V, for safety reasons, the discharge path will not be turned on. In order to ensure the normal charging of electrical equipment, IP5568U will increase the charging undervoltage loop to more than 4.9V to ensure the priority of power supply to electrical equipment.

In the process of charging and discharging, if the charging power is unplugged, IP5568U will turn off the charging function and restart the discharging function to supply power to the electric equipment. For

the sake of safety, and in order to be able to reactivate the mobile phone to request fast charging, the voltage will drop to 0V for a period of time during the conversion process.

In the process of charging and discharging, if the electric equipment is unplugged, or the electric equipment is full and stops pumping for 16s, the corresponding discharge path will be automatically closed. When the discharge paths are closed and the state returns to single charging mode, the charging undervoltage loop will be reduced, and the fast charging will be automatically reactivated to accelerate the charging of mobile power supply.

Wireless charging power supply:

The power supply of wireless charging TX is directly powered from VSYS node. When wireless charging TX and wired port work at the same time, wireless charging only supports 5W, wired port output only 5V, no fast charging.

12.8 Automatic detection of mobile phone

Auto detection on sink device/phone attachment：

IP5568U support auto detection on sink device/phone attachment/ plug in, once the attachment is detected, the boost will be turned on charging the sink device/phone, so non-key solution are supported.

IP5568U wireless charging supports automatic detection of mobile phone into the coil, immediately wake up from the standby state after the mobile phone is placed on the coil, open the output to charge the mobile phone, omit the key operation, support no key mold solution.

Auto detection on sink device/phone fully charged：

IP5568U measures the output current of each port through the on-chip ADC. When the output current of a single port is less than about 80mA and lasts for about 16s, the output port will be closed. When the total current is less than about 80mA for about 32s, it is considered that all output cell phones are full or unplugged, and the boost output will be automatically turned off.

12.9 KEY

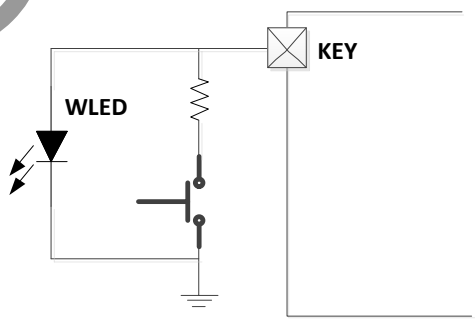


Figure 13 KEY circuit

Key circuit is illustrated in Figure 13, which can recognize short press or long press operation.

- Short press : pressed time in range of 60ms~2s
- Long press :pressed time longer than 2s
- No response on press time less than 30ms

- Two short press in 1s: turn off boost output, battery level display LED.
- Long 10s press will reset the whole system

12.10 Fast Charge state indication

HLED is used for indication for the present fast charge mode, either in fast charging or discharging mode, when the system enters fast charge mode and in non-5V mode, the light LED will turn on.

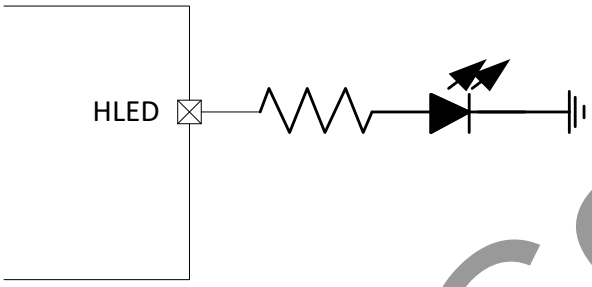


Figure 14 fast charge state indication

12.11 Coulombmeter and battery level display

IP5568U has built-in coulombmeter function, which can realize accurate calculation of the remaining battery capacity.

IP5568U supports 4 LED, 2 LED and 1 LED mode automatic selection.

IP5568U supports 88 / 188 nixie tube to display the remaining battery capacity .

12.11.1 Battery level display for LED mode

IP5568 4LED、2LED、1LED battery level display

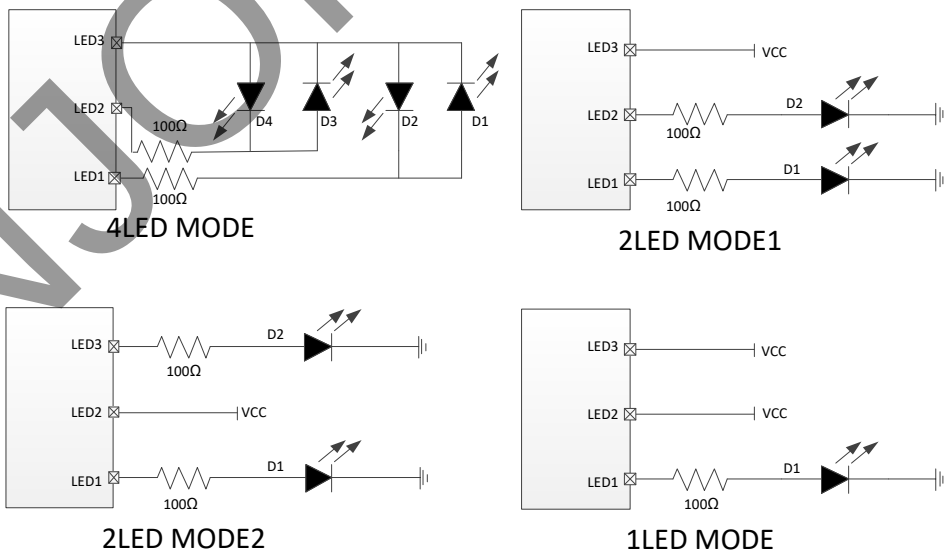


Figure 15 4LED、2LED、1LED circuits

Chart 7 4LED display mode During charging

Battery capacity (C) (%)	D1	D2	D3	D4
Fully charged	ON	ON	ON	ON
75%≤C	ON	ON	ON	0.5Hz Flash
50%≤C<75%	ON	ON	0.5Hz Flash	OFF
25%≤C<50%	ON	0.5Hz Flash	OFF	OFF
C<25%	0.5Hz Flash	OFF	OFF	OFF

Chart 8 4LED display mode During discharging

Battery capacity (C) (%)	D1	D2	D3	D4
C≥75%	ON	ON	ON	ON
50%≤C<75%	ON	ON	ON	OFF
25%≤C<50%	ON	ON	OFF	OFF
3%≤C<25%	ON	OFF	OFF	OFF
0%<C<3%	1.0Hz Flash	OFF	OFF	OFF
C=0%	OFF	OFF	OFF	OFF

Chart 9 2 LED display mode 1 is bi-color LED During charging

Battery capacity (C) (%)	D1	D2
Fully charged	OFF	ON
66%≤C<100%	OFF	0.5Hz Flash
33%≤C<66%	0.5Hz Flash	0.5Hz Flash
C<33%	0.5Hz Flash	OFF

Chart 10 2 LED display mode 1 is bi-color LED During discharging

Battery capacity (C) (%)	D1	D2
66%≤C<100%	OFF	ON
33%≤C<66%	ON	ON
C<33%	ON	OFF
C<3%	1.0Hz Flash	OFF

2 LED mode 2 display：

During charging: D1 LED flash on cycle of 2s (1s on and 1s off), when fully charged, constantly on;

During discharging: D2 LED is constantly on, when voltage lower than 3.2V, flash on cycle of 1s (0.5s on

and 0.5s off), when voltage is lower than 3.0V, system is power down.

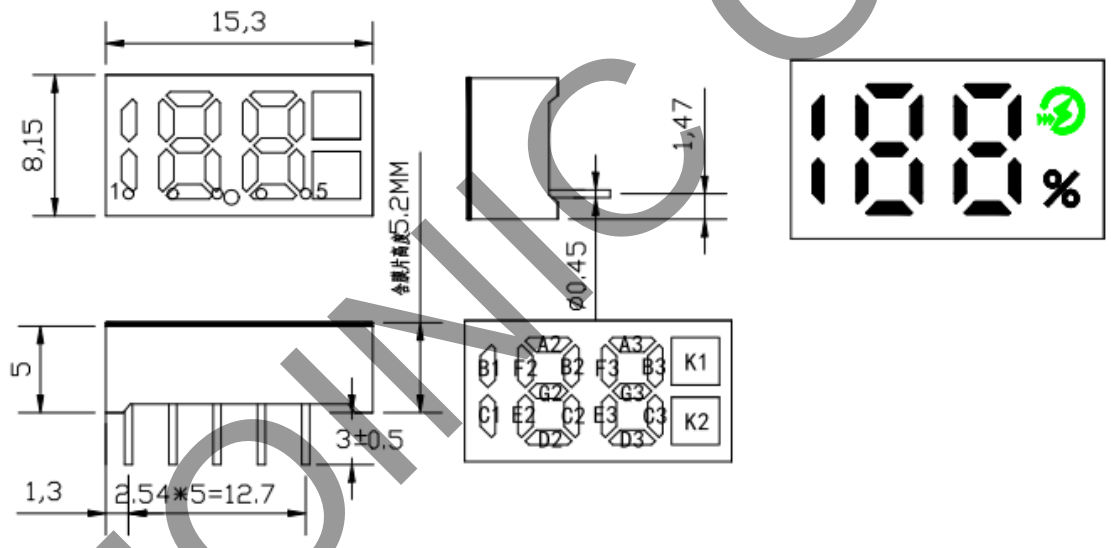
1 LED mode 1 display:
During charging: LED flash on cycle of 2s (1s on and 1s off), when fully charged, constantly on;
During discharging: LED is constantly on, when voltage lower than 3.2V, flash on cycle of 1s (0.5s on and 0.5s off), when voltage is lower than 3.0V, system is power down.

12.11.2 188 nixie tube display mode

The 188 nixie tube model IP5568U supported as below

Nixie Tube	During charging		During discharging	
	Not fully charged	Fullly charged	Battery capacity <5%	Battery capacity>5%
188	0-99% 0.5HZ Flash	constantly on 100%	0-5% 1.0Hz Flash	5%-100% constantly on

5pin 188 nixie tube：



4. 电路图（Circuit Diagram）：

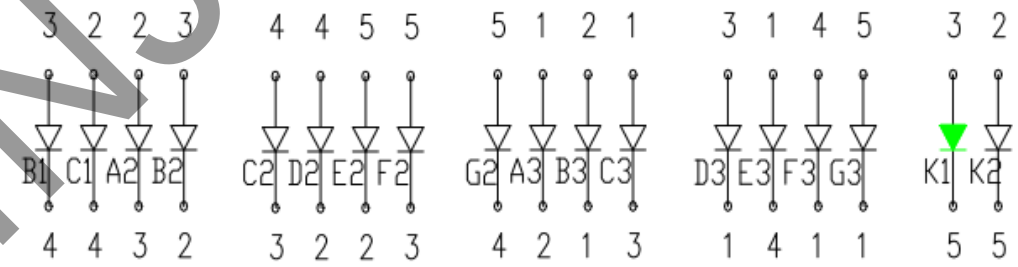


Figure 16 5pin 188 nixie tube circuit

Chart 12 IP5568U Light Drives Drive Pin and Digital Tube Pin Map Relationship

	IP5568U display driver pin	nixie tube pin	
The sequence mapping relationship between IP5568U display driver pin and nixie tube pin	LED1(1 pin)	1 pin	
	LED2(2 pin)	2 pin	
	LED3(3 pin)	3 pin	
	LED_R(11 pin)	4 pin	
	LED_G(13 pin)	5 pin	

12.11.3 Coulombmeter

IP5568U supports the external resistor setting of the initial capacity of thebattery, and uses the integration of the current and time at the port of the battery to manage the remaining capacity of the battery, which can accurately display the current remaining capacity of the battery.

IP5568U external pin sets the initial cell capacity formula: battery capacity = R_{FCAP}*0.5 (mAH). Up to 80000mah.

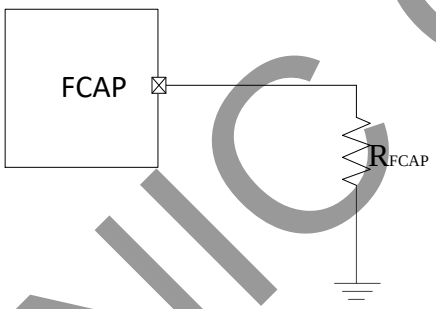


Figure 17 battery initial capacity circuit

Chart 13 Typical battery capacity config table

R_{FCAP}	battery initial capacity
10kΩ	5000mAH
16kΩ	8000mAH
20kΩ	10000mAH
24kΩ	12000mAH
40kΩ	20000mAH
50kΩ	25000mAH

FCAP also reserves a special function. If R_{FCAP} resistance = 1kΩ, the cell capacity is 10000mah by default, and DPA2 pin is used as serial port print port output.

12.12 VSET（Battery full voltage selection）

IP5568U can set battery specifications and configure parameters of different battery specifications. IP5568U can set battery full voltage through VSET pin.The resistance of VSET external to GND and the set battery type are shown in the table below.

Chart 14 Battery voltage selection config table

R_{VSET}	Battery full voltage
115 kΩ	4.20V
82 kΩ	4.30V
51 kΩ	4.35V
20 kΩ	4.40V

12.13 NTC function

IP5568U integrates NTC function, which can detect battery temperature When IP5568U is working, NTC pin output 20μA current, and generate voltage through external NTC resistance. IC internal detects the voltage of NTC pin to determine the current battery temperature and wireless charging coil temperature.

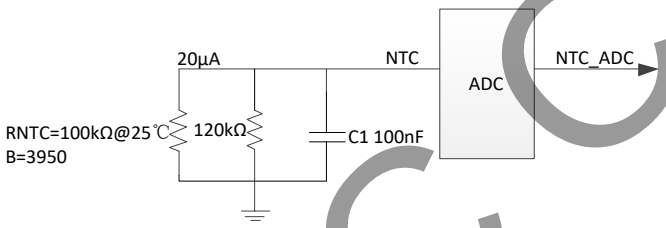


Figure 18 NTC circuit

In the state of charge:

When NTC pin detects that the voltage is 1.96V, it represents low temperature of battery - 10℃; when NTC voltage is higher than 1.96V, it stops charging; when NTC voltage is lower than 1.85V, it resumes charging.

When NTC pin detects that the voltage is 0.64V, it means the battery temperature is 45℃; when NTC voltage is lower than 0.64V, the charging current is reduced by half; when NTC voltage is higher than 0.7V, the charging current is restored to normal value.

When NTC pin detects that the voltage is 0.47V, it represents the battery temperature of 55℃; when NTC voltage is lower than 0.47V, it stops charging; when NTC voltage is higher than 0.7V, it restores the charging current to normal value.

In the state of discharge:

When NTC pin detects that the voltage is 2.13V, it represents low temperature of battery - 20℃; when NTC voltage is higher than 2.13V, it stops discharging; when NTC voltage is lower than 2.04V, it resumes discharging.

When NTC pin detects that the voltage is 0.47V, it represents the battery high temperature of 55℃; when NTC voltage is lower than 0.47V, it stops discharging; when NTC voltage is higher than 0.55V, it resumes discharging.

* The 100nF capacitance of NTC must be close to IC PIN.

*The above temperature range refers to NTC resistance zl104fbxv050 (B = 3950). Other models have differences and need to be adjusted.

*If NTC is not required in the application, 51kΩ resistance shall be connected to the ground at NTC pin, and floating or direct grounding is not allowed.

12.14 Wireless charging TX fuction

IP5568U is integrated with 5W/7.5W/10W/15W wireless charging TX drive control circuits, and IP5568U is internally integrated with two symmetrical half bridge modules (drive of upper PMOS and lower NMOS).

IP5568U is integrated with two ASK demodulation modules, which can respectively collect coil voltage and current for ASK communication demodulation and decoding. Current decoding, direct sampling current value for digital demodulation and decoding. Voltage decoding, without amplification, can be directly sent to the chip after filtering and isolation for digital demodulation and decoding.

IP5568U can detect the voltage and current of the coil through the built-in ADC.

When IP5568U is turned on, the wireless charging will work all the time.

IP5568U_L can drive two LED outputs to indicate wireless charging status. The corresponding relationship between LED status and wireless charging system status is as follow.

state	LED_R	LED_G
wireless charging Abnormal (FOD etc.)	ON	OFF
Charging completed	ON	ON
Charging	OFF	1Hz Flash
PING	OFF	ON

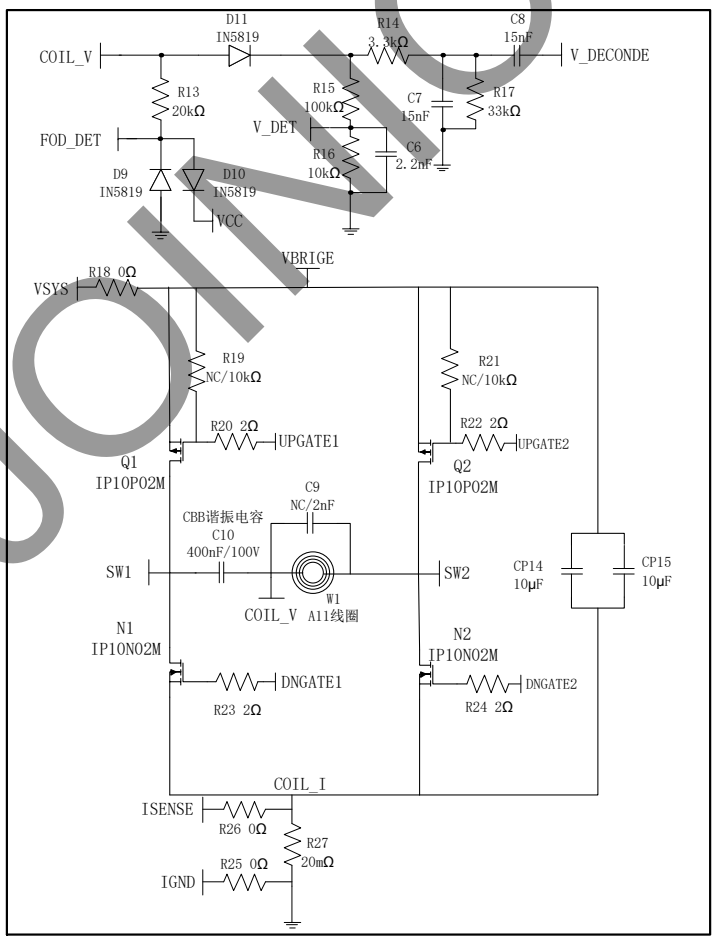


Figure 19 Wireless charging TX circuit

12.15 FOD

The IP5568U supports FOD threshold selection through the FOD_SEL pin and different static and dynamic FOD parameters. Table 16 lists the resistance RFOD_SEL and FOD thresholds.

Chart 16 FOD threshold table

R_{FOD_SEL}	Static FOD	Dynamic FOD
0Ω-30kΩ	R*1.333+10	-500
41kΩ-81kΩ	(R-41)+10	0
91kΩ-131kΩ	(R-90)+10	500

12.16 Pop-up window selection function

The IP5568U supports the selection of magnetic and pop-up window functions through the FSEL pin external resistor. The resistance thresholds and functions are shown in Table 17.

Chart 17 magnetic and pop-up window table

R_{FSEL}	function
20kΩ	Non-magnetic and non-pop-up window
51kΩ	Non-magnetic and single-pop window
82kΩ	Magnetic and non-popup window
115kΩ	Magnetic and single popup window
130kΩ	Magnetic and double-pop windows

12.17 Q value selection

IP5568U supports the function of selecting Q value through LED3 pin external resistor, Q value and resistance formula is Q=RQ*1.

12.18 VCC

VCC is a normally open 3.1V LDO with a load capacity of 50mA.

13 PCB Layout

Here below lists essential precautions that may affect the function and performance on PCB layout, more details will be attached in another document if any.

13.1 Location of VOUT1/VOUT2 capacitor

IP5568U integrated USB output power path. The 10μF capacitance of VOUT1/VOUT2 must be close to IC PIN. As the layout allows, the position of the capacitance closer to the IC is better.

If it is necessary to place the capacitor close to the USB port, the capacitor can be increased by 2.2μF near the USB port.

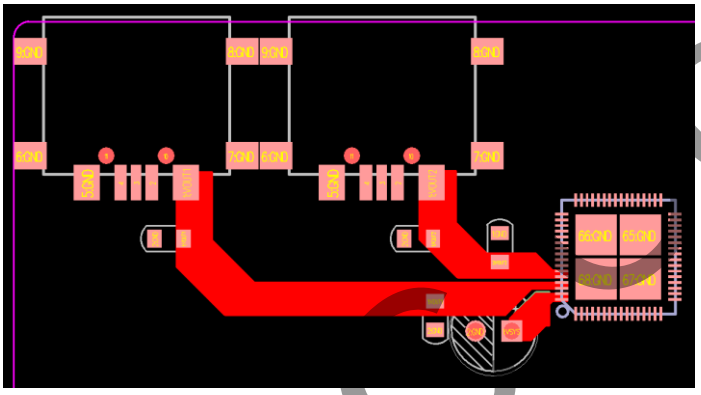


Figure 20 VOUT1/VOUT2 capacitor

13.2 Location of VSYS capacitor

The 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. The capacitors on the VSYS network need to be as close to the VSYS pin and EPAD of the IC as possible, and copper is laid on a large area, and more vias are added to reduce the area of current loop between the capacitors and the IC and reduce parasitic parameters.

VSYS pins are distributed on both sides of the chip, and capacitors need to be placed near the pins on both sides, and the vsys pins on both sides are connected by a wide (no less than 100mil) copper laying on the PCB.

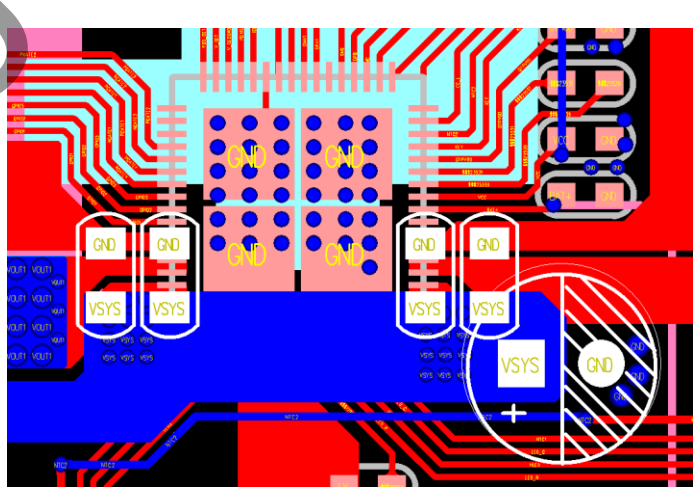


Figure 21 VSYS capacitor

13.3 Location of NTC capacitor

The 100nF capacitance of NTC must be close to IC PIN.

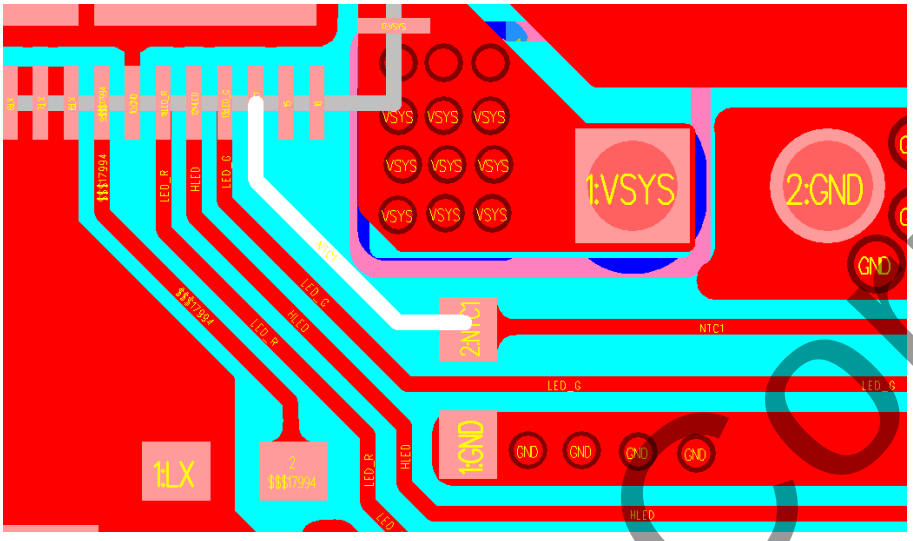
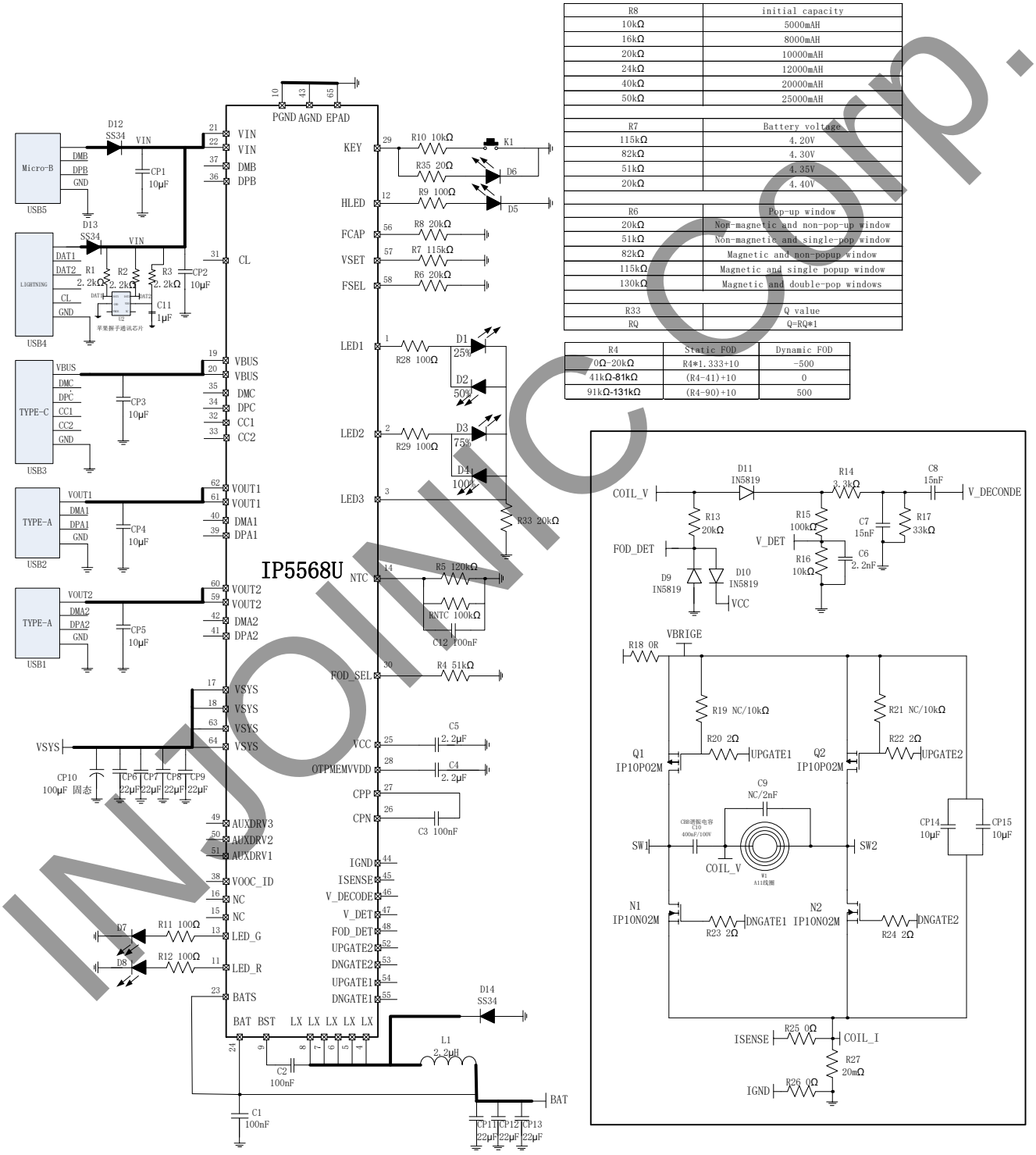


Figure 22 NTC capacitor

14 Typical Application Diagram

Total solution of fast charge power bank is merely realized by passive devices of MOSFET, inductor, capacitor and resistor.

14.1 Power bank+wireless charging TX+LED application



R8	initial capacity
10kΩ	5000mAH
16kΩ	8000mAH
20kΩ	10000mAH
24kΩ	12000mAH
40kΩ	20000mAH
50kΩ	25000mAH

R7	Battery voltage
115kΩ	4.20V
82kΩ	4.30V
51kΩ	4.35V
20kΩ	4.40V

R6	Pop-up window
20kΩ	Non-magnetic and non-pop-up window
51kΩ	Non-magnetic and single-pop window
82kΩ	Magnetic and non-popup window
115kΩ	Magnetic and single popup window
130kΩ	Magnetic and double-pop windows

R33	Q value
RQ	Q=RQ*1

R4	Static FOD	Dynamic FOD
0Ω-20kΩ	R4*1.333+10	-500
41kΩ-81kΩ	(R4-41)+10	0
91kΩ-131kΩ	(R4-90)+10	500

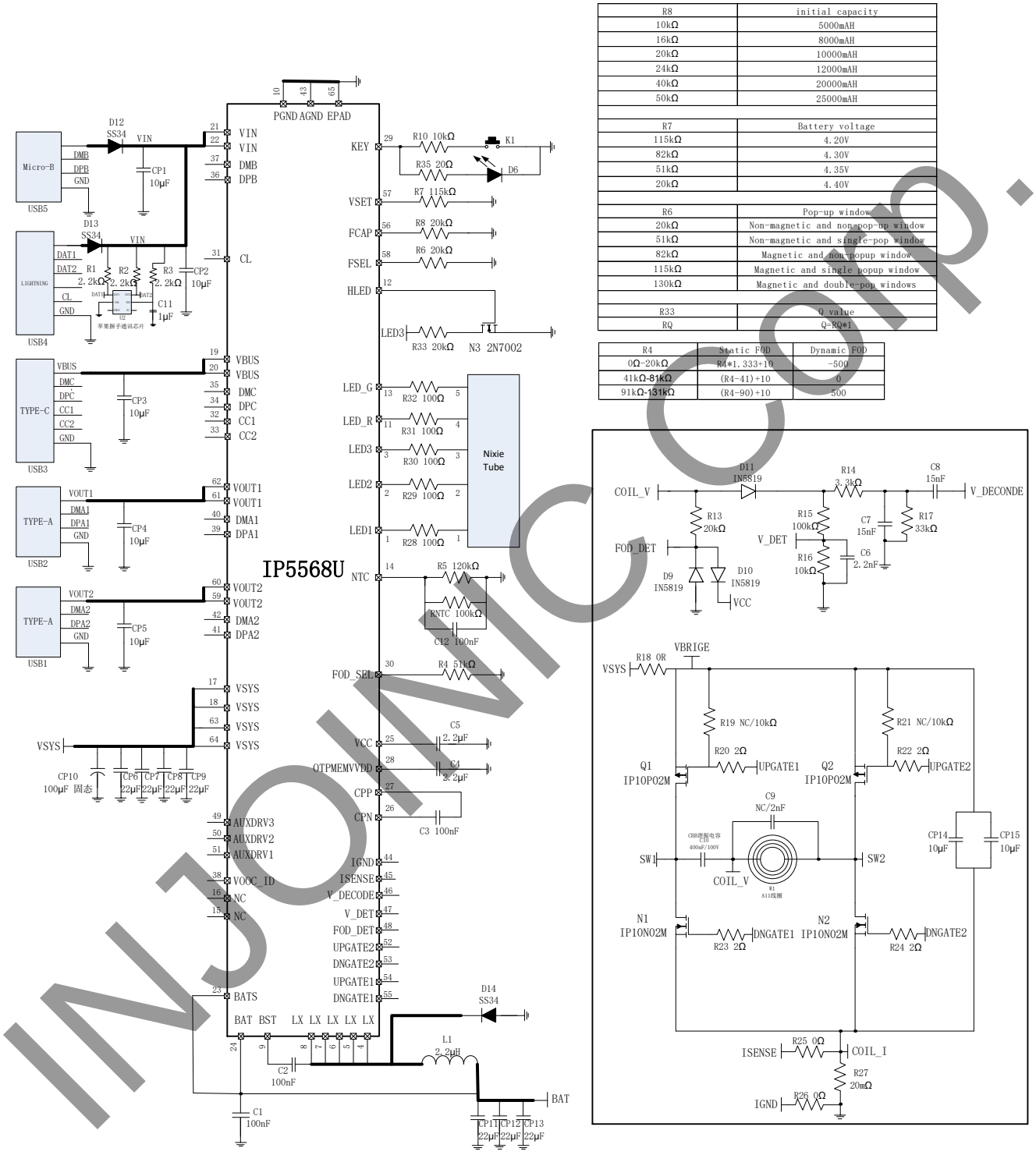
Figure 23 IP5568U_LED application circuit

BOM

No.	Part Name	Type	Location	Num	Note
1	IC	QFN64 IP5568U	U1	1	
2	SMT capacitor	0603 100nF 10% 16V	C1	1	
3	SMT capacitor	0603 100nF 10% 25V	C2 C3	2	
4	SMT capacitor	0603 2.2μF 10% 16V	C4 C5	2	
5	SMT capacitor	0805 22μF 10% 16V	CP11 CP12 CP13	3	
6	SMT capacitor	0805 22μF 10% 25V	CP6 CP7 CP8 CP9	4	
7	SMT capacitor	0805 10μF 10% 25V	CP1 CP2 CP3 CP4 CP5	5	
8	SMT capacitor	100μF 25V 10%	CP10	1	
9	SMT resistor	0603 100Ω 1%	R9	1	
10	SMT resistor	0603 100Ω 1%	R28 R29	2	
11	SMT LED	0603	D1 D2 D3 D4	4	
12	SMT Schottky	SS34	D12 D13 D14	3	
13	IC		U2	1	
14	SMT resistor	0603 2.2kΩ 1%	R1 R2 R3	3	
15	SMT capacitor	0603 1μF 10% 25V	C11	1	
16	SMT resistor	0603 20kΩ 1%	R6 R8 R33	3	
17	SMT resistor	0603 10kΩ 1%	R10	1	
18	SMT resistor	0603 51kΩ 1%	R4	1	
19	SMT resistor	0603 115kΩ 1%	R7	1	
20	SMT resistor	0603 20Ω 1%	R35	1	
21	SMT resistor	0603 120kΩ 1%	R5	1	
22	SMT capacitor	0603 100nF 10% 16V	C12	1	
23	NTC	100 kΩ@25℃ B=3950	RNTC	1	
24	SMT LED	0603	D5	1	
25	SMT LED	5MM LED	D6	1	
26	Inductor	2.2μH 10*10	L1	1	
27	KEY	SMT 3*6	K1	1	
28	USB	AF10 8	USB1 USB2	2	
29	USB	MICRO-7-DIP-5.9	USB5	1	
30	USB C	USB C	USB3	1	
31	LIGHTING	LIGHTING	USB4	1	
32	SMT capacitor	0603 2.2nF 10% 50V	C6	1	
33	SMT capacitor	0603 15nF 10% 50V	C7 C8	2	
35	SMT capacitor	0603 NC/2nF 10% 50V	C9	1	
36	SMT capacitor	0805 10μF 10% 25V	CP14 CP15	2	
37	SMT resistor	0603 100Ω 1%	R11 R12	2	

38	SMT resistor	0603 20kΩ 1%	R13	1	
39	SMT resistor	0603 3.3kΩ 1%	R14	1	
40	SMT resistor	0603 100kΩ 1%	R15	1	
41	SMT resistor	0603 10kΩ 1%	R16	1	
42	SMT resistor	0603 NC/10kΩ 1%	R19 R21	2	
43	SMT resistor	0603 33kΩ 1%	R17	1	
44	SMT resistor	0805 0Ω 1%	R18	1	
45	SMT resistor	0603 0Ω 1%	R25 R26	2	
46	SMT resistor	0603 2Ω1%	R20 R22 R23 R24	4	
47	SMT resistor	1206 20mΩ 1%	R27	1	
48	SMT LED	0603	D7	1	
49	SMT LED	0603	D8	1	
50	SMT Schottky	SOD-123 IN5819	D9 D10 D11	3	
51	SMT PMOS	SOT-23，IP10P02M	Q1 Q2	2	
52	SMT NMOS	SOT-23，IP10N02M	N1 N2	2	
53	CBB resonant capacitor	400nF 100V	C10	1	
54	Coil	A11	W1	1	

14.2 Power bank+wireless charging TX+Nixie Tube application



R8	initial capacity
10kΩ	5000mAH
16kΩ	8000mAH
20kΩ	10000mAH
24kΩ	12000mAH
40kΩ	20000mAH
50kΩ	25000mAH

R7	Battery voltage
115kΩ	4.20V
82kΩ	4.30V
51kΩ	4.35V
20kΩ	4.40V

R6	Pop-up window
20kΩ	Non-magnetic and non-pop-up window
51kΩ	Non-magnetic and single-pop window
82kΩ	Magnetic and non-popup window
115kΩ	Magnetic and single popup window
130kΩ	Magnetic and double-pop windows

R33	Q value
RQ	Q=RQ*1

R4	Static FOD	Dynamic FOD
0Ω-20kΩ	R4*1.333+10	-500
41kΩ-81kΩ	(R4-41)+10	0
91kΩ-131kΩ	(R4-90)+10	500

Figure 24 IP5568U_BZ nixie tube application circuit

BOM

No.	Part Name	Type	Location	Num	Note
1	IC	QFN64 IP5568U	U1	1	
2	SMT capacitor	0603 100nF 10% 16V	C1	1	
3	SMT capacitor	0603 100nF 10% 25V	C2 C3	2	
4	SMT capacitor	0603 2.2μF 10% 16V	C4 C5	2	
5	SMT capacitor	0805 22μF 10% 16V	CP11 CP12 CP13	3	
6	SMT capacitor	0805 22μF 10% 25V	CP6 CP7 CP8 CP9	4	
7	SMT capacitor	0805 10μF 10% 25V	CP1 CP2 CP3 CP4 CP5	5	
8	SMT capacitor	100μF 25V 10%	CP10	1	
9	SMT resistor	0603 100Ω 1%	R28 R29 R30 R31 R32	5	
10	nixie tube	YFTD1508SWPG-5D	SMG	1	
11	SMT Schottky	SS34	D12 D13 D14	3	
12	IC		U2	1	
13	SMT resistor	0603 2.2kΩ 1%	R1 R2 R3	3	
14	SMT capacitor	0603 1μF 10% 25V	C11	1	
15	SMT resistor	0603 10kΩ 1%	R10	1	
16	SMT resistor	0603 20kΩ 1%	R6 R8 R33	3	
17	SMT resistor	0603 115kΩ 1%	R7	1	
18	SMT resistor	0603 20Ω 1%	R35	1	
19	SMT NMOS	2N7002	N3	1	
20	SMT resistor	0603 120kΩ 1%	R5	1	
21	SMT capacitor	0603 100nF 10% 16V	C12	1	
22	NTC	100kΩ@25℃ B=3950	RNTC	1	
23	LED	5MM LED	D6	1	
24	Inductor	2.2μH 10*10	L1	1	
25	KEY	SMT 3*6	K1	1	
26	USB	AF10 8	USB1 USB2	2	
27	USB	MICRO-7-DIP-5.9	USB5	1	
28	USB C	USB C	USB3	1	
29	LIGHTING	LIGHTING	USB4	1	
30	SMT capacitor	0603 2.2nF 10% 50V	C6	1	
32	SMT capacitor	0603 15nF 10% 50V	C7 C8	2	
33	SMT capacitor	0603 NC/2nF 10% 50V	C9	1	
34	SMT capacitor	0805 10μF 10% 25V	CP14 CP15	2	
35	SMT resistor	0603 20kΩ 1%	R13	1	
36	SMT resistor	0603 3.3kΩ 1%	R14	1	
37	SMT resistor	0603 100kΩ 1%	R15	1	
38	SMT resistor	0603 10kΩ 1%	R16	1	

39	SMT resistor	0603 NC/10kΩ 1%	R19 R21	2	
40	SMT resistor	0603 33kΩ 1%	R17	1	
41	SMT resistor	0805 0Ω 1%	R18	1	
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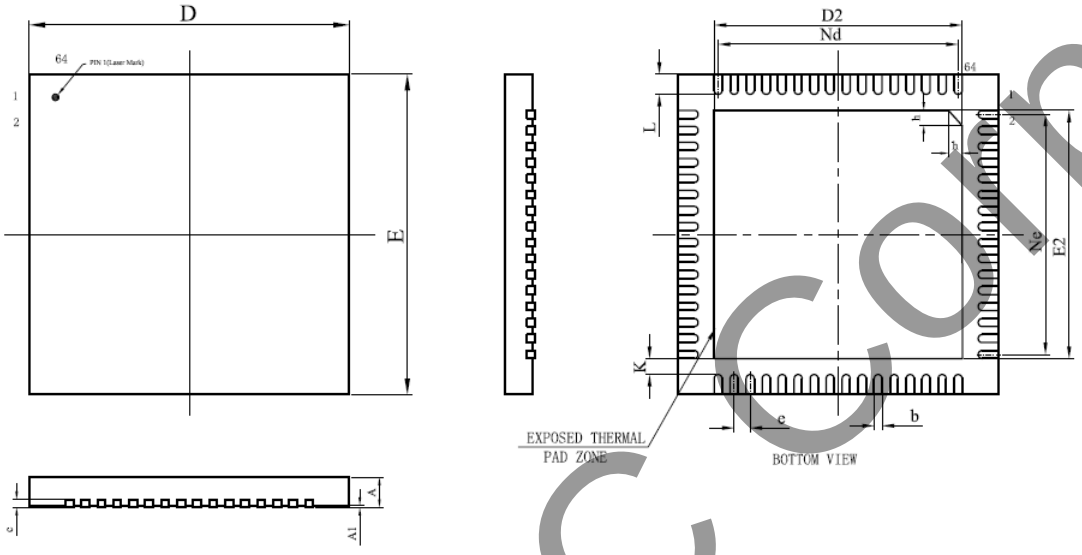
43	SMT resistor	0603 2Ω 1%	R20 R22 R23 R24	4	
44	SMT resistor	1206 20mΩ 1%	R27	1	
45	SMT Schottky	SOD-123 IN5819	D9 D10 D11	3	
46	SMT PMOS	SOT-23，IP10P02M	Q1 Q2	1	
47	SMT NMOS	SOT-23，IP10N02M	N1 N2	1	
48	CBB resonant capacitor	400nF 100V	C10	1	
49	Coil	A11	W1	1	

15 Package

15.1 Chip package



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	-	0.02	0.05
b	0.15	0.20	0.25
c	0.18	0.20	0.25
D	7.90	8.0	8.10
D2	6.10	6.20	6.30
e	0.4 BSC		
Nd	6.00BSC		
E	7.90	8.0	8.10
E2	6.10	6.20	6.30
Ne	6.00BSC		
L	0.45	0.50	0.55
K	0.20	-	-
h	0.30	0.35	0.40

15.2 Silk Screen Description

Note:
1、 --Injoinic Logo
2、IP5568 --Part Number
3、XXXXXXXX --Manufacture lot number
4、 --Pin1 location

Figure 26 Silk Screen Description

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