Support 3-way Type-C, PD3.0 and Wireless charging automatic wake-up Power Bank SOC

1. Features

- **Support multiple ports simultaneously+ Wireless charging**
  - ✧ Output port: USB-C×1 or USB-A×1
  - ✧ Input / Output ports: USB-C×2
  - ✧ Wireless charging output port: TX coil×1
- **WPC QI compliant**
  - ✧ Support BPP, PPDE, EPP protocol
- **Wireless charging**
  - ✧ Support 5W/ 7.5W/ 10W/ 15W TX
  - ✧ External full-bridge power MOS
  - ✧ Integrated ASK communication demodulation module
  - ✧ Support CBB/NPO capacitor
- **Integrated wireless charging function**
  - ✧ Support no-load and on-load foreign object detection
  - ✧ Support coil NTC temperature detection
  - ✧ Support coil voltage maximum amplitude Limit
  - ✧ Support wireless charging automatic wake up
- **Fast charge**
  - ✧ Every ports support fast charge
    ---Input/Output fast charging protocol : FCP, AFC, PD
    --- Output fast charging protocol : QC2.0/QC3.0, SCP
  - ✧ Support USB C DRP input / output
  - ✧ PDO: 5V@3A 9V@2.22A 12V@1.67A 5V~11V@2A
  - ✧ Support BC1.2 / Apple / Samsung
- **Integrated USB PD2.0 / PD3.0 protocol**
  - ✧ PD input fast charging protocol :PD2.0, PD3.0
    --- Supports 5V, 9V voltage range input
  - ✧ PD output fast charging protocol : PD2.0, PD3.0, PPS
    --- Supports 5V, 9V, 12V voltage range input
    --- PPS support 5~11V adjustable voltage with 20mV / Step
  - ✧ Integrated PHY Protocol
    --- Support BMC, Hardware CRC, Hard Reset
- **Charger**
  - ✧ Maximum charging power: 18W
  - ✧ Adaptive charging current adjustment, Up to 5A charging current at battery port
  - ✧ Support 4.20V, 4.30V, 4.35V, 4.40V battery
- **Boost**
  - ✧ Output current: 5V@3.1A 9V@2.22A 12V@1.67A 10V@2.25A
  - ✧ Synchronous switch discharge efficiency ≥ 94% (condition: 5V@2A)
  - ✧ Support line compensate
- **Battery level display**
  - ✧ Integrated 14-bit ADC, support high-precision coulometry
  - ✧ Support 1/2/3/4 LED battery level indicator, auto recognition of LED number
  - ✧ Support 88/188 nixie tube
- **Rich peripheral pin selection function**
  - ✧ Support pin selection of battery capacity and voltage
  - ✧ Supports pin selection of LED or digital tube mode
  - ✧ Support pin selection for internal intelligent temperature loop threshold of chip
- **Others**
  - ✧ Support auto detect of plug in and out
  - ✧ Fast charge status indicator
  - ✧ Intelligent load recognition, automatic standby mode for light loads
  - ✧ Supports fast charging status indicator and 2 wireless charging indicator lights
  - ✧ Support battery temperature detection and I2C communication
- **Multiple protection, high reliability**
  - ✧ Input overvoltage and undervoltage protection
  - ✧ Output overcurrent,overvoltage and short circuit protection
  - ✧ Battery overcharge,over discharge and overcurrent protection
  - ✧ Over temperature protection, Input / Output battery temperature protection
  - ✧ Coil discharge temperature protection, foreign object protection
  - ✧ ESD HBM>4KV, CC withstand voltage>20V
- **Low BOM cost**
  - ✧ Integrated switch power MOSFET
  - ✧ Single inductor for charging and discharging
- **Package size:**
  ---QFN60 (7mm × 7mm, 0.4pitch)

2. Applications

- **Mobile power supply with wireless charging**

3. Description

IP5569 is a power management SOC that complies with with WPC QI standard, Support FCP/AFC input/output fast charging protocol, USB C/PD2.0/PD3.0 input and output protocol, USB C PD3.0 PPS output protocol, QC2.0/ QC3.0/ SCP output fast charging protocol and BC1.2/Apple/ Samsung mobile phone charging protocol. Integrated wireless charging TX, synchronous up / down converter, lithium battery charging management, battery power indication.

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.

Two USB C input / output ports, 1 USB C or USB A optional output 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.

The synchronous switch boost system of IP5569 can provide the maximum output capacity of 22.5W. Even when the battery voltage is low, the output of 22.5W can still maintain an efficiency of over 90% . When boost has no load, it will automatically enter the sleep mode.

IP5569 charger provides 18W charging power and charging current up to 5.0A. Built in IC temperature, battery temperature and input voltage control loop, intelligent regulation of charging current. Support pin selection for internal intelligent temperature loop threshold of chip.

IP5569 internally integrates H-bridge driver module, ASK communication demodulation module and other necessary wireless charging resources.

IP5569 integrates a 14-bit ADC and current sensing circuit, which can accurately measure battery voltage and current. The algorithm of remaining battery capacity of IP5569 can accurately obtain battery level information. The battery capacity can be seted to accurately display the remaining battery capacity. Support pin selection of battery capacity and voltage.

IP5569 supports1/2/3/4LED battery level indicator, auto recognition of LED number and supports 88/188 digital tube battery level indicator. IP5569 also supports the display mode of LED or digital tube for selecting peripheral resistor PIN settings.

Supports buttons and I2C control interface, can further expand the functionality of its application solutions.

Contents

1. Features 1
2. Applications 1
3. Description 2
4. Reversion History 5
5. Typical Application 6
6. IP Series Products List 7
6.1. Power Bank IC 7
7. Pin Configuration and Functions 8
7.1. IP5569 Pin Functions 8
8. Functional Block Diagram 10
9. Absolute Maximum Ratings 11
10. Recommended Operating Conditions 11
11. Electrical Characteristics 11
12. Function Description 14
12.1. Low power lock out and activation 14
12.2. Charge 14
12.3. Boost 14
12.4. USB C 17
12.5. PD Protocol 19
12.6. Fast Charge Protocol 19
12.7. Charge and Discharge Path Management 20
12.8. Automatic detection of mobile phone 22
12.9. KEY 22
12.10. Fast Charge state indication 22
12.11. Coulombmeter and battery level display 23
12.11.1 Battery level display for LED mode 24
12.11.2 188 nixie tube display mode 26
12.11.3 Coulombmeter 27
12.12. VSET(Battery voltage selection) 27
12.13. NTC function 28
12.14. Intelligent temperature selection 30
12.15. Wireless charging 30
12.15.1 ASK communication demodulation/FSK modulation 30
12.15.2 H Bridge Drive 31
12.15.3 Wireless Charging Indicators 31
12.15.4 Wireless Charging Automatic Wake Up 32
12.15.5 Wireless Charging Sampling Battery Voltage 32
12.16. VCC and VDD 32
12.17. I2C 33
13. PCB Layout 34
13.1. Location of VOUT/VBUS/VIN/VWPC capacitor 34

13.2. Location of BAT/VCC/VDD/NTC1 capacitor 34
13.3. Location of VSYS capacitor 35
13.4. Wireless charging Sampling resistance 35
14. Typical Application Diagram 36
14.1. IP5569 C+C+C(DFP)+WPC application 36
14.2. IP5569 C+C+A+WPC application 39
15. Package 42
16. IC Silk Screen Description 43
17. IMPORTANT NOTICE 44

4. Reversion History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Change to Reversion V1.00 (Feb 2025)	Page
• Preliminary release	1

5. Typical Application

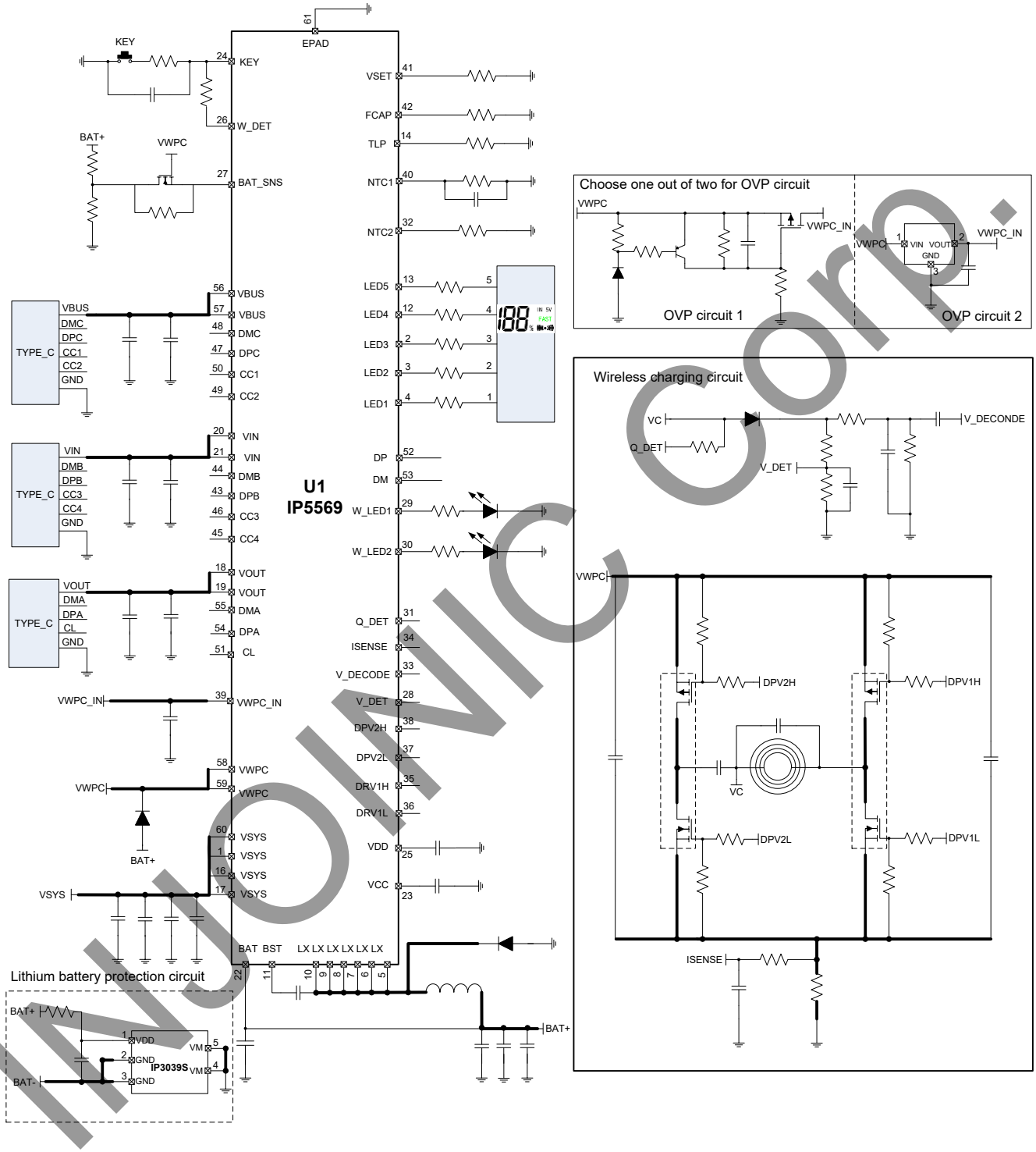


Figure 1 Simplified Application

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	5V/2.4A	1,2,4	√	√	√	-	-	-	-	ESSOP10	
IP5326	5V/2.4A	5V/2.4A	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 Lines	√	√	√	-	QFN32	
IP5356	22.5W	18W	Nixie Tube	√	√	Double Lines	√	√	√	-	QFN40	PIN2PIN
IP5356H	22.5W	18W	Nixie Tube	√	√	Double Lines	√	√	√	-	QFN40	
IP5356M	22.5W	18W	Nixie Tube	√	√	Double Lines	√	√	√	-	QFN40	
IP5365	22.5W	18W	Nixie Tube	√	√	Three Lines	√	√	√	-	QFN48	
IP5358	22.5W	18W	Nixie Tube	-	√	√	√	√	√	-	QFN48	
IP5561	22.5W	18W	Nixie Tube	√	√	√	√	√	√	-	QFN48	
IP5362	22.5W	20W	Nixie Tube	√	√	Three Lines	√	√	√	-	QFN48	
IP5569	22.5W	18W	Nixie Tube	√	√	Three Lines	√	√	√	-	QFN60	
IP5385	65W	65W	Nixie Tube	√	√	Double Lines	√	√	√	√	QFN48	
IP5386	45W	45W	Nixie Tube	√	√	Double Lines	√	√	√	-	QFN48	
IP5389	100W	100W	Nixie Tube	√	√	Double Lines	√	√	√	-	QFN64	
IP5389H	100W	100W	Nixie Tube	√	√	Double Lines	√	√	√	-	QFN64	

7. Pin Configuration and Functions

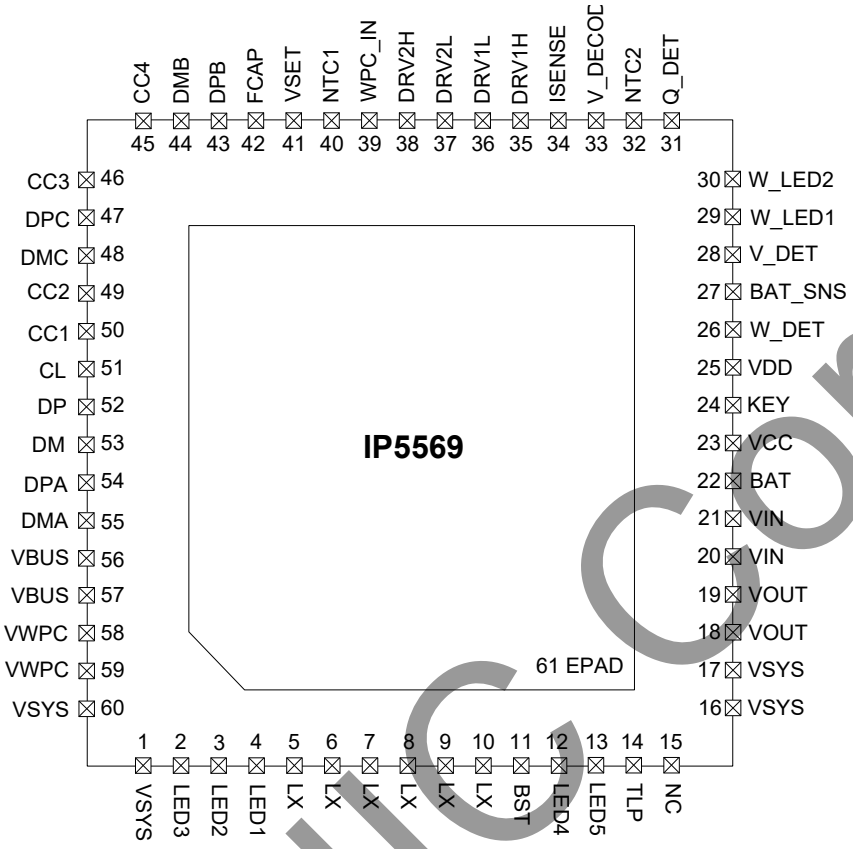


Figure 2 IP5569 60-Pin Top View

7.1. IP5569 Pin Functions

Pin Num	Pin Name	DESCRIPTION
1, 16, 17, 60	VSYS	Public Node of system power input and output
2	LED3	Battery level display drive pin LED3; I2C INT
3	LED2	Battery level display drive pin LED2; I2C SDA
4	LED1	Battery level display drive pin LED1; I2C SCK
5, 6, 7, 8, 9, 10	LX	DCDC switch node, connect to inductor
11	BST	Internal high voltage drive, serial capacitor to LX
12	LED4	Battery level display drive pin LED4 ; Fast charge status indicator drive pin
13	LED5	Battery level display drive pin LED5 ; Pin selection of LED and digital tube mode pin
14	TLP	Pin selection internal temperature loop threshold pin
15	NC	NC
18, 19	VOUT	USB-C3 output port power pin

20, 21	VIN	USB-C2 input and output port power pin
22	BAT	Battery supply pin
23	VCC	3.3V Voltage output pin
24	KEY	Key detect pin
25	VDD	Wireless charging digital circuit power pin
26	W_DET	Wireless charge load signal detection pin
27	BAT_SNS	Battery voltage sampling pin
28	V_DET	Coil voltage detection pin
29	W_LED1	Wireless charging indicator light W-LED1 pin
30	W_LED2	Wireless charging indicator light W-LED2 pin
31	Q_DET	Q Quantity detection pin
32	NTC2	NTC2/display drive pin
33	V_DECODE	Voltage decoding input pin
34	ISENSE	Current sampling input pin
35	DRV1H	DRV1 upper tube driver pin
36	DRV1L	DRV1 lower tube driver pin
37	DRV2L	DRV2 lower tube driver pin
38	DRV2H	DRV2 upper tube drive pin
39	VWPC_IN	Wireless charging power supply pin
40	NTC1	NTC1 resistance detection pin
41	VSET	Battery voltage setting pin
42	FCAP	Battery capacity setting pin
43	DPB	USB-C2 port DP pin
44	DMB	USB-C2 port DM pin
45	CC4	USB-C2 detection pin CC4 pin
46	CC3	USB-C2 detection pin CC3 pin
47	DPC	USB-C1 port DP pin
48	DMC	USB-C1 port DM pin
49	CC2	USB-C1 detection pin CC2 pin
50	CC1	USB-C1 detection pin CC1 pin
51	CL	The CC signal of USB-C3 output port CL pin
52	DP	Wireless charging burning pin DP pin
53	DM	Wireless charging burning pin DM pin
54	DPA	USB-C3 port DP pin

55	DMA	USB-C3 port DM pin
56, 57	VBUS	USB-C1 input and output port power pin
58, 59	VWPC	Wireless charging power supply pin
61(EPAD)	GND	Ground

8. Functional Block Diagram

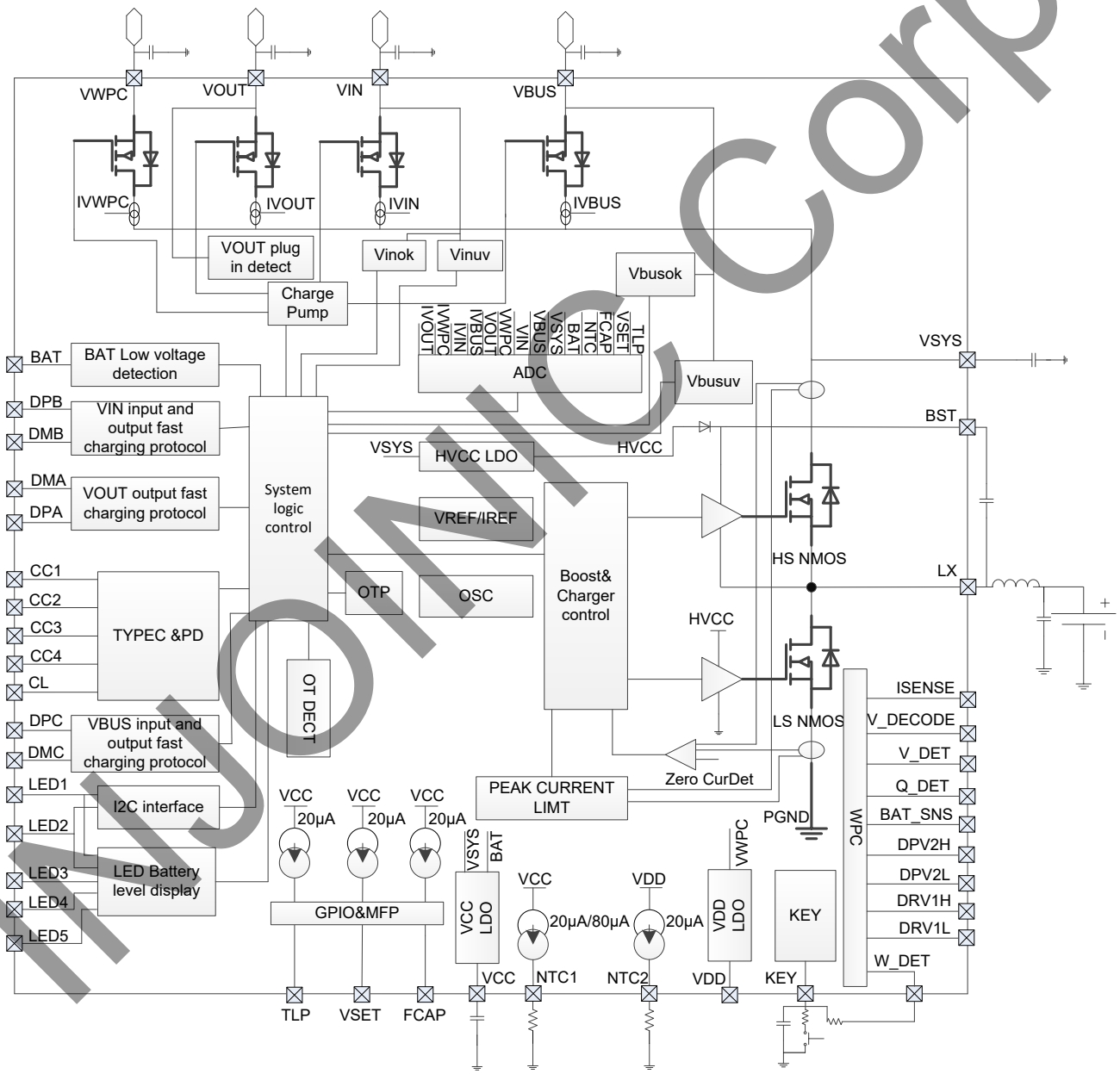


Figure 3 Functional Block Diagram

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}	35	℃ / 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	10.0	V
Battery Voltage	V_{BAT}	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=2.2uH, VBAT=3.8V

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Charging System						
Input voltage	V_{IN} V_{BUS}		4.5	5 / 9	10.0	V
Input Over Voltage	V_{IN} V_{BUS}		9.5	9.9	10.3	V
Constant Charge Voltage	V_{TRGT}	V_{SET}=4.20V	4.18	4.22	4.25	V
		V_{SET}=4.30V	4.28	4.32	4.35	V
		V_{SET}=4.35V	4.33	4.37	4.39	V
		V_{SET}=4.40V	4.38	4.42	4.45	V

Charge Current	I_{CHRG}	V_{IN} or V_{BUS} =5V, input current	2.5	2.9	3.3	A
		V_{IN} or V_{BUS} >=9V, input power	1.7	2.0	2.3	A
Trickle Charge Current	I_{TRKL}	V_{IN}=5V,V_{BAT}<2.5V	70	120	170	mA
		V_{IN}=5V, 2.5V<=V_{BAT}<3.0V	200	400	600	mA
Trickle Charge Stop Voltage	V_{TRKL}		2.9	3.0	3.1	V
Charge Stop Current	I_{STOP}	V_{IN}=5V, battery current	250	400	550	mA
Recharge Voltage Threshold	V_{RCH}		Charging constant voltage -0.1			V
Charge Safety Time	T_{END}		20	24	27	Hour
Discharge System						
Battery operation voltage	V_{BAT}		3.0		4.5	V
DC output voltage	QC2.0 V_{OUT}	V_{OUT}=5V@1A	4.95	5.12	5.23	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		12.45	V
	QC3.0 Step			200		mV
Output voltage ripple	ΔV_{OUT}	V_{BAT}=3.7V, V_{OUT}=5.0V, fs=350kHz		100		mV
		V_{BAT}=3.7V, V_{OUT}=9.0V, fs=350kHz		150		mV
		V_{BAT}=3.7V, V_{OUT}=12V, fs=350kHz		200		mV
Boost output current	I_{out}	V_{OUT}=5V		3.1		A
		V_{OUT}=9V		2.0		A
		V_{OUT}=12V		1.5		A
Boost efficiency	η_{out}	V_{BAT}=3.7V, V_{OUT}=5V, I_{OUT}=2A		93		%
		V_{BAT}=3.7V, V_{OUT}=9V, I_{OUT}=2A		92		%
		V_{BAT}=3.7V, V_{OUT}=12V, I_{OUT}=1.5A		91		%
Boost overcurrent shut down threshold	I_{shut}	V_{BAT}=3.7V, V_{OUT}=5V	3.4	4.0	4.4	A
		V_{BAT}=3.7V, V_{OUT}=9V	2.25	2.60	2.90	A
		V_{BAT}=3.7V, V_{OUT}=12V	1.7	1.9	2.2	A

Output light load shutdown current	I_{LOAD}	V_{BAT}=3.7V	30	60	100	mA
Load overcurrent detect time	T_{UVD}	Duration of output voltage under 4.2V, output voltage setting >=5v		1		ms
Load short circuit detect time	T_{OCD}	Duration of output current above 4.4A, output voltage setting >=5v	100		200	μs
Control System						
Switch frequency	fs	Discharge switch frequency	300	400	500	kHz
		Charge switch frequency	550	650	750	kHz
NMOS on resistance	r_{DSON}	Upper NMOS		9	11	mΩ
NMOS on resistance		Lower NMOS		9	11	mΩ
VCC output voltage	V_{CC}	V_{BAT}=3.7V		3.3		V
VDD output voltage	V_{DD}	VWPC=5V		4.8		V
Battery port standby current	I_{STB}	Automatic wake-up scheme , VIN=0V, VBAT=3.7V, average current		190	300	μA
VCC output current	I_{VCCLDO}	VBAT=3.7V	40	50	60	mA
VDD output current	I_{VDDLDO}	VWPC=5V	40	50	60	mA
LED display driving current	I_{LED1} I_{LED2} I_{LED3}	Voltage decrease 10%		3		mA
Total load Light load shut down detect time	$T1_{load}$	The load current is consistently less than 60mA	25	32	44	s
Output port light load shut down detect time	$T2_{load}$		14	16	18	s
Short press on key wake up time	$T_{OnDebounce}$		60	100	200	ms
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 IP5569 access to the battery, whatever the battery voltage, IC is in lock out state, battery level indicator LED will flash 3s, or the digit 0 of the nixie tube flashes 3s for prompt; Under non-charging state, if the battery voltage is too low to trigger the low power shutdown, IP5569 will enter lock out state too.

In low battery state, to decrease the quiescent power, IP5569 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 3s.

Under the lock out state, only by entering charging status can activate IP5569 ‘s full function.

12.2. Charge

IP5569 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 less than 400mA charging current is applied;
- when the battery voltage is higher than 3V, enters constant current charging stage;
- 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, if the battery voltage is detected to be 100mV lower than the constant voltage, battery charging stage will be restarted.

IP5569 adopted switch charging technology, switch frequency is 650kHz. 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.

IP5569 supports charging the battery and phone at the same time,output voltage is 5v, If wireless charging and USB port are charged and discharged simultaneously, both input and output support 9V fast charging.

12.3. Boost

IP5569 Integrated a synchronized switch converter which supports high voltage output, providing 5.0V ~ 12V output voltage output, load capacity can be: 5V@3.1A, 9V@2.22A and 12V@1.67A. 400kHz switching frequency.

IP5569 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.

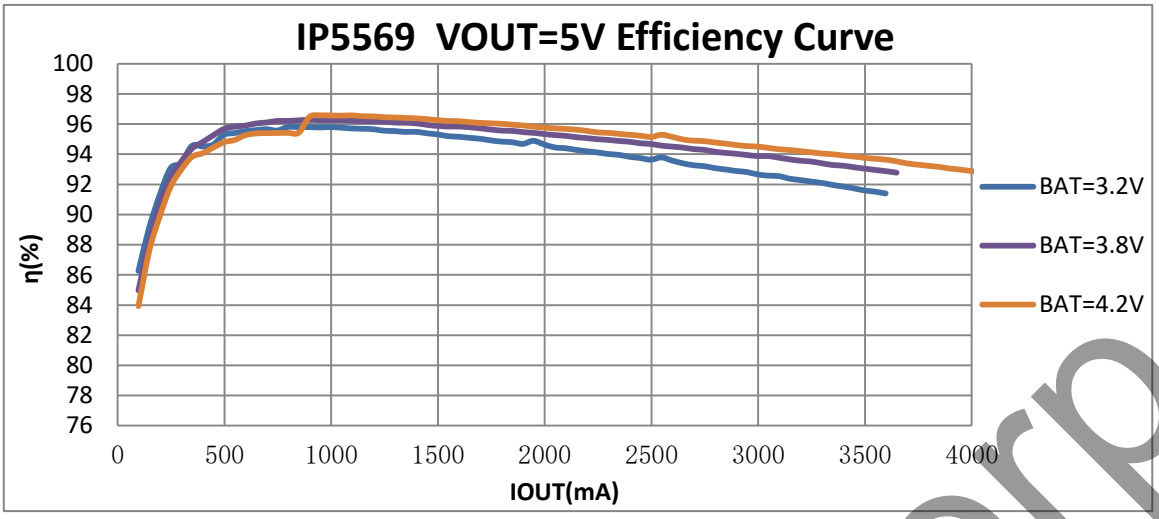


Figure 4 IP5569 VOUT=5V Efficiency Curve

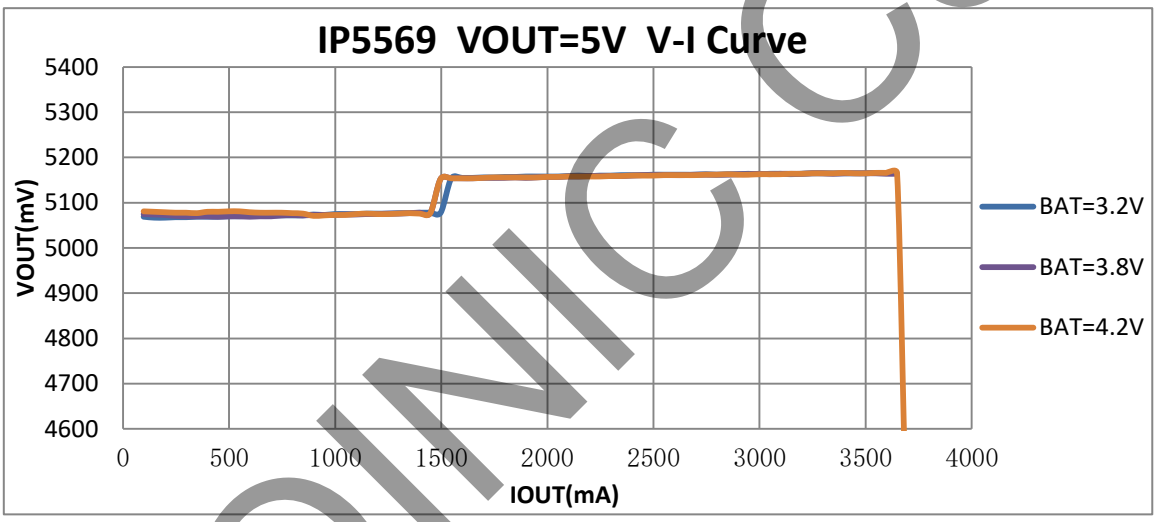


Figure 5 IP5569 VOUT=5V V-I Curve

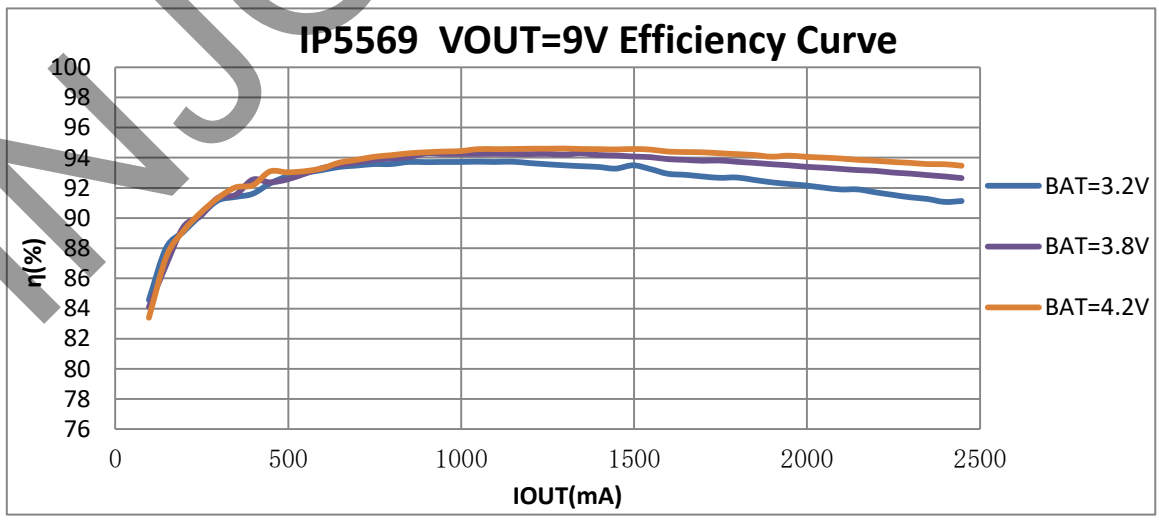


Figure 6 IP5569 VOUT=9V Efficiency Curve

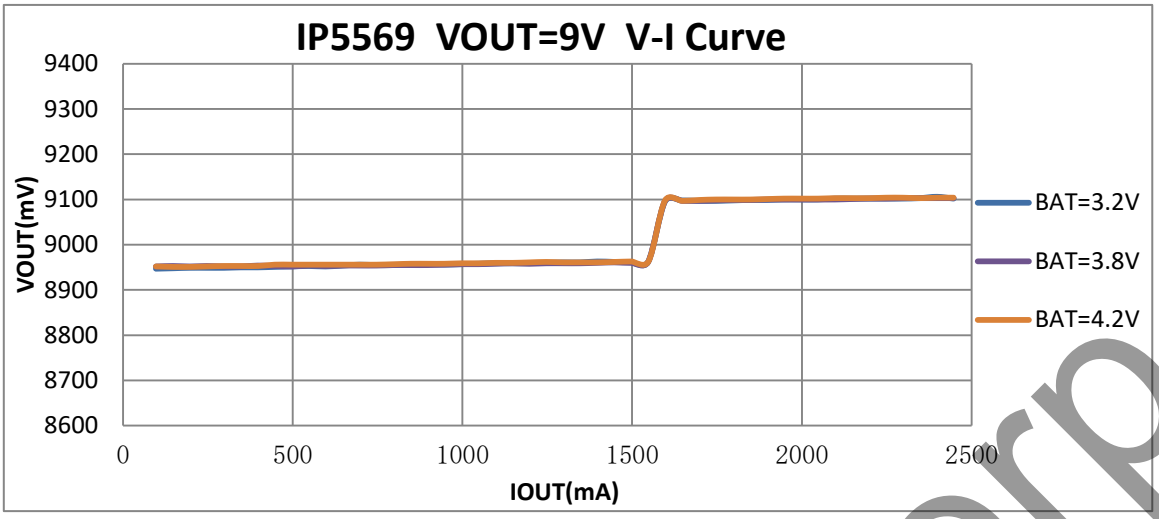


Figure 7 IP5569 VOUT=9V V-I Curve

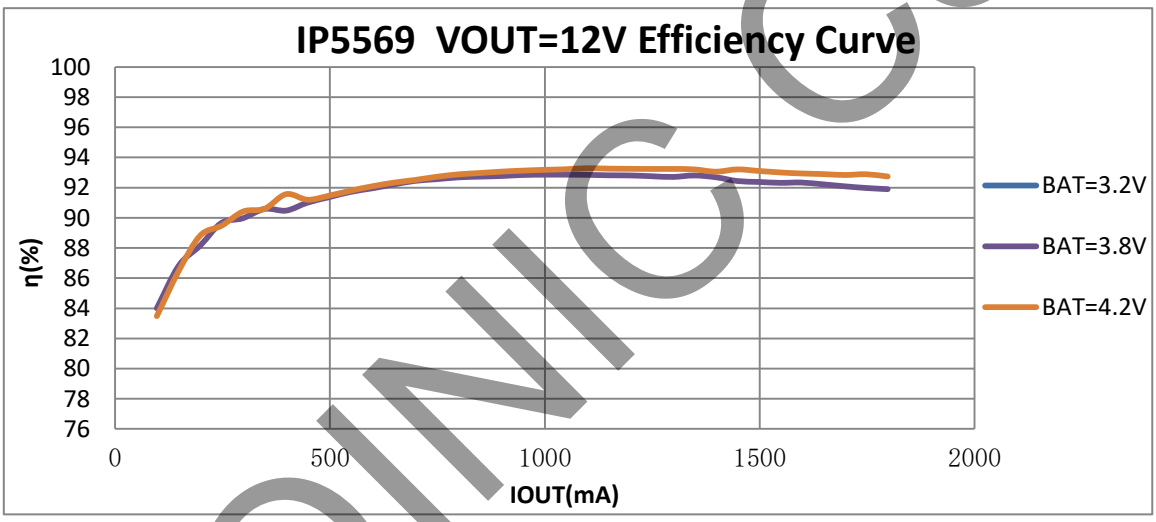


Figure 8 IP5569 VOUT=12V Efficiency Curve

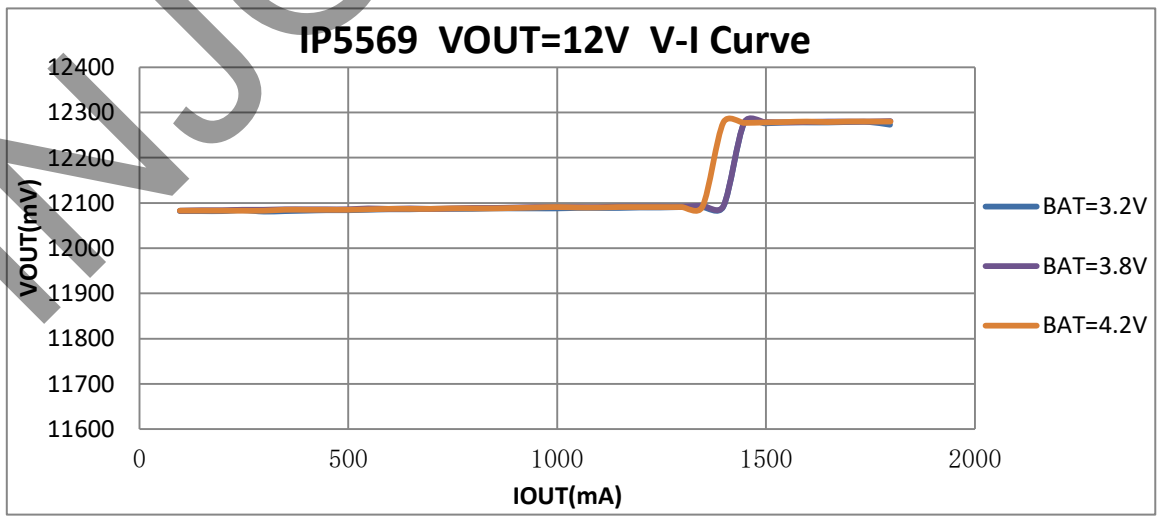


Figure 9 IP5569 VOUT=12V V-I Curve

12.4. USB C

IP5569 integrated USB Type-C PHY protocol, 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, IP5569 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.

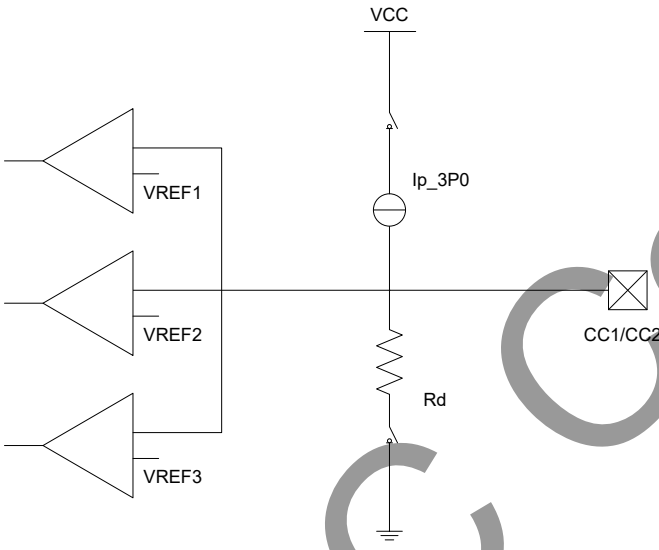


Figure 10 CC internal circuit

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	

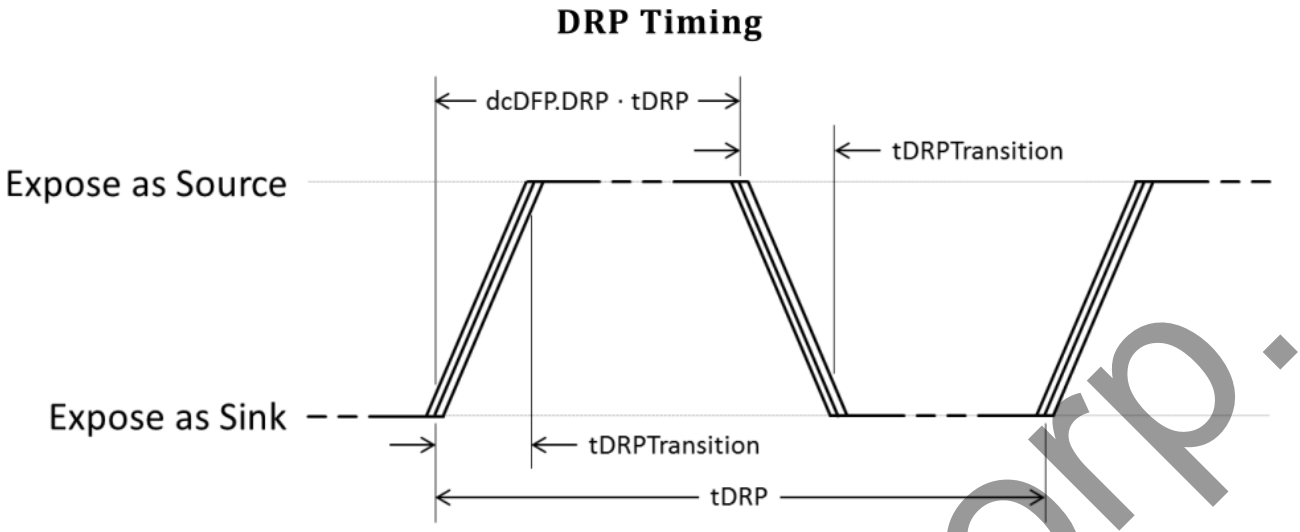


Figure 11 USB C detects cycle

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

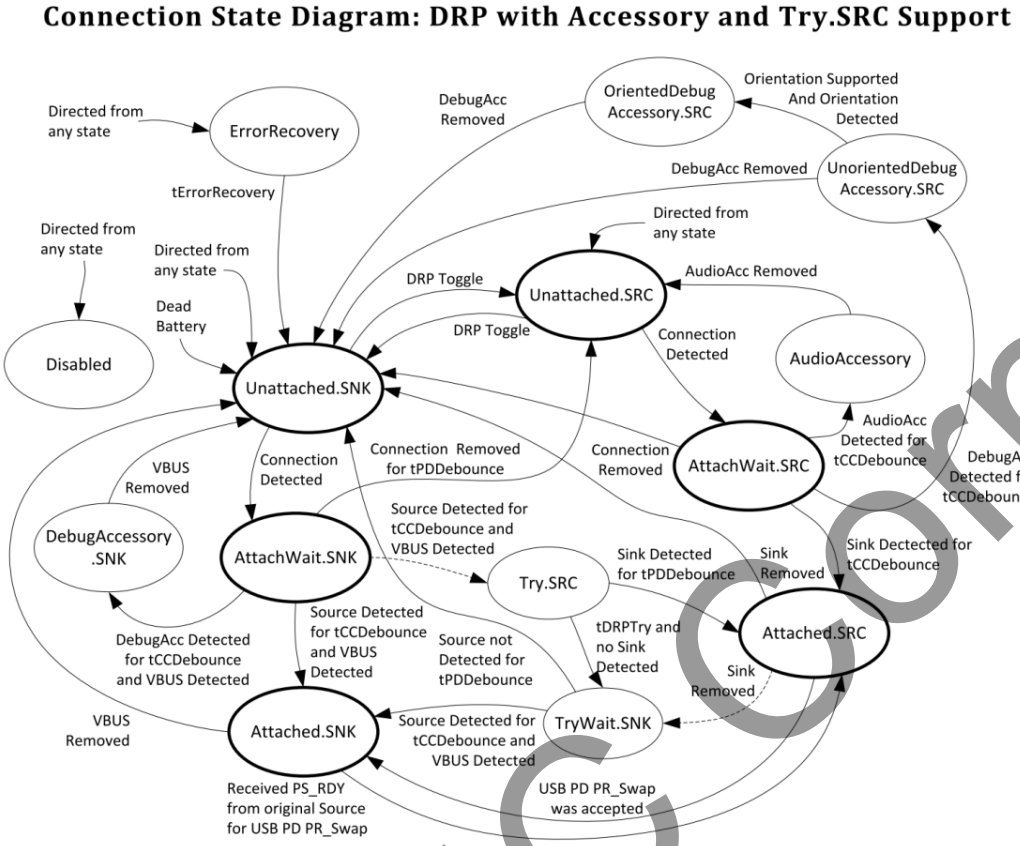


Figure 12 USB C detects state transition

12.5. PD Protocol

IP5569 integrated Power Delivery PD2.0/ PD3.0/ PPS protocol. Support PD2.0 / PD3.0 bi-directional input/output and PPS output protocol. Input voltage support 5V, 9V, output voltage support 5V, 9V, and 12V. Output source cap: 5V@3.0A, 9V@2.22A, 12V@1.67A, PPS 5.0~11V@2A output voltage adjustable with 20mV / step. Support up to 20W power level.

12.6. Fast Charge Protocol

IP5569 support multi fast charge protocols: PD2.0 / PD3.0 / PPS, QC2.0 / QC3.0, FCP, AFC, SCP, Apple, Samsung.

Input fast charge protocol of FCP and AFC are supported for charging the power bank. Input QC2.0/QC3.0 protocol is not support for charging the power bank. External fast charging protocol IC is not supported.

If the power bank is to charge for the phone, when IP5569 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 20kOhm 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 0.2V / step according to QC3.0 request under the continues mode.

Chart 6 Fast charging protocol supported by each port of IP5569

protocols	USB-C3 output port (as port USB-C)	USB-C3 output port (as port USB-A)	USB-C2 output	USB-C2 input	USB-C1 output	USB-C1 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 the USB-C port of VIN or VBUS is connected, IP5569 will start the charging process directly.

If the USB-C port of VIN, VBUS, VOUT is plugged into USB-C UFP device, IP5569 will start discharge function automatically.

If there is a button action and there is a load connection on the output port of the VBUS/VIN/VOUT network, the corresponding output port will be opened. Otherwise, the output port will remain 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 60mA, it will automatically close after a period of time.

The output ports of VBUS network, VIN network, VOUT network, and wireless charging TX all

support fast charging output. 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 60mA for about 32S, the output port and discharge function will be closed and the standby mode will be entered.

When only wireless charging TX is used to charge electrical devices and the output ports of VBUS, VIN, and VOUT networks are all turned off, wireless charging TX can transmit 10W/15W power.

Charging:

Any port of USB-C1 port and USB-C2 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.

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 8.0V, for safety reasons, the discharge path will not be turned on. In order to ensure the normal charging of electrical equipment, IP5569 will increase the charging undervoltage loop to more than 4.9Vto ensure the priority of power supply to electrical equipment.

In the process of charging and discharging, if the charging power is unplugged, IP5569 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.

Attention: When the USB-C port connected to the VBUS or VIN pin enters fast charging, the wireless charging TX can support fast charging output and a maximum output power of 15W, and the wireless charging TX output is not turned off during charging.

12.8. Automatic detection of mobile phone

Auto detection on sink device attachment:

IP5569 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.

Auto detection on sink device fully charged:

IP5569 measures the output current of each port through the on-chip ADC. When the output current of a single port is less than about 60mA and lasts for about 16s, the output port will be closed. When the total current is less than about 60mA 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

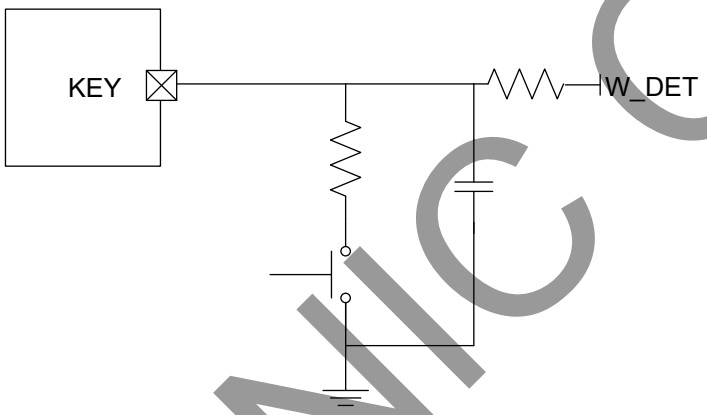


Figure 13 KEY circuit

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

- Short press : pressed time in range of 100ms~2s: turn on the battery level display LED and BOOST output;
- No response on press time less than 30ms;
- Two short press in 1s: turn off boost output, battery level display LED;
- When there is no load on the coil of wireless charging, W-DET outputs a high level. When a load is detected on the coil, W-DET outputs a low level for 200ms to wake up the mobile power supply and automatically turn on the wireless charging output.

12.10. Fast Charge state indication

1. Fast Charge Mode Indicator Light: The fast charge mode indicator is driven by the LED4 pin. When the device enters fast charge mode (whether charging or discharging), the indicator light will automatically turn on.
2. IP5569 Fixed LED Model: The fast charging mode indication can be achieved through the LED4 pin.
3. IP5569 Digital Tube Model: When the resistor connected to the LED5 pin is set to LED display mode, the fast charging light function is not supported.

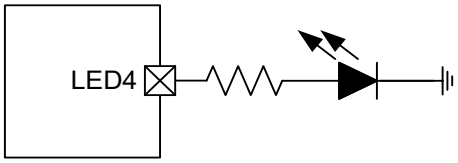


Figure 14 fast charge state indication

12.11. Coulombmeter and battery level display

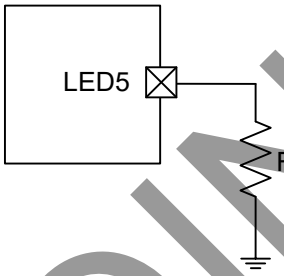
IP5569 has built-in coulombmeter function, which can realize accurate calculation of the remaining battery capacity and supports multiple battery display modes.

- LED display: Supports 1/2/3/4 LED display, and can intelligently recognize the number of LED battery display lights based on hardware connections;
- Digital tube display: supports 88, 188 digital tube display.

IP5569 digital tube model, supports resistance setting for LED5 pin connection, 188 digital tube display mode or LED light display mode:

LED5 pin pull-down 1kΩ to GND: recognized as LED light mode, this LED light mode does not support LED4 pin indicating fast charging light.

LED5 pin hanging: recognized as 188 digital tube mode.



Light display mode	R18
LED	1kΩ
Digital tube	NC

Figure 15 Light display mode configuration circuit diagram

12.11.1 Battery level display for LED mode

IP5569 4LED, 3LED, 2LED and 1LED battery level display solution, the connection method is as follows.

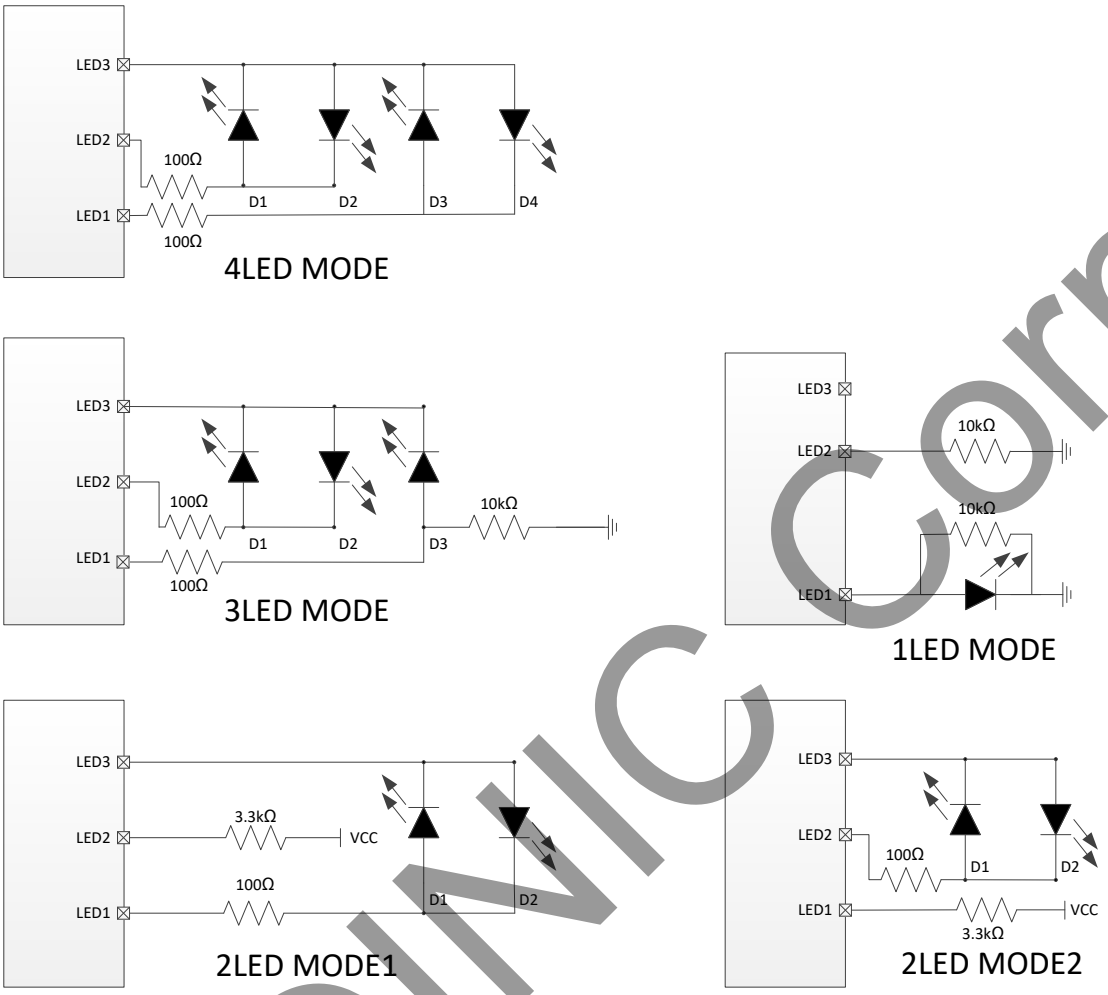


Figure 16 4LED, 3LED, 2LED, 1LED circuits

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	0.6Hz Flash
50%≤C<75%	ON	ON	0.6Hz Flash	OFF
25%≤C<50%	ON	0.6Hz Flash	OFF	OFF
C<25%	0.6Hz 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
5%≤C<25%	ON	OFF	OFF	OFF
0%<C<5%	1.2Hz Flash	OFF	OFF	OFF
C=0%	OFF	OFF	OFF	OFF

Chart 9 3LED display mode During charging

Battery capacity (C) (%)	D1	D2	D3
Fully charged	ON	ON	ON
75%≤C	ON	ON	0.6Hz Flash
25%≤C<75%	ON	0.6Hz Flash	OFF
C<25%	0.6Hz Flash	OFF	OFF

Chart 10 3LED display mode During discharging

Battery capacity (C) (%)	D1	D2	D3
C≥75%	ON	ON	ON
25%≤C<75%	ON	ON	OFF
5%≤C<25%	ON	OFF	OFF
0%<C<5%	1.2Hz Flash	OFF	OFF
C=0%	OFF	OFF	OFF

Chart 11 2 LED display mode 1 is bi-color LED During charging

Battery capacity (C) (%)	D1	D2
Fully charged	OFF	ON
66%≤C<100%	OFF	0.6Hz Flash
33%≤C<66%	0.6Hz Flash	0.6Hz Flash
C<33%	0.6Hz Flash	OFF

Chart 12 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%	1.2Hz Flash	OFF

2 LED mode 2 display:

During charging: D1 LED flash on frequency of 0.6Hz (0.8s on and 0.8s off), when fully charged, constantly on;

During discharging: D2 LED is constantly on, when voltage lower than 3.2V, flash on frequency of 1.2Hz (0.4s on and 0.4s off), when voltage is lower than 3.0V, system is power down.

1 LED mode display:

During charging: LED flash on frequency of 0.6Hz (0.8s on and 0.8s off), when fully charged, constantly on;

During discharging: LED is constantly on, when voltage lower than 3.2V, flash on frequency of 1.2Hz (0.4s on and 0.4s off), when voltage is lower than 3.0V, system is power down.

12.11.2 188 nixie tube display mode

Chart 13 The 188 nixie tube model IP5569 supported as below

state		display
During charging	Not fully charged	0 - 99% 0.5HZ Flash
	Fullly charged	constantly on 100%
During discharging	Battery capacity>5%	5% -100% constantly on
	Battery capacity <5%	0 - 5% 1.0Hz Flash
	Wireless charging with load	wireless charging icon is on
	Wireless charging light load	wireless charger icon is off
	Wireless charging abnormal	wireless charger icon flash

5pin 188 nixie tube:

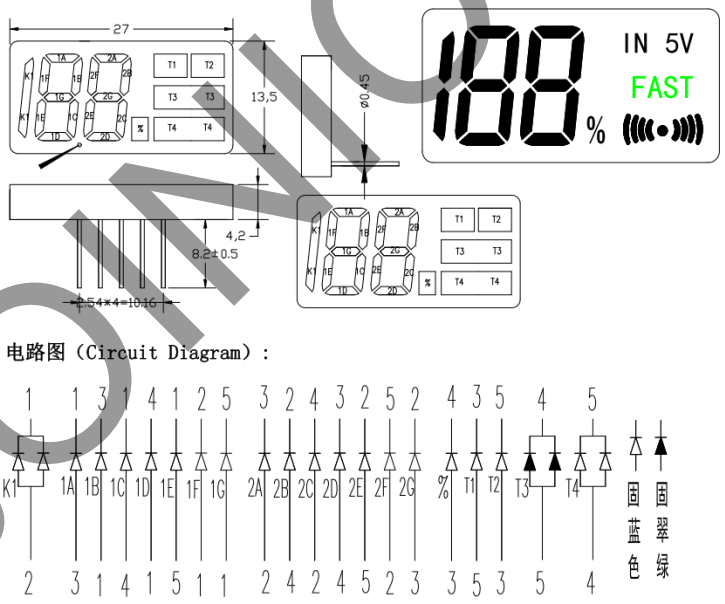


Figure 17 5pin 188 nixie tube circuit

Chart 14 IP5569 Light Drives Drive Pin and Digital Tube Pin Map Relationship

	IP5569 display driver pin	nixie tube pin	note
The sequence mapping relationship between IP5569 display driver pin and nixie tube pin	LED1(4 PIN)	1 pin	
	LED2(3 PIN)	2 pin	
	LED3(2 PIN)	3 pin	
	LED4(12 PIN)	4 pin	
	LED5(13 PIN)	5 pin	

12.11.3 Coulombmeter

IP5569 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.

IP5569 external pin sets the initial battery capacity formula: battery capacity = R_{fcap} * 0.448 (mAH). Up to 60000mah.

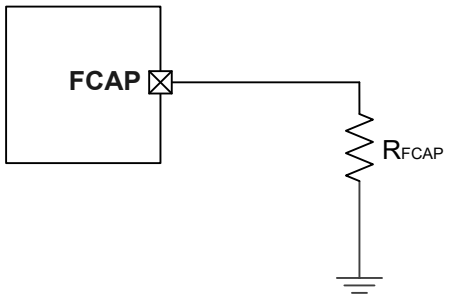


Figure 18 Battery capacity configuration circuit

Chart 15 Typical battery capacity config table

R_{FCAP} resistance	battery initial capacity (mAh)=R_{FCAP}*0.448 (mAh)
11kΩ	5000 mAh
22kΩ	10000 mAh
33kΩ	15000 mAh
44kΩ	20000 mAh
56kΩ	25000 mAh
66.5kΩ	30000 mAh
90kΩ	40000 mAh
110kΩ	50000 mAh
133kΩ	60000 mAh

Note: The unit of R_{FCAP} is Ω, and it needs to be converted to Ω for calculation.

12.12. VSET(Battery voltage selection)

IP5569 sets the battery type by outputting 20uA current on VSET pin and connecting different resistance to GND, so as to change the threshold value of battery level display, the constant voltage to charge the battery and the protection voltage. The resistance of VSET external to GND and the set battery type are shown in the table below. Pay attention to 1% precision resistance for external resistance, Resistance selection needs to take into account the VSET voltage as far as possible in the middle of the judgment range.

IP5569 series IC support 4.20V, 4.30v, 4.35v and 4.40v batteries for VSET pin. By setting the type of battery through VSET pin, the threshold value of power display, the constant voltage of charging battery and the protection voltage are changed. The VSET resistance values and battery type are shown in the table below.

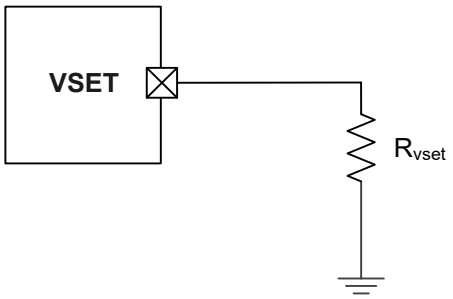


Figure 19 Battery voltage selection configuration circuit

Chart 16 Battery voltage selection config table

VSET pin external resistance to GND	Battery full voltage selection
NC	4.20V
62kΩ	4.30V
33kΩ	4.35V
10kΩ	4.40V

12.13. NTC function

IP5569 integrates two NTC function, NTC1 is used to detect the battery temperature, and NTC2 is used to detect the wireless charging coil temperature. When IP5569 is working, NTC1 pin output constant current, and generate voltage through external NTC1 resistance. IC internal detects the voltage of NTC1 pin to determine the current battery temperature.

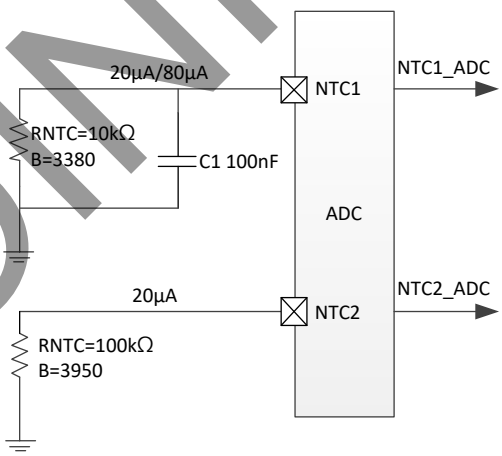


Figure 20 NTC protection detection circuit

The chip detects the current output from the NTC pin and the voltage generated by the externally pulled down NTC thermistor to determine the current temperature.

In order to accurately distinguish the battery temperature detected by NTC1, NTC1 adopts a current source switching detection module

When the NTC1 discharge current is 80μA, if the NTC1 voltage is higher than 1200mV, the current becomes 20μA;

when the NTC1 discharge current is 20μA, if the NTC1 voltage is lower than 200mV, the current changes to 80μA.

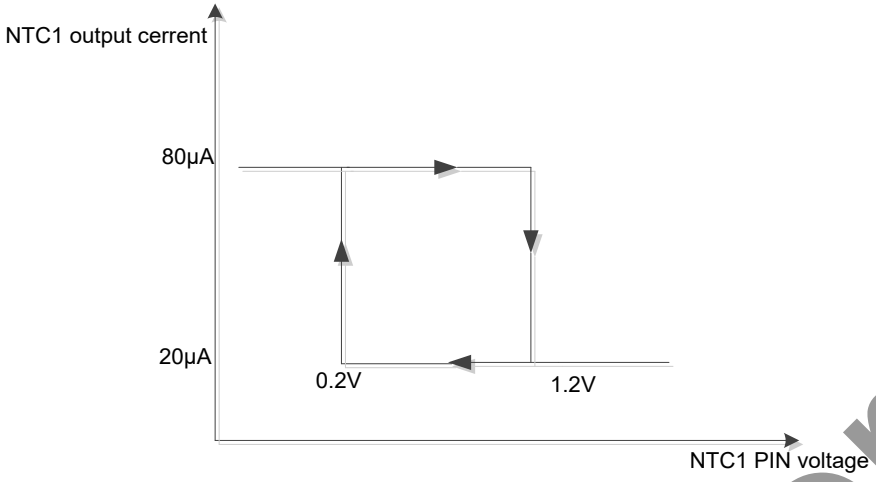


Figure 21 Relationship between NTC1 voltage and output current

- NTC1 temperature detection

In the state of charge:

When the NTC1 voltage is lower than 0.39V, it means the battery temperature is higher than 45℃, the charging is stopped.

When the NTC1 voltage is higher than 0.54V, it means the battery temperature is lower than 0℃, the charging is stopped.

In the state of discharge:

When the NTC1 voltage is lower than 0.24V, it means the battery temperature is higher than 60℃, the discharging is stopped.

When the NTC1 voltage is higher than 1.38V, it means the battery temperature is lower than -20℃, the discharging is stopped.

- NTC2 temperature detection

NTC2 is used to detect the temperature of the wireless charging coil. The output current of the NTC2 pin is 20μA.

When the voltage detected by the NTC2 pin is lower than 0.48V, the coil temperature exceeds 60 ℃, and the discharge power of wireless charging will decrease;

When the voltage detected by the NTC2 pin is lower than 0.29V, the coil temperature exceeds 75 ℃, and the discharge of wireless charging will be turned off;

When the NTC2 voltage is higher than 0.70V (coil temperature is lower than 50 ° C), wireless charge and discharge will be resumed.

Note:

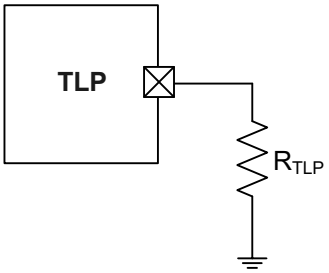
*The 100nF capacitance of NTC1 must be close to IC PIN.

*If the solution does not require NTC, the NTC1 pin must be grounded through a 10k Ω resistor, and the NTC2 pin must be grounded through a 100k Ω resistor, and cannot be floating or directly grounded

12.14. Intelligent temperature selection

The IP5569 chip has an intelligent temperature control function with built-in high temperature detection protection. The temperature control function can automatically adjust the input and output power based on the internal working temperature of the chip, in order to maintain the internal working temperature of the chip below the set temperature threshold.

The temperature detection threshold of the intelligent temperature control function of the IP5569 chip outputs a current of 20uA on the TLP pin, and different resistors are externally connected to GND to configure the temperature threshold.R_{TLP}



Temperature threshold	R_{TLP}
70℃	10kΩ
75℃	24kΩ
80℃	43kΩ
85℃	62kΩ
90℃	82kΩ
95℃	100kΩ
100℃	110kΩ
105℃	130kΩ

Figure 22 Intelligent temperature selection circuit diagram

12.15. Wireless charging

12.15.1 ASK communication demodulation/FSK modulation

The IP5569 has a built-in ASK demodulation module. For the ASK modulated signal from the receiving device, the IP5569 collects the coil voltage and current for ASK signal demodulation and decoding respectively. The system implements the QI wireless charging protocol based on the ASK decoded data.

IP5569 has built-in FSK modulation function, through FSK modulation, IP5569 can send information to the receiving device to realize PPDE, EPP, MPP and other protocols.

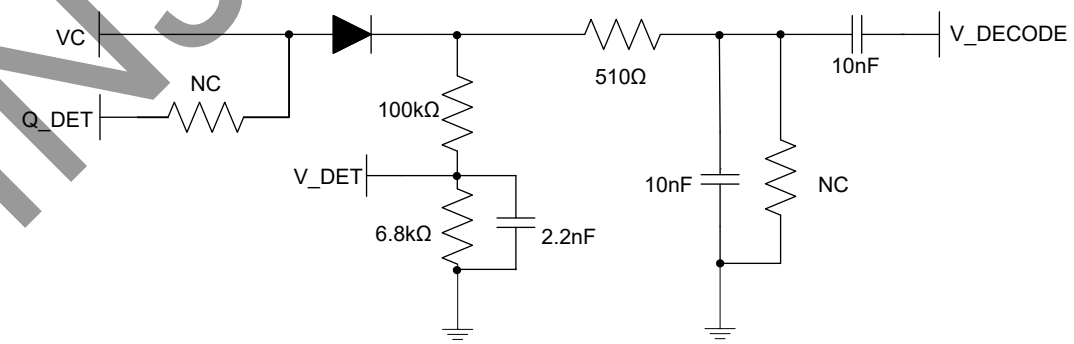


Figure 23 Wireless charging and demodulation circuit

12.15.2 H Bridge Drive

The IP5569 has two built-in symmetrical half-bridge driver modules and an external N+PMOS H-bridge. The dead time and drive strength of the driver modules can be software configured to different gears. During EMI EMC testing, the EMI margin can be improved by configuring a lower drive capability, thus saving external RC devices.

The IP5569 uses 20mΩ sampling resistor for low-side sampling of the H-bridge current, and the RC filter device for the sampled signal should be placed close to the IC to avoid noise interference.

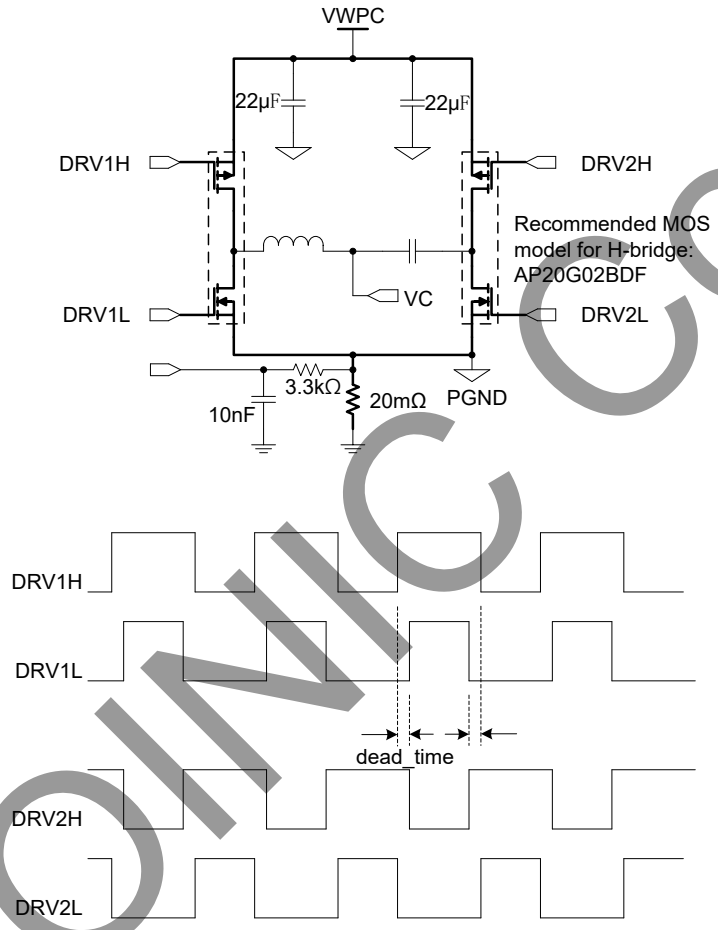


Figure 24 Wireless charging H Bridge

12.15.3 Wireless Charging Indicators

IP5569 supports two wireless charging LED indicator lights, and the corresponding relationship between the LED status and the wireless charging system status is as follows.

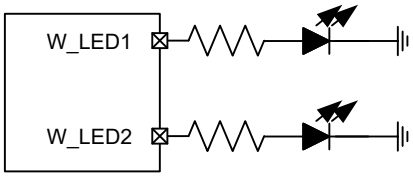


Figure 25 Wireless Charging Indicators

Chart 17 Wireless lamp display

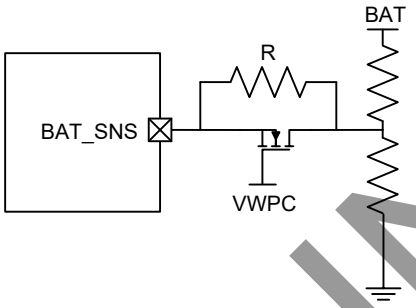
State	WLED1(29PIN)	WLED2(30PIN)
Power on	Supersede Flash, Three times in total	
Wireless charging abnormal	OFF	Flash
Charge complete	OFF	ON
Charging	ON	OFF
standby	OFF	OFF

12.15.4 Wireless Charging Automatic Wake Up

IP5569 wireless charging supports automatic detection of mobile phone, mobile phone is placed on the coil immediately wake up from the standby state, open the output to charge the phone, no button operation, support no button solution.

12.15.5 Wireless Charging Sampling Battery Voltage

IP5569 supports wireless charging sampling battery voltage, and the remaining battery power can be displayed through the double window when charging the mobile phone.



	NMOS	Resistance R
Wireless charging without self wake-up	2N7002	NC
Wireless charging self wake-up	NC	0R

Figure 26 Wireless rechargeable battery voltage sampling circuit

12.16. VCC and VDD

VCC is a normally open 3.3V LDO with a load capacity of 50mA.
VDD is a normally open 4.8V LDO with a load capacity of 50mA.

12.17. I2C

I2C connection mode

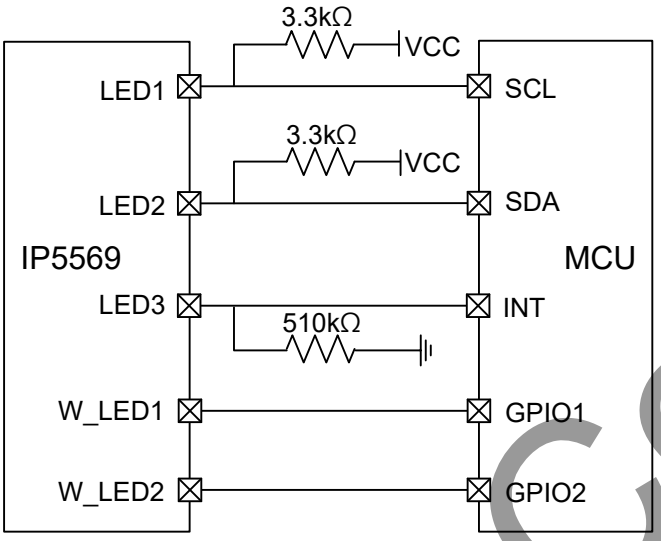


Figure27 IIC Application method

IP5569 model supports I2C connection. According to the corresponding connection mode, IC will automatically enter ot close IIC mode. In I2C mode, the INT signal is in high resistance state in standby mode and high level state in working state, which can be used to wake up MCU.

The MCU determines the wireless charging status based on the high and low levels of the W_LED1 and W_LED2 PINs with IP5569, For detailed information, please refer to the IP5569 (with Reg) documentation.

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 VOUT/VBUS/VIN/VWPC capacitor

IP5569 integrates USB output power path. The 2.2μF capacitor of VOUT/VBUS/VIN/VWPC must be close to the IC pin. If the layout allows, the position of the 2.2μF capacitor should be as close as possible to the chip, and need to be drilled nearby near the GND pad.

At the same time, a 100nF capacitor is placed near the USB connector, and the capacitance is parallel to the USB connector.

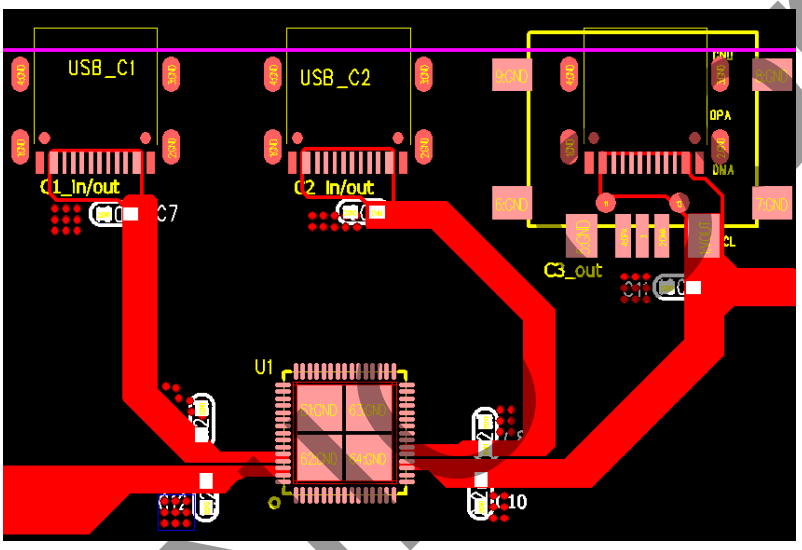


Figure28 Location of VOUT/VBUS/VIN/VWPC capacitor

13.2. Location of BAT/VCC/VDD/NTC1 capacitor

The filter capacitors of BAT/VCC/VDD/NTC1 pin should be placed as close as possible to the pin of the chip, and need to be drilled nearby near the GND pad.

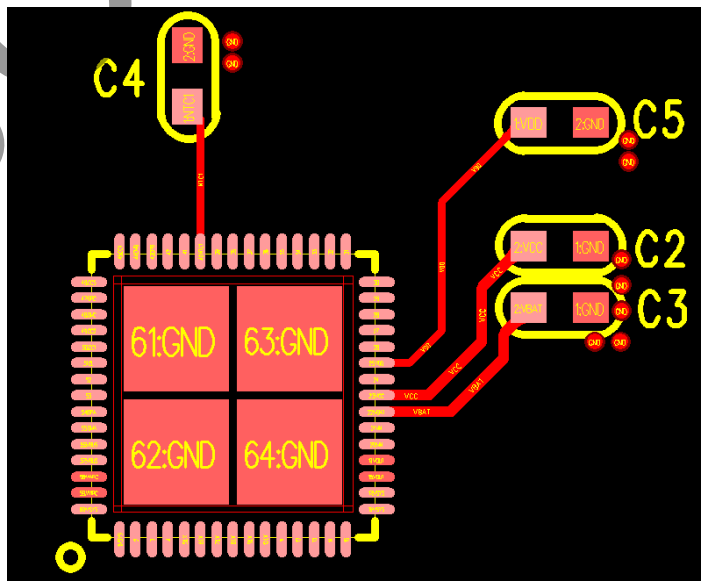


Figure29 Location of BAT/VCC/VDD/NTC1 capacitor

13.3. 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.

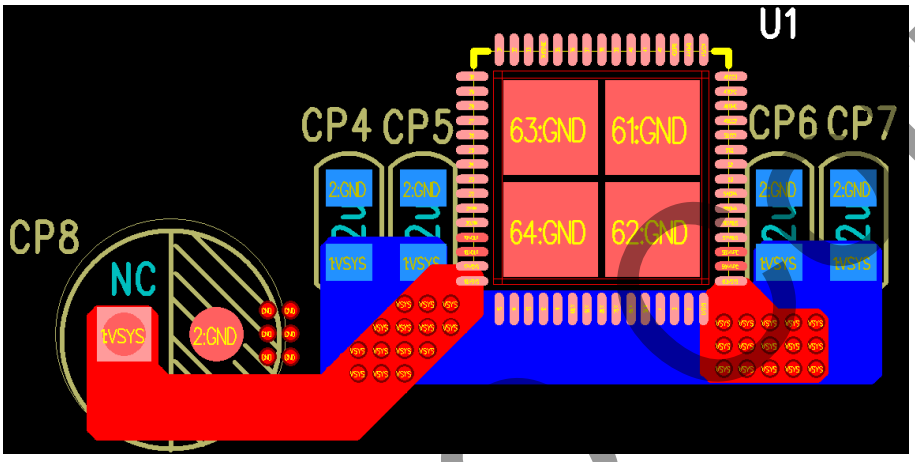


Figure30 Location of VSYS capacitor

13.4. Wireless charging Sampling resistance

The wireless charging path of IP5569 samples the H-bridge current through a 20mΩ sampling resistor. Due to the susceptibility of sampling to noise interference, the sampled data is distorted, so the GND of the 20m Ω sampling resistor needs to be separately copper plated and refluxed to the EPAD of the chip, and the RC filtering circuit for sampling signals needs to be placed as close as possible to the chip pins.

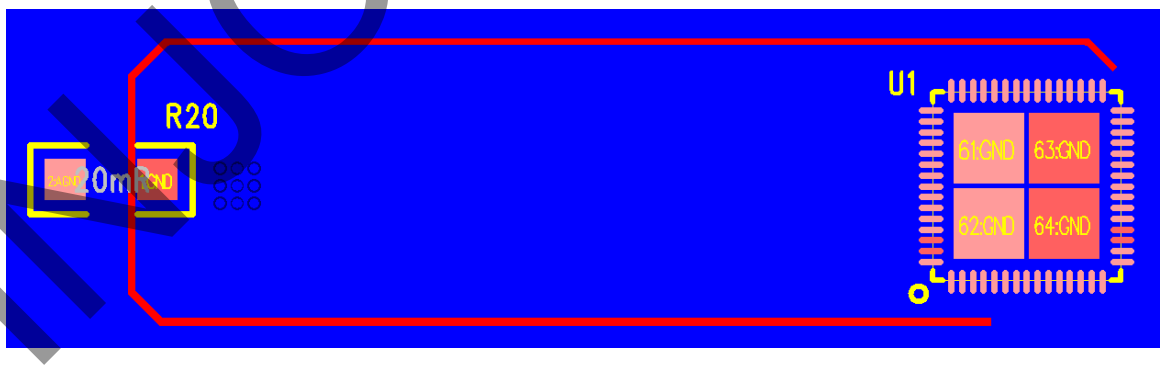


Figure31 Wireless charging sampling resistance wiring

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. IP5569 C+C+C(DFP)+WPC application

This scheme supports two TYPE-C fast charging input and output, TYPE-C fast charging output and 1 Wireless charging TX.

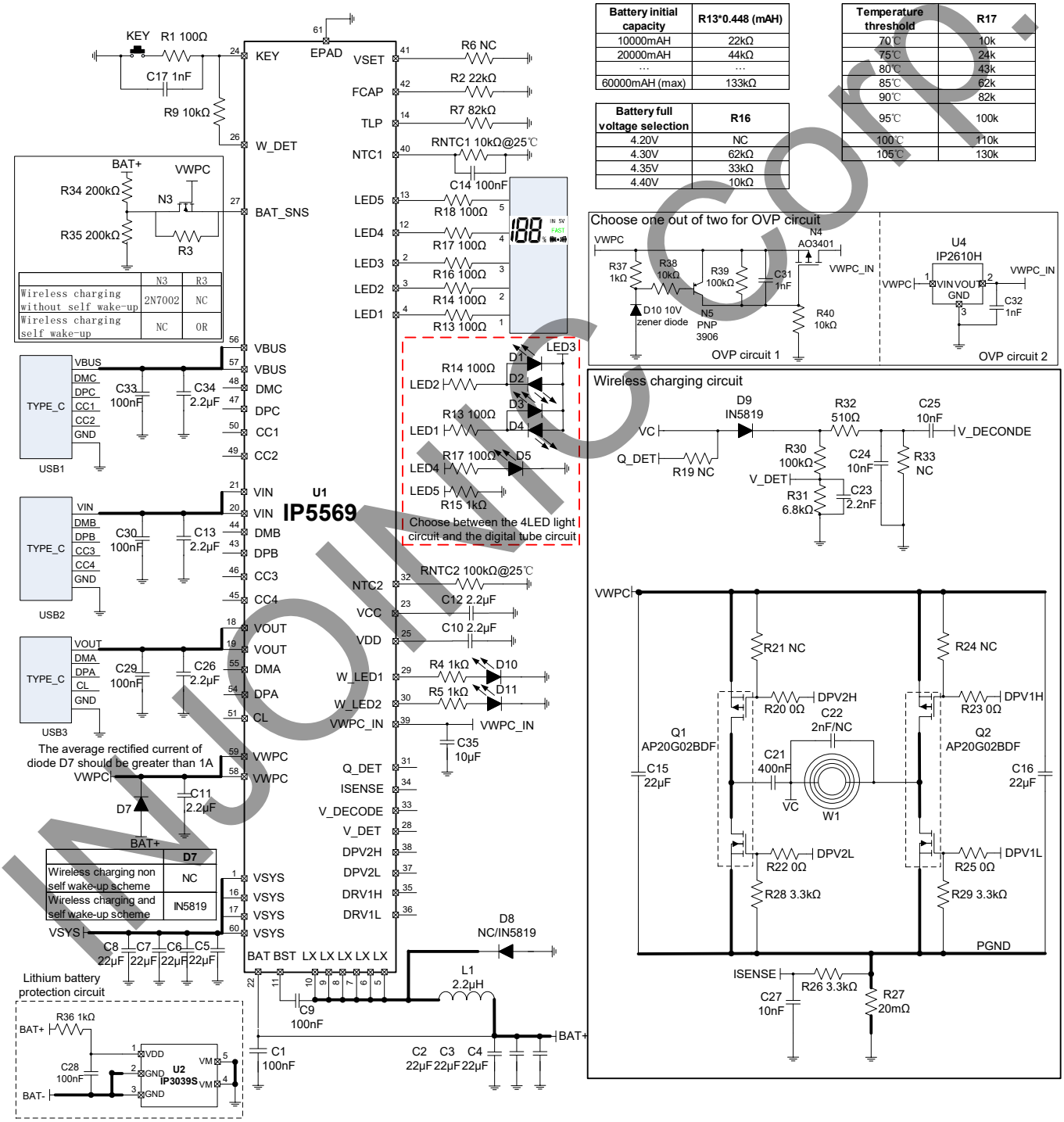


Figure 32 IP5569 application circuit

BOM list

No.	Part Name	Type	Location	Num	Note
1	SMT IC	QFN60 IP5569	U1	1	
2	SMT capacitor	0603 100nF 10% 25V	C1 C9 C14 C29 C30 C33	6	
3	SMT capacitor	0805 22μF 10% 16V	C2 C3 C4	3	
4	SMT capacitor	0805 22μF 10% 25V	C5 C6 C7 C8	4	
5	SMT capacitor	0603 2.2μF 10% 25V	C10 C11 C12 C13 C26 C34	6	
6	SMT capacitor	0603 10μF 10% 25V	C35	1	
7	NTC1 thermal resistor	10 kΩ@25℃ B=3380	RNTC1	1	
8	NTC2 thermal resistor	100 kΩ@25℃ B=3950	RNTC2	1	
9	Inductor	2.2μH 10*10	L1	1	
10	USB C CONNECTOR	USB C connector	USB1 USB2 USB3	3	
11	KEY	SMT 3*6	KEY	1	Key Circuit BOM
12	SMT resistor	0603 100Ω 1%	R1	1	
13	SMT resistor	0603 10kΩ 1%	R9	1	
14	SMT capacitor	0603 1nF 10% 25V	C17	1	
15	SMT resistor	0603 22kΩ 1%	R2	1	PIN selection circuit BOM
16	SMT resistor	0603 NC 1%	R6	1	
17	SMT resistor	0603 82kΩ 1%	R7	1	
18	SMT resistor	0603 1kΩ 1%	R4 R5 R15	3	LED light circuit BOM
19	SMT resistor	0603 100Ω 1%	R13 R14 R17	3	
20	SMT LED	0603 LED	D1 D2 D3 D4 D5 D10 D11	7	
21	SMT resistor	0603 100Ω 1%	R13 R14 R16 R17 R18	5	Digital tube circuit BOM
22	Digital tube	YFTD2715AWPG-5D	SMG	1	
23	SMT capacitor	0603 2.2nF 10% 50V	C23	1	Wireless charging and decoding circuit BOM
24	SMT capacitor	0603 10nF 10% 50V	C24 C25	2	
25	SMT resistor	0603 NC 1%	R19	1	
26	SMT resistor	0603 100kΩ 1%	R30	1	
27	SMT resistor	0603 6.8kΩ 1%	R31	1	
28	SMT resistor	0603 510Ω 1%	R32	1	
29	SMT resistor	0603 NC 1%	R33	1	
30	SMT schottky	IN5819	D9	1	
31	SMT schottky	IN5819	D7	1	Wireless Charging H-bridge Output Circuit BOM
32	SMT resistor	0603 0Ω 1%	R20 R22 R23 R25	4	
33	SMT resistor	0603 NC 1%	R21 R24 R26	3	
34	SMT resistor	0603 3.3kΩ 1%	R28 R29	2	
35	SMT resistor	1206 20mΩ 1%	R27	1	
36	CBB resonant capacitor	400nF 100V	C21	1	

37	SMT capacitor	0603 2nF/NC	C22	1	
38	SMT capacitor	0805 22μF 10% 25V	C15 C16	2	
39	SMT capacitor	0603 10nF 10% 50V	C27	1	
40	SMT MOS	PDFN3*3-8L AP20G02BDF	Q1 Q2	2	
41	Coil	A11	W1	1	
42	SMT NMOS	SOT-23 2N7002/NC	N3	1	Dual pop-up sampling circuit BOM
43	SMT resistor	0603 0Ω/NC 1%	R3	1	
44	SMT resistor	0603 200kΩ 1%	R34 R35	2	
45	SMT IC	CPC8-5 IP3039S	U2	1	Lithium protection circuit BOM
46	SMT capacitor	0603 100nF 10% 16V	C28	1	
47	SMT resistor	0603 1kΩ 1%	R36	1	
48	SMT capacitor	0603 1nF 10% 25V	C31	1	OVP circuit 1 BOM
49	SMT resistor	0603 1kΩ 1%	R37	1	
50	SMT resistor	0603 10kΩ 1%	R38 R40	2	
51	SMT resistor	0603 100kΩ 1%	R39	1	
52	Voltage regulator tube	10V	D10	1	
53	SMT NMOS	SOT-23 AO3401	N4	1	
54	SMT PNP	SOT-23 3906	N5	1	
55	SMT IC	IP2610H	U4	1	OVP circuit 2 BOM
56	SMT capacitor	0603 1nF 10% 25V	C32	1	

Recommended inductance model

DARFON PIN	Thickness (mm)	Inductance (μH)	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	

14.2. IP5569 C+C+A+WPC application

This scheme supports two TYPE-C fast charging input and output, TYPE-A fast charging output and 1 Wireless charging TX.

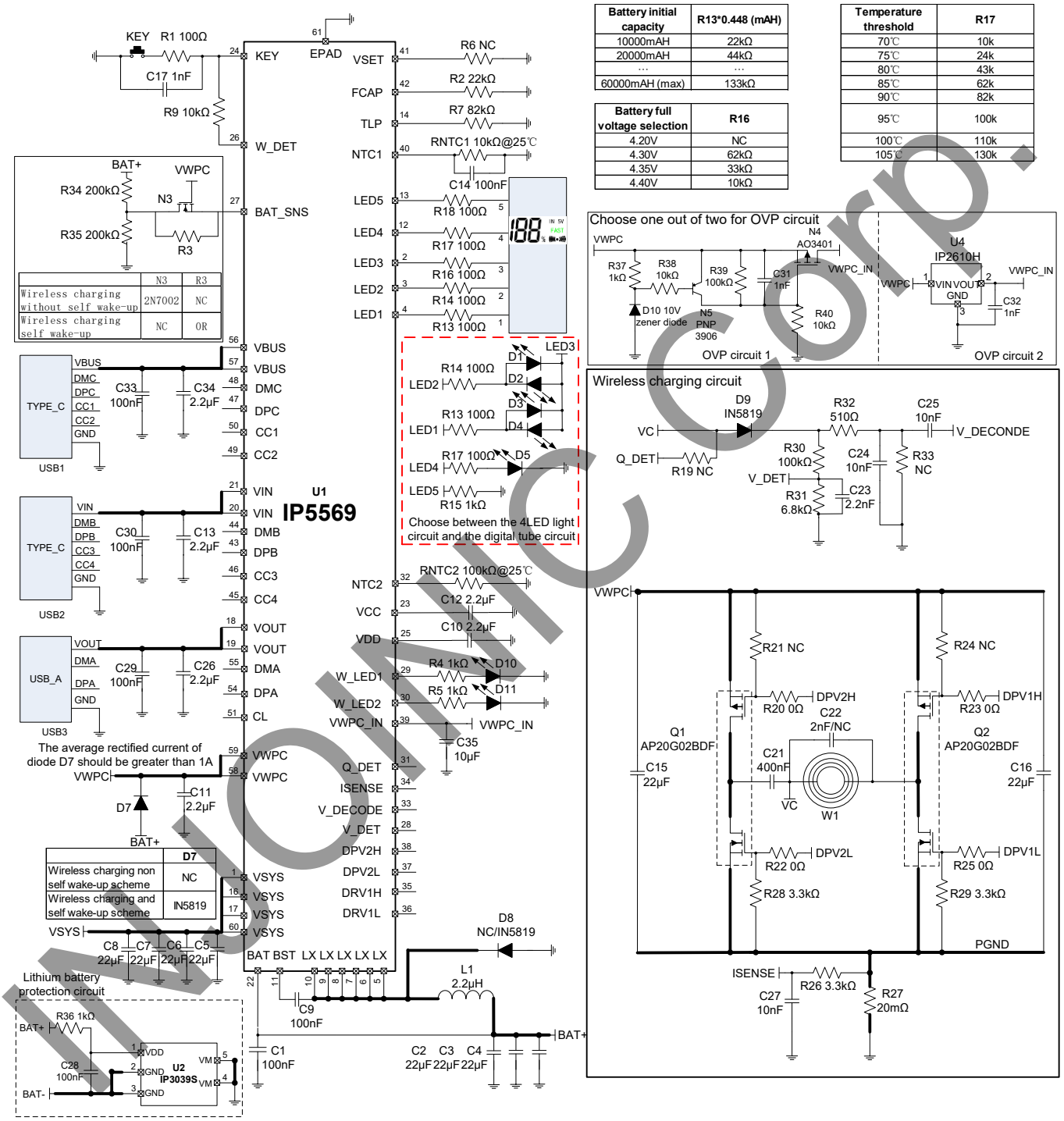


Figure 33 IP5569 application circuit

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5	SMT capacitor	0603 2.2μF 10% 25V	C10 C11 C12 C13 C26 C34	6	
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17	SMT resistor	0603 NC 1%	R6	1	
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51	SMT resistor	0603 10kΩ 1%	R38 R40	2	
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56	SMT IC	IP2610H	U4	1	OVP circuit 2 BOM
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SHC1004-2R2M	4	2.2	±20%	7	9	12	24	

15. Package

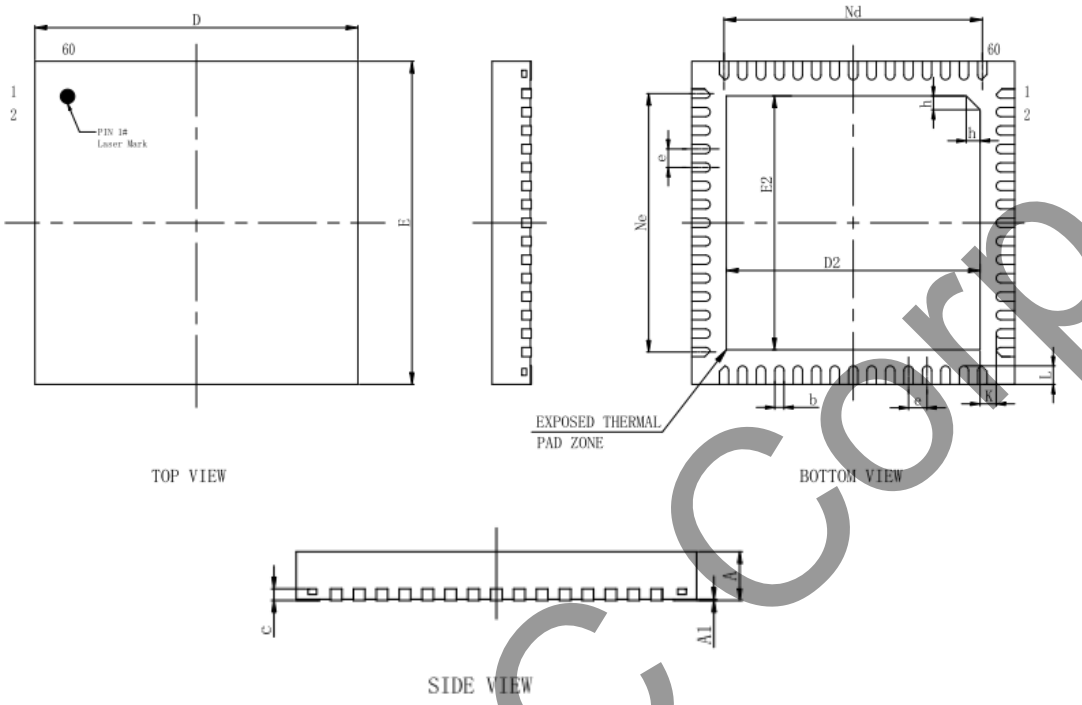
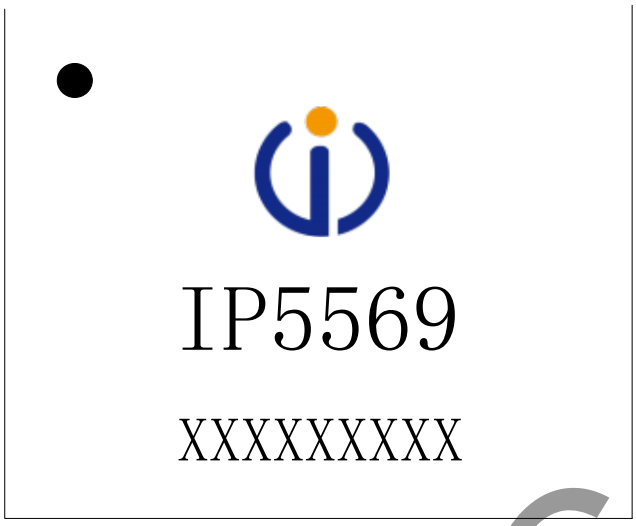


Figure 34 IP5569 Package size

Chart 19 Packaging information size

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.85	0.90	0.95
A1	0	0.02	0.05
b	0.15	0.20	0.25
c	0.203REF		
D	6.90	7.00	7.10
D2	5.40	5.50	5.60
Nd	5.60BSC		
e	0.40BSC		
E	6.90	7.00	7.10
E2	5.40	5.50	5.60
Ne	5.60BSC		
L	0.35	0.40	0.45
h	0.25	0.30	0.35
K	0.35REF		

16. IC Silk Screen Description



Note:
1. --Injoinic Logo
2. IP5569 --Part Number
3. XXXXXXXXX --Manufacture lot number
4. --Pin1 location

Figure 35 IP5569 Silk Screen Description

17. IMPORTANT NOTICE

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