IP5356M

Power bank SOC supporting all fast charging protocols including high-voltage SCP and bidirectional PD3.0.

1. Characteristics

• Supports multiple **USB** ports simultaneously: • 2 USB A output ports • 1 USB B input port • 1 USB C input/output port • 1 Lightning input port • Customizable to support 1 USB C input/ output port + USB C output port

Features include :

Fast charging specifications; support for fast charging on any port; integrated QC2.0/QC3.0 output fast charging protocol; integrated FCP input/output fast charging protocol; integrated AFC input/output fast charging protocol; integrated high-voltage SCP output fast charging protocol; integrated USB C DRP protocol, supporting input and output fast charging; compatible with BC1.2, Apple, and Samsung phone fast charging; integrated Lightning input communication ; and integrated **USB Power Delivery (PD2.0/PD3.0) protocol .**

• Supports PD2.0 bidirectional input/output protocol • Supports PD3.0 input/output and PPS output protocol • Supports 5V, 9V, and 12V voltage input levels • Supports 5V, 9V, and 12V voltage output levels • PPS supports 3.3~11V, 20mV/Step output voltage levels • Integrated hardware bidirectional tag codec (BMC) protocol • Integrated physical layer protocol (PHY) • Integrated hardware CRC • Supports Hard Reset • Charging Specifications • Supports 18W charging, with a maximum battery charging current of 5.0A • Adaptive charging current adjustment • Supports 4.20V, 4.30V, 4.35V, and 4.40V batteries • Discharge Specifications • Output current capability: • 5V@3.1A, 9V@2.22A 12V@1.67A ÿ Synchronous switch discharge 5V@2A with an efficiency of over 95% ÿ Supports line compensation • Battery Level Display • Built-in 14-bit ADC and fuel gauge • Supports 1/2/3/4 LED battery level display • Supports various digital tube battery level displays such as 88 and 188 • Intelligent recognition of the number of LED battery level indicators • Other Functions • Automatic detection of phone insertion and removal • Fast charging status indication • Supports battery temperature detection • Intelligent load recognition, automatically enters standby mode under light load • Built-in lighting driver • Supports I2C interface • Multiple Protections and High Reliability • Input overvoltage and undervoltage protection • Output overcurrent, overvoltage, and short circuit protection • Battery overcharge, over-discharge, and overcurrent protection • Chip over-temperature protection • Charge/discharge battery temperature NTC protection • ESD 4kV, input (including CC pin) withstand voltage 20V • Minimalist **BOM** • Built-in switching power MOS and path MOS Single inductor enables charging and discharging functions . Package specifications: 6mm **× 6mm 0.5**

2. Application Products

• Portable power banks and power banks • Portable devices such as mobile phones and tablets

3. Overview

The IP5356M is a device that integrates QC2.0/QC3.0/SCP output fast charging protocols, FCP/AFC input/output fast charging protocols, USB C/PD2.0/PD3.0 input/output protocols, USB C PD3.0 PPS output protocol, and is compatible with BC1.2/Apple/Samsung phones, supporting synchronous boost/buck conversion.

This multi-functional power management SOC, incorporating converter, lithium battery charging management, and battery level indicator, provides a complete power solution for fast-charging power banks.

The solution supports four USB ports simultaneously: two USB A ports, one USB B port, and one USB C port. Fast charging is supported when any one of the USB ports is used individually.

When using two or more output ports simultaneously, only the 5V voltage level is supported.

The IP5356M's high integration and rich functionality allow it to achieve both buck and boost functions with just one inductor, requiring very few external components in applications.

This effectively reduces the overall size of the solution and lowers the BOM cost.

The IP5356M's synchronous switching boost system provides a maximum output capacity of 22.5W. The boost automatically enters sleep mode when unloaded.

The IP5356M synchronous switching charging system supports 18W charging, with a battery-side charging current of up to 5.0A. It includes built-in chip temperature and battery monitoring.

Temperature and input voltage control loops intelligently adjust charging current.

The IP5356M has built-in TYPE-C and PD2.0/PD3.0 protocols.

The IP5356M features a built-in 14-bit ADC and current sampling circuitry for accurate measurement of battery voltage and current. It also includes a built-in power calculation method.

It can accurately obtain battery power information. The battery capacity can be set to precisely display the battery power level.

The IP5356M supports 1/2/3/4 LED power displays and various digital tube power displays such as 88 and 188; it also supports lighting functions;

button.

The IP5356M supports the I2C control interface.

Table of contents

1. Features..... 1 2. Application Products..... 1 3. Overview..... 2 4. Revision History..... 5 5. Typical Applications..... 6 6. Pin Definitions..... 7 6.1. IP5356M Pin Description..... 7 7. IP Series Model Selection Table..... 9 7.1. Power Bank Chip..... 9 7.2. IP5356M Common Custom Model Description..... 9 8. Limiting Parameters..... 11 9. Recommended Operating Conditions..... 11 10. Electrical Characteristics..... 12 11. Functional Description..... 14 11.1. Internal Structure Diagram..... 14 11.2. Low Voltage Lockout and Activation..... 14 11.3. Charging..... 15 11.4. Boost..... 15 11.5. USB C..... 17 11.6. USB C PD..... 19 11.7. Fast Charging Function..... 19 11.8. Charging/ Discharging Path Management..... 20 11.9. Automatic Phone Detection..... 21 11.10. Buttons and Lights..... 21 11.11. Fast Charging Status Indicator..... 22 11.12. Fuel Gauge and Battery Level Display..... 22 11.12.1. LED Battery Level Display Mode..... 22 11.12.2. Digital Tube Battery Level Display Mode..... 24 11.12.3. Fuel Gauge..... 25 11.13. VSET (Battery Specification Setting)..... 26 11.14. NTC Functions..... 26 11.15. VCC..... 27 11.16. I2C..... 27 12. Layout Considerations..... 28 12.1. Location of VOUT1/VOUT2/VBUS Capacitors..... 28 12.2. Location of VSYS Capacitor..... 28 12.3. Location of BAT/VCC Capacitors..... 29 12.4. Location of NTC Capacitor..... 29 13. Typical Application Schematic..... 30 13.1. Application of IP5356M_LBZ Series/IP5356M_LCL Series..... 30 13.2. Application of IP5356M_DBZ Series/IP5356M_DCL Series..... 31 13.3. IP5356M_LCC Series LEDs Lighting Applications..... 33

13.4. Applications of IP5356M_DCC Series Digital Tubes..... 34
14. Chip Marking Instructions..... 36
15. Encapsulation Information..... 37
16. Liability and Copyright Statement..... 39

4. Edit history

Note: Page numbers in previous versions may differ from those in the current version.

Updated to version V1.00 (October 2023) • Initial release	page number
release	1

Updated to version V1.01 (March 2024)	page number
• The model selection table now includes commonly customized models	10

Change to version V1.02 (June 2024)	Page number
• Revised some parameter descriptions	12

5. Typical Applications

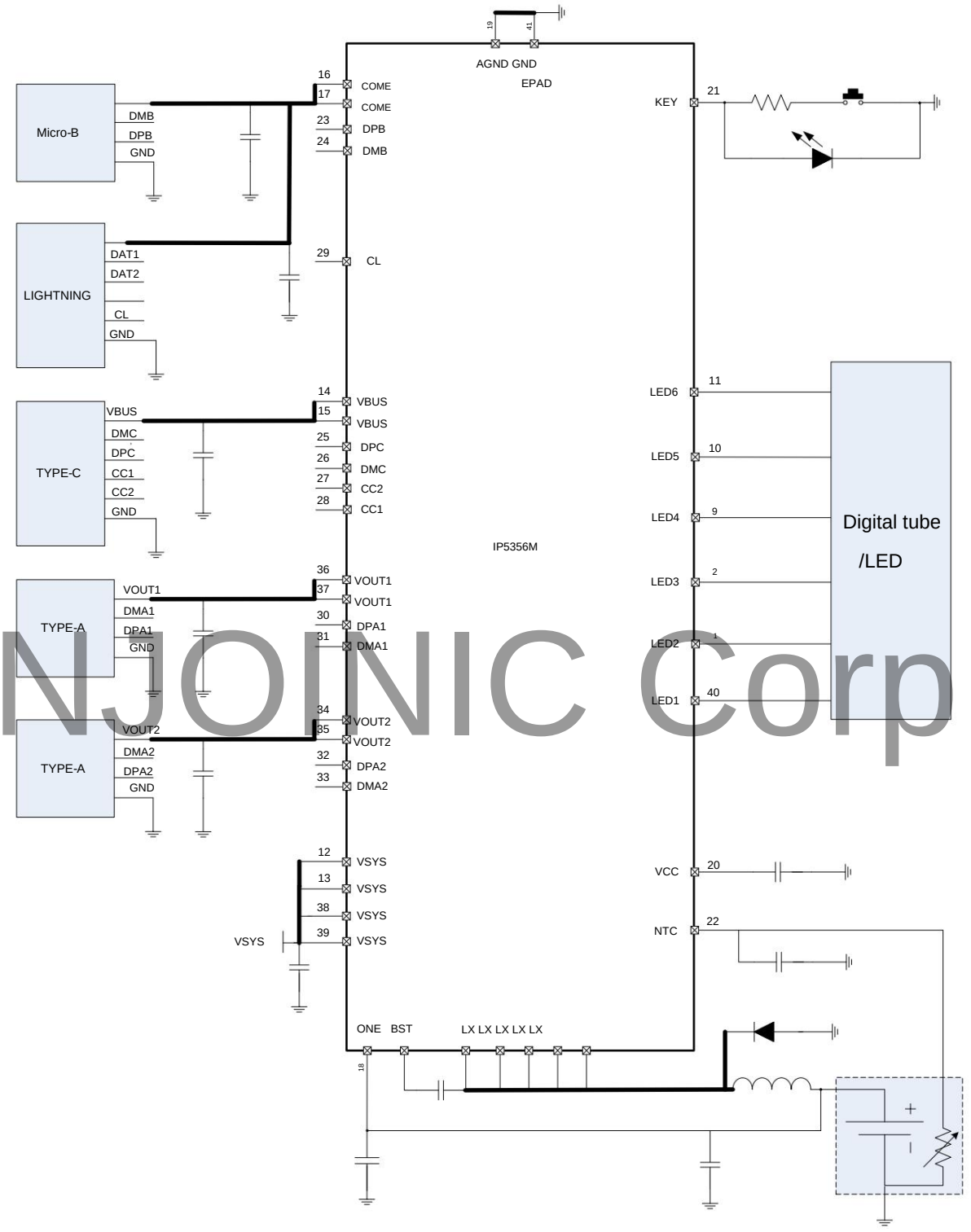


Figure 1 Simplified application principle diagram

6. Pin Definitions

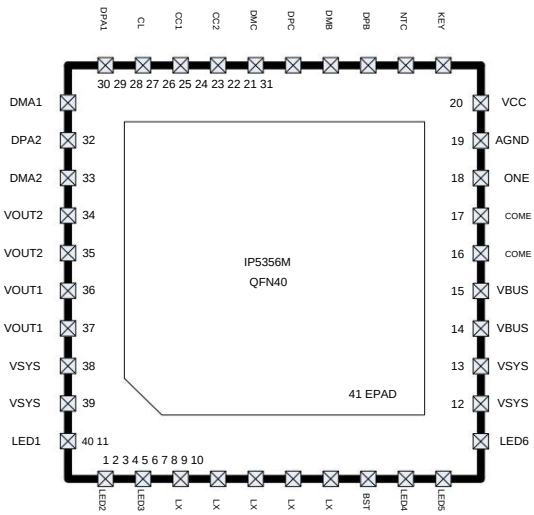


Figure 2. Pin diagram of IP5356M

6.1. IP5356M Pin Description

Pin number	Pin name	Function Description
1		LED2 power indicator light driver LED2/I2C SDA
2		LED3 power indicator light driver LED3/I2C INT
3ÿ4ÿ5ÿ6ÿ7	LX	DC-DC switching node, connected to inductor
8		BST internal high-voltage drive, connecting capacitor to LX
9		LED4 power indicator light driver LED4
10	LED5	The power indicator LED5/FCAP external setting pin can only be selected for one function, as specified at the factory. Set up
11	LED6	Power indicator LED6 driver / Fast charging indicator / Lightning input communication pin / FCAP external device The pin is fixed; only one of the above functions can be selected, and it is set at the factory.
12, 13, 38, 39	VSYS	system input/output common nodes
14ÿ15	VBUS	Input/Output VBUS Power Pin
16ÿ17	COME	VIN input pin (VIN charging power pin)
18	BAT	Battery Power Node
19	AGND	simulation
20	VCC	chip outputs 3.3V voltage.
21	KEY	button and lighting pin
22	NTC	resistance sensing pin
23	DPB	VIN port fast charging intelligent identification DP

24	DMB VIN port fast charging smart recognition DM	
25	DPC VBUS Smart Identifier for Fast Mobile Charging	
26	DMC VBUS port mobile phone fast charging intelligent identification DM	
27	CC2 VBUS port detection pin CC2	
28	CC1 VBUS port detection pin CC1	
29	CL	Connect the CC cable of the Lightning input port to pin 8 of the Lightning input port; or connect the C port input... CC line
30	DPA1 VOUT1 port for smart DP fast charging of mobile phones	
31	DMA1 VOUT1 port mobile phone fast charging intelligent identification DM	
32	DPA2 VOUT2 port for smart DP fast charging of mobile phones	
33	DMA2 VOUT2 port mobile phone fast charging intelligent identification DM	
34ÿ35	VOUT2 Output power pin	
36ÿ37	VOUT1 Output power pin	
40	LED1 power indicator light driver LED1/I2C SCK	
41(EPAD)	GND (power ground) and heat dissipation ground need to maintain good contact with GND.	

7. IP Series Model Selection Table

7.1. Power Bank Chip

chip model	Charge and discharge power		Main features								Packaging	
	Discharge power	Charge power	LED Number of lights	I2C DCP	USB C		QC Certification	PD3.0 /PPS	super Fast charging	UF CS	Specification	Allow
IP5303T	5V/1A	5V/1A	1,2	-	-	-	-	-	-	-	ESOP8	PIN2PIN
IP5305T	5V/1A	5V/1A	1,2,3,4 ÿ		-	-	-	-	-	-	ESOP8	
IP5306	5V/2.4A	5V/2A	1,2,3,4	ÿ	-	-	-	-	-	-	ESOP8	
IP5306H	5V/2.4A	5V/2A	1,2,3,4	ÿ	-	-	-	-	-	-	ESOP8	
IP5306P	5V/2.1A	5V/2A	1,2,4	ÿ	-	-	-	-	-	-	ESOP8	
IP5316	5V/2.4A	5V2.4A	1,2,4	ÿ	ÿ	ÿ	-	-	-	-	ESSOP10	
IP5326	5V/2.4A	5V2.4A	1,2,4	ÿ	ÿ	ÿ	-	-	-	-	QFN16	
IP5407	5V/2.4A	5V/2A	1,2,4	-	ÿ	-	-	-	-	-	ESOP8	
IP5407H	5V/2.4A	5V/2.1A	1,2,4	-	ÿ	-	-	-	-	-	ESOP8	
IP5209	5V/2.4A	5V/2.1A	3,4,5	ÿ	ÿ	-	-	-	-	-	QFN24	
IP5189T	5V/2.1A	5V/2A	1,2,3,4 ÿ		ÿ	-	-	-	-	-	QFN24	
IP5218	5V/1A	5V/1A	1,2,3,4	-	-	ÿ	-	-	-	-	QFN16	
IP5219	5V/2.4A	5V/2A	1,2,3,4 ÿ		-	ÿ	-	-	-	-	QFN24	
IP5310	5V/3.1A	5V/2.6A	1,2,3,4 ÿ		ÿ	ÿ	-	-	-	-	QFN32	
IP5506	5V/2.4A	5V/2A Digital Tube -			-	-	-	-	-	-	ESOP16	
IP5508	5V/2.4A	5V/2A Digital Tube -			ÿ	-	-	-	-	-	QFN32	
IP5320	5V/3.1A	5V/2.6A Digital Display ÿ			ÿ	ÿ	-	-	-	-	QFN28	
IP5330	5V/3.1A	5V/2.6A Digital Tube -			ÿ	ÿ	-	-	-	-	QFN32	
IP5328P	20W	18W	1,2,3,4	ÿ	ÿ	ÿ	ÿ	ÿ	-	-	QFN40	
IP5353	22.5W	18W	4	ÿ	ÿ	ÿ	ÿ	ÿ	ÿ	-	QFN32	
IP5355	22.5W	18W	4	ÿ	ÿ Dual-path ÿ			ÿ	ÿ	-	QFN32	
IP5356	22.5W	18W Digital Tube ÿ			ÿ Dual-path ÿ			ÿ	ÿ	-	QFN40	PIN2PIN
IP5356H	22.5W	18W Digital Tube ÿ			ÿ Dual-path ÿ			ÿ	ÿ	-	QFN40	
IP5356M	22.5W	18W Digital Tube ÿ			ÿ Dual-path ÿ			ÿ	ÿ	-	QFN40	
IP5365	22.5W	18W Digital Tube ÿ			ÿ Three routes ÿ			ÿ	ÿ	ÿ	QFN48	
IP5358	22.5W	18W Digital Tube -			ÿ	ÿ	ÿ	ÿ	ÿ	-	QFN48	
IP5568	22.5W	18W Digital Tube -			ÿ	ÿ	ÿ	ÿ	ÿ	-	QFN64	
IP5568U	22.5W	18W Digital Tube -			ÿ	ÿ	ÿ	ÿ	ÿ	-	QFN64	
IP5385	65W	65W digital tube ÿ			ÿ Dual-path ÿ			ÿ	ÿ	ÿ	QFN48	
IP5386	45W	45W digital tube ÿ			ÿ Dual-path ÿ			ÿ	ÿ	-	QFN48	
IP5389	100W	100W Digital Tube ÿ			ÿ Dual-path ÿ			ÿ	ÿ	-	QFN64	
IP5389H	100W	100W Digital Tube ÿ			ÿ Dual-path ÿ			ÿ	ÿ	-	QFN64	

*For other models, please consult Ingenics business.

7.2. Explanation of Common Customized Models of IP5356M

model	Battery show	LED Fast charging instruct lamp	Capacity settings	Battery charging Full voltage	Lightning communication	Second-channel PD function		Remark
						CL output PD	CL output Release PD	
IP5356M_LBZ_suffix	LED LED6		LED5	LED3	·	ÿ	·	
IP5356M_DBZ_suffix	188	·	LED6	4.2V	·	ÿ	·	
IP5356M_DBZ_4V35_suffix	188	·	LED6	4.35V	·	ÿ	·	
IP5356M_DBZ_4V4_suffix	188	·	LED6	4.4V	·	ÿ	·	
IP5356M_LCL_suffix	LED LED4		LED5	LED3	LED6	ÿ	·	When not using fast charging, LED4 needs to be suspended in the air;
IP5356M_DCL1W_suffix	188	- Curing	10000mAH	4.2V	LED6	ÿ	·	
IP5356M_DCL1W_4V35_suffix	188	- Curing time	10000mAH 4.35V		LED6	ÿ	·	
IP5356M_DCL2W_suffix	188	- Curing	20000mAH	4.2V	LED6	ÿ	·	
IP5356M_DCL2W_4V35_suffix	188	- Curing time	20000mAh 4.35V		LED6	ÿ	·	
IP5356M_DCL3W_suffix	188	- Curing time	30000mAH	4.2V	LED6	ÿ	·	
IP5356M_LCC_suffix	LED LED6		LED5	LED3	·	·	ÿ	Recommended selection: CC line Material;
IP5356M_DCC_suffix	188	·	LED6	4.2V	·	·	ÿ	
IP5356M_DCC_4V35_suffix	188	·	LED6	4.35V	·	·	ÿ	
IP5356M_DCC_4V4_suffix	188	·	LED6	4.4V	·	·	ÿ	
IP5356M_LCLL_ suffix	LED LED4		LED5	LED3	LED6	·	ÿ	Recommended selection: CL line Material; LED series does not use When fast charging, LED4 It needs to be suspended in the air;
IP5356M_DCLL1W_suffix	188	- Curing	10000mAH	4.2V	LED6	·	ÿ	
IP5356M_DCLL1W_4V35_suffix	188	- Curing time	10000mAH 4.35V		LED6	·	ÿ	
IP5356M_DCLL2W_suffix	188	- Curing	20000mAH	4.2V	LED6	·	ÿ	
IP5356M_DCLL2W_4V35_suffix	188	- Curing time	20000mAh 4.35V		LED6	·	ÿ	
IP5356M_DCLO_suffix	188	·	LED6	4.2V	·	·	ÿ	
IP5356M_DCLO_4V35_suffix	188	·	LED6	4.35V	·	·	ÿ	
IP5356M_DCLO_4V4_suffix	188	·	LED6	4.4V	·	·	ÿ	

Not supported: -

Support: ÿ

8. Limiting parameters

	symbol	value	unit
Parameter port input voltage range	VINÿVBUS	-0.3 ~ 16	In
Junction temperature range	TJ	-40 ~ 150	ÿ
Storage temperature range	Test	-60 ~ 150	ÿ
Thermal resistance (junction temperature to ambient temperature)	ÿJA	35	ÿ/W
Human Model (HBM)	ESD	4	kV

*Stress values exceeding the absolute maximum ratings listed may cause permanent damage to the device under any absolute maximum rating conditions.

Prolonged exposure can affect the reliability and lifespan of devices.

9. Recommended working conditions

parameter	symbol	Minimum value	Typical value	Maximum unit	
Input voltage	VINÿVBUS	4.5	5/9/12	14.0	In
Battery voltage	VBAT	3.0	3.7	4.4	In

*The device's operating characteristics cannot be guaranteed beyond these operating conditions.

10. Electrical Characteristics

Unless otherwise specified, TA = 25ÿ, L = 2.2ÿH, VBAT = 3.8V

parameter	symbol	Test conditions	Minimum value	Typical value	maximum value	unit
Charging system						
Input voltage	VINÿVBUS		4.5	5/9/12	14.0V	
Input overvoltage VIN, VBUS			14.0	14.5	15.0V	
Charging constant voltage	VTRGT	4.20V	4.18	4.22	4.25V	
		4.30V	4.28	4.32	4.35V	
		4.35V	4.33	4.37	4.39 V	
		4.40V	4.38	4.42	4.45V	
Charging current	ICHRG	VIN = 5V, input current	1.7	2.0	2.3 A	
		VBUS = 5V, input current	2.5	2.9	3.3 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 charging current	ITRKL	VIN=5VÿVBAT =2.0V	20	50	100 mA	
		VIN=5VÿVBAT =2.8V	50	200	450 mA	
Trickle cutoff voltage	VTRKL		2.9	3.0	3.1V	
Charging stop charging current	STOP		250	400	550 mA	
Recharge threshold	TOP		4.05	4.10	4.15V	
Charging deadline	TEND		20	24	27 Hour	
boost system						
Battery operating voltage	VBAT		3.0		4.5V	
Switch working battery input Current	DIFFERENT	VBAT=3.7VÿVOUT=5.1Vÿfs=400kHz IOUT=0mA	3	5		m.a.
DC output voltage	QC2.0 VOUT	VOUT=5V@1A	4.95	5.12	5.23 V	
		VOUT=9V@1A	8.70	9.00	9.30 AM	
		VOUT=12V@1A	11.60	12.00	12.40 AM	
	QC3.0 VOUT	@1A	4.95		12.45 V	
	QC3.0 Step			200		mV
Output voltage ripple	ÿVOUT	VBAT=3.7VÿVOUT=5.0Vÿfs=400kHz		100		mV
		VBAT=3.7VÿVOUT=9.0Vÿfs=400kHz		150		mV

		VBAT=3.7VÿVOUT=12.0Vÿfs=400kHz		200		mV
Boost system supply current Iout		VOUT=5V		3.1		A
		VOUT=9V		2.0		A
		VOUT=12V		1.5		A
Boost system efficiency	ÿout	VBAT=3.7VÿVOUT=5.0VÿIOUT=2.0A		93		%
		VBAT=3.7VÿVOUT=9.0VÿIOUT=2.0A		92		%
		VBAT=3.7VÿVOUT=12.0VÿIOUT=1.5A		91		%
Overcurrent shutdown of boost system Current	Ishut	VBAT=3.7VÿVOUT=5.0V	3.4	4.0	4.4 A	
		VBAT=3.7VÿVOUT=9.0V	2.25	2.60	2.90 A	
		VBAT=3.7VÿVOUT=12.0V	1.7	1.9	2.2 A	
Output light-load shutdown current Iload		VBAT=3.7V	30	60	100 mA	
During the overcurrent detection period, the TUVD output voltage remained below 4.2V.				30		ms
During the load short-circuit detection time (TOCD) , the output current remains greater than 4.4A.			150		200	ÿs
control system						
Switching frequency	fs	Discharge switching frequency	350	400	450 kHz	
		Charging switching frequency	630	680	730 kHz	
NMOS on-resistance	rDSON	Upper tube		9	11 mÿ	
NMOS on-resistance		Downpipe		9	11 mÿ	
VCC output voltage	VCC	VBAT=3.7V		3.3		In
Battery standby current ISTB VIN=0V, VBAT=3.7V, average current				100		ÿA
LDO output current	LINE		40	50	60 mA	
LED lighting drive current IWLED			10	15	20 mA	
LED display drive current IL1, IL2, IL3 voltage drop by 10%				3		m.a.
Total load light load shutdown Dynamic detection time	T1load load current remains less than 60mA		25	32	44	s
output port light load shutdown automatic Dynamic detection time	T2load		14	16	18	s
Short key wake-up time TOnDebounce			60	100	200 ms	
Turn on WLED time TKeylight			1.2	2.0	3.0	s
Thermal shutdown temperature	TOTP temperature rise		130	140	150 ÿ	
Thermal shutdown temperature hysteresis ÿTOTP				40		ÿ

11. Functional Description

11.1. Internal Structure Diagram

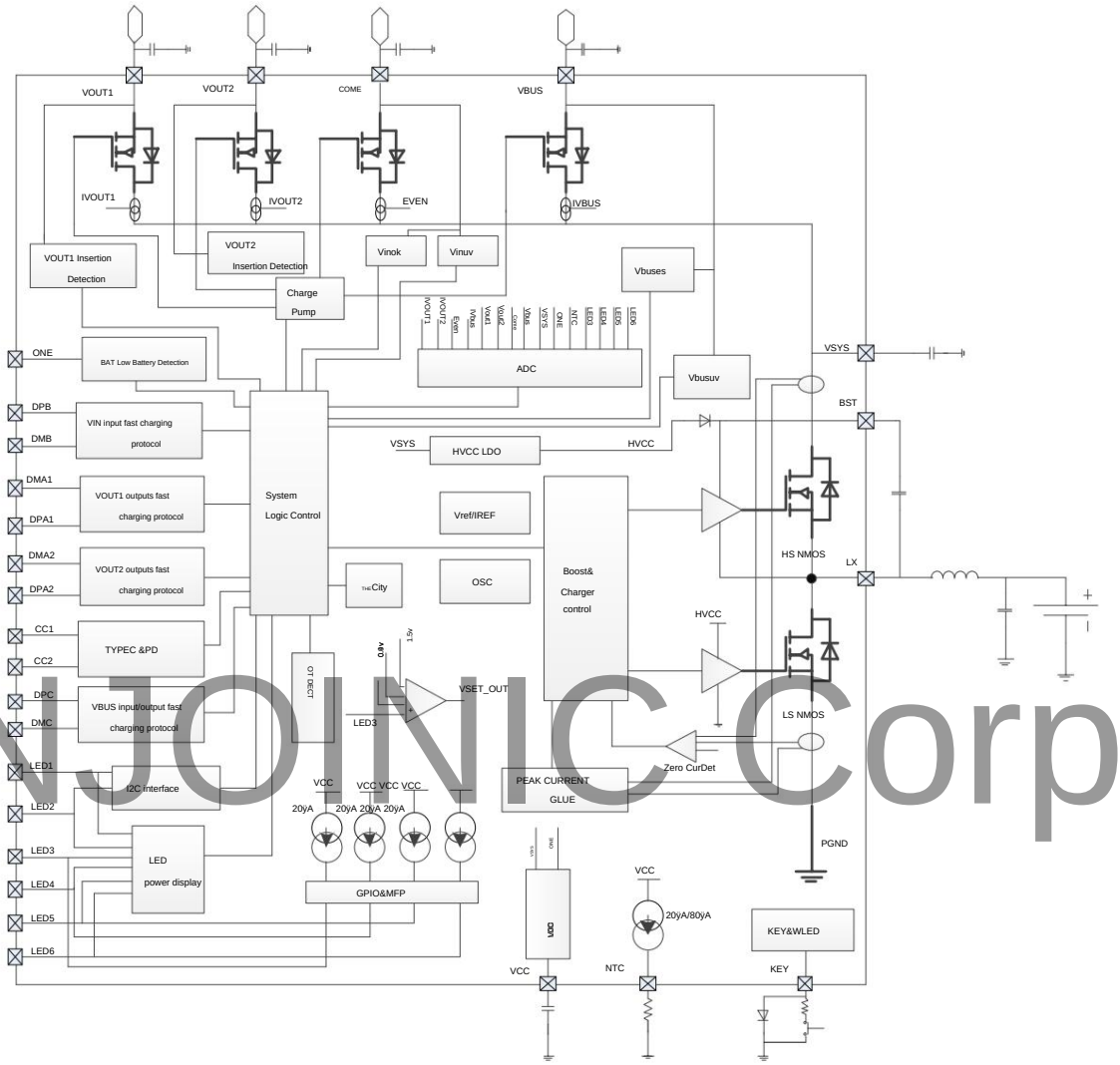


Figure 3 Internal structure block diagram

11.2. Low Power Lockout and Activation

When the IP5356M is first connected to the battery, the chip is in a locked state. The lowest digit of the power indicator will flash for 5 seconds, or the units digit of the digital display will flash for 5 seconds.

Note: When not charging, if the battery voltage is too low and triggers a low-power shutdown, the IP5356M will also enter a locked state.

To reduce static power consumption, the IP5356M does not support mobile phone insertion detection when the chip is locked, and it cannot be activated via buttons. The button press will not activate the boost output, but the lowest power indicator will flash for 5 seconds as a notification.

When locked, a charging action is required to activate the chip's function.

11.3. Charging

The IP5356M integrates trickle charging, constant current, and constant voltage charging management functions. It employs synchronous switching charging technology with a switching frequency of 680kHz and supports... It automatically matches different charging voltage specifications.

When the battery voltage is less than 3V, use 200mA trickle charging;

When the battery voltage is greater than 3V, constant current charging is used, and the maximum charging current at the battery terminal can reach 5.0A; when charging with a normal 5V input, the input current... Input power is 10W; during fast charging, the input power is 18W. Charging efficiency reaches up to 94%, reducing charging time by 3/4.

When the battery voltage approaches the set battery voltage, constant voltage charging is used;

Charging stops when the battery charging current is less than 400mA and the battery voltage is close to the constant voltage. After charging is complete, if the battery voltage is detected... Restart battery charging once the voltage drops below 4.1V.

The IP5356M automatically adjusts the charging current to adapt to adapters with different load capacities.

The IP5356M supports simultaneous charging and discharging, with both input and output in 5V mode during this process.

11.4. Boosting

The IP5356M is an integrated high-voltage output synchronous switching converter system that supports a wide voltage range of 3.3V to 12V, with load capacities of [missing information]. 5V@3.1A, 9V@2.22A, 12V@1.67A, switching frequency 400kHz. The IP5356M features built-in soft-start functionality to prevent power outages during startup. Excessive inrush current can cause malfunctions. The IP5356M integrates output overcurrent, short circuit, overvoltage, and overtemperature protection functions to ensure system stability and reliability. Work.

The boost system output current can be automatically adjusted according to temperature to ensure that the chip temperature is below the set temperature.

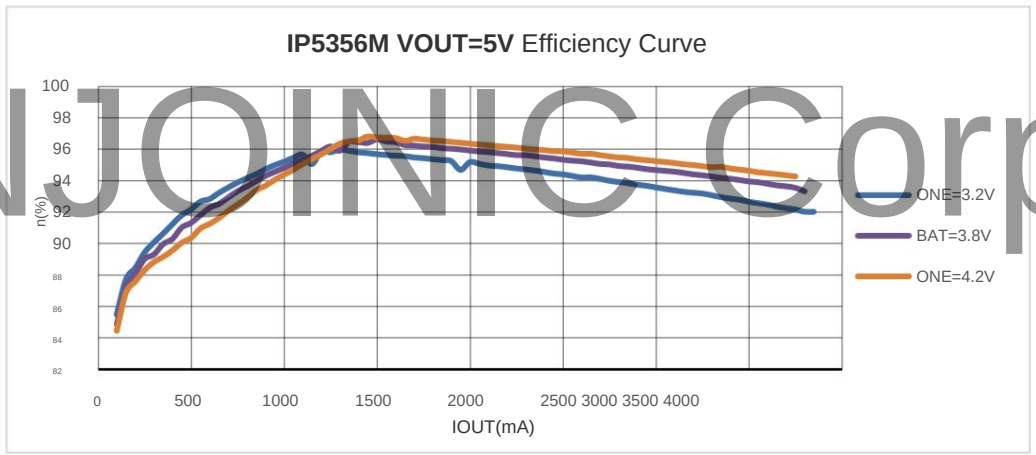


Figure 4. IP5356M Efficiency Curve (VOUT=5V)

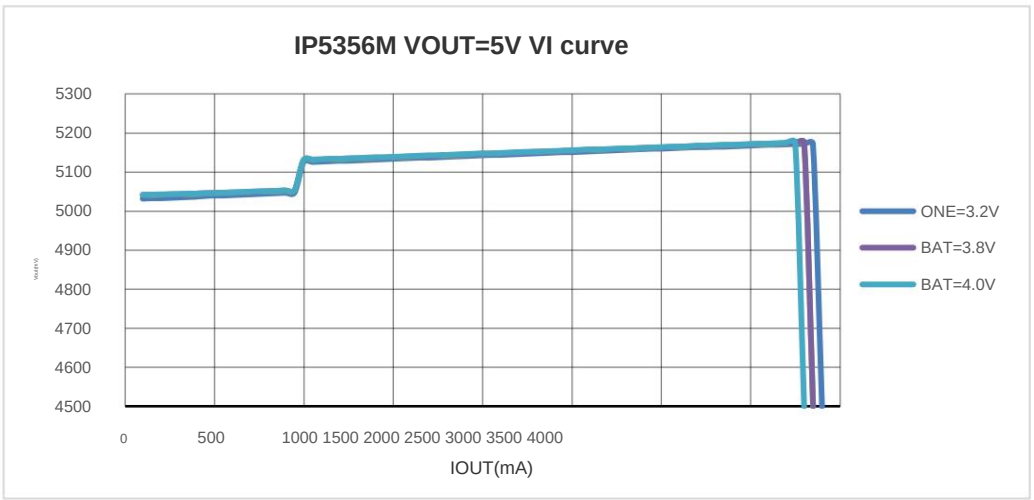


Figure 5 IP5356M VOUT=5V VI curve

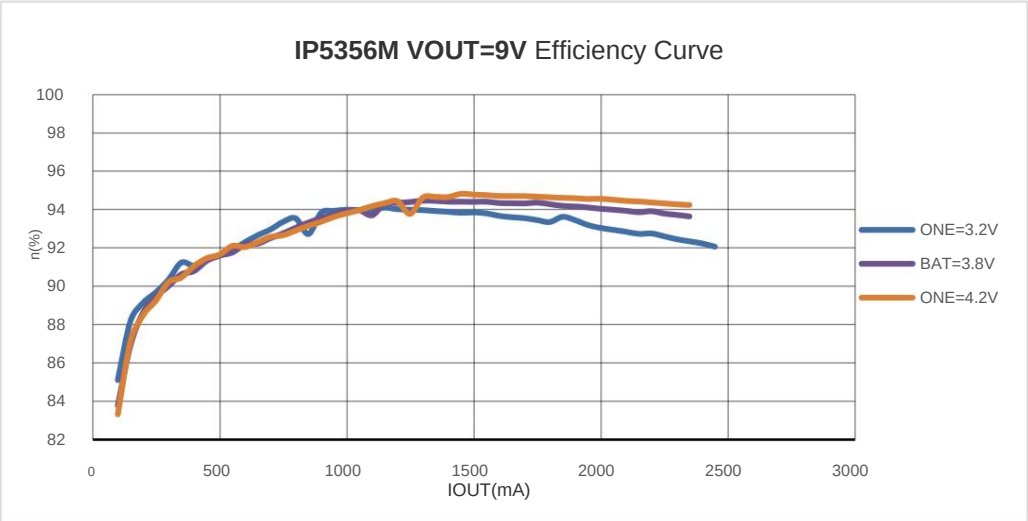


Figure 6. IP5356M Efficiency Curve (VOUT=9V)

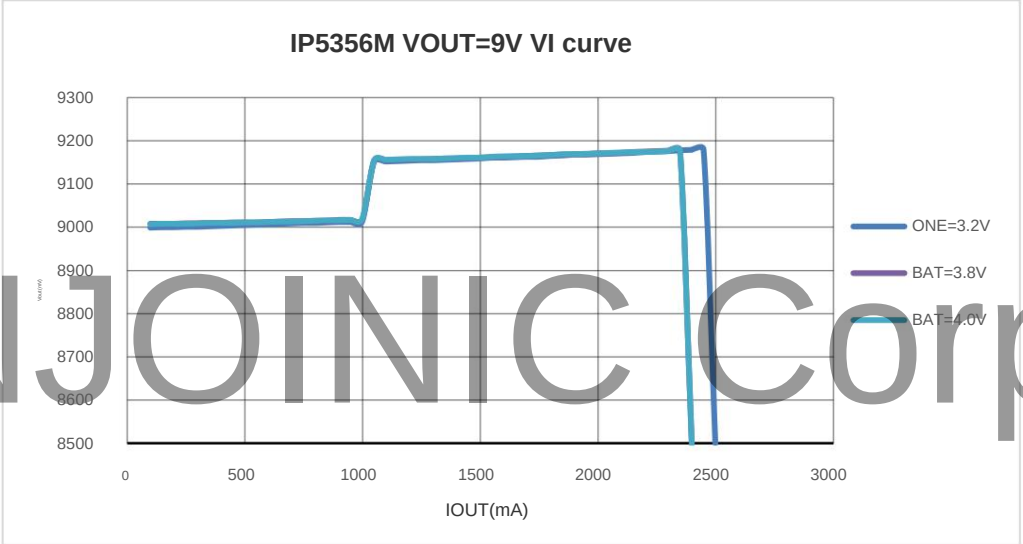


Figure 7 IP5356M VOUT=9V VI curve

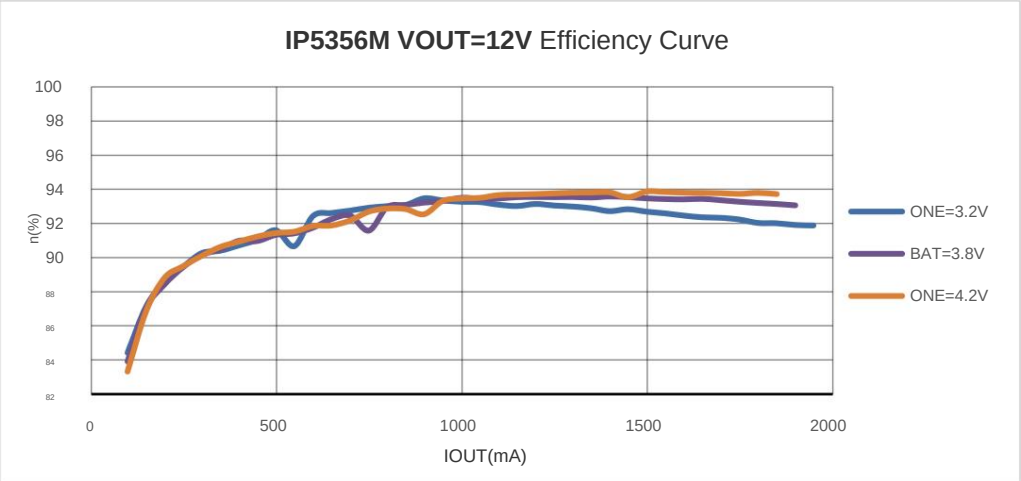


Figure 8. Efficiency curve of IP5356M at VOUT=12V

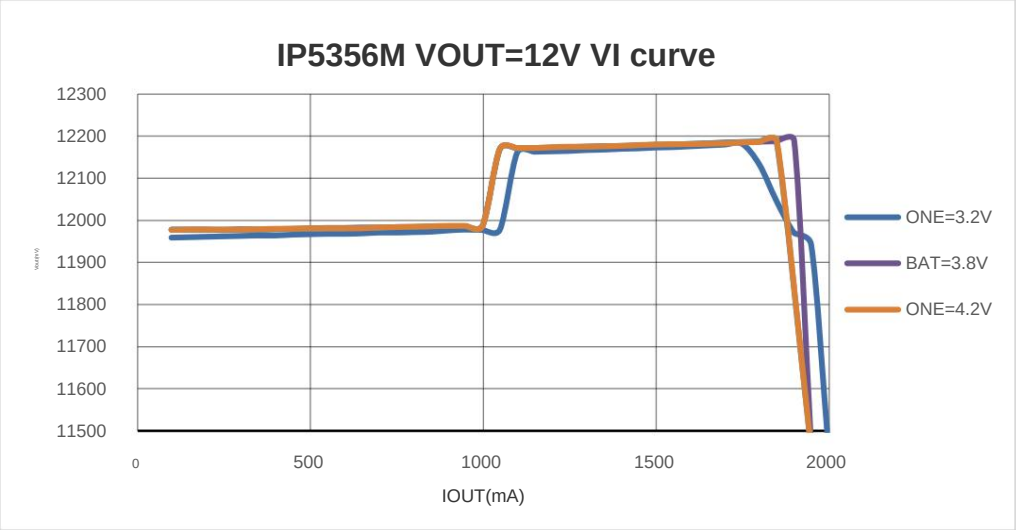


Figure 9 IP5356M VOUT=12V VI curve

11.5. USB C

The IP5356M integrates a USB-C input/output identification interface, supports automatic switching of built-in pull-up/pull-down resistors, and can automatically identify the charging port of the inserted device.

Discharge attribute. Features Try.SRC function, which prioritizes charging the other party when connected to a DRP device.

When operating as a DFP, the CC pin is used to configure the 3A output current capability; when operating as a UFP, the required current can be identified.

The output current capability of the square.

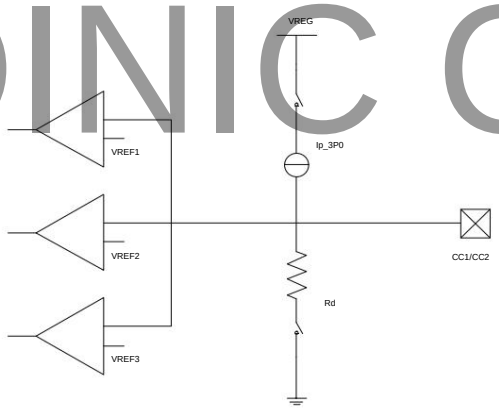


Figure 10 CC Internal Circuit

Table 1 Pull-up and pull-down capabilities

name	value
Ip_3P0	330ÿA
Rd	5.1kÿ

Table 2 Comparator thresholds when pull-up Ip is enabled

	Minimum Voltage	Maximum Voltage	Threshold
Powered cable/adapterÿvRaÿ	0.00V	0.75V	0.80V
SinkÿvRdÿ	0.85V	2.45V	2.60V
No connect(vOPEN)	2.75V		

Table 3 Comparator Thresholds When Pull-down Resistor Rd is Enabled

Detection	Min voltage	Max voltage	Threshold
ask	-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

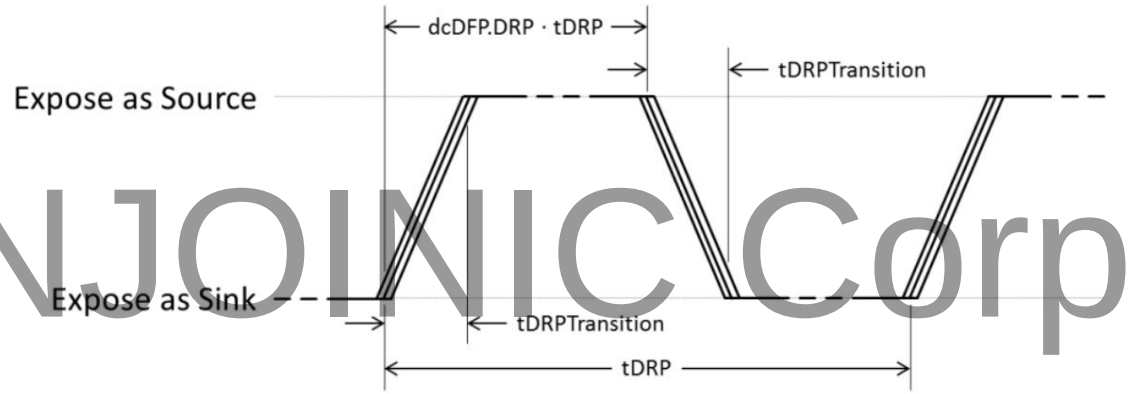


Figure 11 USB C detection cycle

Table 4 USB C detection 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

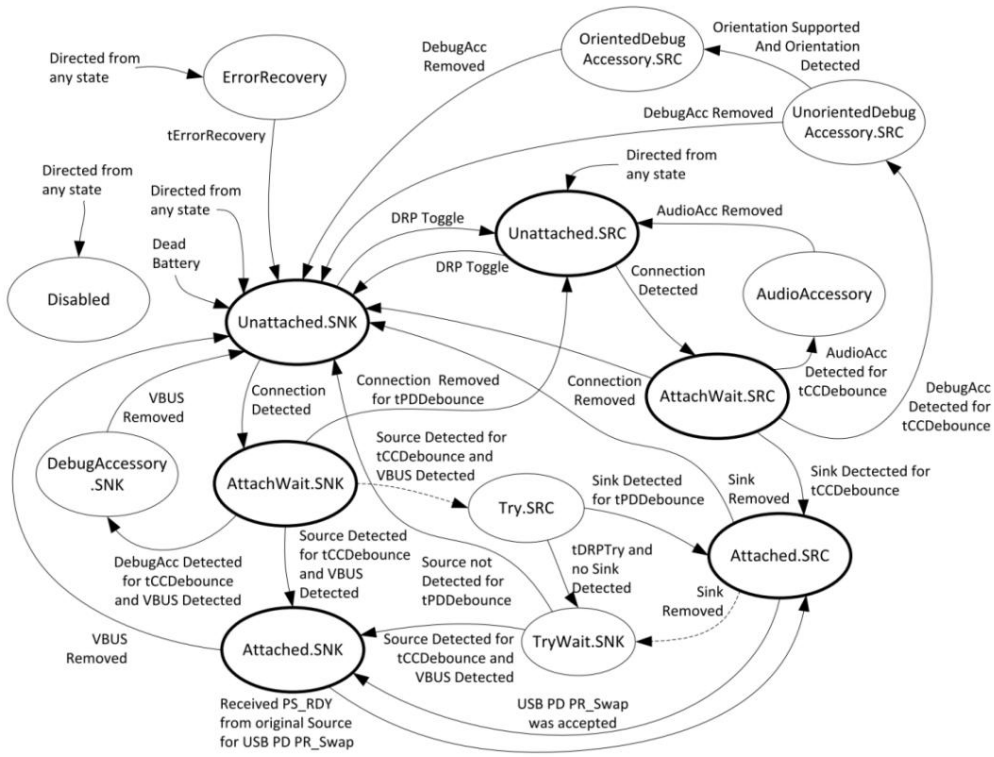


Figure 12 USB C detection state transition

11.6. USB C PD

The IP5356M integrates USB-C Power Delivery PD2.0/PD3.0/PPS protocols, and integrates physical layer protocol (PHY) and hardware bidirectional tag codec (BMC) modules.

The IP5356M supports PD2.0/PD3.0 bidirectional input/output protocols and PPS output protocol. Both input and output support 5V, 9V, and 12V voltage levels. PD output broadcast capabilities are 5V@3A, 9V@2.22A, 12V@1.67A, and PPS 3.3V~11V@2A, supporting 20W power output.

11.7 Fast charging function

The IP5356M supports multiple fast charging standards: PD2.0/PD3.0/PPS, QC2.0/QC3.0, FCP, AFC, SCP, Apple, and Samsung.

Charging the IP5356M does not support QC2.0 or QC3.0 (it does not support external QC fast charging protocol chips). It supports FCP and AFC fast charging input. Since FCP and AFC implement fast charging handshake requests through DP/DM, when other fast charging protocol chips are added, FCP and AFC fast charging will no longer be supported.

When charging a mobile phone, the IP5356M automatically detects the fast charging timing on the DP and DM pins, intelligently identifies the phone type, and supports...

Mobile phones that support QC2.0/QC3.0, FCP, AFC, and SCP protocols, and also support Apple 2.4A mode, Samsung 2A mode, and BC1.2 mode for ordinary Android phones.

In Apple 2.4A mode: DP=DM=2.7V. In Samsung 2A

mode: DP=DM=1.2V. In BC1.2 mode: DP and

DM are shorted. In BC1.2 mode, when the chip

detects that the DP voltage is greater than 0.325V and less than 2V for 1.25s, it initially judges that there is a fast charging request. At this time, the short circuit between DP and DM will be broken, and the DM will be pulled down to ground by a 20kÿ resistor. If the DP voltage is greater than 0.325V...

If the voltage is less than 2V and the DM voltage is less than 0.325V for 2ms, then the fast charging connection is considered successful, and the input will then follow the QC2.0/QC3.0 requirements.

Output the requested voltage. If the DP voltage is ever less than 0.325V, the QC fast charging mode will be forcibly exited, and the output voltage will immediately revert to the default 5V.

Table 5 QC2.0/QC3.0 Output Voltage Request Rules

DP	DM	Result
0.6V	GND	5V
3.3V	0.6V	9V
0.6V	0.6V	12V
0.6V	3.3V	Continue Mode
3.3V	3.3V	Keep

Continue Mode is a unique operating mode of QC3.0. In this mode, the output voltage can be adjusted according to the QC3.0 protocol requirements.

Fine voltage regulation of 0.2V/Step.

Table 6. Fast charging protocols supported by each port of the IP5356M

Protocol **VOUT1** output port, **VOUT2** output port, **VIN** input port, **VBUS** output port, **VBUS** input port					
QC2.0	ÿ	ÿ	-	ÿ	-
QC3.0	ÿ	ÿ	-	ÿ	-
AFC	ÿ	ÿ	ÿ	ÿ	ÿ
FCP	ÿ	ÿ	ÿ	ÿ	ÿ
SCP	ÿ	ÿ	-	ÿ	-
PD2.0	-	-	-	ÿ	ÿ
PD3.0	-	-	-	ÿ	ÿ
PPS	-	-	-	ÿ	-

Support: ÿ

Not supported: -

11.8. Charge/Discharge Path Management

Standby:

When VIN or VBUS is plugged into the charging power source, the charging function can be started directly.

The discharge function can be automatically activated when a USB C UFP device is plugged into VBUS or a power device is plugged into VOUT.

When a button is pressed and a load is connected to VOUT1, VOUT2, or VBUS, the corresponding output port will be opened; otherwise, the output port will remain unchanged.

The device is in the off state.

Discharge:

When no button is pressed, only the output port connected to a power device will open; output ports without a power device connected will remain closed.

Once the output port is opened, it will automatically close after a period of time when the output current of the output port is less than 60mA.

The USB ports VOUT1, VOUT2, and VBUS all support fast charging protocols. However, since this is a single-inductor design, it can only support one port.

The voltage output means that fast charging can only be supported when only one output port is active. When two or more output ports are used simultaneously...

The fast charging function will be automatically turned off.

Connect the circuit as shown in the "Typical Application Schematic Diagram". When any output port has entered fast charging output mode, and other output ports have...

When a device is plugged in, the IP5356M will first shut down all output ports and disable fast charging, then open the output port with the connected device.

The output port only supports BC1.2, Apple, and Samsung DCP charging modes. When reducing from multiple devices to a single device...

The IP5356M will first shut down all output ports, enable fast charging, and then turn on the output port of the last device in use, in this manner.

Reactivate the fast charging request for the device. When only one output port is open, and the total output current is less than 60mA for 32 seconds, the IP5356M will shut down the output port and discharge function, entering standby mode. Charging: Charging can be performed by plugging in a power source through either the VIN or VBUS port. If both are plugged in, the first power source plugged in will be used first. In single-charge mode, the IP5356M supports recognizing the fast charging mode of the charging power source and automatically matching the appropriate charging voltage and current. Simultaneous Charging and Discharging: When both a power source and the device are plugged in simultaneously, the IP5356M will automatically enter simultaneous charging and discharging mode. In this mode, the chip will automatically disable the internal fast charging function. To ensure priority power supply to the device, the IP5356M will raise the charging undervoltage loop threshold to above 4.9V. When the VSYS voltage is only 5V, the discharge path will be opened to power the device; if the VSYS voltage is greater than 7V, the discharge path will not be opened for safety reasons.

During simultaneous charging and discharging, if the charging power source is unplugged, the IP5356M will shut down the charging function and restart the discharging function to power the device. For safety reasons, and also to allow the phone to reactivate fast charging, the output voltage will drop to 0V for a period of time during the conversion process. If the device is unplugged during simultaneous charging and discharging, or if the device is fully charged and the power supply stops for approximately 16 seconds, the IP5356M will automatically... The corresponding discharge path is closed. When all discharge paths are closed and the state returns to single charging mode, the IP5356M will reduce the undervoltage charging loop and automatically re-apply for fast charging to accelerate the charging of the power bank.

11.9. Automatic Mobile Phone Detection

Automatic phone insertion detection: The IP5356M automatically detects when a phone is inserted. Upon insertion, it immediately wakes from standby mode and activates the boosted 5V power supply to charge the phone, eliminating the need for button operation. It supports buttonless design solutions. Automatic full-charge detection: The IP5356M samples the output current of each port using its on-chip ADC. When the output current of a single port is less than 60mA for 16 seconds, the IP5356M will shut down that output port. When the total current is less than 60mA for 32 seconds, it is determined that the phone is either fully charged or disconnected from the circuit, and the boost output will be automatically shut down, entering standby mode.

11.10. Buttons and Lights

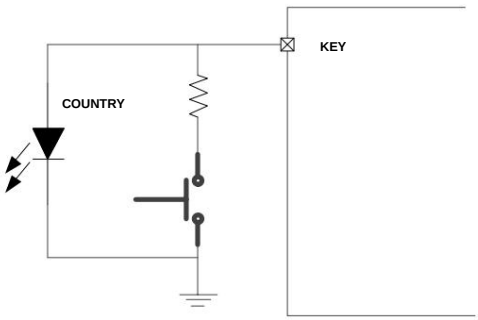


Figure 13 KEY button connection method

The button connection method is shown in Figure 13, which can recognize long and short button operations.

• A button press lasting longer than 100ms but less than 2s is considered a short press. A short press will turn on the power indicator and boost output. • A button press lasting longer than 2s is considered a long press. A long press will turn the WLED lighting on or off. • Button presses lasting less than 30ms will not receive any response. • Two consecutive short presses within 1 second will turn off the boost output, power indicator, and WLED lighting.

11.11. Fast charging status indicator

The LED6 pin of the IP5356M_L series models can indicate the current fast charging mode. When fast charging is entered, the indicator light will automatically light up.

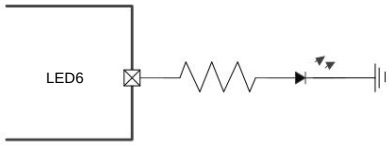


Figure 14 Fast charging indicator light wiring method

If the LED6 pin is to be used as the 6th pin driver in a 6-pin digital tube solution, it needs to be customized.

*The LED6 pin can be used as a Lightning input communication pin, a fast charging LED driver pin, a battery capacity setting FCAP pin, and a 6-pin digital display.

The driving pins for the tube solution. Fast charging lamp function, FCAP pin capacity selection function, Lightning communication function, digital tube driving pins, the above functions...

Only one can be selected; this is set at the factory.

11.12. Fuel meter and power display

The IP5356M has a built-in fuel gauge function, which enables accurate battery power calculation.

The IP5356M supports automatic selection of 4-light, 2-light, and 1-light modes; if a 3-light mode is required, customization is needed.

The IP5356M supports 188-digit digital tube display of battery level.

11.12.1. LED Lamp Power Display Mode

The IP5356M uses a 4-3-2-1 LED power indicator solution, with the following connection method.

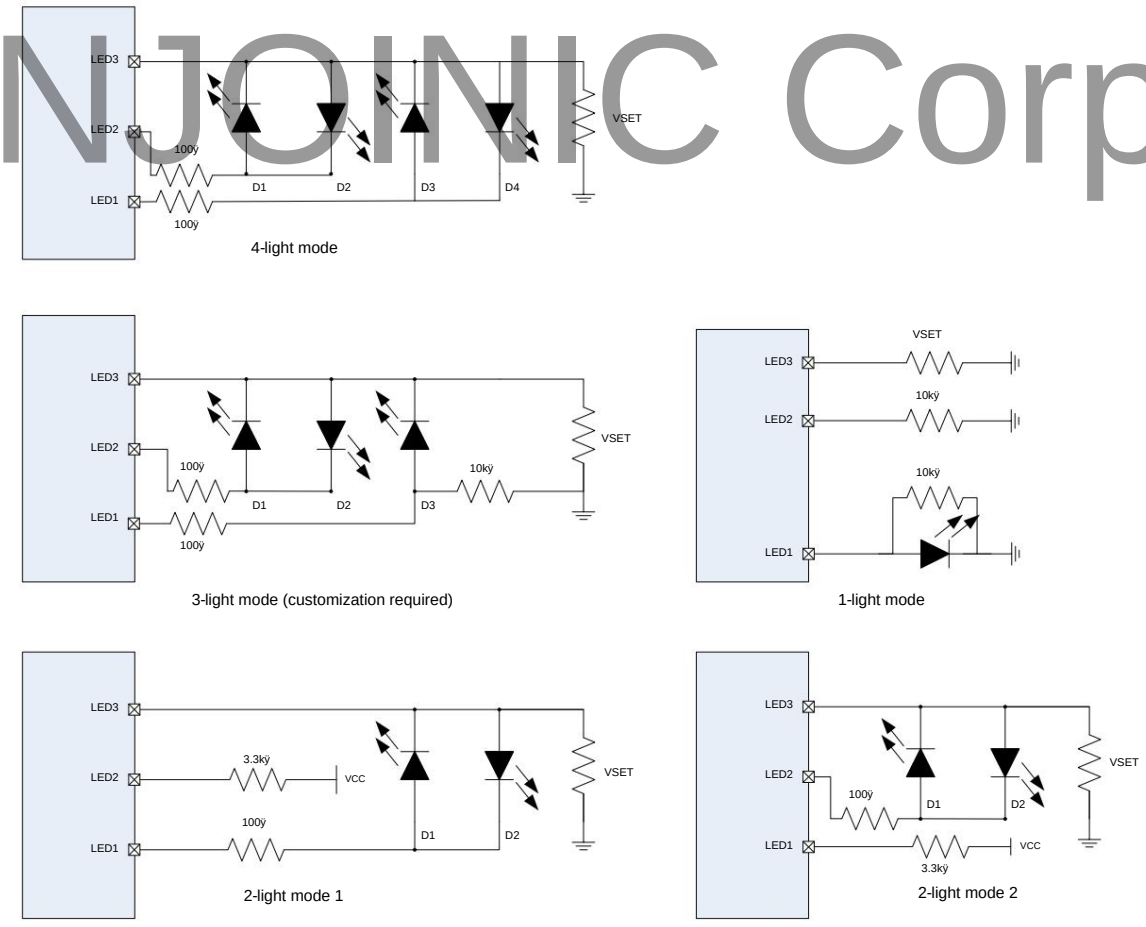


Figure 15. Connection method for 4, 3, 2, and 1 LEDs.

Table 7. Display method of 4 lights during charging

Battery capacity **C (%)**	**D1**	**D2**	**D3**	**D4**
full	Bright	Bright	Bright	Bright
75%ÿC	Bright	Bright	Bright	0.6Hz flicker
50%ÿCÿ75%	Bright	Bright	0.6Hz flicker	Extinction
25%ÿCÿ50%	Bright	0.6Hz flicker	Extinction	Extinction
Cÿ25%	0.6Hz flicker	Extinction	Extinction	Extinction

Table 8. Display method of 4 lamps during discharge.

Battery capacity **C (%)**	**D1**	**D2**	**D3**	**D4**
Cÿ75%	Bright	Bright	Bright	Bright
50%ÿCÿ75%	Bright	Bright	Bright	Extinction
25%ÿCÿ50%	Bright	Bright	Extinction	Extinction
3%ÿCÿ25%	Bright	Extinction	Extinction	Extinction
0%ÿCÿ3%	1.2Hz flicker	Extinction	Extinction	Extinction
C=0%	Extinction	Extinction	Extinction	Extinction

Table 9. Display method of 3 lights during charging

Battery capacity **C (%)**	**D1**	**D2**	**D3**
full	Bright	Bright	Bright
66%ÿC	Bright	Bright	0.6Hz flicker
33%ÿCÿ66%	Bright	0.6Hz flicker	Extinction
Cÿ25%	0.6Hz flicker	Extinction	Extinction

Table 10 Display method of 3 lamps during discharge

Battery capacity **C (%)**	**D1**	**D2**	**D3**
Cÿ66%	Bright	Bright	Bright
33%ÿCÿ66%	Bright	Bright	Extinction
3%ÿCÿ33%	Bright	Extinction	Extinction
0%ÿCÿ3%	1.2Hz flicker	Extinction	Extinction
C=0%	Extinction	Extinction	Extinction

Table 11 Display method of 2-light mode 1 during charging

Battery capacity **C (%)**	**D1**	**D2**
full	Extinction	Bright
66%ÿCÿ100%	Extinction	0.6Hz flicker
33%ÿCÿ66%	0.6Hz flicker	0.6Hz flicker
Cÿ33%	0.6Hz flicker	Extinction

Table 12 Display method of 2-lamp mode 1 during discharge

Battery capacity **C (%)**	**D1**	**D2**
66%ÿCÿ100%	Extinction	Bright
33%ÿCÿ66%	Bright	Bright
Cÿ33%	Bright	Extinction
Cÿ3%	1.2Hz flicker	Extinction

The display method for 2-light mode 2 is as follows:

During charging: The D1 light flashes at 0.6Hz (on for 0.8s and off for 0.8s), and remains on when fully charged.

During discharge: LED D2 remains on. When the voltage drops below 3.2V, it flashes at 1.2Hz (on for 0.4s, off for 0.4s). When the voltage drops below 3.0V, the device shuts down.

The display method for light mode 1 is as follows:

While charging: it flashes at 0.6Hz (on for 0.8s, off for 0.8s), and remains constantly lit when fully charged.

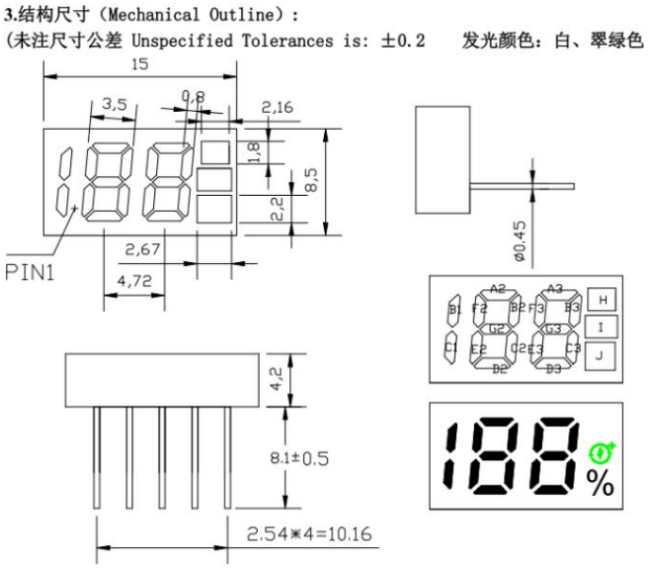
During discharge: constantly lit; when the voltage is below 3.2V, it flashes at 1.2Hz (0.4s on, 0.4s off); when the voltage is below 3.0V, it shuts down.

11.12.2. Digital tube power display mode

Table 13 Default Supported Digital Tubes for IP5356M

Digital tube	Not		Discharge	
	fully charged; Fully charged (less than **5%) ;** 0-99%		battery; 0.6Hz flashing;	Battery level greater than **5%**
The	Solid light (100%).		0-5% 1.2Hz Flickering 5%-100%	Constant On

schematic diagram of the 5-pin 188-type digital tube is as follows:



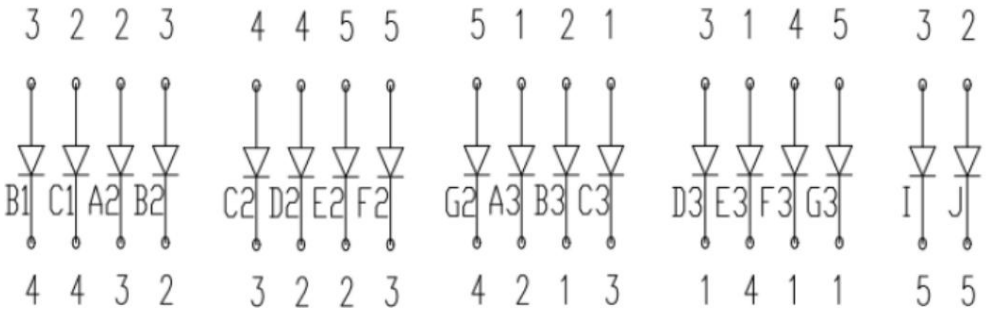


Figure 16. Circuit diagram of a 5-pin 188-type digital tube.

Table 14 Mapping Relationship between IP5356M LED Display Driver Pins and Digital Tube Pins

	IP5356M LED display driver pins, digital tube pins		Remark
IP5356M lamp Display driver pin and digital tube Foot sequence mapping relation	LED1 (40 pins) 1 pin		
	LED2 (pin 1) 2 pins		
	LED3 (2-pin) 3-pin		
	LED4 (9 pins) 4 pins		
	LED5 (10 pins) 5 pins		
	LED6 (11 pins) 6 pins		Optional 6-pin digital tube solution, customization required.

11.12.3. Fuel meter

The IP5356M supports external setting of the battery's initial capacity, managing the remaining capacity by integrating the battery terminal current and time. Accurately displays the current battery capacity;

The IP5356M external pins set the initial battery capacity using the formula: Battery capacity = R13 * 0.448 (mAh). Maximum supported capacity is 60000mAh.

*In the IP5356M_L series, pin 5 can be used as the FCAP capacity setting pin.

*In the IP5356M_D series, the LED6 pin can be used as the FCAP capacity setting pin.

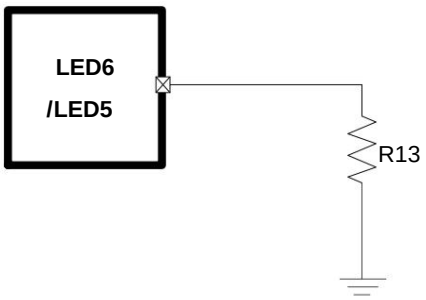


Figure 17 Battery capacity configuration circuit diagram

Table 15 Typical Battery Capacity Configuration

R13 resistor value	The corresponding set battery capacity (mAh) **= R13 * 0.448 (mAh)**
11kÿ	5000mAh
22kÿ	10000mAh
33kÿ	15000mAh
44kÿ	20000mAh
56kÿ	25000mAh
66.5kÿ	30000mAh

90kÿ	40000mAh
110kÿ	50000mAh
133kÿ	60000mAh

11.13. VSET (Battery Specification Setting)

The IP5356M_L series models support LED3 pin selection with 4.20V, 4.3V, 4.35V, and 4.40V batteries. This is achieved via VSET (LED3).

The pin sets the battery type, thereby changing the battery level display threshold, the constant voltage for charging the battery, and the protection voltage. VSET resistor value and setting.

The battery types are shown in the table below.

Table 16 VSET Configuration Table

VSET terminal resistor	Corresponding battery type
NC	4.2V
62kÿ	4.3V
33kÿ	4.35V
10kÿ	4.4V

The IP5356M_D series models are configured with 4.2V cells by default; 4.3V, 4.35V, and 4.40V cells require customization.

11.14. NTC Functions

The IP5356M integrates an NTC function to monitor battery temperature. During operation, the IP5356M generates a constant current source on the NTC pin, which is connected to an external...

The pull-down NTC thermistor generates a voltage, and the chip determines the current battery temperature by internally detecting the voltage at the NTC pin.

* Connect a 100nF capacitor in parallel with GND on the NTC pin. The capacitor should be placed close to the chip pin.

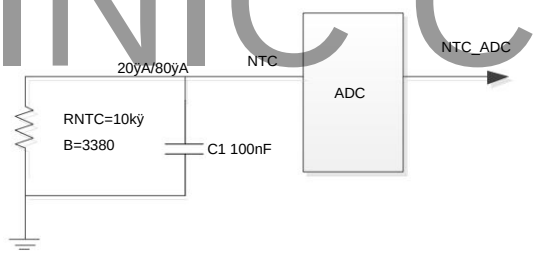


Figure 18 Comparison of NTC batteries

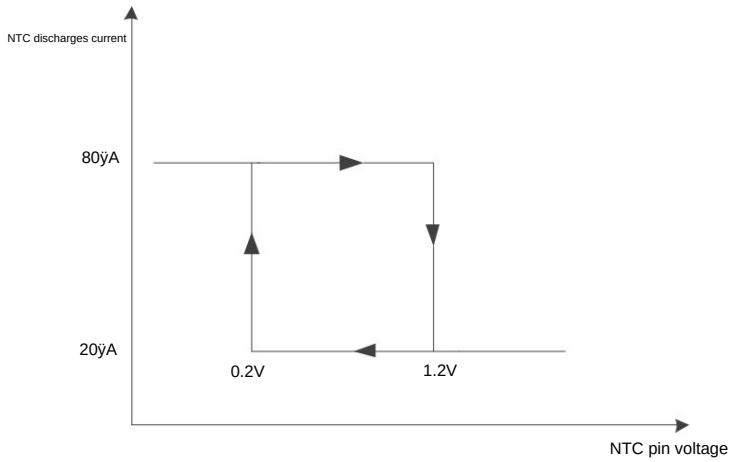


Figure 19 Relationship between NTC voltage and discharge current

To accurately distinguish the temperature of the battery's NTC, the IP5356M employs a current-switching NTC detection module. The chip internally detects the NTC input.

The current output from the pin and the voltage generated by the externally pulled-down NTC thermistor are used to determine the current battery temperature.

When the NTC pin output current is 80ÿA and the detected voltage at the NTC pin is higher than 1.2V, the NTC pin output current is adjusted to 20ÿA; when the NTC pin output current is 20ÿA and the detected voltage at

the NTC pin is lower than 0.2V, the NTC pin output current is adjusted to 80ÿA. In charging state:

When the voltage of the NTC pin is detected to be below 0.39V, it indicates that the battery temperature is above 45ÿ, and the charging function is stopped;

when the voltage of the NTC pin is detected to be above 0.54V, it indicates that the battery temperature is below 0ÿ, and the charging function is stopped.

In the discharge state:

When the voltage of the NTC pin is detected to be below 0.24V, it indicates that the battery temperature is above 60ÿ, and the discharge function is

stopped; when the voltage of the NTC pin is detected to be above 1.38V, it indicates that the battery temperature is below -20ÿ, and the discharge

function is stopped; if the solution does not require the NTC function, a 10kÿ resistor needs to be connected between the NTC pin and ground. The NTC pin cannot be left floating or directly grounded.

11.15. VCC

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

11.16. I2C

I2C connection method:

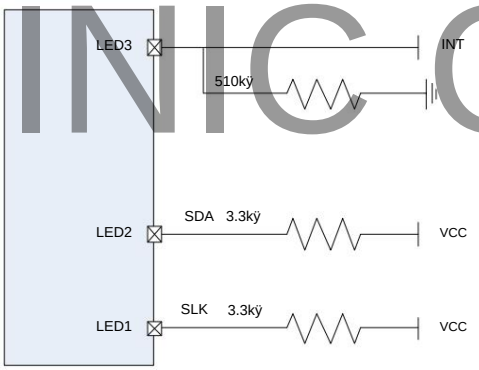


Figure 20 I2C Application Circuit Diagram

The IP5356M_L series supports I2C connectivity. Connecting in the correct manner will automatically disable the Function and enter I2C mode. In I2C mode, the INT signal is high-impedance in standby mode and high-level in operation, which can be used to wake up the MCU.

12. Layout Considerations

These are just a few points to note that may affect functionality and performance; any other points will be supplemented in a separate document.

12.1. Location of VOUT1/VOUT2/VBUS capacitors

The IP5356M integrates a USB output power path. The 2.2ÿF capacitors for VOUT1/VOUT2/VBUS must be placed close to the chip pins. If the layout allows, the capacitor should be placed as close to the chip as possible.

At the same time, place a 100nF capacitor close to the USB socket, with the capacitor parallel to the USB socket.

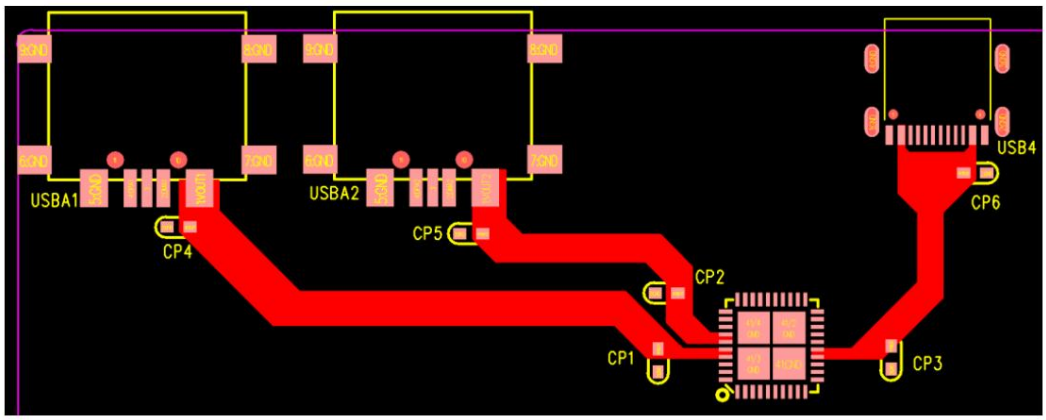


Figure 21 Location of VOUT1/VOUT2/VBUS capacitors

12.2. VSYS Capacitor Location

The chip operates at high power and current, and the location of capacitors on the VSYS network affects the stability of the DC-DC converter. Capacitors on the VSYS network should be placed as close as possible to the chip's VSYS pins and EPAD, with extensive copper plating and additional vias to reduce the current circulation area between the capacitors and the chip, thereby minimizing parasitic parameters.

The VSYS pins are located on both sides of the chip. Capacitors need to be placed near the pins on both sides, and the VSYS pins on both sides are connected together on the PCB by a relatively wide copper pour (not less than 100mil).

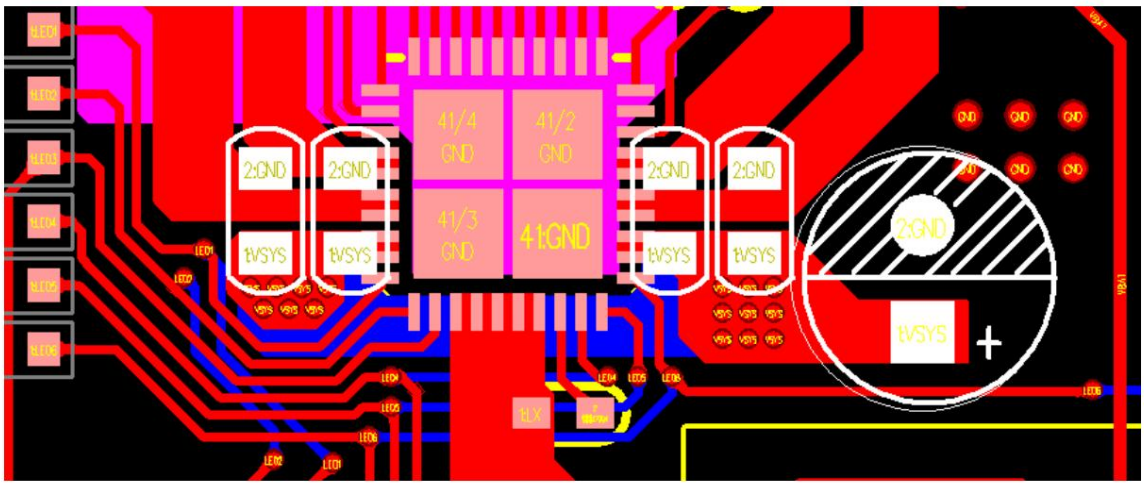


Figure 22 VSYS capacitor location

12.3. Location of BAT/VCC capacitors

The filter capacitors for the BAT and VCC pins of the chip need to be placed as close as possible to the chip pins, and the GND pads of the capacitors should be properly secured. If needed, a GND via should be installed nearby.

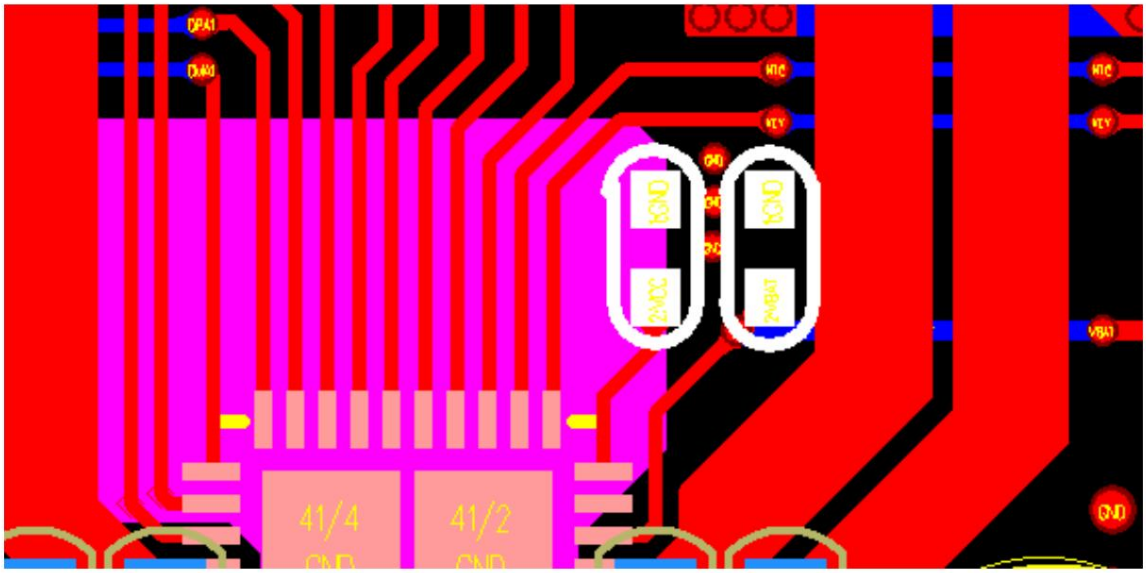


Figure 23 VSYS capacitor location

12.4. NTC Capacitor Location

A 100nF capacitor should be connected in parallel with GND on the NTC pin, and the capacitor should be placed close to the chip pin.

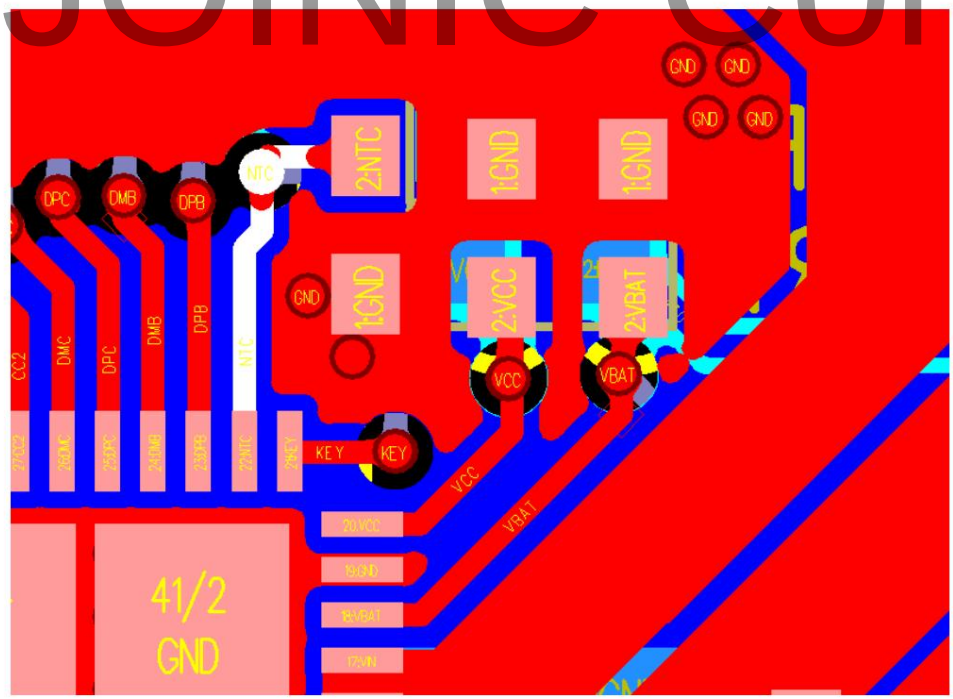
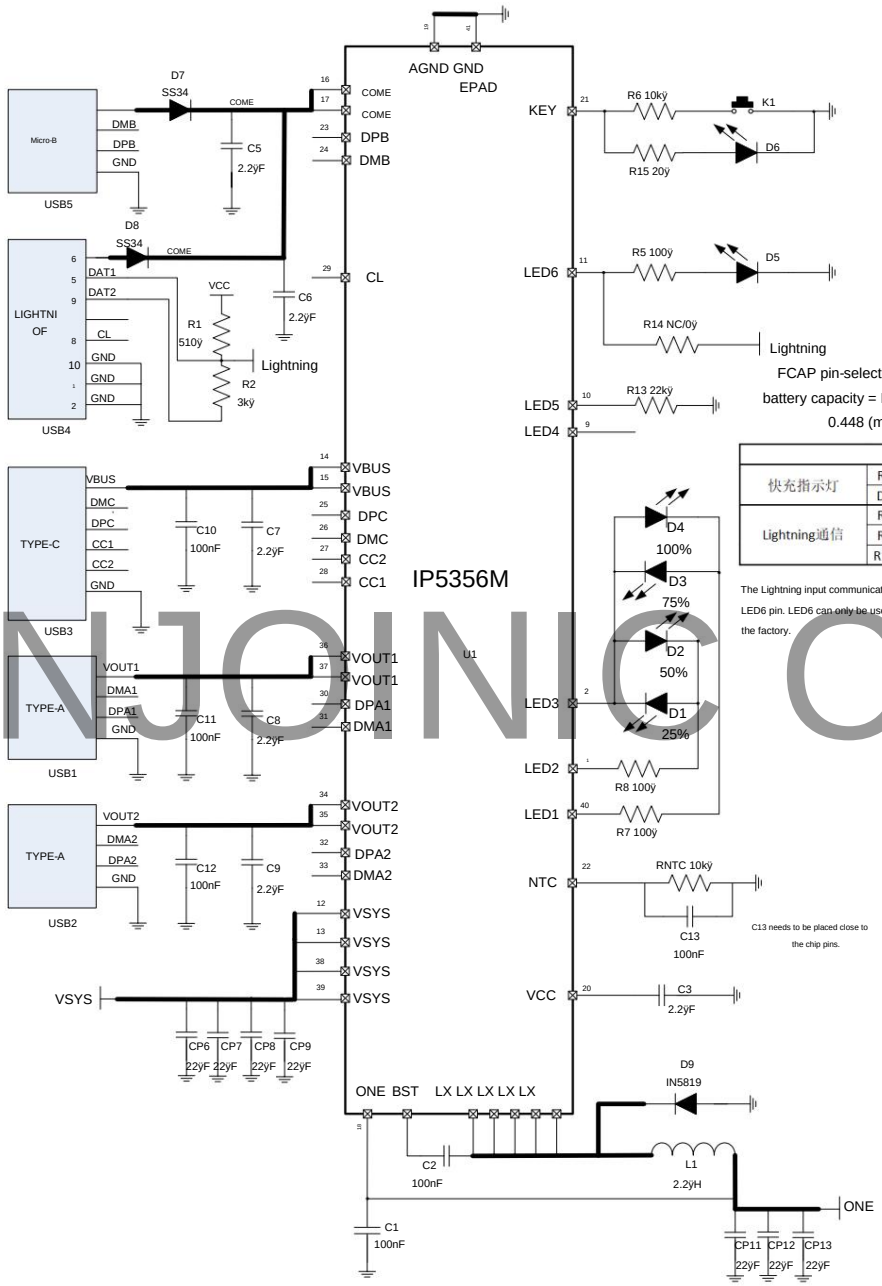


Figure 24 NTC capacitor location

13. Typical Application Schematic Diagram

The IP5356M requires only a few passive components such as MOSFETs, inductors, capacitors, and resistors to achieve a fully functional fast-charging power bank. case.

13.1. Applications of IP5356M_LBZ Series/IP5356M_LCL Series



		IP5356M_LBZ_后缀	IP5356M_LCL_后缀
快充指示灯	R5	100Ω	NC
	D5	贴片 LED	NC
Lightning通信	R1	NC	510Ω
	R2	NC	3kΩ
	R14	NC	0Ω

The Lightning input communication pin and the fast charging indicator are multiplexed on the LED6 pin. LED6 can only be used for either fast charging or Lightning communication; this is set at the factory.

Figure 25 Typical schematic diagram of IP5356M_LBZ series applications

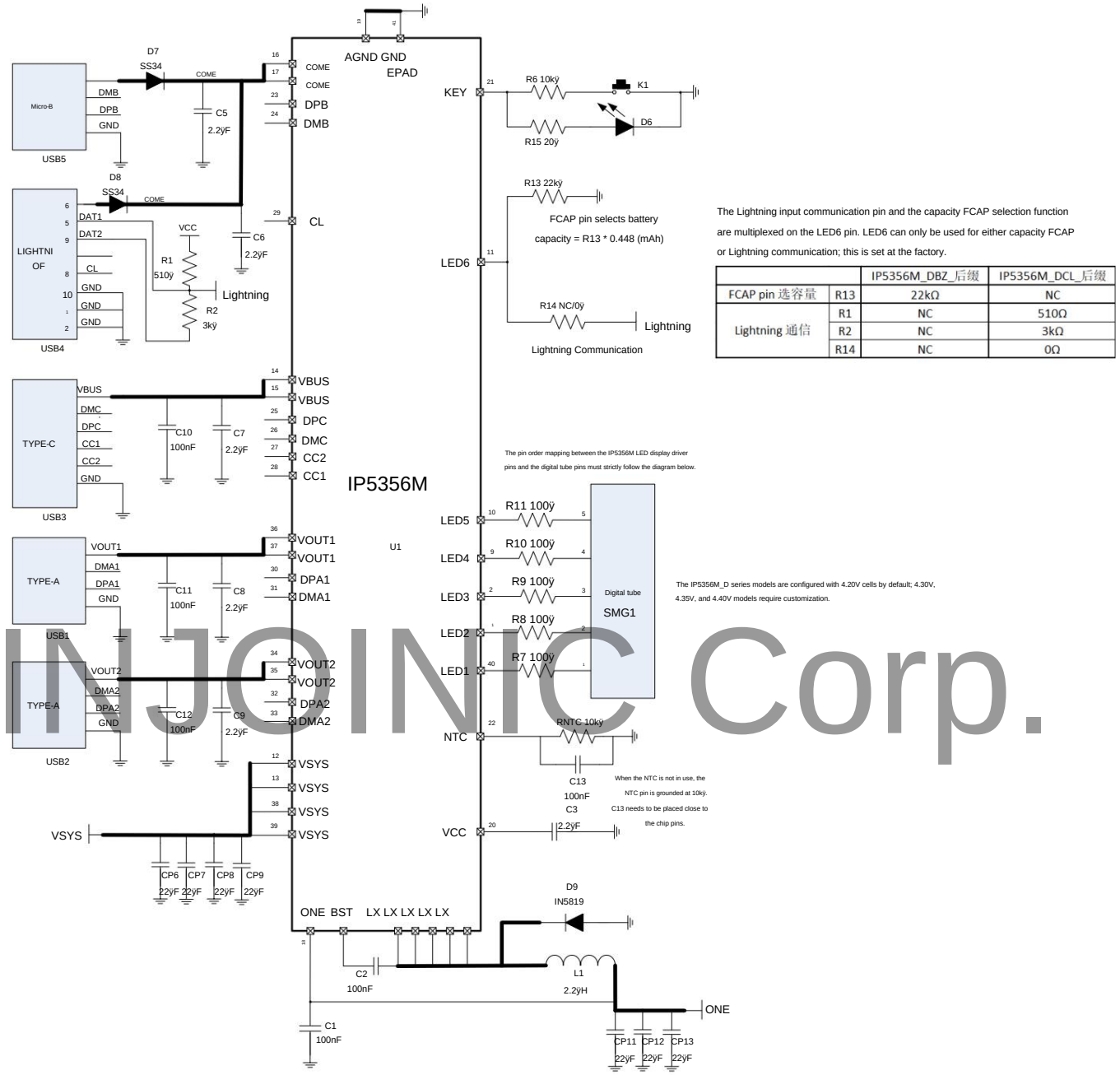
A. If the solution has both a B port and a Lightning port:

1. Note that both ports should not be inserted at the same time. Restrictions can be made on the mold. D7/D8 can be omitted.
2. If simultaneous insertions are involved, D7/D8 cannot be omitted;

B. If the solution only has a B port or only a Lightning port:

D7/D8 can be omitted;

13.2. Applications of IP5356M_DBZ Series/IP5356M_DCL Series



		IP5356M_DBZ_后缀	IP5356M_DCL_后缀
FCAP pin 选容量	R13	22kΩ	NC
Lightning 通信	R1	NC	510Ω
	R2	NC	3kΩ
	R14	NC	0Ω

Figure 26 Typical schematic diagram of IP5356M_DBZ series applications

A. If the solution has both a B port and a Lightning port:

1. Note that both ports should not be inserted at the same time. Restrictions can be made on the mold. D7/D8 can be omitted.
2. If simultaneous insertions are involved, D7/D8 cannot be omitted;

B. If the solution only has a B port or only a Lightning port:

D7/D8 can be omitted;

BOM (Bill of Materials)

Serial Number Component Name	Model & Specifications	Location	Dosage	Remark
1. Surface Mount Chip QFN40 IP5356M 2. Surface Mount Capacitor		U1	1	
0603 100nF 10% 16V 3. Surface Mount Capacitor 0603 100nF 10% 25V C2		C1	1	
C10 C11 C12 4. Surface Mount Capacitor 0603 2.2ÿF 10% 16V 5. Surface Mount Capacitor 0603 2.2ÿF 10% 25V			4	
C5 C6 C7 C8 C9 6. Surface Mount Capacitor 0805 22ÿF 10% 16V CP11		C3	1	
CP12 CP13			5	
7. Surface Mount Capacitors 0805 22ÿF 10% 25V CP6 CP7 CP8 CP9 4				
8 Surface Mount Resistors 0603R 100ÿ 1% R7 R8 2				Optional, LED schematic diagram
9. Surface Mount LED 0603 Blue LED 10. Surface Mount		D1 D2 D3 D4	4	
Resistor 0603R 100ÿ 1% 11. Surface Mount Digital Display		R7 R8 R9 R10 R11	5	Optional, digital tube schematic diagram
YF2252SR-5 12. Surface Mount Resistor 0603R 100ÿ 1% 13.		SMG1	1	
Surface Mount LED 0603 Red LED 14. Surface Mount Resistor 0603R		R5	1	Optional, fast charging solution
22kÿ 1% 15. Surface Mount Schottky SS34 16. Surface Mount		D5	1	
Schottky IN5819 17. Surface Mount Resistor 0603R 510ÿ 1% 18.		R13	1. Optional, FCAP circuit	
Surface Mount Resistor 0603R 3kÿ 1% 19. Surface		D7 D8	2	
Mount Resistor 0603R NC/0ÿ 1% 20. Surface Mount		D9	1	
Resistor 0603R 10kÿ 1% 21. Surface Mount Resistor 0603R 20ÿ 1%		R1	1	
22. NTC Thermistor 10kÿ@25ÿ B=3380 23 Surface Mount Capacitor		R2	1	Optional, Lightning communication circuit
0603 100nF 10% 16V LED Lamp 5mm LED		R14	1	
		R6	1	
		R15	1	
		RNTC	1	Materials required for NTC circuits
		C13	1	
24		D6	1	
25 Molded Inductor 2.2ÿH 10*10 Button SMT		L1	1	
3*6 Button 26		K1	1	
27 Output USB AF10 8-pin USB connector 28 Input USB		USB1 USB2	2	
	MICRO-7-DIP-5.9	USB5	1	
29 USB-C connector		USB3	1	
Recommended models for 30-inch Lightning female connector		USB4	1	

inductors:

DARFON PIN	Thickness (mm)	Inductance (uH)	Tolerance	DC Resistance (mÿ)		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	

13.3. Application of IP5356M_LCC Series LED Lights

The IP5356M_LCC solution supports Micro-B fast charging input, Type-C fast charging input/output, Type-C fast charging output, and USB-A fast charging. Output.

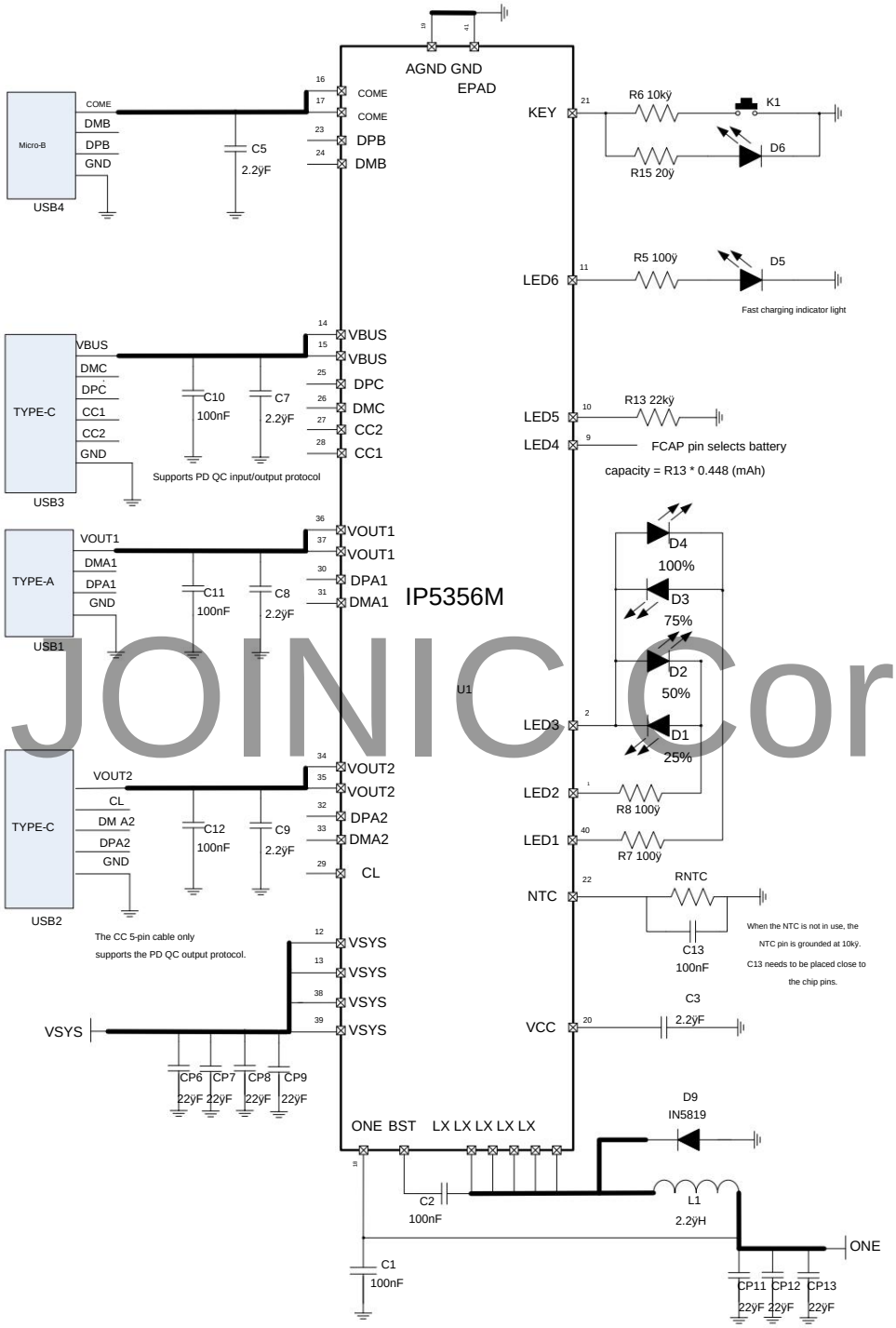


Figure 27 Typical Application Schematic of IP5356M

13.4. Applications of IP5356M_DCC Series Digital Tubes

This solution supports Micro-B fast charging input, Type-C fast charging input and output, Type-C fast charging output, and USB-A fast charging output.

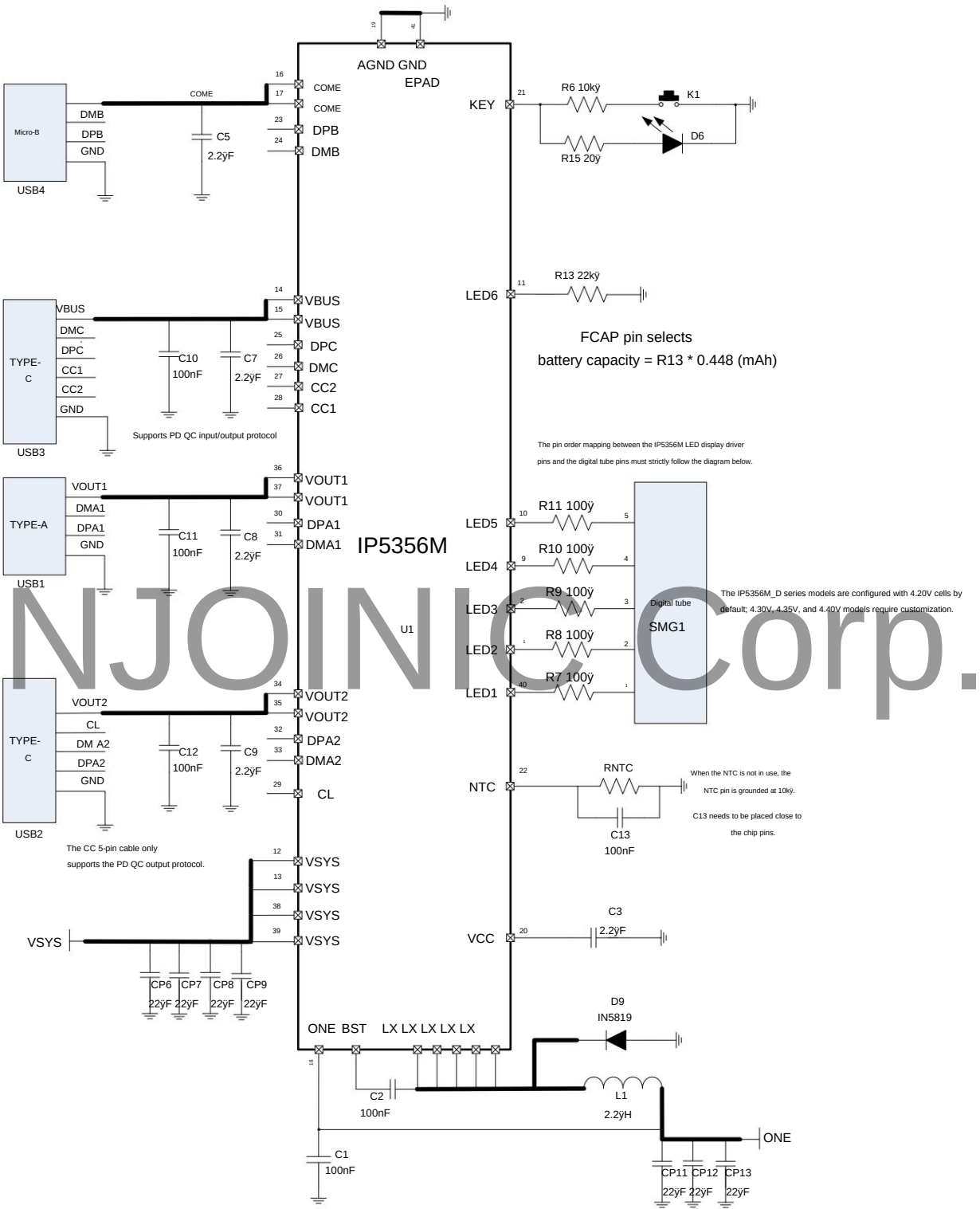


Figure 28 Typical application schematic diagram of IP5356M digital tube.

BOM (Bill of Materials)

Serial Number Component Name	**Model &**	Location	Dosage	Remark
Specifications : 1. Surface Mount Chip QFN40		U1	1	
IP5356M; 2. Surface Mount Capacitor 0603 100nF 10%		C1	1	
16V; 3. Surface Mount Capacitor 0603 100nF 10% 25V C2 C10 C11 C12; 4. Surface			4	
Mount Capacitor 0603 2.2ÿF 10% 16V; 5. Surface Mount		C3	1	
Capacitor 0603 2.2ÿF 10% 25V C5 C6 C7 C8 C9; 6. Surface Mount Capacitor 0805			5	
22ÿF 10% 16V CP11 CP12 CP13; 3.				
7. Surface Mount Capacitors 0805 22ÿF 10% 25V CP6 CP7 CP8 CP9 4				
8 Surface Mount Resistors 0603R 100ÿ 1% R7 R8 2				Optional, LED schematic diagram
9. Surface Mount LED 0603 Blue LED 10. Surface Mount		D1 D2 D3 D4	4	
Resistor 0603R 100ÿ 1% 11. Surface Mount Digital Display		R7 R8 R9 R10 R11	5	Optional, digital tube schematic diagram
YF2252SR-5 12. Surface Mount Resistor 0603R 100ÿ 1% 13.		SMG1	1	
Surface Mount LED 0603 Red LED 14. Surface Mount Resistor 0603R		R5	1	Optional, fast charging solution
22kÿ 1% 15. Surface Mount Schottky Diode IN5819 16.		D5	1	
Surface Mount Resistor 0603R 10kÿ 1% 17. Surface Mount Resistor		R13	1. Optional, FCAP circuit	
0603R 20ÿ 1% 18. NTC Thermistor 10kÿ@25ÿ B=3380		D9	1	
19. Surface Mount Capacitor 0603 100nF 10% 16V LED 5mm		R6	1	
		R15	1	
		RNTC	1	Materials required for NTC circuits
		C13	1	
20		D6	1	
21. Molded Inductor 2.2ÿH 10*10 Button SMT 3*6 Buttons 23.		L1	1	
22	Output USB AF10 8-pin USB 24. USB C	K1	1	
Cable 25. USB C Socket 26. Input USB MICRO-7-DIP-5.9		USB1	1	
		USB2	1	
		USB3	1	
		USB4	1	

Recommended inductor models:

DARFON PIN	**Thickness (mm)**	**Inductance (uH)**	**Tolerance**	**DC Resistance (mÿ)**		**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. Chip Printing Instructions

Note: --

1. Injoinic logo 1,
2. IP5356 -- Product model number, combined with the last letter M on the next line, indicates the model number is IP5356M.
3. XXXXXXXX -- Production batch number
4. M -- Combined with IP5356 above, it represents the IP5356M product.
5. -- Pin PIN1 pin location indicator

Figure 29 IP5356M Silkscreen Instructions

15. Encapsulation Information

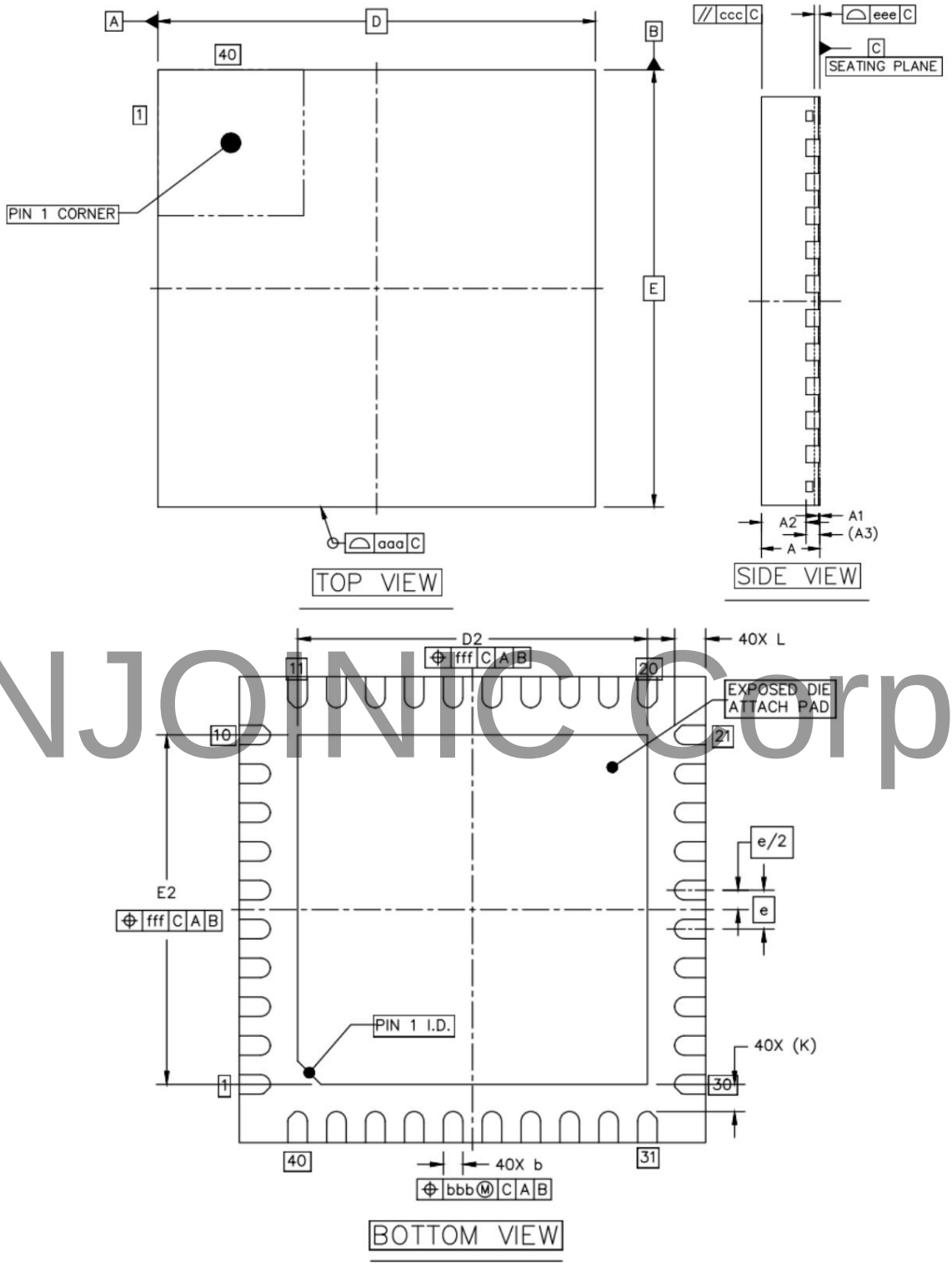


Figure 30 IP5356M Package Dimensions

		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.8	0.85	0.9
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.65	---
L/F THICKNESS		A3		0.203 REF	
LEAD WIDTH		b	0.2	0.25	0.3
BODY SIZE	X	D		6 BSC	
	Y	E		6 BSC	
LEAD PITCH		e		0.5 BSC	
EP SIZE	X	D2	4.45	4.5	4.55
	Y	E2	4.45	4.5	4.55
LEAD LENGTH		L	0.3	0.4	0.5
LEAD TIP TO EXPOSED PAD EDGE		K		0.35 REF	
PACKAGE EDGE TOLERANCE		aaa		0.1	
MOLD FLATNESS		ccc		0.1	
COPLANARITY		eee		0.08	
LEAD OFFSET		bbb		0.1	
EXPOSED PAD OFFSET		fff		0.1	

Figure 31 IP5356M package dimensions

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