USB Type-A fast charging protocol intelligent management chip

Product Features

- Compatible with common USB Type-A fast charging protocols, BC1.2 , Apple 2.4A, QC2.0/QC3.0/QC3.0+, FCP, SCP, HISCP, Low voltage direct charging, etc.
- Support dynamic shutdown of fast charging output
- VIN withstand voltage 36V, D ± withstand voltage 22V
- Internal integration of LDO
- Integrated OPTO output, connected to optocoupler
- Package: SOT23-6

Product Overview

The FS168L (abbreviated as FSFA series) chip is selectively compatible with mainstream charging protocols. The chip can intelligently recognize the type of phone inserted and select the most suitable protocol to meet the needs of the phone.

The D ± of the USB Type-A port is connected to the FSFA chip. After the phone is inserted into the USB Type-A port, according to the agreements of various protocols, the phone and FSFA will start to recognize each other. Once the recognition is successful, FSFA can respond to the phone's request.

The VIN withstand voltage of FS168L is as high as 36V, and the D ± withstand voltage is as high as 22V, which improves the reliability of the system.

Internally integrated with LDO, low loss during high-voltage output, chip power supply can be directly connected to the power supply.

FS168L uses SOT23-6 packaging.

Application field

- Travel Charge
- Wall filling
- Socket
- Other USB Type-A power output devices

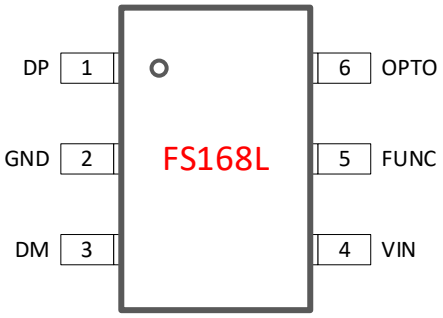
Order information

Part No	Package	Pcs/Reel
FS168LA	SOT23-6	3000
FS168LC	SOT23-6	3000
FS168LD	SOT23-6	3000
FS168LE	SOT23-6	3000

Note: Please refer to the "Device Selection" section for details

V1.3(202510)

Chip packaging and pin definition



SOT23-6

Pic 1. Pin definition

Table 1. FS168L Pin function description

FS168L	Name of the pin	Description
1	DP	USB DP, DP connected to USB Type-A port
2	GND	Chip ground, connected to system ground
3	DM	USB DM, DM connected to USB Type-A port
4	VIN	Chip power supply
5	FUNC	Enable fast charging Suspended: maximum 13.2V 180K: Maximum 20V 68K: Maximum 10.2V Grounding: Shielded fast charging
6	OPTO	OPTO feedback control, connected to the optocoupler

Extreme operating range

Table 2. Maximum operating range

Parameter	Value
VIN	-0.3V~36V
D±	-0.3V~22V
FUNC	-0.3V~8V
ESD（HBM）	±2KV

The maximum operating range listed in the table above, if the limit is exceeded, the chip may be permanently damaged. Users should try to avoid it.

Normal operating range

Table 3. Normal operating range

Parameter	Value
VIN	2.9V~20V
D±	0V~3.3V
FUNC	0V~3.3V
Working temperature range	-40°~105°
Working current	<2mA

Device Configuration

The identification method for the FS168L series is FS168LX.
X represents compatible protocols, commonly defined in the table below.

Table 4. Named X Values

X value	Agreement
A	BC1.2APPLE2.4A,QC2.0/QC3.0/QC3.0+,AFC,FCP, others
C	BC1.2APPLE2.4A,QC2.0/QC3.0/QC3.0+,AFC,FCP,SCP,HISCP,Low-voltage direct charging, others
D	BC1.2APPLE2.4A,QC2.0/QC3.0/QC3.0+,AFC,FCP,SCP,HISCP,High-voltage direct charging, others
E	BC1.2APPLE2.4A,QC2.0/QC3.0/QC3.0+,AFC,FCP,SCP,HISCP,High voltage direct charging, TECNO,others

Pin definition and instructions

VIN

The voltage resistance of VIN can reach up to 36V and can be directly connected to the power system.

DP and DM

DP/M is connected to the USB Type-A port, and both pins can withstand a voltage of 22V.

FUNC

Suspended: maximum 13.2V
180K: Maximum 20V
68K: Maximum 10.2V
Grounding: Shielded fast charging

OPTO

connected to the optocoupler.

Application example

The typical application of FS168L is shown in the figure on the right.

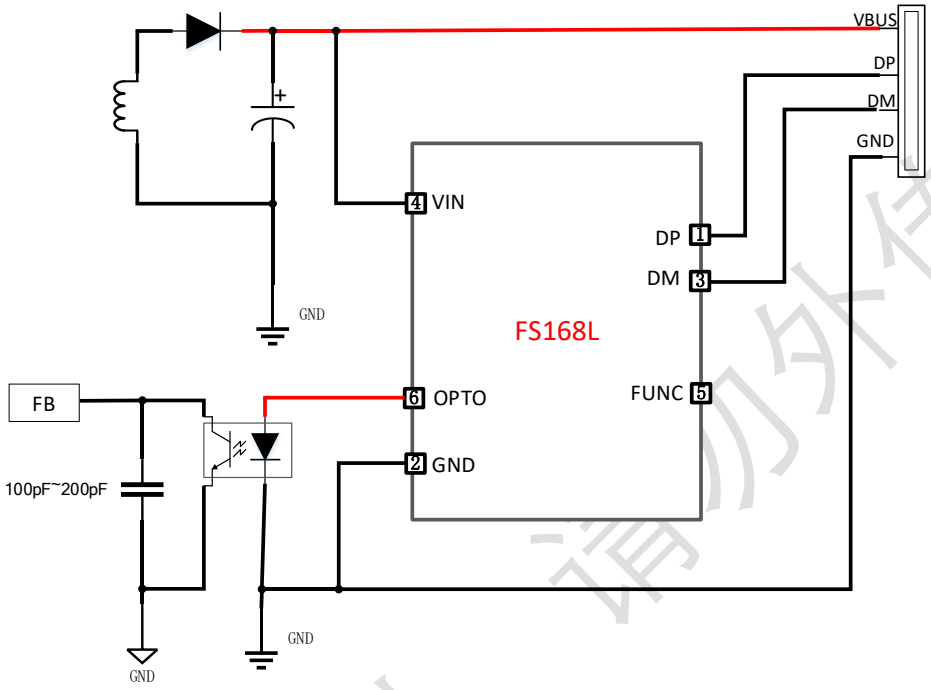


Figure 2. Application diagram

In order to better support the new VIVO mobile phone, it is recommended to use the following circuit, add a 100nF compensation capacitor between VBUS and OPTO.

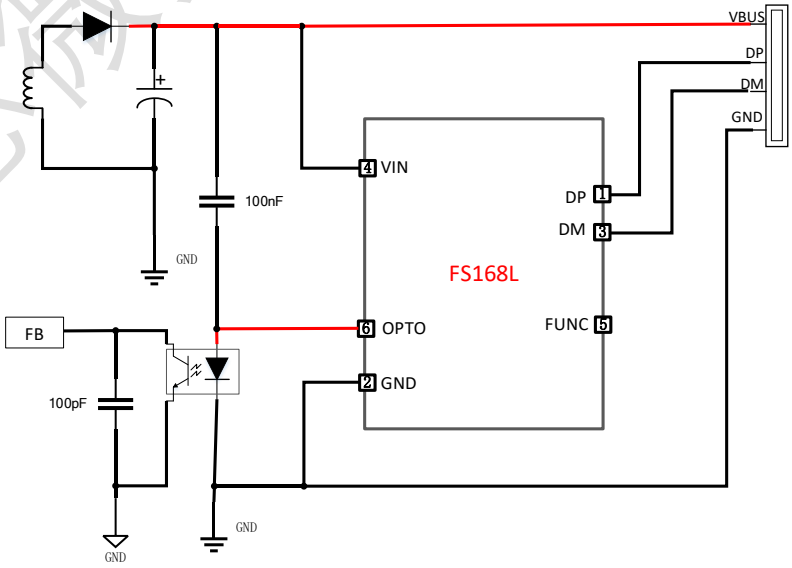
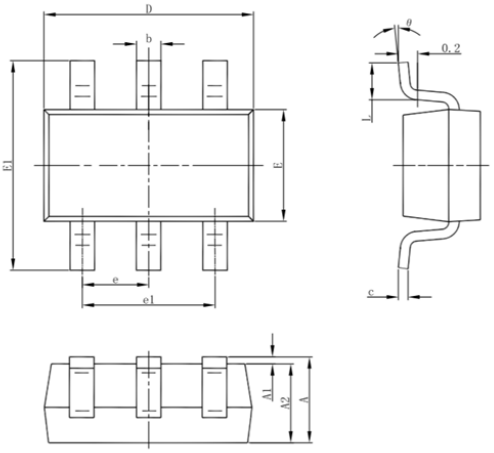


Figure 3. Application diagram

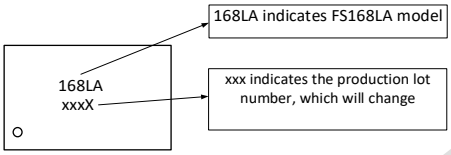
Package outline drawing

SOT23-6

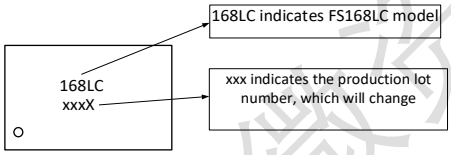


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

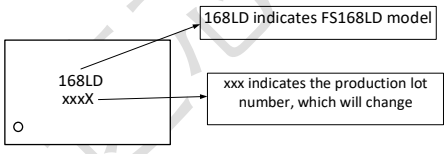
Chip silk screen information



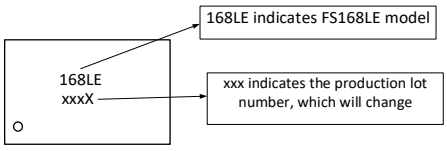
FS168LA model information: 168LA, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch



FS168LC model information: 168LC, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch



FS168LD model information: 168LD, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch



FS168LE model information: 168LE, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch

Company information and statement

HQ

E2-503, China Internet of Things International Innovation Park, No. 200, Linghu Avenue, Xinwu District, Wuxi City

Website: www.fastsoc.com

Wechat public Account.: fastsoc

Sales and technical support

Contact: Mr. Gu

Mobilephone: 1895-248-8621

E-mail: gejing@fastsoc.com

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