

USB Type-A fast charging protocol intelligent management chip

Product Features

- Compatible with common USB Type-A fast charging protocols, it can intelligently recognize the protocol used by the phone.
- Support BC1.2 charging protocol
- Supports Apple 2.4A charging
- Compatible with multiple fast charging protocols (Huawei, Qualcomm, OPPO, VIVO, etc.)
- Support dynamic shutdown of fast charging output
- Supports adjustable maximum voltage of 9V and 12V
- D ± withstand voltage 13V
- FB voltage regulation accuracy 20mV/step
- Working voltage range 2.9~5.6V
- Package: SOT23-6

Product Overview

The FS112K (abbreviated as FSFA series) chip is selectively compatible with mainstream charging protocols. The chip can intelligently identify the type of inserted phone 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. When 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 recognized successfully, FSFA can respond to the phone's request. According to the request information of the mobile phone, FSFA controls the external DC/DC or AC/DC power supply system through the FB pin, and outputs appropriate voltage to power the mobile phone.

In some applications, the external controller can disable the fast charging output function of FSFA through the FUNC pin, and FSFA only outputs 5V voltage at this time. The fast charging function of turning off and on FSFA can be performed at any time without restarting the FSFA chip.

Application field

- Car charger
- Portable source
- Socket
- Other USB Type-A power output devices

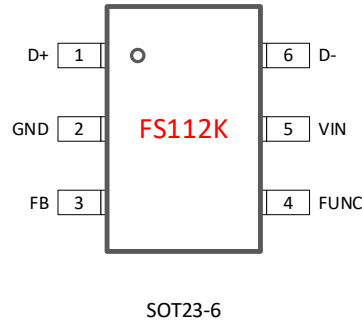
Order information

Part No	Package	Pcs/Reel
FS112K	SOT23-6	3000

V1.0(202404)

Note: Product model, please refer to the "Device Selection" section for details

Chip packaging and pin definition



Pic 1. Pin definition

Table 1. FS112K Pin function description

FS112K	Name of the pin	Description
1	D+	USB D+, D- connected to USB Type-A D+
2	GND	Chip ground, connected to system ground
3	FB	Feedback control, FB connected to the power system
4	FUNC	Fast charging enable, connected to VDD or suspended: enable fast charging; Connect to GND: fast charging function is prohibited; Connect an external 200K Ω resistor to ground: Adjust the maximum voltage of high-voltage fast charging from 12V to 9V
5	VIN	Chip power supply
6	D-	USB D-, D- connected to USB Type-A D-

Extreme operating range

Table 2. Maximum operating range

Parameter	Value
VIN	-0.3V~6.5V
D \pm	-0.3V~13V
FUNC, FB	-0.3V~6V
ESD (HBM)	\pm 4KV

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~5.6V
D±	0V~3.3V
FUNC, FB	0V~3.3V
Working temperature range	-40°~105°

Device Configuration

If the maximum output voltage of the application is 9V, then 200K can be externally connected to the FUNC pin and pulled down to ground. At this point, the maximum output of all high-voltage fast charging protocols will change from 12V to 9V.

The detailed device options are limited by space, please consult the sales or agents for more information.

Pin definition and instructions

VIN

The working range of VIN is 2.9V~5.6V, and an external resistor with a resistance of 750 Ω needs to be connected to the VBUS of the USB port. At the same time, the VIN external capacitor is connected to ground, with a capacitance size of 1uF..

D+ and D-

D ± is connected to the USB Type-A port, and both ports can withstand 13V voltage. Therefore, when adjusting the high voltage fast charging VBUS to a maximum of 12V, accidentally short circuiting D ± to VBUS during use will not cause chip damage.

FUNC

FUNC pin grounding (voltage<0.3V) indicates that all fast charging protocols are prohibited and can only maintain 5V output. At this time, there are only two protocols, Apple2.4A and BC1.2. If connected to VDD (voltage>2.5V) or suspended, it indicates that all fast charging functions are enabled. FUNC can switch voltage values arbitrarily.

In some cases, when multiple USB Type-A ports share a power rail, and these ports are simultaneously plugged into a mobile phone device, the system will want the power rail to remain at 5V. Otherwise, different



phone requests for different voltages may cause conflicts and even damage to the phone. In this case, the FUNC can be grounded.

You can also connect a 200K Ω resistor to ground, and the maximum output voltage of the high-voltage fast charging will change from 12V to 9V. This feature is suitable for power systems with a maximum output of 9V.

FB

TFB is connected to the power system to control the VBUS voltage of USB. After negotiating the protocol and required voltage between the mobile phone and FSFA through D \pm , FSFA initiates voltage regulation through FB. The voltage regulation accuracy of FB is 20mV, and the voltage regulation speed is 200mV/500us.

FB external resistor R1 to VBUS, external resistor R2 to ground. The usual calculation formula is as follows,

$$R_2 = \frac{R_1 V_{FB}}{V_{VBUS} - V_{FB}}$$

For example,

V_{VBUS} takes 5V

V_{FB} can be found in the manual of the power IC, such as taking 0.8V

The typical value of R1 is 100K Ω , and the accuracy needs to meet the requirements of the system, such as selecting an accuracy of 1%

So, R2 can be calculated

Application example

Since there is no need to disable fast charging output, the FUNC pin floats directly. The power system can be DC/DC, with FB directly connected to the FB terminal of the DC/DC IC. According to the manual of the DC/DC IC, the value of R2 can be calculated. The power system can be AC/DC, FB connected to TL431 or TL432. If it is TL431, then FB takes a value of 2.5V; If it is TL432, then the FB value is 1.25V.

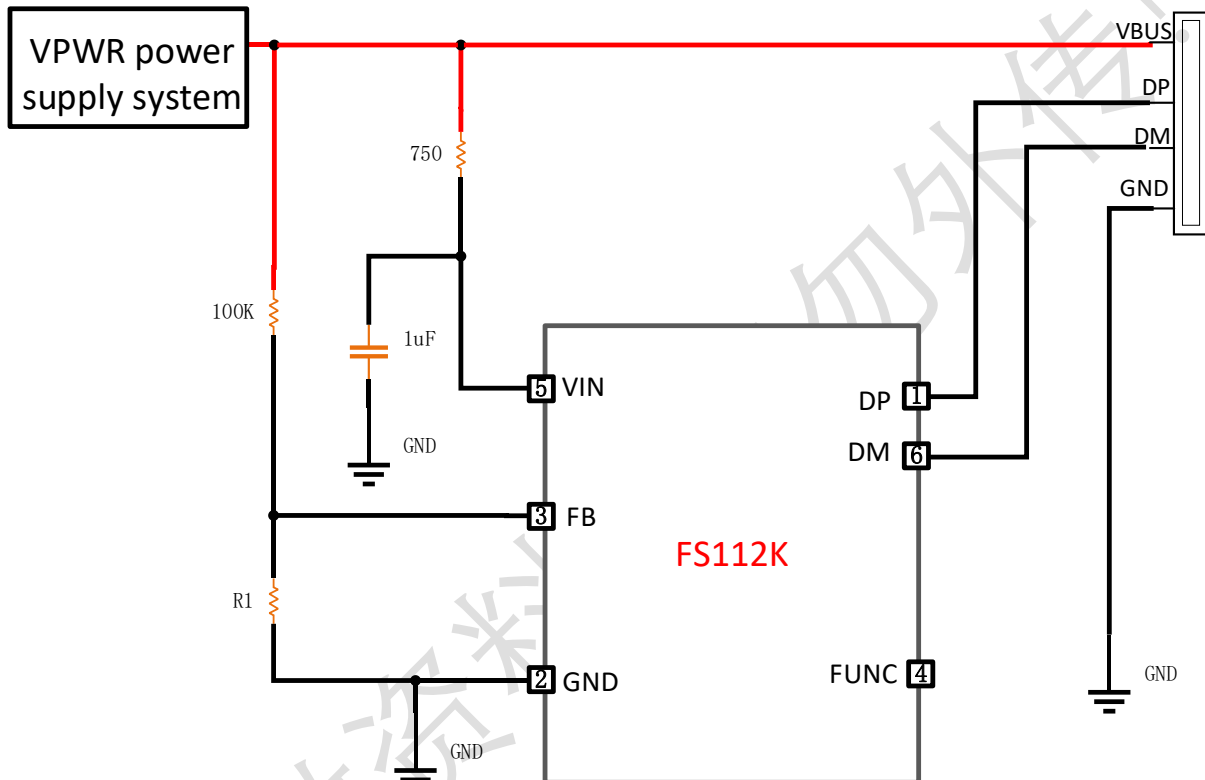
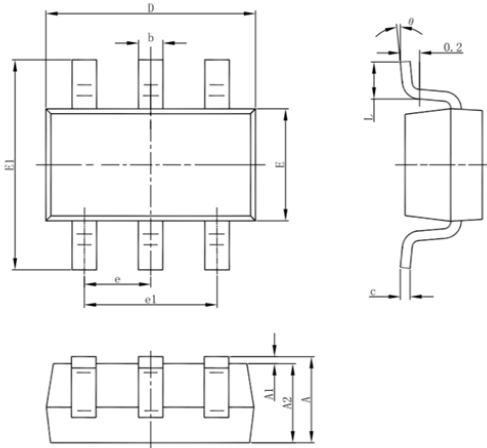


Figure 2. Application diagram



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°	

速芯微资料



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