USB Type-C PD3.2 Fast charging protocol intelligent management chip

Product Features

- Be compatible with various USB Type-C protocols, including Type-C protocol, PD2.0, PD3.0, PD3.2, etc.
- The maximum output current is optional
- VBUS voltage regulation range 5/9/12
- Support common Typec PD PDO pin settings
- Support customized customer Typec PD PDO
- Package：SOT23-6

Product Overview

FS212D belongs to FASTSOC FSFC series，the chip selectively compatible with the mainstream charging protocols. The chip intelligently identifies the type of Mobile and selects the most appropriate protocol for the mobile needs.

FS212D has a minimum power supply of 3.3V and a maximum power supply of 12V, which can adapt to the output voltage of various fast charging protocols.

FS212D provides users with the common TypeC PDO settings to choose from. Users can choose different system settings based on application needs by configuring the FUNC pin external resistance.

FS212D use SOT23-6 package.

Application field

- Charger
- Car charging
- Portable power source
- USB panel
- USB HUB
- Other USB Type-C power output devices

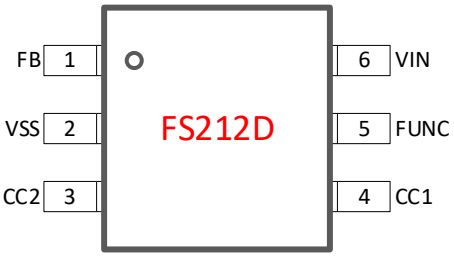
Order information

Part No	Package	Pcs/Reel
FS212D-Y	SOT23-6	3000

comment：XYZ is selected according to specific function, refer to "device selection

V1.3(202410)

Chip packaging and pin definition



SOT23-6

Pic 1. Pin definition

Table 1. FS212D-Y Pin function description

FS212D	Name of the pin	Description
1	FB	External compensation network
2	VSS	Chip ground, connected to the system ground
3	CC2	Connect the USB Type-C CC2 pin
4	CC1	Connect the USB Type-C CC1 pin
5	FUNC	This foot can be suspended in the air. At the same time, external resistors can be connected to set PDO
6	VIN	Chip power supply, usually connected to the output of the power system through a resistor

Extreme operating range

Table 2. Maximum operating range

Parameter	Value
FUNC	-0.3V~5.5V
CC1, CC2	-0.3V~15V
VIN	-0.3V~5.5V
ESD（HBM）	±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	3V~4.5V
FUNC,CC1,CC2	0V~3.3V
Operating temperature range	-40°~105°
Working current	<1mA

Device Configuration

The FSFC series chips have a wide range of configuration options, including several categories: protocol types, declared power and voltage capabilities. Below, we will introduce them separately.

Declared power and voltage

The chip provides a variety of power and voltage options for customers to choose from. Users can set different power and PDO according to the support list through FUNC. For PDO not listed in the support list, it can be customized for users.

The FSFC series provides a dedicated FUNC pin, which allows users to set partial PDO by connecting an external resistor to ground, improving the application flexibility of the chip. Compared to the default settings of the chip, the settings made by the FUNC pin always have the highest priority.

Device selection

The identification method for FS212D is FS212D-Y. Formal name, for example: FS212D-20W9V

The selection of FS212D is related to the declared voltage and power type. Due to space limitations, it is not fully listed in the manual.

For example, 20W9V represents PDO with a power of 20W and a maximum voltage of 9V, including 5V/3A and 9V/2.22A

Y represents the default PDO setting when the FUNC pin is suspended, and users can choose according to their actual situation. Due to space limitations, it is not fully listed in the manual. Please consult sales for details.

Table 4. Named X Values

Example of Y value	PDO when FUNC feet are suspended
18W9V	18W, maximum 9V. Namely: 5V/3A, 9V/2A
20W9V	20W, maximum 9V. Namely 5V/3A, 9V/2.22A

Pin definition and instructions

VIN

IN supplies power to the chip and requires a 750 Ω resistor to be pulled up to VBUS.
For applications up to 12V, 0603/0805 resistors can be selected..

CC1 and CC2

CC1 and CC2 Connect to CC1 and CC2 in the Type-C port. The CC pin is responsible for PD communication, and the quality of communication signals depends on factors such as wire resistance, board resistance, and the actual charging current of the phone. If it exceeds the protocol specifications (refer to the PD protocol specifications for details), it may cause PD communication failure. Suggest choosing wires with lower internal resistance and conducting thorough testing.

FUNC

he external resistance of the FUNC pin can be selected for different PDO and system characteristics, as shown in the table below. It is recommended to use a 100K Ω resistor with 1% accuracy.

Table 5. FUNC pin functions.

Example of FUNC value	**PDO when FUNC foot is suspended**
Hang in the air	OTP configuration
51K	25W，5V/3A，9V/2.77A，3.3-5.9V/3A，3.3-11V/2.25A
100K	15W,，5V/2.4A，9V/1.67A
200K	20W, 5V/3A，9V/2.22A
GND	20W，5V/3A，9V/2.22A，12V/1.67A，3.3-5.9V/3A，3.3-11V/1.8A

Taking the most common shipping model FS212D as an example, its default PDO is 20W12V, 5V/3A, 9V/2.22A, 12V/1.67A

Table 6. FUNC pin functions

Example of FUNC value	**PDO when FUNC foot is suspended**
Hang in the air	20W, 5V/3A 9V/2.22A 12V/1.67A
51K	25W，5V/3A 9V/2.77A 3.3-5.9V/3A 3.3-11V/2.25A
100K	15W, 5V/2.4A 9V/1.67A
200K	20W, 5V/3A 9V/2.22A
GND	20W，5V/3A 9V/2.22A 12V/1.67A 3.3-5.9V/3A 3.3-11V/1.8A

FB

FB is connected to the power system to control the VBUS voltage of the USB. After negotiating the protocol

and required voltage between the terminal device and FS212D through CC, FS212D initiates voltage regulation through FB. The voltage regulation accuracy of FB is 20mv, and the voltage regulation speed is 20mV/1us.

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 instance,

V_{VBUS} take 5V

V_{FB} can be found in the manual of the power IC, for example, take 0.8V

The typical value of R_1 is 100 KΩ. The precision must meet system requirements, for example, 1%

So we can figure out R2.

The power system can be AC/DC, and for better feedback, it is recommended to use 432 instead of 431.

Application example

A typical application of FS212D is shown in the following figure, where the chip is powered by a 750 Ω resistor connected to the output of the power supply.

FB external power supply system.

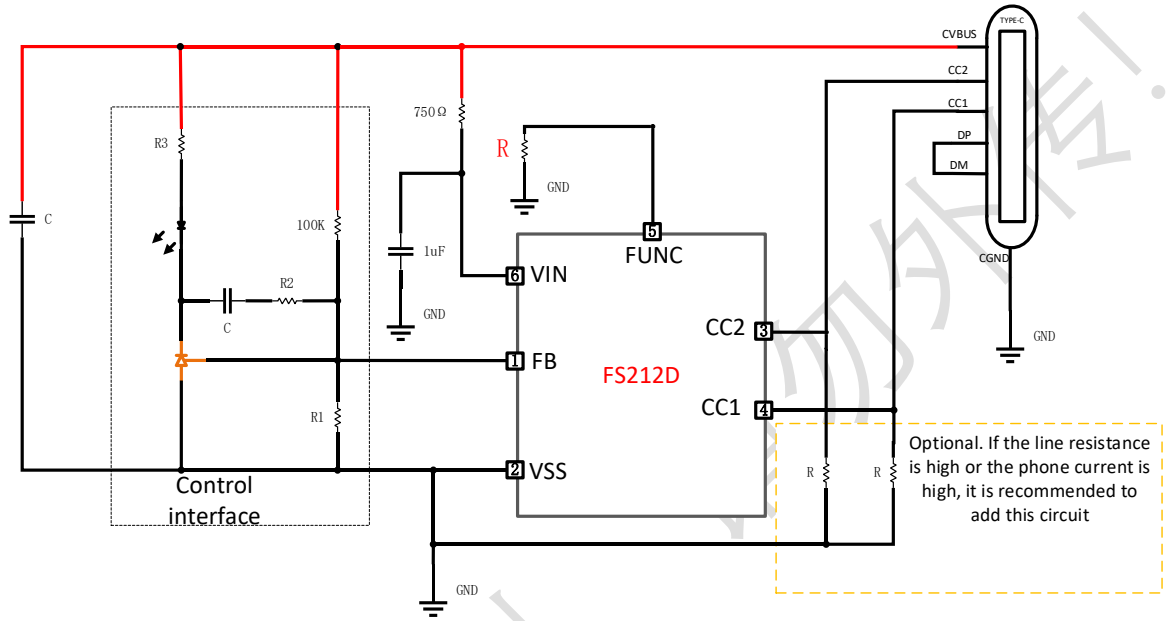
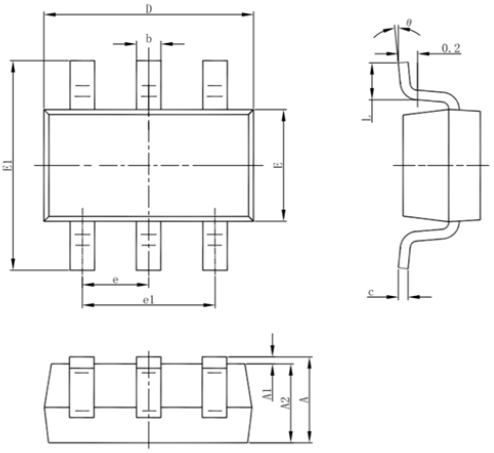


Figure 2. Application diagram

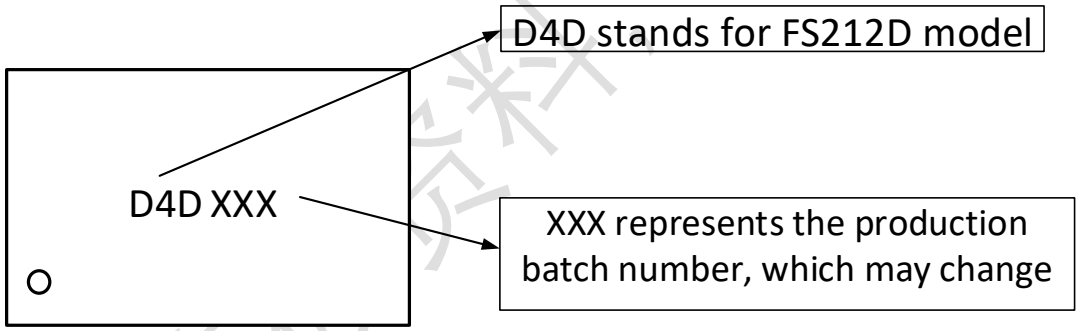
Package outline drawing

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°	0°	8°

Chip silk screen information



1. FS212D model information: D4D, fixed and unchanged

2. The production batch number code is used to distinguish the batch number information each time, based on changes in the production batch

Company information and statement

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