

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 through resistor
- Package: SOT23-6

Product Overview

The FS168K (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 FS168K 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.

FS168K uses SOT23-6 packaging.

Application field

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

Order information

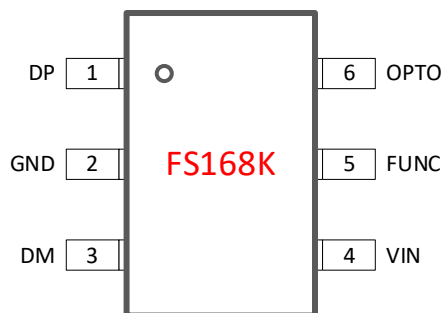
Part No	Package	Pcs/Reel
FS168KA	SOT23-6	3000
FS168KC	SOT23-6	3000
FS168KD	SOT23-6	3000
FS168KE	SOT23-6	3000

V1.1(202509)

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



Chip packaging and pin definition



SOT23-6

Pic 1. Pin definition

Table 1. FS168K Pin function description

FS168K	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 through a resistor of 100R



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 FS168K series is FS168KX.

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
C	BC1.2APPLE2.4A, QC2.0/QC3.0/QC3.0+, AFC, FCP, V, SCP, HISCP, Low-voltage direct charging
D	BC1.2APPLE2.4A, QC2.0/QC3.0/QC3.0+, AFC, FCP, V, SCP, HISCP, High-voltage direct charging, others
E	BC1.2APPLE2.4A, QC2.0/QC3.0/QC3.0+, AFC, FCP, V, SCP, HISCP, High-voltage direct charging, T-ECNO, 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. At the same time, the VIN is externally connected to the ground with a capacitor. The capacitance size is 1uF.

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

The resistance is selected according to the power system, such as 100R.

The resistor of string 100R is connected to the optocoupler.

Application example

The typical application of FS168K is shown in the figure on the right.
The resistor of the OPTO string 100R is connected to the optocoupler.

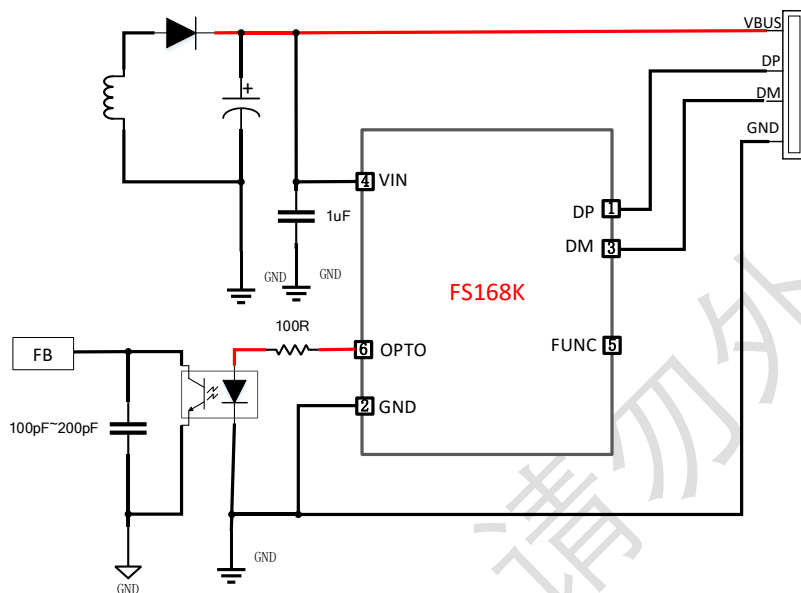
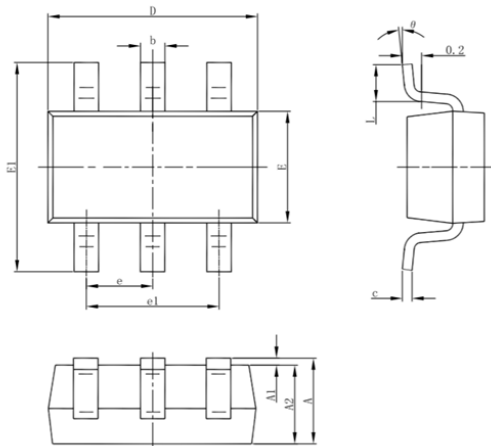


Figure 2. Application diagram



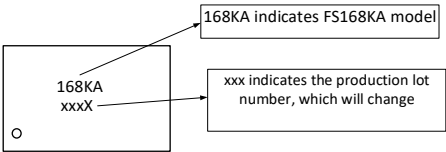
Package outline drawing

SOT23-6

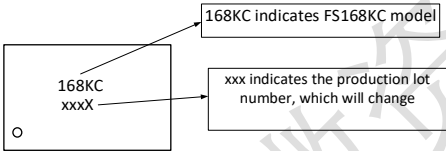


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)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

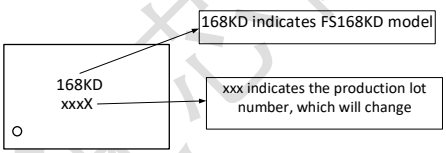
Chip silk screen information



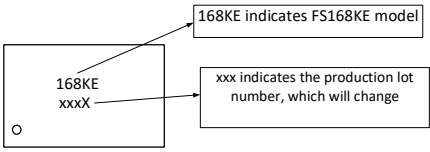
FS168KA model information: 168KA, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch



FS168KC model information: 168KC, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch



FS168KD model information: 168KD, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch



FS168KE model information: 168KE, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch



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