

## 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 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

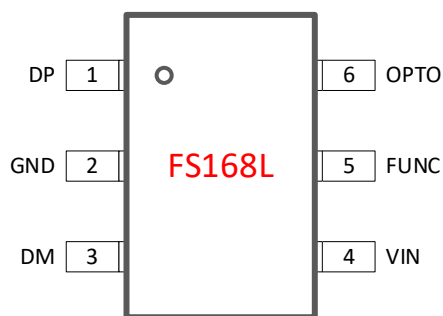
| Part No | Package | Pcs/Reel |
|---------|---------|----------|
| FS168LA | SOT23-6 | 3000     |
| FS168LC | SOT23-6 | 3000     |
| FS168LD | SOT23-6 | 3000     |
| FS168LE | SOT23-6 | 3000     |

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. 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<br>Suspended: maximum 13.2V<br>180K: Maximum 20V<br>68K: Maximum 10.2V<br>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 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, TE-CNO, others |



## Pin definition and instructions

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### 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 FS168L is shown in the figure on the right.  
The resistor of the OPTO string 100R is connected to the optocoupler.

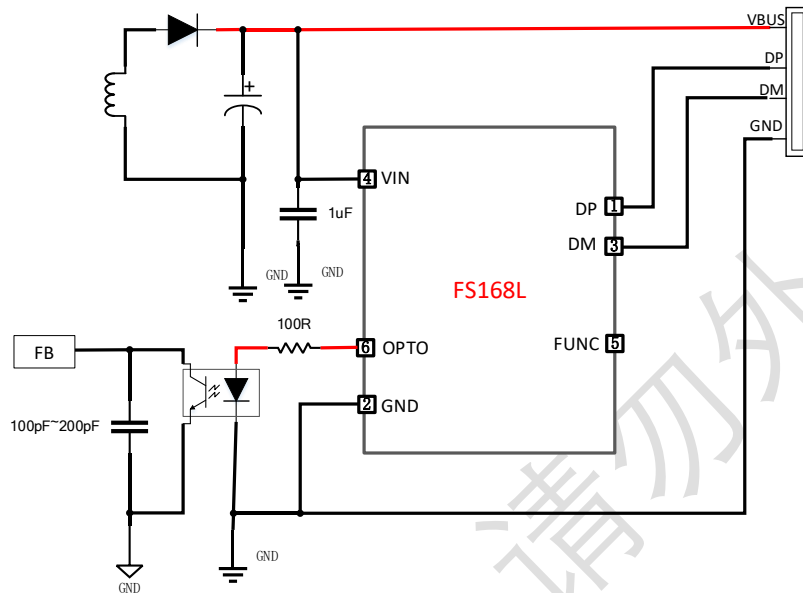


Figure 2. Application diagram

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.

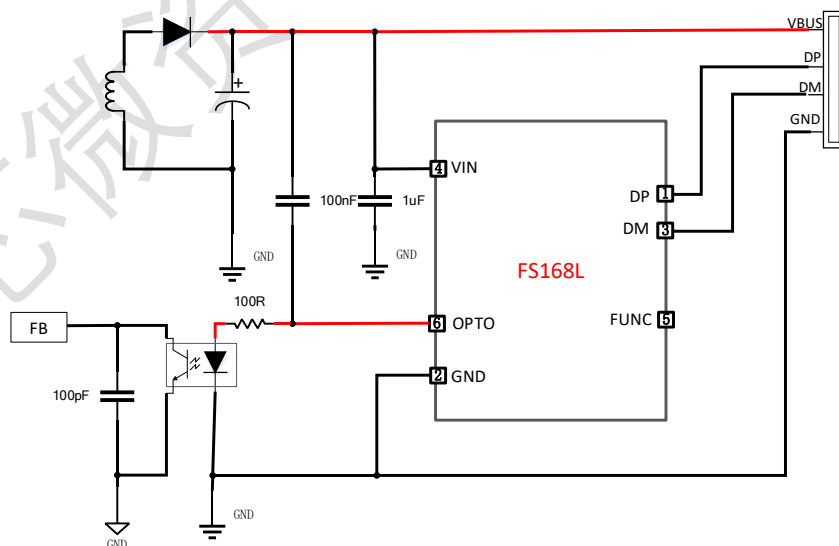
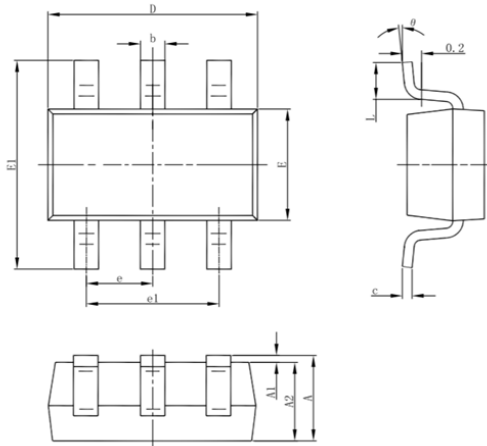


Figure 3. Application diagram

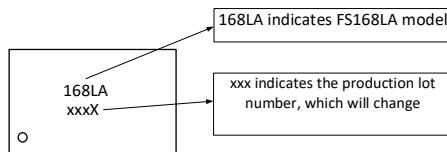
## Package outline drawing

### SOT23-6

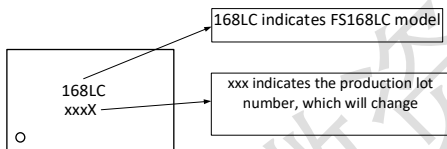


| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.050                     | 1.250 | 0.041                | 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°    |

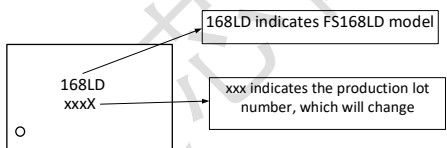
### Chip silk screen information



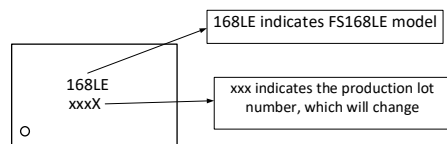
**FS168LA model information:** 168LA, fixed; The production batch number shortcode is to distinguish the batch number information each time, and it varies according to the production batch



**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

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