Low power USB-A dual A fast charging protocol smart management chip

Product Features

System Control

- 32-bit RISC CoreFast Charging Output

Compatible with common USB

- Type-A fast charging protocols, BC1.2, Apple 2.4A, QC2.0/QC3.0/QC3.0, FCP, AFC, SCP, HISCP, low voltage direct charge, etc.

Supports dual A-type ports working at the same time, with input voltage automatically reverting to 5V

VIN can work from 3.6V to 35VSupport common Typec PD PDO pin settings

Package：QFN4X4-28L

Product Overview

The FS520AA is a fast charging protocol controller with a 32-bit RISC core, selectively compatible with mainstream charging protocols. The chip can intelligently identify the type of smartphone that is plugged in and select the most suitable protocol to meet the phone's needs.

The D± connection of the USB Type-A port is linked to the FS520AA chip, and when a smartphone is connected to the USB Type-A port, the phone and FS520AA will begin mutual recognition according to the agreements of various protocols; once recognition is successful, the FS520AA can respond to the phone's requests.

The VIN tolerance of the FS520AA is as high as 35V, enhancing the reliability of the system.

The FS520AA comes in a QFN4X4-28L package, making it easy for users to plan their designs.

Application field

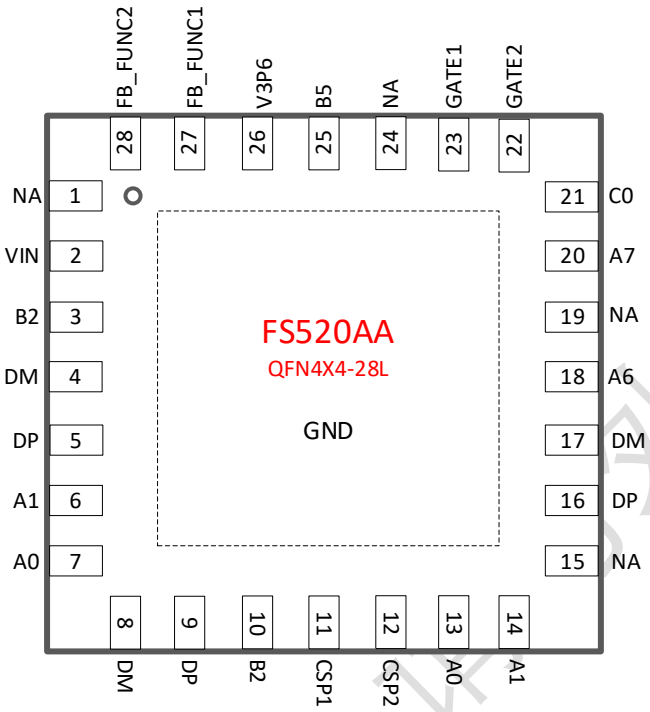
- Travel Charge
- USB panel
- USB socket
- Other USB Type-A power output devices

Order information

Part No	Package	Pcs/Reel
FS520AA-D	QFN4X4-28L	3000
FS520AA-P	QFN4X4-28L	3000

V1.2(202510)

Chip packaging and pin definition



Pic 1. Pin definition

Table 1. FS520AA Pin function description

FS520AA	Name of the pin	Description
1	NA	NA
2	VIN	Can connect to VBUS
3	B2	Functions vary with different applications and are inactive when not in use.
4	DM	Connect to the DM pin of the USB Type-A.
5	DP	Connect to the DP pin of the USB Type-A.
6	A1	Functions vary with different applications and are inactive when not in use.
7	A0	Functions vary with different applications and are inactive when not in use.
8	DM	Connect to the DM pin of the USB Type-A.
9	DP	Connect to the DP pin of the USB Type-A.
10	B2	Functions vary with different applications and are inactive when not in use.
11	CSP1	Current sampling negative terminal
12	CSP2	Current sampling negative terminal

13	A0	Functions vary with different applications and are inactive when not in use.
14	A1	Functions vary with different applications and are inactive when not in use.
15	NA	Functions vary with different applications and are inactive when not in use.
16	DP	Connect to the DP pin of the USB Type-A.
17	DM	Connect to the DM pin of the USB Type-A.
18	A6	Functions vary with different applications and are inactive when not in use.
19	NA	Functions vary with different applications and are inactive when not in use.
20	A7	Functions vary with different applications and are inactive when not in use.
21	C0	Functions vary with different applications and are inactive when not in use.
22	GATE2	Control whether there is a voltage output on the USB Type-A port AVBUS, control the MOSFET.
23	GATE1	Control whether there is a voltage output on the USB Type-A port AVBUS, control the MOSFET.
24	NA	Functions vary with different applications and are inactive when not in use.
25	B5	Functions vary with different applications and are inactive when not in use.
26	V3P6	Built-in LDO
27	FB_FUNC1	Select feedback benchmark
28	FB_FUNC2	Select feedback benchmark
29	EP	GND

Extreme operating range

Table 2. Maximum operating range

Parameter	**symbol**	**Value**	**Unit**
Internal voltage regulation range	V_{REG}	-0.3~6.25	V
DP/DM voltage range	$V_{DP/DM}$	-0.3~6.55	V
VIN voltage range	V_{VIN}	-0.3~35	V
Others		-0.3~6.55	V

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	symbol	Minimum value	Maximum value	Unit
V_REG	V_{reg}	3.5	3.8	V
VIN	V_{VIN}	3.6	35	V
DP/DM	$V_{DP/DM}$	0	3.6	V
Others		0	3.6	V
Working temperature	T_{OP}	-25	80	℃

Device selection

The identification method of the FS520AA series is: FS520AA-X.

X indicates the compatible protocol, commonly defined as shown in the table below.

Table 4. Naming X value

X value	Protocol
D	BC1.2,APPLE2.4A,QC2.0/QC3.0/QC3.0+,AFC,FCP,SCP,HSCP, High-pressure direct charge, Others
P	BC1.2,APPLE2.4A,QC2.0/QC3.0/ QC3.0+,AFC,FCP,SCP,HW,V, High-pressure direct charge, Others

Pin definition and instructions

VIN

VIN powers the chip, supporting a minimum of 3.6V and a maximum of 35V.

V3P6

Built-in LDO, external 1uF capacitor.

DP/DM

DP/DM is used to connect to the USB Type-A port.

Application example

The typical application of FS520AA is shown in the figure.
To enhance the impact resistance of DP/DM, it is advisable to add a TVS and a 20R (±5%, 0603) current-limiting resistor to the DP/DM pins. Recommended specifications for TVS: 3V.
The application diagram for FS520AA-D is as follows: Note: The application diagram for FS520AA-P refers to the application documentation development package.

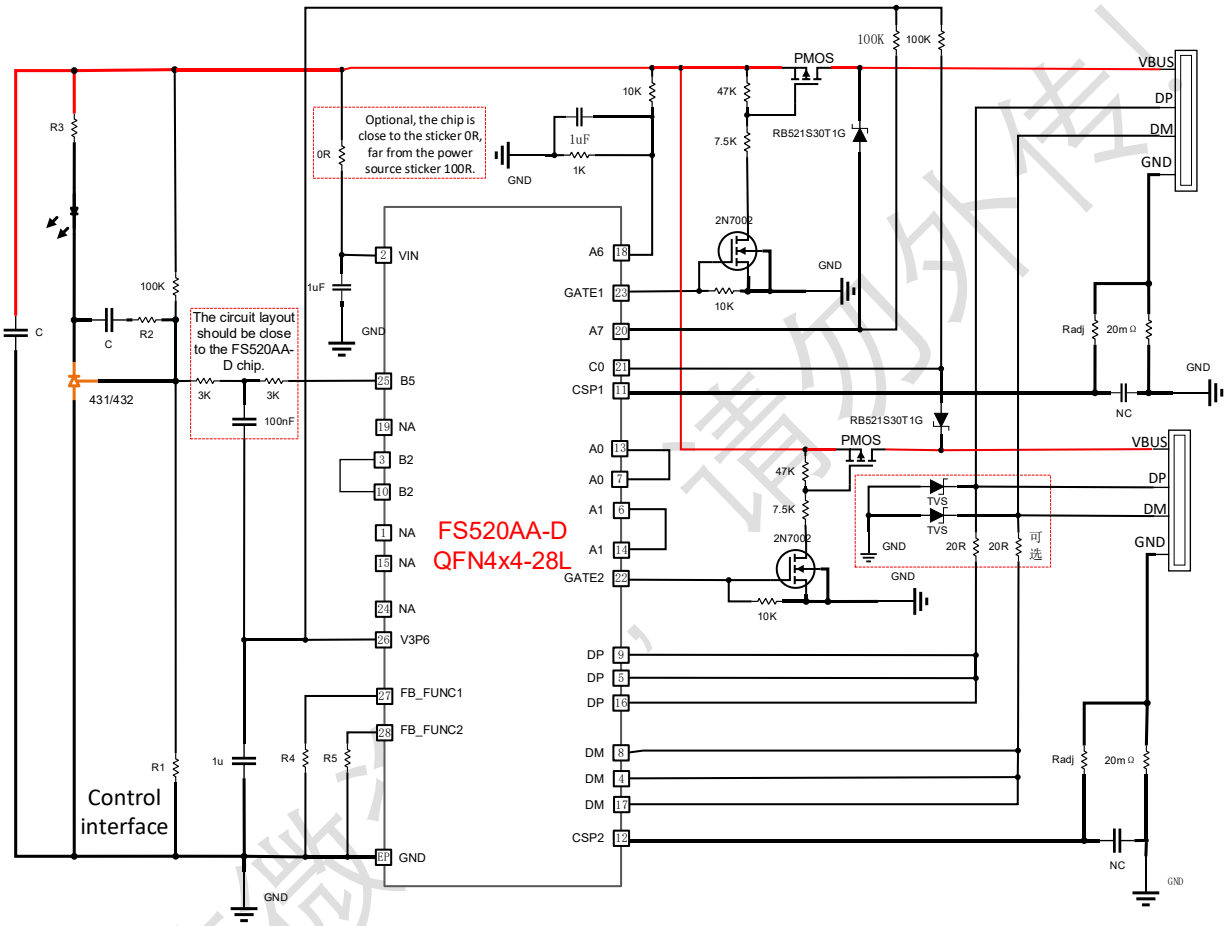


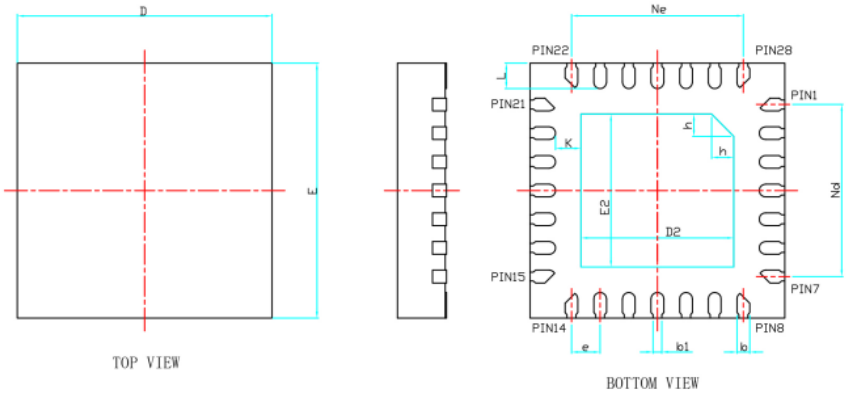
Figure 2. Application diagram of FS520AA-D

Reference voltage	R1	R4	R5
432（1.25V）	32.4K	NC	NC
431（2.5V）	97.6K	NC	0R
DC-DC（VFB=1V）	24K	0R	NC

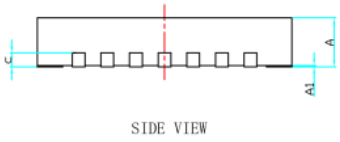
Note: R1 should be close to the GND of the FS520AA-D chip during layout.

Package outline drawing

QFN4x4-28L



SYMBOL	MILLMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.15	0.20	0.25
b1		0.14REF	
c		0.203REF	
D	3.90	4.00	4.10
D2	2.30	2.40	2.50
e		0.45BSC	
Ne		2.70BSC	
Nd		2.70BSC	
E	3.90	4.00	4.10
E2	2.30	2.40	2.50
L	0.35	0.40	0.45
h	0.30	0.35	0.40
K	0.35	0.40	0.45



Chip silk screen information

Company information and statement

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