

## USB Dedicated Charging Port Controller for Fast Charging Protocol and QC 2.0/3.0

### Description

The FP6601Q is a fast charge protocol controller for HiSilicon Fast Charging Protocol (FCP) and Qualcomm® Quick Charge™ 2.0/3.0 (QC 2.0/3.0) USB interface. The device can fast charging FCP or QC 2.0/3.0 powered device (PD). The protocol feature monitors USB D+/D- data line voltage or D- data line transmission and automatically adjusts output voltage of power bank and wall adaptor to optimize charge time.

FP6601Q can support not only USB BC compliant devices, but also Apple / Samsung devices and automatically detects whether a connected powered device is Quick Charge 2.0/3.0 or FCP capable before enabling output voltage adjustment. If a PD not compliant to Quick Charge 2.0/3.0 is detected the FP6601Q disables output voltage adjustment to ensure safe operation with legacy 5 V only USB PDs.

The FP6601Q is available in a space-saving SOT-23-6.

### Features

- Support HiSilicon Fast Charging Protocol (FCP) for output voltage and current communication.
- Support Qualcomm® Quick Charge™ 2.0/3.0
  - Class A : 5V/9V/12V Output Voltage.
- Automatic Selection FCP and QC2.0/3.0 protocols.
- Supports USB DCP Shorting D+ Line to D- Line per USB Battery Charging Specification, Revision 1.2.
- Meets Chinese Telecommunication Industrial Standard YD/T 1591-2009
- Supports USB DCP applying 2.7V on D+ line and 2.7V on D- line.
- Supports USB DCP applying 1.2V on D+ and D- lines
- SOT-23-6 Pb-Free Package

### Applications

- Wall-Adapter, Smart Phones, Tablets, Netbooks
- Mobile / Tablet Power Bank
- Car Charger
- USB Power Output Ports

### Pin Assignments

S6 Package(SOT-23-6)

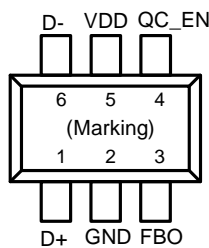
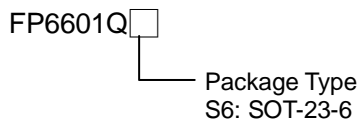


Figure 1. Pin Assignment of FP6601Q

### Ordering Information



#### SOT-23-6 Marking

Part Number	Product Code
FP6601QS6	FT4

Typical Application Circuit

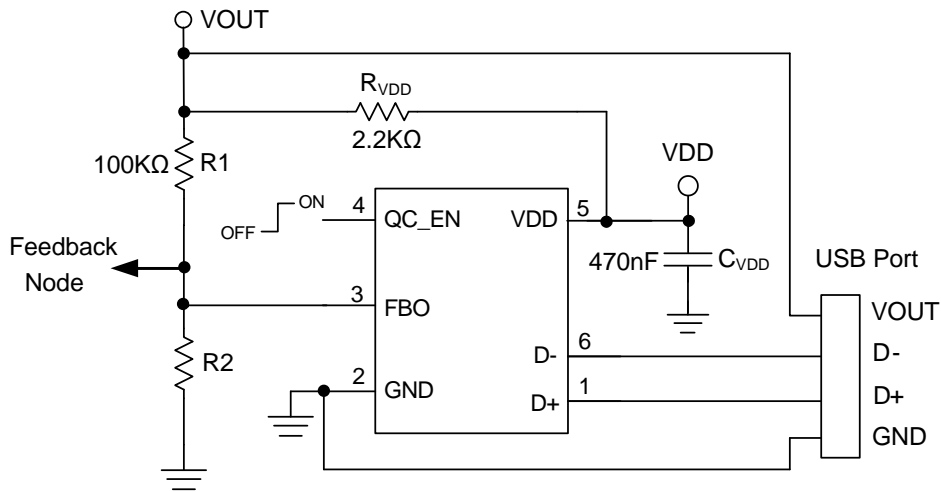


Figure 2. Typical Application Schematic

Output Voltage Lookup Table(QC2.0/3.0)

D+	D-	Output Voltage
0.6V	0.6V	12V
3.3V	0.6V	9V
0.6V	3.3V	Continuous mode
0.6V	High-Z	5V (Default)

## Functional Pin Description

Pin Name	Pin No. (SOT-23-6)	Pin Function
D+	1	USB D+ data line input. Recommended this pin connect without resistors(open) or with a resistor higher than 1MΩ connect to GND.
GND	2	Ground Pin.
FBO	3	Feedback output. Current Sink/Source FB Node.
QC_EN	4	QC_Enable: High-Z with QC3.0 and FCP function; logic low disable QC3.0 and FCP function.
VDD	5	Power Supply Input Pin.
D-	6	USB D- data line input

## Block Diagram

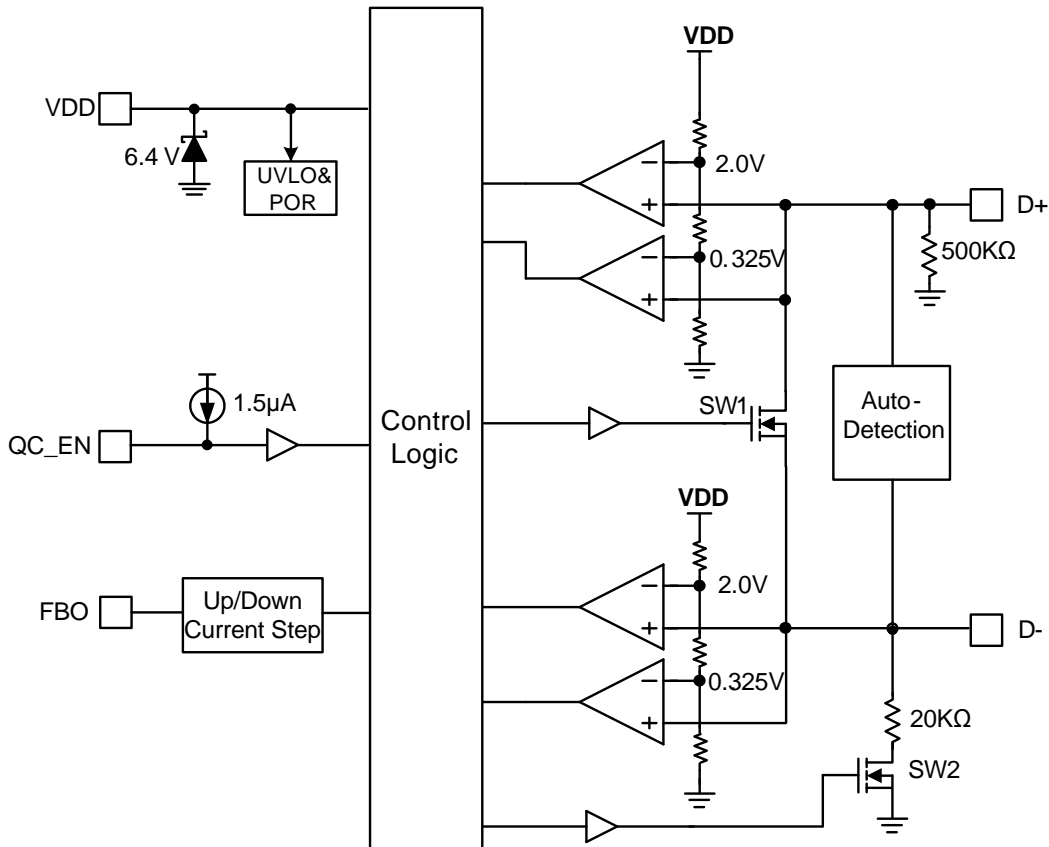


Figure 3. Block Diagram of FP6601Q

## Absolute Maximum Ratings

- Input Supply Voltage VDD ----- - 0.3V to + 6.5V
- All Other Pins Voltage ----- - 0.3V to + 6.5V
- Maximum Junction Temperature (T<sub>J</sub>)----- + 150°C
- Storage Temperature (T<sub>S</sub>)----- - 65°C to + 150°C
- Lead Temperature (Soldering, 10sec.) ----- +260°C
- Power Dissipation @ T<sub>A</sub>=25°C, (P<sub>D</sub>)
  - SOP-8 ----- 1.39W
- Package Thermal Resistance, (θ<sub>JA</sub>):
  - SOP-8----- 90°C/W
- Package Thermal Resistance, (θ<sub>JC</sub>):
  - SOP-8----- 39°C/W

Note1 : Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device.

## Recommended Operating Conditions

- Input Supply Voltage (VDD)----- 3.2V ~ 6.4V
- Operation Temperature Range (T<sub>OPR</sub>) ----- -40°C to +85°C

Note : Over operating free-air temperature range (unless otherwise noted)

## Electrical Characteristics

(VDD=5V, T<sub>A</sub>=25°C and the recommended supply voltage range, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Input Power</b>						
VDD Input Voltage Range	V <sub>DD</sub>		3.2		6.4	V
Input UVLO Threshold	V <sub>UVLO(VTH)</sub>	V <sub>DD</sub> Falling	2.5		2.9	V
VDD Supply Current		V <sub>DD</sub> =5V, Measure V <sub>DD</sub> .		200		μA
VDD Shunt Voltage	V <sub>DD(SHUNT)</sub>	I <sub>VDD</sub> = 3mA	5.9	6.4	6.8	V
<b>High Voltage Dedicated Charging Port (HVDCP)</b>						
Data Detect Voltage	V <sub>DATA(REF)</sub>		0.25	0.325	0.4	V
Output voltage selection reference	V <sub>SEL_REF</sub>		1.8	2.0	2.2	V
D+ High Glitch Filter Time	T <sub>GLITCH(BC)-D+_H</sub>		1000	1250	1500	ms
D- Low Glitch Filter Time	T <sub>GLITCH(BC)-D-_L</sub>			1		ms
Output Voltage Glitch Filter Time	T <sub>GLITCH(V)CHANGE</sub>		20	40	60	ms
D- Pull-Down Resistance	R <sub>D-(DWN)</sub>			20		KΩ
Continuous Mode Glitch Filter Time	T <sub>GLITCH-CON T-CHANGE</sub>		100		200	μs
D+ Leakage Resistance	R <sub>DATA-LKG</sub>	V <sub>DD</sub> =3.2-6.4V, VD+=0.6-3.6V Switch SW1=Off	300	500	800	KΩ
Switch SW1 on-resistance	R <sub>DS_ON_N1</sub>	V <sub>DD</sub> =5V, SW1= 200μA			40	Ω
Up/Down Current Step	I <sub>UP</sub> , I <sub>DOWN</sub>	I <sub>UP</sub> = 40μA (9V), 70μA (12V), I <sub>DOWN</sub> = 14μA (3.6V)		2		μA
<b>DCP 1.2V Charging Mode</b>						
D+ <sub>-1.2V</sub> /D- <sub>-1.2V</sub> line output voltage			1.08	1.2	1.32	V
D+ <sub>-1.2V</sub> /D- <sub>-1.2V</sub> line output Impedance				100		KΩ
<b>Apple 2.4A Mode</b>						
D+ <sub>-2.7V</sub> /D- <sub>-2.7V</sub> line output voltage			2.57	2.7	2.84	V
D+ <sub>-2.7V</sub> /D- <sub>-2.7V</sub> line output Impedance				33.6		KΩ
<b>D- SECTION (FCP)</b>						
D- FCP Tx Valid Output High	V <sub>TX-VOH</sub>		2.55		3.6	V
D- FCP Tx Valid Output Low	V <sub>TX-VOL</sub>				0.3	V
D- FCP Rx Valid Output High	V <sub>RX-VIH</sub>		1.4		3.6	V
D- FCP Rx Valid Output Low	V <sub>RX-VIL</sub>				1.0	V

## Electrical Characteristics(Continued)

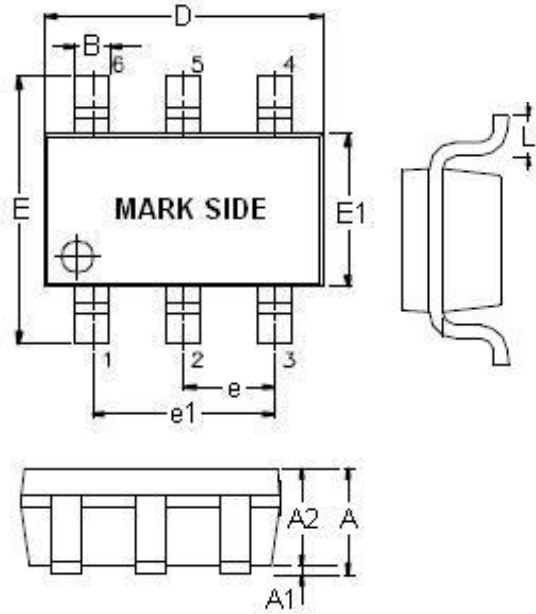
(VDD=5V, T<sub>A</sub>=25°C and the recommended supply voltage range, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
D- Output Pull-Low Resistance (FCP)	R <sub>PD</sub>		400	500	600	Ω
Unit Interval For FCP PHY communication	UI	f <sub>CLK</sub> = 125KHz	144	160	176	μs

Note : Not production tested.

Outline Information

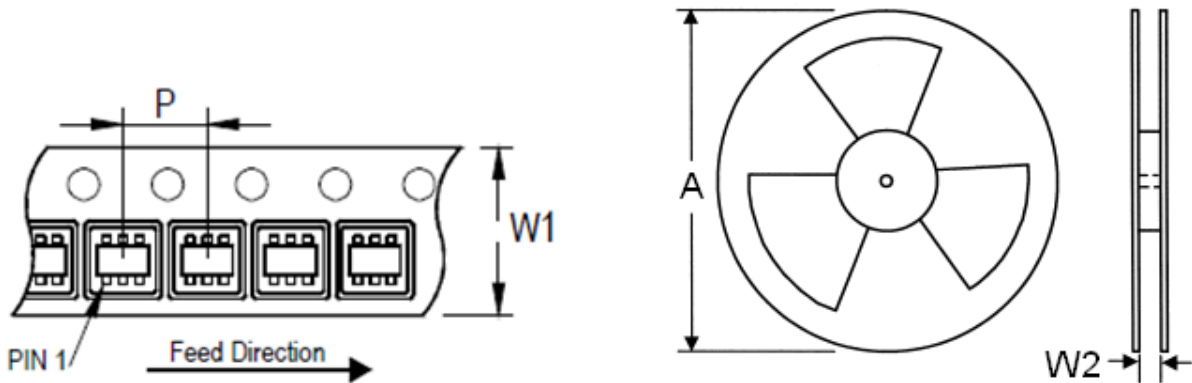
SOT-23-6 Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	0.90	1.45
A1	0.00	0.15
A2	0.90	1.30
B	0.30	0.50
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.70
e	0.90	1.00
e1	1.80	2.00
L	0.30	0.60

Note : Followed From JEDEC MO-178-C.

Carrier Dimensions



Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
8	4	7	180	8.4	300~1000	3,000

Life Support Policy

Fitipower's products are not authorized for use as critical components in life support devices or other medical systems.