USB Charger Adapter Emulator with QC2.0/3.0 Fast Controller Function **Preliminary** **UC2611**

The UC2611 is a fast charge protocol controller for HiSilicon Fast Charging Protocol (FCP) and Qualcomm® Quick ChargeTM 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.

UC2611 can support not only USB BC compliant devices, but also Apple / Samsung / HUAWEI devices and automatically detects whether a connected powered device is QC 2.0/3.0 or FCP capable before enabling output voltage adjustment. If a PD not compliant to QC 2.0/3.0 or FCP is detected the UC2611 disables output voltage adjustment to ensure safe operation with legacy 5 V only USB PDs.

The UC2611 is available in a space-saving SOT-23-6 package

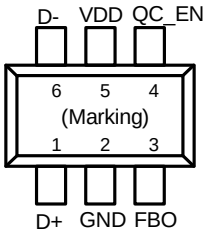
APPLICATIONS

- Mobile Power Supply
- USB Wall Adapter
- Travel Charger
- In-Car Charger

DESCRIPTION

- Support HiSilicon Fast Charging Protocol (FCP) for Output Voltage and Current Communication
- Support Qualcomm® Quick ChargeTM 2.0/3.0
- Class A : 3.6V up to 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 Package

UC2611 SOT23-6 PACKAGE



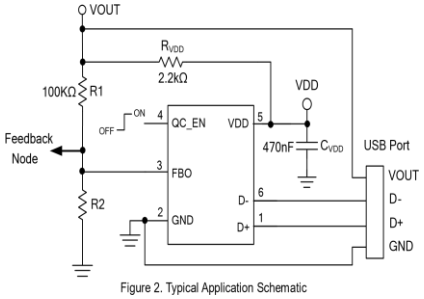


Figure 2. Typical Application Schematic

ORDING INFORMATION

Part Number	Package Type	Package Qty	Op Temp(°C)
UC2611	SOT23-6	3000	-40~85

Functional Pin Description

Pin Name	Pin No. (SOT-23-6)	Pin Function
D+	1	USB D+ data line input pin. 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 pin. Current Sink/Source FB Node.
QC_EN	4	QC_Enable: High-Z with QC2.0/3.0 and FCP function; logic low disable QC2.0/3.0 and FCP function.
VDD	5	Power supply input pin.
D-	6	USB D- data line input pin.

ABSOLUTE MAXIMUM RATINGS (1)

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

PARAMETER		MIN	MAX	UNIT
supply voltage range	IN	-0.3	6.5	V
Input voltage range	All other pins voltage	-0.3	6.5	
	DP, DM		2	
Operating Junction Temperature	TJ	-40	125	°C
Storage Temperature Range	Tstg	-65	150	

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

THERMAL CHARACTERISTICS

over operating free-air temperature range (unless otherwise noted)

THERMAL METRIC			UNIT
θ_{JA}	Package thermal impedance(1)	180	°C/W

(1) The package thermal impedance is calculated in accordance with JESD 51-7.

RECOMMENDED OPERATING CONDITIONS

PARAMETER		MIN	MAX	UNIT
VIN	Input voltage of IN	3.2	6.4	V
TJ	Operating Junction Temperature	-40	125	°C

ELECTRICAL CHARACTERISTICS

(VDD=5V, T_A=25℃ and the recommended supply voltage range, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input Power						
VDD Input Voltage Range	V_{DD}		3.2		6.4	V
Input UVLO Threshold	$V_{UVLO(VTH)}$	V_{DD} Falling	2.5		2.9	V
VDD Supply Current		V_{DD} =5V, Measure V_{DD}		200		μA
VDD Shunt Voltage	$V_{DD(SHUNT)}$	IV_{DD} = 3mA	5.9	6.4	6.8	V
High Voltage Dedicated Charging Port (H VDCP)						
Data Detect Voltage	$V_{DAT(REF)}$		0.25	0.325	0.4	V
Output Voltage Selection Reference	V_{SEL_REF}		1.8	2.0	2.2	V
D+ High Glitch Filter Time	$T_{GLITCH(BC)D+\_H}$		1000	1250	1500	ms
D- Low Glitch Filter Time	$T_{GLITCH(BC)-D-\_L}$			1		ms
Output Voltage Glitch Filter Time	$T_{GLITCH(V)CHANGE}$		20	40	60	ms
D- Pull-Down Resistance	$R_{D-(DWN)}$			20		kΩ
Continuous Mode Glitch Filter Time (Note 4)	$T_{GLITCH-CONT-CHANGE}$		100		200	μs
D+ Leakage Resistance	$R_{DAT-LKG}$	V_{DD} =3.2-6.4V,VD+=0.6-3.6V Switch SW1=Off	300	500	800	kΩ
Switch SW1 On-Resistance	$R_{DS\_ON\_N1}$	V_{DD} =5V,SW1= 200μA			40	Ω
Up/Down Current Step	I_{UP}, I_{DOWN}	I_{UP} = 40μA (9V), 70μA (12V), I_{DOWN} = 14μA (3.6V)		2		μA
DCP 1.2V Charging Mode						

$D+_{\_1.2V}$/$D-_{\_1.2V}$ Line Output Voltage			1.08	1.2	1.32	V
$D+_{\_1.2V}$/$D-_{\_1.2V}$ Line Output Impedance				100		kΩ
Apple 2.4A Mode						
$D+_{\_2.7V}$/$D-_{\_2.7V}$ Line Output Voltage			2.54	2.7	2.86	V
$D+_{\_2.7V}$/$D-_{\_2.7V}$ Line Output Impedance				33.6		kΩ
D- SECTION (FCP)						
D- FCP Tx Valid Output High	V_{TX-VOH}		2.55		3.6	V
D- FCP Tx Valid Output Low	V_{TX-VOL}				0.3	V
D- FCP Rx Valid Output High	V_{RX-VIH}		1.4		3.6	V
D- FCP Rx Valid Output Low	V_{RX-VIL}				1.0	V

Electrical Characteristics (Continued)

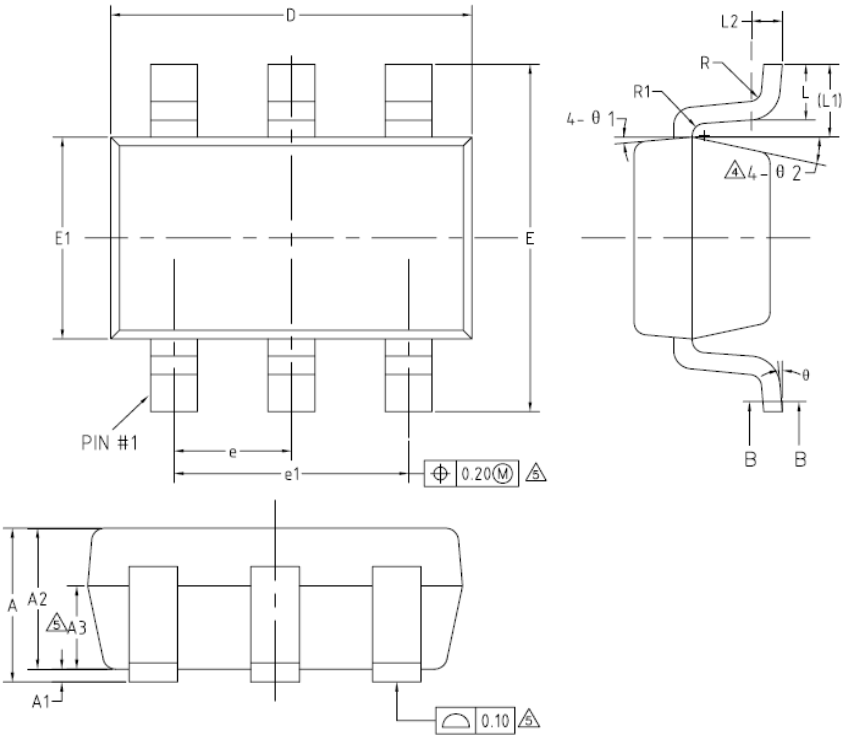
(VDD=5V, T_A=25℃ and the recommended supply voltage range, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
D- Output Pull-Low Resistance (FCP) (Note 4)	R_{PD}		400	500	600	Ω
Unit Interval For FCP PHY Communication	UI	f_{CLK} = 125kHz	144	160	180	μs

Note 4：Not production tested.

Package information

SOT23-6



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

	SYMBOL	MIN	NOM	MAX
	A	–	–	1.25
	A1	0	–	0.15
	A2	1.00	1.10	1.20
	A3	0.60	0.65	0.70
	b	0.36	–	0.50
	b1	0.36	0.38	0.45
	c	0.14	–	0.20
	c1	0.14	0.15	0.16
	D	2.826	2.926	3.026
	E	2.60	2.80	3.00
	E1	1.526	1.626	1.726
4	e	0.90	0.95	1.00
4	e1	1.80	1.90	2.00
	L	0.35	0.45	0.60
	L1	0.59REF		
	L2	0.25BSC		
5	R	0.10	–	–
5	R1	0.10	–	0.20
	θ	0°	–	8°
	θ 1	3°	5°	7°
4	θ 2	6°	–	14°