

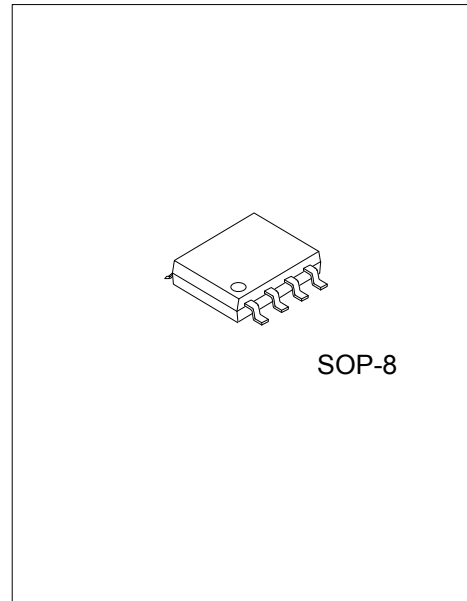


## UCHQ200

Preliminary

CMOS IC

### USB DEDICATED CHARGING PORT CONTROLLER WITH QC 2.0 FAST CHARGING FUNCTION



#### DESCRIPTION

The UTC **UCHQ200** is a fast charge protocol controller and follows Quick Charge 2.0 specification for smart power bank application. The protocol feature monitors USB D+/D- data line voltage, and automatically adjusts output voltage of power bank and wall adaptor to optimize charge time.

UTC **UCHQ200** is a high performance solution for fast-charging mechanism and it saves charging time. It supports the full output voltage range of either Class A or Class B. Optionally Class B can be inhibited for protecting the battery charger from accidental damage.

UTC **UCHQ200** can support not only USB BC compliant devices, but also Apple / Samsung devices and automatically detects whether a connected powered device (PD) is Quick Charge 2.0 capable before enabling output voltage adjustment. If a PD not compliant to Quick Charge 2.0 is detected the **UCHQ200** disables output voltage adjustment to ensure safe operation with legacy 5V only USB P<sub>DS</sub>.

#### FEATURES

- \* Fully Supports Quick Charge 2.0 specification:
  - Class A: 5V, 9V, 12V Output Voltage.
  - Class B: 5V, 9V, 12V, 20V Output Voltage.
- \* 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.
- \* Automatic selection of D+/D- mode for an attached device.
- \* Compliant with Apple and Samsung devices.

#### ORDERING INFORMATION

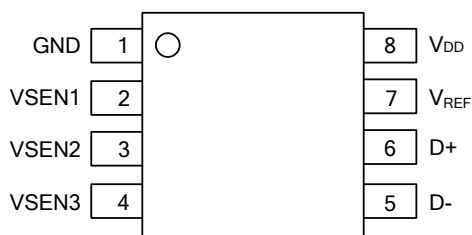
Ordering Number	Package	Packing
UCHQ200G-S08-R	SOP-8	Tape Reel

<p>UCHQ200G-S08-R</p> <ul style="list-style-type: none"> <li>(1) Packing Type</li> <li>(2) Package Type</li> <li>(3) Green Package</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) S08: SOP-8</li> <li>(3) G: Halogen Free and Lead Free</li> </ul>
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### MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOP-8	05: 5.0V 09: 9.0V 12: 12V 20: 20V	

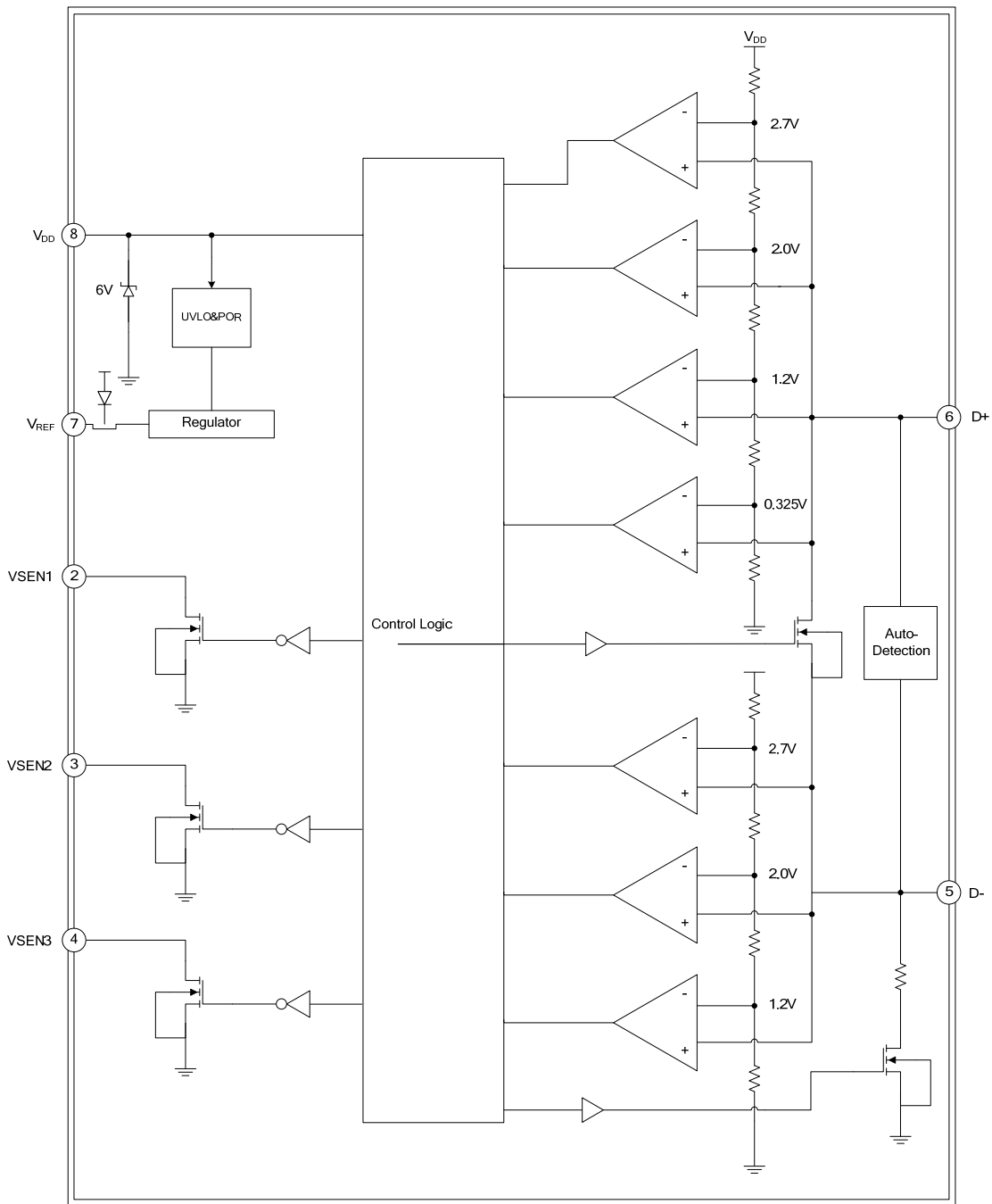
### PIN CONFIGURATION



### PIN DISCRIPTION

PIN NO	PIN NAME	DESCRIPTION
1	GND	Ground Pin.
2	VSEN1	Open Drain Output of output voltage adjustment switch. Active for 9V, 12V, 20V output setting.
3	VSEN2	Open Drain Output of output voltage adjustment switch. Active for 12V, 20V output setting.
4	VSEN3	Open Drain Output of output voltage adjustment switch. Active for 20V output setting.
5	D-	USB D- data line input
6	D+	USB D+ data line input
7	V <sub>REF</sub>	Internal Reference Voltage Output Pin. It must be with a resistor to GND
8	V <sub>DD</sub>	Power Supply Input Pin.

■ BLOCK DIAGRAM



■ OUTPUT VOLTAGE LOOKUP TABLE

D+	D-	Output Voltage	Internal Switch Setting		
			SW1	SW2	SW3
3.3V	3.3V	20V	0	0	0
0.6V	0.6V	12V	0	0	1
3.3V	0.6V	9V	0	1	1
0.6V	GND	5V(Default)	1	1	1

Note: 1 represent the NMOS are OFF, 0 represent the NMOS are ON.

### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Input Supply Voltage	$V_{DD}$	-0.3 ~ +8.0	V
All Other Pins Voltage		-0.3 ~ +8.0	V
Storage Temperature	$T_S$	-65 ~ + 150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Supply Voltage	$V_{DD}$	Operating	4.0		6.0	V
Operating Temperature Range	$T_{OPR}$		-40		+85	°C

### ■ ELECTRICAL CHARACTERISTICS ( $V_{DD}=5V$ , $T_A=25^\circ C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range	$V_{DD}$		4		6	V
Input UVLO Threshold	$V_{UVLO(VTH)}$	$V_{DD}$ Rising	2.0		4.2	V
$V_{DD}$ Supply Current		$V_{DD}=5V$ , Measure $V_{DD}$ , SW1=SW2=SW3=off		600		uA
$V_{DD}$ Shunt Voltage	$V_{DD(SHUNT)}$	$I_{VDD}=3mA$		6.4		V
Reference Voltage Output	$V_R$		1.18	1.23	1.28	V
<b>High Voltage Dedicated Charging Port (HVDACP)</b>						
Data Detect Voltage	$V_{DAT(REF)}$		0.25	0.325	0.4	V
D+ High Glitch Filter Time	$T_{GLITCH(BC)-D+ H}$		1000	1250	1500	ms
Output Voltage Glitch Filter Time	$T_{GLITCH(V)CHANGE}$		20	40	60	ms
D- Pull-Down Resistance	$R_{D-(DWN)}$			20		kΩ
Switch SW1 on-resistance	$R_{DS ON N1}$	SW1=200uA			300	Ω
Switch SW2 on-resistance	$R_{DS ON N2}$	SW2=200uA			300	Ω
Switch SW3 on-resistance	$R_{DS ON N3}$	SW3=200uA			300	Ω
Switch SW5 on-resistance	$R_{DS ON N5}$	SW5=200uA			40	Ω
<b>DCP 1.2V Charging Mode</b>						
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
<b>Apple 2.4A Mode</b>						
D+ 2.7V/D- 2.7V line output voltage			2.57	2.7	2.84	V
D+ 2.7V/D- 2.7V line output Impedance				33.6		kΩ

## ■ APPLICATION INFORMATION

### Function Description

The UTC **UCHQ200** is a USB Dedicated Charging Port Controller can fast charge most of the handheld devices. It can be like the original charging adapter. The **UCHQ200** can support BC1.2, Apple Divider mode, Samsung device.

The UTC **UCHQ200** is a low cost USB high voltage dedicated charging port interface IC for Quick Charge 2.0 specification. It also supports full output voltage range of Quick Charge 2.0 Class A or Class B.

### Quick Charge 2.0 Interface

Power up D+/D- is supply 2.7V to Apple Device and then supply D+ short to D- into BC1.2. Set the output voltage level 5V. If D+ continuous above 0.325V and keep 1.25 seconds **UCHQ200** into Quick Charge 2.0 operation mode.

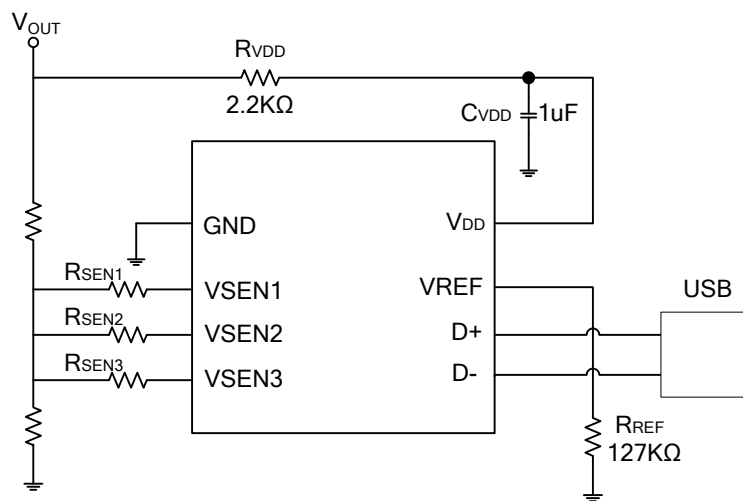
The output voltage (12V) can be inhibited by connect VSEN2 to V<sub>DD</sub>. The output voltage (20V) can be inhibited by connect VSEN3 to V<sub>DD</sub>.

If P<sub>D</sub> without QC 2.0 the device will keep output voltage level 5V guarantee safe operation for only 5V USB PD.

### Shunt Regulator

The wide power supply output voltage through external resistor from RV<sub>DD</sub> to VIN. The internal with Zener-Diode clamp V<sub>IN</sub> pin at 6.4V. RV<sub>DD</sub>=2.2K $\Omega$  and CV<sub>DD</sub>=1 $\mu$ F. R<sub>REF</sub>=127 K $\Omega$ .

■ APPLICATION CIRCUIT



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