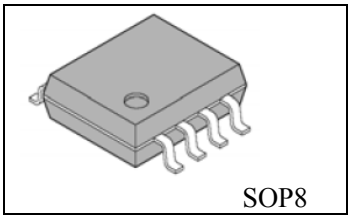
General Description

The HM6600 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.


SOP8

HM6600 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.

HM6600 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 HM6600 disables output voltage adjustment to ensure safe operation with legacy 5 V only USB PDs.

The HM6600 is available in space-saving SOP8 package.

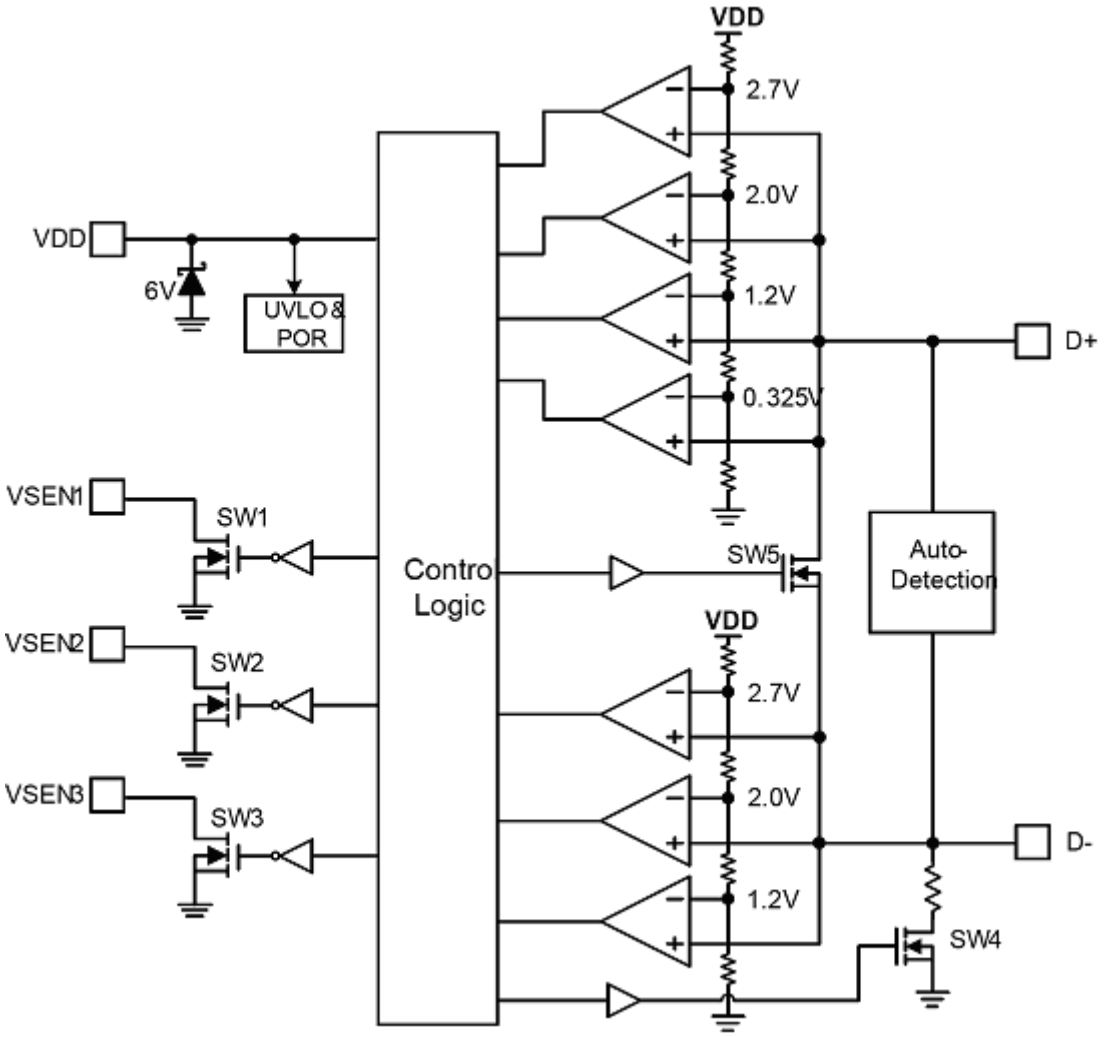
Features

- Input Voltage Range from 4V to 6V
- 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
- Complaint with Apple® and Samsung devices

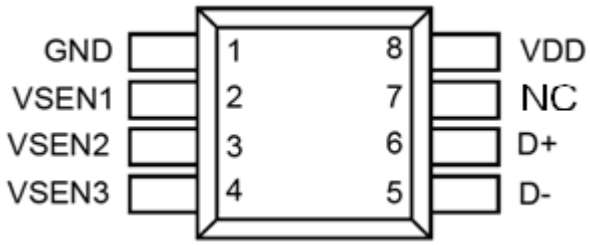
Applications

- Wall-Adapter/Power Plugs, Outlets
- Mobile/Tablet Power Bank
- Car Charger
- USB Power Output Ports

Functional Block Diagram



Pin Configuration



Pin Description

Pin Number	Pin Name	Function 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	NC	NC
8	VDD	Power Supply Input Pin.

Absolute Maximum Ratings

Parameter Name	Symbol	Value	Unit
Input Supply Voltage	VDD	-0.3~+8	V
All Other Pins Voltage		-0.3~+8	V
Maximum Junction Temperature	T_J	150	℃
Storage Temperature	T_S	-65~+150	℃
Lead Temperature (Soldering, 10sec.)		260	℃
Power Dissipation @TA=25℃	P_D	1.39	W
Package Thermal Resistance	θ_{JA}	90	℃/W
	θ_{JC}	39	℃/W

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

Recommended Operating Conditions

Parameter Name	Symbol	Value	Unit
Input Supply Voltage	VDD	4~6	V
Operating temperature range	Topr	-40~+85	℃

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

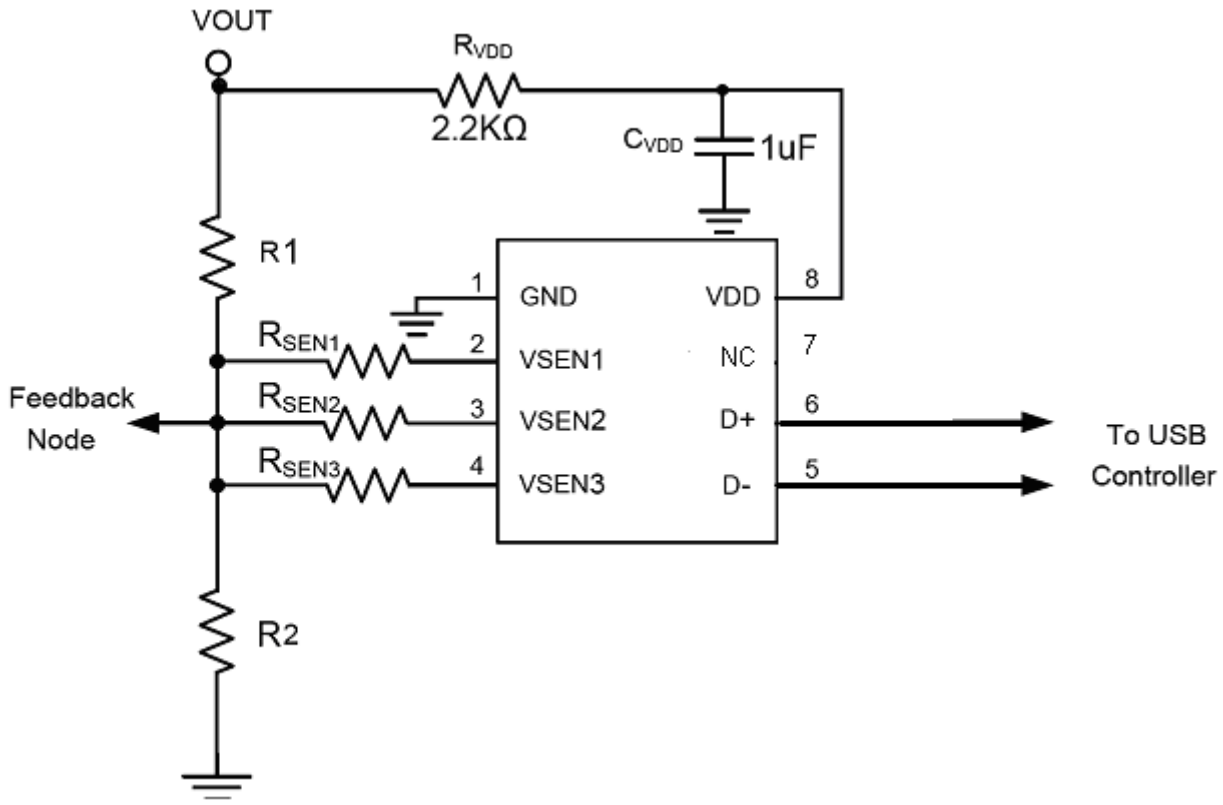
Electrical Characteristics

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

Parameter Name	Symbol	Test Conditions	Min	Typ	Max	Units
Input Power						
VDD Input Voltage Range	V_{DD}	V_{DD} Rising	4		6	V
Input UVLO Threshold	$V_{UVLO(VTH)}$	V_{DD} =5V,Measure V_{DD} SW1=SW2=SW3=Off	2.0		3.9	V
VDD Supply Current				120		μA
VDD Shunt Voltage	$V_{DD(SHUNT)}$		TBD	TBD	TBD	V
High Voltage Dedicated Charging Port (HVDCP)						
20V Output Inhibit Threshold	V_{DDH}		V_{DD} -1.0			V
Data Detect Voltage	$V_{DAT(REF)}$		0.3	0.35	0.4	V
Output Voltage Selection Reference	V_{SEL_REF}		1.0	1.2	1.4	V
Data Lines Short-Circuit Delay	$T_{DAT(SHORT)}$	VOUT≥0.8V		10	20	ms
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	$R_{D-(DWN)}$		5.0	6.5	8.0	kΩ
Switch SW1 on-resistance	$R_{DS_ON_N1}$	SW1=200μA			300	Ω
Switch SW2 on-resistance	$R_{DS_ON_N2}$	SW2=200μA			300	Ω
Switch SW3 on-resistance	$R_{DS_ON_N3}$	SW3=200μA			300	Ω
Switch SW5 on-resistance	$R_{DS_ON_N5}$	SW5=200μA		80	150	Ω
DCP 1.2V Charging Mode						
$D+_{_1.2V}$/$D-_{_1.2V}$ Line Output Voltage			1.15	1.25	1.30	V
$D+_{_1.2V}$/$D-_{_1.2V}$ Line Output Impedance				102		kΩ
Apple 2.4A Mode						
$D+_{_2.7V}$/$D-_{_2.7V}$ Line Output Voltage			2.57	2.70	2.84	V
$D+_{_2.7V}$/$D-_{_2.7V}$ Line Output Impedance				28		kΩ

* Not production tested.

Typical Application



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

* represent the NMOS are OFF, 0 represent the NMOS are ON.

Application Information

Function Description

The HM6600 is a USB Dedicated Charging Port Controller can fast charge most of the handheld devices. It can be like the original charging adapter. The HM6600 can support BC1.2, Apple Divider mode, Samsung Device.
The HM6600 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.

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 0.4V and keep 1.25 secons HM6600 into Quick Charge 2.0 operation mode.

The output voltage(12V) can be inhibited by connect VSEN2 to VDD. If PD 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 RVDD to VIN. The internal with Zener-Diode clamp VIN pin at 7.5V. RVDD =2.2KΩ and CVDD=1uF

Outline Dimensions

SOP8 Unit：mm

