

HL7139

Dual Phase 40W Charge Pump Charger

Overview

The HL7139 is the low voltage fast direct charger for 1 cell Li-ion and Li-polymer batteries. The device integrates a dual phase switched capacitor converter and reverse blocking MOSFET (QRB FET). The HL7139 has 97.4% efficiency at 4.5V output and 5A current with 2x22uF per phase.

The switched capacitor converter architecture and the integrated FETs in device are optimized to enable 50% duty cycle operation under charge pump (CP) mode. The 2:1 CP mode allows output voltage (VOUT) to be around half of the input voltage (VIN) and output current to double the input current, reducing input power cable loss and limiting temperature rise in application. The dual-phase architecture reduces input capacitance requirements and input voltage ripple. Besides the CP mode, the device also has bypass (BP) mode. The BP mode allows VIN forwardly passing through internal power FETs to VOUT without any conversion.

The HL7139 provides CC (Constant Current) and CV (Constant Voltage) regulations through controlling the QRB FET for safe charging operation. The CC regulation is controlled through a closed loop of input current sensing or battery current sensing. The CV regulation is controlled through a closed loop of battery voltage sensing. In addition, the HL7139 also supports thermal regulation loop in case the CV/CC regulation causes overheating device.

The HL7139 has all the necessary protections to ensure the safe operation. The device includes OTP (Over-Temperature Protection), VIN UVP/OVP, IIN OCP/UCP, VOUT OVP/UVP, VBAT OVP, IBAT OCP, PMID to VOUT OV/UV, CFLY SCP (Short Circuit Protection), VIN SCP, VOUT SCP and watchdog timer.

Besides all the protections above, the HL7139 also features 12-bit ADC that can offer VIN, IIN, VOUT, VBAT, IBAT, VTS, TDIE information to system for optimizing charging control.

The HL7139 is available in a 36-bump WLCSP package with 2.65mm x 2.61mm size.

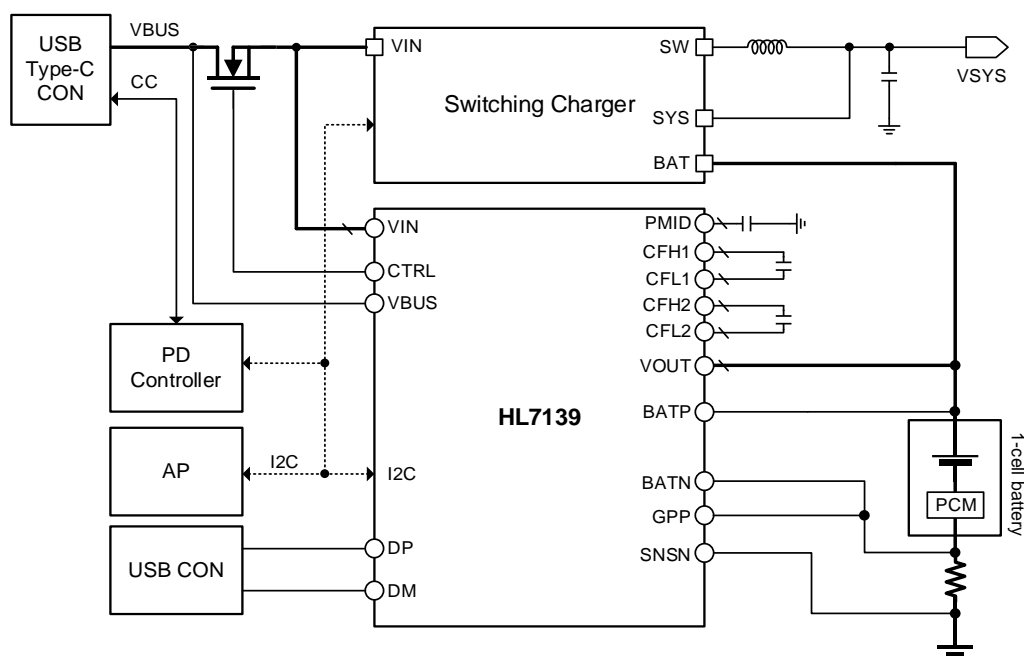
Features

- High reliable AMR input/output pins
 - 37V AMR on VBUS
 - 22V AMR on VIN pin
 - 7V AMR on VOUT, BATH
- Built-in external input NFET control
- Wide range operating voltage
 - 3V to 11.7V Operational VIN voltage
 - 5.5V Max operational output voltage
- Dual conversion modes
 - 2:1 Charge pump mode (CP mode)
 - Optimized for 50% duty
 - 1:1 Bypass mode (BP mode)
- High efficiency charge pump
 - 97.4% Efficiency for VOUT = 4.5V_5A with 2x22uF
 - 97.6% Efficiency for VOUT = 4.5V_5A with 3x22uF
- Regulation loop for charging operation through QRB FET control.
 - Input current regulation
 - Battery voltage regulation
 - Battery current regulation
 - Thermal regulation
- Selectable switching frequency from 500kHz to 1.6MHz
- Integrated 12-bit ADC
 - Input voltage (VIN)
 - Input current (IIN)
 - Output voltage (VOUT)
 - Battery voltage (VBAT)
 - Battery current (IBAT)
 - NTC temperature (TS voltage)
 - Die temperature (TDIE)
- Multi protection layers
 - Over die temperature protection
 - VIN over/under voltage protection
 - Voltage tracking protection
 - Input over/under current protection
 - VOUT over voltage protection
 - VBAT over voltage protection
 - IBAT over current protection
 - VOUT short circuit protection
 - VIN short circuit protection
 - CFLY short circuit protection
 - NTC protection
- Integrated customized proprietary protocol
- 2.65mm x 2.61mm 36-bump WLCSP

Applications

- Smartphones
- Tablet PC
- Mobile IoT Device

Simplified Application Diagram



Ordering Information

Part Number	I2C Slave Address	Package	Remark
HL7139WL01	0xAA (SNSN = GND) 0xA8 (SNSN = Hi-Z)	36-Bump WLCSP 2.65mm x 2.61mm	
HL7139WL02	0xBE (SNSN = GND) 0xBC (SNSN = Hi-Z)	36-Bump WLCSP 2.65mm x 2.61mm	

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