HL7139A
Dual-Phase 40W Charge Pump Charger

Description

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 capacitive converter and reverse blocking MOSFET (QRB FET) and shows 97.4% efficiency for 4.5V output and 5A charging current with 2x22uF per phase.

The switched capacitor converter architecture of this device and the integrated FET are optimized to enable a 50% duty cycle operation under Charge Pump (CP) Mode. The CP mode allows the output voltage VOUT to be around half of the input voltage VIN and the output current to be double of the input current, reducing the losses over the input power cable as well as limiting the temperature rise in the application. The dual-phase architecture reduces the input capacitance requirements as well as reducing the input voltage ripple. Besides CP Mode, the device also has Bypass (BP) Mode. BP Mode allows VIN forwardly passing through internal power FETs to VOUT without any conversion.
The HL7139 provides CC regulation and CV regulation through controlling the QRB FET for a safe charging operation. CC regulation is controlled through a close loop of the input current sensing or battery current sensing and CV regulation is controlled through a close loop of the battery voltage sensing. In addition, HL7139 also supports thermal regulation loop in case CV/CC loop causing device over-heat during regulation operating.

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

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, BATP
- 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
- 36-Bump, WLCSP 2.65mm x 2.61mm

Applications

- Smartphones
- Tablet PC
- Mobile IoT Devices

Typical Application Diagram

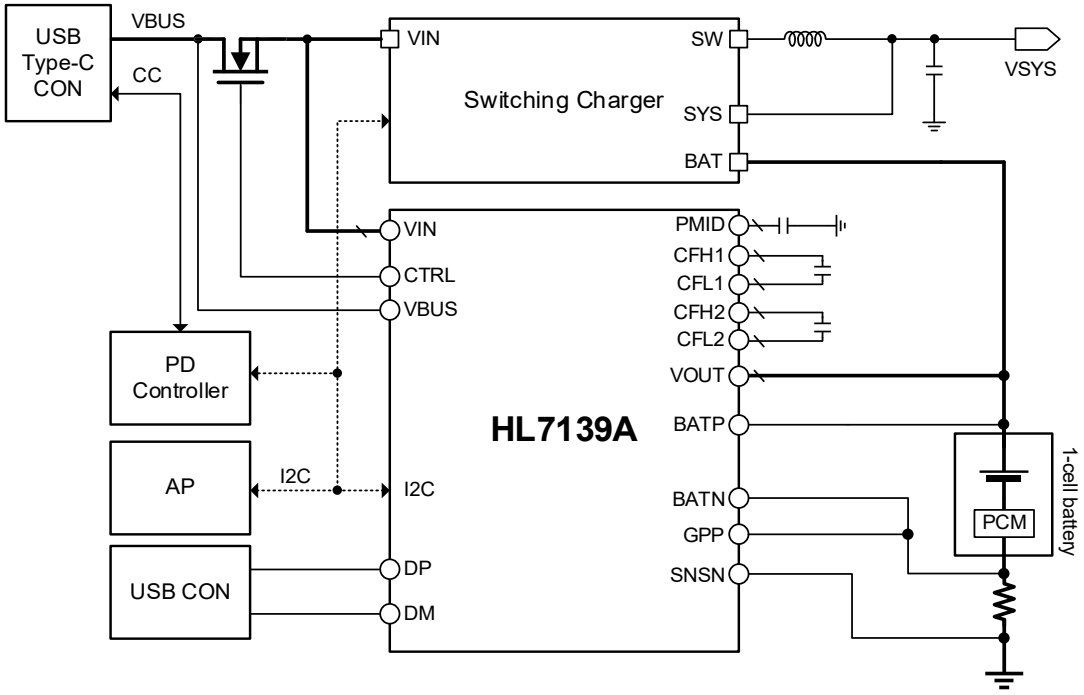

Figure 1. Typical Application Diagram

Order Information

Part Number	I2C Slave Address	Package	Remark
HL7139AWL01	0xBE (SNSN = GND)	36-Bump WLCSP 2.65mm x 2.61mm	

Important Notice

HMI reserves the rights to modify, update, improve, and discontinue its products, services, documentations and more without advance notice. We encourage customers to contact HMI's sales representative for the most up to date product information.

HMI's products, solutions, and documents must not be used for any medical or military purposes without a proper legal authorization from HMI. HMI disclaims any responsibilities and liabilities for personal or property damages arising from such applications.