

HL5099

USB Type-C VBUS Combo Switch with Protection

Description

The HL5099 provides a dual channel VBUS power switches and 3.3V LDO for USB PD application. The device includes a bidirectional high voltage switch which supports up to 22V sink and 6V source voltage, VOTG switch supporting up to 13.2V source voltage and a 100mA 3.3V LDO providing power supply to PD controller in dead battery operation.

Between VBUS and VCHG, back-to-back high voltage switches (HVSW) is implemented, and its AMR is 28V for both pins. The integrated power switch can be configured as a bi-directional switch with an appropriate I²C control or enable pins. In the SINK mode, allowable current is continuous 7A. In the source mode, switch current flows from VCHG to VBUS and maximum allowable current is 3A.

From the VOTG to VBUS (VOTG mode), there is back-to-back power switch which AMR is 16V on VOTG. This switch is to source power from VOTG to VBUS up to 13.2V and 3A continuous current. This power switch has an ideal diode feature and supports fast role swap for USB PD3.0 application.

HL5099 has built-in protections, programmable VBUS over voltage protection, reverse current protection, short current protection, programmable overcurrent protection in SOURCE / VOTG modes, Over temperature protection.

VBUS discharge circuit is integrated to meet USB PD VBUS discharging requirement. To decrease inrush current during normal startup, turn on slew rate control has been built in for both power switches.

It is also possible to set the various parameter and monitor the status of the HL5099 using I²C communication. Source switch selection, OVP threshold and Current Limit Protection level could be set through I²C communication. Various device status could be monitored using I²C including device modes (SINK/SRC/VOTG), protection flag.

The HL5099 is available in a 42-pin WLCSP package.

Features

- USB Type-C VBUS Sink/Source Combo Switch with Protection
- VSYS Input Voltage Range: 2.6V to 5.5V
- AMR of VBUS/VCHG: 28V
- AMR of VOTG: 16V
- Low Rds(on) N-MOS Back-to-Back Switch
 - VBUS to VCHG: 21mΩ
 - VOTG to VBUS: 29mΩ
- Highly reliable VBUS pin protection
 - IEC61000-4-2 (ESD) Contact: ±8kV
 - IEC61000-4-2 (ESD) Air: ±15kV
 - IEC61000-4-5 (Surge): ±100V
- High voltage switch operation
 - Up to 22V Sink voltage from VBUS to VCHG
 - Up to 6V Source voltage from VCHG to VBUS
 - Up to 13.2V Source voltage from VOTG to VBUS
- High current switch current operation
 - Maximum VBUS to VCHG current SINK mode: 7A, 10A/100us peak current
 - Maximum VCHG to VBUS current SOURCE mode: 3A
 - Maximum VOTG to VBUS current VOTG mode: 3A
- Support Fast Role swap
- I²C Programmable VBUS OVP threshold: 6.0V/6.8V/10V/11.5V/14V/17V/23V
- Ultrafast OVP Protection Response Time: 30ns typ
- Integrated 3.3V 100mA LDO from VBUS
- Bypass switch from VSYS to LDO33.
- Built-in protections
 - Over current protection – Programmable
 - Reverse Current Protection
 - Short Circuit Protection
 - Over Temperature Protection
- Safety Certificate
 - UL 62368-1, file no. E527559
 - IEC 62368-1, file no. DK-128489-UL
- 42-Bump, 0.4mm Pitch, 2.49mm × 2.89mm WLCSP

Applications

- Smartphones
- Laptop
- Tablet
- Mobile IoT Devices

Typical Application Diagram

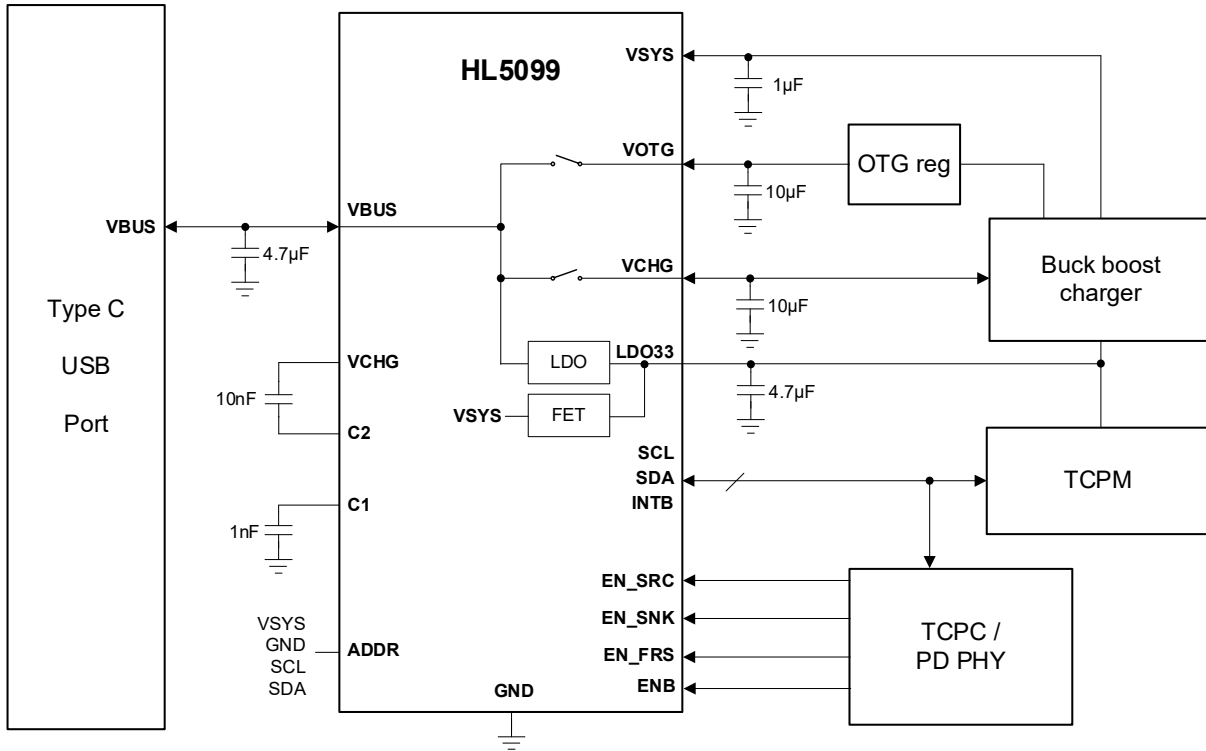


Figure 1. Typical Application Diagram

Order Information

| Part Number | Default VBUS OVP threshold | Package |
|-------------|----------------------------|-------------------------------|
| HL5099WL01 | 6.8V | 42-Bump WLCSP 2.49mm x 2.89mm |
| HL5099WL02 | 23V | 42-Bump WLCSP 2.49mm x 2.89mm |



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