

65 W USB Type-C™ Power Delivery reference design based on VIPERGAN65 and STUSB4761



Features

- Input voltage range: universal AC from 90 to 264 VAC with 47 Hz to 63 Hz frequency
- Maximum output power: 65 W
- Output voltage: single Type-C output 5 VDC÷20 VDC
- Five fixed PDOs: 5 V@3 A, 9 V@3 A, 12 V@3 A, 15 V@3 A, 20 V@3.25 A
- Peak efficiency > 93.5%
- Support for USB Power Delivery protocol
- Key products: PowerGaN IC: VIPERGAN65; SR IC SRK1001

Application

- AC-DC smart chargers for smartphones, tablets, laptops, and other handheld equipment

| Product status link | |
|------------------------------|--|
| EVLVPGAN65PD | |

| Product summary | |
|---|------------------------------|
| 65 W USB PD adaptor | EVLVPGAN65PD |
| PowerGaN IC | VIPERGAN65 |
| Type-C and USB PD controller, programmable VBUS voltage and current protections, high-side current sensing, integrated CC/CV regulation | STUSB4761 |
| Secondary side synchronous rectification controller optimized for flyback | SRK1001 |
| Converter, operating frequency up to 300 kHz | |

Description

The [EVLVPGAN65PD](#) is a 65 W USB Type-C® Power Delivery 3.0 adapter reference design. It is an isolated power supply with a standalone USB PD controller. The evaluation board implements at the primary side a quasi-resonant flyback converter based on the VIPERGAN65 HV converter with optocoupler feedback for voltage regulation. This controller combines a high performance low-voltage PWM controller chip with a 650 V HV startup cell in the same package. The advanced power management with the low quiescent helps to achieve low standby consumptions.

At the secondary side, to increase the system efficiency, the rectification is based on the SRK1001 adaptive synchronous rectification controller.

Also on the secondary side, the CC/CV regulation loop to drive the power regulation stage and the USB Type-C® PD interface is based on the STUSB4761 controller. This controller offers the benefits of a full hardware USB PD stack allowing robust, deterministic, and safe negotiation in line with USB PD standards.

The evaluation board implements a robust adapter protected for output overvoltage, output undervoltage, output over power and output short-circuit. This reference design, based on STMicroelectronics semiconductors, helps designers to develop adapters with a short bill of materials in order to obtain a cost-effective and fast design.

1 Schematics

Figure 1. Input board circuit schematic

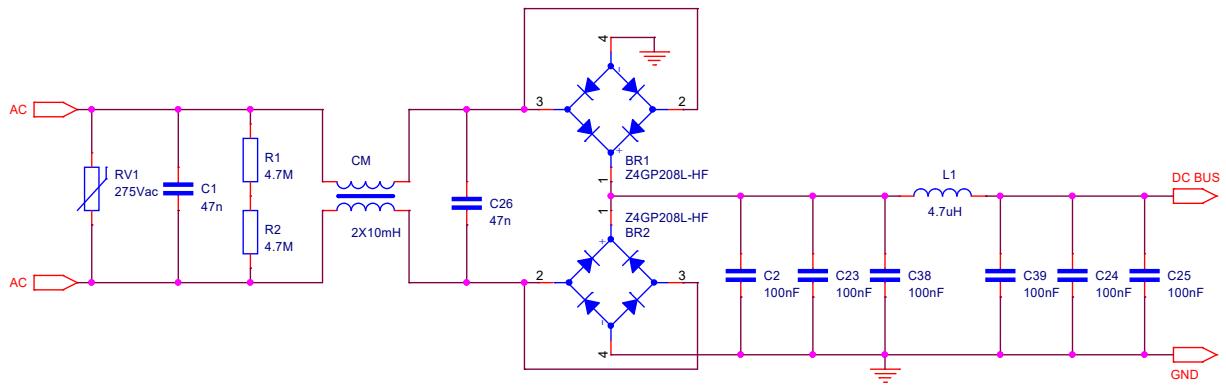


Figure 2. Main board circuit schematic

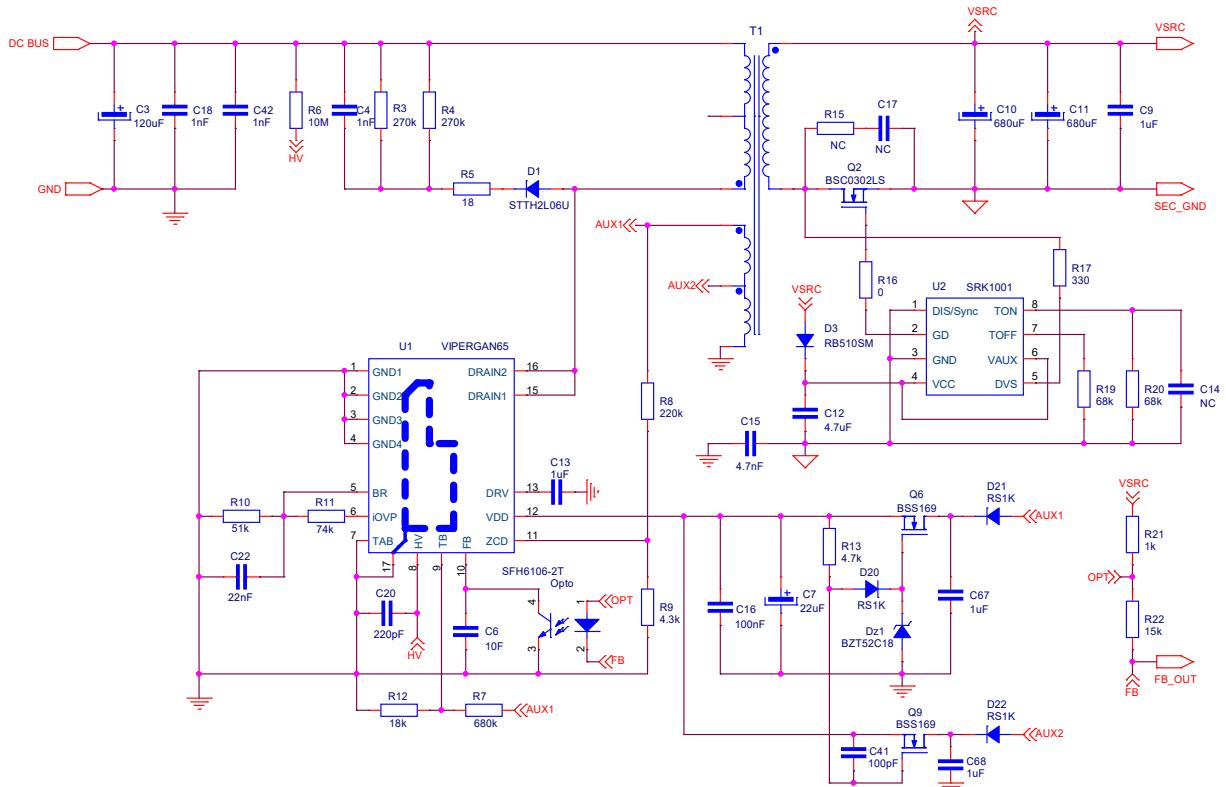
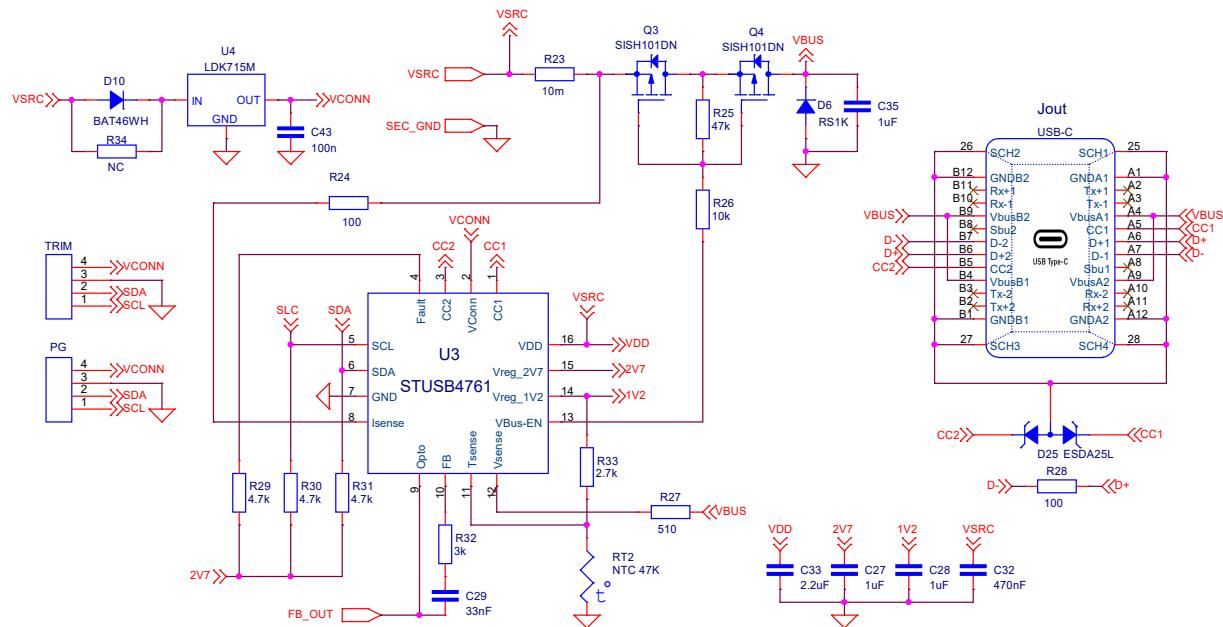


Figure 3. Daughterboard circuit schematic


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Efficiency

Figure 4. Efficiency at 115 Vac

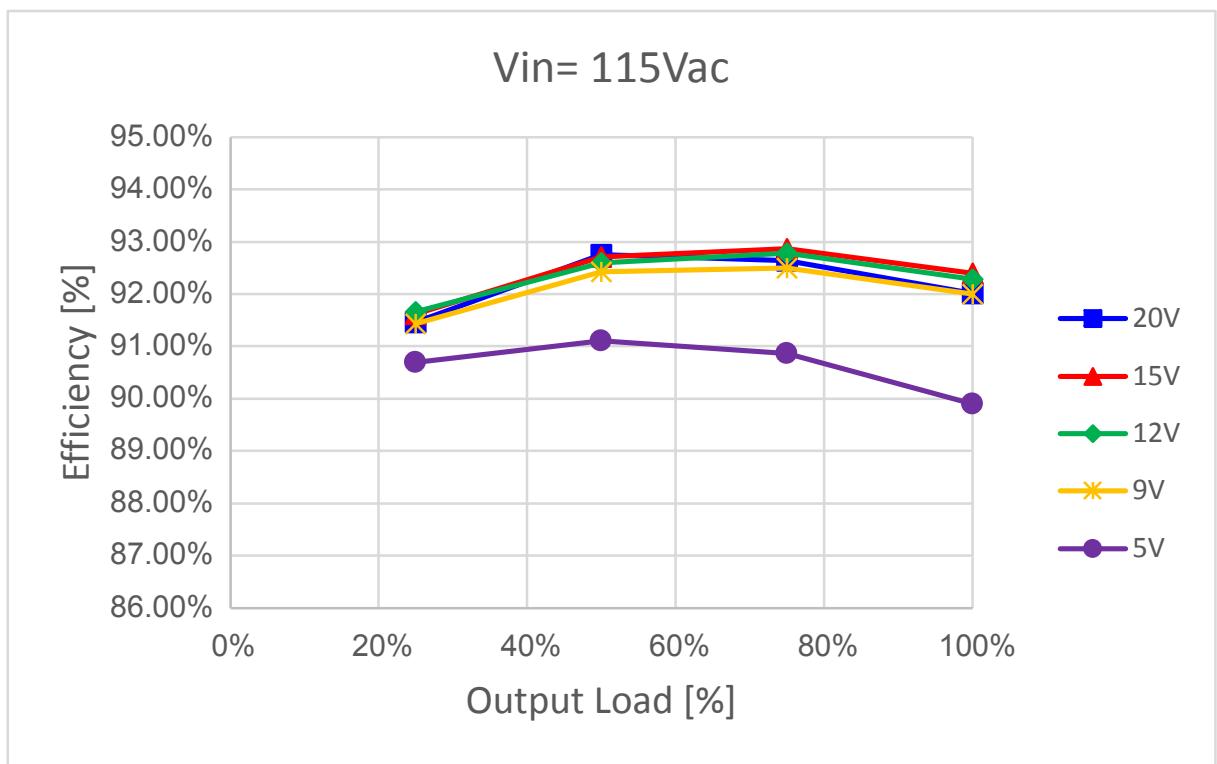
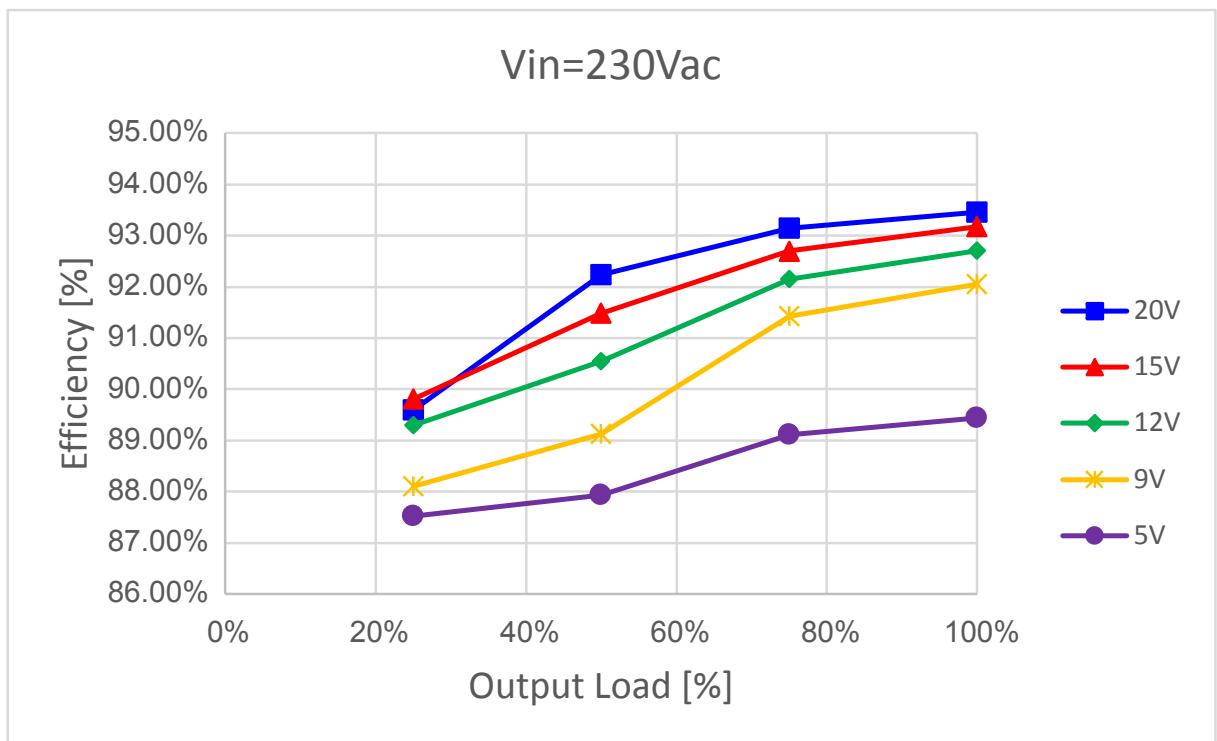


Figure 5. Efficiency at 230 Vac



Revision history

Table 1. Document revision history

| Date | Version | Changes |
|-------------|---------|------------------|
| 05-Sep-2022 | 1 | Initial release. |

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