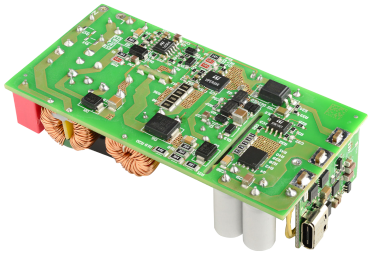
EVLVIPGAN100PD

Data brief

100 W USB Type-C power delivery reference design based on VIPERGAN100



Features

- Input voltage range: Universal AC from 90 to 264 VAC with 47 Hz to 63 Hz frequency
- Maximum output power: 100 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@5 A
- Peak efficiency> 92.6%
- Power density (unboxed): > 24 W/in3
- Support for USB Power Delivery protocol

Application

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

Description

The EVLVIPGAN100PD is a 100 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 STMicroelectronics' VIPerGaN® high-voltage converter VIPERGAN100 with optocoupler feedback for voltage regulation. This controller combines a high performance low-voltage PWM controller chip with a 650 V startup cell in the same package. The advanced power management with the low quiescent helps to achieve low standby consumptions.

To reduce the input mains current distortion, thus providing IDE range mains operation with an extremely low THD, a PFC based on the L6564 is used.

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

Always 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 overpower, and output short-circuit. This reference design helps designers to develop adapters with a short bill of materials in order to obtain a cost-effective and fast design.

Product summary	
100W USB Power delivery reference design	EVLVIPGAN100PD
High-voltage GaN converter	VIPERGAN100
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 converter, operating frequency up to 300 kHz	SRK1001
Current mode PFC controller operating in transition mode	L6564

1 Schematics

Figure 1. Input stage schematic

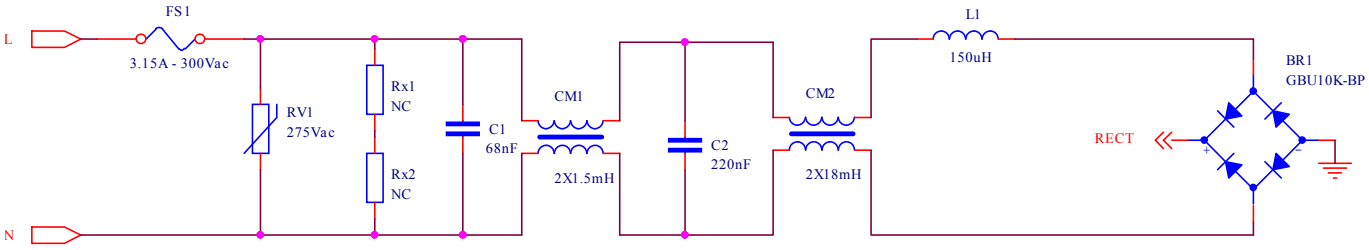


Figure 2. PFC stage schematic

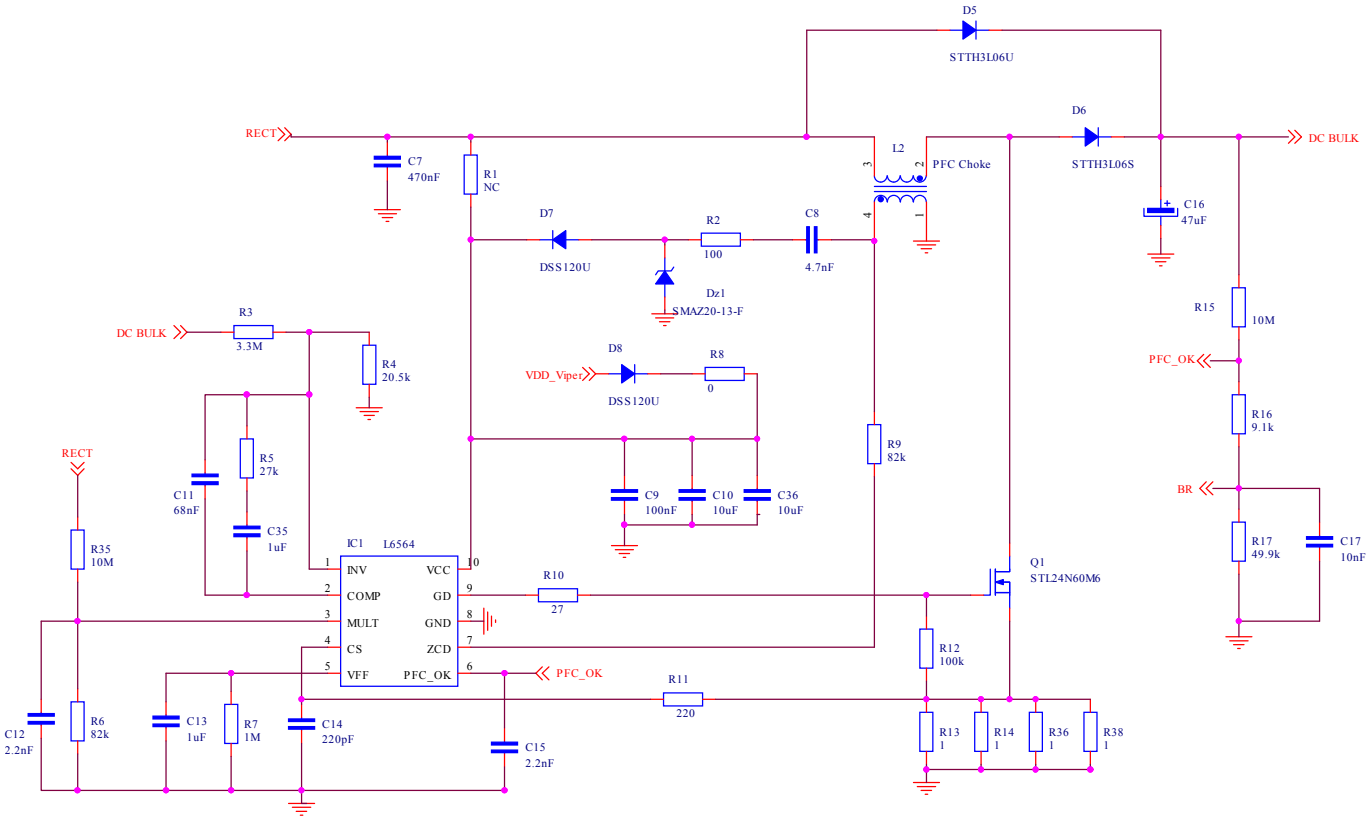


Figure 3. **Flyback stage schematic**

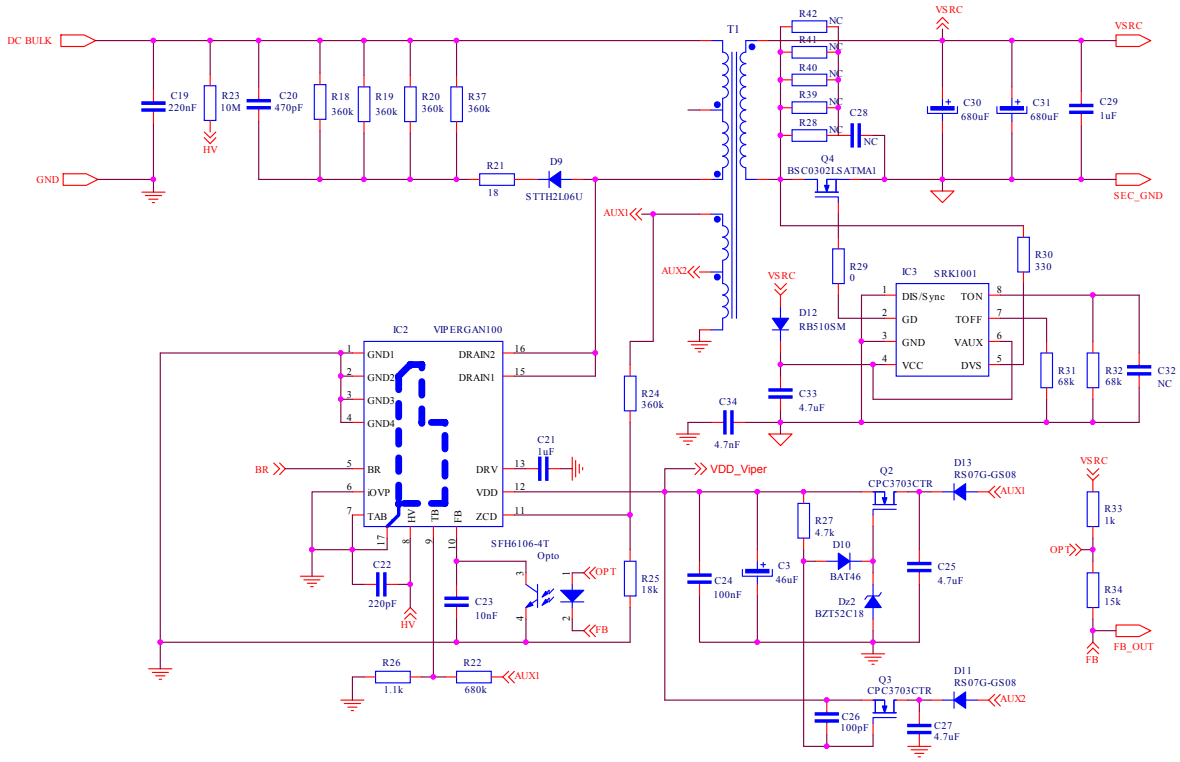
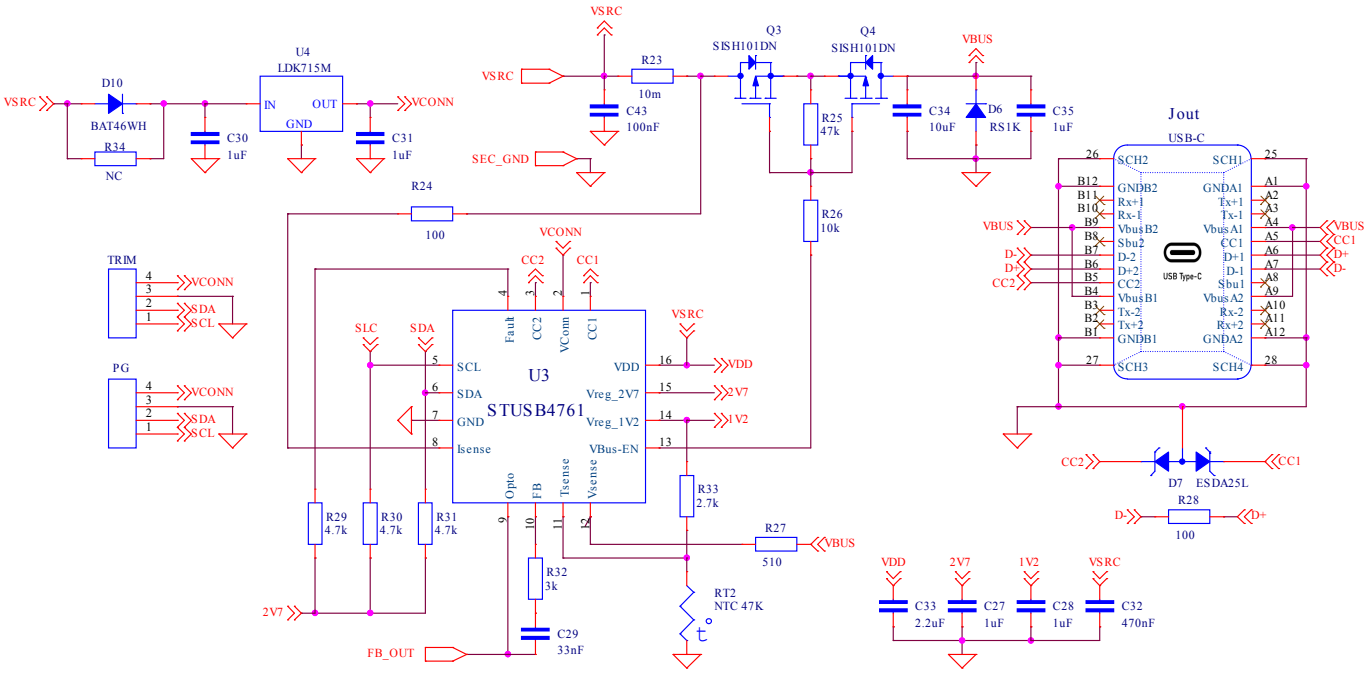


Figure 4. **Daughterboard schematic**



2 Efficiency

Figure 5. **Efficiency at 115 Vac**

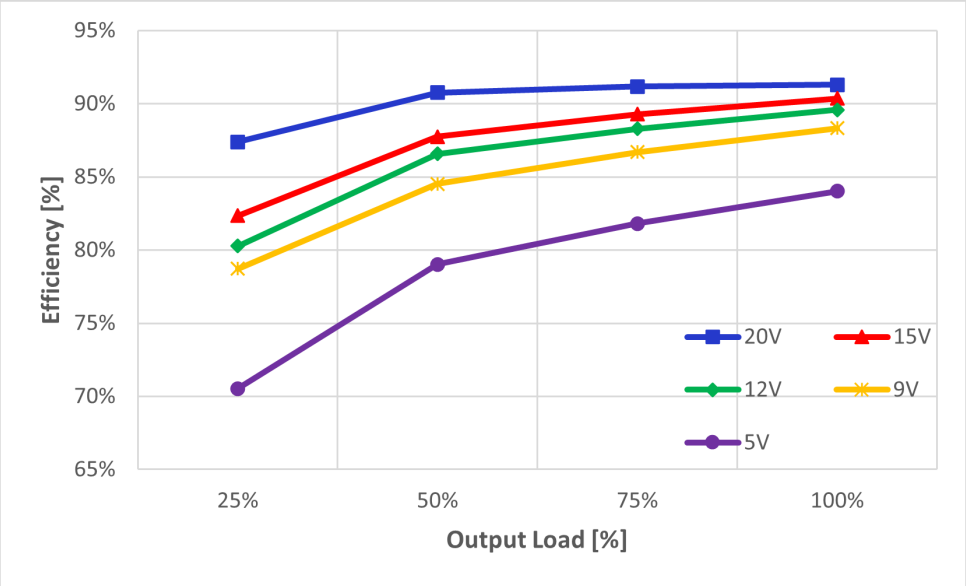
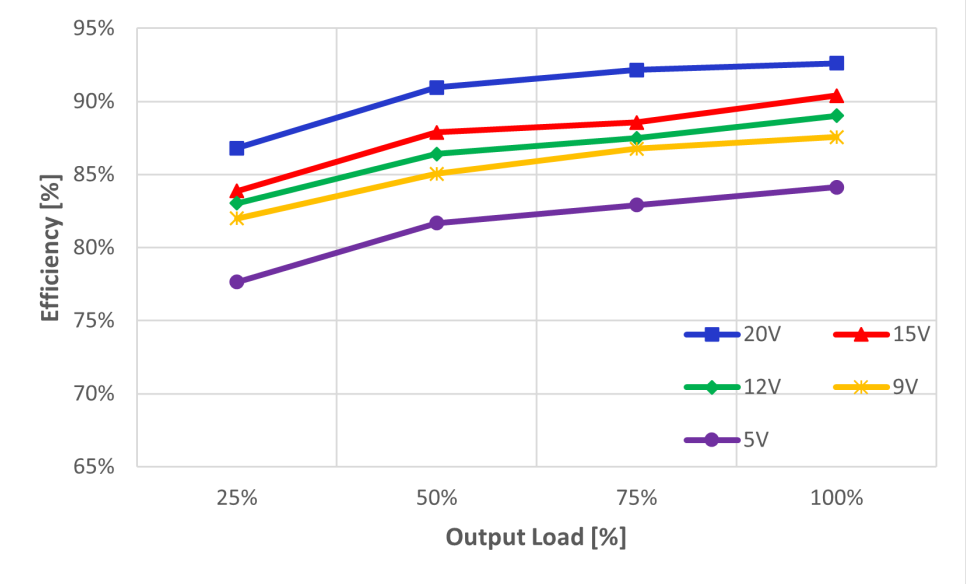


Figure 6. **Efficiency at 230 Vac**



Revision history

Table 1. **Document revision history**

Date	Version	Changes
30-May-2023	1	Initial release.
03-Aug-2023	2	Updated Figure 3. Flyback stage schematic ; updated ; some typo removed in Description .

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