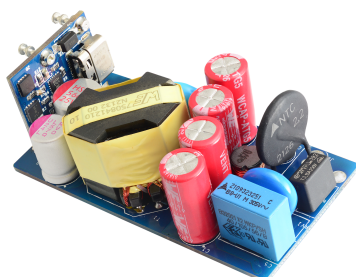


45 W QR USB PD adaptor reference design based on VIPERGAN50 and STUSB4761



Features

- Input voltage range: Universal AC from 90 to 264 VAC with 47 Hz to 63 Hz frequency
- Output voltage: 5 V, 9 V, 12 V, 15 V, 20 V
- Output current: 3 A @5 V, 9 V, 12 V, 15 V – 2.25 A @ 20 V
- Maximum output power: 45 W
- Efficiency standards: Meet CoC Tier 2 and DoE Level 6 efficiency requirements
- Peak efficiency: > 92 %
- Support for USB-PD, Type C output connector
- Meets IEC55022 Class B conducted EMI
- Key products: VIPerGaN50, STUSB4761, SRK1001

Application

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

Description

The **EVLVIPGAN50PD** 45 W USB Type-C® Power Delivery 3.0 adapter is a USBPD reference design solution. It is an isolated power supply based on the **VIPERGAN50**, a new offline high-voltage converter from the VIPerPlus family with a 650 V HEMT Power GaN transistor, designed for quasi-resonant flyback converters, capable of providing an output power up to 50 W in wide range.

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

Still 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 standard.

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 to obtain a cost-effective and fast design.

Product status link	
EVLVIPGAN50PD	
VIPERGAN50	
STUSB4761	
SRK1001	
Product summary	
45W USB PD adapter	EVLVIPGAN50PD
Energy saving offline High Voltage Converter with 650 V GAN power	VIPERGAN50
Stand-alone USB PD controller (with integrated CC/CV)	STUSB4761
Adaptive synchronous rectification controller for flyback converter	SRK1001
Applications	USB Type-C PD

1 Electrical characteristics

Table 1. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Nom.	Max.	Unit
Input parameters						
V_{IN}	Input line voltage		90	115 / 230	264	Vrms
f_{LINE}	Input line frequency		47	50 / 60	63	Hz
P_{STBY}	No load input power-5 Vout			40		mW
P_{STBY}	No load input power-9 Vout			60		mW
P_{STBY}	No load input power-12 Vout			80		mW
P_{STBY}	No load input power-15 Vout			100		mW
P_{STBY}	No load input power-20 Vout			140		mW
Output parameters-5 V setting						
Vout	Output voltage	$V_{IN} = 90\text{ V}_{RMS} \sim 264\text{ V}_{RMS}$ $I_{OUT} = 0\text{ A} \sim 3\text{ A}$		5		V
I_{out}	Output current		0		3	A
Output parameters-9 V setting						
Vout	Output voltage	$V_{IN} = 90\text{ V}_{RMS} \sim 264\text{ V}_{RMS}$ $I_{OUT} = 0\text{ A} \sim 3\text{ A}$		9		V
I_{out}	Output current		0		3	A
Output parameters-12 V setting						
Vout	Output voltage	$V_{IN} = 90\text{ V}_{RMS} \sim 264\text{ V}_{RMS}$ $I_{OUT} = 0\text{ A} \sim 3\text{ A}$		12		V
I_{out}	Output current		0		3	A
Output parameters-15 V setting						
Vout	Output voltage	$V_{IN} = 90\text{ V}_{RMS} \sim 264\text{ V}_{RMS}$ $I_{OUT} = 0\text{ A} \sim 3\text{ A}$		15		V
I_{out}	Output current		0		3	A
Output parameters-20 V setting						
Vout	Output voltage	$V_{IN} = 90\text{ V}_{RMS} \sim 264\text{ V}_{RMS}$ $I_{OUT} = 0\text{ A} \sim 2.25\text{ A}$		20		V
I_{out}	Output current		0		2.25	A
Ambient parameters						
T_{AMB}	Ambient temperature	Free convection	0		40	°C

2 Schematics

Figure 1. Motherboard circuit schematic

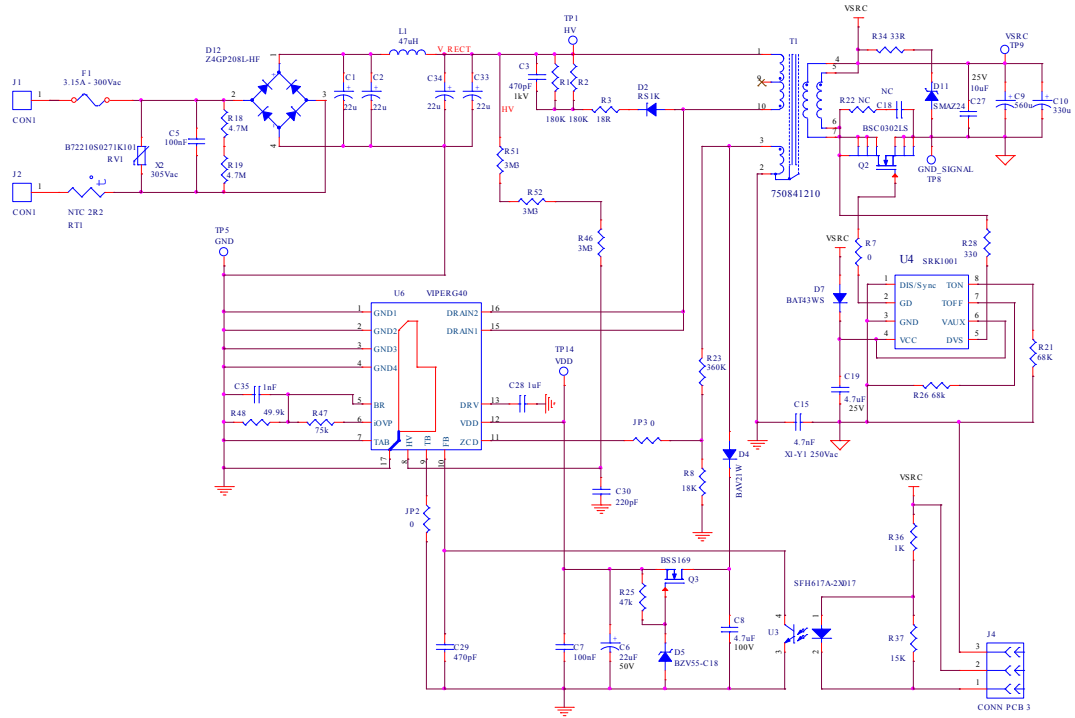
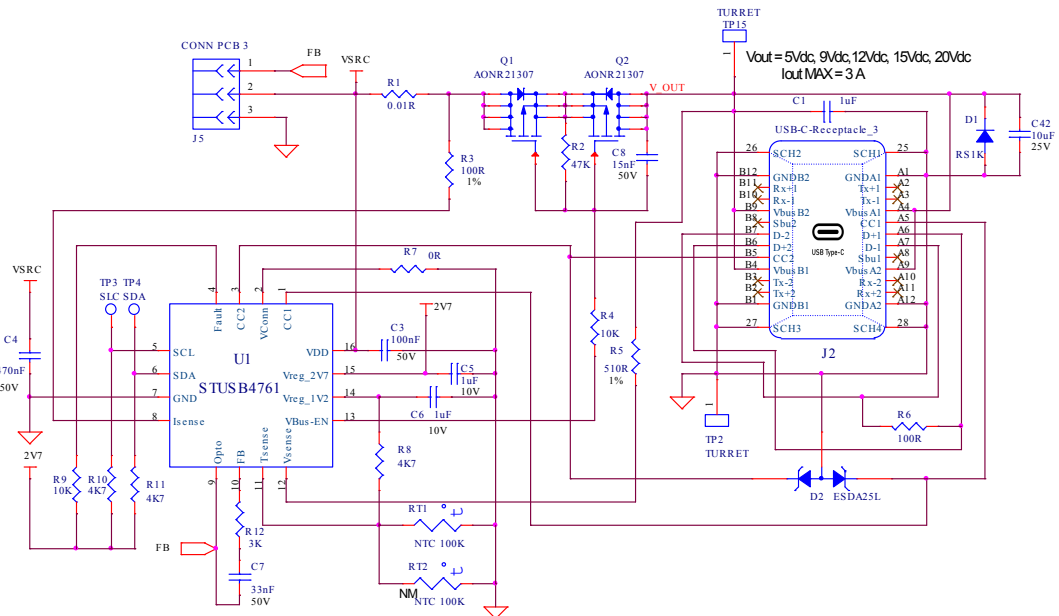


Figure 2. Daughterboard circuit schematic



3 Efficiency

Figure 3. Efficiency @115 Vac

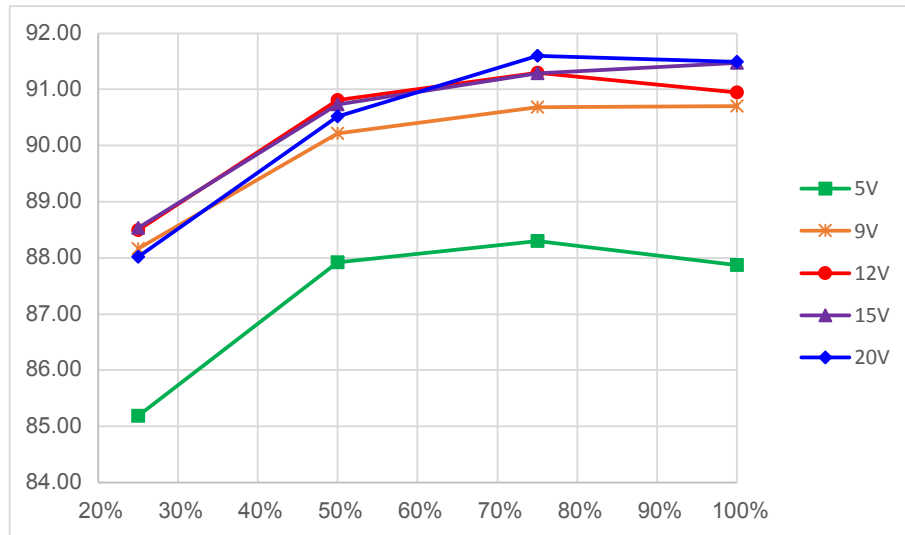
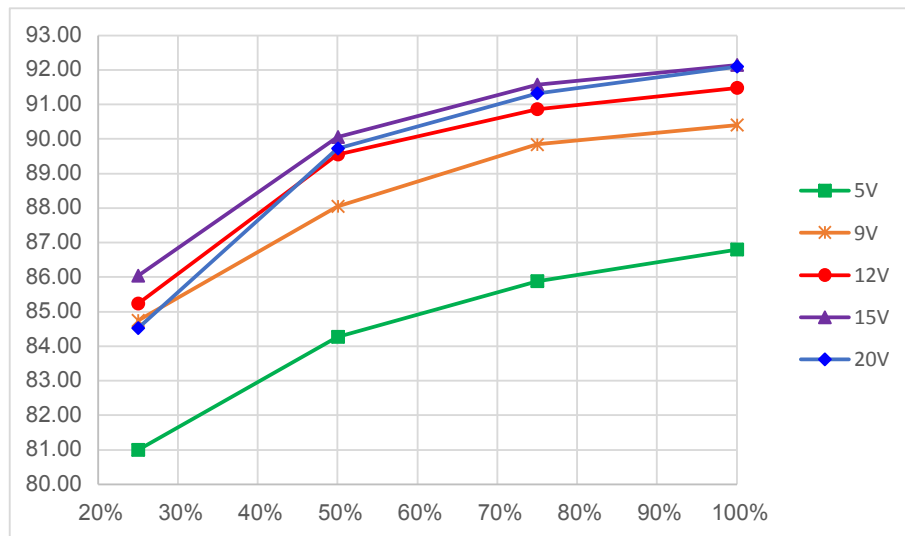


Figure 4. Efficiency @230Vac



Revision history

Table 2. Document revision history

Date	Version	Changes
23-Mar-2022	1	Initial release.

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