



# USB-AC-PD

230V<sub>ac</sub> 20W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger



**USB-AC-PD:** A 230V<sub>ac</sub> 20W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger

## Features

- 18mm DIN Rail width
- 60mW Standby Power
- Long life / Electrolytic capacitor free
- USB-PD Supported Levels:
  - 5 V<sub>dc</sub> - 3 A<sub>dc,max</sub>
  - 9 V<sub>dc</sub> - 2.22 A<sub>dc,max</sub>
  - 12 V<sub>dc</sub> - 1.67 A<sub>dc,max</sub>
- Auxilliary 5V Output
- 207 V<sub>ac</sub> to 253 V<sub>ac</sub> input voltage range
- Output short circuit proof
- Active output overvoltage protection
- Green Power LED

## Product description

USB-AC-PD is 230V<sub>ac</sub> power supply for DIN RAIL control cabinets. It delivers 5V/3A, 9V/2.22A and 12V/1.67A. It's intended use are tight control cabinets with AC Inputs, to supply USB-C-PD devices, such as laptops, embeded computer, tablles or smart meter gateways with electrical energy.

The device is resilient to typical operating failures: Input transient protection, output short circuit, open circuit, moderate input transients and moderate output transients. The device is designed for long-livity by not using electrolytic capaitors. A green power led indicates stable operation.

The device may be operated at ambient temperatures between -40°C and 50°C. Derating might be required.

## Specification overview

Description	Value
<b>Input</b>	
Input Voltage Range (V <sub>ac</sub> )	207 - 253
Input Voltage Frequency (Hz)	49-61
<b>Output</b>	
Voltage (V)	5 / 9 / 12
Current (A)	3 / 2.22 / 1.67
Power Good Indicator	Green LED
<b>Protection</b>	
Input Fuse	yes
Temperature Prection	yes
Short circuit protection	yes
Input Overvoltage supressor	MOV
<b>Mechanical</b>	
Dimensions LxWxH (mm)	17.6 x 106 x 60

## Ordering information

Ordercode	Description
USB-AC-PD	230V <sub>ac</sub> 20W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger
Customisation available. Contact DPS.	

## Engineering standards

Applied engineering standards	
IEC 55032	IEC 61000-4-2
IEC 61000-4-3	IEC 61000-4-4
IEC 61000-4-5	IEC 61000-4-6
IEC 61000-4-7	IEC 61000-4-8





## 1 Functional description

### 1.1 Overview

USB-AC-PD is 230V<sub>ac</sub> power supply for DIN RAIL control cabinets. It delivers 5V/3A, 9V/2.22A and 12V/1.67A. It's intended use are tight control cabinets with AC Inputs, to supply USB-C-PD devices, such as laptops, embeded computer, tablles or smart meter gateways with electrical energy.

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Operating range: -40°C to 50°C. Temperature derating is required.

### 1.2 Protections

The following output protection mechanisms are implemented to ensure reliable and safe operation of the USB-AC-PD:

- **Input Overvoltage Protection:** A Metal Oxide Varistor (MOV) safeguards the input against overvoltage conditions.
- **Output Short Circuit Protection:** The USB-AC-PD includes an overtemperature shut-down mechanism to prevent damage during short circuit conditions.
- **Short Circuit Resilience:** The output can withstand a short circuit indefinitely without adverse effects.
- **Open Circuit Resilience:** The output can safely operate in an open-circuit condition for an unlimited duration.
- **Output Overvoltage Protection:** The USB-AC-PDis equipped with an active transient voltage protection of 12V to prevent destruction.

### 1.3 Safety Advice / Risk of Destruction

Do not disconnect the USB-AC-PD AC connection while a DC voltage is applied. Always disconnect the DC supply voltage before performing any work on the USB-AC-PD. The USB-AC-PDis only inteded for professional users.

### 1.4 Ordering Information

Ordercode	Description	EAN
USB-AC-PD	230V <sub>ac</sub> 20W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger	4262542250008
Customisation available. Contact DPS.		



## 2 Pinout

The pinout of the converter is depicted in Figure ??.

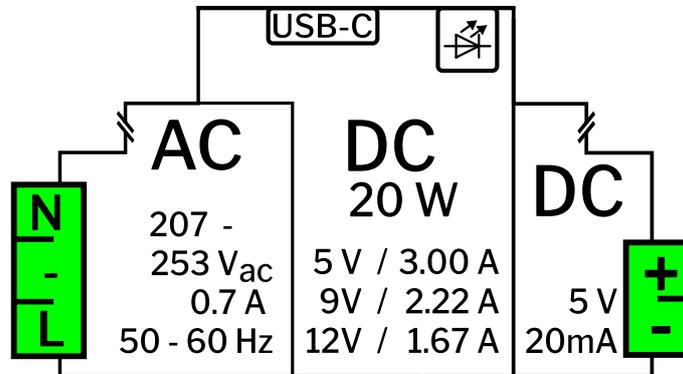


Figure 1: Pinout USB-AC-PD power supply. Pinout is explained in belows table ??.

Pin	Functional Description
<b>Input</b>	
N	Neutral, AC input pin.
L	Line (Live), AC input pin. <i>Note: N and L can be interchanged.</i>
<b>Output USB</b>	
USB C	USB-C power connector.
<b>Output 5V</b>	
+	Positive output terminal 5V.
-	Negative output terminal 5V. <i>Note: USB and 5V share the same ground.</i>
<b>Indicator</b>	
LED	A green LED indicates that the output is functioning properly.

Table 1: Connector Descriptions and Functional Details





## 3 Specification

The specification for USB-AC-PD is shown in the following table. If not otherwise specified the following parameters have been used:  $T_{amb}=25^{\circ}\text{C}$  and  $U_{in}=24\text{ V}_{dc}$ .

	Min	Typ	Max	Unit
<b>Eingang</b> <b>Input</b>				
Eingangsspannung $U_{out}=5\text{ V}$ Input Voltage Range	207		253	$\text{V}_{dc}$
Eingangskapazität Input Capacitance		4.7		$\mu\text{F}$
Standby Leistungsverbrauch Standby Power		50	60	mW
Eingangssicherung Input Fuse		750		mA
<b>USB-C Ausgang</b> <b>USB-C Output</b>				
Ausgangsspannung $U_{out}=5\text{ V}$ Output Voltage $U_{out}=5\text{ V}$	4.8	5.2	5.5	V
Ausgangsstrom $U_{out}=5\text{ V}$ Output Current $U_{out}=5\text{ V}$	0		3	A
Ausgangsspannung $U_{out}=9\text{ V}$ Output Voltage $U_{out}=9\text{ V}$	8.5	9.2	9.8	V
Ausgangsstrom $U_{out}=9\text{ V}$ Output Current $U_{out}=9\text{ V}$	0		2.22	A
Ausgangsspannung $U_{out}=12\text{ V}$ Output Voltage $U_{out}=12\text{ V}$	11.5	12.2	12.8	V
Ausgangsstrom $U_{out}=12\text{ V}$ Output Current $U_{out}=12\text{ V}$	0		1.67	A
Wandlungseffizienz Conversion Efficiency		85		%
Zener Schutzdiode Ausgang Zener Protection Output	active transistor clamp 12V			
<b>5V Hilfsausgang</b> <b>5V auxiliary output</b>				
Ausgangsspannung Output Voltage	4.3	5.0	5.2	V
Ausgangsstrom Output Current		20		mA





# USB-AC-PD

230V<sub>ac</sub> 20W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger

	Min	Typ	Max	Unit
<b>Gehäuse</b> Case				
Montageform Mounting Type	Din Rail			
Teilungseinheiten Modular width units		1		
Montagebreite Mounting Width		17.6		mm
Montagebreite Mounting Length		106		mm
Montagebreite Mounting Height		60		mm
Montagestiel Mounting Style	Household Installation BOX			
<b>Sicherheitsfeatures</b> Safety Features				
Eingangsoverspannungsschutz Input overvoltage protection	yes			
Übertemperaturschutz Over Temperature Protection		70	80	°C
Kurzschlusschutz Short circuit protection	yes			
Leerlaufschutz Open circuit protection	yes			
<b>Betriebsbedingungen</b> Operating Conditions				
Temperaturbereich Temperature Range	-40		50	°C
<b>Technische Merkmale</b> Technical Characteristics				
Elektrolytkondensatoren Electrolytic Capacitors	No electrolytic capacitors			
Platinen Lackierung PCB conformal coating	No conformal coating.			



## 4 Measurements

### 4.1 Measurement Conditions

The measurement conditions are noted in table ??, if not otherwise noted in the specific measurement.

	Min	Typ	Max	Unit
Eingang Input				
Eingangsspannung Input Voltage	227	230	233	V <sub>ac</sub>
Eingangsfrequenz Input Frequency	49	50	51	V <sub>ac</sub>
Umgebungsbedingungen Environment Conditions				
Temperatur Temperature	20		24	°C
Feuchtigkeit Humidity	30		90	% <sub>rel</sub>

Table 4: Measurement Conditions, if not otherwise noted.

### 4.2 Output Voltage Stability

The output voltage is measured across the operating range, as illustrated in Figure ?. The voltage levels are set to 5 V<sub>dc</sub>, 9 V<sub>dc</sub>, and 12 V<sub>dc</sub>.

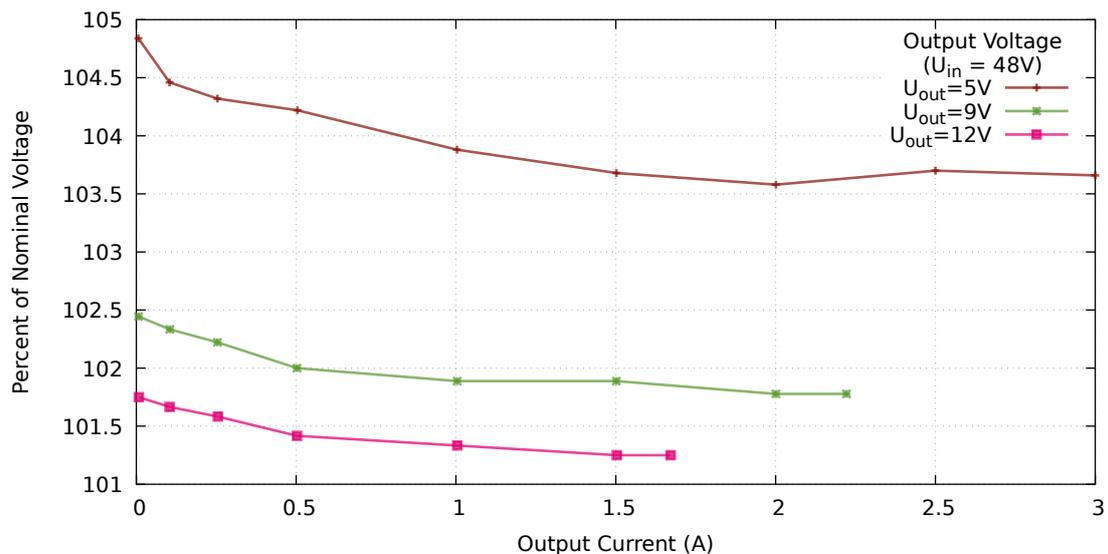


Figure 2: Relative Output Voltage stability over Output Current



### 4.3 Output Voltage Ripple

The output voltage ripple is measured across the operating range and presented in Figure ???. The voltage levels are set to 5 V<sub>dc</sub>, 9 V<sub>dc</sub>, and 12 V<sub>dc</sub>.

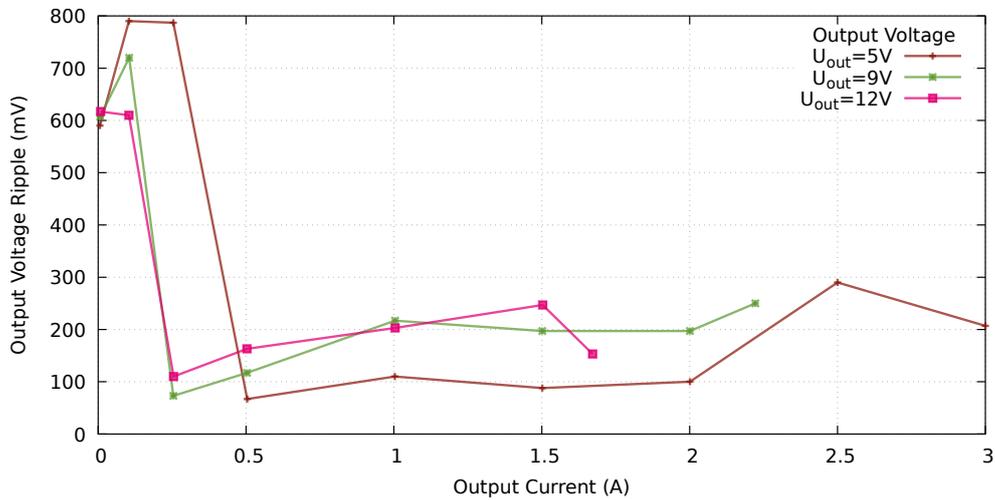


Figure 3: The output voltage ripple is measured over the output current range.

### 4.4 Conversion Efficiency

The conversion efficiency is plotted over the output current range. The voltage levels are set to 5 V<sub>dc</sub>, 9 V<sub>dc</sub>, and 12 V<sub>dc</sub>.

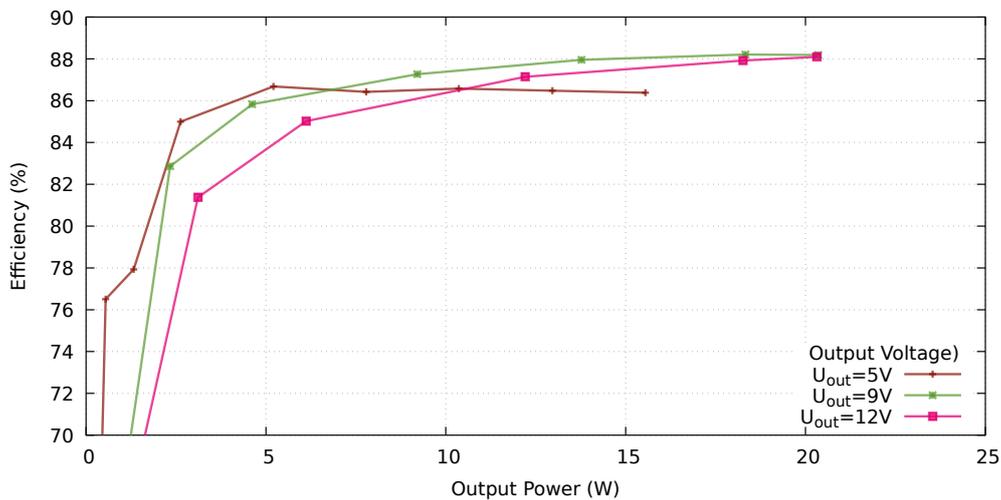


Figure 4: Conversion Efficiency Output Current



## 4.5 Input Standby Current

The input standby power over the output voltage is plotted over the input voltage range.

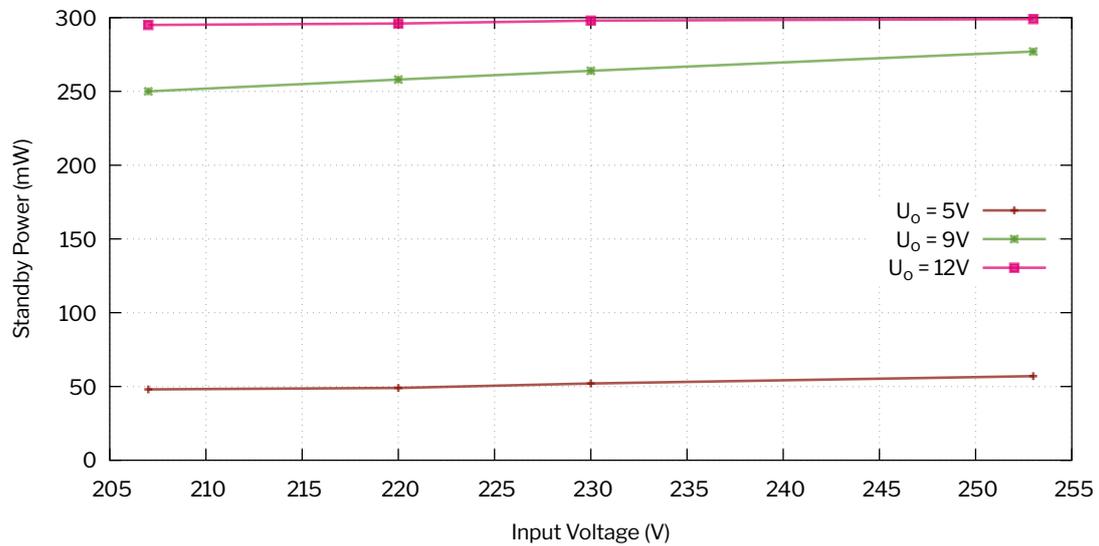


Figure 5: Standby Current over Input Voltage

If no device is connected, the device returns to 5 V<sub>dc</sub>. Hence, only this value is important for input standby power.



## 4.6 Step Response 5 V

For the step response the output current was changed from 0 A to 3 A at an output voltage of 5 V. The output voltage is shown in the subsequent figure ???. The rise and fall slope of the current were set to 2A/ms.

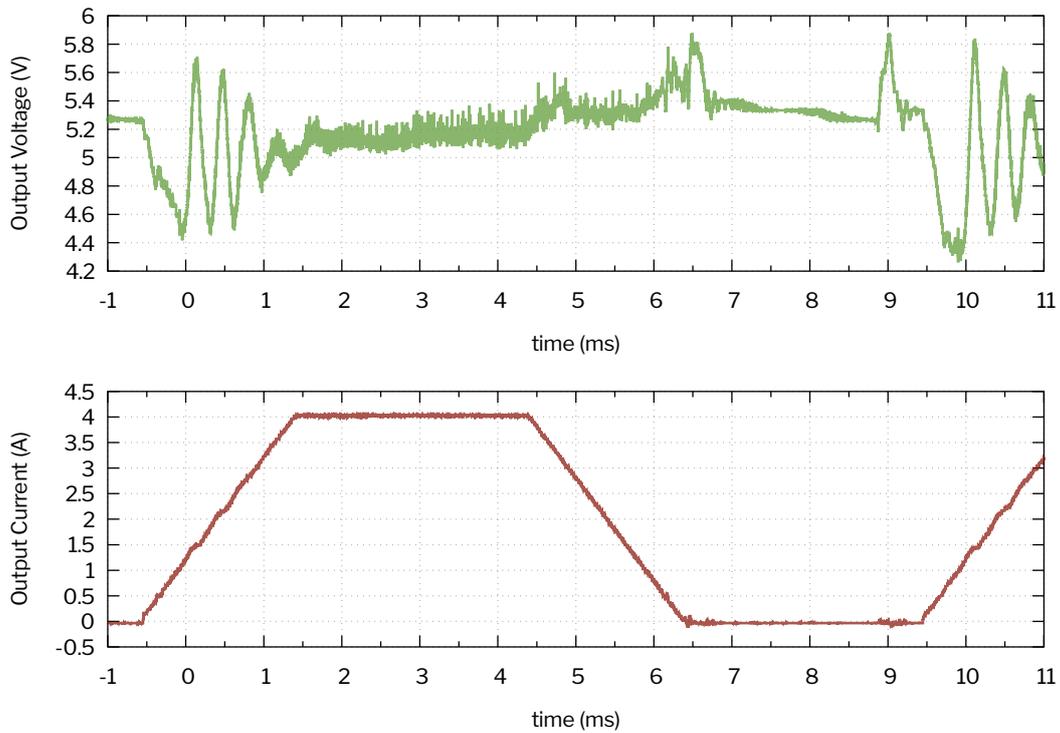


Figure 6: Transient response  $U_{out}=5V$



## 4.7 Step Response 9 V

For the step response the output current was changed from 0 A to 2.22 A at an output voltage of 9 V. The output voltage is shown in the subsequent Figure ???. The rise and fall slope of the current were set to 2A/ms.

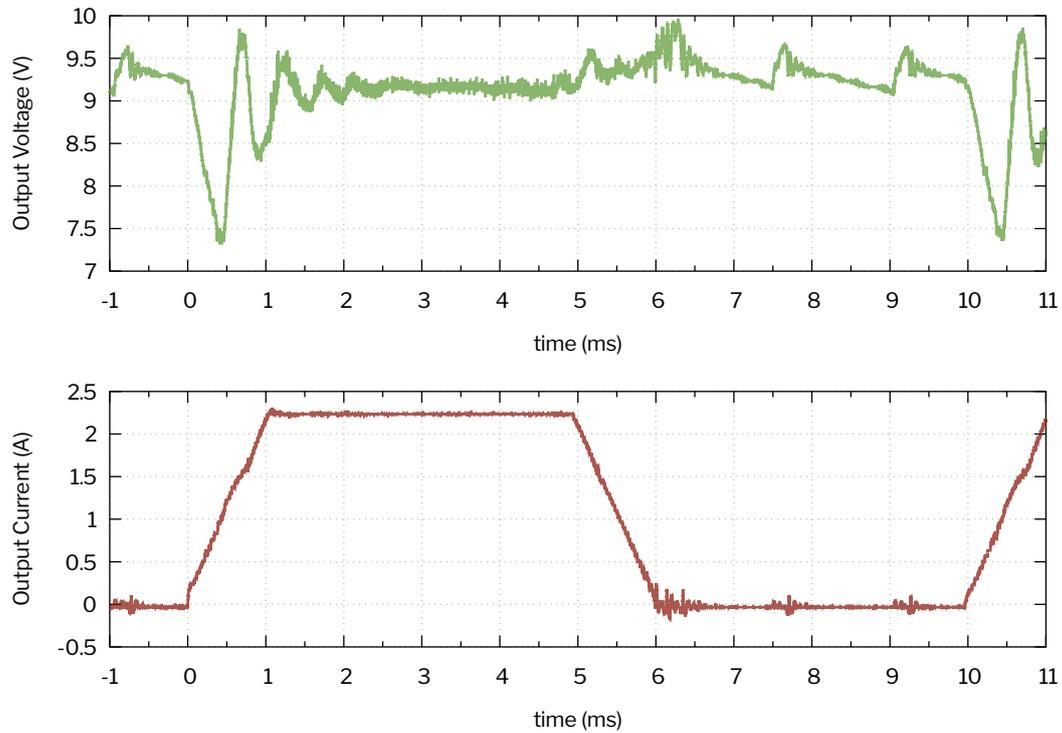


Figure 7: Transient response  $U_{out}=9V$



## 4.8 Step Response 12 V

For the step response the output current was changed from 0 A to 1.67 A. The output voltage is shown in the subsequent Figure ???. The rise and fall slope of the current were set to 2A/ms.

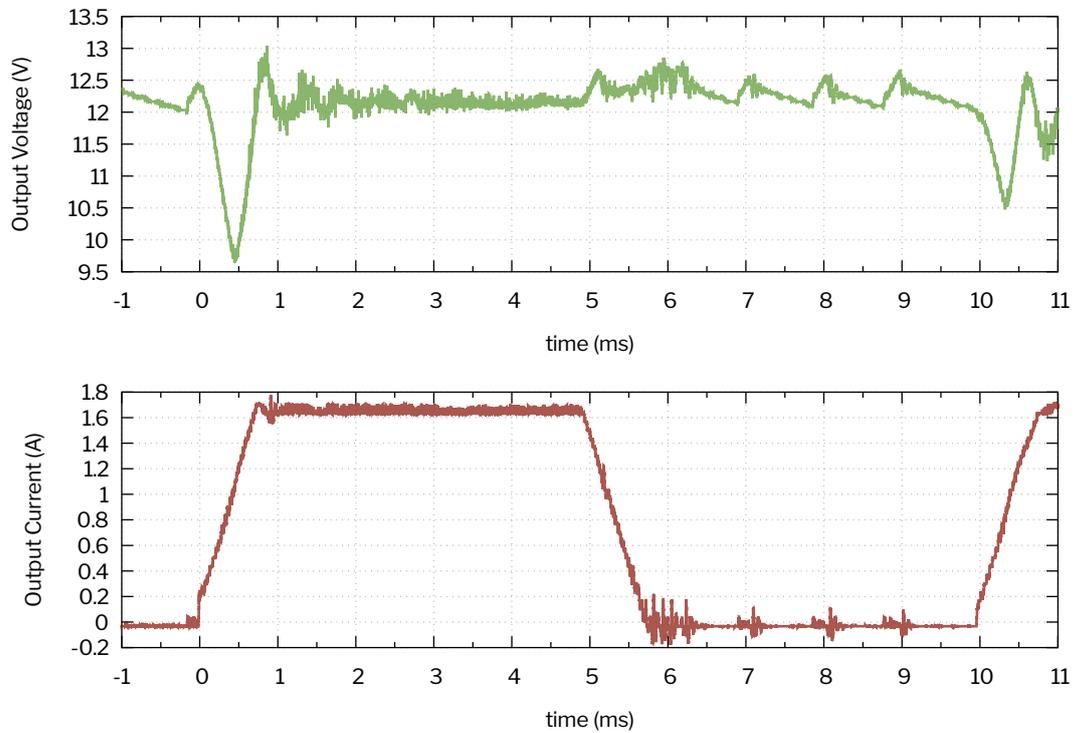


Figure 8: Transient response  $U_{out}=12V$



## 5 EMC Measurements

### 5.1 AC Input

The average and quasipeak input EMC conducted line emission of USB-AC-PD are depicted in ??.

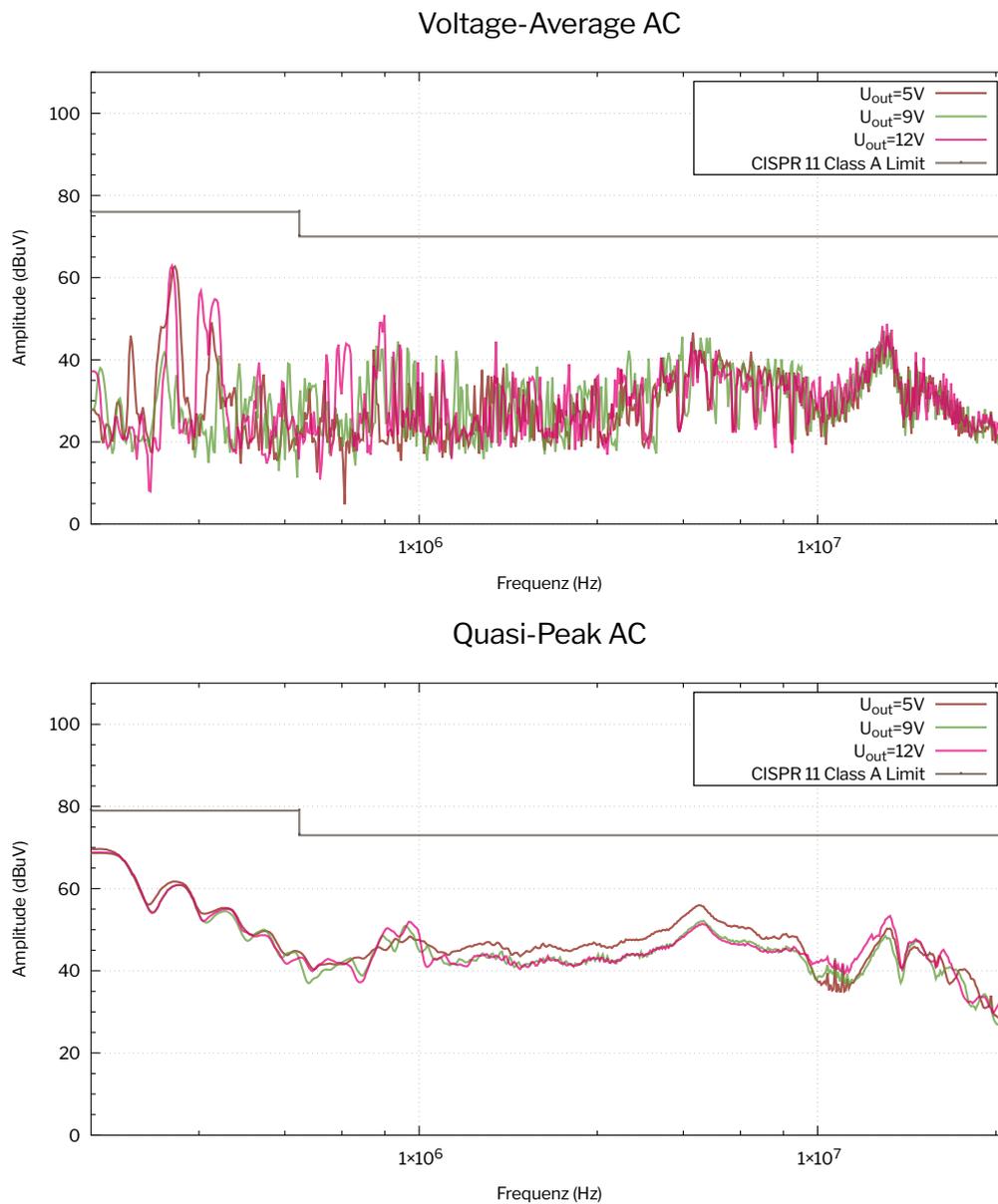


Figure 9: Input EMC Emission USB-AC-PD.



## 5.2 USB-C Output

The output emissions of USB-AC-PD are depicted in Figure ??.

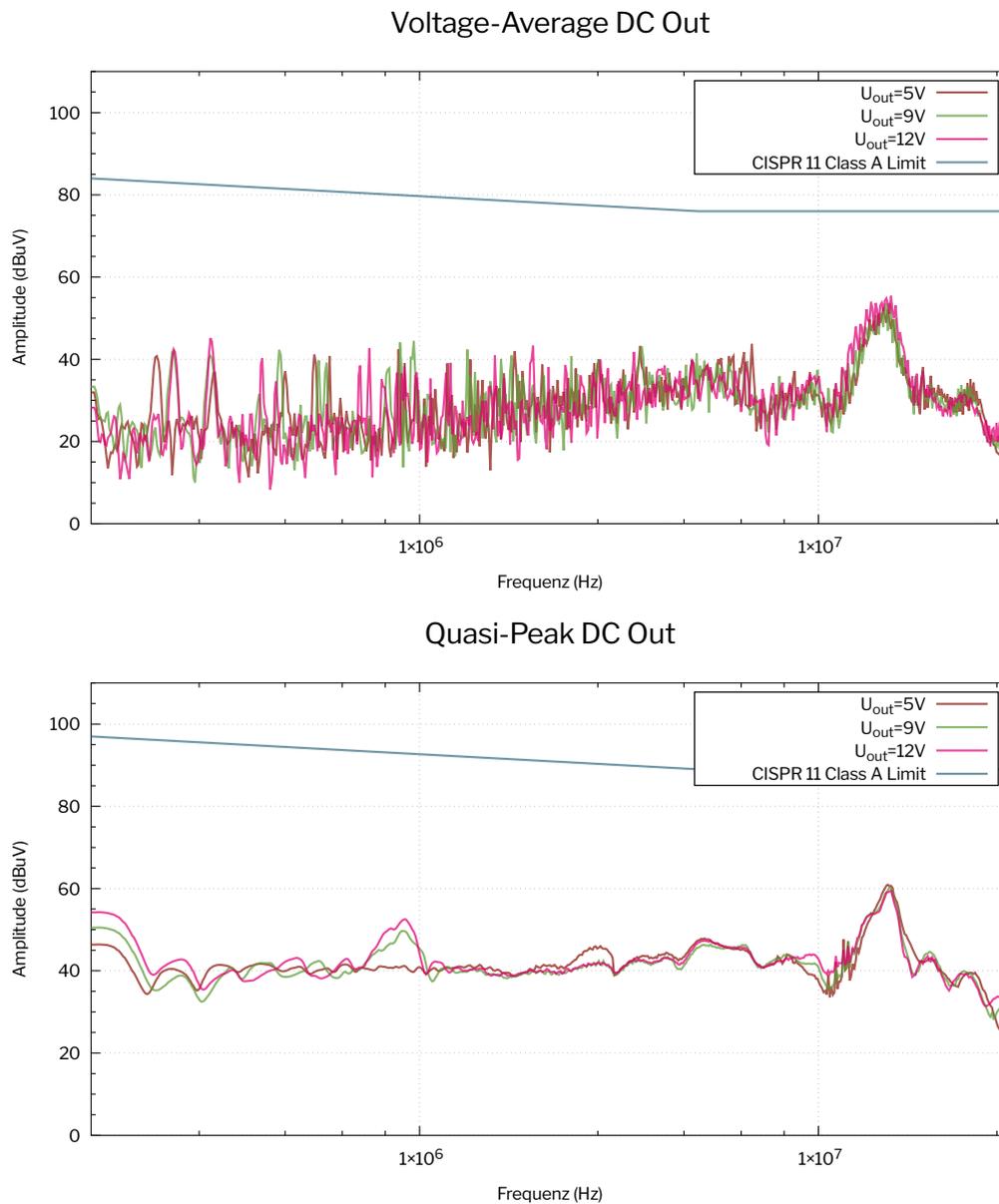


Figure 10: Output EMC Emission USB-AC-PD.



## 6 Case

The case drawing of the USB-AC-PD is shown in Figure ??.

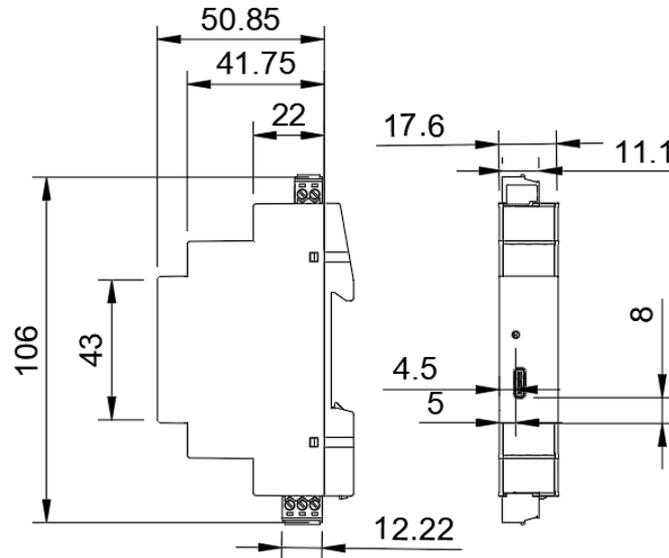


Figure 11: USB-AC-PD Product drawing with dimensions.

## 7 Product label

The product label of the USB-AC-PD is depicted in the following Figure ?. The magenta cutouts show the position of the USB-C connector (large) and the LED (small).

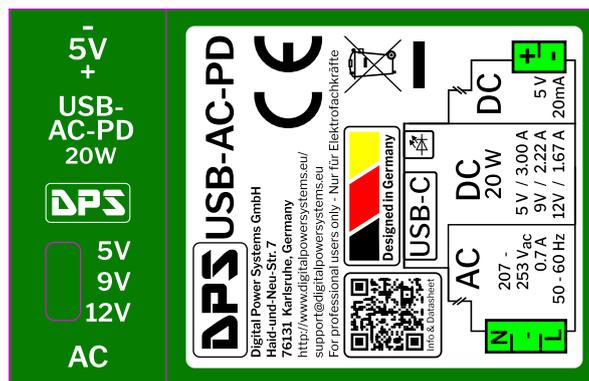


Figure 12: The product label USB-AC-PD(Revision 1).





## 8 Document

### 8.1 Latest Document Revision

The latest document revision can be downloaded here:

[https://digitalpowersystems.eu/usb\\_ac\\_pd\\_20w\\_en/](https://digitalpowersystems.eu/usb_ac_pd_20w_en/)

### 8.2 Datasheet Quality

Digital Power Systems aims for the highest datasheet quality. We value your feedback to improve this document. Please email:

`datasheet (ät) digitalpowersystems (döt) eu`

### 8.3 Revision History

The revision history is depicted in the following table.

Date	Changes in Revision
18.2.2025	Preview with missing data
17.3.2025	Datasheet released with final measurements
14.4.2025	Updated product image
04.9.2025	Updated EAN to GS1 Standard (4262542250008)

### 8.4 Contact Information

This is a product of the Digital Power Systems GmbH (DPS).

Digital Power Systems GmbH  
Haid- und Neu Str. 7  
76131 Karlsruhe, Germany

Visit our website: [www.digitalpowersystems.eu](http://www.digitalpowersystems.eu)

