



USB-DC-PD topview.

Feature summary

- Ultrathin: 8.8mm DIN Rail width
- Electrolytic capacitor free
- USB-PD Supported Levels:
 - 5 V_{dc} - 3 A_{dc,mac}
 - 9 V_{dc} - 2 A_{dc,mac}
 - 12 V_{dc} - 1.5 A_{dc,mac}
- 9 V_{dc} to 30 V_{dc} input voltage range
- Output short circuit proof
- Input Reverse Polarity Protection
- Green Power LED
- Low Conducted Emissions

Product description

The USB-DC-PD (30V 15W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger) is USB-C PD buck converter accepting input voltages up to 30V. It delivers 5V/3A, 9V/2A and 12V/1.5A. The USB-DC-PD provides low ripple constant voltage output for USB C PD devices. It's intended use are tight control cabinets, to supply USB-C-PD devices, such as laptops, tablets or smartphones with electrical energy.

The device is resilient to typical operating failures: Input reverse polarity, output short circuit, open circuit, moderate input transients and moderate output transients. The device offers solid output current stability over the complete input voltage range.

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

Specification overview

Description	Value
Input	
Input Voltage min	9 / 11 / 15 V
Input Voltage max	30 V
Output	
Voltage	5 / 9 / 12 V
Current	3 / 2 / 1.5 A
Power Good Indicator	Green LED
Peak Efficiency	92 %
Protection	
Input Fuse	yes
Input Reverse polarity protection	yes
Short circuit protection	yes
Input Overvoltage supressor	TVS
Mechanical	
Dimensions LxWxH (mm)	8.8 x 88.4 x 58

Ordering information

Ordercode	Description
USB-DC-PD	30V 15W 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

The USB-DC-PD (30V 15W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger) is USB-C PD buck converter accepting input voltages up to 30V. It delivers 5V/3A, 9V/2A and 12V/1.5A. The USB-DC-PD provides low ripple constant voltage output for USB C PD devices. Its intended use are tight control cabinets, to supply USB-C-PD devices, such as laptops, tablets or smartphones with electrical energy.

The device is resilient to typical operating failures: Input reverse polarity, output short circuit, open circuit, moderate input transients and moderate output transients. The device offers solid output current stability over the complete input voltage range.

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

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

1.2 Protections

The following output protections are in place:

- **Input Reverse polarity:** The input may be connected in reverse polarity with an input of $U_{in,max} = -30\text{ V}$.
- **Short circuit proof:** The output of the converter can be shortcircuited without problems for infinite time.
- **Open circuit proof** The output may be operated in open circuit for infinite time.
- **Input TVS diode** The converter features an input TVS diode for protection.

1.3 Safety Advice / Risk of Destruction

The device may be destroyed when an overvoltage is applied. This can also be caused by loose contacts. Make sure there is no loose connection. Do not disconnect the USB-DC-PD when a DC Voltage is present. Always remove DC Supply voltage prior to work on USB-DC-PD.

1.4 Ordering Information

Ordercode	Description	EAN
USB-DC-PD	30V 15W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger	0735654854135
Customisation available. Contact DPS.		



2 Pinout

The pinout of the converter is depicted in Figure 1.

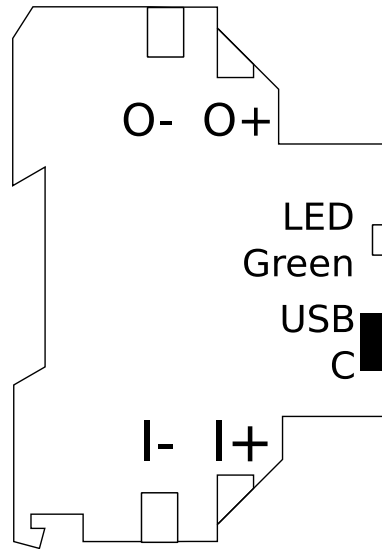


Figure 1: Pinout USB-DC-PD power supply: The input is at the bottom and the output is at the top. On the front USB-C can also be accessed.

Pin	Functional description
Input	
I-	Negative Input Pin
I+	Positive Input Pin (10V-28V)
Output	
O-	Negative Output Pin
O+	Positive Output Pin (5 V)
USB C	USB C Power Pin
Indicator	
LED	A green LED is on, when the output is good.



3 Specification

The specification for USB-DC-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
Eingang				
Input				
Eingangsspannung $U_{out}=5\text{V}$ Input Voltage $U_{out}=5\text{V}$	9		30	V_{dc}
Eingangsspannung $U_{out}=9\text{V}$ Input Voltage $U_{out}=9\text{V}$	11		30	V_{dc}
Eingangsspannung $U_{out}=12\text{V}$ Input Voltage $U_{out}=12\text{V}$	15		30	V_{dc}
Eingangskapazität Input Capacitance		30		μF
Eingangs-Standy-Strom (lastlos) Input Standby Current (no load)	ToDo	ToDo	ToDo	mA
Zener Schutzdiode Eingang Zener Protection Input	1SMA4754A			
Ausgang				
Output				
Ausgangsspannung $U_{out}=5\text{ V}$ Output Voltage $U_{out}=5\text{ V}$				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 $U_{out}=9\text{ V}$				V
Ausgangsstrom $U_{out}=9\text{ V}$ Output Current $U_{out}=9\text{ V}$	0		2	A
Ausgangsspannung $U_{out}=12\text{ V}$ Output Voltage $U_{out}=12\text{ V}$				V
Ausgangsstrom $U_{out}=12\text{ V}$ Output Current $U_{out}=12\text{ V}$	0		1.5	A
Wandlungseffizienz Conversion Efficiency		93	95	%
Zener Schutzdiode Ausgang Zener Protection Output	no diode			
Gehäuse				
Case				
Montageform Mounting Type	Din Rail			
Breiteneinheiten Mounting Width	8.8			mm
Montagehöhe Mounting Height	Household Installation BOX			





USB-DC-PD

30V 15W USB-C Power Delivery (PD) 5V 9V 12V DIN Rail Charger

	Min	Typ	Max	Unit
Sicherheitsfeatures Safety Features				
Verpolungsschutz Reverse polarity protection		yes		
Neg. Eingangsspannung Negative Input Voltage			- 28	V _{dc}
Kurzschlusschutz Short circuit protection		yes		
Leerlaufschutz Open circuit protection		yes		
Betriebsbedingungen Operating Conditions				
Temperaturbereich Temperature Range	-40		50	°C
Technische Merkmale Technical Characteristics				
Elektrolytkondensatoren Electrolytic Capacitors	No electrolytic capacitors			



4 Measurements

4.1 Measurement Conditions

The measurement conditions are noted in table 3, if not otherwise noted in the specific measurement.

	Min	Typ	Max	Unit
Eingang Input				
Eingangsspannung Input Voltage	23.5	24	24.5	V _{dc}
Umgebungsbedingungen Environment Conditions				
Temperatur Temperature	20		24	°C
Feuchtigkeit Humidity	30		90	% _{rel}

Table 3: Measurement Conditions, if not otherwise noted.

4.2 Output Voltage Stability

The output voltage is measured over the operation range in Figure 2. The output voltages are set to 5 V_{dc}, 9 V_{dc} and 12 V_{dc}.

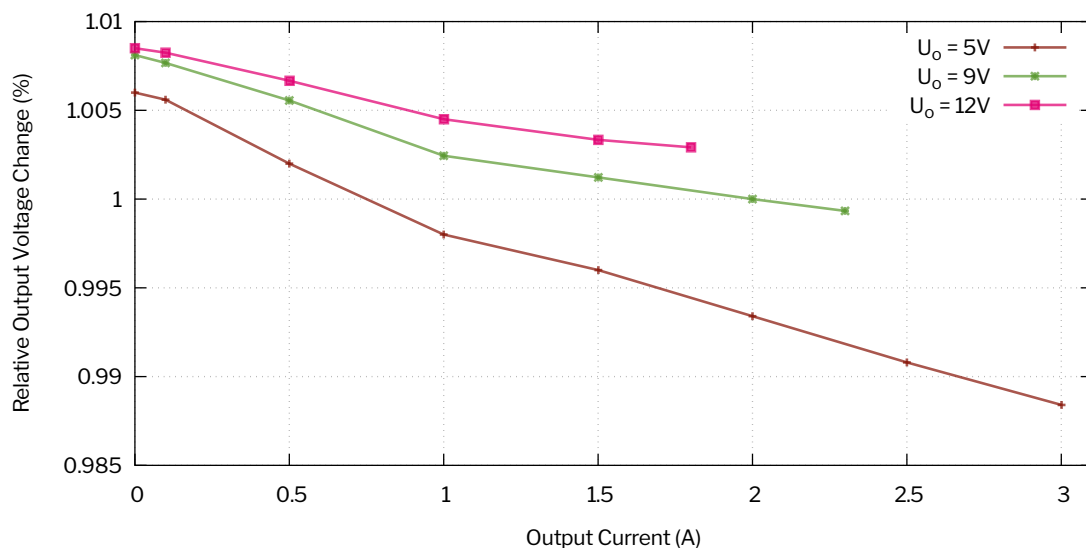


Figure 2: Relative Output Voltage stability over Output Current



4.3 Output Voltage Ripple

The output voltage ripple is measured over the operation range and plotted in Figure 3. ToDo

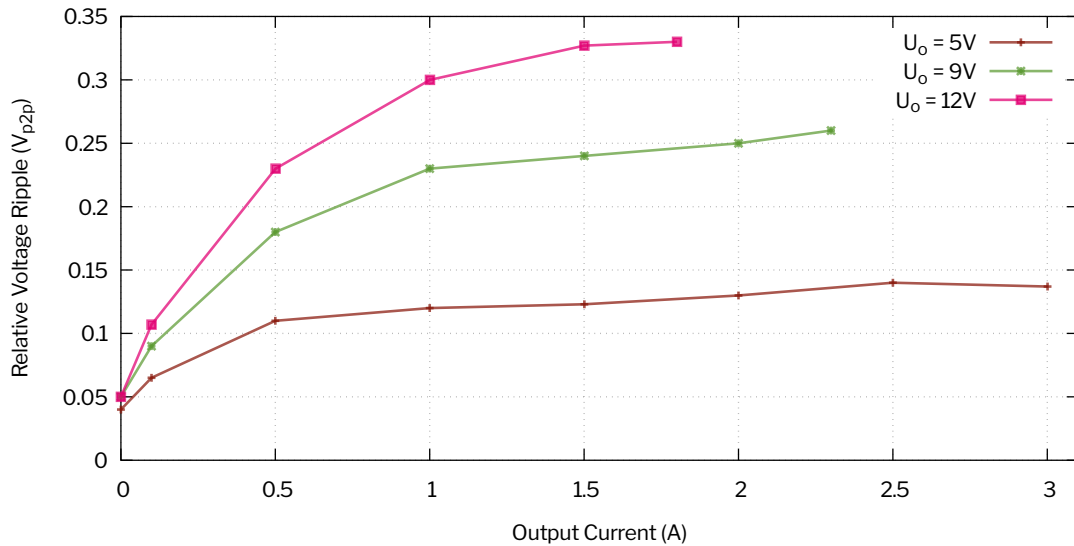


Figure 3: The output voltage ripple is measured over the output current range.

4.4 Conversion Efficiency

The conversion efficiency is plotted over the output current range.

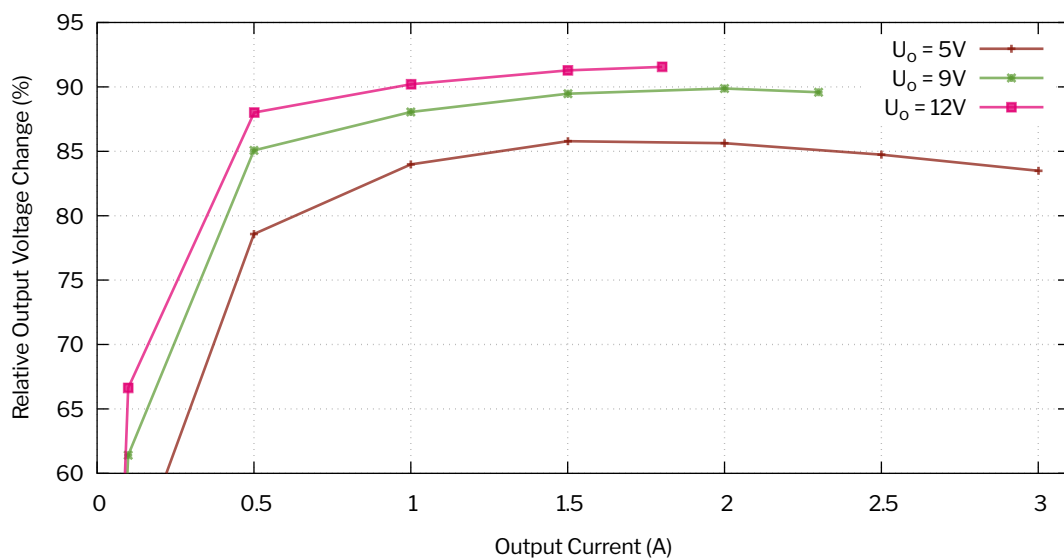


Figure 4: Conversion Efficiency Output Current



4.5 Input Standby Current

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

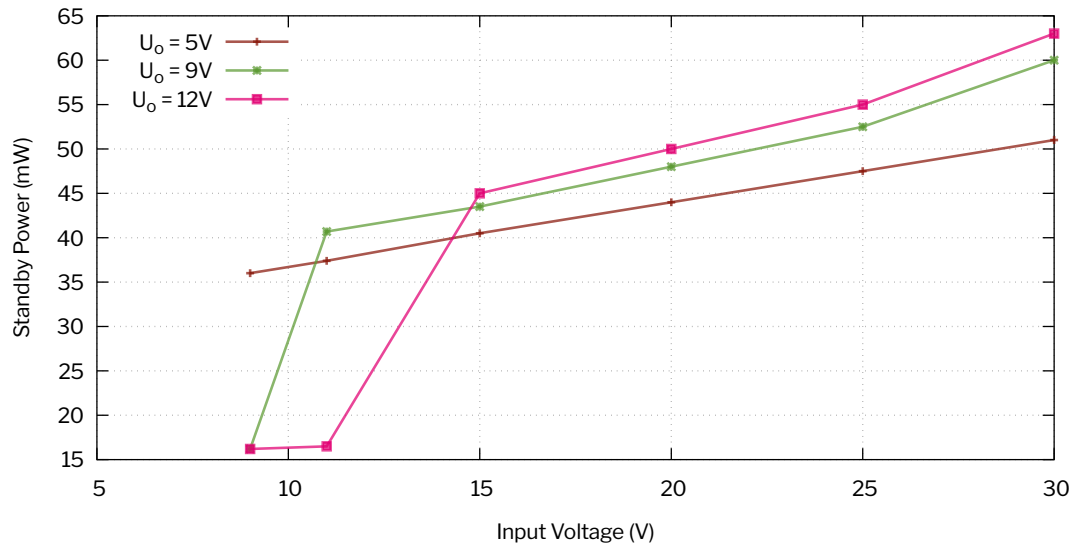


Figure 5: Standby Current over Input Voltage



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 6.

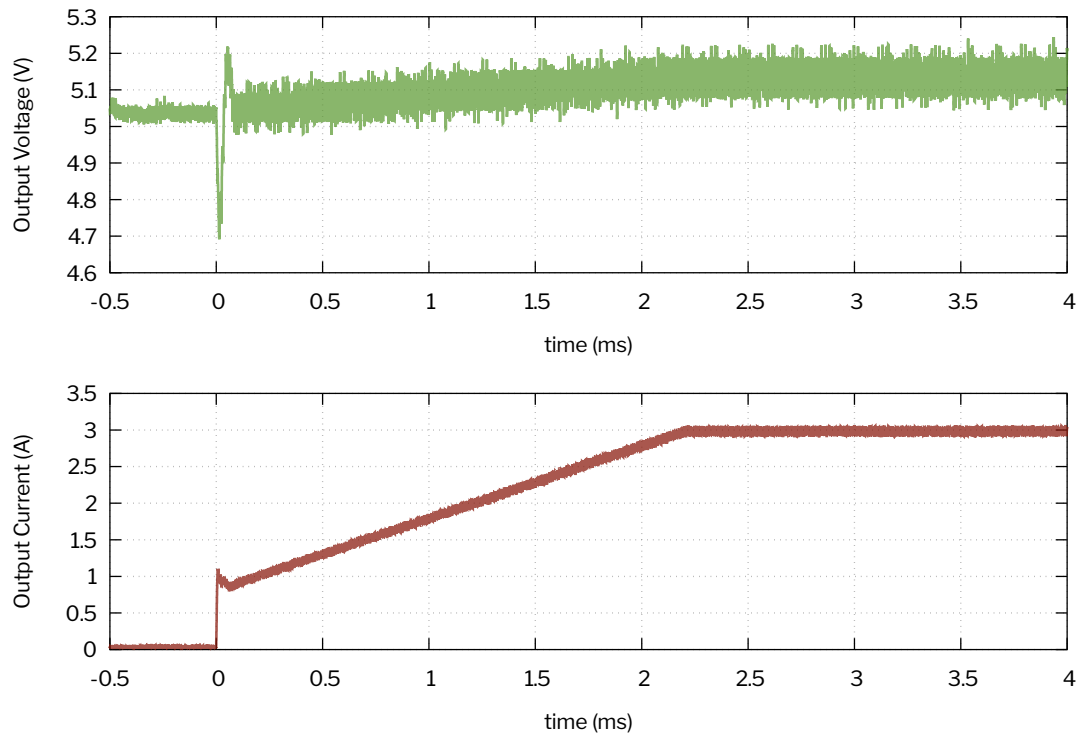


Figure 6: 5V Transient response 5V



4.7 Step Response 9 V

For the step response the output current was changed from 0 A to 3 A at an output voltage of 9 V. The output voltage is shown in the subsequent Figure 7.

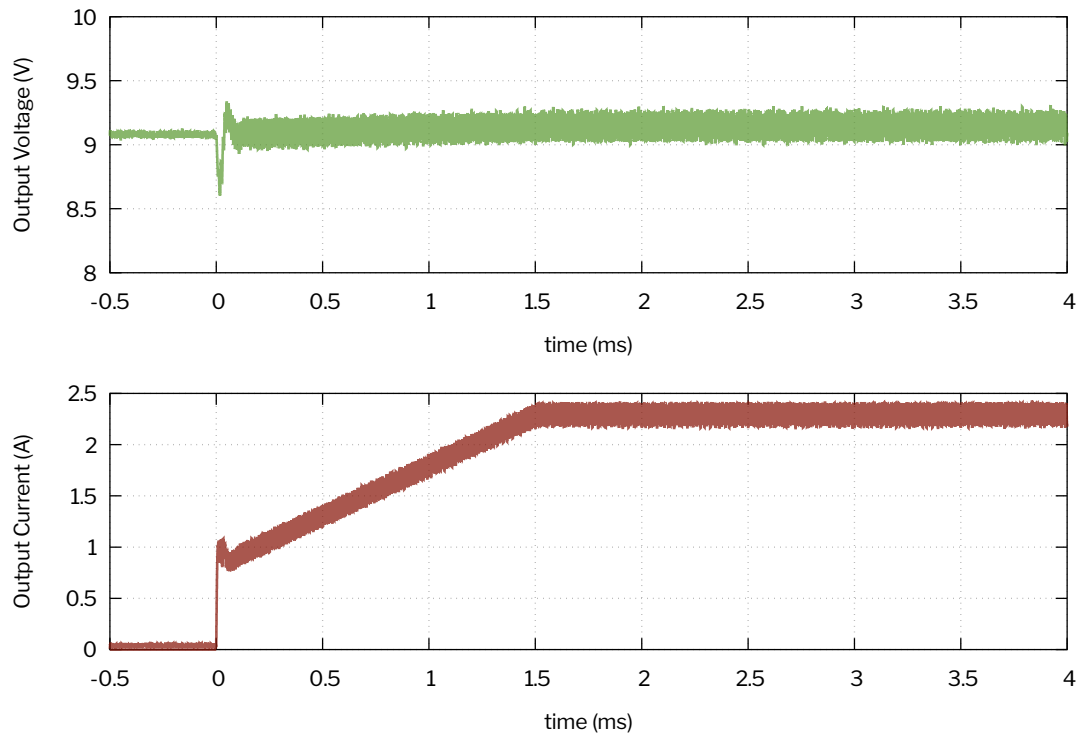


Figure 7: Transient response 9V



4.8 Step Response 12 V

For the step response the output current was changed from 0 A to 1.8 A. The output voltage is shown in the subsequent Figure 8.

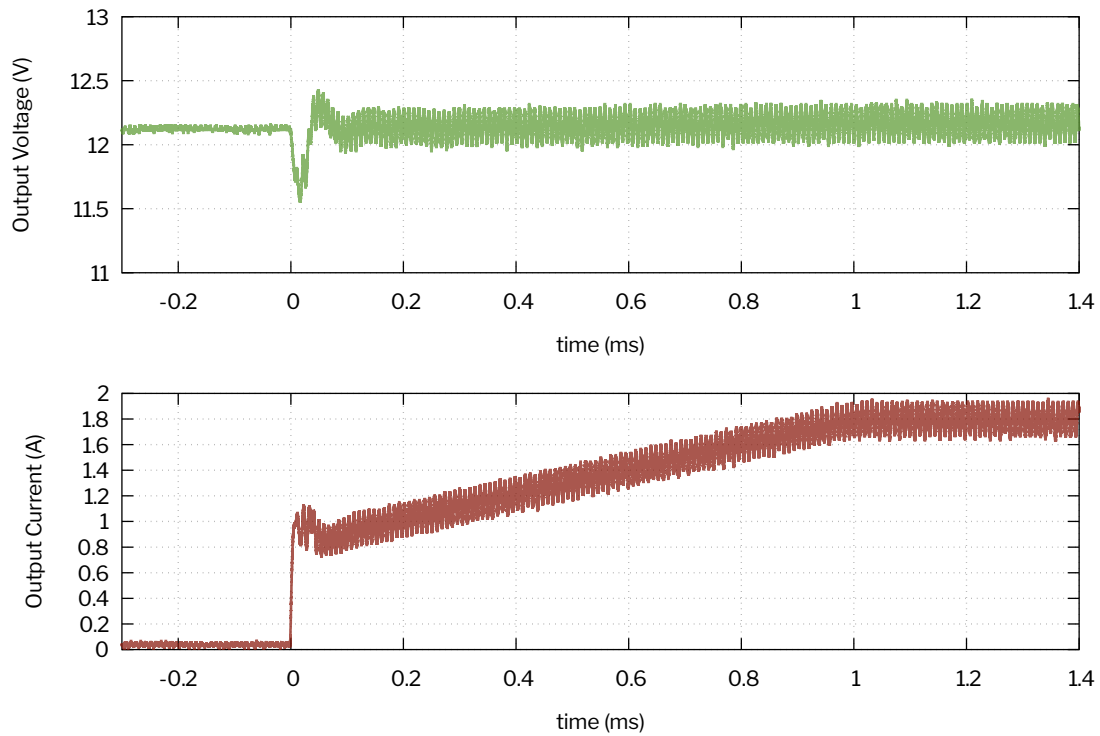


Figure 8: Transient response 12 V



5 EMC Measurements

The average and quasipeak input EMC conducted line emission of USB-DC-PD are depicted in Figure 9. The output emissions are depicted in Figure 10.

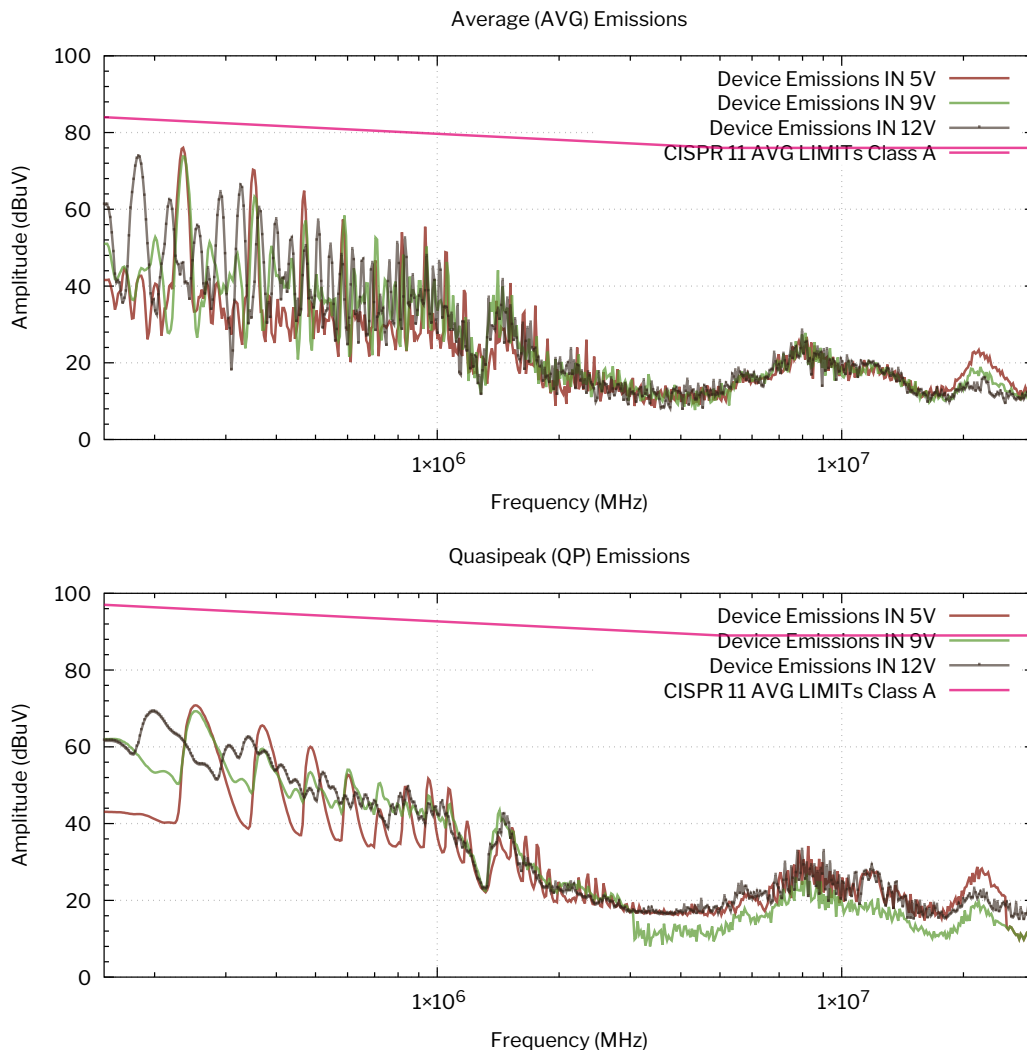


Figure 9: Input EMC Emission USB-DC-PD.



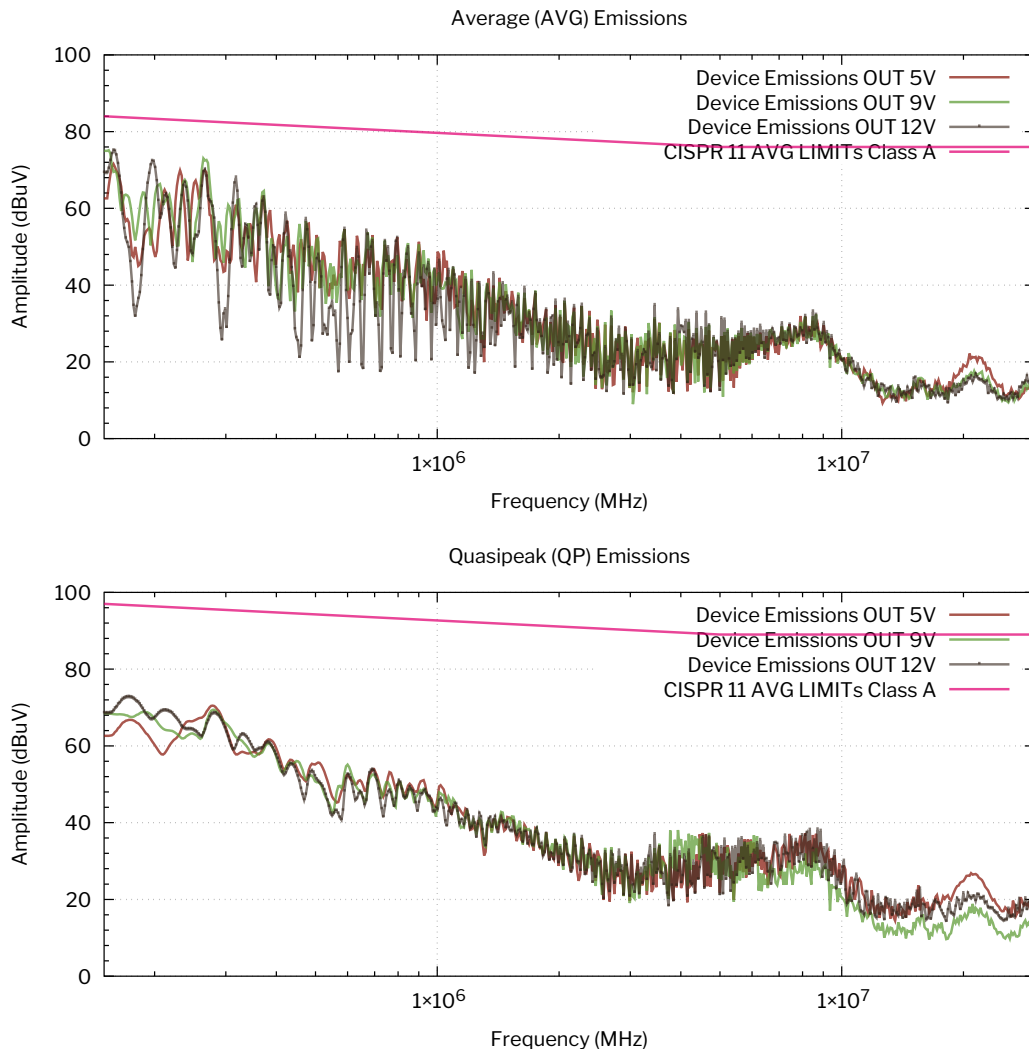


Figure 10: Output EMC Emission USB-DC-PD.



6 Case

The case drawing of the USB-DC-PD is shown in Figure 11.

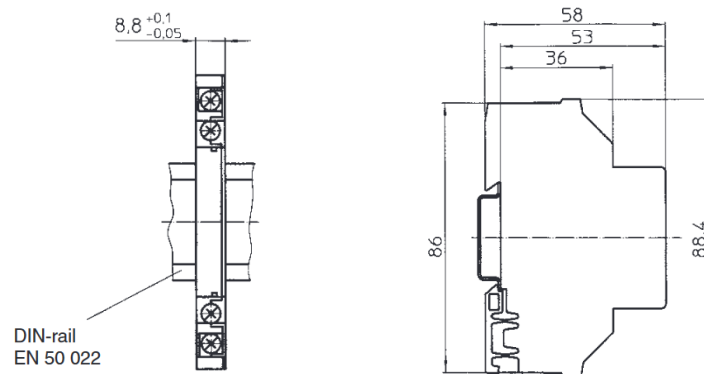


Figure 11: Product case.

7 Product label

The Label for the USB-DC-PD is depicted in the following Figure 12.

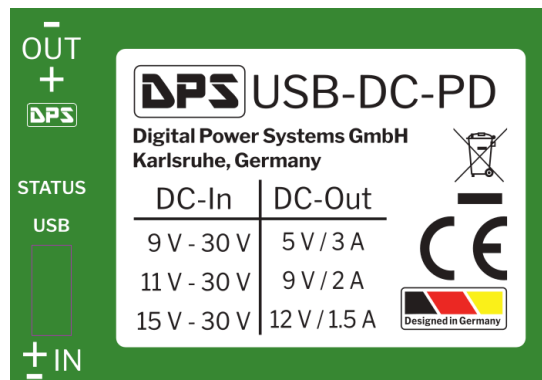


Figure 12: The product label USB-DC-PD.





8 Document

8.1 Latest Document Revision

The latest document revision can be downloaded here:

<https://digitalpowersystems.eu/usb-dc-pd/>

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
29.10.2024	Initial release

8.4 Contact Information

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

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