



USB-DC-PD

30 V 18 W USB-C Power Delivery (PD) 5 V 9 V 12 V DIN Rail Charger



USB-DC-PD product photograph

Feature summary

- Ultrathin: 8.8 mm DIN rail width
- Electrolytic capacitor free
- USB-C PD levels 5 V, 9 V and 12 V
- Up to 3 A output current at 5 V
- Wide input voltage range (9 V–30 V)
- Input reverse polarity protection
- Output short circuit proof
- Green power LED
- Low conducted emissions

Product description

The USB-DC-PD is a USB-C Power Delivery (PD) buck converter for DIN rail mounting. It accepts input voltages from 9 V_{dc} to 30 V_{dc} and offers the PD levels 5 V/3 A, 9 V/2 A and 12 V/1.5 A with low output ripple. It is intended for tight control cabinets, to supply USB-C PD devices such as laptops, tablets or smartphones.

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 may be operated at ambient temperatures between -40 °C and 50 °C. Derating may 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	91 %
Protection	
Input fuse	yes
Reverse polarity	protected
Short circuit	protected
Input overvoltage	TVS
Mechanical	
Dimensions WxHxD (mm)	8.8 x 88.4 x 58

Ordering information

Order code	PD levels
USB-DC-PD	5 / 9 / 12 V
Customisation available. Contact DPS.	

Engineering standards

Applied engineering standards	
EN 55011	CISPR 11
EN 61000-4-2	EN 61000-4-3
EN 61000-4-4	EN 61000-4-5
EN 61000-4-6	EN 61000-4-8





1 Functional description

1.1 Overview

The USB-DC-PD is a USB-C Power Delivery (PD) buck converter for DIN rail mounting. It accepts input voltages from 9 V_{dc} to 30 V_{dc} and offers the PD levels 5 V/3 A, 9 V/2 A and 12 V/1.5 A with low output ripple. It is intended for tight control cabinets, to supply USB-C PD devices such as laptops, tablets or smartphones.

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

1.2 USB Power Delivery

The USB-DC-PD is a USB Power Delivery source. After a sink is connected to the USB-C receptacle, the device offers its PD levels and the sink selects one of them. Which levels are offered depends on the input voltage: a level is only available when the input voltage is at or above the minimum input voltage stated for that level in Table 3. USB-C sinks without USB PD are supplied with 5 V.

The output is only switched on after a USB-C sink has been detected. The device detects the sink through the configuration channel (CC) of the USB-C connection. Without a correctly detected USB-C sink – no device connected, a cable without the CC connection, or a sink that does not identify itself as a USB-C device – the output voltage is 0 V.

The screw terminals O+ and O– are connected to the USB-C output and carry the same voltage as the USB-C receptacle. They therefore also carry 0 V as long as no USB-C sink is detected at the receptacle; they cannot be used as a stand-alone DC output.

1.3 Protections

The following protections are in place:

- **Input reverse polarity:** The input may be connected in reverse polarity down to the negative input voltage given in Table 3.
- **Short circuit proof:** The output of the converter can be short-circuited for an unlimited time. On a short circuit the converter switches off and retries after the hiccup time given in Table 3 (hiccup mode); it resumes normal operation once the short is removed.
- **Open circuit proof:** The output may be operated in open circuit for an unlimited time.
- **Over-temperature protection:** The converter shuts down when its controller reaches the shutdown temperature given in Table 3 and resumes operation once it has cooled down by the stated hysteresis.
- **Undervoltage lockout (UVLO):** The controller starts above the UVLO turn-on voltage and stops below the UVLO turn-off voltage given in Table 3. The device is specified only from the minimum input voltage of each PD level upwards.
- **Input TVS diode:** The converter features an input transient voltage suppressor (TVS) diode for protection.
- **Input fuse:** The input is protected by a fuse of the rating given in Table 3. The fuse is not user replaceable.





1.4 Galvanic isolation

The USB-DC-PD is a **non-isolated** buck converter. Input and output share a common reference potential: the negative input pin I– and the negative output pin O– are connected internally, and so is the ground of the USB-C receptacle.

- The output must not be treated as a floating or SELV-isolated supply derived from the input.
- Where several supplies share a system ground, the resulting ground loops must be considered by the system integrator.
- The device provides no isolation barrier and must not be used where galvanic separation between input and output is required.

1.5 Safety Information

Read this section before installing or operating the device.

- The device must be installed and commissioned by **qualified electrical personnel** only.
- The supply **must** be disconnected and secured against being switched on again before any wiring work is carried out on the device. Do not connect or disconnect the USB-DC-PD while a DC voltage is present.
- Loose contacts can cause overvoltage that destroys the device. All screw terminals **must** be tightened.
- **AC must not be applied** to the input. Applying AC destroys the device and is misuse, for which no replacement is offered.
- The device **must not** be opened, modified or repaired. It contains no user serviceable parts, and opening it voids conformity.
- The device is intended for installation in a **closed control cabinet or enclosure** for indoor use. It carries no declared IP rating and **must not** be exposed to moisture, condensation, dust or outdoor conditions.
- The device **must not** be operated outside the input voltage, output current and ambient temperature limits stated in Section 3. These are absolute limits, not recommendations.
- Adequate convection **must** be provided. The device dissipates heat through its enclosure and **must not** be covered or mounted without clearance to adjacent devices.

1.6 Ordering Information

The following ordering options are available.

Ordercode	Description	EAN	Weight	HS-Code	Origin
USB-DC-PD	5 / 9 / 12 V USB-C PD	4262542250015	30 g	8504409590	Germany
Customisation available. Contact DPS.					

Table 1: Ordering information of the USB-DC-PD.



2 Pinout

The connections of the USB-DC-PD are shown in Figure 1. The input is at the bottom and the output at the top; the USB-C receptacle is on the front.

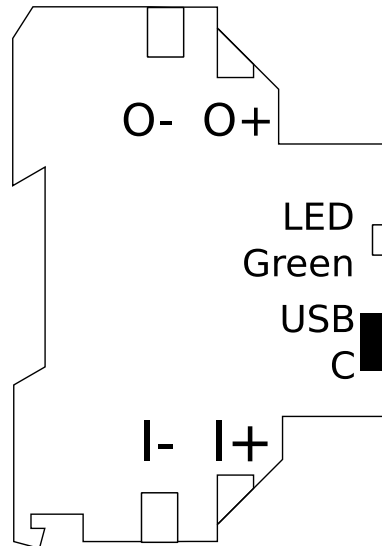


Figure 1: Connection diagram of the USB-DC-PD.

Pin	Functional description
Input	
I-	Negative input pin
I+	Positive input pin (9 V–30 V)
Output	
O-	Negative output pin
O+	Positive output pin, connected to the USB-C output (5 / 9 / 12 V). 0 V while no USB-C sink is detected.
USB C	USB-C receptacle, Power Delivery source. Output is 0 V until a USB-C sink is detected.
Indicator	
LED	A green LED is on when the output is good.

Table 2: Pin description of the USB-DC-PD.





3 Specification

The specification is shown in Table 3. If not otherwise specified the following parameters have been used: $T_{amb}=25\text{ }^{\circ}\text{C}$ 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-Standby-Strom (lastlos) Input standby current (no load)		4	10	mA
Zener Schutzdiode Eingang Zener protection input	1SMA4754A			
Eingangssicherung (nicht tauschbar) Input fuse (not user replaceable)		4		A
Unterspannungsabschaltung ein (Controller) UVLO turn-on (controller)		6.6		V_{dc}
Unterspannungsabschaltung aus (Controller) UVLO turn-off (controller)		6.3		V_{dc}





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	Min	Typ	Max	Unit
Ausgang Output				
Ausgangsschnittstelle Output interface	USB-C PD source			
Ausgang ohne erkannte USB-C-Senke Output, no USB-C sink detected	0 V (off)			
Ausgangsspannung $U_{out}=5\text{ V}$ Output voltage $U_{out}=5\text{ V}$	4.8	5	5.2	V _{dc}
Ausgangsstrom $U_{out}=5\text{ V}$ Output current $U_{out}=5\text{ V}$	0		3	A _{dc}
Ausgangsspannung $U_{out}=9\text{ V}$ Output voltage $U_{out}=9\text{ V}$	8.5	9	9.5	V _{dc}
Ausgangsstrom $U_{out}=9\text{ V}$ Output current $U_{out}=9\text{ V}$	0		2	A _{dc}
Ausgangsspannung $U_{out}=12\text{ V}$ Output voltage $U_{out}=12\text{ V}$	11.4	12	12.6	V _{dc}
Ausgangsstrom $U_{out}=12\text{ V}$ Output current $U_{out}=12\text{ V}$	0		1.5	A _{dc}
Wandlungseffizienz Conversion efficiency		90	91	%
Zener Schutzdiode Ausgang Zener protection output	no protection			
Softstart-Zeit (Controller) Soft-start time (controller)		2		ms
Gehäuse Case				
Montageform Mounting type	DIN rail TS35 (EN 60715)			
Gehäusebauform Housing style	Installation box, 1/2 TE			
Breite Width		8.8		mm
Höhe Height		88.4		mm
Tiefe Depth		58		mm
Gewicht Weight		30		g
Schutzart Degree of protection	none declared			





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	Min	Typ	Max	Unit
Sicherheitsfeatures				
Safety features				
Verpolungsschutz Reverse polarity protection	yes			
Neg. Eingangsspannung Negative input voltage			-30	V _{dc}
Kurzschlusschutz Short circuit protection	yes, hiccup mode			
Hiccup-Zeit (Controller) Hiccup time (controller)		64		ms
Leerlaufschutz Open circuit protection	yes			
Übertemperaturschutz Over-temperature protection	yes, auto-restart			
Abschalttemperatur (Controller) Shutdown temp. (controller)		150		°C
Hysterese (Controller) Shutdown hyst. (controller)		15		K
Galvanische Trennung Galvanic isolation	none (non-isolated buck)			
Betriebsbedingungen				
Operating conditions				
Temperaturbereich Temperature range	-40		50	°C
Lagertemperatur Storage temperature	-40		50	°C
Derating Derating	may be required			
Einsatzort Place of use	indoor, control cabinet			
Technische Merkmale				
Technical characteristics				
Elektrolytkondensatoren Electrolytic capacitors	no electrolytic capacitors			
Schutzlackierung PCB conformal coating	no			

Table 3: Specification of the USB-DC-PD.



4 Measurements

4.1 Measurement Conditions

The measurement conditions are noted in Table 4, if not otherwise noted in the specific measurement. All three USB PD levels (5 V, 9 V and 12 V) were measured.

	Min	Typ	Max	Unit
Input				
Input voltage	23.5	24	24.5	V _{dc}
Environment				
Temperature	20		24	°C
Humidity	30		90	% _{rel}

Table 4: Measurement conditions, if not otherwise noted.

4.2 Output Voltage Stability

The output voltage is measured over the output current range in Figure 2, for each of the three PD levels.

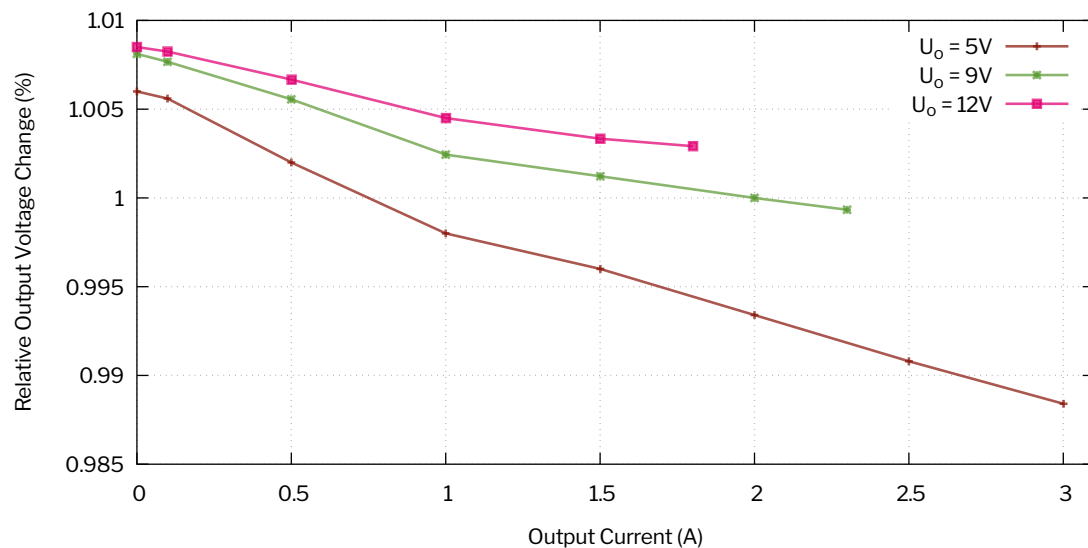


Figure 2: Output voltage relative to its nominal value over output current, U_{in}=24 V_{dc}.

4.3 Output Voltage Ripple

The peak-to-peak output voltage ripple is measured over the output current range and plotted in Figure 3.



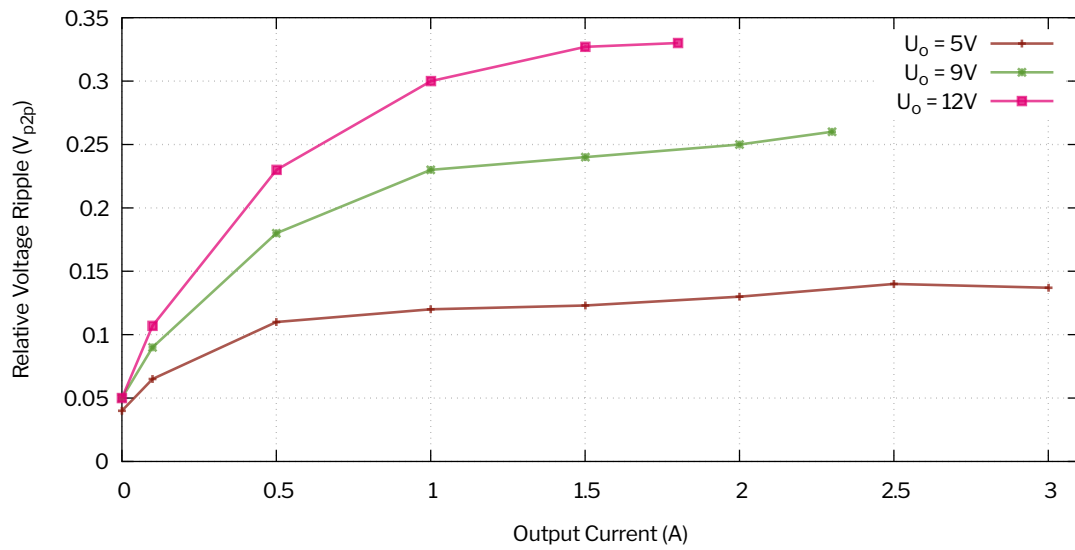


Figure 3: Peak-to-peak output voltage ripple over output current, $U_{in}=24 V_{dc}$.



4.4 Conversion Efficiency

The conversion efficiency is plotted over the output current range in Figure 4.

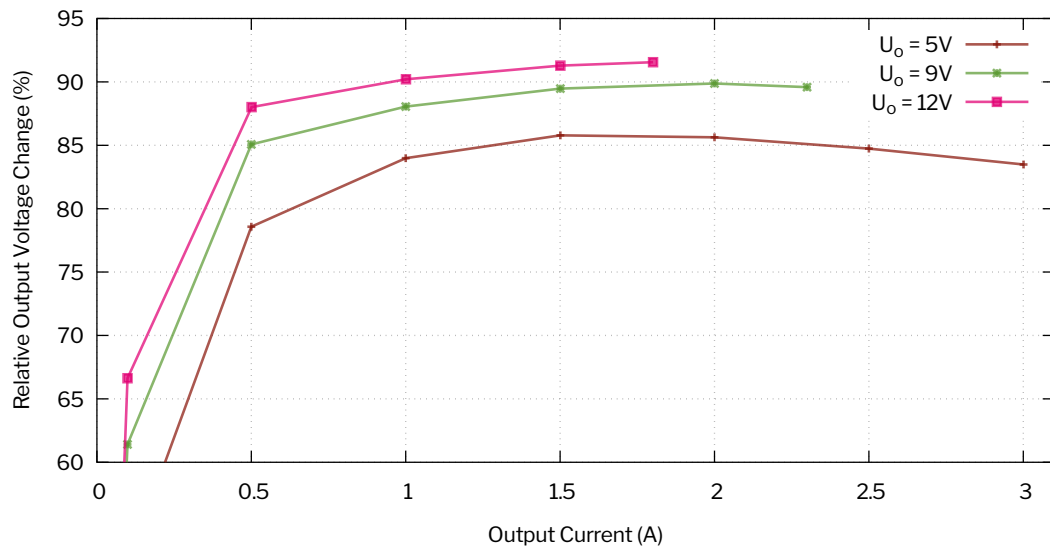


Figure 4: Conversion efficiency over output current, $U_{in}=24 V_{dc}$.

4.5 Input Standby Power

The input power without load is plotted over the input voltage range in Figure 5.

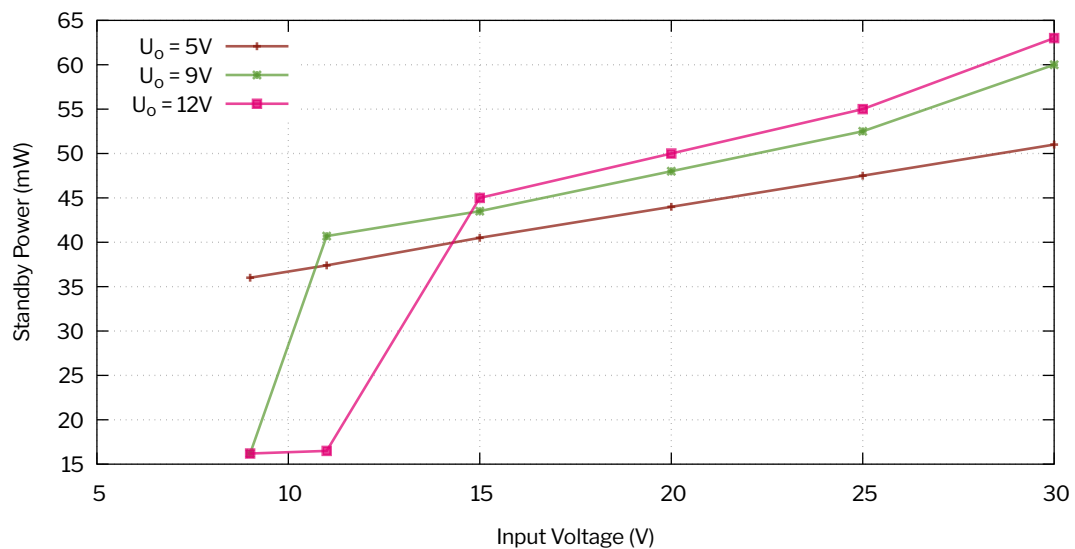


Figure 5: Input standby power without load over input voltage.



4.6 Step Response

For the step response the output current was raised from no load to the load stated for each level, $U_{in}=24\text{ V}_{dc}$. Output voltage and output current are shown in Figures 6, 7 and 8.

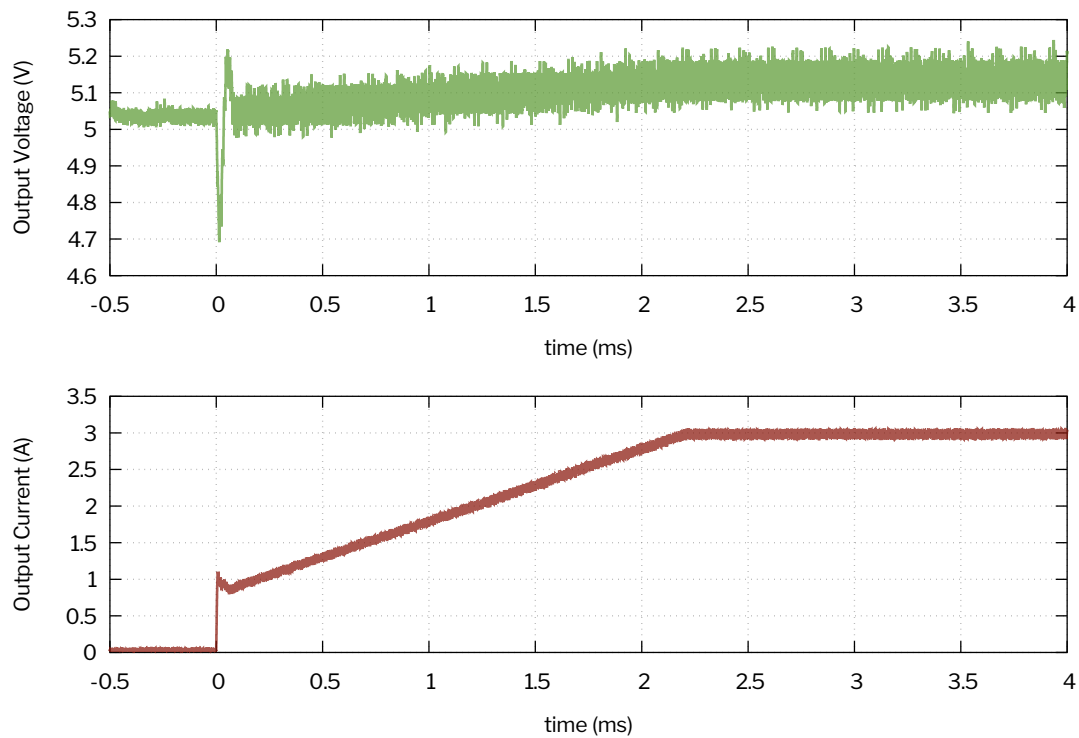


Figure 6: Step response at $U_{out}=5\text{ V}$, load step 0 A to 3 A.



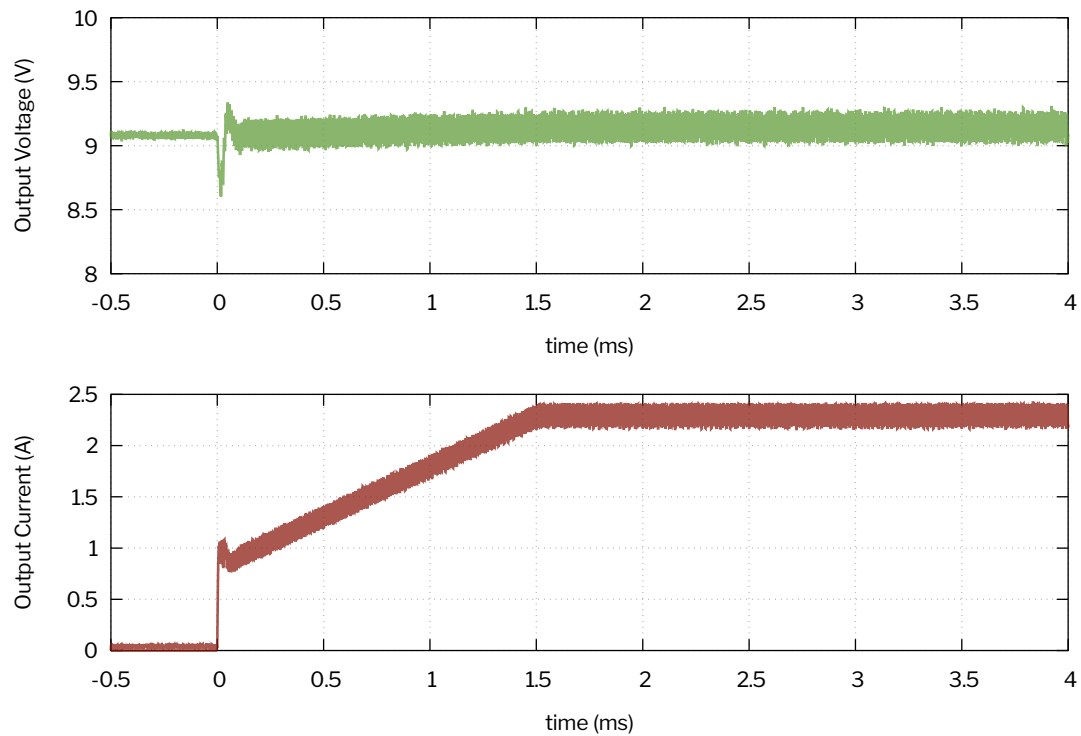


Figure 7: Step response at $U_{\text{out}}=9\text{ V}$, load step 0 A to 2.3 A.



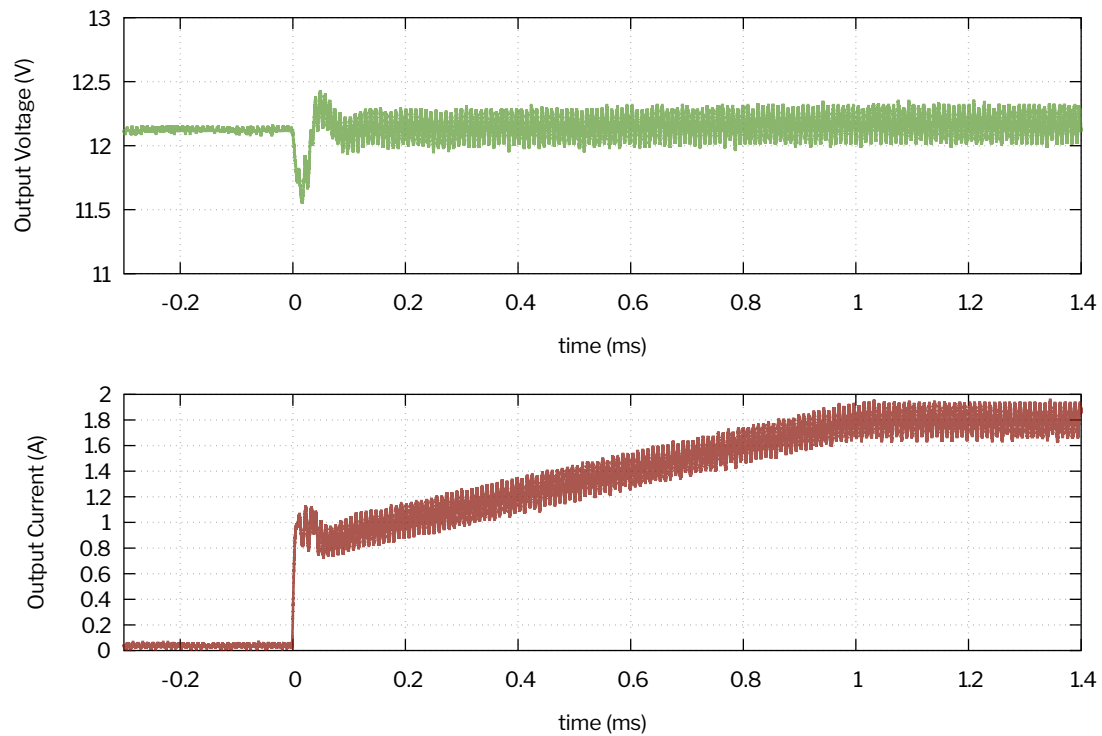


Figure 8: Step response at $U_{\text{out}}=12\text{ V}$, load step 0 A to 1.8 A.



5 EMC Measurements

The average (AVG) and quasi-peak (QP) conducted emissions of the USB-DC-PD at the input are shown in Figure 9, those at the output in Figure 10, each for the three PD levels 5 V, 9 V and 12 V against the Class A limits of EN 55011 / CISPR 11.

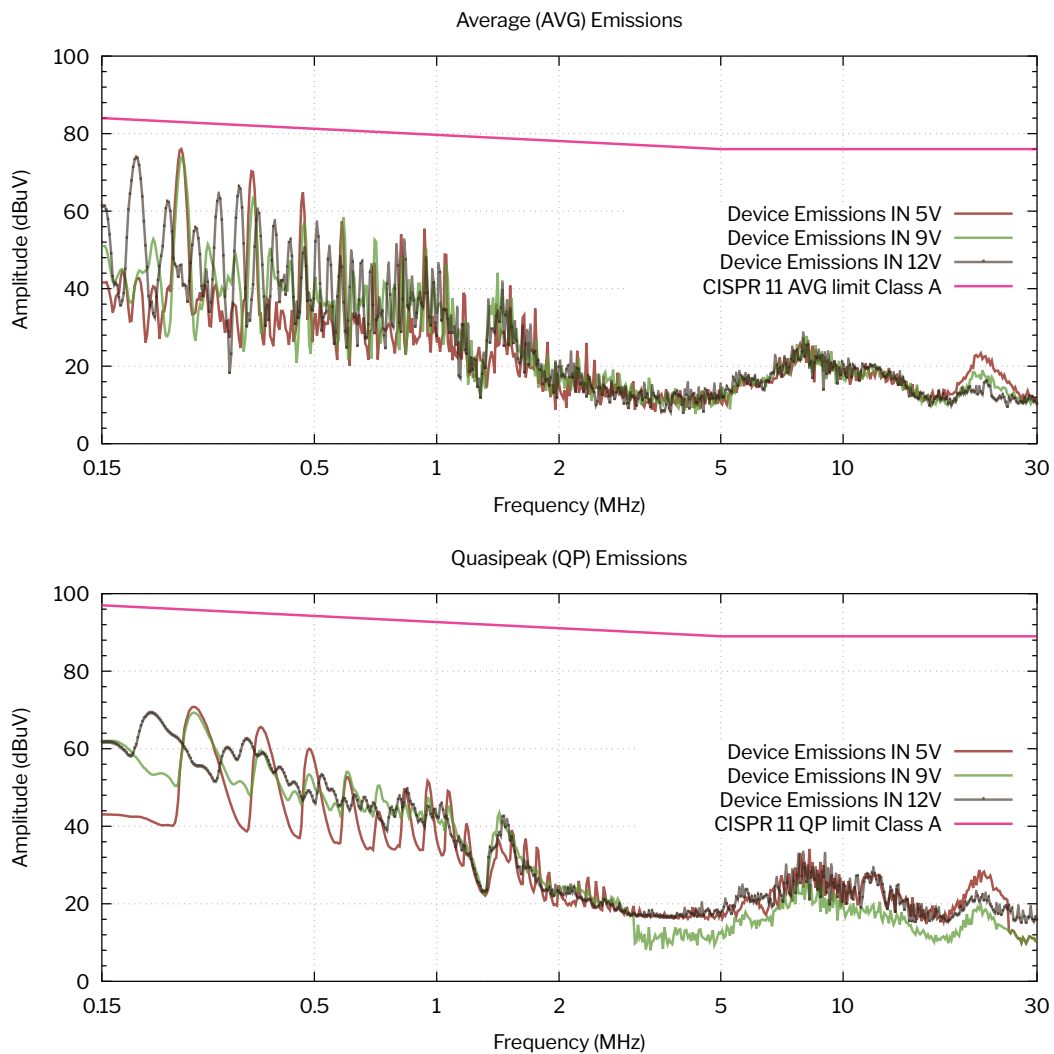


Figure 9: Conducted emissions of the USB-DC-PD at the input, AVG and QP.



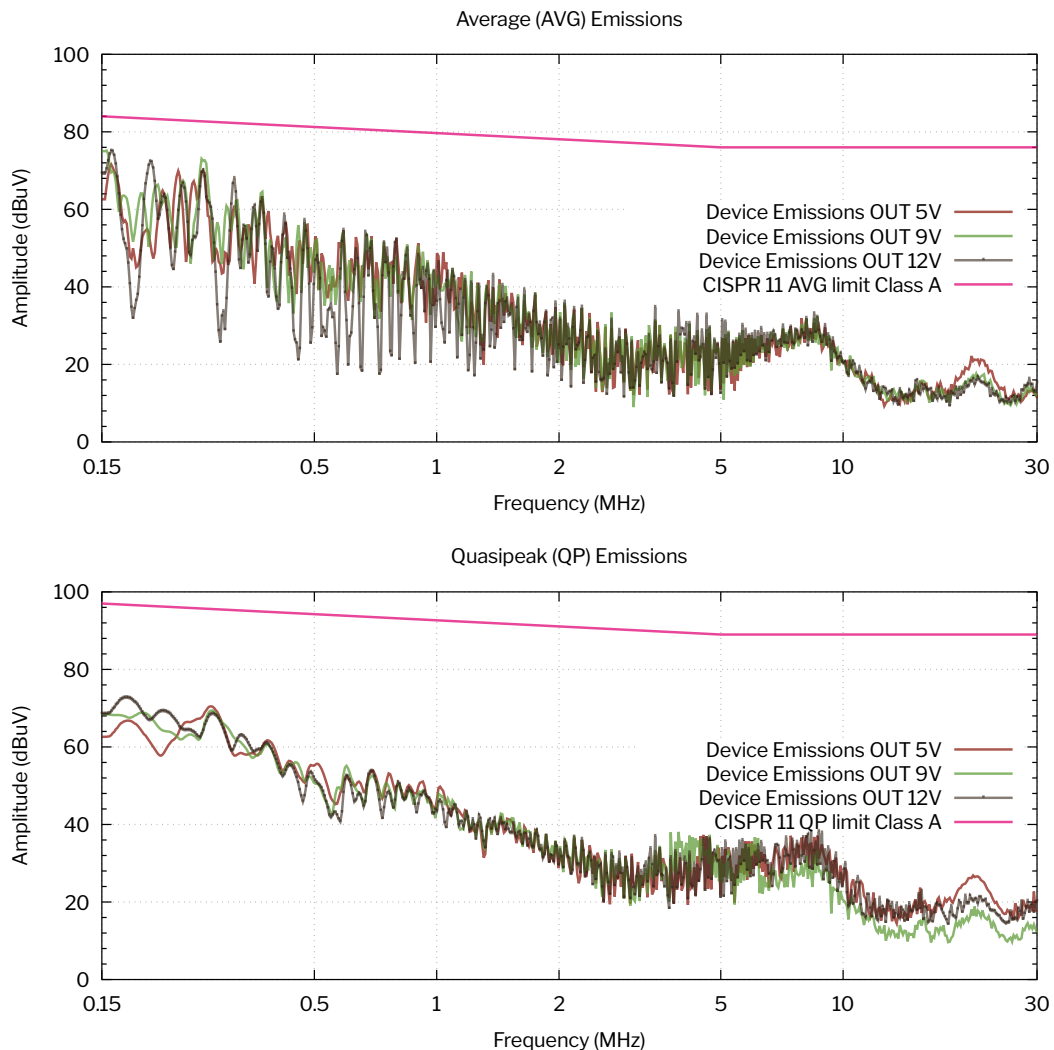


Figure 10: Conducted emissions of the USB-DC-PD at the output, AVG and QP.

The measured emissions stay below the **Class A** limits of EN 55011 / CISPR 11 over the whole measured frequency range, both for the average and for the quasi-peak detector. The USB-DC-PD is therefore declared as a **Class A** device.

The applied immunity standards are listed on the first page. The EU Declaration of Conformity for the USB-DC-PD is issued as a separate document, DPS-USB-DC-PD-CE.pdf. It is available on the product page or on request via <https://digitalpowersystems.eu/contact-us/>.



6 Case

The USB-DC-PD is housed in a half-module (1/2 TE) DIN rail enclosure. The case drawing is shown in Figure 11.

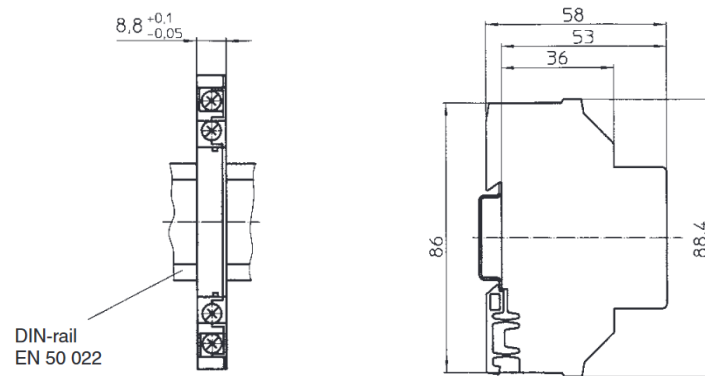


Figure 11: Case drawing of the USB-DC-PD. All dimensions in mm.

The front panel of the USB-DC-PD carries the USB-C receptacle and the green LED; the input terminals sit at the bottom and the output terminals at the top of the housing, see Figure 1.



7 Product label

7.1 Revision 4 (current)

The current product label (revision 4) of the USB-DC-PD is shown in Figure 12.

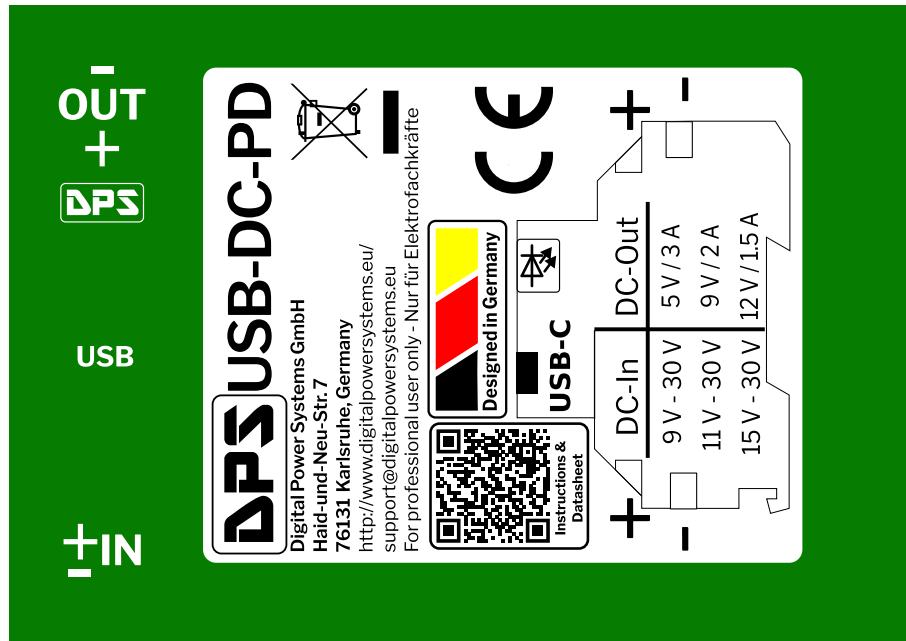


Figure 12: Current revision 4 product label of the USB-DC-PD.

7.2 Revisions 2 and 3 (obsolete)

The revision 2 and revision 3 labels are superseded and are shown only for traceability of units shipped before revision 4, see Figures 13 and 14.

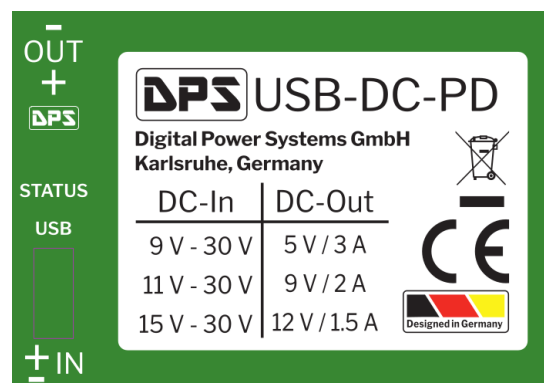


Figure 13: Obsolete revision 2 product label of the USB-DC-PD. Shown for traceability only.





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30 V 18 W USB-C Power Delivery (PD) 5 V 9 V 12 V DIN Rail Charger



Figure 14: Obsolete revision 3 product label of the USB-DC-PD. Shown for traceability only.





8 Revision History

The revision history is depicted in the following table.

Date	Changes in Revision
29.10.2024	Initial release.
14.01.2025	Added standby current.
11.06.2025	Updated product picture, added label revision 3, added missing output voltage information, updated EAN code.
23.09.2026	Migrated to the shared DPS datasheet support package. New company address. Standards cited with their EN designation, emissions stated against EN 55011 / CISPR 11 Class A. Efficiency corrected to the measurement, subtitle corrected to 18 W. Added output behaviour without detected USB-C sink, protection data, galvanic isolation, weight, HS code, origin, safety information and the EU Declaration of Conformity. Label revision 4. Corrected pinout ranges, negative input voltage and step response descriptions.





9 Contact Information

This is a product of the Digital Power Systems GmbH (DPS).
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68753 Waghäusel-Kirrlach, Germany
HRB 738185 – Amtsgericht Mannheim
Geschäftsführer: Dr. Michael Heidinger
Visit our website: <https://digitalpowersystems.eu/>

9.1 Latest version of this document

The latest revision of this datasheet, together with the EU Declaration of Conformity (DPS-USB-DC-PD-CE.pdf), is available on the product page: <https://digitalpowersystems.eu/usb-dc-pd-linklist/>. Please check that the revision date in Section 8 matches the version published there before relying on this document.

9.2 Feedback on this document

DPS welcomes corrections and suggestions concerning this datasheet. If you find an error, an ambiguity or a missing specification, please write to datasheet@digitalpowersystems.eu or use the contact page <https://digitalpowersystems.eu/contact-us/>, and state the product name, the revision date of this document and the section concerned.

