voltbricks

DATASHEET

VDV (HV) Series

VDV(HV)400, VDV(HV)500

High voltage input DC/DC converters

Description

Compact isolated DC/DC converters of VDV(HV) Series for industrial and special purpose applications. Despite the small size (122×84,2×12,85 mm) the maximum output power of modules reach up 500 W and they are able to operate in a wide case operating temperature range (–60...+125°C). These modules have functions of remote on/off, remote feedback, short circuit, overcurrent and thermal protection and can operate in parallel mode. Without optocouplers in the converter's circuit it can safely operate in conditions of ionizing radiation and high temperature. Units have variable protections from different factors: vibration, dirt, moisture fog and salt fog.

These modules undergo special thermal and limit test including burn-in test with extreme on/off modes.

Engineered in accordance with

- MIL-STD-810G
- MIL-STD-461F (CE102)
- MIL-STD-704F

Description of VDV(HV) Series on the manufacturer's website
https://voltbricks.com/product/vdvh

Features

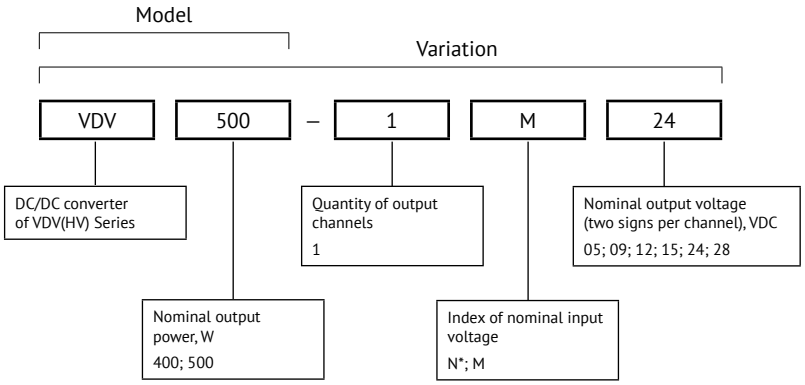
- 5 year warranty
- Output current up to 30 A
- 270 VDC (index "M") input compliant with MIL-STD-704F
- Low-profile design (12,85 mm) with cylindrical pin outs
- Case operating temperature –60...+125°C
- 125 °C baseplate operation without derating
- Magnetic feedback without optocouplers
- Short circuit protection, overvoltage, thermal protection
- Remote on/off
- Output voltage adjustment
- Typical efficiency 89% (Uout.=24 VDC)
- Parallel operation, remote feedback
- Parallel or series mode
- Polymer potting sealing

Order registration
+65 6950 0011, Global Operations Team

Technical support
support@voltbricks.com

Reliability test
https://support.voltbricks.com/Reliability-Test_ENG.pdf

Ordering information



For more information please contact our Global Operations Team

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* Power 500 W is not supported by this unit.

Output power and current

Model	VDV400				VDV500		
Output power, W	360	400			450	500	
Output voltage, VDC	12	15	24	28	15	24	28
Max. output current, A	30	26,6	16,7	14,2	30	20,8	17,8

Other output voltage within range 3...70 VDC is also available upon special request.

Index of nominal input voltage*

Parameter		Index "N"	Index "M"
Nominal input voltage, VDC		110	230
Input voltage range, VDC		82...154	175...350
Transient deviation (1 s), VDC		82...170	175...400
Typical efficiency for Uout.=24 VDC		85	89
Output voltage, VDC	VDV400 VDV500	12, 15, 24, 28 –	12, 15, 24, 28 15, 24, 28

* Reflected input ripple current (10–10000 Hz) — 8% Uin. nom

Specifications

All specifications valid for normal climatic conditions (ambient temp. 15…35°C; relative humidity 45…80%; air pressure $8{,}6\times10^4$…$10{,}6\times10^4$ Pa), Uin. nom, Iout. nom, unless otherwise stated. It is important to note that the information herein is not full.

Output specifications

Parameter		Value
Output voltage adjustment		±5% Uout. nom
Regulation	Input voltage variation (Umin…Umax)	max ±2% Uout. nom
	Load variation (10…100% Imax)	
	Total regulation	±6% Uout. nom
Ripple and noise (p-p)		<2% Uout. nom
Maximum capacitive load	12 VDC 24 VDC 48 VDC	1000 uF 150 uF 70 uF
Start up time (remote)		max 0,1 s
Overload protection level*	400 W 500 W	<2,2 Pmax <1,8 Pmax
Short circuit protection*		hiccup auto recovery
Overvoltage protection		1,5 Unom

* Parameters are stated for the information purposes and could not be used at long term work, exceeding maximum output current, at work outside of a range of operating temperatures.

General specifications

Parameter		Value
Case temperature	Operating	–60…+125°C
	Storage	–60…+125°C
Switching frequency		130 kHz ±10%
Isolation capacitance	input/output	1500 pF
Isolation voltage (60 s)	input/output input/case output/case	1500 VAC, 50 Hz 1500 VAC, 50 Hz 500 VAC, 50 Hz
Isolation resistance @ 500 VDC	input/output	20 MOhm min, normal climatic conditions
Thermal impedance		3°C/W
Thermal protection level		118…125°C, clamp, auto recovery
Remote on/off		Off.: connection of pins "ON" and "–IN", I≤5 mA
Vibration and dust proof, salt fog resistant		+
Moisture proof (Tamb.=25°C)		98%
Typical MTBF		1 737 900 hrs
Failure rate		<0,05%
Warranty		5 years

Specifications (cont.)

Physical specifications

Parameter	Value
Case material	aluminium
Potting	epoxy polimer
Pin material	phosphor bronze, SnPb plated
Weight	max 250 g
Soldering temperature	260°C @ 5 s

Design topology

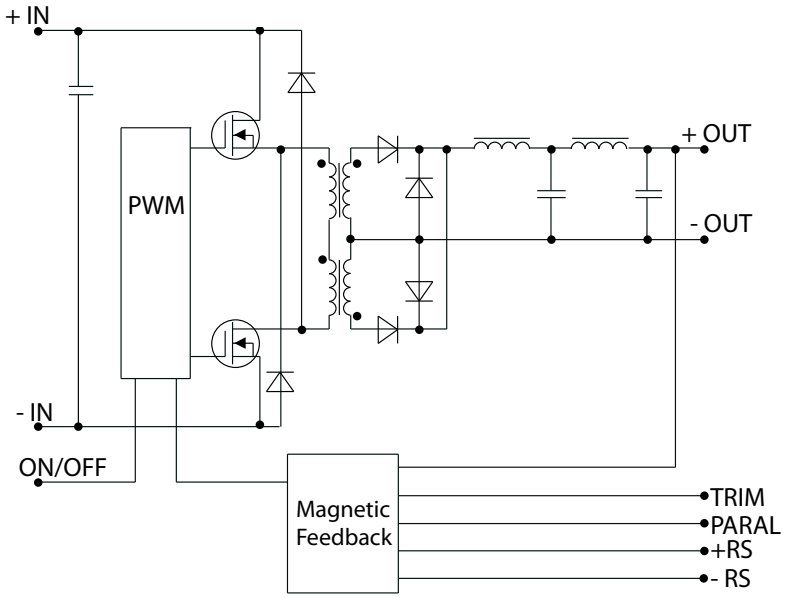

Figure 1. Design topology.

Service functions

Typical connection

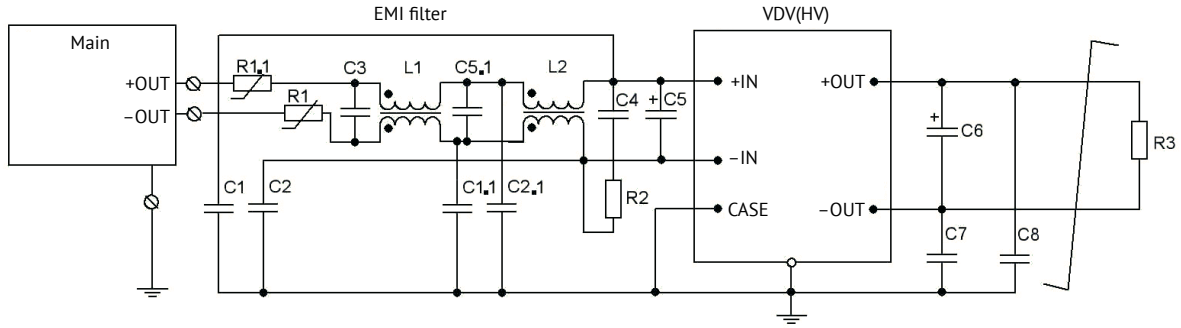

Figure 2. Typical connection with filtration unit.

R2	resistor			1 Ohm
R1, R1.1	NTC-thermistor			4,7 Ohm
C1, C2	ceramic capacitor			4700 pF 500 VDC min
C1.1, C2.1	tantalum capasitor			0…2200 pF
C7, C8	tantalum capasitor			2200…4700 pF
C4	film capacitor	Input voltage		0,01…0,15 uF
C5	film capacitor*			0,47…1 uF
	elecrolytic capacitor	Input voltage	110 VDC 230 VDC	150…330 uF 33…82 uF
C6	tantalum capasitor	Output voltage		10…33 uF
L1	common mode choke			0,4…2 mH
L2	common mode choke			5…20 mH
C3 C5.1	film capacitor	Input voltage	110 VDC 230 VDC	0,47…1 uF

* C4 is recommended to be installed in addition to C5 (electrolytic).

Service functions (cont.)

Remote control

Function of remote control by a signal allows to control the unit's operation using mechanical relay or electric switch of "open collector" type.

The unit should be powered off by connecting "ON" output to "–IN" output. The switch can carry current of up to 5 mA, the max voltage drop on the switch should be less than 1,1 V.

The unit is powered on by disconnecting the switch within the time less then 5 µs. Being disconnected the switch is applied by approximately 5 V, allowable current leakage through the switch should not be over 50 µA.

To arrange remote power off/on of several units simultaneously it is not allowed to use additional elements in the circuit to connect outputs "ON" and "–IN" and a switch.

If the function of remote power off/on is not used, "ON" output is allowed to be left unconnected.

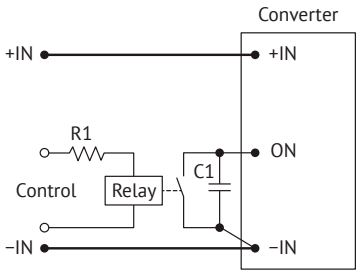

Figure 3 (a). ON/OFF control by relay.

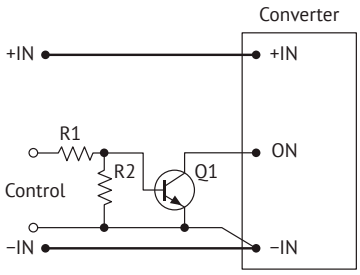

Figure 3 (b). ON/OFF control by bipolar transistor.

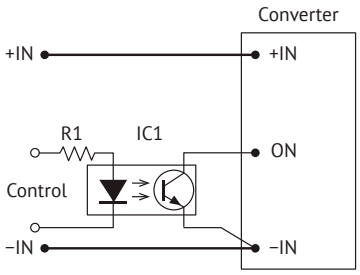

Figure 3 (c). ON/OFF control by optocoupler.

Adjustment

Adjustment of output voltage of a power supply unit within the range of at least ±5% can be done by connecting "ADJ" output (if available) through "–OUT" output to increase output voltage, or through "+OUT" output to decrease the output voltage.

In case of using variable resistor Rvar and outside resistors (R1, R2) it is possible to fulfill the adjustment both to increase and decrease the output voltage.

If you need to control the output voltage of a power supply unit by a signal from external source of current or voltage, e.g. in micro-controller automated control systems using DAC, the external current or voltage signal should be supplied to the adjustment output relating to "–OUT" output, as shown in the drawings (e) and (d).

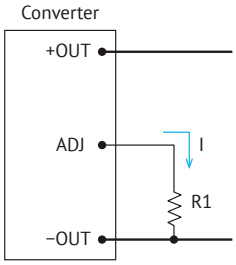

Figure 4 (a). Output voltage increase.

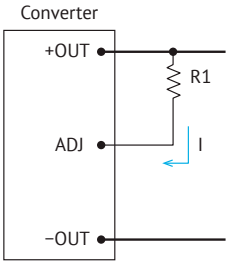

Figure 4 (b). Output voltage decrease.

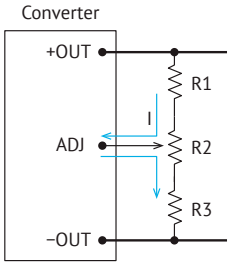

Figure 4 (c). Adjustment by resistive divider.

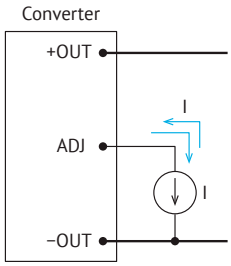

Figure 4 (d). Adjustment by current sourse.

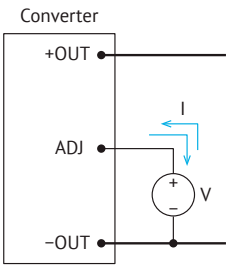

Figure 4 (e). Adjustment by voltage sourse.

Service functions (cont.)

External feedback

Application of external feedback allows to compensate for output voltage drop on extended power lines and isolating diodes. The maximum value of compensation for output voltage drop is no less than 5%. If it's necessary to provide better A/J, "+RS" and "-RS" pins should be connected to the load with twisted-pair wire which has cross-section area no less than 0,1 mm².

Typical connection diagram of external feedback application for power supply system with extended power lines is shown in picture:

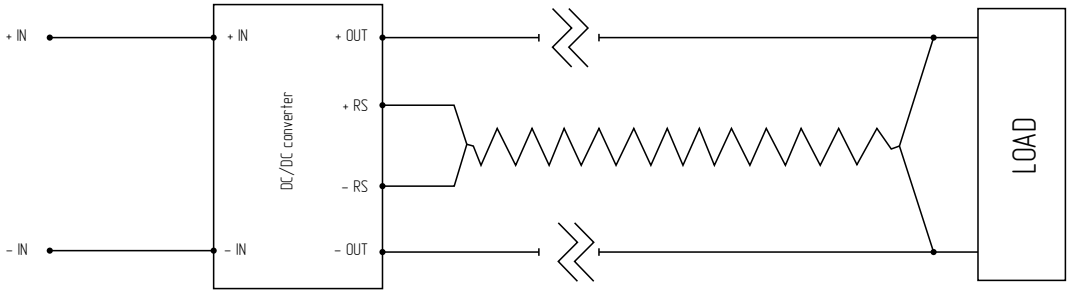

Figure 5. Typical connection diagram of external feedback application.

If there no need to apply external feedback, "+RS" and "-RS" pins should be connected with "+IN" and "-IN" directly according to the picture. It is strictly forbidden to leave "+RS" and "-RS" pins disconnected.

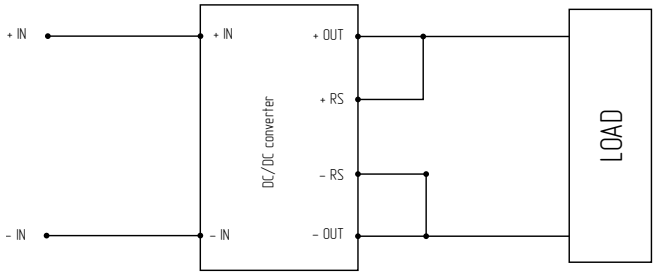

Figure 6. Typical connection diagram without external feedback application.

Efficiency

VS load

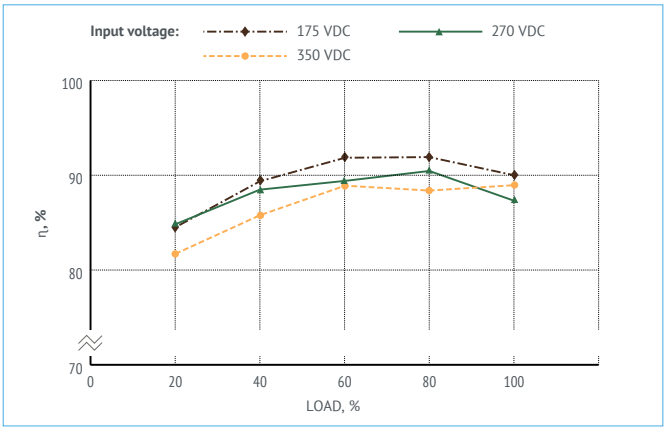

Figure 7. Efficiency of VDV(HV)400-1M28.

Oscillograph charts

Testing conditions Uin.=270 VDC, Iout.=30 A, Tamb.=25°C, Uout.=12 VDC, Cout.=100 uF

The database of regulated parameters of the maunfactured products is available. Pls. contact your personal manager or customer support service to get necessary information.

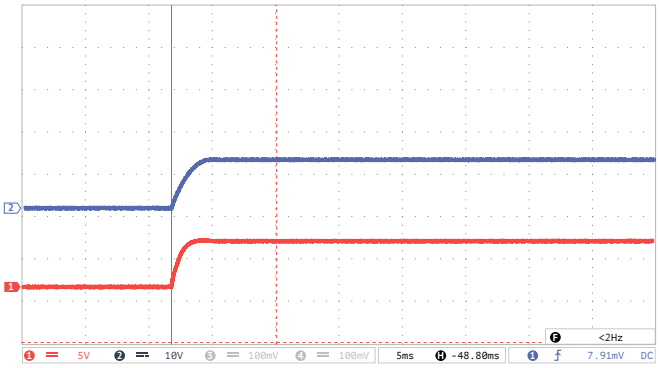

Figure 8 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-output.

Ray 1 (red) – output voltage. Scale 5 V/div.
Ray 2 (blue) – voltage at ON-output. Scale 10 V/div.
Time scale t=5 ms/div.

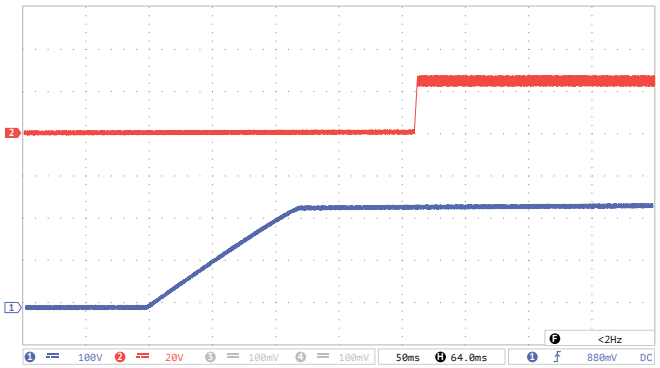

Figure 8 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (blue) – input voltage. Scale 100 V/div.
Ray 2 (red) – output voltage. Scale 20 V/div.
Time scale t=50 ms/div.

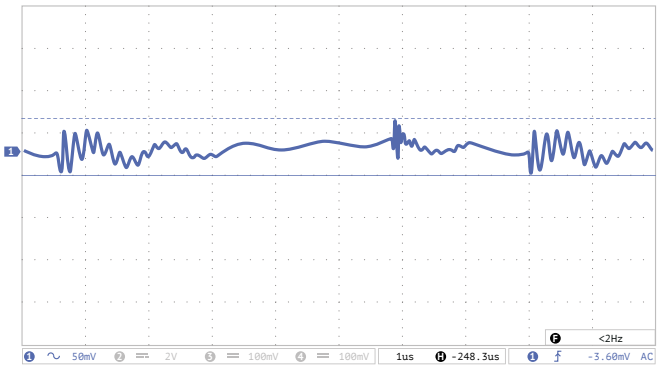

Figure 8 (c). Oscillograph chart of output voltage ripple.

Ray 1 (blue) – ripple of output voltage. Scale 50 mV/div.
Time scale 1 us/div.
Measuring technique: see Electrical Test Screen.

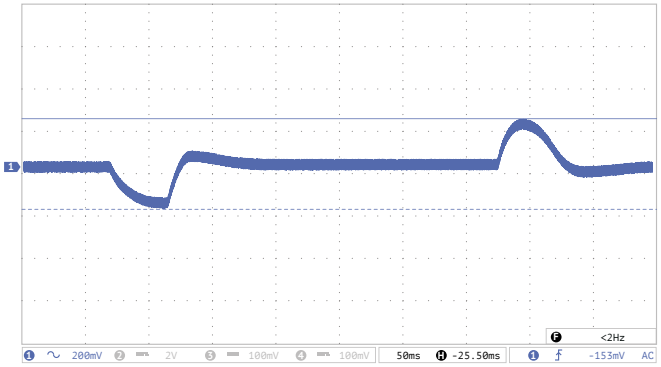

Figure 8 (d). Oscillograph chart of voltage transient deviation during load "drop/rise".

Ray 1 (blue) – output voltage. Scale 200 mV/div.
Time scale t=50 ms/div.

Modes:
– "drop" output current variation (10...100%) Inom;
– "rise" output current variation (10...100%) Inom;
– build-up time 500 us.

Noise spectrogram

Testing according to MIL-STD-461F CE102. (Tcase=25°C, Vin.=+12 V, full load, unless otherwise specified)

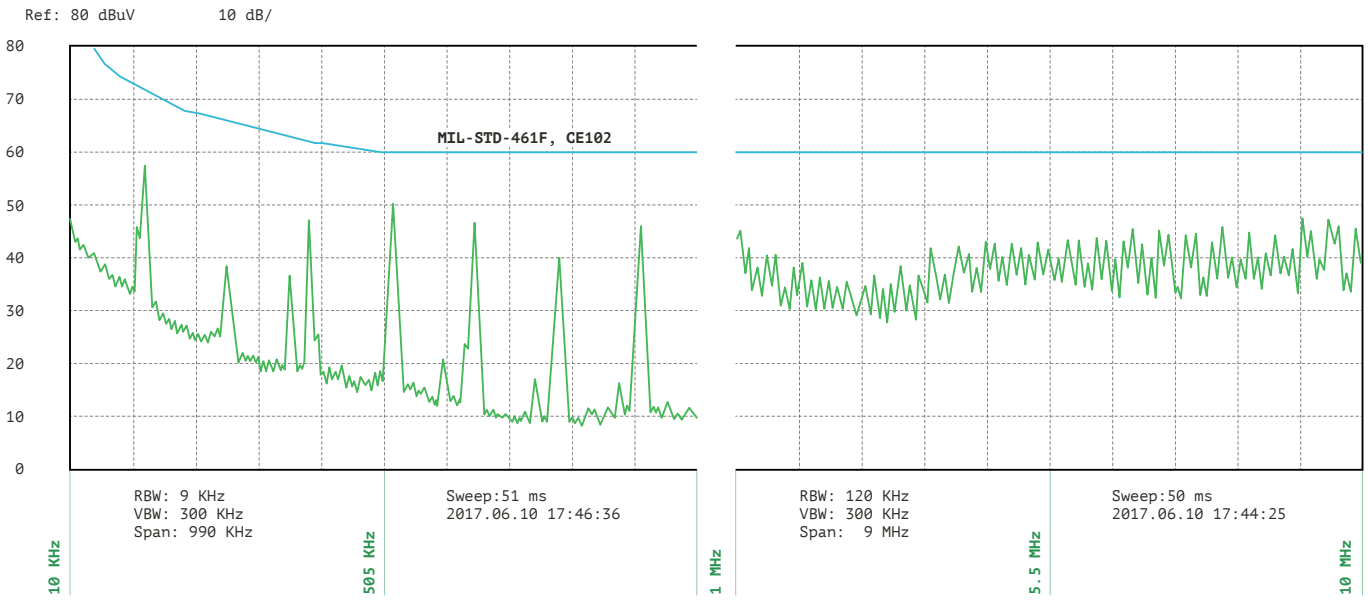

Figure 9. Spectrogram of VDV(HV)500-1M28 with typical connection diagram.

Outline dimensions

Models packed in reinforced case with flanges

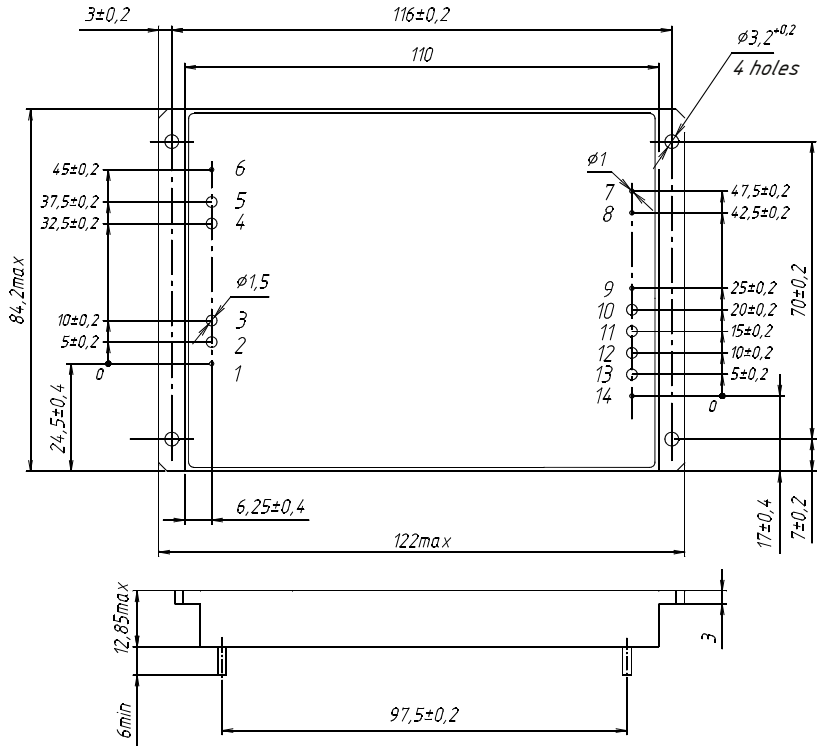

Figure 10. Single-output models.

Pin out

Pin #	1	2, 3	4, 5	6	7	8	9	10, 11	12, 13	14
Function	ON	–IN	+IN	CASE	PARAL	TRIM	–RS	–OUT	+OUT	+RS

Heatsink

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g
752695.008	Longitudinal	122×82×14×4	558	210
752695.008-01	Longitudinal	122×82×24×4	901	317

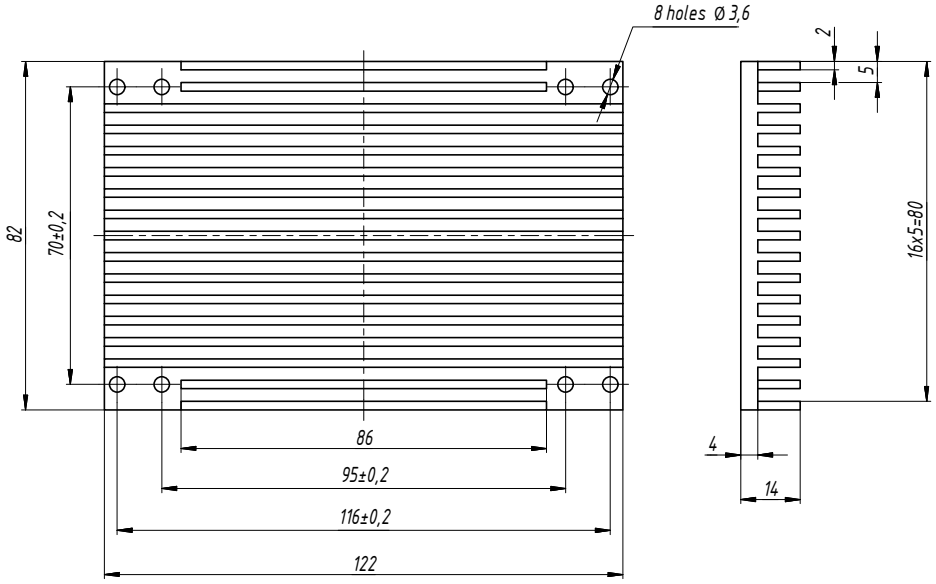

Figure 11 (a). *752695.008.*

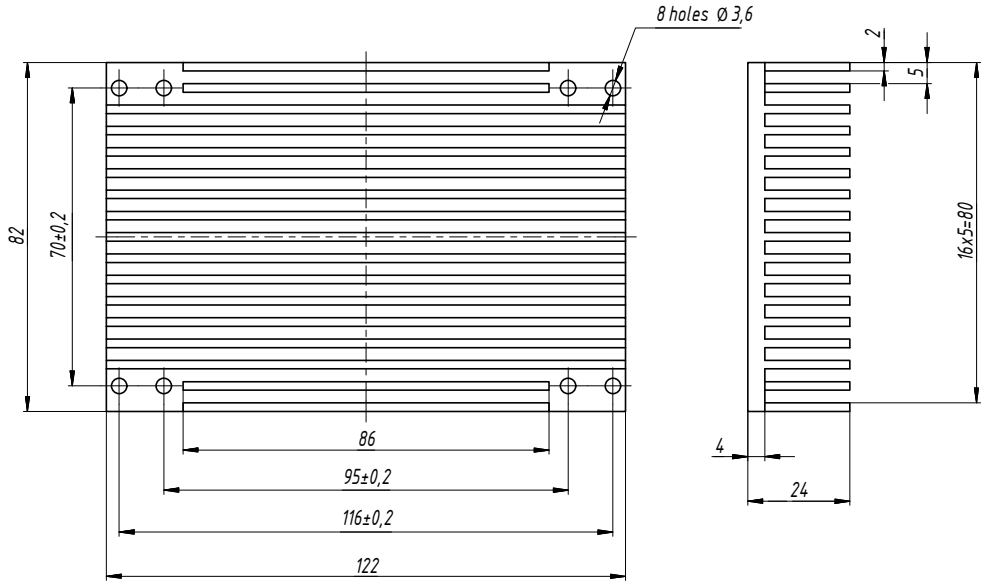

Figure 11 (b). *752695.008-01.*

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Manufacturer of reliable DC/DC converters and power supply systems

This datasheet is valid for the following units: VDV400-1N12; VDV400-1N15; VDV400-1N24; VDV400-1N28; VDV400-1M12; VDV400-1M15; VDV400-1M24; VDV400-1M28; VDV500-1M15; VDV500-1M24; VDV500-1M28.