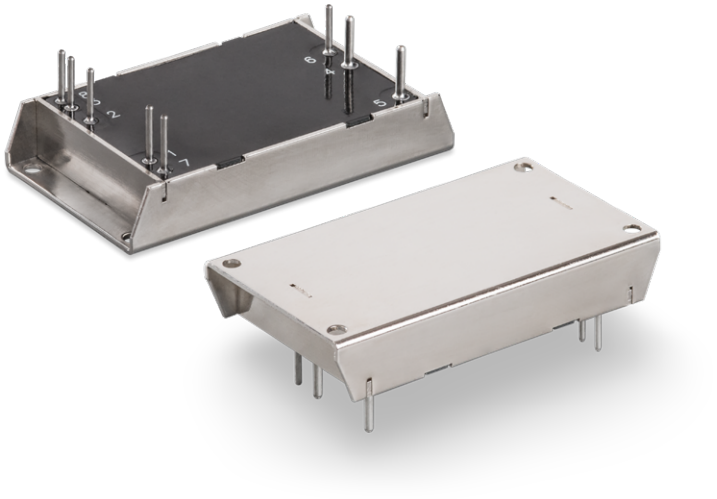
voltbricks

DATASHEET

VDR Series

VDR75, VDR100

Ultra compact DC/DC converters



Description

Ultra compact isolated single channel DC/DC converters designed for industrial and special purpose applications. These compact units (57,5×33,2×10,25 mm without output pins) have output power up to 100 W and wide operating temperature range (–60...+125°C for VDR75). They can be switched on/off by a signal, equipped with protection from overcurrent, short circuit, output overvoltage and overtemperature and can be connected in series.

VDR100 can safely operate in conditions of ionizing radiation and high temperature. Polymer potting sealing protects units from different factors: vibration, dirt, moisture 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-461E (CE102)
- MIL-STD-704F (index “W”)

Description of VDR Series on the manufacturer's website
https://voltbricks.com/product/vdr

Features

- Output current up to 20 A
- Case operating temperature:
  –60...+125°C for VDR75
  –60...+115°C for VDR100
- 125 °C baseplate operation without derating
- 28 VDC (index “W”) input compliant with MIL-STD-704F
- Low-profile design 10,25 mm
- Copper case with mounting flanges
- Short circuit, overcurrent, output overvoltage, thermal protection
- Remote on/off
- Output voltage adjustment
- Switching frequency 350 kHz (fixed)
- Typical efficiency 89% (Uout.=12 VDC)
- Polymer potting sealing
- No optocouplers
- External synchronization

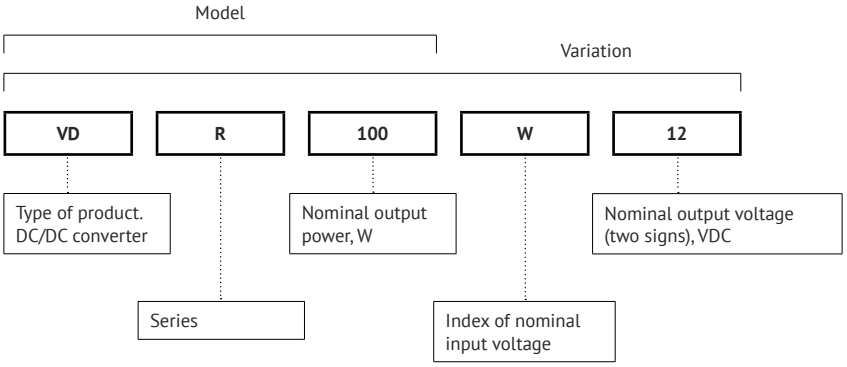
Order registration
+65 6950 0011, Global Operations Team

Technical support
support@voltbricks.com

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

3D models
https://support.voltbricks.com/models/VDR100-en.stp

Ordering information



For more information please contact our Global Operations Team
+65 6950 0011
info@voltbricks.com

Output power and current

Model	VDR75							VDR100					
Output power, W	66*	75						100					
Output voltage, VDC	3,3	5	9	12	15	24	28	5	9	12	15	24	28
Maximal output current, A	20	15	8,3	6,25	5	3,1	2,6	20	11,1	8,3	6,6	4,1	3,5

* The output power is limited by the max current of 20A for VDR75 and VDR100.

Index of nominal input voltage

Parameter	Index "B"	Index "W"
Nominal input voltage, VDC	12	28
Input voltage range, VDC	9...36	18...75
Transient deviation (1 s), VDC	9...40	17...84

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		max ±6% Uout. nom
Ripple and noise (p-p)			<2% Uout. nom
Maximum capacitive load*	75W	3 up to 6 V above 6 up to 15 V above 15 up to 28 V above 28 V	7500 uF 1200 uF 370 uF 75 uF
Maximum capacitive load	100W	3 up to 6 V above 6 up to 15 V above 15 up to 28 V above 28 V	10000 uF 1600 uF 500 uF 100 uF
Start up time (remote)			<0,1 s
Trancient responce deviation	On change Uin.min…Uin.max		max ±10% (50% load step change, 500 us front time)
	On change within 0,5×Inom…Inom		
Non-load operation mode**	Iout < 0.1 * Iout.nom		Uout ⩽ 1,3·Uout.nom

* The specified maximum capacitive load ensures start up time of 100 ms at max ohmic load. The value can be increased during testing with lower load or in case the start up time should not be followed.

** When the power converter runs in the non-load operation mode, ripple of output voltage isn't defined. At the same time module can switch to hiccup operation mode when the output voltage appears and disappears periodically. Hiccup operation mode isn't a defect sign. Long time operation in non-load operation mode isn't recommended.

Protections***

Parameter	Value
Overload protection level	<1,5 Pmax
Short circuit protection	yes
Overvoltage protection	yes
Thermal protection level	+115…+130 °C
Vibration proof	1…2000 Hz, 200 (20) m/s^2 (g), 0,3 mm
Dust proof	yes
Salt fog resistant	yes
Moisture proof (Tamb.=35°C)	98%

*** 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.

Specifications (cont.)

General specifications

Parameter			Value
Operating case temperature	75 W 100 W		–60...+125 °C –60...+115 °C
Operating ambient temperature (on condition the case temperature is maintained)	75 W 100 W		–60...+120 °C –60...+110 °C
Storage temperature			–60...+125 °C
Switching frequency			350 kHz typ. (fixed, pulse width modulation)
Input capacitance (10 kHz), external	Index «B»	75 W 100 W	110 uF tantalum + 20 uF ceramic 120 uF tantalum + 30 uF ceramic
	Index «W»	75 W 100 W	55 uF tantalum + 10 uF ceramic 68 uF tantalum + 15 uF ceramic
Isolation voltage (60 s)	input/output, input/case, output/case		500 VAC 50 Hz
			750 VDC
Isolation resistance @ 500 VDC	input/output, input/case, output/case		20 MOhm min
Thermal impedance			8,7 °C/W
Remote on/off			Off: connection of pins «ON» and «–IN», I≤5 mA
Typical MTBF			1 737 900 hrs
Warranty			5 years

Physical specifications

Parameter	Value
Case material	copper alloy with nickel electroplating coating
Potting	epoxy
Pin material	bronze
Weight	max 65 g
Soldering temperature	max 260°C @ 5 s
Dimensions	max 57,5×33,2×10,25 mm without output pins

Design topologies

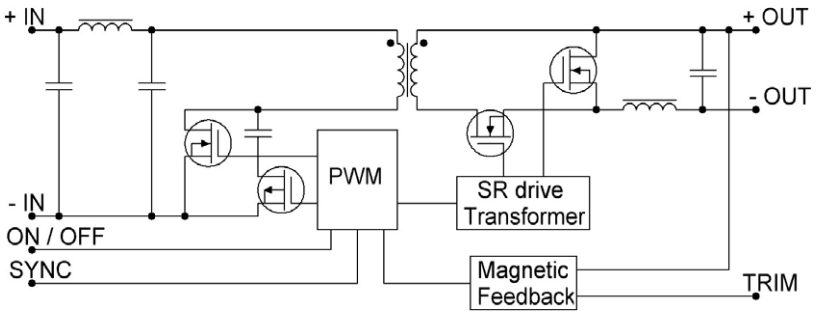


Figure 1. VDR75 and VDR100 design topology.

Service functions

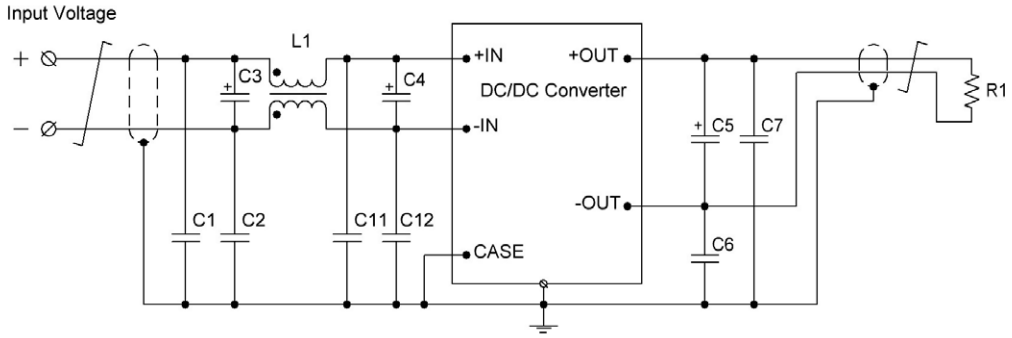


Figure 2. Typical connection with filtration unit for VDR75 and VDR100.

C1, C2, C6, C7, C11, C12		ceramic capacitor			10000 pF 500 VDC min	Y capacitors, part of EMI filter
C5		tantalum or aluminum capasitor	Output voltage	3 up to 6 V above 6 up to 15 V above 15 up to 28 V above 28 V	440 uF tant. 200 uF tant. 30 uF tant., 68 uF alum. 68 uF alum.	Usage of this capasitor is advisory and influences the value of voltage transient deviation
EN55022 Class A EMI Filter	L1	common mode choke			min 8 mH	initial permeability from 10000 to 20000, part of EMI filter
	C3, C4	ceramic capacitor	Input voltage	12 VDC 24 (28) VDC	20 uF 10 uF	Low ESR, part of EMI filter
		tantalum capasitor	Input voltage	12 VDC 24 (28) VDC	110 uF 55 uF	

Tablet 1. Components of typical connecting circuit for VDR75.

C1, C2, C6, C7, C11, C12		ceramic capacitor			10000 pF 500 VDC min	Y capacitors, part of EMI filter
C5		tantalum or aluminum capasitor	Output voltage	3 up to 6 V above 6 up to 25 V above 15 up to 28 V above 28 V	440 uF tant. 200 uF tant. 30 uF tant., 68 uF alum. 68 uF alum.	Usage of this capasitor is advisory and influences the value of voltage transient deviation
EN55022 Class A EMI Filter	L1	common mode choke			min 8 mH	initial permeability from 10000 to 20000, part of EMI filter
	C3, C4	ceramic capacitor	Input voltage	12 VDC 24 (28) VDC	30 uF 15 uF	Low ESR, part of EMI filter
		tantalum capasitor	Input voltage	12 VDC 24 (28) VDC	120 uF 68 uF	

Tablet 2. Components of typical connecting circuit for VDR100.

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.

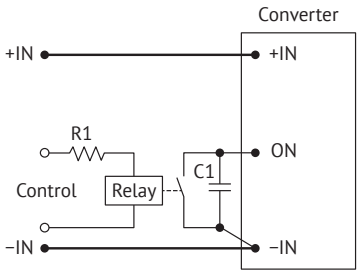


Figure 3 (a). ON/OFF control by relay.

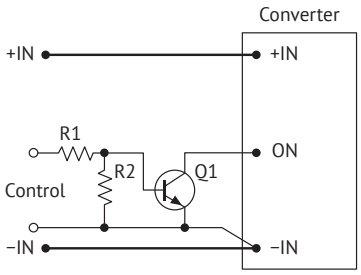


Figure 3 (b). ON/OFF control by bipolar transistor.

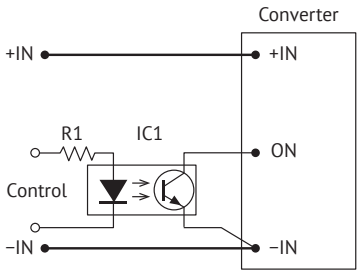


Figure 3 (c). ON/OFF control by optocoupler.

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).

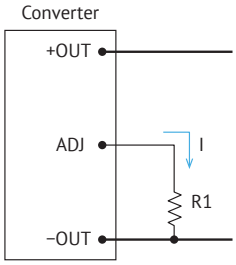


Figure 4 (a). Output voltage increase.

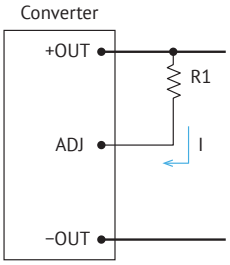


Figure 4 (b). Output voltage decrease.

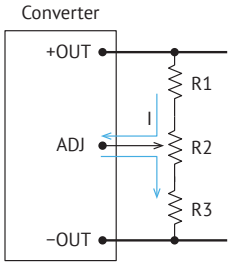


Figure 4 (c). Adjustment by resistive divider.

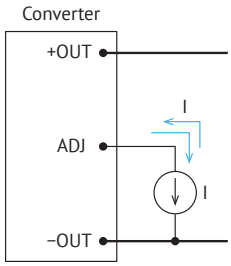


Figure 4 (e). Adjustment by current sourse.

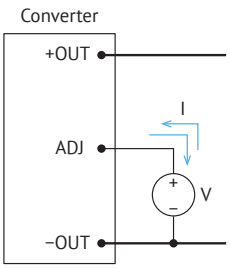


Figure 4 (d). Adjustment by voltage sourse.

Service functions (cont.)

Output voltage VS resistor rating for VDR75 and VDR100

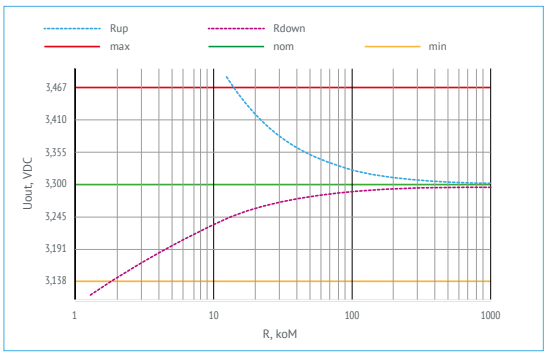


Figure 5 (a). Output voltage and resistor rating of Uout.=3,3 VDC.

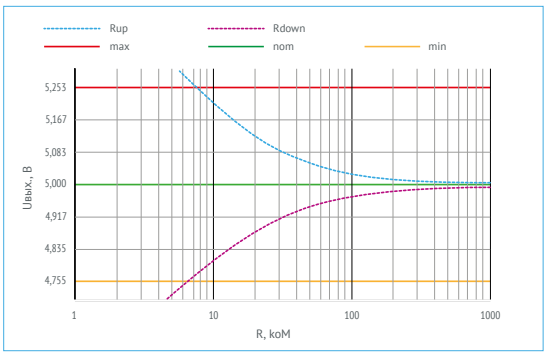


Figure 5 (b). Output voltage and resistor rating of Uout.=5 VDC.

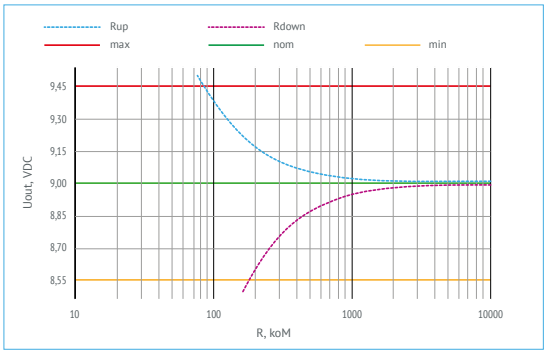


Figure 5 (c). Output voltage and resistor rating of Uout.=9 VDC.

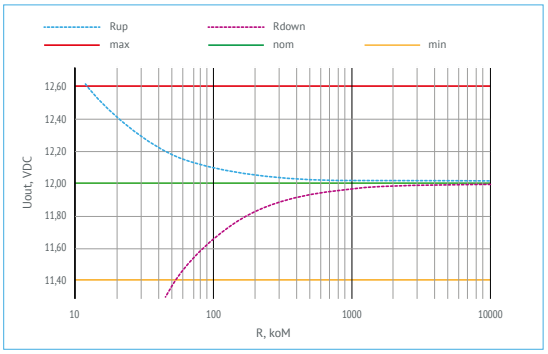


Figure 5 (d). Output voltage and resistor rating of Uout.=12 VDC.

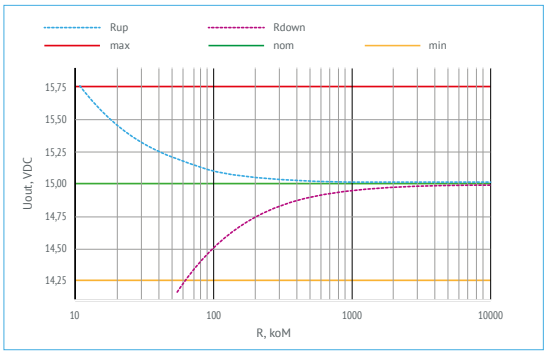


Figure 5 (e). Output voltage and resistor rating of Uout.=15 VDC.

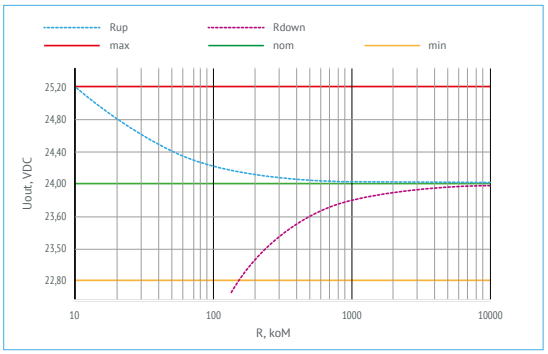


Figure 5 (f). Output voltage and resistor rating of Uout.=24 VDC.

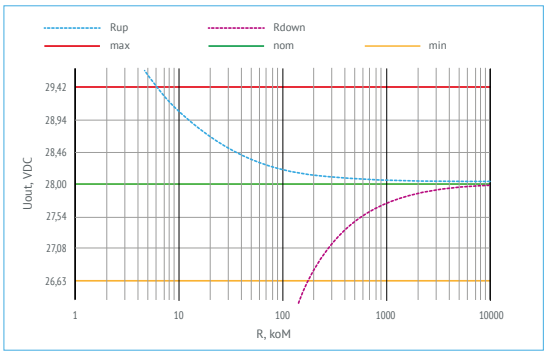


Figure 5 (g). Output voltage and resistor rating of Uout.=28 VDC.

Efficiency

VS load for VDR100 (Index “B”)

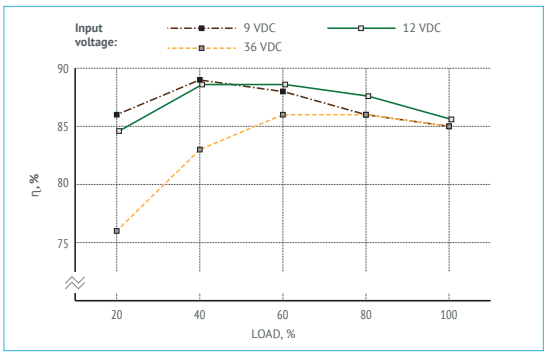


Figure 6 (a). Efficiency of VDR100B05.

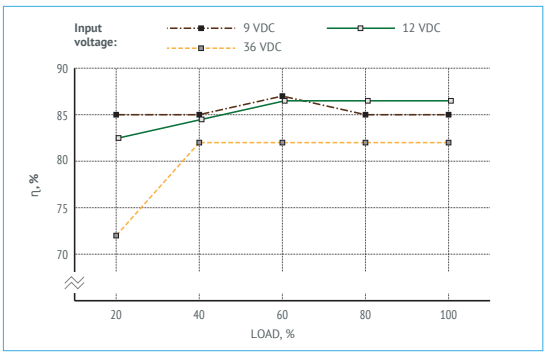


Figure 6 (b). Efficiency of VDR100B09.

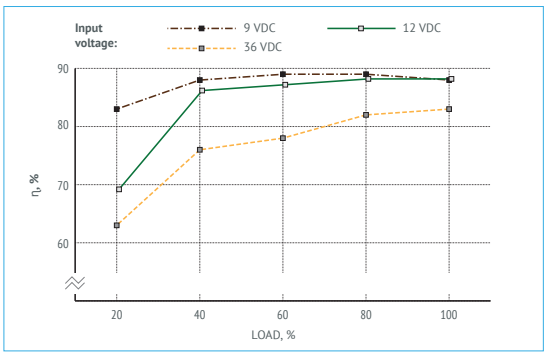


Figure 6 (c). Efficiency of VDR100B12.

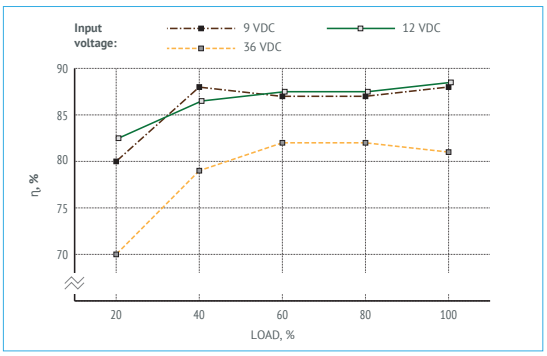


Figure 6 (d). Efficiency of VDR100B15.

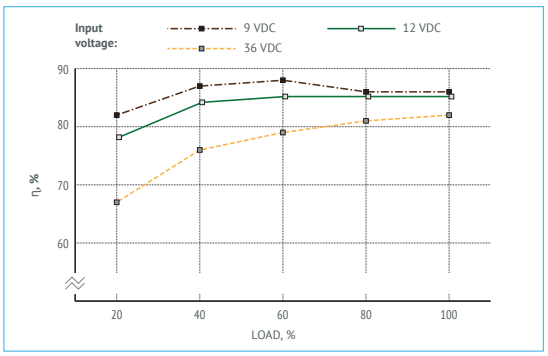


Figure 6 (e). Efficiency of VDR100B24.

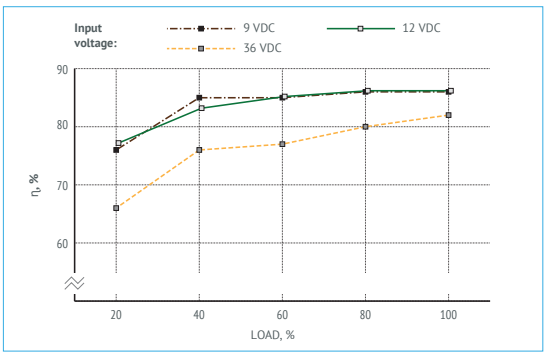


Figure 6 (f). Efficiency of VDR100B28.

Efficiency

VS load for VDR100 (Index “W”)

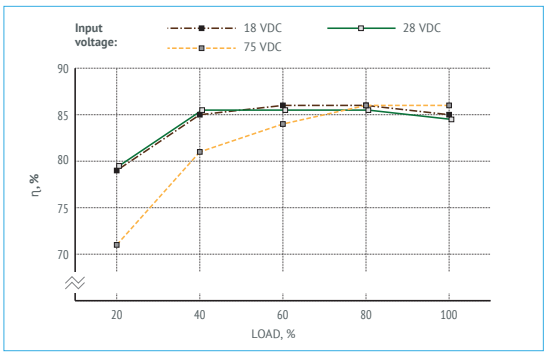


Figure 7 (a). Efficiency of VDR100W05.

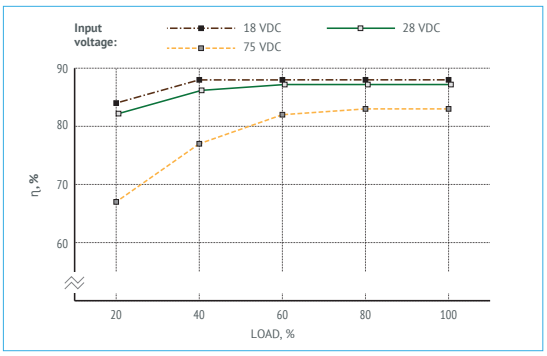


Figure 7 (b). Efficiency of VDR100W09.

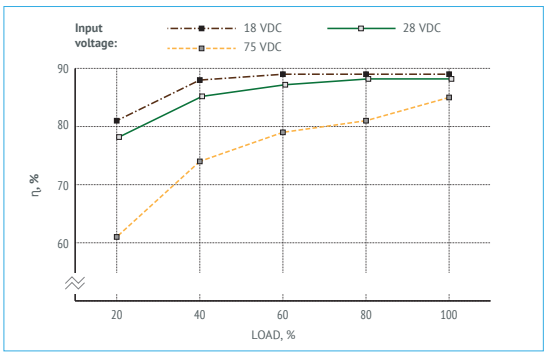


Figure 7 (c). Efficiency of VDR100W12.

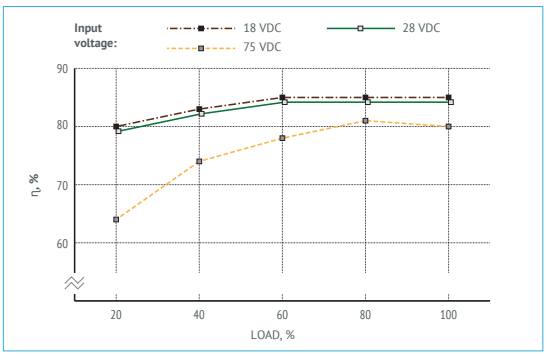


Figure 7 (d). Efficiency of VDR100W24.

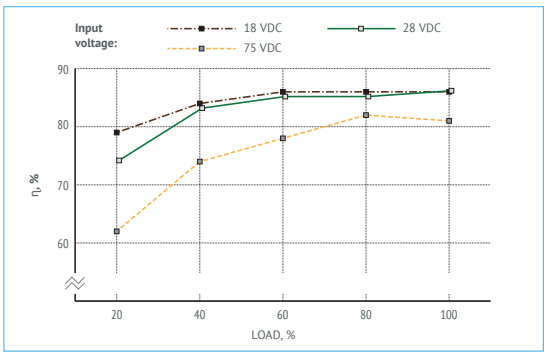


Figure 7 (e). Efficiency of VDR100W28.

Oscillograph charts

Charts of VDR100B12

Testing conditions Uin.=12 VDC, Iout.=8,3 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.

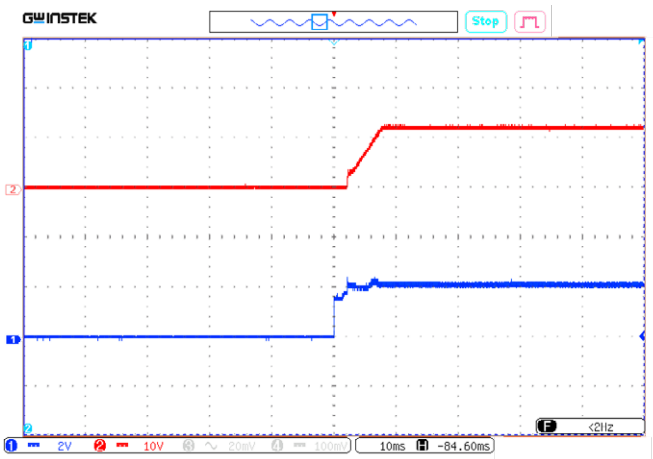


Figure 8 (a). Oscillograph chart of setting output voltage after supplying remote control signal to ON-input.

Ray 1 (blue) — voltage at ON-input. Scale 2 V/div.
Ray 2 (red) — output voltage. Scale 10 V/div.
Time scale 10 ms/div.

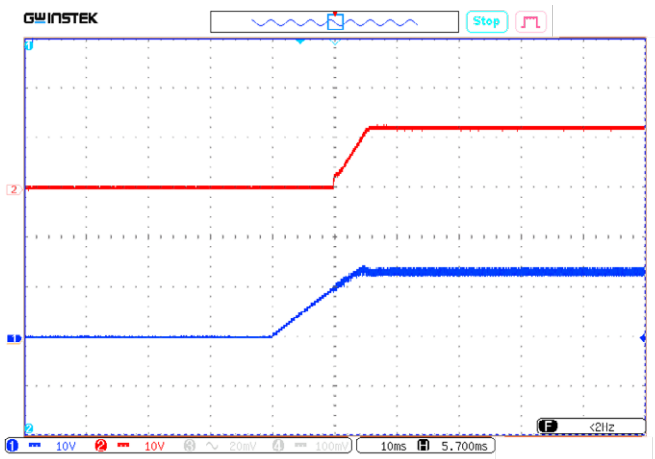


Figure 8 (b). Oscilliograph chart of output voltage after supplying the input voltage.

Ray 1 (blue) — input voltage. Scale 10 V/div.
Ray 2 (red) — output voltage. Scale 10 V/div.
Time scale 10 ms/div.

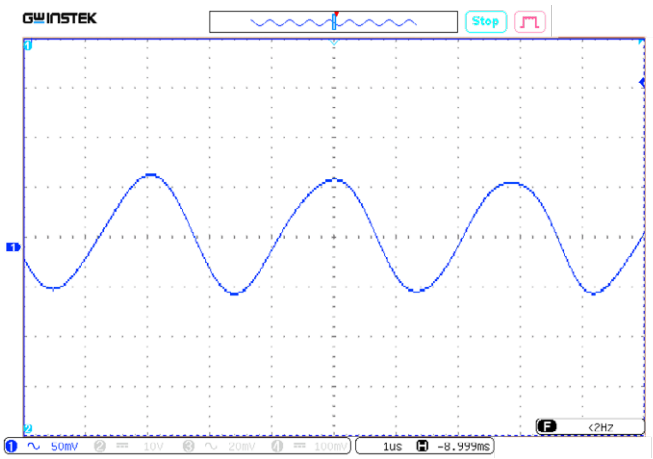


Figure 8 (c). Oscillograph chart of output voltage ripple.

Ripple of output voltage. Scale 50 mV/div. Time scale 1 us/div.

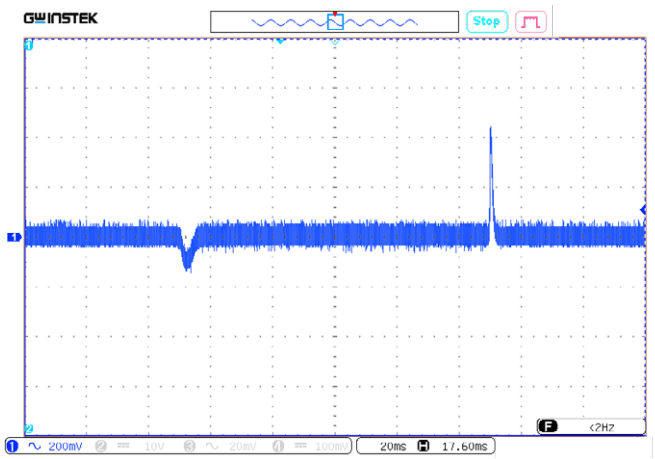


Figure 8 (d). Oscillograph chart of voltage transient deviation during load "drop/rise" 0...100 %.

Ray 1 (blue) — output voltage. Scale 200 mV/div. Time scale 20 ms/div.

Noise spectrogram

Spectrogram of VDR100B12 with typical connection diagram

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

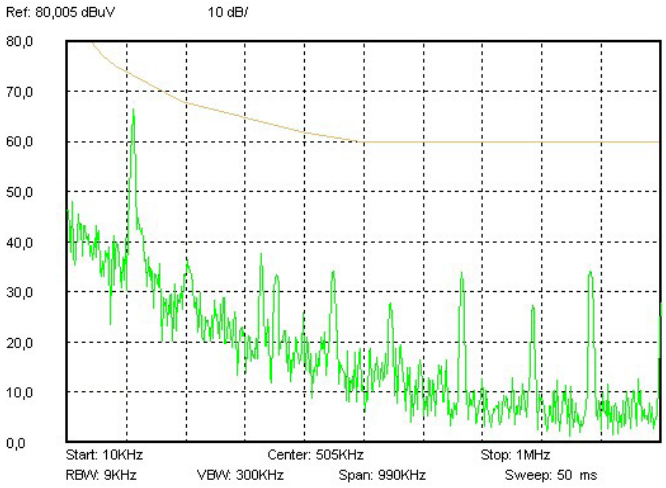


Figure 9 (a). Spectrogram 0,01–1 MHz.

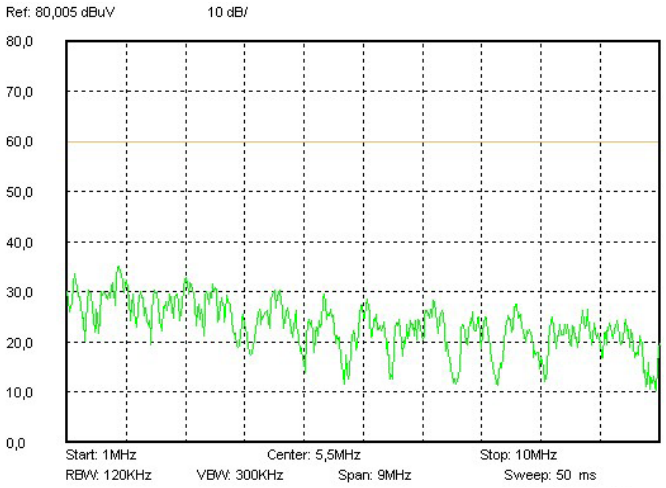


Figure 9 (b). Spectrogram 1–10 MHz.

Spectrogram of VDR100W24 with typical connection diagram

Testing according to MIL-STD-461F CE102. (Tcase=25°C, Vin.=+28 V, full load, unless otherwise specified)

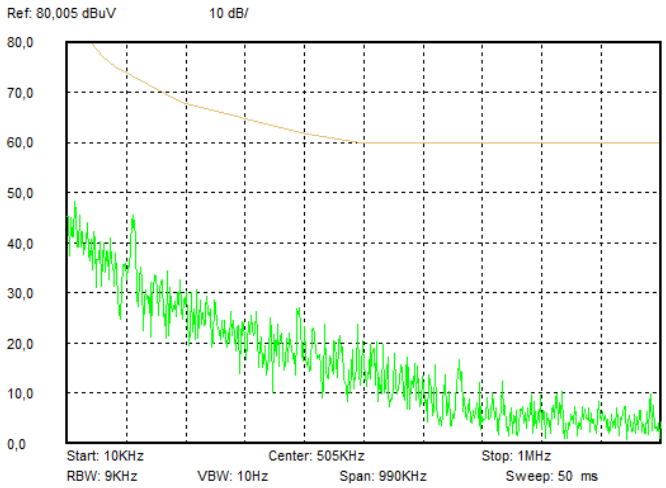


Figure 10 (a). Spectrogram 0,01–1 MHz.

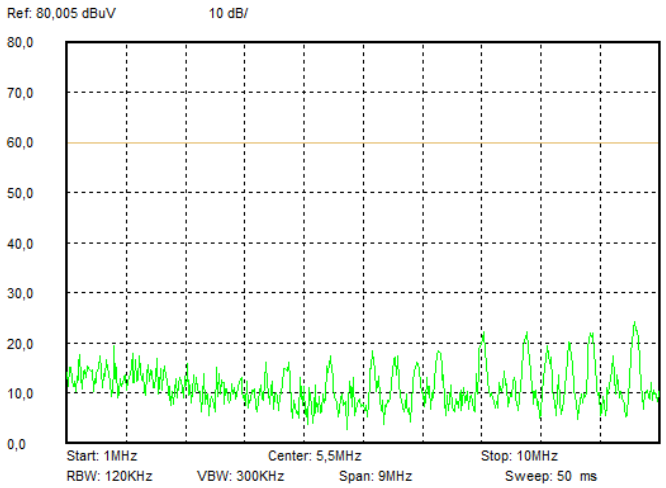


Figure 10 (b). Spectrogram 1–10 MHz.

Outline dimensions

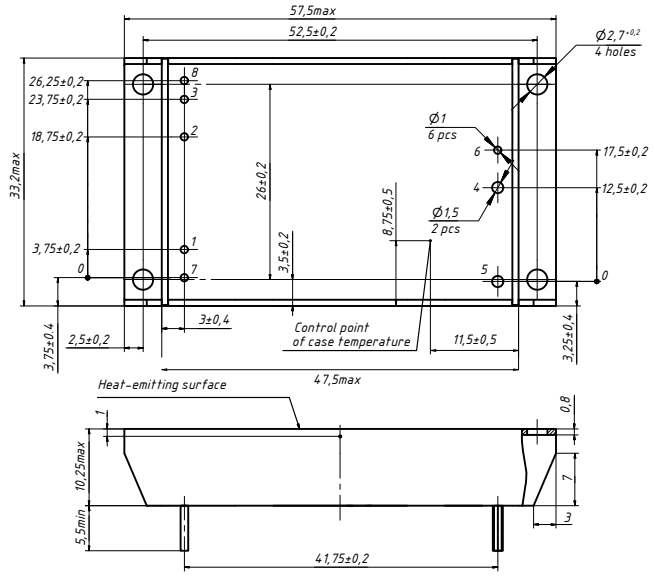


Figure 11. Flanged units.

Pin out

Pin #	1	2	3	4	5	6	7	8
Function	+IN	–IN	ON	+OUT	–OUT	TRIM	CASE	SYNC

Heatsink

Part number	Ribs configuration	Dimensions A×B×H×D, mm	Area, cm²	Weight, g	Picture, №
752695.002	Cross	57,5×32×14×4	94	38	*[Pic.1]*
752695.003	Longitudinal	57,5×32×14×4	97	39	*[Pic.2]*
752695.002-01	Cross	57,5×32×24×4	163	55	*[Pic.1]*
752695.003-01	Longitudinal	57,5×32×24×4	170	58	*[Pic.1]*

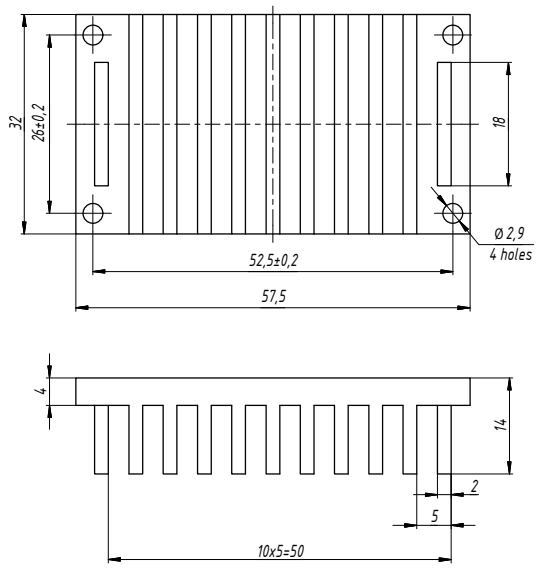


Figure 12 (a). *752695.002.*

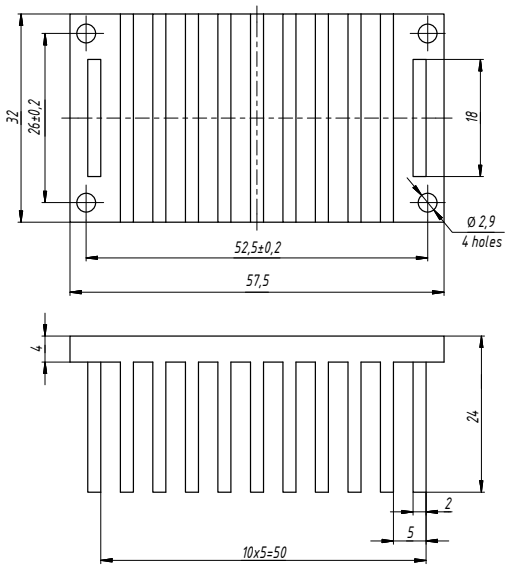


Figure 12 (b). *752695.002-01.*

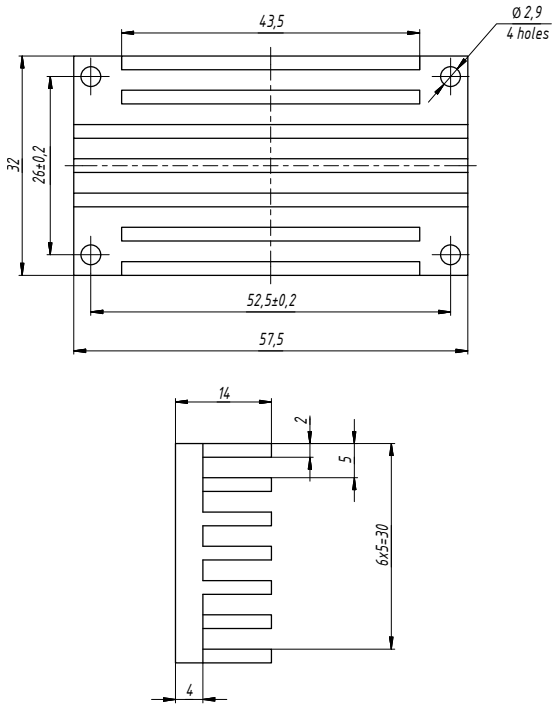


Figure 12 (c). *752695.003.*

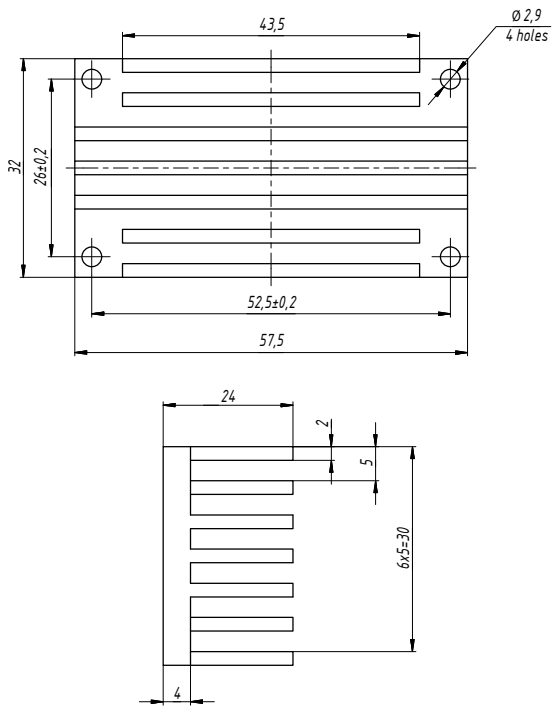


Figure 12 (d). *752695.003-01.*

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www.voltbricks.com info@voltbricks.com

VOLTBRICKS PTE. LTD.

105 Cecil street

#15-01 The OCTAGONE

Singapore 069534

+65 6950 0011

Manufacturer of reliable DC/DC converters and power supply systems

This datasheet is valid for the following units: VDR75B3,3; VDR75B05; VDR75B09; VDR75B12; VDR75B15; VDR75B24; VDR75B28; VDR75W3,3; VDR75W05; VDR75W09; VDR75W12; VDR75W15; VDR75W24; VDR75B28; VDR100B05; VDR100B09; VDR100B12; VDR100B15; VDR100B24; VDR100B28; VDR100W05; VDR100W09; VDR100W12; VDR100W15; VDR100W24; VDR100W28.