

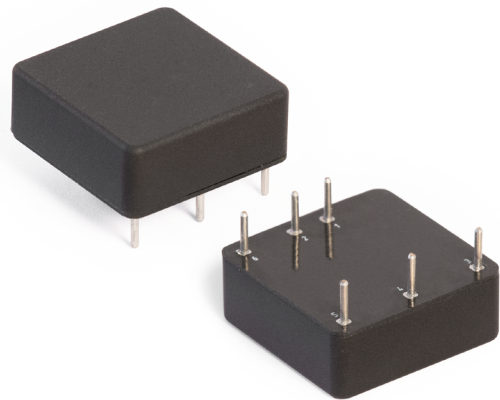
voltbricks

DATASHEET

VDRI Series

VDRI20, VDRI30

Miniature DC/DC converters
for industrial application



1. Description

Universal isolated DC/DC converters of high reliability and extended service life were designed for industrial application.

Waterproof potting securely protects the unit from aggressive external factors and allows this converter to operate in a wide range of environmental conditions.

Each batch of products is tested for compliance to dozens of various electric parameters, and is exposed to special types of peak thermal tests.

1.1. Engineered in accordance with

- Safety Std. Approval
EN 60950-1, RoHS
- EMC Std
EN55032 Class B

1.2. Features

- 3 year warranty
- Form-factor 1×1 inch
- Output current up to 9 A
- Case operating temperature –40...+105 °C
- Low-profile design 10,2 mm
- Short circuit and overvoltage
- Remote on/off
- On-peak efficiency 90 %
- Potting sealing

1.3. Additional information

1.3.1. Description on the manufacturer's website

<https://voltbricks.ru/product/vdri>



1.3.2. Order registration

+65 6950 0011

sales@voltbricks.com

1.3.3. Technical support

support@voltbricks.com

1.3.4. Reliability test

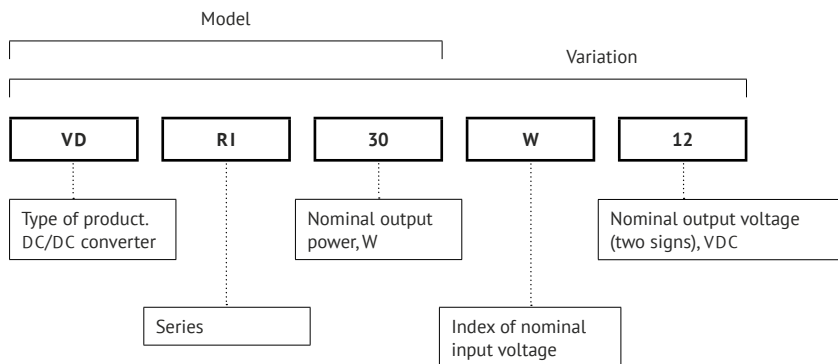
https://support.voltbricks.com/Reliability-Test_ENG.pdf

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3. Part number

For more information please contact our Global Operations Team: +65 6950 0011



4. Specifications

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

4.1. General specifications

Parameter	Symbol	Conditions	Value	Unit
Operating case temperature	T_{CASE}		-40...+105	°C
Operating ambient temperature	T_{AMB}	Case temperature in standard limits	-40...+85	°C
Storage temperature			-50...+110	°C
Switching frequency			340–400	kHz
Isolation voltage @ 60 s		Input/output, input/case, output/case	1500	VDC
Isolation resistance @ 500 VDC		Input/output, input/case, output/case	min 1	GOhm
Thermal impedance			15	°C/W
Remote on/off			Off.: 0...1 VDC or connection of pins "ON" and "–IN", $I < 1$ mA	
MTBF		$T_{CASE}=75$ °C, $P_{OUT}=70$ %	585 000	hrs
Warranty			3	years

4.2. Input specifications

Parameter	Symbol	Conditions	Value	Unit
Nominal input voltage	$U_{IN,NOM}$	Index «B»	24	VDC
		Index «W»	48	VDC
Input voltage range		$U_{IN,NOM}=24$ V	9...36	VDC
		$U_{IN,NOM}=48$ V	18...75	VDC
Transient deviation U_{IN}		$U_{IN,NOM}=24$ V @ 1 s	8...40	VDC
		$U_{IN,NOM}=48$ V @ 1 s	16...80	VDC

4.3. Output specifications

Parameter	Symbol	Conditions	Value	Unit
Output power	P_{OUT}		20; 30	W
Typical efficiency	EFF	$U_{IN}=24$ V, $U_{OUT}=12$ V	90	%
		$U_{IN}=48$ V, $U_{OUT}=12$ V	90	%
Quantity of output channels			1	
Nominal output voltage	$U_{OUT,NOM}$		3,3; 5; 9; 12; 15; 24; 48	VDC
Output current (min)	$I_{OUT,MIN}$		0	A
Output current (max)	$I_{OUT,MAX}$		9	A
Output voltage adjustment			min ± 10	%
Steady-state output voltage deviation, $U_{OUT,NOM}$		$U_{IN,NOM}$, $I_{OUT,MAX}$, normal climatic conditions	max ± 1	%

Parameter	Symbol	Conditions	Value	Unit
Voltage regulation, $U_{OUT,NOM}$		Gradual change of U_{IN} within set value range	max $\pm 0,5$	%
		Gradual change of I_{OUT} within $0,05...1 \times I_{OUT,MAX}$	max $\pm 0,5$	%
		Thermal instability	max ± 2	%
		Repeatability	max $\pm 0,5$	%
		Total voltage regulation within the complete range of output voltage, output current and ambient temperature	max ± 4	%
Ripple and noise (p-p), $U_{OUT,NOM}$	U_{p-p}	$U_{OUT} \leq 5 V$	<50	mV
		$U_{OUT} > 5 V$	<1	%
Max total capacitance of output capacitors	$C_{OUT,MAX}$	$U_{OUT}=3,3 V$	10000	uF
		$U_{OUT}=5 V$	7000	
		$U_{OUT}=9 V$	2000	
		$U_{OUT}=12 V$	1100	
		$U_{OUT}=15 V$	750	
		$U_{OUT}=24 V$	300	
		$U_{OUT}=48 V$	70	
	$P_{OUT}=20 W$ $P_{OUT}=30 W$			
Start up time	t_{IN}	$I_{OUT,MAX} + C_{OUT,MAX}, U_{IN,NOM}$	<0,05	s
Transient response deviation, $U_{OUT,NOM}$		On change $U_{IN,NOM}$ to $1,4 \times U_{IN,NOM}$; On change within $(0,75...1) \times I_{OUT,MAX}$; front time >100 us.	max ± 5	%

4.4. Protections

Parameters are stated for the information purposes and could not be used for long term operation, over current operation, operation out of stated temperature limits.

Parameter	Symbol	Conditions	Value	Unit
Short circuit protection		$U_{OUT} \leq 5 V$	<2 $I_{OUT,MAX}$	
		$U_{OUT} > 5 V$	<2 $I_{OUT,MAX}$	
Overvoltage protection			<1,3 $U_{OUT,NOM}$	
Vibration proof			10...2000 Hz, 200 (20) m/s^2 (g), 0,3 mm	
Dust proof			yes	
Salt fog resistant			yes	
Moisture proof		98% at $T_{AMB} = 35^\circ C$	yes	

4.5. Physical specifications

Parameter	Symbol	Conditions	Value	Unit
Form-factor			1x1 inch	
Case material			aluminium	
Coating			anodic oxide	
Pin material			bronze	
Weight			max 20	g
Soldering temperature		5 s	260	$^\circ C$
Dimensions		Without output pins	max 25,4x25,4x10,2	mm

5. Diagrams

5.1. Layout

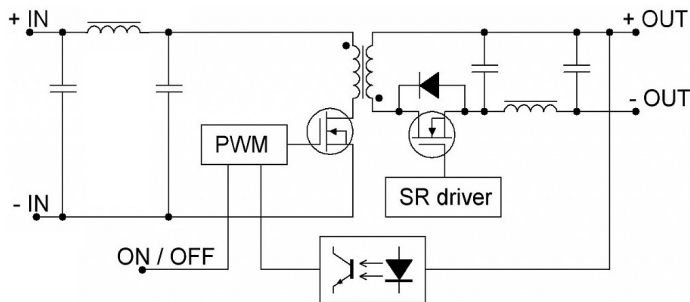


Figure 1. VDRI20, VDRI30 layout.

5.2. Typical connection diagram

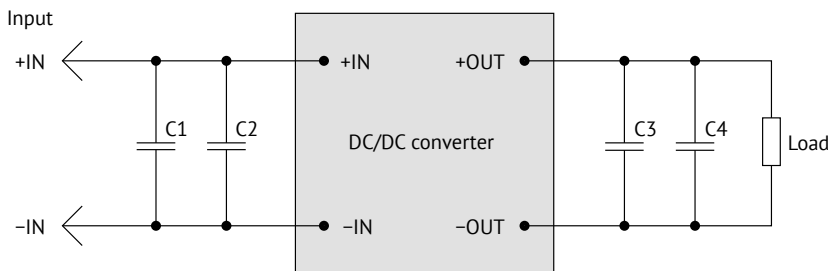


Figure 2. VDRI20, VDRI30 typical connection diagram.

Name	Type	Comment		VDRI20	VDRI30
C1	tantalum capacitor	Input voltage	=24 V	22 μ F	47 μ F
			=48 V		33 μ F
C2	ceramic capacitor		=24 V	4,7 μ F	10 μ F
			=48 V		6,8 μ F
C3	ceramic capacitor	Output voltage	3,3 up to 15 V on	10 μ F	
			=24 V	4,7 μ F	
			=48 V	2,2 μ F	
C4	tantalum capacitor		=3,3V	100 μ F	
			=5V	68 μ F	
			9 up to 12V on	47 μ F	
			=15V	33 μ F	
			24 up to 48V on	10 μ F	

Table 1. Description of the elements of a typical VDRI20, VDRI30 connection diagram.

5.2.1. Wiring diagram for compliance with EN55032 Class A

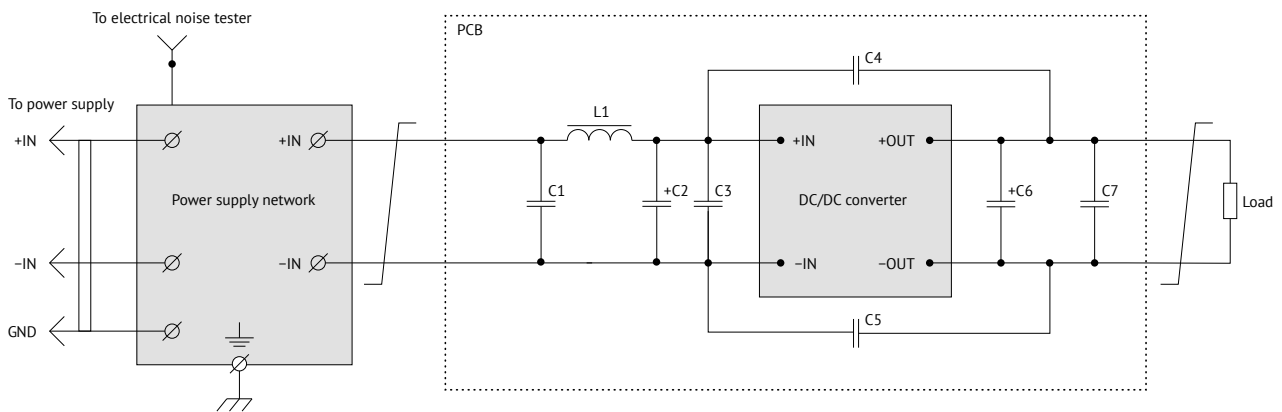


Figure 3. Connection diagram VDRI20, VDRI30.

Name	Type	Comment	VDRI20	VDRI30
C1	ceramic capacitor		4,7 μ F	
C2	tantalum capacitor	Input voltage	=24 V =48 V	22 μ F 47 μ F 33 μ F
C3	ceramic capacitor		=24 V =48 V	4,7 μ F 10 μ F 6,8 μ F
C4, C5	ceramic capacitor		10 nF	
C6	tantalum capacitor	Output voltage	=3,3V =5V 9 up to 12V on =15V 24 up to 48V on	100 μ F 68 μ F 47 μ F 33 μ F 10 μ F
C7	ceramic capacitor		=3,3V 5 up to 48V on	10 μ F 4,7 μ F 2,2 μ F
L1			min 2,2 mH	do not install

Table 2. Description of the elements VDRI20, VDRI30 for compliance with EN55032 Class A.

5.2.2. Wiring diagram for compliance with EN55032 Class B

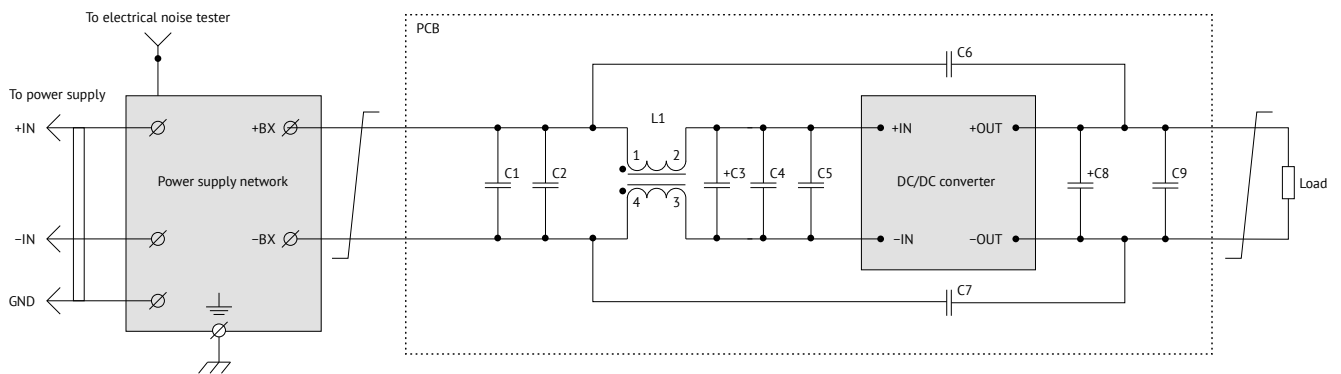


Figure 4. Connection diagram VDRI20, VDRI30.

Name	Type	Comment	VDRI20	VDRI30
C1, C2,	ceramic capacitor		4,7 μ F	
C3	tantalum capacitor	Input voltage		
		=24 V	22 μ F	47 μ F
		=48 V		33 μ F
C4	ceramic capacitor			
		=24 V	4,7 μ F	10 μ F
		=48 V		6,8 μ F
C5	ceramic capacitor		4,7 μ F	
C6, C7	ceramic capacitor		10 nF	
C8	tantalum capacitor	Output voltage		
		=3,3V	100 μ F	
		=5 V	68 μ F	
		9 up to 12V on	47 μ F	
		=15 V	33 μ F	
		24 up to 48 V on	10 μ F	
C9	ceramic capacitor			
		3,3 up to 15 V on	10 μ F	
		=24 V	4,7 μ F	
		=48 V	2,2 μ F	
L1	common mode choke		min 1 mH	

Table 3. Description of the elements VDRI20, VDRI30 for compliance with EN55032 Class B.

5.2.3. Wiring diagram for compliance with MIL-STD-461F CE102

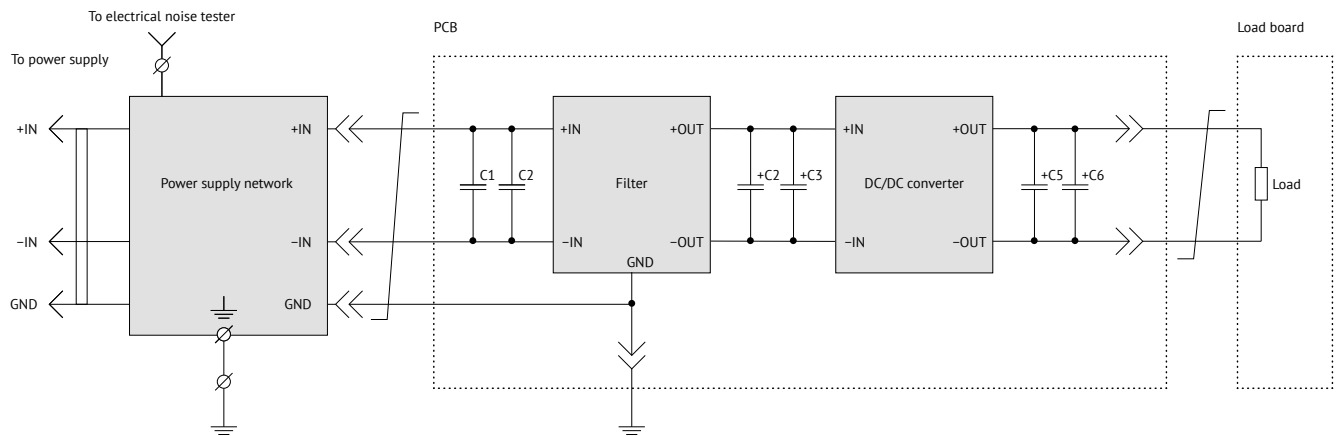


Figure 6. Connection diagram VDRI20, VDRI30.

Name	Type	Comment		VDRI20	VDRI30
C1	tantalum capacitor	Input voltage	=24 V =48 V	22 μ F	47 μ F 33 μ F
C2	ceramic capacitor		=24 V =48 V	4.7 μ F	10 μ F 6,8 μ F
C3	tantalum capacitor		=24 V =48 V	22 μ F	47 μ F 33 μ F
C4	ceramic capacitor		=24 V =48 V	4.7 μ F	10 μ F 6,8 μ F
C5	tantalum capacitor	Output voltage	=3,3V =5 V 9 up to 12V on =15 V =24 V =48 V	100 μ F 68 μ F 47 μ F 33 μ F 10 μ F 10 μ F	
C6	ceramic capacitor		3,3 up to 15 V on =24 V =48 V	10 μ F 4,7 μ F 2.2 μ F	
Filter		Input voltage	=24 V =48 V	VFD07B VFD07W	

Table 4. Description of the elements VDRI20, VDRI30 for compliance with MIL-STD-461F CE102.

6. Outline dimensions

Pin #	1	2	3	4	5	6
Function	+IN	-IN	+OUT	TRIM	-OUT	Remote On/Off

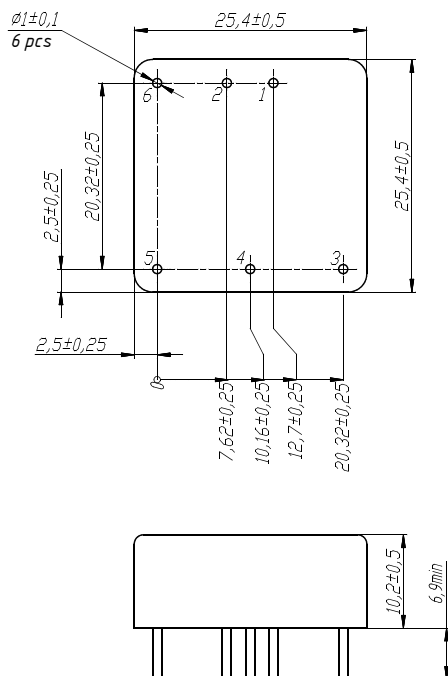


Figure 7. Valid for VDRI15, VDRI25.

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This datasheet is valid for the following units: VDRI20B3,3; VDRI20B05; VDRI20B09; VDRI20B12; VDRI20B15; VDRI20B24; VDRI20B48; VDRI20W3,3; VDRI20W05; VDRI20W09; VDRI20W12; VDRI20W15; VDRI20W24; VDRI20W48; VDRI30B05; VDRI30B09; VDRI30B12; VDRI30B15; VDRI30B24; VDRI30B48; VDRI30W05; VDRI30W09; VDRI30W12; VDRI30W15; VDRI30W24; VDRI30W48.