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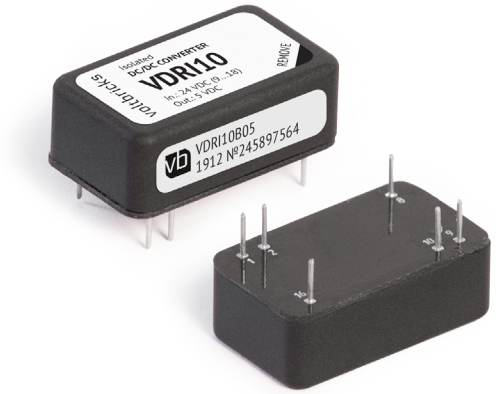
DATASHEET

VDRI Series

VDRI6, VDRI10

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 DIP-16
- Output current up to 3 A
- Case operating temperature –40...+105 °C
- Low-profile design 8 mm
- Short circuit and overvoltage
- Remote on/off
- On-peak efficiency 88 %
- Potting sealing

1.3. Additional information

1.3.1. Description on the manufacturer's website

https://voltbricks.com/product/vdri

1.3.2. Order registration

+65 6950 0011

sales@voltbricks.com

1.3.3. Technical support

support@voltbricks.com

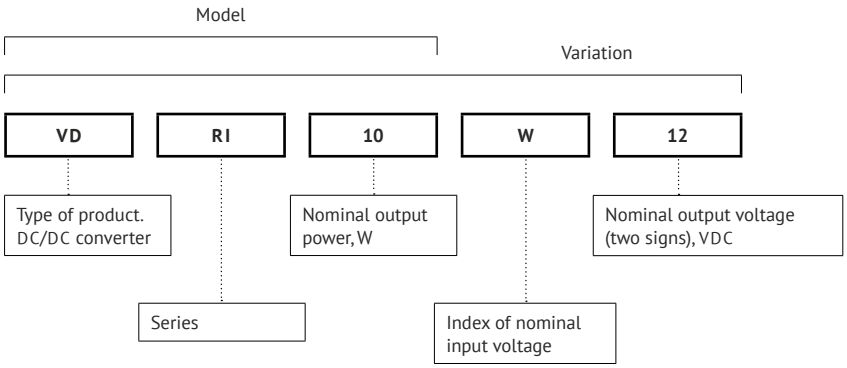
1.3.4. Reliability test

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

2. Contents

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 8,6×10⁴…10,6×10⁴ 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			405–495	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			34	°C/W
Remote on/off			Off.: 0…1 VDC or connection of pins “ON” and “–IN”, I≤5 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}		6; 10	W
Typical efficiency	EFF	U_{IN}=24 V, U_{OUT}=12 V	88	%
		U_{IN}=48 V, U_{OUT}=12 V	88	%
Quantity of output channels			1	
Nominal output voltage	$U_{OUT.NOM}$		3,3; 5; 9; 12; 15; 24	VDC
Output current (min)	$I_{OUT.MIN}$		0	A
Output current (max)	$I_{OUT.MAX}$	P_{OUT}=6 W	1,82	A
		P_{OUT}=10 W	3	A
Output voltage adjustment			no	%
Steady-state output voltage deviation, $U_{OUT.NOM}$		$U_{IN.NOM}$, $I_{OUT.MAX}$, normal climatic conditions	max ±1	%

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Parameter	Symbol	Conditions	Value	Unit
Voltage regulation, $U_{OUT.NOM}$		Gradual change of U_{IN} within set value range	max ±0,5	%
		Gradual change of I_{OUT} within 0,05...1×$I_{OUT.MAX}$	max ±0,5	%
		Thermal instability	max ±2	%
		Repeatability	max ±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}≤5 V	<50	mV
		U_{OUT}>5 V	<1	%
Max total capacitance of output capacitors	$C_{OUT.MAX}$	U_{OUT}=3,3 V U_{OUT}=5 V U_{OUT}=9 V U_{OUT}=12 V U_{OUT}=15 V U_{OUT}=24 V U_{OUT}=48 V	4000 3200 1000 600 380 140 30	uF
Start up time	t_{IN}	$I_{OUT.MAX}$ + $C_{OUT.MAX}$, $U_{IN.NOM}$	<0,05	s
Trancient responce deviation, $U_{OUT.NOM}$		On change $U_{IN.NOM}$ to 1,4×$U_{IN.NOM}$; On change within (0,75...1)×$I_{OUT.MAX}$; 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} ≤5 V	3 $I_{OUT.MAX}$	
		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°C	yes	

4.5. Physical specifications

Parameter	Symbol	Conditions	Value	Unit
Form-factor			DIP-16	
Case material			aluminium	
Coating			anodic oxide	
Pin material			bronze	
Weight			max 10	g
Soldering temperature		5 s	260	°C
Dimensions		Without output pins	max 24×13,8×8	mm

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5. Diagrams

5.1. Layout

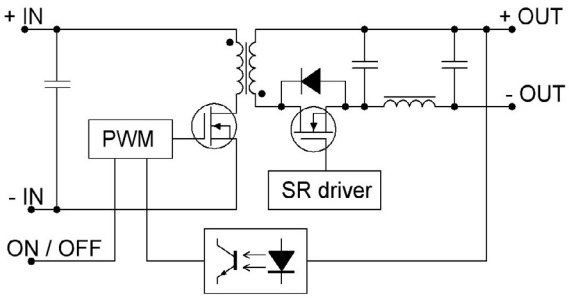

Figure 1. VDRI6, VDRI10 layout.

5.2. Typical connection diagram

5.2.1. Typical connection diagram

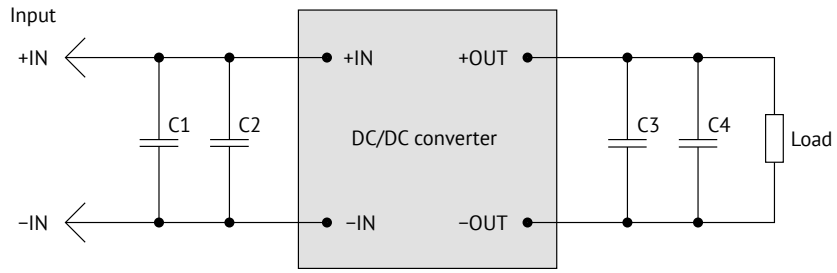

Figure 2. VDRI6, VDRI10 typical connection diagram.

Name	Type	Comment		Denomination
C1	tantalum capasitor			10 µF
C2	ceramic capacitor			2,2 µF
C3	ceramic capacitor	Output voltage	3,3 up to 15 V on =24 V	10 µF 4,7 µF
C4	tantalum capasitor	Output voltage	=3,3 V =5 V 9 up to 12 V on =15 V = 24 V	100 µF 68 µF 47 µF 33 µF 10 µF

Table 1. Description of the elements of a typical VDRI6, VDRI10 connection diagram.

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5.2.2. Wiring diagram for compliance with EN55032 Class A

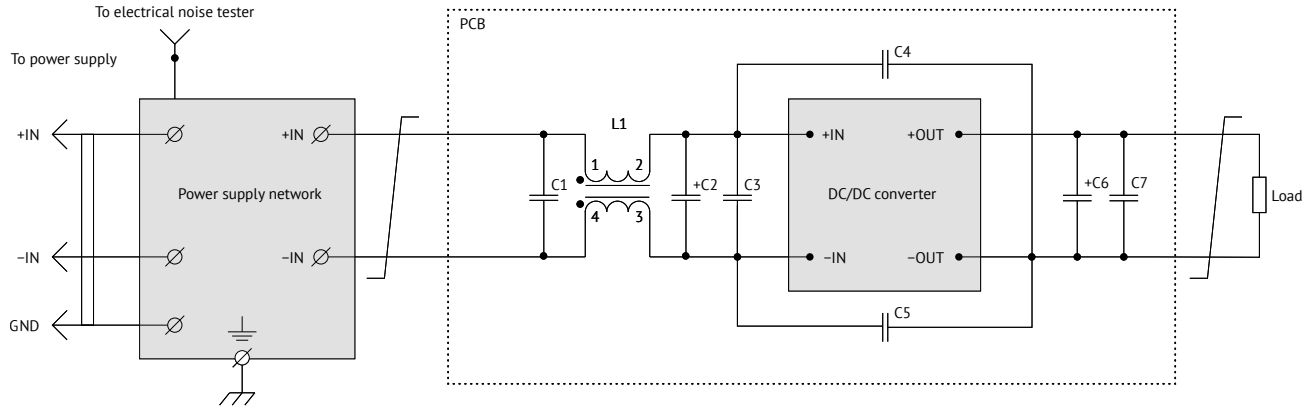

Figure 3. Connection diagram VDRI6, VDRI10.

Name	Type	Comment		Denomination
C1	ceramic capacitor			4,7 µF
C2	tantalum capasitor			10 µF
C3	ceramic capacitor			2,2 µF
C4, C5	ceramic capacitor			3300 pF
C6	tantalum capasitor	Output voltage	=3,3 V =5 V 9 up to 12 V on =15 V = 24 V	100 µF 68 µF 47 µF 33 µF 10 µF
C7	ceramic capacitor	Output voltage	3,3 up to 15 V on =24 V	10 µF 4,7 µF
L1	common mode choke			min 2 mH

Table 2. Description of the elements VDRI6, VDRI10 for compliance with EN55032 Class A.

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5.2.3. Wiring diagram for compliance with EN55032 Class B

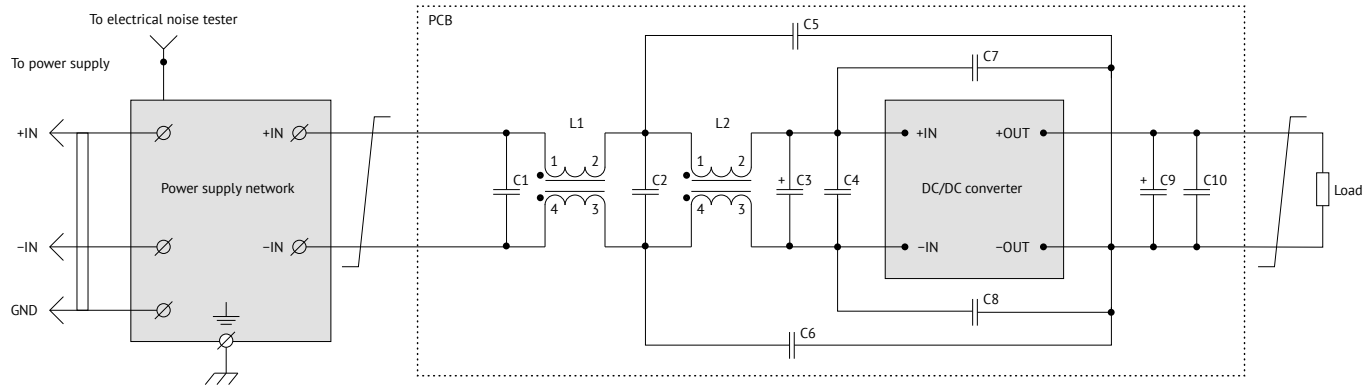

Figure 4. Connection diagram VDRI6, VDRI10.

Name	Type	Comment		Denomination
C1,C2	ceramic capacitor			4,7 µF
C3	tantalum capasitor			10 µF
C4	ceramic capacitor			2,2 µF
C5, C6	ceramic capacitor			3300 µF
C7, C8	ceramic capacitor			680 µF
C9	tantalum capasitor	Output voltage	=3,3 V =5 V 9 up to 12 V on =15 V = 24 V	100 µF 68 µF 47 µF 33 µF 10 µF
C10	ceramic capacitor	Output voltage	3,3 up to 15 V on =24 V	10 µF 4,7 µF
L1, L2	common mode choke			min 2 mH

Table 3. Description of the elements VDRI6, VDRI10 for compliance with EN55032 Class B.

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

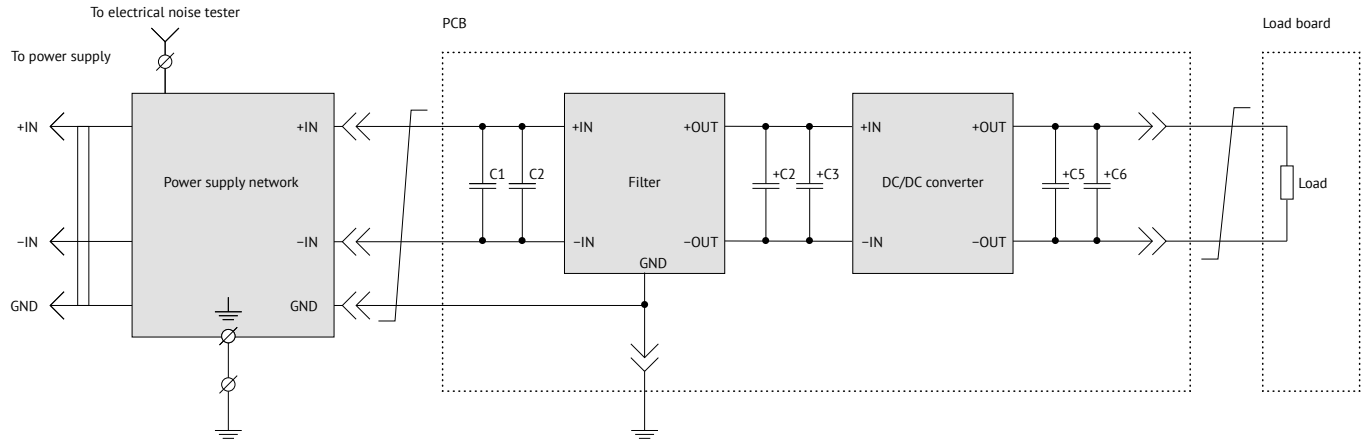

Figure 5. Connection diagram VDRI6, VDRI10.

Name	Type	Comment		Denomination
C1	tantalum capasitor			10 µF
C2	ceramic capacitor			2,2 µF
C3	tantalum capasitor			10 µF
C4	ceramic capacitor			2,2 µF
C5	tantalum capasitor	Output voltage	=3,3 V =5 V 9 up to 12 V on =15 V =24 V	100 µF 68 µF 47 µF 33 µF 10 µF
C6	ceramic capacitor	Output voltage	3,3 up to 15 V on =24 V	10 µF 4,7 µF
Filter		Input voltage	=24 V =48 V	VFD07B VFD07W

Table 4. Description of the elements VDRI6, VDRI10 for compliance with MIL-STD-461F CE102.

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6. Test reports

6.1. Efficiency and P_{OUT} / T_{AMB} dependence

6.1.1. VDRI10B3,3

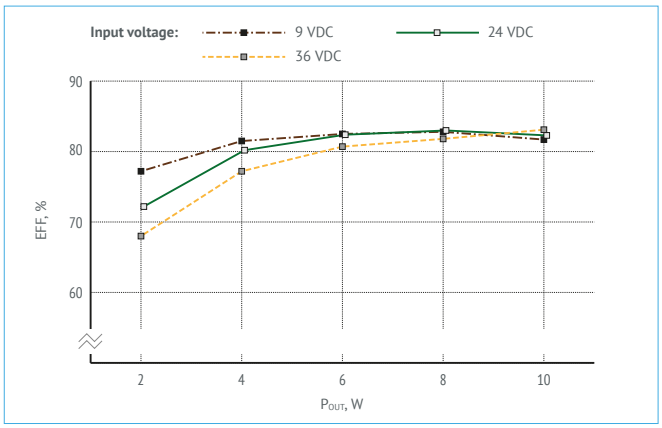

Figure 6. Efficiency.

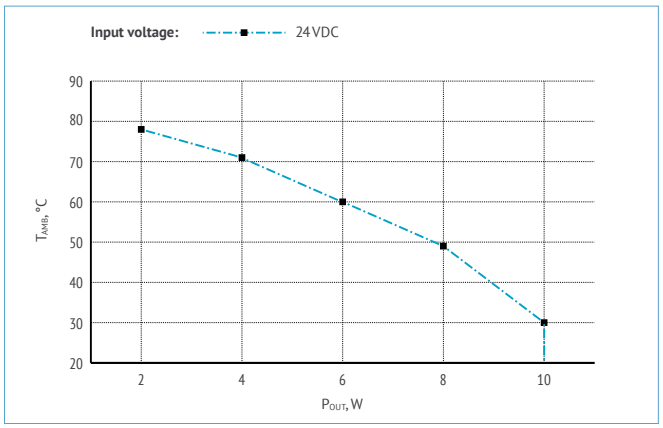

Figure 7. P_{OUT} vs T_{AMB} chart.

6.1.2. VDRI10B05

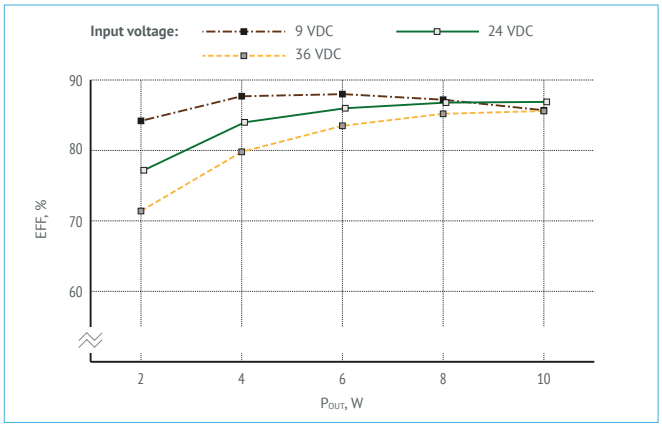

Figure 8. Efficiency.

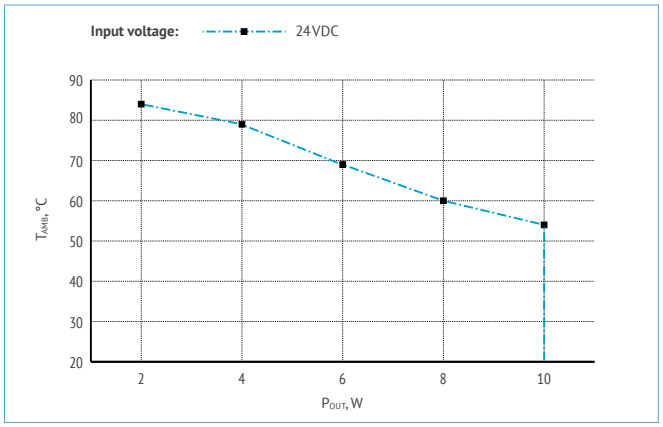

Figure 9. P_{OUT} vs T_{AMB} chart.

6.1.3. VDRI10B09

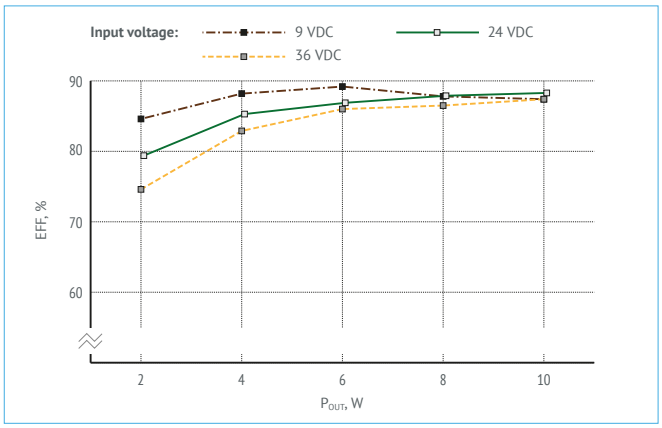

Figure 10. Efficiency.

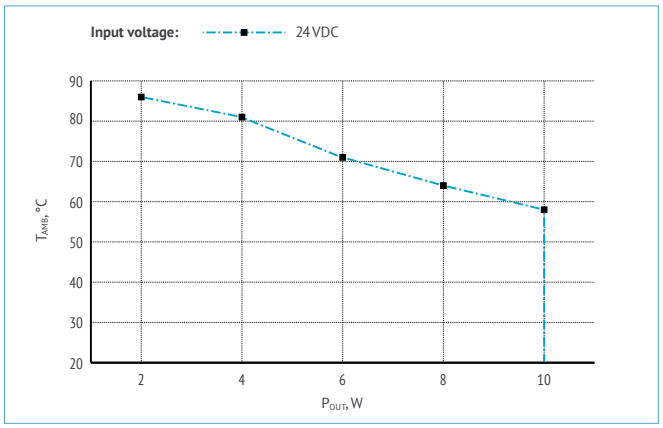

Figure 11. P_{OUT} vs T_{AMB} chart.

6.1.4. VDRI10B24

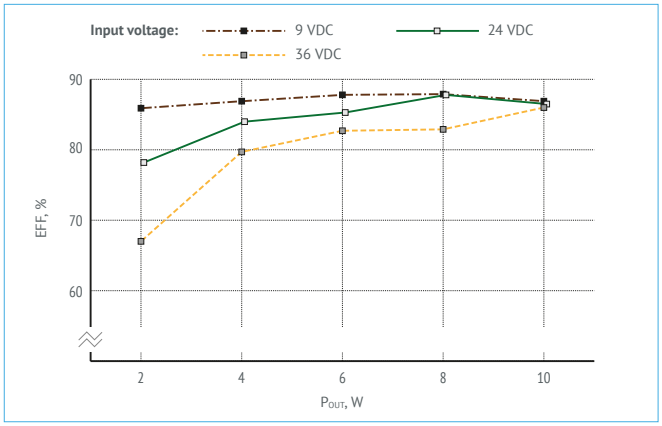

Figure 12. Efficiency.

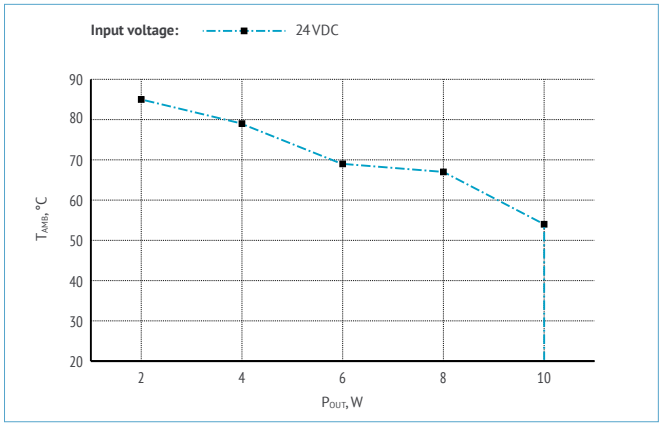

Figure 13. P_{OUT} vs T_{AMB} chart.

6.1.5. VDRI10W05

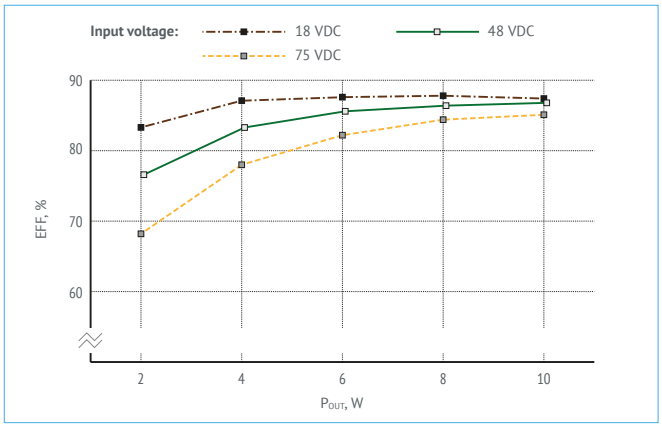

Figure 14. Efficiency.

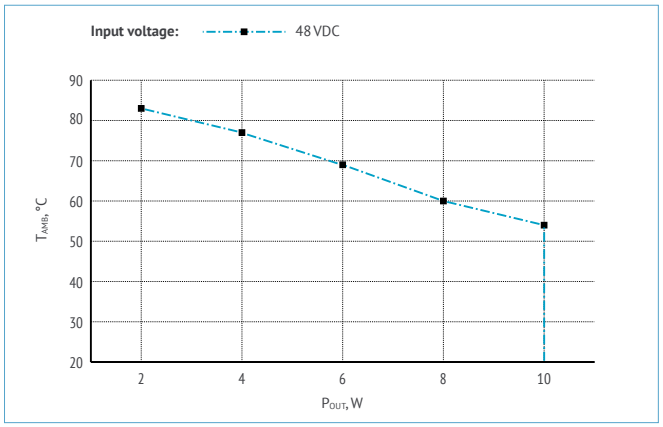

Figure 15. P_{OUT} vs T_{AMB} chart.

6.1.6. VDRI10W24

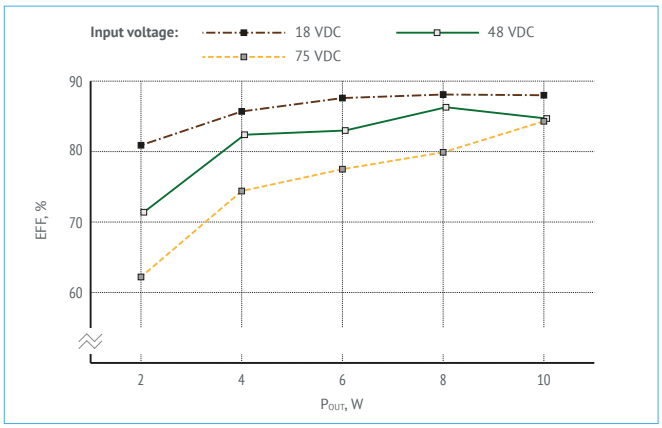

Figure 16. Efficiency.

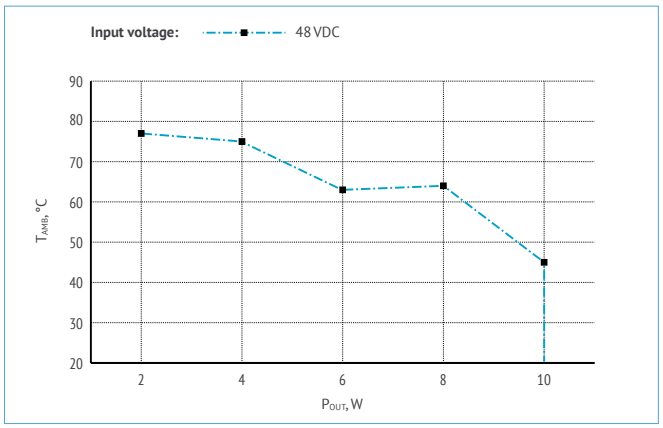

Figure 17. P_{OUT} vs T_{AMB} chart.

6.2. Oscillograph charts

6.2.1. VDRI10B09

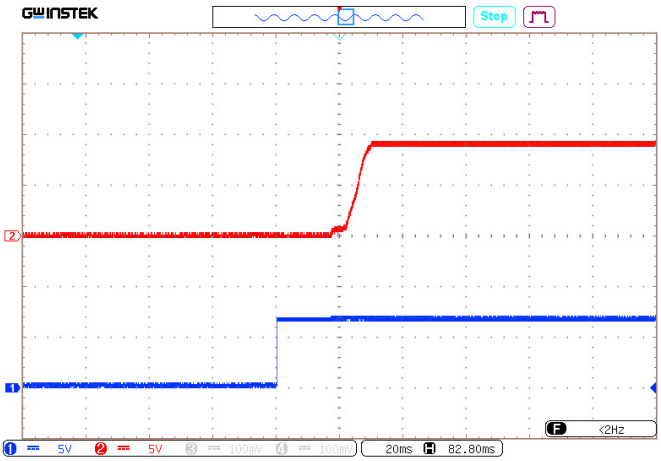

Figure 18. $U_{OUT.NOM}$ stabilizing with Remote On/Off option (ON and -OUT pins connection).

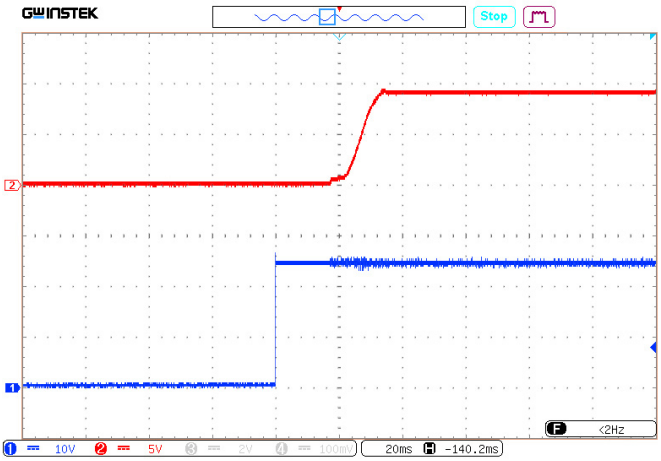

Figure 20. $U_{OUT.NOM}$ stabilizing with $U_{IN.NOM}$.

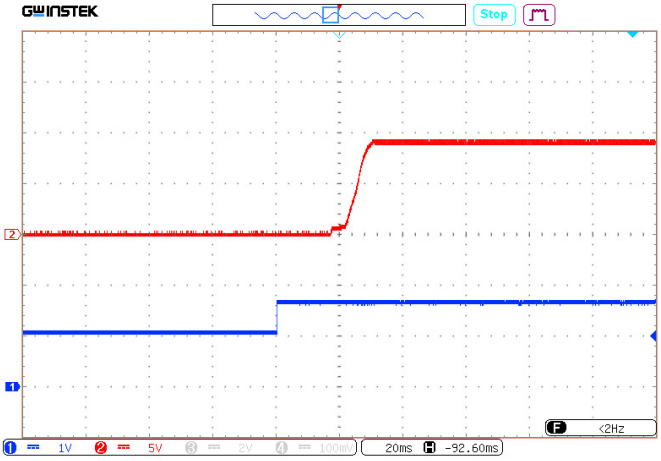

Figure 19. $U_{OUT.NOM}$ stabilizing with Remote On/Off option (control signal).

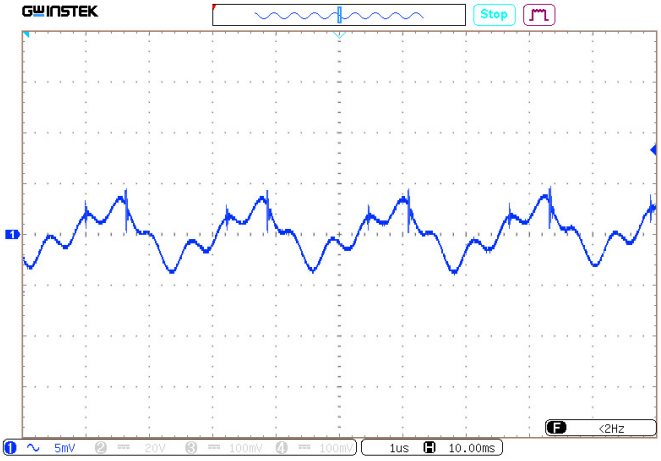

Figure 21. $U_{OUT.NOM}$ ripple.

6.2.2. VDRI10W24

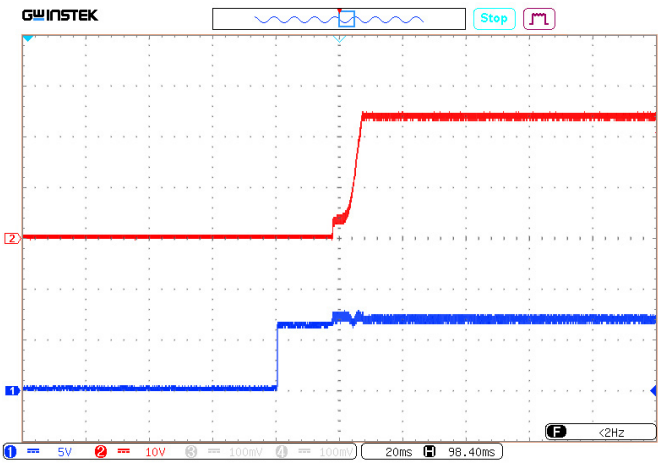

Figure 22. $U_{OUT.NOM}$ stabilizing with Remote On/Off option (ON and -OUT pins connection).

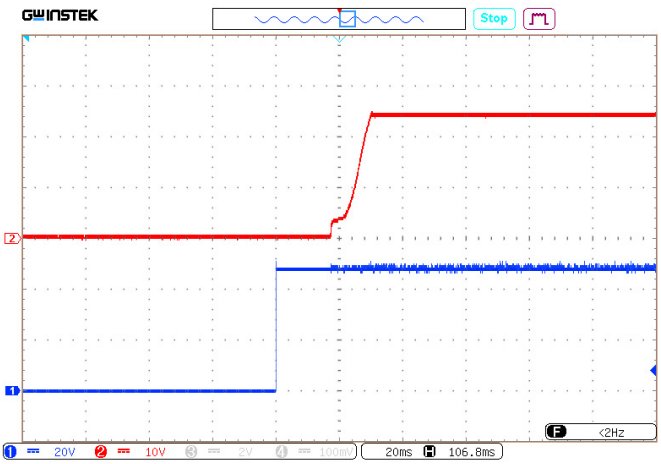

Figure 24. $U_{OUT.NOM}$ stabilizing with $U_{IN.NOM}$.

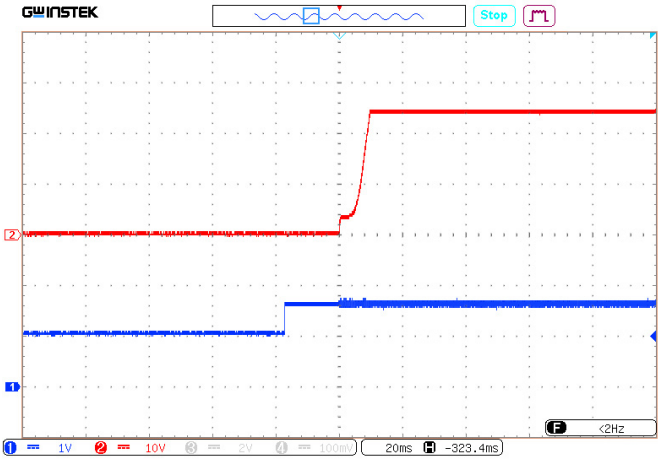

Figure 23. $U_{OUT.NOM}$ stabilizing with Remote On/Off option (control signal).

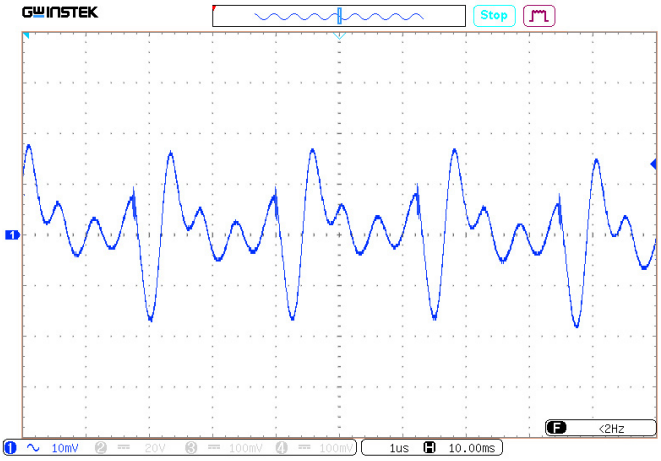

Figure 25. $U_{OUT.NOM}$ ripple.

7. Outline dimensions

Pin #	1	2	8	9	10	16
Function	−IN	Remote On/Off	NOT USE	+OUT	−OUT	+IN

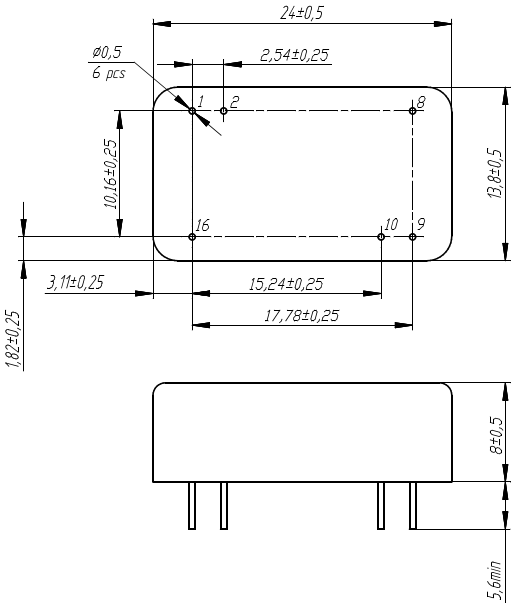

Figure 26. Valid for VDRI6, VDRI10.

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Manufacturer of reliable DC/DC converters and power supply systems

This datasheet is valid for the following units: VDRI6B3,3; VDRI6B05; VDRI6B09; VDRI6B12; VDRI6B15; VDRI6B24; VDRI6B48; VDRI6W3,3; VDRI6W05; VDRI6W09; VDRI6W12; VDRI6W15; VDRI6W24; VDRI6W48; VDRI10B05; VDRI10B09; VDRI10B12; VDRI10B15; VDRI10B24; VDRI10B48; VDRI10W05; VDRI10W09; VDRI10W12; VDRI10W15; VDRI10W24; VDRI10W48.