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RDE03 Series

DC-DC Converter

XP Power

3 Watts

- Regulated Single & Dual Output
- Wide 4:1 Input Range
- Covers 72 & 110 VDC for Rail Applications
- 3000 VAC Isolation Reinforced
- Operating Temperature -40 °C to +105 °C
- Full Power at 80 °C
- Complies with EN50155 and IEC60571
- Meets EMC Standard EN50121-3-2
- No External Filter Required
- 3 Year Warranty



Dimensions:

RDE03:
1.25 x 0.8 x 0.47" (31.8 x 20.3 x 12.0 mm)

The RDE03 series provides a compact DC-DC solution featuring a robust construction for the demands of railway applications.

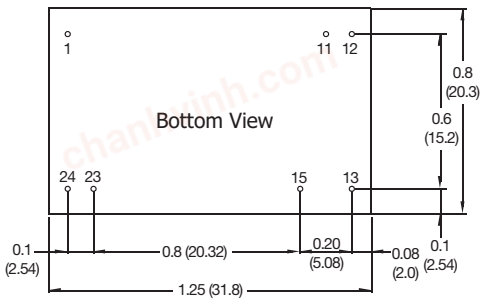
Models & Ratings

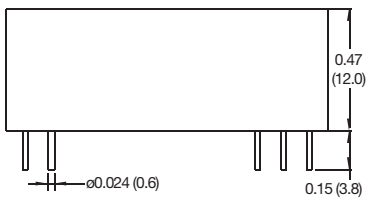
Input voltage	Output voltage	Output current	Input current[1]		Maximum capacitive load	Efficiency	Model number
			No load	Full load			
9-36	5.0 V	600 mA	9 mA	155 mA	680 µF	80%	RDE0324S05
	12.0 V	250 mA		150 mA	330 µF	84%	RDE0324S12
	15.0 V	200 mA		150 mA	220 µF	85%	RDE0324S15
	±12.0 V	±125 mA		150 mA	±220 µF	83%	RDE0324D12
	±15.0 V	±100 mA		80 mA	±220 µF	84%	RDE0324D15
18-75	5.0 V	600 mA	5 mA	75 mA	680 µF	80%	RDE0348S05
	12.0 V	250 mA		75 mA	330 µF	83%	RDE0348S12
	15.0 V	200 mA		75 mA	220 µF	84%	RDE0348S15
	±12.0 V	±125 mA		75 mA	±220 µF	83%	RDE0348D12
	±15.0 V	±100 mA		75 mA	±220 µF	83%	RDE0348D15
40-160	5.0 V	600 mA	3 mA	35 mA	680 µF	80%	RDE03110S05
	12.0 V	250 mA		30 mA	330 µF	84%	RDE03110S12
	15.0 V	200 mA		30 mA	220 µF	84%	RDE03110S15
	±12.0 V	±125 mA		35 mA	±220 µF	83%	RDE03110D12
	±15.0 V	±100 mA		30 mA	±220 µF	85%	RDE03110D15

Notes

1. Input current measured at nominal input voltage.

Mechanical Details





Pin Connections		
Pin	Single Output	Dual Output
1	+Vin	+Vin
11	No Pin	Common
12	-Vout	No Pin
13	+Vout	-Vout
15	No Pin	+Vout
23	-Vin	-Vin
24	-Vin	-Vin

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Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	9		36		24 V nominal
	18		75	VDC	48 V nominal
	40		160	VDC	72/110 V nominal
Input Filter	Internal Pi type				
Input Surge			50	VDC for 1 s	24 V nominal
			100		48 V nominal
			170		72/110 V nominal
Undervoltage Lockout	OFF at <7.5 V				24 V nominal
	OFF at <16.0 V				48 V nominal
	OFF at <37.0 V				72/110 V nominal

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	5		30	VDC	See Models and Ratings table
Initial Set Accuracy			±1.0	%	At full load
Minimum Load				A	No minimum load required
Line Regulation			±0.5	%	From minimum to maximum input at full load
Load Regulation			±1.0	%	From 0 to full load
Cross Regulation			±5.0	%	On dual output models when one load is varied between 25% and 100% and other is fixed at 100%
Transient Response		±3	±5	% deviation	Recovery within 1% in less than 250 µs for a 25% load change.
Ripple & Noise		50/75		mV pk-pk	5 V output / other models. 20 MHz bandwidth. Measured using 10 µF MLCC
Overload Protection		150		%	
Short Circuit Protection					Continuous trip & restart (hiccup mode), with auto recovery
Maximum Capacitive Load					See Models and Ratings table
Temperature Coefficient			0.02	%/°C	

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		84		%	See Models and Ratings table
Isolation: Input to Output	3000			VAC	60 s Reinforced
Isolation Resistance	10^9			Ω	At 500 VDC
Isolation Capacitance		1500		pF	
Switching Frequency		170/285		kHz	72 & 110 V input/other models
Power Density			6.38	W/in^3	
Mean Time Between Failure	3.36			MHrs	MIL-HDBK-217F, +25 °C GB
Case Material	Non conductive black plastic, UL94V-0 rated				
PCB Pin Material	Tinned copper				
Weight		0.03 (15.4)		lb (g)	

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Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+105	°C	Derate from 100% load at 80 °C to 0 load at 105 °C
Storage Temperature	-50		+125	°C	
Humidity			95	%RH	Non-condensing
Cooling	IEC/EN 60068-2-1				
Dry Heat	IEC/EN 60068-2-2				
Damp Heat	IEC/EN 60068-2-30				
Shock & Vibration	IEC/EN 61373				
Lead Free Reflow Solder Process	IPC JEDEC J-STD 020D.1				

EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
ITE	EN55032	Class A	Conducted and Radiated
Railway Equipment	EN50121-3-2		Conducted and Radiated

EMC: Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
ITE Equipment	EN55024	High severity, as below		
Railway Equipment	EN50121-3-2			Electromagnetic compatibility for rolling stock apparatus
ESD	EN61000-4-2	±8 kV air discharge, ±6 kV contact	A	
Radiated	EN61000-4-3	10 V/m	A	
EFT/Burst	EN61000-4-4	±2 kV	A	With external capacitor Suggested parts are 24Sxx: CHEMI-CON KY 470 µF/50 V 48Sxx: CHEMI-CON KY 330 µF/100 V 110Sxx: CHEMI-CON KY 220 µF/250 V
Surge	EN61000-4-5	±2 kV	A	
Conducted	EN61000-4-6	10 V rms	A	
Magnetic Fields	EN61000-4-8	3 A/m	A	

Safety Approvals

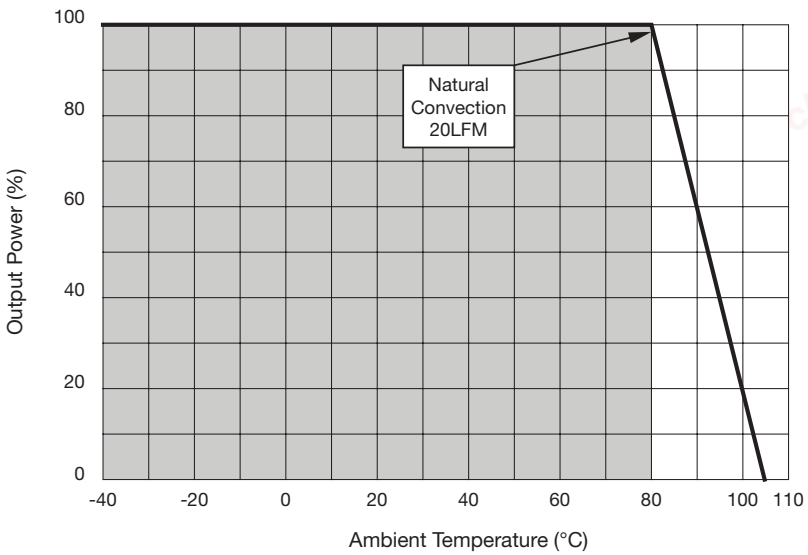
Safety Agency	Safety Standard	Notes & Conditions
CB Report	IEC62368-1	Information Technology
UL	UL/cUL62368-1	Information Technology

Safety Agency	Safety Standard	Notes & Conditions
CB Report	IEC60571	Railway Applications, Electronic Equipment used on Rail Vehicles
EN	EN50155	Railway Applications, Electronic Equipment used on Rolling Stock

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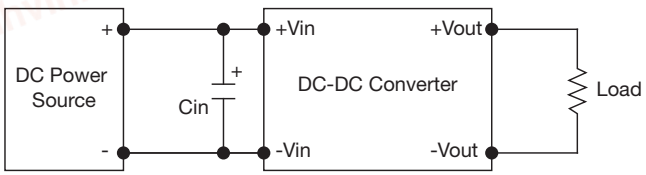
Application Notes

Derating Curve



Input Source Impedance

With high loads and with power distributed over long lines it can be advisable to use a low ESR 4.7 µF input for 24 V devices, 2.2 µF for 48 V devices and 1 µF for 110 V devices.



Output Ripple Reduction

To reduce output ripple, it is recommended to use 4.7 µF capacitors at the output.

