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.

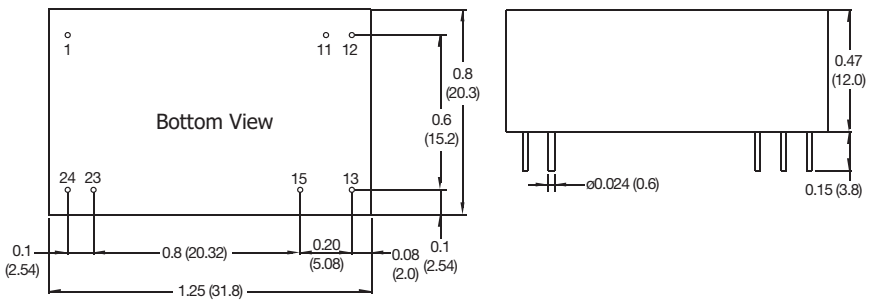
Models & Ratings

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

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)	

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	

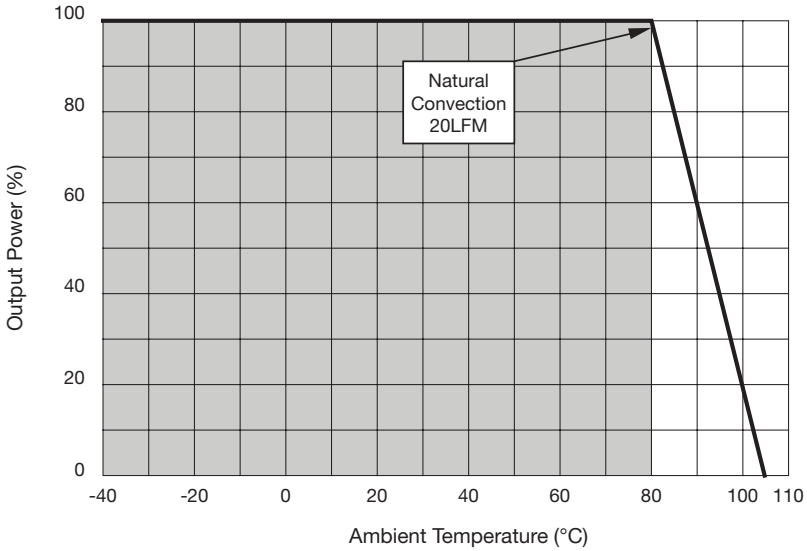
Safety Approvals

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

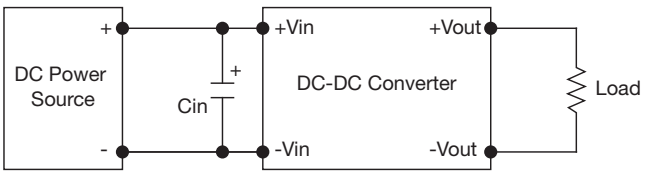
Application Notes

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.

