

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.

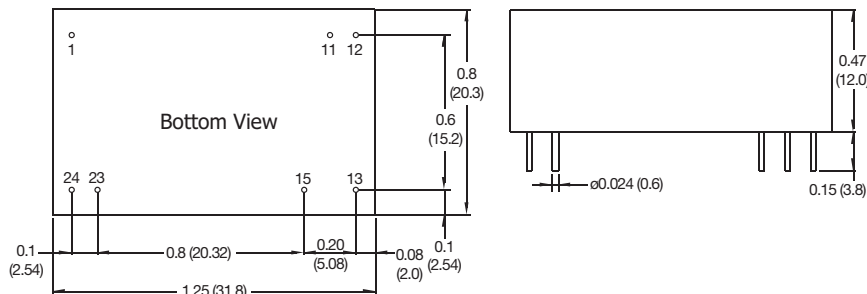
Models & Ratings

| 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 | |

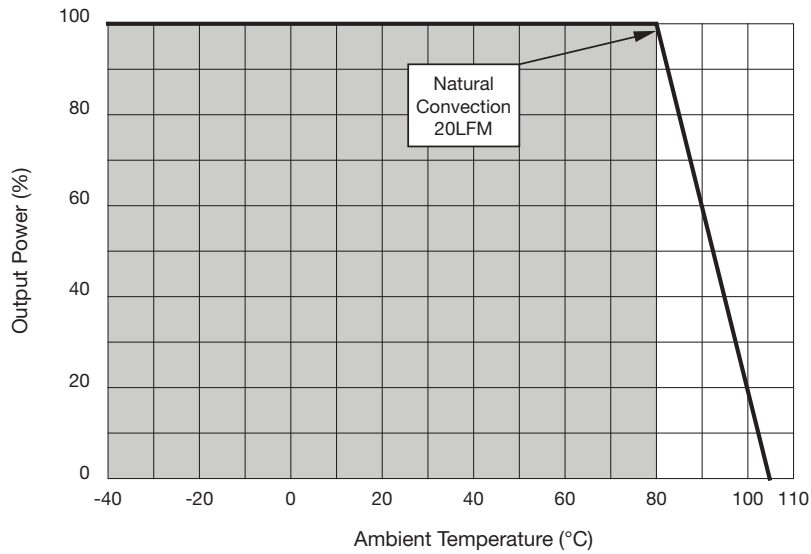
Safety Approvals

| 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 |

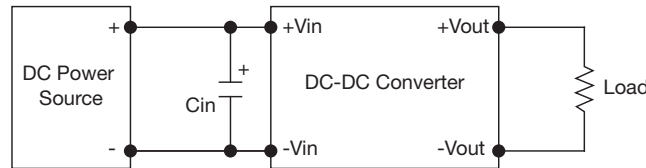
Application Notes

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.

