

40 Watts

- 72 & 110 VDC Input for Railway Applications
- Single and Dual Outputs
- 1500 VAC Basic Isolation
- High Efficiency - Up to 90%
- Remote On/Off
- Complies with EN50155
- EN50121-3-2 EMC for Railway Applications
- 3 Year Warranty



Dimensions:

RDC40:

2.00 x 1.60 x 0.4" (50.8 x 40.6 x 10.16 mm)

The RDC40 series of 40W DC-DC converters are designed for railway applications and comply with EN50121-3-2, the EMC standard for rolling stock apparatus. There are two input voltage ranges. The 72 VDC nominal models accept an input from 36 to 140 VDC and the 110 V nominal versions have a 55 to 176 VDC input. A trim pin allows a +/-10% adjustment for single output models. Using convection cooling the converters have a wide operating temperature range of -40°C to +85°C and a maximum case temperature of 105°C.

Models & Ratings

| Input Voltage | Output Voltage | Output Current | Input Current ⁽¹⁾ | | Maximum Capacitive Load | Efficiency | Model Number ⁽²⁾ |
|---------------|----------------|----------------|------------------------------|-----------|-------------------------|------------|-----------------------------|
| | | | No Load | Full Load | | | |
| 36-140 VDC | 3.3 V | 10.00 A | 30 mA | 526.82 mA | 25000 µF | 87.0% | RDC4072S3V3 |
| | 5.0 V | 8.00 A | 30 mA | 617.28 mA | 2000 µF | 90.0% | RDC4072S05 |
| | 12.0 V | 3.35 A | 25 mA | 641.76 mA | 2500 µF | 87.0% | RDC4072S12 |
| | 15.0 V | 2.65 A | 25 mA | 627.37 mA | 2500 µF | 88.0% | RDC4072S15 |
| | ±12.0 V | ±1.65 A | 30 mA | 632.18 mA | ±1600 µF | 87.0% | RDC4072D12 |
| | ±15.0 V | ±1.35 A | 30 mA | 639.20 mA | ±1600 µF | 88.0% | RDC4072D15 |
| 55-176 VDC | 3.3 V | 10.00 A | 20 mA | 344.83 mA | 25000 µF | 87.0% | RDC40110S3V3 |
| | 5.0 V | 8.00 A | 25 mA | 408.58 mA | 2000 µF | 89.0% | RDC40110S05 |
| | 12.0 V | 3.35 A | 25 mA | 420.06 mA | 2500 µF | 87.0% | RDC40110S12 |
| | 15.0 V | 2.65 A | 25 mA | 410.64 mA | 2500 µF | 88.0% | RDC40110S15 |
| | ±12.0 V | ±1.65 A | 20 mA | 413.79 mA | ±1600 µF | 87.0% | RDC40110D12 |
| | ±15.0 V | ±1.35 A | 20 mA | 420.78 mA | ±1600 µF | 87.5% | RDC40110D15 |

Notes

1. Input current specified at nominal 72 V or 110 V input.

2. Add suffix '-HK' for optional heatsink.

Input

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|---------------------------|------------------------|---------|--------------------------|-------|---|
| Input Voltage - Operating | 36 55 | | 140 176 | VDC | 72 V nominal 110 V nominal |
| Input Current | | | | | See models and ratings table |
| Input Reflected Ripple | | 20 | | mA | Through 12 µH inductor and 33 µF capacitor |
| Input Filter | | | | | Pi network |
| Undervoltage Lockout | OFF: 30.5 OFF: 48.5 | | ON: 33.5 V ON: 52.5 V | V | 72 V models 110 V models |
| Input Surge | | | 150 185 | VDC | 72 V models (for 100 ms) 110 V models (for 100 ms) |

Output

| Characteristic | Min. | Typ. | Max. | Units | Notes & Conditions |
|----------------------------|------|--|--------------|----------------------|---|
| Output Voltage | | | | VDC | See Models and Ratings table |
| Output Voltage Trim | | ±10 | | % | On single outputs models only |
| Minimum Load | 0 | | | A | |
| Line Regulation | | | ±0.2 | % | |
| Load Regulation | | | ±0.5 ±1.0 | % | Single output models Dual output models (balanced outputs) |
| Cross Regulation | | ±5 | | % | Dual output models, when one load is varied between 25% and 100% and the other is fixed at 100% |
| Setpoint Accuracy | | ±1 | | % | |
| Start Up Time | | 30 | | ms | |
| Ripple and Noise | | | 100 150 | mV pk-pk mV pk-pk | Single output models Dual output model Measured with 20 MHz bandwidth in parallel with 1 µF ceramic capacitor across output rails |
| Transient Response | | | 4 | % | Deviation, recovery to within 1% in <500 µs for a 25% load change |
| Oversvoltage Protection | | 3.9 6.2 15.0 18 ±15 ±18 | | V | 3.3 V Models 5.0 V Models 12 V Models 15 V Models ±12 V Models ±15 V Models |
| Overload Protection | | 130 | | % | Of Full Load |
| Short Circuit Protection | | | | | Trip and restart (hiccup mode, auto recovery) |
| Overtemperature Protection | | 115 | | °C | Case temperature |
| Remote On/Off | | | | | On = Logic High (>3.0) or Open Off = Logic Low (<1.2 V) or short pin 2 to 3 |
| Maximum Capacitive Load | | | | | See Models and Ratings table |

General

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|----------------------------|--|------------|---------|-------------------|------------------------------|
| Efficiency | | 88 | | % | See Models and Ratings table |
| Isolation: Input to Output | | | 1500 | VAC | |
| Input to Case | | | 1600 | VDC | |
| Output to Case | | | 1600 | VDC | |
| Switching Frequency | | 270 | | kHz | |
| Power Density | | 31 | | W/in ³ | |
| Mean Time Between Failure | 320 | | | kHrs | MIL-HDBK-217F at 25 °C GB |
| Weight | | 0.105 (48) | | lb (g) | |
| Pin material | Solder-coated copper | | | | |
| Solder profile | Wave solder 260°C 1.5mm from case 10s maximum. With iron, 450°C 5s maximum | | | | |
| Potting material | Epoxy UL94V-0 rated, designed to meet EN45545-2 | | | | |
| Case material | Nickel-coated copper | | | | |
| Base material | Non conductive black plastic UL94V-0 rated | | | | |

Environmental

| Characteristic | Minimum | Typical | Maximum | Units | Notes & Conditions |
|-----------------------|---------|---------|---------|-------|---|
| Operating Temperature | -40 | | +85 | °C | See derating curve in Applications Note |
| Case Temperature | | | +105 | °C | See derating curve in Applications Note |
| Cooling | | | | | Convection-cooled |
| Operating Humidity | | | 95 | %RH | Non-condensing |
| Storage Temperature | -55 | | +125 | °C | |

EMC: Emissions

| Phenomenon | Standard | Test Level | Notes & Conditions |
|------------|---|-------------------------------|---------------------------|
| General | Complies with EN50155 & EN50121-3-2, Railway Applications - Electromagnetic Compatibility for Rolling Stock Apparatus | | |
| Emissions | EN55011 | 79 dB μ V / 73 dB μ V | 0.15-0.5 MHz / 0.5-30 MHz |

EMC: Immunity

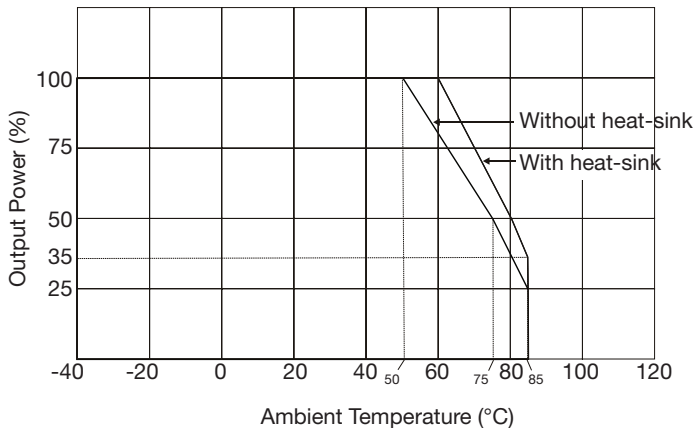
| Phenomenon | Standard | Test Level | Criteria | Notes & Conditions |
|----------------|-------------|------------|----------|---|
| ESD | EN61000-4-2 | 3 | A | |
| Radiated | EN61000-4-3 | 20 V/m | A | |
| EFT | EN61000-4-4 | 3 | A | |
| Surges | EN61000-4-5 | 2 | A | External Input Capacitor required 220 μ F / 250 V |
| Conducted | EN61000-4-6 | 10 Vrms | A | |
| Magnetic Field | EN61000-4-8 | 10 A/m | A | |

Safety Approvals

| Safety Agency | Safety Standard | Notes & Conditions |
|---------------|-----------------|-------------------------------------|
| CE | LVD & RoHS | Tested in accordance with EN62368-1 |

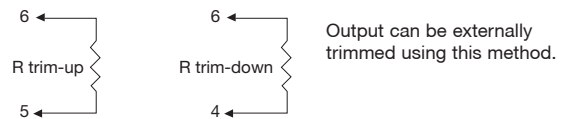
Application Notes

Derating Curve



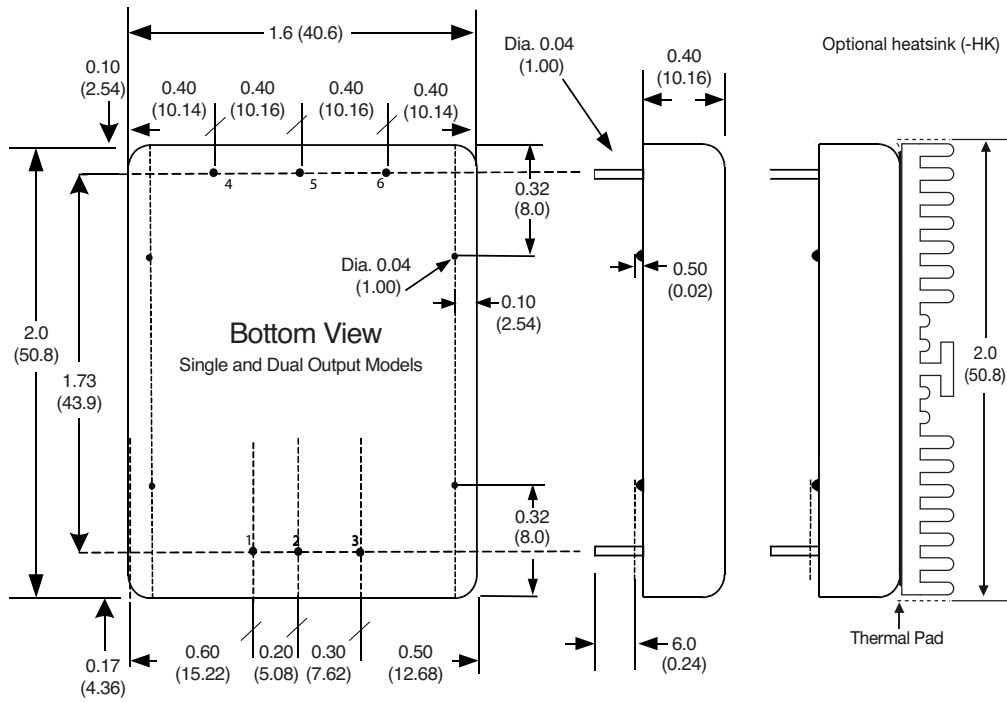
External Output Trim

On single output versions only.



| | Typical Resistor | | | |
|---------------|------------------|-----------------|-----------------|-----------------|
| | S3V3 | S05 | S12 | S15 |
| Trim Down 10% | 15.3 k Ω | 5.31 k Ω | 5.3 k Ω | 5.8 k Ω |
| Trim Up 10% | 10.3 k Ω | 10.6 k Ω | 22.1 k Ω | 20.0 k Ω |

Mechanical Details



Notes

1. Dimensions shown in inches (mm).
2. Weight: 0.105 lbs (48.0 g)
3. Pin diameter: 0.04 ± 0.002 (1.0 ± 0.05)
4. Pin pitch tolerance: ± 0.014 (± 0.35)
5. Case tolerance: ± 0.02 (± 0.5)

| PIN CONNECTIONS | | |
|-----------------|---------------|---------------|
| Pin | Single | Dual |
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 3 | Remote On/Off | Remote On/Off |
| 4 | +Vout | +Vout |
| 5 | -Vout | Com |
| 6 | Trim | -Vout |