

# 30 Watts

## RDC Series



- 72 & 110 VDC Input for Railway Applications
- Single, Dual and Triple Outputs
- 1500 VAC Basic Isolation
- High Power Density
- High Efficiency – Up to 91%
- Remote On/Off
- 3 Year Warranty

### Specification

#### Input

|                        |                                                                                       |
|------------------------|---------------------------------------------------------------------------------------|
| Input Voltage Range    | • 72 V (36-140 VDC), 110 V (55-176 VDC)                                               |
| Input Current          | • See table                                                                           |
| Input Reflected Ripple | • 20 mA pk-pk through 12 $\mu$ H inductor                                             |
| Input Filter           | • Pi network                                                                          |
| Undervoltage Lockout   | • 72 V models: ON 33.5 V, OFF 30.5 V typ.<br>110 V models: ON 52.5 V, OFF 48.5 V typ. |
| Input Surge            | • 72 V models 150 VDC for 100 ms<br>110 V models 185 VDC for 100 ms                   |

#### Output

|                            |                                                                                                                                                                                                                                     |
|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Output Voltage             | • See table                                                                                                                                                                                                                         |
| Output Voltage Trim        | • $\pm 10\%$ on single outputs models only                                                                                                                                                                                          |
| Minimum Load               | • No minimum load required for single and dual output models, 10% required on all outputs for triple output models                                                                                                                  |
| Line Regulation            | • $\pm 0.2\%$ max for single and dual output models, $\pm 1.0\%$ main, $\pm 5\%$ auxiliary for triple output models                                                                                                                 |
| Load Regulation            | • Single output models: $\pm 0.5\%$ max. Dual output models: $\pm 1\%$ max balanced outputs. Triple output models: $\pm 1\%$ max main, $\pm 5\%$ auxiliaries                                                                        |
| Cross Regulation           | • $\pm 5\%$ for dual and triple outputs (see note 2)                                                                                                                                                                                |
| Setpoint Accuracy          | • $\pm 1\%$ ( $\pm 5\%$ for triple auxiliaries)                                                                                                                                                                                     |
| Start Up Time              | • 30 ms typical                                                                                                                                                                                                                     |
| Ripple & Noise             | • 100 mV or 1% pk-pk for single output models, 150 mV or 1% pk-pk for dual output model, whichever is greater, 50/75 mV pk-pk main/auxiliary outputs of triple output models, 20 MHz bandwidth (see note 3)                         |
| Transient Response         | • 4% max deviation, recovery to within 1% in $<500 \mu$ s for a 25% load change                                                                                                                                                     |
| Temp. Coefficient          | • 0.02%/°C                                                                                                                                                                                                                          |
| Overvoltage Protection     | • 3.3 V models: 3.9 V typical, 5 V models: 6.2 V typical, 12 V models: 15 V typical, 15 V models: 18 V typical, $\pm 5$ V models: $\pm 6.2$ V typical, $\pm 12$ V models: $\pm 15$ V typical, $\pm 15$ V models: $\pm 18$ V typical |
| Overload Protection        | • $>150\%$ of full load                                                                                                                                                                                                             |
| Short Circuit Protection   | • Trip & restart (hiccup mode), auto recovery                                                                                                                                                                                       |
| Overtemperature Protection | • 115 °C typical                                                                                                                                                                                                                    |
| Remote On/Off              | • On = Logic High ( $>3.0$ ) or Open<br>Off = Logic Low ( $<1.2$ V) or short pin 2 to 3                                                                                                                                             |
| Maximum Capacitive Load    | • See table                                                                                                                                                                                                                         |

#### General

|                       |                                                                                                  |
|-----------------------|--------------------------------------------------------------------------------------------------|
| Efficiency            | • See table                                                                                      |
| Isolation Voltage     | • 1500 VAC Input to Output<br>1600 VDC Input to Case<br>1600 VDC Output to Case                  |
| Isolation Capacitance | • 2000 pF                                                                                        |
| Switching Frequency   | • 270 kHz typical                                                                                |
| Power Density         | • 37.5 W/in <sup>3</sup>                                                                         |
| MTBF                  | • 435 kHrs for single/dual output, 320 kHrs for triple output, min to MIL-HDBK-217F at 25 °C, GB |

#### Environmental

|                       |                                                                      |
|-----------------------|----------------------------------------------------------------------|
| Operating Temperature | • -40 °C to +75 °C (80 °C with optional heatsink) see derating curve |
| Case Temperature      | • +105 °C max                                                        |
| Cooling               | • Convection-cooled                                                  |
| Operating Humidity    | • 5-95% RH, non-condensing                                           |
| Storage Temperature   | • -40 °C to +125 °C                                                  |

#### EMC

|                    |                                                                                                               |
|--------------------|---------------------------------------------------------------------------------------------------------------|
| General            | • Complies with EN50121-3-2, Railway Applications - Electromagnetic Compatibility for Rolling Stock Apparatus |
| Emissions          | • EN55011, 79 dB $\mu$ V (0.15-0.5 MHz)<br>73 dB $\mu$ V (0.5-30 MHz)                                         |
| ESD Immunity       | • EN61000-4-2, level 3, Perf Criteria A                                                                       |
| Radiated Immunity  | • EN61000-4-3 20 V/m Perf Criteria A*                                                                         |
| EFT/Burst          | • EN61000-4-4 level 3, Perf Criteria A*                                                                       |
| Surge              | • EN61000-4-5 level 2, Perf Criteria A                                                                        |
| Conducted Immunity | • EN61000-4-6 10 V/rms, Perf Criteria A                                                                       |
| Magnetic Field     | • EN61000-4-8 10 A/m, Perf Criteria A                                                                         |

\*External input capacitor required 220  $\mu$ F/250 V

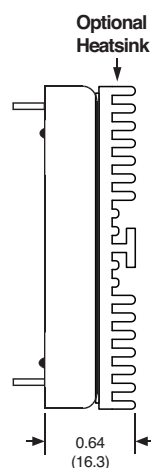
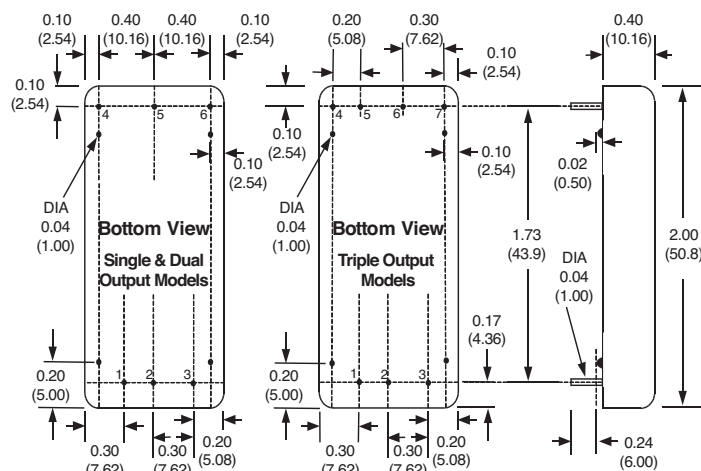
## Models and Ratings

| Input Voltage | Output Voltage       | Output Current       | Input Current <sup>(1)</sup> |           | Maximum Capacitive Load  | Efficiency | Model Number <sup>(4)</sup> |
|---------------|----------------------|----------------------|------------------------------|-----------|--------------------------|------------|-----------------------------|
|               |                      |                      | No Load                      | Full Load |                          |            |                             |
| 36-140 VDC    | 3.3 V                | 7.50 A               | 25 mA                        | 386 mA    | 20000 $\mu$ F            | 89%        | RDC3072S3V3                 |
|               | 5.0 V                | 6.00 A               | 25 mA                        | 458 mA    | 14000 $\mu$ F            | 91%        | RDC3072S05                  |
|               | 12.0 V               | 2.50 A               | 20 mA                        | 470 mA    | 2000 $\mu$ F             | 88%        | RDC3072S12                  |
|               | 15.0 V               | 2.00 A               | 20 mA                        | 466 mA    | 2000 $\mu$ F             | 89%        | RDC3072S15                  |
|               | $\pm 5.0$ V          | $\pm 3.00$ A         | 40 mA                        | 468 mA    | $\pm 3000$ $\mu$ F       | 89%        | RDC3072D05                  |
|               | $\pm 12.0$ V         | $\pm 1.25$ A         | 25 mA                        | 471 mA    | $\pm 1300$ $\mu$ F       | 88%        | RDC3072D12                  |
|               | $\pm 15.0$ V         | $\pm 1.00$ A         | 20 mA                        | 471 mA    | $\pm 1300$ $\mu$ F       | 88%        | RDC3072D15                  |
|               | +3.3 V, $\pm 12.0$ V | 5.00 A, $\pm 0.42$ A | 25 mA                        | 414 mA    | 15000, $\pm 220$ $\mu$ F | 89%        | RDC3072T0312                |
|               | +3.3 V, $\pm 15.0$ V | 5.00 A, $\pm 0.33$ A | 25 mA                        | 414 mA    | 15000, $\pm 220$ $\mu$ F | 88%        | RDC3072T0315                |
|               | +5.0 V, $\pm 12.0$ V | 4.00 A, $\pm 0.42$ A | 25 mA                        | 464 mA    | 8000, $\pm 220$ $\mu$ F  | 90%        | RDC3072T0512                |
| 55-176 VDC    | 3.3 V                | 7.50 A               | 20 mA                        | 254 mA    | 20000 $\mu$ F            | 88%        | RDC30110S3V3                |
|               | 5.0 V                | 6.00 A               | 25 mA                        | 303 mA    | 14000 $\mu$ F            | 90%        | RDC30110S05                 |
|               | 12.0 V               | 2.50 A               | 20 mA                        | 310 mA    | 2000 $\mu$ F             | 88%        | RDC30110S12                 |
|               | 15.0 V               | 2.00 A               | 20 mA                        | 308 mA    | 2000 $\mu$ F             | 88%        | RDC30110S15                 |
|               | $\pm 5.0$ V          | $\pm 3.00$ A         | 35 mA                        | 308 mA    | $\pm 3000$ $\mu$ F       | 88%        | RDC30110D05                 |
|               | $\pm 12.0$ V         | $\pm 1.25$ A         | 25 mA                        | 310 mA    | $\pm 1300$ $\mu$ F       | 88%        | RDC30110D12                 |
|               | $\pm 15.0$ V         | $\pm 1.00$ A         | 20 mA                        | 311 mA    | $\pm 1300$ $\mu$ F       | 87%        | RDC30110D15                 |
|               | +3.3 V, $\pm 12.0$ V | 5.00 A, $\pm 0.42$ A | 20 mA                        | 274 mA    | 15000, $\pm 220$ $\mu$ F | 88%        | RDC30110T0312               |
|               | +3.3 V, $\pm 15.0$ V | 5.00 A, $\pm 0.33$ A | 20 mA                        | 274 mA    | 15000, $\pm 220$ $\mu$ F | 87%        | RDC30110T0315               |
|               | +5.0 V, $\pm 12.0$ V | 4.00 A, $\pm 0.42$ A | 25 mA                        | 307 mA    | 8000, $\pm 220$ $\mu$ F  | 89%        | RDC30110T0512               |
|               | +5.0 V, $\pm 15.0$ V | 4.00 A, $\pm 0.33$ A | 25 mA                        | 307 mA    | 8000, $\pm 220$ $\mu$ F  | 88%        | RDC30110T0515               |

### Notes

- Input current specified at nominal 72 V or 110 V input.
- Cross regulation for duals is  $\pm 5\%$  when one output is at 100% and the other is varied between 25% and 100%. Cross regulation for triples is  $\pm 5\%$  when main output and one auxiliary is at 25% and the other is varied between 25% and 100%.
- Measured with 1  $\mu$ F ceramic capacitor in parallel with 10  $\mu$ F electrolytic capacitor across output rails.
- Add suffix '-HK' for optional heatsink.

## Mechanical Details



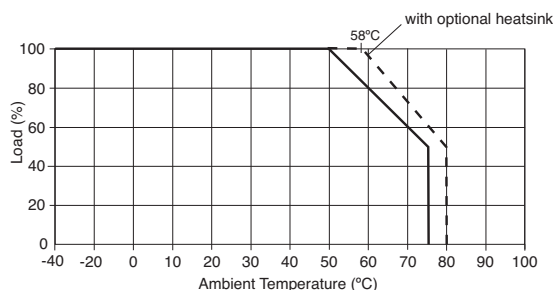
| PIN CONNECTIONS |               |               |               |
|-----------------|---------------|---------------|---------------|
| Pin             | Single        | Dual          | Triple        |
| 1               | +Vin          | +Vin          | +Vin          |
| 2               | -Vin          | -Vin          | -Vin          |
| 3               | Remote On/Off | Remote On/Off | Remote On/Off |
| 4               | +Vout         | +Vout         | +Vout 2       |
| 5               | -Vout         | Com           | -Vout 3       |
| 6               | Trim          | -Vout         | Com           |
| 7               |               |               | +Vout 1       |

### Notes

- All dimensions are in inches (mm).
- Weight: 0.07 lbs (30 g) approx
- Pin diameter: 0.04  $\pm$  0.002 (1.0  $\pm$  0.05)
- Pin pitch tolerance:  $\pm$  0.014 ( $\pm$  0.35)
- Case tolerance:  $\pm$  0.02 ( $\pm$  0.5)

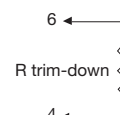
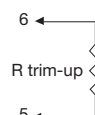
## Application Notes

### Derating Curve



### External Output Trim

On single output versions only.



Output can be externally trimmed using this method.  
Contact sales for details.

| Typical Resistor |                 |                 |                 |                 |
|------------------|-----------------|-----------------|-----------------|-----------------|
|                  | S3V3            | S05             | S12             | S15             |
| Trim Down 10%    | 15.3 k $\Omega$ | 15.3 k $\Omega$ | 5.3 k $\Omega$  | 5.8 k $\Omega$  |
| Trim Up 10%      | 10.3 k $\Omega$ | 15.3 k $\Omega$ | 22.1 k $\Omega$ | 20.0 k $\Omega$ |