

## RDC Series



- 72 & 110 VDC Input for Railway Applications
- Single, Dual and Triple Outputs
- 1500 VAC Basic Isolation
- High Efficiency – Up to 91%
- Remote On/Off
- Complies with EN50155
- EN50121-3-2 EMC for Railway Applications
- 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. 110 V models: ON 52.5 V, OFF 48.5 V typ.
Input Surge	• 72 V models 150 VDC for 100 ms 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%/ $^{\circ}$ 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 $^{\circ}$ C typical
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 table

## General

Efficiency	• See table
Isolation Voltage	• 1500 VAC Input to Output 1600 VDC Input to Case 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 $^{\circ}$ C, GB
Pin Material	• Solder coated copper
Solder Profile	• Wave solder 260 $^{\circ}$ C 1.5mm from case 10s maximum. With iron, 450 $^{\circ}$ C 5s maximum
Potting Material	• Epoxy UL94V-0 rated, designed to meet EN45545-2
Case Material	• Nickel coated copper
Base Material Rated	• Non-conductive black plastic UL94V-0 rated

## Environmental

Operating Temperature	• -40 $^{\circ}$ C to +75 $^{\circ}$ C (80 $^{\circ}$ C with optional heatsink) see derating curve
Case Temperature	• +105 $^{\circ}$ C max
Cooling	• Convection-cooled
Operating Humidity	• 5-95% RH, non-condensing
Operating Altitude	• 3048m
Storage Temperature	• -40 $^{\circ}$ C to +125 $^{\circ}$ C

## EMC &amp; Safety

General	• Complies with EN50121-3-2, Railway Applications - Electromagnetic Compatibility for Rolling Stock Apparatus Complies with EN50155
Emissions	• EN55011, 79 dB $\mu$ V (0.15-0.5 MHz) 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
Safety Approvals	• CE LVD tested to EN62368-1, CE (Meets all applicable directives), UKCA (Meets all applicable legislation)

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

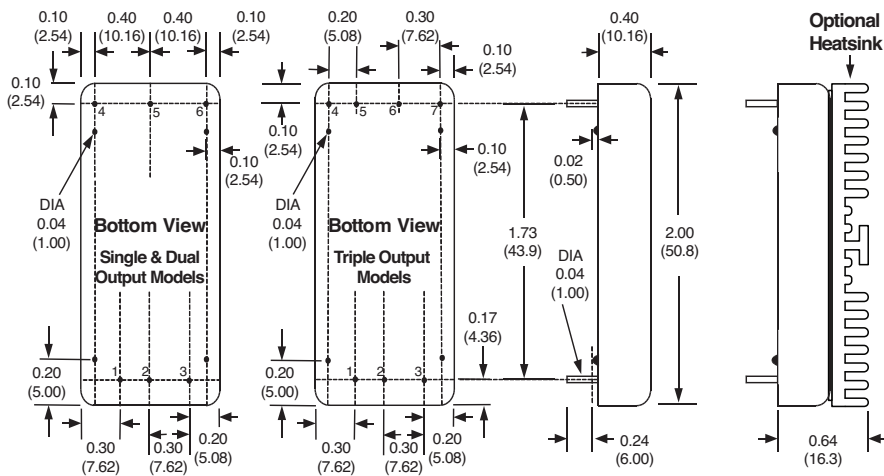
**Models and Ratings**

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 µF	89%	RDC3072S3V3
	5.0 V	6.00 A	25 mA	458 mA	14000 µF	91%	RDC3072S05
	12.0 V	2.50 A	20 mA	470 mA	2000 µF	88%	RDC3072S12
	15.0 V	2.00 A	20 mA	466 mA	2000 µF	89%	RDC3072S15
	±5.0 V	±3.00 A	40 mA	468 mA	±3000 µF	89%	RDC3072D05
	±12.0 V	±1.25 A	25 mA	471 mA	±1300 µF	88%	RDC3072D12
	±15.0 V	±1.00 A	20 mA	471 mA	±1300 µF	88%	RDC3072D15
	+3.3 V, ±12.0 V	5.00 A, ±0.42 A	25 mA	414 mA	15000, ±220 µF	89%	RDC3072T0312
	+3.3 V, ±15.0 V	5.00 A, ±0.33 A	25 mA	414 mA	15000, ±220 µF	88%	RDC3072T0315
	+5.0 V, ±12.0 V	4.00 A, ±0.42 A	25 mA	464 mA	8000, ±220 µF	90%	RDC3072T0512
+5.0 V, ±15.0 V	4.00 A, ±0.33 A	25 mA	464 mA	8000, ±220 µF	90%	RDC3072T0515	
55-176 VDC	3.3 V	7.50 A	20 mA	254 mA	20000 µF	88%	RDC30110S3V3
	5.0 V	6.00 A	25 mA	303 mA	14000 µF	90%	RDC30110S05
	12.0 V	2.50 A	20 mA	310 mA	2000 µF	88%	RDC30110S12
	15.0 V	2.00 A	20 mA	308 mA	2000 µF	88%	RDC30110S15
	±5.0 V	±3.00 A	35 mA	308 mA	±3000 µF	88%	RDC30110D05
	±12.0 V	±1.25 A	25 mA	310 mA	±1300 µF	88%	RDC30110D12
	±15.0 V	±1.00 A	20 mA	311 mA	±1300 µF	87%	RDC30110D15
	+3.3 V, ±12.0 V	5.00 A, ±0.42 A	20 mA	274 mA	15000, ±220 µF	88%	RDC30110T0312
	+3.3 V, ±15.0 V	5.00 A, ±0.33 A	20 mA	274 mA	15000, ±220 µF	87%	RDC30110T0315
	+5.0 V, ±12.0 V	4.00 A, ±0.42 A	25 mA	307 mA	8000, ±220 µF	89%	RDC30110T0512
+5.0 V, ±15.0 V	4.00 A, ±0.33 A	25 mA	307 mA	8000, ±220 µF	88%	RDC30110T0515	

**Notes**

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

**Mechanical Details**



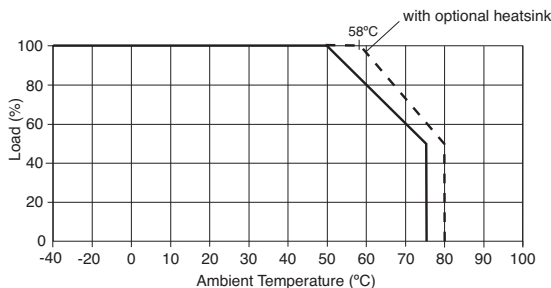
PIN CONNECTIONS			
Pin	Single	Dual	Triple
1	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin
3	Remote On/Off	Remote On/Off	Remote On/Off
4	+Vout	+Vout	+Vout 2
5	-Vout	Com	-Vout 3
6	Trim	-Vout	Com
7			+Vout 1

**Notes**

1. All dimensions are in inches (mm).
2. Weight: 0.07 lbs (30 g) approx
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)

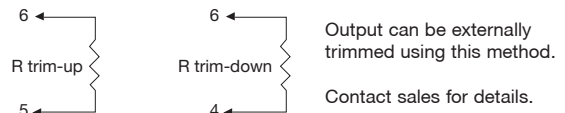
**Application Notes**

**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 kΩ	15.3 kΩ	5.3 kΩ	5.8 kΩ
Trim Up 10%	10.3 kΩ	15.3 kΩ	22.1 kΩ	20.0 kΩ