

# 20 Watts

## RDC Series



- 72 & 110 VDC Input for Railway Applications
- Single and Dual Outputs
- 1500 VAC Basic Isolation
- High Power Density
- High Efficiency – Up to 88%
- 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. 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
Line Regulation	• $\pm 0.2\%$ max
Load Regulation	• Single output models: $\pm 0.5\%$ max, Dual output models: $\pm 1\%$ max balanced outputs
Cross Regulation	• $\pm 5\%$ (see note 2)
Setpoint Accuracy	• $\pm 1\%$
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, 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	• 25 W/in <sup>3</sup>
MTBF	• 400 kHrs min to MIL-HDBK-217F at 25 $^{\circ}$ C, GB

#### Environmental

Operating Temperature	• -40 $^{\circ}$ C to +85 $^{\circ}$ C (see derating curve)
Case Temperature	• +105 $^{\circ}$ C max
Cooling	• Convection-cooled
Operating Humidity	• 5-95% RH, non-condensing
Storage Temperature	• -40 $^{\circ}$ C to +125 $^{\circ}$ 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) 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

# RDC20

## Models and Ratings

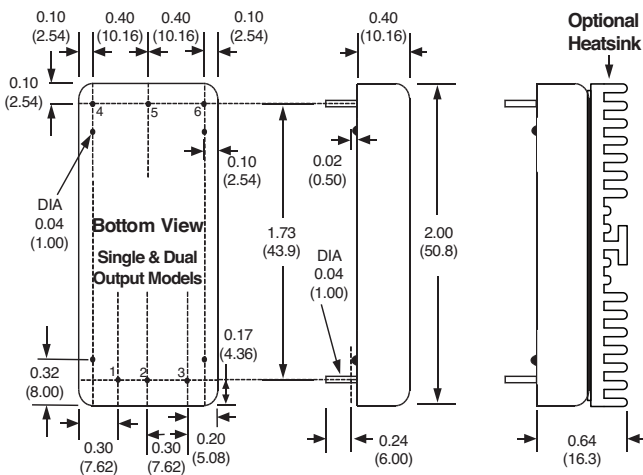
Input Voltage	Output Voltage	Output Current	Input Current <sup>(1)</sup>		Maximum Capacitive Load	Efficiency	Model Number <sup>(4)</sup>
			No Load	Full Load			
36-140 VDC	3.3 V	6.00 A	20 mA	312 mA	10000 $\mu$ F	88.0%	RDC2072S3V3
	5.0 V	4.00 A	25 mA	313 mA	6800 $\mu$ F	88.5%	RDC2072S05
	12.0 V	1.65 A	15 mA	318 mA	1000 $\mu$ F	86.5%	RDC2072S12
	15.0 V	1.33 A	20 mA	318 mA	700 $\mu$ F	87.0%	RDC2072S15
	$\pm$ 5.0 V	$\pm$ 2.00 A	35 mA	319 mA	$\pm$ 1000 $\mu$ F	87.0%	RDC2072D05
	$\pm$ 12.0 V	$\pm$ 0.83 A	20 mA	323 mA	$\pm$ 470 $\mu$ F	85.5%	RDC2072D12
55-176 VDC	3.3 V	6.00 A	15 mA	208 mA	10000 $\mu$ F	86.5%	RDC20110S3V3
	5.0 V	4.00 A	20 mA	209 mA	6800 $\mu$ F	87.0%	RDC20110S05
	12.0 V	1.65 A	15 mA	212 mA	1000 $\mu$ F	85.0%	RDC20110S12
	15.0 V	1.33 A	15 mA	211 mA	700 $\mu$ F	86.0%	RDC20110S15
	$\pm$ 5.0 V	$\pm$ 2.00 A	30 mA	211 mA	$\pm$ 1000 $\mu$ F	86.0%	RDC20110D05
	$\pm$ 12.0 V	$\pm$ 0.83 A	15 mA	215 mA	$\pm$ 470 $\mu$ F	84.0%	RDC20110D12
	$\pm$ 15.0 V	$\pm$ 0.67 A	15 mA	215 mA	$\pm$ 330 $\mu$ F	85.0%	RDC20110D15

### 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%.

- 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



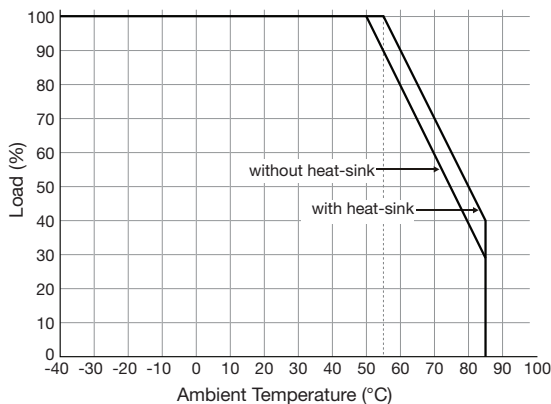
PIN CONNECTIONS		
Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	Remote On/Off	Remote On/Off
4	+Vout	+Vout
5	-Vout	Com
6	Trim	-Vout

### 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)

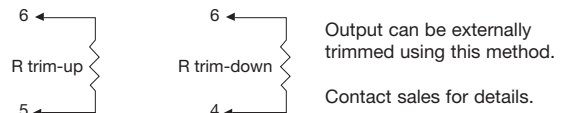
## Application Notes

### Derating Curve



### External Output Trim

On single output versions only.



Typical Resistor				
	S3V3	S05	S12	S15
Trim Down 10%	15.3 k $\Omega$	5.31 k $\Omega$	5.3 k $\Omega$	5.8 k $\Omega$
Trim Up 10%	10.3 k $\Omega$	10.6 k $\Omega$	22.1 k $\Omega$	20.0 k $\Omega$