

### 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 <sup>(1)</sup>		Maximum Capacitive Load	Efficiency	Model Number <sup>(2)</sup>
			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 <sup>3</sup>	
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 $\mu$ V / 73 dB $\mu$ V	0.15-0.5 MHz / 0.5-30 MHz

### EMC: Immunity

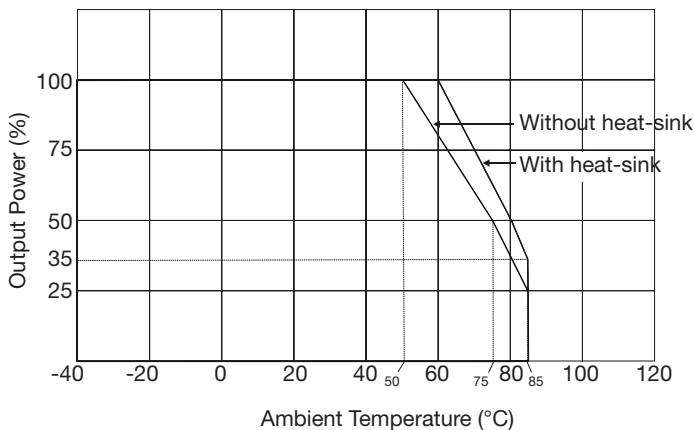
Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
ESD	EN61000-4-2	3	A	
Radiated	EN61000-4-3	20 V/m	A	
EFT	EN61000-4-4	3	A	
Surges	EN61000-4-5	2	A	External Input Capacitor required 220 $\mu$ F / 250 V
Conducted	EN61000-4-6	10 Vrms	A	
Magnetic Field	EN61000-4-8	10 A/m	A	

### Safety Approvals

Safety Agency	Safety Standard	Notes & Conditions
CE	Meets all applicable directives	
UKCA	Meets all applicable legislation	

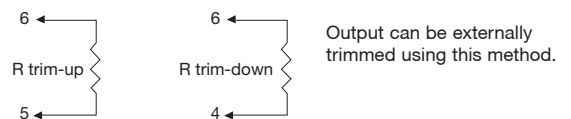
### Application Notes

#### Derating Curve



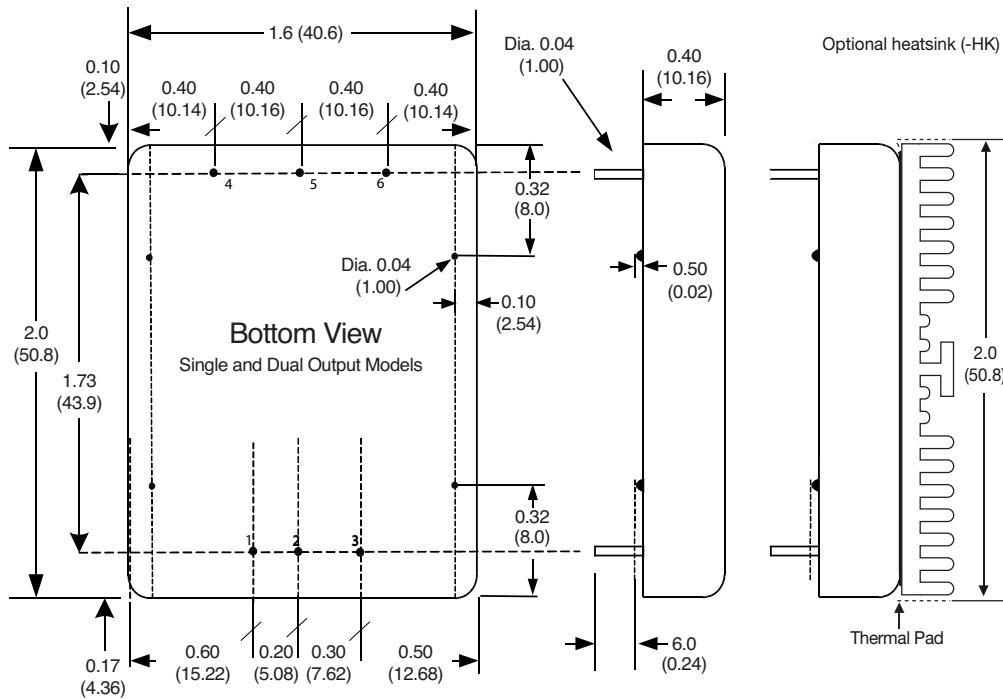
#### External Output Trim

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 $\Omega$

### Mechanical Details



#### Notes

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

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