

### 50 Watts

- Regulated Single Output
- 72 & 110 VDC for Rail Applications
- Baseplate-cooled
- 3000 VAC Isolation
- Operating Temperature -40 °C to +105 °C
- Remote On/Off & Remote Sense
- Complies with EN50155 and IEC60571
- Meets EMC Standard EN50121-3-2
- Optional Heatsink
- 3 Year Warranty



#### Dimensions:

##### RCQ50:

2.28 x 1.45 x 0.50" (57.9 x 36.8 x 12.7 mm)

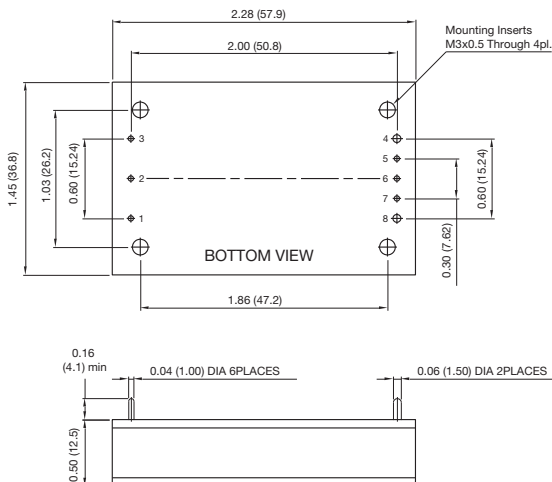
### Models & Ratings

Input voltage	Output voltage	Output current	Input current <sup>(1,2)</sup>		Overvoltage Protection	Maximum capacitive load	Efficiency	Model number <sup>(3)</sup>
			No load	Full load				
43-101V	5 V	10.00 A	50 mA	770 mA	6.2 V	17000 µF	90%	RCQ5072S05
	12 V	4.17 A	45 mA	755 mA	15.0 V	2950 µF	92%	RCQ5072S12
	15 V	3.33 A	45 mA	755 mA	18.0 V	1900 µF	92%	RCQ5072S15
	24 V	2.08 A	50 mA	760 mA	30.0 V	740 µF	91%	RCQ5072S24
66-160V	5 V	10.00 A	40 mA	505 mA	6.2 V	17000 µF	90%	RCQ50110S05
	12 V	4.17 A	35 mA	500 mA	15.0 V	2950 µF	91%	RCQ50110S12
	15 V	3.33 A	35 mA	495 mA	18.0 V	1900 µF	92%	RCQ50110S15
	24 V	2.08 A	40 mA	500 mA	30.0 V	740 µF	91%	RCQ50110S24

### Notes

1. Input currents measured at nominal input voltage.
2. Input current is typically 2.5 mA at nominal input voltage when output is turned off using remote on/off.
3. Add suffix "-HK" for optional heatsink.

### Mechanical Details



Pin Connections	
Pin	Function
1	+Vin
2	Remote On/Off
3	-Vin
4	-Vout
5	-Sense*
6	Trim
7	+Sense*
8	+Vout

\* If remote sense not used the +sense should be connected to +output and -sense should be connected to -output. Maximum output deviation is 10% inclusive of trim.

### Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	43		101	VDC	72 V nominal
	66		160	VDC	110 V nominal
Input Filter	Internal Pi type				
Input Surge			165	VDC for 100 ms	72 V models
			250		110 V models
Remote On/Off	ON: Logic high (3.5-12 V) or open circuit OFF: Logic low (<1.2 V) or short pin 2 to pin 3				
Undervoltage Lockout	ON >43 V, OFF at <40 V				72 V models
	ON >66 V, OFF at <63 V				110 V models

### Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	5		24	VDC	See Models and Ratings table
Initial Set Accuracy			±1.0	%	At full load
Output Trim			±10	%	See Application Notes
Minimum Load				A	No minimum load required
Line Regulation			±0.2	%	From minimum to maximum input at full load
Load Regulation			±0.3	%	From 0 to full load
Cross Regulation			±5.0	%	On dual output models when one load is varied between 25% and 100% and other is fixed at 100%
Transient Response		3	5	% deviation	Recovery within 1% in less than 250 µs for a 25% load change.
Ripple & Noise			150/100	mV pk-pk	24 output / other models. 20 MHz bandwidth. Measured using 1µF MLCC & 10µF tantalum capacitor.
Overload Protection		150		%	
Short Circuit Protection					Continuous Trip & Restart (Hiccup mode), with auto recovery
Maximum Capacitive Load					See Models and Ratings table
Temperature Coefficient			0.02	%/°C	
Remote Sense	Compensates up to 10% of Vout nominal plus output trim. If remote sense is not used, connect +S to +Vo and -S to -Vo.				

### General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		91		%	See Models and Ratings table
Isolation: Input to Output	3000			VAC	60 s
Isolation: Output to Case	1500			VDC	
Isolation Resistance	10 <sup>9</sup>			Ω	At 500 VDC
Isolation Capacitance			3000	pF	
Switching Frequency		320		kHz	
Power Density			30.2	W/in <sup>3</sup>	
Mean Time Between Failure		310		kHrs	MIL-HDBK-217F, +25 °C GB
Weight		0.13 (61.0)		lb (g)	

### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Baseplate Temperature	-40		+105	°C	See Derating Curve.
Storage Temperature	-50		+125	°C	
Overtemperature Protection			+110	°C	
Humidity			95	%RH	Non-condensing
Cooling	IEC/EN 60068-2-1				
Dry Heat	IEC/EN 60068-2-2				
Damp Heat	IEC/EN 60068-2-30				
Shock	IEC/EN 61373				
Vibration	EN 45545-2				
Thermal Impedance to Air			7.5/6.8	°C/W	No heatsink / with heatsink

### EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
IT Equipment	EN55022	A	Conducted & Radiated, see Application Notes
Railway Equipment	EN50121-3-2		Conducted & Radiated

### EMC: Immunity

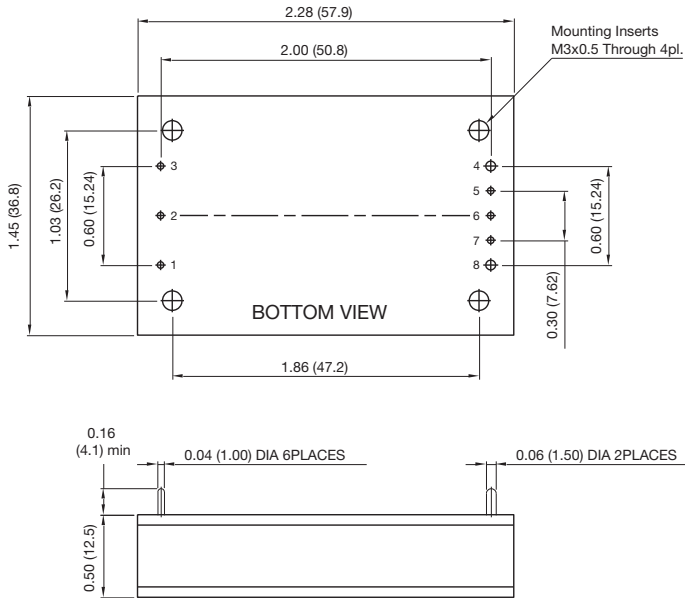
Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
IT Equipment	EN55024	High severity, as below		
Railway Equipment	EN50121-3-2			Electromagnetic compatibility for rolling stock apparatus
ESD	EN61000-4-2	±8 kV air discharge, ±6 kV contact	A	
Radiated	EN61000-4-3	10 V/m	A	
EFT/Burst	EN61000-4-4	±2 kV	A	With external capacitor, suggested part is CHEMI-CON KY 470µF/100V
Surge	EN61000-4-5	±1 kV	A	With external capacitor, suggested part is CHEMI-CON KY 470µF/100V
Conducted	EN61000-4-6	10 V rms	A	

### Safety Approvals

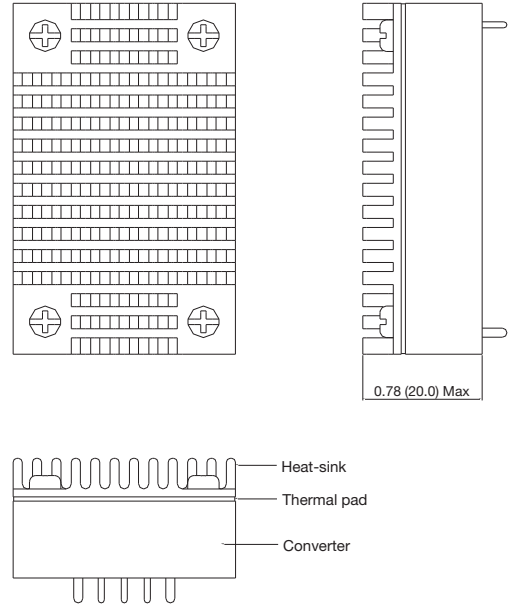
Safety Agency	Safety Standard	Notes & Conditions
CB Report	IEC60950-1	Information Technology
UL	UL/cUL60950-1	Information Technology

Safety Agency	Safety Standard	Notes & Conditions
CB Report	IEC60571	Railway Applications
EN	EN50155	Railway Applications, Electronic Equipment used on Rolling Stock

### Mechanical Details



### Optional Heatsink (-HK)



### Notes

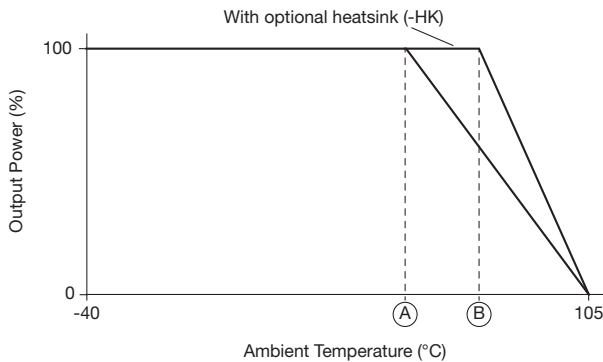
- All dimensions are in inches (mm)
- Weight: 0.13 lbs (61.0g) approx.
- Tolerance: X.XX±0.01 (X.X±0.25)  
X.XXX±0.005 (X.XX±0.13)
- Pin Tolerance: ±0.002 (±0.05)

Pin Connections	
Pin	Function
1	+Vin
2	Remote On/Off
3	-Vin
4	-Vout
5	-Sense*
6	Trim
7	+Sense*
8	+Vout

\* If remote sense not used the +sense should be connected to +output and -sense should be connected to -output. Maximum output deviation is 10% inclusive of trim.

### Application Notes

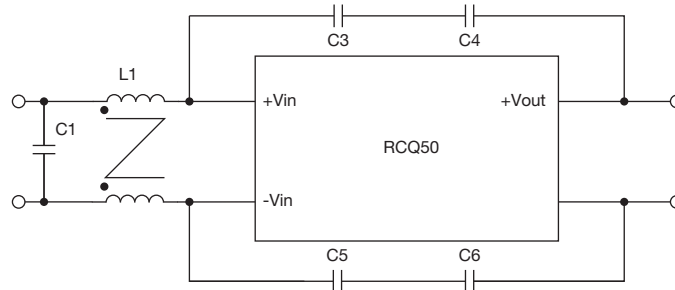
#### Derating Curve with standard optional heatsink



Models - RCQ50	Max Ambient Temperature	
	No Heatsink (A)	With Heatsink (B)
72S12, 72S15, 110S15	72°C	75°C
72S24, 110S12, 110S24	68°C	71°C
72S05, 110S05	63°C	67°C

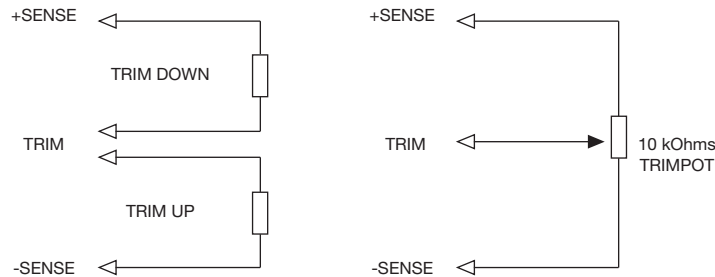
### Application Notes

#### EMI Filter for Conducted Emissions



Class	C1	C3	C4	C5	C6	L1
Class A	CHEMI-CON KXG Series 68 $\mu$ F/200V	2200pF/3kV	2200pF/3kV	2200pF/3kV	2200pF/3kV	450 $\mu$ H

#### External Output Trimming



#### Trim Down Resistor Values (Rd)

Models	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
	Voutx0.99	Voutx0.98	Voutx0.97	Voutx0.96	Voutx0.95	Voutx0.94	Voutx0.93	Voutx0.92	Voutx0.91	Voutx0.90
5V	138.88 k	62.41 k	36.92 k	24.18 k	16.53 k	11.44 k	7.79 k	5.06 k	2.94 k	1.24 k
12V	413.55 k	184.55 k	108.22 k	70.05 k	47.15 k	31.88 k	20.98 k	12.80 k	6.44 k	1.35 k
15V	530.73 k	238.61 k	141.24 k	92.56 k	63.35 k	43.87 k	29.96 k	19.53 k	11.41 k	4.92 k
24V	598.66 k	267.78 k	157.49 k	102.34 k	69.25 k	47.19 k	31.44 k	19.62 k	10.43 k	3.08 k

#### Trim Down Resistor Values (Ru)

Models	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
	Voutx1.01	Voutx1.02	Voutx1.03	Voutx1.04	Voutx1.05	Voutx1.06	Voutx1.07	Voutx1.08	Voutx1.09	Voutx1.10
5V	106.87 k	47.76 k	28.06 k	18.21 k	12.30 k	8.36 k	5.55 k	3.44 k	1.79 k	0.48 k
12V	351.00 k	157.50 k	93.00 k	60.75 k	41.40 k	28.50 k	19.29 k	12.37 k	7.00 k	2.70 k
15V	422.77 k	189.89 k	112.26 k	73.44 k	50.15 k	34.63 k	23.54 k	15.22 k	8.75 k	3.58 k
24V	487.14 k	218.02 k	128.31 k	83.46 k	56.55 k	38.61 k	25.79 k	16.18 k	8.70 k	2.72 k