

### 8 Watts

- Wide Input Range for Railway Applications
- Single and Dual Outputs
- DIP24 Package
- -40 °C to +85 °C Operation
- Full Load at 70 °C Ambient
- 3000 VDC Isolation
- MTBF >800 kHrs
- 3 Year Warranty
- EN50155 Approval for Railway Applications
- EN50121-3-2 EMC for Railway Applications



#### Dimensions:

#### RDD:

1.25 x 0.80 x 0.42" (31.8 x 20.3 x 10.7 mm)

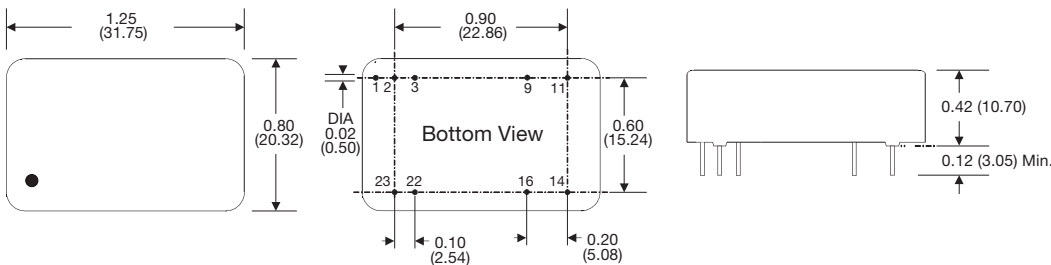
### Models & Ratings

Input Voltage	Output Voltage	Output Current	Overvoltage level	Input current <sup>(1)</sup>		Maximum capacitive load	Efficiency <sup>(2)</sup>	Model Number
				No Load	Full Load			
13-70 V	3V3	2400 mA	3.9 V	30 mA	398 mA	1330 µF	83%	RDD0824S3V3
	5 V	1600 mA	6.2 V	20 mA	388 mA	1330 µF	86%	RDD0824S05
	12 V	665 mA	15 V	10 mA	392 mA	330 µF	85%	RDD0824S12
	15 V	535 mA	18 V	10 mA	389 mA	220 µF	86%	RDD0824S15
	±5 V	±800 mA	±6.2 V	10 mA	402 mA	±900 µF	83%	RDD0824D05
	±12 V	±335 mA	±15 V	10 mA	395 mA	±220 µF	85%	RDD0824D12
	±15 V	±265 mA	±18 V	10 mA	386 mA	±100 µF	86%	RDD0824D15
42-176 V	3V3	2400 mA	3.9 V	10 mA	89 mA	1330 µF	81%	RDD08110S3V3
	5 V	1600 mA	6.2 V	10 mA	87 mA	1330 µF	84%	RDD08110S05
	12 V	665 mA	15 V	5 mA	87 mA	330 µF	84%	RDD08110S12
	15 V	535 mA	18 V	5 mA	88 mA	220 µF	83%	RDD08110S15
	±5 V	±800 mA	±6.2 V	5 mA	91 mA	±900 µF	80%	RDD08110D05
	±12 V	±335 mA	±15 V	5 mA	90 mA	±220 µF	82%	RDD08110D12
	±15 V	±265 mA	±18 V	5 mA	88 mA	±100 µF	83%	RDD08110D15

### Notes

1. Input currents measured at nominal input voltage.
2. Typical value at full load and nominal input

### Mechanical Details



### Pin Connections

Pin	Single	Dual
1	Remote On/Off	Remote On/Off
2	-Vin	-Vin
3	-Vin	-Vin
9	No Pin	Common
11	N.C.	-Vout
14	+Vout	+Vout
16	-Vout	Common
22	+Vin	+Vin
23	+Vin	+Vin

### Notes

1. All dimensions are in inches (mm)
2. Weight: 0.039 lbs (18 g) approx.
3. Pin diameter: 0.02±0.002 (0.5±0.05)
4. Pin pitch tolerance: ±0.014 (±0.35)
5. Case tolerance: ±0.02 (±0.5)

### Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Input Voltage Range	13		70	VDC	24 V nominal
	42		176	VDC	110 V nominal
Input Filter	Pi type				
Input Reflected Ripple Current		20		mA pk-pk	Through 12 $\mu$ H inductor and 33 $\mu$ F capacitor
Input Surge			100	VDC for 1000 ms	24 V models
			185	VDC for 1000 ms	110 V models

### Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Output Voltage	3.3		15	VDC	See Models and Ratings table
Initial Set Accuracy			$\pm 1$	%	At 70% load
Minimum Load	0			%	Minimum load required to meet specification. Operation at no load will not cause damage.
Line Regulation			$\pm 0.5$	%	
Load Regulation			$\pm 0.5$	%	From 0% to full load
Cross Regulation			$\pm 5$	%	On dual output models, when one output is at 25% load and other is varied from no load to full load
Ripple & Noise			75	mV pk-pk	20 MHz bandwidth. Measured using 0.1 $\mu$ F ceramic capacitor
Short Circuit Protection					Continuous hiccup mode, with auto recovery
Maximum Capacitive Load					See Models and Ratings table
Temperature Coefficient			0.02	%/°C	
Overload Protection		160		%	Of nominal output current
Overvoltage Protection					See Models and Ratings table
Remote On/Off	Output turns off if remote on/off (pin 1) is shorted to -Vin (pin 2,3) Output is on if remote on/off (pin 1) is open or >3 V				
Start Up Time		30	40	ms	Nominal Vin and constant resistive load

### General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency	80		86	%	See Models and Ratings table
Isolation: Input to Output	3000			VDC	
Switching Frequency		330/220		kHz	24 V / 110 V models
Isolation Resistance	10 <sup>9</sup>			$\Omega$	
Isolation Capacitance		1000		pF	
Power Density			14	Win <sup>3</sup>	
Mean Time Between Failure	800			kHrs	MIL-HDBK-217F, +25 °C GB
Weight		0.039 (18)		lb (g)	

### Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Operating Temperature	-40		+85	°C	Derate from 100% load at +70 °C to 50% at +85 °C
Storage Temperature	-55		+125	°C	
Case Temperature			+105	°C	
Humidity			95	%RH	Non-condensing
Cooling					Natural convection

### Safety Approvals

Safety Agency	Safety Standard	
EN	EN50155	Railway Applications

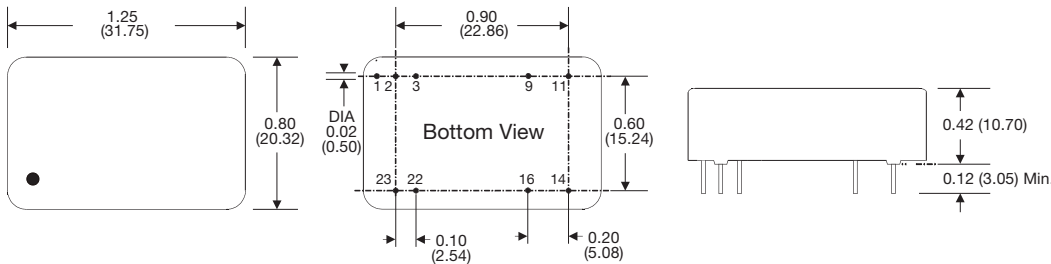
### EMC: Emissions

Phenomenon	Standard	Test Level	Notes & Conditions
Conducted	EN50121-3-2	0.15-0.50 MHz, 99 dB $\mu$ V 0.50-30.0 MHz, 93 dB $\mu$ V	RDD0824 models also meet EN55022 Class A. See application note to meet EN55022 Class A for RDD08110 models.
Radiated		30.0-230.0 MHz, 40 dB $\mu$ V 230.0-1000.0 MHz, 47 dB $\mu$ V	

### EMC: Immunity

Phenomenon	Standard	Test Level	Criteria	Notes & Conditions
ESD Immunity	EN50121-3-2	Air $\pm$ 8 kV, Contact $\pm$ 6 kV	A	
Radiated Immunity	EN50121-3-2	20 Vrms/m	A	
EFT/Burst	EN50121-3-2	2 kV	A	External input capacitor required, see application note
Surges	EN50121-3-2	2 kV	A	External input capacitor required, see application note
Conducted Immunity	EN50121-3-2	10 V	A	
Magnetic Fields	EN61000-4-8	10 A/m	A	

### Mechanical Details



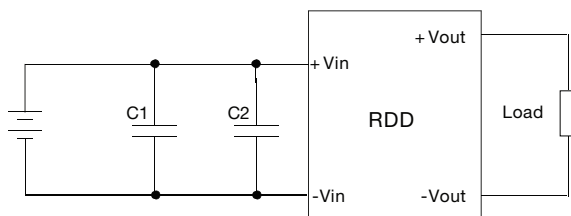
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#### Notes

- All dimensions are in inches (mm)
- Weight: 0.039 lbs (18 g) approx.
- Pin diameter:  $0.02 \pm 0.002$  ( $0.5 \pm 0.05$ )
- Pin pitch tolerance:  $\pm 0.014$  ( $\pm 0.35$ )
- Case tolerance:  $\pm 0.02$  ( $\pm 0.5$ )

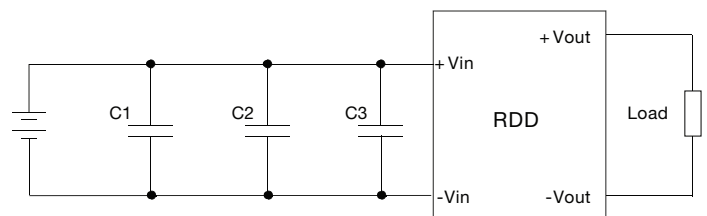
### Application Note

#### External Filter for Surge and EFT



For RDD0824 models, C1 = 330  $\mu$ F, 100 V and C2 not fitted  
For RDD08110 models, C1 and C2 = 100  $\mu$ F, 250 V

#### EMI Filter for RDD08110 models



C1, C2, & C3 are 1  $\mu$ F, 250 V multilayer ceramic Chip Capacitor, placed as close as possible to the input pins