

RV9-S/D15W

15W Regulated Single & Dual Output DC/DC Converter



Picture similar



- 1.6" x 1" Package
- Wide 4:1 Input Range
- 3000VDC Isolation
- No Minimum Load Required
- Efficiency up to 90%
- Operating Temperature Range -40°C ~ +100°C max.
- Adjustable Output Voltage
- Over Current Protection, Over and Under Voltage Protection
- EMI filter meets EN55032 class A without external components
- Soft Start
- Remote On/Off Control

Output Specifications	
Voltage Accuracy	±1%, max.
Output Voltage Adjustability (Trim)	Single Output: ±10% max.
Maximum Output Current	See table
Line Regulation	±0.5% max.
Load Regulation	Single: ±0.5% max. Dual: ±1%, max. (balanced load)
Cross Regulation (Dual Output)	±5%
Over Voltage Protection	140% of Vout typ.
Over Current Protection	170% of FL typ.
Short Circuit Protection	Indefinite (hiccup) (Automatic Recovery)
Ripple & Noise (20 MHz bandwidth)	75mV/60mV pk-pk max. (Single/Dual)
Temperature Coefficient	±0.02%/°C
Transient Recovery Time	250µs typ.
Transient Response Deviation	±3 ~ 5% max.

Input Specifications	
Voltage Range	See table
Start-up Time	30ms typ.
No-Load/Full-Load Input Current	See table
Input Filter	C/L (see filter details on following pages)
Input Reflected Ripple Current	20mA pk-pk typ.
Remote ON	3.0 ~ 12VDC or open circuit
Remote OFF	0 ~ 1.2VDC or short circuit pin 2 and 3
OFF Idle Current	2mA typ.
Surge Voltage (100 ms) ¹⁾	
24V Models	50VDC max.
48V Models	100VDC max.

General Specifications	
I/O Isolation Voltage (60 sec)	3000VDC
Isolation Voltage Case/Input&Output	1600VDC
I/O Isolation Capacitance	2000pF typ.
I/O Isolation Resistance	1000M Ohm, min.
Switching Frequency	270kHz, 330kHz typ.
Humidity	95% rel H
Reliability Calculated MTBF	>600khrs (MIL-HDBK-217 f)
Safety Standard(s)	UL62368-1 approval

Environmental Specifications	
Operating Temperature Range	-40°C ~ +100°C (see Derating Curve)
Maximum Case Temperature	105°C
Storage Temperature	-55°C ~ +125°C
Cooling	Natural Convection (optional Heat-sink)
Soldering Profile and Peak Temperature	Wave Flow: 260°C (1.5 mm from case), 10s, max.

Physical Specifications	
Case Material	Copper Black Base Material: Non-conductive Black Plastic (UL94V-0 rated)
Pin Material	1.0mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	29.0g
Case Dimensions	1.60" x 1.00" x 0.41"

EMC Specifications	
Radiated / Conducted Emissions	EN55032 Class A see EMI Filter
ESD	IEC 61000-4-2 Perf. Criteria B
Rad. RF	IEC 61000-4-3 Perf. Criteria A
EFT	IEC 61000-4-4 Perf. Criteria A
Surge	IEC 61000-4-5 Perf. Criteria A
Cond. RF	IEC 61000-4-6 Perf. Criteria A
PFMF	IEC 61000-4-8 Perf. Criteria A
VD/SI/VV	-

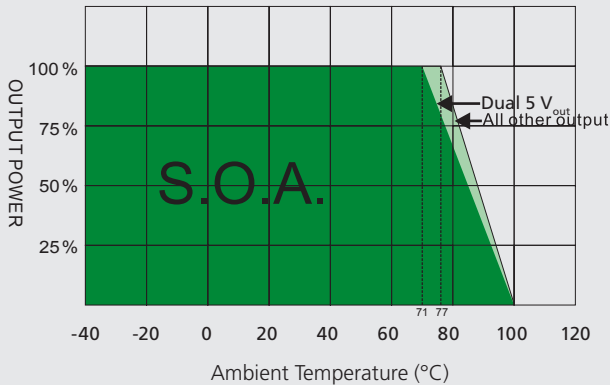
¹⁾ These are stress ratings; exposure of devices to any of these conditions may adversely affect long-term reliability. All specifications typical at T_A = 25 °C, nominal input voltage and full load, unless otherwise specified.

The information and specification contained in this data sheet are believed to be correct at time of publication. However, Acal BFi accepts no responsibility for consequences arising from printing errors or inaccuracies. [Specifications are subject to change without notice.](#)

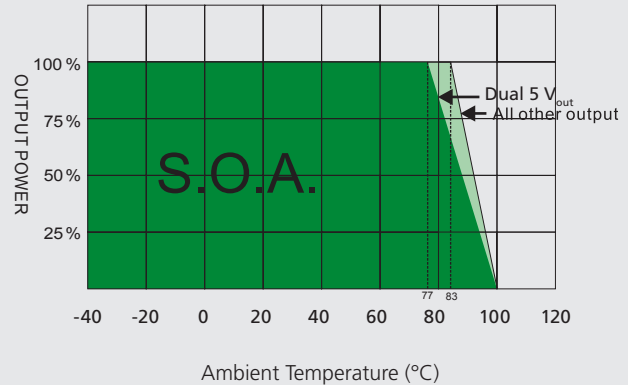
Number structure RV9

RV9	-	24	05	S	15	A	3	(W)
Name/package	V-input nom.	V-output	Output type	Power	Int. Code	Isolation	Wide-Input	
RV9 = 1.6" x 1"	24 = 9V~36V 48 = 18V~75V	03 = 3.3V 05 = 5V 12 = 15V 15 = 15V	S = Single D = Dual	15 = 15W 20 = 20W	Logistics Code	3 = 3kVDC	_ = 2:1 W = 4:1	

Derating Curve
(without heat sink)



Derating Curve
(with heat sink)



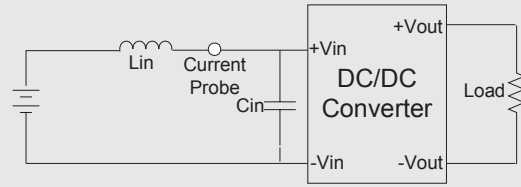
Model Selection Guide

Model Number	Input Voltage Range (V DC)	Input Current		Output Voltage (V DC)	Output Current		Efficiency @ Full Load (%, typ.)	Capacitor Load @ Full Load (μF, max.)
		No-Load (mA, max.)	Full Load (mA, typ.)		Min. Load (mA)	Full Load (mA)		
RV9-2403S15A3W	9~36	10	509.25	3.3	0	3000	82	3300
RV9-2405S15A3W	9~36	10	748.5	5	0	3000	85	3300
RV9-2412S15A3W	9~36	10	735.3	12	0	1250	88	680
RV9-2415S15A3W	9~36	10	718.4	15	0	1000	89	470
RV9-4803S15A3W	18~75	10	254.63	3.3	0	3000	82	3300
RV9-4805S15A3W	18~75	10	376.51	5	0	3000	85	3300
RV9-4812S15A3W	18~75	10	367.64	12	0	1250	87	680
RV9-4815S15A3W	18~75	10	363.37	15	0	1000	88	470
RV9-2405D15A3W	9~36	10	753.01	±5	0	±1500	85	±2200
RV9-2412D15A3W	9~36	10	722.54	±12	0	±625	88	±470
RV9-2415D15A3W	9~36	15	714.86	±15	0	±500	89	±330
RV9-4805D15A3W	18~75	8	372.02	±5	0	±1500	88	±2200
RV9-4812D15A3W	18~75	8	359.19	±12	0	±625	90	±470
RV9-4815D15A3W	18~75	10	363.37	±15	0	±500	88	±330

Test Configurations

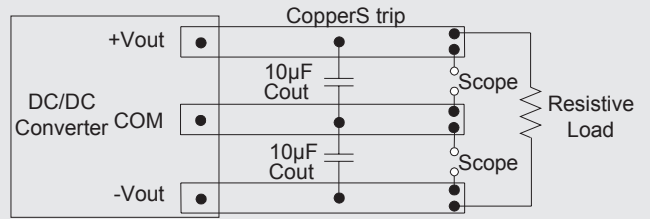
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor L_{in} (12 μ H) and a source capacitor C_{in} (47 μ F, ESR < 1.0 Ω at 100KHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

To reduce ripple and noise, it is recommended to use a 10 μ F ceramic disk capacitor to at the output.



Design & Feature Configurations

Over Voltage Protection

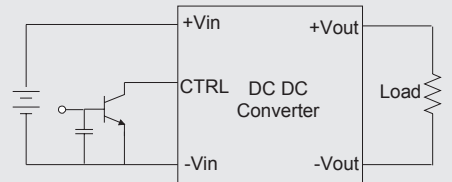
The module includes an internal output over voltage protection circuit, which monitors the voltage on the output terminals. If this voltage exceeds the over voltage set point, the module will activate the control loop of internal circuit to clamp the output voltage.

Over Current Protection

The module includes an internal over current protection circuit, which will endure current limiting for an unlimited duration during output over load condition. If the output current exceeds the OCP set point, the module will shut down automatically (hiccup). The module will try to restart after shut down. If the over load condition still exists, the module will shut down again.

CTRL Module ON / OFF

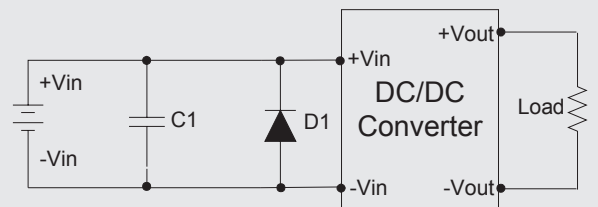
Positive logic turns on the module during high logic and off during low logic. Ctrl module on/off can be controlled by an external switch between the ctrl terminal and -Vin terminal. The switch can be an open collector or open drain. For positive logic if the ctrl feature is not used, please leave the ctrl pin floating.



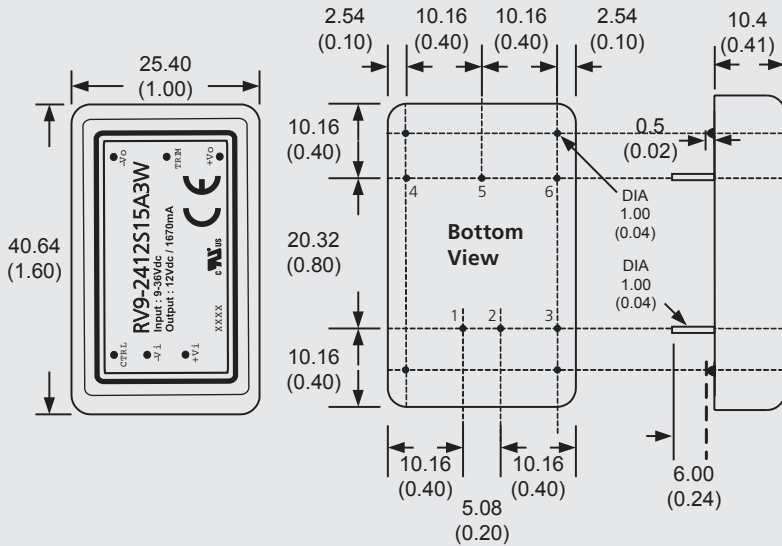
EFT/Surge Filter

Input filter components (C1, D1) are used to help meet EN61000-4-4 and EN61000-4-5.

	C1	D1
RV9-24xxxx	330 μ F, 100 V	TVS, 58V, 3kW
RV9-48xxxx	330 μ F, 100 V	TVS, 120V, 3kW



Mechanical Specifications



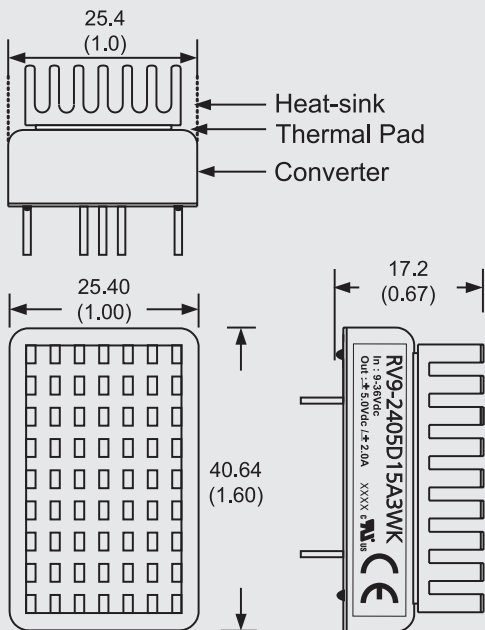
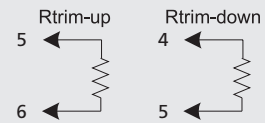
Pin Connections		
Pin Number	Single	Dual
1	+V Input	+V Input
2	-V Input	-V Input
3	CTRL	CTRL
4	+V Output	+V Output
5	Trim	Com
6	-V Output	-V Output

Notes: All dimensions are typical in millimeters (inches).

1. Pin diameter: 0.5 ± 0.05 (0.02 \pm 0.002)
 2. Pin pitch and length tolerance: ± 0.35 (± 0.014)
 3. Case Tolerance: ± 0.5 (± 0.02)
 4. Stand-off Tolerance: ± 0.1 (± 0.004)
- (The Pin Connection of high isolation one is the same with normal one.)

External Output Trimming

Output can be externally trimmed by using the method as below. (single output models only).



Order code: RV9-XXXXK(contain: heat-sink, thermal pad)
 Material: Aluminum
 Finish: Anodic treatment (black)
 Weight: 6.5 g (0.23oz) (without converter)

Note: Converters will be supplied with heat-sinks already mounted.

Notes

1. For cross regulation one load is 25% to 100% load, the other load is 100% load, the output voltage variable rate is within $\pm 5\%$.
2. Capacitive load tested by minimal V_{in} and constant resistive load.
3. Transient recovery & response tested by normal V_{in} and 25% load step change (75%-50%-25% of I_o).
4. Measured Input reflected ripple current with a simulated source inductance of 12H and a source capacitor C_{in} (47 μ F, ESR<1.0 Ω at 100kHz).
5. The remote on/off control pin is referenced to -Vin (pin 2).
6. Natural convection is usually about 30-65 LFM but is not equal to still air (0 LFM).
7. An external filter is required if the module has to meet IEC61000-4-4, IEC61000-4-5.
 RV9-24XXXX15 recommends an aluminum electrolytic capacitor (Nippon chemi-con KY series, 330 μ F/100V) and a TVS (SMDJ58A, 58V, 3000W peak pulse power) to be connected in parallel.
 RV9-48XXXX15 recommends an aluminum electrolytic capacitor (Nippon chemi-con KY series, 330 μ F/100V) and a TVS (SMDJ120A, 120V, 3000W peak pulse power) to be connected in parallel.
 Refer to the EFT/Surge Filter of design & feature configuration.