RRA-S/D08

8W Regulated Single & Dual Output DC/DC Converter

Picture similar

RoHS

- **24 Pin DIL Package**
- **Ultra-wide Railway Input Range**
- **3000VDC Isolation**
- **EN50155 approval for railway applications**
- **Efficiency up to 86%**
- **Operating Temperature Range -40°C ~ +85°C**
- **Continuous Short Circuit Protection**
- **Over Current Protection, Over and Under Voltage Protection**
- **Metal Case**
- **Remote On/Off Control**

Output Specifications	
Voltage Accuracy	±1%, max.
Output Voltage Adjustability (Trim)	–
Maximum Output Current	See table
Line Regulation	Single & Dual ±0.5% max.
Load Regulation	from 0% to 100% Load: ±0.5% max. –
Cross Regulation (Dual Output)	±5%
Over Voltage Protection	118 ~ 125% of Vout typ.
Over Current Protection	160% of Iout typ.
Short Circuit Protection	Indefinite (Automatic Recovery)
Ripple & Noise (20 MHz bandwidth)	75mV pk-pk max.
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 1 and 2/3
OFF Idle Current	5mA typ.
Surge Voltage (100 ms) †)	
24V Models 110V Models	100VDC max. 185VDC max.

General Specifications	
I/O Isolation Voltage (60 sec)	3000VDC
Isolation Voltage Case/Input&Output	1000VDC
I/O Isolation Capacitance	1000pF typ.
I/O Isolation Resistance	1000M Ohm, min.
Switching Frequency	330kHz (24V), 220kHz (110V) typ.
Humidity	95% rel H
Reliability Calculated MTBF	>800KHrs (MIL-HDBK-217 f)
Safety Standard(s)	EN50155 approval, IEC/EN62368-1 (meet)

Environmental Specifications	
Operating Temperature Range	-40°C ~ +85°C (see Derating Curve)
Maximum Case Temperature	105°C
Storage Temperature	-55°C ~ +125°C
Cooling	Natural Convection
Soldering Profile and Peak Temperature	Wave Flow: 260°C (1.5 mm from case), 10s, max.

Physical Specifications	
Case Material	Nickel-coated Copper Base Material: Non-conductive Black Plastic (UL94V-0 rated)
Pin Material	0.5mm Brass Solder-coated
Potting Material	Epoxy (UL94V-0 rated)
Weight	18.0g
Case Dimensions	1.25" x 0.80" x 0.40"

EMC Specifications	
Radiated / Conducted Emissions	EN50121-3-2 see note EMI Filter
ESD	EN50121-3-2 Air ±8KV Perf.Criteria A
Rad. RF	EN50121-3-2 20V/m Perf.Criteria A
EFT	EN50121-3-2 2.0KV Perf.Criteria A
Surge	EN50121-3-2 2.0KV Perf.Criteria A
Cond. RF	EN50121-3-2 10V Perf.Criteria A
PFMF	IEC 61000-4-8 10A/m Perf.Criteria A
VD/SI/VV	–

†) 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.

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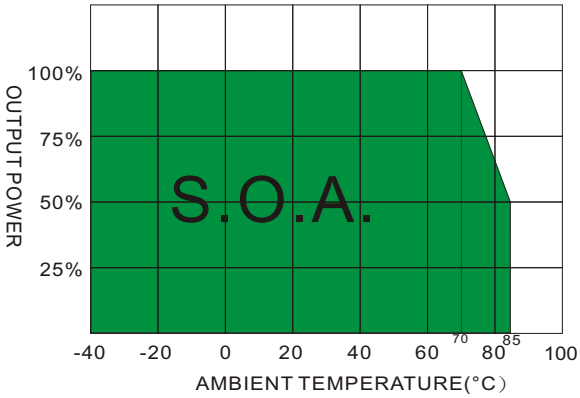
RRA-S/D08

NUMBER STRUCTURE

RRA - XX XX S/D XX A X

- **Name/Package**: RRA=DIL24
- **Input**: 24=13-70V, 110=42-176 V
- **Output**: 03=3.3V, 05=5.0V, 12=12V, 15=15V
- **Type**: S= Single-Outp., D= Dual-Outp.
- **Power (W)**: 08=8.00
- **Code**: internal
- **Isolation (kVDC)**: 3= 3.0

Derating Curve



MODEL SELECTION GUIDE

MODEL NUMBER	INPUT Voltage Range (Vdc)	INPUT Current No-Load (mA)	INPUT Current Full Load (mA)	OUTPUT Voltage (Vdc)	OUTPUT Current Min. load (mA)	OUTPUT Current Full load (mA)	EFFICIENCY @FL(%)	Capacitor Load(uF)
RRA-2403S08A3	13.0 ~ 70.0VDC or 24.0VDC	30	397.59	3.3	0	2400	83	1330
RRA-2405S08A3	13.0 ~ 70.0VDC or 24.0VDC	20	387.60	5	0	1600	86	1330
RRA-2412S08A3	13.0 ~ 70.0VDC or 24.0VDC	10	391.18	12	0	665	85	330
RRA-2415S08A3	13.0 ~ 70.0VDC or 24.0VDC	10	388.18	15	0	535	86	220
RRA-2405D08A3	13.0 ~ 70.0VDC or 24.0VDC	10	401.61	±5	0	±800	83	±900
RRA-2412D08A3	13.0 ~ 70.0VDC or 24.0VDC	10	394.12	±12	0	±335	85	±220
RRA-2415D08A3	13.0 ~ 70.0VDC or 24.0VDC	10	385.17	±15	0	±265	86	±100
RRA-11003S08A3	42.0 ~ 176.0VDC or 110.0VDC	10	88.89	3.3	0	2400	81	1330
RRA-11005S08A3	42.0 ~ 176.0VDC or 110.0VDC	10	86.58	5	0	1600	84	1330
RRA-11012S08A3	42.0 ~ 176.0VDC or 110.0VDC	5	86.36	12	0	665	84	330
RRA-11015S08A3	42.0 ~ 176.0VDC or 110.0VDC	5	87.90	15	0	535	83	220
RRA-11005D08A3	42.0 ~ 176.0VDC or 110.0VDC	5	90.91	±5	0	±800	80	±900
RRA-11012D08A3	42.0 ~ 176.0VDC or 110.0VDC	5	89.14	±12	0	±335	82	±220
RRA-11015D08A3	42.0 ~ 176.0VDC or 110.0VDC	5	87.08	±15	0	±265	83	±100

1. Cross regulation: one load is 25% to 100%, the other load is 100%, the output voltage variable rate is within ±5%.
2. Ripple/Noise is measured with a 0.1uF ceramic capacitor and 10uF electrolytic capacitor.
3. Capacitive load is tested at nominal input voltage and constant resistor load.
4. Transient recovery and response are tested at normal Vin and 25% load step change (75%-50%-25% of Io) at 1A/μs.
5. Measured Input reflected ripple current with a simulated source inductance of 12μH and a source capacitor Cin (33μF, ESR<1.0Ω at 100kHz).
6. The remote on/off control pin is referenced to -Vin (pin2, pin3).
7. Exceeding the absolute ratings of the unit could cause damage. It is not allowed for continuous operating.
8. "Natural Convection" is usually about 30-65 LFM but is not equal to still air (0 LFM).
9. Input filter components are used to help meet conducted emissions 79dBμV from 0.15-0.5MHz and 73dBμV from 0.5-30MHz requirement for the module. Refer to the EMI Filter of design & feature configuration.
10. An external filter capacitor is required if the module has to meet EFT and Surge in EN50121-3-2. The suggested filter capacitor:
    RRA-24XXX: one electrolytic capacitor (Nippon-chemi-con KY series, 330μF/100V)
    RRA-110XXX: two electrolytic capacitors (Ruby-con BXF series, 100μF/250V) in parallel

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DESIGN & FEATURE CONFIGURATIONS

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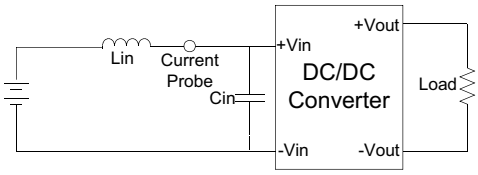
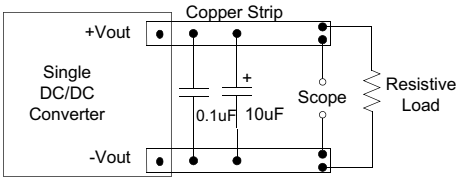
Input Reflected Ripple Current Test Step

Input reflected ripple current is measured through a source inductor Lin(12uH) and a source capacitor Cin(33uF, ESR<1.0Ω at 100KHz) at nominal input and full load.



Output Ripple & Noise Measurement Test

Use a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor measurement.
The Scope measurement bandwidth is 0-20MHz.

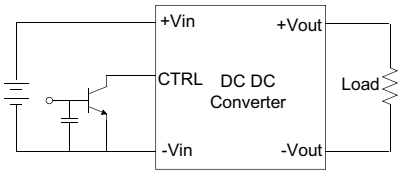


CTRL Module ON / OFF

Positive logic turns on the module during high logic and off during low logic.

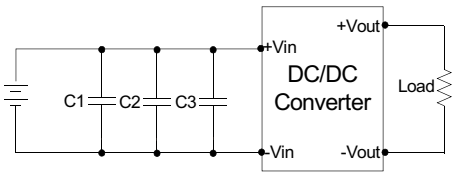
Ctrl module on/off can be controlled by an external switch between the ctrl terminal and -Vin terminal.
The switch can be an open collector or open drain

For positive logic if the ctrl feature is not used, please leave the ctrl pin floating.



EMI Filter

Input filter components (C1,C2,C3) are used to help meet conducted emissions 79dBuV from 0.15-0.5MHZ and 73dBuV from 0.5-30MHZ requirement for the module. These components should be mounted as close as possible to the module; and all leads should be minimized to decrease radiated noise.



	C1、C2、C3
RRA-24XXXX	None
RRA-110XXX	MLCC,1uF, 250V

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.

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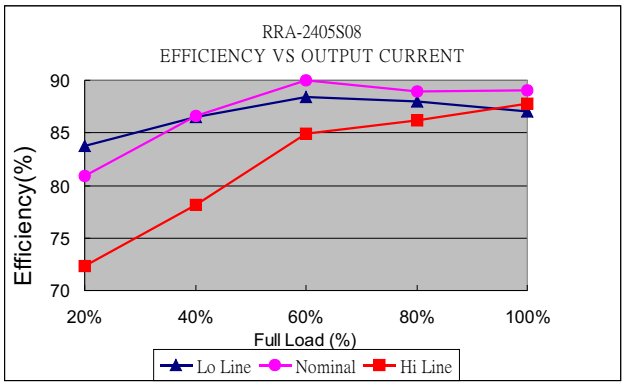
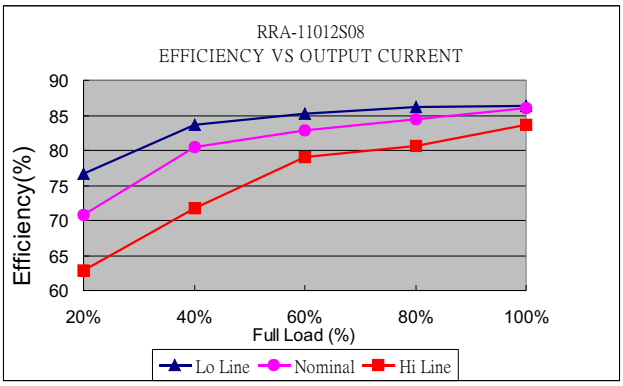
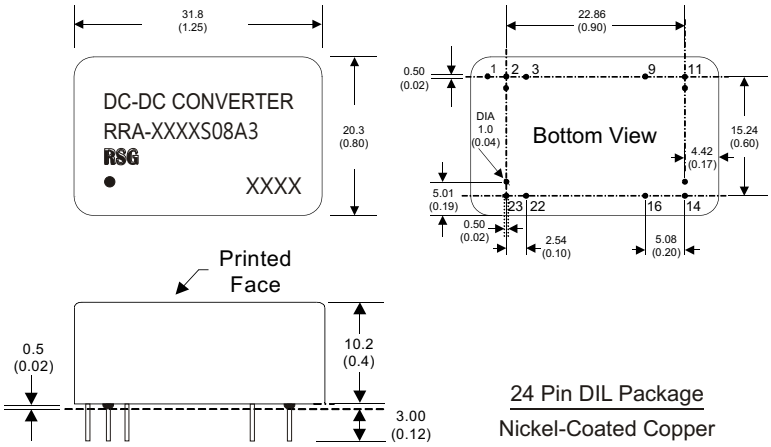
Typical Operating Conditions

ELECTRICAL CHARACTERISTICS CURVES





MECHANICAL SPECIFICATIONS



24 Pin DIL Package
Nickel-Coated Copper

All dimensions are typical in millimeters (inches).
1. Pin diameter: 0.5 ±0.05 (0.02 ±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)

PIN CONNECTIONS

PIN NUMBER	SINGLE	DUAL
1	CTRL	CTRL
2	−V Input	−V Input
3	−V Input	−V Input
9	N.P.	Common
11	N.C.	−V Output
14	+V Output	+V Output
16	−V Output	Common
22	+V Input	+V Input
23	+V Input	+V Input

The models listed above are standard types. If you need special specifications or have questions regarding packing (Tube or Tape&Reel) or need application support, please contact our specialists: sales@rsg-electronic.de or +49 69-984047-0

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