

Features

Unregulated Converters

- Fully RoHS 6/6 Conform
- Full Power at 100°C Ambient Temperature
- 1kVDC and 3kVDC Isolation Options
- /H Version Certified for Medical Applications
- UL/EN/CSA Certified, CB Report
- Suitable for Fully Automated Assembly (including Vapour Phase Soldering)
- Optional Continuous Short Circuit Protection
- Efficiency to 85%
- Built-In EN55022 Class A Filter

Description

The R2S and R2D converters are of the enclosed open frame type, meaning that they are un-potted. The converters are typically used in general purpose and industrial low power isolation and voltage matching applications where an SMD converter is required. The converter series feature an extended ambient temperature operating range of -40°C to +100°C without derating and optional continuous short circuit protection. In addition to two isolation options and three different case formats, the converters are also available prepacked as tape and reel for use with automatic insertion machines.

Selection Guide

| Part Number | SMD | (3kV) | Input Voltage (VDC) | Output Voltage (VDC) | Output Current (mA) | Efficiency (%) | Max Capacitive Load ⁽¹⁾ |
|-------------|-----|-------|---------------------|----------------------|---------------------|----------------|------------------------------------|
| R2S**-xx3.3 | (H) | | 5, 12, 15, 24 | 3.3 | 606 | 70-75 | 3300µF |
| R2S**-xx05 | (H) | | 5, 12, 15, 24 | 5 | 400 | 76-84 | 1200µF |
| R2S**-xx09 | (H) | | 5, 12, 15, 24 | 9 | 222 | 76-84 | 1200µF |
| R2S**-xx12 | (H) | | 5, 12, 15, 24 | 12 | 167 | 76-85 | 680µF |
| R2S**-xx15 | (H) | | 5, 12, 15, 24 | 15 | 133 | 76-85 | 680µF |
| R2S**-xx24 | (H) | | 5, 12, 15, 24 | 24 | 83 | 76-85 | 220µF |
| R2D**-xx05 | (H) | | 5, 12, 15, 24 | ±5 | ±200 | 75-80 | ±470µF |
| R2D**-xx09 | (H) | | 5, 12, 15, 24 | ±9 | ±111 | 75-80 | ±470µF |
| R2D**-xx12 | (H) | | 5, 12, 15, 24 | ±12 | ±83 | 75-83 | ±330µF |
| R2D**-xx15 | (H) | | 5, 12, 15, 24 | ±15 | ±66 | 75-85 | ±330µF |
| R2D**-xx24 | (H) | | 5, 12, 15, 24 | ±24 | ±42 | 75-85 | ±330µF |

xx = Input Voltage. Other input and output voltage combinations available on request.

* add Suffix "P" for Continuous Short Circuit Protection, e.g. R2S-0505/P, R2D-0505/HP

* add suffix -R for tape&reel packing e.g. R2S-0505-R. For more details see Tapes Section.

Case and Pinning Options (note restrictions on /H option)

- R2S** : ** without marking denotes 5 pins out of 8 fitted (/H option available)
 ** with marking **8** denotes 8 pins out of 8 fitted (/H option not available)
 ** with marking **12** denotes 10 pins out of 12 fitted (/H option available)
- R2D** : ** without marking denotes 6 pins out of 10 fitted (/H option available)
 ** with marking **10** denotes with 10 pins out of 10 fitted (/H option not available)
 ** with marking **12** denotes with 10 pins out of 12 fitted (/H option available)

Specifications (measured at T_A = 25°C, nominal input voltage, full load and after warm-up)

| | | |
|---|--------------------------------|---|
| Input Voltage Range | | ±10% |
| Output Voltage Accuracy | | ±5% |
| Line Voltage Regulation | | 1.2%/1% of Vin max. |
| Load Voltage Regulation | 3.3V output types | 20% max. |
| (10% to 100% full load) | 5V output type | 15% max. |
| | 9V, 12V, 15V, 24V output types | 10% max. |
| Output Ripple and Noise (20MHz limited) | | 150mVp-p max. |
| Operating Frequency | | 20kHz min. / 40kHz typ. / 85kHz max. |
| Efficiency at Full Load | | 70% min. / 80% typ. |
| Minimum Load = 0% | | Specifications valid for 10% minimum load only. |

continued on next page

ECONOLINE

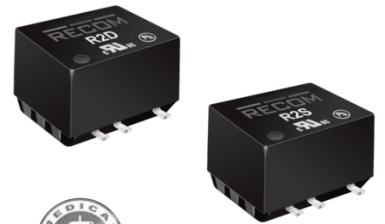
DC/DC-Converter

with 3 year Warranty

RECOM

2 Watt

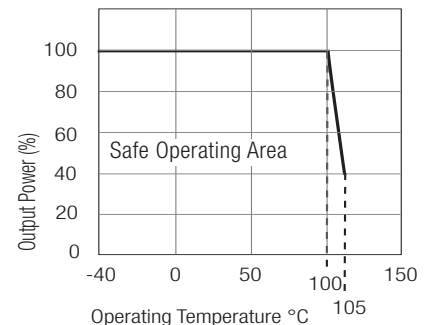
SMD Single & Dual Output



UL-60950-1 Certified
EN-60950-1 Certified
EN-60601-1 Certified*
 (* /H suffix)

R2S-R2D

Derating-Graph (Ambient Temperature)



***Any data referred to in this datasheet are of indicative nature and based on our practical experience only. For further details, please refer to our Application Notes.

Refer to Application Notes

Specifications - Continued

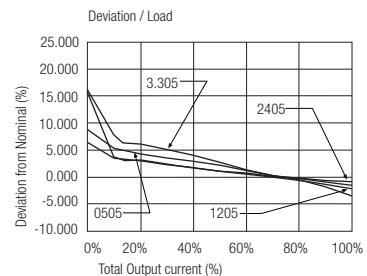
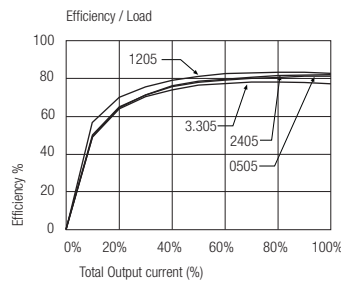
| | | |
|---|--|--|
| Isolation Voltage | (tested for 1 second) (rated for 1 minute***) | 1000VDC 500VAC / 60Hz |
| Isolation Voltage | (tested for 1 second) (rated for 1 minute***) | 3000VDC 1500VAC / 60Hz |
| Isolation Capacitance | | 115pF max. |
| Isolation Resistance | (Viso 500V) | 10 GΩ min. |
| Short Circuit Protection | | 1 Second |
| P-Suffix | | Continuous |
| Operating Temperature Range (free air convection) | | -40°C to +100°C (see Graph) |
| Storage Temperature Range | | -55°C to +125°C |
| Reflow Temperature | ROHS compliant | 245°C (30 sec), peak 255°C (5 sec) max. |
| Vapour Phase Process | (for more details see Application Notes) | 230°C (90 sec) max. |
| Relative Humidity | | 95% RH |
| Package Weight | R2S, R2S8 R2D, R2D10 R2S12, R2D12 | 1.4g 1.5g 1.6g |
| Packing Quantity | R2S, R2S8 R2S12, R2D, R2D10, R2D12 All Types | 39 pcs per Tube 33 pcs per tube 250 pcs per Reel |
| MTBF (+25°C) (+85°C) | <i>Detailed Information see Application Notes chapter "MTBF"</i> using MIL-HDBK 217F using MIL-HDBK 217F | 886 x 10 ³ hours 128 x 10 ³ hours |
| Certifications | | |
| CB Test Report | Report: US/14402/UL | |
| UL General Safety | Report: E308085 | UL 60950-1 2nd Ed. |
| CUL General Safety | | C22.2 No. 60950-1-03 |
| EN Medical Safety | Report: MDD1205098-2 + RM1205098-2 Medical Report + ISO14971 Risk Assessment | IEC/EN 60601-1 3rd Ed. |
| EN General Safety | Report: SPCLVD 1211033-3 | EN60950-1: 2006 + A12:2011 |
| Conducted / Radiated Emissions | EN55022 | Level A |

Notes

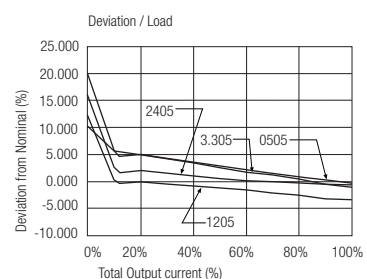
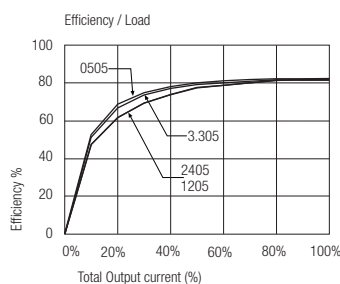
Note 1 Maximum capacitive load is defined as the capacitive load that will allow start up in under 1 second without damage to the converter.

Typical Characteristics

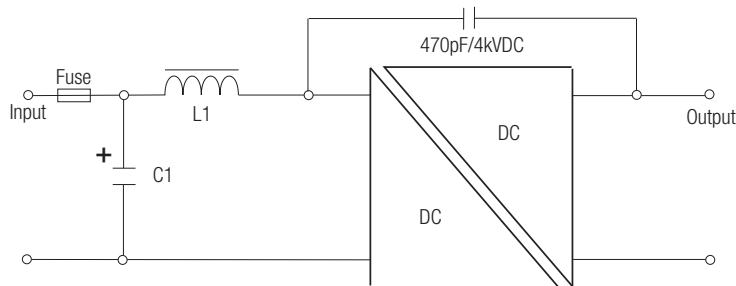
R2S-xx05



R2D-xx05

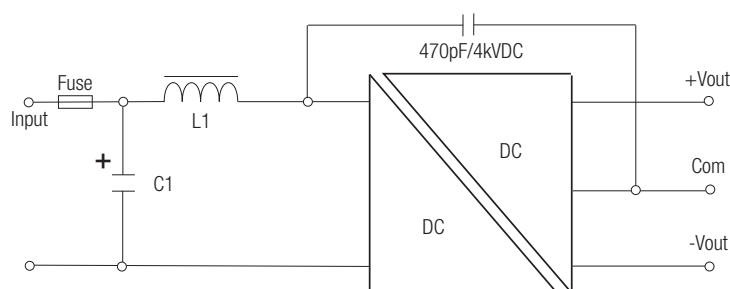


EMC Filtering - Suggestion for EN55022 Class B (Conducted and Emitted)



Standard and /H versions

| C1 | L1 | Vin |
|-------|-------|-----|
| 2.2µF | 4.7µH | 5V |
| 2.2µF | 10µH | 12V |
| 2.2µF | 22µH | 15V |
| 4.7µF | 22µH | 24V |



/P and /HP versions

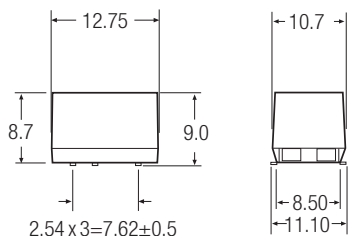
| C1 | L1 | Vin |
|-------|------|-----|
| 10µF | 10µH | 5V |
| 4.7µF | 22µH | 12V |
| 4.7µF | 22µH | 15V |
| 10µF | 47µH | 24V |

C1 = MLCC

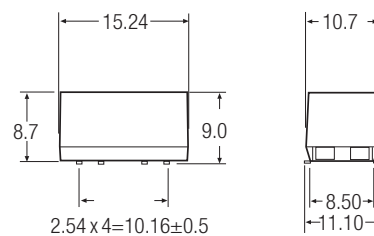
L1 = SMD Inductor

Package Style and Pinning (mm)

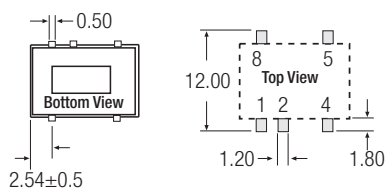
8 PIN Single SMD Package



10 PIN Dual SMD Package



Recommended Footprint Details

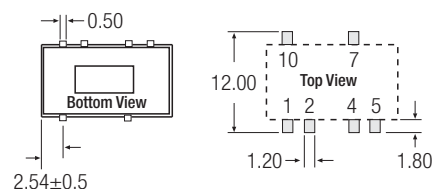


Pin Connections

| Pin # | Single | Dual |
|-------|--------|--------|
| 1 | -Vin | -Vin |
| 2 | +Vin | +Vin |
| 4 | -Vout | Com |
| 5 | +Vout | -Vout |
| 7 | No Pin | +Vout |
| 8 | NC | No Pin |
| 10 | No Pin | NC |

NC = No Connection
 XX.X ± 0.5 mm
 XX.XX ± 0.25 mm

Recommended Footprint Details



R2S** : ** without marking denotes 5 pins out of 8 fitted (includes /H option)
 ** with marking **8** denotes 8 pins out of 8 fitted (/H option not available)

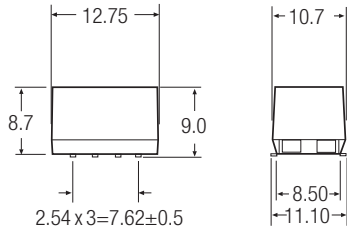
e.g. R2S-0505, R2S-0505/H, R2S-0505/HP
 e.g. R2S8-0505, R2S8-0505/P

R2D** : ** without marking denotes 6 pins out of 10 fitted (includes /H option)
 ** with marking **10** denotes with 10 pins out of 10 fitted (/H option not available)

e.g. R2D-0505, R2D-0505/H, R2D-0505/HP
 e.g. R2D10-0505, R2D10-0505/P

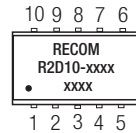
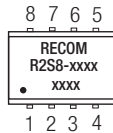
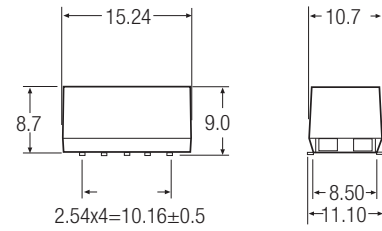
Package Style and Pinning (mm)

Full 8 PIN Single SMD Package

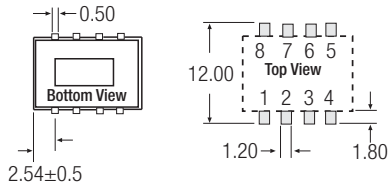


Note: /H option is not available in these pin packages

Full 10 PIN Dual SMD Package



Recommended Footprint Details



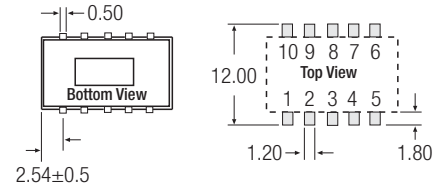
Pin Connections

| Pin # | Single | Dual |
|-------|--------|-------|
| 1 | -Vin | -Vin |
| 2 | +Vin | +Vin |
| 3 | NC | NC |
| 4 | -Vout | Com |
| 5 | +Vout | -Vout |
| 6 | NC | NC |
| 7 | NC | +Vout |
| 8 | NC | NC |
| 9 | - | NC |
| 10 | - | NC |

NC = No Connection

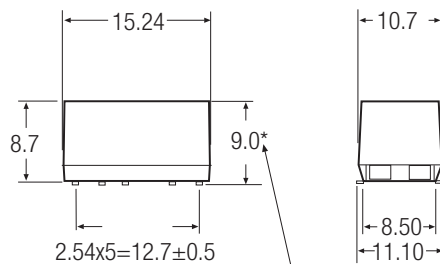
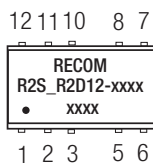
XX.X ± 0.5 mm
XX.XX ± 0.25 mm

Recommended Footprint Details

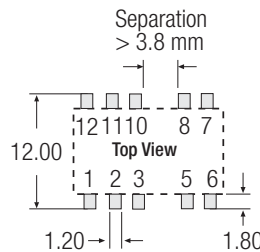
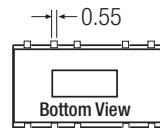


12 PIN Single and Dual SMD Package

Note: /H option is available in this pin package



*R2S12-05xx/HP = 9.4mm



Pin Connections

| Pin # | Single | Dual |
|-------|--------|-------|
| 1 | -Vin | -Vin |
| 2 | +Vin | +Vin |
| 3 | NC | NC |
| 5 | -Vout | Com |
| 6 | NC | -Vout |
| 7 | NC | NC |
| 8 | +Vout | +Vout |
| 10 | NC | NC |
| 11 | NC | NC |
| 12 | NC | NC |

NC = No Connection

XX.X ± 0.5 mm
XX.XX ± 0.25 mm

Recommended Footprint Details

R2S** : ** with marking 12 denotes 10 pins out of 12 fitted (includes /H option)
R2D** : ** with marking 12 denotes 10 pins out of 12 fitted (includes /H option)

e.g. R2S12-0505, R2S12-0505/H, R2S12-0505/HP
e.g. R2D12-0505, R2D12-0505/H, R2D12-0505/HP