

# Features

## Unregulated Converter

- 1 : 1 Input Range
- 0.5W SMD Package
- Efficiency up to 80%
- Approved for Medical Applications
- 1kVDC and 3 kVDC Isolation Option
- Operating Temperature from -40°C to +100°C

### Specifications (measured at $T_A = 25^\circ\text{C}$ , nominal input voltage, full load and after warm-up)

| Part Number SMD | Input Voltage (VDC) | Output Voltage (VDC) | Output Current (mA) | Efficiency typ. (%) | Max Capacitive Load <sup>(1)</sup> ** |
|-----------------|---------------------|----------------------|---------------------|---------------------|---------------------------------------|
| R0.5S**-3.305*  | 3.3                 | 5                    | 100                 | 80                  | 1000µF                                |
| R0.5S**-3.312*  | 3.3                 | 12                   | 42                  | 77                  | 150µF                                 |
| R0.5S**-3.315*  | 3.3                 | 15                   | 33                  | 77                  | 150µF                                 |
| R0.5S**-0505*   | 5                   | 5                    | 100                 | 72                  | 1000µF                                |
| R0.5S**-0512*   | 5                   | 12                   | 42                  | 77                  | 150µF                                 |
| R0.5S**-0515*   | 5                   | 15                   | 33                  | 79                  | 150µF                                 |
| R0.5S**-1205*   | 12                  | 5                    | 100                 | 74                  | 1000µF                                |
| R0.5S**-1212*   | 12                  | 12                   | 42                  | 75                  | 150µF                                 |
| R0.5S**-1215*   | 12                  | 15                   | 33                  | 75                  | 150µF                                 |
| R0.5S**-2405*   | 24                  | 5                    | 100                 | 75                  | 1000µF                                |
| R0.5S**-2412*   | 24                  | 12                   | 42                  | 77                  | 150µF                                 |
| R0.5S**-2415*   | 24                  | 15                   | 33                  | 77                  | 150µF                                 |
| R0.5D**-3.305*  | 3.3                 | ±5                   | ±50                 | 79                  | ±470µF                                |
| R0.5D**-3.312*  | 3.3                 | ±12                  | ±21                 | 76                  | ±68µF                                 |
| R0.5D**-3.315*  | 3.3                 | ±15                  | ±17                 | 77                  | ±68µF                                 |
| R0.5D**-0505*   | 5                   | ±5                   | ±50                 | 79                  | ±470µF                                |
| R0.5D**-0512*   | 5                   | ±12                  | ±21                 | 77                  | ±68µF                                 |
| R0.5D**-0515*   | 5                   | ±15                  | ±17                 | 79                  | ±68µF                                 |
| R0.5D**1205*    | 12                  | ±5                   | ±50                 | 76                  | ±470µF                                |
| R0.5D**1212*    | 12                  | ±12                  | ±21                 | 75                  | ±68µF                                 |
| R0.5D**1215*    | 12                  | ±15                  | ±17                 | 75                  | ±68µF                                 |
| R0.5D**2405*    | 24                  | ±5                   | ±50                 | 77                  | ±470µF                                |
| R0.5D**2412*    | 24                  | ±12                  | ±21                 | 75                  | ±68µF                                 |
| R0.5D**2415*    | 24                  | ±15                  | ±17                 | 75                  | ±68µF                                 |

\*add Suffix "/H" for 3kVDC Isolation Voltage

\*\*add Suffix "/P" for continuous short circuit protection

\*\*add Suffix "-R" for tape & reel packing

For more details and dimensions of the tapes and reels see Application Notes

R0.5S\*\*:

\*\*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)

\*\*with marking 12 denotes 10 pins out of 12 fitted (includes „/H“ option)

R0.5D\*\*:

\*\*without marking denotes 6 pins out of 10 fitted (includes „/H“ option)

\*\*with marking 10 denotes 10 pins out of 10 fitted („/H“ option not available)

\*\*with marking 12 denotes 10 pins out of 12 fitted (includes „/H“ option)

# ECONOLINE

DC/DC-Converter

with 3 year Warranty

# RECOM

## 0.5 Watt SMD Isolated Single or Dual Output



UL-60950-1 Certified

# RO.5S\_D

## Derating-Graph (Ambient Temperature)



Refer to Application Notes

### Specifications (measured at $T_A = 25^\circ\text{C}$ , nominal input voltage, full load and after warm-up)

|                             |          |                                      |  |
|-----------------------------|----------|--------------------------------------|--|
| Input Voltage Range         |          |                                      | $\pm 10\%$ max.  |
| Voltage Set Accuracy        |          | 100% Load/nominal Vin                | -1% typ. / $\pm 5\%$ max.  |
| Line Regulation             |          | Low Line to High Line @ max. Load    | 1.2% typ.  |
| Load Regulation             |          | 5V output                            | 6% typ. / 15% max.   |
| (10% to 100% Load)          |          | 12/15V output                        | 5%typ. / 10% max.  |
| Ripple & Noise @ 20MHz BW   |          |                                      | 50 mVp-p typ. / 100mVp-p max.                                    |
| Efficiency at Full Load     |          |                                      | 70% min.   |
| Operating Temperature       |          |                                      | -40°C to +100°C  |
| Storage Temperature         |          |                                      | -55°C to +125°C  |
| Isolation Voltage           |          | (tested for 1 second)                | 1000VDC  |
|                             |          | (rated for 1 minute <sup>***</sup> ) | 500VAC / 60Hz  |
| Isolation Voltage           | H-Suffix | (tested for 1 second)                | 3000VDC  |
|                             | H-Suffix | (rated for 1 minute <sup>***</sup> ) | 1500VAC / 60Hz   |
| Isolation Capacitance       |          |                                      | 75pF max.  |
| Isolation Resistance        |          | Viso = 500V                          | 10 G $\Omega$ min.   |
| Humidity                    |          |                                      | 95% max.   |
| Operating Frequency         |          | Vin (nom.)                           | 20kHz min. / 50 kHz typ. / 90 kHz max.                           |
| Short-Circuit Protection    |          |                                      | 1 Second   |
| MTBF                        |          | Using MIL-HDBK 217F (+100°C)         | 1003 x 10 <sup>3</sup> hours                                     |
| Using MIL-HDBK 217F (+25°C) |          | 3962 x 10 <sup>3</sup> hours         | <i>Detailed Information see Application Notes chapter „MTBF“</i> |
| Weight                      |          | Single Types                         | 1.0 g  |
|                             |          | Dual Types                           | 1.2 g  |
| Certification               |          |                                      |  |
| UL General Safety           |          | Report: E358085                      | UL 60950-1 2nd Ed.   |

<sup>\*\*\*</sup>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.

#### Notes

Note1: Maximum capacitive load is defined as the capacitive load that will allow start up in under 1second without damage to the converter.

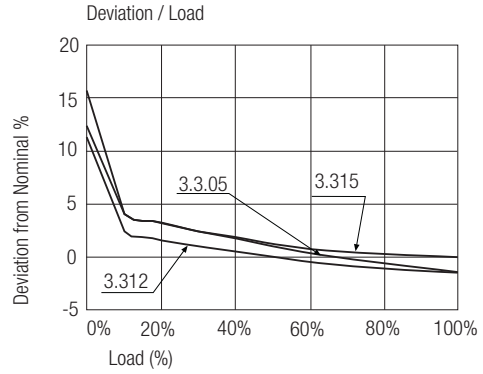
## Typical Characteristics

### Tolerance Envelope

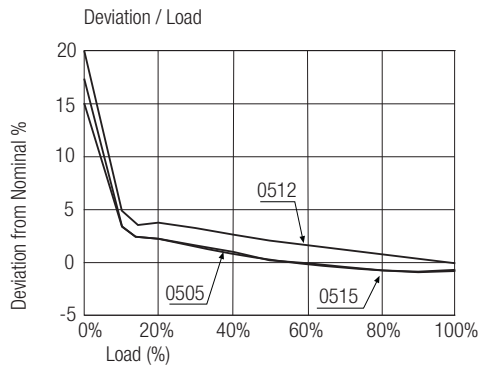


### Typical Characteristics

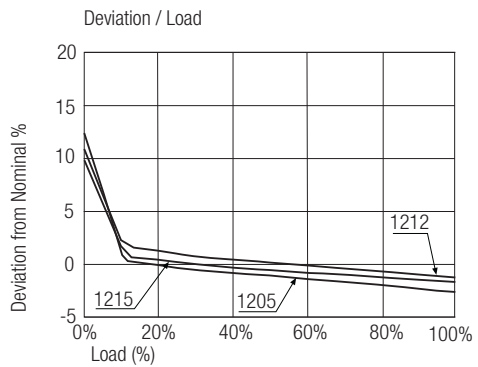
#### R0.5S-3.3xx



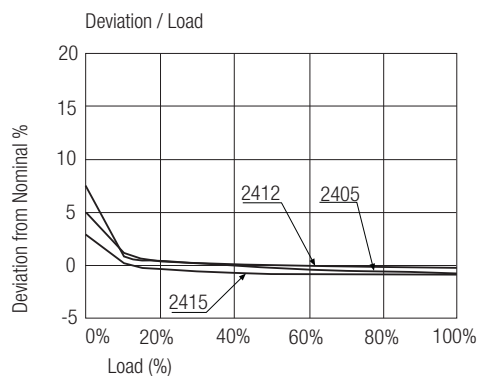
#### R0.5S-05xx



#### R0.5S-12xx



#### R0.5S-24xx



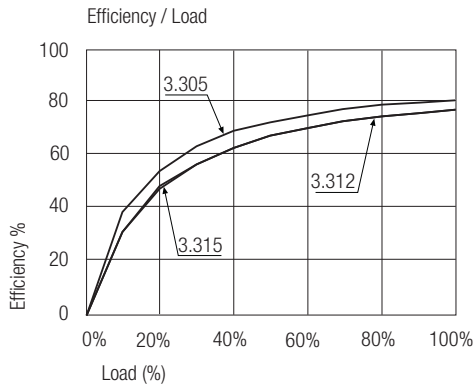
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DC/DC-Converter

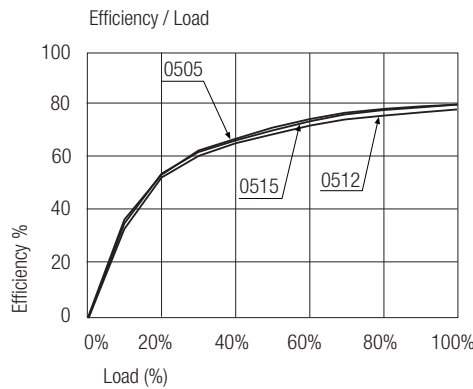
# R0.55\_D Series

## Typical Characteristics

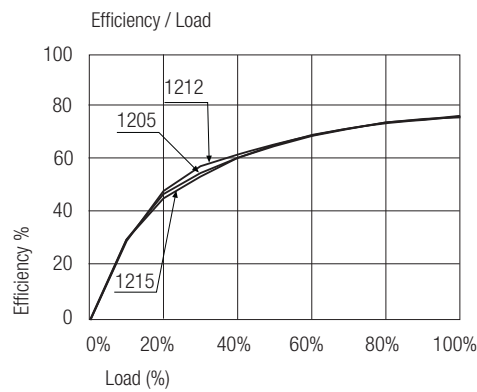
### R0.5D-3.3xx



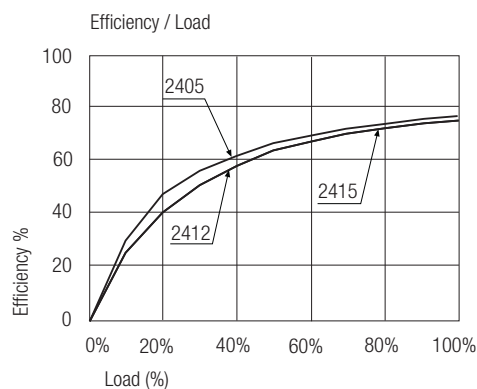
### R0.5D-05xx



### R0.5D-12xx



### R0.5D-24xx



R0.55\_D

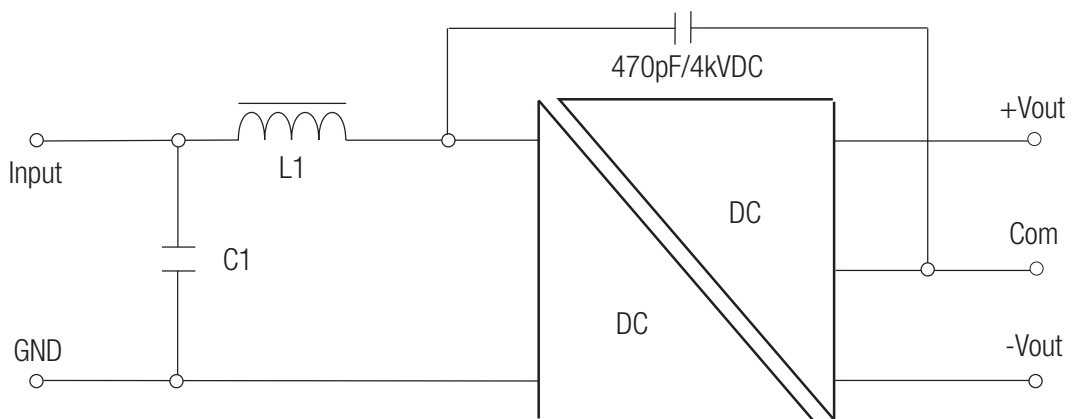
### Single Output



Except „/P“ Versions

| C1    | L1    | Vin  |
|-------|-------|------|
| 4.7µF | 4.7µH | 3.3V |
| 4.7µF | 4.7µH | 5V   |
| 4.7µF | 4.7µH | 12V  |
| 2.2µF | 4.7µH | 15V  |

### Dual Output



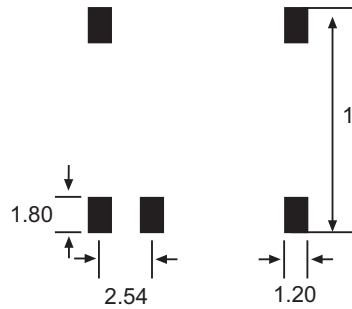
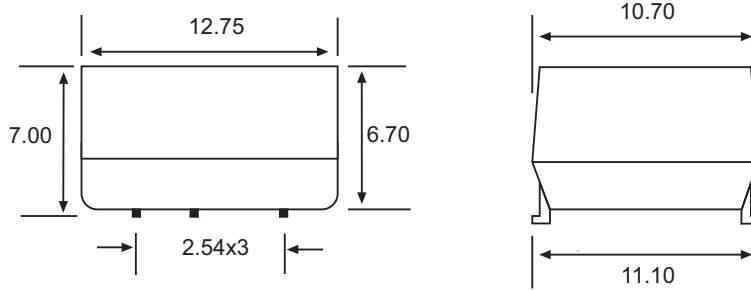
Except „/P“ Versions

| C1    | L1    | Vin  |
|-------|-------|------|
| 4.7µF | 10µH  | 3.3V |
| 4.7µF | 4.7µH | 5V   |
| 4.7µF | 2.2µH | 12V  |
| 4.7µF | 2.2µH | 15V  |

C1 = MLCC  
L1 = SMD Inductor

### Package Style and Pinning (mm)

#### 5 PINS Single SMD Package



#### Footprint

#### Pin Connections

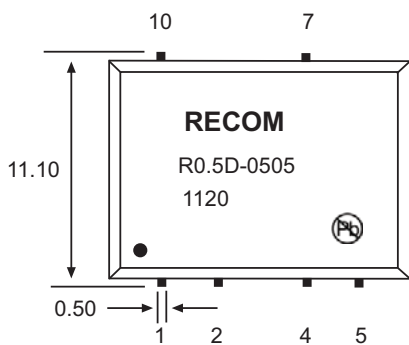
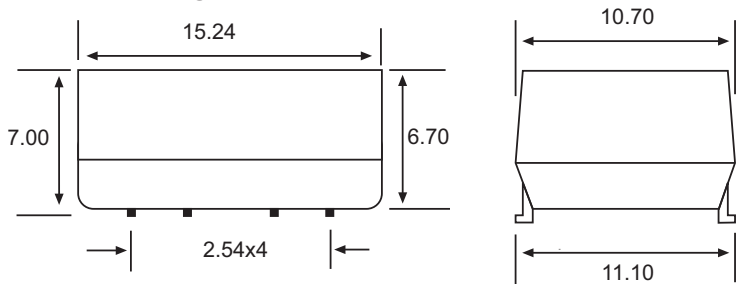
| Pin # | Single | Dual   |
|-------|--------|--------|
| 1     | -Vin   | -Vin   |
| 2     | +Vin   | +Vin   |
| 4     | -Vout  | Com.   |
| 5     | +Vout  | -Vout  |
| 7     | No Pin | +Vout  |
| 8     | NC     | No Pin |
| 10    | No Pin | NC     |

NC= No Connection

UNIT: mm

TOL.: ± 0.25 mm

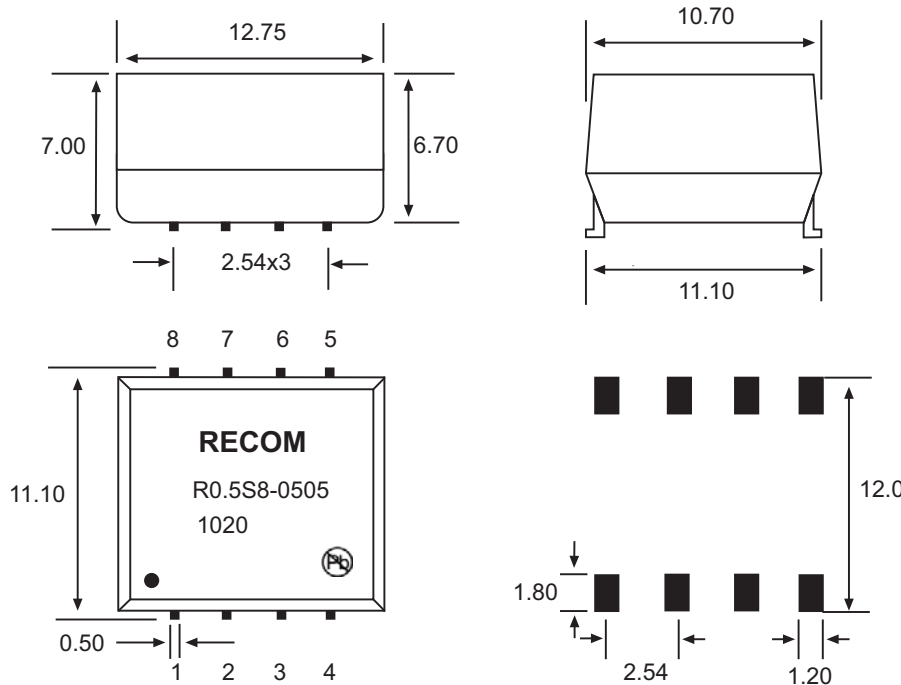
#### 6 PINS Dual SMD Package



#### Footprint

### Package Style and Pinning (mm)

#### 8 PINS Single SMD Package



#### Footprint

##### Pin Connections

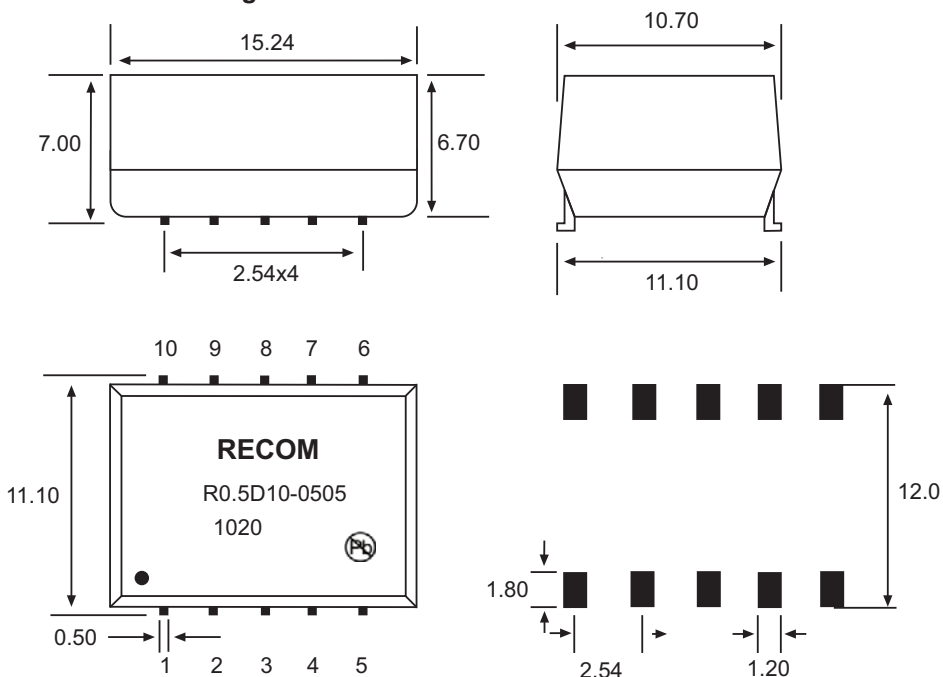
| Pin #   | Single | Dual  |
|---------|--------|-------|
| 1       | -Vin   | -Vin  |
| 2       | +Vin   | +Vin  |
| 4       | -Vout  | Com.  |
| 5       | +Vout  | -Vout |
| 7       | NC     | +Vout |
| 3, 6, 8 | NC     | NC    |
| 9, 10   | No Pin | NC    |

NC= No Connection

UNIT: mm

TOL.: ± 0.25 mm

#### 10 PINS Dual SMD Package



#### Footprint

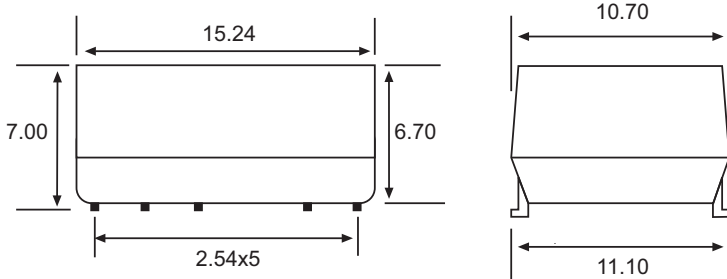
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DC/DC-Converter

# R0.55\_D Series

## Package Style and Pinning (mm)

### 12 PINS Dual SMD Package



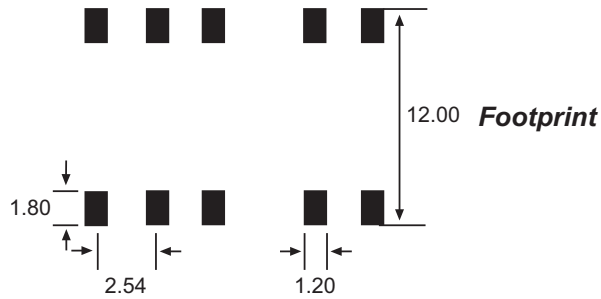
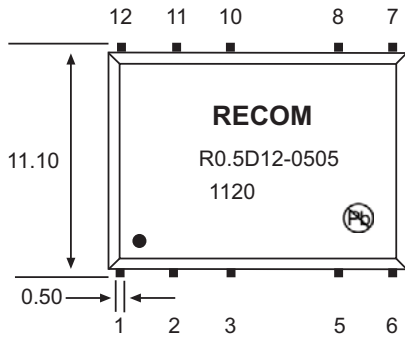
#### Pin Connections

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

NC= No Connection

Unit: mm

TOL.: ± 0.25 mm



**Footprint**



# Features

## Unregulated Converters

- Fully RoHS 6/6 Conform
- Full Power at 100°C Ambient Temperature
- 1kVDC or 3kVDC Isolation Options
- UL /CSA Certified, CB Report
- Suitable for Fully Automated Assembly (including Vapor Phase Soldering)
- Optional Continuous Short Circuit Protection
- Efficiency to 84%
- Built-In EN55022 Class A Filter

### Description

The R1S and R1D converters are of the enclosed open frame type, i.e. they are not 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<br>SMD | Input Voltage<br>(3kV) | Input Voltage<br>(VDC) | Output Voltage<br>(VDC) | Output Current<br>(mA) | Efficiency<br>(%) | Max Capacitive Load <sup>(1)</sup> |
|--------------------|------------------------|------------------------|-------------------------|------------------------|-------------------|------------------------------------|
| R1S**-xx3.3        | (H)                    | 3.3, 5, 12, 15, 24     | 3.3                     | 303                    | 75                | 2200µF                             |
| R1S**-xx05         | (H)                    | 3.3, 5, 12, 15, 24     | 5                       | 200                    | 72-78             | 1000µF                             |
| R1S**-xx09         | (H)                    | 3.3, 5, 12, 15, 24     | 9                       | 111                    | 74-78             | 1000µF                             |
| R1S**-xx12         | (H)                    | 3.3, 5, 12, 15, 24     | 12                      | 84                     | 75-80             | 470µF                              |
| R1S**-xx15         | (H)                    | 3.3, 5, 12, 15, 24     | 15                      | 66                     | 75-82             | 470µF                              |
| R1S**-xx24         | (H)                    | 3.3, 5, 12, 15, 24     | 24                      | 42                     | 74-84             | 220µF                              |
| R1D**-xx3.3        | (H)                    | 3.3, 5, 12, 15, 24     | ±3.3                    | ±152                   | 75                | ±1000µF                            |
| R1D**-xx05         | (H)                    | 3.3, 5, 12, 15, 24     | ±5                      | ±100                   | 72-78             | ±470µF                             |
| R1D**-xx09         | (H)                    | 3.3, 5, 12, 15, 24     | ±9                      | ±56                    | 74-78             | ±470µF                             |
| R1D**-xx12         | (H)                    | 3.3, 5, 12, 15, 24     | ±12                     | ±42                    | 75-80             | ±220µF                             |
| R1D**-xx15         | (H)                    | 3.3, 5, 12, 15, 24     | ±15                     | ±33                    | 75-82             | ±220µF                             |
| R1D**-xx24         | (H)                    | 3.3, 5, 12, 15, 24     | ±24                     | ±21                    | 74-84             | ±100µF                             |

xx = Input Voltage (other input and output voltage combinations available on request)

\* add Suffix "H" for 3kV Isolation, e.g. R1S-0505/H, R1D-0505/H, R1S12-0505/H, R1D12-0505/H

\* add Suffix "P" for Continuous Short Circuit Protection, e.g. R1S8-0505/P, R1S-0505/HP, R1D12-0505/HP

\* add suffix -R for tape & reel packing e.g. R1S-0505-R. For more details see Application Notes.

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

R1S\*\* : \*\* 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)  
 \*\* with marking **12** denotes 10 pins out of 12 fitted (includes /H option)

R1D\*\* : \*\* 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)  
 \*\* with marking **12** denotes 10 pins out of 12 fitted (includes /H option)

### Specifications (measured at T<sub>A</sub> = 25°C, nominal input voltage, full load and after warm-up)

|  |                            |                                       |
|--|----------------------------|---------------------------------------|
| Input Voltage Range                                |                            | ±10%                                  |
| Output Voltage Accuracy                            |                            | ±2% typ., ±5% max.                    |
| Line Voltage Regulation                            | All Variants               | 1.2%/1% of Vin typ.                   |
| Load Voltage Regulation<br>(10% to 100% full load) | 3.3V output types          | 15% typ., 20% max.                    |
|  | 5V output type             | 12% typ., 15% max.                    |
|  | 9V output type             | 7% typ., 10% max.                     |
|  | 12V, 15V, 24V output types | 6% typ., 10% max.                     |
| Output Ripple and Noise (20MHz BW limited)         |                            | 50mVp-p typ., 100mVp-p max.           |
| Operating Frequency                                |                            | 20kHz min. / 60kHz typ. / 100kHz max. |

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## ECONOLINE

### DC/DC-Converter

with 3 year Warranty

# RECOM

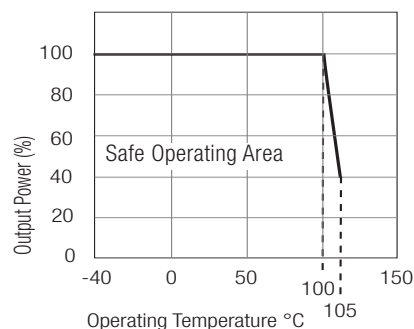
## 1 Watt SMD Single & Dual Output



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

## R1S\_R1D

## Derating-Graph (Ambient Temperature)



Refer to Application Notes