

# Features

## Unregulated Converters

- Industry standard pinout
- 1kVDC/1s or 2kVDC/1s isolation option
- Efficiency up to 85%
- Optional continuous short circuit protection
- Fully encapsulated
- UL94V-0 package material

**RECOM**  
DC/DC Converter

**RE**

**1 Watt  
SIP7  
Single Output**



### Description

The RE DC/DC converters are typically used in general purpose power isolation and voltage matching applications, and feature a full industrial operating temperature range of -40°C to +85°C without derating.

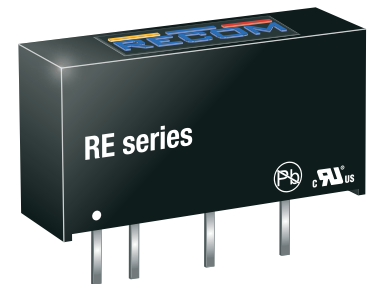
### Selection Guide

| Part Number                | nom. Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. <sup>(1)</sup> [%] | max. Capacitive Load <sup>(2)</sup> [μF] |
|----------------------------|--------------------------|----------------------|---------------------|------------------------------------|------------------------------------------|
| RE-xx3.3S <sup>(3,4)</sup> | 3.3, 5, 12, 15, 24       | 3.3                  | 303                 | 75                                 | 2200                                     |
| RE-xx05S <sup>(3,4)</sup>  | 3.3, 5, 12, 15, 24       | 5                    | 200                 | 78-80                              | 2200                                     |
| RE-xx09S <sup>(3,4)</sup>  | 3.3, 5, 12, 15, 24       | 9                    | 111                 | 78-80                              | 1000                                     |
| RE-xx12S <sup>(3,4)</sup>  | 3.3, 5, 12, 15, 24       | 12                   | 83                  | 80-84                              | 470                                      |
| RE-xx15S <sup>(3,4)</sup>  | 3.3, 5, 12, 15, 24       | 15                   | 66                  | 80-84                              | 470                                      |
| RE-xx24S <sup>(3,4)</sup>  | 3.3, 5, 12, 15, 24       | 24                   | 42                  | 78-85                              | 220                                      |

#### Notes:

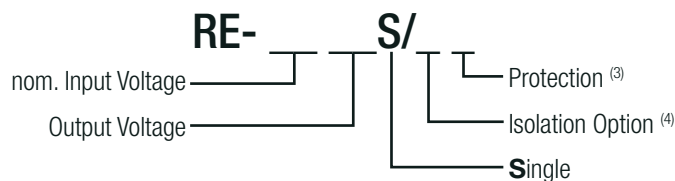
Note1: Efficiency is tested at nominal input and full load at +25°C ambient

Note2: Max Cap Load is tested at nominal input and full resistive load and is defined as the capacitive load that will allow start up in under 1s without damage to the converter



UL60950-1 certified  
CAN/CSA-C22.2 No 60950-1 certified  
IEC/EN60950-1 certified  
EN55032 compliant  
CB report

### Model Numbering



#### Notes:

Note3: standard part is without Continuous Short Circuit Protection  
add suffix „/P“ for Continuous Short Circuit Protection

Note4: add suffix „/H“ for 2kVDC/1s Isolation  
or add suffix „/HP“ for 2kVDC/1s Isolation and Continuous Short Circuit Protection

#### Ordering Examples:

RE-123.3S/P: 12V Input Voltage, 3.3V Output Voltage, Single Output with continuous short circuit protection

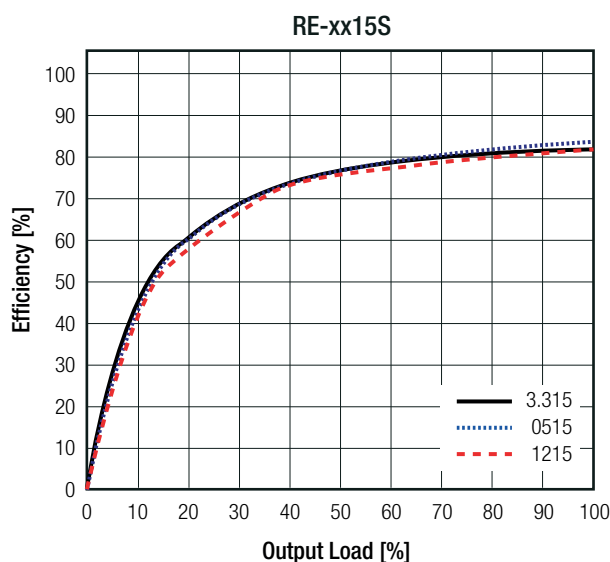
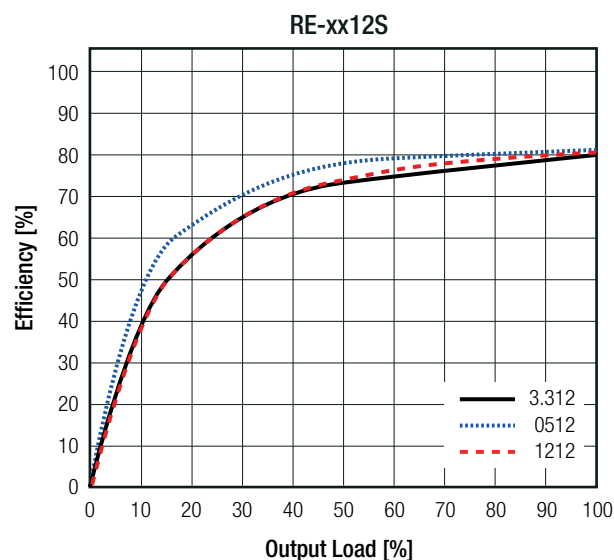
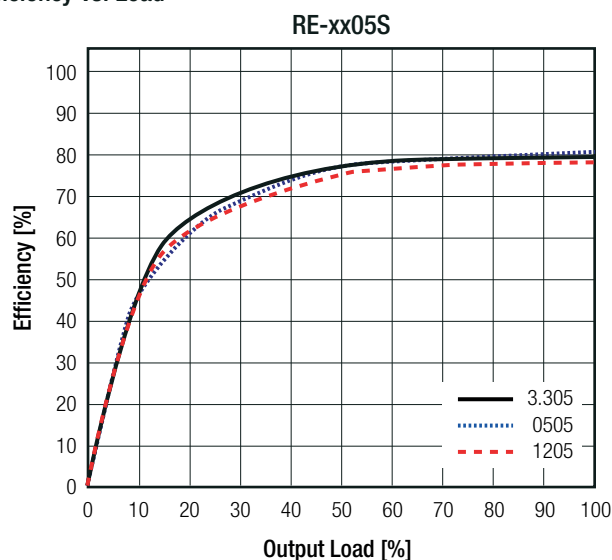
RE-0509S/HP: 5V Input Voltage, 9V Output Voltage, Single Output with 2kVDC/1s isolation and continuous short circuit protection

**Specifications** (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

### BASIC CHARACTERISTICS

| Parameter                    | Condition | Min.       | Typ.   | Max.     |
|------------------------------|-----------|------------|--------|----------|
| Internal Input Filter        |           | capacitors |        |          |
| Input Voltage Range          |           |            | ±10%   |          |
| Minimum Load <sup>(5)</sup>  |           | 0%         |        |          |
| Internal Operating Frequency |           | 50kHz      | 100kHz | 105kHz   |
| Output Ripple and Noise      | 20MHz BW  |            |        | 100mVp-p |

### Efficiency vs. Load



### REGULATIONS

| Parameter       | Condition             | Value                  |
|-----------------|-----------------------|------------------------|
| Output Accuracy |                       | ±5.0% max.             |
| Line Regulation | low line to high line | ±1.2% of 1.0% Vin typ. |

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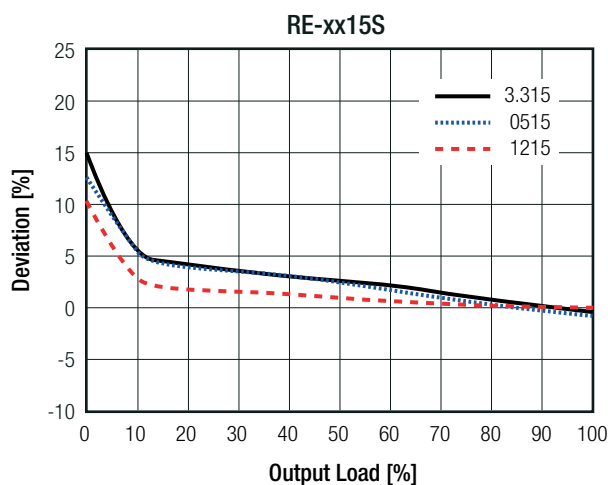
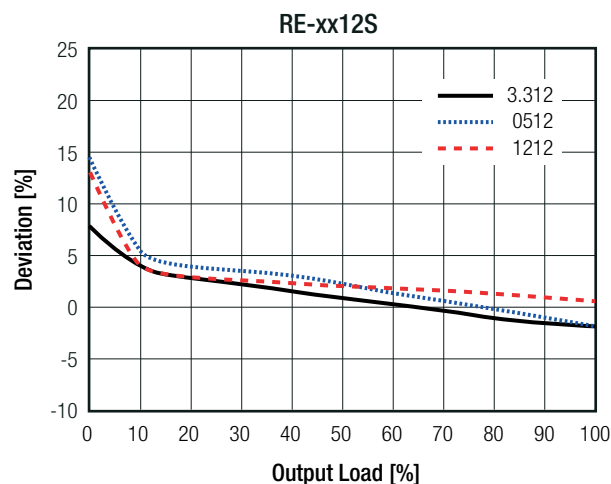
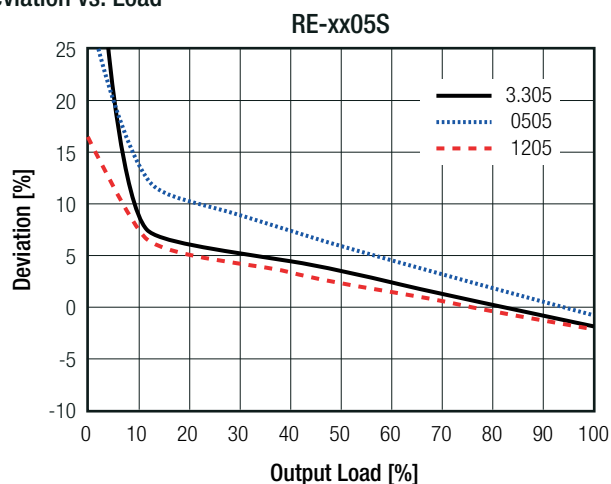
### Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

| Parameter                      | Condition        |                   | Value      |
|--------------------------------|------------------|-------------------|------------|
| Load Regulation <sup>(5)</sup> | 10% to 100% load | 3.3Vout           | 20.0% max. |
|                                |                  | 5Vout             | 15.0% max. |
|                                |                  | 9, 12, 15, 24Vout | 10.0% max. |

#### Notes:

Note5: Operation below 10% load will not harm the converter, but specifications may not be met

#### Deviation vs. Load



### PROTECTIONS

| Parameter                        | Type             |                  | Value                                           |
|----------------------------------|------------------|------------------|-------------------------------------------------|
| Short Circuit Protection (SCP)   | without suffix   |                  | 1 second                                        |
|                                  | with suffix "/P" |                  | continuous                                      |
| Isolation Voltage <sup>(6)</sup> | I/P to O/P       | without suffix   | 1kVDC<br>500VAC/60Hz                            |
|                                  |                  | with suffix "/H" | 2kVDC<br>1kVAC/60Hz                             |
| Isolation Resistance             |                  |                  | 10GΩ min.                                       |
| Isolation Capacitance            |                  |                  | 20pF min. / 75pF max.                           |
| Insulation Grade                 |                  |                  | basic (IEC/EN60950-1)<br>functional (UL60950-1) |

#### Notes:

Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note7: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

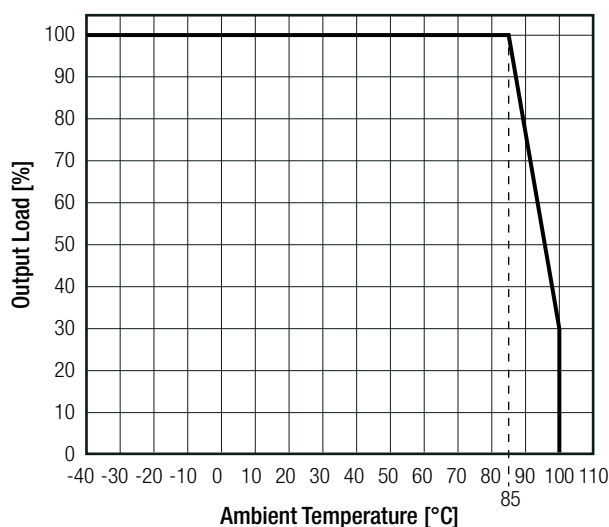
**Specifications** (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

**ENVIRONMENTAL**

| Parameter                   | Condition                                   |                | Value                                                         |
|-----------------------------|---------------------------------------------|----------------|---------------------------------------------------------------|
| Operating Temperature Range | full load @ free air convection (see graph) |                | -40°C to +85°C                                                |
| Maximum Case Temperature    |                                             |                | +105°C                                                        |
| Temperature Coefficient     |                                             |                | ±0.03%/K typ.                                                 |
| Operating Altitude          |                                             |                | 2000m                                                         |
| Operating Humidity          | non-condensing                              |                | 95% RH max.                                                   |
| Pollution Degree            |                                             |                | PD2                                                           |
| MTBF                        | according to MIL-HDBK-217F, G.B.            | +25°C<br>+85°C | 16400 x 10 <sup>3</sup> hours<br>8600 x 10 <sup>3</sup> hours |

**Derating Graph**

(@ free air convection)



**SAFETY AND CERTIFICATIONS**

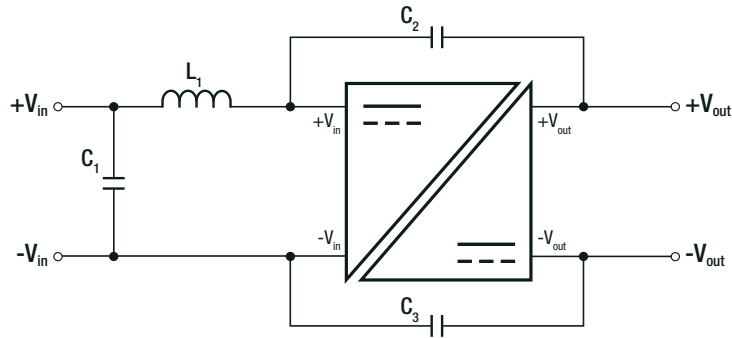
| Certificate Type (Safety)                                              | Report / File Number | Standard                                                                      |
|------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------|
| Information Technology Equipment, General Requirements for Safety      | SPCLVD1602031        | IEC60950-1:2005, 2nd Edition + A2:2013<br>EN60950-1:2006 + A2:2013            |
| Information Technology Equipment, General Requirements for Safety      | E358085-A4-UL        | UL60950-1, 2nd Edition:2007<br>CAN/CSA C22.2 No. 60950-1-03, 2nd Edition:2007 |
| Information Technology Equipment, General Requirements for Safety (CB) | E322406-A4-CB-1      | IEC60950-1:2005, 2nd Edition                                                  |
| EAC                                                                    | RU-AT.49.09571       | TP TC 004/2011                                                                |
| RoHS 2+                                                                |                      | RoHS-2011/65/EU + AM-2015/863                                                 |

| EMC Compliance                                                                | Condition                                                        | Standard / Criterion                 |
|-------------------------------------------------------------------------------|------------------------------------------------------------------|--------------------------------------|
| Electromagnetic compatibility of multimedia equipment - Emission requirements | with external filter<br>(refer to "EMC Filter Suggestion" below) | EN55032, Class A<br>EN55032, Class B |

continued on next page

### Specifications (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

#### EMC Filter Suggestion according to EN55032



#### Component List Class A

| MODEL    | C1                | L1  | C2 (safety) | C3 (safety) |
|----------|-------------------|-----|-------------|-------------|
| RE-0505S | 4.7µF<br>50V MLCC | N/A | N/A         | N/A         |
| RE-0512S |                   |     |             | N/A         |
| RE-2405S |                   |     |             | N/A         |
| RE-2415S |                   |     |             | 2.2nF       |

#### Component List Class B

| MODEL    | C1                | L1                                                    | C2 (safety) | C3 (safety) |
|----------|-------------------|-------------------------------------------------------|-------------|-------------|
| RE-0505S | 10µF<br>100V MLCC | <a href="#">22µH choke</a><br><a href="#">RLS-226</a> | 100pF       | 330pF       |
| RE-0512S |                   |                                                       |             |             |
| RE-2405S |                   |                                                       |             |             |
| RE-2415S |                   |                                                       |             |             |

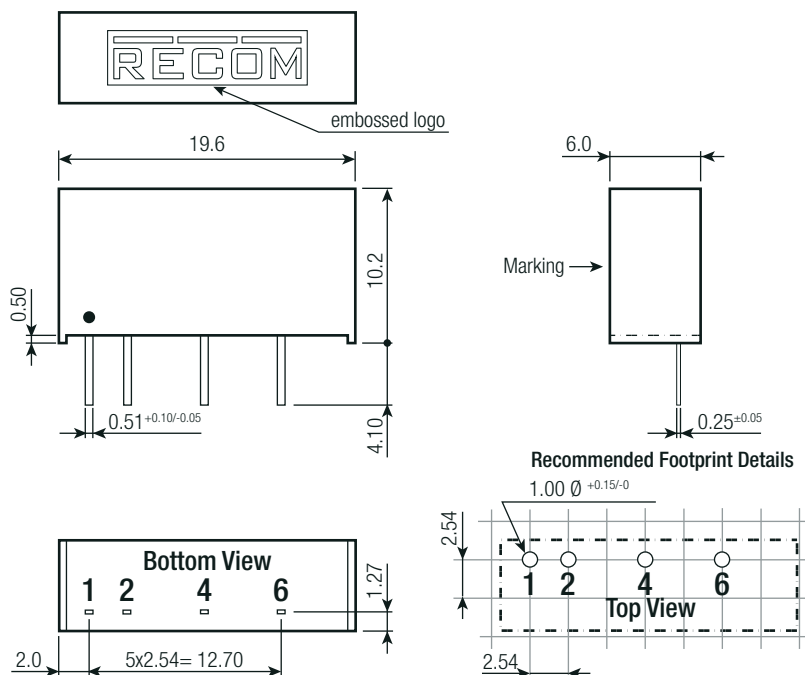
#### Notes:

Note8: Filter suggestions are valid for indicated part numbers only. For other part numbers, please contact RECOM tech support for advice

### DIMENSION AND PHYSICAL CHARACTERISTICS

| Parameter         | Type                   | Value                                                                            |
|-------------------|------------------------|----------------------------------------------------------------------------------|
| Material          | case<br>potting<br>PCB | non-conductive black plastic, (UL94 V-0)<br>epoxy, (UL94 V-0)<br>FR4, (UL94 V-0) |
| Dimension (LxWxH) |                        | 19.6 x 6.0 x 10.2mm                                                              |
| Weight            |                        | 2.2g typ.                                                                        |

#### Dimension Drawing (mm)



#### Pinning Information

| Pin # | Single |
|-------|--------|
| 1     | +Vin   |
| 2     | -Vin   |
| 4     | -Vout  |
| 6     | +Vout  |

Tolerance:  
xx.x= ±0.5mm  
xx.xx= ±0.25mm

**Specifications** (measured @ Ta= 25°C, nom. Vin, full load otherwise stated)

**PACKAGING INFORMATION**

| Parameter                   | Type | Value                |
|-----------------------------|------|----------------------|
| Packaging Dimension (LxWxH) | tube | 520.0 x 16.0 x 9.0mm |
| Packaging Quantity          | tube | 25pcs                |
| Storage Temperature Range   |      | -55°C to +125°C      |
| Storage Humidity            |      | 95% RH max.          |

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