

# Features

## Unregulated Converters

- 1:1 input range
- Efficiency up to 82%
- 1kVDC/1s or 2kVDC/1s isolation option
- Wide operating temperature range from -40°C to +100°C at full load
- UL60950-1 and IEC/EN60950-1 certified
- 1W SMD package

**RECOM**  
DC/DC Converter

## R1S/E

**1 Watt  
SMD  
Single Output**



### Description

The R1S/E series is an unregulated DC/DC converter in fully encapsulated open Frame package style. This series has been designed to offer exceptionally high efficiency at low loads and an extended operating temperature range. Uses include battery powered supplies, green energy applications and general isolating/converting DC power where board space and high efficiency is a premium.

### 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] |
|----------------------------------------------|--------------------------|----------------------|---------------------|------------------------------------|------------------------------------------|
| R1S <sup>(3)</sup> -3.305/E <sup>(4,5)</sup> | 3.3                      | 5                    | 200                 | 81                                 | 2200                                     |
| R1S <sup>(3)</sup> -0505/E <sup>(4,5)</sup>  | 5                        | 5                    | 200                 | 81                                 | 2200                                     |
| R1S <sup>(3)</sup> -1205/E <sup>(4,5)</sup>  | 12                       | 5                    | 200                 | 82                                 | 2200                                     |
| R1S <sup>(3)</sup> -2405/E <sup>(4,5)</sup>  | 24                       | 5                    | 200                 | 80                                 | 2200                                     |

#### Notes:

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

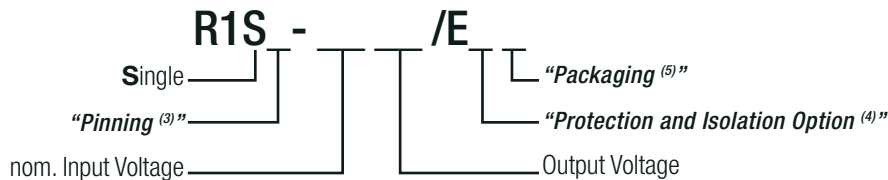
Note2: Max Cap Load is tested at nominal input and full resistive load and is defined as the capacitive load that will allow start up in under 1s without damage to the converter



**UL**  
US  
E358085



### Model Numbering



#### Notes:

Note3: 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)

Note4: standard part is without continuous short circuit protection

add suffix „/P“ for continuous short circuit protection

add suffix „/H“ for 2kVDC/1s isolation (not available for R1S8)

or add suffix „/HP“ for 2kVDC/1s isolation and continuous short circuit protection

Note5: add suffix „-R“ for tape and reel packaging (compatible with all other suffixes)

#### Ordering Examples:

R1S8-3.305/E = Single Output, 8 pins out of 8 fitted, 3.3Vin, 5Vout

R1S-3.305/EH = Single Output, 5 pins out of 8 fitted, 3.3Vin, 5Vout with 2kVDC/1s isolation

R1S8-0505/EP = Single Output, 8 pins out of 8 fitted, 5Vin, 5Vout with continuous short circuit protection

R1S-0505/EHP-R = Single Output, 8 pins out of 8 fitted, 5Vin, 5Vout with 2kVDC/1s isolation, continuous short circuit protection and tape and reel packaging

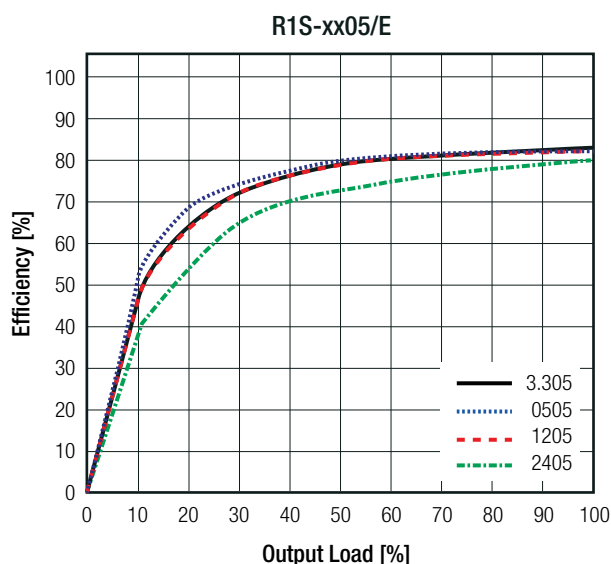
UL60950-1 certified  
CAN/CSA-C22.2 No. 60950-1-07 certified  
IEC/EN60950-1 certified  
EN55032 compliant

**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

### BASIC CHARACTERISTICS

| Parameter                    | Condition | Min.  | Typ.    | Max.     |
|------------------------------|-----------|-------|---------|----------|
| Input Voltage Range          |           |       | ±10%    |          |
| Minimum Load <sup>(5)</sup>  |           | 0%    |         |          |
| Internal Operating Frequency |           | 20kHz |         | 90kHz    |
| Output Ripple and Noise      | 20MHz BW  |       | 50mVp-p | 100mVp-p |

### Efficiency vs. Load



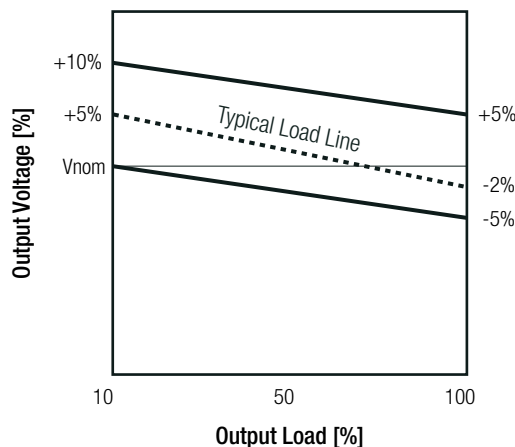
### REGULATIONS

| Parameter       | Condition                        | Value      |
|-----------------|----------------------------------|------------|
| Output Accuracy |                                  | ±5.0% max. |
| Line Regulation | low line to high line, full load | ±1.2% typ. |
| Load Regulation | 10% to 100% load                 | 15.0% max. |

#### Notes:

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

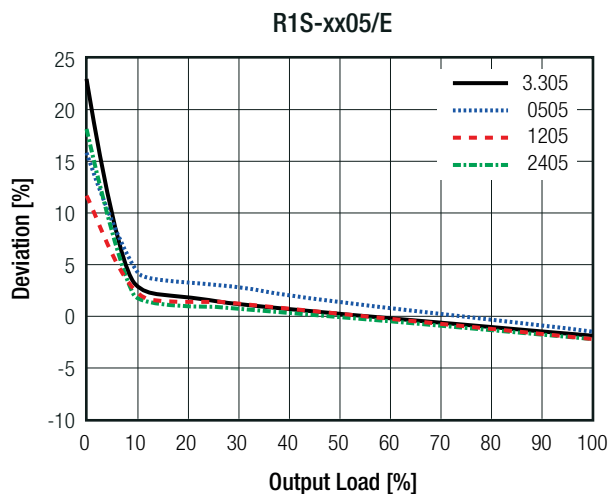
### Tolerance Envelope



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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**Deviation vs. Load**



**PROTECTIONS**

| Parameter                        | Type        |                                    | Value                                     |
|----------------------------------|-------------|------------------------------------|-------------------------------------------|
| Short Circuit Protection (SCP)   | below 100mΩ | without suffix<br>with suffix "/P" | 1 second<br>continuous                    |
| Isolation Voltage <sup>(7)</sup> | I/P to O/P  | without suffix                     | tested for 1 second<br>rated for 1 minute |
|                                  |             | with suffix "/H"                   | tested for 1 second<br>rated for 1 minute |
| Isolation Resistance             |             |                                    | 1kVDC<br>500VAC/60Hz                      |
| Isolation Capacitance            |             |                                    | 2kVDC<br>1kVAC/60Hz                       |
| Insulation Grade                 |             |                                    | 10GΩ min.<br>75pF max.<br>functional      |

**Notes:**

Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note8: Refer to local safety regulations if input over-current protection is also required. Recommended fuse: slow blow type

**ENVIRONMENTAL**

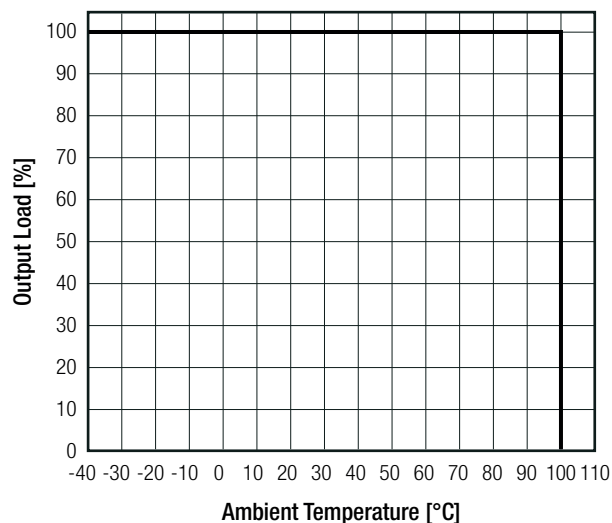
| Parameter                   | Condition                                                         |                 | Value                                                       |
|-----------------------------|-------------------------------------------------------------------|-----------------|-------------------------------------------------------------|
| Operating Temperature Range | full load @ free air convection, refer to <i>"Derating Graph"</i> |                 | -40°C to +100°C                                             |
| Operating Altitude          |                                                                   |                 | 2000m                                                       |
| Operating Humidity          | non-condensing                                                    |                 | 95% RH max.                                                 |
| Pollution Degree            |                                                                   |                 | PD2                                                         |
| MTBF                        | according to MIL-HDBK-217F, G.B.                                  | +25°C<br>+100°C | 3459 x 10 <sup>3</sup> hours<br>756 x 10 <sup>3</sup> hours |

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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**Derating Graph**

(@ Chamber and free air convection)



**SAFETY AND CERTIFICATIONS**

| Certificate Type (Safety)                                                                            | Report / File Number | Standard                                                                      |
|------------------------------------------------------------------------------------------------------|----------------------|-------------------------------------------------------------------------------|
| Information Technology Equipment, General Requirements for Safety                                    | E358085-A2-UL        | UL60950-1, 2nd Edition:2007<br>CAN/CSA C22.2 No. 60950-1-07, 2nd Edition:2007 |
| Information Technology Equipment, General Requirements for Safety                                    | LVD1605077-08        | IEC60950-1:2005, 2nd Edition + A2:2013<br>EN60950-1:2006 + A2:2013            |
| Medical electrical equipment Part 1: General requirements for basic safety and essential performance | WD-SE-R-180674-A0    | EN60601-1:2006 + A12:2014<br>IEC60601-1:2005 + A1:2012, 3rd Edition           |
| EAC                                                                                                  | RU-AT.49.09571       | TP TC 004/2011                                                                |
| RoHS2                                                                                                |                      | RoHS-2011/65/EU + AM-2015/863                                                 |

**DIMENSION AND PHYSICAL CHARACTERISTICS**

| Parameter         | Type | Value                                    |
|-------------------|------|------------------------------------------|
| Material          | case | non-conductive black plastic, (UL94 V-0) |
| Dimension (LxWxH) |      | 12.75 x 10.7 x 6.7mm                     |
| Weight            |      | 1.0g typ.                                |

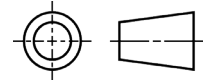
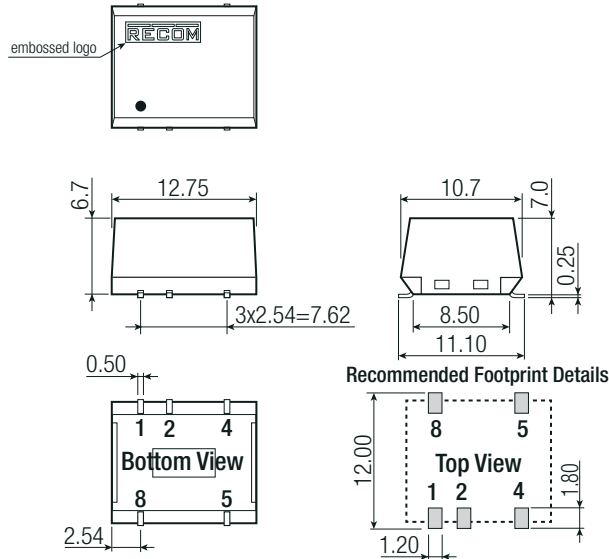
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**Specifications** (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

**Dimension Drawing (mm)**

**5 Pin Single SMD Package**

/H option is available in these pin package



**Pinning Information**

| Pin # | Single |
|-------|--------|
| 1     | -Vin   |
| 2     | +Vin   |
| 4     | -Vout  |
| 5     | +Vout  |
| 8     | NC     |

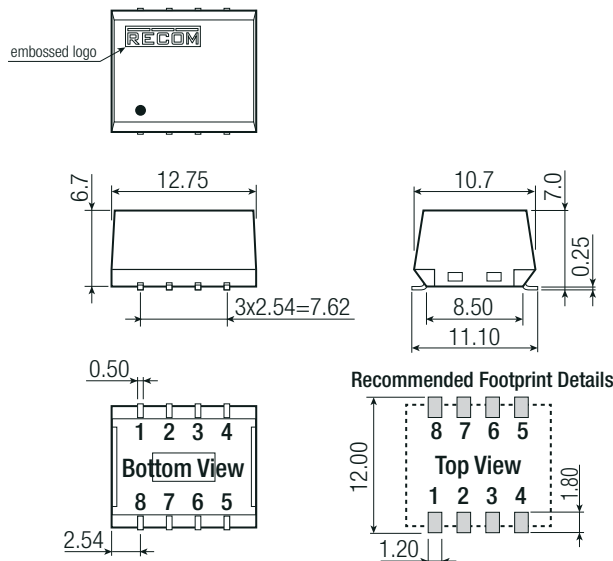
NC = No Connection

Tolerance:

xx.xx= ±0.25mm

**8 Pin Single SMD Package**

/H option is not available in these pin package



**Pinning Information**

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

NC = No Connection

Tolerance:

xx.xx= ±0.25mm

**PACKAGING INFORMATION**

|                             |                                |                                                 |
|-----------------------------|--------------------------------|-------------------------------------------------|
| Packaging Dimension (LxWxH) | tube<br>tape and reel (carton) | 530.0 x 17.0 x 14.0mm<br>355.0 x 342.0 x 36.0mm |
| Packaging Quantity          | tube<br>tape and reel          | 40pcs<br>500pcs                                 |
| Tape Width                  |                                | 24.0mm                                          |
| Storage Temperature Range   |                                | -55°C to +125°C                                 |
| Storage Humidity            | non-condensing                 | 95% RH max.                                     |

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