

Features

Unregulated Converters

- 3 Watt in a SIP4 Package
- 1-3kVDC Isolation
- Efficiency up to 90%
- -40°C to +100°C Operating Temperature Range
- IEC/EN/UL60950 Certified
- CB Report
- Industry Standard Pinout

Description

The RI3 series has been specifically designed for applications where board space is at a premium since these 3 Watt converters have the same foot print as the RI series 2 Watt converters. With efficiencies up to 90%, the full output power is available over the operating temperature range -40°C to +85°C and the converters can be used in ambient temperatures of up to 100°C with derating. The wide selection of input voltage and output voltage options plus an I/O-Isolation of 1kVDC, 2kVDC or 3kVDC makes these converters suitable for many industrial applications.

Selection Guide

| Part Number | Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. @ full load [%] | max. Capacitive Load ⁽¹⁾ [μF] |
|-------------|---------------------|----------------------|---------------------|---------------------------------|--|
| RI3-0505S | 5 | 5 | 600 | 83 | 2200 |
| RI3-0509S | 5 | 9 | 333 | 86 | 1200 |
| RI3-0512S | 5 | 12 | 250 | 87 | 1000 |
| RI3-0515S | 5 | 15 | 200 | 88 | 820 |
| RI3-1205S | 12 | 5 | 600 | 85 | 2000 |
| RI3-1209S | 12 | 9 | 333 | 88 | 1200 |
| RI3-1212S | 12 | 12 | 250 | 89 | 1000 |
| RI3-1215S | 12 | 15 | 200 | 89 | 820 |
| RI3-1505S | 15 | 5 | 600 | 85 | 2000 |
| RI3-1509S | 15 | 9 | 333 | 88 | 1200 |
| RI3-1512S | 15 | 12 | 250 | 88 | 1000 |
| RI3-1515S | 15 | 15 | 200 | 88 | 820 |
| RI3-2405S | 24 | 5 | 600 | 86 | 2000 |
| RI3-2409S | 24 | 9 | 333 | 89 | 1200 |
| RI3-2412S | 24 | 12 | 250 | 90 | 1000 |
| RI3-2415S | 24 | 15 | 200 | 90 | 820 |

Notes:

Note1: Max. capacitive load is tested at nominal input and constant resistive load.

Model Numbering



Notes:

Note2: add suffix "H2" for 2kVDC/1second or "H3" for 3kVDC/1second isolation without suffix standard 1kVDC/1second isolation

Examples:

- e.g. RI3-1212S, Single Output, 12Vin and 12Vout, 1kVDC isolation
- e.g. RI3-1212S/H2, Single Output, 12Vin and 12Vout, 2kVDC isolation
- e.g. RI3-1212S/H3, Single Output, 12Vin and 12Vout, 3kVDC isolation
- e.g. RI3-2405S, Single Output, 24Vin and 5Vout, 1kVDC isolation
- e.g. RI3-2405S/H2, Single Output, 24Vin and 5Vout, 2kVDC isolation
- e.g. RI3-2405S/H3, Single Output, 24Vin and 5Vout, 3kVDC isolation

RI3

**3 Watt
SIP4
Single Output**



RECOM
E224736

IEC/EN60950-1 Certified
UL60950-1 Certified
CSA C22.2 NO. 60950 Certified
EN55022

Specifications (measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load and after warm up unless otherwise specified)

BASIC CHARACTERISTICS

| Parameter | Condition | Min. | Typ. | Max. |
|--|-----------|---------|----------|---------|
| Input Voltage Range | 5VDC | 4.5VDC | 5VDC | 5.5VDC |
| | 12VDC | 10.8VDC | 12VDC | 13.2VDC |
| | 15VDC | 13.5VDC | 15VDC | 16.5VDC |
| | 24VDC | 21.6VDC | 24VDC | 26.4VDC |
| Operating Frequency | | 20kHz | 40kHz | |
| Minimum Load ⁽³⁾ | | 0% | | |
| Output Ripple and Noise ⁽⁴⁾ | 20MHz BW | 50mVp-p | 100mVp-p | |

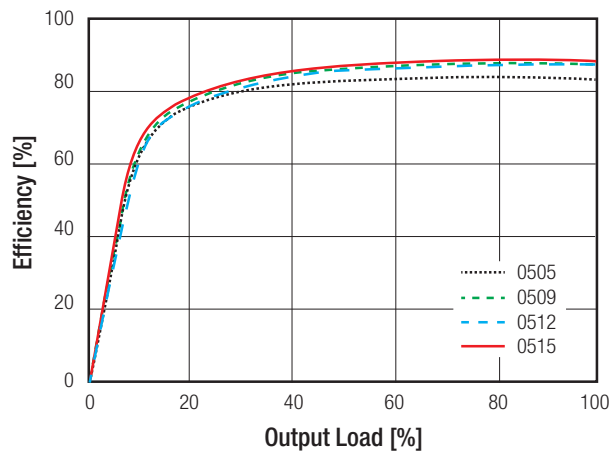
Notes:

Note3: Operation below no load won't harm the converter, but specifications may not be met

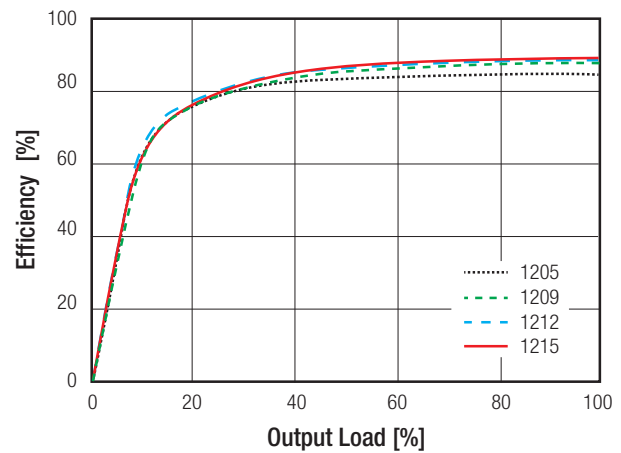
Note4: Measurements are made with a 100nF MLCC across output. (low ESR)

Efficiency vs. Load

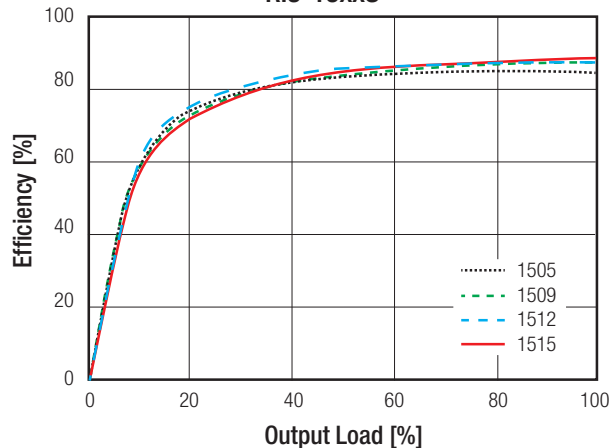
RI3-05xxS



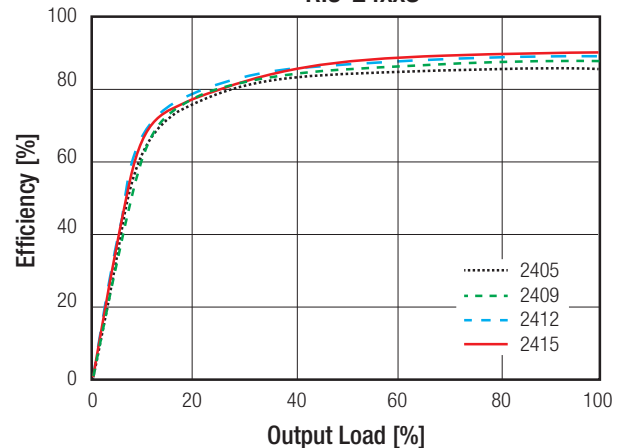
RI3-12xxS



RI3-15xxS



RI3-24xxS

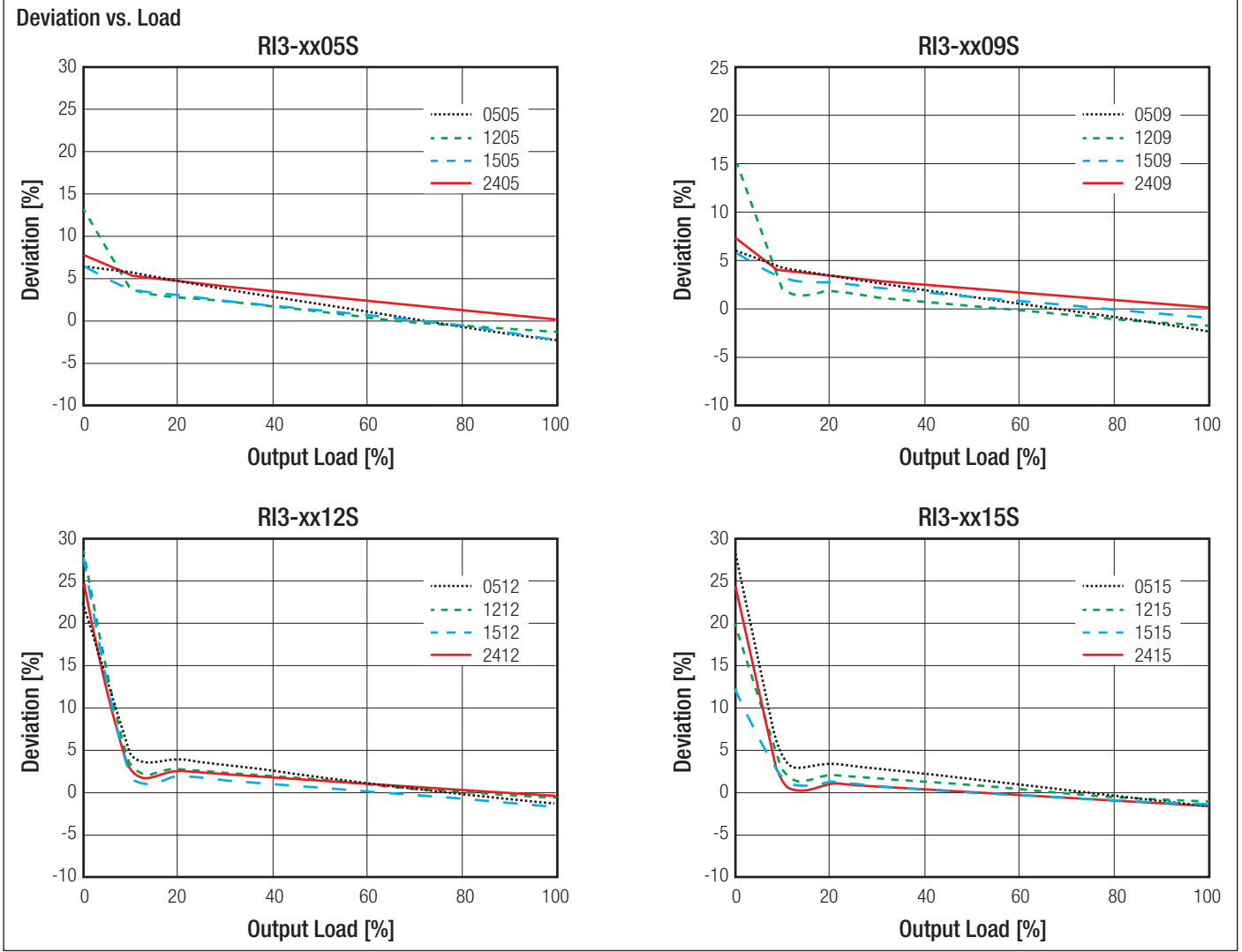


REGULATIONS

| Parameter | Condition | Values |
|-------------------------|--|--------------------------------------|
| Output Voltage Accuracy | 5Vout | $\pm 3.0\%$ min. / $\pm 4.0\%$ typ. |
| | all other | $\pm 2.0\%$ min. / $\pm 3.0\%$ typ. |
| Line Voltage Regulation | low line to high line, load @1% of Vin | $\pm 1.2\%$ max. |
| Load Voltage Regulation | 5Vout | $\pm 8.0\%$ typ. / $\pm 10.0\%$ max. |
| | 10% to 100% load | $\pm 6.0\%$ typ. / $\pm 10.0\%$ max. |

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Specifications (measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load and after warm up unless otherwise specified)



| PROTECTIONS | | | |
|-----------------------|---------------------|-------------------------|------------------------|
| Parameter | Condition | | Value |
| Isolation Voltage | tested for 1 second | standard without suffix | 1kVDC |
| | | with suffix "H2" | 2kVDC |
| | | with suffix "H3" | 3kVDC |
| Isolation Capacitance | | | 37pF typ. / 130pF max. |
| Isolation Resistance | | | 10GΩ min. |

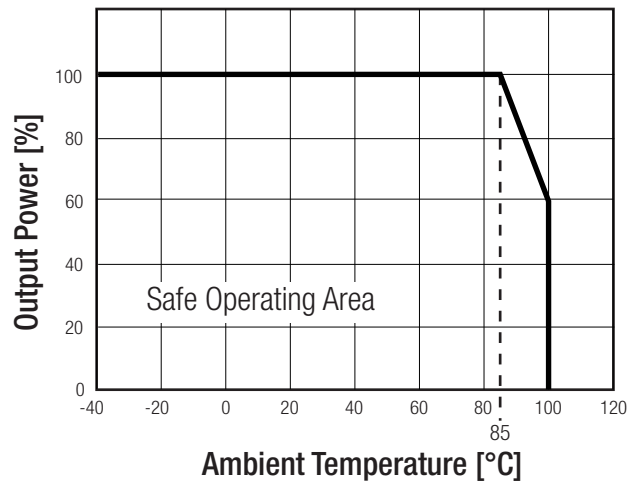
| ENVIRONMENTAL | | | |
|-----------------------------|---------------------------------------|-------|------------------------------|
| Parameter | Condition | | Value |
| Operating Temperature Range | free air convection, without derating | | -40°C to +85°C |
| | with derating | | -40°C to +100°C |
| Maximum Case Temperature | | | +115°C |
| Operating Humidity | non-condensing | | 5% - 95% RH max. |
| Vibration | | | MIL-STD-202G |
| MTBF | according to MIL-HDBK-217F, G.B. | +25°C | 4395 x 10 ³ hours |
| | | +85°C | 1740 x 10 ³ hours |

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Specifications (measured at $T_a=25^{\circ}\text{C}$, nominal input voltage, full load and after warm up unless otherwise specified)

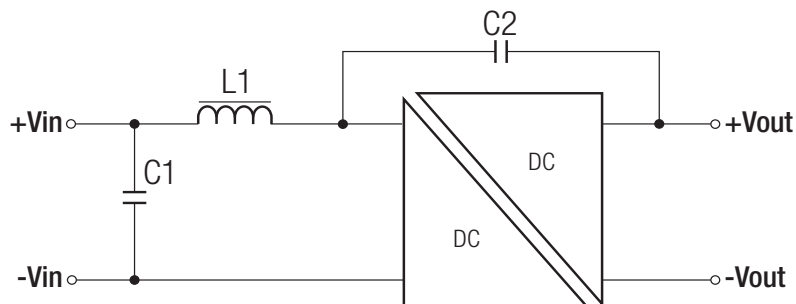
Derating Graph

(@ Chamber and natural convection 0.1 m/s)



| SAFETY AND CERTIFICATIONS | | |
|--|-------------------------|---|
| Certificate Type | Report / File Number | Standard |
| Information Technology Equipment - General Requirements for Safety (CB Scheme) | E224736-A31 | IEC60950-1, 2nd Edition, 2013 EN60950-1, 2nd Edition, 2013 |
| Information Technology Equipment - General Requirements for Safety | E224736-A32 | UL60950-1, 2nd Edition, 2014 C22.2 No. 60950-1-07, 2nd Edition, 2014 |
| RoHS2 | | RoHS 2011/65/EU + AM2015/863 |
| EMC Compliance | Condition | Standard / Criterion |
| Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement | without external filter | EN55022, Class A |
| | with external filter | EN55022, Class B |

EMC Filtering - Suggestions for Class B



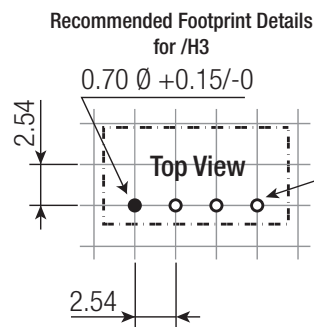
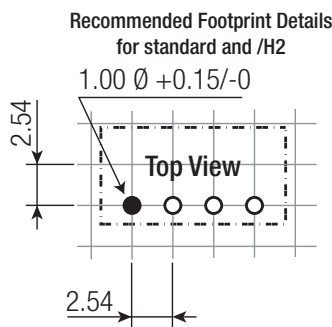
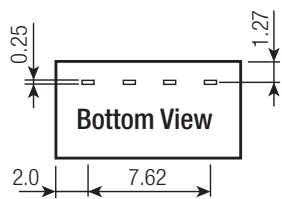
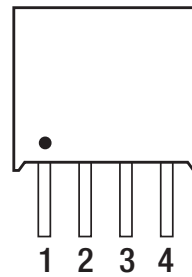
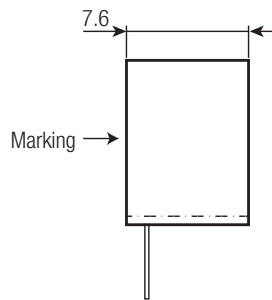
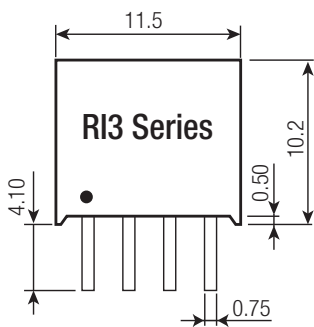
| MODEL | C1 | C2 | L1 |
|------------------------|-------------------|-----------|--------------------------|
| RI3-05xxS | 4.7 μF | 470pF/4kV | 10 μH Choke |
| RI3-12xxS | 4.7 μF | 470pF/4kV | 10 μH Choke |
| RI3-15xxS RI3-24xxS | 2.2 μF | 470pF/4kV | 10 μH , Choke |

Specifications (measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load and after warm up unless otherwise specified)

DIMENSION and PHYSICAL CHARACTERISTICS

| Parameter | Type | Value |
|---------------------------|--------------|--|
| Material | Case Potting | non conductive plastic (UL94V-0) silicone (UL94V-0) |
| Package Dimension (LxWxH) | | 11.5 x 10.2 x 7.6mm |
| Package Weight | | 2.2g typ. |

Dimension Drawing (mm)

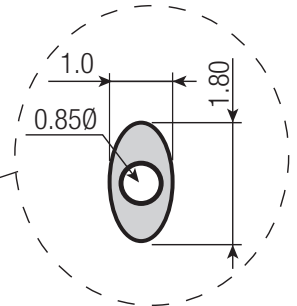


Pin Connections

| Pin # | Function |
|-------|----------|
| 1 | -Vin |
| 2 | +Vin |
| 3 | -Vout |
| 4 | +Vout |

Tolerance: xx.x= ±0.5mm
xx.xx= ±0.35mm
Pin dimension: ±0.05mm
Pin pitch: ±0.25mm

solder pad for /H3 models



PACKAGING INFORMATION

| | | |
|-----------------------------|------|----------------------|
| Packaging Dimension (LxWxH) | tube | 520.0 x 9.3 x 16.5mm |
| Packaging Quantity | | 42pcs |
| Storage Temperature Range | | -55°C to +125°C |