# Features

# Unregulated Converters

- Ultra-compact size - only 8.3 x 8.3 x 6.8mm
- 1kVDC/1s or 2KVDC/1s basic isolation
- Optional continuous short circuit protected
- Fully encapsulated
- UL and EN certified, CB report
- Efficiency to 84%

RECOM
DC/DC Converter

# RNM

## 1 Watt DIP6 Single Output

3 YEAR warranty

## Description

The RNM series DC/DC converters are ultra-compact isolated single output converters for applications where board space is at a premium. Despite their small size, the converters are fully featured with a full industrial operating temperature range of -40°C to +85°C without derating (+100°C with derating), 1kVDC or 2kVDC isolation and optional short circuit protection. The converters are also UL-60950-1 and EN-60950-1 certified and have a CB Report.

## Selection Guide

| Part Number | nom. Input Voltage [VDC] | Output Voltage [VDC] | Output Current [mA] | Efficiency typ. (1) [%] | max. Capacitive Load (2) [µF] |
|---|---|---|---|---|---|
| RNM-xx3.3S (3,4) | 3.3, 5, 12, 15 | 3.3 | 303 | 75 | 2200 |
| RNM-xx05S (3,4) | 3.3, 5, 12, 15 | 5 | 200 | 70-82 | 1000 |
| RNM-xx09S (3,4) | 3.3, 5, 12, 15 | 9 | 111 | 70-78 | 1000 |
| RNM-xx12S (3,4) | 3.3, 5, 12, 15 | 12 | 83 | 76-80 | 470 |
| RNM-xx15S (3,4) | 3.3, 5, 12, 15 | 15 | 66 | 78-84 | 470 |

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. 60950-1-07 certified*
IEC/EN60950-1 certified

## Model Numbering

RNM- ___ ___ S/ ___ ___

- Input Voltage
- Output Voltage
- Protection (3)
- Isolation Option (4)
- **S**ingle

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 continuous short circuit protection and 2kVDC/1s Isolation

**Ordering Examples:**

RNM-0505S/P: 5V Input Voltage, 5V Output Voltage, Single Output with continuous short circuit protection
RNM-0505S/HP: 5V Input Voltage, 5V Output Voltage, Single Output with 2kVDC/1s Isolation and continuous short circuit protection

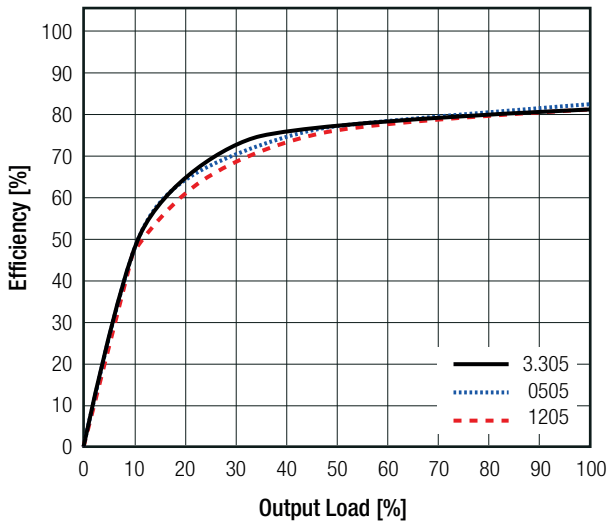
## Specifications (measured @ Ta= 25°C, nom. Vin and full load otherwise stated)

### BASIC CHARACTERISTICS

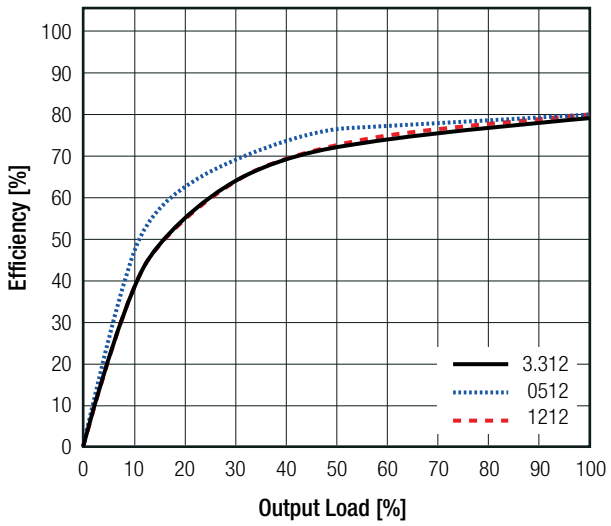
| Parameter | Condition | Min. | Typ. | Max. |
|---|---|---|---|---|
| Input Voltage Range | | | ±10% | |
| Minimum Load | | 0% | | |
| Internal Operating Frequency | | 50kHz | 100kHz | 105kHz |
| Output Ripple and Noise | 20MHz BW | | | 100mVp-p |

**Efficiency vs. Load**

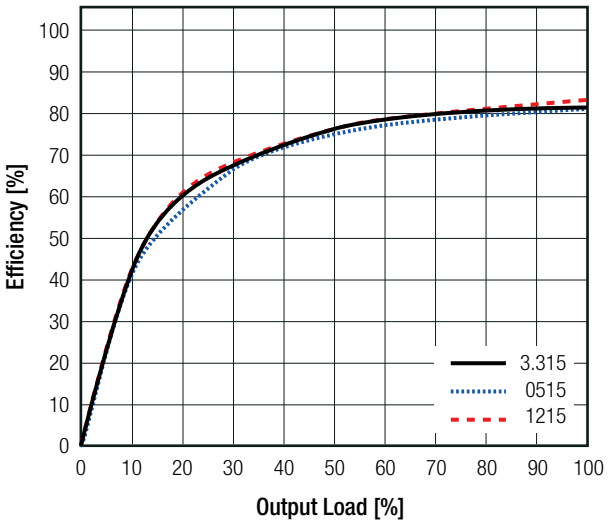
RNM-xx05S




RNM-xx12S




RNM-xx15S




### REGULATIONS

| Parameter | Condition | | Value |
|---|---|---|---|
| Output Accuracy | | | ±5.0% max. |
| Line Regulation | low line to high line | | ±1.2% of 1.0% Vin typ. |
| Load Regulation [5] | 10% to 100% load | 3.3Vout | 20.0% max. |
| | | 5Vout | 15.0% max. |
| | | 9, 12, 15Vout | 10.0% max. |

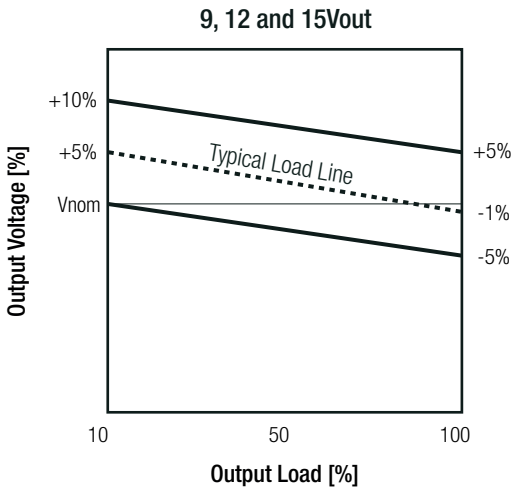
continued on next page

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

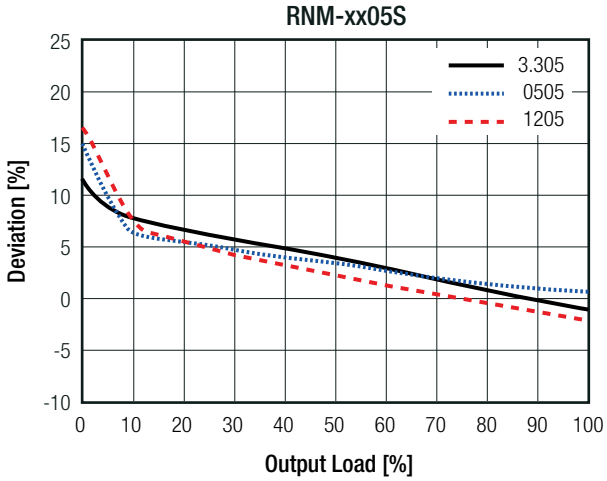
**Notes:**

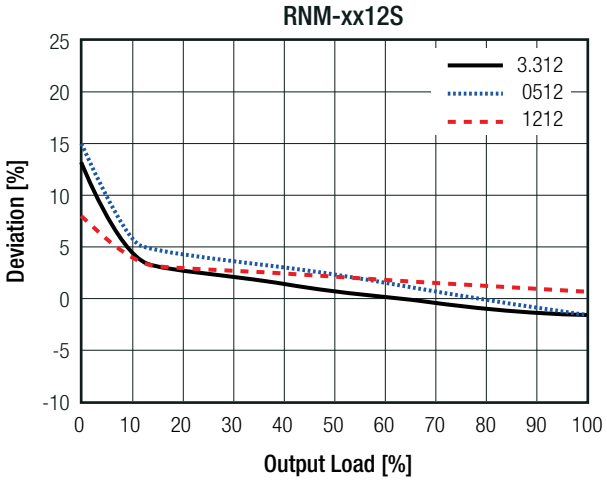
Note5: Operation below 10% load will not harm the converter, but specifications may not be met

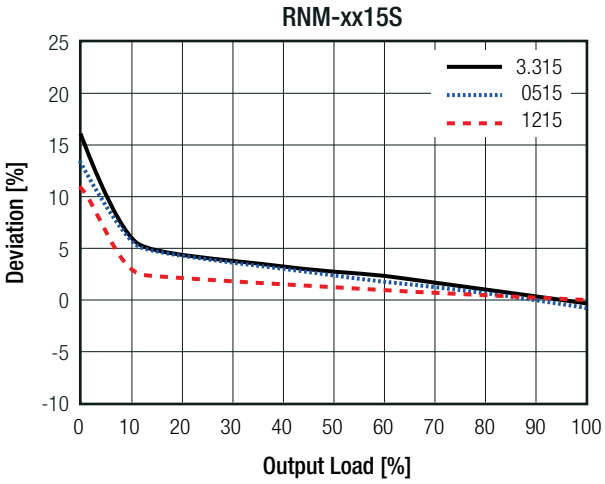
### Tolerance Envelope




### Deviation vs. Load



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

### PROTECTIONS

| Parameter | Type | | | Value |
|---|---|---|---|---|
| Short Circuit Protection (SCP) | without suffix<br>with suffix "/P" | | | 1 second<br>continuous |
| Isolation Voltage [6] | I/P to O/P | without suffix | tested for 1 second<br>rated for 1 minute | 1kVDC<br>500VAC/60Hz |
| | | with suffix "/H" | tested for 1 second<br>rated for 1 minute | 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:**

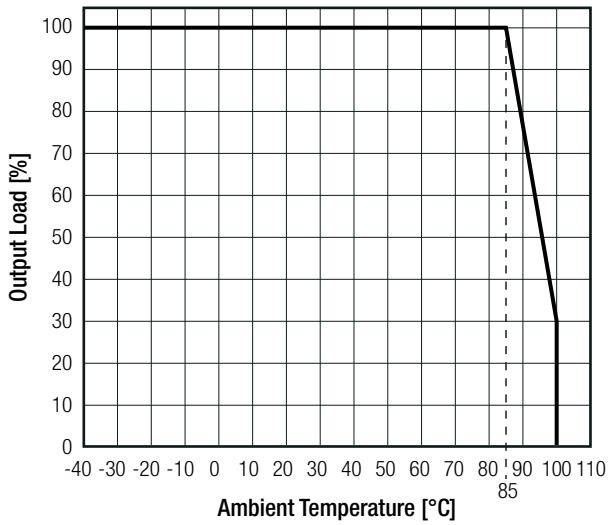
Note6: For repeat Hi-Pot testing, reduce the time and/or the test voltage

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

### ENVIRONMENTAL

| Parameter | Condition | | Value |
|---|---|---|---|
| Operating Temperature Range | full load @ free air convection (see graph) | | -40°C to +85°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>+85°C | 22900 x $10^3$ hours<br>9100 x $10^3$ hours |

**Derating Graph**
(@ free air convection)



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

### SAFETY AND CERTIFICATIONS

| Certificate Type (Safety) | Report / File Number | Standard |
|---|---|---|
| Information Technology Equipment, General Requirements for Safety [8] | E358085 | UL60950-1, 2nd Edition:2007<br>CAN/CSA C22.2 No. 60950-1-07, 2nd Edition:2007 |
| Information Technology Equipment, General Requirements for Safety | 1602031 | IEC60950-1:2005, 2nd Edition + A2:2013<br>EN60950-1:2006 + A2:2013 |
| Information Technology Equipment, General Requirements for Safety [8] (CB Scheme) | US-13859-UL | IEC60950-1:2005, 2nd Edition |
| EAC | RU-AT.49.09571 | TP TC 004/2011 |
| RoHs 2+ | | RoHS-2011/65/EU + AM-2015/863 |

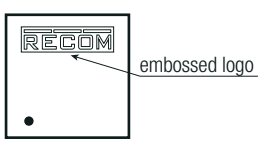
**Notes:**

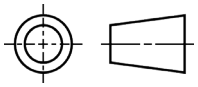
Note8: suffix "/P" excluded

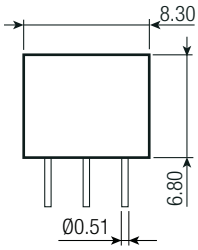
### DIMENSION AND PHYSICAL CHARACTERISTICS

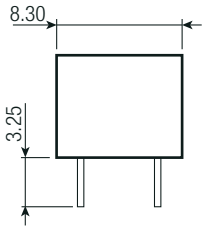
| Parameter | Type | Value |
|---|---|---|
| Material | case<br>potting<br>PCB | non-conductive black plastic, (UL94 V-0)<br>epoxy, (UL94 V-0)<br>FR4, (UL94 V-0) |
| Dimension (LxWxH) | | 8.3 x 8.3 x 6.8mm |
| Weight | | 1.1g typ. |

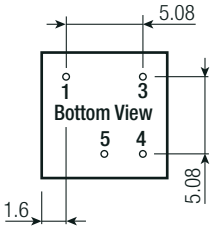
**Dimension Drawing (mm)**



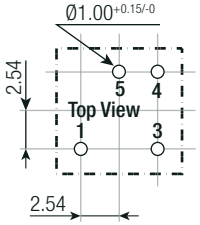






Recommended Footprint Details




**Pinning information**

| Pin # | Single |
|---|---|
| 1 | -Vin |
| 3 | +Vin |
| 4 | +Vout |
| 5 | -Vout |

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

### PACKAGING INFORMATION

| Parameter | Type | Value |
|---|---|---|
| Packaging Dimension (LxWxH) | tube | 530.0 x 14.0 x 10.0mm |
| Packaging Quantity | | 60pcs |
| Storage Temperature Range | | -55°C to +125°C |
| Storage Humidity | non-condensing | 95% RH max. |

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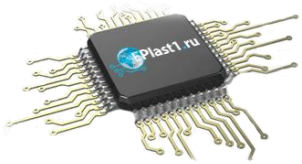
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.




**Как с нами связаться**

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