

Features

- Adjustable Output Voltage
- Non-Isolated
- 1-2AMP Adjustable Positive Step Down Integrated Switching Regulator
- Internal Short Circuit Protection
- ON/OFF Control(Ground Off)
- UL94V-0 Package Material
- Wide Input Range
- Efficiency to 96%

Rev.1

Description

The R-6XXX series is a high performance 1.5V to 15V, 1Amp to 2Amp, 12-Pin SIP (single in-line package) integrated switching regulator (ISR). Synchronous rectification yields excellent efficiencies of up to 97%. The devices feature short circuit protection with internal crowbar function to reduce the short circuit input current to under 50mA during fault conditions.

Selection Guide

| Part Number SIP12 | Input Range (V) | Nominal Output Voltage (V) | Vout Adjust Range (V) | Output Current (A) | Efficiency (%) | |
|----------------------|--------------------|-------------------------------|--------------------------|-----------------------|----------------|--------------|
| | | | | | Vin min. (%) | Vin max. (%) |
| R-611.8x | 9 – 32 | 1.8 | 1.5 – 3.6 | 1 | 79 | 67 |
| R-612.5x | 9 – 32 | 2.5 | 1.5 – 4.5 | 1 | 84 | 74 |
| R-613.3x | 9 – 32 | 3.3 | 1.8 – 6 | 1 | 88 | 79 |
| R-615.0x | 9 – 32 | 5 | 1.8 – 9 | 1 | 92 | 84 |
| R-619.0x | 11 – 32 | 9 | 3.3 – 15 | 1 | 96 | 90 |
| R-6112x | 14 – 32 | 12 | 3.3 – 15 | 1 | 97 | 92 |
| R-621.8x | 9 – 32 | 1.8 | 1.5 – 3.6 | 2 | 76 | 68 |
| R-622.5x | 9 – 32 | 2.5 | 1.5 – 4.5 | 2 | 81 | 74 |
| R-623.3x | 9 – 32 | 3.3 | 1.8 – 6 | 2 | 86 | 80 |
| R-625.0x | 9 – 32 | 5 | 1.8 – 9 | 2 | 90 | 85 |
| R-629.0x | 11 – 32 | 9 | 3.3 – 15 | 2 | 95 | 91 |
| R-6212x | 14 – 32 | 12 | 3.3 – 15 | 2 | 96 | 93 |

Note: $V_{in} - V_{out} \geq 1.5V$ if adjust function is used!

Suffix x: (see mechanical drawing for details)

x = P pins vertical through hole

x = D pins bent for horizontal through hole mounting

Specifications (refer to the standard application circuit, Ta: 25°C)

| Characteristics | Conditions | Min. | Typ. | Max. |
|---|------------------|------|------|------|
| Input Voltage Range | $V_{out} = 1.8V$ | 9V | | 32V |
| | $V_{out} = 2.5V$ | 9V | | 32V |
| | $V_{out} = 3.3V$ | 9V | | 32V |
| | $V_{out} = 5V$ | 9V | | 32V |
| | $V_{out} = 9V$ | 11V | | 32V |
| | $V_{out} = 12V$ | 14V | | 32V |
| Output Voltage Adjust Range (see table 1) | $V_{out} = 1.8V$ | 1.5V | 1.8V | 3.6V |
| | $V_{out} = 2.5V$ | 1.5V | 2.5V | 4.5V |
| | $V_{out} = 3.3V$ | 1.8V | 3.3V | 6V |
| | $V_{out} = 5V$ | 1.8V | 5V | 9V |
| | $V_{out} = 9V$ | 3.3V | 9V | 15V |
| | $V_{out} = 12V$ | 3.3V | 12V | 15V |

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INNOLINE
DC/DC-Converter

R-6xxxP_D Series

**1-2 AMP
SIP12
Vertical &
Horizontal**



RECOM

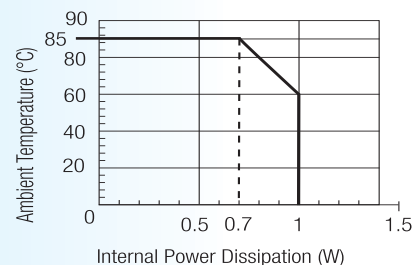
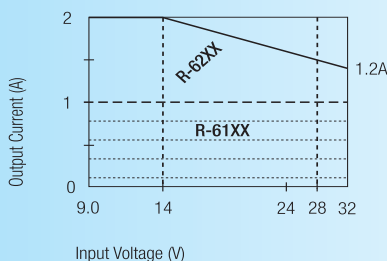
Specifications (refer to the standard application circuit, Ta: 25°C)

| Characteristics | Conditions | Min. | Typ. | Max. |
|---|-------------------------------|--------------------------------|--------|-----------------------------|
| Output Current | R-61xxP/D | 0.1A | | 1.0A |
| | R-62xxP/D | 0.2A | | 2.0A |
| Output Current Limit | | 4A | 4.5A | 5A |
| Short Circuit Input Current | Vin > 12V | 20mA | | 100mA |
| Short Circuit Protection | | Continuous, automatic recovery | | |
| Output Voltage Accuracy | At 100% Load | | ±1% | ±2% |
| Line Voltage Regulation (Vin = min. to max. at full load) | | | 0.5% | |
| Load Regulation (10 to 100% full load) | R-61xxP/D | | | 0.5% |
| | R-62xxP/D | | | 1.0% |
| Vo Ripple & Noise | R-61xxP/D | | 40mVpp | 100mVpp |
| | R-62xxP/D | | 40mVpp | 120mVpp |
| Transient Response (see note 1) | 50% Load Change | | 100us | 200us |
| | Vout Over / Undershoot | | 5% | |
| Remote ON / OFF (see note 2) (positive logic) | Open or high (Power ON) | 2.0V | | 10V |
| | Low (Power OFF) | | | 0.8V |
| Remote Off Input Current | Remote ON/OFF low level | | 100µA | |
| Switching Frequency | | 200kHz | 250kHz | 300kHz |
| Quiescent Current | Vin = min. to max. at 0% load | | 6mA | 10mA |
| Operating Temperature Range | | -40°C | | +85°C |
| Storage Temperature Range | | -40°C | | +125°C |
| internal Power Dissipation | Io x Vo x (1-Efficiency) | | | 1.0W |
| Package Weight | | | | 9g |
| MTBF (Nominal Vout, 100% load) | Tamb. = +25°C | | | 563 x 10 ³ hours |
| | Tamb. = +71°C | | | 117 x 10 ³ hours |

Notes:

1. Requires a 100µF electrolytic or tantalum output capacitor for proper operation in all applications (the capacitor to be placed as close as possible to the output pins).
2. ON / OFF pin can be driven by TTL (logic gate), open-collector bipolar transistor or open-drain MOSFET.
3. Output Current vs. Input Voltage (see graph below).

Output Current vs Input Voltage



Max output current calculation:

Internal power dissipation
 $(1W) = I_o \times V_o \times (1-\text{Efficiency})$
 $I_o = 1(W) / V_o \times (1-\text{Efficiency})$

Example : R-6212P

at Vin = 28VDC

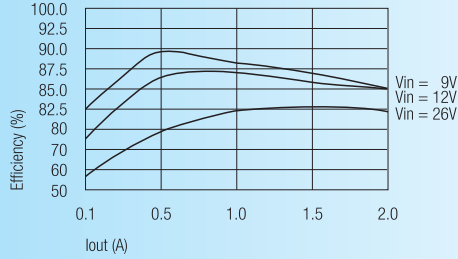
Efficiency = 94% (see "Selection Guide" table)
 $V_o = 12VDC$
 $I_o = 1W / 12V \times (1-0.94) = 1.388A = 1.5A$

at Vin = 14VDC

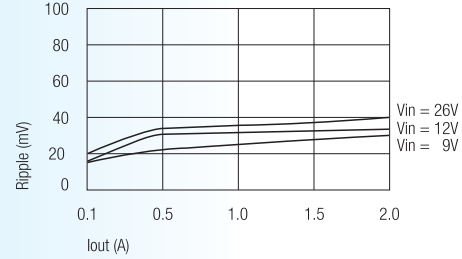
Efficiency = 96% (see "Selection Guide" table)
 $V_o = 12Vdc$
 $I_o = 1W / 12V \times (1-0.96) = 2.08A$ (spec. = 2A max.)

Characteristics

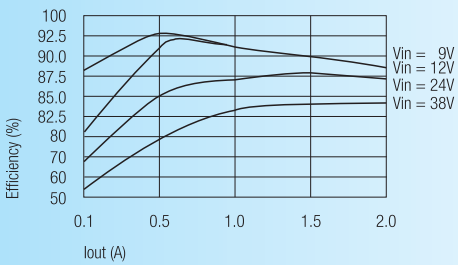
R-623.3 / R-613.3
Efficiency vs Output Current



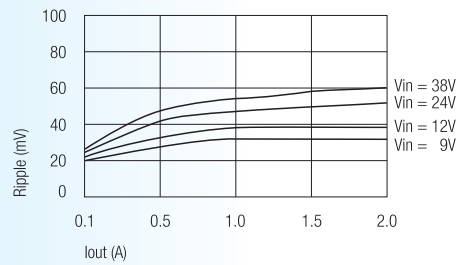
R-623.3 / R-613.3
Ripple vs Output Current



R-625.0 / R-615.0
Efficiency vs Output Current

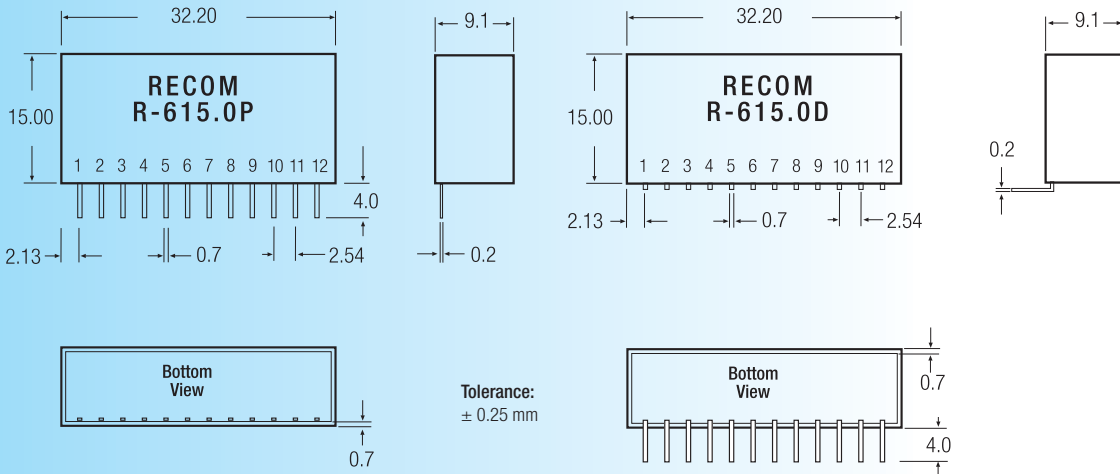


R-625.0 / R-615.0
Ripple vs Output Current



Package Style and Pinning (mm)

SIP12 PIN Package



Pin Connections

| Pin # | Name | Description |
|------------|----------|---|
| 1 | ON / OFF | Input pin : Active low (less than 0.8V) to disable the device |
| 2, 3, 4 | Vin | Power input |
| 5, 6, 7, 8 | GND | Input and output ground (common) |
| 9, 10, 11 | Vout | Power output |
| 12 | Vout-Adj | With external resistors R1,R2 to selected output voltage |