

## Features

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

**INNOVATION**  
DC/DC-Converter

# R-6xxxP\_D Series

## Selection Guide

| Part Number | Input Range (V) | Nominal Output Voltage (V) | Vout Adjust Range (V) | Output Current (A) | Efficiency (%) Vin min. | Efficiency (%) Vin max. |
|-------------|-----------------|----------------------------|-----------------------|--------------------|-------------------------|-------------------------|
| SIP12       | (V)             | (V)                        | (V)                   | (A)                | (%)                     | (%)                     |
| 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

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



**RECOM**

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

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

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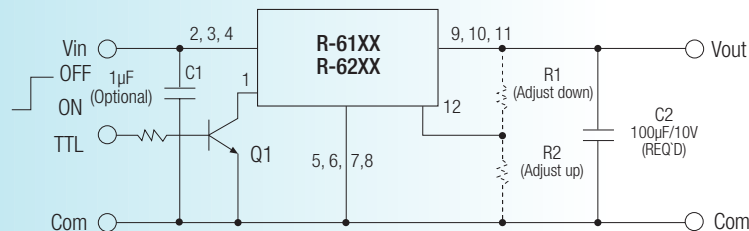
**Specifications (refer to the standard application circuit, Ta: 25°C)**

| Characteristics                                  | Conditions                                 | Min.   | Typ.             | Max.               |
|--------------------------------------------------|--------------------------------------------|--------|------------------|--------------------|
| Vo Ripple & Noise                                | R-61xxP/D<br>R-62xxP/D                     |        | 40mVpp<br>40mVpp | 100mVpp<br>120mVpp |
| Transient Response (see note 1)                  | 50% Load Change<br>Vout Over / Undershoot  |        | 100us<br>5%      | 200us              |
| Remote ON / OFF (see note 2)<br>(positive logic) | Open or high (Power ON)<br>Low (Power OFF) | 2.0V   |                  | 10V<br>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               |

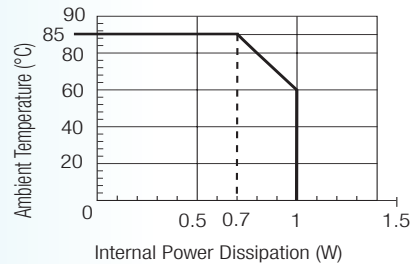
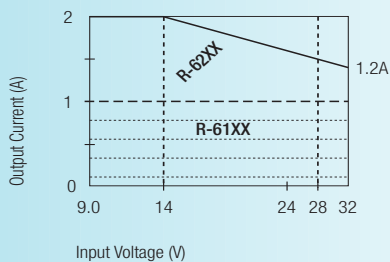
**Notes:**

- 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).
- ON / OFF pin can be driven by TTL (logic gate), open-collector bipolar transistor or open-drain MOSFET.
- Output Current vs. Input Voltage (see graph below).

**Standard Application Circuit**



**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)

Vo = 12VDC

$I_o = 1W / 12V \times (1-0.94) = 1.388A \approx 1.5A$

**at Vin = 14VDC**

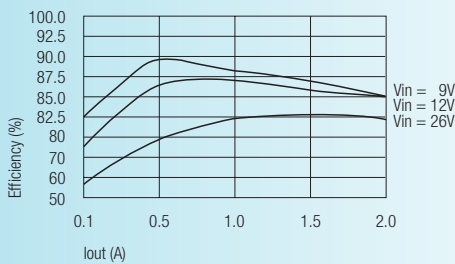
Efficiency = 96% (see "Selection Guide" table)

Vo = 12Vdc

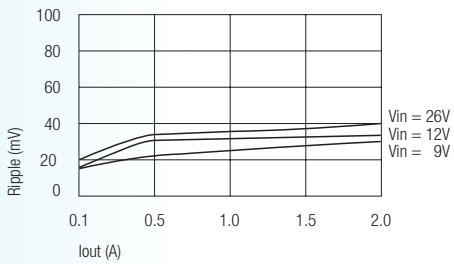
$I_o = 1W / 12V \times (1-0.96) = 2.08A$  (spec. = 2A max.)

Characteristics

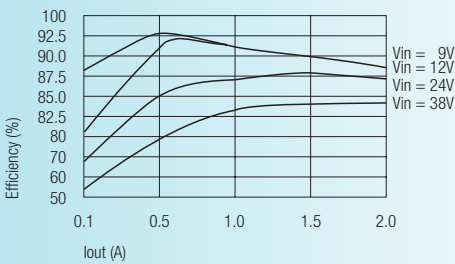
R-623.3 / R-613.3  
Efficiency vs Output Current



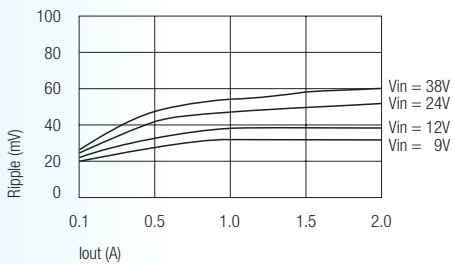
R-623.3 / R-613.3  
Ripple vs Output Current



R-625.0 / R-615.0  
Efficiency vs Output Current

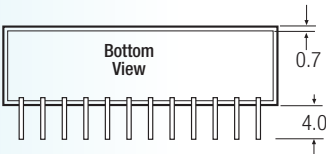
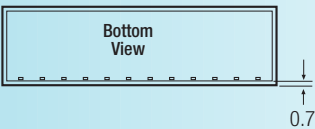
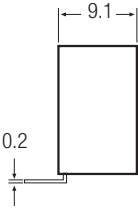
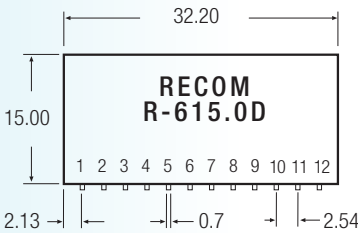
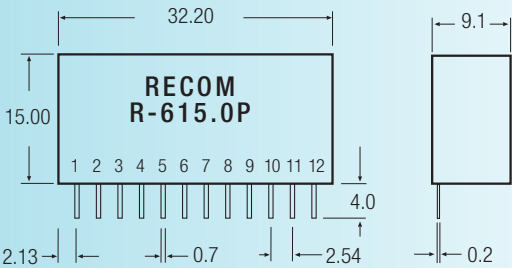


R-625.0 / R-615.0  
Ripple vs Output Current



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      |

Tolerance:  
± 0.25 mm

Table 1: Adjustment Resistor Values

| 1Adc           | R-611.8P/D |       | R-612.5P/D |       | R-613.3P/D |       | R-615.0P/D |       | R-619.0P/D |       | R-6112P/D |       |
|----------------|------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|-----------|-------|
| 2Adc           | R-621.8P/D |       | R-622.5P/D |       | R-623.3P/D |       | R-625.0P/D |       | R-629.0P/D |       | R-6212P/D |       |
| Vout (nominal) | 1.8VDC     |       | 2.5VDC     |       | 3.3VDC     |       | 5VDC       |       | 9VDC       |       | 12VDC     |       |
| Vout (adj)     | R1         | R2    | R1         | R2    | R1         | R2    | R1         | R2    | R1         | R2    | R1        | R2    |
| 1.5            | 13.6KΩ     |       | 3.3KΩ      |       |            |       |            |       |            |       |           |       |
| 1.8            |            |       | 8.2KΩ      |       | 3.1KΩ      |       | 820Ω       |       |            |       |           |       |
| 2.0            |            | 10KΩ  | 15KΩ       |       | 5.1KΩ      |       | 1.5KΩ      |       |            |       |           |       |
| 2.5            |            | 5.1KΩ |            |       | 13KΩ       |       | 3.6KΩ      |       |            |       |           |       |
| 3.0            |            | 2.5KΩ |            | 10KΩ  | 51KΩ       |       | 7.0KΩ      |       |            |       |           |       |
| 3.3            |            | 1.7KΩ |            | 5.9KΩ |            |       | 9.7KΩ      |       | 0Ω         |       | 0Ω        |       |
| 3.6            |            | 1.2KΩ |            | 3.9KΩ |            | 18KΩ  | 14KΩ       |       | 1.5KΩ      |       | 560Ω      |       |
| 3.9            |            |       |            | 2.8KΩ |            | 9.1KΩ | 20KΩ       |       | 3.3KΩ      |       | 1.2KΩ     |       |
| 4.5            |            |       |            | 1.6KΩ |            | 3.9KΩ | 60KΩ       |       | 7.5KΩ      |       | 2.1KΩ     |       |
| 5.0            |            |       |            |       |            | 2.4KΩ |            |       | 11KΩ       |       | 4.0KΩ     |       |
| 5.1            |            |       |            |       |            | 2.2KΩ |            | 60KΩ  | 12KΩ       |       | 4.3KΩ     |       |
| 5.5            |            |       |            |       |            | 1.6KΩ |            | 15KΩ  | 17KΩ       |       | 5.6KΩ     |       |
| 6.0            |            |       |            |       |            | 1.1KΩ |            | 7.2KΩ | 24KΩ       |       | 7.5KΩ     |       |
| 7.0            |            |       |            |       |            |       |            | 2.8KΩ | 51KΩ       |       | 12KΩ      |       |
| 8.0            |            |       |            |       |            |       |            | 1.5KΩ | 130KΩ      |       | 19KΩ      |       |
| 9.0            |            |       |            |       |            |       |            | 880Ω  |            |       | 31KΩ      |       |
| 10             |            |       |            |       |            |       |            | 450Ω  |            | 36KΩ  | 55KΩ      |       |
| 11             |            |       |            |       |            |       |            | 180Ω  |            | 15KΩ  | 125KΩ     |       |
| 12             |            |       |            |       |            |       |            |       |            | 8.2KΩ |           |       |
| 13             |            |       |            |       |            |       |            |       |            | 4.7KΩ |           | 11KΩ  |
| 14             |            |       |            |       |            |       |            |       |            | 2.7KΩ |           | 4.0KΩ |
| 15             |            |       |            |       |            |       |            |       |            | 1.3KΩ |           | 1.6KΩ |