

## 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%

**INNOLINE**  
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. (%)	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

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



**RECOM**

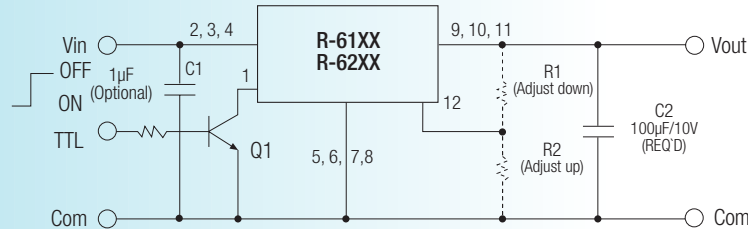
**Specifications (refer to the standard application circuit, Ta: 25°C)**

Characteristics	Conditions	Min.	Typ.	Max.
Vo Ripple & Noise	R-61xxP/D R-62xxP/D		40mVpp 40mVpp	100mVpp 120mVpp
Transient Response (see note 1)	50% Load Change Vout Over / Undershoot		100us 5%	200us
Remote ON / OFF (see note 2) (positive logic)	Open or high (Power ON) Low (Power OFF)	2.0V		10V 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	$I_o \times V_o \times (1-\text{Efficiency})$			1.0W

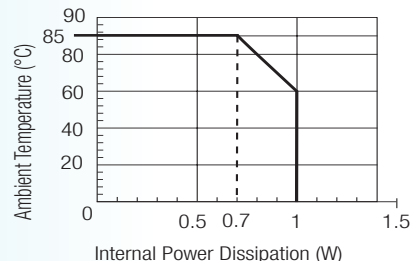
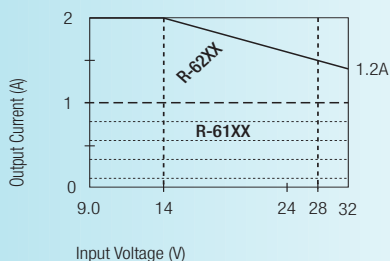
**Notes:**

- 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**

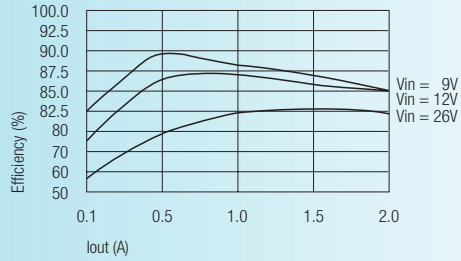
Efficiency = 94% (see "Selection Guide" table)  
 $V_o = 12VDC$   
 $I_o = 1W / 12V \times (1-0.94) = 1.388A = 1.5A$

**at Vin = 14VDC**

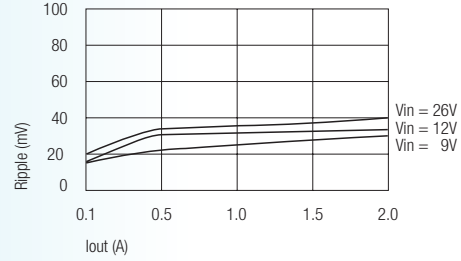
Efficiency = 96% (see "Selection Guide" table)  
 $V_o = 12Vdc$   
 $I_o = 1W / 12V \times (1-0.96) = 2.08A$  (spec. = 2A max.)

**Characteristics**

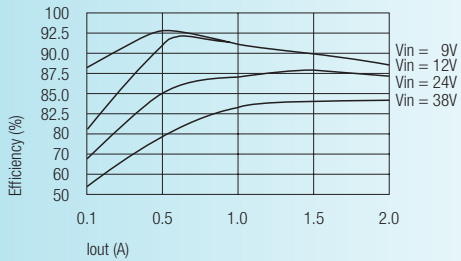
**R-623.3 / R-613.3**  
Efficiency vs Output Current



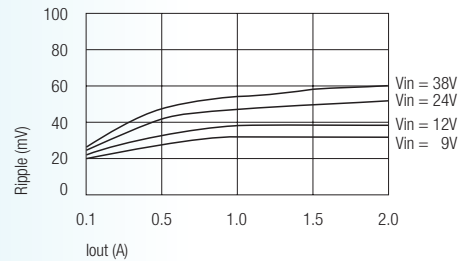
**R-623.3 / R-613.3**  
Ripple vs Output Current



**R-625.0 / R-615.0**  
Efficiency vs Output Current

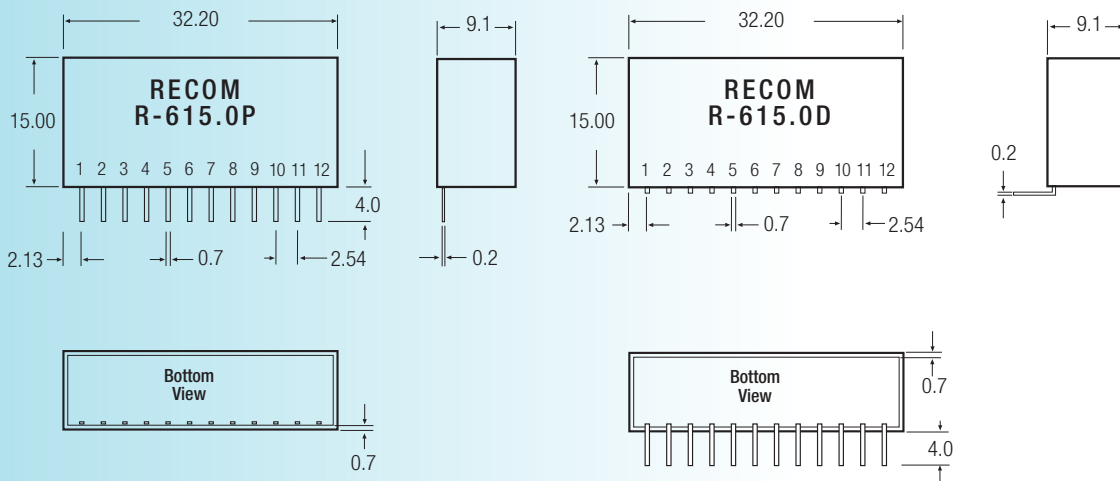


**R-625.0 / R-615.0**  
Ripple vs Output Current



**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

**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	13.6K $\Omega$		3.3K $\Omega$									
1.8			8.2K $\Omega$		3.1K $\Omega$		820 $\Omega$					
2.0		10K $\Omega$	15K $\Omega$		5.1K $\Omega$		1.5K $\Omega$					
2.5		5.1K $\Omega$			13K $\Omega$		3.6K $\Omega$					
3.0		2.5K $\Omega$	10K $\Omega$		51K $\Omega$		7.0K $\Omega$					
3.3		1.7K $\Omega$	5.9K $\Omega$				9.7K $\Omega$		0 $\Omega$		0 $\Omega$	
3.6		1.2K $\Omega$	3.9K $\Omega$		18K $\Omega$		14K $\Omega$		1.5K $\Omega$		560 $\Omega$	
3.9			2.8K $\Omega$		9.1K $\Omega$		20K $\Omega$		3.3K $\Omega$		1.2K $\Omega$	
4.5			1.6K $\Omega$		3.9K $\Omega$		60K $\Omega$		7.5K $\Omega$		2.1K $\Omega$	
5.0					2.4K $\Omega$				11K $\Omega$		4.0K $\Omega$	
5.1					2.2K $\Omega$		60K $\Omega$		12K $\Omega$		4.3K $\Omega$	
5.5					1.6K $\Omega$		15K $\Omega$		17K $\Omega$		5.6K $\Omega$	
6.0					1.1K $\Omega$		7.2K $\Omega$		24K $\Omega$		7.5K $\Omega$	
7.0							2.8K $\Omega$		51K $\Omega$		12K $\Omega$	
8.0							1.5K $\Omega$		130K $\Omega$		19K $\Omega$	
9.0							880 $\Omega$				31K $\Omega$	
10							450 $\Omega$		36K $\Omega$		55K $\Omega$	
11							180 $\Omega$		15K $\Omega$		125K $\Omega$	
12									8.2K $\Omega$			
13									4.7K $\Omega$		11K $\Omega$	
14									2.7K $\Omega$		4.0K $\Omega$	
15									1.3K $\Omega$		1.6K $\Omega$	