

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%

INNOLINE
DC/DC-Converter

R-6xxxP_D Series

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



RECOM

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: Vin -Vout ≥ 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
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%

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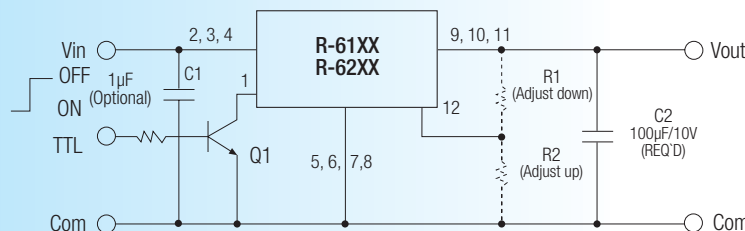
Specifications (refer to the standard application circuit, Ta: 25°C)

Characteristics	Conditions	Min.	Typ.	Max.
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	$I_o \times V_o \times (1 - \text{Efficiency})$			1.0W
MTBF (Nominal Vout, 100% load)	Tamb. = +25°C			563 x 10 ³ hours
	Tamb. = +71°C			117 x 10 ³ hours

Notes:

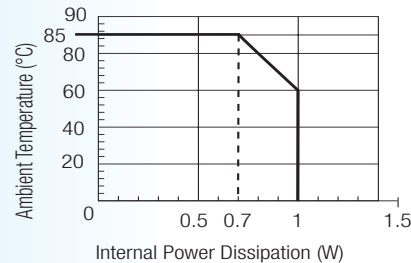
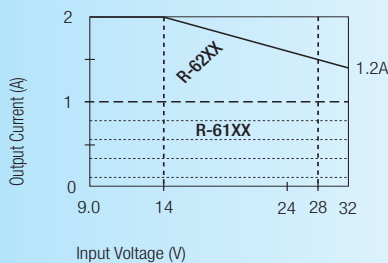
- Requires a 100µF electrolytic or tantalum output capacitor for proper operation in all applications (the capacitor to be placed as close as possible to the output pins).
- ON / OFF pin can be driven by TTL (logic gate), open-collector bipolar transistor or open-drain MOSFET.
- Output Current vs. Input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

Standard Application Circuit



Add a blocking diode to Vout if current can flow backwards into the output, as this can damage the converter..

Output Current vs Input Voltage

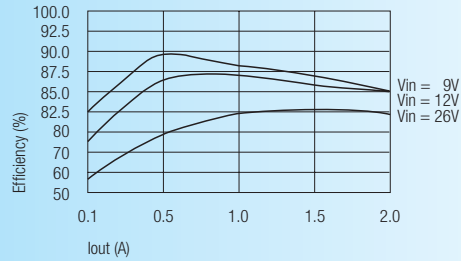


Max output current calculation:
 Internal power dissipation
 $(1W) = I_o \times V_o \times (1 - \text{Efficiency})$
 $I_o = 1(W) / V_o \times (1 - \text{Efficiency})$
Example : R-6212P
at Vin = 28VDC
 Efficiency = 94% (see "Selection Guide" table)
 Vo = 12VDC
 $I_o = 1W / 12V \times (1 - 0.94) = 1.388A \approx 1.5A$

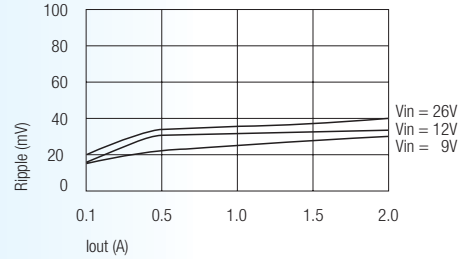
at Vin = 14VDC
 Efficiency = 96% (see "Selection Guide" table)
 Vo = 12Vdc
 $I_o = 1W / 12V \times (1 - 0.96) = 2.08A$ (spec. = 2A max.)

Characteristics

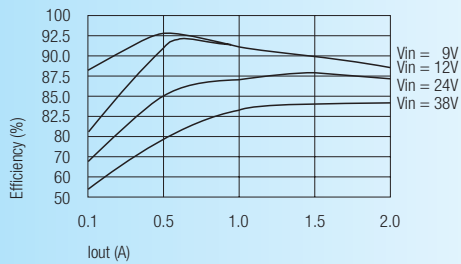
R-623.3 / R-613.3
Efficiency vs Output Current



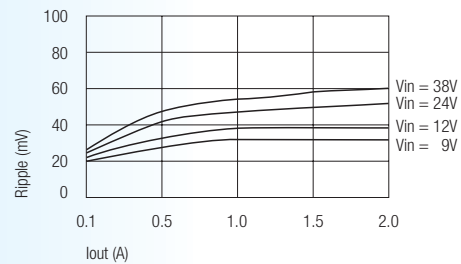
R-623.3 / R-613.3
Ripple vs Output Current



R-625.0 / R-615.0
Efficiency vs Output Current



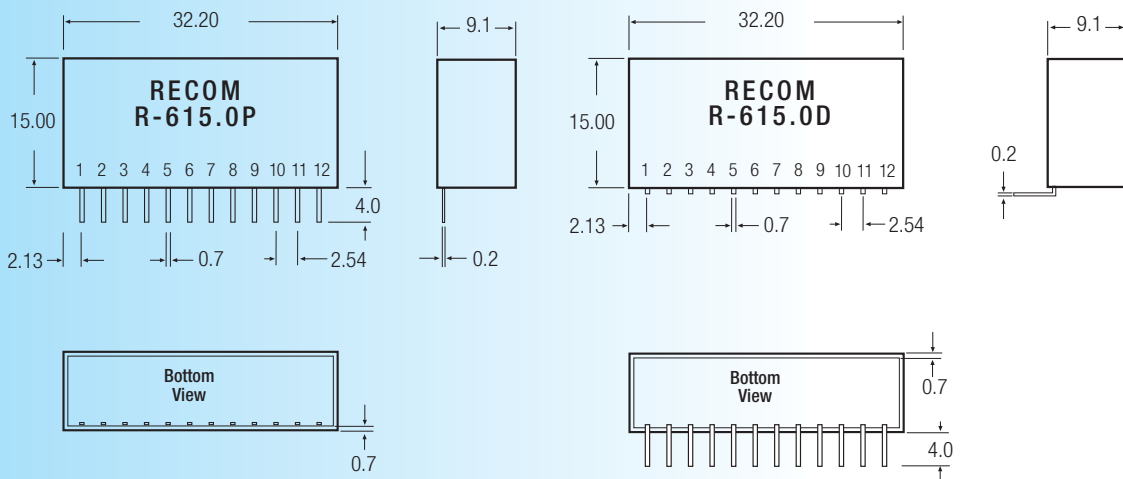
R-625.0 / R-615.0
Ripple vs Output Current



Package Style and Pinning (mm)

SIP12 PIN Package

3rd angle projection



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