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%
- See Innoline Application Notes for use as an Inverter

INNOLINE
DC/DC-Converter

with 3 year Warranty

RECOM

1-2 AMP SIP12 Vertical & Horizontal

RoHS 2011/65/EU 6/6

EN-60950-1 Certified

R-6xxx

Description

The R-6XXX series is a high performance 1.5V to 15V (18V), 1.1Amp to 2.0Amp,12-Pin SIP (single in-line package) switching regulator. Synchronous rectification yields excellent efficiencies of up to 97%. Short circuit protection reduces the short circuit input current to under 50mA.

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: 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

Continued on next page

Refer to Application Notes

R-6xxxP_D Series

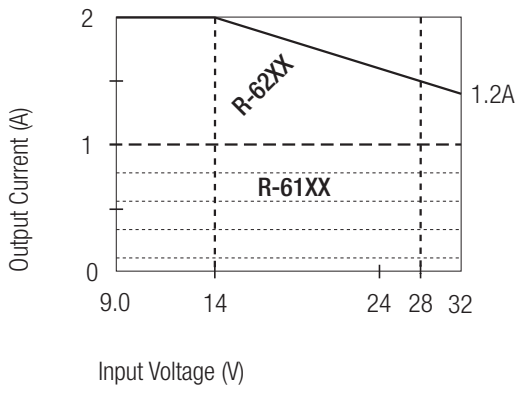
Specifications (refer to the standard application circuit, Ta: 25°C)

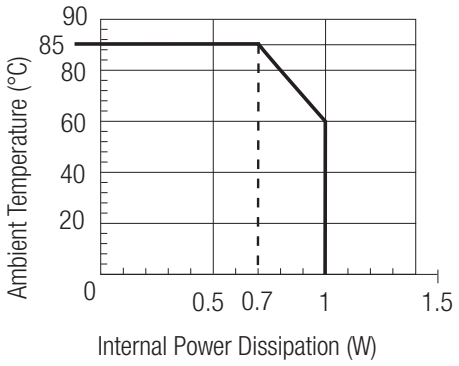
Characteristics	Conditions	Min.	Typ.	Max.
Output Current	R-61xxP/D	0.1A		1.1A
	R-62xxP/D	0.2A		2.0A
Output Current Limit		4A	4.5A	5A
Short Circuit Input Current	Vin > 12V	20mA		100mA
Short Circuit Protection			Continuous, automatic recovery	
Output Voltage Accuracy	At 100% Load		±1%	±2%
Line Voltage 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)	Open or high (Power ON)	2.0V		10V
(positive logic)	Low (Power OFF)			0.8V
Remote Off Input Current	Remote ON/OFF low level		100µA	
Max capacitance Load	with normal start-up time, no external diodes			200µF
	with <1 second start up time + diode protection circuit			6800µF
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
Case Material				Non-Conductive Black Plastic
Potting Material				Epoxy (UL94V-0)
internal Power Dissipation	Io x Vo x (1-Efficiency)			1.0W
Package Weight				9g
Packing Quantity				15 pcs per Tube
MTBF (Nominal Vout, 100% load)	Tamb. = +25°C	*Detailed Information see Application Notes chapter "MTBF"*		563 x 10³ hours
	Tamb. = +71°C			117 x 10³ hours
EN General Safety	Report: SPCLVD 1301028-1			EN60950-1:2006 + A12:2011

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





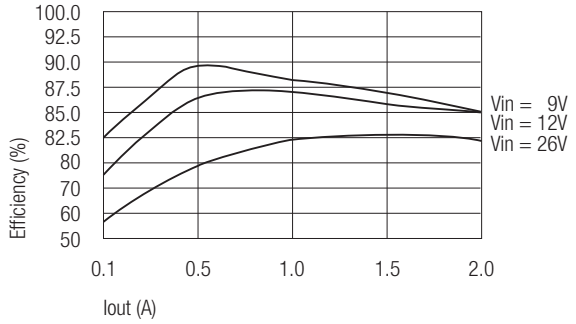
Max output current calculation:
Internal power dissipation
(1W) = Io x Vo x (1-Efficiency)
Io = 1(W) / Vo x (1-Efficiency)

Example : R-6212P

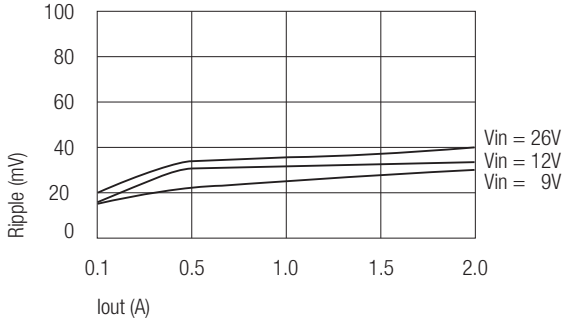
at Vin = 32VDC	at Vin = 14VDC
Efficiency = 93% (see "Selection Guide" table)	Efficiency = 96% (see "Selection Guide" table)
Vo = 12VDC	Vo = 12Vdc
Io = 1W / 12V x (1-0.93) = 1.19A	Io = 1W / 12V x (1-0.96) = 2.08A

Characteristics

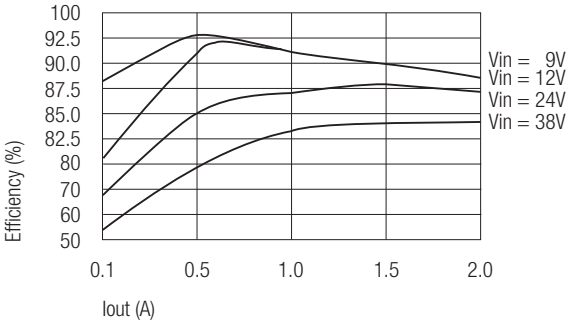
R-623.3 / R-613.3
Efficiency vs Output Current



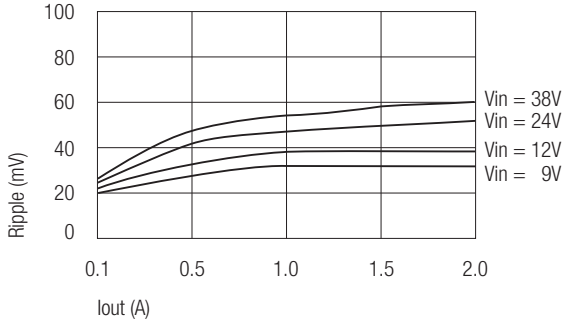
R-623.3 / R-613.3
Ripple vs Output Current



R-625.0 / R-615.0
Efficiency vs Output Current

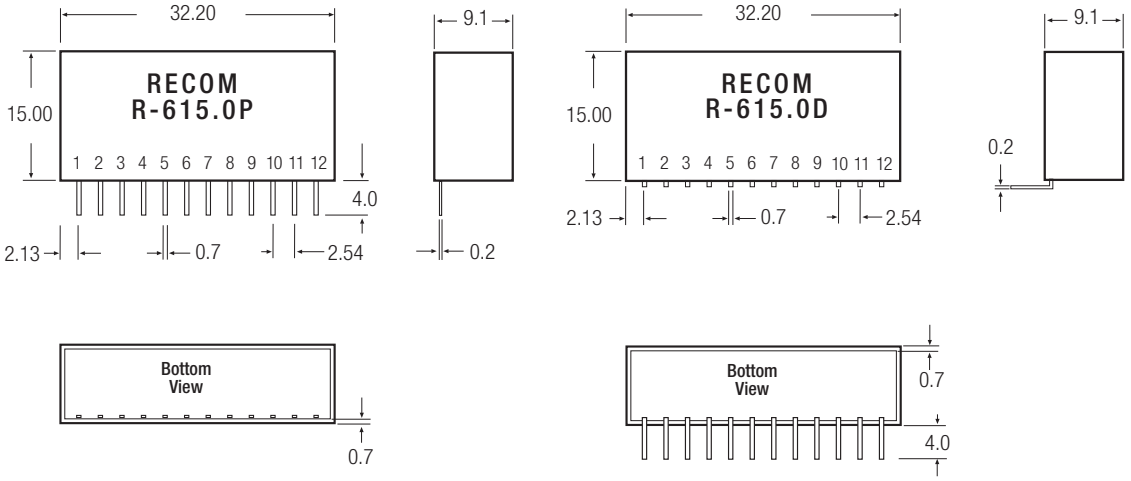


R-625.0 / R-615.0
Ripple vs Output Current



Package Style and Pinning (mm)

SIP12 PIN Package



Pin Connections

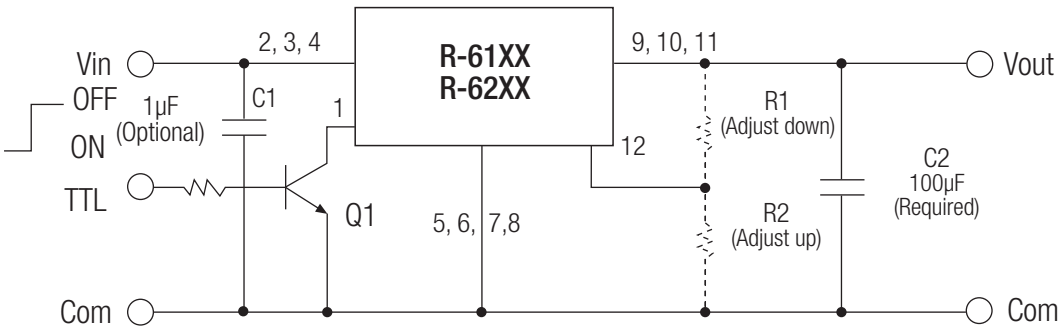
Pin #	Name	Description
1	ON / OFF	Input pin : Active low (less than 0.8V) to disable the device
2, 3, 4	Vin	Power input
5, 6, 7, 8	GND	Input and output ground (common)
9 , 10, 11	Vout	Power output
12	Vout-Adj	With external resistors R1,R2 to selected output voltage

Tolerance: xx.x ±0.5mm
xx.xx ±0.25mm

Table 1: Adjustment Resistor Values

1.1Adc	R-611.8P/D		R-621.5P/D		R-613.3P/D		R-615.0P/D		R-619.0P/D		R-6112P/D	
2.0Adc	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		7.2Ω	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

Standard Application Circuit



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

Protection diodes are required for high capacitive loads.

Refer to R-5xxxA Datasheet (see Optional Diode Protection Circuit) for circuit suggestions.