Features

- Auto-sense
- Non-Isolation
- Synchronous rectification design
- Adjustable Output voltage
- 2, 3, 4 & 5AMP Adjustable Positive Step Down Integrated Switching Regulator
- Over load protection (125% full load typical)
- Remote ON/OFF Control(Ground Off)
- Wide Input Range
- UL94V-0 Package Material
- Continuous short circuit protection (Short Circuit Input Current, Iin<50mA)
- Input voltage range 4.5V~18V
- Efficiency to 96%

INNOLINE
DC/DC-Converter

R-5xxxPA _DA Series

2, 3, 4, 5 AMP SIP12 Vertical & Horizontal

Selection Guide

Part Number SIP12	Inpu Range (V)	Nominal Output Voltage (V)	Vout Adjust Range (V)	Output Current (A)	Efficiency min.Vin (%)	12V (%)	max.Vin (%)
R-521.2xA	4.5 – 18	1.2	1.0 – 3.0	2	83	79	75
R-521.8xA	4.5 – 18	1.8	1.1 – 4.5	2	88	85	82
R-522.5xA	4.5 – 18	2.5	1.6 – 5.5	2	91	88	86
R-523.3xA	4.5 – 18	3.3	1.6 – 5.5	2	92	90	89
R-525.0xA	6.5 – 18	5.0	3.0 – 5.5	2	95	93	92
R-531.2xA	4.5 – 18	1.2	1.0 – 3.0	3	85	84	82
R-531.8xA	4.5 – 18	1.8	1.1 – 4.5	3	89	88	86
R-532.5xA	4.5 – 18	2.5	1.6 – 5.5	3	92	91	89
R-533.3xA	4.5 – 18	3.3	1.6 – 5.5	3	94	93	92
R-535.0xA	6.5 – 18	5.0	3.0 – 5.5	3	96	95	94
R-541.2xA	4.5 – 18	1.2	1.0 – 3.0	4	82	81	79
R-541.8xA	4.5 – 18	1.8	1.1 – 4.5	4	87	86	85
R-542.5xA	4.5 – 18	2.5	1.6 – 5.5	4	91	89	88
R-543.3xA	4.5 – 18	3.3	1.6 – 5.5	4	93	92	91
R-545.0xA	6.5 – 18	5.0	3.0 – 5.5	4	95	94	93
R-551.2xA	4.5 – 18	1.2	1.0 – 3.0	5	81	80	78
R-551.8xA	4.5 – 18	1.8	1.1 – 4.5	5	86	85	84
R-552.5xA	4.5 – 18	2.5	1.6 – 5.5	5	90	89	88
R-553.3xA	4.5 – 18	3.3	1.6 – 5.5	5	92	91	90
R-555.0xA	7.0 – 18	5.0	3.0 – 5.5	5	94	93	92

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

Description

The R-5XXX series is a high performance 1.2V to 5.0V , 2Amp to 5Amp,12-Pin SIP (single in-line package) integrated switching regulator (ISR). Synchronuous - rectified design yields excellent efficiencies up to 96%. Short circuit protection with crowbar function to reduce the short circuit input current to under 50mA. Autosense function compensates for any losses in long circuit loops.

INNOLINE
DC/DC-Converter

R-5xxxPA_DA Series

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

Characteristics	Conditions	Min.	Typ.	Max.
Output Voltage Range	All Series	0.8		6.0V
Output Current	R-52xxPA/DA	0.2		2.0A
	R-53xxPA/DA	0.3		3.0A
	R-54xxPA/DA	0.4		4.0A
	R-55xxPA/DA	0.5		5.0A
Output Current Limit	R-52xxPA/DA		2.5	3.0A
	R-53xxPA/DA		3.75	4.25A
	R-54xxPA/DA		5.0	5.5A
	R-55xxPA/DA		6.0	6.5A
Short Circuit Input Current	All Series			50mA
Short Circuit Protection				Continuous, automatic recovery
Output Voltage Accuracy	At 100% Load All Series		±1%	±2%
Line Voltage Regulation (Vin = min. to max. at full load)	R-52xxPA/DA		0.25	0.5%
	R-53xxPA/DA & R-54xxPA/DA & R-55xxPA/DA		0.5	1.0%
Load Regulation (10 to 100% full load)	R-52xxPA/DA		0.5	1.0%
	R-53xxPA/DA & R-54xxPA/DA & R-55xxPA/DA		1.0	2.0%
Ripple & Noise	R-52xxPA/DA		40mVp-p	70mVp-p
	R-53xxPA/DA & R-54xxPA/DA & R-55xxPA/DA		80mVp-p	120mVp-p
Transient Response (see note 1)	50% Load Change		100µs	200µs
	Vout Over / Undershoot			100mV
Remote ON / OFF (see note 2)	Open or High (Power ON)	4.5		18V
(positive logic)	Low (Power OFF)			0.8V
Remote Off Input Current	Remote ON/OFF low level			100µA
Switching Frequency		270	300	330kHz
Quiescent Current	Vin = min. to max. at 0% load			20mA
Operating Temperature Range		-40°C		+85°C
Storage Temperature Range		-40°C		+125°C
Internal Power Dissipation	Io x Vo x (1-Efficiency)			1.4W
MTBF (Nominal Vout, 100% load)	Tamb. = +25°C			749 x 10³ hours
	Tamb. = +85°C			150 x 10³ hours

Notes:

1. Requires an electrolytic or tantalum output capacitor for proper operation in all applications (the capacitor to be placed as close as possible to the output pins) 100µF for R-52xxPA/DA, R-53xxPA/DA and R-54xxPA/DA or 220µF for R-55xxPA/DA.
2. ON / OFF pin driven by TTL (logic gate), open-collector bipolar transistor or open-drain MOSFET.
3. Output Current vs. Input Voltage (see graph below).

INNOLINE
DC/DC-Converter

R-5xxxPA_DA Series

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

Parallel Application Circuit

The R-52xx, R-53xx, R-54xx series can be used in parallel to upgrade the output current capacity for the same output voltage.

For example, the R-543.3PA can parallel up with another R-554.3PA to give up to 8 amps or with the R-533.3PA or R-523.3PA types to give output currents of up to 7 Amps or 6 Amps.

The R-55xx series cannot be paralleled.

must be connected together
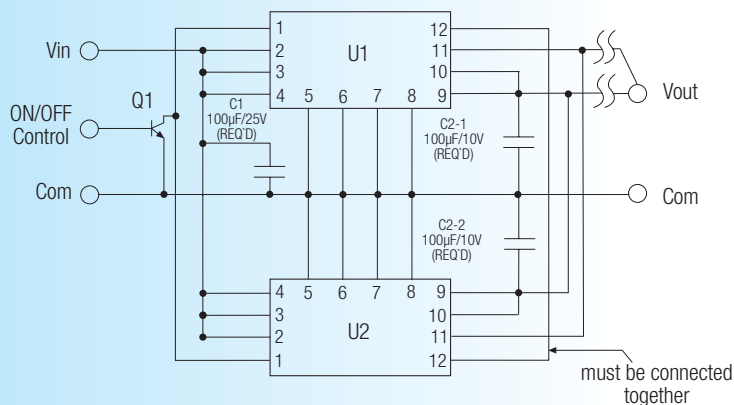
Component side
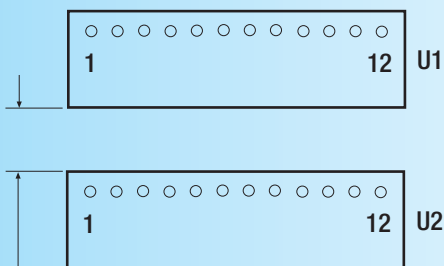
Keep 2mm to 5mm distance between both converters

Solder side

To Load

INNOLINE
DC/DC-Converter

R-5xxxPA_DA Series
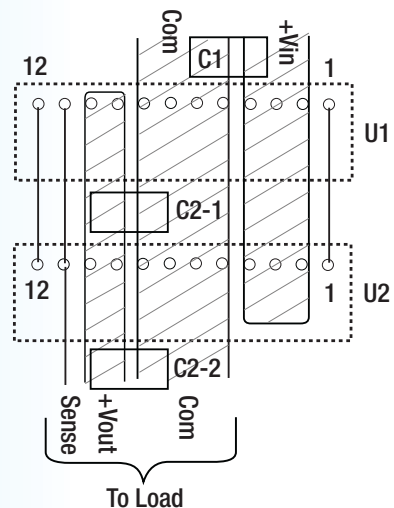
Output Current vs Input Voltage

How to calculate the max output current

The internal power dissipation(P_D)follows the equation:

$$P_D = I_o \times V_o \times (1-\eta)$$

$$I_o = P_D / V_o \times (1-\eta)$$

Where P_D = Internal power dissipation

I_o = Output current

V_o = Output voltage

η = Efficiency

Example: R-545.0P , at Vin = 18Vdc , Vo = 5Vdc ,η=93% (see "Selection Guide" table)

(a) When Ta = 60°C , P_D = 1.4 Watt (see adjacent diagram)

I_o = 1.4(W) / 5(V) × (1-0.93) = 4(A)

(b) When Ta = 85°C , P_D = 1 Watt (see adjacent diagram)

I_o = 1(W) / 5(V) × (1-0.93) = 2.857(A)

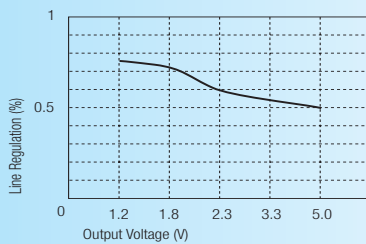(c) At Vin = 12Vdc efficiency = 94% (see "Selection Guide" table)

When Ta = 85°C , P_D = 1 Watt (see adjacent diagram)

I_o = 1(W) / 5(V) × (1-0.94) =3.33(A)
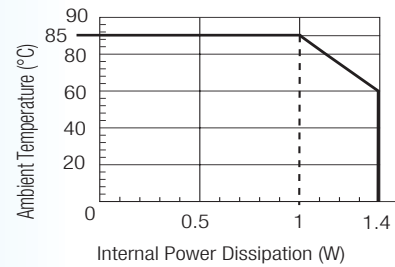
Characteristics
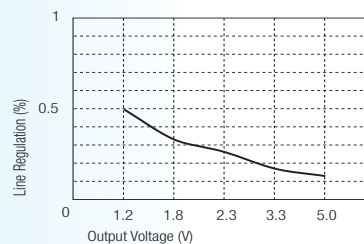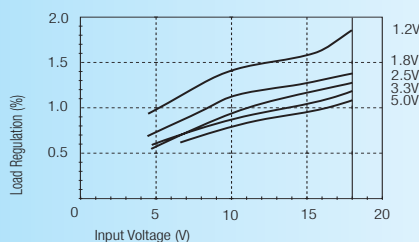
R-53xx / R-54xx
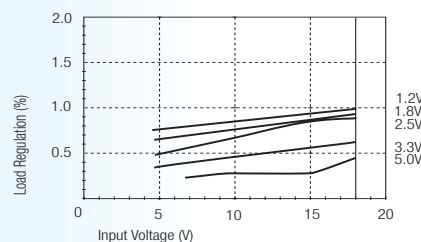**Output Voltage Line Regulation VS Vout**

R-52xx / R-55xx
Output Voltage Line Regulation VS Vout

R-53xx / R-54xx
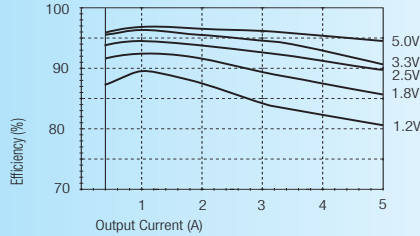**Intput Voltage Load Regulation VS Vin**

R-52xx / R-55xx
Intput Voltage Load Regulation VS Vin

INNOLINE
DC/DC-Converter
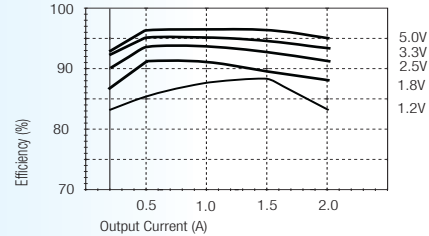
R-5xxxPA_DA Series
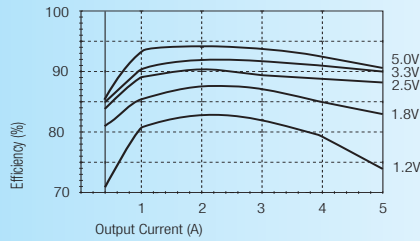
Characteristics

R-53xx / R-54xx / R-55xx
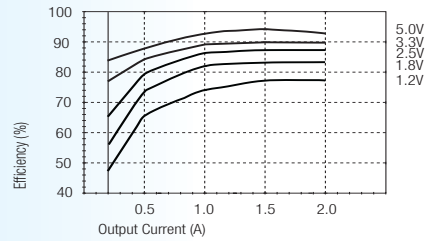Output Current Efficiency vs I_{out} (Vin = Min)

R-52xx
Output Current Efficiency vs I_{out} (Vin = Min)

R-53xx / R-54xx / R-55xx
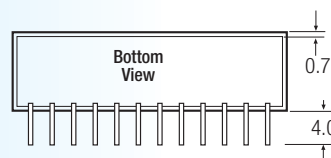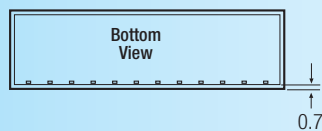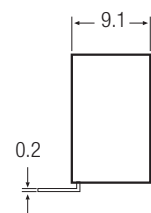Output Current Efficiency vs I_{out} (Vin = 18V)

R-52xx
Output Current Efficiency VS I_{out} (Vin = 18V)

Package Style and Pinning (mm)

SIP12 PIN Package

3rd angle projection

RECOM
R-521.2PA

32.20
15.00
9.1
1 2 3 4 5 6 7 8 9 10 11 12
4.0
2.13
0.7
2.54
0.2
0.7

Bottom View

RECOM
R-521.2DA

32.20
15.00
9.1
1 2 3 4 5 6 7 8 9 10 11 12
2.13
0.7
2.54
0.2
0.7
4.0

Bottom View
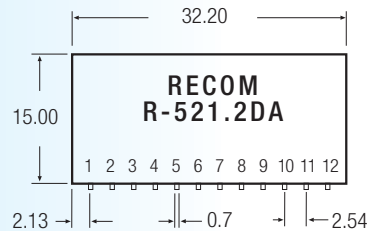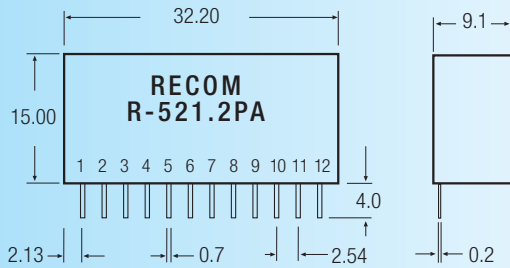
Pin Connections

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	Vout	Power output
11	Vout (Auto Sense)	If unused this pin must be connected to Pin 9 and 10
12	Vout-Adj	With external resistors R1,R2 to selected output voltage

Tolerance:
± 0.25 mm

INNOLINE
DC/DC-Converter

R-5xxxPA_DA Series

Table 1: Adjustment Resistor Values

	1.2Vdc		1.8Vdc		2.5Vdc		3.3Vdc		5.0Vdc	
2Adc	R-521.2PA/DA		R-521.8PA/DA		R-522.5PA/DA		R-523.3PA/DA		R-525.0PA/DA	
3Adc	R-531.2PA/DA		R-531.8PA/DA		R-532.5PA/DA		R-533.3PA/DA		R-535.0PA/DA	
4Adc	R-541.2PA/DA		R-541.8PA/DA		R-542.5PA/DA		R-543.3PA/DA		R-545.0PA/DA	
5Adc	R-551.2PA/DA		R-551.8PA/DA		R-552.5PA/DA		R-553.3PA/DA		R-555.0PA/DA	
Vout (nominal)	1.2Vdc		1.8Vdc		2.5Vdc		3.3Vdc		5.0Vdc	
Vout (adj)	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
0.8 (V)										
0.9 (V)	740Ω									
1.0 (V)	3.9KΩ									
1.1 (V)	13KΩ		1.05KΩ							
1.2 (V)			2.1KΩ		270Ω					
1.3 (V)		37KΩ	3.7KΩ		750Ω					
1.5 (V)		11.5KΩ	10KΩ		2.1KΩ		390Ω			
1.6 (V)		8.2KΩ	18KΩ		3.0KΩ		750Ω			
1.7 (V)		6.5KΩ	41KΩ		4.1KΩ		1.2KΩ			
1.8 (V)		5.2KΩ			5.6KΩ		1.7KΩ			
1.9 (V)		4.3KΩ		36KΩ	7.5KΩ		2.2KΩ			
2.0 (V)		3.6KΩ		1.8KΩ	10.5KΩ		2.8KΩ			
2.4 (V)		2.1KΩ		5.2KΩ	82KΩ		6.8KΩ			
2.5 (V)		1.8KΩ		4.3KΩ			8.5KΩ			
2.6 (V)		1.65KΩ		3.6KΩ		33KΩ	10.5KΩ			
3.0 (V)		1.05KΩ		2.1KΩ		6.2KΩ	33KΩ		470Ω	
3.2 (V)				1.65KΩ		4.1KΩ	110KΩ		1.6KΩ	
3.3 (V)				1.5KΩ		3.4KΩ			2.2KΩ	
3.4 (V)				1.35KΩ		2.9KΩ		36KΩ	3.0KΩ	
3.6 (V)				1.07KΩ		2.2KΩ		11KΩ	4.7KΩ	
3.9 (V)				780Ω		1.4KΩ		4.7KΩ	8.5KΩ	
4.5 (V)				390Ω		650Ω		1.6KΩ	30KΩ	
4.9 (V)						350Ω		820Ω	220KΩ	
5.0 (V)						290Ω		680Ω		
5.1 (V)						220Ω		560Ω		28KΩ
5.5 (V)						39Ω		190Ω		2.6KΩ