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
- Continuous short circuit protection (Very low short 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



RECOM

Selection Guide

Part Number	Inpu Range	Nominal Output Voltage	Vout Adjust Range	Output Current	Efficiency (%) min		max
SIP12	(V)	(V)	(V)	(A)	Vin	12V	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 current under 50mA of input current. Autosense function compensates for any losses in long circuit loops.

R-5xxxPA_DA Series

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

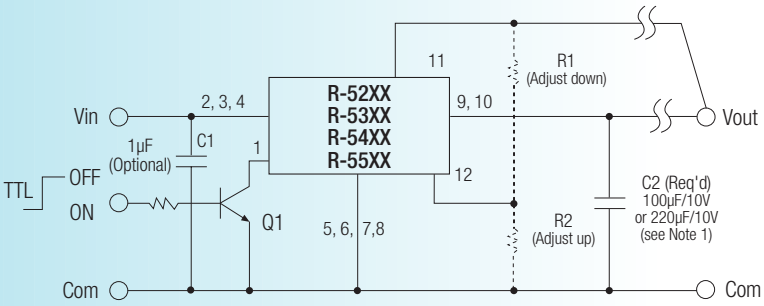
Characteristics	Conditions	Min.	Typ.	Max.
Output Voltage Range	All Series	0.8		6.0V
Output Current	R-52xxPA/DA R-53xxPA/DA R-54xxPA/DA R-55xxPA/DA	0.2 0.3 0.4 0.5		2.0A 3.0A 4.0A 5.0A
Output Current Limit	R-52xxPA/DA R-53xxPA/DA R-54xxPA/DA R-55xxPA/DA		2.5 3.75 5.0 6.0	3.0A 4.25A 5.5A 6.5A
Short Circuit Input Current	All Series			50mA
Output Voltage Accuracy	At 100% Load All Series		±1%	±2%
Line Voltage Regulation (Vin = min. to max. at full load)	R-52xxPA/DA R-53xxPA/DA & R-54xxPA/DA & R-55xxPA/DA		0.25 0.5	0.5% 1.0%
Load Regulation (10 to 100% full load)	R-52xxPA/DA R-53xxPA/DA & R-54xxPA/DA & R-55xxPA/DA		0.5 1.0	1.0% 2.0%
Ripple & Noise	R-52xxPA/DA R-53xxPA/DA & R-54xxPA/DA & R-55xxPA/DA		40mVp-p 80mVp-p	70mVp-p 120mVp-p
Transient Response (see note 1)	50% Load Change Vout Over / Undershoot		100µS	200µs 100mV
Remote ON / OFF (see note 2) (positive logic) Remote Off Input Current	Open or High (Power ON) Low (Power OFF) Remote ON/OFF low level	4.5		18V 0.8V 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			749kHrs
	Tamb. = +85°C			150kHrs

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).

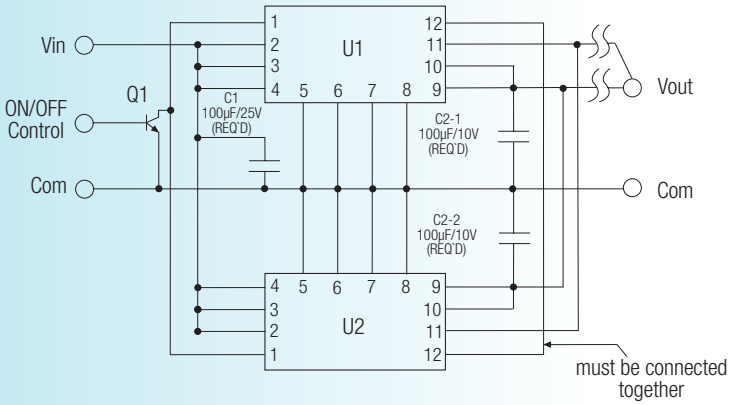
R-5xxxPA_DA Series

Standard Application Circuit

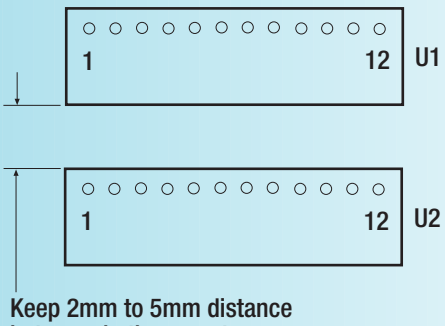


Parallel Application Circuit

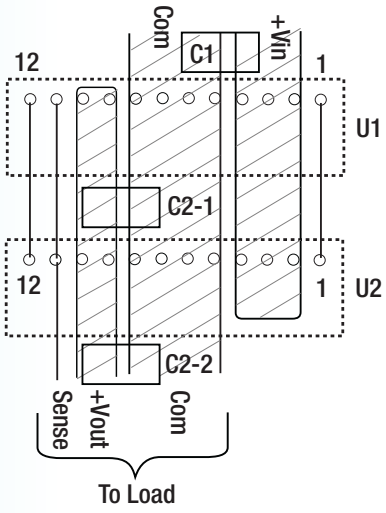
The R-52xx, R-53xx, R-54xx series can be used in parallel to upgrade the output current capacity for the same output voltage.
For example, the R-543.3PA can parallel up with another R-554.3PA to give up to 8 amps or with the R-533.3PA or R-523.3PA types to give output currents of up to 7 Amps or 6 Amps.
The R-55xx series cannot be paralleled.



Component side



Solder side



Output Current vs Input Voltage

How to calculating the max output current

The internal power dissipation(P_D)follows the equation:

$P_D = Io \times Vo \times (1-\eta)$

$Io = P_D / Vo \times (1-\eta)$

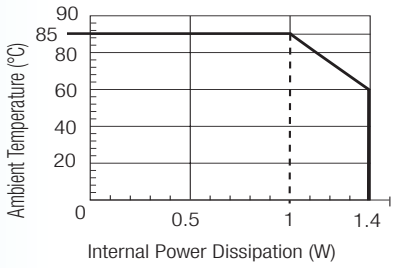
Where P_D = Internal power dissipation
Io = Output current
Vo = Output voltage
η = Efficiency

Example: R-545.0P , at Vin = 18Vdc , Vo = 5Vdc ,η=93% (see table 1)

(a) When Ta = 60°C , P_D = 1.4 Watt (see fig-1)
Io = 1.4(W) / 5(V) × (1-0.93) = 4(A)

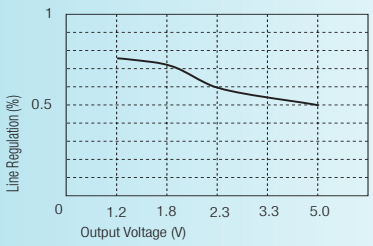
(b) When Ta = 85°C , P_D = 1 Watt (see fig-1)
Io = 1(W) / 5(V) × (1-0.93) = 2.857(A)

(c) At Vin = 12Vdc efficiency = 94% (see table 1)
When Ta = 85°C , P_D = 1 Watt (see fig-1)
Io = 1(W) / 5(V) × (1-0.94) =3.33(A)

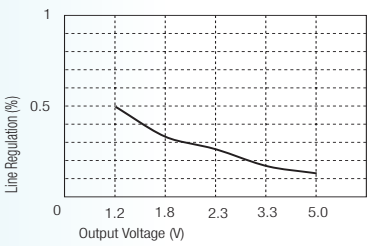


Characteristics

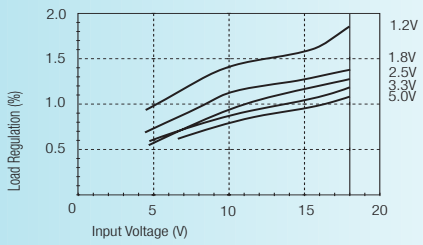
R-53xx / R-54xx
Output Voltage Line Regulation VS Vout



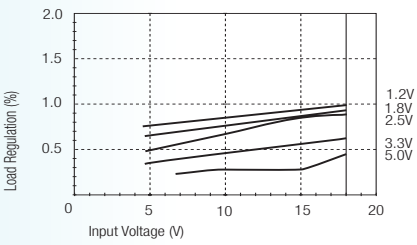
R-52xx / R-55xx
Output Voltage Line Regulation VS Vout



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



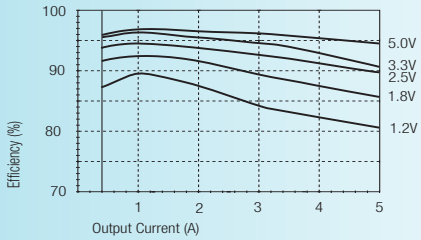
R-52xx / R-55xx
Intput Voltage Load Regulation VS Vin



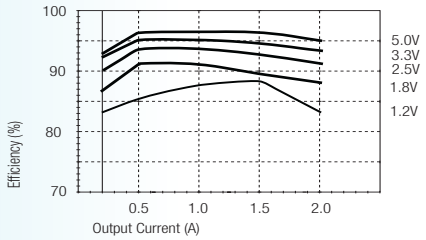
R-5xxxPA_DA Series

Characteristics

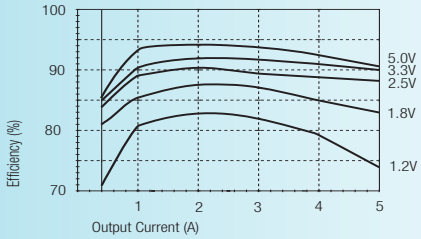
R-53xx / R-54xx / R-55xx
Output Current Efficiency vs I_{out} (Vin = Min)



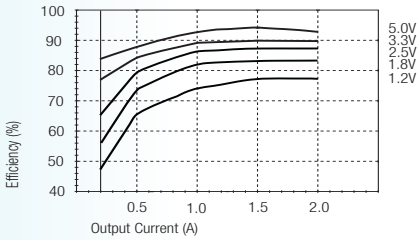
R-52xx
Output Current Efficiency vs I_{out} (Vin = Min)



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



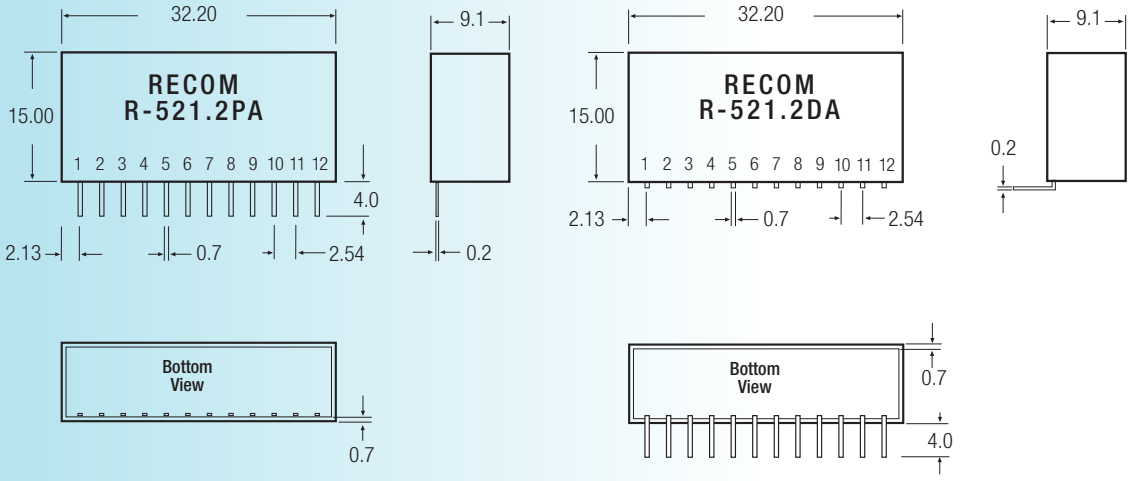
R-52xx
Output Current Efficiency VS I_{out} (Vin = 18V)



Package Style and Pinning (mm)

SIP12 PIN Package

3rd angle projection



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

R-5xxxPA_DA Series

Table 1: Adjustment Resistor Values

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