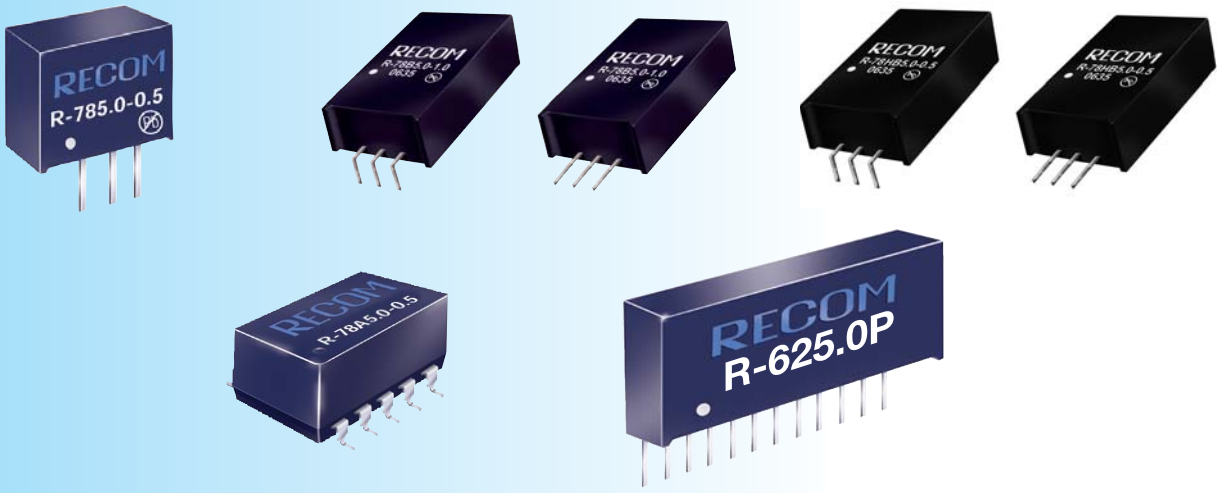
Positive to Negative Converters

Features

Innoline Switching Regulators

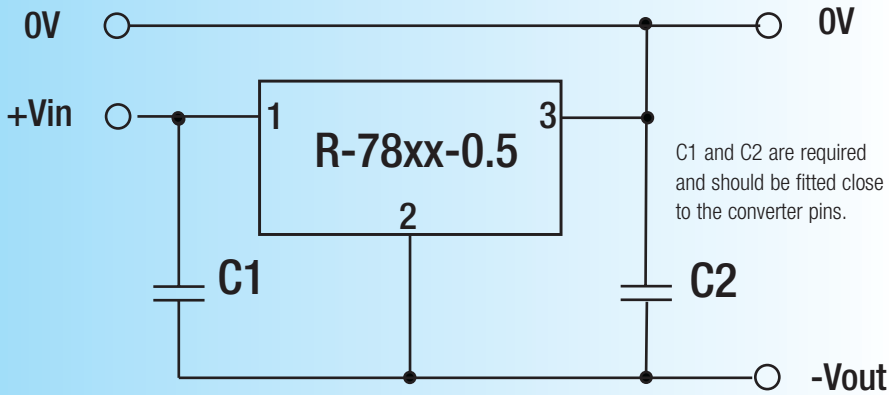
- Innoline Switching Regulators can also be used to convert a positive voltage into a negative voltage
- The standard parts can be used - only two extra capacitors are required
- Fixed and variable output voltages are available.
- Input voltage range can be lower than the output voltage for higher output voltages



Positive-to-Negative Switching Regulators Selection Guide

Series	Maximum Output Current	Input Voltages (VDC) min. max.	Output Voltages (VDC)	No. of Outputs	Case	Adjustable Vout?	Page
R-78xx-0.5	-0.4A -0.2A	4.75 – 28, 5.0 – 26, 8.0 – 18	-1.5, -1.8, -2.5, -3.3, -5.0, -6.5, -9.0, -12, -15	S	SIP3	No	2
R-78Axx-0.5SMD	-0.4A -0.2A	4.75 – 28, 5.0 – 26, 8.0 – 18	-1.5, -1.8, -2.5, -3.3, -5.0, -6.5, -9.0, -12, -15	S	SMD	Yes	3
R-78xx-1.0	Not recommended to be used in this mode due to the reduced input and output voltage range						
R-78Axx-1.0SMD	Not recommended to be used in this mode due to the reduced input and output voltage range						
R-78Bxx-1.0	-0.6A -0.4A -0.3A	4.75 – 28, 8.0 – 28, 8.0 – 26 8.0 – 18	-1.5, -1.8, -2.5, -3.3, -5.0, -6.5, -9.0, -12, -15	S	SIP3	No	5
R-78Bxx-1.5	Not recommended to be used in this mode due to the reduced input and output voltage range						
R-78HBxx-0.5	-0.4A/-0.35A -0.3A/-0.25/-0.2A -0.2A	15 – 65, 15 – 62, 15 – 59, 15 – 56, 20 – 48	-3.3, -5.0,-6.5 -9.0, -12, -15 -24	S	SIP3	No	6
R-5xxxP/DA	Not recommended to be used in this mode due to the reduced input and output voltage range						
R-61xxP/D	Not recommended to be used in this mode as R-78B series offer a lower cost alternative						
R-62xxP/D	-1A -0.8A/-0.6A	9 – 28 9 – 26	-1.8, -2.5, -3.3, -5, -9, -12	S	SIP12	Yes	7
R-7xxxP/D	Not recommended to be used in this mode due to the reduced efficiency and higher Ripple & Noise figures.						
Circuit Ideas							9

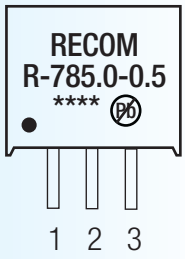
Positive to Negative Converter



C1 and C2 are required and should be fitted close to the converter pins.

Pin Connections

Pin #	Negative Output	Positive Output
1	+Vin	+Vin
2	-Vout	GND
3	GND	+Vout



INNOLINE

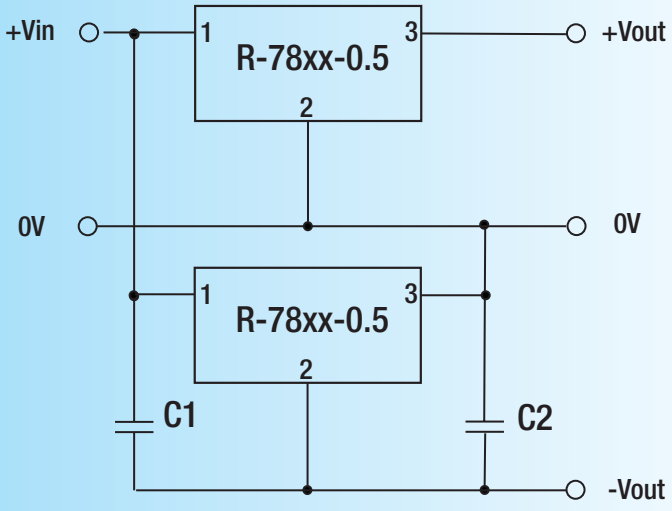
DC/DC-Converter

R-78xx-0.5 Series Positive to Negative Converter

Selection Guide

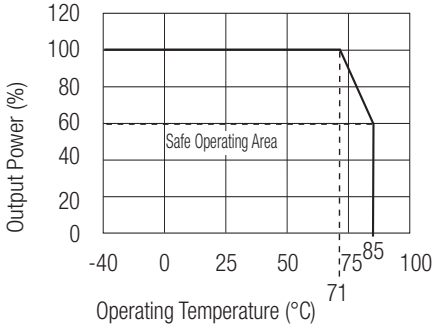
Part Number	Input Range	Output Voltage	Output Current	Efficiency Min. Vin	Efficiency Max. Vin	External Capacitors C1	External Capacitors C2
SIP3	(V)	(V)	(A)	(%)	(%)		
R-781.5-0.5	4.75 – 28	-1.5	-0.4	68	67	10µF/35V	22µF/6.3V
R-781.8-0.5	4.75 – 28	-1.8	-0.4	71	70	10µF/50V	22µF/6.3V
R-782.5-0.5	4.75 – 28	-2.5	-0.4	75	76	10µF/50V	22µF/6.3V
R-783.3-0.5	4.75 – 28	-3.3	-0.4	77	80	10µF/50V	22µF/6.3V
R-785.0-0.5	6.5 – 28	-5.0	-0.4	79	84	10µF/50V	22µF/10V
R-786.5-0.5	5.0 – 26	-6.5	-0.3	81	86	10µF/50V	10µF/10V
R-789.0-0.5	8.0 – 18	-9.0	-0.2	87	89	10µF/50V	10µF/16V
R-7812-0.5	8.0 – 18	-12	-0.2	87	90	10µF/50V	10µF/25V
R-7815-0.5	8.0 – 18	-15	-0.2	87	91	10µF/50V	10µF/25V

Application Example (see also Circuit Ideas)

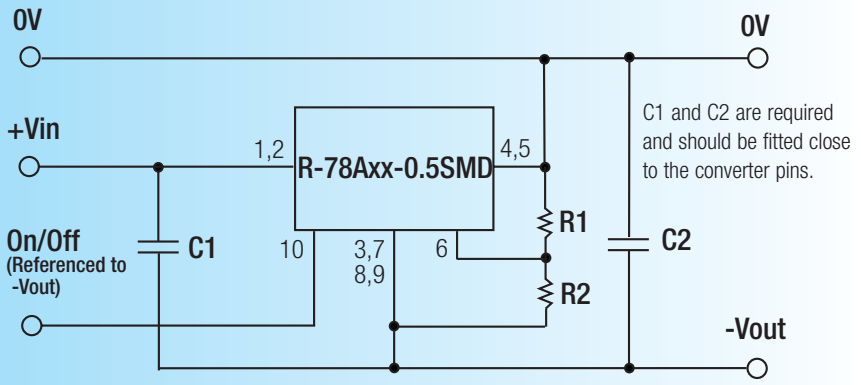


Derating-Graph

(Ambient Temperature)

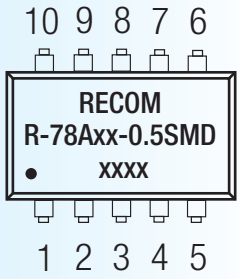


Positive to Negative Converter



Pin Connections

Pin #	Negative Output	Positive Output
1,2	+Vin	+Vin
3,7,8,9	-Vout	GND
4,5	GND	+Vout
6	-Vout Adj.	+Vout Adj.
10	On/Off	On/Off



INNOLINE

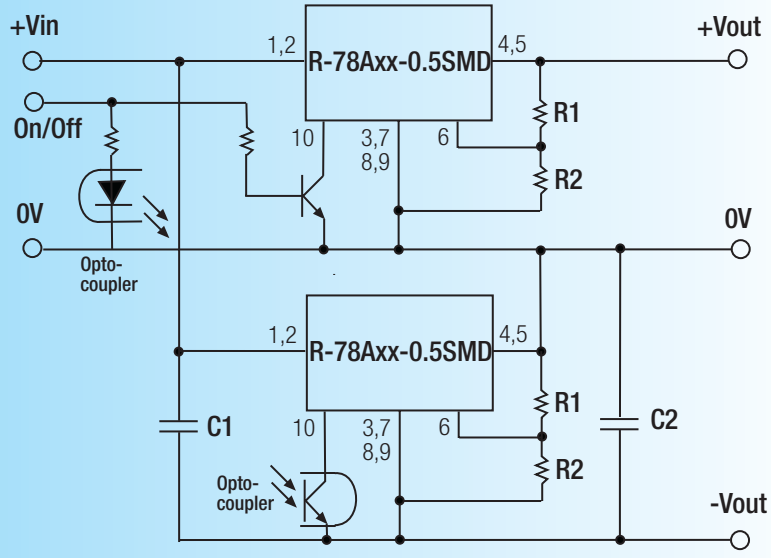
DC/DC-Converter

R-78Axx-0.5 SMD Positive to Negative Converter

Selection Guide

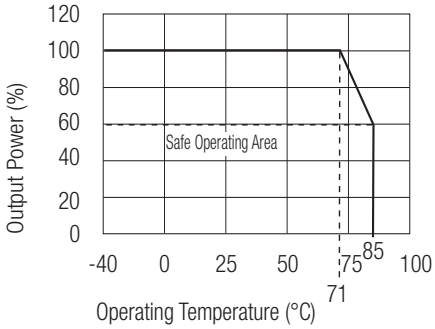
Part Number	Input Range	Output Voltage	Output Current	Efficiency Min. Vin	Efficiency Max. Vin	External Capacitors C1	External Capacitors C2
SIP3	(V)	(V)	(A)	(%)	(%)		
R-78A1.5-0.5SMD	4.75 – 28	-1.5	-0.4	68	67	10µF/35V	22µF/6.3V
R-78A1.8-0.5SMD	4.75 – 28	-1.8	-0.4	71	70	10µF/50V	22µF/6.3V
R-78A2.5-0.5SMD	4.75 – 28	-2.5	-0.4	75	76	10µF/50V	22µF/6.3V
R-78A3.3-0.5SMD	4.75 – 28	-3.3	-0.4	77	80	10µF/50V	22µF/6.3V
R-78A5.0-0.5SMD	4.75 – 28	-5.0	-0.4	79	84	10µF/50V	22µF/10V
R-78A6.5-0.5SMD	5.0 – 26	-6.5	-0.3	81	86	10µF/50V	10µF/10V
R-78A9.0-0.5SMD	8.0 – 18	-9.0	-0.2	87	89	10µF/50V	10µF/16V
R-78A12-0.5SMD	8.0 – 18	-12	-0.2	87	90	10µF/50V	10µF/25V
R-78A15-0.5SMD	8.0 – 18	-15	-0.2	87	91	10µF/50V	10µF/25V

Application Example (see also Circuit Ideas)



Derating-Graph

(Ambient Temperature)

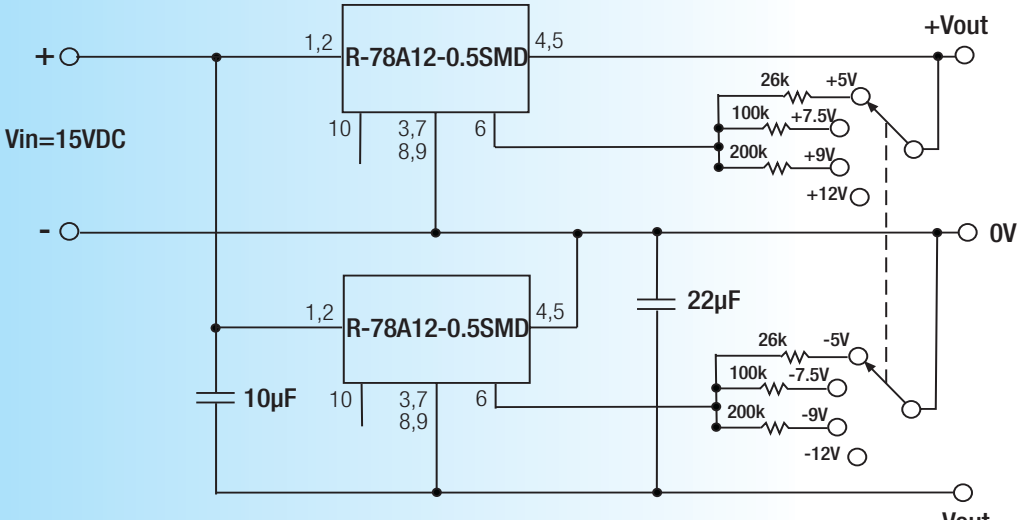


R-78Axx-0.5 SMD Positive to Negative

Table 1: Adjustment Resistor Values

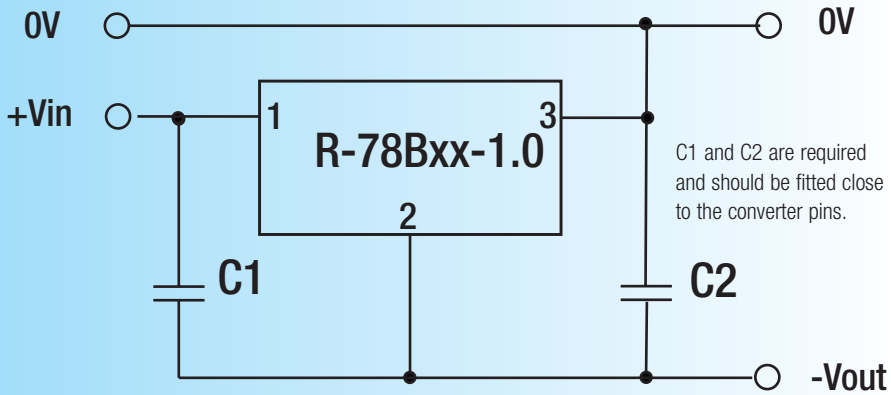
	R-78A1.8 -0.5SMD		R-78A2.5 -0.5SMD		R-78A3.3 -0.5SMD		R-78A5.0 -0.5SMD		R-78A6.5 -0.5SMD		R-78A9.0 -0.5SMD		R-78A12 -0.5SMD	
Vout (nom.)	1.8Vdc		2.5Vdc		3.3Vdc		5.0Vdc		6.5Vdc		9.0Vdc		12.0Vdc	
Vout (adj)	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2	R1	R2
-1.5 (V)	3KΩ		200Ω											
-1.8 (V)			12KΩ											
-2.5 (V)		12KΩ				21KΩ		5.6KΩ						
-3.0 (V)		4.7KΩ		50KΩ	88.4KΩ			17KΩ						
-3.3 (V)		2.7KΩ		29KΩ				27KΩ		6.7KΩ				
-3.6 (V)				19.4KΩ		69KΩ		42KΩ		14KΩ				
-3.9 (V)				14kΩ		30.5KΩ		58KΩ		23KΩ				
-4.5 (V)				8kΩ		12.1kΩ		180KΩ		49KΩ		26KΩ		17KΩ
-4.9 (V)						7.6kΩ		850KΩ		77kΩ		36KΩ		24KΩ
-5.0 (V)						6.8kΩ				86kΩ		39KΩ		26KΩ
-5.1 (V)						6.2kΩ		540kΩ		97KΩ		42KΩ		28KΩ
-5.5 (V)						4kΩ		71kΩ		160KΩ		56KΩ		36KΩ
-6.5 (V)								20.2kΩ				112KΩ		63KΩ
-8.0 (V)								7.2kΩ		26KΩ		400KΩ		125KΩ
-9.0 (V)										11.3KΩ				200KΩ
-10 (V)										5.2KΩ		59KΩ		345KΩ
-11 (V)										1.8KΩ		18.5KΩ		740KΩ
-12 (V)												5.2KΩ		
-12.6 (V)												830KΩ		216KΩ
-13.0 (V)														82KΩ
-14.0 (V)														30KΩ
-15.0 (V)														13KΩ

Typical Application



Dual Rail Selectable Output Voltage Power Supply

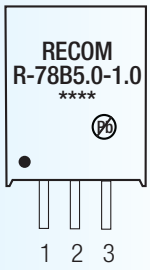
Positive to Negative Converter



C1 and C2 are required and should be fitted close to the converter pins.

Pin Connections

Pin #	Negative Output	Positive Output
1	+Vin	+Vin
2	-Vout	GND
3	GND	+Vout



INNOLINE

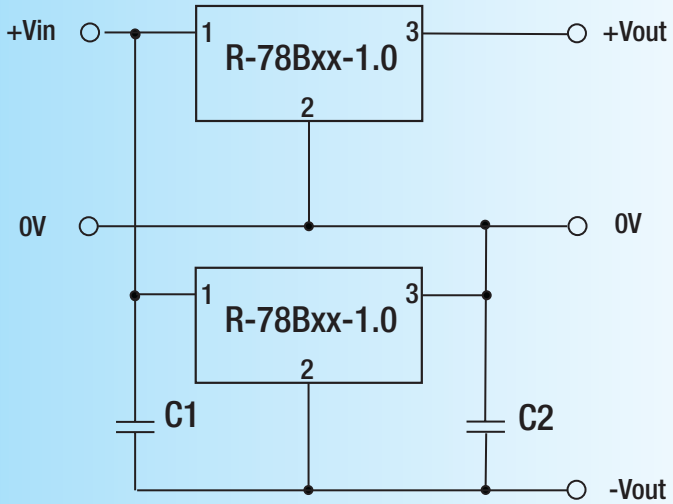
DC/DC-Converter

R-78Bxx-1.0 Series Positive to Negative Converter

Selection Guide

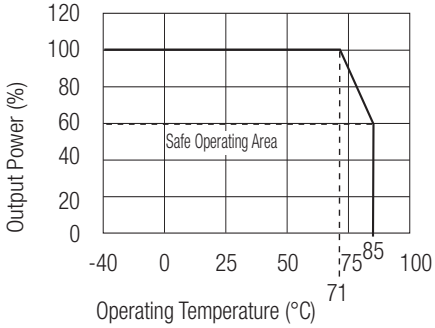
Part Number	Input Range	Output Voltage	Output Current	Efficiency Min. Vin	Efficiency Max. Vin	External Capacitors C1	External Capacitors C2
SIP3	(V)	(V)	(A)	(%)	(%)		
R-78B1.5-1.0	4.75 – 28	-1.5	-0.6	70	68	10µF/50V	22µF/6.3V
R-78B1.8-1.0	4.75 – 28	-1.8	-0.6	72	72	10µF/50V	22µF/6.3V
R-78B2.5-1.0	4.75 – 28	-2.5	-0.6	75	77	10µF/50V	22µF/6.3V
R-78B3.3-1.0	4.75 – 28	-3.3	-0.6	77	80	10µF/50V	22µF/6.3V
R-78B5.0-1.0	8.0 – 28	-5.0	-0.6	83	85	10µF/50V	22µF/10V
R-78B6.5-1.0	8.0 – 26	-6.5	-0.4	84	87	10µF/50V	10µF/10V
R-78B9.0-1.0	8.0 – 18	-9.0	-0.4	88	89	10µF/50V	10µF/16V
R-78B12-1.0	8.0 – 18	-12	-0.3	89	90	10µF/50V	10µF/25V
R-78B15-1.0	8.0 – 18	-15	-0.3	89	91	10µF/50V	10µF/25V

Application Example (see also Circuit Ideas)

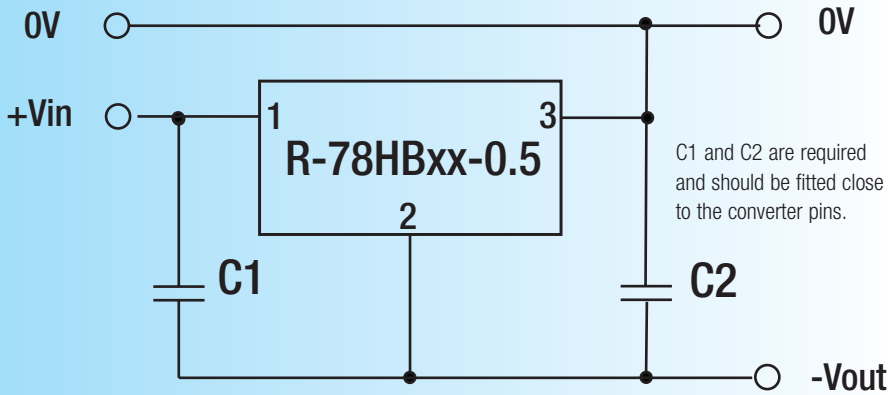


Derating-Graph

(Ambient Temperature)



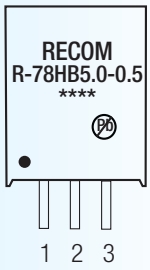
Positive to Negative Converter



C1 and C2 are required and should be fitted close to the converter pins.

Pin Connections

Pin #	Negative Output	Positive Output
1	+Vin	+Vin
2	-Vout	GND
3	GND	+Vout



INNOLINE

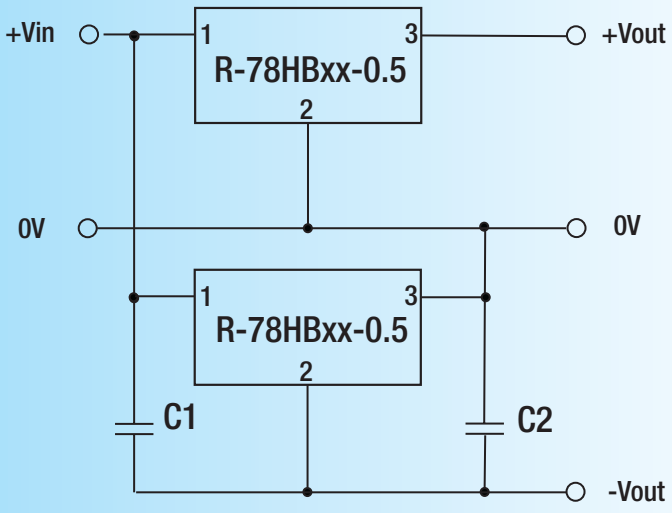
DC/DC-Converter

R-78HBxx-0.5 Series Positive to Negative Converter

Selection Guide

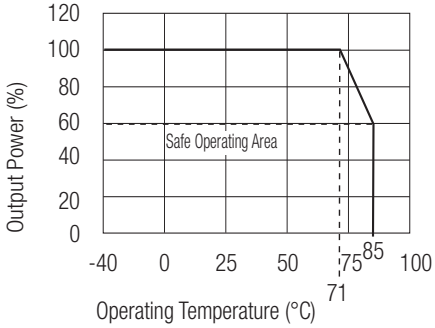
Part Number	Input Range	Output Voltage	Output Current	Efficiency Min. Vin	Efficiency Max. Vin	External Capacitors C1	External Capacitors C2
SIP3	(V)	(V)	(A)	(%)	(%)		
R-78HB3.3-0.5	15 – 65	-3.3	-0.4	78	75	1µF/100V	22µF/6.3V
R-78HB5.0-0.5	15 – 65	-5.0	-0.4	82	80	1µF/100V	22µF/10V
R-78HB6.5-0.5	15 – 65	-6.5	-0.35	84	82	1µF/100V	22µF/10V
R-78HB9.0-0.5	15 – 62	-9.0	-0.3	87	85	1µF/100V	10µF/16V
R-78HB12-0.5	15 – 59	-12	-0.25	88	86	1µF/100V	10µF/25V
R-78HB15-0.5	15 – 56	-15	-0.2	89	87	1µF/100V	10µF/25V
R-78HB24-0.3	15 – 48	-24	-0.2	89	87	1µF/100V	10µF/35V

Application Example (see also Circuit Ideas)

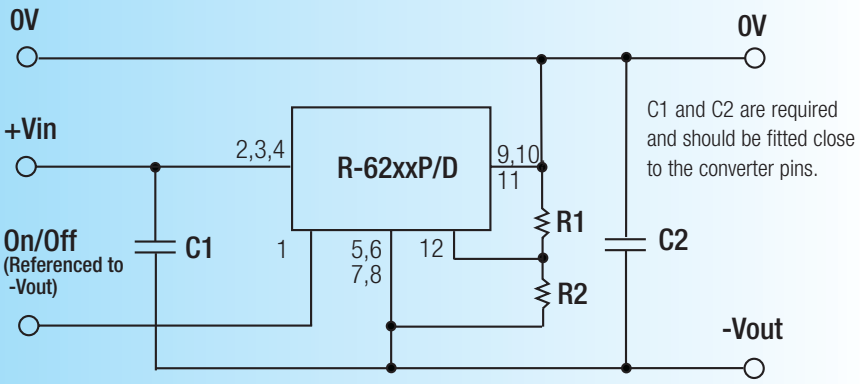


Derating-Graph

(Ambient Temperature)



Positive to Negative Converter

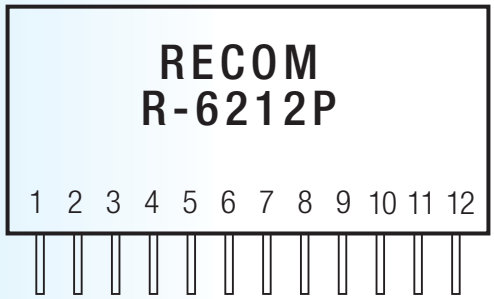


INNOLINE
DC/DC-Converter

R-62xxP/D SIP12 Positive to Negative Converter

Pin Connections

Pin #	Negative Output	Positive Output
2,3,4	+Vin	+Vin
5,6,7,8	-Vout	GND
9,10,11	GND	+Vout
12	-Vout Adj.	+Vout Adj.
1	On/Off	On/Off

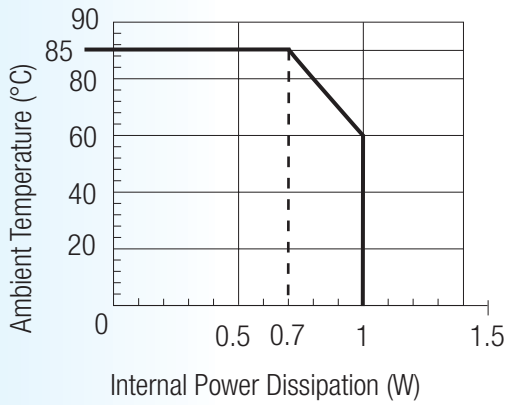


Selection Guide

Part Number	Input Range	Output Voltage	Output Current	Efficiency Min. Vin	Efficiency Max. Vin	External Capacitors C1	External Capacitors C2
SIP3	(V)	(V)	(A)	(%)	(%)		
R-621.8P/D	9 – 28	-1.8 (-1.5~-3.6)	-1.0	72	65	10µF/50V	100µF/6.3V
R-622.5P/D	9 – 28	-2.5 (-1.5~-4.5)	-1.0	76	72	10µF/50V	100µF/6.3V
R-623.3P/D	9 – 28	-3.3 (-1.8~-6V)	-1.0	79	76	10µF/50V	100µF/10V
R-625.0P/D	9 – 28	-5.0 (-1.8~-9V)	-1.0	81	80	10µF/50V	100µF/10V
R-629.0P/D	9 – 26	-9.0 (-3.3~-15V)	-0.8	84	85	10µF/50V	100µF/25V
R-6212P/D	9 – 26	-12 (-3.3~-15V)	-0.6	86	88	10µF/50V	100µF/25V

Derating

Max output current calculation:
Internal power dissipation
(1W) = Io x Vo x (1-Efficiency)
Io = 1(W) / Vo x (1-Efficiency)
Example : R-625.0P
at Vin = +9VDC, Vout=-5.0V
Efficiency = 80% (see "Selection Guide" table)
Io = 1W / 5V x (1-0.8) = -1000mA
at Vin = +9VDC, Vout=-8.0V (with trim)
Efficiency = 80% (see "Selection Guide" table)
Io = 1W / 8V x (1-0.8) = -625mA



R-62xxP_D
Positive to Negative

Remote On/Off Control Application Example

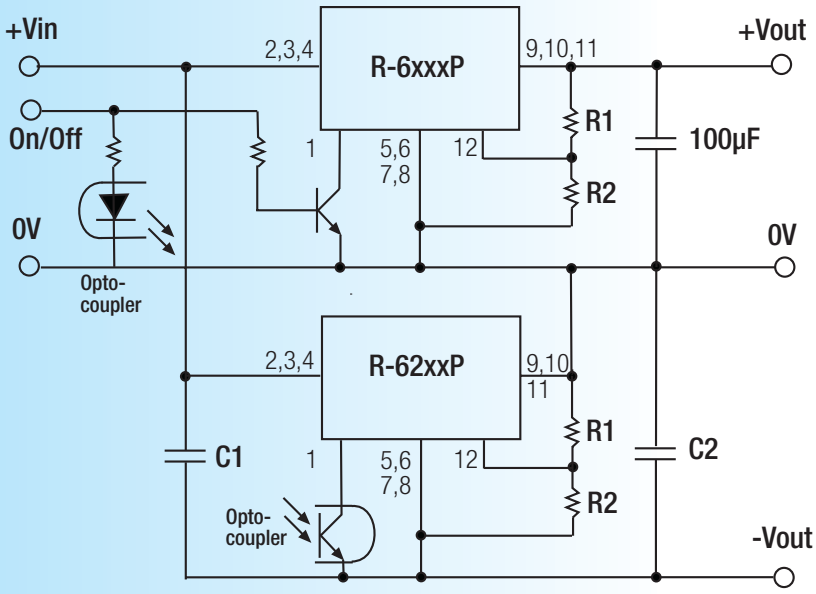


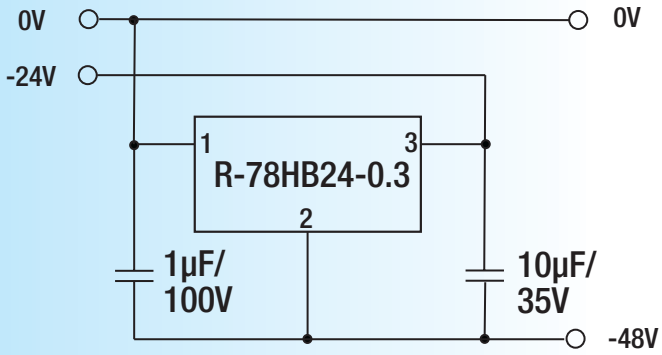
Table 1: Adjustment Resistor Values

	R-621.8P/D		R-622.5P/D		R-623.3P/D		R-625.0P/D		R-629.0P/D		R-6212P/D	
Vout (nom.)	**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		7.2KΩ	24kΩ		7.5kΩ	
7.0								2.8KΩ	51kΩ		12kΩ	
8.0								1.5KΩ	130kΩ		19kΩ	
9.0								880Ω			31kΩ	
10										36kΩ	55kΩ	
11										15kΩ	125kΩ	
12										8.2kΩ		
13										4.7kΩ		11kΩ
14										2.7kΩ		4.0kΩ
15										1.3kΩ		1.6kΩ

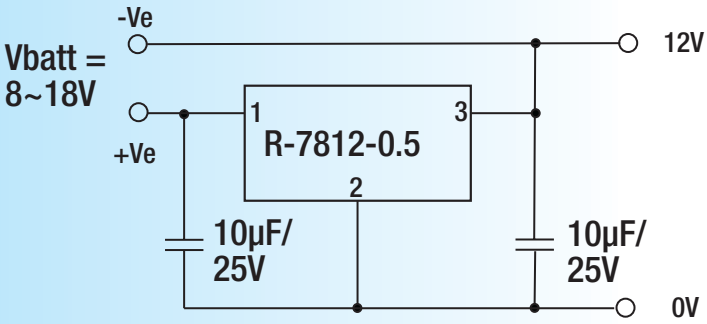
Positive to Negative Circuit Ideas

Application Examples

Negative Voltage Doubler

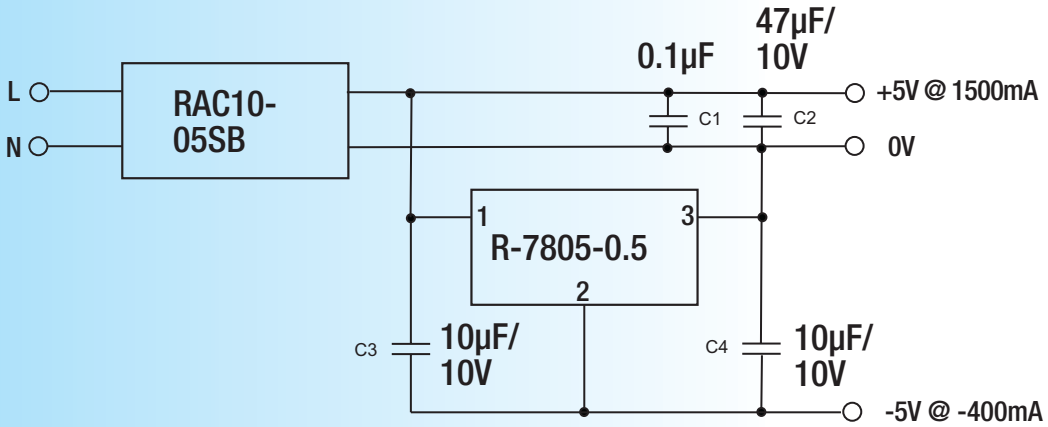


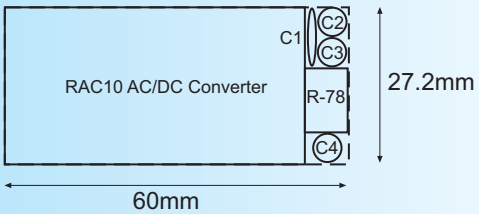
12V Battery Stabilisor



12V Battery Voltage Stabilisor

Negative Rail Generator for Asymmetric Loads





Ultra-compact low noise regulated and protected AC/DC dual output supply.