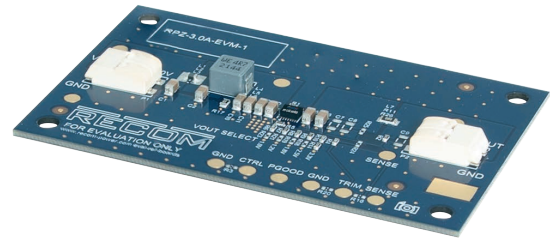


# RPZ-3.0A-EVM-1 ◊ Evaluation Module

3.0Amp ◊ Input: 2.75-6.0VDC

## FEATURES

- Evaluation platform for RPZ-3.0A Buck Regulator Module
- Thermal design considerations included
- EMI Class B filter
- Easy evaluation of control, power good, and sensing functions



## DESCRIPTION

The RPZ-3.0A-EVM-1 generates a constant output voltage with an output current up to 3A from an external DC source. All the functions of the RPZ-3.0A-EVM-1 like trimming, control, power good and sensing can be evaluated. Also the behavior in overload or over temperature can be evaluated easily before it is designed in.

## SELECTION GUIDE

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current max. [mA]	Switching Frequency [kHz]
RPZ-3.0A-EVM-1	2.75-6	1.0, 1.2, 1.8, 2.5, 3.3	3000	1150

### Quick Start Guide:

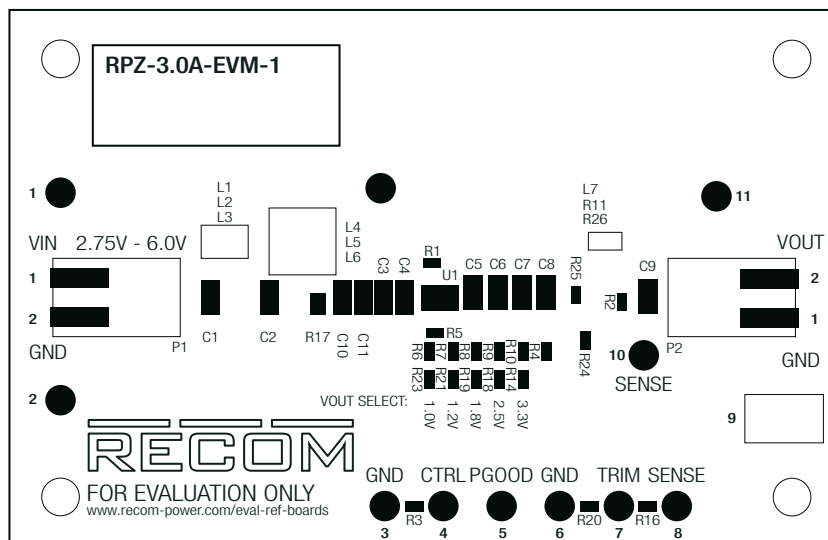
1. Connect P1 to power supply (observe correct polarity!)
2. Connect P2 to the load
3. The evaluation module is preset to VOUT= 3.3VDC. The output voltage can be selected with values of 1.0V, 1.2V, 1.8V, 2.5V and 3.3V by shorting a 0Ω resistor to the respective places as seen in the board silkscreen.
4. Disable the device via R3. The device is preset as normally on. It can be disabled by pulling the CTRL-pad to GND. Short R3 to disable the device.



### Caution:

ESD sensitive. Always follow ESD preventative procedures when handling the product!

### COMPONENT PLACEMENT



### Connector Description

Pads direct connection

Pin	Name	Description
1	VIN	Positive Input Voltage
2	GND	Common GND
3	GND	Common GND
4	CTRL	CTRL pin (leave open if not used)
5	PGOOD	Power Good Signal
6	GND	Common GND
7	TRIM	Trim Pin (leave open if not used)
8	SENSE	Output Voltage Sense Pin (leave open if not used)
9	GND	Common GND, can connect oscilloscope GND for measurement
10	SENSE	Output Voltage Sense Pin (leave open if not used)
11	VOUT	Positive Output Voltage

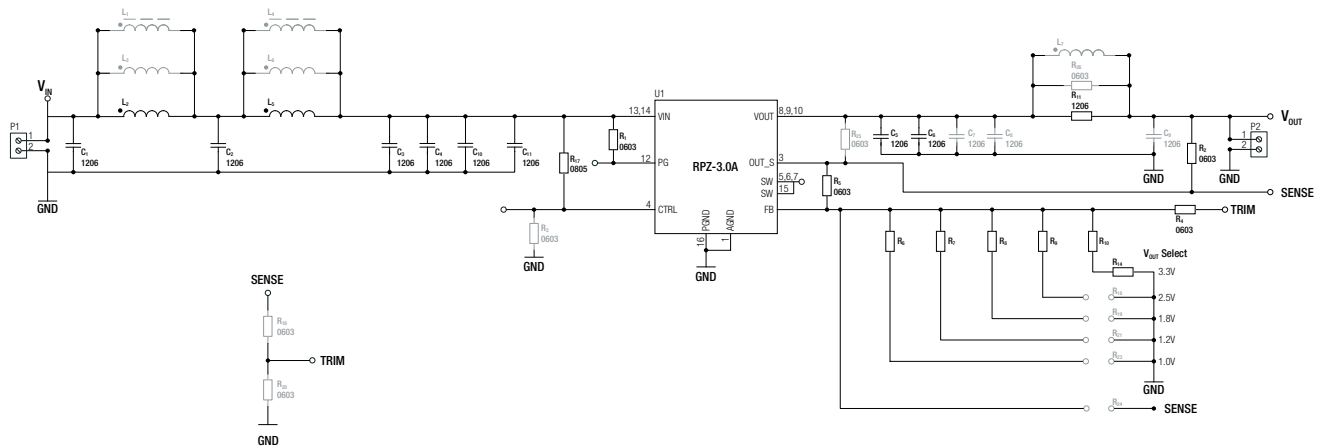
P1

Pin	Name	Description
1	VIN	Positive Input Voltage (observe correct polarity!)
2	GND	Common GND

P2

Pin	Name	Description
1	GND	Common GND
2	VOUT	Positive Output Voltage

### SCHEMATIC



Note1: Gray colored components are not mounted.

### DESCRIPTION

U1: RPZ-3.0A power module.

C1,C10,L1,L2,L3,C2,C11,L4,L5,L6,C3,C4: allow placement of various sized components to test input filter design. The populated filter is designed to meet EN55032 class B

C5,C6,C7,C8,L7,R11,R26,C9: allow placement of various sized components to test output filter design. The populated filter is designed to meet EN55032 class B

R3: connect 0Ω resistor to disable the module. This resistor is not populated.

R1: populated 100kΩ resistor which is pulled up to VIN. This is for output power good signal.

R17: populated 100kΩ resistor which is pulled up to VIN. This is for input module enable.

R2: populated 0Ω resistor sense point for output voltage after the filter.

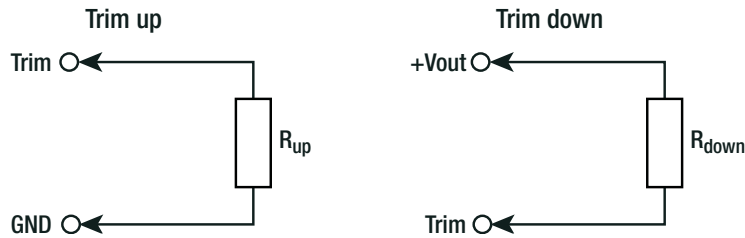
R25: 0Ω resistor for direct output voltage measurement. If sense is desired at a different location, for example after the filter or directly at the load), desolder R2, and connect sense to the new measurement point.

R2: populated 0Ω resistor sense point for output voltage after the filter.

R16 and R20: trim the output voltage. See „Output Voltage Trimming“

### OUTPUT VOLTAGE TRIMMING

The RPZ-3.0A-EVM-1 offers the feature of trimming the output voltage by using external trim resistors. The values for the trim resistors in trim tables are according to standard E96 values; therefore, the specified voltage may slightly vary.



#### Calculation:

- $V_{OUT}$  = nom. output voltage [VDC]
- $V_{out\_set}$  = trimmed output voltage [VDC]
- $V_{ref}$  = reference voltage [VDC]
- $R_{up}$  = trim up resistor [ $\Omega$ ]
- $R_{down}$  = trim down resistor [ $\Omega$ ]
- $R_1, R_2, R_3$  = feedback resistors [ $\Omega$ ]

$$R_{up} = \frac{[(V_{set} - V_{ref})(R_2 R_3)] - [(R_1 \times V_{ref})(R_2 + R_3)]}{V_{ref}(R_1 + R_2) - R_2 \times V_{set}} = [k\Omega]$$

#### Practical Example RPZ-3.0A, trim up:

$$R_{up} = \frac{[(3.63 - 0.6)(44.2k \times 1k)] - [(200k \times 0.6)(44.2k + 1k)]}{[0.6 \times (200k + 44.2k)] - (44.2k \times 3.63)}$$

$R_{up} = 383k\Omega$  (according to E96 1%)

$V_{OUT}$ [VDC]	$R_1$ [ $\Omega$ ]	$R_2$ [ $\Omega$ ]	$R_3$ [ $\Omega$ ]	$V_{ref}$
1.0	200k	300k	1k	0.6VDC
1.2		200k		
1.8		100k		
2.5		63k4		
3.3		44k2		

$$R_{down} = \frac{(V_{set} - V_{ref})(R_1 R_2 + R_2 R_3) - V_{ref}(R_1 R_3)}{V_{ref}(R_1 + R_2) - V_{set}(R_2)} = [k\Omega]$$

#### Practical Example RPZ-3.0A, trim up:

$$R_{down} = \frac{(2.64 - 0.6)[(200k \times 44.2k) + (44.2k \times 1k)] - (0.6 \times 200k \times 1k)}{[0.6 \times (200k + 44.2k)] - (2.64 \times 44.2)}$$

$R_{down} = 604k\Omega$  (according to E96 1%)

#### $V_{out\_set} = 1.0VDC$

##### Trim up

$V_{out\_set} =$	1.1	[VDC]
$R_{up}$ (E96) $\approx$	1M21	[ $\Omega$ ]

##### Trim down

$V_{out\_set} =$	0.9	0.8	[VDC]
$R_{down}$ (E96) $\approx$	590k	200k	[ $\Omega$ ]

#### $V_{out\_set} = 1.2VDC$

##### Trim up

$V_{out\_set} =$	1.3	1.32	[VDC]
$R_{up}$ (E96) $\approx$	1M21	1M	[ $\Omega$ ]

##### Trim down

$V_{out\_set} =$	0.96	[VDC]
$R_{down}$ (E96) $\approx$	301k	[ $\Omega$ ]

#### $V_{out\_set} = 1.8VDC$

##### Trim up

$V_{out\_set} =$	1.9	1.98	[VDC]
$R_{up}$ (E96) $\approx$	1M18	665k	[ $\Omega$ ]

##### Trim down

$V_{out\_set} =$	1.7	1.5	1.44	[VDC]
$R_{down}$ (E96) $\approx$	2M21	604k	464k	[ $\Omega$ ]

#### $V_{out\_set} = 2.5VDC$

##### Trim up

$V_{out\_set} =$	2.6	2.75	[VDC]
$R_{up}$ (E96) $\approx$	1M13	464k	[ $\Omega$ ]

##### Trim down

$V_{out\_set} =$	2.2	2.1	2	[VDC]
$R_{down}$ (E96) $\approx$	1M1	768k	562k	[ $\Omega$ ]

#### $V_{out\_set} = 3.3VDC$

##### Trim up

$V_{out\_set} =$	3.4	3.5	3.6	3.63	[VDC]
$R_{up}$ (E96) $\approx$	1M4	649k	422k	383k	[ $\Omega$ ]

##### Trim down

$V_{out\_set} =$	2.64	[VDC]
$R_{down}$ (E96) $\approx$	604k	[ $\Omega$ ]

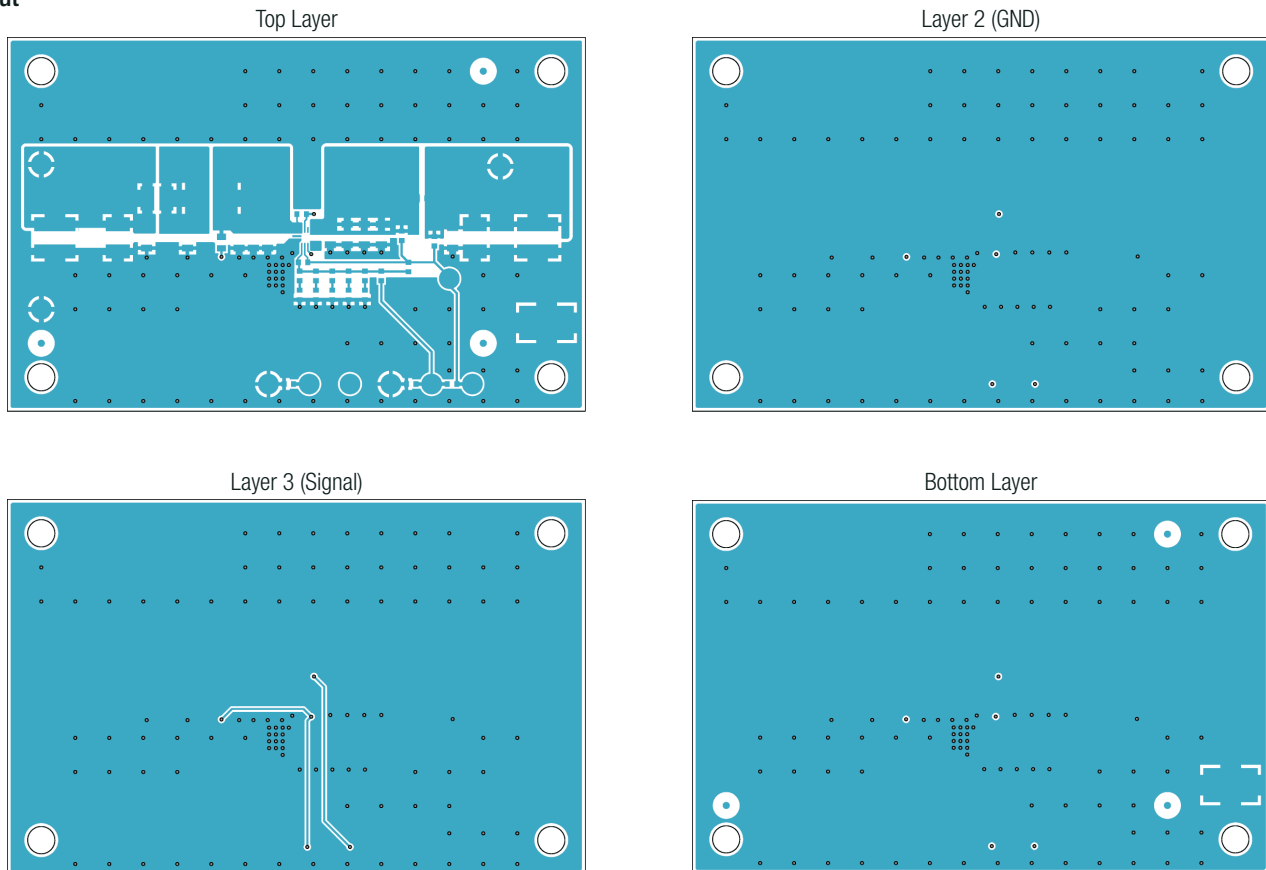
# RPZ-3.0A-EVM-1 ◊ Evaluation Module

3.0Amp ◊ Input: 2.75-6.0VDC

## DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Dimension (LxWxH)		85.0 x 55.0 x 6.4mm 0.86 x 0.36 x 0.44 inch
Weight		13.2g typ. 0.01 lbs

### Layout



Note2: Visit [www.recom-power.com/eval-ref-boards](http://www.recom-power.com/eval-ref-boards) to download Gerber files

BOM				
Component	Description	Manufacturer Part Number	Manufacturer	Remarks
C1-C6, C10, C11	22µF X7R 10VDC 1206	CL31B226KPHNFNE	SAMSUNG ELECTRO-MECHANICS	
C7-C9, L1, L4	CAP 1206			not mounted
L2	FERRITE BEAD 110 OHM 0805	BLM21SP111SH1D	MURATA	
L3, L6	3.9µH 1.32A 140MOHM SMT			not mounted
L5	FIXED IND 4.7UH 5A 30.8MOHM SMT	74437349047	WURTH MIDCOM	
L7	CAP 0805			not mounted
P1, P2	CONNECTOR	695402400222	WURTH	
R1, R8	100K 0.1W 1% 100ppm 0603	RC0603FR-07100KL	YAGEO	
R2	OR 0.1W 0603	RC0603JR-070RL	YAGEO	
R3	CAP 0603			not mounted
R4	1K 0.1W 1% 100ppm 0603	RC0603FR-071KL	YAGEO	
R5, R7	200K 0.1W 1% 100PPM 0603	0603WAF2003T5E	ROYALOHM	
R6	300K 0.1W 1% 100ppm 0603	CRCW0603300KFKEA	VISHAY GENERAL SEMICONDUCTOR	
R9	63K4 0.1W 1% 100ppm 0603	CRCW060363K4FKEA	VISHAY GENERAL SEMICONDUCTOR	
R10	44K2 0.1W 1% 100ppm 0603	CRCW060344K2FKEA	VISHAY GENERAL SEMICONDUCTOR	
R11	OR 0.25W 1206	CRCW12060000Z0EAC	VISHAY GENERAL SEMICONDUCTOR	

# RPZ-3.0A-EVM-1 ◊ Evaluation Module

3.0Amp ◊ Input: 2.75-6.0VDC

## BOM

Component	Description	Manufacturer Part Number	Manufacturer	Remarks
R14	0R 0.1W 0603	RC0603JR-070RL	YAGEO	
R16, R18-R26	CAP 0603			Not mounted
R17	100K 0.125W 1% 100ppm 0805	CRCW0805100KFKEA	VISHAY	
U1	RPZ-3.0A MODULE	RPZ-3.0A	RECOM	

## PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	single box	114.0 x 60.0 x 28.0mm
Packaging Quantity		1pc

## CONTENTS

- RPZ-3.0A-EVM-1 Evaluation Module
- Terms and conditions

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