Technical Data Sheet

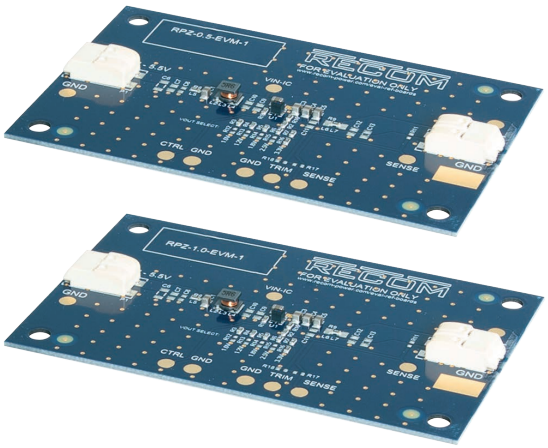
RPZ-0.5(1.0)-EVM-1 ◊ Evaluation Module

0.5(1.0)Amp ◊ Input: 2.3-5.5VDC

RECOM DC/DC Converter

FEATURES

- Evaluation platform for RPZ-0.5/1.0 Buck Regulator Module
- Thermal design considerations included
- EMI Class B filter
- Easy evaluation of output voltage selection, control and sensing functions



DESCRIPTION

The RPZ-0.5/1.0-EVM-1 generates a constant output voltage selectable from 1.0V, 1.2V, 1.8V, 2.5V to 3.3V from a DC input in the range from 2.3V to 5.5V. It has a maximum continuous output current 1A. Switching frequency is internally regulated from 1.8MHz to 3MHz. All the functions of the RPZ-0.5/1.0 such as output voltage selection, control, trim and output sense can be readily evaluated. Also the behavior in overload or over-temperature can be evaluated easily before it is designed in. The evaluation board also contains the filter components to meet EMC Class B levels. Alternate component positions are included to allow experimentation to optimize the EMC performance depending on operating conditions and budget.

SELECTION GUIDE

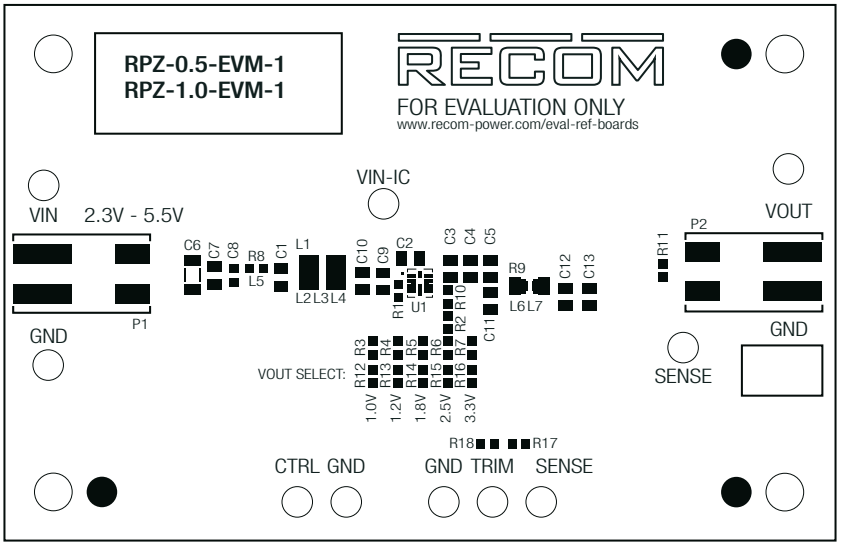
Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current max. [mA]	Switching Frequency [kHz]
RPZ-0.5-EVM-1	2.3-5.5	1.0, 1.2, 1.8, 2.5, 3.3	500	1800-3000
RPZ-1.0-EVM-1	2.3-5.5	1.0, 1.2, 1.8, 2.5, 3.3	1000	1800-3000

Quick Start Guide:

1. Connect P1 to power supply (observe correct polarity!)
2. Connect P2 to the load (no load operation is allowed. For higher temperatures please refer to safe operating area in the RPZ-0.5/1.0 datasheet.
3. The evaluation module is preset to V_{OUT}= 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. CTRL - The device is preset as normally on. It can be disabled by pulling the CTRL pad to GND.

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

COMPONENT PLACEMENT



Connector Description

Pads direct connection

Name	Description
VIN	Positive Input Voltage
GND	Negative Input Voltage (GND)
CTRL	Control Pad (leave open if not used)
TRIM	TRIM pad (leave open if not used)
SENSE	Output Voltage Sense Pin (leave open if not used)
VOUT	Positive Output Voltage
GND	Negative Output Voltage (GND)

P1

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

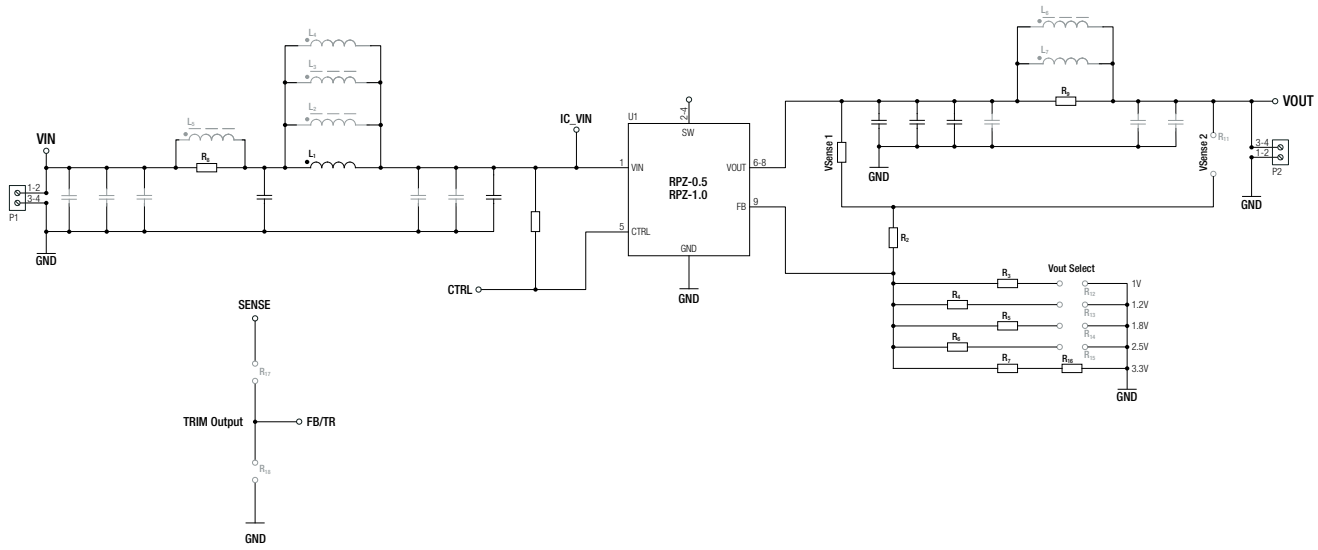
P2

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

RPZ-0.5(1.0)-EVM-1 ◊ Evaluation Module

0.5(1.0)Amp ◊ Input: 2.3-5.5VDC

SCHEMATIC



Note1: Gray colored components are not mounted.

DESCRIPTION

U_1: RPZ-0.5/1.0 power module.

C_1, C_2, C_6-C_{10}, L_1-L_5, R_8: allow placement of various sized components to test input filter design. The populated filter is designed to meet EN55022 class B.

C_3-C_5, C_{11}-C_{13}, L_6-L_7, R_9: allow placement of various sized components to test output filter design. The populated filter is designed to meet EN55022 class B.

R_1: configure Enable function (CTRL). R_1 is populated to enable the RPZ-0.5/1.0

R_{10}: populated zero ohm resistor for direct output voltage measurement. If sense is desired at a different location, for example after the filter or directly at the load), unsolder R_{10}, and connect sense to the new measurement point.

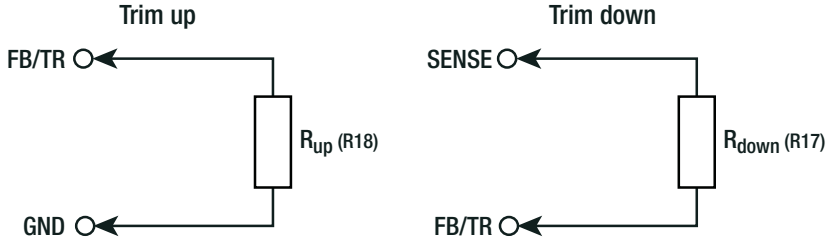
R_{11}: Sense point for output voltage after the filter. To set sense point here, remove R_{10} and solder a zero ohm resistor at R_{11}.

V_{OUT} Selection: the output voltage can be selected with values of 1.0V, 1.2V, 1.8, 2.5V and 3.3V by shorting a zero ohm resistor to the respective places as seen in the board silkscreen.

R_{17}, R_{18}: trim the output voltage. Refer to **„Output Voltage Trimming“**

OUTPUT VOLTAGE TRIMMING

The RPZ-0.5-EVM-1 / RPZ-1.0-EVM-1 offers the feature of trimming the output voltage in range from 0.6V to 4.5V by using external trim resistors. Internal value of RH is 100kΩ (tolerance 1%) . The values for trim resistors are shown in trim tables below according to E96 values; therefore, the specified voltage may slightly vary. Refer to **„Selection Guide“** for applicable V_{OUT} range.



Calculation:

V_{OUT}	= nom. output voltage	[VDC]
$Vout_{set}$	= trimmed output voltage	[VDC]
R_{up}	= trim up resistor (R18)	[Ω]
R_{down}	= trim down resistor (R17)	[Ω]
R_H, R_L	= feedback resistors (R2, R3-R7)	[Ω]

$$R_{up} = \frac{R_H R_L V_{out}}{(V_{set} - V_{out})(R_H + R_L)} = [k\Omega]$$

$$R_{down} = \frac{V_{set} R_H^2 - R_H R_L (V_{out} - V_{set})}{(V_{out} - V_{set})(R_H + R_L)} = [k\Omega]$$

V_{OUT} [VDC]	R_H [Ω]	R_L [Ω]
1.0	100k	150
1.2		100
1.8		49k9
2.5		31k6
3.3		22k1

Practical Example RPZ-0.5(1.0), trim up:

V_{OUT}= 1.2VDC, $Vout_{set}$= 1.5VDC

$$R_{up} = \frac{100 \times 100 \times 1.2}{(1.5 - 1.2)(100 + 100)} = 200k\Omega$$

$$R_{up} = 200k\Omega \ (according\ to\ E96\ 1\%)$$

Practical Example RPZ-0.5(1.0), trim up:

V_{OUT}= 3.3VDC, $Vout_{set}$= 2.8VDC

$$R_{down} = \frac{2.8 \times 100^2 - 100 \times 22.1(3.3 - 2.8)}{(3.3 - 2.8)(100 + 22.1)} = 440.54k\Omega$$

$$R_{down} = 442k\Omega \ (according\ to\ E96\ 1\%)$$

$Vout_{set}$= 1.0VDC

Trim up

$Vout_{set}$ =	1.1	[VDC]
R_{up} (E96) ≈	604k	[Ω]

Trim down

$Vout_{set}$ =	0.6	0.7	0.8	0.9	[VDC]
R_{down} (E96) ≈	0	33k2	100k	301k	[Ω]

$Vout_{set}$= 1.2VDC

Trim up

$Vout_{set}$ =	1.3	1.4	1.5	1.6	[VDC]
R_{up} (E96) ≈	604k	301k	200k	150k	[Ω]

Trim down

$Vout_{set}$ =	1.1	[VDC]
R_{down} (E96) ≈	499k	[Ω]

$Vout_{set}$= 1.8VDC

Trim up

$Vout_{set}$ =	1.9	2	2.1	2.2	2.3	[VDC]
R_{up} (E96) ≈	604k	301k	200k	150k	121k	[Ω]

Trim down

$Vout_{set}$ =	1.7	1.6	1.5	[VDC]
R_{down} (E96) ≈	1M1	499k	301k	[Ω]

$Vout_{set}$= 2.5VDC

Trim up

$Vout_{set}$ =	2.6	2.8	3.0	3.2	[VDC]
R_{up} (E96) ≈	604k	200k	121k	86k6	[Ω]

Trim down

$Vout_{set}$ =	2.4	2.3	2.2	2.1	2.0	[VDC]
R_{down} (E96) ≈	1M78	845k	536k	374k	280k	[Ω]

$Vout_{set}$= 3.3VDC

Trim up

$Vout_{set}$ =	3.4	3.5	3.7	4.0	4.5	[VDC]
R_{up} (E96) ≈	604k	301k	150k	84k5	49k9	[Ω]

Trim down

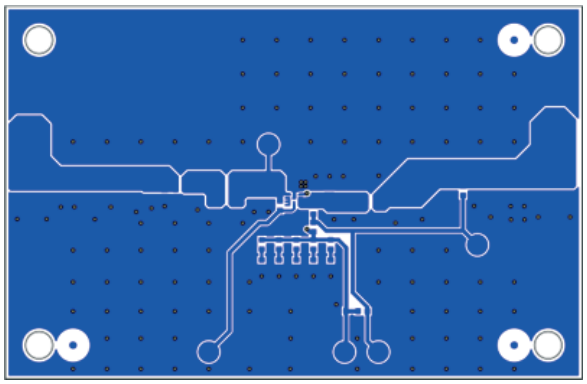
$Vout_{set}$ =	3.2	3.1	3.0	2.9	2.8	[VDC]
R_{down} (E96) ≈	2M61	1M24	806k	576k	442k	[Ω]

DIMENSION & PHYSICAL CHARACTERISTICS

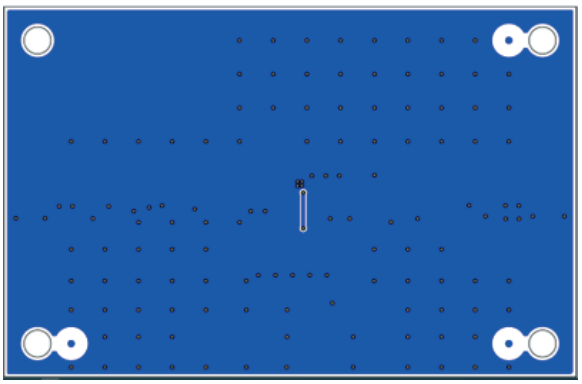
Parameter	Type	Value
Dimension (LxWxH)		85.0 x 55.0 x 6.5mm 0.86 x 0.36 x 0.44 inch
Weight		13.2g typ. 0.01 lbs

Layout

Top Layer



Bottom Layer



Note2: Visit www.recom-power.com/eval-ref-boards to download Gerber files

BOM

Component	Description	Manufacturer Part Number	Manufacturer	Remarks
C1-C5	10µF 10V X7R 0805	CL21B106KPQNNNG	SAMSUNG ELECTRO-MECHANICS	-
C6	CAP 1206			not mounted
C7	CAP 0805			not mounted
C9-C13	CAP 0805			not mounted
L1	IND-5.6uH-1.18A	RLS-567	RECOM	
L2-L8	IND / BEAD			not mounted
P1	CONNECTOR	2060-452_998-404	WAGO	
P2	CONNECTOR	2060-452_998-404	WAGO	
R1, R2, R4	100kΩ 0.1W 0603	RC0603FR-07100KL	YAGEO	
R3	150kΩ 0.1W 0603	RC0603FR-07150KL	YAGEO	
R5	49.9kΩ 0.1W 0603	RC0603FR-0749K9L	YAGEO	
R6	31.6kΩ 0.1W 0603	RC0603FR-0731K6L	YAGEO	
R7	22.1kΩ 0.1W 0603	RC0603FR-0722K1L	YAGEO	
R8-R10, R16	0Ω 0.1W 0603	RC0603JR-070RL	YAGEO	
R11-R15	RES-0603			not mounted
R17, R18	0Ω 0.1W 0603			not mounted
U1	RPZ-0.5/1.0 MODULE	RPZ-0.5/ RPZ-1.0	RECOM	

PACKAGING INFORMATION

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

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- RPZ-0.5-EVM-1 / RPZ-1.0-EVM-1 Evaluation Module
- Terms and conditions