

PI33xx-xx-EVAL1 & PI34xx-xx-EVAL1

ZVS Regulators Buck Evaluation Board



Contents	Page
Introduction	1
Evaluation Board Supply & Load Connections	4
Bills of Materials	7
Evaluation Board Notes	13

Introduction

The PI33xx-xx-EVAL1 and PI34xx-xx-EVAL1 evaluation board demonstrates the features and benefits of the ZVS Buck Regulator PI33xx and PI34xx families. The board features the ZVS Buck Regulator SiP, along with inductor, ceramic input and output capacitors.

The evaluation board provides several options for making input power (V_{IN} and GND) and output load (V_{OUT} and GND) connections. The user can solder tab style banana jacks or wire, use threaded binding posts secured by a retaining nut, or to simply use a #6 nut and bolt connection.

All the I/O pins are labeled and routed to the board edge for easy access. Each I/O pin is accompanied with an adjacent 50mil through-hole for adding a test point or to facilitate wiring to external circuitry.

The board has a scope tip jack for measuring output voltage (V_{OUT}), and has locations for two optional jacks for measuring V_{IN} and the switching node of the regulator (See Figure 4). There are two headers installed: an ENABLE jumper which can be used to enable or disable the converter and the remote sense jumper that will connect the buck's remote sense pin to the output at the V_{OUT} terminal.

For PI33xx-20 regulators only, there is a 4-pin I²C™ header that allows users to set certain device parameters and to read the fault registers of the regulator. Each regulator can be assigned an address from 0 to 7 using the two tri-state address pins (ADR0 and ADR1).

Connections required for parallel regulator operation are grouped together (labeled Current Sharing) to allow for easy connection between evaluation boards. There is a zero ohm jumper between SYNC1 and SGND to ensure that SYNC1 is grounded when not used. This resistor must be removed for interleaved operation. Please refer to the product data sheet for more detailed information on paralleling and on interleaving units.

There are two unpopulated resistor footprints (RADJ1 and RADJ2) used in trimming the output voltage and a capacitor footprint (CTRK) to add additional capacitance to the output tracking pin. Please refer to the product datasheet for more detailed information on these topics.

The evaluation board is constructed using 4 layers of 2oz copper and is routed to optimize the regulation path between input and output voltage, which reduces the parasitic losses and yields the best efficiency.

Table 1
Applicable evaluation board,
product part numbers,
and associated evaluation
PCB number

Product Part Number	Evaluation Board Number	PCB Part Number
PI3301-00-LGIZ	PI3301-00-EVAL1	PCB0108
PI3301-01-LGIZ	PI3301-01-EVAL1	PCB0113
PI3302-00-LGIZ	PI3302-00-EVAL1	PCB0108
PI3302-03-LGIZ	PI3302-03-EVAL1	PCB0190
PI3303-00-LGIZ	PI3303-00-EVAL1	PCB0108
PI3303-20-LGIZ	PI3303-20-EVAL1	PCB0108
PI3305-00-LGIZ	PI3305-00-EVAL1	PCB0108
PI3311-00-LGIZ	PI3311-00-EVAL1	PCB0113
PI3311-01-LGIZ	PI3311-01-EVAL1	PCB0113
PI3312-00-LGIZ	PI3312-00-EVAL1	PCB0108
PI3312-01-LGIZ	PI3312-01-EVAL1	PCB0113
PI3318-00-LGIZ	PI3318-00-EVAL1	PCB0113
PI3318-01-LGIZ	PI3318-01-EVAL1	PCB0113
PI3420-00-LGIZ	PI3420-00-EVAL1	PCB0113
PI3421-00-LGIZ	PI3421-00-EVAL1	PCB0113
PI3422-00-LGIZ	PI3422-00-EVAL1	PCB0113
PI3423-00-LGIZ	PI3423-00-EVAL1	PCB0113
PI3424-00-LGIZ	PI3424-00-EVAL1	PCB0113

Figure 1
Evaluation board
(PCB 0108)



Figure 2
Evaluation board
(PCB 0113)



Figure 3
Evaluation board
(PCB 0190)



Evaluation Board Supply & Load Connections

Figure 4 displays the recommended connections for input supply and output loading, and the best test points for measuring input and output voltages. All the I/O pins are brought out to the edge to allow for easy measurement and/or connection to the user's external circuitry.

Figure 4
Evaluation board
measurement
connection

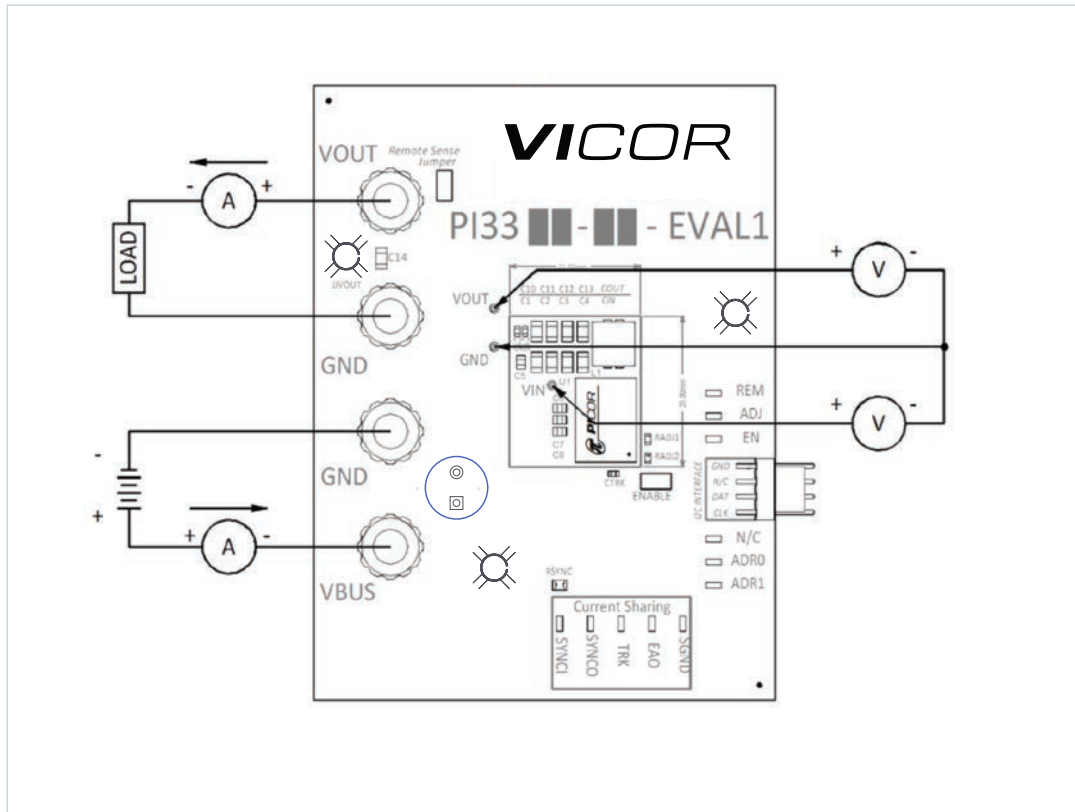


Figure 5
Evaluation board
(PCB 0108) schematic

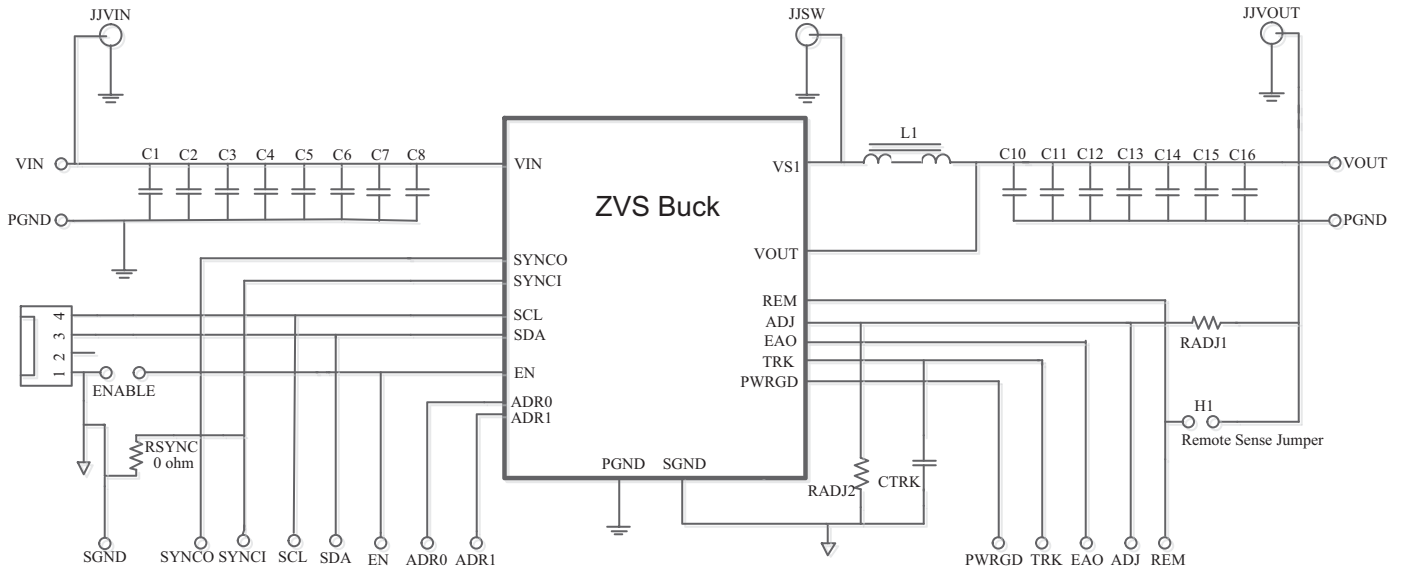


Figure 6
Evaluation board
(PCB0113) schematic

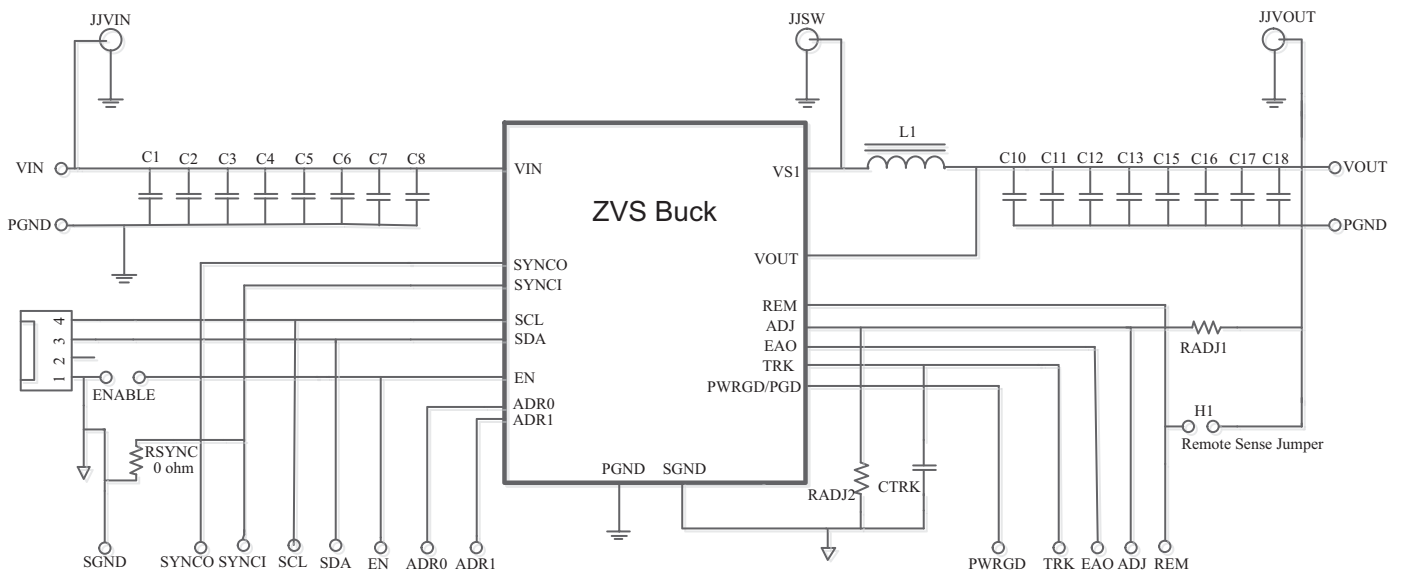
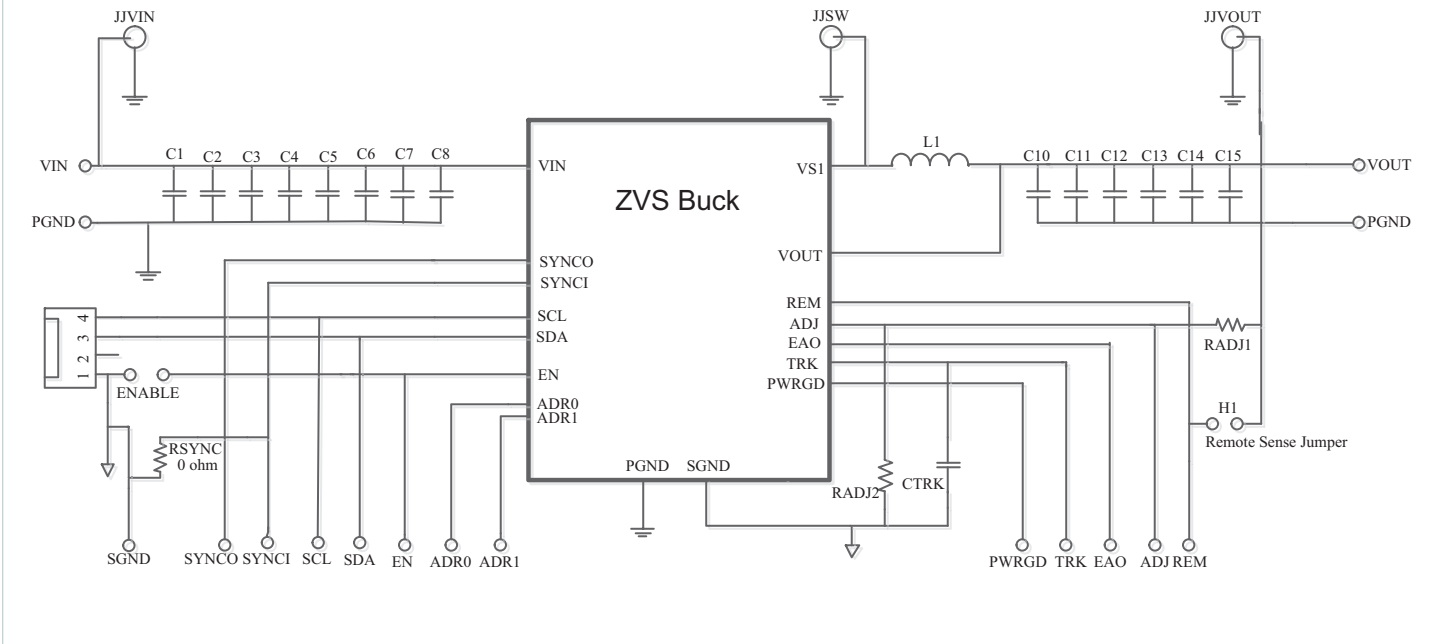


Figure 7
 Evaluation board
 (PCB0190) schematic



Bills of Materials

Locate the PCB number for your product in the following tables and find the BOM for that PCB.

Table 2
Bill of materials Vicor
ZVS Buck
Regulator evaluation board
(PCB 0108)

Device	Qty	Designators	Value	Description	Manufacturer	Part Number
PI3301-00	1	U1	3.3V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3301-00-LGIZ
	4	C10-C13	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	200nH	Buck Inductor	Eaton	FPT705-200-R
		I ² C_ INTERFACE	n/a	n/a	n/a	n/a
PI3302-00	1	U1	5V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3302-00-LGIZ
	4	C10-C13	47µF 10V	Ceramic Output Capacitor	Murata	GRM31CR61A476ME15L
	1	L1	200nH	Buck Inductor	Eaton	FPT705-200-R
		I ² C_ INTERFACE	n/a	n/a	n/a	n/a
PI3303-00	1	U1	12V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3303-00-LGIZ
	4	C10-C13	22µF 25V	Ceramic Output Capacitor	Murata	GRM31CR61E226KE15L
	1	L1	230nH	Buck Inductor	Eaton	FPT705-200-R
		I ² C_ INTERFACE	n/a	n/a	n/a	n/a
PI3303-20	1	U1	12V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3303-20-LGIZ
	4	C10-C13	22µF 25V	Ceramic Output Capacitor	Murata	GRM31CR61E226KE15L
	1	L1	230nH	Buck Inductor	Eaton-Coiltronics	FPT705-230-R
	1	I ² C_ INTERFACE		4 Position, I2C Header	Molex	22-23-2041
PI3305-00	1	U1	15V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3305-00-LGIZ
	4	C10-C13	22µF 25V	Ceramic Output Capacitor	Murata	GRM31CR61E226KE15L
	1	L1	230nH	Buck Inductor	Eaton-Coiltronics	FPT705-230-R
		I ² C_ INTERFACE	n/a	n/a	n/a	n/a

Bills of Materials (Cont.)

Table 2 (Cont.)
 Bill of materials Vicor
 ZVS Buck
 Regulator evaluation board
 (PCB 0108)

Device	Qty	Designators	Value	Description	Manufacturer	Part Number
PI3312-00	1	U1	2.5V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3312-00-LGIZ
	4	C10-C13	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	200nH	Buck Inductor	Eaton-Coiltronics	FPT705-200-R
		I ² C_ INTERFACE	n/a	n/a	n/a	n/a
Common	10	ADJ, ADR0, ADR1, EAO, EN, REM, SGND, SYNCI, SYNCO, TRK		SM Test Point	Keystone	5015
	4	C1-C4	4.7µF 50V	Ceramic Capacitor	Murata	GRM31CR71H475KA12L
	4	C5-C8	0.1µF 50V	Ceramic Capacitor	TDK	C2012X7R1H104K085AA
	1	C14	0.1µF 50V	Ceramic Capacitor	Murata	GRM319R71H104KA01D
	2	C15-C16	1µF 16V	Ceramic Capacitor	Murata	GRM188R71C105KA12J
	2	ENABLE, H1		Header Jumper	Samtec	TSW-148-07-F-S
	3	GND, VIN, VOUT		TH Testpoint	Vector	K24
	1	JJVOUT		Compact 3.5mm Jack	Tektronix	131503100
		JJVIN, JJVSW	n/a	n/a	n/a	n/a
	1	PCB		PI33XX-xx-EVAL1 PCB	VICOR	PCB0108
	1	RSYNC	0Ω	0805 Resistor	Rohm	MCR10EZPJ000

Bills of Materials (Cont.)

Table 3
*Bill of materials Vicor
 ZVS Buck
 Regulator evaluation board
 (PCB 0113)*

Device	Qty	Designators	Value	Description	Manufacturer	Part Number
PI3301-01	1	U1	3.3V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3301-01-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	150nH	Buck Inductor	Datatronics	38950-05
	6	C1-C6	4.7µF 50V	Ceramic Capacitor	Murata	GRM31CR71H475KA12L
PI3311-00	1	U1	1V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3311-00-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	125nH	Buck Inductor	Datatronics	38950-04
	6	C1-C6	4.7µF 50V	Ceramic Capacitor	Murata	GRM31CR71H475KA12L
PI3311-01	1	U1	1V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3311-01-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	80nH	Buck Inductor	Datatronics	38950-02
	6	C1-C6	4.7µF 50V	Ceramic Capacitor	Murata	GRM31CR71H475KA12L
PI3312-01	1	U1	2.5V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3312-01-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	125nH	Buck Inductor	Datatronics	38950-04
	6	C1-C6	4.7µF 50V	Ceramic Capacitor	Murata	GRM31CR71H475KA12L
PI3318-00	1	U1	1.8V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3318-00-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	150nH	Buck Inductor	Datatronics	38950-05
	6	C1-C6	4.7µF 50V	Ceramic Capacitor	Murata	GRM31CR71H475KA12L

Bills of Materials (Cont.)

Table 3 (Cont.)
 Bill of materials Vicor
 ZVS Buck
 Regulator evaluation board
 (PCB 0113)

Device	Qty	Designators	Value	Description	Manufacturer	Part Number
PI3318-01	1	U1	1.8V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3318-01-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	125nH	Buck Inductor	Datatronics	38950-04
	6	C1-C6	4.7µF 50V	Ceramic Capacitor	Murata	GRM31CR71H475KA12L
PI3420-00	1	U1	1.8V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3420-00-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	80nH	Inductor	Datatronics	38950-02
	6	C1-C6	22µF 25V	Ceramic Capacitor	Murata	GRM31CR61E226KE15L
PI3421-00	1	U1	1.8V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3421-00-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	125nH	Inductor	Datatronics	38950-04
	6	C1-C6	22µF 25V	Ceramic Capacitor	Murata	GRM31CR61E226KE15L
PI3422-00	1	U1	2.5V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3422-00-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	125nH	Inductor	Datatronics	38950-04
	6	C1-C6	22µF 25V	Ceramic Capacitor	Murata	GRM31CR61E226KE15L
PI3423-00	1	U1	3.3V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3423-00-LGIZ
	8	C10-C15 C19-C20	100µF 6.3V	Ceramic Output Capacitor	Murata	GRM31CR60J107ME39L
	1	L1	150nH	Inductor	Datatronics	38950-05
	6	C1-C6	22µF 25V	Ceramic Capacitor	Murata	GRM31CR61E226KE15L

Bills of Materials (Cont.)

Table 3 (Cont.)
 Bill of materials Vicor
 ZVS Buck
 Regulator evaluation board
 (PCB 0113)

Device	Qty	Designators	Value	Description	Manufacturer	Part Number
PI3424-00	1	U1	5V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3424-00-LGIZ
	8	C10-C15 C19-C20	47 μ F 10V	Ceramic Output Capacitor	Murata	GRM31CR61A476ME15L
	1	L1	150nH	Inductor	Datatronics	38950-05
	6	C1-C6	22 μ F 25V	Ceramic Capacitor	Murata	GRM31CR61E226KE15L
Common	11	ADJ, ADRO, ADR1, EAO, EN, NC, REM, SGND, SYNCl, SYNCO, TRK		SM Testpoint	Keynote	5015
	2	C7-C8	0.1 μ F 50V	Ceramic Capacitor	TDK	C2012X7R1H104K085AA
	1	C16	0.1 μ F 50V	Ceramic Capacitor	Murata	GRM319R71H104KA01D
	2	C17-C18	1 μ F 16V	Ceramic Capacitor	Murata	GRM188R71C105KA12J
	2	ENABLE, H1		Header Jumper	Samtec	TSW-148-07-F-S
	3	GND, VIN, VOUT		TH Testpoint	Vector Technologies	K24C/M
	1	JJVOU		Compact 3.5mm Jack	Tektronix	131503100
		JJVIN, JJVSW	n/a	n/a	n/a	n/a
	1	PCB		PI3xxx-XX-EVAL1-pcb	VICOR	PCB0113
	1	ROUT	1k Ω	Resistor	Rohm	MCR18EZHf1001
	1	RSYNC	0 Ω	Resistor	Rohm	MCR10EZPJ000
		I ² C_ INTERFACE	n/a	n/a	n/a	n/a

Bills of Materials (Cont.)

Table 4
*Bill of materials Vicor
 ZVS Buck
 Regulator evaluation board
 (PCB 0190)*

Device	Qty	Designators	Value	Description	Manufacturer	Part Number
PI3302-03	1	U1	5V ZVS Buck Regulator	ZVS Buck Regulator	VICOR	PI3302-03-LGIZ
	6	C10-C15	47 μ F 10V	Ceramic Capacitor	Murata	GRM32ER71A476KE15L
	1	L1	185nH	Buck inductor	Eaton-Coiltronics	FP1507R1-R185-R
	11	ADJ, ADRO, ADR1, EAO, EN, N/C, REM, SGND, SYNCI, SYNCO, TRK		SM Testpoint	Keystone	5015
	1	C16	0.1 μ F 50V	Ceramic Capacitor	Murata	GRM319R71H104KA01D
	2	C17-C18	1 μ F 16V	Ceramic Capacitor	Murata	GRM188R71C105KA12J
	6	C1-C6	10 μ F 50V	Ceramic Capacitor	TDK	C3216X5R1H106K160AB
	2	C7-C8	0.1 μ F 50V	Ceramic Capacitor	TDK	C2012X7R1H104K085AA
	2	ENABLE, H1		Header Jumper	Samtec	TSW-148-07-F-S
		JVIN, JVSW, JVOUT	n/a	n/a	n/a	n/a
	3	GND, VIN VOUT		TH Testpoint	Vector	K24
	1	ROUT	1k Ω	1206 Resistor	Rohm	MCR18EZH1001
	1	RSYNC	0 Ω	0805 Resistor	Rohm	MCR10EZPJ000
		I ² C_ INTERFACE	n/a	n/a	n/a	n/a

Evaluation Board Notes

The evaluation board has solder mask openings on the bottom side of the board to allow for the option of additional output capacitance (4 x 1206 or 2 x 1812).

There are two additional, unmarked, scope tip test points (circled in red in Figures 8 – 10) that allow the user to measure V_{IN} and the switching node (VS1). These are labeled as JJVIN and JJVSW in Figures 8 – 10.

There are two through-hole pads (blue circle) for the addition of an electrolytic bulk storage capacitor. This capacitor is required when the evaluation board is connected to the input voltage source through long leads. A 100 μ F, 50V Electrolytic is recommended with an ESR between 20 and 50m Ω .

The two pins labeled as "N/C" (highlighted in green box in Figures 8 – 10) are not electrically connected to each other.

There are internal connections within the PI33xx and PI34xx between grounds SGND and PGND. It is not required to tie these two grounds together externally and these two grounds are not connected together on the evaluation board.

Figure 8
 Optional Test Points
 & Component Locations
 (PCB 0108)

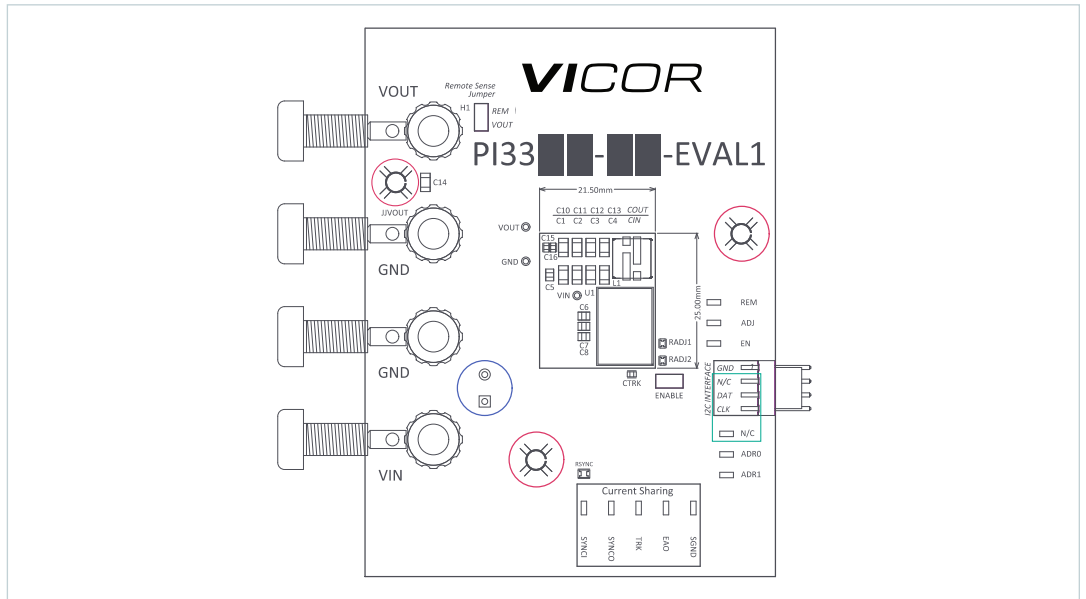


Figure 9
 Optional Test Points
 & Component Locations
 (PCB0113)

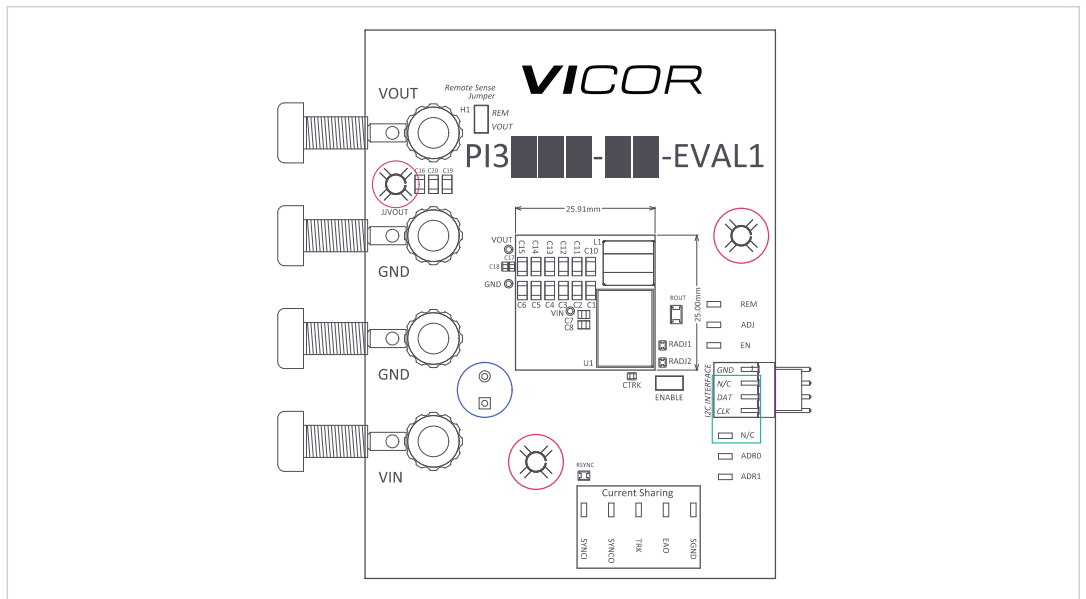


Figure 10
 Optional Test Points
 & Component Locations
 (PCB0190)

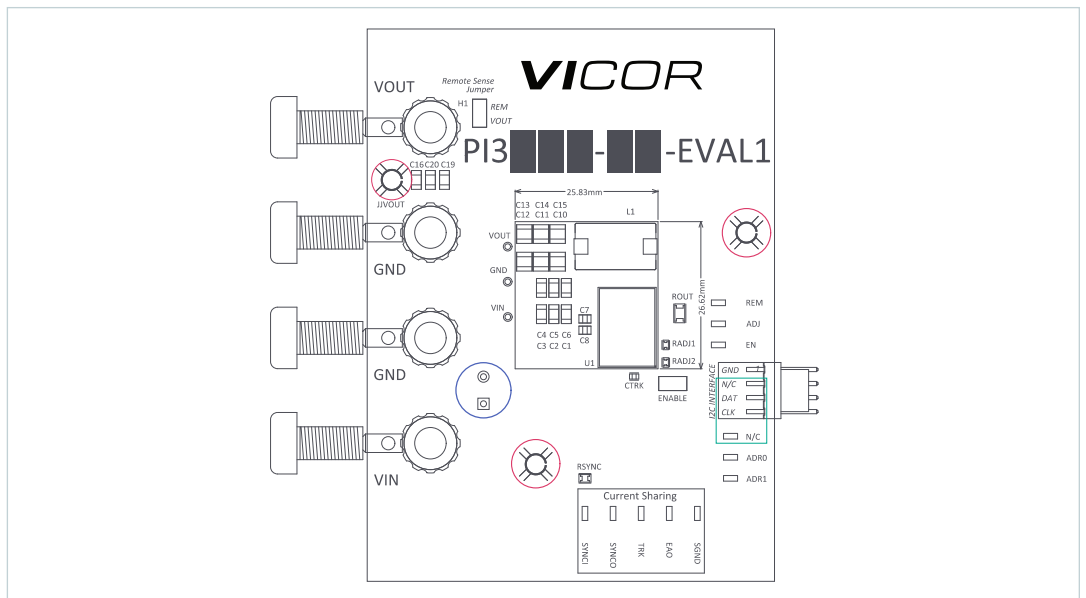
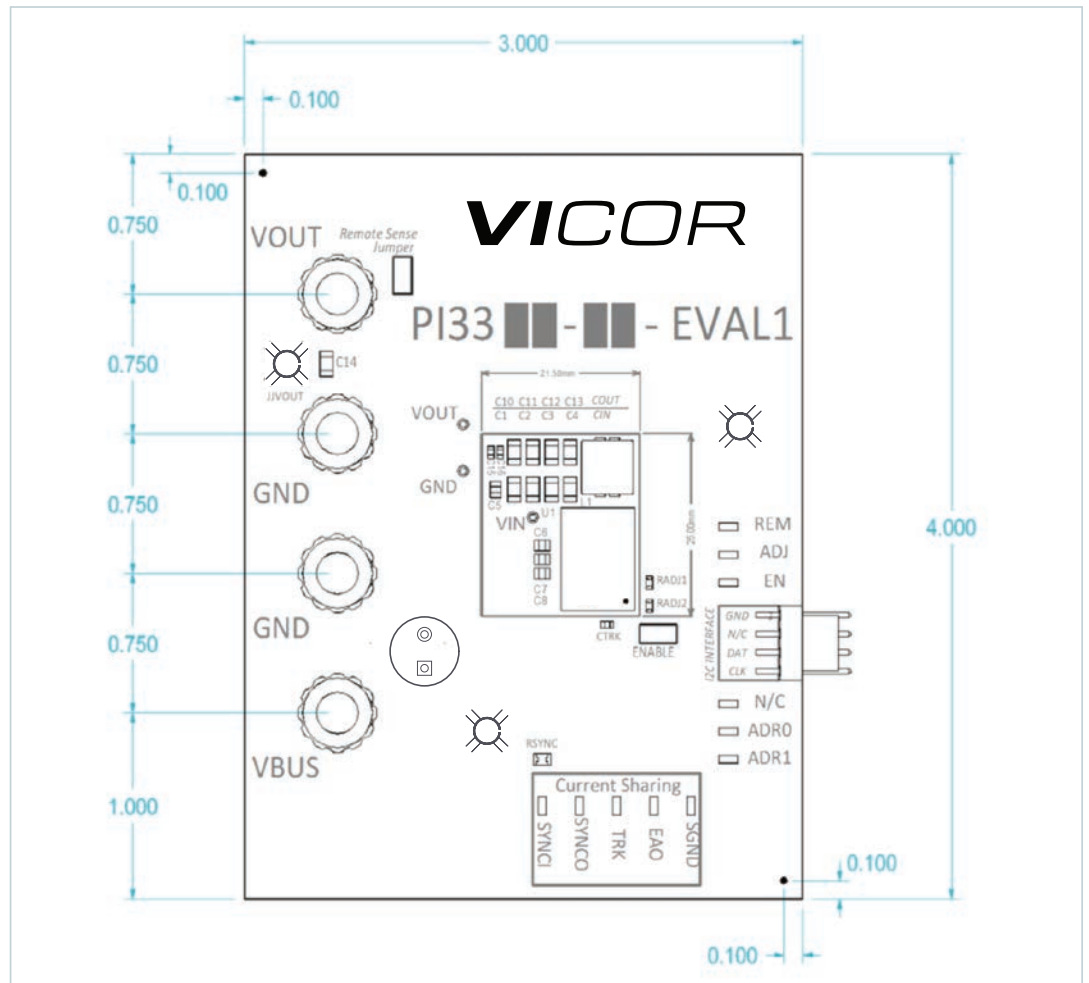


Figure 11
Board Dimensions
Common to all
Three PCBNumbers



Limitation of Warranties

Information in this document is believed to be accurate and reliable. HOWEVER, THIS INFORMATION IS PROVIDED "AS IS" AND WITHOUT ANY WARRANTIES, EXPRESSED OR IMPLIED, AS TO THE ACCURACY OR COMPLETENESS OF SUCH INFORMATION. VICOR SHALL HAVE NO LIABILITY FOR THE CONSEQUENCES OF USE OF SUCH INFORMATION. IN NO EVENT SHALL VICOR BE LIABLE FOR ANY INDIRECT, INCIDENTAL, PUNITIVE, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR SAVINGS, BUSINESS INTERRUPTION, COSTS RELATED TO THE REMOVAL OR REPLACEMENT OF ANY PRODUCTS OR REWORK CHARGES).

Vicor reserves the right to make changes to information published in this document, at any time and without notice. You should verify that this document and information is current. This document supersedes and replaces all prior versions of this publication.

All guidance and content herein are for illustrative purposes only. Vicor makes no representation or warranty that the products and/or services described herein will be suitable for the specified use without further testing or modification. You are responsible for the design and operation of your applications and products using Vicor products, and Vicor accepts no liability for any assistance with applications or customer product design. It is your sole responsibility to determine whether the Vicor product is suitable and fit for your applications and products, and to implement adequate design, testing and operating safeguards for your planned application(s) and use(s).

VICOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED OR WARRANTED FOR USE IN LIFE SUPPORT, LIFE-CRITICAL OR SAFETY-CRITICAL SYSTEMS OR EQUIPMENT. VICOR PRODUCTS ARE NOT CERTIFIED TO MEET ISO 13485 FOR USE IN MEDICAL EQUIPMENT NOR ISO/TS16949 FOR USE IN AUTOMOTIVE APPLICATIONS OR OTHER SIMILAR MEDICAL AND AUTOMOTIVE STANDARDS. VICOR DISCLAIMS ANY AND ALL LIABILITY FOR INCLUSION AND/OR USE OF VICOR PRODUCTS IN SUCH EQUIPMENT OR APPLICATIONS AND THEREFORE SUCH INCLUSION AND/OR USE IS AT YOUR OWN RISK.

Terms of Sale

The purchase and sale of Vicor products is subject to the Vicor Corporation Terms and Conditions of Sale which are available at: (<http://www.vicorpower.com/termsconditionswarranty>)

Export Control

This document as well as the item(s) described herein may be subject to export control regulations. Export may require a prior authorization from U.S. export authorities.

Contact Us: <http://www.vicorpower.com/contact-us>

Vicor Corporation

25 Frontage Road
Andover, MA, USA 01810
Tel: 800-735-6200
Fax: 978-475-6715
www.vicorpower.com

email

Customer Service: custserv@vicorpower.com
Technical Support: apps@vicorpower.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Vicor:

[PI3318-21-EVAL1](#) [PI3301-21-EVAL1](#) [PI3312-21-EVAL1](#) [PI3305-20-EVAL1](#) [PI3303-20-EVAL1](#) [PI3311-21-EVAL1](#)
[PI3302-03-EVAL1](#) [PI3318-00-EVAL1](#)