



A New Direction in Mixed-Signal

# 1.5A 18V 1.4MHz non-Synchronous Step-Down Converter

## XRP7659

August 2012

Rev. 1.0.0

### GENERAL DESCRIPTION

The EXAR XRP7659 Evaluation kit is a fully assembled and tested surface-mount PCB that demonstrates the XRP7659 non-synchronous step-down regulator. The current-mode switching regulator generates a preset 3.3V output with a load of up to 1.5A.

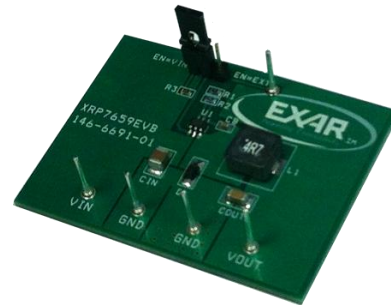
The EVB kit requires a single input voltage  $V_{IN}$  source, if EN is tied to  $V_{IN}$  via jumper J1 (default setting as supplied from EXAR). If J1 is set to EN=EXT position, then a logic-level active-high signal is required at EN pin in order to turn the regulator on and off.

### STANDARD CONFIGURATION

The XRP7659EVB evaluation board is configured to operate under the following conditions and parameters:

- Input voltage range: 4.5V - 18V
- Output voltage range: 3.3V
- Output current/load range: 0 - 1.5A

### EVALUATION BOARD MANUAL



### FEATURES

- **1.5A Continuous Output Current**
- **4.5V to 18V Wide Input Voltage**
- **PWM Current-Mode Control**
  - 1.4MHz Constant frequency
- **Adjustable Output Voltage**
  - 0.81V to 15V Range /  $\pm 3\%$  Accuracy
- **Enable Function and integrated Softstart**
- **Built-in Thermal, Over-Current, UVLO and Output Over-Voltage Protection**
- **RoHS Compliant, "Green"/Halogen Free SOT-23-6 Package**

### EVALUATION BOARD SCHEMATICS

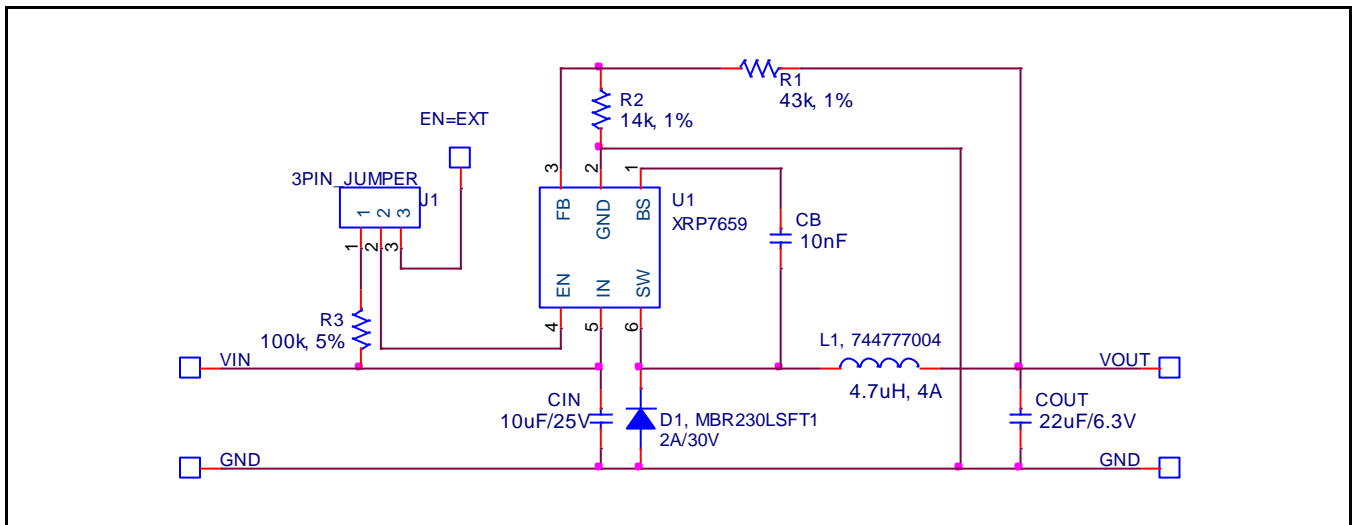


Fig. 1: XRP7659 Evaluation Board Schematics

**PIN ASSIGNMENT**

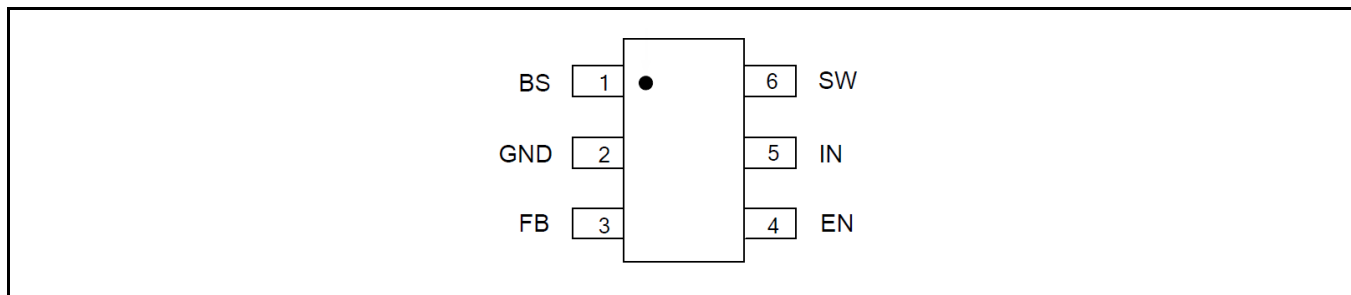


Fig. 2: XRP7659 Pin Assignment

**PIN DESCRIPTION**

Name	Pin Number	Description
BS	1	Bootstrap pin. Connect a 10nF bootstrap capacitor between BS and SW pins. The voltage across the bootstrap capacitor drives the internal high-side MOSFET.
GND	2	Ground pin.
FB	3	Feedback pin. Connect to a resistor divider to program the output voltage. If $V_{FB}$ exceeds 0.972V the OVP is triggered. If $V_{FB}$ drops below 0.25V the short circuit protection is activated.
EN	4	Enable Input Pin. Forcing this pin above 1.5V enables the IC. Forcing the pin below 0.4V shuts down the IC. For automatic enable connect a 100kΩ resistor between EN and IN.
IN	5	Power Input Pin. Must be closely decoupled to GND pin with a 10μF/25V or greater ceramic capacitor.
SW	6	Power switch output pin. Connect to inductor and bootstrap capacitor.

**ORDERING INFORMATION**

Refer to XRP7659’s datasheet and/or [www.exar.com](http://www.exar.com) for exact and up to date ordering information.

**USING THE EVALUATION BOARD**

**STANDARD CONFIGURATION**

The evaluation board is configured to operate under the following conditions and parameters:

- Input voltage range: 4.5V - 18V
- Output voltage range: 3.3V
- Output current/load range: 0 – 1.5A

**INITIAL SETUP**

Set the input supply to 12V and connect it to VIN and GND connectors on the left side of the evaluation board. Connect the load to the VOUT and GND connectors on the right side of the board. Check to make sure that jumper J1

is set to the left side (position marked EN=VIN). The board will power up and regulate the output at 3.3V upon turning on the input supply. The XRP7659 will operate with a load current of up to 1.5A and should provide nominal efficiency equal to figure 4 of the datasheet.

**JUMPER J1 FUNCTION**

Jumper J1 can be used to either connect EN to VIN or allow an independent logic-level control signal to be applied to EN. The board is supplied from EXAR with jumper J1 set at left-side (position marked EN=VIN). This allows for automatic startup of the XRP7659 regulator when VIN is applied.

**1.5A 18V 1.4MHz non-Synchronous Step-Down Converter**

**TYPICAL PERFORMANCE CHARACTERISTICS**

All data taken at  $V_{IN} = 12V$ ,  $T_J = T_A = 25^\circ C$ , unless otherwise specified - Schematic and BOM from Application Information section of this manual.

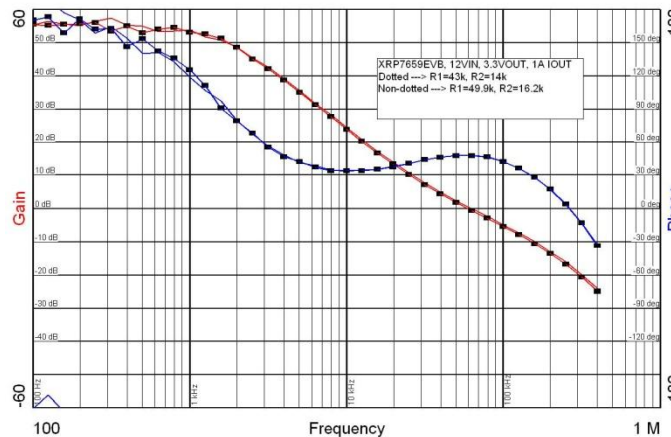
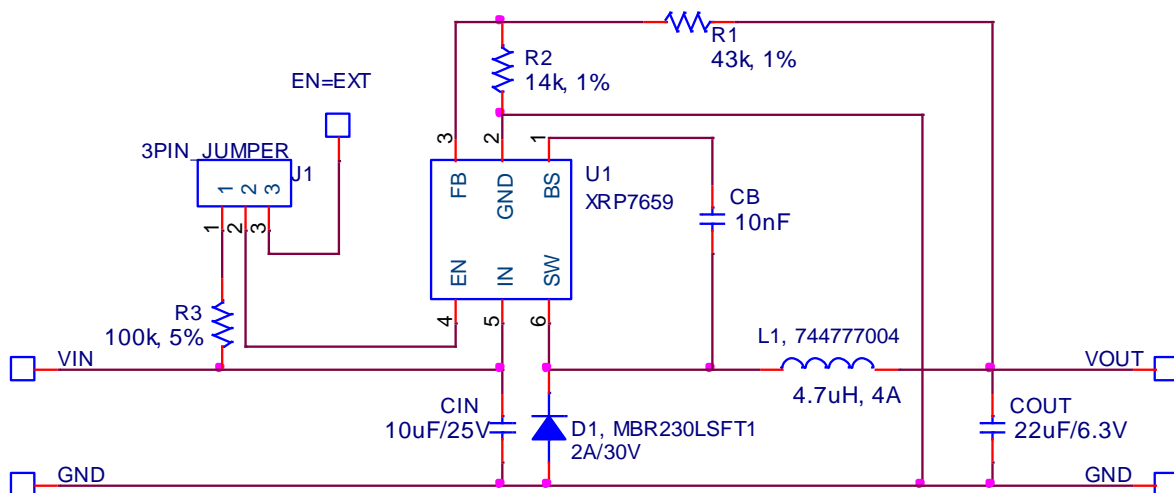


Fig. 3: Gain and Phase Margin Responses of XRP7659EVB

Bode plots of the XRP7659EVB, as illustrated in Fig. 3, show a stable system with a  $\sim 60kHz$  crossover frequency and  $\sim 50dB$  phase margin.

Furthermore, the XRP7659EVB is stable and exhibits similar performances with both the recommended resistors R1 and R2 at respectively  $43k\Omega$  and  $14k\Omega$  and the Monolithic Power System's MP2359 recommended resistors R1 and R2 at respectively  $49.9k\Omega$  and  $16.2k\Omega$ .

**EVALUATION BOARD SCHEMATICS**



Title		
XRP7659EVB		
Size	Document Number	Rev
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**BILL OF MATERIAL**

Ref.	Qty	Manufacturer	Part Number	Size	Component
PCB	1	Exar	XRP7659EVB	2"x2"	XRP7659 Evaluation kit
U1	1	Exar	XRP7659	SOT23-6	Buck regulator
D1	1	ON Semi	MBR230LSFT1	SOD123	Schottky, 2A/30V
L1	1	Würth Elektronik	744777004	7.3x7.3mm	4.7uH shielded inductor
CIN	1	Murata Corp.	GRM32DR61E106KA12L	1210	CER CAP 10uF, 25V, X5R
COUT	1	Murata Corp.	GRM31CR60J226KE19L	1206	CER CAP 22uF, 6.3V, X5R
CB	1	Murata Corp.	GRM188R71H103KA01D	0603	CER CAP 10000pF, X7R, 50V
R1	1	Panasonic Corp.	ERJ-3EKF4302V	0603	Resistor 43.0kΩ, 1%
R2	1	Panasonic Corp.	ERJ-3EKF1402V	0603	Resistor 14.0kΩ, 1%
R3	1	Panasonic Corp.	ERJ-3EKF1003V	0603	Resistor 100kΩ, 1%
J1	1	Würth Elektronik	61304011121		Conn. Header 0.1" 3POS
J1(JUMPER)	1	Würth Elektronik	609002115121		CONN JUMPER SHORT.
VIN, VOUT, GND, EN	5	Vector Electronic	K24C/M	.042 Dia	Test Point Post

**EVALUATION BOARD LAYOUT**

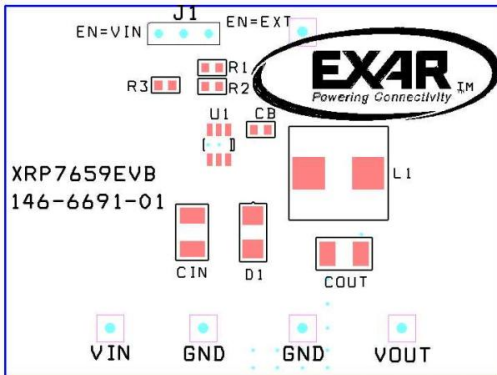


Fig. 4: Component Placement – Top Side

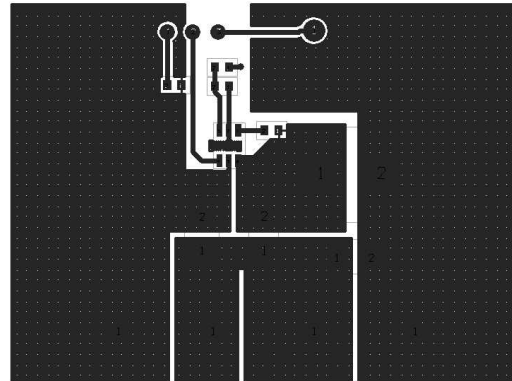


Fig. 5: Layout – Top Side

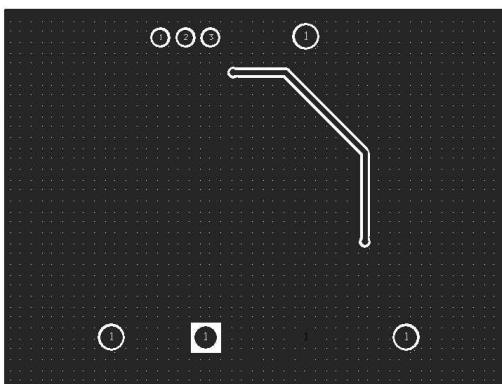


Fig. 6: Layout - Bottom



**DOCUMENT REVISION HISTORY**

Revision	Date	Description
1.0.0	08/09/2012	Initial release of document

**BOARD REVISION HISTORY**

Board Revision	Date	Description
146-6691-01	08/09/2012	Initial release of evaluation board

**FOR FURTHER ASSISTANCE**

Email: [customersupport@exar.com](mailto:customersupport@exar.com)  
Exar Technical Documentation: <http://www.exar.com/TechDoc/default.aspx?>



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