



A New Direction in Mixed-Signal

May 2013

XRP6670

## 3A 300kHz-2.5MHz Synchronous Step Down Regulator

Rev. 1.0.1

### GENERAL DESCRIPTION

The Exar XRP6670 Evaluation board (EVB) is a fully assembled and tested surface-mount PCB that demonstrates the XRP6670 buck regulator. The XRP6670 is a synchronous current mode PWM step-down converter with integrated FET capable of delivering up to 3Amps and optimized for portable battery-operated applications. A 2.6V to 5.5V input voltage range allows for single supply operation from industry standard 3.3V and 5V power rails. Operating frequency is programmable between 300kHz and 2.5MHz via external resistor ROSC. The integrated P-channel control FET allows 100% duty cycle.

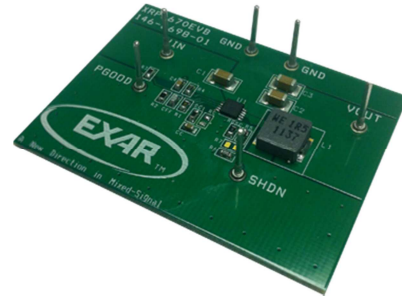
Built-in over-temperature, overcurrent, short-circuit and under-voltage lock-out protection insure safe operation under abnormal operating conditions.

### STANDARD CONFIGURATION

The XRP6670EVB evaluation board is configured to operate under the following conditions and parameters:

- Input voltage range: 2.6V – 5.5V
- Output voltage range: 2.5V
- Output current/load range: 0 – 3A
- Switching frequency: 1MHz

### EVALUATION BOARD MANUAL



### FEATURES

- **Guaranteed 3A Output Current**
  - Input Voltage: 2.6V to 5.5V
- **PWM Current Mode Control**
  - Programmable 300kHz to 2.5MHz
  - 100% Duty Cycle LDO Mode Operation
  - Achieves 95% Efficiency
- **Adjustable Output Voltage Range**
  - 0.8V to 5V with +/-2% Accuracy
- **Enable and Power Good Functions**
- **460µA Quiescent Current**
- **Over-temperature, Overcurrent, Short-circuit and UVLO Protection**

### EVALUATION BOARD SCHEMATICS

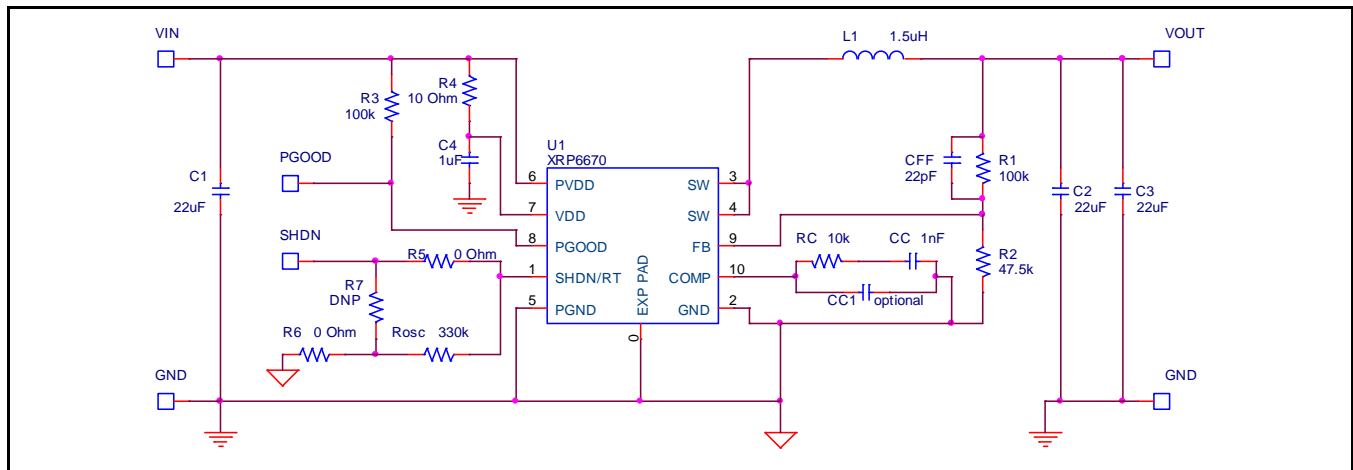


Fig. 1: XRP6670 Evaluation Board Schematics

**3A 300kHz-2.5MHz Synchronous Step Down Regulator**

**PIN ASSIGNMENT**

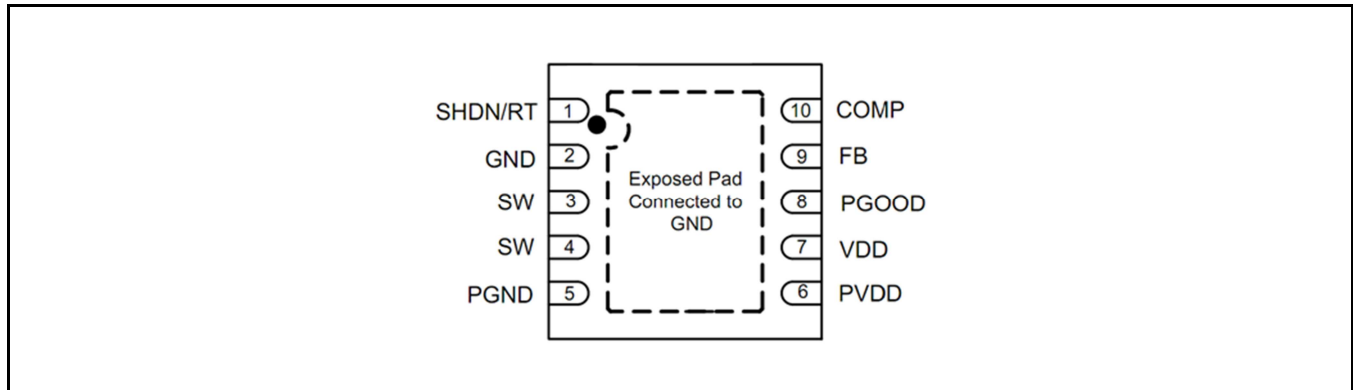


Fig. 2: XRP6670 Pin Assignment

**PIN DESCRIPTION**

Name	Pin Number	Description
SHDN/RT	1	Shutdown and Oscillator resistor input. Connect a resistor to GND from this pin to set the switching frequency. Forcing this pin to VDD shuts down the device.
GND	2	Signal ground. All small-signal ground, such as the compensation components and exposed pad should be connected to this, which in turn connects to PGND at one point.
SW	3, 4	Power switch output pin. This pin is connected to the inductor.
PGND	5	Power Ground Signal. Connect this signal as close as possible to the input and output capacitors $C_{IN}$ and $C_{OUT}$ .
PVDD	6	Power Input Supply Pin. Decouple this pin to PGND (pin 5) with a capacitor.
VDD	7	Signal Input Supply Pin. Decouple this pin to GND (pin 2) with a capacitor. Typically, VDD and PVDD are connected together.
PGOOD	8	Power Good Flag. This is an open drain output and is pulled to ground if the output voltage is out of regulation.
FB	9	Feedback pin. An external resistor divider connected to FB programs the output voltage.
COMP	10	Compensation pin. This is the output of transconductance error amplifier and the input to the current comparator. It is used to compensate the control loop. Connect an RC network from this pin to GND.
Exp. Pad	Exp. Pad	Connect to GND signal (pin 2).

**ORDERING INFORMATION**

Refer to XRP6670's datasheet and/or [www.exar.com](http://www.exar.com) for exact and up to date ordering information.

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### **USING THE EVALUATION BOARD**

#### **POWERING UP THE BOARD**

Connect a power supply to the VIN and GND pins of the PCB. Upon powering up the XRP6670 will regulate the VOUT at 2.5V nominal. XRP6670 is guaranteed to supply output current of up to 3A and provide nominal efficiency equal to figure 6 of the datasheet.

#### **SHUTDOWN FUNCTION**

XRP6670 will shut down if SHDN pin is jumpered to the VIN pin. In order to use an

external SHDN signal, remove R5/R6 and populate R7 with a 0Ω resistor. Please note that the SHDN signal has to be tri-stated. Depending on the impedance of the tri-state signal there may be some shift in switching frequency.

#### **CORRECTION TO DESIGNATOR RC/CC1**

Please note that designators for components RC and CC1 have been switched around. In other words the component RC has the designator CC1 and optional component CC1 has designator RC.

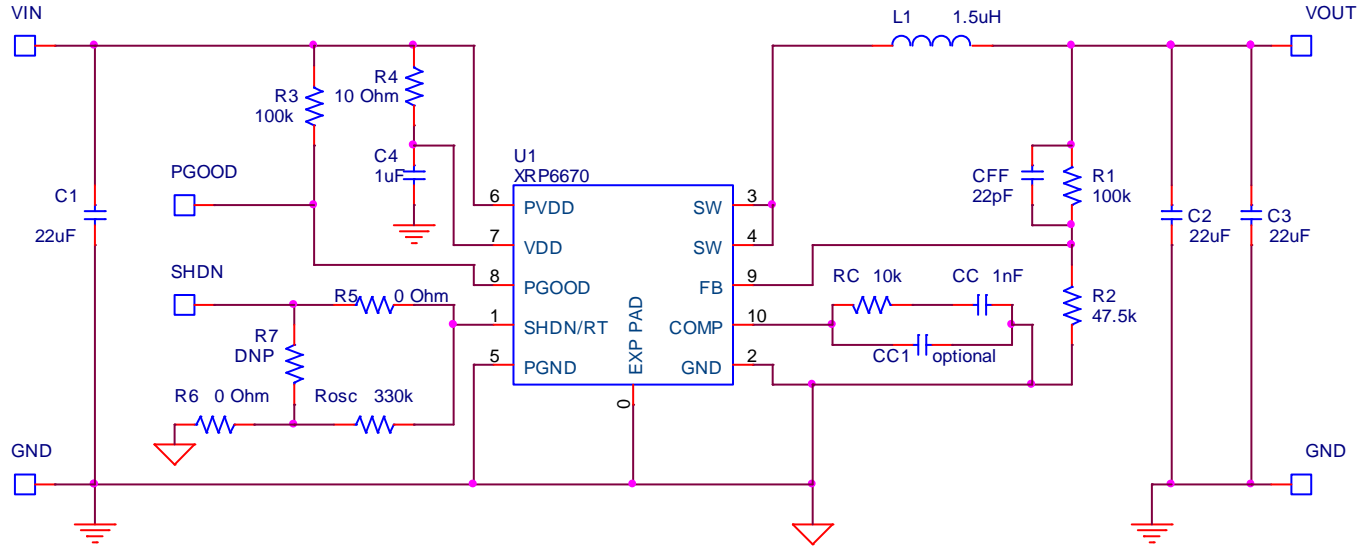


A New Direction in Mixed-Signal

# XRP6670

## 3A 300kHz-2.5MHz Synchronous Step Down Regulator

### EVALUATION BOARD SCHEMATICS



### BILL OF MATERIAL

Reference Designator	Qty.	Manufacturer	Manufacturer Part Number	Size	Component
PCB	1	Exar	XRP6670EVB	1.5"x2"	XRP6670 Evaluation kit
U1	1	Exar	XRP6670	DFN-10	Buck regulator
L1	1	Würth	74437346015	6.6x7.3mm	1.5uH, 7.2A power inductor
C1, C2, C3	3	Murata	GRM31CR61C226KE15K	1206	Ceramic cap., 22uF, 16V, X5R, 10%
C4	1	Murata	GRM188R61C105KA93D	0603	Ceramic cap., 1uF, 16V, X5R, 10%
CC	1	Murata	GRM188R71H102KA01D	0603	Ceramic cap., 1000pF, 50V, X7R, 10%
CFF	1	Murata	GRM1885C1H220JA01D	0603	Ceramic cap., 22pF, 50V, NP0, 10%
R1, R3	2	Vishay/Dale	CRCW0603100KFKEA	0603	RES 100kΩ, 1/10W, 1%, SMD
R2	1	Vishay/Dale	CRCW060347K5FKEA	0603	RES 47.5kΩ, 1/10W, 1%, SMD
R4	1	Vishay/Dale	CRCW060310R0FKEA	0603	RES 10.0Ω, 1/10W, 1%, SMD
R5, R6	2	Vishay/Dale	CRCW06030000Z0EA	0603	RES 0.0Ω, 1/10W, SMD
RC	1	Vishay/Dale	CRCW060310K0FKEA	0603	RES 10kΩ, 1/10W, 1%, SMD
Rosc	1	Vishay/Dale	CRCW0603330KFKEA	0603	RES 330kΩ, 1/10W, 1%, SMD
VIN, VOUT, GND, GND, PGOOD, SHDN	6	Vector Electronics	K24C/M	.042 Dia	Test Point Post

### EVALUATION BOARD LAYOUT

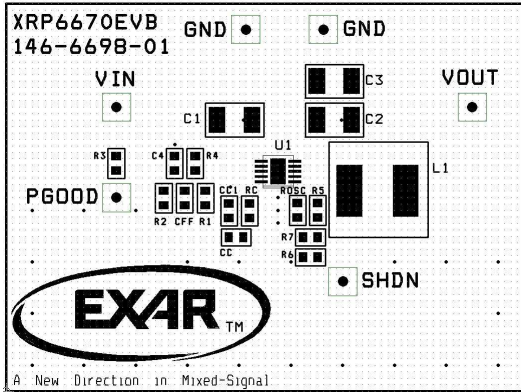


Fig. 3: Component Placement – Top Side

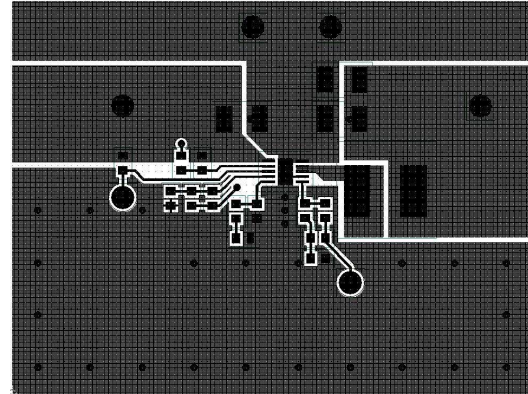


Fig. 4: Layout – Top Side

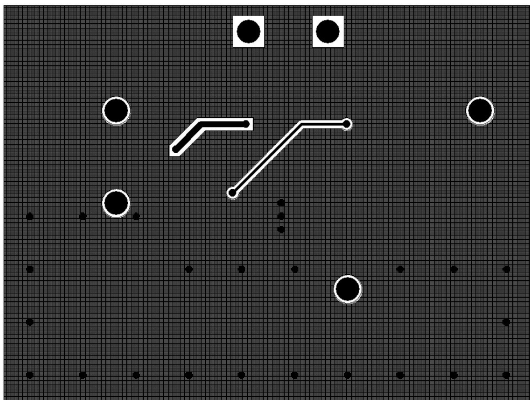


Fig. 5: Layout - Bottom

**3A 300kHz-2.5MHz Synchronous Step Down Regulator**

**DOCUMENT REVISION HISTORY**

Revision	Date	Description
1.0.0	03/19/13	Initial release of document
1.0.1	05/24/13	Changed output voltage from 3.3V to 2.5V

**BOARD REVISION HISTORY**

Board Revision	Date	Description
146-6698-01	03/19/13	Initial release of evaluation board

**FOR FURTHER ASSISTANCE**

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