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A New Direction in Mixed-Signal

August 2014

XRP7664-65-74-75

2A/3A 18V Synchronous Step-Down Regulator, Constant frequency (XRP7664-65), Light-Load efficiency (XRP7674-75)

Rev. 2.0.0

GENERAL DESCRIPTION

The EXAR XRP76XX Evaluation kit is a fully assembled and tested surface-mount PCB that demonstrates the XRP7664, XRP7665, XRP7674 and XRP7675 synchronous buck regulators. The current-mode switching regulator generates a preset 3.3V output with a load of up to 2A (XRP7664, XRP7674) and 3A (XRP7665, XRP7675).

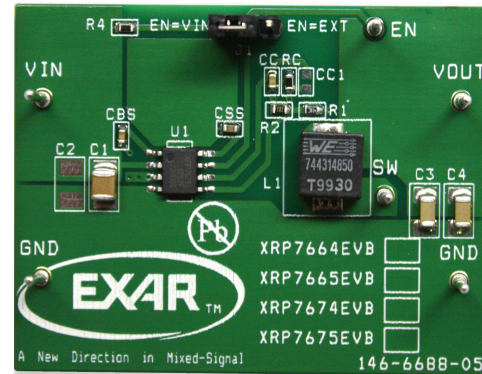
The EVB kit requires a single input voltage VIN source if EN is tied to VIN via jumper J1 (default setting as supplied from EXAR). If J1 is set to EN=EXT position then a logic-level signal is required at EN pin in order to turn the regulator on and off.

STANDARD CONFIGURATION

The XRP76XXEVB 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 - 2A/3A

EVALUATION BOARD MANUAL



FEATURES

- 2A/3A Continuous Output Current
- 4.5V to 18V Wide Input Voltage
- PWM Current-Mode Control
- Adjustable Output Voltage
 - 2% Accuracy
- Programmable Soft-Start and Enable Function
- Constant frequency (XRP7664-65)
- Light-load efficiency (XRP7674-75)
- Built-in Thermal, Over Current, UVLO and Output Over-Voltage Protections
- RoHS Compliant "Green"/Halogen Free 8-Pin Exposed Pad SOIC Package

EVALUATION BOARD SCHEMATICS

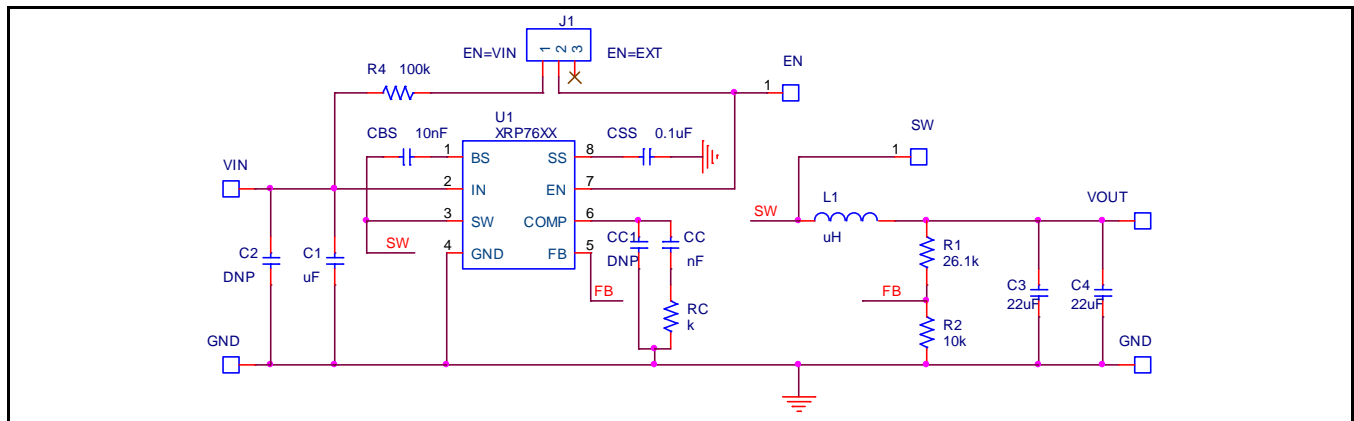


Fig. 1: XRP76XX Evaluation Board Schematics

PIN ASSIGNMENT

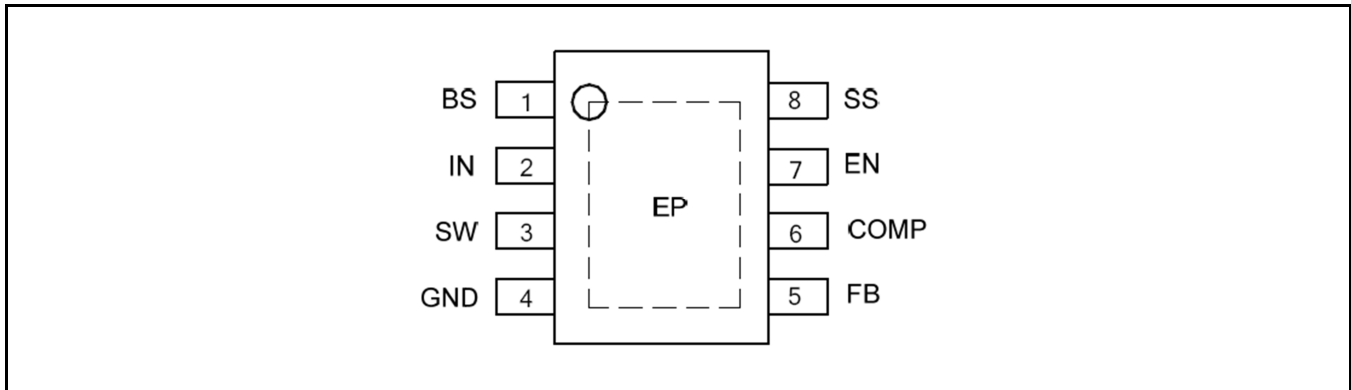


Fig. 2: XRP7664-65-74-75 Pin Assignment, Exposed Pad applicable to XRP7665 and XRP7675

PIN DESCRIPTION

Name	Pin Number	Description
BS	1	Bootstrap pin. Connect a 0.01 μ F or larger bootstrap capacitor between the BS pin and the SW pin. The voltage across the bootstrap capacitor drives the internal high-side power MOSFET.
IN	2	Supply input pin. A capacitor should be connected between the IN pin and GND pin to keep the input voltage constant.
SW	3	Power switch output pin. This pin is connected to the inductor and the bootstrap capacitor.
GND	4	Ground pin.
FB	5	Feedback pin. An external resistor divider connected to FB programs the output voltage. If the feedback pin exceeds 1.1V the over-voltage protection will trigger. If the feedback voltage drops below 0.3V the oscillator frequency is lowered to short-circuit protection.
COMP	6	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.
EN	7	Control input pin. Drive EN high/low in order to turn on/off the regulator. When the IC is in shutdown mode all functions are disabled to decrease the supply current below 0.1 μ A nominal.
SS	8	Soft-start control input pin. Connect a capacitor from SS to GND to set the soft-start period. A 0.1 μ F capacitor sets the soft start period to 15ms. To disable the soft-start feature, leave SS unconnected.

ORDERING INFORMATION

Refer to XRP7664-65-74-75's datasheet and/or www.exar.com for exact and up to date ordering information.



2A/3A 18V Synchronous Step-Down Regulator, Constant frequency (XRP7664-65), Light-Load efficiency (XRP7674-75)

XRP7664-65-74-75

USING THE EVALUATION BOARD

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 at 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 XRP76XX 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 set at left-side (position marked EN=VIN). This allows for automatic startup of the XRP76XX regulator when VIN is applied.

SETTING THE OUTPUT VOLTAGE

Use an external resistor divider to set the output voltage. Program the output voltage from:

$$R1 = R2 \times \left(\frac{V_{out}}{0.925V} - 1 \right)$$

Where:

R1 is the resistor between V_{OUT} and FB

R2 is the resistor between FB and GND (nominally 10kΩ)

0.925V is the nominal feedback voltage.

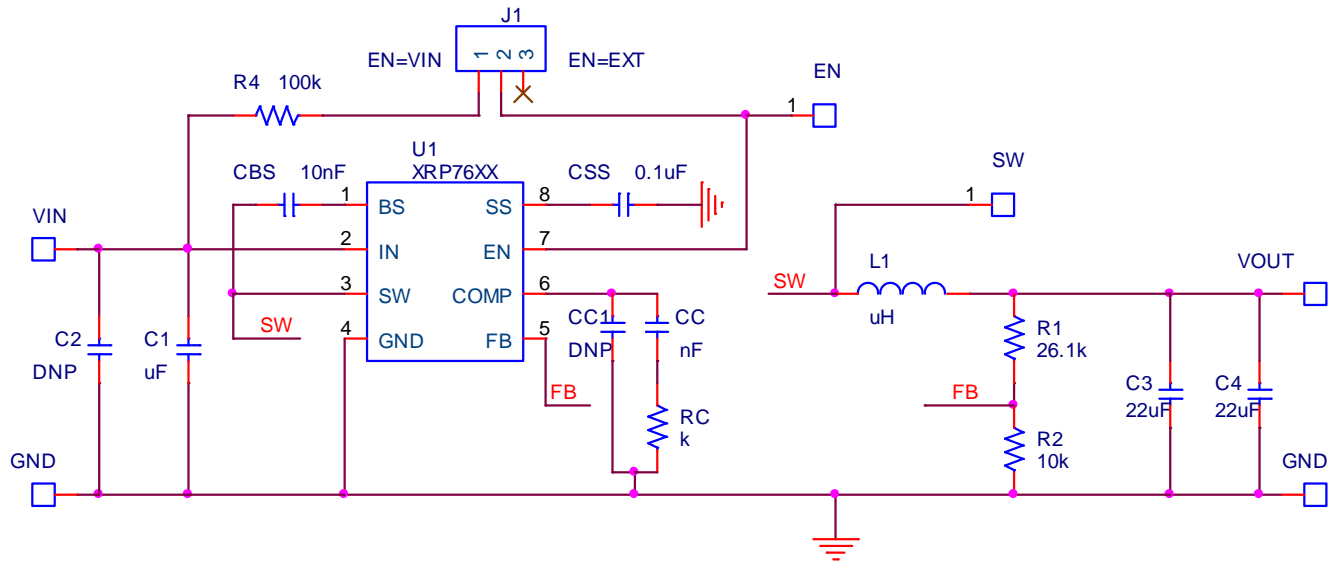


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EVALUATION BOARD SCHEMATICS





XRP7664-65-74-75

2A/3A 18V Synchronous Step-Down Regulator, Constant frequency (XRP7664-65), Light-Load efficiency (XRP7674-75)

XRP7664 BILL OF MATERIAL

Reference	Qty.	Manufacturer	Part Number	Size	Component
PCB	1	Exar	XRP7664EVB	1.3"x2"	XRP7664 Evaluation kit
U1	1	Exar	XRP7664	SO-8	2A Buck regulator
L1	1	COOPER-Bussmann	DR74-100R	7.6x7.6mm	10uH shielded inductor
C1	1	Murata Corp.	GRM32DR61E106KA12L	1210	CER CAP 10uF, 25V, X5R
C3, C4	2	Murata Corp.	GRM31CR61A226ME19L	1206	CER CAP 22uF, 10V, X5R
CBS	1	Murata Corp.	GRM188R71H103KA01D	0603	CAR CEP 10000pF, X7R, 50V
CC	1	Murata Corp.	GRM188R71H332KA01D	0603	CAP CER 3300pF, X7R, 50V
CSS	1	Murata Corp.	GRM188R71H104KA57D	0603	CAP CER 0.1uF, X7R, 50V
R1	1	Panasonic	ERJ-3EKF2612V	0603	Resistor 26.1K Ohm, 1%
R2	1	Panasonic	ERJ-3EKF1002V	0603	Resistor 10K Ohm, 1%
RC	1	Panasonic	ERJ-3EKF5621V	0603	Resistor 5.62K Ohm, 1%
R4	1	Panasonic	ERJ-3EKF1003V	0603	Resistor 100K Ohm, 1%
J1	1	Wurth Elektronik	61304011121		Conn. Header 0.1" 3POS
J1(JUMPER)	1	Wurth Elektronik	609002115121		CONN JUMPER SHORT.
VIN, VOUT, GND, EN, SW	6	Vector Electronic	K24C/M	.042 Dia	Test Point Post

XRP7665 BILL OF MATERIAL

Reference	Qty.	Manufacturer	Part Number	Size	Component
PCB	1	Exar	XRP7665EVB	1.3"x2"	XRP7665 Evaluation kit
U1	1	Exar	XRP7665	PSO-8	3A Buck Regulator
L1	1	Wurth Elektronik	744314850	7x7x5mm	8.5uH shielded inductor
C1	1	Murata Corp.	GRM32ER61E226KE15L	1210	CER CAP 22uF, 25V, X5R
C3, C4	2	Murata Corp.	GRM31CR61A226KE19L	1206	CER CAP 22uF, 10V, X5R
CBS	1	Murata Corp.	GRM188R71H103KA01D	603	CAP CEP 10000pF, X7R, 50V
CC	1	Murata Corp.	GRM188R71H392KA01D	603	CAP CER 3900pF, X7R, 50V
CSS	1	Murata Corp.	GRM188R71H104KA57D	603	CAP CER 0.1uF, X7R, 50V
R1	1	Panasonic	ERJ-3EKF2612V	603	Resistor 26.1k Ohm, 1%
R2	1	Panasonic	ERJ-3EKF1002V	603	Resistor 10k Ohm, 1%
RC	1	Panasonic	ERJ-3EKF6821V	603	Resistor 6.81k Ohm, 1%
R4	1	Panasonic	ERJ-3EKF1003V	603	Resistor 100k Ohm, 1%
J1	1	Wurth Elektronik	61304011121		Conn. Header 0.1" 3POS
J1(JUMPER)	1	Wurth Elektronik	609002115121		CONN JUMPER SHORT.
VIN, VOUT, GND, EN, SW	6	Vector Electronic	K24C/M	.042 Dia	Test Point Post



XRP7664-65-74-75

2A/3A 18V Synchronous Step-Down Regulator, Constant frequency (XRP7664-65), Light-Load efficiency (XRP7674-75)

XRP7674 BILL OF MATERIAL

Reference	Qty.	Manufacturer	Part Number	Size	Component
PCB	1	Exar	XRP7674EVB	1.3"x2"	XRP7674 Evaluation kit
U1	1	Exar	XRP7674	SO-8	2A Buck Regulator, light-load efficient
L1	1	COOPER-Bussmann	DR74-100R	7.6x7.6mm	10uH shielded inductor
C1	1	Murata Corp.	GRM32DR61E106KA12L	1210	CER CAP 10uF, 25V, X5R
C3, C4	2	Murata Corp.	GRM31CR61A226ME19L	1206	CER CAP 22uF, 10V, X5R
CBS	1	Murata Corp.	GRM188R71H103KA01D	0603	CAR CEP 10000pF, X7R, 50V
CC	1	Murata Corp.	GRM188R71H472KA01D	0603	CAP CER4700pF, X7R, 50V
CSS	1	Murata Corp.	GRM188R71H104KA57D	0603	CAP CER 0.1uF, X7R, 50V
R1	1	Vishay/Dale	CRCW060326K1FKEA	0603	Resistor 26.1K Ohm, 1%
R2	1	Vishay/Dale	CRCW060310K0FKEA	0603	Resistor 10K Ohm, 1%
RC	1	Vishay/Dale	CRCW060313K0FKEA	0603	Resistor 13K Ohm, 1%
R4	1	Vishay/Dale	CRCW0603100KFKEA	0603	Resistor 100K Ohm, 1%
J1	1	Würth Elektronik	61304011121		Conn. Header 0.1" 3POS
J1(JUMPER)	1	Würth Elektronik	609002115121		CONN JUMPER SHORT.
VIN, VOUT, GND, EN, SW	6	Vector Electronic	K24C/M	.042 Dia	Test Point Post

XRP7675 BILL OF MATERIAL

Reference	Qty.	Manufacturer	Part Number	Size	Component
PCB	1	Exar	XRP7675EVB	1.3"x2"	XRP7675 Evaluation kit
U1	1	Exar	XRP7675EVB	PSO-8	3A Buck Regulator, Light-Load efficient
L1	1	Würth Elektronik	744314850	7x7x5mm	8.5uH shielded inductor
C1	1	Murata Corp.	GRM32ER61E226KE15L	1210	CER CAP 22uF, 25V, X5R
C3, C4	2	Murata Corp.	GRM31CR61A226ME19L	1206	CER CAP 22uF, 10V, X5R
CBS	1	Murata Corp.	GRM188R71H103KA01D	603	CAR CEP 10000pF, X7R, 50V
CC	1	Murata Corp.	GRM188R71H332KA01D	603	CAP CER 3300pF, X7R, 50V
CSS	1	Murata Corp.	GRM188R71H104KA57D	603	CAP CER 0.1uF, X7R, 50V
R1	1	Vishay/Dale	CRCW060326K1FKEA	603	Resistor 26.1K Ohm, 1%
R2	1	Vishay/Dale	CRCW060310K0FKEA	603	Resistor 10K Ohm, 1%
RC	1	Vishay/Dale	CRCW060313K0FKEA	603	Resistor 13K Ohm, 1%
R4	1	Vishay/Dale	CRCW0603100KFKEA	603	Resistor 100K Ohm, 1%
J1	1	Würth Elektronik	61304011121		Conn. Header 0.1" 3POS
J1(JUMPER)	1	Würth Elektronik	609002115121		CONN JUMPER SHORT.
VIN, VOUT, GND, EN, SW	6	Vector Electronic	K24C/M	.042 Dia	Test Point Post

EVALUATION BOARD LAYOUT

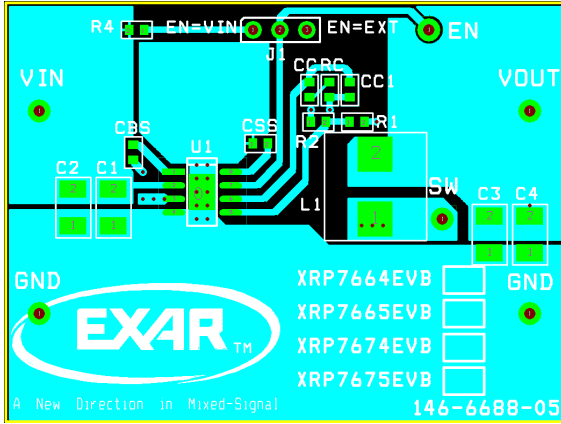


Fig. 3: Component Placement – Top Side

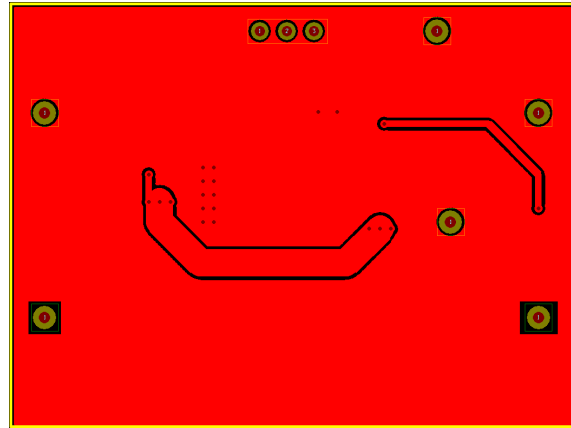


Fig. 4: Layout – Bottom Side



2A/3A 18V Synchronous Step-Down Regulator, Constant frequency (XRP7664-65), Light-Load efficiency (XRP7674-75)

XRP7664-65-74-75

DOCUMENT REVISION HISTORY

Revision	Date	Description
1.0.0	10/29/10	Initial release of XRP7664-65 EVB Manual
1.0.0	03/22/13	Initial release of XRP7674-75 EVB Manual
2.0.0	08/19/14	Initial release of combined XRP7664-65-74-75 EVB Manual

BOARD REVISION HISTORY

Board Revision	Date	Description
146-6688-01	10/29/10	Initial release of evaluation board XRP7664-65
146-6688-04	03/22/13	Initial release of evaluation board XRP7674-75
146-6688-05	08/19/14	Initial release of combined XRP7664-65-74-75 EVB

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