XRP6142

Synchronous Step-Down Controller with DDR Memory Termination

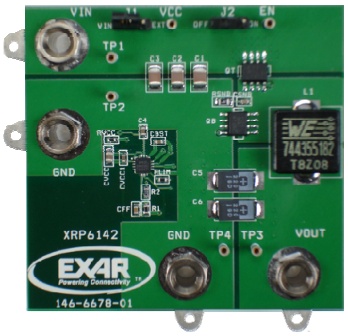
July 2010 Rev. 0.0.2

GENERAL DESCRIPTION

The EXAR XRP6142 Evaluation kit is a fully assembled and tested surface-mount PCB that demonstrates the XRP6142 constant on-time buck controller. The switch-mode power supply regulator generates a preset 2.5V output with a load of up to 15A.

The EVB kit requires a single input voltage V_{IN} source of 4.5V to 5.5V if V_{CC} is tied to V_{IN} via jumper J1. If V_{CC} is supplied through an independent 5V supply then the converter can operate with V_{IN} ranging from 3.3V to 5.5V.

EVALUATION BOARD MANUAL



FEATURES

- **Input Voltage Range of 4.5V – 5.5V (V_{CC}=V_{IN})**
- **Input Voltage Range of 3.3V – 5.5V (V_{CC}=5V)**
- **15A output current**
- **Current limit with hiccup**
- **Internal soft-start**
- **Internal bootstrap diode**
- **No compensation required**
- **Precision Enable**

EVALUATION BOARD SCHEMATICS

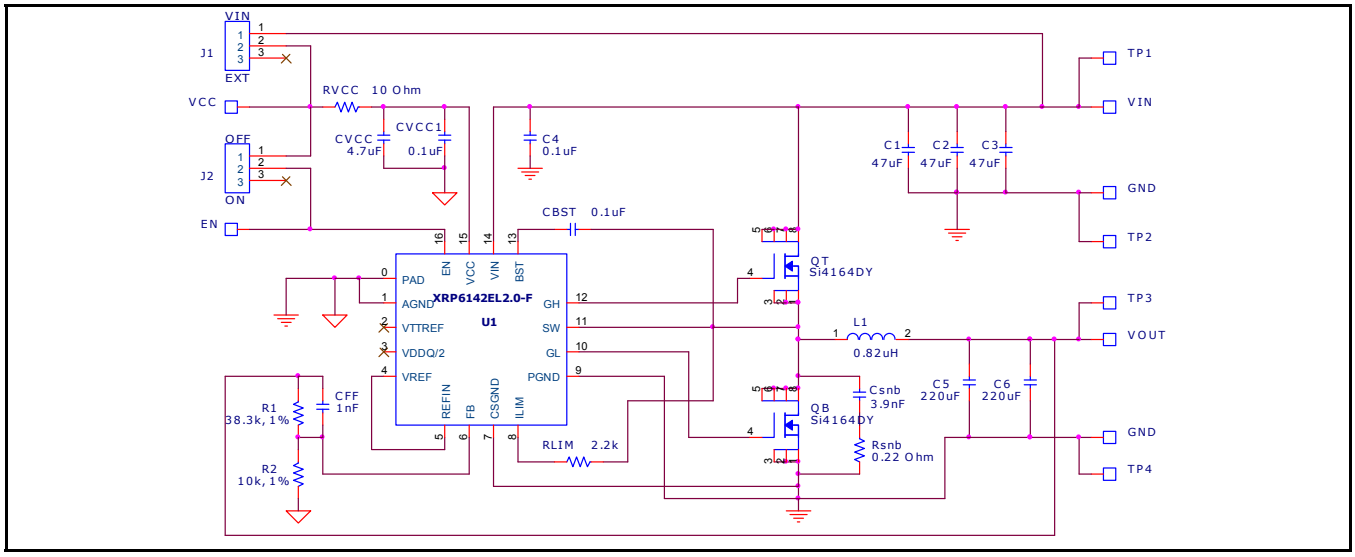


Figure 1: XRP6142 Evaluation Board Schematics

PIN ASSIGNEMENT

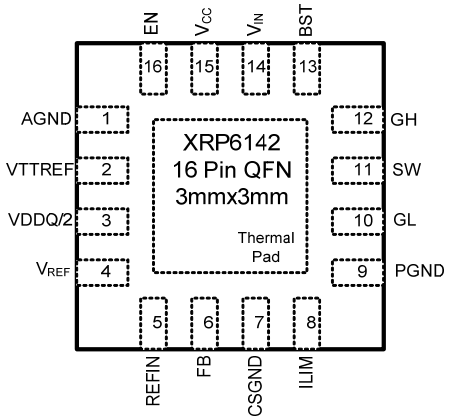


Figure 2: XRP6142 Pin Assignment

PIN DESCRIPTION

Name	Pin Number	Description
AGND	1	Analog Ground
VTTREF	2	V_{TT} reference for DDR applications. Buffered output of VDDQ/2
VDDQ/2	3	Voltage used for the input to the V_{TT} buffer
V_{REF}	4	Precision reference output
REFIN	5	Reference input to the switching-regulator feedback comparator
FB	6	Feedback input to feedback comparator
CSGND	7	Current-sense ground
ILIM	8	Connect a resistor between this pin and the low-side current-sense element in order to set the current-limit-trip threshold. See applications section for instructions on how to set this resistor
PGND	9	Gate driver GND.
GL	10	Low-side N-channel MOSFET driver
SW	11	Switch node for floating-high-side gate drive
GH	12	High-side N-channel MOSFET driver
BST	13	Bootstrap capacitor to drive the high-side gate driver, GH
V_{IN}	14	Input voltage for the power train
Vcc	15	Input voltage for the XRP6142 internal circuitry and gate drives. Vin and Vcc can be tied together when Vin ≥ 3.0V
EN	16	Precision enable pin. Pulling this pin above 1.2V will turn the part on
Thermal pad	-	Internally connected to AGND

ORDERING INFORMATION

Refer to XRP6142's datasheet and/or www.exar.com for exact and up to date ordering information.

USING THE EVALUATION BOARD

INITIAL SETUP

Set the input supply to a voltage between 4.5V to 5.5V and connect it to VIN and GND connectors on the upper left side of the evaluation board. Monitor V_{IN} using test pins TP1 and TP2. Connect the load to the VOUT and GND connectors at the lower right side of the board. Monitor V_{OUT} using test pins TP3 and TP4. Check to make sure that jumper J1 is set to left side (position marked VIN) and jumper J2 is set to left side (position marked OFF). The board will power-up and regulate the output upon turning on the input supply. The mean V_{OUT} is 2.48V for the pair of the standard resistors R1/R2 shown in figure 1. The board will operate with a load current I_{OUT} of up to 15A and provide efficiency equal to figure 6 of XRP6142 datasheet.

JUMPER J1 FUNCTION

Jumper J1 can be used to either short V_{CC} to V_{IN} or allow an independent supply to power-up the V_{CC}. The Board is supplied from EXAR with jumper set at left side (position marked VIN). With this setting the V_{CC} is shorted to V_{IN} and minimum allowable V_{IN}=V_{CC}=4.5V. This is dictated by the 4.5V gate-drive voltage rating of the power MOSFETs. To power V_{CC} from an independent supply set J1 to right side position (marked EXT) and apply 5V between test points VCC and TP2. Thus V_{IN} can be applied over a 3.3V to 5.5V range.

JUMPER J2 FUNCTION

Jumper J2 can be used to either short the EN pin to V_{CC} or allow an independent enable signal to be applied to EN. The Board is supplied from EXAR with jumper set at left side (position marked OFF). With this setting EN is shorted to V_{CC}. Thus the rising and falling edge of the V_{CC} provide the enable/disable function respectively. In order to apply an independent enable signal set J2 to right side (position marked ON). Apply the enable signal between test points EN and TP2.

EVALUATION BOARD LAYOUT

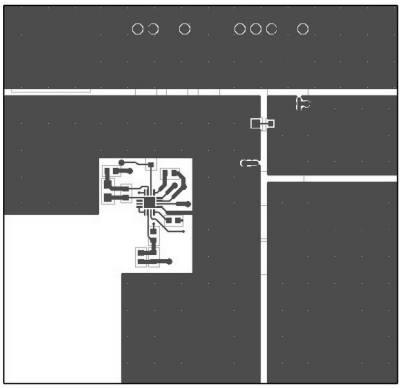


Figure 3: Top metal

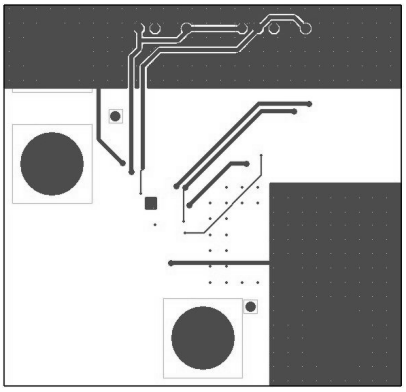


Figure 4: Bottom metal

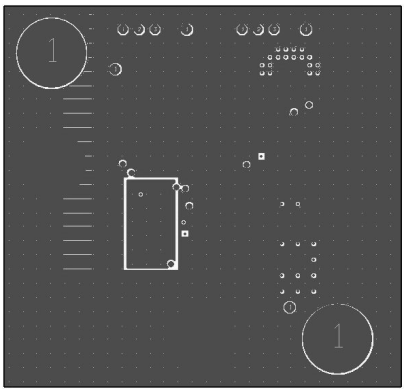


Figure 5: Internal layer 1 (Ground)

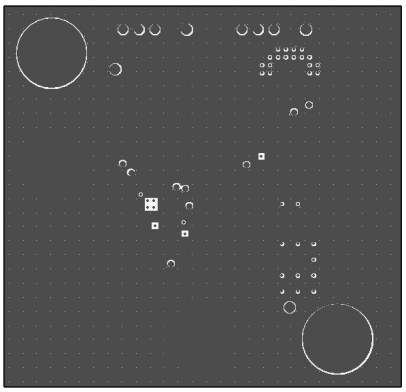


Figure 6: Internal layer 2 (Ground)

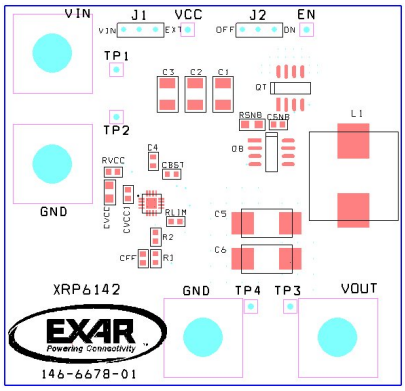


Figure 7: Component Placement

BILL OF MATERIAL

Reference Designator	Qty.	Manufacturer	Manufacturer Part Number	Size	Component
PCB	1	Exar	XRP6142EB		XRP6142 Evaluation kit
U1	1	Exar	XRP6142EL2.0-F	QFN-16	Constant on-time Buck Controller
QT, QB	2	Vishay, Siliconix	Si4164DY	SO-8	N-Ch. UltraFET TrenchMOSFET
L1	1	Wurth Elektronik	744355182	13x14mm	Inductor 0.82uH, 1.2mOhm, 27A
C1, C2, C3	3	Murata	GRM32ER71A476K	1210	Cap Cer 47uF, 10V, X7R, 10%
C4, CBST, CVCC1	3	Murata	GRM188R71H104K	0603	Cap Cer 0.1uF, 50V, X7R, 10%
C5, C6	2	Sanyo	6TPE220MI	D2E	POSCAP, 6.3V, 220uF, 18mOhm
CFF	1	Murata	GRM188R71H102K	0603	Cap Cer 1000pF, 50V,X7R, 10%
Csnb	1	Murata	GRM188R71H392K	0603	Cap Cer 3900pF, 50V, X7R, 10%
R1	1	Panasonic	ERJ-3EKF38R3V	0603	Chip Res. 38.3k Ohm, 1%
R2	1	Panasonic	ERJ-3EKF1002V	0603	Chip Res. 10k Ohm, 1%
RVCC	1	Panasonic	ERJ-3EKF10R0V	0603	Chip Res. 10 Ohm.
Rsnb	1	Panasonic	ERJ-6RQFR22V	0805	Resis. 0.22Ohm, 1/8W, 1%
J1, J2	2	Wurth Elektronik	61304011121	HDR1X3	Conn. Header 0.1" 3POS
J1,J2(JUMPER)	2	Wurth Elektronik	6.09003E+11	0.100"	CONN JUMPER SHORT.
TP1, TP2, TP3, TP4, VCC, EN	6	Vector Electronic	K24C/M	.042 Dia	Test Point Post
VIN, GND, VOUT, GND	4	Pomona Electronics	3267		HDWR BANANA JACK

REVISION HISTORY

Revision	Date	Description
0.0.1	02/17/10	Document created
0.0.2	07/27/10	Changed R1 in figure 1 from 39.2k to 38.3k Changed R1 in BOM from 39.2k to 38.3k

FOR FURTHER ASSISTANCE

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