

GENERAL DESCRIPTION

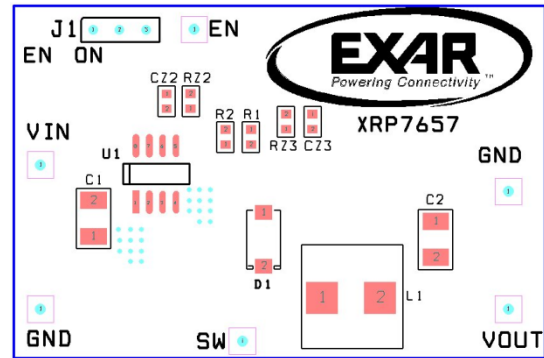
The XRP7657 is a non synchronous voltage mode PWM step down (buck) regulator capable of a constant output current up to 2 Amps. A wide 4.75V to 25V input voltage range allows for single supply operations from industry standard 5V, 12V and 24V power rails.

With a 420kHz constant operating frequency and integrated high side switch, the XRP7657 reduces the overall component count and solution footprint. In addition to a 2% output setpoint accuracy, this device provides high efficiency, low ripple and excellent line and load regulation. An enable function and soft start feature allow for controlled power up sequencing implementation.

Built-in over current, output short-circuit and over temperature protection insure safe operation under abnormal operating conditions.

The XRP7657 is offered in a RoHS compliant, "green"/halogen free 8-pin SOIC package.

EVALUATION BOARD MANUAL



FEATURES

- **2A Constant Output Current**
- **4.75V to 25V Wide Input Voltage**
- **PWM Voltage Mode Control**
 - 420kHz Constant Operations
 - Up to 94% Efficiency
- **Adjustable Output Voltage**
 - 0.8V to 21V Range - 2% Accuracy
- **Soft-Start and Enable Function**
- **OTP, OCP and Short Circuit Protections**

EVALUATION BOARD SCHEMATICS

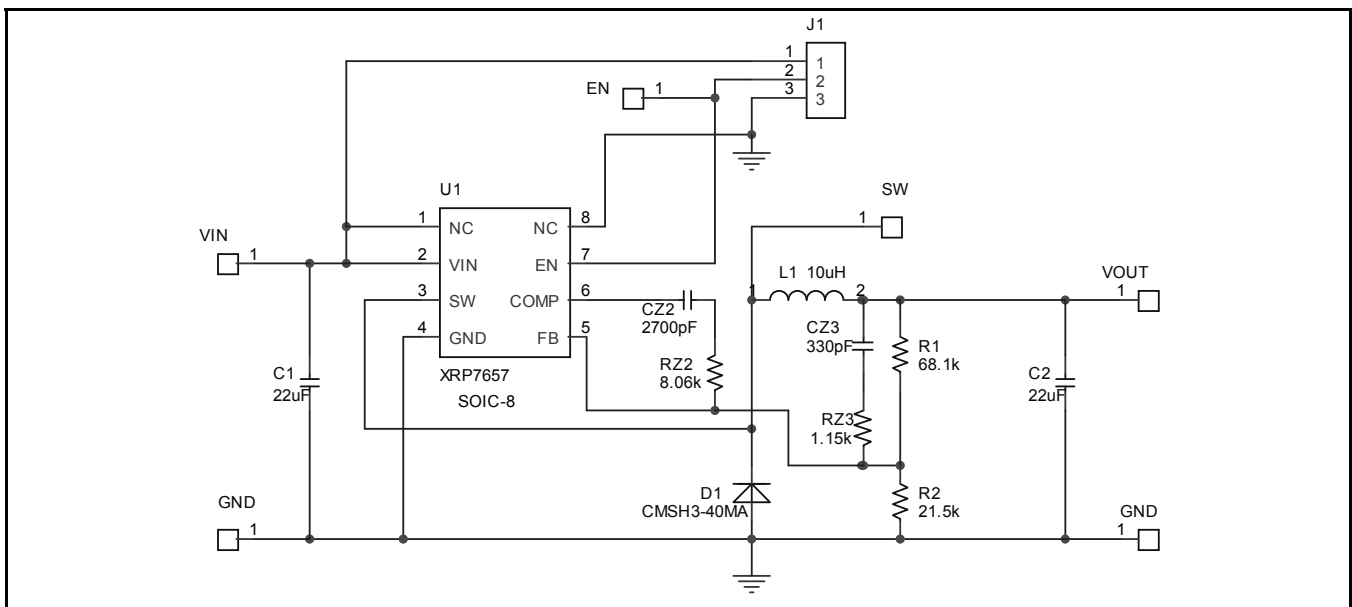


Fig. 1: XRP7657 Evaluation Board Schematics

PIN ASSIGNMENT

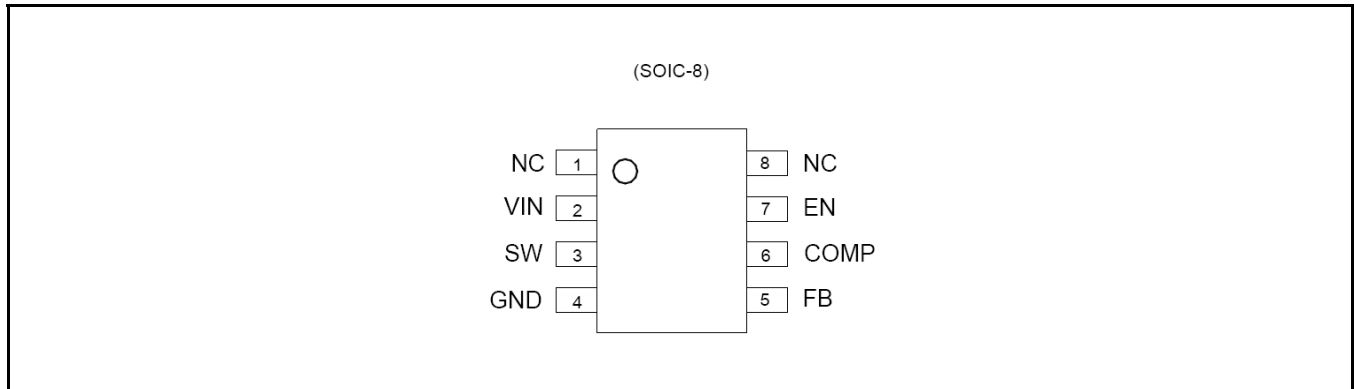


Fig. 2: XRP7657 Pin Assignment

PIN DESCRIPTION

Name	Pin Number	Description
NC	1	No connect
VIN	2	Supply Voltage Input Pin. Bypass VIN to GND with a suitable large capacitor to eliminate noise on the input
SW	3	Power Switch Output Pin. SW is the switch node that supplies power to the output
GND	4	Ground signal pin
FB	5	Feedback Pin. Through an external resistor divider network, FB senses the output voltage and regulates it. To prevent current limit run away in a short circuit fault condition, the frequency feedback comparator lowers the oscillator frequency to 40kHz when the FB voltage is below 0.52V. The feedback threshold voltage is 0.8V
COMP	6	Compensation Pin. This pin is the output of the error amplifier. Frequency compensation is done at this pin by connecting a series RC to ground (parallel a C if necessary)
EN	7	Enable Pin. Drive EN pin high to turn on the device, drive it low to turn off. Default of this pin is high level.
NC	8	No connect

ORDERING INFORMATION

Refer to XRP7657's datasheet and/or www.exar.com for exact and up to date ordering information.

USING THE EVALUATION BOARD

POWERING UP THE XRP7657 CIRCUIT

Connect the input voltage to the pins marked VIN and GND at the left side of the Evaluation Board. Connect the load to the pins marked VOUT and GND on the right side of the evaluation board. Upon powering up the input supply to the board, a regulated VOUT of 3.3V will be produced. The evaluation board will startup and regulate the VOUT without a load. Although the evaluation board is optimized for 12V input voltage operations, it should regulate VOUT for VIN ranging from 9V to 20V (see datasheet graphs for maximum output current as a function of VIN).

SETTING THE OUTPUT VOLTAGE

V_{OUT} is set using the resistor divider R₁ and R₂. R₁ which is part of loop compensation is set at 68.1k and R₂ is then calculated from:

$$R_2 = \frac{R_1}{\frac{V_{OUT}}{V_{REF}} - 1}$$

Where V_{REF}=0.8V nominal.

TYPICAL PERFORMANCE CHARACTERISTICS

All data taken at V_{IN} = 12V and V_{OUT} = 3.3V, unless otherwise specified.

ENABLE FUNCTION

The XRP7657 evaluation board is supplied with a jumper that can be used to short the enable pin to VIN (connector header set to the left side). To apply an external Enable signal, remove the jumper and apply the signal between the EN and GND pins.

COMPENSATION

A type-III compensation is used to stabilize the loop. A detailed explanation of calculating component values for type-III is given in EXAR's ANP-16 application note. Compensation was calculated based on a cross-over frequency (f_c) of 40kHz and ramp voltage of 0.5V. Component Cp, which is mentioned in ANP-16, has not been used here.

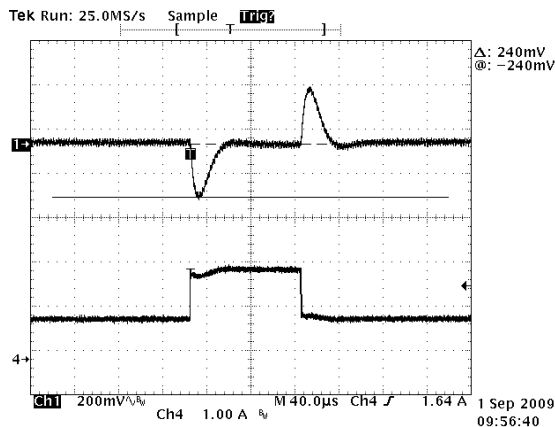


Fig. 3: Transient Response 1A to 2A

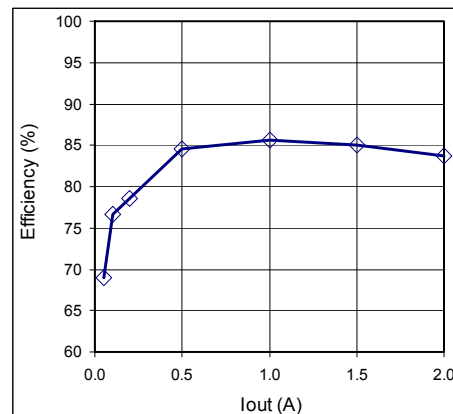


Fig. 4: Efficiency (A)

EVALUATION BOARD LAYOUT

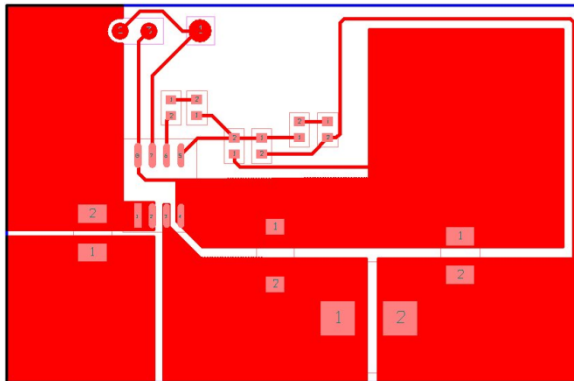


Fig. 5: XRP7657 Evaluation Board Component Placement and Component Side Lay Out

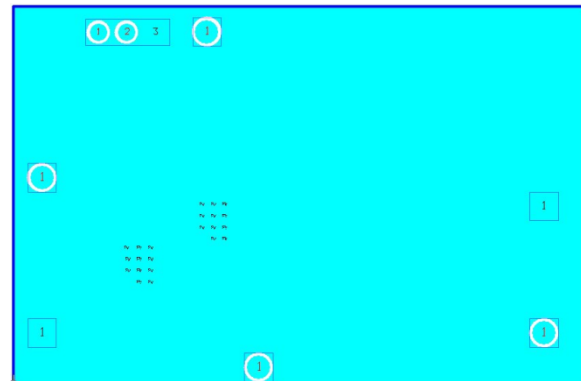


Fig. 6: XRP7657 Evaluation Board Soldier Side Lay Out

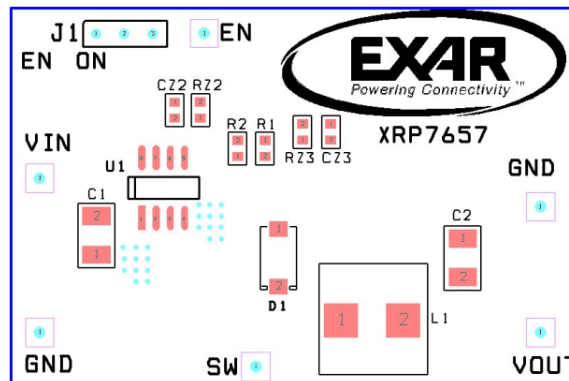


Fig. 7: XRP7657 Evaluation Board Component Placement

BILL OF MATERIAL

Ref.	Qty	Manufacturer	Part Number	Size	Component
PCB	1	EXAR		2"x1.25"	XRP7657EVB
U1	1	EXAR	XRP7657EDTR-F	SOIC-8	Non-synchronous Buck Regulator
D1	1	Central Semicon.	CMSH3-40MA	SMA	Schotkky, 40V, 3A
L1	1	Cooper Bussmann	DR74-100	7.6x7.6mm	10uH Coil 2.4A 48.9mOhm
C1	1	Murata Corp.	GRM32ER61E226K	1210	Ceramic Cap 22uF, 25V,X5R,1210
C2	1	Murata Corp.	GRM31CR61C226M	1206	Ceramic Cap 22uF, 16V,X5R, 1206
CZ3	1	Murata Corp.	GRM188R71H331K	0603	Ceramic Cap 330pF, 50V,X7R, 0603
CZ2	1	Murata Corp.	GRM188R71H272K	0603	Ceramic Cap 2700pF, 50v,X7R,0603
R1	1	Panasonic	ERJ-3EKF6812V	0603	Res 68.1k Ohm, 1%, 0603, SMD
R2	1	Panasonic	ERJ-3EKF2152V	0603	Res 21.5k Ohm, 1%, 0603 SMD
RZ3	1	Panasonic	ERJ-3EKF1151V	0603	Res 1.15k Ohm, 1%, 0603 SMD
RZ2	1	Panasonic	ERJ-3EKF8061V	0603	Res 8.06k Ohm, 1%, 0603 SMD
J1	1	SULLINS	PEC03SAAN	HDR1X3	Conn. Header 0.1" 3 POS
VIN, VOUT, GND, GND, SW1	5	Vector Electronic	K24C/M	.042 Dia	Test Point Post



REVISION HISTORY

Revision	Date	Description
1.0.0	09/25/09	Initial release of document

FOR FURTHER ASSISTANCE

Email:

customersupport@exar.com

Exar Technical Documentation:

<http://www.exar.com/TechDoc/default.aspx?>

EXAR CORPORATION

HEADQUARTERS AND SALES OFFICES

48720 Kato Road

Fremont, CA 94538 – USA

Tel.: +1 (510) 668-7000

Fax: +1 (510) 668-7030

www.exar.com



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