EN5339QI 3A Synchronous DCDC Converter Evaluation Board User Guide

Introduction

Thank you for choosing Altera Enpirion power products!

You are evaluating Altera Enpirion's EN5339QI low profile 3A PowerSoC. The device is a fully integrated step down DCDC converter with control/compensation, gate drive, MOSFET switches and Altera Enpirion's proprietary high performance magnetics. It comes in a 4mm x 6mm x 1.1mm low profile package and requires only a small number of external components to make a complete converter solution.

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This user guide should be used together with the latest device datasheet. The datasheet can be found at www.altera.com/enpirion.

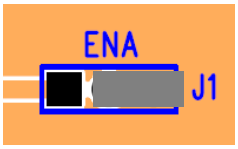
Following are the features of this evaluation board.

- Populated with one EN5339QI 3A PowerSoC with integrated inductor.
- Pre-tinned pads are available for a wide range of input and output capacitor configurations.
- There are four positions available for the output capacitors. The first position, closest to the IC, can accommodate a 1206 or 0805 case size while the other three positions can accommodate either 0805 or 0603 capacitor case sizes.
- The base output capacitor configuration is 3 x 22uF 0805 MLCC. Refer to the product datasheet for output capacitor requirements.
- There are two positions for the input capacitors which can accommodate either 0805 or 0603 case sizes. The base input capacitor configuration is a single 22uF 0805 MLCC. Refer to the product datasheet for input capacitor requirements.
- Output voltage programming is accomplished via a simple resistor divider. Jumpers are provided for 4 pre-configured output settings. These settings are as follows:
  - 1.0V, 1.2V, 1.5V, 1.8V
- Easy jumpers are provided for the following signals:
  - Enable
- Numerous test points are provided as well as clip leads for input and output connections
- The board comes with input decoupling and reverse polarity protection.

Quick Start Guide

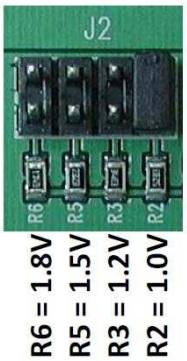
Figure 1 shows a photograph of the evaluation board. Please refer to this figure while configuring the board for evaluation.

STEP 1: Set the "ENABLE" jumper to the Disable Position.

ENABLE 

DISABLE

STEP 2: Select the desired VOUT voltage setting by placing the jumper J2 on the correct jumper pin. Below shows the VOUT jumper options.



CAUTION: the VOUT jumper settings can only be changed when the device is disabled. Failure to follow this guideline may result in damage to the part.

STEP 3: Connect the Power Supply to the input power connectors, VIN (+) and GND (-). DO NOT turn the power supply on yet.

CAUTION: be mindful of the polarity. Reversing polarity will result in damage to the part.

STEP 4: Connect an electronic load, or load board to the load to the output connectors VOUT (+) and GND (-).

STEP 5: Power up the board and move the ENABLE jumper to the enabled position. The EN5339QI is now powered up.

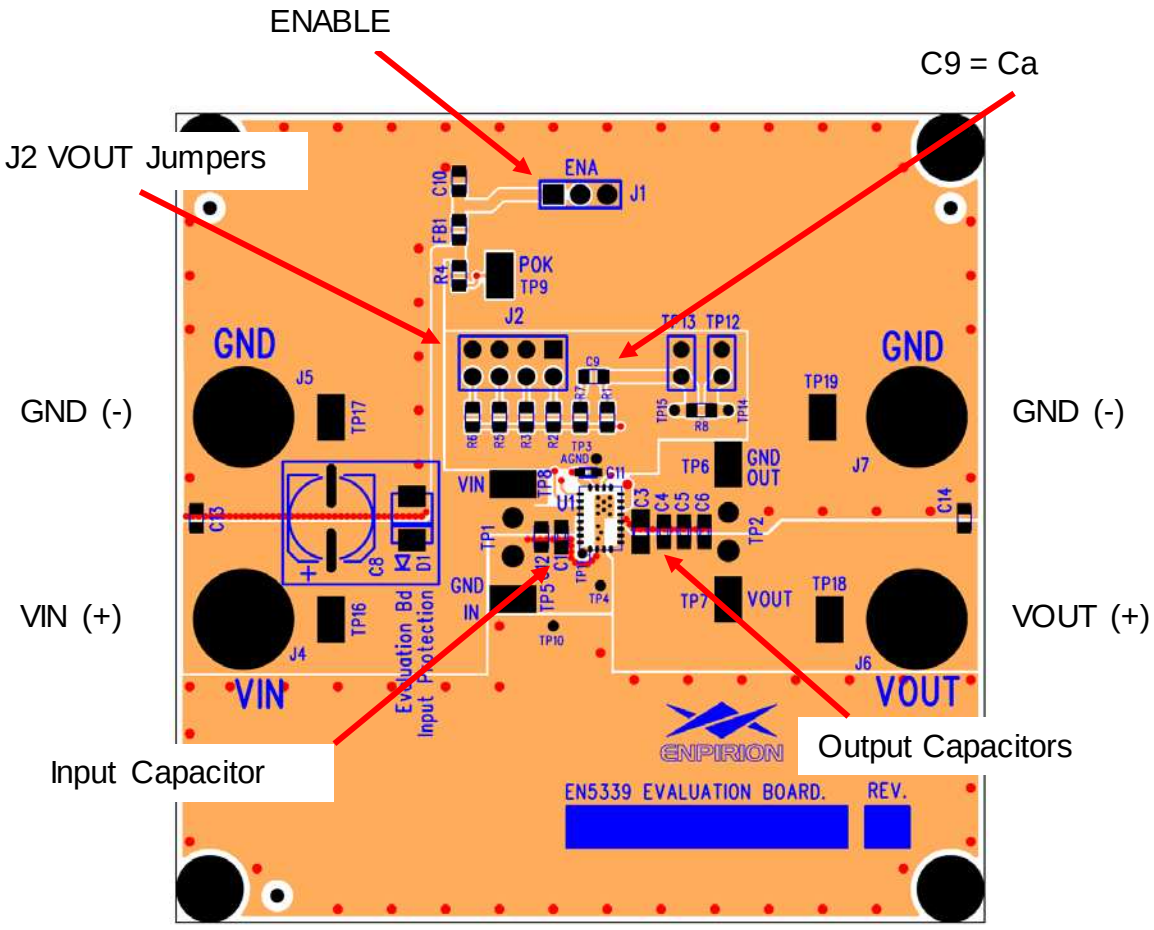


Figure 1. Evaluation Board top view**.**

Output Voltage Select

The EN5339QI is programmed via an external resistor divider. Figure 2 shows the device application circuit.

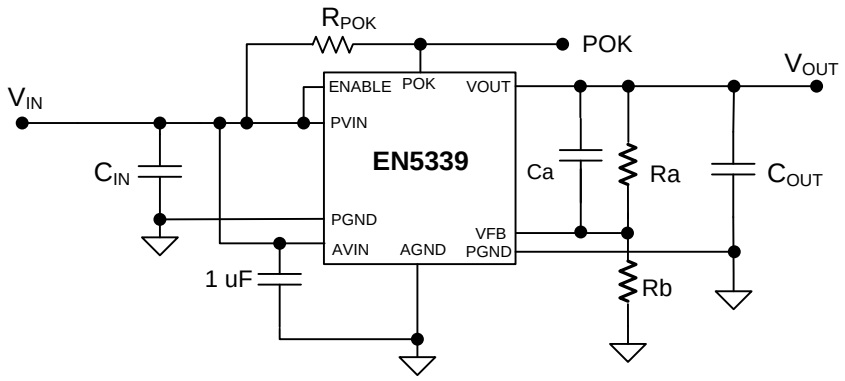


Figure 2. EN5339QI application Circuit.

Table 1 shows the recommended values for the phase lead capacitor Ca for the EN5339QI.

Table 1. recommended BOM for EN5339QI.

VIN (V)	IOUT	VOUT	COUT	Ra (kΩ)	Ca (pF)
2.5 to 5.5	3A	0.9V	3x 22µF (0805)	348	10
		1V			
		1.2V			
		1.5V			
		1.8V			
		2.5			8.2
		2.85V			
		3.3V			

To choose output voltage settings other than those configured on this Evaluation Board, replace one or more of the resistors R6, R5, R3, or R2 per the formula below and set the jumper J2 accordingly. If the desired VOUT is greater than 1.8V, Capacitor Ca (C9) will need to be replaced with the value shown in Table 1 for the VOUT desired.

$$Rb = \frac{Ra \times V_{REF}}{V_{OUT} - V_{REF}}$$

Since Ra = 348kΩ and V_{REF} = 0.600V, the equation becomes:

$$Rb = \frac{208.8}{V_{OUT} - 0.6} k\Omega$$

NOTE: if capacitor Ca is changed to accommodate a voltage greater than 1.8V, the part may not be stable for voltages of 1.8V or lower.

Test Recommendations

Recommendations
To guarantee measurement accuracy, the following precautions should be observed:

Make all input and output voltage measurements at the board using the test points provided. This will eliminate voltage drop across the line and load cables that can produce false readings.

Measure input and output current with series ammeters or accurate shunt resistors. This is especially important when measuring efficiency.

Use a balanced impedance probe tip across C_{OUT} to measure V_{OUT} Ripple to avoid noise coupling into the probe ground lead. The recommended probe configuration is shown in Figure 3.

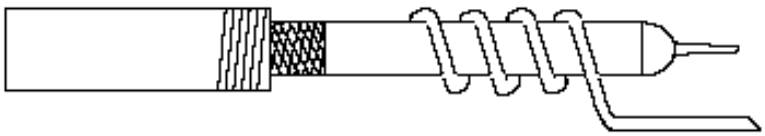
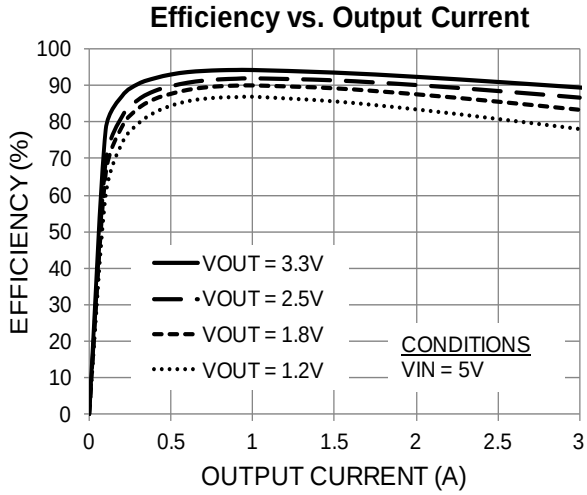
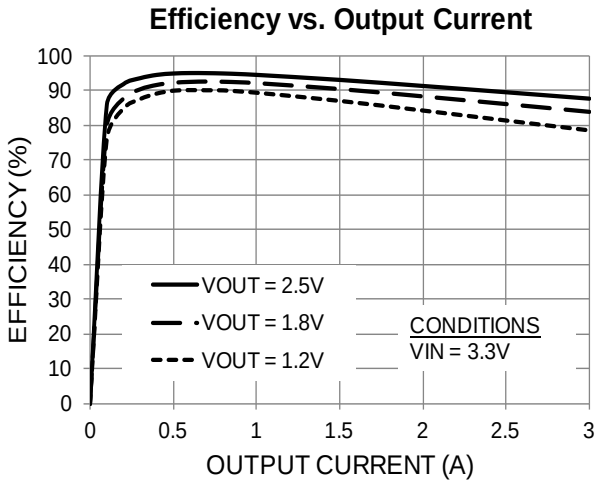


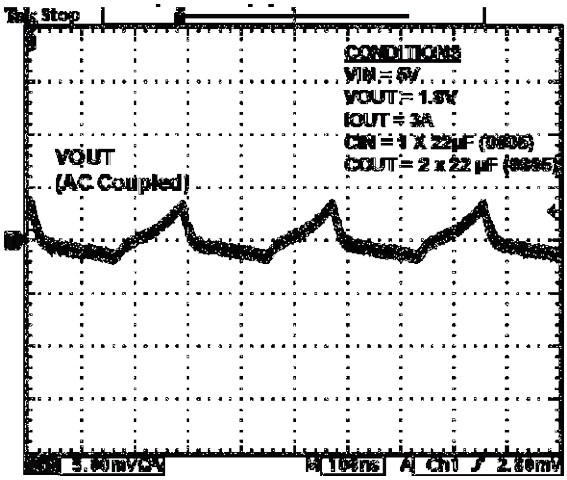
Figure 3. Recommended probe configuration.

Typical Performance Characteristics

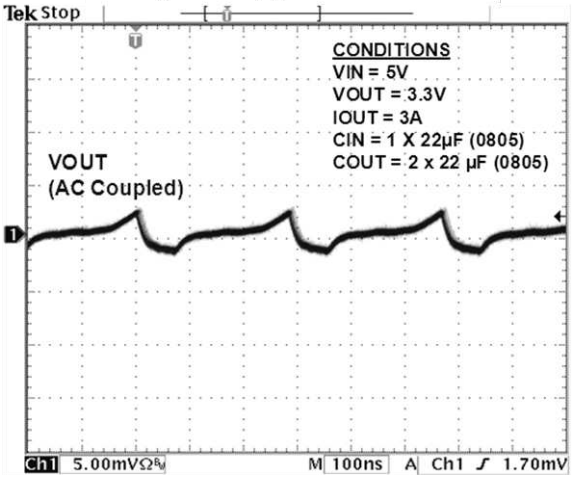




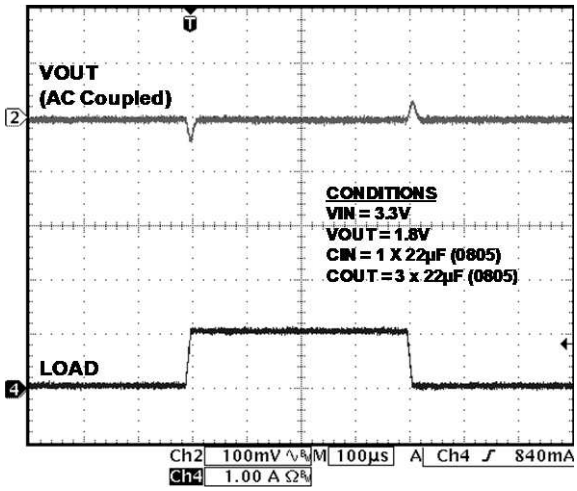
Output Ripple at 20MHz



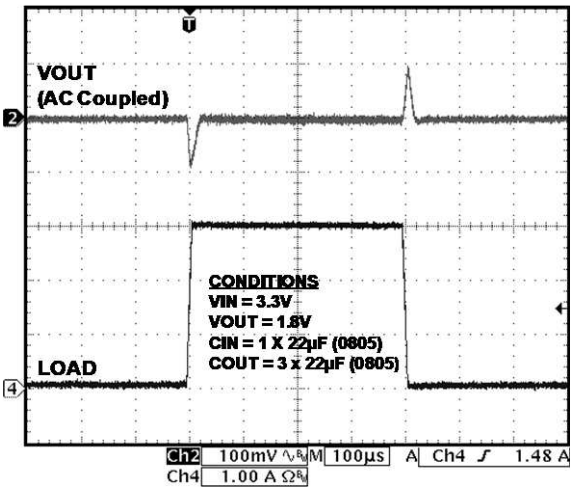
Output Ripple at 20MHz



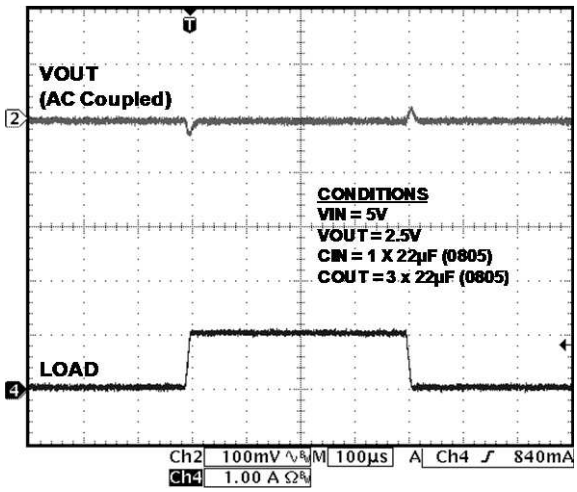
Load Transient from 0 to 1A



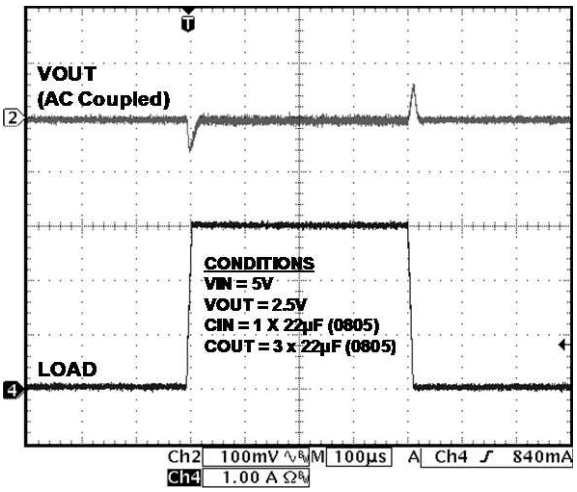
Load Transient from 0 to 3A



Load Transient from 0 to 1A



Load Transient from 0 to 3A



Evaluation Board Schematic

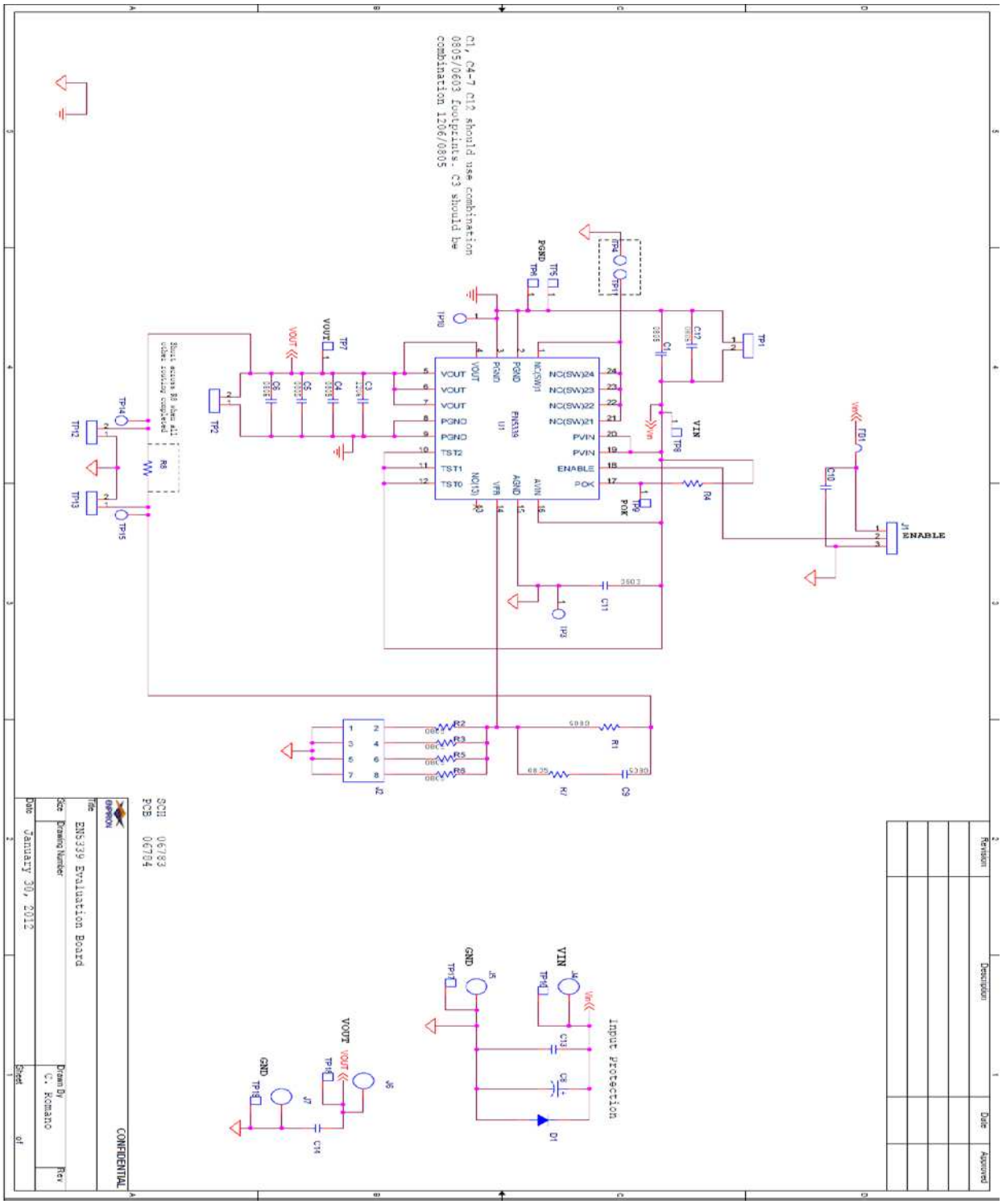


Figure 4. Engineering Evaluation board schematic.

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