Enpirion EP53F8QI 1.5A Synchronous DCDC Converter Module Evaluation Board

Introduction

Thank you for choosing Altera Enpirion power products!

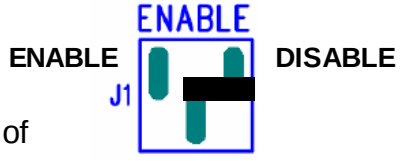
You are evaluating a new class of DCDC converter product, a complete power system on silicon:

- The EP53F8QI is a complete module with integrated magnetics.
- The evaluation board is designed to offer a wide range of engineering evaluation capabilities.
- Pads are available to add up to one additional input capacitor and up to one additional output capacitors to allow for evaluation of performance over a wide range of input/output capacitor combinations.
- Output voltage is programmed using a resistor divider. The board comes populated with four pre-placed resistors and a jumper to choose one of four preset output voltages.
- Easy jumpers are provided for the following signals:
  - Enable
  - VOUT
- Numerous test points are provided as well as clip leads for input and output connections
- The board comes with input decoupling and input reverse polarity protection to protect the device from common setup mishaps.

Quick Start Guide

Figure 1 shows a top view of the evaluation board.

STEP 1: Set the “ENABLE” jumper to the Disable Position.



STEP 2: Set the output voltage by setting jumper “J2” to one of the pre selected output voltage settings.

STEP 3: Connect Power Supply to the input power connectors, VIN (+) and GND (-).

CAUTION: be mindful of the polarity. Even though the evaluation board comes with reverse polarity protection diodes, it is rarely a good idea to reverse the input polarity.

STEP 4: Connect 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 EP53F8QI is now powered up.

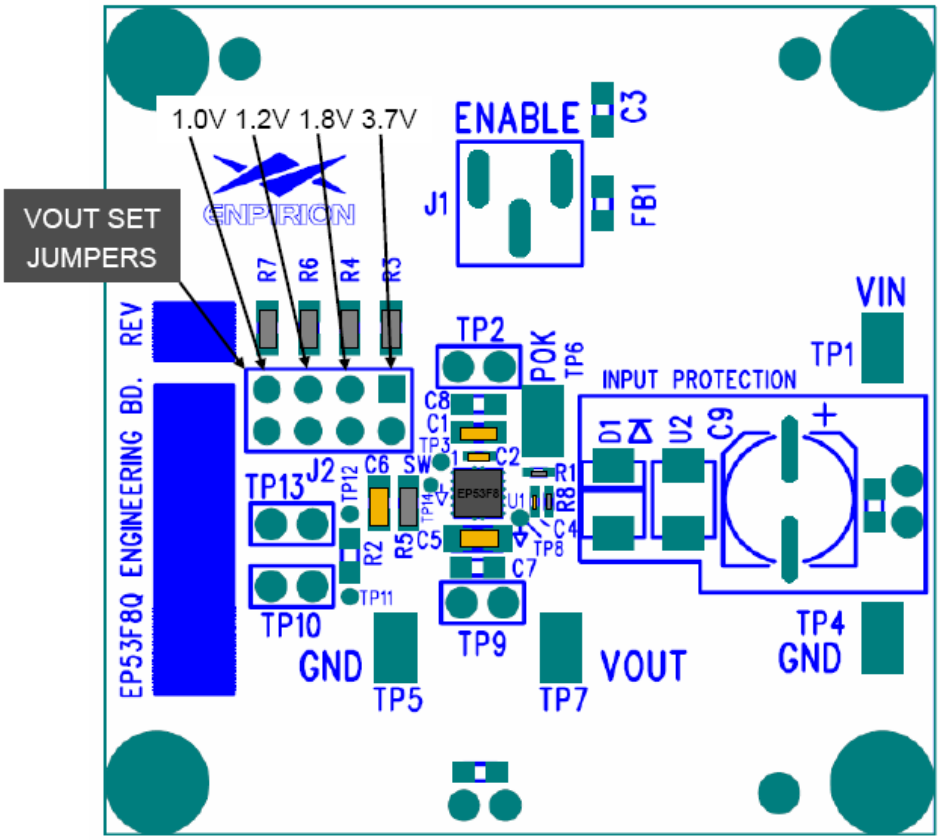


Figure 1. Evaluation Board Layout.

Output Voltage Select

The output voltage of the EP53F8QI is programmed using a simple resistor divider. The evaluation board comes pre-populated with a set of four jumpers that allow the user to choose one of four preset voltages. Refer to Figure 1 and Figure 2 for the specific settings. If no jumper is populated the default voltage setting will be 0.6V.

It is also possible to remove one of the preset resistors and replace with another value to generate any desired output within the devices operating range.

Refer to the product data sheet for further information on setting the output voltage.

Figure 2 shows a close-up of the jumper on the evaluation board.

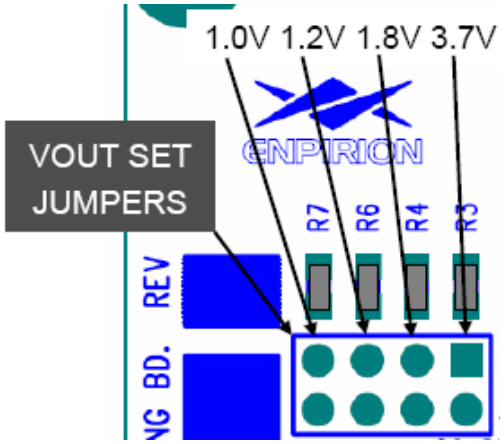


Figure 2. Close up of the V_{OUT} setting jumpers, J2.

Test Recommendations

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

1. 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.
2. Measure input and output current with series ammeters or accurate shunt resistors. This is especially important when measuring efficiency.
3. 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.

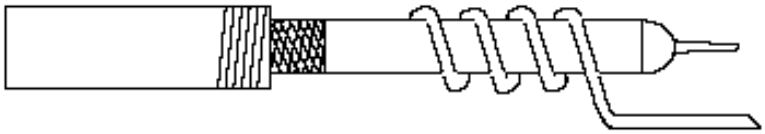


Figure 3. Recommended probe configuration.

Input and Output Capacitors

The **input** capacitance requirement is a 10 uF and a 680pF MLCC capacitor in parallel. The smaller valued capacitor, the 680pF, must be placed closest to the EP53F8QI. Both capacitors have been placed as close to the device as possible to minimize the physical area of the input AC current loop.

There is a pre-tinned pad that allows for an additional 0805 case size MLCC capacitor to experiment with input filter performance.

The **output** capacitance requirement is a minimum of 22uF. The evaluation board comes populated with a single 22uF 0805 case size MLCC capacitor.

The board has a pre-tinned pad for up to 1 additional 0805 case size output capacitor.

NOTE: Capacitors must be X5R or X7R dielectric formulations.

Evaluation Board Metal Layers

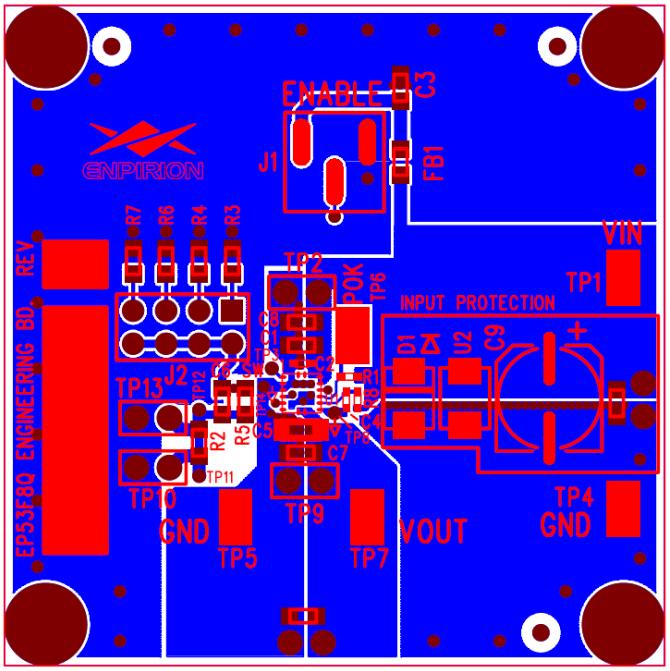


Figure 4. Top layer metal with silkscreen.

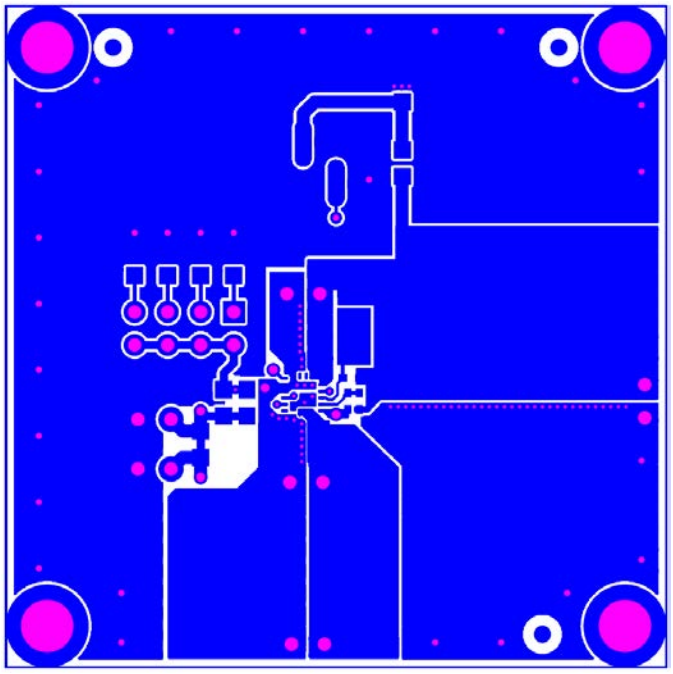


Figure 5. Top layer metal.

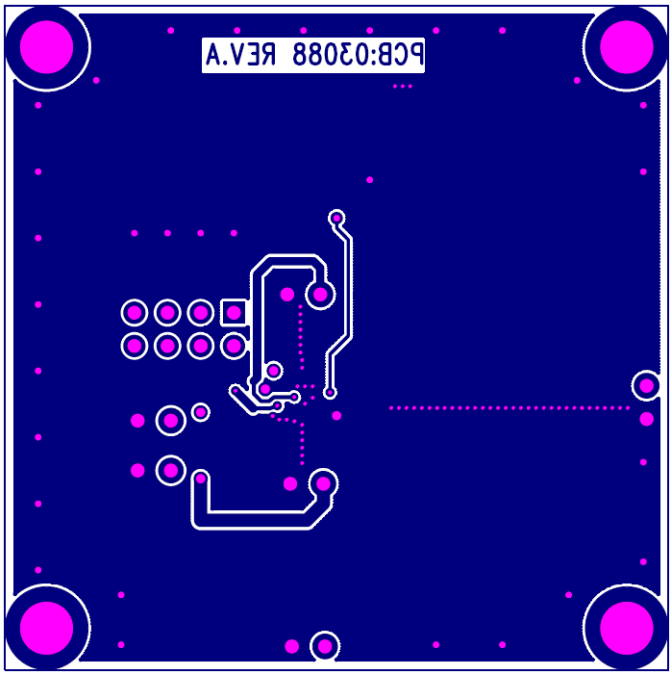
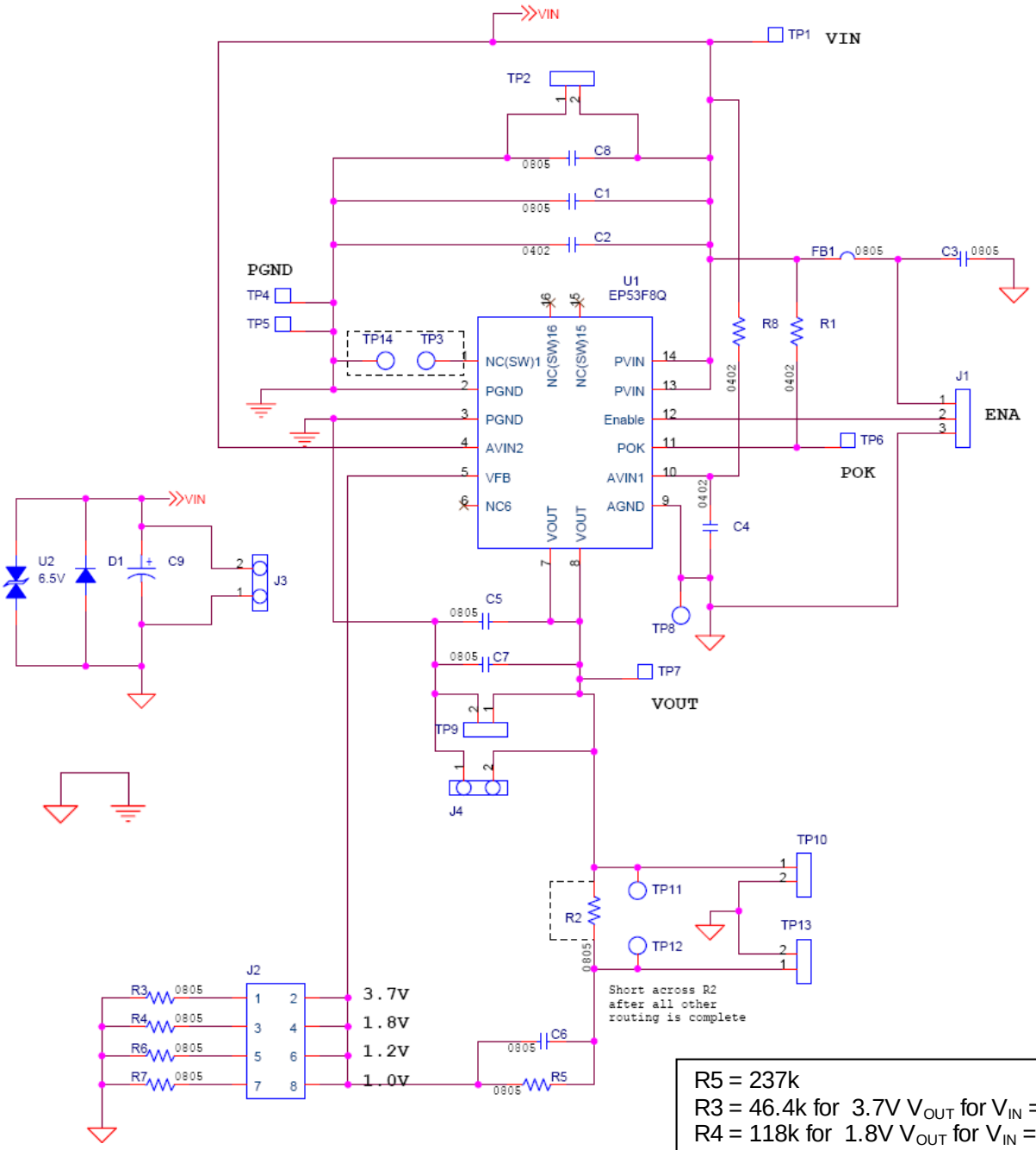


Figure 6. Bottom layer metal.

Evaluation Board Schematic



R5 = 237k
R3 = 46.4k for 3.7V V_{OUT} for V_{IN} = 5V
R4 = 118k for 1.8V V_{OUT} for V_{IN} = 5V
R6 = 237k for 1.2V V_{OUT} for V_{IN} = 5V
R7 = 357k for 1.0V V_{OUT} for V_{IN} = 5V
C6 = 5.0pF
C2 = 680pF
C1 = 10uF
C5 = 22uF

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