



**User Guide for  
FEBFAN48610\_M00LPOLA  
Evaluation Board**

**Synchronous Boost Regulator with  
Pass-Through Mode**

**Featured Fairchild Product:  
FAN48610**

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This user guide supports the evaluation kit for the FAN48610. It should be used in conjunction with the FAN48610 datasheet as well as Fairchild's application notes and technical support team. Please visit Fairchild's website at [www.fairchildsemi.com](http://www.fairchildsemi.com).

## 1. Description

The FAN48610 evaluation board is a compact circuit including Fairchild's FAN48610 synchronous boost regulator with Pass-Through Mode in a 9-bump Wafer-Level Chip-Scale Package (WLCSP). Small input/output capacitors and a 470 nH inductor ensure smooth output regulation.

The board also features an on-board active load circuit and footprints to accommodate additional input/output capacitors. The evaluation board provides probe access points to all key circuit nodes so that electrical characteristics can be measured.

### 1.1. Features

- Input Voltage Range: 2.35 V to 5.50 V
- Output Voltages Range: 3.0 V to 5.0 V
- $I_{OUT} \geq 1 \text{ A}$  at  $V_{OUT} = 5.0 \text{ V}$ ,  $V_{IN} \geq 2.5 \text{ V}$
- $I_{OUT} \geq 1.5 \text{ A}$  at  $V_{OUT} = 5.0 \text{ V}$ ,  $V_{IN} \geq 3.0 \text{ V}$
- Up to 94% Efficient
- Automatic Pass-Through Operation when  $V_{IN} > V_{OUT}$
- Internal Synchronous Rectification
- Soft-Start with True Load Disconnect
- Short-Circuit Protection
- 9-Bump, 1.215 mm x 1.215 mm, 0.4 mm Pitch WLCSP
- Three External Components: 2016 0.47  $\mu\text{H}$  Inductor, 0603 Case Size Input / Output Capacitors

## 1.2. Quick Start Connection Guide

1. Connect VIN to input power supply (2.35V -5.50 V) as shown in Figure 1.
2. Set EN header (J4) at the '1' position with a jumper.
3. Connect the external load between VOUT and PGND.
4. Kelvin connected input and output voltage-sense points (VIN\_S, VOUT\_S) are provided. Measure relative to AGND.

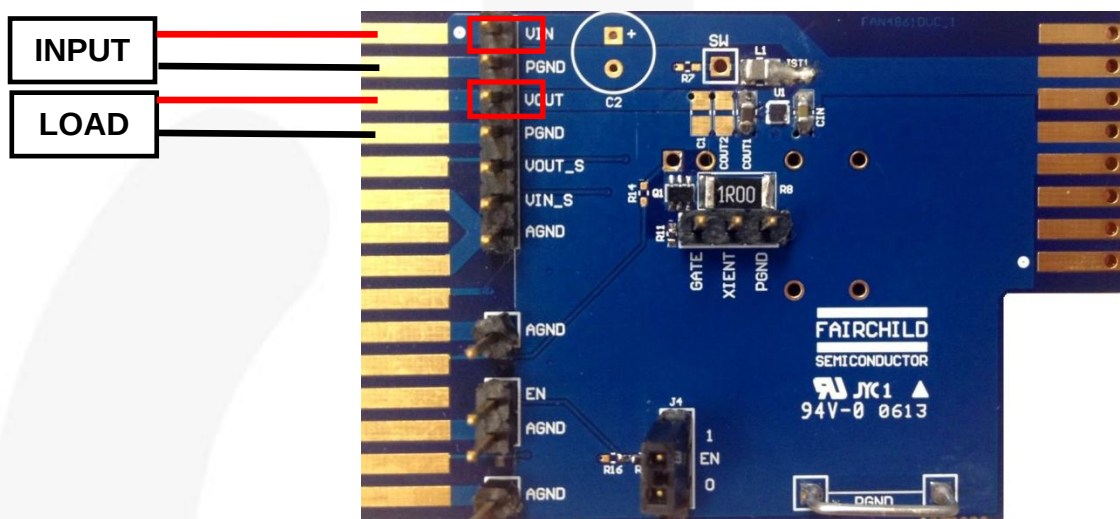


Figure 1. Evaluation Board Connection Diagram Evaluation Board Specifications

## 2. Bill of Materials

| Reference              | Qty. | Description                     | Manufacturer                    |
|------------------------|------|---------------------------------|---------------------------------|
| U1                     | 1    | IC, FAN48610 (WLCSP 9)          | Fairchild Semiconductor         |
| L1                     | 1    | 470 nH, 3.2 A, 40 mΩ, 20%, 2016 | TOKO DFE201612C-R47M            |
| Q1                     | 1    | NMOS, 30 V, 2 A, SC70-6         | Fairchild Semiconductor FDG315N |
| C <sub>IN</sub>        | 1    | 10 μF, 6.3 V, 10%, X5R, 0603    | TDK C1608X5R0J106K080AB         |
| C <sub>OUT1</sub>      | 1    | 22 μF, 6.3 V, 20%, X5R, 0603    | TDK C1608X5R0J226M080AC         |
| R2                     | 1    | 20 kΩ, 5%, 0402                 |                                 |
| R8                     | 1    | 1.0 Ω, 1%, 2010                 |                                 |
| R11                    | 1    | 1.0 kΩ, 5%, 0402                |                                 |
| R7, R14, R15, R16      | 4    | No Load 0402                    |                                 |
| C <sub>OUT2</sub> , C1 | 2    | No Load 0603                    |                                 |
| C2                     | 1    | No Load ALEL                    |                                 |

### 3. Evaluation Board Special Features

#### 3.1. On-Board Load Current Control

Most electronic loads cannot generate the kind of high-speed load transients that occur in modern applications.

To facilitate these high-speed transient edges (~100 ns), the FAN48610 evaluation board includes a MOSFET (Q1) and a 1  $\Omega$  current-sense resistor (R8) connected to VOUT (see Figure 2). This circuit is not rated for the dissipation associated with DC loads. 10% maximum duty cycle is recommended.

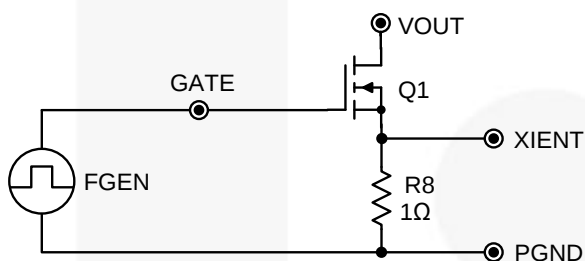


Figure 2. On-Board Load Current Control

The NFET is wired as a source follower to provide simple amplitude and rise/fall time control. It can be driven by a pulse generator. The load current step depends on the applied GATE voltage and  $I_{d(V_{GS})}$  characteristic of the NFET at ambient operating temperature. To simplify the load current setup, a precision 1  $\Omega$  sense resistor allows the load current to be read at a 1 mV/1 mA rate on the XIENT pin.

Table 1. Typical  $V_{GATE}$  to Load Dependence

| Load (mA) | $V_{GATE}$ (V) |
|-----------|----------------|
| 0         | 1.80           |
| 50        | 1.85           |
| 200       | 2.00           |

#### 3.2. Input / Output Capacitance

The FAN48610 evaluation board includes empty locations for the addition of input or output capacitance.

The C2 location should be used to provide a suitable local charge reservoir when inductance is introduced by long cables from the DC source.

#### 3.3. ENABLE Header (J4)

The ENABLE header is set to '1' position by default. To disable the FAN48610, move the EN jumper to the '0' position.

#### 3.4. Signal Monitoring

VIN\_S, VOUT\_S, and EN signals can be monitored with an oscilloscope probe at headers, as shown in Figure 1. Measure relative to AGND.

For best output ripple measurements, do not use VOUT\_S; instead monitor directly across the output capacitor with an oscilloscope probe.

## 4. Printed Circuit Board

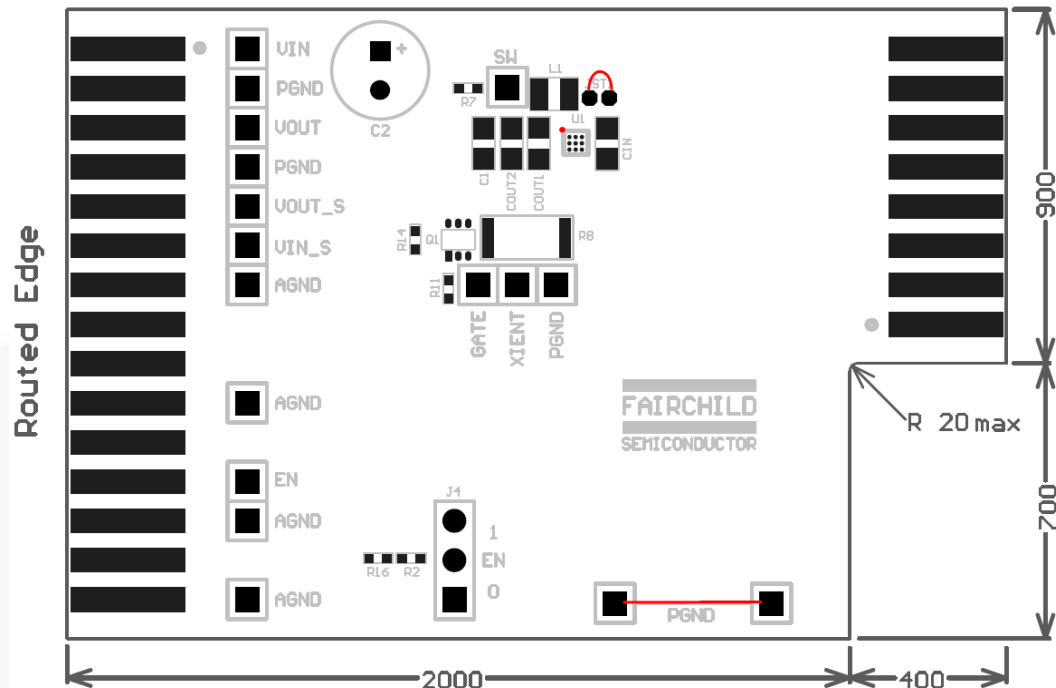


Figure 3. Top-Side Silk Screen

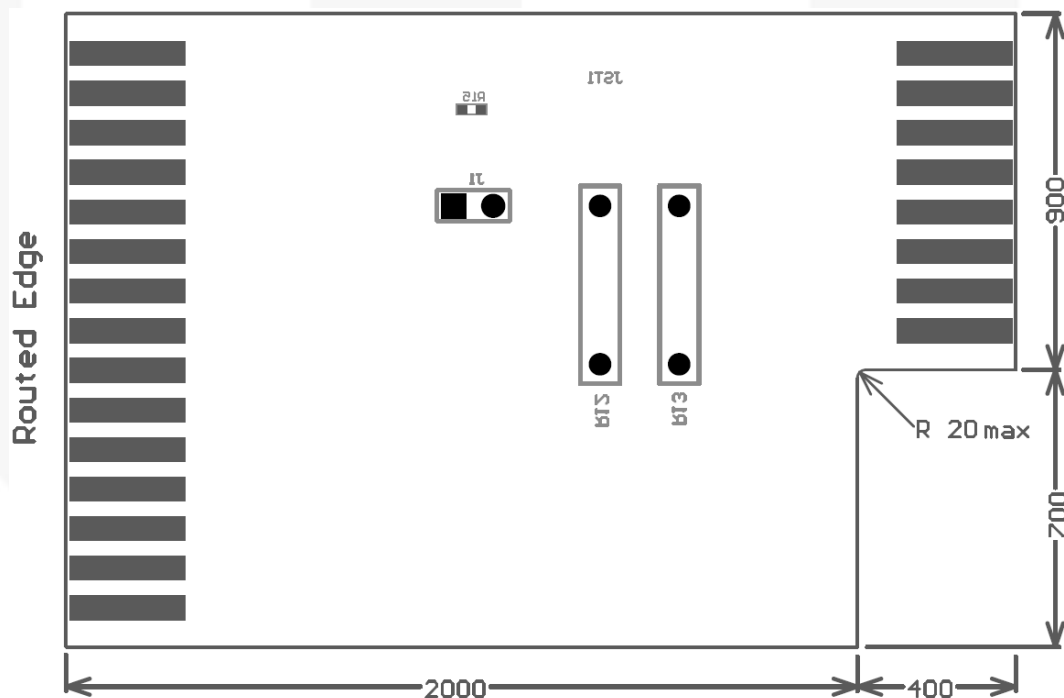


Figure 4. Bottom-Side Silk Screen

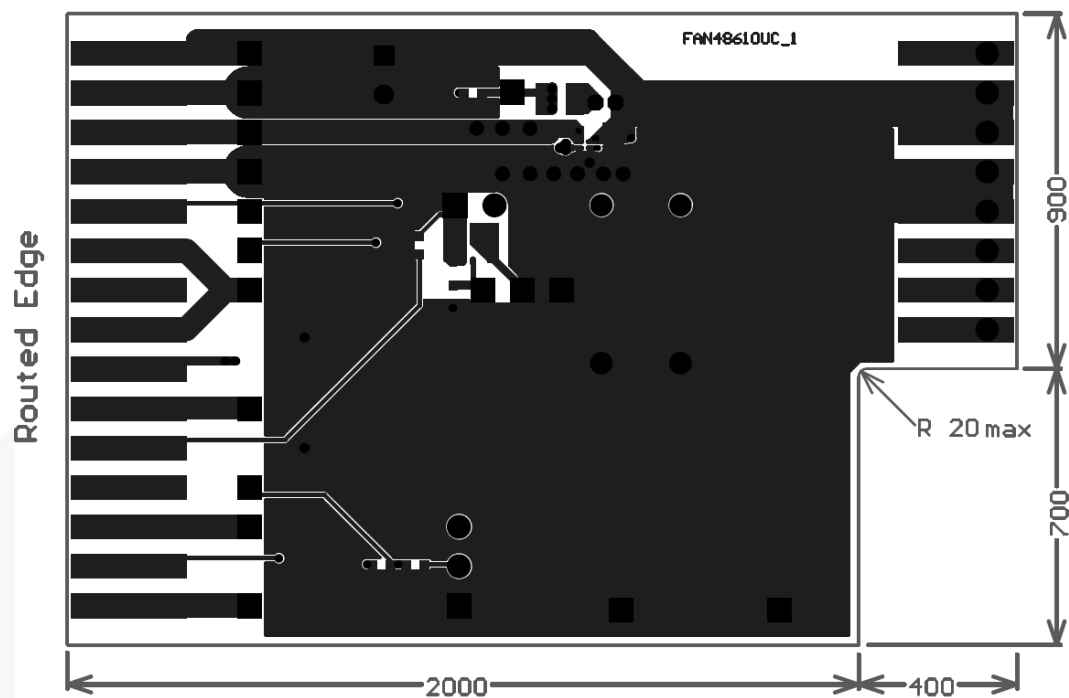


Figure 5. Top Layer

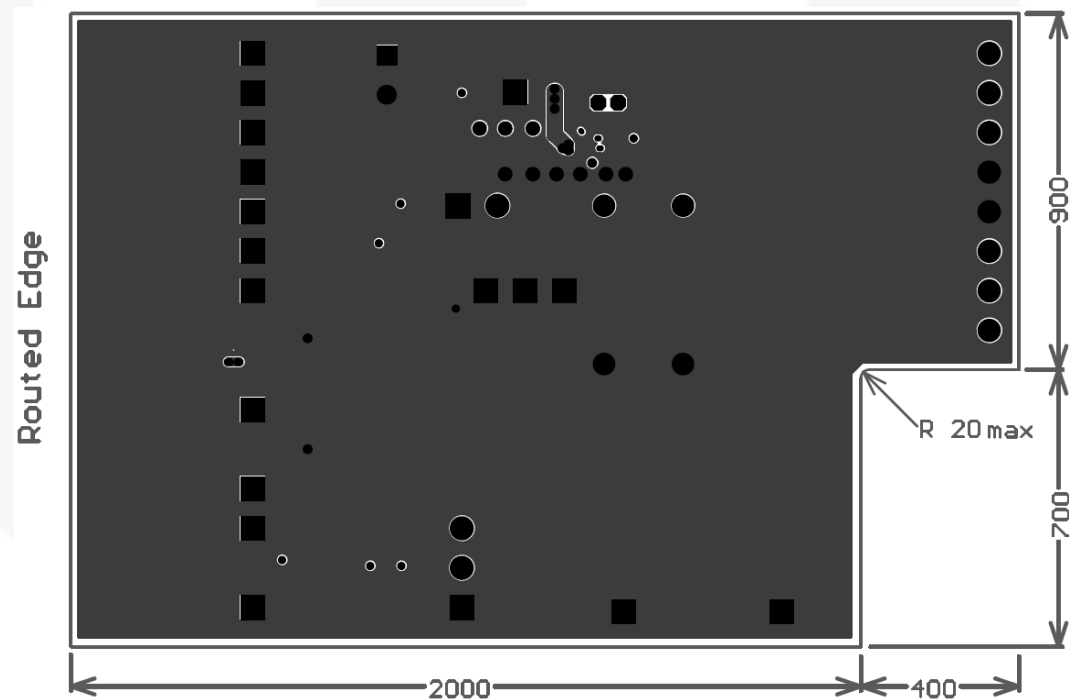


Figure 6. Mid-Layer 1

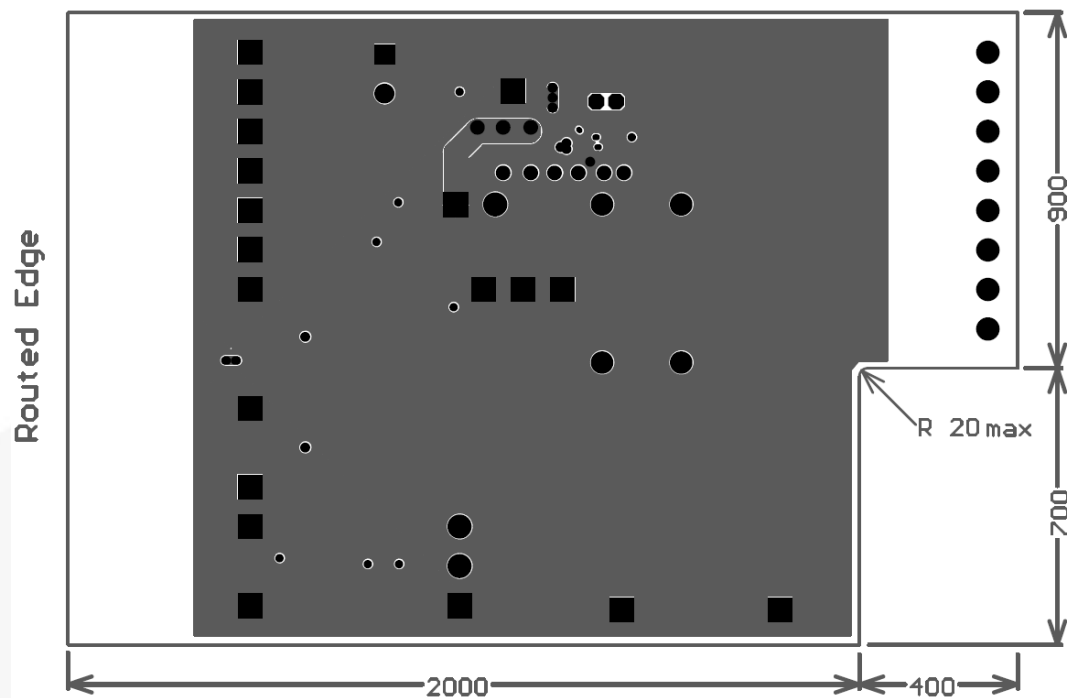


Figure 7. Mid-Layer 2

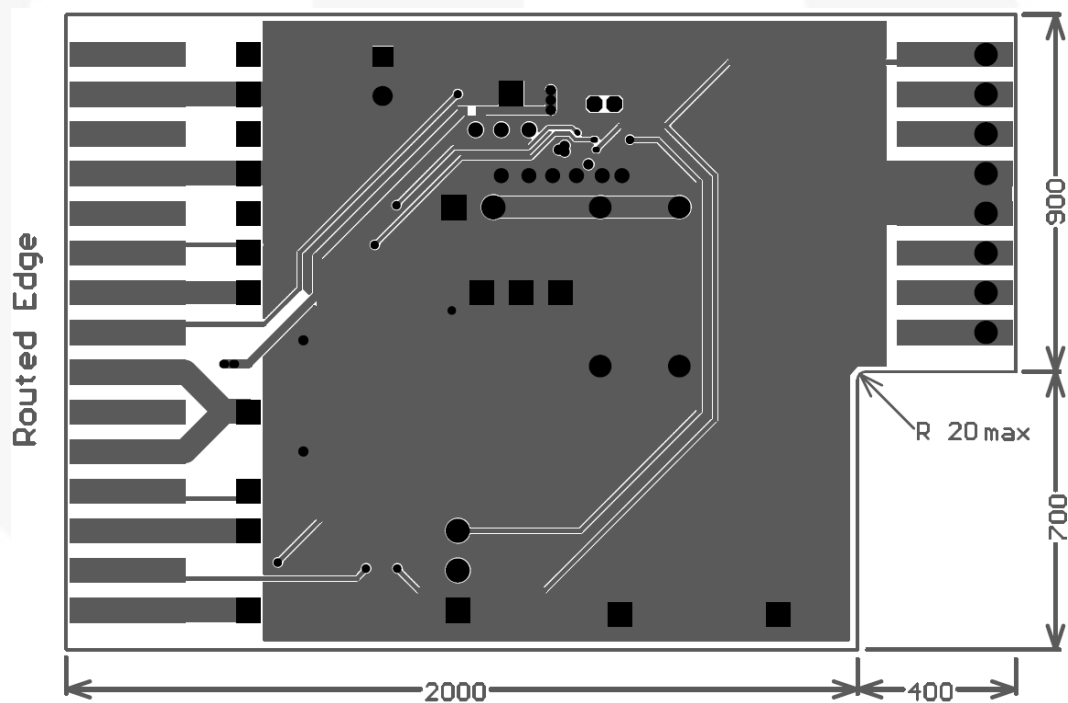
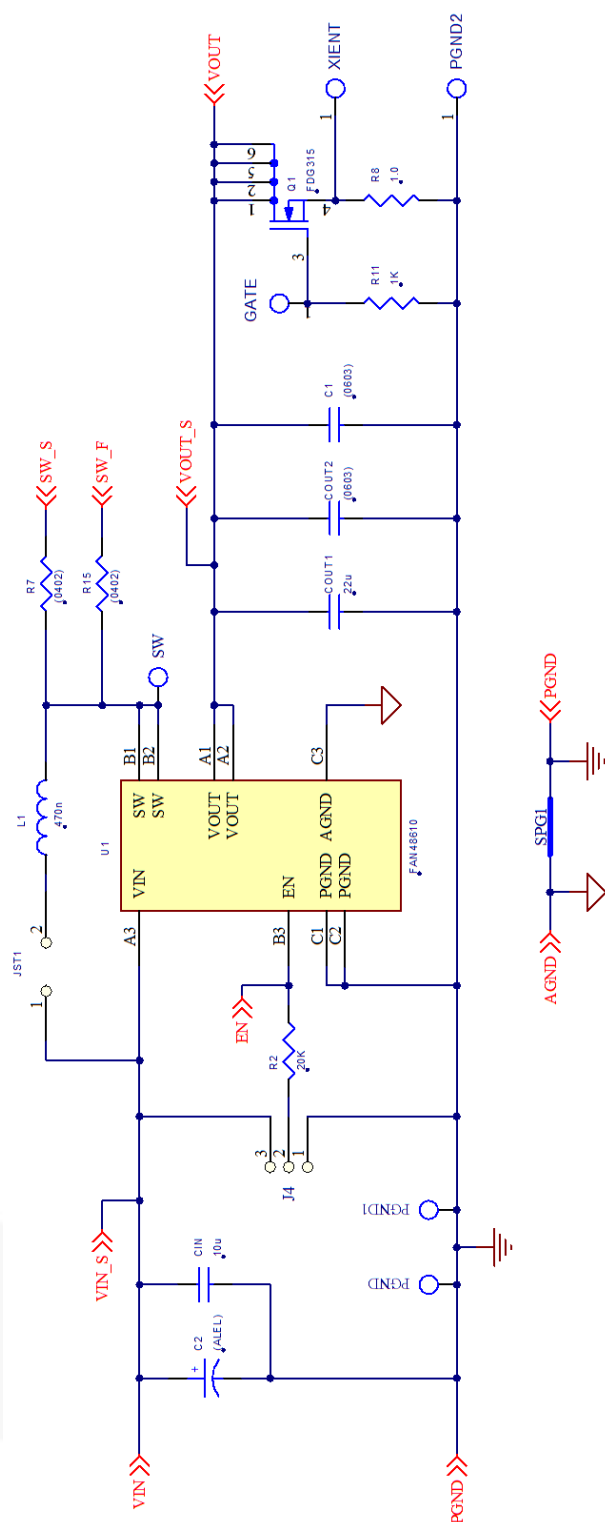


Figure 8. Bottom Layers

## 5. Schematic



**Figure 9. Evaluation Board Schematic**

## 6. Revision History

| Rev.  | Date          | Description     |
|-------|---------------|-----------------|
| 1.0.0 | November 2013 | Initial Release |
|       |               |                 |
|       |               |                 |
|       |               |                 |

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Replace components on the Evaluation Board only with those parts shown on the parts list (or Bill of Materials) in the Users' Guide. Contact an authorized Fairchild representative with any questions.

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Тел: +7 (812) 336 43 04 (многоканальный)

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