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User Guide for

FEBFAN48610_M00LPOLA

Evaluation Board

Synchronous Boost Regulator with Pass-Through Mode

Featured Fairchild Product:

FAN48610

Direct questions or comments about this evaluation board to: "Worldwide Direct Support"

Fairchild Semiconductor.com

Table of Contents

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.

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
- $I_{OUT} \geq 1$ A at V_{OUT} =5.0 V, $V_{IN} \geq 2.5$ V
- $I_{OUT} \geq 1.5$ A at V_{OUT} =5.0 V, $V_{IN} \geq 3.0$ 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 µH 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.

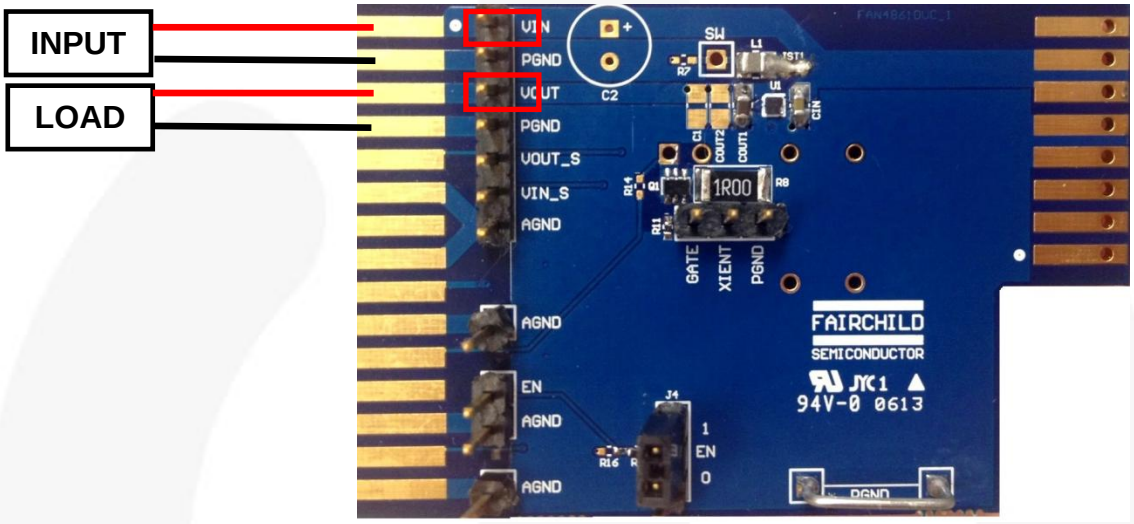

Figure 1. Evaluation Board Connection Diagram Evaluation Board Specifications

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_{IN}	1	10 µF, 6.3 V, 10%, X5R, 0603	TDK C1608X5R0J106K080AB
C_{OUT1}	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_{OUT2}, 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 Ω 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.

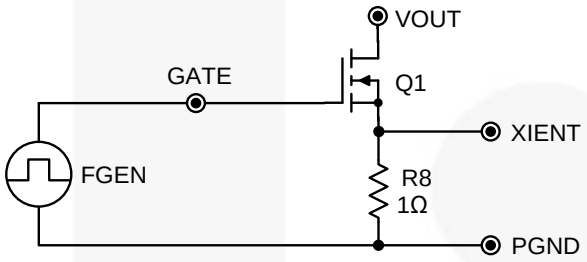

Figure 2. On-Board Load Current Control

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 $I_{d(Vgs)}$ characteristic of the NFET at ambient operating temperature. To simplify the load current setup, a precision 1 Ω 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

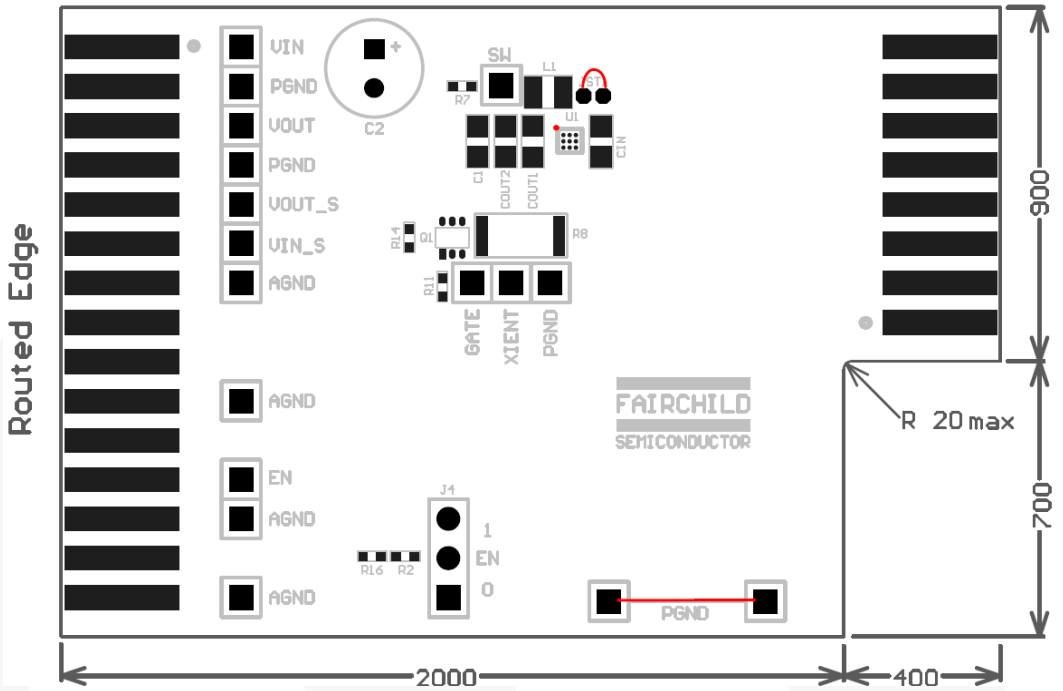

Figure 3. Top-Side Silk Screen

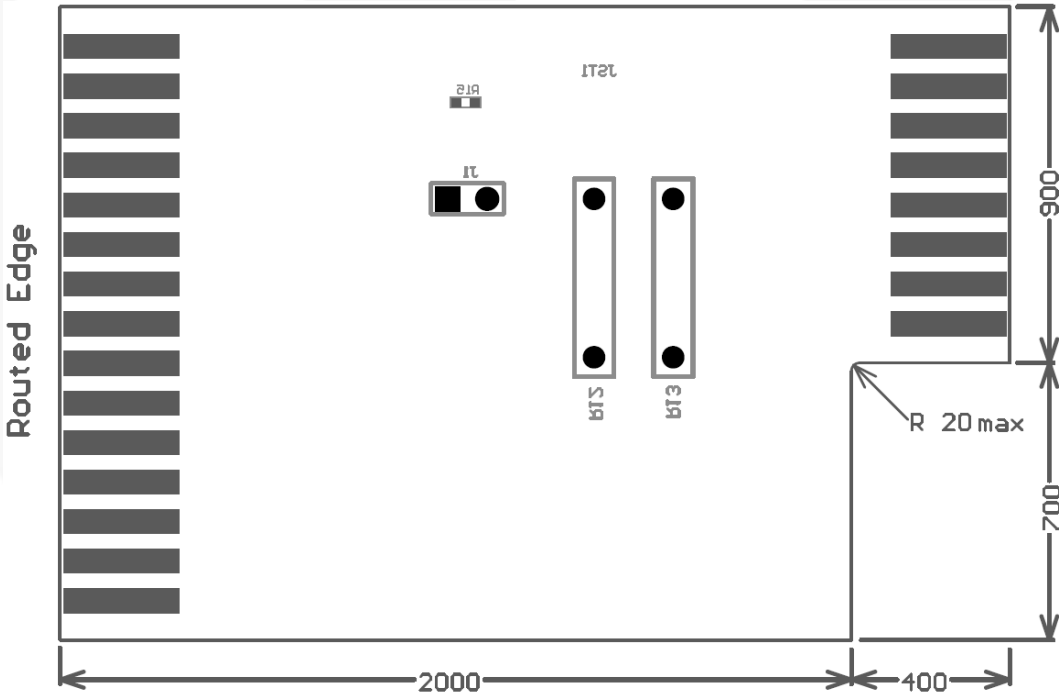

Figure 4. Bottom-Side Silk Screen

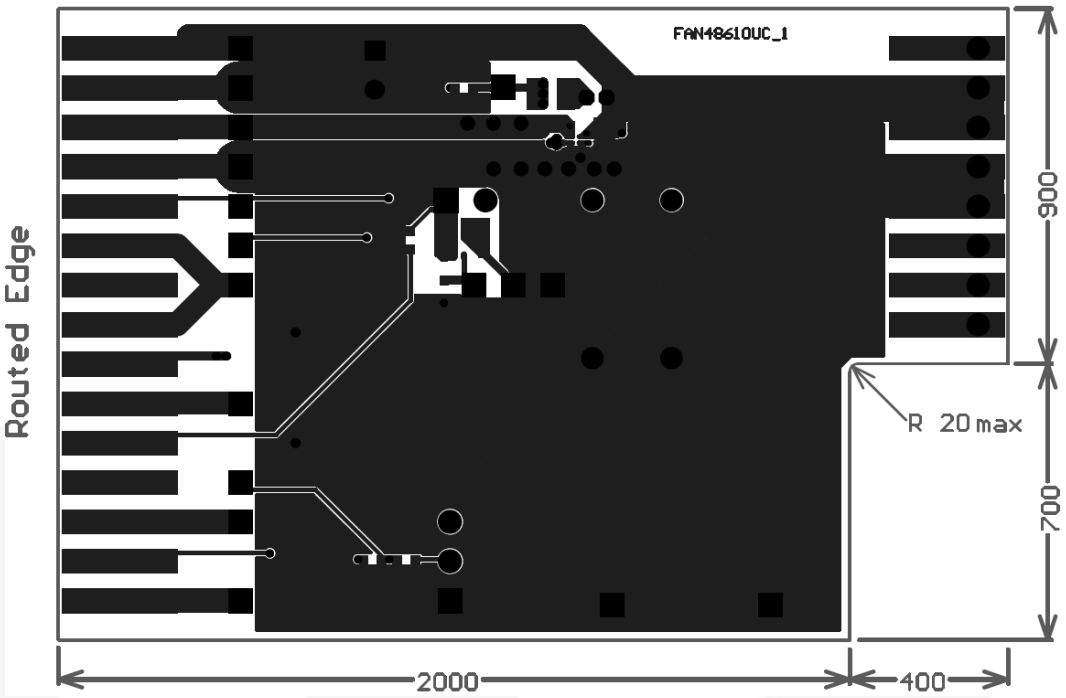

Figure 5. Top Layer

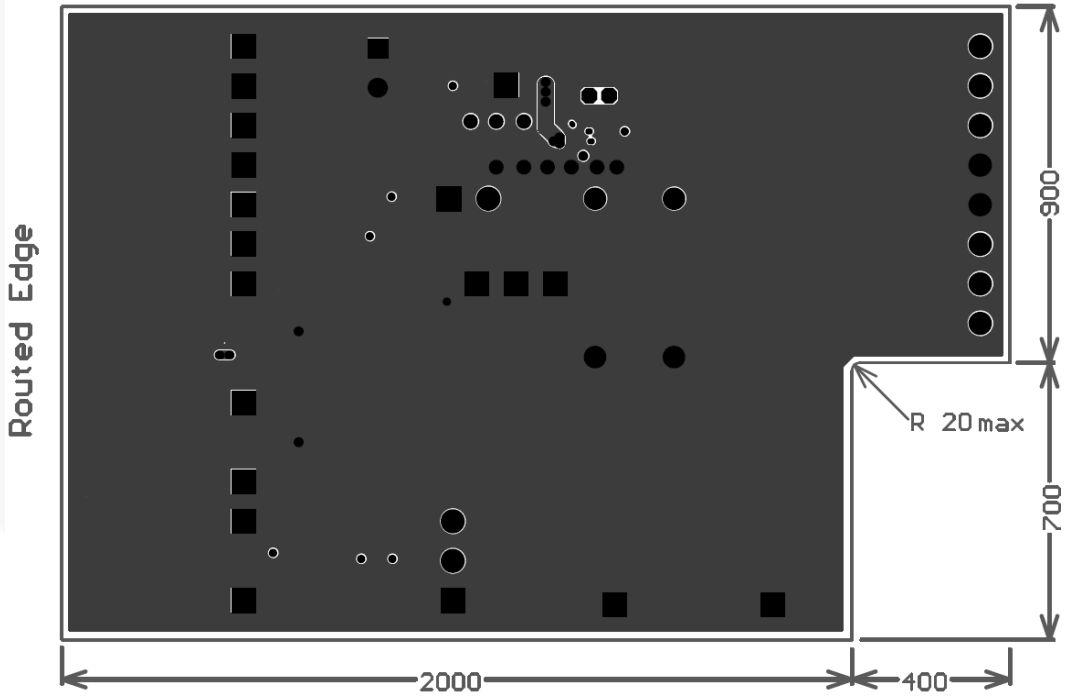

Figure 6. Mid-Layer 1

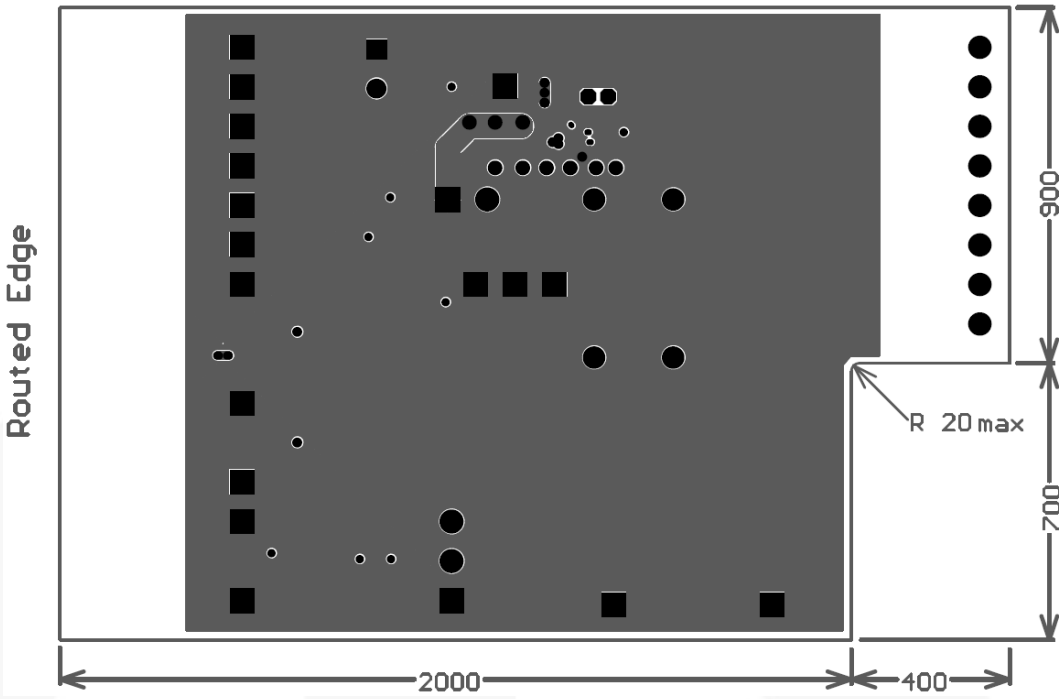

Figure 7. Mid-Layer 2

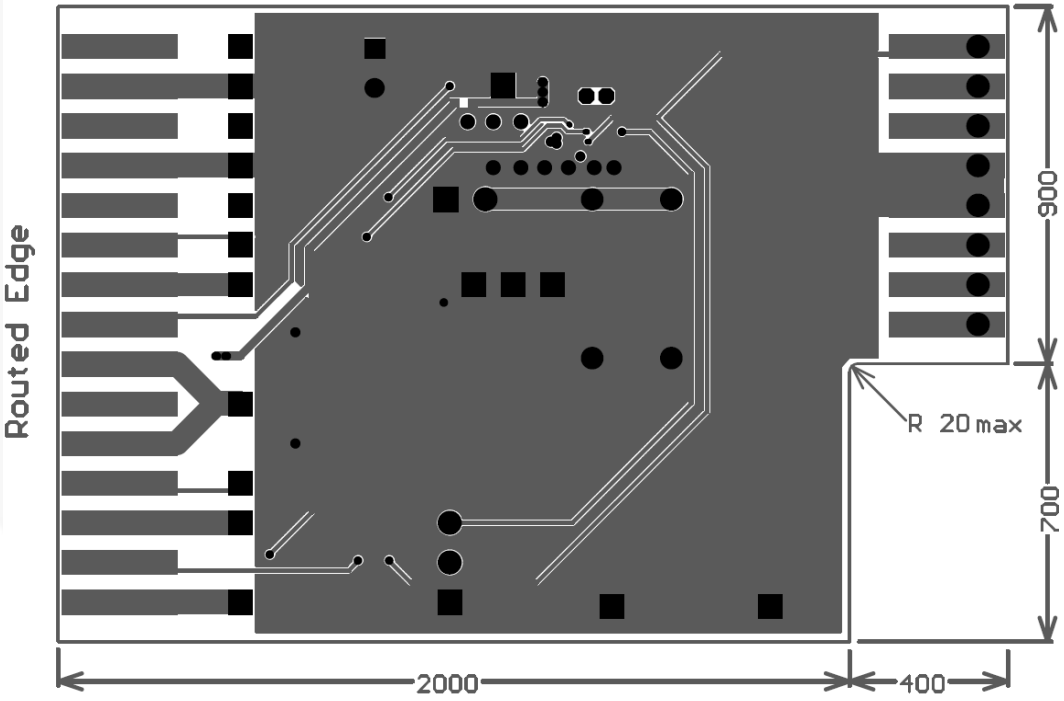

Figure 8. Bottom Layers

5. Schematic

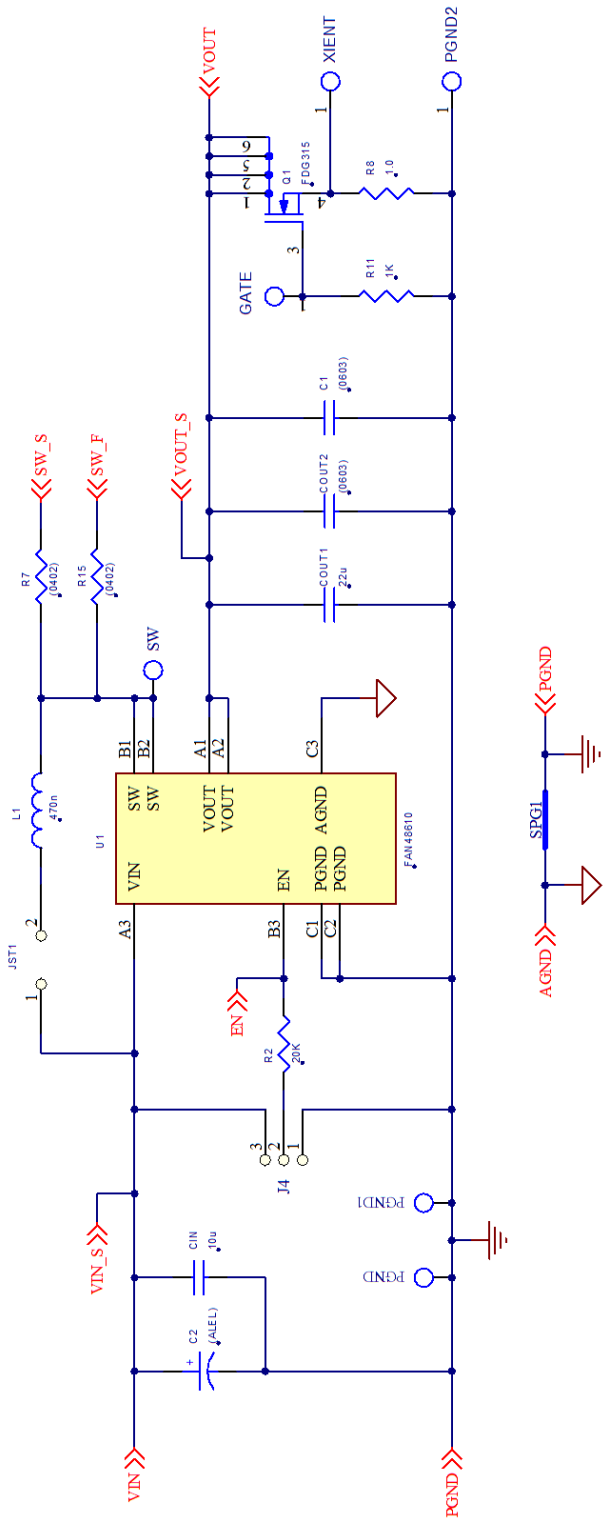

Figure 9. Evaluation Board Schematic

6. Revision History

Rev.	Date	Description
1.0.0	November 2013	Initial Release

WARNING AND DISCLAIMER

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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