LX8247
Evaluation Board User Guide

Microsemi
Power Matters.™

Contents

1 Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision 1.0

Revision 1.0 was published in March 2018. It was the first publication of this document.

2 Overview

The LX8247 consists of dual 5 V and 12 V eFuse over-voltage protection switches.

The 5 V and 12 V eFuse switches are designed for hot swap and limit inrush current limiting. In addition, they provide fast acting protection of voltage surges, output over-current, and crowbar events. Under an input voltage surge condition, the eFuse devices clamp the output voltage to protect downstream circuitry and maximize run time. In addition to surge protection, the 5 V eFuse switch provides bidirectional voltage blocking to block current in the reverse direction under input voltage crowbar conditions. Both eFuses have thermal protection to protect all circuitry in the event of sustained surge or short conditions.

The LX8247 has dual current monitoring outputs to allow monitoring of the input power under all conditions. Both the 5 V and 12 V inputs are monitored.

Flexible SATA and SAS disable modes are supported and can be tailored to a particular system.

2.1 Features

- 50 mΩ (typical) Rdson Internal eFuse FET protected from 15 V
- 12 V eFuse
  - Current limiting (hotswap inrush, over-load, short-circuit)
  - Output voltage clamping and soft start
  - Output current monitoring
  - Thermal latch off
- 5 V eFuse
  - Current limiting (hotswap inrush, over-load, short-circuit)
  - Output voltage clamping and soft start
  - Current monitoring
  - Reverse current protection
  - Thermal latch off
  - High-speed (3.4 MHz) I2C serial bus
  - PowerDisable support

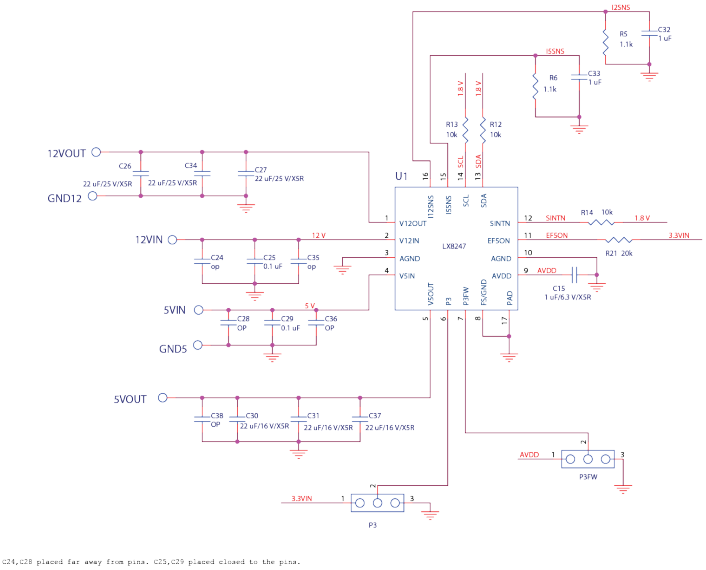
2.2 Applications

- Hard disk drives
- Solid state drives
- Hot swap

2.3 Evaluation Board Schematic

The following schematic shows the LX8247 evaluation board.

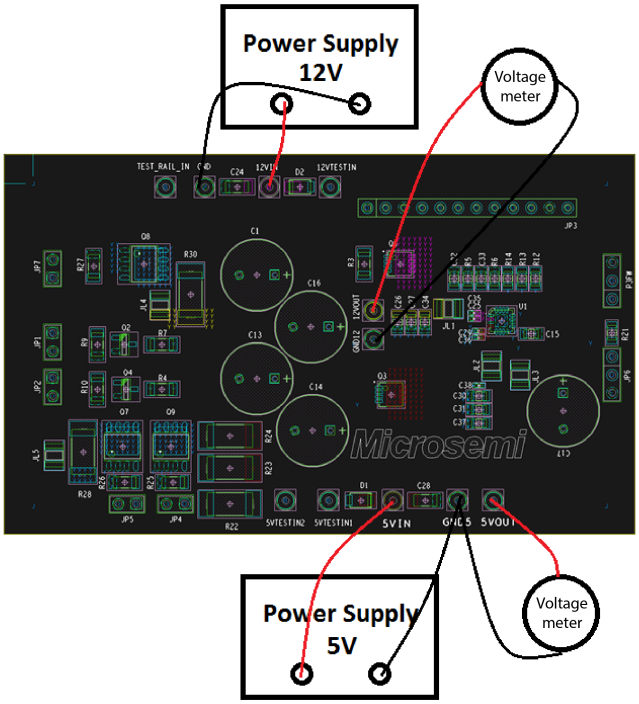
Figure 1 • Evaluation Board Schematic



2.4 Basic Power Supply Connection

The following illustration shows the basic power supply connection instructions for the LX8247 evaluation board.

Figure 2 • Basic Power Supply Connection



2.5 Recommended Operating Conditions

The following table describes the recommended operating conditions for the LX8247 evaluation board.

Table 1 • Recommended Operating Conditions

Description	Min	Typ	Max	Units
V12IN voltage	10.8		13.2	V
V12OUT continous current			2.5	A
V5IN voltage	4.3		5.5	V
V5OUT voltage	2.5		5.5	V
V5OUT continous current			2.5	A
Serial I/F voltage	1.7	1.8	1.95	V
P3 input voltage	–0.3	3.3	3.6	V
P3FW input voltage	–0.3		1.1*AVDD	V
Junction temperature	–10		125	°C
Ambient temperature	–10		85	°C

3 PCB Layout of Evaluation Board

The following images show the PCB layout of the LX8247 evaluation board.

Figure 3 • Top Silkscreen

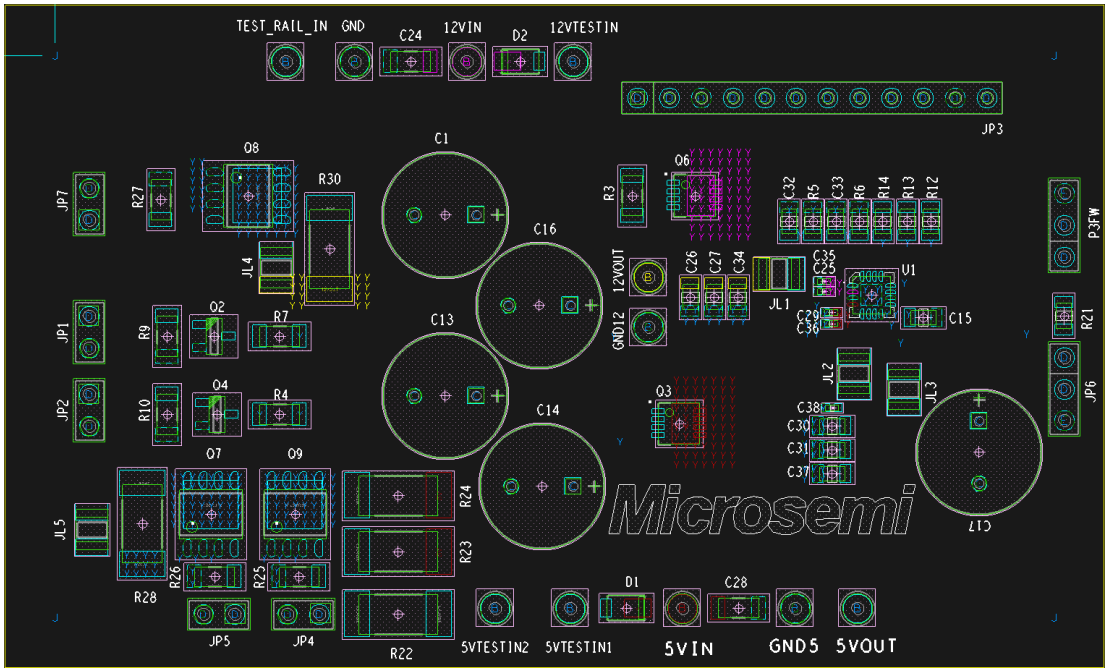


Figure 4 • Top Layer

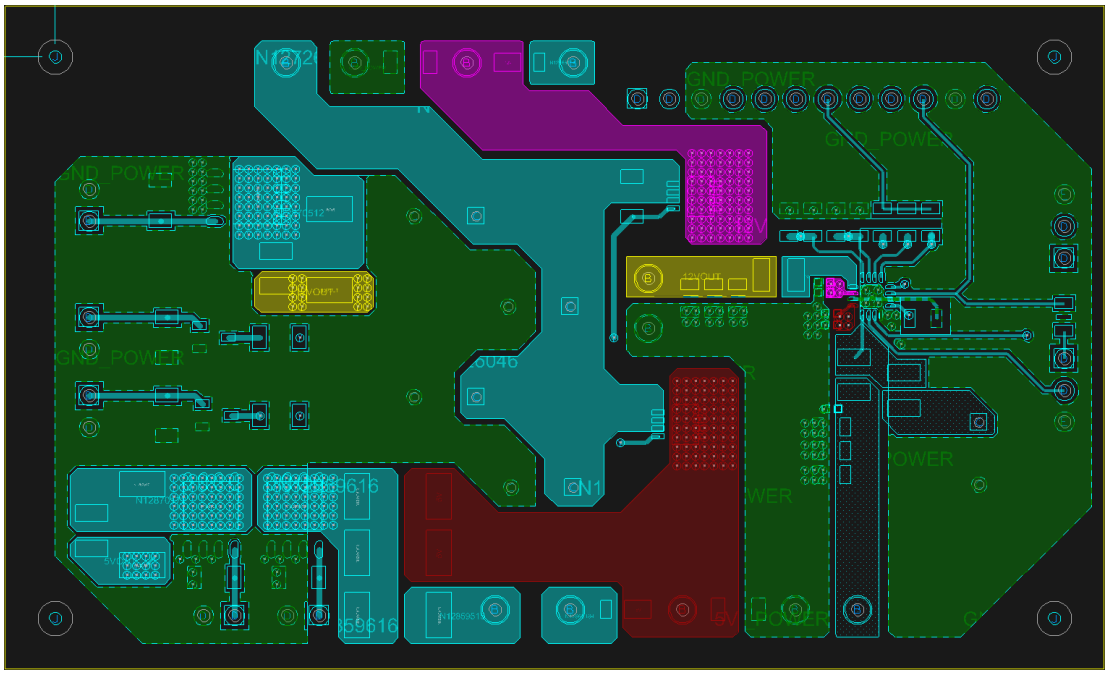


Figure 5 • Ground Layer

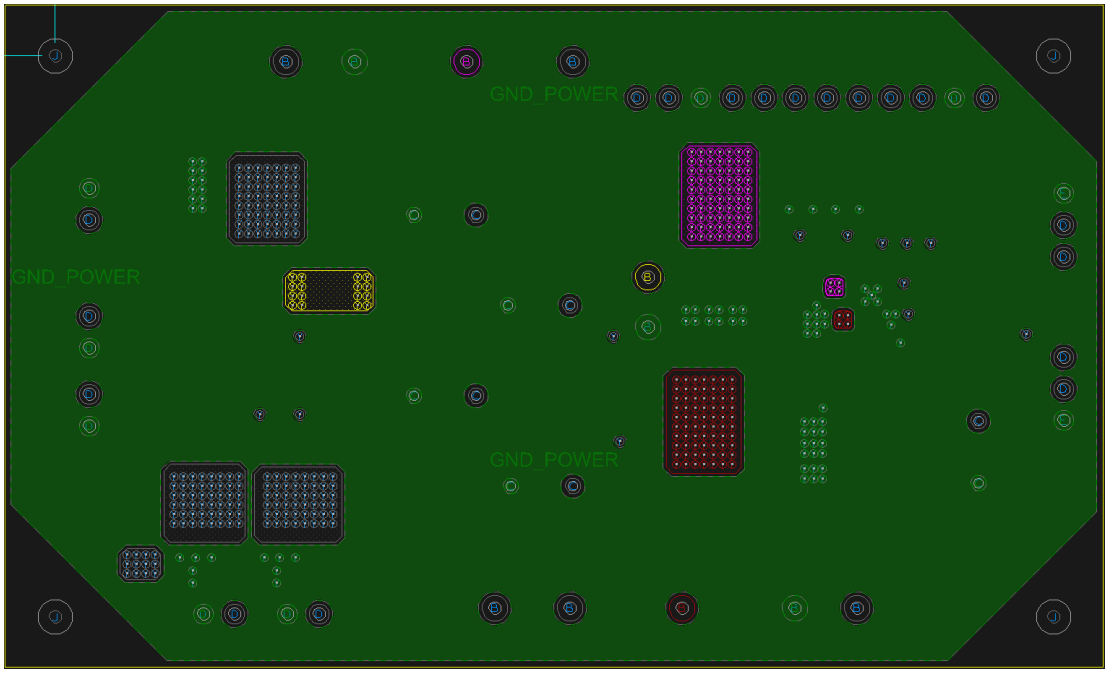


Figure 6 • Power Layer

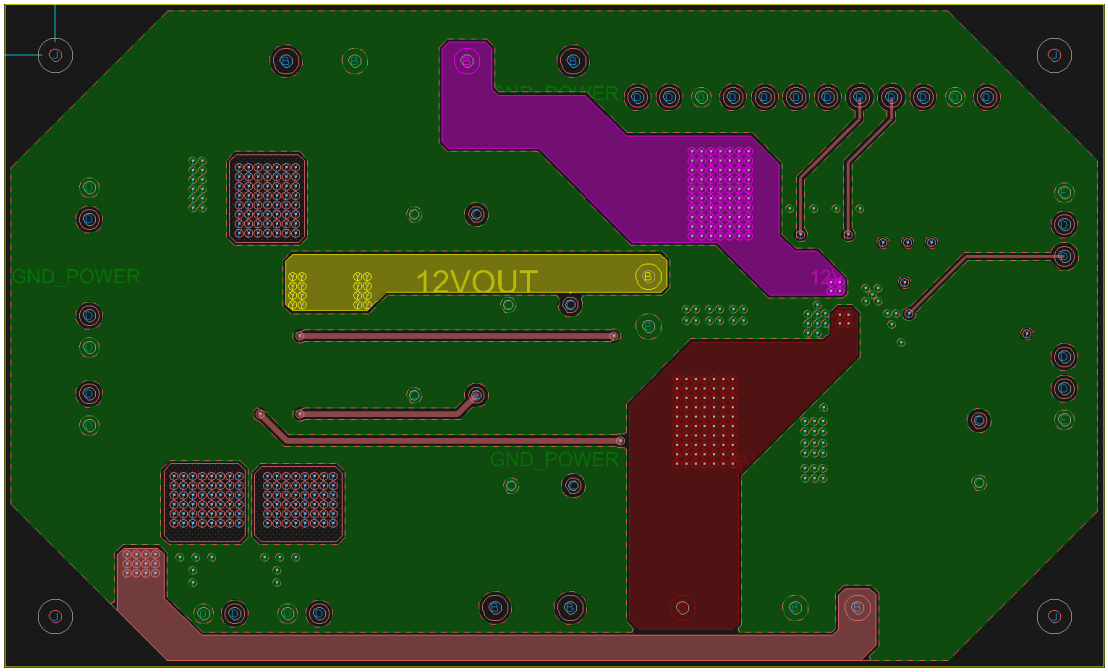
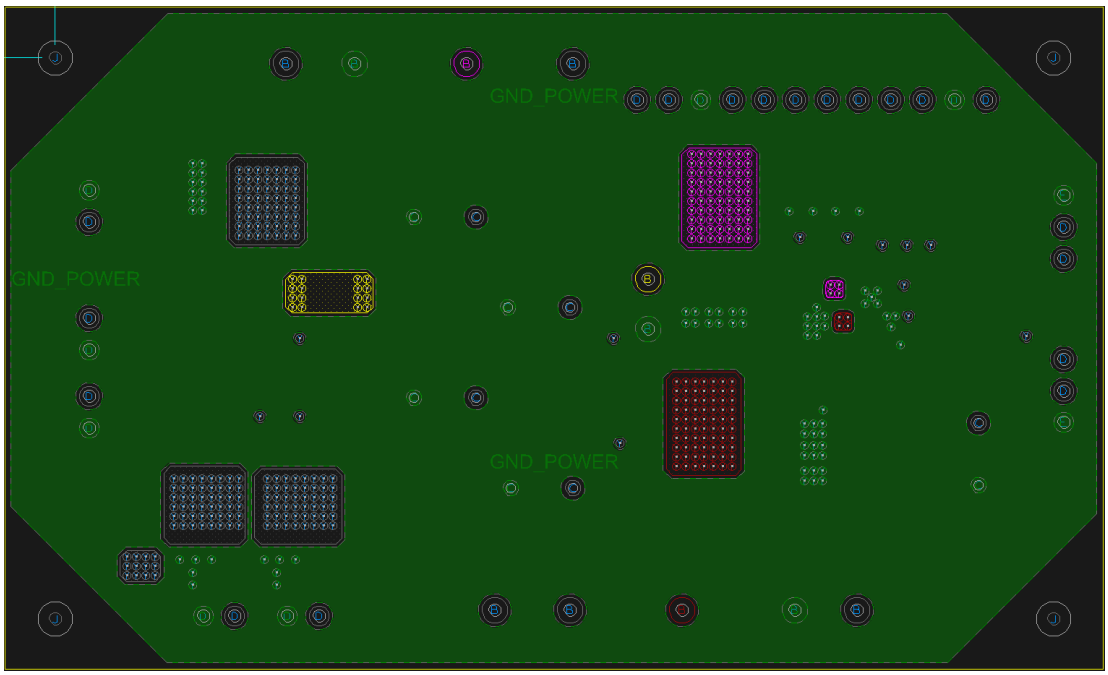


Figure 7 • Bottom Layer



4 Bill of Materials

The following tables describe the bill of materials for the LX8247 device.

Table 2 • Miscellaneous Components

Part Number	Reference	Quantity
Microsemi IC—LX8247ILQ	U1	1

Table 3 • Capacitors

Part Number	Reference	Quantity
470 µF/35 V/19 mΩ ESR	C1, C13, C14, C16, C17	5
1 µF/6.3 V/X5R	C15	1
0.1 µF	C25, C29	2
22 µF/25 V/X5R	C26, C27, C34	3
22 µF/16 V/X5R	C30, C31, C37	3
1 µF	C32, C33	2

Table 4 • Resistors

Part Number	Reference	Quantity
215 Ω, 1/4 W	R3, R7	2
430 Ω, 1/4 W	R4	1
1.1 kΩ	R5, R6	2
51 Ω	R9, R10, R22, R25, R26, R27	6
10 kΩ	R12, R13, R14	3
20 kΩ	R21	1
2 Ω	R23, R24	2
0.62 Ω	R28	1
1.3 Ω	R30	1

Table 5 • Diodes

Part Number	Reference	Quantity
DFLS240	D1, D2	2

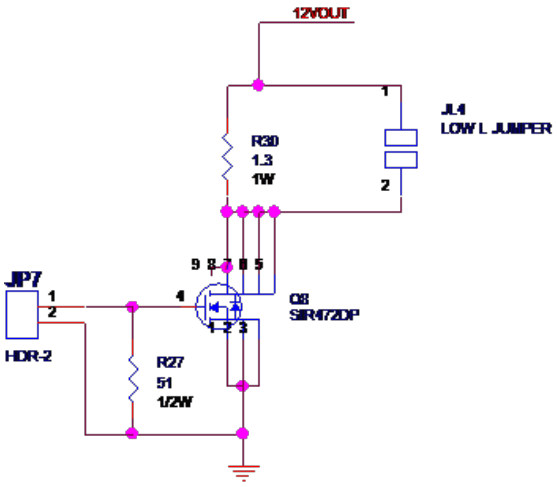
Table 6 • MOSFETS

Part Description	Reference	Quantity
2N7002	Q2, Q4	2
IRFHM9391TRPBF	Q3, Q6	2
SIR472DP	Q7, Q8, Q9	3

5 Scope Images

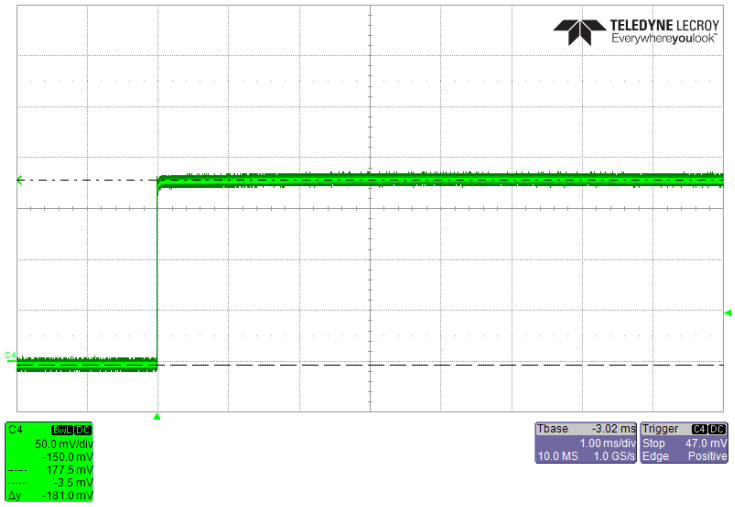
The following image shows a test circuit for the EF12 OC limit.

Figure 8 • Test Circuit



The following image shows the EF12 OC limit.

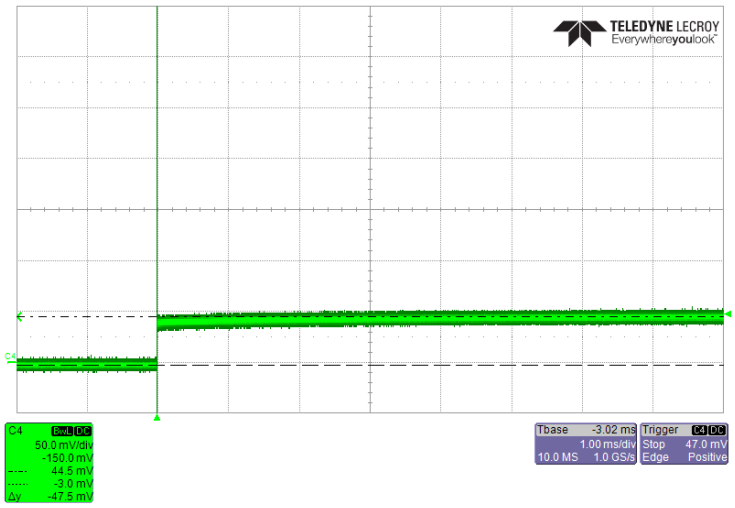
Figure 9 • EF12 OC Limit



P3; scale= 42.0 mV/A

The following image is from testing with the same test circuit as the OC limit test with the 1.3 Ω resistor shorted.

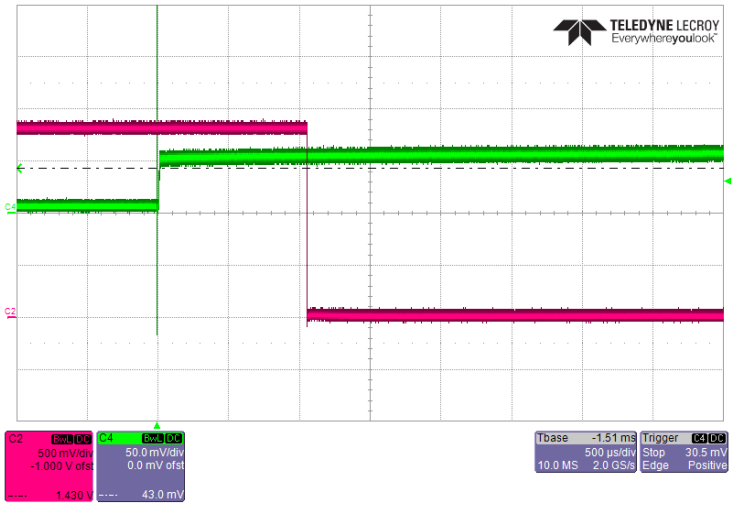
Figure 10 • EF12 Short Circuit Limit



P3; scale= 42.0 mV/A

The following image shows the same test circuit as the short circuit limit test.

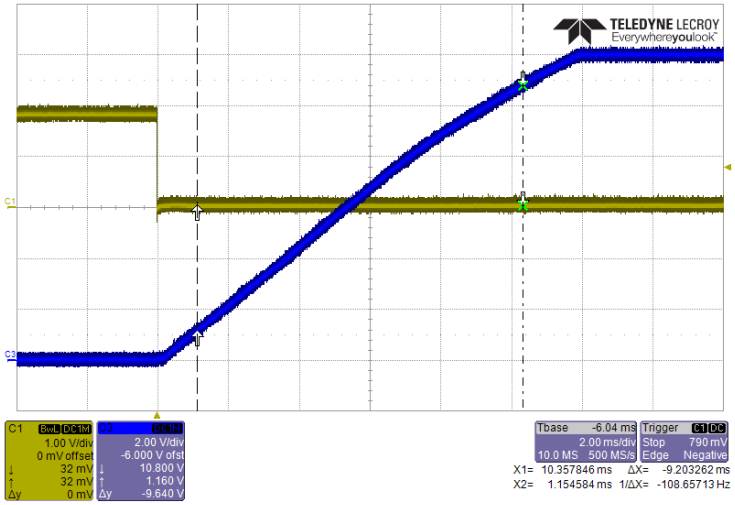
Figure 11 • EF12 Short to SINT Delay



Green: EF12 current, scale= 42.0 mV/A; Red: SINT

The following image shows a the EF12 soft start rise.

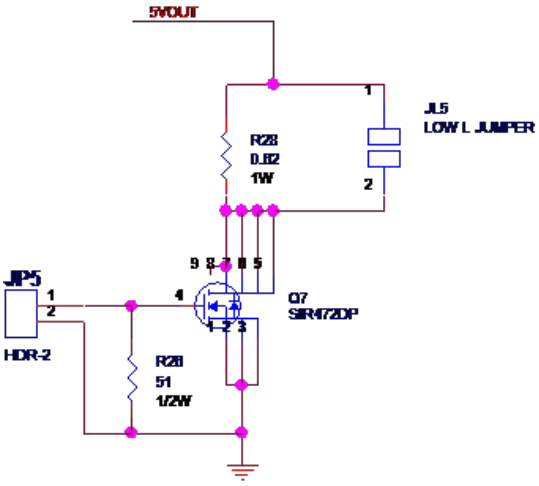
Figure 12 • EF12 Soft Start Rise



Blue: EF12 output; Yellow: P3

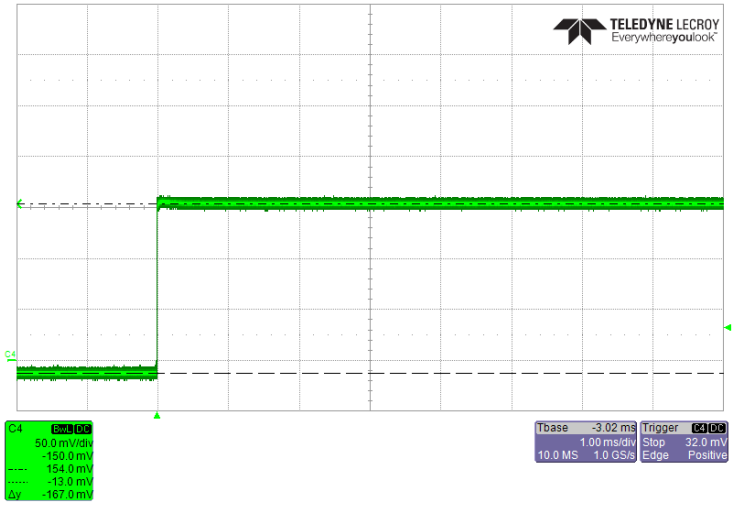
The following image shows a test circuit for the EF5 OC limit.

Figure 13 • Test Circuit



The following image shows the EF5 OC limit.

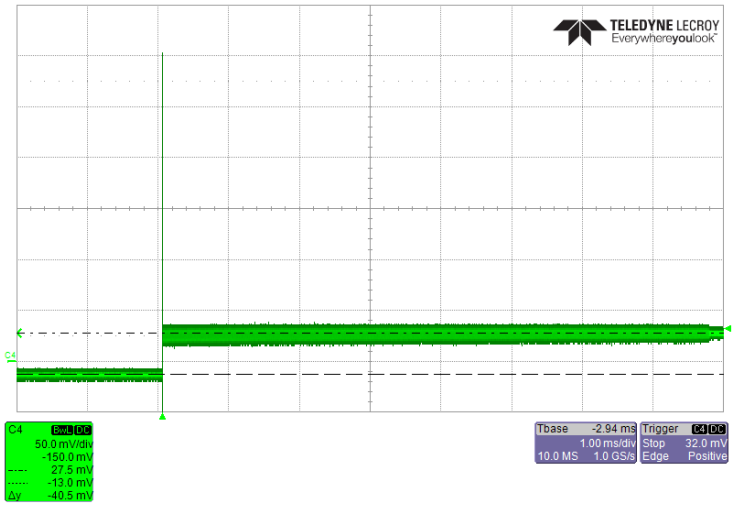
Figure 14 • EF5 OC Limit



P3; scale= 41.5 mV/A

The following image is from testing with the same test circuit as EF5 OC limit with R28 shorted.

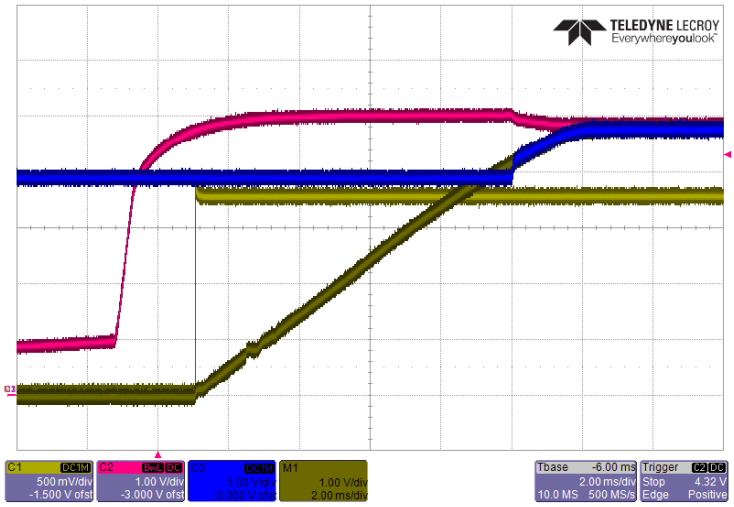
Figure 15 • EF5 Short Circuit Limit



P3; scale= 41.5 mV/A

The following image shows the EF5on signal during startup into the pre-biased condition. The image was taken with VIN starting at 1 V; VOUT connected to an external 4.8 V supply through a diode; and load current as 1 A. The output soft start ramp is superimposed on the image to show timing with respect to the internal reference.

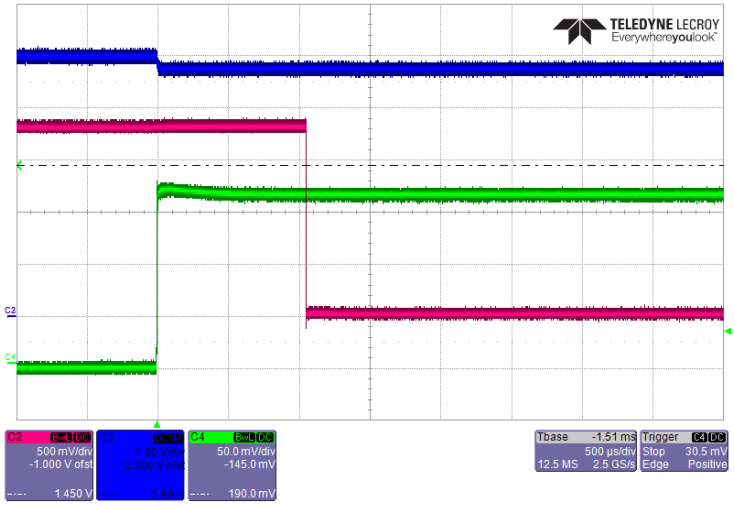
Figure 16 • EF5ON vs Soft Start



CH1 (YEL): EF5on
CH2 (RED): 5VIN
CH3 (BLU): 5VOUT
M1 (Dk YEL): Soft start ramp

The following image shows the EF5 OC to SINT delay.

Figure 17 • EF5 OC to SINT Delay



Green: EF5 current, scale= 41.5 mV/A; Red: SINT; Blue = 5VIN

6 Ordering Information

The following table lists the ordering information for the LX8247 device.

Table 7 • Ordering Information

Part Number	Description
LX8247ILQ	QFN 16L 3.0 mm x 3.0 mm
LX8247 Evaluation Board	Evaluation PCB for LX8247ILQ

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