Evaluation Board User Guide

EVAL-LT8277-AZ

High Power Multiphase Step-Up Controller

General Description

Evaluation circuit EVAL-LT8277-AZ is a dual-phase non-synchronous high-power step-up converter featuring the LT8277. It regulates the output voltage up to 60V and drives up to a 3A load at 60V when the V_{IN} is between 9V and 36V. The EVAL-LT8277-AZ runs at 200kHz switching frequency with the ability to turn on spread spectrum frequency modulation (SSFM) for reduced EMI emission. It can run with or without SPI communications. Multiple EVAL-LT8277-AZ can be paralleled to deliver more output power. A graphic user interface (GUI) is available when connected to a DC2026C Linduino One demo circuit.

The LT8277 is a dual-phase interleaved current mode boost and SEPIC controller. It has a wide input voltage range from 3V to 40V and an adjustable switching frequency between 100kHz and 2MHz. The EVAL-LT8277-AZ enables users to easily evaluate LT8277's features, like the SPI interface, PGOOD output status reporting, frequency synchronization, clock output for 4- or 8-phase operation, etc. Users could change the R_T resistor to set the circuit's switching frequency, change ENABLE resistors to set the minimum input voltage when the circuit starts operation and change V_C pin components to adjust loop compensation.

With SPI control, EVAL-LT8277-AZ can set the output voltage from 9V to 60V in a 0.5V step. The SPI interface also configures on/off of the clock output (CLKOUT pin), clock output phase shift, speed of soft start, and keep/drop phase two at light load conditions. The MODE pin controls the watchdog timer of the SPI interface. The JP3 jumper sets the MODE pin voltage or enables GUI control of the MODE pin. For a detailed way of using the SPI interface and MODE pin, refer to the EVAL-LT8277-AZ GUI manual.

The EVAL-LT8277-AZ features an input EMI filter for low emissions. Inductor current is sensed by sensing resistors, while DCR sensing is available. Power-stage MOSFETs and diodes are optimized to achieve high efficiency. The PCB has large copper planes and extensive vias for excellent high-power thermal performance.

The LT8277 data sheet gives a complete description of the device, operation, and applications information. The data sheet must be read in conjunction with this user guide for EVAL-LT8277-AZ. The LT8277RUDCM#WPBF is assembled in a 3mm x 4mm, Plastic Side-solderable QFN package with a thermally enhanced ground pad. A proper board layout is essential for maximum thermal performance. Refer to the data sheet layout considerations section.

Windows®-based graphical user interface (GUI) software is available for use with the EV kit and can be downloaded from the LT8277 website. Follow the EVAL-LT8277-AZ GUI manual for software installation and evaluation guidance.

Design files for this circuit board are available at *www.analog.com*.

Performance Summary (T_A = 25°C)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage PV_{IN} Range	Operating	9		36	V
Switching Frequency	R8 = 200kΩ		200		kHz
Output Voltage Range V_{OUT}	Set by SPI Interface	9		60	V
Max. Output Current I_{OUT}	V_{IN} = 9V, V_{OUT} = 60V			3	A
PV_{IN} Undervoltage Lockout (Falling)	R9 = 383kΩ, R12 = 82.5kΩ		7.1		V
PV_{IN} Turn-On Voltage (Rising)	R9 = 383kΩ, R12 = 82.5kΩ		8.4		V
Efficiency	V_{IN} = 12V, V_{OUT} = 60V, I_{OUT} = 3A		92		%

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Quick Start Procedure

How to Operate in Non-SPI Mode

The EVAL-LT8277-AZ is easy to set up to evaluate the performance of the LT8277. Follow the steps below:

1. With the power off, connect the load between the V_{OUT} and GND terminals. Connect the ENABLE terminal to GND to keep the circuit shut down. With the power off, connect the input power supply to the PV_{IN} and GND terminals. Make sure that the input voltage does not exceed 36V.
2. Set JP1 to NO SYNC/SSFM or SSFM position.
3. Set JP3 to 60V or 36V.
4. Turn the input power supply on and make sure the voltage is between 9V and 36V to start the operation.
5. Release the connection between ENABLE and GND.
6. Observe the output voltage at 60V or 36V, depending on JP3 selection, with an output current ranging from 0A to 3A.

How to Operate in SPI Mode

1. Follow the EVAL-LT8277-AZ GUI manual to download, install, and setup the SPI GUI interface.
2. With the power off, connect the load between the V_{OUT} and GND terminals. Connect the ENABLE terminal to GND to keep the circuit shut down. With power off, connect the input power supply to the PV_{IN} and GND terminals. Make sure the input voltage does not exceed 36V.
3. Set JP1 to the “NO SYNC/SSFM” or “SSFM” position.
4. Set JP3 to the “EXT_CTRL” position to enable GUI control of the MODE pin.
5. Connect a ribbon cable (CA2440) between the J5 communication connection and a Linduino One (DC2026C) demo circuit.
6. Connect a USB cable between a PC and the DC2026C.
7. Start the GUI program.
8. Turn the input power supply on between the PV_{IN} and GND terminals and make sure the voltage is between 9V and 36V to start operation.
9. Release the connection between ENABLE and GND.
10. Use the GUI to evaluate the performance of the EVAL-LT8277-AZ.

Setup Diagram

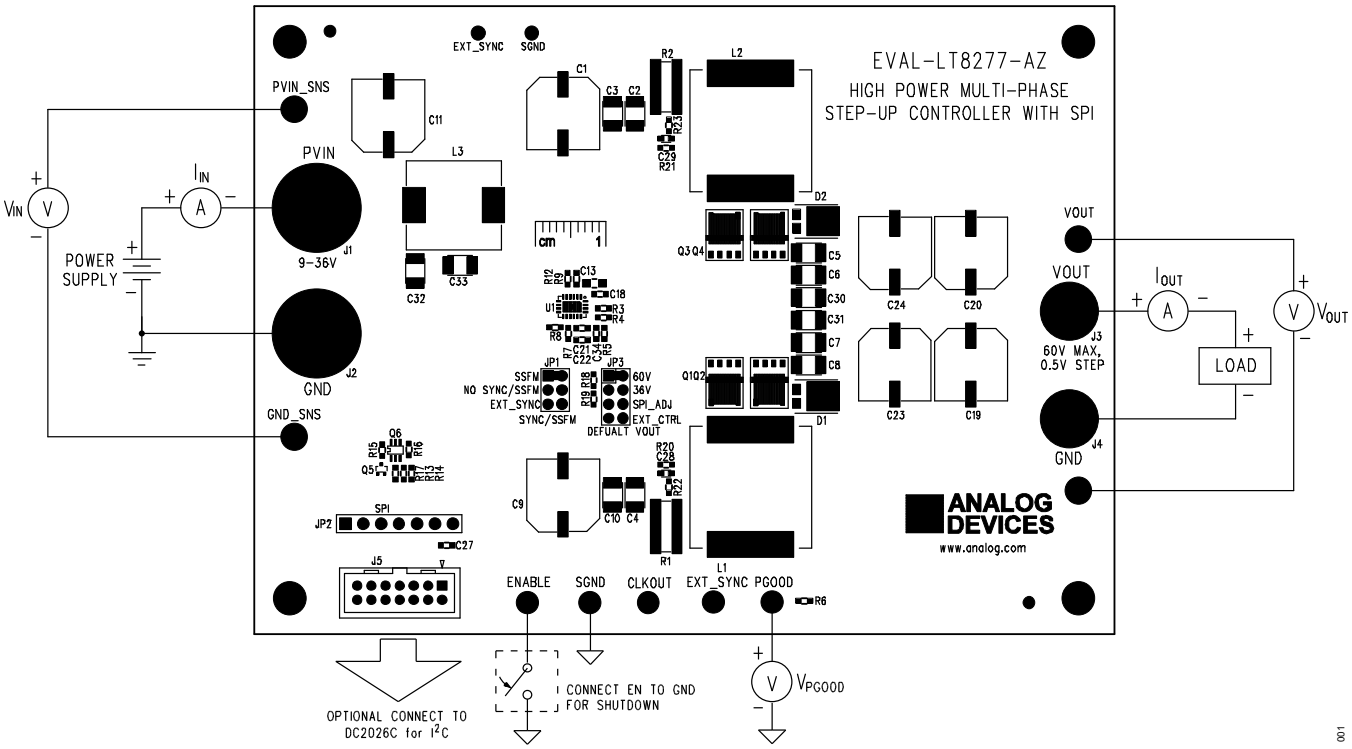


Figure 1. Setup Diagram for EVAL-LT8277-AZ

Performance

Conditions: PV_{IN} = 12V, V_{OUT} = 60V, I_{OUT} = 3A, f_{SW} = 200kHz, T_A = +25°C

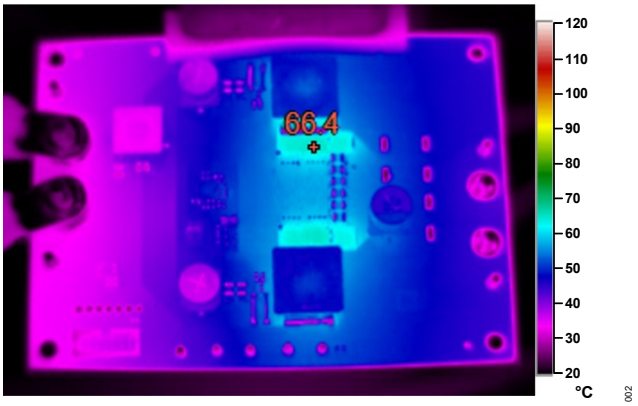


Figure 2. EVAL-LT8277-AZ Thermal Image

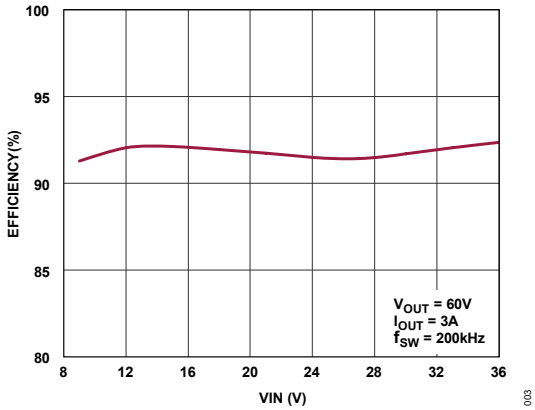


Figure 3. Efficiency vs. Input Voltage

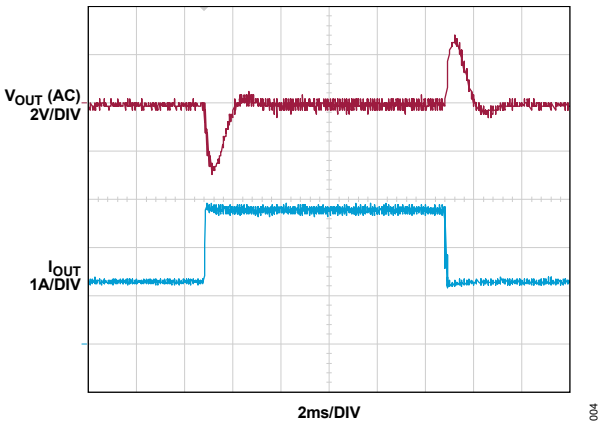
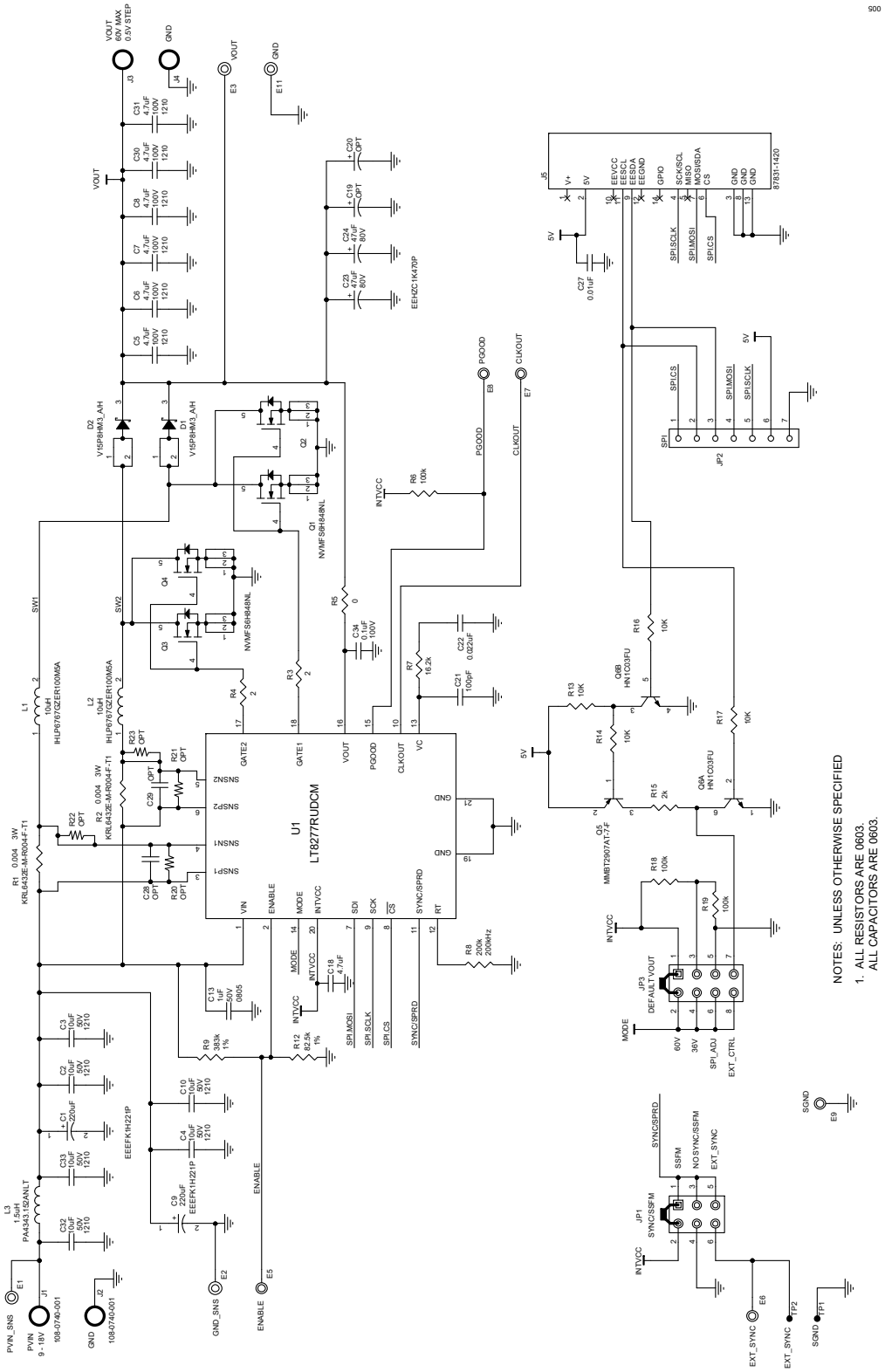


Figure 4. Transient Response

Schematic


U1
LT8277RUDCM
NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE 0603.
ALL CAPACITORS ARE 0603.

Revision History

Revision Number	Revision Date	Nature of Change	Page Number
Rev 0	10/23	Initial Release	—