EVAL-LT8615-AZ

42V, 3.5A Synchronous Step-Down Regulator

Description

The evaluation board EVAL-LT8615-AZ is a 42V, 3.5A micropower synchronous step-down regulator with Silent Switcher® powertrain featuring the LT®8615.

The evaluation board is designed for a 5V output from a 5.5V to 42V input. The wide input range allows a variety of input sources, such as automotive batteries and industrial supplies. The LT8615 is a compact, high efficiency, high speed synchronous monolithic step-down switching regulator that consumes only 2.5µA of quiescent current when the output is regulated at 5V. Top and bottom power switches, compensation components, and other necessary circuits inside the LT8615 minimize external components and simplify design.

The SYNC pin on the evaluation board is grounded by default for low ripple burst mode operation. Moving JP1 to pulse skipping/sync position can change the operation mode to pulse skipping operation. To synchronize to an external clock, move JP1 to pulse skipping/sync and apply the external clock to the SYNC turret. Once JP1 is on the spread-spectrum position, V_{CC} is applied to the SYNC pin for low EMI spread spectrum operation. *Figure 1* shows the efficiency of the circuit.

The evaluation board has an EMI filter installed. Under spread-spectrum operation, the radiated and conducted EMI performances of the board (with EMI filter) are shown in *Figure 2* and *Figure 3*. The red lines in the figures are CISPR25 Class 5 peak limit. To use the EMI filter, the input should be tied to V_{EMI}, not V_{IN}. An inductor L2, which is a 0Ω jumper on the board by default now, can be added in the EMI filter to further reduce the conducted emission.

This board is suitable for a wide range of automotive, telecom, industrial, and other general-purpose applications. The LT8615 data sheet gives a complete description of the part, operation, and application information. Read the data sheet in conjunction with this user guide for the EVAL-LT8615-AZ.

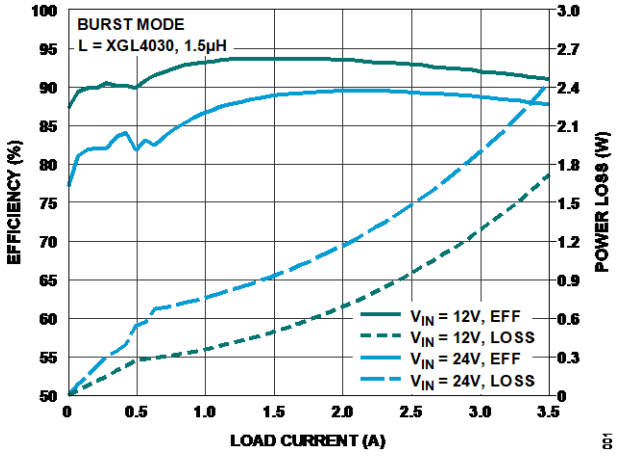

Figure 1. EVAL-LT8615-AZ Efficiency vs. Load Current

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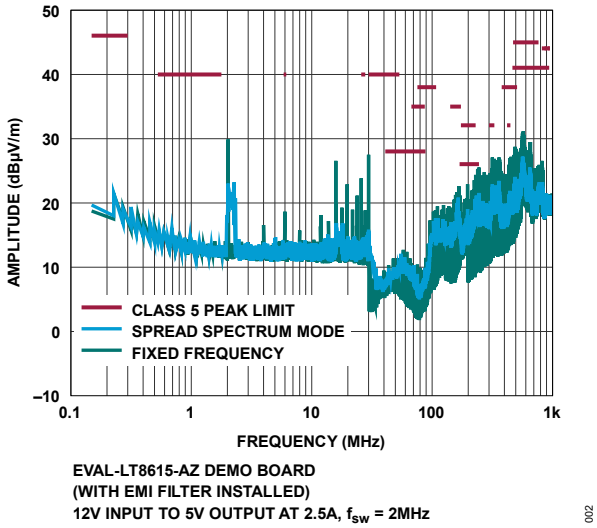


Figure 2. LT8615 Evaluation Board EMI Performance in CISPR25 Radiated Emission Test

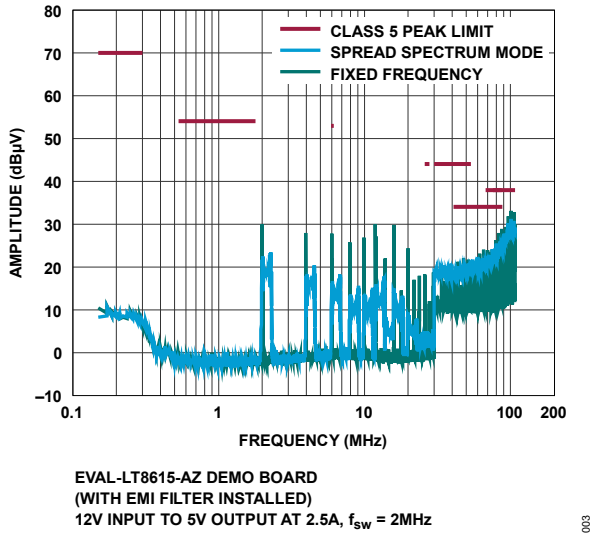


Figure 3. LT8615 Evaluation Board EMI Performance in CISPR25 Conducted Emission Test

Table 1. Performance Summary (specifications are T_A= 25°C)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IN}	Input Voltage Range		5.5*		42	V
V_{OUT}	Output Voltage		4.8	5	5.2	V
I_{OUT}	Maximum Output Current		3.5			A
f_{SW}	Switching Frequency		1.9	2	2.1	MHz
Eff	Efficiency	V_{IN} = 12V, I_{OUT} = 1.75A		93.7		%

**The minimum input voltage of evaluation board guarantees 5V output regulation. The minimum input voltage of the LT8615 is 3V. Refer to the LT8615 data sheet for more details.*

Quick Start Procedure

The EVAL-LT8615-AZ is easy to set up to evaluate the performance of the LT8615. See *Figure 4* for proper measurement equipment setup and follow this procedure:

NOTE: When measuring the input or output voltage ripple, take care to avoid a long ground lead on the oscilloscope probe. See *Figure 5* for the proper scope technique.

1. Set an input power supply capable of 42V/3.5A. Then, turn off the supply.
2. With power off, connect the supply to the input terminals V_{EMI} and GND.
3. Turn on the power at the input.

   NOTE: Make sure the input voltage never exceeds 42V.
4. Check for the proper output voltage of 5V. Turn off the power at the input.
5. Once the proper output voltage is established, connect a variable load capable of sinking 3.5A at 5V to the output terminals V_{OUT} and GND. Set the current for 0A.
   a. If efficiency measurements are desired, an ammeter can be put in series with the output load to measure the output current of the evaluation board.
   b. A voltmeter can be placed across the $V_{OUT-SENSE}$ and GND terminals to get an accurate output voltage measurement.
6. Turn on the power at the input.

   NOTE: If there is no output, temporarily disconnect the load to make sure the load is not set too high.
7. Once the proper output voltage is again established, adjust the load and/or input within the operating range and observe the output voltage regulation, ripple voltage, efficiency, and other desired parameters.
8. An external clock can be added to the SYNC terminal when the SYNC function is used (JP1 on the pulse skipping/sync position). Ensure that the chosen RT sets the LT8615 switching frequency to equal or below the lowest SYNC frequency. See the ‘Synchronization’ section in the data sheet.

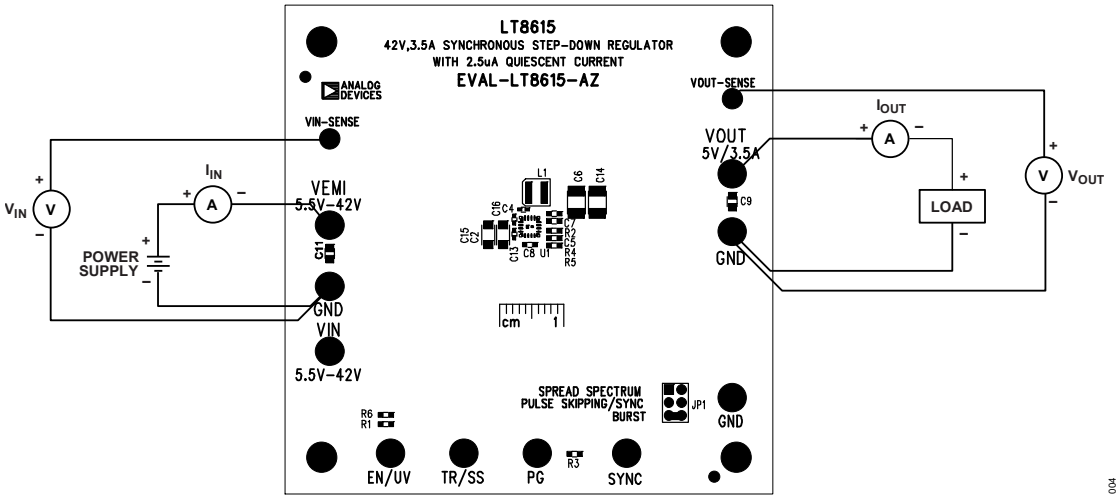


Figure 4. Proper Measurement Equipment Setup

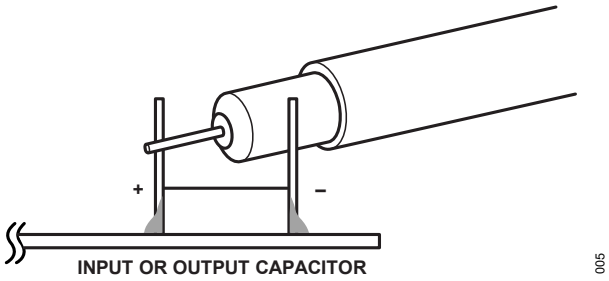
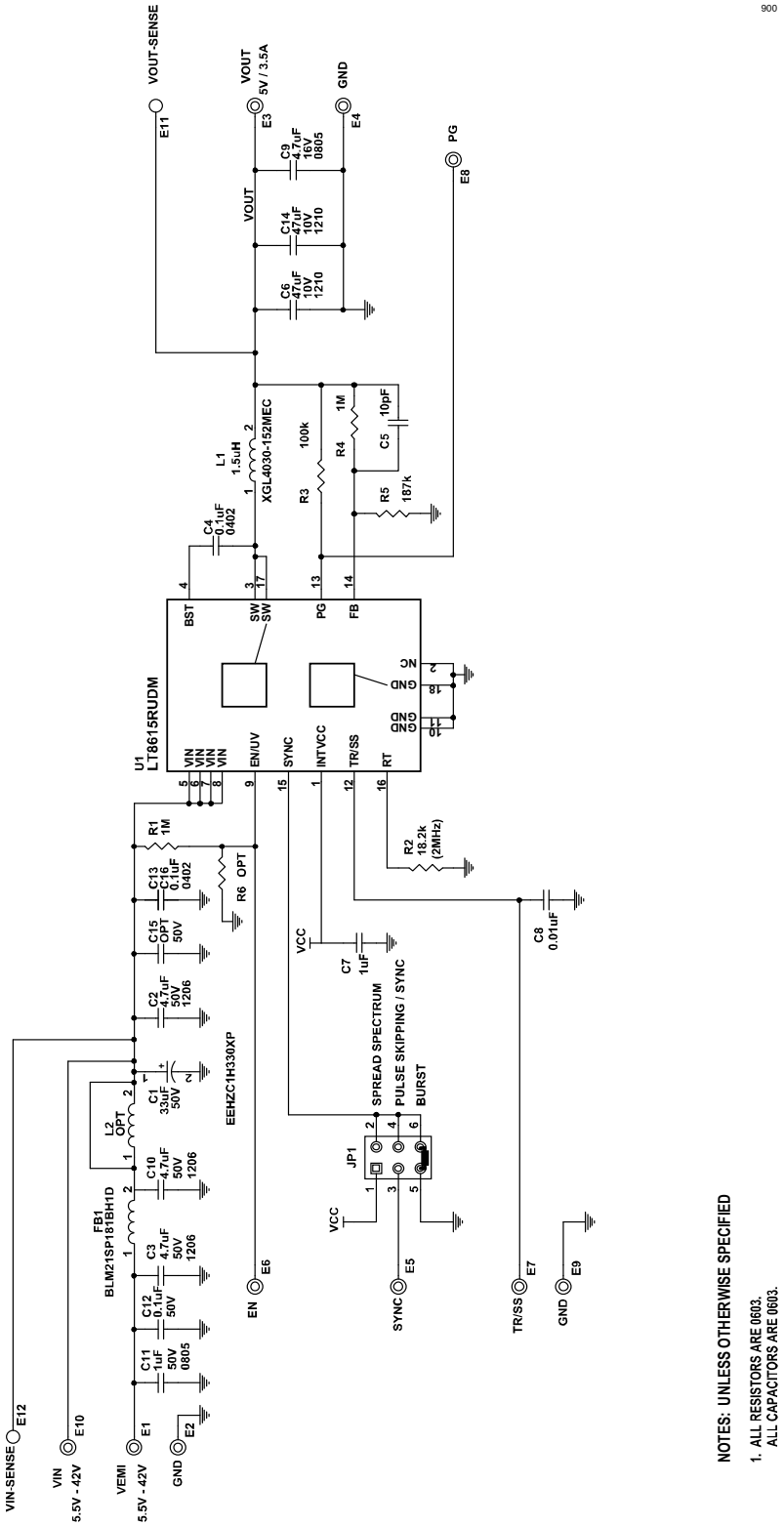


Figure 5. Measuring the Input or Output Voltage Ripple

Bill of Materials

Item	Qty	Reference	Part Description	Manufacturer, Part Number
Required Circuit Components				
1	1	C2	Capacitor, 4.7µF, X7S, 50V, 10%, 1206	Murata, GCM31CC71H475KA03K
2	1	C4	Capacitor, 0.1µF, X7R, 25V, 10%, 0402	Murata, GCM155R71E104KE02D
3	1	C5	Capacitor, 10pF, C0G, 16V, 5%, 0603	AVX, 0603YA100JAT2A
4	2	C6, C14	Capacitor, 47µF, X7R, 10V, 10%, 1210	Murata, GRM32ER71A476KE15L
5	1	C7	Capacitor, 1µF, X7R, 16V, 10%, 0603	TDK, CGA3E1X7R1C105K080AC
6	1	C8	Capacitor, 0.01µF, X7R, 50V, 10%, 0603	TDK, CGA3E2X7R1H103K080AA
7	1	L1	Inductor, 1.5µH, PWR, 20%, 10.2A, 10.5mΩ	Coilcraft, XGL4030-152MEC
8	1	R1	Resistor, 1MΩ, 1%, 1/10W, 0603	Vishay, CRCW06031M00FKEA
9	1	R2	Resistor, 18.2kΩ, 1%, 1/10W, 0603	Panasonic, ERJ3EKF1822
10	1	R3	Resistor, 100kΩ, 1%, 1/10W, 0603	Vishay, CRCW0603100KFKEA
11	1	R4	Resistor, 1MΩ, 1%, 1/10W, 0603	Panasonic, ERJ3EKF1004V
12	1	R5	Resistor, 187kΩ, 1%, 1/10W, 0603	Panasonic, ERJ3EKF1873V
13	1	U1	IC, 42V, 3.5A regulator, QFN-16	Analog Devices, LT8615RUDM#WPBF
Additional Evaluation Board Circuit Components				
1	1	C1	Capacitor, 33µF, POLY, 50V, 20%, 6.3mm x 7.7mm	Panasonic, EEHZC1H330XP
2	2	C3, C10	Capacitor, 4.7µF, X7S, 50V, 10%, 1206	Murata, GCM31CC71H475KA03K
3	1	C9	Capacitor, 4.7µF, X7R, 16V, 10%, 0805	AVX, 0805YC475KAT2A
4	1	C11	Capacitor, 1µF, X7R, 50V, 20%, 0805	TDK, CGA4J3X7R1H105M125AB
5	1	C12	Capacitor, 0.1µF, X7R, 50V, 10%, 0603	TDK, CGA3E2X7R1H104K080AE
6	2	C13, C16	Capacitor, 0.1µF, X7R, 50V, 10%, 0402	Murata, GCM155R71H104KE02D
7	0	C15	Capacitor, option, 1206	
8	1	FB1	Ferrite bead, 180Ω at 100MHz, 0805	Murata, BLM21SP181BH1D
9	0	L2	Inductor, option	
10	0	R6	Resistor, option, 0603	
Hardware: For Evaluation Board Only				
1	10	E1 to E10	Test point, turret, 0.094"	Mill-Max, 2501-2-00-80-00-00-07-0
2	2	E11, E12	Test point, turret, 0.064"	Mill-Max, 2308-2-00-80-00-00-07-0
3	1	JP1	Connector, HDR, male, 2 x 3, 2mm	Wurth Elektronik, 62000621121
4	4	MP1 to MP4	Standoff, nylon, snap-on, 0.50"	Keystone, 8833
5	1	XJP1	Connector, shunt, female, 2-POS, 2mm	Samtec, 2SN-BK-G

Schematic Diagram



Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	10/24	Initial release	—

Notes