ANALOG DEVICES LT8608S 42V 1.5A Synchronous Step Down Regulator User Manual
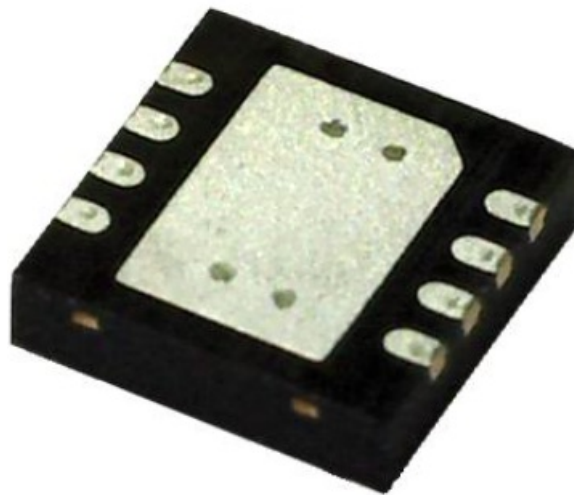
ANALOG DEVICES LT8608S 42V 1.5A Synchronous Step Down Regulator User Manual

Contents

DESCRIPTION

Demonstration circuit 2711A is a 42V, 1.5A synchronous step-down regulator featuring th®8608S. The demo board is designed for 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 LT8608S is a compact, high efficiency, high speed

synchronous monolithic step-down switching regulator with the second-generation Silent Switcher® structure that minimizes EMI and reduces PCB layout sensitivity. LT8608S consumes only 3µA of quiescent current when output is regulated at 5V. Top and bottom power switches, compensation components and other necessary circuits are inside of the LT8608S to minimize external components and simplify design.

The SYNC pin on the demo board is grounded by default for low ripple Burst Mode® operation. Move JP1 to PULSE SKIPPING position can change the operation mode to pulse-skippingperation. Once JP1 is on SPREAD SPECTRUM position, VCC is applied to the SYNC pin of low EMI spread spectrum operation. To synchronous to an external clock, move JP1 to SYNC and apply the external clock to the SYNC turret. Figure 1 shows the efficiency of the circuit.

The demo board has an EMI filter installed. The radiated EMI performances of the board (with EMI filter) are shown in Figure 2 and Figure 3. The red lines in Figure 2 and Figure 3 are CISPR25 Class 5 peak limit. To use the EMI filter, the input should be tied to VEMI, not VIN. An inductor L2, which is shorted on the board by default now, can be added in the EMI filter to further reduce the conducted emission.

The LT8608S data sheet gives a complete description of the part, operation and applicatiormation. The data sheet must be read in conjunction with this demo manual for DC2711A.

PERFORMANCE SUMMARY

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
VIN	Input Voltage Range		5.5		42	V
VOUT	Output Voltage		4.8	5	5.2	V
IOUT	Maximum Output Current		1.5			A
fawn	Switching Frequency		1.85	2	2.15	MHz
EFE	Efficiency at DC	VIN = 12V, IOUT = 0.75A	90.3			%

QUICK START PROCEDURE

DC2711A is easy to set up to evaluate the performance of the LT8608S. Refer to Figure 4 furrower measurement equipment setup and follow the procedure below

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

1. Set an input power supply that is capable of 42V at 1.5A. Then turn off the supply.
2. With power off, connect the supply to the input terminals VIN and GND.
3. Turn on the power at the input.
   NOTE: Make sure that 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 1.5A at 5V to the output terminals VOUT and GND. Set the current for 0A.
   a. If efficiency measurements are desired, an ammeter can be put in series with the output load in order to measure the DC2711A's output current.

b. A voltmeter can be placed across the output terminals in order 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 that the load is not set too high.

7. Once the proper output voltage is established again, adjust the load and/orinputwithin 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 SYNC function is used (JP1 on the SYNC position). Please ensure that the chosen RT sets the LT8608S switching frequency to equal or below the lowest SYNC frequency. See the data sheet section, Synchronization.

QUICK START PROCEDURE

Figure 1. Efficiency vs Load Current at 2MHz Switching Frequency

dc2711a F01
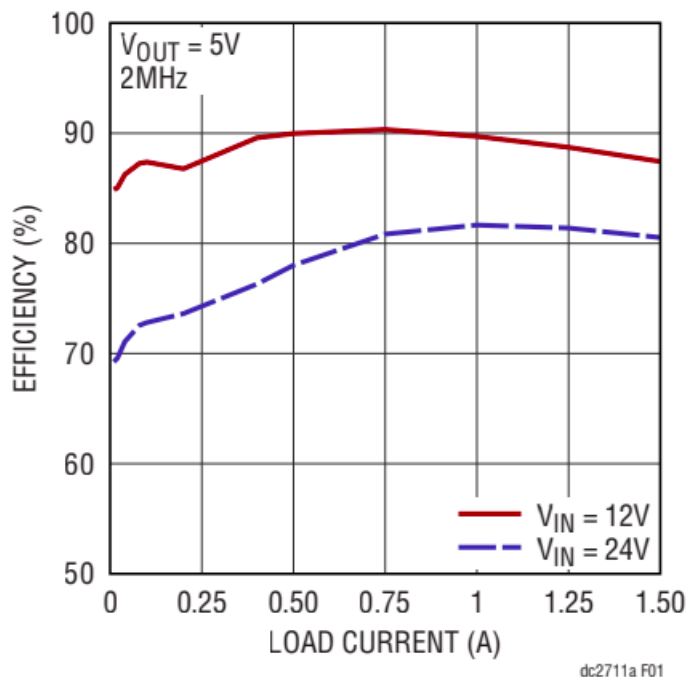
Radiated EMI Performance (CISPR25 Radiated Emission Test with Class 5 Peak Limits)
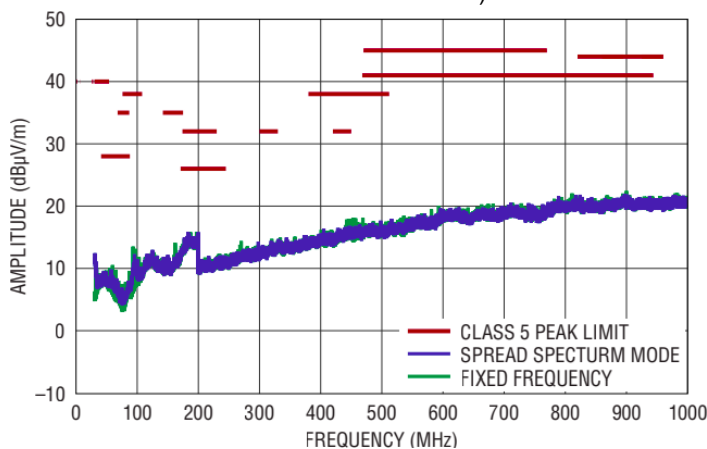
DC2711A DEMO BOARD
(WITH EMI FILTER INSTALLED)
14V INPUT TO 5V OUTPUT AT 1.5A, fawn = 2MHz

Figure 2. LT8608S Demo Circuit EMI Performance in CISPR25 Radiated Emission Test, Antenna Polarization: Vertical (VIN = 14V, VOUT = 5V, IOUT = 1.5A, 2MHz Switching Frequency)

Radiated EMI Performance (CISPR25 Radiated Emission Test with Class 5 Average Limits)
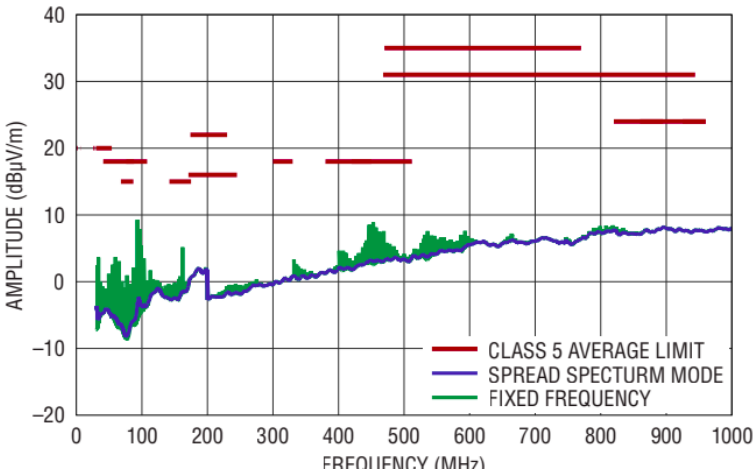
DC2711A DEMO BOARD
(WITH EMI FILTER INSTALLED)
14V INPUT TO 5V OUTPUT AT 1.5A, fawn = 2MHz

Figure 3. LT8608S Demo Circuit EMI Performance in CISPR25 Radiated Emission Test, Antenna Polarization: Horizontal (VIN = 14V, VOUT = 5V, IOUT = 1.5A, 2MHz Switching Frequency)
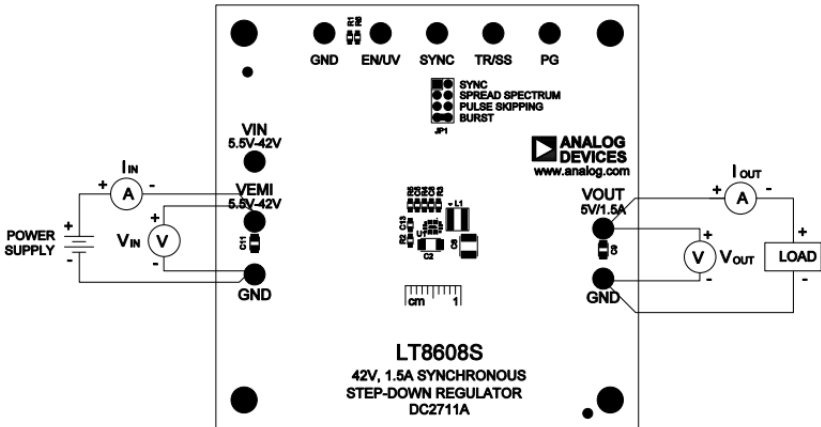

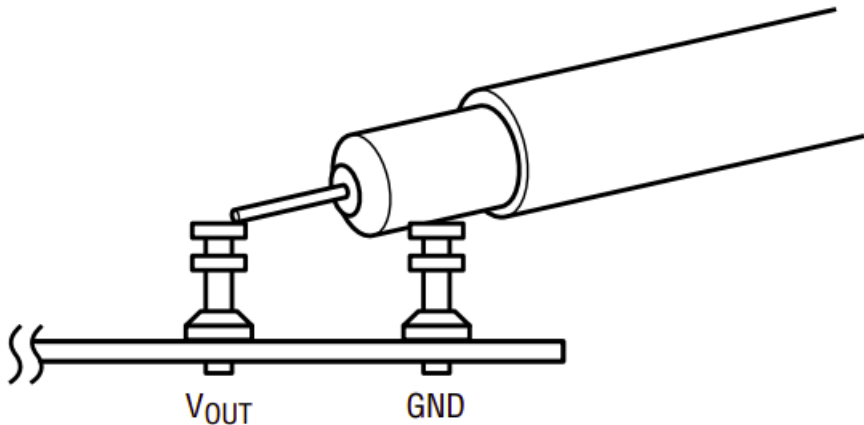Figure 4. Proper Measurement Equipment Setup

Figure 5. Measuring Output Ripple

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER

Required Circuit Components

| 1	1	C2	CAP., X7R, 4.7µF, 50V, 10% 1206	MURATA, GRM31CR71H475KA12L
2	1	C5	CAP., C0G, 10pF, 25V, 5%, 0603	AVX, 06033A100JAT2A
3	1	C6	CAP., X7R, 47µF, 10V, 10%, 1210	MURATA, GRM32ER71A476KE15L
4	1	C8	CAP., X7R, 0.01µF, 16V, 10%, 0603	AVX, 0603YC103KAT2A
5	1	C13	CAP., X7R, 1µF, 16V, 10%, 0603	AVX, 0603YC105KAT2A
6	1	L1	IND., 2.2µH	COILCRAFT, XFL4020-222ME
7	1	R2	RES., CHIP, 18.2k, 1/10W, 1%, 0603	VISHAY, CRCW060318K2FKEA
8	1	R3	RES., CHIP, 49.9k, 1/10W, 1%, 0603	VISHAY, CRCW060349K9FKEA
9	2	R1, R4	RES., CHIP, 1M, 1/10W, 1%, 0603	VISHAY, CRCW06031M00FKEA
10	1	R5	RES., CHIP, 187k, 1/10W, 1%, 0603	VISHAY, CRCW0603187KFKEA
11	1	U1	IC, REGULATOR, LQFN-12	ANALOG DEVICES, LT8608SEV#TRMPBF

Additional Demo Board Circuit Components

1	1	C1	CAP., ALUM 22µF 63V	SUN ELECT, 63CE22BS
2	2	C3, C10	CAP., X7R, 4.7µF, 50V, 10% 1206	MURATA, GRM31CR71H475KA12L
3	1	C9	CAP., X7R, 4.7µF, 16V, 10%, 0805	MURATA, GRM21BR71C475K73L
4	1	C11	CAP., X7R, 1µF, 50V, 10%, 0805	MURATA, GRM21BR71H105KA12L
5	1	C12	CAP., X7R, 0.1µF, 50V, 10%, 0603	MURATA, GRM188R71H104KA93D
6	1	FB1	FERRITE BEAD 0805	TDK, MPZ2012S331AT000
7	0	L2 (OPT.)	IND., 2010	
8	0	R6 (OPT.)	RES., 0603	

Hardware: For Demo Board Only

1	9	E1-E9	TESTPOINT, TURRET, 0.094″	MILL-MAX, 2501-2-00-80-00-00-07-0
2	1	E10 (OPT.)	TESTPOINT, TURRET, 0.094″	
3	1	JP1	DOUBLE ROW HEADER 2 × 4 0.079″	SULLINS, NRPN042PAEN-RC
4	1	XJP1	SHUNT, 0.079″ CENTER	SAMTEC, 2SN-BK-G
5	4	MH1-MH4	STAND-OFF, NYLON 0.50″ TALL	KEYSTONE, 8833(SNAP ON)

SCHEMATIC DIAGRAM
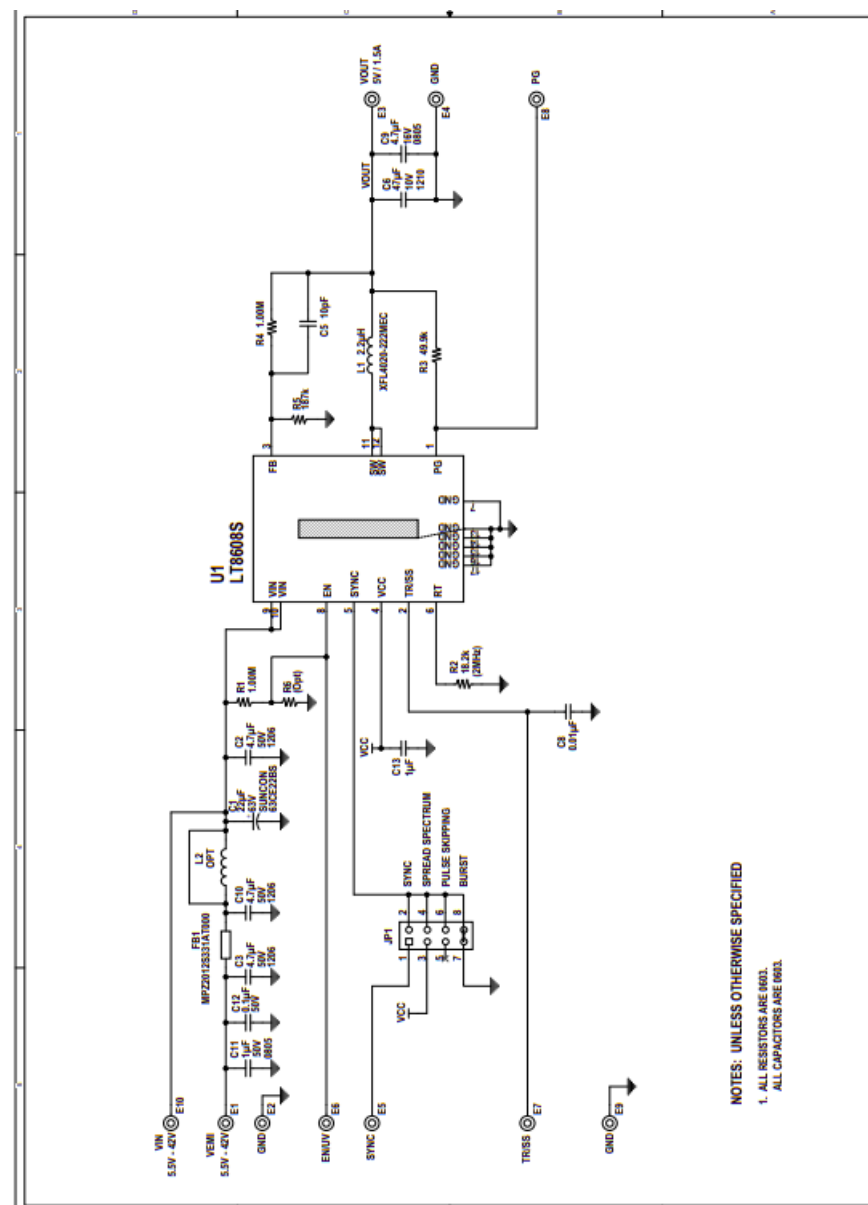
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Documents / Resources

[ANALOG DEVICES LT8608S 42V 1.5A Synchronous Step Down Regulator](#) [pdf] User Manual
DC2711A, LT8608S, LT8608S 42V 1.5A Synchronous Step Down Regulator, LT8608S, 42V 1.5A Synchronous Step Down Regulator, Synchronous Step Down Regulator, Step Down Regulator, Regulator

References

- **[User Manual](#)**