

ANALOG DEVICES LT8692S Monolithic Synchronous Step Down Regulator Instruction Manual

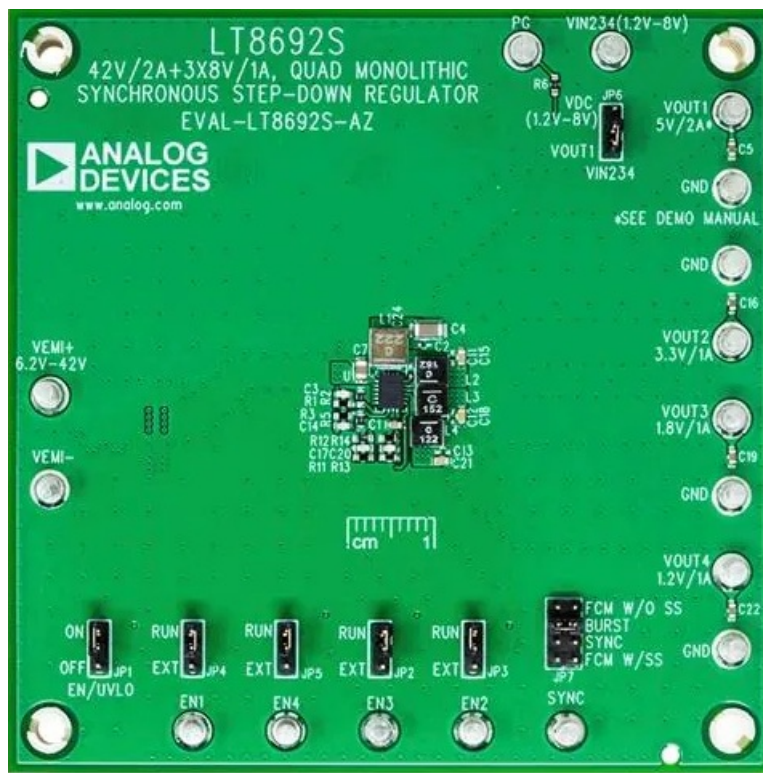
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ANALOG DEVICES LT8692S Monolithic Synchronous Step-Down Regulator



Product Information

Specifications:

- Input Voltage: 6.2V – 42V
- Output Voltage VOUT1: 4.80V – 5.20V
- Output Voltage VOUT2: 3.17V – 3.43V
- Output Voltage VOUT3: 1.73V – 1.87V
- Output Voltage VOUT4: 1.15V – 1.25V
- Maximum Output Current IOUT1: 2A
- Maximum Output Current IOUT2: 1A
- Maximum Output Current IOUT3: 1A
- Maximum Output Current IOUT4: 1A
- Switching Frequency: 1.8MHz – 2.2MHz
- Channel 1 Efficiency: 90% – 92%
- Channel 2 Efficiency: 90%
- Channel 3 Efficiency: 87%
- Channel 4 Efficiency: 90%

Product Usage Instructions

Quick Start Procedure:

1. With power off, connect the input power supply to the board through VIN and GND terminals on the top layer.
2. Connect the loads to the terminals VOUT1 and GND, VOUT2 and GND, VOUT3 and GND, VOUT4 and GND on the board.
3. Adjust the input voltage and load currents within the operating range.

4. Observe the output voltage regulation, transient, ripple voltage, efficiency, and other parameters.

Measurement Equipment Setup:

Refer to Figure 1 for proper equipment setup.

Parts List:

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	C1	AVX, 06036D225KAT2A	
2	1	C3	CAP., 10pF, C0G, 50V, 5%, 0603	AVX, 06035A100JAT2A
3	1	C4	TAIYO YUDEN, LMK316ABJ476ML-T	
4	4	C5, C16, C19, C22	(Manufacturer/Part Number not provided)	

FAQ:

- Q: Can the regulators be synchronized to an external clock input?
- A: Yes, all regulators can be synchronized to a common external clock input or internal oscillator of 2MHz.
- Q: Are the design files for this circuit board available?
- A: Yes, the design files for this circuit board are available.
- Q: Where can I find more information about the LT8692S?
- A: The LT8692S data sheet provides a complete description of the part, operation, and application information. It should be read in conjunction with the quick start guide for demo circuit EVAL-LT8692S-AZ.
- Q: What should I be careful of when measuring input or output voltage ripples?
- A: Care must be taken to avoid a long ground lead on the oscilloscope probe when measuring the input or output voltage ripples. Measure the input or output voltage ripple by touching the probe tip directly across the VIN or VOUT capacitor terminals.

DESCRIPTION

Demonstration circuit EVAL-LT8692S-AZ is an ultra-compact 4 rail power supply featuring the LT®8692S, a 42V quad monolithic synchronous step-down Silent Switcher®. The demo circuit is designed for 5V, 3.3V, 1.8V, and 1.2V outputs from a nominal 12V input. The 3.3V, 1.8V, and 1.2V converters are powered from the high voltage buck regulator with 5V output, which is powered from a wide range of 6.2V to 42V input. The current capability is 2A for channel 1 and 1A for the low voltage channels.

Internal soft-start, individual current limit, and independent enable for each channel simplify the complex design of quad-output power converters. All regulators can be synchronized to a common external clock input or internal oscillator of 2MHz.

The table below summarizes the performance of the demo board at room temperature. The circuit can be easily modified for different applications.

The LT8692S data sheet gives a complete description of the part, operation, and application information. The data

sheet must be read in conjunction with this quick start guide for demo circuit EVAL-LT8692S-AZ. Design files for this circuit board are available.

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PERFORMANCE SUMMARY

Specifications are at TA = 25°C

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage		6.2	12	42	V
Output Voltage VOUT1	VIN = 12V , IOUT1 = 1A	4.80	5	5.20	V
Output Voltage VOUT2	IOUT2 = 1A	3.17	3.3	3.43	V
Output Voltage VOUT3	IOUT3 = 1A	1.73	1.8	1.87	V
Output Voltage VOUT4	IOUT4 = 1A	1.15	1.2	1.25	V
Maximum Output Current IOUT1	Total Current with Channels 2, 3, 4 Disabled	2			A
Maximum Output Current IOUT2		1			A
Maximum Output Current IOUT3		1			A
Maximum Output Current IOUT4		1			A
Switching Frequency		1.8	2	2.2	MHz
Channel 1 Efficiency	VIN = 12V, VOUT = 5V, IOUT = 2A with Channels 2, 3, 4 Disabled	90			%
Channel 2 Efficiency	VIN234 = 5V , VOUT = 3.3V , IOUT = 1A	92			%
Channel 3 Efficiency	VIN234 = 5V , VOUT = 1.8V , IOUT = 1A	90			%
Channel 4 Efficiency	VIN234 = 5V , VOUT = 1.2V , IOUT = 1A	87			%

QUICK START PROCEDURE

Demo circuit EVAL-LT8692S-AZ is easy to set up to evaluate the performance of the LT8692S. Refer to Figure 1 for proper equipment setup and follow the procedure below.

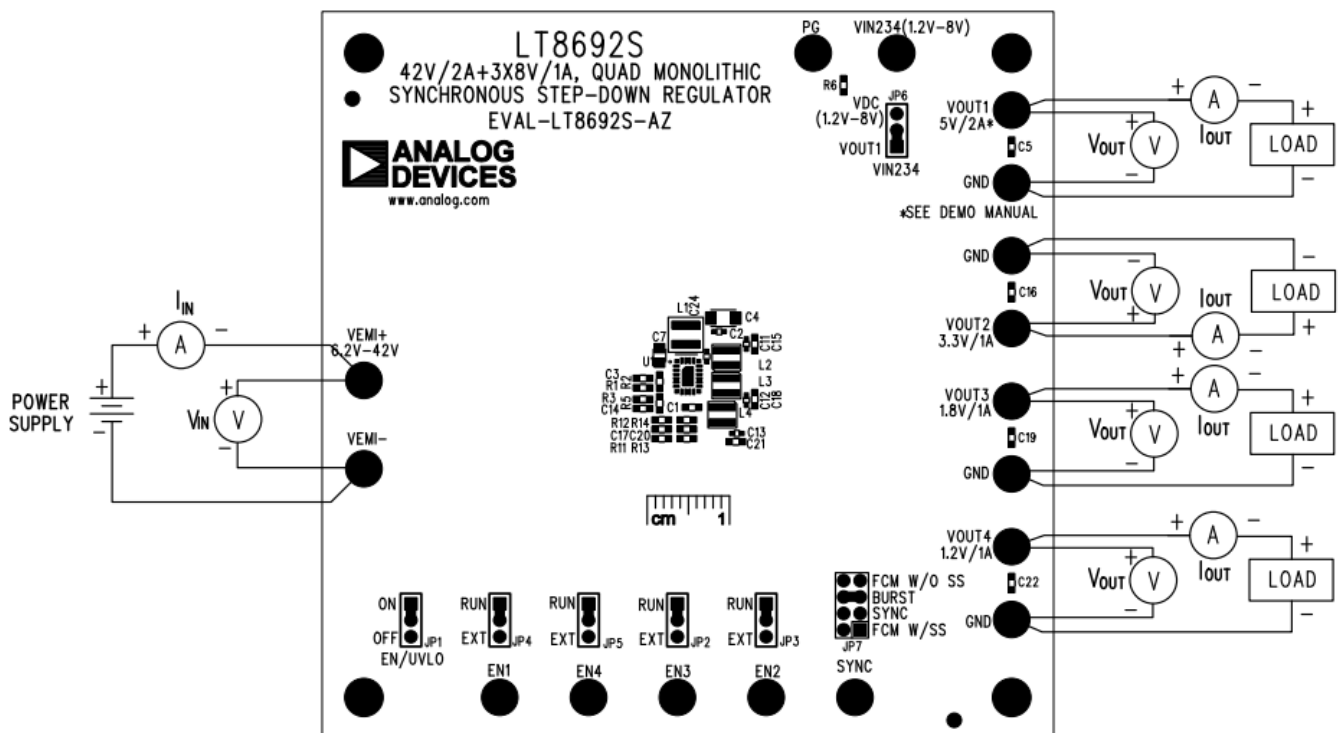
1. With power off, connect the input power supply to the board through VIN and GND terminals on the top layer. Connect the loads to the terminals VOUT1 and GND, VOUT2 and GND, VOUT3 and GND, VOUT4 and GND on the board. The default positions of the Headers are given in Table 1.

Table 1. Default Positions of the Headers

NAME	JUMPER	POSITION
EN/UVLO	JP1	ON
EN3	JP2	RUN
EN2	JP3	RUN
EN1	JP4	RUN
EN4	JP5	RUN
VIN234	JP6	VOUT1

- Turn on the power at the input (VEMI+, VEMI-). Increase voltage to 12V. Make sure that the input voltage is always within spec. Refer to the data sheet on the burst mode operation in light load and high VIN conditions.
- Check for the proper output voltages. The output should be regulated at 5V ($\pm 4\%$), 3.3V ($\pm 4\%$), 1.8V ($\pm 4\%$), 1.2V ($\pm 4\%$). Do not overload unless a proper thermal cooling method such as air flow or heat sink is applied.
- Once the proper output voltage is established, adjust the input voltage and load currents within the operating range and observe the output voltage regulation, transient, ripple voltage, efficiency, and other parameters. When measuring the input or output voltage ripples, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the VIN or VOUT capacitor terminals.

Figure 1. Proper Measurement Equipment Setup



PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
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Required Circuit Components

1	1	C1	CAP., 2.2μF, X5R, 6.3V, 10%, 0603	AVX, 06036D225KAT2A
2	1	C3	CAP., 10pF, C0G, 50V, 5%, 0603	AVX, 06035A100JAT2A
3	1	C4	CAP., 47μF, X5R, 10V, 20%, 1206	TAIYO YUDEN, LMK316ABJ476ML-T
4	4	C5, C16, C19, C22	CAP., 0.1μF, X7R, 50V, 10%, 0603	AVX, 06035C104KAT2A
5	1	C6	CAP., 22μF, ALUM ELECT, 50V, 20%, 6.3mm × 5.4mm, RADIAL, SMD, CE-BSS SERIES, AEC-Q200	SUN ELECTRONIC INDUSTRIES CORP, 50CE22BSS
6	1	C7	CAP., 2.2μF, X7R, 50V, 10%, 0805	AVX, 08055C225KAT2A
7	1	C8	CAP., 0.1μF, X7R, 50V, 10%, 0402	AVX, 04025C104KAT2A
8	1	C9	CAP., 4.7μF, X7R, 10V, 10%, 0805, AEC-Q200	KEMET, C0805C475K8RACAUTO
9	2	C10, C23	CAP., 10μF, X5R, 50V, 10%, 1206	TAIYO YUDEN, UMK316BBJ106KL-T
10	1	C14	CAP., 4.7pF, C0G/NP0, 50V, ±0.25pF, 0603	MURATA, GRM1885C1H4R7CA01D
11	3	C15, C18, C21	CAP., 47μF, X5R, 4V, 20%, 0603	MURATA, GRM188R60G476ME15D
12	1	C17	CAP., 10pF, C0G, 50V, 5%, 0603	AVX, 06035A100JAT2A
13	1	C20	CAP., 39pF, C0G, 50V, 5%, 0603	AVX, 06035A390JAT2A
14	1	FB1	IND., 100Ω AT 100MHz, FERRITE BEAD, 25%, 2A, 40mΩ, 0603	TDK, MPZ1608Y101BTA00
15	1	L1	IND., 2.2μH, PWR, SHIELDED, 20%, 7.8A, 22.1mΩ, 4.3mm × 4.3mm, XEL4030, AEC-Q200	COILCRAFT, XEL4030-222MEB
16	1	L2	IND., 1.8μH, POWER SHIELDED, 20%, 2.9A, 24.1mΩ, 3.2mm × 3.5mm, AEC-Q200	COILCRAFT, XGL3520-182MEB
17	1	L3	IND., 1.5μH, POWER SHIELDED, 20%, 3.1A, 19.8mΩ, 3.2mm × 3.5mm, AEC-Q200	COILCRAFT, XGL3520-152MEB
18	1	L4	IND., 1.2μH, POWER SHIELDED, 20%, 3.5A, 15.8mΩ, 3.2mm × 3.5mm, AEC-Q200	COILCRAFT, XGL3520-122MEB
19	1	L5	IND., 0.22μH, PWR, SHIELDED, 20%, 6.5A, 11.4mΩ, 1212BZ, IHLP-11 SERIES	VISHAY, IHLP1212BZERR22M11

20	4	R1, R3, R11, R14	RES., 1M, 1%, 1/10W, 0603, AEC-Q200	NIC, NRC06F1004TRF
21	1	R2	RES., 191k, 1%, 1/10W, 0603	VISHAY, CRCW0603191KFKEA
22	1	R4	RES., 340k, 1%, 1/10W, 0603	VISHAY, CRCW0603340KFKEA
23	1	R5	RES., 316k, 1%, 1/10W, 0603, AEC-Q200	NIC, NRC06F3163TRF
24	1	R6	RES., 19.1k, 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ3EKF1912V
25	9	R10, R21, R22, R26-R31	RES., 100k, 1%, 1/10W, 0603	STACKPOLE ELECTRONICS, INC., RMCF0603FG100K
26	1	R12	RES., 806k, 1%, 1/10W, 0603, AEC-Q200	NIC, NRC06F8063TRF
27	1	R13	RES., 499k, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW0603499KFKEA
28	1	U1	IC, QUAD MONOLITHIC SYNCHRONOUS STEP DOWN REGULATOR, LQFN-20	ANALOG DEVICES, LT8692SIV#TRPBF

Additional Demo Board Circuit Components

1	0	C2, C11-C13, C24	CAP., OPTION, 0402
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Hardware: For Demo Board Only

1	17	E1-E10, E14, E16, E17, E19-E22	TEST POINT, TURRET, 0.094" MTG. HOLE, PCB 0.062" THK	MILL-MAX, 2501-2-00-80-00-00-07-0
2	6	JP1-JP6	CONN., HDR, MALE, 1×3, 2mm, VERT, ST, THT, NO SUBS. ALLOWED	WURTH ELEKTRONIK, 62000311121
3	1	JP7	CONN., HDR, MALE, 2×4, 2mm, VERT, ST, THT	WURTH ELEKTRONIK, 62000821121
4	4	MP1-MP4	STANDOFF, NYLON, SNAP-ON, 0.50"	KEYSTONE, 8833
5	7	XJP1-XJP7	CONN., SHUNT, FEMALE, 2-POS, 2mm	WURTH ELEKTRONIK, 60800213421

SCHEMATIC DIAGRAM

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References

- [User Manual](#)

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