

LT8692S

42V/2A plus 3× 8V/1A, 2MHz Quad Monolithic Synchronous Step-Down Regulator

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 the channel 1, and 1A for the low voltage channels.

Internal soft-start, individual current limit, 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 T_A = 25°C

| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|--|------|-----|------|-------|
| Input Voltage | | 6.2 | 12 | 42 | V |
| Output Voltage V _{OUT1} | V _{IN} = 12V , I _{OUT1} = 1A | 4.80 | 5 | 5.20 | V |
| Output Voltage V _{OUT2} | I _{OUT2} = 1A | 3.17 | 3.3 | 3.43 | V |
| Output Voltage V _{OUT3} | I _{OUT3} = 1A | 1.73 | 1.8 | 1.87 | V |
| Output Voltage V _{OUT4} | I _{OUT4} = 1A | 1.15 | 1.2 | 1.25 | V |
| Maximum Output Current I _{OUT1} | Total Current with Channels 2 , 3 , 4 Disabled | 2 | | | A |
| Maximum Output Current I _{OUT2} | | 1 | | | A |
| Maximum Output Current I _{OUT3} | | 1 | | | A |
| Maximum Output Current I _{OUT4} | | 1 | | | A |
| Switching Frequency | | 1.8 | 2 | 2.2 | MHz |
| Channel 1 Efficiency | V _{IN} = 12V, V _{OUT} = 5V, I _{OUT} = 2A with Channels 2, 3, 4 Disabled | | 90 | | % |
| Channel 2 Efficiency | V _{IN234} = 5V , V _{OUT} = 3.3V , I _{OUT} = 1A | | 92 | | % |
| Channel 3 Efficiency | V _{IN234} = 5V , V _{OUT} = 1.8V , I _{OUT} = 1A | | 90 | | % |
| Channel 4 Efficiency | V _{IN234} = 5V , V _{OUT} = 1.2V , I _{OUT} = 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 |

2. 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 data sheet on the burst mode operation in light load and high V_{IN} condition.
3. 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 proper thermal cooling method such as air flow or heat sink is applied.
4. 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.

QUICK START PROCEDURE

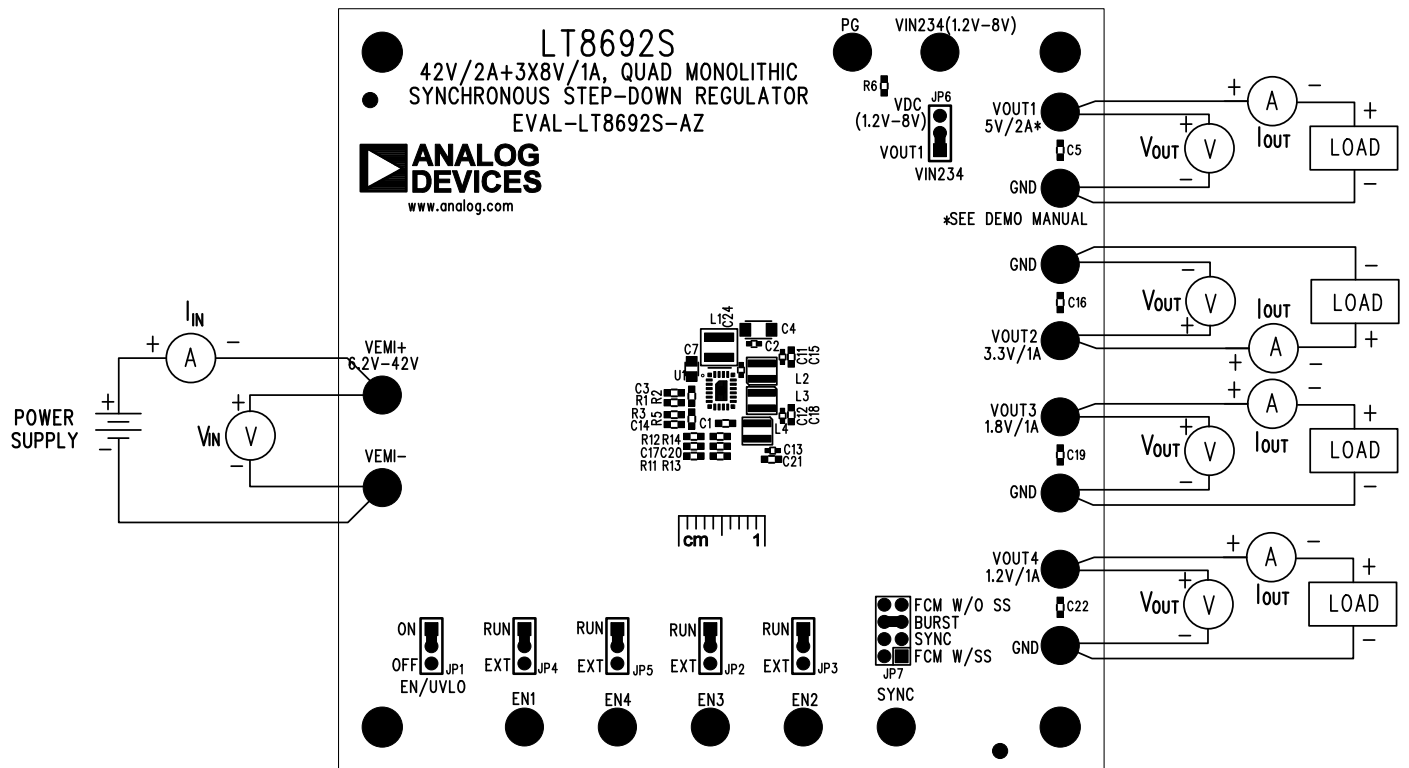


Figure 1. Proper Measurement Equipment Setup

DEMO MANUAL

EVAL-LT8692S-AZ

PARTS LIST

| ITEM | QTY | REFERENCE | PART DESCRIPTION | MANUFACTURER/PART NUMBER |
|------------------------------------|-----|------------------------|---|---|
| Required Circuit Components | | | | |
| 1 | 1 | C1 | CAP, 2.2 μ F, X5R, 6.3V, 10%, 0603 | AVX, 06036D225KAT2A |
| 2 | 1 | C3 | CAP, 10pF, C0G, 50V, 5%, 0603 | AVX, 06035A100JAT2A |
| 3 | 1 | C4 | CAP, 47 μ F, X5R, 10V, 20%, 1206 | TAIYO YUDEN, LMK316ABJ476ML-T |
| 4 | 4 | C5, C16, C19, C22 | CAP, 0.1 μ F, X7R, 50V, 10%, 0603 | AVX, 06035C104KAT2A |
| 5 | 1 | C6 | CAP, 22 μ F, ALUM ELECT, 50V, 20%, 6.3mm \times 5.4mm, RADIAL, SMD, CE-BSS SERIES, AEC-Q200 | SUN ELECTRONIC INDUSTRIES CORP, 50CE22BSS |
| 6 | 1 | C7 | CAP, 2.2 μ F, X7R, 50V, 10%, 0805 | AVX, 08055C225KAT2A |
| 7 | 1 | C8 | CAP, 0.1 μ F, X7R, 50V, 10%, 0402 | AVX, 04025C104KAT2A |
| 8 | 1 | C9 | CAP, 4.7 μ F, X7R, 10V, 10%, 0805, AEC-Q200 | KEMET, C0805C475K8RACAUTO |
| 9 | 2 | C10, C23 | CAP, 10 μ F, X5R, 50V, 10%, 1206 | TAIYO YUDEN, UMK316BBJ106KL-T |
| 10 | 1 | C14 | CAP, 4.7pF, C0G/NPO, 50V, \pm 0.25pF, 0603 | MURATA, GRM1885C1H4R7CA01D |
| 11 | 3 | C15, C18, C21 | CAP, 47 μ F, 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., 100 Ω AT 100MHZ, FERRITE BEAD, 25%, 2A, 40m Ω , 0603 | TDK, MPZ1608Y101BTA00 |
| 15 | 1 | L1 | IND., 2.2 μ H, PWR, SHIELDED, 20%, 7.8A, 22.1m Ω , 4.3mm \times 4.3mm, XEL4030, AEC-Q200 | COILCRAFT, XEL4030-222MEB |
| 16 | 1 | L2 | IND., 1.8 μ H, POWER SHIELDED, 20%, 2.9A, 24.1m Ω , 3.2mm \times 3.5mm, AEC-Q200 | COILCRAFT, XGL3520-182MEB |
| 17 | 1 | L3 | IND., 1.5 μ H, POWER SHIELDED, 20%, 3.1A, 19.8m Ω , 3.2mm \times 3.5mm, AEC-Q200 | COILCRAFT, XGL3520-152MEB |
| 18 | 1 | L4 | IND., 1.2 μ H, POWER SHIELDED, 20%, 3.5A, 15.8m Ω , 3.2mm \times 3.5mm, AEC-Q200 | COILCRAFT, XGL3520-122MEB |
| 19 | 1 | L5 | IND., 0.22 μ H, PWR, SHIELDED, 20%, 6.5A, 11.4m Ω , 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

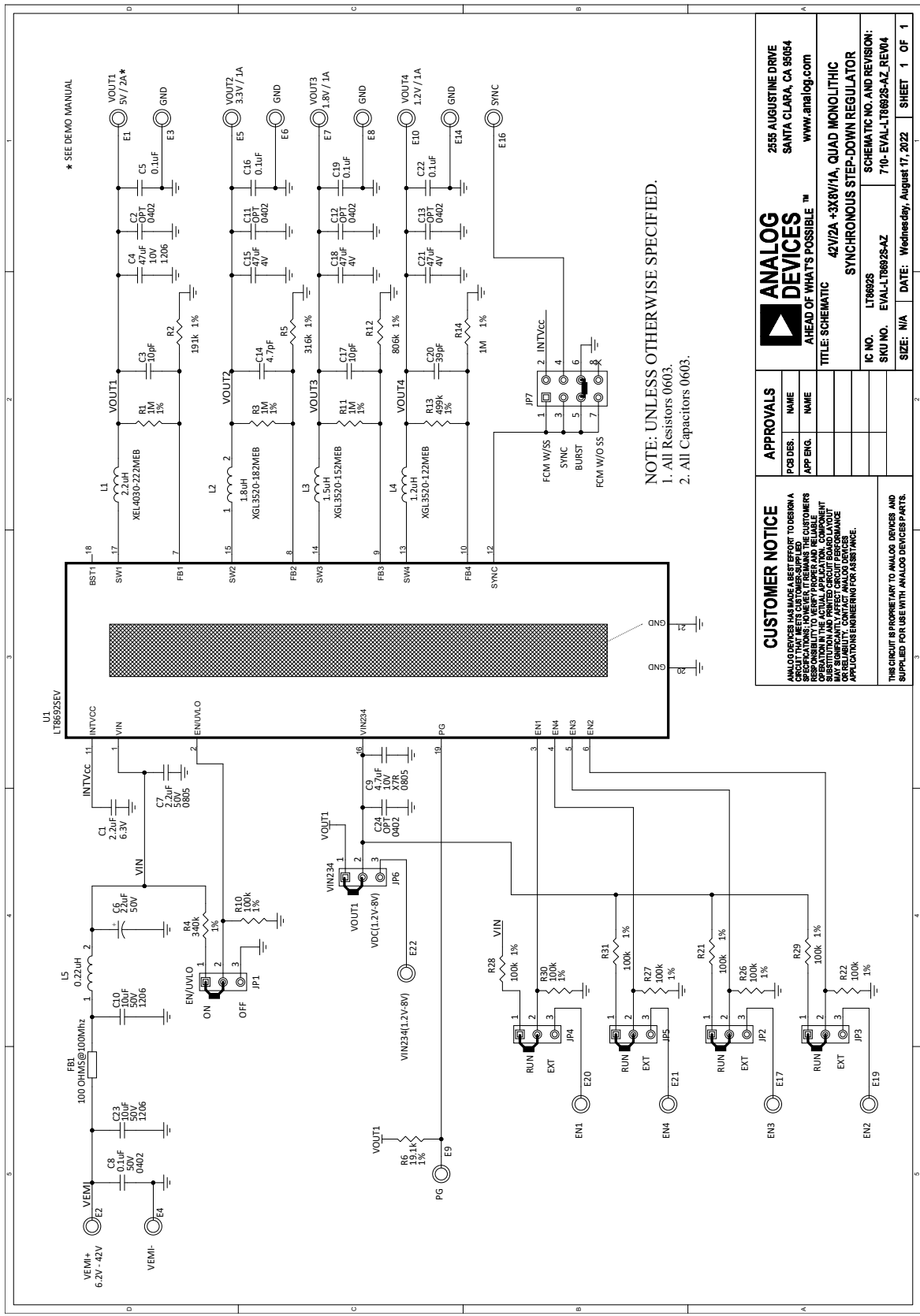
| | | | | |
|---|---|------------------|-------------------|--|
| 1 | 0 | C2, C11-C13, C24 | CAP, OPTION, 0402 | |
|---|---|------------------|-------------------|--|

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 \times 3, 2mm, VERT, ST, THT, NO SUBS. ALLOWED | WURTH ELEKTRONIK, 62000311121 |
| 3 | 1 | JP7 | CONN., HDR, MALE, 2 \times 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 |

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SCHEMATIC DIAGRAM



DEMO MANUAL

EVAL-LT8692S-AZ



ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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