

ANALOG DEVICES LTM4702EY Step Down Module Regulator Low Noise Reference Instruction Manual

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DESCRIPTION

Evaluation board EVAL-LTM4702-AZ is a step-down DC/DC switching converter featuring the LTM®4702 μ Module® regulator. The evaluation board is designed to deliver 8A maximum output current from a 4V to 16V input. The LTM4702 employs Silent Switcher® architecture with internal hot loop bypass capacitors to achieve both low EMI and high efficiency. The LTM4702 contains a current mode regulator IC, power inductor, and a modest amount of input and output capacitance. A single resistor (R3) sets the output voltage, providing unity gain operation over the output range, resulting in virtually constant output noise independent of output voltage.

The EVAL-LTM4702-AZ evaluation board default switching frequency is 800kHz. An external resistor is placed from RT pin to GND (R7) to set the switching frequency.

SYNC pin programs three different operating modes (JP1 jumper): select PULSE for pulse-skipping mode with improved efficiency at light loads; select FCM for forced continuous mode operation where fixed frequency operation is more critical than low current efficiency and where the lowest output ripple is desired; select SYNC to synchronize to an external clock signal.

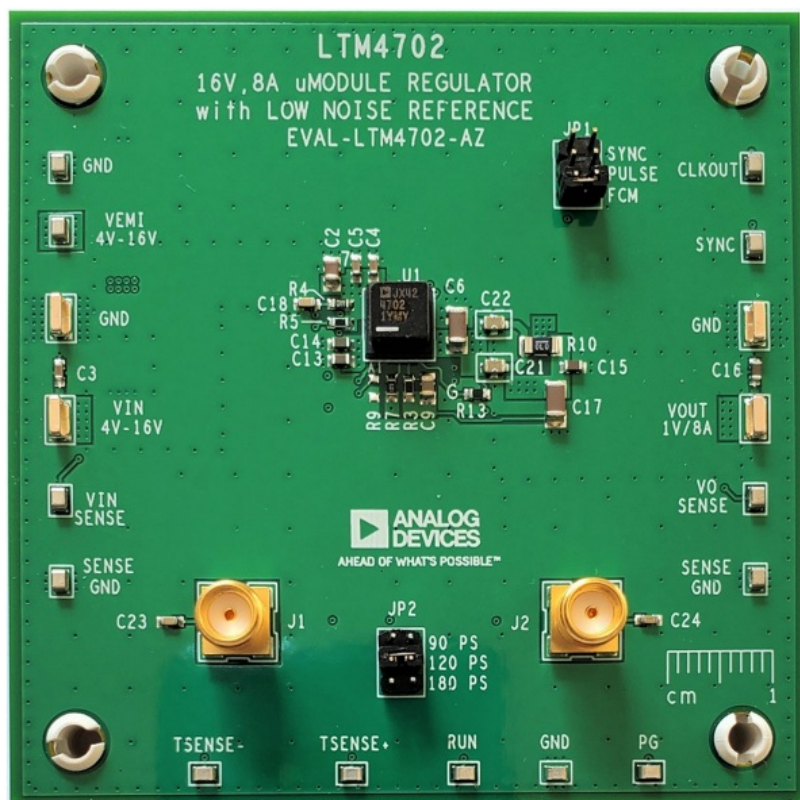
The RUN terminal can be used to set the LTM4702 in shutdown mode. The power good output (PG) will be low when the output voltage is outside of the $\pm 7.5\%$ regulation window. When the power good feature is used, set the PGSET resistor (R1) value according to the regulator output voltage.

The LTM4702 data sheet gives a complete description of the operation and application information. The data sheet must be read in conjunction with this evaluation board.

Design files for this circuit board are available.

BOARD PHOTO

Part marking is either ink mark or laser mark



PERFORMANCE SUMMARY

Specifications are at **TA = 25°C**

PARAMETER	CONDITIONS	MIN TYP MAX	V
Input Voltage Range		4 16	V
Output Voltage	VIN = 4V to 16V, IOUT = 0A to 8A	1 ±2%	A
Maximum Output Current	VIN = 4V to 16V	8	A
Typical Switching Frequency		800	kHz
Typical Efficiency	VIN = 12V, IOUT = 8A	80.5	%

QUICK START PROCEDURE

Evaluation board **EVAL-LTM4702-AZ** is easy to set up to evaluate the performance of the LTM4702. See Figure 1 for the proper measurement equipment setup and follow the procedure below.

1. With power off, connect the input power supply to VIN (4V to 16V) and GND (input return).
2. Connect the 1V output load between VOUT and GND (Initial load: no load).
3. **Connect the DVMs to the input and output. Set default jumper position:**
JP1: FCM ON
JP2: 120 PS ON
4. Turn on the input power supply and check for the proper output voltage. **VOUT** should be 1V ±2%.



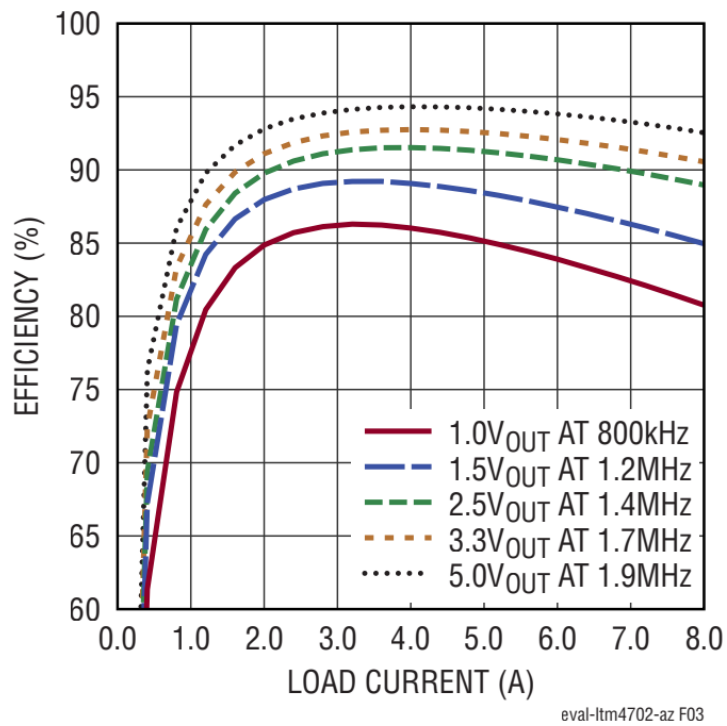


Figure 4. Output Voltage Ripple (12VIN, 1V, 8A Output)

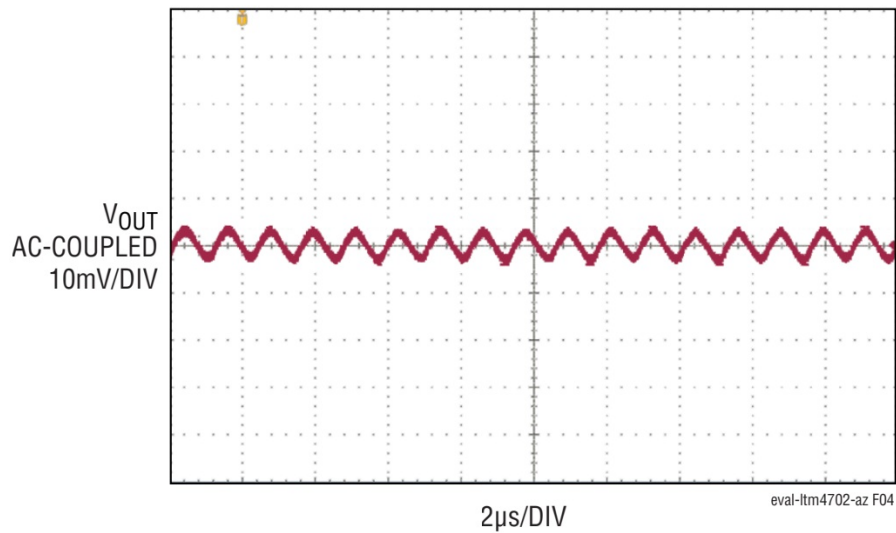


Figure 5. Load Step Transient Test ($V_{IN} = 12V$, $V_{OUT} = 1V$)

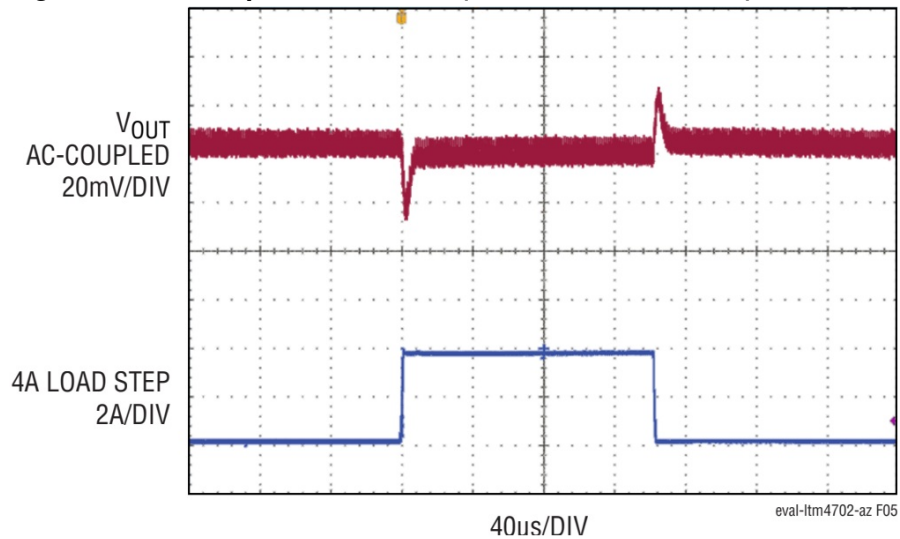
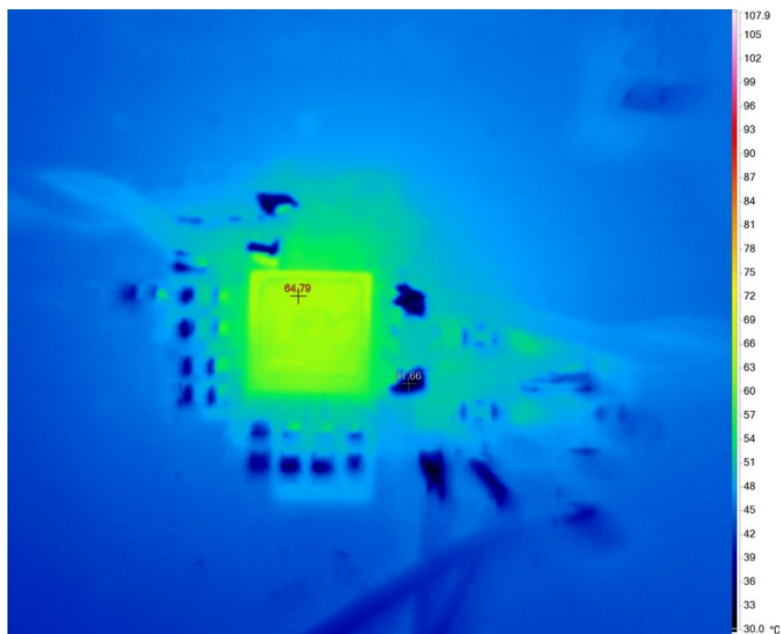


Figure 6. Thermal Image, $V_{IN} = 12V$, 1V, 8A Output (No Heat Sink, No Forced Airflow)

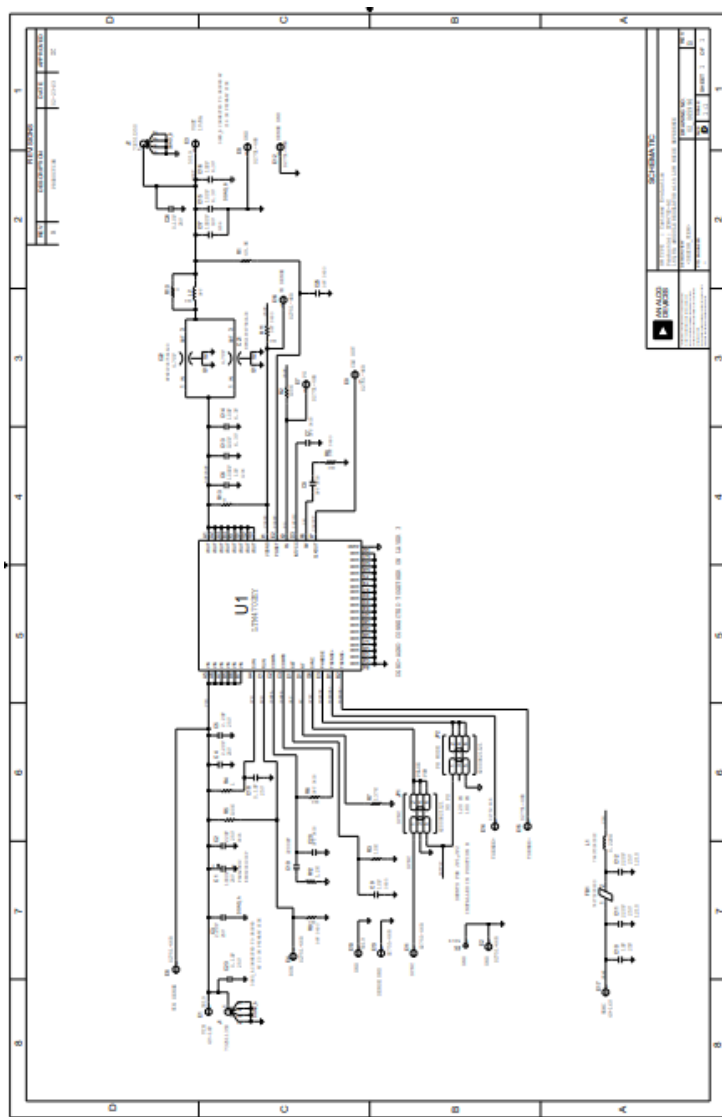


PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	1	C1	CAP., ALUM POLY HYBRID, 100μF, 25V, 20%, 6.3mm × 7.7mm, AEC-Q200	PANASONIC, EEHZC1E10 1XP
2	1	C10	CAP. CER, 1μF, 25V, 10%, X7R, 0603, AEC-Q 200	TDK, CGA3E1X7R1E105K080AC
3	2	C11, C12	CAP. CER, 22μF, 25V, 10%, X7R, 1210	MURATA, GRM32ER71E22 6KE15L
4	4	C13, C14, C15, C16	CAP. CER, 10μF, 6.3V, 20%, X7S, 0603	TDK, C1608X7S0J106M080AC
5	2	C6, C17	CAP. CER, 100μF, 10V, 20%, X5R, 1206, LOW ESR	TDK, C3216X5R1A107M16 0AC
6	3	C18, C23, C24	CAP. CER, 0.1μF, 25V, 10%, X7R, 0603	SAMSUNG, CL10B104KA8 NNNC
7	1	C19	CAP. CER, 2200pF, 16V, 10%, X7R, 0603	VISHAY, VJ0603Y222KXJC W1BC
8	1	C2	CAP. CER, 22μF, 25V, 20%, X5R, 0805, AEC-Q200	MURATA, GRT21BR61E22 6ME13L
9	2	C21, C22	CAP FEEDTHRU, 4.7μF, 10V, 20%, 0805, 3-T ERMINAL	MURATA, NFM21PC475B1 A3D
10	3	C3, C4, C5	CAP. CER, 2.2μF, 25V, 10%, X5R, 0603	MURATAGRM188R61E225 KA12D
11	1	C9	CAP. CER, 1μF, 10V, 10%, X7R, 0805	AVX, 0805ZC105KAT2A
12	1	FB1	IND., CHIP FERRITE BEAD, 0.015Ω, DCR, 5. 1A	WURTH ELEKTRONIK, 74 279228600

13	1	L1	IND., POWER SHIELDED WIREWOUND, 0.0 073Ω, DCR, 9.5A	WURTH ELEKTRONIK, 74 4373240022
14	1	R1	RES., SMD, 49.9k, 1%, 1/10W, 0603, AEC-Q2 00	PANASONIC, ERJ-3EKF49 92V
15	1	R10	RES., SMD, 0Ω, 1%, 1/4W, 1206	VISHAYWSL, 120600000Z EA9
16	1	R12	RES., 1.2k, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW06031K20F KEA
17	1	R13	RES., SMD, 0Ω, JUMPER, 1/10W, 0603, AEC-Q200,PRECISION POWER	VISHAY, CRCW06030000Z 0EA
18	2	R2, R5	RES., SMD, 100k, 1%, 1/10W, 0603, AEC-Q20 0	PANASONIC, ERJ-3EKF10 03V
19	1	R3	RES., SMD, 10k 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ-3EKF10 02V
20	1	R4	RES., SMD, 1Ω, 1%, 1/10W, 0603	YAGEO, RC0603FR-071RL
21	1	R7	RES., 137k, 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW0603137KF KEA
22	1	U1	IC-ADI, 18VIN, 8A, Silent Switcher, μModule R EGULATOR	ANALOG DEVICES, LTM4 702EY#PBF
18	0	C7, C8, C20, C2 5	OPTIONAL CAPACITOR	
19	0	R6, R8, R9, R11	OPTIONAL RESISTOR	
20	0	L2	OPTIONAL INDUCTOR	
24	2	J1, J2	CONN., PCB, SMA, FEMALE JACK, RCP, 50Ω	MOLEX, 732511350
26	2	JP1, JP2	CONN., HDR, MALE, 2 × 3, 2mm, VERT, ST, T HT	WURTH ELEKTRONIK, 62 000621121
27	4		STANDOFF, BRD, SPT, SNAP-FIT, 9.53mm LE NGTH, EVAL BOARD MTG	KEYSTONE, 8832
28	2		CONN., SHUNT, FEMALE, 2-POS, 2mm	KEYSTONE, 8831
29	1	PCBs	FAB PRINTED CIRCUIT BOARD	WURTH ELEKTRONIK, 70 2931000

SCHEMATIC DIAGRAM



REVISION HISTORY

R EV	DATE	DESCRIPTION	PAGE NU MBER
0	04/23	Initial Release	—



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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References

- [Mixed-signal and digital signal processing ICs | Analog Devices](#)
- [User Manual](#)