

General Description

The EVAL-LTM4732-AZ evaluation board is a step-down DC-to-DC switching converter featuring the [LTM[®]4732](#) power μ Module[®] (micromodule) regulator. The EVAL-LTM4732-AZ is designed to deliver 4A maximum output current from a 4V to 16V input. The LTM4732 employs [Silent Switcher[®]3](#) architecture with internal hot loop bypass capacitors to achieve both low electromagnetic interference (EMI) and high efficiency. The LTM4732 contains a current mode regulator IC, a 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 a virtually constant output noise independent of the output voltage.

The EVAL-LTM4732-AZ evaluation board's default switching frequency is 800kHz. An external resistor is placed from the RT pin to GND (R7) to set the switching frequency.

The SYNC pin programs three different operating modes (JP1 jumper): select PULSE for pulse-skipping mode (PSM) 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 LTM4732 in shutdown mode. The power good output (PG) will be low when the output voltage exceeds 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 LTM4732 data sheet provides a complete description of the operation and the application information. The data sheet must be read in conjunction with this user guide.

Features and Benefits

- Parallel for High-Power Applications
- External or Internal Compensation
- With Optional Input EMI Filter

EVAL-LTM4732-AZ Evaluation Board

FILE	DESCRIPTION
EVAL-LTM4732-AZ	Design files

[Ordering Information](#) appears at end of this user guide.

Evaluation Board Photo

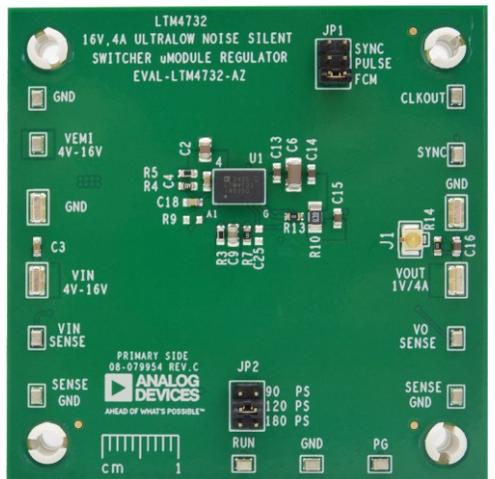


Figure 1. EVAL-LTM4732-AZ Evaluation Board

Performance Summary

Specifications are at $T_A = 25^\circ\text{C}$.

PARAMETER	CONDITIONS	MIN	TYP	MAX	VALUE
Input voltage range		4		16	V
Output voltage	$V_{IN} = 4\text{V to }16\text{V}$, $I_{OUT} = 0\text{A to }4\text{A}$			$1 \pm 2\%$	V
Maximum output current	$V_{IN} = 4\text{V to }16\text{V}$		4		A
Typical switching frequency	$R_T = 137\text{k}\Omega$		800		kHz
Typical efficiency	$V_{IN} = 12\text{V}$, $I_{OUT} = 4\text{A}$		75		%

Quick Start

Required Equipment

- One power supply: 16V, 2A
- One load: 1V, 4A
- Two digital voltmeters (DVMs) for V_{IN} , and V_{OUT}

Quick Start Procedure

The EVAL-LTM4732-AZ evaluation board is easy to set up to evaluate the performance of the LTM4732. See [Figure 2](#) for the proper measurement equipment setup and follow the procedure below.

1. With power off, connect the input power supply to V_{IN} (4V to 16V) and GND (input return).
2. Connect the 1V output load between V_{OUT} and GND (initial load: no load).
3. Connect the DVMs to the input and output. Set the default jumper to the position shown below.

JP1	JP2
FCM	120 PS

4. Turn on the input power supply and check for the proper output voltage. The V_{OUT} should be $1\text{V} \pm 2\%$.
5. Once the proper output voltage is established, adjust the load within the operating range and observe the output voltage regulation, efficiency, and other parameters.

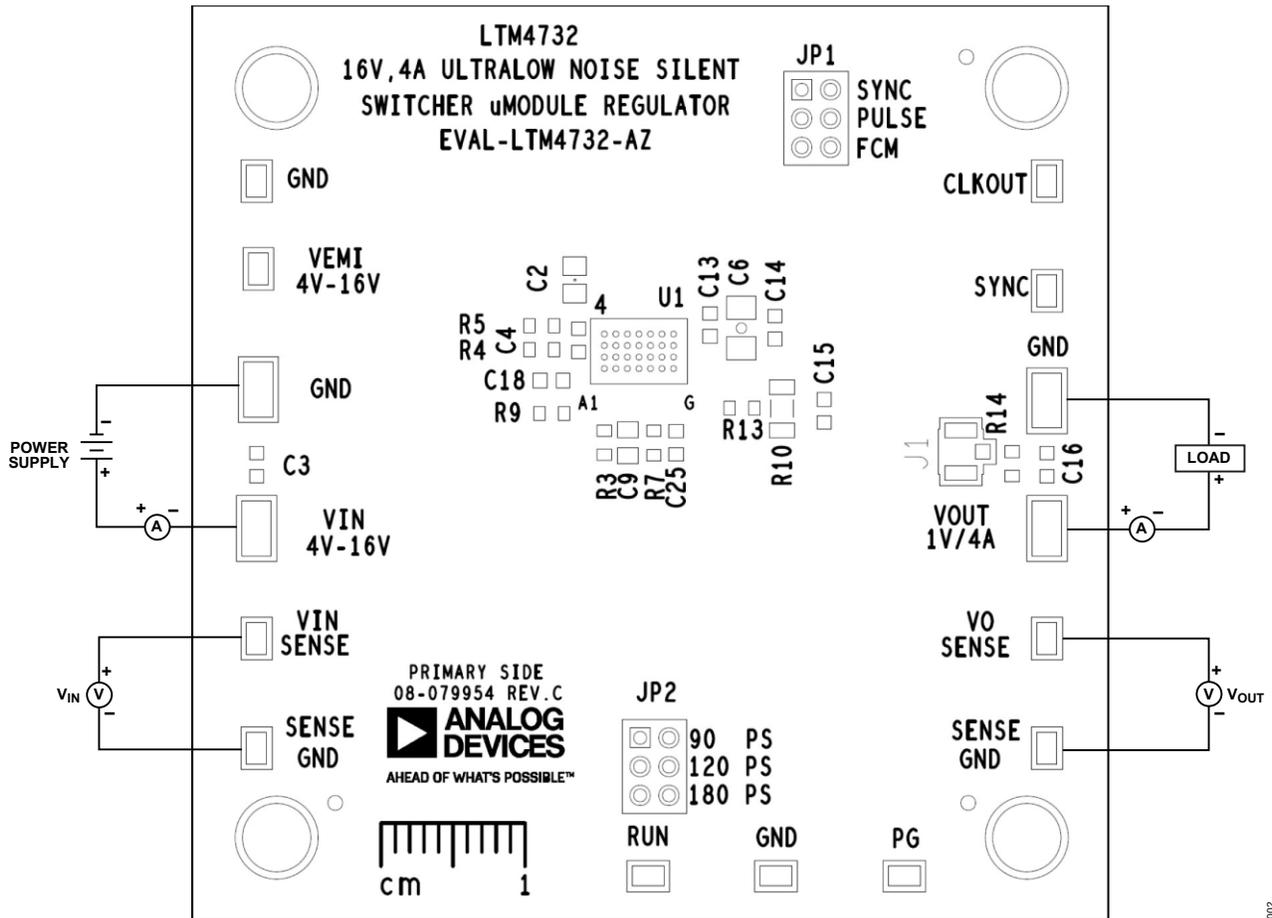


Figure 2. Proper Measurement Equipment Setup

Note: When measuring the output or the input voltage ripple, do not use the long ground lead on the oscilloscope probe. See [Figure 3](#) for the proper scope probe technique. Short, stiff leads may be soldered to an output capacitor's (+) and (-) terminals. The probe's ground ring needs to touch the (-) lead, and the probe tip needs to touch the (+) lead.

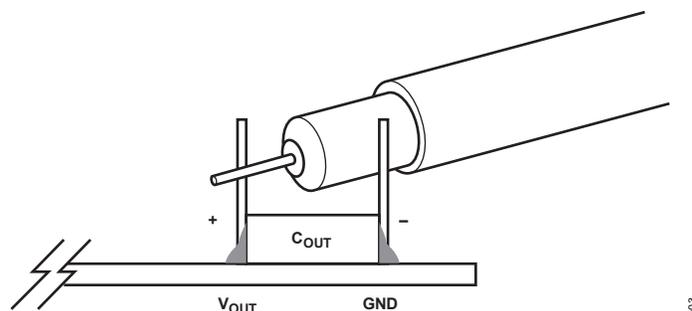


Figure 3. Measuring Output Ripple Voltage

Typical Performance Characteristics

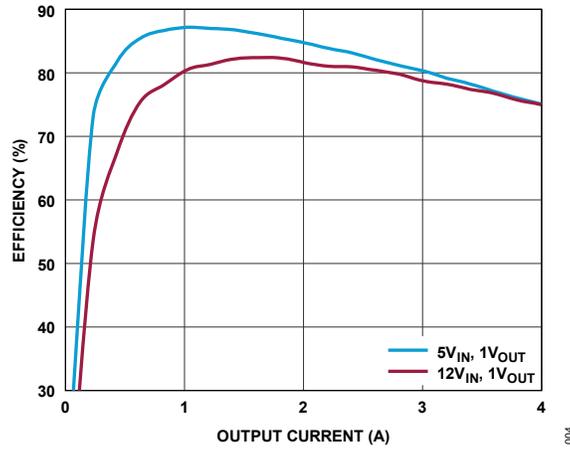


Figure 4. Efficiency vs. Load Current, Forced Continuous Mode

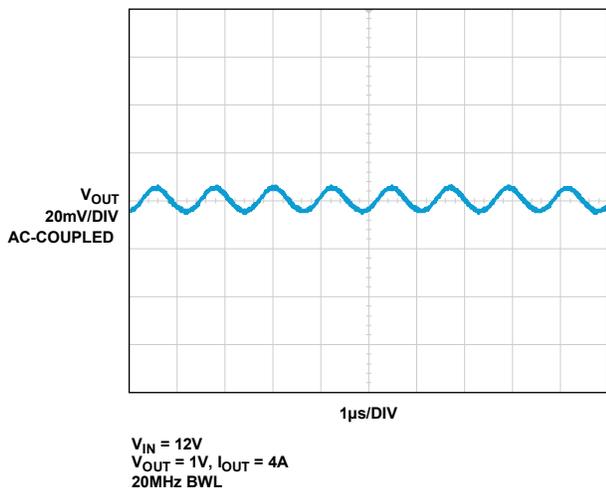


Figure 5. Output Voltage Ripple

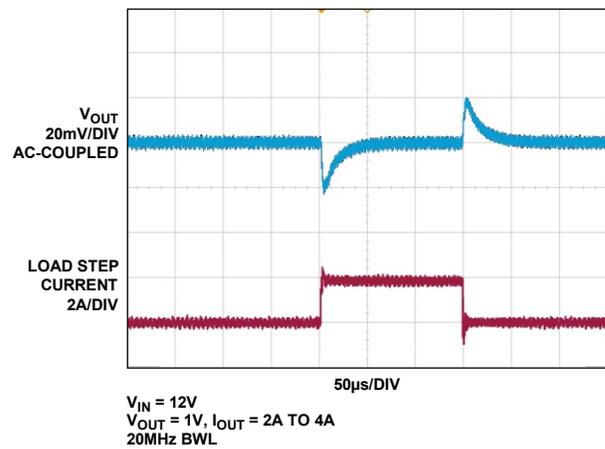


Figure 6. Load Step Transient Test

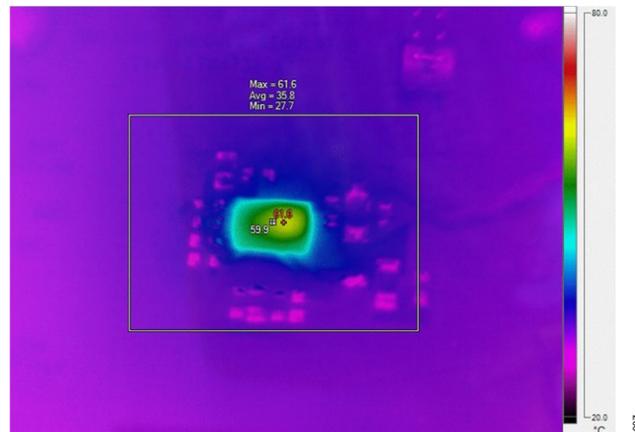


Figure 7. Thermal Image, 12V_{IN}, 1V_{OUT}, I_{OUT} = 4A, No Heat Sink, No Forced Airflow

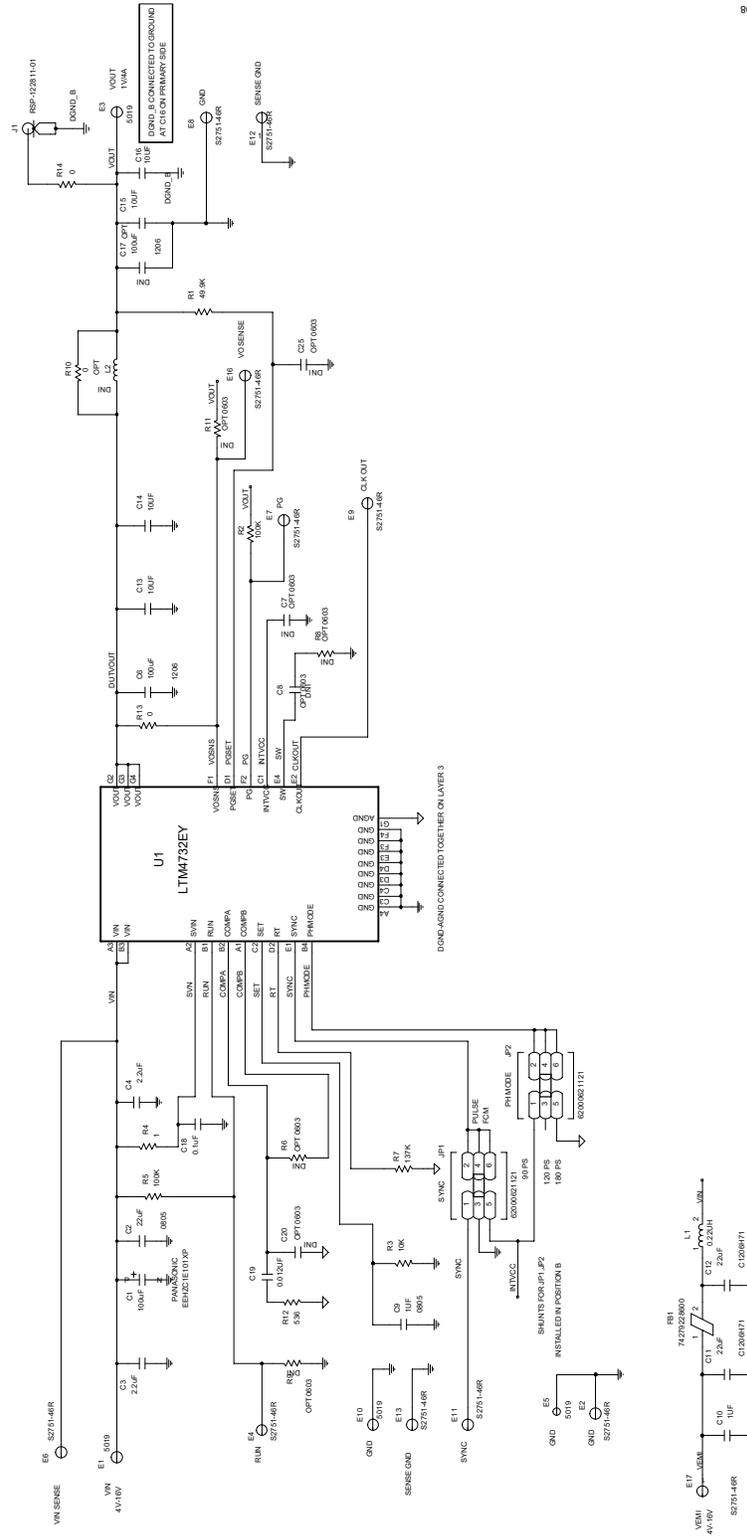
EVAL-LTM4732-AZ Evaluation Board Bill of Materials

QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components			
1	U1	IC-ADI 16V _{IN} 4A Ultralow Noise Silent Switcher 3 μ Module Regulator	ANALOG DEVICES, LTM4732EY#PBF
1	C1	Capacitor Aluminum Polymer Hybrid, 100 μ F, 25V, 20%, 6.3mm \times 7.7mm, AEC-Q200	PANASONIC, EEHZC1E101XP
1	C10	Capacitor Ceramic, 1 μ F, 25V, 10%, X7R, 0603, AEC-Q200	TDK, CGA3E1X7R1E105K080AC
2	C11, C12	Capacitors Ceramic, 22 μ F, 25V, 10%, X5R, 1206	SAMSUNG, CL31A226KAHNNNE
4	C13-C16	Capacitors Ceramic, 10 μ F, 6.3V, 20%, X7S, 0603, Low ESR	TDK, C1608X7S0J106M080AC
2	C18, C24	Capacitors Ceramic, 0.1 μ F, 25V, 10%, X7R, 0603	SAMSUNG, CL10B104KA8NNNC
1	C19	Capacitor Ceramic, 0.012 μ F, 50V, 10%, X7R, 0603	VISHAY, VJ0603Y123KXACW1BC
1	C2	Capacitor Ceramic, 22 μ F, 25V, 20%, X5R, 0805, AEC-Q200	MURATA, GRT21BR61E226ME13L
2	C3, C4	Capacitors Ceramic, 2.2 μ F, 25V, 10%, X5R, 0603	MURATA, GRM188R61E225KA12D
1	C6	Capacitors Ceramic, 100 μ F, 10V, 20%, X5R, 1206, Low ESR	TDK, C3216X5R1A107M160AC
1	C9	Capacitor Ceramic, 1 μ F, 10V, 10%, X7R, 0805	AVX CORPORATION, 0805ZC105KAT2A
1	FB1	Inductor Ferrite Bead, 60 Ω , 25%, 100MHz, 5.1A, 0.015 Ω , DCR, 0603	WURTH ELEKTRONIK,74279228600
1	L1	Inductor Power Shielded Wirewound, 0.0073 Ω , DCR, 9.5A	WURTH ELEKTRONIK,744373240022
1	R1	Resistor SMD, 49.9k Ω , 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ-3EKF4992V
1	R10	Resistor SMD, 0 Ω , 1%, 1/4W, 1206	VISHAY, WSL120600000ZEA9
1	R12	Resistor SMD, 536 Ω , 1%, 1/4W, 0603, AEC-Q200	PANASONIC, ERJ-UP3F5360V
1	R13	Resistor SMD, 0 Ω , Jumper 1/10W, 0603, AEC-Q200, Precision Power	VISHAY, CRCW06030000Z0EA
2	R2, R5	Resistors SMD, 100k Ω , 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ-3EKF1003V
1	R3	Resistor SMD, 10k Ω , 1%, 1/10W, 0603, AEC-Q200	PANASONIC, ERJ-3EKF1002V
1	R4	Resistor SMD, 1 Ω , 1%, 1/10W, 0603	YAGEO, RC0603FR-071RL

QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	R7	Resistor SMD, 137k Ω , 1%, 1/10W, 0603, AEC-Q200	VISHAY, CRCW0603137KFKEAC
Additional Evaluation Board Circuit Components			
4	E1, E3, E5, E10	Connector-PCB Test Point Compact Mini	KEYSTONE ELECTRONICS, 5019
11	E2, E4, E6-E9, E11-E13, E16, E17	Connector-PCB SMD Test Point Tin, 2.00mm \times 1.20mm	HARWIN, S2751-46R
1	J1	Connector-PCB COAX RCPT Male, 0Hz to 6Hz, 50 Ω	SAMTEC INC., RSP-122811-01
2	JP1, JP2	Connector-PCB 6-Position Male HDR Unshrouded Dual Row Straight 2mm Pitch, 2.70mm, Solder Tail	WURTH ELEKTRONIK, 62000621121
2		Shunt Female 2-Positions, 2mm	WURTH ELEKTRONIK, 60800213421
4		Standoff, Board Support Snap Fit 9.53mm Length, Eval Board Manufacturing TG	KEYSTONE, 8832
Hardware: For Evaluation Board Only			
1	C17		
1	L2		
4	R6, R8, R9, R11		
4	C7, C8, C20, C25		

EVAL-LTM4732-AZ Evaluation Board Schematic

800



Ordering Information

PART	TYPE
EVAL-LTM4732-AZ	16V, 4A Ultralow Noise Silent Switcher 3 μ Module Regulator.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	01/26	Initial release	—

Notes

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