EVAL-LTM4703-AZ

LTM4703

16V, 12A Step-Down µModule Regulator with Low Noise Reference

General Description

The EVAL-LTM4703-AZ evaluation board is a step-down dc-to-dc switching converter featuring the LTM®4703 µModule® (micromodule) regulator. The EVAL-LTM4703-AZ is designed to deliver 12A maximum output current from a 4V to 16V input. The LTM4703 employs Silent Switcher® architecture with internal hot loop bypass capacitors to achieve both low electromagnetic interference (EMI) and high efficiency. The LTM4703 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 virtually constant output noise independent of output voltage.

The EVAL-LTM4703-AZ evaluation board's default switching frequency is 400kHz. 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 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 LTM4703 in shutdown mode. The power good output (PG) will be low when the output voltage exceeds the ±7.5% regulation window. When the power good feature is used, set the PGSET resistor (R1) value according to the regulator output voltage.

The LTM4703 data sheet provides a complete description of the operation and 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-LTM4703-AZ Evaluation Board Files

FILE	DESCRIPTION
EVAL-LTM4703-AZ	Design files

Ordering Information *appears at end of this user guide.*

Evaluation Board Photo

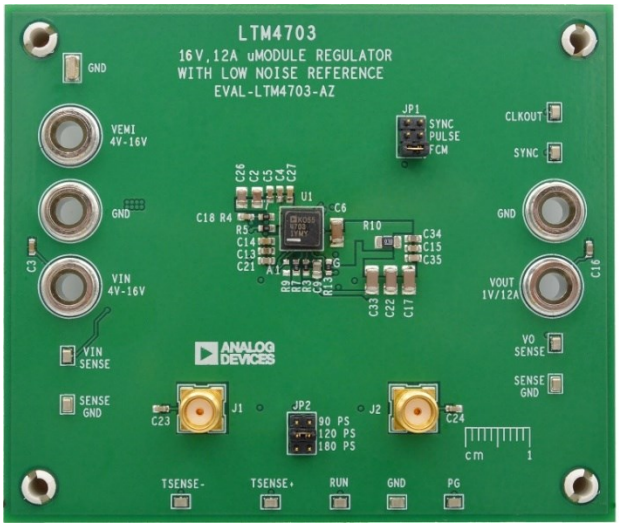

Figure 1. EVAL-LTM4703-AZ Evaluation Board (Part Marking Is either Ink Mark or Laser Mark)

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Performance Summary

Specifications are at T_A = 25°C.

PARAMETER	CONDITIONS	MIN	TYP	MAX	VALUE
Input voltage range		4		16	V
Output voltage	V_{IN} = 4V to 16V, I_{OUT} = 0A to 12A		1 ±2%		V
Maximum output current	V_{IN} = 4V to 16V		12		A
Typical switching frequency	R_T = 287kΩ		400		kHz
Typical efficiency	V_{IN} = 12V, I_{OUT} = 12A		86.8		%

Quick Start

Required Equipment

- One power supply: 16V, 5A
- One load: 1V, 12A
- Two digital voltmeters (DVMs) for V_{IN}, and V_{OUT}

Quick Start Procedure

The EVAL-LTM4703-AZ evaluation board is easy to set up to evaluate the performance of the LTM4703. 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 default jumper position:

JP1	JP2
FCM	120 PS

4. Turn on the input power supply and check for the proper output voltage. V_{OUT} should be 1V ±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.

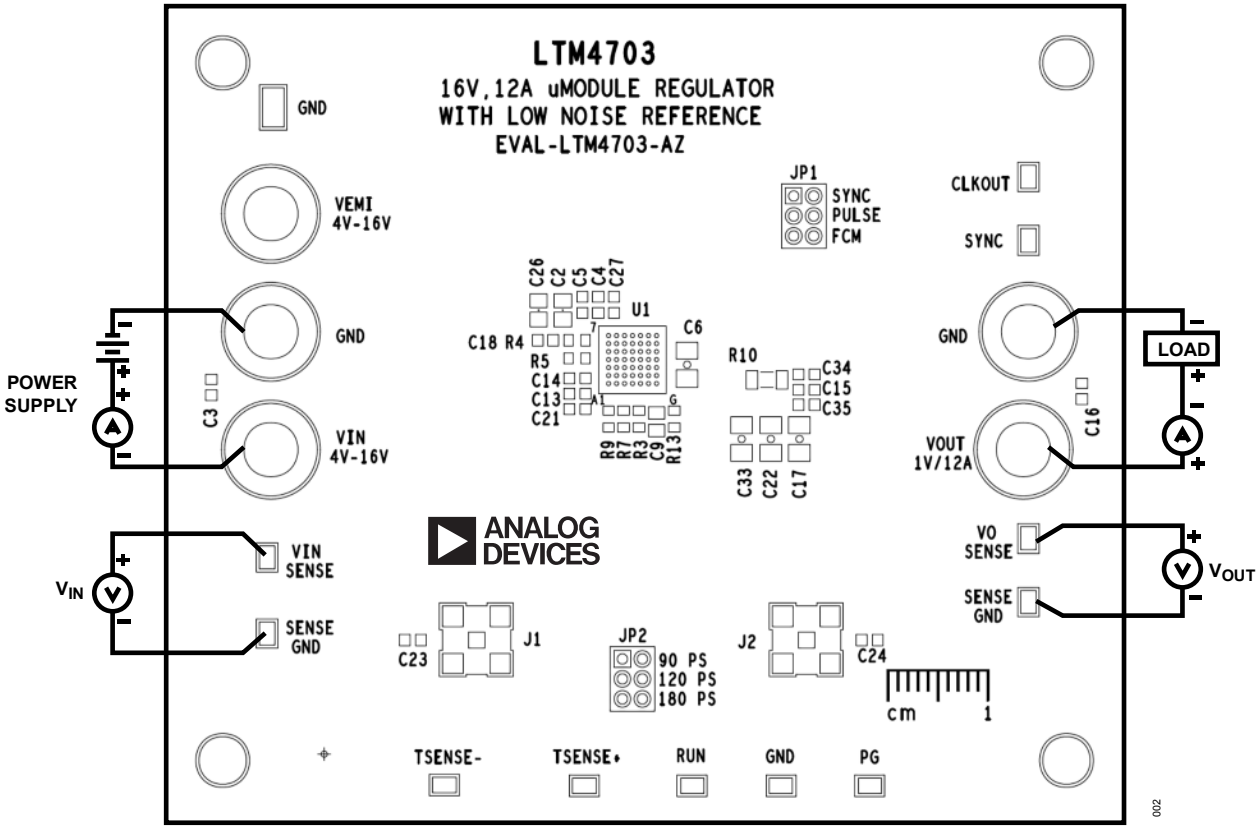


Figure 2. Proper Measurement Equipment Setup

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.

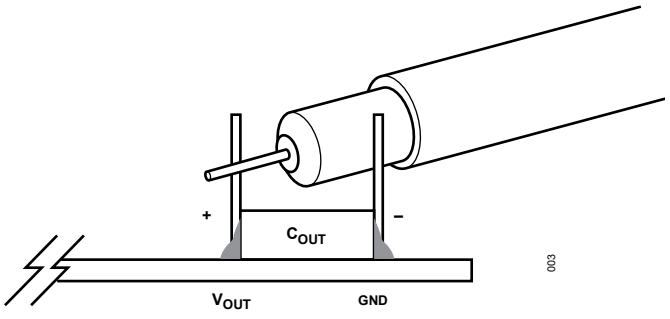


Figure 3. Measuring Output Ripple Voltage

Typical Performance Characteristics

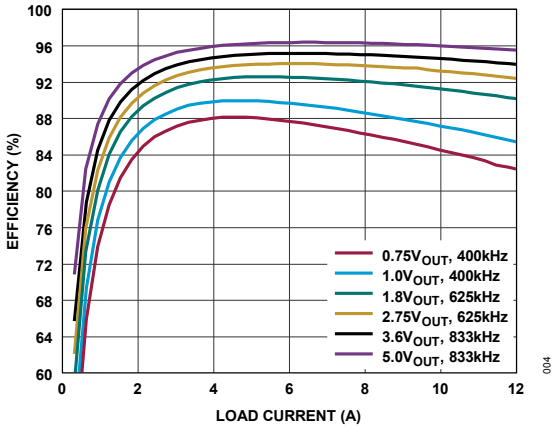


Figure 4. Efficiency vs. Load Current, V_{IN} = 12V

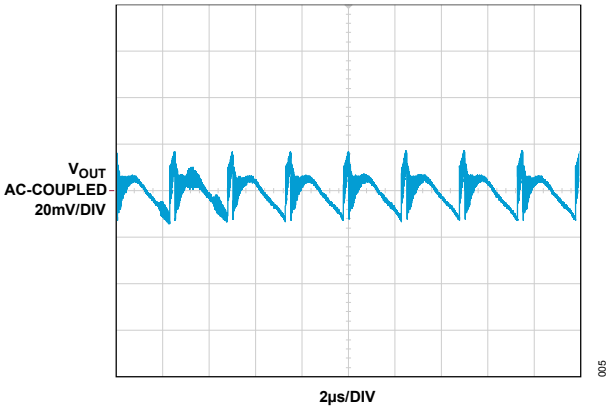


Figure 5. Output Voltage Ripple, $12V_{IN}$, $1V_{OUT}$, 12A Output with 20MHz BW Limit

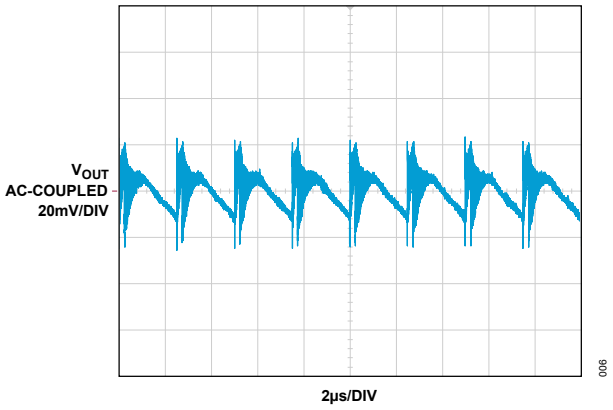


Figure 6. Output Voltage Ripple, $12V_{IN}$, $1V_{OUT}$, 12A Output without 20MHz BW Limit

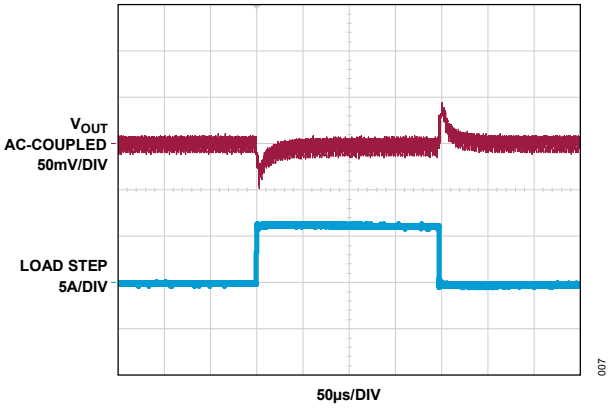


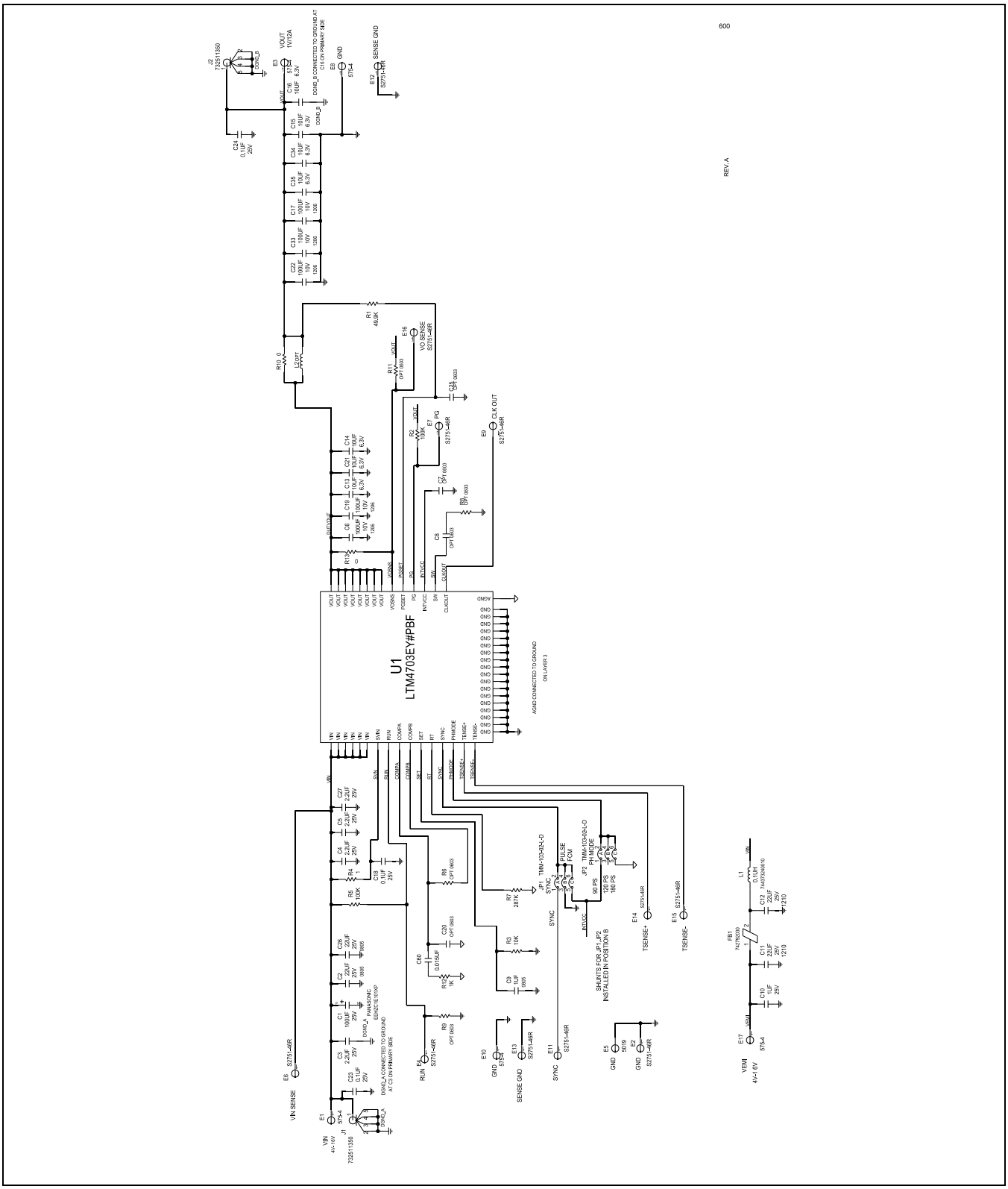
Figure 7. Load Step Transient Test, $12V_{IN}$, $1V_{OUT}$, 0A to 6A Output Current

Figure 8. Thermal Image, $12V_{IN}$, $1V_{OUT}$, 12A Output, No Heat Sink, No Forced Airflow

EVAL-LTM4703-AZ Evaluation Board Bill of Materials

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP. ALUM POLY HYBRID 100µF 25V 20% 6.3mm × 7.7mm AEC-Q200	PANASONIC, EEHZC1E101XP
2	1	C10	CAP. CER 1µF 25V 10% X7R 0603 AEC-Q200	TDK, CGA3E1X7R1E105K080AC
3	2	C11, C12	CAP. CER 22µF 25V 10% X7R 1210	MURATA, GRM32ER71E226KE15L
4	7	C13-C16, C21, C34, C35	CAP. CER 10µF 6.3V 20% X7R 0603	TDK, C1608X7S0J106M080AC
5	5	C6, C17, C19, C22, C33	CAP. CER 100µF 10V 20% X5R 1206 LOW ESR	TDK, C3216X5R1A107M160AC
6	3	C18, C23, C24	CAP. CER 0.1µF 25V 10% X7R 0603	SAMSUNG, CL10B104KA8NNNC
7	2	C2, C26	CAP. CER 22µF 25V 20% X5R 0805 AEC-Q200	MURATA, GRM21BR61E226ME44L
8	4	C3-C5, C27	CAP. CER 2.2µF 25V 10% X5R 0603	MURATA, GRM188R61E225KA12D
9	1	C60	CAP. CER 0.015µF 25V 1% C0G 0603 EXTREME LOW ESR	MURATA, GCM188R72A153KA37D
10	1	C9	CAP. CER 1µF 10V 10% X7R 0805	TAIYO YUDEN, MSASL219SB7105KTNA01
11	1	FB1	IND. CHIP FERRITE 30Ω 10A 25% 0.003Ω DCR 0805	WURTH ELEKTRONIK, 742792030
12	1	R1	RES. SMD 49.9kΩ 1% 1/10W 0603 AEC-Q200	PANASONIC, ERJ-3EKF4992V
13	1	R10	RES. SMD 0Ω 1% 1/4W 1206	VISHAY, WSL120600000ZEA9
14	1	R12	RES. SMD 1kΩ 1% 1/10W 0603 AEC-Q200	VISHAY, CRCW06031K00FKEA
15	1	R13	RES. SMD 0Ω JUMPER 1/10W 0603 AEC-Q200 PRECISION POWER	VISHAY, CRCW06030000Z0EA
16	2	R2, R5	RES. SMD 100kΩ 1% 1/10W 0603 AEC-Q200	VISHAY, CRCW0603100KFKEA
17	1	R3	RES. SMD 10kΩ 1% 1/10W 0603 AEC-Q200	PANASONIC, ERJ-3EKF1002V
18	1	R4	RES. SMD 1Ω 1% 1/10W 0603	YAGEO, RC0603FR-071RL
19	1	R7	RES. SMD 287kΩ 1% 1/10W 0603	YAGEO, RC0603FR-07287KL
20	1	U1	IC-ADI 16V_{IN}, 12A Silent Switcher µModule REGULATOR WITH LOW NOISE REFERENCE	ANALOG DEVICES, LTM4703EY#PBF
Additional Evaluation Board Circuit Components				
1	0	C7, C8, C20, C25		
2	0	R6, R8, R9, R11		
3	0	L2		
Hardware: For Evaluation Board Only				
1	5	E1, E3, E8, E10, E17	CONN-PCB BANANA JACK	KEYSTONE ELECTRONICS, 575-4
2	11	E2, E4, E6, E7, E9, E11-E16	CONN-PCB SMD TEST POINT TIN 2.00mm × 1.20mm	HARWIN, S2751-46R
3	1	E5	CONN-PCB TEST POINT COMPACT MINI	KEYSTONE ELECTRONICS, 5019
4	2	J1, J2	CONN-PCB SMA FEMALE JACK RCP, 50Ω	MOLEX, 732511350
5	2	JP1, JP2	CONN., HDR, MALE, 2 × 3, 2mm, VERT, ST, THT	WURTH ELEKTRONIK, 62000621121
6	3		SHUNT, 2mm JUMPER WITH TEST POINT	WURTH ELEKTRONIK, 60800213421
7	4		STANDOFF, NYLON, SNAP-ON, 0.50"	WURTH ELEKTRONIK, 702935000

EVAL-LTM4703-AZ Evaluation Board Schematic



Ordering Information

PART	TYPE
EVAL-LTM4703-AZ	16V, 12A step-down µModule regulator with low noise reference.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	08/24	Initial release.	—

Notes