Evaluation Board User Guide

EVAL-LTM4719-AZ

LTM4719

42V Dual Input, Low Noise 150mA Step-Down µModule Regulator with I²C Battery Health Monitor

General Description

The EVAL-LTM4719-AZ evaluation board features the LTM®4719, a 42V dual input, 150mA synchronous buck power µModule® (micromodule) regulator with an integrated battery health monitor and a low-dropout linear regulator. The EVAL-LTM4719-AZ has a wide operating input range of 2.4V to 42V and supports seamless transition between the two separate input power sources. The output has a range of 1V to 4.2V and can source up to 150mA of continuous output current.

The EVAL-LTM4719-AZ also features an $EXTV_{CC}$ jumper (JP3) to V_{BUS} for improved efficiency in some applications. The system can be monitored through $\overline{VALID1}$, $\overline{VALID2}$, $\overline{PRIORITY}$, and PG indicators. There are accurate V_{SET1} and V_{SET2} comparators to program independent undervoltage lockout (UVLO) thresholds. Fault protection features include input UVLO, power good, current limit, and overtemperature protection. The built-in precision coulomb counter supports input voltages from 1.8V to 5.5V and a peak current of up to 100mA. The EVAL-LTM4719-AZ utilizes jumpers to easily program the peak current limit of the coulomb counter from 5mA to 100mA by setting IPK0 (JP4), IPK1 (JP5), and IPK2 (JP6).

The EVAL-LTM4719-AZ can be connected directly to a PC at P1 using the DC1613A, Analog Devices I²C/SMBus/PMBus dongle. The LTpowerPlay® allows the user to run a graphical user interface (GUI) and configure a battery state of health (SoH) monitor.

Features and Benefits

- Seamless Transition between Inputs
- Compatible with LTpowerPlay
  - Easy to use GUI for the Coulomb Counter
  - Access Coulomb Counter Register Data
- Optional Supercapacitor Balancer

EVAL-LTM4719-AZ Evaluation Board

FILE	DESCRIPTION
EVAL-LTM4719-AZ	Design files.
LTpowerPlay	Easy-to-use Windows® based GUI development tool.
DC1613A	The USB to PMBus controller dongle.

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

Evaluation Board Photo

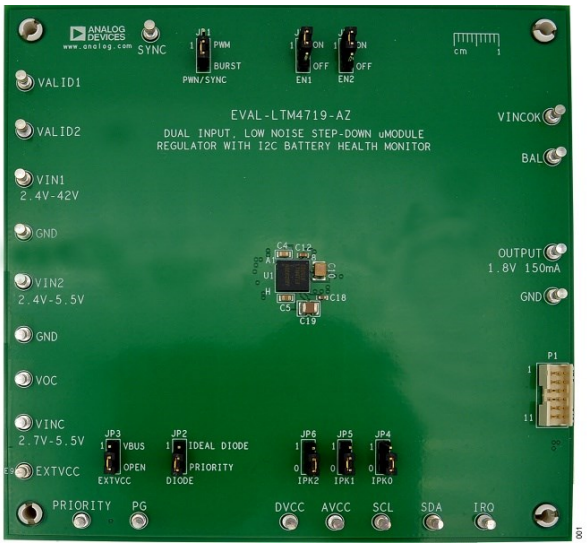


Figure 1. EVAL-LTM4719-AZ Evaluation Board (Part Marking is Laser Mark)

Performance Summary

Specifications are at T_A = 25°C.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input voltage range	V_{IN1}, V_{IN2}	2.4		42	V
Input voltage range for coulomb counter	V_{INC}	2.7		5.5	V
Output voltage	V_{OUT}		1.8		V
Bus voltage	V_{BUS}		2.3		V
Maximum continuous output current per phase			150		mA
Default operating frequency			700		kHz
Efficiency at V_{BUS}	$12V_{IN1}$, $2.3V_{BUS}$ with 150mA load, EN2 off, Burst Mode® operation		78.6		%
Efficiency at V_{OUT}	$12V_{IN1}$, $2.3V_{BUS}$, $1.8V_{OUT}$ with 150mA load, Burst Mode operation		60.5		%

Quick Start

Required Equipment

- Two power supplies
- One electronic load
- At least four digital multimeters (DMMs)

Optional Equipment

- DC1613A
- PC with the LTpowerPlay software installed

Procedure

The EVAL-LTM4719-AZ evaluation board provides an easy way to evaluate the performance of the LTM4719 µModule. See *Figure 2* for test setup connections and use the following procedure.

1. With power off, ensure that the jumpers are in the proper positions.

JP1	JP2	JP3	JP7	JP8
PWM/SYNC	DIODE	$EXTV_{CC}$	EN2	EN1
BURST	$\overline{\text{PRIORITY}}$	OPEN	ON	ON

2. Configure the I_{PEAK} jumpers for your chosen current limit for the coulomb counter. Note that the I_{PEAK} setting is locked at startup.

IPK2 (JP6)	IPK1 (JP5)	IPK0 (JP4)	I_{PEAK} (mA)
0	0	0	5
0	0	1	10
0	1	0	15
0	1	1	20
1	0	0	25
1	0	1	50
1	1	0	75
1	1	1	100

3. Before connecting the input supply, loads, and meters, preset the V_{IN1} supply to be between 2.4V and 42V and the V_{INC} supply to be between 2.7V to 5.5V. Preset the load current to 0A.
4. With power off, connect the load, input voltage supplies, and meters, as shown in *Figure 2*.
5. Turn on V_{IN1} and V_{INC}. The output voltage should be 1.8V ±2%.
6. Once the proper output voltages are established, adjust the load current up to 150mA. Observe the seamless transition between input supplies, output voltage regulation, output voltage ripple, and other parameters. If V_{OUT} loses regulation while power is being supplied to V_{INC}, the power supplies should be shut down, and the I_{PEAK} limit should be adjusted.
7. Connect the DC1613A dongle from a PC to the P1 connector and configure a battery SoH monitor. See the *LTpowerPlay GUI for the LTM4719 Quick Start Guide* for details.

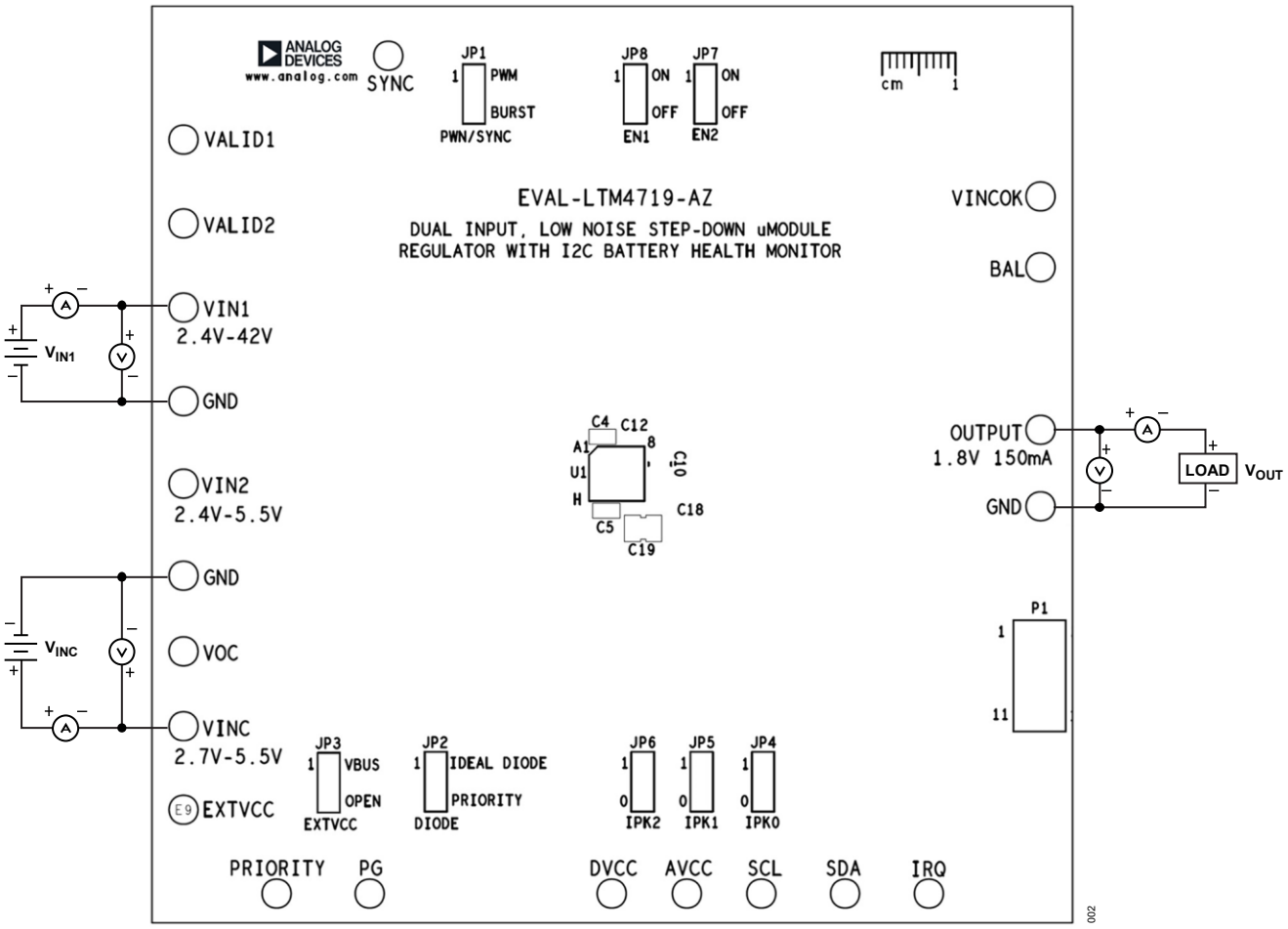


Figure 2. Test Setup of EVAL-LTM4719-AZ

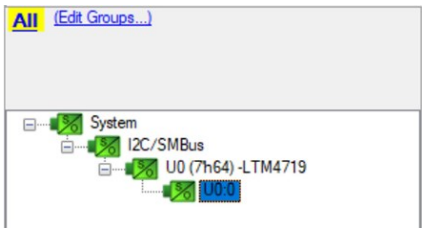
LTpowerPlay Software GUI

The LTpowerPlay is a powerful Windows-based development environment that supports Analog Devices power system management (PSM) ICs, including the LTM4719, LTM4676A, LTC®3880, LTC3883, LTC2974, and LTC2978. The software supports a variety of different tasks. Use the LTpowerPlay to evaluate the Analog Devices ICs by connecting to an evaluation (demo) board system. The LTpowerPlay can also be used in an offline mode (with no hardware present) to build a multichip configuration file that can be saved and reloaded later. The LTpowerPlay provides unprecedented diagnostic and debug features. The LTpowerPlay becomes a valuable diagnostic tool during board bring-up to program or tweak the power management scheme in a system, or to diagnose power issues when bringing up rails. The LTpowerPlay utilizes the DC1613A USB-to-SMBus controller to communicate with one of the many potential targets, including the LTM4719 or a customer board. The software also provides an automatic update feature to keep the software current with the latest set of device drivers and documentation. To access technical support documents for Analog Devices digital PSM products, visit the Help section to access the online help on the LTpowerPlay menu.

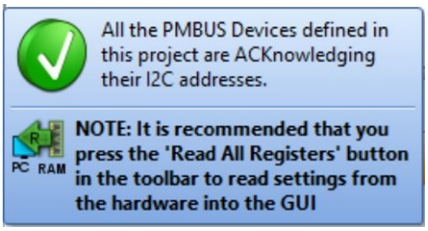
LTpowerPlay GUI for the LTM4719 Quick Start Guide

The following procedure describes how to use the LTpowerPlay to configure and monitor the settings of the LTM4719.

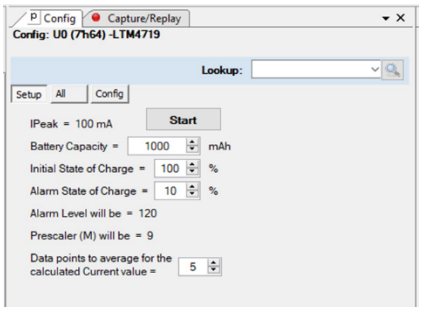
1. Download and install the LTpowerPlay GUI: *LTpowerPlay*.
2. Ensure the coulomb counter is powered through V_{INC} and adjust the I_{PEAK} settings for your chosen current limit for the coulomb counter. Note that the I_{PEAK} setting is locked at startup.
3. Launch the LTpowerPlay GUI.
    a. The GUI should automatically identify the EVAL-LTM4719-AZ. The system tree on the left-hand side should look like the following image:



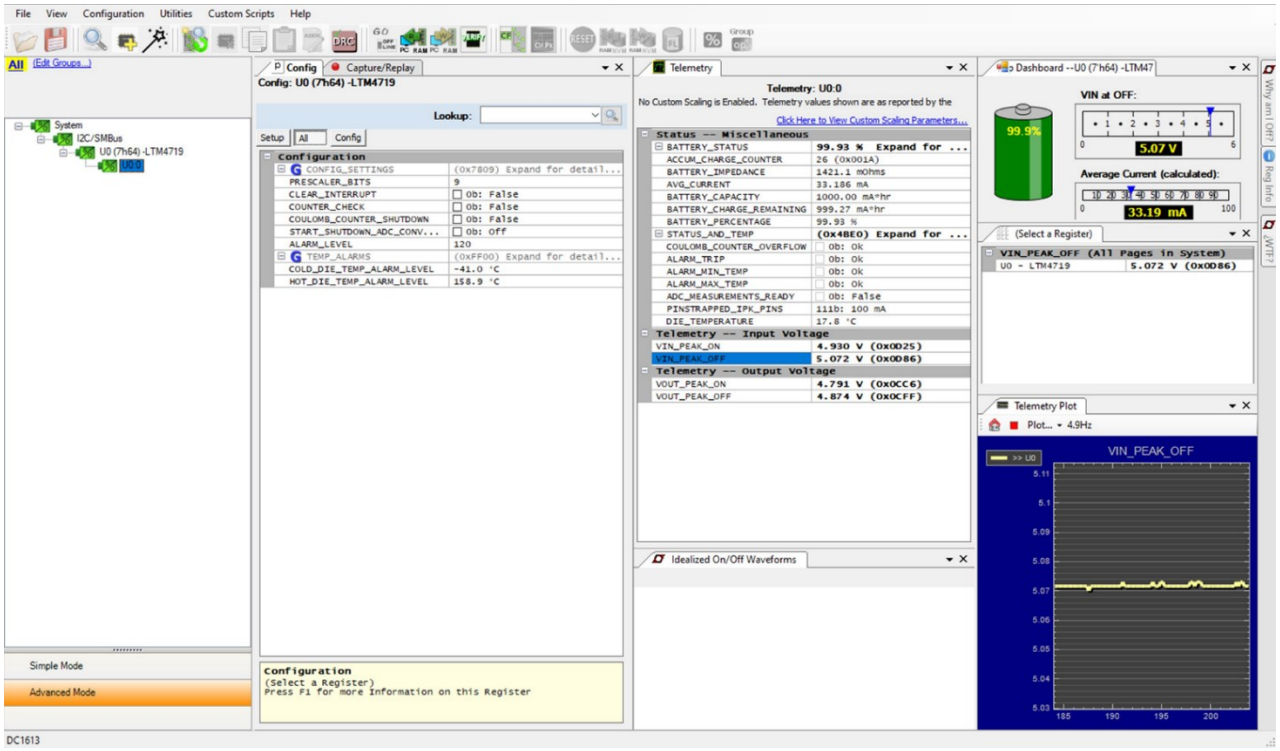
    b. A green message box shows for a few seconds in the lower left-hand corner, confirming that the LTM4719 is communicating.



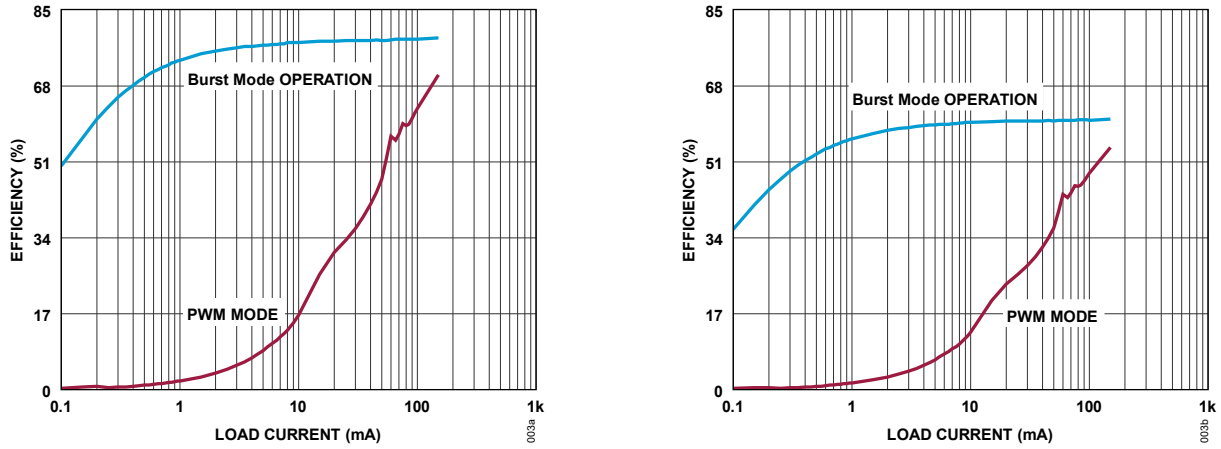
4. In the Setup tab, configure the settings for your chosen battery. Once finished, **click the Start** button.



5. The coulomb counter is now monitoring the SoH of the battery.



Typical Performance Characteristics



(a) Efficiency at V_{BUS} (b) Efficiency at V_{OUT}

Figure 3. Efficiency in Burst Mode Operation vs. Pulse-Width Modulation (PWM) Mode

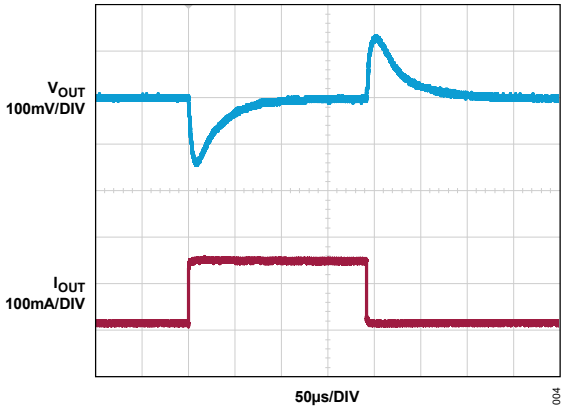


Figure 4. Load Transient Response from 15mA to 150mA Load Step

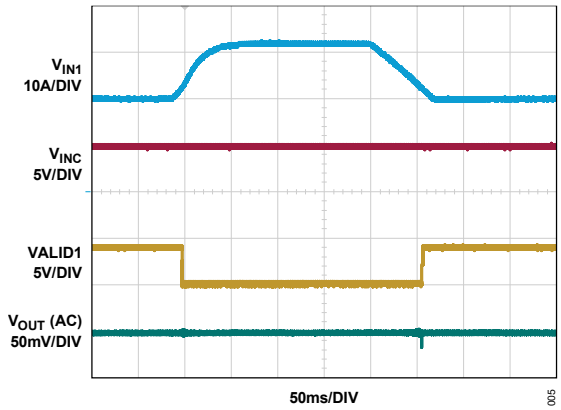


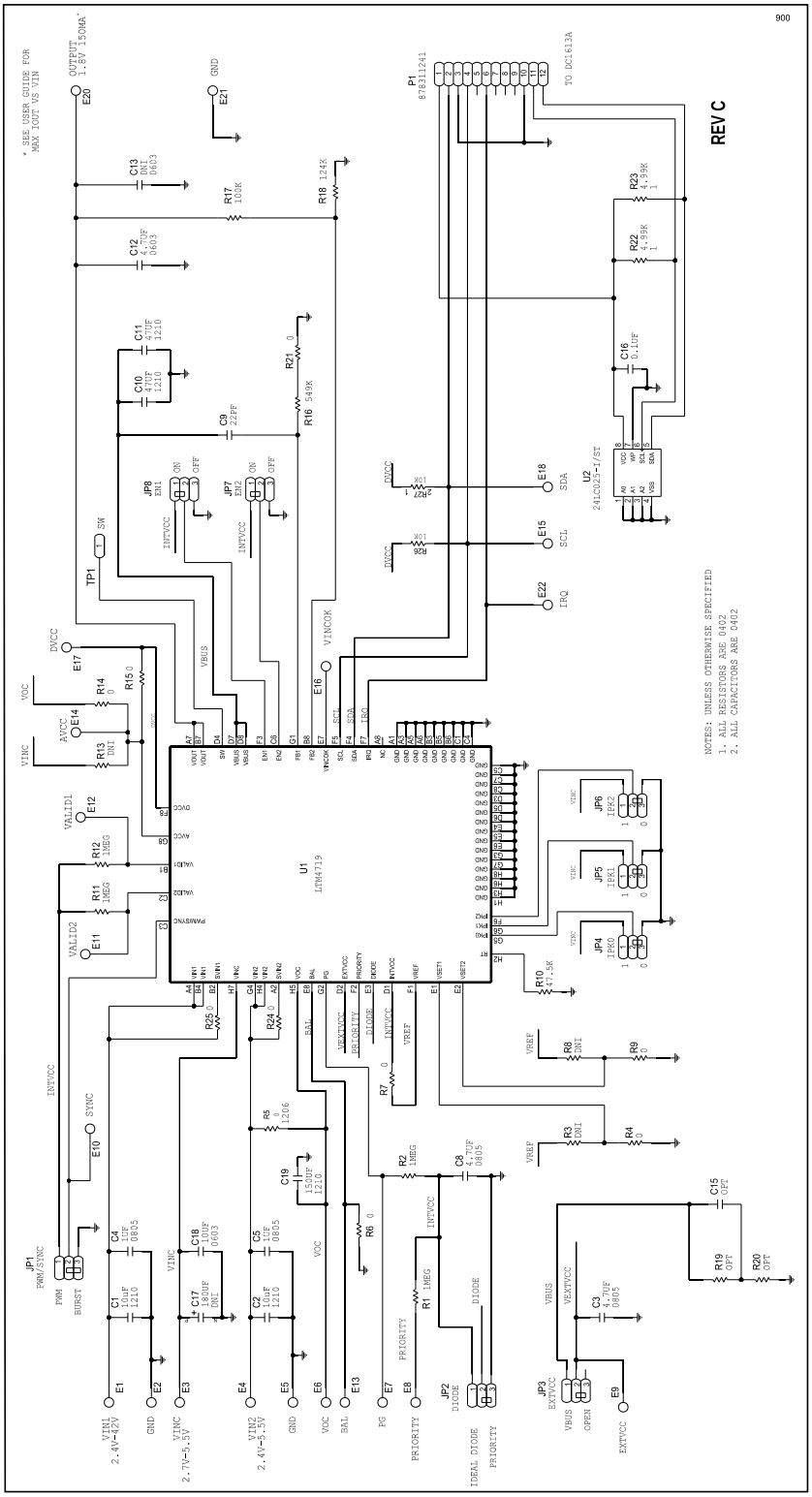
Figure 5. Switchover to Battery Power

EVAL-LTM4719-AZ Evaluation Board Bill of Materials

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C1, C2	CAP., 10µF, 50V, –20% TO 80%, Y5V, 1210	AVX CORPORATION, 12105G106ZAT2A
2	2	C10, C11	CAP., 47µF, 10V, 10%, X7R, 1210	MURATA, GRM32ER71A476KE15L
3	1	C12	CAP., 4.7µF, 6.3V, 10%, X7R, 0603	SAMSUNG, CL10B475KQ8NQNC
4	1	C16	CAP., 0.1µF, 25V, 10%, X7R, 0402	MURATA, GRM155R71E104KE14D
5	1	C18	CAP., 10µF, 10V, 10%, X5R, 0603	MURATA, GRM188R61A106KE69D
6	1	C19	CAP., 150µF, 6.3V, 20%, X5R, 1210	SAMSUNG, CL32A157MQVNNNE
7	2	C3, C8	CAP., 4.7µF, 50V, 10%, X7R, 0805	MURATA, GRM21BZ71H475KE15L
8	2	C4, C5	CAP., 1µF, 50V, 10%, X5R, 0805	MURATA, GRM219R61H105KA73D
9	1	C9	CAP., 22pF, 50V, 5%, C0G, 0402, AEC-Q200	MURATA, GCM1555C1H220JA16J
10	21	E1-E18, E20-E22	CONN-PCB SOLDER TERMINAL, TEST POINT TURRET, 0.094″ MTG. HOLE PCB 0.062″ THK	MILL-MAX, 2501-2-00-80-00-00-07-0
11	8	JP1-JP8	CONN-PCB 3-POS UNSHROUDED HDR SINGLE ROW ST, 5.84mm POST HEIGHT, 2.54mm SOLDER TAIL, 2.54mm PITCH	SAMTEC INC., TSW-103-07-F-S
12	1	P1	CONN-PCB 12-POS MALE HDR SHROUDED DOUBLE ROW ST, 2mm PITCH, 2.50mm SOLDER TAIL	MOLEX, 87831-1241
13	1	PCB1	PCB, EVAL-LTM4719-AZ	ADI APPROVED SUPPLIER, 08_070955C
14	2	R1, R2	RES., 1MΩ, 1%, 1/10W, 0402, AEC-Q200	PANASONIC, ERJ-2RKF1004X
15	1	R10	RES., 47.5kΩ, 0.1%, 1/10W, 0402	VISHAY, TNPW040247K5BEED
16	2	R11, R12	RES., 1MΩ, 5%, 1/10W, 0402, AEC-Q200	PANASONIC, ERJ-2GEJ105X
17	7	R6, R7, R14, R15, R21, R24, R25	RES., 0Ω JUMPER, 1/16W, 0402, AEC-Q200	YAGEO, AC0402JR-070RL
18	1	R16	RES., 549kΩ, 1%, 1/16W, 0402	YAGEO, RC0402FR-07549KL
19	1	R17	RES., 100kΩ, 5%, 1/10W, 0402, AEC-Q200	PANASONIC, ERJ-2GEJ104X
20	1	R18	RES., 124kΩ, 1%, 1/16W, 0402	YAGEO, RC0402FR-07124KL
21	2	R22, R23	RES., 4.99kΩ, 1%, 1/10W, 0402, AEC-Q200	PANASONIC, ERJ-2RKF4991X
22	2	R26, R27	RES., 10kΩ, 1%, 1/10W, 0402, AEC-Q200	PANASONIC, ERJ-2RKF1002X

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
23	2	R4, R9	RES., 0Ω JUMPER, 1/10W, 0402, AEC-Q200	PANASONIC, ERJ-2GE0R00X
24	1	R5	RES., 0Ω JUMPER, 3/4W, 1206, AEC-Q200, HIGH POWER	VISHAY, CRCW12060000Z0EAHP
25	1	U1	IC-ADI DUAL-INPUT, LOW-NOISE STEP-DOWN µModule REGULATOR	ANALOG DEVICES, LTM4719IY#PBF
26	1	U2	IC EEPROM 2-KBIT I^2C SERIAL EEPROM 400kHZ	MICROCHIP TECHNOLOGY, 24LC025-I/ST
Required Circuit Components				
1	1	C13	CAP., OPTION, 0603	
2	1	C15	CAP., OPTION, 0402	
3	1	C17	CAP., OPTION, 8mm × 11.9mm	
4	5	R3, R8, R13, R19, R20	RES., OPTION, 0402	
Hardware: For Evaluation Board Only				
1	4		STANDOFF, BRD SPT SNAP FIT, 12.7mm LENGTH	KEYSTONE, 8833
2	8	XJP1-XJP8	CONN., SHUNT, FEMALE, 2-POS, 0.100″ PITCH	SAMTEC, SNT-100-BK-G

EVAL-LTM4719-AZ Schematic



Ordering Information

PART	TYPE
EVAL-LTM4719-AZ	The evaluation board features the LTM4719, a 42V dual input, low noise 150mA µModule regulator with an I^2C battery health monitor.

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	01/25	Initial release	—

Notes

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Analog Devices Inc.:

EVAL-LTM4719-AZ