

A81415 Evaluation Board User Guide

DESCRIPTION

The A81415 evaluation board is designed to help system designers evaluate the operation and performance of a power management IC. The A81415 evaluation board provides connections to a buck-boost preregulator, five low-dropout oscillators (LDOs), a wheel-speed sensor interface, and serial port interface (SPI).

FEATURES

- A81415 synchronous buck-boost preregulator
- V_{IN} operating range from 3.2 V to 36 V
- Five internal linear regulators with fold-back short-circuit protection
- Integrated wheel-speed sensor interface compatible with AK Protocol Level 2, Level 3, and Level 3 High Resolution
- Control and diagnostic reporting through a secure SPI communication channel
- Frequency dithering and controlled slew rate to reduce electromagnetic interference (EMI) and improve electromagnetic compatibility (EMC)



Figure 1: A81415 Evaluation Board

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Table 1: A81415 Evaluation Board Configurations

Configuration Name	Part Number	V_{LDOA} (V)	V_{LDOB} (V)	$V_{COREMON}$
A81415KEVGTR-1	A81415KEV-01-T	5	5	Enabled
A81415KEVGTR-2	A81415KEV-01-T	5	3.3	Enabled
A81415KEVGTR-3	A81415KEV-01-T	3.3	3.3	Enabled
A81415KEVGTR-4	A81415KEV-01-T	5	5	Disabled

Table 2: General Specifications

Specification	Min	Nom	Max	Units
Input Operating Voltage	3.2	13.5	36	V
Output Current	—	—	1.25	A
Switching Frequency	—	2.2	—	MHz
EN High Threshold	2.7	—	—	V
EN Low Threshold	—	—	2.2	V

USING THE EVALUATION BOARD

This section provides an overview of the connections and configuration options of the A81415 evaluation board. Each group of connections highlighted in Figure 2 is detailed in the sections that follow. The board is configured to operate with a specific part variant: Before power-up of the board, verify that the board configuration (printed on the board within a white box that follows the part number) matches the device under test. The necessary and optional connections are shown in Figure 2: Configuration jumpers and SPI connections are highlighted in orange, and LDO outputs are highlighted in blue. The A81415 datasheet contains detailed information about the use and functionality of each pin. For more detailed information, refer to the datasheet.

Voltage Input

1. Connect a power supply to the green terminal block labeled "VIN" using two wires.
2. Tighten the screws to clamp the wires in place.

NOTE: Clip leads can be used on the test points located on either side of the green terminal block.
3. Observe the polarity on the board for the following conditions:

- A. VIN connected to the positive supply terminal VIN+ (VBAT)
- B. GND connected to the negative supply terminal VIN-.

Five Linear Regulator Outputs

Each of the five linear regulators with fold-back short-circuit protection has a test point connected to its output pin and a load resistor.

1. While measuring the output voltage, connect the positive probe of the multimeter to the appropriate test point.
2. While measuring the output voltage, connect the negative terminal of the multimeter to a nearby GND connection.
3. To apply the load resistors incorporated on the board, install a two-pin jumper on the appropriate three-pin header for the desired output load resistor.

The default jumper positions are highlighted in Figure 2 with a small white line alongside two of the three pins on each header.

4. To measure the output current of each LDO, remove the two-pin jumper and replace it with two probes of an ammeter.

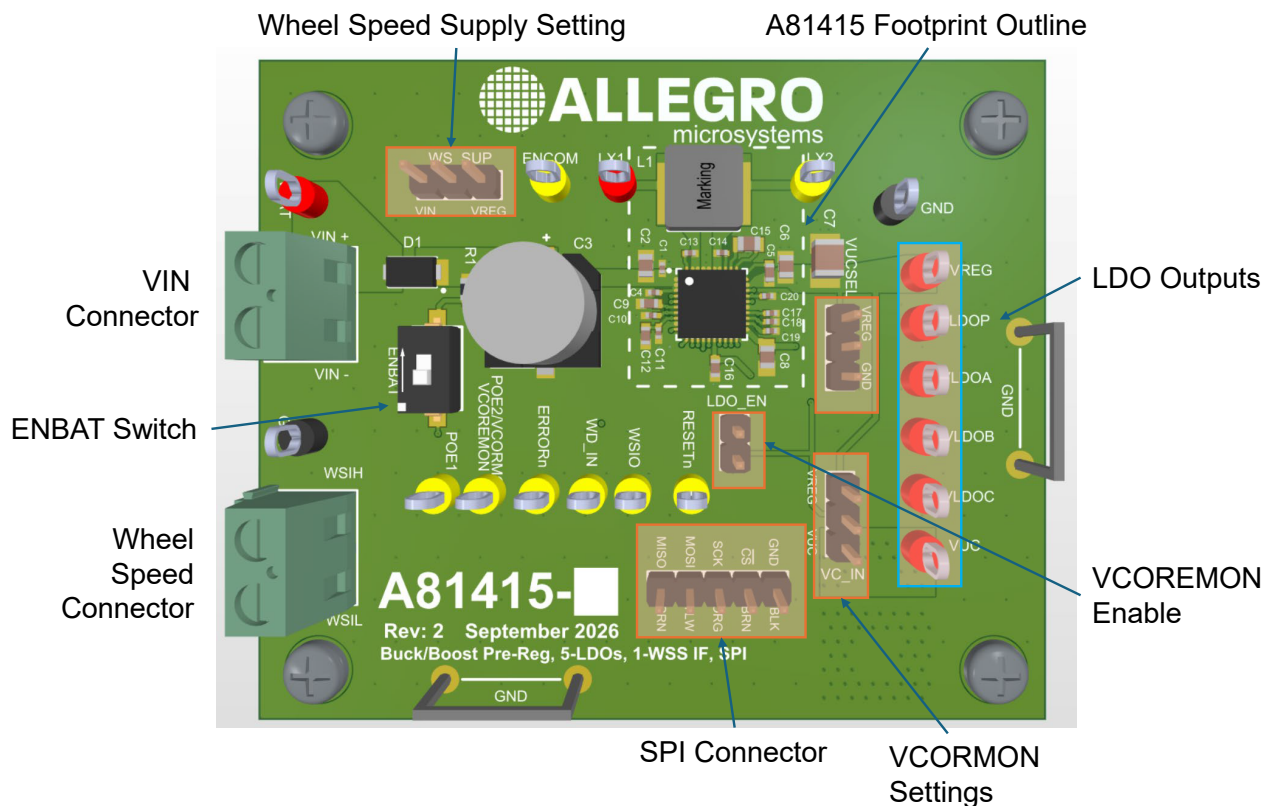


Figure 2: A81415 Evaluation Board Input and Output (I/O) Connections

Output Voltage Configuration

The A81415 can configure two of the five LDO outputs between either 5 V or 3.3 V output levels at the factory. The VLDOA and VLDOB output can be ordered from the factory with either a 3.3 V or 5 V output. To determine the output configuration of a version, refer to the datasheet selection guide. The white box located next to the part number on the board indicates which part is installed on the board.

SPI Communications

The A81415 has a graphical user interface (GUI) for easy communications through the SPI port to a PC using an FTDI cable. The GUI is available for download from the Allegro website. For microcontroller unit (MCU) SPI communication instructions, refer to the datasheet.

Enable

To enable the A81415 evaluation board pull either the ENBAT or ENCOM pin high. For convenience, the ENBAT pin has a switch to pull the pin high and enable the part. If an external signal is needed, use the test point for the ENCOM pin.

Wheel Speed Sensor Interface

The A81415 evaluation board has a wheel-speed sensor interface that connects the wheel-speed sensor via the green connector of the WSIH (V+) and WSIL(V-) pins. The jumper labeled “WS_SUP”, located on the top of the board, determines which power supply to connect to the WSIH pin. To provide power to the wheel-speed sensor, the jumper can tie either the VIN pin or the VREG pin to the WSIH pin.

Diagnostic Outputs

The A81415 includes a power-on reset pin (RESETn) and two safety output pins, POE1 and POE2. Fault registers can also be monitored through SPI communications.

Switching Frequency

The switching frequency of the preregulator is fixed at 2.2 MHz and can be monitored by connecting an oscilloscope probe to the LX1 test point and GND.

VCORE Emulation Circuit

The A81415 incorporates a voltage monitor function through the VCORMON pin. An external LDO is included on this board to test the voltage monitor function. To enable the VCORMON function, place a jumper on the LDO_EN header. To disable the function, remove the jumper from the LDO_EN header. Prior to power up, LDO must be enabled or disabled.

To set the external LDO input voltage, place a jumper on either side of the VC_IN header (VREG or VUC).

NOTE: The state of the LDO pin should not be changed on the fly. Rather, it should be enabled prior to power up. In the real-world application, this pin is intended to be hard-wired.

Startup Procedure

The instructions that follow provide details to begin using the A81415 evaluation board. These instructions refer to the diagram in Figure 2 and the test point descriptions outlined in Table 3. For more technical information, refer to the datasheet.

1. Ensure the VUCSEL and WS_SUP jumpers are in the proper positions. For boards marked "A81415-4", ensure the LDO_EN jumper is removed or is in the open position. For all other boards, ensure the LDO_EN and VC_IN jumpers are installed in the selected positions.
2. Apply an input voltage across the VBAT terminals between 3.2 V and 36 V with a minimum supply current of 2 A. For startup, the typical applied DC level is 12 V.
3. Use the multimeter to check the VREG output to confirm that the A81415 is functional. Continue to check the remaining outputs to confirm that all outputs are operating at their default levels.

For further and more-detailed information about working with the A81415, refer to the datasheet.

Table 3: A81415 Test Point Descriptions

Test Point	Description
VBAT	Positive terminal for input voltage connection or connect wires to the green screw-down test block V+ on the top
VIN-	Negative terminal for input voltage connection or connect wires to the green screw-down test block GND on bottom (VIN-)
ENCOM	High level enable for wake by CAN, Ethernet, or any other wakeup signal
LX1	Buck switching node; switching frequency of the preregulator (22 MHz)
LX2	Boost switching node
VREG	Voltage input to the VLDOA, VLDOB, VLDOC, VLDOP, and VUC regulators
VLDOP	Output voltage of VLDOP regulator
VLDOA	Output voltage of VLDOA regulator
VLDOB	Output voltage of VLDOB regulator
VLDOC	Output voltage of VLDOC regulator
VUC	Output voltage of VUC regulator
RESETn	Controller reset to the MCU
WD_IN	Watchdog Input from MCU
ERRORn	Active low input or toggling signal used to drive POEx low
POE2/ VCORMON	Power-on enable, safety output, forced low during safety state, OR, external regulator MCU core voltage monitor input
POE1	Power-on enable, safety output, forced low during safety state
WSIH	Wheel-speed sensor positive voltage connection (green block)
WSIL	Wheel-speed sensor negative voltage connection (green block)



Figure 3: Startup Sequence Triggered on VIN



Figure 4: Typical Operation

SCHEMATIC

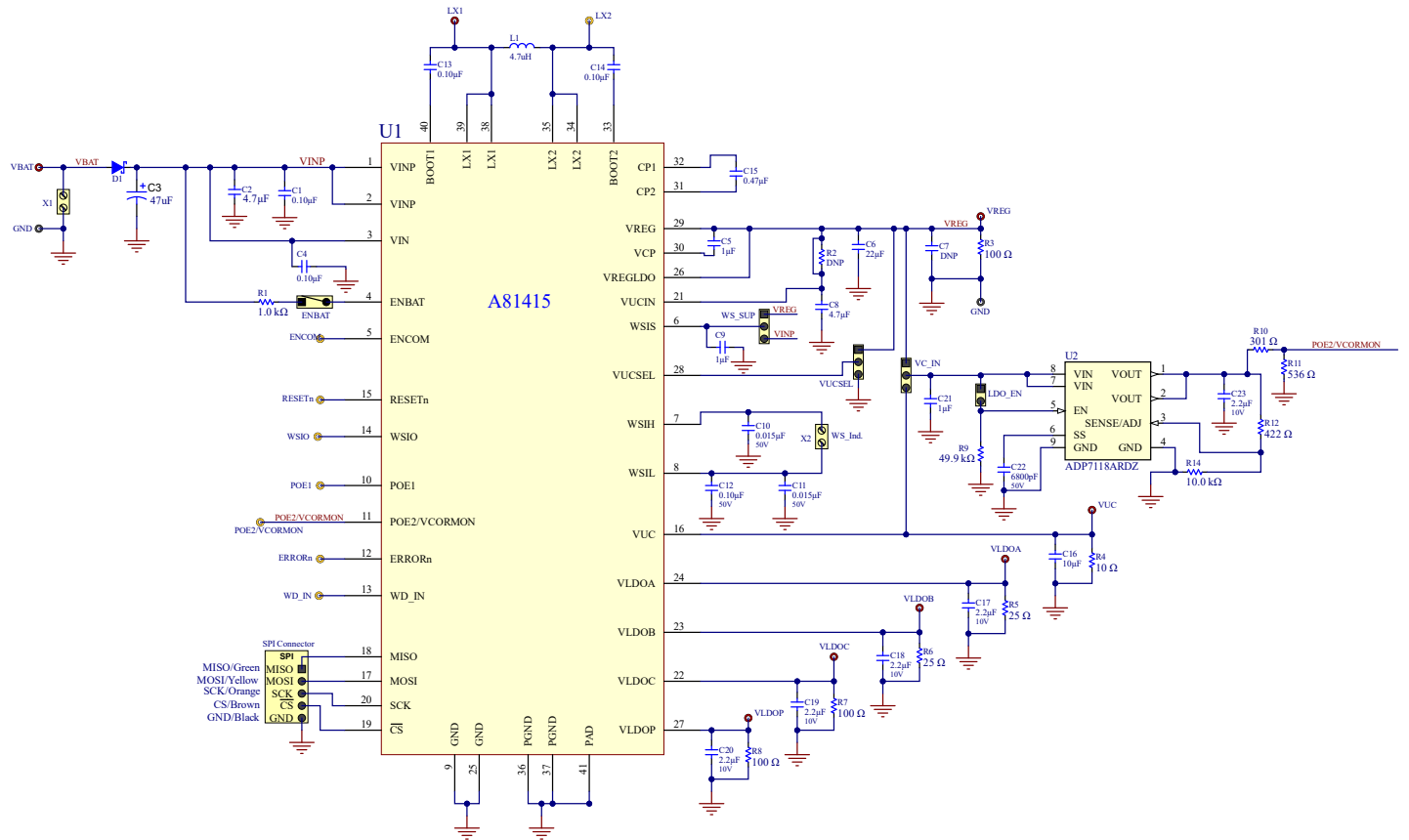


Figure 5: A81415 Evaluation Board Schematic

LAYOUT

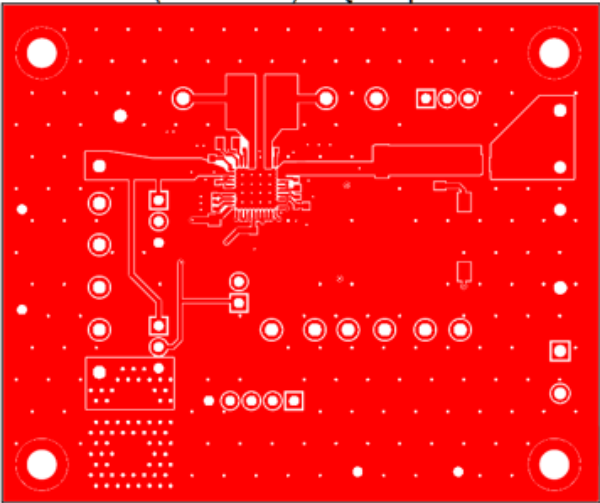


Figure 6: Top Layer PCB

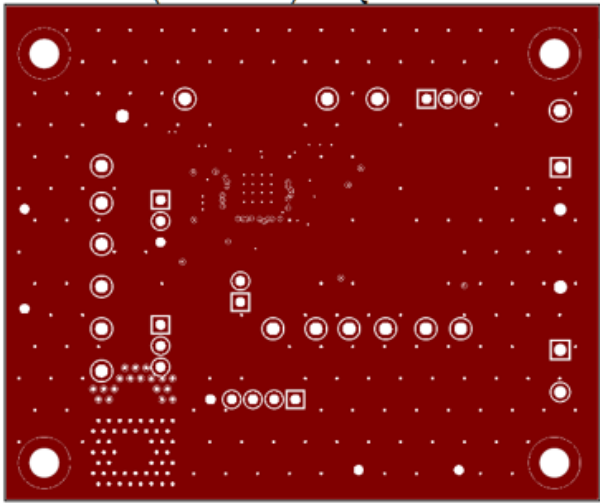


Figure 7: Inner Layer 2 PCB (GND Plane)

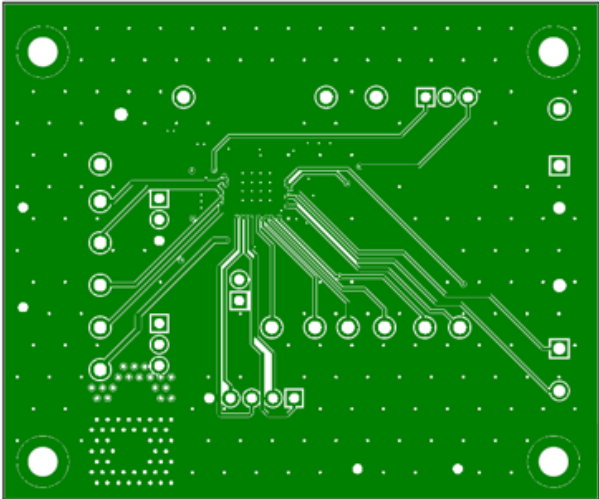


Figure 8: Inner Layer 3 PCB (Test Points 1)

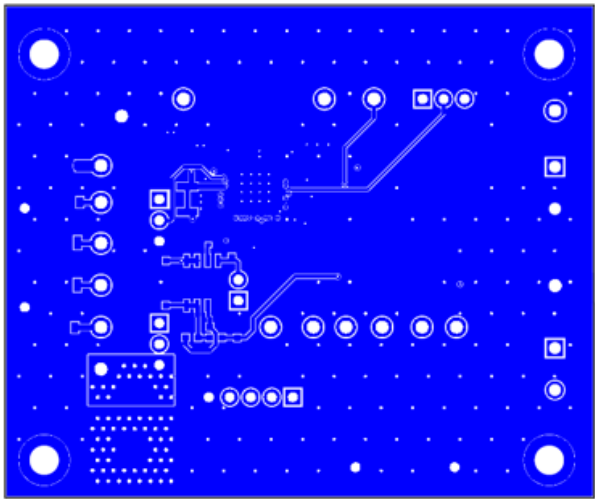


Figure 9: Bottom Layer 4 PCB

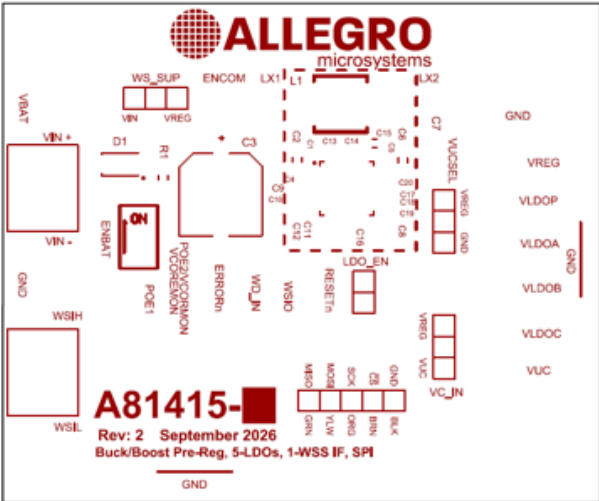


Figure 10: Top Layer Overlay

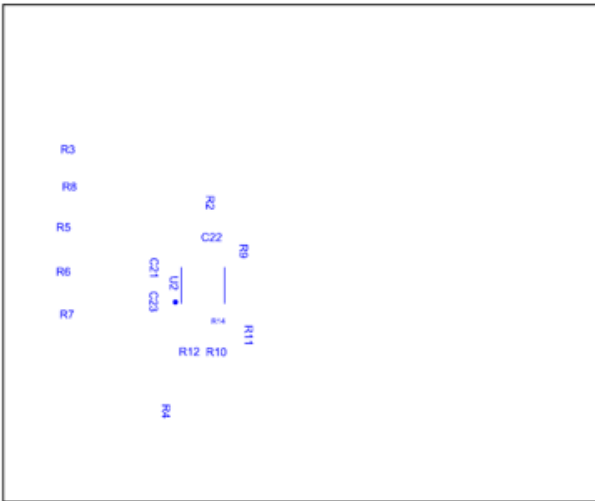


Figure 11: Bottom Layer Overlay

BILL OF MATERIALS

Table 4: A81415 Version Evaluation Board Bill of Materials

Designator	Name	Description	Quantity	Manufacturer	Manufacturer Part Number
C1, C4, C13, C14	0.10 μ F	Capacitor, ceramic, 0.1 μ F, 50 V, X7R 0402	4	Murata	GRM155R71H104KE14J
C2	4.7 μ F	Capacitor, ceramic, 4.7 μ F, 50 V, X7R 0805	1	TDK	CGA4J1X7R1H475K125AE
C3	47 μ F	Capacitor, aluminum, 47 μ F, 20% 50 V, SMD	1	KYOCERA AVX	UBC1H470MNS1GS
C5	1 μ F	Capacitor, ceramic, 1 μ F, 25 V, X7R 0603	1	TDK	CGA3E1X7R1E105K080AC
C6	22 μ F	Capacitor, ceramic, 22 μ F, 10 V, X7R 0805	1	Murata	GRM21BZ71A226ME15K
C7	DNP	Cap CER 22 μ F, 25 V, X7R 1210	1		
C8	4.7 μ F	Capacitor, ceramic, 4.7 μ F, 25 V, X7R 0805	1	TDK	CGA4J1X7R1E475K125AC
C9, C21	1 μ F	Capacitor, ceramic, 1 μ F, 25 V, X7R 0603	2	TDK	CGA3E1X7R1E105K080AD
C10, C11	0.015 μ F	Capacitor, ceramic, 0.015 μ F, 50 V, X7R 0402	2	Murata	GCM155R71H153KA55D
C12	0.10 μ F	Capacitor, ceramic, 0.1 μ F, 50 V, X7R 0603	1	Murata	GCM188R71H104KA57D
C15	0.47 μ F	Capacitor, ceramic, 0.47 μ F, 50 V, X7R 0805	1	Murata	GRM21BR71H474KA88K
C16	10 μ F	Capacitor, ceramic, 10 μ F, 10 V, X7R 0603	1	Murata	GRM188Z71A106KA73D
C17, C18, C19, C20	2.2 μ F	Capacitor, ceramic, 2.2 μ F, 10 V, X7R 0402	4	Murata	GRM155Z71A225KE01D
C22	6800 pF	Capacitor, ceramic, 6800 pF, 50 V, X7R 0402	1	Murata	GCM155R71H682KA55D
C23	2.2 μ F	Capacitor, ceramic, 2.2 μ F, 10 V, X7R 0603	1	Murata	GRM188R71A225ME15D
D1	Diode (Schottky) DO221BC	Diode, Schottky, 45 V, 3 A, DO-221BC	1	Vishay	V4PAL45-M3/I
J1	VUCSEL	Connector, header, vertical, 3 position, 2.54 mm	1	Würth Elektronik	61300311121
J2	VC_IN	Connector, header, vertical, 3 position, 2.54 mm	1	Würth Elektronik	61300311121
J3	LDO_EN	Connector, header, vertical, 2 position, 2.54 mm	1	Würth Elektronik	61300211121
J5	WS_SUP	Connector, header, vertical, 3 position, 2.54 mm	1	Würth Elektronik	61300311121
J6	SPI connector	Connector, header, vertical, 5 position, 2.54 mm for SPI with VCC pin	1	Würth Elektronik	61300511121
L1	4.7 μ H	Inductor, 4.7 μ H, 20%, 10 A, 21 m Ω	1	Coilcraft	XGL6030-472MEC
MS1, MS2, MS3, MS4	M3 screw	Pan head screw, M3 $\times$ 8 mm cross SL	4	Würth Elektronik	97790803111
R1	1.0 k Ω	Resistor, 1.0 k Ω , 1/8 W, 1%, 0805	1	Panasonic	ERA6AEB102V
R2	DNP	Resistor, 2.2 Ω , 1 W, 1%, 1210	1		
R3, R7, R8	100 Ω	Resistor, 100 Ω , 1/2 W, 1%, 0805	3	Vishay	CRCW0805100RFKEAHP
R4	10 Ω	Resistor, 10 Ω , 3.5 W, 1%, 2512	1	Stackpole Electronics	CSRT2512FT10R0-UP
R5, R6	25 Ω	Resistor, 25 Ω , 2.4 W, 2%, 1206	2	Vishay	RCP1206W25R0GEB
R9	49.9 k Ω	Resistor, 49.9 k Ω , 1/10 W, 1%, 0603	1	Yageo Group	RT0603BRD0749K9L
R10	301 Ω	Resistor, 301 Ω , 1/10 W, 1%, 0603	1	Yageo Group	RT0603FRE07301RL
R11	536 Ω	Resistor, 536 Ω , 1/10 W, 1%, 0603	1	Vishay	CRCW0805536RFKEA
R12	422 Ω	Resistor, 422 Ω , 1/10 W, 1%, 0603	1	Yageo Group	RC0603FR-07422RL
R14	10.0 k Ω	Resistor, 10.0 k Ω , 1/10 W, 1%, 0603	1	Panasonic	ERJ-3EKF1002V
STND1, STND2, STND3, STND4	M3 standoff 15 mm	Standoffs and spacers, 5.0 hex, 15.0 mm, nylon	4	Keystone	25512
SW1	ENBAT	SW, SPST	1	C&K Components	SDA01H1SBD
TP1, TP3, TP5, TP7, TP8, TP9, TP10, TP11	VBAT, LX1, VREG, VUC, VLDOA, VLDOB, VLDOC, VLDOP	Test point, red, through-hole mount, 1.6 mm	8	Keystone	5010
TP2, TP6	GND	Test point, black, through-hole mount, 1.6 mm	2	Keystone	5011

Continued on next page...

Table 4: A81415 Version Evaluation Board Bill of Materials (cont.)

Designator	Name	Description	Quantity	Manufacturer	Manufacturer Part Number
TP4, TP12, TP13, TP14, TP15, TP16, TP17, TP18	LX2, WD_IN, ERRORn, POE2/ VCORMON, POE1, WSIO, RESETn, ENCOM	Test point, yellow, through-hole mount, 1.6 mm	8	Keystone	5014
U1	A81415	Buck-boost preregulator, 5× linear regulators, 1× WSS IF and SPI	1	Allegro MicroSystems	To be supplied
U2	ADP7118ARDZ	IC voltage regulator, linear, adjustable, 8-pin surface-mount SOIC package, exposed thermal pad	1	Analog Devices	ADP7118ARDZ-R7
X1	Terminal block, 2-position	Terminal block, 5.08 mm, vertical, 2 position	1	TE Connectivity	2828372
X2	WS_Ind.	Terminal block, 5.08 mm, vertical, 2 position	1	TE Connectivity	2828372

RELATED LINKS

- A81415 product page on Allegro MicroSystems website:
<https://www.allegromicro.com/en/products/regulate/functional-safety-pmics/a81415>

APPLICATION SUPPORT

- Allegro technical assistance: <https://www.allegromicro.com/en/about-allegro/contact-us/technical-assistance>

Revision History

Number	Date	Description
–	September 17, 2026	Initial release to Allegro website

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