ATM5/e Series Evaluation Kit

User Guide

SUMMARY: This guide provides an overview of the ATM5/e Wireless SoC Series Evaluation Kit (EVK), power-up instructions, and hardware configurations.

Atmosic™

ATM5/e Series Evaluation Kit
September 10, 2026
9973-0228-0011

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Acronyms and Abbreviations

Acronyms	Definition
ATM5/e	ATM53 ATM53e ATM52
ATM53	ATM5305
ATM53e	ATM5305e
ATM52	ATM5205
EVB	Evaluation Board
EVK	Evaluation Kit
LDO	Low Dropout Regulator
OB	On Board
PA	Power Amplifier
SDK	Software Development Kit
SoC	System-on-Chip

1. Overview

The EVK for ATM5/e Wireless SoC Series enables developers to:

- Evaluate ATM5/e Bluetooth Low Energy SoC features, energy harvesting functionality, and performance
- Run basic example applications from the SDK
- Develop and Debug with FTDI debugger included on the EVB
- Measure the ATM5/e device power consumption
- Prototype applications on the ATM5/e

This document provides an overview of the available EVKs, EVBs, power-up instructions, hardware, and Windows driver configurations.

See the Reference Documents section for related documents.

2. Hardware and Software Requirements

2.1 Supported EVK

This document is applicable to:

EVK	SoC Package	SoC Part Number	Kit Part Number
Evaluation Kit for ATM5305 QFN 5x5 mm Package	40-pin 5x5 mm QFN	ATM5305-3NC8QK	ATMEVK-5305-NQK-2
Evaluation Kit for ATM5205 QFN 5x5 mm Package	40-pin 5x5 mm QFN	ATM5205-3NC8QK	ATMEVK-5205-NQK-2

Table 1 - Applicable SoCs and EVKs

2.2 Supported SDK

The Atmosic Zephyr OpenAir SDK can be used with the EVK. Refer to **https://github.com/Atmosic/openair/tree/pre_rel_26.09.0** for more information.

3. ATM5/e EVK Description

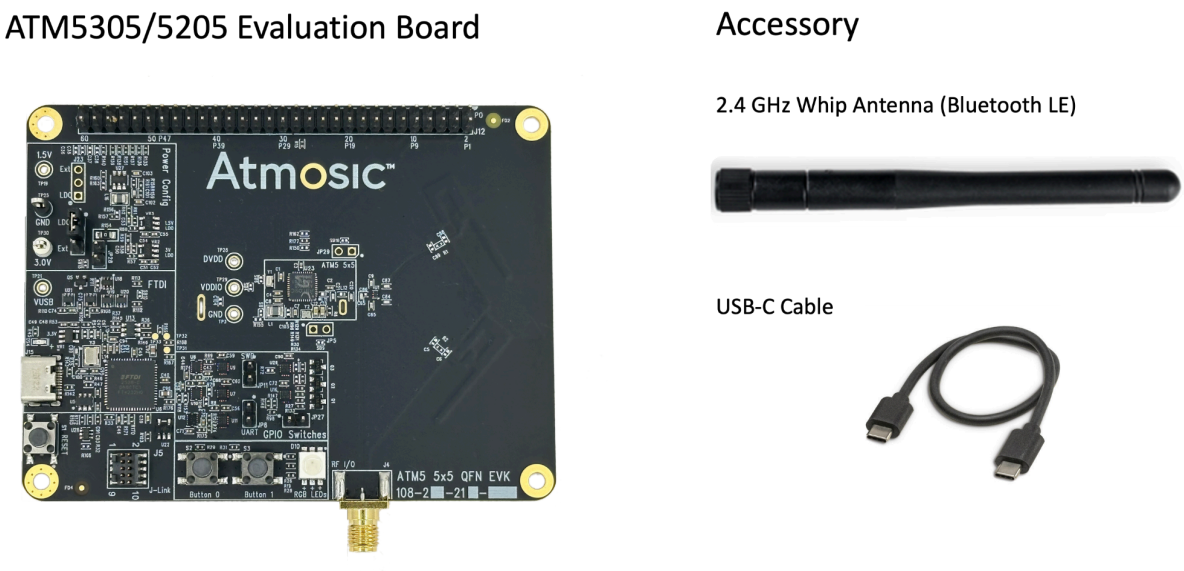

Figure 1 - ATM5/e Evaluation Kit Components

3.1 ATM5305/ATM5205 QFN 5x5 mm EVB Description

Figure 2 highlights some of the key components of the ATM5305/ATM5205 QFN 5x5 mm EVB. Table 2 provides the descriptions of the labeled components.

All components, except for the CR2032-sized battery holder, are on the top side of the board.

The jumper settings as shown in the figure have been configured for typical operation where 3V battery voltage (VBAT3V) for the ATM5305/ATM5205 is supplied by the onboard 3.0 V LDO regulator.

The I/O voltage (VDDIO) of the ATM5/e is internally supplied by an on-chip LDO. The supply voltage (VCCIO) of the onboard voltage level shifters and analog switches and peripherals is generated by an auto-tracking circuit such that VCCIO = VDDIO when VDDIO >= 1.5V.

The BLE RF signal can be accessed by default through the SMA connector J4. This access is useful for conducted measurements, where a coax cable can be used to connect from this connector to an instrument like a spectrum analyzer, a BLE tester, or

another BLE device. In addition, an external commercial 50-ohm 2.4GHz antenna can be connected to J4 if a radiated measurement is desired. Please note that the 50-ohm microstrip feeding J4 has a 0.5dB loss at 2.4GHz. Also, J4 should always be connected to a 50-ohm load when the transmitter is on for accurate power consumption measurements.

If an external commercial 50-ohm 2.4GHz antenna is not available, the on-board optional printed PCB antennas can also be used for radiated measurements. This can be done by removing C65 and installing C86 to reroute the RF signal to the RF switch feeding the printed antennas, and reconfiguring the software to enable the two GPIO signals controlling the switch. Either one antenna, or both antennas can be used, depending on the settings of these two GPIOs.

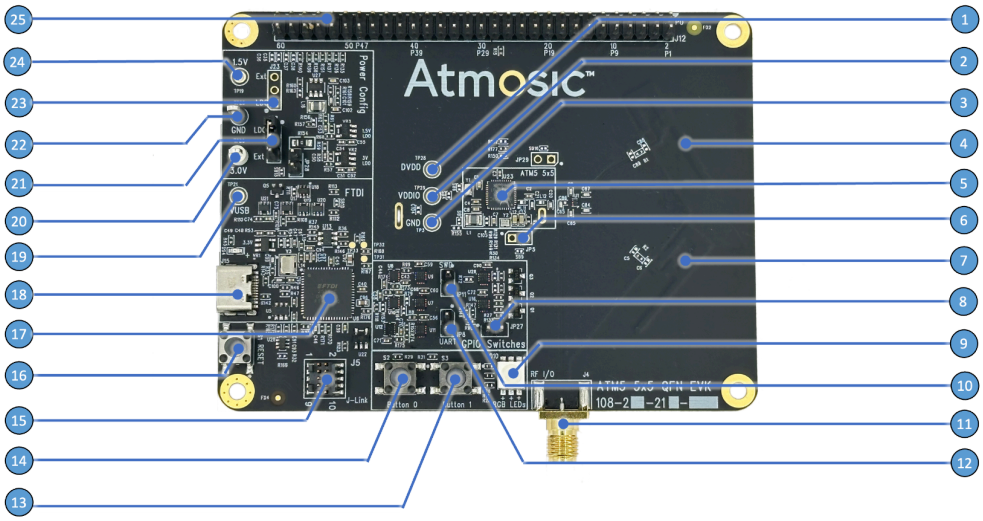

Figure 2 - ATM5305/ATM5205 QFN 5x5 mm Package v2.x EVB Overview

Item	Component	Description
1	DVDD Test Point (TP28)	• Test point for the digital core voltage supply. It is nominally 1V and is internally generated by a switching regulator. • External 1V can be connected to this test point for testing purposes..
2	VDDIO Test Point (TP29)	• Test point for the digital I/O voltage supply. It is nominally 1.8V and is internally generated by an LDO. • External 1.8V can be connected to this test point for testing

Item	Component	Description
		purposes.
3	GND (TP3)	• Ground for the entire board.
4	2.4 GHz PCB Antenna 1	• Printed Inverted-F antenna with better than 10dB Return Loss over the entire 2.4GHz ISM band, without a matching network. • Objects, especially conducted ones, in close proximity to the antenna may negatively affect its performance. • PCB Antenna 1 and Antenna 2 are optional and can be used for radiated testing and measurements, especially for evaluating channel-sounding features and performance. • Note: PCB Antenna 1 and Antenna 2 are fed by an RF switch which is controlled by two GPIO signals. These GPIO signals must be set correctly by software. • Note: To use PCB Antenna 1 and Antenna 2, C86 has to be removed and C65 has to be installed for RF energy to be rerouted to the RF switch.
5	ATM5305/ATM5205	• Atmosic 40-pin 5x5 mm QFN with center GND pad.
6	VBAT1V Test Point (JP5)	• This jumper by default connects (through a solder bridge on the bottom layer) the internally generated 1V voltage to the analog 1V circuitry, through an RC filter, as its supply. • External 1V supply can be connected for testing purposes through this test point / jumper.
7	2.4 GHz PCB Antenna 2	• Printed Inverted-F antenna with better than 10dB Return Loss over the entire 2.4GHz ISM band, without a matching network. • Objects, especially conducted ones, in close proximity to the antenna may affect its performance. • PCB Antenna 1 and Antenna 2 are optional and can be used for radiated testing and measurements, especially for evaluating channel-sounding features and performance. • Note: PCB Antenna 1 and Antenna 2 are fed by an RF switch which is controlled by two GPIO signals. These GPIO signals must be set correctly by software. • Note: To use PCB Antenna 1 and Antenna 2, C65 has to be removed and C86 has to be installed for RF energy to be rerouted to the RF switch.
8	LED/Button Disable Jumper (JP27)	• Installing a jumper at JP27 will disconnect (using the analog switches) the ATM5/e GPIOs from the circuitries related to the LEDs, buttons, and Antenna switch. This isolation is useful for accurate current consumption measurements of the ATM5/e.
9	RGB LED	• This LED has 3 separate controls for Red, Green, and Blue internal LEDs and is used, in conjunction with proper FW code, for demonstration of the PWM features of the ATM5/e.

Item	Component	Description
10	SWD Disable Jumper (JP11)	• Installing a jumper at JP11 will disconnect (using the analog switches) the ATM5/e GPIOs from the SWD signals from the FTDI interface chip and level shifters. This isolation is useful for accurate current consumption measurements of the ATM5/e.
11	Bluetooth LE RFIO Connector (J4)	• An instrument (network analyzer, spectrum analyzer, Bluetooth LE tester) can be connected to this SMA connector for conducted testing and measurements. • A 50-ohm 2.4GHz antenna can also be connected to this SMA connector for radiated testing and measurements.
12	UART Disable Jumper (JP8)	• Installing a jumper at JP8 will disconnect (using the analog switches) the ATM5/e GPIOs from the UART signals from the FTDI interface chip and level shifters. This isolation is useful for accurate current consumption measurements of the ATM5/e.
13	Push Button 1 (S3)	• Pressing this button will change GPIO P12 on the ATM5/e from HIGH to LOW, provided JP27 jumper is not installed.
14	Push Button 0 (S2)	• Pressing this button will change GPIO P11 on the ATM5/e from LOW to HIGH, provided JP27 jumper is not installed.
15	J-Link Connector (J5)	• This connector is used for an external J-Link debugger.
16	Reset Button (S1)	• Pressing this button will assert PWD and reset the ATM5/e.
17	FTDI Debugger	• This chip provides the USB interface to the ATM5/e, enabling its UART and SWD functionalities.
18	USB-C Connector (J15)	• This connector allows communication and control of the ATM/e EVB to and from a computer. It also provides power to the EVB, eliminating the need for an external power supply.
19	USB Power Test Point (TP21)	• This test point allows access to the 5V supply from the computer's USB port. • This test point can also be used to apply an external 5V supply to the EVB in the case where a computer is not available and computer control is not needed.
20	External 3.0V Power Input (TP30)	• This test point allows external 3.0V supply to be applied to the EVB instead of using the on-board 3.0V supply generated by the on-board LDO. This option allows for varying the supply voltage (within the limits of the ATM5/e supply voltage) for testing as well

Item	Component	Description
		as power consumption testing. • Note: To use this external 3.0V supply, the jumper on J22 (item 21) needs to be moved from pin1-pin2 to pin2-pin3. • Note: On this current version of EVB, this external 3.0V supply voltage is limited to a maximum of 3.2V. Please contact technical support if a higher supply voltage is required.
21	VBAT3V Input Selector (J22)	• This 3-pin header J22 allows the selection of powering the ATM5/e with either on-board 3.0V LDO or the external 3.0V supply through TP30 for the default Buck Mode operation.
22	GND (TP25)	• This TP allows access to EVB ground.
23	VBAT1V Input Selector (J23)	• This 3-pin header J23 allows the selection of powering the ATM5/e with either on-board 1.5V LDO or the external 1.5V supply through TP19 for Boost Mode operation.
24	External 1.5V Power Input (TP19)	• This test point allows external 1.5V supply to be applied to the EVB instead of using the on-board 1.5V supply generated by the on-board LDO. This option allows for varying the supply voltage (within the limits of the ATM5/e supply voltage) for testing as well as power consumption testing. • Note: To use this external 1.5V supply, the jumper on J23 (item 23) needs to be moved from pin1-pin2 to pin2-pin3.
25	60-Pin Expansion Header (J12)	• Provide direct access to all GPIOs on the ATM5/e as well as GND and various supplies and signals needed by add-on boards.

Table 2 - ATM5305/ATM5205 QFN 5x5 mm Package v2.x EVB Main Components Descriptions

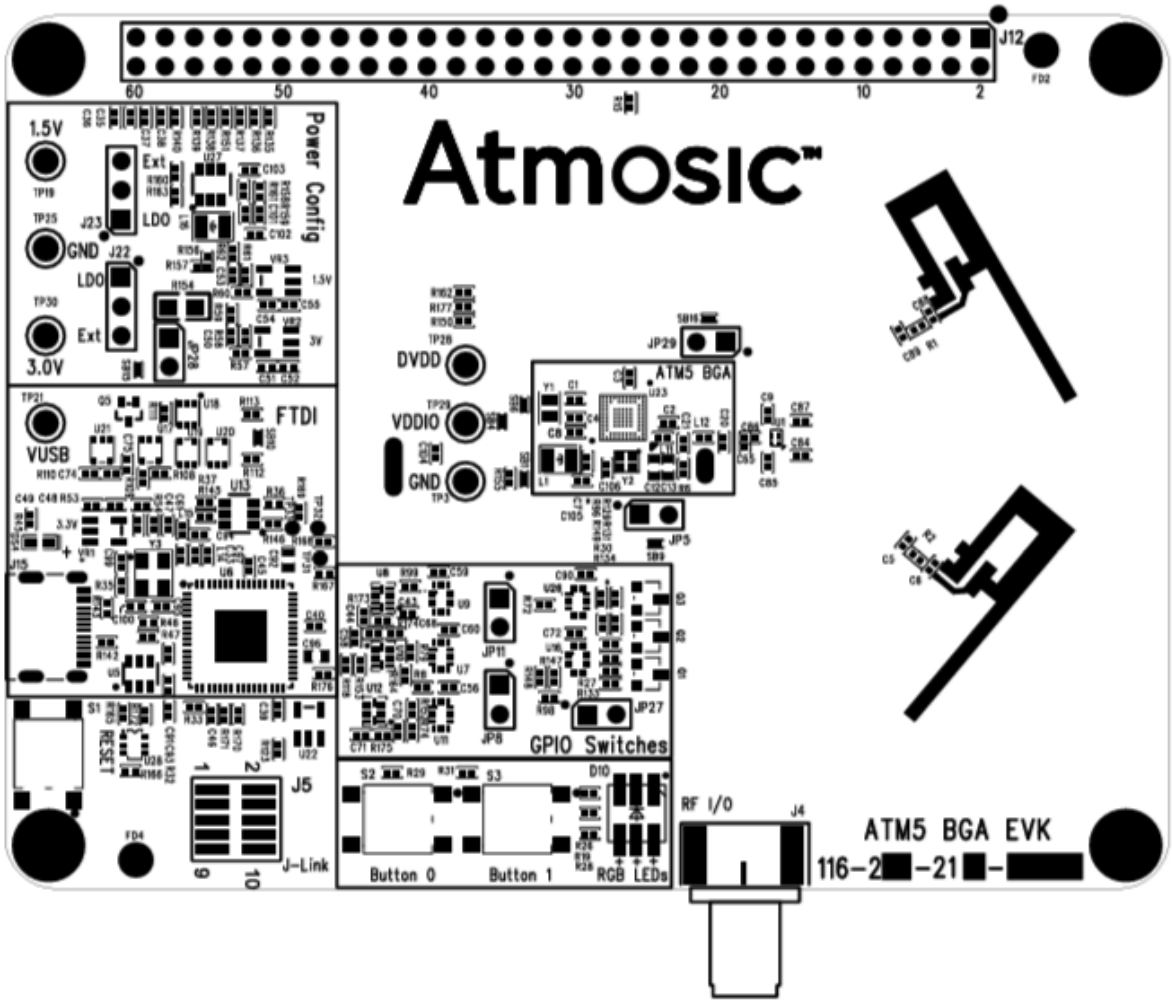

Figure 3 - ATM5305/ATM5205 QFN 5x5 mm Package v2.x EVB Top Silkscreen

The jumpers and resistors on the EVB have been pre-configured for the following default Buck Mode of operation, with UARTs, SWD, and Buttons and LEDs enabled. See Table 4 below.

Default Configuration	Jumper
3.0V is supplied to ATM5/e pin 29 via on-board LDO	J22:1-2
BLE RF signal is routed to the SMA connector J4	J4 connected
Resistors R154, R157, R165 are installed. Resistors R155, R156, R166 are not.	
On-chip PA uses VBAT1V	R177 installed

Default Configuration	Jumper
VDDIO=1.8V, on-chip generated	SB1,SB4 open
UART signals are connected to FTDI Debugger via analog switches	JP8 not installed
SWD and BBOOT signals are connected to FTDI Debugger via analog switches	JP11 not installed
LEDs and Buttons are powered and connected to the ATM5/e GPIOs	JP27 not installed
VCCIO voltage (FTDI I/O voltage) tracks VDDIO voltage (ATM5/e I/O voltage)	R112, R113 installed

Table 3 - ATM5305/ATM5205 QFN 5x5 mm Package v2.x EVB Default Configurations

To reconfigure the EVB, the user can easily add, remove, or move jumpers and resistors. The user needs to match the software settings with the board configurations. Please refer to Reconfigure the EVB section for examples.

The EVB can also be further modified to allow for detailed current measurements if desired by cutting solder bridges and installing jumpers as previously mentioned.

To cut a solder bridge, simply use a blade to cut the thin trace that connects the two pads of the solder bridge. To short/close a solder bridge, simply use a soldering iron and some solder to fuse the two pads together. A microscope may be needed to make sure the connection has been thoroughly cut or fused.

4. Powering on the EVB via the USB Connector

The EVB is configured out of the box to send out Bluetooth LE advertisement beacons once EVB is powered through the USB connector. To do that, connect the EVB to a PC using the supplied USB-C cable. The green USB Power LED next to the USB connector of the EVB should light up, indicating that it is receiving 5 V from the PC's USB port. J22 can then be set to LDO to power the ATM5/e by the on-board 3.0V LDO (jumper on pin1 and pin2 of J22 is installed by default).

The EVB is pre-programmed with the OpenAir beacon application, which runs in simple beacon mode if no button is pressed at boot time. When the EVB runs in simple beacon mode, the on-board RGB LED will blink red in 3s intervals.

The beacons are radiated by the 2.4GHz antenna connected to the SMA connector on the EVB and can be detected over the air by any Bluetooth sniffer phone app.

To perform power consumption measurement, please refer to the **ATM5/e Series EVK Power Consumption Evaluation User Guide** and Making Measurements with the EVB.

5. VDDIO Voltage

The EVB is configured out of the box to support VDDIO of 1.8 V. It can be reconfigured to be the same as VBAT by shorting solder bridge SB4.

For VDDIO voltages other than these two options, an external power supply should be used. The user needs to match the software settings with the board configurations. Please refer to Reconfigure the EVB section for examples.

6. Reconfigure the EVB

Here are a few examples to reconfigure the EVB.

Example 1: The default EVB assumes the BLE RF signal is routed to the SMA connector J4. To use the optional printed PCB antennas, perform the following steps:

1. Remove C65
2. Install C86

Configure the settings of the two GPIOs controlling the switch depending on which antenna is used, or both antennas are used in 2x2 antenna configuration Channel Sounding evaluation.

Example 2: The default EVB assumes an internally generated 1.8V I/O supply. To reprogram the device for external I/O supply equal to VBAT3V, the following procedure needs to be followed:

1) Power down the device.
2) Change the solder bridge SB4 according to the VDDIO Voltage section.
3) Power up the device.
4) Reprogram the device to indicate an externally generated I/O supply.
5) Proceed with evaluation.

7. Making Measurements with the EVB

The EVB can be used to evaluate many performance metrics of the ATM5/e. To obtain accurate results, certain measurements require correct board configurations and/or careful setups and procedures. The following lists several guidelines:

- Conducted Receiver Sensitivity measurements:
    - Good low-loss and well matched (Z0=50ohms up to at least 3GHz) RF cables should be used between the tester and the EVB if needed and this loss should be subtracted from the results. For an optimum setup, direct SMA-to-SMA connection is recommended.
    - The entire setup should be shielded to avoid ambient RF interference. Degradation in sensitivity on certain channels at different measurement times may be an indication of interference.
    - It is crucial that the EVB RFIO Connector (J4) be well terminated with 50 ohms before the EVB is powered on for the measurements because the receiver calibration routine, which occurs at power-up, can be impacted by the input impedance of the receiver. This proper sequence can be done by simply connecting the EVB to the tester first, before powering on the EVB, or by pressing the Reset Button (S1) on the EVB after the RFIO Connector has been connected to the tester input SMA.

Reference Documents

Title	Document Number
ATM5/e Series Datasheet	9972-xxxx-xxxx
ATM5/e Series EVK Power Consumption Evaluation User Guide	9981-xxxx-xxxx

Revision History

Date	Version	Description
September 10, 2026	0.11	Updated with v2.x EVB descriptions
June 16, 2026	0.10	Initial version created.

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