

ATM2/ATM3 Evaluation Kit

User Guide

SUMMARY: An overview of the hardware features and basic usage of the Evaluation Board provided with the ATM2/ATM3 Evaluation Kit.



Atmosic™

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Acronyms and Abbreviations

Acronyms	Definition
ATM2	ATM2202 ATM2221 ATM2251
ATM3	ATM3202 ATM3221
EVB	Evaluation Board
EVK	Evaluation Kit
SDK	Software Development Kit
SoC	System on Chip

1. Overview

The ATM2/ATM3 EVK enables developers to:

- Measure ATM2/ATM3 current consumption
- Validate ATM2/ATM3 Bluetooth Low Energy, and wakeup receiver functionality and performance
- Prototype their own applications on the ATM2/ATM3 devices.

This guide provides an overview of the EVB. To measure ATM2/ATM3 power consumption, please refer to the **ATM2/ATM3 EVK Power Consumption Evaluation User Guide**. To use the Atmosic SDK with the EVK, please refer to the **SDK User Guide**.

2. Hardware and Software Requirements

2.1 Supported EVK

There are multiple versions of the ATM2/ATM3 EVKs based on the specific device and package configuration. See [Table 1](#).

EVK	SoC Package	SoC Part Number	Kit Part Number
Evaluation Kit for ATM2202	40-pin 5x5 mm QFN	ATM2202SR	ATMEVK-M2202-02
Evaluation Kit for ATM2221	64-pin 6x6 mm QFN	ATM2221SR	ATMEVK-M2221-02
Evaluation Kit for ATM2251	37L WLCP	ATM2251SR	ATMEVK-M2251-01
Evaluation Kit for ATM3202	40-pin 5x5 mm QFN	ATM3202SR	ATMEVK-M3202-02
Evaluation Kit for ATM3221	64-pin 6x6 mm DR_QFN	ATM3221SR	ATMEVK-M3221-02

Table 1 - Supported ATM2/ATM3 SoCs and EVKs

2.2 Supported SDK

The Atmosic SDK 5.3.0 or later can be used with the EVK. Refer to the **SDK User Guide** for more information.

3. EVK Description

[Figure 1](#) and [Figure 2](#) show the ATM2202/ATM2221/ATM2251 and ATM3202/ATM3221 EVK content respectively.

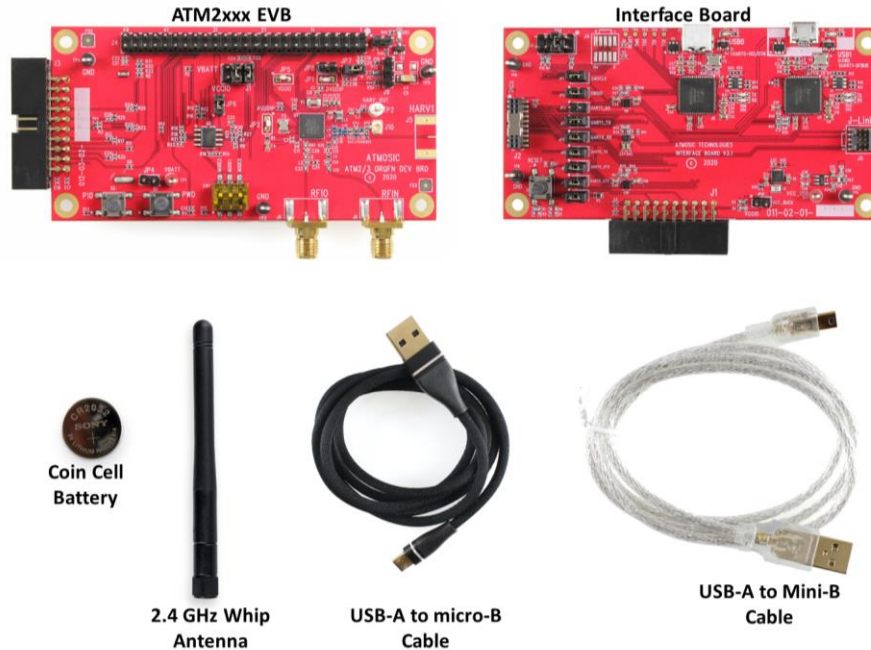


Figure 1 - Content of ATM2202/ATM2221/ATM2251 EVK

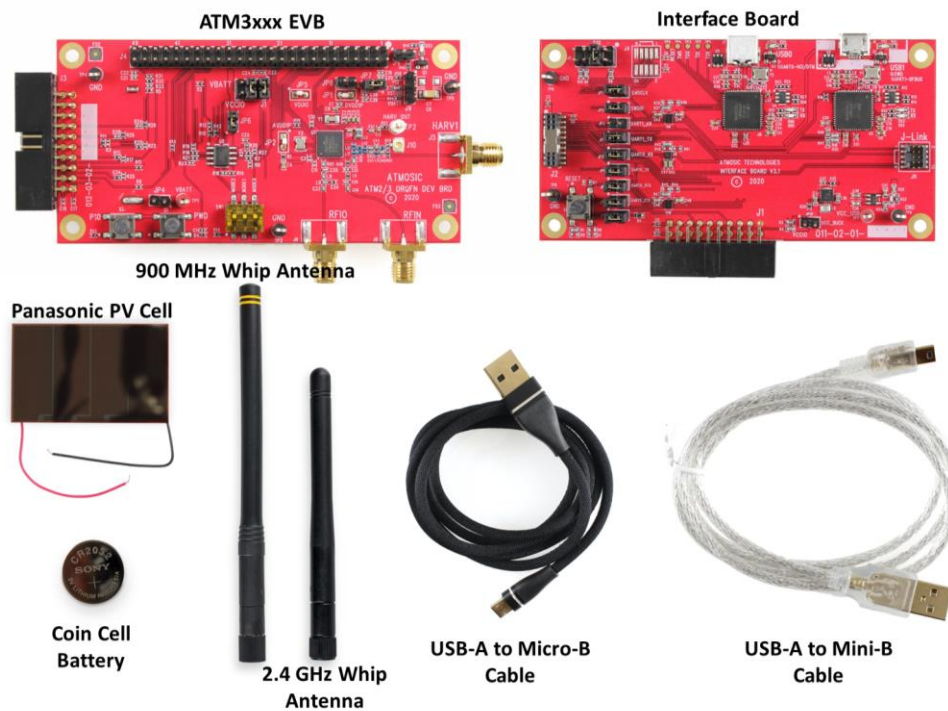


Figure 2 - Content of ATM3202/ATM3221 EVK

3.1 ATM2 EVB Description

[Figure 3](#) and [Figure 4](#) below highlight key elements of current EVB revisions except for the CR2032-sized battery holder, which is on the back side of the board.

3.1.1 ATM2202

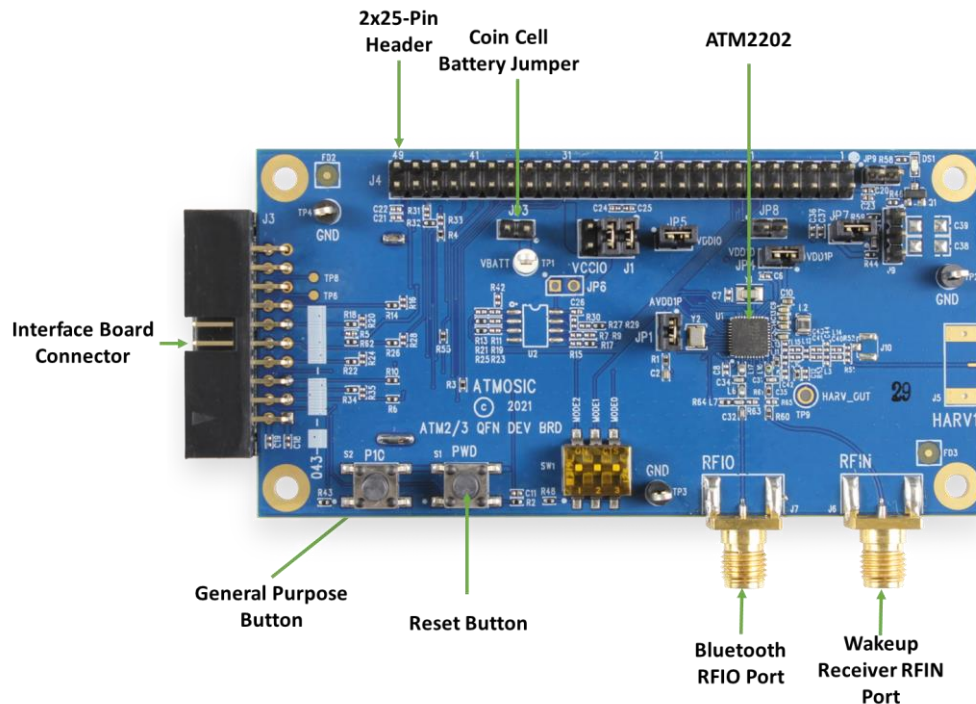


Figure 3 - EVB with ATM2202

Reference	Description
ATM2202	This variant does not support harvesting and has embedded flash.
Coin Cell Battery Jumper	This should be shorted when using the battery holder to power the EVB.
2x25 Pin Header	This 2.54 mm pitch 2x25 50-pin male interface is used to connect ATM2202 GPIO's to other devices. Table 3 shows the header pinout.
Interface Board Connector	This 2.54 mm pitch 2x10 20-pin male interface is used to connect the EVB to an Interface Board.
General Purpose Button	This button is active high and connected to P10 with a pull-down resistor.
Reset Button	This button connects to PWD and will reset ATM2202 when pressed (Active High) and released

Reference	Description
Bluetooth RFIO Port	A 2.4 GHz antenna should be attached to this SMA connector to validate Bluetooth functionality.
Wakeup Receiver RFIN Port	A 2.4 GHz antenna should be attached to this SMA connector to validate wakeup receiver functionality.

Table 2 - ATM2202 EVB Component Description

Header Pin(s) ¹	ATM2202 GPIO	Details
1, 27	N/A	GND
2, 50	N/A	VCCIO/VDDIO
3	P13	Default: GPIO connected to Interface Board connector
7	P17	NC (Do not connect)
9	P19	NC (Do not connect)
10	P20	Default: GPIO connected to Header Pin
12	P22	Default: GPIO connected to Header Pin
13	P23	Default: GPIO connected to Header Pin
14	P24	Default: GPIO connected to Header Pin
15	P25	Default: GPIO connected to Interface Board connector
22	P30	Default: GPIO connected to Interface Board connector
24	P32	Default: GPIO connected to Interface Board connector
25	P33	Default: GPIO connected to Interface Board connector
26	N/A	VCC_3V_BD
31	P1	Default: GPIO connected to Interface Board connector
32	P2	Default: GPIO connected to Interface Board connector

¹ Header Pins not listed in the table are not used.

Header Pin(s) ¹	ATM2202 GPIO	Details
39	P9	Default: GPIO connected to Header Pin
40	P10	Default: GPIO connected to Header Pin
41	P11	Default: GPIO connected to Interface Board connector
47	N/A	Benign Boot
49	N/A	PWD

Table 3 - 2x25 Pin Header Pinout for ATM2202 EVB

3.1.2 ATM2221

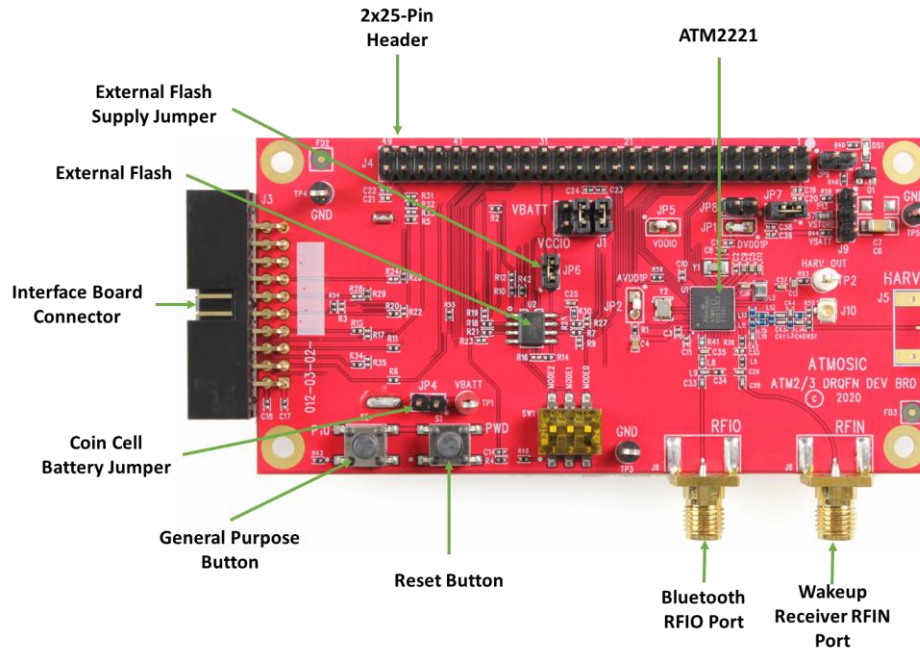


Figure 4 - EVB with ATM2221

Reference	Description
ATM2221	This variant does not support harvesting and does not have embedded flash.
2x25 Pin Header	This 2.54 mm pitch 2x25 50-pin male interface is used to connect ATM2221 GPIO's to other devices. Table 5 shows the header pinout.

Reference	Description
External Flash Supply Jumper	This jumper should be shorted to use the external flash. If this jumper is open, the ATMx201 will execute from ROM and OTP.
External Flash	This Macronix 512 KB QSPI flash is used for code and data storage.
Interface Board Connector	This 2.54 mm pitch 2x10 20-pin male interface is used to connect the EVB to an Interface Board.
Coin Cell Battery Jumper	This should be shorted when using the battery holder to power the EVB.
General Purpose Button	This button is active high and connected to P10 with a pull-down resistor.
Reset Button	This button connects to PWD and will reset ATM2221 when pressed (Active High) and released
Bluetooth RFIO Port	A 2.4 GHz antenna should be attached to this SMA connector to validate Bluetooth functionality.
Wakeup Receiver RFIN Port	A 2.4 GHz antenna should be attached to this SMA connector to validate wakeup receiver functionality.

Table 4 - ATM2221 EVB Component Description

Header Pin(s) ²	ATM 2221 GPIO	Details
1, 27	N/A	GND
2, 50	N/A	VCCIO/VDDIO
3	P13	Default: GPIO connected to Header Pin
4	P14	Default: GPIO connected to external flash on board
5	P15	Default: GPIO connected to external flash on board
6	P16	Default: GPIO connected to external flash on board
7	P17	Default: GPIO connected to external flash on board
8	P18	Default: GPIO connected to external flash on board
9	P19	Default: GPIO connected to external flash on board

² Header Pins not listed in the table are not used.

Header Pin(s) ²	ATM 2221 GPIO	Details
10	P20	Default: GPIO connected to Header Pin
11	P21	Default: GPIO connected to Header Pin
12	P22	Default: GPIO connected to Header Pin
13	P23	Default: GPIO connected to Header Pin
14	P24	Default: GPIO connected to Header Pin
15	P25	Default: GPIO connected to Header Pin
16	P26	Default: GPIO connected to Header Pin
17	P27	Default: GPIO connected to Header Pin
18	P28	Default: GPIO connected to Header Pin
21	P29	Default: GPIO connected to Header Pin
22	P30	Default: GPIO connected to Header Pin
23	P31	Default: GPIO connected to Header Pin
24	P32	Default: GPIO connected to Interface Board connector
25	P33	Default: GPIO connected to Interface Board connector
26	N/A	VCC_3V_BD
33	P3	Default: GPIO connected to Header Pin
34	P4	Default: GPIO connected to Header Pin
35	P5	Default: GPIO connected to Header Pin
36	P6	Default: GPIO connected to Header Pin
37	P7	Default: GPIO connected to Header Pin
38	P8	Default: GPIO connected to Header Pin
39	P9	Default: GPIO connected to Header Pin
40	P10	Default: GPIO connected to Interface Board connector
41	P11	Default: GPIO connected to Interface Board connector
42	P12	Default: GPIO connected to Header Pin

Header Pin(s) ²	ATM 2221 GPIO	Details
47	N/A	Benign Boot
49	N/A	PWD

Table 5 - 2x25 Pin Header Pinout for ATM2221 EVB

3.1.3 ATM2251

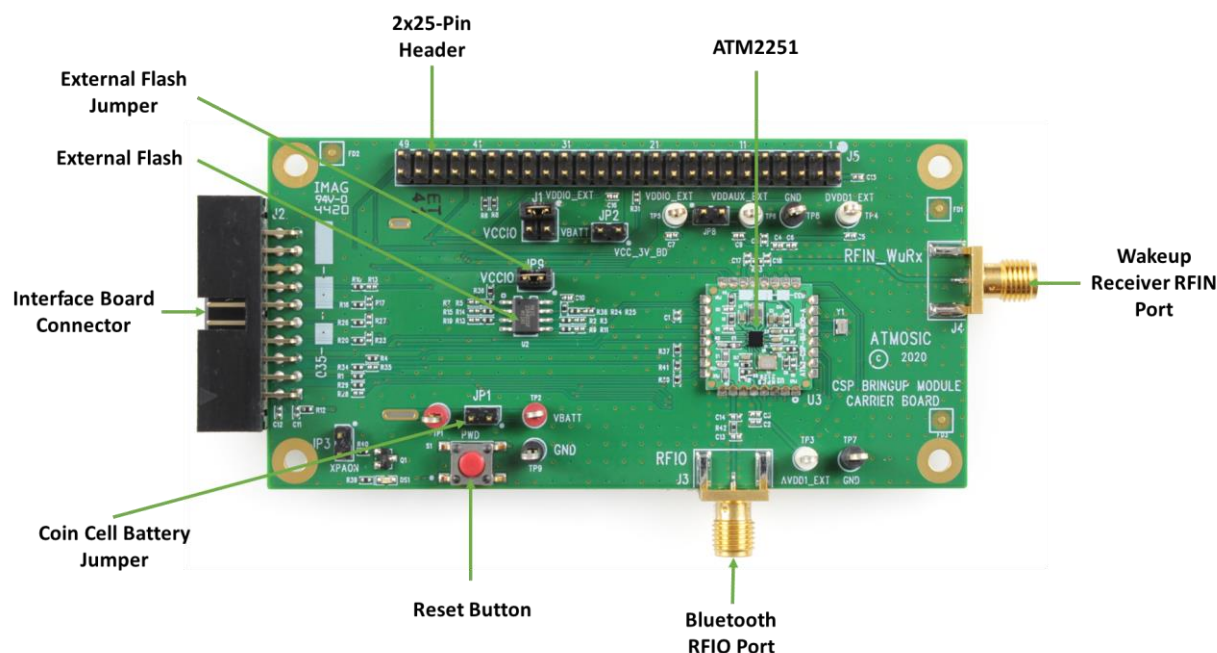


Figure 5 - EVB with ATM2251

Reference	Description
ATM2251	This variant does not support harvesting and does not have embedded flash.
2x25 Pin Header	This 2.54 mm pitch 2x25 50-pin male interface is used to connect ATM2251 GPIO's to other devices. Table 7 shows the header pinout.
External Flash Supply Jumper	This jumper should be shorted to use the external flash. If this jumper is open, the ATMx201 will execute from ROM and OTP.
External Flash	This Macronix 512 KB QSPI flash is used for code and data storage.

Reference	Description
Interface Board Connector	This 2.54 mm pitch 2x10 20-pin male interface is used to connect the EVB to an Interface Board.
Coin Cell Battery Jumper	This should be shorted when using the battery holder to power the EVB.
Reset Button	This button connects to PWD and will reset ATM2251 when pressed (Active High) and released
Bluetooth RFIO Port	A 2.4 GHz antenna should be attached to this SMA connector to validate Bluetooth functionality.
Wakeup Receiver RFIN Port	A 2.4 GHz antenna should be attached to this SMA connector to validate wakeup receiver functionality.

Table 6 - ATM2251 EVB Component Description

Header Pin(s) ³	ATM2251 GPIO	Details
1, 27	N/A	GND
2, 50	N/A	VCCIO/VDDIO
3	P13	Default: GPIO connected to Header Pin
7	P17	Default: GPIO connected to external flash on board)
9	P19	Default: GPIO connected to external flash on board
10	P20	Default: GPIO connected to external flash on board
12	P22	Default: GPIO connected to external flash on board
13	P23	Default: GPIO connected to external flash on board
14	P24	Default: GPIO connected to external flash on board
15	P25	Default: GPIO connected to Interface Board connector
22	P30	Default: GPIO connected to Interface Board connector
24	P32	Default: GPIO connected to Interface Board connector
25	P33	Default: GPIO connected to Interface Board connector

³ Header Pins not listed in the table are not used.

Header Pin(s) ³	ATM2251 GPIO	Details
26	N/A	VCC_3V_BD
39	P9	Default: GPIO connected to Header Pin
40	P10	Default: GPIO connected to Header Pin
41	P11	Default: GPIO connected to Header Pin
47	N/A	Benign Boot
49	N/A	PWD

Table 7 - 2x25 Pin Header Pinout for ATM2251 EVB

3.2 ATM3 EVB Description

3.2.1 ATM3202

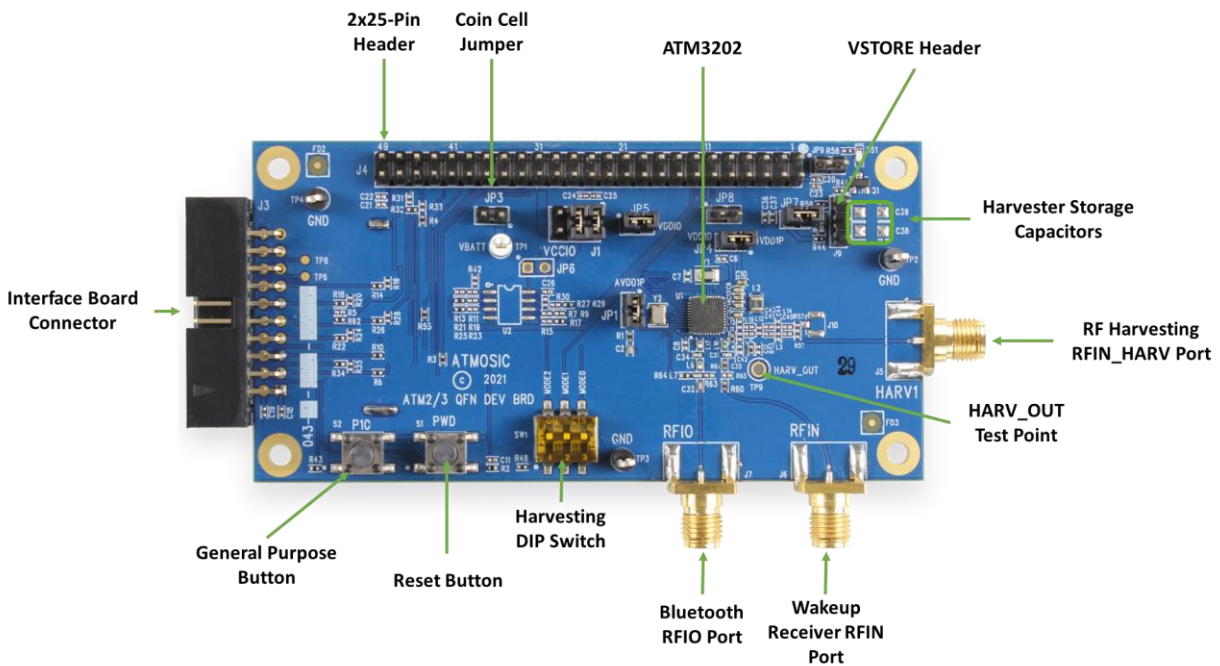


Figure 6 - EVB with ATM3202

Reference	Description
ATM3202	This variant supports harvesting and has embedded flash.
Coin Cell Battery Jumper	This should be shorted when using the battery holder to power the EVB.
2x25 Pin Header	This 2.54 mm pitch 2x25 50-pin male interface is used to connect ATM3202 GPIO's to other devices. Table 9 shows the header pinout.
Interface Board Connector	This 2.54 mm pitch 2x10 20-pin male interface is used to connect the EVB to an Interface Board.
General Purpose Button	This button is active high and connected to P10 with a pull-down resistor.
Reset Button	This button connects to PWD and will reset ATM3202 when pressed (Active High) and released
Harvesting DIP Switch	This switch configures the ATM3202 for different battery types and harvesting modes. Please refer to the ATM32xx EVK Energy Harvesting Quick Start Guide for details.
Bluetooth RFIO Port	A 2.4 GHz antenna should be attached to this SMA connector to validate Bluetooth functionality.
Wakeup Receiver RFIN Port	A 2.4 GHz antenna should be attached to this SMA connector to validate wakeup receiver functionality.
HARV_OUT Test Point	Testing point for output of RF Harvester, can also be used as input from other harvesting modalities to supply energy to the ATM3202
RF Harvester RFIN_HARV Port	A 915 MHz antenna should be attached to this SMA connector to validate RF harvester functionality.
Harvester Storage Capacitors	These capacitors are used to store harvested energy.
VSTORE Header	This header configures the ATM3202 for rechargeable battery or harvesting meter operation. Please refer to the ATM32xx EVK Energy Harvesting Quick Start Guide for details.

Table 8 - ATM3202 EVB Component Description

Header Pin(s) ⁴	ATM3202 GPIO	Details
1, 27	N/A	GND
2, 50	N/A	VCCIO/VDDIO
3	P13	Default: GPIO connected to Interface Board connector
7	P17	NC (Do not connect)
9	P19	NC (Do not connect)
10	P20	Default: GPIO connected to Header Pin
12	P22	Default: GPIO connected to Header Pin
13	P23	Default: GPIO connected to Header Pin
14	P24	Default: GPIO connected to Header Pin
15	P25	Default: GPIO connected to Interface Board connector
22	P30	Default: GPIO connected to Interface Board connector
24	P32	Default: GPIO connected to Interface Board connector
25	P33	Default: GPIO connected to Interface Board connector
26	N/A	VCC_3V_BD
31	P1	Default: GPIO connected to Interface Board connector
32	P2	Default: GPIO connected to Interface Board connector
39	P9	Default: GPIO connected to Header Pin
40	P10	Default: GPIO connected to Header Pin
41	P11	Default: GPIO connected to Interface Board connector
47	N/A	Benign Boot
49	N/A	PWD

Table 9 - 2x25 Pin Header Pinout for ATM3202 EVB

⁴ Header Pins not listed in the table are not used.

3.2.2 ATM3221

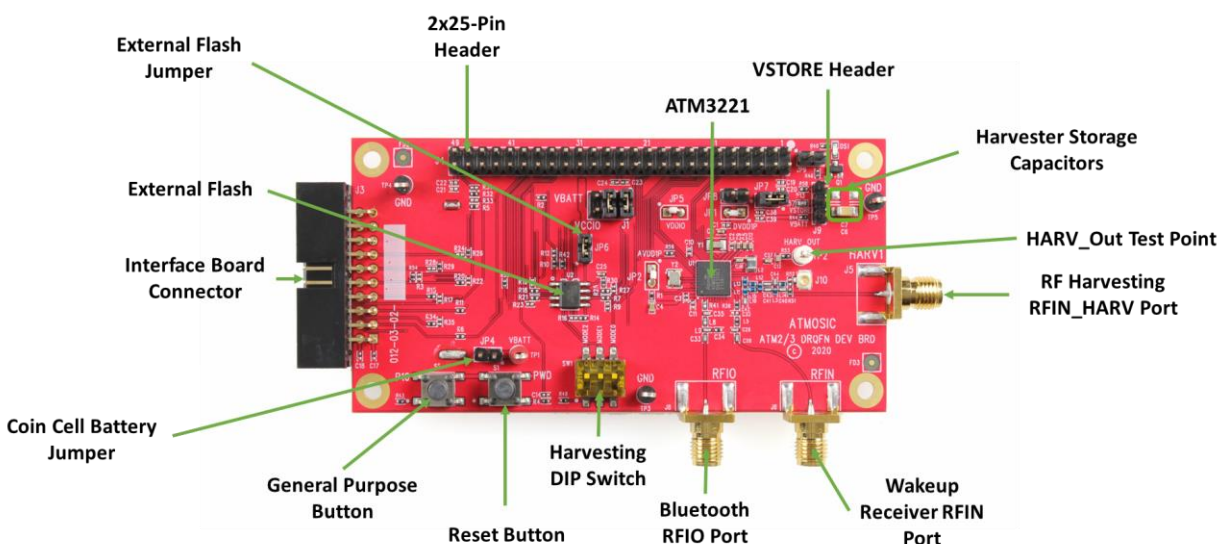


Figure 7 - EVB with ATM3221

Reference	Description
ATM3221	This variant supports harvesting and does not have embedded flash.
2x25 Pin Header	This 2.54 mm pitch 2x25 50-pin male interface is used to connect ATM3221 GPIO's to other devices. Table 11 shows the header pinout.
External Flash Supply Jumper	This jumper should be shorted to use the external flash. If this jumper is open, the ATM3221 will execute from ROM and OTP.
External Flash	This Macronix 512 KB QSPI flash is used for code and data storage.
Interface Board Connector	This 2.54 mm pitch 2x10 20-pin male interface is used to connect the EVB to an Interface Board.
Coin Cell Battery Jumper	This should be shorted when using the battery holder to power the EVB.
General Purpose Button	This button is active high and connected to P10 with a pull-down resistor.
Reset Button	This button connects to PWD and will reset ATM3221 when pressed (Active High) and released
Harvesting DIP Switch	This switch configures the ATM3221 for different battery types and harvesting modes. Please refer to the ATM32xx EVK Energy Harvesting Quick Start Guide for details.

Reference	Description
Bluetooth RFIO Port	A 2.4 GHz antenna should be attached to this SMA connector to validate Bluetooth functionality.
Wakeup Receiver RFIN Port	A 2.4 GHz antenna should be attached to this SMA connector to validate wakeup receiver functionality.
RF Harvester RFIN_HARV Port	A 915 MHz antenna should be attached to this SMA connector to validate RF harvester functionality.
HARV_OUT Test Point	Testing point for output of RF Harvester, can also be used as input from other harvesting modalities to supply energy to the ATM3321
Harvester Storage Capacitors	These capacitors are used to store harvested energy. Please refer to the ATM32x1 Energy Harvesting Application Note for details.
VSTORE Header	This header configures the ATM3221 for rechargeable battery or harvesting meter operation. Please refer to the ATM32xx EVK Energy Harvesting Quick Start Guide for details.

Table 10 - ATM3221 EVB Component Description

Header Pin(s) ⁵	ATM3221 GPIO	Details
1, 27	N/A	GND
2, 50	N/A	VCCIO / VDDIO
3	P13	Default: GPIO connected to Header Pin
4	P14	Default: GPIO connected to external flash on board
5	P15	Default: GPIO connected to external flash on board
6	P16	Default: GPIO connected to external flash on board
7	P17	Default: GPIO connected to external flash on board
8	P18	Default: GPIO connected to external flash on board
9	P19	Default: GPIO connected to external flash on board
10	P20	Default: GPIO connected to Header Pin
11	P21	Default: GPIO connected to Header Pin
12	P22	Default: GPIO connected to Header Pin

⁵ Header Pins not listed in the table are not used.

Header Pin(s) ⁵	ATM3221 GPIO	Details
13	P23	Default: GPIO connected to Header Pin
14	P24	Default: GPIO connected to Header Pin
15	P25	Default: GPIO connected to Header Pin
16	P26	Default: GPIO connected to Header Pin
17	P27	Default: GPIO connected to Header Pin
18	P28	Default: GPIO connected to Header Pin
21	P29	Default: GPIO connected to Header Pin
22	P30	Default: GPIO connected to Header Pin
23	P31	Default: GPIO connected to Header Pin
24	P32	Default: GPIO connected to Interface Board connector
25	P33	Default: GPIO connected to Interface Board connector
26	N/A	VCC_3V_BD
33	P3	Default: GPIO connected to Header Pin
34	P4	Default: GPIO connected to Header Pin
35	P5	Default: GPIO connected to Header Pin
36	P6	Default: GPIO connected to Header Pin
37	P7	Default: GPIO connected to Header Pin
38	P8	Default: GPIO connected to Header Pin
39	P9	Default: GPIO connected to Header Pin
40	P10	Default: GPIO connected to Interface Board connector
41	P11	Default: GPIO connected to Interface Board connector
42	P12	Default: GPIO connected to Header Pin
47	N/A	Benign Boot
49	N/A	PWD

Table 11 - 2x25 Pin Header Pinout for ATM3221 EVB

4. Powering on the EVB

The EVB can be powered on in the following ways:

1) Interface board

This method is recommended when using the SDK to program the board. Please refer to the **SDK User Guide** for instructions. Please remove the coin cell battery jumper from the EVB before connecting the interface board to the EVB.

2) Power supply⁶

This method is recommended when measuring current consumption. Please remove the coin cell battery jumper from the EVB before measuring power consumption, and refer to the **ATM2/ATM3 EVK Power Consumption Evaluation User Guide** for further instructions.

3) CR2032-sized coin cell battery

The EVB is configured out of the box to send out Bluetooth LE advertisement beacons once the coin cell battery included in the kit is inserted into the holder at the back side of the EVB, without the need of a PC. Please make sure the Coin Cell Battery Jumper is shortened so that EVB will be powered from the coin cell battery, as described under EVB Component Description in EVB Description chapter.

The beacons can be detected over the air by any Bluetooth sniffer phone app if the 2.4 GHz antenna (the shorter of the two antennas included in the kit) is connected to the SMA connector labeled RFIO and the phone is placed close to the EVB.

5. Bluetooth Low Energy RF PHY Testing

RF PHY testing can be performed with a Bluetooth tester (for example, R&S CMW270, Anritsu MT8852, etc.) by running a serial 2-wire link with the DTM application provided in the SDK examples directory.

EVK setup is shown in [Figure 8](#):

⁶ The default ATM2 EVB configuration only supports voltage levels >1.8 V.

- 1) Plug the interface board into the EVB.
- 2) Attach an RF cable to the RFIO port of the EVB.
- 3) Attach the other end of the RF cable to the tester.
- 4) Plug in a USB cable into the USB0 port of the interface board.
- 5) Plug the other end of the USB cable into the tester. The tester should select the second USB0 COM port from the Interface board. and configure it to 460800 baud, 8 bits, 1 stop bit, and no parity. If a lower baud rate is desired, modify the setting in the UART0 driver (as shown in [Figure 8](#)) and the tester.

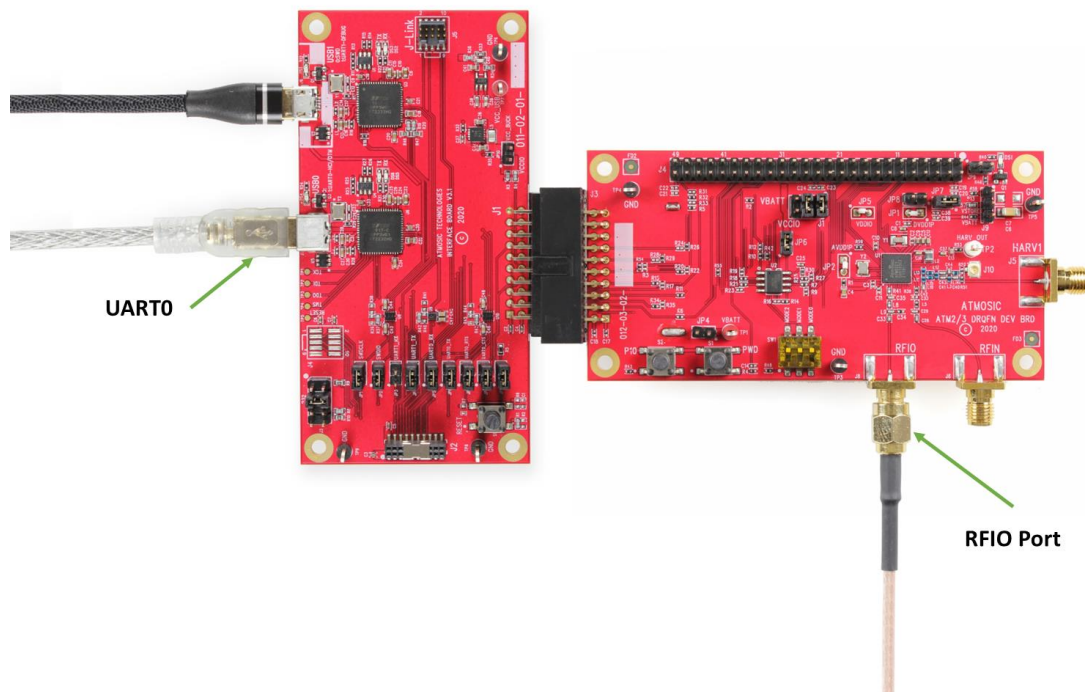


Figure 8 - EVK Setup

5.1 RF PHY Performance

[Table 12](#) shows typical EVB results measured with the Frontline TLF3000.

Measured RF Parameter	Measured Value			Unit
	Min	Typical	Max	
Tx Power	2.5	3.5	4.5	dBm
Rx Sensitivity @ 1 Mbps	-92	-94	-96	dBm
Rx Sensitivity @ 2 Mbps	-90	-92	-94	dBm

Table 12 - Typical EVB RF PHY Performance

Reference Documents

Title	Document Number
ATM2201/ATM2221/ATM2231 Datasheet	ATM22x1-DS
ATM2251 Datasheet	ATM2251-DS
ATM3201/ATM3221/ATM3231 Datasheet	ATM32x1-DS
ATM3202 Datasheet	ATM3202-DS
ATM2/ATM3 EVK Power Consumption Evaluation User Guide	ATM2_ATM3-UGPCE
ATM32xx EVK Energy Harvesting Quick Start Guide	ATM32xx-QSEHV
SDK User Guide	ATM-UGSDK

Revision History

Date	Version	Description
April 25, 2023	0.62	Added footnote to Powering on the EVB , item 2.
April 6, 2023	0.61	Changed format, no content change.
April 4, 2023	0.60	Updated content to include both ATM2/ATM3 series. Changed format.
April 14, 2021	0.59	Updated format, no content change.
March 30, 2021	0.58	Updated Overview .
November 20, 2020	0.57	Corrected typos.
March 13, 2020	0.56	Corrected typos.
February 14, 2020	0.55	Updated Overview , Table 3 , Programming the OTP, Programming the Serial Flash, Software configuration, Errata sections.
November 7, 2019	0.54	Updated various sections.
September 24, 2019	0.53	Updated various sections.
August 6, 2019	0.52	Minor formatting update.
July 31, 2019	0.51	Updated various sections.
July 9, 2019	0.50	Initial version created.



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