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# FCC Certification Scenarios for Atmel ZigBits on Customers' products

## Features

- Covers FCC certification scenarios for Atmel ZigBits' usage
- Analyzes the custom products possibilities and likely-hoods for successful certification

## 1 Introduction

Atmel's Wireless applications play vital role in providing IEEE 802.15.4 – compliant, ZigBee, and 6LoWPAN wireless solutions using family of RF devices such as ZigBits, AT86RFxxx, and MegaRF single chip solutions.

These devices are purely based on Atmel's wide range of high performance, low-power IEEE 802.15.4-compliant transceivers for the regional 700/800/900MHz frequency bands available in Europe and North America, and the 2.4GHz band available world wide.



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**Application Note**

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## 2 Overview

This application note describes an overview of the Certification Scenarios possible when a designer uses the Atmel ZigBits portfolio. It also covers the changes that affect Atmel's existing certification due to minor or major changes on designer's hardware.

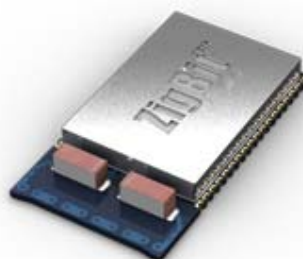
## 3 Atmel's Range of ZigBit Modules and usage scenarios in customer products

### 3.1 ATZB-24-A2

It is a ZigBit Module with Dual Chip Antenna, a low-power, 802.15.4 ZigBee module combination with the popular ATmega1281V MCU and the Atmel AT86RF230 radio transceiver.

The ATZB-24-A2 comes with a Dual Chip Antenna and eliminates the need for costly and time-consuming RF development and shortens time to market, while embedded 802.15.4/ZigBee software ensures standards-based wireless connectivity for a wide range of applications.

**Figure 3-1.** ATZB-24-A2



#### 3.1.1 Certification scenarios

The following scenario explains the usage of the ATZB-24-A2 module with the customer's base board.

##### 3.1.2 Scenario # 1

The ATZB-24-A2 module is bought by a designer and used on the base board.

When designers use the ATZB-24-A2 module on their base board and if the product does not have any other radiating circuits, the designer need not re-certify the complete product. In this case the designer has to mention on a visible area in their product that "Product carries FCC module with FCC ID – VW4A090664".

### 3.1.3 Scenario # 2

When designers use the ATZB-24-A2 module on their base board and if there are additional circuits on the base board, with the additionally added circuits comprising of another radio or switching circuits, the radiations caused by the new circuits may or may not affect the performance of the ATZB-24-A2. If the ATZB-24-A2 does not get affected by the additional circuits, still there are possibilities that there could be emissions from these circuits that are out of limits specified by part 15.247. If these additional circuits are designed to operate within compliance limits, then the probability of successful certification is high. For more information on the type of additional circuits, please refer [appendix A](#).

The FCC ID of ATZB-24-A2 is VW4A090664. Customers have to mention "Product carries Module with FCC ID VW4A090664" on their product containing the ATZB-24-A2 ZigBits. The ZigBit's FCC ID cannot be used in replacement of the final product's FCC ID, if there is a requirement to have separate FCC ID for the entire product.

## 3.2 ATZB-A24-UFL

ZigBit Amp ATZB-A24-UFL is an amplified IEEE 802.15.4/ZigBee module. Its unique RF design achieves a rare combination of the industry-leading range performance and low power consumption. The ATZB-A24-UFL module's small footprint of less than a square inch of space makes the integration easy, with the built-in U.FL antenna connector.

**Figure 3-2. ATZB-A24-UFL**



### 3.2.1 Certification scenarios

The following scenarios explain the usage of the ATZB-A24-UFL module on customer's base board.

#### 3.2.2 Scenario # 1

The ATZB-A24-UFL module is bought by a designer and used on the base board.

Atmel's ATZB-A24-UFL Module has been certified under Limited Modular category of FCC part 15 subpart C, limited modular certification applies to modules that do not fully meet the requirements for a single modular certification. Host-manufacturer must ensure that the end-user of the host that will finally carry the module has no access to



the antenna connectors, because they are standard connectors. The position of the Antenna cable is not really fixed as part of this product, and hence the module must be re-certified.

If there are additional circuits on the base board, with the additionally added circuits comprising of another radio or switching circuits, the radiations caused by the new circuits may or may not affect the performance of the ATZB-A24-UFL. If the ATZB-A24-UFL does not get affected by the additional circuits, still there are possibilities that there could be emissions from these circuits that are out of limits specified by part 15.247. If these additional circuits are designed to operate within compliance limits, then the probability of successful certification is high. For more information please refer [appendix A](#).

### 3.2.3 Scenario # 2

Designers may want to use the ATZB-A24-UFL on the base board and / or use UFL antenna adaptor and take out the RF signal to a different antenna connector. Sometimes customers may have requirement to use higher gain antenna than an antenna with 0dBi gain as mentioned in sec 3.2.2. In such case designer is expected to ensure that the compliance of the additional circuits are taken care while re-certifying the end product with ATZB-A24-UFL. Refer [appendix A](#) for detailed information about additional circuits on base board.

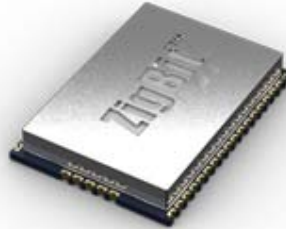
The FCC ID of ATZB-A24-UFL is VW4A090668. Customers have to mention "Product carries Module with FCC ID VW4A090668" on their product containing the ATZB-A24-UFL ZigBits. The ZigBit's FCC ID cannot be used in replacement of the final product's FCC ID, since there is a requirement to have separate FCC ID for the entire product.

## 3.3 ATZB-24-B0

ATZB-24-B0 ZigBit Module with Balanced RF Output is a low-power, 802.15.4/ ZigBee module, combination of the ATmega1281V MCU and the AT86RF230 radio transceiver. ATZB-24-B0 module is very similar to the ATZB-24-A2 module and unlike ATZB-24-A2 module it offers the flexibility of adding design oriented external antenna in the application board.

ATZB-24-B0 minimizes bill of materials (BOM) and shortens time to market, while embedded 802.15.4/ ZigBee software ensures standards-based wireless connectivity for a wide range of applications.

**Figure 3-3. ATZB-24-B0**



### 3.3.1 Certification scenarios

The following scenarios explain the usage of the ATZB-24-B0 module on customer's base board.

#### 3.3.2 Scenario # 1

The ATZB-24-B0 module is bought by designers and used on a base board.

Atmel's ATZB-24-B0 Module has been certified under Limited Modular category of FCC part 15 subpart C. Limited modular certification applies to modules that do not fully meet the requirements for a single modular certification. The ATZB-24-B0 module meets all but the requirement of having an on-board antenna or connector.

Designers are required to re-certify their products carrying this module as this module brings out the Balanced RF Output without ending up in any antenna structure on the module. Since there is RF signal flowing on the designer's base board in such case, the entire product has to be re-tested and certified. The new FCC ID obtained by the designer has to be used to meet regulatory requirements.

By following the recommended design to connect the RF signal from B0 Module pins to the Antenna, the probability of success in Re-certification tests is very high. This is because the module has been successfully certified with Atmel's Base board reference. The Base board reference design that applies for the ATZB-24-B0 is ATZB-EVB-24-SMA.

#### 3.3.3 Scenario # 2

In cases where usage explained in Scenario #1 applies and additionally, application dependent circuits as explained in Appendix A is used on the Base board, this scenario applies.

If the circuits on the customer's base board are either Intentional or Unintentional Radiators or both, then the customer has to certify the entire product carrying the ATZB-24-B0 Module. The probability of a successful certification lies with how good or bad, the additional circuits on base board are designed in terms of regulatory compliance. Atmel's Base board reference design- ATZB-EVB-24-SMA in this case can help customers in assuring success in the module related tests alone.



### 3.4 ATZB-900-B0

ATZB-900-B0 is an ultra-compact, low-power, high-sensitivity 868MHz / 915MHz 802.15.4/ZigBee OEM module from Atmel.

ATZB-900-B0 modules eliminate the need for costly and time-consuming RF development, minimizes bill of materials (BOM), and shortens time to market for a wide range of wireless applications, while embedded 802.15.4 / ZigBee software ensures standards-based wireless connectivity.

**Figure 3-4. ATZB-900-B0**



#### 3.4.1 Certification scenarios

The following scenarios explain the usage of the ATZB-900-B0 module on customer's base board.

##### 3.4.2 Scenario # 1

The ATZB-900-B0 module is bought by designers and used on their base board.

Atmel's ATZB-900-B0 Module has been certified under Limited Modular category of FCC part 15 subpart C.

Limited modular certification applies to modules that do not fully meet the requirements for a single modular certification. The ATZB-900-B0 module meets all but the requirement of having an on-board antenna or connector.

Designers are required to re-certify their products carrying this module as this module brings out the Balanced RF Output without ending up in any antenna structure on the module. Since there is RF signal flowing on the designer's base board in such case, the entire product has to be re-tested and certified. The new FCC ID obtained by the designer has to be used to meet regulatory requirements.

By following the recommended design to connect the RF signal from B0 Module pins to the Antenna, the probability of success in Re-certification tests is very high. This is because the module has been successfully certified with Atmel's Base board reference. The Base board reference design that applies for the ATZB-900-B0 is ATZB-EVB-900-SMA.

### 3.4.3 Scenario # 2

In cases where usage explained in Scenario #1 applies and additionally, application dependent circuits as explained in Appendix A is used on the Base board, this scenario applies.

If the circuits on the customer's base board are either Intentional or Unintentional Radiators or both, then the customer has to certify the entire product carrying the ATZB-900-B0 Module. The probability of a successful certification lies with how good or bad, the additional circuits on base board are designed in terms of regulatory compliance. Atmel's Base board reference design- ATZB-EVB-900-SMA in this case can help customers in assuring success in the module related tests alone.

## 3.5 ATZB-A24-U0

ZigBit Amp ATZB-A24-U0 is an amplified IEEE 802.15.4/ZigBee module with low power consumption and small footprint of less than a square inch of space.

ATZB-A24-U0 Module with Un-balanced RF Output minimizes bill of materials (BOM) and shortens time to market, while embedded 802.15.4/ ZigBee software ensures standards-based wireless connectivity for a wide range of applications.

**Figure 3-5. ATZB-A24-U0**



### 3.5.1 Certification scenarios

The following scenarios will explain the changes that can be done on the ATZB-A24-U0 module and / or on their carrier boards on customer's base board.

### 3.5.2 Scenario # 1

The ATZB-A24-U0 module is bought by designers and used on customer's base board.

Atmel's ATZB-A24-U0 Module has been certified under Limited Modular category of FCC part 15 subpart C.

Limited modular certification applies to modules that do not fully meet the requirements for a single modular certification. The ATZB-A24-U0 module meets all but the requirement of having an on-board antenna or connector.



Designers are required to re-certify their products carrying this module as this module brings out the UnBalanced RF Output without ending up in any antenna structure on the module. Since there is RF signal flowing on the designer's base board in such case, the entire product has to be re-tested and certified. The new FCC ID obtained by the designer has to be used to meet regulatory requirements.

By following the recommended design to connect the RF signal from U0 Module pin to the Antenna, the probability of success in Re-certification tests is very high. This is because the module has been successfully certified with Atmel's Base board reference. The Base board reference design that applies for the ATZB-A24-U0 is ATZB-EVB-A24-SMA. The recommended antenna gain for ATZB-A24-U0 on a baseboard is less than or equal to 0dBi.

### 3.5.3 Scenario # 2

In cases where usage explained in Scenario #1 applies and additionally, application dependent circuits as explained in Appendix A is used on the Base board OR antenna with gain of more than 0dBi (directional antenna) is used, this scenario applies.

If the circuits on the customer's base board are either Intentional or Unintentional Radiators or both, then the customer has to certify the entire product carrying the ATZB-A24-U0 Module. The probability of a successful certification lies with how good or bad, the additional circuits on base board are designed in terms of regulatory compliance. Atmel's Base board reference design- ATZB-EVB-A24-SMA in this case can help customers in assuring success in the module related tests alone.

## 4 Country Specific certifications

### 4.1 Japan

The ZigBits that are intended to use in Japan must be certified with TELEC certification system. TELEC is the major organization providing the certification services as a registered certification body.

FCC approval and CE declaration are not recognized by TELEC.

TELEC certification requires the ZigBits to be tested and certified in an accredited test lab within Japan according to TELEC standards.

The probability of getting certified is high if the products already hold FCC / CE certification, since the TELEC specifications on the limits are similar to FCC/CE. Refer RF TELEC standard for more details.

### 4.2 Korea

The ZigBits and the ZigBit's products that are to be used in Korea must be certified with KCC (Korea Communications Commission) certification body. KCC is the institution providing the certification services as a registered certification body.

The product which even passes the FCC / CE certification must undergo in-country testing and certification. But the probability of getting certified is high in case if the products already hold FCC / CE certification.



### 4.3 Taiwan

In Taiwan, NCC (National Communications Commission) approval is required for the end product using ZigBits. In-country testing is required since FCC / CE certifications are not accepted. ETSI / FCC will be the reference standard for certification regulations. The probability of getting certified is high in case if the products already hold FCC / CE certification.

### 4.4 China

The ZigBits and the ZigBit's products that are to be used in China must under go in-country certification as mentioned by SRRC (State Radio Regulatory Committee). SRRC is a radio management of P.R China.

The product which even passes the FCC / CE certification must undergo in-country testing and certification. But the probability of getting certified is high in case if the products already hold FCC / CE certification.

### 4.5 Australia

RF Products that are used inside Australia must have the C-Tick mark. CE declaration is recognized in Australia. The ACMA (Australian Communication and Media Authority) accepts products that are tested for ETSI limits. The product has to be registered with ACMA for obtaining and using the C-Tick mark.

## 5 SAR Requirements

SAR, Specific absorption rate, is a measure of radiated RF energy absorbed by a human body tissue. SAR is expressed in watts per kilogram (W/kg) of biological tissue. The ZigBit modules must undergo SAR tests and qualification before commercial release if the device is operating with 20cm distance to the human body.

SAR is measured using special lab equipments and environments. The device under test is placed in a phantom shell with tissue and checked for RF field exposure. The phantom is in human body shape and the DUT is positioned in the head part and body part. Probe positioner and device positioner are used to move the respective devices and simulated data is acquired and analyzed.

SAR testing requirements on customer's base board has to be decided, based on the nature of intended application.

## 6 Appendix

### 6.1 Appendix A

Designers can use the ZigBit alone or with additional circuits on the base board. In this case following points need to be taken care.

The custom product may contain any of the following circuits

1. High Voltage
2. Switching circuits



### 3. Secondary or another radio part

When the above mentioned blocks are bought out items and are already pre-certified individually, the designer is expected to verify the entire product with FCC accredited Lab. The ZigBit's FCC ID is still valid but cannot be used as a final product's FCC ID because there are additional circuits in the product. But since ZigBits already carry FCC ID and are certified, the likelihood of getting the entire product certified is high, since the rest of circuits in the product are pre-certified too.

If circuits listed above are not present in Customer's base board and if customer's base board is only for carrying the ZigBit ATZB-24-A2 or ATZB-A24-UFL module, then there is no need for re-certification

When all or any of the above mentioned blocks are not pre-certified / non-compliant, irrespective of the scenarios mentioned for all of the ZigBits, the designers must certify the entire product and the likelihood of successful certification depends on the circuit design of the extra circuits added apart from the ZigBit.

Testing and maintaining reports will be useful in a case when FCC / ETSI conducts audit on the product and asks the product owner for test reports and affiliated documents in a short notice

## 6.2 Appendix B

Constraints / ZigBits	Scenario 1	Scenario 2	Additional Circuits in Base board		FCC approval Requirement
			Non compliant circuits / Uncertified circuits	Compliant circuits / Pre-certified circuits	
ATZB-24-A2	√			√	Mention FCC ID on Label of product
		√	√		Recertification
ATZB-24-B0	√				Recertification; Probability of successful certification is high
		√		√	Recertification; Probability of successful certification is high
		√	√		Recertification; Probability of successful certification depends on Additional circuits on baseboard.
ATZB-900-B0	√				Recertification; Probability of successful certification is high
		√		√	Recertification; Probability of successful certification is high
		√	√		Recertification; Probability of successful certification depends on Additional circuits on baseboard.
ATZB-A24-UFL	√			√	Recertification; Probability of successful certification is high
		√	√		Recertification
ATZB-A24-U0	√				Recertification; Probability of successful certification is high
		√		√	Recertification; Probability of successful certification is high



		√	√		Recertification; Probability of successful certification depends on Additional circuits on baseboard.
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