

#### Features

- Ultra compact size (24 × 13.5 × 2.0mm for the Atmel® ATZB-24-A2 module and 18 × 13.5 × 2.0mm for the Atmel ATZB-24-B0 module)
- Innovative balanced dual chip antenna design with antenna gain of approximately 0dBi (A2 only) (for ATZB-24-A2 version)
- High RX sensitivity (-101dBm)
- Outperforming link budget (104dB) Atmel
- Up to 3dBm output power
- Very low power consumption:
  - <6µA in sleep mode
  - 21.8mA in RX mode
  - 20.8mA in TX mode (0dBm)
- Ample memory resources (128KB of flash memory, 8KB RAM, 4KB EEPROM)
- Wide range of interfaces (both analog and digital)
  - Nine spare GPIO, two spare IRQ lines
  - Four ADC lines + one line for supply voltage control (up to nine lines with JTAG disabled)
  - UART with CTS/RTS control
  - USART
  - I<sup>2</sup>C
  - 1-wire
  - Up to 30 lines configurable as GPIO
  - Capability to write own MAC address into the EEPROM
  - Optional antenna reference designs
  - IEEE® 802.15.4 compliant receiver
  - 2.4GHz ISM band
  - BitCloud® embedded software, including serial bootloader
- Small physical footprint and low profile for optimum fit in even the smallest of devices
- Best-in-class RF link range
- Extended battery life
- Easy prototyping with 2-layer PCB
- Ample memory for user software application
- Mesh networking capability
- Easy-to-use low cost evaluation kit
- Single source of support for HW and SW
- Worldwide license-free operation

## Table of Contents

<b>1. Introduction</b>	<b>3</b>
1.1 Summary	3
1.2 Applications	3
1.3 Abbreviations and Acronyms	4
1.4 Related Documents	5
<b>2. ZigBit Module Overview</b>	<b>6</b>
2.1 Overview	6
<b>3. Specification</b>	<b>8</b>
3.1 Electrical Characteristics	8
3.1.1 Absolute Maximum Ratings	8
3.1.2 Test Conditions	8
3.1.3 RF Characteristics	9
3.1.4 Atmel ATmega1281V Microcontroller Characteristics	9
3.1.5 Module Interfaces Characteristics	9
3.2 Physical / Environmental Characteristics and Outline	9
3.3 Pin Configuration	11
3.4 Mounting Information	14
3.5 Sample Antenna Reference Designs	15
3.5.2 General Recommendations	17
3.6 Soldering Profile	18
3.7 Internal Schematics	19
3.8 Handling instructions	20
<b>4. Agency Certifications</b>	<b>21</b>
4.1 United States (FCC)	21
4.2 Canada (IC)	21
4.3 European Union (ETSI)	21
4.4 Using Limited Modular Certified Products	22
4.5 Approved Antenna List	23
<b>5. Ordering Information</b>	<b>23</b>
<b>6. Revision History</b>	<b>24</b>

# 1. Introduction

## 1.1 Summary

ZigBit<sup>®</sup> is an ultra-compact, low-power, high-sensitivity 2.4GHz IEEE 802.15.4/ZigBee<sup>®</sup> OEM module based on the innovative mixed-signal hardware platform from Atmel. It is designed for wireless sensing, control and data acquisition applications. ZigBit modules eliminate the need for costly and time-consuming RF development, and shorten time-to-market for a wide range of wireless applications.

Two different versions of 2.4GHz ZigBit modules are available: the Atmel ATZB-24-B0 module with balanced RF port for applications where the benefits of PCB or external antenna can be utilized and the Atmel ATZB-24-A2 module with dual chip antenna satisfying the needs of applications that require integrated, small-footprint antenna design.

## 1.2 Applications

ZigBit module is compatible with robust IEEE 802.15.4/ZigBee stack that supports a self-healing, self-organizing mesh network, while optimizing network traffic and minimizing power consumption. Atmel offers two stack configurations: BitCloud and SerialNet. BitCloud is a ZigBee PRO certified software development platform supporting reliable, scalable, and secure wireless applications running on the Atmel ZigBit modules. SerialNet allows programming of the module via serial AT-command interface.

The applications include, but are not limited to:

- Building automation and monitoring
  - Lighting controls
  - Wireless smoke and CO-detectors
  - Structural integrity monitoring
- HVAC monitoring and control
- Inventory management
- Environmental monitoring
- Security
- Water metering
- Industrial monitoring
  - Machinery condition and performance monitoring
  - Monitoring of plant system parameters such as temperature, pressure, flow, tank level, humidity, vibration, etc.
- Automated Meter Reading (AMR)

### 1.3 Abbreviations and Acronyms

ADC	Analog-to-Digital Converter
AMR	Automated Meter Reading
API	Application Programming Interface
DC	Direct Current
DTR	Data Terminal Ready
DIP	Dual In-line package
EEPROM	Electrically Erasable Programmable Read-Only Memory
ESD	Electrostatic Discharge
GPIO	General Purpose Input/Output
HAL	Hardware Abstraction Layer
HVAC	Heating, Ventilating, and Air Conditioning
HW	Hardware
°C	Inter-Integrated Circuit
IEEE	Institute of Electrical and Electronics Engineers
IRQ	Interrupt Request
ISM	Industrial, Scientific and Medical radio band
JTAG	Digital interface for debugging of embedded device, also known as IEEE 1149.1 standard interface
MAC	Medium Access Control layer
MCU	Microcontroller Unit. In this document it also means the processor, which is the core of a ZigBit module
NWK	Network layer
OEM	Original Equipment Manufacturer
OTA	Over-The-Air upgrade
PCB	Printed Circuit Board
PER	Package Error Ratio
PHY	Physical layer
RAM	Random Access Memory
RF	Radio Frequency
RTS/CTS	Request to Send/ Clear to Send
RX	Receiver
SMA	Surface Mount Assembly
SPI	Serial Peripheral Interface
SW	Software
TTM	Time-To-Market
TX	Transmitter
UART	Universal Asynchronous Receiver/Transmitter

USART	Universal Synchronous/Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
ZDK	ZigBit Development Kit
ZigBee, ZigBee PRO	Wireless networking standards targeted at low-power applications
802.15.4	The IEEE 802.15.4-2003 standard applicable to low-rate wireless Personal Area Network

## 1.4 Related Documents

- [1] Atmel 8-bit AVR<sup>®</sup> Microcontroller with 64KB/128KB/256KB In-System Programmable Flash. [Atmel doc2549.pdf](#)
- [2] Atmel Low-Power Transceiver for ZigBee Applications. AT86RF230 datasheet. [Atmel doc5131.pdf](#)
- [3] IEEE Std 802.15.4-2003 IEEE Standard for Information technology - Part 15.4 Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANs)
- [4] ZigBee Specification. ZigBee Document 053474r17, October 19, 2007
- [5] BitCloud<sup>®</sup> IEEE 802.15.4/ZigBee Software. AVR2050: BitCloud Developer Guide. [Atmel doc8199.pdf](#)

## 2. ZigBit Module Overview

### 2.1 Overview

ZigBit is a low-power, high-sensitivity IEEE 802.15.4/ ZigBee-compliant OEM module. This multifunctional device occupies less than a square inch of space, which is comparable to a typical size of a single chip. Based on a solid combination of the latest MCU Wireless hardware platform from Atmel, the ZigBit offers superior radio performance, ultra-low power consumption, and exceptional ease of integration.

Figure 2-1. Atmel ATZB-24-B0 Block Diagram.

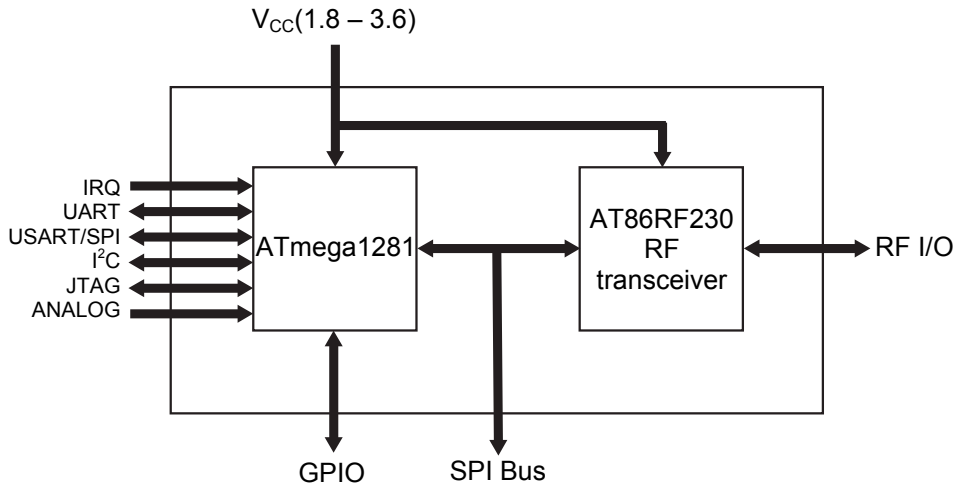
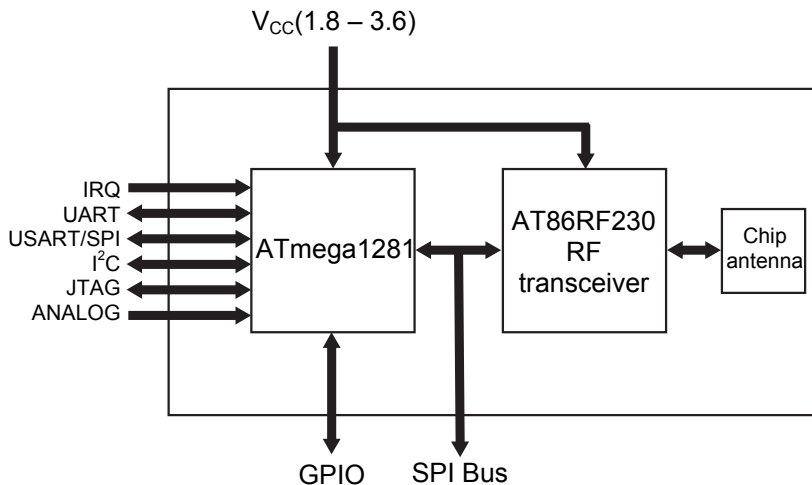


Figure 2-2. Atmel ATZB-24-A2 Block Diagram.



ZigBit modules comply with the FCC (Part 15), IC and ETSI (CE) rules applicable to the devices radiating in an uncontrolled environment. For further details, see Chapter 4.

ZigBit fully satisfies the requirements of the "Directive 2002/95/EC of the European Parliament and the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment" (RoHS). Atmel provides fully compliant product in all regions, where the directive is enforced since July 1, 2006.

The ZigBit contains the Atmel ATmega1281V Microcontroller [1] and the Atmel AT86RF230 RF Transceiver [2]. The module features 128KB Flash memory and 8KB RAM.

The ZigBit already contains a complete RF/MCU-related design with all the necessary passive components included. The module can be easily mounted on a simple 2-layer PCB. Compared to a custom RF/MCU design, a module-based solution offers considerable savings in development time and NRE cost per unit during the design, prototyping, and mass production phases of product development.

Innovative dual chip antenna design in ATZB-24-A2 module eliminates the balun and achieves good performance over 2.4GHz frequency band.

All ZigBits are preloaded with a Bootloader when they are sold as Modules, either in Single units or T&R.

Depending on end-user design requirements, a ZigBit module can operate as a self-contained sensor node, where it would function as a single MCU, or it can be paired with a host processor, driving the module over a serial interface. In the former case, a user application may be used with the BitCloud software, allowing customization of embedded applications through BitCloud's C API.

In the latter case, the host processor controls data transmission and manages module peripherals via an extensive set of SerialNet AT commands. Thus, no firmware customization is required for a successful module design-in, additionally; third-party sensors can be connected directly to the module, thus expanding the existing set of peripheral interfaces.

## 3. Specification

### 3.1 Electrical Characteristics

#### 3.1.1 Absolute Maximum Ratings

Table 3-1. Absolute Maximum Ratings <sup>(1)(2)</sup>

Parameter	Minimum	Maximum
Voltage on any pin, except RESET with respect to ground	-0.5V	V <sub>CC</sub> + 5V
DC current per I/O pin		40mA
DC current DVCC and DGND pins		200mA
Input RF level		+10dBm

- Notes:
1. Absolute Maximum Ratings are the values beyond which damage to the device may occur. Under no circumstances must the absolute maximum ratings given in this table be violated. Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only. Functional operation of the device at these or other conditions, beyond those indicated in the operational sections of this specification, is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.
  2. **Attention!** ZigBit is an ESD-sensitive device. Precaution should be taken when handling the device in order to prevent permanent damage.

#### 3.1.2 Test Conditions

Table 3-2. Test Conditions (unless otherwise stated), V<sub>CC</sub> = 3V, T<sub>amb</sub> = 25°C.

Parameter	Range	Unit
Supply voltage, V <sub>CC</sub> <sup>(2)</sup>	1.8 to 3.6	V
Current consumption: RX mode	21.8	mA
Current consumption: TX mode <sup>(1)</sup>	20.8	mA
Current consumption: Radio is turned off, MCU is active 50% of the time <sup>(1)</sup>	3.5	mA
Current consumption: Power-save mode <sup>(1)</sup>	6	µA

- Notes:
1. The parameters are measured under the following conditions:
    - a) BitCloud Software is running at 8MHz clock rate, DTR line management is turned off.
    - b) All interfaces are set to the default state (see Pin Assignment Table).
    - c) Output TX power is 0dBm
    - d) JTAG is not connected.
  2. Supply voltage below 2.7V requires the MCU to be operating at 2MHz speed.  
Current consumption actually depends on multiple factors, including but not limited to, the board design and materials, BitCloud settings, network activity, EEPROM read/write operations. It also depends on MCU load and/or peripherals used by an application.



### 3.1.3 RF Characteristics

Table 3-3. RF Characteristics.

Parameter	Condition	Range	Unit
Frequency band		2.4000 to 2.4835	GHz
Numbers of channels		16	
Channel spacing		5	MHz
Transmitter output power	Adjusted in 16 steps	-17 to +3	dBm
Receiver sensitivity	PER = 1%	-101	dBm
On-air data rate		250	Kbps
TX output/ RX input nominal impedance	For balanced output	100	$\Omega$

### 3.1.4 Atmel ATmega1281V Microcontroller Characteristics

Table 3-4. ATmega1281V Characteristics.

Parameter	Condition	Range	Unit
On-chip flash memory size		128K	Bytes
On-chip RAM size		8K	Bytes
On-chip EEPROM size		4K	Bytes
Operation frequency		8	MHz

### 3.1.5 Module Interfaces Characteristics

Table 3-5. Module Interfaces Characteristics.

Parameter	Condition	Range	Unit
UART maximum baud rate		38.4	Kbps
ADC resolution/ conversion time	In single conversion mode	10/200	Bits/ $\mu$ s
ADC input resistance		>1	M $\Omega$
ADC reference voltage ( $V_{REF}$ )		1.0 to $V_{CC} - 3$	V
ADC input voltage		0 - $V_{REF}$	V
I <sup>2</sup> C maximum clock		400	kHz
GPIO output voltage (high/low)	-10/ 5mA	2.3/ 0.5	V
Real time oscillator frequency		32.768	kHz

## 3.2 Physical / Environmental Characteristics and Outline

Table 3-6. Physical / Environmental Characteristics and Outline.

Parameter	Value	Comments
Size	18.8 × 13.5 × 2.0mm	ATZB-24-B0
	24.0 × 13.5 × 2.0mm	ATZB-24-A2
Weight	1.3g	ATZB-24-B0
	1.5g	ATZB-24-A2
Operating temperature range	-20°C to +70°C	-40°C to +85°C operational <sup>(1)</sup>
Operating relative humidity range	No more than 80%	

Note: 1. Minor degradation of clock stability may occur.

Figure 3-1. Atmel ATZB-24-B0 Mechanical Drawing.

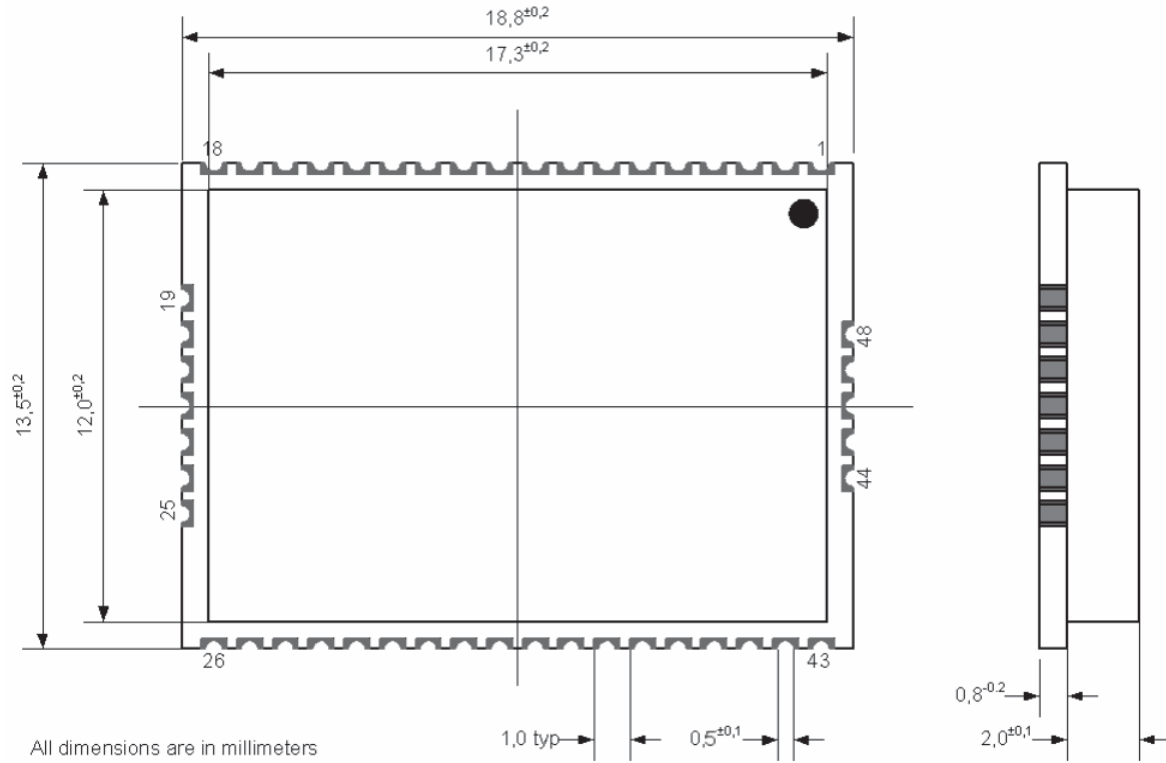
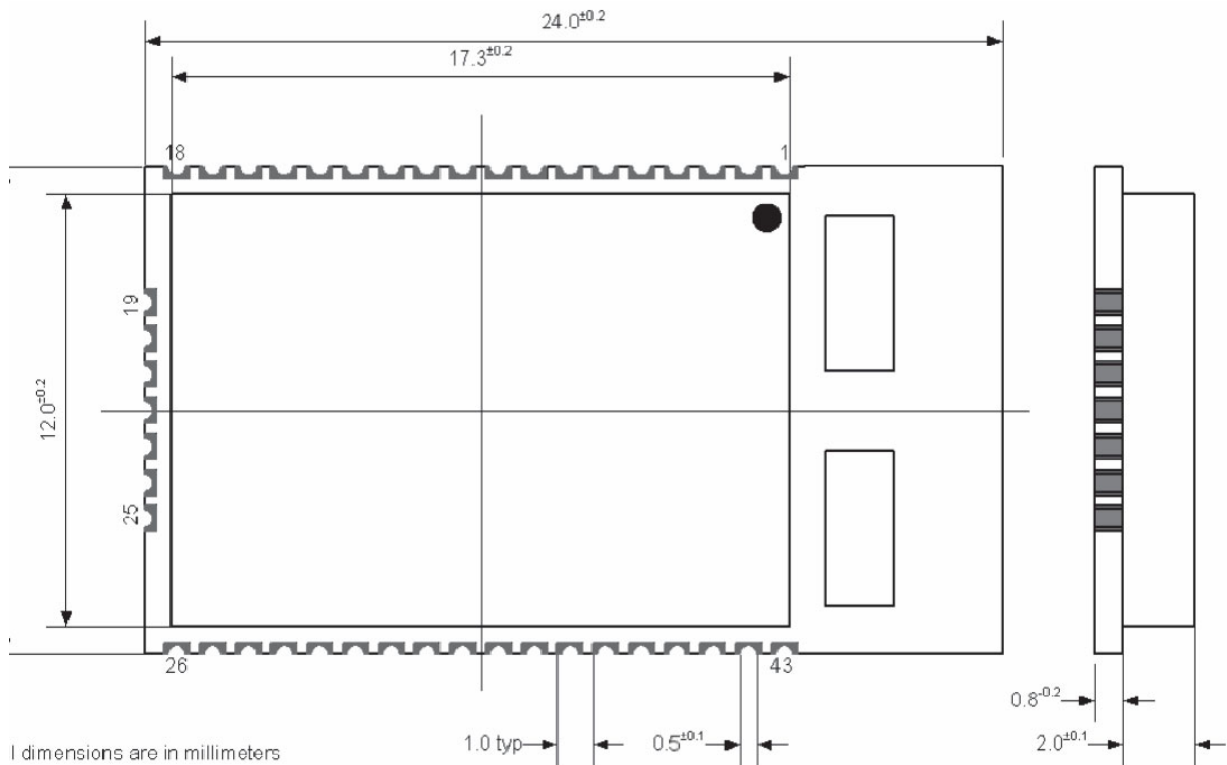


Figure 3-2. Atmel ATZB-24-A2 Mechanical Drawing.



### 3.3 Pin Configuration

Figure 3-3. Atmel ATZB-24-B0 Pinout.

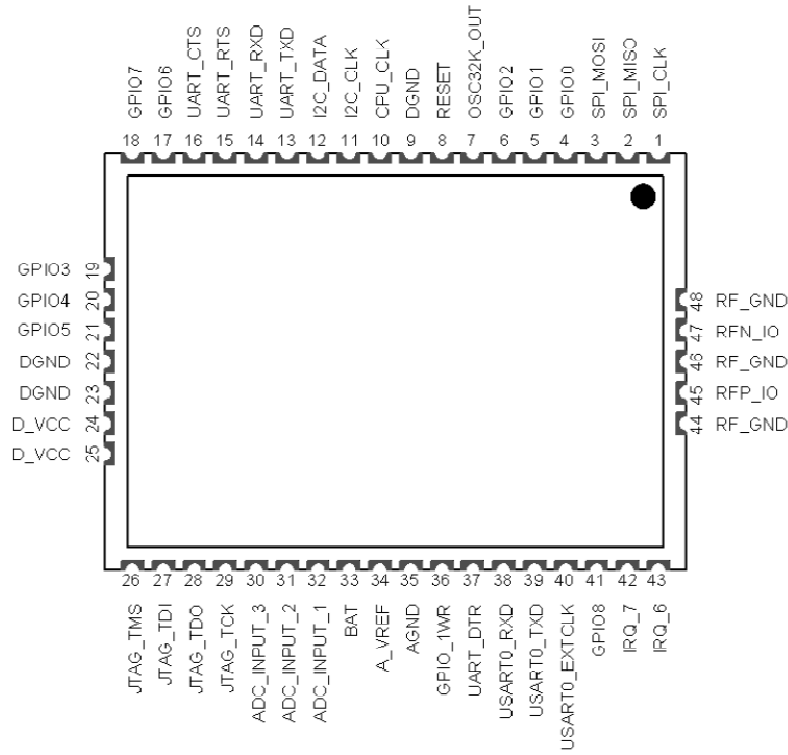
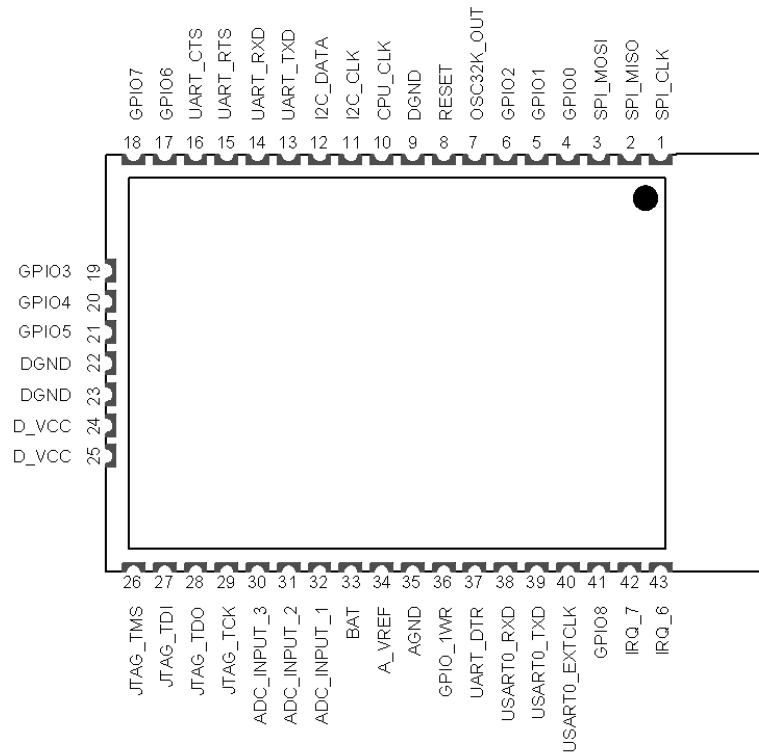


Figure 3-4. Atmel ATZB-24-A2 Pinout.

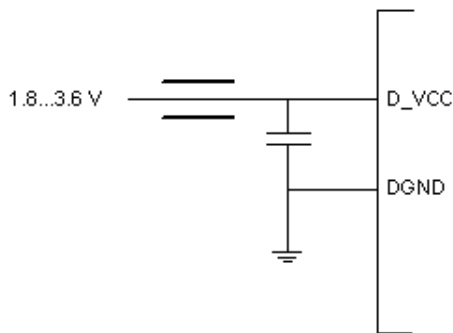


**Table 3-7. Pin Descriptions.**

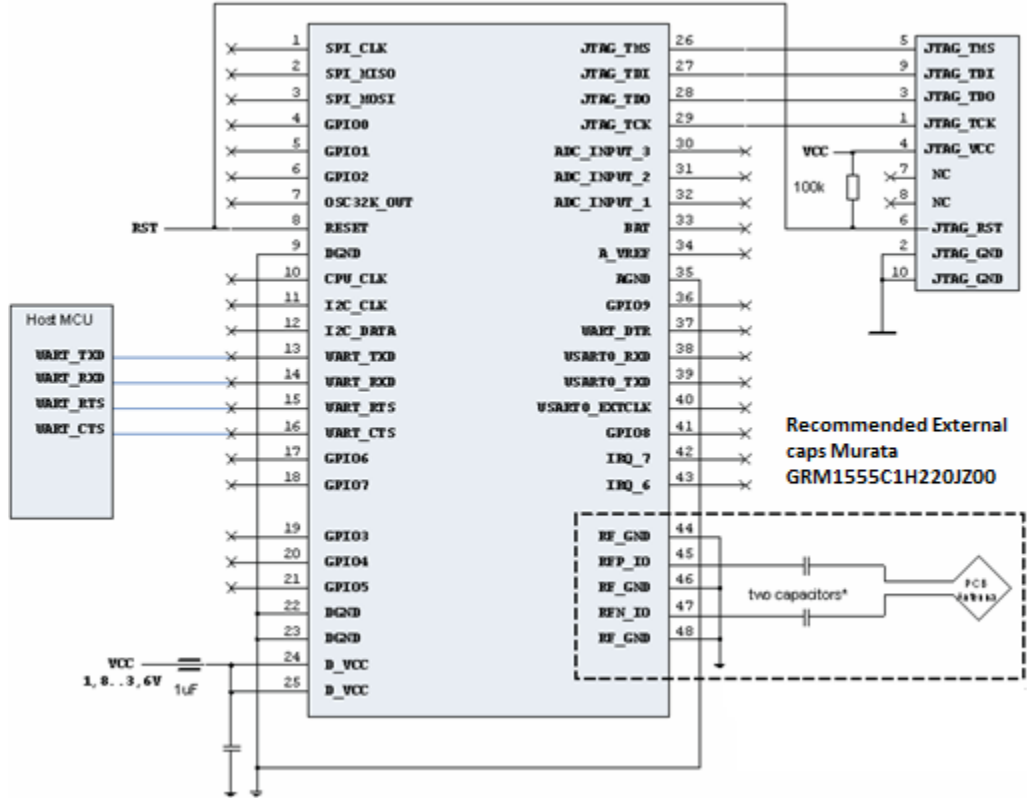
Connector pin	Pin name	Description	I/O	Default state after power on
1	SPI_CLK	Reserved for stack operation <sup>(4)</sup>	O	
2	SPI_MISO	Reserved for stack operation <sup>(4)</sup>	I/O	
3	SPI_MOSI	Reserved for stack operation <sup>(4)</sup>	I/O	
4	GPIO0	General purpose digital input/output 0 <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
5	GPIO1	General purpose digital input/output 1 <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
6	GPIO2	General purpose digital input/output 2 <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
7	OSC32K_OUT	32.768kHz clock output <sup>(4)(5)</sup>	O	
8	RESET	Reset input (active low) <sup>(4)</sup>		
9, 22, 23	DGND	Digital ground		
10	CPU_CLK	RF clock output. When module is in active state, 8MHz signal is present on this line. While module is in the sleeping state, clock generation is also stopped <sup>(4)</sup> . This pin is a test point and not to be used to clock External devices	O	
11	I2C_CLK	I <sup>2</sup> C Serial clock output <sup>(2)(3)(4)(7)</sup>	O	tri-state
12	I2C_DATA	I <sup>2</sup> C Serial data input/output <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
13	UART_TXD	UART receive input to ZigBit MCU <sup>(1)(2)(3)(4)(7)</sup>	I	tri-state
14	UART_RXD	UART transmit output from ZigBit MCU <sup>(1)(2)(3)(4)(7)</sup>	O	tri-state
15	UART_RTS	RTS input (Request to send) for UART hardware flow control. Active low <sup>(2)(3)(4)(7)</sup>	I	tri-state
16	UART_CTS	CTS output (Clear to send) for UART hardware flow control. Active low <sup>(2)(3)(4)(7)(8)</sup>	O	tri-state
17	GPIO6	General purpose digital input/output 6 <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
18	GPIO7	General purpose digital input/output 7 <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
19	GPIO3	General purpose digital input/output 3 <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
20	GPIO4	General purpose digital input/output 4 <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
21	GPIO5	General purpose digital input/output 5 <sup>(2)(3)(4)(7)</sup>	I/O	tri-state
24, 25	D_VCC	Digital supply voltage (V <sub>CC</sub> ) <sup>(9)</sup>		
26	JTAG_TMS	JTAG Test Mode Select <sup>(2)(3)(4)(6)</sup>	I	
27	JTAG_TDI	JTAG Test Data Input <sup>(2)(3)(4)(6)</sup>	I	
28	JTAG_TDO	JTAG Test Data Output <sup>(2)(3)(4)(6)</sup>	O	
29	JTAG_TCK	JTAG Test Clock <sup>(2)(3)(4)(6)</sup>	I	
30	ADC_INPUT_3	ADC Input Channel 3 <sup>(2)(3)(7)</sup>	I	tri-state
31	ADC_INPUT_2	ADC Input Channel 2 <sup>(2)(3)(7)</sup>	I	tri-state
32	ADC_INPUT_1	ADC Input Channel 1 <sup>(2)(3)(7)</sup>	I	tri-state
33	BAT	ADC Input Channel 0, used for battery level measurement <sup>(2)(3)(7)</sup>	I	tri-state
34	A_VREF	Input/Output reference voltage for ADC	I/O	tri-state
35	AGND	Analog ground		
36	GPIO_1WR	1-wire interface <sup>(2)(3)(4)(7)</sup>	I/O	
37	UART_DTR	DTR input (Data Terminal Ready) for UART. Active low <sup>(2)(3)(4)(7)</sup>	I	tri-state

38	USART0_RXD	USART/SPI Receive pin <sup>(2)(3)(4)(7)</sup>	I	tri-state
39	USART0_TXD	USART /SPI Transmit pin <sup>(2)(3)(4)(7)</sup>	O	tri-state
40	USART0_EXTCLK	USART/SPI External Clock <sup>(2)(3)(4)(7)(11)</sup>	I/O	tri-state
41	GPIO8	General Purpose Digital Input/Output	I/O	tri-state
42	IRQ_7	Digital Input Interrupt request 7 <sup>(2)(3)(4)(7)</sup>	I	tri-state
43	IRQ_6	Digital Input Interrupt request 6 <sup>(2)(3)(4)(7)</sup>	I	tri-state
44, 46, 48	RF GND	RF Analog Ground <sup>(2)(3)(4)(7)</sup>		
45	RFP_IO	Differential RF Input/Output <sup>(10)</sup>	I/O	
47	RFN_IO	Differential RF Input/Output <sup>(10)</sup>	I/O	

- Notes:
1. The UART\_TXD pin is intended for input (that is, its designation as "TXD" implies some complex system containing ZigBit as its RF terminal unit), while the UART\_RXD pin, vice versa, is for output.
  2. Most of pins can be configured for general purpose I/O or for some alternate functions as described in details in the Atmel ATmega1281V Datasheet [1].
  3. GPIO pins can be programmed either for output, or for input with/without pull-up resistors. Output pin drivers are strong enough to drive LED displays directly (refer to figures on pages 387-388, [1]).
  4. All digital pins are provided with protection diodes to D\_VCC and DGND.
  5. It is strongly recommended to avoid assigning an alternate function for OSC32K\_OUT pin because it is used by BitCloud. However, this signal can be used if another peripheral or host processor requires 32.768kHz clock, otherwise this pin can be disconnected.
  6. Normally, JTAG\_TMS, JTAG\_TDI, JTAG\_TDO, JTAG\_TCK pins are used for on-chip debugging and flash burning. They can be used for A/D conversion if JTAGEN fuse is disabled.
  7. The following pins can be configured with the BitCloud software to be general-purpose I/O lines: GPIO0, GPIO1, GPIO2, GPIO3, GPIO4, GPIO5, GPIO6, GPIO7, GPIO8, GPIO\_1WR, I2C\_CLK, I2C\_DATA, UART\_TXD, UART\_RXD, UART\_RTS, UART\_CTS, ADC\_INPUT\_3, ADC\_INPUT\_2, ADC\_INPUT\_1, BAT, UART\_DTR, USART0\_RXD, USART0\_TXD, USART0\_EXTCLK, IRQ\_7, IRQ\_6. Additionally, four JTAG lines can be programmed with software as GPIO as well, but this requires changing the fuse bits and will disable JTAG debugging.
  8. With BitCloud, CTS pin can be configured to indicate sleep/active condition of the module thus providing a mechanism for power management of the host processor. If this function is necessary, a connection of this pin to an external pull-down resistor is recommended to prevent the undesirable transients during the module reset process.
  9. Using ferrite bead and 1µF capacitor located closely to the power supply pin is recommended, as shown below:



10. Pins 44 through 48 are not designed for the Atmel ATZB-24-A2 module. Note these pins are used in Atmel ATZB-24-B0, see them in antenna schematics below:



Note: TXD, RXD of UART are crossed inside ZigBit Module. So external UART devices connecting to ZigBit Module should just follow straight connection for UART.  
 UART\_TXD\_external\_device <-> UART\_TXD  
 UART\_RXD\_external\_device <-> UART\_RXD

11. In SPI mode, USART0\_EXTCLK is output. In USART mode, this pin can be configured as either input or output pin.

### 3.4 Mounting Information

Figure 3-5 and Figure 3-6 show the PCB layout recommended for a ZigBit module. Neither via-holes nor wires are allowed on the PCB upper layer in the area occupied by the module. As a critical requirement, RF\_GND pins should be grounded via several via-holes to be located right next to the pins thus minimizing inductance and preventing both mismatch and losses.

Figure 3-5. Atmel ATZB-24-B0 PCB Recommended Layout, top view.

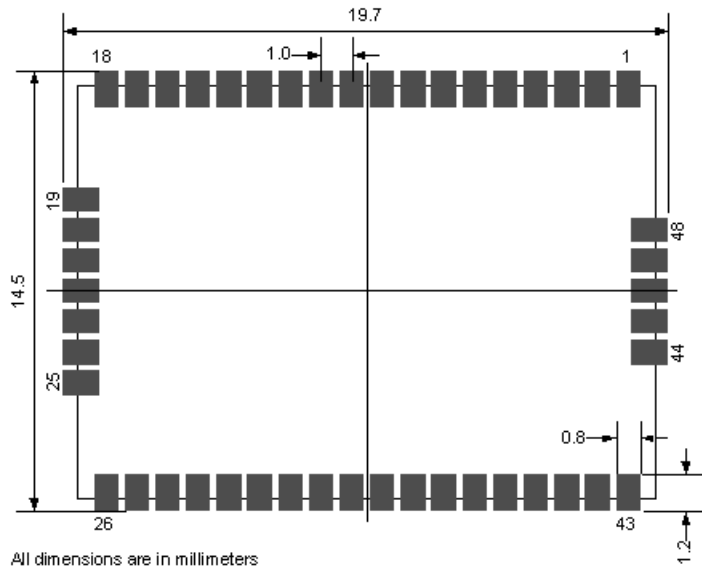
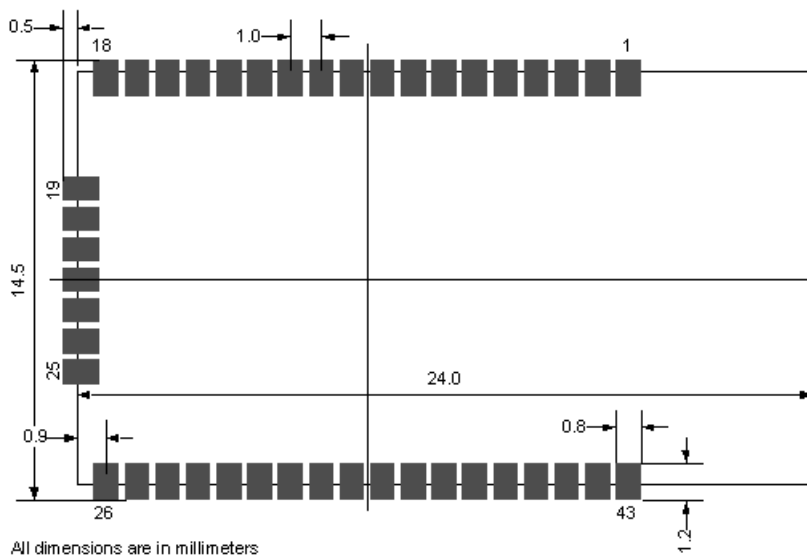


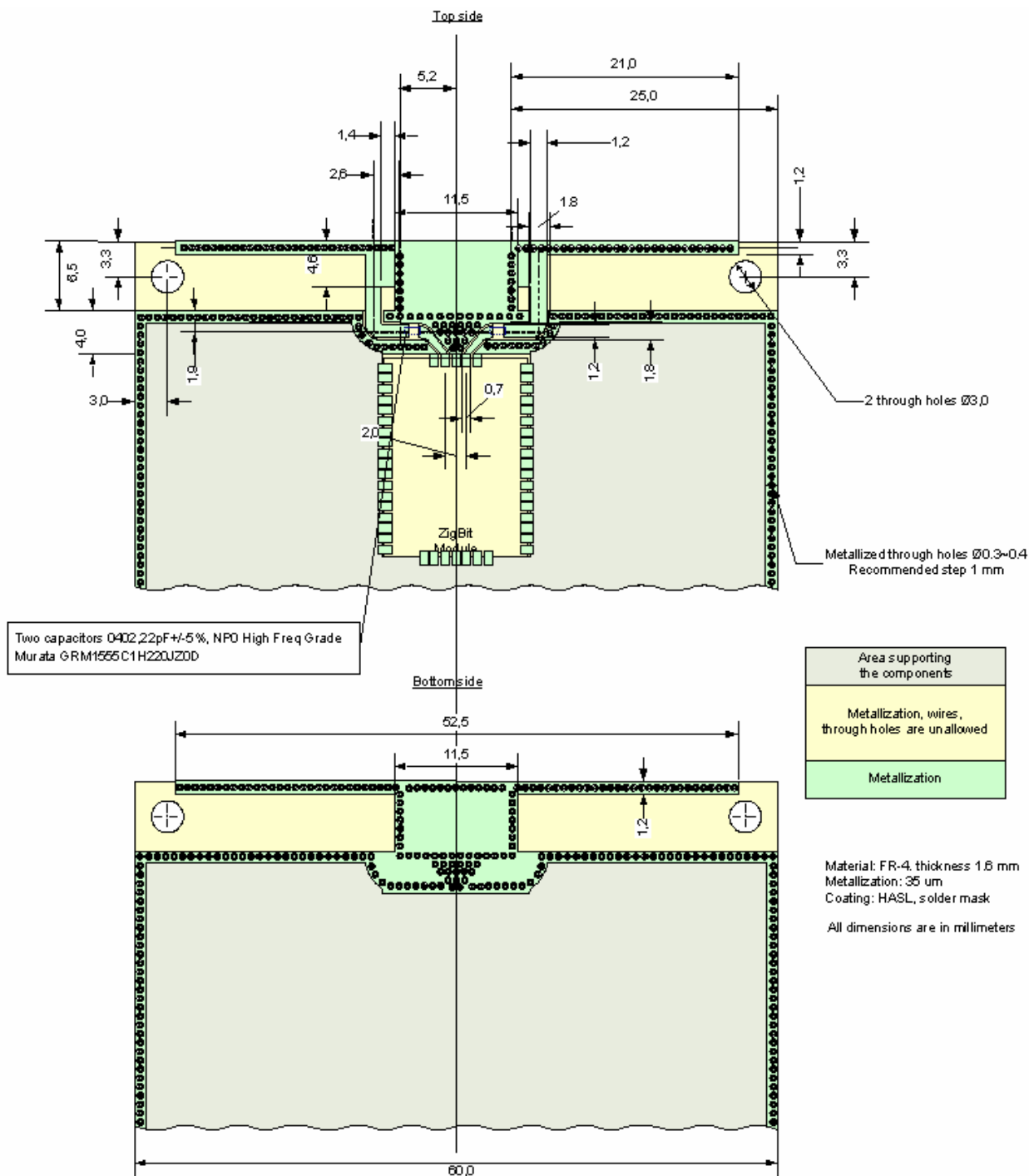
Figure 3-6. Atmel ATZB-24-A2 PCB Recommended Layout, top view.



### 3.5 Sample Antenna Reference Designs

This section presents PCB designs which combine ZigBit with different antennas: PCB onboard antenna, external antenna and dual chip antenna. These antenna reference designs are recommended for successful design-in.

Figure 3-7. PCB layout: Symmetry Dipole Antenna Recommended for Atmel ATZB-24-B0.



The symmetric dipole antenna above has been tuned for the particular design. The 'cut-and-paste' approach would not guarantee optimal performance because of multiple factors affecting proper antenna match, hence, affecting the pattern. The particular factors are the board material and thickness, shields, the material used for enclosure, the board neighborhood, and other components adjacent to antenna.

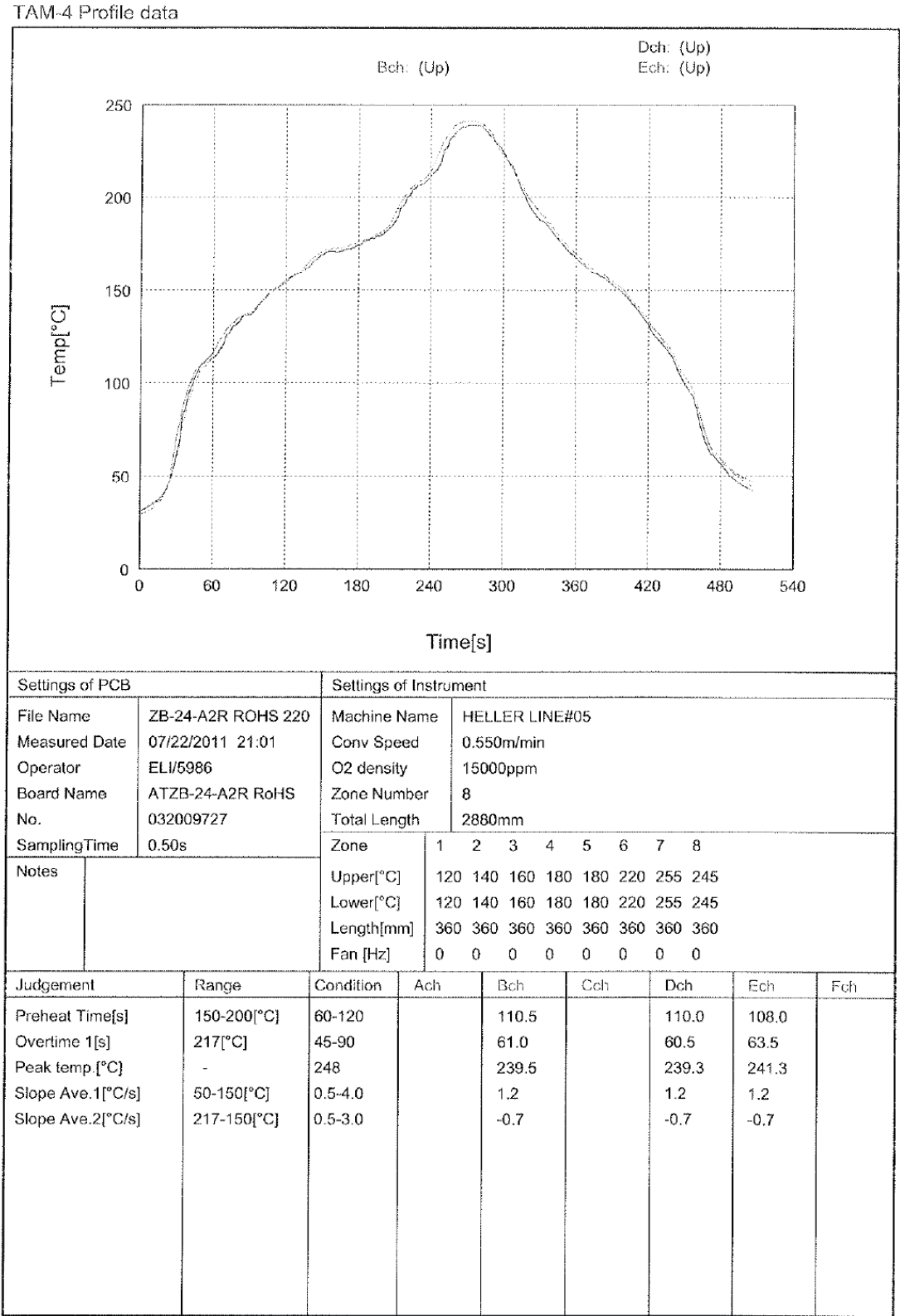


### 3.5.2 General Recommendations

- Metal enclosure should not be used. Using low profile enclosure might also affect antenna tuning
- Placing high profile components next to antenna should be avoided
- Having holes/vias punched around the periphery of the board eliminates parasitic radiation from the board edges also distorting antenna pattern
- ZigBit module should not be placed next to consumer electronics which might interfere with ZigBit RF frequency band

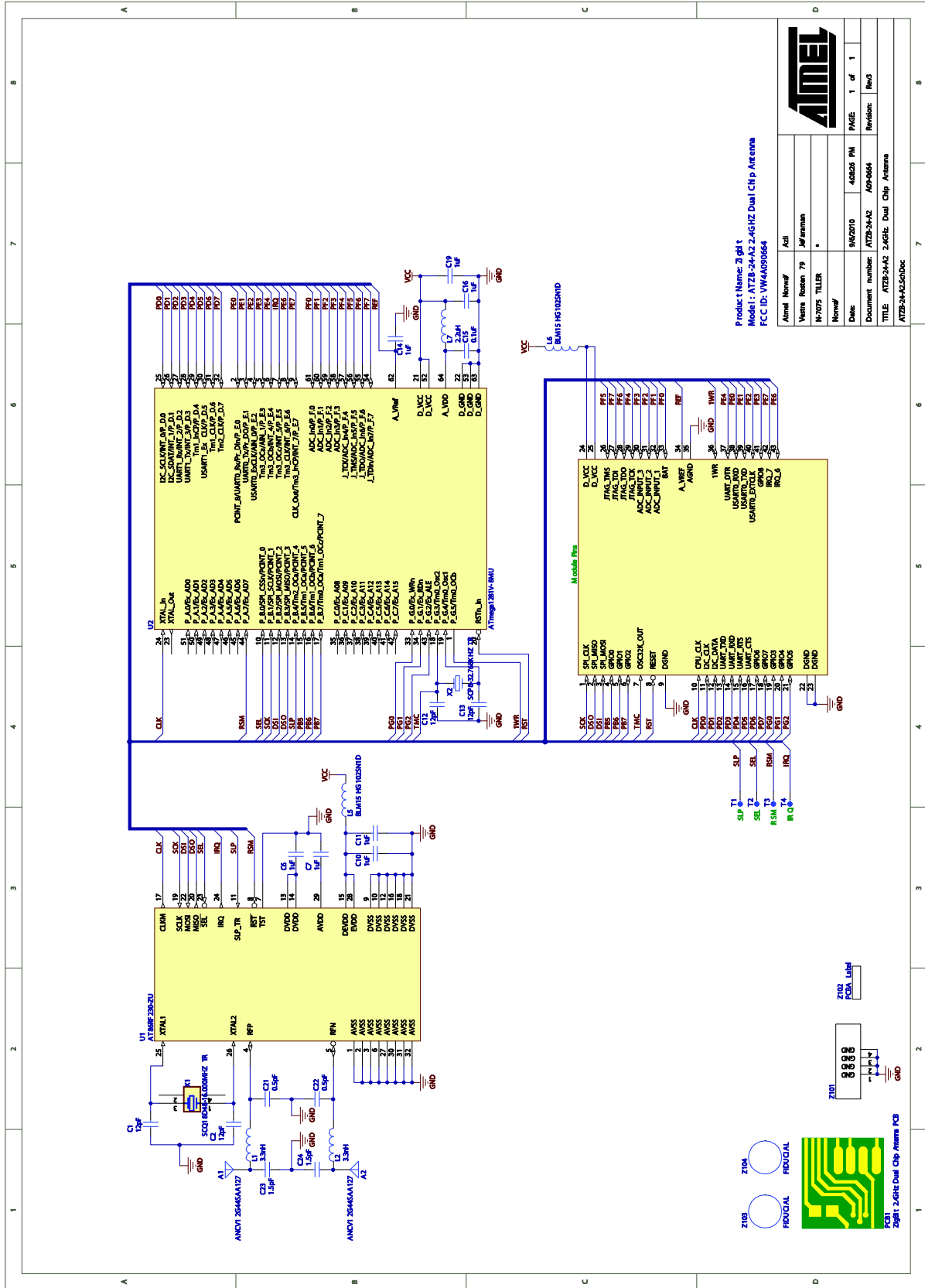
### 3.6 Soldering Profile

Figure 3-8. Profile Data.



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### 3.7 Internal Schematics



### 3.8 Handling instructions

The ZigBit Modules are fixed with an EMI Shield to ensure compliance to Emission and Immunity rules. This shield is galvanic and NOT air tight. So cleaning of the module with IPA / other similar agents is not advised. Humidity protection coating (conformal) will cause deviated RF behavior and coating material being trapped inside EMI Shield. So this should be avoided. For products requiring conformal coating, it is advised to suitably mask the ZigBit before applying the coating to rest of the ZigBit carrier board. To protect ZigBit from humidity, the housing of the product should ensure compliance of suitable Ingress Protection standards.

## 4. Agency Certifications

### 4.1 United States (FCC)

This equipment complies with Part 15 of the FCC rules and regulations.

To fulfill FCC Certification requirements, an OEM manufacturer must comply with the following regulations:

1. The modular transmitter must be labeled with its own FCC ID number, and, if the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following:

#### Example of label required for OEM product containing ATZB-24-A2 module

**Contains FCC ID: VW4A090664**

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

#### Example of label required for OEM product containing ATZB-24-B0 module

**Contains FCC ID: VW4A090665**

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

Any similar wording that expresses the same meaning may be used.

ATZB-24-A2 module is Modular approved and does not need separate approval for this module when used on an application board

ATZB-24-B0 is limited modular approved and required separate approval for this module when used on an application board

### 4.2 Canada (IC)

**ATZB-24-A2 Module** complies with Industry Canada specifications RSS-210 and RSS – Gen

IC ID for ATZB-24-A2 is **11019A-090664**

ATZB-24-A2 module is Modular approved and does not need separate approval for this module when used on an application board

### 4.3 European Union (ETSI)

The ATZB-24-A2 and ATZB-24-B0 Modules has been certified for use in European Union countries.

If the ATZB-24-A2 and ATZB-24-B0 Modules are incorporated into a product, the manufacturer must ensure compliance of the final product to the European harmonized EMC and low-voltage/safety standards. A Declaration of Conformity must be issued for each of these standards and kept on file as described in Annex II of the R&TTE Directive.

Furthermore, the manufacturer must maintain a copy of the ATZB-24-A2 and ATZB-24-B0 Modules documentation and ensure the final product does not exceed the specified power ratings, antenna specifications, and/or installation requirements as specified in the user manual. If any of these specifications are exceeded in the final product, a submission must be made to a notified body for compliance testing to all required standards.

**IMPORTANT:** The 'CE' marking must be affixed to a visible location on the OEM product. The CE mark shall consist of the initials "CE" taking the following form:

If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected. The CE marking must have a height of at least 5mm except where this is not possible on account of the nature of the apparatus.

The CE marking must be affixed visibly, legibly, and indelibly.

More detailed information about CE marking requirements you can find at "**DIRECTIVE 1999/5/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL**" on 9 March 1999 at section 12.

#### 4.4 Using Limited Modular Certified Products

The ATZB-24-B0 ZigBit Module is certified under part 15 of FCC rules. The Modular certification category of this module is "Limited Modular". The End product using these modules hence has to undergo compliance testing and receive a new FCC ID for the final product carrying these modules. Certification of the final product lies solely with the type of design of the final product, excluding the ZigBit.

1. To be used with the ATZB-24-B0 module, the external antennas have been tested and approved which are specified in here below. The ATZB-24-B0 Module may be integrated with other custom design antennas which OEM installer must authorize following the FCC 15.21 requirements.

**Warning:** The Original Equipment Manufacturer (OEM) must ensure that the OEM modular transmitter must be labeled with its own FCC ID number. This includes a clearly visible label on the outside of the final product enclosure that displays the contents shown below. If the FCC ID is not visible when the equipment is installed inside another device, then the outside of the device into which the equipment is installed must also display a label referring to the enclosed equipment.

**IMPORTANT:** This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation (FCC 15.19).

The internal / external antenna(s) used for this mobile transmitter must provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance. This device is approved as a mobile device with respect to RF exposure compliance, and may only be marketed to OEM installers. Use in portable exposure conditions (FCC 2.1093) requires separate equipment authorization.

**IMPORTANT:** Modifications not expressly approved by this company could void the user's authority to operate this equipment (FCC section 15.21).

**IMPORTANT:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense (FCC section 15.105).

## 4.5 Approved Antenna List

The Atmel ATZB-24-A2 Module works with integrated dual chip antenna. The design of the antenna is fully compliant with all the aforementioned regulation.

The Atmel ATZB-24-B0 Module has been tested and approved for use with the antennas listed in [Table 4-1](#). ATZB-24-B0 Module may be integrated with other custom design antennas which OEM installer must authorize with respective regulatory agencies. For further information see Section [4.4](#).

**Table 4-1. Approved Antenna Specifications**

Part number	Manufacture and description	Gain [dBi]	Minimum separation [cm]
2010B48-01	Antenova Titanis, swivel antenna (1/4 wave antenna) with SMA connector, frequency range 2.4 - 2.5GHz	2.2	20
17010.10	WiMo, swivel antenna (1/2 wave antenna) with SMA connector, frequency range 2.35 - 2.5GHz	2.1	20

## 5. Ordering Information

**Table 5-1. Ordering Information**

Part number	Description
ATZB-24-B0R	2.4GHz IEEE802.15.4/ZigBee OEM module with balanced RF port, tape and reel
ATZB-24-B0	2.4GHz IEEE802.15.4/ZigBee OEM module with balanced RF port, single unit
ATZB-24-A2R	2.4GHz IEEE802.15.4/ZigBee OEM module with dual chip antenna, tape and reel
ATZB-24-A2	2.4GHz IEEE802.15.4/ZigBee OEM module with dual chip antenna, single unit

Note: Tape and reel quantity: 200.

## 6. Revision History

Doc. Rev.	Date	Comments
8226C	07/2013	New template and several other changes
8226B	06/2009	
8226A	10/2008	Initial document release



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