Ubisense

Ultra-wideband Location System

Modular Ubitag V2.0

User's Manual

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Released: October 2009

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Introduction

The Modular Ubitag V2.0 is a wireless module intended to be integrated into other devices for the real-time location of objects within buildings. It transmits ultra-wideband (UWB) pulses which are picked up by a network of basestations (Ubisensors) placed inside the building, allowing the 3D position of the tag to be found. The use of UWB technology enables greater positioning accuracy within buildings than other wireless technologies, because it is much less susceptible to multipath interference effects. Applications of the system include healthcare, workplace productivity, security, retail management and manufacturing.

This document describes the features and specifications of the Modular Ubitag and important regulatory information concerning its use and integration into other devices.

Regulatory Information for the United States of America

The Modular Ubitag V2.0 is approved under subpart F (Part 15.517) and Part 15.249 of the FCC rules as a Modular Transmitter.

The product into which the Modular Ubitag V2.0 is incorporated must bear a label per the FCC requirements which shows the FCC ID assigned to the Modular Ubitag V2.0 as follows.

Contains FCC ID: SEAMOD21

The following information must be conveyed in the information supplied to the End User of the product into which the Modular Ubitag V2.0 is incorporated:

> *This device 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.*
>
> *CAUTION: This equipment may only be operated indoors. Operation outdoors is in violation of 47 U.S.C. 301 and could subject the operator to serious penalties.*
>
> *The Modular Ubitag V2.0 will only operate (i.e. transmit UWB signals) in conjunction with an in-building UWB sensor network, which should be professionally installed. The installed sensor network will be configured to cover only the area inside the building, preventing Ubitags from emitting UWB signals outdoors. Contact your system administrator if you are unsure as to the extent of the coverage of the Ubisense In-Building Location System in your building.*

The user's manual or instruction manual shall caution the user that changes or modifications to the equipment not expressly approved by the party responsible for the grant of equipment authorization issued by the FCC could void the user's authority to operate the equipment under the grant of equipment authorization, for example:

> *CAUTION: Any changes or modifications made to the Modular Ubitag V2.0 which are not expressly approved by the Ubisense Limited could void the user's authority to operate the equipment.*

Regulatory Information for Europe

Hereby, Ubisense declares that this Modular Ubitag V2.0 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. A copy of the Declaration of Conformity for this equipment may be obtained from:

Ubisense
St. Andrew's House
St. Andrews Road
Chesterton
Cambridge
CB4 1DL
United Kingdom

This UWB transmitter must not be installed at a fixed outdoor location or used in flying models, aircraft and other forms of aviation.

Integrators should note that when the module is integrated into other equipment the combined device must meet all essential requirements and other relevant provisions of European Directives for that combined equipment. See ETSI TR102070-1 and ETSI TR102070-2 for further details.

Regulatory Information for Canada

The Modular Ubitag V2.0 is approved under Industry Canada documents RSS-GEN, RSS-210 and RSS-220 as a Modular Transmitter.

The product into which the Modular Ubitag V2.0 is incorporated must bear a label per Industry Canada requirements which shows the Industry Canada ID assigned to the Modular Ubitag V2.0 as follows.

Contains IC: 8673A-MOD21

The following information must be conveyed in the information supplied to the End User of the product into which the Modular Ubitag V2.0 is incorporated:

> *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.*

Modular Ubitag V2.0 Specifications

UWB transmitter section

Operates under:	FCC Part 15.517 (U.S) and EN302500 (E.U.)
Centre frequency:	7.488 GHz
-10dB bandwidth:	1.014 GHz

Conventional 2.4GHz radio transceiver

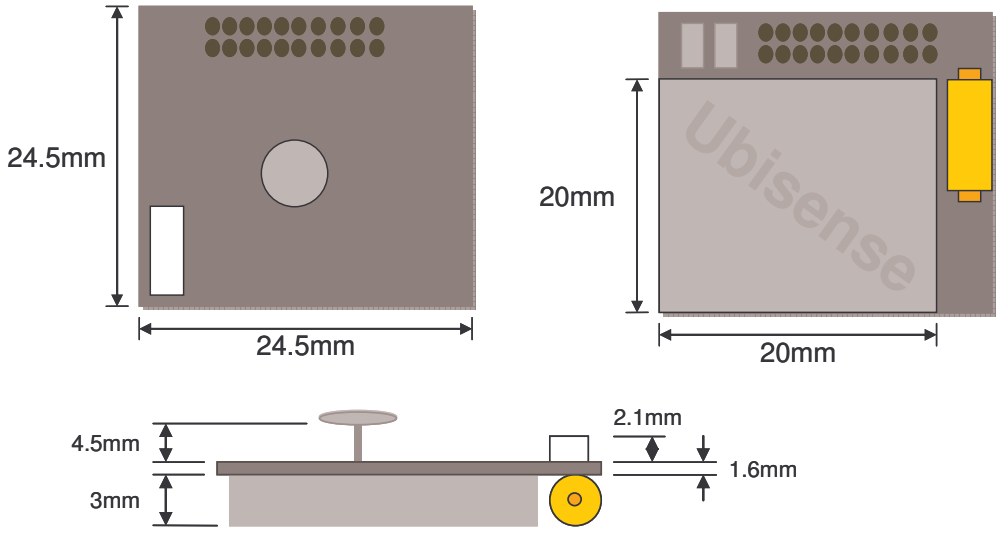
Operates under:	FCC Part 15.249 (U.S) and EN300440 (E.U.)
Lowest channel frequency:	2402.5MHz
Highest channel frequency:	2480.5MHz

General specifications

Dimensions (WxHxD):	24.5mm x 24.5mm x 9mm
Weight:	6g
Power supply:	2.3V-5.25V DC supply
Operating temperature range:	-40ºC to +85ºC

Integration information

The dimensions of the module PCB are shown below:



When mounting the tag on another device care must be taken to avoid occlusion of the antennas by tall components, shielding, or mounting screws. There should be an air gap of at least 1mm left around both of the antennas to avoid detuning.

While the connector provides some mechanical fixing it is not recommended that this is the only fixing point. A double-sided pad has been supplied that can be fitted to the top of the screening can to securely fix the module to a PCB.

When designing the PCB it is recommended that there is no ground plane underneath the module.

Power should be supplied on the following pins of the header:

2.3V-5.25V DC power input:	Pin 3
Ground:	Pins 5,6,9,10,14,18,19

A number of pins on the module's header may be used for digital input/output and analogue input. Note that application-specific use of these pins will require Ubisense to write modified firmware for the device, and therefore integrators wishing to make use of these features should contact Ubisense in the first instance.

The header used on the module is a **Major League TSHS-5 10-D-04-A-F-LF**, a standard 1.27mm pitch through-hole pin header. The recommended connector to use with the module is:

Connector: Major League LSSHS-5 10-D-06-F-TB-P-LF (SMD)

Please refer to http://www.mlelectronics.com for further information and ordering details.

Annex A – Additional information pertaining to use of UWB indoors

This section lists the regulatory requirements for indoor UWB operation in various territories. Note that this text is presented only for informative purposes, and that all regulatory steps (labeling, instructions to the user, etc.) listed in the main section of this document must be fulfilled by integrators supplying the Ubitag Module V2.0 to users.

United States of America

This section reiterates the technical requirements laid down in the FCC's rules which must be met by UWB devices operating indoors under §15.517 of those rules. Modular Ubitags operating with a correctly-installed Ubisense location system will meet these requirements.

(1) Indoor UWB devices, by the nature of their design, must be capable of operation only indoors. The necessity to operate with a fixed indoor infrastructure, e.g., a transmitter that must be connected to AC power lines, may be considered sufficient to demonstrate this.

(2) The emissions from equipment operated under this section shall not be intentionally directed outside of the building in which the equipment is located, such as through a window or a doorway, to perform an outside function, such as the detection of persons about to enter a building.

(3) The use of outdoor mounted antennas, e.g., antennas mounted on the outside of a building or on a telephone pole, or any other outdoors infrastructure is prohibited.

(4) Field disturbance sensors installed inside of metal or underground storage tanks are considered to operate indoors provided the emissions are directed towards the ground.

(5) A communications system shall transmit only when the intentional radiator is sending information to an associated receiver.

Canada

This section reiterates the technical requirements laid down in Industry Canada's rules which must be met by UWB devices operating indoors under RSS-210. Modular Ubitags operating with a correctly-installed Ubisense location system will meet these requirements:

> Indoor UWB communications devices, by the nature of their design, shall be capable of operation only indoors or in locations completely enclosed by walls and a ceiling. The necessity to operate within a fixed indoor infrastructure (e.g., a transmitter that must be connected to the AC power lines, an enclosure that is not weatherproof, etc.) may be considered sufficient to meet this requirement.

EU

This section reiterates the technical requirements laid down in EN302500 which must be met by UWB devices. Modular Ubitags operating with a correctly-installed Ubisense location system will meet these requirements:

(1) The UWB transmitter equipment conforming to the present document shall not be:

- installed at a fixed outdoor location;

- installed or used in flying models, aircraft and other forms of aviation;

- installed or used in a road or rail vehicle.

(2) To minimize interference to other users of the radio spectrum, in particular outdoor radio stations, the equipment shall transmit only when it is sending information to a receiver or attempting to acquire or maintain association. The device shall cease transmission within ten seconds unless it receives an acknowledgement that its transmission is being received. An acknowledgement of transmission shall continue to be received by the UWB device at least every ten seconds, or it shall cease transmitting. Equipment covered by the present document shall include a receiver mechanism capable of receiving the reception acknowledgement from an associated receiver.

NOTE: As an example, the receiver mechanism might be capable of operating at frequency bands given in CEPT/ERC/REC 70-03, annex 1 and tested according to EN 300 220 or EN 300 440.

If a device ceases UWB transmissions due to lack of a reception acknowledgement, it shall wait for at least twelve seconds before reattempting to send information to a receiver or to acquire or maintain association with a receiver, unless it first receives an indication from an external source that its UWB transmissions are likely to be detected. In this latter case, the device may reattempt to send information to a receiver or to acquire or maintain association with a receiver immediately.