WiSe 1210 Bluetooth Low Energy User's Guide

Model: WISE1012B

FCC ID: 2AG4NWISE1012B

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Introduction

This chapter introduces the WiSe1210 Bluetooth Low Energy module which also includes some fundamentals concepts of Bluetooth Low Energy (BLE). The WiSe1210 Bluetooth® Low Energy Module is a single mode Bluetooth Smart module that complies with Bluetooth Core Specification v4.1. WiSe1210 enables ultra-low-power connectivity and basic data transfer for applications previously limited by the power consumption, size constraints and complexity of other wireless standards.

WiSe 1210 module provides everything required to create a Bluetooth low energy product with RF, baseband, MCU, qualified Bluetooth v4.1 specification stack and customer application running on a single IC The WiSe1210 module is easy to use and provides users with a fast-to-market, flexible, and powerful solution for BTLE technology.

Finally, the WiSe1210 module also supports a user-defined private profile/service, which can precisely fit a user's particular application. All configurations will be saved in on-board non-volatile memory (NVM), so users need to set up the module only once.

Bluetooth Low Energy Fundamentals

All BTLE device roles are built on top of the Generic Accessory Profile (GAP), which defines the devices to be either Central, Peripheral, Observer or a Broadcaster. When two BTLE devices need to establish a connection, one is in a central role and the other in a peripheral role. Only central role devices can initiate a connection to peripheral role devices. Likewise, peripheral devices are not allowed to initiate connections. The peripheral advertises its connection status, while the central device starts the connection process. Once connected, either end of the connection can initiate the bond. Once bonded, all security-related keys will be saved and the security process will be waived when reconnecting. The bonded peripheral device can only perform direct advertise; therefore, it is no longer able to connect to devices other than its bonded peer. Similar to Bluetooth Classic, BTLE uses the concept of profiles to ensure interoperability between different devices. However, unlike Bluetooth Classic, BTLE profiles are a collection of services.

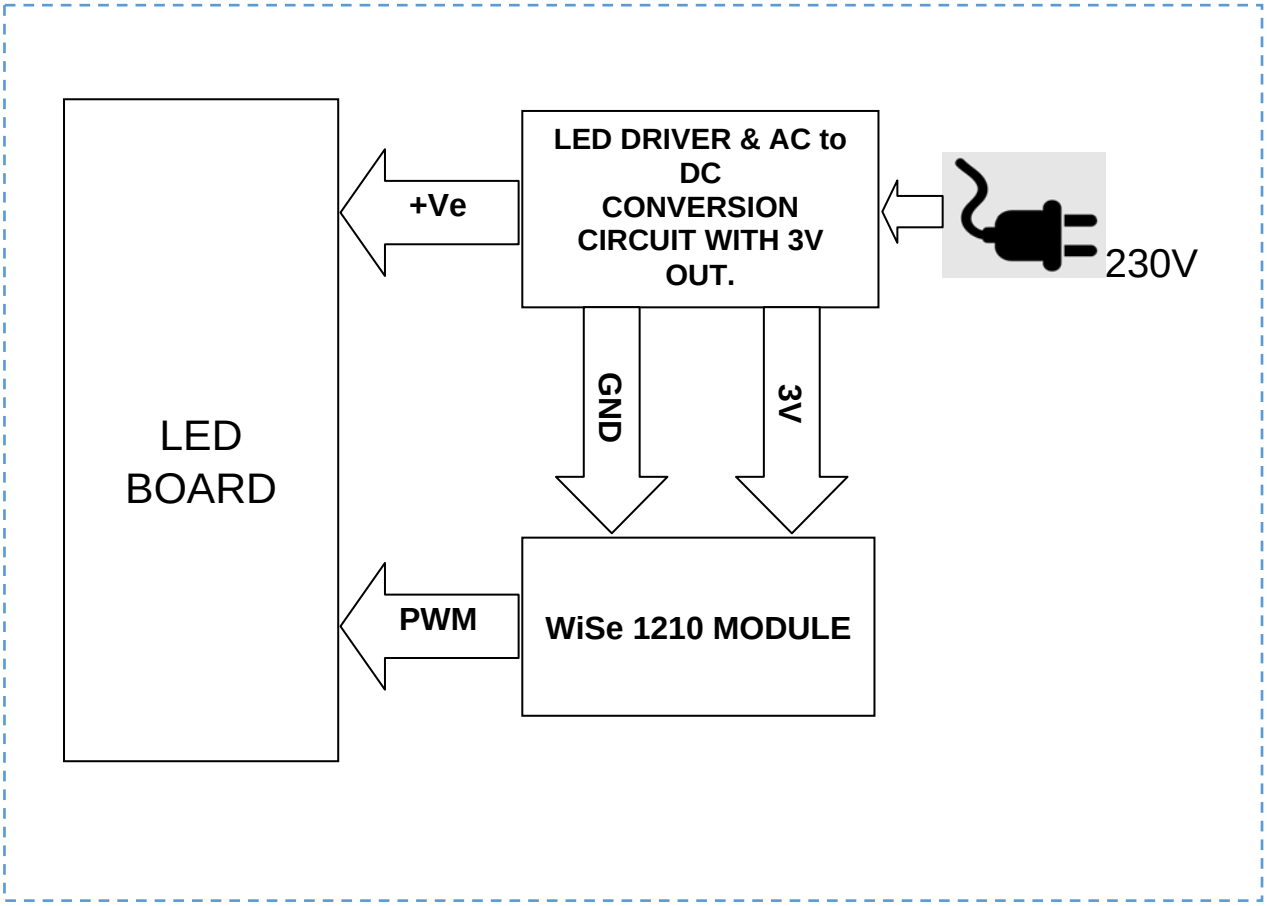
All BTLE services are built on top of the Generic Attribute Profile (GATT), where GATT defines the accessibility of attributes, which are called characteristics. Therefore, the main functionality of BTLE profiles is built around these characteristics. Devices that maintain the value of characteristics in a service are the "server" of the service. Conversely, devices that acquire data from their peer are considered the "client". Each service and its characteristics are identified by their Universally Unique Identifier (UUID). The UUID can either be short form (16-bit) or long form (128-bit). All Bluetooth SIG adopted services and characteristics have a short UUID, whereas a user-defined private UUID must be in long form. For information on the Bluetooth SIG adopted services and characteristics, visit the Bluetooth Developer Portal at:

https://developer.bluetooth.org/gatt/profiles/Pages/ProfilesHome.aspx

Features

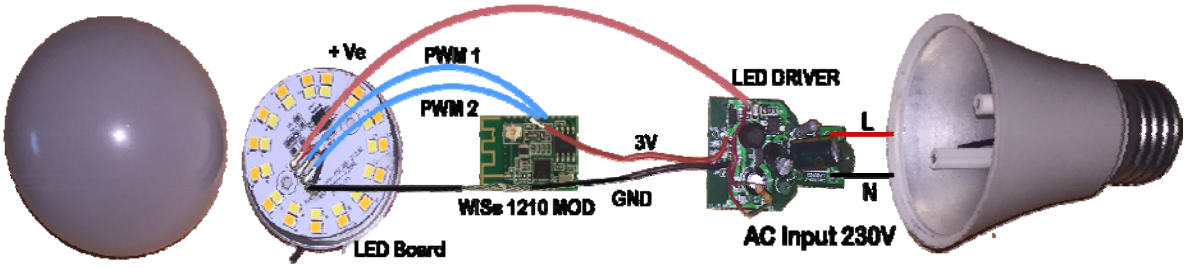
- Bluetooth v4.1 specification complaint
- Support for Bluetooth 4.1 specification host stack
- 64kb of RAM and 64kb of ROM
- 16 MHz and 32.768 kHz clock system
- 32.768 kHz for sleep time
- PWM/SPI/GPIO/UART/I2C interface
- Both PCB printed and External Antenna
- 8 programmable GPIO's
- 1 MB EEPROM
- Debug SPI

Block Diagram For LED Lamp Using WiSe 1210 MOD:



Product Level Diagram:

The below images shows the product level diagram of 2 Tone LED bulb and its assembly.



WiSe 1210 Module Applications

WiSe 1210 Bluetooth Smart enables connectivity and data transfer to leading smartphone, tablet and personal computing devices including Apple iPhone, iPad, iPod and Mac products and leading Android devices. WiSe1210 takes less time to make a connection than conventional Bluetooth wireless technology and can consume approximately 1/20th of the power of Bluetooth Basic Rate. WiSe 1210 module support the profiles for

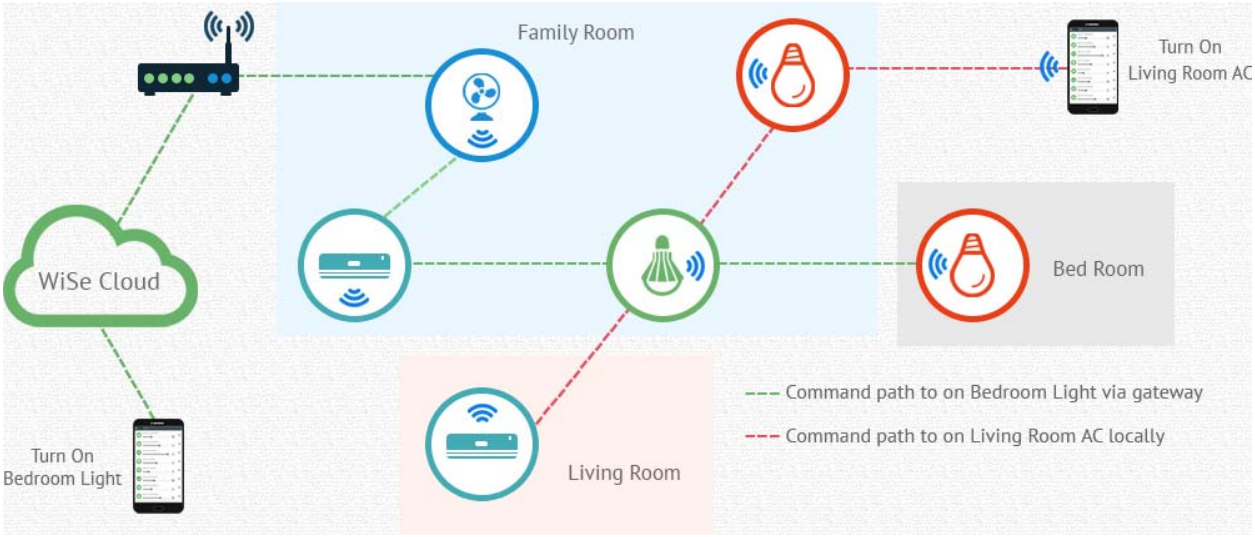
- Smart mesh light application
- Smart home heating and lighting control
- Health sensors like blood pressure, thermometer and glucose meter
- Beacons
- Security
- Sensors

Smart Mesh Light Application

The **Internet of Things** (**IoT**) is the interconnection of uniquely identifiable devices within the existing Internet infrastructure. Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications. The interconnection of these embedded devices (including smart objects), is expected to get used in automation in nearly all fields, while also enabling advanced applications like a Smart Grid.

Things, in the IoT, can refer to a wide variety of devices such as heart monitoring implants, biochip transponders on farm animals, household or commercial lighting solution, and automobiles with built-in sensors, or field operation devices that assist fire-fighters in search and rescue

The below figure describes the WiSe Mesh used for the WiSe Home implementation. With the WiSe Home the user will be able to control the home globally with the prerequisite of an internet connection and a WiSe App for your smart phone.



So all our home appliances should be incorporated WiSe1210 Module to have smart control.

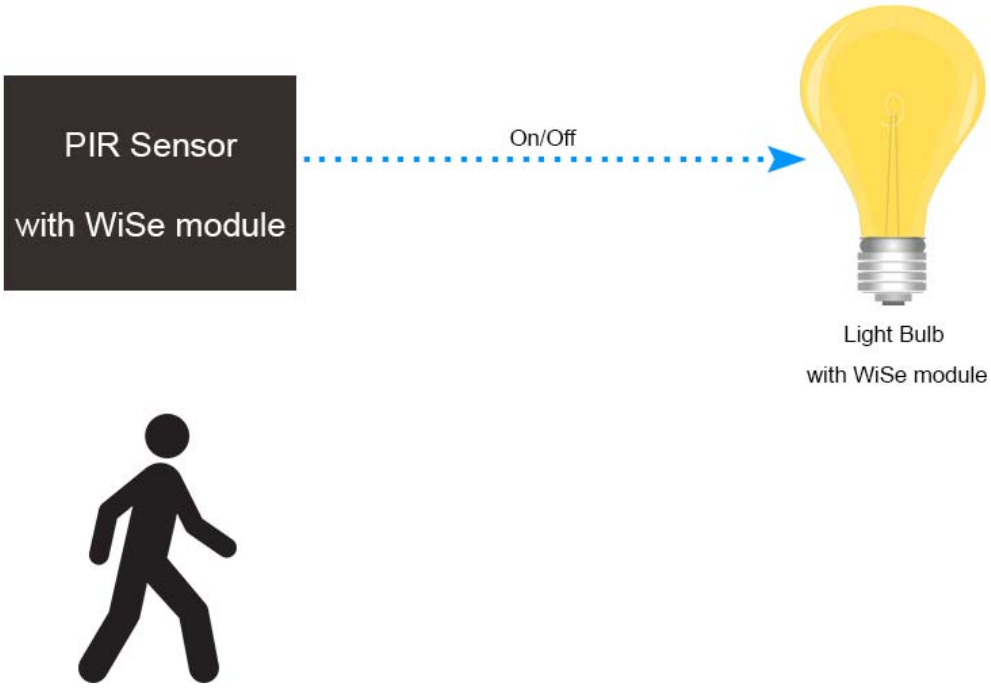
Sensor

Sensor devices are mainly used to reduce the totally power consumption which included

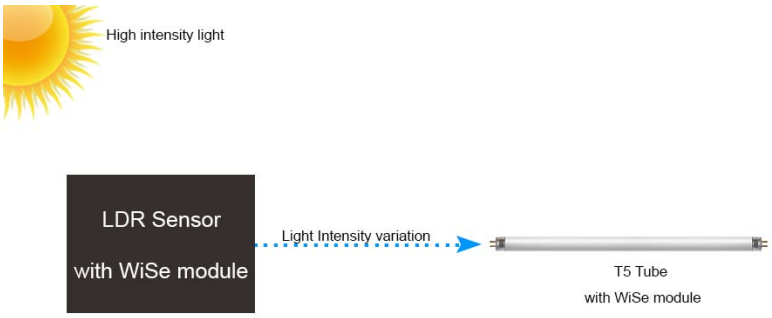
- PIR Sensor

- LDR Sensor
- Temperature and Humidity sensor

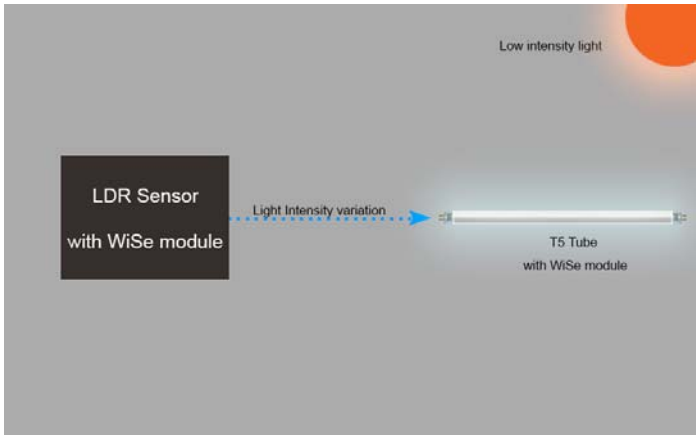
All the above sensors are integrated with WiSe1210 module, So once the sensor are is get triggered it will sent it's respective command (ON/OFF in case of PIR Sensor) to the paired device of the particular sensor. Below figure show working Model before and after triggering.



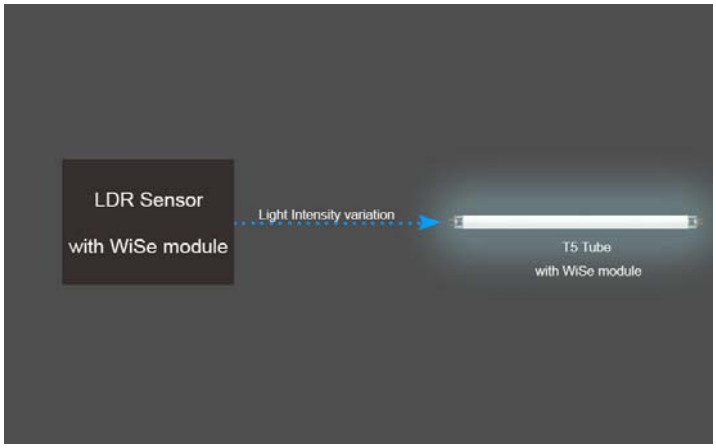
LDR Sensor is used for the ambient light control



High Ambient Light



Less Ambient Light

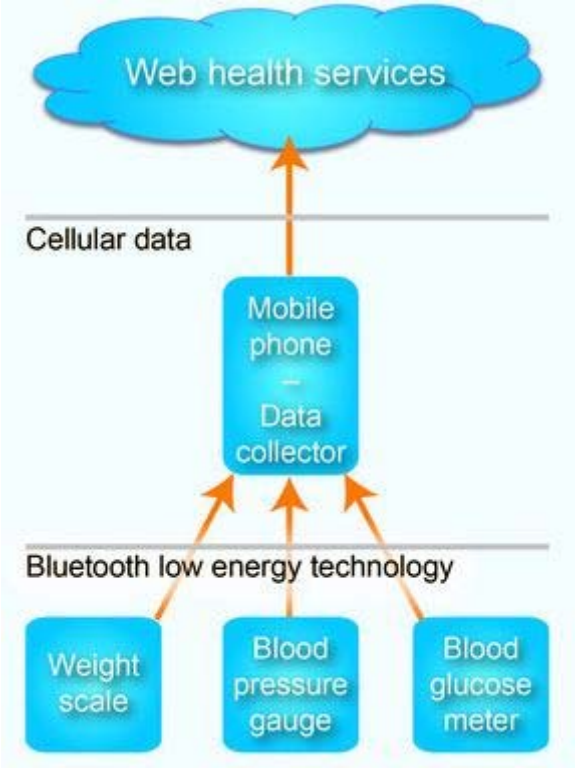


Absence Of Ambient light

As shown in above image the Intensity of the T5 tube is controlled by LDR sensor integrated with WiSe1210 module.

Health Sensor

The reduced power and cost of Bluetooth low energy technology enable many medical use models from the home to the hospital. The example model in the home could be used to log data and establish trends for a Congestive Heart Failure (CHF) patient using several types of sensors and the patient's mobile phone.



As the technology is being implemented in almost all mobile devices, there is an opportunity to utilize off-the-shelf handheld devices and enable new use models that leverage off of the rich user interface and communication features of those platforms.

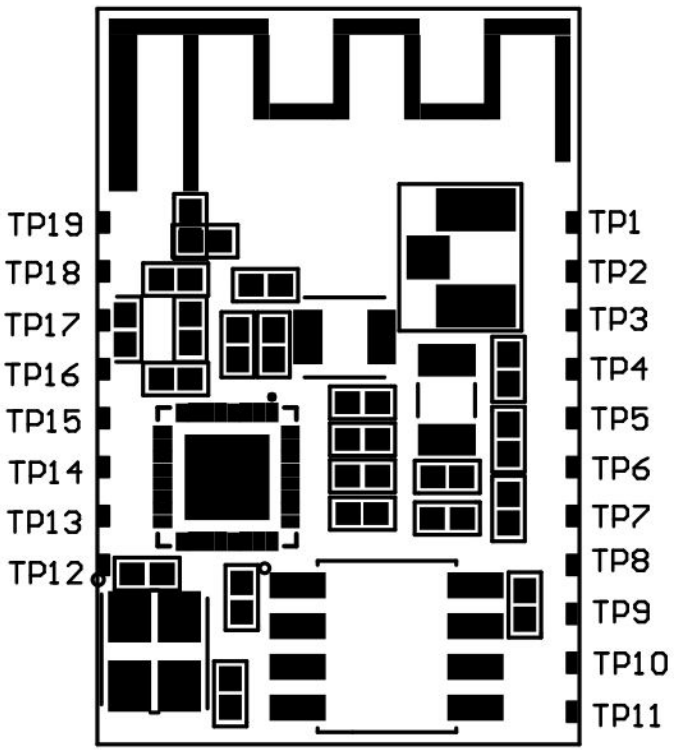
Beacons

Beacons are small indoor positioning devices that use low-energy Bluetooth (BLE) to communicate with a shopper's smartphone in the hopes of improving the in-store shopping experience. When placed in a store, beacons can detect nearby smartphones and send those media such as ads, coupons, or customized supplementary product information. Not just for shoppers, beacons can also be used as point-of-sale systems and collect large amounts of data that can then be used to improve both real-time and right-time marketing, in-store and online.

Some list of things that we can do with Beacon

- Control device based on the presence information
- Receive reminders when the tag moves into or out of any location
- Share location and movement information of an assets with friends and family.
- Improve the experience, sales and service based on accurate contextual information.

Module Pin Diagram:



Module Pin Description

PINS	NAME	FUNCTION	COMMENTS
TP1	SPI_MOSI	I	SPI data input or Programmable I/O
TP2	SPI_MISO	O	SPI data output or Programmable I/O
TP3	SPI_CSB	O	SPI select or Programmable I/O
TP4	SPI_PIO_SEL	I	Programmable I/O pulled high
TP5	3V3	Power	Power Input
TP6	PIO[11]	I/O	Programmable I/O
TP7	PIO[10]	I/O	Programmable I/O
TP8	PIO[9]	I/O	Programmable I/O
TP9	SCL	I/O	Eeprom installed
TP10	SDA	I/O	Eeprom installed
TP11	PIO[3]	I/O	Programmable I/O
TP12	SPI_CLK	I	SPI Clock or Programmable I/O
TP13	PIO[4]	O	Programmable I/O
TP14	RX	I/O	Programmable I/O or UART RX
TP15	TX	I/O	Programmable I/O or UART TX
TP16	AIO[0]	I/O	Analog Programmable I/O
TP17	AIO[1]	I/O	Analog Programmable I/O
TP18	AIO[2]	I/O	Analog Programmable I/O
TP19	GND	Ground	Ground

Programmable GPIO's

Totally 3 Analog Channels, 5 digital IO's and 4 PWM channels are available in WiSe 1210 Module

ADC

WiSe 1210 Module supports 10bit ADC

- TP16 (AIO[0])
- T17 (AIO[1])
- TP18 (AIO[2])

Digital IO's

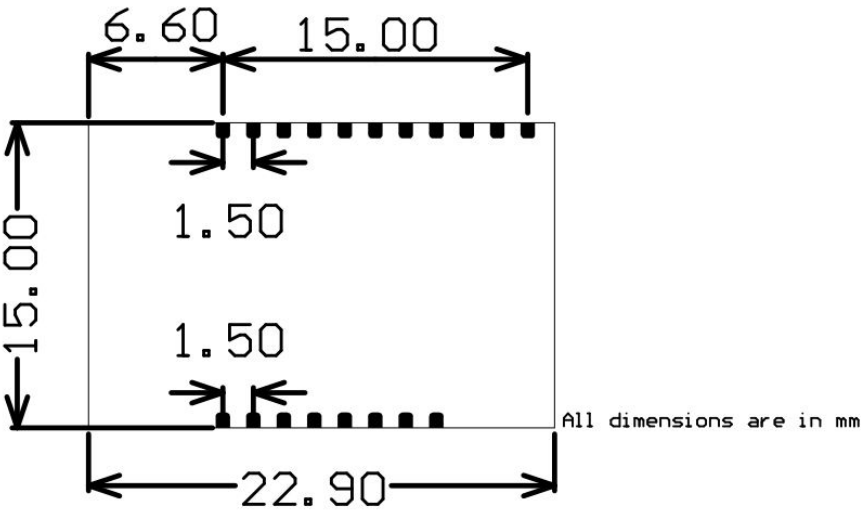
- TP6 (PIO[11])
- TP7 (PIO[10])
- TP8 (PIO[9])
- TP11 (PIO[3])
- TP13 (PIO[4])

PWM

Any of the Digital IO pins can be configured as PWM i.e (PIO[9] to PIO[11], PIO[3] and PIO[4]).

Package Dimension:

- Dimension: 22.9x15mm
- Pitch: 1.5mm.
- Pad dimension 0.7x0.77mm



NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

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.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

(OEM) Integrator has to assure compliance of the entire end-product
incl. the integrated RF Module. Additional measurements (15B) and/or equipment authorizations
(e.g Verification) may need to be addressed depending on co-location or simultaenous
transmission issues if applicable.

Integrator is reminded to assure that these installation instructions
will not be made available to the end-user of the final host device.

With the low output power, this RF Module meets the FCC SAR exemption
and can be therefore integrated into any (portable, mobile, fixed) host device that powered by battery.

The final host device, into which this RF Module is integrated" has to be labelled
with an auxilliary lable stating the FCC ID of the RF Module, such as
"Contains FCC ID: 2AG4NWISE1012B ".