Meye Security LTD

Bluetooth Communication Module
Part Number: MT-SiW35-SiGeL-001

FCC (FRN): 0012886107
FCC Grantee Code: S37

FCC ID: S37-SIW35-SIGL-01

DA-1407 Compliance Document

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Product Description :

The **MTeye Security Ltd** Bluetooth Class 1 module Part Number: **MT-SiW35-SiGeL-001** is a compact and qualified modules that provide a complete Bluetooth solution for wireless data communications.
The modules will be integrated into **MTeye Security Ltd** various applications to enable wireless communication.
MT-SiW35-SiGeL-001 is available with two antenna options which are not part of the module but supply with. A detailed description of the antenna RF connection method is also supplied.

MT-SiW35-SiGeL-001 is a low cost, high speed and fast implementation Bluetooth device.

Key Features and Benefits :

- Complete 2.4GHz radio transceiver and Base band
- Bluetooth™ version 1.2 compliant
- Small footprint (20.3mm x 14.2mm x 2.4mm)
- Bluetooth™ Class 1 (up to 20dBm)
- Basic module as SMD type - Surface mountable
- Based on RFMD SiW3500 Ultimate Blue™, single chip Bluetooth™ system
- UART interface
- Built-in ROM contains the Bluetooth lower layer stack software including the HCI transport driver
- Park, Sniff, Hold and Sleep low power modes
- Detached antenna support
- Shielding mask and GND layout design to reduce EMI and RFI issue

Technology Background:

Bluetooth® technology is a cutting-edge open specification that enables short-range wireless connections between desktop and notebook computers, handhelds, personal digital assistants, mobile phones, camera phones, printers, digital cameras, headsets, keyboards and even a computer mouse. Bluetooth wireless technology uses a globally available frequency band (2.4GHz) for worldwide compatibility. Bluetooth technology unplugs your digital peripherals and makes cable clutter a thing of the past..

Radio Technology

FHSS - Frequency Hopping Spread Spectrum. A type of spared spectrum radio Technology where the sender and receiver "hop" together from one frequency to Another to avoid detection or jamming.
The FHSS it's internally process by the integrated chip SiW3500
Our design is the created the condition to work with Another parameter but with exactly method like the chip operating.
However, the internally chip its provided to buffered modulation/data inputs.

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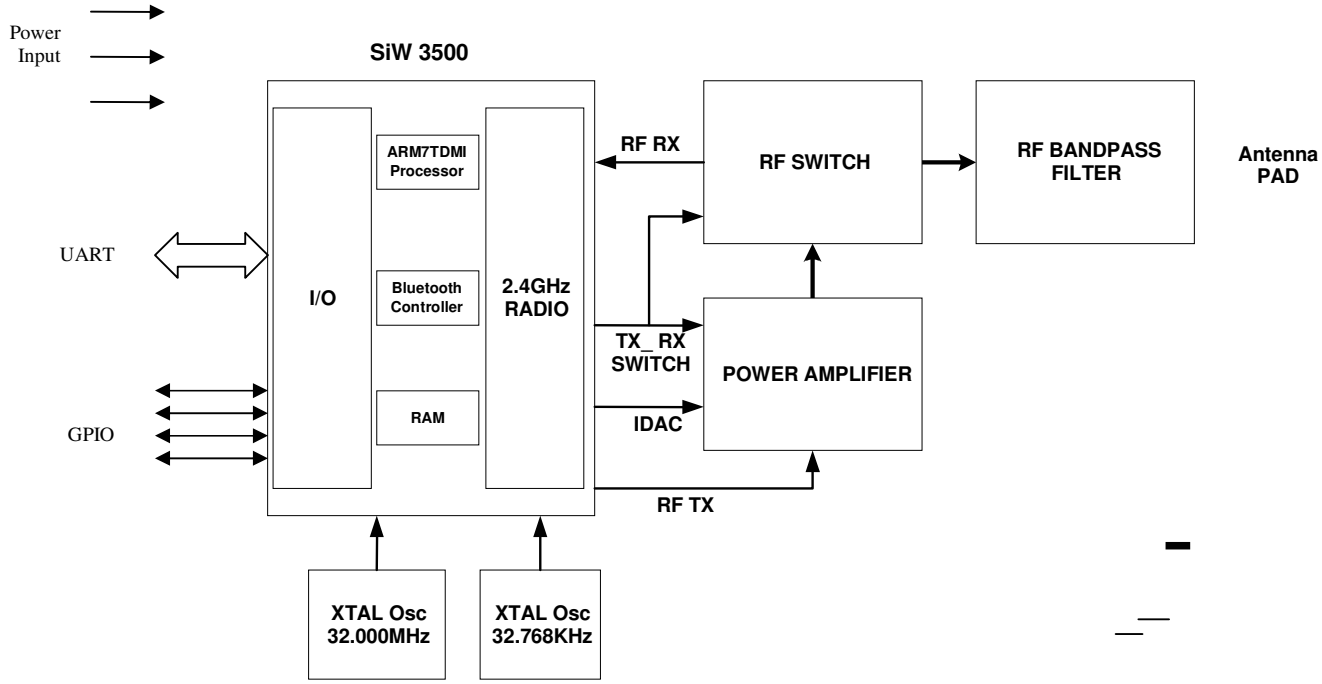
Block Diagram



1. The modular transmitter must have its own RF shielding. This is intended to ensure that the module does not have to rely upon the shielding provided by the device into which it is installed in order for all modular transmitter emissions to comply with Part 15 limits. It is also intended to prevent coupling between the RF circuitry of the module and any wires or circuits in the device into which the module is installed. Such coupling may result in non-compliant operation.

The **MTeye Security Ltd** Bluetooth module Part Number: **MT-SiW35-SiGeL-001** has its own shielding placed as an upper cover, the RF shielding is used as shielding for the module.
The RF shielding is soldered to the ground plane , top layer of the PCB module and soldered at four corners.
The shielding material is Silver Nickel.
The shield prevents any coupling between the RF circuit in the module, to other circuit which the module can be mount on.

Figure 1: Shield Mechanical Diagram:

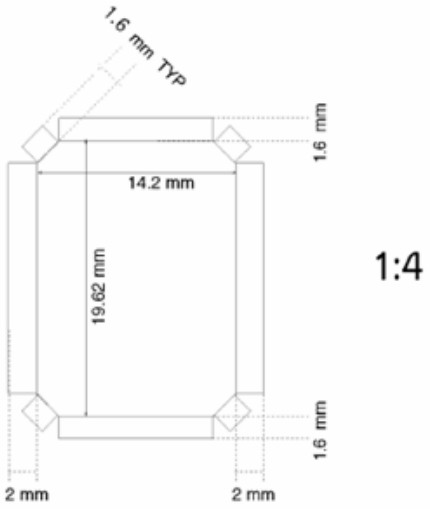
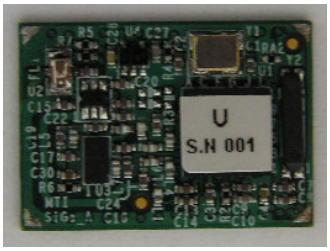
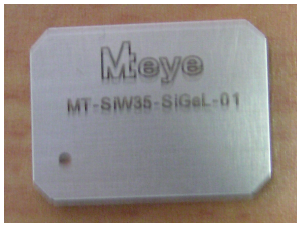


Figure 2: Module with/out shield images:

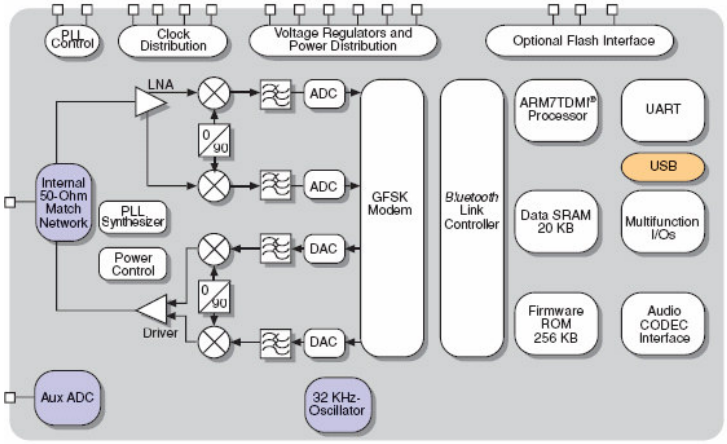




2. The modular transmitter must have buffered modulation/data inputs (if such inputs are provided) to ensure that the module will comply with Part 15 requirements under conditions of excessive data rates or over-modulation.

The **MTeye Security Ltd** Bluetooth module Part Number: **MT-SiW35-SiGeL-001** is based on **RFMD SiW3500** single-chip IC solution which combines a 2.4 GHz transceiver, Base band processor and protocol stack software for *Bluetooth*® wireless technology.

RFMD SiW3500 Block Diagram:



The transmitting of data (packet) is preformed using 'store & forward' mechanism.
The data is loaded to the base band processor using Bluetooth Host Controller Interface (HCI)[1]

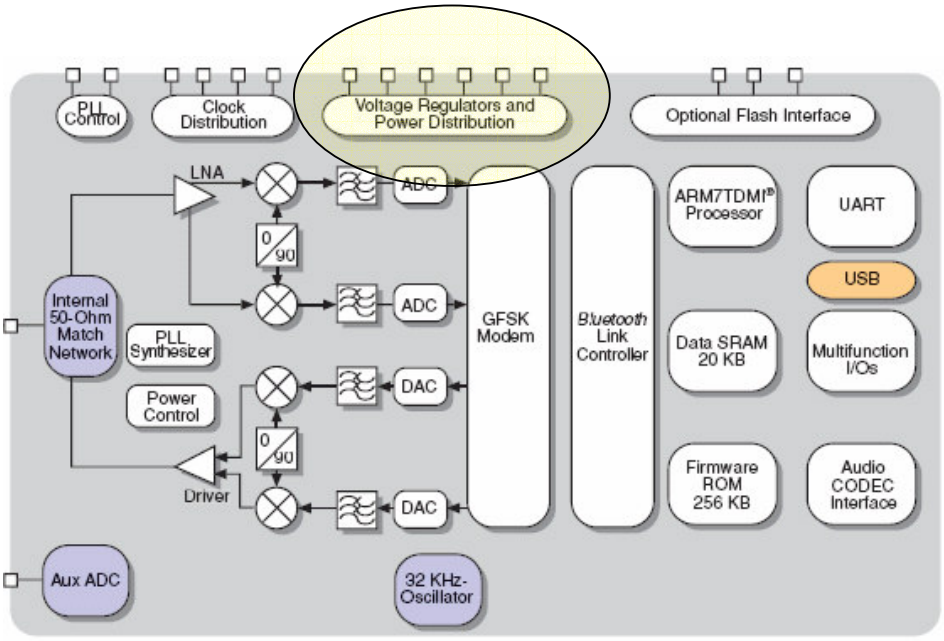
Using the 'store & forward' mechanism of the Bluetooth, no modulation/data inputs are available in the module, and they are 'on chip' generated.

[1] The HCI provides a command interface to the Base band controller and link manager, and access to hardware status and control registers. Essentially this interface provides a uniform method of accessing the Bluetooth base band capabilities.

3. The modular transmitter must have its own power supply regulation. This is intended to ensure that the module will comply with Part 15 requirements regardless of the design of the power supplying circuitry in the device into which the module is installed.

The **RFMD SiW3500** single-chip IC solution (as described in the previous section), contain internal voltage regulator for the RF & Digital circuitry. In this case **no other external regulators are needed** in the design which the module can be installed in.

RFMD SiW3500 Block Diagram:



Internal Regulators:

Internal Analog Regulator	Internal Digital Regulator
V_{BATT_ANA} = 2.3 to 3.63 V	V_{BATT_DIG} = 2.3 to 3.63 V
V_{CC_OUT} = 1.8 V	V_{DD_C} = 1.8 V

4. The modular transmitter must comply with the antenna requirements of Section 15.203 and 15.204(c). The antenna must either be permanently attached or employ a "unique" antenna coupler (at all connections between the module and the antenna, including the cable). Any antenna used with the module must be approved with the module, either at the time of initial authorization or through a Class II permissive change. The "professional installation" provision of Section 15.203 may not be applied to modules.

The **MTeye Security Ltd** Bluetooth module Part Number: **MT-SiW35-SiGeL-001** employ a 'unique' antenna couplers, in order to be compatible with the following two antennas option.

Antenna Option #1: Applied in MTeye Security Product: **SmartView**	Antenna Option #2: Applied in MTeye Security Product: **Gateway**
GigaAnt 2.4 GHz Rufa SMD Antenna 	SENTON **2.4GHz Swivel SMA connector Antenna** 
Antenna Specification Frequency: 2.4-2.5 GHz Type: Ground plane dependent Efficiency: 65%* Gain: 0 dBi* Nominal impedance: 50 Ohm VSWR: <2:1* Mounting: SMD Operating temperatur: -40 ℃ to +85 ℃ Relative humidity: 93% at +40 ℃ Weight: 0.1 g * Typical value	**Antenna Specification** Specification for 2.4GHz Impedance: 50 Ohms VSWR: <=2.0 Gain: 2.0dBi Electrical Wave: 1/4λ Dipole Admitted power radiation: Max 3W Standard Connector: SMA 360 degree swivel adjustment 90 degree angle direction

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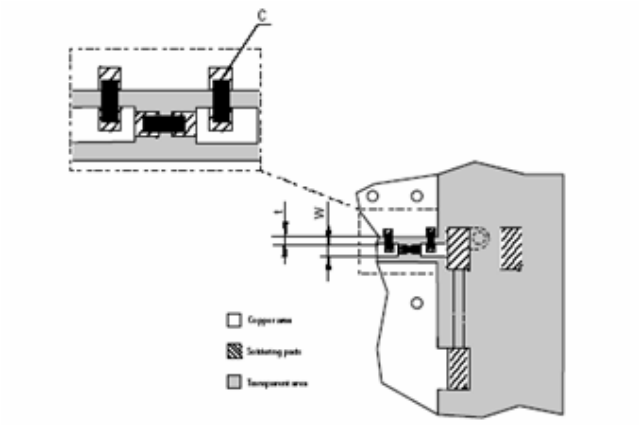
Complying with Section 15.203 and 15.204(c):

Antenna Option #1 – is permanently attached to MTeye Security LTD product named **SmartView** - the antenna is soldered to the product circuit supplied by MTeye.

Antenna Option #1



Antenna Option #2 – This antenna is supplied with MTeye Security product named **Gateway**. The Antenna is permanently soldered to the RF connector and can not be replaced by user.
A broken antenna can be replaced only by **MTeye Security LTD** guided technician who will also supply the interchangeable antenna and replace the broken one.

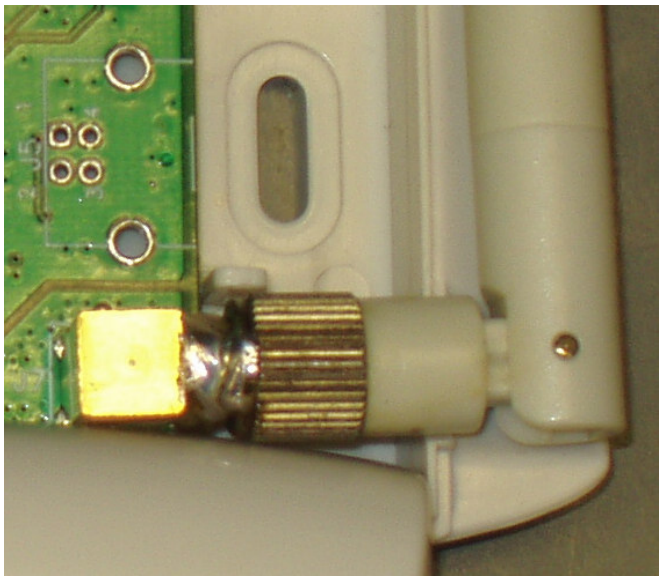
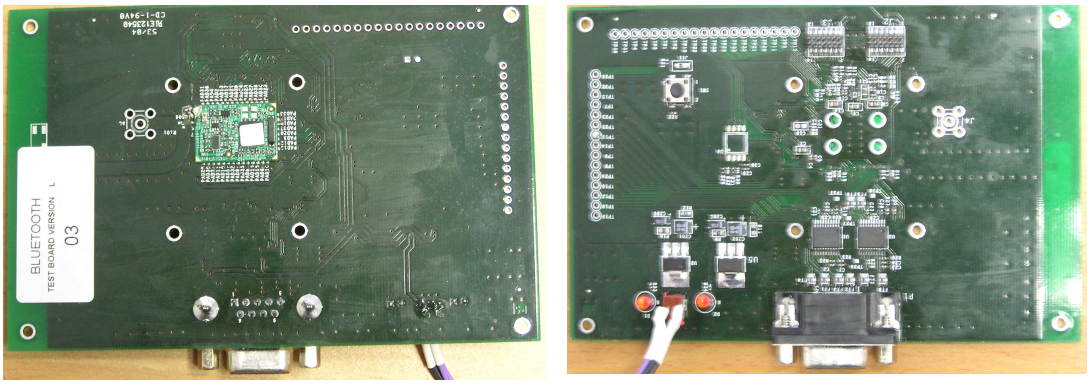


Figure __ - The antenna is soldered to the SMA connector and it can't be replaced by the user.

5. The modular transmitter must be tested in a stand-alone configuration, i.e., the module must not be inside another device during testing. This is intended to demonstrate that the module is capable of complying with Part 15 emission limits regardless of the device into which it is eventually installed. Unless the transmitter module will be battery powered, it must comply with the AC line conducted requirements found in Section 15.207. AC or DC power lines and data input/output lines connected to the module must not contain ferrites, unless they will be marketed with the module (see Section 15.27(a)). The length of these lines shall be length typical of actual use or, if that length is unknown, at least 10 centimeters to insure that there is no coupling between the case of the module and supporting equipment. Any accessories, peripherals, or support equipment connected to the module during testing shall be unmodified or commercially available (see Section 15.31(i)).

MTeye Security Ltd Bluetooth module Part Number: **MT-SiW35-SiGeL-001** was tested in a stand-alone configuration, while it was populated on a test circuit and powered by two AA batteries.

Figure __ : Picture of the test circuit with Bluetooth module:



The test circuit content only RS232 level shifting to connect the Bluetooth module to a PC for configuration. After the completion of the configuration, the PC was disconnected and **the module was tested as a stand-alone unit**.

6. 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: "Contains Transmitter Module FCC ID: XYZMODEL1" or "Contains FCC ID: XYZMODEL1." Any similar wording that expresses the same meaning may be used. The Grantee may either provide such a label, an example of which must be included in the application for equipment authorization, or, must provide adequate instructions along with the module which explain this requirement. In the latter case, a copy of these instructions must be included in the application for equipment authorization.

The MTeye Security Ltd Bluetooth module Part Number: **MT-SiW35-SiGeL-001**, may installed inside other products, and in this case it will be marked in external labels with one of the following wording:

"Contains Transmitter Module FCC ID: S37-SIW35-SIGL-01"

or

"Contains FCC ID: S37-SIW35-SIGL-01"

7. The modular transmitter must comply with any specific rule or operating requirements applicable to the transmitter and the manufacturer must provide adequate instructions along with the module to explain any such requirements. A copy of these instructions must be included in the application for equipment authorization. For example, there are very strict operational and timing requirements that must be met before a transmitter is authorized for operation under Section 15.231. For instance, data transmission is prohibited, except for operation under Section 15.231(e), in which case there are separate field strength level and timing requirements. Compliance with these requirements must be assured.

MTeye Security Ltd Bluetooth module Part Number: **MT-SiW35-SiGeL-001**, is compatible with Bluetooth Specification Ver 1.2 (upon usage of RFMD SiW3500 - single-chip IC solution, which contain Base band processor and protocol stack software for *Bluetooth*® wireless technology)

In this case, no specific rule or operating required in the used application, because All the operational and timing requirements are managed very strict by the Base band processor upon Bluetooth Ver 1.2 requirements[2] (which met all the transmitter authorized timing etc..)

[2] Bluetooth technology uses a time-division duplex (TDD) multiple access scheme that is based around 625-µs time slots. The master Transmits packets addressed to specific slaves and slaves may only respond starting in the next available slave-to-master time slot. Communication Between devices is done using the 14 defined packet types that encompass 1, 3, or 5 time slots.
The Bluetooth Specification is defined such that there is a minimum of 234.5 µs of Time Between subsequent packets including a ±10 µs uncertainty window for reception.

8. The modular transmitter must comply with any applicable RF exposure requirements. For example, FCC Rules in Sections 2.1091, 2.1093 and specific Sections of Part 15, including 15.319(i), 15.407(f), 15.253(f) and 15.255(g), require that Unlicensed PCS, UNII and millimeter wave devices perform routine environmental evaluation for RF Exposure to demonstrate compliance. In addition, spread spectrum transmitters operating under Section 15.247 are required to address RF Exposure compliance in accordance with Section 15.247(b)(4). Modular transmitters approved under other Sections of Part 15, when necessary, may also need to address certain RF Exposure concerns, typically by providing specific installation and operating instructions for users, installers and other interested parties to ensure compliance.

According to FCC Part 15 Section 15.247(b)(4) and according to chapter 4 at this document, the antennas which in use in the MTeye Security Ltd products are not directional antenna and the antenna gain is lower than +6dbi.