User Manual

V2.1

Communication module

CU02

FCC ID: 2BOUM-CU02

IC: 33848-CU02
HVIN: CU02

1. Scope

Designed for professional integration into host devices, the CU02 radio module complies with the following FCC and ISED Rules:

47 CFR FCC Part 15, Subpart C (section 15.247)
RSS-247, Issue 3 (August 2023)

2. Technical Specifications

2.1 Power supply:

8-28 Vdc

2.2 Operating frequency bands:

2402 - 2480 MHz (Bluetooth mode)

2402 - 2480 MHz (BLE mode)

2412 - 2462 MHz (WiFi mode)

2.3 RF power transmission:

9 mW (Bluetooth mode)

7 mW (BLE mode)

174 mW (WiFi mode)

3. Specific Operational Use Conditions

This radio module is for OEM integration only and cannot be sold to general public.
The company E-Shock S.r.l. is the Grantee of this FCC ID / IC. This radio module is exclusively for integration into host devices manufactured by E-Shock S.r.l. only.

4. Limited Module Procedures

This modular transmitter has been tested in a "*non-standalone*" configuration - i.e., embedded in a test jig board - for compliance with Part 15 requirements.
The module requires the host integrator to file a Class II permissive change for each specific host, considering the test plan detailed in chapter 5.4.
A host manufacture is recommended to use FCC's KDB 996369 D04 Module Integration Guide V01 as "best practice" for RF design engineering, testing and evaluation.

5. OEM Responsibilities to comply with FCC Regulations

5.1 General Considerations

This modular transmitter has been tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B and ICES-003 requirements, which are applicable to the final host. The final host shall be assessed for compliance with the requirements of the above Regulations, as applicable.

5.2 Host Manufacturer Responsibilities

Host manufacturers are ultimately responsible for the full compliance of the host system before it can be placed on the US/Canadian market.
This includes reassessing the transmitter module for compliance with all applicable radio and RF Exposure requirements of the FCC and ISED rules.

Note: this radio module is designed for integration into end products manufactured by E-Shock S.r.l., which assumes full responsibility for the final compliance.

5.3 Multi-Radio Systems

This module must not be incorporated into any other radio system without retesting for compliance as multi-radio and combined equipment.
In case of any co-located radio transmitter being allowed to transmit simultaneously, or in case of portable use at closer distances from the human body than those allowing the exceptions rules to be applied, a separate additional SAR evaluation will be required, ultimately leading to a Class II Permissive Change, or more rarely to a new Grant.

Note: if these conditions cannot be met, then the FCC authorization is no longer considered valid, and the FCC ID/IC identifiers cannot be used on the final product. Then for the FCC/ISED authorization to remain valid, the final product will have to undergo additional testing to evaluate the RF exposure and a Permissive Change will have to be applied. The evaluation (SAR) is in the responsibility of the end-product's manufacturer, as well as the Permissive Change that can be carried out with the help of a Telecommunication Certification Body.

5.4 Test plan (KDB996369 D01)

Module integrator shall confirm and demonstrate compliance with the following test plan:

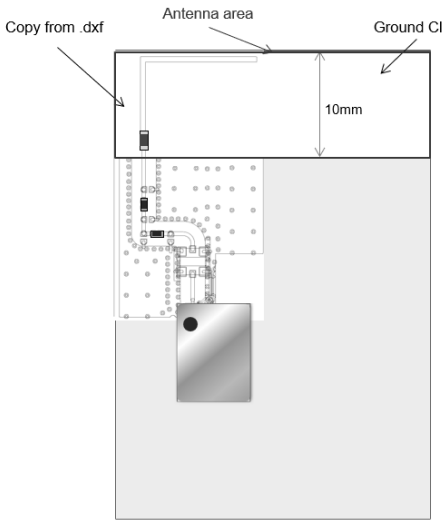
- Perform Maximum Output Power test (radiated) according to Part 15.247 / KDB558074 D01 (IEEE 802.11b, frequency: 2462 MHz, ch.11; data rate: 1.0 Mbps)
- Check band edge compliance according to Part 15.247 / KDB558074 for lowest channel (IEEE 802.11b, frequency: 2412 MHz, ch.1; data rate: 1 Mbps D01)
- Check band edge compliance according to Part 15.247 / KDB558074 for upper channel (IEEE 802.11b, frequency: 2462 MHz, ch.11; data rate: 1 Mbps D01)
- Perform radiated spurious emission (frequency range 1 GHz – 25 GHz) according to Part 15.247 (IEEE 802.11b, frequency: 2437 MHz, ch.6; data rate: 1 Mbps)

  Note: radiated spurious emission test must be carried out with all transmitters active if they can operate simultaneously.
- Demonstrate compliance with human exposure requirements according to 47 CFR Part 2, § 2.1091/ KDB447498 D01 (see also chapter 7).
- Final host system requires compliance testing according to 47 CFR Part 15.

6. Antenna Design

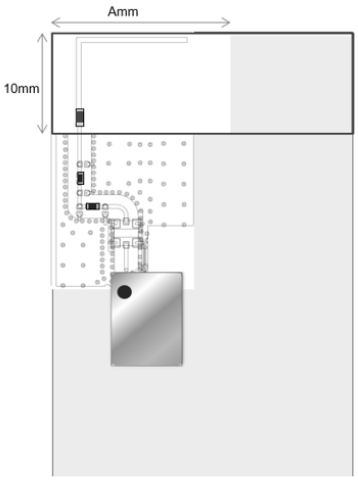
6.1 Type of antenna

The antenna must be embedded according to the following instruction:



- Place the antenna on top-left corner.
- Keep GND clearance all long the top edge.

Basically please propose Antenna area doesn't have GND plane .
This is 1st priority.



If PCB has to arrange GND plane in antenna right area

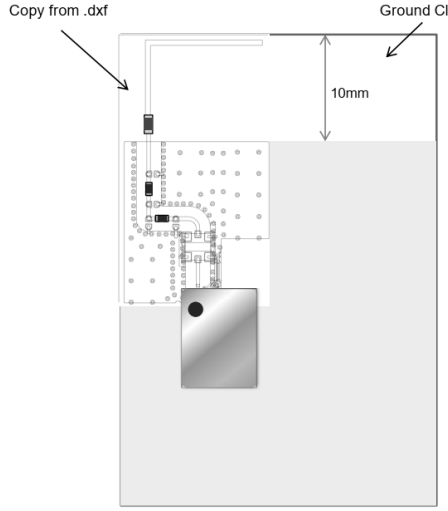
- Recommend size A : >20mm

- Simulation results

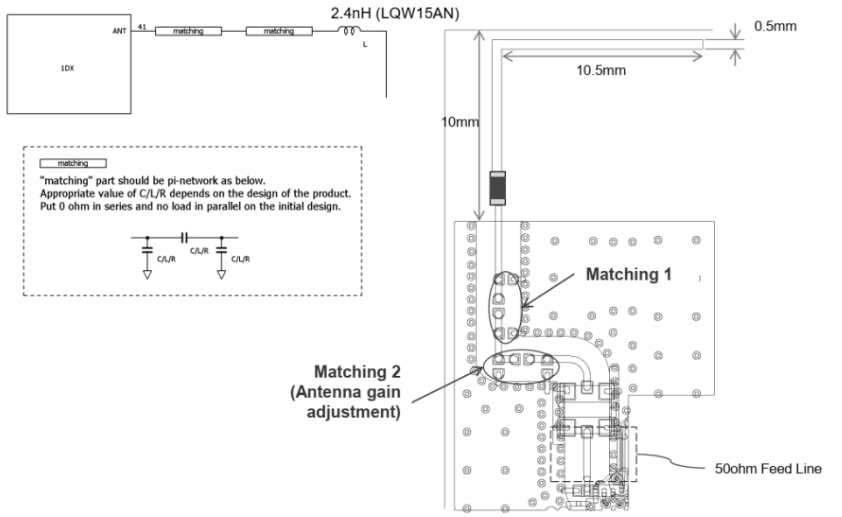
Efficiency [dB]

	Frequency [MHz]			
Condition	2400	2442	2484	Average
A=15mm	-1.9	-1.9	-2.0	-1.9
A=20mm	-1.3	-1.3	-1.3	-1.3
A=25mm	-1.2	-1.2	-1.2	-1.2
A=30mm	-1.1	-1.1	-1.2	-1.1
A=35mm	-1.2	-1.2	-1.2	-1.2
A=40mm	-1.2	-1.3	-1.3	-1.3

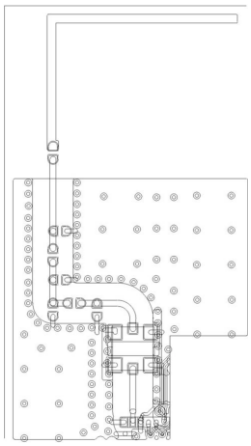
Under 20mm : worse than efficiency of 20mm
Over 20mm : Same efficiency



- Place the antenna on top-left corner.
- Keep GND clearance all long the top edge.
- Place metal stuff as far as possible.
- Place two pi-network for matching and attenuating.
  - Put 0ohm in series and no load in parallel on the initial design.
  - Put appropriate value of C/L/R depends on actual performance.



Please refer Type1DX Antenna P2ML4452-1-A.dxf
(see following drawing):



6.2 Antenna gain

Antenna gain must be lower than 0.6 dBi.

7. RF Exposure Conditions

This modular transmitter complies with FCC and ISED radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated at a minimum distance of 20 cm between the radiator and the human body.
This device and its antenna(s) must not be co-located or operated in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures (see chapter 5.3).

8. End Product Labelling

Due to the small dimensions of this modular transmitter, FCC ID, as well as IC and HVIN identifiers, are reported in the User Manual. A removable label is also attached to the product. End product must be labeled in a visible area with the following text:

"Contains FCC ID: 2BOUM-CU02"
"Contains IC: 33848-CU02"

as applicable.

9. Information to the End User

The end user manual shall include all required Regulatory information/warning as follows:

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

For US market:
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.

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.

RF Radiation Exposure Statement:
This product complies with FCC radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated at a minimum distance of 20 cm between the radiator and the human body.
This device and its antenna(s) must not be co-located or operated in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

For Canadian market:
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.
L'emetteur/recepteur exempt de licence contenu dans le present appareil est conforme aux CNR d'Innovation, Sciences et Developpement economique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisee aux deux conditions suivantes:
1. L'appareil ne doit pas produire de brouillage.
2. L'appareil doit accepter tout brouillage radioelectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement du dispositif.

ICES-003 Class B Notice - Avis NMB-003 Classe B:
This Class B digital device complies with Canadian ICES-003.
Cet appareil numerique classe B est conforme à la norme NMB-003 du Canada.

CAN ICES-3(B) / NMB-3(B)

RF Radiation Exposure Statement:
This product complies with ISED radiation exposure limits set forth for an uncontrolled environment. The antenna should be installed and operated at a minimum distance of 20 cm between the radiator and the human body.
This device and its antenna(s) must not be co-located or operated in conjunction with any other antenna or transmitter except in accordance with ISED multi-transmitter product procedures.
Cet appareil est conforme aux limites d'exposition aux rayonnements de l'ISED pour un environnement non contrôlé. L'antenne doit être installé de façon à garder une distance minimale de 20 centimètres entre la source de rayonnements et votre corps.
Cet appareil et son (ses) antenne(s) ne doivent pas être co-localisés ou utilisés en conjonction avec une autre antenne ou un autre émetteur, sauf en conformité avec les procédures du produit multi-émetteur de la ISED.
This device complies with Health Canada's Safety Code. The installer of this device should ensure that RF radiation is not emitted in excess of the Health Canada's requirement.
Cet appareil est conforme avec Santé Canada Code de sécurité 6. Le programme d'installation de cet appareil doit s'assurer que les rayonnements RF n'est pas émis au-delà de l'exigence de Santé Canada.