

COMARCH BLUETOOTH LOW ENERGY MODULE

CBM001

TECHNICAL SPECIFICATION

Document version	Date	Author	Comment
0.1.1	2015.10.29	K.Chwalek	Draft
0.1.2	2015.12.10	K.Chwałek	Draft – second revision
1.0.0	2015.12.16	K.Chwałek	First version
1.0.1	2016.12.13	K.Chwałek	Second version, PCB verified, certification ongoing

TABLE OF CONTENTS

1. GENERAL DESCRIPTION	3
1.1. Components:	3
1.2. Mechanical specification:	3
1.3. Radio specification:	3
1.4. Physical Interfaces	4
1.5. Dimensions	4
1.6. Pin assignment	5
1.7. BLE module placement	6
2. CHARACTERISTICS	7
2.1. Absolute Maximum Ratings	7
2.2. Recommended Operating Conditions	7
2.3. Signal strengths	7
2.4. Signal measurements at 1m	8
3. CERTIFICATIONS / ENVIRONMENTAL INFORMATION	8
3.1. CE	8
3.2. Bluetooth	8
3.3. The correct disposal of electrical and electronic equipment	9

1. GENERAL DESCRIPTION

Model number: CBM001

1.1. Components:

- application processor - CSR1012 microcontroller with integrated BT transceiver
- chip antenna

1.2. Mechanical specification:

- dimension 17.5 mm x 11 mm x 2.4 mm
- weight 0.65 g

1.3. Radio specification:

- Bluetooth 4.1 Low Energy
- Device Class 1
-
- Receive sensitivity: -92.5 dBm
- Frequency range: 2.4 GHz to 2.4835 GHz
- Channels:
 - bandwidth: 1 MHz
 - spacing: 2 MHz
 - count: 40
 - first channel: 2.402 GHz
 - data channels count: 37
 - advertising channels count: 3 (2.402 GHz, 2.426 GHz, 2.480 GHz)
 - GFSK modulation
- Chip antenna:
 - peak gain: 0.5 dBi
 - average gain: -0.5 dBi
 - 50 Ohm
- Power consumption
 - Idle: 7.3 μ A @ 3.35V

- Peak: 24 mA @ 3V

1.4. Physical Interfaces

- I²C
- Up to 12 digital PIOs
- 3 analogue AIOS
- UART

1.5. Dimensions

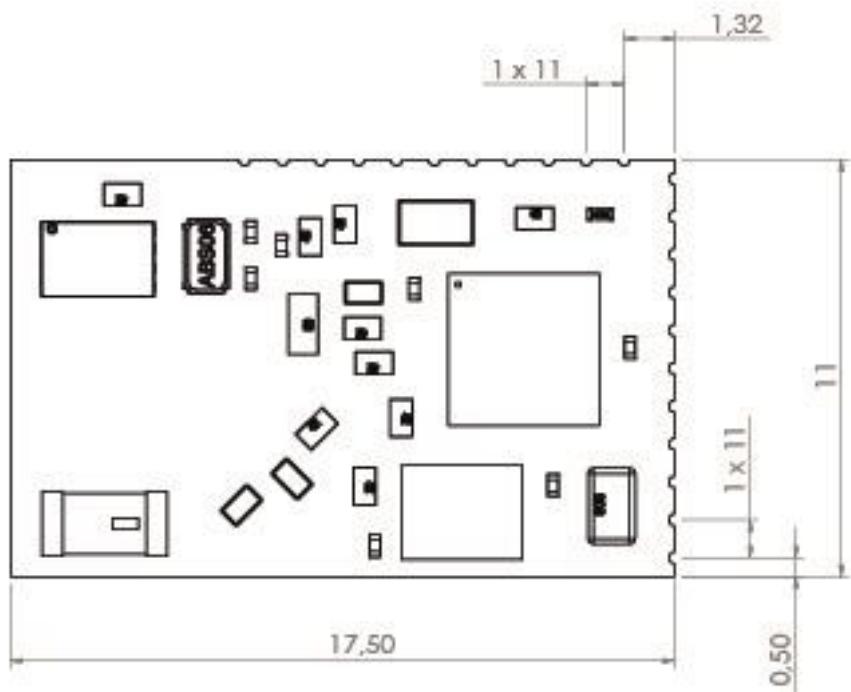


Fig. 1 Dimensions draft (all dimensions in mm)

1.6. Pin assignment

21 Edge connectors with pads 0.6 x 0.6 mm each.

Pin	Name	Pin function	Description
1	Vbatt	Power	Power supply 1.8-3.6 V
2	GND	Ground	Should be connected to ground plane on application PCB
3	PIO 0 / UART TX	Digital I/O	General purpose I/O pin or UART TX line
4	PIO 1 / UART RX	Digital I/O	General purpose I/O pin or UART RX line
5	PIO 3	Digital I/O	General purpose I/O line
6	PIO 4	Digital I/O	General purpose I/O line
7	PIO 6	Digital I/O	General purpose I/O pin or DEBUG_CS# line*
8	PIO 7	Digital I/O	General purpose I/O pin or DEBUG_MOSI line*
9	PIO 8	Digital I/O	General purpose I/O pin or DEBUG_MISO line*
10	PIO 9	Digital I/O	General purpose I/O line
11	PIO 5	Digital I/O	General purpose I/O pin or DEBUG_CLK line*
12	PIO 10	Digital I/O	General purpose I/O line
13	SPIPIO#	Input pin	Selects SPI debug on PIO[8:5] line*
14	PIO 2 / I2C_P	Output pin	EEPROM power supply line
15	PIO 11	Digital I/O	General purpose I/O line
16	AIO 0	ADC input 0	Analogue programmable I/O line
17	AIO 1	ADC input 1	Analogue programmable I/O line
18	AIO 2	ADC input 2	Analogue programmable I/O line
19	WAKE	External wake	Input to wake from hibernate or dormant mode If not in use, pin should be grounded
20	I2C_SDA	I2C data pin	I2C data input / output line
21	I2C_SCL	I2C clock pin	I2C clock line
22	GND	Ground	Should be connected to ground plane on application PCB

All pins are compatible with CSR1012 chip pinout.

*Programming is also available from bottom PCB side through testpoints.

1.7. BLE module placement

As shown at Fig.2 the BLE module should be placed on the corner of host PCB. If there is no possibility, BLE module should be placed at least at the bottom edge of host PCB with no ground area in front of the antenna.

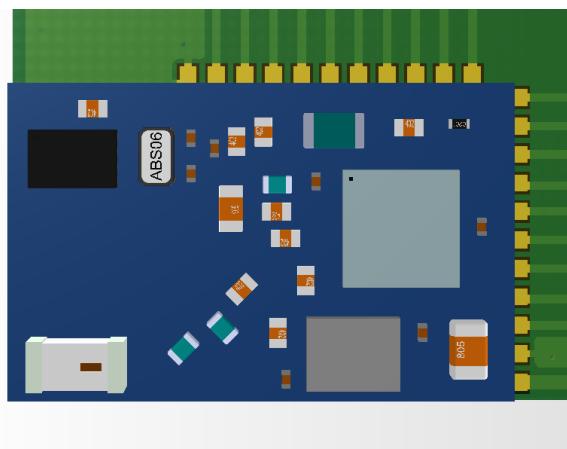


Fig. 2 BLE module best placement

Under the BLE module antenna should be a keep-out area (no ground polygon and no other signals) which has at least dimensions: 6,5mm X 6,25mm (shown as a pink area at Fig.3)

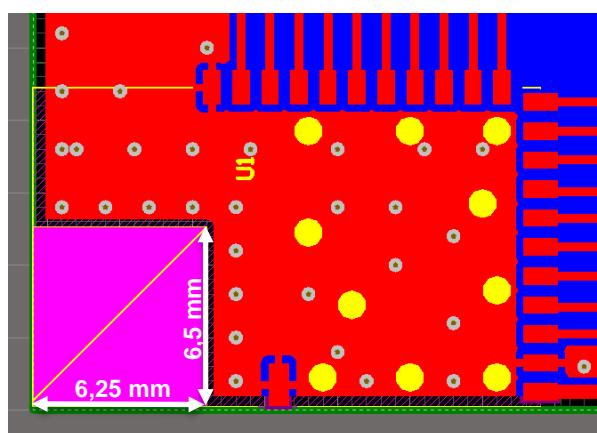


Fig. 3 Placement and minimum dimensions of keep-out area

2. CHARACTERISTICS

2.1. Absolute Maximum Ratings

Rating	Min	Max	Unit
Storage temperature	-40	85	°C
Power supply voltage	-	3.6	V

2.2. Recommended Operating Conditions

Operating Condition	Min	Typ	Max	Unit
Operating temperature range	-30	-	85	°C
Vbatt	1.8	-	3.6	V

2.3. Signal strengths

Condition	Range	Unit	Comment
Inside building	Up to 30	m	0m to 10m/13m: good signal possible to give reliable proximity output
Outside building	Up to 100	m	0m to 20m: good range visibility 20m to 30m: signal strength 'hole' (depending on how high from the ground the beacon is placed) Over 30m: low signal quality, can be used only for beacon detection

Signal strengths highly depend on phone antenna, direction and obstacles between devices.

2.4. Signal measurements at 1m

TX power level	Measured according to iBeacon specification [dBm]
0	-80
1	-77
2	-71
3	-64
4	-62
5	-59
6	-56
7	-53

3. CERTIFICATIONS / ENVIRONMENTAL INFORMATION

3.1. CE

ongoing

- ETSI EN 300 328 V1.8.1
- EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

3.2. Bluetooth

- BT SIG Declaration ID: TBD
- BT SIG Qualified Design ID: 64572

3.3. The correct disposal of electrical and electronic equipment

After end of life, this product cannot be thrown out with municipal waste. For more information about how and where recycling of this product is possible, please contact dealer or supplier.



FCC Statement

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.

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

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.

We will retain control over the final installation of the modular such that compliance of the end product is assured. In such cases, an operating condition on the limit modular approval for the module must be only approved for use when installed in devices produced by a specific manufacturer. If any hardware modify or RF control software modify will be made by host manufacturer,C2PC or new certificate should be apply to get approval,if those change and modification made by host manufacturer not expressly approved by the party responsible for compliance ,then it is illegal.

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

If the FCC identification number 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: 2AEN7-CBM001 Or Contains FCC ID: 2AEN7-CBM001"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. 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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

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.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with limit modular approval should perform the test of radiated & conducted emission and spurious emission,etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, then the host can be sold legally.