

# EMBC3 Proximity Beacon User Manual

## 1. GENERAL DESCRIPTION

EMBC is a family of small, high performance, low-power, Bluetooth® Low Energy (BLE) beacons. EMBC33, EMBC32 and EMBC30 are the newest additions, offering ultra-low energy consumption, BLE 5.4 features, and increased security. EMBC33 includes a NIST-traceable high precision temperature sensor and EMBC32 includes an ultra-low power accelerometer.

All members of the EMBC family come in the convenient coin shape established with the successful EMBC2x generation and are powered by EM's new ultra-low power Bluetooth Low Energy System-on-Chip, the EM9305.

Location applications can be addressed with EMBC3 using the classic RSSI approach or AoA/AoD technology when compatible gateways are deployed.

EMBC3 features a state-of-the-art 2.4GHz transceiver: a low-power receiver with excellent sensitivity/selectivity, and a programmable transmitter with up to +10dBm output power.

EMBC3 can be shipped pre-programmed with custom firmware or custom parameters and can be securely updated in the field with over-the-air programming from a mobile device (all major iOS® and Android™ devices supported).

The EMBC32's accelerometer can be used to implement efficient, low-energy algorithms for various applications, in addition to activating beaconing on movement, gestures, or similar motion events. When not in use, the beacon automatically switches to a sleep mode and consumes minimal energy.

The EMBC33's NIST-traceable temperature sensor with up to 0.1°C accuracy can be used in applications like cold-chain where traceability and accuracy of measurements are of prime concern.

EMBC3 can be stored in off mode without significantly degrading the battery lifetime. When active for 8 hours per day and configured for 0dBm output power and 1 second advertising intervals, the typical battery lifetime is more than 5 years.

The EMBC3 can be delivered in any quantity with a guaranteed unique ID. This ID is captured in a QR code printed on the beacon housing scannable for easy provisioning.

EMBC finished product outline dimensions are shown in Figure 1.

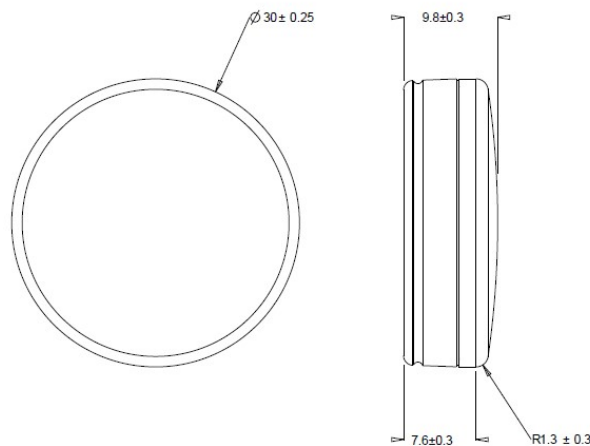


Figure 1: Complete product drawing

## 1.1. GENERAL OPERATING CONDITIONS

The general operating conditions are listed in **Table 1: General Operating Conditions**. Electrical characteristics are defined for the typical operating conditions with no more than 10% of the overall life of the active life of the product spent outside typical conditions.

Table 1: General Operating Conditions				
Parameter	Min	Typ	Max	Unit
Supply Voltage (VCC)	1.9	3	3.3	V
Temperature Range	0	25	+60	°C
Operating Frequency Range	2402	2440	2480	MHz
RF Output Power			13.7	mW

## 2. MODULE PARTS LIST

Table 2: Part List	
Component	Qty
2.4GHz BLE Radio Controller	1
FLASH - NOR Memory IC 8Mb (1M x 8) SPI	1
Temperature Sensor Digital, Local -55°C ~ 125°C	1
High Performance Low Power Accelerometer	1
Ceramic Capacitor	13
Ferrite Bead	1
Inductor	3
Resistor	6
LED	2
48 MHZ Crystal	1
Battery clip	1
CR2032 Battery	1
FR4 PCB	1
Plastic enclosure	1

### 3. REGULATORY

EMBC is certified and complies with the following regulatory requirements:

#### 3.1. REGULATORY INFORMATION CE

EM Microelectronic as the responsible party for regulatory compliance, declares under our sole responsibility that as delivered the described product is in conformity with the RED Radio Equipment Directive 2014/53/EU, following the provisions of ERP Directive 2009/125/EC, EU RoHS Directive 2011/65/EU, including the amendment 2015/863/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment, and carries the CE-marking. Refer to [emmicroelectronic.com](http://emmicroelectronic.com) for the signed declaration.

#### 3.2. REGULATORY INFORMATION USA

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

- ☐ Part 15 – General emissions
- ☐ Part 15.247:2011 – Operation within the band 2.4-2.4835GHz

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.

##### CLASS B DEVICE NOTICE

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.

Note that final host products require Subpart B compliance testing with the modular transmitter installed.

Module integrator (host manufacturer) is recommended to use FCC KDB publication 996369 D04 Module Integration Guide"

Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures

##### RF EXPOSURE SAFETY

The EMBC is a radio transmitter and receiver.

It is designed not to exceed the emission limits for exposure to radio frequency (RF) energy set by the Federal Communications Commission. The antenna must be installed and operated with minimum distance of 2.2 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

##### PERMITTED ANTENNA

This radio transmitter model, FCC ID: 2ACQR-EMBC3 has been approved by FCC to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

FCC Permitted Antenna	
Type	Integrated PCB IFA
Max Gain	1.5 dBi

##### LABELLING REQUIREMENTS FOR THE HOST DEVICE

The host device shall be properly labelled to identify the modules within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host

device must be labelled to display the IC of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Contains FCC ID: 2ACQR-EMBC3

### 3.3. REGULATORY INFORMATION CANADA

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

Les changements ou modifications non expressément approuvés par la partie responsable de la conformité pourraient annuler l'autorisation de l'utilisateur d'utiliser l'équipement.

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions: (1) This device may not cause interference; and (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

- ☐ ICES-003 – General emissions
- ☐ RSS-210:2010 – Low-power License exempt Radio Communication Devices

#### RF EXPOSURE SAFETY

The EMBC3 is a radio transmitter and receiver. It is designed not to exceed the emission limits for exposure to radio frequency (RF) energy set by the ISED. The antenna must be installed and operated with minimum distance of 2.2 cm between the radiator and your body. This transmitter must not be colocated or operating in conjunction with any other antenna or transmitter.

IC Permitted Antenna	
Type	Integrated PCB IFA
Max Gain	1.5 dBi

Le EMBC3 est un émetteur et un récepteur radio. Il est conçu pour ne pas dépasser les limites d'émission pour l'exposition à l'énergie radiofréquence (RF) établie par l'ISDE. L'antenne doit être installée de façon à garder une distance minimale de 2.2 cm entre la source de rayonnement et votre corps. L'émetteur ne doit pas être localisé ni fonctionner conjointement avec à autre antenne ou autre émetteur.

IC Permis Antenne	
Type	Integrated PCB IFA
Max Gain	1.5 dBi

#### PERMITTED ANTENNA

This radio transmitter model, IC: 12155A-EMBC3 has been approved by the ISED to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio modèle, IC: 12155A-EMBC a été approuvé par ISDE pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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

This Class A/B digital apparatus complies with Canadian ICES-003

Cet appareil numérique de classe B est conforme à la norme Canadienne ICES-003

#### LABELLING REQUIREMENTS FOR THE HOST DEVICE

The host device shall be properly labelled to identify the modules within the host device. The certification label of the module shall be clearly visible at all times when installed in the host device, otherwise the host device must be labelled to display the IC of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:

Contains IC: 12155A- EMBC3

L'équipement hôte doit être correctement étiqueté pour identifier les modules dans l'équipement. L'étiquette de certification du module doit être clairement visible en tout temps lorsqu'il est installé dans l'hôte, l'équipement hôte doit être étiqueté pour afficher l'IC du module, précédé des mots "Contient le module émetteur", ou le mot "Contient", ou un libellé similaire exprimant la même signification, comme suit:

Contains IC: 12155A- EMBC3