

# EmTag User Manual

Enovate Medical Assembly Number: A0001707

## 1. Device Description:

The Enovate Medical A0001707 EmTag device is a small, battery powered RF transceiver circuit developed by Enovate Medical for the purposes of wireless BLE communications using the proprietary BLE wireless communication standard. The EmTag provides BLE wireless communications between itself and another BLE enabled device such as a smartphone, tablet, BLE Beacon or other BLE-enabled device or network.

## 2. Component Description:

### 2.1: BLE SoC: nRF52832

The Nordic Semiconductor nRF52832 is built around a 32-bit ARM Cortex-M4F CPU Core running at 64 MHz with 512kB of on-chip Flash memory and 64kB of RAM. This allows it to run the full BLE stack in addition to running the application code. The nRF52832 includes many microprocessor features including 12-bit A/D converters, UART, SPI and I2C communications interfaces, timers, analog comparators, a temperature sensor and General Purpose I/O. The nRF52832 operates from a supply voltage in the 1.7V – 3.6V range. The nRF52832 IC handles all of the Baseband functions for the BLE transmission including data formatting. Full 2.4 GHz radio functionality is integrated into the nRF52832 including packet generation with DMA, CRC, Whitening/Dewhitening, and full transmitter/receiver functionality. It also includes an on-chip balun, RSSI with 1dB resolution and an internal power amplifier with support for FSK modulation on the transmit side, and integrated digital demodulation on the receive side. Data rates of 1 Mbit/s and 2 Mbit/s are supported. The nRF52832 IC generates its own internal clocks and synthesizes the RF carrier signals from the 32 MHz external crystal.

### 2.2: 3-Axis Accelerometer: LIS2DE12

The ST Microelectronics LIS2DE12 is a low-power, 3-axis MEMS accelerometer with I2C and SPI serial interfaces. The I2C interface is used in the EmTag device. The LIS2DE12 has user-selectable full-scale acceleration measurement ranges of +/- 2g, +/- 4g, +/- 8g and +/-16g. The chip can also generate user-configurable interrupt signals by detecting inertial wake-up/free-fall events. The chip operates from a 1.71V to 3.6V voltage supply.

### 2.3: CR2477 Coin Cell Battery

The EmTag can be powered by any traditional non-rechargeable/primary 3V CR2477 coin cell battery.

### **3. Antenna Description:**

The EmTag contains a pcb trace monopole “whip” antenna that is integrated into the PCB design. The antenna is impedance-matched to the RF output of the nRF52832 at 2.4 GHz with discrete impedance matching components. Maximum peak antenna gain of -1.5 dBi is calculated from measured e.i.r.p.

### **FCC (United States) Compliance Statement**

The EmTag does not have a user replaceable antenna. The only valid certification is with the integrated meander antenna. Accessing the antenna trace connection and operating with a different antenna is strictly prohibited.

**Warning:** Changes or modifications not expressly approved by Enovate Medical could void FCC compliance and negate the authority to operate the product.

### **IC (Canada) Compliance Statement**

The EmTag does not have a user replaceable antenna. This radio transmitter has been approved by Industry Canada to operate only with the integrated meander antenna. Accessing the antenna trace connection and operating with a different antenna is strictly prohibited. (RSS-GEN clause 8.3)

#### 4. Assembly Instructions

To assemble EmTag, first insert the CR2477 battery into the battery holder on a programmed P0001701 PCA:



Next, press the PCA into the P0001698 case halve. It should be placed such that the CR2477 coin cell battery is on the size with the rib indicated by the red arrow below:



Next, assemble the P0001699 case halve to the rest of the EmTag, lining up the latches on the P0001698 case halve with the retaining features in the P0001699 case halve. Snap the assembly together:



At this point, the EmTag (A0001707) is fully assembled and is now operational as well. EmTag assembly is typically done at the customer site. EmTag assembly is always done by Enovate Medical personnel.

## **5. Disassembly Instructions**

To disassemble the EmTag, use a finger to pull one of the latches back on the plastic. This will allow one side of the case to pop free. Repeat on the other side to break the other latch free and open the unit. Once disassembled, the EmTag battery can be replaced and it can be reassembled.

## **FCC REGULATORY DISCLOSURES**

This device complies with Part 15 of the FCC's 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 undesirable 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
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This device is intended for installation by Enovate Medical personnel only.

The FCC ID for this device is FCC ID: 2AQ9D-A0001707

## **INDUSTRY CANADA REGULATORY DISCLOSURES**

INDUSTRY CANADA STATEMENT:

This device complies with Industry Canada license-exempt RSS standard(s). 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.

Cet appareil est conforme avec Industrie Canada exempts de licence standard RSS (s). L'opération est soumise aux deux conditions suivantes: (1) cet appareil ne peut causer d'interférences, et (2) cet appareil doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

## INDUSTRY CANADA RADIATION EXPOSURE STATEMENT AND LIMITATIONS ON USE

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and must not be co-located or operating in conjunction with any other antenna or transmitter.

The Industry Canada certification number for this device is: 24335-A0001707