

# **Installation Guide for P0000457/P0001809 Board Containing the P0000457 External BLE Circuit Limited Module**

## **1. Purpose**

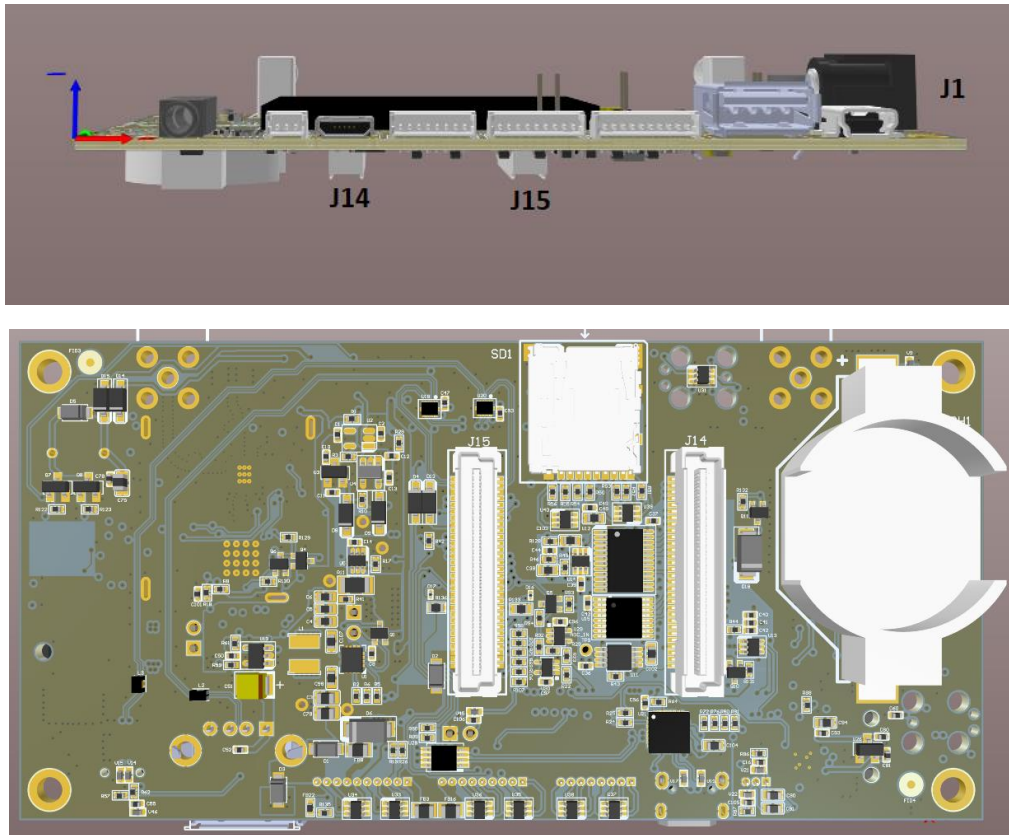
The purpose of this document is to provide information on how to use and install a P0000457 or P0001809 PCB Assembly containing the Enovate Medical External P0000457 BLE Circuit (hereafter called P0000457 External BLE Circuit) limited module when integrating into an Enovate Medical product such as an Envoy or Encore workstation. Incorrect integration or use of this module may infringe compliance rules meaning recertification may be required. The differences between the P0000457 and P0001809 PCB's, both of which contain the P0000457 External BLE Circuit, is the color of the soldermask (to associate them with their respective product lines), the part number etched on the board, and the Software loaded into the board during manufacturing. The differences in the software have to do with the differences in user interface between the two workstations that these boards are installed in. These differences are not related to and do not have any impact on the baseband or RF characteristics of the P0000457 External BLE Circuit. The External BLE Circuit has the P0000457 part number incorporated because that PCB and its associated product were developed first.

## **2. Module Description**

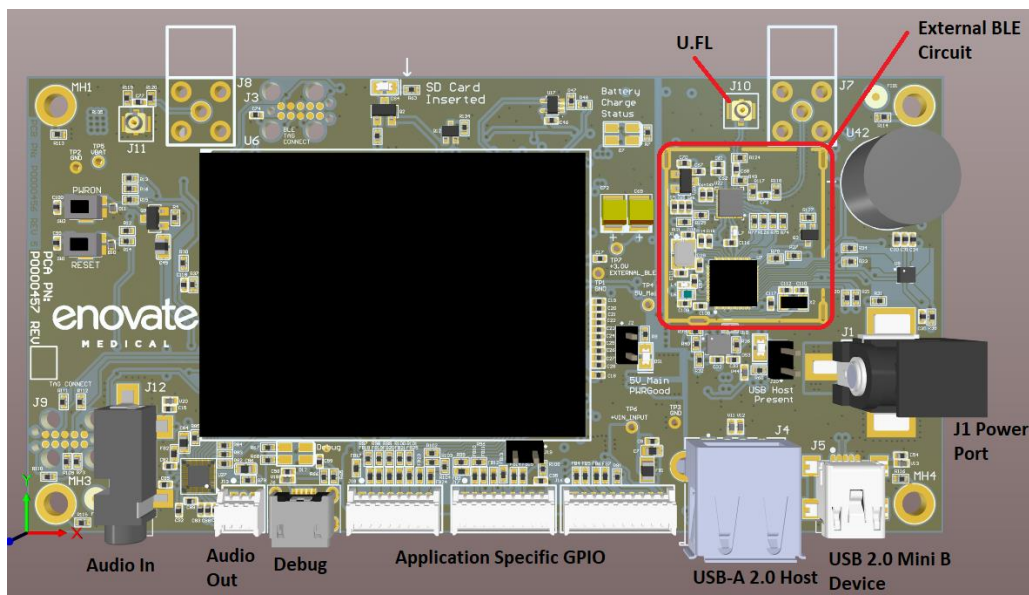
The P0000457 External BLE Circuit is an RF circuit contained on the P0000457 PCB Assembly (and on the P0001809 PCB Assembly) developed by Enovate Medical for the purposes of wireless BLE communications using the proprietary BLE wireless communication standard. The P0000457 External BLE Circuit provides BLE wireless communications between the end-product that the P0000457 or P0001809 PCB Assembly is integrated into and another BLE enabled device such as a smartphone, tablet, BLE Beacon or other BLE-enabled device. The central component in the P0000457 External BLE Circuit is the Nordic Semiconductor nRF52832 2.4 GHz BLE, proprietary 2.4 GHz and ANT-capable System on Chip integrated circuit.

## **3. Integration into Products**

The module is primarily designed to be mounted, with appropriate screws, into an Enovate Medical end-product. Two 60-pin headers on the bottom of the P0000457/P0001809 PCB assembly, J14 and J15, provide physical connection to a mating PCB which provides power to the PCB which is further regulated to power the P0000457 External BLE Circuit (reference P0000457/P0001809 Block Diagram). Screws fasten the P0000457/P0001809 PCB assembly to the mating PCB assembly. Alternatively, the P0000457/P0001809 PCB assembly can be powered through external DC barrel jack J1 and used without a mating PCB. Input power from either source needs to be between 4V-15V and capable of delivering up to 1.5A of current. Any external power supply used with the P0000457 or P0001809 PCB Assembly shall comply with relevant regulations and standards applicable in the country of intended use.



In either case, the P0000457 External BLE Circuit operates with an attached U.FL to SMA RF cable and SMA dipole “whip” antenna. The P0000457/P0001809 PCB Assembly containing the P0000457 External BLE Circuit, along with connected U.FL to SMA RF cables and the SMA antenna must be placed in a suitable location to ensure the BLE performance is not compromised.



## **Module & Antenna Placement**

A separation distance greater than 20cm will always be maintained between the External BLE Circuit antenna and any other radio transmitter if installed in the same product.

Depending on intended usage of the P0000457 or P0001809 board, the following ports can / should also be connected using the connectors along the bottom edge of the PCB:

Micro USB for Debug

USB 2.0 A Host and USB 2.0 Mini-B Device ports

Audio

Other Application Specific GPIO

At no point should any part of the board be altered as this will invalidate any existing compliance work. Always consult professional compliance experts as well as Enovate Medical personnel about integrating the P0000457 or P0001809 board into a product to ensure that all certifications are retained.

## **4. End Product Labeling**

A label is to be fitted to the exterior of all products containing the P0000457 or P0001809 PCB containing the P0000457 External BLE Circuit. The label must contain the words “Contains FCC ID: 2AQ9D-P0000457” (for FCC) and “Contains IC: 24335-P0000457” (for ISED).

### **FCC**

P0000457 External BLE Circuit with FCC ID: 2AQ9D-P0000457

This device complies with Part 15 of 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 causes undesired operation.

Caution: Any changes or modifications to this equipment not expressly approved by Enovate Medical could void the user’s authority to operate the equipment.

This equipment has been tested and found to comply within 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: (1) Re-orient or relocate the receiving antenna (2) Increase the separation between the equipment and receiver (3) Connect the

equipment into an outlet on a different circuit from that to which the receiver is connected (4) Consult the dealer or an experienced radio/TV technician for help.

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's multi-transmitter procedures.

IMPORTANT NOTE: FCC Radiation Exposure Statement; Co-location of this module with other transmitter that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures. This device complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

## **ISED**

P0000457 External BLE Circuit with IC: 24335-P0000457

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 interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Le present 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.

The device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures.

Cet appareil et son antenne(s) ne doit pas être co-localisés ou fonctionner en association avec une autre antenne ou transmetteur.

### **IMPORTANT NOTE:**

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum separation distance of 2cm between the device and all persons.

Cet équipement est conforme aux limites d'exposition au rayonnement IC RSS-102 définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance de séparation minimale de 2cm entre l'appareil et toutes les personnes.

## **Integration Information for the OEM**

This module is to be installed by Enovate Medical personnel. It is the responsibility of Enovate Medical to ensure the P0000457 or P0001809 PCB along with RF Cables and antenna are integrated in such a way as to ensure continued compliance to FCC and ISED Canada certification requirements once installed in the Enovate Medical Host product.

### **Changes in Usage Conditions of this Limited Module**

This device has been approved as a portable device in accordance with FCC and ISED Canada requirements. This means that there must be a minimum separation distance of 2cm between the Limited Module's antenna and any persons.

A change in use that involves a separation distance  $\leq 2\text{cm}$  (Portable usage) between the Module's antenna and any persons is a change in the RF exposure of the module and, hence, is subject to a FCC Class 2 Permissive Change and a ISED Canada Class 4 Permissive Change policy in accordance with FCC KDB 996396 D01 and ISED Canada RSP-100.

As noted above, this device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures. If the device is co-located with multiple antennas, the module could be subject to a FCC Class 2 Permissive Change and a ISED Canada Class 4 Permissive Change policy in accordance with FCC KDB 996396 D01 and ISED Canada RSP-100.

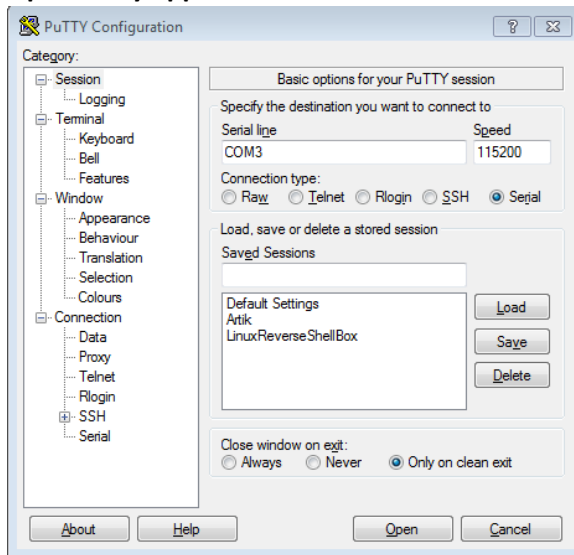
In accordance with FCC KDB 996369 D03, section 2.9, test mode configuration information is available from the Module manufacturer for the Host (OEM) product manufacturer. This test mode configuration information is included in Appendix A at the end of this User Manual.

## Appendix A

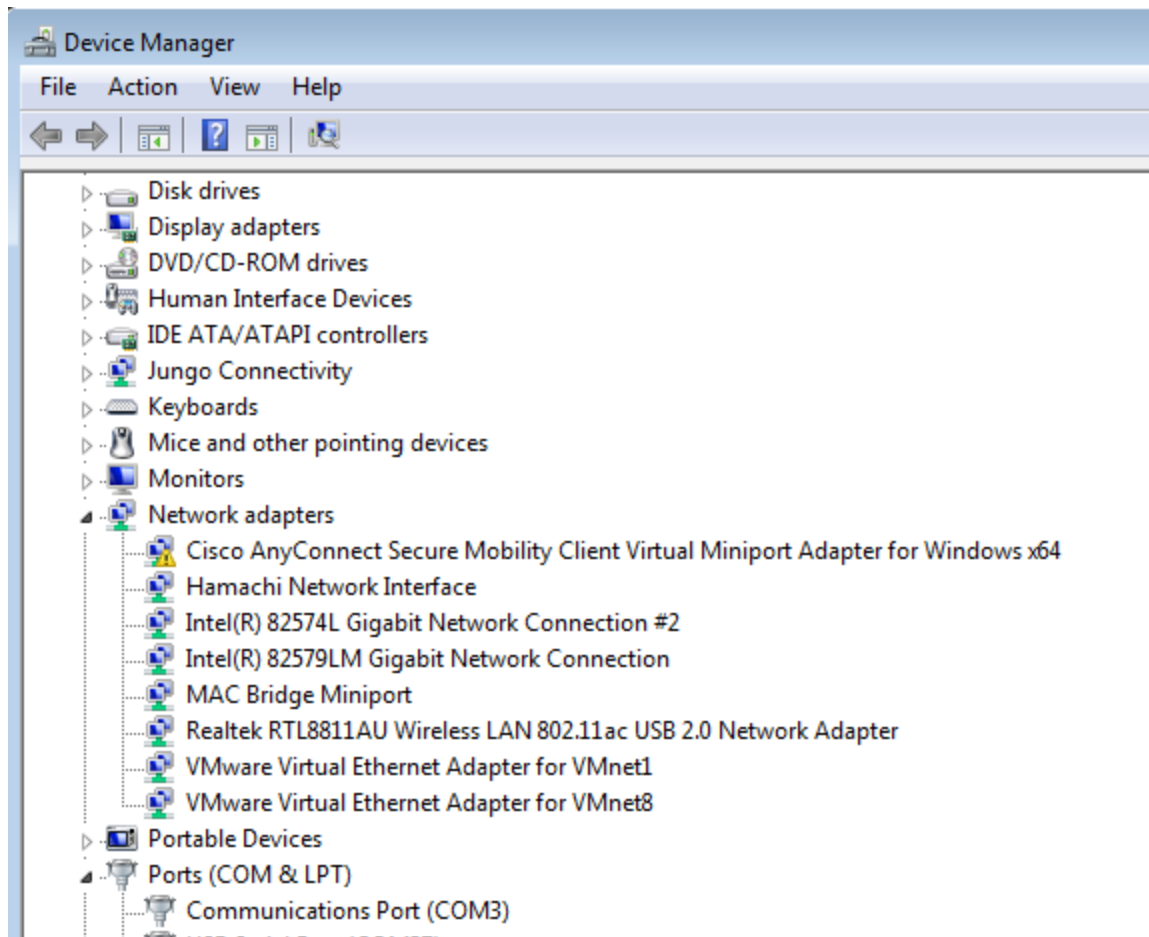
### P0000457 External BLE Circuit

#### Configuration And Test Modes

1. Turn on the All-In-One PC.
2. Connect a micro-USB cable from the PC to the Artik P00000457 hardware.
3. Power on the P00000457 hardware.
4. Open Putty application on the All-In-One PC.



Set Speed to 115200, and Serial Line to COM#, where # is the COM# of the hardware listed in Device Manager on the PC (see below).



5. Hit Open
6. Type in *root* if prompted for a username or password and then hit enter.
7. Type *minicom -s*
8. In minicom setup, enter the following settings:
  - *port /dev/ttySAC5*
  - *Baud 115200, no parity, 1 stop bitF*
  - *No hardware flow control*
9. Save minicom setup settings and hit enter.
10. Select "Exit"
11. You are now connected to the nRF through UART from the Artik in Radio Test Mode.

The Radio Test app/firmware allows you to configure the radio as a constant RX/TX carrier, modulated TX carrier, and RX/TX sweep. The tests are controlled with simple one-letter commands via the serial port. At any time during the tests, you can set the radio parameters output power, bit rate, and channel. You can also set the time on each channel in sweep mode, in steps of 1 millisecond from 1 millisecond to 99 milliseconds.

The application starts with enabling the 16 MHz crystal oscillator and configuring the UART and interrupts. The main loop waits until it receives a command through the UART. Then it initiates the requested command.

The following one-letter commands are available:

- a: **Enter start channel for sweep/channel for constant carrier.**
- b: **Enter end channel for sweep.**
- c: **Start TX carrier.**
- d: **Enter time on each channel (1 ms - 99 ms).**
- e: **Cancel sweep/carrier.**
- h: **Display these commands (help/usage)**
- m: **Enter data rate.**
- o: **Start modulated TX carrier. (*transmit pseudorandom bit sequence*)**
- p: **Enter output power.**
- s: **Print current delay, channels and so on.**
- r: **Start RX sweep.**
- t: **Start TX sweep.**
- x: **Start RX carrier.**
- 1: **Turn gain amplifier on**
- 2: **Turn gain amplifier off**
- 3: **Set gain low**
- 4: **Set gain high**
- 5: **Select on-board antenna**
- 6: **Select external antenna**
- 7: **Display amp/antenna configuration**

The text "RF Test" should appear at the top of the terminal after completing step 10.

Type any of the letters described above. An output text should be displayed in the PUTTY window, or a sweep or signal should be started.