



# Radicom BPM730CE series Bluetooth HID Module Datasheet V1.7

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# 1. Introduction

Radicom BPM730CE series is a worldwide Bluetooth Human Interface Device (HID) module based on the latest Broadcom BCM20730 Bluetooth chip. It is integrated with PCB antenna, serial EEPROM, crystal, and also components for the built-in switching regulators to reduce the external BOM cost.

Radicom BPM730CE series Bluetooth module integrates the entire profile, application, and Bluetooth protocol stack and is fully compliant with the Bluetooth SIG specification for human interface devices. The BPM730CE series is fully compliant with the version 3.0 Bluetooth specification, including enhanced power control (Unicast Connectionless Data), which is essential to mouse and keyboard applications in personal computers.

Integration is the key to achieving the system cost targets of today's PC OEMs. By integrating all components within today's mouse and keyboard into the BPM730CE series, low system costs can be achieved to approach the price points of legacy-wired mice and keyboards. The BPM730CE series can interface directly to mouse optical or ball encoders and keyboard scan matrices.

This module is suitable for the following various applications:

- Wireless keyboards
- Wireless pointing devices: mice, track balls
- Game controllers
- Joysticks
- Presenter devices
- Remote controls



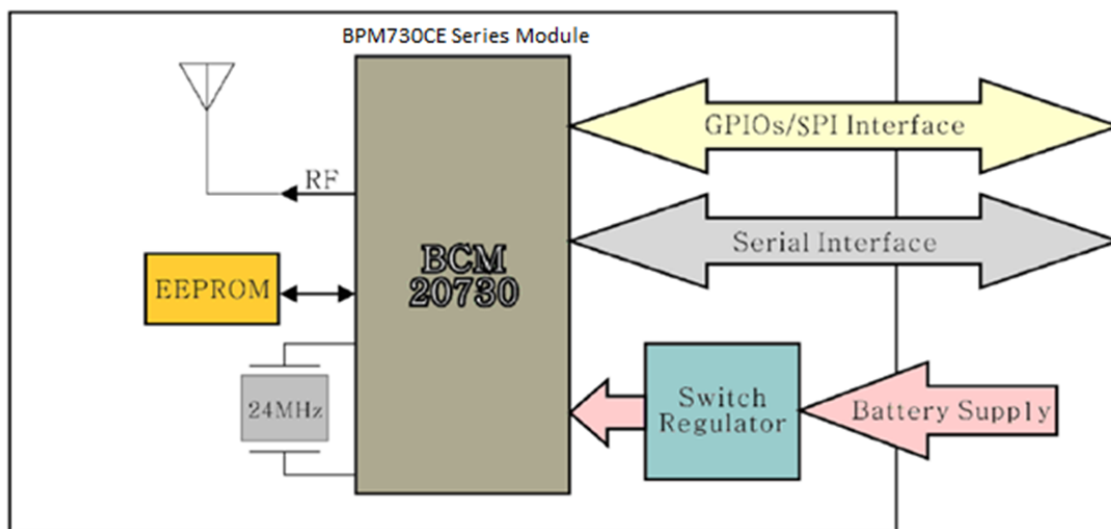
Class 2, BPM730CE series

## 2. Features

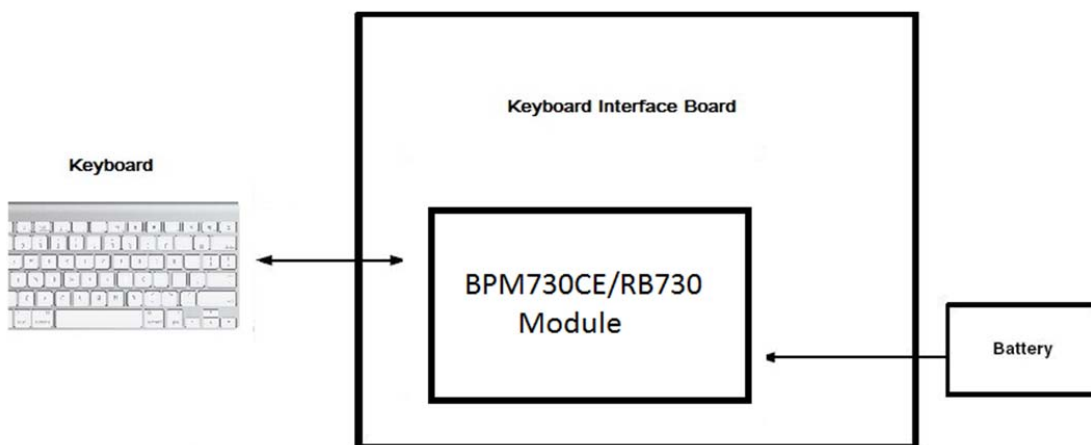
1. Single-chip Bluetooth device with fully integrated Human Interface Device (HID) profile and full Bluetooth stack.
2. On-board ARM processor and RAM/ROM memory.
3. Custom-integrated Bluetooth core processor has been optimized to support the HID V1.0 profile and minimize power consumption.
4. Bluetooth version 3.0 compliant including support for enhanced power control (Unicast Connectionless Data)
5. Integrate serial EEPROM and contains high-performance boost regulator for direct connection with mice electronics.
6. Built-in switching regulator to reduce external BOM and provide high efficient power for external sensor.
7. On-module serial EEPROM for configuration and patch code.
8. Supports SPI (full duplex and half duplex) to communicate with mouse sensor.
9. Direct interface to keyboard scan matrix with full support for up to 8X20 keys and user-customized hot keys.
10. Integrated quadrature signal decoder to support both ball and optical mouse designs.
11. Direct interface to LED
12. Approx. 30.6mm x 15mm x 3mm FR4 PCB.

## 3. Product Specifications

### 3.1. Function Block Diagram



### 3.2. Applications Diagram



### 3.3. Bluetooth related Specification

|                    |                                                                                                                                                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wireless           | Bluetooth v3.0 Class 2 (Broadcom20730chip)                                                                                                                     |
| Data Rate          | Bluetooth v3.0 (1Mbps)                                                                                                                                         |
| Bandwidth          | 2.402GHz – 2.480 GHz                                                                                                                                           |
| RF output power    | Bluetooth class 2 ( up to +2dBm )<br>meet FCC and R&TTE                                                                                                        |
| Sensitivity        | Bluetooth class 2 ( down to -84dBm)                                                                                                                            |
| Spread Spectrum    | Frequency Hopping Spread Spectrum (FHSS)                                                                                                                       |
| Modulation method  | GFSK                                                                                                                                                           |
| Operation Range    | Up to 10M (open space)<br><i>Note: The maximum operating range depends on the paired PC or Rx dongle performance, battery power, and environmental factors</i> |
| System             | IBM PC Pentium 233 or Above.<br>Linux and Mac are also acceptable i.e. PowerMac 10.1 /<br>PowerPC G4(1.2) or Above.                                            |
|                    | Win2000/ WinXP/ Vista/ Win7<br>(Support WinXP SP2, Widcomm BTW, Toshiba Stack or IVT<br>BlueSoleil Bluetooth Softwares)                                        |
|                    | Bluetooth USB dongle or Bluetooth-enabled PC                                                                                                                   |
| Storage Temp.      | -40°C~125°C                                                                                                                                                    |
| Operation Humidity | 10%~90%(55±2%)                                                                                                                                                 |
| Operation Temp.    | -20°C ~ +70°C                                                                                                                                                  |

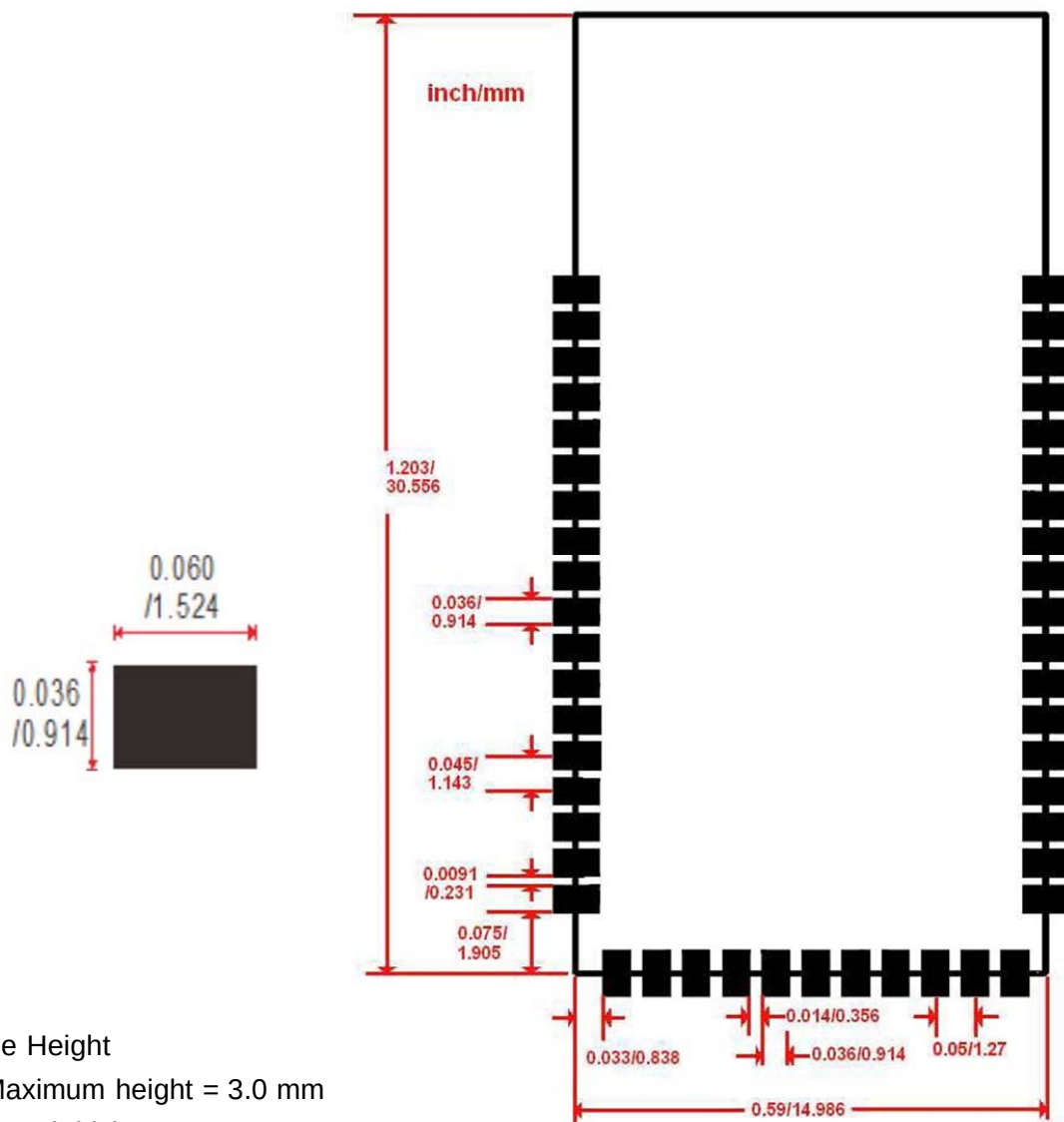
### 3.4 Electronic Character

|                               | Minimum | Typical | Maximum | Unit |
|-------------------------------|---------|---------|---------|------|
| Operation voltage             | 2.0     | 3.0     | 3.6     | V    |
| Output Power                  |         | 2       |         | dBm  |
| Sensitivity                   |         | -84     |         | dBm  |
| Key scan active mode, VBAT=3V |         | 2.5     |         | mA   |
| Sniff Mode, 100mS, VBAT=3V    |         | 0.78    |         | mA   |
| Deep sleep, VBAT=3V           |         | 40      |         | uA   |

### 3.5 Mechanical Dimension

Top side view:

- ✧ Board size = 30.556 mm x 14.986 mm
- ✧ Pitch of short side = 1.27 mm
- ✧ Pitch of long side = 1.143 mm
- ✧ Pad width = 0.914 mm

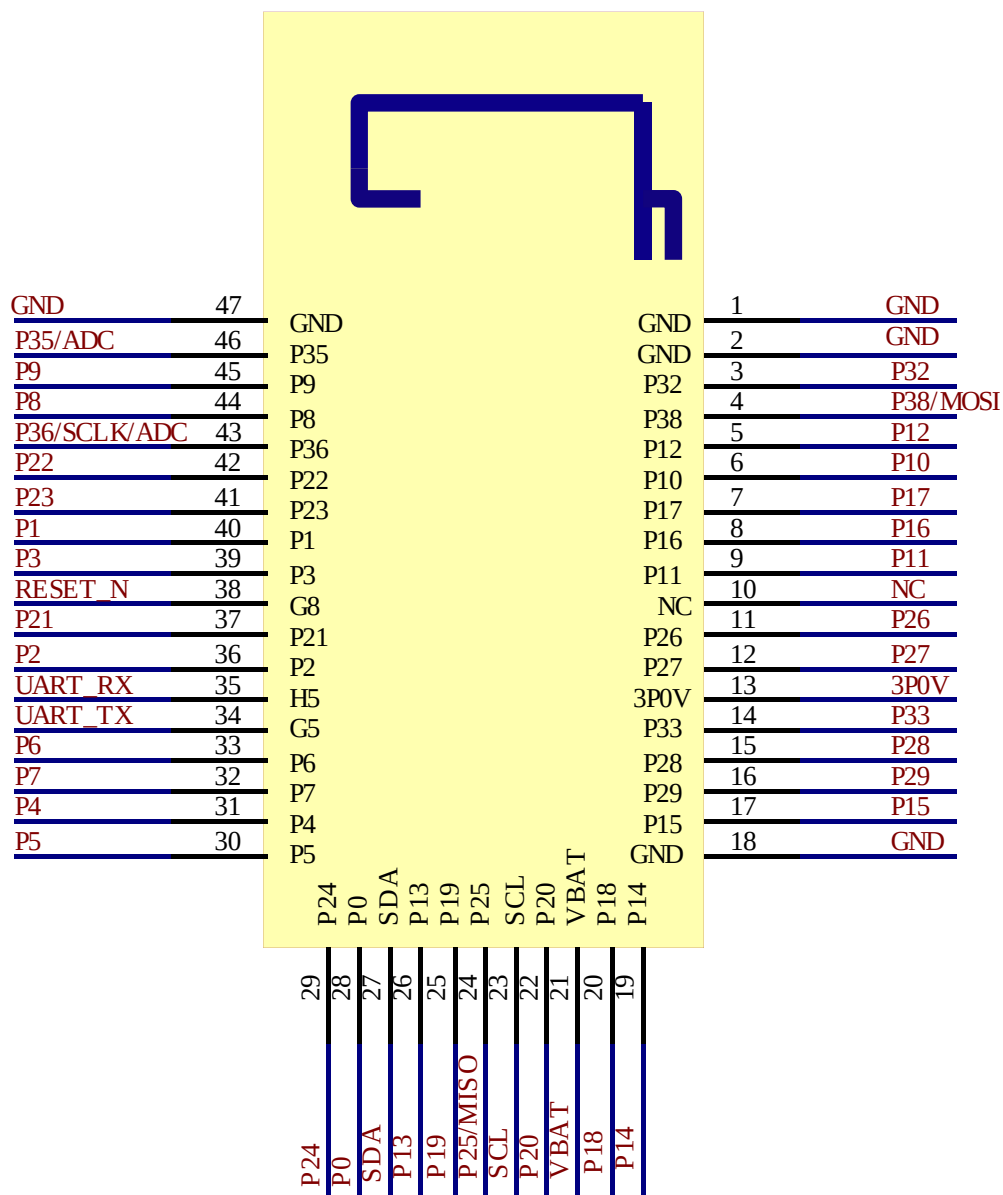


Module Height

- ✧ Maximum height = 3.0 mm
- ✧ Board thickness = 0.80 mm



## 3.6 Pinout Diagram





## 3.7 Pin Definition

| Pin No. | Pin Name | I/O     | Description                                     |
|---------|----------|---------|-------------------------------------------------|
| 01      | GND      | Power   | System ground                                   |
| 02      | GND      | Power   | System ground                                   |
| 03      | P32      | I/O     | Port 32                                         |
| 04      | P38/MOSI | I/O / O | Port 38 / MOSI for SPI Interface                |
| 05      | P12      | I/O     | Port 12                                         |
| 06      | P10      | I/O     | Port 10                                         |
| 07      | P17      | I/O     | Port 17                                         |
| 08      | P16      | I/O     | Port 16                                         |
| 09      | P11      | I/O     | Port 11                                         |
| 10      | NC       |         | Module internal connection for write protection |
| 11      | P26      | I/O     | Port 26                                         |
| 12      | P27      | I/O     | Port 27                                         |
| 13      | 3P0V     | Power   | 3V power output                                 |
| 14      | P33      | I/O     | Port 33                                         |
| 15      | P28      | I/O     | Port 28                                         |
| 16      | P29      | I/O     | Port 29                                         |
| 17      | P15      | I/O     | Port 15                                         |
| 18      | GND      | Power   | System ground                                   |
| 19      | P14      | I/O     | Port 14                                         |
| 20      | P18      | I/O     | Port 18                                         |
| 21      | VBAT     | Power   | Battery power supply                            |
| 22      | P20      | I/O     | Port 20                                         |
| 23      | SCL      | O       | SCL for I <sup>2</sup> C Interface              |
| 24      | P25/MISO | I/O / I | Port 25 / MISO for SPI Interface                |
| 25      | P19      | I/O     | Port 19                                         |
| 26      | P13      | I/O     | Port 13                                         |
| 27      | SDA      | I/O     | SDA for I <sup>2</sup> C Interface              |
| 28      | P0       | I/O     | Port 0                                          |
| 29      | P24      | I/O     | Port 24                                         |
| 30      | P5       | I/O     | Port 5                                          |

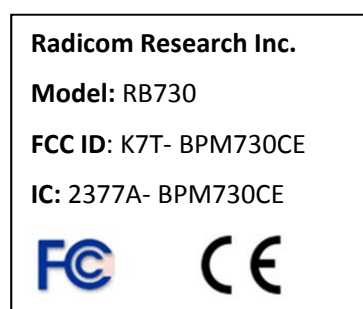
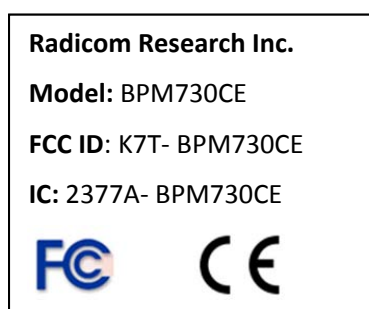


|    |              |             |                                                                                                          |
|----|--------------|-------------|----------------------------------------------------------------------------------------------------------|
| 31 | P4           | I/O         | Port 4                                                                                                   |
| 32 | P7           | I/O         | Port 7                                                                                                   |
| 33 | P6           | I/O         | Port 6                                                                                                   |
| 34 | UART_TX      | O           | Debug UART transmit port                                                                                 |
| 35 | UART_RX      | I           | Debug UART receiver port. After power on reset, if UP_RX =1, firmware download mode UP_RX=0, normal mode |
| 36 | P2           | I/O         | Port 2                                                                                                   |
| 37 | P21          | I/O         | Port 21                                                                                                  |
| 38 | RESET_N      | I           | Active low system reset with a weak pull up.                                                             |
| 39 | P3           | I/O         | Port 3                                                                                                   |
| 40 | P1           | I/O         | Port 1                                                                                                   |
| 41 | P23          | I/O         | Port 23                                                                                                  |
| 42 | P22          | I/O         | Port 22                                                                                                  |
| 43 | P36/SCLK/ADC | I/O / O / I | Port 36 / SCLK for SPI Interface / Battery Detector Input                                                |
| 44 | P8           | I/O         | Port 8                                                                                                   |
| 45 | P9           | I/O         | Port 9                                                                                                   |
| 46 | P35/ADC      | I/O / I     | Port 35 / Battery Detector Input                                                                         |
| 47 | GND          | Power       | System ground                                                                                            |

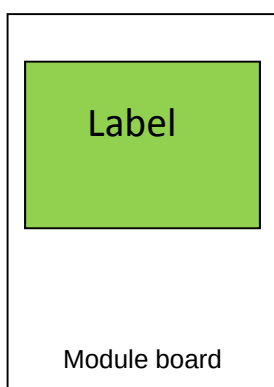
P.S. CS for SPI interface could be configured by any PIOs except module Pin 4, 23, 24, 27 and 43.

#### ***4. FCC & IC Label and Model Identification***

The BPM730CE module family is FCC Part 15 and IC (Industry Canada) certified. The BPM730CE is also CE marked. The modules are labeled with the BPM730CE module model number and FCC Part 15 ID, IC registration number and CE mark. The label can be found on top of the metal shielding on the BPM730CE Module.



Location:



## 5. Federal Communication Commission Interference Statement

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 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.

**FCC Caution:** Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.



#### **IMPORTANT NOTE:**

##### **FCC Radiation Exposure Statement:**

The product comply with the US portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

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

##### **This device is intended only for OEM integrators under the following conditions:**

- 1) The transmitter module may not be co-located with any other transmitter or antenna,

As long as 1 condition above is met, further transmitter test will not be required.

However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

#### **IMPORTANT NOTE**

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.



### **End Product Labeling**

The final end product must be labeled in a visible area with the following:

“Contains FCC ID: **K7T- BPM730CE**

### **Manual Information to the End User**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

## **6. Industry Canada statement:**

This device complies with Industry Canada licence-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 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.*

### **Radiation Exposure Statement:**

The product comply with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

### **Déclaration d'exposition aux radiations:**

Le produit est conforme aux limites d'exposition pour les appareils portables RF pour les Etats-Unis et le Canada établies pour un environnement non contrôlé. Le produit est sûr pour un fonctionnement tel que décrit dans ce manuel. La réduction aux expositions RF peut être augmentée si l'appareil peut être conservé aussi loin que possible du corps de l'utilisateur ou que le dispositif est réglé sur la puissance de sortie la plus faible si une telle fonction est disponible.



**This device is intended only for OEM integrators under the following conditions:**

- 1) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 1 condition above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

**Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes:**

- 1) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 1 condition ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

**IMPORTANT NOTE:**

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

**NOTE IMPORTANTE:**

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.





### **End Product Labeling**

The final end product must be labeled in a visible area with the following:

Contains IC: **2377A- BPM730CE**

### **Plaque signalétique du produit final**

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante:

Contient des IC: **2377A- BPM730CE**

### **Manual Information to the End User**

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

### **Manuel d'information à l'utilisateur final**

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module. Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

## **7. CE Declaration of Conformity**

For the following equipment:

Radicom Research Inc. Wi-Fi Module

Mode(s): **BPM730CE, RB730**

are herewith confirmed to comply with the requirements set out in the Council (European parliament) Directive on the Approximation of the Laws of the Member States relating to Electromagnetic Compatibility of Radio and Telecom device (1999/5/CE).

For the evaluation regarding this Directive, the following standards were applied:

EN 300328 V1.8.1: 2012

EN 62311:2008(MPE)

EN 301489-1 V1.9.2:2011

EN 301489-17 V2.2.1:2012

EN 60950-1:2006+A11:2009+A1:2010+A12:2011



This equipment is marked with  and can be used throughout the European community.

### **Europe – R&TTE Compliance Statement:**

Hereby, Radicom Research Inc. declares that this equipment complies with the essential requirements

and other relevant provisions of DIRECTIVE 1999/5/CE OF THE EUROPEAN PARLIAMENT

AND THE COUNCIL of March 9, 1999 on radio equipment and telecommunication terminal Equipment and the mutual recognition of their conformity (R&TTE).