

# CE RF Exposure Report

**Equipment** : Bluetooth Serial Module with integrated antenna

**Model No.** : BTM431  
(Please refer to section 1.1.1 for more details.)

**Brand Name** : Laird Technologies

**Applicant** : Laird Technologies

**Address** : W66N220 Commerce Court, Cedarburg,  
Wisconsin 53012, USA

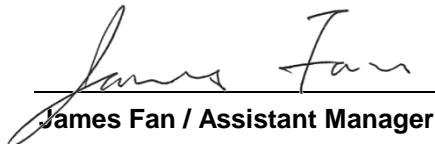
**Standard** : EN 62311:2008  
EN 50385:2002

**Received Date** : Apr. 19, 2017

**Tested Date** : Feb. 24 ~ Feb. 25, 2016 (for original test)  
May 12, 2017 (for new test)

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

  
James Fan / Assistant Manager

Approved by:

  
Gary Chang / Manager

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## Release Record

Report No.	Version	Description	Issued Date
EA480602-02	Rev. 01	Initial issue	May 23, 2017

# 1 General Description

## 1.1 Information

### 1.1.1 Product Details

This report is issued as a supplementary report to original ICC report no. EA480602-01. The difference is concerned with following items:

- ✧ Addition standard of EN 50385:2002
- ✧ Modified address of applicant.
- ✧ Remove Model: BTM410 / BTM420 / BTM430 (configuration with external antenna)
- ✧ Remove Model: BTM421 / BTM461 (configuration with integrated antenna)

Therefore, related test items had been performed and presented in the following sections.

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Laird Technologies	BTM411 / BTM431 / BTM441 / BTM443	Bluetooth Serial Module with integrated antenna	---
Model Name	Difference		
BTM411	Class 2 Bluetooth AT Data Module using CSR Unified Stack 2.1+EDR		
<b>BTM431</b>	Class 2 Bluetooth AT Data Module using CSR Unified Stack 2.0+EDR		
BTM441	Class 2 Bluetooth with Multipoint using CCL Interface Express Subsystem 2.1+EDR		
BTM443	Class 2 Bluetooth AT Data module using CCL Interface Express Subsystem 2.1+EDR		
✦ Hardware is the same on all of these modules. Only difference is the Bluetooth firmware installed.			

- ✧ The above models, model **BTM431** was selected as representative ones for pretesting.

### 1.1.2 Specification of the Equipment under Test (EUT)

<b>Operating Frequency</b>	2402 MHz ~ 2480 MHz
<b>Modulation Type</b>	Bluetooth BR(1Mbps): GFSK Bluetooth EDR (2Mbps): $\pi/4$ -DQPSK Bluetooth EDR (3Mbps): 8-DPSK

### 1.1.3 Antenna Details

Ant. No.	Model	Type	Connector	Gain (dBi)	Remark
1	2450AT42B100	Surface Mount Ceramic Chip	N/A	0	Populated on BTM411 / BTM431 / BTM441 / BTM443

### 1.1.4 EUT Operational Condition

<b>Power Supply Type</b>	3Vdc from host
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## **2 RF exposure evaluation**

### **2.1 Scope**

The object of this standard is to demonstrate the compliance of such product with the basic restrictions (directly or indirectly via compliance with reference levels) related to general public exposure to radio frequency electromagnetic fields.

### **2.2 Normative References**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 50383, Basic standard for the calculation and measurement of human exposure to electromagnetic fields from radio base stations and fixed terminal stations for wireless telecommunication systems (110 MHz – 40 GHz).

IEC 60050-161, International Electrotechnical Vocabulary – Chapter 161: Electromagnetic compatibility.

Council Recommendation 1999/519/EC of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (Official Journal L 199 of 30 July 1999).

### **2.3 Conditions for Calculation and Measurement**

The station shall be operating in accordance with the manufacturer's specification. Calculations and/or measurements on base stations intended for use with external antennas shall be performed for at least one typical system configuration consisting of a combination of the base station and an antenna system representative of the intended final use.

## 2.4 Limits

The device shall comply with the relevant limits for general public exposure specified as basic restrictions or reference levels in the Council Recommendation 1999/519/EC as below table.

Reference levels for electric, magnetic and electromagnetic fields  
(0 Hz to 300 GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density $S_{eq}$ (W/m <sup>2</sup> )
0-1 Hz	—	$3,2 \times 10^4$	$4 \times 10^4$	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—
0,8-3 kHz	$250/f$	5	6,25	—
3-150 kHz	87	5	6,25	—
0,15-1 MHz	87	$0,73/f$	$0,92/f$	—
1-10 MHz	$87/f^{1/2}$	$0,73/f$	$0,92/f$	—
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375\ f^{1/2}$	$0,0037\ f^{1/2}$	$0,0046\ f^{1/2}$	$f/200$
2-300 GHz	61	0,16	0,20	10

### Notes:

1.  $f$  as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz,  $S_{eq}$ ,  $E^2$ ,  $H^2$ , and  $B^2$  are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz,  $S_{eq}$ ,  $E^2$ ,  $H^2$ , and  $B^2$  are to be averaged over any  $68/f^{1.05}$  -minute period ( $f$  in GHz).
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.

## 2.5 Evaluation Formula for Far-Field

Follow below formula to evaluate E-field strength.

$$E = \frac{\sqrt{30 * P * G}}{R}$$

Where

P(W) is the input power of antenna

G is the gain of antenna

R(m) Is the distance between the human body and the antenna

## 2.6 Evaluation Results

Frequency Range (MHz)	Maximum E.I.R.P. (dBm)	Distance (m)	Evaluation E-Field Strength (V/m)	Limit (V/m)	PASS / FAIL
2402-2480	3.24	0.2	1.26	61	Pass

### 3 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

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