

CE RF Exposure Report

Equipment : Bluetooth Serial Module with integrated antenna
(Please refer to section 1.1.1 for more details.)

Model No. : BTM420, BTM461
(Please refer to section 1.1.1 for more details.)

Brand Name : Laird Technologies

Applicant : Laird Technologies

Address : 11160 Thompson Ave. / Lenexa, Kansas / 66219 / USA

Standard : EN 62311:2008

Received Date : Feb. 24, 2016

Tested Date : Feb. 24 ~ Feb. 25, 2016

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.

Approved & Reviewed by:


Gary Chang / Manager



Table of Contents

1	GENERAL DESCRIPTION	4
1.1	Information.....	4
2	RF EXPOSURE EVALUATION	6
2.1	Scope	6
2.2	Normative References.....	6
2.3	Compliance Criteria.....	6
2.4	Limits	7
2.5	Evaluation Formula for Far-Field.....	8
2.6	Evaluation Results.....	8
3	TEST LABORATORY INFORMATION	9

Release Record

Report No.	Version	Description	Issued Date
EA480602-01	Rev. 01	Initial issue	Apr. 01, 2016

1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Laird Technologies	BTM411 / BTM421 / BTM431 / BTM441 / BTM443 / BTM461	Bluetooth Serial Module with integrated antenna	Surface mount module with chip antenna
Laird Technologies	BTM410 / BTM420 / BTM430	Bluetooth Serial Module with surface mount pad for external antenna	Surface mount pad with dipole antenna.
Model Name	Difference		
BTM411	Class 2 Bluetooth AT Data Module using CSR Unified Stack 2.1+EDR		
BTM421	Class 2 Bluetooth HCI data module using CSR HCI Stack 2.1+EDR		
BTM431	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		
BTM461	Class 2 Bluetooth AT / Multipoint using CCL Interface Express Subsystem 2.1+EDR		
✦ Hardware is the same on all of these modules. Only difference is the Bluetooth firmware installed.			
Model Name	Difference		
BTM410	Class 2 Bluetooth AT Data Module using CSR Unified Stack 2.1+EDR		
BTM420	Class 2 Bluetooth HCI data module using CSR HCI Stack 2.1+EDR		
BTM430	Class 2 Bluetooth AT Data Module using CSR Unified Stack 2.0+EDR		
✦ Hardware is the same on all of these modules. Only difference is the Bluetooth firmware installed.			

✧ The above models, model **BTM420**, **BTM421**, and **BTM461** were selected as representative ones for pretesting.

1.1.2 Specification of the Equipment under Test (EUT)

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

1.1.1 Antenna Details

Ant. No.	Model	Type	Connector	Gain (dBi)	Remark
1	2450AT42B100	Surface Mount Ceramic Chip	N/A	0	Populated on BTM411 / BTM421 / BTM431 / BTM441 / BTM443 / BTM461
2	S181AH-2450S	Dipole	RP-SMA	2	Used with BTM410 / BTM420 / BTM430

2 RF exposure evaluation

2.1 Scope

This International Standard applies to electronic and electrical equipment for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies. The frequency range covered is 0 Hz to 300 GHz.

The object of this generic standard is to provide assessment methods and criteria to evaluate such equipment against basic restrictions or reference levels on exposure of the general public related to electric, magnetic and electromagnetic fields and induced and contact current

2.2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies

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 Compliance Criteria

The electronic and electrotechnical apparatus shall comply with the basic restriction as specified in Annex III of Council Recommendation 1999/519/EC.

The reference levels in the Council Recommendation 1999/519/EC on public exposure to electromagnetic fields are derived from the basic restrictions using worst-case assumptions about exposure. If the reference levels are met, then the basic restrictions will be complied with, but if the reference levels are exceeded, that does not necessarily mean that the basic restrictions will not be met. In some situations, it will be necessary to show compliance with the basic restrictions directly, but it may also be possible to derive compliance criteria that allow a simple measurement or calculation to demonstrate compliance with the basic restriction. Often these compliance criteria can be derived using realistic assumptions about conditions under which exposures from a device may occur, rather than the conservative assumptions that underly the reference levels.

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 ²)
0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—
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	8.50	0.2	2.3	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, 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 Hsiang. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan,
R.O.C.

Kwei Shan

Tel: 886-3-271-8666

No. 3-1, Lane 6, Wen San 3rd
St., Kwei Shan Hsiang, Tao Yuan
Hsien 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd
St., Kwei Shan Hsiang, Tao Yuan
Hsien 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666

Fax: 886-3-318-0155

Email: ICC_Service@icertifi.com.tw

==END==