CE RF Exposure Report

Equipment	:	**Bluetooth 4.2 module (BLE only)**
Model No.	:	**BL652-SA, BL652-SC** **(Refer to item 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	:	**Jun. 22, 2016**
Tested Date	:	**Jul. 11 ~ Jul. 18, 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

Testing Laboratory
2732

Table of Contents

Release Record

Report No.	Version	Description	Issued Date
EA662202	Rev. 01	Initial issue	Aug. 19, 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	BL652-SA	Bluetooth 4.2 module (BLE only)	with chip antenna
	BL652-SC		with MHF4 connector type antenna

1.1.2 Specification of the Equipment under Test (EUT)

Operating Frequency	2402 MHz ~ 2480 MHz
Modulation Type	Bluetooth 4.2 LE: GFSK

1.1.3 Antenna Details

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)	Remarks
1	ACX	AT3216-B2R7HAA	Chip	N/A	0.5	For BL652-SA
2	LSR	FlexPIFA 001-0022	FlexPIFA	MHF4	2	For BL652-SC
3	LSR	FlexNotch 001-0023	Flexible Notch	MHF4	2	
4	MAG. LAYERS	EDA-8709-2G4C1-B27	Dipole	MHF4	2	
5	Walsin	RFDPA870910EMAB302	Dipole	MHF4	2	

1.1.4 EUT Operational Condition

Power Supply Type	3.3Vdc from host

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^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	7.48	0.2	2.05	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 Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 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

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