

CE RF Exposure Report

Equipment : Sterling-LWB5 Module
Model No. : 450-0162, 450-0168, 450-0169
(Refer to item 1.1.1 for more details)
Brand Name : Laird Connectivity
Applicant : Laird Connectivity LLC
Address : W66N220 Commerce Court, Cedarburg,
Wisconsin 53012, USA
Standard : EN IEC 62311:2020
EN 50385:2017
EN 50665:2017
BS EN IEC 62311:2020
BS EN 50385:2017
BS EN 50665:2017
Received Date : Jul. 03, 2017
Tested Date : Aug. 04~ Sep. 04, 2017

We, International Certification Corporation, 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 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

Table of Contents

1	GENERAL DESCRIPTION	4
1.1	Information.....	4
2	RF EXPOSURE EVALUATION	6
2.1	Limits	6
2.2	Evaluation Formula for Far-Field.....	7
2.3	Deviation from Test Standard and Measurement Procedure.....	7
2.4	Measurement Uncertainty	7
2.5	Evaluation Results.....	7
3	TEST LABORATORY INFORMATION	8

Release Record

Report No.	Version	Description	Issued Date
EA770305-04	Rev. 01	Initial issue	Oct. 20, 2022

1 General Description

1.1 Information

This report is issued as a duplicate report to original ICC report no. EA770305. The difference is concerned with following items:

- ✧ Updating version of standard and adding BS standard.
- ✧ Changing applicant and brand name.

Above changes have no impact on test, thus test results are consistent with previous report.

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Laird	450-0162	Sterling-LWB5 Module	SIP Module
	450-0168		U.FL Module
	450-0169		Chip Antenna Module

1.1.1 Specification of the Equipment under Test (EUT)

WLAN	
Operating Frequency (MHz)	802.11b/g/n: 2412 MHz ~ 2472 MHz 802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5700 MHz
Modulation Type	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n/ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
BT	
Operating Frequency	2402 MHz ~ 2480 MHz
Modulation Type	Bluetooth LE: GFSK Bluetooth BR(1Mbps): GFSK Bluetooth EDR (2Mbps): $\pi/4$ -DQPSK Bluetooth EDR (3Mbps): 8-DPSK

1.1.2 Antenna Details

For WLAN

Ant. No.	Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)			
				2400~2483.5	5150~5250	5250~5350	5470~5725
1	LSR/001-0009	Dipole	IPEX U.FL	2	2		
2	LSR/FlexPIFA 001-0016	PIFA	IPEX U.FL	2.5	3		
3	LSR/001-0012	Dipole	IPEX U.FL	2	2		
4	CHIP ANTENNA: Johanson P/N: 2450AD14A5500#	Chip	IPEX U.FL	1	4		

For BT

Ant. No.	Model	Type	Connector	Gain (dBi)
1	LSR/001-0009	Dipole	IPEX U.FL	2
2	LSR/FlexPIFA 001-0016	PIFA	IPEX U.FL	2.5
3	LSR/001-0012	Dipole	IPEX U.FL	2
4	CHIP ANTENNA: Johanson P/N: 2450AD14A5500#	Chip	IPEX U.FL	1

1.1.3 EUT Operational Condition

Power Supply Type	3.3Vdc from host
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2 RF exposure evaluation

2.1 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.

2.2 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

2.3 Deviation from Test Standard and Measurement Procedure

None

2.4 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Parameters	Uncertainty
Conducted power	±0.808 dB

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

2.5 Evaluation Results

Mode	Frequency Range (MHz)	Maximum E.I.R.P. (dBm)	Distance (m)	Evaluation E-Field Strength (V/m)	Limit (V/m)	PASS / FAIL
BT EDR	2402-2480	11.90	0.2	3.41	61	Pass
BT LE	2402-2480	9.99	0.2	2.74	61	Pass
WLAN	2412-2472	15.93	0.2	5.42	61	Pass
	5180-5240	20.19	0.2	8.85	61	Pass
	5260-5320	20.21	0.2	8.87	61	Pass
	5500-5700	20.65	0.2	9.33	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 Corporation (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>.

Linkou

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