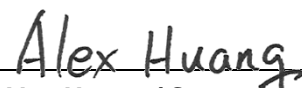


# CE RF Exposure Report

**Equipment** : Sterling-LWB5+ 802.11a/b/g/n/ac Module with Bluetooth 5.2  
**Model No.** : Sterling LWB5+  
**Brand Name** : Laird Connectivity  
**Applicant** : Laird Connectivity  
**Address** : W66N220 Commerce Court, Cedarburg, WI 53012 United States Of America  
**Standard** : EN IEC 62311:2020  
EN 50385:2017  
EN 50665:2017  
**Received Date** : Jun. 11, 2020  
**Tested Date** : Jul. 17 ~ Aug. 24, 2020

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:

  
Alex Huang / Supervisor

Approved by:

  
Gary Chang / Manager

## Table of Contents

<b>1</b>	<b>GENERAL DESCRIPTION .....</b>	<b>4</b>
1.1	Information.....	4
<b>2</b>	<b>RF EXPOSURE EVALUATION .....</b>	<b>6</b>
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.....	8
<b>3</b>	<b>TEST LABORATORY INFORMATION .....</b>	<b>9</b>

---

## Release Record

Report No.	Version	Description	Issued Date
EA061103-12	Rev. 01	Initial issue	Jun. 06, 2024

# 1 General Description

## 1.1 Information

This report is issued as a duplicate report to the original ICC report no. EA061103. The modifications are changing product name & updating standard to the latest version.

### 1.1.1 Product Details

The device has 5 configurations as below:

Brand name	Model Name	Product Name	Part Number	Description
Laird Connectivity	Sterling LWB5+	Sterling-LWB5+ 802.11a/b/g/n/ac Module with Bluetooth 5.2	453-00045	Chip Antenna
Laird Connectivity	Sterling LWB5+	Sterling-LWB5+ 802.11a/b/g/n/ac Module with Bluetooth 5.2	453-00046	MHF4 Connector
Laird Connectivity	Sterling LWB5+	Sterling-LWB5+ 802.11a/b/g/n/ac Module with Bluetooth 5.2	453-00047	RF Trace Pin
Laird Connectivity	Sterling LWB5+	Sterling-LWB5+ 802.11a/b/g/n/ac Module with Bluetooth 5.2	453-00048	M.2 PCI-E Card w/SDIO and UART Interface
Laird Connectivity	Sterling LWB5+	Sterling-LWB5+ 802.11a/b/g/n/ac Module with Bluetooth 5.2	453-00049	M.2 PCI-E Card w/USB and USB Interface
+ Part Number: 453-00046 was selected as a representative one for the final test				

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

<b>SW Version</b>	001.001.025.0071.0000
<b>WLAN</b>	
<b>Operating Frequency</b>	802.11b/g/n: 2412 MHz ~ 2472 MHz 802.11a/n/ac: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5700 MHz, 5745 ~5825 MHz
<b>Modulation Type</b>	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n/ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
<b>BT</b>	
<b>Operating Frequency</b>	2402 MHz ~ 2480 MHz
<b>Modulation Type</b>	Bluetooth 5.2 LE: GFSK Bluetooth BR(1Mbps): GFSK Bluetooth EDR (2Mbps): $\pi/4$ -DQPSK Bluetooth EDR (3Mbps): 8-DPSK

### 1.1.3 Antenna Details

WLAN/BT antenna

Ant. No.	Manufacturer	Model	Laird Part Number	Type	Connector	Antenna Gain (dBi)		
						2.4GHz	5.15~5.35 GHz	5.47~5.85 GHz
1	Laird	2.4/5.5 GHz Dipole Antenna	001-0009	Dipole	RP-SMA	2.0	2.0	2.0
2	Laird	FlexPIFA	001-0021	PIFA	IPEX MHF4L	2.5	3.0	3.0
3	Laird	Mini NanoBlade Flex	EMF2449A1-1 0MH4L	PCB Dipole	IPEX MHF4L	2.79	3.38	3.38
4	Laird	Nanoblade	ENB2449A1-1 0MH4L	PCB Dipole	IPEX MHF4L	2.0	3.9	4.0
5	ACX	AD1608-A2455 AAT/LF	NA	Chip Antenna	N/A	1.0	4.0	4.0

### 1.1.4 Power Supply Type of the Equipment under Test (EUT)

Power Type	3.3 Vdc
------------	---------

## 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 <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.

## 2.2 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 LE	2402-2480	9.91	0.2	2.71	61	Pass
BT EDR	2402-2480	10.49	0.2	2.90	61	Pass
Wi-Fi	2412-2472	19.54	0.2	8.21	61	Pass
	5180-5240	21.73	0.2	10.57	61	Pass
	5260-5320	21.66	0.2	10.48	61	Pass
	5500-5700	22.20	0.2	11.16	61	Pass
	5745-5825	13.22	0.2	3.97	61	Pass

Note: Above output power is max output power and measured from 453-00046

### 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**

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 Dist., Tao Yuan  
City 33381, Taiwan (R.O.C.)  
No.2-1, Lane 6, Wen San 3rd  
St., Kwei Shan Dist., Tao Yuan  
City 33381, Taiwan (R.O.C.)

#### **Kwei Shan Site II**

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd  
St., Kwei Shan Dist., Tao Yuan  
City 33381, Taiwan (R.O.C.)

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

Tel: 886-3-271-8666

Fax: 886-3-318-0345

Email: ICC\_Service@icertifi.com.tw

==END==