

CE RF Exposure Report

Equipment : 802.11 ac/a/b/g/n M.2 2230 + Bluetooth 4.2 module
(Please refer to section 1.1.1 for more details)

Model No. : ST60-2230C
(Please refer to section 1.1.1 for more details)

Brand Name : Laird Connectivity

Applicant : Laird Connectivity, Inc.

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

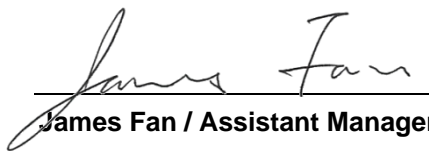
Standard : EN IEC 62311:2020
EN 50665:2017
EN 50385:2017

Received Date : Apr. 07, 2017

Tested Date : Apr. 24 ~ Jun. 09, 2017
Jul. 01 ~ Aug. 22, 2019

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
EA740701-11	Rev. 01	Initial issue	Feb. 25, 2021

1 General Description

1.1 Information

This report is issued as a supplementary report to original ICC report no. EA740701-08 and EA740701-06.
The modification is

1. Additional model and product names, changing applicant and brand name
2. Resistance of CONFIG_HOST0/1/2 are different to switch interface
3. Updating standard version

Above changes do not affect any test items, thus all test results remain unchanged.

1.1.1 Product Details

The following models are provided to this EUT.

Brand Name	Model Name	Product Name	Description
Laird Connectivity	ST60-2230C	802.11 ac/a/b/g/n M.2 2230 + Bluetooth 4.2 module	with carrier board
	ST60-2230C-P	802.11 ac/a/b/g/n M.2 2230 + Bluetooth 4.2 module PCIe/UART interface	PCIe/UART interface
	ST60-2230C-PU	802.11 ac/a/b/g/n M.2 2230 + Bluetooth 4.2 module PCIe/USB interface	PCIe/USB interface
	ST60-2230C-SS	802.11 ac/a/b/g/n M.2 2230 + Bluetooth 4.2 module SDIO/SDIO Interface	SDIO/SDIO Interface
	ST60-2230C-U	802.11 ac/a/b/g/n M.2 2230 + Bluetooth 4.2 module USB/UART Interface	USB/UART Interface
	ST60-2230C-UU	802.11 ac/a/b/g/n M.2 2230 + Bluetooth 4.2 module USB/USB interface	USB/USB interface
	ST60-2230C-Q	802.11 ac/a/b/g/n M.2 2230 + Bluetooth 4.2 module, ST60-2230C-Q	The difference between ST60-2230C and ST60-2230C-Q the OTP parameter is different for ID recognition. SW is exactly the same.
★ The above models, model ST60-2230C was selected as a representative one for the final test and only its data was recorded in this report.			

1.1.2 Specification of the Equipment under Test (EUT)

WLAN	
Operating Frequency	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 4.2 LE: GFSK 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	Operating Frequencies (MHz) / Antenna Gain (dBi)				
				2400~2483.5	5150~5250	5250~5350	5470~5725	5725~5850
1	LSR/001-0009	Dipole	IPEX U.FL	2	2	2	2	2
2	Laird NanoBlade-IP04	PCB Dipole	IPEX U.FL	2	3.9	3.9	4	4
3	Laird MAF95310 Mini NanoBlade Flex	PCB Dipole	IPEX U.FL	2.79	3.38	3.38	3.38	3.38
4	LSR/FlexPIFA 001-0016	PIFA	IPEX U.FL	2.5	3	3	3	3
5	Ethertronics WLAN_1000146	Isolated Magnetic Dipole	IPEX U.FL	2.5	3.5	3.5	3.5	3.5
6	Laird/MIMO FlexPIFA Antenna	PIFA	IPEX U.FL	2	3	3	3	3

1.1.4 EUT Operational Condition

Power Supply Type	DC 3.3V 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

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. 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

Frequency Range (MHz)	Maximum E.I.R.P. (dBm)	Distance (m)	Evaluation E-Field Strength (V/m)	Limit (V/m)	PASS / FAIL
2402-2480 BR	14.81	0.2	4.76	61	Pass
2402-2480 LE	9.85	0.2	2.69	61	Pass
2412-2472	19.86	0.2	8.52	61	Pass
5180-5240	22.87	0.2	12.05	61	Pass
5260-5320	22.76	0.2	11.90	61	Pass
5500-5700	22.89	0.2	12.08	61	Pass
5725~5850	13.95	0.2	4.32	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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If you have any suggestion, please feel free to contact us as below information

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