CE RF Exposure Report

Equipment	:	**LTE Modem**
Model No.	:	**Pinnacle 100**
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	:	**May 03, 2019**
Tested Date	:	**Nov. 22 ~ Nov. 25, 2019**

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: **Approved by:**

James Fan / Assistant Manager **Gary Chang / Manager**

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Release Record

Report No.	Version	Description	Issued Date
EA950303-04	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. EA950303. The difference is concerned with following items:

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

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

1.1.1 Specification of the Equipment under Test (EUT)

BT	
Operating Frequency	2402 MHz ~ 2480 MHz
Modulation Type	Bluetooth LE: GFSK
Cat-M1 / NB-IoT	
Operating Frequency (MHz)	LTE Band 1: 1920 MHz ~ 1980 MHz LTE Band 3: 1710 MHz ~ 1785 MHz LTE Band 8: 880 MHz ~ 915 MHz LTE Band 20: 832 MHz ~ 862 MHz LTE Band 28: 703 MHz ~ 748 MHz
Modulation Type	QPSK, 16QAM
SW Version	BHL78xx.3.7.2.3

1.1.2 Antenna Details

For BT

Ant. No.	Brand	Model	Type	Gain (dBi)	Connector
1	LSR	001-0001	2.4GHz Dipole	2	RP-SMA Female with IPEX U.FL antenna cable
2	Laird	NanoBlue-IP04 (MAF94045)	PCB Dipole	2	IPEX U.FL
3	LSR	001-0014	2.4GHz Flex PIFA	2	IPEX U.FL
4	Laird	110-00665	Trace Monopole	2.6	NA

For LTE

Ant. No.	Brand / Model	Type	Connector	Gain (dBi)	Operating Band
1	Laird / DBA6927C1	Dipole	U.FL	2.2	LTE Band 1
				2.2	LTE Band 3
				0.5	LTE Band 8
				0.5	LTE Band 20
				0.5	LTE Band 28
2	Laird / EFF6925A3S	Flex	U.FL	3.7	LTE Band 1
				3.7	LTE Band 3
				1.9	LTE Band 8
				1.9	LTE Band 20
				1.9	LTE Band 28
3	Laird / 110-00665	Stamped Metal	N/A	2.6	LTE Band 1
				2.6	LTE Band 3
				1.3	LTE Band 20
				1.3	LTE Band 28

1.1.3 EUT Operational Condition

Power Supply Type	3.7 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/m²)
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

BT						
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	9.94	0.2	2.72	61	Pass

Cat-M1 / NB-IoT							
Mode	**LTE Band**	**Maximum Conducted Power (dBm)**	**Antenna Gain (dBi)**	**Distance (m)**	**Evaluation E-Field Strength (V/m)**	**Limit (V/m)**	**PASS / FAIL**
Cat-M1	1	21.66	3.7	0.2	16.05	60.25	Pass
	3	22.67	3.7	0.2	18.03	56.86	Pass
	8	22.35	1.9	0.2	14.13	40.79	Pass
	20	22.95	1.9	0.2	15.14	39.66	Pass
	28	23.35	1.9	0.2	15.85	36.46	Pass
NB-IoT	1	21.63	3.7	0.2	16.00	60.25	Pass
	3	22.7	3.7	0.2	18.09	56.86	Pass
	8	22.29	1.9	0.2	14.03	40.79	Pass
	20	22.75	1.9	0.2	14.79	39.66	Pass
	28	22.97	1.9	0.2	15.17	36.46	Pass

Evaluation for simultaneous transmission

The device supports simultaneous transmission as below

1. BT + Cat-M1 / NB-IoT

Calculation for simultaneous transmission conditions

1. BT + LTE = $(2.72 / 61)^2 + (15.85 / 36.46)^2 = 0.191 < 1$

Results of single and simultaneous transmission comply with requirement of standard.

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	**Kwei Shan**	**Kwei Shan Site II**
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If you have any suggestion, please feel free to contact us as below information

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