

# AS/NZS RF Exposure Report

**Equipment** : Bluetooth v5 Power Amplified Module  
**Model No.** : BL654PA  
**Brand Name** : Laird  
**Applicant** : Laird Connectivity  
**Address** : W66N220 Commerce Court, Cedarburg,  
Wisconsin 53012, USA  
**Standard** : AS/NZS 2772.2:2011  
Radiation Protection Standard for Maximum  
Exposure Levels to Radiofrequency Fields  
- 3 kHz to 300 GHz  
**Received Date** : Apr. 01, 2019  
**Tested Date** : May 16 ~ May 24, 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:

Approved by:

James Fan / Assistant Manager

Gary Chang / Manager



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## Release Record

Report No.	Version	Description	Issued Date
AA940104	Rev. 01	Initial issue	Aug. 05, 2019

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# 1 General Description

## 1.1 Information

### 1.1.1 Product Details

The device supports integrated and external antenna.

Brand Name	Model Name	Product Name	Description
Laird	BL654PA	Bluetooth v5 Power Amplified Module	Integrated antenna
			External antenna

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

Bluetooth	
Operating Frequency	2402 MHz ~ 2480 MHz
Modulation Type	Bluetooth 5.0 LE: GFSK
NFC	
Operating Frequency	13.56 MHz
Modulation Type	ASK

### 1.1.3 Antenna Details

Ant. No.	Manufacturer	Model	Laird Part Number	Type	Connector	Gain (dBi)	Remarks
1	Laird	NanoBlue	EBL2400A1-10MH4L	PCB Dipole	IPEX MHF4	2	Connector Type Antenna
2	Laird	FlexPIFA	001-0022	PIFA	IPEX MHF4	2	Connector Type Antenna
3	Laird	2.4GHz Dipole Antenna	001-0001	Dipole	RP-SMA Male	2	Connector Type Antenna
4	Mag.Layers	EDA-8709-2 G4C1-B27-CY	0600-00057	Dipole	IPEX MHF4	2	Connector Type Antenna
5	Laird	mFlexPIFA	EFA2400A3S-10MH4L	PIFA	IPEX MHF4	2	Connector Type Antenna
6	Laird	Laird NFC	0600-00061	NFC	N/A	---	Printed PCB Antenna & Connector Type Antenna
7	Laird	BL654-SA PCB printed antenna	NA	Printed PCB	N/A	0	Printed PCB Antenna

## 2 RF exposure evaluation

### 2.1 Limits

The device shall comply with the relevant limits as below table.

Exposure category	Frequency Range	E-field strength (V/m)	H-field strength (A/m)	Equivalent plane wave power flux density $S_{eq}(W/m^2)$
Occupational	400MHz ~ 2GHz	$3.07 * f^{0.5}$	$0.00814 * f^{0.5}$	$f / 40$
	2GHz ~ 300GHz	137	0.364	50
General public	400MHz ~ 2GHz	$1.37 * f^{0.5}$	$0.00364 * f^{0.5}$	$f / 200$
	2GHz ~ 300GHz	61.4	0.163	10

Note: f is the frequency in MHz.

### 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

<b>Declaration of Conformity:</b>
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
<b>Comments and Explanations:</b>
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

<b>Highest power level</b>					
Frequency Range (MHz)	Maximum Average E.I.R.P (dBm)	Distance (m)	Evaluation E-Field Strength (V/m)	Limit (V/m)	PASS / FAIL
2402 -2480	22	0.2	10.90	61.4	Pass
<b>Lowest power level</b>					
Frequency Range (MHz)	Maximum Average E.I.R.P (dBm)	Distance (m)	Evaluation E-Field Strength (V/m)	Limit (V/m)	PASS / FAIL
2402 -2480	-21.14	0.2	0.08	61.4	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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