

RF Exposure Evaluation Declaration

Product Name : Bluetooth 5.1 BLE Data Module
Trade Name : Laird Connectivity
Model No. : BL653

Applicant : Laird Connectivity, Inc.
Address : W66N220 Commerce Court, Cedarburg,
Wisconsin 53012, USA

Date of Receipt : Mar. 02, 2020
Issued Date : Jun. 16, 2020
Report No. : 2030001R-RFCEP01V00-A
Report Version : V2.0



The declaration results relate only to the samples calculated.

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Test Result for Inspection

Issued Date : Jun. 16, 2020

Report No. : 2030001R-RFCEP01V00-A



Product Name : Bluetooth 5.1 BLE Data Module

Applicant : Laird Connectivity, Inc.

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

Manufacturer : Laird Connectivity, Inc.

Model No. : BL653

EUT Voltage : DC 3.3V

Testing Voltage : DC 3.3V

Trade Name : Laird Connectivity

Applicable Standard : EN 62479: 2010

Laboratory Name : Hsin Chu Laboratory

Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township,
Hsinchu County 31061, Taiwan, R.O.C.
TEL: +886-3-582-8001 / FAX: +886-3-582-8958

Test Result : Complied

Tested By

:



(Elwin Lin / Engineer)

Approved By

:



(Louis Hsu / Deputy Manager)

Revision History

Report No.	Version	Description	Issued Date
2030001R-RFCEP01V00-A	V1.0	Initial issue of report	Jun. 02, 2020
2030001R-RFCEP01V00-A	V2.0	Revise Product Name	Jun. 16, 2020

1.1. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Test Site
Temperature (°C)	RF output power	15 - 35	3
Humidity (%RH)		20 - 75	

Note: Test site information refers to Laboratory Information.

Laboratory Information

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <http://www.dekra.com.tw>

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No. 75-2, 3rd Lin, WangYe Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C. 2. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 3. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-592-8858 2. +886-3-582-8001 3. +886-3-582-8001
Fax number	1. +886-3-592-8859 2. +886-3-582-8958 3. +886-3-582-8958
E mail address	info.tw@dekra.com
Website	http://www.dekra.com.tw

1.2. List of Test Equipment

RF output power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Temperature & Humidity Test Chamber	KSON	THS-B4T-150	A0401	2020/01/06	2021/01/06
USB Power Sensor	Keysight	U2021XA	MY54110016	N/A	N/A
USB Power Sensor	Keysight	U2021XA	MY54070005	N/A	N/A
USB Power Sensor	Keysight	U2021XA	MY54080017	N/A	N/A
USB Power Sensor	Keysight	U2021XA	MY54120005	N/A	N/A
MIMO Power Switch Box	Pallas	4PS6A-1	TW5451093	N/A	N/A

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

1.3. Uncertainty

Test item	Uncertainty
RF output power	± 1.27 dB

Note: Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2. EN 62479 REQUIREMENT

2.1. HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS (10MHz to 300GHz)

LIMIT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the following limits.

For frequency range 10 MHz to 10 GHz

The basic restriction at frequencies between 10 MHz and 100 GHz is on localized SAR in the head. Any device with output power below 20 mW cannot produce an exposure exceeding this restriction under the most pessimistic exposure conditions.

The basic restriction is 2 W/kg so any unit which supplies less than 20 mW ($=2/100W$) from its antenna port, averaged over 6 minutes, will meet the basic restriction.

For frequency range 10 GHz to 300 GHz

The most conservative assumption is that all the transmitted power is absorbed within the specified area, therefore any device which supplies less than 20 mW will meet the basic restriction. The average time is equal to $68/f-1.05$ minutes (where f is in GHz)

In the frequency range 10 GHz to 300 GHz, the basic restriction is 10 Wm⁻² averaged over any 20 cm² of exposed area with a spatial maximum of 200 Wm⁻² averaged over 1 cm²

Criteria A: All electromagnetic fields

If the average power emitted by apparatus operating in the frequency range 10 MHz - 300GHz is less than or equal to 20 mW and the transmitting peak power is less than 20W then the apparatus is deemed to comply with the basic restrictions without testing. Averaging time is 6 minutes in the frequency range 10 MHz to 10 GHz. The average time is equal to $68/f-1.05$ minutes (where f is in GHz) in the frequency range 10 GHz to 300 GHz.

If the total supply power or the input power to the circuitry producing the greatest emissions in the device is less than or equal to 20 mW then it is assumed that the emitted power is less than 20 mW.

Criteria B: Pulse modulated electromagnetic fields with pulse duration less than 30 microseconds

For pulses of duration less than 30 microseconds at frequencies between 300 MHz and 10 GHz, there is also a basic restriction on Specific energy absorption (SA). This is 2mJ kg⁻¹ in any 10g of tissue in the head. For most pulses, the SAR restriction will be more stringent, but for pulses with a repetition frequency of less than 100 Hz, the SA restriction will predominate. For devices producing pulses with repetition rates below 100 Hz, the average power should be less than 20 x prf mW (pulse repetition frequency, prf in Hz).

TEST RESULTS**BLE High Power (8dBm) Measurement:**

Frequency (MHz)	Maximum Conducted Output Power		Maximum E-Field Strength at R = 0.2 m (V/m)	Limit (V/m)
	(dBm)	(mW)		
2402_1Mbps	7.900	6.166	2.707	67.389
2440_1Mbps	7.980	6.281	2.732	67.920
2480_1Mbps	7.890	6.152	2.704	68.474
2402_2Mbps	7.900	6.166	2.707	67.389
2440_2Mbps	7.980	6.281	2.732	67.920
2480_2Mbps	7.890	6.152	2.704	68.474

Conclusion:

Average Power is less than or equal to 20mW with averaging time is 6 minutes in the frequency range 10 MHz to 10 GHz. This proves that the unit complies with the EN 62479 (2010) for RF power measurement.

BLE Low Power (-40dBm) Measurement:

Frequency (MHz)	Maximum Conducted Output Power		Maximum E-Field Strength at R = 0.2 m (V/m)	Limit (V/m)
	(dBm)	(mW)		
2402_1Mbps	-41.640	0.0001	0.009	67.389
2440_1Mbps	-41.540	0.0001	0.009	67.920
2480_1Mbps	-42.230	0.0001	0.008	68.474
2402_2Mbps	-39.830	0.0001	0.011	67.389
2440_2Mbps	-40.150	0.0001	0.011	67.920
2480_2Mbps	-40.860	0.0001	0.010	68.474

Conclusion:

Average Power is less than or equal to 20mW with averaging time is 6 minutes in the frequency range 10 MHz to 10 GHz. This proves that the unit complies with the EN 62479 (2010) for RF power measurement.