

Test Report # 3526 G

Equipment Under Test: WGS100

Requirement(s): FCC Part 1.1307, 2.1093, RSS-102

Test Date(s): October 15th, 2021

Prepared for: Ivy Biomedical
Attn: Felicia Piel
11 Business Park Drive
Branford, CT 06405

Report Issued by: Zach Wilson, EMC Engineer

Signature: *Zach Wilson*

Date: 1/20/2022

Report Reviewed by: Adam Alger, Laboratory Manager

Signature: *Adam Alger*

Date: 1/20/2022

Report Constructed by: Zach Wilson, EMC Engineer

Signature: *Zach Wilson*

Date: 1/5/2022

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Report: TR3526 G		Model: 580076
Quote: NBO-01-2021-003089		Serial: OS21080008

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Laird Connectivity Test Services in Review

The Laird Connectivity LLC laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin, 53012 USA is recognized through the following organizations:



A2LA – American Association for Laboratory Accreditation

Accreditation based on ISO/IEC 17025:2017 with Electrical (EMC) Scope

A2LA Certificate Number: 1255.01

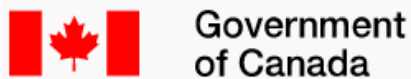
Scope of accreditation includes all test methods listed herein unless otherwise noted



Federal Communications Commission (FCC) – USA

Accredited Test Firm Registration Number: 953492

Recognition of two 3 meter Semi-Anechoic Chambers



Innovation, Science and Economic Development Canada

Accredited U.S. Identification Number: US0218

Recognition of two 3 meter Semi-Anechoic Chambers

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1 TEST REPORT SUMMARY

On **October 15th, 2021**, the Equipment Under Test (EUT), **WGS100**, as provided by **Ivy Biomedical** was evaluated to the following requirements the **Federal Communications Commission** and **Innovation, Science and Economic Development Canada**:

Portable Device

Requirement	Description	Method	Result
FCC Part 1.1307, 2.1093	RF Exposure and equipment authorization requirements	FCC KDB 447498	Reported
RSS-102	Radiofrequency Radiation Exposure Limits	RSS-102	Reported

Notice:

The results relate only to the item tested as configured and described in this report. Any additional configurations, modes of operation, or modifications made to the equipment under test after the specified test date(s) are at the decision of the client and may not apply to the data seen in this test report.

The decision rule for Pass / Fail assessment to the specification or standard listed in this test report has been agreed upon by the client and laboratory to be as follows:

Measurement Type	Rule
Emissions – Amplitude	1 dB below specified limit
Emissions – Frequency	1% less than the specification
Immunity	Tested at specified level

2 CLIENT INFORMATION

Company Name	Ivy Biomedical
Contact Person	Felicia Piel
Address	11 Business Park Drive Branford, CT 06405

2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

Product Name	WGS100
Model Number	580076
Serial Number	OS21080008
FCC ID	2A3IX-WGS100
ISED ID	27829-WGS100

2.2 Product Description

2.4 GHz Bluetooth Low Energy Module

2.3 Modifications Incorporated for Compliance

Not applicable to RF Exposure

2.4 Deviations and Exclusions from Test Specifications

None noted at time of test

2.5 Additional Information

Applicant Ivy Biomedical has filed for a change of ID and a class 2 permissive change to modify RF Exposure conditions from mobile classification conditions to portable.

3 REFERENCES

Publication	Edition	Date	AMD 1
eCFR	-	2022	-
KDB 447498 D01	06	2015	-
RSS-102	5	2015	2021

4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of $k = 2$.

References	Version / Date
CISPR 16-4-1	Ed. 2 (2009-02)
CISPR 16-4-2	Ed. 2 (2011-06)
CISPR 32	Ed. 1 (2012-01)
ANSI C63.23	2012
A2LA P103	February 4, 2016
A2LA P103c	August 10, 2015
ETSI TR 100-028	V1.3.1 (2001-03)

Measurement Type	Configuration	Uncertainty \pm
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

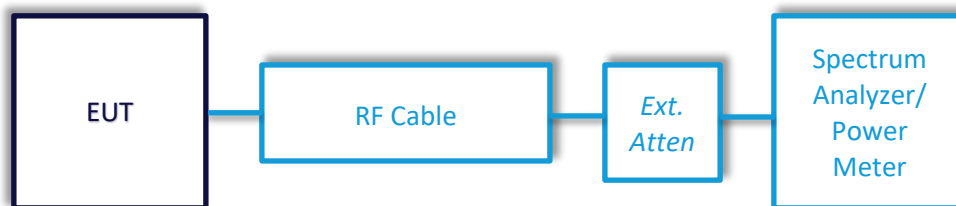
Parameter	ETSI U.C. \pm	U.C. \pm
Radio Frequency, from F0	1×10^{-7}	0.55×10^{-7}
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

5 TEST DATA

5.1 Antenna Port Conducted Emissions

Description of Measurement	<p>The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p>
Example Calculations	<p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>

Block Diagram



5.1.1 Antenna Port Conducted Emissions

Operator	Anthony Smith	QA	Zach Wilson
Temperature	20.1°C	R.H. %	51.4%
Test Date	10/15/2021	Location	Conducted RF Bench
Requirement	FCC 15.247	Method	ANSI C63.10

Test Parameters

Frequency	2402 MHz, 2440 MHz, 2480 MHz	Setup	Conducted
RBW	1 MHz	VBW	3 MHz
Detector(s)	Peak detector	Trace	Max Hold
Example Calculations	Output Power (mW) = $10^{(P/10)}$ *where P = power in dBm		

Instrumentation

Asset #	Description	Manufacturer	Model #	Serial #	Date	Due Date	Status
AA 960143	Cable	Gore	EKD01D01048.0	5546519	2/3/2021	2/3/2022	Active Verification
EE 960087	Analyzer - Spectrum	Agilent	N9010A	MY53400296	7/28/2021	7/28/2022	Active Calibration

EUT Parameters

Input Power	5VDC	Method	Conducted
Channels	0, 39, 79	Misc.	Modulated
Data Rates	125k, 500k, 1Mbps, 2Mbps	Mode	BLE Transmit

Data Table

Data Rate	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mw)
125k	2402	5.6	3.6
125k	2440	5.5	3.5
125k	2480	5.1	3.2
500k	2402	5.6	3.6
500k	2440	5.5	3.5
500k	2480	5.2	3.3
1Mbps	2402	6.1	4.1
1Mbps	2440	6.0	4.0
1Mbps	2480	5.8	3.8
2Mbps	2402	6.3	4.3
2Mbps	2440	6.2	4.2
2Mbps	2480	6.0	4.0

5.2 FCC RF Exposure Evaluation

Rated output power at 2.402 GHz + 1 dB Tune Up Tolerance: 7.3 dBm = 5.4 mW = 5 mW

For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})]^*$

$[\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, where $f(\text{GHz})$ is the RF channel transmit frequency in GHz

$$[5 / 5]^* [\sqrt{2.402}] = 1.5 < 3.0$$

At the minimum separation distance of 5 mm the numeric threshold of 1.5 is less than 3.0 therefore SAR test is not required.

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5.3 ISED RF Exposure Routine Evaluation

Rated output power at 2.402 GHz = 6.3 dBm

Tune up tolerance = 1.0 dB

Antenna gain = 2.0 dBi

EIRP = 9.3 dBm = 8.5 mW = 9 mW

SAR evaluation — Exemption limits for routine evaluation based on frequency and separation distance ^{4,5}					
Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

Interpolated Exemption Limit @ 2402 MHz and 15mm = 15.2 mW

At the minimum separation distance of 15 mm the power of 9.0 mW is less than 15.2 mW, therefore SAR test is not required.

6 REVISION HISTORY

Version	Date	Notes	Person
0	1/5/2022	Initial Draft	Zach Wilson
1	1/19/2022	Revised per TCB review	Zach Wilson

END OF REPORT