TEST REPORT

(FULL COMPLIANCE)

Report Number: 104106572MPK-003
Project Number: G104106572

Report Issue Date: February 20, 2020
Revision Issue Date: November 23, 2021

Product Designation: Implant Charger
Model Tested: 31102

Standards: FCC Part 18

for

Galvani Bioelectronics

Tested by:
Intertek
1365 Adams Court
Menlo Park, CA 94025 USA

Client:
Galvani Bioelectronics
269 E Grand Ave
South San Francisco, CA 94080 USA

Report prepared by

Aaron Chang / EMC Project Engineer

Report reviewed by

Krishna Vemuri / EMC Manager

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1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested.

2 Executive Test Plan and Test Summary

Tests were performed to the following standards: FCC Part 18:

Radiated Emissions
ANSI C63.4: 2014, FCC MP-5

AC Mains Conducted Emissions
ANSI C63.4: 2014, FCC MP-5

Test Plan

The EUT shall be tested according to the table below:

FCC Part 18 Emissions Test Requirements Proposed Tests		
FCC Part 18 Subpart C	Radiated Emission, 9 kHz – 400 MHz	Normal @ 120V 60Hz
FCC Part 18 Subpart C	Conducted Emission, 150 kHz – 30 MHz	Not Applicable[1]

[1]The EUT transmits only in battery mode.

Test Summary

Test Description	Reference FCC	Pass/Fail Comments
Radiated Emissions		
FCC Part 18 Subpart C	18.305	Complies
Conducted Emissions (AC Mains)		
FCC Part 18 Subpart C	18.307	Not Applicable[1]

[1]The EUT transmits only in battery mode.

3 Client Information, Environmental Conditions, Performance Level

This EUT was tested at the request of:

Client: Galvani Bioelectronics
269 E Grand Ave
South San Francisco, CA 94080 USA

Contact: Rizwan Bashirullah
Telephone: (919) 696-1039
Email: Rizwan.x.bashirullah@galvani.bio

4 Description of Equipment Under Test and Variant Models

Equipment Under Test			
Description	**Manufacturer**	**Model Number**	**Serial Number**
Implant Charger	Galvani Bioelectronics	31102	00000117

Receive Date:	January 13, 2019	**Test Started:**	January 21, 2019
Received Condition:	Good	**Test Completed:**	January 29, 2019
Type:	Production		

Description of Equipment Under Test (provided by client)
The Implant Charger is a wireless charger to charge the Implantable Pulse Generator (IPG). It only wirelessly charges in battery mode.

Equipment Under Test Power Configuration			
Rated Voltage	**Rated Current**	**Rated Frequency**	**Number of Phases**
$3.8V_{DC}$	395mA	N/A	N/A

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	The Implant Charger was transmitting at 6.78 MHz.

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

Not Applicable.

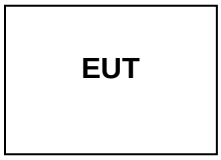
5 System Setup and Method

No Support Equipment was used.

5.1 Method:

Configuration as required by ANSI C63.4, FCC MP-5.

5.2 System Block Diagram



5.3 Justification:

The EUT was configured in Table-Top configuration for testing, as specified by Galvani Bioelectronics.

5.4 Software Exercise Program:

The test mode firmware version 01.13.30 was used during testing. This information was provided by Galvani Bioelectronics.

5.5 Modifications Required for Compliance:

No modifications were installed by Intertek Testing Services during compliance testing in order to bring the product into compliance.

6 FCC Part 18

6.1 Electromagnetic Radiated Disturbance

6.1.1 Test Limits

FCC Part 18

Table 8-1a Limits for Electromagnetic Radiated Disturbance for FCC Part 18

Equipment	Operating Frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25xSQRT(power/500)	300 [1]300
	Any non-ISM Frequency	Below 500 500 or more	15 15xSQRT(power/500)	300 [1]300
Industrial heaters and RF stabilized arc welders	On or below 5,725 MHz Above 5,725 MHz	Any Any	10 ([2])	1600 ([2])
Medical diathermy	Any ISM frequency Any non-ISM frequency	Any Any	25 15	300 300
Ultrasonic	Below 490 kHz	Below 500 500 or more	2,400/F(kHz) 2,400/F(kHz)xSQRT (power/500)	300 [3]300
	490 to 1,600 kHz Above 1,600 kHz	Any Any	24,000/F(kHz) 15	30 30
Induction cooking ranges	Below 90 khz On or above 90 kHz	Any Any	1,500 300	[4]30 [4]30

[1]Field strength may not exceed 10 uV/m at 1600 meters. Consumer equipment operating below 1000 MHz is not permitted the increase in field strength otherwise permitted here for power over 500 watts.

[2]Reduced to the greatest extent possible.

[3]Field strength may not exceed 10 uV/m at 1600 meters. Consumer equipment is not permitted the increase in field strength otherwise permitted here for over 500 watts.

[4]Induction cooking ranges manufactured prior to February 1, 1980, shall be subject to the field strength limits for miscellaneous ISM equipment.

6.1.2 Test Procedure

Measurements are conducted with a quasi-peak detector instrument in the frequency range of 9 kHz to 1000 MHz. The measuring receiver meets the requirements of Section One of CISPR 16 and the measuring antenna correlates to a balanced dipole.

Measurements of the radiated field are made with the antenna located at a distance of 10 meter from the EUT for 150kHz to 30MHz and 10 meter for 30 to 1000MHz. If the field-strength measurements at 10m cannot be made because of high ambient noise level or for other reasons, measurements may be made at a closer distance, for example 1m. An appropriate distance correction factor (DCF) should be used to normalize the measured data to the specified distance for determining compliance.

The antenna-to-EUT azimuth is varied during the measurement to find the maximum field-strength readings by rotating the turntable.

The antenna-to-EUT polarization (Parallel and Perpendicular) is varied during the measurements to find the maximum field-strength readings.

Equipment setup for radiated disturbance tests followed the guidelines of MP-5.

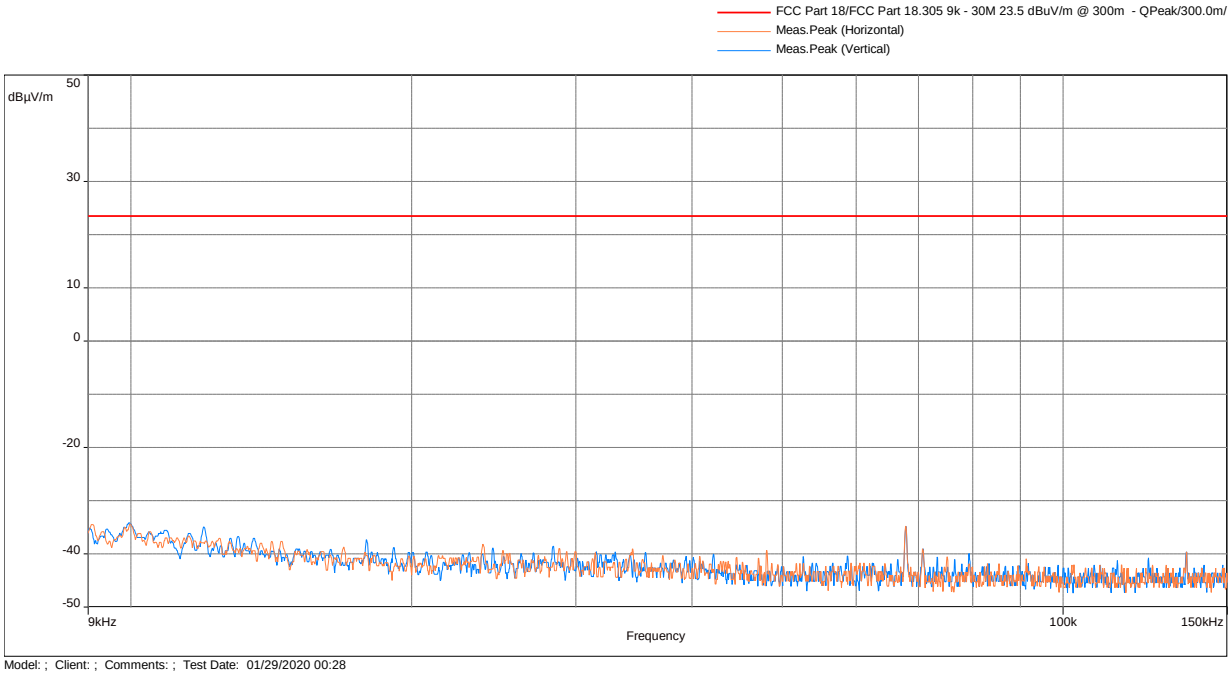
Tested By:	Aaron Chang
Test Date:	January 21 & 29, 2020

17.9°C, 55.5% RH, 29.3inHg

6.1.3 Test Results

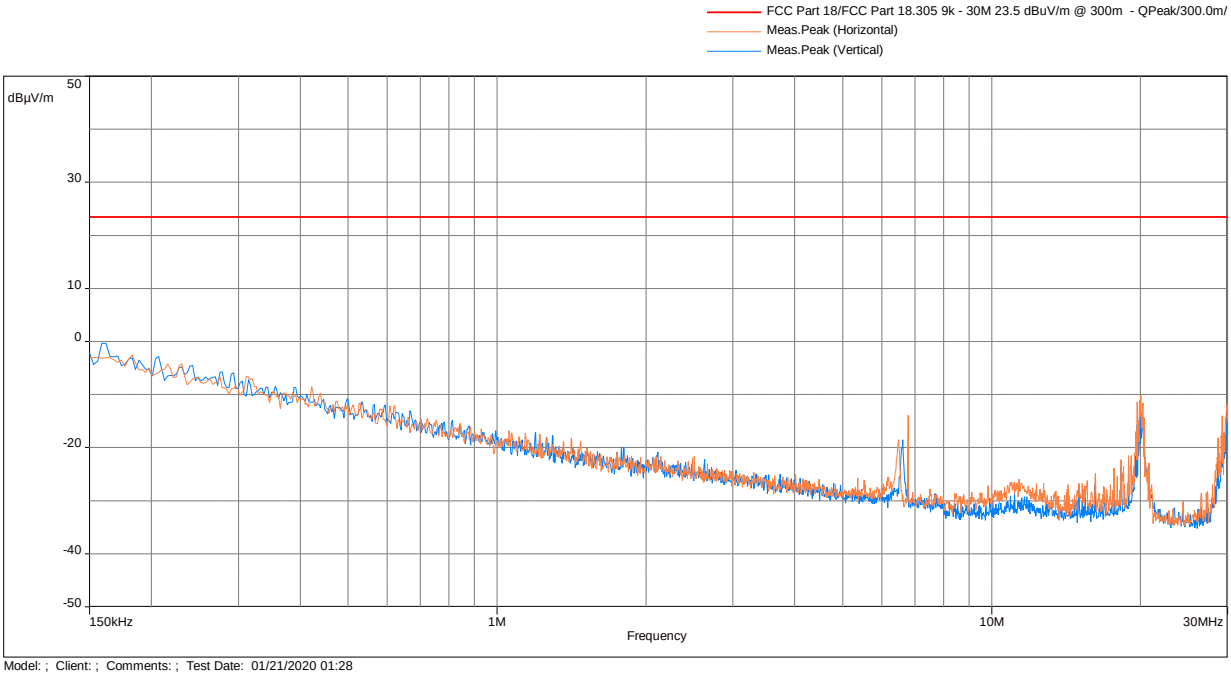
FCC Part 18 Radiated Disturbances

Radiated Spurious Emissions 9 - 150 kHz, Peak Scan vs QP Limit



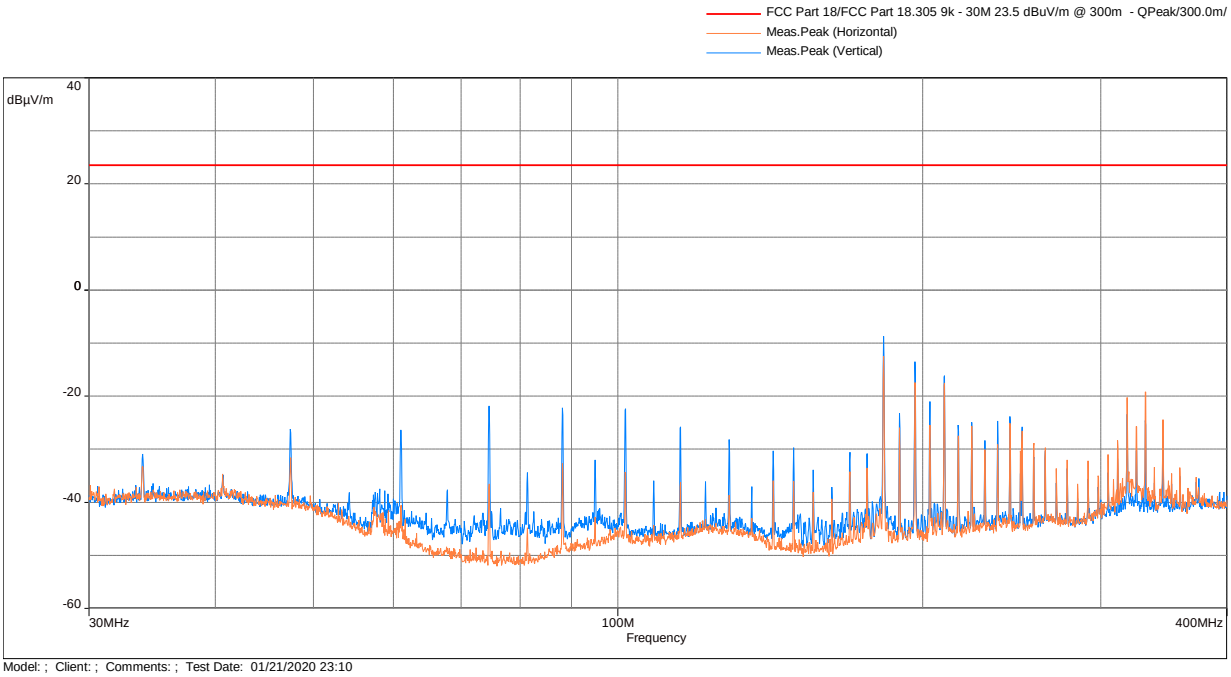
Model: ; Client: ; Comments: ; Test Date: 01/29/2020 00:28

Radiated Spurious Emissions 150 kHz – 30 MHz, Peak Scan vs QP Limit



Model: ; Client: ; Comments: ; Test Date: 01/21/2020 01:28

Radiated Spurious Emissions 30 - 400 MHz, Peak Scan vs QP Limit



DCF: Distance Correction Factor to normalize from 10m to 300m

Note 1: The RF frequency for the Implant Charger is 6.78 MHz. The RF power generated is less than 500W therefore the limit chosen is 15uV (23.5dBuV/m).

Note 2: The EUT was tested in X,Y and Z orientation. The worst-case data is presented.

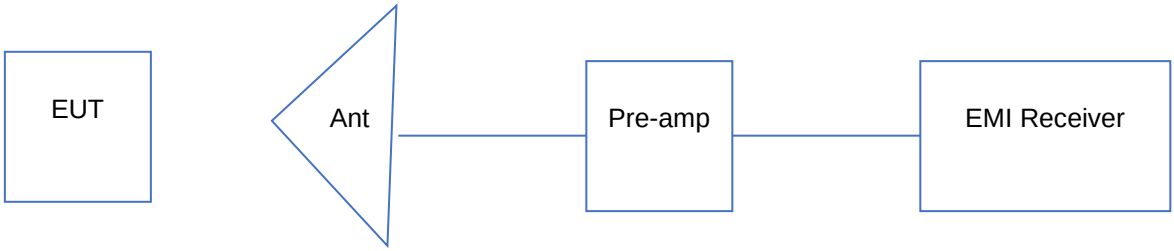
Frequency MHz	QP@10m dB(µV/m)	Limit@10m dB(µV/m)	Margin (dB)	Height (m)	Angle (°)	Polarization	Correction (dB)
6.780	-13.91	23.5	-37.41	1	225.5	Horizontal	14.47
20.015	-10.08	23.5	-33.58	1	286.25	Horizontal	14.89
29.910	-11.87	23.5	-35.37	1	122.75	Horizontal	13.21
183.069	-12.43	23.5	-35.93	3.98	258.25	Horizontal	-14.89
183.069	-8.69	23.5	-32.19	1	119.75	Vertical	-14.89
196.574	-14.68	23.5	-38.18	1	160.5	Vertical	-14.31
196.611	-17.38	23.5	-40.88	3.98	62.5	Horizontal	-14.31
210.215	-16.71	23.5	-40.21	1	156.75	Vertical	-13.66

Note: The “Correction” column contains factors for cable, antenna, preamp and distance correction factor (DCF). DCF is calculated by 20log(10/300) = -29.5dB.

Result: **Complies** by 8.69dB

6.1.4 Test Configuration Photograph

The following photographs show the testing configurations used.



Electromagnetic Radiated Disturbance Setup Photograph

6.2 AC Mains Line-Conducted Disturbance

6.2.1 Test Limits

FCC Part 18

For the following equipment, when designed to be connected to the public utility (AC) power line the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies shall not exceed the limits in the following tables. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal using a 50 µH/50 ohms line impedance stabilization network (LISN).

Table 8-2a Limits for Conducted Disturbance at the Mains Ports for all Induction cooking ranges and ultrasonic equipment:

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-Peak	Average
0.009-0.05	110	--
0.05-0.15	90-80*	--
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

**Decreases with the logarithm of the frequency.*

Table 8-2b Limits for Conducted Disturbance at the Mains Ports for all other part 18 consumer devices:

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

**Decreases with the logarithm of the frequency.*

Table 8-2c Limits for Conducted Disturbance at the Mains Ports for RF lighting devices:

Frequency (MHz)	Maximum RF line voltage measured with a 50 uH/50 ohm LISN (uV)
Non-consumer equipment:	
0.45 to 1.6	1,000
1.6 to 30	3,000
Consumer equipment:	
0.45 to 2.51	250
2.51 to 3.0	3,000
3.0 to 30	250

Test Procedure

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUTs are placed on a horizontal metal ground plane and isolated from the ground plane by 3 to 12 mm of insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

Equipment setup for conducted disturbance tests followed the guidelines of FCC-MP5.

6.2.2 Test Results

Not Applicable. The EUT transmits in battery mode only.

7 List of Test Equipment

Equipment	Manufacturer	Model/Type	Asset #	Cal Int	Cal Due
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	11/07/20
BI-Log Antenna	Antenna Research	LPB-2513/A	ITS 00355	12	04/24/20
Pre-Amplifier	Sonoma Instrument	310N	ITS 00415	12	04/17/20
Passive Loop Antenna	EMCO	6512	ITS 01598	12	10/22/20

8 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
1	February 20, 2020	104106572MPK-003	AC	KV	Original Issue
2	November 11, 2021	104106572MPK-003	AC	KV	Updated report with test mode firmware version.
2	November 23, 2021	104106572MPK-003	AC	KV	Updated section 6.1.3 with distance correction factor (DCF).