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MEASUREMENT REPORT
FCC Part 15C Wireless Power Transfer

Applicant Name:
SetPoint Medical
25101 Rye Canyon Loop
Valencia, CA 91355

Date of Testing:
06/13/2024
Test Report Issue Date:
10/03/2024
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2406050045-02.2BG3Y

FCC ID:	**2BG3YE04**
APPLICANT:	**SetPoint Medical**

Application Type:	Certification
Model:	20067-03
EUT Type:	Charger
Frequency Range:	127.6 – 134.4kHz
FCC Classification:	Part 15 Low Power Transmitter Below 1705kHz (DCD)
FCC Rule Part(s):	Part 15 Subpart C
Test Procedure(s):	ANSI C63.10-2013

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and has been tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez Executive Vice President

ACCREDITED
CERT #2041.01

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and Innovation, Science and Economic Development Canada.

1.2 Element Test Location

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.

- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreements (MRAs).

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **SetPoint Medical Charger FCC ID: 2BG3YE04**. The test data contained in this report pertains only to the emissions due to the wireless power transfer circuitry of the EUT. This device also contains an integrated Bluetooth LE module (FCC ID: S9NSPBTLE1S). The emissions data from the Bluetooth LE module is also included in a separate report.

To assess compliance to the AC line conducted emissions requirements under FCC Part 15.207, a docking station (certified under FCC ID: 2BG3YC01) is used for testing of this EUT.

Test Device Serial No.: E04-002671
Docking Station Serial No.: C01-002781

2.2 Device Capabilities

This device contains the following capabilities:

Wireless Power Transfer (127.6 – 134.4kHz)

2.3 Test Configuration

The EUT was connected to a configuration application installed on an iPad device. In the application, the EUT was configured to its maximum output power for both the inductive radio and the BLE module. The BLE radio was set to an output of +4dBm. The iPad application remained connected during the spurious emissions measurements. The EUT was placed on a docking station on the test tabletop and arranged in a typical configuration in accordance with ANSI C63.10-2013.

The test configurations are further described in the SetPoint PD-00902 rev A DVeP, Externals, FCC Emissions document

For more information, please see Section 8.0 for test data and the test setup photos document for the test setup photographs.

2.4 Software and Firmware

The test was conducted with software/firmware version v.2.0.66 installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedure described in the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices (ANSI C63.10-2013) was used in the measurement of the EUT**.**

Deviation from measurement procedure…….....None

3.2 AC Line Conducted Emissions

The line-conducted facility is located inside a 10'x16'x9' shielded enclosure. The shielded enclosure is manufactured by ETS Lindgren RF Enclosures. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-5. A 1m x 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50μH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. The external power line filter is an ETS Lindgren Model LPRX-4X30 (100dB Attenuation, 14kHz-18GHz) and the two EMI/RFI filters are ETS Lindgren Model LRW-2030-S1 (100dB Minimum Insertion Loss, 14kHz – 10GHz). These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

Line conducted emissions test results are shown in Section 7.4. The EMI Receiver mode of the Agilent MXE was used to perform AC line conducted emissions testing.

3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Clause 5, Figure 5.7 of ANSI C63.4-2014. A raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. . An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 474788 D01 v01r01.

3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

4.0 ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:
"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the EUT are **permanently attached.**
- This unit was tested with its standard battery.

Conclusion:

The EUT complies with the requirement of §15.203.

5.0 SAMPLE CALCULATIONS

5.1 Conducted Emission Measurement Sample Calculation

@ 20.3 MHz

Class B limit	**= 60.0 dBµV (Quasi-peak limit)**
Reading	= - 57.8 dBm (calibrated quasi-peak level)
Convert to dBµV	= - 57.8 + 107 = 49.2 dBµV
Margin	= 49.2 - 60.0 = - 10.8 dB
	= **10.8 dB below limit**

5.2 Radiated Emission Measurement Sample Calculation

@ 66.7 MHz

Class B limit	**= 100 µV/m = 40.0 dBµV/m**
Reading	= - 76.0 dBm (calibrated level)
Convert to dBµV	= - 76.0 + 107 = 31.0 dBµV
Antenna Factor + Cable Loss	= 5.8 dB/m
Total	= 36.8 dBµV/m
Margin	= 36.8 - 40.0 = - 3.2 dB
	= **3.2 dB below limit**

Note:

Level [dBµV] = 20 log $_{10}$ (Level [µV/m])

Level [dBµV] = Level [dBm] + 107

6.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Disturbance	3.09
Radiated Disturbance (<1GHz)	4.98

7.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Com-Power	AL-130R	9kHz - 30MHz Loop Antenna	2/22/2024	Biennial	2/22/2026	121085
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	9/25/2023	Annual	9/25/2024	100342
ETS-Lindgren	3816/2NM	LISN	8/11/2022	Biennial	8/11/2024	00114451
Keysight Technologies	N9030A	MXE EMI Receiver	8/30.2023	Annual	8/30/2024	MY51210133

Table 7-1. Annual Test Equipment Calibration Schedule

8.0 TEST DATA

8.1 Summary

Company Name: SetPoint Medical

FCC ID: 2BG3YE04

FCC Classification: Part 15 Low Power Transmitter Below 1705kHz (DCD)

Frequency Range: 127.6 – 134.4kHz

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.209	Out-of-Band Emissions	Emissions must meet the radiated limits detailed in 15.209	RADIATED	PASS	Section 8.3
15.207	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 8.4

Table 8-1. Summary of Test Results

8.2 Test Support Equipment

SetPoint Coil Spacer (shim)	Part Number:	80481-01	S/N:	N/A
Docking Station	Model Number:	20087-03	S/N:	C01-002781

Table 8-2. Test Support Equipment Used

Note: See test setup photographs for actual system test setup.

8.3 Radiated Measurement Data

§15.209

Test Overview and Limit

The EUT was tested from 9kHz up to 30MHz. All measurements up to 30MHz were recorded with a spectrum analyzer employing a quasi-peak detector.

All out of band emissions must not exceed the limits shown in Table 8-3 per Section 15.209.

Frequency	Field Strength [µV/m]	Measured Distance [Meters]
0.009 – 0.490 MHz	2400/F (kHz)	300
0.490 – 1.705 MHz	24000/F (kHz)	30
1.705 – 30.00 MHz	30	30
30.00 – 88.00 MHz	100	3
88.00 – 216.0 MHz	150	3
216.0 – 960.0 MHz	200	3
Above 960.0 MHz	500	3

Table 8-3. Radiated Limits – Out of band

Test Procedures Used

ANSI C63.10-2013 – Section 6.5.4

Test Settings

Quasi-Peak Field Strength Measurements

1. Analyzer frequency set to the frequency of the radiated spurious emission of interest
2. RBW = 9kHz for emissions below 30MHz
3. VBW = ≥ 3 x RBW
4. Detector = Peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

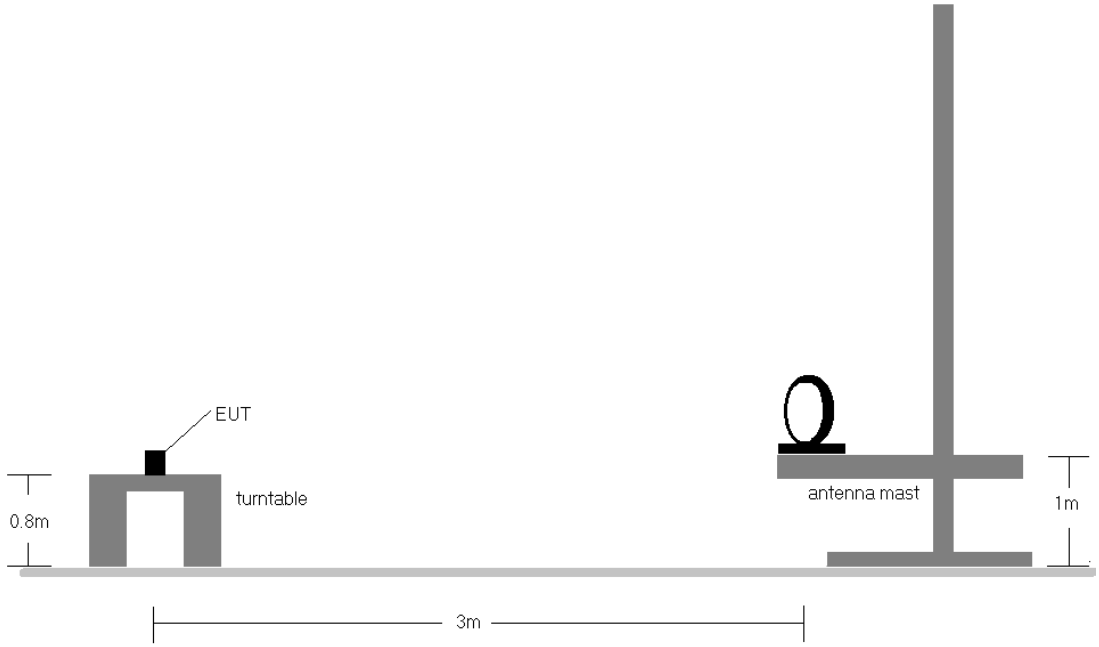
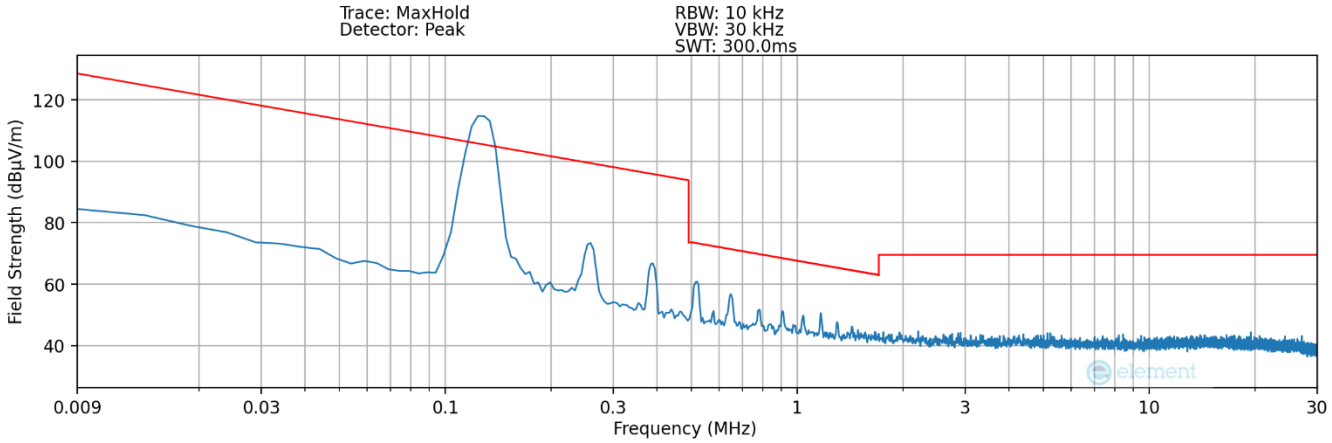


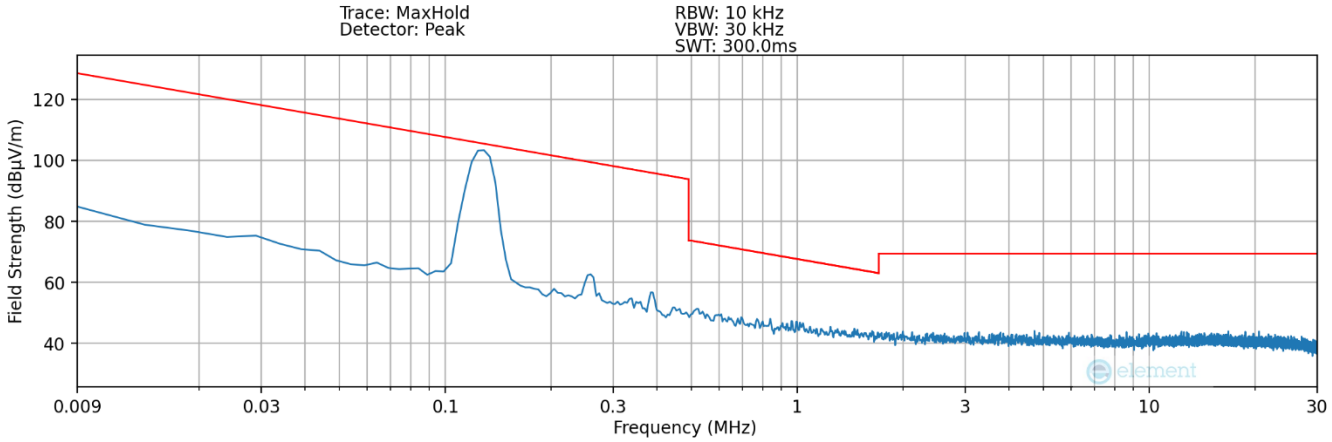
Figure 8-1. Radiated Test Setup < 30MHz

1. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector for emissions below 30MHz.
2. A loop antenna was used to investigate emissions below 30MHz.
3. Below 30MHz the loop antenna was positioned in 3 orthogonal planes (X front, Y side, Z top) to determine the orientation resulting in the worst case emissions.
4. The EUT was positioned in three orthogonal planes to determine the orientation resulting in the worst case emissions.
5. The spectrum is investigated from 9kHz up to 30MHz per §15.33. The worst-case emissions are reported.
6. No spurious emissions levels were found to be greater than the level of the fundamental.
7. The "-" shown in the following RSE tables are used to denote a noise floor measurement.
8. The provisions of 15.31(f)(2) are applied to use two measurement points at different distances (1m and 3m) from the EUT to calculate an appropriate distance correction factor to the distance required by the 15.209 requirements.
9. In the following pre-scan plots, a RBW of 10kHz was used to reduce the testing time. It's noted that official measurements below 150kHz are performed using RBW = 200Hz. As such, radiated band edge measurements were not performed at 110kHz for the fundamental emissions shown in the following plots since the edge of the emission would not be near the band edge when using RBW = 200Hz.

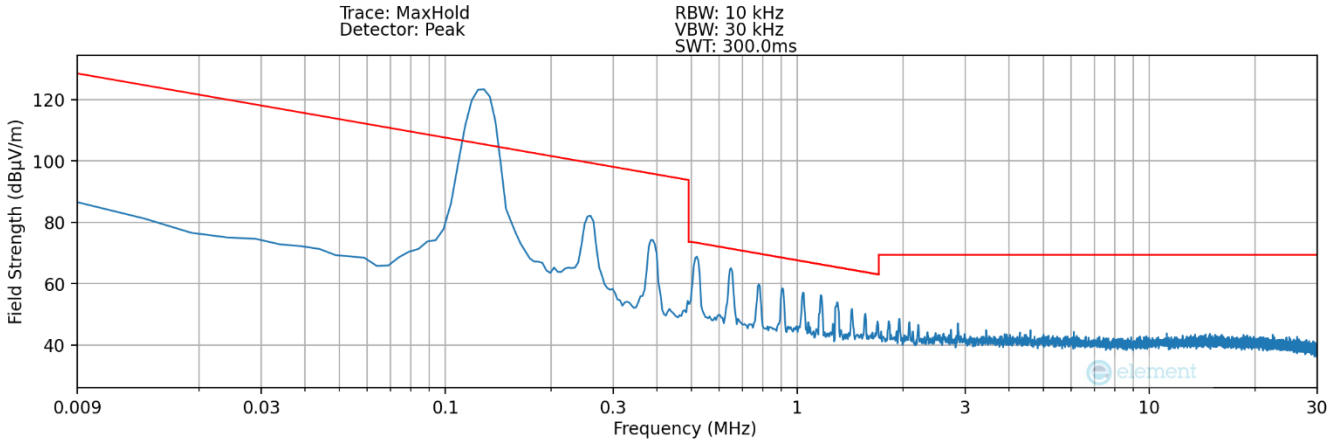
Radiated Spurious Emission Measurements, Out-of-Band, Wireless Power Transfer
§15.209



Plot 8-1. Radiated Spurious Plot 9kHz – 30MHz (Pol. X)



Plot 8-2. Radiated Spurious Plot 9kHz – 30MHz (Pol. Y)



Plot 8-3. Radiated Spurious Plot 9kHz – 30MHz (Pol. Z)

Distance Correction Factor Calculation

The distance correction factor is only applied for the fundamental transmission frequency of 129kHz. The calculation is based on the guidance in Section 6.4.4.4 in ANSI C63.10-2013 with measurements performed at 1m and 3m as shown below:

Frequency	λ/2π	Test Distance	Adjusted Level (without distance correction)	Extrapolation Factor	Test Distance of Spec. Limit
(MHz)	(m)	(meters)	(dBuV/m)	(dB / decade)	(meters)
0.129	370.3	1	134.8	56.1	300.0
0.129	370.3	3	108.0		

Table 8-4. Distance Correction Factor Extrapolation

Notes:

1. Per the guidance of Section 6.4.4.4 of ANSI C63.10-2013, the extrapolation factor is determined based on the following formula:

$$N = 20\frac{\log(E_1/E_2)}{\log(d_1/d_2)}$$

where

E_1 is the field strength at the measurement distance closest to the radiating source, expressed in μV/m

E_2 is the field strength at the measurement distance farthest from the radiating source, expressed in μV/m

d_1 is the measurement distance closest to the radiating source

d_2 is the measurement distance farthest from the radiating source

N is the distance extrapolation factor in dB/decade of distance. The field strength at the limit distance shall then be calculated using the methods and formula described in 6.4.4.7.

2. The calculated 56.1dB/decade extrapolation factor is applied to the fundamental emission at 129kHz to correct the field strength out to the appropriate distance of 300m (two decades).
3. All other emissions shown in the table above use the standard 40dB/decade distance correction factor as allowed per 15.31(f)(2) of the FCC rules.

Tx Frequency 129kHz

Measurement Distance: 3 Meters

Frequency [MHz]	Ant. Pol. [X/Y/Z]	Antenna Height [cm]	Turntable Azimuth [degree]	Level [dBm]	AFCL [dB/m]	3m Field Strength [dBµV/m]	Distance Correction Factor [dB]	Corrected Field Strength [dBµV/m]	Limit [µV/m]	Limit [dBµV/m]	Margin [dB]
0.129	Z	100	255	-12.86	13.86	108.00	112.20	-4.20	18.61	25.40	-29.60
0.259	Z	100	255	-38.40	13.88	82.48	80.00	2.48	9.27	19.34	-16.86
0.389	Z	100	255	-46.22	13.89	74.67	80.00	-5.33	6.17	15.81	-21.14
0.519	Z	100	255	-52.71	14.09	68.38	80.00	-11.62	4.63	13.30	-24.92
0.649	Z	100	255	-56.05	14.10	65.05	80.00	-14.95	3.70	11.36	-26.31

Table 8-5. Radiated Measurements

8.4 Line Conducted Measurement Data

§15.207

Test Overview and Limit

All AC line conducted spurious emissions are measured with a receiver connected to a grounded LISN while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates and modes were investigated for conducted spurious emissions. Only the conducted emissions of the configuration that produced the worst case emissions are reported in this section.

All conducted emissions must not exceed the limits shown in the table below per FCC Part 15.207.

Frequency of emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

Table 8-6. Conducted Limits

*Decreases with the logarithm of the frequency.

Test Procedures Used

ANSI C63.10-2013, Section 6.2

Test Settings

Quasi-Peak Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = quasi-peak
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

Average Field Strength Measurements

1. Analyzer center frequency was set to the frequency of the spurious emission of interest
2. RBW = 9kHz (for emissions from 150kHz – 30MHz)
3. Detector = RMS
4. Sweep time = auto couple
5. Trace mode = max hold
6. Trace was allowed to stabilize

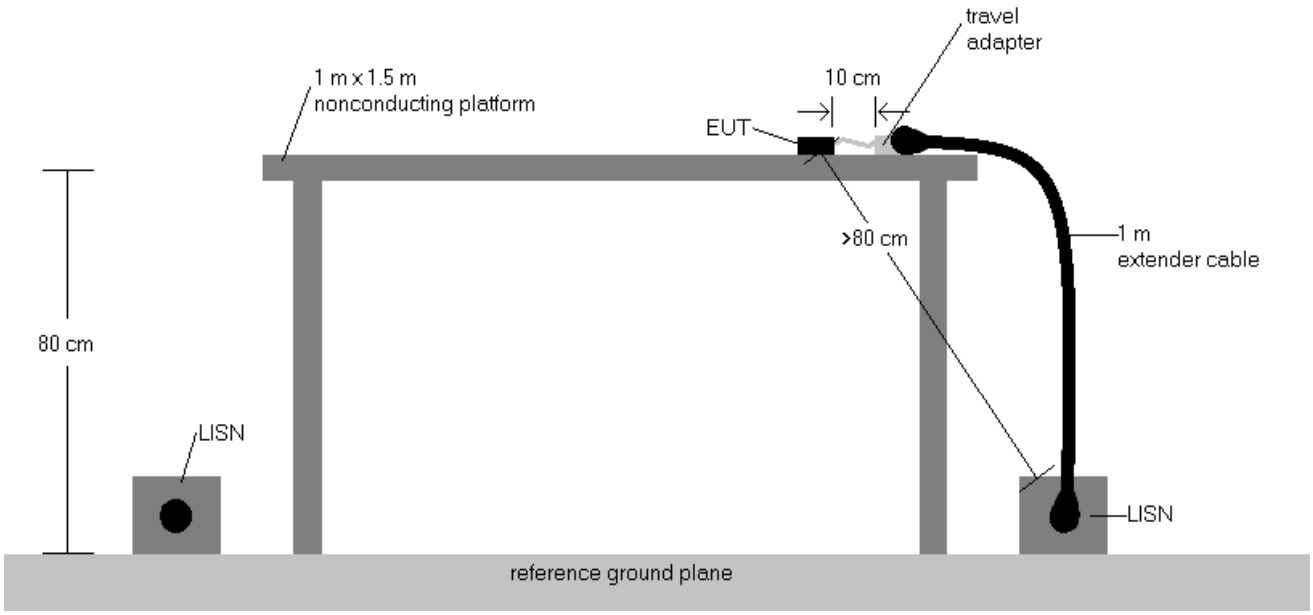


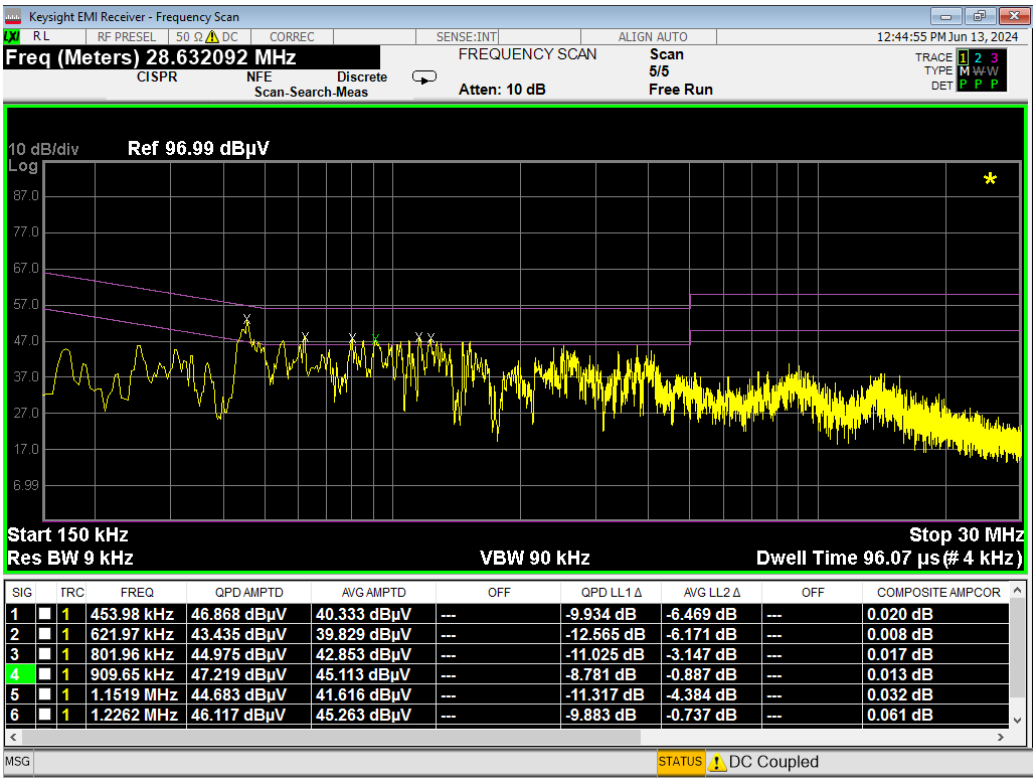
Figure 8-2. Test Instrument & Measurement Setup

Test Setup

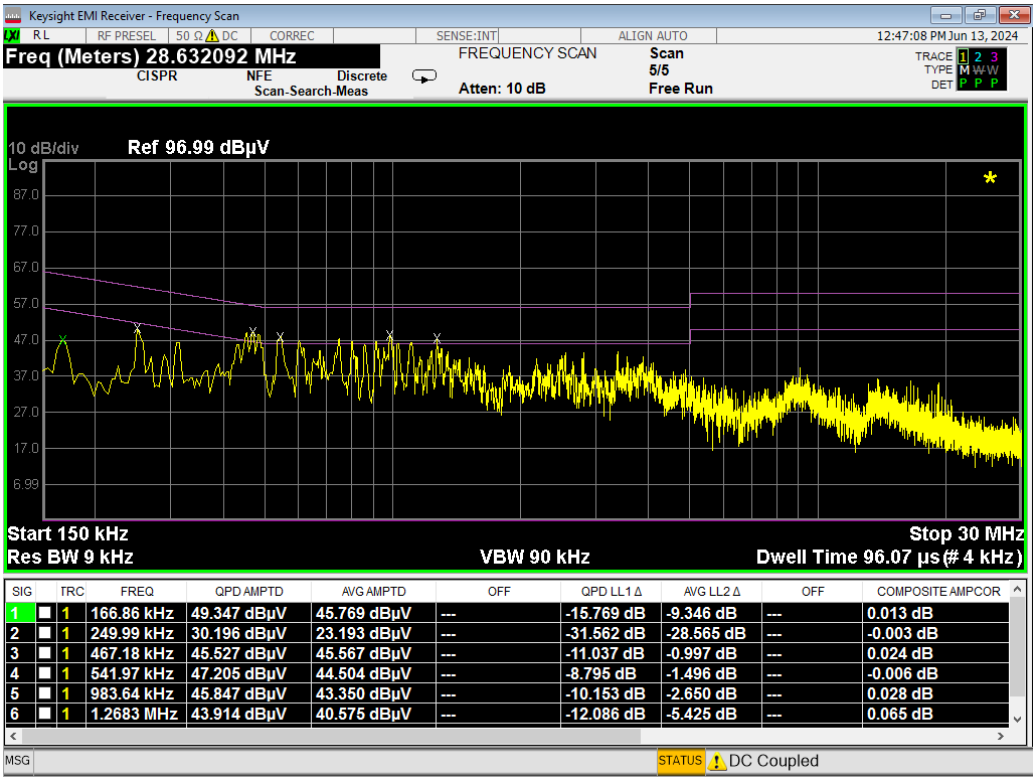
The EUT and measurement equipment were set up as shown in the test setup photos provided. The charger was placed on a docking station since it cannot connect directly to the AC Mains.

Test Notes

1. All modes of operation were investigated and the worst-case emissions are reported using mid channel. The emissions found were not affected by the choice of channel used during testing.
2. The limit for an intentional radiator from 150kHz to 30MHz are specified in 15.207 and RSS-Gen (8.8).
3. Corr. (dB) = Cable loss (dB) + LISN insertion factor (dB)
4. QP/AV Level (dBμV) = QP/AV Analyzer/Receiver Level (dBμV) + Corr. (dB)
5. Margin (dB) = QP/AV Limit (dBμV) - QP/AV Level (dBμV)
6. Traces shown in plot are made using a peak detector.
7. Deviations to the Specifications: None.



Plot 8-4. Line Conducted Plot (L1)



Plot 8-5. Line Conducted Plot (N)

9.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **SetPoint Medical Charger FCC ID: 2GB3YE04** has been tested to comply with the requirements specified in Part 15 (§15.207 and §15.209) of the FCC rules.