FCC PART 15, SUBPART B and C; FCC Section 15.249; and RSS-210 & RSS-GEN TEST REPORT

for

HINGE SENSOR

Model: H3

Prepared for

HINGE HEALTH, INC.
465 CALIFORNIA STREET, FLOOR 14
SAN FRANCISCO, CALIFORNIA 94104

Prepared by:_____

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JANUARY 28, 2020

	REPORT BODY	APPENDICES					TOTAL
		A	***B***	***C***	***D***	***E***	
PAGES	24	2	2	2	19	48	**97**

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TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

The client must not use this report to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the U.S. government.

Device Tested: Hinge Sensor
Model: H3
S/N: N/A

Product Description: The EUT is a wearable sensor that utilizes a BLE Radio.

Modifications: The EUT was not modified to meet the specifications.

Customer: Hinge Health, Inc.
456 California Street, Floor 14
San Francisco, California 94104

Test Dates: July 27, 2020; July 28, 2020; July 29, 2020; and December 18, 2020

Test Specifications covered by accreditation:

Test Specifications: Emissions requirements
CFR Title 47, Part 15, Subpart B;
CFR Title 47, Part 15, Subpart C, Sections 15.209 and 15.249;
and RSS-210 and RSS-Gen

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Test Procedures: ANSI C63.4: 2014 and ANSI C63.10: 2013

Test Deviations: The test procedure was not deviated from during the testing.

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	The EUT complies with the limits of CFR Title 47, Part 15 Subpart B, Section 15.107, Class B; CFR Title 47, Part 15, Subpart C, Sections 15.207; and RSS-Gen See section 6.3 for Measurement Uncertainty
2	Spurious Radiated RF Emissions, 30 MHz – 1000 MHz	The EUT complies with the limits of CFR Title 47, Part 15 Subpart B, Section 15.109, Class B; CFR Title 47, Part 15, Subpart C, Sections 15.209 and 15.249;and RSS-210 and RSS-Gen See section 6.3 for Measurement Uncertainty
3	Spurious Radiated RF Emissions, 9 kHz –30 MHz and 1000 MHz – 25000 MHz	The EUT complies with the limits of CFR Title 47, Part 15, Subpart B, Section 15.109, Class B; CFR Title 47, Part 15, Subpart C, Sections 15.209 and 15.249; and RSS-210 and RSS-Gen See section 6.3 for Measurement Uncertainty

1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the Hinge Sensor, Model: H3. The emissions measurements were performed according to the measurement procedure described in ANSI C63.4 and ANSI C63.10. The tests were performed to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the specification limits defined by CFR Title 47, Part 15 Subpart B, Sections 15.107 Class B and 15.109 Class B; CFR Title 47, Part 15, Subpart C, Sections 15.207, 15.209 and 15.249; and RSS-210 and RSS-Gen.

1.1 Decision Rule & Risk

If a measured value exceeds a specification limit it implies non-compliance. If the value is below a specification limit it implies compliance. Measurement uncertainty of the laboratory is reported with all measurement results but generally not taken into consideration unless a standard, rule or law requires it to be considered.

Qualification test reports are only produced for products that are in compliance with the test requirements, therefore results are always in conformity. Otherwise, an engineering report or just the data is provided to the customer.

When performing a measurement and making a statement of conformity, in or out-of-specification to manufacturer's specifications or Pass/Fail against a requirement, there are two possible outcomes:

- The result is reported as conforming with the specification
- The result is reported as not conforming with the specification

The decision rule is defined below.

When the test result is found to be below the limit but within our measurement uncertainty of the limit, it is our policy that the final acceptance decision is left to the customer, after discussing the implications and potential risks of the decision.

When the test result is found to be exactly on the specification, it is our policy, in the case of unwanted emissions measurements to consider the result non-compliant, however, the final decision is left to the customer, after discussing the implications and potential risks of the decision.

When the test result is found to be over the specification limit under any condition, it is our policy to consider the result non-compliant.

In terms of uncertainty of measurement, the laboratory is a calibrated and tightly controlled environment and generally exceptionally stable, the measurement uncertainties are evaluated without the considering of the test sample. When it comes to the test sample however, as most testing is performed on a single sample rather than a sample population, and that sample is often a pre-production representation of the final product, that test sample represents a significantly higher source of measurement uncertainty. We advise our customers of this and that when in doubt (small test to limit margins), they may wish to perform statistical sampling on a population to gain a higher confidence in the results. All lab reported results are that of a single sample in any event.

2. ADMINISTRATIVE DATA

2.1 Location of Testing

The emissions tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

2.3 Cognizant Personnel

Hinge Health, Inc.

Simon Hunter Vice President of Product

Compatible Electronics Inc.

Kyle Fujimoto Test Engineer
James Ross Test Engineer

2.4 Date Test Sample was Received

The test sample was received on July 27, 2020. Received as described in product description.

2.5 Disposition of the Test Sample

The test sample has not been returned to Hinge Health, Inc. as of the date of this test report.

2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Model
S/N	Serial Number
ITE	Information Technology Equipment
DoC	Declaration of Conformity
N/A	Not Applicable
Tx	Transmit
Rx	Receive
Inc.	Incorporated
RF	Radio Frequency
CFR	Code of Federal Regulations
FCC	Federal Communications Commission

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this emission Test Report.

SPEC	TITLE
CFR Title 47, Part 15 Subpart C	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
CFR Title 47, Part 15 Subpart B	FCC Rules – Radio frequency devices (including digital devices) – Unintentional Radiators
RSS-210, Issue 10: December 2019	Licence-Exempt Radio Apparatus: Category I Equipment
RSS-Gen, Issue 5: March 2019 + Amendment 1	General Requirements for Compliance of Radio Apparatus
ANSI C63.4: 2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10: 2013	American National Standard of procedure for compliance testing of unlicensed wireless devices

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – Emissions

The Hinge Sensor, Model: H3 (EUT) was fully tested in two modes of operation. See below:

AC Mode

The EUT was connected to a junction box via its mini USB port. The junction box was also connected to an AC adapter, and further contained a hard wired, unterminated cable. Further, the EUT was continuously charging during this mode of operation.

Battery Mode

The EUT was tested as a stand-alone unit that was internal battery powered. Its mini USB port was left unterminated in this mode of operation.

During both noted modes of operation, the EUT was investigated in all three orthogonal axis (X, Y, & Z) at its low, middle, and high channels (2402 MHz, 2440 MHz, and 2480 MHz), respectively. During the testing, the EUT was continuously transmitting. Finally, the EUT was tested from 9 kHz to 25 GHz.

The "X" orientation is when the EUT is parallel to the ground. The "Y" orientation is when the EUT is perpendicular to the ground mounted vertically. The "Z" orientation is when the EUT is perpendicular to the ground mounted horizontally.

A fully charged battery was installed inside the EUT prior to the testing. The EUT was programmed via an installed v 9.00.09 firmware.

The final radiated emissions data for the EUT was taken in the modes described above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination

Cable 1*

This is a 28-centimeter braid shielded cable connecting the EUT to the junction box. The cable contained a mini USB connector at the EUT end and was hard wired at the junction box end. The shield of the cable was terminated via the connector and the hard wire.

Cable 2*

This is a 15-centimeter braid shielded cable connecting the junction box to the AC adapter. The cable was hard wired at the junction box end and contained a USB Type A connector at the AC adapter end. The shield of the cable was terminated via the connector and the hard wire.

Cable 3*

This is a 28-centimeter braid shielded, unterminated cable connected to the junction box. The cable was hard wired at the junction box end and contained a mini USB connector at the unterminated end. The shield of the cable was terminated via the hard wire.

*AC Mode Only

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
HINGE SENSOR (EUT)	HINGE HEALTH, INC.	H3	N/A	2AQLGHINGE3
FIRMWARE	HINGE HEALTH, INC.	V9.00.09	N/A	N/A
JUNCTION BOX (AC MODE ONLY)	HINGE HEALTH, INC.	N/A	N/A	N/A
AC TO USB ADAPTER (AC MODE ONLY)	AMAZON	FANA7R	AH172600U2039	N/A

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
RF RADIATED AND CONDUCED EMISSIONS TEST EQUIPMENT					
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
EMI Receiver, 20 Hz – 26.5 GHz	Keysight Technologies	N9038A	MY51210150	August 23, 2019	1 Year
EMI Receiver, 20 Hz – 40 GHz	Rohde & Schwarz	ESIB40	100172	July 15, 2020	1 Year
System Controller	Sunol Sciences Corporation	SC110V	112213-1	N/A	N/A
Turntable	Sunol Sciences Corporation	2011VS	N/A	N/A	N/A
Antenna-Mast	Sunol Sciences Corporation	TWR95-4	112213-3	N/A	N/A
Loop Antenna	Com-Power	AL-130R	121090	February 5, 2019	2 Year
CombiLog Antenna	Com-Power	AC-220	61093	June 5, 2019	2 Year
Horn Antenna	Com-Power	AH-118	10050113	February 4, 2020	2 Year
Preamplifier	Com-Power	PA-118	181653	February 5, 2020	1 Year
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A
Preamplifier	Com-Power	PA-840	711013	April 9, 2020	2 Year
Horn Antenna	Com-Power	AH-826	71957	N/A	N/A

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 of this report for emissions test location.

6.2 EUT Mounting, Bonding and Grounding

For frequencies 1 GHz and below: The EUT was mounted on a 0.6 by 1.2 meter non-conductive table 0.8 meters above the ground plane.

For frequencies above 1 GHz: The EUT was mounted on a 0.6 by 1.2 meter non-conductive table 1.5 meters above the ground plane.

The EUT was not grounded.

6.3 Measurement Uncertainty

Compatible Electronics' U_{lab} value is less than U_{cispr}, thus based on this − compliance is deemed to occur if no measured disturbance exceeds the disturbance limit

$$u_c(y) = \sqrt{\sum_i c_i^2 \; u^2(x_i)}$$

Measurement		**U_{cispr}**	$U_{lab} = 2\,uc\,(y)$
Conducted disturbance (mains port)	(150 kHz – 30 MHz)	3.4 dB	2.73 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	6.3 dB	3.27 dB (Vertical) 3.19 dB (Horizontal)
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(1 GHz - 6 GHz)	5.2 dB	3.95 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(6 GHz – 18 GHz)	5.5 dB	3.95 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(18 GHz – 26.5 GHz)	N/A	4.69 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(26.5 GHz – 40 GHz)	N/A	4.55 dB

7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

7.1 RF Emissions

7.1.1 Conducted Emissions Test

The EMI Receiver was used as a measuring meter. A quasi-peak and/or average reading was taken only where indicated in the data sheets. A 10 dB attenuator was used for the protection of the EMI Receiver input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the EMI Receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI 63:4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by computer software. The final qualification data is located in Appendix E.

Test Results:

The EUT complies with the specification limits of CFR Title 47, Part 15, Subpart B, Section 15.107 Class B; CFR Title 47, Part 15, Subpart C, Section 15.207; and RSS-Gen for conducted emissions.

7.1.2 Radiated Emissions Test

The EMI Receiver was used as the measuring meter. Preamplifiers were used to increase the sensitivity of the instrument. The EMI Receiver was initially used with the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured.

The frequencies below 1 GHz were quasi-peaked using the quasi-peak detector of the EMI Receiver.

All other frequencies above 1 GHz were averaged using the average detector of the EMI Receiver.

The EMI test chamber of Compatible Electronics, Inc. was used for radiated emissions testing. This test site is in full compliance with ANSI C63.4. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength).

The EUT was tested at a 3-meter test distance. The six highest emissions are listed in Table 1.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
9 kHz to 150 kHz	200 Hz	Loop Antenna
150 kHz to 30 MHz	9 kHz	Loop Antenna
30 MHz to 1 GHz	120 kHz	CombiLog Antenna
1 GHz to 25 GHz	1 MHz	Horn Antenna

Test Results:

The EUT complies with the specification limits of CFR Title 47, Part 15, Subpart B, Section 15.109 Class B; CFR Title 47, Part 15, Subpart C, Sections 15.209 and 15.249; and RSS-210 and RSS-Gen for radiated emissions.

7.1.3 RF Emissions Test Results

Table 1 CONDUCTED EMISSION RESULTS
Hinge Sensor, Model: H3

Frequency MHz	Corrected Reading* dBuv	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
0.154 (BL)	36.20 (AVG)	54.96	-18.76
0.234 (BL)	32.90 (AVG)	51.68	-18.78
0.214 (BL)	34.06 (AVG)	53.00	-18.94
0.194 (BL)	33.96 (AVG)	53.39	-19.43
0.230 (BL)	32.50 (AVG)	52.04	-19.55
0.490 (BL)	23.29 (AVG)	46.14	-22.85

Notes:
* The complete emissions data is given in Appendix E of this report.
(AVG) Average
(BL) Black Lead
(WL) White Lead

RF Emissions Test Results (Continued)

Table 2 RADIATED EMISSION RESULTS
Hinge Sensor, Model: H3

Frequency MHz	Corrected Reading* dBuV/m	Specification Limit dBuV/m	Delta (Cor. Reading – Spec. Limit) dB
2400.00 (V) (Z-Axis) (Battery)	40.26 (AVG)	53.97	-13.71
785.40 (H) (X-Axis) (AC)	31.67 (QP)	46.00	-14.33
783.70 (V) (X-Axis) (AC)	31.64 (QP)	46.00	-14.36
780.20 (V) (X-Axis) (AC)	31.61 (QP)	46.00	-14.39
779.10 (H) (X-Axis) (AC)	31.58 (QP)	46.00	-14.42
764.20 (H) (X-Axis) (AC)	31.38 (QP)	46.00	-14.62

Notes:
* The complete emissions data is given in Appendix E of this report.
(V) Vertical
(H) Horizontal
(AVG) Average
(QP) Quasi-Peak
(AC) Alternating Current

7.1.4 Sample Calculations

A correction factor for the antenna, cable, and a distance factor (if any) must be applied to the meter reading before a true field strength reading can be obtained. This Corrected Meter Reading is then compared to the specification limit in order to determine compliance with the limits.

Conversion to logarithmic terms: Specification limit (μV/m) log x 20 = Specification Limit in dBuV/m

To correct for distance when measuring at a distance other than the specification

For measurements below 30 MHz: (Specification distance / test distance) log x 40 = distance factor

For measurements above 30 MHz: (Specification distance / test distance) log x 20 = distance factor

Note: When using an Active Antenna, the Antenna factor shall be subtracted due to the combination of the internal amplification and antenna loss.

Corrected Meter Reading = meter reading + F – A + C

where: F = antenna factor
A= amplifier gain
C = cable loss

The correction factors for the antenna and the amplifier gain are attached in Appendix D of this report. The data sheets are attached in Appendix E.

The distance factor D is 0 when the test is performed at the required specification distance.

When the limit is in terms of magnetic field, the following equation applies:

$$H[dB(\mu A/m)] = V[dB(\mu V)] + L_C\,[dB] - G_{PA}\,[dB] + AF^H\,[dB(S/m)]$$

where: *H* is the magnetic field strength (to be compared with the limit),
V is the voltage level measured by the receiver or spectrum analyzer,
L_C is the cable loss,
G_{PA} is the gain of the preamplifier (if used), and
AF^H is the magnetic antenna factor.

The G_{PA} term is only included in the equation when an external preamplifier is used in the measurement chain, in front of the receiver or spectrum analyzer. An external preamplifier is not usually necessary (or even advisable, due to risk of saturating the input mixer of the receiver) when an active loop antenna is used. In that case, the antenna factor of the loop already includes the gain of its built-in preamplifier.

Sample Calculations (Continued)

If the "electrical" antenna factor is used instead, the above equation becomes:

$$H[dB(\mu A/m)] = V[dB(\mu V)] + L_C\,[dB] - G_{PA}[dB] + AF^E\,[dB(m^{-1})] - 51.5\,[dB\Omega]$$

where: AF^E is the "electric" antenna factor, as provided by the antenna calibration laboratory.

When the limit is in terms of electric field, the following equation applies:

$$E[dB(\mu V/m)] = V[dB(\mu V)] + L_C[dB] - G_{PA}[dB] + AF^E\,[dB(m^{-1})]$$

or, if the magnetic antenna factor is used:

$$E[dB(\mu V/m)] = V[dB(\mu V)] + L_C[dB] - G_{PA}[dB] + AF^H\,[dB(S/m)] + 51.5[dB\Omega]$$

The display of the receiver (or spectrum analyzer) **shall not** be configured in units of current, e.g. µA or dB(µA). That conversion is calculated inside the receiver (or spectrum analyzer) using its input impedance, which is 50 Ω, while the magnetic field calculation is based on the free-space impedance of 377 Ω.

7.2 99% Bandwidth

The 99% Bandwidth was measured using an EMI Receiver and was taken after maximizing the worst case fundamental emission for both channels per section 7.1.

The following steps were performed for measuring the 99% bandwidth per RSS-GEN, Issue 5, clause 6.7.

1. Set RBW to 1% to 5% of the actual occupied bandwidth.
2. Set VBW to greater than 3 times the RBW.
3. Set the EMI Receiver to the Occupied Bandwidth Function set at 99%
4. Set the peak detector to max hold.
5. Set the sweep time to auto
6. Allow the trace to stabilize.

Please note that this was only used to determine the emission bandwidth and that there are no limits or pass/fail criteria for this test. Please see the data sheets located in Appendix E.

7.3 Variation of the Input Power

The variation of the input power test was performed using the EMI Receiver. The EUT input power was varied between 85% and 115% of the nominal rated supply voltage. The carrier frequency was monitored for any change in amplitude.

Test Results:

The EUT complies with the relevant requirements of CFR Title 47, Part 15, Subpart A, Section 15.31 (e); and RSS-GEN for variation of the input power.

7.4 Duty Cycle Calculation

The fundamental and harmonics were measured at a 3-meter test distance. The EMI Receiver was used to obtain the final test data. The final qualification data sheets are located in Appendix E.

Where

$$\delta(\mathrm{dB}) = 20\log\left[\sum\left(nt_1 + mt_2 + \ldots + \xi t_x\right)/T\right]$$

n is the number of pulses of duration *t*1
m is the number of pulses of duration *t*2
ξ is the number of pulses of duration *tx*
T is the period of the pulse train or 100 ms if the pulse train length is greater than 100 ms

The worst case was when the EUT was in advertising mode

Duty Cycle Correction Factor = -20 dB

Time of One Pulse = 480.961924 us

Total On Time = 480.961924 us

The time between pulses is 46.492986 ms

Duty Cycle = 480.961924 us / 46.492986 ms = 0.01034 = 1.03 %

8. CONCLUSIONS

The Hinge Sensor, Model: H3 (EUT), as tested, meets all of the specification limits defined in CFR Title 47, Part 15, Subpart B, Sections 15.107 Class B and 15.109 Class B; CFR Title 47, Part 15, Subpart C, Sections 15.205, 15.207, 15.209 and 15.249; and RSS-210 and RSS-Gen.

APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP TESTING
NVLAP LAB CODE 200528-0

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For US, Canada, Australia/New Zealand, Japan, Taiwan, Korea, and the European Union, Compatible Electronics is currently accredited by NVLAP to ISO/IEC 17025.

For the most up-to-date version of our scopes and certificates please visit
http://celectronics.com/quality/scope/

Quote from ISO-ILAC-IAF Communiqué on 17025:
"A laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 (Section 4) are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems — Requirements."

ISED Test Site Registration Number: 2154A

APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B, FCC 15.249, RSS-210, and RSS-Gen specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT during the testing.

APPENDIX C

ADDITIONAL MODELS COVERED UNDER THIS REPORT

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST	Hinge Sensor Model: H3 S/N: N/A

There are no additional models covered under this report.

APPENDIX D

DIAGRAMS AND CHARTS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

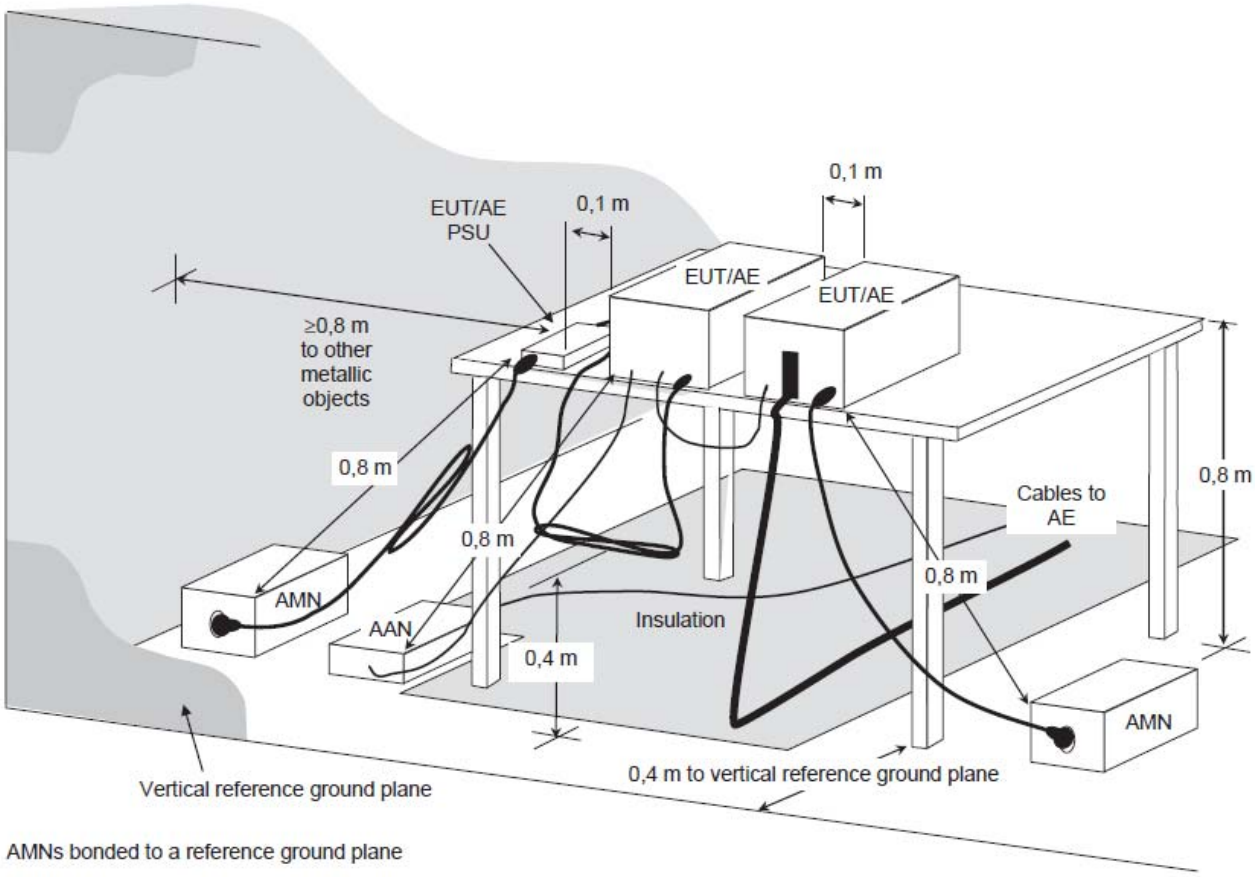
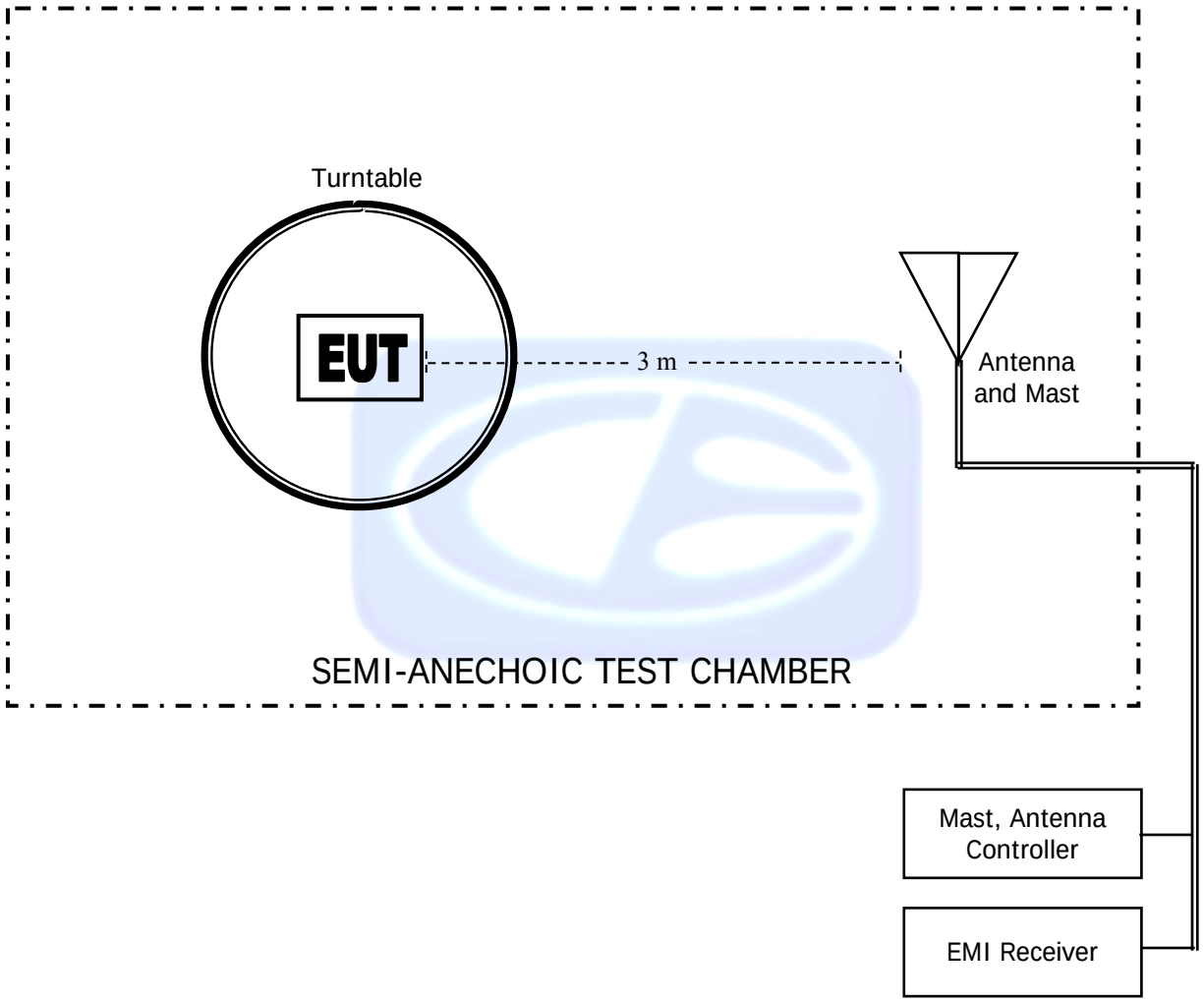


FIGURE 2: LAYOUT OF THE SEMI -ANECHOIC TEST CHAMBER



COM-POWER AL-130R

LOOP ANTENNA

S/N: 121090

CALIBRATION DATE: FEBRUARY 5, 2019

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.01	15.6	-35.9
0.02	14.8	-36.7
0.03	15.6	-35.9
0.04	15.1	-36.4
0.05	14.4	-37.0
0.06	14.6	-36.9
0.07	14.4	-37.1
0.08	14.3	-37.1
0.09	14.5	-36.9
0.10	14.1	-37.3
0.20	14.1	-37.3
0.30	14.0	-37.4
0.40	14.0	-37.4
0.50	14.2	-37.2
0.60	14.2	-37.2
0.70	14.2	-37.2
0.80	14.2	-37.3
0.90	14.3	-37.2
1.00	14.5	-37.0
H30	14.5	-36.9
3.00	14.5	-36.9
4.00	14.7	-36.8
5.00	14.6	-36.9
6.00	14.6	-36.9
7.00	14.6	-36.9
8.00	14.6	-36.9
9.00	14.6	-36.9
10.00	14.8	-36.6
11.00	14.9	-36.6
1H30	14.8	-36.6
13.00	14.8	-36.7
14.00	14.6	-36.8
15.00	14.5	-36.9
16.00	14.5	-37.0
17.00	14.6	-36.9
18.00	14.7	-36.7
19.00	14.8	-36.6
20.00	14.9	-36.6
21.00	14.6	-36.8
2H30	14.2	-37.2
23.00	13.7	-37.7
24.00	13.3	-38.2
25.00	13.0	-38.5
26.00	12.9	-38.6
27.00	13.0	-38.5
28.00	13.1	-38.4
29.00	13.1	-38.4
30.00	12.9	-38.5

COM-POWER AC-220

COMBILOG ANTENNA

S/N: 61093

CALIBRATION DATE: JUNE 5, 2019

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	22.10	200	15.30
35	20.90	250	16.80
40	20.10	300	19.00
45	19.40	350	19.60
50	18.40	400	21.70
60	15.10	450	21.60
70	1H30	500	22.20
80	11.60	550	22.70
90	13.50	600	24.20
100	14.70	650	24.40
120	15.90	700	24.50
125	15.90	750	25.40
140	14.80	800	26.30
150	15.50	850	26.70
160	19.80	900	27.50
175	15.20	950	27.80
180	14.90	1000	27.90

COM POWER AH-118

HORN ANTENNA

S/N: 10050113

CALIBRATION DATE: FEBRUARY 4, 2020

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	24.343	10.0	38.826
1.5	25.419	10.5	39.102
H3	28.838	11.0	39.259
2.5	28.971	11.5	39.920
3.0	29.919	1H3	40.149
3.5	30.674	12.5	40.576
4.0	31.670	13.0	40.264
4.5	32.437	13.5	40.364
5.0	33.414	14.0	40.424
5.5	34.003	14.5	41.677
6.0	34.799	15.0	43.010
6.5	35.381	15.5	39.799
7.0	37.024	16.0	40.187
7.5	34.403	16.5	40.155
8.0	37.445	17.0	40.507
8.5	37.390	17.5	41.963
9.0	38.076	18.0	43.196
9.5	38.809		

COM-POWER PA-118

PREAMPLIFIER

S/N: 181653

CALIBRATION DATE: FEBRUARY 5, 2020

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	40.10	6.0	40.60
1.1	40.10	6.5	39.50
1.2	40.00	7.0	39.40
1.3	39.70	7.5	39.30
1.4	39.60	8.0	39.20
1.5	39.90	8.5	40.50
1.6	40.00	9.0	39.60
1.7	39.70	9.5	39.50
1.8	39.50	10.0	38.80
1.9	39.60	11.0	38.70
H3	39.90	1H3	42.20
2.5	40.10	13.0	40.00
3.0	40.80	14.0	40.30
3.5	40.60	15.0	40.20
4.0	40.50	16.0	41.00
4.5	41.60	17.0	39.70
5.0	39.20	18.0	40.90
5.5	40.00		

COM-POWER PA-840

MICROWAVE PREAMPLIFIER

S/N: 711013

CALIBRATION DATE: APRIL 9, 2020

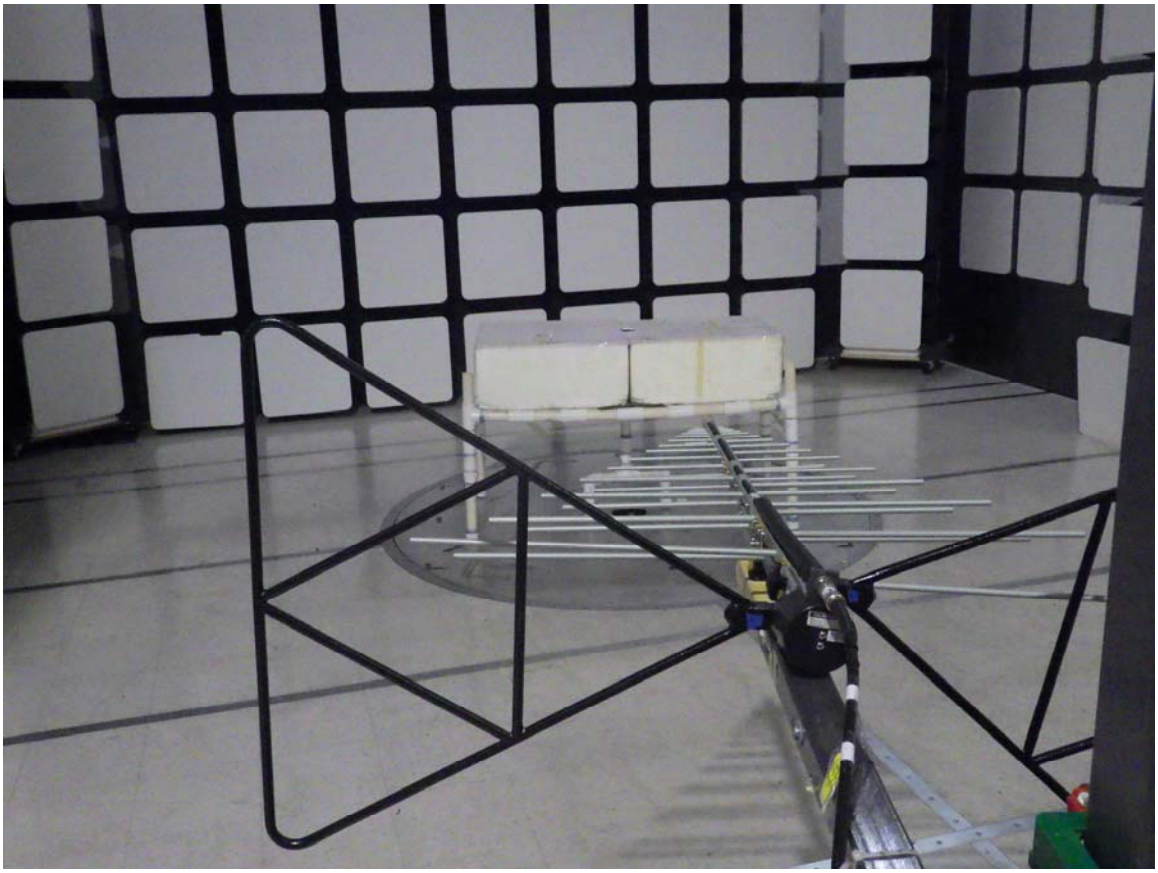
FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	26.88	31.0	24.65
19.0	25.52	31.5	25.92
20.0	26.26	3H3	24.83
21.0	24.96	32.5	26.90
2H3	24.74	33.0	26.27
23.0	25.45	33.5	25.18
24.0	26.65	34.0	23.14
25.0	26.02	34.5	25.81
26.0	27.16	35.0	27.63
26.5	28.08	35.5	26.53
27.0	25.99	36.0	24.41
27.5	25.35	36.5	27.02
28.0	25.77	37.0	25.42
28.5	27.22	37.5	24.71
29.0	28.38	38.0	24.36
29.5	25.63	38.5	23.16
30.0	27.08	39.0	21.44
30.5	26.10	39.5	21.15
		40.0	21.20

COM-POWER AH-826

HORN ANTENNA

S/N: 71957

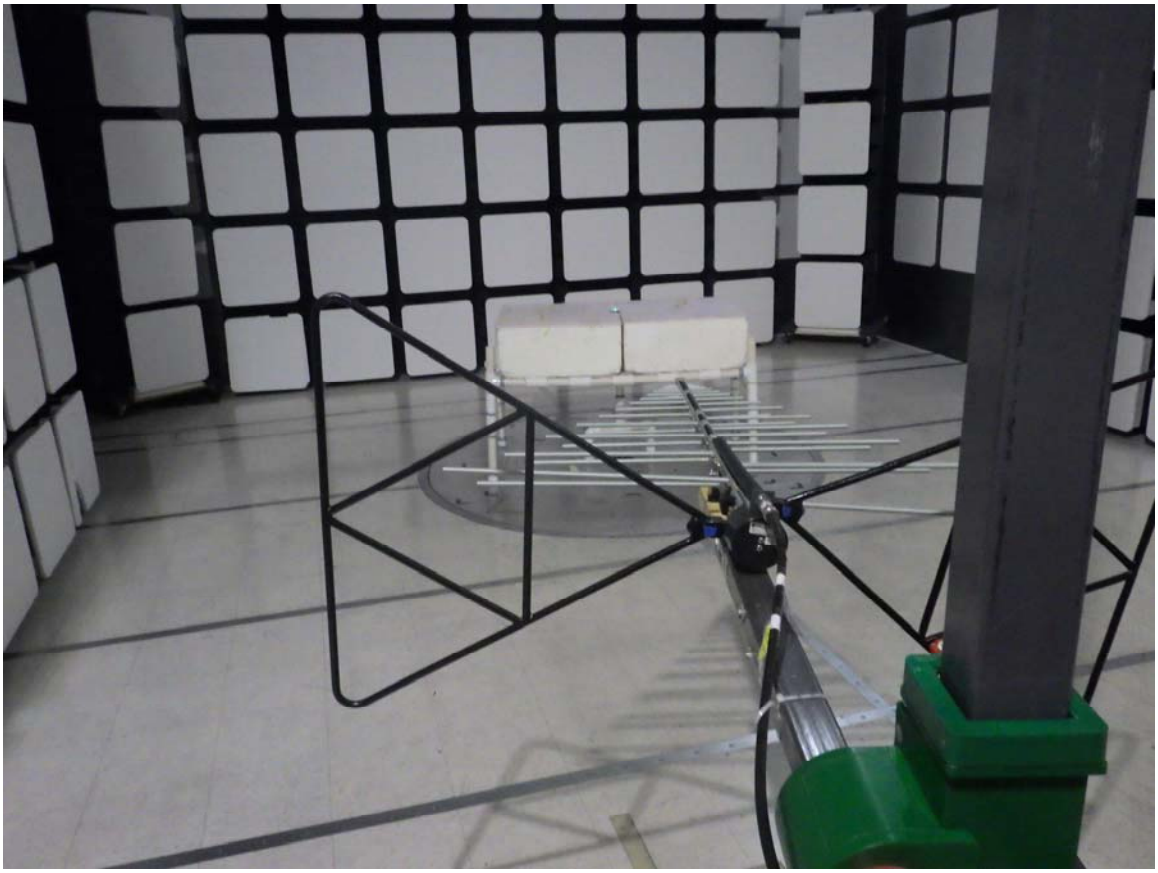
FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	33.5	22.5	35.5
18.5	33.5	23.0	35.9
19.0	34.0	23.5	35.7
19.5	34.0	24.0	35.6
20.0	34.3	24.5	36.0
20.5	34.9	25.0	36.2
21.0	34.7	25.5	36.1
21.5	35.0	26.0	36.2
2H3	35.0	26.5	35.7



FRONT VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; RSS-210 AND RSS-GEN
RADIATED EMISSIONS – BATTERY MODE – BELOW 1 GHz

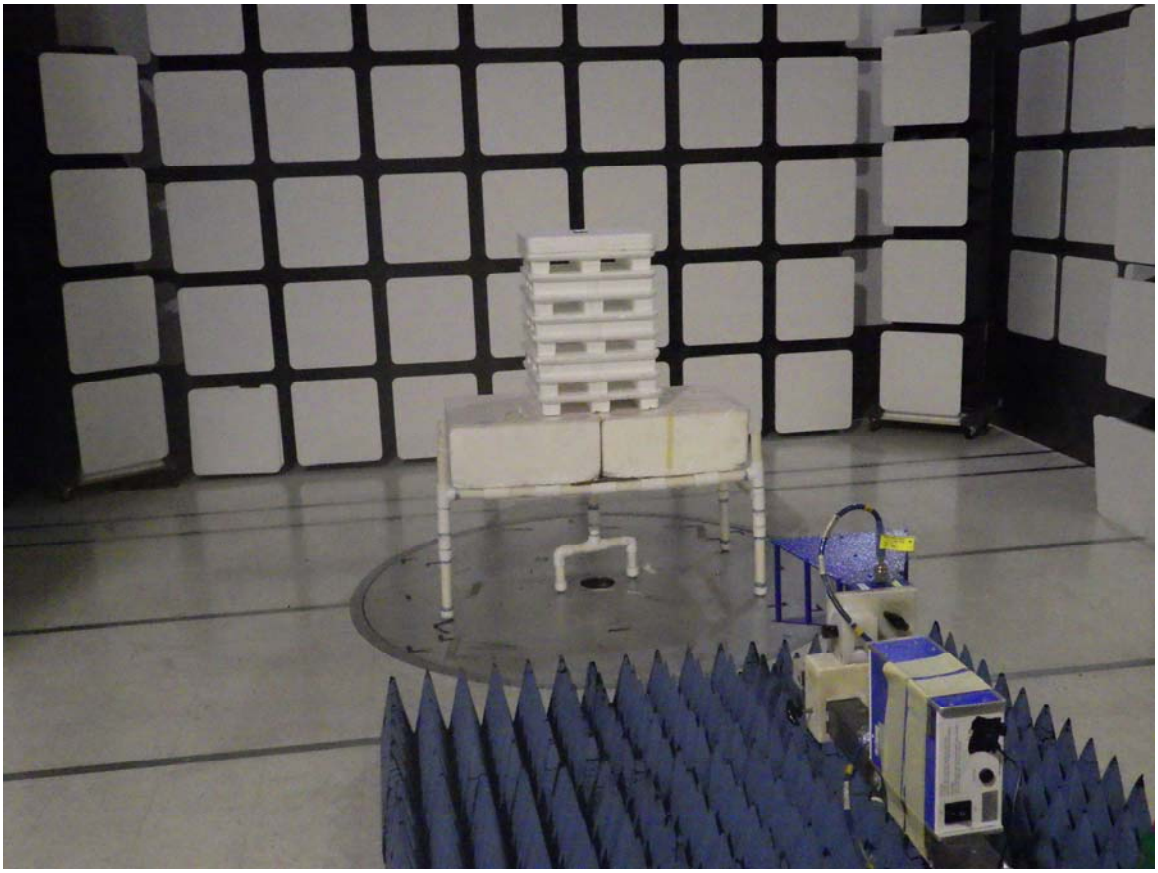
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; RSS-210 AND RSS-GEN
RADIATED EMISSIONS – BATTERY MODE – BELOW 1 GHz

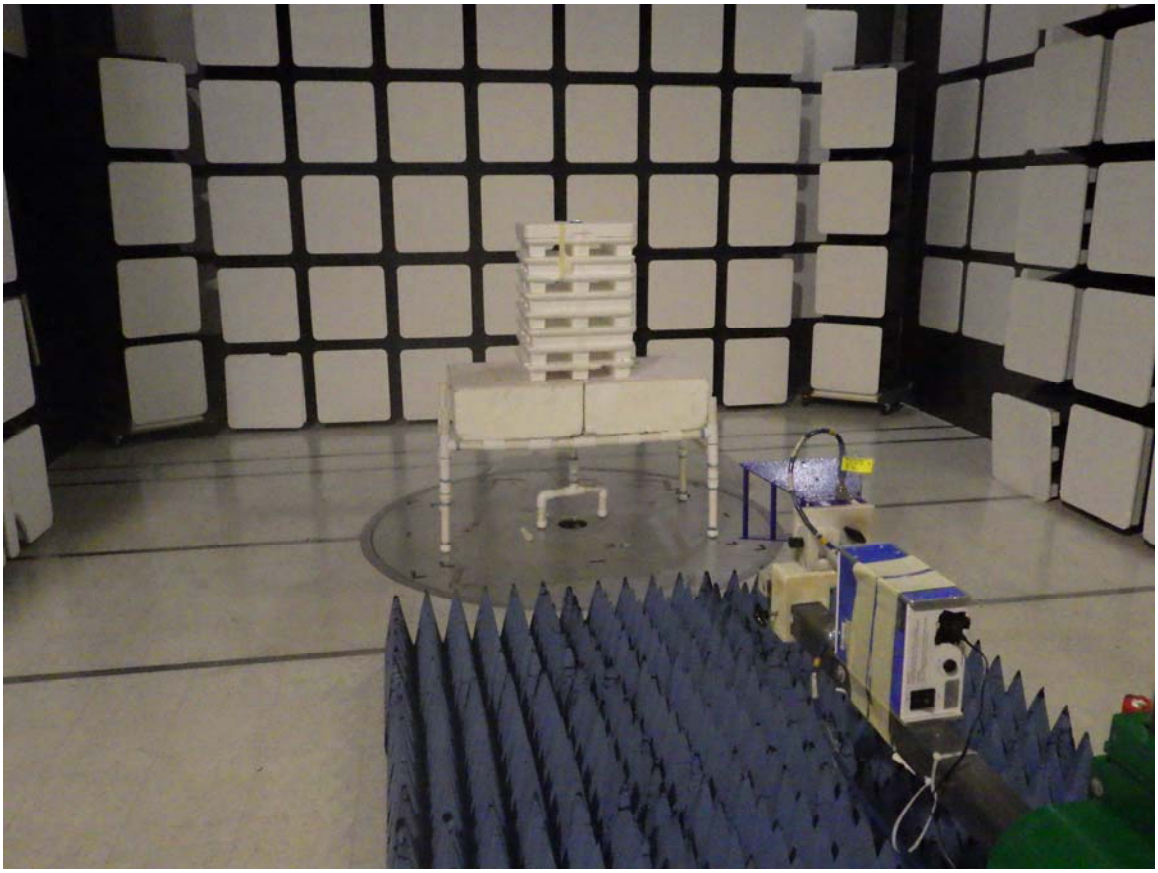
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; RSS-210 AND RSS-GEN
RADIATED EMISSIONS – BATTERY MODE – ABOVE 1 GHz

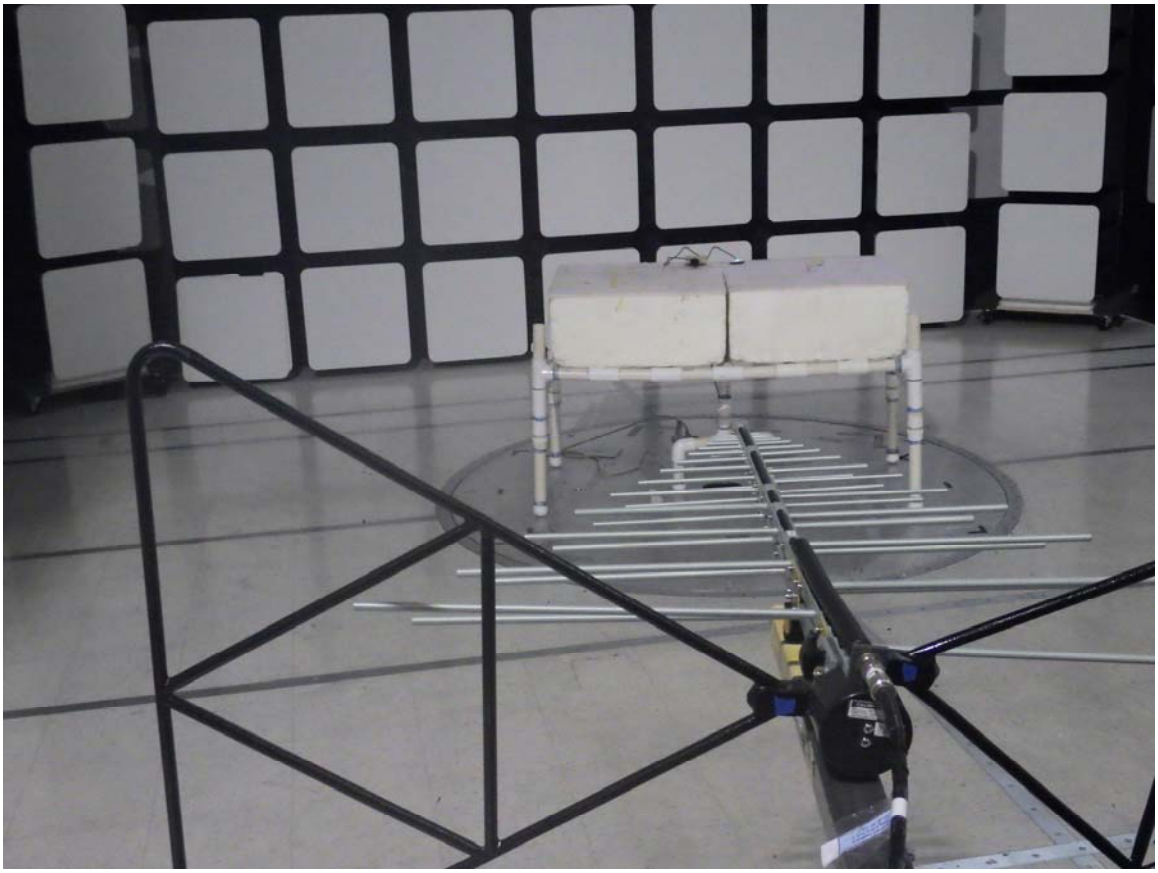
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; RSS-210 AND RSS-GEN
RADIATED EMISSIONS – BATTERY MODE – ABOVE 1 GHz

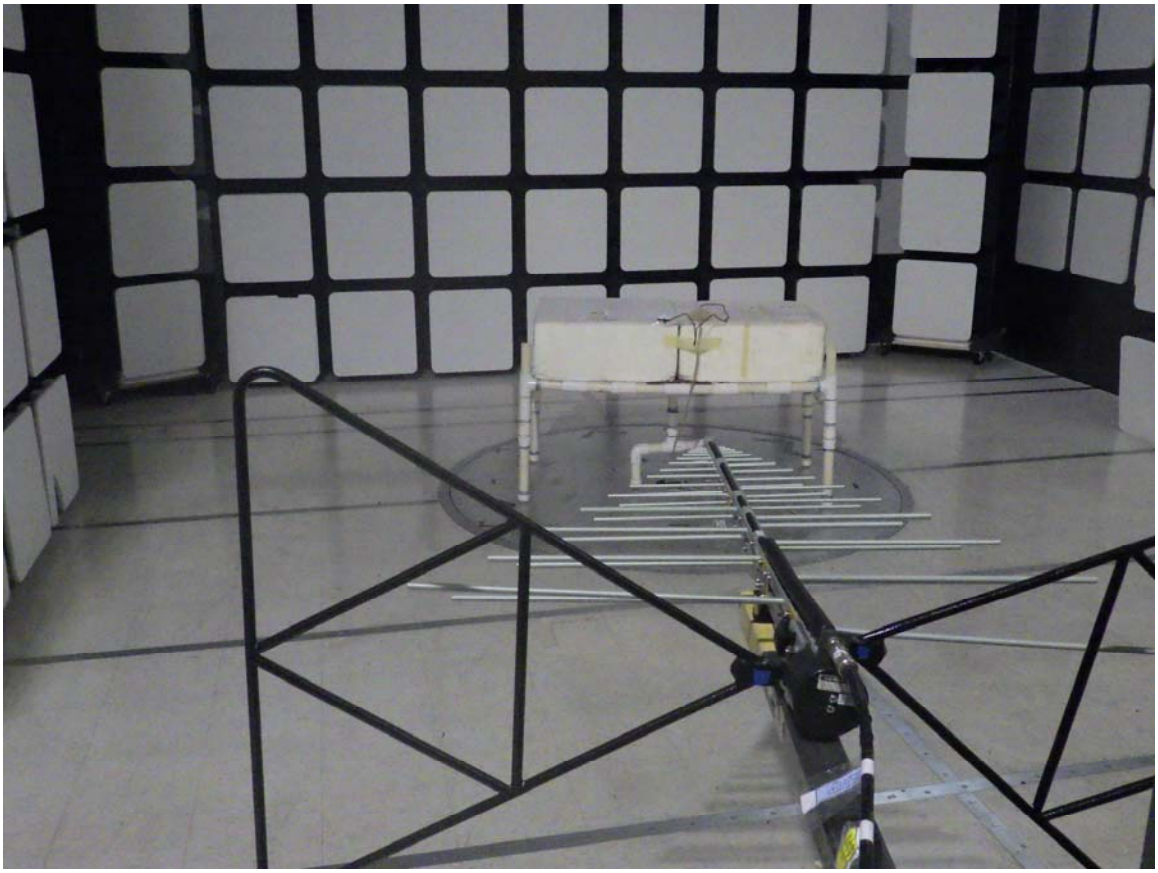
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; RSS-210 AND RSS-GEN
RADIATED EMISSIONS – AC MODE – BELOW 1 GHz

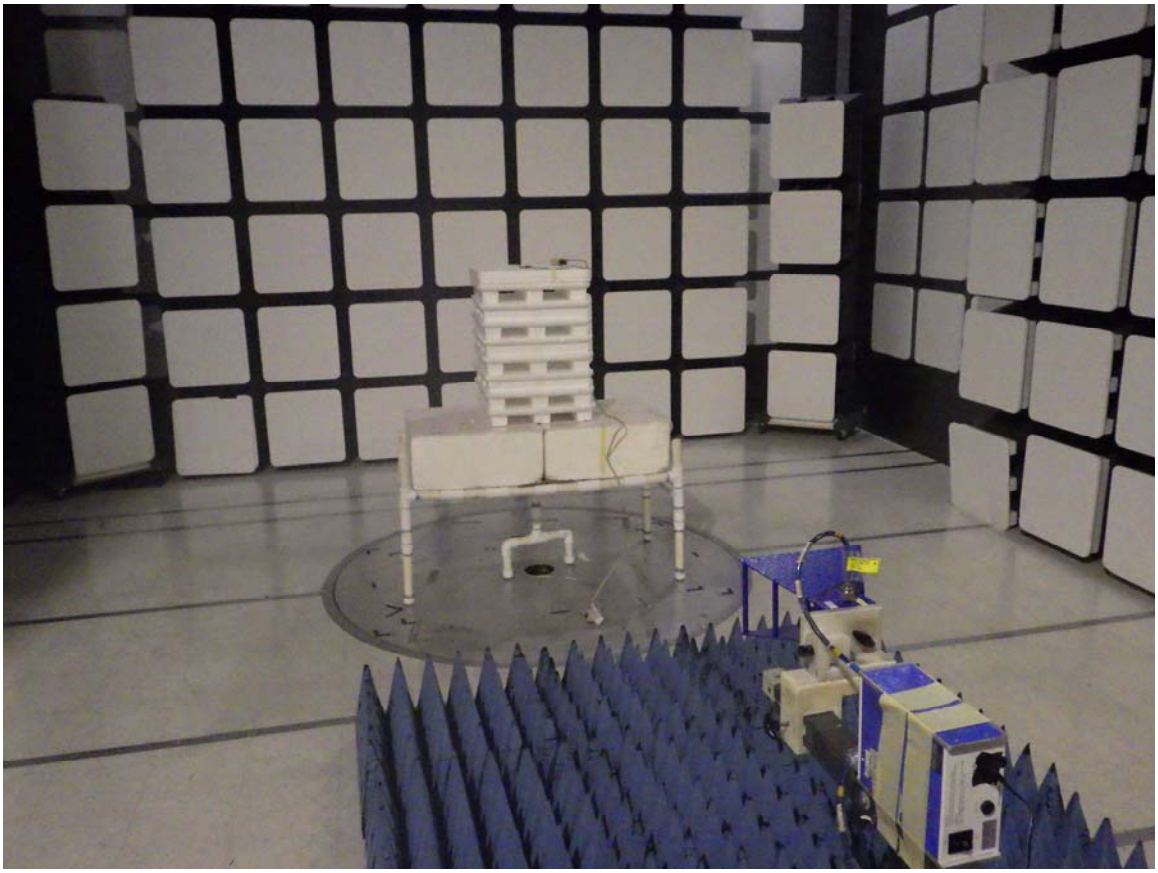
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; RSS-210 AND RSS-GEN
RADIATED EMISSIONS – AC MODE – BELOW 1 GHz

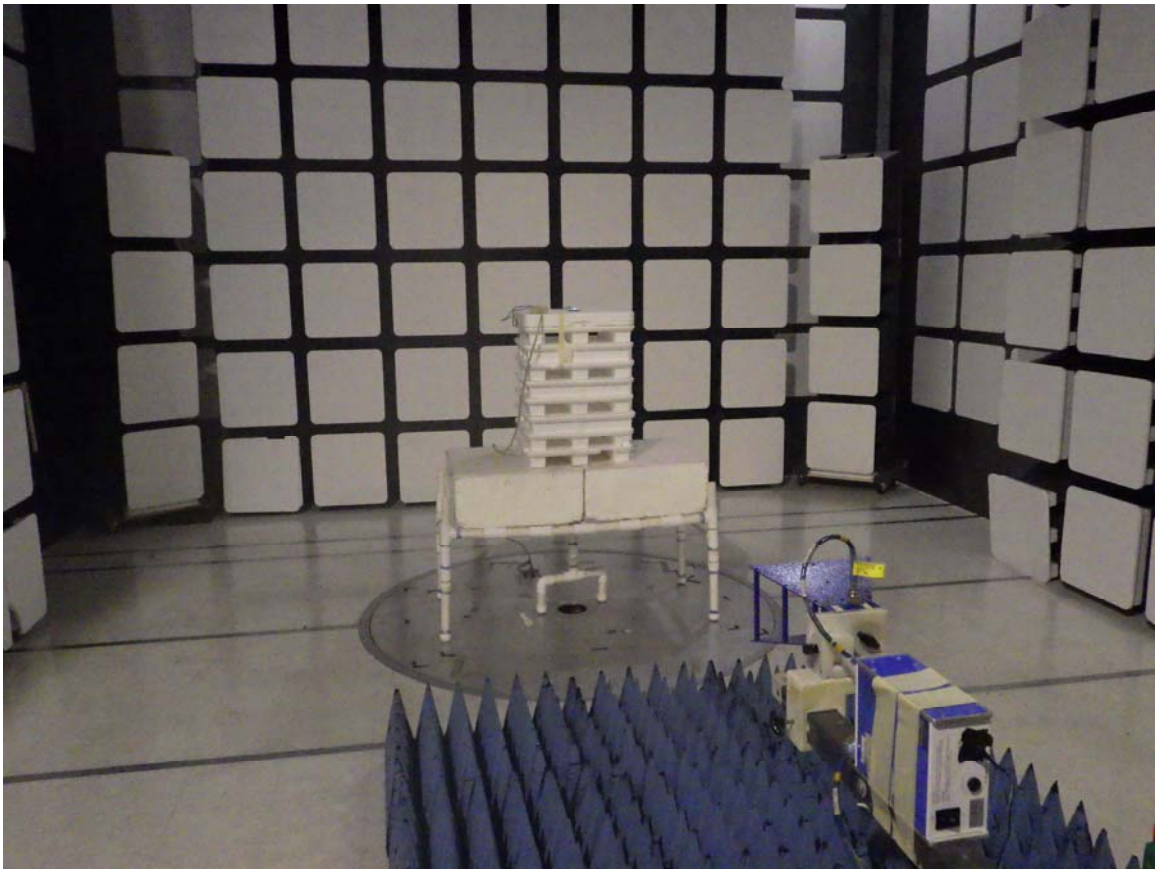
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; RSS-210 AND RSS-GEN
RADIATED EMISSIONS – AC MODE – ABOVE 1 GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; RSS-210 AND RSS-GEN
RADIATED EMISSIONS – AC MODE – ABOVE 1 GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

FRONT VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; AND RSS-GEN
CONDUCTED EMISSIONS – AC MODE

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

REAR VIEW

HINGE HEALTH, INC.
HINGE SENSOR
MODEL: H3
FCC SUBPART B AND C; AND RSS-GEN
CONDUCTED EMISSIONS – AC MODE

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

APPENDIX E

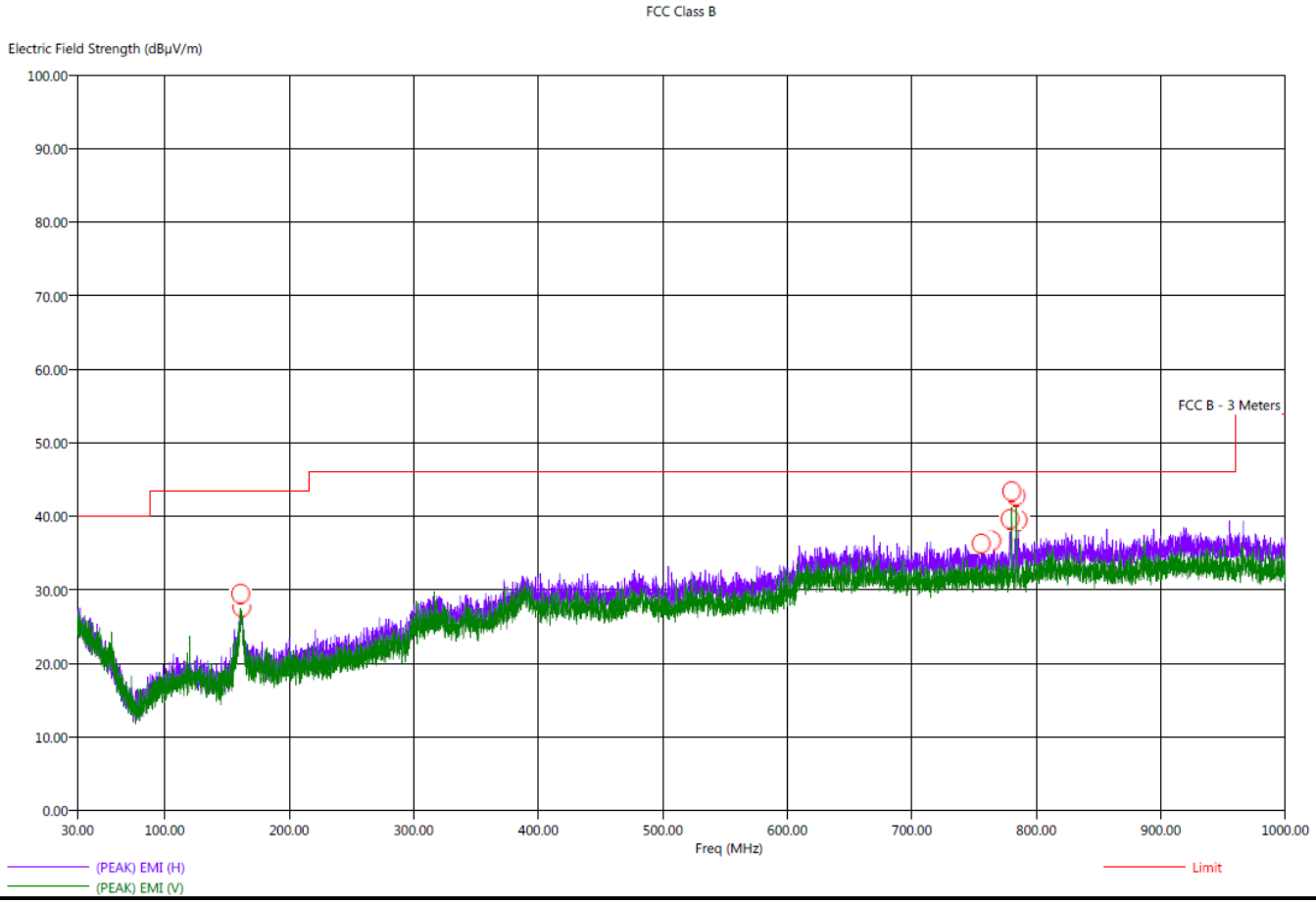
DATA SHEETS

RADIATED EMISSIONS

DATA SHEETS

Title: Pre-Scan - FCC Class B
File: 2 - Pre-Scan - AC Mode - FCC Class B - 07-28-2020.set
Operator: Kyle Fujimoto
EUT Type: Hinge Sensor
EUT Condition: The EUT is continuously transmitting BLE at 2480 MHz
Company: Hinge Health
M/N: H3
S/N: N/A
AC Mode

7/28/2020 7:47:15 AM
Sequence: Preliminary Scan



Title: Final Scan - FCC Class B
File: 1 - Final Scan - AC Mode - FCC Class B - 07-28-2020.set
Operator: Kyle Fujimoto
EUT Type: Hinge Sensor
EUT Condition: The EUT is continuously transmitting BLE at 2480 MHz
Company: Hinge Health
M/N: H3
S/N: N/A
AC Mode

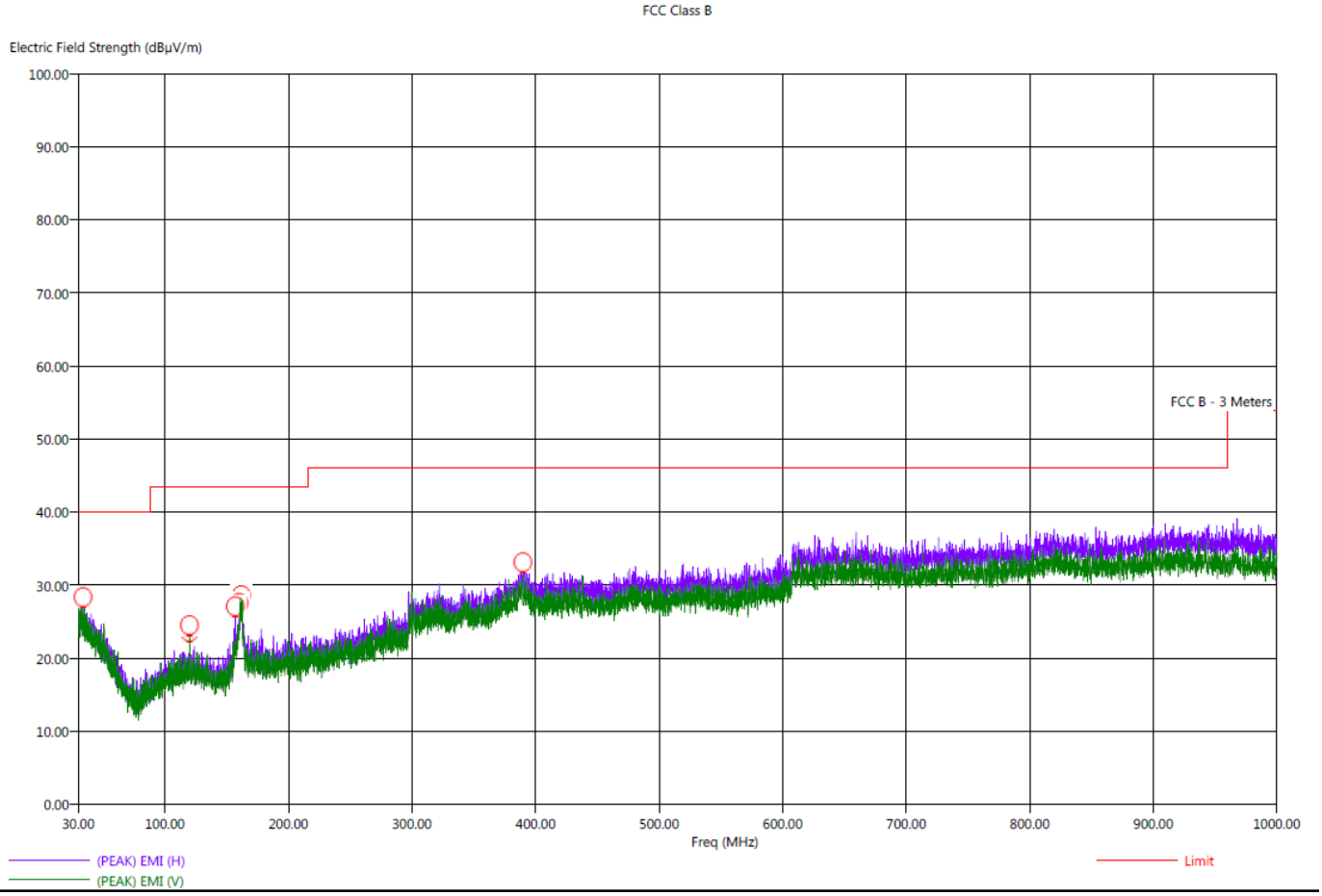
7/28/2020 7:58:54 AM
Sequence: Final Measurements

FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Agl (deg)	Twr Ht (cm)
161.10	H	30.25	24.88	-13.25	-18.62	43.50	21.74	0.88	171.75	270.32
161.90	H	30.38	24.86	-13.12	-18.64	43.50	21.75	0.88	32.75	127.22
755.80	H	37.67	31.37	-8.33	-14.63	46.00	25.30	2.22	197.25	238.68
764.20	H	36.81	31.38	-9.19	-14.62	46.00	25.40	2.24	101.00	366.14
779.10	H	36.56	31.58	-9.44	-14.42	46.00	25.68	2.27	359.75	144.95
780.20	V	36.92	31.61	-9.08	-14.39	46.00	25.63	2.27	205.50	334.14
783.70	V	37.47	31.64	-8.53	-14.36	46.00	25.70	2.28	202.25	271.34
785.40	H	36.81	31.67	-9.19	-14.33	46.00	25.73	2.28	272.50	111.88

Title: Pre-Scan - FCC Class B
File: 2 - Pre-Scan - Battery Mode - FCC Class B - 07-28-2020.set
Operator: Kyle Fujimoto
EUT Type: Hinge Sensor
EUT Condition: The EUT is continuously transmitting BLE at 2480 MHz
Company: Hinge Health
M/N: H3
S/N: N/A
Battery Mode

7/28/2020 8:26:51 AM
Sequence: Preliminary Scan



Title: Final Scan - FCC Class B
File: 2 - Final Scan - Battery Mode - FCC Class B - 07-28-2020.set
Operator: Kyle Fujimoto
EUT Type: Hinge Sensor
EUT Condition: The EUT is continuously transmitting BLE at 2480 MHz
Company: Hinge Health
M/N: H3
S/N: N/A
Battery Mode

7/28/2020 8:37:50 AM
Sequence: Final Measurements

FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Agl (deg)	Twr Ht (cm)
33.80	V	28.94	23.38	-11.06	-16.62	40.00	21.16	0.34	210.00	302.20
120.00	H	24.49	20.74	-19.01	-22.76	43.50	15.90	0.75	308.00	349.49
120.00	V	28.87	25.79	-14.63	-17.71	43.50	15.90	0.75	263.00	127.16
157.10	H	25.59	19.92	-17.91	-23.58	43.50	16.76	0.86	286.75	318.92
160.00	H	28.39	22.96	-15.11	-20.54	43.50	19.81	0.87	12.25	208.41
162.00	H	29.92	24.75	-13.58	-18.75	43.50	21.63	0.88	96.25	158.92
389.80	H	34.21	27.96	-11.79	-18.04	46.00	23.20	1.51	342.25	127.10

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Fundamental Low Channel - AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
2402	77.50	V	113.97	-36.47	Peak	326.00	139.16	**X-Axis**
2402	57.50	V	93.97	-36.47	Avg	326.00	139.16	**Vertical Polarization**
2402	86.68	V	113.97	-27.29	Peak	175.25	110.74	**Y-Axis**
2402	66.68	V	93.97	-27.29	Avg	175.25	110.74	**Vertical Polarization**
2402	86.32	V	113.97	-27.65	Peak	5H30	207.04	**Z-Axis**
2402	66.32	V	93.97	-27.65	Avg	5H30	207.04	**Vertical Polarization**
2402	89.52	H	113.97	-24.45	Peak	55.25	164.47	**X-Axis**
2402	69.52	H	93.97	-24.45	Avg	55.25	164.47	**Horizontal Polarization**
2402	79.11	H	113.97	-34.86	Peak	341.00	238.98	**Y-Axis**
2402	59.11	H	93.97	-34.86	Avg	341.00	238.98	**Horizontal Polarization**
2402	87.70	H	113.97	-26.27	Peak	126.50	111.34	**Z-Axis**
2402	67.70	H	93.97	-26.27	Avg	126.50	111.34	**Horizontal Polarization**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Fundamental Middle Channel - AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
2440	77.28	V	113.97	-36.69	Peak	354.00	222.98	**X-Axis**
2440	57.28	V	93.97	-36.69	Avg	354.00	222.98	**Vertical Polarization**
2440	87.03	V	113.97	-26.94	Peak	117.25	110.68	**Y-Axis**
2440	67.03	V	93.97	-26.94	Avg	117.25	110.68	**Vertical Polarization**
2440	84.15	V	113.97	-29.82	Peak	49.00	176.00	**Z-Axis**
2440	64.15	V	93.97	-29.82	Avg	49.00	176.00	**Vertical Polarization**
2440	88.78	H	113.97	-25.19	Peak	4.25	159.16	**X-Axis**
2440	68.78	H	93.97	-25.19	Avg	4.25	159.16	**Horizontal Polarization**
2440	80.98	H	113.97	-32.99	Peak	318.25	221.91	**Y-Axis**
2440	60.98	H	93.97	-32.99	Avg	318.25	221.91	**Horizontal Polarization**
2440	86.61	H	113.97	-27.36	Peak	124.00	111.40	**Z-Axis**
2440	66.61	H	93.97	-27.36	Avg	124.00	111.40	**Horizontal Polarization**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Fundamental High Channel - AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
2480	78.11	V	113.97	-35.86	Peak	351.00	222.80	**X-Axis**
2480	58.11	V	93.97	-35.86	Avg	351.00	222.80	**Vertical Polarization**
2480	85.26	V	113.97	-28.71	Peak	351.00	115.24	**Y-Axis**
2480	65.26	V	93.97	-28.71	Avg	351.00	115.24	**Vertical Polarization**
2480	85.93	V	113.97	-28.04	Peak	354.00	110.92	**Z-Axis**
2480	65.93	V	93.97	-28.04	Avg	354.00	110.92	**Vertical Polarization**
2480	88.62	H	113.97	-25.36	Peak	0.00	128.23	**X-Axis**
2480	68.62	H	93.97	-25.36	Avg	0.00	128.23	**Horizontal Polarization**
2480	84.29	H	113.97	-29.68	Peak	19.75	110.92	**Y-Axis**
2480	64.29	H	93.97	-29.68	Avg	19.75	110.92	**Horizontal Polarization**
2480	86.35	H	113.97	-27.62	Peak	52.75	127.94	**Z-Axis**
2480	66.35	H	93.97	-27.62	Avg	52.75	127.94	**Horizontal Polarization**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Low Channel - Transmit Mode - X-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00								**No Emission**
4804.00								**Detected**
7206.00								**No Emission**
7206.00								**Detected**
9608.00								**No Emission**
9608.00								**Detected**
12010.00								**No Emission**
12010.00								**Detected**
1441H30								**No Emission**
1441H30								**Detected**
16814.00								**No Emission**
16814.00								**Detected**
19216.00								**No Emission**
19216.00								**Detected**
21618.00								**No Emission**
21618.00								**Detected**
24020.00								**No Emission**
24020.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Low Channel - Transmit Mode - Y-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	41.26	V	73.97	-32.71	Peak	230.75	111.40	
4804.00	21.26	V	53.97	-32.71	Avg	230.75	111.40	
7206.00								**No Emission**
7206.00								**Detected**
9608.00								**No Emission**
9608.00								**Detected**
12010.00								**No Emission**
12010.00								**Detected**
1441H30								**No Emission**
1441H30								**Detected**
16814.00								**No Emission**
16814.00								**Detected**
19216.00								**No Emission**
19216.00								**Detected**
21618.00								**No Emission**
21618.00								**Detected**
24020.00								**No Emission**
24020.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Low Channel - Transmit Mode - Z-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	44.72	V	73.97	-29.25	Peak	78.25	127.34	
4804.00	24.72	V	53.97	-29.25	Avg	78.25	127.34	
7206.00								**No Emission**
7206.00								**Detected**
9608.00								**No Emission**
9608.00								**Detected**
12010.00								**No Emission**
12010.00								**Detected**
1441H30								**No Emission**
1441H30								**Detected**
16814.00								**No Emission**
16814.00								**Detected**
19216.00								**No Emission**
19216.00								**Detected**
21618.00								**No Emission**
21618.00								**Detected**
24020.00								**No Emission**
24020.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Low Channel - Transmit Mode - X-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	41.19	H	73.97	-32.78	Peak	102.50	161.25	
4804.00	21.19	H	53.97	-32.78	Avg	102.50	161.25	
7206.00								**No Emission**
7206.00								**Detected**
9608.00								**No Emission**
9608.00								**Detected**
12010.00								**No Emission**
12010.00								**Detected**
1441H30								**No Emission**
1441H30								**Detected**
16814.00								**No Emission**
16814.00								**Detected**
19216.00								**No Emission**
19216.00								**Detected**
21618.00								**No Emission**
21618.00								**Detected**
24020.00								**No Emission**
24020.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Low Channel - Transmit Mode - Y-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	41.77	H	73.97	-32.20	Peak	175.00	174.98	
4804.00	21.77	H	53.97	-32.20	Avg	175.00	174.98	
7206.00								**No Emission**
7206.00								**Detected**
9608.00								**No Emission**
9608.00								**Detected**
12010.00								**No Emission**
12010.00								**Detected**
1441H30								**No Emission**
1441H30								**Detected**
16814.00								**No Emission**
16814.00								**Detected**
19216.00								**No Emission**
19216.00								**Detected**
21618.00								**No Emission**
21618.00								**Detected**
24020.00								**No Emission**
24020.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Low Channel - Transmit Mode - Z-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	43.30	H	73.97	-30.67	Peak	241.00	110.86	
4804.00	23.30	H	53.97	-30.67	Avg	241.00	110.86	
7206.00								**No Emission**
7206.00								**Detected**
9608.00								**No Emission**
9608.00								**Detected**
12010.00								**No Emission**
12010.00								**Detected**
1441H30								**No Emission**
1441H30								**Detected**
16814.00								**No Emission**
16814.00								**Detected**
19216.00								**No Emission**
19216.00								**Detected**
21618.00								**No Emission**
21618.00								**Detected**
24020.00								**No Emission**
24020.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Middle Channel - Transmit Mode - X-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	41.61	V	73.97	-32.36	Peak	23H30	222.92	**No Emission**
4880.00	21.61	V	53.97	-32.36	Avg	23H30	222.92	**Detected**
7320.00								**No Emission**
7320.00								**Detected**
9760.00								**No Emission**
9760.00								**Detected**
12200.00								**No Emission**
12200.00								**Detected**
14640.00								**No Emission**
14640.00								**Detected**
17080.00								**No Emission**
17080.00								**Detected**
19520.00								**No Emission**
19520.00								**Detected**
21960.00								**No Emission**
21960.00								**Detected**
24400.00								**No Emission**
24400.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Middle Channel - Transmit Mode - Y-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	44.44	V	73.97	-29.53	Peak	28.50	206.98	
4880.00	24.44	V	53.97	-29.53	Avg	28.50	206.98	
7320.00								**No Emission**
7320.00								**Detected**
9760.00								**No Emission**
9760.00								**Detected**
12200.00								**No Emission**
12200.00								**Detected**
14640.00								**No Emission**
14640.00								**Detected**
17080.00								**No Emission**
17080.00								**Detected**
19520.00								**No Emission**
19520.00								**Detected**
21960.00								**No Emission**
21960.00								**Detected**
24400.00								**No Emission**
24400.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Middle Channel - Transmit Mode - Z-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	46.19	V	73.97	-27.78	Peak	79.00	111.52	
4880.00	26.19	V	53.97	-27.78	Avg	79.00	111.52	
7320.00								**No Emission**
7320.00								**Detected**
9760.00								**No Emission**
9760.00								**Detected**
12200.00								**No Emission**
12200.00								**Detected**
14640.00								**No Emission**
14640.00								**Detected**
17080.00								**No Emission**
17080.00								**Detected**
19520.00								**No Emission**
19520.00								**Detected**
21960.00								**No Emission**
21960.00								**Detected**
24400.00								**No Emission**
24400.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Middle Channel - Transmit Mode - X-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	45.57	H	73.97	-28.40	Peak	64.00	110.98	
4880.00	25.57	H	53.97	-28.40	Avg	64.00	110.98	
7320.00								**No Emission**
7320.00								**Detected**
9760.00								**No Emission**
9760.00								**Detected**
12200.00								**No Emission**
12200.00								**Detected**
14640.00								**No Emission**
14640.00								**Detected**
17080.00								**No Emission**
17080.00								**Detected**
19520.00								**No Emission**
19520.00								**Detected**
21960.00								**No Emission**
21960.00								**Detected**
24400.00								**No Emission**
24400.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Middle Channel - Transmit Mode - Y-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	45.40	H	73.97	-28.57	Peak	211.00	142.92	
4880.00	25.40	H	53.97	-28.57	Avg	211.00	142.92	
7320.00								**No Emission**
7320.00								**Detected**
9760.00								**No Emission**
9760.00								**Detected**
12200.00								**No Emission**
12200.00								**Detected**
14640.00								**No Emission**
14640.00								**Detected**
17080.00								**No Emission**
17080.00								**Detected**
19520.00								**No Emission**
19520.00								**Detected**
21960.00								**No Emission**
21960.00								**Detected**
24400.00								**No Emission**
24400.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Middle Channel - Transmit Mode - Z-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	41.82	H	73.97	-32.15	Peak	235.00	173.97	
4880.00	21.82	H	53.97	-32.15	Avg	235.00	173.97	
7320.00								**No Emission**
7320.00								**Detected**
9760.00								**No Emission**
9760.00								**Detected**
12200.00								**No Emission**
12200.00								**Detected**
14640.00								**No Emission**
14640.00								**Detected**
17080.00								**No Emission**
17080.00								**Detected**
19520.00								**No Emission**
19520.00								**Detected**
21960.00								**No Emission**
21960.00								**Detected**
24400.00								**No Emission**
24400.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
High Channel - Transmit Mode - X-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	41.27	V	73.97	-32.70	Peak	54.50	249.92	
4960.00	21.27	V	53.97	-32.70	Avg	54.50	249.92	
7440.00								**No Emission**
7440.00								**Detected**
9920.00								**No Emission**
9920.00								**Detected**
12400.00								**No Emission**
12400.00								**Detected**
14880.00								**No Emission**
14880.00								**Detected**
17360.00								**No Emission**
17360.00								**Detected**
19840.00								**No Emission**
19840.00								**Detected**
22320.00								**No Emission**
22320.00								**Detected**
24800.00								**No Emission**
24800.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
High Channel - Transmit Mode - Y-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	46.15	V	73.97	-27.82	Peak	16.25	158.92	
4960.00	26.15	V	53.97	-27.82	Avg	16.25	158.92	
7440.00								**No Emission**
7440.00								**Detected**
9920.00								**No Emission**
9920.00								**Detected**
12400.00								**No Emission**
12400.00								**Detected**
14880.00								**No Emission**
14880.00								**Detected**
17360.00								**No Emission**
17360.00								**Detected**
19840.00								**No Emission**
19840.00								**Detected**
22320.00								**No Emission**
22320.00								**Detected**
24800.00								**No Emission**
24800.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
High Channel - Transmit Mode - Z-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	44.71	V	73.97	-29.26	Peak	295.00	142.98	
4960.00	24.71	V	53.97	-29.26	Avg	295.00	142.98	
7440.00								**No Emission**
7440.00								**Detected**
9920.00								**No Emission**
9920.00								**Detected**
12400.00								**No Emission**
12400.00								**Detected**
14880.00								**No Emission**
14880.00								**Detected**
17360.00								**No Emission**
17360.00								**Detected**
19840.00								**No Emission**
19840.00								**Detected**
22320.00								**No Emission**
22320.00								**Detected**
24800.00								**No Emission**
24800.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
High Channel - Transmit Mode - Y-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	41.31	H	73.97	-32.66	Peak	149.00	222.98	
4960.00	21.31	H	53.97	-32.66	Avg	149.00	222.98	
7440.00								**No Emission**
7440.00								**Detected**
9920.00								**No Emission**
9920.00								**Detected**
12400.00								**No Emission**
12400.00								**Detected**
14880.00								**No Emission**
14880.00								**Detected**
17360.00								**No Emission**
17360.00								**Detected**
19840.00								**No Emission**
19840.00								**Detected**
22320.00								**No Emission**
22320.00								**Detected**
24800.00								**No Emission**
24800.00								**Detected**

FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
High Channel - Transmit Mode - Z-Axis
AC Mode

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	41.66	H	73.97	-32.31	Peak	81.25	191.40	
4960.00	21.66	H	53.97	-32.31	Avg	81.25	191.40	
7440.00								**No Emission**
7440.00								**Detected**
9920.00								**No Emission**
9920.00								**Detected**
12400.00								**No Emission**
12400.00								**Detected**
14880.00								**No Emission**
14880.00								**Detected**
17360.00								**No Emission**
17360.00								**Detected**
19840.00								**No Emission**
19840.00								**Detected**
22320.00								**No Emission**
22320.00								**Detected**
24800.00								**No Emission**
24800.00								**Detected**

FCC 15.249
Hinge Health
Hinge Sensor
Model: H3
Digital Portion of the Tx from 9 kHz to 30 MHz and 1 GHz to 25 GHz
Non-Harmonic Emissions of the Tx from 9 kHz to 30 MHz and 1 GHz to 25 GHz

Date: 07/27/2020
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
								No Emissions Detected
								from 9 kHz to 30 MHz
								for the digital portion
								of the EUT
								No Emissions Detected
								from 9 kHz to 30 MHz
								for the Non-Harmonic Emissions
								of the Transmitter for the EUT
								No Emissions Detected
								from 1 GHz to 25 GHz
								for the digital portion
								of the EUT
								No Emissions Detected
								from 1 GHz to 25 GHz
								for the Non-Harmonic Emissions
								of the Transmitter for the EUT
								Investigated in the X-Axis,
								Y-Axis, and Z-Axis
								AC Mode

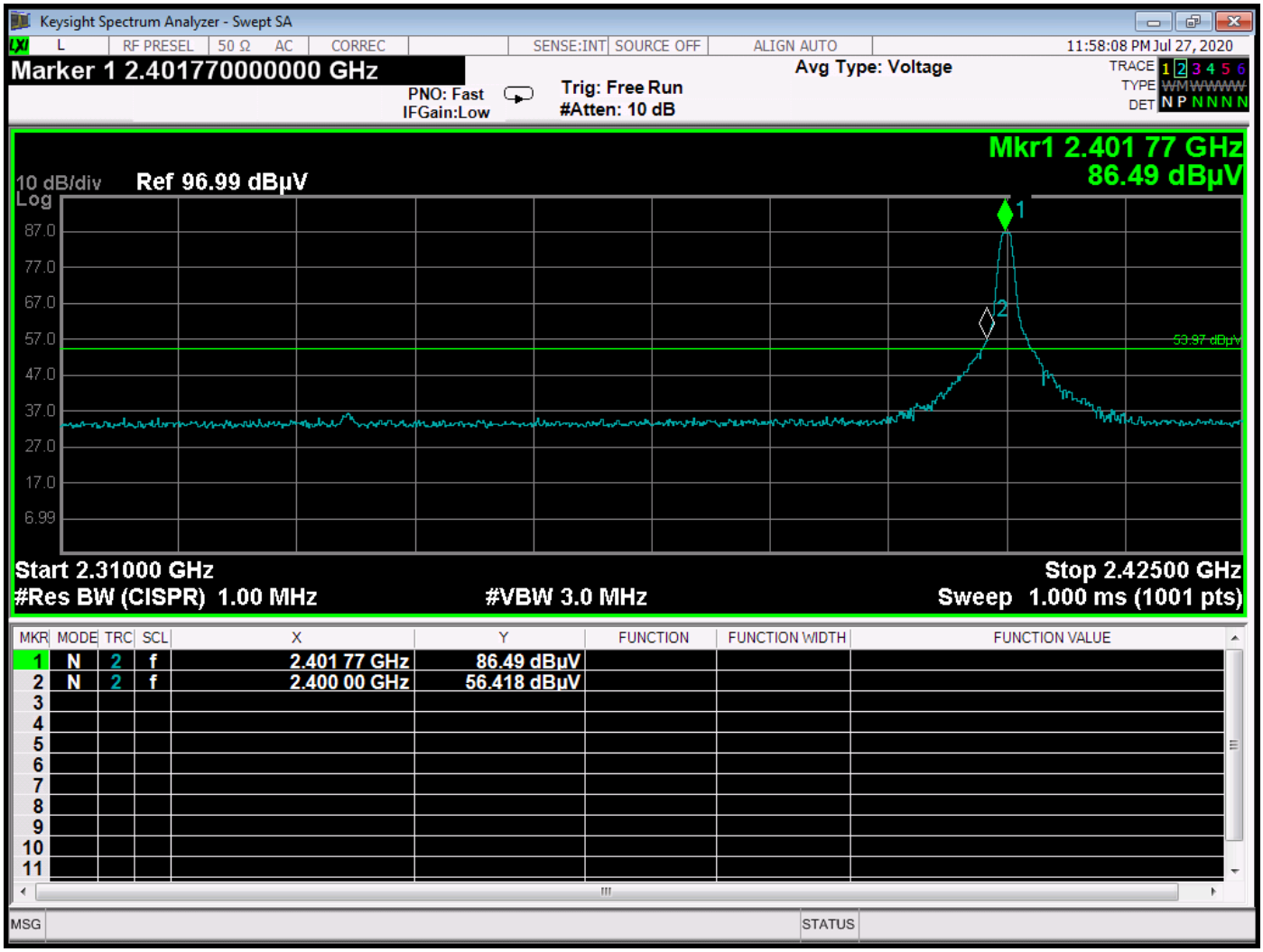
BAND EDGES

DATA SHEETS

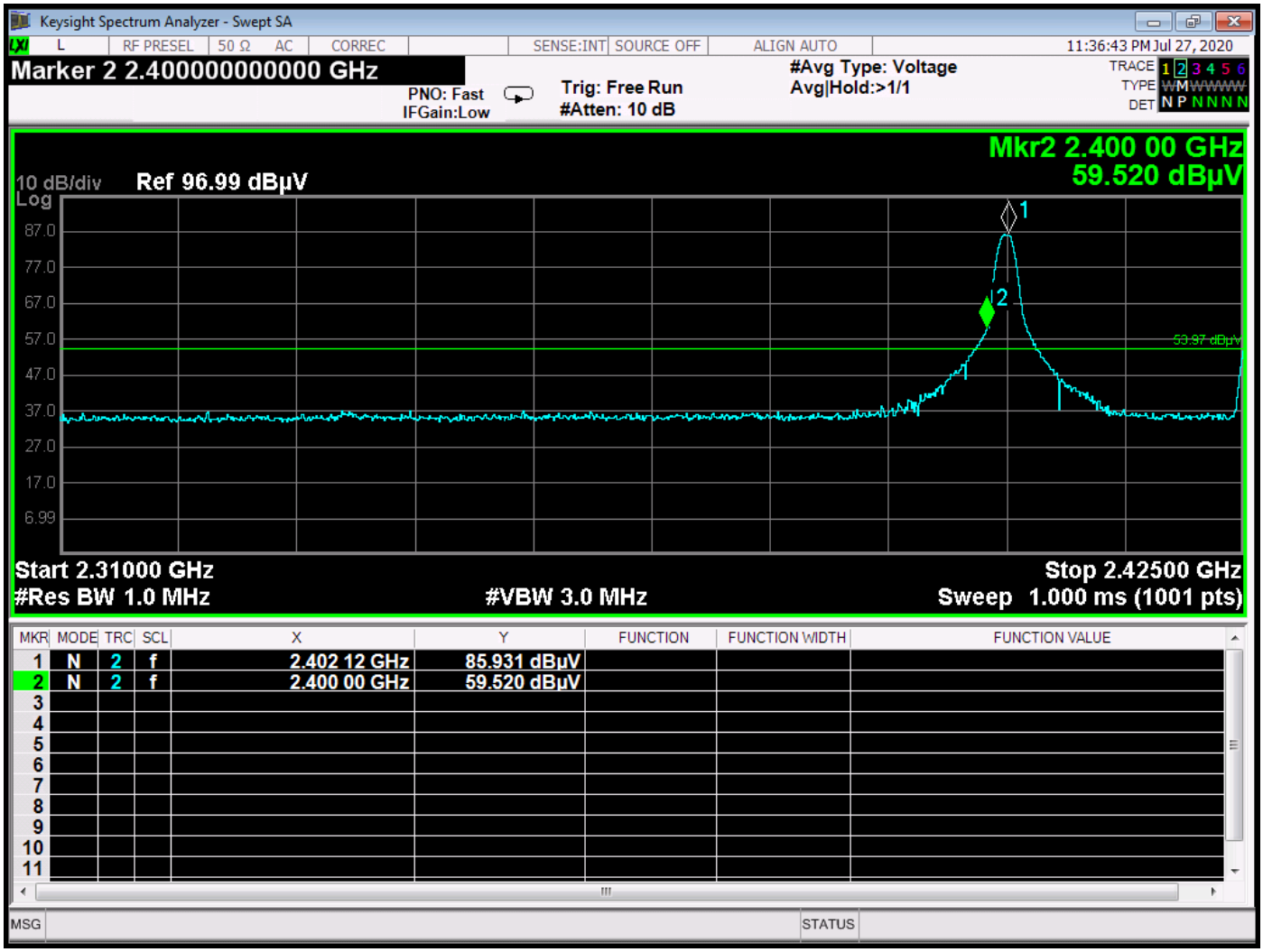
FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Band Edges - Battery Mode

Dates: 07/27/2020 and 07/28/2020
Lab: D
Tested By: Kyle Fujimoto

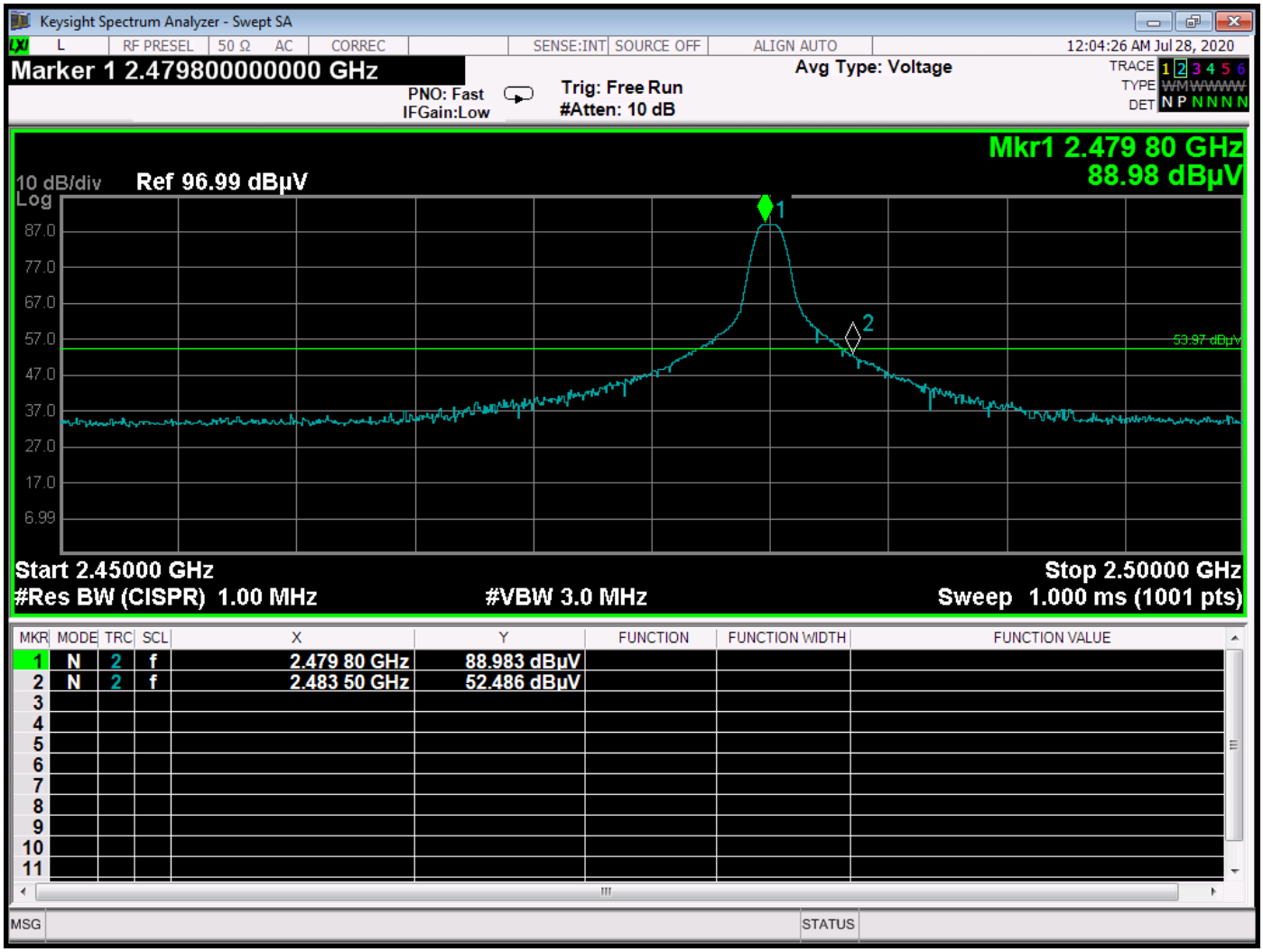
Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
240H30	86.49	H	113.97	-27.48	Peak	18.50	159.28	**Fundamental - Low Ch.**
240H30	66.49	H	93.97	-27.48	Avg	18.50	159.28	**X-Axis - Worst Case**
2400.00	56.42	H	73.97	-17.55	Peak	18.50	159.28	**Band Edge**
2400.00	36.42	H	53.97	-17.55	Avg	18.50	159.28	**X-Axis - Worst Case**
240H30	85.93	V	113.97	-28.04	Peak	212.50	142.86	**Fundamental - Low Ch.**
240H30	65.93	V	93.97	-28.04	Avg	212.50	142.86	**Z-Axis - Worst Case**
2400.00	60.26	V	73.97	-13.71	Peak	212.50	143.16	**Band Edge**
2400.00	40.26	V	53.97	-13.71	Avg	212.50	143.16	**Z-Axis - Worst Case**
2480.00	88.98	H	113.97	-24.99	Peak	48.75	159.10	**Fundamental - High Ch.**
2480.00	68.98	H	93.97	-24.99	Avg	48.75	159.10	**X-Axis - Worst Case**
2483.50	52.49	H	73.97	-21.48	Peak	48.75	159.10	**Band Edge**
2483.50	32.49	H	53.97	-21.48	Avg	48.75	159.10	**X-Axis - Worst Case**
2480.00	86.54	V	113.97	-27.43	Peak	90.75	138.20	**Fundamental - High Ch.**
2480.00	66.54	V	93.97	-27.43	Avg	90.75	138.20	**Z-Axis - Worst Case**
2483.50	50.58	V	73.97	-23.39	Peak	90.75	138.20	**Band Edge**
2483.50	30.58	V	53.97	-23.39	Avg	90.75	138.20	**Z-Axis - Worst Case**



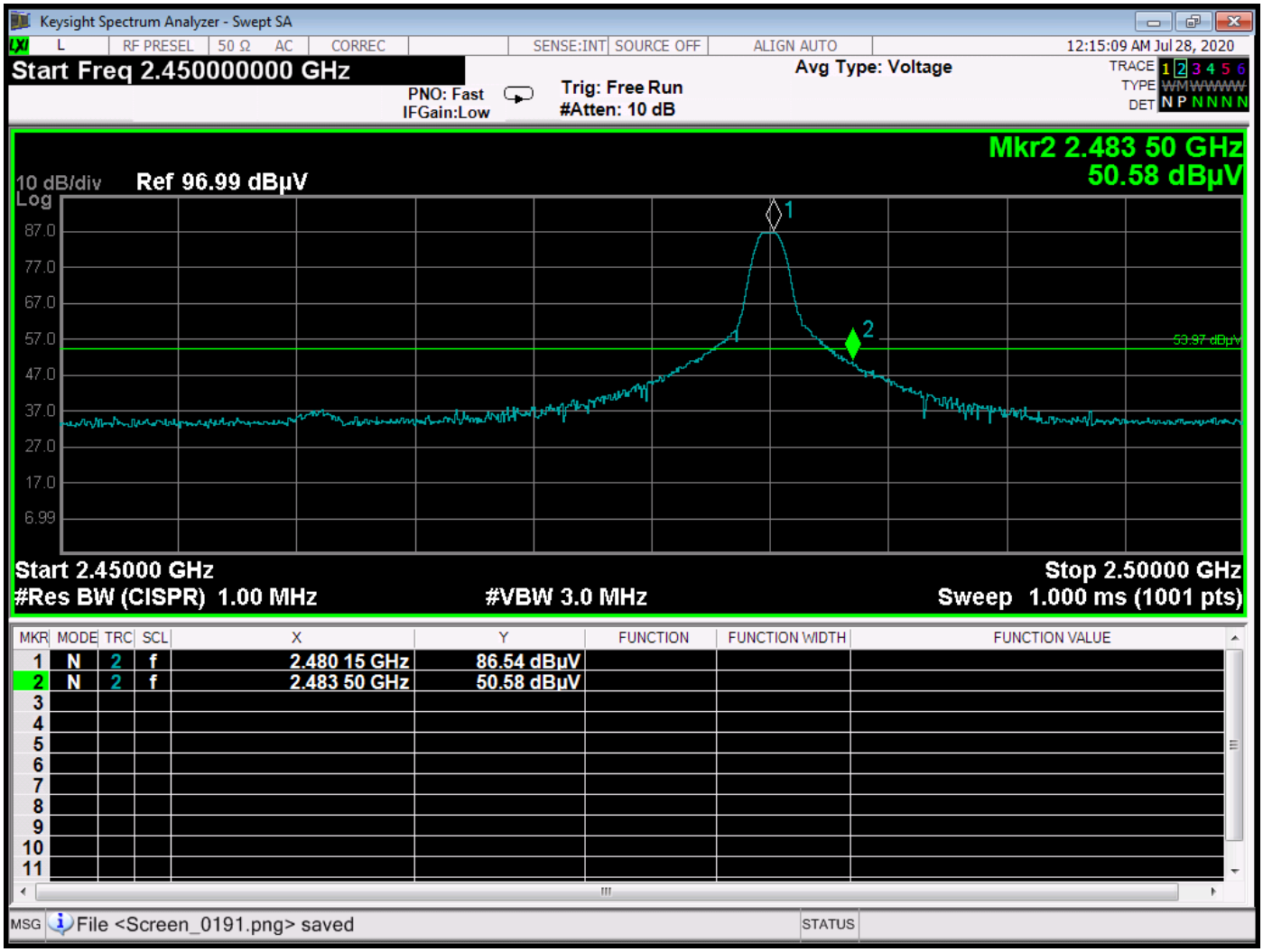
Band Edge – Low Channel – Horizontal Polarization – Battery Mode – X-Axis



Band Edge – Low Channel – Vertical Polarization – Battery Mode – Z-Axis



Band Edge – High Channel – Horizontal Polarization – Battery Mode – X-Axis

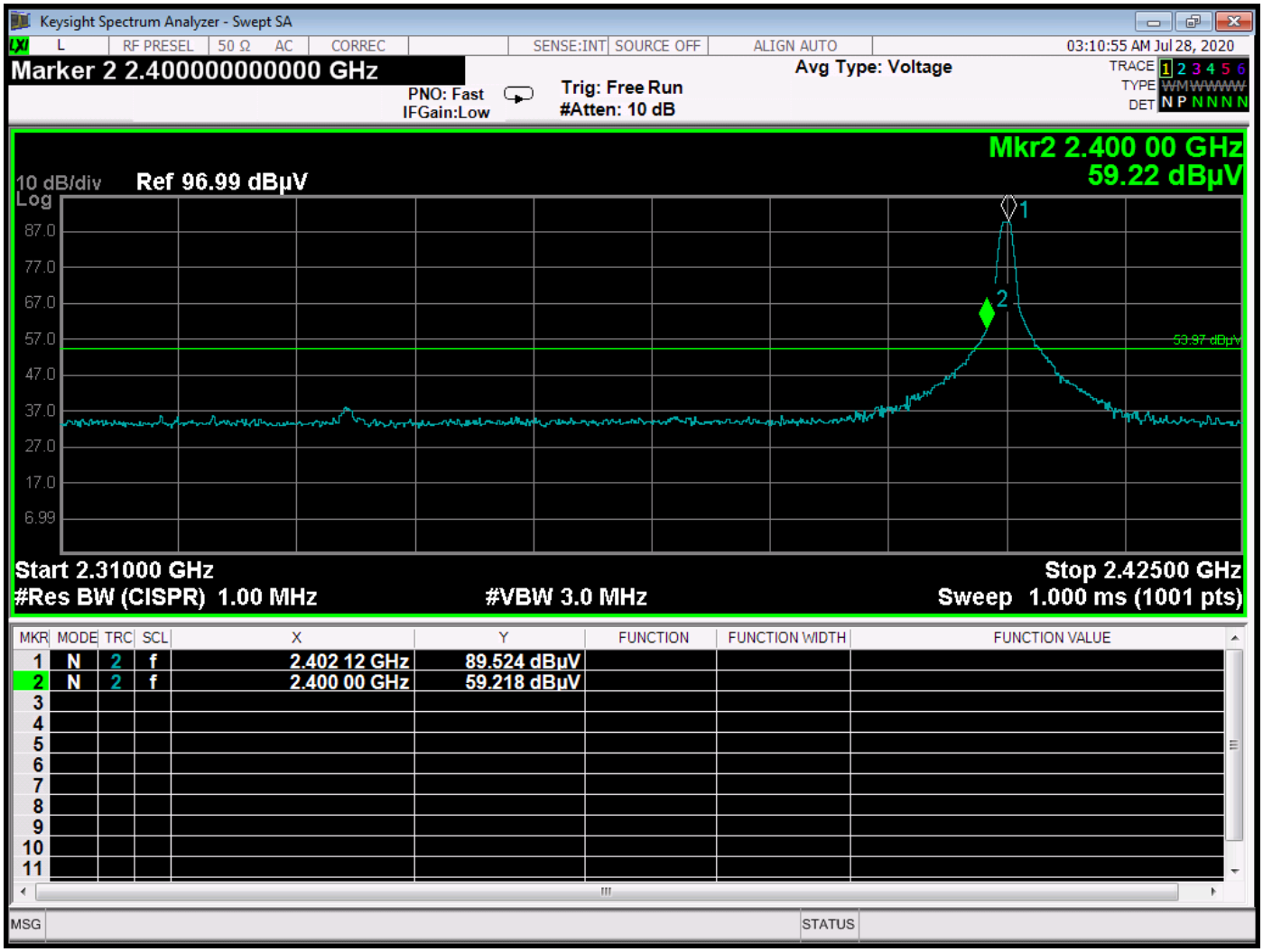


Band Edge – High Channel – Vertical Polarization – Battery Mode – Z-Axis

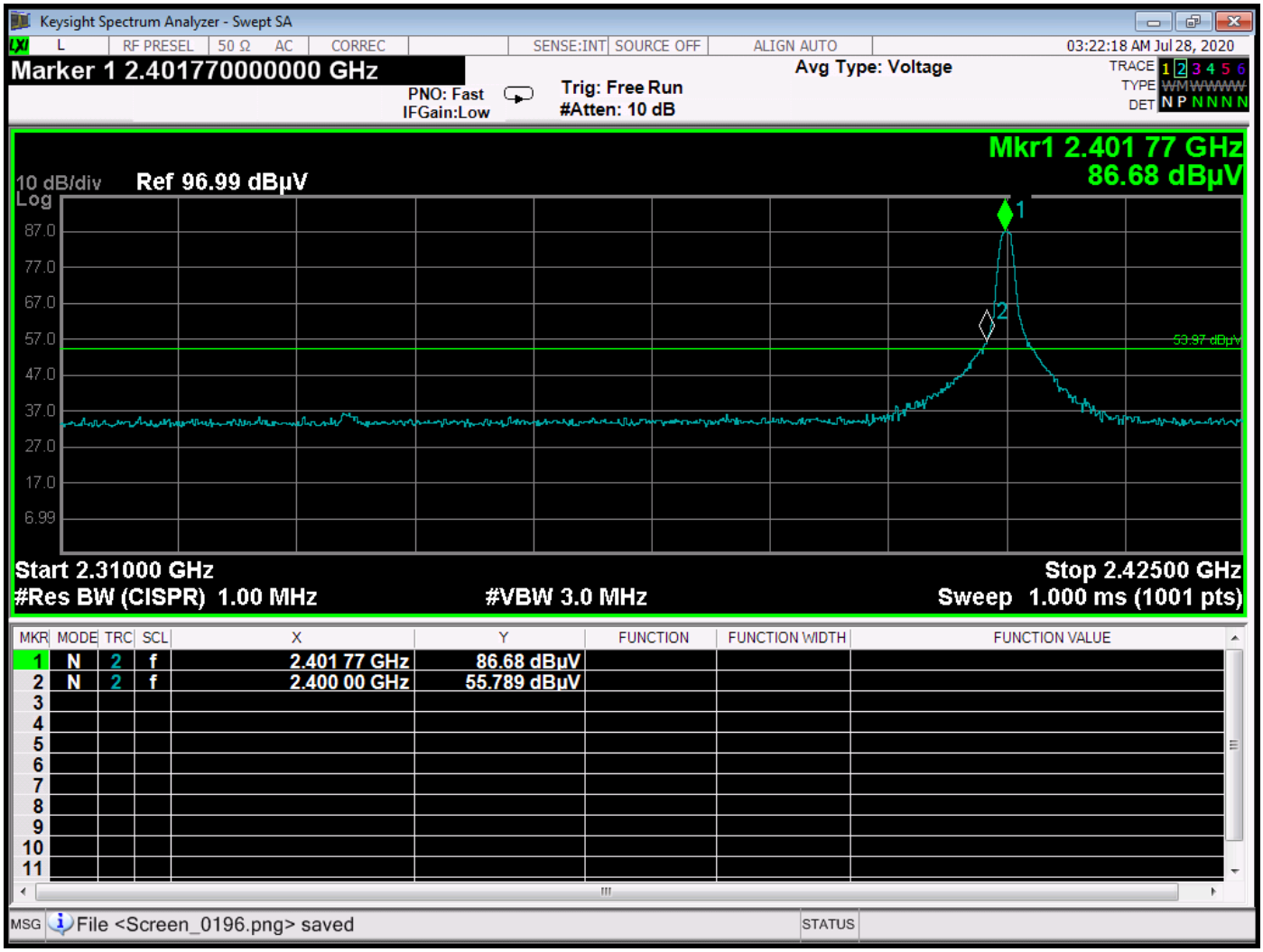
FCC 15.249
Hinge Health, Inc.
Hinge Sensor
Model: H3
Band Edges - AC Mode

Date: 07/28/2020
Lab: D
Tested By: Kyle Fujimoto

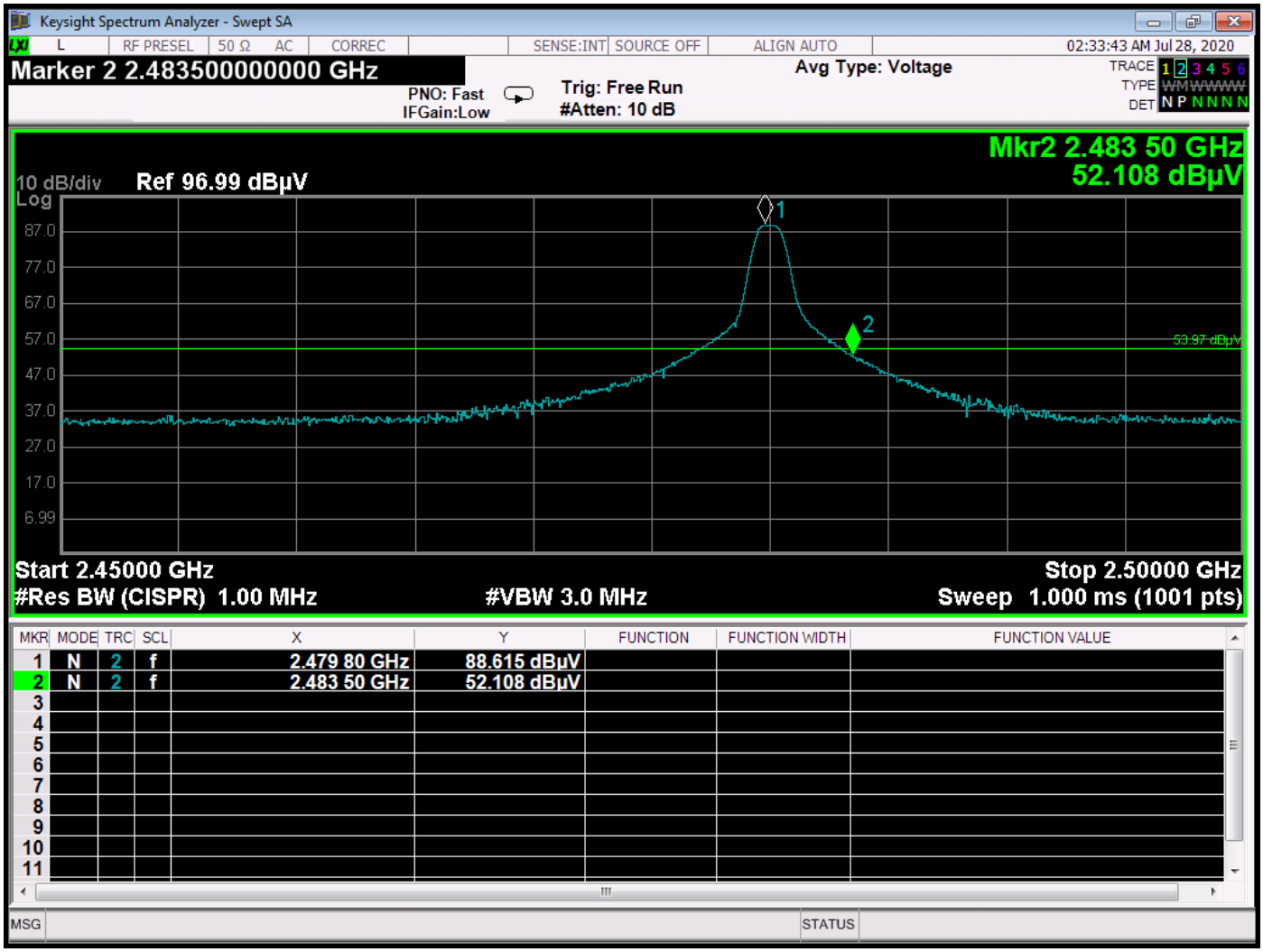
Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
240H30	89.52	H	113.97	-24.45	Peak	55.25	164.47	**Fundamental - Low Ch.**
240H30	69.52	H	93.97	-24.45	Avg	55.25	164.47	**X-Axis - Worst Case**
2400.00	59.22	H	73.97	-14.75	Peak	55.25	164.47	**Band Edge**
2400.00	39.22	H	53.97	-14.75	Avg	55.25	164.47	**X-Axis - Worst Case**
240H30	86.68	V	113.97	-27.29	Peak	175.25	110.74	**Fundamental - Low Ch.**
240H30	66.68	V	93.97	-27.29	Avg	175.25	110.74	**Y-Axis - Worst Case**
2400.00	55.79	V	73.97	-18.18	Peak	175.25	110.74	**Band Edge**
2400.00	35.79	V	53.97	-18.18	Avg	175.25	110.74	**Y-Axis - Worst Case**
2480.00	88.62	H	113.97	-25.36	Peak	0.00	128.23	**Fundamental - High Ch.**
2480.00	68.62	H	93.97	-25.36	Avg	0.00	128.23	**X-Axis - Worst Case**
2483.50	52.11	H	73.97	-21.86	Peak	0.00	128.23	**Band Edge**
2483.50	32.11	H	53.97	-21.86	Avg	0.00	128.23	**X-Axis - Worst Case**
2480.00	85.93	V	113.97	-28.04	Peak	354.00	110.92	**Fundamental - High Ch.**
2480.00	65.93	V	93.97	-28.04	Avg	354.00	110.92	**Z-Axis - Worst Case**
2483.50	50.38	V	73.97	-23.59	Peak	354.00	110.92	**Band Edge**
2483.50	30.38	V	53.97	-23.59	Avg	354.00	110.92	**Z-Axis - Worst Case**



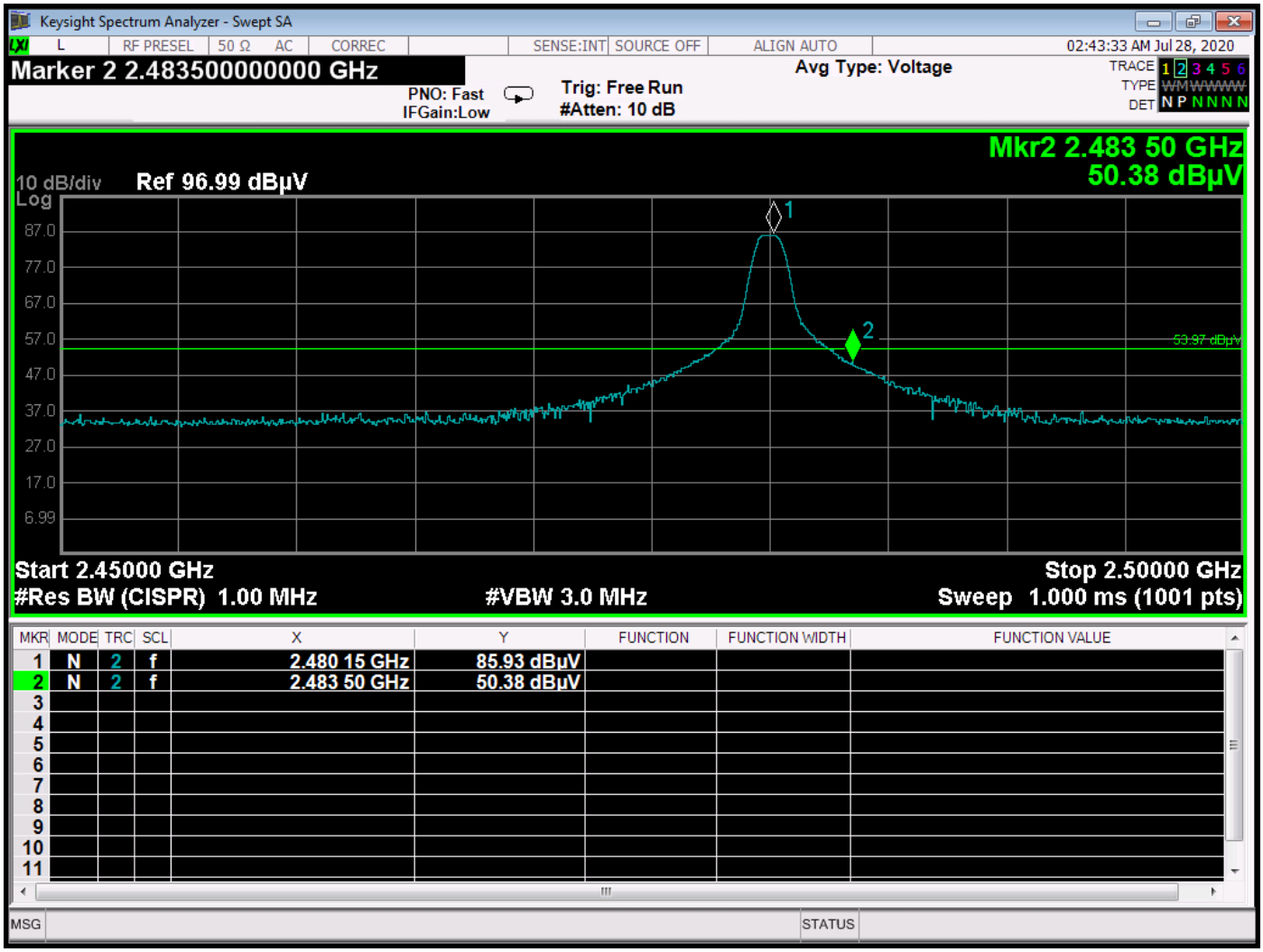
Band Edge – Low Channel – Horizontal Polarization – AC Mode – X-Axis



Band Edge – Low Channel – Horizontal Polarization – AC Mode – Y-Axis



Band Edge – High Channel – Horizontal Polarization – AC Mode – X-Axis



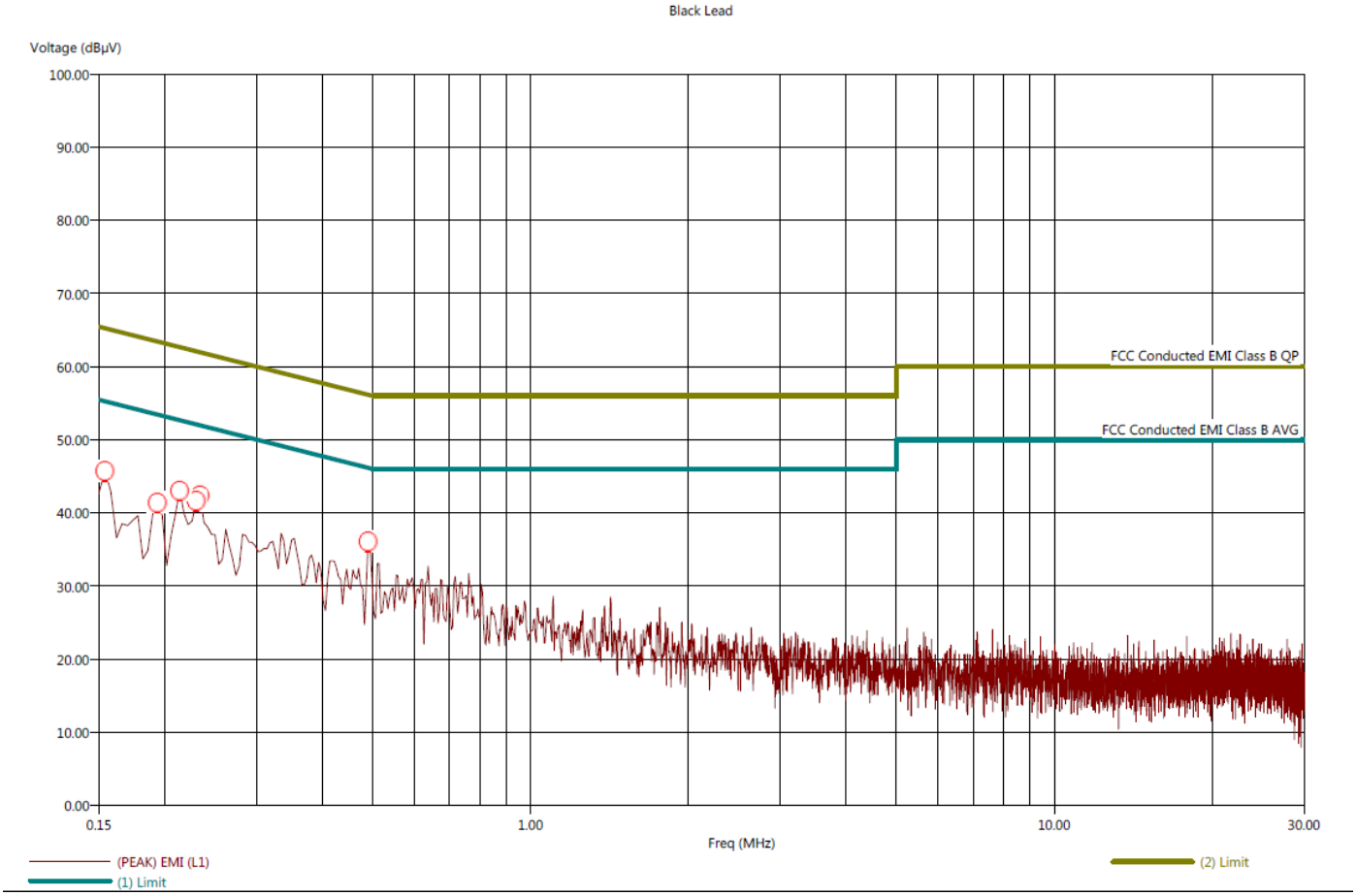
Band Edge – High Channel – Vertical Polarization – AC Mode – Z-Axis

CONDUCTED EMISSIONS

DATA SHEETS

Title: FCC Class B - Black Lead
File: 1 - Pre-Scan - Black Lead - AC Mode - 07-28-2020.set
Operator: Kyle Fujimoto
EUT Type: Hinge Sensor
EUT Condition: The EUT is continuously transmitting BLE at 2480 MHz
Company: Hinge Health
M/N:H3
S/N:N/A
AC Mode

7/28/2020 9:20:20 AM
Sequence: Preliminary Scan



Title: FCC Class B - Black Lead
File: 1 - Final Scan - Black Lead - AC Mode - 07-28-2020.set
Operator: Kyle Fujimoto
EUT Type: Hinge Sensor
EUT Condition: The EUT is continuously transmitting BLE at 2480 MHz
Company: Hinge Health
M/N: H3
S/N: N/A
AC Mode

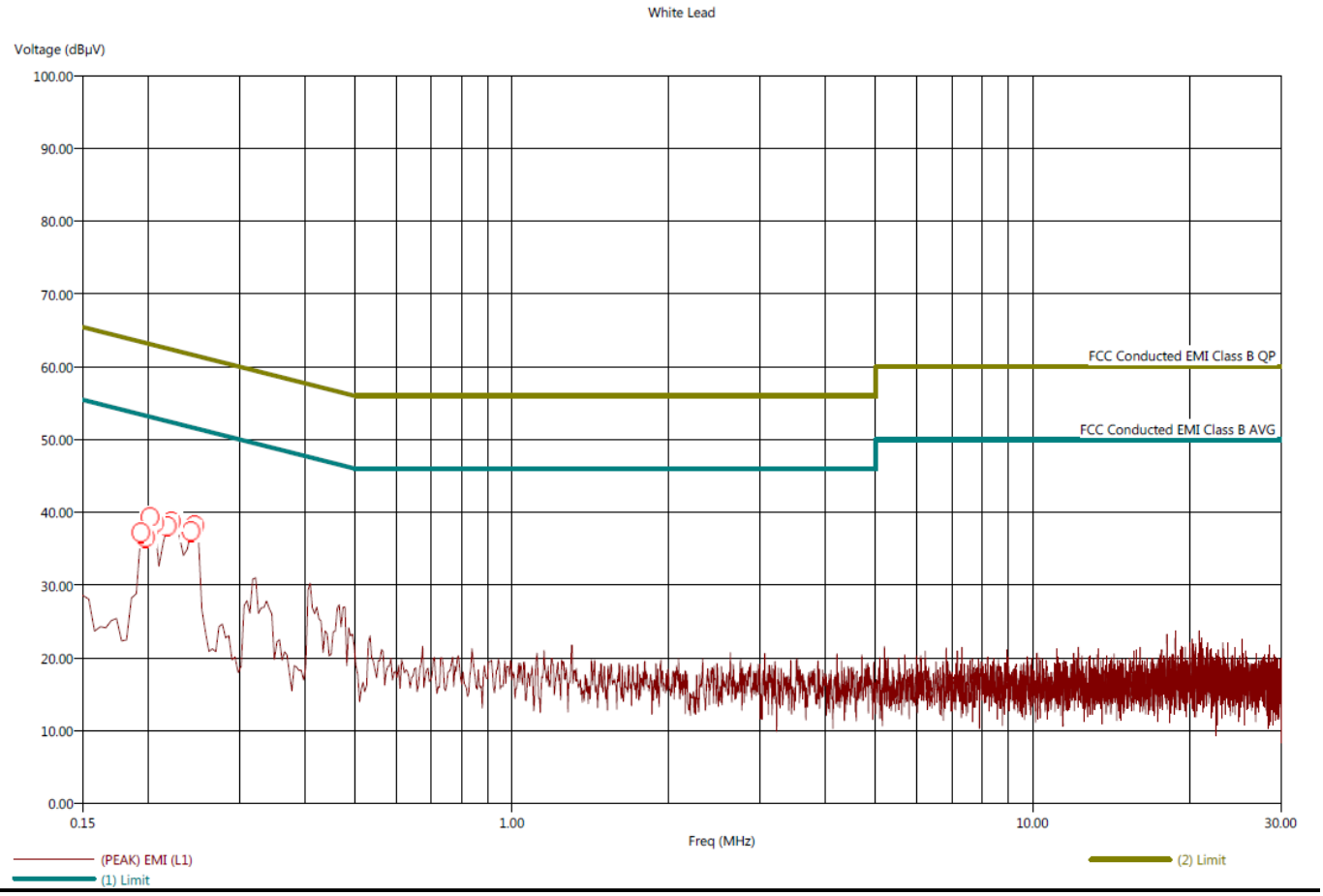
7/28/2020 9:30:31 AM
Sequence: Final Measurements

Black Lead - Average

Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (AVG) (dB)	(AVG) Margin (AVG) (dB)	(AVG) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)
0.154	47.61	36.20	-7.35	-18.76	54.96	0.05	0.47	10.03
0.194	47.09	33.96	-6.30	-19.43	53.39	0.05	0.38	10.00
0.214	46.37	34.06	-6.63	-18.94	53.00	0.05	0.36	10.00
0.230	47.80	32.50	-4.25	-19.55	52.04	0.06	0.30	10.02
0.234	44.66	32.90	-7.02	-18.78	51.68	0.06	0.28	10.02
0.490	33.46	23.29	-12.68	-22.85	46.14	0.09	0.12	10.10

Title: FCC Class B - White Lead
File: 2 - Pre-Scan - White Lead - AC Mode - 07-28-2020.set
Operator: Kyle Fujimoto
EUT Type: Hinge Sensor
EUT Condition: The EUT is continuously transmitting BLE at 2480 MHz
Company: Hinge Health
M/N:H3
S/N:N/A
AC Mode

7/28/2020 9:32:26 AM
Sequence: Preliminary Scan



Title: FCC Class B - White Lead
File: 2 - Final Scan - White Lead - AC Mode - 07-28-2020.set
Operator: Kyle Fujimoto
EUT Type: Hinge Sensor
EUT Condition: The EUT is continuously transmitting BLE at 2480 MHz
Company: Hinge Health
M/N: H3
S/N: N/A
AC Mode

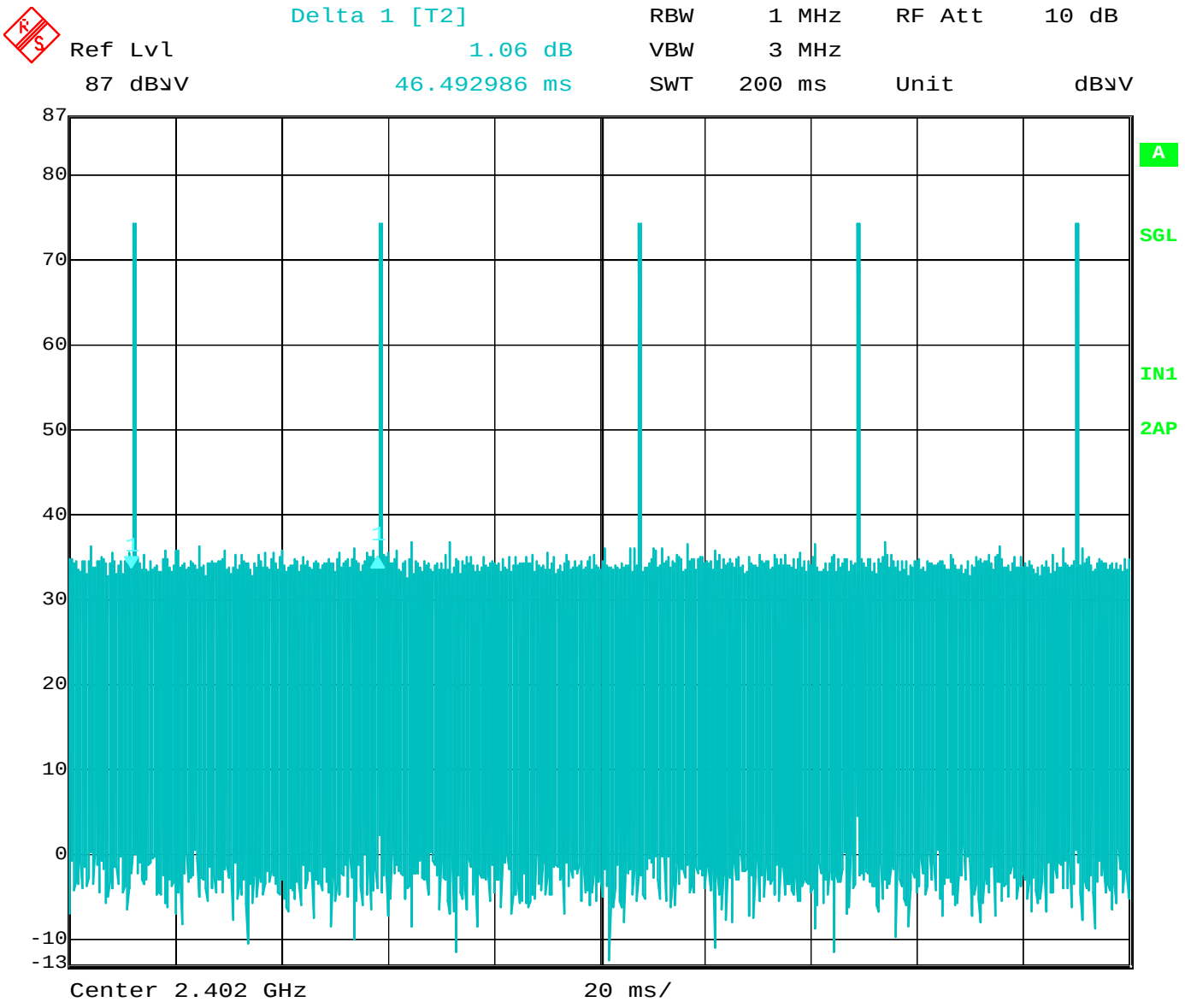
7/28/2020 9:33:18 AM
Sequence: Final Measurements

White Lead - Average

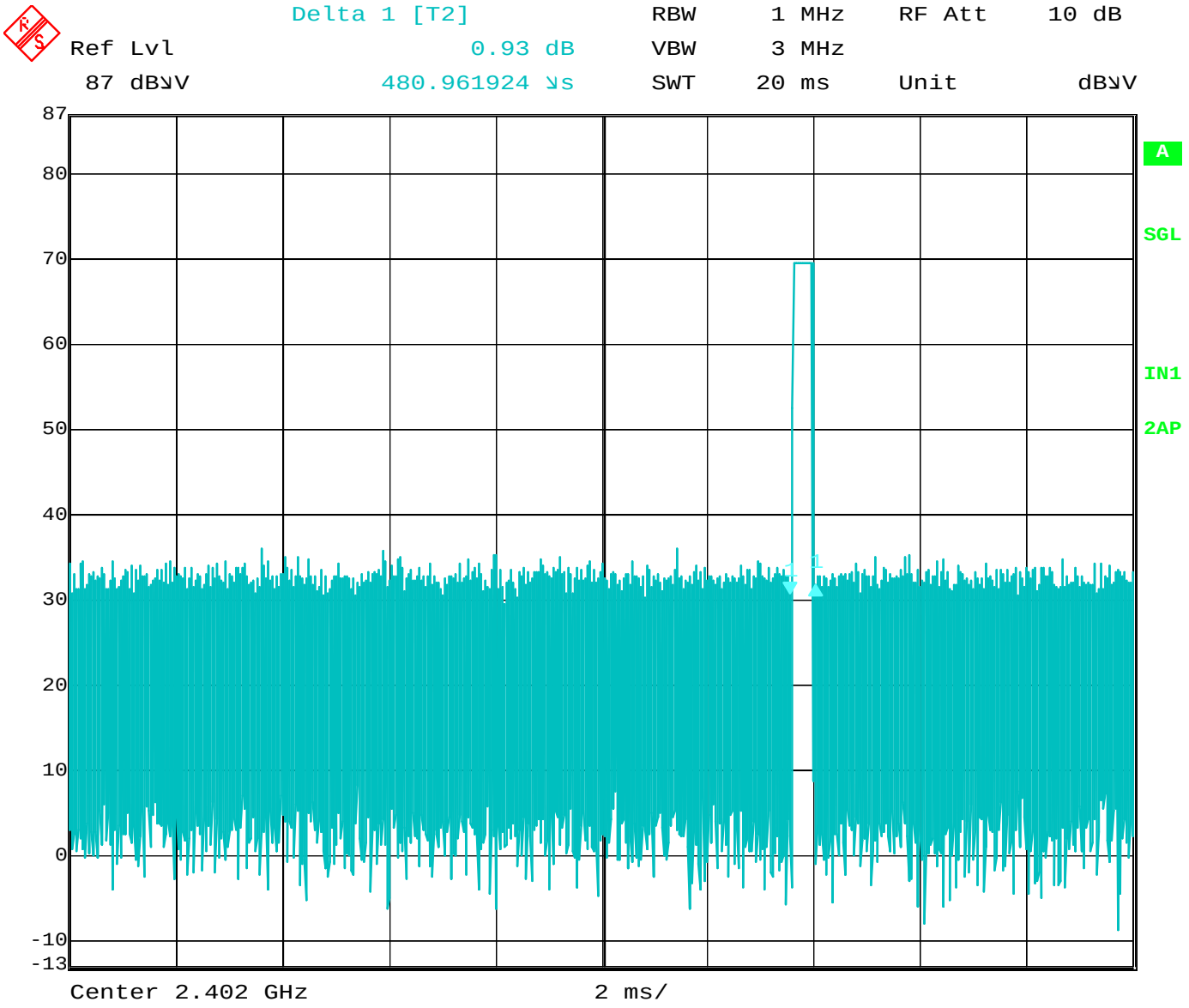
Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (AVG) (dB)	(AVG) Margin (AVG) (dB)	(AVG) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)
0.194	43.48	28.13	-9.84	-25.19	53.31	0.05	0.37	10.00
0.198	44.10	27.93	-9.25	-25.42	53.34	0.05	0.38	10.00
0.202	41.43	26.22	-11.45	-26.66	52.88	0.05	0.35	10.00
0.206	43.29	28.66	-9.81	-24.44	53.10	0.05	0.36	10.00
0.218	40.97	27.20	-11.41	-25.18	52.38	0.05	0.32	10.01
0.222	41.15	27.08	-11.31	-25.38	52.46	0.05	0.33	10.01
0.242	40.65	26.02	-10.88	-25.51	51.52	0.06	0.27	10.02
0.246	40.29	25.51	-11.51	-26.29	51.79	0.06	0.29	10.02

DUTY CYCLE

DATA SHEETS

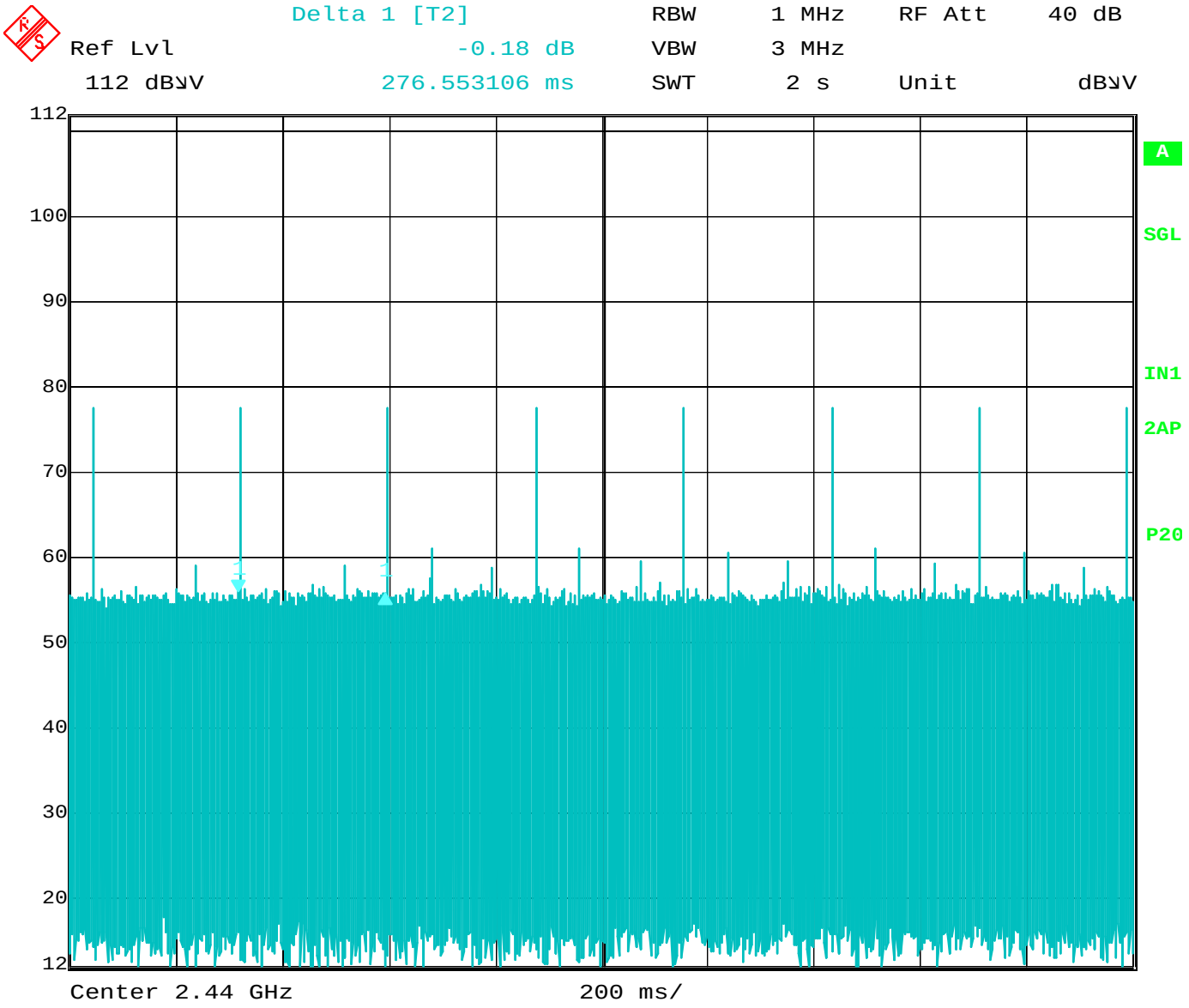


Time Between Pulses – Advertising Mode

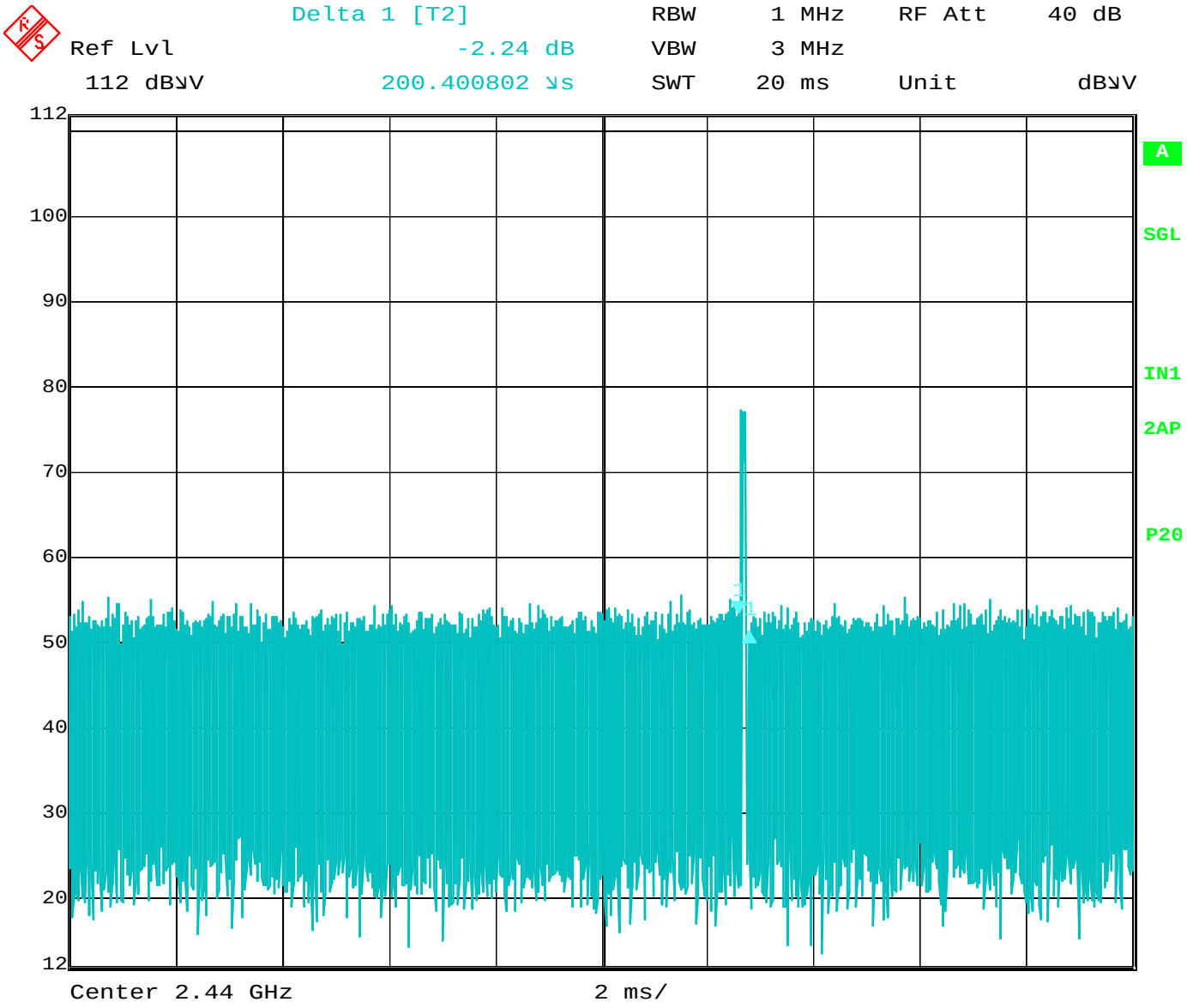


Time of One Pulse – Advertising Mode

Duty Cycle = 480.961924 us / 46.492986 ms = 1.03%



Time Between Pulses – Data Mode



Time of One Pulse – Data Mode

Duty Cycle = 200.400802 us / 276.553106 ms = 0.72%