

*FCC PART 15, SUBPART B and C
TEST REPORT**for***S DISPLAY****Model: 3.3****Serial Number: F0210007**

Prepared for

COMODULE OU
DUNKRI 9
TALLINN, ESTONIA 10123

Prepared by: _____

HARVEY SAMACO

Approved by: _____

JAMES ROSS

COMPATIBLE ELECTRONICS INC.
114 OLINDA DRIVE
BREA, CALIFORNIA 92823
(714) 579-0500

DATE: MAY 12, 2020

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
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Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500**Lake Forest Division**
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400**Newbury Park Division**
1050 Lawrence Drive
Newbury Park, CA 91320
(805) 480-4044

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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.

This report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the U.S. government.

Device Tested: S Display
Model: 3.3
S/N: F0210007

Product Description: The EUT is used to communicate with an e-bike via a cable and send the usage metrics to the mobile device over BLE 2.4 GHz ISM band. Clock Frequencies: 32 MHz and 32.768 kHz
(Dimensions: 60 mm x 40 mm x 50 mm)

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

Customer: Comodule OU
Dunkri 9
Tallinn, Estonia 10123

Test Dates: March 13-14 and 16, 2020

Test Specification covered by accreditation:



Test Specifications: Emissions requirements
CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247

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

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	Complies with the Class B limits of the CFR Title 47, Part 15 Subpart B. Highest reading in relation to spec limit 35.70 (Avg) dBuV @ 0.314 MHz (*U = 2.73 dB)
2	Radiated RF Emissions, 9 kHz – 25000 MHz	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and the limits of CFR Title 47, Part 15 Subpart C, 15.205, 15.209 and 15.247 (d) Highest reading in relation to spec limit 48.14 (Avg) dBuV/m @ 12010 MHz (*U = 3.95 dB)
3	DTS Bandwidth	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(2)
4	Peak Output Power	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (b)(3)
5	RF Band Edges	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (d)
6	Spectral Density	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (e)

1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the S Display, Model: 3.3. The emissions measurements were performed according to the measurement procedure described in ANSI C63.4 and ANSI C63.10. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the Class B specification limits defined by CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247.

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 consideration 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

Comodule OU

Kristjan Maruste CEO

Compatible Electronics Inc.

Harvey Samaco Test Technician

Kyle Fujimoto Test Engineer

James Ross Test Engineer

2.4 Date Test Sample was Received

The test sample was received on March 12, 2020. Received as described in product description.

2.5 Disposition of the Test Sample

The test sample has not been returned to Comodule OU 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	Part Number
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
IR	Infrared
BLE	Bluetooth Low Energy
OU	Osauhinglt (Limited liability company)
LIN	Line
UART	Universal Asynchronous Receiver/Transmitter
GND	Ground

3. APPLICABLE DOCUMENTS

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

SPEC	TITLE
FCC Title 47, Part 15 Subpart C	FCC Rules – Radio frequency devices (including digital devices) – Intentional Radiators
FCC Title 47, Part 15 Subpart B	FCC Rules – Radio frequency devices (including digital devices) – Unintentional Radiators
558074 D01 DTS Meas Guidance v05r02	Guidance for Performing Compliance Measurements on Digital Transmissions Systems (DTS) Operating Under Section 15.247
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 for Testing Unlicensed Wireless Devices

4. DESCRIPTION OF TEST CONFIGURATION

The S Display, Model: 3.3 (EUT) was connected to a Kvaser Leaf Light v.2 and a switching power supply via the LIN, CAN, UART, I2C, and GND internal ports. The Kvaser Leaf Light v.2 was also connected to the laptop via its internal data port. The laptop was also connected to an AC/DC adapter.

The EUT is continuously transmitting and sending data to the laptop and displaying an image on EUT display as well as the laptop.

Statement of Rationale: The device should be used as stated in the operation manual. The manufacturer is not responsible for the device performance when the device is not used as intended.

The final radiated as well as the conducted emissions data for the EUT was taken in the configuration described above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination

- Cable 1** This is a 60-centimeter unshielded cable connecting the EUT to the D-9 pin metallic connector and cable #5. The cable is hard wired at each end. The first black, purple, and orange wires are connected to the D-9 pin metallic connector and the second black and red wires are connected to cable #5.
- Cable 2** This is a 20-centimeter braid shielded cable connecting the D-9 pin metallic connector to the Light Leaf v.2. The cable is hard wired at each end. The shield of the cable is grounded to the chassis via a hard wired connection.
- Cable 3** This is a 1-meter braid shielded cable connecting the Light Leaf v.2 to the laptop. The cable has a USB type 'A' connector at the laptop end and is hard wired into the Light Leaf v.2. The shield of the cable is grounded to the chassis via the connector.
- Cable 4** This is a 1.5-meter unshielded cable connecting the AC/DC Adapter to the laptop. The cable has a one-pin barrel connector at the laptop end and is hard wired into the AC/DC Adapter. The cable has a molded ferrite at the laptop end.
- Cable 5** This is a 1.5-meter unshielded cable connecting the red and black wires of cable #1 to the switching power supply. The cable is hard wired at each end. The cable was bundled to a length of 1-meter.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT**5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
S DISPLAY (EUT)	COMODULE OU	3.3	F0210007	2AQHSF0210007
AC/DC POWER SUPPLY (LAPTOP)	DELL	HA65NS1-00	N/A	N/A
SWITCHING POWER SUPPLY (EUT)	XP POWER	VEL05US120-EU-JA	N/A	N/A
LEAF LIGHT V.2	KVASER	73-30130-00685-0	019930	N/A
FIRMWARE	KVASER	207.200326	B2	N/A
LAPTOP	DELL	LATITUDE	4XTJ4S	DoC

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
RF RADIATED AND CONDUCTED 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
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
Horn Antenna	Com-Power	AH-826	71957	N/A	N/A
Preamplifier	Com-Power	PAM-118	181653	February 5, 2020	1 Year
Preamplifier	Com-Power	PA-840	711013	May 10, 2018	2 Year
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A
LISN (EUT)	Com-Power	LI-215A	191951	August 7, 2019	1 Year
LISN (ACC)	Com-Power	LI-215A	191952	August 7, 2019	1 Year
Attenuator 10 dB	SureCall	SC-ATT-10	17100025	October 28, 2019	1 Year

6. TEST SITE DESCRIPTION

6.1 Test Facility Description

Please refer to section 2.1 and 7.1 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 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

For frequencies above 1 GHz: The EUT was mounted on a 1.0 by 1.5 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.

The uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level, using a coverage factor of $k=2$

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

Measurement		U_{cispr}	$U_{lab} = 2u_c(y)$
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 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. CHARACTERISTICS OF THE TRANSMITTER

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

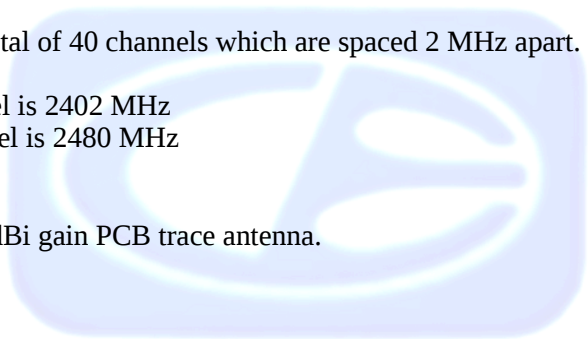
7.1 Channel Number and Frequencies

The EUT uses a total of 40 channels which are spaced 2 MHz apart.

The lowest channel is 2402 MHz
The highest channel is 2480 MHz

7.2 Antenna

The EUT has a 0 dBi gain PCB trace antenna.



8. TEST PROCEDURES

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

8.1 RF Emissions

8.1.1 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 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.

The six highest emissions are listed in Table 1.0.

Test Results:

The EUT complies with the **Class B** limits of **CFR** Title 47, Part 15, Subpart B; and the limits of **CFR** Title 47, Part 15, Subpart C sections 15.207 for conducted emissions.

8.1.2 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.

The frequencies above 1 GHz were averaged using the RMS detector average function on 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 gunsight method was used when measuring with the horn antenna in order to ensure accurate results.

The EUT was tested at a 3-meter test distance. The six highest emissions are listed in Table 2.0.

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 **Class B** limits of **CFR** Title 47, Part 15, Subpart B; and Subpart C sections 15.205, 15.209, and 15.247 (d) for radiated emissions.

8.1.3 RF Emissions Test ResultsTable 1.0 CONDUCTED EMISSION RESULTS
S DISPLAY
Model: 3.3

Frequency MHz	Average Emission Level* dBuV	Average Specification Limit dBuV	Delta (Emission – Spec limit) dB
0.314 (BL)	35.70	49.65	-13.95
0.318 (BL)	35.66	49.65	-13.99
0.326 (BL)	33.67	49.58	-15.90
0.302 (BL)	33.42	49.81	-16.39
0.318 (WL)	32.66	49.67	-17.01
0.306 (WL)	32.19	49.69	-17.51

Table 2.0 RADIATED EMISSION RESULTS
S DISPLAY
Model: 3.3

Frequency (MHz)	EMI Reading (dBuV/m)	Average Specification Limit (dBuV/m)	Delta (Cor. Reading – Spec. Limit) (dB)
12010.00 (V) (Z-Axis)	48.14 (Avg)	53.97	-5.83
12010.00 (H) (X-Axis)	46.40 (Avg)	53.97	-7.57
12200.00 (H) (X-Axis)	46.19 (Avg)	53.97	-7.78
12200.00 (H) (Y-Axis)	45.99 (Avg)	53.97	-7.98
12200.00 (H) (Z-Axis)	45.93 (Avg)	53.97	-8.04
12400.00 (H) (Z-Axis)	44.39 (Avg)	53.97	-9.58

Notes: * The complete emissions data is given in Appendix E of this report.
(BL) Black Lead
(WL) White Lead
(V) Vertical
(H) Horizontal

8.1.4 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 ($\mu\text{V/m}$) $\log \times 20$ = 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) $\log \times 40$ = distance factor

For measurements above 30 MHz: (Specification distance / test distance) $\log \times 20$ = 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.

8.2 DTS Bandwidth

The DTS Bandwidth was measured using the EMI Receiver. The following steps were performed for measuring the DTS Bandwidth.

1. Set RBW = 100 kHz
2. Set the video bandwidth (VBW) to equal or greater than 3 times the RBW
3. Detector = Peak
4. Trace Mode = Max Hold
5. Sweep = Auto Couple
6. Allow the trace to stabilize
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(2).

8.3 Peak Output Power

The Peak Output Power was measured using radiated emissions method described in section 8.1.2 of this test report. The peak power was calculated by the following equation:

$$P = [(E \cdot D)^2] / (30 G)$$

P = Power in Watts for which you are solving

E = the measured maximum field strength in V/m utilizing the widest available RBW.

G = the numeric gain of the transmitting antenna over an isotropic radiator.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (b)(3). The maximum peak output power is less than 1 Watt. Please see the data sheets located in Appendix E.

8.4 Emissions in Non-restricted Frequency Bands

The procedure described in section 8.1.2 of this test report was used to maximize the emissions. The procedure of section 11.11.2 of ANSI C63.10 was then used to determine that the highest reference level was the lower channel, which was 96.72 dBuV/m.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d). The emissions in the non-restricted frequency bands are at least attenuated by 20 dB below the highest reference level established by section 11.11.2 of ANSI C63.10. Please see the data sheets located in Appendix E.

8.5 RF Band Edges

The RF band edges were taken at 2390 MHz when the EUT was on the low channel and 2483.5 MHz when the EUT was on the high channel using the EMI Receiver. A preamplifier was used to boost the signal level, with the plots being taken at a 3 meter test distance. The radiated emissions test procedure as describe in section 8.1.2 of this test report was used to maximize the emission.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d). The RF power at the restricted bands closest to the band edges at 2390 MHz and 2483.5 MHz also meet the limits of section 15.209. Please see the data sheets located in Appendix E.

8.6 Spectral Density Test

The spectrum density output was measured using radiated emissions method described in section 8.1.2 of this test report. The spectral density was calculated by the following equation.

$$P = [(E \cdot D)^2] / (30 G)$$

P = Power in Watts for which you are solving

E = the measured maximum field strength in V/m utilizing the an RBW of 3 kHz.

G = the numeric gain of the transmitting antenna over an isotropic radiator.

The EMI Receiver was setup as follows:

1. Set analyzer center frequency to DTS channel center frequency
2. Set the span to at least 1.5 times the OBW.
3. Set the RBW to 3 kHz
4. Set the VBW $\geq 3 \times$ RBW
5. Detector = Peak
6. Ensure that the number of measurement points in the sweep $\geq 2 \times$ span/RBW
7. Sweep time = auto couple
8. Use the peak marker function to determine the maximum amplitude level

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (e).

9. CONCLUSIONS

The S Display, Model: 3.3 (EUT), as tested, meets all of the specification limits defined in FCC Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247.



APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

Brea Division
114 Olinda Drive
Brea, CA 92823
(714) 579-0500

Lake Forest Division
20621 Pascal Way
Lake Forest, CA 92630
(949) 587-0400

Newbury Park Division
1050 Lawrence Drive
Newbury Park, CA 91320
(805) 480-4044

LABORATORY ACCREDITATIONS AND RECOGNITIONS



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."



APPENDIX B

MODIFICATIONS TO THE EUT

MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and FCC 15.247 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

S Display
Model: 3.3
S/N: F0210007

There are no additional models covered under this report.



APPENDIX D

DIAGRAMS AND CHARTS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

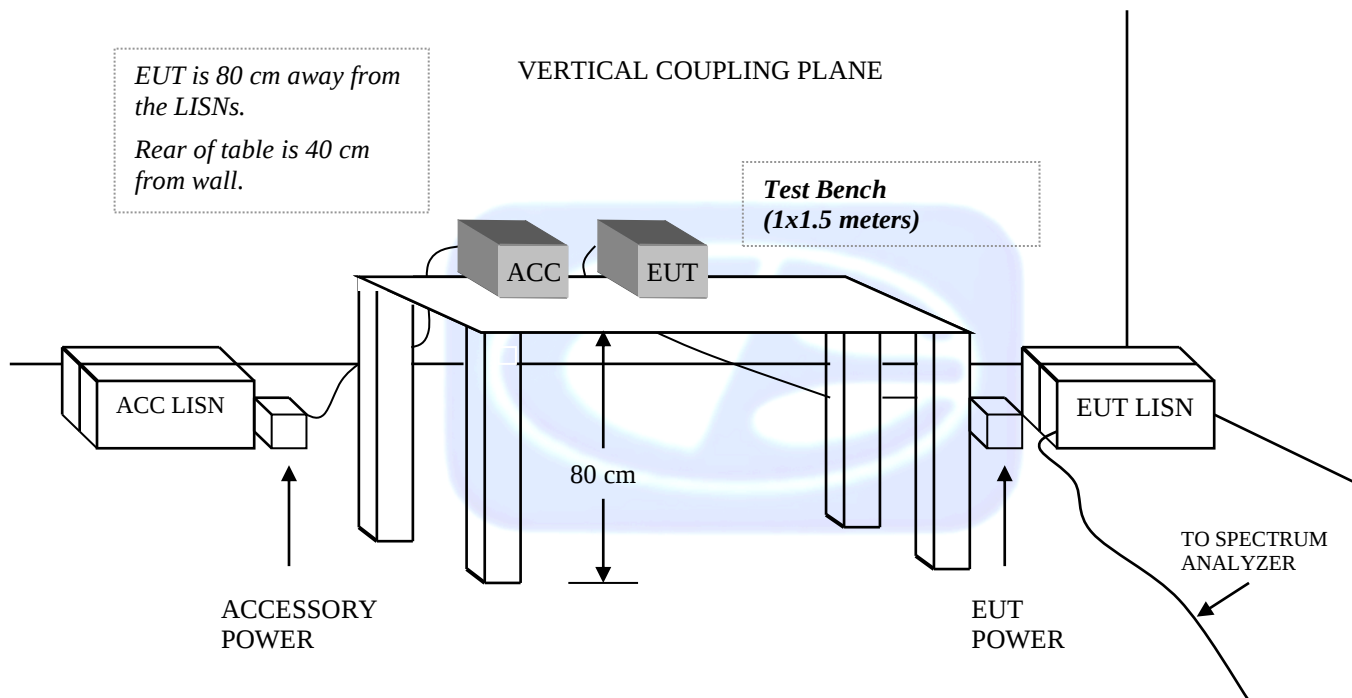
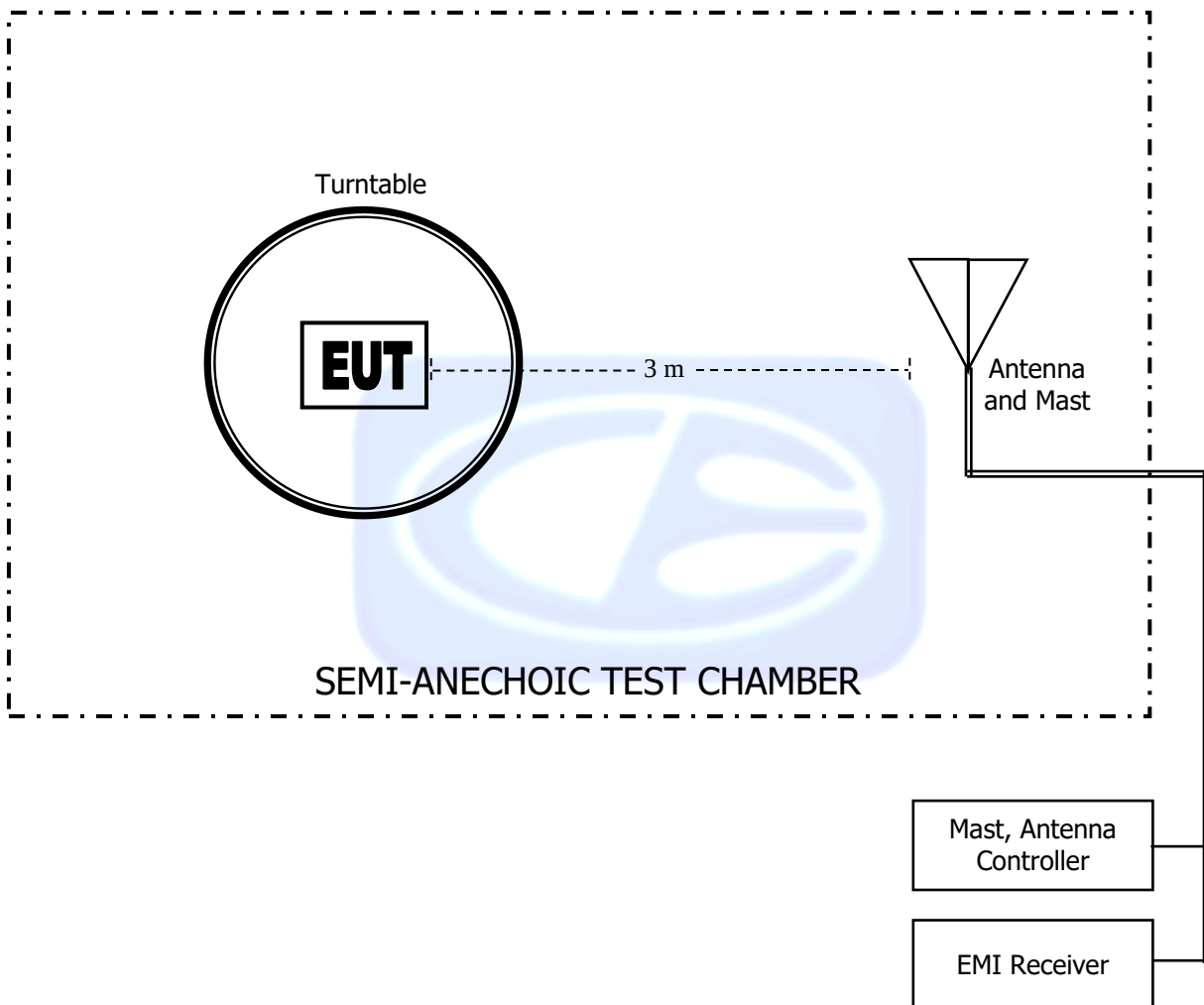


FIGURE 2: LAYOUT OF THE SEMI-ANECHOIC TEST CHAMBER



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
2.00	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
12.00	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
22.00	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	12.00	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
2.0	28.838	11.0	38.259
2.5	28.971	11.5	39.920
3.0	29.919	12.0	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	37.403	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 AH-826**HORN ANTENNA****S/N: 71957**

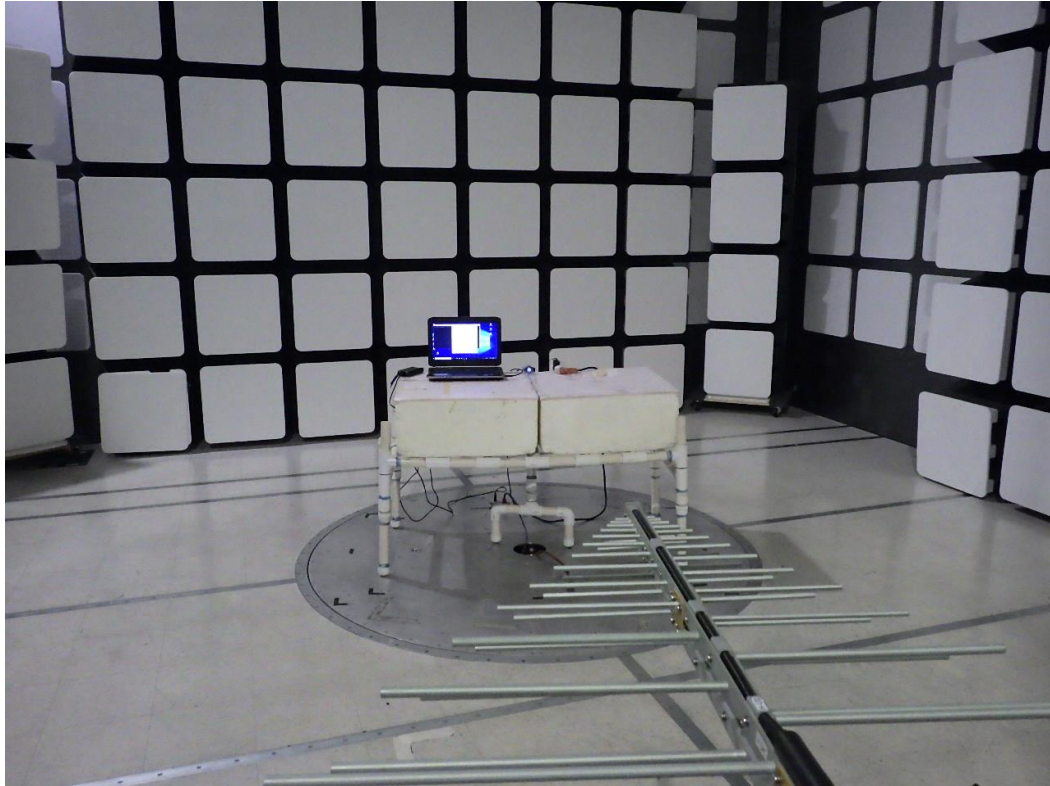
FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	33.5	22.5	35.5
18.5	33.5	23.0	35.9
19.0	34.0	23.5	35.7
19.5	34.0	24.0	35.6
20.0	34.3	24.5	36.0
20.5	34.9	25.0	36.2
21.0	34.7	25.5	36.1
21.5	35.0	26.0	36.2
22.0	35.0	26.5	35.7

COM-POWER PAM-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
2.0	39.90	12.0	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: MAY 10, 2018**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
18.0	26.90	31.0	24.56
19.0	24.65	31.5	25.84
20.0	25.74	32.0	26.93
21.0	24.78	32.5	27.76
22.0	24.83	33.0	25.76
23.0	24.81	33.5	26.76
24.0	25.52	34.0	26.51
25.0	24.90	34.5	27.49
26.0	25.92	35.0	27.64
26.5	26.53	35.5	27.45
27.0	26.41	36.0	25.08
27.5	24.78	36.5	25.61
28.0	25.13	37.0	24.69
28.5	29.29	37.5	24.10
29.0	28.44	38.0	24.83
29.5	27.51	38.5	24.41
30.0	27.12	39.0	24.44
30.5	26.42	39.5	22.96
		40.0	22.29

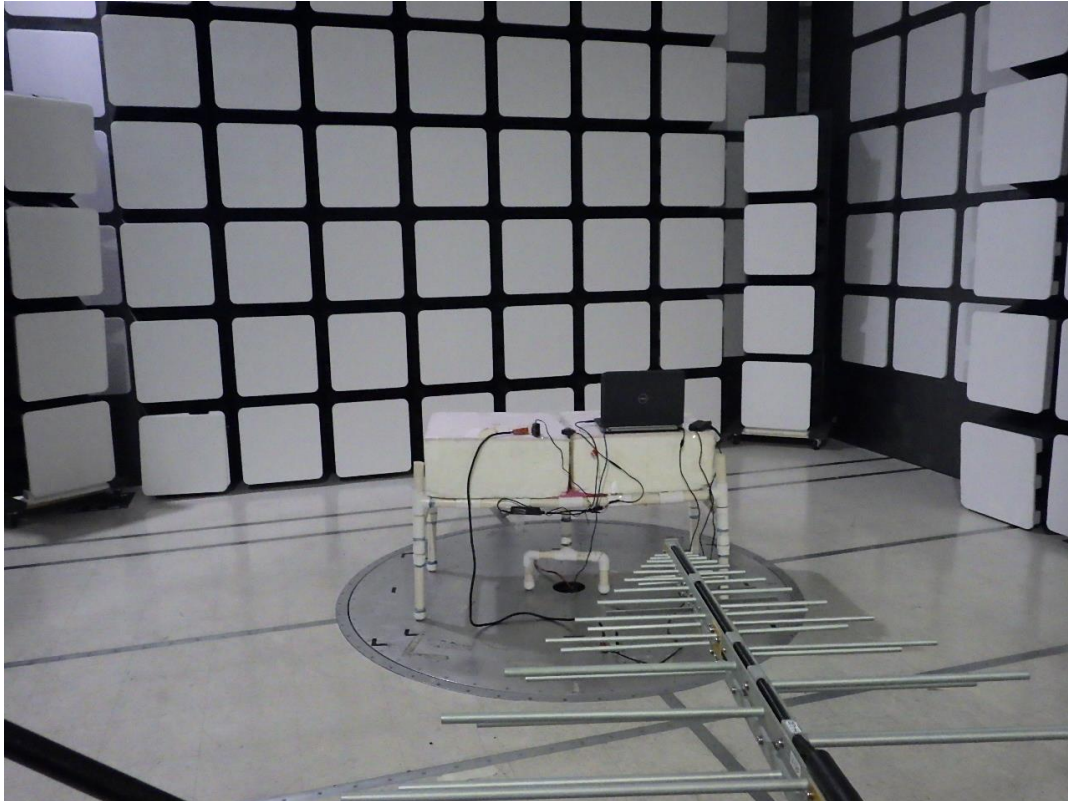


FRONT VIEW

COMODULE OU
S DISPLAY
MODEL: 3.3

FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

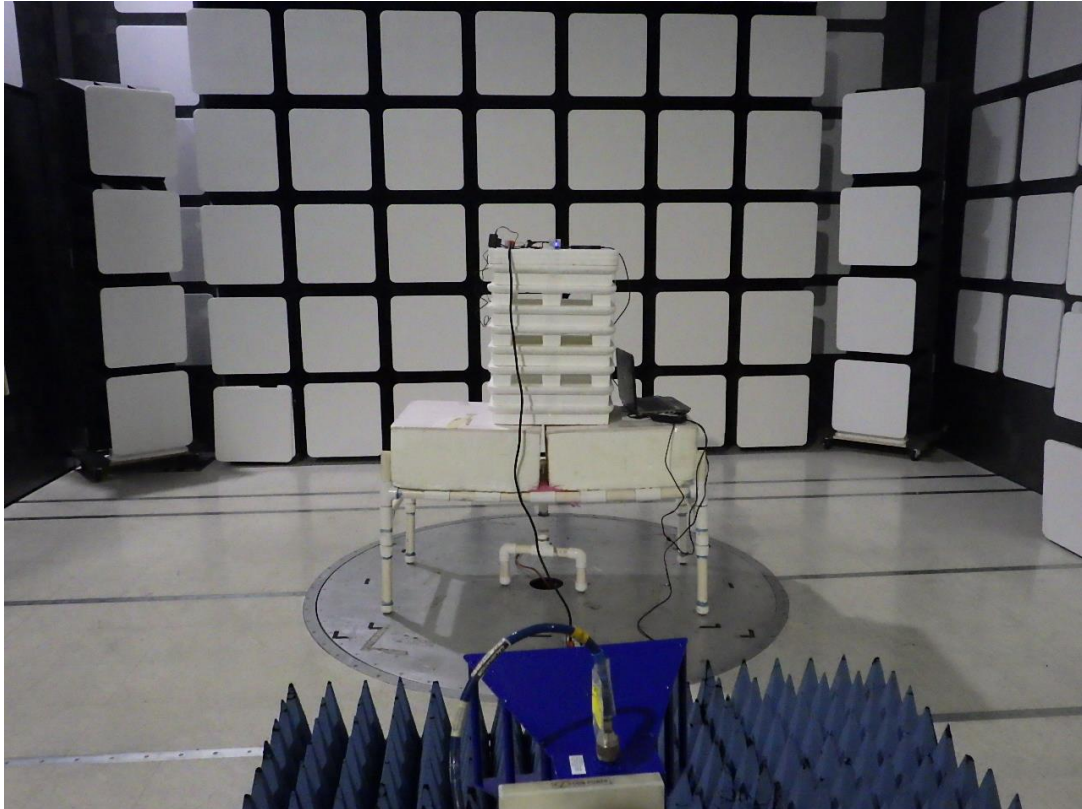


REAR VIEW

COMODULE OU
S DISPLAY
MODEL: 3.3

FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

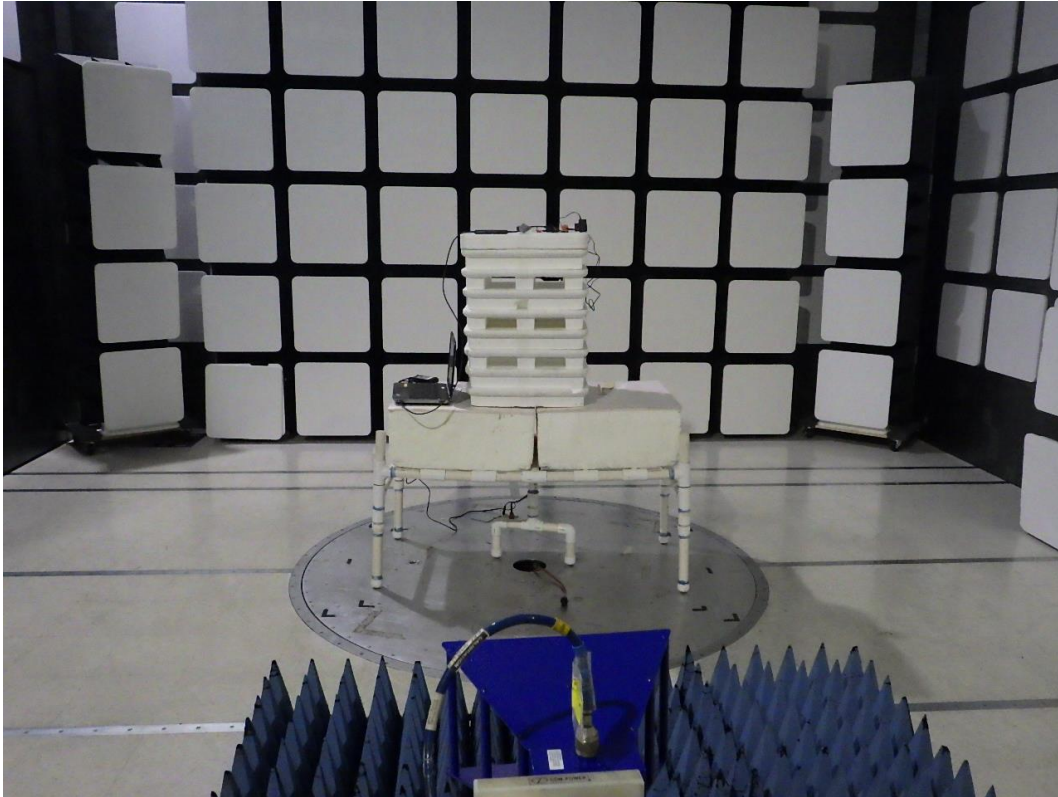


FRONT VIEW

COMODULE OU
S DISPLAY
MODEL: 3.3

FCC SUBPART B AND C – RADIATED EMISSIONS – 1 GHz to 18 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

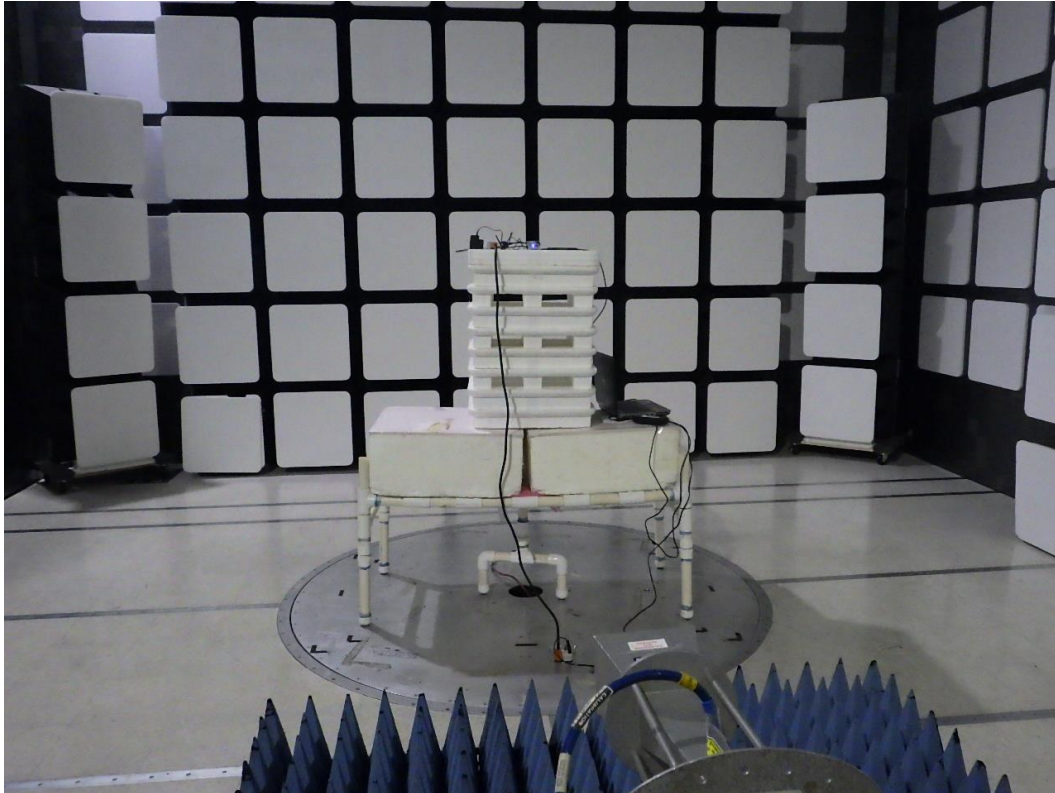


REAR VIEW

COMODULE OU
S DISPLAY
MODEL: 3.3

FCC SUBPART B AND C – RADIATED EMISSIONS – 1 GHz to 18 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

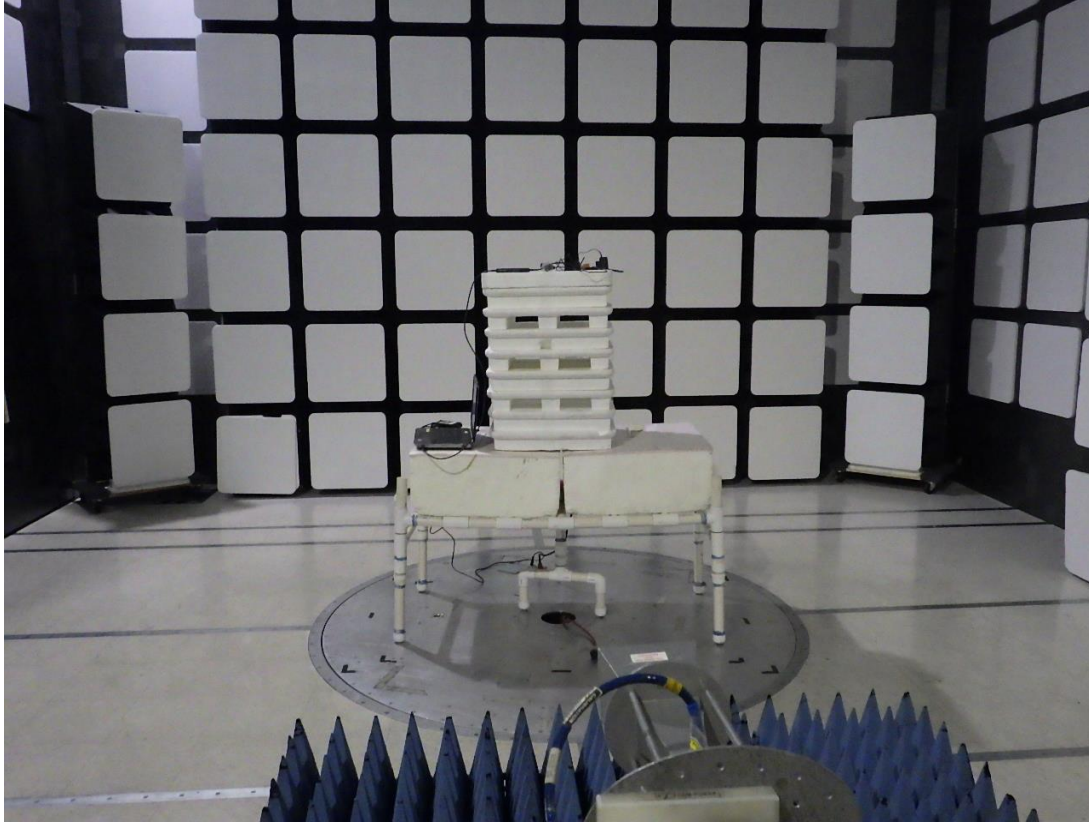


FRONT VIEW

COMODULE OU
S DISPLAY
MODEL: 3.3

FCC SUBPART B AND C – RADIATED EMISSIONS – 18 GHz to 25 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

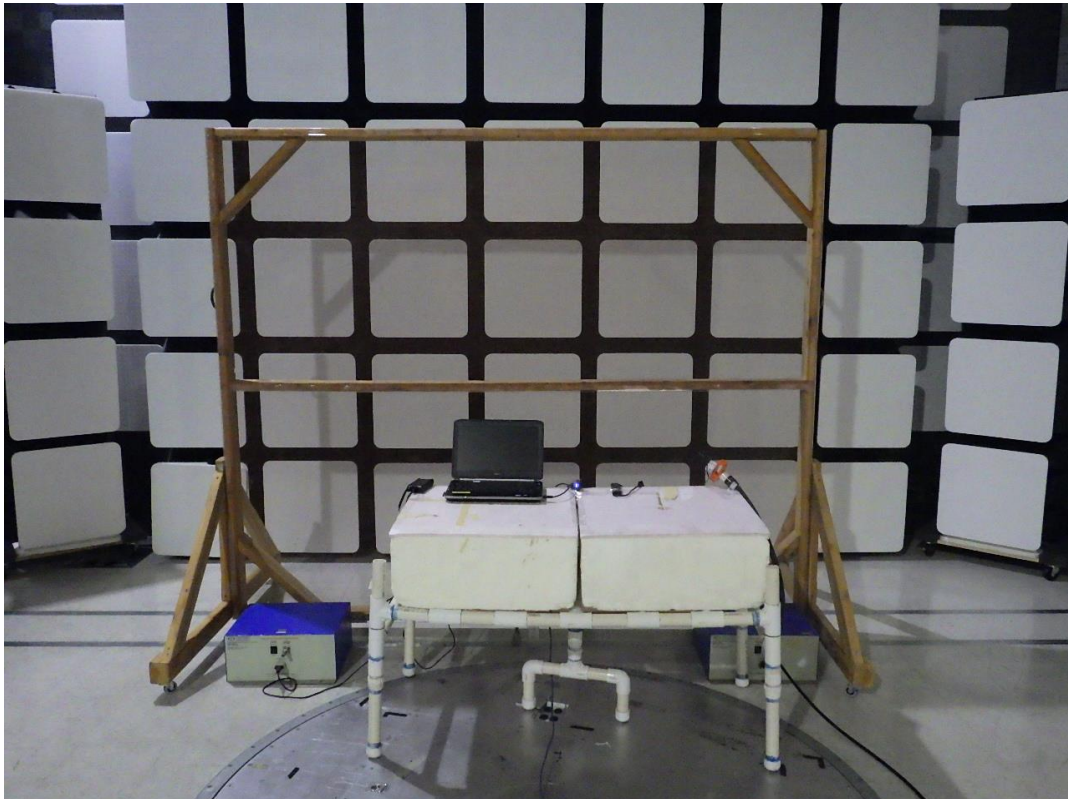


REAR VIEW

COMODULE OU
S DISPLAY
MODEL: 3.3

FCC SUBPART B AND C – RADIATED EMISSIONS – 18 GHz to 25 GHz

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



FRONT VIEW

COMODULE OU

S DISPLAY

MODEL: 3.3

FCC SUBPART B AND C – CONDUCTED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

COMODULE OU
S DISPLAY
MODEL: 3.3

FCC SUBPART B AND C – CONDUCTED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**

APPENDIX E

DATA SHEETS

***RADIATED EMISSIONS
DATA SHEETS***

FCC 15.247
COMODULE
S Display
M/N: 3.3Date: 03/13/2020
Lab: D
Tested By: Kyle FujimotoHarmonics - Low Channel
Transmit Mode - X-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	45.06	V	73.97	-28.91	Peak	145.50	143.10	
4804.00	37.00	V	53.97	-16.97	Avg	145.50	143.10	
7206.00	45.54	V	73.97	-28.43	Peak	287.50	143.34	
7206.00	35.18	V	53.97	-18.79	Avg	287.50	143.34	
9608.00	45.15	V	76.72	-39.34	Peak	265.75	222.68	Not in
								Restricted Band
12010.00	52.07	V	73.97	-21.90	Peak	297.00	159.22	
12010.00	42.84	V	53.97	-11.13	Avg	297.00	159.22	
14412.00								No Emission
14412.00								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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental
Of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3Date: 03/16/2020
Lab: D
Tested By: Kyle FujimotoHarmonics - Low Channel
Transmit Mode - Y-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	46.52	V	73.97	-27.45	Peak	135.25	111.46	
4804.00	38.88	V	53.97	-15.09	Avg	135.25	111.46	
7206.00	46.32	V	73.97	-27.65	Peak	166.00	249.92	
7206.00	36.03	V	53.97	-17.94	Avg	166.00	249.92	
9608.00	45.44	V	76.72	-39.05	Peak	328.00	249.92	Not in Restricted Band
12010.00	52.00	V	73.97	-21.97	Peak	308.50	159.16	
12010.00	41.64	V	53.97	-12.33	Avg	308.50	159.16	
14412.00								No Emission Detected
14412.00								
16814.00								No Emission Detected
16814.00								
19216.00								No Emission Detected
19216.00								
21618.00								No Emission Detected
21618.00								
24020.00								No Emission Detected
24020.00								

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Low Channel
Transmit Mode - Z-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	50.44	V	73.97	-23.53	Peak	171.25	143.40	
4804.00	43.77	V	53.97	-10.20	Avg	171.25	143.40	
7206.00	45.58	V	73.97	-28.39	Peak	153.50	111.40	
7206.00	34.91	V	53.97	-19.06	Avg	153.50	111.40	
9608.00	45.32	V	76.72	-39.17	Peak	327.75	175.52	Not in
								Restricted Band
12010.00	55.66	V	73.97	-18.31	Peak	273.00	127.64	
12010.00	48.14	V	53.97	-5.83	Avg	273.00	127.64	
14412.00								No Emission
14412.00								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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Low Channel
Transmit Mode - X-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	48.87	H	73.97	-25.10	Peak	352.75	205.85	
4804.00	41.78	H	53.97	-12.19	Avg	352.75	205.85	
7206.00	45.80	H	73.97	-28.17	Peak	99.25	127.28	
7206.00	36.03	H	53.97	-17.94	Avg	99.25	127.28	
9608.00	45.09	H	76.72	-39.40	Peak	124.50	175.28	Not in
								Restricted Band
12010.00	55.09	H	73.97	-18.88	Peak	278.75	127.10	
12010.00	46.40	H	53.97	-7.57	Avg	278.75	127.10	
14412.00								No Emission
14412.00								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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3Date: 03/13/2020
Lab: D
Tested By: Kyle FujimotoHarmonics - Low Channel
Transmit Mode - Y-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	47.73	H	73.97	-26.24	Peak	329.50	111.52	
4804.00	39.92	H	53.97	-14.05	Avg	329.50	111.52	
7206.00	46.56	H	73.97	-27.41	Peak	95.00	111.28	
7206.00	37.37	H	53.97	-16.60	Avg	95.00	111.28	
9608.00	45.46	H	76.72	-39.03	Peak	195.00	222.80	Not in Restricted Band
12010.00	46.81	H	73.97	-27.16	Peak	270.25	111.40	
12010.00	36.30	H	53.97	-17.67	Avg	270.25	111.40	
14412.00								No Emission Detected
14412.00								
16814.00								No Emission Detected
16814.00								
19216.00								No Emission Detected
19216.00								
21618.00								No Emission Detected
21618.00								
24020.00								No Emission Detected
24020.00								

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Low Channel
Transmit Mode - Z-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4804.00	48.02	H	73.97	-25.95	Peak	203.00	111.34	
4804.00	40.79	H	53.97	-13.18	Avg	203.00	111.34	
7206.00	47.82	H	73.97	-26.15	Peak	34.25	222.92	
7206.00	38.92	H	53.97	-15.05	Avg	34.25	222.92	
9608.00	45.49	H	76.72	-39.00	Peak	264.75	206.92	Not in
								Restricted Band
12010.00	50.35	H	73.97	-23.62	Peak	141.00	223.16	
12010.00	40.40	H	53.97	-13.57	Avg	141.00	223.16	
14412.00								No Emission
14412.00								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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - X-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	46.38	V	73.97	-27.59	Peak	0.00	207.22	
4880.00	38.58	V	53.97	-15.39	Avg	0.00	207.22	
7320.00	44.57	V	73.97	-29.40	Peak	321.75	111.46	
7320.00	33.53	V	53.97	-20.44	Avg	321.75	111.46	
9760.00	47.67	V	76.72	-36.82	Peak	0.50	223.04	Not in
								Restricted Band
12200.00	49.28	V	73.97	-24.69	Peak	316.25	111.34	
12200.00	38.94	V	53.97	-15.03	Avg	316.25	111.34	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental
of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - Y-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	44.43	V	73.97	-29.54	Peak	40.75	159.04	
4880.00	33.93	V	53.97	-20.04	Avg	40.75	159.04	
7320.00	46.16	V	73.97	-27.81	Peak	295.50	111.28	
7320.00	35.37	V	53.97	-18.60	Avg	295.50	111.28	
9760.00	46.61	V	76.72	-37.88	Peak	145.00	238.92	Not in
								Restricted Band
12200.00	51.15	V	73.97	-22.82	Peak	298.00	222.80	
12200.00	40.56	V	53.97	-13.41	Avg	298.00	222.80	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental
of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - Z-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	46.52	V	73.97	-27.45	Peak	67.00	190.86	
4880.00	37.42	V	53.97	-16.55	Avg	67.00	190.86	
7320.00	44.36	V	73.97	-29.61	Peak	286.25	127.22	
7320.00	33.35	V	53.97	-20.62	Avg	286.25	127.22	
9760.00	46.96	V	76.72	-37.53	Peak	246.50	158.92	Not in
								Restricted Band
12200.00	50.20	V	73.97	-23.77	Peak	313.25	249.97	
12200.00	39.49	V	53.97	-14.48	Avg	313.25	249.97	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental
of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - X-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	49.75	H	73.97	-24.22	Peak	142.25	223.82	
4880.00	41.70	H	53.97	-12.27	Avg	142.25	223.82	
7320.00	44.16	H	73.97	-29.81	Peak	64.75	249.97	
7320.00	33.90	H	53.97	-20.07	Avg	64.75	249.97	
9760.00	47.09	H	76.72	-37.40	Peak	259.75	111.28	Not in
								Restricted Band
12200.00	54.81	H	73.97	-19.16	Peak	273.25	111.34	
12200.00	46.19	H	53.97	-7.78	Avg	273.25	111.34	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Middle Channel**
Transmit Mode - Y-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	48.25	H	73.97	-25.72	Peak	144.25	222.74	
4880.00	40.19	H	53.97	-13.78	Avg	144.25	222.74	
7320.00	44.61	H	73.97	-29.36	Peak	98.75	143.10	
7320.00	33.34	H	53.97	-20.63	Avg	98.75	143.10	
9760.00	46.14	H	76.72	-38.35	Peak	325.25	206.98	Not in
								Restricted Band
12200.00	54.82	H	73.97	-19.15	Peak	275.75	111.40	
12200.00	45.99	H	53.97	-7.98	Avg	275.75	111.40	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - Z-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4880.00	46.34	H	73.97	-27.63	Peak	140.75	190.92	
4880.00	38.10	H	53.97	-15.87	Avg	140.75	190.92	
7320.00	44.50	H	73.97	-29.47	Peak	120.00	175.40	
7320.00	33.27	H	53.97	-20.70	Avg	120.00	175.40	
9760.00	46.95	H	76.72	-37.54	Peak	35.75	225.61	Not in
								Restricted Band
12200.00	54.75	H	73.97	-19.22	Peak	276.75	110.86	
12200.00	45.93	H	53.97	-8.04	Avg	276.75	110.86	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - X-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	43.89	V	73.97	-30.08	Peak	161.50	126.86	
4960.00	34.20	V	53.97	-19.77	Avg	161.50	126.86	
7440.00	48.95	V	73.97	-25.02	Peak	288.50	111.40	
7440.00	39.12	V	53.97	-14.85	Avg	288.50	111.40	
9920.00	46.92	V	76.72	-37.57	Peak	105.00	127.94	Not in
								Restricted Band
12400.00	48.59	V	73.97	-25.38	Peak	273.50	127.28	
12400.00	37.10	V	53.97	-16.87	Avg	273.50	127.28	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental
of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - Y-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	44.10	V	73.97	-29.87	Peak	87.25	158.86	
4960.00	35.38	V	53.97	-18.59	Avg	87.25	158.86	
7440.00	48.95	V	73.97	-25.02	Peak	288.00	111.46	
7440.00	38.76	V	53.97	-15.21	Avg	288.00	111.46	
9920.00	46.62	V	76.72	-37.87	Peak	238.25	193.01	Not in
								Restricted Band
12400.00	51.23	V	73.97	-22.74	Peak	57.25	127.34	
12400.00	41.82	V	53.97	-12.15	Avg	57.25	127.34	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3Date: 03/13/2020
Lab: D
Tested By: Kyle FujimotoHarmonics - High Channel
Transmit Mode - Z-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	42.70	V	73.97	-31.27	Peak	161.25	127.10	
4960.00	32.45	V	53.97	-21.52	Avg	161.25	127.10	
7440.00	47.54	V	73.97	-26.43	Peak	287.50	127.10	
7440.00	37.24	V	53.97	-16.73	Avg	287.50	127.10	
9920.00	46.67	V	76.72	-37.82	Peak	224.50	127.04	Not in
								Restricted Band
12400.00	47.60	V	73.97	-26.37	Peak	56.50	127.04	
12400.00	37.13	V	53.97	-16.84	Avg	56.50	127.04	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - X-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	44.49	H	73.97	-29.48	Peak	189.75	128.89	
4960.00	35.45	H	53.97	-18.52	Avg	189.75	128.89	
7440.00	48.28	H	73.97	-25.69	Peak	285.00	111.40	
7440.00	38.74	H	53.97	-15.23	Avg	285.00	111.40	
9920.00	46.57	H	76.72	-37.92	Peak	64.50	144.71	Not in
								Restricted Band
12400.00	51.84	H	73.97	-22.13	Peak	273.75	127.16	
12400.00	42.08	H	53.97	-11.89	Avg	273.75	127.16	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - Y-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	50.20	H	73.97	-23.77	Peak	164.00	222.80	
4960.00	43.75	H	53.97	-10.22	Avg	164.00	222.80	
7440.00	44.56	H	73.97	-29.41	Peak	81.00	238.74	
7440.00	33.72	H	53.97	-20.25	Avg	81.00	238.74	
9920.00	46.55	H	76.72	-37.94	Peak	230.50	250.14	Not in
								Restricted Band
12400.00	48.96	H	73.97	-25.01	Peak	32.25	127.28	
12400.00	38.41	H	53.97	-15.56	Avg	32.25	127.28	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

FCC 15.247
COMODULE
S Display
M/N: 3.3

Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto

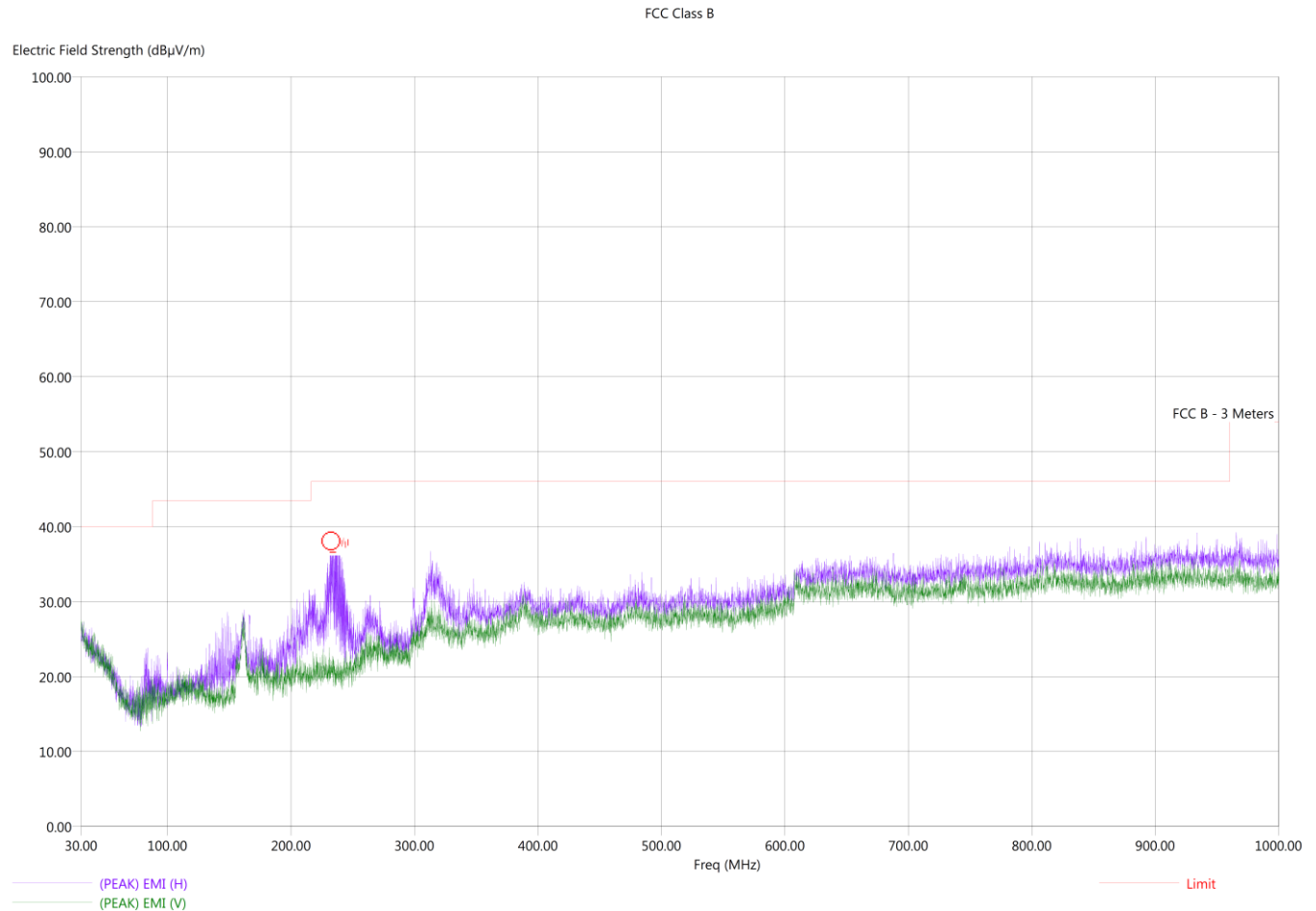
Harmonics - High Channel
Transmit Mode - Z-Axis
BLE Mode

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
4960.00	43.91	H	73.97	-30.06	Peak	258.95	206.86	
4960.00	31.04	H	53.97	-22.93	Avg	258.95	206.86	
7440.00	45.56	H	73.97	-28.41	Peak	138.00	206.98	
7440.00	35.35	H	53.97	-18.62	Avg	138.00	206.98	
9920.00	46.85	H	76.72	-37.64	Peak	289.25	127.04	Not in
								Restricted Band
12400.00	53.35	H	73.97	-20.62	Peak	281.50	127.22	
12400.00	44.39	H	53.97	-9.58	Avg	281.50	127.22	
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

*The limit at the 4th Harmonic is 20 dB below the Maximum Fundamental of 96.72 dBuV/m per section 11.11.2 of ANSI C63.10: 2013

Title: Pre-Scan - FCC Class B
File: 1 - Agilent - Pre-Scan - COMODULE - Z-axis - FCC Class B - 30 MHz to 1000 MHz.set
Operator: Harvey Samaco
EUT Type: S Display
EUT Condition: The EUT is continuously transmitting in BLE at 2.4 GHz
Company: COMODULE
M/N: 3.3
Z-axis (Worst case)

3/16/2020 3:09:25 PM
Sequence: Preliminary Scan



Title: Radiated Final - FCC Class B
File: 1 - Agilent - Final Scan - COMODULE - FCC Class B - 30 MHz to 1000 MHz.set
Operator: Harvey Samaco
EUT Type: S Display
EUT Condition: The EUT is continuously transmitting in BLE at 2.4 GHz
Company: COMODULE
M/N: 3.3
Z-axis (Worst case)

3/16/2020 3:45:30 PM
Sequence: Final Measurements

FCC Class B

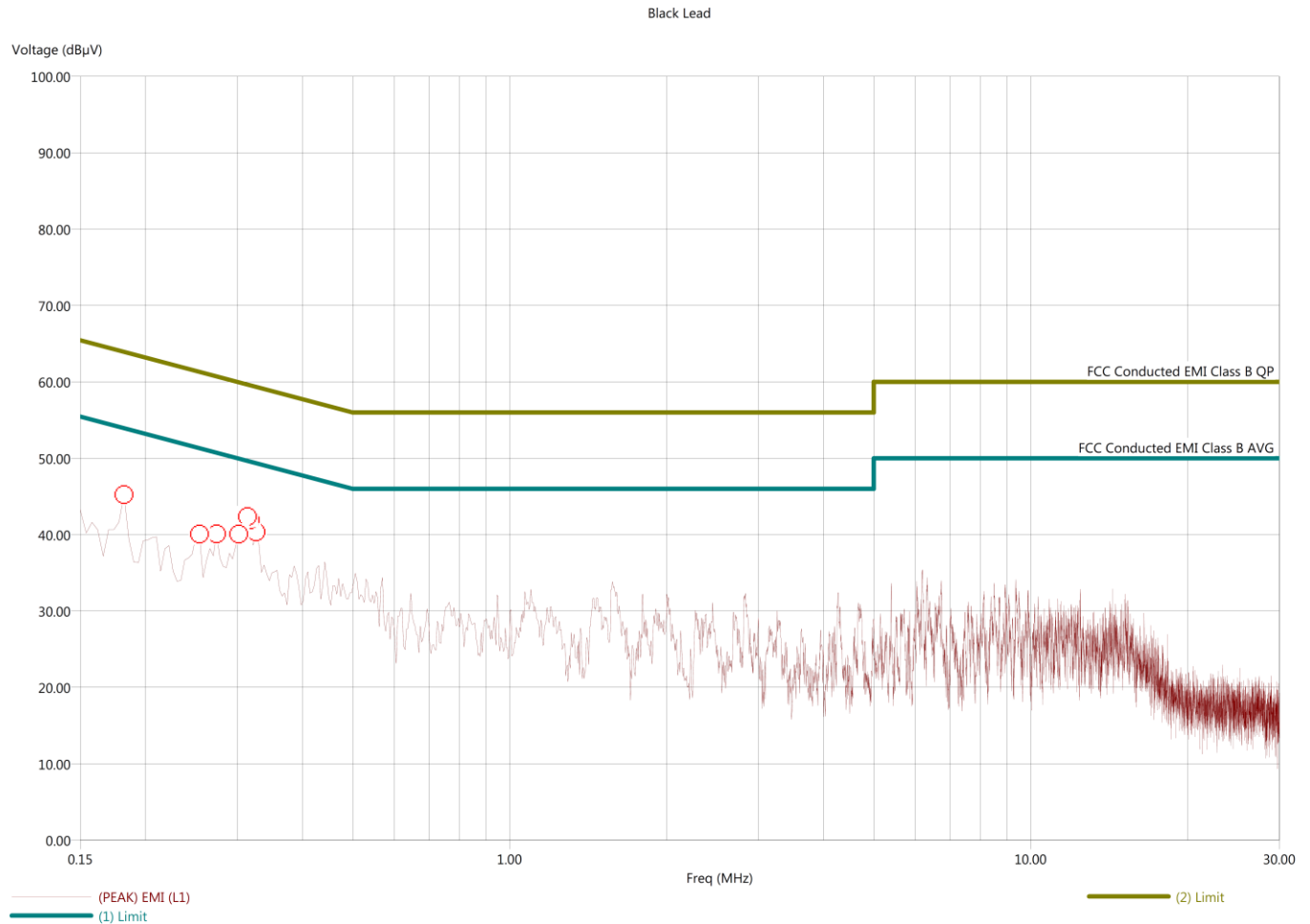
Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	TtBl Aql (deg)	Twr Ht (cm)
232.30	H	28.57	23.51	-17.43	-22.49	46.00	15.91	1.18	301.50	111.28
233.80	H	28.73	24.15	-17.27	-21.85	46.00	16.00	1.18	316.00	127.22
235.20	H	26.28	22.17	-19.72	-23.83	46.00	16.13	1.18	178.50	126.98
236.70	H	27.10	22.31	-18.90	-23.69	46.00	16.28	1.18	124.00	158.80
237.10	H	27.67	23.08	-18.33	-22.92	46.00	16.32	1.18	130.00	127.22
238.90	H	27.05	21.91	-18.95	-24.09	46.00	16.50	1.17	135.00	111.16



***CONDUCTED EMISSIONS
DATA SHEETS***

Title: FCC Class B - Black Lead
File: Keysight - Pre-Scan - Black Lead - FCC Class B.set
Operator: Harvey Samaco
EUT Type: S Display
EUT Condition: The EUT was continuously transmitting in BLE at 2.4 GHz
Company: COMODULE
M/N: 3.3

3/16/2020 4:30:26 PM
Sequence: Preliminary Scan



Title: FCC Class B - Black Lead
File: Keysight - Final Scan - Black Lead - FCC Class B.set
Operator: Harvey Samaco
EUT Type: S Display
EUT Condition: The EUT was continuously transmitting in BLE at 2.4 GHz
Company: COMODULE
M/N: 3.3

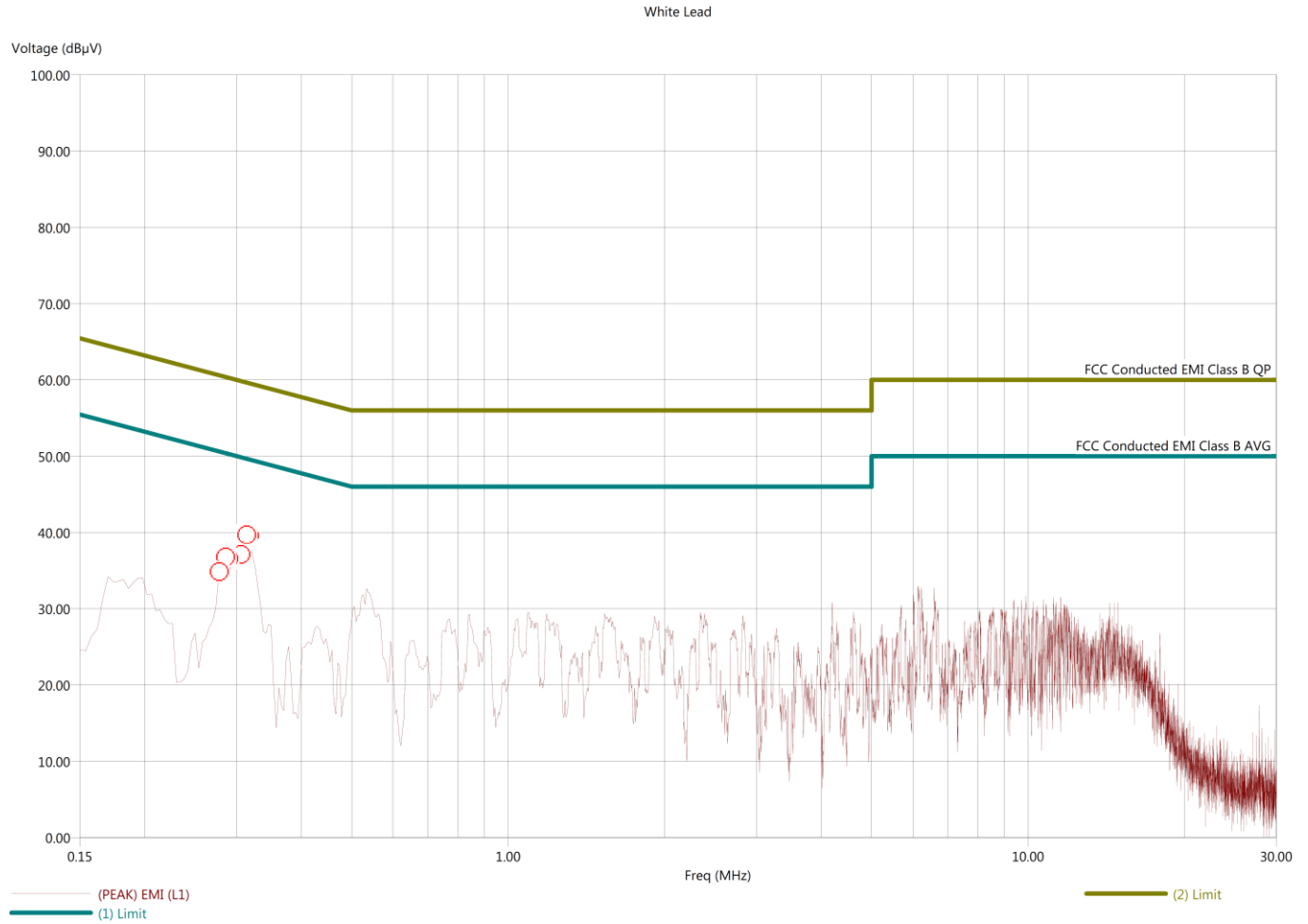
3/16/2020 4:31:59 PM
Sequence: Final Measurements

Black Lead									
Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (AVG) (dB)	(RMS) Margin (dB)	(RMS) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)	
0.182	46.36	34.18	-17.38	-19.56	53.74	0.02	0.40		10.01
0.254	47.08	32.24	-14.43	-19.27	51.50	0.02	0.27		10.02
0.274	40.94	32.22	-19.42	-18.14	50.35	0.02	0.21		10.04
0.302	44.77	33.42	-15.04	-16.39	49.81	0.02	0.18		10.05
0.314	43.98	35.70	-15.67	-13.95	49.65	0.02	0.17		10.05
0.318	46.90	35.66	-12.75	-13.99	49.65	0.02	0.17		10.05
0.326	46.80	33.67	-12.77	-15.90	49.58	0.02	0.16		10.05



Title: FCC Class B - White Lead
File: Keysight - Pre-Scan - White Lead - FCC Class B.set
Operator: Harvey Samaco
EUT Type: S Display
EUT Condition: The EUT was continuously transmitting in BLE at 2.4 GHz
Company: COMODULE
M/N: 3.3

3/16/2020 4:40:23 PM
Sequence: Preliminary Scan



Title: FCC Class B - White Lead
File: Keysight - Final Scan - White Lead - FCC Class B.set
Operator: Harvey Samaco
EUT Type: S Display
EUT Condition: The EUT was continuously transmitting in BLE at 2.4 GHz
Company: COMODULE
M/N: 3.3

3/16/2020 4:41:19 PM
Sequence: Final Measurements

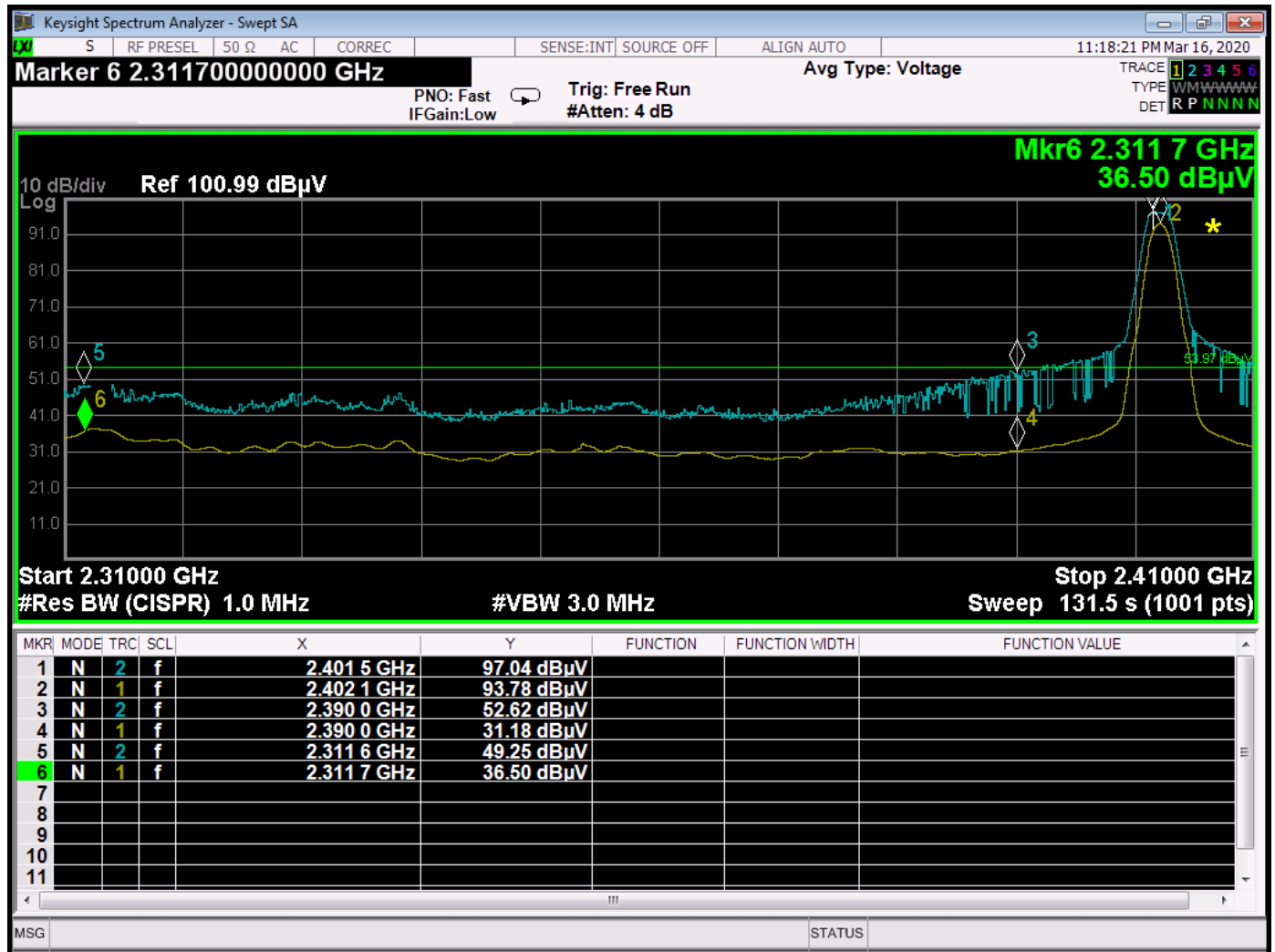
White Lead									
Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (AVG) (dB)	(RMS) Margin (dB)	(RMS) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)	
0.278	37.91	28.11	-22.82	-22.62	50.73	0.02	0.23		10.03
0.286	41.42	30.01	-18.88	-20.29	50.30	0.02	0.20		10.04
0.290	38.61	29.47	-21.78	-20.92	50.39	0.02	0.21		10.04
0.306	40.15	32.19	-19.55	-17.51	49.69	0.02	0.17		10.05
0.314	42.94	30.12	-16.55	-19.37	49.49	0.02	0.16		10.05
0.318	40.55	32.66	-19.12	-17.01	49.67	0.02	0.17		10.05



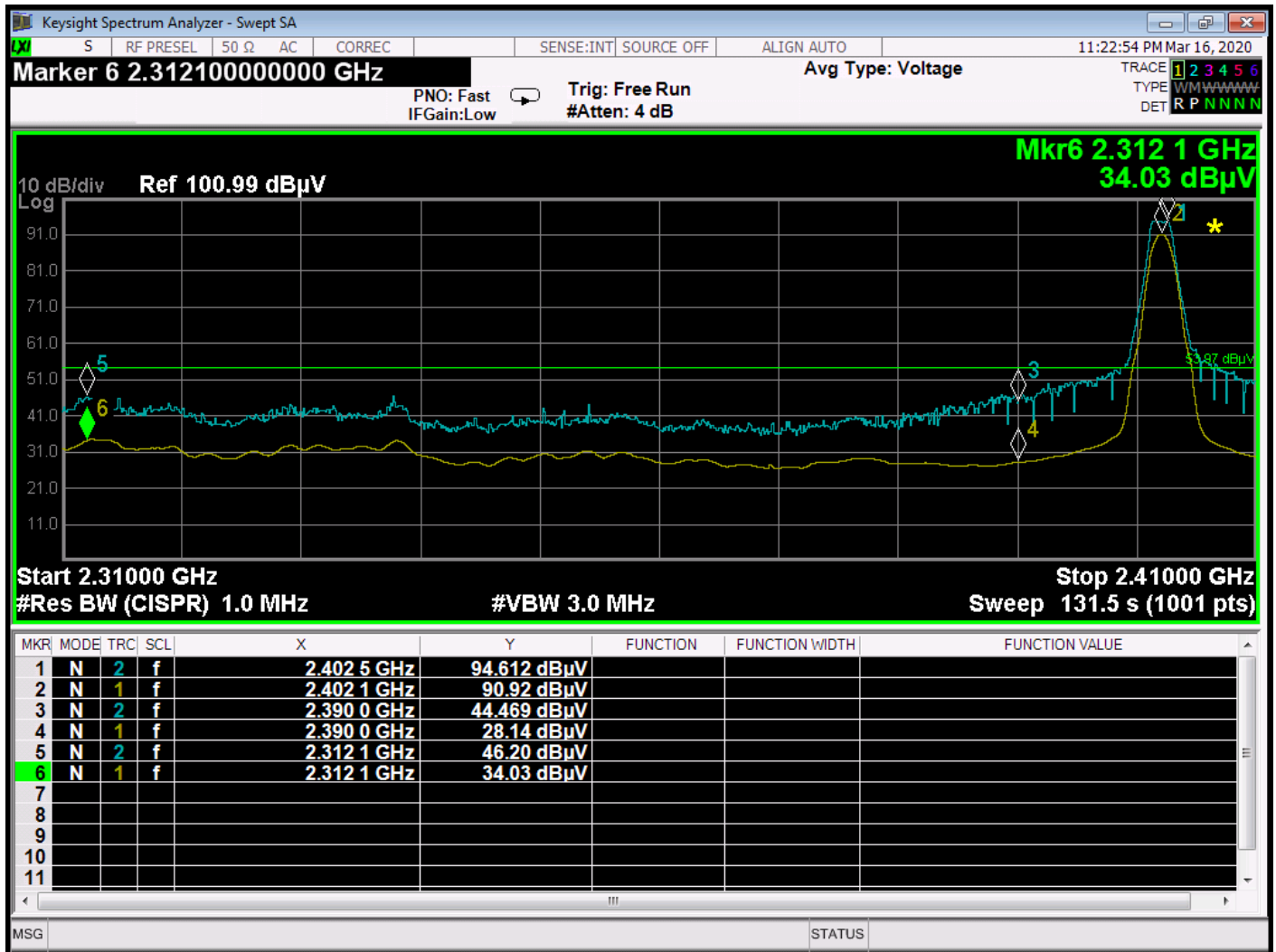
***BAND EDGES
DATA SHEETS***

FCC 15.247
COMODULE
S Display
M/N: 3.3Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto**Band Edges - BLE Mode**

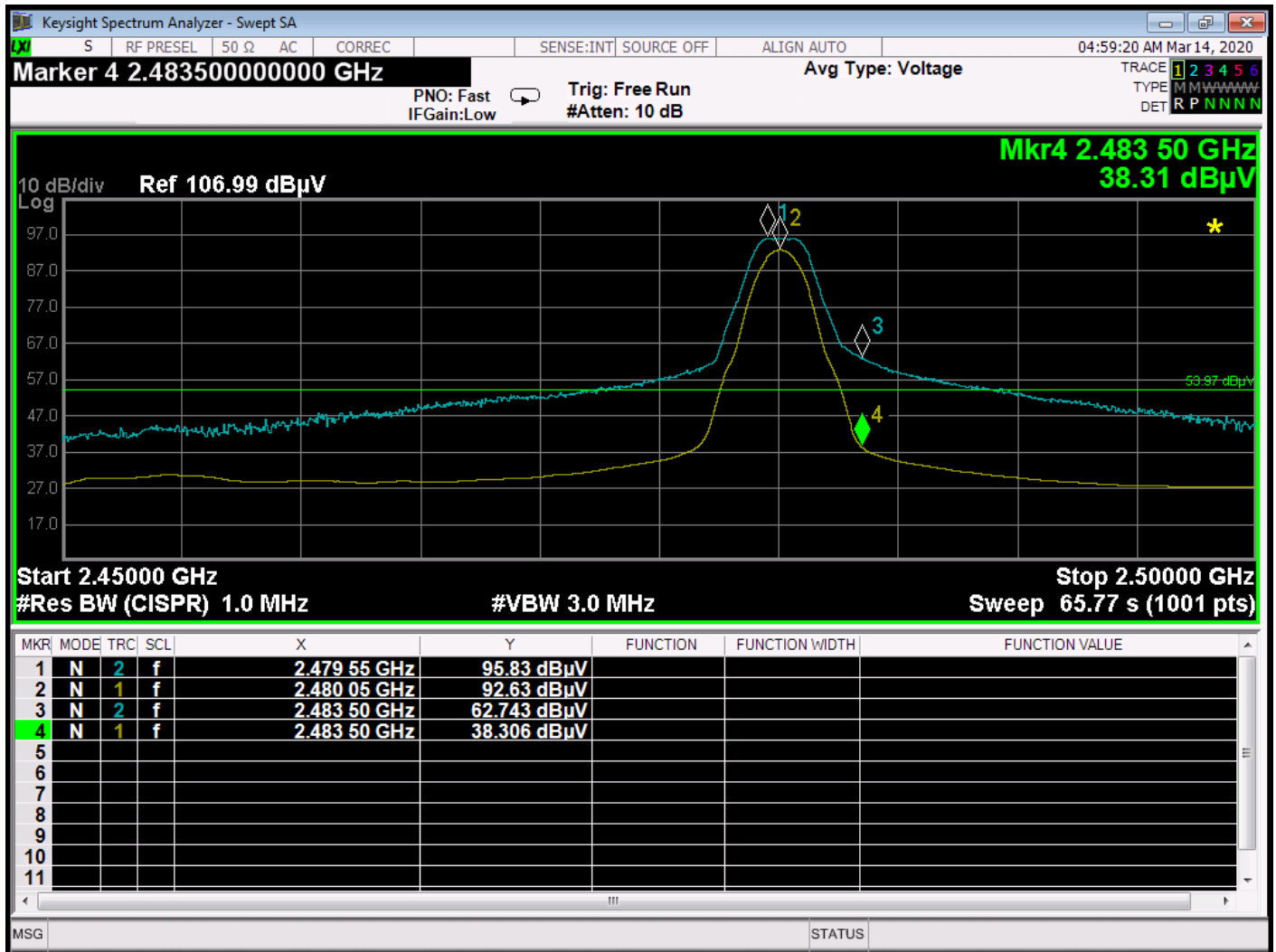
Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
2402.00	97.04	H	--	--	Peak	231.50	155.46	Fundamental - Low Ch.
2402.00	93.78	H	--	--	Avg	231.50	155.46	X-Axis - Worst Case
2390.00	52.62	H	73.97	-21.35	Peak	231.50	155.46	Band Edge
2390.00	31.18	H	53.97	-22.79	Avg	231.50	155.46	X-Axis - Worst Case
2311.60	49.25	H	73.97	-24.72	Peak	231.50	155.46	Band Edge
2311.60	36.50	H	53.97	-17.69	Avg	231.50	155.46	X-Axis - Worst Case
2402.00	94.61	V	--	--	Peak	230.25	126.32	Fundamental - Low Ch.
2402.00	90.92	V	--	--	Avg	230.25	126.32	Z-Axis - Worst Case
2390.00	44.47	V	73.97	-29.50	Peak	230.25	126.32	Band Edge
2390.00	28.14	V	53.97	-25.83	Avg	230.25	126.32	Z-Axis - Worst Case
2312.10	46.20	V	73.97	-27.77	Peak	230.25	126.32	Band Edge
2312.10	34.03	V	53.97	-19.94	Avg	230.25	126.32	Z-Axis - Worst Case



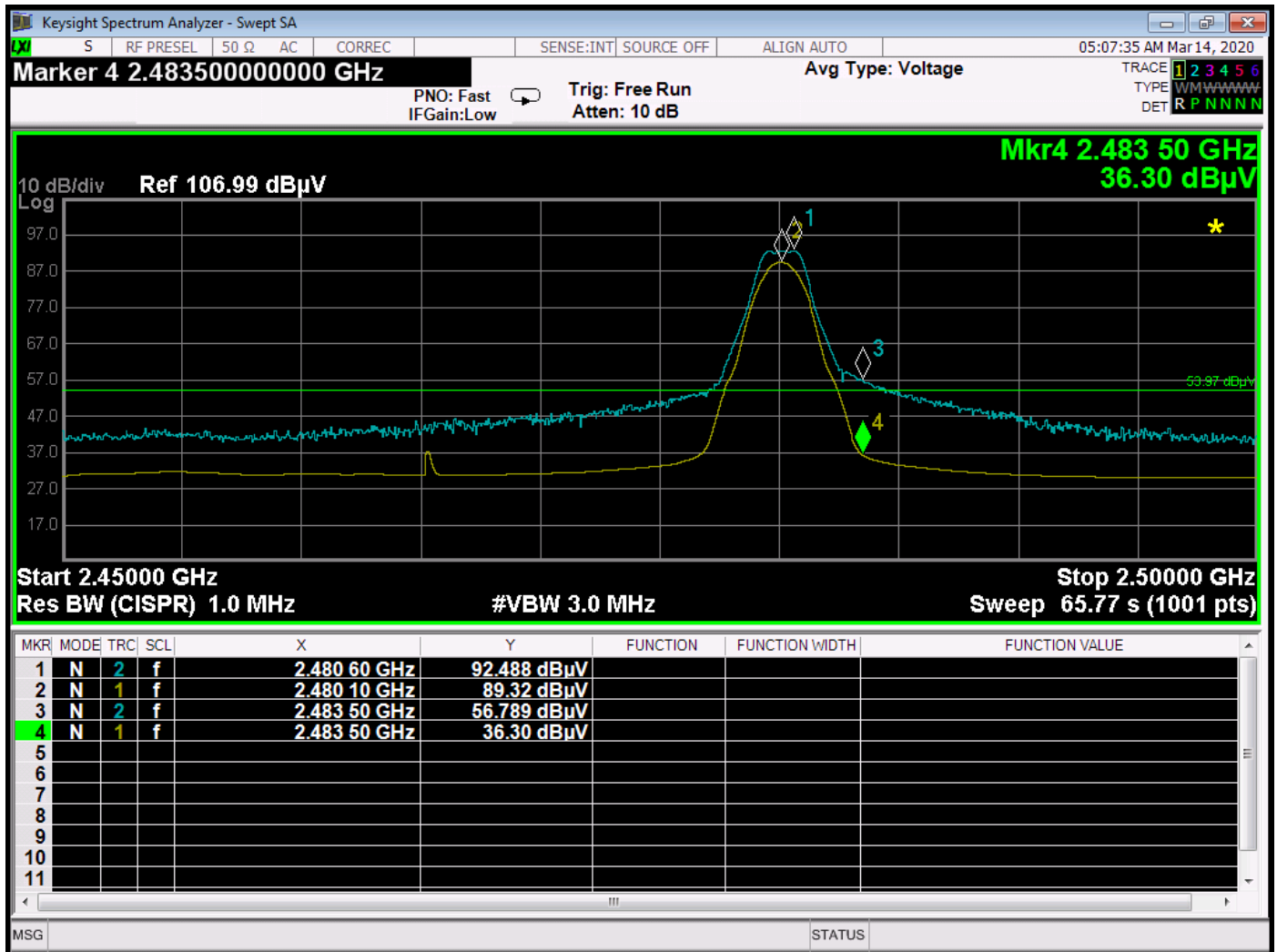
BE - 2402 MHz - Horizontal - X-Axis Worst Case – BLE Mode



BE - 2402 MHz - Vertical - Z-Axis Worst Case – BLE Mode

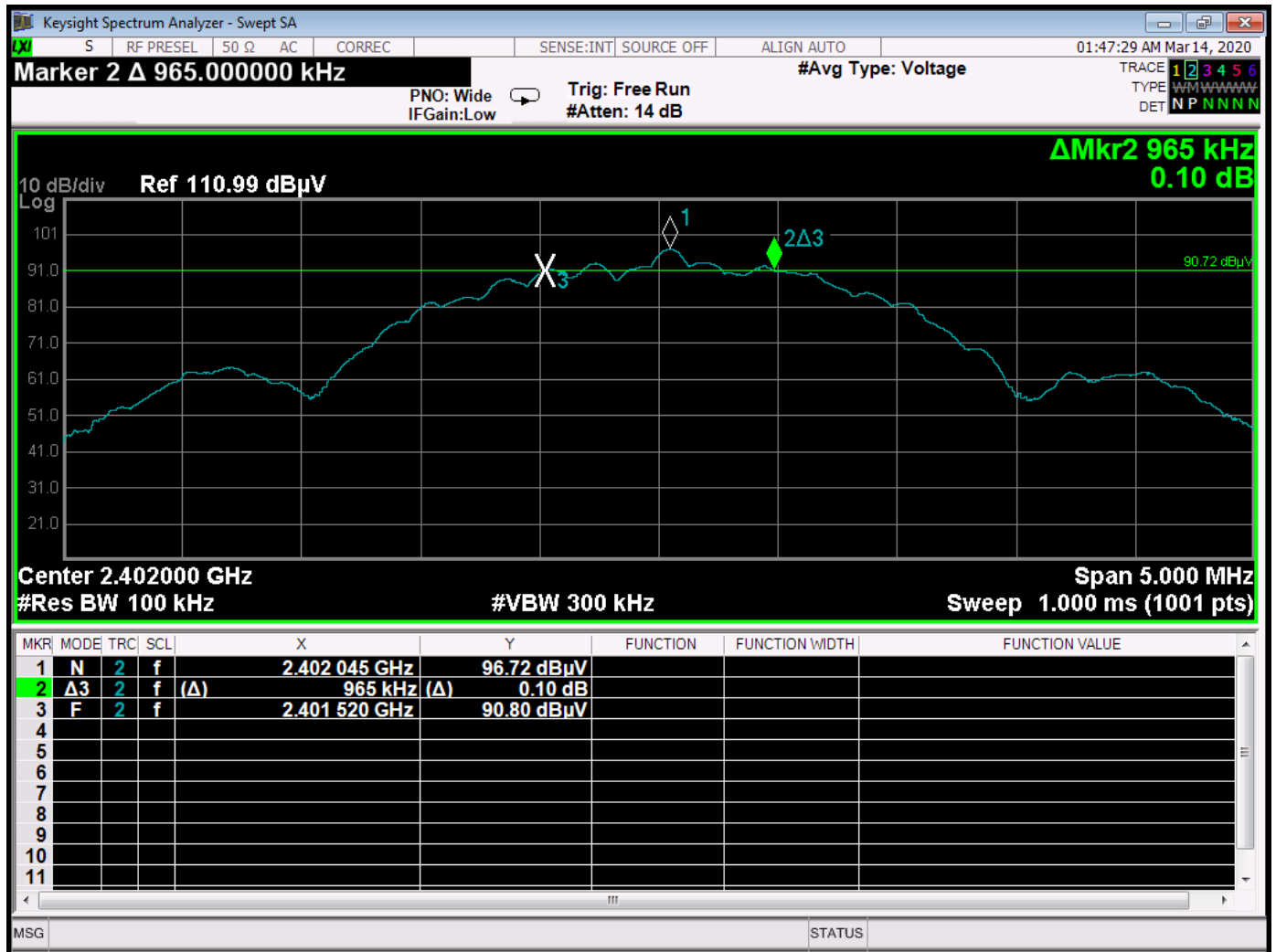


BE - 2480 MHz - Horizontal - Z-Axis Worst Case – BLE Mode

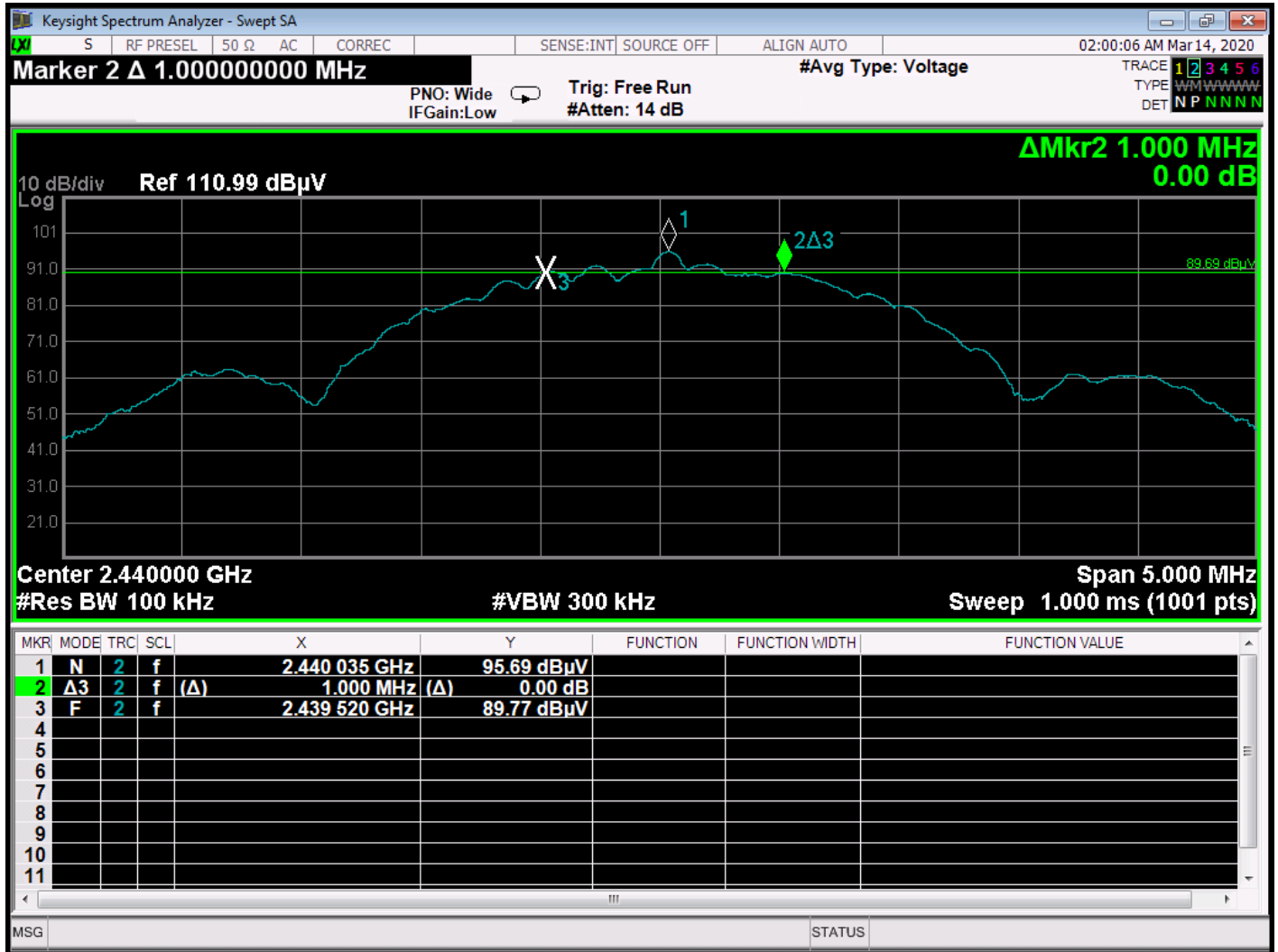


BE - 2480 MHz - Vertical - Y-Axis Worst Case – BLE Mode

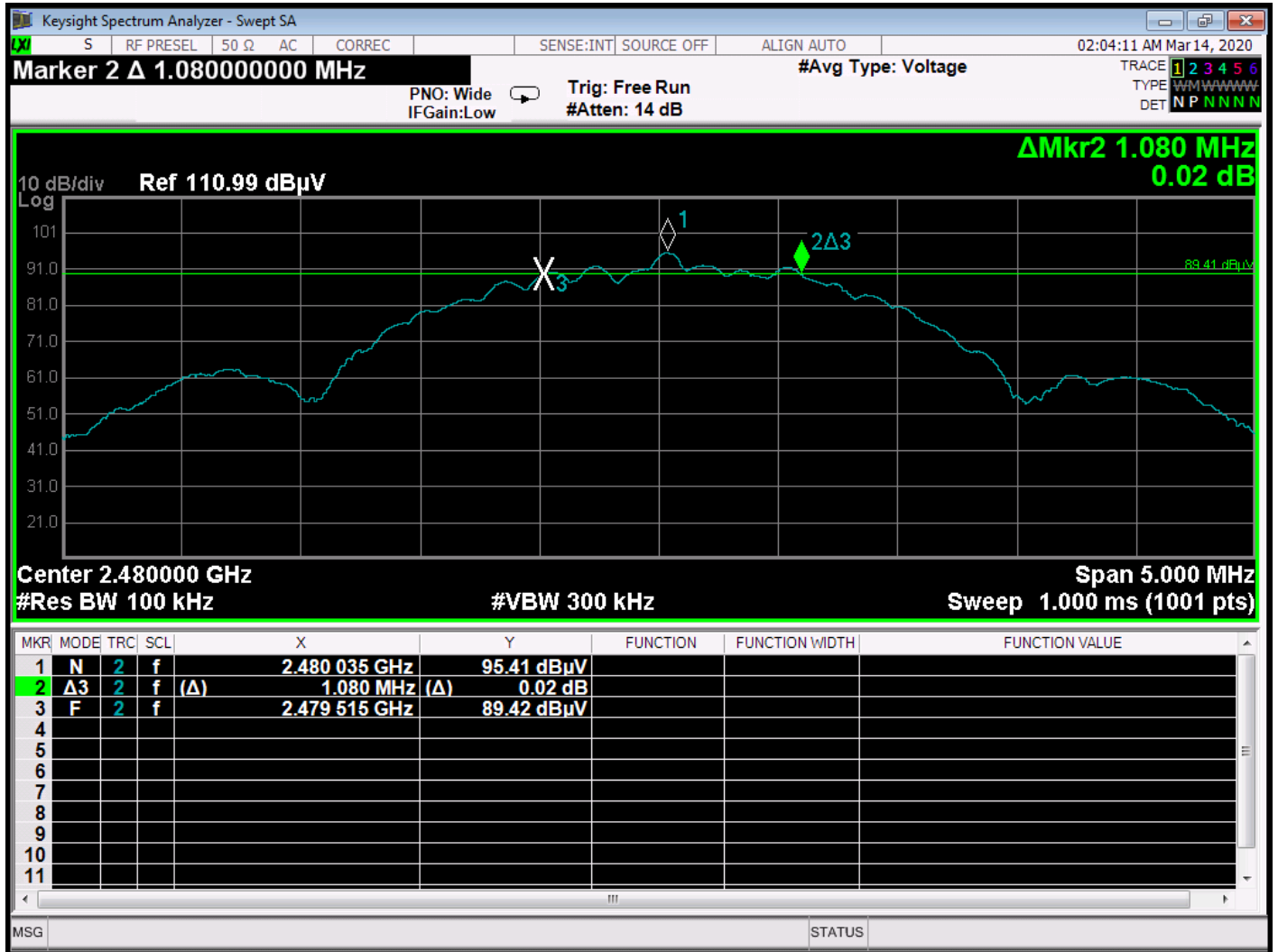
***DTS BANDWIDTH
DATA SHEETS***



Bandwidth 6 dB - 2402 MHz



Bandwidth 6 dB - 2440 MHz



Bandwidth 6 dB - 2480 MHz

***PEAK OUTPUT POWER
DATA SHEETS***

FCC 15.247
COMODULE
S Display
Model: 3.3Date: 03/13/2020
Lab: D
Tested By: Kyle Fujimoto**Peak Output Power - 2MBit (Worst Case)**

Freq. (MHz)	Level (dBuV/m)	Level (V/m)	Antenna Gain (dBi)	Numeric Gain	Power Output (Watts)	Power Output (mW)	Power Output (dBm)	Limit (dBm)	Margin (dB)	Comments
2402.00	86.84	0.021978599	0	1	0.00014492	0.14492	-8.39	30.00	-38.39	Vert. X-Axis
2440.00	84.92	0.017613676	0	1	0.00009307	0.09307	-10.31	30.00	-40.31	Vert. X-Axis
2480.00	84.04	0.015922087	0	1	0.00007605	0.07605	-11.19	30.00	-41.19	Vert. X-Axis
2402.00	93.89	0.049499407	0	1	0.00073506	0.73506	-1.34	30.00	-31.34	Vert. Y-Axis
2440.00	93.14	0.045399388	0	1	0.00061833	0.61833	-2.09	30.00	-32.09	Vert. Y-Axis
2480.00	92.65	0.042909159	0	1	0.00055236	0.55236	-2.58	30.00	-32.58	Vert. Y-Axis
2402.00	94.46	0.052850609	0	1	0.00083796	0.83796	-0.77	30.00	-30.77	Vert. Z-Axis
2440.00	93.92	0.049642083	0	1	0.00073930	0.73930	-1.31	30.00	-31.31	Vert. Z-Axis
2480.00	92.01	0.039856577	0	1	0.00047656	0.47656	-3.22	30.00	-33.22	Vert. Z-Axis
2402.00	97.10	0.071597853	0	1	0.00153788	1.53788	1.87	30.00	-28.13	Horiz. X-Axis
2440.00	96.46	0.066534975	0	1	0.00132807	1.32807	1.23	30.00	-28.77	Horiz. X-Axis
2480.00	95.78	0.061538938	0	1	0.00113611	1.13611	0.55	30.00	-29.45	Horiz. X-Axis
2402.00	93.91	0.049607804	0	1	0.00073828	0.73828	-1.32	30.00	-31.32	Horiz. Y-Axis
2440.00	95.27	0.058022976	0	1	0.00101000	1.01000	0.04	30.00	-29.96	Horiz. Y-Axis
2480.00	92.92	0.044263933	0	1	0.00058779	0.58779	-2.31	30.00	-32.31	Horiz. Y-Axis
2402.00	93.21	0.045740404	0	1	0.00062766	0.62766	-2.02	30.00	-32.02	Horiz. Z-Axis
2440.00	93.60	0.047835465	0	1	0.00068647	0.68647	-1.63	30.00	-31.63	Horiz. Z-Axis
2480.00	92.90	0.044172299	0	1	0.00058536	0.58536	-2.33	30.00	-32.33	Horiz. Z-Axis

RBW = 8 MHz, VBW = 50 MHz, Sweep Time = Auto

 $P = [(E \cdot D)^2 / (30 \cdot G)]$

P = Power in Watts

E = The Measured Maximum Field Strength in V/m

D = Test Distance in Meters

G = The Numeric Gain of the Transmitting Antenna over an Isotropic Radiator

***SPECTRAL DENSITY OUTPUT
DATA SHEETS***

FCC 15.247

COMODULE

S Display

Model: 3.3

Date: 03/13/2020

Lab: D

Tested By: Kyle Fujimoto

Spectral Density Output - 2 Mbit (Worst Case)

Freq. (MHz)	Level (dBuV/m)	Level (V/m)	Antenna Gain (dBi)	Numeric Gain	PPSD Output (Watts)	PPSD Output (mW)	PPSD Output (dBm)	Limit (dBm)	Margin (dB)	Comments
2402.00	68.12	0.002545658	0	1	0.00000194	0.00194	-27.11	8.00	-35.11	Vert. X-Axis
2440.00	68.31	0.002603754	0	1	0.00000203	0.00203	-26.92	8.00	-34.92	Vert. X-Axis
2480.00	65.33	0.001847141	0	1	0.00000102	0.00102	-29.90	8.00	-37.90	Vert. X-Axis
2402.00	75.62	0.006040182	0	1	0.00001095	0.01095	-19.61	8.00	-27.61	Vert. Y-Axis
2440.00	74.67	0.005413149	0	1	0.00000879	0.00879	-20.56	8.00	-28.56	Vert. Y-Axis
2480.00	74.96	0.00559951	0	1	0.00000941	0.00941	-20.27	8.00	-28.27	Vert. Y-Axis
2402.00	77.79	0.007754432	0	1	0.00001804	0.01804	-17.44	8.00	-25.44	Vert. Z-Axis
2440.00	77.28	0.007314759	0	1	0.00001605	0.01605	-17.94	8.00	-25.94	Vert. Z-Axis
2480.00	73.67	0.004824474	0	1	0.00000698	0.00698	-21.56	8.00	-29.56	Vert. Z-Axis
2402.00	78.80	0.008711642	0	1	0.00002277	0.02277	-16.43	8.00	-24.43	Horiz. X-Axis
2440.00	78.02	0.007958844	0	1	0.00001900	0.01900	-17.21	8.00	-25.21	Horiz. X-Axis
2480.00	77.33	0.007351907	0	1	0.00001622	0.01622	-17.90	8.00	-25.90	Horiz. X-Axis
2402.00	75.76	0.006134794	0	1	0.00001129	0.01129	-19.47	8.00	-27.47	Horiz. Y-Axis
2440.00	77.05	0.007122788	0	1	0.00001522	0.01522	-18.18	8.00	-26.18	Horiz. Y-Axis
2480.00	75.31	0.005825725	0	1	0.00001018	0.01018	-19.92	8.00	-27.92	Horiz. Y-Axis
2402.00	75.29	0.005817013	0	1	0.00001015	0.01015	-19.93	8.00	-27.93	Horiz. Z-Axis
2440.00	75.28	0.005808982	0	1	0.00001012	0.01012	-19.95	8.00	-27.95	Horiz. Z-Axis
2480.00	74.51	0.005315572	0	1	0.00000848	0.00848	-20.72	8.00	-28.72	Horiz. Z-Axis

RBW = 3 kHz, VBW = 10 kHz, Sweep Time = 100 Seconds

 $P = [(E \cdot D)^2 / (30 \cdot G)]$

P = Power in Watts

E = The Measured Maximum Field Strength in V/m

D = Test Distance in Meters

G = The Numeric Gain of the Transmitting Antenna over an Isotropic Radiator

Limit = +8 dBm