

**FCC PART 15, SUBPART B and C
TEST REPORT***for***TRANSPONDER****MODEL: RUM V3 REV. C**

Prepared for

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	REPORT BODY	APPENDICES					TOTAL
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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 to claim product certification, approval or endorsement by NVLAP, NIST or any agency of the federal government.

Device Tested: Transponder
Model: RUM V3 REV. C
S/N: 0XA411DAAB10000005

Product Description: The EUT acquires meter pulses.

Modifications: The EUT was not modified during the testing.

Customer: Marine Sync Corporation
3469 Kurtz Street
San Diego, California 92110

Test Dates: March 21 and 22, 2019; and April 1, 2019

Test Specifications covered by accreditation:

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

Test Procedure: ANSI C63.4 and ANSI C63.10



SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	The EUT complies with the Class B limits of CFR Title 47, Part 15 Subpart B; the limits of CFR Title 47, Part 15, Subpart C, section 15.207
2	Spurious Radiated RF Emissions, 30 MHz – 1000 MHz	The EUT complies with the Class B limits of CFR Title 47, Part 15 Subpart B; the limits of CFR Title 47, Part 15, Subpart C, section 15.209
3	Spurious Radiated RF Emissions, 9 kHz – 30 MHz and 1000 MHz – 9300 MHz	The EUT complies with the Class B limits of CFR Title 47, Part 15, Subpart B; CFR Title 47, Part 15, Subpart C, section 15.247(d)
4	Fundamental and Emissions produced by the intentional radiator in non-restricted bands, 9 kHz – 9.3 GHz	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247(d)
5	Emissions produced by the intentional radiator in restricted bands, 9 kHz – 9.3 GHz	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.205, 15.209, section 15.247 (d)
6	DTS Bandwidth	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (a)(2)
7	Maximum Peak Conducted Output Power	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (b)(3)
8	RF Conducted Antenna Test	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (d)
9	Peak Power Spectral Density from the Intentional Radiator to the Antenna	Complies with the relevant requirements of CFR 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 Transponder, Model: RUM V3 REV. C. The emissions measurements were performed according to the measurement procedure described in ANSI C63.10 and ANSI C63.4. 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.

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

Marine Sync Corporation

Nathan Vujovich Applications Engineer

Compatible Electronics Inc.

Thomas Szynal	Test Technician
Kyle Fujimoto	Test Engineer
James Ross	Test Engineer

2.4 Date Test Sample was Received

The test sample was received on March 23, 2019.

2.5 Disposition of the Test Sample

The test sample has not been returned to Marine Sync Corporation as of the date of this test report.

2.6 Abbreviations and Acronyms

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

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network
N/A	Not Applicable

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
ANSI C63.4 2014	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
FCC Title 47, Part 15 Subpart B	FCC Rules - Radio frequency devices (including digital devices) – Unintentional Radiators

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – Emissions

The Transponder Model: RUM V3 REV. C (EUT) was connected to watt hour meter, power supply, and LED via its ISOA+ & ISOA-, power, and LED ports. The cable had unterminated wires connected to the +, ground fault, LED, AUX A, relay 1, relay 2, A+, A-, B+, B-, AUX B, and com ports. The Watt hour meter was also connected to the EL Meter Sensor and 12 volt power supply. An LED board was also connected to the EUT via the R, G, B, V+ ports.

The EUT was continuously transmitting and receiving during the testing. The EUT was also getting readings from the EL Meter Sensor via the Watt Meter.

The EUT voltage was also varied between 85% and 115% using a variable transformer and the fundamental was verified to not change.

The firmware used for the EUT is stored on the company's servers.

It was determined that the emissions were at their highest level when the EUT was operating in the above configuration. The final emissions data was taken in this mode of operation. All initial investigations were performed with the measurement receiver in manual mode scanning the frequency range continuously. Photographs of the test setup are in Appendix D of this report.

4.1.1 Cable Construction and Termination

- Cable 1-6** These are 1-meter unshielded cables connecting the Watt Meter to the EUT. The cables are hard wired at each end.
- Cables 7-8** These are 1-meter unshielded cables connecting the EUT to the power supply. The cables are hard wired at each end.
- Cables 9-28** These are 1-meter unshielded, unterminated cables connected to the EUT. The cables are hard wired into the EUT.
- Cables 29-30** These are 1-meter unshielded cables connecting the Watt Hour Meter to the EL Meter Sensor. The cables are hard wired at each end.
- Cables 31-32** These are 1-meter unshielded cables connecting the power supply to the Watt Hour Meter. The cables are hard wired at each end.
- Cables 33-36** These are 10-centimeter unshielded cables connecting the LED board to the EUT. The cables are hard wired at each end.

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

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
TRANSPONDER	MARINE SYNC CORPORATION	RUM V3 REV. C	0XA411DAAB10000005	2AS2M-RUMV3
12-VOLT POWER SUPPLY	MEAN WELL	MDR-10-12	EB68H59381	N/A
DOUBLE DUAL ELEMENT WATT HOUR METER	EL METER TECHNOLOGIES	A4231/E1	66878	N/A
EZ METER SENSOR	EZ METER	EZ417-1	N/A	N/A
LAPTOP	ASUS	E4035	GCNLCV001926495	N/A
ATMEL STUDIOS 7.0	ATMEL STUDIOS	7.0	N/A	N/A
MARINE SYNC FIRMWARE*	N/A	6-2	N/A	N/A
RUM V2 50 mS FIRMWARE*	N/A	RUMV2 50ms	N/A	N/A

*Used to program the EUT only

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU- FACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CAL. CYCLE
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
CombiLog Antenna	Com-Power	AC-220	61060	July 27, 2017	2 Year
Horn Antenna	Com-Power	AH-118	071175	February 22, 2018	2 Year
EMI Receiver, 20 Hz – 26.5 GHz	Keysight Technologies	N9038A	MY51210150	July 26, 2018	1 Year
Loop Antenna	Com-Power	AL-130R	121090	February 05, 2019	2 Year
Preamplifier	Com-Power	PAM-118A	551024	May 10, 2018	1 Year
Digital Multimeter	Fluke	115	36601149WS	September 20, 2018	2 Year
Variable Transformer	Superior Electric	Type: 11560	Spec: BP142056	N/A	N/A
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A
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
LISN (EUT)	Com-Power	LI-215A	191951	January 10, 2019	1 Year
LISN (ACC)	Com-Power	LI-215A	191952	June 28, 2018	1 Year
Attenuator, 10 dB	SureCall	SC-ATT-10	17100025	November 27, 2018	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 grounded to earth ground via the safety ground of the AC Adapter.

7. CHARACTERISTICS OF THE TRANSMITTER

7.1 Channel Description and Frequencies

The lowest channel the EUT uses is 906 MHz. The highest channel the EUT uses is 924 MHz.

7.2 Antenna Gain

The EUT uses a 2.67 dBi gain 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 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 C63.4. 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 reading are listed in Table 1.0.

Test Results:

The EUT complies with the Class B limits of CFR Title 47, Part 15 Subpart B; the limits of CFR Title 47, Part 15, Subpart C, section 15.207 for conducted emissions. Please see the data sheet located in Appendix E of this test report.

8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The EMI Receiver was used as the measuring meter. Below 1 GHz, a built-in, internal preamplifier was used to increase the sensitivity of the instrument. At frequencies above 1 GHz, external preamplifiers were used. 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. A quasi-peak reading was taken only for those readings, which are marked accordingly on the data sheets.

The frequencies above 1 GHz were averaged by using the RMS detector function on the EMI Receiver.

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 9.3 GHz	1 MHz	Horn Antenna

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 six highest reading are listed in Table 2.0.

Test Results:

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; the limits of CFR Title 47, Part 15, Subpart C, Sections 15.209 and 15.247 for radiated emissions. Please see Appendix E for the data sheets.

8.1.3 RF Emissions Test ResultsTable 1.0 CONDUCTED EMISSION RESULTS
Transponder, Model: RUM V3 REV. C

Frequency MHz	Corrected Reading* dBuV	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
0..394 (WL) (Tx Mode)	41.53 (Avg)	47.82	-6.29
0.402 (WL) (Tx Mode)	40.12 (Avg)	47.81	-7.69
0.378 (WL) (Tx Mode)	40.06 (Avg)	48.03	-7.97
0.398 (WL) (Tx Mode)	39.29 (Avg)	47.79	-8.49
0.394 (WL) (Rx Mode)	39.29 (Avg)	47.79	-8.50
0.382 (WL) (Tx Mode)	39.29 (Avg)	47.87	-8.59

BL Black Lead
WL White Lead
Avg Average
Tx Transmit
Rx Receive

Table 2.0 RADIATED EMISSION RESULTS
Transponder, Model: RUM V3 REV. C

Frequency MHz	Corrected Reading* dBuV/m	Specification Limit dBuV	Delta (Cor. Reading – Spec. Limit) dB
5436.00 (V) (X-Axis) (Tx Mode)	53.89 (AVG)	53.97	-0.08
179.10 (H) (Tx Mode)	43.40 (QP)	43.50	-0.10
177.00 (H) (Tx Mode)	43.38 (QP)	43.50	-0.12
5436.00 (H) (Y-Axis) (Tx Mode)	53.62 (Avg)	53.97	-0.35
179.70 (H) (Tx Mode)	42.90 (QP)	43.50	-0.60
178.30 (H) (Tx Mode)	42.87 (QP)	43.50	-0.63

QP Quasi-Peak Reading
H Horizontal PolarizationAvg Average Reading
V Vertical Polarization

8.2 DTS Bandwidth

The DTS Bandwidth was measured using the EMI Receiver. The bandwidth was measured using a direct connection from the EUT. 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 Maximum Peak Conducted Output Power

The maximum conducted output power was measured using the EMI Receiver. The maximum conducted output power was measured using a direct connection from the EUT. The following steps were performed for measuring the maximum conducted output power.

1. Set the RBW $\geq$ DTS bandwidth
2. Set the video bandwidth (VBW) to equal or greater than 3 times the RBW
3. Set span $\geq$ [3 X RBW]
4. Sweep time = auto couple
5. Detector = peak
6. Trace mode = max hold
7. Allow the trace to stabilize
8. Use peak marker function to determine the peak amplitude level.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (b)(3).

8.4 Emissions in Non-Restricted Bands

The emissions in the non-restricted frequency bands measurements were performed using the EMI receiver directly connected to the EUT. The reference level was established by setting the instrument center frequency to DTS channel center frequency. The span was set to ≥ 1.5 times the DTS bandwidth. The RBW was set to 100 kHz and the VBW was set to 300 kHz. A peak detector was used with sweep set to auto. A max hold trace was used and allowed to fully stabilize. The peak marker function was used to determine the level and 20 dB below that was the reference level. For emission level measurement, the center frequency and span were set to encompass the frequency range to be measured. The RBW was set to 100 kHz and the VBW was set to 300 kHz. A peak detector was used with a sweep time set to auto. The number of measurement points were greater than the span/RBW. A max hold trace was used and allowed to fully stabilize. The peak marker function was used to determine the maximum amplitude level. The final qualification data sheets are located in Appendix E.

Test Results:

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

8.5 RF Band Edges

The RF band edges were taken at the edges of the ISM spectrum (902 MHz when the EUT was on the low channel and 928 MHz when the EUT was on the high channel) using the EMI Receiver. The RBW was set to 100 kHz and the VBW was set to 300 kHz. Plots of the fundamental were taken to ensure the amplitude at the band edges were at least 20 dB down from the peak of the fundamental emission.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d). Please see the data sheets located in Appendix E.

8.6 Spectral Density Test

The spectrum density output was measured using the EMI Receiver. The spectral density output was measured using a direct connection from the RF out on the EUT into the input of the EMI Receiver. The following steps were performed for measuring the spectral density.

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 $\leq$ RBW $\leq$ 100 kHz
4. Set the VBW $\geq$ 3 X RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test Results:

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

8.7 Variation of the Input Power

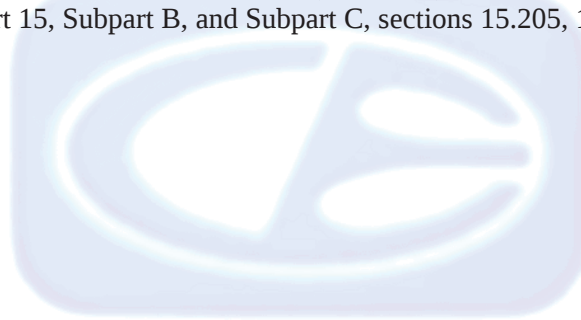
The variation of the input power test was performed using the EMI Receiver. The EUT input power was varied between 85% and 115% of the nominal rated supply voltage. The carrier frequency was monitored for any change in amplitude.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart A section 15.31 (e).

9. CONCLUSIONS

The Transponder, Model: RUM V3 REV. C, 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

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

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

LABORATORY ACCREDITATIONS AND RECOGNITIONS



NVLAP LAB CODE 200528-0

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."



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/>



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.

The EUT was not modified during the testing.



APPENDIX C

***ADDITIONAL MODELS COVERED
UNDER THIS REPORT***

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

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

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

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

Transponder
Model: RUM V3 REV. C
S/N: N/A

There are no additional models covered under this report.



APPENDIX D

DIAGRAMS AND CHARTS

FIGURE 1: LAYOUT OF THE SEMI-ANECHOIC TEST CHAMBER

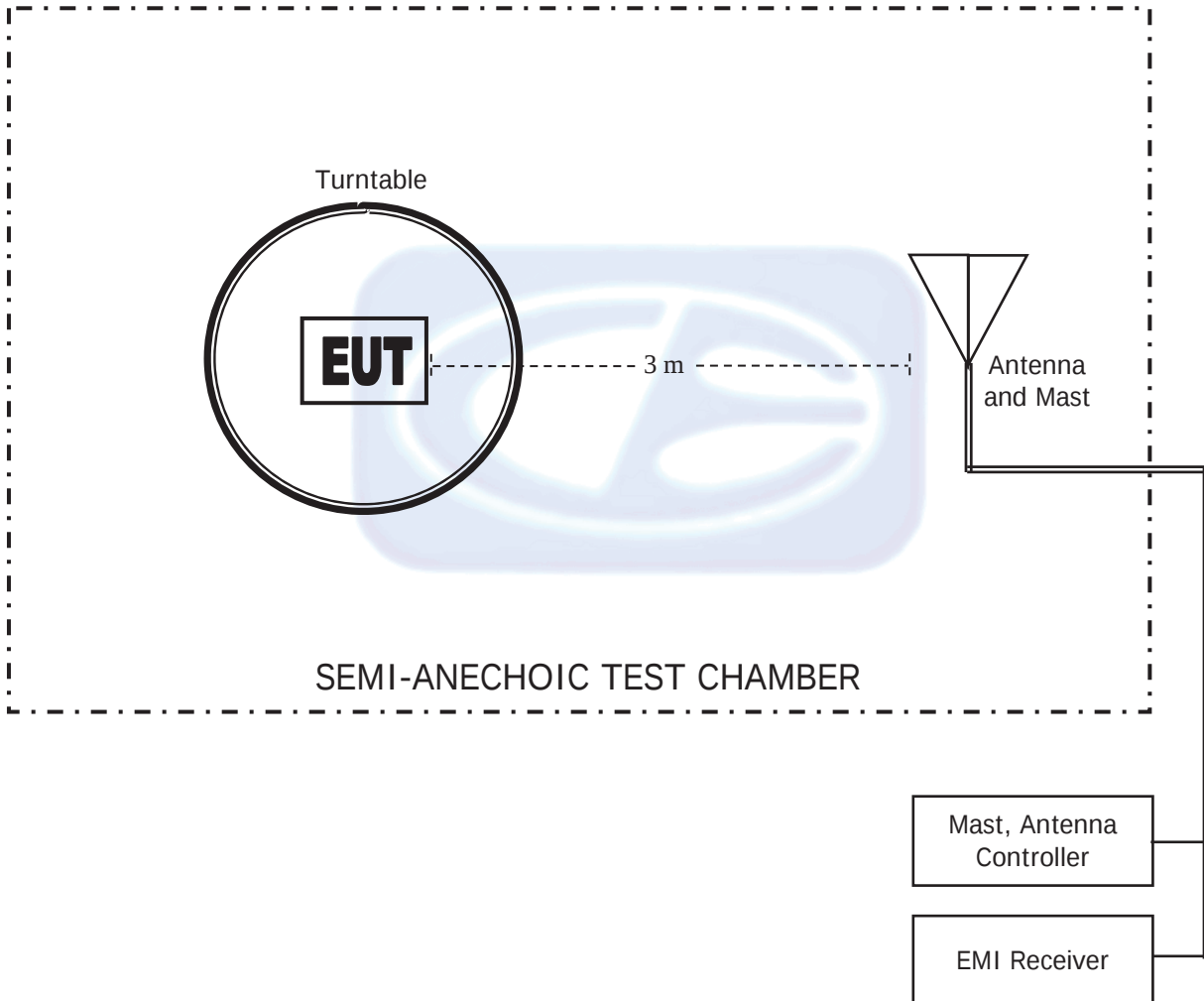
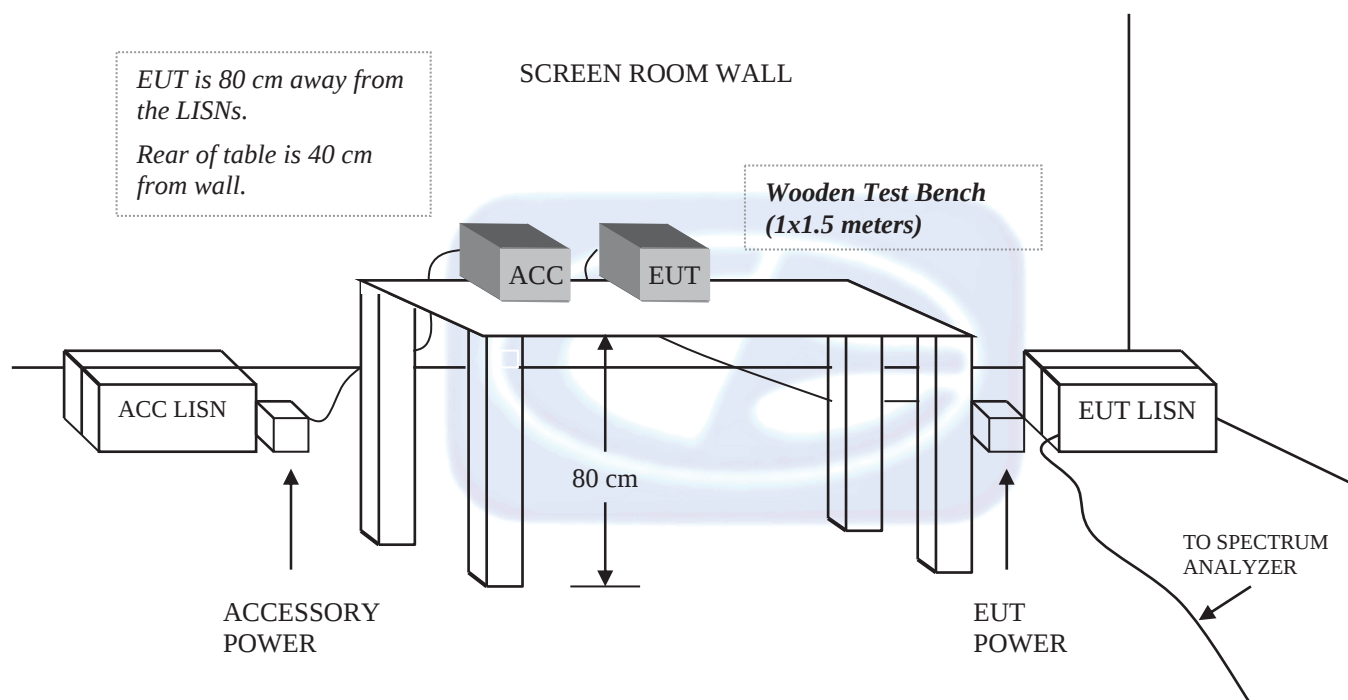


FIGURE 2: CONDUCTED EMISSIONS TEST SETUP



COM-POWER AL-130R**LOOP ANTENNA****S/N: 121090****CALIBRATION DATE: FEBRUARY 05, 2019**

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-35.4	16.1
0.01	-35.9	15.6
0.02	-36.7	14.8
0.03	-35.9	15.6
0.04	-36.4	15.1
0.05	-37.0	14.4
0.06	-36.9	14.6
0.07	-37.1	14.4
0.08	-37.1	14.3
0.09	-36.9	14.5
0.1	-37.3	14.1
0.2	-37.3	14.1
0.3	-37.4	14.0
0.4	-37.4	14.0
0.5	-37.2	14.2
0.6	-37.2	14.2
0.7	-37.2	14.2
0.8	-37.3	14.2
0.9	-37.2	14.3
1	-37.0	14.5
2	-36.9	14.5
3	-36.9	14.5
4	-36.8	14.7
5	-36.9	14.6
6	-36.9	14.6
7	-36.9	14.6
8	-36.9	14.6
9	-36.9	14.6
10	-36.6	14.8
15	-36.9	14.5
20	-36.6	14.9
25	-38.5	13.0
30	-38.5	12.9

COM-POWER AC-220

COMBILOG ANTENNA

S/N: 61060

CALIBRATION DATE: JULY 27, 2017

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	23.80	200	14.10
35	24.00	250	15.30
40	24.70	300	17.70
45	22.90	350	17.70
50	22.10	400	19.00
60	17.60	450	21.30
70	12.70	500	21.00
80	11.20	550	22.30
90	13.10	600	23.40
100	14.40	650	22.90
120	15.30	700	24.60
125	15.00	750	24.50
140	12.80	800	25.40
150	16.50	850	26.40
160	12.90	900	27.20
175	14.30	950	27.80
180	14.50	1000	26.80

COM POWER AH-118**HORN ANTENNA****S/N: 071175****CALIBRATION DATE: FEBRUARY 22, 2018**

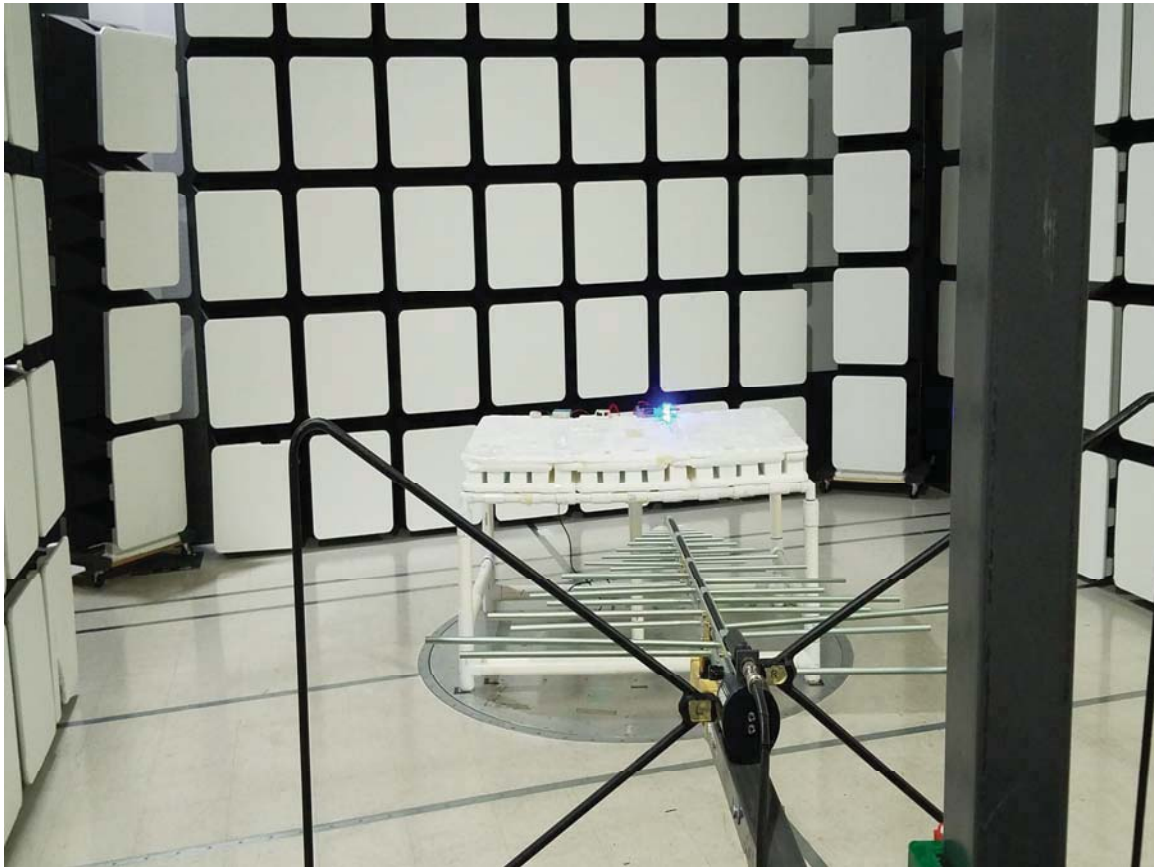
FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	23.71	10.0	40.08
1.5	25.46	10.5	40.75
2.0	29.26	11.0	41.78
2.5	27.95	11.5	41.02
3.0	29.03	12.0	40.32
3.5	29.70	12.5	40.96
4.0	30.71	13.0	40.29
4.5	31.62	13.5	39.48
5.0	33.23	14.0	39.89
5.5	35.07	14.5	42.75
6.0	34.43	15.0	40.98
6.5	34.98	15.5	38.54
7.0	36.75	16.0	39.40
7.5	37.10	16.5	39.40
8.0	37.66	17.0	41.74
8.5	39.29	17.5	42.58
9.0	37.75	18.0	44.68
9.5	38.23		

COM-POWER PAM-118A**PREAMPLIFIER**

S/N: 551024

CALIBRATION DATE: MAY 10, 2018

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	40.99	6.0	39.01
1.1	39.77	6.5	39.00
1.2	39.02	7.0	39.69
1.3	39.44	7.5	38.96
1.4	39.64	8.0	38.57
1.5	40.23	8.5	39.17
1.6	40.17	9.0	38.82
1.7	40.23	9.5	39.30
1.8	39.48	10.0	38.90
1.9	39.85	11.0	38.86
2.0	39.99	12.0	39.87
2.5	40.38	13.0	39.55
3.0	40.64	14.0	38.92
3.5	40.68	15.0	39.33
4.0	40.87	16.0	39.60
4.5	40.04	17.0	40.28
5.0	39.54	18.0	39.58
5.5	39.58		



FRONT VIEW

**MARINE SYNC CORPORATION
TRANSPONDER
MODEL: RUM V3 REV. C
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz**

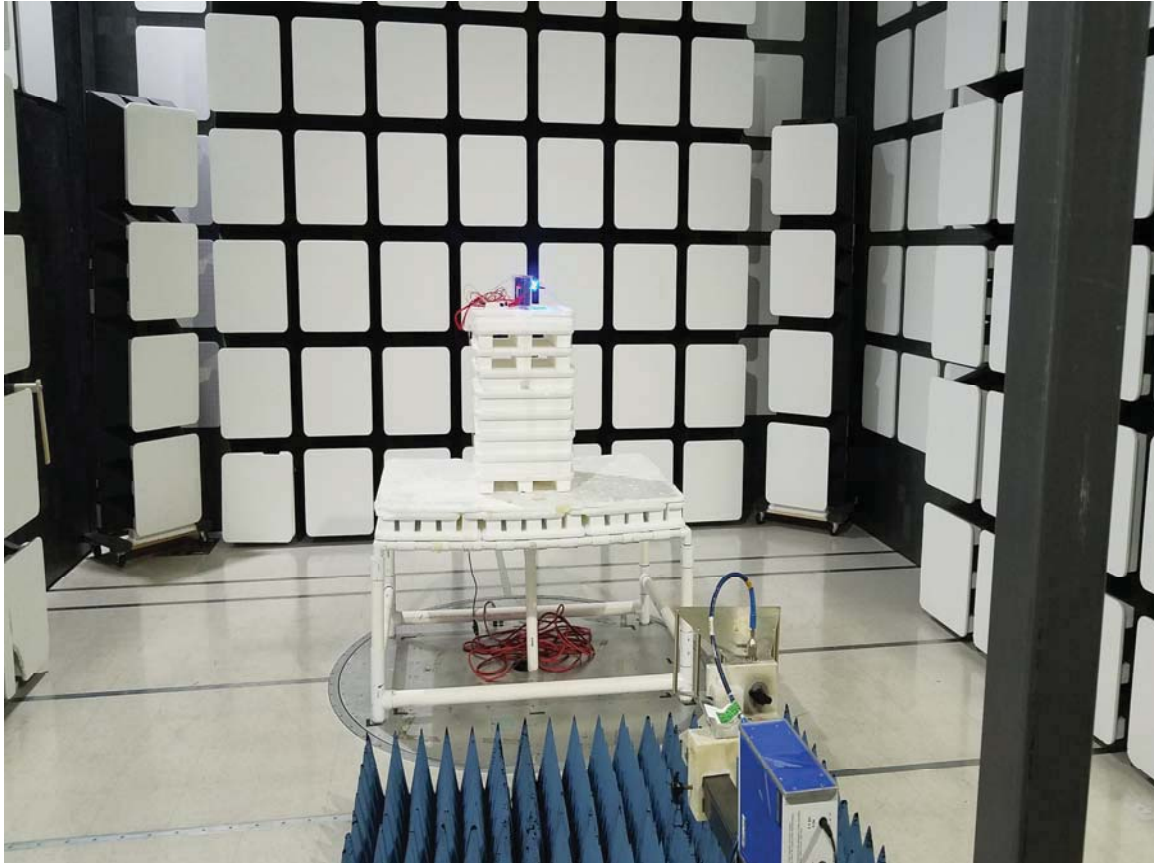
**PHOTOGRAPH SHOWING THE EUT CONFIGURATION
FOR MAXIMUM EMISSIONS**



REAR VIEW

**MARINE SYNC CORPORATION
TRANSPONDER
MODEL: RUM V3 REV. C
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz**

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

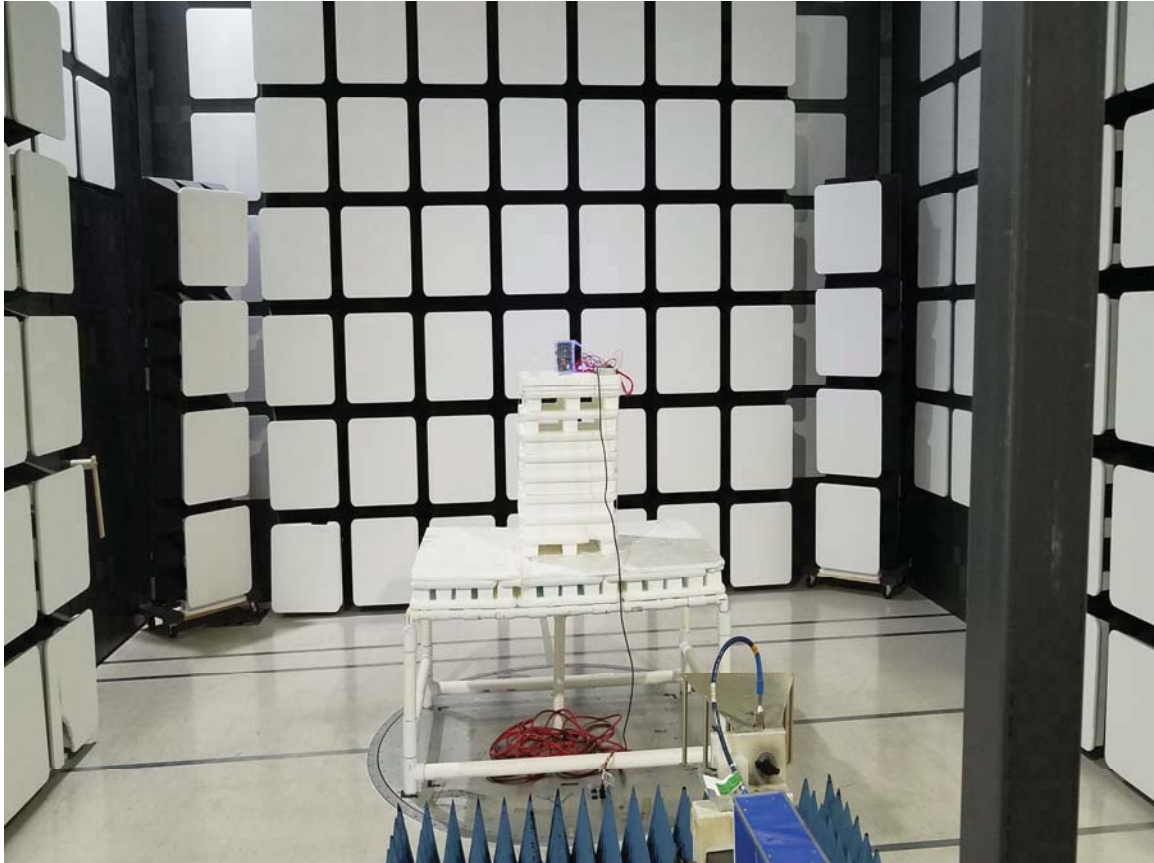


FRONT VIEW

**MARINE SYNC CORPORATION
TRANSPONDER
MODEL: RUM V3 REV. C**

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

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

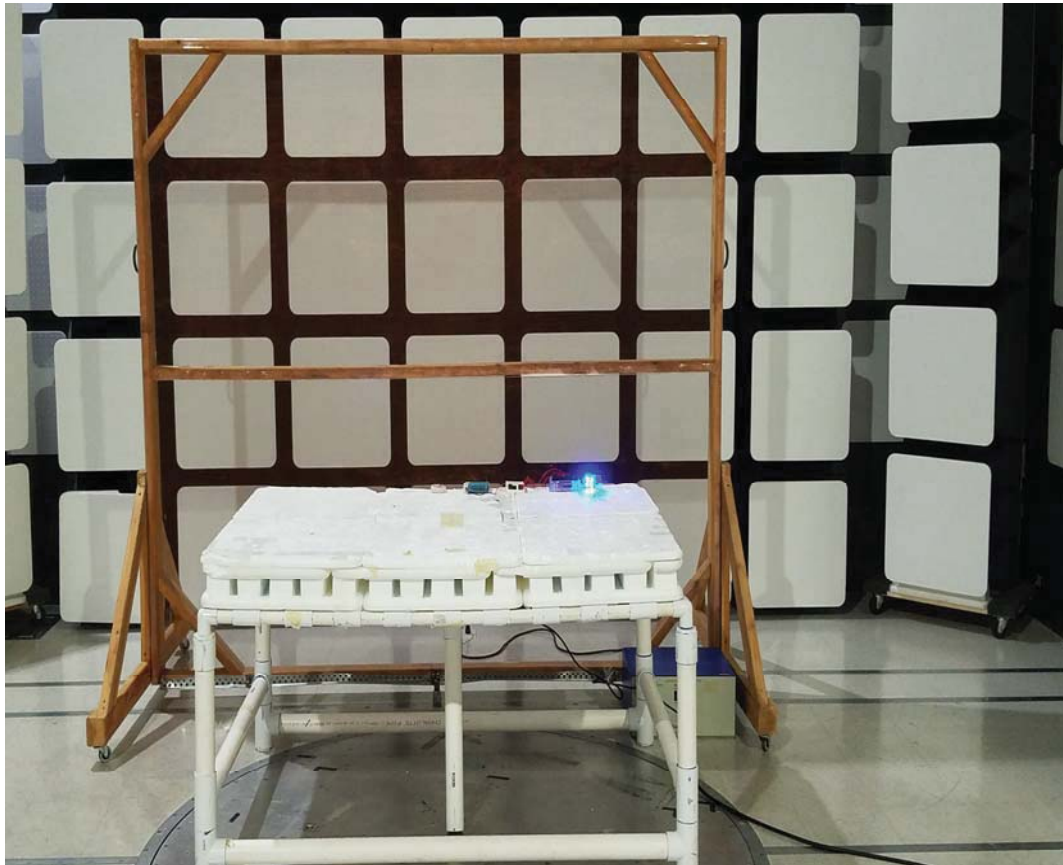


REAR VIEW

MARINE SYNC CORPORATION
TRANSPONDER
MODEL: RUM V3 REV. C

FCC SUBPART B AND C; AND RSS-247 – RADIATED EMISSIONS – ABOVE 1 GHz

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



FRONT VIEW

MARINE SYNC CORPORATION
TRANSPONDER
MODEL: RUM V3 REV. C
FCC SUBPART B AND C – CONUDCTED EMISSIONS

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



REAR VIEW

MARINE SYNC CORPORATION
TRANSPONDER
MODEL: RUM V3 REV. C
FCC SUBPART B AND C – CONDUCTED EMISSIONS

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

APPENDIX E

DATA SHEETS

***RADIATED EMISSIONS
DATA SHEETS***

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. CDate: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Low Channel
Transmit Mode - X-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1812.00								N/A - Not
1812.00								in Restricted Band
2718.00	59.79	V	73.97	-14.18	Peak	308.50	177.77	
2718.00	52.81	V	53.97	-1.17	Avg	308.50	177.77	
3624.00	49.03	V	73.97	-24.94	Peak	316.00	161.59	
3624.00	41.53	V	53.97	-12.44	Avg	316.00	161.59	
4530.00	48.71	V	73.97	-25.26	Peak	318.75	137.11	
4530.00	41.82	V	53.97	-12.16	Avg	318.75	137.11	
5436.00	59.60	V	73.97	-14.37	Peak	307.00	113.41	
5436.00	53.89	V	53.97	-0.08	Avg	307.00	113.41	
6342.00								N/A - Not
6342.00								in Restricted Band
7248.00								No emissions
7248.00								detected
8154.00								No emissions
8154.00								detected
9060.00								No emissions
9060.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019

Lab: D

Tested By: Kyle Fujimoto

Harmonics - Low Channel
Transmit Mode - Y-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1812.00								N/A - Not
1812.00								in Restricted Band
2718.00	56.12	V	73.97	-17.85	Peak	157.00	136.34	
2718.00	48.17	V	53.97	-5.80	Avg	157.00	136.34	
3624.00	41.93	V	73.97	-32.04	Peak	96.00	177.47	
3624.00	34.59	V	53.97	-19.38	Avg	96.00	177.47	
4530.00	43.99	V	73.97	-29.98	Peak	128.75	152.82	
4530.00	34.93	V	53.97	-19.04	Avg	128.75	152.82	
5436.00	54.95	V	73.97	-19.03	Peak	271.25	153.00	
5436.00	49.45	V	53.97	-4.52	Avg	271.25	153.00	
6342.00								N/A - Not
6342.00								in Restricted Band
7248.00								No emissions
7248.00								detected
8154.00								No emissions
8154.00								detected
9060.00								No emissions
9060.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. CDate: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Low Channel
Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1812.00								N/A - Not
1812.00								in Restricted Band
2718.00	54.54	V	73.97	-19.44	Peak	37.50	129.29	
2718.00	46.20	V	53.97	-7.77	Avg	37.50	129.29	
3624.00	46.03	V	73.97	-27.94	Peak	38.75	154.43	
3624.00	38.10	V	53.97	-15.87	Avg	38.75	154.43	
4530.00	45.71	V	73.97	-28.26	Peak	179.75	158.97	
4530.00	36.36	V	53.97	-17.61	Avg	179.75	158.97	
5436.00	54.59	V	73.97	-19.38	Peak	216.00	157.53	
5436.00	49.02	V	53.97	-4.95	Avg	216.00	157.53	
6342.00								N/A - Not
6342.00								in Restricted Band
7248.00								No emissions
7248.00								detected
8154.00								No emissions
8154.00								detected
9060.00								No emissions
9060.00								detected

FCC 15.247

Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019

Lab: D

Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1812.00								N/A - Not
1812.00								in Restricted Band
2718.00	56.02	H	73.97	-17.96	Peak	69.50	100.25	
2718.00	47.38	H	53.97	-6.59	Avg	69.50	100.25	
3624.00	44.39	H	73.97	-29.58	Peak	187.00	161.35	
3624.00	37.26	H	53.97	-16.72	Avg	187.00	161.35	
4530.00	44.87	H	73.97	-29.10	Peak	197.75	191.68	
4530.00	35.75	H	53.97	-18.22	Avg	197.75	191.68	
5436.00	56.72	H	73.97	-17.25	Peak	269.75	191.68	
5436.00	50.79	H	53.97	-3.18	Avg	269.75	191.68	
6342.00								N/A - Not
6342.00								in Restricted Band
7248.00								No emissions
7248.00								detected
8154.00								No emissions
8154.00								detected
9060.00								No emissions
9060.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. CDate: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Low Channel
Transmit Mode - Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1812.00								N/A - Not
1812.00								in Restricted Band
2718.00	57.35	H	73.97	-16.62	Peak	156.25	134.55	
2718.00	50.04	H	53.97	-3.93	Avg	156.25	134.55	
3624.00	48.74	H	73.97	-25.23	Peak	294.00	171.62	
3624.00	43.89	H	53.97	-10.08	Avg	294.00	171.62	
4530.00	46.83	H	73.97	-27.14	Peak	10.00	176.22	
4530.00	37.42	H	53.97	-16.55	Avg	10.00	176.22	
5436.00	59.13	H	73.97	-14.84	Peak	273.25	213.17	
5436.00	53.62	H	53.97	-0.35	Avg	273.25	213.17	
6342.00								N/A - Not
6342.00								in Restricted Band
7248.00								No emissions
7248.00								detected
8154.00								No emissions
8154.00								detected
9060.00								No emissions
9060.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019

Lab: D

Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1812.00								N/A - Not
1812.00								in Restricted Band
2718.00	60.17	H	73.97	-13.80	Peak	249.25	198.01	
2718.00	52.64	H	53.97	-1.33	Avg	249.25	198.01	
3624.00	49.80	H	73.97	-24.17	Peak	159.75	214.01	
3624.00	38.33	H	53.97	-15.64	Avg	159.75	214.01	
4530.00	46.42	H	73.97	-27.55	Peak	150.00	164.52	
4530.00	39.02	H	53.97	-14.95	Avg	150.00	164.52	
5436.00	52.56	H	73.97	-21.41	Peak	167.50	191.68	
5436.00	45.92	H	53.97	-8.05	Avg	167.50	191.68	
6342.00								N/A - Not
6342.00								in Restricted Band
7248.00								No emissions
7248.00								detected
8154.00								No emissions
8154.00								detected
9060.00								No emissions
9060.00								detected

FCC 15.247

Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1828.00								N/A - Not
1828.00								in Restricted Band
2742.00	46.47	V	73.97	-27.50	Peak	154.50	127.26	
2742.00	38.67	V	53.97	-15.30	Avg	154.50	127.26	
3656.00	44.46	V	73.97	-29.51	Peak	261.50	111.38	
3656.00	39.94	V	53.97	-14.03	Avg	261.50	111.38	
4570.00	45.86	V	73.97	-28.11	Peak	52.00	111.20	
4570.00	38.29	V	53.97	-15.68	Avg	52.00	111.20	
5484.00								N/A - Not
5484.00								in Restricted Band
6398.00								N/A - Not
6398.00								in Restricted Band
7312.00								No emissions
7312.00								detected
8226.00								No emissions
8226.00								detected
9140.00								No emissions
9140.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. CDate: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Middle Channel
Transmit Mode - Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1828.00								N/A - Not
1828.00								in Restricted Band
2742.00	52.99	V	73.97	-20.98	Peak	169.50	111.50	
2742.00	45.91	V	53.97	-8.06	Avg	169.50	111.50	
3656.00	37.84	V	73.97	-36.13	Peak	319.75	190.85	
3656.00	27.13	V	53.97	-26.84	Avg	319.75	190.85	
4570.00	46.34	V	73.97	-27.63	Peak	0.00	143.42	
4570.00	37.95	V	53.97	-16.02	Avg	0.00	143.42	
5484.00								N/A - Not
5484.00								in Restricted Band
6398.00								N/A - Not
6398.00								in Restricted Band
7312.00								No emissions
7312.00								detected
8226.00								No emissions
8226.00								detected
9140.00								No emissions
9140.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. CDate: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Middle Channel
Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1828.00								N/A - Not
1828.00								in Restricted Band
2742.00	58.38	V	73.97	-15.59	Peak	95.25	143.20	
2742.00	52.03	V	53.97	-1.94	Avg	95.25	143.20	
3656.00	48.07	V	73.97	-25.90	Peak	318.00	191.02	
3656.00	44.37	V	53.97	-9.60	Avg	318.00	191.02	
4570.00	47.32	V	73.97	-26.65	Peak	263.50	111.38	
4570.00	39.92	V	53.97	-14.05	Avg	263.50	111.38	
5484.00								N/A - Not
5484.00								in Restricted Band
6398.00								N/A - Not
6398.00								in Restricted Band
7312.00								No emissions
7312.00								detected
8226.00								No emissions
8226.00								detected
9140.00								No emissions
9140.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019

Lab: D

Tested By: Kyle Fujimoto

Harmonics - Middle Channel
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1828.00								N/A - Not
1828.00								in Restricted Band
2742.00	55.56	H	73.97	-18.41	Peak	335.00	127.26	
2742.00	48.92	H	53.97	-5.05	Avg	335.00	127.26	
3656.00	45.12	H	73.97	-28.85	Peak	3.00	143.20	
3656.00	39.29	H	53.97	-14.68	Avg	3.00	143.20	
4570.00	45.12	H	73.97	-28.85	Peak	356.75	175.08	
4570.00	36.58	H	53.97	-17.39	Avg	356.75	175.08	
5484.00								N/A - Not
5484.00								in Restricted Band
6398.00								N/A - Not
6398.00								in Restricted Band
7312.00								No emissions
7312.00								detected
8226.00								No emissions
8226.00								detected
9140.00								No emissions
9140.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. CDate: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Middle Channel
Transmit Mode - Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1828.00								N/A - Not
1828.00								in Restricted Band
2742.00	57.04	H	73.97	-16.93	Peak	304.25	191.02	
2742.00	50.24	H	53.97	-3.73	Avg	304.25	191.02	
3656.00	48.61	H	73.97	-25.36	Peak	300.00	174.91	
3656.00	44.59	H	53.97	-9.38	Avg	300.00	174.91	
4570.00	51.01	H	73.97	-22.96	Peak	0.25	111.20	
4570.00	44.53	H	53.97	-9.44	Avg	0.25	111.20	
5484.00								N/A - Not
5484.00								in Restricted Band
6398.00								N/A - Not
6398.00								in Restricted Band
7312.00								No emissions
7312.00								detected
8226.00								No emissions
8226.00								detected
9140.00								No emissions
9140.00								detected

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. CDate: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto**Harmonics - Middle Channel
Transmit Mode - Z-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1828.00								N/A - Not
1828.00								in Restricted Band
2742.00	51.30	H	73.97	-22.67	Peak	179.00	127.14	
2742.00	44.13	H	53.97	-9.84	Avg	179.00	127.14	
3656.00	45.39	H	73.97	-28.58	Peak	359.50	143.26	
3656.00	39.30	H	53.97	-14.67	Avg	359.50	143.26	
4570.00	45.12	H	73.97	-28.85	Peak	250.00	223.02	
4570.00	36.89	H	53.97	-17.08	Avg	250.00	223.02	
5484.00								N/A - Not
5484.00								in Restricted Band
6398.00								N/A - Not
6398.00								in Restricted Band
7312.00								No emissions
7312.00								detected
8226.00								No emissions
8226.00								detected
9140.00								No emissions
9140.00								detected

FCC 15.247

Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019

Lab: D

Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1848.00								N/A - Not
1848.00								in Restricted Band
2772.00	46.02	V	73.97	-27.95	Peak	331.25	143.08	
2772.00	36.58	V	53.97	-17.39	Avg	331.25	143.08	
3696.00	49.88	V	73.97	-24.09	Peak	265.00	111.32	
3696.00	43.79	V	53.97	-10.18	Avg	265.00	111.32	
4620.00	46.59	V	73.97	-27.38	Peak	227.75	110.97	
4620.00	40.00	V	53.97	-13.97	Avg	227.75	110.97	
5544.00								N/A - Not
5544.00								in Restricted Band
6468.00								N/A - Not
6468.00								in Restricted Band
7392.00								No emissions
7392.00								detected
8316.00								No emissions
8316.00								detected
9240.00								N/A - Not
9240.00								in Restricted Band

FCC 15.247Marine Sync Corporation
Transponder
Model: RUM V3 Rev. CDate: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto**Harmonics - High Channel
Transmit Mode - Y-Axis**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1848.00								N/A - Not
1848.00								in Restricted Band
2772.00	47.94	V	73.97	-26.03	Peak	290.75	111.44	
2772.00	38.71	V	53.97	-15.26	Avg	290.75	111.44	
3696.00	52.14	V	73.97	-21.83	Peak	142.25	127.38	
3696.00	46.00	V	53.97	-7.97	Avg	142.25	127.38	
4620.00	43.21	V	73.97	-30.76	Peak	242.25	111.38	
4620.00	34.85	V	53.97	-19.12	Avg	242.25	111.38	
5544.00								N/A - Not
5544.00								in Restricted Band
6468.00								N/A - Not
6468.00								in Restricted Band
7392.00								No emissions
7392.00								detected
8316.00								No emissions
8316.00								detected
9240.00								N/A - Not
9240.00								in Restricted Band

FCC 15.247

Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019
Lab: D
Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1848.00								N/A - Not
1848.00								in Restricted Band
2772.00	53.64	V	73.97	-20.33	Peak	97.00	111.32	
2772.00	45.60	V	53.97	-8.37	Avg	97.00	111.32	
3696.00	52.54	V	73.97	-21.43	Peak	146.25	127.14	
3696.00	47.22	V	53.97	-6.75	Avg	146.25	127.14	
4620.00	49.71	V	73.97	-24.26	Peak	153.25	159.26	
4620.00	44.47	V	53.97	-9.50	Avg	153.25	159.26	
5544.00								N/A - Not
5544.00								in Restricted Band
6468.00								N/A - Not
6468.00								in Restricted Band
7392.00								No emissions
7392.00								detected
8316.00								No emissions
8316.00								detected
9240.00								N/A - Not
9240.00								in Restricted Band

FCC 15.247

Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019

Lab: D

Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - X-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1848.00								N/A - Not
1848.00								in Restricted Band
2772.00	53.98	H	73.97	-19.99	Peak	165.25	111.20	
2772.00	45.46	H	53.97	-8.51	Avg	165.25	111.20	
3696.00	54.62	H	73.97	-19.35	Peak	137.50	127.14	
3696.00	48.40	H	53.97	-5.57	Avg	137.50	127.14	
4620.00	46.49	H	73.97	-27.48	Peak	193.25	110.43	
4620.00	40.24	H	53.97	-13.73	Avg	193.25	110.43	
5544.00								N/A - Not
5544.00								in Restricted Band
6468.00								N/A - Not
6468.00								in Restricted Band
7392.00								No emissions
7392.00								detected
8316.00								No emissions
8316.00								detected
9240.00								N/A - Not
9240.00								in Restricted Band

FCC 15.247

Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019

Lab: D

Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - Y-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1848.00								N/A - Not
1848.00								in Restricted Band
2772.00	53.71	H	73.97	-20.26	Peak	132.75	175.26	
2772.00	45.40	H	53.97	-8.57	Avg	132.75	175.26	
3696.00	53.56	H	73.97	-20.41	Peak	127.50	127.26	
3696.00	47.05	H	53.97	-6.92	Avg	127.50	127.26	
4620.00	48.59	H	73.97	-25.38	Peak	185.75	143.38	
4620.00	43.04	H	53.97	-10.93	Avg	185.75	143.38	
5544.00								N/A - Not
5544.00								in Restricted Band
6468.00								N/A - Not
6468.00								in Restricted Band
7392.00								No emissions
7392.00								detected
8316.00								No emissions
8316.00								detected
9240.00								N/A - Not
9240.00								in Restricted Band

FCC 15.247

Marine Sync Corporation
Transponder
Model: RUM V3 Rev. C

Date: 03/21/2019

Lab: D

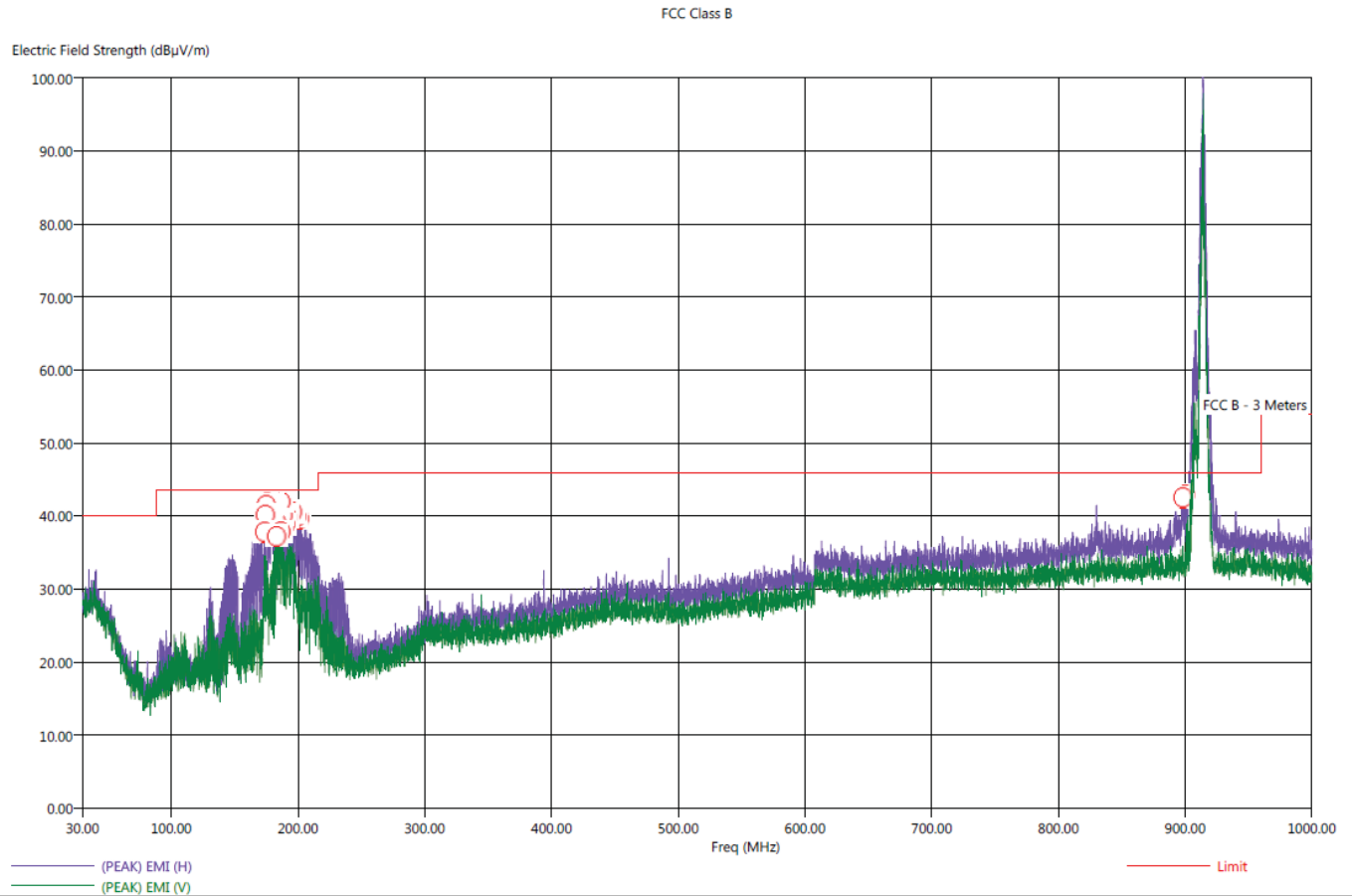
Tested By: Kyle Fujimoto

Harmonics - High Channel
Transmit Mode - Z-Axis

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1848.00								N/A - Not
1848.00								in Restricted Band
2772.00	49.37	H	73.97	-24.60	Peak	321.00	111.26	
2772.00	40.67	H	53.97	-13.30	Avg	321.00	111.26	
3696.00	50.81	H	73.97	-23.16	Peak	178.75	143.14	
3696.00	44.61	H	53.97	-9.36	Avg	178.75	143.14	
4620.00	46.34	H	73.97	-27.63	Peak	137.75	127.26	
4620.00	38.53	H	53.97	-15.44	Avg	137.75	127.26	
5544.00								N/A - Not
5544.00								in Restricted Band
6468.00								N/A - Not
6468.00								in Restricted Band
7392.00								No emissions
7392.00								detected
8316.00								No emissions
8316.00								detected
9240.00								N/A - Not
9240.00								in Restricted Band

Title: Pre-Scan - FCC Class B
File: 1 - Pre-Scan - Radiated - Tx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuous transmitting at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A
Note: The Emission at 914 MHz is from the transmitter itself and is subject to the limits of FCC 15.247 instead.

3/21/2019 12:18:17 PM
Sequence: Preliminary Scan



Title: Radiated Final - FCC Class B
File: 1 - Final Scan - Radiated - Tx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuous transmitting at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

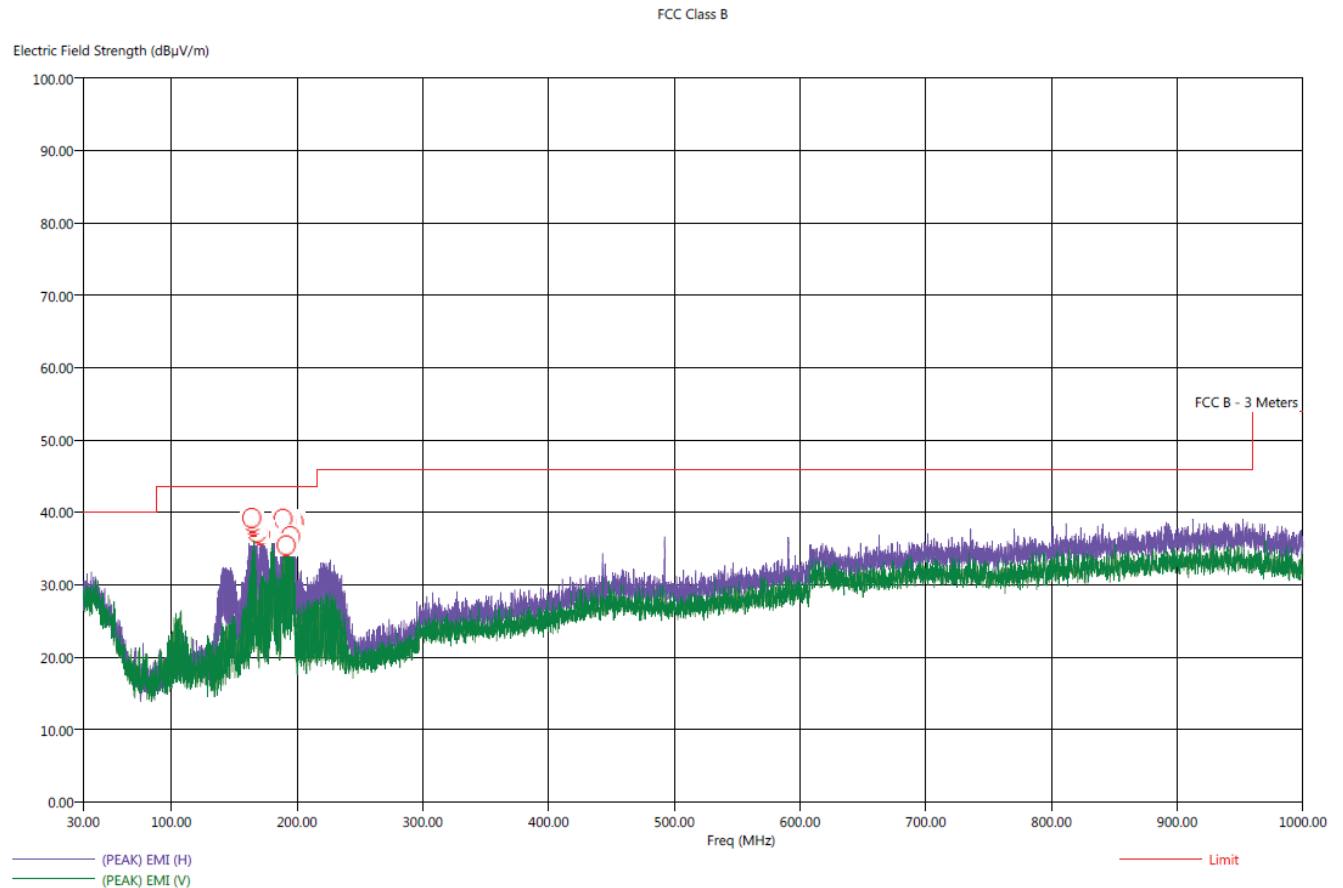
3/21/2019 12:27:24 PM
Sequence: Final Measurements

FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBμV/m)	(OP) EMI (dBμV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBμV/m)	Transducer (dB)	Cable (dB)	Ttbl Aql (deg)	Twr Ht (cm)
173.70	H	41.54	38.43	-1.96	-5.07	43.50	14.18	1.30	8.00	159.26
174.30	H	42.86	39.88	-0.64	-3.62	43.50	14.24	1.30	359.50	143.38
174.90	H	43.86	40.22	0.36	-3.28	43.50	14.29	1.30	16.75	159.20
175.60	H	44.18	42.02	0.68	-1.48	43.50	14.33	1.31	155.50	127.38
176.30	H	45.29	42.62	1.79	-0.88	43.50	14.35	1.31	153.75	143.32
177.00	H	45.56	43.38	2.06	-0.12	43.50	14.38	1.32	146.25	238.91
177.70	H	45.17	42.83	1.67	-0.67	43.50	14.41	1.32	151.50	191.20
178.30	H	45.33	42.87	1.83	-0.63	43.50	14.43	1.33	146.25	223.08
179.10	H	45.76	43.40	2.26	-0.10	43.50	14.46	1.33	159.75	239.14
179.70	H	45.25	42.90	1.75	-0.60	43.50	14.49	1.34	153.50	143.32
183.10	V	41.57	37.98	-1.93	-5.52	43.50	14.43	1.37	153.50	111.44
183.20	H	44.11	41.42	0.61	-2.08	43.50	14.43	1.37	154.50	254.85
183.80	H	44.12	40.06	0.62	-3.44	43.50	14.42	1.38	134.75	159.32
186.50	H	45.47	42.33	1.97	-1.17	43.50	14.36	1.40	140.75	159.38
186.60	V	43.42	40.98	-0.08	-2.52	43.50	14.36	1.40	145.00	111.32
187.10	H	45.38	42.73	1.88	-0.77	43.50	14.35	1.40	359.50	175.32
187.30	V	43.42	39.90	-0.08	-3.60	43.50	14.35	1.40	151.75	111.26
188.10	H	43.69	41.38	0.19	-2.12	43.50	14.34	1.41	16.75	191.20
190.00	H	41.46	38.58	-2.04	-4.92	43.50	14.29	1.42	167.50	127.26
191.40	H	43.41	41.06	-0.09	-2.44	43.50	14.27	1.43	50.00	191.14
192.10	H	43.36	40.90	-0.14	-2.60	43.50	14.25	1.44	50.75	207.14
195.60	H	42.45	38.22	-1.05	-5.28	43.50	14.18	1.47	358.50	126.85
196.20	H	42.99	38.97	-0.51	-4.53	43.50	14.17	1.47	17.50	239.20
196.80	H	42.39	39.57	-1.11	-3.93	43.50	14.16	1.48	358.50	127.14
198.70	H	41.52	38.49	-1.98	-5.01	43.50	14.12	1.49	18.00	270.97
201.20	H	42.41	39.98	-1.09	-3.52	43.50	14.13	1.50	358.75	158.97
898.20	H	43.32	37.16	-2.68	-8.84	46.00	27.17	2.99	138.00	336.70
900.10	H	43.87	37.90	-2.13	-8.10	46.00	27.20	3.00	138.75	318.85

Title: Pre-Scan - FCC Class B
File: 2 - Pre-Scan - Radiated - Rx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuous receiving at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 1:46:25 PM
Sequence: Preliminary Scan



Note: No Emissions for the Receive Mode Detected above 1 GHz

Title: Radiated Final - FCC Class B

File: 2 - Final Scan - Radiated - Rx Mode.set

Operator: Kyle Fujimoto

EUT Type: Transponder

EUT Condition: The EUT is continuous receiving at 914 MHz - X-Axis Worst Case

Comments: Company: Marine Sync Corporation

Model: RUM V3 Rev. C

S/N: N/A

3/21/2019 1:55:53 PM
 Sequence: Final Measurements

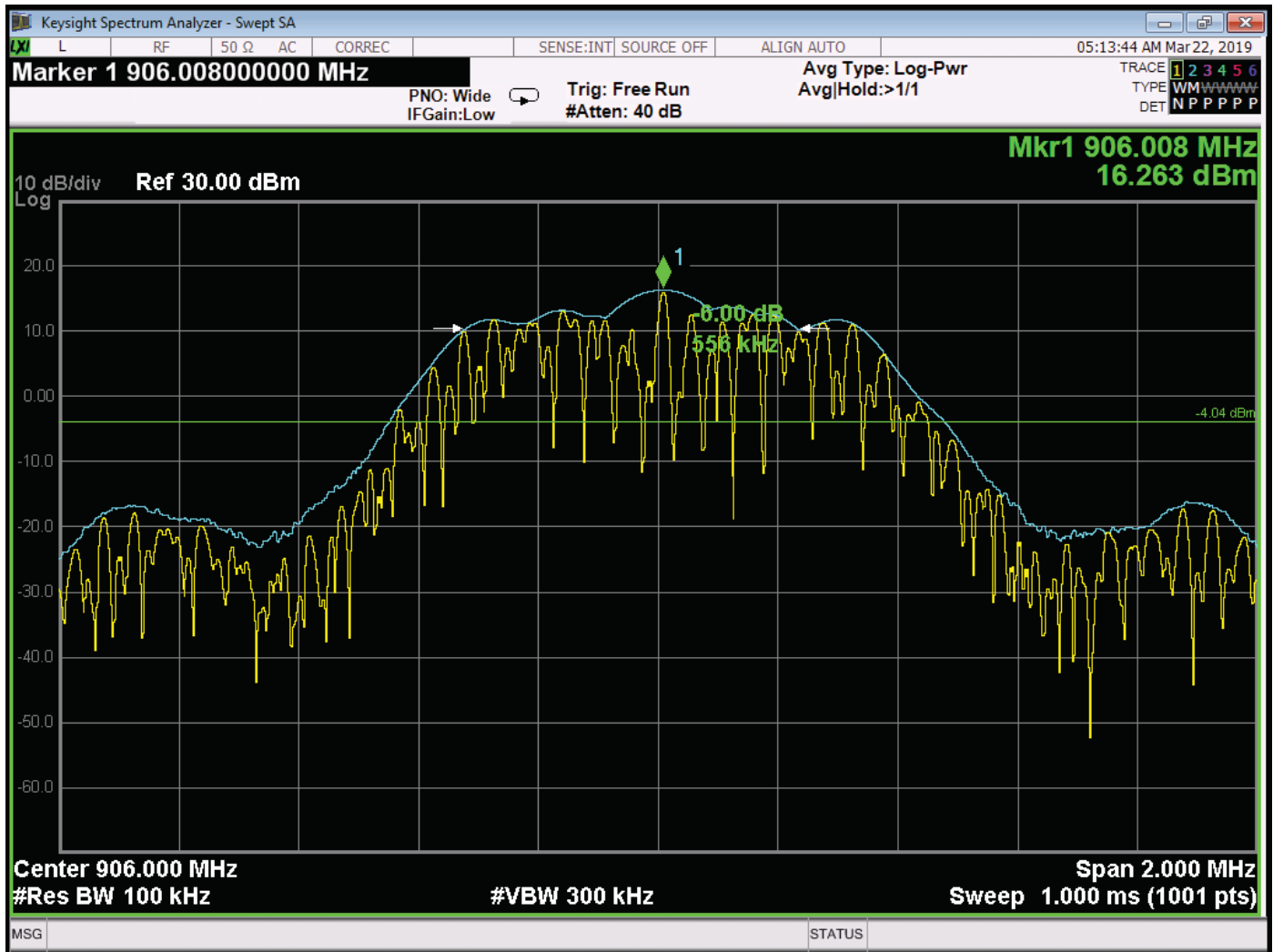
FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBμV/m)	(OP) EMI (dBμV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBμV/m)	Transducer (dB)	Cable (dB)	Ttbl Aql (deg)	Twr Ht (cm)
164.00	H	41.25	40.43	-2.25	-3.07	43.50	13.28	1.30	0.00	159.44
164.70	H	42.06	41.03	-1.44	-2.47	43.50	13.34	1.30	138.50	207.32
165.40	H	41.92	40.75	-1.58	-2.75	43.50	13.42	1.30	141.75	207.14
166.20	H	41.58	40.32	-1.92	-3.18	43.50	13.48	1.30	133.25	207.14
168.10	H	38.69	36.89	-4.81	-6.61	43.50	13.67	1.30	153.25	206.97
170.90	H	37.99	36.66	-5.51	-6.84	43.50	13.92	1.30	360.00	127.38
171.60	H	39.92	38.10	-3.58	-5.40	43.50	13.99	1.30	20.75	175.08
172.20	H	39.33	37.93	-4.17	-5.57	43.50	14.04	1.30	359.00	143.14
173.00	H	39.49	38.06	-4.01	-5.44	43.50	14.11	1.30	11.75	159.26
188.80	H	41.02	39.36	-2.48	-4.14	43.50	14.32	1.41	359.75	159.38
189.40	H	40.23	39.00	-3.27	-4.50	43.50	14.31	1.42	0.00	159.26
190.10	H	39.73	38.56	-3.77	-4.94	43.50	14.30	1.42	355.75	159.14
191.50	H	39.91	38.67	-3.59	-4.83	43.50	14.27	1.43	0.75	175.32
191.50	V	36.98	35.54	-6.52	-7.96	43.50	14.27	1.43	303.25	111.56
192.90	H	39.61	38.46	-3.89	-5.04	43.50	14.24	1.44	360.00	159.44
193.60	H	39.28	38.15	-4.22	-5.35	43.50	14.23	1.45	0.00	159.26
194.80	V	38.36	36.68	-5.14	-6.82	43.50	14.20	1.46	285.25	111.50
195.50	V	38.31	36.96	-5.19	-6.54	43.50	14.19	1.47	275.25	111.50
197.70	H	39.52	38.21	-3.98	-5.29	43.50	14.15	1.48	360.00	143.44

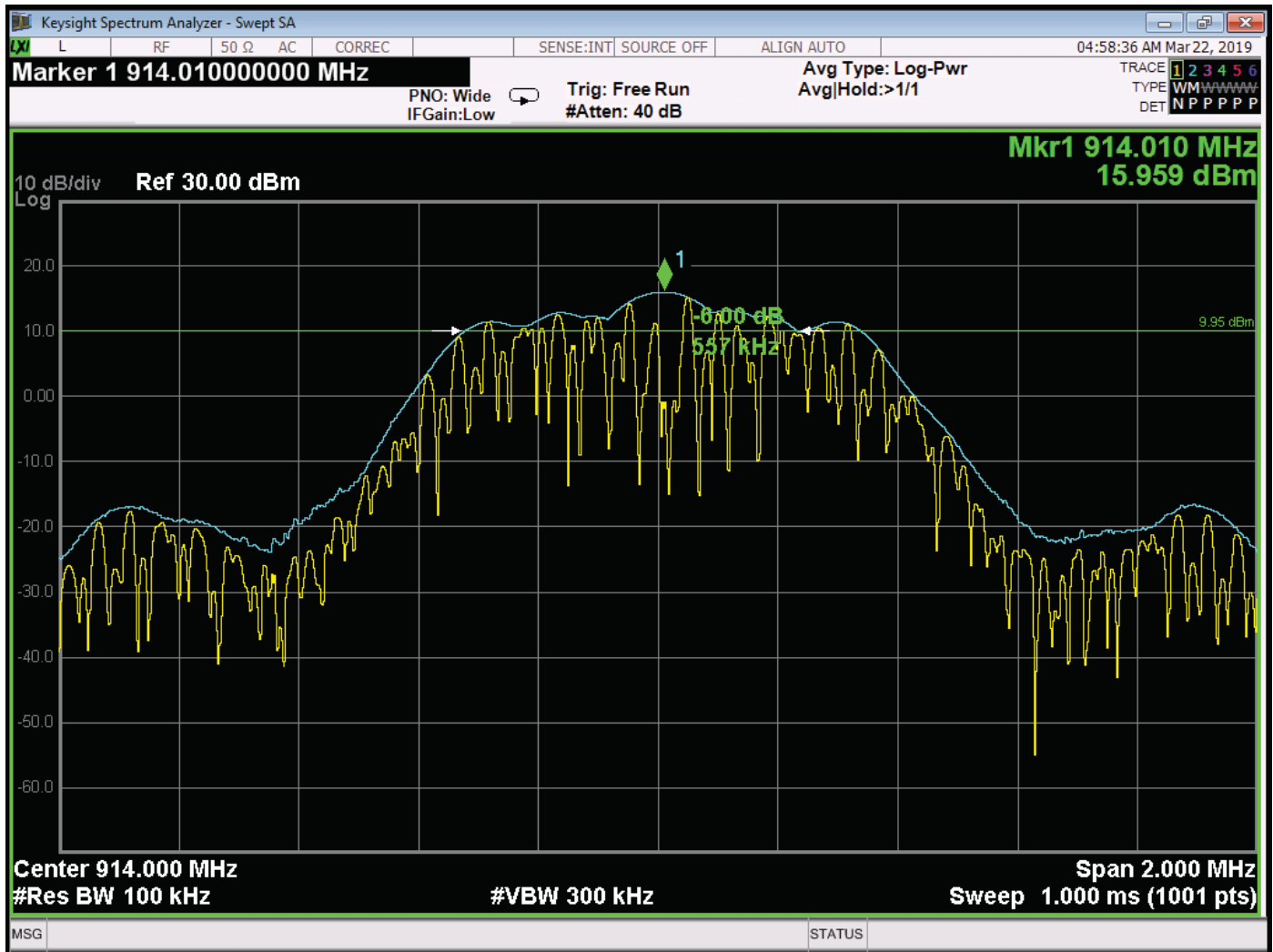


-6 dB BANDWIDTH

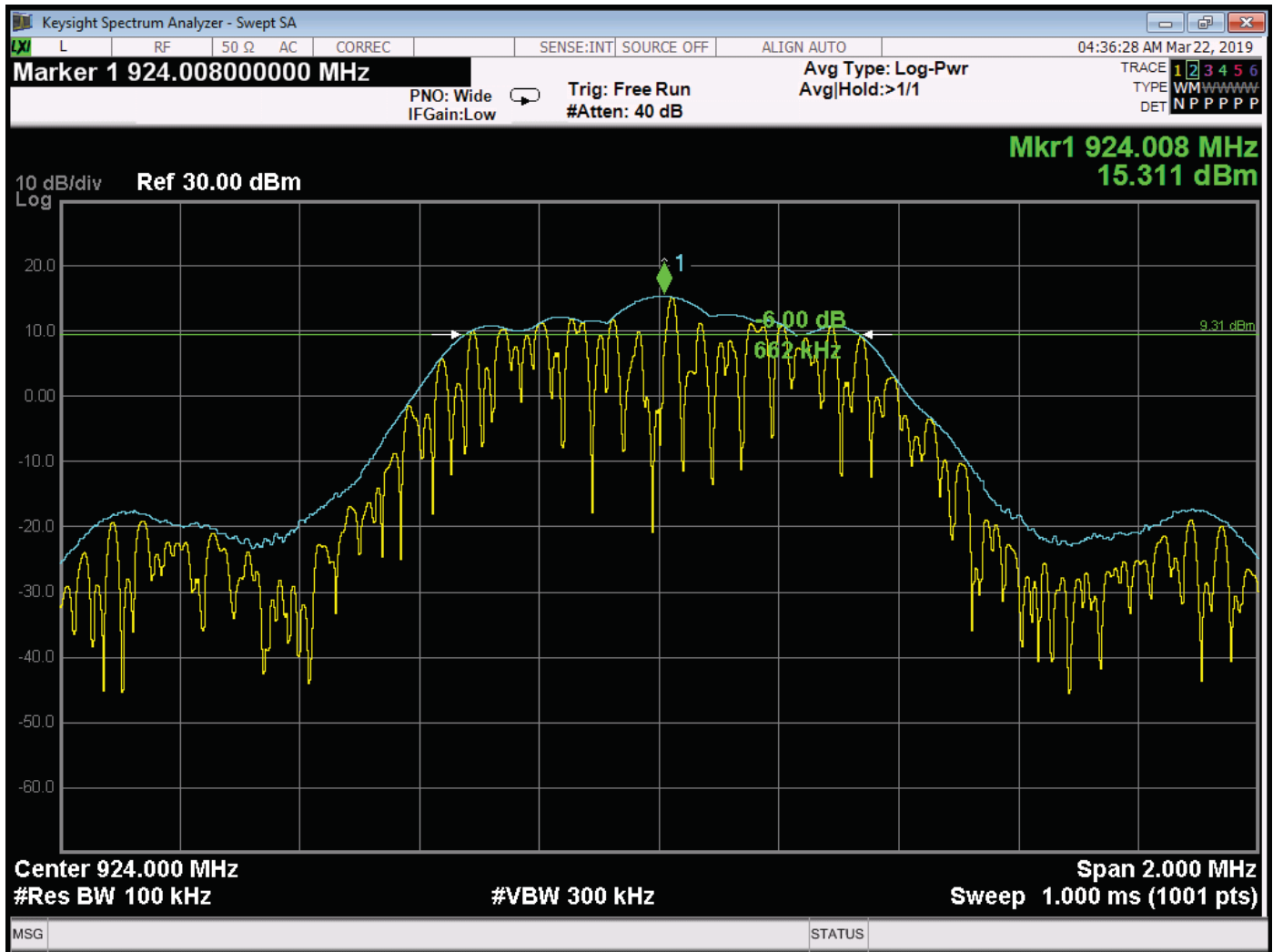
DATA SHEETS



-6 dB Bandwidth – Low Channel



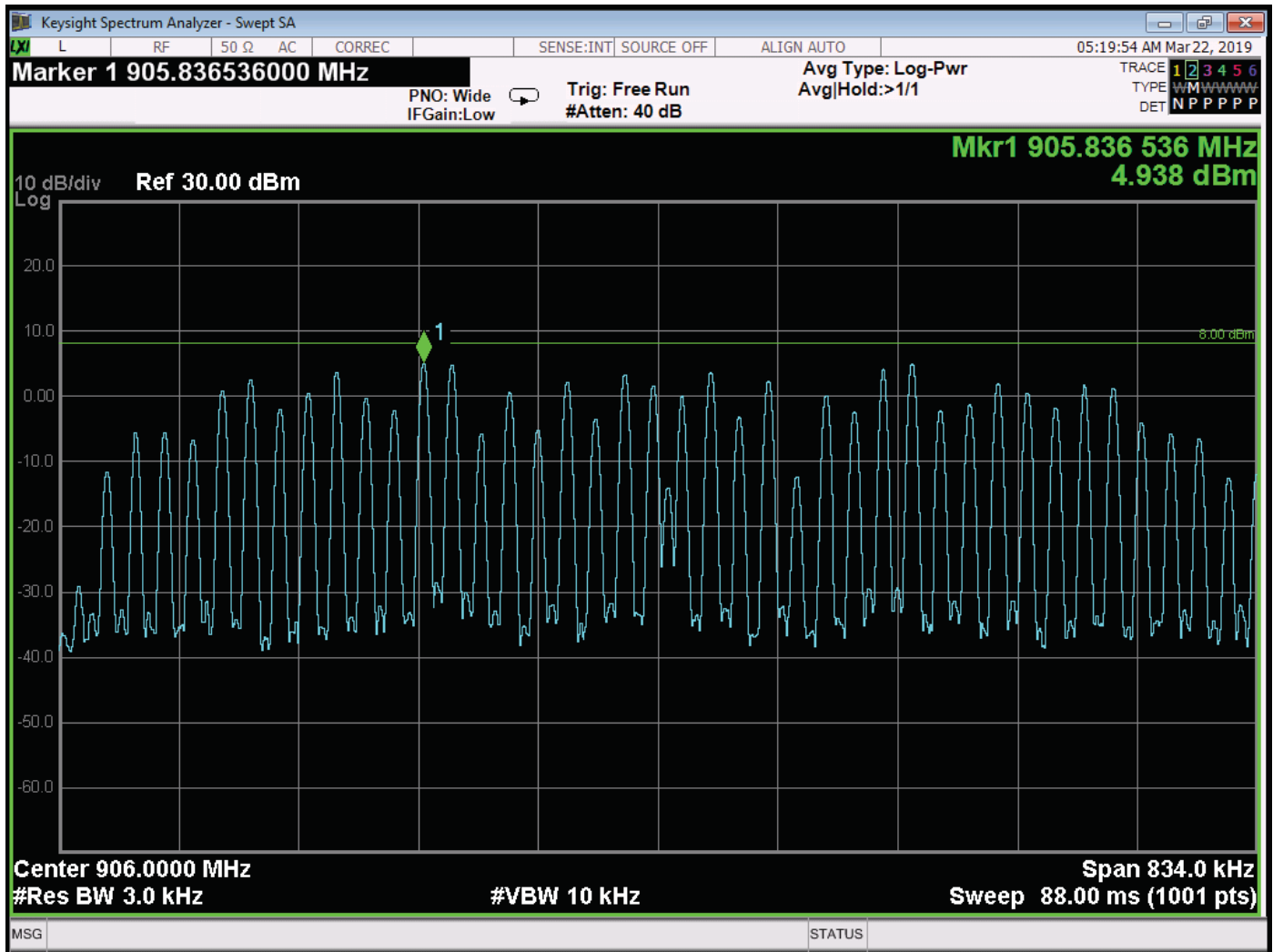
-6 dB Bandwidth – Middle Channel1



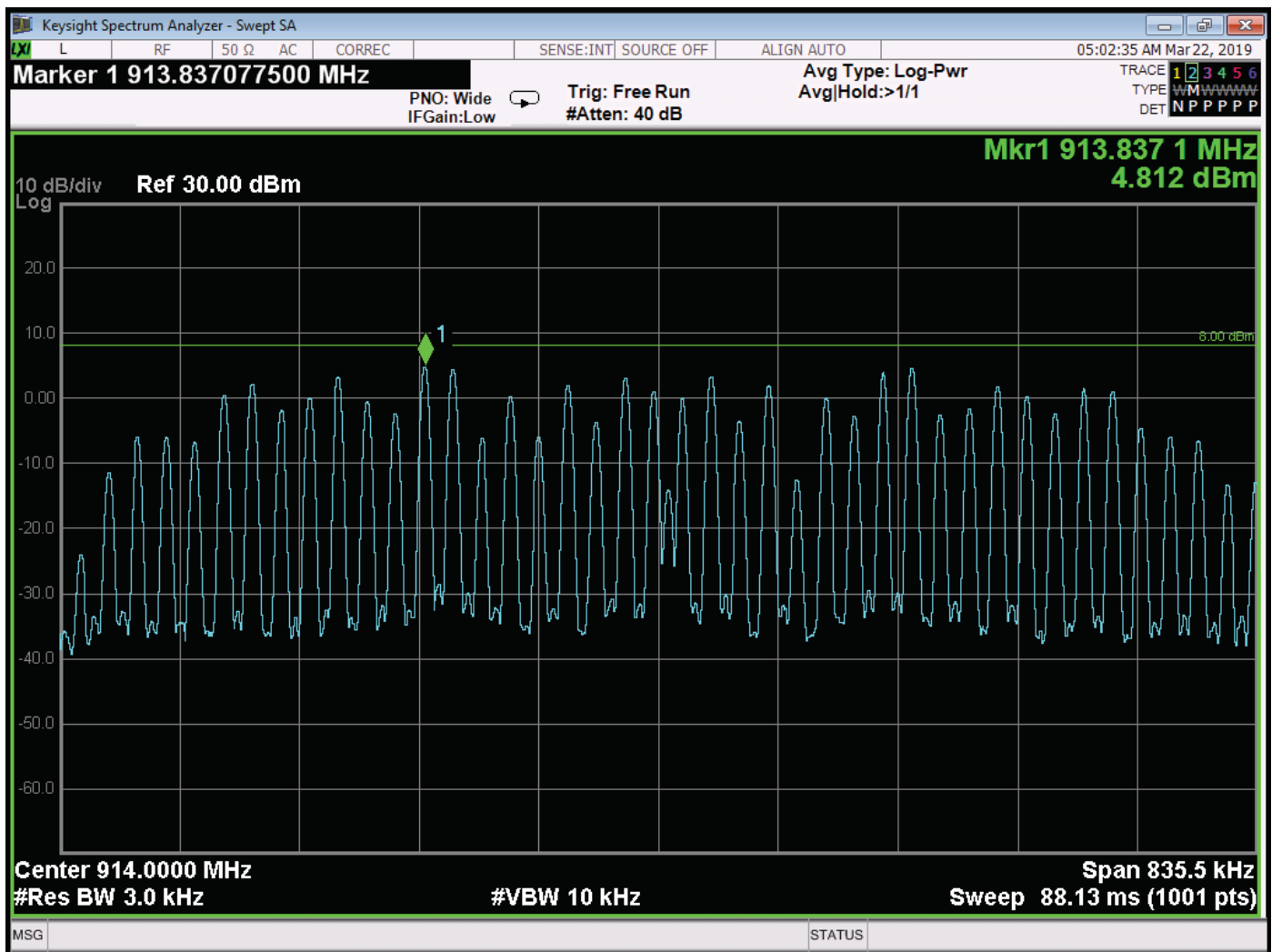
-6 dB Bandwidth – High Channel

SPECTRAL DENSITY OUTPUT

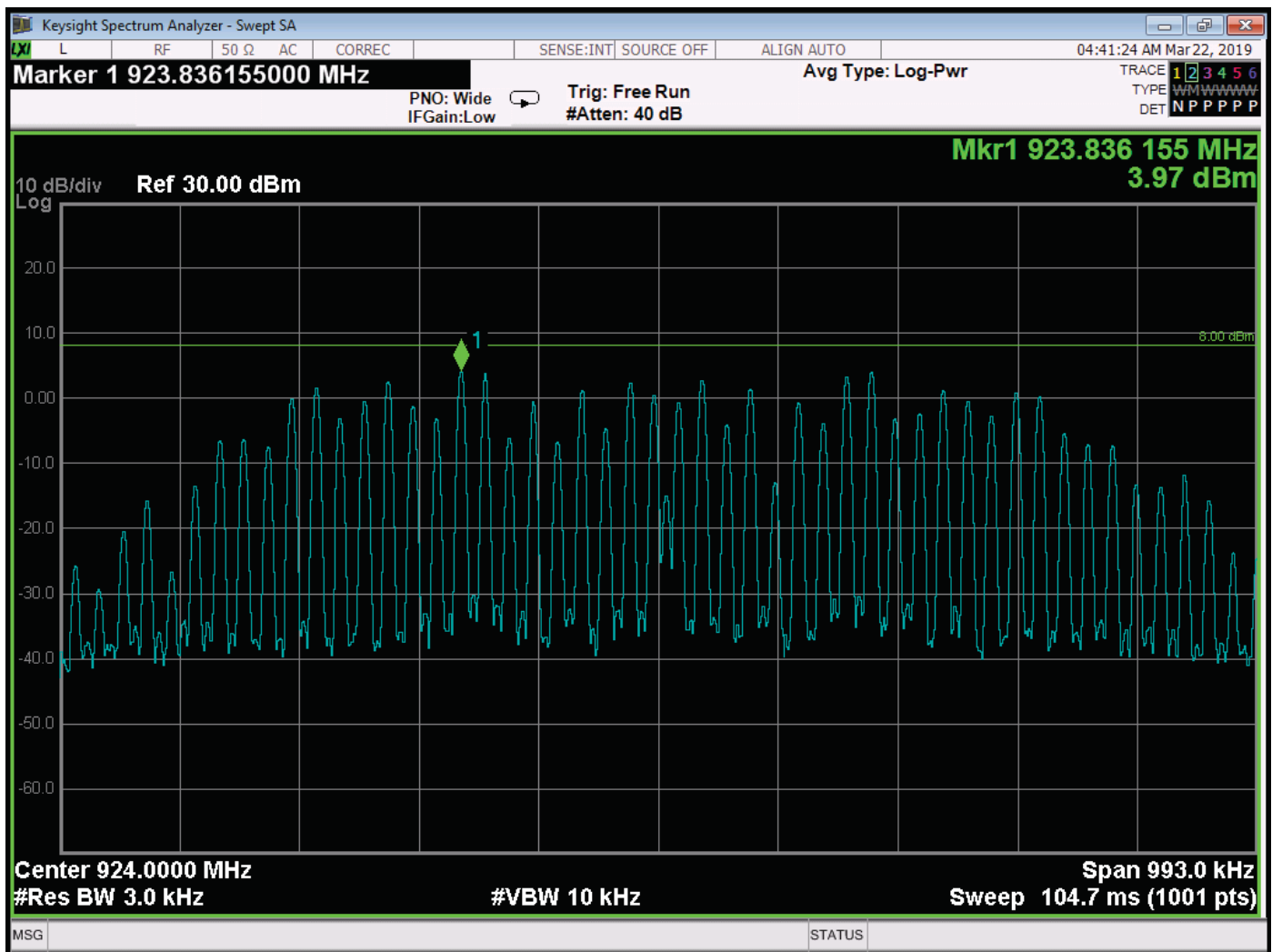
DATA SHEETS



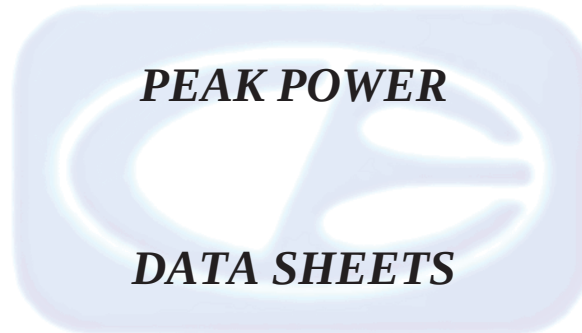
Spectral Density – Low Channel

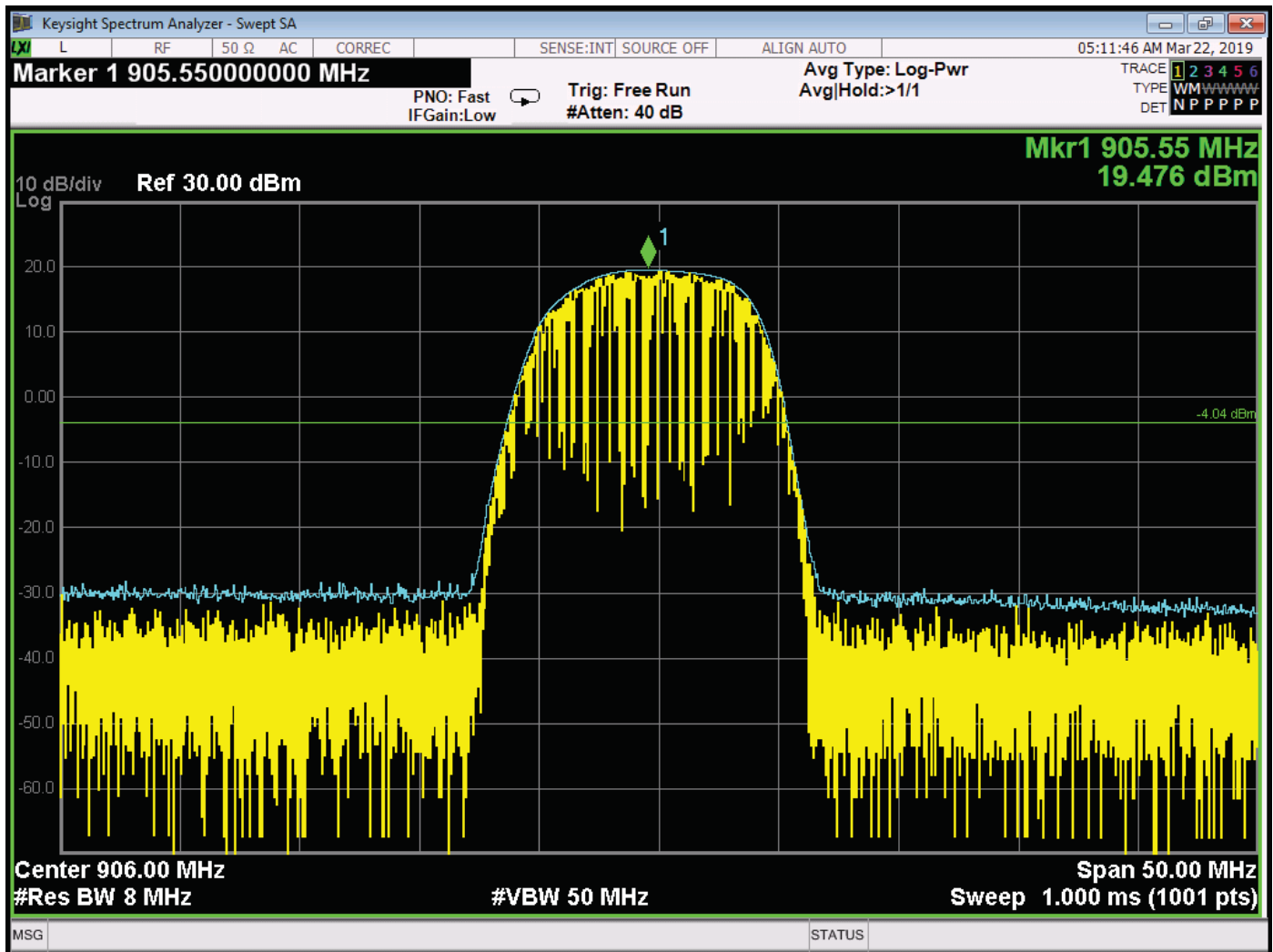


Spectral Density – Middle Channel

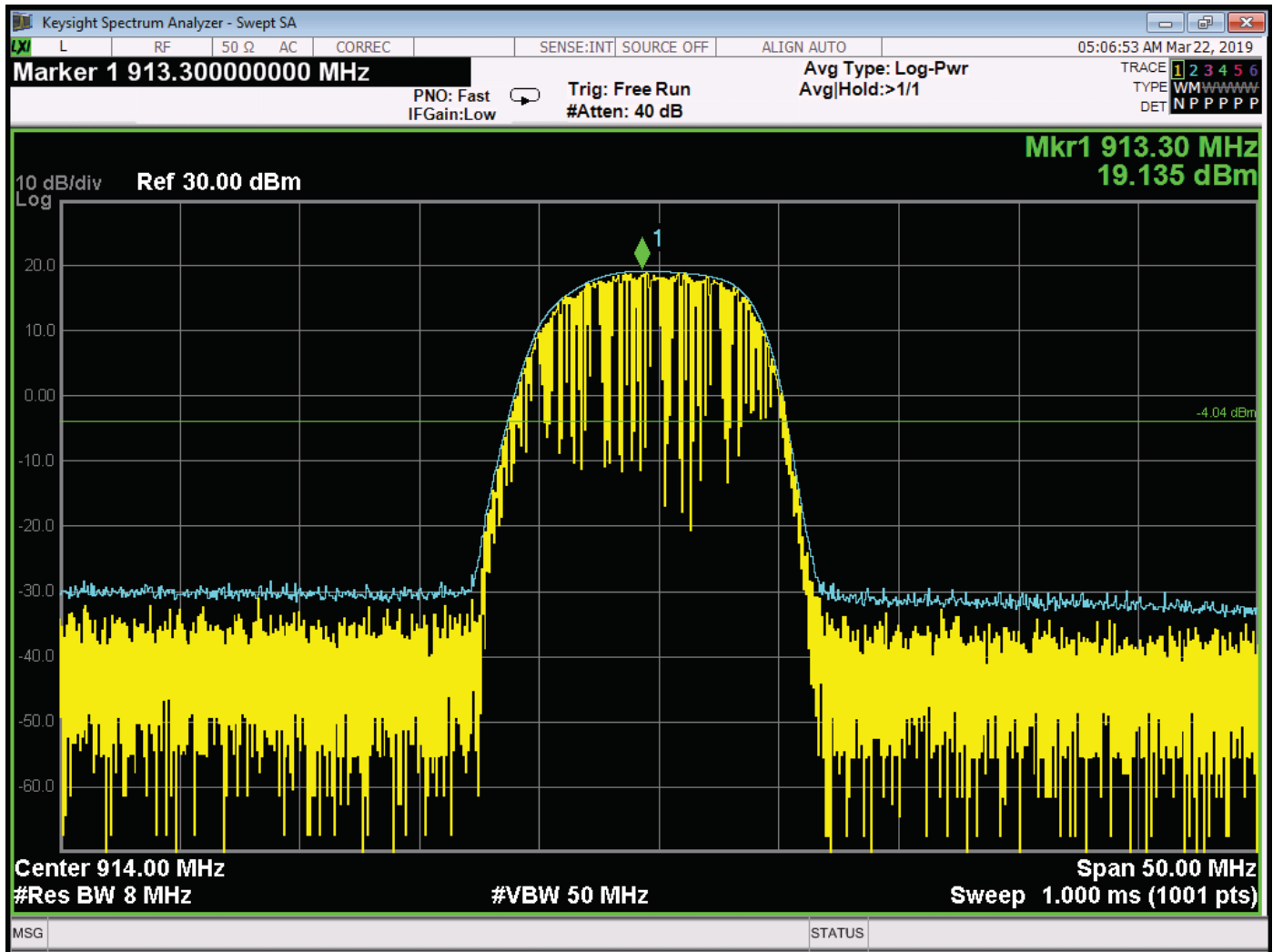


Spectral Density – High Channel

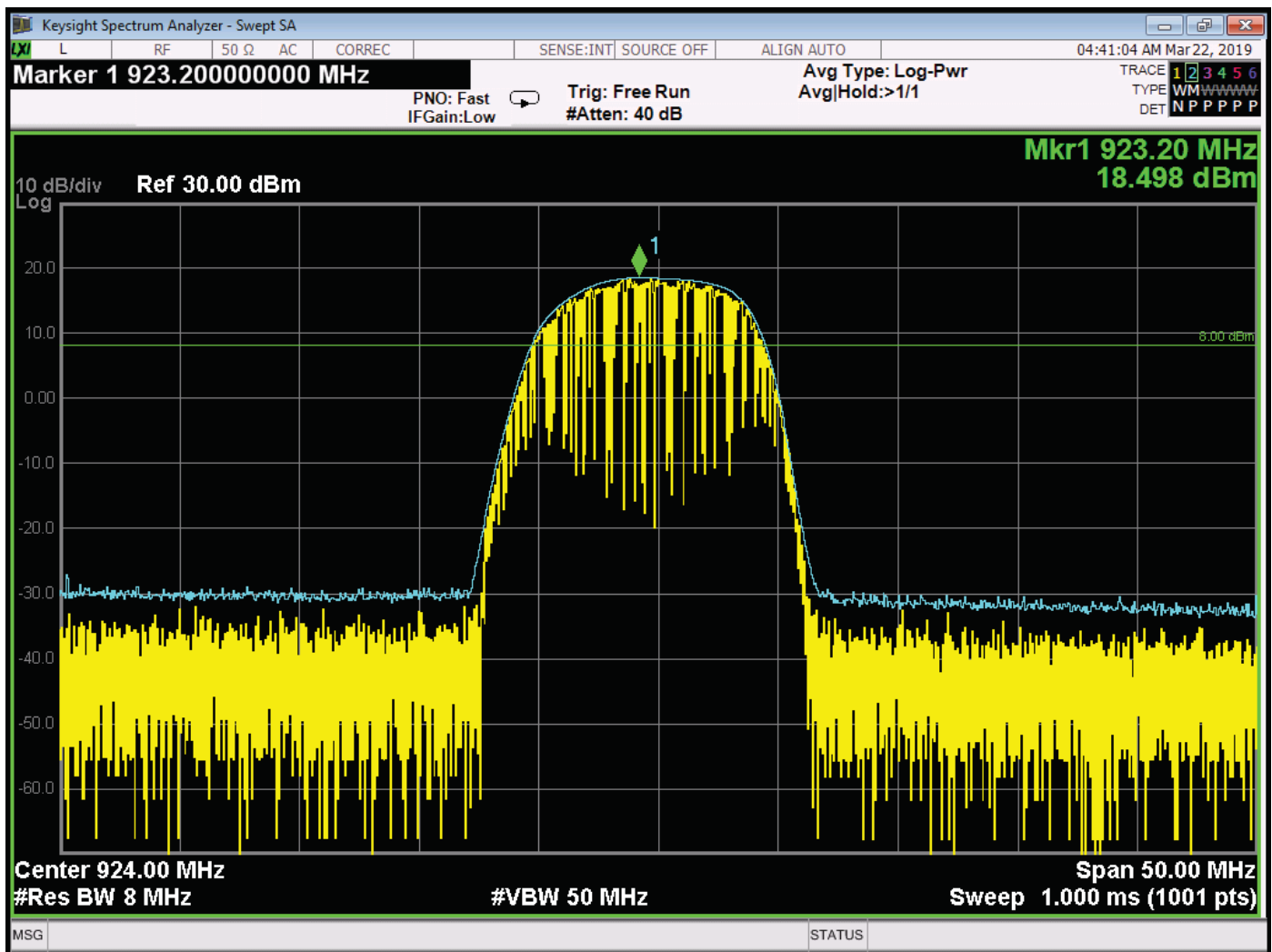




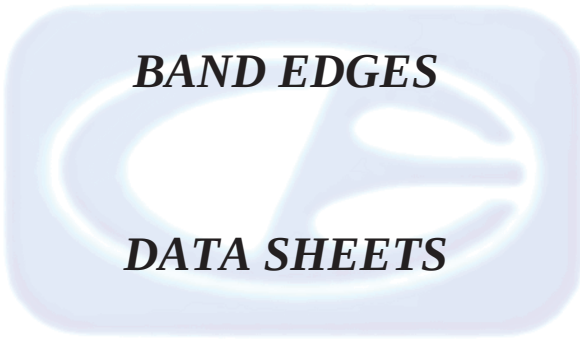
Peak Output Power – Low Channel



Peak Output Power – Middle Channel

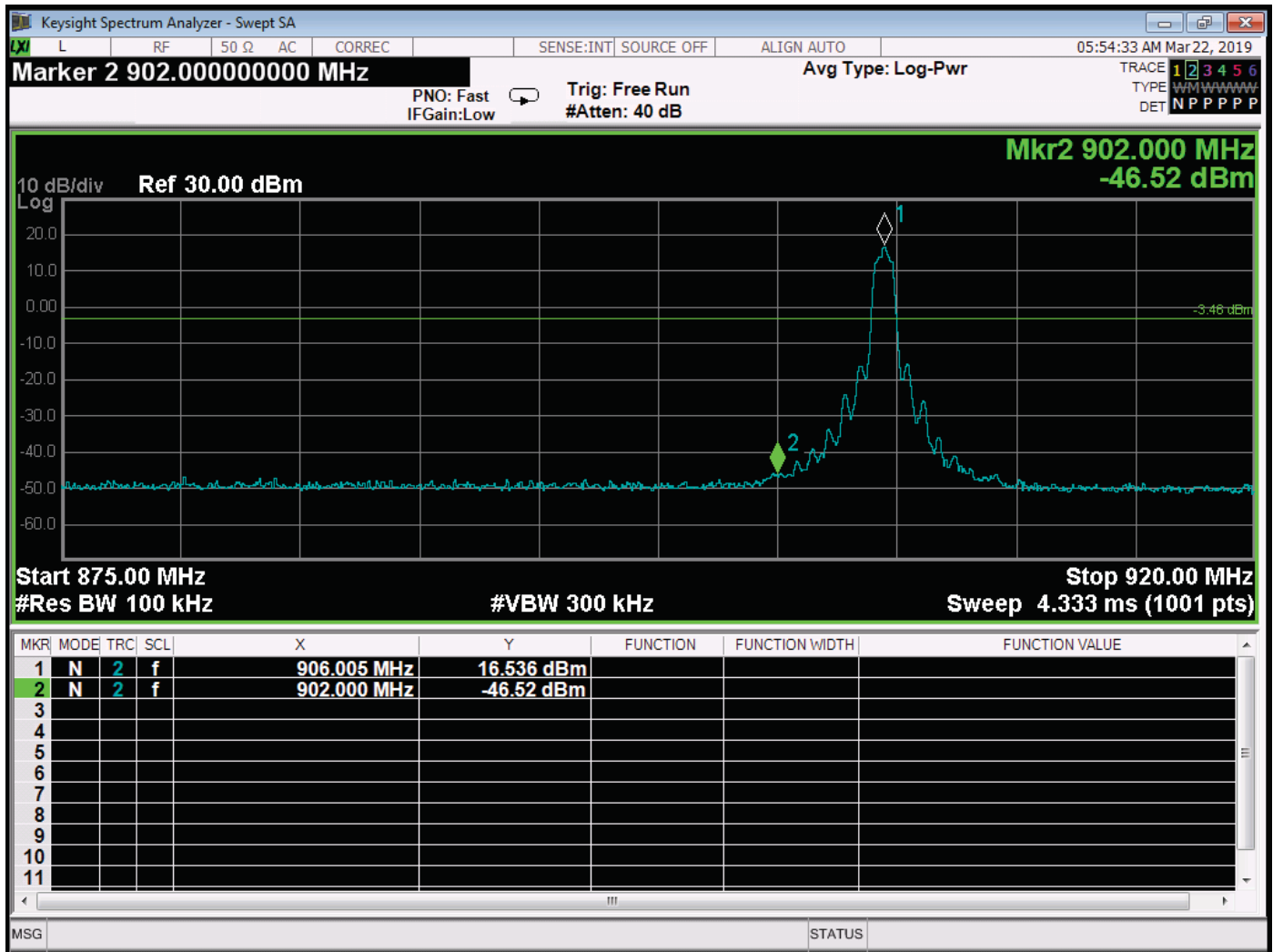


Peak Output Power – High Channel

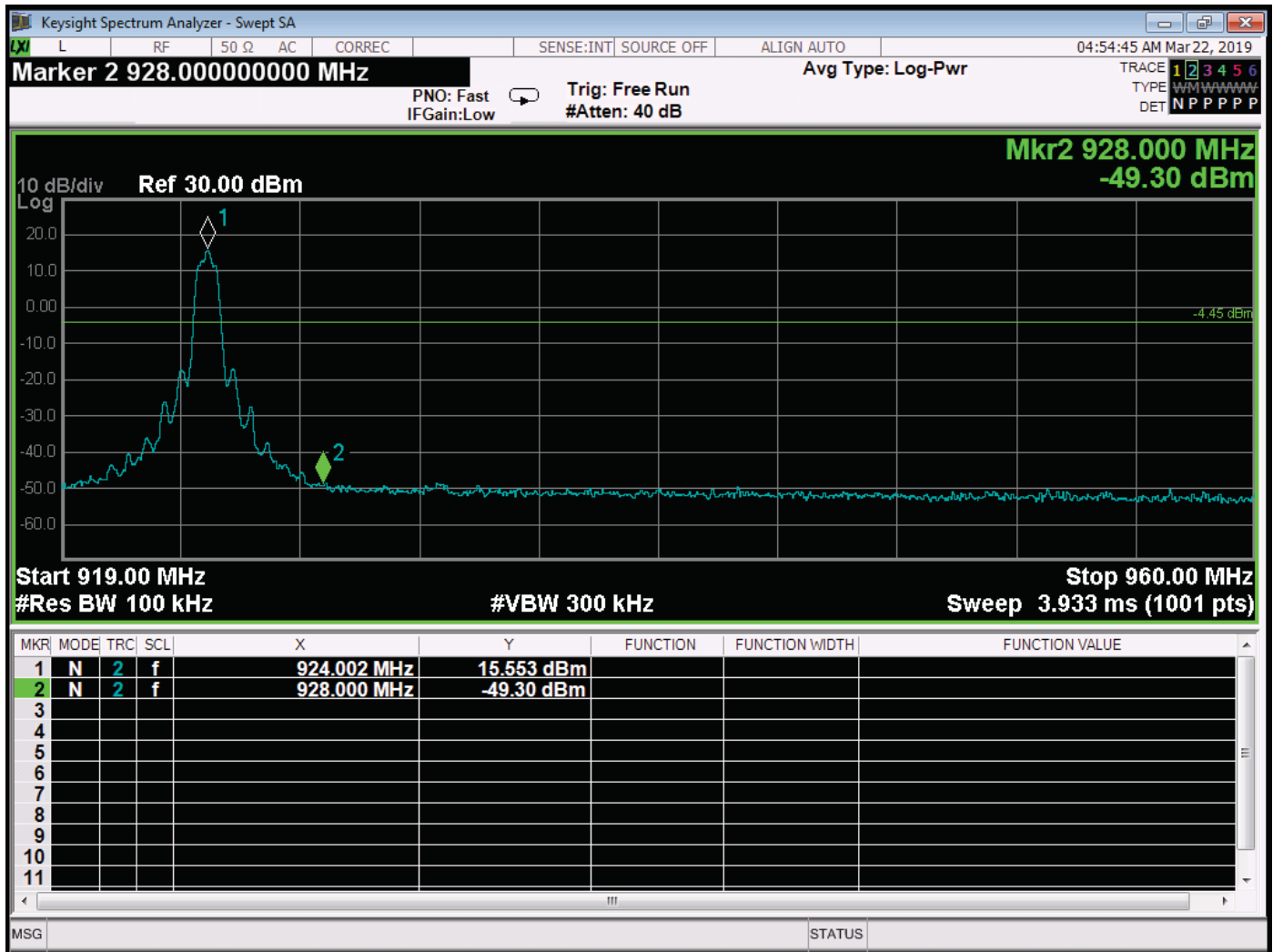


BAND EDGES

DATA SHEETS

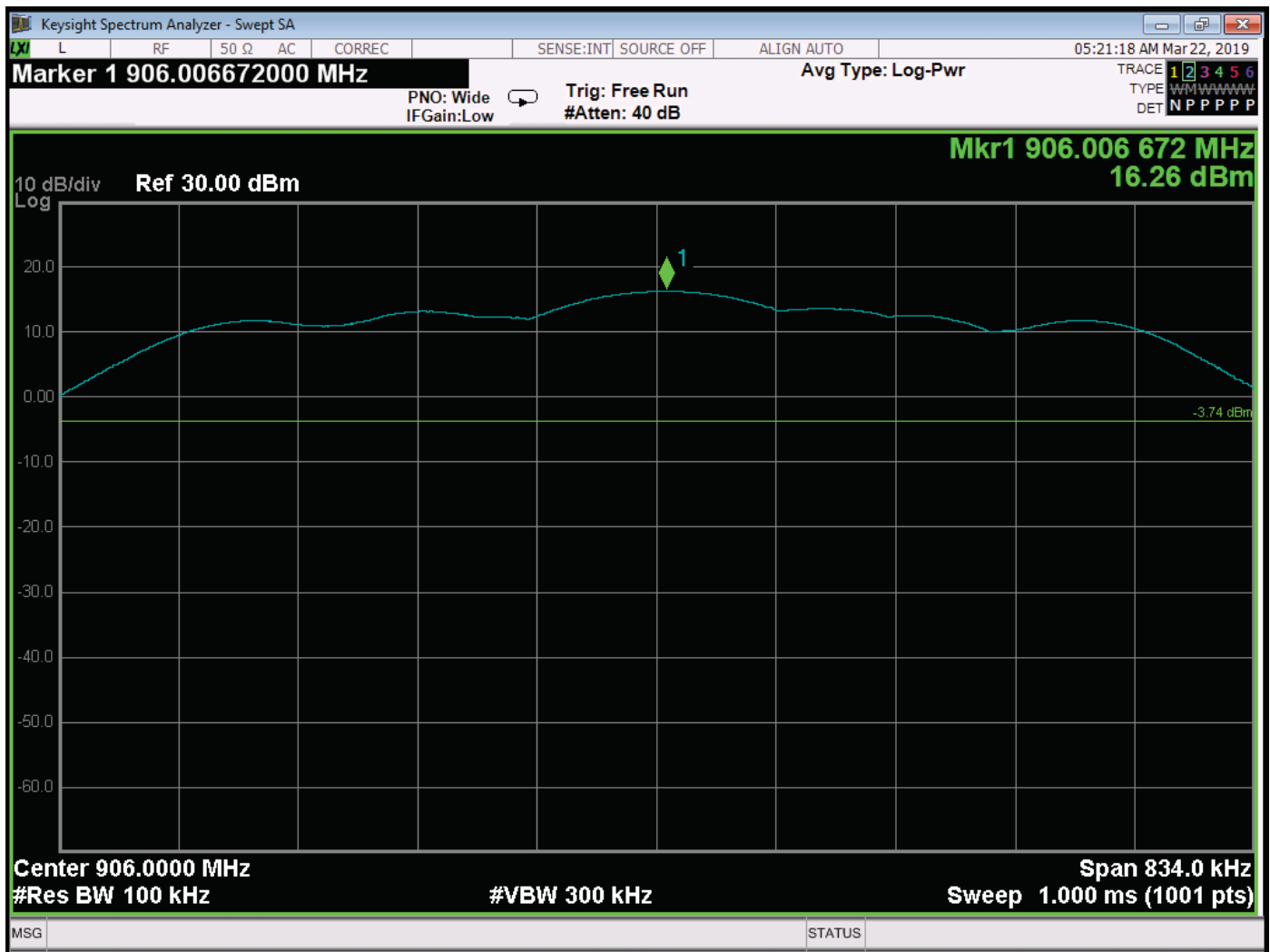


Band Edge – Low Channel

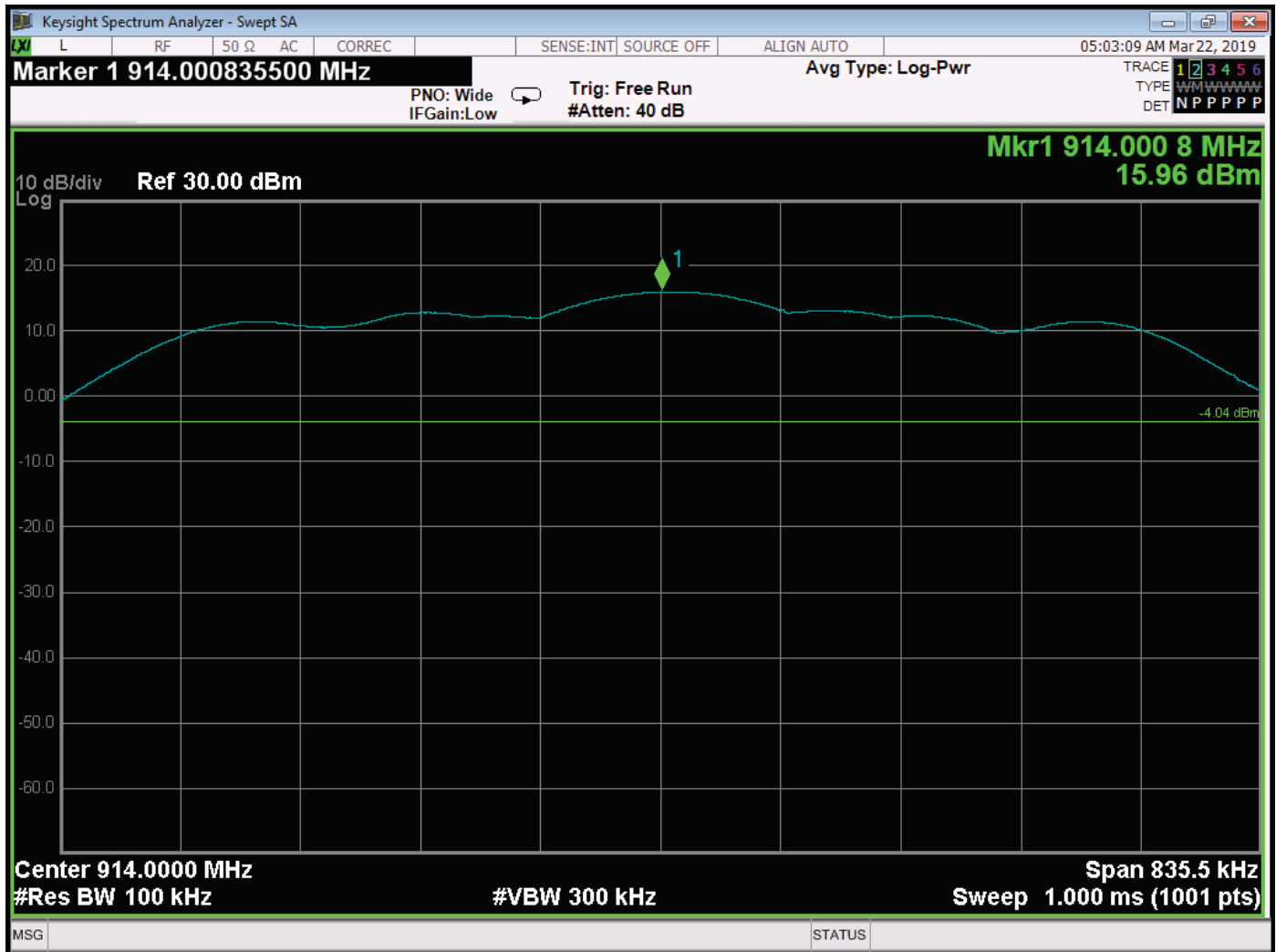


Band Edge – High Channel

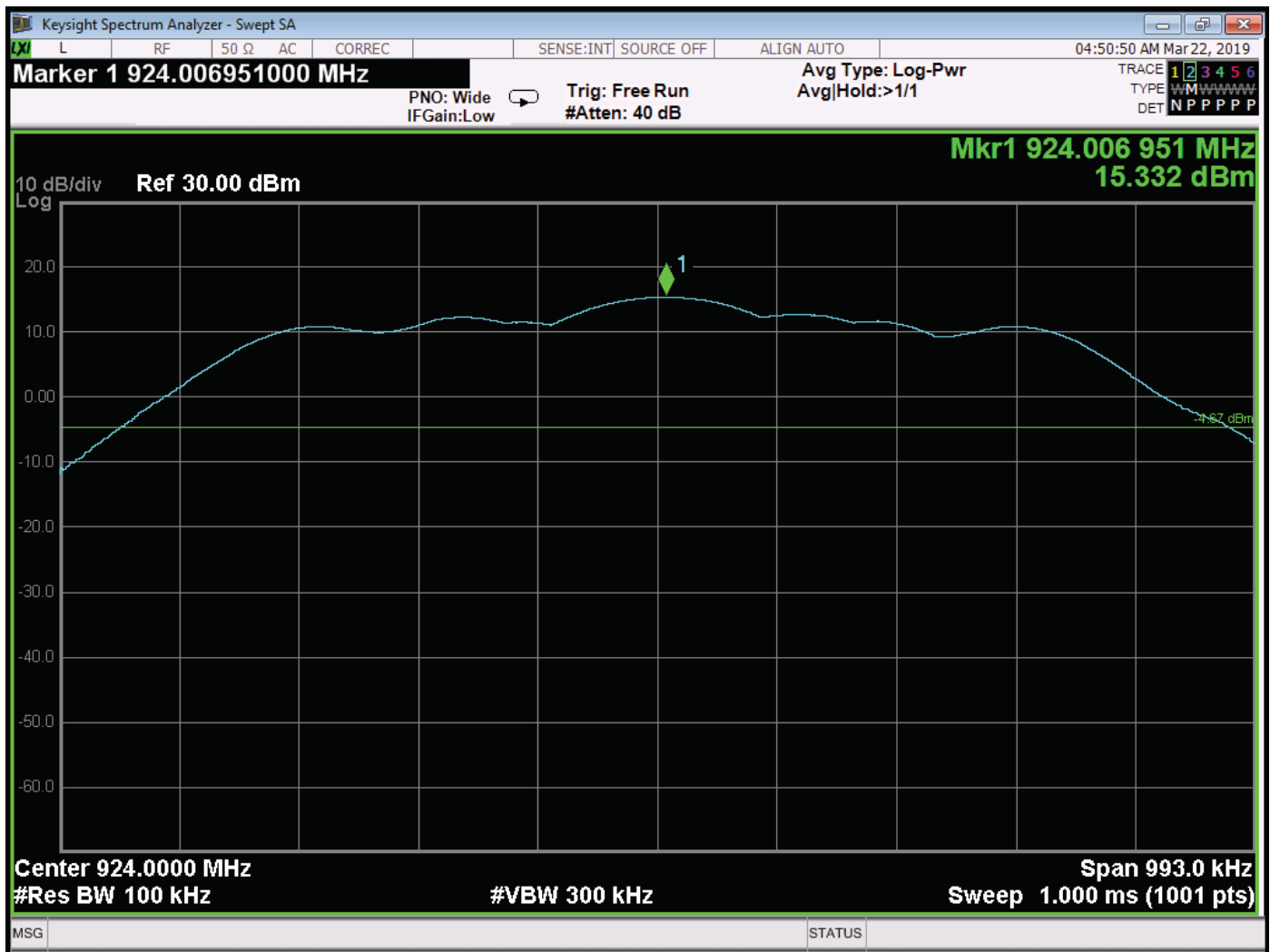
**EMISSIONS IN
NON-RESRTICTED BANDS
*DATA SHEETS***



RF Antenna Conducted – Reference Level – Low Channel



RF Antenna Conducted – Reference Level – Middle Channel



RF Antenna Conducted – Reference Level – High Channel

MARINE SYNC CORPORATION**TRANSPONDER****MODEL: RUM V3 REV. C****EMISSIONS IN NON-RESTRICTED BANDS**

FREQUENCY (MHz)	LEVEL (dBm)	Limit* (dBm)	Margin (dB)
1812	-33.475	-3.74	-29.735
1828	-34.637	-4.04	-30.597
1848	-36.319	-4.67	-31.469

Note: The three highest non-restricted emissions are reported.

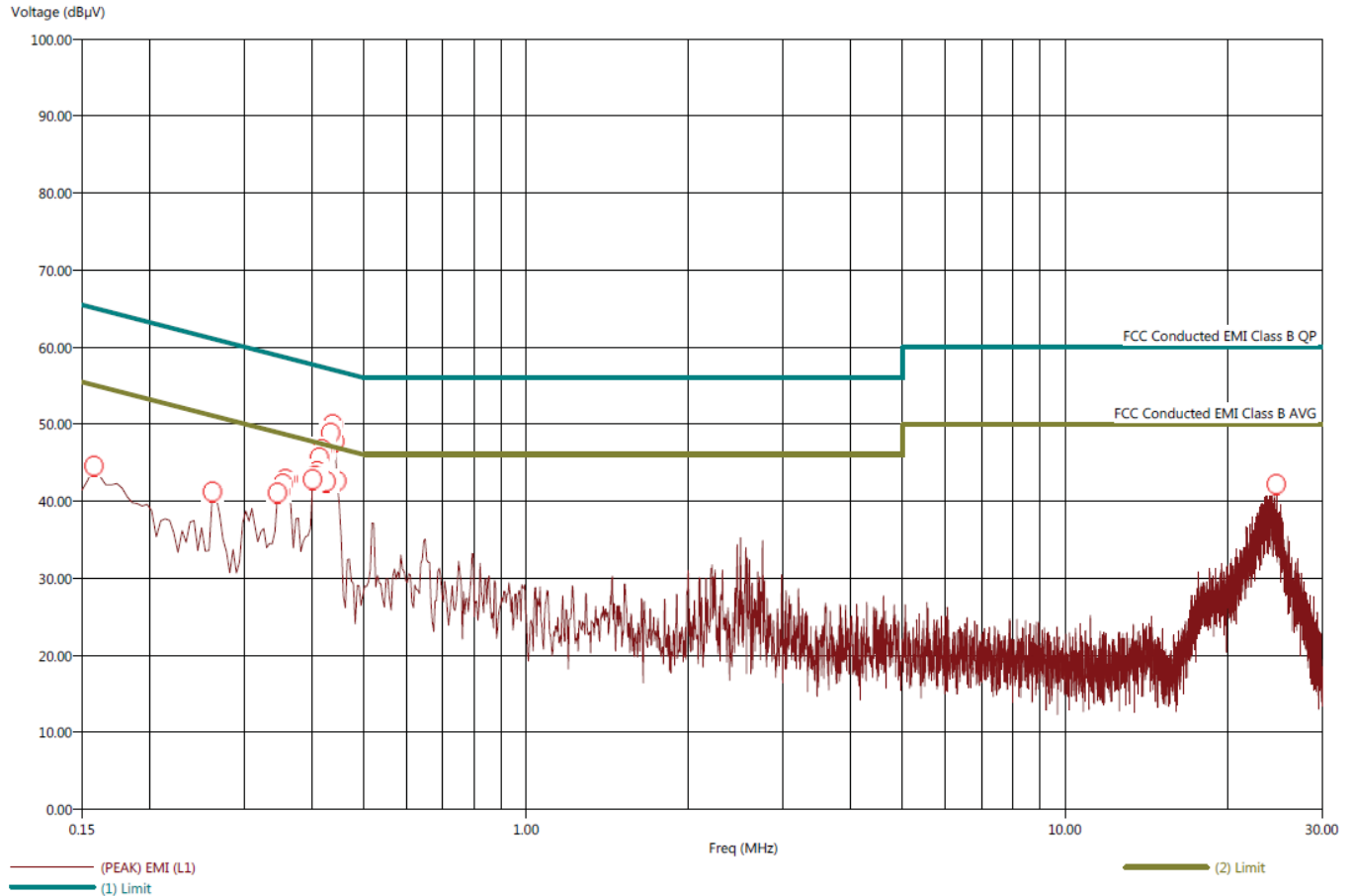
*The Limit is based on 20 dB below the reference levels obtained on the previous pages.

***CONDUCTED EMISSIONS
DATA SHEETS***

Title: FCC Class B - Black Lead
File: 3 - Pre-Scan - Black Lead - Rx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuously receiving at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 3:05:02 PM
Sequence: Preliminary Scan

Black Lead - FCC Class B



Title: FCC Class B - Black Lead
File: 3 - Final Scan - Black Lead - Rx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuously receiving at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 3:11:41 PM
Sequence: Final Measurements

Black Lead - AVG - FCC Class B

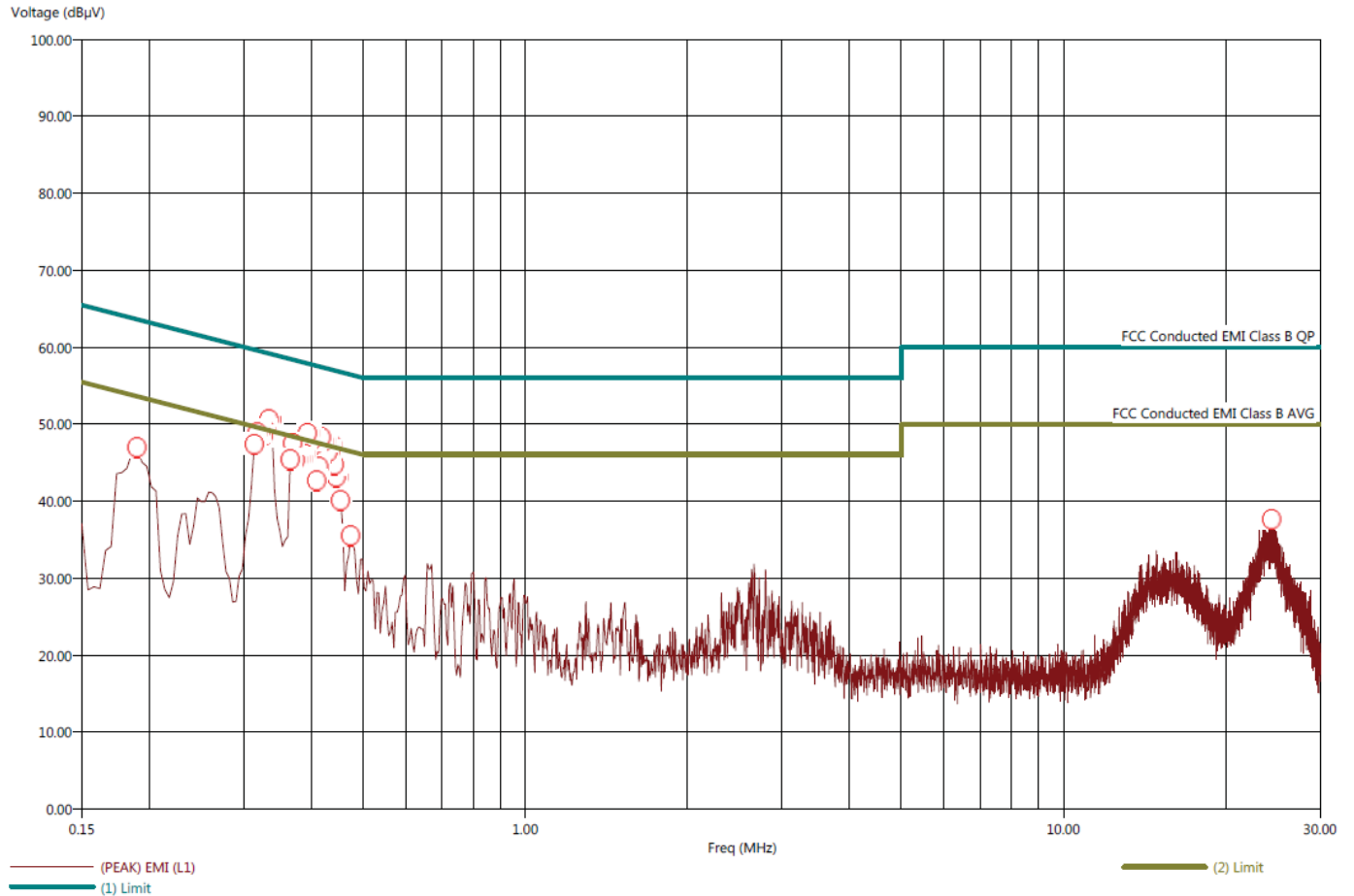
Freq (MHz)	(PEAK) EMI (dBµV)	(AVG) EMI (dBµV)	(PEAK) Margin (AVG) (dB)	(AVG) Margin (AVG) (dB)	(AVG) Limit (dBµV)	Cable (dB)	Transducer (dB)	Filter (dB)
0.158	47.13	34.86	-8.23	-20.50	55.36	0.00	0.42	9.80
0.262	44.60	22.74	-6.48	-28.34	51.08	0.00	0.18	9.77
0.346	44.63	30.61	-4.11	-18.13	48.74	0.00	0.05	9.74
0.350	44.68	30.74	-4.06	-18.00	48.74	0.00	0.05	9.74
0.354	44.22	31.26	-4.22	-17.18	48.44	0.00	0.05	9.73
0.358	44.53	30.90	-4.12	-17.75	48.64	0.00	0.05	9.74
0.362	44.75	31.23	-3.85	-17.37	48.61	0.00	0.05	9.74
0.402	47.21	34.78	-0.61	-13.04	47.81	0.00	0.04	9.73
0.406	48.74	34.26	1.02	-13.46	47.72	0.00	0.04	9.72
0.410	51.06	35.52	3.61	-11.93	47.45	0.00	0.04	9.72
0.414	51.35	35.14	3.89	-12.32	47.46	0.00	0.04	9.72
0.418	51.50	35.18	4.18	-12.14	47.32	0.00	0.04	9.72
0.422	50.80	34.82	3.57	-12.41	47.23	0.00	0.03	9.72
0.426	50.18	34.28	3.04	-12.86	47.13	0.00	0.03	9.72
0.430	50.97	35.07	3.70	-12.20	47.28	0.00	0.03	9.72
0.434	50.50	34.84	3.32	-12.34	47.18	0.00	0.03	9.72
0.438	51.16	35.42	3.83	-11.91	47.34	0.00	0.04	9.72
0.442	48.52	32.96	1.49	-14.07	47.03	0.00	0.03	9.71
0.446	45.34	30.50	-1.53	-16.37	46.88	0.00	0.03	9.71
24.678	40.90	30.57	-9.10	-19.43	50.00	0.51	0.03	9.80



Title: FCC Class B - White Lead
File: 4 - Pre-Scan - White Lead - Rx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuously receiving at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 3:17:51 PM
Sequence: Preliminary Scan

White Lead - FCC Class B



Title: FCC Class B - White Lead
File: 4 - Final Scan - White Lead - Rx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuously receiving at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 3:19:10 PM
Sequence: Final Measurements

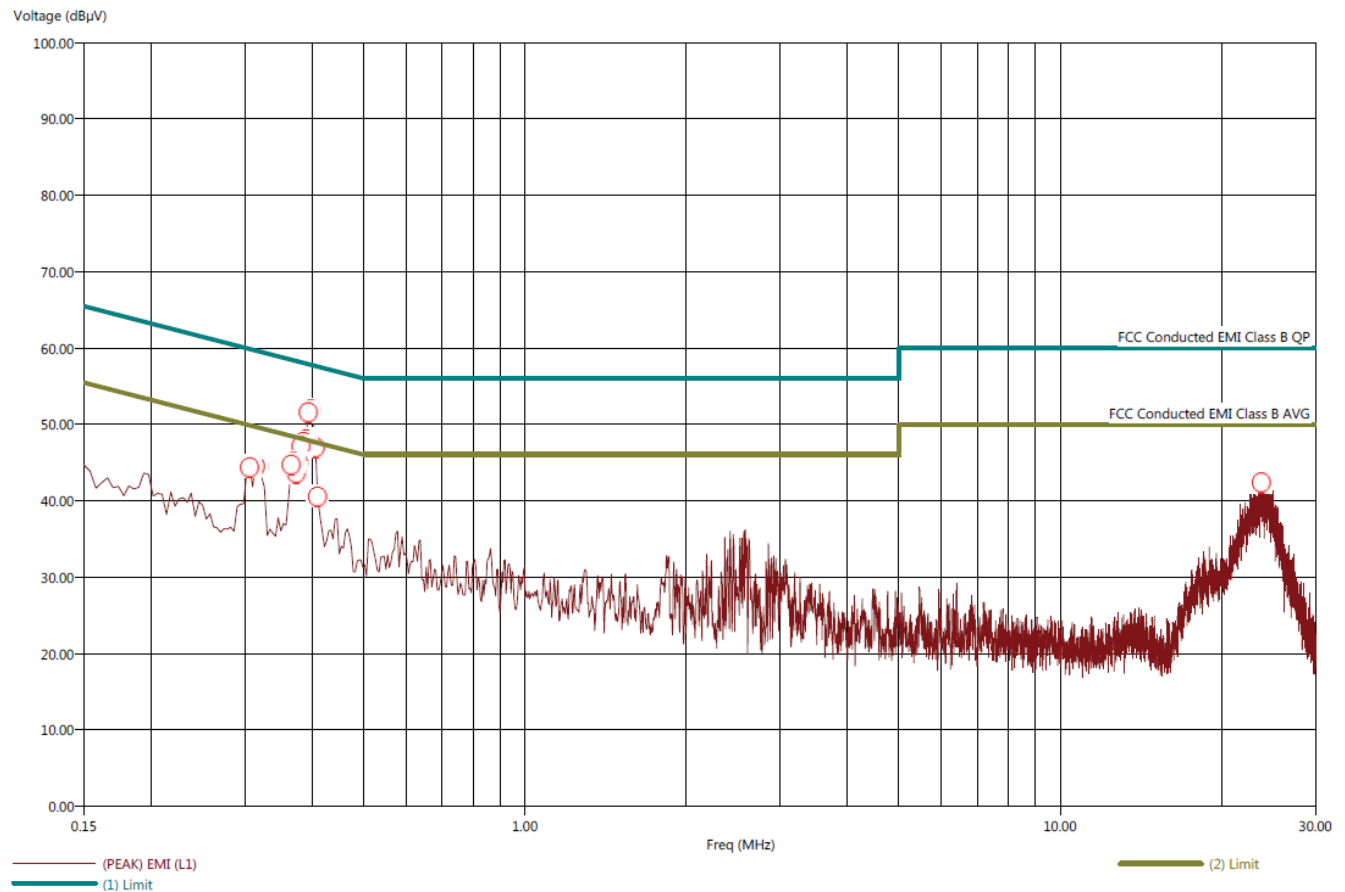
White Lead - AVG - FCC Class B

Freq (MHz)	(PEAK) EMI (dBμV)	(AVG) EMI (dBμV)	(PEAK) Margin (dB)	(AVG) Margin (dB)	(AVG) Limit (dBμV)	Cable (dB)	Transducer (dB)	Filter (dB)
0.190	48.49	36.12	-5.36	-17.73	53.85	0.00	0.31	9.80
0.314	49.94	37.96	0.29	-11.69	49.64	0.00	0.07	9.75
0.318	50.11	38.35	0.54	-11.22	49.57	0.00	0.06	9.75
0.322	50.91	39.98	1.61	-9.32	49.30	0.00	0.05	9.75
0.326	50.96	39.83	1.62	-9.51	49.34	0.00	0.05	9.75
0.330	50.79	38.91	1.61	-10.27	49.17	0.00	0.04	9.74
0.334	50.84	38.98	1.66	-10.20	49.18	0.00	0.04	9.74
0.338	50.91	39.85	1.69	-9.37	49.22	0.00	0.04	9.74
0.366	50.04	36.31	1.39	-12.34	48.65	0.00	0.02	9.74
0.370	49.42	35.81	0.83	-12.78	48.58	0.00	0.02	9.74
0.374	49.80	36.09	1.17	-12.54	48.63	0.00	0.02	9.74
0.378	47.99	35.51	-0.39	-12.87	48.39	0.00	0.02	9.73
0.382	50.14	37.99	2.23	-9.92	47.91	0.00	0.02	9.73
0.386	47.68	36.47	-0.40	-11.61	48.08	0.00	0.02	9.73
0.390	50.57	38.70	2.70	-9.17	47.86	0.00	0.02	9.73
0.394	51.24	39.29	3.45	-8.50	47.79	0.00	0.02	9.72
0.398	50.83	38.98	2.98	-8.87	47.84	0.00	0.02	9.73
0.402	50.85	39.17	3.02	-8.66	47.82	0.00	0.02	9.73
0.406	49.16	37.32	1.18	-10.66	47.98	0.00	0.02	9.73
0.410	50.55	38.67	2.68	-9.20	47.86	0.00	0.02	9.73
0.414	52.27	37.97	4.88	-9.42	47.39	0.00	0.02	9.72
0.418	50.02	35.49	2.87	-11.66	47.15	0.00	0.02	9.72
0.422	50.26	35.96	3.07	-11.23	47.18	0.00	0.02	9.72
0.426	51.30	37.05	4.04	-10.21	47.26	0.00	0.02	9.72
0.430	49.67	35.35	2.52	-11.80	47.15	0.00	0.02	9.72
0.434	52.43	38.07	5.00	-9.36	47.43	0.00	0.02	9.72
0.438	49.61	35.36	2.47	-11.78	47.13	0.00	0.02	9.72
0.442	50.34	35.88	3.15	-11.31	47.18	0.00	0.02	9.72
0.446	46.45	32.36	-0.53	-14.62	46.98	0.00	0.02	9.71
0.450	45.99	31.86	-0.97	-15.10	46.96	0.00	0.02	9.71
0.454	45.74	31.59	-1.21	-15.36	46.95	0.00	0.02	9.71
0.474	36.12	21.61	-10.38	-24.89	46.50	0.00	0.02	9.71
24.374	37.95	27.06	-12.05	-22.94	50.00	0.49	0.11	9.80

Title: FCC Class B - Black Lead
File: 5 - Pre-Scan - Black Lead - Tx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuously transmitting at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 3:32:28 PM
Sequence: Preliminary Scan

Black Lead - FCC Class B



Title: FCC Class B - Black Lead
File: 5 - Final Scan - Black Lead - Tx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuously transmitting at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 3:33:55 PM
Sequence: Final Measurements

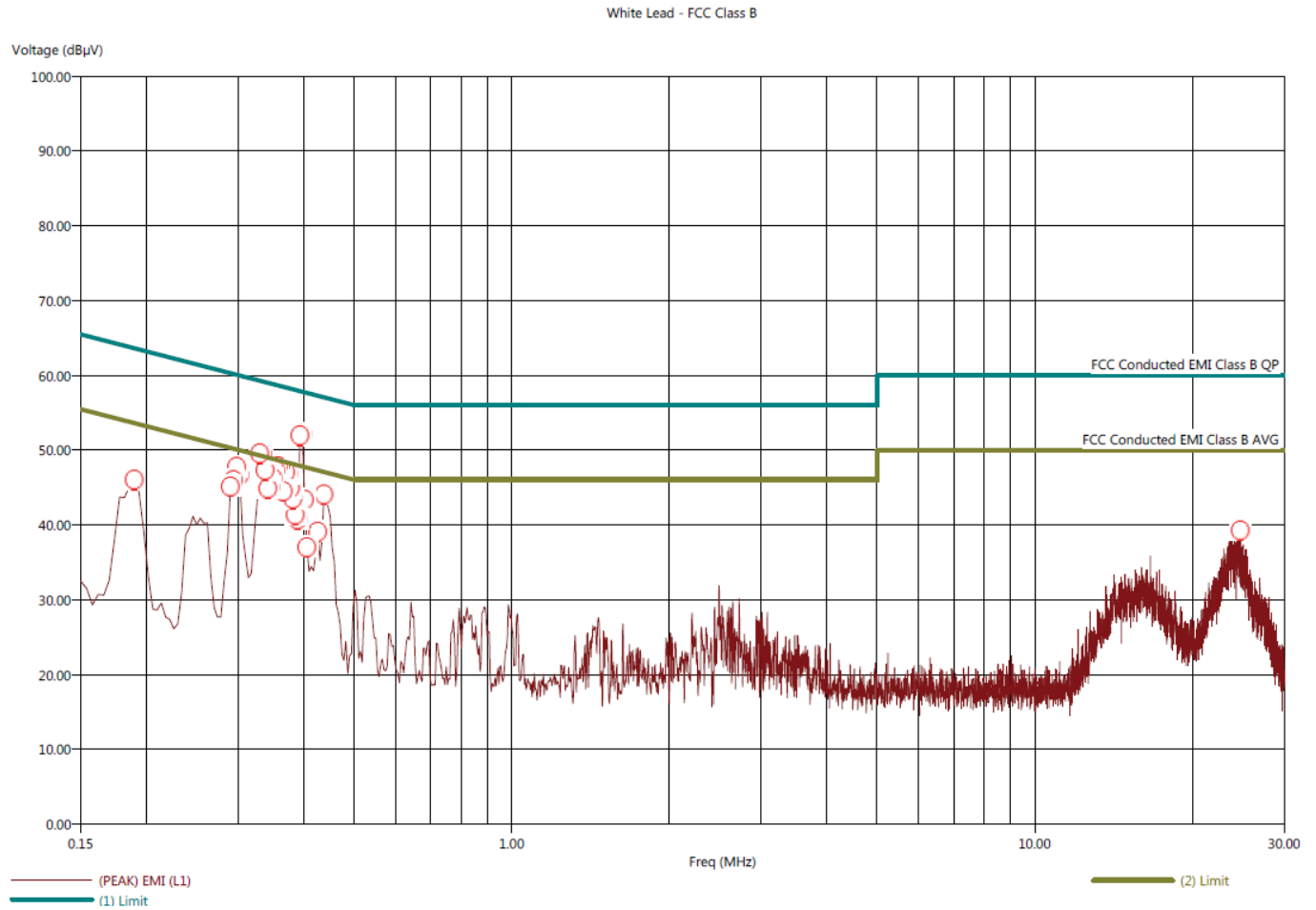
Black Lead - AVG - FCC Class B

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)
0.306	42.74	28.34	-7.13	-21.53	49.88	0.00	0.11	9.75
0.314	44.64	28.80	-5.17	-21.01	49.81	0.00	0.11	9.75
0.318	44.40	31.83	-5.03	-17.60	49.44	0.00	0.09	9.75
0.366	47.85	31.50	-0.42	-16.77	48.27	0.00	0.04	9.73
0.370	49.25	33.27	1.12	-14.86	48.14	0.00	0.04	9.73
0.374	46.76	32.13	-1.57	-16.20	48.33	0.00	0.05	9.73
0.378	49.96	35.85	1.93	-12.18	48.04	0.00	0.04	9.73
0.382	52.35	36.89	4.58	-10.88	47.78	0.00	0.04	9.72
0.386	49.87	35.31	1.82	-12.74	48.05	0.00	0.04	9.73
0.390	51.06	36.14	3.12	-11.80	47.94	0.00	0.04	9.73
0.394	52.57	35.81	4.83	-11.93	47.75	0.00	0.04	9.72
0.398	51.76	35.83	3.91	-12.02	47.85	0.00	0.04	9.73
0.402	52.46	35.87	4.88	-11.71	47.58	0.00	0.04	9.72
0.406	52.76	35.25	5.02	-12.49	47.75	0.00	0.04	9.72
0.410	51.76	35.68	4.06	-12.02	47.71	0.00	0.04	9.72
23.774	43.12	32.04	-6.88	-17.96	50.00	0.45	0.02	9.80



Title: FCC Class B - White Lead
File: 6 - Pre-Scan - White Lead - Tx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuously transmitting at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 3:37:54 PM
Sequence: Preliminary Scan



Title: FCC Class B - White Lead
File: 6 - Final Scan - White Lead - Tx Mode.set
Operator: Kyle Fujimoto
EUT Type: Transponder
EUT Condition: The EUT is continuously transmitting at 914 MHz - X-Axis Worst Case
Company: Marine Sync Corporation
Model: RUM V3 Rev. C
S/N: N/A

3/21/2019 3:39:22 PM
Sequence: Final Measurements

White Lead - AVG - FCC Class B

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)
0.190	50.28	33.74	-3.68	-20.22	53.96	0.00	0.31	9.80
0.290	49.58	35.20	-0.46	-14.84	50.04	0.00	0.09	9.76
0.294	50.03	37.31	0.25	-12.47	49.78	0.00	0.08	9.75
0.298	49.79	34.60	-0.14	-15.33	49.93	0.00	0.08	9.75
0.302	50.42	37.59	0.81	-12.02	49.61	0.00	0.07	9.75
0.330	50.83	39.18	1.56	-10.09	49.27	0.00	0.05	9.75
0.334	51.19	39.32	1.77	-10.10	49.42	0.00	0.06	9.75
0.338	51.16	37.14	2.02	-12.00	49.14	0.00	0.04	9.74
0.342	48.67	33.47	-0.40	-15.60	49.07	0.00	0.04	9.74
0.346	50.01	32.04	1.21	-16.76	48.80	0.00	0.02	9.74
0.350	49.21	32.96	0.60	-15.65	48.60	0.00	0.02	9.74
0.354	49.43	32.77	0.66	-16.00	48.77	0.00	0.02	9.74
0.358	50.34	32.62	1.55	-16.17	48.78	0.00	0.02	9.74
0.362	50.20	35.61	1.78	-12.81	48.42	0.00	0.02	9.73
0.366	48.91	32.99	0.33	-15.59	48.58	0.00	0.02	9.74
0.370	52.87	38.71	4.78	-9.38	48.09	0.00	0.02	9.73
0.374	52.05	35.60	3.80	-12.65	48.25	0.00	0.02	9.73
0.378	53.51	40.06	5.48	-7.97	48.03	0.00	0.02	9.73
0.382	54.70	39.29	6.82	-8.59	47.87	0.00	0.02	9.73
0.386	52.68	38.44	4.49	-9.75	48.19	0.00	0.02	9.73
0.390	54.04	37.73	5.98	-10.33	48.06	0.00	0.02	9.73
0.394	54.79	41.53	6.97	-6.29	47.82	0.00	0.02	9.73
0.398	55.29	39.29	7.51	-8.49	47.79	0.00	0.02	9.72
0.402	54.89	40.12	7.08	-7.69	47.81	0.00	0.02	9.73
0.406	55.07	38.96	7.32	-8.79	47.76	0.00	0.02	9.72
0.426	53.56	37.61	6.07	-9.88	47.50	0.00	0.02	9.72
0.438	48.48	32.78	1.37	-14.33	47.10	0.00	0.02	9.72
24.742	37.69	24.20	-12.31	-25.80	50.00	0.52	0.11	9.80