

*FCC PART 15, SUBPART B and C
TEST REPORT*

for

VPh Sensor

MODEL: CM-000363

Prepared for

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DATE: AUGUST 29, 2018

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
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2	Layout of the Semi-Anechoic Test Chamber

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: VPh Sensor
Model: CM-000363
S/N: N/A

Product Description: The EUT a part of a wireless sensor system to monitor the storage of vaccines.

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

Customer: Mesa Labs, Inc.
12100 West 6th Avenue
Lakewood, Colorado 80228

Test Dates: June 1, 4, 6, 8, and 28, 2018; and August 28, 2018

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

<i>TEST</i>	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz - 30 MHz	This test was not performed because the EUT is battery powered only.
2	Radiated RF Emissions, 9 kHz – 9300 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: 51.72 (Avg) dBuV/m @ 4575.60 MHz (*U = 3.67 dB)
3	20 dB Bandwidth	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1)(i)
4	Peak Power Output	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (b)(2)
5	RF Band Edges	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (d)
6	Number of Hopping Frequencies	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (a)(1)(i)
7	RF Conducted Antenna Test	This test was not performed because the all emissions were performed via the radiated method described in section 8.1.2 of the test report.
8	Carrier Frequency Separation	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1)
9	Average Time of Occupancy	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1)(i)
10	Variation of Input Power	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart A, section 15.31 (e)

1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the VPh Sensor, Model: CM-000363. 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.



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

Mesa Labs, Inc.

Al Murphy

Director of Engineering – Hardware

Compatible Electronics Inc.

Kyle Fujimoto

Test Engineer

James Ross

Test Engineer

2.4 Date Test Sample was Received

The test sample was received on May 22, 2018.

2.5 Disposition of the Test Sample

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

2.6 Abbreviations and Acronyms

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

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
LISN	Line Impedance Stabilization Network
N/A	Not Applicable
Tx	Transmit
Rx	Receive

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 v04	Guidance for Performing Compliance Measurements on Digital Transmissions Systems (DTS) Operating Under Section 15.247
EN 50147-2: 1997	Anechoic chambers. Alternative test site suitability with respect to site attenuation
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 VPh Sensor, Model: CM-000363 (EUT) was connected to a temperature-humidity probe and a door switch sensor via its probe and door sensor ports, respectively.

For configuring the EUT for the intentional radiator portion of the test: The EUT was connected to a laptop that had a program that locked one channel at a time so that the low, middle, and high channels could be tested. The EUT was tested in three orthogonal axis. The carrier was modulated in the same way it would be when the EUT was in its normal operating mode. The EUT was also continuously getting input data from the temperature humidity probe.

For configuring the EUT for the unintentional radiator portion of the test: The EUT was connected to a laptop that allowed the EUT to function as normal. The laptop also had a program that locked one channel at a time so that the low, middle, and high channels of the LO of the Rx could be tested. The EUT was also continuously getting input data from the temperature humidity probe.

Note #1: The laptop was only connected to the EUT to program the correct configuration and then was removed during the testing.

Note #2: The EUT was tested at the high channel (worst case) when performing the unintentional radiator portion of the test for radiated and conducted emissions.

Note #3: For band edges, the EUT was performed in both single channel (locking the channel on the low or high channel) and frequency hopping modes.

The program is the VPx Configuration Utility software, version 1.1.8.2 BETA. This software is located of the company's servers.

The X-Axis is when the EUT is parallel to the ground reference plane. The Y-Axis is when the EUT is perpendicular to the ground reference plane. The Z-Axis is when the front of the EUT is rotated 90 degrees and perpendicular to the ground reference plane.

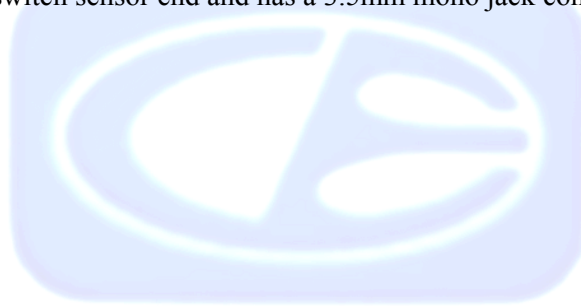
The final radiated data for the EUT as well as the conducted data was taken in the modes described above. Please see Appendix E for the data sheets.

4.1.1 Cable Construction and Termination**Cable 1**

This is a 1.5-meter unshielded cable connecting the temperature humidity probe to the EUT. The cable is hard wired at the steel thermistor probe end and has a 6-pin Hirose connector at the EUT end.

Cable 2

This is a 1-meter unshielded cable connecting the door switch sensor to the EUT. The cable is hard wired at the door switch sensor end and has a 3.5mm mono jack connector at the EUT end.



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

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
VPh SENSOR	MESA LABS, INC.	CM-000363	5900002	UUYUPH900
AC ADAPTER FOR LAPTOP	HEWLETT PACKARD	PPP012D-S	WCNXF0ACX3OCXS	N/A
LAPTOP	HEWLETT PACKARD	PROBOOK 6560B	N/A	N/A
VPx CONFIGURATION UTILITY*	MESA LABS, INC.	VER. 1.1.8.2 BETA	SW-00056	N/A

*This is the software used to program the EUT so that it can transmit in the low, middle, and high channels and also transmit in its normal operation on a continuous basis.

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
RF RADIATED EMISSIONS TEST EQUIPMENT					
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
EMI Receiver	Rohde & Schwarz	ESIB40	100194	September 26, 2017	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 9, 2017	2 Year
CombiLog Antenna	Com-Power	AC-220	61060	July 27, 2017	1 Year
Horn Antenna	Com-Power	AH-118	071175	February 22, 2018	2 Year
Preamplifier	Com-Power	PAM-118A	551024	May 10, 2018	1 Year
Computer	Hewlett Packard	p6716f	MXX1030PX0	N/A	N/A
LCD Monitor	Hewlett Packard	52031a	3CQ046N3MG	N/A	N/A

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

The uncertainty values are in the table below.

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

MEASUREMENT TYPE	PARTICULAR CONFIGURATION	UNCERTAINTY VALUES
RADIATED EMISSIONS	3-METER CHAMBER, COMBILOG ANTENNA	3.26 dB (Vertical) 3.19 dB (Horizontal)
RADIATED EMISSIONS	3-METER CHAMBER, HORN ANTENNA	3.67 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 FHSS uses at least a minimum of 50 channels minimum using a pseudo random technique. It uses GFSK modulation. The channels are separated by approximately 250 kHz.

The three subbands that the EUT can operate on are:

1. 906.12 MHz to 924.12 MHz, which contains 60 channels
2. 902.62 MHz to 914.87 MHz, which contains 50 channels
3. 914.87 MHz to 927.62 MHz, which contains 52 channels

See Appendix E for the each plot showing the total number of channels in each subband.

7.2 Antenna

The EUT is an integral 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 transient limiter was used for the protection of the EMI Receiver input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the EMI Receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

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

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

The EUT was tested at 120 VAC. The six highest emissions are listed in Table 1.0.

Test Results:

This test was not performed because the EUT operates on battery power only and cannot be connected to the AC public mains.

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 EUT was tested at a 3-meter test distance. The six highest emissions are listed in Table 1.0.

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 9.3 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 RADIATED EMISSION RESULTS
VPh Sensor
Model: CM-000363

Frequency MHz	EMI Reading (dBuV/m)	Specification Limit (dBuV/m)	Delta (Cor. Reading – Spec. Limit) dB
4575.60 (H) (Y-Axis)	51.72 (Avg)	53.97	-2.25
4513.10 (H) (Z-Axis)	46.84 (Avg)	53.97	-7.13
4638.10 (V) (X-Axis)	46.35 (Avg)	53.97	-7.62
7320.96 (H) (Y-Axis)	45.43 (Avg)	53.97	-8.54
4575.60 (V) (X-Axis)	45.37 (Avg)	53.97	-8.60
4575.60 (H) (Z-Axis)	44.72 (Avg)	53.97	-9.25

Notes:

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

8.2 20 dB Bandwidth

The 20 dB Bandwidth was measured using the EMI Receiver. The resolution bandwidth was within 1 % to 5 % of the occupied bandwidth and the video bandwidth was approximately \geq RBW.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1)(i). The 20 dB bandwidth is less than the separation between channels. Please see the data sheets located in Appendix E.

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 except the RBW was set to 8 MHz and the VBW was set to 50 MHz. The peak power was calculated by the following equation:

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

P = Power in Watts for which you are solving

D = The test distance of the EUT in Meters

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)(2). The maximum peak output power is less than 1 Watt. Please see the data sheets located in Appendix E.

8.4 RF Antenna Conducted Test

The RF antenna conducted test was performed using the EMI Receiver. The RF antenna conducted test measured using a direct connection from the RF out on the EUT into the input of the EMI Receiver. The resolution bandwidth was 100 kHz, and the video bandwidth was 300 kHz. The spans were wide enough to include all the harmonics and emissions that were produced by the intentional radiator.

Test Results:

This test was not performed because all of the emissions, including the non-restricted band emissions were done via the radiated method described in section 8.1.2 of this test report.

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. The plots were taken in both frequency hopping mode and single channel mode.

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 band edges at 902 MHz and 928 MHz meet the requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d). Please see the data sheets located in Appendix E.

8.6 Carrier Frequency Separation

The Channel Hopping Separation Test was measured using the EMI Receiver. The EUT was operating in its normal frequency hopping mode. The resolution bandwidth was approximately 30% of the channel spacing, and the video bandwidth \geq RBW. The frequency span was wide enough to include the peaks of two adjacent channels.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1). The Channel Hopping Separation is greater than the 20 dB bandwidth. Please see the data sheets located in Appendix E.

8.7 Number of Hopping Frequencies

The Number of Hopping Frequencies was measured using the EMI Receiver. The EUT was operating in its normal frequency hopping operating mode. The resolution bandwidth was set to approximately 30% of the channel spacing, and the video bandwidth was \geq RBW. The frequency span was wide enough to include all of the peaks in the frequency band of operation.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1) and 15.247 (a)(1)(i). Please see the data sheets located in Appendix E.

8.8 Average Time of Occupancy Test

The Average Time of Occupancy Test was measured using the EMI Receiver. The EUT was operating in its normal frequency hopping operating mode. The frequency span was taken to 0 Hz to determine the time for each transmission and the number of transmissions over a 20 second period. The low hop band table was determined to be the worst case because this mode results in the pulses appearing more frequently.

Test Results:

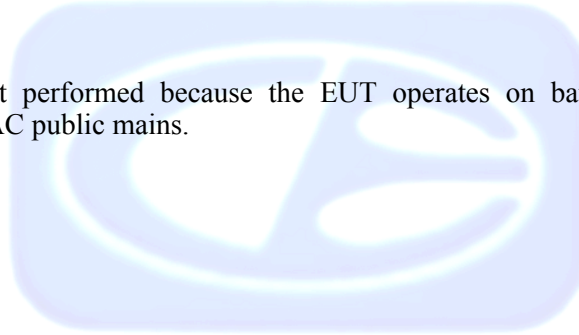
The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1)(i). Please see the data sheets located in Appendix E.

8.9 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:

This test was not performed because the EUT operates on battery power only and cannot be connected to the AC public mains.



9. CONCLUSIONS

The VPh Sensor, Model: CM-000363, 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***

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

ADDITIONAL MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST

VPh Sensor
Models: CM-000363
S/N: N/A

There are no additional models covered under this report.



APPENDIX D

DIAGRAMS AND CHARTS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

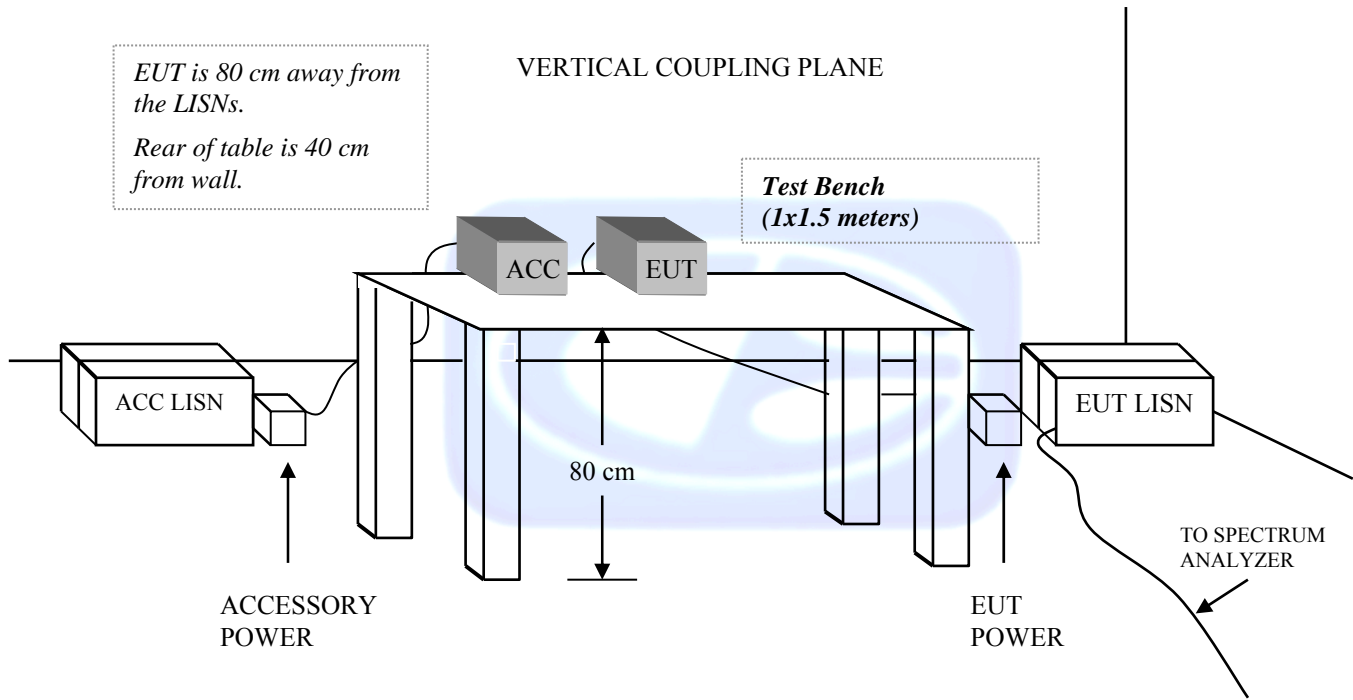
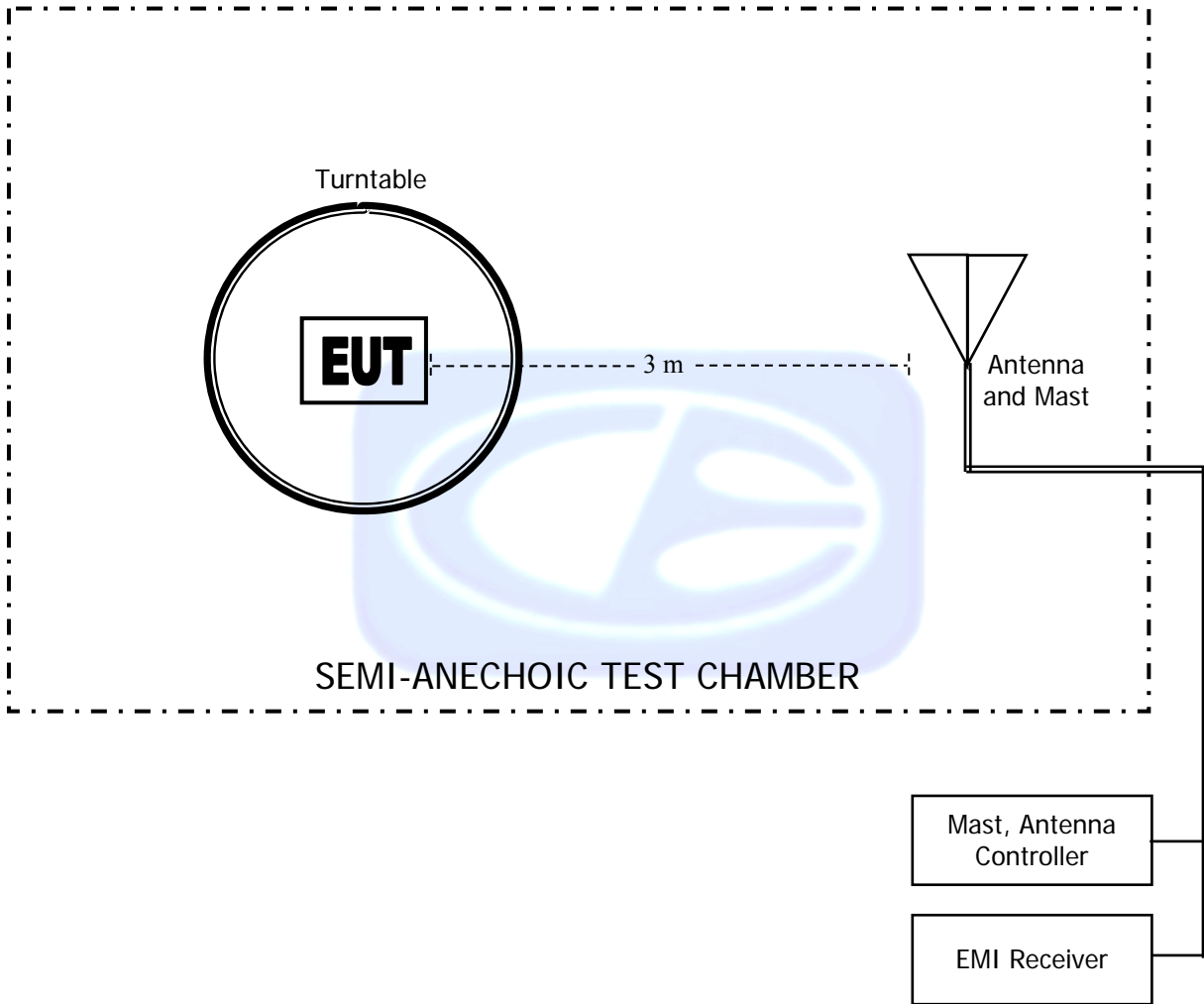


FIGURE 2: LAYOUT OF THE SEMI MI-ANECHOIC TEST CHAMBER



COM-POWER AL-130R**LOOP ANTENNA**

S/N: 121090

CALIBRATION DATE: FEBRUARY 9, 2017

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	-36.17	15.33
0.01	-35.86	15.64
0.02	-37.30	14.20
0.03	-36.58	14.92
0.04	-36.99	14.51
0.05	-37.66	13.84
0.06	-37.53	13.97
0.07	-37.64	13.86
0.08	-37.52	13.98
0.09	-37.62	13.88
0.1	-37.59	13.91
0.2	-37.79	13.71
0.3	-37.80	13.70
0.4	-37.70	13.80
0.5	-37.79	13.71
0.6	-37.79	13.71
0.7	-37.69	13.81
0.8	-37.49	14.01
0.9	-37.39	14.11
1	-37.39	14.11
2	-37.09	14.41
3	-37.09	14.41
4	-37.19	14.31
5	-36.98	14.52
6	-37.17	14.33
7	-37.05	14.45
8	-36.85	14.65
9	-36.84	14.66
10	-36.75	14.75
15	-37.16	14.34
20	-36.44	15.06
25	-37.88	13.62
30	-39.14	12.36

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

MESA LABS, INC.

VPh Sensor

MODEL: CM-000363

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

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



REAR VIEW

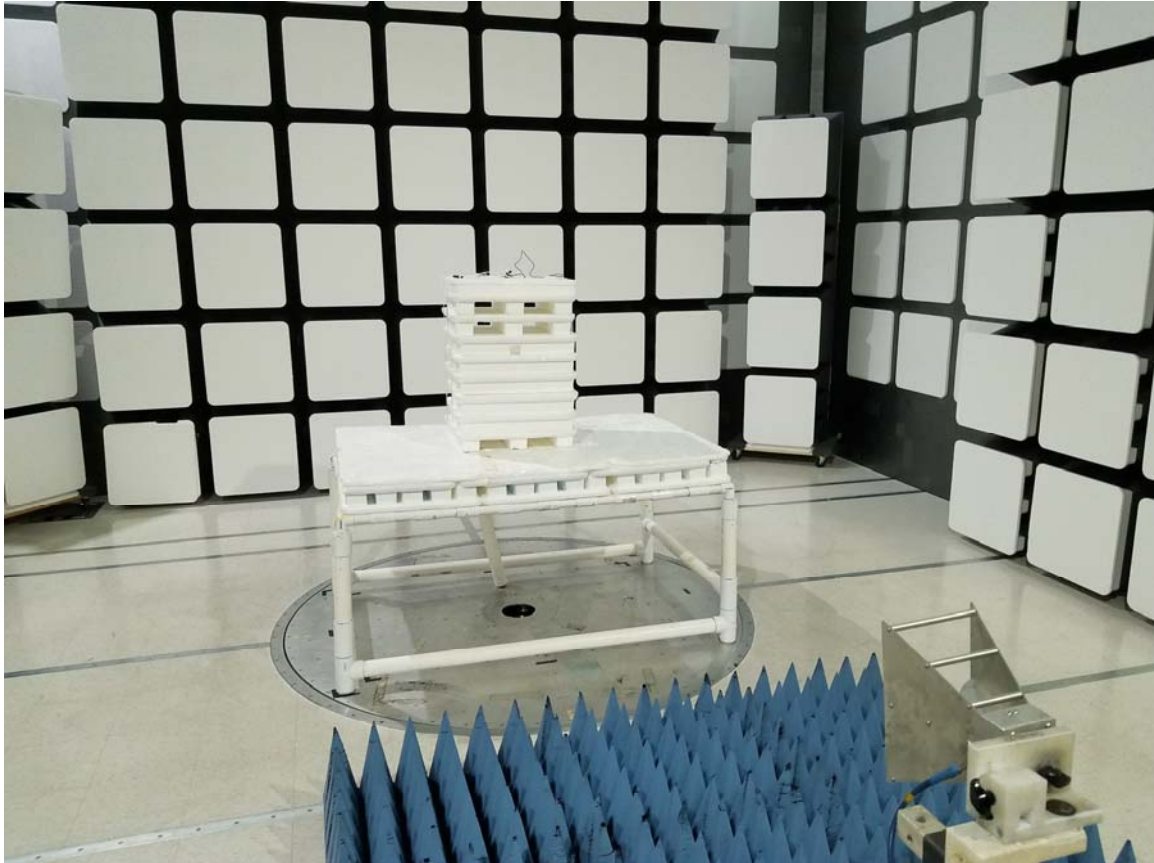
MESA LABS, INC.

VPh Sensor

MODEL: CM-000363

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

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



FRONT VIEW

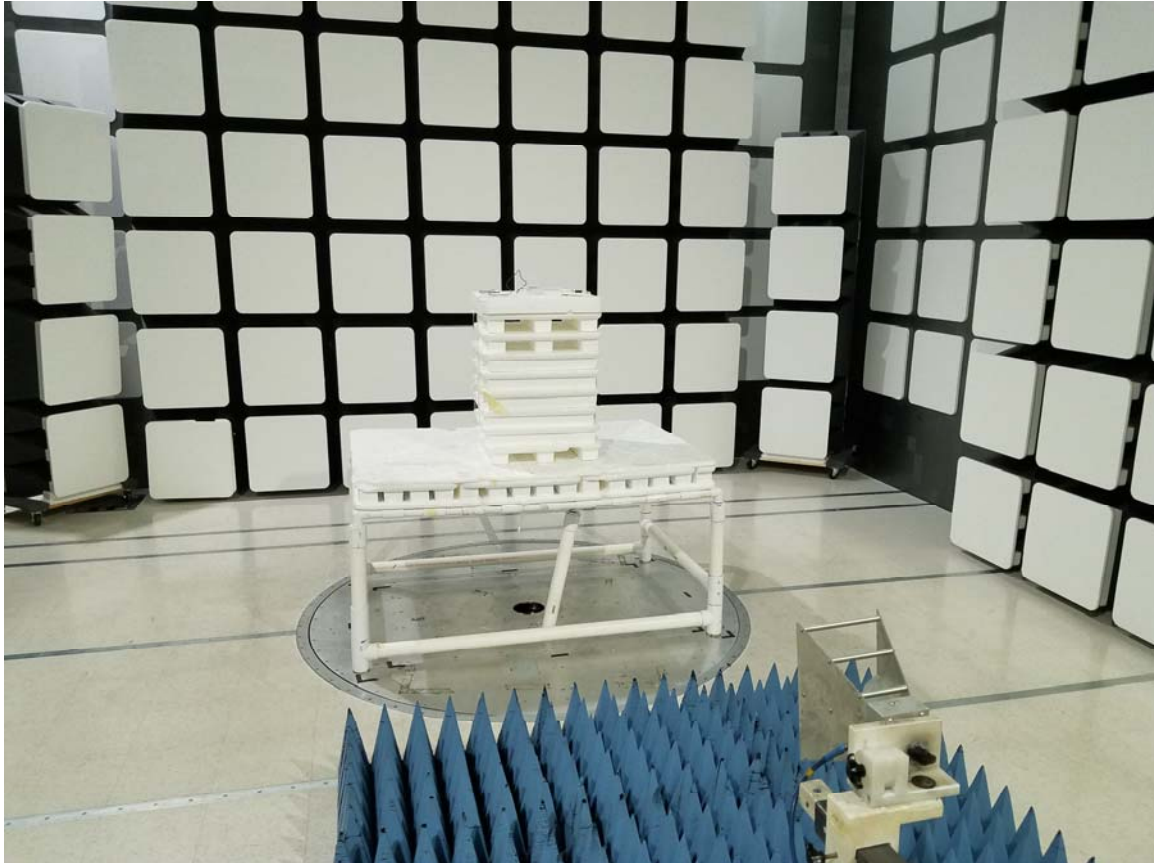
MESA LABS, INC.

VPh Sensor

MODEL: CM-000363

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

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



REAR VIEW

MESA LABS, INC.

VPh Sensor

MODEL: CM-000363

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

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

APPENDIX E

DATA SHEETS



***RADIATED EMISSIONS
DATA SHEETS***

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1805.24	33.33	V	81.78	-48.45	Peak	224.00	121.89	Not in Restricted Band
2707.86	37.48	V	73.97	-36.49	Peak	260.00	156.70	
2707.86	31.90	V	53.97	-22.07	Avg	260.00	156.70	
3610.48	40.23	V	73.97	-33.74	Peak	260.25	184.58	
3610.48	36.78	V	53.97	-17.19	Avg	260.25	184.58	
4513.1	46.64	V	73.97	-27.33	Peak	80.00	191.44	
4513.1	43.19	V	53.97	-10.78	Avg	80.00	191.44	
5415.72	45.65	V	73.97	-28.32	Peak	262.50	142.85	
5415.72	39.21	V	53.97	-14.76	Avg	262.50	142.85	
6318.34	50.48	V	81.78	-31.30	Peak	84.25	198.91	Not in Restricted Band
7220.96								No Emission Detected
8123.58								No Emission Detected
9026.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
Low Channel - Y-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1805.24	38.40	V	81.78	-43.38	Peak	349.75	247.38	Not in Restricted Band
2707.86	37.43	V	73.97	-36.54	Peak	285.50	128.94	
2707.86	31.99	V	53.97	-21.98	Avg	285.50	128.94	
3610.48	38.49	V	73.97	-35.48	Peak	122.75	100.00	
3610.48	31.91	V	53.97	-22.06	Avg	122.75	100.00	
4513.1	46.78	V	73.97	-27.19	Peak	45.50	137.17	
4513.1	43.11	V	53.97	-10.86	Avg	45.50	137.17	
5415.72	45.87	V	73.97	-28.10	Peak	249.00	247.56	
5415.72	38.45	V	53.97	-15.52	Avg	249.00	247.56	
6318.34	53.26	V	81.78	-28.52	Peak	275.00	203.62	Not in Restricted Band
7220.96								No Emission Detected
7220.96								No Emission Detected
8123.58								No Emission Detected
8123.58								No Emission Detected
9026.2								No Emission Detected
9026.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
Low Channel - Z-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1805.24	35.51	V	81.78	-46.27	Peak	123.50	225.89	Not in Restricted Band
2707.86	35.33	V	73.97	-38.64	Peak	323.00	232.40	
2707.86	28.64	V	53.97	-25.33	Avg	323.00	232.40	
3610.48	38.16	V	73.97	-35.81	Peak	150.75	147.50	
3610.48	31.38	V	53.97	-22.59	Avg	150.75	147.50	
4513.1	47.01	V	73.97	-26.96	Peak	296.50	145.00	
4513.1	44.37	V	53.97	-9.60	Avg	296.50	145.00	
5415.72	44.90	V	73.97	-29.07	Peak	293.00	154.37	
5415.72	36.54	V	53.97	-17.43	Avg	293.00	154.37	
6318.34	49.65	V	81.78	-32.13	Peak	235.50	156.16	Not in Restricted Band
7220.96								No Emission Detected
7220.96								No Emission Detected
8123.58								No Emission Detected
8123.58								No Emission Detected
9026.2								No Emission Detected
9026.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1805.24	42.48	H	81.78	-39.30	Peak	222.75	159.98	Not in Restricted Band
2707.86	36.53	H	73.97	-37.44	Peak	203.50	153.53	
2707.86	32.40	H	53.97	-21.57	Avg	203.50	153.53	
3610.48	38.50	H	73.97	-35.47	Peak	245.75	157.35	
3610.48	33.52	H	53.97	-20.45	Avg	245.75	157.35	
4513.1	46.65	H	73.97	-27.32	Peak	251.75	142.97	
4513.1	43.73	H	53.97	-10.24	Avg	251.75	142.97	
5415.72	45.71	H	73.97	-28.26	Peak	252.00	145.00	
5415.72	39.87	H	53.97	-14.10	Avg	252.00	145.00	
6318.34	51.56	H	81.78	-30.22	Peak	358.00	122.13	Not in Restricted Band
7220.96								No Emission Detected
7220.96								No Emission Detected
8123.58								No Emission Detected
8123.58								No Emission Detected
9026.2								No Emission Detected
9026.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

**Low Channel - Y-Axis
 Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1805.24	36.38	H	81.78	-45.40	Peak	37.75	149.47	Not in Restricted Band
2707.86	37.16	H	73.97	-36.81	Peak	286.25	181.35	
2707.86	30.48	H	53.97	-23.49	Avg	286.25	181.35	
3610.48	41.18	H	73.97	-32.79	Peak	80.00	137.29	
3610.48	37.64	H	53.97	-16.33	Avg	80.00	137.29	
4513.1	50.66	H	73.97	-23.31	Peak	21.75	117.77	
4513.1	44.46	H	53.97	-9.51	Avg	21.75	117.77	
5415.72	46.54	H	73.97	-27.43	Peak	3.00	173.00	
5415.72	40.95	H	53.97	-13.02	Avg	3.00	173.00	
6318.34	52.90	H	81.78	-28.88	Peak	344.00	124.04	Not in Restricted Band
7220.96								No Emission Detected
7220.96								No Emission Detected
8123.58								No Emission Detected
8123.58								No Emission Detected
9026.2								No Emission Detected
9026.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

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

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1805.24	38.59	H	81.78	-43.19	Peak	28.50	160.34	Not in Restricted Band
2707.86	35.10	H	73.97	-38.87	Peak	44.00	100.00	
2707.86	29.79	H	53.97	-24.18	Avg	44.00	100.00	
3610.48	38.68	H	73.97	-35.29	Peak	310.75	137.95	
3610.48	32.60	H	53.97	-21.37	Avg	310.75	137.95	
4513.1	49.08	H	73.97	-24.89	Peak	354.50	101.00	
4513.1	46.84	H	53.97	-7.13	Avg	354.50	101.00	
5415.72	43.28	H	73.97	-30.69	Peak	126.50	125.00	
5415.72	39.34	H	53.97	-14.63	Avg	126.50	125.00	
6318.34	50.65	H	81.78	-31.13	Peak	360.00	174.01	Not in Restricted Band
7220.96								No Emission Detected
8123.58								No Emission Detected
9026.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

**Middle Channel - X-Axis
 Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1830.24	34.17	V	81.78	-47.61	Peak	91.25	244.88	Not in Restricted Band
2745.36	39.87	V	73.97	-34.10	Peak	192.25	138.97	
2745.36	36.27	V	53.97	-17.70	Avg	192.25	138.97	
3660.48	38.53	V	73.97	-35.44	Peak	187.75	100.00	
3660.48	35.59	V	53.97	-18.38	Avg	187.75	100.00	
4575.6	48.27	V	73.97	-25.70	Peak	150.50	184.76	
4575.6	45.37	V	53.97	-8.60	Avg	150.50	184.76	
5490.72	46.12	V	81.78	-35.66	Peak	192.00	155.56	Not in Restricted Band
6405.84	51.92	V	81.78	-29.86	Peak	292.25	224.88	Not in Restricted Band
7320.96								No Emission Detected
8236.08								No Emission Detected
9151.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
Middle Channel - Y-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1830.24	40.95	V	81.78	-40.83	Peak	358.25	211.02	Not in Restricted Band
2745.36	34.65	V	73.97	-39.32	Peak	90.75	102.97	
2745.36	27.88	V	53.97	-26.09	Avg	90.75	102.97	
3660.48	37.77	V	73.97	-36.20	Peak	187.75	100.00	
3660.48	28.06	V	53.97	-25.91	Avg	187.75	100.00	
4575.6	44.07	V	73.97	-29.90	Peak	243.50	135.50	
4575.6	39.46	V	53.97	-14.51	Avg	243.50	135.50	
5490.72								No Emission Detected
5490.72								
6405.84	50.64	V	81.78	-31.14	Peak	229.25	100.00	Not in Restricted Band
7320.96	51.20	V	73.97	-22.77	Peak	37.50	100.00	
7320.96	44.24	V	53.97	-9.73	Avg	37.50	100.00	
8236.08								No Emission Detected
8236.08								
9151.2								No Emission Detected
9151.2								

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

**Middle Channel - Z-Axis
 Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1830.24	43.67	V	81.78	-38.11	Peak	89.75	136.04	Not in Restricted Band
2745.36	36.00	V	73.97	-37.97	Peak	256.00	100.00	
2745.36	28.94	V	53.97	-25.03	Avg	256.00	100.00	
3660.48	36.94	V	73.97	-37.03	Peak	87.25	100.00	
3660.48	29.56	V	53.97	-24.41	Avg	87.25	100.00	
4575.6	46.59	V	73.97	-27.38	Peak	100.50	102.85	
4575.6	42.76	V	53.97	-11.21	Avg	100.50	102.85	
5490.72								No Emission Detected
5490.72								
6405.84	53.74	V	81.78	-28.04	Peak	27.25	100.00	Not in Restricted Band
7320.96								No Emission Detected
7320.96								
8236.08								No Emission Detected
8236.08								
9151.2								No Emission Detected
9151.2								

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
Middle Channel - X-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1830.24	39.12	H	81.78	-42.66	Peak	28.50	160.34	Not in Restricted Band
2745.36	35.27	H	73.97	-38.70	Peak	44.00	100.00	
2745.36	28.25	H	53.97	-25.72	Avg	44.00	100.00	
3660.48	38.01	H	73.97	-35.96	Peak	310.75	137.95	
3660.48	27.62	H	53.97	-26.35	Avg	310.75	137.95	
4575.6	47.11	H	73.97	-26.86	Peak	354.50	101.00	
4575.6	43.36	H	53.97	-10.61	Avg	354.50	101.00	
5490.72								No Emission Detected
5490.72								
6405.84	52.49	H	81.78	-29.29	Peak	360.00	174.01	Not in Restricted Band
7320.96								No Emission Detected
7320.96								
8236.08								No Emission Detected
8236.08								
9151.2								No Emission Detected
9151.2								

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
Middle Channel - Y-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1830.24	37.96	H	81.78	-43.82	Peak	311.25	105.71	Not in Restricted Band
2745.36	37.03	H	73.97	-36.94	Peak	265.25	100.00	
2745.36	32.38	H	53.97	-21.59	Avg	265.25	100.00	
3660.48	39.29	H	73.97	-34.68	Peak	99.00	124.94	
3660.48	33.86	H	53.97	-20.11	Avg	99.00	124.94	
4575.6	53.13	H	73.97	-20.84	Peak	28.50	142.13	
4575.6	51.72	H	53.97	-2.25	Avg	28.50	142.13	
5490.72								No Emission Detected
6405.84	52.78	H	81.78	-29.00	Peak	22.75	115.98	Not in Restricted Band
7320.96	53.33	H	73.97	-20.64	Peak	22.50	100.00	
7320.96	45.43	H	53.97	-8.54	Avg	22.50	100.00	
8236.08								No Emission Detected
9151.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

**Middle Channel - Z-Axis
 Transmit Mode**

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1830.24	37.62	H	81.78	-44.16	Peak	342.25	165.89	Not in Restricted Band
2745.36	35.66	H	73.97	-38.31	Peak	36.75	100.00	
2745.36	26.66	H	53.97	-27.31	Avg	36.75	100.00	
3660.48	38.39	H	73.97	-35.58	Peak	102.50	100.00	
3660.48	30.85	H	53.97	-23.12	Avg	102.50	100.00	
4575.6	47.86	H	73.97	-26.11	Peak	92.00	130.13	
4575.6	44.72	H	53.97	-9.25	Avg	92.00	130.13	
5490.72								No Emission Detected
6405.84	50.04	H	81.78	-31.74	Peak	103.00	179.92	Not in Restricted Band
7320.96	52.21	H	73.97	-21.76	Peak	11.00	100.00	No Emission Detected
7320.96	44.34	H	53.97	-9.63	Avg	11.00	100.00	
8236.08								No Emission Detected
9151.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
High Channel - X-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1855.24	34.09	V	81.78	-47.69	Peak	22.50	221.00	Not in Restricted Band
2782.86	41.03	V	73.97	-32.94	Peak	147.50	158.91	
2782.86	36.85	V	53.97	-17.12	Avg	147.50	158.91	
3710.48	39.17	V	73.97	-34.80	Peak	201.00	100.00	
3710.48	31.76	V	53.97	-22.21	Avg	201.00	100.00	
4638.1	49.19	V	73.97	-24.78	Peak	168.00	165.35	
4638.1	46.35	V	53.97	-7.62	Avg	168.00	165.35	
5565.72								No Emission Detected
5565.72								
6493.34	53.32	V	81.78	-28.46	Peak	302.00	120.94	Not in Restricted Band
7420.96								No Emission Detected
7420.96								
8348.58								No Emission Detected
8348.58								
9276.2								No Emission Detected
9276.2								

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
High Channel - Y-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1855.24	34.26	V	81.78	-47.52	Peak	22.50	221.00	Not in Restricted Band
2782.86	42.68	V	73.97	-31.29	Peak	147.50	158.91	
2782.86	37.28	V	53.97	-16.69	Avg	147.50	158.91	
3710.48	40.29	V	73.97	-33.68	Peak	201.00	100.00	
3710.48	32.26	V	53.97	-21.71	Avg	201.00	100.00	
4638.1	48.26	V	73.97	-25.71	Peak	168.00	165.35	
4638.1	43.28	V	53.97	-10.69	Avg	168.00	165.35	
5565.72								No Emission Detected
5565.72								
6493.34	51.98	V	81.78	-29.80	Peak	102.00	187.32	Not in Restricted Band
7420.96								No Emission Detected
7420.96								
8348.58								No Emission Detected
8348.58								
9276.2								No Emission Detected
9276.2								

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
High Channel - Z-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1855.24	35.26	V	81.78	-46.52	Peak	20.50	223.00	Not in Restricted Band
2782.86	42.57	V	73.97	-31.40	Peak	150.25	175.26	
2782.86	38.59	V	53.97	-15.38	Avg	150.25	175.26	
3710.48	40.26	V	73.97	-33.71	Peak	235.00	101.26	
3710.48	32.58	V	53.97	-21.39	Avg	235.00	101.26	
4638.1	50.26	V	73.97	-23.71	Peak	175.00	170.35	
4638.1	47.59	V	53.97	-6.38	Avg	175.00	170.35	
5565.72								No Emission Detected
6493.34	54.05	V	81.78	-27.73	Peak	311.00	121.29	Not in Restricted Band
7420.96								No Emission Detected
8348.58								No Emission Detected
9276.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
High Channel - X-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1855.24	36.29	H	81.78	-45.49	Peak	15.50	225.50	Not in Restricted Band
2782.86	42.39	H	73.97	-31.58	Peak	144.50	123.58	
2782.86	36.98	H	53.97	-16.99	Avg	144.50	123.58	
3710.48	40.21	H	73.97	-33.76	Peak	224.00	101.58	
3710.48	32.21	H	53.97	-21.76	Avg	224.00	101.58	
4638.1	48.21	H	73.97	-25.76	Peak	179.00	175.25	
4638.1	43.22	H	53.97	-10.75	Avg	179.00	175.25	
5565.72								No Emission Detected
5565.72								
6493.34	51.25	H	81.78	-30.53	Peak	299.00	130.58	Not in Restricted Band
7420.96								No Emission Detected
7420.96								
8348.58								No Emission Detected
8348.58								
9276.2								No Emission Detected
9276.2								

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
High Channel - Y-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1855.24	38.01	H	81.78	-43.77	Peak	26.50	242.25	Not in Restricted Band
2782.86	42.45	H	73.97	-31.52	Peak	102.50	145.25	
2782.86	37.04	H	53.97	-16.93	Avg	102.50	145.25	
3710.48	40.29	H	73.97	-33.68	Peak	265.00	199.98	
3710.48	32.59	H	53.97	-21.38	Avg	265.00	199.98	
4638.1	48.26	H	73.97	-25.71	Peak	185.00	170.25	
4638.1	44.26	H	53.97	-9.71	Avg	185.00	170.25	
5565.72								No Emission Detected
5565.72								
6493.34	52.26	H	81.78	-29.52	Peak	214.00	125.25	Not in Restricted Band
7420.96								No Emission Detected
7420.96								
8348.58								No Emission Detected
8348.58								
9276.2								No Emission Detected
9276.2								

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363
High Channel - Z-Axis
Transmit Mode

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV/m)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Table Angle (deg)	Ant. Height (cm)	Comments
1855.24	37.26	H	81.78	-44.52	Peak	12.25	230.25	Not in Restricted Band
2782.86	41.69	H	73.97	-32.28	Peak	126.25	187.50	
2782.86	36.24	H	53.97	-17.73	Avg	126.25	187.50	
3710.48	42.89	H	73.97	-31.08	Peak	275.00	198.85	
3710.48	34.59	H	53.97	-19.38	Avg	275.00	198.85	
4638.1	47.24	H	73.97	-26.73	Peak	165.00	175.24	
4638.1	43.25	H	53.97	-10.72	Avg	165.00	175.24	
5565.72								No Emission Detected
6493.34	51.27	H	81.78	-30.51	Peak	226.00	158.25	Not in Restricted Band
7420.96								No Emission Detected
8348.58								No Emission Detected
9276.2								No Emission Detected

Note: Per section 11.11.2 of ANSI C63.10: 2013, the channel that had the maximum level can be used to establish the reference level.

The reading with the worst case level is Horizontal Y-Axis - Low Channel

FCC 15.247 and FCC Class B

Mesa Labs, Inc.
VPh Sensor
Model: CM-000363

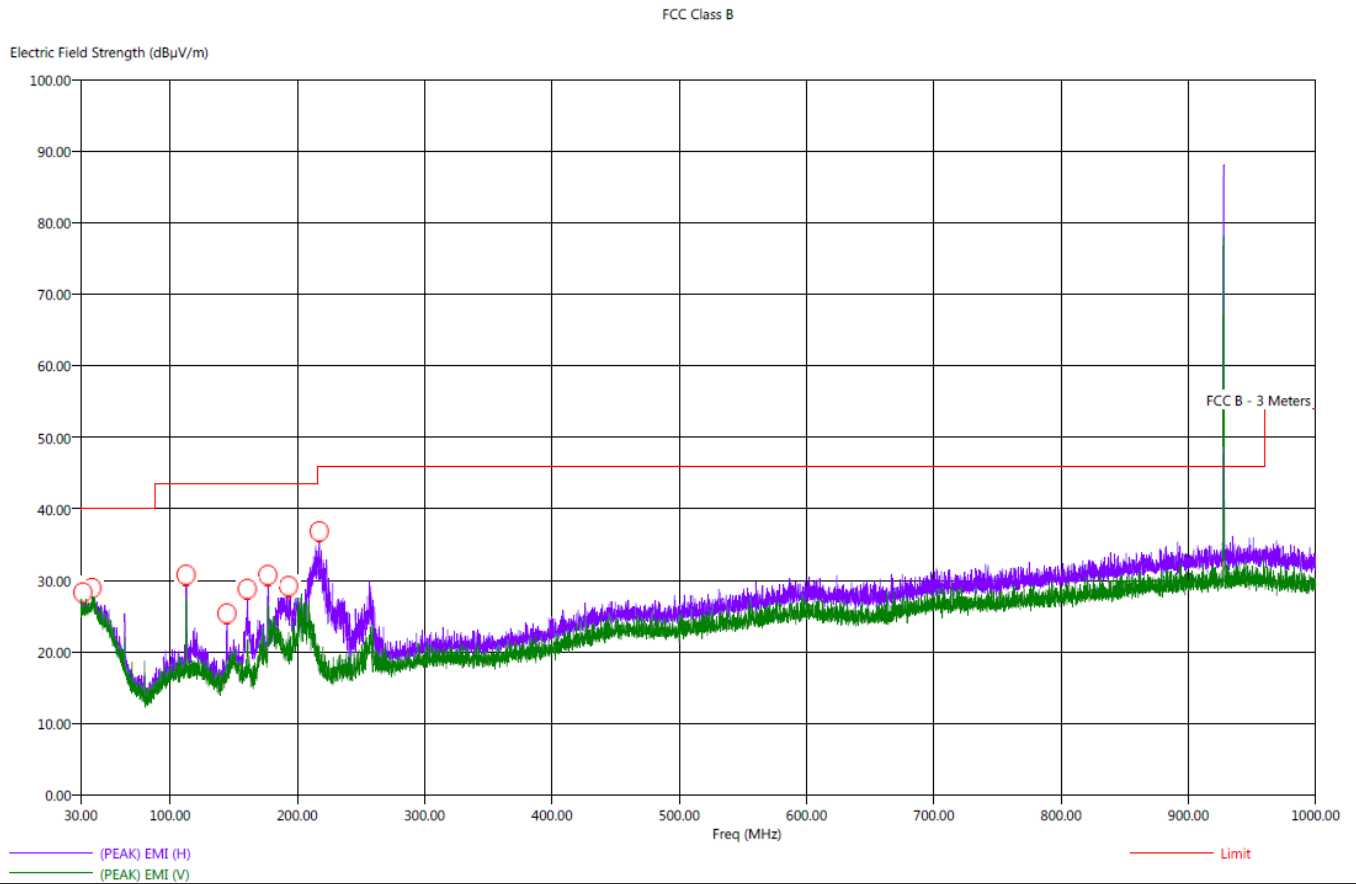
Date: 06/04/2018
Lab: D
Tested By: Kyle Fujimoto

Non Harmonic Emissions from the Tx - 10 kHz to 30 MHz and 1 GHz to 9.3 GHz
Digital Portion from the EUT - 10 kHz to 30 MHz and 1 GHz to 9.3 GHz

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
								No Emissions Detected from the Non Harmonic Emissions from the Tx 9 kHz to 30 MHz
								No Emissions Detected from the Non Harmonic Emissions from the Tx 1 GHz to 9.3 GHz
								No Emissions Detected from the Digital Portion of the EUT 9 kHz to 30 MHz
								No Emissions Detected from the Digital Portion of the EUT 1 GHz to 9.3 GHz
								Tested in both Horizontal and Vertical Polarizations

Title: Pre-Scan - FCC Class B
File: Rohde & Schwarz - Pre-Scan TRANSMITTER FCC Class B - 30 MHz to 1000 MHz.set
Operator: Johnny
EUT Type: VPh Sensor
EUT Condition: The EUT is continuously transmitting
Company: Mesa Labs, Inc
Model: CM-000363
S/N: 59000002
Note: Testing X axis (worst case)
Note #2: The Emission in the 902 MHz - 928 MHz range is subject to the limits of FCC 15.247

6/8/2018 12:52:48 PM
Sequence: Preliminary Scan



Note: The EUT is continuously transmitting at the high channel

Title: Radiated Final - FCC Class B
 File: Rohde & Schwarz - Final Scan TRANSMITTER FCC Class B - 30 MHz to 1000 MHz.set
 Operator: Johnny
 EUT Type: VPh Sensor
 EUT Condition: The EUT is continuously transmitting
 Company: Mesa Labs, Inc
 Model: CM-000363
 S/N: 59000002
 Note: Testing X-axis (worst case)

6/8/2018 1:26:12 PM
 Sequence: Final Measurements

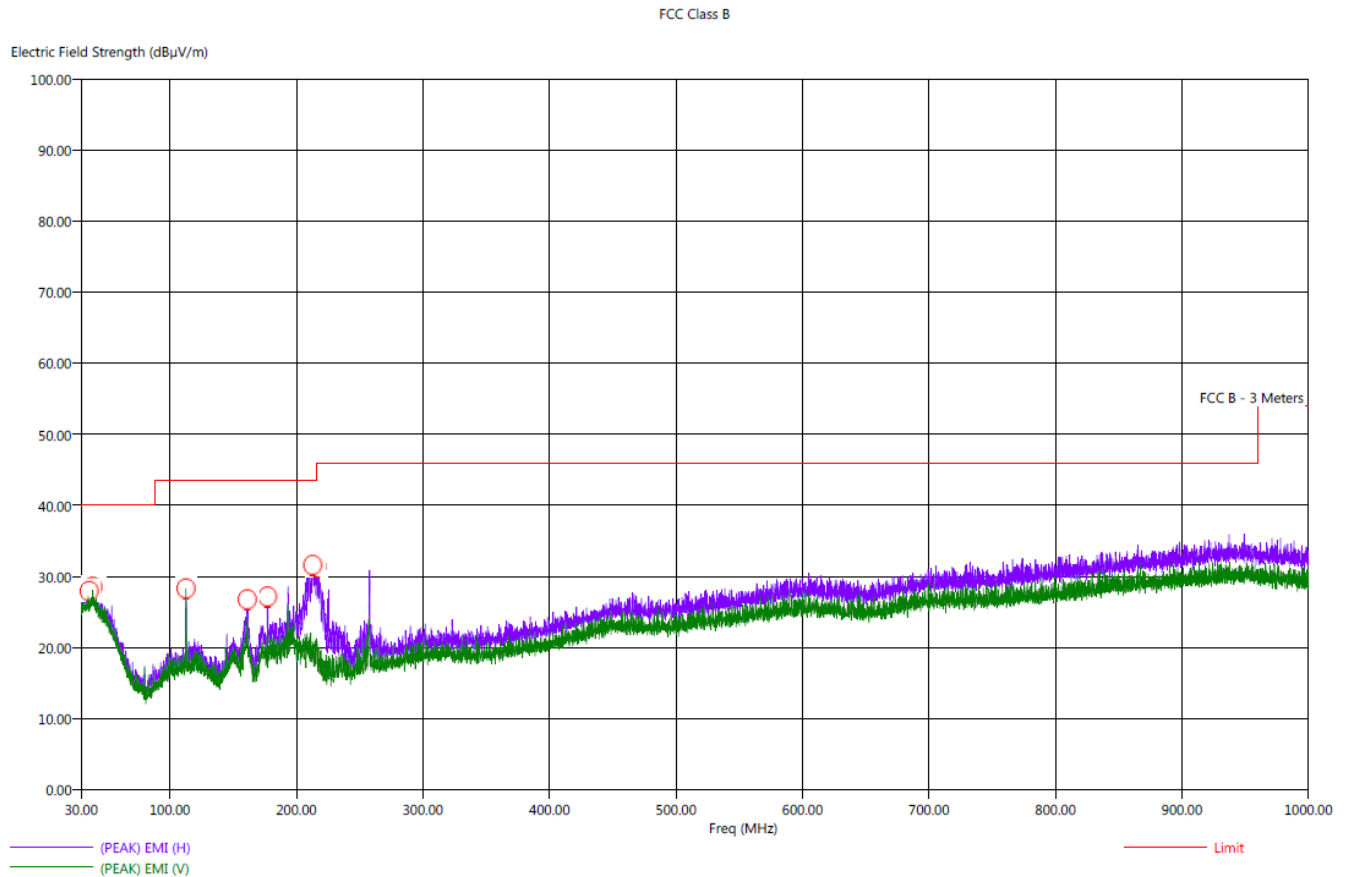
FCC Class B										
Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Agl (deg)	Twr Ht (cm)
31.50	H	27.07	21.85	-12.93	-18.15	40.00	23.86	0.82	24.75	258.55
38.70	H	28.06	22.86	-11.94	-17.14	40.00	24.55	0.89	112.25	144.16
112.60	H	33.54	31.64	-9.96	-11.86	43.50	14.99	1.15	144.00	258.67
144.70	H	25.64	22.94	-17.86	-20.56	43.50	14.66	1.28	123.50	127.56
160.70	H	32.76	28.70	-10.74	-14.80	43.50	12.99	1.30	244.50	193.05
176.90	H	33.21	29.17	-10.29	-14.33	43.50	14.38	1.32	311.00	160.64
193.10	H	29.41	25.17	-14.09	-18.33	43.50	14.24	1.45	269.25	111.26
217.30	H	37.05	32.51	-8.95	-13.49	46.00	14.54	1.57	117.75	110.97

Note: The EUT is continuously transmitting at the high channel



Title: Pre-Scan - FCC Class B
File: Rohde & Schwarz - Pre-Scan RECEIVER - FCC Class B - 30 MHz to 1000 MHz.set
Operator: Johnny
EUT Type: VPh Sensor
EUT Condition: The EUT is continuously receiving
Company: Mesa Labs, Inc
Model: CM-000363
S/N: 59000002
Note: Testing X axis (worst case)

6/8/2018 2:06:06 PM
Sequence: Preliminary Scan



Note: The EUT is continuously receiving at the high channel (worst case)

Title: Radiated Final - FCC Class B
 File: Rohde & Schwarz - Final Scan RECEIVER FCC Class B - 30 MHz to 1000 MHz.set
 Operator: Johnny
 EUT Type: VPh Sensor
 EUT Condition: The EUT is continuously RECEIVING
 Company: Mesa Labs, Inc
 Model: CM-000363
 S/N: 59000002
 Note: X-Axis (Worst Case)

6/8/2018 2:30:41 PM
 Sequence: Final Measurements

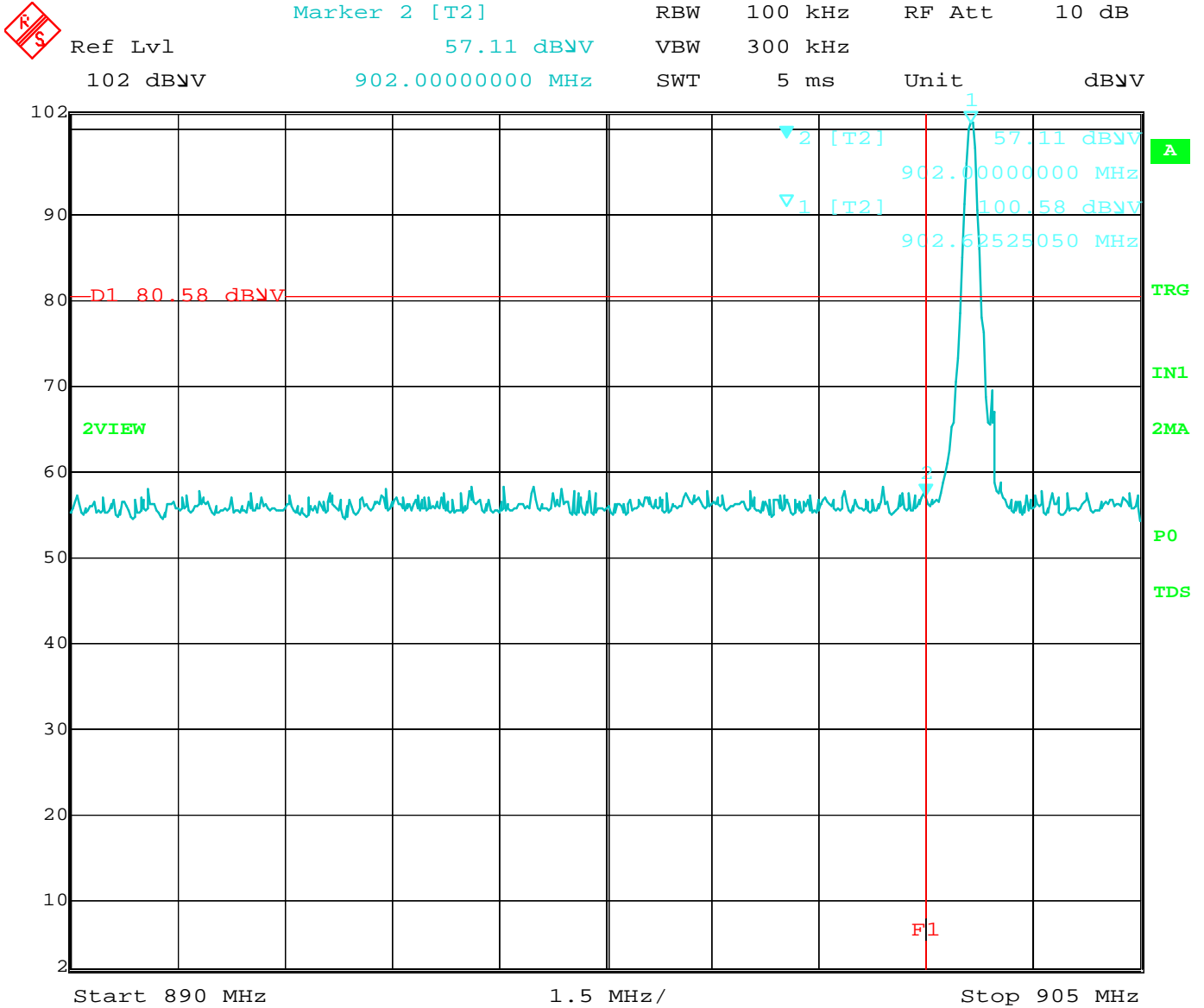
FCC Class B										
Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Aql (dea)	Twr Ht (cm)
36.30	H	27.33	22.32	-12.67	-17.68	40.00	24.16	0.86	163.50	340.58
39.10	H	27.58	22.84	-12.42	-17.16	40.00	24.59	0.89	47.50	324.58
40.40	H	27.41	22.81	-12.59	-17.19	40.00	24.56	0.90	126.00	357.47
112.80	H	33.19	28.99	-10.31	-14.51	43.50	14.99	1.15	148.75	242.43
161.30	H	28.40	22.67	-15.10	-20.83	43.50	13.02	1.30	90.50	193.05
177.20	H	33.51	24.44	-9.99	-19.06	43.50	14.38	1.32	67.25	193.23
213.00	H	33.03	30.58	-10.47	-12.92	43.50	14.44	1.55	81.25	111.32
214.20	H	33.03	30.60	-10.47	-12.90	43.50	14.47	1.56	91.25	127.68
216.00	H	32.41	29.84	-11.09	-13.66	43.50	14.51	1.56	84.25	127.62

Note: The EUT is continuously receiving at the high channel (worst case)



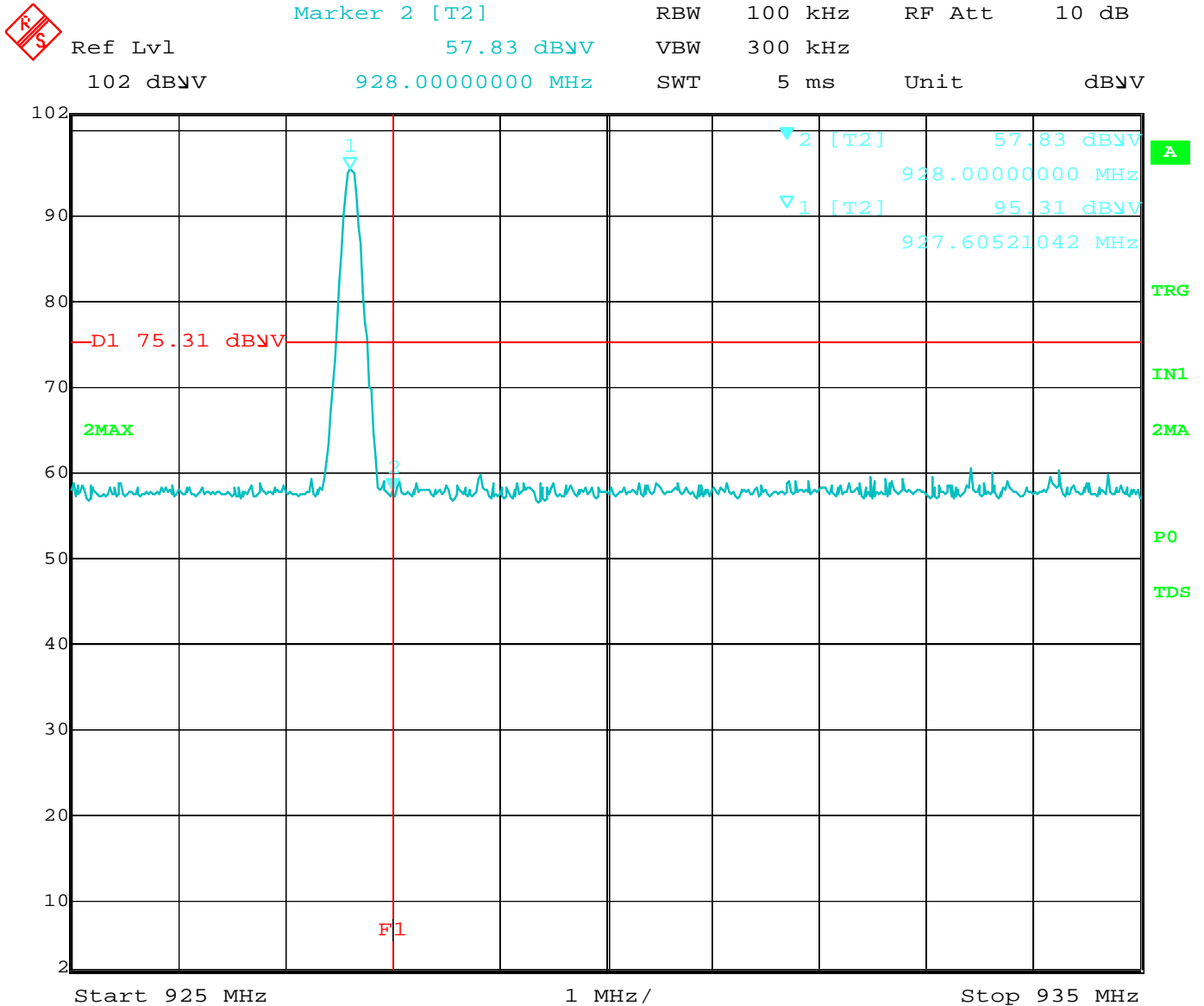


***BAND EDGES
DATA SHEETS***



Date: 6.JUN.2018 16:20:12

Band Edge – Low Channel – Fixed Frequency Mode

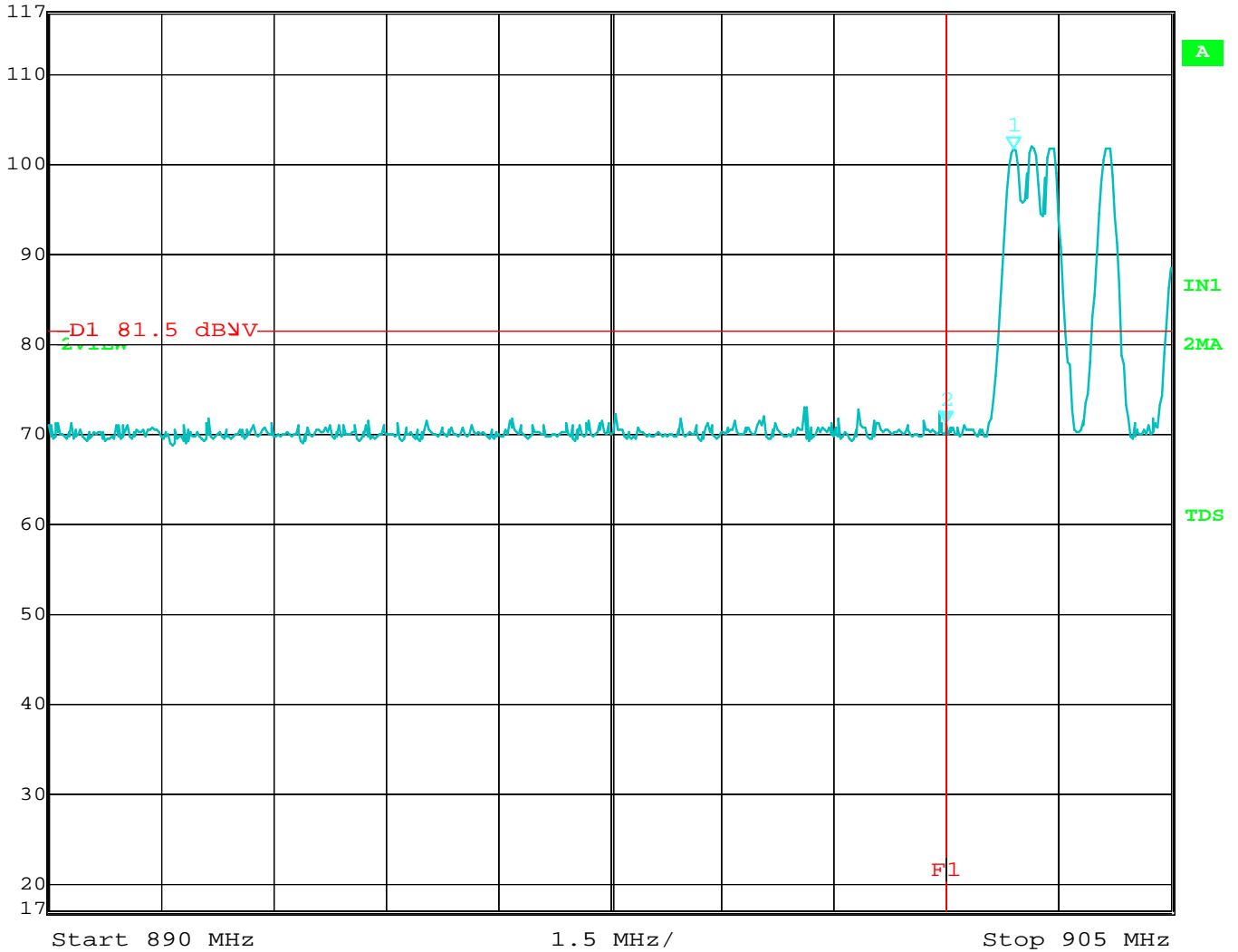


Date: 6.JUN.2018 16:24:00

Band Edge – High Channel – Fixed Frequency Mode



Marker 2 [T2] RBW 100 kHz RF Att 20 dB
 Ref Lvl 71.21 dBμV VBW 300 kHz
 117 dBμV 902.00000000 MHz SWT 5 ms Unit dBμV

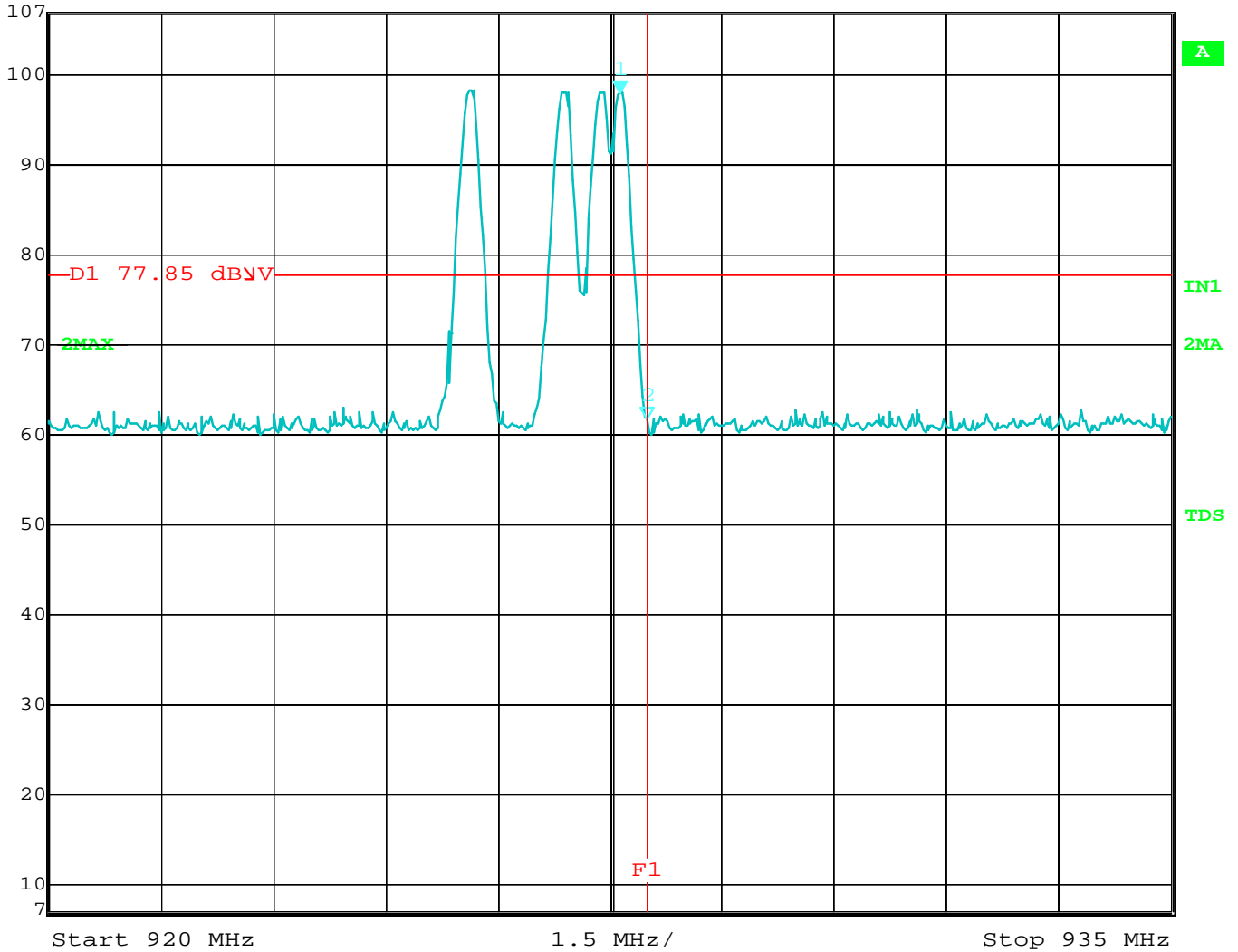


Date: 6.JUN.2018 19:08:06

Band Edge – Low Channel – Frequency Hopping Mode



Marker 1 [T2] RBW 100 kHz RF Att 10 dB
 Ref Lvl 97.85 dBμV VBW 300 kHz
 107 dBμV 927.63527054 MHz SWT 5 ms Unit dBμV



Date: 6.JUN.2018 19:16:10

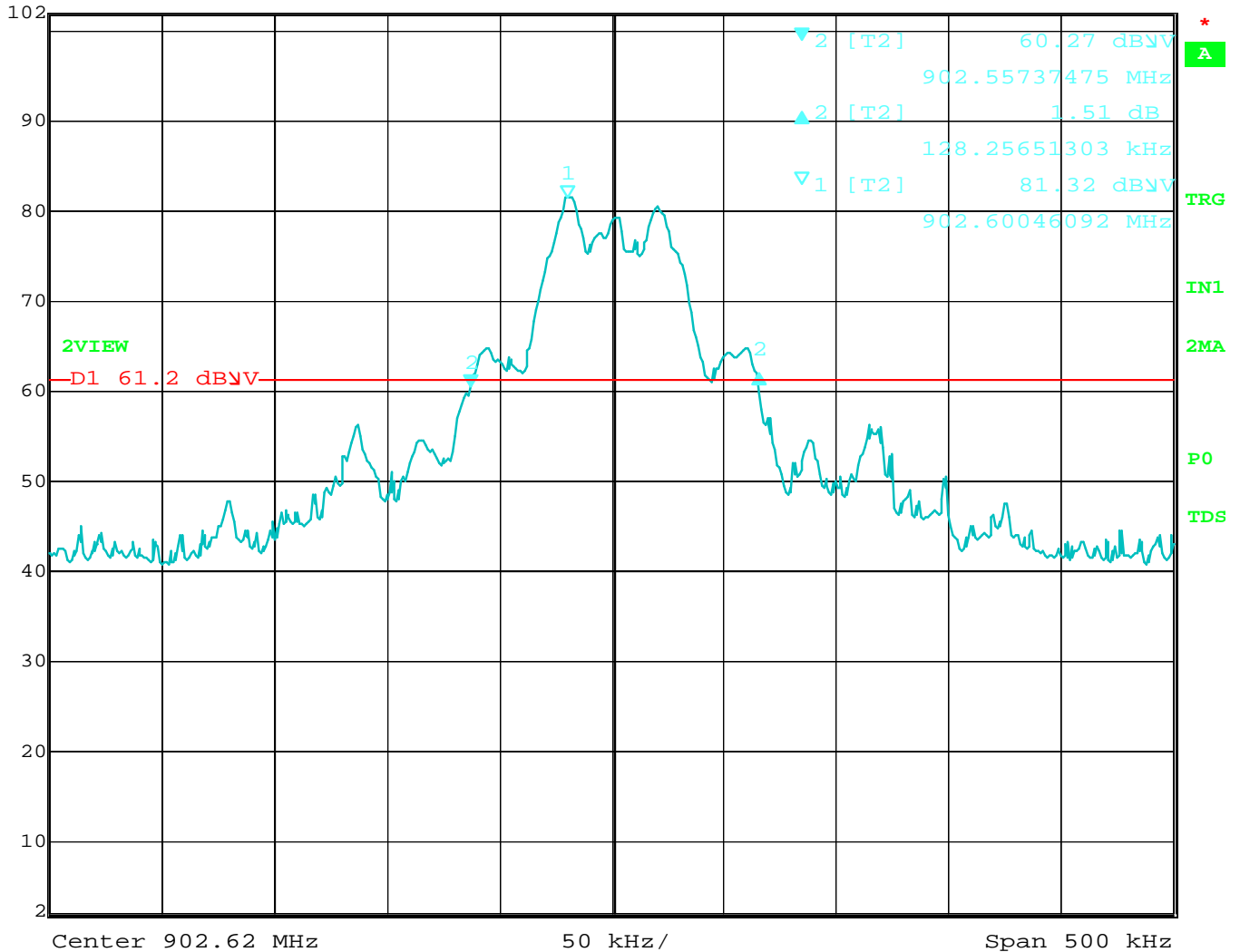
Band Edge – High Channel – Frequency Hopping Mode



***-20 DB BANDWIDTH
DATA SHEETS***



Delta 2 [T2] RBW 2 kHz RF Att 10 dB
 Ref Lvl 1.51 dB VBW 10 kHz
 102 dBV 128.25651303 kHz SWT 320 ms Unit dBV

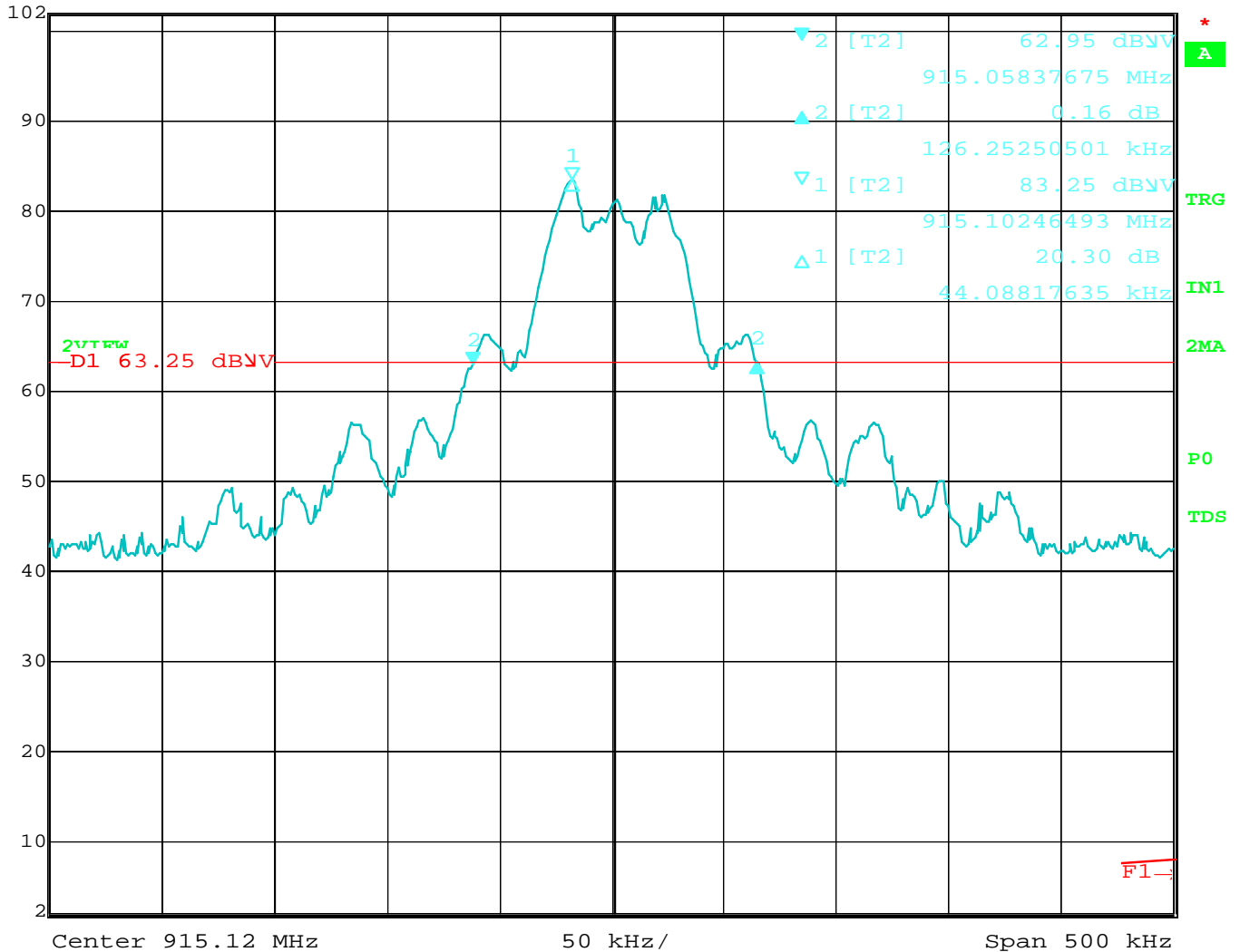


Date: 6.JUN.2018 16:19:03

-20 dB Bandwidth – Low Channel



Delta 2 [T2] RBW 2 kHz RF Att 10 dB
 Ref Lvl 0.16 dB VBW 10 kHz
 102 dBV 126.25250501 kHz SWT 320 ms Unit dBV

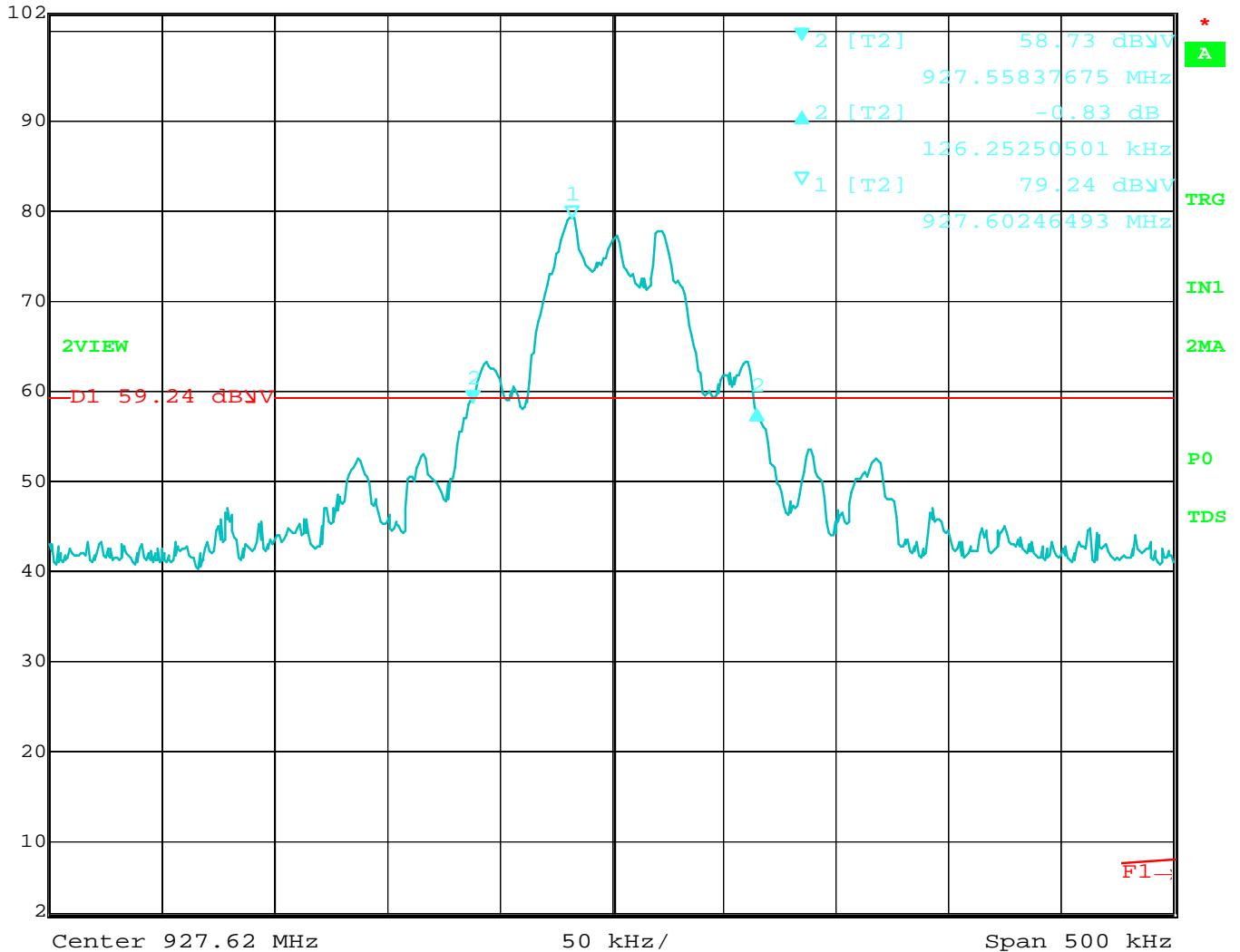


Date: 6.JUN.2018 16:34:54

-20 dB Bandwidth – Middle Channel



Delta 2 [T2] RBW 2 kHz RF Att 10 dB
 Ref Lvl -0.83 dB VBW 10 kHz
 102 dBmV 126.25250501 kHz SWT 320 ms Unit dBmV



Date: 6.JUN.2018 16:27:25

-20 dB Bandwidth – High Channel



***PEAK POWER OUTPUT
DATA SHEETS***

FCC 15.247

Mesa Labs, Inc.
 VPh Sensor
 Model: CM-000363

Date: 06/01/2018
 Lab: D
 Tested By: Kyle Fujimoto

Setting = VPx Configuration Utility - Ver. 1.1.8.2 BETA - SW-00056
Peak Output Power - Tested at 3 Meters

Freq. (MHz)	Level (dBuV/m)	Level (V/m)	Antenna Gain (dBi)	Numeric Gain	Power Output (Watts)	Power Output (mW)	Power Output (dBm)	Comments
902.62	97.83	0.077893281	0.5	1.122018	0.00162226	1.62226	2.10	Vert. X-Axis
915.12	86.37	0.020820924	0.5	1.122018	0.00011591	0.11591	-9.36	Vert. X-Axis
927.62	92.43	0.041831169	0.5	1.122018	0.00046787	0.46787	-3.30	Vert. X-Axis
902.62	97.81	0.077714132	0.5	1.122018	0.00161481	1.61481	2.08	Vert. Y-Axis
915.12	92.30	0.041209752	0.5	1.122018	0.00045407	0.45407	-3.43	Vert. Y-Axis
927.62	89.95	0.031441264	0.5	1.122018	0.00026431	0.26431	-5.78	Vert. Y-Axis
902.62	95.41	0.058952198	0.5	1.122018	0.00092923	0.92923	-0.32	Vert. Z-Axis
915.12	94.50	0.053088444	0.5	1.122018	0.00075357	0.75357	-1.23	Vert. Z-Axis
927.62	94.69	0.054262525	0.5	1.122018	0.00078727	0.78727	-1.04	Vert. Z-Axis
902.62	100.71	0.108517555	0.5	1.122018	0.00314863	3.14863	4.98	Horiz. X-Axis
915.12	91.11	0.03593354	0.5	1.122018	0.00034524	0.34524	-4.62	Horiz. X-Axis
927.62	95.57	0.060048201	0.5	1.122018	0.00096410	0.96410	-0.16	Horiz. X-Axis
902.62	101.78	0.122743923	0.5	1.122018	0.00402829	4.02829	6.05	Horiz. Y-Axis
915.12	97.26	0.072945751	0.5	1.122018	0.00142273	1.42273	1.53	Horiz. Y-Axis
927.62	93.95	0.049831046	0.5	1.122018	0.00066393	0.66393	-1.78	Horiz. Y-Axis
902.62	93.81	0.049034302	0.5	1.122018	0.00064287	0.64287	-1.92	Horiz. Z-Axis
915.12	95.47	0.059360835	0.5	1.122018	0.00094215	0.94215	-0.26	Horiz. Z-Axis
927.62	94.15	0.05099176	0.5	1.122018	0.00069522	0.69522	-1.58	Horiz. Z-Axis

The Power in Watts is obtained by the following Formula Below:

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

D = Distance in Meters. The EUT was tested at 3 meters.

P = Power in Watts

E = The Measured Maximum Field Strength in V/m

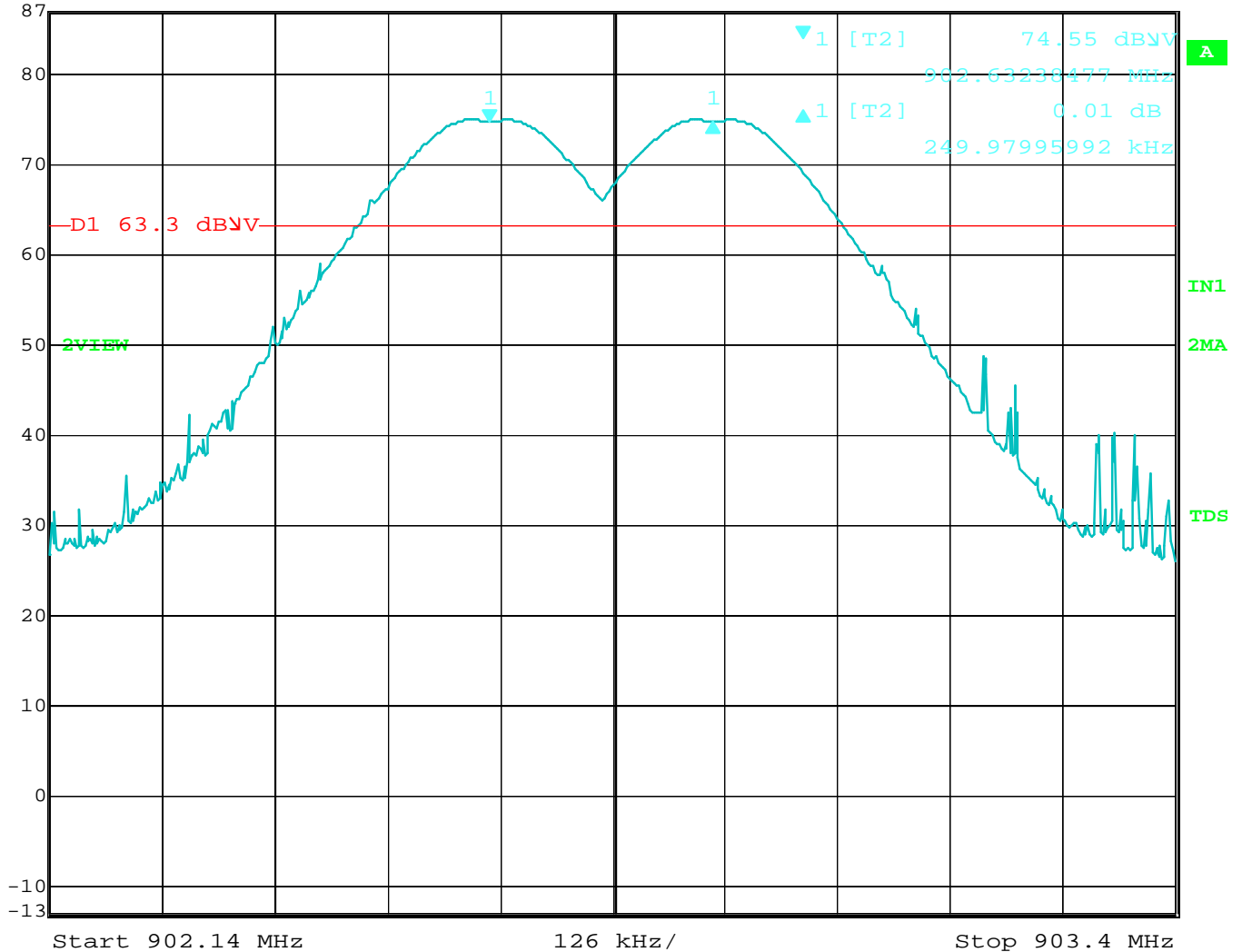
G = The Numeric Gain of the Transmitting Antenna over an Isotropic Radiator



***CHANNEL FREQUENCY SEPARATION
DATA SHEET***



Delta 1 [T2] RBW 100 kHz RF Att 10 dB
 Ref Lvl 0.01 dB VBW 300 kHz
 87 dBμV 249.97995992 kHz SWT 5 ms Unit dBμV



Date: 1.JUN.2018 10:32:04

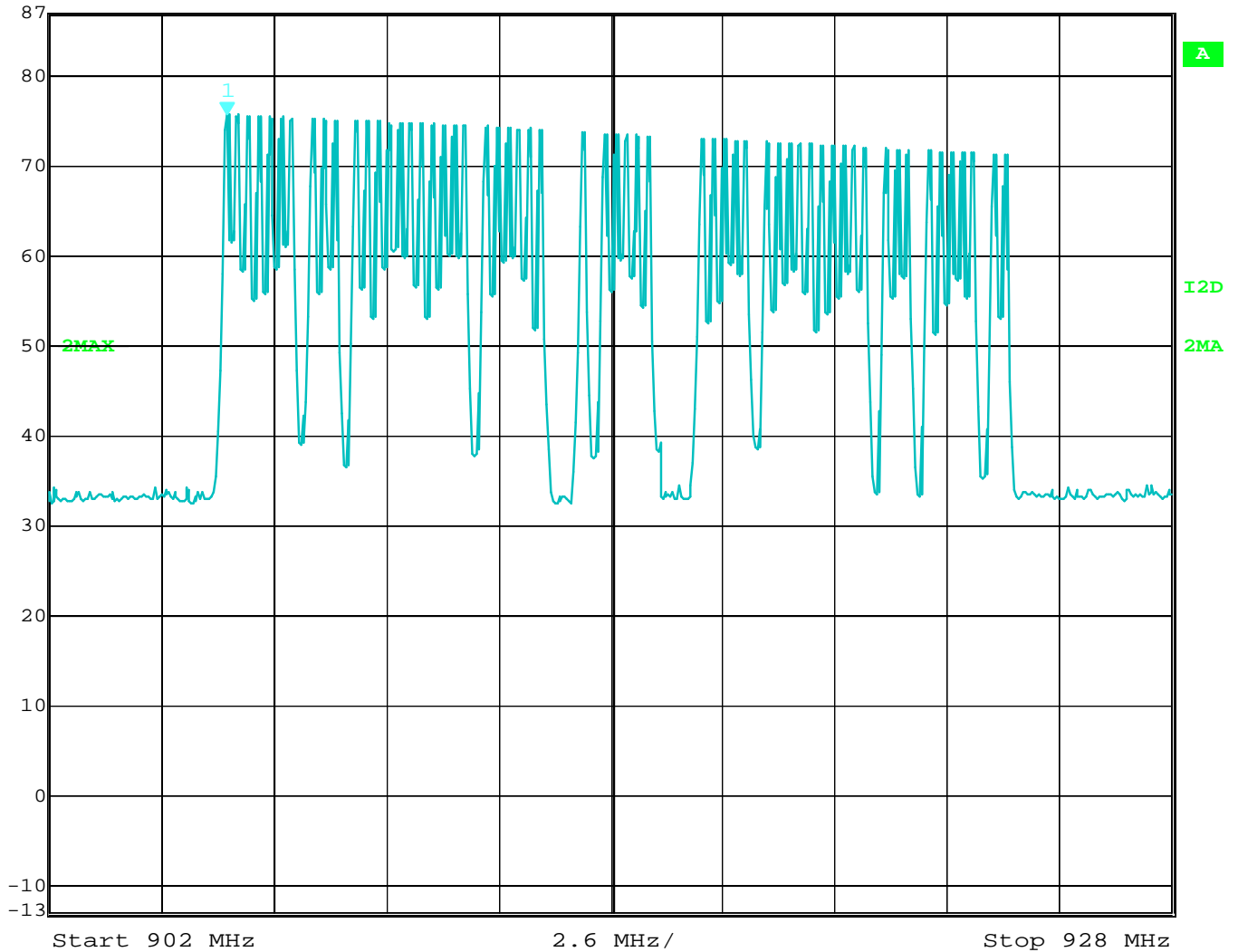
Channel Frequency Separation

NUMBER OF FREQUENCIES

DATA SHEET



Marker 1 [T2] RBW 50 kHz RF Att 10 dB
 Ref Lvl 75.54 dBV VBW 200 kHz
 87 dBV 906.11623246 MHz SWT 26 ms Unit dBV

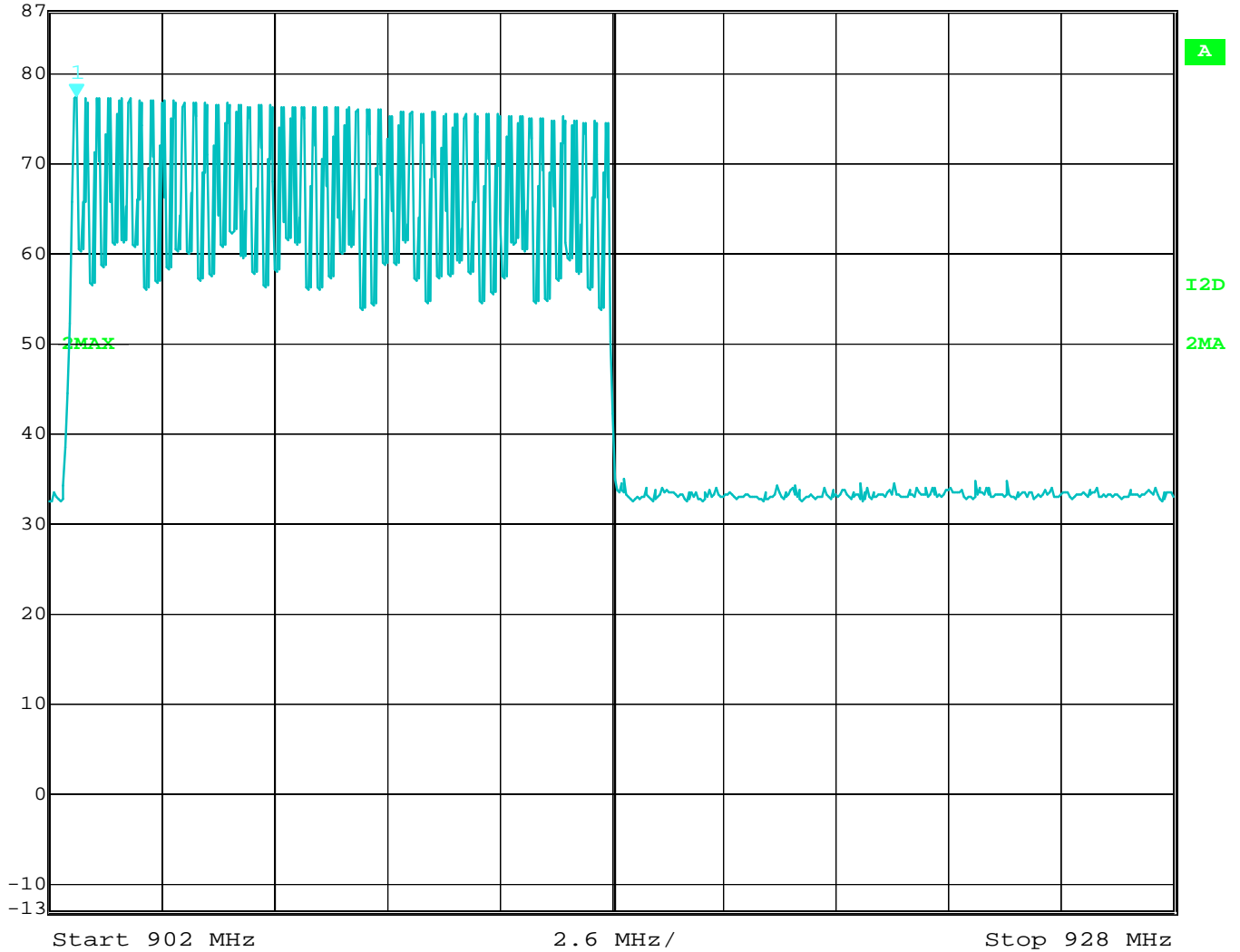


Date: 28.JUN.2018 13:56:29

Number of Channels is 58 – 906.12 MHz to 924.12 MHz Band



Marker 1 [T2] RBW 50 kHz RF Att 10 dB
 Ref Lvl 77.30 dBV VBW 200 kHz
 87 dBV 902.62525050 MHz SWT 26 ms Unit dBV

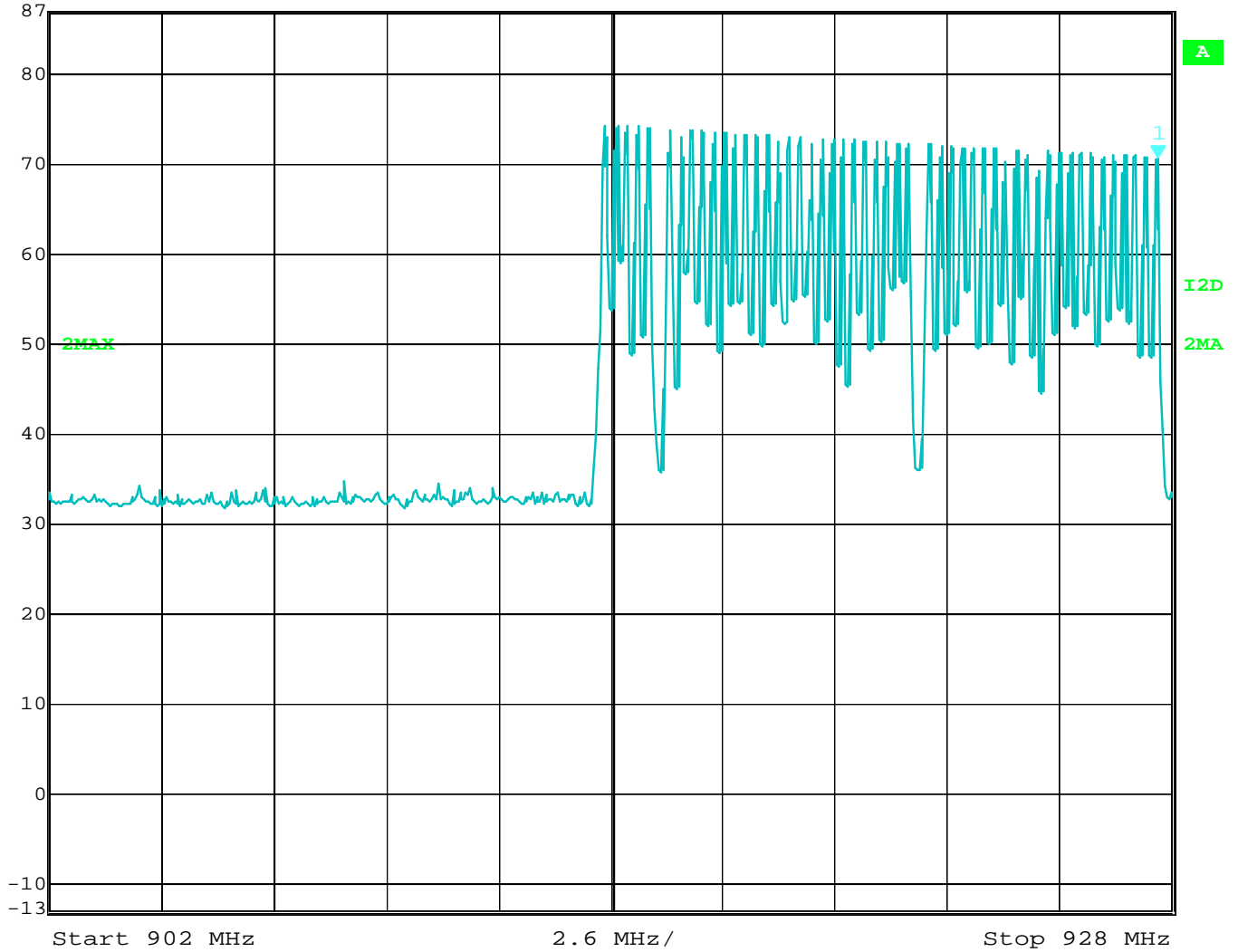


Date: 28.JUN.2018 15:51:03

Number of Channels is 50 – 902.62 MHz to 914.87 MHz Band



Marker 1 [T2] RBW 50 kHz RF Att 10 dB
 Ref Lvl 70.60 dBV VBW 200 kHz
 87 dBV 927.68737475 MHz SWT 26 ms Unit dBV



Date: 28.JUN.2018 14:31:16

Number of Channels is 50 – 914.87 MHz to 927.62 MHz Band



TIME OF OCCUPANCY
DATA SHEETS



Delta 1 [T2]

RBW 50 kHz RF Att 10 dB

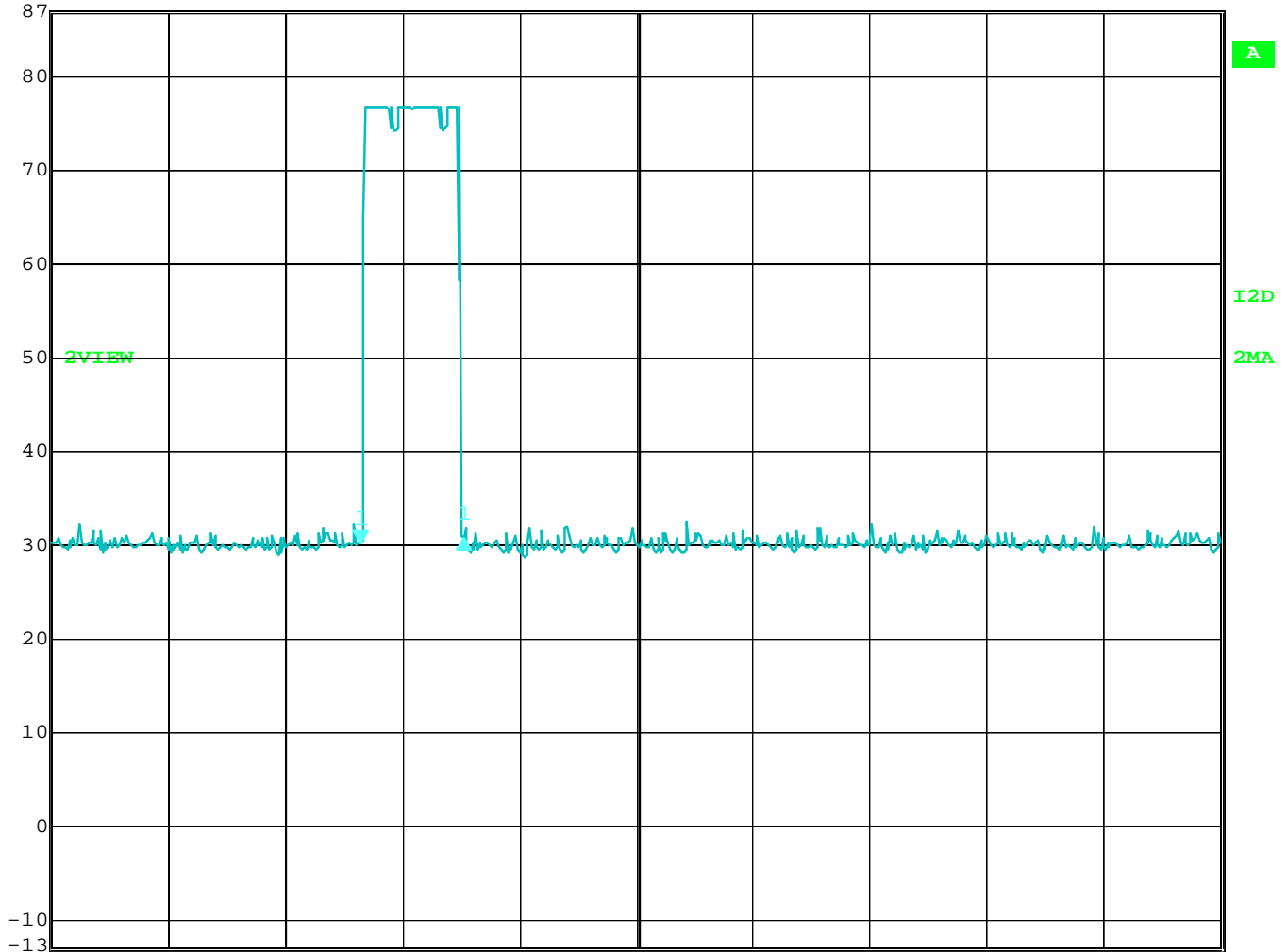
Ref Lvl 0.36 dB

VBW 200 kHz

87 dB μ V 8.817635 ms

SWT 100 ms

Unit dB μ V



Center 902.62 MHz

10 ms/

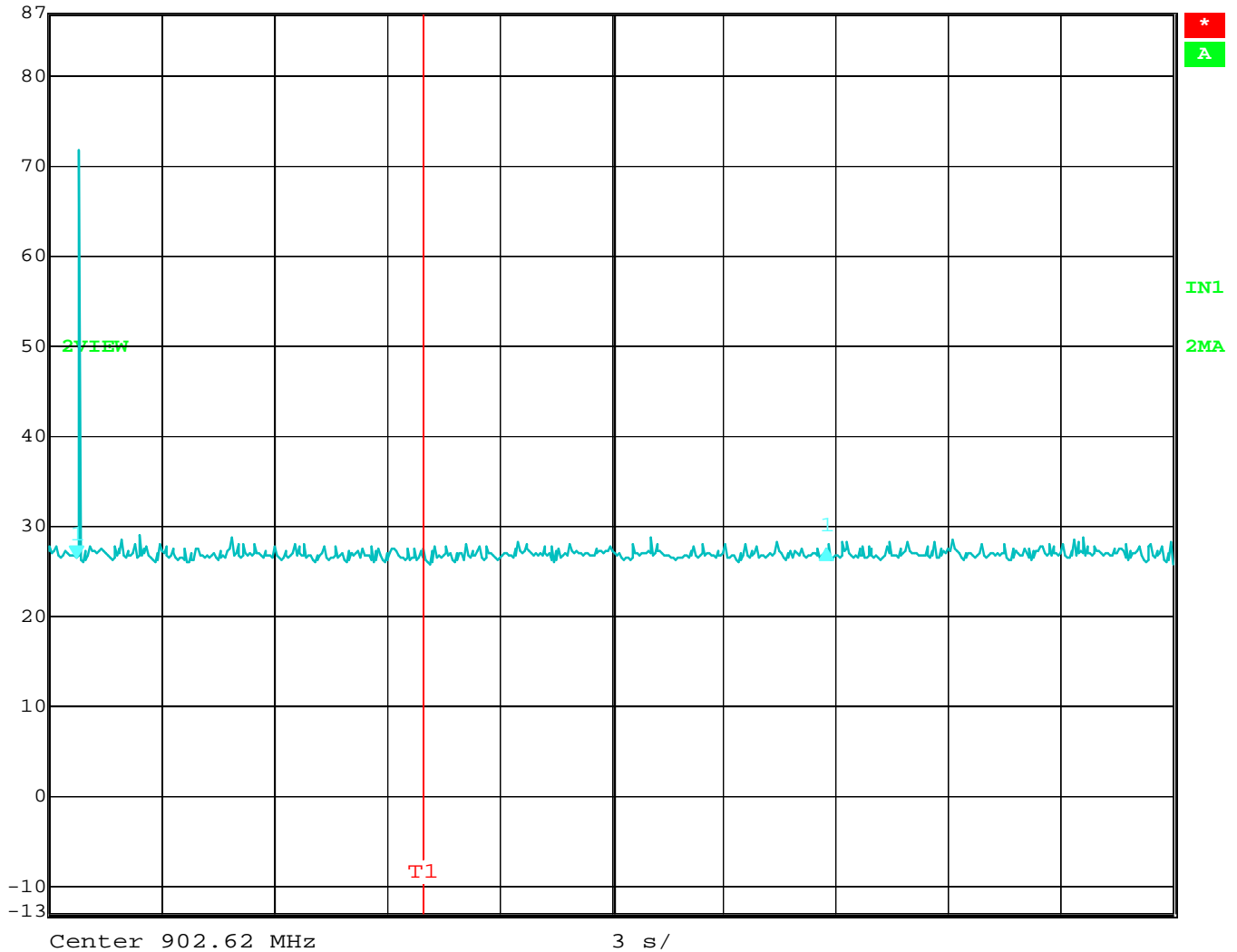
Date: 28.JUN.2018 15:58:55

Time of One Pulse – 8.817635 ms

Note: Worst Case Mode of low band hop table used, which results in the pulses appearing more frequently.



Delta 1 [T2] RBW 100 kHz RF Att 10 dB
 Ref Lvl 0.91 dB VBW 300 kHz
 87 dBV 20.020040 s SWT 30 s Unit dBV



Date: 28.AUG.2018 15:24:39

One Pulse Per 20 Seconds
 Total Time = 8.817635 ms per 20 seconds
 Limit = 400 ms per 20 seconds

Note: Worst Case Mode of low band hop table used, which results in the pulses appearing more frequently.