FCC PART 15, SUBPART B and C; FCC 15.247; RSS-247 and RSS-GEN TEST REPORT

For

900 MHz SENSOR

Model: ESSENTIALS

Part Number: DS-VP-ESS-900-S

Prepared for

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DATE: SEPTEMBER 16, 2022

	REPORT		APPENDICES				TOTAL
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NVLAP TESTING
NVLAP LAB CODE 200528-0

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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.

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

Device Tested: 900 MHz Sensor
Models: Essentials
P/N: DS-VP-ESS-900-S
S/N: N/A

Product Description: The EUT a battery powered general purpose 902-928 MHz logging sensor measuring temperature, humidity, and discrete inputs. The integrated MCU/radio clocks are: 32.768 kHz and 48 MHz. The dimensions of the EUT is 4.4" (H) x 2.15" (W) x 1.2" (L).

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

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

Test Dates: August 18, 19, 20 and 22, 2022

Test Specifications covered by accreditation:

Test Specifications: Emissions requirements
CFR Title 47, Part 15, Subpart B; and Subpart C, Sections 15.205, 15.209, and 15.247;
RSS-247 and RSS-GEN

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

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

SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	This test was not performed because the EUT is an internal battery power device only and does not connect to the public AC mains.
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; RSS-247 and RSS-GEN Highest reading in relation to spec limit: 42.98 dBuV/m @ 854.60 MHz (*U = 3.30 dB)
3	20 dB Bandwidth	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a) (1) (i); RSS-247
4	Peak Power Output	Complies with the relevant requirements of FCC Title 47, Part 15, Subpart C, section 15.247 (b) (2); RSS-247
5	RF Conducted Antenna Test	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (d); RSS-247
6	Carrier Frequency Separation	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a) (1); RSS-247
7	Average Time of Occupancy	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a) (1) (i); RSS-247
8	Peak Power Spectral Density from the International Radiator to the Antenna	This test was not performed because the EUT is a frequency hopper.
9	99% Bandwidth	This test was performed to obtain the emission designator required by Innovation, Science and Economic Development Canada.
10	Number of Hopping Frequencies	Complies with the relevant requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a) (1) (i); RSS-247

1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the 900 MHz Sensor, Model: Essentials, Part Number: DS-VP-ESS-900-S. The emissions measurements were performed according to the measurement procedures 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; RSS-247 and RSS-GEN.

Note: This test report is for the G5 Compatibility Mode. For the G4 Compatibility Mode, please see Compatible Electronics, Inc. test report B20822D1.

1.1 Decision Rule & Risk

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

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

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

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

The decision rule is defined below.

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

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

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

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

2. ADMINISTRATIVE DATA

2.1 Location of Testing

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

2.2 Traceability Statement

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

2.3 Cognizant Personnel

Mesa Laboratories, Inc.

Joel Cunningham	Engineering Lead
Paul Hill	Senior Engineer

Compatible Electronics Inc.

James Ross	Senior Test Engineer
Kyle Fujimoto	Senior Test Engineer

2.4 Date Test Sample was Received

The test sample was received prior to the initial date of testing.

2.5 Disposition of the Test Sample

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

2.6 Abbreviations and Acronyms

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

EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Model
S/N	Serial Number
ITE	Information Technology Equipment
N/A	Not Applicable
RF	Radio Frequency
HP	Hewlett Packard
LISN	Line Impedance Stabilization Network
LO	Local Oscillator
TX	Transmit
RX	Receive

3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this emission 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
KDB 558074 D01 v05r02	Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC Rules
ANSI C63.4: 2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10: 2013	American National Standard of procedure for compliance testing of unlicensed wireless devices
RSS-GEN Issue 5: April 2018 + Amendment 1: March 2019 + Amendment 2: February 2021	General Requirements for Compliance of Radio Apparatus
RSS-247 Issue 2: February 2017	Digital Transmissions Systems (DTSs), Frequency Hopping Systems (FHSS) and License-Exempt Local Area Network (LE-LAN) Devices

4. DESCRIPTION OF TEST CONFIGURATION

4.1 Description of Test Configuration – Emissions

The 900 MHz Sensor, Model: Essentials, Part Number: DS-VP-ESS-900-S (EUT) was tested connected to a 10K Thermistor Temperature probe and I2C temperatre/humidity probe via its probe input ports. The EUT was also connected to a Door Switch / Motion / Alarm Contact via its discrete switch/contact input port.

The EUT was powered by two "AA" batteries.

The EUT was tested for emissions while in the X, Y, and Z axis. The X orientation is when the EUT is parallel to the ground mounted horizontally. The Y orientation is when the EUT is perpendicular to the ground mounted vertically. The Z orientation is when the EUT is perpendicular to the ground mounted horizontally.

The firmware inside the EUT allowed the EUT to continuously transmit or receive at the low, middle, and high channels for both the G4 and G5 configurations on a continuous basis.

The firmware is stored on the company's servers.

Note: The EUT was tested in the G5 Compatibility Mode configuration.

The radiated data was taken in the continuously exercising mode of operation. All initial investigations were performed with the EMI Receiver in manual mode scanning the frequency range continuously. The cables were bundled and routed as shown in the photographs in Appendix D.

4.1.1 Cable Construction and Termination

Cable 1 This is a 40-centimeter braid shielded cable connecting the 10K Thermistor Temperature probe to the EUT. The cable has a 6-pin round Hirose connector at the EUT end and is hard wired into the probe. The shield of the cable was grounded to the chassis via the connector.

Cable 2 This is a 40-centimeter braid shielded cable connecting the I2C Humidity Temperature probe to the EUT. The cable has a 6-pin round Hirose connector at the EUT end and is hard wired into the probe. The shield of the cable was grounded to the chassis via the connector.

Cable 3 This is a 1-meter braid shielded cable connecting the Door Switch / Motion / Alarm Contact to the EUT. The cable has a 1/8 inch connector at the EUT end and is hard wired into the Door Switch / Motion / Alarm Contact. The shield of the cable was grounded to the chassis via the connector.

5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

5.1 EUT and Accessory List

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	WIRELESS ID
900 MHZ SENSOR (EUT)	MESA LABORATORIES, INC.	ESSENTIALS P/N: DS-VP-ESS-900-S	N/A	FCC ID: UUYESS900 IC ID: 6891A-ESS900
10K THERMISTOR TEMPERATURE PROBE	MESA LABORATORIES, INC.	P/N: 71205-12	23578	N/A
I2C HUMIDITY/ TEMPERATURE PROBE	MESA LABORATORIES, INC.	P/N: 72112	227164	N/A
DOOR SWITCH / MOTION / ALARM CONTACT	MESA LABORATORIES, INC.	P/N: 166552	N/A	N/A
FIRMWARE*	MESA LABORATORIES, INC.	VPX CONFIGURATION UTILITY	Version 1.3.10.0	N/A
LAPTOP*	VOSTRO	P89G	DQNH703	DoC

*Only used to program the EUT and then was removed during the testing.

5.2 Emissions Test Equipment

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
RF RADIATED EMISSIONS TEST EQUIPMENT					
TDK TestLab	TDK RF Solutions, Inc.	9.22	700145	N/A	N/A
EMI Receiver, 20 Hz – 26.5 GHz	Keysight Technologies, Inc.	N9038A	MY51210510	September 17, 2021	September 17, 2022
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	129091	February 10, 2022	February 10, 2025
CombiLog Antenna	Com-Power	AC-220	61093	December 14, 2021	December 14, 2023
Horn Antenna	Com-Power	AH-118	10050113	December 16, 2021	December 16, 2023
Preamplifier	Com-Power	PA-118	181653	March 7, 2022	March 7, 2023
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 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 during testing.

6.3 Measurement Uncertainty

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

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

Measurement		U_{cispr}	$U_{lab} = 2\,uc\,(y)$
Conducted disturbance (mains port)	(150 kHz – 30 MHz)	3.4 dB	2.72 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(30 MHz – 1 000 MHz)	6.3 dB	3.32 dB (Vertical) 3.30 dB (Horizontal)
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(1 GHz - 6 GHz)	5.2 dB	4.06 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(6 GHz – 18 GHz)	5.5 dB	4.06 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(18 GHz – 26.5 GHz)	N/A	4.43 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site)	(26.5 GHz – 40 GHz)	N/A	4.57 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 Description and Frequencies

The FHSS uses at least a minimum of 50 channels minimum using a pseudo random technique. It uses GFSK modulation. Please see the channel separation data sheet in Appendix E for the separation between channels for each sub-band.

The three sub-bands that the EUT can operate on are:
1. 906.12 MHz to 924.12 MHz, which contains 58 channels
2. 902.62 MHz to 914.87 MHz, which contains 50 channels
3. 914.87 MHz to 927.62 MHz, which contains 50 channels

See Appendix E for the each plot showing the total number of channels in each sub-band.

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7.2 Antenna Gain

The antenna has a gain of 5.42 dBi.

8. TEST PROCEDURES

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

8.1 RF Emissions

8.1.1 Conducted Emissions Test

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

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

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

Test Results:

This test was not performed because the EUT is an internal battery powered device and does not connect to the public AC mains.

8.1.2 Radiated Emissions Test

The EMI Receiver was used as the measuring meter. A built-in, internal preamplifier was 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. A quasi-peak reading was taken only for those readings, which are marked accordingly on the data sheets. The effective measurement bandwidth used for the radiated emissions test was according to the frequency measured (200 Hz for 10 kHz to 150 kHz, 9 kHz for 150 kHz to 30 MHz, 120 kHz for 30 MHz to 1 GHz and 1 MHz for 1 GHz to 9.3 GHz).

The frequencies above 1 GHz were averaged by using duty cycle correction factor.

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

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

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

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
9 kHz to 150 kHz	200 Hz	Loop Antenna
150 kHz to 30 MHz	9 kHz	Loop Antenna
30 MHz to 1 GHz	120 kHz	CombiLog Antenna
1 GHz to 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 the limits of CFR Title 47, Part 15, Subpart C sections 15.205, 15.209 and 15.247 (d); and the limits of RSS-247 and RSS-GEN for radiated emissions.

8.1.3 RF Emissions Test Results

Table 1.0 RADIATED EMISSION RESULTS
900 MHz Sensor
Model: Essentials; Part Number: DS-VP-ESS-900-S

Frequency MHz	Quasi-Peak EMI Reading* (dBuV)	Specification Limit (dBuV)	Delta (Cor. Reading – Spec. Limit) dB)
854.60 (H) (Tx) (X-Axis)	42.98	46.00	-3.02
451.30 (H) (Tx) (X-Axis)	37.20	46.00	-8.80
843.60 (H) (Rx) (Z-Axis)	33.43	46.00	-12.57
853.60 (H) (Rx) (Z-Axis)	33.13	46.00	-12.87
781.50 (H) (Rx) (Z-Axis)	32.44	46.00	-13.56
378.20 (H) (Tx) (X-Axis)	29.39	46.00	-16.61

Notes:
* The complete emissions data is given in Appendix E of this report.
(Tx) Transmit
(Rx) Receive
(V) Vertical
(H) Horizontal

8.1.4 Sample Calculations

A correction factor for the antenna, cable, and a distance factor (if any) must be applied to the meter reading before a true field strength reading can be obtained. This Corrected Meter Reading is then compared to the specification limit in order to determine compliance with the limits.
Conversion to logarithmic terms: Specification limit (µV/m) log x 20 = Specification Limit in dBuV/m
To correct for distance when measuring at a distance other than the specification
For measurements below 30 MHz: (Specification distance / test distance) log x 40 = distance factor
For measurements above 30 MHz: (Specification distance / test distance) log x 20 = distance factor
Note: When using an Active Antenna, the Antenna factor shall be subtracted due to the combination of the internal amplification and antenna loss.
Corrected Meter Reading = meter reading + F – A + C

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

The correction factors for the antenna and the amplifier gain are attached in Appendix D of this report. The data sheets are attached in Appendix E.
The distance factor D is 0 when the test is performed at the required specification distance.
When the limit is in terms of magnetic field, the following equation applies:

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

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

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

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

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

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

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

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

or, if the magnetic antenna factor is used:

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

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

8.2 20 dB Bandwidth

The 20 dB Bandwidth was measured using the EMI Receiver. The bandwidth was measured using a direct connection from the RF output of the EUT. The resolution bandwidth was between 1% and 5% of the bandwidth and the video bandwidth was ≥ 3 X RBW.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a) (1) (i); and RSS-247. 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 the EMI Receiver. The peak output power was measured using a direct connection from the RF output of the EUT. The resolution bandwidth was greater than the 20 dB bandwidth and the video bandwidth was ≥ 3 X RBW. The cable loss was also added back into the reading using the reference level offset.

Test Results:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (b) (2); and RSS-247. 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:

The EUT complies with the relevant requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d); and RSS-247. The RF power that is produced by the intentional radiator is at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of desired power. Please see the radiated emission data sheets located in Appendix E.

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); and RSS-247. 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 operating mode. The resolution bandwidth was approximately 30% of the channel spacing, and the video bandwidth ≥ 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); and RSS-247. 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 operating mode. The resolution bandwidth was set to approximately 30% of the channel spacing, and the video bandwidth was ≥ 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) (i); and RSS-247. 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 normal 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 RBW was set to be less than the channel spacing. 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); and RSS-247. Please see the data sheets located in Appendix E.

8.9 Fundamental Field Strength (Duty Cycle Calculations)

The Peak Transmit Radiated Field Strength was measured at a 3-meter test distance. The EMI Receiver was used to obtain the duty cycle. The data sheets are located in Appendix E.

Where

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

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

Duty Cycle Correction Factor = -20.00dB

Pulse = 1 * 8.3 mS

Total On Time = 8.3 mS

Duty Cycle Train was longer than 100mS; therefore 100mS span was used.

8.3 mS / 100 mS = 8.3%

20 log (0.083) = -21.61 dB correction factor

Max Duty Cycle Correction Factor = -20.00dB

8.10 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 is an internal battery powered only device.

8.11 99% Bandwidth

The 99 % bandwidth was measured using an EMI Receiver.

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

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

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

9. CONCLUSIONS

The 900 MHz Sensor, Model: Essentials, Part Number: DS-VP-ESS-900-S (EUT), as tested, meets all of the specification limits defined in FCC Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, and 15.247; and RSS-GEN and RSS-247.

APPENDIX A

LABORATORY ACCREDITATIONS AND RECOGNITIONS

LABORATORY ACCREDITATIONS AND RECOGNITIONS

NVLAP TESTING
NVLAP LAB CODE 200528-0

ilac-MRA

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 the Management Systems Requirements of ISO/IEC 17025, General Requirements for the competence of testing and calibration laboratories:

"A laboratory's fulfilment of the requirements of ISO/IEC 17025 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 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001"

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 C, FCC 15.247, RSS-GEN, and RSS-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

MODELS COVERED UNDER THIS REPORT

MODELS COVERED UNDER THIS REPORT

USED FOR THE PRIMARY TEST	900 MHz Sensor Model: Essentials Part Number: DS-VP-ESS-900-S Serial Number: N/A Note: G5 Compatibility Mode

There are no additional models covered under this report.

APPENDIX D

DIAGRAMS AND CHARTS

FIGURE 1: CONDUCTED EMISSIONS TEST SETUP

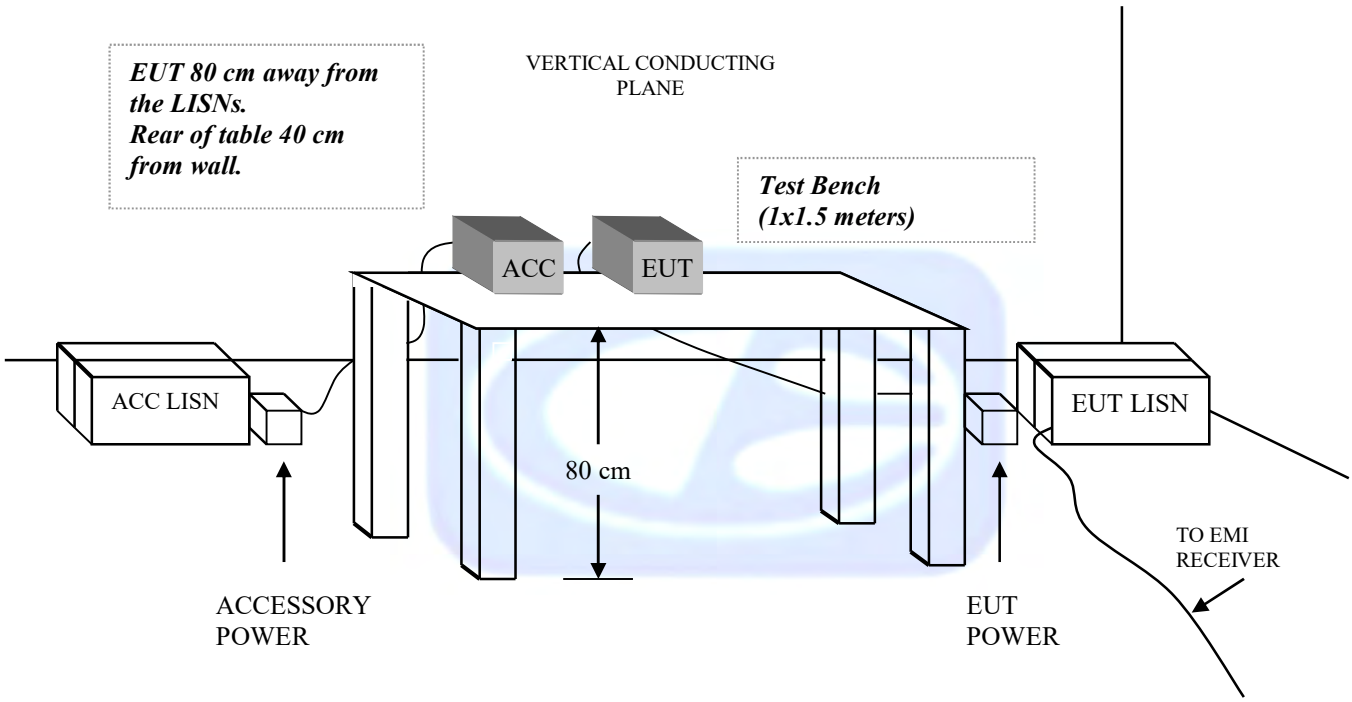
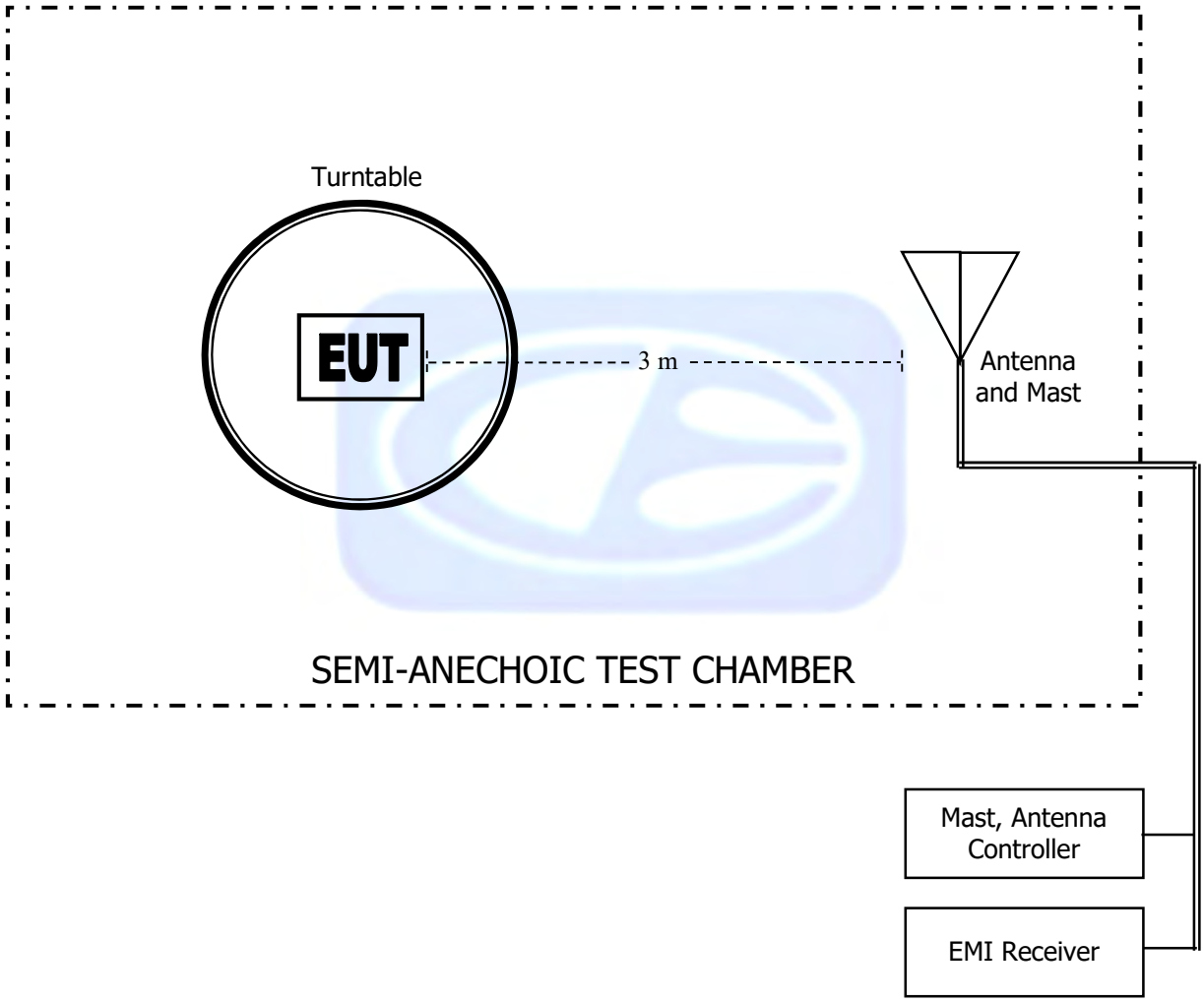


FIGURE 2: LAYOUT OF THE SEMI -ANECHOIC TEST CHAMBER



COM-POWER AL-130R

LOOP ANTENNA

S/N: 121090

CALIBRATION DATE: FEBRUARY 10, 2022

FREQUENCY (MHz)	MAGNETIC (dB/m)	ELECTRIC (dB/m)
0.009	15.6	-35.8
0.01	15.8	-35.6
0.02	14.8	-36.6
0.03	15.6	-35.9
0.04	15.0	-36.5
0.05	14.4	-37.1
0.06	14.6	-36.9
0.07	14.3	-37.2
0.08	14.3	-37.2
0.09	14.4	-37.0
0.10	14.1	-37.4
0.20	14.1	-37.4
0.30	14.0	-37.5
0.40	13.9	-37.6
0.50	14.1	-37.3
0.60	14.1	-37.3
0.70	14.2	-37.3
0.80	14.2	-37.3
0.90	14.2	-37.2
1.00	14.4	-37.0
2.00	14.6	-36.9
3.00	14.6	-36.8
4.00	14.9	-36.6
5.00	14.9	-36.7
6.00	14.8	-36.7
7.00	14.6	-36.8
8.00	14.5	-37.0
9.00	14.3	-37.2
10.00	14.5	-37.0
11.00	14.6	-36.9
12.00	14.7	-36.7
13.00	14.9	-36.6
14.00	15.0	-36.5
15.00	14.9	-36.6
16.00	14.9	-36.6
17.00	14.6	-36.8
18.00	14.4	-37.1
19.00	14.5	-37.0
20.00	14.5	-37.0
21.00	14.2	-37.3
22.00	13.9	-37.5
23.00	13.9	-37.5
24.00	13.8	-37.7
25.00	13.4	-38.0
26.00	13.2	-38.2
27.00	13.2	-38.3
28.00	12.7	-38.7
29.00	12.7	-38.8
30.00	12.4	-39.0

COM-POWER AC-220

COMBILOG ANTENNA

S/N: 061093

CALIBRATION DATE: DECEMBER 14, 2021

FREQUENCY (MHz)	FACTOR (dB)	FREQUENCY (MHz)	FACTOR (dB)
30	22.5	200	16.0
35	21.4	250	17.4
40	21.0	300	19.7
45	20.6	350	20.0
50	19.7	400	22.2
60	16.1	450	22.4
70	12.8	500	23.1
80	12.5	550	23.4
90	14.2	600	24.9
100	15.4	650	25.3
120	16.5	700	25.4
125	16.8	750	26.4
140	15.9	800	26.7
150	16.6	850	27.1
160	18.5	900	27.9
175	15.9	950	28.0
180	15.5	1000	28.0

COM POWER AH-118

HORN ANTENNA

S/N: 10050113

CALIBRATION DATE: DECEMBER 16, 2021

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	23.86	10.0	38.91
1.5	25.67	10.5	39.94
2.0	28.25	11.0	39.10
2.5	29.17	11.5	39.70
3.0	29.78	12.0	40.29
3.5	30.88	12.5	41.93
4.0	31.21	13.0	41.34
4.5	32.96	13.5	40.57
5.0	33.30	14.0	40.23
5.5	34.24	14.5	42.25
6.0	34.57	15.0	43.63
6.5	35.61	15.5	39.96
7.0	36.60	16.0	40.38
7.5	37.49	16.5	40.56
8.0	37.44	17.0	40.93
8.5	37.98	17.5	42.27
9.0	38.01	18.0	43.77
9.5	38.53		

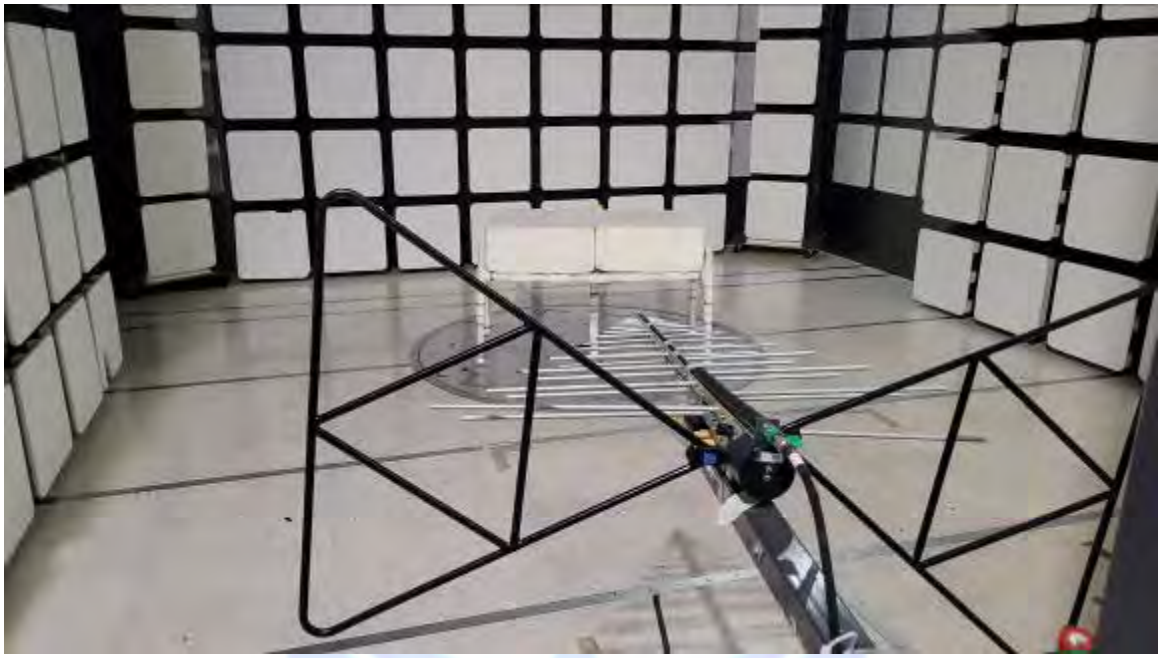
COM-POWER PAM-118

PREAMPLIFIER

S/N: 181653

CALIBRATION DATE: MARCH 7, 2022

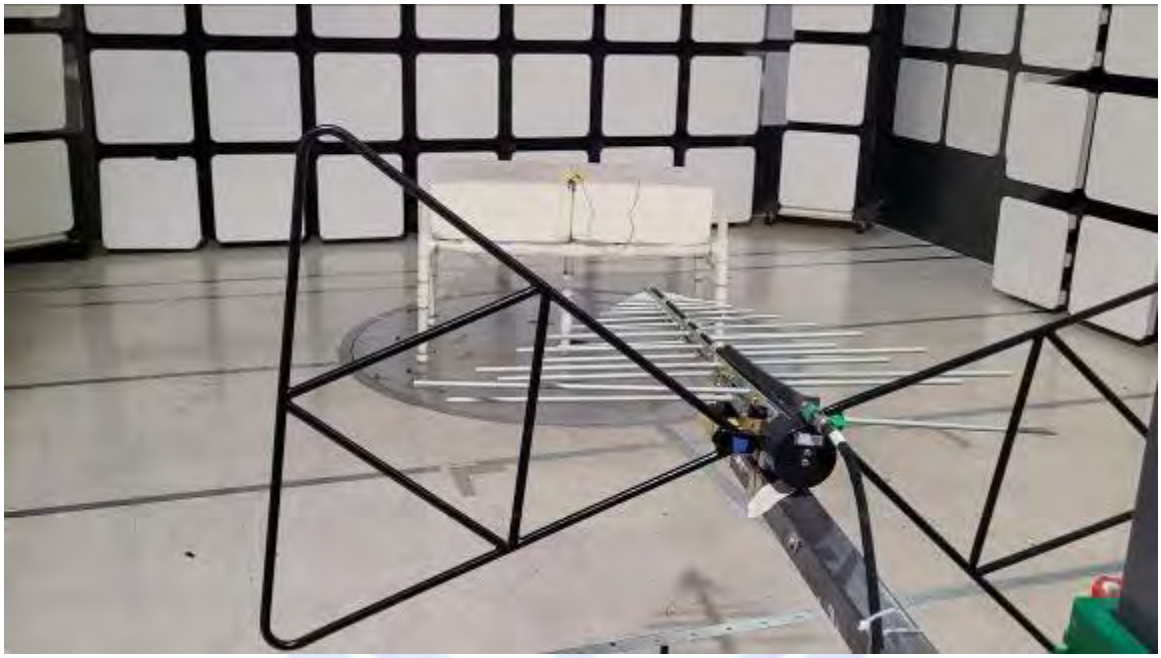
FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	40.02	6.0	38.84
1.1	39.72	6.5	39.20
1.2	39.93	7.0	39.46
1.3	39.98	7.5	39.67
1.4	39.99	8.0	39.28
1.5	40.20	8.5	38.63
1.6	40.05	9.0	38.96
1.7	40.15	9.5	39.33
1.8	40.20	10.0	39.58
1.9	40.33	11.0	38.25
2.0	40.33	12.0	40.03
2.5	40.60	13.0	40.55
3.0	40.76	14.0	40.36
3.5	40.87	15.0	39.34
4.0	40.39	16.0	37.34
4.5	39.55	17.0	42.14
5.0	40.34	18.0	42.54
5.5	39.45		



FRONT VIEW

MESA LABORATORIES, INC.
900 MHz SENSOR – G5 COMPATIBILITY MODE
MODEL: ESSENTIALS; PART NUMBER: DS-VP-ESS-900-S
FCC SUBPART B AND C; RSS-GEN and RSS-247 – RADIATED EMISSIONS – BELOW 1 GHz

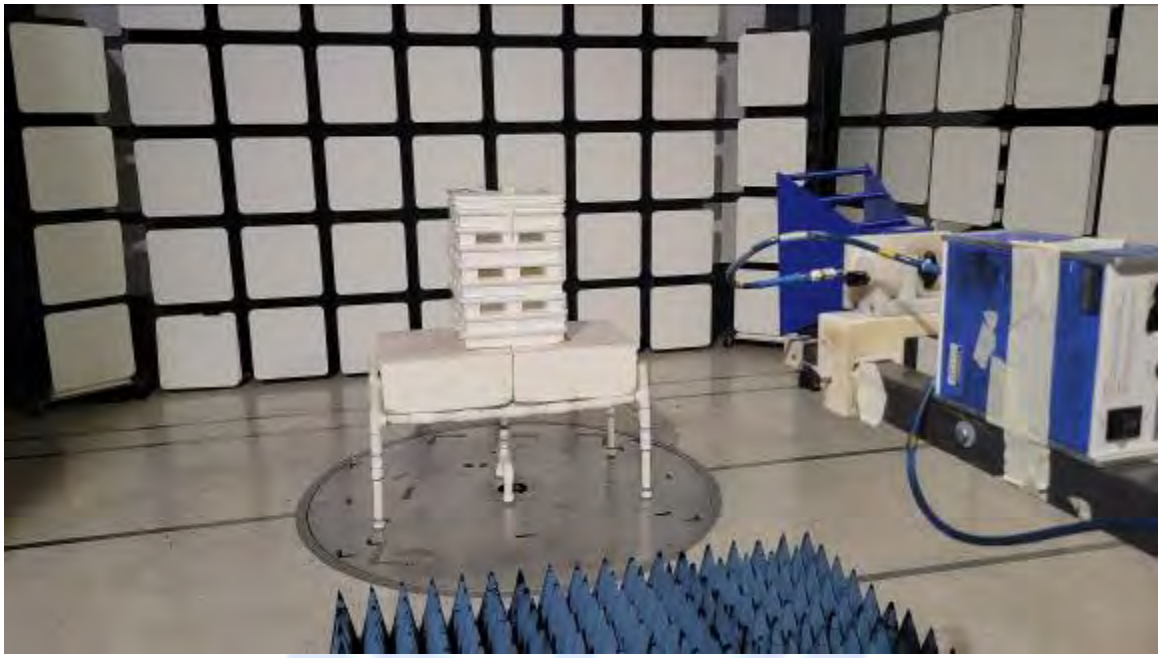
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

MESA LABORATORIES, INC.
900 MHz SENSOR – G5 COMPATIBILITY MODE
MODEL: ESSENTIALS; PART NUMBER: DS-VP-ESS-900-S
FCC SUBPART B AND C; RSS-GEN and RSS-247 – RADIATED EMISSIONS – BELOW 1 GHz

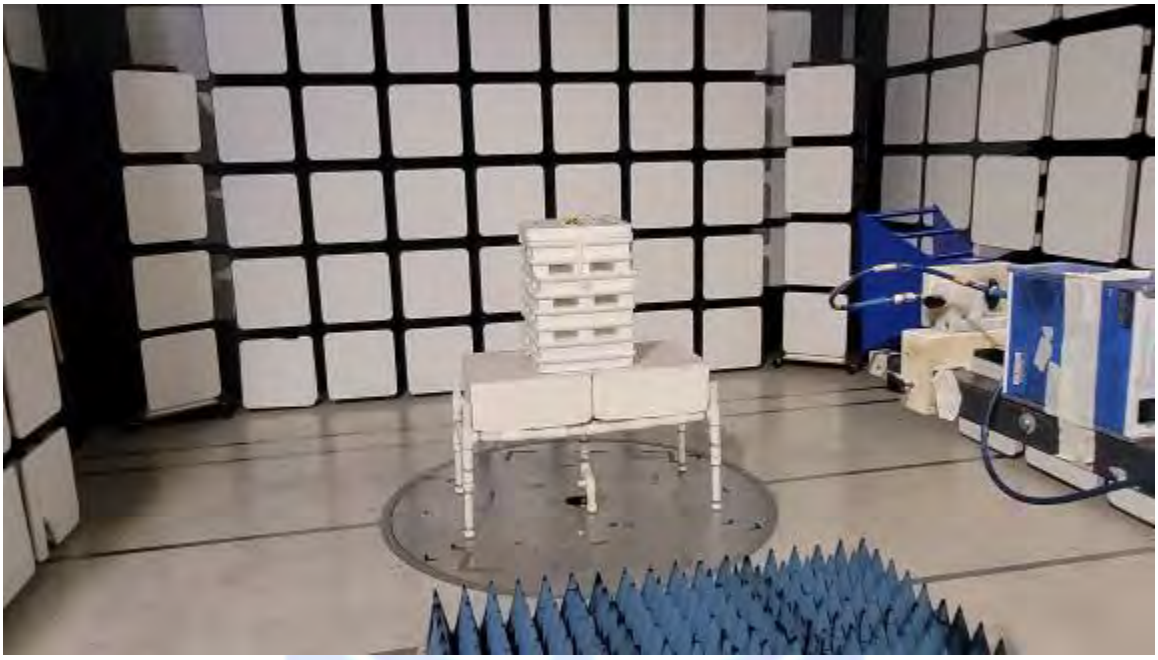
PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



FRONT VIEW

MESA LABORATORIES, INC.
900 MHz SENSOR – G5 COMPATIBILITY MODE
MODEL: ESSENTIALS; PART NUMBER: DS-VP-ESS-900-S
FCC SUBPART B AND C; RSS-GEN and RSS-247 – RADIATED EMISSIONS – ABOVE 1 GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



REAR VIEW

MESA LABORATORIES, INC.
900 MHz SENSOR – G5 COMPATIBILITY MODE
MODEL: ESSENTIALS; PART NUMBER: DS-VP-ESS-900-S
FCC SUBPART B AND C; RSS-GEN and RSS-247 – RADIATED EMISSIONS – ABOVE 1 GHz

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

APPENDIX E

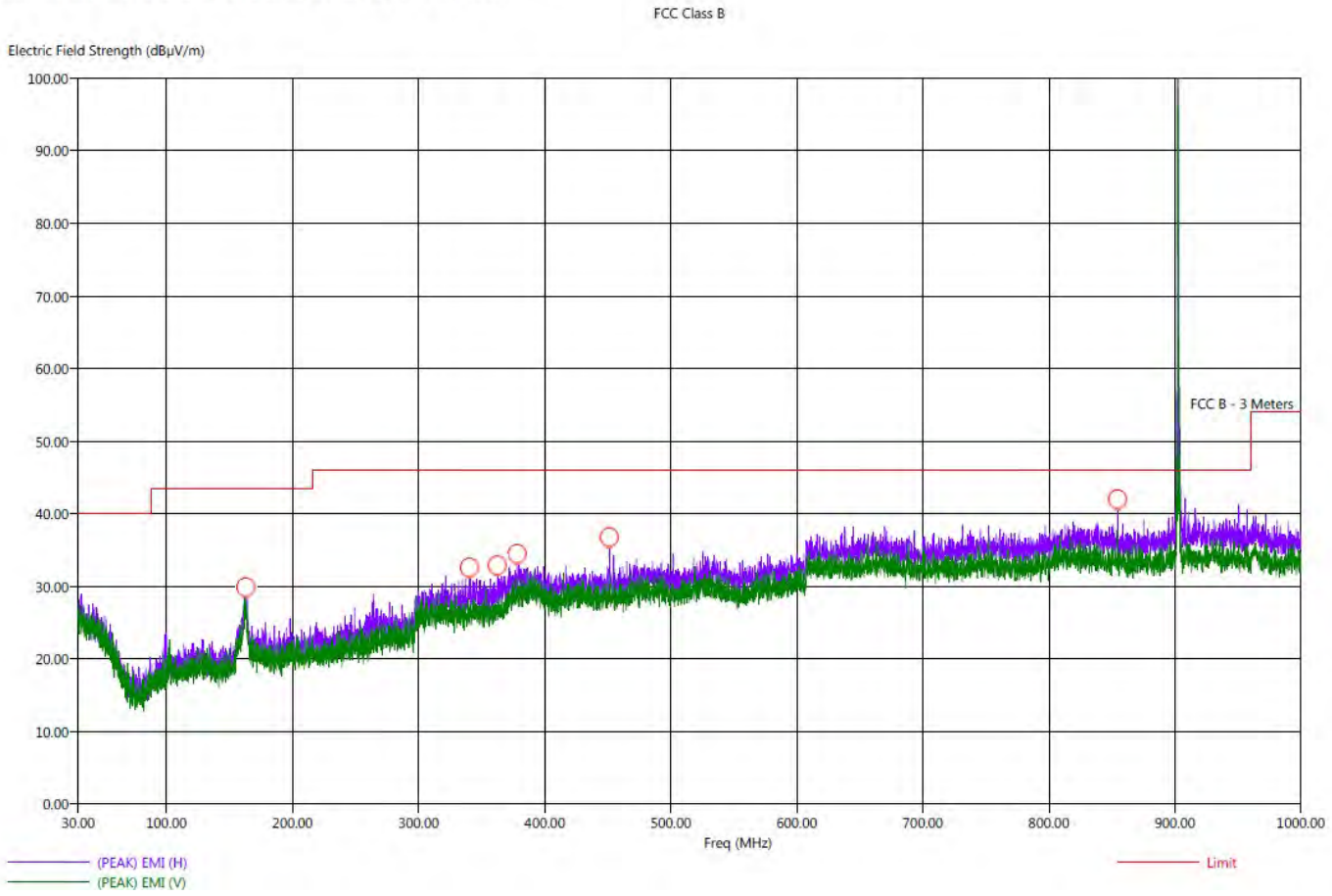
DATA SHEETS

RADIATED EMISSIONS

DATA SHEETS

Title: Pre-Scan - FCC Class B
File: 1 - Pre-Scan - Battery - Tx Mode - X-Axis - FCC Class B - G5 Configuration - Essentials - 08-22-2022.set
Operator: Kyle Fujimoto
EUT Type: 900 MHz Sensor
EUT Condition: The EUT is continuously transmitting at the Low Channel - G5 Configuration
Company: Mesa Laboratories, Inc.
Model: Essentials
P/N: DS-VP-ESS-900-S
Tx Mode
X-Axis
Note: The Frequency at 902.62 MHz is subject to the limits of FCC 15.247 instead.

8/22/2022 8:16:23 AM
Sequence: Preliminary Scan



Title: Radiated Final - FCC Class B
File: 1 - Final Scan - Battery - Tx Mode - X-Axis - FCC Class B - G5 Configuration - Essentials - 08-22-2022.set
Operator: Kyle Fujimoto
EUT Type: 900 MHz Sensor
EUT Condition: The EUT is Continuously Transmitting at the Low Channel - G5 Configuration
Company: Mesa Laboratories, Inc.
Model: Essentials
P/N: DS-VP-ESS-900-S
Tx Mode
X-Axis

8/22/2022 8:50:53 AM
Sequence: Final Measurements

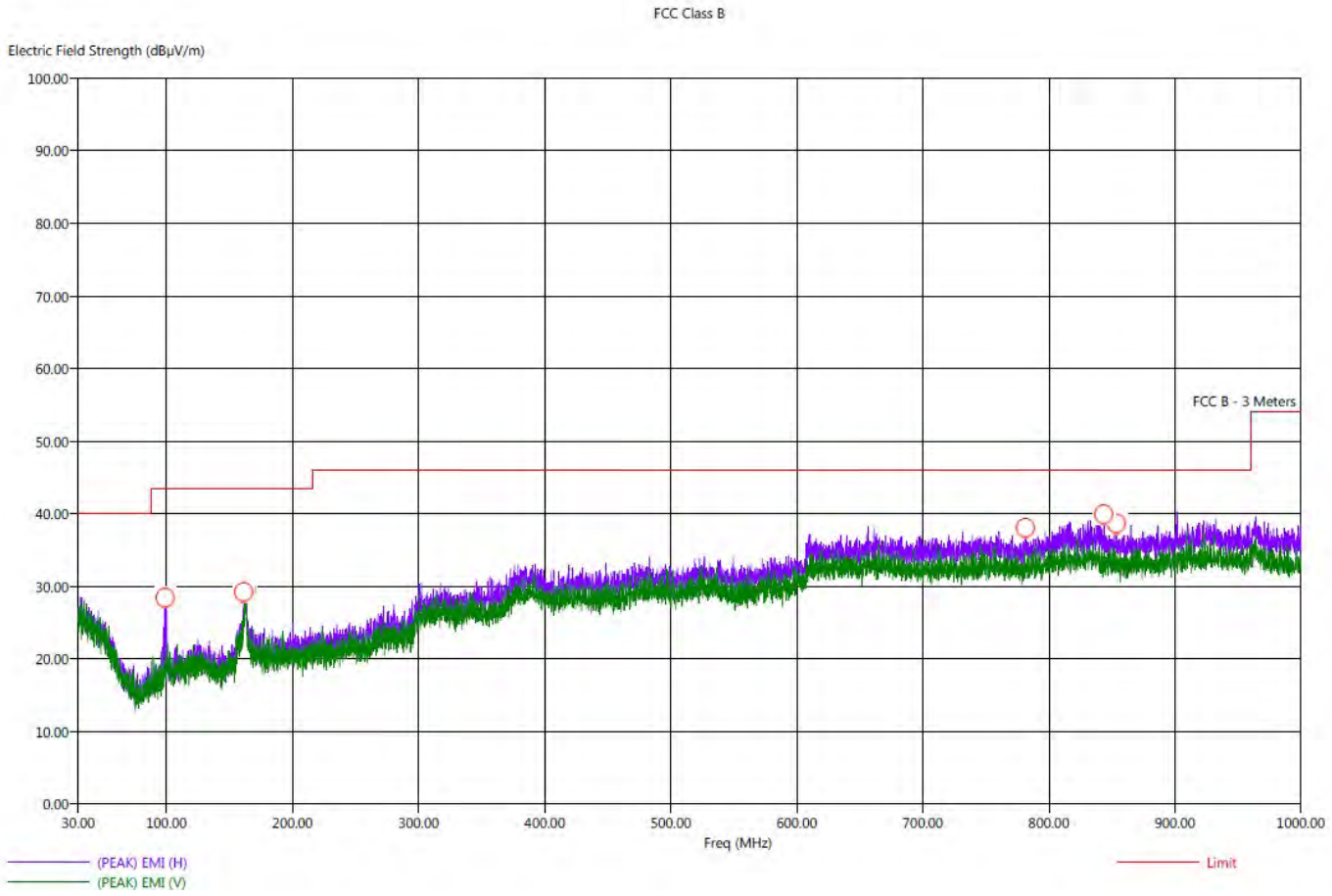
FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Agl (deg)	Twr Ht (cm)
163.00	H	30.60	25.23	-12.90	-18.27	43.50	21.72	1.07	82.25	190.74
340.30	H	32.04	26.29	-13.96	-19.71	46.00	20.04	1.54	123.75	400.05
362.50	H	32.82	27.32	-13.18	-18.68	46.00	20.44	1.61	309.50	324.41
378.20	H	34.40	29.39	-11.60	-16.61	46.00	22.72	1.66	129.00	238.86
451.30	H	39.45	37.20	-6.55	-8.80	46.00	22.40	1.79	244.00	209.55
854.60	H	45.53	42.98	-0.47	-3.02	46.00	27.04	2.57	219.75	184.71

1

Title: Pre-Scan - FCC Class B
File: 2 - Pre-Scan - Battery - Rx Mode - Z-Axis - FCC Class B - G5 Configuration - Essentials - 08-22-2022.set
Operator: Kyle Fujimoto
EUT Type: 900 MHz Sensor
EUT Condition: The EUT is Continuously Receiving at the Low Channel - G5 Configuration
Company: Mesa Laboratories, Inc.
Model: Essentials
P/N: DS-VP-ESS-900-S
Rx Mode
Z-Axis

8/22/2022 9:28:07 AM
Sequence: Preliminary Scan



Title: Radiated Final - FCC Class B
File: 2 - Final Scan - Battery - Rx Mode - Z-Axis - FCC Class B - G5 Configuration - Essentials - 08-22-2022.set
Operator: Kyle Fujimoto
EUT Type: 900 MHz Sensor
EUT Condition: The EUT is Continuously Receiving at the Low Channel - G5 Configuration
Company: Mesa Laboratories, Inc.
Model: Essentials
P/N: DS-VP-ESS-900-S
Rx Mode
Z-Axis

8/22/2022 9:37:38 AM
Sequence: Final Measurements

FCC Class B

Freq (MHz)	Pol	(PEAK) EMI (dBµV/m)	(QP) EMI (dBµV/m)	(PEAK) Margin (dB)	(QP) Margin (dB)	Limit (dBµV/m)	Transducer (dB)	Cable (dB)	Ttbl Agl (deg)	Twr Ht (cm)
99.00	H	29.72	21.72	-13.78	-21.78	43.50	15.30	0.79	220.75	270.68
161.30	V	29.18	24.09	-14.32	-19.41	43.50	20.60	1.07	333.00	289.13
163.10	H	31.15	25.73	-12.35	-17.77	43.50	22.24	1.07	50.50	303.76
781.50	H	37.48	32.44	-8.52	-13.56	46.00	26.10	2.46	96.25	111.22
843.60	H	38.63	33.43	-7.37	-12.57	46.00	27.30	2.57	28.25	257.01
853.60	H	38.88	33.13	-7.12	-12.87	46.00	27.07	2.57	230.50	239.10

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Low Channel - X-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1805.24								**Tested via Conducted**
2707.86	44.24	V	73.97	-29.73	Peak	84.25	127.46	
2707.86	24.24	V	53.97	-29.73	Avg	84.25	127.46	
3610.48	38.72	V	73.97	-35.25	Peak	318.50	143.34	
3610.48	18.72	V	53.97	-35.25	Avg	318.50	143.34	
4513.10	47.48	V	73.97	-26.49	Peak	216.00	175.10	
4513.10	27.48	V	53.97	-26.49	Avg	216.00	175.10	
5415.72	47.80	V	73.97	-26.17	Peak	210.75	111.40	
5415.72	27.80	V	53.97	-26.17	Avg	210.75	111.40	
6318.34								**Not in Restricted Band**
6318.34								**Tested via Conducted**
7220.96								**Not in Restricted Band**
7220.96								**Tested via Conducted**
8123.58	45.84	V	73.97	-28.13	Peak	133.25	175.22	
8123.58	25.84	V	53.97	-28.13	Avg	133.25	175.22	
9026.20	44.98	V	73.97	-28.99	Peak	200.50	238.62	
9026.20	24.98	V	53.97	-28.99	Avg	200.50	238.62	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Low Channel - Y-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								Not in Restricted Band
1805.24								Tested via Conducted
2707.86	49.22	V	73.97	-24.75	Peak	344.25	111.34	
2707.86	29.22	V	53.97	-24.75	Avg	344.25	111.34	
3610.48	39.52	V	73.97	-34.45	Peak	181.00	143.34	
3610.48	19.52	V	53.97	-34.45	Avg	181.00	143.34	
4513.10	44.81	V	73.97	-29.16	Peak	179.75	111.52	
4513.10	24.81	V	53.97	-29.16	Avg	179.75	111.52	
5415.72	46.40	V	73.97	-27.57	Peak	95.75	111.46	
5415.72	26.40	V	53.97	-27.57	Avg	95.75	111.46	
6318.34								No Emission
6318.34								Detected
7220.96								No Emission
7220.96								Detected
8123.58	43.31	V	73.97	-30.66	Peak	222.75	111.40	
8123.58	23.31	V	53.97	-30.66	Avg	222.75	111.40	
9026.20	44.95	V	73.97	-29.02	Peak	87.50	111.46	
9026.20	24.95	V	53.97	-29.02	Avg	87.50	111.46	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Low Channel - Z-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								Not in Restricted Band
1805.24								Tested via Conducted
2707.86	46.60	V	73.97	-27.37	Peak	349.50	111.46	
2707.86	26.60	V	53.97	-27.37	Avg	349.50	111.46	
3610.48	38.57	V	73.97	-35.40	Peak	142.75	111.46	
3610.48	18.57	V	53.97	-35.40	Avg	142.75	111.46	
4513.10	49.79	V	73.97	-24.18	Peak	151.00	143.40	
4513.10	29.79	V	53.97	-24.18	Avg	151.00	143.40	
5415.72	49.13	V	73.97	-24.84	Peak	163.75	143.22	
5415.72	29.13	V	53.97	-24.84	Avg	163.75	143.22	
6318.34								Not in Restricted Band
6318.34								Tested via Conducted
7220.96								Not in Restricted Band
7220.96								Tested via Conducted
8123.58	45.34	V	73.97	-28.63	Peak	127.00	207.10	
8123.58	25.34	V	53.97	-28.63	Avg	127.00	207.10	
9026.20	44.63	V	73.97	-29.34	Peak	130.25	190.98	
9026.20	24.63	V	53.97	-29.34	Avg	130.25	190.98	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Low Channel - X-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								Not in Restricted Band
1805.24								Tested via Conducted
2707.86	50.23	H	73.97	-23.74	Peak	190.50	111.34	
2707.86	30.23	H	53.97	-23.74	Avg	190.50	111.34	
3610.48	40.28	H	73.97	-33.69	Peak	340.00	143.34	
3610.48	20.28	H	53.97	-33.69	Avg	340.00	143.34	
4513.10	46.16	H	73.97	-27.81	Peak	327.75	190.98	
4513.10	26.16	H	53.97	-27.81	Avg	327.75	190.98	
5415.72	47.63	H	73.97	-26.34	Peak	151.75	143.40	
5415.72	27.63	H	53.97	-26.34	Avg	151.75	143.40	
6318.34								Not in Restricted Band
6318.34								Tested via Conducted
7220.96								Not in Restricted Band
7220.96								Tested via Conducted
8123.58	43.02	H	73.97	-30.95	Peak	172.25	111.34	
8123.58	23.02	H	53.97	-30.95	Avg	172.25	111.34	
9026.20	43.78	H	73.97	-30.19	Peak	172.25	238.80	
9026.20	23.78	H	53.97	-30.19	Avg	172.25	238.80	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Low Channel - Y-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								Not in Restricted Band
1805.24								Tested via Conducted
2707.86	49.02	H	73.97	-24.95	Peak	245.75	127.16	
2707.86	29.02	H	53.97	-24.95	Avg	245.75	127.16	
3610.48	40.29	H	73.97	-33.68	Peak	294.25	127.46	
3610.48	20.29	H	53.97	-33.68	Avg	294.25	127.46	
4513.10	49.44	H	73.97	-24.53	Peak	181.25	111.22	
4513.10	29.44	H	53.97	-24.53	Avg	181.25	111.22	
5415.72	50.66	H	73.97	-23.31	Peak	141.00	159.16	
5415.72	30.66	H	53.97	-23.31	Avg	141.00	159.16	
6318.34								Not in Restricted Band
6318.34								Tested via Conducted
7220.96								Not in Restricted Band
7220.96								Tested via Conducted
8123.58	45.54	H	73.97	-28.43	Peak	93.50	174.98	
8123.58	25.54	H	53.97	-28.43	Avg	93.50	174.98	
9026.20	43.90	H	73.97	-30.07	Peak	137.50	127.22	
9026.20	23.90	H	53.97	-30.07	Avg	137.50	127.22	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Low Channel - Z-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								Not in Restricted Band
1805.24								Tested via Conducted
2707.86	51.91	H	73.97	-22.06	Peak	135.00	111.40	
2707.86	31.91	H	53.97	-22.06	Avg	135.00	111.40	
3610.48	39.99	H	73.97	-33.98	Peak	155.75	143.40	
3610.48	19.99	H	53.97	-33.98	Avg	155.75	143.40	
4513.10	45.11	H	73.97	-28.86	Peak	134.50	111.46	
4513.10	25.11	H	53.97	-28.86	Avg	134.50	111.46	
5415.72	47.37	H	73.97	-26.60	Peak	58.50	127.28	
5415.72	27.37	H	53.97	-26.60	Avg	58.50	127.28	
6318.34								Not in Restricted Band
6318.34								Tested via Conducted
7220.96								Not in Restricted Band
7220.96								Tested via Conducted
8123.58	46.52	H	73.97	-27.45	Peak	148.50	175.04	
8123.58	26.52	H	53.97	-27.45	Avg	148.50	175.04	
9026.20	43.97	H	73.97	-30.00	Peak	194.25	143.28	
9026.20	23.97	H	53.97	-30.00	Avg	194.25	143.28	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Middle Channel - X-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1830.24								**Tested via Conducted**
2745.36	46.43	V	73.97	-27.54	Peak	141.50	143.22	
2745.36	26.43	V	53.97	-27.54	Avg	141.50	143.22	
3660.48	38.19	V	73.97	-35.78	Peak	218.00	143.34	
3660.48	18.19	V	53.97	-35.78	Avg	218.00	143.34	
4575.60	46.79	V	73.97	-27.18	Peak	228.25	111.46	
4575.60	26.79	V	53.97	-27.18	Avg	228.25	111.46	
5490.72								**Not in Restricted Band**
5490.72								**Tested via Conducted**
6405.84								**Not in Restricted Band**
6405.84								**Tested via Conducted**
7320.96	44.27	V	73.97	-29.70	Peak	337.00	175.22	
7320.96	24.27	V	53.97	-29.70	Avg	337.00	175.22	
8236.08	43.85	V	73.97	-30.12	Peak	143.00	174.92	
8236.08	23.85	V	53.97	-30.12	Avg	143.00	174.92	
9151.20	44.23	V	73.97	-29.74	Peak	324.00	222.86	
9151.20	24.23	V	53.97	-29.74	Avg	324.00	222.86	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Middle Channel - Y-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1830.24								**Tested via Conducted**
2745.36	47.47	V	73.97	-26.50	Peak	157.25	111.28	
2745.36	27.47	V	53.97	-26.50	Avg	157.25	111.28	
3660.48	37.92	V	73.97	-36.05	Peak	37.00	127.40	
3660.48	17.92	V	53.97	-36.05	Avg	37.00	127.40	
4575.60	44.44	V	73.97	-29.53	Peak	359.75	127.28	
4575.60	24.44	V	53.97	-29.53	Avg	359.75	127.28	
5490.72								**Not in Restricted Band**
5490.72								**Tested via Conducted**
6405.84								**Not in Restricted Band**
6405.84								**Tested via Conducted**
7320.96	44.82	V	73.97	-29.15	Peak	0.25	127.34	
7320.96	24.82	V	53.97	-29.15	Avg	0.25	127.34	
8236.08	44.55	V	73.97	-29.42	Peak	356.75	111.34	
8236.08	24.55	V	53.97	-29.42	Avg	356.75	111.34	
9151.20	43.91	V	73.97	-30.06	Peak	176.75	159.16	
9151.20	23.91	V	53.97	-30.06	Avg	176.75	159.16	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Middle Channel - Z-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1830.24								**Tested via Conducted**
2745.36	46.46	V	73.97	-27.51	Peak	91.50	159.28	
2745.36	26.46	V	53.97	-27.51	Avg	91.50	159.28	
3660.48	38.57	V	73.97	-35.40	Peak	114.25	249.92	
3660.48	18.57	V	53.97	-35.40	Avg	114.25	249.92	
4575.60	47.36	V	73.97	-26.61	Peak	328.25	111.34	
4575.60	27.36	V	53.97	-26.61	Avg	328.25	111.34	
5490.72								**Not in Restricted Band**
5490.72								**Tested via Conducted**
6405.84								**Not in Restricted Band**
6405.84								**Tested via Conducted**
7320.96	44.36	V	73.97	-29.61	Peak	68.25	191.16	
7320.96	24.36	V	53.97	-29.61	Avg	68.25	191.16	
8236.08	32.80	V	73.97	-41.17	Peak	0.25	238.86	
8236.08	12.80	V	53.97	-41.17	Avg	0.25	238.86	
9151.20	32.75	V	73.97	-41.22	Peak	300.50	249.97	
9151.20	12.75	V	53.97	-41.22	Avg	300.50	249.97	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Middle Channel - X-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1830.24								**Tested via Conducted**
2745.36	49.29	H	73.97	-24.68	Peak	182.00	111.28	
2745.36	29.29	H	53.97	-24.68	Avg	182.00	111.28	
3660.48	37.90	H	73.97	-36.07	Peak	295.25	159.34	
3660.48	17.90	H	53.97	-36.07	Avg	295.25	159.34	
4575.60	45.40	H	73.97	-28.57	Peak	311.50	111.28	
4575.60	25.40	H	53.97	-28.57	Avg	311.50	111.28	
5490.72								**Not in Restricted Band**
5490.72								**Tested via Conducted**
6405.84								**Not in Restricted Band**
6405.84								**Tested via Conducted**
7320.96	45.41	H	73.97	-28.56	Peak	290.75	111.46	
7320.96	25.41	H	53.97	-28.56	Avg	290.75	111.46	
8236.08	45.07	H	73.97	-28.90	Peak	30.50	111.52	
8236.08	25.07	H	53.97	-28.90	Avg	30.50	111.52	
9151.20	43.78	H	73.97	-30.19	Peak	198.25	175.04	
9151.20	23.78	H	53.97	-30.19	Avg	198.25	175.04	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Middle Channel - Y-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1830.24								**Tested via Conducted**
2745.36	47.99	H	73.97	-25.98	Peak	143.00	143.28	
2745.36	27.99	H	53.97	-25.98	Avg	143.00	143.28	
3660.48	36.04	H	73.97	-37.93	Peak	310.25	126.80	
3660.48	16.04	H	53.97	-37.93	Avg	310.25	126.80	
4575.60	49.93	H	73.97	-24.04	Peak	8.00	105.97	
4575.60	29.93	H	53.97	-24.04	Avg	8.00	105.97	
5490.72								**Not in Restricted Band**
5490.72								**Tested via Conducted**
6405.84								**Not in Restricted Band**
6405.84								**Tested via Conducted**
7320.96	41.94	H	73.97	-32.03	Peak	36.00	207.10	
7320.96	21.94	H	53.97	-32.03	Avg	36.00	207.10	
8236.08	44.09	H	73.97	-29.88	Peak	268.75	191.22	
8236.08	24.09	H	53.97	-29.88	Avg	268.75	191.22	
9151.20	43.93	H	73.97	-30.04	Peak	4.00	111.22	
9151.20	23.93	H	53.97	-30.04	Avg	4.00	111.22	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Middle Channel - Z-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1830.24								**Tested via Conducted**
2745.36	49.60	H	73.97	-24.37	Peak	303.00	127.16	
2745.36	29.60	H	53.97	-24.37	Avg	303.00	127.16	
3660.48	38.18	H	73.97	-35.79	Peak	162.50	206.98	
3660.48	18.18	H	53.97	-35.79	Avg	162.50	206.98	
4575.60	45.73	H	73.97	-28.24	Peak	314.00	111.34	
4575.60	25.73	H	53.97	-28.24	Avg	314.00	111.34	
5490.72								**Not in Restricted Band**
5490.72								**Tested via Conducted**
6405.84								**Not in Restricted Band**
6405.84								**Tested via Conducted**
7320.96	44.85	H	73.97	-29.12	Peak	108.00	111.46	
7320.96	24.85	H	53.97	-29.12	Avg	108.00	111.46	
8236.08	45.27	H	73.97	-28.70	Peak	220.75	143.58	
8236.08	25.27	H	53.97	-28.70	Avg	220.75	143.58	
9151.20	43.78	H	73.97	-30.19	Peak	248.00	143.28	
9151.20	23.78	H	53.97	-30.19	Avg	248.00	143.28	

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
High Channel - X-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1855.24								**Tested via Conducted**
2782.86	44.48	V	73.97	-29.49	Peak	17.25	111.64	
2782.86	24.48	V	53.97	-29.49	Avg	17.25	111.64	
3710.48	41.89	V	73.97	-32.08	Peak	298.75	111.28	
3710.48	21.89	V	53.97	-32.08	Avg	298.75	111.28	
4638.10	49.83	V	73.97	-24.14	Peak	223.50	127.40	
4638.10	29.83	V	53.97	-24.14	Avg	223.50	127.40	
5565.72								**Not in Restricted Band**
5565.72								**Tested via Conducted**
6493.34								**Not in Restricted Band**
6493.34								**Tested via Conducted**
7420.96	44.55	V	73.97	-29.42	Peak	297.75	111.52	
7420.96	24.55	V	53.97	-29.42	Avg	297.75	111.52	
8348.58	44.30	V	73.97	-29.67	Peak	66.00	207.16	
8348.58	24.30	V	53.97	-29.67	Avg	66.00	207.16	
9276.20								**Not in Restricted Band**
9276.20								**Tested via Conducted**

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
High Channel - Y-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1855.24								**Tested via Conducted**
2782.86	47.71	V	73.97	-26.26	Peak	206.75	143.34	
2782.86	27.71	V	53.97	-26.26	Avg	206.75	143.34	
3710.48	40.48	V	73.97	-33.49	Peak	206.25	111.46	
3710.48	20.48	V	53.97	-33.49	Avg	206.25	111.46	
4638.10	47.19	V	73.97	-26.78	Peak	185.75	111.52	
4638.10	27.19	V	53.97	-26.78	Avg	185.75	111.52	
5565.72								**Not in Restricted Band**
5565.72								**Tested via Conducted**
6493.34								**Not in Restricted Band**
6493.34								**Tested via Conducted**
7420.96	46.94	V	73.97	-27.03	Peak	121.25	175.16	
7420.96	26.94	V	53.97	-27.03	Avg	121.25	175.16	
8348.58	45.78	V	73.97	-28.19	Peak	225.75	111.40	
8348.58	25.78	V	53.97	-28.19	Avg	225.75	111.40	
9276.20								**Not in Restricted Band**
9276.20								**Tested via Conducted**

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
High Channel - Z-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1855.24								**Tested via Conducted**
2782.86	43.95	V	73.97	-30.02	Peak	175.25	126.74	
2782.86	23.95	V	53.97	-30.02	Avg	175.25	126.74	
3710.48	41.81	V	73.97	-32.16	Peak	117.75	140.35	
3710.48	21.81	V	53.97	-32.16	Avg	117.75	140.35	
4638.10	49.59	V	73.97	-24.38	Peak	152.75	111.58	
4638.10	29.59	V	53.97	-24.38	Avg	152.75	111.58	
5565.72								**Not in Restricted Band**
5565.72								**Tested via Conducted**
6493.34								**Not in Restricted Band**
6493.34								**Tested via Conducted**
7420.96	44.66	V	73.97	-29.31	Peak	220.00	127.52	
7420.96	24.66	V	53.97	-29.31	Avg	220.00	127.52	
8348.58	45.66	V	73.97	-28.31	Peak	222.25	207.10	
8348.58	25.66	V	53.97	-28.31	Avg	222.25	207.10	
9276.20								**Not in Restricted Band**
9276.20								**Tested via Conducted**

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
High Channel - X-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1855.24								**Tested via Conducted**
2782.86	48.19	H	73.97	-25.78	Peak	164.50	143.22	
2782.86	28.19	H	53.97	-25.78	Avg	164.50	143.22	
3710.48	40.58	H	73.97	-33.39	Peak	178.00	143.10	
3710.48	20.58	H	53.97	-33.39	Avg	178.00	143.10	
4638.10	47.44	H	73.97	-26.53	Peak	132.75	127.28	
4638.10	27.44	H	53.97	-26.53	Avg	132.75	127.28	
5565.72								**Not in Restricted Band**
5565.72								**Tested via Conducted**
6493.34								**Not in Restricted Band**
6493.34								**Tested via Conducted**
7420.96	45.12	H	73.97	-28.85	Peak	65.00	111.46	
7420.96	25.12	H	53.97	-28.85	Avg	65.00	111.46	
8348.58	44.51	H	73.97	-29.46	Peak	359.50	127.46	
8348.58	24.51	H	53.97	-29.46	Avg	359.50	127.46	
9276.20								**Not in Restricted Band**
9276.20								**Tested via Conducted**

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
High Channel - Y-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1855.24								**Tested via Conducted**
2782.86	47.07	H	73.97	-26.90	Peak	196.00	127.46	
2782.86	27.07	H	53.97	-26.90	Avg	196.00	127.46	
3710.48	44.21	H	73.97	-29.76	Peak	188.00	143.40	
3710.48	24.21	H	53.97	-29.76	Avg	188.00	143.40	
4638.10	51.30	H	73.97	-22.67	Peak	191.75	127.58	
4638.10	31.30	H	53.97	-22.67	Avg	191.75	127.58	
5565.72								**Not in Restricted Band**
5565.72								**Tested via Conducted**
6493.34								**Not in Restricted Band**
6493.34								**Tested via Conducted**
7420.96	44.45	H	73.97	-29.52	Peak	337.50	127.46	
7420.96	24.45	H	53.97	-29.52	Avg	337.50	127.46	
8348.58	45.04	H	73.97	-28.93	Peak	288.75	143.34	
8348.58	25.04	H	53.97	-28.93	Avg	288.75	143.34	
9276.20								**Not in Restricted Band**
9276.20								**Tested via Conducted**

FCC 15.247
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
High Channel - Z-Axis
Transmit Mode
G5 Configuration

Date: 08/18/2022
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								**Not in Restricted Band**
1855.24								**Tested via Conducted**
2782.86	51.22	H	73.97	-22.75	Peak	93.50	143.28	
2782.86	31.22	H	53.97	-22.75	Avg	93.50	143.28	
3710.48	41.46	H	73.97	-32.51	Peak	199.75	111.46	
3710.48	21.46	H	53.97	-32.51	Avg	199.75	111.46	
4638.10	48.14	H	73.97	-25.83	Peak	125.00	111.46	
4638.10	28.14	H	53.97	-25.83	Avg	125.00	111.46	
5565.72								**Not in Restricted Band**
5565.72								**Tested via Conducted**
6493.34								**Not in Restricted Band**
6493.34								**Tested via Conducted**
7420.96	46.35	H	73.97	-27.62	Peak	50.00	159.10	
7420.96	26.35	H	53.97	-27.62	Avg	50.00	159.10	
8348.58	46.90	H	73.97	-27.07	Peak	96.75	159.10	
8348.58	26.90	H	53.97	-27.07	Avg	96.75	159.10	
9276.20								**Not in Restricted Band**
9276.20								**Tested via Conducted**

FCC 15.247 and FCC Class B
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S

Date: 08/18/2022
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
G5 Configuraiton

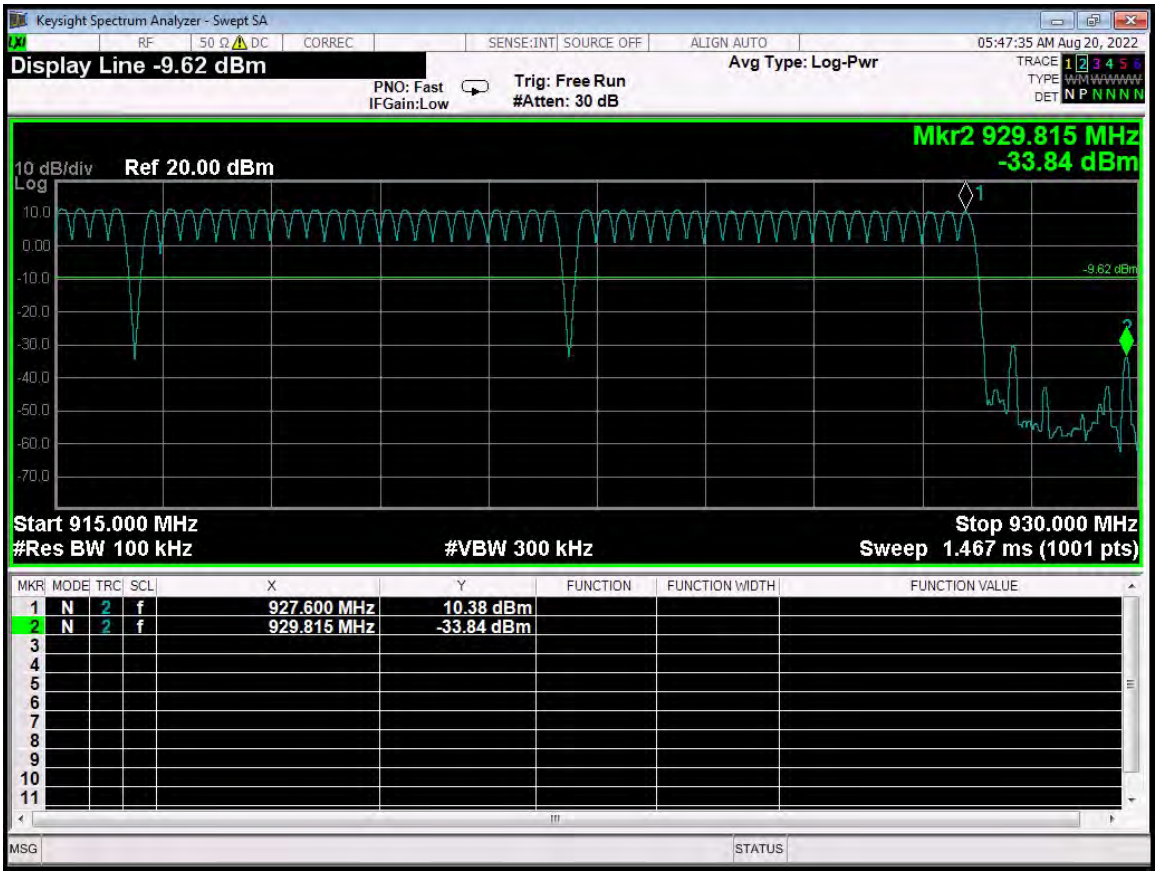
Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
								No Emissions Detected
								from the Non Harmonic Emissions
								from the Tx
								10 kHz to 30 MHz
								No Emissions Detected
								from the Non Harmonic Emissions
								from the Tx
								1 GHz to 9.3 GHz
								No Emissions Detected
								from the Digilal Portion
								of the EUT
								10 kHz to 30 MHz
								No Emissions Detected
								from the Digilal Portion
								of the EUT
								1 GHz to 9.3 GHz
								Tested in both Horizontal and
								Vertical Polaizations
								Tested in the X-Axis, Y-Axis,
								and Z-Axis

FCC Class B
Mesa Laboratories, Inc.
900 MHz Sensor
Model: Essentials
Part Number: DS-VP-ESS-900-S
Receiver Portion - 10 kHz to 30 MHz and 1 GHz to 9.3 GHz
G5 Configuration

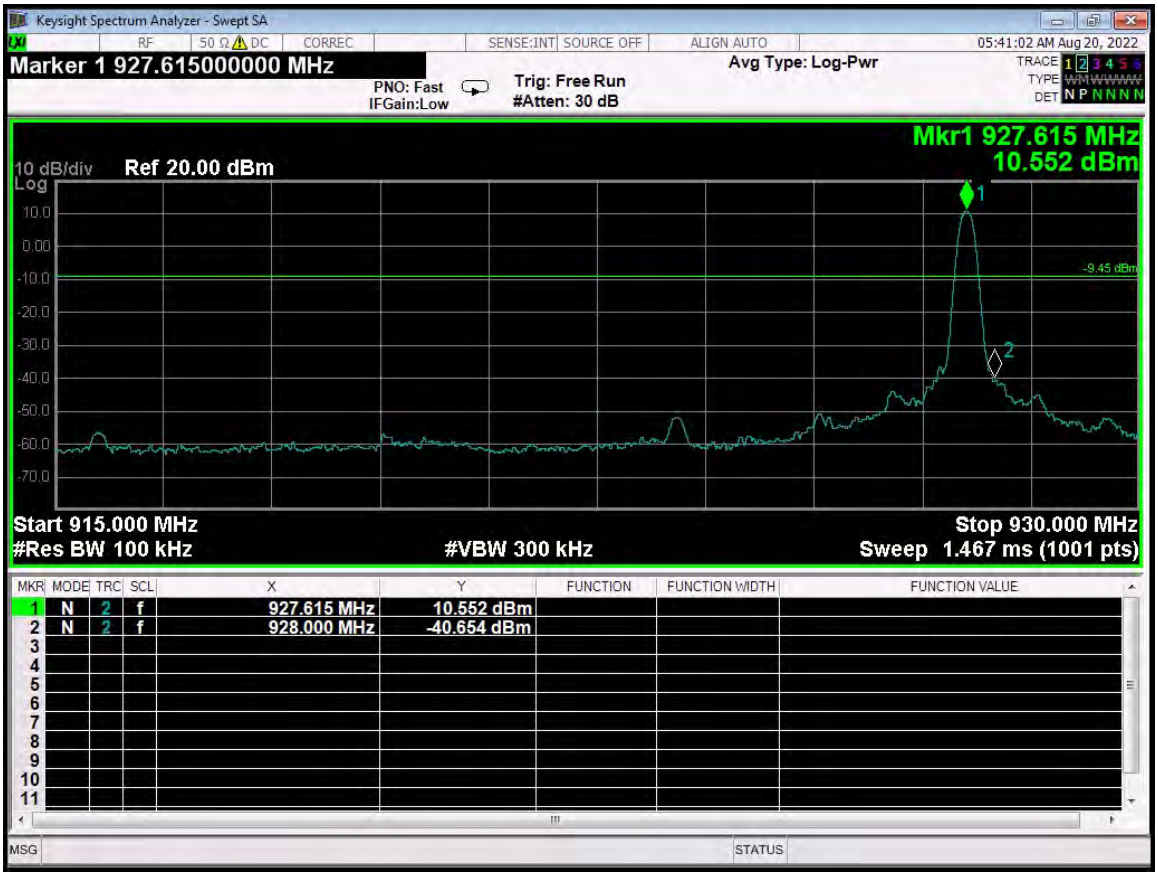
Date: 08/18/2022
Lab: D
Tested By: Kyle Fujimoto

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
								No Emissions Detected in Receiver Mode 10 kHz to 30 MHz
								No Emissions Detected in Receiver Mode 1 GHz to 9.3 GHz
								Tested in both Horizontal and Vertical Polaizations
								Tested in the X-Axis, Y-Axis, and Z-Axis

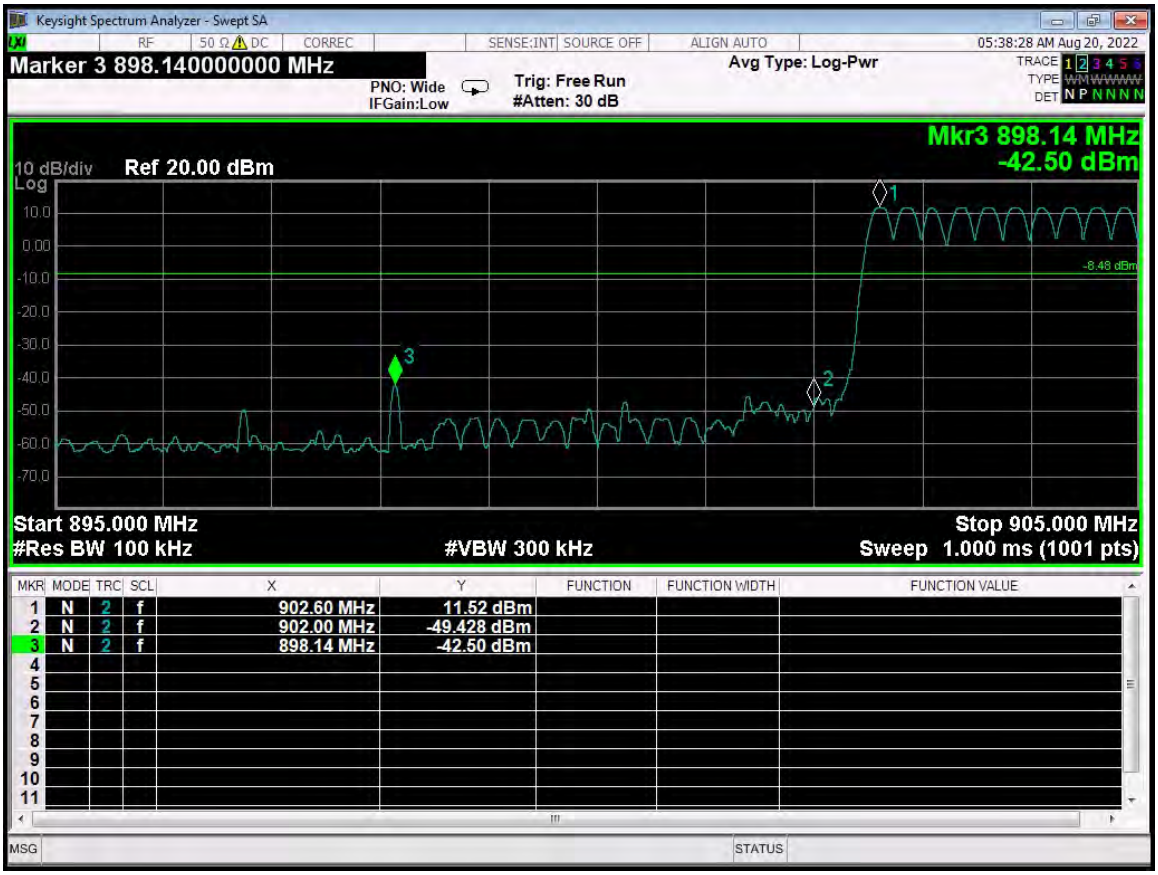
BAND EDGES DATA SHEETS



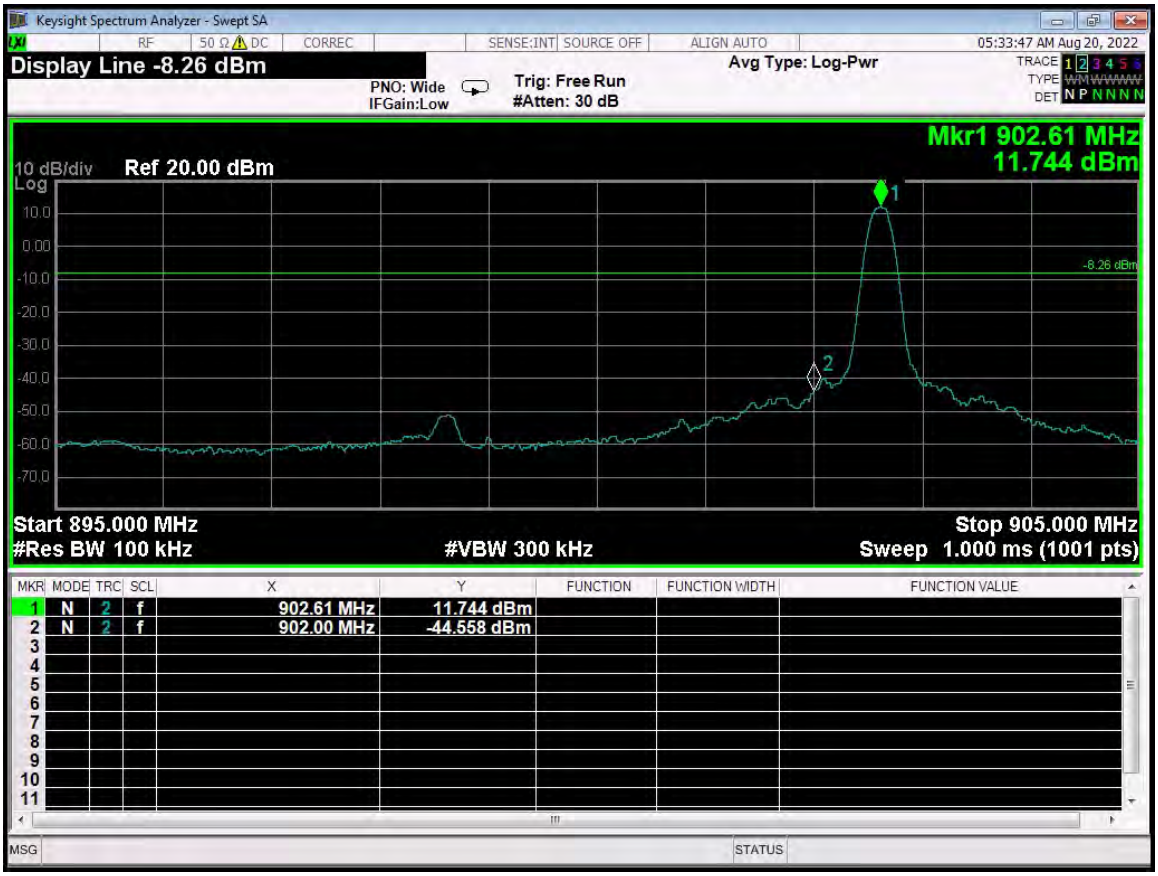
Band Edge – High Channel - G5 Compatibility Mode - Frequency Hopping



High Channel - G5 Compatibility Mode - Single Channel

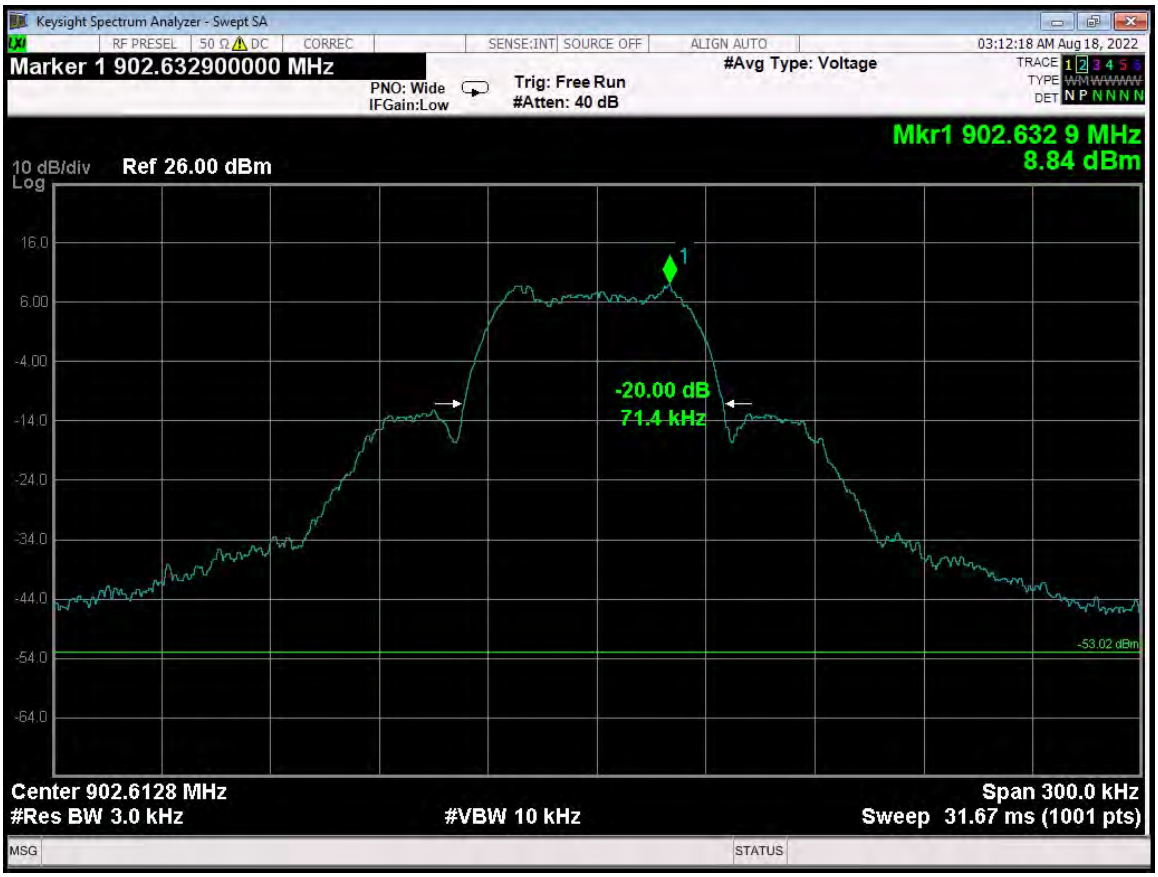


Band Edge – Low Channel - G5 Compatibility Mode - Frequency Hopping

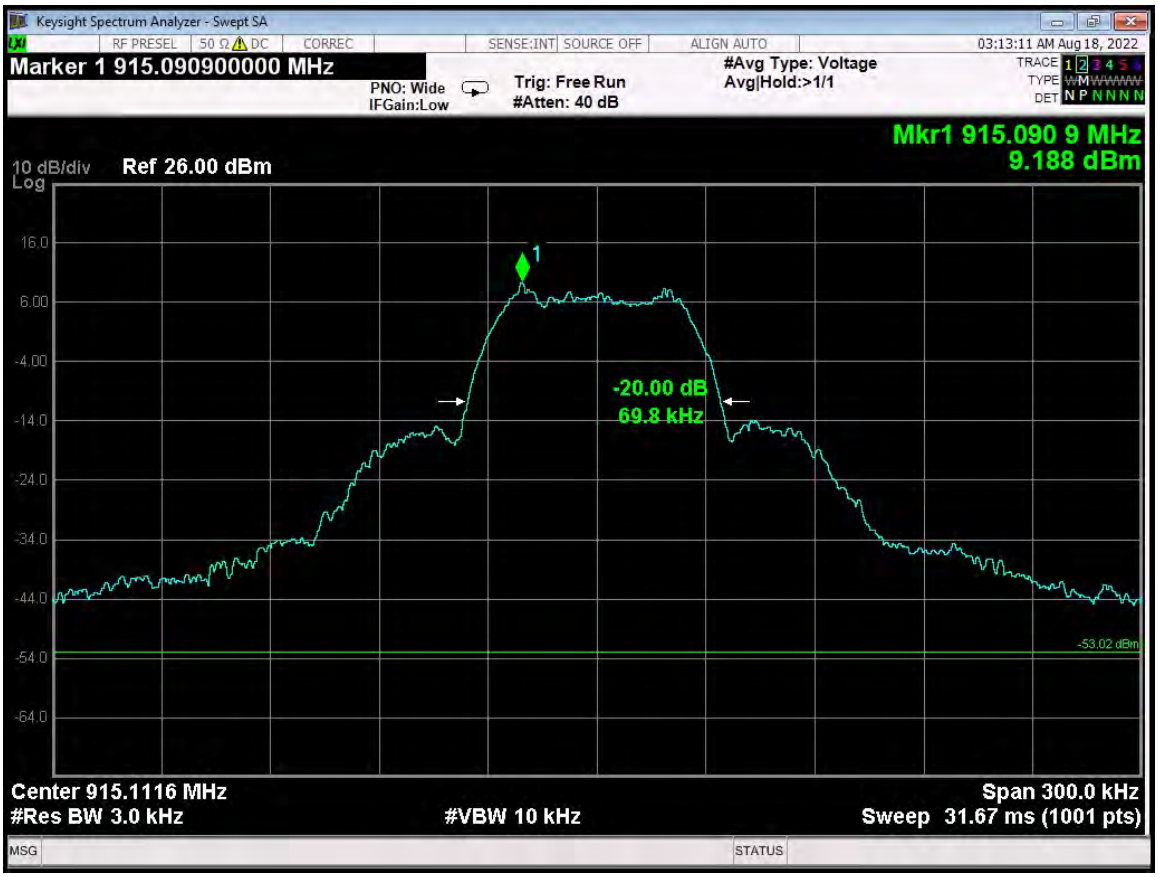


Band Edge – Low Channel - G5 Compatibility Mode - Single Channel

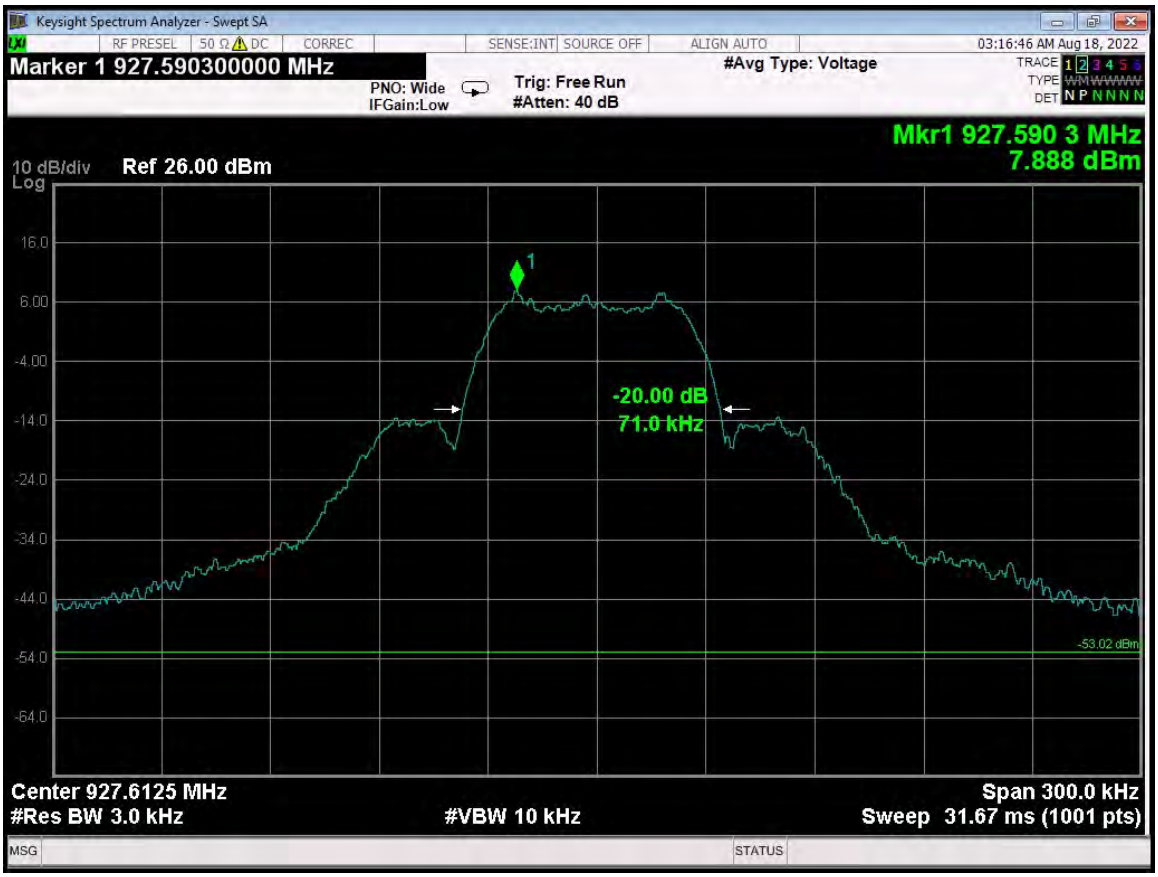
-20 dB BANDWIDTH DATA SHEETS



-20 dB Bandwidth - 902.61 MHz - G5 Compatibility Mode - 71.4 kHz

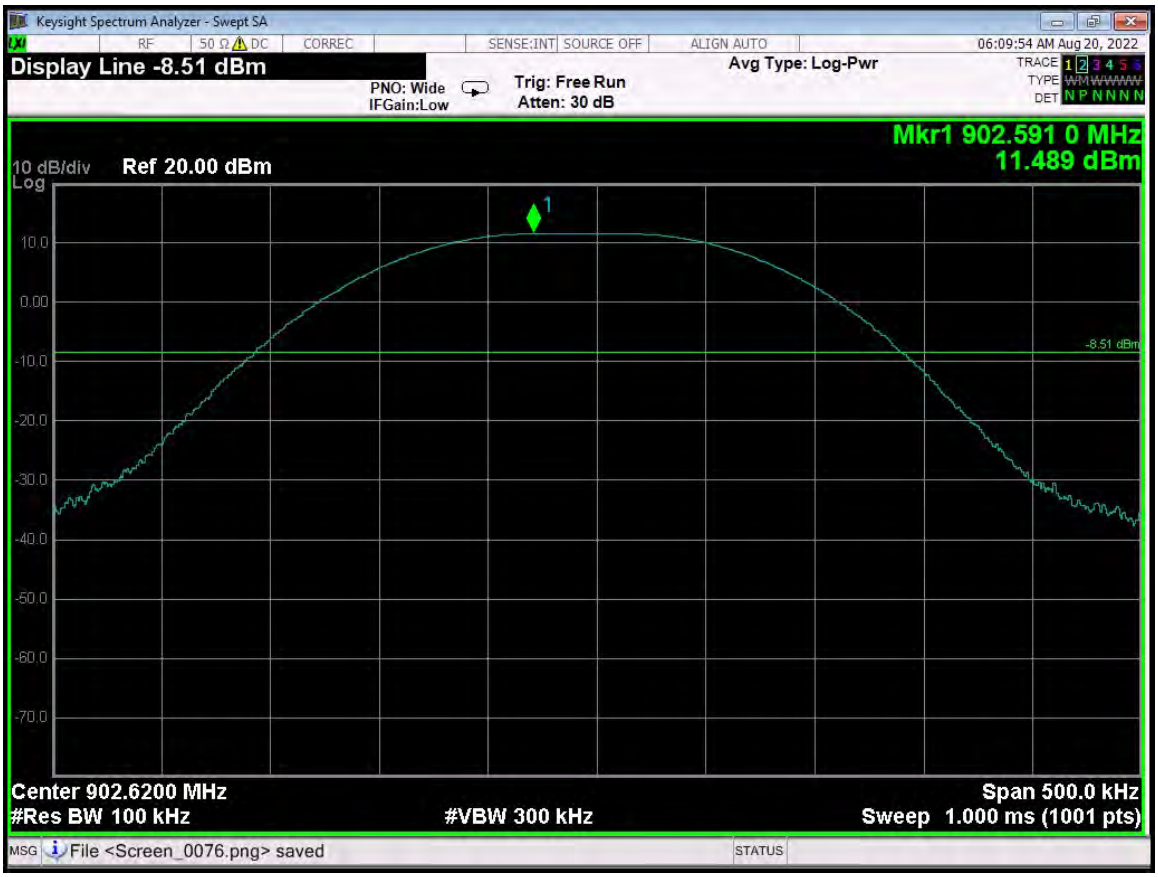


-20 dB Bandwidth - 915.11 MHz - G5 Compatibility Mode - 69.8 kHz

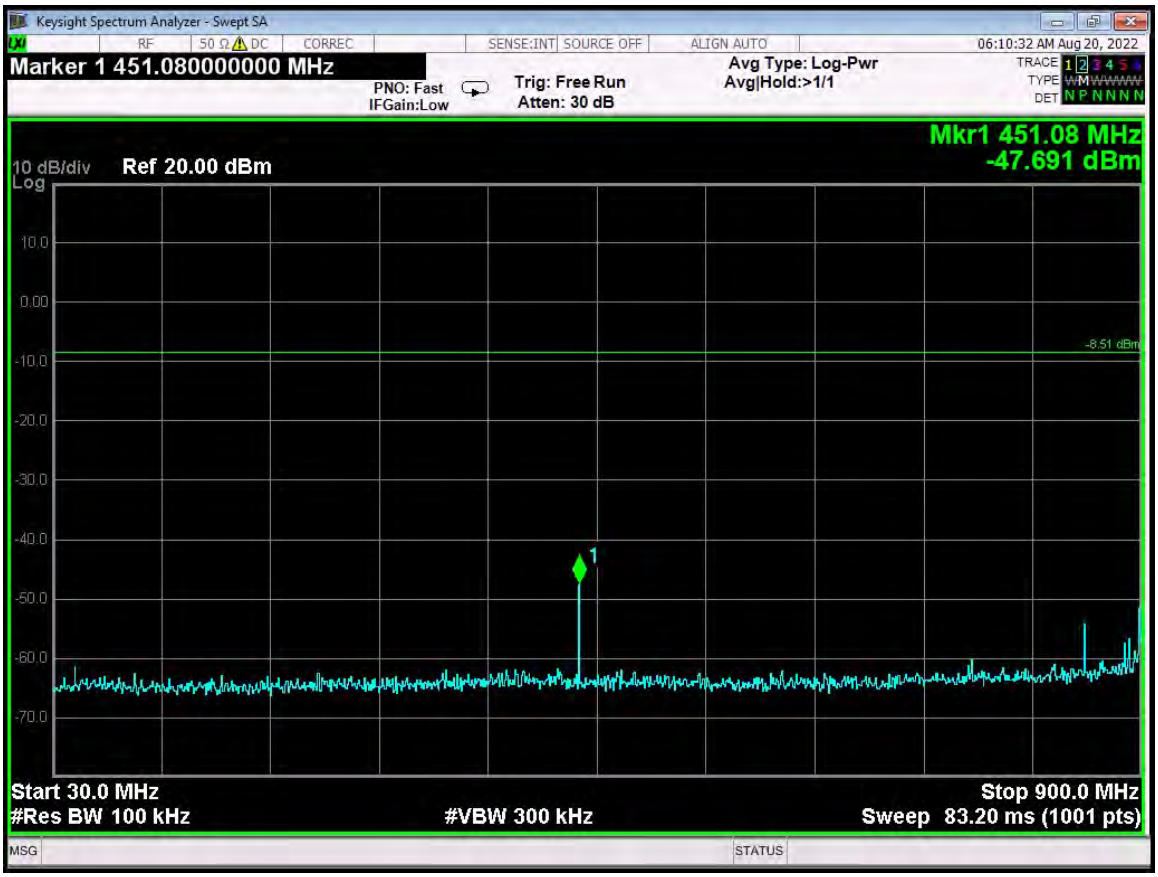


-20 dB Bandwidth - 927.61 MHz - G5 Compatibility Mode - 71.0 kHz

RF ANTENNA CONDUCTED DATA SHEETS

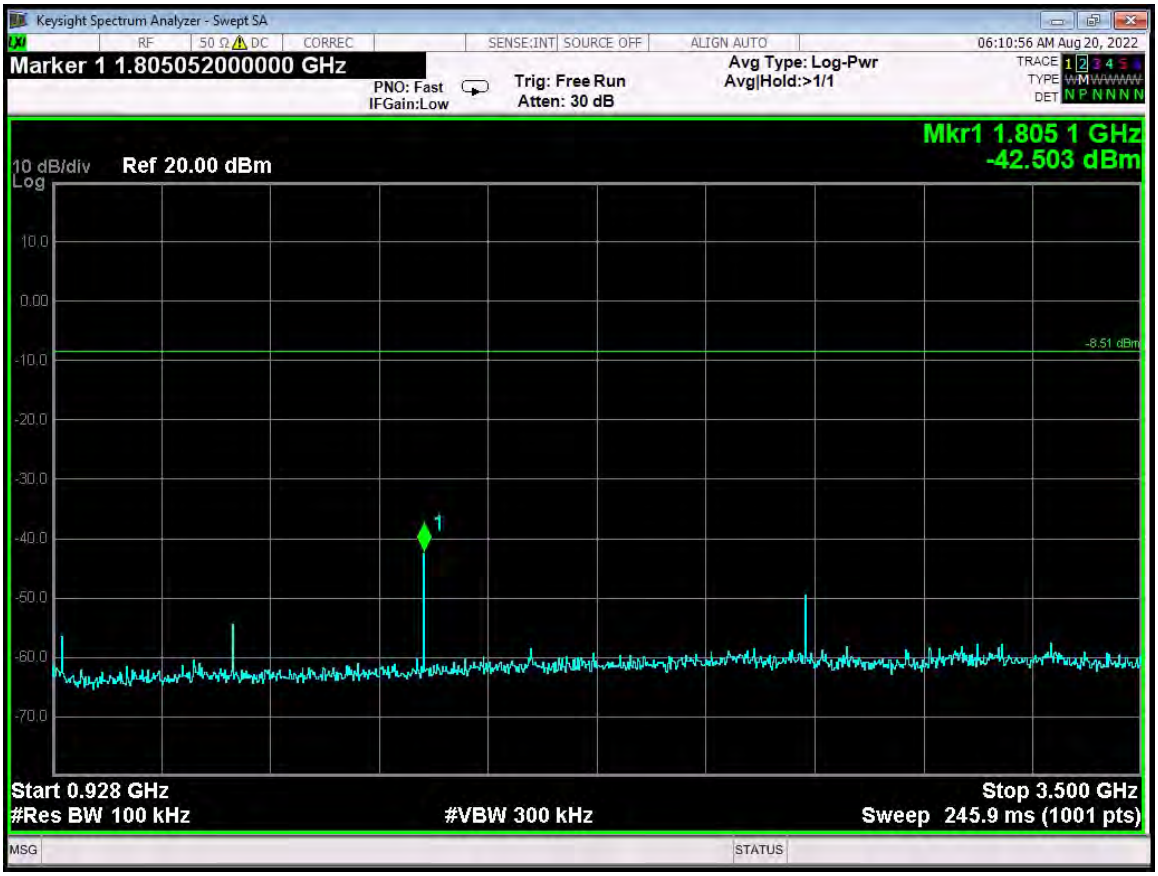


RF Antenna Conducted Low Channel - G5 Compatibility Mode - Reference Level

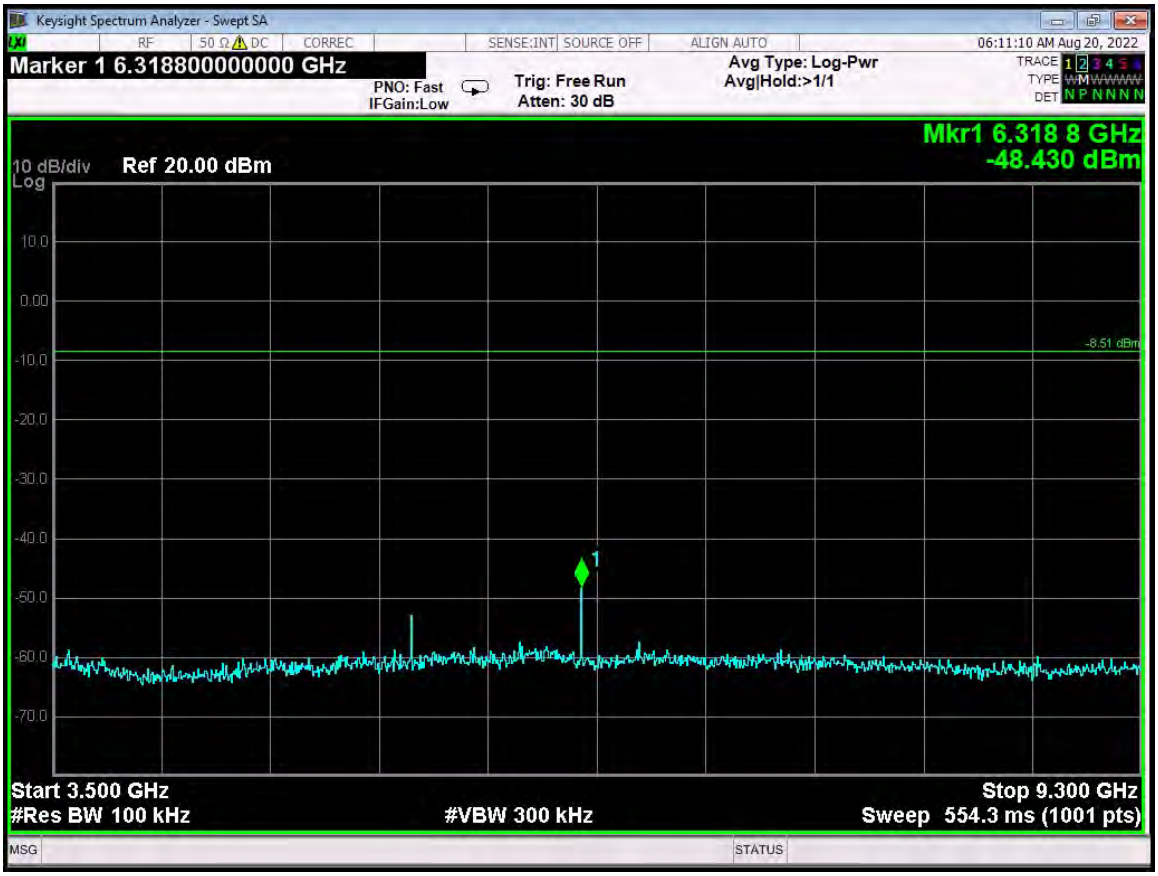


RF Antenna Conducted - Low Channel - G5 Compatibility Mode - 30 MHz to 900 MHz

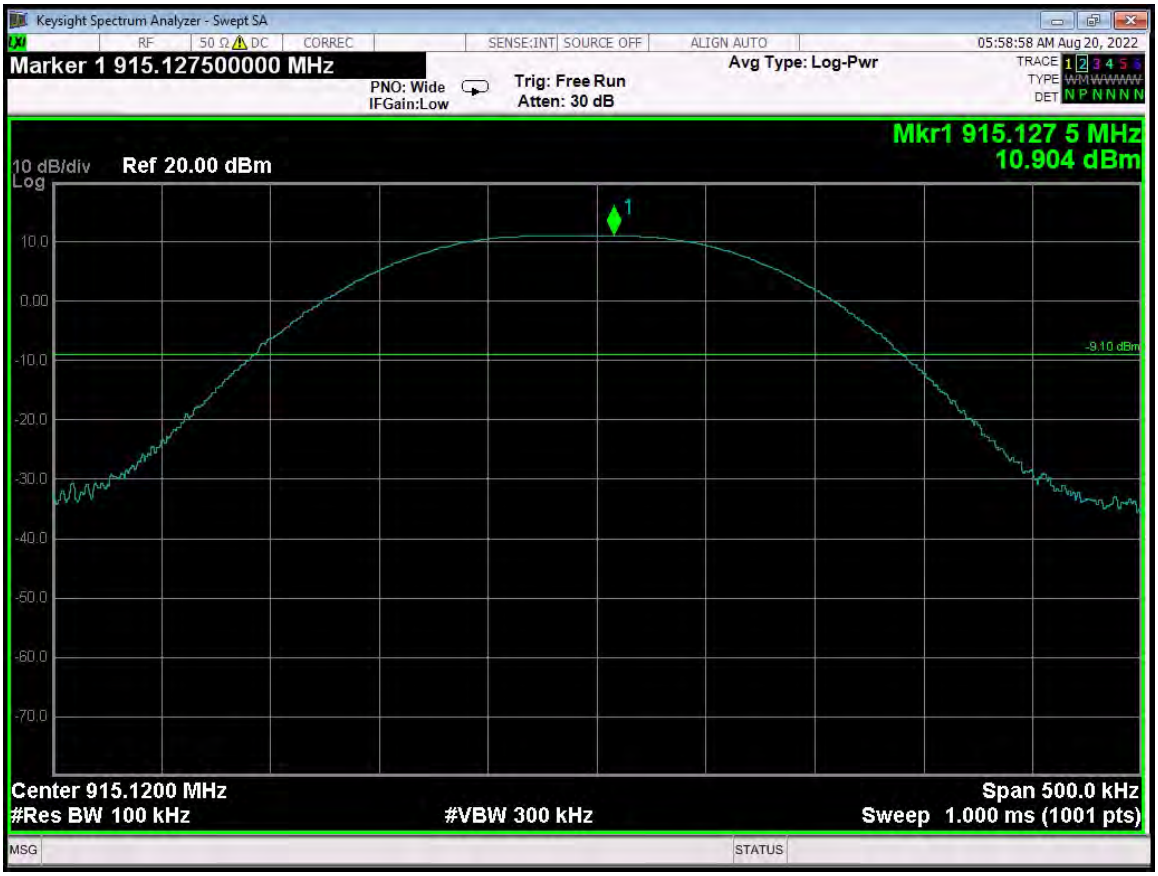
RF Antenna Conducted - Low Channel - G5 Compatibility Mode - 900 MHz to 902 MHz



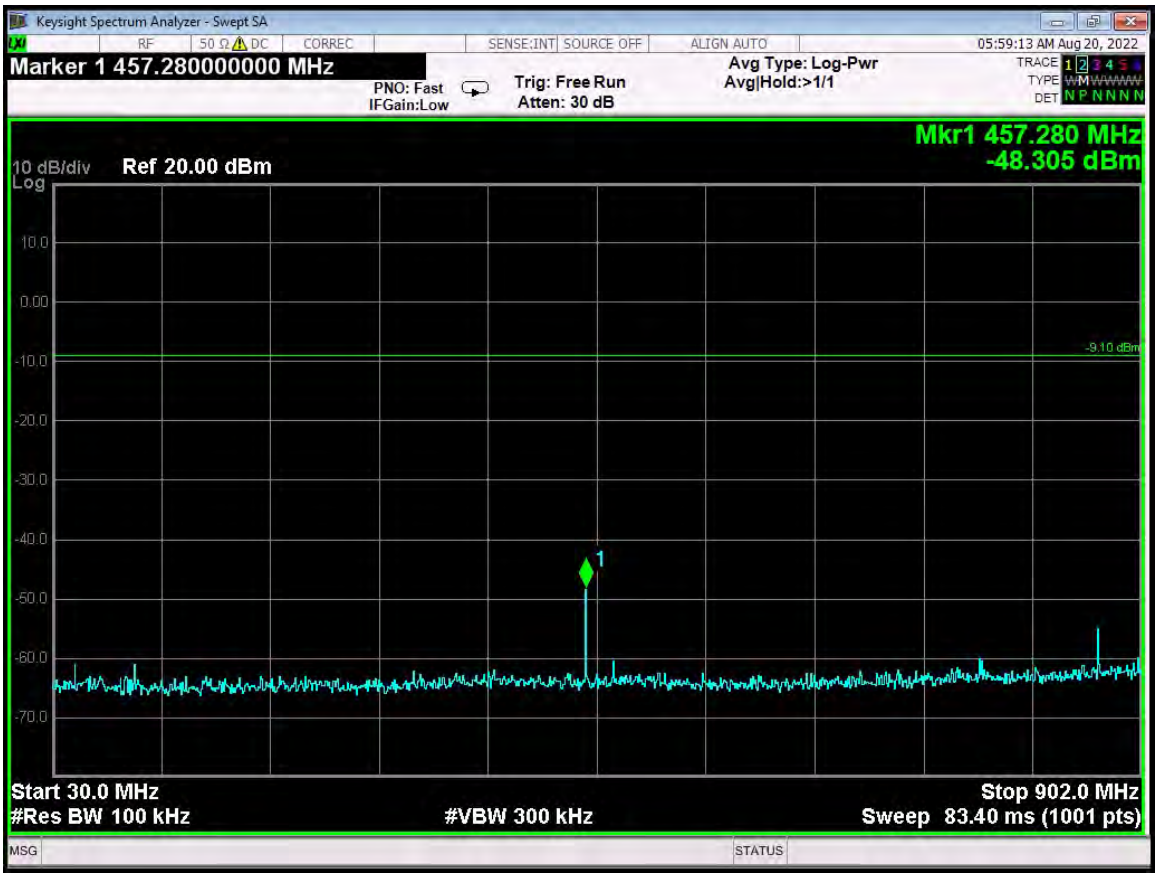
RF Antenna Conducted - Low Channel - G5 Compatibility Mode - 928 MHz to 3.5 GHz



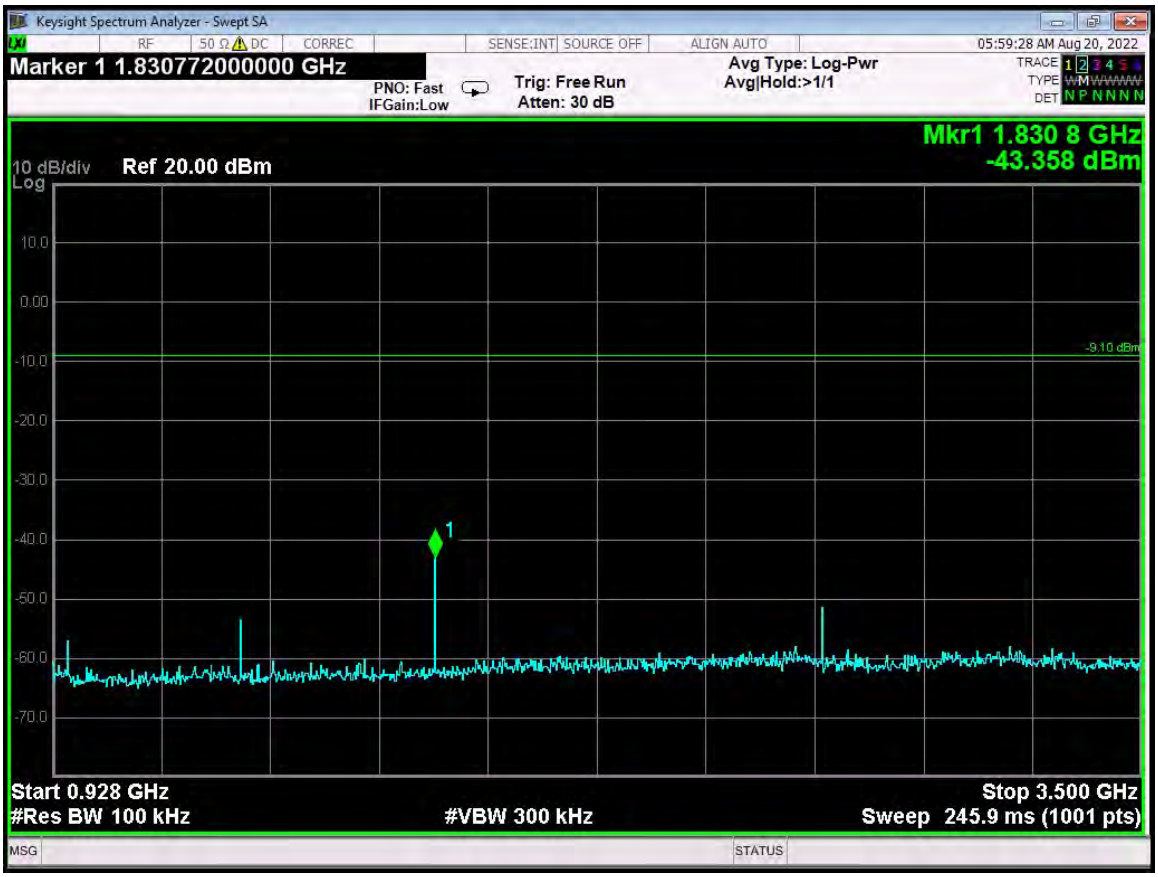
RF Antenna Conducted - Low Channel - G5 Compatibility Mode - 3.5 GHz to 9.3 GHz



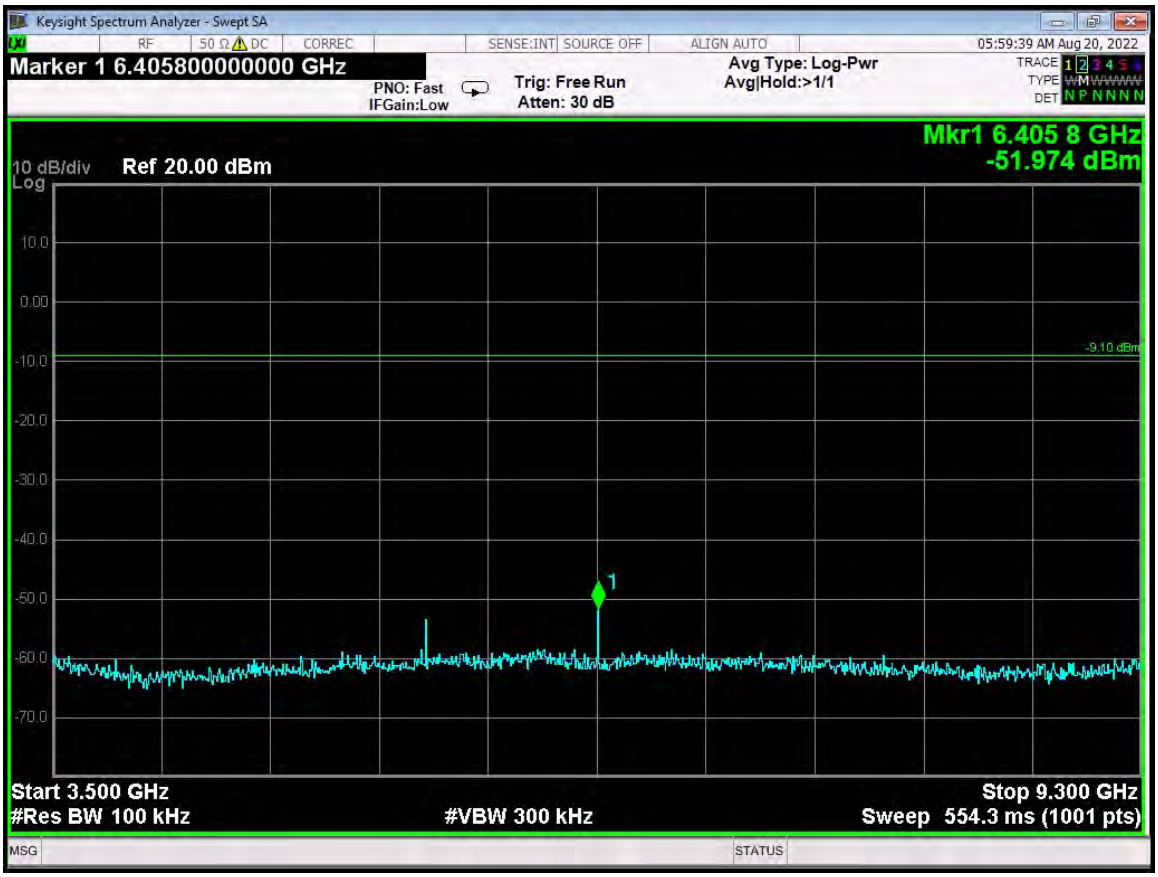
RF Antenna Conducted - Mid Channel - G5 Compatibility Mode - Reference Level



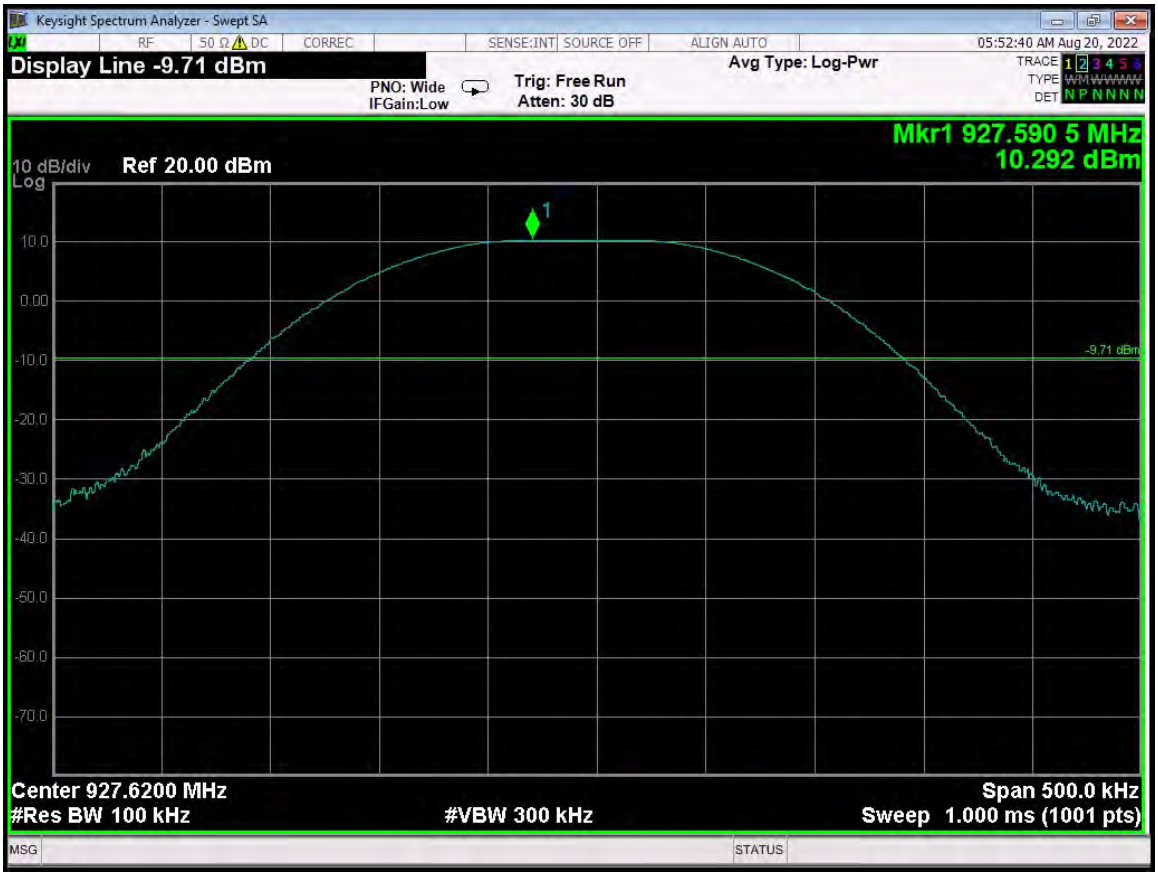
RF Antenna Conducted - Mid Channel - G5 Compatibility Mode - 30 MHz to 902 MHz



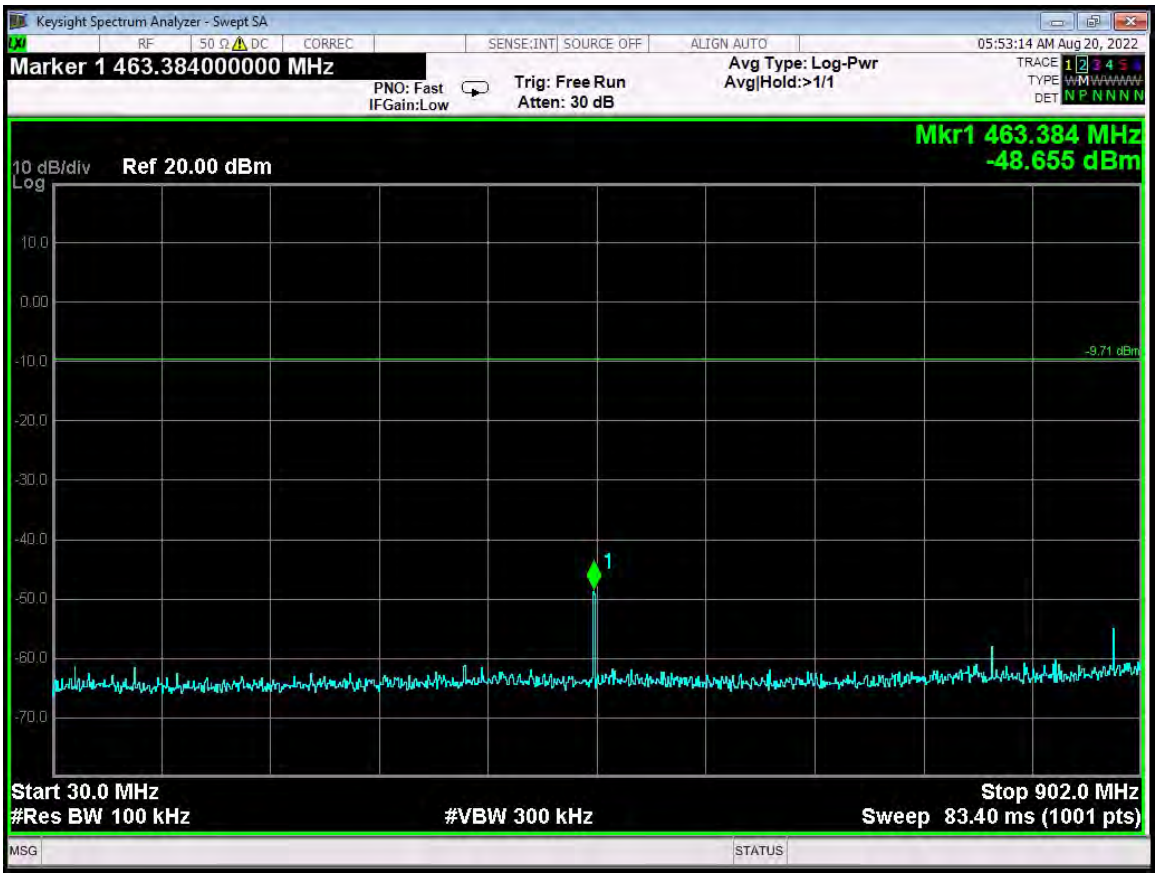
RF Antenna Conducted - Mid Channel - G5 Compatibility Mode - 928 MHz to 3.5 GHz



RF Antenna Conducted - Mid Channel - G5 Compatibility Mode - 3.5 GHz to 9.3 GHz

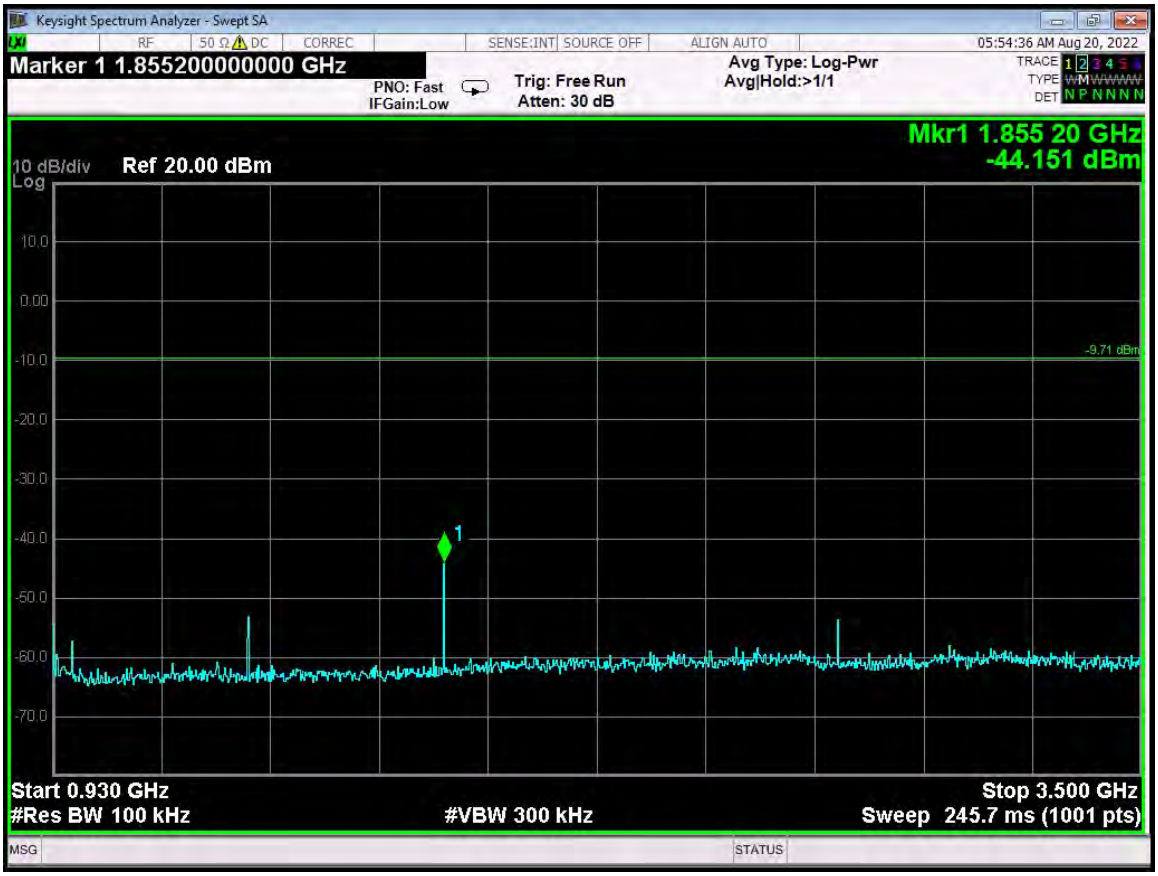


RF Antenna Conducted - High Channel - G5 Compatibility Mode - Reference Level

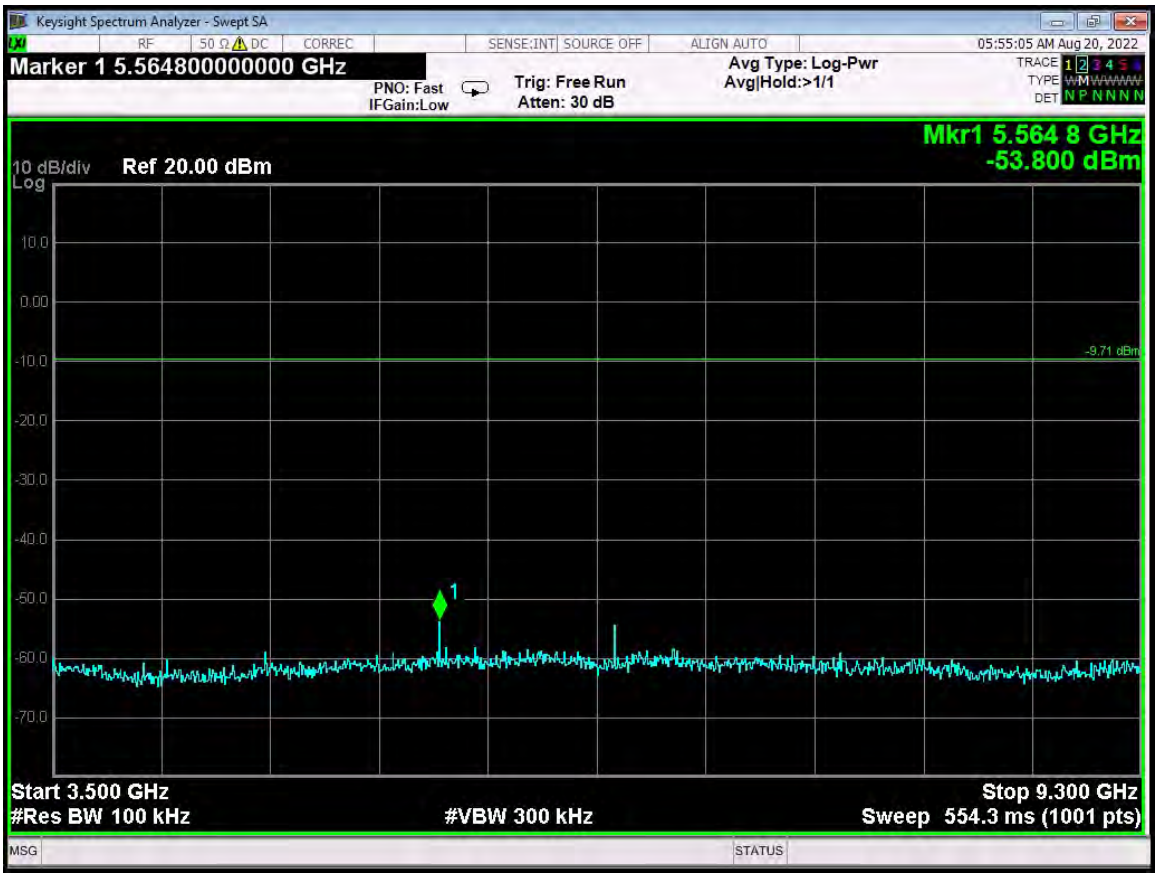


RF Antenna Conducted - High Channel - G5 Compatibility Mode - 30 MHz to 902 MHz

RF Antenna Conducted - High Channel - G5 Compatibility Mode - 928 MHz to 930 MHz

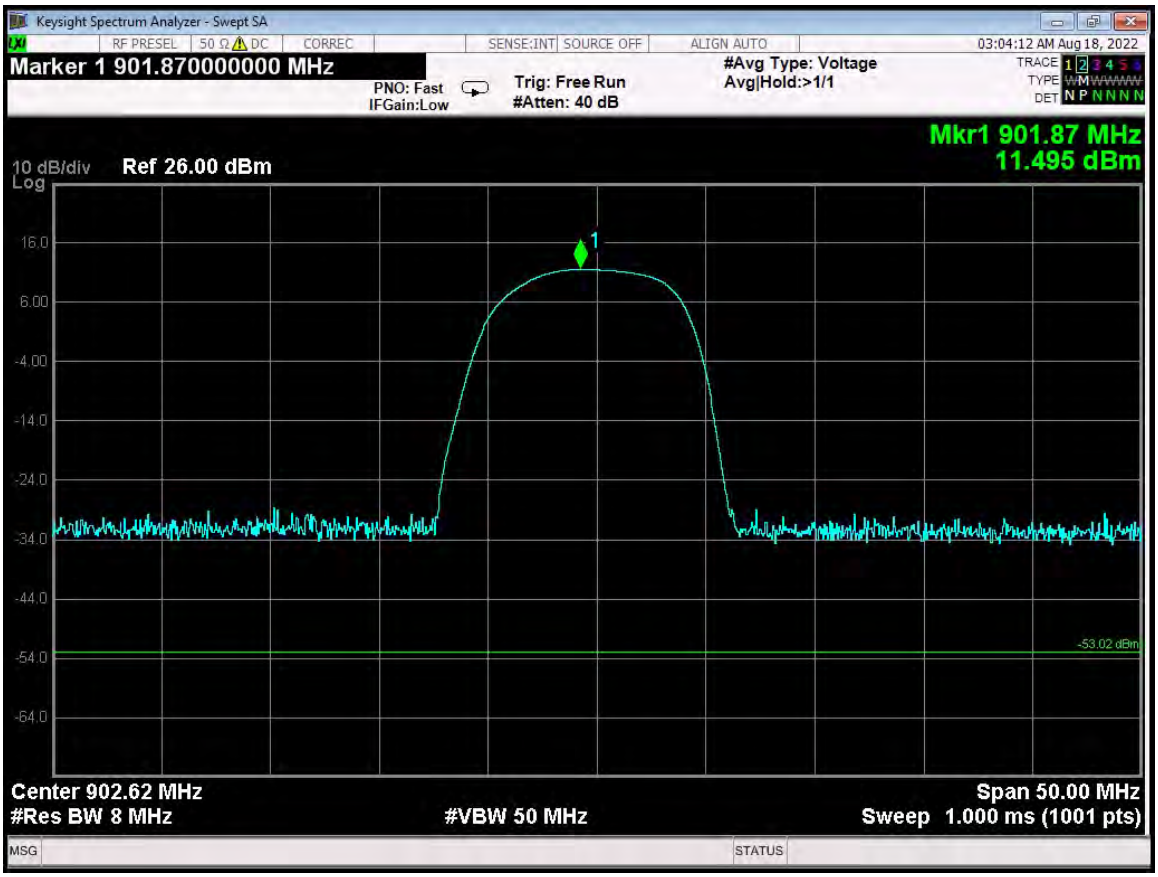


RF Antenna Conducted - High Channel - G5 Compatibility Mode - 930 MHz to 3.5 GHz

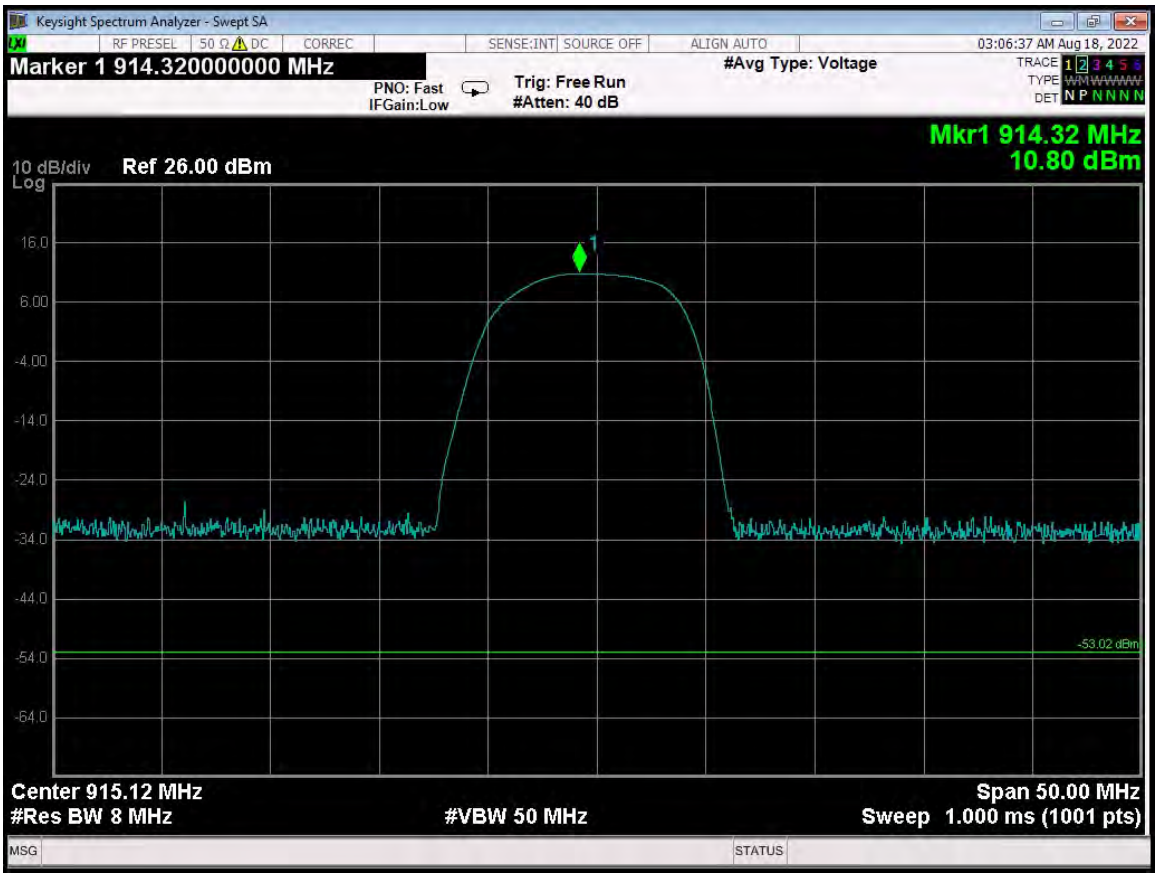


RF Antenna Conducted - High Channel - G5 Compatibility Mode - 3.5 GHz to 9.3 GHz

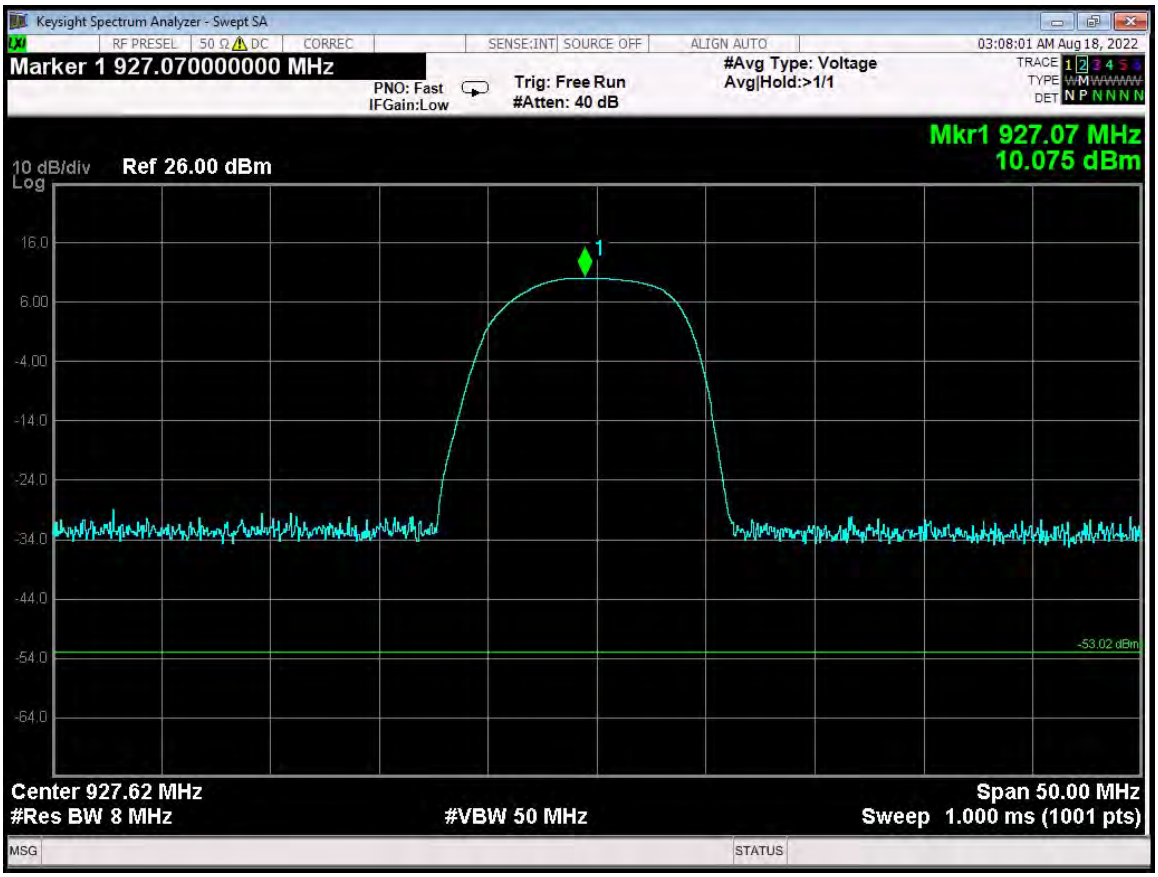
PEAK POWER OUTPUT DATA SHEETS



Peak Power Output - 902.62 MHz - G5 Compatibility Mode

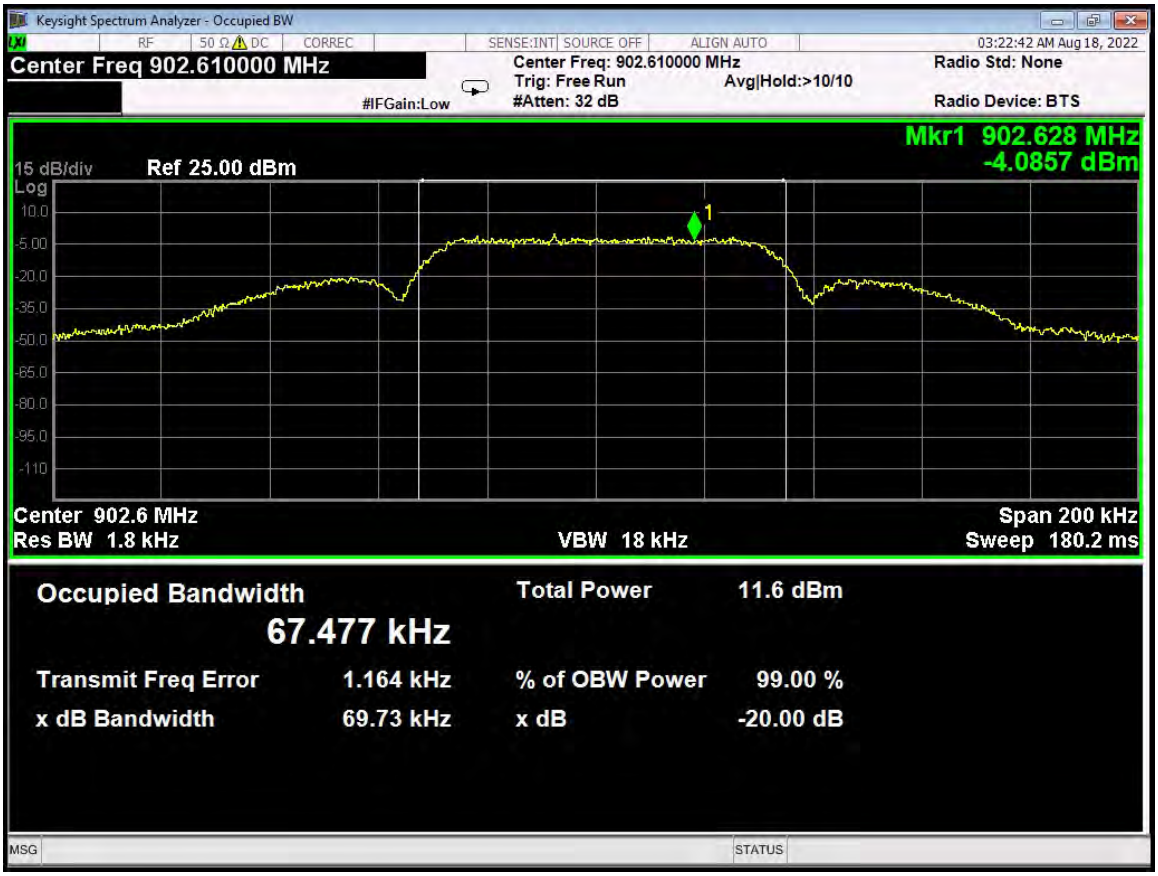


Peak Power Output - 915.12 MHz - G5 Compatibility Mode

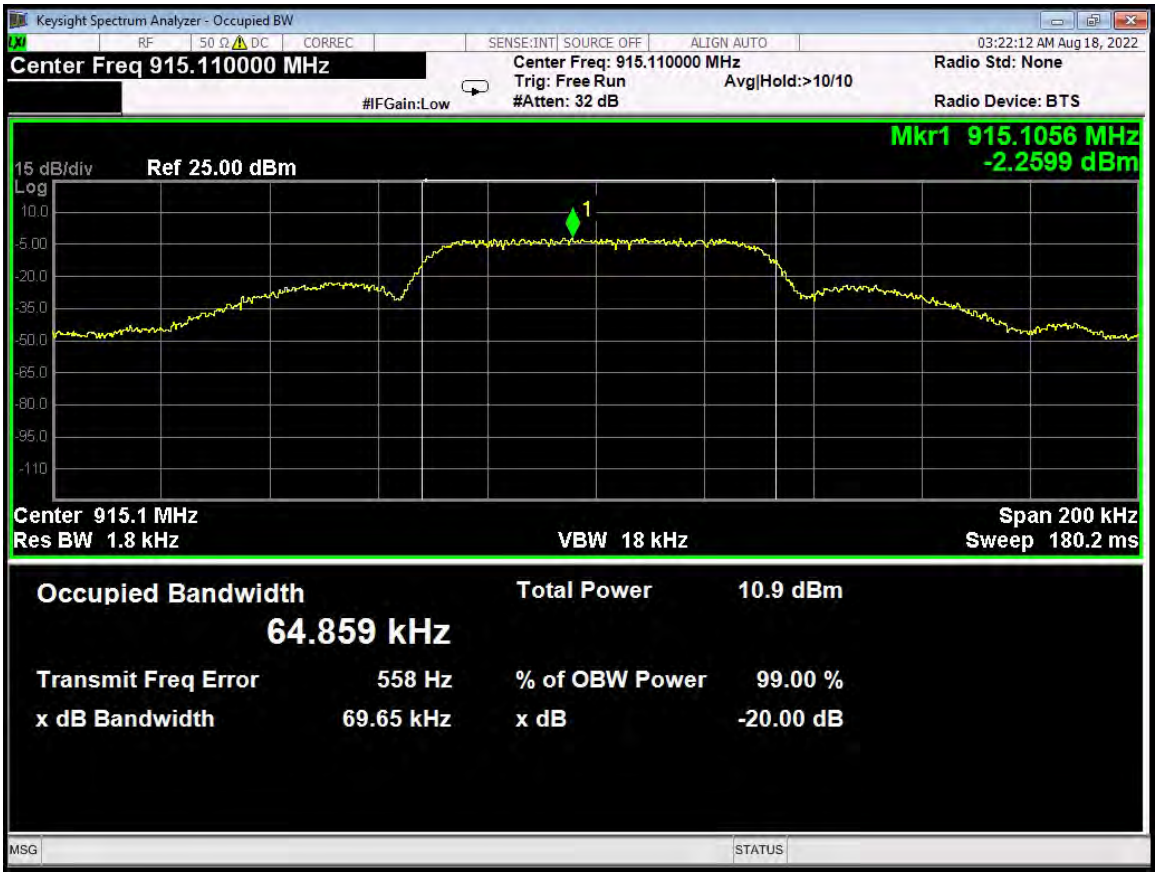


Peak Power Output - 927.62 MHz - G5 Compatibility Mode

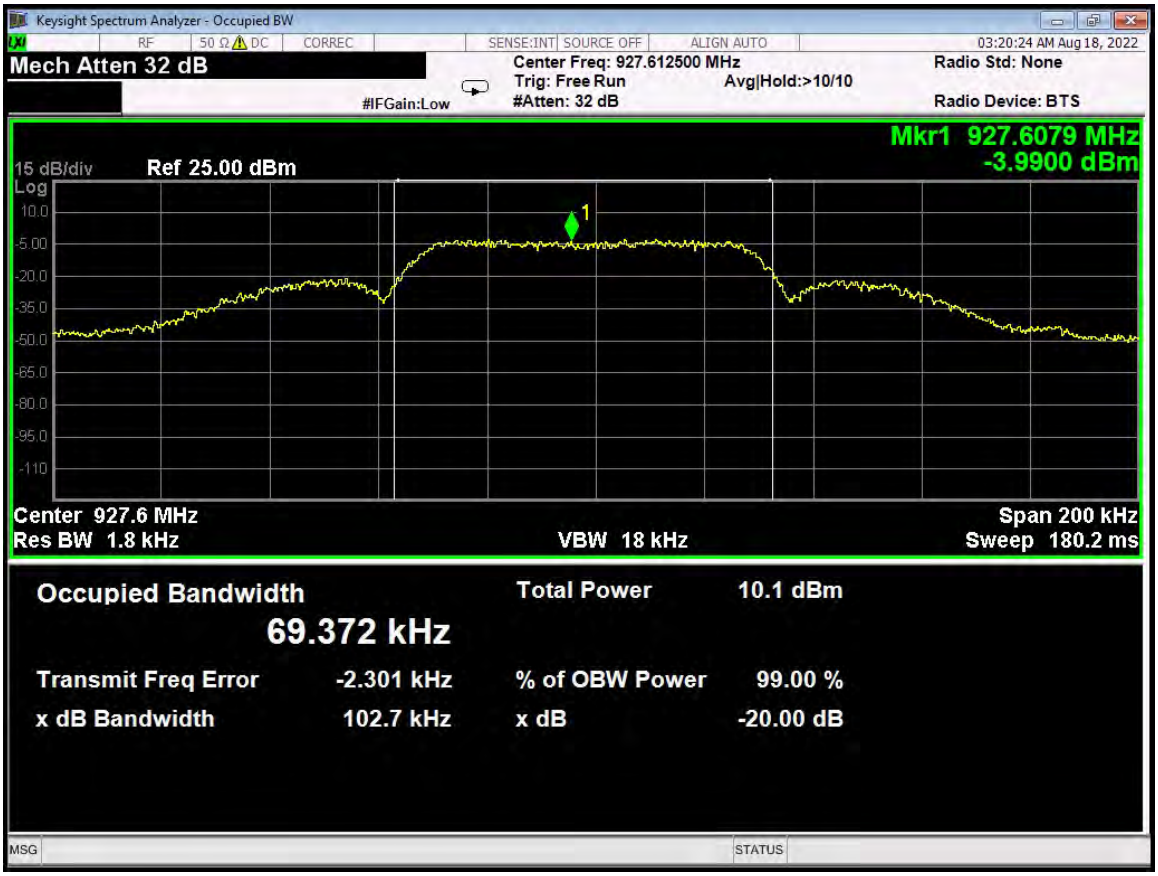
99% BANDWIDTH DATA SHEET



99 % Bandwidth - 902.62 MHz - G5 Compatibility Mode

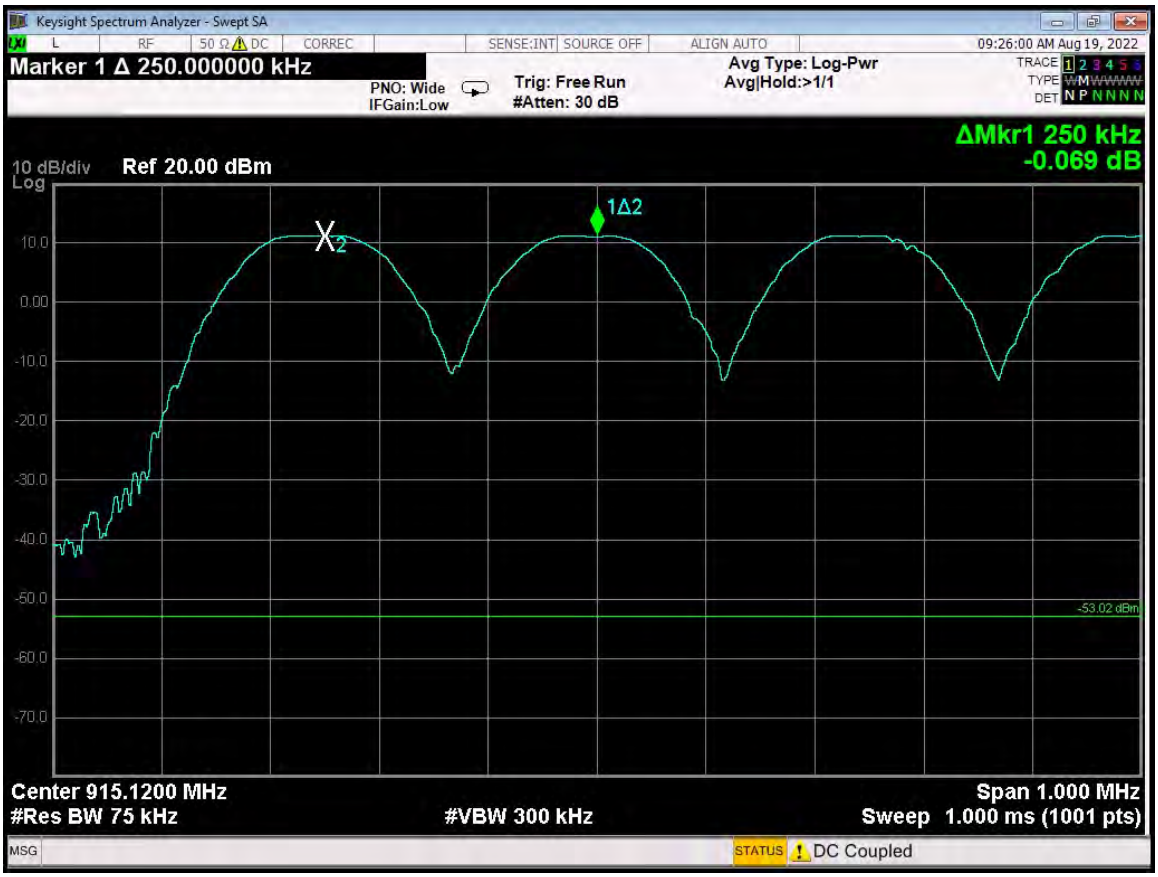


99 % Bandwidth - 915.10 MHz - G5 Compatibility Mode

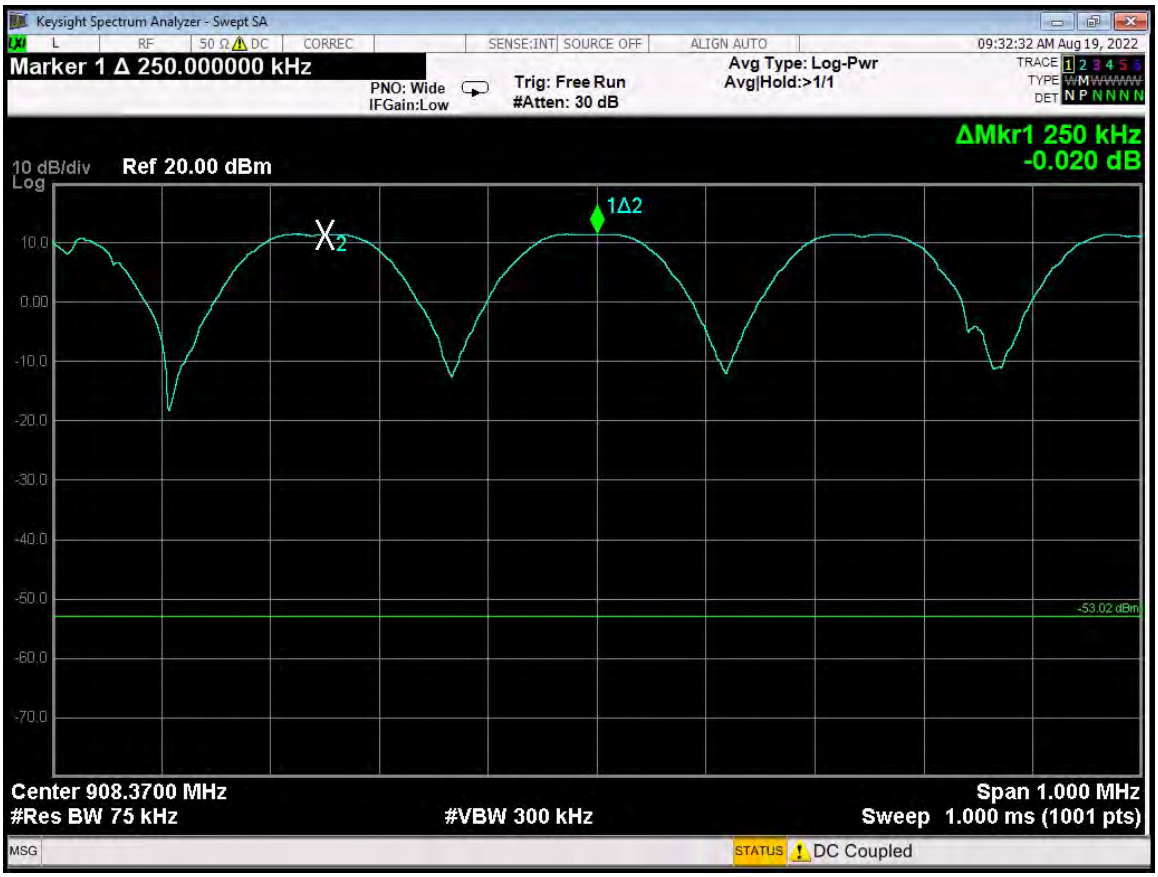


99 % Bandwidth - 927.60 MHz - G5 Compatibility Mode

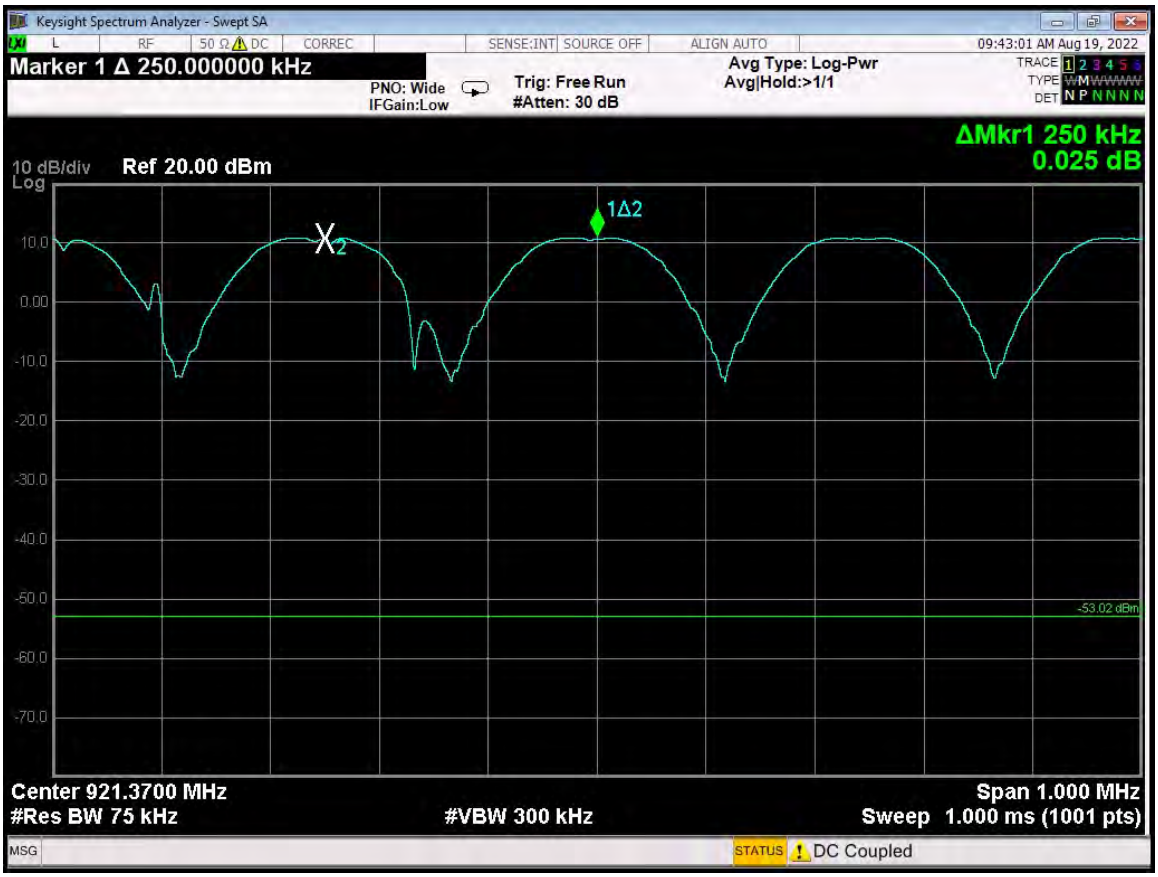
CHANNEL FREQUENCY SEPARATION DATA SHEET



Channel Frequency Separation - Hop Set 0 - G5 Compatibility Mode



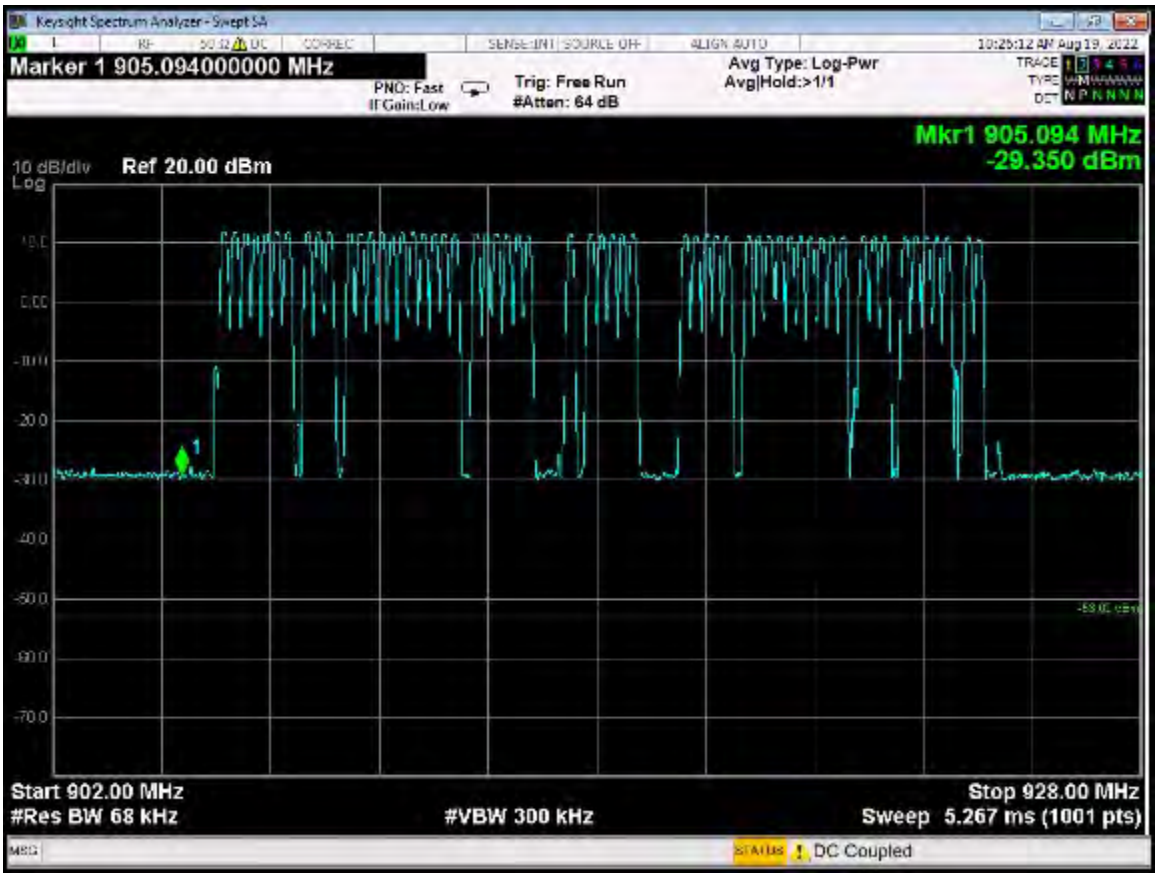
Channel Frequency Separation - Hop Set 1 - G5 Compatibility Mode



Channel Frequency Separation - Hop Set 2 - G5 Compatibility Mode

NUMBER OF FREQUENCIES

DATA SHEET



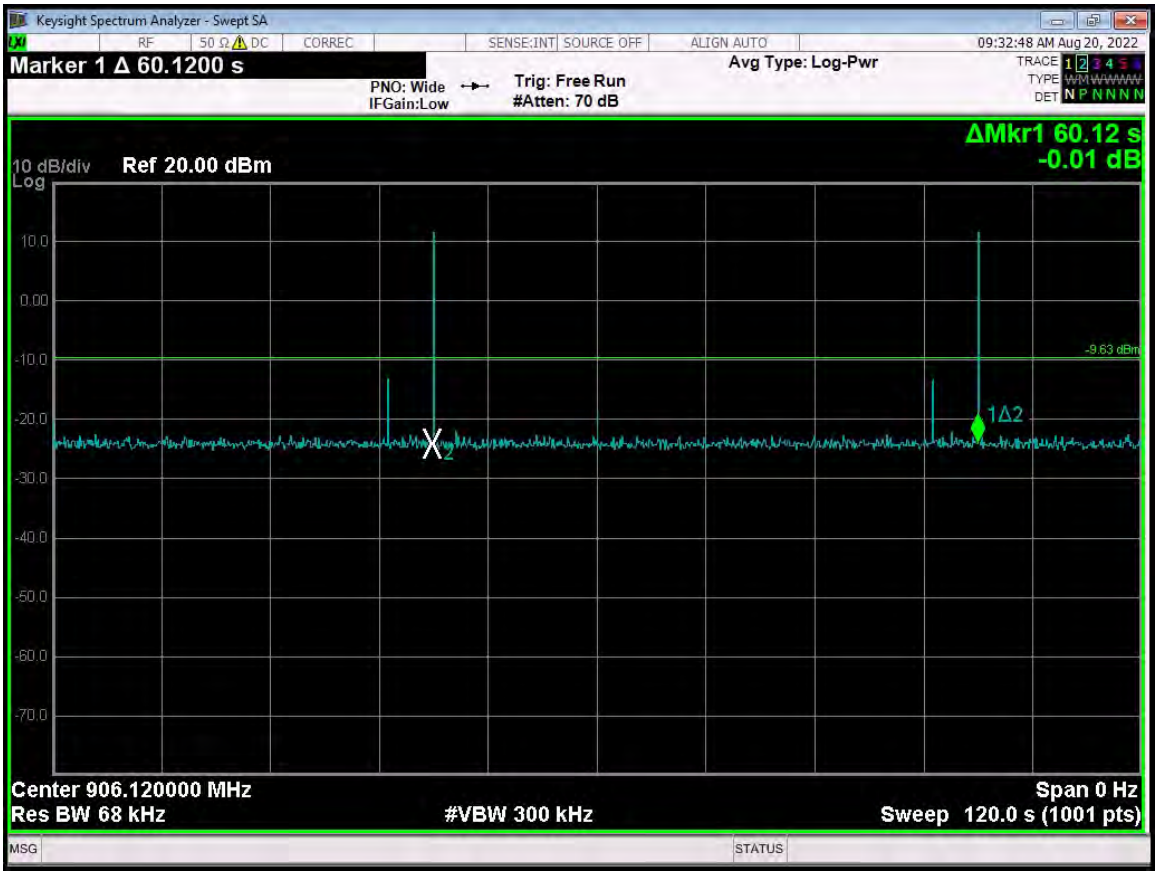
Number of Maximum Channels is 58 - Hop Set 0 - G5 Compatibility Mode

Number of Maximum Channels is 50 - Hop Set 1 - G5 Compatibility Mode

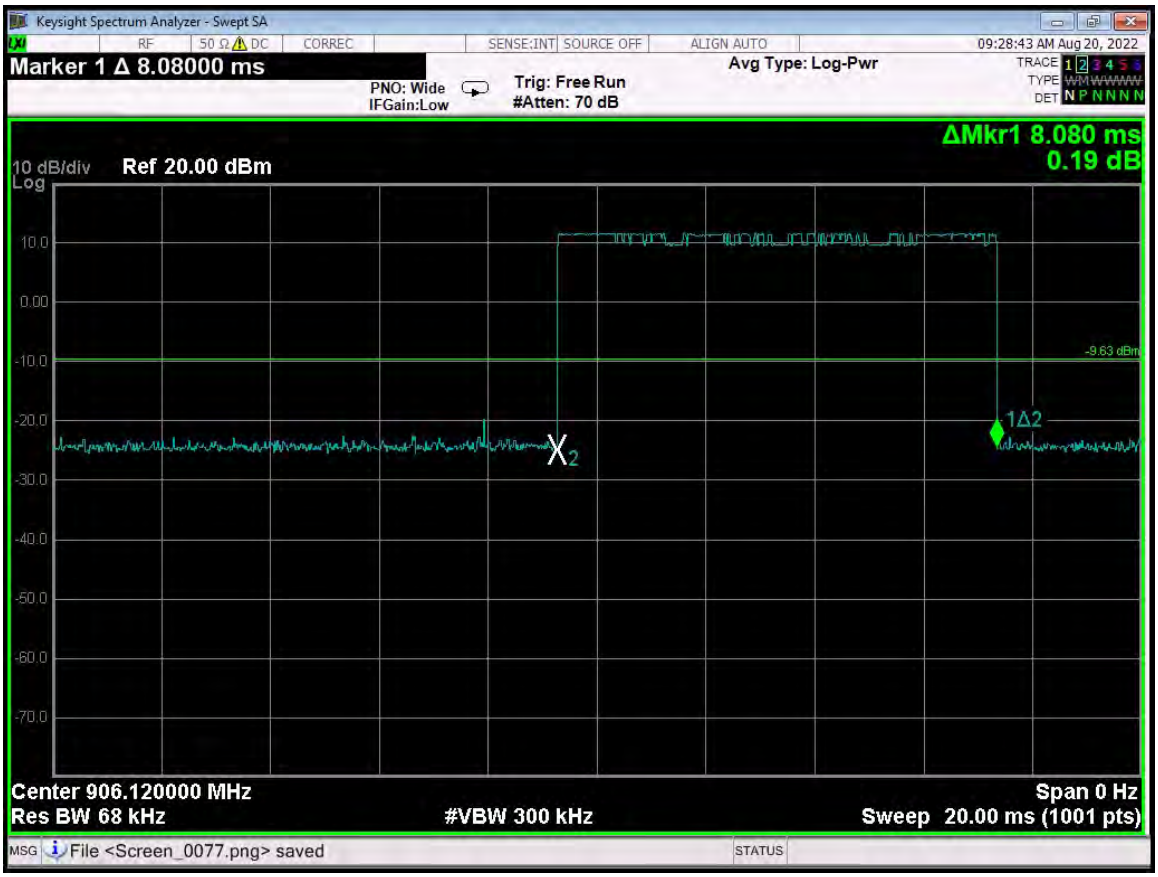
Number of Maximum Channels is 50 - Hop Set 2 - G5 Compatibility Mode

TIME OF OCCUPANCY

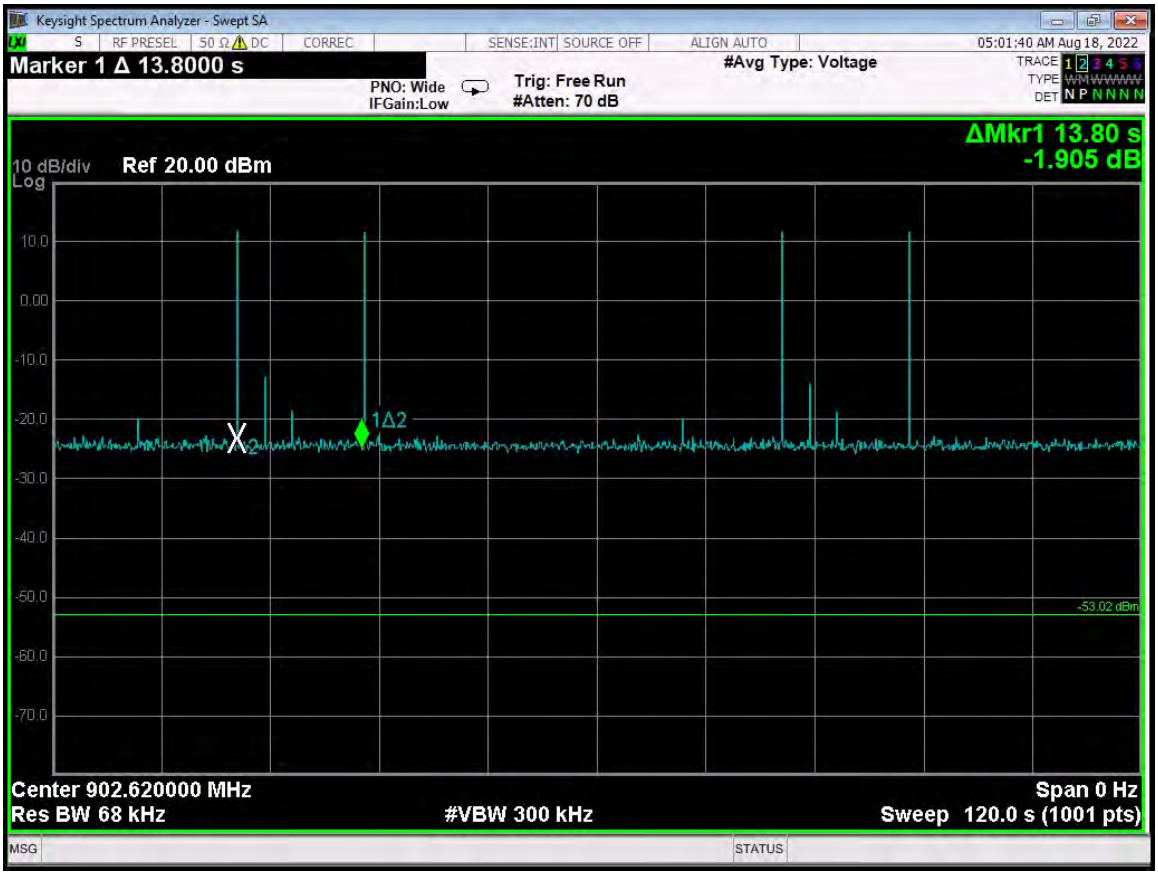
DATA SHEETS



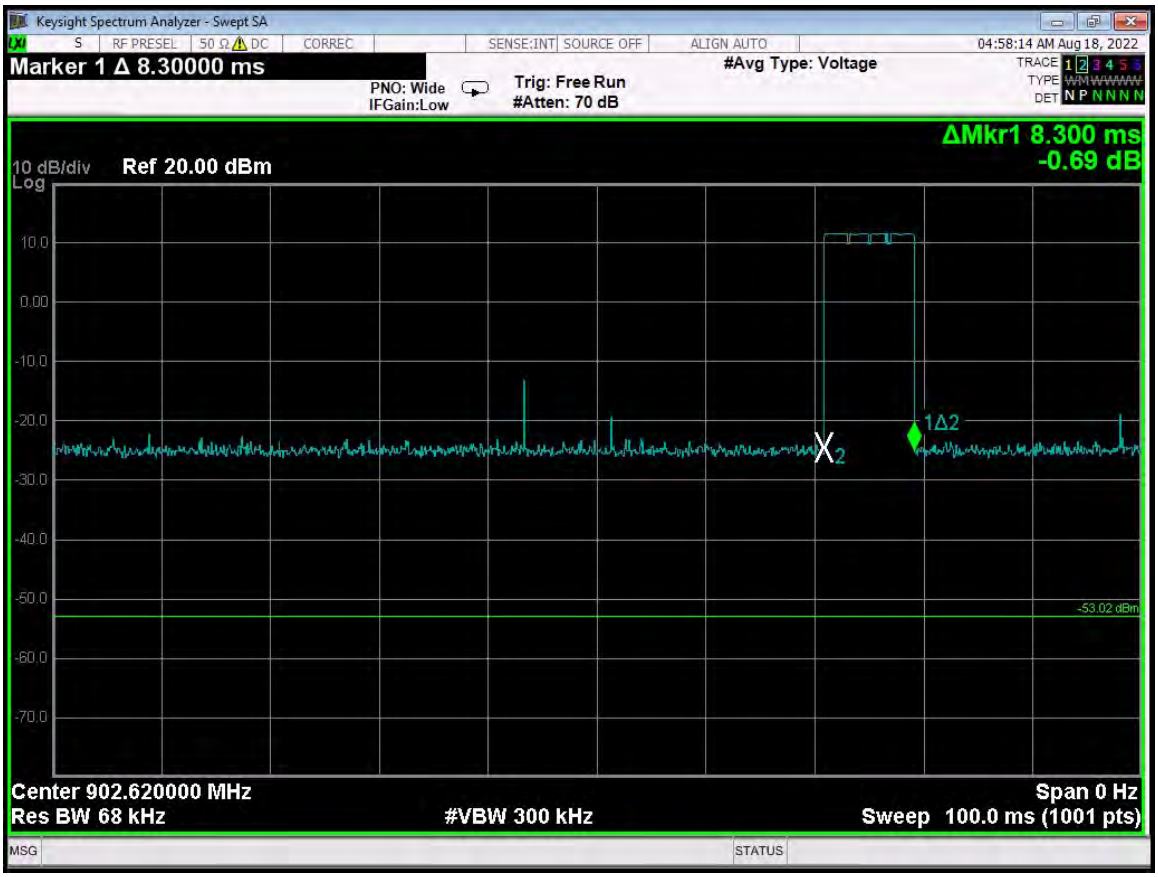
Time Between Pulses – 60.12 Seconds - Hop Set 0 - G5 Compatibility Mode



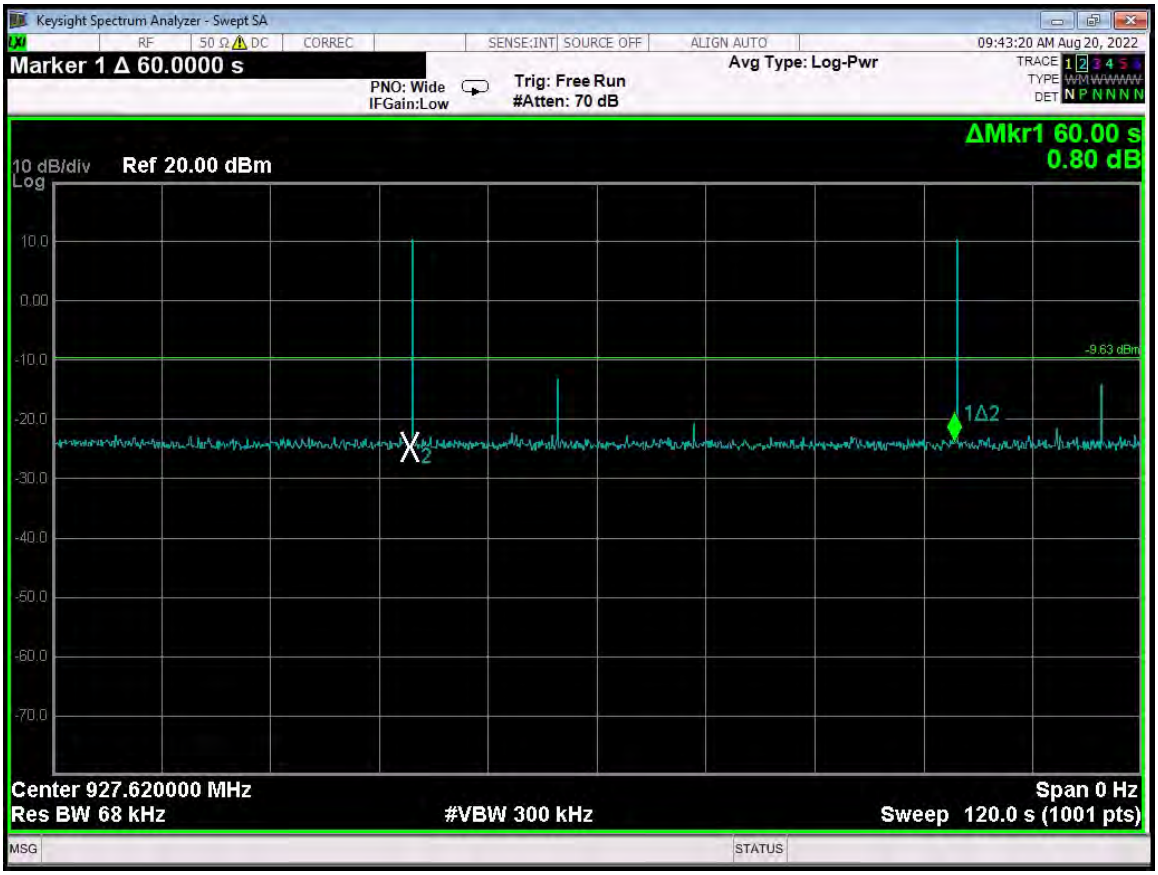
One Pulse is 8.08 ms - Hop Set 0 - G5 Compatibility Mode



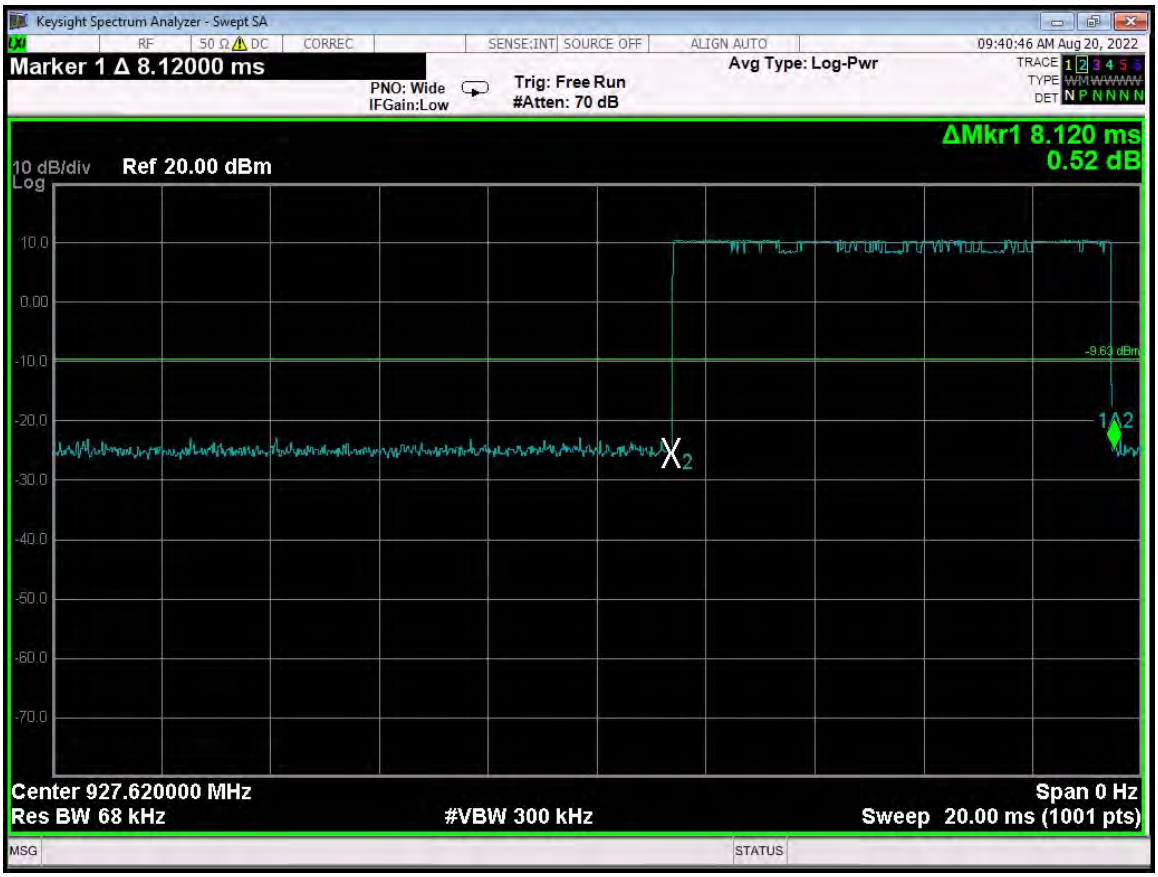
Time Between Pulses – 13.80 Seconds - Hop Set 1 - G5 Compatibility Mode



One Pulse is 8.30 ms - Hop Set 1 - G5 Compatibility Mode



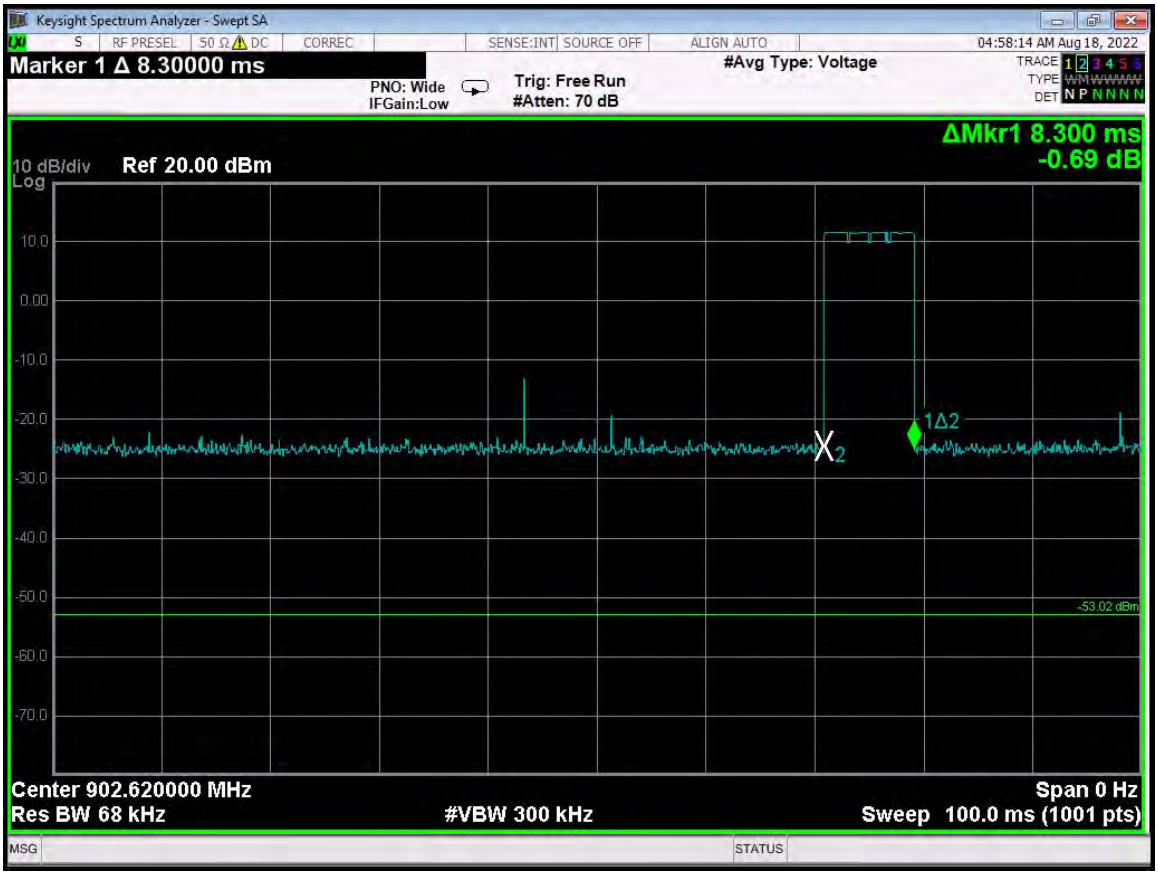
Time Between Pulses - 60 Seconds - Hop Set 2 - G5 Compatibility Mode



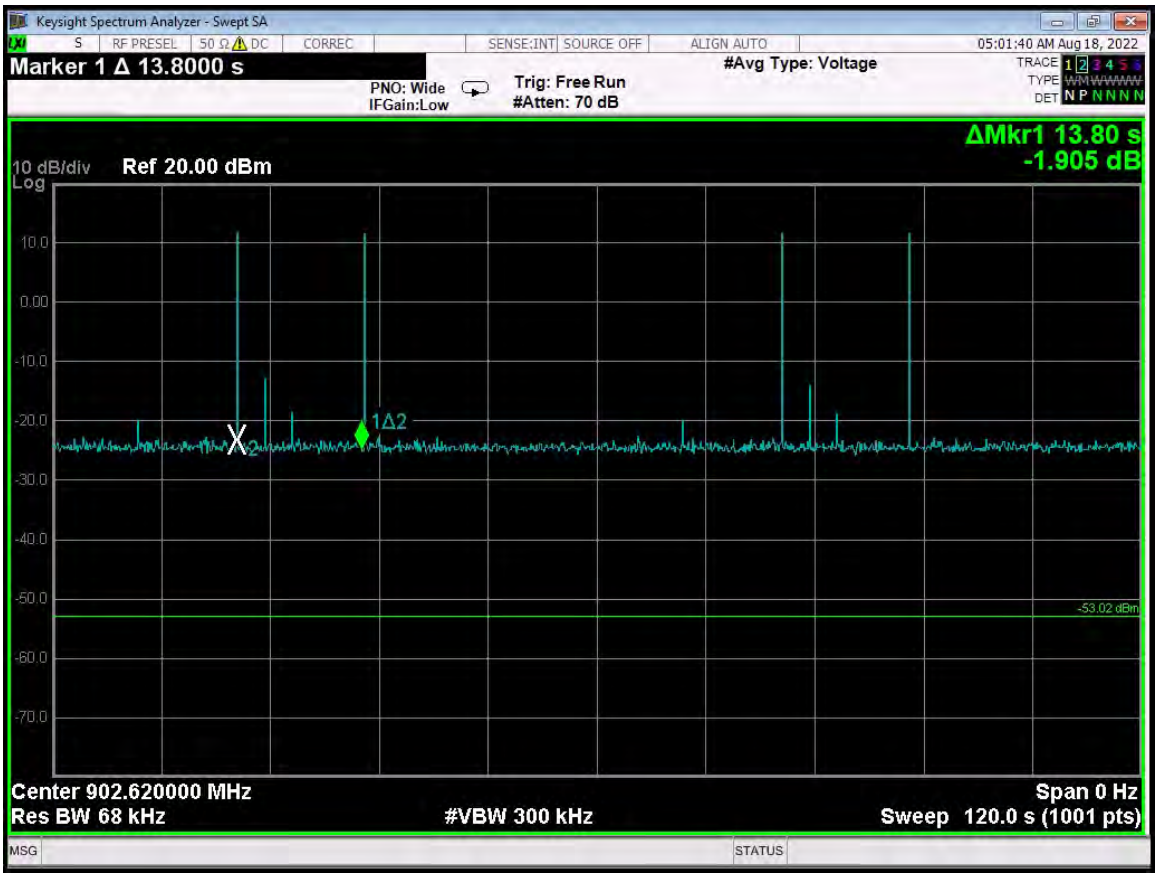
One Pulse is 8.12 ms - Hop Set 2 - G5 Compatibility Mode

DUTY CYCLE

DATA SHEETS



Time of One Pulse - 8.3 ms - G5 Compatibility Mode



One pulse per 13.80 seconds - G5 Compatibility Mode

Note: Worst Case Mode, which results in the pulses appearing more frequently

Duty Cycle = 8.3 %