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

***for***

# INTELLIGENT WATER MONITORING BRIDGE

# MODEL NUMBER: F2700

Prepared for

FLUME INC.
75 HIGUERA ST., STE 120
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DATE: MARCH 24, 2023

| | REPORT | APPENDICES | | | | | TOTAL |
|---|---|---|---|---|---|---|---|
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NVLAP TESTING NVLAP LAB CODE 200063-0

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# GENERAL REPORT SUMMARY

This electromagnetic emission 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 in any form except in full, without the written permission of Compatible Electronics.

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

| | |
|---|---|
| Device Tested: | Intelligent Water Monitoring Bridge<br>Model: F2700<br>S/N: None |
| Product Description: | This system remotely monitors water usage in real time by utilizing a Flume Sensor attached to a water meter. The Bridge interfaces with the sensor and the customer's WiFi network. It contains a pre-certified module (FCC ID: 2AC7Z-ESP32WROOM32E, IC ID: 21098-ESPWROOM32E).<br>Highest Frequency: 927 MHz (Dimensions: 1.5" x 2.5" x 3.3") |
| Modifications: | The EUT was not modified during the testing in order to comply with the specifications. |
| Manufacturer: | Flume Inc.<br>75 Higuera St., STE 120<br>San Luis Obispo, CA 93401 |
| Test Dates: | March 1, 2, 3, 6 and June 15 & 30, 2023 |

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**Innovation, Science and Economic Development Canada**

**Lab Code 22209**

Test Specifications covered by accreditation:

Emissions requirements
CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.207, 15.209, 15.247, RSS Gen Issue 5 2018 + A1: 2019 & A2: 2021 and RSS 247 Issue 2 2017
Test Procedure: ANSI C63.4: 2014, ANSI C63.10: 2013 and KDB 558074 D01 v05r02

# SUMMARY OF TEST RESULTS

| *TEST* | DESCRIPTION | RESULTS |
|---|---|---|
| 1 | Conducted RF Emissions, 150 kHz - 30 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, section 15.207. |
| 2 | Radiated RF Emissions, 9 kHz – 24.8 GHz | 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) |
| 3 | 20 dB Bandwidth | Complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1)(i) |
| 4 | Peak Power Output | Complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (b)(2) |
| 5 | RF Conducted Antenna Test | Complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (d) |
| 6 | Carrier Frequency Separation | Complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1) |
| 7 | Average Time of Occupancy | Complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1)(i) |
| 8 | Number of Hopping Frequencies | Complies with the requirements of CFR Title 47, Part 15, Subpart C, section 15.247 (a)(1)(i) |
| 9 | Variation of Input Power | Complies with the requirements of FCC Title 47, Part 15, Subpart C<br>section 15.31 (e), RSS-247 and RSS-GEN. |

# 1. PURPOSE

This document is a qualification test report based on the emissions tests performed on the Intelligent Water Monitoring Bridge, Model Number: F2700. The emissions measurements were performed according to the measurement procedure described in ANSI C63.10 and ANSI C63.4. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class B** specification limits defined by **CFR** Title 47, Part 15, Subpart B and Subpart C, sections 15.205, 15.207, 15.209, and 15.247; RSS-247 and RSS-Gen.

## 1.1 DECISION RULE & RISK

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

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

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

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

The decision rule is defined below.

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

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

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

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

# 2. ADMINISTRATIVE DATA

## 2.1 Location of Testing

The emissions tests described herein were performed at the test facility of Compatible Electronics, 1050 Lawrence Drive, Newbury Park, California 91320.

## 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

Flume Inc.

| | |
|---|---|
| Alan Beverly | Engineering Manager |

Compatible Electronics Inc.

| | |
|---|---|
| Reynald O. Ramirez | Sr. Test Engineer |
| Ruby Hall | Lab Manager |

## 2.4 Date Test Sample Was Received

The test sample was received on March 3, 2023. Received as described in product description.

## 2.5 Disposition of the Test Sample

The test sample remains at Compatible Electronics.

## 2.6 Abbreviations and Acronyms

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

| | |
|---|---|
| RF | Radio Frequency |
| EMI | Electromagnetic Interference |
| EUT | Equipment Under Test |
| P/N | Part Number |
| S/N | Serial Number |
| HP | Hewlett Packard |
| ITE | Information Technology Equipment |
| CML | Corrected Meter Limit |
| LISN | Line Impedance Stabilization Network |
| N/A | Not Applicable |
| NCR | No Calibration Required |

## 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 |
| RSS Gen, Issue 5: 2018 + A1: 2019 & A2: 2021 | General Requirements for Compliance of Radio Apparatus |
| RSS-247, Issue 2: 2017 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices |
| ANSI C63.4 2014 | Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz |
| ANSI C63.10 2013 | American National Standard for Testing Unlicensed Wireless Devices |
| FCC Title 47, Part 15 Subpart B | FCC Rules - Radio frequency devices (including digital devices) – Unintentional Radiators |
| 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 |
| EN 50147-2: 1997 | Anechoic chambers. Alternative test site suitability with respect to site attenuation |

# 4. DESCRIPTION OF TEST CONFIGURATION

## 4.1 Description of Test Configuration – Emissions

The EUT was tested in a tabletop configuration. The Bridge (EUT) communicates with the Sensor using frequency hopping across 902-928 MHz. This channel is used for Sensor configuration and data reporting. The Bridge, in turn, interfaces with the custormer's WiFi network at 2.4 GHz. During the testing an application was used to change the low, mid and high channel parameters. Once selected the EUT transmits only at the selected channel.

During single channel spurious emissions testing, all three channels of the 900 MHz FHSS were tested, and the final data was set on the worst-case channel (915 MHz). Please see Appendix E for the data sheets.

During conducted emissions testing, the 900 MHz FHSS was tested, and the final data was set on the worst case emissions channel (915 MHz). Please see Appendix E for the data sheets.

During spurious emissions co-location testing, the Bridge and the Sensor were tested together operating at its normal condition to show compliance with FCC rules. In this configuration, the 900 MHz FHSS, RX mode and WiFi were enabled. Please Appendix E for the data sheets.

The EUT was also checked in receive mode on the low, mid and high channels for the 900 MHz FHSS.

**For direct measurement portion of the test –** The EUT was directly connected to the EMI receiver. A special program was used to control the channel of the transmitter.

The radiated final as well as the conducted data for the EUT were taken in the worst-case configuration 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, round cable that connects the EUT to the AC adapter. The cable has a micro-USB connector at the EUT end and is hardwired at the AC adapter end.

# 5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

## 5.1 EUT and Accessory List

| EQUIPMENT | MANUFACTURER | MODEL NUMBER | SERIAL NUMBER | FCC ID |
|---|---|---|---|---|
| INTELLIGENT WATER MONITORING BRIDGE (EUT) | FLUME INC. | F2700 | N/A | FCC ID: 2AOX8-F2700<br>IC: 26125-F2700 |
| PRE-CERTIFIED MODULE | ESPRESSIF INC. | ESP32-WROOM-32E | NONE | FCC ID: 2AC7Z-ESP32WROOM32E<br>IC: 21098-ESPWROOM32E |
| AC ADAPTER | GENERIC (NO NAME) | GEO151UB-6025 | NONE | N/A |

## 5.2 Emissions Test Equipment

| EQUIPMENT TYPE | MANU-FACTURER | MODEL NUMBER | SERIAL NUMBER | CAL. DATE | CAL. DUE DATE |
|---|---|---|---|---|---|
| TDK Emissions Lab Software | TDK RF Solutions, Inc. | TDK Emissions Lab | Version: 10.78 | NCR | NCR |
| EMI Receiver | Agilent | N9038A | MY51100115 | Jan 11, 2023 | Jan 11, 2025 |
| LISN (EUT) | Com-Power | LI-215A | 191989 | Jan. 24, 2023 | Jan. 24, 2025 |
| LISN (ACC) | Com-Power | LI-215A | 191983 | Jan. 24, 2023 | Jan. 24, 2025 |
| 10 dB Attenuator | Weinschel Corp. | 2 | BH8161 | Jul. 05, 2022 | Jul. 05, 2023 |
| Active Loop Antenna | Com-Power | AL-130R | 10160065 | Aug. 03, 2021 | Aug. 03, 2023 |
| Combi-Log Antenna | Com-Power | AC-220 | 10030030 | Jan. 29, 2022 | Jan. 29, 2024 |
| Antenna Cable | Belden | RG-214/U | A/N: 6014 | Feb. 08, 2022 | Feb. 08, 2024 |
| Horn Antenna | Com-Power | AH-118 | 071370 | Jun. 20, 2022 | Jun. 20, 2024 |
| Preamplifier | Com-Power | PAM-118A | 551015 | Jan. 20, 2022 | Jan. 20, 2024 |
| Preamplifier | Com-Power | PAM-118 | 443009 | Jan. 04, 2022 | Jan. 04, 2024 |
| Horn Antenna | Com-Power | AH-826 | 081081 | NCR | NCR |
| Preamplifier(backup) | Com-Power | PA-840 | 711883 | Jan. 17, 2022 | Jan. 17, 2024 |
| Preamplifier | Com-Power | PAM-840 | 461268 | Jan. 17, 2022 | Jan. 17, 2024 |

## 5.3 Emissions Test Equipment (continued)

| EQUIPMENT TYPE | MANU-FACTURER | MODEL NUMBER | SERIAL NUMBER | CAL. DATE | CAL. DUE DATE |
|---|---|---|---|---|---|
| High Freq. Antenna Cables | SucoFlex | 102_EA | A/N: 6012 & 6013 | Feb. 07, 2022 | Feb. 07, 2024 |
| 902-928 MHz 60 dB Notch Filter | Microwave Circuits | N0309154 | 495405-495406 | NCR | NCR |
| 3-20 GHz Highpass Filter | Microwave Circuits | H3G020G4 | 495523- | NCR | NCR |
| Turntable | EMCO | 2088-2.03 | None | NCR | NCR |
| Antenna Mast | EMCO | 2075-2 | None | NCR | NCR |
| Multi-Device Controller | ETS EMCO | 2090 | 9511-1095 | NCR | NCR |
| Temperature and Humidity Indicator | Abbeon | HTAB169B | 3428 | Sep. 09, 2022 | Sep. 09, 2023 |
| Barometer | Maximum | Predictor | 3429 | May 20, 2022 | May 20, 2023 |
| Computer | Dell | Vostro 3900 | Asset# 3423 | NCR | NCR |

# 6. TEST SITE DESCRIPTION

## 6.1 Test Facility Description

Please refer to section 2.1 and 7.1.2 of this report for test location.

## 6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5-meter non-conductive table 0.8 meters above the ground plane.

For frequencies above 1 GHz the EUT was mounted on a 1.0 by 1.5 meter non-conductive table 1.5 meters above the ground plane.

The EUT was not grounded.

## 6.3 Measurement Uncertainty

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

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

| Measurement | | $U_{cispr}$ | $U_{lab} = 2\,uc\,(y)$ |
|---|---|---|---|
| Conducted disturbance (mains port) | (150 kHz – 30 MHz) | 3.4 dB | 2.73 dB |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) | (30 MHz – 1 000 MHz) | 6.3 dB | 3.12 dB (Vertical)<br>3.07 dB (Horizontal) |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) | (1 GHz - 6 GHz) | 5.2 dB | 3.13 dB |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) | (6 GHz – 18 GHz) | 5.5 dB | 3.13 dB |
| Radiated disturbance (electric field strength on an open area test site or alternative test site) | (18 GHz – 26 GHz) | N/A | 3.57 dB |

# 7. CHARACTERISTICS OF THE TRANSMITTER

## 7.1 Channel Description and Frequencies

The EUT operates on 50 channels. The low channel is 902.5 MHz, the middle channel is 915 MHz and the high channel is 927 MHz. The EUT also uses a pre-certified 2.4 GHz WiFi module.

## 7.2 Antenna

The antenna is an inverted F with a gain of 0.9 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. The data was collected with the EMI Receiver in the peak detect mode with the "Max Hold" feature activated. The quasi-peak or average was used only were indicated in the data sheets. A 10-dB attenuation pad was used for the protection of the EMI Receiver input stage, and the EMI Receiver offset was adjusted accordingly to read the actual data measured. The EMI Receiver read the LISN output. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for the conducted emissions test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The initial test data was taken in manual mode while scanning the frequency ranges of 0.15 MHz to 1.6 MHz, 1.6 MHz to 5 MHz and 5 MHz to 30 MHz. The conducted emissions from the EUT were maximized for operating mode as well as cable placement. Once a predominant frequency (within 12 dB of the limit) was found, it was more closely examined with the EMI Receiver span adjusted to 1 MHz.

The final data was collected under program control by the computer in several overlapping sweeps by running the EMI Receiver at a minimum scan rate of 10 seconds per octave. The six highest emissions are listed in Table 1.0.

**Test Results:**

The EUT complied with the requirements as specified in the Summary of Test Results starting on page 5.

### 8.1.2 Radiated Emissions (Spurious and Harmonics) Test

The EMI Receiver was used as the measuring meter. Below 1 GHz, a built-in, internal preamplifier was used to increase the sensitivity of the instrument. At frequencies above 1 GHz, external preamplifiers were used. The EMI Receiver was initially used with the Analyzer mode feature activated. In this mode, the EMI receiver can then record the actual frequency to be measured. This final reading is then taken accurately in the EMI Receiver mode, which takes into account the cable loss, amplifier gain and antenna factors, so that a true reading is compared to the true limit.

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

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

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

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

The six highest readings are listed in Table 2.

**Test Results:**

The EUT complied with the requirements as specified in the Summary of Test Results starting on page 5.

### 8.1.3 RF Emissions Test Results

Table 1.0 CONDUCTED EMISSION RESULTS 120V AC Intelligent Water Monitoring Bridge
Model Number: F2700

| Frequency MHz | Emission Level* dBuV | Average Specification Limit dBuV | Delta (Emission-Spec limit) dB |
|---|---|---|---|
| 0.15 | 37.75**A** | 55.87 | -18.12 |
| 0.23 | 33.99**A** | 52.76 | -18.77 |
| 0.32 | 30.24**A** | 49.69 | -19.45 |
| 0.39 | 25.30**A** | 48.07 | -22.77 |
| 0.50 | 27.53**A** | 46.14 | -18.61 |
| 0.77 | 22.21**A** | 46.00 | -23.70 |

Table 2.0 RADIATED EMISSION RESULTS Intelligent Water Monitoring Bridge
Model Number: F2700
(worst case findings)

| Frequency MHz | Corrected Reading* dBuV/m | Specification Limit dBuV/m | Delta (Cor. Reading – Spec. Limit) dB |
|---|---|---|---|
| 54.80 | 33.91# | 40.00 | -6.09 |
| 56.40 | 35.15# | 40.00 | -4.85 |
| 65.90 | 32.56# | 40.00 | -7.44 |
| 1854.00 | 47.47A | 54.93 | -7.46 |
| 2745.00 | 51.66A | 54.93 | -3.27 |
| 2781.00 | 51.44A | 54.93 | -3.49 |

Notes:

* The complete emissions data is given in Appendix E of this report.

** The factors for the antenna and preamplifier gain are attached in Appendix D of this report.

\# Quasi-Peak Reading
**A** Average Reading

### 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

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.

# 9 TEST PROCEDURES

## 9.1 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.

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Steps a) through c) might require iteration to adjust within the specified tolerances.
e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
f) Set detection mode to peak and trace mode to max hold.
g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument.
i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j).
j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "−xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth.

**Test Results:**

The EUT complies with the requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1)(i), RSS-247 and RSS-GEN. The 20 dB bandwidth is less than 500 kHz. Please see the data sheets located in Appendix E.

## 9.2 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 ≥ 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), RSS-247 and RSS-GEN. The maximum peak output power is less than 1 watt. Please see the data sheets located in Appendix E.

## 9.3 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 requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d), RSS-247 and RSS-GEN. Please see the data sheets located in Appendix E.

## 9.4 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 requirements of FCC Title 47, Part 15, Subpart C section 15.247 (d), RSS-247 and RSS-GEN. Please see the data sheets located in Appendix E.

## 9.5 Carrier Frequency Separation

The Channel Hopping Separation Test was measured using the EMI Receiver. The EUTs hopping function was enabled.

a) Span: Wide enough to capture the peaks of two adjacent channels.
b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
c) Video (or average) bandwidth (VBW) ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

**Test Results:**

The EUT complies with the requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1), RSS-247 and RSS-GEN. The Channel Hopping Separation is greater than the 20 dB bandwidth. Please see the data sheets located in Appendix E.

## 9.6 Number of Hopping Frequencies

The Number of Hopping Frequencies was measured using the EMI Receiver. The EUTs hopping function was enabled.

a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c) VBW ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize

**Test Results:**

The EUT complies with the requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1) and 15.247 (a)(1)(i), RSS-247 and RSS-GEN. Please see the data sheets located in Appendix E.

## 9.7 Average Time of Occupancy Test

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

a) Span: Zero span, centered on a hopping channel.
b) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / *T*, where *T* is the expected dwell time per channel.
c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d) Detector function: Peak.
e) Trace: Max hold.
Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.
Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:
(Number of hops in the period specified in the requirements) =
(number of hops on spectrum analyzer) × (period specified in the requirements / analyzer sweep time)
The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements. If the number of hops in a specific time varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation.
The measured transmit time and time between hops shall be consistent with the values described in the operational description for the EUT.

**Test Results:**

The EUT complies with the requirements of FCC Title 47, Part 15, Subpart C section 15.247 (a)(1)(i), RSS-247 and RSS-GEN. Please see the data sheets located in Appendix E.

## 9.8 Variation of the Input Power

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

**Test Results:**

The EUT complies with the requirements of FCC Title 47, Part 15, Subpart C section 15.31 (e), RSS-247 and RSS-GEN.

## 9.9 Occupied Bandwidth

The following steps were performed for measuring the Occupied Bandwidth.

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data maybe reported in addition to the plot(s).

### Test Results:

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.

## 10 CONCLUSIONS

The Intelligent Water Monitoring Bridge , Model Number: F2700 (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; RSS-247 and RSS-Gen.

# APPENDIX A

# *LABORATORY ACCREDITATIONS AND RECOGNITIONS*

# 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/**

NVLAP TESTING
NVLAP LAB CODE 200063-0

ilac-MRA

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"

Innovation, Science and Economic Development Canada Lab Code 22209

# APPENDIX B

# *MODIFICATIONS TO THE EUT*

# MODIFICATIONS TO THE EUT

There were no modifications made to the EUT.

# APPENDIX C

# *ADDITIONAL MODELS*

# ADDITIONAL MODELS

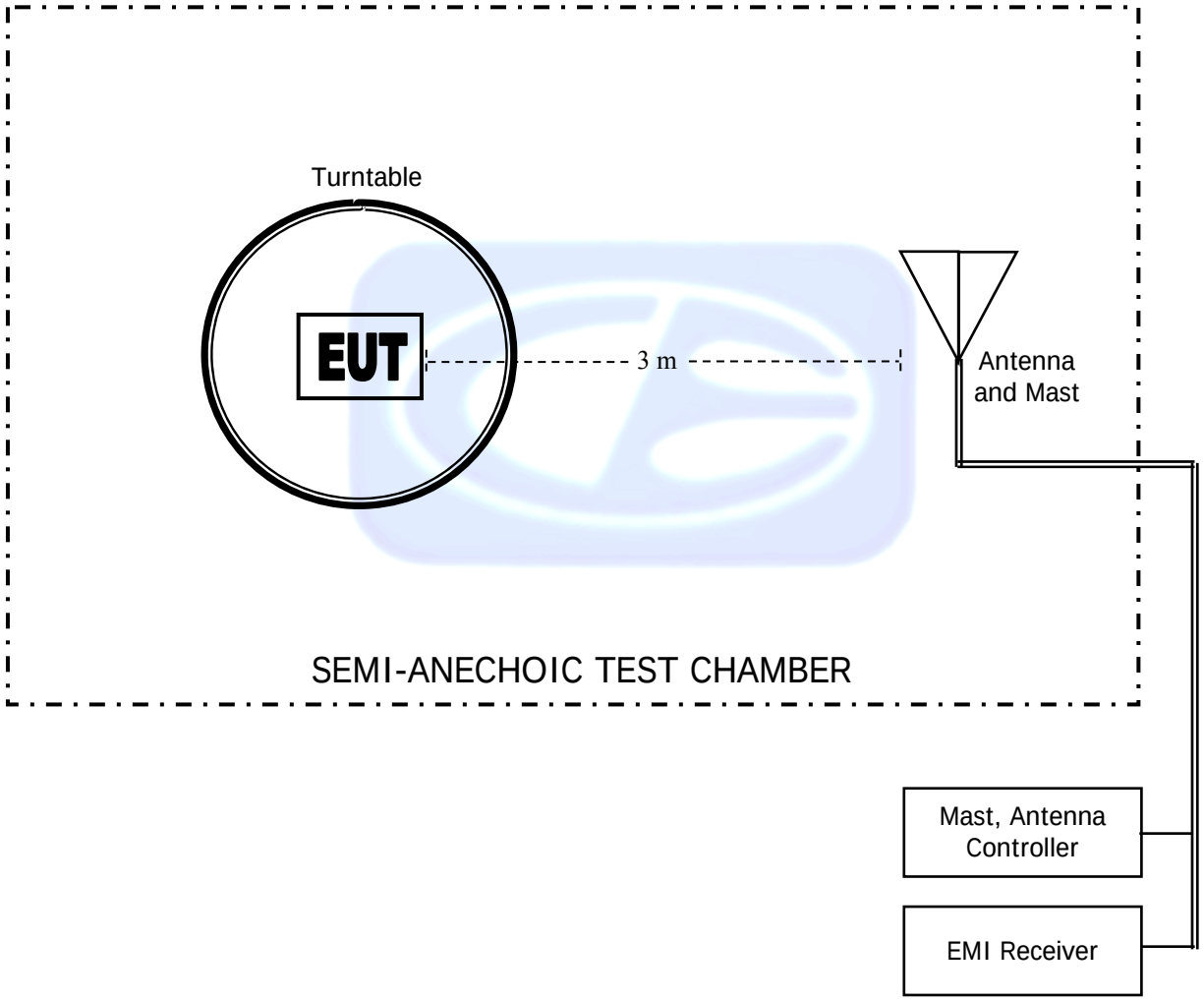
Used for the Primary Test: Intelligent Water Monitoring Bridge
Model: F2700
S/N: None

No Additional models.

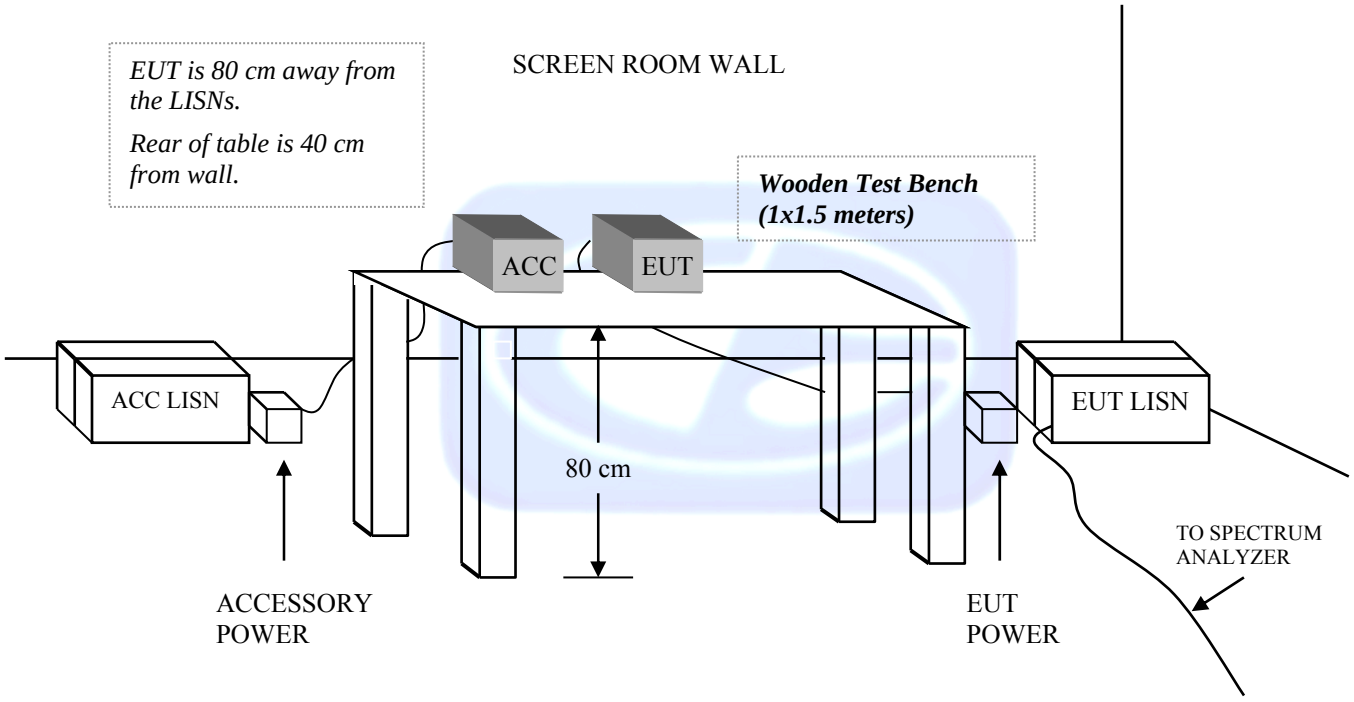
# APPENDIX D

# *DIAGRAMS AND CHARTS*

# *FIGURE 1: LAYOUT OF THE SEMI-ANECHOIC TEST CHAMBER*



# *FIGURE 2: CONDUCTED EMISSIONS TEST SETUP*



# COM-POWER AL-130R

# ACTIVE LOOP ANTENNA

# S/N: 10160065

# CALIBRATION DATE: AUGUST 3, 2021

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 0.009 | 15.68 | 1 | 14.54 |
| 0.01 | 15.33 | 2 | 14.53 |
| 0.02 | 14.77 | 3 | 14.53 |
| 0.03 | 15.69 | 4 | 14.64 |
| 0.04 | 15.17 | 5 | 14.65 |
| 0.05 | 14.52 | 6 | 14.55 |
| 0.06 | 14.71 | 7 | 14.56 |
| 0.07 | 14.42 | 8 | 14.56 |
| 0.08 | 14.44 | 9 | 14.56 |
| 0.09 | 14.52 | 10 | 14.88 |
| 0.1 | 14.12 | 15 | 14.56 |
| 0.2 | 14.13 | 20 | 14.90 |
| 0.3 | 14.04 | 25 | 13.06 |
| 0.4 | 14.04 | 30 | 13.03 |
| 0.5 | 14.23 | | |
| 0.6 | 14.23 | | |
| 0.7 | 14.23 | | |
| 0.8 | 14.14 | | |
| 0.9 | 14.34 | | |

# COM-POWER AC-220

# COMBI-LOG ANTENNA

## S/N: 10030030
## ASSET: 6037

## CALIBRATION DATE: JANUARY 29, 2022

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 30 | 22.3 | 450 | 21.5 |
| 35 | 21.3 | 500 | 22.1 |
| 40 | 20.5 | 550 | 22.8 |
| 45 | 19.7 | 600 | 24.3 |
| 50 | 18.6 | 650 | 24.4 |
| 60 | 14.9 | 700 | 24.4 |
| 70 | 11.8 | 750 | 26.1 |
| 80 | 11.8 | 800 | 26.3 |
| 90 | 13.6 | 850 | 26.0 |
| 100 | 14.4 | 900 | 27.6 |
| 120 | 15.6 | 950 | 28.5 |
| 140 | 14.2 | 1000 | 28.3 |
| 160 | 14.1 | | |
| 180 | 14.8 | | |
| 200 | 15.3 | | |
| 225 | 15.8 | | |
| 250 | 16.7 | | |
| 275 | 18.4 | | |
| 300 | 18.5 | | |
| 350 | 19.5 | | |
| 400 | 20.7 | | |

# AH-118

# DOUBLE RIDGE HORN ANTENNA

# S/N: 071370

# CALIBRATION DATE: JUNE 20, 2022

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 1000 | 24.06 | 10000 | 39.24 |
| 1500 | 25.16 | 10500 | 39.47 |
| 2000 | 28.25 | 11000 | 39.21 |
| 2500 | 28.54 | 11500 | 39.96 |
| 3000 | 29.67 | 12000 | 40.49 |
| 3500 | 30.58 | 12500 | 40.04 |
| 4000 | 31.56 | 13000 | 40.25 |
| 4500 | 32.17 | 13500 | 40.19 |
| 5000 | 33.40 | 14000 | 40.72 |
| 5500 | 33.88 | 14500 | 42.04 |
| 6000 | 34.29 | 15000 | 41.29 |
| 6500 | 34.89 | 15500 | 39.52 |
| 7000 | 36.92 | 16000 | 39.58 |
| 7500 | 37.40 | 16500 | 39.31 |
| 8000 | 37.65 | 17000 | 41.01 |
| 8500 | 37.97 | 17500 | 43.31 |
| 9000 | 37.92 | 18000 | 45.26 |
| 9500 | 38.63 | | |

# AH-826

# HORN ANTENNA

# S/N: 081081

| FREQUENCY (MHz) | FACTOR (dB) |
|---|---|
| 18000 | 36.6 |
| 18500 | 36.0 |
| 19000 | 36.1 |
| 19500 | 19.0 |
| 20000 | 38.6 |
| 20500 | 37.2 |
| 21000 | 37.6 |
| 21500 | 37.6 |
| 22000 | 37.4 |
| 22500 | 37.9 |
| 23000 | 37.4 |
| 23500 | 36.7 |
| 24000 | 37.4 |
| 24500 | 37.7 |
| 25000 | 38.3 |
| 25500 | 38.0 |
| 26000 | 38.2 |
| 26500 | 38.1 |

# COM-POWER PAM-118A

# PREAMPLIFIER

# S/N: 551015

# CALIBRATION DATE: JANUARY 20, 2022

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 500 | 39.86 | 7500 | 37.03 |
| 1000 | 39.80 | 8000 | 36.06 |
| 1100 | 40.25 | 8500 | 36.09 |
| 1200 | 39.77 | 9000 | 35.68 |
| 1300 | 40.12 | 9500 | 37.53 |
| 1400 | 39.93 | 10000 | 36.66 |
| 1500 | 40.05 | 11000 | 36.94 |
| 1600 | 40.00 | 12000 | 37.06 |
| 1700 | 40.03 | 13000 | 36.88 |
| 1800 | 40.40 | 14000 | 36.33 |
| 1900 | 40.02 | 15000 | 37.06 |
| 2000 | 39.74 | 16000 | 38.32 |
| 2500 | 39.95 | 17000 | 38.32 |
| 3000 | 39.99 | 18000 | 38.17 |
| 3500 | 39.92 | | |
| 4000 | 39.58 | | |
| 4500 | 39.00 | | |
| 5000 | 38.28 | | |
| 5500 | 37.42 | | |
| 6000 | 37.18 | | |
| 6500 | 37.00 | | |
| 7000 | 36.95 | | |

# COM-POWER PAM-118

# PREAMPLIFIER

# S/N: 443009

# CALIBRATION DATE: JANUARY 4, 2022

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 500 | 25.6 | 9500 | 21.5 |
| 1000 | 24.0 | 10000 | 21.8 |
| 1100 | 24.3 | 11000 | 21.3 |
| 1200 | 25.0 | 12000 | 21.0 |
| 1300 | 25.2 | 13000 | 19.8 |
| 1400 | 24.9 | 14000 | 19.0 |
| 1500 | 24.5 | 15000 | 19.8 |
| 1600 | 24.8 | 16000 | 20.1 |
| 1700 | 24.8 | 17000 | 19.3 |
| 1800 | 24.5 | 18000 | 18.5 |
| 1900 | 25.2 | | |
| 2000 | 24.9 | | |
| 2500 | 24.9 | | |
| 3000 | 24.9 | | |
| 3500 | 24.7 | | |
| 4000 | 24.6 | | |
| 4500 | 23.8 | | |
| 5000 | 23.6 | | |
| 5500 | 22.5 | | |
| 6000 | 21.5 | | |
| 6500 | 20.6 | | |
| 7000 | 20.3 | | |
| 7500 | 20.7 | | |
| 8000 | 21.4 | | |
| 8500 | 22.1 | | |
| 9000 | 22.5 | | |

# COM-POWER PAM-840

# PREAMPLIFIER

# S/N: 461268

# CALIBRATION DATE: JANUARY 17, 2022

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 18000 | 22.3 | 31500 | 20.8 |
| 19000 | 22.0 | 32000 | 21.0 |
| 20000 | 23.2 | 32500 | 20.4 |
| 21000 | 24.5 | 33000 | 20.3 |
| 22000 | 24.2 | 33500 | 20.3 |
| 23000 | 23.1 | 34000 | 18.6 |
| 24000 | 23.7 | 34500 | 20.3 |
| 25000 | 22.2 | 35000 | 19.7 |
| 26000 | 20.6 | 35500 | 19.2 |
| 26500 | 21.3 | 36000 | 20.9 |
| 27000 | 21.3 | 36500 | 21.4 |
| 27500 | 21.5 | 37000 | 20.4 |
| 28000 | 21.9 | 37500 | 20.7 |
| 28500 | 21.7 | 38000 | 20.6 |
| 29000 | 21.6 | 38500 | 19.6 |
| 29500 | 21.5 | 39000 | 19.7 |
| 30000 | 21.3 | 39500 | 20.0 |
| 30500 | 21.0 | 40000 | 19.6 |
| 31000 | 21.0 | | |
| | | | |
| | | | |

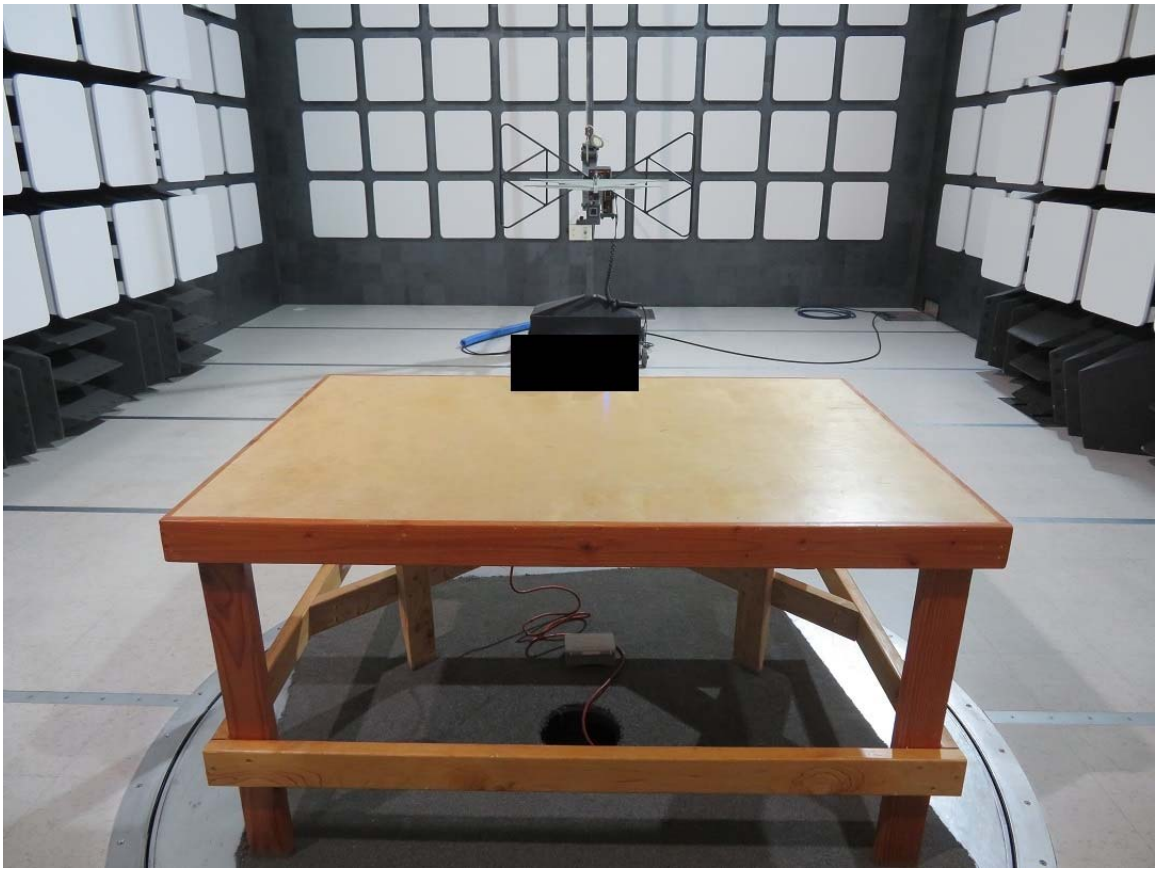
# COM-POWER PA-840

# PREAMPLIFIER

# S/N: 711883

# CALIBRATION DATE: JANUARY 17, 2022

| FREQUENCY (MHz) | FACTOR (dB) | FREQUENCY (MHz) | FACTOR (dB) |
|---|---|---|---|
| 18000 | 28.9 | 33500 | 25.3 |
| 19000 | 29.0 | 34000 | 25.2 |
| 20000 | 28.7 | 34500 | 25.7 |
| 21000 | 27.4 | 35000 | 25.8 |
| 22000 | 26.8 | 35500 | 26.8 |
| 23000 | 27.0 | 36000 | 27.4 |
| 24000 | 27.3 | 36500 | 27.2 |
| 25000 | 28.8 | 37000 | 29.0 |
| 26000 | 28.9 | 37500 | 29.6 |
| 26500 | 28.3 | 38000 | 29.5 |
| 27000 | 28.4 | 38500 | 27.7 |
| 27500 | 27.9 | 39000 | 28.2 |
| 28000 | 27.7 | 39500 | 27.4 |
| 28500 | 27.8 | 40000 | 27.4 |
| 29000 | 27.8 | | |
| 29500 | 27.5 | | |
| 30000 | 26.8 | | |
| 30500 | 27.3 | | |
| 31000 | 26.1 | | |
| 31500 | 26.2 | | |
| 32000 | 26.4 | | |
| 32500 | 26.5 | | |
| 33000 | 25.0 | | |



**FRONT VIEW**

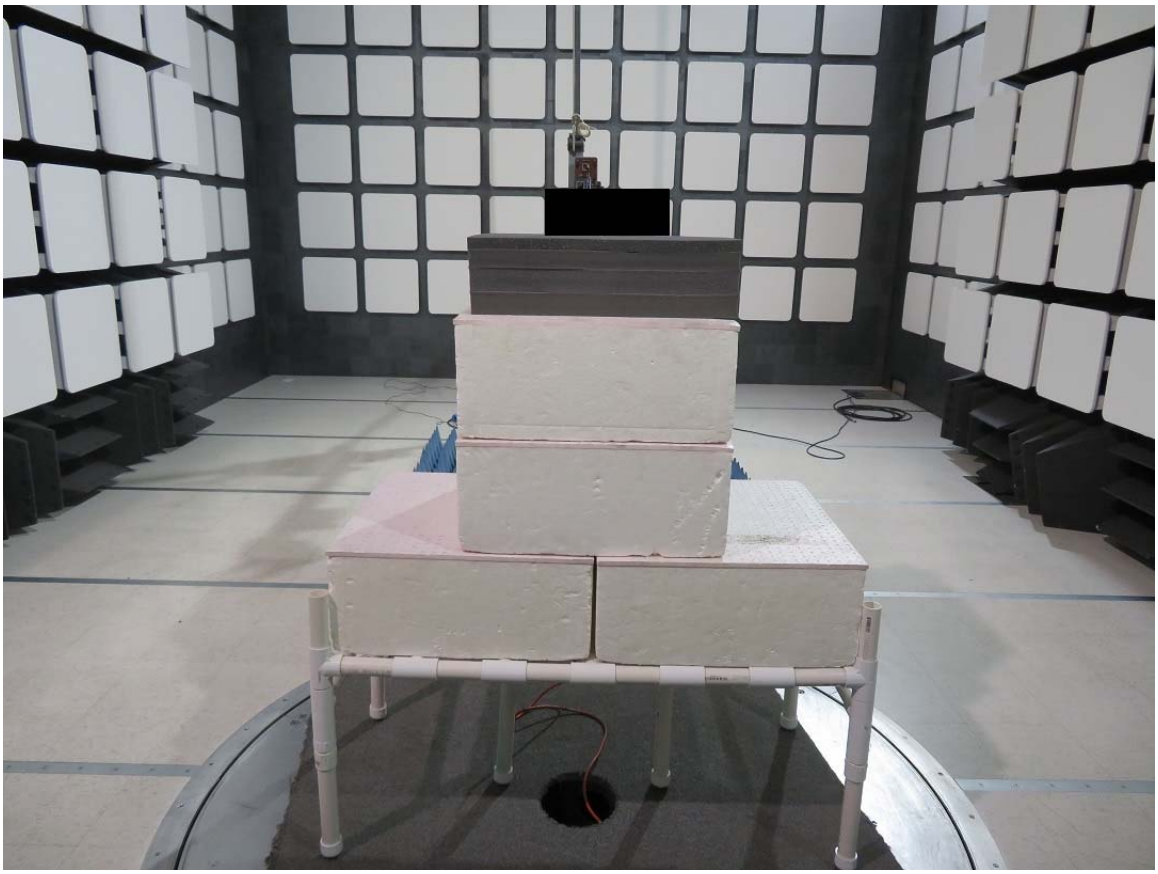
FLUME INC.
INTELLIGENT WATER MONITORING BRIDGE
MODEL NUMBER: F2700
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

**REAR VIEW**

FLUME INC.
INTELLIGENT WATER MONITORING BRIDGE
MODEL NUMBER: F2700
FCC SUBPART B AND C – RADIATED EMISSIONS – BELOW 1 GHz

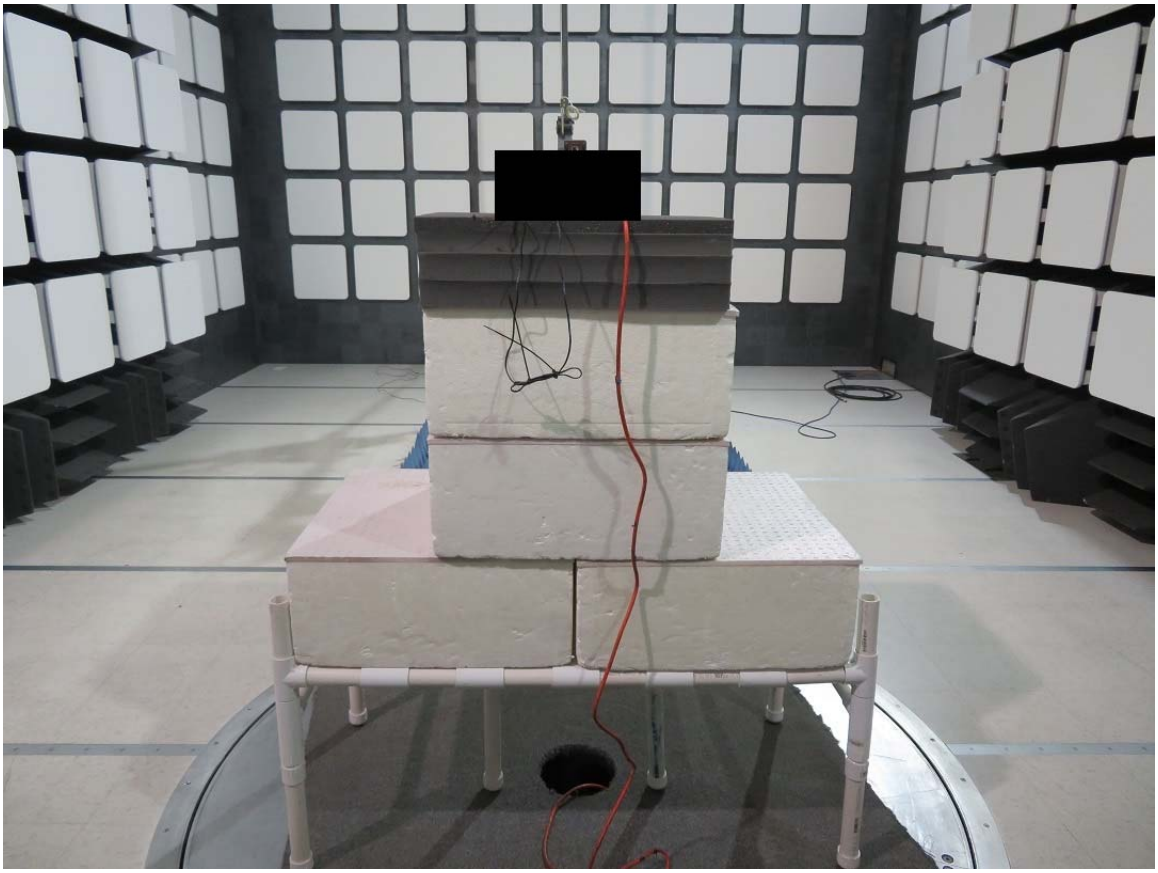
## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



**FRONT VIEW**

FLUME INC.
INTELLIGENT WATER MONITORING BRIDGE
MODEL NUMBER: F2700
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



**REAR VIEW**

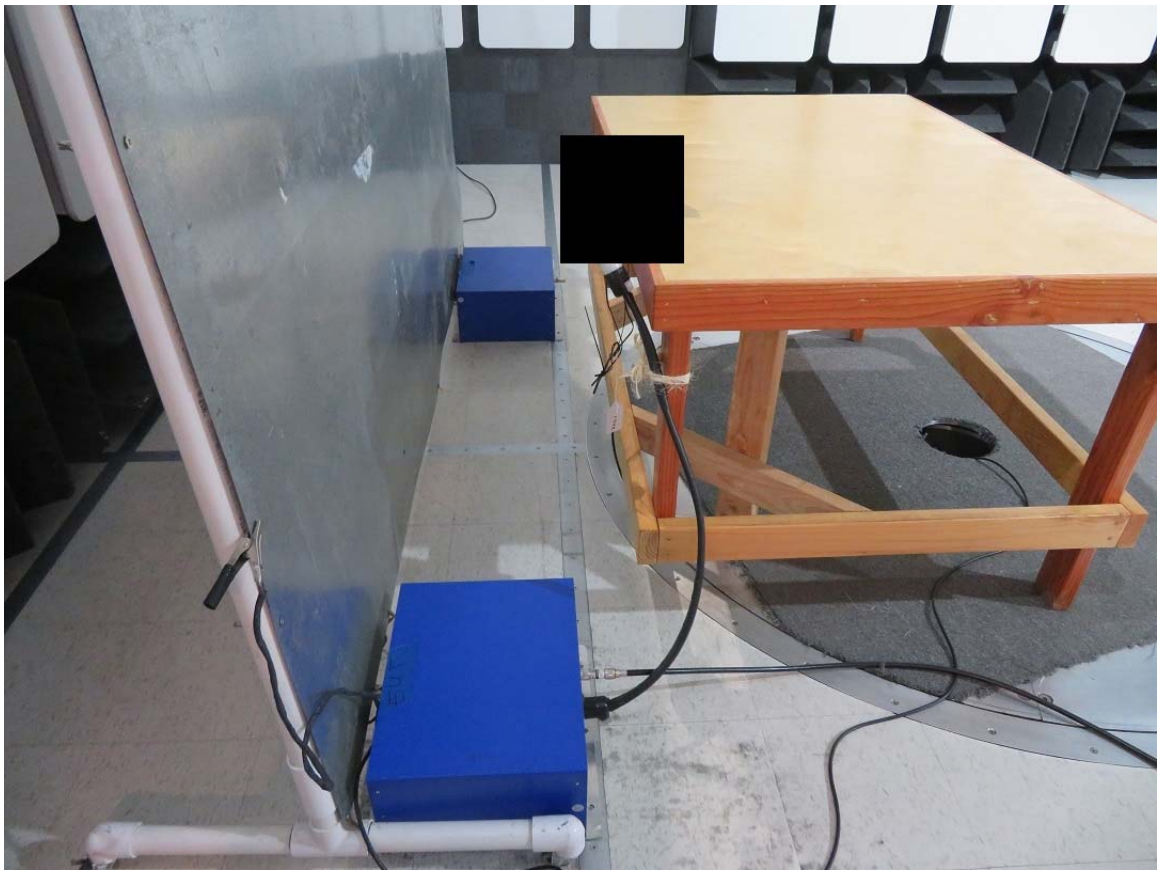
FLUME INC.
INTELLIGENT WATER MONITORING BRIDGE
MODEL NUMBER: F2700
FCC SUBPART B AND C – RADIATED EMISSIONS – ABOVE 1 GHz

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

**FRONT VIEW**

FLUME INC.
INTELLIGENT WATER MONITORING BRIDGE
MODEL NUMBER: F2700
FCC SUBPART B - CONDUCTED EMISSIONS – 3-3-23

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS



**REAR VIEW**

FLUME INC.
INTELLIGENT WATER MONITORING BRIDGE
MODEL NUMBER: F2700
FCC SUBPART B - CONDUCTED EMISSIONS – 3-3-23

## PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS

# APPENDIX E

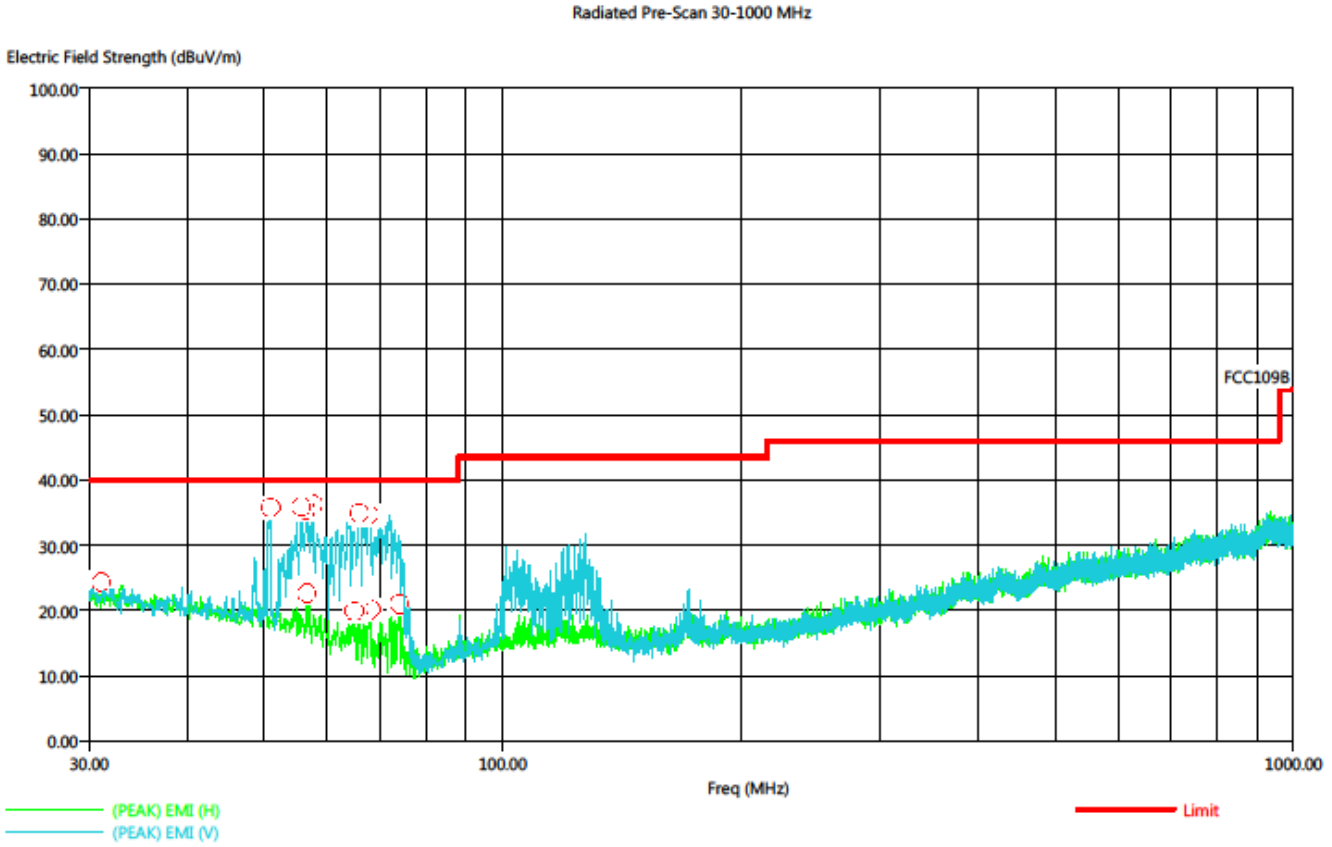
# *DATA SHEETS*

# *RADIATED EMISSIONS*

# *DATA SHEETS*
# *(hopping and WiFi enabled)*

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz Bridge hopping
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Bridge (hopping), WiFi enabled
Comments: Lab T
Clock Oscillators: 915 MHz & 2.4 GHz
Company: Flume Inc.
Model: F2700
Temperature: 52 F Humidity: 62 % Pressure: 29.2 inHg
Tested to: 24 GHz (no frequencies found above 1 GHz)

3/1/2023 8:34:29 AM
Sequence: Preliminary Scan



Title: Radiated Final 30-1000 MHz
File: Radiated Final 30-1000 MHz Bridge hopping
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Bridge (hopping), WiFi enabled
Comments: Lab T
Clock Oscillators: 915 MHz & 2.4 GHz
Company: Flume Inc.
Model: F2700
Temperature: 52 F Humidity: 62 % Pressure: 29.2 inHg
Tested to: 24 GHz (no frequencies found above 1 GHz)

3/1/2023 8:44:58 AM
Sequence: Final Measurements

Data

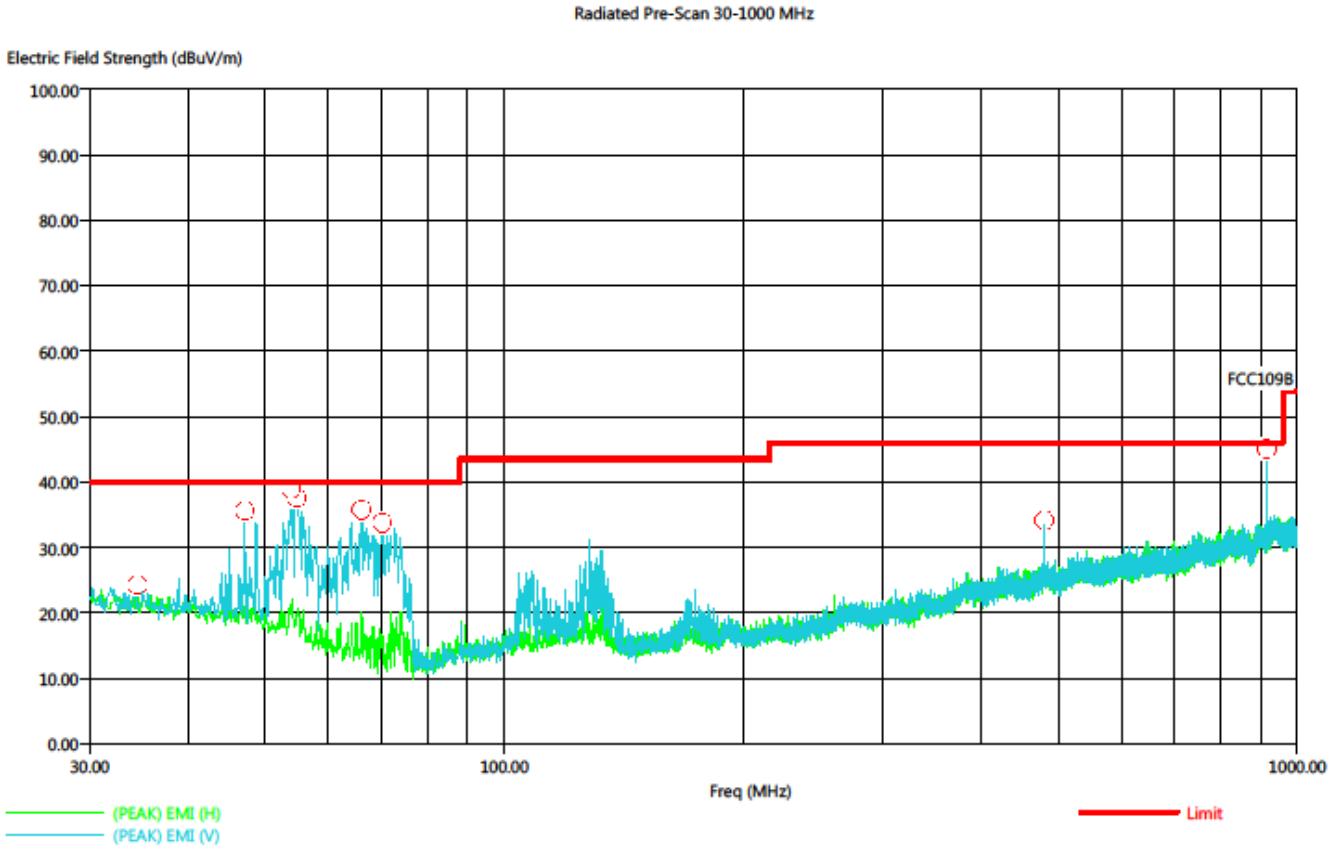
| Freq (MHz) | Pol | (PEAK) Trace (dBuV) | Cable (dB) | Transducer (dB) | (PEAK) EMI (dBuV/m) | (QP) EMI (dBuV/m) | Limit (dBuV/m) | (QP) Margin (dB) | Ttbl Aql (deg) | Twr Ht (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 31.10 | H | 0.77 | 0.72 | 21.59 | 23.08 | 19.52 | 40.00 | -20.48 | 66.00 | 288.50 |
| 50.90 | V | 16.50 | 0.79 | 17.91 | 35.20 | 29.21 | 40.00 | -10.79 | 359.00 | 153.00 |
| 55.70 | V | 16.48 | 0.82 | 16.28 | 33.58 | 28.80 | 40.00 | -11.20 | 3.30 | 209.00 |
| 56.40 | V | 22.18 | 0.83 | 15.87 | 38.88 | 35.15 | 40.00 | -4.85 | 36.40 | 127.00 |
| 56.60 | H | 6.51 | 0.83 | 15.86 | 23.20 | 19.81 | 40.00 | -20.19 | 322.10 | 276.10 |
| 57.60 | V | 18.74 | 0.84 | 15.52 | 35.09 | 31.42 | 40.00 | -8.58 | 199.00 | 132.90 |
| 65.00 | H | 5.56 | 0.91 | 12.81 | 19.28 | 14.09 | 40.00 | -25.91 | 228.80 | 125.10 |
| 65.90 | H | 4.14 | 0.92 | 12.46 | 17.53 | 14.40 | 40.00 | -25.60 | 233.20 | 309.80 |
| 65.90 | V | 23.99 | 0.93 | 12.38 | 37.29 | 32.56 | 40.00 | -7.44 | 185.40 | 131.40 |
| 67.70 | V | 23.40 | 0.95 | 11.80 | 36.14 | 32.22 | 40.00 | -7.78 | 201.20 | 144.30 |
| 68.10 | H | 8.45 | 0.94 | 11.87 | 21.27 | 16.83 | 40.00 | -23.17 | 265.50 | 343.70 |
| 74.10 | H | 10.71 | 0.99 | 10.62 | 22.32 | 17.11 | 40.00 | -22.89 | 212.60 | 285.10 |

1

# *RADIATED EMISSIONS SINGLE CHANNEL (worst case findings)*

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz Bridge 915
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Bridge (915), WiFi enabled
Comments: Lab T
Clock Oscillators: 915 MHz & 2.4 GHz
Company: Flume Inc.
Model: F2700
Temperature: 62 F Humidity: 46 % Pressure: 29.3 inHg
Tested to: 24 GHz (no frequencies found above 1 GHz)

3/2/2023 8:30:28 AM
Sequence: Preliminary Scan



Title: Radiated Final 30-1000 MHz
File: Radiated Final 30-1000 MHz Bridge 915
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Bridge (915), WiFi enabled
Comments: Lab T
Clock Oscillators: 915 MHz & 2.4 GHz
Company: Flume Inc.
Model: F2700
Temperature: 62 F Humidity: 46 % Pressure: 29.3 inHg
Tested to: 24 GHz (no frequencies found above 1 GHz)

3/2/2023 8:53:29 AM
Sequence: Final Measurements

Data

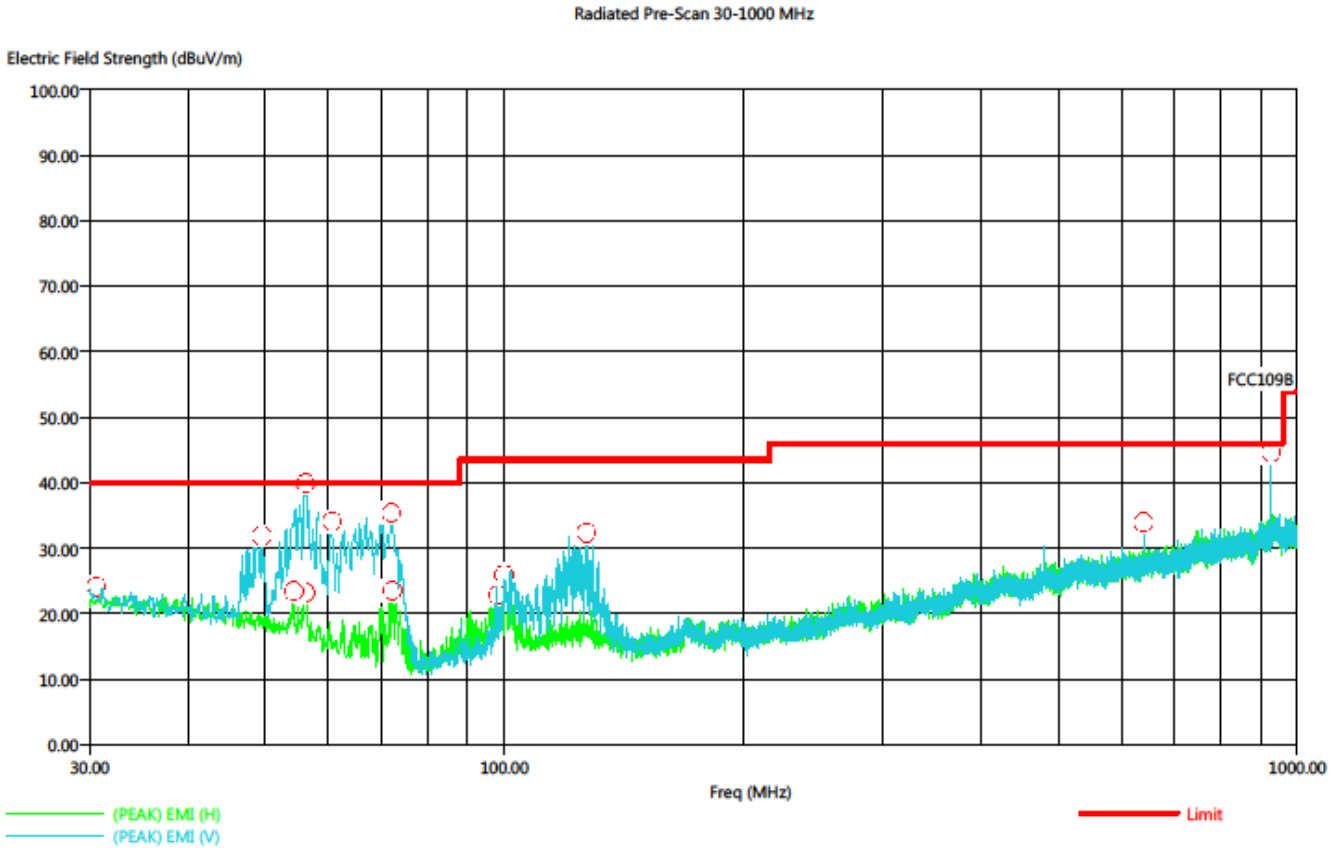
| Freq (MHz) | Pol | (PEAK) Trace (dBuV) | Cable (dB) | Transducer (dB) | (PEAK) EMI (dBuV/m) | (QP) EMI (dBuV/m) | Limit (dBuV/m) | (QP) Margin (dB) | Ttbl Aql (deg) | Twr Ht (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 34.50 | H | 0.18 | 0.73 | 20.85 | 21.75 | 18.74 | 40.00 | -21.26 | 5.20 | 340.40 |
| 47.10 | V | 11.16 | 0.78 | 18.62 | 30.55 | 23.79 | 40.00 | -16.21 | 238.50 | 192.80 |
| 53.90 | V | 17.72 | 0.81 | 16.90 | 35.44 | 30.45 | 40.00 | -9.55 | 177.70 | 191.50 |
| 54.80 | V | 19.77 | 0.82 | 16.60 | 37.19 | 33.91 | 40.00 | -6.09 | 208.20 | 139.00 |
| 55.70 | V | 17.28 | 0.83 | 16.25 | 34.35 | 30.11 | 40.00 | -9.89 | 38.30 | 142.60 |
| 66.10 | H | 5.34 | 0.92 | 12.39 | 18.65 | 15.24 | 40.00 | -24.76 | 57.90 | 128.30 |
| 66.10 | V | 21.06 | 0.92 | 12.38 | 34.37 | 31.11 | 40.00 | -8.89 | 358.70 | 147.50 |
| 72.10 | H | 9.17 | 0.98 | 10.89 | 21.04 | 17.30 | 40.00 | -22.70 | 42.40 | 253.80 |
| 74.20 | H | 9.73 | 0.99 | 10.60 | 21.32 | 16.97 | 40.00 | -23.03 | 17.90 | 279.50 |
| 133.10 | H | 1.80 | 1.29 | 14.89 | 17.98 | 14.76 | 43.52 | -28.76 | 25.30 | 178.70 |
| 480.00 | H | 9.65 | 2.56 | 22.60 | 34.81 | 33.87 | 46.00 | -12.13 | 220.70 | 123.50 |
| 480.00 | V | 9.95 | 2.56 | 22.60 | 35.11 | 33.18 | 46.00 | -12.82 | 163.50 | 132.80 |

1

# *RADIATED EMISSIONS CO-LOCATION, HOPPING MODE AND RECEIVE MODE DATA SHEETS*

Title: Radiated Pre-Scan 30-1000 MHz
File: Radiated Pre-Scan 30-1000 MHz co location
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Co-location, hopping, WiFi and receiving modes
Comments: Lab T
Clock Oscillators: 915 MHz & 2.4 GHz
Company: Flume Inc.
Model: F2700
Temperature: 52 F Humidity: 62 % Pressure: 29.2 inHg
Tested to: 24 GHz (no frequencies found above 1 GHz)

3/1/2023 12:06:12 PM
Sequence: Preliminary Scan



Title: Radiated Final 30-1000 MHz
File: Radiated Final 30-1000 MHz co location
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Co-location, hopping, WiFi and receiving modes
Comments: Lab T
Clock Oscillators:
Company: Flume Inc.
Model: F2700
Temperature: 52 F Humidity: 62 % Pressure: 29.2 inHg
Tested to: 24 GHz (no frequencies found above 1 GHz)

3/1/2023 12:17:38 PM
Sequence: Final Measurements

Data

| Freq (MHz) | Pol | (PEAK) Trace (dBuV) | Cable (dB) | Transducer (dB) | (PEAK) EMI (dBuV/m) | (QP) EMI (dBuV/m) | Limit (dBuV/m) | (QP) Margin (dB) | Ttbl Aql (deg) | Twr Ht (cm) |
|---|---|---|---|---|---|---|---|---|---|---|
| 30.60 | H | 0.75 | 0.72 | 21.60 | 23.07 | 19.73 | 40.00 | -20.27 | 351.40 | 141.20 |
| 49.50 | V | 13.23 | 0.79 | 18.26 | 32.28 | 27.75 | 40.00 | -12.25 | 0.00 | 144.30 |
| 54.30 | H | 6.03 | 0.82 | 16.68 | 23.53 | 17.91 | 40.00 | -22.09 | 356.30 | 170.90 |
| 56.20 | H | 7.26 | 0.83 | 16.00 | 24.09 | 20.22 | 40.00 | -19.78 | 295.30 | 125.10 |
| 56.20 | V | 22.10 | 0.83 | 16.00 | 38.93 | 35.59 | 40.00 | -4.41 | 352.20 | 126.00 |
| 60.70 | V | 17.80 | 0.85 | 14.45 | 33.11 | 29.84 | 40.00 | -10.16 | 167.10 | 123.50 |
| 72.10 | V | 24.07 | 0.98 | 10.90 | 35.95 | 33.03 | 40.00 | -6.97 | 185.80 | 166.60 |
| 72.30 | H | 7.99 | 0.98 | 10.91 | 19.88 | 15.32 | 40.00 | -24.68 | 87.20 | 123.50 |
| 98.30 | H | 7.63 | 1.09 | 13.96 | 22.68 | 17.11 | 43.52 | -26.41 | 195.40 | 353.30 |
| 100.00 | H | 7.71 | 1.10 | 14.08 | 22.89 | 20.76 | 43.52 | -22.76 | 164.60 | 237.50 |
| 127.00 | V | 14.62 | 1.27 | 15.50 | 31.39 | 28.53 | 43.52 | -14.99 | 186.40 | 124.20 |
| 640.00 | V | 5.89 | 3.08 | 23.90 | 32.87 | 30.61 | 46.00 | -15.39 | 74.00 | 122.10 |

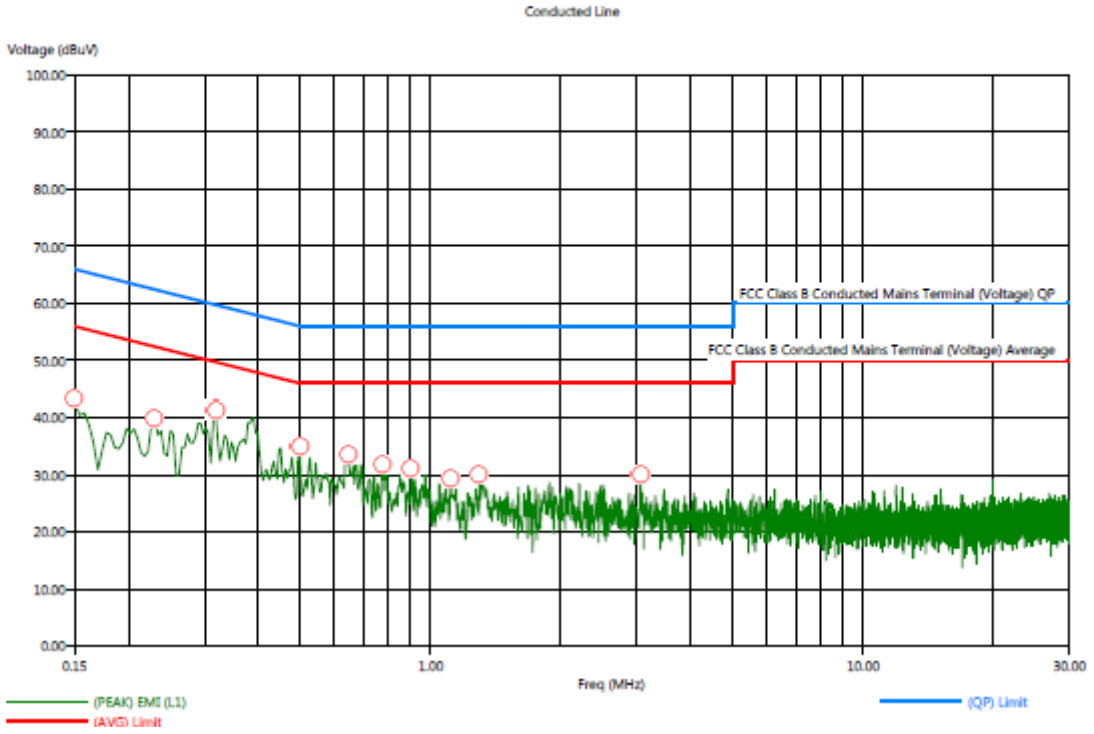
1

# *CONDUCTED EMISSIONS*

# *DATA SHEETS*

Title: Conducted Emissions - Line
File: Conducted - Pre-Test - Line 120
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Bridge AC adapter, 915 MHz worst case
Comments: Lab T
Company: Flume Inc.
Model: F2700
Voltage: 120

3/3/2023 1:22:37 PM
Sequence: Preliminary Scan



Title: Conducted Emissions - Line
File: Conducted - Final Test - Line 120
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Bridge AC adapter, 915 MHz worst case
Comments: Lab T
Company: Flume Inc.
Model: F2700
Voltage: 120

3/3/2023 1:24:11 PM
Sequence: Final Measurements

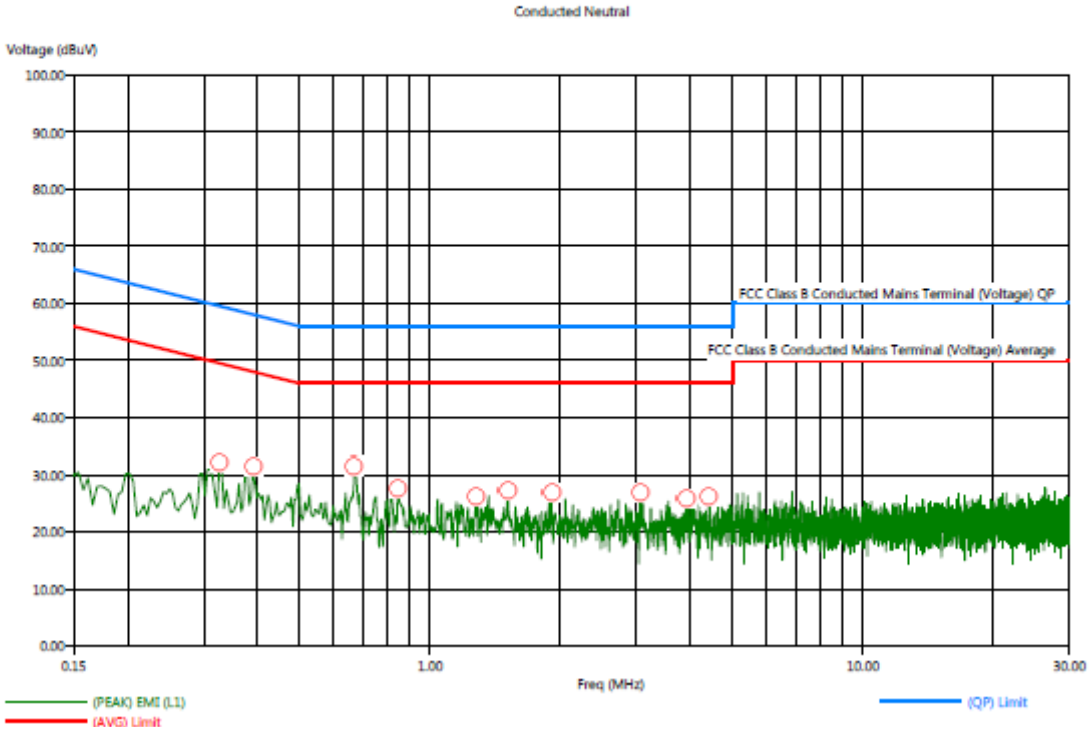
Data

| Freq (MHz) | (PEAK) EMI (dBuV) | (AVG) EMI (dBuV) | (QP) EMI (dBuV) | (AVG) Limit (dBuV) | (QP) Limit (dBuV) | (AVG) Margin AVL (dB) | (QP) Margin QPL (dB) |
|---|---|---|---|---|---|---|---|
| 0.15 | 47.22 | 37.75 | 41.86 | 55.87 | 65.87 | -18.12 | -24.01 |
| 0.23 | 39.79 | 33.99 | 38.06 | 52.76 | 62.76 | -18.77 | -24.70 |
| 0.32 | 38.73 | 30.24 | 36.23 | 49.69 | 59.69 | -19.45 | -23.46 |
| 0.50 | 36.63 | 27.53 | 32.02 | 46.14 | 56.14 | -18.61 | -24.12 |
| 0.65 | 34.51 | 21.97 | 30.79 | 46.00 | 56.00 | -24.03 | -25.21 |
| 0.77 | 30.57 | 22.30 | 29.83 | 46.00 | 56.00 | -23.70 | -26.17 |
| 0.90 | 27.59 | 22.21 | 28.01 | 46.00 | 56.00 | -23.79 | -27.99 |
| 1.11 | 27.27 | 21.31 | 27.66 | 46.00 | 56.00 | -24.69 | -28.34 |
| 1.30 | 27.14 | 20.68 | 26.34 | 46.00 | 56.00 | -25.32 | -29.66 |
| 3.05 | 25.76 | 18.58 | 24.43 | 46.00 | 56.00 | -27.42 | -31.57 |

1

Title: Conducted Emissions - Neutral
File: Conducted - Pre-Test - Neutral 120
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Bridge AC adapter, 915 MHz worst case
Comments: Lab T
Company: Flume Inc.
Model: F2700
Voltage: 120

3/3/2023 1:27:04 PM
Sequence: Preliminary Scan



Title: Conducted Emissions - Neutral
File: Conducted - Final Test - Neutral 120
Operator: R. Ramirez
EUT Type: Intelligent Water Monitoring Bridge
EUT Condition: Bridge AC adapter, 915 MHz worst case
Comments: Lab T
Company: Flume Inc.
Model: F2700
Voltage: 120

3/3/2023 1:28:23 PM
Sequence: Final Measurements

Data

| Freq (MHz) | (PEAK) EMI (dBuV) | (AVG) EMI (dBuV) | (QP) EMI (dBuV) | (AVG) Limit (dBuV) | (QP) Limit (dBuV) | (AVG) Margin AVL (dB) | (QP) Margin QPL (dB) |
|---|---|---|---|---|---|---|---|
| 0.33 | 31.52 | 20.26 | 29.58 | 49.67 | 59.67 | -29.42 | -30.10 |
| 0.39 | 33.64 | 25.30 | 33.06 | 48.07 | 58.07 | -22.77 | -25.01 |
| 0.67 | 25.89 | 18.28 | 24.86 | 46.00 | 56.00 | -27.72 | -31.14 |
| 0.84 | 24.33 | 16.15 | 22.65 | 46.00 | 56.00 | -29.85 | -33.35 |
| 1.28 | 24.19 | 16.60 | 22.69 | 46.00 | 56.00 | -29.40 | -33.31 |
| 1.51 | 24.34 | 16.16 | 22.44 | 46.00 | 56.00 | -29.84 | -33.56 |
| 1.91 | 24.59 | 17.24 | 22.34 | 46.00 | 56.00 | -28.76 | -33.66 |
| 3.07 | 26.56 | 16.06 | 21.74 | 46.00 | 56.00 | -29.94 | -34.26 |
| 3.90 | 24.67 | 15.97 | 20.88 | 46.00 | 56.00 | -30.03 | -35.12 |
| 4.41 | 23.67 | 16.51 | 20.94 | 46.00 | 56.00 | -29.49 | -35.06 |

1

**FCC 15.247**

Flume Inc.
Intelligent Water Monitoring Bridge
M/N: F2700

Date: 3/2/2023
Lab: T
Tested By: Rey Ramirez

**Non Harmonic Emissions from the Tx and Digital Portion - 9 kHz to 30 MHz**
**Non Harmonic Emissions from the Tx and Digital Portion - 1 GHz to 24.8 GHz**

| Freq. (MHz) | Level (dBuV/m) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Table Angle (deg) | Ant. Height (cm) | Comments |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 9 kHz to 30 MHz |
| | | | | | | | | for the digital portion |
| | | | | | | | | of the EUT |
| | | | | | | | | |
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 9 kHz to 30 MHz |
| | | | | | | | | for the Non-Harmonic Emissions |
| | | | | | | | | of the Transmitter for the EUT |
| | | | | | | | | |
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 1 GHz to 24.8 GHz |
| | | | | | | | | for the digital portion |
| | | | | | | | | of the EUT |
| | | | | | | | | |
| | | | | | | | | No Emissions Detected |
| | | | | | | | | from 1 GHz to 24.8 GHz |
| | | | | | | | | for the Non-Harmonic Emissions |
| | | | | | | | | of the Transmitter for the EUT |
| | | | | | | | | |
| | | | | | | | | Receive mode on all channels of the 900 MHz FHSS were checked. |
| | | | | | | | | No spurious emissions found |
| | | | | | | | | |
| | | | | | | | | Receive mode, 900 MHz FHSS and WiFi were tested during the |
| | | | | | | | | Co-location test with the Bridge |
| | | | | | | | | And Sensor communicating with |
| | | | | | | | | Each other. |
| | | | | | | | | Please see Appendix E for the |
| | | | | | | | | Data sheets. |
| | | | | | | | | |
| | | | | | | | | |

# HARMONIC EMISSIONS LOW CHANNEL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **FCC 15.247** | | | | | | | | |
| Company: | Flume Inc. | | | | | | Date: | 3/2/2023 |
| EUT: | Intelligent Water Monitoring Bridge | | | | | | Lab: | T |
| Model: | F2700 | | | | | | Test ENG: | R. Ramirez |

**Compatible Electronics, Inc. ( Lab T )**

| Freq. (MHz) | Level (dBuV/m) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 1805.00 | 56.57 | H | 73.98 | -17.41 | Peak | 1.99 | 138 | |
| 1805.00 | 45.40 | H | 53.98 | -8.58 | Avg | 1.99 | 138 | |
| | | | | | | | | |
| 2707.50 | | H | | | Peak | | | **In Restricted Band** |
| 2707.50 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 3610.00 | | H | | | Peak | | | **In Restricted Band** |
| 3610.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 4512.50 | | H | | | Peak | | | **In Restricted Band** |
| 4512.50 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 5415.00 | | H | | | Peak | | | **In Restricted Band** |
| 5415.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 6317.50 | | H | | | Peak | | | **No emissions found** |
| 6317.50 | | H | | | Avg | | | |
| | | | | | | | | |
| 7220.00 | | H | | | Peak | | | **No emissions found** |
| 7220.00 | | H | | | Avg | | | |
| | | | | | | | | |
| 8122.50 | | H | | | Peak | | | **In Restricted Band** |
| 8122.50 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 9025.00 | | H | | | Peak | | | **In Restricted Band** |
| 9025.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |

Test distance
3 meter

# HARMONIC EMISSIONS LOW CHANNEL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **FCC 15.247** | | | | | | | | |
| Company: | Flume Inc. | | | | | | Date: | 3/2/2023 |
| EUT: | Intelligent Water Monitoring Bridge | | | | | | Lab: | T |
| Model: | F2700 | | | | | | Test ENG: | R. Ramirez |

**Compatible Electronics, Inc. ( Lab T )**

| Freq. (MHz) | Level (dBuV/m) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 1805.00 | 57.33 | V | 73.98 | -16.65 | Peak | 2 | 69.1 | |
| 1805.00 | 46.32 | V | 53.98 | -7.66 | Avg | 2 | 69.1 | |
| | | | | | | | | |
| 2707.50 | | V | | | Peak | | | **In Restricted Band** |
| 2707.50 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 3610.00 | | V | | | Peak | | | **In Restricted Band** |
| 3610.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 4512.50 | | V | | | Peak | | | **In Restricted Band** |
| 4512.50 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 5415.00 | | V | | | Peak | | | **In Restricted Band** |
| 5415.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 6317.50 | | V | | | Peak | | | **No emissions found** |
| 6317.50 | | V | | | Avg | | | |
| | | | | | | | | |
| 7220.00 | | V | | | Peak | | | **No emissions found** |
| 7220.00 | | V | | | Avg | | | |
| | | | | | | | | |
| 8122.50 | | V | | | Peak | | | **In Restricted Band** |
| 8122.50 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 9025.00 | | V | | | Peak | | | **In Restricted Band** |
| 9025.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |

Test distance
3 meter

# HARMONIC EMISSIONS MID CHANNEL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **FCC 15.247** | | | | | | | | |
| Company: | Flume Inc. | | | | | | Date: | 3/2/2023 |
| EUT: | Intelligent Water Monitoring Bridge | | | | | | Lab: | T |
| Model: | F2700 | | | | | | Test ENG: | R. Ramirez |

**Compatible Electronics, Inc. ( Lab T )**

| Freq. (MHz) | Level (dBuV/m) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 1830.00 | 56.77 | H | 73.98 | -17.21 | Peak | 2.00 | 232.7 | |
| 1830.00 | 46.01 | H | 53.98 | -7.97 | Avg | 2.00 | 232.7 | |
| | | | | | | | | |
| 2745.00 | 62.09 | H | 73.98 | -11.89 | Peak | 2.00 | 19.9 | **In Restricted Band** |
| 2745.00 | 51.14 | H | 53.98 | -2.84 | Avg | 2.00 | 19.9 | **In Restricted Band** |
| | | | | | | | | |
| 3660.00 | | H | | | Peak | | | **In Restricted Band** |
| 3660.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 4575.00 | | H | | | Peak | | | **In Restricted Band** |
| 4575.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 5490.00 | | H | | | Peak | | | **No emissions found** |
| 5490.00 | | H | | | Avg | | | |
| | | | | | | | | |
| 6405.00 | | H | | | Peak | | | **No emissions found** |
| 6405.00 | | H | | | Avg | | | |
| | | | | | | | | |
| 7320.00 | | H | | | Peak | | | **In Restricted Band** |
| 7320.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 8235.00 | | H | | | Peak | | | **In Restricted Band** |
| 8235.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 9150.00 | | H | | | Peak | | | **In Restricted Band** |
| 9150.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |

Test distance
3 meter

# HARMONIC EMISSIONS MID CHANNEL

| | | | |
|---|---|---|---|
| **FCC 15.247** | | | |
| Company: | Flume Inc. | Date: | 3/2/2023 |
| EUT: | Intelligent Water Monitoring Bridge | Lab: | T |
| Model: | F2700 | Test ENG: | R. Ramirez |

**Compatible Electronics, Inc. ( Lab T )**

| Freq. (MHz) | Level (dBuV/m) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 1830.00 | 58.63 | V | 73.98 | -15.35 | Peak | 1.5 | 346.8 | |
| 1830.00 | 46.56 | V | 53.98 | -7.42 | Avg | 1.5 | 346.8 | |
| | | | | | | | | |
| 2745.00 | 62.84 | V | 73.98 | -11.14 | Peak | 1.89 | 105 | **In Restricted Band** |
| 2745.00 | 51.66 | V | 53.98 | -2.32 | Avg | 1.89 | 105 | **In Restricted Band** |
| | | | | | | | | |
| 3660.00 | | V | | | Peak | | | **In Restricted Band** |
| 3660.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 4575.00 | | V | | | Peak | | | **In Restricted Band** |
| 4575.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 5490.00 | | V | | | Peak | | | **No emissions found** |
| 5490.00 | | V | | | Avg | | | |
| | | | | | | | | |
| 6405.00 | | V | | | Peak | | | **No emissions found** |
| 6405.00 | | V | | | Avg | | | |
| | | | | | | | | |
| 7320.00 | | V | | | Peak | | | **In Restricted Band** |
| 7320.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 8235.00 | | V | | | Peak | | | **In Restricted Band** |
| 8235.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 9150.00 | | V | | | Peak | | | **In Restricted Band** |
| 9150.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |

Test distance
3 meter

# HARMONIC EMISSIONS HIGH CHANNEL

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **FCC 15.247** | | | | | | | | |
| Company: | Flume Inc. | | | | | | Date: | 3/2/2023 |
| EUT: | Intelligent Water Monitoring Bridge | | | | | | Lab: | T |
| Model: | F2700 | | | | | | Test ENG: | R. Ramirez |

**Compatible Electronics, Inc. ( Lab T )**

| Freq. (MHz) | Level (dBuV/m) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 1854.00 | 59.24 | H | 73.98 | -14.74 | Peak | 1.89 | 115.3 | |
| 1854.00 | 47.47 | H | 53.98 | -6.51 | Avg | 1.89 | 115.3 | |
| | | | | | | | | |
| 2781.00 | 62.49 | H | 73.98 | -11.49 | Peak | 2 | 332.54 | **In Restricted Band** |
| 2781.00 | 51.44 | H | 53.98 | -2.54 | Avg | 2 | 332.54 | **In Restricted Band** |
| | | | | | | | | |
| 3708.00 | | H | | | Peak | | | **In Restricted Band** |
| 3708.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 4635.00 | | H | | | Peak | | | **In Restricted Band** |
| 4635.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 5562.00 | | H | | | Peak | | | **No emissions found** |
| 5562.00 | | H | | | Avg | | | |
| | | | | | | | | |
| 6489.00 | | H | | | Peak | | | **No emissions found** |
| 6489.00 | | H | | | Avg | | | |
| | | | | | | | | |
| 7416.00 | | H | | | Peak | | | **In Restricted Band** |
| 7416.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 8343.00 | | H | | | Peak | | | **In Restricted Band** |
| 8343.00 | | H | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 9270.00 | | H | | | Peak | | | **No emissions found** |
| 9270.00 | | H | | | Avg | | | |
| | | | | | | | | |

Test distance
3 meter

# HARMONIC EMISSIONS HIGH CHANNEL

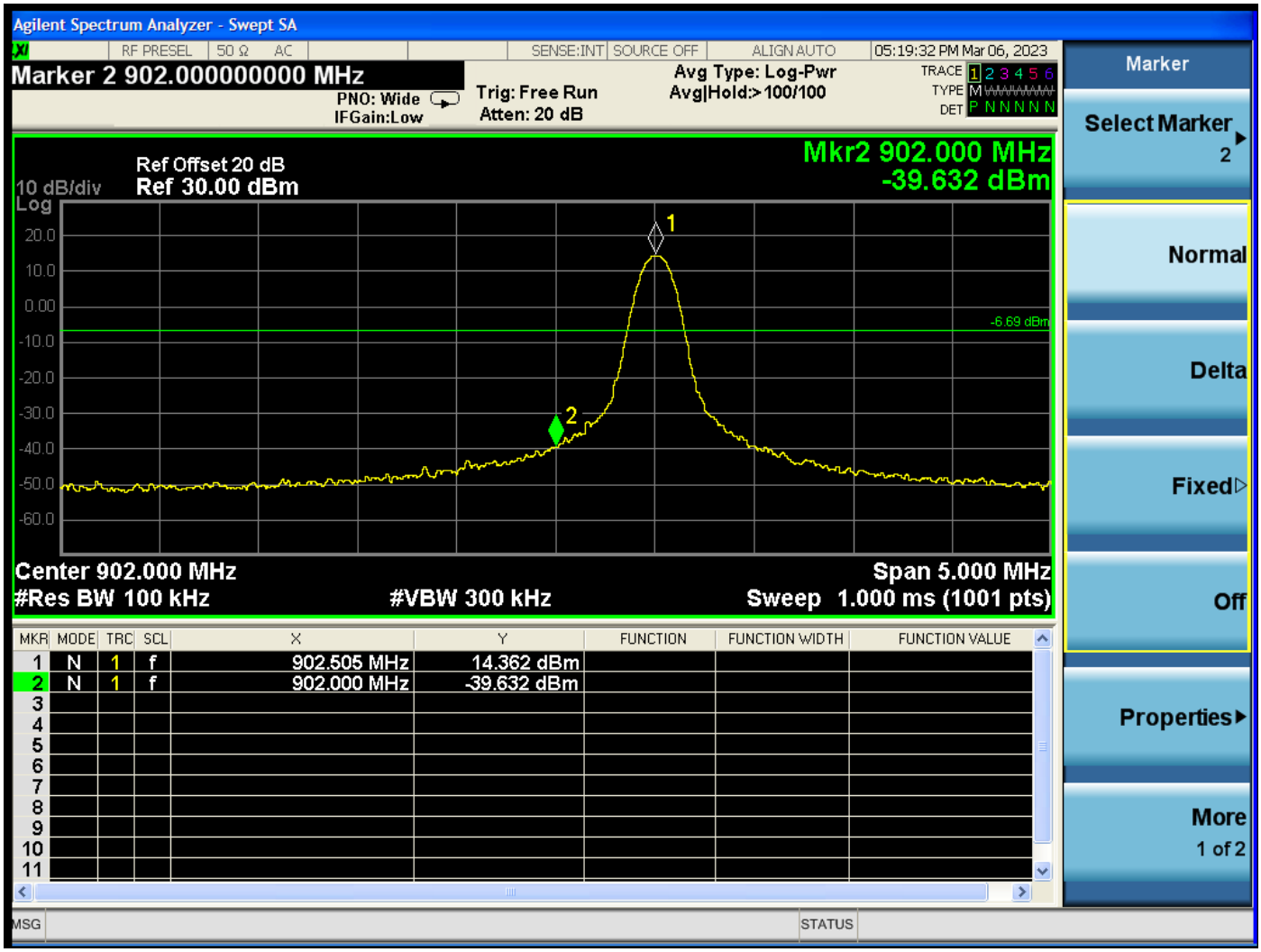
| | | | |
|---|---|---|---|
| **FCC 15.247** | | | |
| Company: | Flume Inc. | Date: | 3/2/2023 |
| EUT: | Intelligent Water Monitoring Bridge | Lab: | T |
| Model: | F2700 | Test ENG: | R. Ramirez |

**Compatible Electronics, Inc. ( Lab T )**

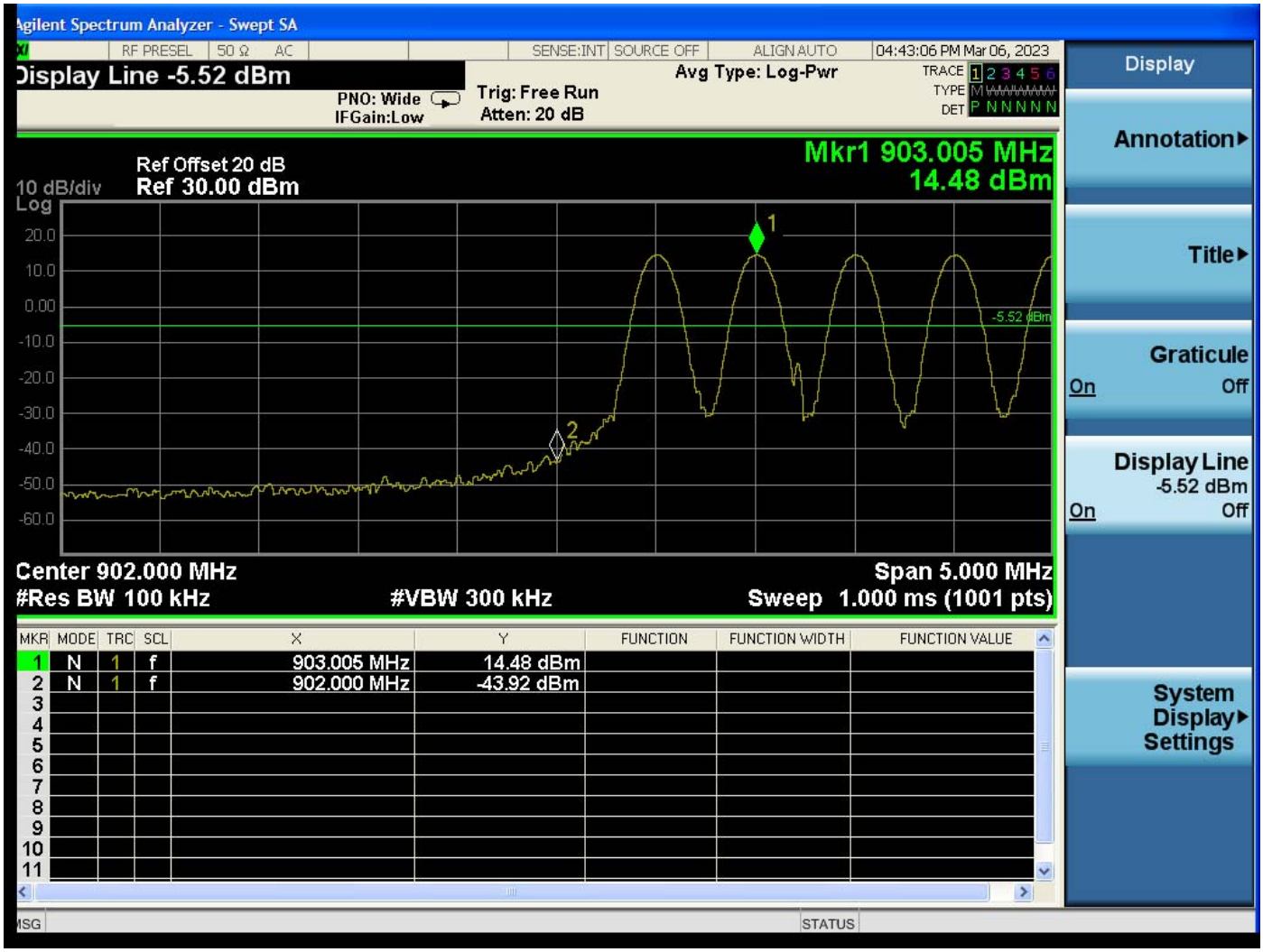
| Freq. (MHz) | Level (dBuV/m) | Pol (v/h) | Limit | Margin | Peak / QP / Avg | Ant. Height (m) | Table Angle (deg) | Comments |
|---|---|---|---|---|---|---|---|---|
| 1854.00 | 56.81 | V | 73.98 | -17.17 | Peak | 1.94 | 255.4 | |
| 1854.00 | 45.91 | V | 53.98 | -8.07 | Avg | 1.94 | 255.4 | |
| | | | | | | | | |
| 2781.00 | 62.64 | V | 73.98 | -11.34 | Peak | 1.51 | 321.74 | **In Restricted Band** |
| 2781.00 | 51.23 | V | 53.98 | -2.75 | Avg | 1.51 | 321.74 | **In Restricted Band** |
| | | | | | | | | |
| 3708.00 | | V | | | Peak | | | **In Restricted Band** |
| 3708.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 4635.00 | | V | | | Peak | | | **In Restricted Band** |
| 4635.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 5562.00 | | V | | | Peak | | | **No emissions found** |
| 5562.00 | | V | | | Avg | | | |
| | | | | | | | | |
| 6489.00 | | V | | | Peak | | | **No emissions found** |
| 6489.00 | | V | | | Avg | | | |
| | | | | | | | | |
| 7416.00 | | V | | | Peak | | | **In Restricted Band** |
| 7416.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 8343.00 | | V | | | Peak | | | **In Restricted Band** |
| 8343.00 | | V | | | Avg | | | **No emissions found** |
| | | | | | | | | |
| 9270.00 | | V | | | Peak | | | **No emissions found** |
| 9270.00 | | V | | | Avg | | | |
| | | | | | | | | |

Test distance
3 meter

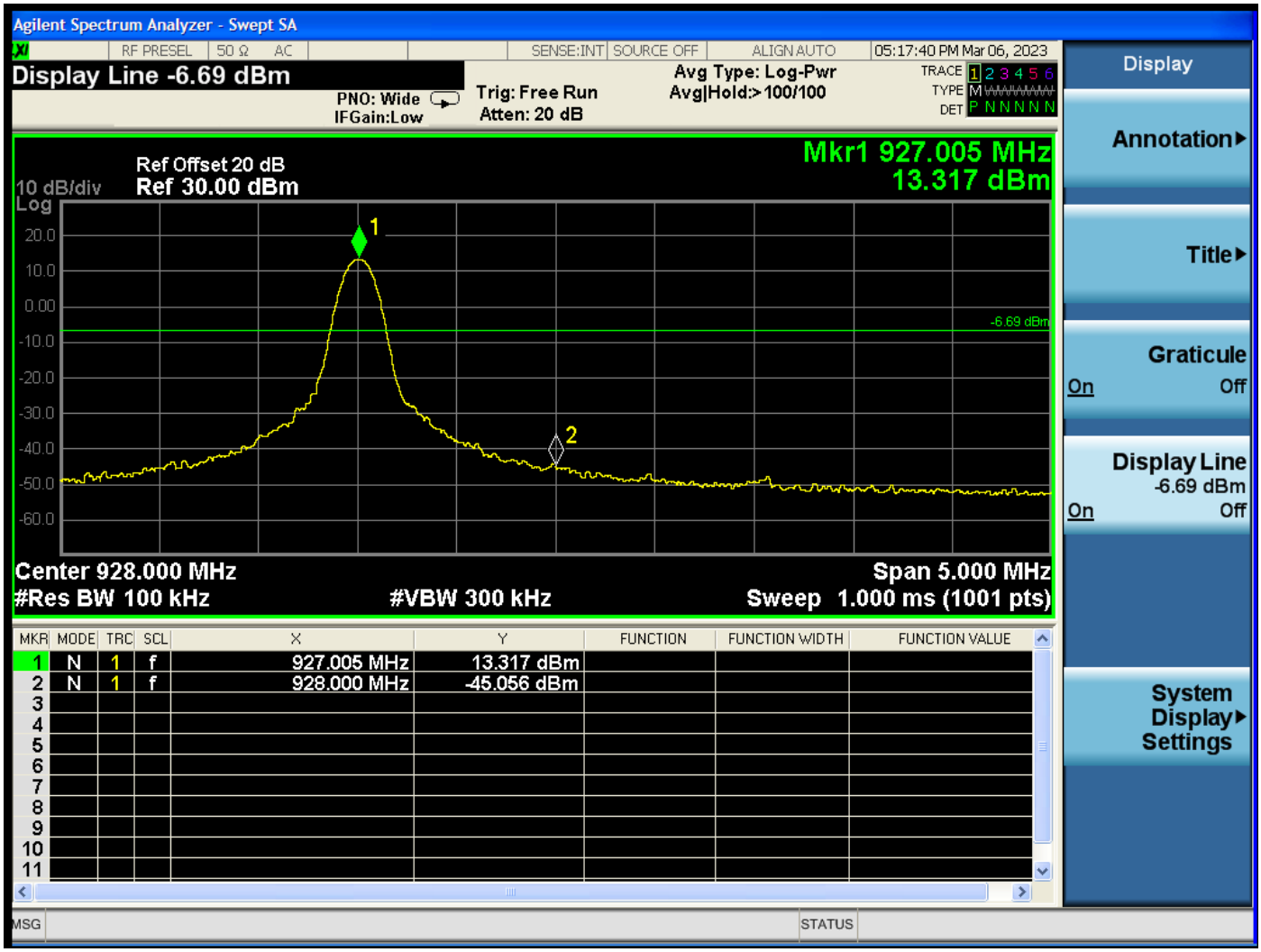
# *BAND EDGES DATA SHEETS*



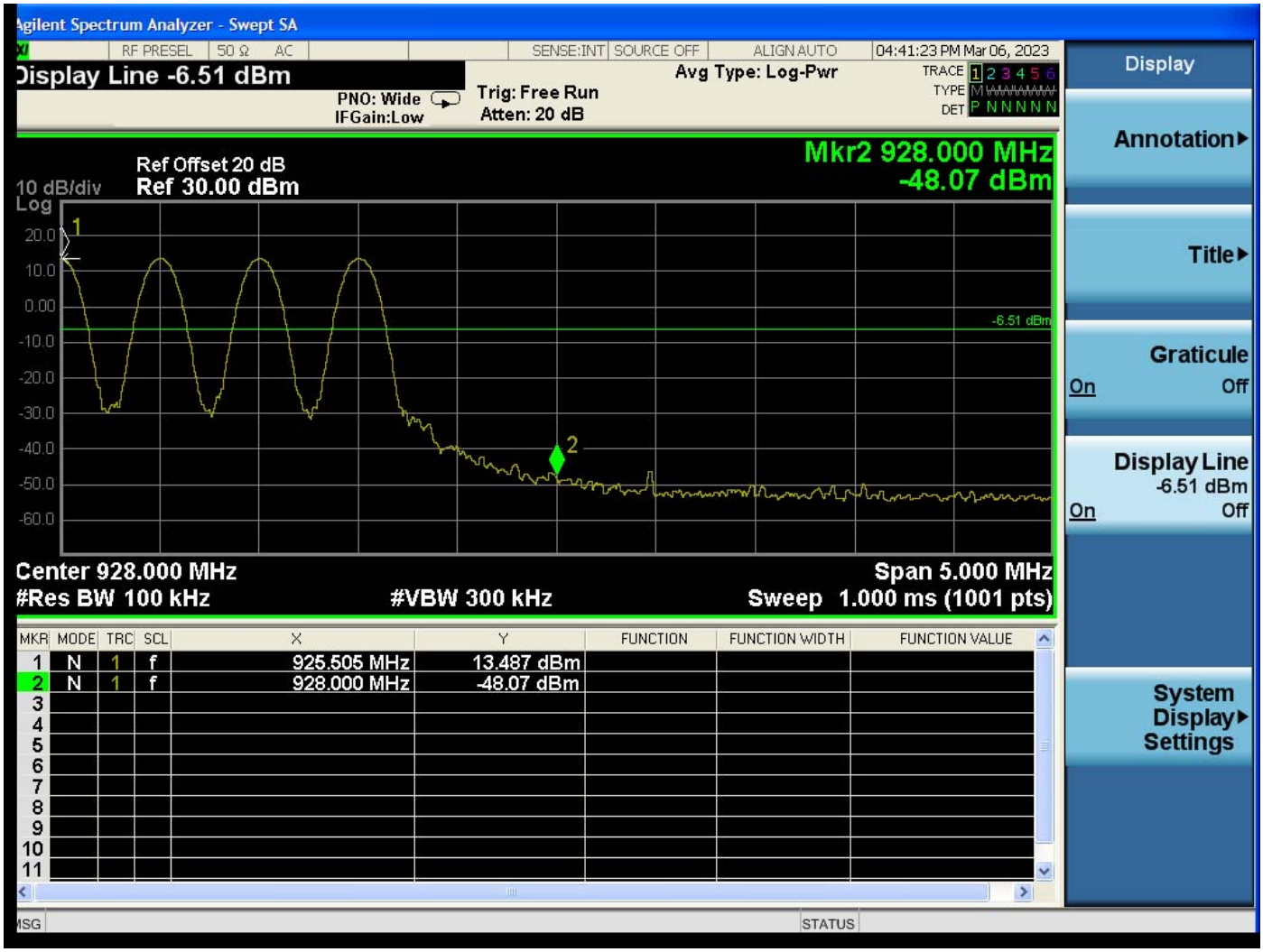

Band Edge – Low Channel – Fixed Frequency Mode




Band Edge – Low Channel - Frequency Hopping Mode

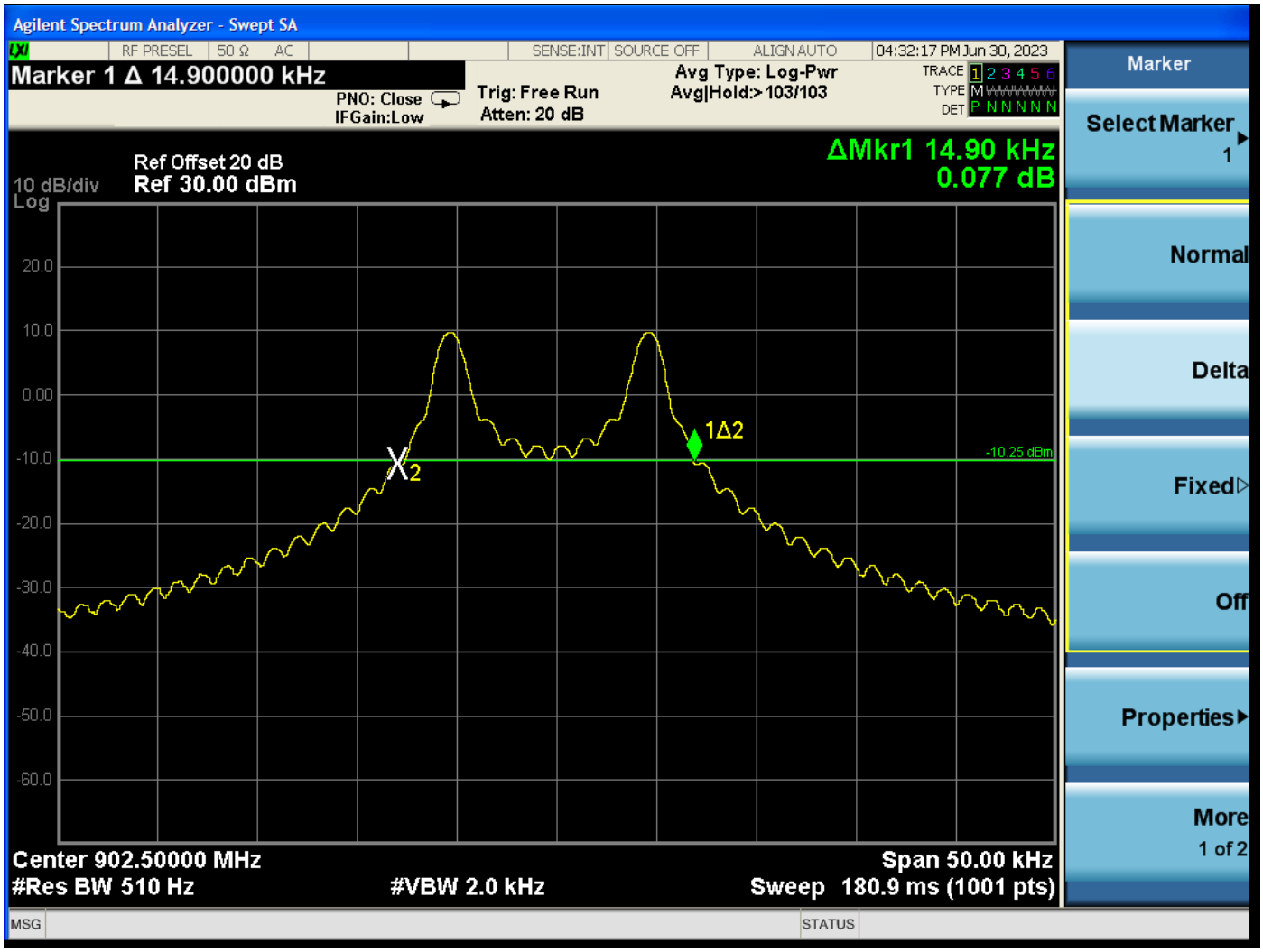



Band Edge – High Channel – Fixed Frequency Mode

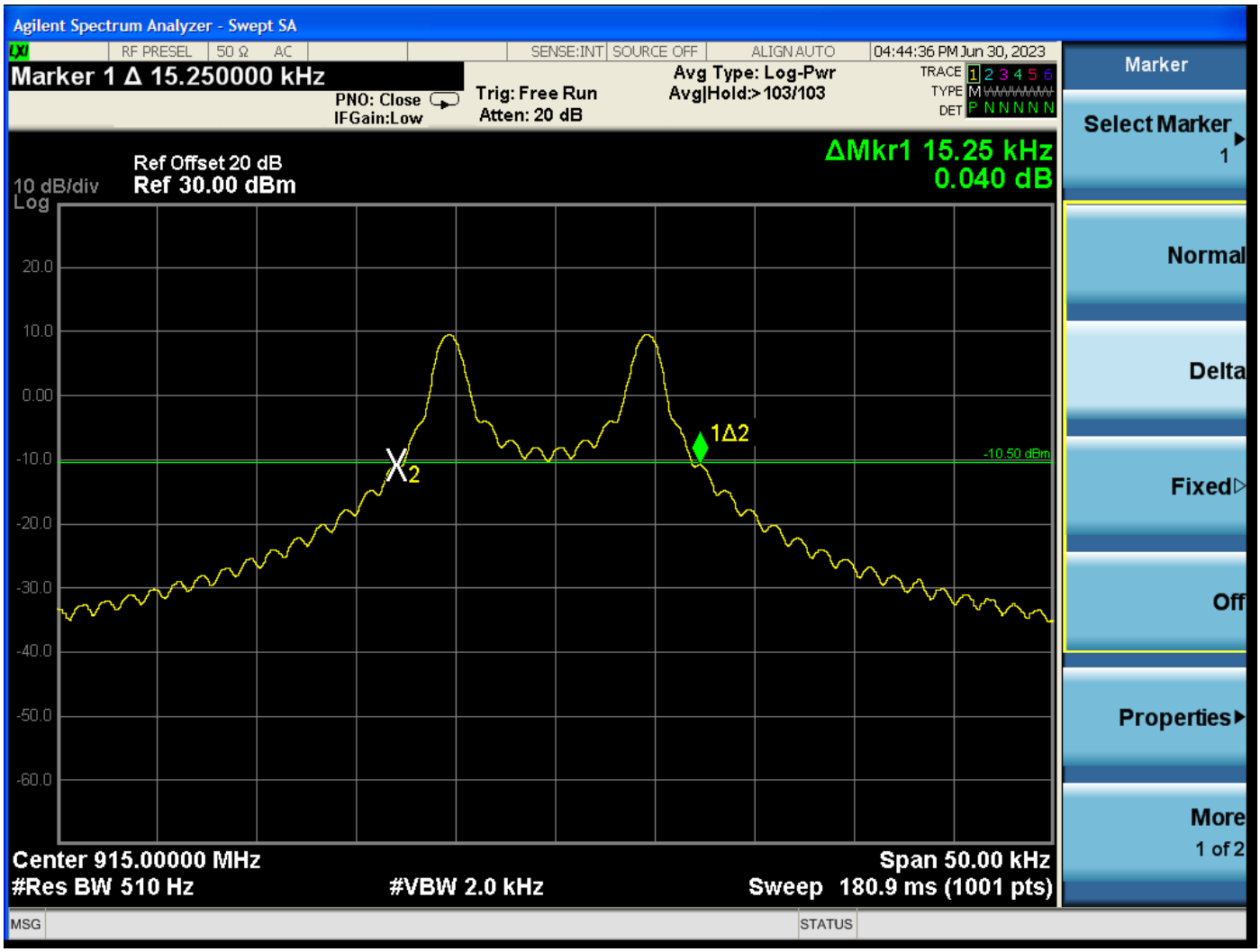



Band Edge – Frequency Hopping Mode

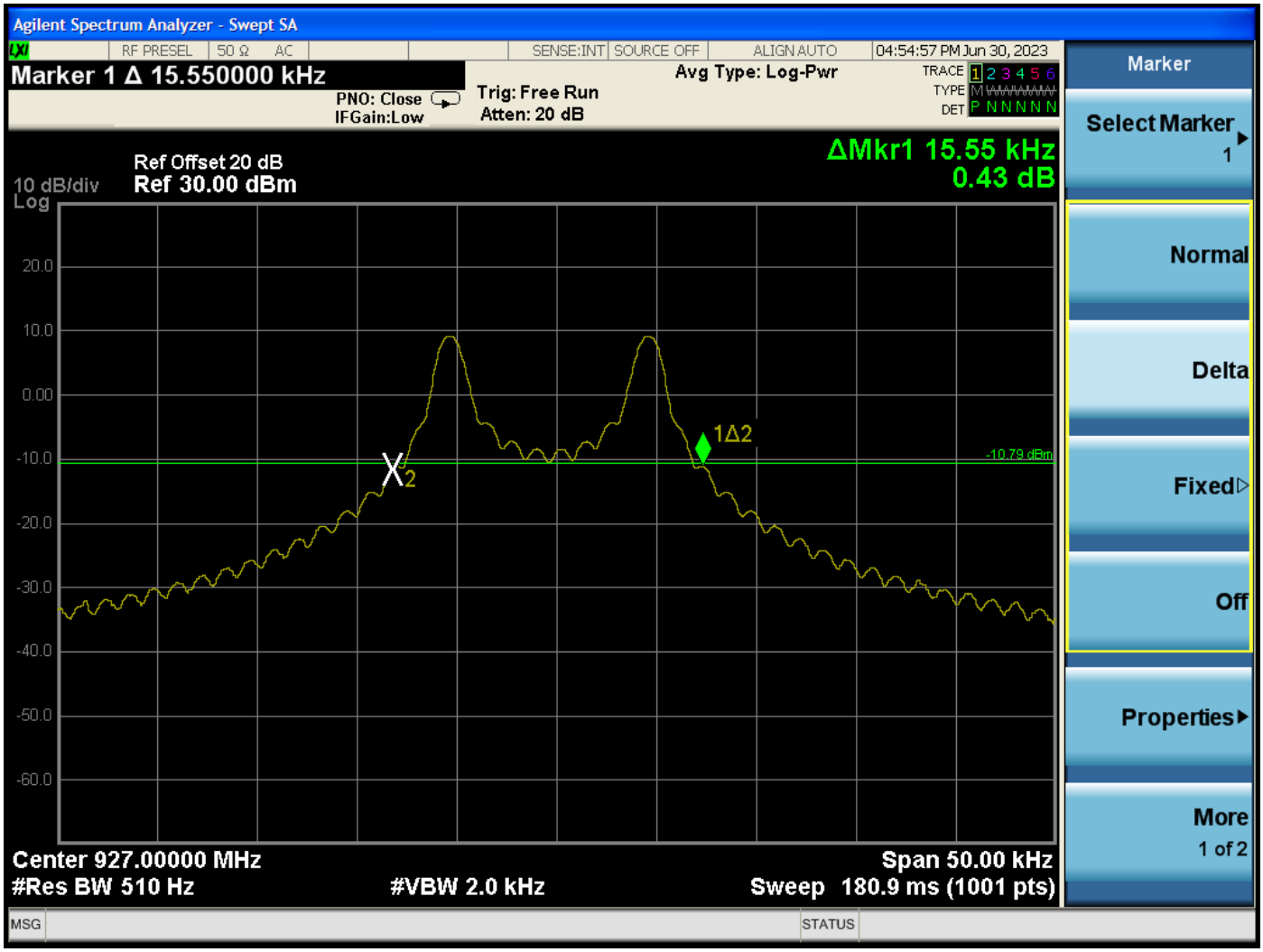
# *-20 DB BANDWIDTH DATA SHEETS*




-20 dB Bandwidth – Low Channel

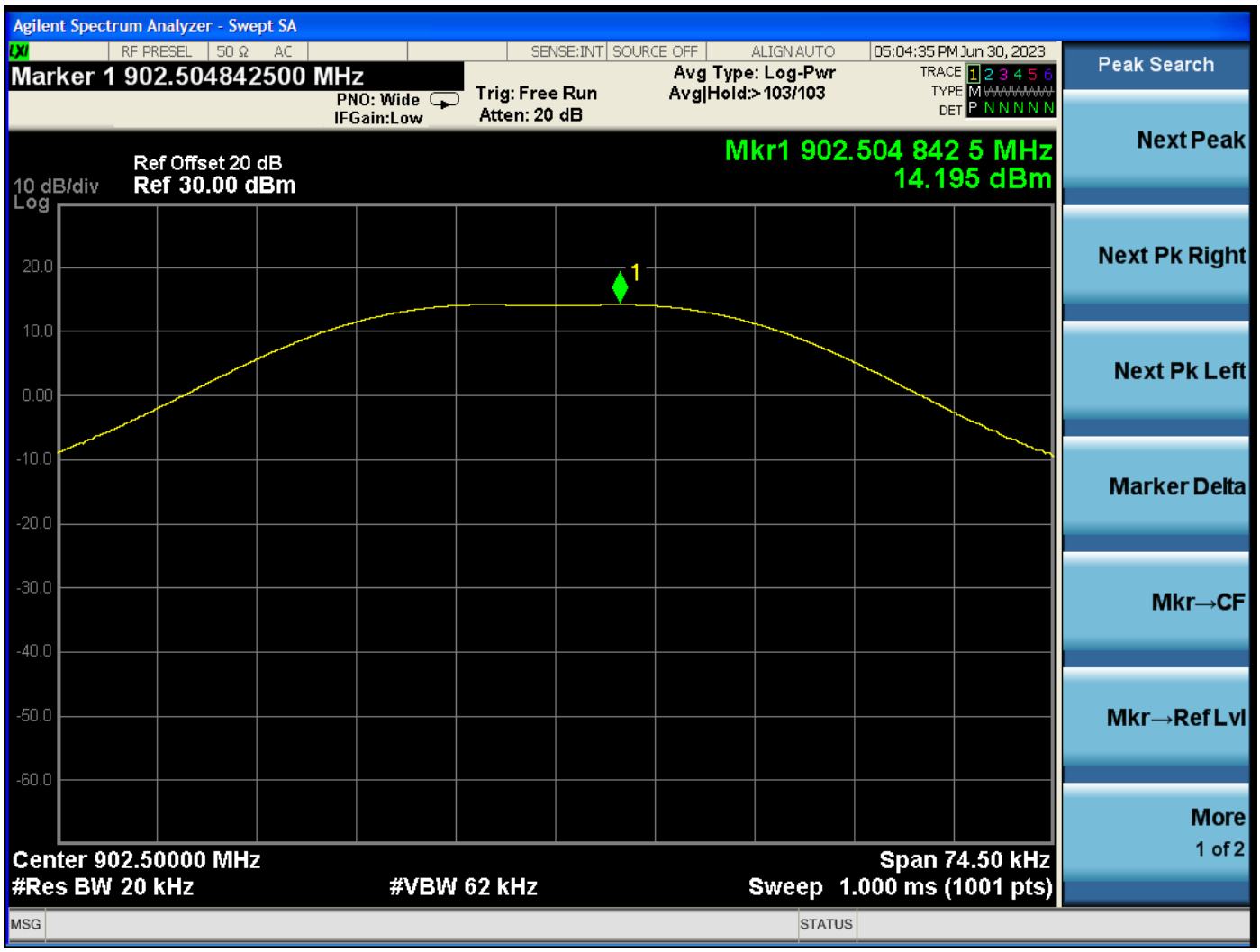



-20 dB Bandwidth – Middle Channel

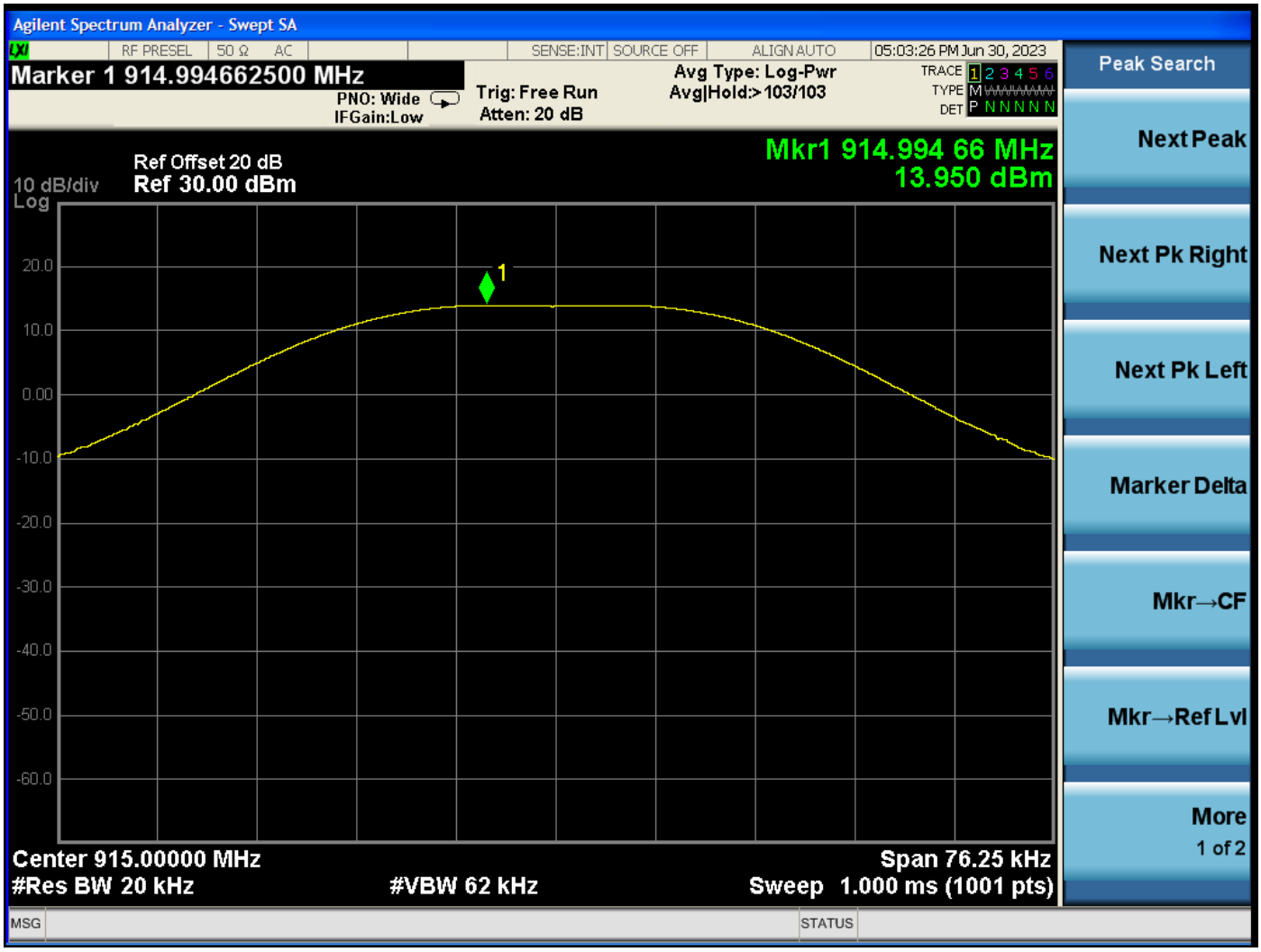



-20 dB Bandwidth – High Channel

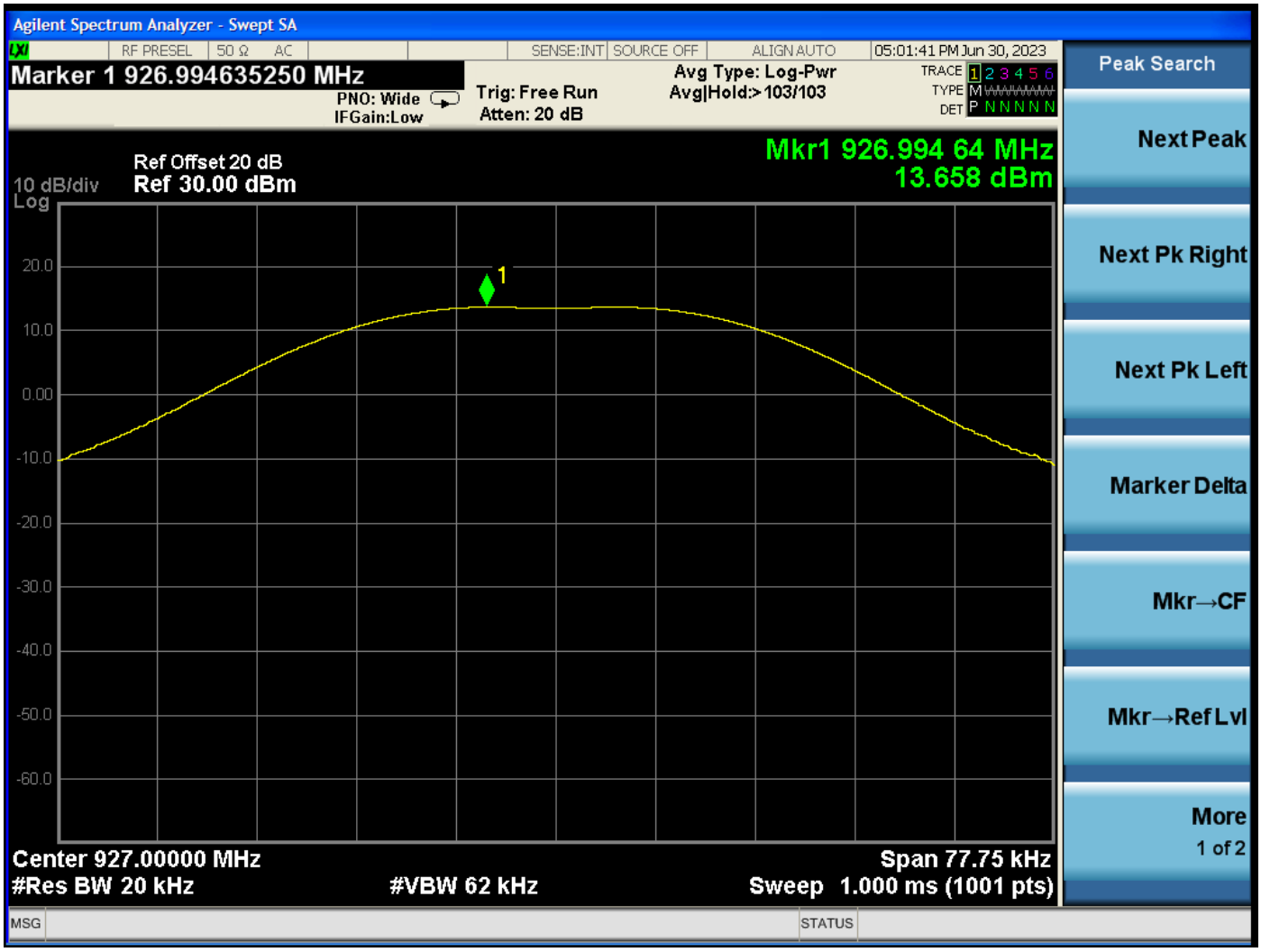
# *PEAK POWER OUTPUT DATA SHEETS*




Peak Output Power – Low Channel




Peak Output Power – Middle Channel



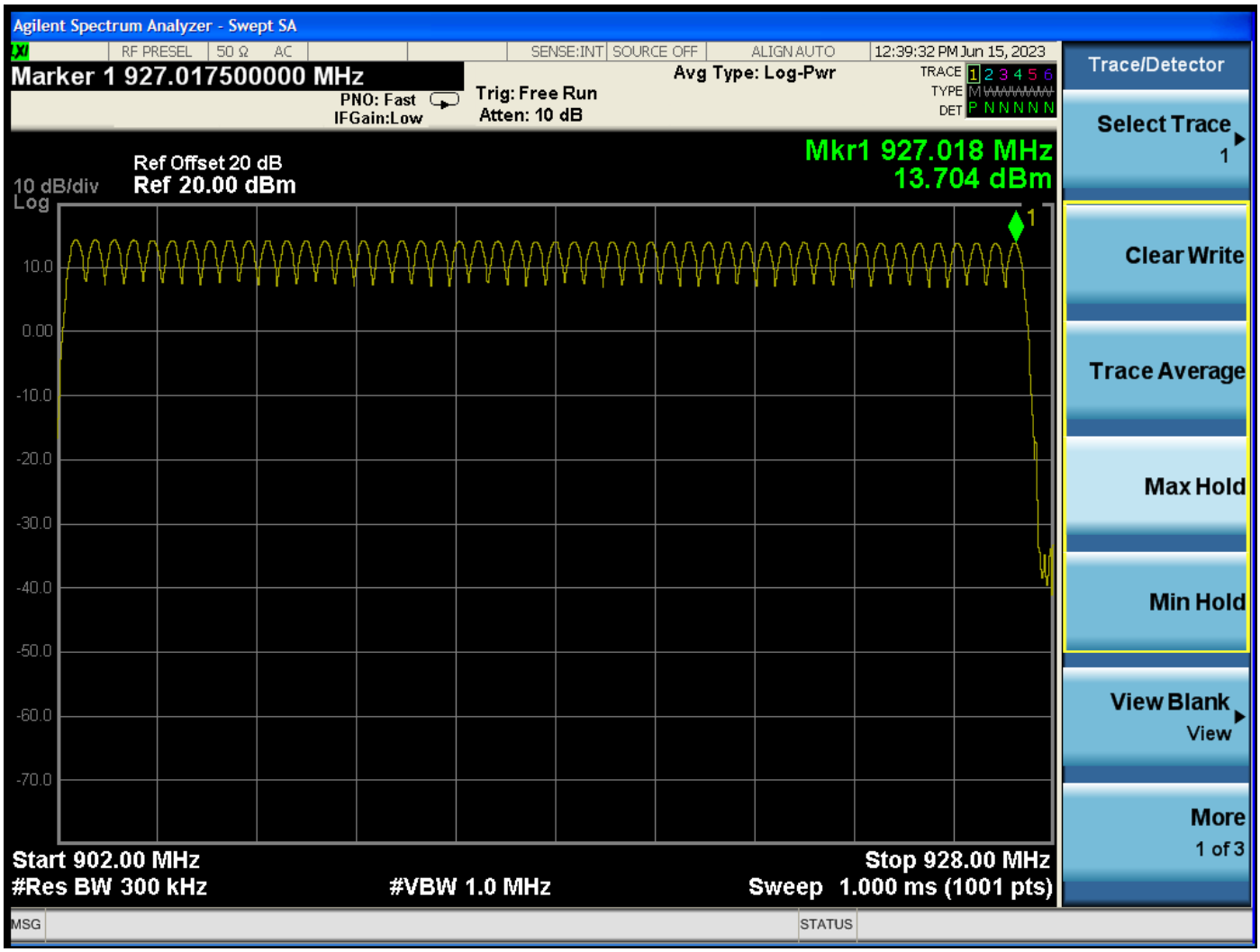

Peak Output Power – High Channel

# *CHANNEL FREQUENCY SEPARATION DATA SHEET*


Channel Frequency Separation

# *NUMBER OF FREQUENCIES*

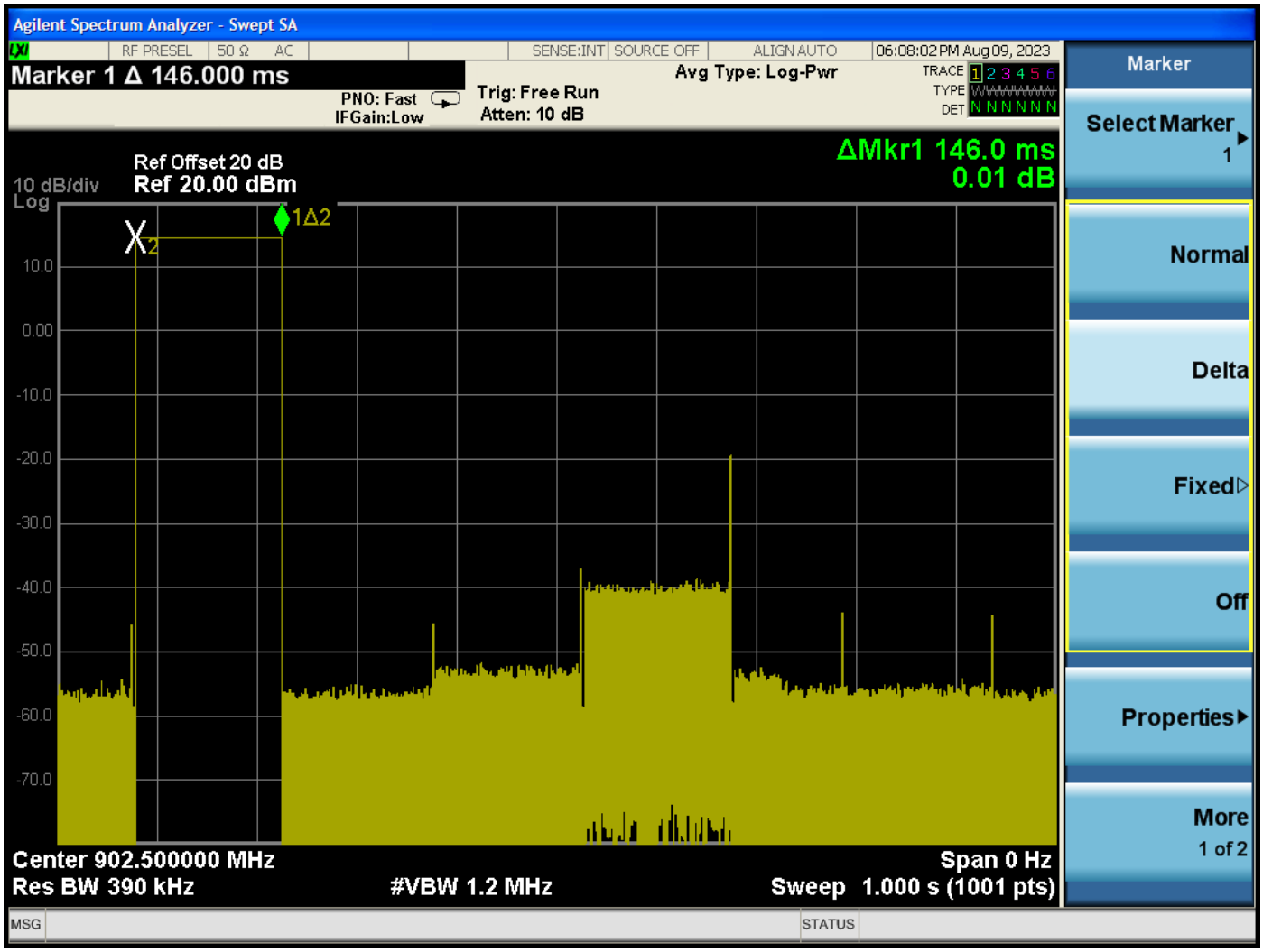
# *DATA SHEET*



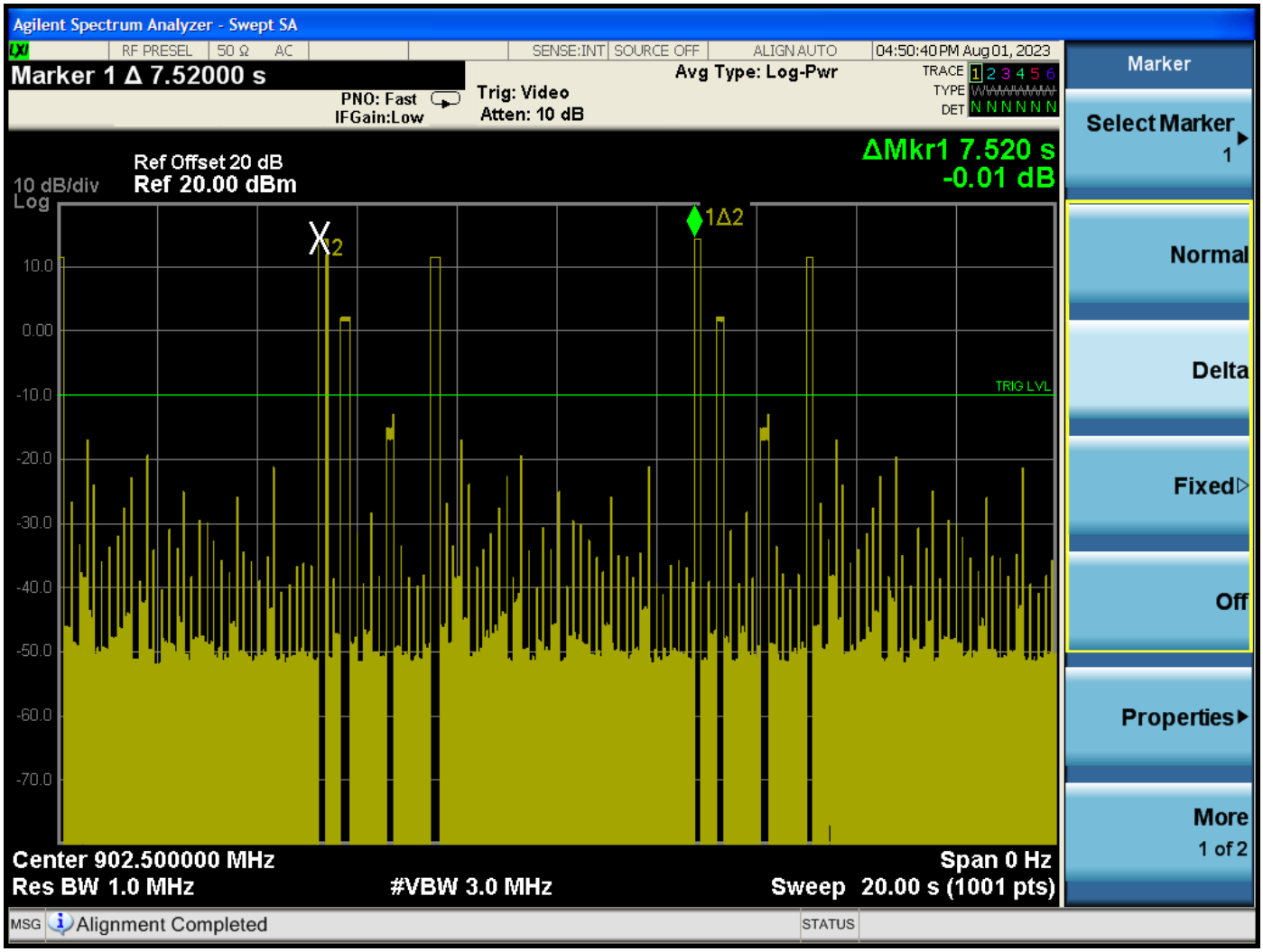

Number of Channels is 50

# *TIME OF OCCUPANCY*

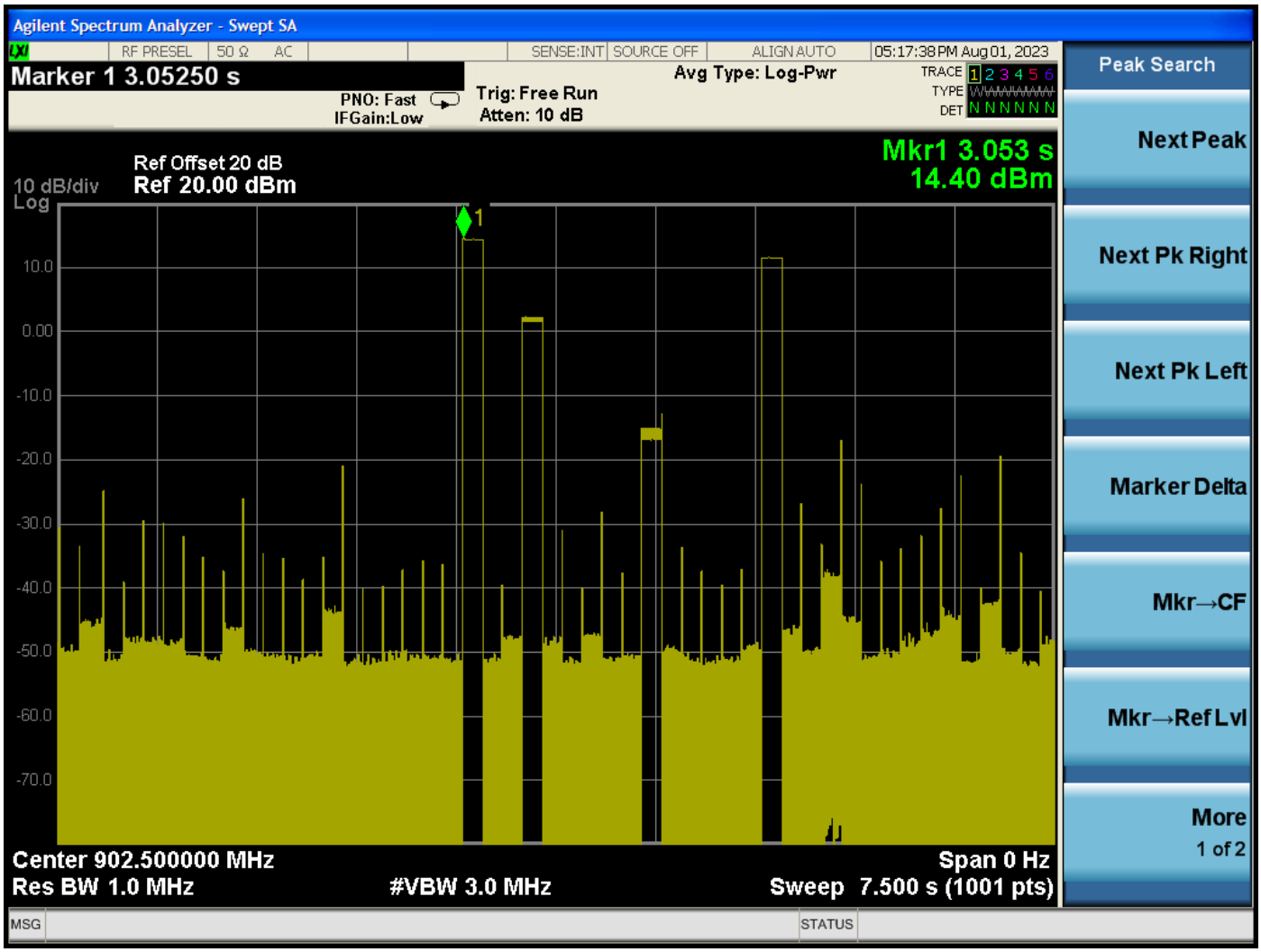
# *DATA SHEET*




Time of One Pulse = 146 ms




Worst Case of 2 pulse in 20 seconds
Total Dwell Time = 146 * 2 = 292 ms
Limit = 400 ms in a 20 second period

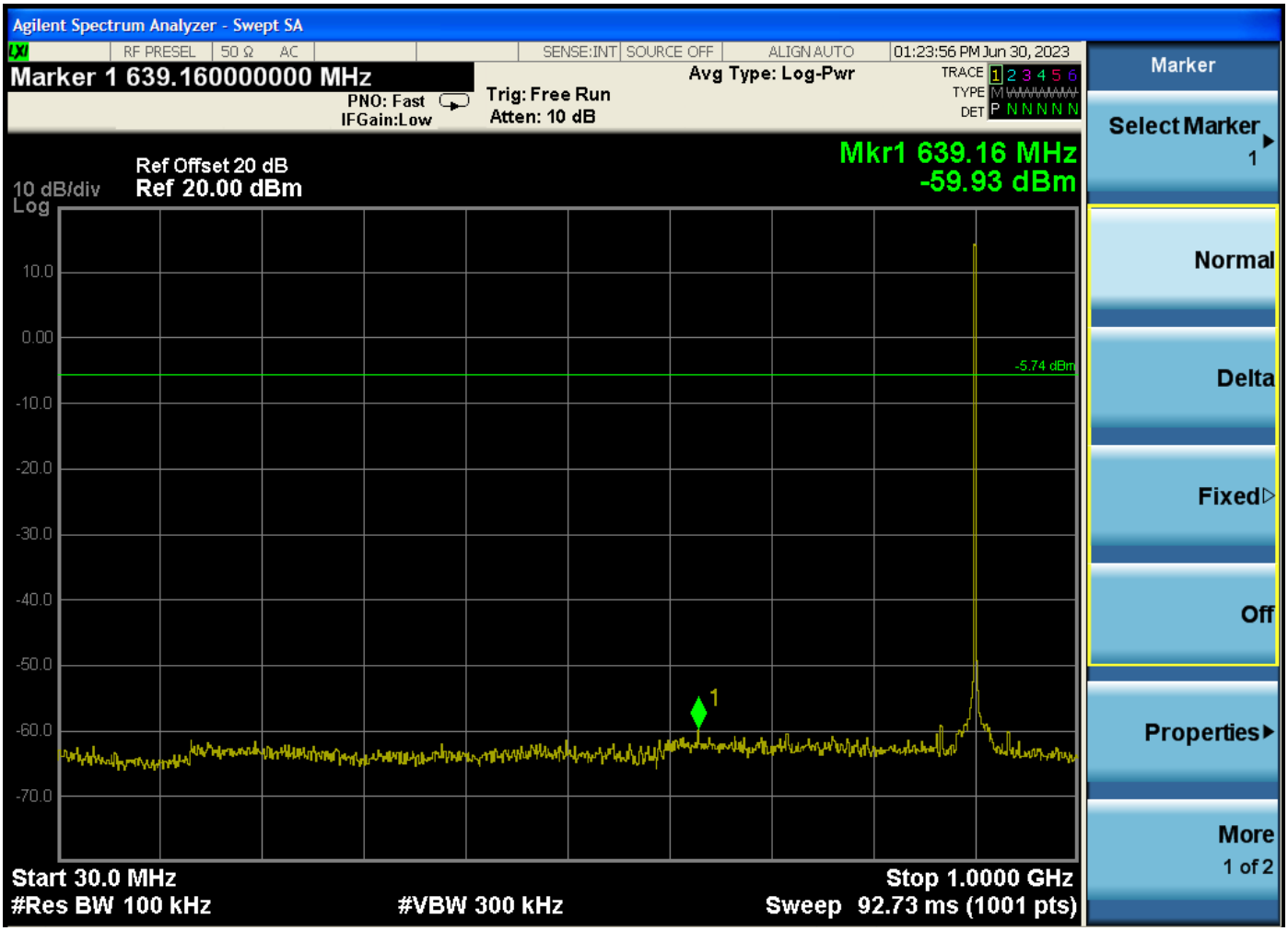



Single pulse in a 7.5 second period

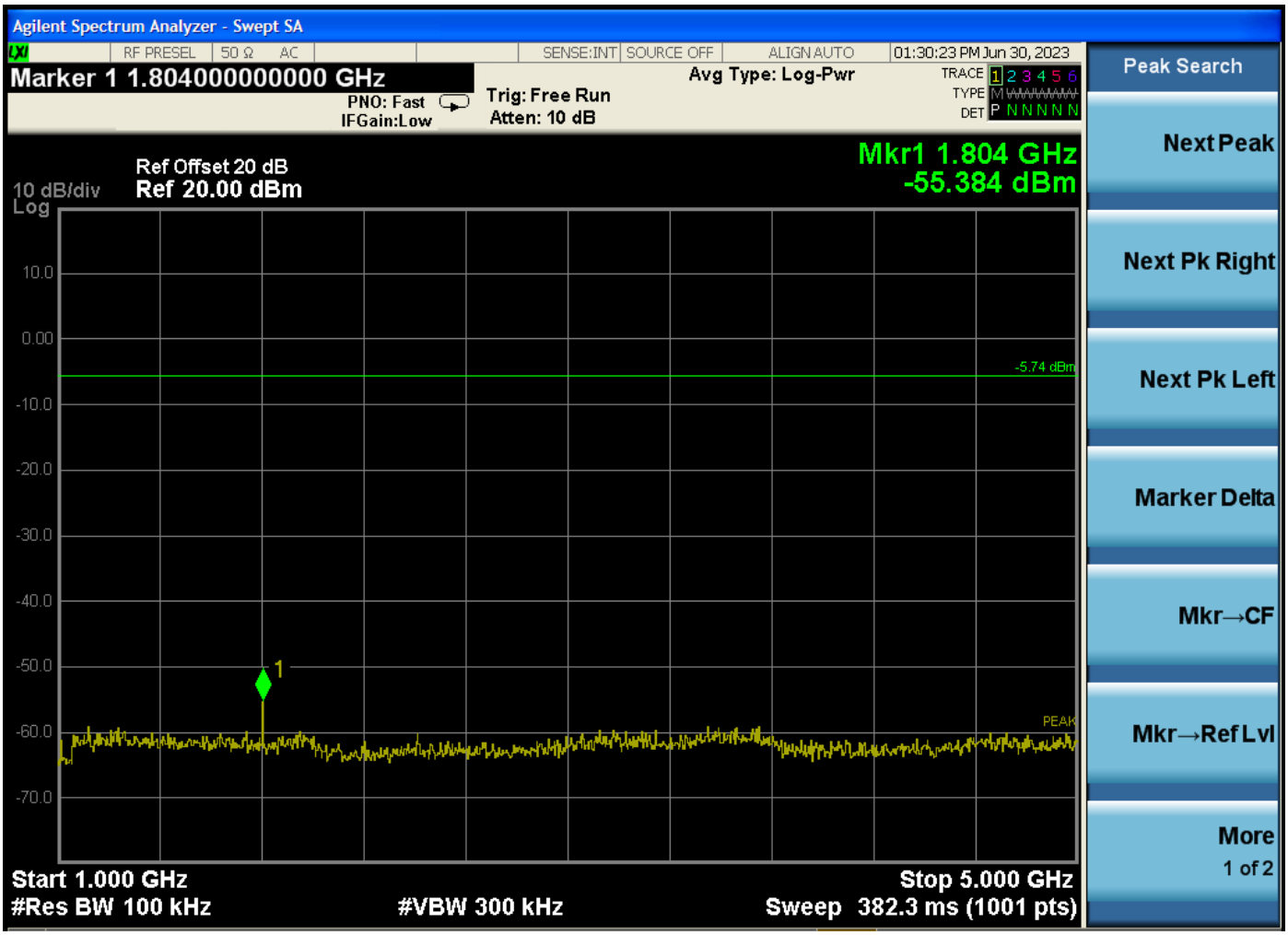
2.667 = (1) * (20/7.5)

Average Time of Occupancy
2.667 * 146 mS = 389.382 mS

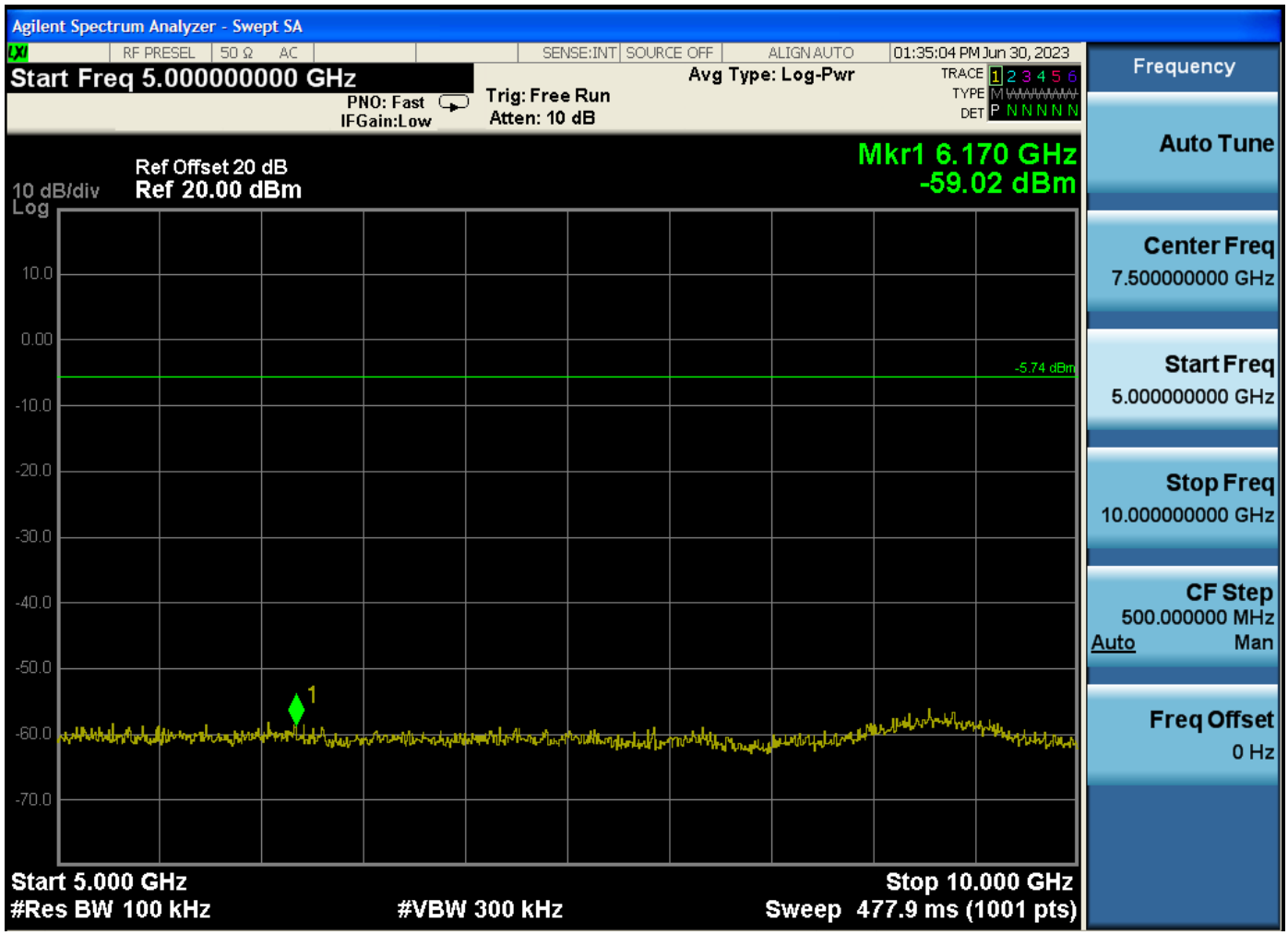
# *RF ANTENNA CONDUCTED TEST*



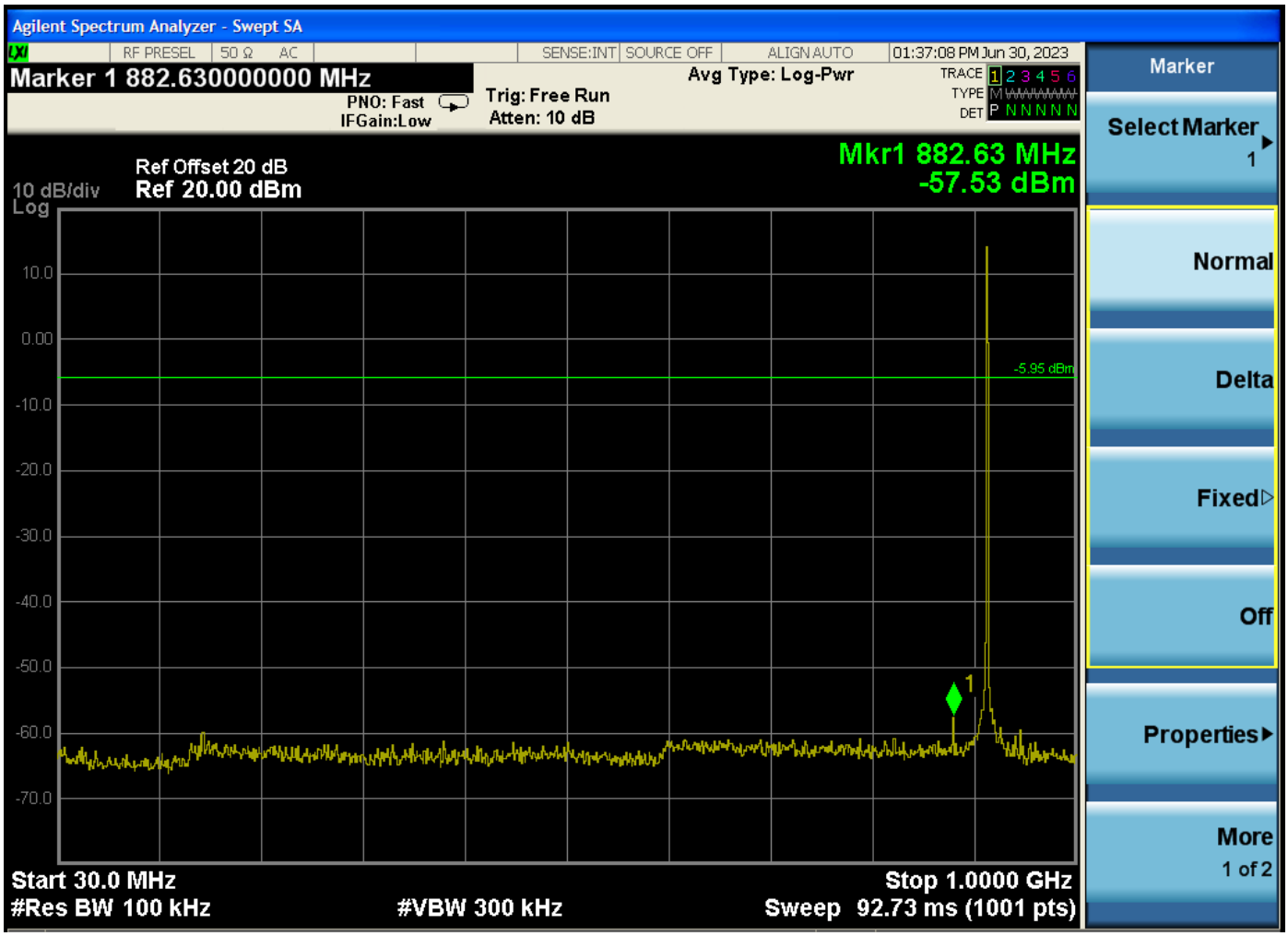

Low Channel 30-1000 MHz



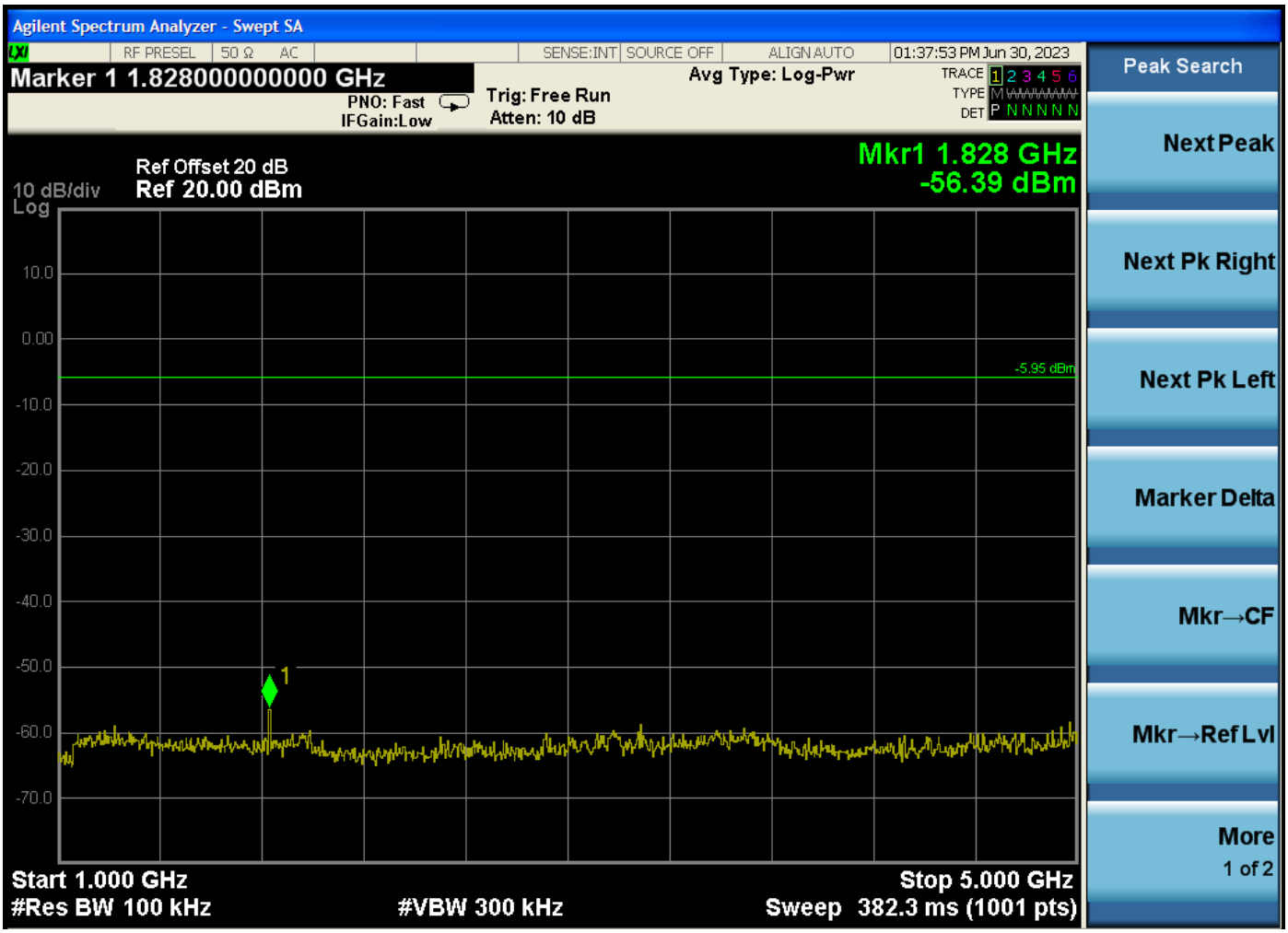

Low Channel 1-5 GHz



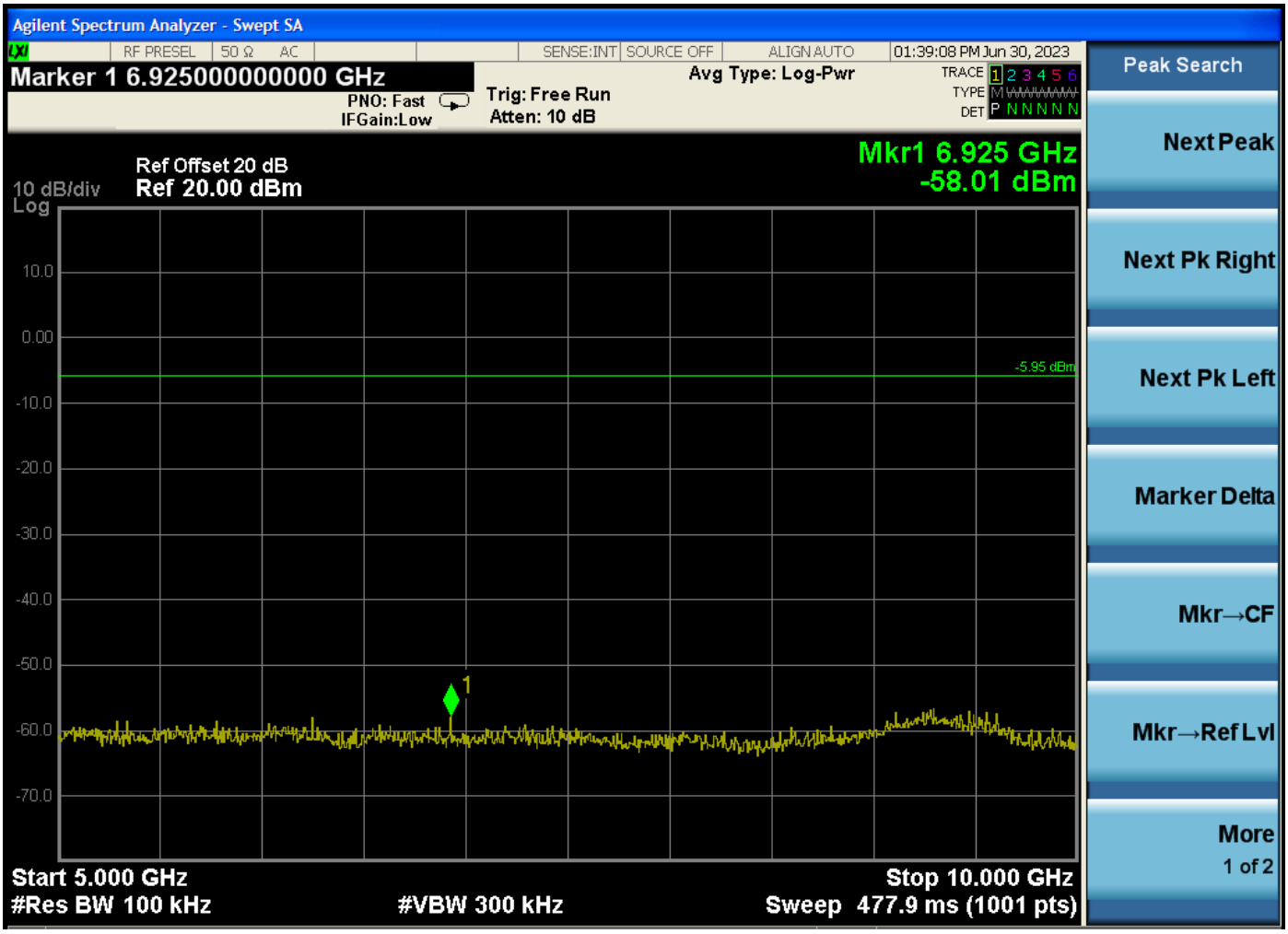

Low Channel 5-10 GHz



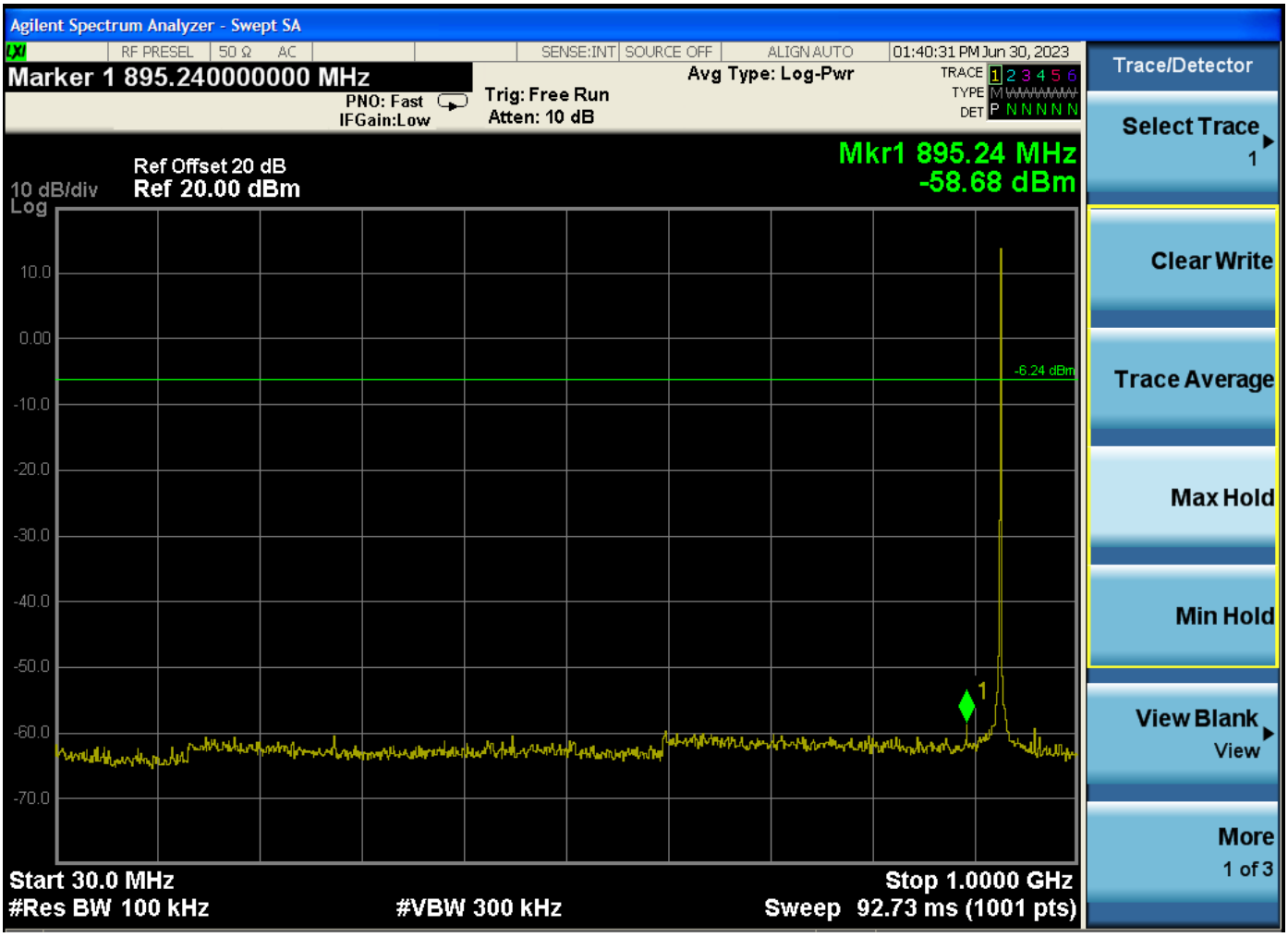

Middle Channel 30-1000 MHz



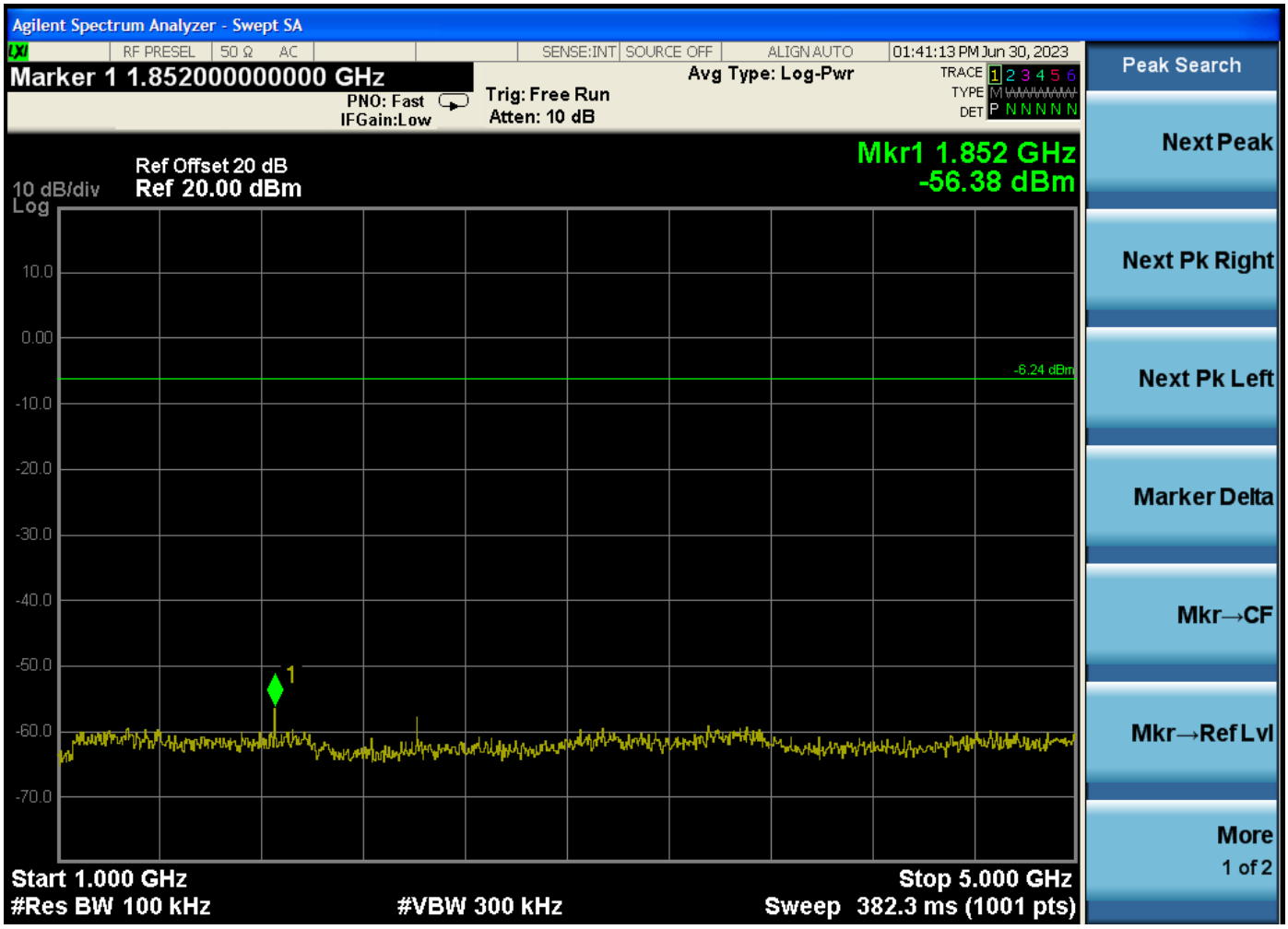

Middle Channel 1-5 GHz



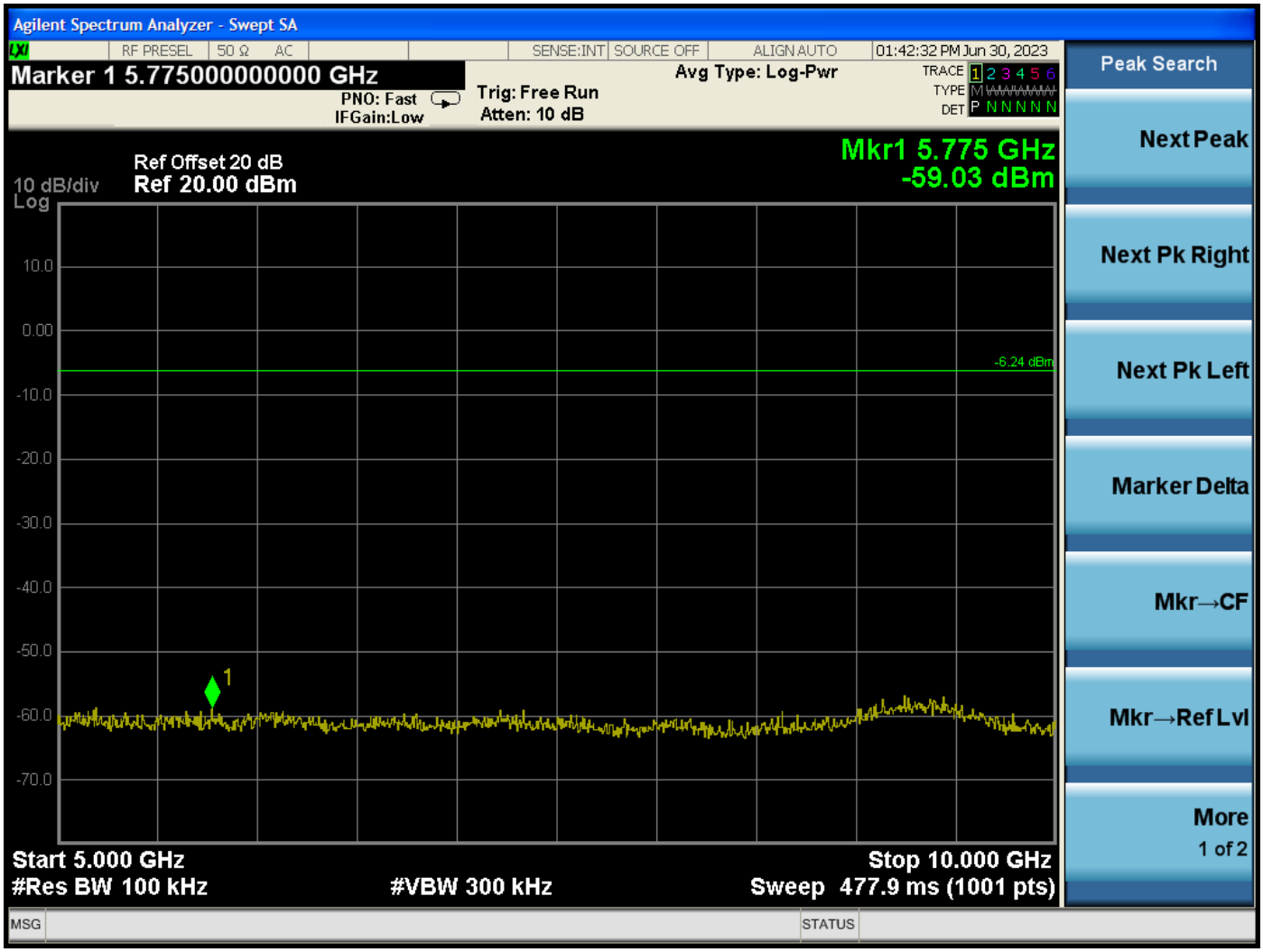

Middle Channel 5-10 GHz




High Channel 30-1000 MHz

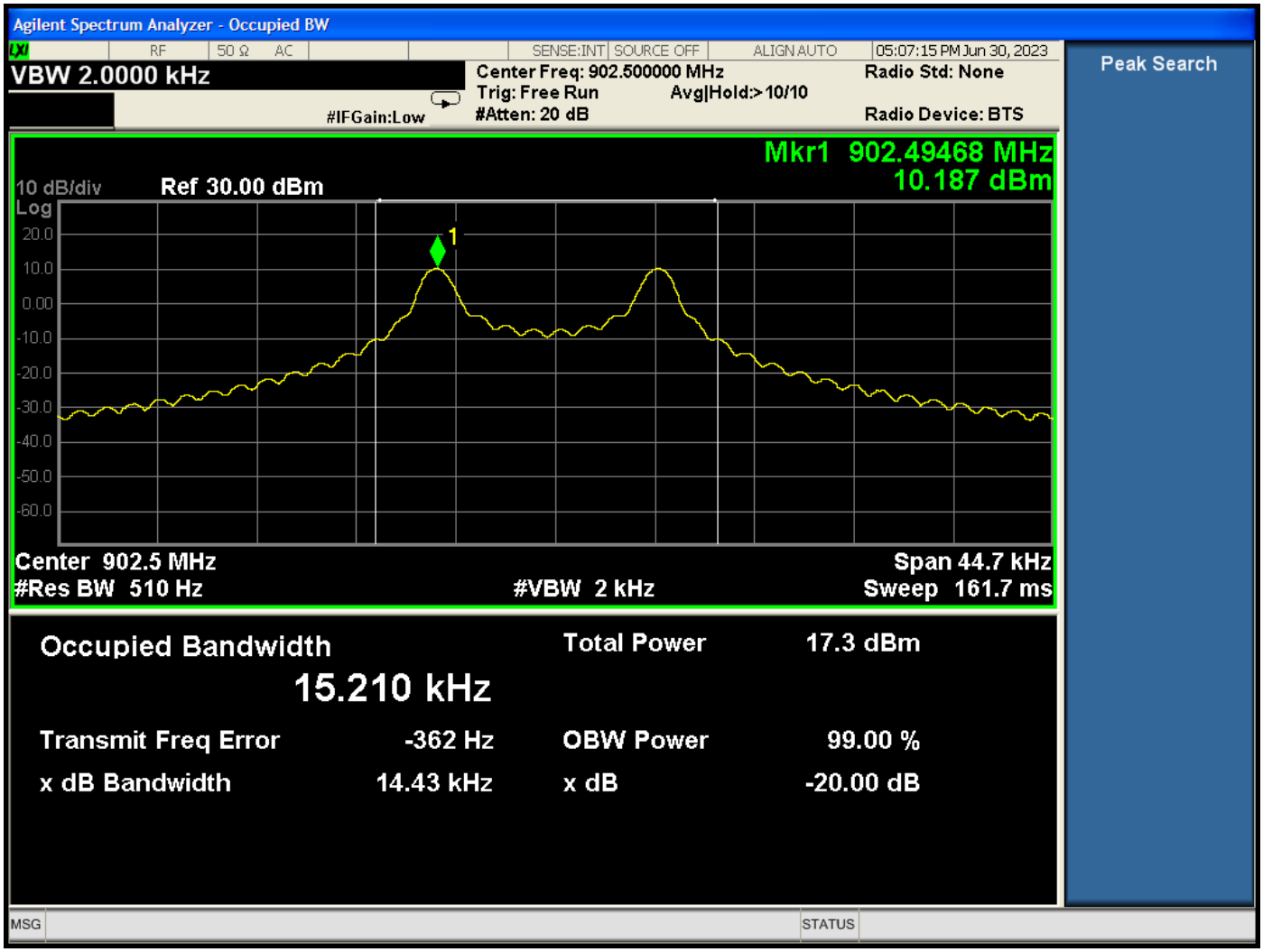



High Channel 1-5 GHz

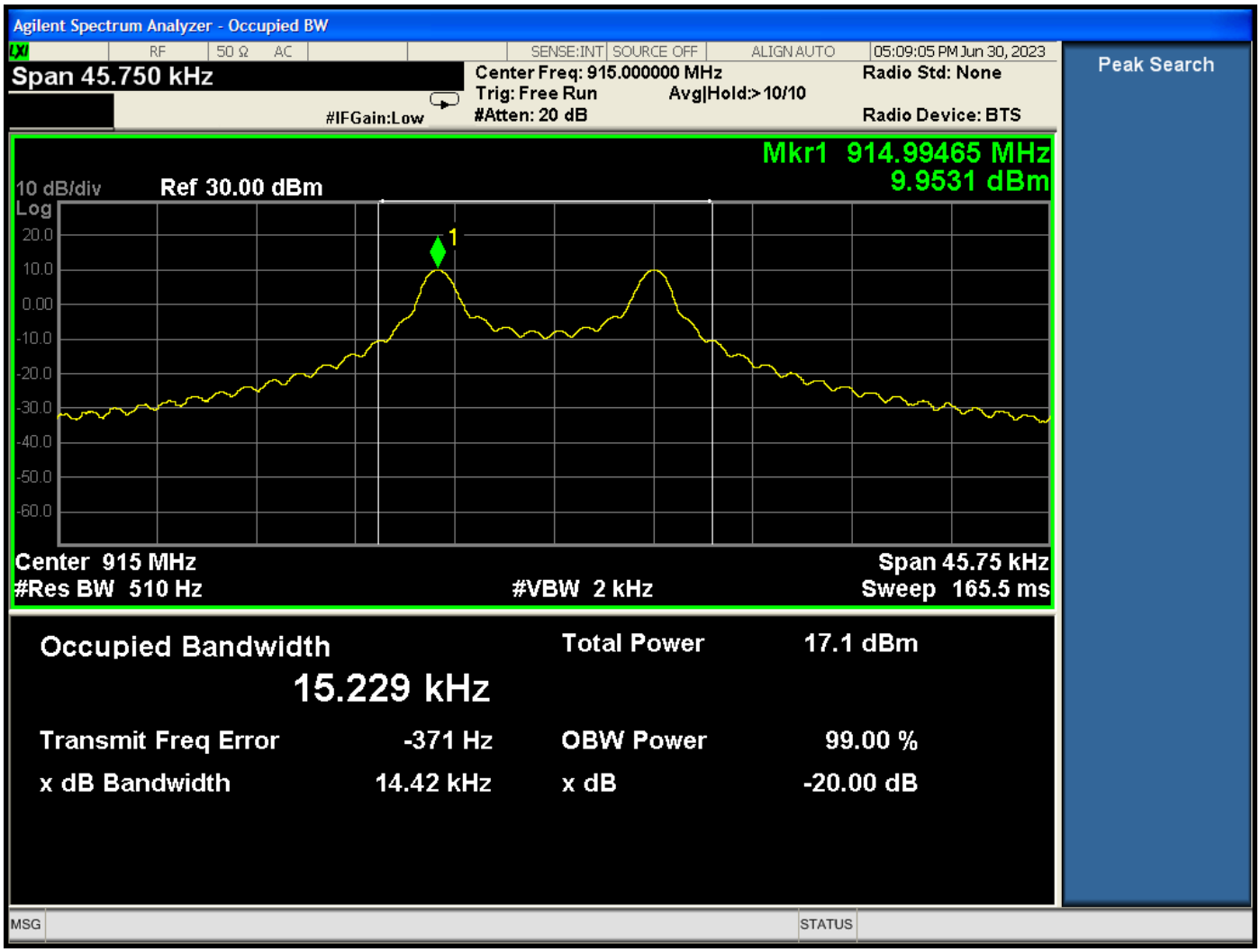



High Channel 5-10 GHz

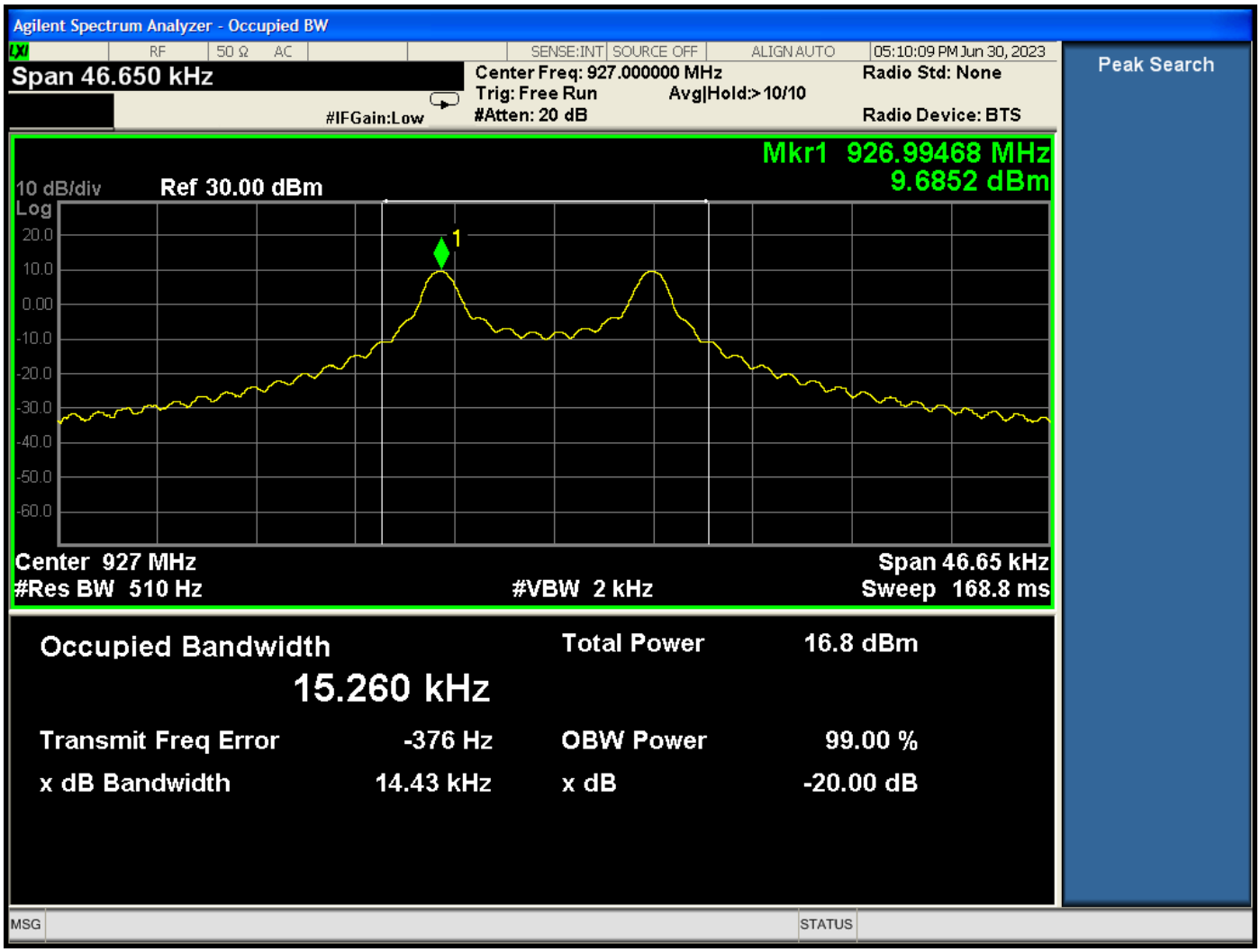
# *OCCUPIED BANDWIDTH*


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT SOURCE OFF ALIGN AUTO 05:07:15 PM Jun 30, 2023
VBW 2.0000 kHz
Center Freq: 902.500000 MHz
Trig: Free Run Avg|Hold:>10/10
#IFGain:Low #Atten: 20 dB
Radio Std: None
Radio Device: BTS
Peak Search
Mkr1 902.49468 MHz
10.187 dBm
10 dB/div Ref 30.00 dBm
Log
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Center 902.5 MHz
#Res BW 510 Hz
#VBW 2 kHz
Span 44.7 kHz
Sweep 161.7 ms
Occupied Bandwidth
15.210 kHz
Total Power 17.3 dBm
Transmit Freq Error -362 Hz
OBW Power 99.00 %
x dB Bandwidth 14.43 kHz
x dB -20.00 dB
MSG
STATUS

Low Channel


Agilent Spectrum Analyzer - Occupied BW
RF 50 Ω AC
SENSE:INT SOURCE OFF ALIGN AUTO 05:09:05 PM Jun 30, 2023
Span 45.750 kHz
Center Freq: 915.000000 MHz
Trig: Free Run Avg|Hold:>10/10
#IFGain:Low #Atten: 20 dB
Radio Std: None
Radio Device: BTS
Peak Search
Mkr1 914.99465 MHz
9.9531 dBm
10 dB/div Ref 30.00 dBm
Log
20.0
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
Center 915 MHz
#Res BW 510 Hz
#VBW 2 kHz
Span 45.75 kHz
Sweep 165.5 ms
Occupied Bandwidth
15.229 kHz
Total Power 17.1 dBm
Transmit Freq Error -371 Hz
OBW Power 99.00 %
x dB Bandwidth 14.42 kHz
x dB -20.00 dB
MSG
STATUS

Mid Channel




High Channel