




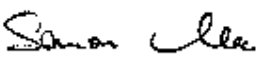
FCC PART 74, SUBPART H  
ISEDG RSS-210, ISSUE 10, ANNEX G  
TEST REPORT

For

**Lectrosonics, Inc.**

581 Laser Road NE Rio Rancho, NM 87124, USA

**FCC ID: DBZDPRA**  
**IC: 8024A-DPRA**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Wireless Microphone Transmitter
<b>Prepared By:</b> Christopher Casteel Test Technician	
<b>Report Number</b>	R1911131-74
<b>Report Issue Date:</b>	2020-02-19
<b>Reviewed By:</b> Simon Ma RF Supervisor	
Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: +1 (408) 732-9162, Fax: +1 (408) 732-9164	



**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by A2LA\*, NIST, or any agency of the Federal Government.

\* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “\*”

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**DOCUMENT REVISION HISTORY**

<b>Revision Number</b>	<b>Report Number</b>	<b>Description of Revision</b>	<b>Date of Revision</b>
0	R1911131-74	Original Report	2020-02-19

# 1 General Description

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## 1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report has been compiled on behalf of *Lectrosonics, Inc.* and their product model: *DPR-A*, *FCC ID: DBZDPRA, IC: 8024A-DPRA*, which henceforth is referred to as the EUT (Equipment Under Test). The EUT is a wireless microphone transmitter. The EUT operates in the frequency range: 470.100-607.950 MHz.

## 1.2 Mechanical Description of EUT

The *DPR-A* (EUT) measures approximately 10.8 cm (L) x 4.4 cm (W) x 3.5 cm (H) and weighs approximately 0.181 kg with two AA batteries and 0.159 kg without batteries.

*The data gathered are from a typical production sample provided by the Lectrosonics, Inc. with serial number: 1 and 2*

## 1.3 Objective

The following test report was prepared on behalf of *Lectrosonics, Inc.* in accordance with Part 74, Subparts H of the Federal Communications Commission rules, and ISED RSS-210 Issue 10 Annex G.

The objective was to determine compliance with Part 74 of the FCC Rules, and ISED RSS-210 Issue 10 Annex G, limits for RF Output Power, Occupied Bandwidth & Emission Mask, Conducted Spurious Emissions, Field Strength of Spurious Radiation, and Frequency Stability for low power auxiliary stations operating in the 600 MHz duplex gap and the bands allocated for TV broadcasting.

## 1.4 Related Submittal(s)/Grant(s)

None

## 1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ETSI EN 300 422-1 v1.4.2 (2011-08) Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement and KDB 971168 D01 Power Meas License Digital Systems v03r01.

All tests were performed at Bay Area Compliance Laboratories Corp.

## 1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 ° C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

## 1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

## 1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

**A- An independent, 3<sup>rd</sup>-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2005 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02)**, in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (\*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report.

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

**B- A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

**C- A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01) to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:**

- 1 Electronics and Office Equipment:
  - for Telephony (ver. 3.0)
  - for Audio/Video (ver. 3.0)
  - for Battery Charging Systems (ver. 1.1)
  - for Set-top Boxes & Cable Boxes (ver. 4.1)
  - for Televisions (ver. 6.1)
  - for Computers (ver. 6.0)
  - for Displays (ver. 6.0)
  - for Imaging Equipment (ver. 2.0)
  - for Computer Servers (ver. 2.0)
- 2 Commercial Food Service Equipment
  - for Commercial Dishwashers (ver. 2.0)
  - for Commercial Ice Machines (ver. 2.0)
  - for Commercial Ovens (ver. 2.1)
  - for Commercial Refrigerators and Freezers
- 3 Lighting Products
  - For Decorative Light Strings (ver. 1.5)
  - For Luminaires (including sub-components) and Lamps (ver. 1.2)
  - For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
  - For Integral LED Lamps (ver. 1.4)
- 4 Heating, Ventilation, and AC Products
  - for Residential Ceiling Fans (ver. 3.0)
  - for Residential Ventilating Fans (ver. 3.2)
- 5 Other
  - For Water Coolers (ver. 3.0)

**D- A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:**

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - o BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - o NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - o EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - o Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - o Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-USA:
- USA:
  - o ENERGY STAR Recognized Test Laboratory – US EPA
  - o Telecommunications Certification Body (TCB) – US FCC;
  - o Nationally Recognized Test Laboratory (NRTL) – US OSHA

Vietnam: APEC Tel MRA -Phase I;



## 2 EUT Test Configuration

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### 2.1 Justification

The EUT was configured for testing according to ETSI EN 300 422-1 V1.4.2 and KDB 971168 D01 Power Meas License Digital Systems v03r01.

### 2.2 EUT Exercise Software

None

### 2.3 Equipment Modifications

None

### 2.4 Local Support Equipment

None

### 2.5 Remote Support Equipment

Manufacturer	Description	Model
SENNHEISER	Microphone	E 835

### 2.6 Interface Ports and Cables

None

### 3 Summary of Test Results

FCC & ISEDC Rules	Descriptions of Test	Result (s)
ISEDC RSS-Gen §6.8	Antenna Requirements	Compliant
FCC §74.861(e)(1) ISEDC RSS-210 §G.1	RF Output Power	Compliant
FCC §2.1093 ISEDC RSS-102	RF Exposure	Compliant <sup>1</sup>
ISEDC RSS-210 §G.5	Modulation Characteristic	Not applicable <sup>2</sup>
FCC §2.1049 FCC §74.861(e)(5)(7) ISEDC RSS-210 §G.2 & §G.4	Occupied Bandwidth & Emission Mask	Compliant
FCC §2.1051 FCC §74.861(e)(7) ISEDC RSS-210 §G.4	Spurious Emissions at the Antenna Port	Compliant
FCC §2.1053 FCC §74.861(e)(7) ISEDC RSS-210 §G.4	Field Strength of Spurious Emissions	Compliant
FCC §2.1055 FCC §74.861(e)(4) ISEDC RSS-210 §G.3	Frequency Stability	Compliant

Note<sup>1</sup>: Please refer to report R1911131-SAR.

Note<sup>2</sup>: EUT only supports digital modulation (8PSK).

## 4 ISEDC RSS-Gen §6.8 - Antenna Requirements

### 4.1 Applicable Standards

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter 8024A-DPRA has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

### 4.2 Antenna Description

The antennas used by the EUT are externally attached antennas.

Antenna usage	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
AMM19 Dipole Antenna	470.100 - 537.500	2.15
AMM22 Dipole Antenna	537.600 – 607.950	2.15

## 5 FCC §74.861(e)(1) & ISEDC RSS-210 §G.1 - RF Output Power

### 5.1 Applicable Standards

According to FCC §74.861 (e): For low power auxiliary stations operating in the 600 MHz duplex gap and the bands allocated for TV broadcasting, the following technical requirements apply:

- (1) The power may not exceed the following values.
  - (i) 54-72, 76-88, and 174-216 MHz bands: 50 mW EIRP
  - (ii) 470-608 and 614-698: 250 mW conducted power
  - (iii) 600 MHz duplex gap: 20 mW EIRP

According to ISEDC RSS-210 §G.1: The transmit power shall be measured in average value as a conducted emission over any period of continuous transmission.

The frequency bands, transmit e.i.r.p., authorized bandwidth and frequency stability limits for devices are provided in table G1.

Table G1 — Specifications for wireless microphones			
Frequency bands (MHz)	Transmit e.i.r.p. (mW)	Authorized bandwidth (kHz)	Frequency stability ( $\pm$ ppm)
54-72 76-88 174-216	50	200	50
470-608	250	200	50
614-616 653-663	20	200	50

### 5.2 Test Procedure

The tests were performed following the procedures outlined in KDB 971168 D01 Power Meas License Digital Systems v03r01.

### 5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
ETS-Lindgren	Power Sensor	7002-006	160097	2018-12-31	2 years
-	RF Cable	-	-	Each time <sup>1</sup>	N/A

Note<sup>1</sup>: RF cable included in the test set-up will be checked each time before testing.

**Statement of Traceability:** *BACL Corp.* attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 02 October 2018) "A2LA Policy on Metrological Traceability".

### 5.4 Test Environmental Conditions

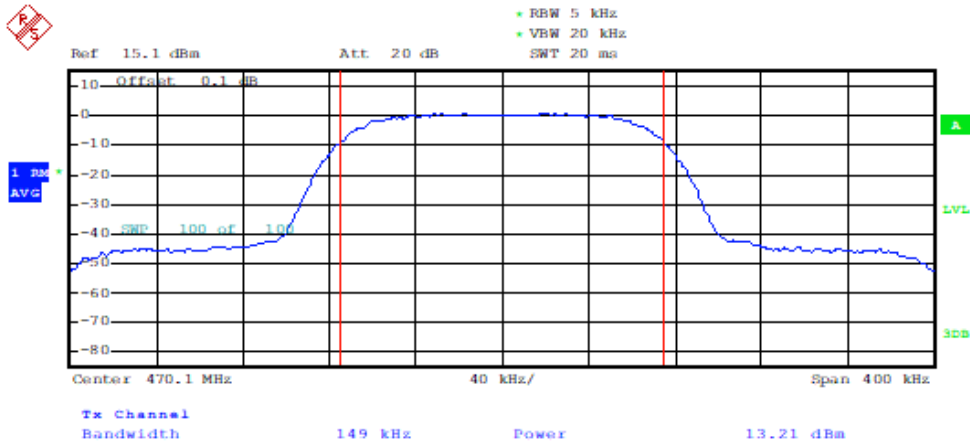
Temperature:	21 °C
Relative Humidity:	19 %
ATM Pressure:	101.7 kPa

The testing was performed by Christopher Casteel on 2019-12-19 at RF site.

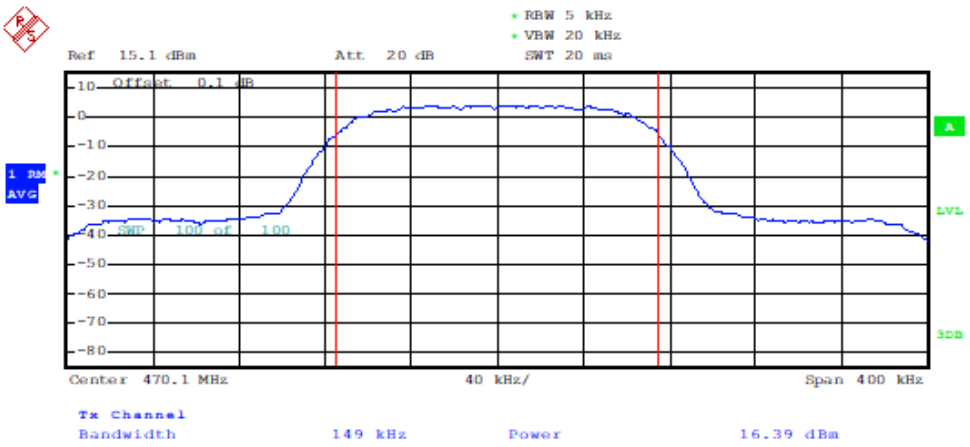
### 5.5 Test Results

Channel	Frequency (MHz)	Average Conducted Power (dBm)		Antenna Max Gain (dBi)	Average EIRP (dBm)		Limit (dBm)
		Setting: 25 mW	Setting: 50 mW		Setting: 25 mW	Setting: 50 mW	
Low	470.100	13.21	16.39	2.15	15.36	18.54	24
Middle	539.025	13.39	16.59	2.15	15.54	18.74	24
High	607.950	13.97	17.02	2.15	16.12	19.17	24

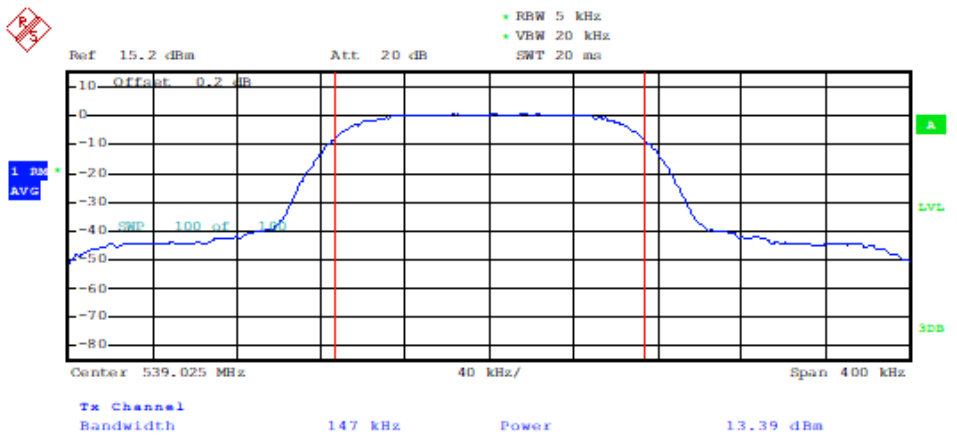
### 470.100 MHz, 25 mW



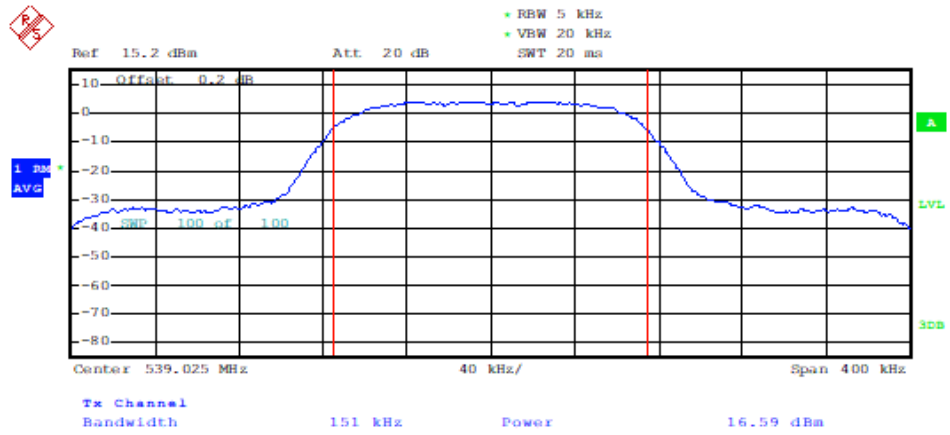
### 470.100 MHz, 50 mW



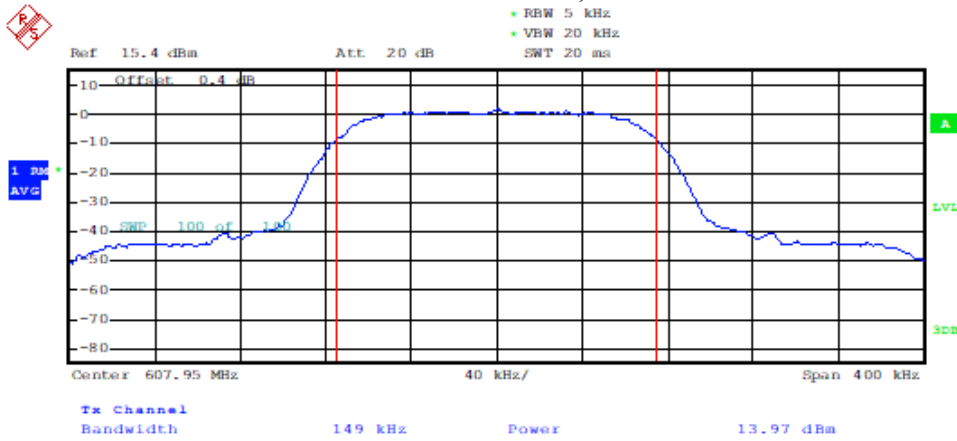
### 539.025 MHz, 25 mW



### 539.025 MHz, 50 mW



### 607.950 MHz, 25 mW



### 607.950 MHz, 50 mW



## 6 FCC §74.861(e)(5)(7) & ISEDC RSS-210 §G.2, §G.4 - Occupied Bandwidth & Emission Mask

### 6.1 Applicable Standards

According to FCC §74.861 (e) (5) (7):

(5) The operating bandwidth shall not exceed 200 kHz.

(7) Analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Digital emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.2.2 (Figure 4) of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Beyond one megahertz below and above the carrier frequency, emissions shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08). The requirements of this paragraph (e)(7) shall not apply to applications for certification of equipment in these bands until nine months after release of the Commission's Channel Reassignment Public Notice, as defined in §73.3700(a)(2) of this chapter.

According to ISEDC RSS-210 §G.2 & §G.4:

The occupied bandwidth for wireless microphones shall not exceed the authorized bandwidth specified in table G1.

The transmitter unwanted emissions shall meet and be measured according to the requirements in sections 8.3 and 8.4 of ETSI EN 300 422-1.

Table G1 — Specifications for wireless microphones			
Frequency bands (MHz)	Transmit e.i.r.p. (mW)	Authorized bandwidth (kHz)	Frequency stability ( $\pm$ ppm)
54-72 76-88 174-216	50	200	50
470-608	250	200	50
614-616 653-663	20	200	50



## 6.2 Test Procedure

The tests were performed following the procedures outlined in ETSI EN 300 422-1 v1.4.2 (2011-08) for Emission Mask and KDB 971168 D01 Power Meas License Digital Systems v03r01 for Occupied Bandwidth.

## 6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008K39-101203-UW	2019-08-06	1 year
Agilent	EXA Signal Analyzer	N9010A	MY48030852	2020-02-12	1 year
-	RF Cable	-	-	Each time <sup>1</sup>	N/A

Note<sup>1</sup>: RF cable included in the test set-up will be checked each time before testing.

**Statement of Traceability: BACL Corp.** attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 02 October 2018) "A2LA Policy on Metrological Traceability".

## 6.4 Test Environmental Conditions

Temperature:	21-22 °C
Relative Humidity:	19-37 %
ATM Pressure:	101.7 kPa

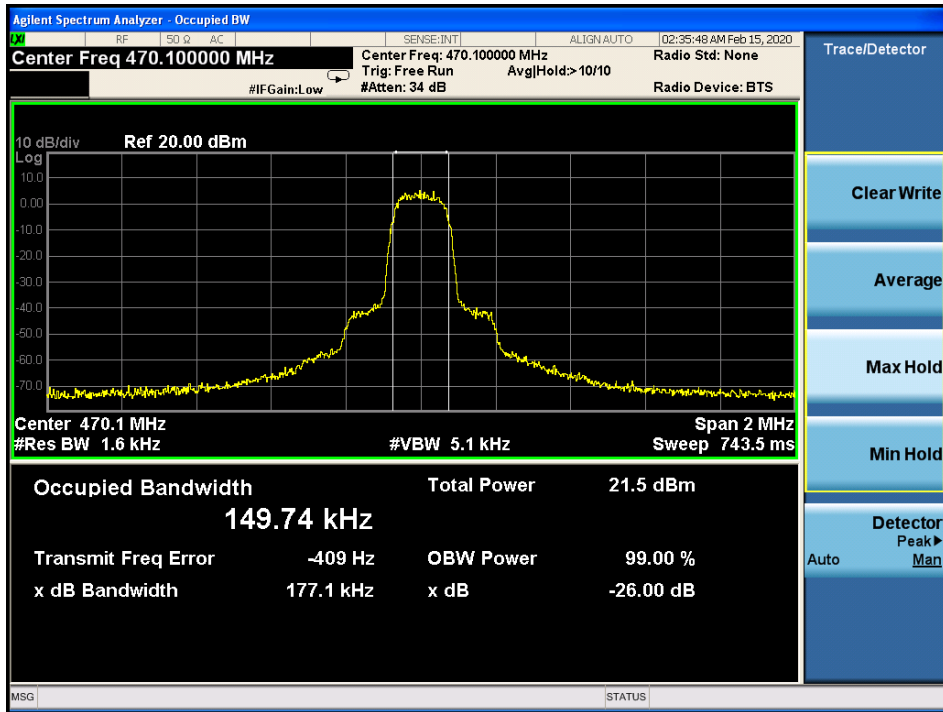
The testing was performed by Christopher Casteel on 2019-12-21 and 2020-02-15 at RF site.

## 6.5 Test Results

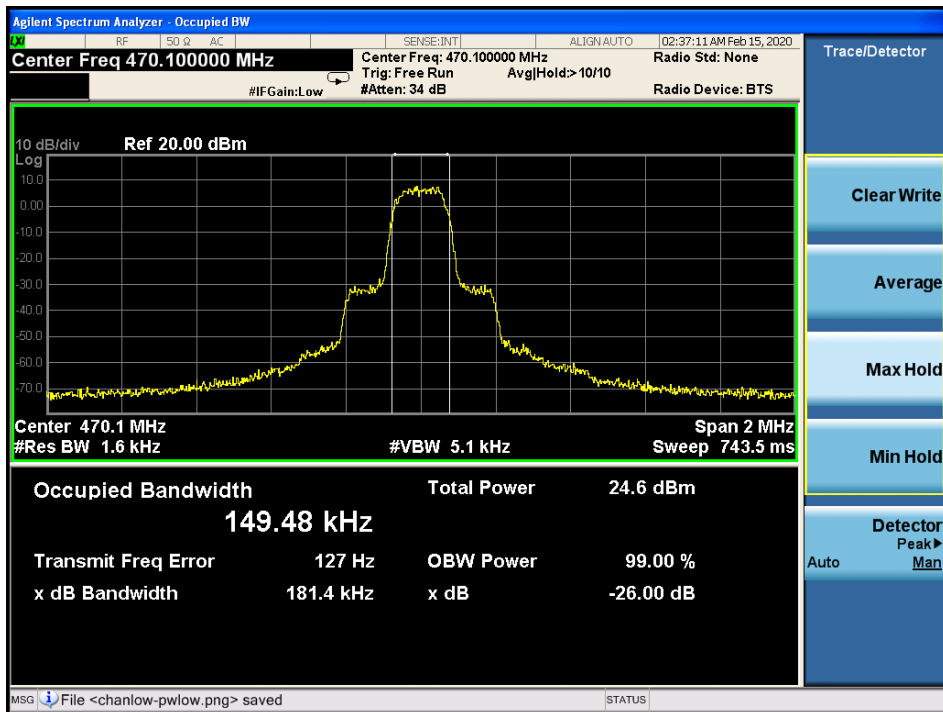
Center Frequency (MHz)	99% Bandwidth (kHz)		Limit (kHz)	Result
	Setting: 25 mW	Setting: 50 mW		
470.100	149.74	149.48	200	Pass
539.025	147.68	151.57	200	Pass
607.950	149.21	150.31	200	Pass

Please refer to the following plots for detailed test results.

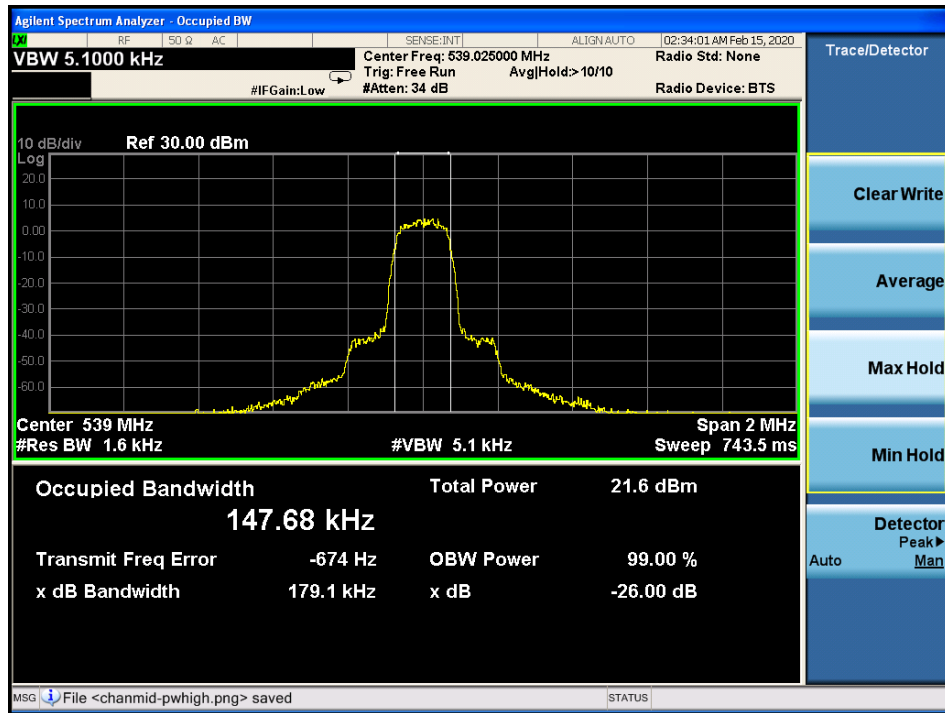
470.1 MHz, 25 mW



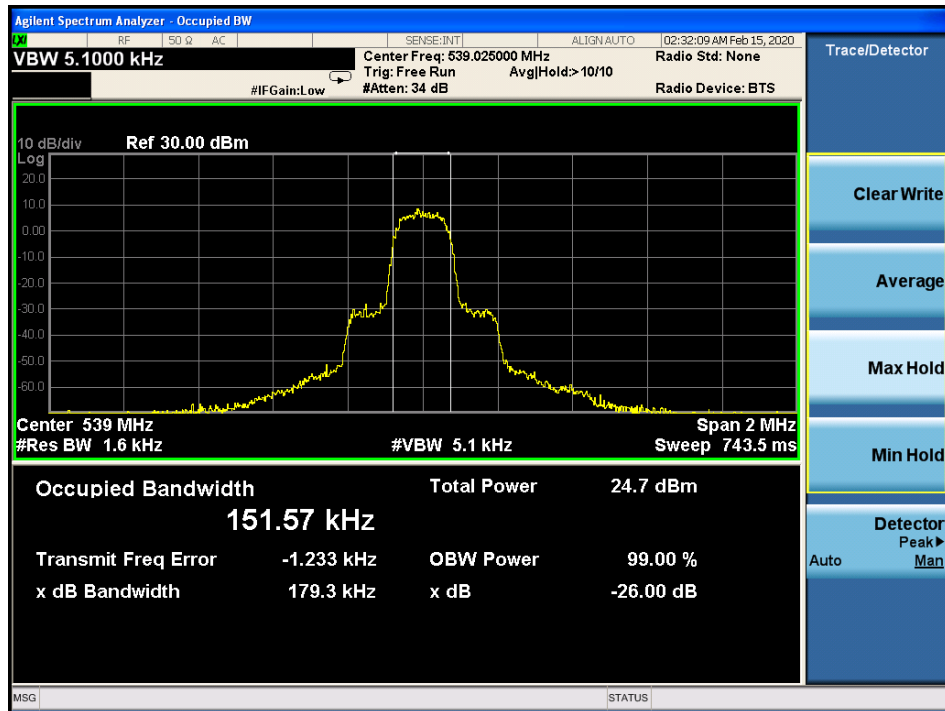
470.1 MHz, 50 mW



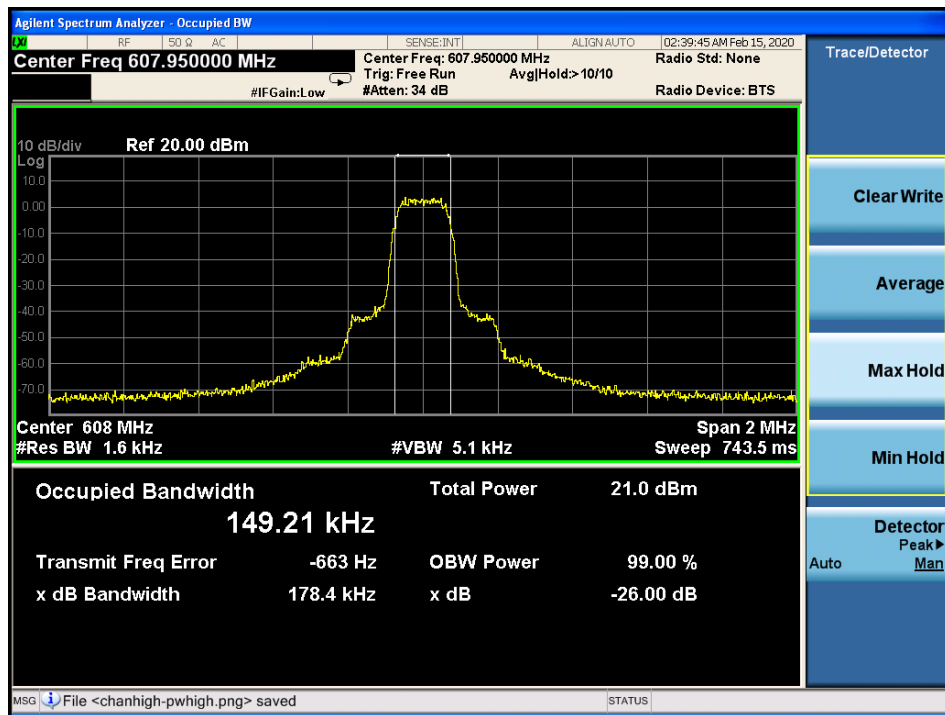
539.025 MHz, 25 mW



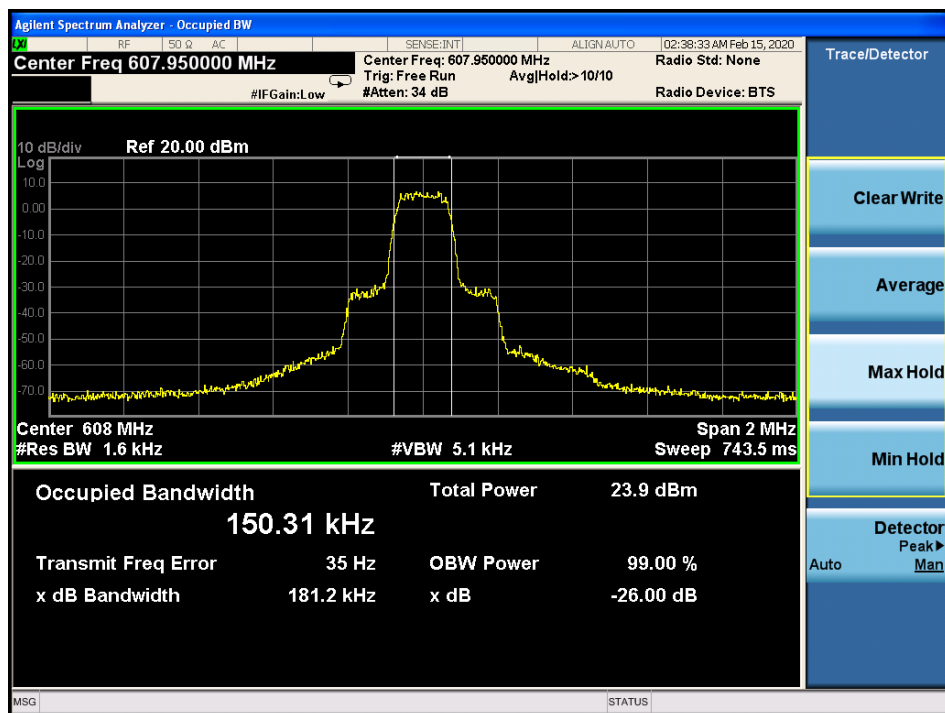
539.025 MHz, 50 mW



607.950 MHz, 25 mW

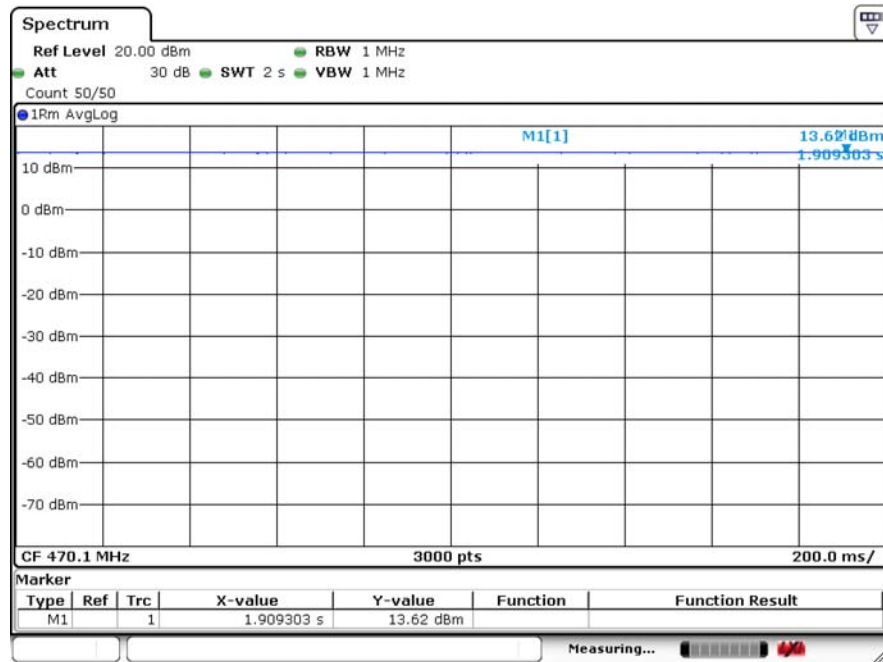


607.950 MHz, 50 mW



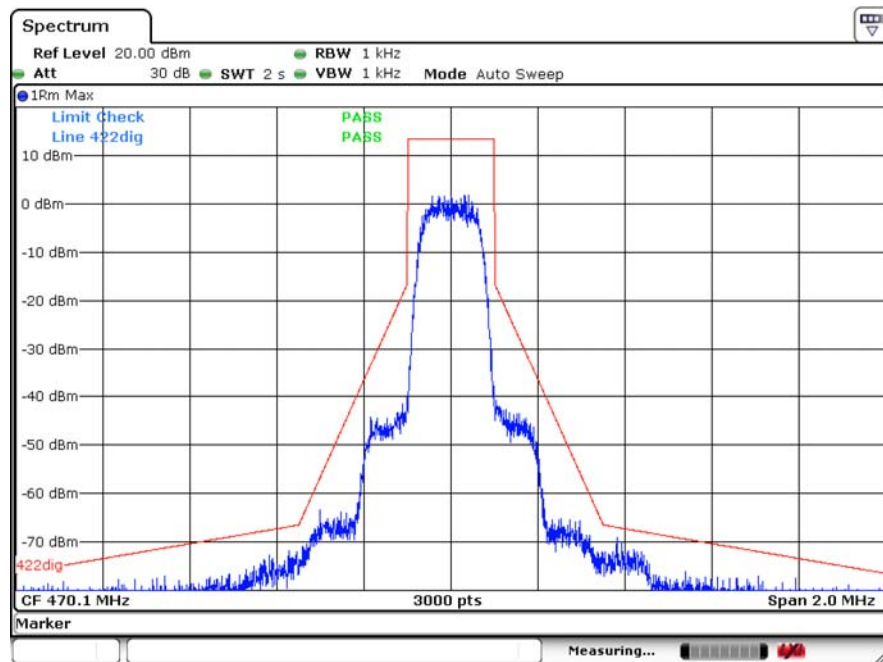
### Emission Mask

25 mW 470.100 MHz, Carrier Power Reference



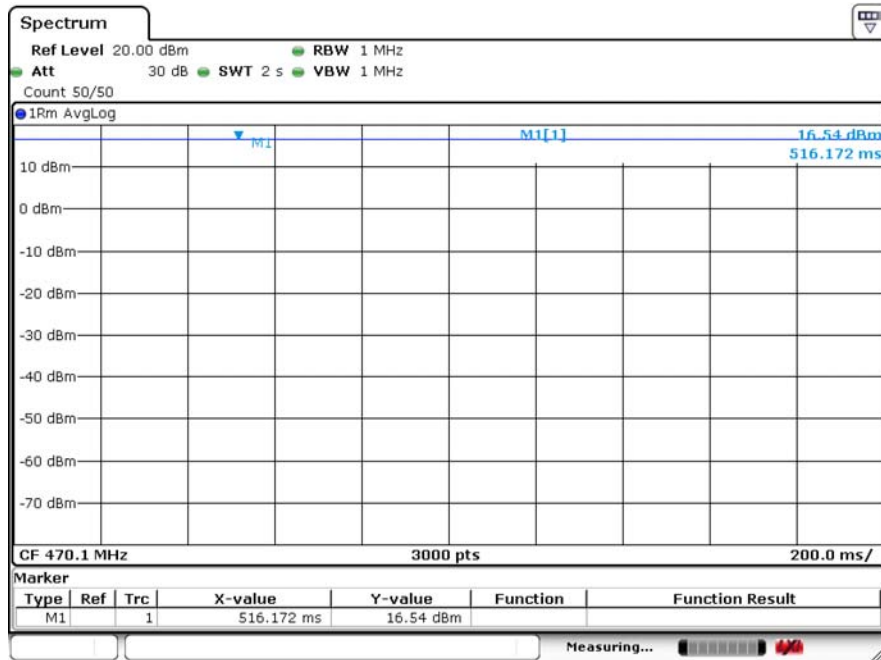
Date: 7.FEB.2020 14:01:49

25 mW 470.100 MHz



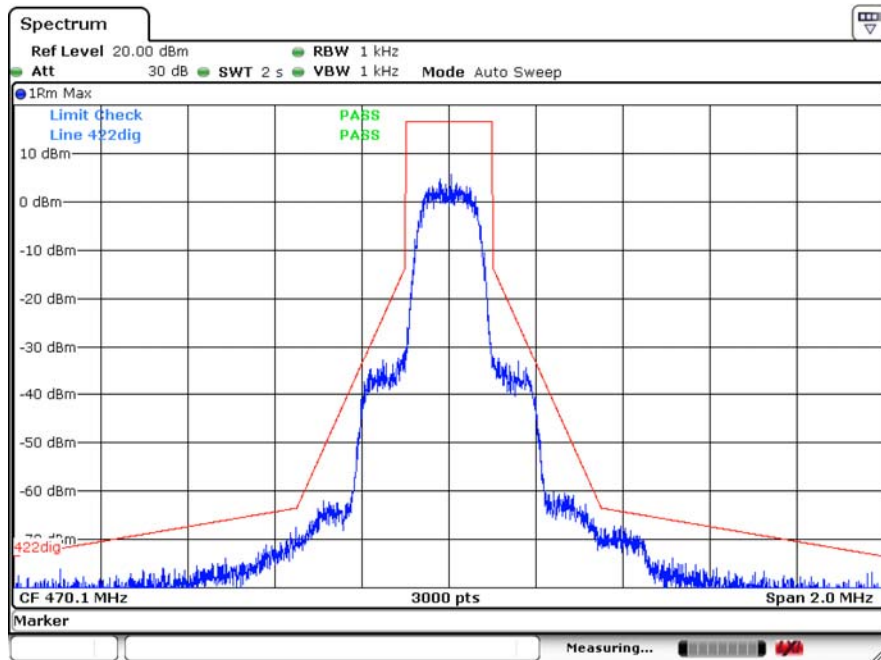
Date: 7.FEB.2020 15:35:54

50 mW 470.100 MHz, Carrier Power Reference



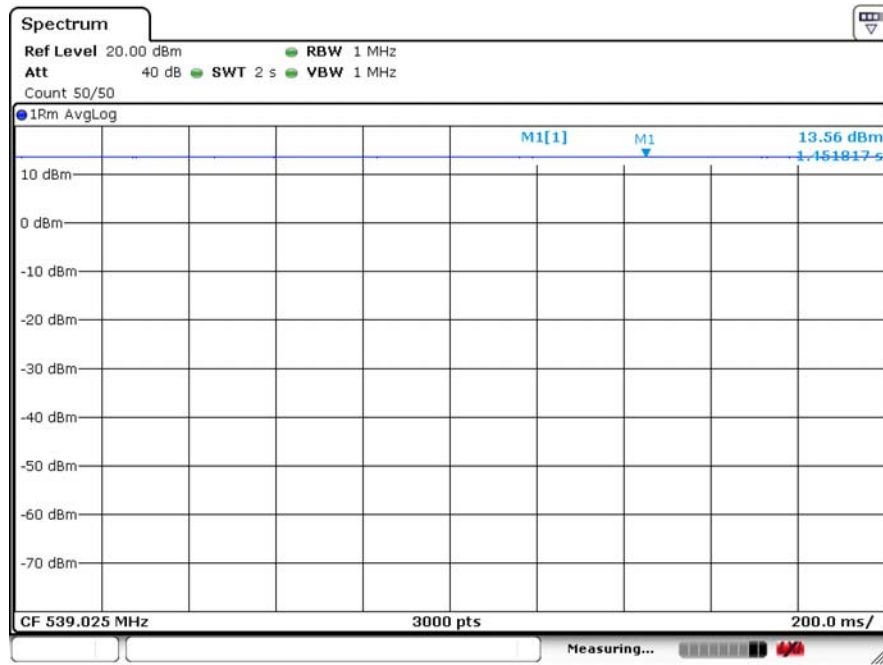
Date: 7.FEB.2020 13:56:11

50 mW 470.100 MHz



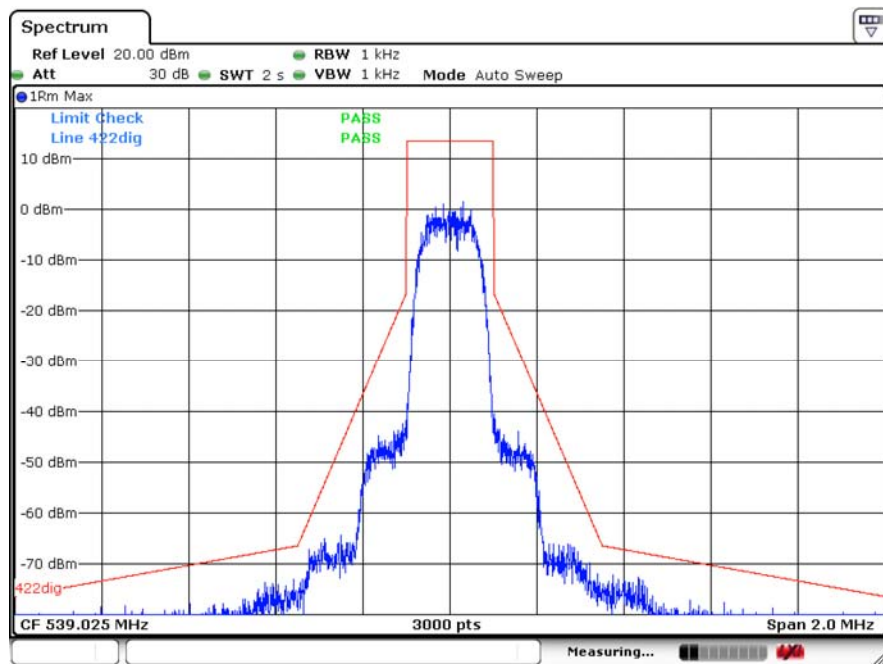
Date: 7.FEB.2020 13:59:14

### 25 mW 539.025 MHz, Carrier Power Reference



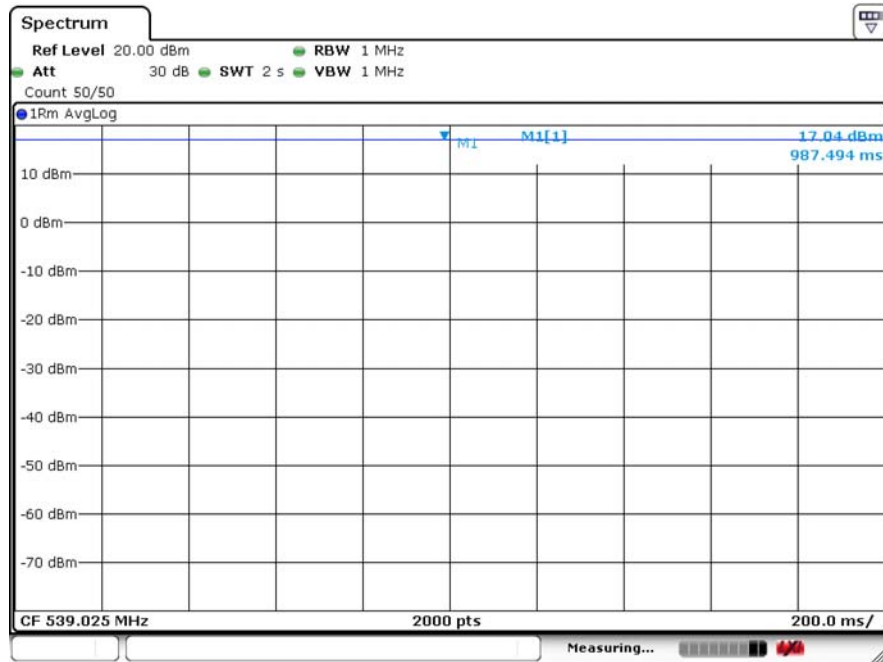
Date: 7.FEB.2020 13:29:52

### 25 mW 539.025 MHz



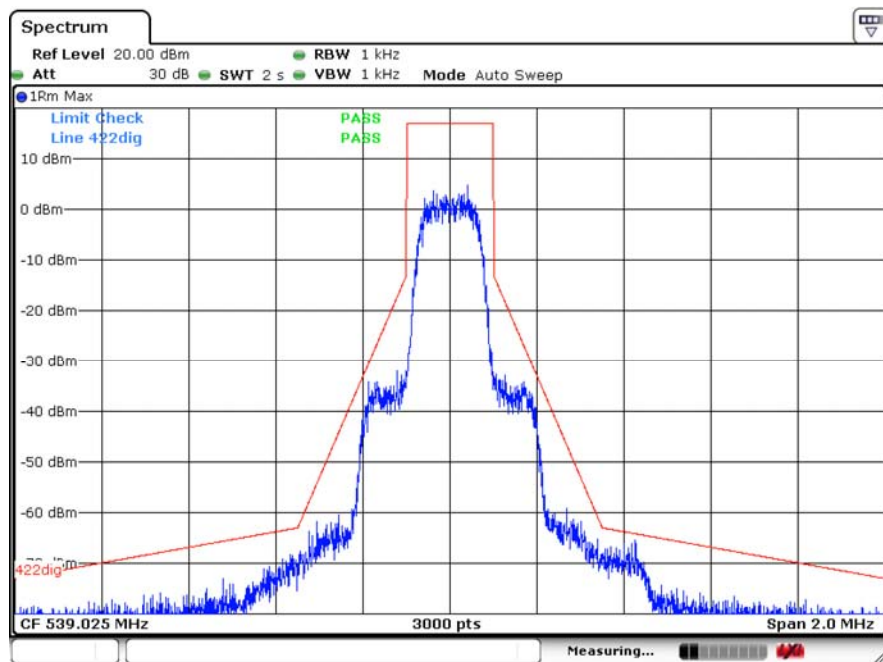
Date: 7.FEB.2020 13:48:55

### 50 mW 539.025 MHz, Carrier Power Reference



Date: 7.FEB.2020 13:18:05

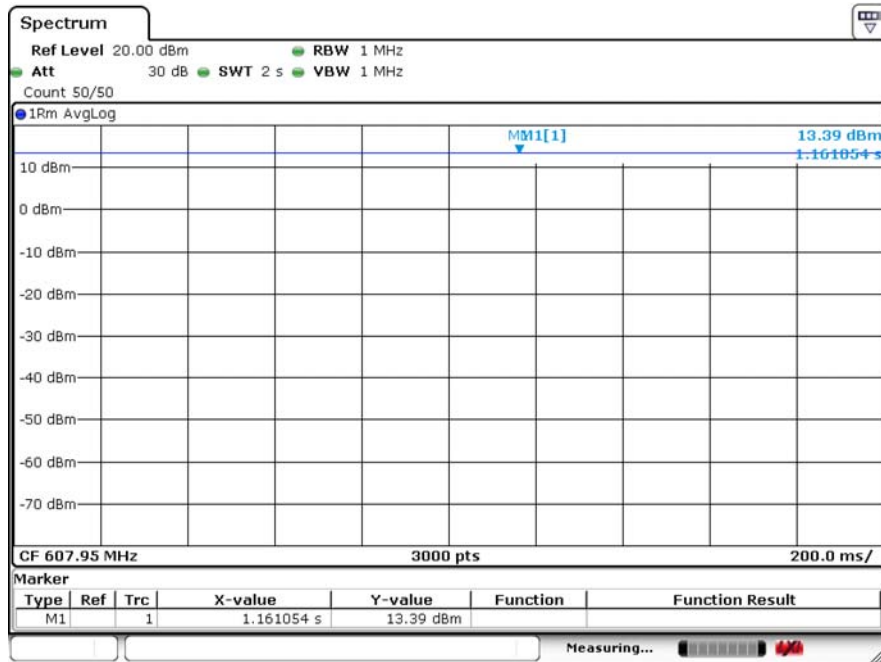
### 50 mW 539.025 MHz



Date: 7.FEB.2020 13:50:49

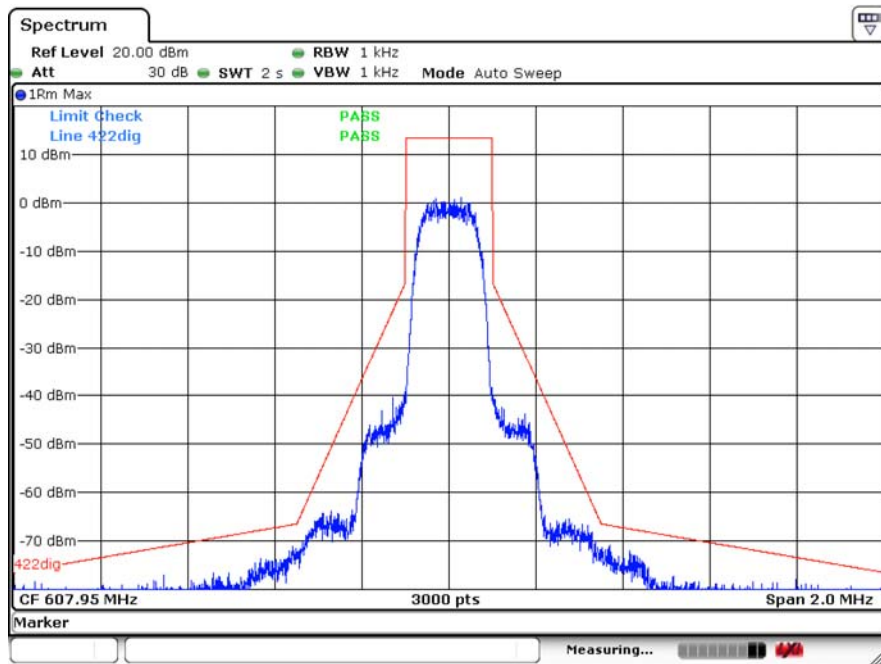


25 mW 607.950 MHz, Carrier Power Reference



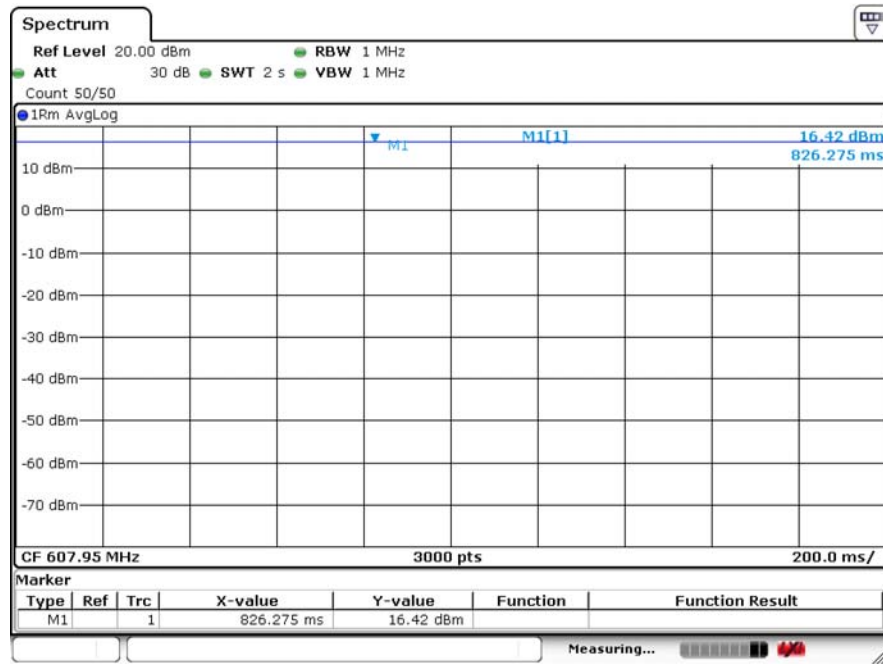
Date: 7.FEB.2020 14:14:36

25 mW 607.950 MHz



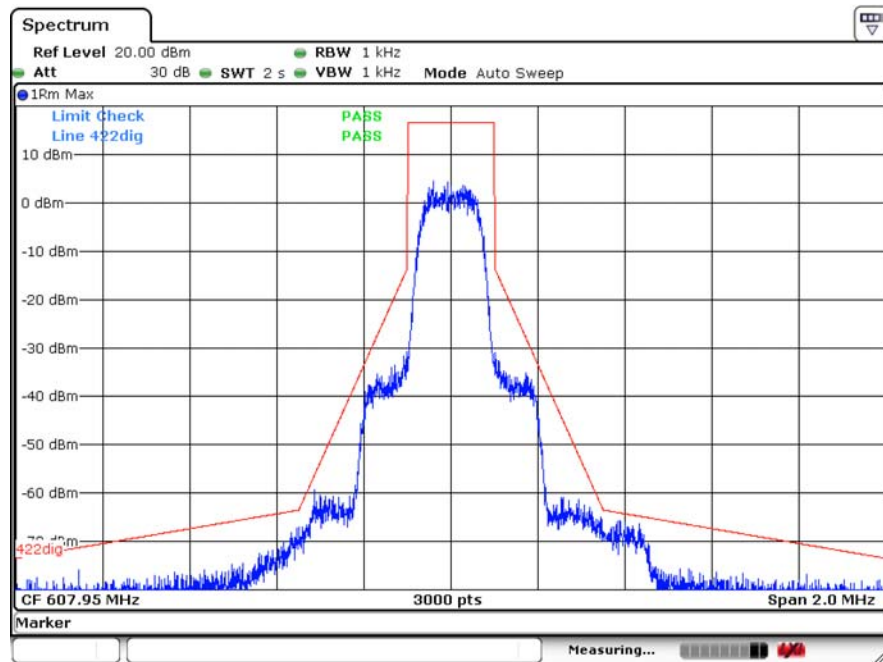
Date: 7.FEB.2020 14:16:36

50 mW 607.950 MHz, Carrier Power Reference



Date: 7.FEB.2020 14:09:07

50 mW 607.950 MHz



Date: 7.FEB.2020 14:12:01

## 7 FCC §74.861(e) (7) & ISEDC RSS-210 §G.4 - Conducted Spurious Emissions at Antenna Port

### 7.1 Applicable Standards

According to FCC §74.861 (e) (7):

(7) Analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Digital emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.2.2 (Figure 4) of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Beyond one megahertz below and above the carrier frequency, emissions shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08). The requirements of this paragraph (e)(7) shall not apply to applications for certification of equipment in these bands until nine months after release of the Commission's Channel Reassignment Public Notice, as defined in §73.3700(a)(2) of this chapter.

According to RSS-210 §G.4: The transmitter unwanted emissions shall meet and be measured according to the requirements in sections 8.3 and 8.4 of ETSI EN 300 422-1.

### 7.2 Test Procedure

The tests were performed following the procedures outlined in ETSI EN 300 422-1 V1.4.2 (2011-08) and KDB 971168 D01 Power Meas License Digital Systems v03r01.

### 7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2019-06-26	1 year
-	RF Cable	-	-	Each time <sup>1</sup>	N/A

Note<sup>1</sup>: RF cable included in the test set-up will be checked each time before testing.

**Statement of Traceability:** *BACL Corp.* attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 02 October 2018) "A2LA Policy on Metrological Traceability".

### 7.4 Test Environmental Conditions

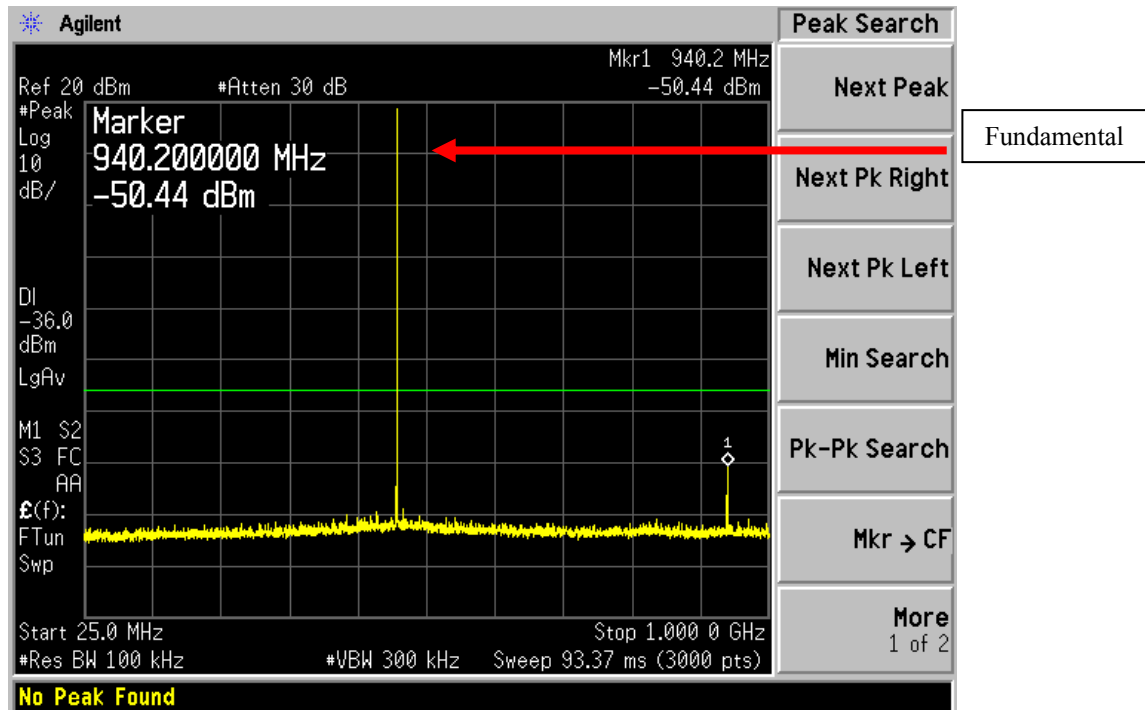
<b>Temperature:</b>	21 °C
<b>Relative Humidity:</b>	19 %
<b>ATM Pressure:</b>	101.7 kPa

The testing was performed by Christopher Casteel on 2020-01-14 at RF site.

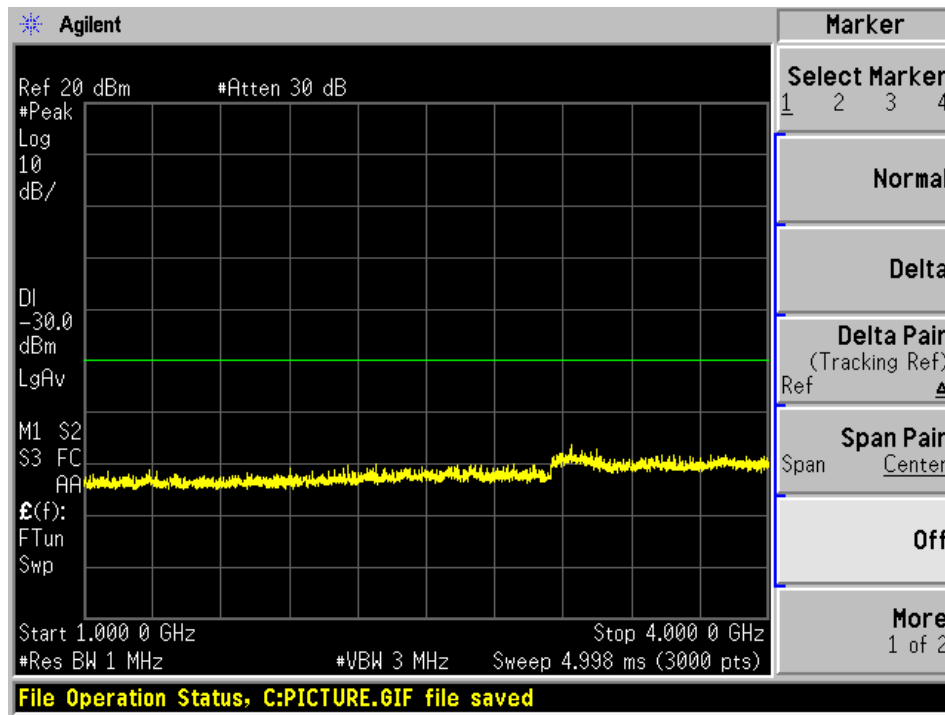
### 7.5 Test Results

Please refer to the following plots for detailed test results. Testing was done at the highest power setting to demonstrate worst case.

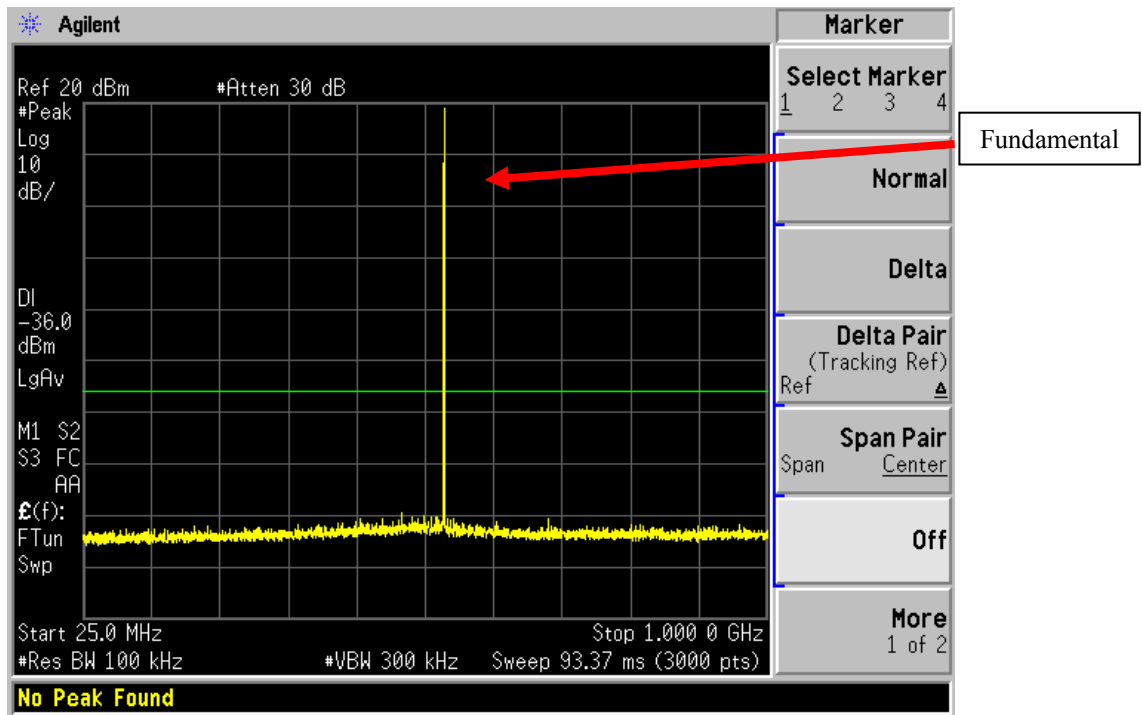
407.100 MHz, below 1 GHz



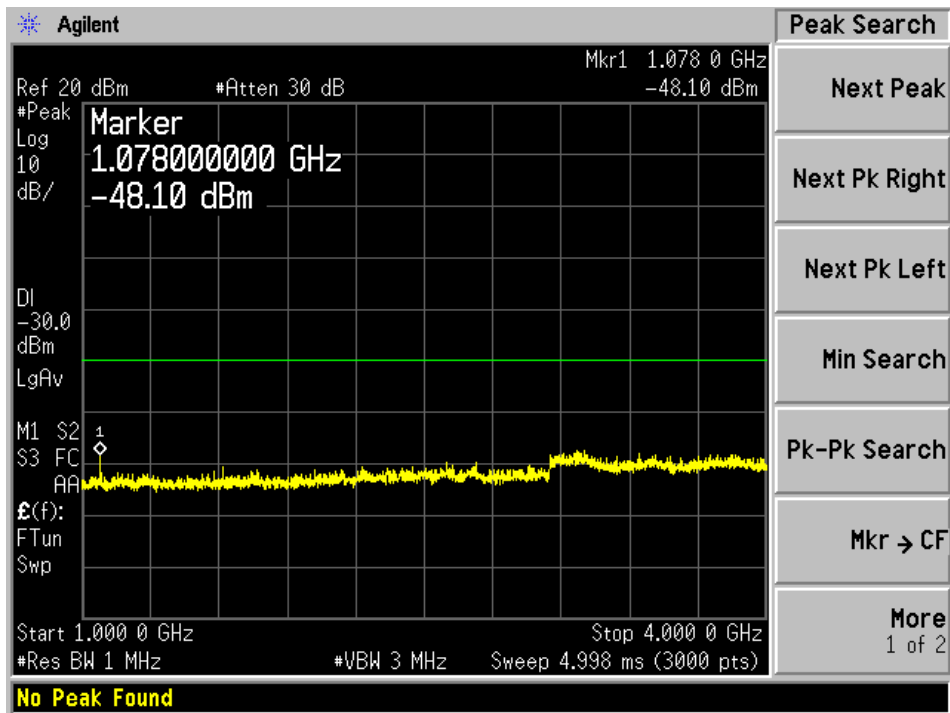
407.100 MHz, above 1 GHz



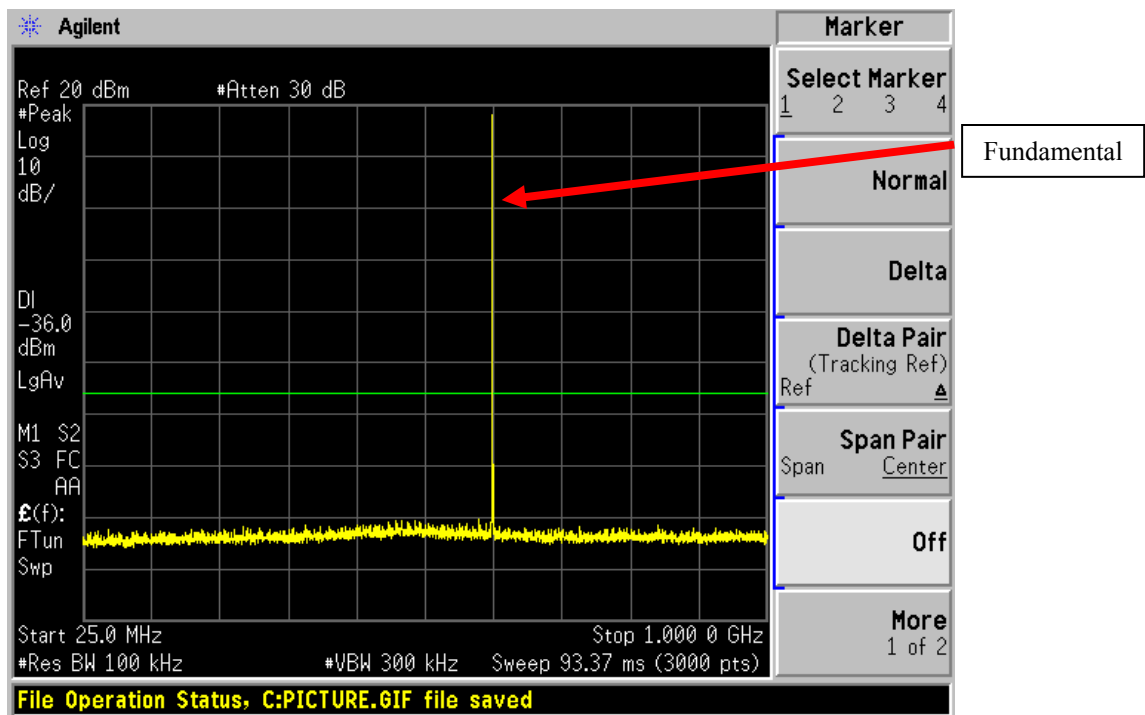
539.025 MHz, below 1 GHz



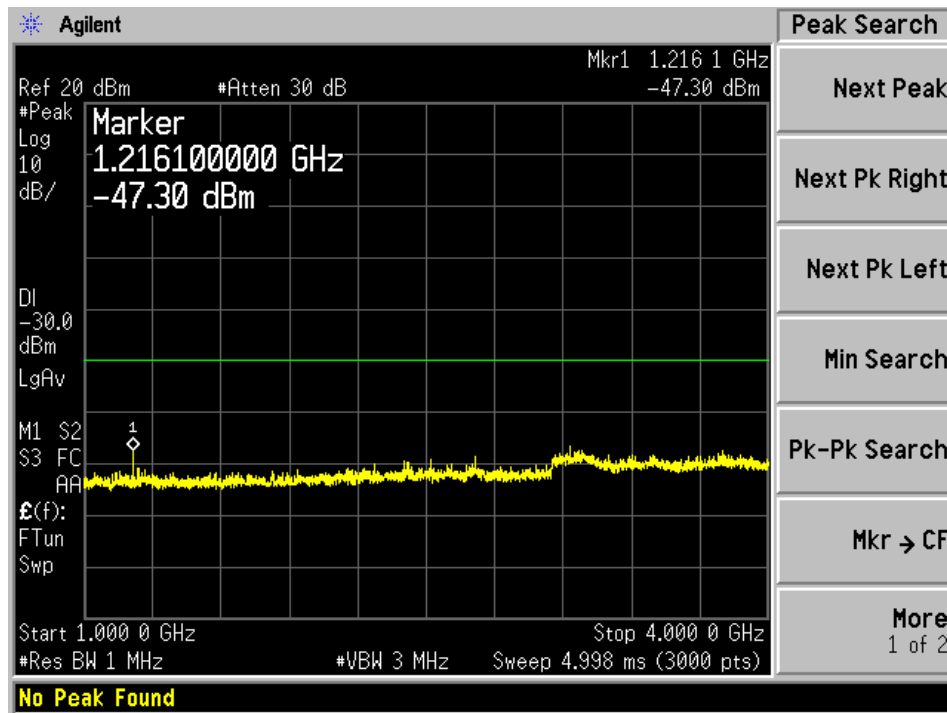
539.025MHz, above 1 GHz



607.950 MHz, below 1 GHz



607.950 MHz, above 1 GHz



## **8 FCC §74.861(e) (7) & ISEDC RSS-210 §G.4 - Field Strength of Spurious Radiation**

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### **8.1 Applicable Standards**

According to FCC §74.861 (e) (7):

(7) Analog emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.1.2 of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Digital emissions within the band from one megahertz below to one megahertz above the carrier frequency shall comply with the emission mask in section 8.3.2.2 (Figure 4) of the European Telecommunications Institute Standard ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and Radio spectrum Matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; part 1: Technical characteristics and methods of measurement. Beyond one megahertz below and above the carrier frequency, emissions shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08). The requirements of this paragraph (e)(7) shall not apply to applications for certification of equipment in these bands until nine months after release of the Commission's Channel Reassignment Public Notice, as defined in §73.3700(a)(2) of this chapter.

According to RSS-210 §G.4: The transmitter unwanted emissions shall meet and be measured according to the requirements in sections 8.3 and 8.4 of ETSI EN 300 422-1.

### **8.2 Test Procedure**

The tests were performed following the procedures outlined in ETSI EN 300 422-1 V1.4.2 (2011-08) and KDB 971168 D01 Power Meas License Digital Systems v03r01.



### 8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008K3 9-101203-UW	2019-08-06	1 year
Sunol Sciences	System Controller	SC110V	122303-1	N/R	N/A
Sunol Sciences	Biconi-Log Antenna	JB1	A013105-3	2018-02-26	2 years
Agilent	Pre-Amplifier	8447D	2944A10187	2019-04-11	1 year
HP/Agilent	Pre-Amplifier	8449B OPT HO2	3008A0113	2019-09-30	1 year
Sunol Sciences	Horn Antenna	DRH-118	A052704	2019-04-02	2 years
A.R.A.	Horn Antenna	DRG-118/A	1132	2018-02-13	2 years
MDP Digital	Times Microwave LMR 400 UltraFex Coaxial Cable 35'	LMR400UF	1904161	2019-04-16	1 year
Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2020-02-11	1 year
-	RF Cable	-	-	Each time <sup>1</sup>	N/A
IW Microwave	150 Series 2.92mm Cable	KPS1501AN- 3780-KPS	DC 1925	2019-09-11	1 year
COM-POWER	Dipole Antenna	AD-100	721033DB1, 2, 3, 4	2019-03-06	2 years

Note<sup>1</sup>: cable included in the test set-up will be checked each time before testing.

**Statement of Traceability:** *BACL Corp.* attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 02 October 2018) "A2LA Policy on Metrological Traceability".

### 8.4 Test Environmental Conditions

<b>Temperature:</b>	21 °C
<b>Relative Humidity:</b>	19 %
<b>ATM Pressure:</b>	101.7 kPa

The testing was performed by Matthew Riego de Dios on 2020-02-11 in 5 meter chamber 3.

## 8.5 Test Results

EUT was configured to the highest power setting, and the antenna port was terminated with 50 ohm load.

470.100 MHz, 50 mW

Freq. (MHz)	S.A. Amp. (dBμV)	Table Azimuth (Degrees)	Test Antenna		Substitution				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Freq. (MHz)	S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
295	28.18	0	100	H	295	-72.06	1.6	0.48	-70.94	-36	-34.94
295	27.93	0	100	V	295	-72.98	1.6	0.48	-71.86	-36	-35.86
1215	52.02	0	100	H	1215	-60.81	6.88	1.98	-55.91	-30	-25.91
1215	51.76	0	100	V	1215	-61.29	6.88	1.98	-56.39	-30	-26.39
1820	50.8	0	100	H	1820	-58.64	9.533	3.07	-52.177	-30	-22.177
1820	50.88	0	100	V	1820	-58.32	9.533	3.07	-51.857	-30	-21.857

539.025 MHz, 50 mW

Freq. (MHz)	S.A. Amp. (dBμV)	Table Azimuth (Degrees)	Test Antenna		Substitution				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Freq. (MHz)	S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
295	31.91	0	100	H	295	-68.33	1.6	0.48	-67.21	-36	-31.21
295	28.11	0	100	V	295	-72.8	1.6	0.48	-71.68	-36	-35.68
1215	51.97	0	100	H	1215	-60.86	6.88	1.98	-55.96	-30	-25.96
1215	52.17	0	100	V	1215	-60.88	6.88	1.98	-55.98	-30	-25.98
1820	50.79	0	100	H	1820	-58.65	9.533	3.07	-52.187	-30	-22.187
1820	50.87	0	100	V	1820	-58.33	9.533	3.07	-51.867	-30	-21.867

607.950 MHz, 50 mW

Freq. (MHz)	S.A. Amp. (dB $\mu$ V)	Table Azimuth (Degrees)	Test Antenna		Substitution				Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Freq. (MHz)	S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
295	29.01	0	100	H	295	-71.23	1.6	0.48	-70.11	-36	-34.11
295	28.02	0	100	V	295	-72.89	1.6	0.48	-71.77	-36	-35.77
1215	52.53	0	100	H	1215	-60.3	6.88	1.98	-55.4	-30	-25.4
1215	52.44	0	100	V	1215	-60.61	6.88	1.98	-55.71	-30	-25.71
1820	50.52	0	100	H	1820	-58.92	9.533	3.07	-52.457	-30	-22.457
1820	50.7	0	100	V	1820	-58.5	9.533	3.07	-52.037	-30	-22.037

## 9 FCC §2.1055 & ISEDC RSS-210 §G.3 - Frequency Stability

### 9.1 Applicable Standards

According to §2.1055 and RSS-210 §G.1: the frequency stability of equipment shall comply with the limits specified in table G1, when tested under the frequency stability testing conditions specified in RSS-Gen.

Frequency bands (MHz)	Transmit e.i.r.p. (mW)	Authorized bandwidth (kHz)	Frequency stability ( $\pm$ ppm)
54-72 76-88 174-216	50	200	50
470-608	250	200	50
614-616 653-663	20	200	50

### 9.2 Test Procedure

According to FCC 2.1055, (a) the frequency stability was measured with variation of ambient temperature as follows:

- (1) From  $-30^{\circ}$  to  $+50^{\circ}$  centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
  - (2) From  $-20^{\circ}$  to  $+50^{\circ}$  centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.
  - (3) From  $0^{\circ}$  to  $+50^{\circ}$  centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.
- (b) Frequency measurements was made at the extremes of the specified temperature range and at intervals of not more than  $10^{\circ}$  centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

- (d) The frequency stability was also measured with variation of primary supply voltage as follows:

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

An unmodulated carrier was not available, the measurement method is described as follow. 20 dBc points on each side of the peak point was measured as  $f_L$  and  $f_H$ . The measured center frequency is then calculated by following the formula below, and compare with the declared channel center frequency.

$$f_L + (f_H - f_L)/2$$

### 9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	EXA Signal Analyzer	N9010A	MY48030852	2018-10-22	2 years
Tenney	Environmental Chamber	TUJR	27445-06	2019-03-26	1 year
-	RF Cable	-	-	Each time <sup>1</sup>	N/A
KEPCO	DC Source	25-10M	H1334526	Cal. Not Required	N/A

Note<sup>1</sup>: RF cable included in the test set-up will be checked each time before testing.

**Statement of Traceability:** *BACL Corp.* attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with A2LA Policy P102 (dated 02 October 2018) "A2LA Policy on Metrological Traceability".

### 9.4 Test Environmental Conditions

<b>Temperature:</b>	19 °C
<b>Relative Humidity:</b>	21 %
<b>ATM Pressure:</b>	101.7 kPa

The testing was performed by Christopher Casteel on 2019-12-20 to 2020-02-13 at RF site.

## 9.5 Test Results

FC = 539.025 MHz:

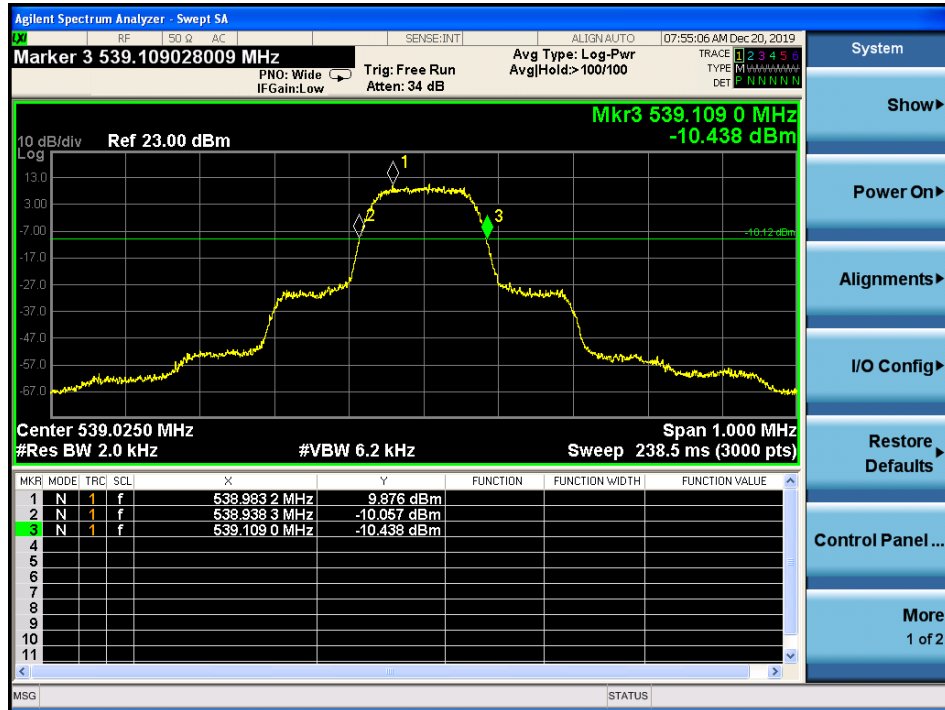
Varying temperature:

Temperature (°C)	Measured Frequency (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limit (± ppm)
-30	539.02365	539.025	2.50	50
-20	539.02460	539.025	0.74	50
-10	539.02460	539.025	0.74	50
0	539.02450	539.025	0.93	50
10	539.02415	539.025	1.58	50
20	539.02500	539.025	0	50
30	539.02535	539.025	-0.65	50
40	539.02485	539.025	0.28	50
50	539.02420	539.025	1.48	50

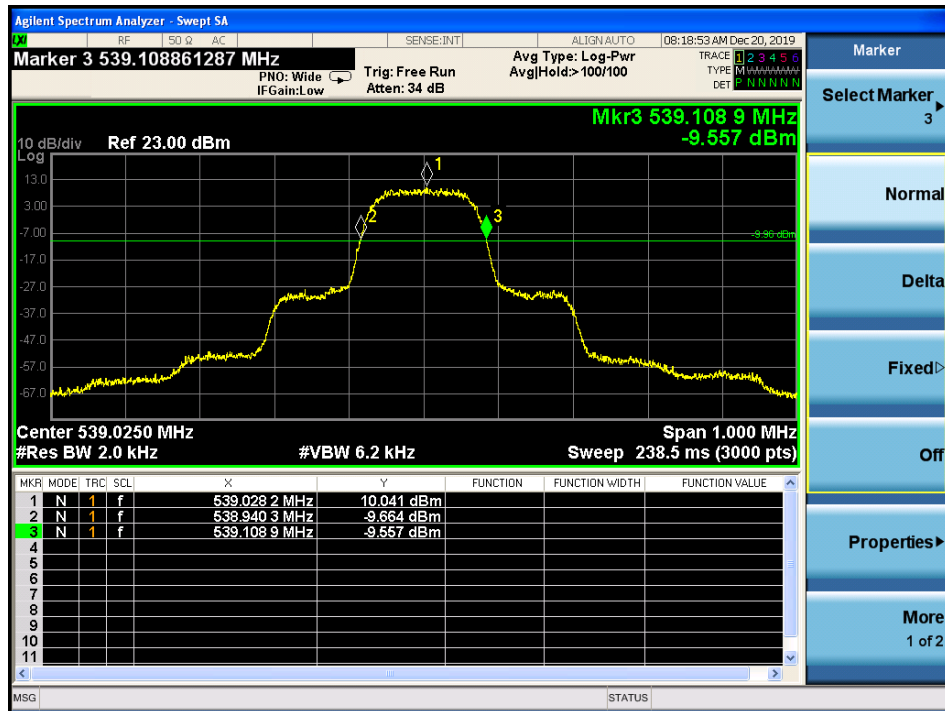
Varying supply voltage:

Voltage	Measured Frequency (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limit (± ppm)
Low (2.55 V)	539.02500	539.025	0	50
High (3.45 V)	539.02450	539.025	0.93	50

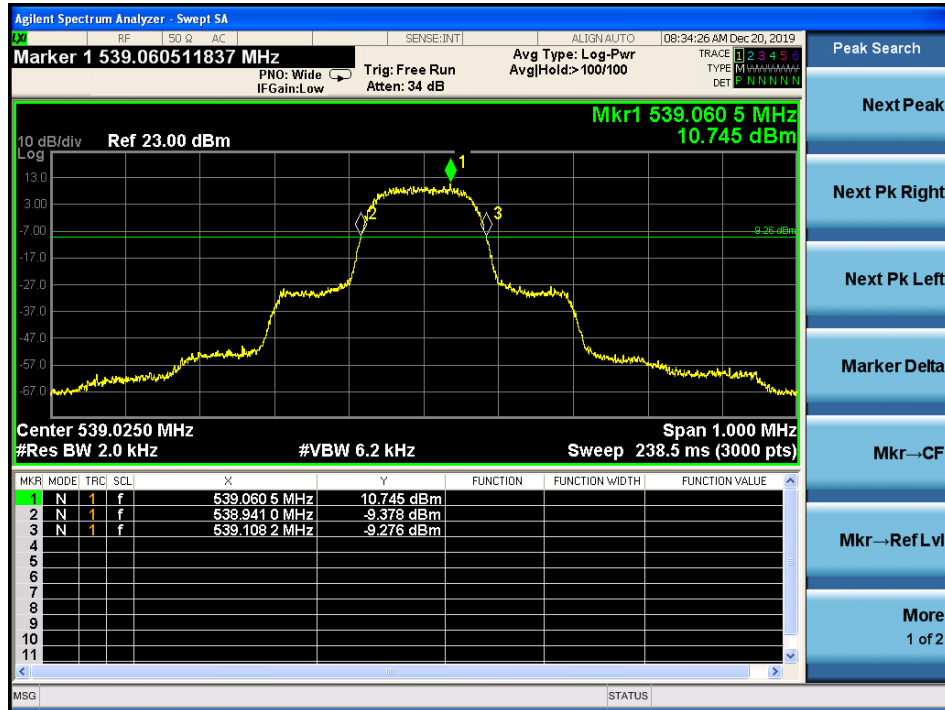
-30 °C



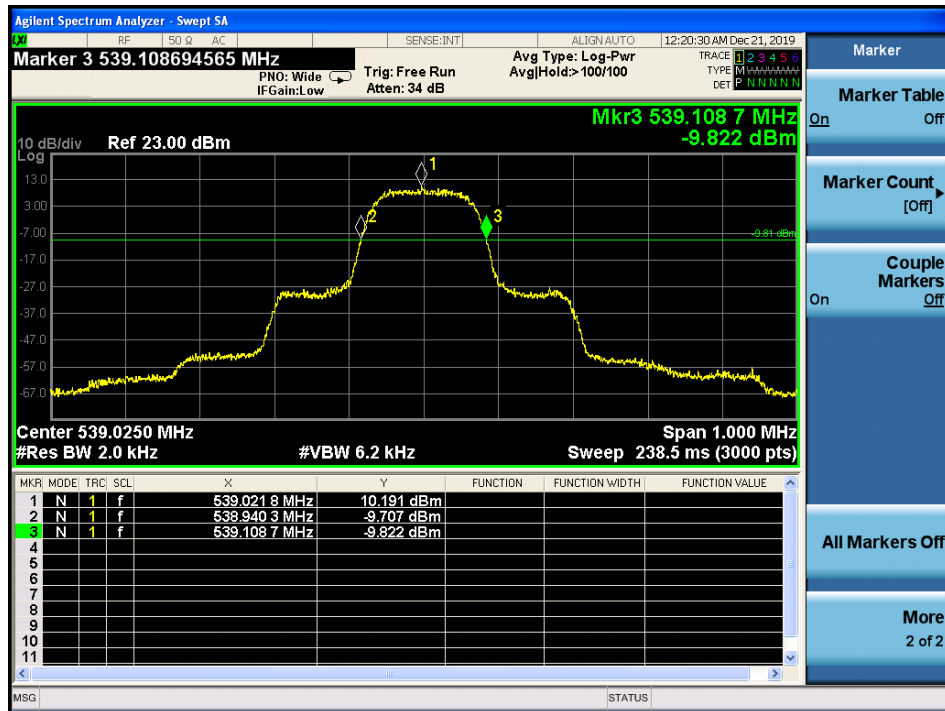
-20 °C



-10 °C

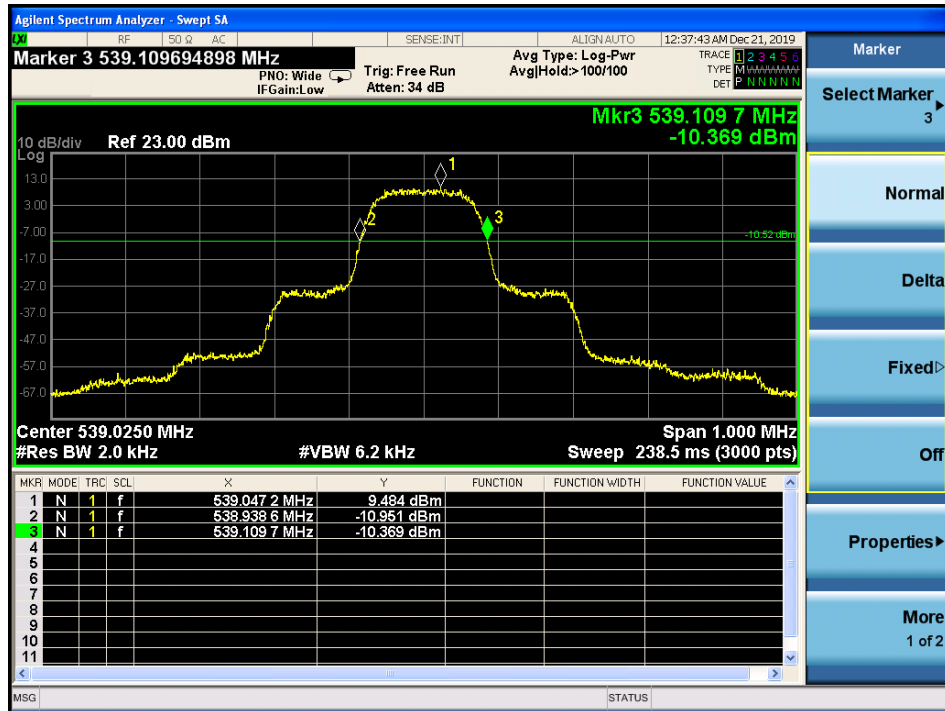


0 °C

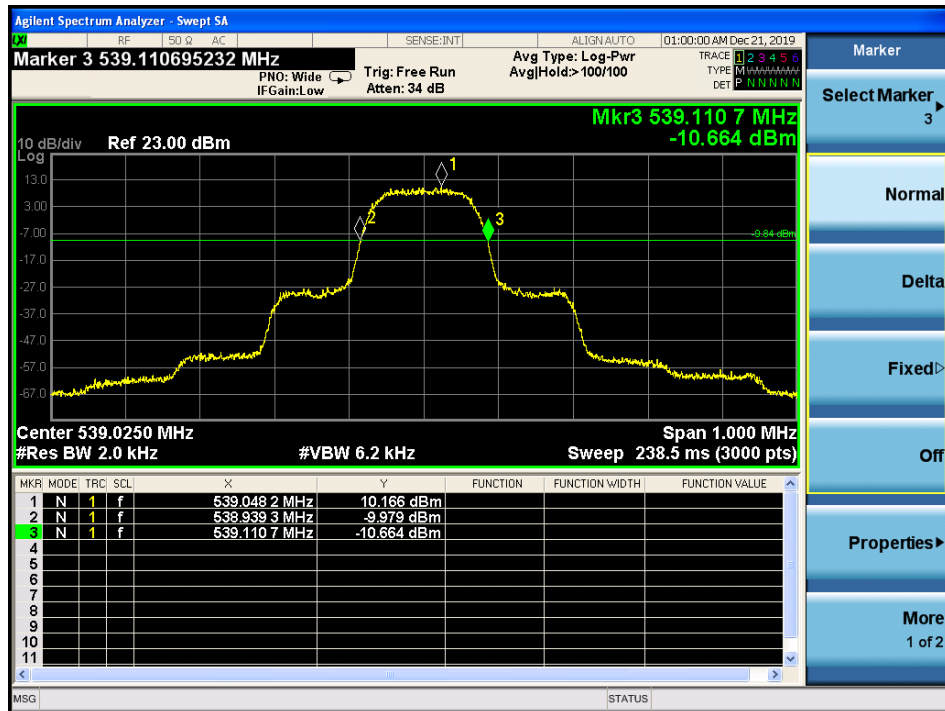




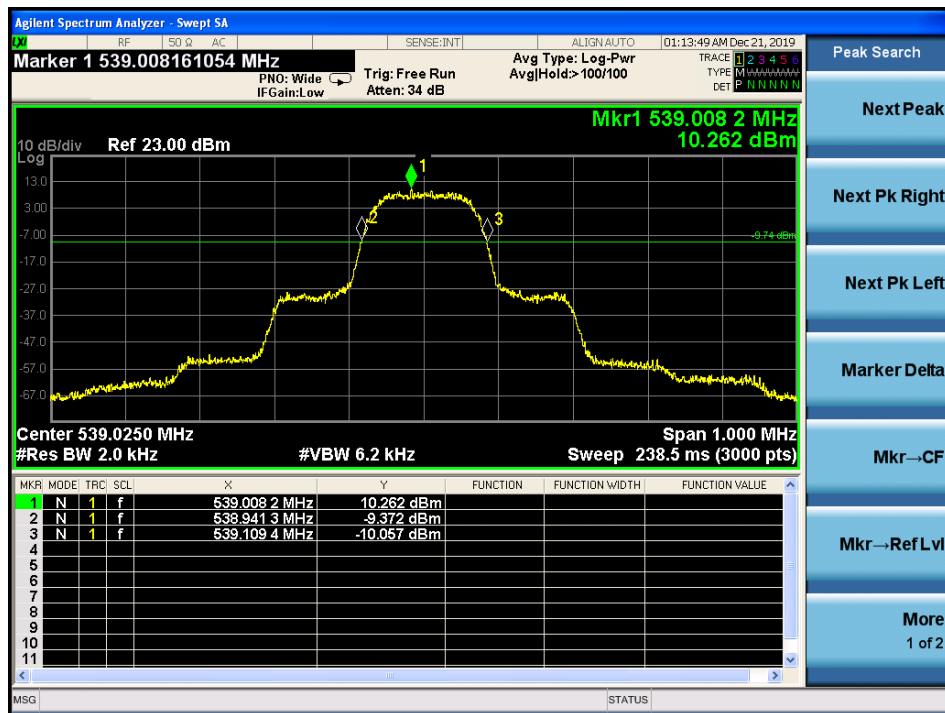
10 °C



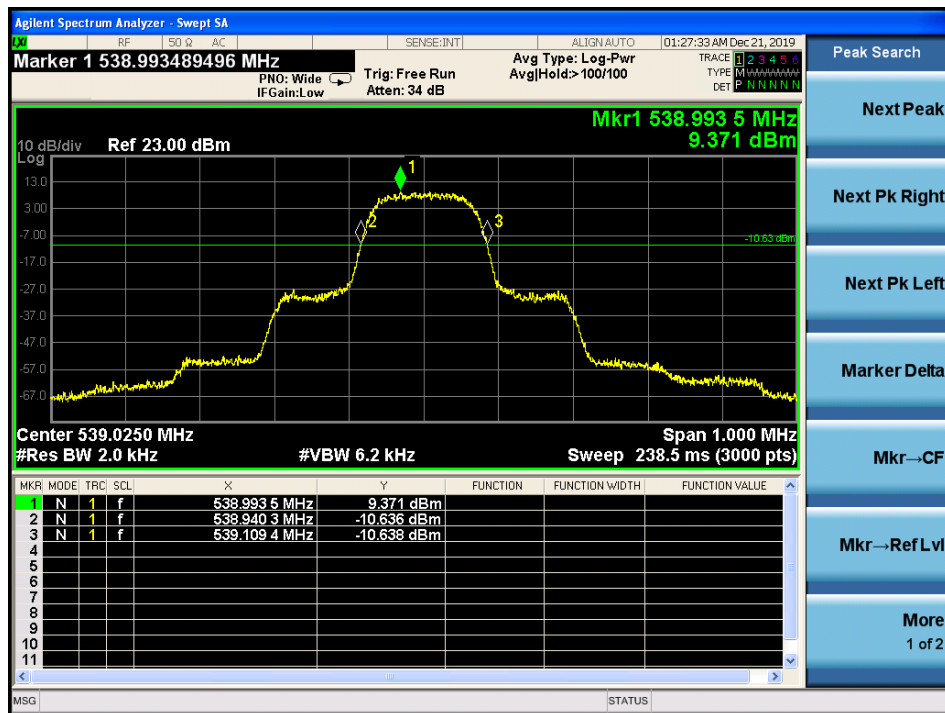
20 °C



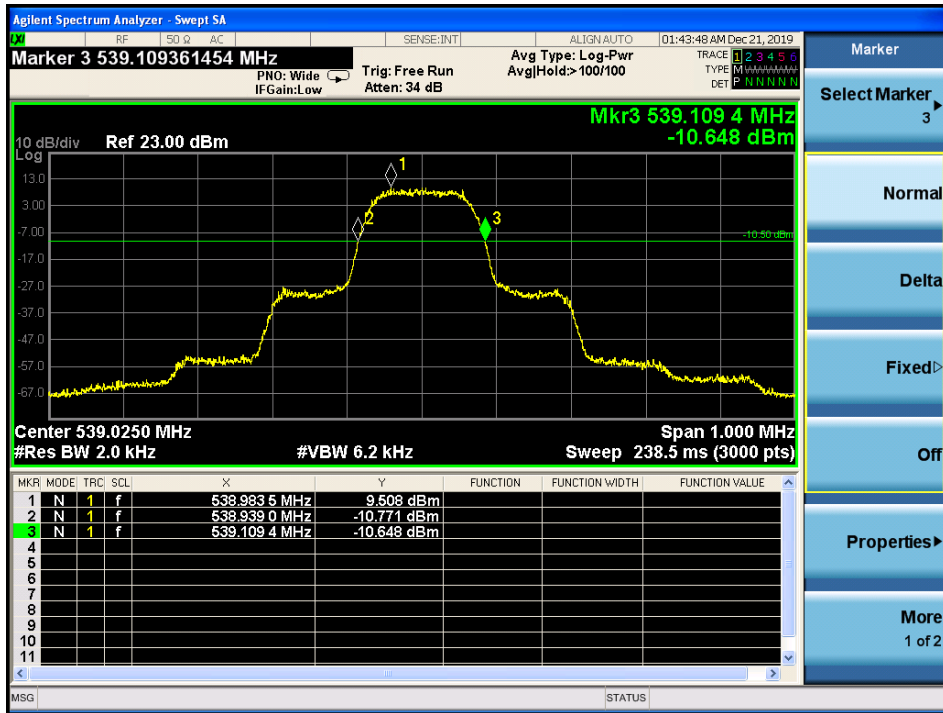
30 °C



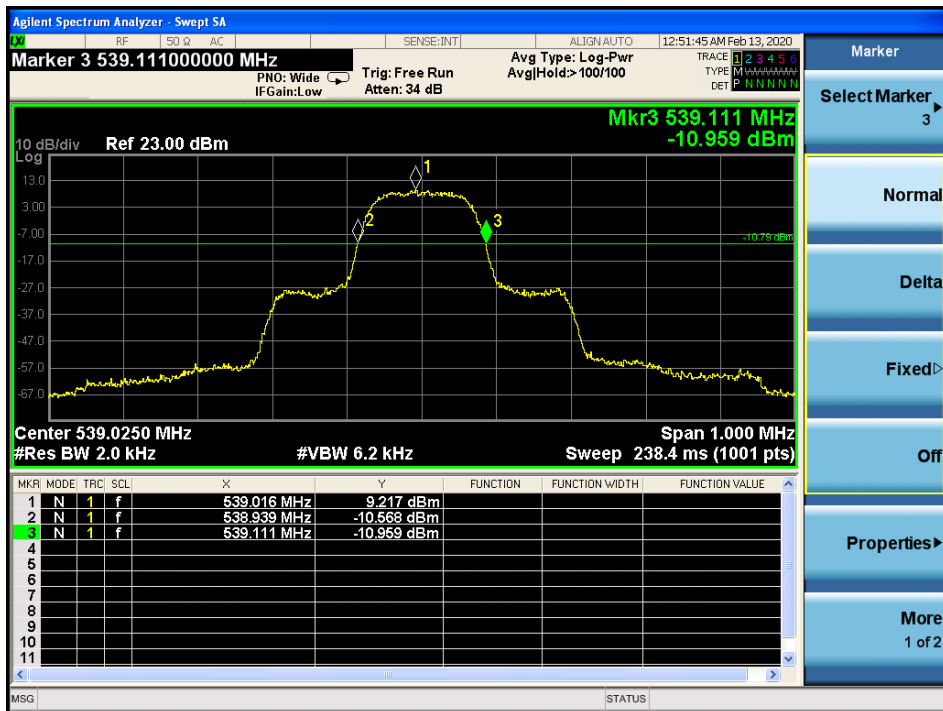
40 °C



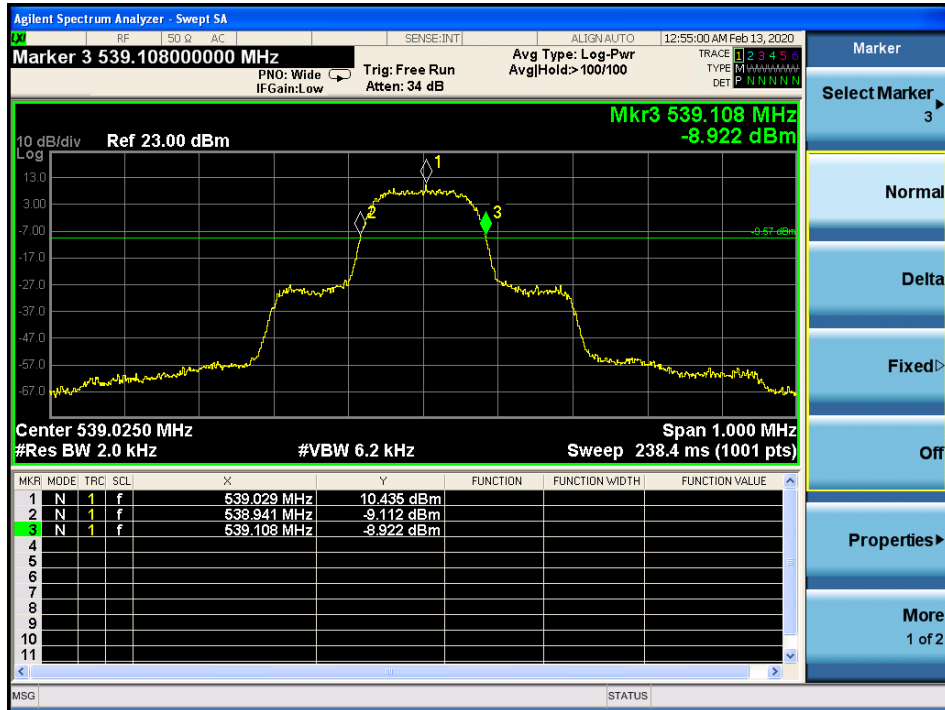
50 °C



Low Voltage



### High Voltage



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## **10 Annex A - Test Setup Photographs**

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Please refer to the attachment

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## **11 Annex B - EUT External Photographs**

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Please refer to the attachment

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## **12 Annex C - EUT Internal Photographs**

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Please refer to the attachment

### 13 Annex D (Normative) - A2LA Electrical Testing Certificate



## Accredited Laboratory

A2LA has accredited

### BAY AREA COMPLIANCE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

### Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. This laboratory also meets A2LA R222 - Specific Requirements EPA ENERGY STAR Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Presented this 2<sup>nd</sup> day of October 2018.

Vice President, Accreditation Services  
For the Accreditation Council  
Certificate Number 3297.02  
Valid to September 30, 2020  
Revised June 5, 2019

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

Please follow the web link below for a full ISO 17025 scope

<https://www.a2la.org/scopepdf/3297-02.pdf>

--- END OF REPORT ---