FCC PART 74, SUBPART H
ISEDC RSS-123, ISSUE 4
TEST AND MEASUREMENT REPORT

For

Lectrosonics, Inc.

581 Laser Road NE, Rio Rancho, NM 87124, USA

FCC ID: DBZHHA79
IC: 8024A-HHA79

Report Type:	**Product Type:**
Original Report	Wireless Microphone Transmitter

Prepared By:	Zhao Zhao Test Engineer
Report Number	R1911012-74
Report Issue Date:	2020-01-28
Reviewed By:	Simon Ma RF Supervisor

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ACCREDITED
CERTIFICATE #3297.02

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1911012-74	Original Report	2020-01-28

1 General Description

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: *HHA/E07-941, FCC ID: DBZHHA79, IC: 8024A-HHA79,* 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: 941.525-951.975 MHz, 953.025-956.225 MHz and 956.475-959.825 MHz.

1.2 Mechanical Description of EUT

The *HHa/E07-941* (EUT) measures approximately 24.1 cm (L) x 5.0 cm (W) x 5.0 cm (H) and weighs approximately 343g and powered by two AA batteries.

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

1.3 Objective

The following type approved report is prepared on behalf of *Lectrosonics, Inc.* in accordance with Part 74, Subparts H of the Federal Communications Commission rules, and ISED RSS-123 Issue 4.

The objective is to determine compliance with Part 74 of the FCC Rules, and ISED RSS-123 Issue 4, limits for RF output power, Modulation characteristics, Emission bandwidth, Field strength of spurious radiation and Frequency stability for low power auxiliary stations operating in the bands other than those allocated for TV broadcasting.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI/TIA-603-E-2016, ANSI C63.26-2015, FCC KDB 971168 D01 Power Meas License Digital Systems v03r01, and EN 300 422-1 v1.4.2 Electromagnetic compatibility and Radio Spectrum Matters; Wireless microphones in the 25MHz to 3GHz frequency range.

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 º 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, 3rd-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 3279.01)*** 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):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - 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:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA

Vietnam: APEC Tel MRA -Phase I;

2 EUT Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI/TIA-603-E-2016, ANSI C63.26-2015, and KDB 971168 D01 v03r01.

2.2 EUT Exercise Software

None

2.3 Special Equipment

None

2.4 Equipment Modifications

There is a customized microphone with conducted Audio Signal TNC port for band mask tests.

There is a customized conducted sample with SMA port for conducted tests.

2.5 Local Support Equipment

None

2.6 Interface Ports and Cables

None

3 Summary of Test Results

FCC & ISEDC Rules	Descriptions of Test	Result (s)
FCC §2.1093 ISEDC RSS-102	RF exposure	Compliant[1]
FCC §74.861(d)(1) ISEDC RSS-123 §8.2	RF output power	Compliant
FCC §2.1047 ISEDC RSS-123 §8.1	Modulation characteristics	Compliant
FCC §2.1049 FCC §74.861(d)(4)(i) ISEDC RSS-123 §8.2 &§ 8.3	Operating bandwidth & Emission mask	Compliant
FCC §2.1051 FCC §74.861(d)(4)(i) ISEDC RSS-123 §8.3	Spurious emissions at the antenna port	Compliant
FCC §2.1053 FCC §74.861(d)(4)(i) ISEDC RSS-123 §8.3	Field strength of spurious emissions	Compliant
FCC §2.1055 ISEDC RSS-123 §8.2	Frequency tolerance	Compliant

Note[1]: Please refer to report R1911012-20

4 FCC §2.1093 & ISEDC RSS-102 - RF Exposure

Please refer to report R1911012-20 for results.

5 FCC §74.861(d)(1) & ISEDC RSS-123 §8.2 - RF Output Power

5.1 Applicable Standards

According to FCC §74.861 (d) For low power auxiliary stations operating in the bands other than those allocated for TV broadcasting, the following technical requirements are imposed.

(1) For all bands except the 1435-1525 MHz band, the maximum transmitter power which will be authorized is 1 watt. In the 1435-1525 MHz band, the maximum transmitter power which will be authorized is 250 milliwatts. Licensees may accept the manufacturer's power rating; however, it is the licensee's responsibility to observe specified power limits.

According to ISEDC RSS-123 §8.2 the device shall meet the transmit power/e.r.p., authorized bandwidth and frequency stability limits for its operating bands as specified in table 1.

Table 1 — Frequency bands, transmit power/e.r.p., authorized bandwidths and frequency stability limits

Frequency band (MHz)	Transmit power (W)	e.r.p. (W)	Authorized bandwidth (kHz)	Frequency stability (± ppm)
26.10-26.48	--	1	200	50
88-107.5	--	1	200	50
150-174	0.05	--	54	50
450-451	--	1	200	50
455-456	--	1	200	50
941.5-952	1	--	200	20
953-959.85	1	--	200	20
6930-6955	1	--	600	10
7100-7125	1	--	600	10

5.2 Test Procedure

KDB 971168 D01 v03r01

5.3 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
-	20dB attenuator	-	-	Each time[1]	N/A
-	RF Cable	-	-	Each time[1]	N/A

Note[1]: attenuator and 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:	23 ºC
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

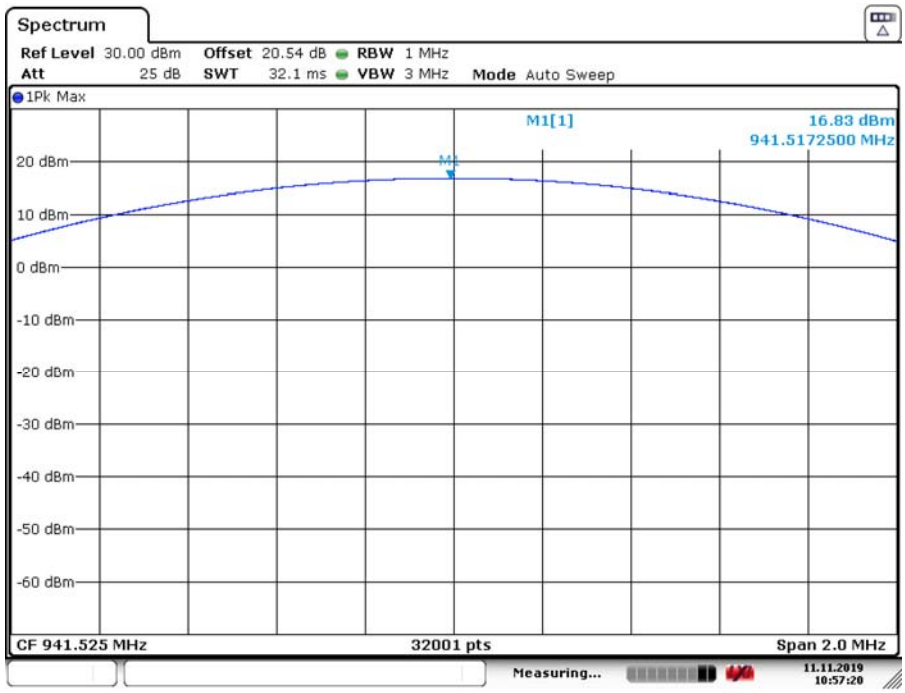
The testing was performed by Zhao Zhao on 2019-11-11 at RF site.

5.5 Test Results

Channel	Frequency (MHz)	Conducted Output Power (dBm)		Limit (dBm)	Rated Power (dBm)
		Setting: 50 mW	Setting: 100 mW		
Low	941.525	16.83	20.04	30	17/20
Middle	950.675	16.76	20.10	30	17/20
High	959.825	16.92	19.88	30	17/20

Please refer to the following plots for details.

Low Channel, 941.525 MHz (50 mW)



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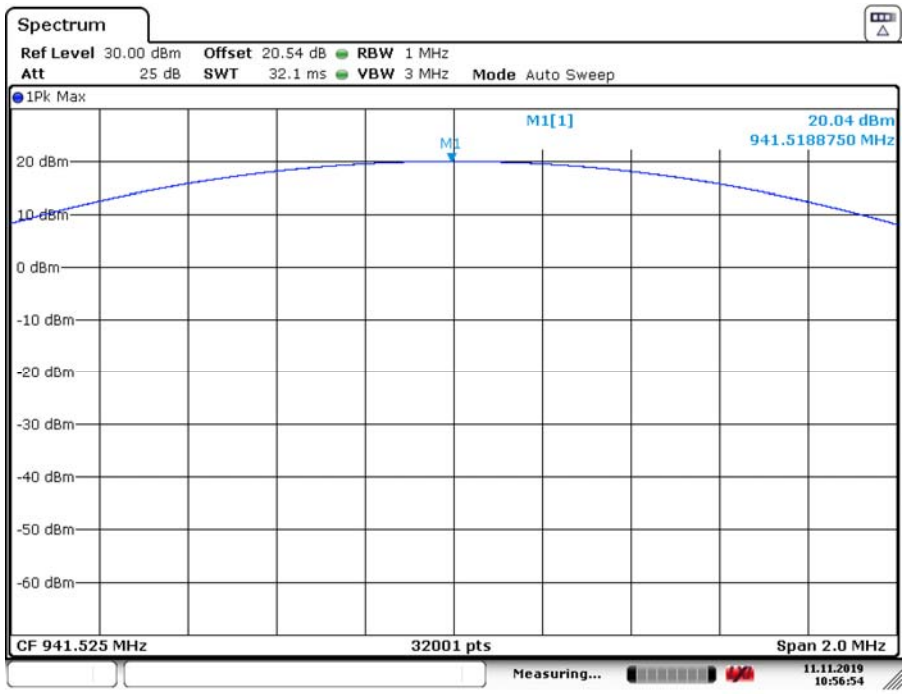
Low Channel, 941.525 MHz (100 mW)



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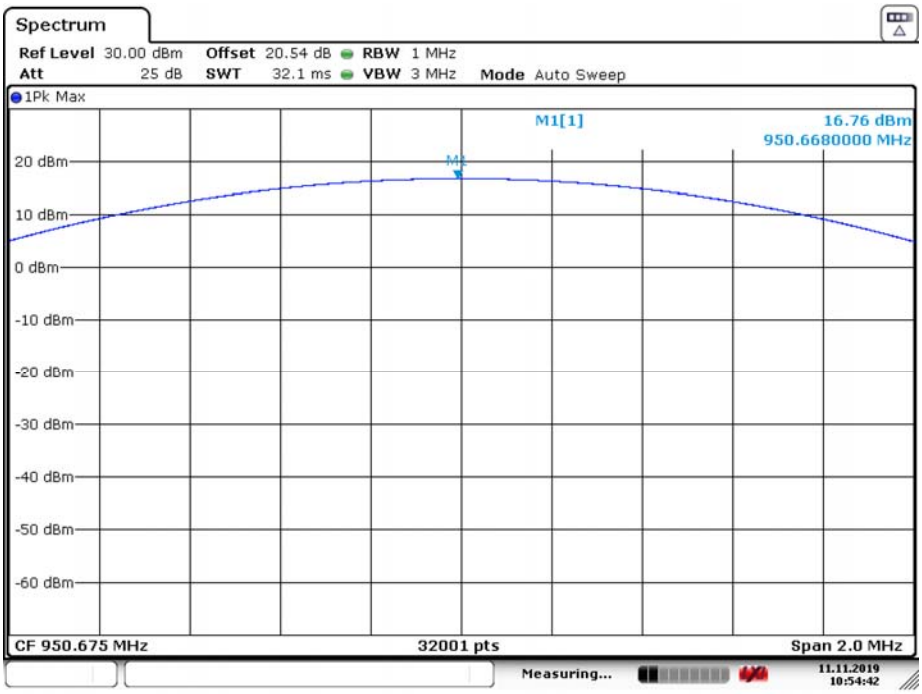
Middle Channel, 950.625 MHz (50 mW)



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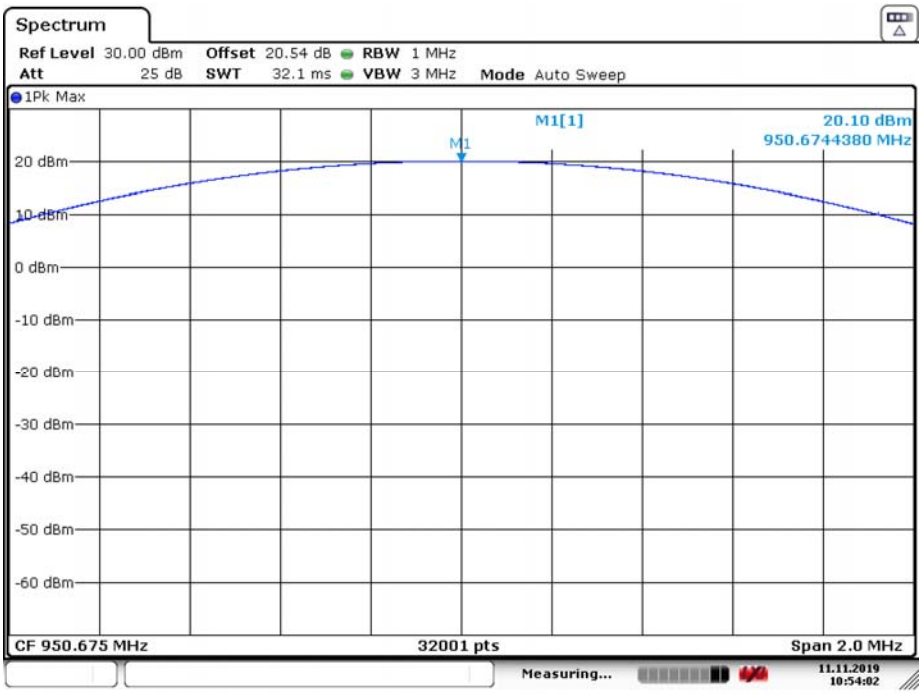
Middle Channel, 950.625 MHz (100 mW)



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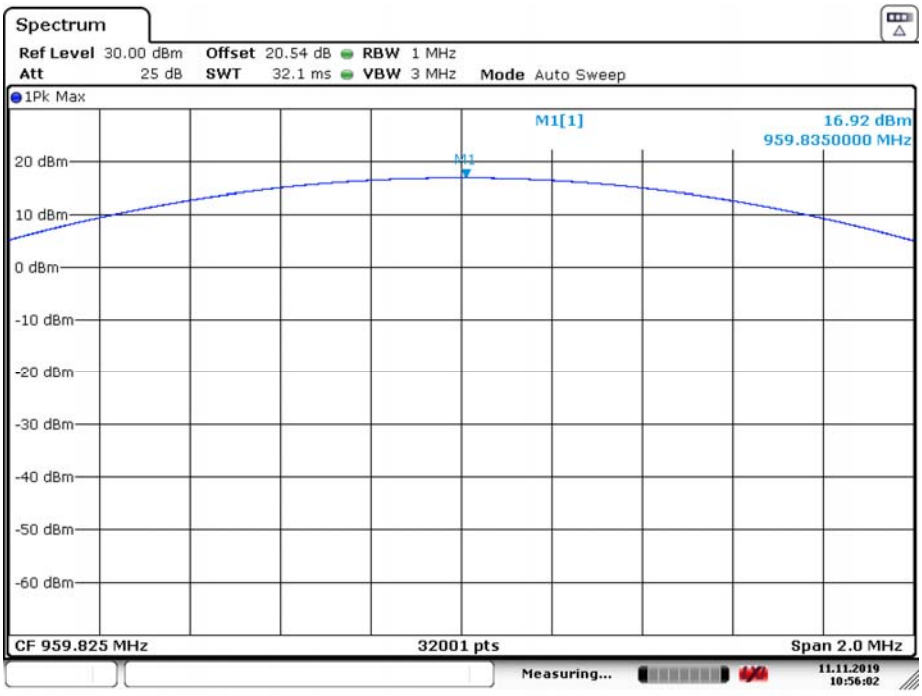
High Channel, 959.825 MHz (50 mW)



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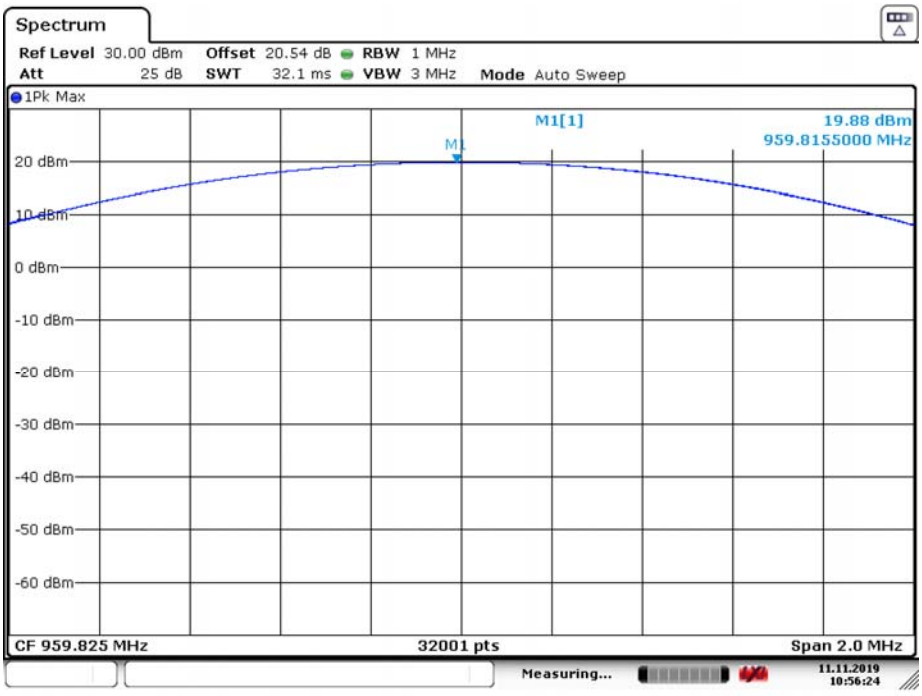
High Channel, 959.825 MHz (100 mW)



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6 FCC §2.1049, §74.861(d)(4)(i) & ISEDC RSS-123 §8.2, §8.3 - Occupied Bandwidth & Emission Mask

6.1 Applicable Standards

FCC §2.1049

According to FCC §74.861 (d) (4) (i):

(4)(i) For the 653-657 MHz, 941.5-944 MHz, 944-952 MHz, 952.850-956.250 MHz, 956.45-959.85 MHz, 1435-1525 MHz, 6875-6900 MHz and 7100-7125 MHz bands, 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. 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).

According to ISEDC RSS123 §8.2:

Table 1 — Frequency bands, transmit power/e.r.p., authorized bandwidths and frequency stability limits

Frequency band (MHz)	Transmit power (W)	e.r.p. (W)	Authorized bandwidth (kHz)	Frequency stability (± ppm)
26.10-26.48	--	1	200	50
88-107.5	--	1	200	50
150-174	0.05	--	54	50
450-451	--	1	200	50
455-456	--	1	200	50
941.5-952	1	--	200	20
953-959.85	1	--	200	20
6930-6955	1	--	600	10
7100-7125	1	--	600	10

According to ISEDC RSS123 §8.3 Clause c. devices operating in frequency bands 941.5-952 MHz, 953-959.85 MHz, 6930-6955 MHz and 7100-7125 MHz shall have the transmitter's unwanted emissions meet the requirements in sections 8.3 and 8.4 of ETSI EN 300 422-1.

6.2 Test Procedure

The OBW is according to KDB 971168 D01 v03r01

The Emission mask is according to Clause 8.3 of ETSI EN 300 422-1 V1.4.2 (2011-08).

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Rohde & Schwarz	Spectrum Analyzer	FSQ26	200749	2019-11-07	2 years
HP	RF Communications Test Set	8920A	3438A05338	2018-01-09	2 years
HP	Modulation Analyzer	8901A	2026A00847	2019-01-24	2 years
Krohn-Hite	Active Dual Channel Filter	3940	3212	2019-10-24	1 year
Agilent	Function Generator	33220A	MY43004878	2019-01-09	1 year
HP	TIMS	4934A	3737U15141	2019-01-18	1 year
-	20dB attenuator	-	-	Each time[1]	N/A
-	RF Cable	-	-	Each time[1]	N/A

Note[1]: attenuator 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:	22 ºC
Relative Humidity:	37 %
ATM Pressure:	101.7 kPa

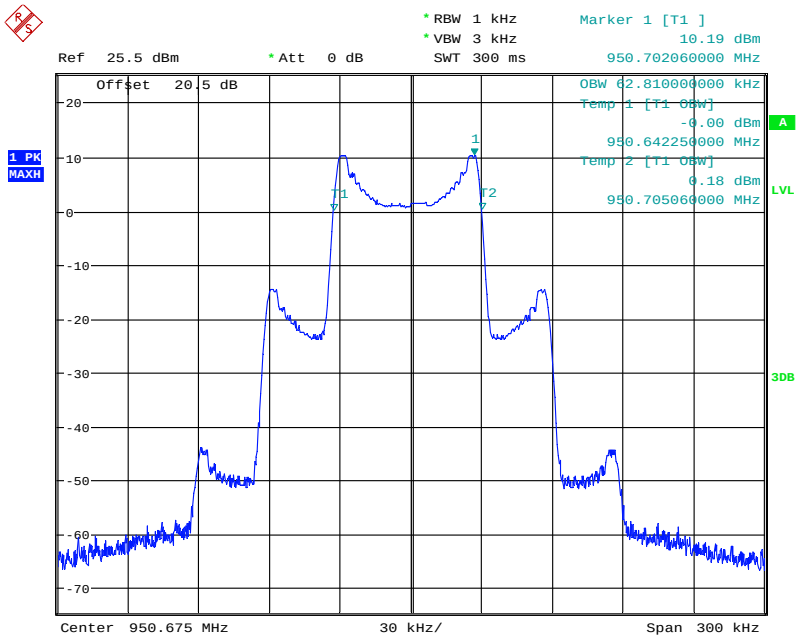
The testing was performed by Zhao Zhao on 2020-01-03 at RF site.

6.5 Test Results

Center Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Result	Power Setting
950.675	62.81	200	Pass	Low (50 mW)
950.675	62.62	200	Pass	High (100 mW)

Please refer to the following plots for detailed test results

99% Emission Bandwidth @ 50 mW



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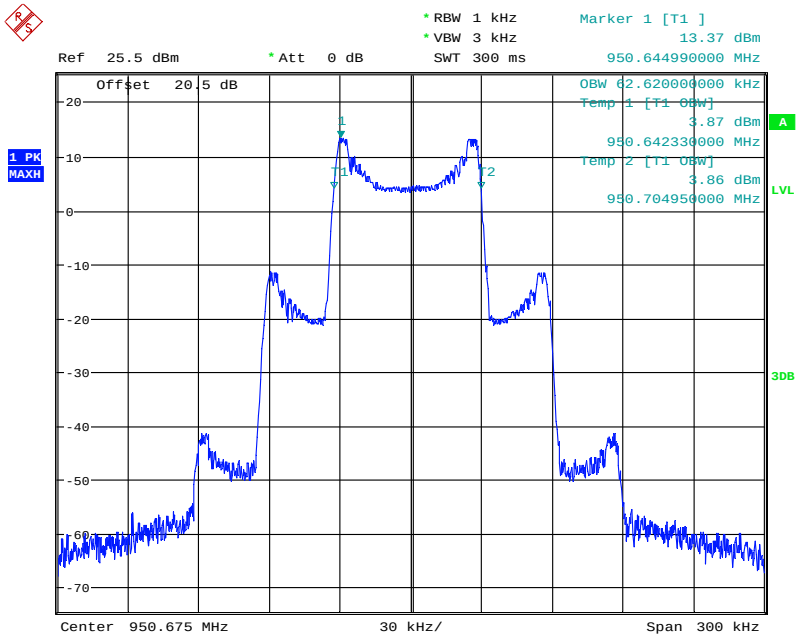
99% Emission Bandwidth @ 100 mW



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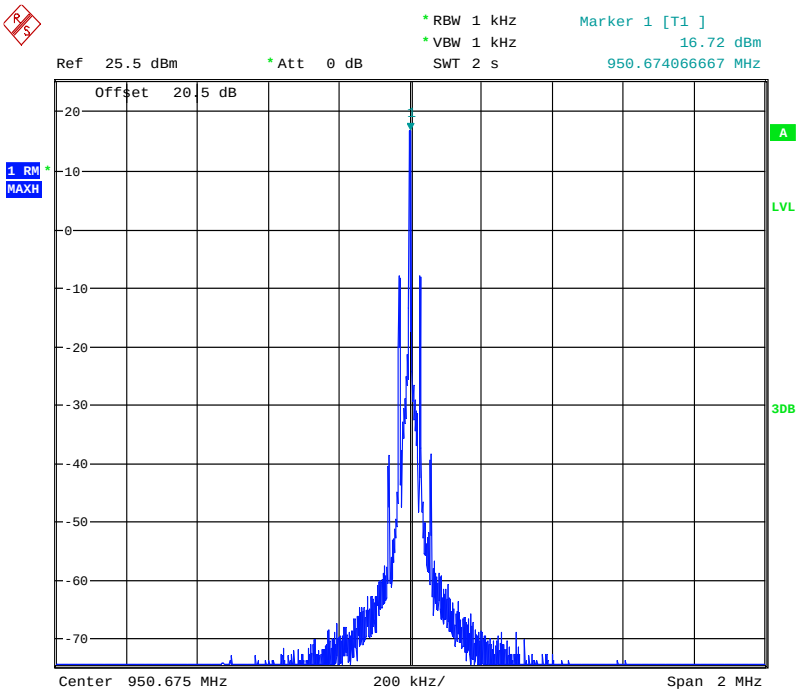
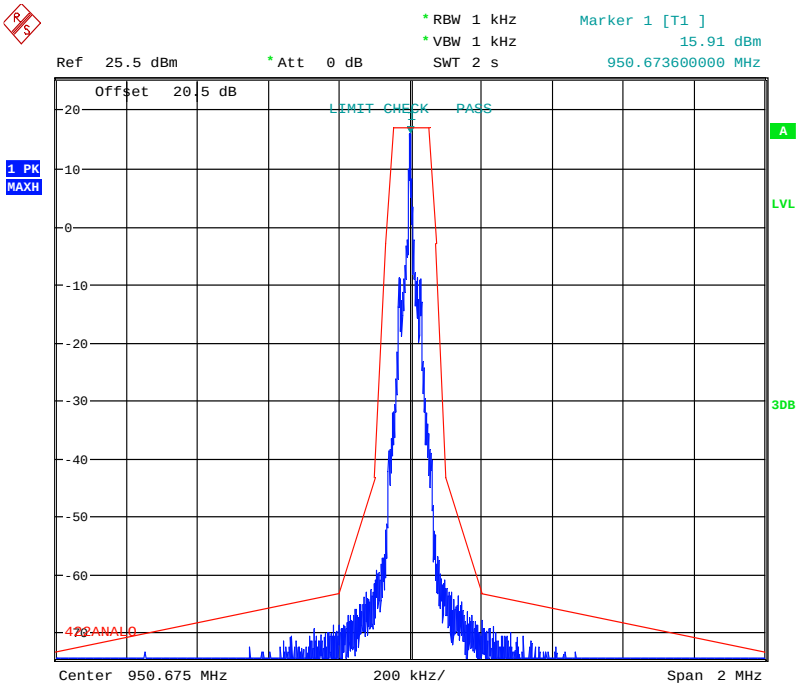
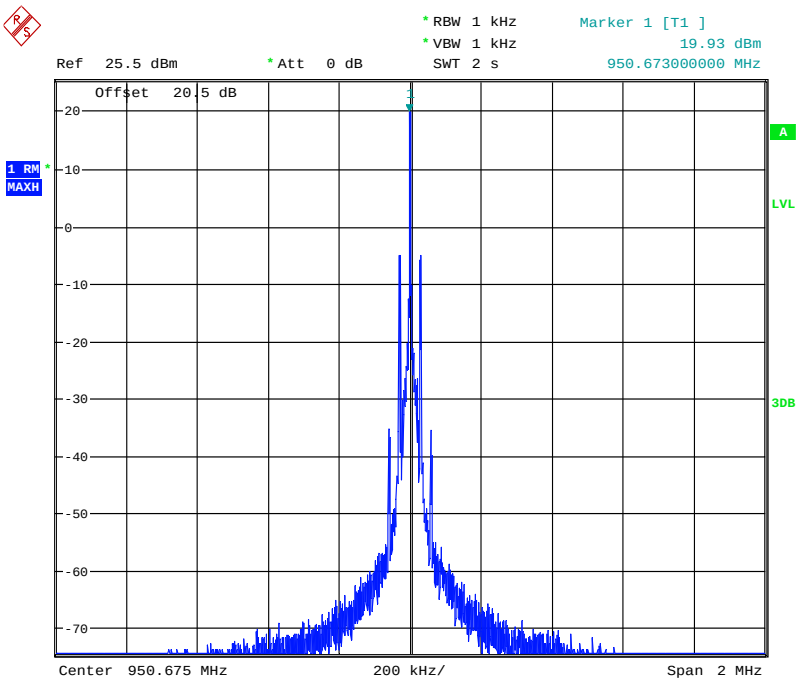
Emission Mask-1, 950.675 MHz @ 50 mW



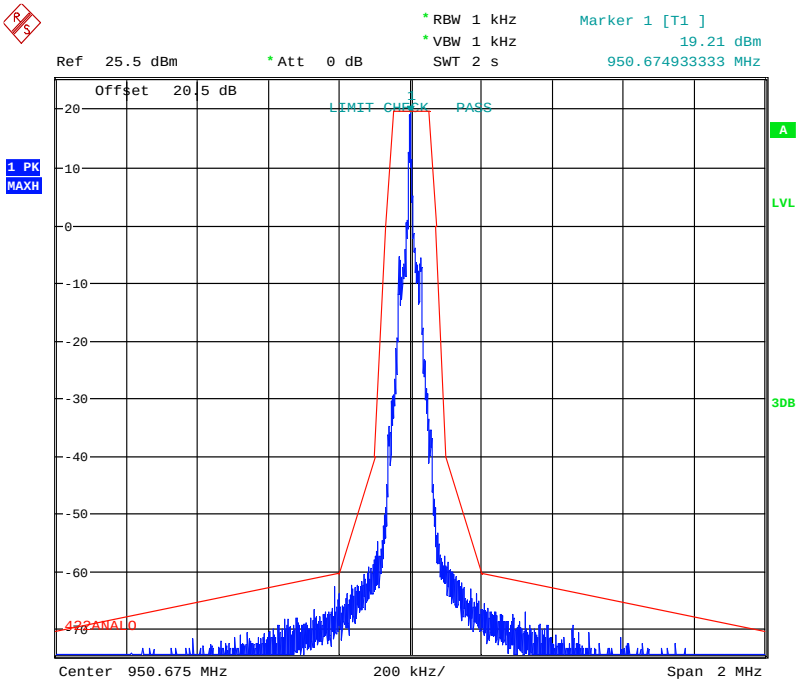
Emission Mask-2, 950.675 MHz @ 50 mW



Emission Mask-1, 950.675 MHz @ 100 mW



Emission Mask-2, 950.675 MHz @ 100 mW



7 FCC §74.861(d)(4)(i) & ISEDC RSS-123 §8.3 - Conducted Spurious Emissions at Antenna Port

7.1 Applicable Standards

According to FCC §74.861 (d) (4) (i):

For the 653-657 MHz, 941.5-944 MHz, 944-952 MHz, 952.850-956.250 MHz, 956.45-959.85 MHz, 1435-1525 MHz, 6875-6900 MHz and 7100-7125 MHz bands, 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. 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).

According to RSS-123 §8.3 Clause c. devices operating in frequency bands 941.5-952 MHz, 953-959.85 MHz, 6930-6955 MHz and 7100-7125 MHz shall have the transmitter's unwanted emissions meet the requirements in sections 8.3 and 8.4 of ETSI EN 300 422-1

7.2 Test Procedure

KDB 971168 D01 v03r01 and ETSI EN 300 422-1 V1.4.2 (2011-08).

7.3 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
-	20 dB attenuator	-	-	Each time[1]	N/A
-	RF Cable	-	-	Each time[1]	N/A

Note[1]: attenuator 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

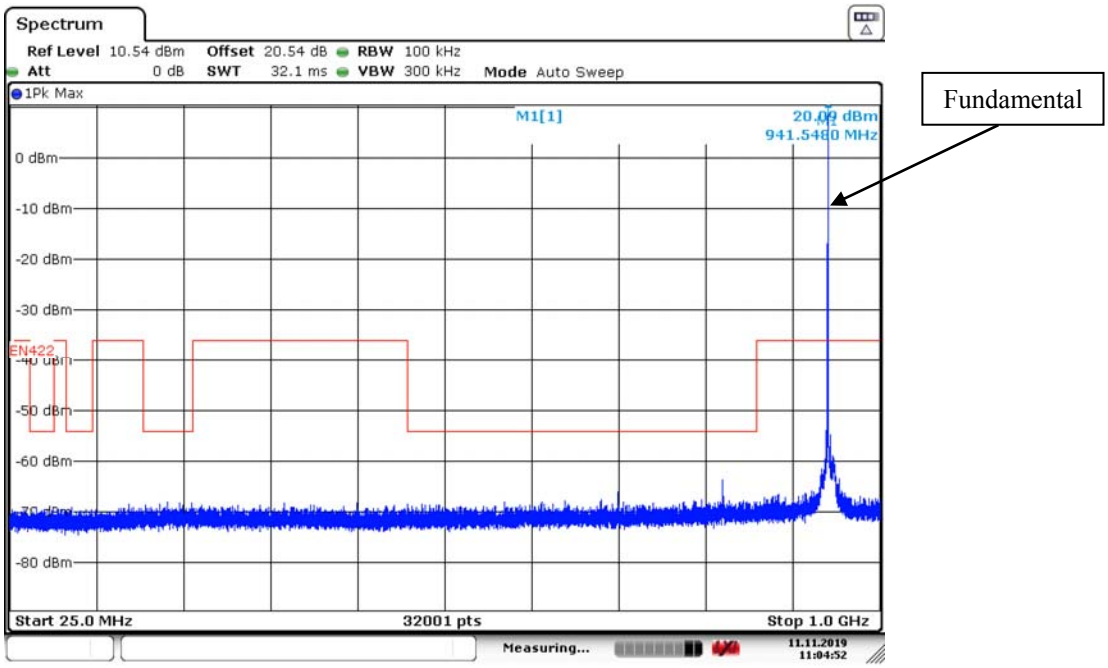
Temperature:	23 ºC
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

The testing was performed by Zhao Zhao on 2019-11-11 at RF site.

7.5 Test Results

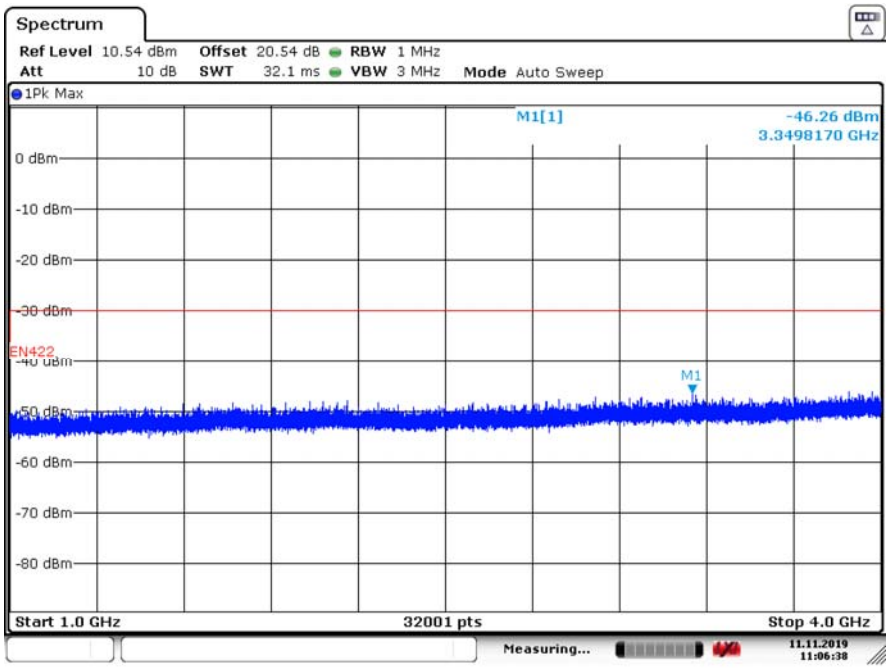
Please refer to the following table plots for detailed test results, testing was done at the highest power setting and limits from ETSI EN 300 422-1 v1.4.2 (2011-08), Electromagnetic compatibility and radio spectrum matters (ERM); Wireless microphones in the 25 MHz to 3 GHz frequency range; Part 1: Technical characteristics and methods of measurement were used for worst case limits.

Low Channel, 941.525 MHz SE_1



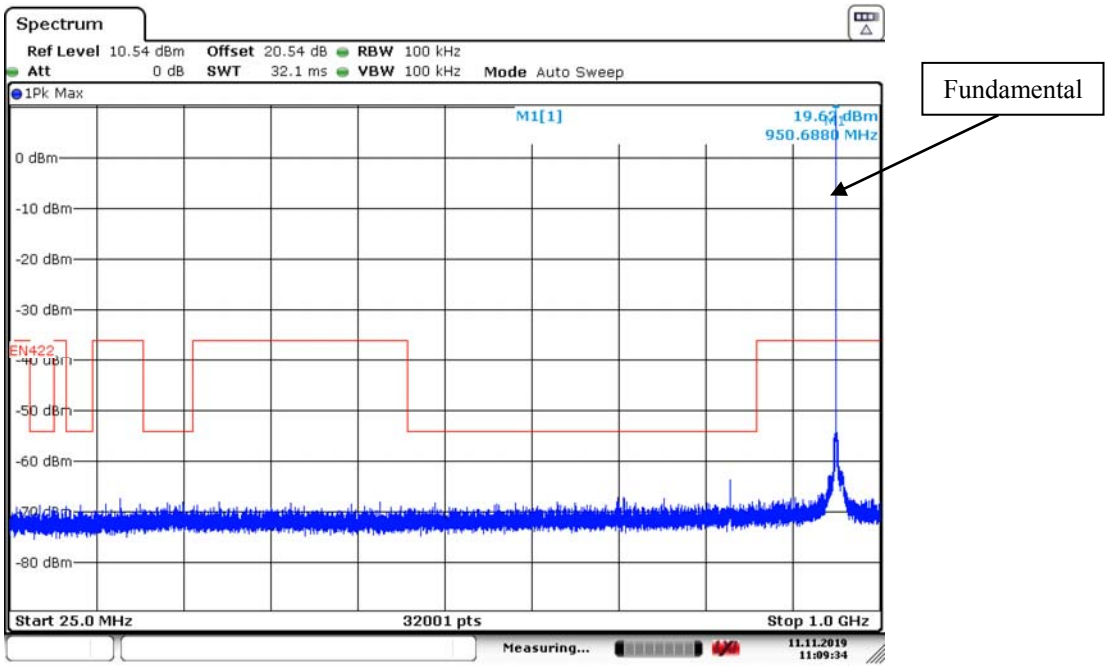
Date: 11.NOV.2019 11:04:52

Low Channel, 941.525 2 MHz SE_2



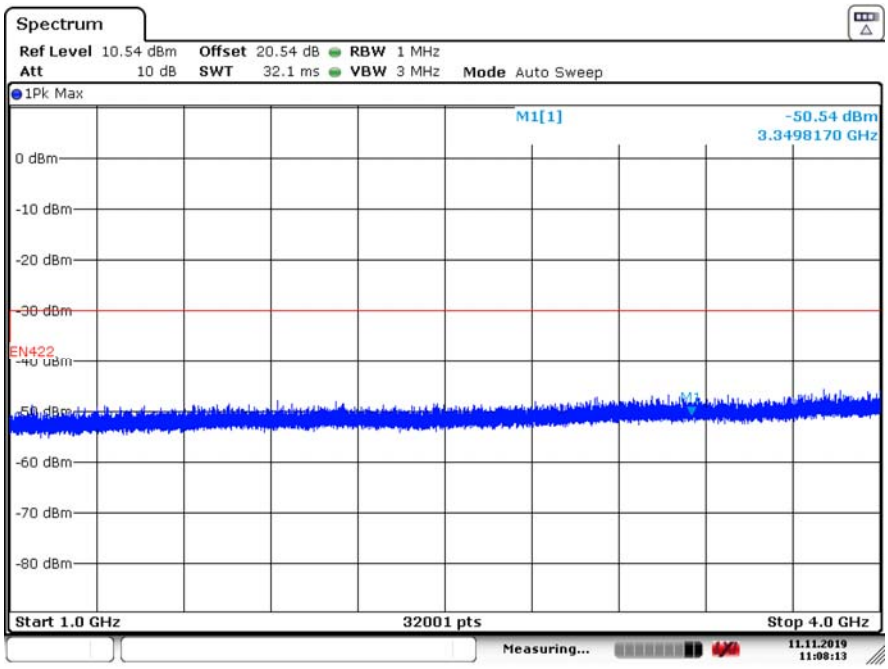
Date: 11.NOV.2019 11:06:39

Middle Channel, 950.675 MHz SE_1



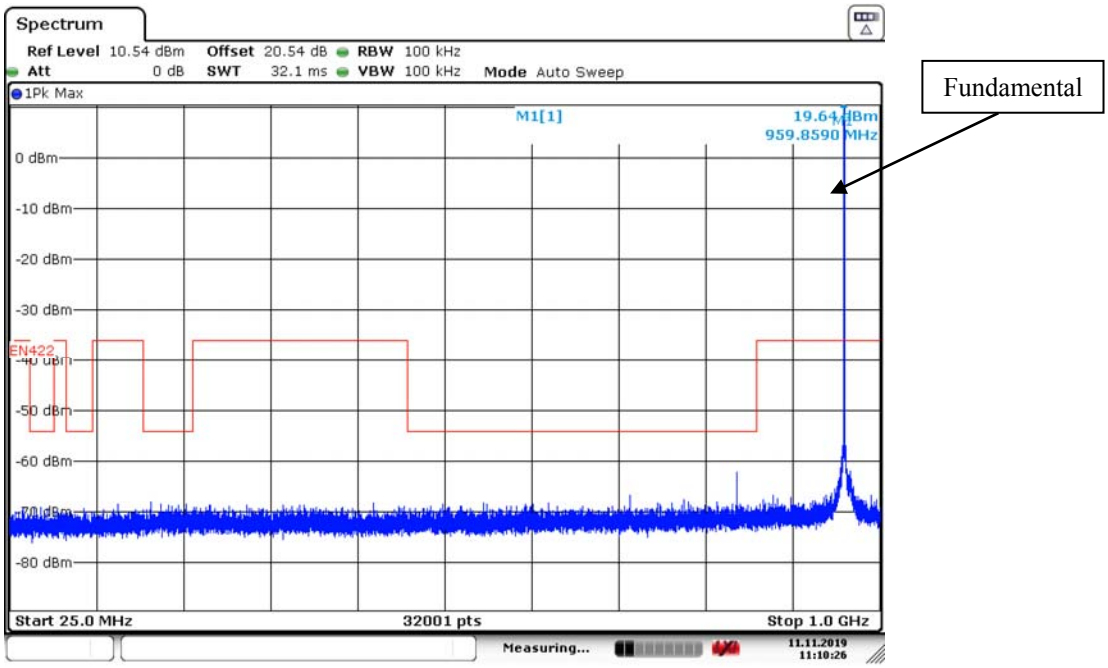
Date: 11.NOV.2019 11:09:33

Middle Channel, 950.675 MHz SE_2



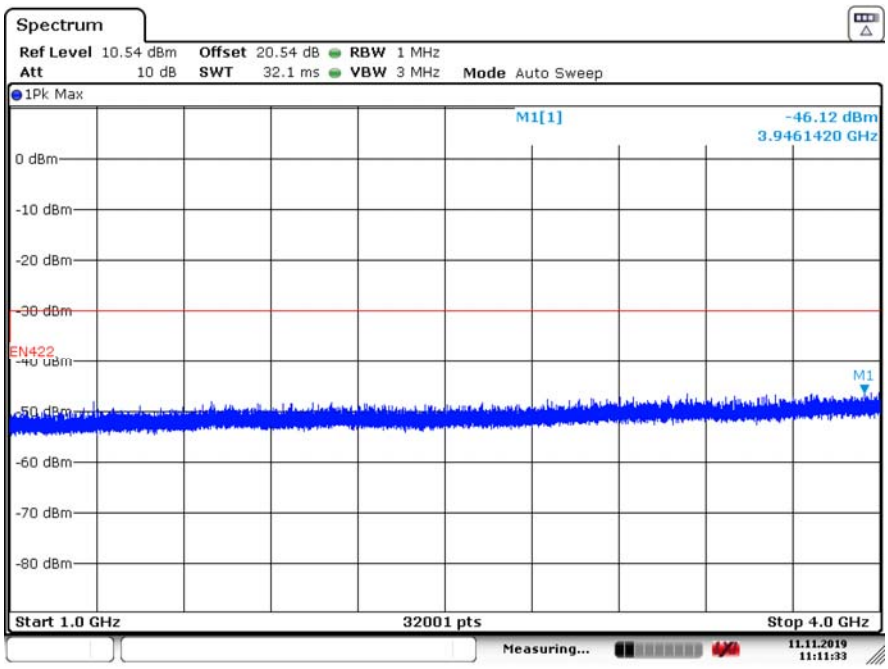
Date: 11.NOV.2019 11:08:13

High Channel, 959.825 MHz SE_1



Date: 11.NOV.2019 11:10:27

High Channel, 959.825 MHz SE_2



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8 FCC §74.861(d)(4)(i) & ISEDC RSS-123 §8.3 - Field Strength of Spurious Radiation

8.1 Applicable Standards

According to FCC §74.861 (d) (4) (i):

For the 653-657 MHz, 941.5-944 MHz, 944-952 MHz, 952.850-956.250 MHz, 956.45-959.85 MHz, 1435-1525 MHz, 6875-6900 MHz and 7100-7125 MHz bands, 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. 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).

According to RSS-123 §8.3 Clause c. devices operating in frequency bands 941.5-952 MHz, 953-959.85 MHz, 6930-6955 MHz and 7100-7125 MHz shall have the transmitter's unwanted emissions meet the requirements in sections 8.3 and 8.4 of ETSI EN 300 422-1

8.2 Test Procedure

KDB 971168 D01 v03r01 and ETSI EN 300 422-1 V1.4.2 (2011-08).

8.3 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
Sunol Science Corp	System Controller	SC99V	011003-1	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	Pre-Amplifier	8449B	3147A00400	2019-05-20	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
HP	Signal Generator	83650B	3614A00276	2019-04-12	1 year
-	RF Cable	-	-	Each time[1]	N/A
COM-POWER	Dipole Antenna	AD-100	721033DB1, 2, 3, 4	2019-03-06	2 years

Note[1]: 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

Temperature:	22 ºC
Relative Humidity:	40 %
ATM Pressure:	101.4 kPa

The testing was performed by Zhao Zhao from 2019-11-18 at 5 meter chamber 3.

8.5 Test Results

EUT was configured to the highest power setting on worst case channel.

TX Middle channel (950.675 MHz) at the maximum output power:

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)			
466	26.07	0	100	H	500	-77.96	0	0.41	-78.37	-54	-24.37
466	25.95	0	100	V	500	-79.41	0	0.41	-79.82	-54	-25.82
910	28.21	0	100	H	900	-69.02	0	0.49	-69.51	-54	-15.51
910	27.49	0	100	V	900	-70.45	0	0.49	-70.94	-54	-16.94
1350	51.05	0	100	H	1350	-62.2	7.965	0.74	-54.98	-30	-24.98
1350	51.17	0	100	V	1350	-62.81	7.766	0.74	-55.78	-30	-25.78
2852.03	54.85	129	148	H	2852.03	-53	9.66	1.07	-44.41	-30	-14.41
2852.03	61.62	6	106	V	2852.03	-46.51	9.61	1.07	-37.97	-30	-7.97

Standby mode:

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)			
500	26.38	0	100	H	500	-77.65	0	0.41	-78.06	-57	-21.06
500	25.87	0	100	V	500	-77.81	0	0.41	-78.22	-57	-21.22
900	29.36	0	100	H	900	-67.87	0	0.49	-68.36	-57	-11.36
900	28.55	0	100	V	900	-68.47	0	0.49	-68.96	-57	-11.96
1350	51.33	0	100	H	1350	-61.92	0	0.74	-62.66	-47	-15.66
1350	50.67	0	100	V	1350	-63.31	0	0.74	-64.05	-47	-17.05

9 FCC §2.1055 & ISEDC RSS-123 §8.2 - Frequency Stability

9.1 Applicable Standards

According to §2.1055 and RSS-123 §8.2 the device shall meet the transmit power/e.r.p., authorized bandwidth and frequency stability limits for its operating bands as specified in table 1.

Table 1 — Frequency bands, transmit power/e.r.p., authorized bandwidths and frequency stability limits

Frequency band (MHz)	Transmit power (W)	e.r.p. (W)	Authorized bandwidth (kHz)	Frequency stability (± ppm)
26.10-26.48	--	1	200	50
88-107.5	--	1	200	50
150-174	0.05	--	54	50
450-451	--	1	200	50
455-456	--	1	200	50
941.5-952	1	--	200	20
953-959.85	1	--	200	20
6930-6955	1	--	600	10
7100-7125	1	--	600	10

9.2 Test Procedure

According to FCC 2.1055, (a) the frequency stability shall be measured with variation of ambient temperature as follows:
(1) From −30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
(2) From −20° to + 50° 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° to + 50° centigrade for equipment to be licensed for use in the Radio Broadcast Services under part 73 of this chapter.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° 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 shall be 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.

If an unmodulated carrier is not available, the measurement method shall be described in the test report.

9.3 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
Tenney	Environmental Chamber	TUJR	27445-06	2019-03-26	1 year
KEPCO	DC Source	25-10M	H1334526	Cal. Not Required	N/A
-	20 dB attenuator	-	-	Each time[1]	N/A
-	RF Cable	-	-	Each time[1]	N/A

Note[1]: cable and attenuator 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

Temperature:	23 ºC
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

The testing was performed by Zhao Zhao 2019-11-11 at RF site.

9.5 Test Results

Fc=950.675 MHz:

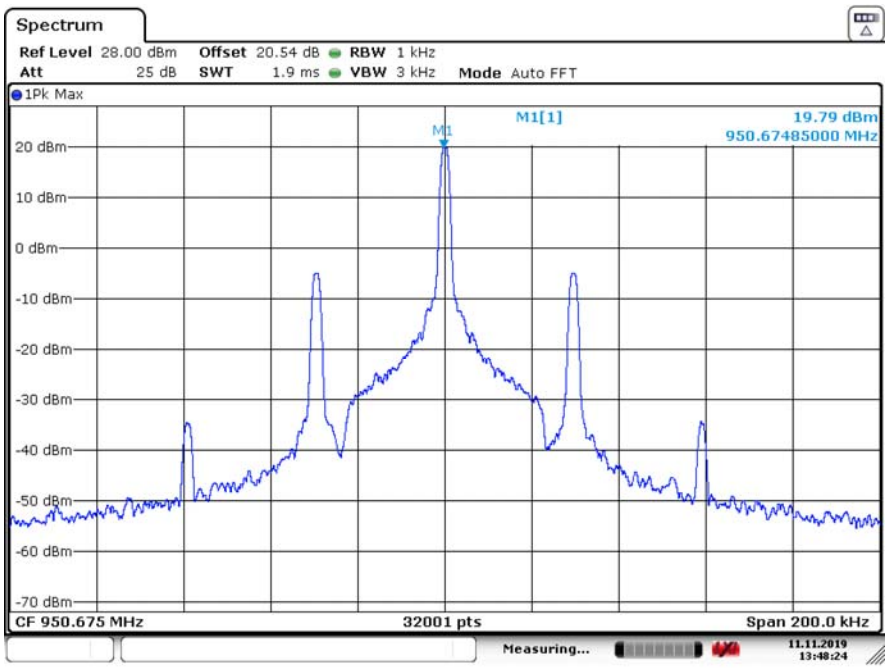
Varying temperature:

Temperature (℃)	Measured Frequency (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limit (± ppm)
-20	950.67485000	950.675	-0.158	20
-10	950.67652500	950.675	1.604	20
0	950.67687490	950.675	1.972	20
10	950.67433750	950.675	-0.697	20
20	950.67488750	950.675	-0.118	20
30	950.67393130	950.675	-1.124	20
40	950.67125640	950.675	-3.938	20
50	950.66962520	950.675	-5.654	20

Varying supply voltage:

Voltage	Measured Frequency (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limit (± ppm)
Low (2.55 V)	950.67384380	950.675	-1.216	20
High (3.45 V)	950.67318130	950.675	-1.913	20

-20 °C



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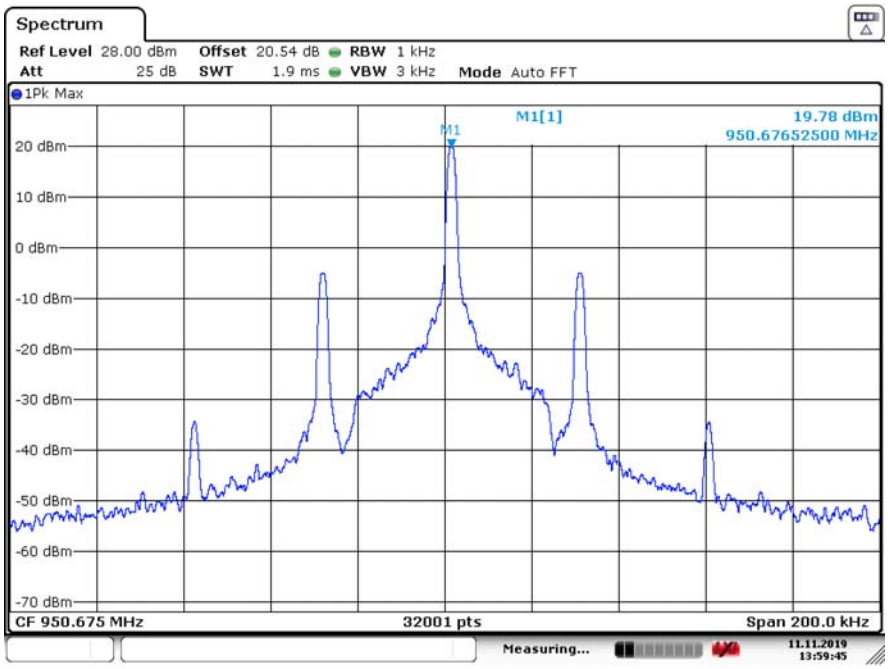
-10 °C



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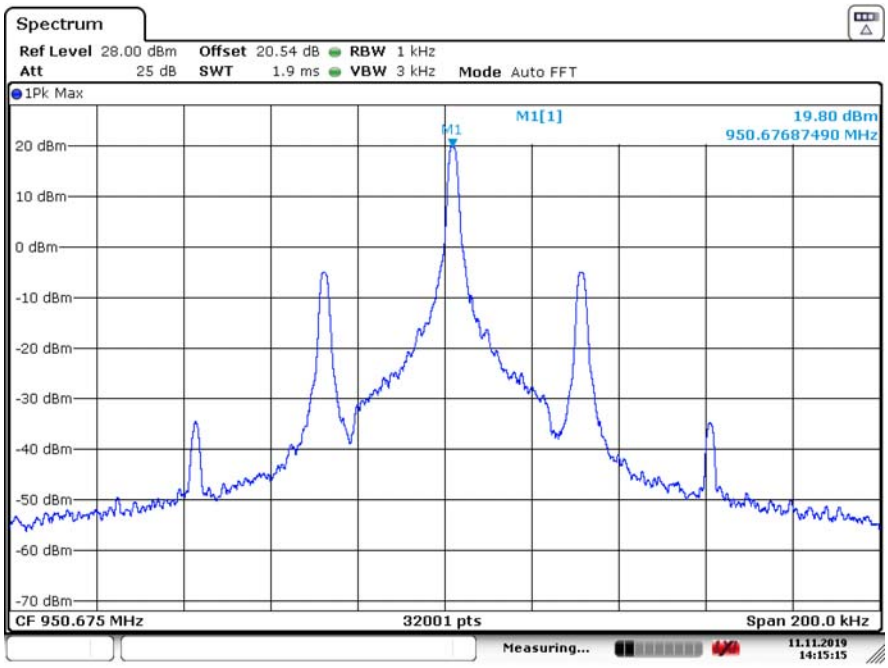
0 °C



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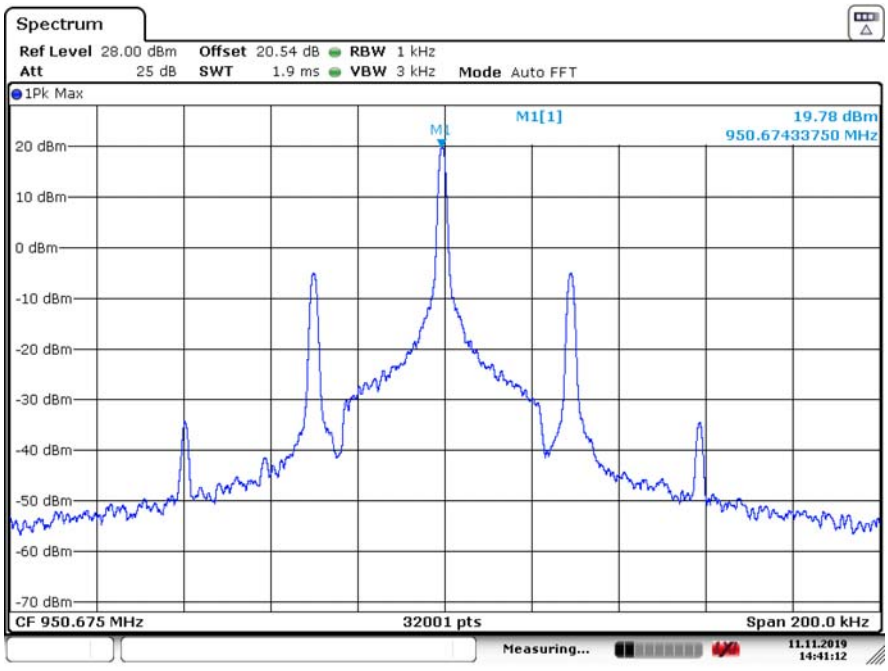
10 °C



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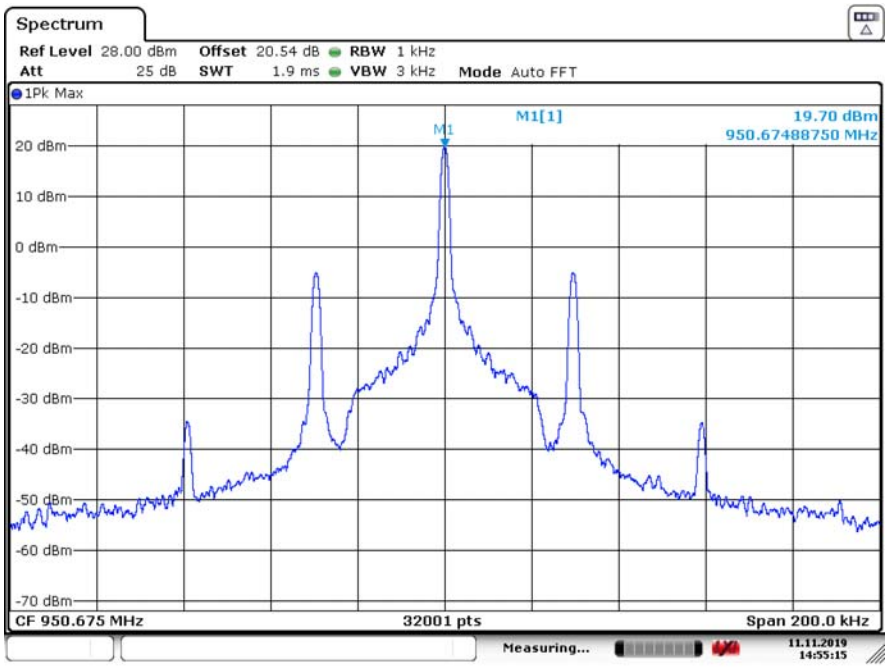
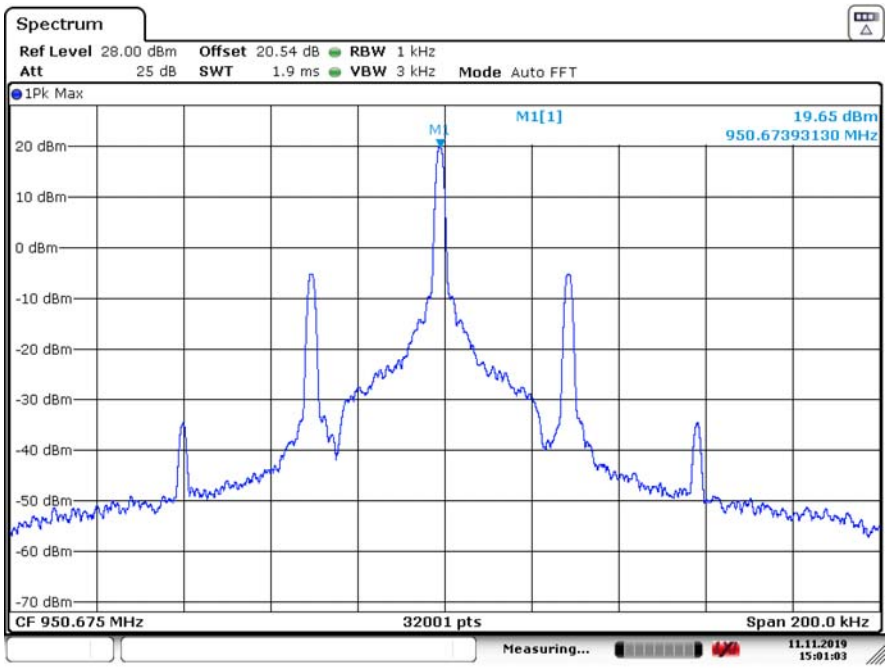
20 °C



Date: 11.NOV.2019 14:55:15

30 °C



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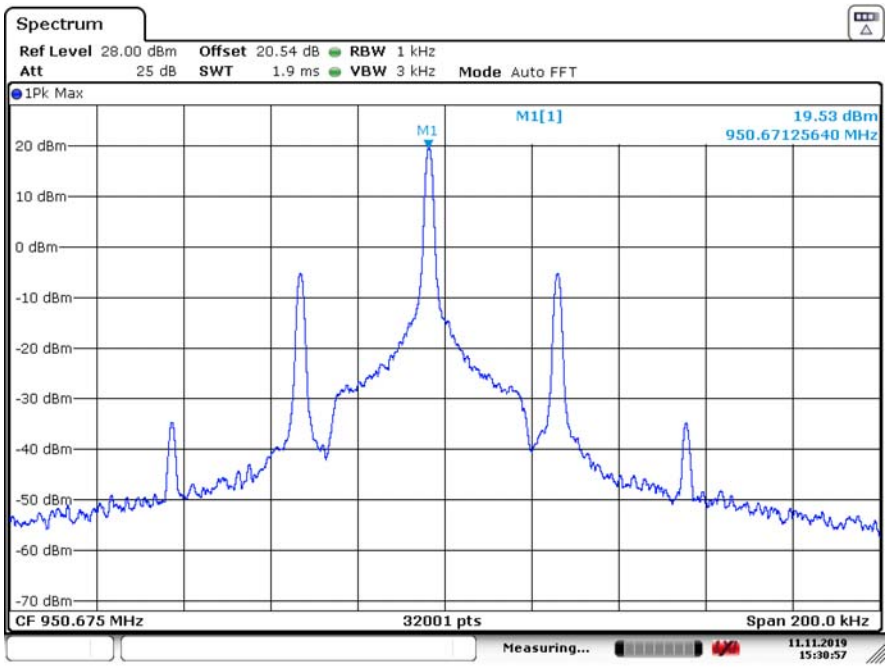
40 °C



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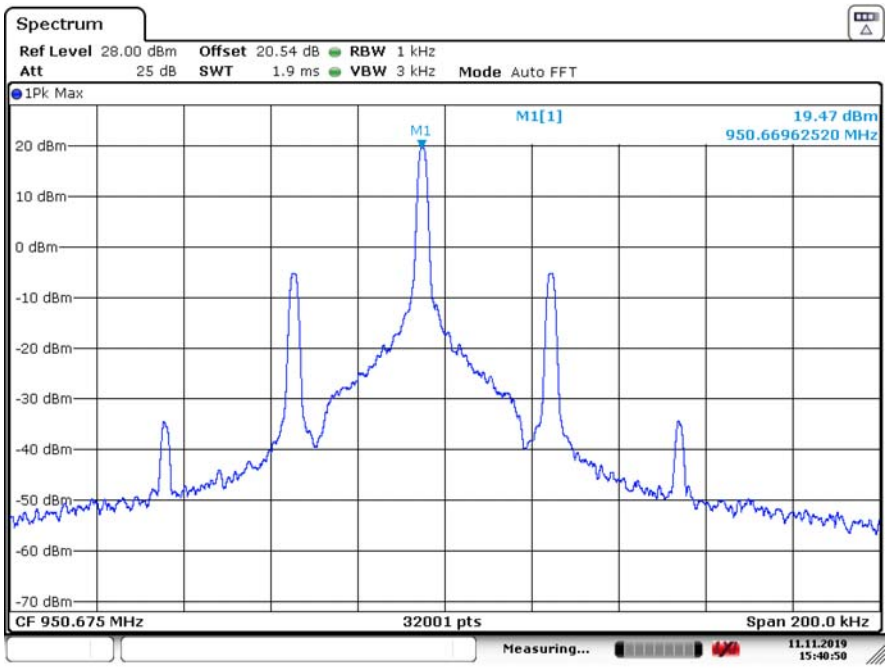
50°C



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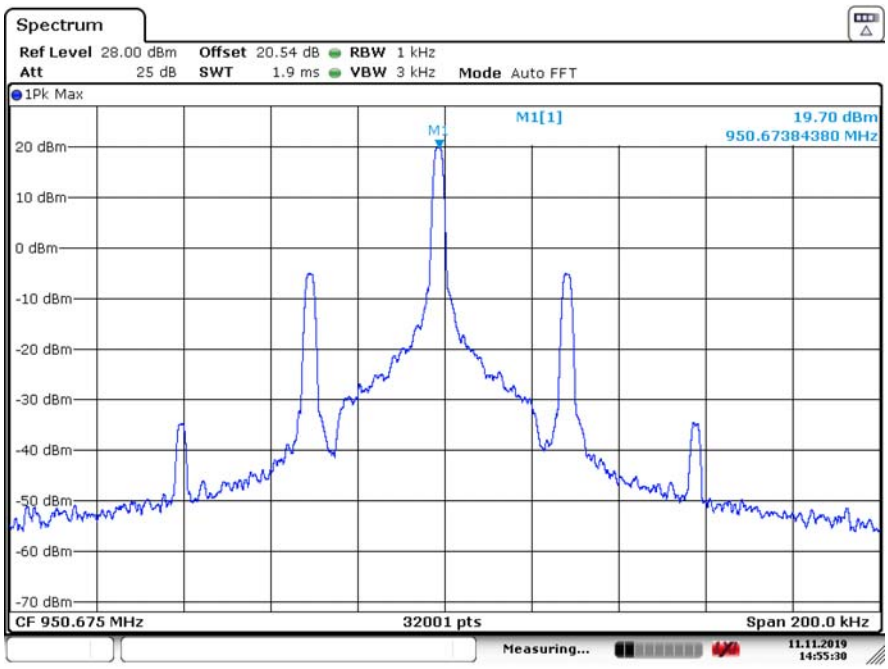
Low Voltage



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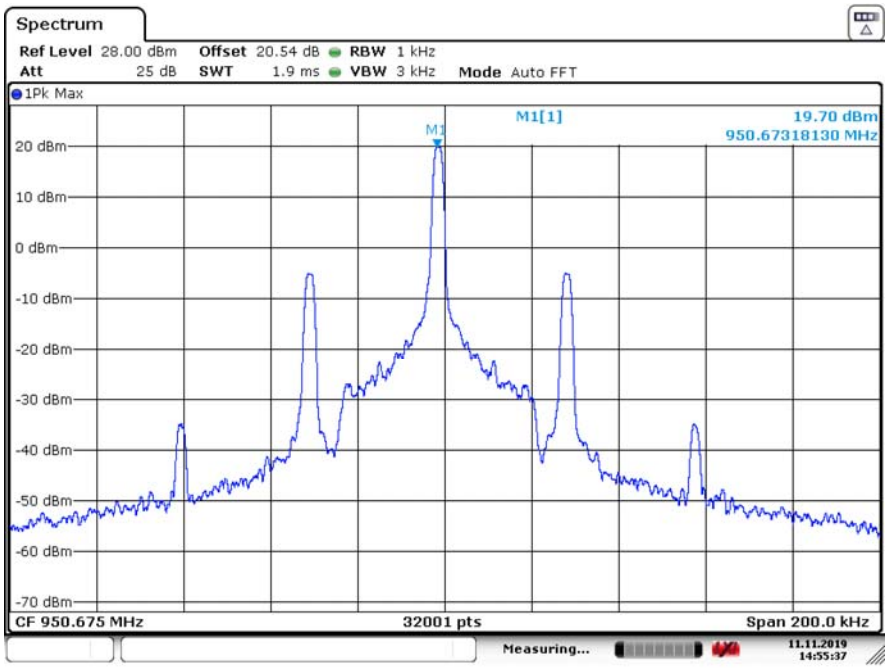
High Voltage



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10 FCC §2.1047 & ISEDC RSS-123 §8.1 - Modulation Characteristic

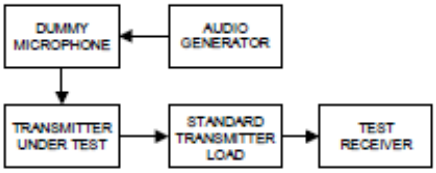
10.1 Applicable Standards

According to FCC §2.1047(a):

Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

According to ISEDC RSS-123 §8.1 Equipment employing frequency modulation (FM) shall have the frequency deviation not exceed ±75 kHz.

10.2 Test Procedure



a) Connect the equipment as illustrated.

b) Adjust the transmitter per the manufacturer's procedure for full rated system deviation.

c) Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤0.25 Hz to ≥15,000 Hz. Turn the de-emphasis function off.

d) Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation.

e) Increase the level from the audio frequency generator by 20 dB in one step (rise time between the 10% and 90% points shall be 0.1 second maximum).

f) Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level.

g) With the level from the audio frequency generator held constant at the level obtained in step e), slowly vary the audio frequency from 300 Hz to 3000 Hz and observe the steady-state deviation. Record the maximum deviation.

h) Set the test receiver to measure peak negative deviation and repeat steps d) through g).

i) The values recorded in steps g) and h) are the modulation limiting.

10.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
HP	RF Communications Test Set	8920A	3438A05338	2018-01-09	2 years
HP	Modulation Analyzer	8901A	2026A00847	2019-01-24	2 years
-	RF Cable	-	-	-	Each time

Note[1]: attenuator 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".*

10.4 Test Environmental Conditions

Temperature:	23 ºC
Relative Humidity:	37 - 40 %
ATM Pressure:	101.7 kPa

The testing was performed by Zhao Zhao on 2019-11-18 and 2020-01-03 at RF site.

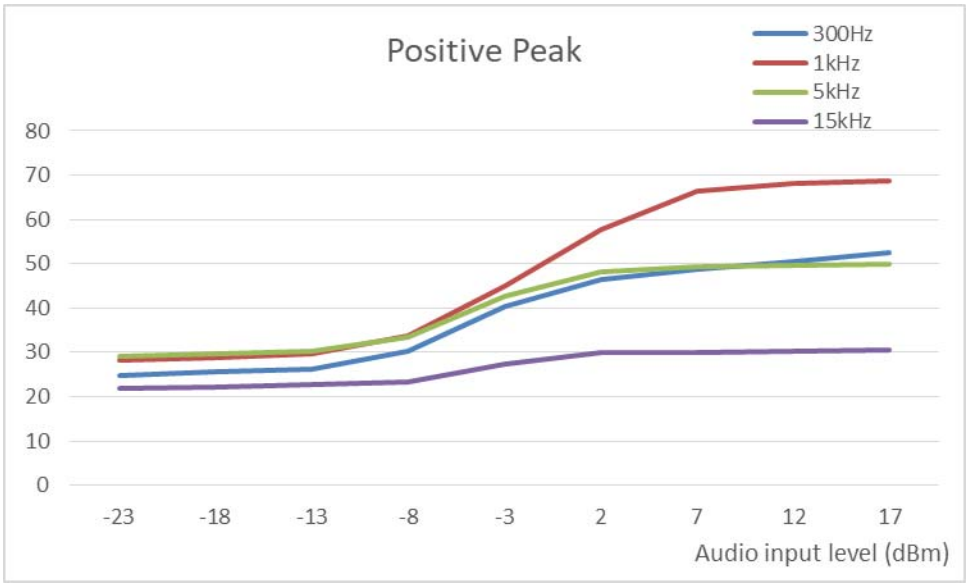
10.5 Test Results

MODULATION LIMITING

Carrier Frequency: 950.675 MHz

Positive Peak

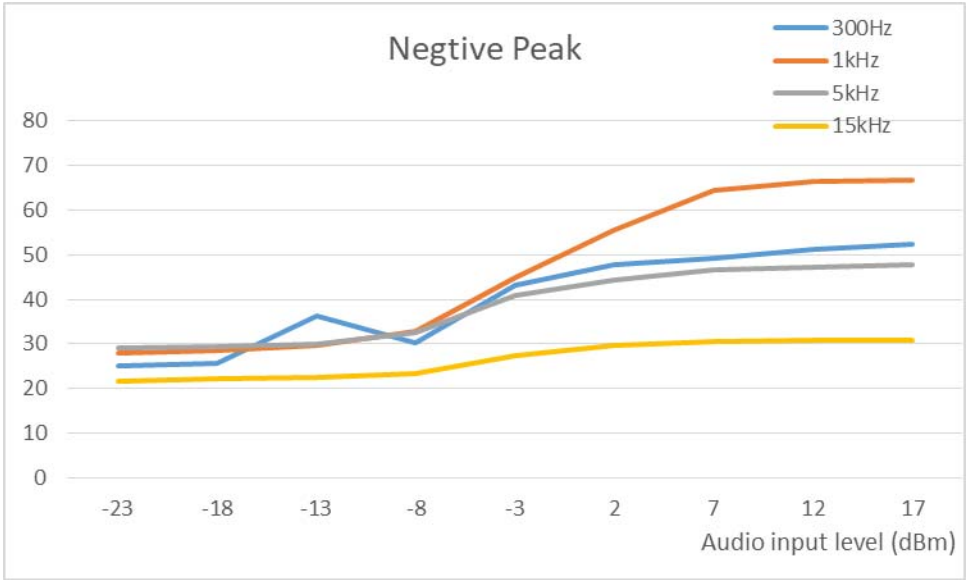
AF Level (dBm)	AF Frequency (Hz)/Peak Deviation (kHz)				Limit (kHz)
	300 Hz	1000 Hz	5000 Hz	15000 Hz	
-23	24.92	28.33	29.17	21.76	±75
-18	25.54	28.86	29.64	22.17	±75
-13	26.28	29.78	30.28	22.61	±75
-8	30.31	33.76	33.38	23.26	±75
-3	40.5	45.1	42.7	27.51	±75
2	46.6	57.6	48.1	29.97	±75
7	48.9	66.5	49.3	30.03	±75
12	50.5	68.2	49.7	30.26	±75
17	52.4	68.7	49.8	30.51	±75



Carrier Frequency: 950.675 MHz

Negative Peak

AF Level (dBm)	AF Frequency (Hz)/Peak Deviation (kHz)				Limit (kHz)
	300 Hz	1000 Hz	5000 Hz	15000 Hz	
-23	24.94	27.87	28.96	21.73	±75
-18	25.73	28.58	29.44	22.08	±75
-13	36.30	29.54	30.10	22.63	±75
-8	30.26	32.90	32.65	23.27	±75
-3	43.20	44.88	40.90	27.40	±75
2	47.70	55.60	44.40	29.78	±75
7	49.20	64.30	46.70	30.42	±75
12	51.30	66.50	47.30	30.81	±75
17	52.50	66.70	47.70	30.95	±75



Audio Frequency Response, Middle Channel

AF Frequency (Hz)	Frequency Deviation (kHz)	AF Response (dB)
100	7.14	-1.00
200	7.44	-0.64
300	7.52	-0.55
400	7.61	-0.44
500	7.71	-0.33
600	7.88	-0.14
700	7.93	-0.09
800	7.89	-0.13
900	7.90	-0.12
1000	8.01	0.00
1200	8.17	0.17
1400	8.12	0.12
1600	8.29	0.30
1800	8.32	0.33
2000	8.28	0.29
2200	8.40	0.41
2400	8.36	0.37
2600	8.24	0.25
2800	8.28	0.29
3000	8.30	0.31
3250	8.25	0.26
3500	8.21	0.21
3750	8.14	0.14
4000	8.43	0.44
4250	8.13	0.13
4500	8.28	0.29
4750	8.12	0.12
5000	8.34	0.35

Note: AF Response = 20*log (Measured Frequency Deviation/Frequency Deviation at 1 kHz)

11 Annex A - EUT Photographs

Please refer to the following exhibits:

Exhibit- EUT Test Setup Photographs
Exhibit- EUT External Photographs
Exhibit- EUT Internal Photographs

12 Annex B (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 2nd 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 ---