FCC PART 74, SUBPART H
TEST AND MEASUREMENT REPORT

For

Lectrosonics, Inc.

581 Laser Road NE Rio Rancho, NM 87124, USA

FCC ID: DBZSMQV23A

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

Prepared By:	Vincent Licata Test Engineer
Report Number:	R1807309-74
Report Date:	2018-09-10
Reviewed By:	Jin Yang RF Lead
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1807309-74	Original Report	2018-09-10

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: *SMQV-23, FCC ID: DBZSMQV23A,* 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: 588.8-607.95 MHz.

A similar model: *SMV-23* has been declared to be electrically identical with the model tested by the applicant. Please refer to DoS letter.

1.2 Mechanical Description of EUT

The SMQV-23 (EUT) measures approximately 5.8 cm (L) x 6.0 cm (W) x 1.6 cm (H) and weighs approximately 0.105 kg with two AA batteries.

The SMV-23 measures approximately 5.8 cm (L) x 4.6 cm (W) x 1.6 cm (H) and weighs approximately 0.0759 kg with one AA battery.

The data gathered are from a typical production sample provided by the Lectrosonics, Inc. with serial number: 20696 & 7842

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.

The objective is to determine compliance with Part 74 of the FCC Rules, limits for RF output power, Modulation characteristics, Emission bandwidth, Field strength of spurious radiation and Frequency stability for license-exempt, low-power radio apparatus operating in the television bands.

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, 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.

Based on CISPR16-4-2:2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from ±2.0 dB for Conducted Emissions tests and ±4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

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 3279.02)*****,** 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***
- - 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: (Industry Canada - IC) 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 Development Authority - IDA) 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 and KDB 971168 D01 v03r01.

2.2 EUT Exercise Software

None

2.3 Special Equipment

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

None

2.6 Interface Ports and Cables

Manufacturer	Model Number	Cable Description	Length (m)	From	To
Lectrosonics	MC35	Microphone Adapter XLR with Cable	<1	Audio Signal Generator	EUT

3 Summary of Test Results

FCC Rules	Descriptions of Test	Result (s)
FCC §2.1093	RF exposure	Compliant[1]
FCC §74.861(e)(1)	RF output power	Compliant
FCC §74.861(e)(3)	Modulation characteristics	Compliant
FCC §74.861(e)(5)(7)	Operating bandwidth & Emission mask	Compliant
FCC §74.861(e)(7)	Spurious emissions at the antenna port	Compliant
FCC §74.861(e)(7)	Field strength of spurious emissions	Compliant
FCC §74.861(e)(4)	Frequency Tolerance	Compliant

Note 1: Please refer to report R1807309-SAR

4 FCC §2.1093 - RF Exposure

Please refer to report R1807309-SAR for results.

5 FCC §74.861(e) (1) - RF Output Power

5.1 Applicable Standards

According to FCC §74.861 (e) (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 MHz bands—250 mW Conducted power
(iii) 600 MHz duplex gap: 20 mW EIRP

5.2 Test Procedure

KDB 971168 D01 v03r01

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Rohde & Schwarz	Signal Analyzer	FSQ26	200749	06/08/2017	2 years
-	10dB attenuator	-	-	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 09 June 2016) "A2LA Policy on Metrological Traceability".*

5.4 Test Environmental Conditions

Temperature:	22 ºC
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

The testing was performed by ChinMing Lui on 2018-08-01 at RF site.

5.5 Test Results

SMV-23

Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limits (dBm)	Rated Power (mW/dBm)
Low	588.800	23.54	24	250/24
		19.70	24	100/20
		16.59	24	50/17
Middle	598.375	23.46	24	250/24
		19.61	24	100/20
		16.79	24	50/17
High	607.950	23.56	24	250/24
		19.59	24	100/20
		16.72	24	50/17

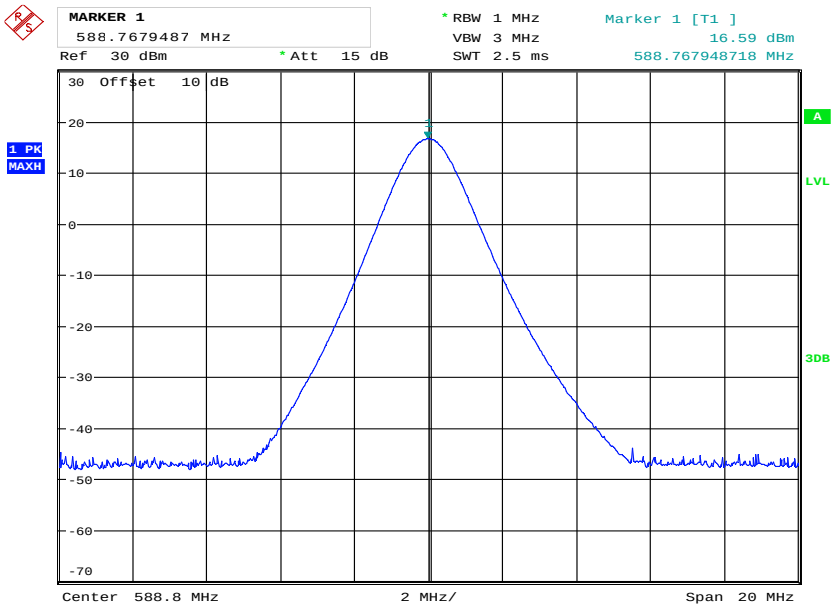
SMQV-23

Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limits (dBm)	Rated Power (mW/dBm)
Low	588.800	23.7	24	250/24
		19.6	24	100/20
		16.61	24	50/17
Middle	598.375	23.71	24	250/24
		19.83	24	100/20
		16.73	24	50/17
High	607.950	23.68	24	250/24
		19.75	24	100/20
		16.75	24	50/17

Please refer to the following plots.

SMV-23

50 mW Low Channel 588.80 MHz



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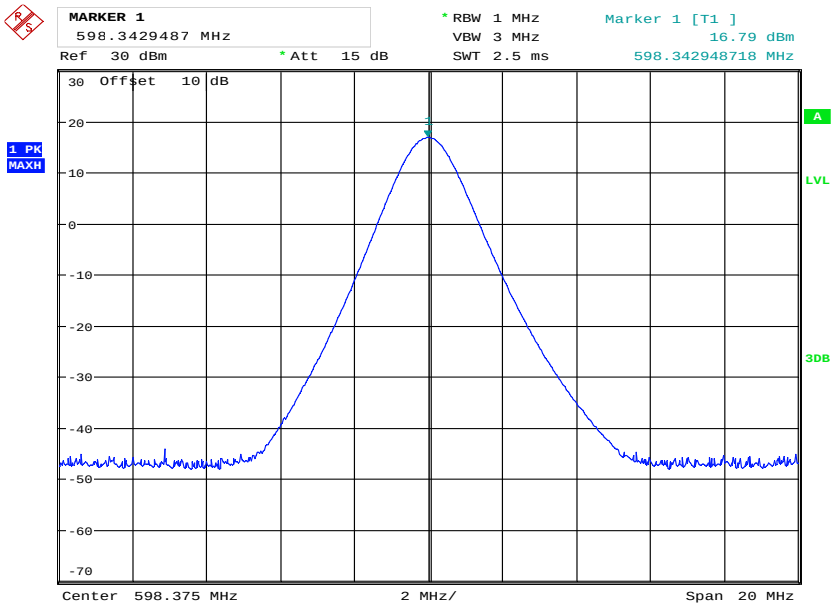

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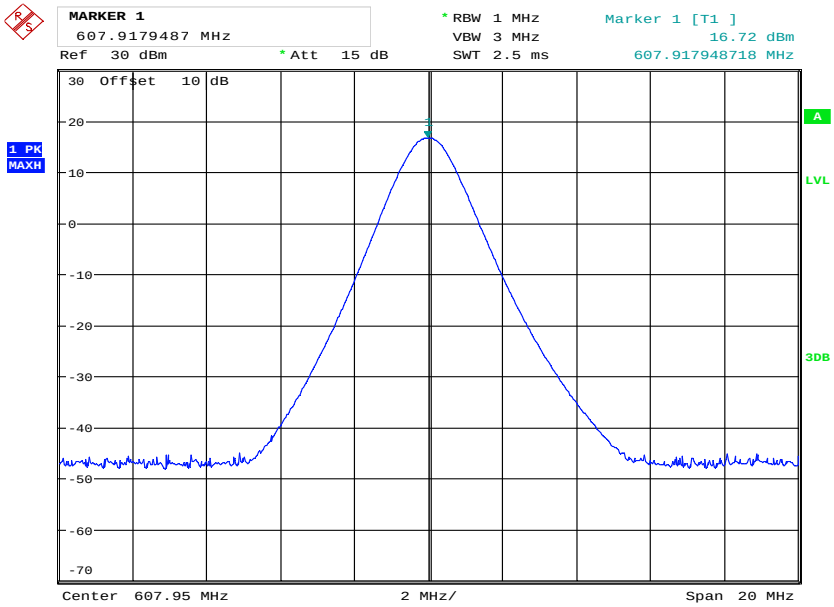

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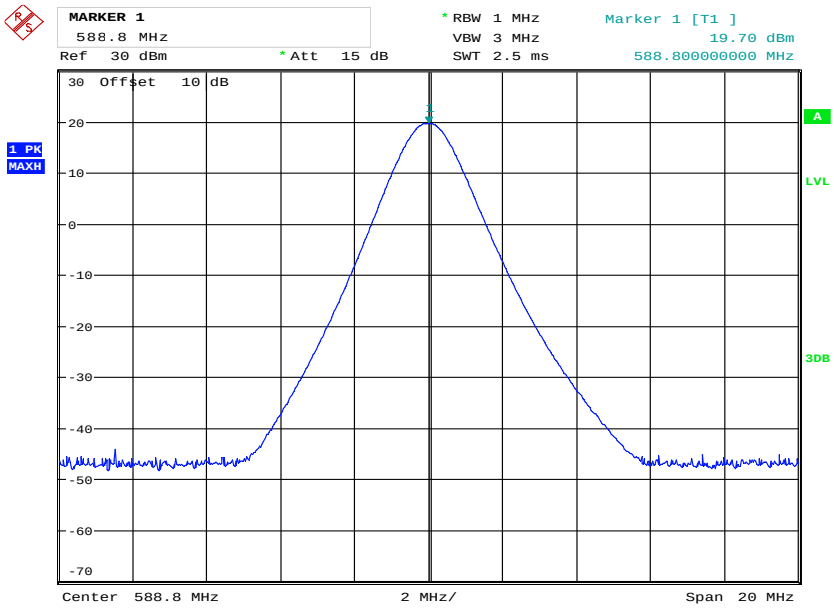

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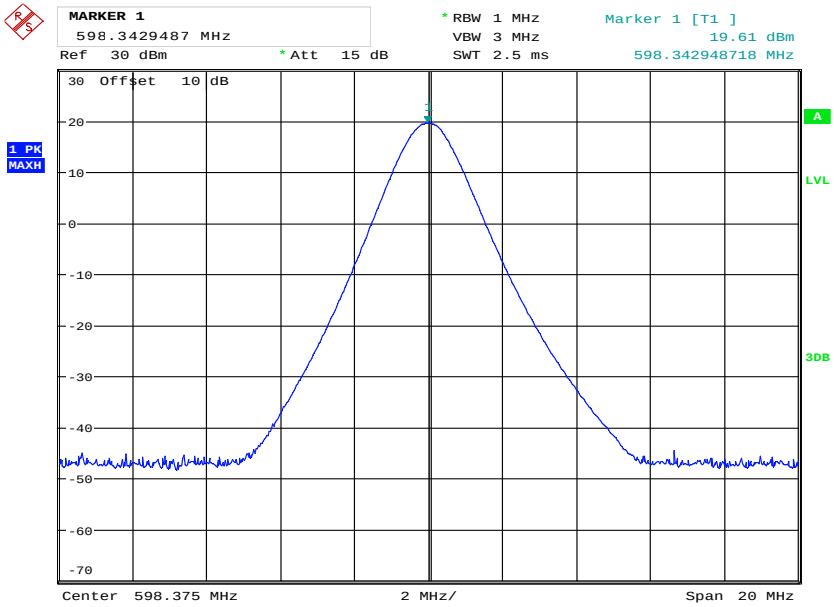

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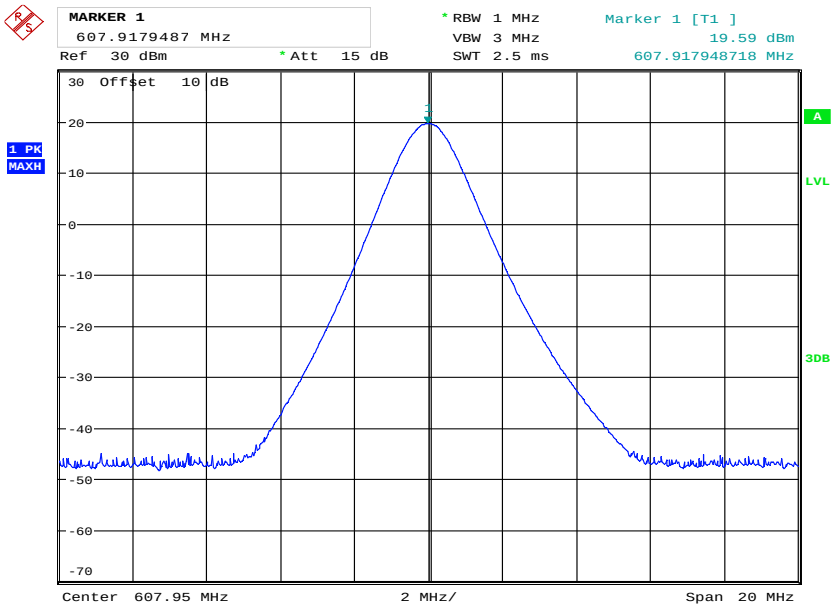

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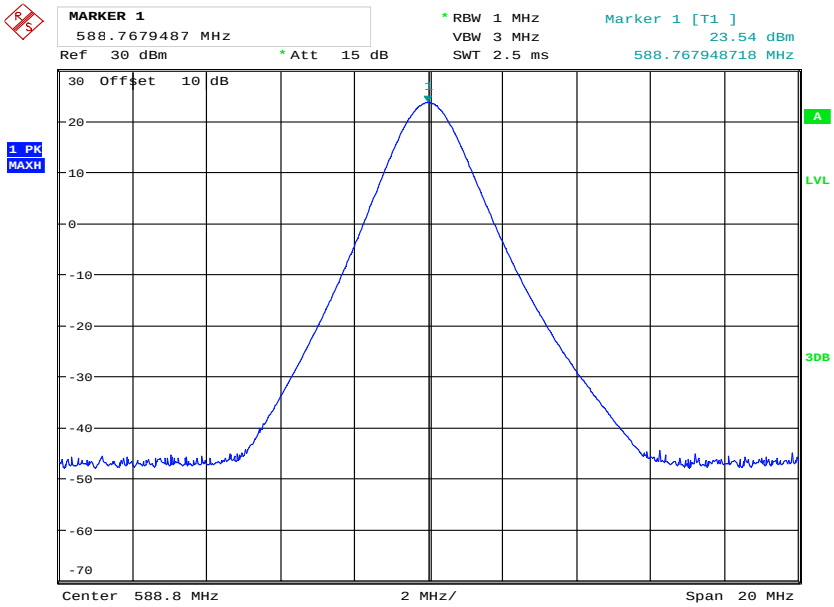

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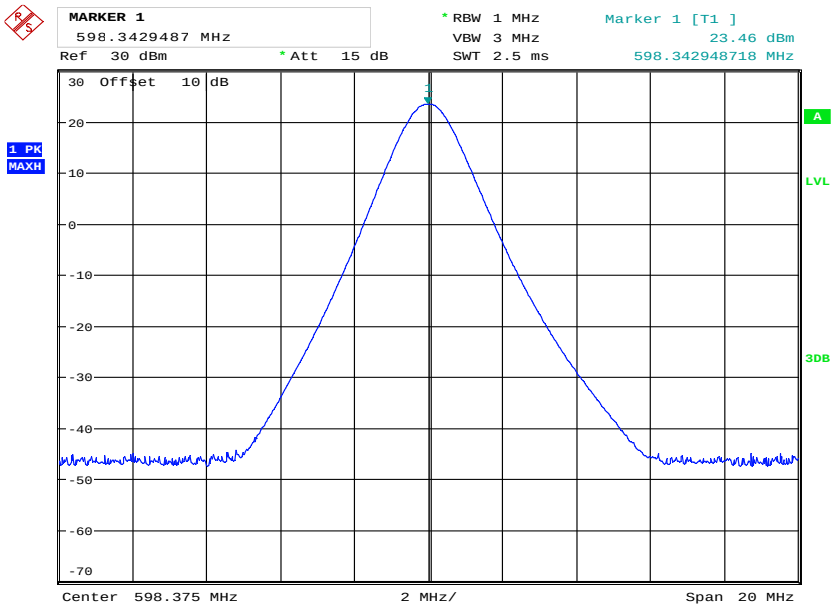

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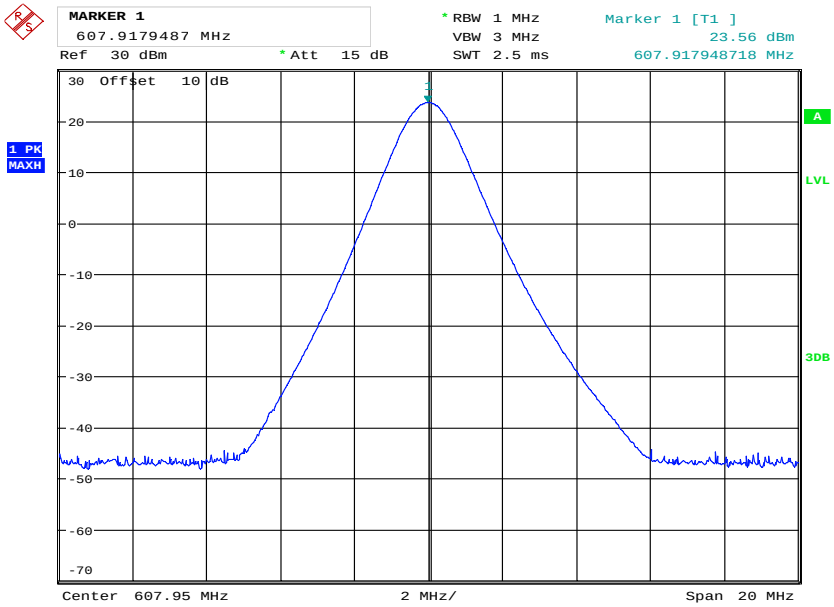

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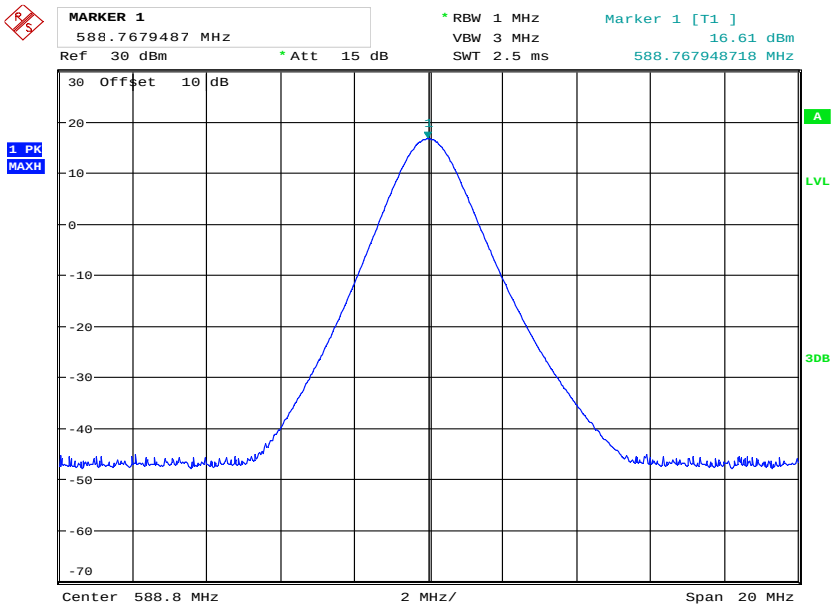
SMQV-23

50 mW Low Channel 588.8 MHz



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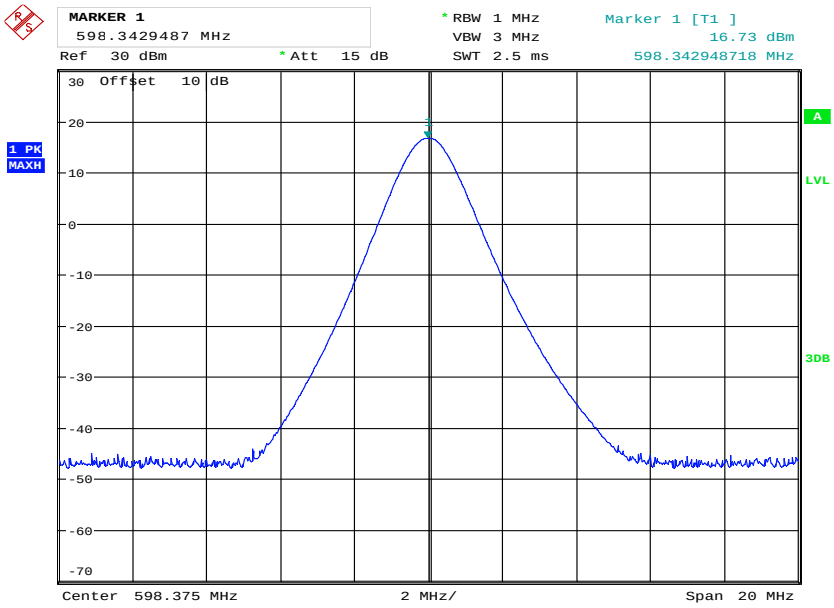

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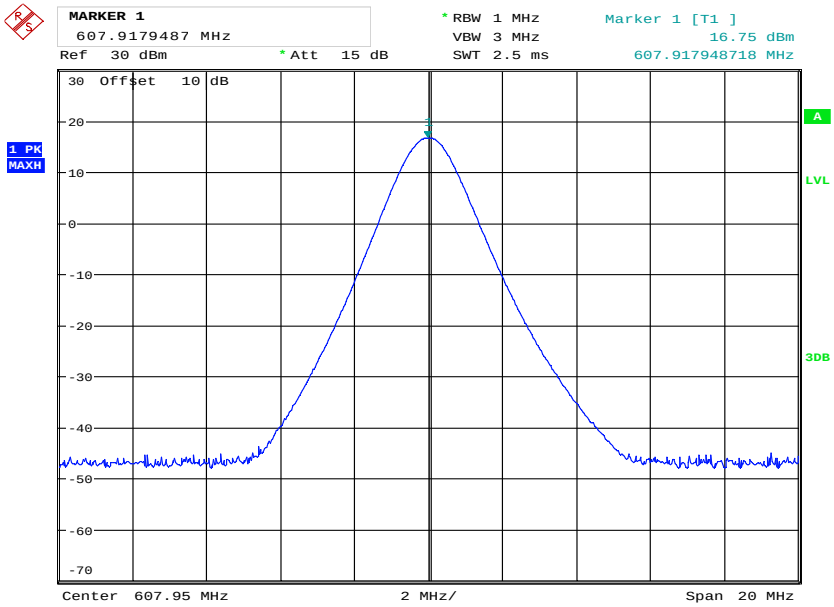

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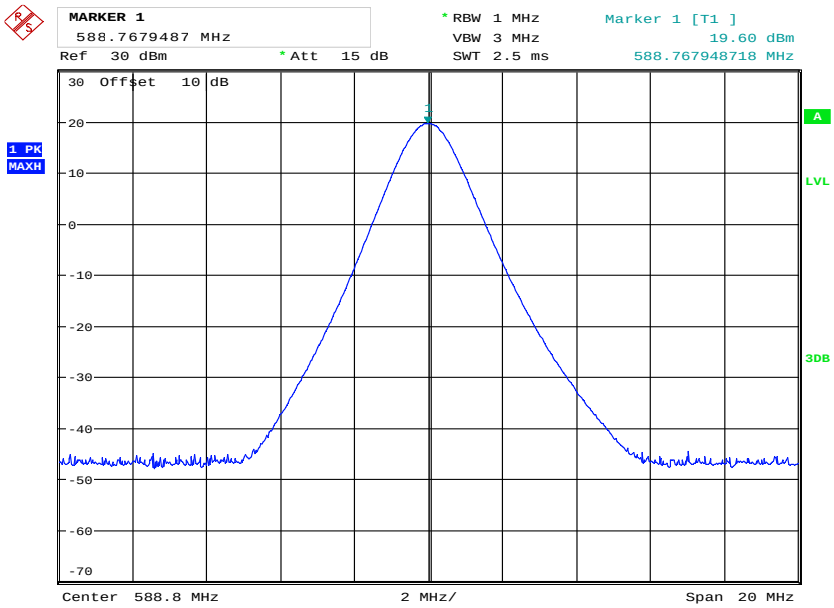

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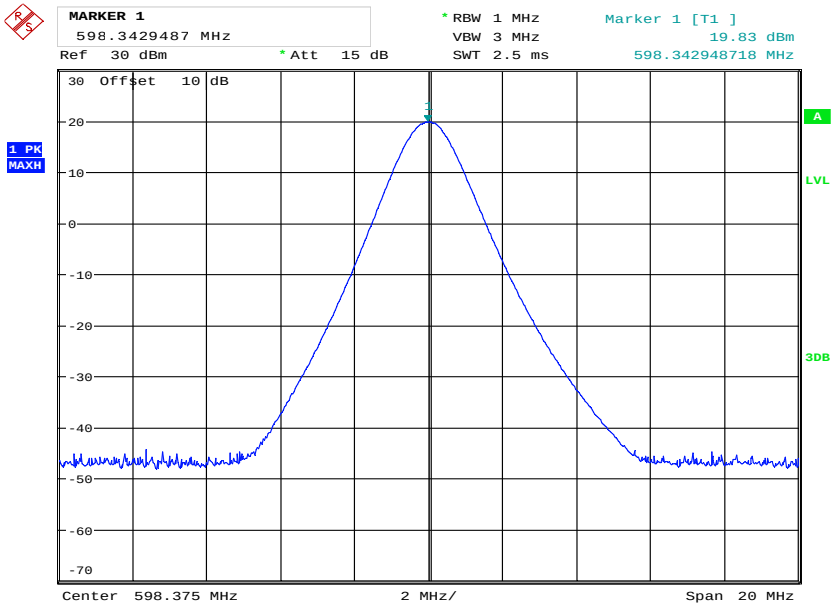

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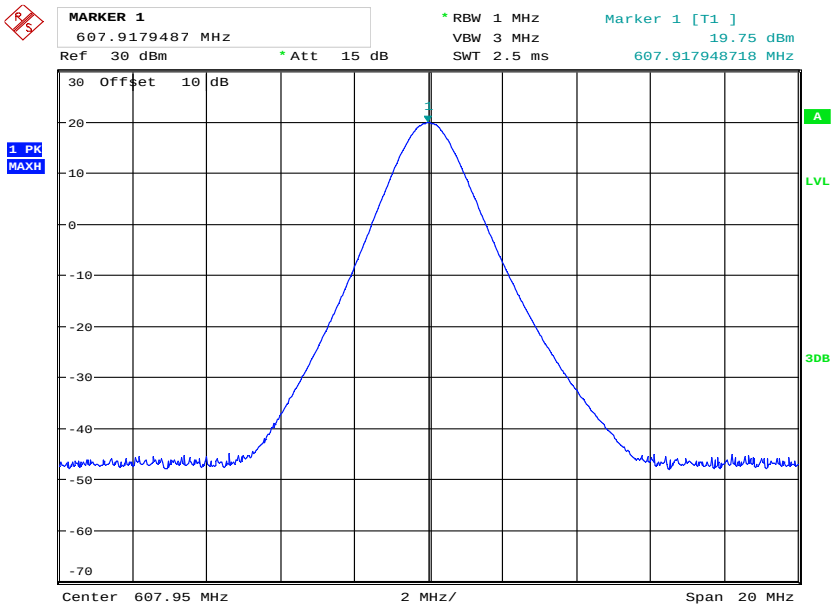

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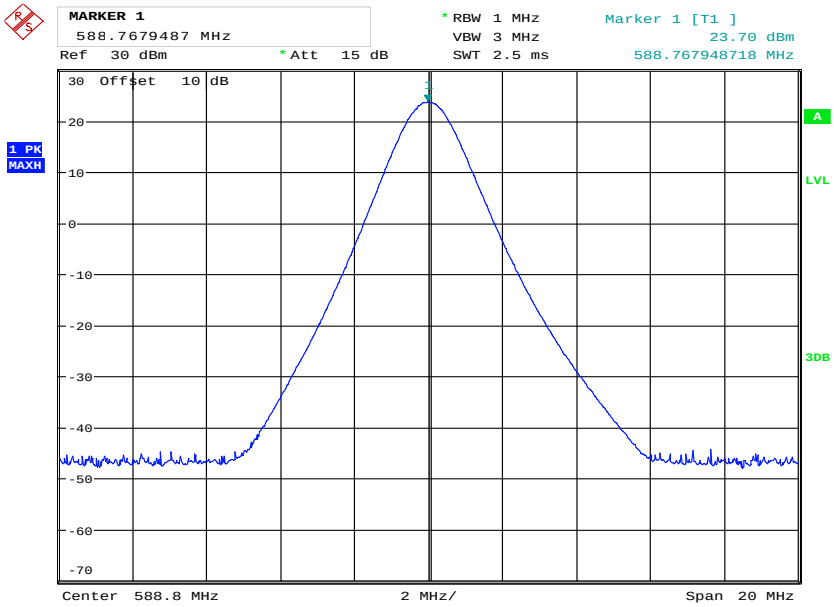
250 mW Low Channel 588.8 MHz



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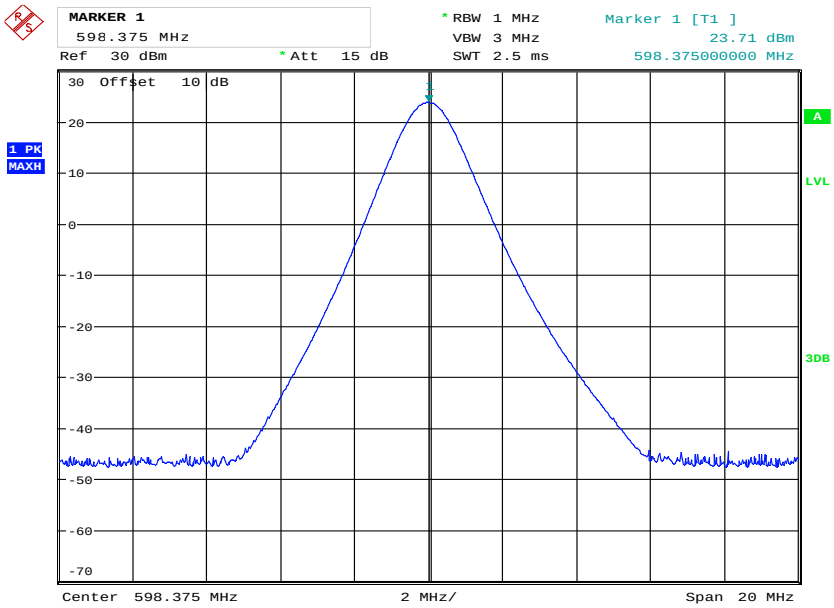

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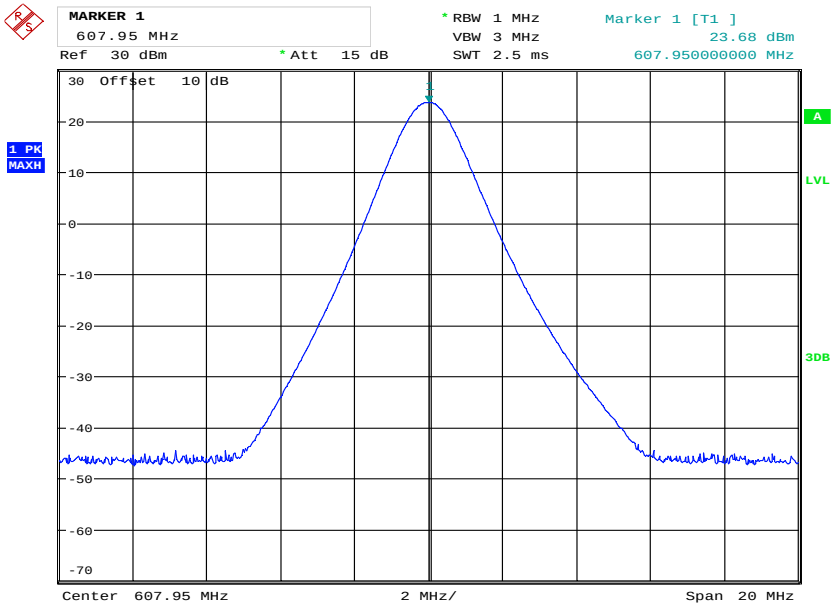
250 mW High Channel 607.950 MHz



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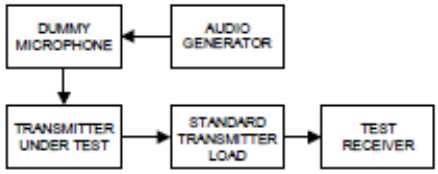
6 FCC §74.861 (e) (3) - Modulation Characteristics

6.1 Applicable Standards

According to FCC §74.861 (e)

(3) Any form of modulation may be used. A maximum deviation of ±75 kHz is permitted when frequency modulation is employed.

6.2 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.

6.3 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	2018-01-06	2 years
-	RF Cable	-	-	-	Each time

Note: Cable and attenuator included in the test set-up were 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 09 June 2016) "A2LA Policy on Metrological Traceability".*

6.4 Test Environmental Conditions

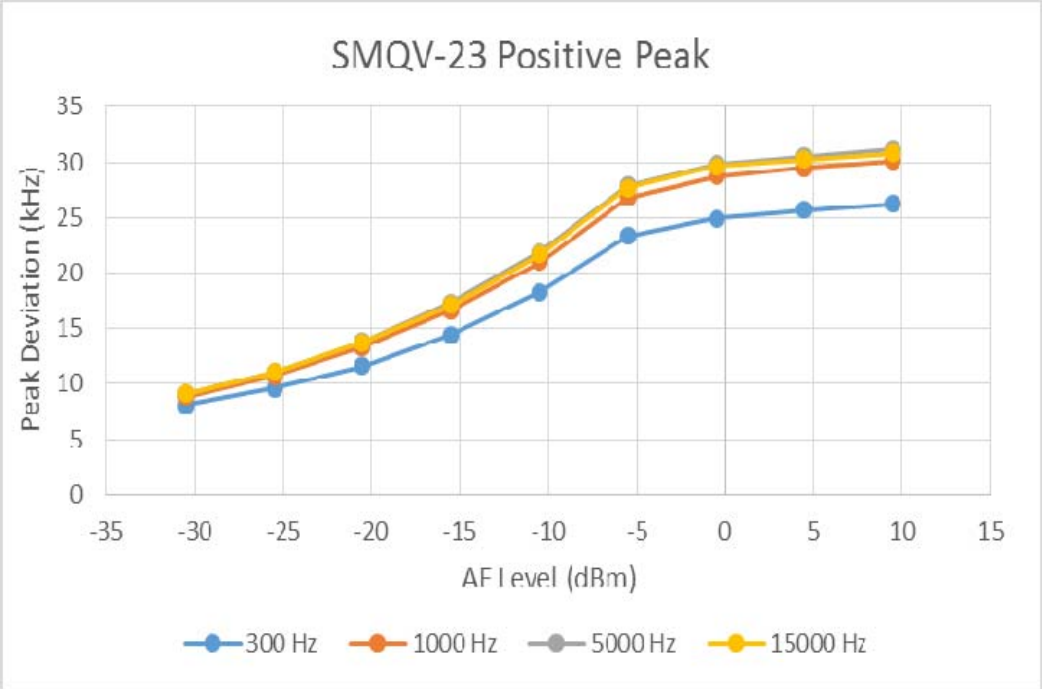
Temperature:	22 ºC
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

The testing was performed by Vincent Licata on 2018-08-16 and 2018-08-17 at RF site.

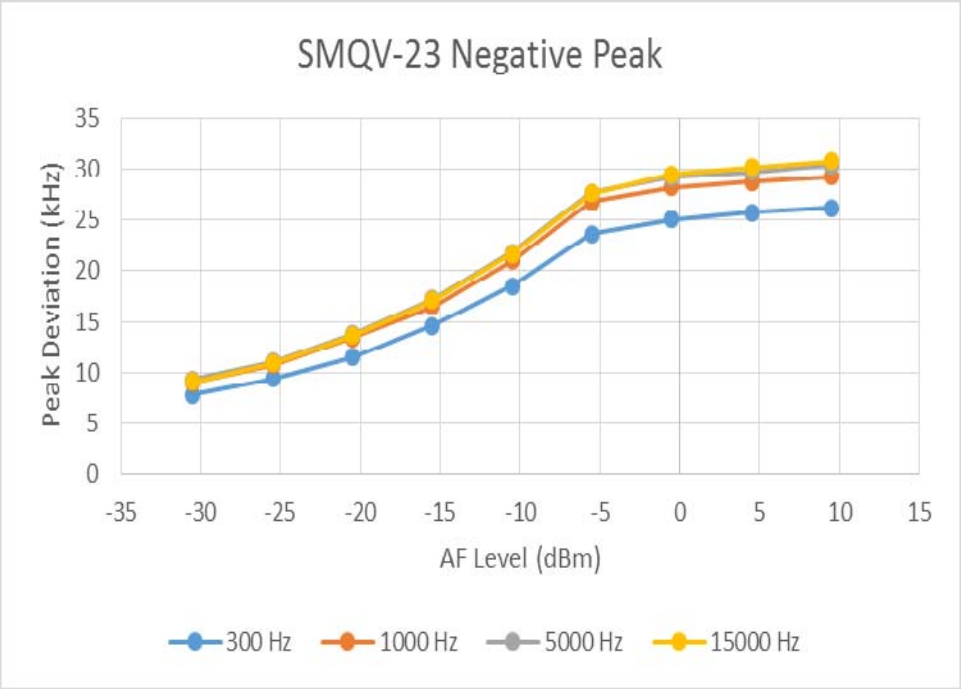
6.5 Test Results

Deviation versus Audio input level and Audio Frequency

AF Level (dB)	AF Frequency (Hz)/Positive Peak Deviation (kHz)				Limit (kHz)
	300 Hz	1000 Hz	5000 Hz	15000 Hz	
-20	8.08	8.88	9.15	9.11	±75
-15	9.62	10.75	11.07	11.04	±75
-10	11.63	13.35	13.83	13.73	±75
-5	14.43	16.63	17.33	17.13	±75
0	18.33	21.02	21.92	21.67	±75
5	23.33	26.79	27.92	27.71	±75
10	24.93	28.73	29.86	29.62	±75
15	25.68	29.48	30.56	30.24	±75
20	26.23	30.11	31.15	30.82	±75



AF Level (dB)	AF Frequency (Hz)/Negative Peak Deviation (kHz)				Limit (kHz)
	300 Hz	1000 Hz	5000 Hz	15000 Hz	
-20	7.84	9.05	9.33	9.12	±75
-15	9.42	10.75	11.05	10.92	±75
-10	11.54	13.39	13.78	13.61	±75
-5	14.62	16.49	17.21	17.06	±75
0	18.52	21.01	21.81	21.68	±75
5	23.65	26.81	27.67	27.62	±75
10	25.04	28.21	29.18	29.53	±75
15	25.72	28.72	29.77	30.15	±75
20	26.21	29.27	30.42	30.76	±75



Audio Frequency Response, Middle Channel

AF Frequency (Hz)	AF Level (mV)	AF Response (dB)
100	17.5	2.9
200	15.0	1.6
300	16.5	2.4
400	13.5	0.7
500	11.5	-0.7
600	10.5	-1.5
700	11.5	-0.7
800	13.0	0.3
900	13.0	0.3
1000	12.5	0.0
1200	11.0	-1.1
1400	11.0	-1.1
1600	12.5	0.0
1800	12.5	0.0
2000	11.0	-1.1
2200	11.5	-0.7
2400	11.5	-0.7
2600	11.5	-0.7
2800	11.0	-1.1
3000	11.5	-0.7
3250	11.5	-0.7
3500	11.0	-1.1
3750	11.5	-0.7
4000	11.0	-1.1
4250	11.0	-1.1
4500	11.5	-0.7
4750	11.5	-0.7
5000	11.5	-0.7

Note: AF Response = 20*log (AF Level/AF Level of 1 kHz)

7 FCC §74.861(e) (5) (7) - Occupied Bandwidth & Emission Mask

7.1 Applicable Standards

According to FCC §74.861 (e) (5) (7):
The operating bandwidth shall not exceed 200 kHz.
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.

7.2 Test Procedure

The OBW is according to KDB 971168 D01 v03r01

The Emission mask is according to sections 8.3 of 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
Rohde & Schwarz	Spectrum Analyzer	FSQ26	200749	2017-06-08	2 years
HP	RF Communications Test Set	8920A	3438A05338	2018-01-09	2 years
HP	Modulation Analyzer	8901A	2026A00847	2018-01-06	2 years
Krohn-Hite	Active Dual Channel Filter	3940	3212	2017-09-06	1 year
Agilent	Function Generator	33220A	MY43004878	2018-01-09	1 year
HP	TIMS	4934A	3737U15141	2018-01-09	1 year
-	10dB attenuator	-	-	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 09 June 2016) "A2LA Policy on Metrological Traceability".*

7.4 Test Environmental Conditions

Temperature:	22 ºC
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

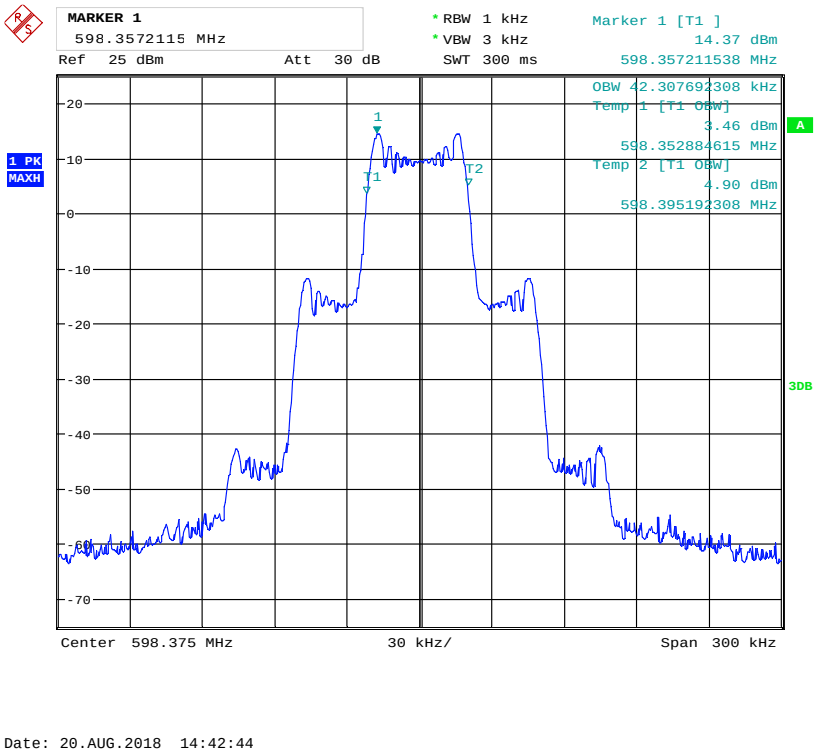
The testing was performed by Vincent Licata on 2018-08-20 and 2018-08-28 at RF site.

7.5 Test Results

Center Frequency (MHz)	99% Bandwidth (kHz)	Limit (kHz)	Result
598.375	42.31	200	Pass

Please refer to the following plots for detailed test results

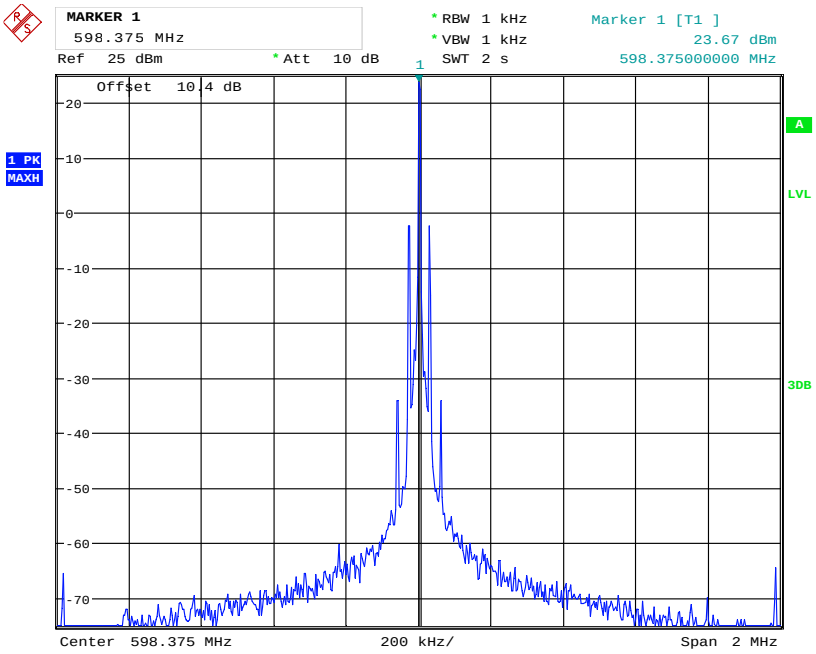
Occupied Bandwidth



Emission Mask

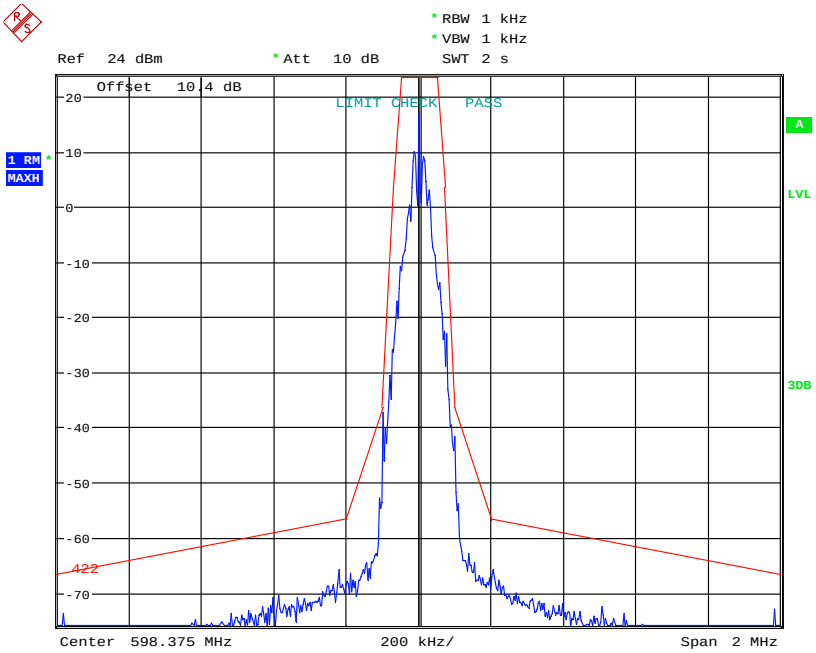
(250 mW power setting)

Reference Level



Date: 28.AUG.2018 10:17:27

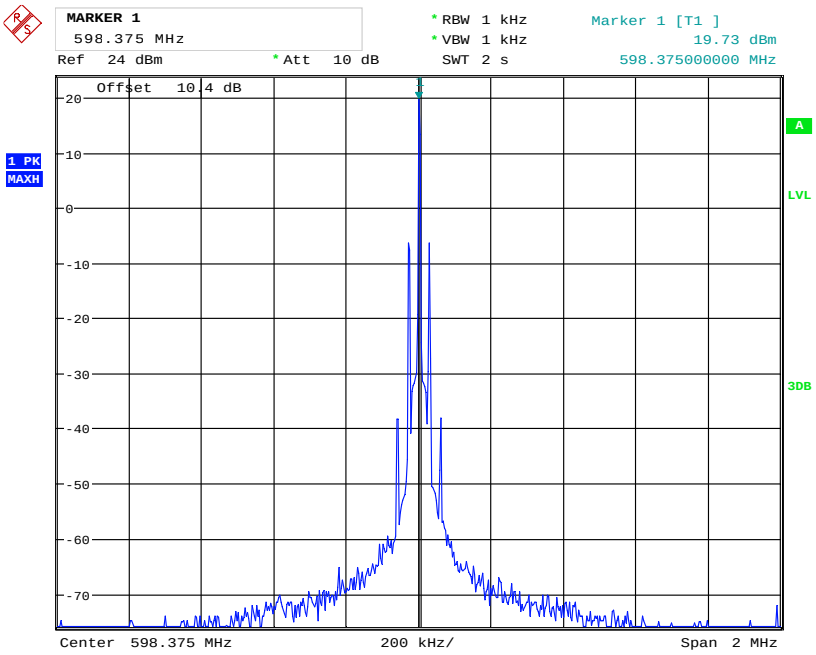
Emission Mask



Date: 28.AUG.2018 10:25:27

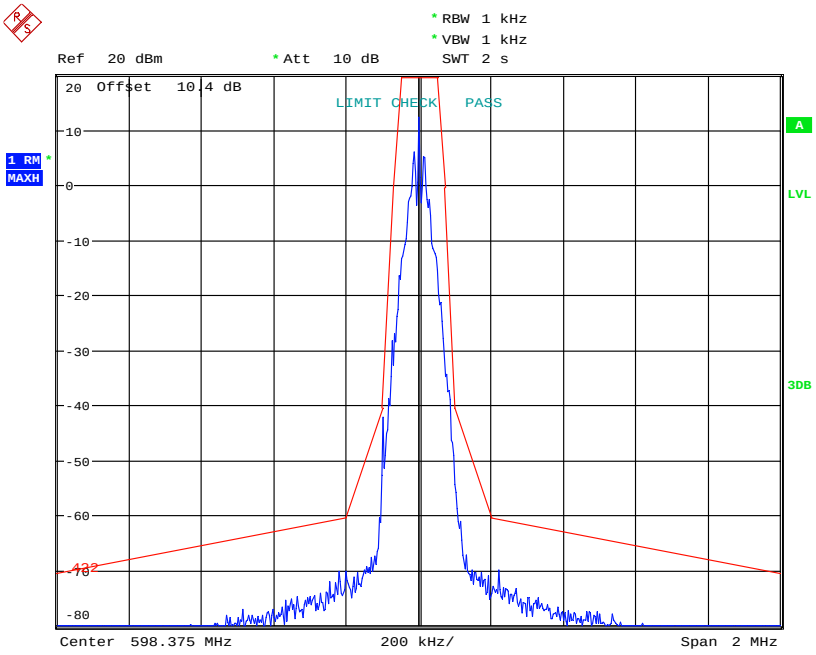
(100 mW power setting)

Reference Level



Date: 28.AUG.2018 10:26:33

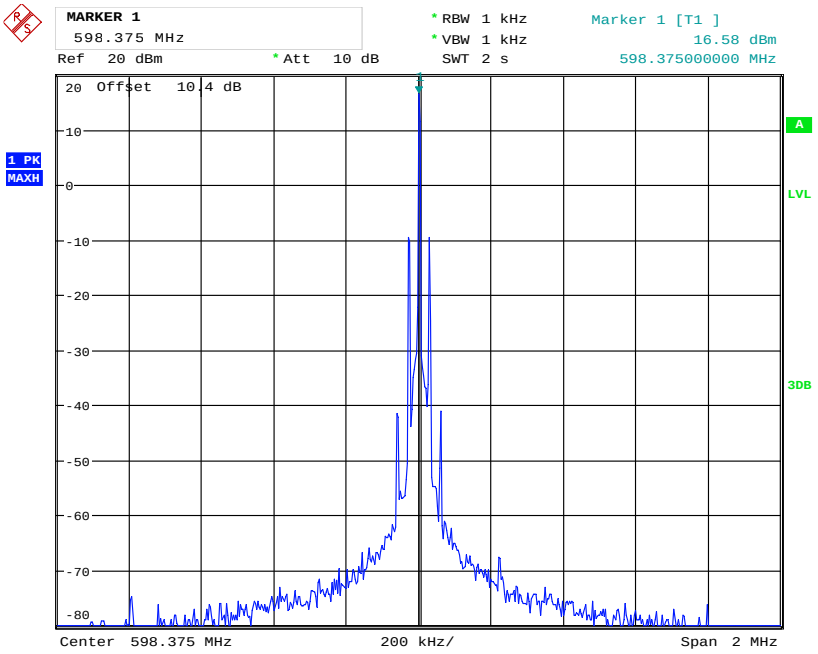
Emission Mask



Date: 28.AUG.2018 10:27:51

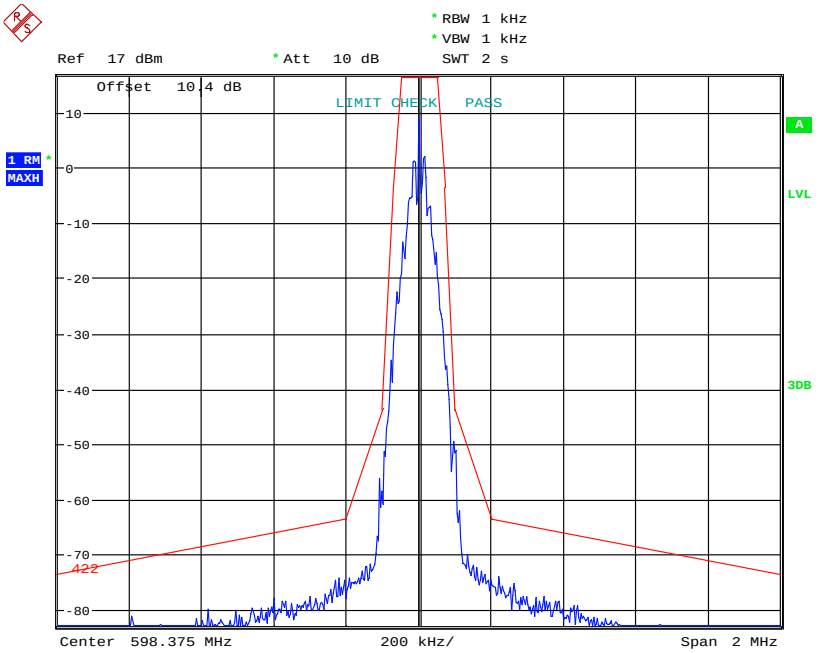
(50 mW power setting)

Reference Level



Date: 28.AUG.2018 10:31:58

Emission Mask



Date: 28.AUG.2018 10:33:20

8 FCC §74.861(e) (7) - Conducted Spurious Emissions at Antenna Port

8.1 Applicable Standards

According to FCC §74.861 (e) (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.

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	2018-07-23	1 year
-	20dB attenuator	-	-	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 09 June 2016) "A2LA Policy on Metrological Traceability".*

8.4 Test Environmental Conditions

Temperature:	22 ºC
Relative Humidity:	45 %
ATM Pressure:	101.2 kPa

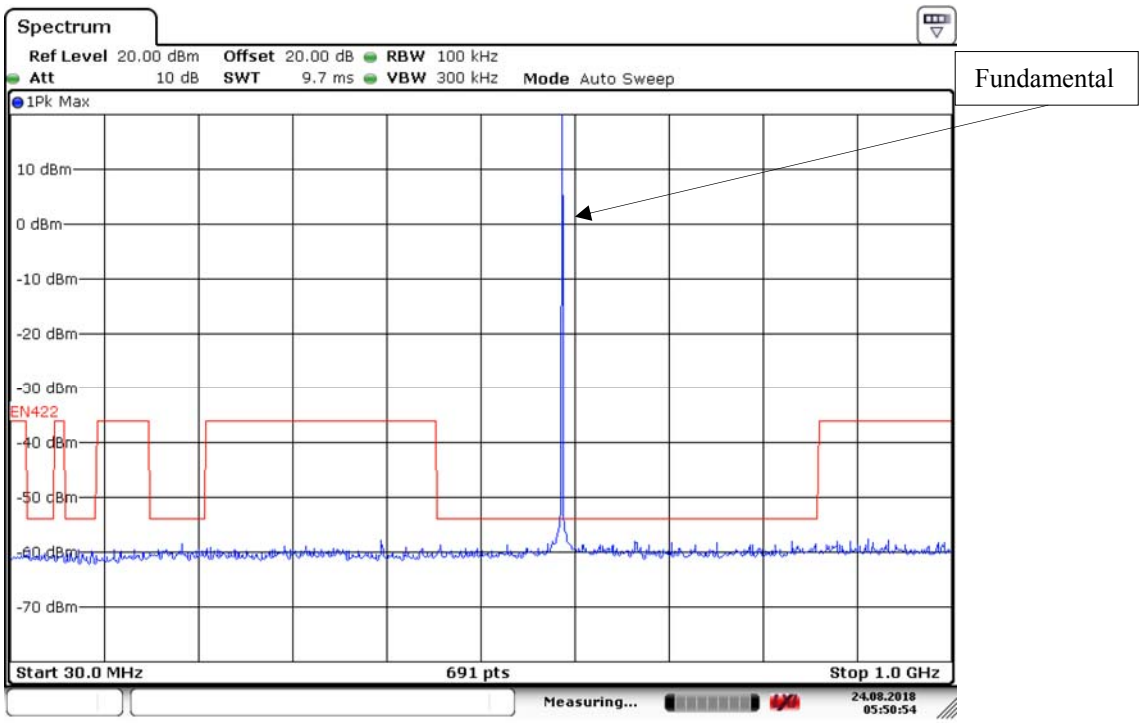
The testing was performed by Vincent Licata on 2018-08-24 at RF site.

8.5 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.

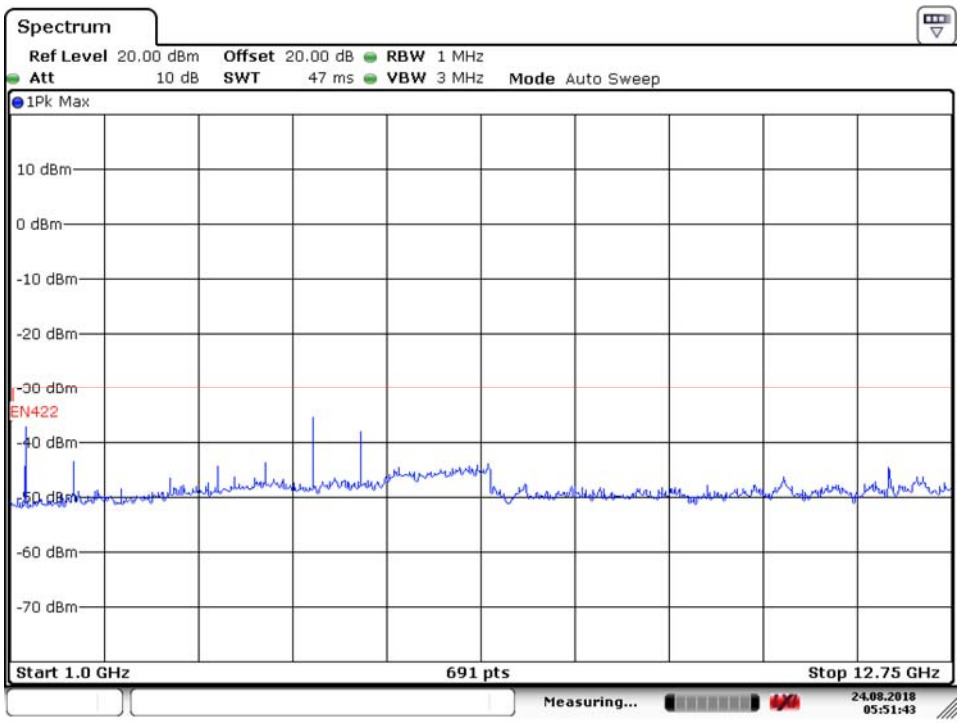
Middle Channel: 598.375 MHz

30 MHz to 1 GHz



Date: 24.AUG.2018 05:50:54

1 GHz to 12.75 GHz



Date: 24.AUG.2018 05:51:43

9 FCC §74.861(e) (7) - Field Strength of Spurious Radiation

9.1 Applicable Standards

According to FCC §74.861 (e) (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.

9.2 Test Procedure

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

9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	MY48250238	2018-05-08	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	2018-04-02	1 year
HP	Pre-Amplifier	8449B	3147A00400	2018-02-02	1 year
Sunol Sciences	Horn Antenna	DRH-118	A052704	2017-03-27	2 years
EMCO	Horn Antenna	3115	9511-4627	2018-03-28	2 years
HP	Signal Generator	83650B	3614A00276	2017-11-06	1 year
-	RF Cable	-	-	Each time[1]	N/A
COM-POWER	Dipole Antenna	AD-100	721033DB1, 2, 3, 4	2017-2-13	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 09 June 2016) "A2LA Policy on Metrological Traceability".*

9.4 Test Environmental Conditions

Temperature:	22 ºC
Relative Humidity:	40 %
ATM Pressure:	101.0 kPa

The testing was performed by Vincent Licata and Frank Wang from 2018-08-20 to 2018-08-22 at 5 meter chamber 3.

9.5 Test Results

TX Middle channel 598.375 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 (dB)	Cable Loss (dB)			
447	29.53	0	100	H	447	-75.03	0	0.227	-75.257	-54	-21.257
447	27.54	0	100	V	447	-75.07	0	0.227	-75.297	-54	-21.297
1196.75	50.08	0	100	H	1196.75	-60.35	6.796	0.423	-53.977	-30	-23.977
1795.13	54.87	0	183	H	1795.13	-53.53	9.604	0.591	-44.517	-30	-14.517
2393.5	54.02	0	126	H	2393.5	-52.54	9.763	0.695	-43.472	-30	-13.472
2991.88	58.29	0	159	H	2991.88	-45.41	9.282	0.786	-36.914	-30	-6.914
3590.25	50.91	0	184	H	3590.25	-50.95	10.329	0.87	-41.491	-30	-11.491
4188.63	59.87	0	187	H	4188.63	-40.94	10.882	0.927	-30.985	-30	-0.985
4787	46.94	0	208	H	4787	-52.29	10.689	1.06	-42.661	-30	-12.661
5385.38	57.21	0	167	H	5385.38	-39.81	10.329	1.103	-30.584	-30	-0.584
5983.75	48.63	0	172	H	5983.75	-47.79	10.882	1.165	-38.073	-30	-8.073

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 (dB)	Cable Loss (dB)			
41	43.96	0	155	V	41	-68.91	0	0.05	-68.96	-57	-11.96
53	45.68	0	180	H	53	-66.98	0	0.05	-67.03	-57	-10.03
1276	47.99	0	100	V	1276	-60.73	7.4	0.63	-53.96	-47	-6.96
1276	46.78	0	100	H	1276	-61.73	7.4	0.63	-54.96	-47	-7.96

10 FCC §2.1055, §74.861(e) (4) - Frequency Stability

10.1 Applicable Standards

According to FCC §74.861 (e) (4):

The frequency tolerance of the transmitter shall be 0.005 percent

10.2 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.

(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.

10.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4446A	US44300386	2018-06-01	1 year
Tenney	Environmental Chamber	TUJR	27445-06	2017-10-02	1 year
KEPCO	DC Source	25-10M	H1334526	Cal. Not Required	N/A
Fluke	Digital Multi-meter	189	89920092	2018-03-22	1 year
-	20dB 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 09 June 2016) "A2LA Policy on Metrological Traceability".*

10.4 Test Environmental Conditions

Temperature:	23 ºC
Relative Humidity:	43 %
ATM Pressure:	101.1 kPa

The testing was performed by Chinming Liu 2018-08-06 and 2018-08-15 at RF site.

10.5 Test Results

Varying temperature:

Temperature (℃)	Measured Frequency (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limits (+/-ppm)
-30	598.3767	598.375	2.84	50
-20	598.3784	598.375	5.68	50
-10	598.3767	598.375	2.84	50
0	598.3767	598.375	2.84	50
10	598.3784	598.375	5.68	50
20	598.3758	598.375	1.34	50
30	598.3750	598.375	0.00	50
40	598.3733	598.375	-2.84	50
50	598.3725	598.375	-4.18	50

Varying supply voltage:

Voltage	Measured Frequency (MHz)	Channel Frequency (MHz)	Frequency Tolerance (ppm)	Limits (+/-ppm)
2.55 V	598.3742	598.375	-1.34	50
3.45 V	598.3733	598.375	-2.84	50

11 Appendix A - FCC Equipment Labeling Requirements

11.1 FCC ID Label Requirements

As per FCC §2.925,

(a) Each equipment covered in an application for equipment authorization shall bear a nameplate or label listing the following:

(1) FCC Identifier consisting of the two elements in the exact order specified in §2.926. The FCC Identifier shall be preceded by the term FCC ID in capital letters on a single line, and shall be of a type size large enough to be legible without the aid of magnification.

Example: FCC ID: XXX123

Where: XXX—Grantee Code, 123—Equipment Product Code

As per FCC §15.19,

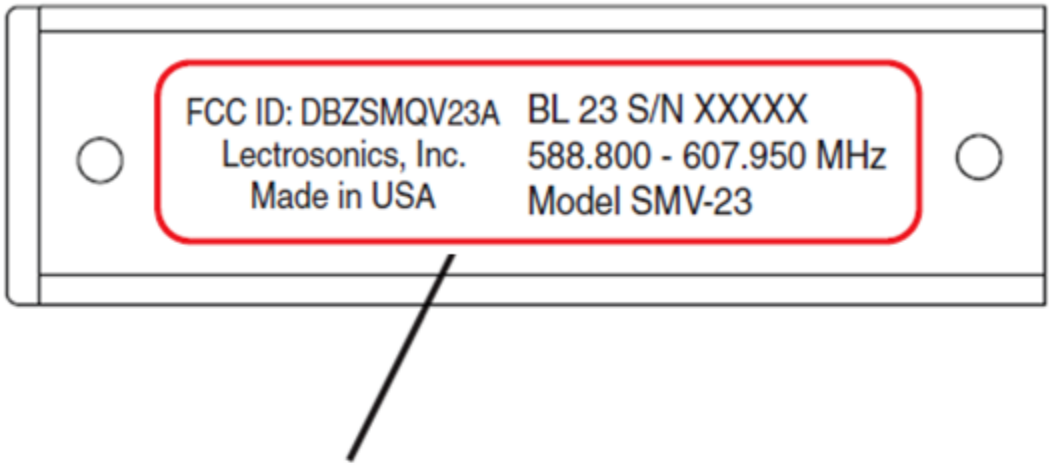
(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows:

(3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

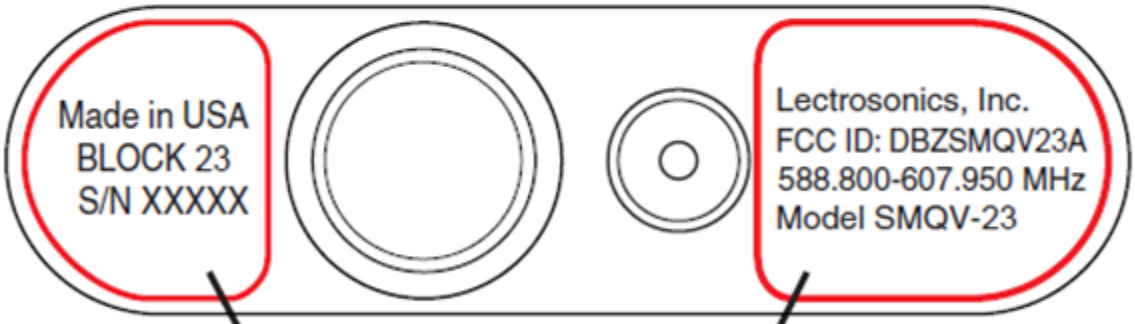
(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified above is required to be affixed only to the main control unit. If the EUT is integrated within another device then a label affixed to the host shall also state, "Contains FCC ID: XXXXXX"

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

11.2 Label Contents and Location



Label location - actual size



Label locations - actual size

12 Appendix B - EUT Photographs

Please see attachments:

Exhibit – EUT Test Setup Photographs
Exhibit – EUT External Photographs
Exhibit – EUT Internal Photographs

13 Appendix C (Informative) - 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 the requirements of any additional program requirements in the Electrical field. 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 8 January 2009*).

Presented this 30th day of August 2016.

President and CEO
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2018
Revised November 14, 2016

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

--- END OF REPORT ---