FCC Part 90.217

TEST REPORT

For

Communications Specialists, Inc.

426 West Taft Avenue,

Orange, CA 92864, USA

FCC ID: CFXTXR-2

Report Type: Original Report	**Product Type:** Ankle/Wrist Homing Transmitter

Test Engineer:	Frank Wang
Report Number:	R1611033-90
Report Date:	2017-02-22
Reviewed By:	Todd Moy RF Lead
Prepared By:	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, U.S.A. Tel: (408) 732-9162 Fax: (408) 732-9164

TABLE OF CONTENTS

1 General Information 4
1.1 Product Description for Equipment Under Test (EUT) 4
1.2 Mechanical Description 4
1.3 Objective 4
1.4 Related Submittal(s)/Grant(s) 4
1.5 Test Methodology 4
1.6 Measurement Uncertainty 4
1.7 Test Facility Registrations 5
1.8 Test Facility Accreditations 5
2 System Configuration 8
2.1 Justification 8
2.2 EUT Exercise Software 8
2.3 Equipment Modifications 8
2.4 Special Accessories 8
2.5 Local Support Equipment 8
2.6 Interface Ports and Cabling 8
3 Summary of Test Results 9
4 FCC §2.1093 - RF Exposure Information 10
4.1 Applicable Standards 10
4.2 Test Results 10
5 FCC §2.1046, 90.217 & 90.259 - RF Output Power 11
5.1 Applicable Standard 11
5.2 Test Procedure 11
5.3 Test Equipment List and Details 11
5.4 Test Environmental Conditions 12
5.5 Test Results 12
6 FCC §2.1055 & §90.213 - Frequency Stability 14
6.1 Applicable Standard 14
6.2 Test Procedure 14
6.3 Test Equipment List and Details 14
6.4 Test Environmental Conditions 14
6.5 Test Results 15
7 FCC §90.209, §90.217 & §90.259 - Occupied Bandwidth & Emission Mask 17
7.1 Applicable Standard 17
7.2 Test Procedure 17
7.3 Test Equipment List and Details 17
7.4 Test Environmental Conditions 18
7.5 Test Results 18
8 FCC §2.1053 & §90.217 - Field Strength of Spurious Radiation 23
8.1 Applicable Standard 23
8.2 Test Procedure 23
8.3 Test Equipment List and Details 24
8.4 Test Environmental Conditions 24
8.5 Test Results 25

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1611033-90	Original Report	2017-02-22

1 General Information

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Communications Specialists, Inc.* and their product, model: CSTXR.1, *FCC ID:* CFXTXR-2 or the "EUT" as referred to in this report. The EUT is an Ankle/Wrist Homing Transmitter operating in 433.5 MHz and the 217-220 MHz & 216-217 MHz frequency band.

1.2 Mechanical Description

The "EUT" measures 25m*m (L) x 25mm (W) x 5mm (H)*, and weighs approximately *5*g.

The data gathered are from production sample. Serial number R1611033-1 assigned by BACL.

1.3 Objective

This report is prepared on behalf of *Communications Specialists, Inc.* in accordance with Part 2, Subpart J,and Part 90.217, of the Federal Communication Commission's rules.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.231, Equipment DSR with FCC ID: CFXTXR-2, IC: 22317-CFXTXR2
FCC Part 95, Subpart G, Equipment TNT with FCC ID: CFXTXR-2
ISED RSS-210 with IC: 22317-CFXTXR2

1.5 Test Methodology

All measurements contained in this report were conducted with TIA-603-D, Land Mobile FM OR PM Communications Equipment Measurement and Performance Standards. All radiated and conducted emissions measurements were performed at BACL.

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 $\pm$2.0 dB for Conducted Emissions tests and $\pm$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 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: (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/EC US-EU EMC & Telecom MRA CAB
    - Radio & Teleterminal Equipment (R&TTE) Directive 1995/5/EC
      US -EU EMC & Telecom MRA CAB

  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;
- Vietnam: APEC Tel MRA -Phase I;

2 System Configuration

2.1 Justification

The EUT was configured for testing according to TIA-603-D.
The EUT was tested in the testing mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

The EUT did not require any software to operate.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Special Accessories

No special accessories were used or came with the EUT.

2.5 Local Support Equipment

No local support equipment was used with the EUT.

2.6 Interface Ports and Cabling

There were no interface ports or cables that came with the EUT.

3 Summary of Test Results

FCC Rules	Description of Tests	Results
§2.1093	RF Exposure	Compliant
§2.1046, §90.217& §90.259	RF Output Power	Compliant
§2.1055 & §90.213	Frequency Stability	Compliant
§90.209, §90.217 & §90.259	Occupied Bandwidth & Emission Mask	Compliant
§2.1053 & §90.217	Field Strength of Spurious Radiation	Compliant

4 FCC §2.1093 - RF Exposure Information

4.1 Applicable Standards

FCC §2.1093

4.2 Test Results

Refer to the 4.3.1 Standalone SAR test exclusion considerations in 447498 D01 General RF Exposure Guidance V06.

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] =[7.13mW/5mm] · [√0.2185] =0.6664 ≤ 7.5 for 10-g extremity SAR.

Since the results for the highest output power is less than the SAR exclusion value, SAR testing was exempt.

5 FCC §2.1046, 90.217 & 90.259 - RF Output Power

5.1 Applicable Standard

According to FCC §90.217, Except as noted herein, transmitters used at stations licensed below 800 MHz on any frequency listed in subparts B and C of this part or licensed on a business category channel above 800 MHz which have an output power not exceeding 120 mW.

According to FCC §90.259 (a) 216-220 MHz band (4) in the 217-220 MHz band, the maximum transmitter output is 2 watts.

5.2 Test Procedure

The transmitter was place onto a Styrofoam block. The unit was normally transmitting with a 50 ohm terminator connected to the antenna terminal.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of fundamental emissions from the EUT.

After the fundamental emissions were found, the EUT was removed and replaced by a substituting antenna. A signal generator was connected to the substituting antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2016-06-26	1 Year
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2015-07-11	2 Years
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/R
Suirong	30 ft conductive emission cable	LMR 400	-	2016-03-05	1 year
Agilent	Analyzer, Spectrum	E4440A	US45303156	2016-01-19	1 Year
HP	Generator, Signal	83650B	3614A00276	2016-09-09	1 year
COM-POWER	Antenna, Dipole	AD-100	721033DB1, 2, 3, 4	2016-11-03	2 year
-	SMA cable	-	C0003	Each time[1]	Each time[1]
-	N-Type Cable	-	C00013	2016-04-28	1 year
-	N-Type Cable	-	C00014	2016-05-28	1 year

[1] This equipment was calibrated before each test.
***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 9 June 2016) "A2LA Policy on Metrological Traceability".

5.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	51 %
ATM Pressure:	101.4 kPa

The testing was performed by Frank Wang on 2016-11-28 in the chamber 5m3.

5.5 Test Results

ERP:

Test Mode: Transmitting N0N mode

Indicated		Azimuth (degree)	Test Antenna		Substituted				
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)
217.0125	80.98	0	100	H	217.0125	-29	0	0.227	-29.227
219.9875	85.73	0	100	H	219.9875	-24.25	0	0.227	-24.477

Test Mode: Transmitting FSK mode

Indicated		Azimuth (degree)	Test Antenna		Substituted				
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)
218.5	84.29	0	100	H	218.5	-25.69	0	0.227	-25.917

Note: The EUT antenna gain is -30 dBi which is used to transfer from EIRP output power to conducted output power.

Conducted

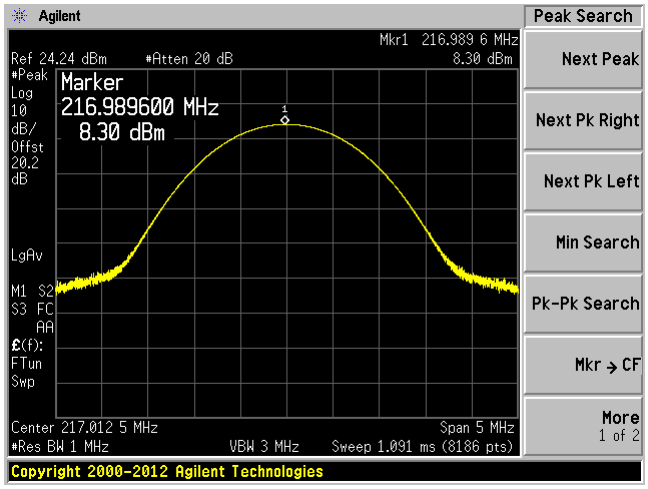
Test Mode: Transmitting N0N mode

Frequency (MHz)	Conduct Output Power		Limit
	(dBm)	(mW)	(mW)
217.0125	8.3	6.76	120
219.9875	8.31	6.78	120

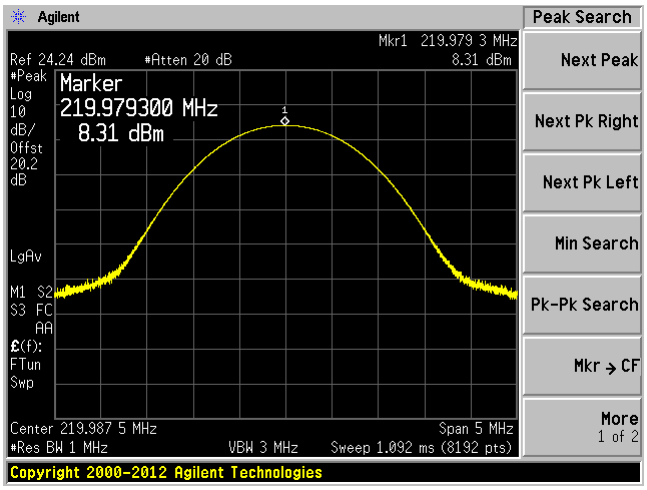
Test Mode: Transmitting FSK mode

Frequency (MHz)	Conduct Output Power		Limit
	(dBm)	(mW)	(mW)
218.5000	8.53	7.13	120

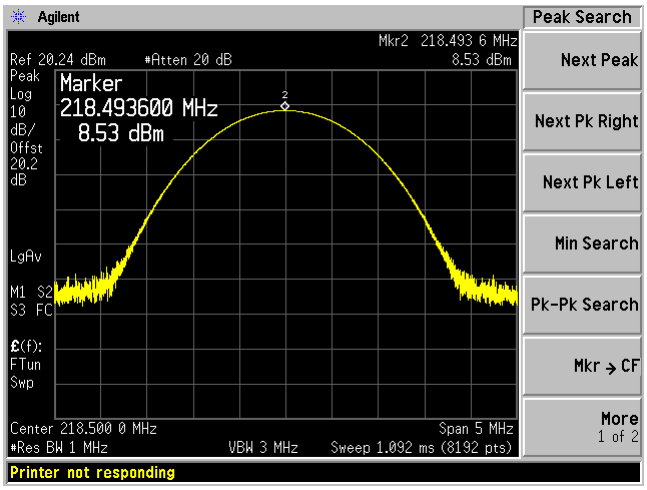
N0N, 217.0125 MHz



N0N, 219.9875 MHz



FSK, 218.5000 MHz



6 FCC §2.1055 & §90.213 - Frequency Stability

6.1 Applicable Standard

According to FCC §90.213 Minimum Frequency Stability table, for the frequency range 216-220 MHz with 2 watts or less output signal, the frequency stability should be within 1.0 parts per million.

6.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to the Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2016-12-16	1 Year
ESPEC	Humidity Chamber	ESL-4CA	18010	2016-02-24	1 Year
KEPCO	Source, DC	25-10M	H1334526	N/A	N/A
Craftsman	Multimeter	-	-	N/A	N/A
-	20 dB Attenuator	-	-	Each time[1]	Each time[1]
-	SMA cable	-	C0003	Each time[1]	Each time[1]

***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 9 June 2016) "A2LA Policy on Metrological Traceability".

6.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	51 %
ATM Pressure:	101.4 kPa

The testing was performed by Frank Wang on 2017-2-21 in the RF Site.

6.5 Test Results

N0N, 217.0125 MHz

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (Vdc)	Temperature (^{o}C)				
Frequency vs. Temperature					
3.0	50	217.0125	217.012507	0.032256	± 1.0
3.0	40	217.0125	217.012501	0.004608	± 1.0
3.0	30	217.0125	217.012502	0.009216	± 1.0
3.0	20	217.0125	217.012503	0.013824	± 1.0
3.0	10	217.0125	217.012508	0.036864	± 1.0
3.0	0	217.0125	217.012505	0.023040	± 1.0
3.0	-10	217.0125	217.012504	0.018432	± 1.0
3.0	-20	217.0125	217.012504	0.018432	± 1.0
3.0	-30	217.0125	217.012502	0.009216	± 1.0
Frequency vs. Voltage					
2.55	20	217.0125	217.012501	0.004608	± 1.0
3.45	20	217.0125	217.012502	0.009216	± 1.0

N0N, 219.9875 MHz

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (Vdc)	Temperature (^{o}C)				
Frequency vs. Temperature					
3.0	50	219.9875	219.987505	0.022729	± 1.0
3.0	40	219.9875	219.98751	0.045457	± 1.0
3.0	30	219.9875	219.987509	0.040911	± 1.0
3.0	20	219.9875	219.98751	0.045457	± 1.0
3.0	10	219.9875	219.987508	0.036366	± 1.0
3.0	0	219.9875	219.987514	0.063640	± 1.0
3.0	-10	219.9875	219.987513	0.059094	± 1.0
3.0	-20	219.9875	219.987507	0.031820	± 1.0
3.0	-30	219.9875	219.987513	0.059094	± 1.0
Frequency vs. Voltage					
2.55	20	219.9875	219.987509	0.040911	± 1.0
3.45	20	219.9875	219.987508	0.036366	± 1.0

FSK, 218.5 MHz

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (Vdc)	**Temperature (^{o}C)**				
Frequency vs. Temperature					
3.0	50	218.5	218.499968	-0.146453	± 1.0
3.0	40	218.5	218.500017	0.077803	± 1.0
3.0	30	218.5	218.500010	0.043478	± 1.0
3.0	20	218.5	218.500005	0.020595	± 1.0
3.0	10	218.5	218.500073	0.334096	± 1.0
3.0	0	218.5	218.499995	-0.022883	± 1.0
3.0	-10	218.5	218.500086	0.391304	± 1.0
3.0	-20	218.5	218.500052	0.235698	± 1.0
3.0	-30	218.5	218.499994	-0.029748	± 1.0
Frequency vs. Voltage					
2.55	20	218.5	218.499990	-0.045767	± 1.0
3.45	20	218.5	218.499990	-0.045767	± 1.0

7 FCC §90.209, §90.217 & §90.259 - Occupied Bandwidth & Emission Mask

7.1 Applicable Standard

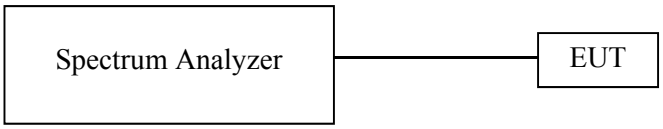
According to FCC §90.209 Standard Channel Spacing/Bandwidth table, the authorized bandwidth limit for 216-220 MHz frequency band is 6/11.25/20 kHz.

According to FCC §90.217 (c) For equipment designed to operate with a 6.25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 12.5 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

According to FCC §90.259(a) (7) Frequencies will be assigned with a 6.25 kHz, 12.5 kHz, 25 kHz or 50 kHz channel bandwidth. Frequencies may be assigned with a channel bandwidth exceeding 50 kHz only upon a showing of adequate justification. (8) Assignable 6.25 kHz channels will occur in increments of 6.25 kHz from 217.00625 MHz to 219.99375 MHz.

7.2 Test Procedure

The EUT is connected to the spectrum analyzer. The EUT transmits a CW signal with no modulation and FSK modulation.



7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Analyzer, Spectrum	E4446A	MY48250238	2016-12-16	1 Year
KEPCO	Source, DC	25-10M	H1334526	N/A	N/A
Craftsman	Multimeter	-	-	N/A	N/A
-	SMA cable	-	C0003	Each time[1]	Each time[1]
-	20 dB Attenuator	-	-	Each time[1]	Each time[1]

[1] This equipment was calibrated before each test.
***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 9 June 2016) "A2LA Policy on Metrological Traceability".

7.4 Test Environmental Conditions

Temperature:	21°C
Relative Humidity:	51 %
ATM Pressure:	101.4 kPa

The testing was performed by Frank Wang on 2017-2-22 in the Bench.

7.5 Test Results

Test Mode: Transmitting N0N mode

Frequency (MHz)	Emission Bandwidth (kHz)	Limit (kHz)	Result
217.0125	0.853	11.25	Pass
219.9875	0.85	11.25	Pass

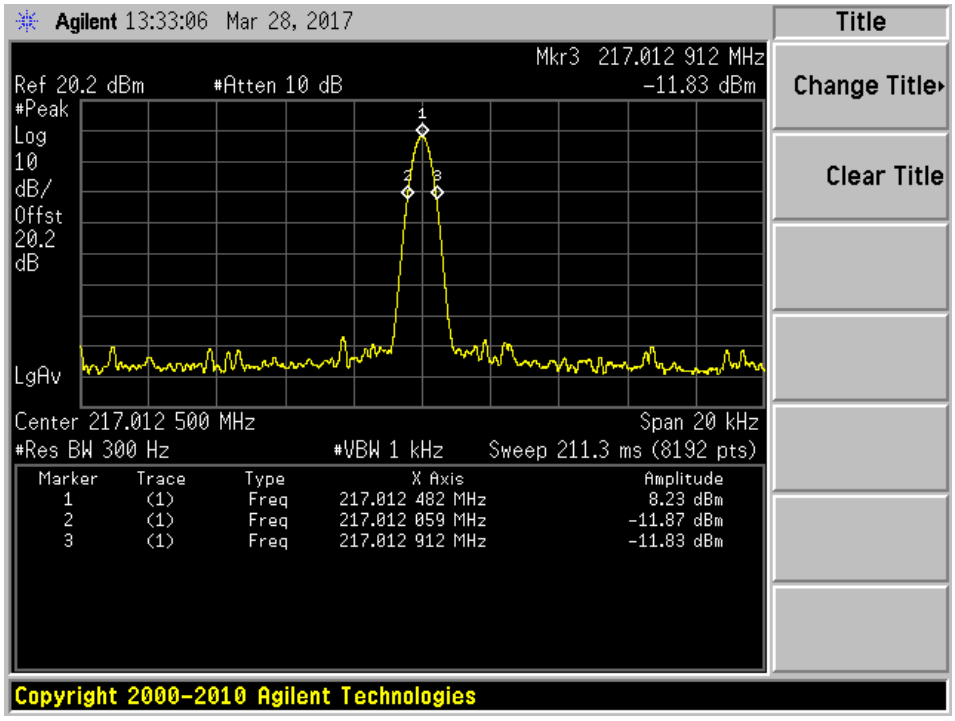
Test Mode: Transmitting FSK mode

Frequency (MHz)	Emission Bandwidth (kHz)	Limit (kHz)	Result
218.500	3.071	11.25	Pass

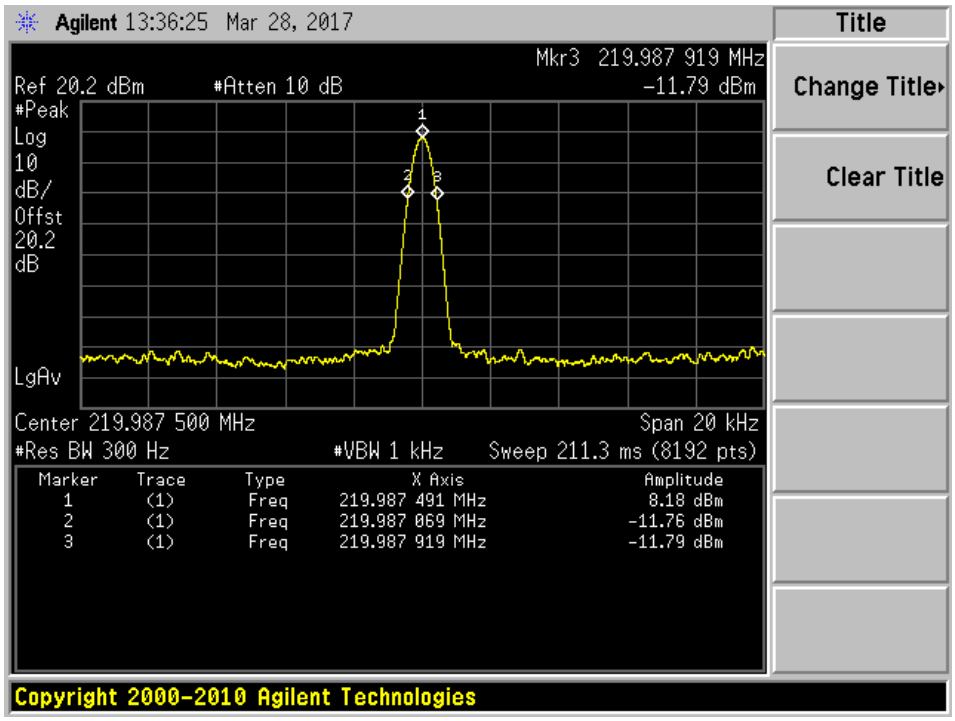
Please refer to the hereinafter plots.

Emission Bandwidth

217.0125 MHz, Modulation: N0N



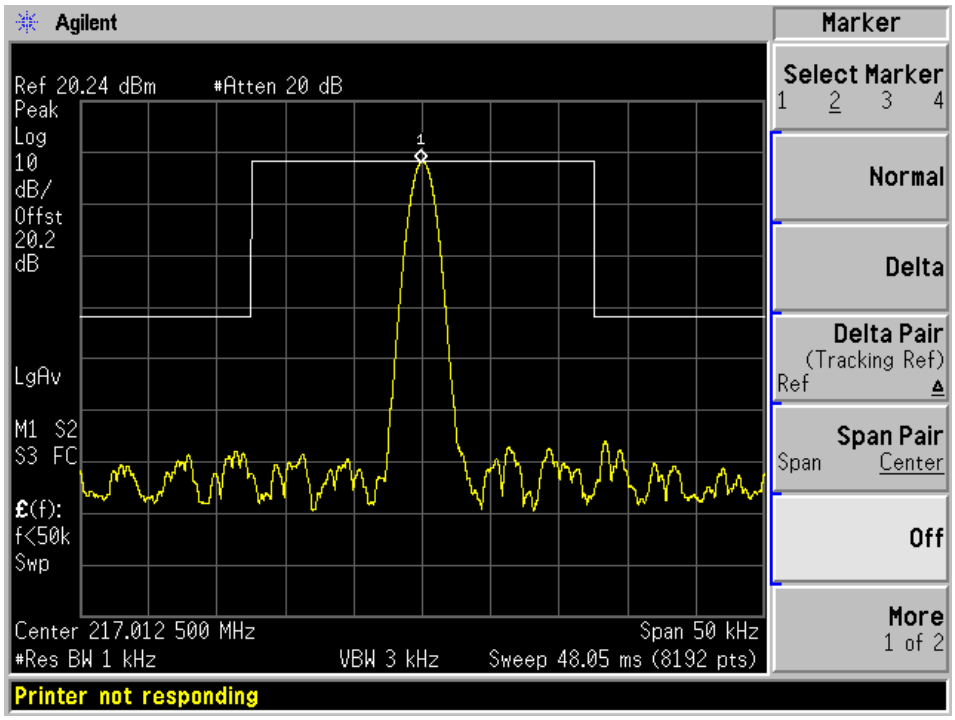
219.9875 MHz, Modulation: N0N



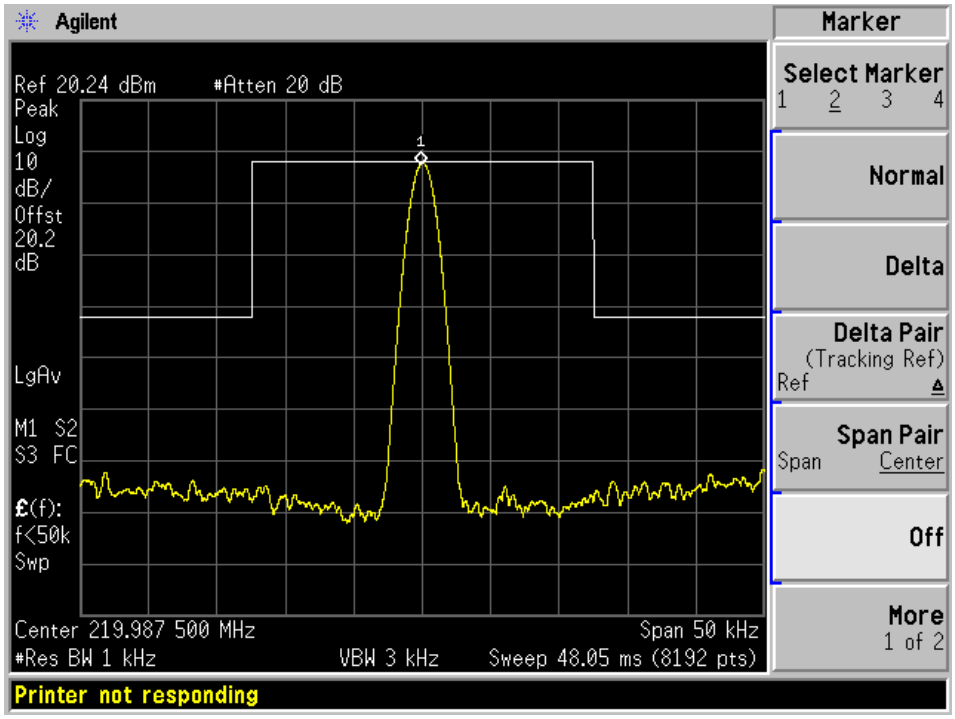
218.500 MHz, Modulation: FSK

Emission Mask

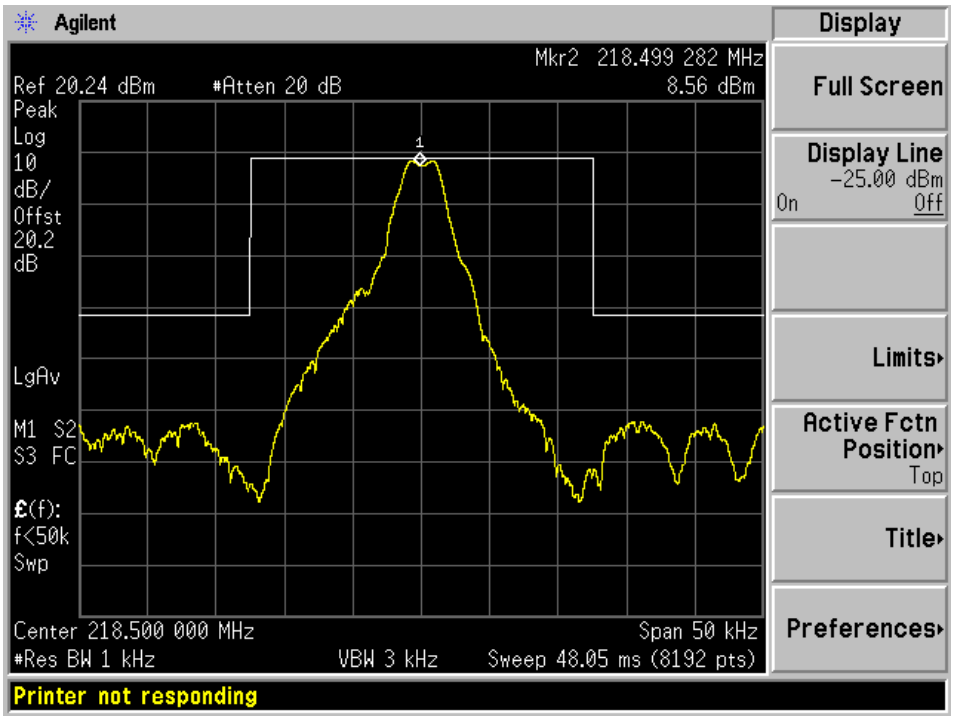
217.0125 MHz, Modulation: N0N



219.9875 MHz, Modulation: N0N



218.5 MHz, Modulation: FSK



8 FCC §2.1053 & §90.217 - Field Strength of Spurious Radiation

8.1 Applicable Standard

According to FCC §90.217 (c) For equipment designed to operate with a 6.25 kHz channel bandwidth, the sum of the bandwidth occupied by the emitted signal plus the bandwidth required for frequency stability shall be adjusted so that any emission appearing on a frequency 12.5 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.

8.2 Test Procedure

The transmitter was place onto a Styrofoam block. The unit was normally transmitting with a 50 ohm terminator connected to the antenna terminal.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT.

Emissions were investigated up to the tenth harmonic of the fundamental frequency.

After the emissions were found, the EUT was removed and replaced by a substituting antenna. A signal generator was connected to the substituting antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2016-06-26	1 Year
HP	Pre Amplifier	8449B OPT HO2	3008A0113	2016-05-23	1 year
Sunol Sciences	Antenna, Biconi-Log	JB3	A020106-2	2015-07-11	2 Years
Sunol Sciences	System Controller	SC99V	011003-1	N/R	N/R
Suirong	30 ft conductive emission cable	LMR 400	-	2016-03-05	1 year
Sunol Sciences	Antenna, Horn	DRH-118	A052704-MOD	2015-03-09	2 years
A.R.A.	Antenna, Horn	DRG-118/A	1132	2015-09-21	2 year
Agilent	Analyzer, Spectrum	E4440A	US45303156	2016-01-19	1 Year
-	SMA cable	-	C0002	Each time[1]	Each time[1]
-	SMA cable	-	C0003	Each time[1]	Each time[1]
-	N-Type Cable	-	C00013	2016-04-28	1 year
-	N-Type Cable	-	C00014	2016-05-28	1 year
IW	Armored High Frequency Cable	DC 1531	KPS-1501A3960KPS	2016-08-05	1 Year
HP	Generator, Signal	83650B	3614A00276	2016-09-09	1 year
COM-POWER	Antenna, Dipole	AD-100	721033DB1, 2, 3, 4	2016-11-03	2 year

[1]This equipment has been calibrated before each test.
***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 9 June 2016) "A2LA Policy on Metrological Traceability".

8.4 Test Environmental Conditions

Temperature:	22 °C
Relative Humidity:	52 %
ATM Pressure:	101.1 kPa

The testing was performed by Frank Wang on 2016-11-30 in 5 meter chamber 3.

8.5 Test Results

Please see following table for detailed results.

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dBd/dBi)	Cable Loss (dB)	Absolute Level (dBm)		
N0N, 217.0125 MHz											
434.02	30.66	253	259	H	434.02	-75.93	0	0.227	-76.157	-59.227	-16.93
433.99	28.25	283	146	V	433.99	-77.77	0	0.227	-77.997	-59.227	-18.77
651.05	26.83	114	167	H	651.05	-75.5	0	0.227	-75.727	-59.227	-16.50
651.04	26.09	116	197	V	651.04	-75.17	0	0.227	-75.397	-59.227	-16.17
868.01	25.49	0	100	H	868.01	-73.15	0	0.335	-73.485	-59.227	-14.26
868.01	27.35	13	150	V	868.01	-71.61	0	0.335	-71.945	-59.227	-12.72
N0N, 219.9875 MHz											
439.9865	31.3	360	286	H	439.9865	-75.29	0	0.227	-75.517	-54.477	-21.04
439.9865	29.32	67	100	V	439.9865	-76.7	0	0.227	-76.927	-54.477	-22.45
659.97	27.68	100	100	H	659.97	-74.65	0	0.227	-74.877	-54.477	-20.40
660	26.88	256	300	V	660	-74.38	0	0.227	-74.607	-54.477	-20.13
879.94	25.82	0	100	H	879.94	-72.82	0	0.335	-73.155	-54.477	-18.68
879.94	27.33	189	200	V	879.94	-71.63	0	0.335	-71.965	-54.477	-17.49
FSK, 218.5000 MHz											
435.79	25.72	0	100	H	435.79	-80.87	0	0.227	-81.097	-55.917	-25.18
435.67	26.76	0	100	V	435.67	-79.26	0	0.227	-79.487	-55.917	-23.57
658.53	24.44	0	100	H	658.53	-77.89	0	0.227	-78.117	-55.917	-22.20
659.25	25.97	0	100	V	659.25	-75.29	0	0.227	-75.517	-55.917	-19.60
879.48	25.49	0	100	H	879.48	-73.15	0	0.335	-73.485	-55.917	-17.57
881.7	25.36	0	100	V	881.7	-73.6	0	0.335	-73.935	-55.917	-18.02

Note: The limit is based on the standard that any emission appearing on a frequency 40 kHz or more removed from the assigned frequency is attenuated at least 30 dB below the unmodulated carrier.