FCC PART 95

MEASUREMENT AND TEST REPORT

For

Quanzhou HengLiDa Tel-Equipment Co.,Ltd.

No.659 Xingpu, Xiamei Town, Nan'an City, Fujian Province,China

FCC ID: 2AIJ4T-M2D

Report Type:	**Product Type:**
Original Report	TWO WAY RADIO

Test Engineer:	*Kevin Hu*
Report Number:	RXM161226050-00
Report Date:	2017-02-19
Reviewed By:	Henry Ding EMC Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Quanzhou HengLiDa Tel-Equipment Co.,Ltd.* 's product, model number: *T-M2D (FCC ID: 2AIJ4T-M2D)* or the "EUT" in this report was a *TWO WAY RADIO ,* which was measured approximately:2.9 cm (L) x 1.8 cm (W) x 7.2 cm (H), rated input voltage: DC 3.7 V from battery.

** All measurement and test data in this report was gathered from production sample serial number: 161226050(Assigned by BACL,Chengdu). The EUT supplied by the applicant was received on 2017-01-06.*

Objective

This report is prepared on behalf of *Quanzhou HengLiDa Tel-Equipment Co.,Ltd.* in accordance with Part 2 and Part 95, Subpart A & Subpart E of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

No related submittal(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with Part 95 Subpart A and Subpart E of the Federal Communication Commissions rules with TIA-603-D, Land Mobile FM or PM-Communications Equipment-Measurement and Performance Standards.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The test site used by BACL to collect test data is located in the 5040, HuiLongWan Plaza, No. 1, ShaWan Road, JinNiu District, ChengDu, China

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

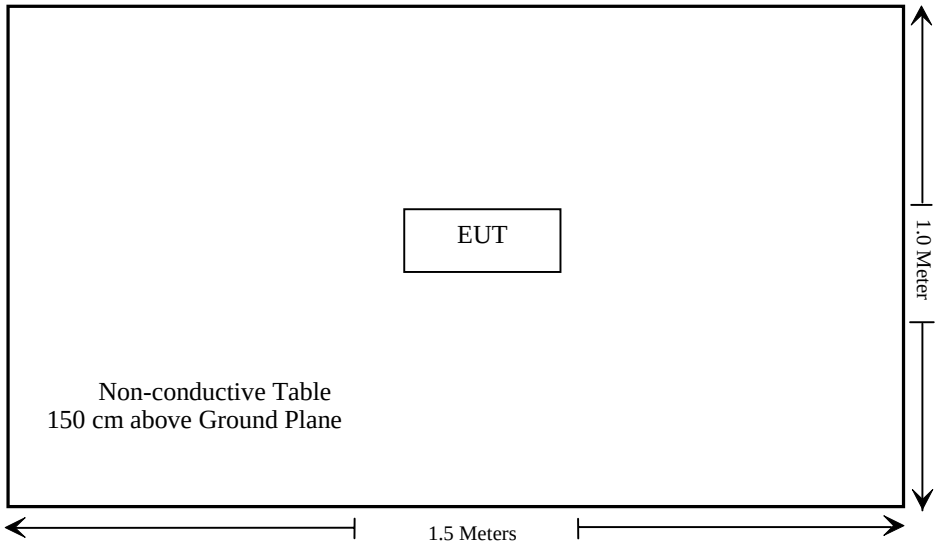
Description of Test Configuration

The system was configured for testing in a typical fashion (as normally used by a typical user).

Equipment Modifications

No modification was made to the EUT tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§2.1093	RF Exposure	Compliance
§2.1046, §95.135	RF Output Power	Compliance
§2.1047, §95.637(a)	Modulation Characteristic	Compliance
§2.1049, §95.633(a)	Authorized Bandwidth & Emission Mask	Compliance
§2.1053, §95.635	Spurious Radiated Emissions	Compliance
§2.1055(d), §95.621	Frequency Stability	Compliance

FCC §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

According to FCC §2.1093 and §1.1307(b) (1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

Test Result

Please refer to SAR Report Number: RXM161226050-20.

FCC §2.1046, §95.135 - RF OUTPUT POWER

Applicable Standard

Acorrding to FCC §95.135

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

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 .The test was performed by placing the EUT on 3-orthogonal axis.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the emissions were measured by the substitution.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
HP	RF Communications Test Set	8920A	00 247	2016-08-10	2017-08-10
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-06-16	2017-06-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2016-05-23	2017-05-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-05-23	2017-05-22
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable (below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable (below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable (above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09
N/A	RF Attenuator	20dB	N/A	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (Chengdu) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

Temperature:	23.9°C
Relative Humidity:	41%
ATM Pressure:	102.3 kPa

-The testing was performed by Kevin Hu on 2017-01-22.

Test Mode: Transmitting

Conducted Output Power:

Mode	Frequency	Conducted Output Power(W)	
	(MHz)	High	Low
FM	462.550	1.790	0.513
FM	462.625	1.786	0.517
FM	462.725	1.773	0.509

Note: The rated high output power is 1.8 W and low power is 0.5 W

ERP:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
Frequency: 462.625 **MHz**								
462.625	H	90.52	8.3	0.0	0.4	7.9	37.0	29.1
462.625	V	108.84	28.7	0.0	0.4	28.3	37.0	8.7

Test Result: Compliance.

FCC §2.1047 & §95.637(a) - MODULATION CHARACTERISTIC

Applicable Standard

Per FCC §2.1047 and §95.637(a): A GMRS transmitter that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 5 kHz. A FRS unit that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 2.5 kHz, and the audio frequency response must not exceed 3.125 kHz .

Each GMRS transmitter, except a mobile station transmitter with a power output of 2.5 W or less, must automatically prevent a greater than normal audio level from causing over-modulation. The transmitter also must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of § 95.631 (without filtering.) The filter must be between the modulation limiter and the modulated stage of the transmitter. At any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least 60 log 10 (f/3) dB greater than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 kHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	RF Communications Test Set	8920A	00 247	2016-08-10	2017-08-09
LEADER	Millivoltmeter	LMV-181A	601561	2016-08-10	2017-08-09
N/A	RF Attenuator	20dB	N/A	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (Chengdu) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

Test Method: TIA/EIA-603-D

Test Data

Environmental Conditions

Temperature:	23.9 °C
Relative Humidity:	41%
ATM Pressure:	102.3kPa

The testing was performed by Kevin Hu on 2017-01-22.

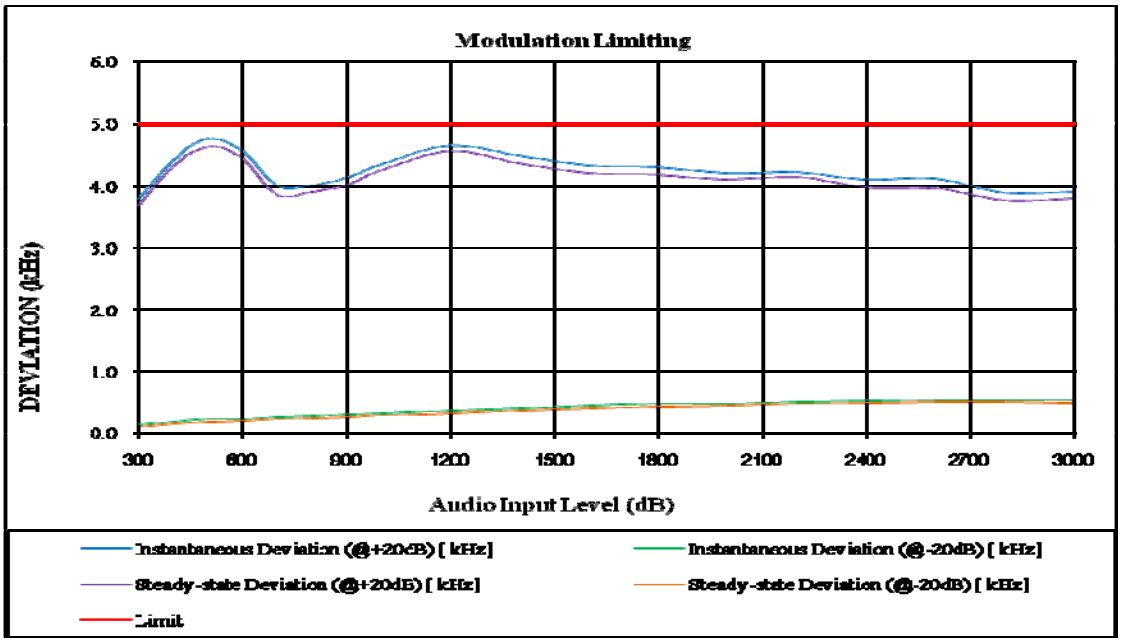
Please refer to the following tables and plots.

Test Mode: Transmitting

MODULATION LIMITING

462.625 MHz

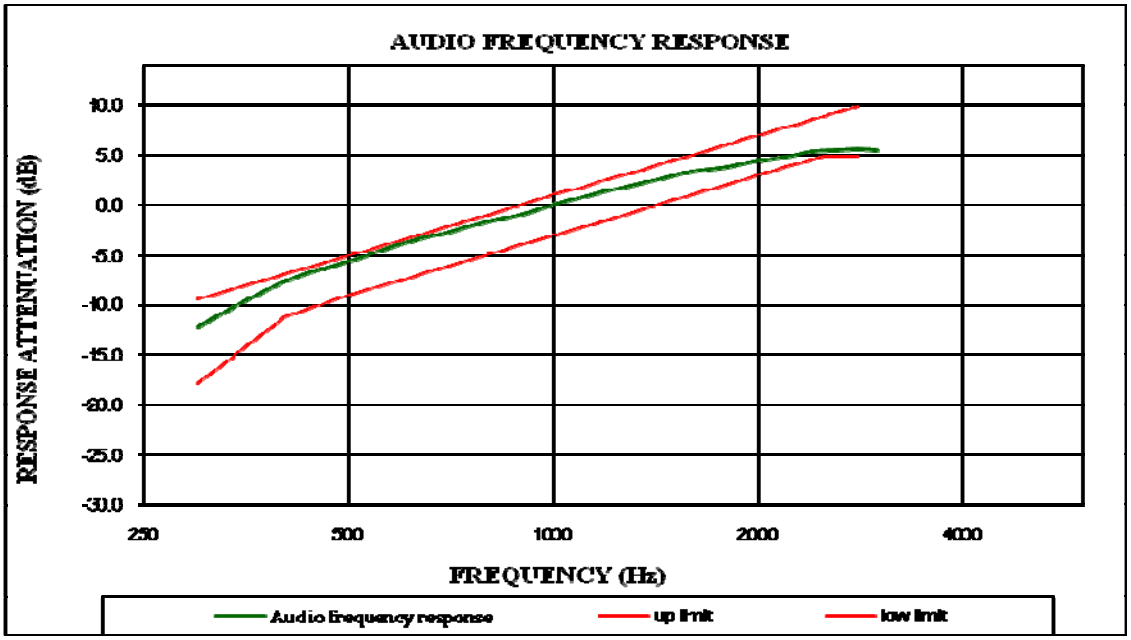
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit [kHz]
	Deviation (@+20dB) [kHz]	Deviation (@-20dB) [kHz]	Deviation (@+20dB) [kHz]	Deviation (@-20dB) [kHz]	
300	3.768	0.136	3.656	0.105	5
400	4.424	0.188	4.332	0.156	5
500	4.776	0.227	4.646	0.183	5
600	4.579	0.238	4.454	0.204	5
700	4.022	0.258	3.863	0.226	5
800	4.025	0.286	3.906	0.255	5
900	4.137	0.308	4.023	0.264	5
1000	4.356	0.329	4.264	0.295	5
1200	4.664	0.366	4.576	0.325	5
1400	4.498	0.409	4.377	0.376	5
1600	4.344	0.454	4.217	0.403	5
1800	4.317	0.478	4.195	0.436	5
2000	4.223	0.486	4.113	0.455	5
2200	4.235	0.513	4.154	0.478	5
2400	4.107	0.528	3.988	0.496	5
2600	4.126	0.543	3.968	0.506	5
2800	3.893	0.547	3.766	0.516	5
3000	3.915	0.536	3.796	0.493	5



Audio Frequency Response

462.625 MHz

Audio Frequency (Hz)	Response Attenuation (dB)
300	-12.21
400	-7.75
500	-5.63
600	-3.82
700	-2.65
800	-1.63
900	-0.94
1000	0.00
1200	1.41
1400	2.43
1600	3.37
1800	3.85
2000	4.46
2200	4.82
2400	5.36
2600	5.48
2800	5.56
3000	5.49



FCC §2.1049 & §95.633(a) - AUTHOURIZED BANDWIDTH AND EMISSION MASK

Applicable Standard

According to §95.633

(a) The *authorized bandwidth* (maximum permissible bandwidth of a transmission) for emission type H1D, J1D, R1D, H3E, J3E or R3E is 4 kHz. The authorized bandwidth for emission type A1D or A3E is 8 kHz. The authorized bandwidth for emission type F1D, G1D, F3E or G3E is 20 kHz.

The power of each unwanted emission shall be less than TP as specified in the applicable paragraphs listed in the following :

1) At least 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 100% of the authorized bandwidth.

2) At least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100% up to and including 250% of the authorized bandwidth.

3) At least $43 + 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

Test Procedure

TIA-603-D, section 2.2.11

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
HP	RF Communications Test Set	8920A	00 247	2016-08-10	2017-08-09
N/A	RF Attenuator	20dB	N/A	Each Time	/
N/A	RF Attenuator	20dB	N/A	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (Chengdu) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

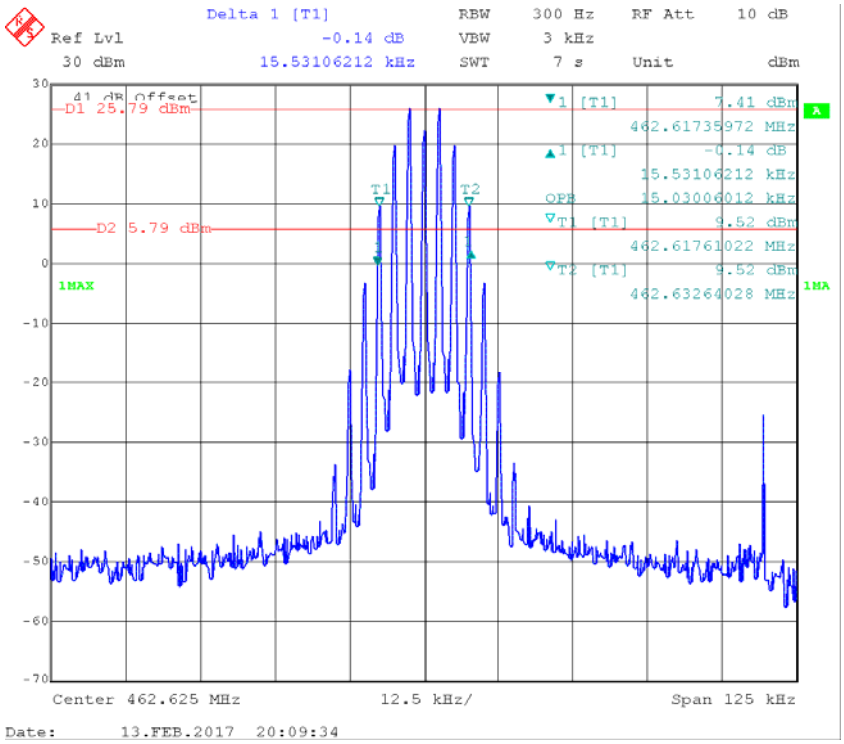
Temperature:	23.7 ℃
Relative Humidity:	37%
ATM Pressure:	102.1kPa

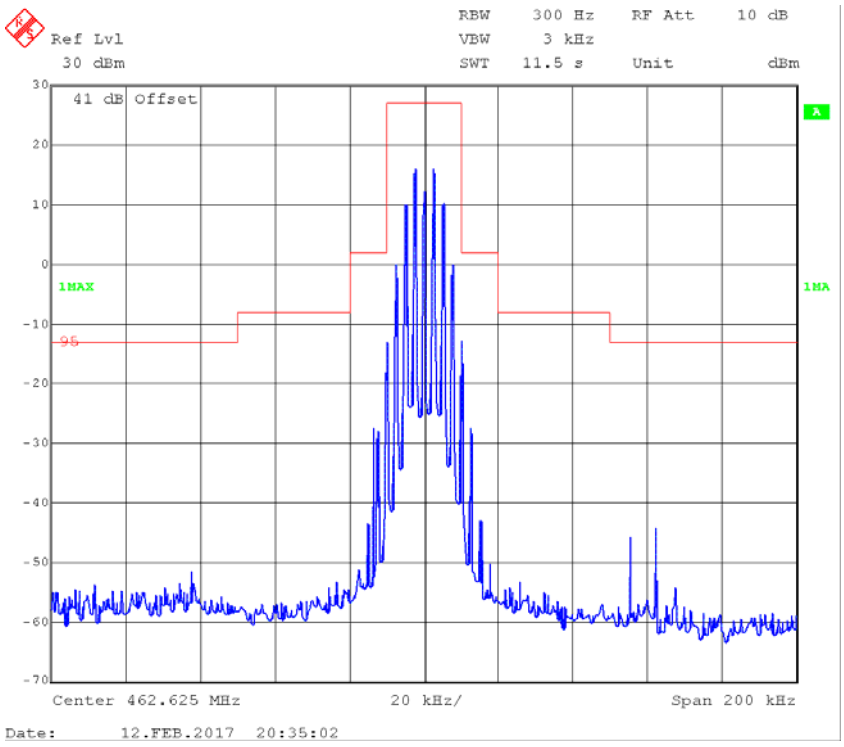
The testing was performed by Kevin Hu on 2017-02-12.

Test Mode: Transmitting

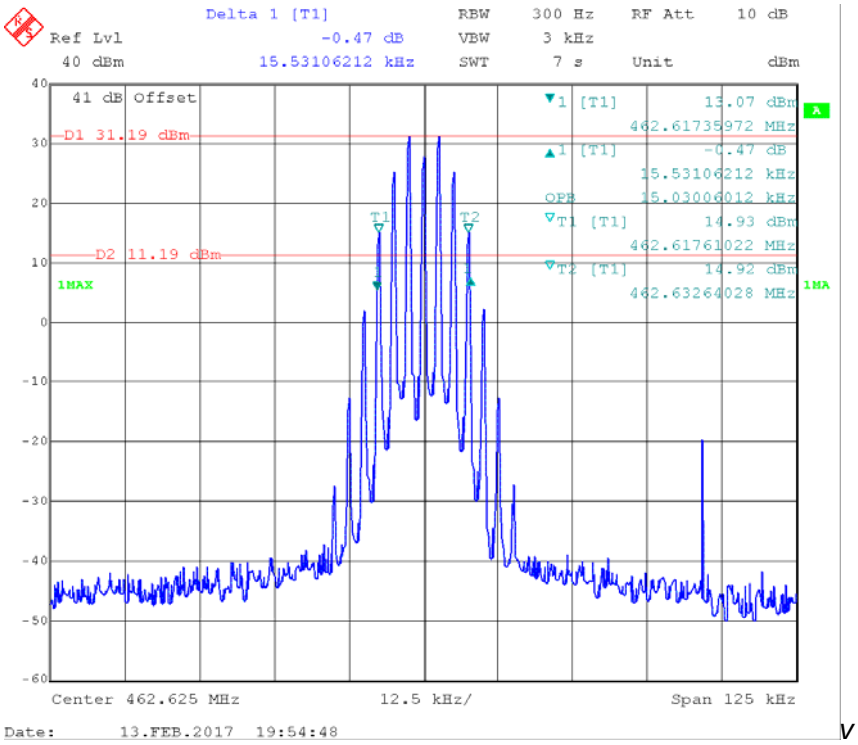
Modulation Mode	fc	High Power		Low Power	
		99% Occupied Bandwidth	20 dB Bandwidth	99% Occupied Bandwidth	20 dB Bandwidth
	MHz	kHz	kHz	kHz	kHz
FM	462.625	15.030	15.310	15.030	15.310

462.625 MHz-Low Power





462.625 MHz-High Power



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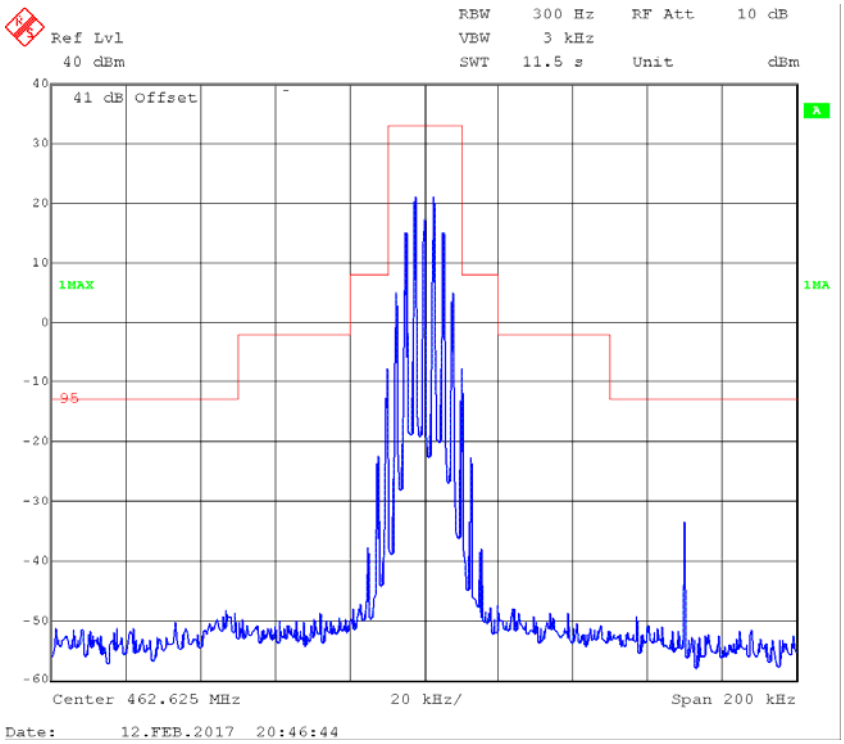
RBW 300 Hz
RF Att 10 dB
VBW 3 kHz
Ref Lvl
40 dBm
SWT 11.5 s
Unit dBm
41 dB Offset
1MAX
1MA
95
Center 462.625 MHz
20 kHz/
Span 200 kHz
Date: 12.FEB.2017 20:46:44

FCC §2.1053 & §95.635 - RADIATED SPURIOUS EMISSION

Applicable Standard

FCC §2.1053 and §95.635

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

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 .The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =10 1g (TXpwr in Watts/0.001)-the absolute level
Spurious attenuation limit in dB = 43+10 Log_{10} (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A101808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-0113024	2014-6-16	2017-6-15
EMCO	Adjustable Dipole Antenna	3121C	9109-258	N/A	N/A
HP	Signal Generator	8648C	3623A04150	2016-5-23	2017-5-22
WILTRON	SWEPT FREQUENCY SYNTHESIZER	6737	213001	2016-5-23	2017-5-22
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
EMCT	Semi-Anechoic Chamber	966	N/A	2015-04-24	2018-04-23
N/A	RF Cable(below 1GHz)	NO.1	N/A	2016-11-10	2017-11-09
N/A	RF Cable(below 1GHz)	NO.4	N/A	2016-11-10	2017-11-09
N/A	RF Cable(above 1GHz)	NO.2	N/A	2016-11-10	2017-11-09

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Chengdu) attests that all calibrations have been performed in accordance to requirements, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	23.9 ℃
Relative Humidity:	41%
ATM Pressure:	102.3kPa

The testing was performed by Kevin Hu on 2017-01-22.

Test Mode: Transmitting

30MHz-5GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			S.G. Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
frequency:462.625**MHz**								
925.250	H	48.75	-25	0.0	1	-26.0	-13.0	13.0
925.250	V	55.31	-15.1	0.0	1	-16.1	-13.0	3.1
4626.250	H	47.84	-44.9	14.3	2.8	-33.4	-13.0	20.4
4626.250	V	49.40	-44	14.3	2.8	-32.5	-13.0	19.5

FCC§2.1055 (d)& §95.621 - FREQUENCY STABILITY

Applicable Standard

According to FCC §2.1055(a) (1), the frequency stability shall be measured with variation of ambient temperature from –30 ºC to +50 ºC, and according to FCC 2.1055(d) (2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC §95.621, Each GMRS transmitter for mobile station, small base station and control station operation must be maintained within a frequency tolerance of 0.0005 %(5 ppm).

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 a Frequency Counter 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 Frequency Counter.

Frequency Stability vs. Voltage:

1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

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

The output frequency was recorded for each voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
BACL	High Temperature Test Chamber	BTH-150	30024	2016-12-2	2017-12-1
FLUKE	Multimeter	1587	27870099	2016-12-30	2017-12-29
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
N/A	RF Attenuator	20dB	N/A	Each Time	/

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (Chengdu) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data

Environmental Conditions

Temperature:	23.9℃
Relative Humidity:	41%
ATM Pressure:	102.3 kPa

The testing was performed by Kevin Hu on 2017-01-22.

Test Mode: Transmitting

Reference Frequency: 462.625 MHz				
Temerature	**Voltage**	**Reading**	**Frequency Error**	**Limit**
℃	**Vdc**	**MHz**	**ppm**	**ppm**
-30	3.7	462.625112	0.24	5
-20		462.625121	0.26	
-10		462.625111	0.24	
0		462.625112	0.24	
10		462.625130	0.28	
20		462.625180	0.39	
30		462.625113	0.24	
40		462.625121	0.26	
50		462.625109	0.24	
60		462.625123	0.27	
25	3.1	462.625119	0.26	
25	4.3	462.625116	0.25	

Note:The extreme low voltage was declared by applicant.

******* END OF REPORT *******