FCC PART 95

MEASUREMENT AND TEST REPORT

For

Powerwerx, Inc.

23695 Via Del Rio Yorba Linda CA 92887,USA

FCC ID: 2ACK8TR505

Report Type:	**Product Type:**
Original Report	Two-way Radio

Test Engineer:	Simon Wang
Report Number:	RSZ141128553-00
Report Date:	2014-12-24
Reviewed By:	Jimmy Xiao RF Engineer
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Powerwerx, Inc.* 's product, model number: *TR-505 (FCC ID: 2ACK8TR505)* or the "EUT" in this report was a *Two-way Radio* , which was measured approximately: 5.8 cm (L) x 4.1cm (W) x 17.6 cm (H), rated input voltage: DC 7.4 V battery.

** All measurement and test data in this report was gathered from production sample serial number: 1411032 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2014-11-28.*

Objective

This report is prepared on behalf of *Powerwerx, Inc.*in accordance with Part 2 and Part 95, Subpart A & Subpart B & 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, B 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. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. 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

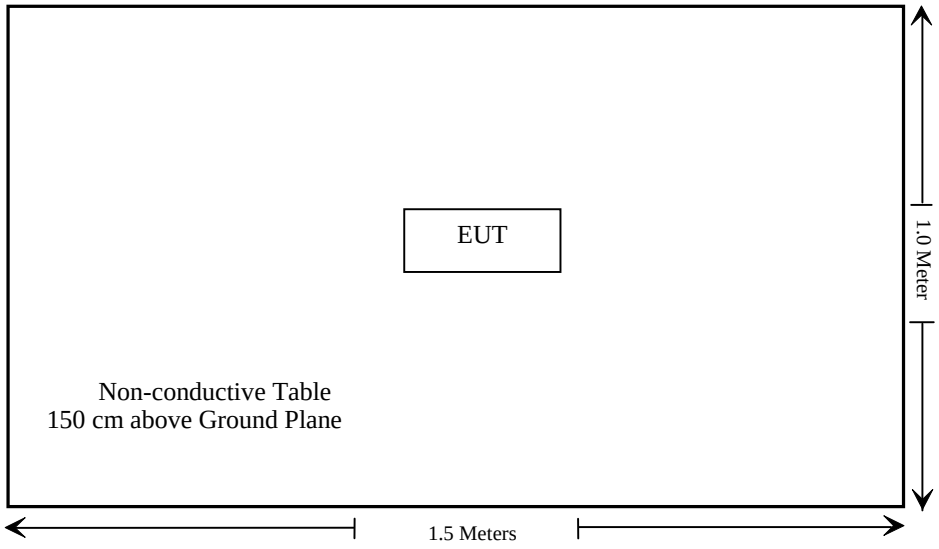
Description of Test Configuration

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, §95.639(a), §95.639(d)	RF Output Power	Compliance
§2.1047, §95.637(a)	Modulation Characteristic	Compliance
§2.1049, §95.633(a) (c)	Authorized Bandwidth & Emission Mask	Compliance
§2.1053, §95.635(b) (7)	Spurious Radiated Emissions	Compliance
§2.1055(d), §95.626(b), §95.621	Frequency Stability	Compliance

FCC §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

Please refer to SAR Report Number: RSZ141128553-20

FCC §2.1046, §95.639(a) & §95.639(d) - RF OUTPUT POWER

Applicable Standard

Per FCC §2.1046, §95.639(a) and §95.639(d), No FRS Unit, under any condition of modulation, shall exceed a 0.5 W effective radiated power (ERP).

Per FCC §95.639 (a) (1), No GMRS transmitter, under any condition of modulation, shall exceed 50 W Carrier power when transmitting emission type A1D, F1D, G1D, A3E, F3E or G3E.

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 NO.	Serial NO.	Calibration Date	Calibration Due Date
HP	Signal Generator	8648C	3426A01345	2014-06-09	2015-06-09
HP	Amplifier	8447E	1937A01046	2014-05-06	2015-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2014-11-03	2015-11-03
Sunol Sciences	Broadband Antenna	JB3	A111513	2014-6-18	2017-6-17
Com Power	Dipole Antenna	AD-100	041000	NCR	NCR

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

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

The testing was performed by Simon Wang on 2014-12-19.

Test Mode: Transmitting

Indicated		Table Angle Degree	Test Ant.		Substituted			Absolute Level (dBm)	FCC Part 95	
Frequency (MHz)	S.A. Reading (dBµV)		Height (m)	Polar (H/V)	S.G. Level (dBm)	Ant. Gain (dBd)	Cable Loss (dB)		ERP (Watt)	Limit (Watt)
GMRS Channel (462.625MHz)										
462.625	101.78	184	1.4	H	30.8	0	0.47	30.33	1.08	50
462.625	101.41	353	1.5	V	30.1	0	0.47	29.63	0.92	50
GMRS Channel (467.625MHz)										
467.625	101.17	184	1.4	H	30.2	0	0.47	29.73	0.94	50
467.625	102.28	353	1.5	V	30.9	0	0.47	30.43	1.10	50

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 No.	Serial No.	Calibration Date	Calibration Due Date
HP	RF Communication Test Set	HP8920A	3438A05201	2014-06-03	2015-06-03

*** Statement of Traceability:** Bay Area Compliance Lab Corp. (ShenZhen) 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:	24 °C
Relative Humidity:	50 %
ATM Pressure:	100.0 kPa

The testing was performed by Simon Wang on 2014-12-19.

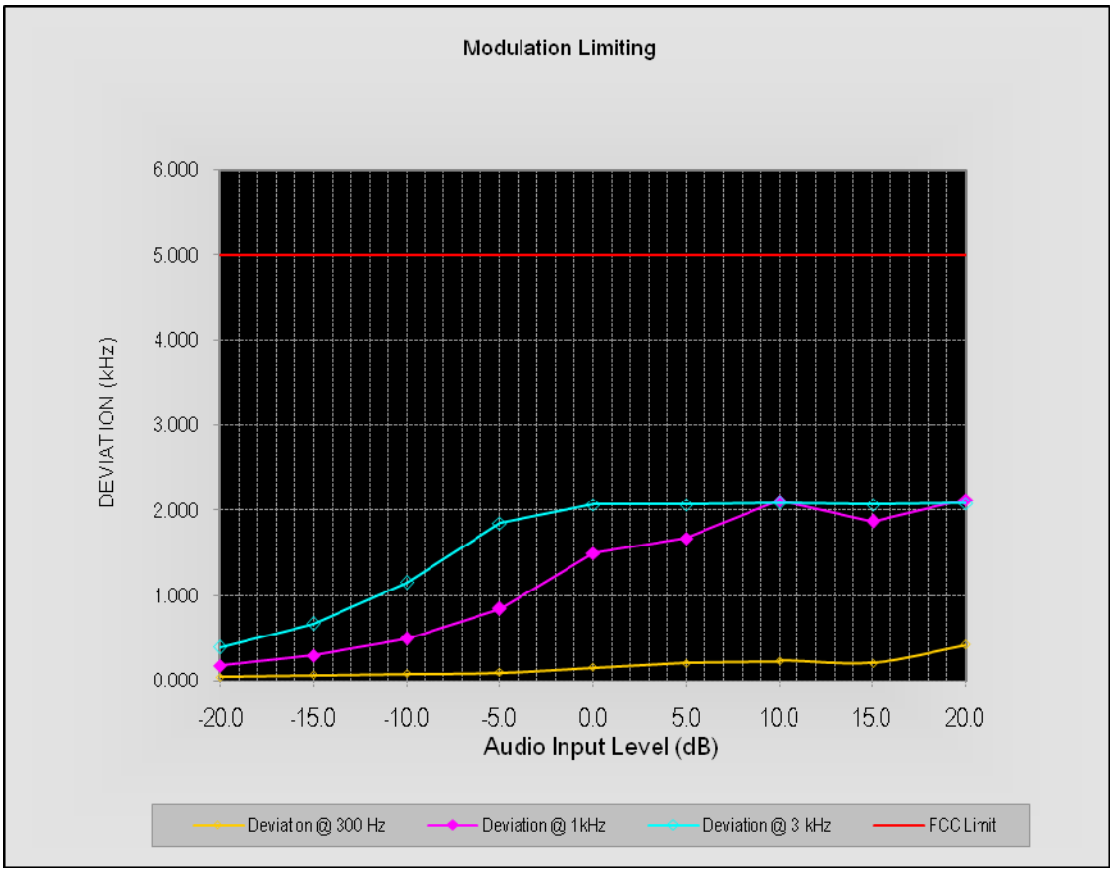
Please refer to the following tables and plots.

Test Mode: Transmitting

MODULATION LIMITING

GMRS (462.625 MHz)

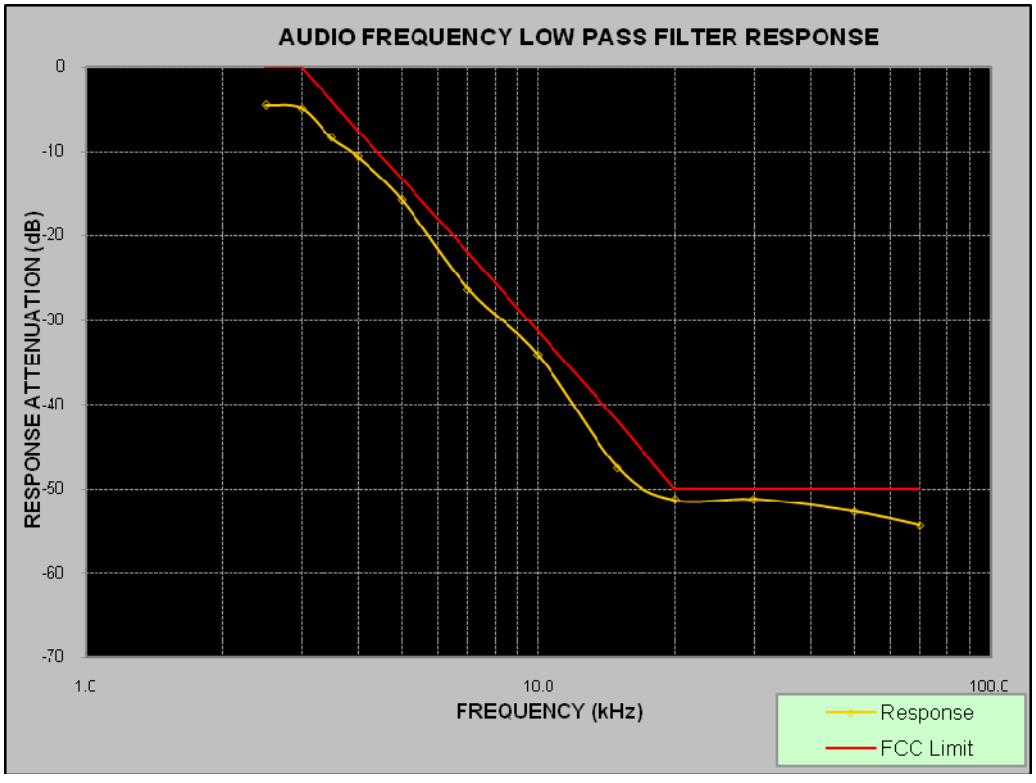
Audio Input Level (dB)	Frequency Deviation (kHz)			FCC Limit (kHz)
	(@ 300 Hz)	(@ 1000 Hz)	(@ 3000 Hz)	
20.0	0.425	2.132	2.087	5.0
15.0	0.217	1.873	2.072	5.0
10.0	0.239	2.115	2.093	5.0
5.0	0.211	1.678	2.071	5.0
0.0	0.165	1.500	2.074	5.0
-5.0	0.104	0.850	1.853	5.0
-10.0	0.092	0.501	1.155	5.0
-15.0	0.075	0.299	0.672	5.0
-20.0	0.055	0.185	0.396	5.0



Audio frequency Low Pass Filter Response

GMRS (462.625 MHz)

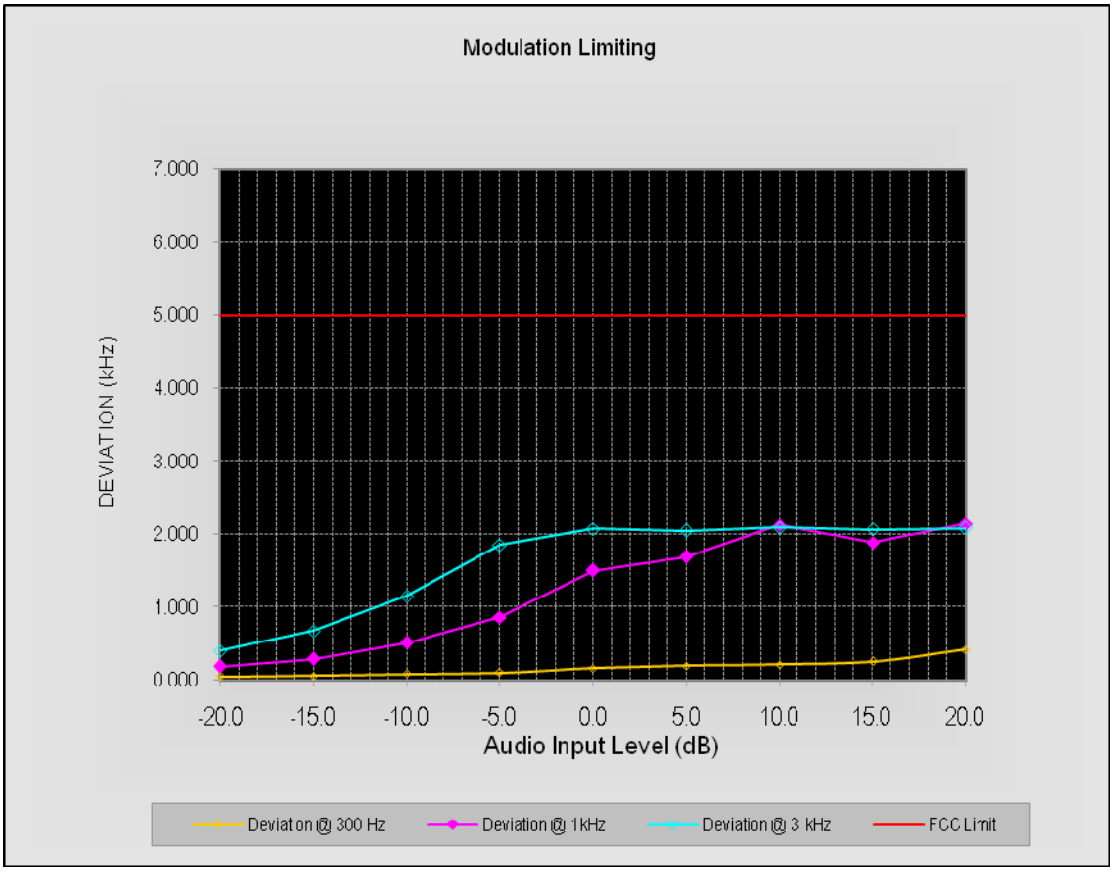
Audio Frequency (kHz)	Response Attenuation (dB)	FCC Limit (dB)
2.5	-4.56	0.0
3.0	-4.91	0.0
3.5	-8.35	-4.0
4.0	-10.62	-7.5
5.0	-15.79	-13.3
7.0	-26.33	-22.1
10.0	-34.12	-31.4
15.0	-47.54	-42.0
20.0	-51.33	-50.0
30.0	-51.21	-50.0
50.0	-52.69	-50.0
70.0	-54.33	-50.0



MODULATION LIMITING

GMRS (467.625 MHz)

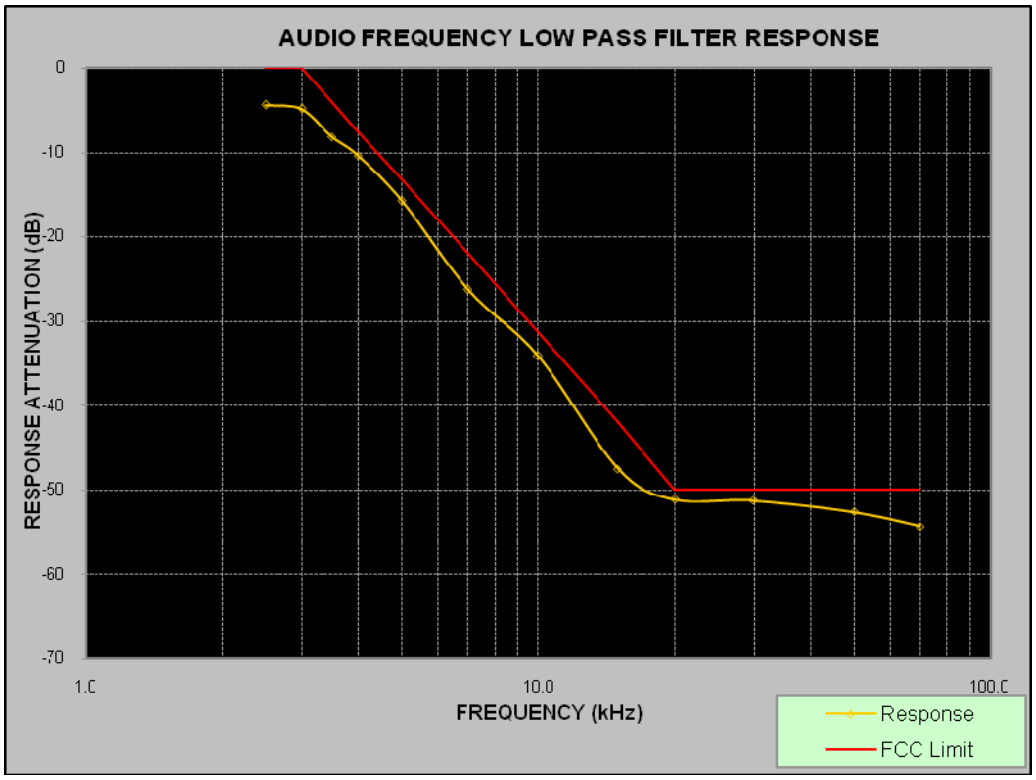
Audio Input Level (dB)	Frequency Deviation (kHz)			FCC Limit (kHz)
	(@ 300 Hz)	(@ 1000 Hz)	(@ 3000 Hz)	
20.0	0.419	2.140	2.084	5.0
15.0	0.256	1.885	2.069	5.0
10.0	0.212	2.126	2.095	5.0
5.0	0.201	1.693	2.050	5.0
0.0	0.166	1.500	2.073	5.0
-5.0	0.107	0.861	1.855	5.0
-10.0	0.089	0.512	1.157	5.0
-15.0	0.063	0.290	0.675	5.0
-20.0	0.052	0.189	0.399	5.0



Audio frequency Low Pass Filter Response

GMRS (467.625 MHz)

Audio Frequency (kHz)	Response Attenuation (dB)	FCC Limit (dB)
2.5	-4.38	0.0
3.0	-4.85	0.0
3.5	-8.14	-4.0
4.0	-10.4	-7.5
5.0	-15.81	-13.3
7.0	-26.29	-22.1
10.0	-34.14	-31.4
15.0	-47.53	-42.0
20.0	-51.17	-50.0
30.0	-51.28	-50.0
50.0	-52.62	-50.0
70.0	-54.35	-50.0



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

Applicable Standard

According to §95.633(c) , the authorized bandwidth for emission type F3E or F2D transmitted by a FRS unit is 12.5 kHz. The authorized bandwidth for emission type F1D, G1D, F3E or G3E is 20kHz.

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
HP	RF Communication Test Set	HP8920A	3438A05201	2014-06-03	2015-06-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	837405/023	2014-08-22	2015-08-22

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

Test Data

Environmental Conditions

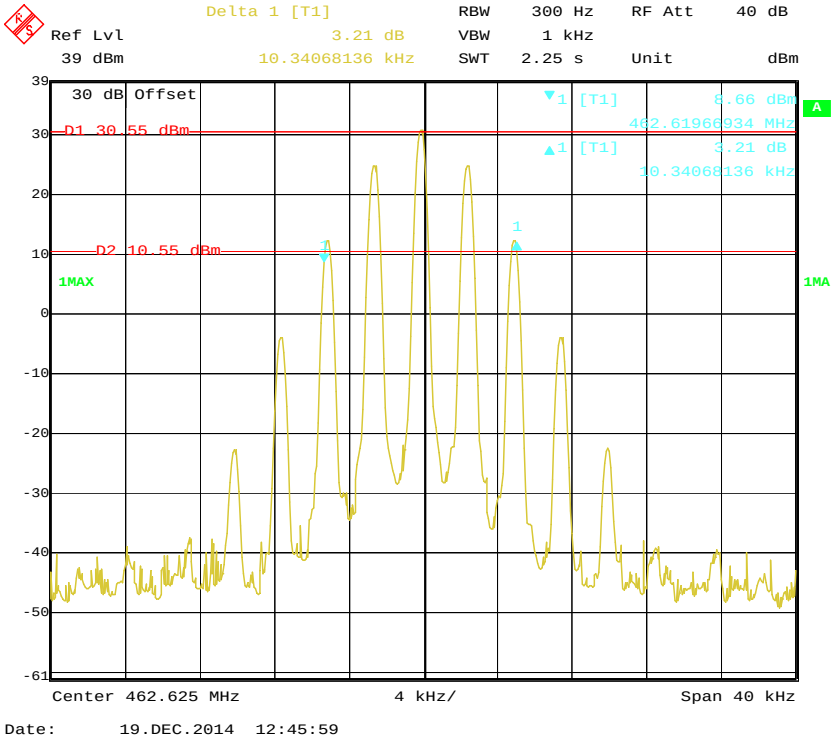
Temperature:	26 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2014-12-19.

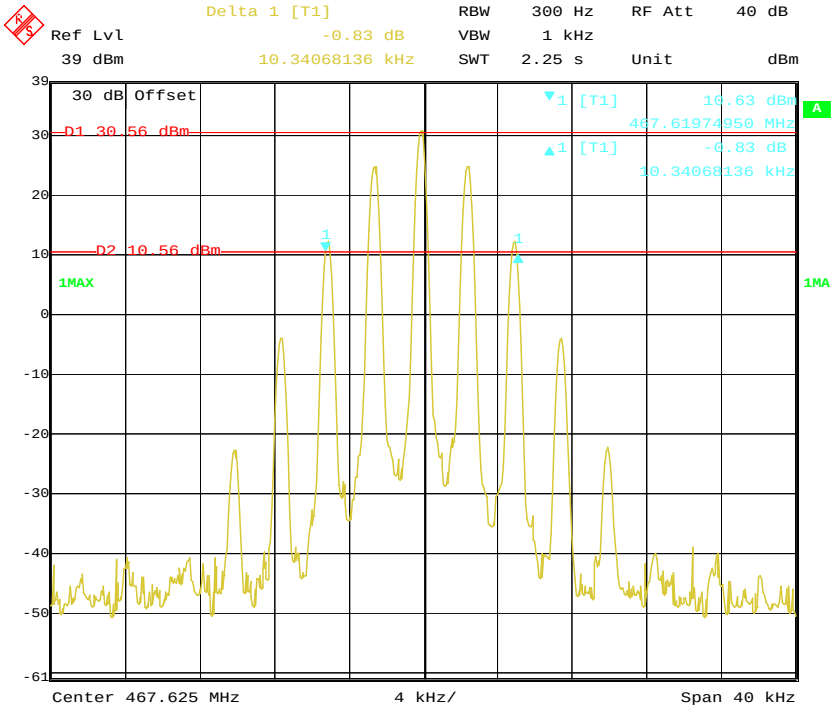
Test Mode: Transmitting

Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
462.625	10.34	20	Pass
467.625	10.34	20	Pass

GMRS (462.625 MHz)

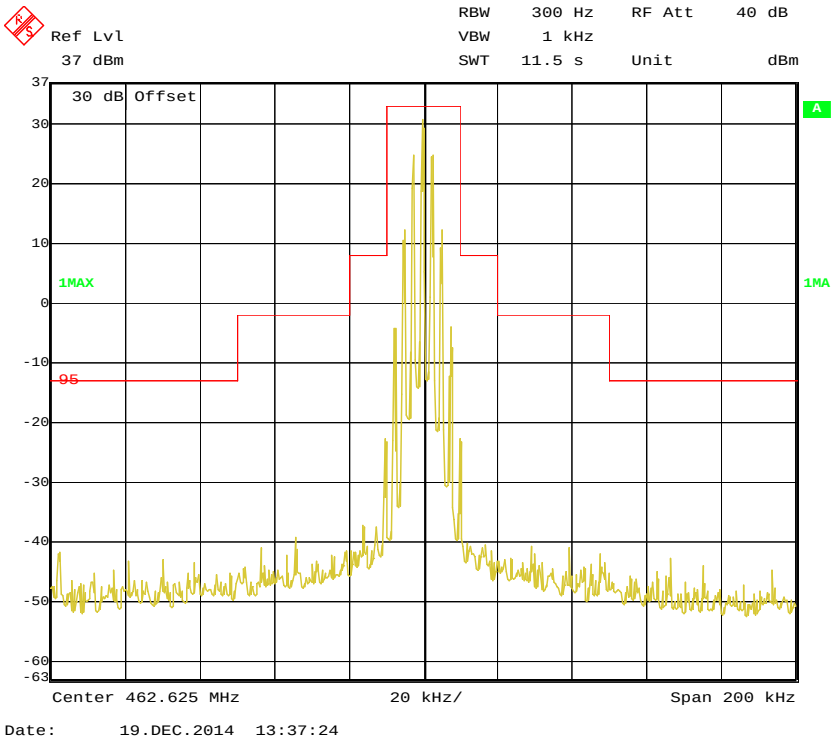


GMRS (467.625 MHz)

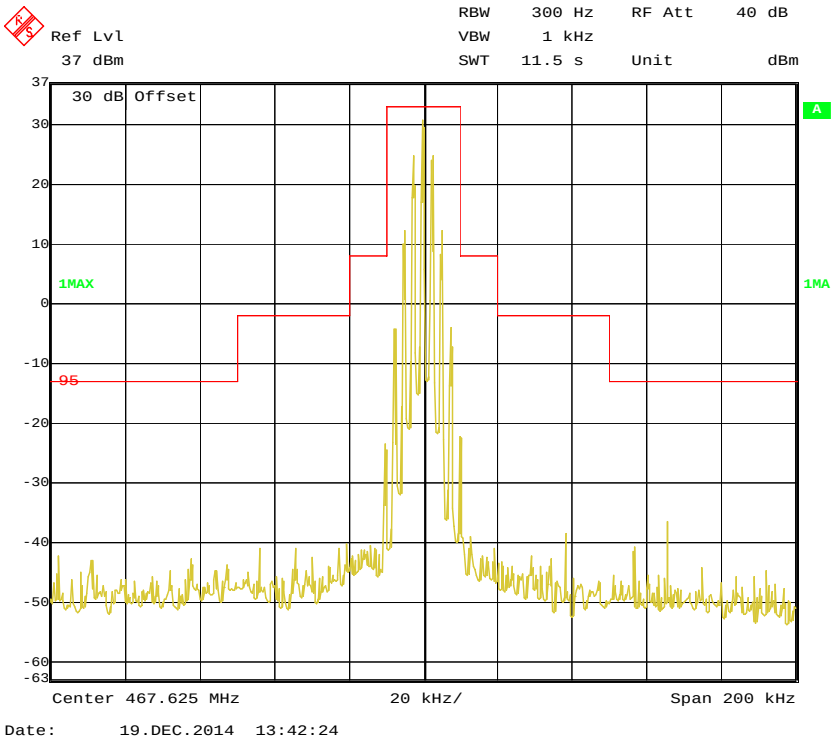


Emission Mask

GMRS (462.625 MHz)



GMRS (467.625 MHz)



FCC §2.1053 & §95.635(b) (7) - 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
HP	Amplifier	8447E	1937A01046	2014-05-06	2015-05-06
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2014-11-03	2015-11-03
Sunol Sciences	Broadband Antenna	JB3	A111513	2014-6-18	2017-6-17
Mini	Amplifier	ZVA-183-S+	5969001149	2014-04-03	2015-04-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	837405/023	2014-08-22	2015-08-22
A.H. System	Horn Antenna	SAS-200/571	135	2012-02-11	2015-02-10

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) 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:	26 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2014-12-19.

Test Mode: Transmitting

GMRS (462.625MHz)

Indicated		Table Angle Degree	Test Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Receiver Reading (dBuV)		Height (m)	Polar (H/V)	Level (dBm)	Antenna Gain	Cable Loss (dB)			
925.25	49.67	173	1.0	H	-47.3	0.70	0	-48.00	-13	35.00
925.25	53.43	146	2.1	V	-43.6	0.70	0	-44.30	-13	31.30
1387.88	66.61	108	1.5	H	-32.8	1.20	6.40	-27.60	-13	14.60
1387.88	61.96	285	2.3	V	-38.4	1.20	6.40	-33.20	-13	20.20
1850.50	46.47	283	2.1	H	-50.2	1.40	7.30	-44.30	-13	31.30
1850.50	46.60	226	1.3	V	-48.5	1.40	7.30	-42.60	-13	29.60
2313.13	51.23	29	2.5	H	-46.6	1.30	8.30	-39.60	-13	26.60
2313.13	48.03	257	1.9	V	-48.6	1.30	8.30	-41.60	-13	28.60

GMRS (467.625 MHz)

Indicated		Table Angle Degree	Test Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Receiver Reading (dBuV)		Height (m)	Polar (H/V)	Level (dBm)	Antenna Gain	Cable Loss (dB)			
925.25	50.29	356	2.1	H	-46.7	0.70	0	-47.40	-13	34.40
925.25	52.85	191	2.4	V	-44.1	0.70	0	-44.80	-13	31.80
1402.88	53.98	337	1.1	H	-45.5	1.20	6.40	-40.30	-13	27.30
1402.88	47.55	67	1.7	V	-52.8	1.20	6.40	-47.60	-13	34.60
1870.50	60.23	34	1.3	H	-36.5	1.40	7.30	-30.60	-13	17.60
1870.50	65.23	352	2.0	V	-29.9	1.40	7.30	-24.00	-13	11.00

FCC§2.1055 (d), §95.626(b) & §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 §95.626(b), Each FRS Unit must be maintained within a frequency tolerance of 0.00025 %(2.5 ppm).

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 NO.	Serial NO.	Calibration Date	Calibration Due Date
Hewlett-Packard	Frequency Counter	5343A	2232A00827	2013-05-09	2016-05-08
WUHUAN	Temperature & Humidity Chamber	HTP205	20021115	NCR	NCR

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

Test Data

Environmental Conditions

Temperature:	26℃
Relative Humidity:	52%
ATM Pressure:	101.0 kPa

The testing was performed by Simon Wang on 2014-12-19.

Test Mode: Transmitting

GMRS

Reference Frequency: 462.625 MHz, Limit: ±5 ppm			
Environment Temperature (℃)	**Power Supplied (V_{DC})**	**Measurement Frequency (MHz)**	**Frequency Error (ppm)**
Frequency Stability Ver. Temperature			
50	7.4	462.624777	-0.482
40	7.4	462.624781	-0.473
30	7.4	462.624779	-0.478
20	7.4	462.624785	-0.465
10	7.4	462.624786	-0.463
0	7.4	462.624789	-0.456
-10	7.4	462.624790	-0.454
-20	7.4	462.624784	-0.467
-30	7.4	462.624792	-0.450
Frequency Stability Ver. Input Voltage			
20	6.6	462.624791	-0.452

GMRS

Reference Frequency: 467.625 MHz, Limit: ±5 ppm			
Environment Temperature (℃)	**Power Supplied (V_{DC})**	**Measurement Frequency (MHz)**	**Frequency Error (ppm)**
Frequency Stability Ver. Temperature			
50	7.4	467.624760	-0.513
40	7.4	467.624767	-0.498
30	7.4	467.624771	-0.490
20	7.4	467.624780	-0.470
10	7.4	467.624776	-0.479
0	7.4	467.624781	-0.468
-10	7.4	467.624765	-0.503
-20	7.4	467.624775	-0.481
-30	7.4	467.624779	-0.473
Frequency Stability Ver. Input Voltage			
20	6.6	467.624785	-0.460

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