FCC Part 95
Measurement and Test Report

For

Quanzhou Wouxun Electronics Co., Ltd.

No.928 Nanhuan Road, Jiangnan High Technology Industry Park, Quanzhou,

Fujian, China

FCC ID: WVTWOUXUN08

Test Standards:	FCC Part 95
Product Description:	TWO-WAY RADIO
Tested Model:	KG-833
Report No.:	STR12038361I
Tested Date:	2012-06-05 to 2012-07-03
Issued Date:	2012-07-04
Tested By:	Seven Song / Engineer
Reviewed By:	Lahm Peng / EMC Manager
Approved & Authorized By:	Jandy so / PSQ Manager

Prepared By:

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Quanzhou Wouxun Electronics Co., Ltd.
Address of applicant:	No.928 Nanhuan Road, Jiangnan High Technology Industry Park, Quanzhou, Fujian, China
Manufacturer:	Quanzhou Wouxun Electronics Co., Ltd.
Address of manufacturer:	No.928 Nanhuan Road, Jiangnan High Technology Industry Park, Quanzhou, Fujian, China

General Description of EUT	
Product Name:	TWO-WAY RADIO
Trade Name:	WOUXUN
Model No.:	KG-833
Adding Model(s):	KG-639E, GU-16, KG-659E, KG-703, KG-699E, KG-679E, KG-689E, KG-699E, KG-801E, KG-805
Rated Voltage:	DC 7.4V Battery
Power Adapter Model:	1A31KG-2
Note: The test data is gathered from a production sample, provided by the manufacturer. The other model listed in the report has different appearance only of KG-833 without circuit and electronic construction changed, declared by the manufacturer	

Technical Characteristics of EUT	
Frequency Range:	462.5500-462.7250MHz 467.5500-467.7250MHz
Rated Output Power:	1 W
Modulation:	FM (Analog)
Bandwidth:	Wide Bandwidth 25kHz
Quantity of Channels:	23
Antenna Type:	External Antenna
Device Category:	Portable Device

1.2 Test Standards

The following report is prepared on behalf of the Quanzhou Wouxun Electronics Co., Ltd. in accordance with FCC Part 95, Subpart A, Subpart E, and FCC Part 2 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 95, Subpart A, Subpart E, and FCC Part 2 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 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 and Performance Standards and ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

- **FCC – Registration No.: 994117**
  SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**
  The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Setup and Test Mode

The EUT was operated in continuous transmitting mode that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	462MHz Channel	462.6250MHz
TM2	467MHz Channel	467.6250MHz

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 95.639	RF Output Power	Compliant
§ 95.633	Occupied Bandwidth Emission	Compliant
§ 95.635	Radiated Spurious Emissions	Compliant
§ 95.621, 95.627	Frequency Stability	Compliant
§ 95.637	Modulation Characteristics	Compliant

3. RF OUTPUT POWER

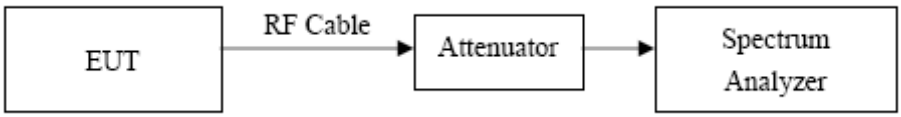
3.1 Standard Applicable

According to FCC Part 95.639 (a), No GMRS transmitter, under and condition of modulation, shall exceed: (1) 50W Carrier power (average TP during one unmodulated RF cycle) when transmitting emission type A1, F1D, G1D, A3E, F3E or G3E.

3.2 Test Equipment List and Detail

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2012-03-28	2013-03-27
Attenuator	ATTEN	ATS100-4-20	/	2012-03-28	2013-03-27

3.3 Test Procedure



a) Connect the equipment as illustrated.

b) Measure the transmitter output power during the defined duty cycle. Correct for all losses in the RF path.

c) The value recorded in step b) is the conducted carrier output power rating.

3.4 Environmental Conditions

Temperature:	22 °C
Relative Humidity:	51%
ATM Pressure:	1012 mbar

3.5 Test Result/Plots

Frequency (MHz)	Collected Voltage (VDC)	Collected Current (A)	Output Power (mW)	Rated Output Power (mW)	Limit (W)	Result
462.6250	7.4	0.581	796.159	1000	50	Pass
467.6250	7.4	0.579	779.830	1000	50	Pass

4. RADIATED OUTPUT POWER (ERP)

4.1 Standard Applicable

According to FCC Part 95.639 (a), No GMRS transmitter, under and condition of modulation, shall exceed: (1) 50W Carrier power (average TP during one unmodulated RF cycle) when transmitting emission type A1, F1D, G1D, A3E, F3E or G3E.

4.2 Test Equipment List and Detail

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24
Signal Generator	Rohde & Schwarz	SMR20	100047	2012-03-28	2013-03-27

4.3 Test Procedure

According to the TIA/EIA-603-D, the following method of measurement shall be used:

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

2. 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.

3. 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 ERP were measured by the substitution.

4. Absolute level = substituted level + Antenna gain – Cable Loss

4.4 Environmental Conditions

Temperature:	22 °C
Relative Humidity:	51%
ATM Pressure:	1012 mbar

4.5 Test Result

Frequency	SG Reading	Height	Table	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 95
MHz	dBm	Meter	Degree	H / V	dB	dB	dBm	W
Test Channel: 462.6250MHz								
462.6250	26.0	1.5	145	H	1.9	0	24.1	50
462.6250	30.5	1.5	115	V	1.9	0	28.6	50
Test Channel: 467.6250MHz								
467.6250	27.2	1.5	270	H	1.9	0	24.3	50
467.6250	30.6	1.5	90	V	1.9	0	28.7	50

5. OCCUPIED BANDWIDTH OF EMISSION

5.1 Standard Applicable

According to FCC Part 95.633 (a), The authorized bandwidth for emission type F1D, G1D, F3E or G3E is 20 kHz.

Per FCC §95.635 (b)(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.

Per FCC §95.635 (b)(3), 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.

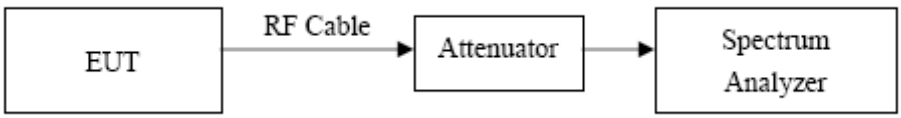
Per FCC §95.635 (b)(7), At least 43 + 10 log10(T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

5.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2012-03-28	2013-03-27
Attenuator	ATTEN	ATS100-4-20	/	2012-03-28	2013-03-27

5.3 Test Procedure

According to Standard TIA-603-D, the method of measurement for occupied bandwidth of emission as follows:



a) The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

b) Turn on the transmitter, and set it to transmit the pulse train continuously.

c) The bandwidth of the carrier with audio modulation signal was measured and recorded.

5.4 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	57 %
ATM Pressure:	1012 mbar

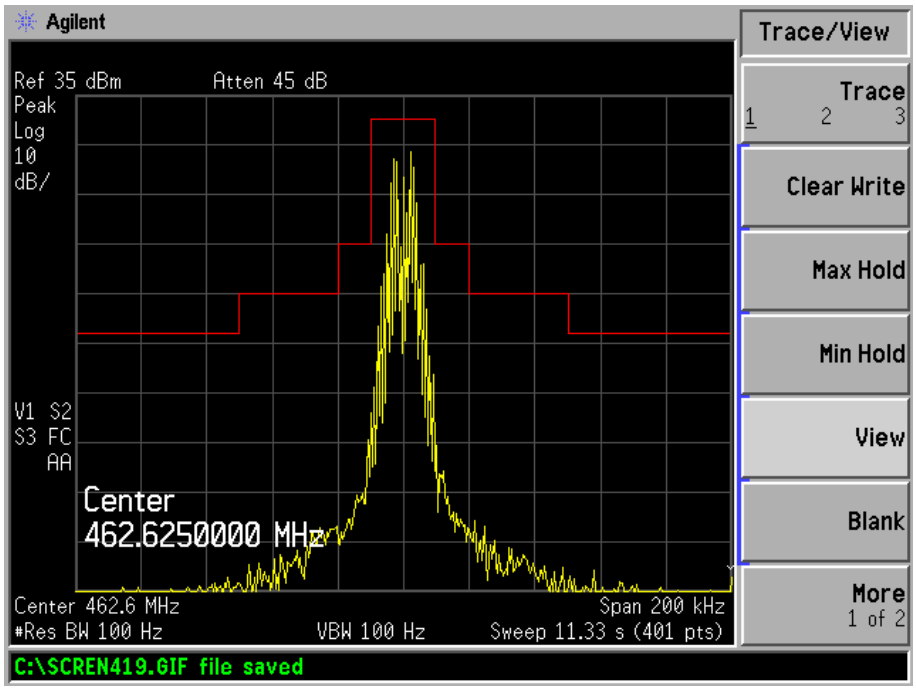
5.5 Test Results/Masks

The occupied Bandwidth Emission of all fall in the Mask, full fit the requirements of the standards.

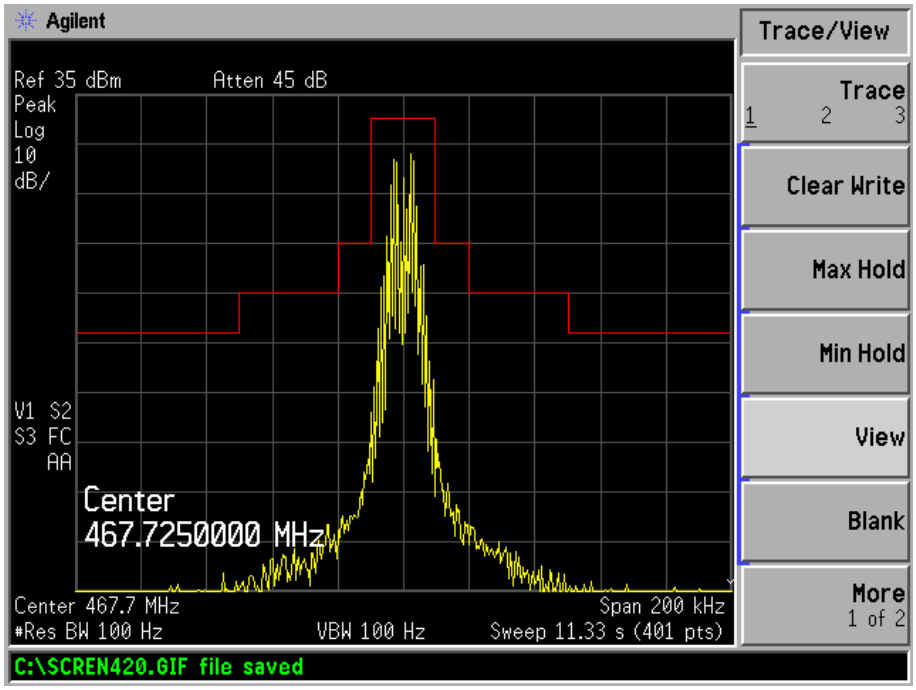
Necessary Bandwidth For Wideband Channel Separation 25 kHz:
K = 1
M = 3 kHz
D = 5 kHz
B_n = 2M + 2DK = 2*3 + 2*5*1 = 16 kHz
Emission Designation=16K0F3E

Please refer to the following test plots:

For GMRS transmitter (462.6250 MHz)



For GMRS transmitter (467.6250 MHz)



6. UNWANTED RADIATED EMISSION

6.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.1 dB.

6.2 Standard Applicable

Per FCC §95.635 (b)(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.

Per FCC §95.635 (b)(3), 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.

Per FCC §95.635 (b)(7), At least 43 + 10 log10(T) dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

6.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2012-02-25	2013-02-24

6.4 Test Procedure

1. The setup of EUT is according with per TIA-603-D measurement procedure.

2. 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.

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

4. 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 attenuation limit in dB = 43+10 Log_{10} (power out in Watts)

6.5 Environmental Conditions

Temperature:	18° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

6.6 Summary of Test Results/Plots

According to the data below, the FCC Part 95 standards, and had the worst margin of:

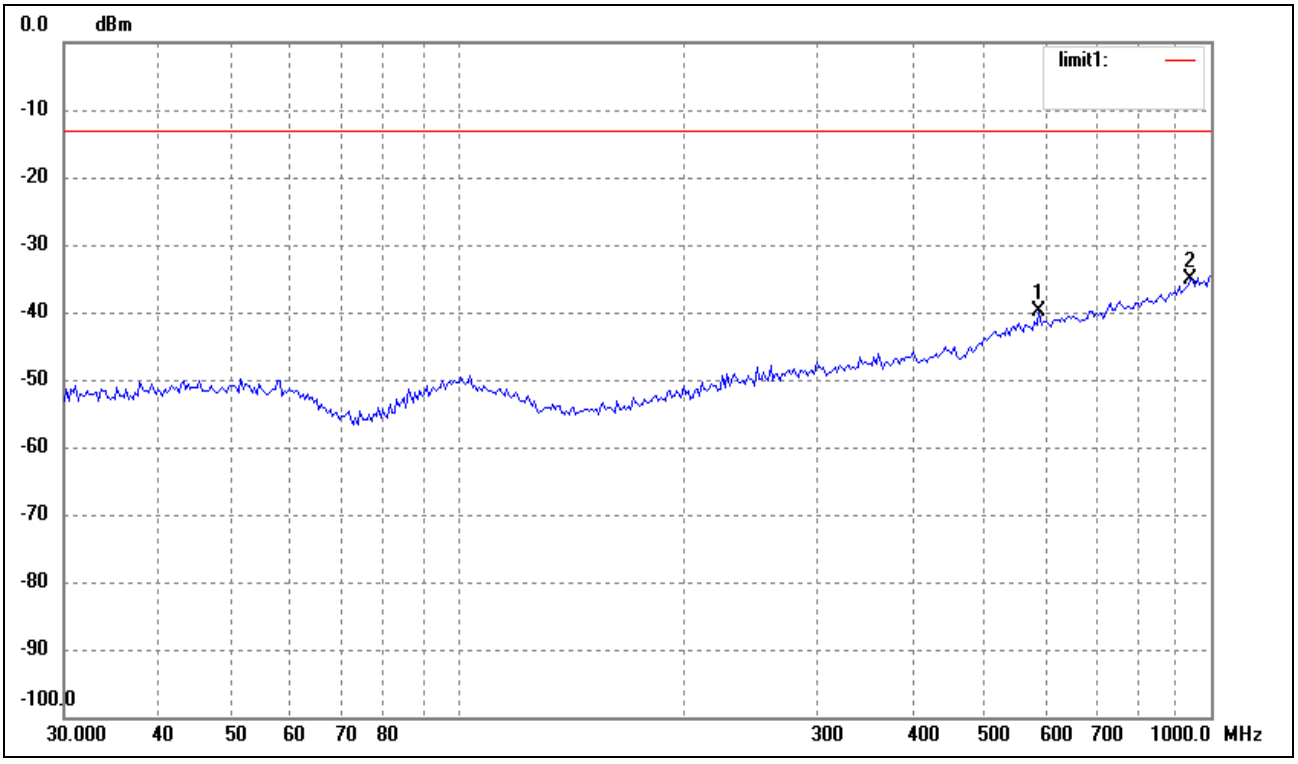
-16.6 dB at **1387.8750 MHz** in the **Vertical** polarization, **9 kHz to 5 GHz**, **3 Meters**

Note: *this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

Plots of the spurious emission for below 1GHz:

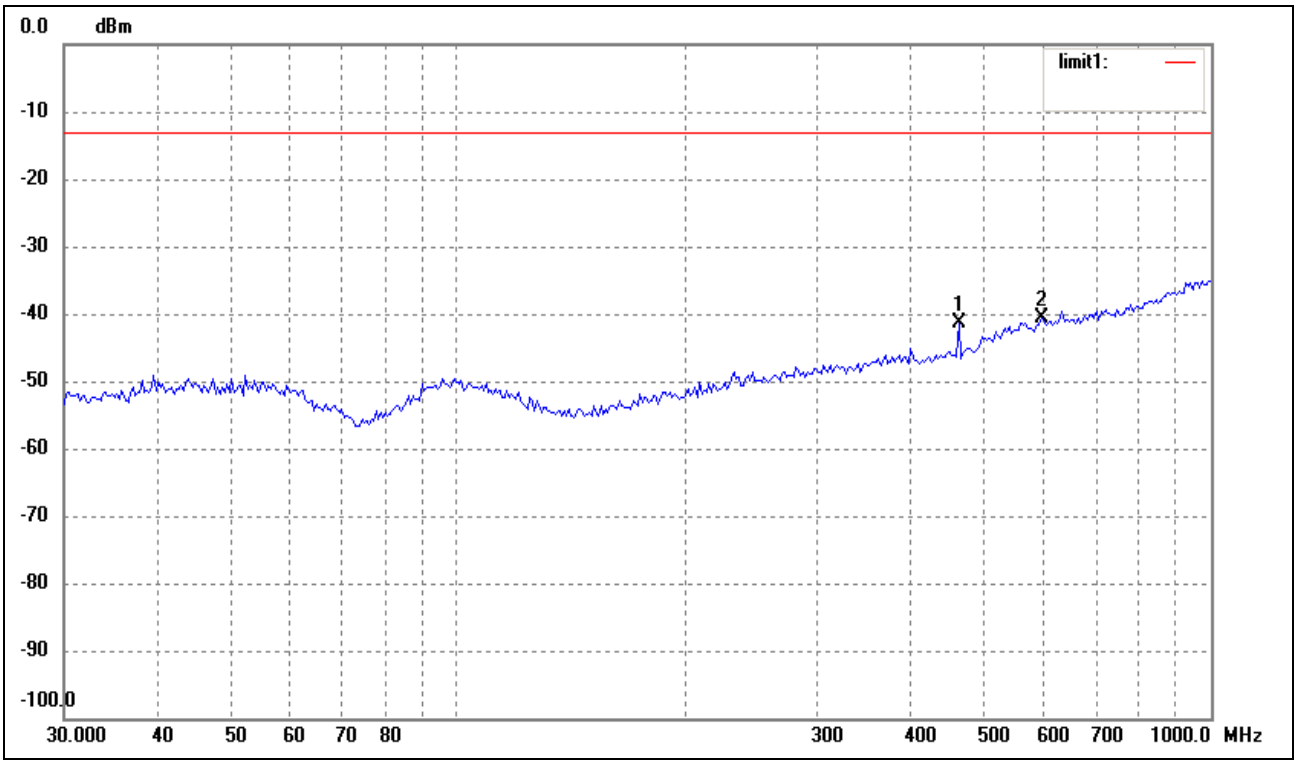
For GMRS transmitter (462.6250 MHz)

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	590.9737	-68.22	28.26	-39.96	-13.00	-26.96	ERP
2	938.8326	-68.45	33.41	-35.04	-13.00	-22.04	ERP

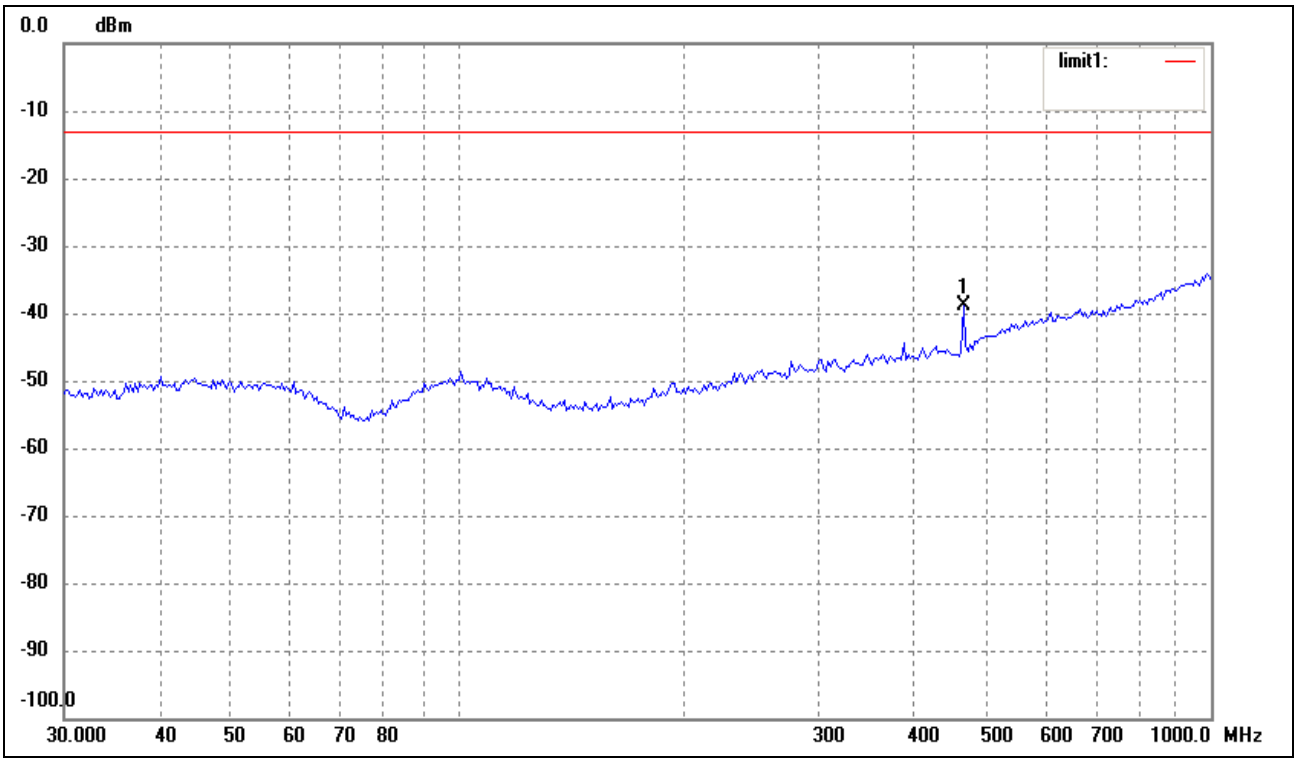
Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	462.3455	-64.99	23.63	-41.36	-13.00	-28.36	ERP
2	595.1329	-68.89	28.35	-40.54	-13.00	-27.54	ERP

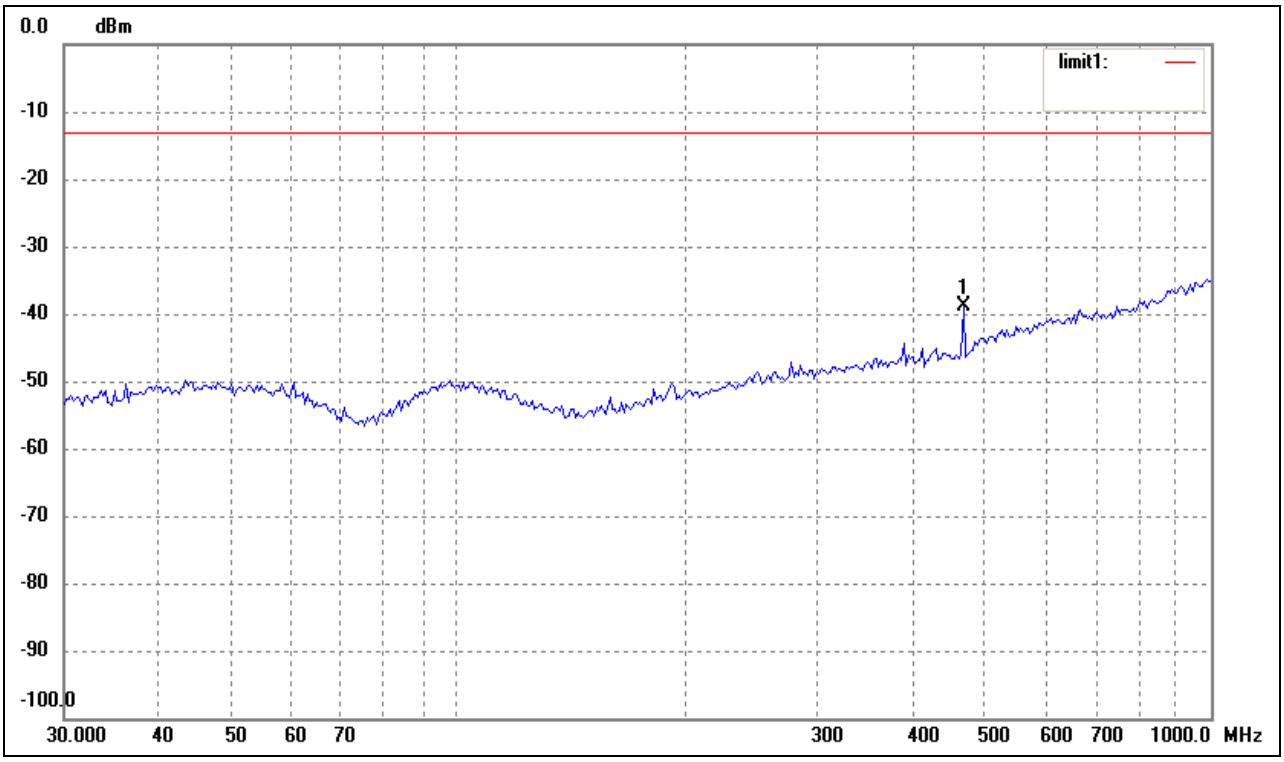
For GMRS transmitter (467.6250 MHz)

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	468.8762	-62.84	23.86	-38.98	-13.00	-25.98	ERP

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	Factor(dB)	(dBm)	(dBm)	(dB)	
1	468.8762	-62.84	23.86	-38.98	-13.00	-25.98	ERP

Plots of the spurious emission for Above 1GHz:

Frequency	SG Reading	Height	Polar	Cable loss	Antenna Gain	Corrected Ampl.	FCC Part 95 Limit	FCC Part 95 Margin
MHz	dBm	Meter	H / V	dB	dB	dBm	dBm	dB
GMRS transmitter (462.6250MHz)								
1387.8750	-33.4	1.5	V	2.6	6.4	-29.6	-13	-16.6
1387.8750	-36.1	1.0	H	2.6	6.4	-32.3	-13	-19.3
1850.5000	-41.9	1.5	V	2.9	7.2	-37.6	-13	-24.6
1850.5000	-44.6	1.2	H	2.9	7.2	-40.3	-13	-27.3
GMRS transmitter (467.6250MHz)								
1402.8750	-35.1	1.5	V	2.7	6.6	-31.2	-13	-18.2
1402.8750	-41.9	1.0	H	2.7	6.6	-38.0	-13	-25.0
1870.5000	-43.2	1.5	V	3.0	7.4	-38.8	-13	-25.8
1870.5000	-45.6	1.5	H	3.0	7.4	-41.2	-13	-28.2

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
The measurements greater than 20dB below the limit from 9kHz to 30MHz..

7. FREQUENCY STABILITY

7.1 Standard Applicable

According to FCC Part 2.1055(a)(1), the frequency stability shall be measure with variation of ambient temperature from –30ºC to +50ºC, 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.

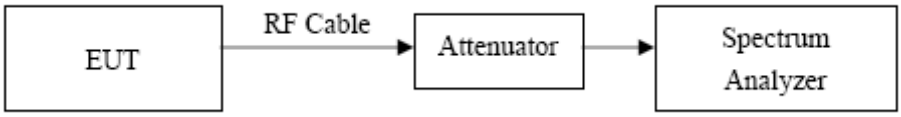
According to FCC Part 95.621(b), Each GMRS transmitter for mobile station, small base station and control operation must be maintained within a frequency tolerance of 0.0005%.

7.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2012-03-28	2013-03-27
Attenuator	ATTEN	ATS100-4-20	/	2012-03-28	2013-03-27

7.3 Test Procedure

According to Standard TIA-603-D, the method of measurement for frequency stability as follows:



a) Connect the equipment as illustrated.

b) Operate the equipment in standby conditions for 15 minutes before proceeding.

c) Record the carrier frequency of the transmitter as MCFMHz .

d) Calculate the percent frequency error by the following:

$$\%\ error = \left(\frac{MCF_{MHz}}{ACF_{MHz}} - 1 \right) * 100$$

where
MCFMHz is the Measured Carrier Frequency in MHz
ACFMHz is the Assigned Carrier Frequency in MHz

e) The value recorded in step d) is the carrier frequency stability.

7.4 Test Result

For GMRS transmitter (462.6250MHz)

Reference Frequency: 462.6250 MHz, Limit: +/-0.0005%			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (MHz)	Error %
50	7.4	462.62535	0.00007
40	7.4	462.62513	0.00003
30	7.4	462.62490	-0.00002
20	7.4	462.62475	-0.00005
10	7.4	462.62432	-0.00015
0	7.4	462.62413	-0.00019
-10	7.4	462.62400	-0.00021
-20	7.4	462.62399	-0.00022
-30	7.4	462.62385	-0.00023

So, Frequency Stability Versus Input Voltage is:

Reference Frequency: 462.6250 MHz, Limit: +/-0.0005%		
Power Supplied (VDC)	Frequency Measure with Time Elapsed	
	Frequency (MHz)	Error %
6.42	462.6246	-0.00009

For GMRS Transmitter (467.6250MHz)

Reference Frequency: 467.6250 MHz, Limit: +/-0.0005%			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (MHz)	Error %
50	7.4	467.62556	0.00012
40	7.4	467.62530	0.00006
30	7.4	467.62496	-0.00001
20	7.4	467.62485	-0.00003
10	7.4	467.62472	-0.00006
0	7.4	467.62463	-0.00008
-10	7.4	467.62451	-0.00010
-20	7.4	467.62425	-0.00016
-30	7.4	467.62413	-0.00019

So, Frequency Stability Versus Input Voltage is:

Reference Frequency: 467.6250 MHz, Limit: +/-0.0005%		
Power Supplied (VDC)	Frequency Measure with Time Elapsed	
	Frequency (MHz)	Error %
6.42	467.62486	-0.00003

8. MODULATION CHARACTERISTICS

8.1 Standard Applicable

According to FCC Part 95.637:

A GMRS transmitter that transmits emission types F1D, G1D, or G3E must not exceed a peak frequency deviation of plus or minus 5 kHz. A GMRS transmitter that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 5 kHz.

According to FCC Part 2.1047

(a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.

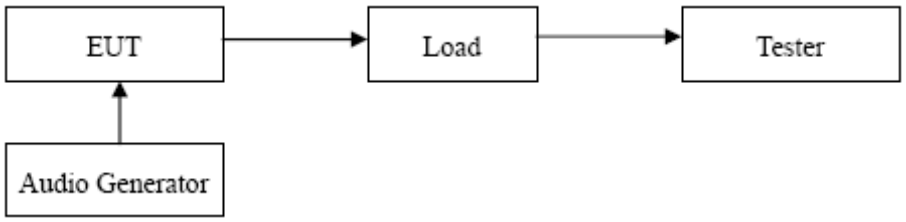
(b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

8.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Cell Site Test Set	HP	8921A	3524A02414	2012-03-28	2013-03-27
Attenuator	ATTEN	ATS100-4-20	/	2012-03-28	2013-03-27
Audio Generator	Good Will	GAG-809	A620083	2012-03-28	2013-03-27

8.3 Test Procedure

According to Standard TIA-603-D, the method of measurement for modulation limiting as follows:



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.

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 100 Hz to 5000 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.

8.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55%
ATM Pressure:	1015mbar

8.5 Test Results/Plots

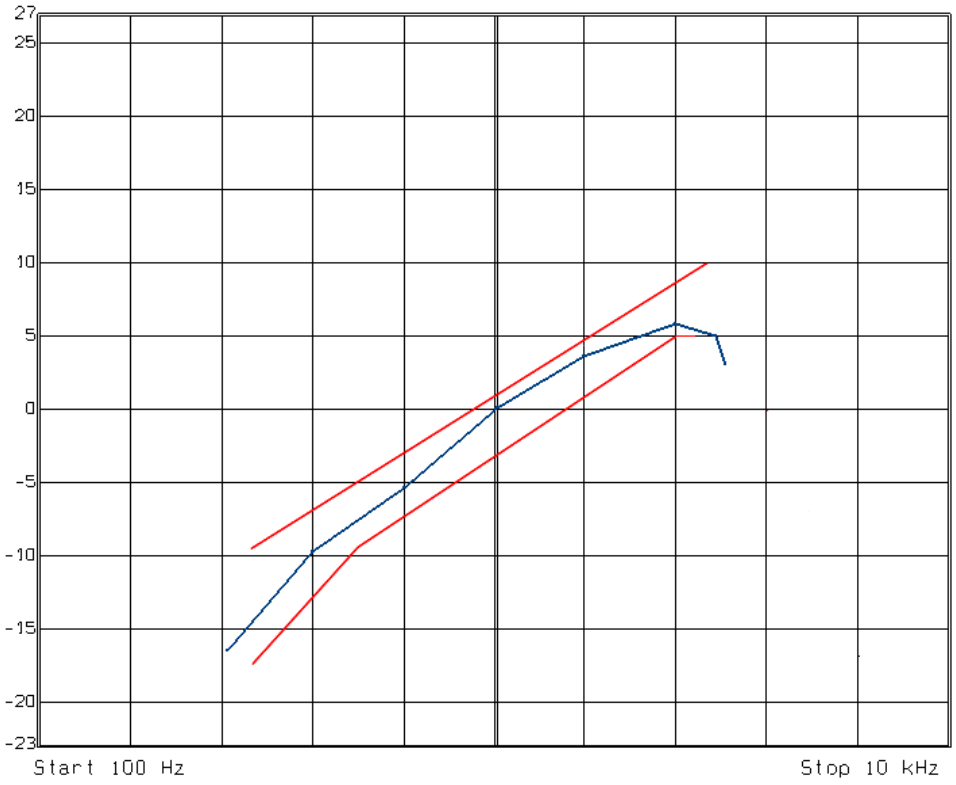
For GMRS Frequency 462.6250MHz

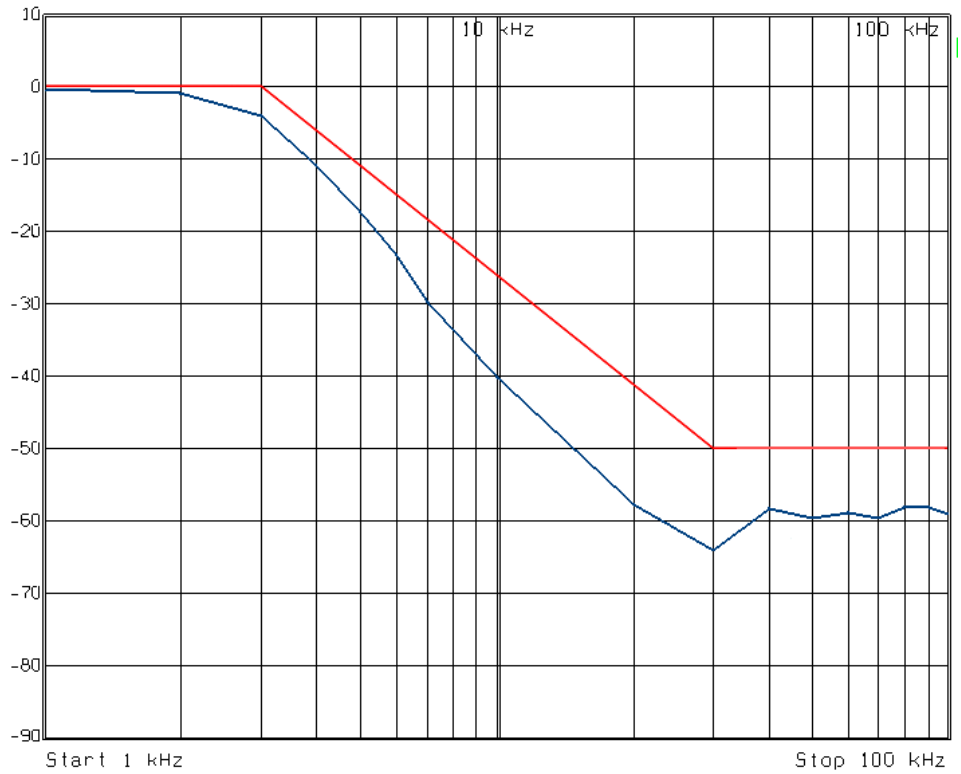
Audio Frequency (Hz)	Deviation (kHz)	Limit (kHz)
100	0.464	5.0
300	2.037	5.0
500	3.014	5.0
1000	4.270	5.0
3000	3.572	5.0
5000	0.917	5.0

For GMRS Frequency 467.6250MHz

Audio Frequency (Hz)	Deviation (kHz)	Limit (kHz)
100	0.493	5.0
300	1.962	5.0
500	2.965	5.0
1000	4.124	5.0
3000	3.461	5.0
5000	0.895	5.0

Audio Low Pass Filter Characteristic Curve





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