

TEST REPORT

Applicant Name : Midland Radio Corporation
Address : 5900 Parretta Drive, Kansas City, Missouri, United States
Report Number : XMTN1211217-65464E-RF
FCC ID: MMAMXR10

Test Standard (s)
 FCC PART 95

Sample Description

Product Type: Repeater
Model No.: MXR10
Date Received: 2021-12-17
Date of Test: 2022-01-03 to 2022-01-12
Report Date: 2022-01-13

Test Result:	Pass*
--------------	-------

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Black Ding

Black Ding
EMC Engineer

Approved By:

Candy Li

Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk ". Customer model name, addresses, names, trademarks etc. are not considered data. This report cannot be reproduced except in full, without prior written approval of the Company. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

Shenzhen Accurate Technology Co., Ltd.

1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

Tel: +86 755-26503290 Fax: +86 755-26503396 Web: www.atc-lab.com

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
DESCRIPTION OF CHANNEL LIST	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
SUMMARY OF TEST RESULTS	7
TEST EQUIPMENT LIST	8
FCC §95.385 (a) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)	9
APPLICABLE STANDARD	9
RESULT	9
FCC §2.1046 & §95.1767 - RF OUTPUT POWER.....	10
APPLICABLE STANDARD	10
TEST PROCEDURE	10
TEST DATA	10
FCC §2.1047 & §95.1775 - MODULATION CHARACTERISTIC.....	12
APPLICABLE STANDARD	12
TEST PROCEDURE	12
TEST DATA	12
FCC §2.1049 & §95.1773&§95.1779(a)(c) - AUTHOURIZED BANDWIDTH AND EMISSION MASK.....	18
APPLICABLE STANDARD	18
TEST PROCEDURE	19
TEST DATA	19
FCC §2.1051 & §95.1779 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS	22
APPLICABLE STANDARD	22
TEST DATA	22
FCC §2.1053 & §95.1779- RADIATED SPURIOUS EMISSION	25
APPLICABLE STANDARD	25
TEST PROCEDURE	25
TEST DATA	25
FCC§2.1055 (d) & §95.1765 - FREQUENCY STABILITY	27
APPLICABLE STANDARD	27
TEST PROCEDURE	27
TEST DATA	27

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

Product	Repeater
Tested Model	MXR10
Frequency Range	TX 462.5500-462.7250MHz, RX 467.5500-467.7250 MHz
The Maximum Conducted Peak Power	39.76dBm
The Minimum Conducted Peak Power	33.75dBm
Modulation Technique	FM
Antenna Specification*	External Antenna: 8.1dBi Maximum
Voltage Range	DC 12V from Adapter
Sample serial number	XMTN1211217-65464E-RF-S1 (Assigned by ATC)
Sample/EUT Status	Good condition
Adapter information	Model: B06120500 Input: AC 110-240V, 50/60Hz, 1.3A Max Output: DC 12V, 5.0A

Objective

This report is in accordance with Part 2 and Part 95, Subpart A & Subpart E of the Federal Communication Commissions rules.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with Part 95 Subpart A, Subpart E of the Federal Communication Commissions rules with TIA-603-E 2016, Land Mobile FM or PM-Communications Equipment-Measurement and Performance Standards.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		0.082×10^{-7}
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
Audio Frequency Response		0.1dB
Low Pass Filter Response		1.2dB
Modulation Limiting		1%
Emissions, Radiated	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
Temperature		1°C
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISED), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

Description of Channel List

462MHz main channels for Transmit

Channel No.	Channel Frequency (MHz)	Channel No.	Channel Frequency (MHz)
1	462.5500	2	462.5750
3	462.6000	4	462.6250
5	462.6500	6	462.6750
7	462.7000	8	462.7250

467MHz main channels for Receive

Channel No.	Channel Frequency (MHz)	Channel No.	Channel Frequency (MHz)
1	467.5500	2	467.5750
3	467.6000	4	467.6250
5	467.6500	6	467.6750
7	467.7000	8	467.7250

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Shenzhen Delippo Technology Co., Ltd	AC Adapter	B06120500	01210194324
Unknow	Load(100W)	Unknow	Unknow
Unknow	Earphone	Unknow	Unknow
Shenzhen Delippo Technology Co., Ltd	Micphone	Unknow	Unknow

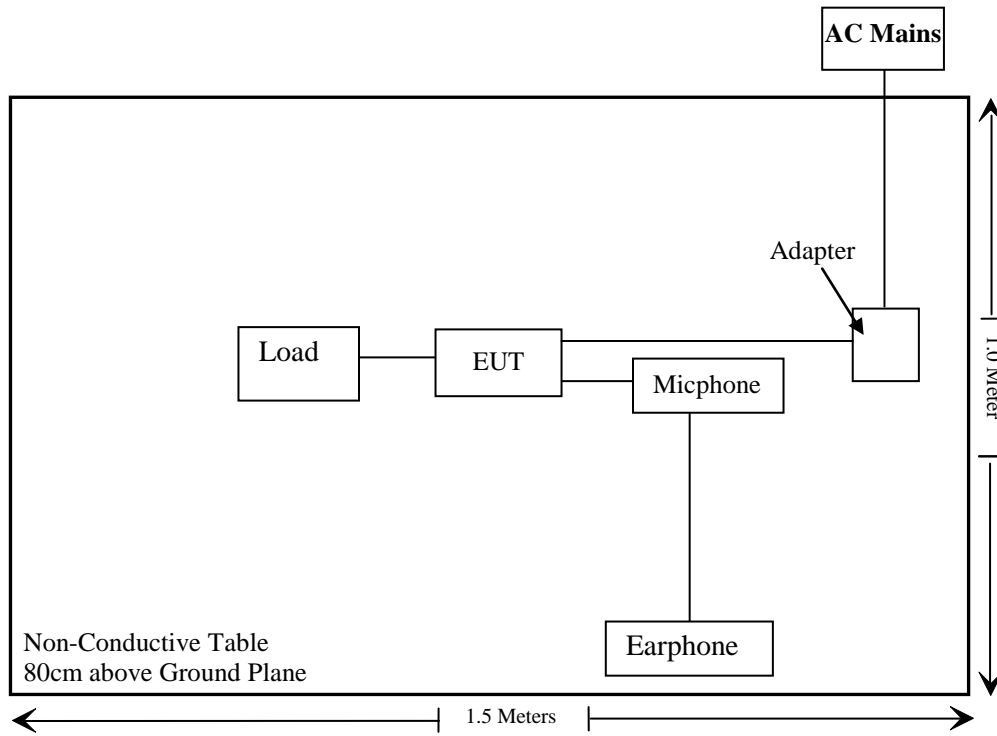
External I/O Cable

Cable Description	Length (m)	From Port	To Port
Un-shielding Detachable DC Cable	1.4	EUT	Adapter
Un-shielding Detachable AC Cable	0.8	AC Mains	Adapter
Un-shielding Detachable I/O Cable	2.0	EUT	Micphone
Un-shielding Detachable Earphone Cable	1.0	Micphone	Earphone
Un-shielding Detachable Cable	0.3	EUT	Load

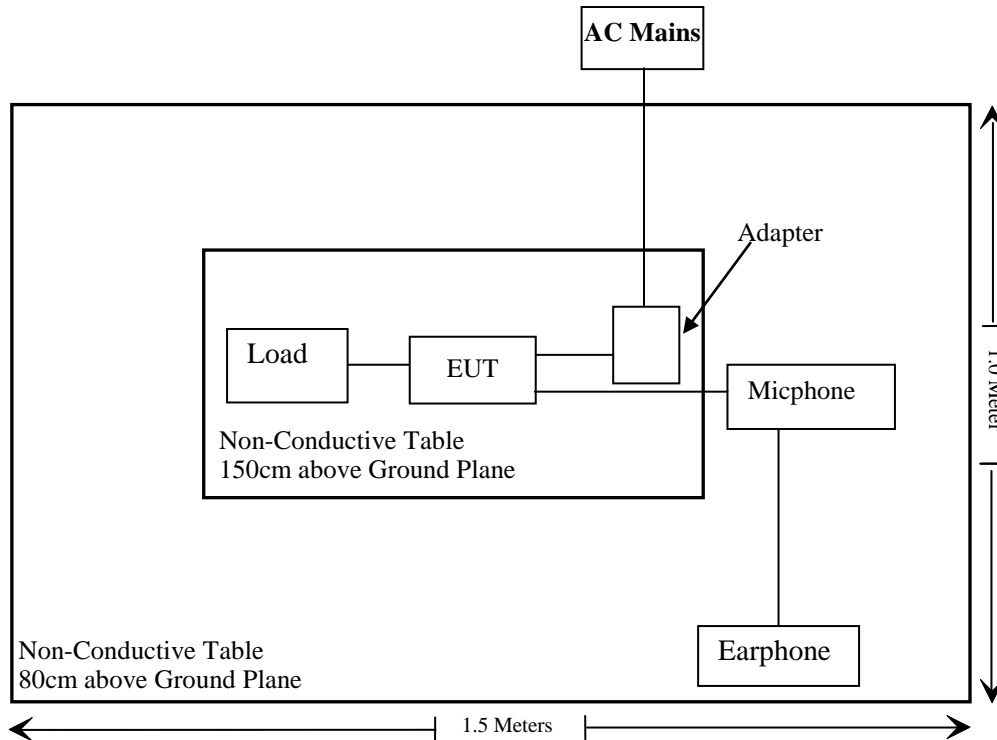
Block Diagram of Test Setup

Spurious emission test:

Below 1G:



Above 1G:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
FCC §95.385 (a), §2.1091	MAXIMUM PERMISSIBLE EXPOSURE(MPE)	Compliant
§95.1787	Antenna Requirement	Not Applicable
§2.1046, §95.1767	RF Output Power	Compliant
§2.1047, §95.1775	Modulation Characteristic	Compliant
§2.1049, §95.1773, §95.1779	Authorized Bandwidth & Emission Mask	Compliant
§2.1051, §95.1779	Spurious Emission at Antenna Terminal	Compliant
§2.1053, §95.1779	Spurious Radiated Emissions	Compliant
§2.1055(d), §95.1765	Frequency Stability	Compliant

Not Applicable: The product is a repeater and has not digital data transmissions function.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emissions Test					
Rohde & Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde & Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/11/09	2022/11/08
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
CD	High Pass Filter	HPM-1.2/18G-60	110	2021/12/14	2022/12/13
Schwarzbeck	Bilog Antenna	VULB9163	9163-194	2020/01/05	2023/01/04
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-655	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Agilent	Signal Generator	N5183A	MY51040755	2021/12/13	2022/12/12
Radiated Emission Test Software: e3 19821b(V9)					
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
AGILENT	Vector Signal Generator	N5182A	MY50143401	2021/12/13	2022/12/12
HP Agilent	RF Communication test set	8920B	3325U00859	2021/03/15	2022/03/15
Aeroflex/Weinschel	30dB Attenuator (Input 250W/Output 50W)	58-30-33	PS467	2021/12/14	2022/12/13
Gongwen	Temp. & Humid. Chamber	HSD-500	109	2021/10/14	2022/10/13
Fluke	Desktop Multi Meter	45	7664009	2021/12/13	2022/12/12
Agilent	programmable power supply	E3642A	MY40002025	2021/12/13	2022/12/12

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §95.385 (a) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 95.385 (a) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For worst case:

Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm²)	MPE Limit (mW/cm²)
	(dBi)	(numeric)	(dBm)	(mW)			
462.550-462.725	8.1	6.46	40	10000	130	0.304	0.308

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 130cm from nearby persons.

Result: Compliant

FCC §2.1046 & §95.1767 - RF OUTPUT POWER

Applicable Standard

Per FCC §2.1046, and §95.1767, This section contains transmitting power limits for GMRS stations. The maximum transmitting power depends on which channels are being used and the type of station.

(a) 462/467 MHz main channels. The limits in this paragraph apply to stations transmitting on any of the 462 MHz main channels or any of the 467 MHz main channels. Each GMRS transmitter type must be capable of operating within the allowable power range. GMRS licensees are responsible for ensuring that their GMRS stations operate in compliance with these limits.

(1) The transmitter output power of mobile, repeater and base stations must not exceed 50 Watts.

(2) The transmitter output power of fixed stations must not exceed 15 Watts.

(b) 462 MHz interstitial channels. The effective radiated power (ERP) of mobile, hand-held portable and base stations transmitting on the 462 MHz interstitial channels must not exceed 5 Watts.

(c) 467 MHz interstitial channels. The effective radiated power (ERP) of hand-held portable units transmitting on the 467 MHz interstitial channels must not exceed 0.5 Watt. Each GMRS transmitter type capable of transmitting on these channels must be designed such that the ERP does not exceed 0.5 Watt.

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 Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

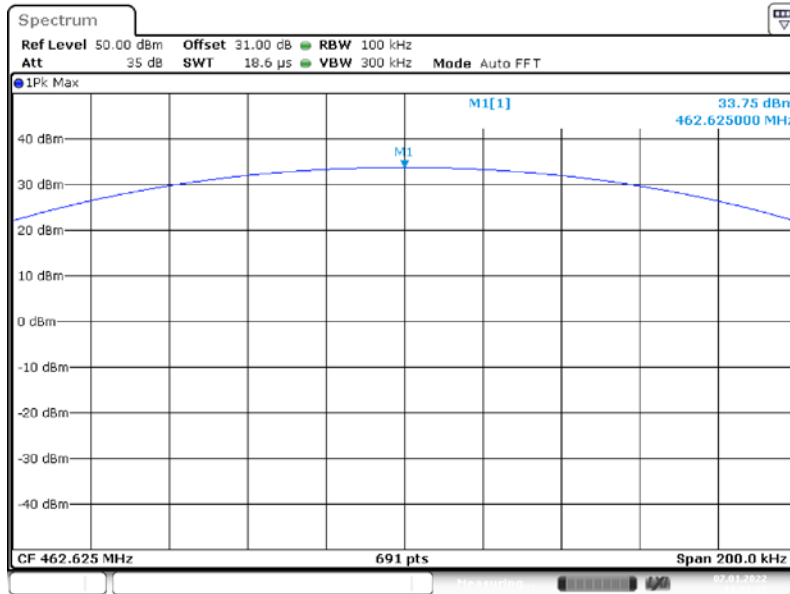
The testing was performed by Chao Mo on 2022-01-07

Test Mode: Transmitting

Test Result: Compliant.

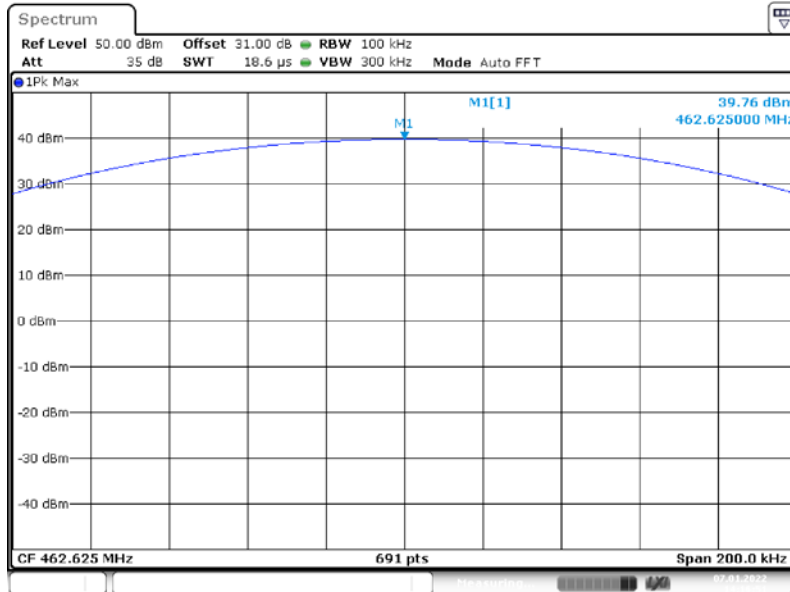
Test Frequency (MHz)	Conducted Output Peak Power (dBm)		Limit (dBm)
	462.6250	Low level	
	High level	39.76	

462.625MHz Low Power



Date: 7.JAN.2022 14:23:28

462.625MHz High Power



Date: 7.JAN.2022 14:16:51

FCC §2.1047 & §95.1775 - MODULATION CHARACTERISTIC

Applicable Standard

Per FCC §2.1047 and §95.1775: Each GMRS transmitter type must be designed to satisfy the modulation requirements in this section. Operation of GMRS stations must also be in compliance with these requirements.

(a) Main channels. The peak frequency deviation for emissions to be transmitted on the main channels must not exceed ± 5 kHz.

(b) 462 MHz interstitial channels. The peak frequency deviation for emissions to be transmitted on the 462 MHz interstitial channels must not exceed ± 5 kHz.

(c) 467 MHz interstitial channels. The peak frequency deviation for emissions to be transmitted on the 467 MHz interstitial channels must not exceed ± 2.5 kHz, and the highest audio frequency contributing substantially to modulation must not exceed 3.125 kHz.

(d) Overmodulation. Each GMRS transmitter type, except for a mobile station transmitter type with a transmitter power output of 2.5 W or less, must automatically prevent a higher than normal audio level from causing overmodulation.

(e) Audio filter. Each GMRS transmitter type must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of §95.1779 (without filtering).

(1) The filter must be between the modulation limiter and the modulated stage of the transmitter.

(2) At any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least $60 \log(f/3)$ dB more than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB more than the attenuation at 1 kHz.

Test Procedure

Test Method: TIA/EIA-603-E

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2022-01-03.

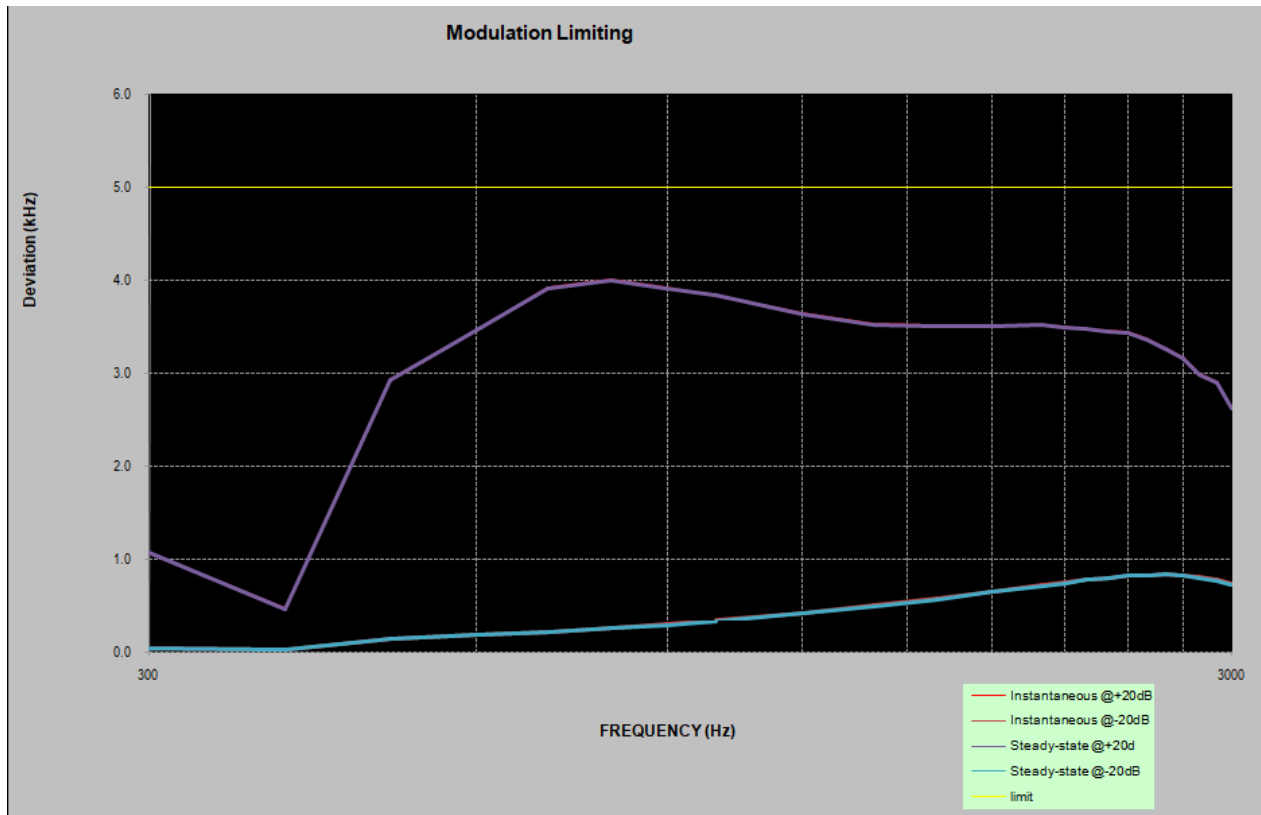
Please refer to the following tables and plots.

Test Mode: Transmitting

MODULATION LIMITING

Carrier Frequency: 462.625MHz

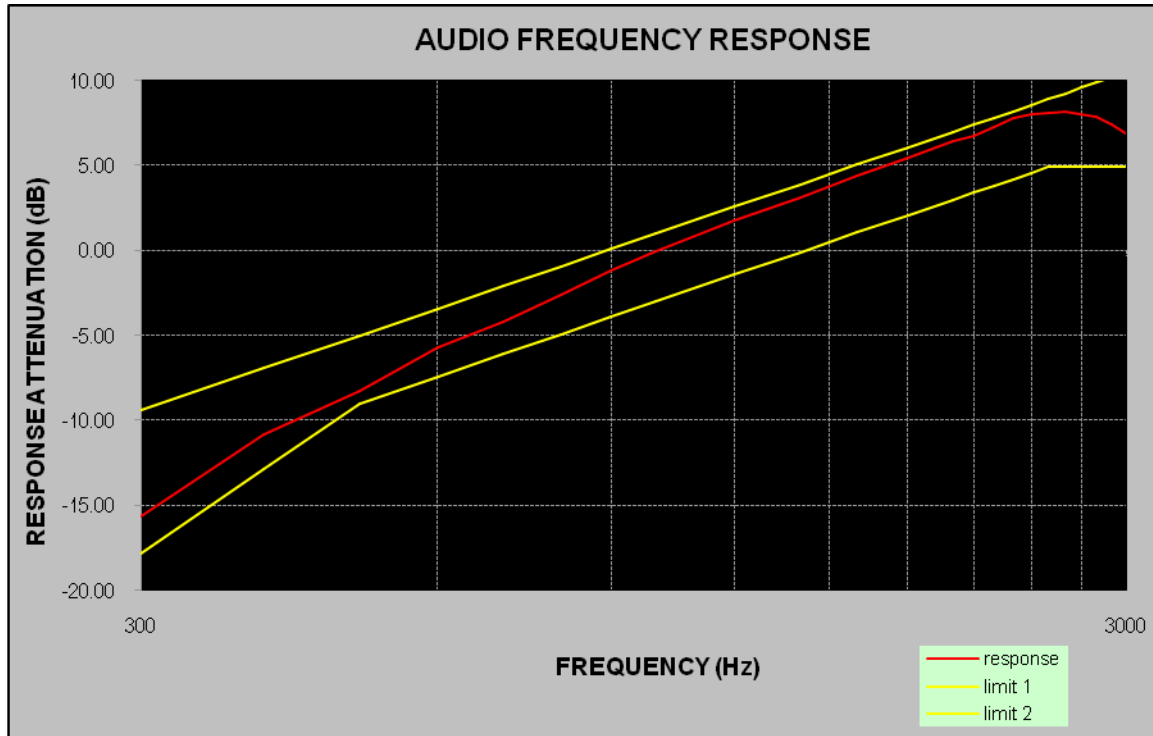
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	1.072	0.035	1.064	0.031	5.000
400	0.464	0.021	0.461	0.019	5.000
500	2.938	0.136	2.927	0.131	5.000
600	3.462	0.181	3.455	0.175	5.000
700	3.915	0.217	3.904	0.209	5.000
800	4.001	0.259	3.994	0.251	5.000
900	3.918	0.294	3.904	0.288	5.000
1000	3.840	0.335	3.831	0.327	5.000
1200	3.641	0.415	3.632	0.408	5.000
1400	3.528	0.493	3.517	0.487	5.000
1600	3.512	0.574	3.502	0.565	5.000
1800	3.504	0.650	3.495	0.641	5.000
2000	3.516	0.714	3.508	0.708	5.000
2100	3.493	0.746	3.487	0.739	5.000
2200	3.475	0.780	3.467	0.772	5.000
2300	3.457	0.795	3.449	0.788	5.000
2400	3.437	0.825	3.427	0.819	5.000
2500	3.370	0.823	3.358	0.817	5.000
2600	3.267	0.832	3.259	0.828	5.000
2700	3.166	0.824	3.157	0.815	5.000
2800	2.992	0.803	2.985	0.797	5.000
2900	2.899	0.771	2.891	0.764	5.000
3000	2.623	0.729	2.617	0.718	5.000



Audio Frequency Response

Carrier Frequency: 462.625 MHz

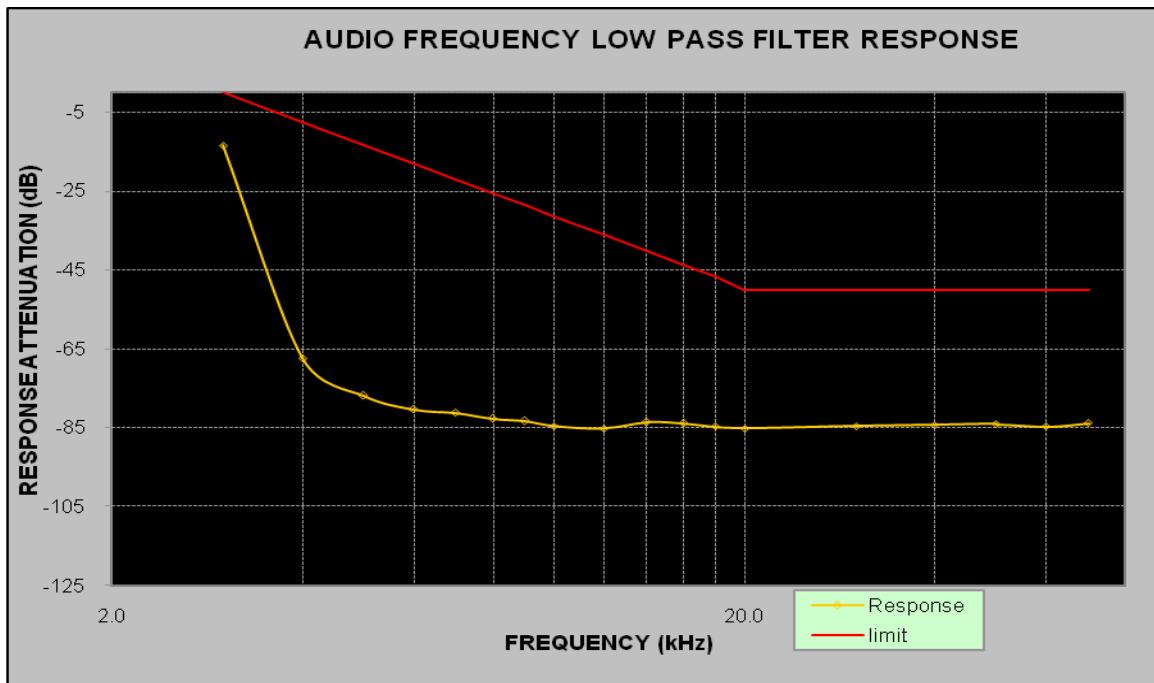
Audio Frequency (Hz)	Response Attenuation (dB)
300	-15.65
400	-10.84
500	-8.29
600	-5.71
700	-4.22
800	-2.57
900	-1.16
1000	0
1200	1.77
1400	3.16
1600	4.44
1800	5.48
2000	6.43
2100	6.79
2200	7.26
2300	7.81
2400	8.03
2500	8.14
2600	8.16
2700	8.07
2800	7.87
2900	7.47
3000	6.87



Audio frequency lows pass filter response

Carrier Frequency: 462.625 MHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-13.5	0.0
4.0	-67.4	-7.5
5.0	-76.9	-13.3
6.0	-80.3	-18.1
7.0	-81.2	-22.1
8.0	-82.7	-25.6
9.0	-83.3	-28.6
10.0	-84.6	-31.4
12.0	-85.1	-36.1
14.0	-83.6	-40.1
16.0	-83.9	-43.6
18.0	-84.7	-46.7
20.0	-85.2	-50.0
30.0	-84.6	-50.0
40.0	-84.3	-50.0
50.0	-84.1	-50.0
60.0	-84.7	-50.0
70.0	-83.8	-50.0



FCC §2.1049 & §95.1773&§95.1779(a)(c) - AUTHOURIZED BANDWIDTH AND EMISSION MASK

Applicable Standard

According to §95.1773. Each GMRS transmitter type must be designed such that the occupied bandwidth does not exceed the authorized bandwidth for the channels used. Operation of GMRS stations must also be in compliance with these requirements.

(a) Main channels. The authorized bandwidth is 20 kHz for GMRS transmitters operating on any of the 462 MHz main channels (see §95.1763(a)) or any of the 467 MHz main channels (see §95.1763(c)).

(b) Interstitial channels. The authorized bandwidth is 20 kHz for GMRS transmitters operating on any of the 462 MHz interstitial channels (see §95.1763(b)) and is 12.5 kHz for GMRS transmitters operating on any of the 467 MHz interstitial channels (see §95.1763(d)).

(c) Digital data transmissions. Digital data transmissions are limited to the 462 MHz main channels and interstitial channels in the 462 MHz and 467 MHz bands.

According to §95.1779. Each GMRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

(a) Emission masks. Emission masks applicable to transmitting equipment in the GMRS are defined by the requirements in the following table. The numbers in the attenuation requirements column refer to rule paragraph numbers under paragraph (b) of this section.

Emission types filter	Attenuation requirements
-----------------------	--------------------------

(b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

(1) 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) 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.

(b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

(1) 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) 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.

(7) $43 + 10 \log (P)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

(c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) through (4) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (b)(5) of this section is measured with a reference bandwidth of at least 30 kHz.

Test Procedure

TIA-603-E, section 2.2.11

Test Data**Environmental Conditions**

Temperature:	25°C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2022-01-07 and 2022-01-12.

Test Mode: Transmitting

Item	Frequency (MHz)	OBW (kHz)	Limit (kHz)	Result
Low Power	462.6250	10.507	20	Pass
High Power	462.6250	10.507	20	Pass

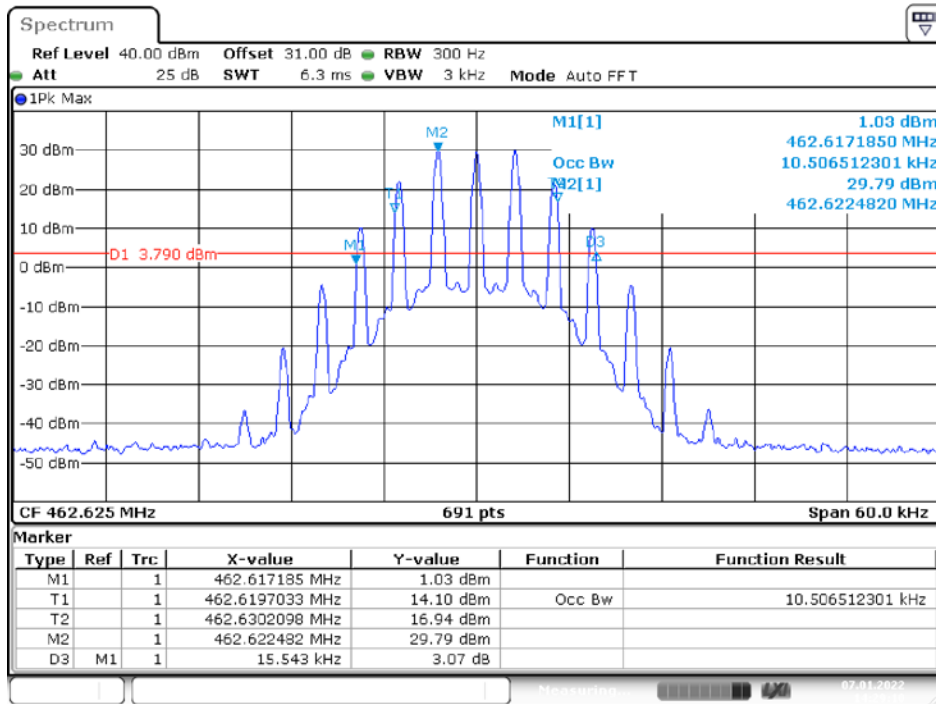
Emission Designator Per CFR 47 §2.201& §2.202&, $B_n = 2M + 2D$:

The maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.

$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 5.0 \text{ kHz}) = 16 \text{ kHz} \rightarrow 16K0$

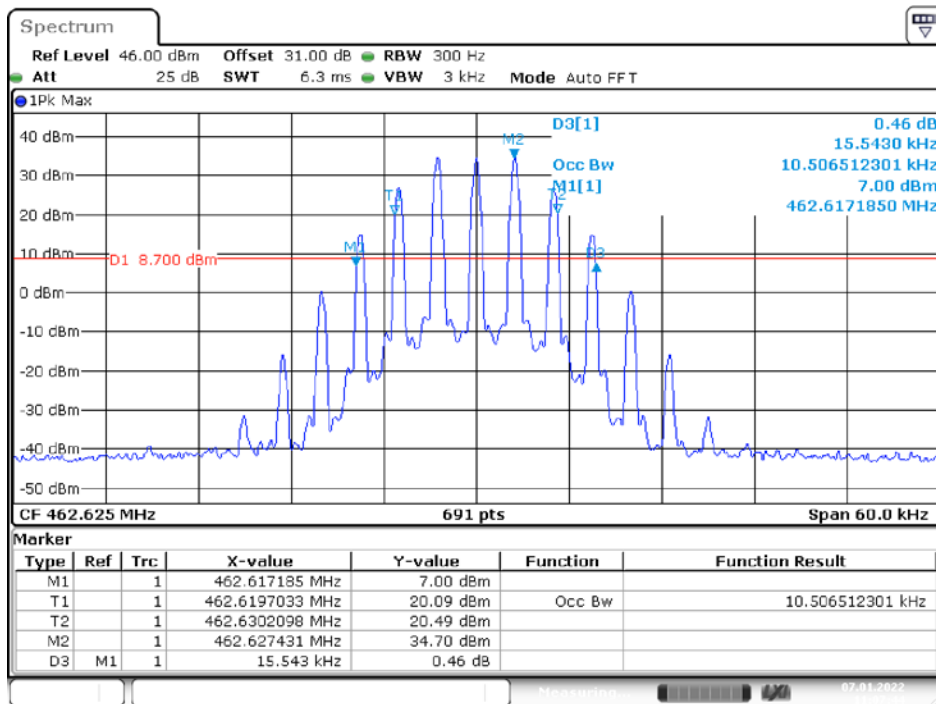
F3E portion of the designator represents an FM voice transmission Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

OBW, 462.625 MHz-Low Power



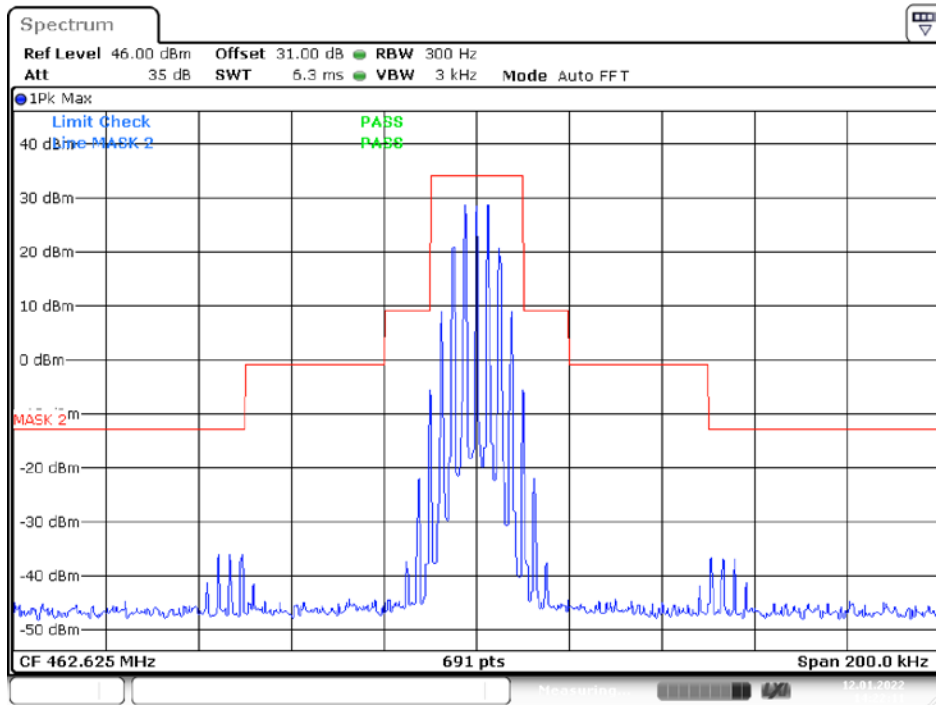
Date: 7. JAN.2022 14:29:10

OBW, 462.625 MHz-High Power



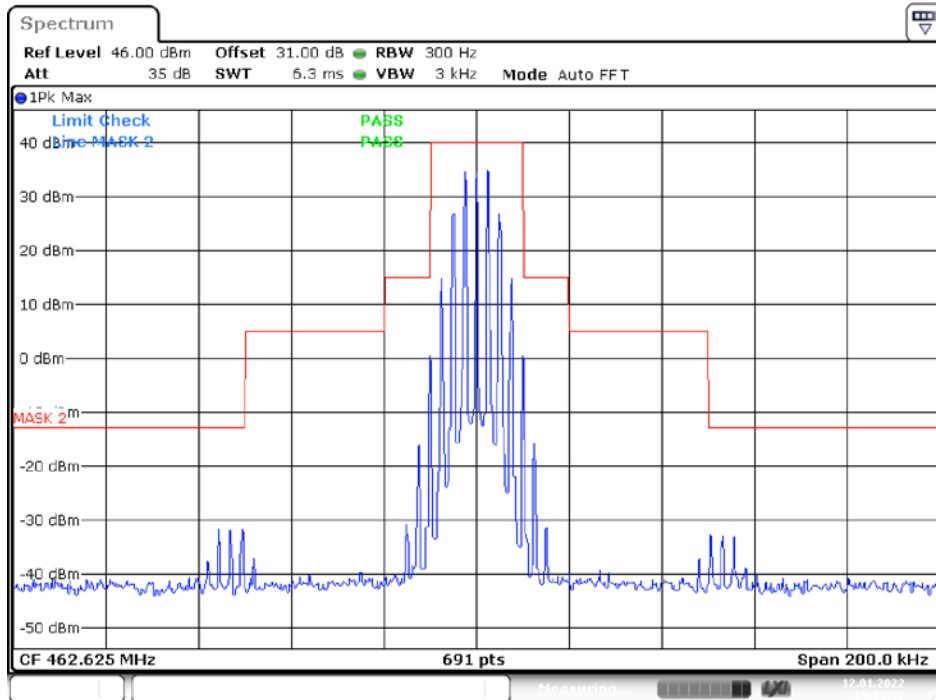
Date: 7. JAN.2022 11:07:45

Emission Mask, 462.625 MHz--Low Power



Date: 12.JAN.2022 14:22:11

Emission Mask, 462.625 MHz--High Power



Date: 12.JAN.2022 14:19:37

FCC §2.1051 & §95.1779 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

According to §95.1779. Each GMRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

(b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

(1) 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) 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.

(7) $43 + 10 \log (P)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

(c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) through (4) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (b)(5) of this section is measured with a reference bandwidth of at least 30 kHz.

(d) Measurement conditions. The requirements in this section apply to each GMRS transmitter type both with and without the connection of permitted attachments, such as an external speaker, microphone, power cord and/or antenna.

Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for below 1GHz, and 1MHz for above 1GHz. sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Data

Environmental Conditions

Temperature:	26 °C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

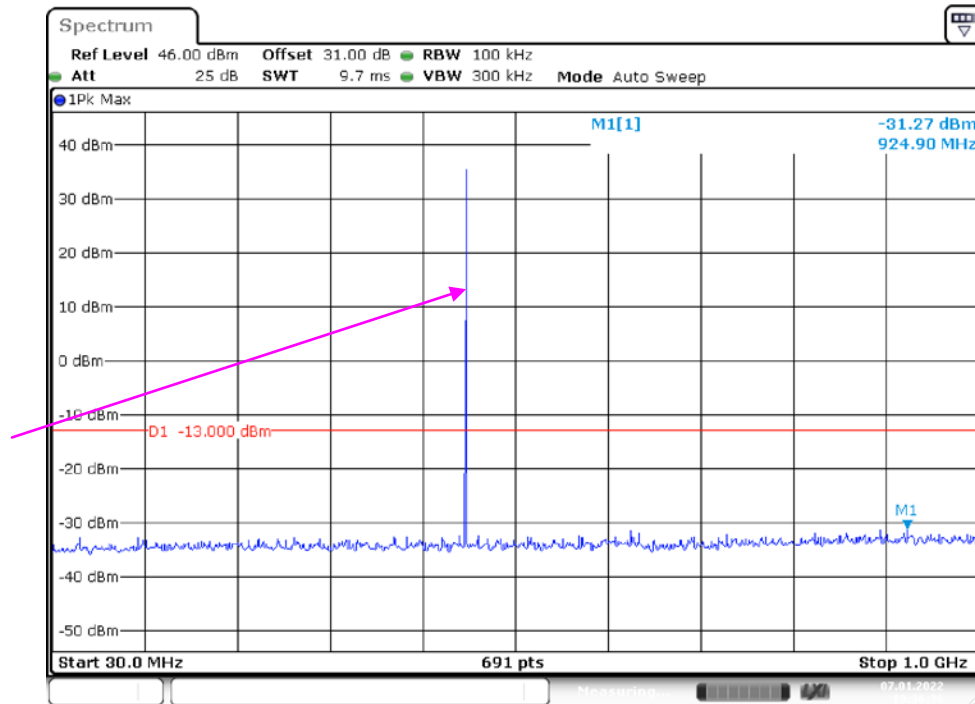
The testing was performed by Paul Liu on 2022-01-07.

Test Mode: Transmitting

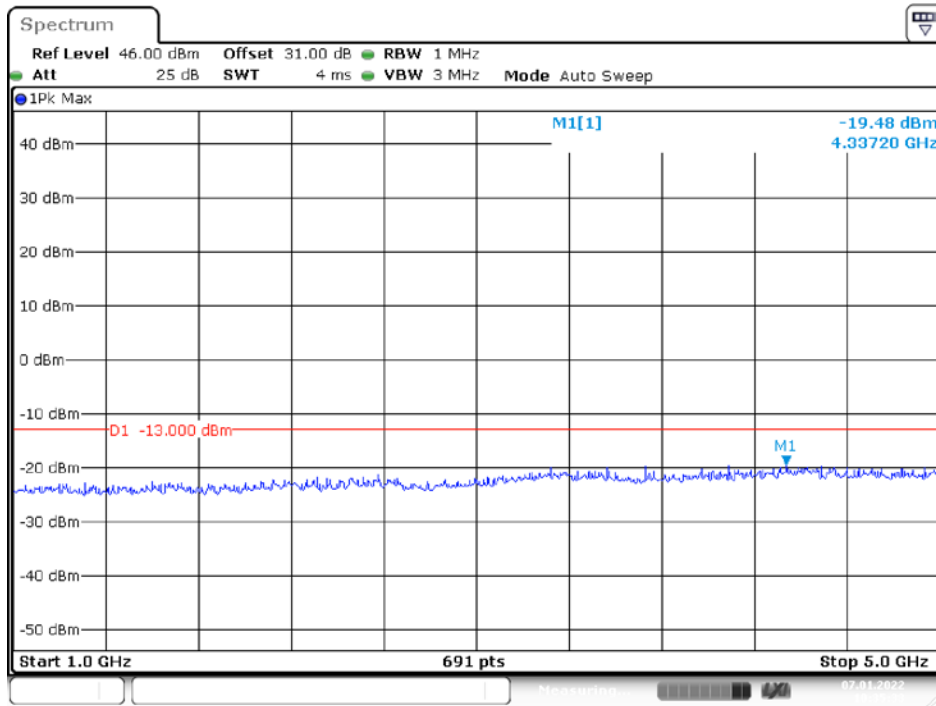
Please refer to the following plots.

Low Power 30 MHz – 1 GHz, 462.625 MHz

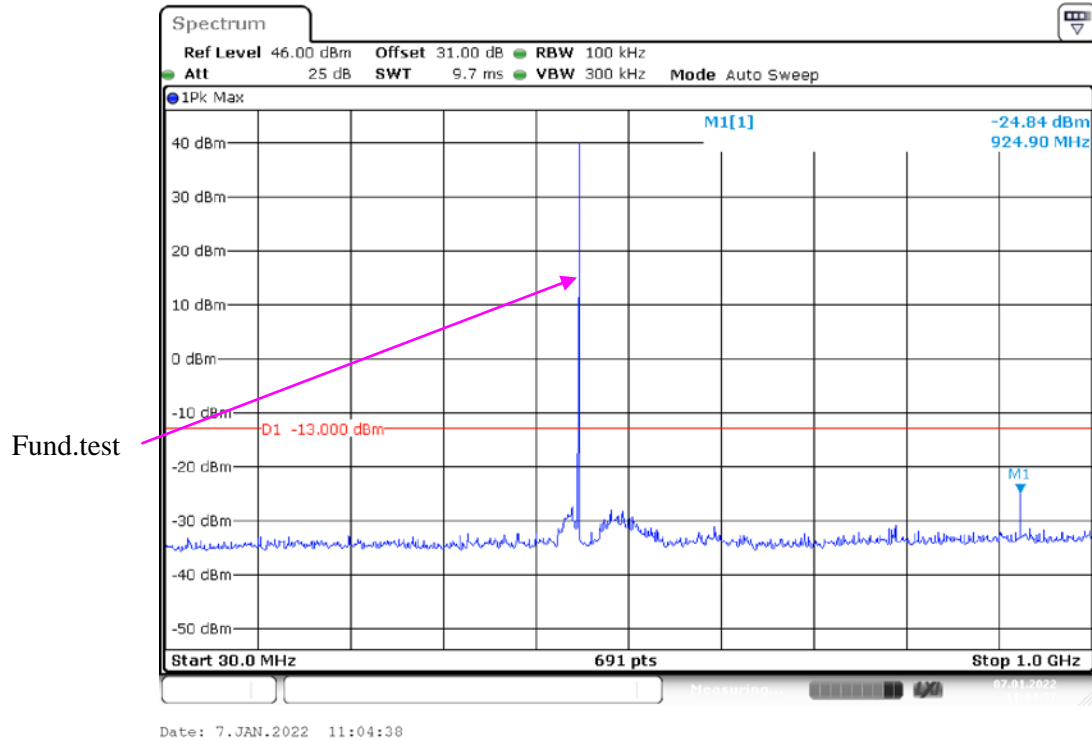
Fund.test



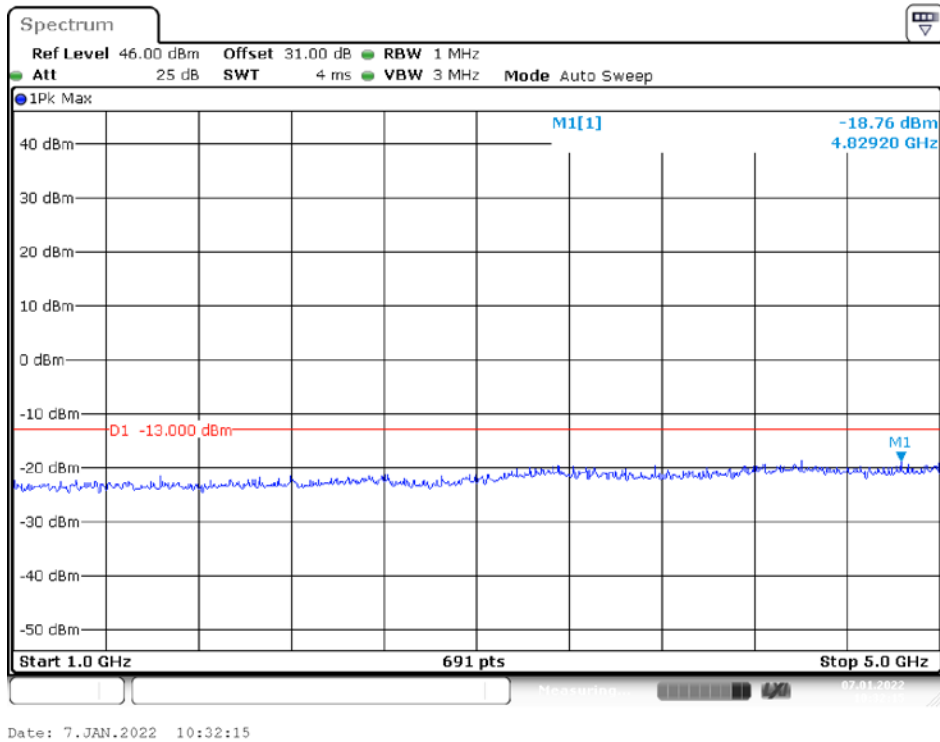
1 GHz – 5.0 GHz, 462.625 MHz



High Power 30 MHz – 1 GHz, 462.625 MHz



1 GHz – 5.0 GHz, 462.625 MHz



FCC §2.1053 & §95.1779- RADIATED SPURIOUS EMISSION

Applicable Standard

FCC §2.1053 and §95.1779. Each GMRS transmitter type must be designed to comply with the applicable unwanted emissions limits in this section.

(b) Attenuation requirements. The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

(1) 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) 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.

(7) $43 + 10 \log (P)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

(c) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) through (4) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (b)(5) of this section is measured with a reference bandwidth of at least 30 kHz.

(d) Measurement conditions. The requirements in this section apply to each GMRS transmitter type both with and without the connection of permitted attachments, such as an external speaker, microphone, power cord and/or antenna.

Test Procedure

The transmitter was placed on a wooden 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 = $10 \lg (\text{TXpwr in Watts}/0.001)$ -the absolute level
Spurious attenuation limit in dB = $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

Test Data

Environmental Conditions

Temperature:	25°C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Mo on 2022-01-03.

Test Mode: Transmitting (Worst case for high power)

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/Ave		Height (m)	Polar (H/V)				
462.625MHz									
925.25	-58.52	PK	252	1.1	H	9.27	-49.25	-13	36.25
925.25	-62.35	PK	215	1.2	V	11.86	-50.49	-13	37.49
1850.50	-47.03	PK	335	2.2	H	4.4	-42.63	-13	29.63
1850.50	-47.16	PK	252	2.2	V	3.6	-43.56	-13	30.56
2313.13	-50.25	PK	86	2.0	H	7.22	-43.03	-13	30.03
2313.13	-51.07	PK	256	1.4	V	6.7	-44.37	-13	31.37
2775.75	-47.84	PK	184	1.3	H	6.7	-41.14	-13	28.14
2775.75	-44.22	PK	73	1.0	V	6.31	-37.91	-13	24.91
3238.38	-48.90	PK	184	1.3	H	7	-41.90	-13	28.90
3238.38	-44.30	PK	73	1.0	V	6.27	-38.03	-13	25.03
3701.00	-43.60	PK	163	1.3	H	8.11	-35.49	-13	22.49
3701.00	-44.11	PK	345	2.1	V	7.6	-36.51	-13	23.51

Note:

Absolute Level = Reading Level + Substituted Factor
 Substituted Factor contains: SG Level - Cable loss+ Antenna Gain
 Margin = Limit - Absolute Level

FCC§2.1055 (d) & §95.1765 - FREQUENCY STABILITY

Applicable Standard

According to FCC §2.1055(a) (1), the frequency stability shall be measured with variation of ambient temperature from –30 °C to +50 °C, 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 §95.1765, Each GMRS transmitter type must be designed to comply with the frequency accuracy requirements in this section under normal operating conditions. Operators of GMRS stations must also ensure compliance with these requirements.

(a) The carrier frequency of each GMRS transmitter transmitting an emission with an occupied bandwidth greater than 12.5 kHz must remain within 5 parts-per-million (ppm) of the channel center frequencies listed in §95.1763 under normal operating conditions.

(b) The carrier frequency of each GMRS transmitter transmitting an emission with an occupied bandwidth of 12.5 kHz or less must remain within 2.5 ppm of the channel center frequencies listed in §95.1763 under normal operating conditions.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC 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 AC 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 (item 1 or item 2 will be chosen according to different condition) :

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 Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2022-01-10.

Test Mode: Transmitting

Reference Frequency: 462.6250 MHz, Limit: ± 2.5 ppm			
Environment Temperature (°C)	Voltage Supplied (V _{AC})	Measurement Frequency (MHz)	Frequency Error (ppm)
Frequency Stability Ver. Temperature			
50	120	462.624829	-0.37
40	120	462.624832	-0.36
30	120	462.624820	-0.39
20	120	462.624817	-0.40
10	120	462.624835	-0.36
0	120	462.624824	-0.38
-10	120	462.624802	-0.43
-20	120	462.624829	-0.37
-30	120	462.624818	-0.39
Frequency Stability Ver. Input Voltage			
20	102	462.624825	-0.38
20	138	462.624836	-0.35

Note: The extreme voltage was declared by applicant.

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