

TEST REPORT

Applicant Name : Sam Radios Ltd.
Address : No.18 Daxiamei Industrial Park, Nan'an, Quanzhou, Fujian,
362300, China
Report Number : XMTN1220517-21002E-00C
FCC ID: 2AGPQ-GMRS1

Test Standard (s)
FCC PART 95

Sample Description

Product Type: GMRS RADIO
Model No.: FT-28
Trade Mark: N/A
Date Received: 2022-05-17
Report Date: 2022-06-21

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:



Black Ding
EMC Engineer

Approved By:



Candy Li
EMC Engineer

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

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

Product	GMRS RADIO
Tested Model	FT-28
Frequency Range	462.5500-462.7250MHz (Main channels) 462.5625-462.7125MHz(Interstitial channels) 467.5500-467.7250MHz (Main channels) 467.5625-467.7125MHz(Interstitial channels)
The Maximum Output Power (ERP)	462.6250 MHz: 32.24dBm(Main channels) 462.6375 MHz: 32.26dBm(Interstitial channels) 467.6250 MHz: 32.14dBm(Main channels) 467.6375 MHz: 26.44dBm(Interstitial channels)
Modulation Technique	FM
Antenna Specification	Omni External Antenna: 2.0dBi
Voltage Range	DC 3.7V from battery or DC 5V from USB port
Sample serial number	XMTN1220517-21002E-RF-S1 (Assigned by ATC)
Sample/EUT Status	Good condition
Adapter information	Model: AS011Z-0501000UU; Input: 100-240V~50/60Hz, 0.45A; Output: 5.0V1.0A

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, and ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services.

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
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
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

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

462MHz interstitial channels

Channel No.	Channel Frequency (MHz)	Channel No.	Channel Frequency (MHz)
1	462.5625	2	462.5875
3	462.6125	4	462.6375
5	462.6625	6	462.6875
7	462.7125	8	/

467MHz main channels

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

Note: The EUT transmit on these 467MHz main channels only when communicating through a repeater station or making brief test transmissions in accordance with § 95.319(c), and which testing is compliant to this report and will do not cause interference to the communications of other stations.

467MHz interstitial channels

Channel No.	Channel Frequency (MHz)	Channel No.	Channel Frequency (MHz)
1	467.5625	2	467.5875
3	467.6125	4	467.6375
5	467.6625	6	467.6875
7	467.7125	8	/

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

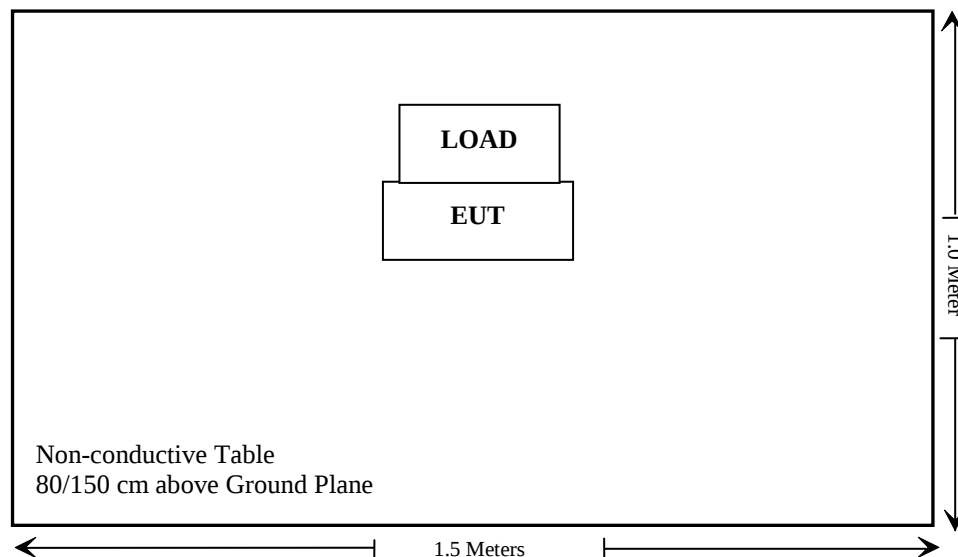
Manufacturer	Description	Model	Serial Number
Unknow	100W	Unknow	Unknow

External I/O Cable

Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

For Spurious emission test:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§2.1093	RF Exposure	Compliant
§95.1787	GMRS additional requirements	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 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
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/11/09	2022/11/08
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/12/13	2022/12/12
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
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
Unknown	RF Coaxial Cable	No.16	N200	2021/12/14	2022/12/13
AGILENT	Vector Signal Generator	N5182A	MY50143401	2021/12/13	2022/12/12
Radiated Emission Test Software: e3 19821b(V9)					
RF Conducted Test					
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
Aeroflex/Weinschel	30dB Attenuator (Input 250W/Output 50W)	58-30-33	PS467	2021/12/14	2022/12/13
HP Agilent	RF Communication Test Set	8920B	3325U00859	2021/12/13	2022/12/12
Mini-Circuits	Power Splitter	DC-18000MHz	SF10944151S	2021/12/13	2022/12/12
Gongwen	Temp. & Humid. Chamber	HSD-500	109	2021/10/14	2022/10/13
UNI-T	DC Power Supply	UTP8305B	10584	NCR	NCR
Fluke	Desktop Multi Meter	45	7664009	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.32	RF-02	Each time	

*** 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 §1.1307(b) & §2.1093 - RF EXPOSURE

Applicable Standard

According to FCC §1.1307(b) and §2.1093, portable device operates Part 95 should be subjected to routine environmental evaluation for RF exposure prior or equipment authorization or use.

Result: Compliant.

Please refer to SAR Report Number: CR22050028-20A.

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.

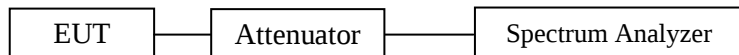
(b) 462 MHz interstitial channels. The effective radiated power (ERP) of mobile, hand-held portable and base stations transmitting on the 462 MHz interstitial channels must not exceed 5 Watts.

(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

Test Method: TIA/EIA-603-E 2016.

1) Connect the equipment as below setup block.



- 2) Correct for all losses in the RF path.
- 3) Set the RBW of 100kHz and VBW of 300kHz for Spectrum Analyzer.
- 4) Detector of Peak.
- 5) Trace mode is Maxhold.
- 6) Allow trace to fully stabilize.
- 7) The peak value recorded is the conducted output power.
- 8) Repeat to test all frequencies.

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Cat Kang on 2022-05-24.

Test Mode: Transmitting

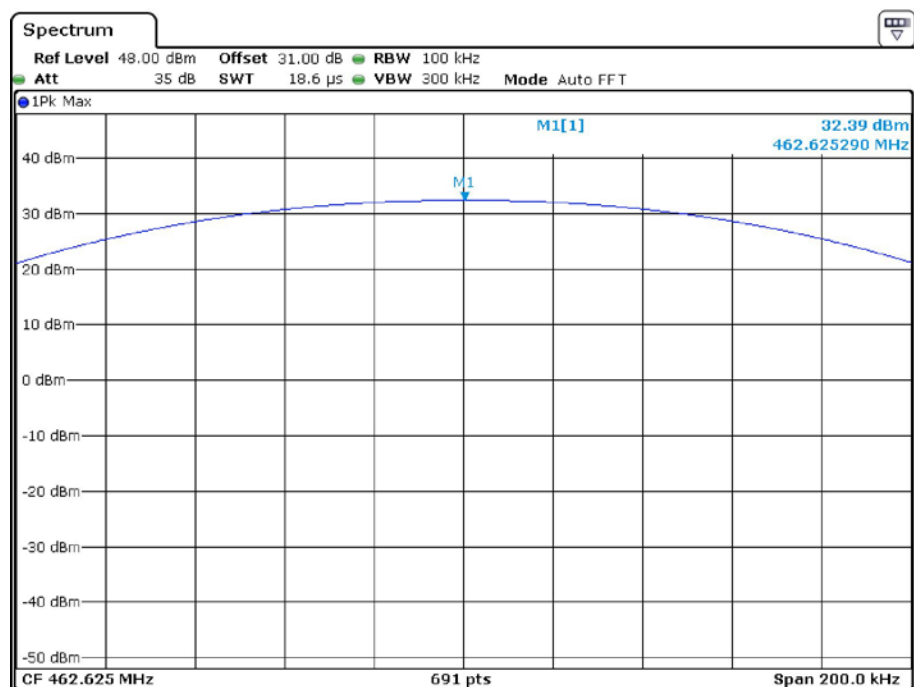
Test Result: Compliant.

Please refer to the following tables and plots.

Test Frequency (MHz)	Conducted Output Power (dBm)	Conducted Output Power Limit (dBm)	ERP (dBm)	ERP Limit (dBm)
462.6250	32.39	47	32.24	/
462.6375	32.41	/	32.26	37
467.6250	32.29	47	32.14	/
467.6375	26.59	/	26.44	27

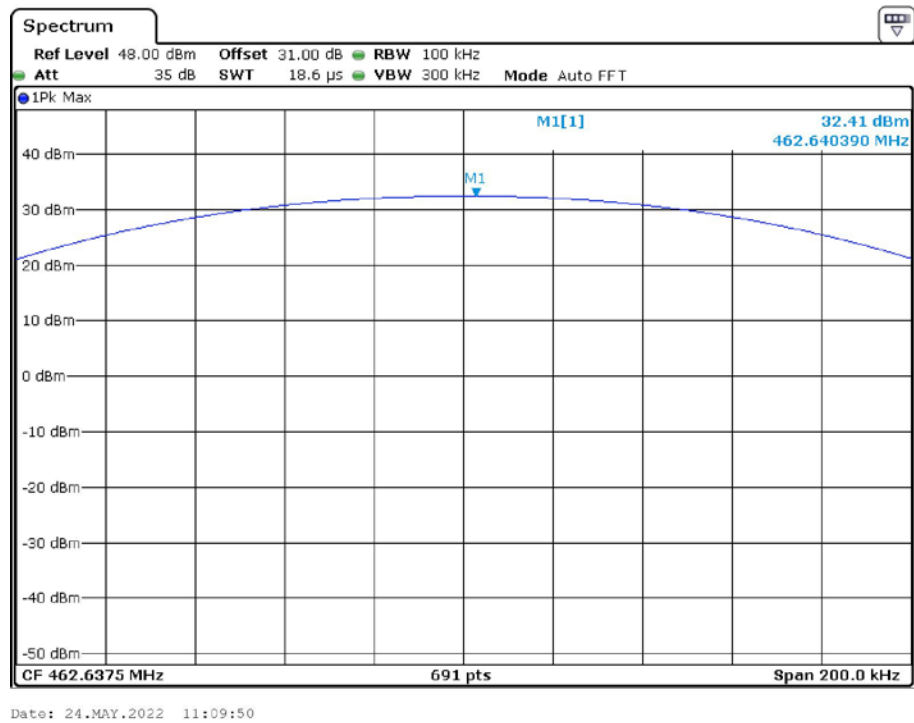
Note:
 Antenna Gain:2.0dBi(-0.15dBd)
 0dBd=2.15dBi
 ERP=Conducted Output Power+ Antenna Gain(dBd)

462.625MHz

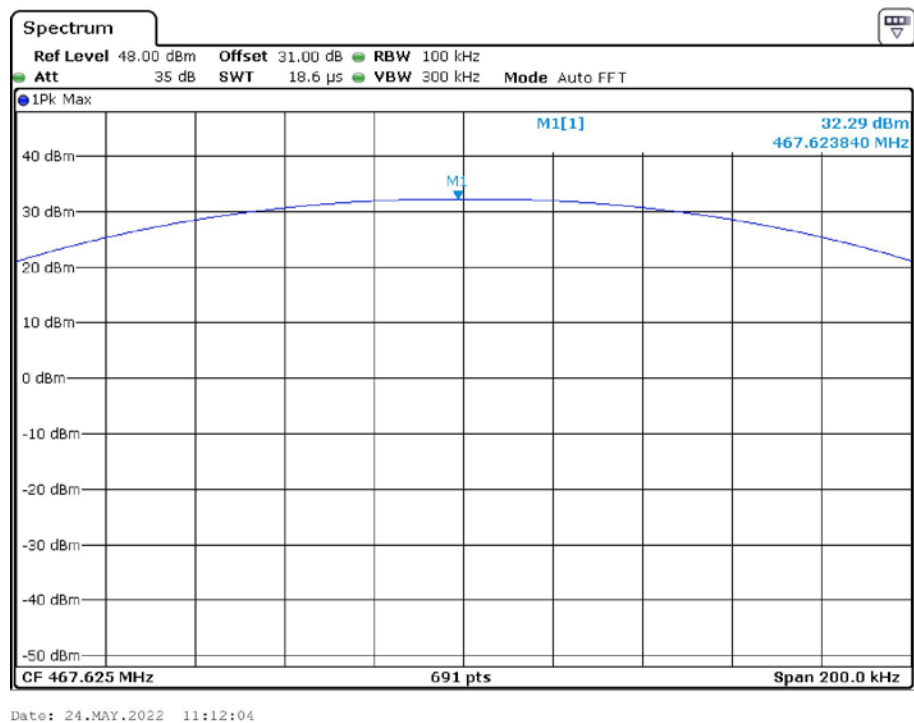


Date: 24.MAY.2022 11:10:45

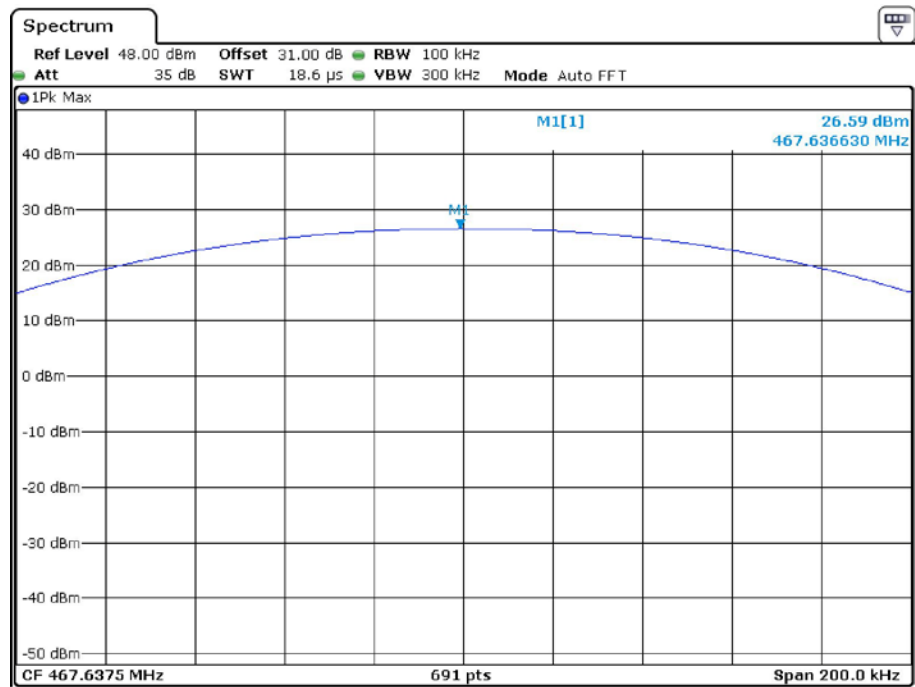
462.6375MHz



467.625MHz



467.6375MHz



Date: 24.MAY.2022 11:14:52

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 2016

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	50 %
ATM Pressure:	101.1 kPa

The testing was performed by Cat Kang on 2022-05-23.

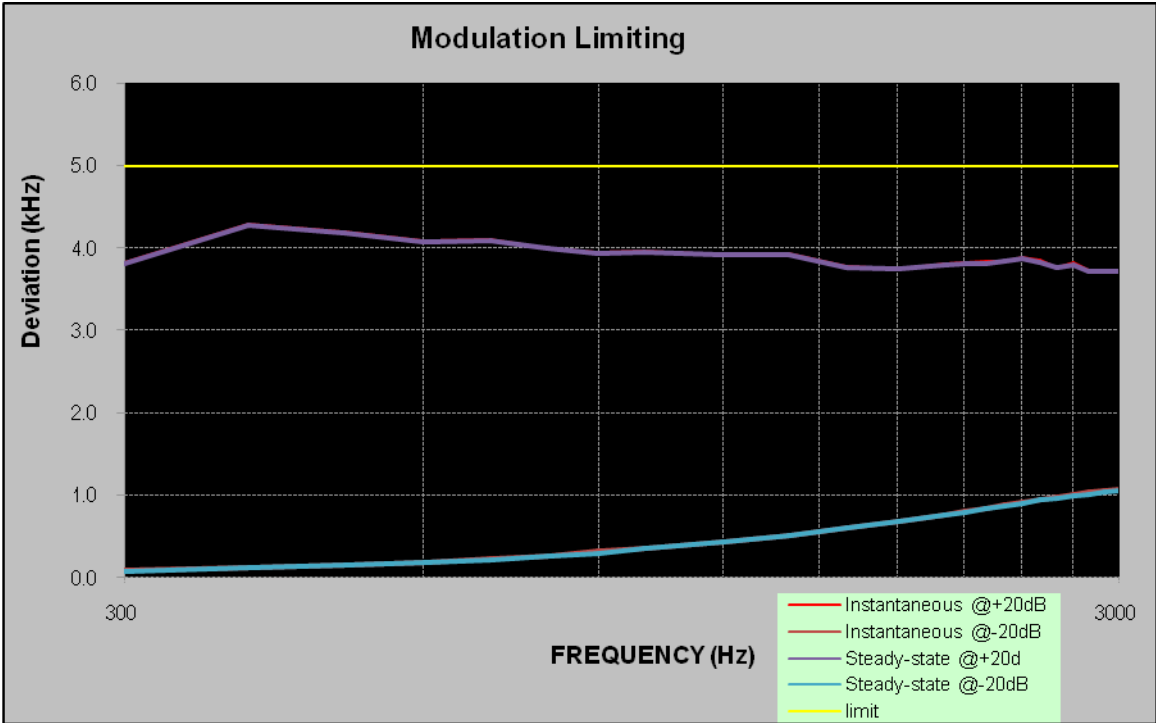
Please refer to the following tables and plots.

Test Mode: Transmitting

MODULATION LIMITING

Carrier Frequency: 462.6250MHz

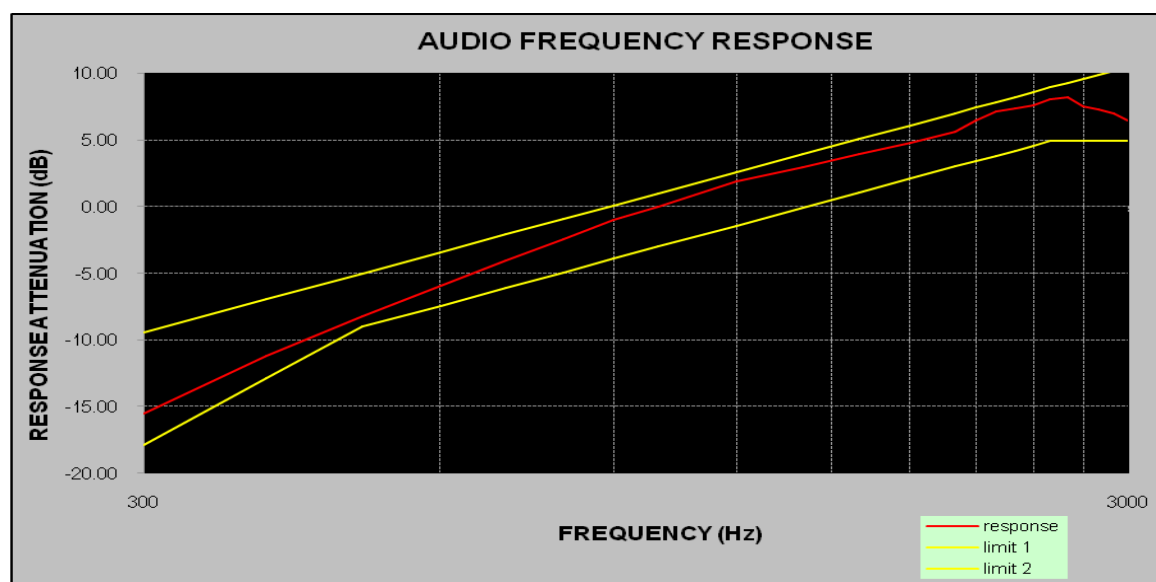
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	3.824	0.092	3.811	0.076	5.000
400	4.295	0.121	4.277	0.114	5.000
500	4.196	0.152	4.188	0.148	5.000
600	4.096	0.191	4.073	0.183	5.000
700	4.105	0.231	4.093	0.214	5.000
800	4.001	0.262	3.993	0.258	5.000
900	3.955	0.317	3.943	0.299	5.000
1000	3.969	0.351	3.951	0.347	5.000
1200	3.927	0.434	3.915	0.427	5.000
1400	3.941	0.516	3.922	0.507	5.000
1600	3.781	0.603	3.768	0.598	5.000
1800	3.753	0.684	3.749	0.675	5.000
2000	3.812	0.764	3.802	0.759	5.000
2100	3.832	0.809	3.818	0.798	5.000
2200	3.839	0.842	3.815	0.830	5.000
2300	3.843	0.880	3.838	0.875	5.000
2400	3.885	0.914	3.878	0.906	5.000
2500	3.863	0.946	3.825	0.939	5.000
2600	3.767	0.981	3.759	0.965	5.000
2700	3.820	1.003	3.801	0.995	5.000
2800	3.729	1.037	3.710	1.012	5.000
2900	3.738	1.051	3.725	1.047	5.000
3000	3.733	1.065	3.725	1.057	5.000



Audio Frequency Response

Carrier Frequency: 462.6250 MHz

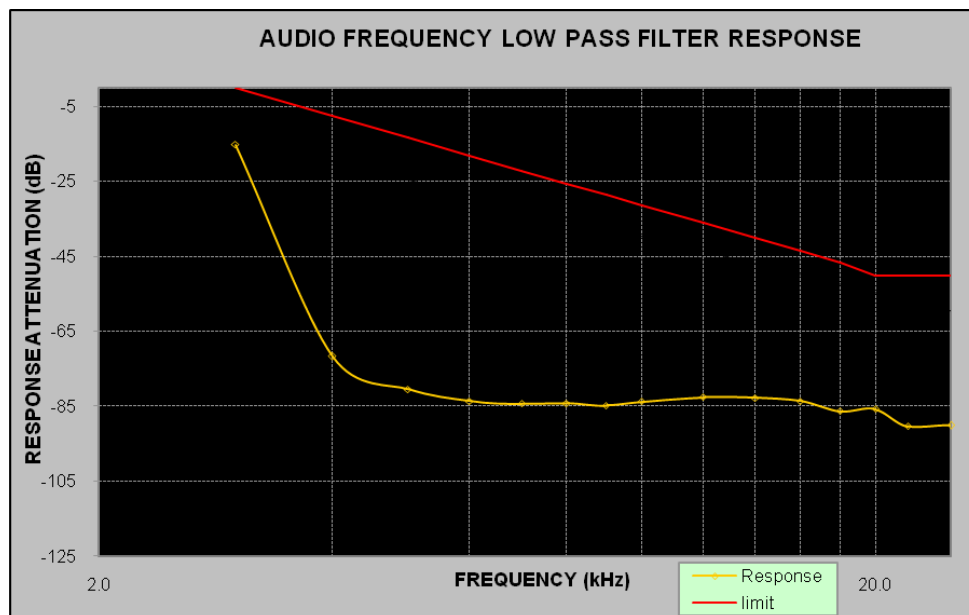
Audio Frequency (Hz)	Response Attenuation (dB)
300	-15.49
400	-11.18
500	-8.25
600	-5.95
700	-4.04
800	-2.43
900	-1.01
1000	0.00
1200	1.92
1400	2.97
1600	3.94
1800	4.76
2000	5.65
2100	6.42
2200	7.15
2300	7.35
2400	7.64
2500	8.02
2600	8.21
2700	7.53
2800	7.28
2900	7.01
3000	6.45



Audio frequency lows pass filter response

Carrier Frequency: 462.625 MHz

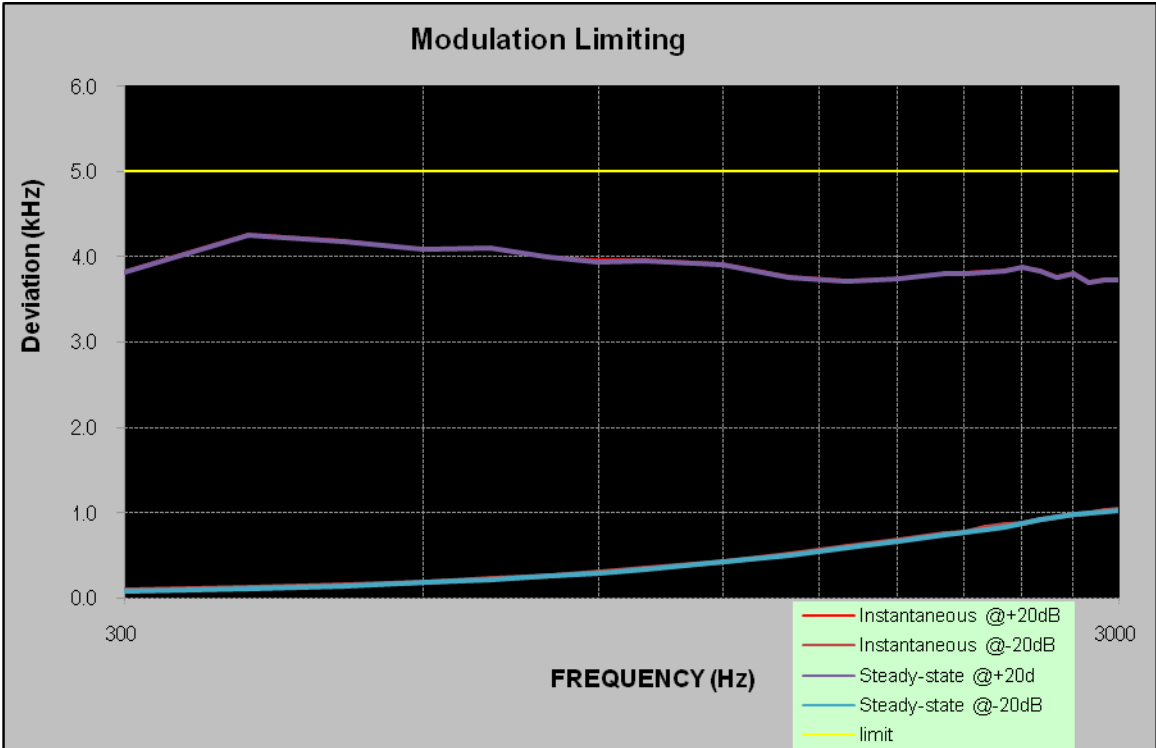
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-15.1	0.0
4.0	-71.7	-7.5
5.0	-80.4	-13.3
6.0	-83.6	-18.1
7.0	-84.3	-22.1
8.0	-84.2	-25.6
9.0	-84.8	-28.6
10.0	-83.7	-31.4
12.0	-82.5	-36.1
14.0	-82.7	-40.1
16.0	-83.7	-43.6
18.0	-86.3	-46.7
20.0	-85.7	-50.0
22.0	-90.3	-50.0
25.0	-90.1	-50.0
30.0	-91.4	-50.0



MODULATION LIMITING

Carrier Frequency: 462.6375MHz

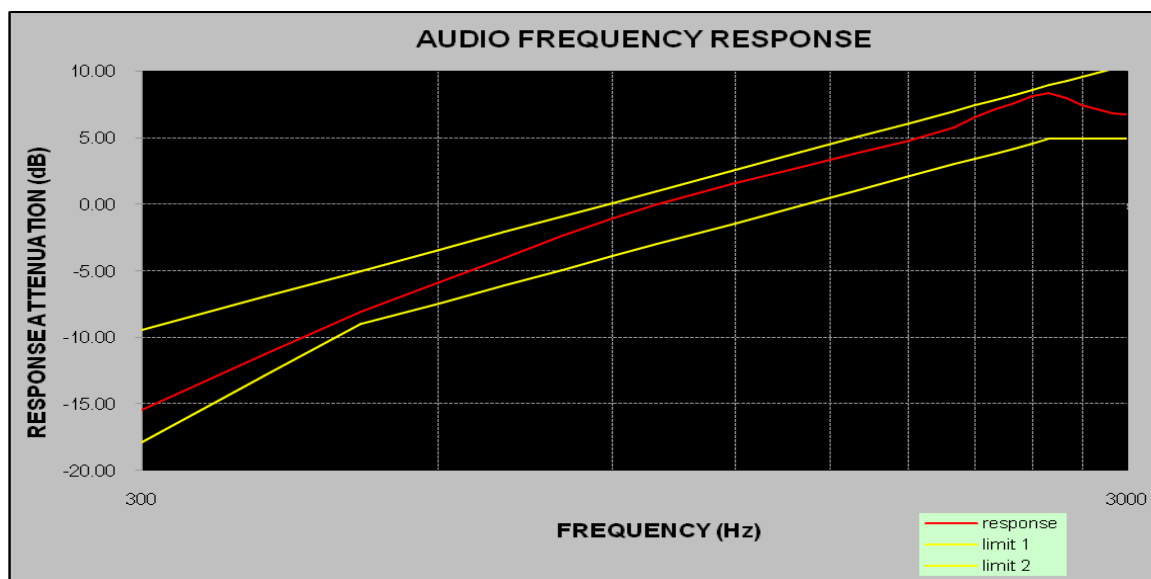
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	3.835	0.092	3.818	0.076	5.000
400	4.275	0.123	4.260	0.119	5.000
500	4.192	0.156	4.186	0.143	5.000
600	4.090	0.192	4.083	0.185	5.000
700	4.109	0.235	4.098	0.218	5.000
800	4.001	0.265	3.998	0.258	5.000
900	3.963	0.305	3.945	0.299	5.000
1000	3.971	0.347	3.949	0.341	5.000
1200	3.927	0.431	3.915	0.422	5.000
1400	3.774	0.516	3.763	0.504	5.000
1600	3.729	0.604	3.717	0.591	5.000
1800	3.749	0.680	3.738	0.669	5.000
2000	3.803	0.764	3.797	0.747	5.000
2100	3.817	0.772	3.799	0.768	5.000
2200	3.836	0.828	3.823	0.808	5.000
2300	3.850	0.861	3.838	0.839	5.000
2400	3.886	0.884	3.873	0.871	5.000
2500	3.852	0.928	3.837	0.915	5.000
2600	3.767	0.953	3.759	0.945	5.000
2700	3.816	0.982	3.804	0.975	5.000
2800	3.717	1.003	3.703	0.997	5.000
2900	3.745	1.022	3.728	1.014	5.000
3000	3.738	1.036	3.724	1.024	5.000



Audio Frequency Response

Carrier Frequency: 462.6375 MHz

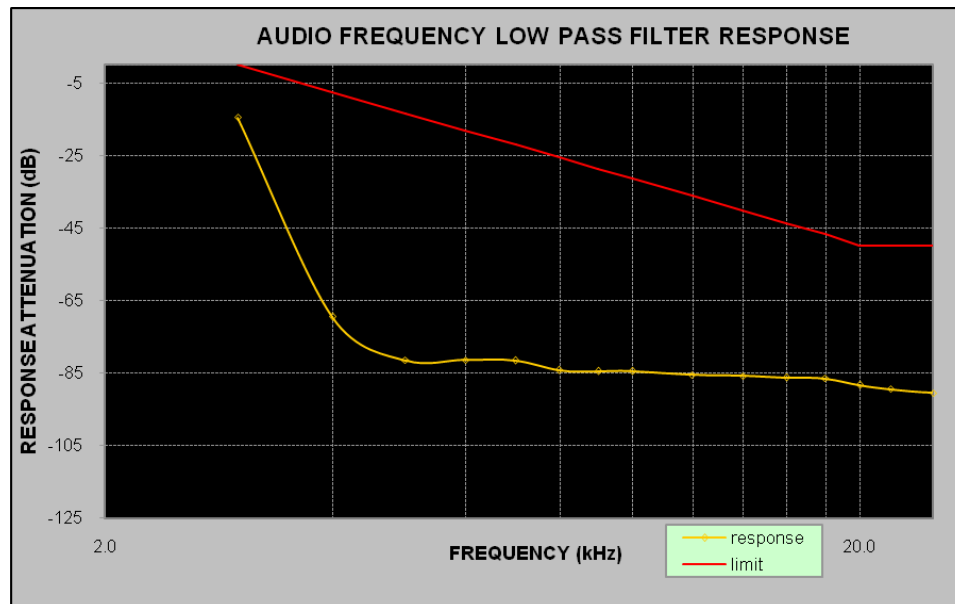
Audio Frequency (Hz)	Response Attenuation (dB)
300	-15.44
400	-11.28
500	-8.09
600	-5.87
700	-4.05
800	-2.37
900	-1.05
1000	0.00
1200	1.55
1400	2.84
1600	3.88
1800	4.82
2000	5.75
2100	6.55
2200	7.15
2300	7.61
2400	8.14
2500	8.36
2600	7.95
2700	7.46
2800	7.17
2900	6.82
3000	6.74



Audio frequency lows pass filter response

Carrier Frequency: 462.6375 MHz

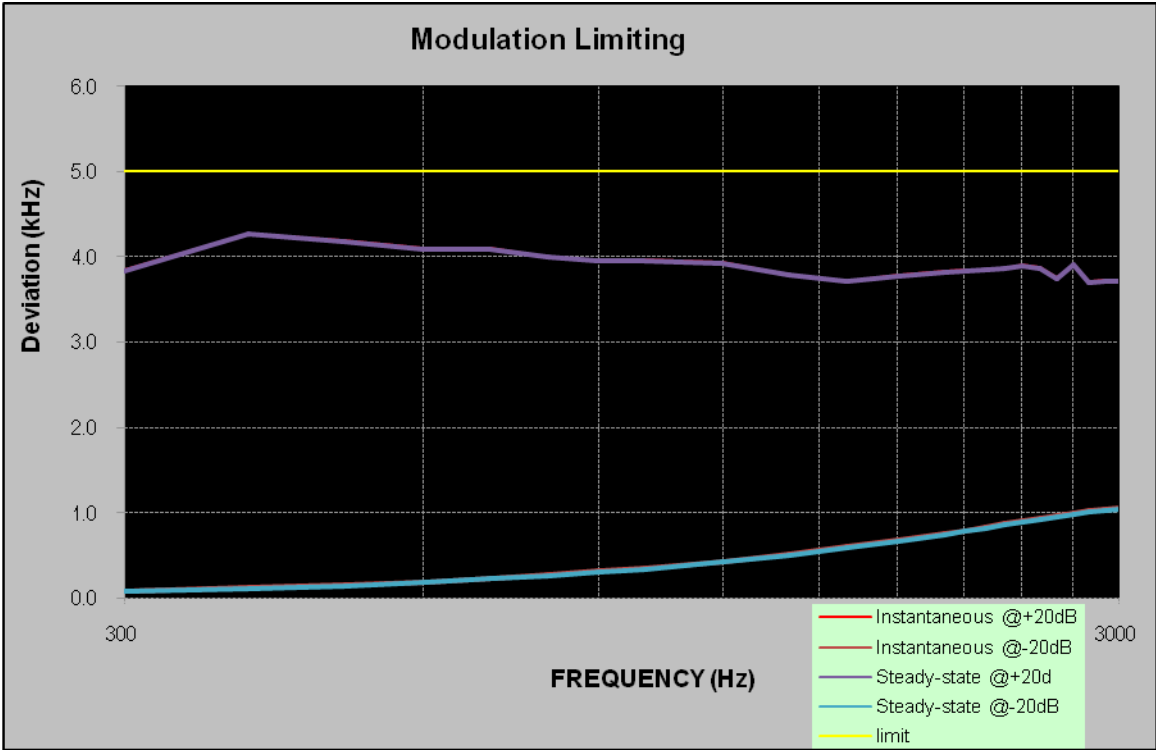
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-14.5	0.0
4.0	-69.6	-7.5
5.0	-81.5	-13.3
6.0	-81.4	-18.1
7.0	-81.6	-22.1
8.0	-84.2	-25.6
9.0	-84.5	-28.6
10.0	-84.5	-31.4
12.0	-85.5	-36.1
14.0	-85.8	-40.1
16.0	-86.3	-43.6
18.0	-86.5	-46.7
20.0	-88.3	-50.0
22.0	-89.4	-50.0
25.0	-90.5	-50.0
30.0	-90.6	-50.0



MODULATION LIMITING

Carrier Frequency: 467.625MHz

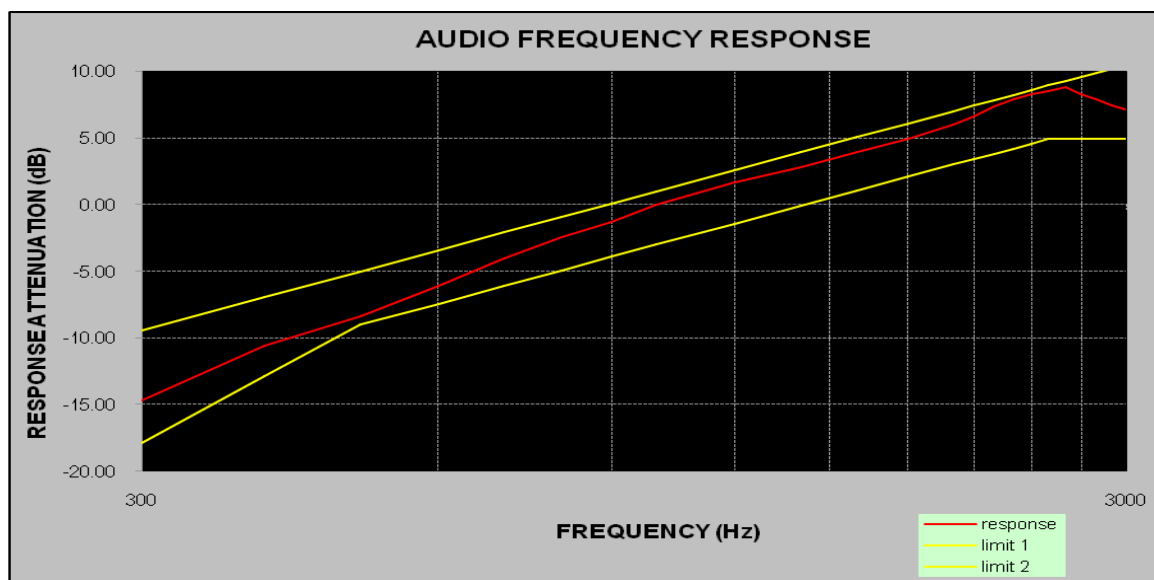
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	3.842	0.082	3.827	0.076	5.000
400	4.272	0.131	4.267	0.115	5.000
500	4.195	0.151	4.177	0.148	5.000
600	4.097	0.193	4.088	0.186	5.000
700	4.107	0.231	4.088	0.227	5.000
800	4.004	0.276	3.995	0.266	5.000
900	3.957	0.319	3.949	0.306	5.000
1000	3.962	0.351	3.949	0.342	5.000
1200	3.939	0.432	3.924	0.424	5.000
1400	3.791	0.512	3.785	0.508	5.000
1600	3.718	0.602	3.708	0.589	5.000
1800	3.782	0.681	3.767	0.671	5.000
2000	3.834	0.751	3.821	0.741	5.000
2100	3.851	0.791	3.839	0.785	5.000
2200	3.855	0.834	3.842	0.823	5.000
2300	3.870	0.874	3.864	0.860	5.000
2400	3.903	0.902	3.896	0.899	5.000
2500	3.875	0.937	3.862	0.926	5.000
2600	3.752	0.971	3.746	0.955	5.000
2700	3.915	0.992	3.906	0.989	5.000
2800	3.716	1.022	3.705	1.015	5.000
2900	3.725	1.041	3.711	1.035	5.000
3000	3.728	1.053	3.716	1.044	5.000



Audio Frequency Response

Carrier Frequency: 467.6250 MHz

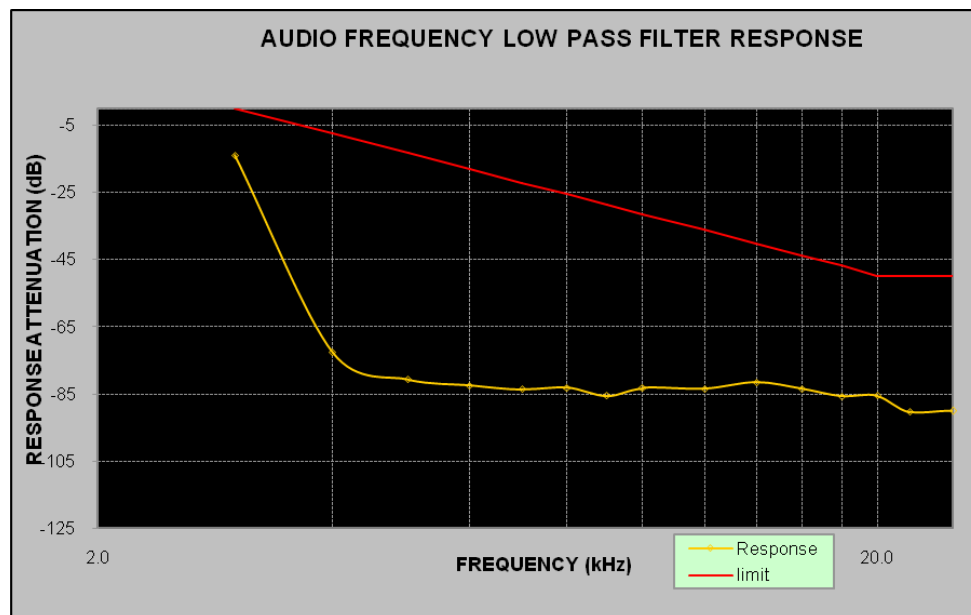
Audio Frequency (Hz)	Response Attenuation (dB)
300	-14.66
400	-10.54
500	-8.38
600	-6.09
700	-4.07
800	-2.43
900	-1.30
1000	0.00
1200	1.63
1400	2.82
1600	3.97
1800	4.92
2000	5.99
2100	6.63
2200	7.35
2300	7.91
2400	8.27
2500	8.54
2600	8.85
2700	8.31
2800	7.87
2900	7.47
3000	7.17



Audio frequency lows pass filter response

Carrier Frequency: 467.625 MHz

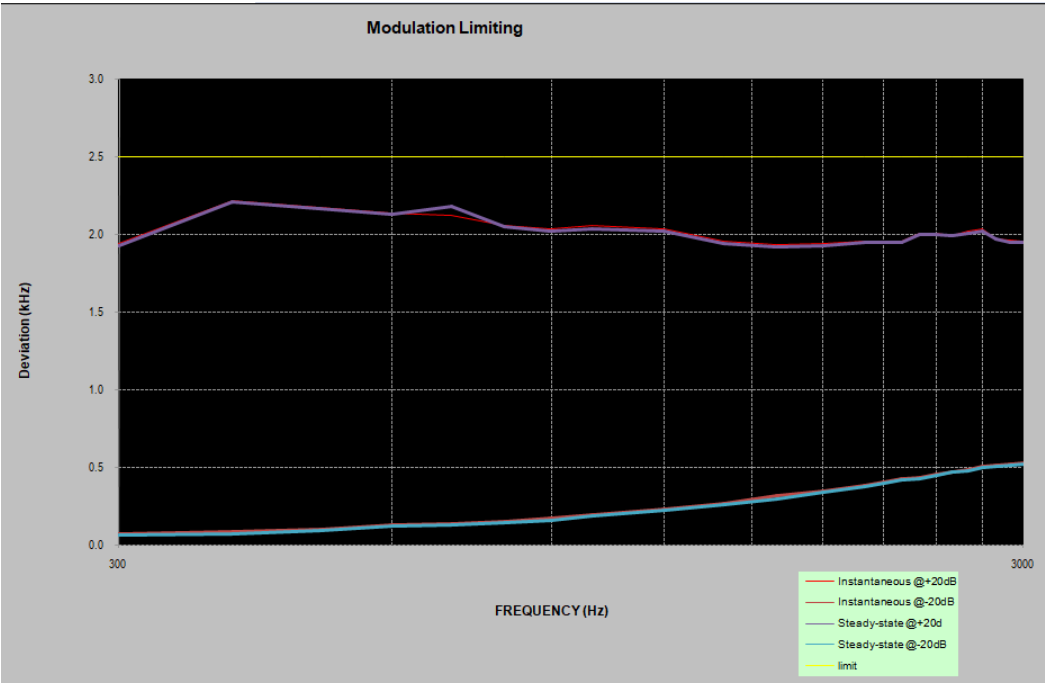
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-13.9	0.0
4.0	-72.6	-7.5
5.0	-80.6	-13.3
6.0	-82.5	-18.1
7.0	-83.5	-22.1
8.0	-83.1	-25.6
9.0	-85.5	-28.6
10.0	-83.2	-31.4
12.0	-83.4	-36.1
14.0	-81.5	-40.1
16.0	-83.4	-43.6
18.0	-85.6	-46.7
20.0	-85.5	-50.0
22.0	-90.3	-50.0
25.0	-90.1	-50.0
30.0	-91.4	-50.0



MODULATION LIMITING

Carrier Frequency: 467.6375MHz

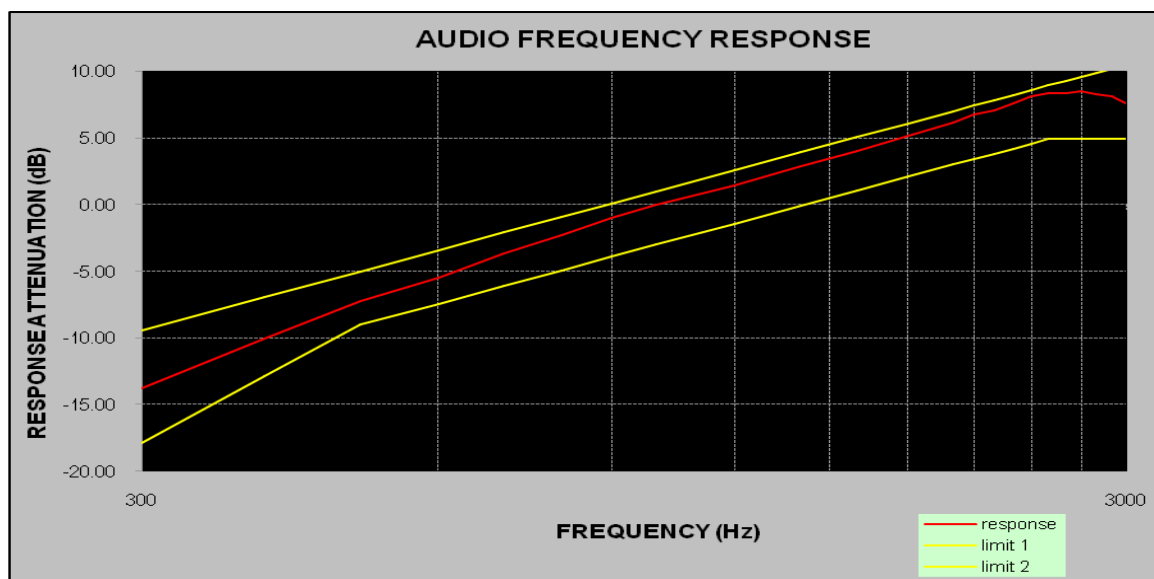
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit [kHz]
	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	DEVIATION (@+20dB) [kHz]	DEVIATION (@-20dB) [kHz]	
300	1.936	0.067	1.924	0.058	2.500
400	2.211	0.081	2.205	0.072	2.500
500	2.171	0.097	2.163	0.089	2.500
600	2.132	0.124	2.125	0.119	2.500
700	2.121	0.131	2.177	0.124	2.500
800	2.054	0.150	2.047	0.141	2.500
900	2.033	0.172	2.019	0.159	2.500
1000	2.052	0.191	2.033	0.183	2.500
1200	2.029	0.231	2.016	0.218	2.500
1400	1.952	0.263	1.938	0.258	2.500
1600	1.931	0.315	1.919	0.294	2.500
1800	1.941	0.346	1.926	0.337	2.500
2000	1.952	0.381	1.948	0.375	2.500
2100	1.951	0.403	1.946	0.394	2.500
2200	1.951	0.422	1.947	0.418	2.500
2300	2.003	0.433	1.996	0.427	2.500
2400	2.006	0.451	1.999	0.447	2.500
2500	1.992	0.471	1.986	0.466	2.500
2600	2.015	0.485	2.004	0.477	2.500
2700	2.030	0.501	2.019	0.499	2.500
2800	1.971	0.512	1.965	0.503	2.500
2900	1.961	0.520	1.949	0.512	2.500
3000	1.951	0.524	1.943	0.519	2.500



Audio Frequency Response

Carrier Frequency: 467.6375 MHz

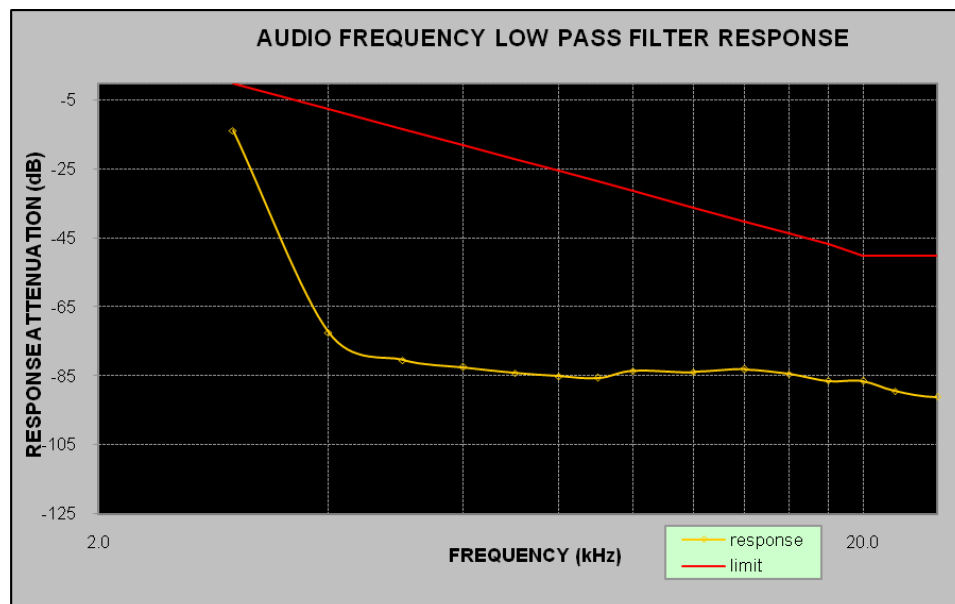
Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.81
400	-10.01
500	-7.21
600	-5.45
700	-3.69
800	-2.32
900	-0.97
1000	0.00
1200	1.42
1400	2.85
1600	4.03
1800	5.14
2000	6.12
2100	6.73
2200	7.05
2300	7.61
2400	8.12
2500	8.35
2600	8.37
2700	8.49
2800	8.28
2900	8.12
3000	7.58



Audio frequency lows pass filter response

Carrier Frequency: 467.6375 MHz

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0.0	/
3.0	-13.8	0.0
4.0	-72.5	-7.5
5.0	-80.4	-13.3
6.0	-82.5	-18.1
7.0	-84.1	-22.1
8.0	-85.1	-25.6
9.0	-85.6	-28.6
10.0	-83.5	-31.4
12.0	-83.9	-36.1
14.0	-83.1	-40.1
16.0	-84.5	-43.6
18.0	-86.5	-46.7
20.0	-86.5	-50.0
22.0	-89.4	-50.0
25.0	-91.1	-50.0
30.0	-90.4	-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 2016, section 2.2.11

Test Data

Environmental Conditions

Temperature:	24 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Cat Kang on 2022-05-24.

Test Mode: Transmitting

Item	Frequency (MHz)	OBW (kHz)	26dB Bandwidth (kHz)	Limit (kHz)	Result
GMRS	462.6250	10.941	15.977	20	Pass
GMRS	462.6375	10.941	15.977	20	Pass
GMRS	467.6250	10.941	15.977	20	Pass
GMRS	467.6375	9.378	10.767	12.5	Pass

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

The maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.

$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} \rightarrow 11K0$

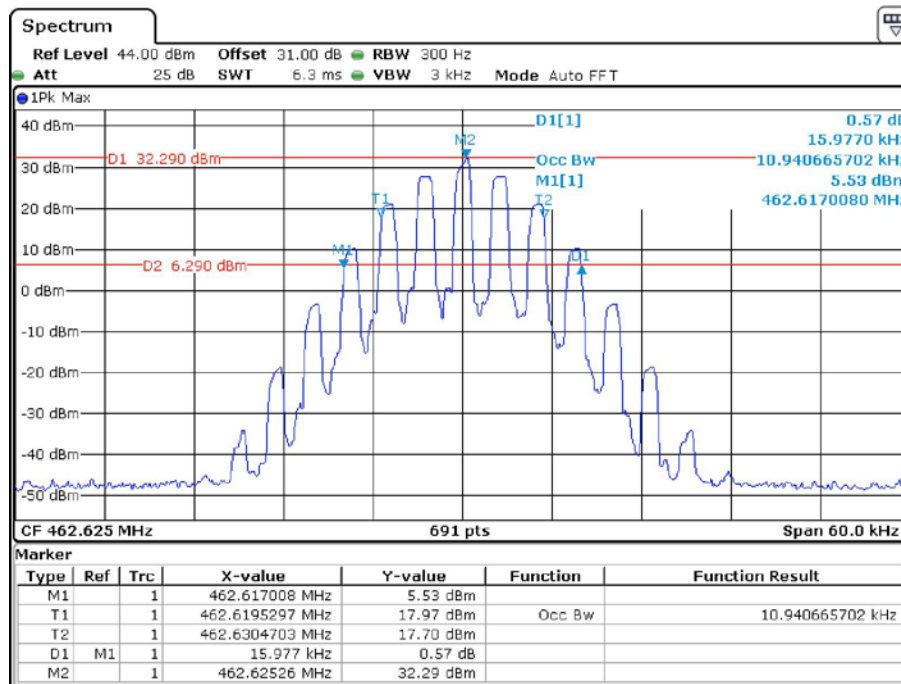
F3E portion of the designator represents an FM voice transmission Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

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

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

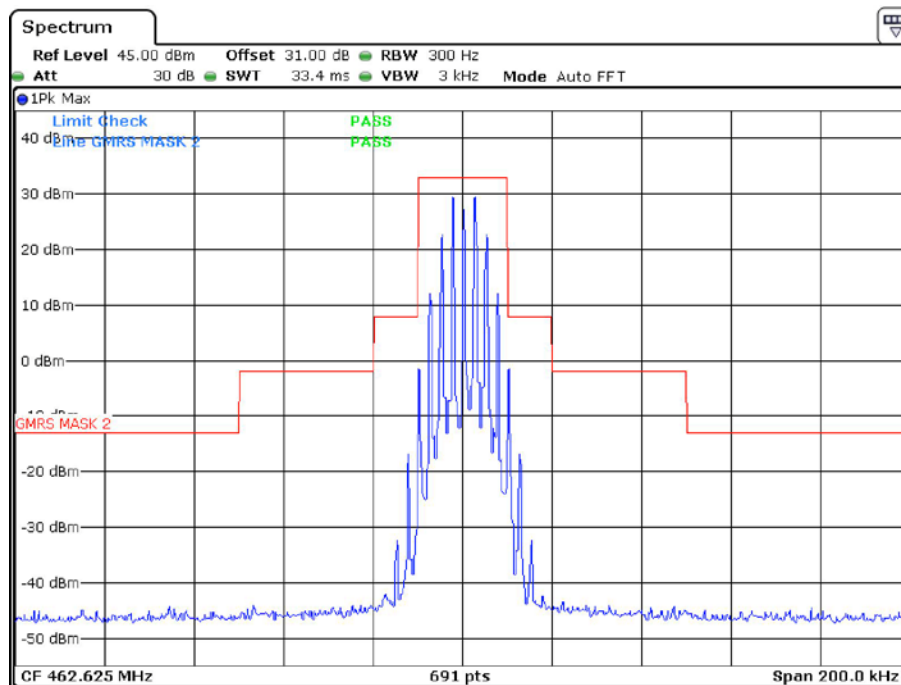
F3E portion of the designator represents an FM voice transmission Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 16K0F3E.

OBW, 462.6250 MHz



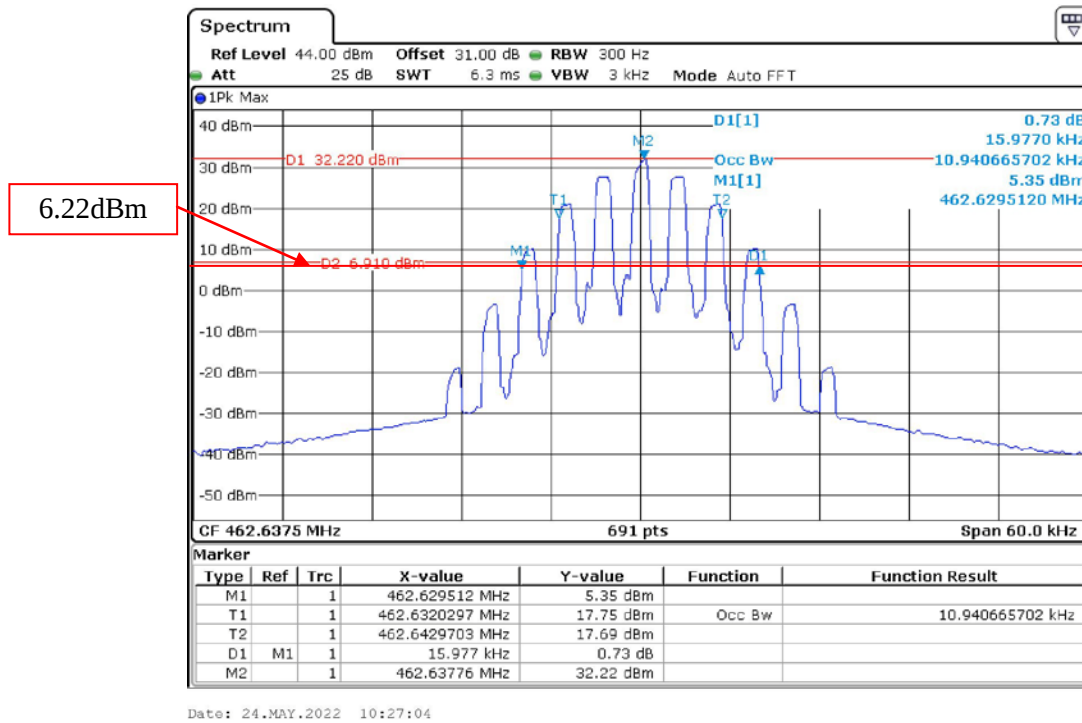
Date: 24.MAY.2022 10:29:41

Emission Mask, 462.6250 MHz

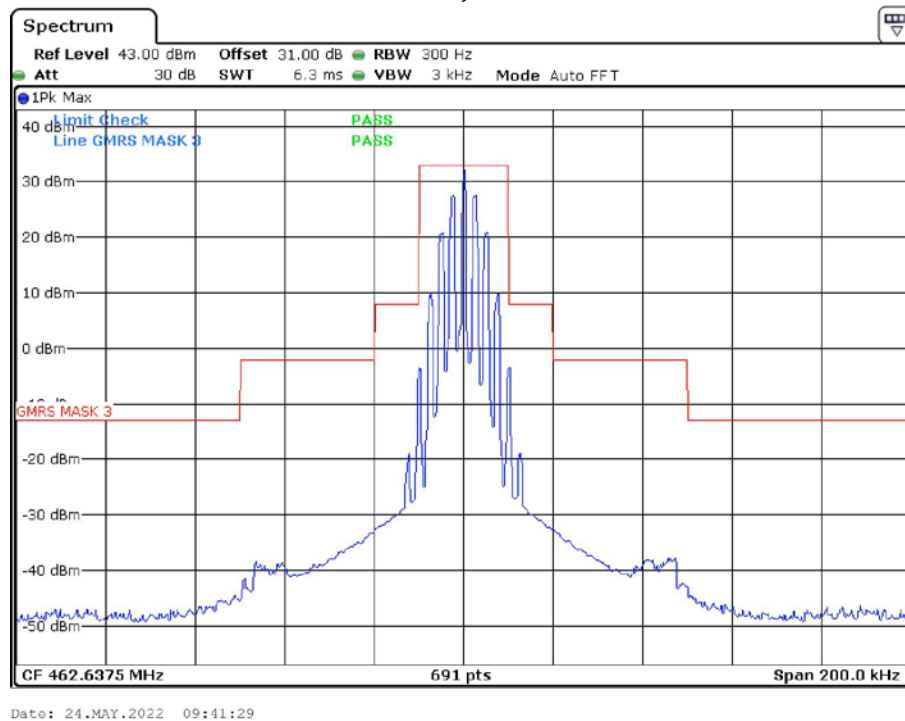


Date: 24.MAY.2022 09:00:26

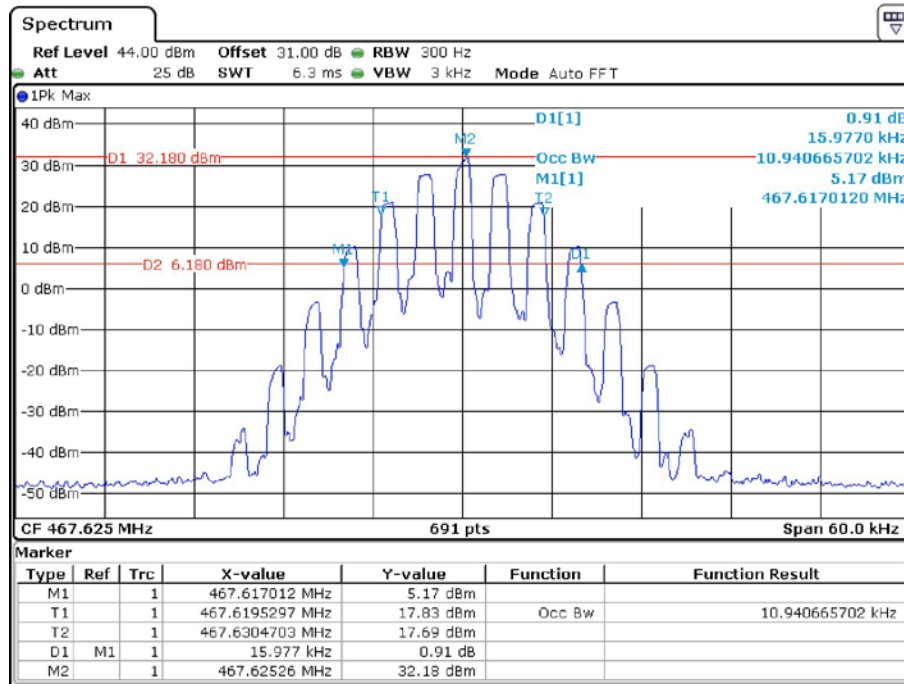
OBW, 462.6375 MHz



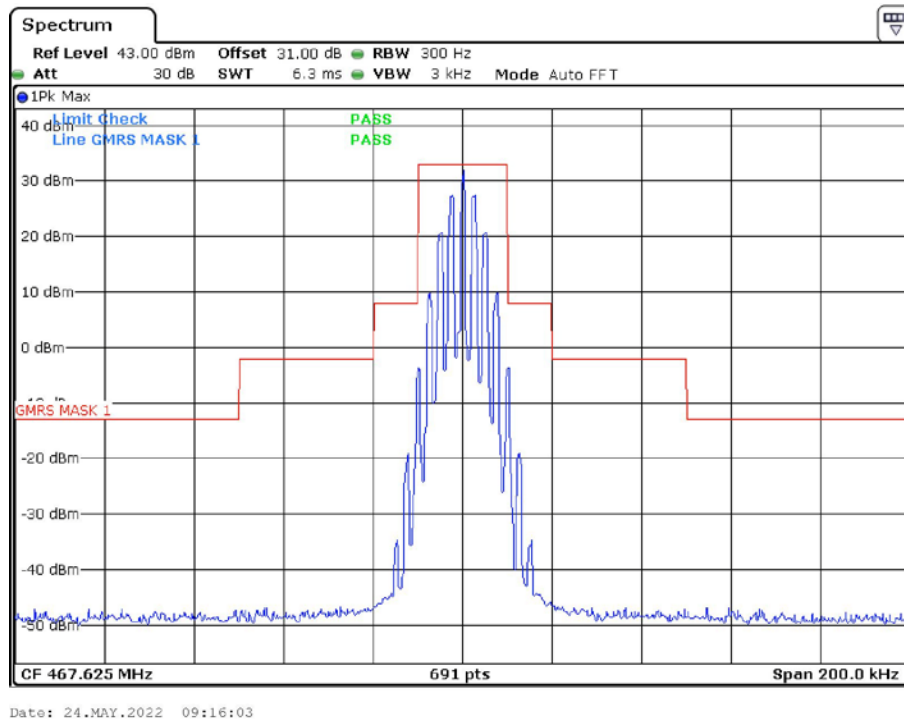
Emission Mask, 462.6375 MHz



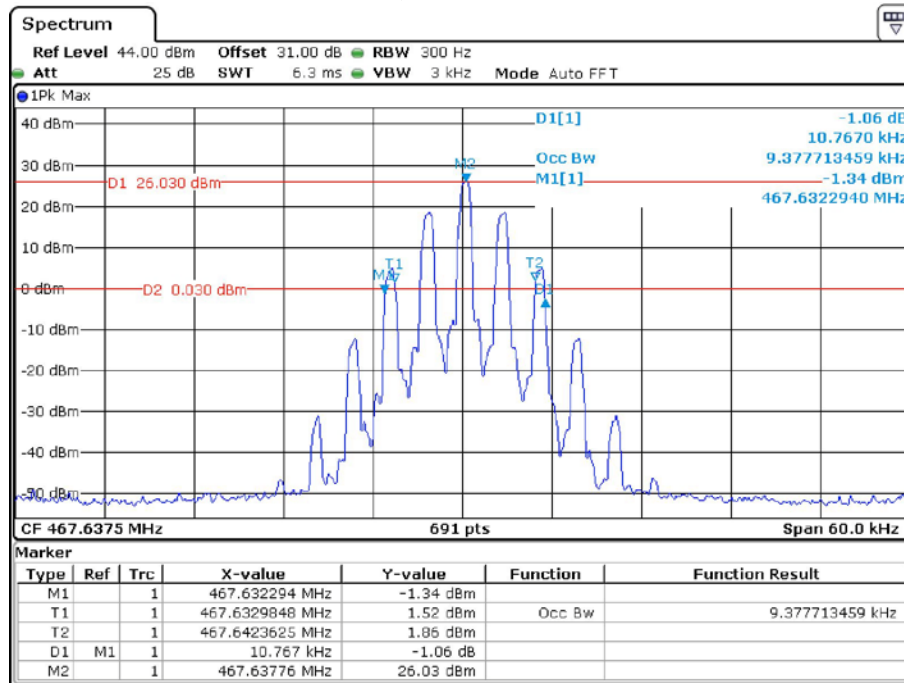
OBW, 467.6250 MHz



Emission Mask, 467.6250 MHz

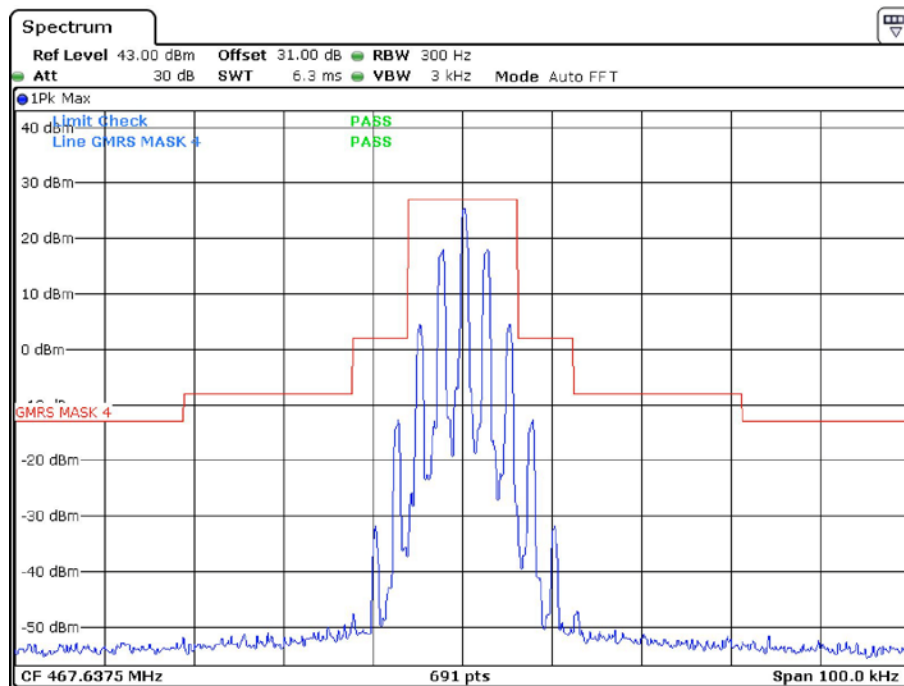


OBW, 467.6375 MHz



Date: 24.MAY.2022 10:33:12

Emission Mask, 467.6375 MHz



Date: 24.MAY.2022 10:19:03

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

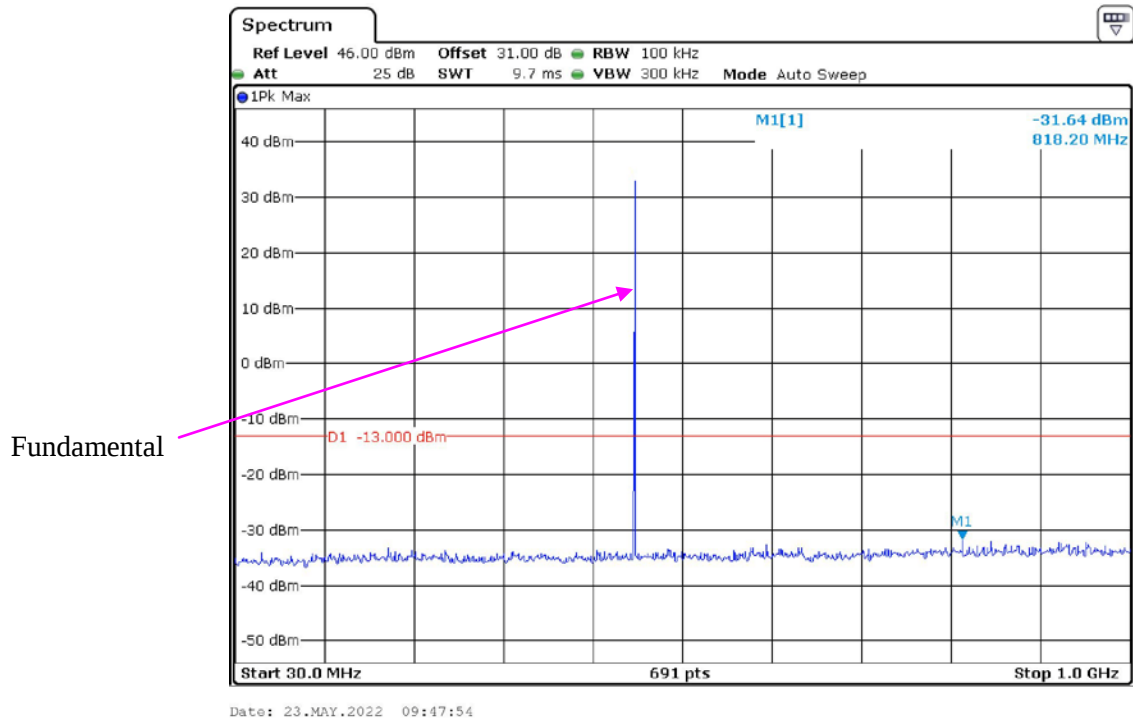
Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.1 kPa

The testing was performed by Cat Kang on 2022-05-23.

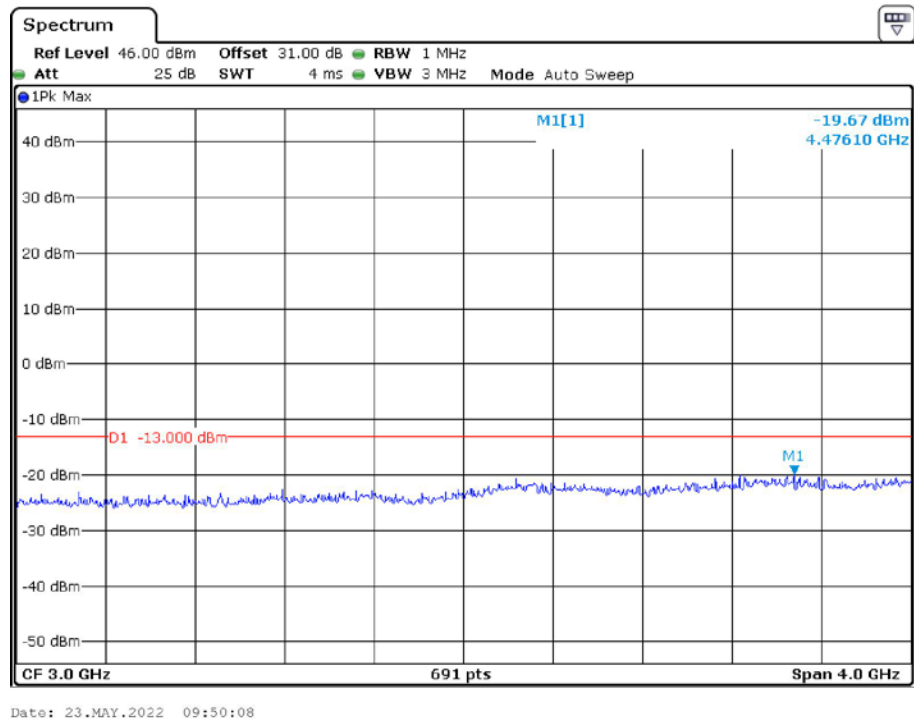
Test Mode: Transmitting

Please refer to the following plots.

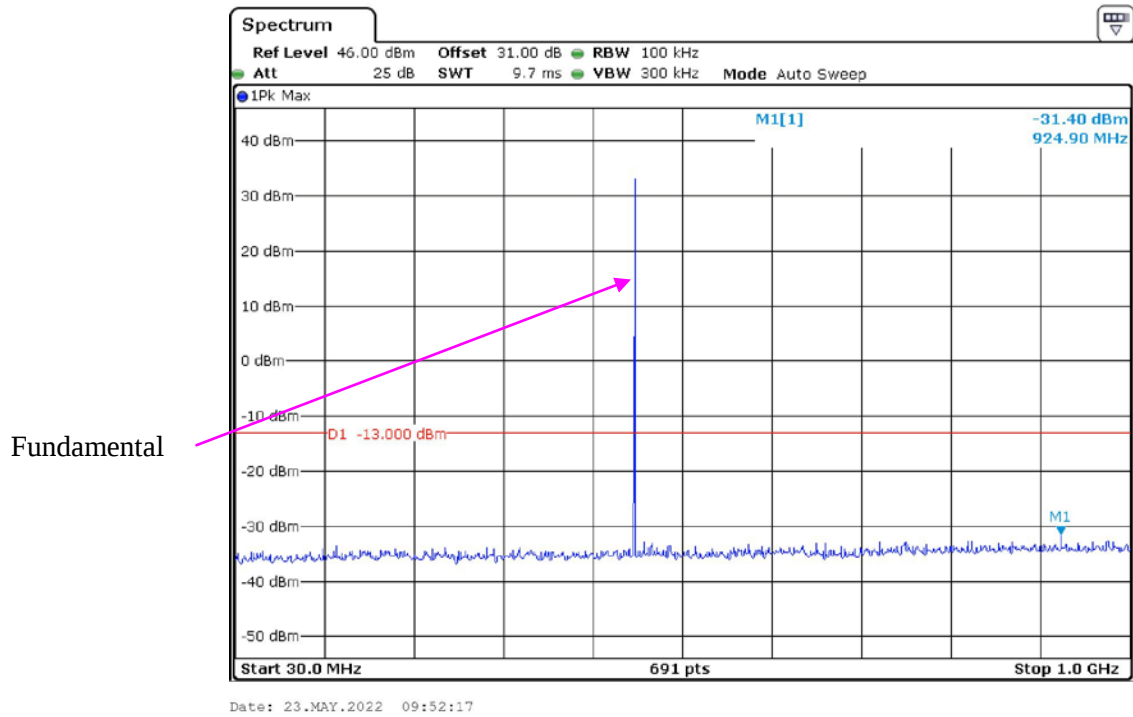
30 MHz – 1 GHz, 462.6250 MHz



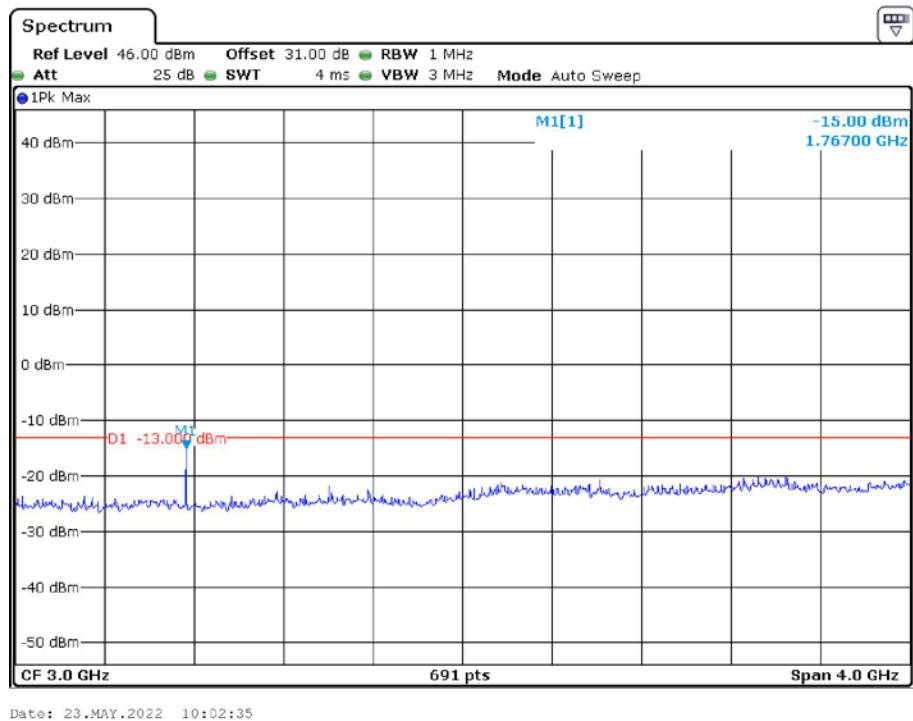
1 GHz – 5.0 GHz, 462.6250 MHz



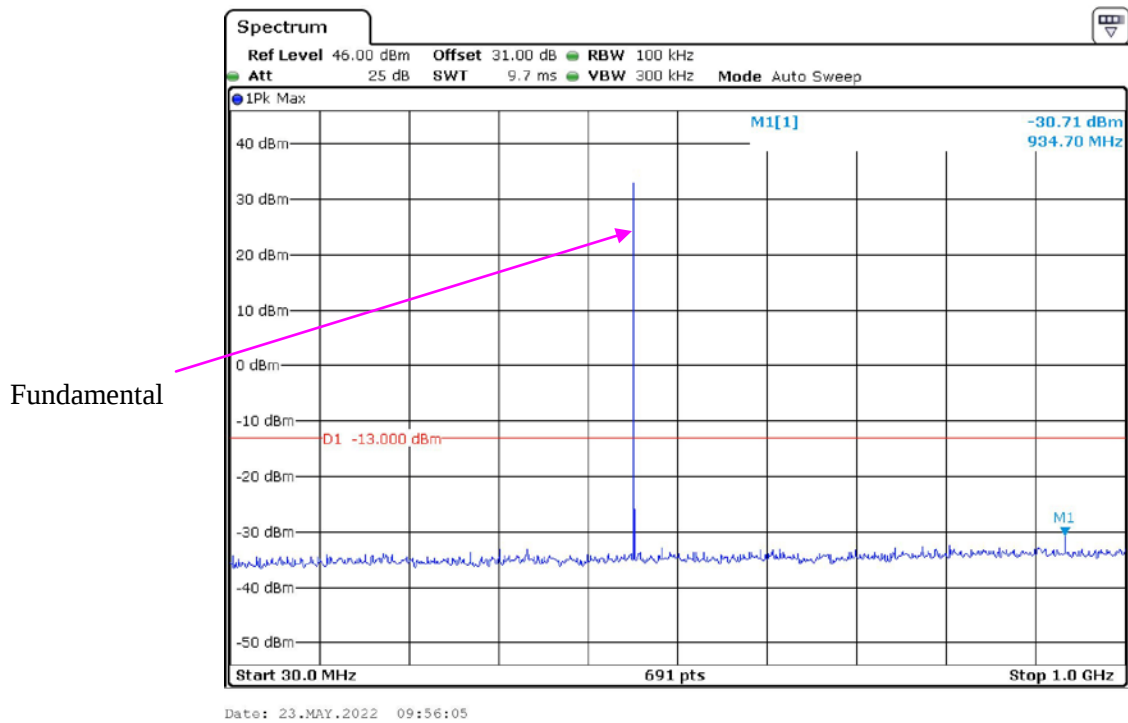
30 MHz – 1 GHz, 462.6375 MHz



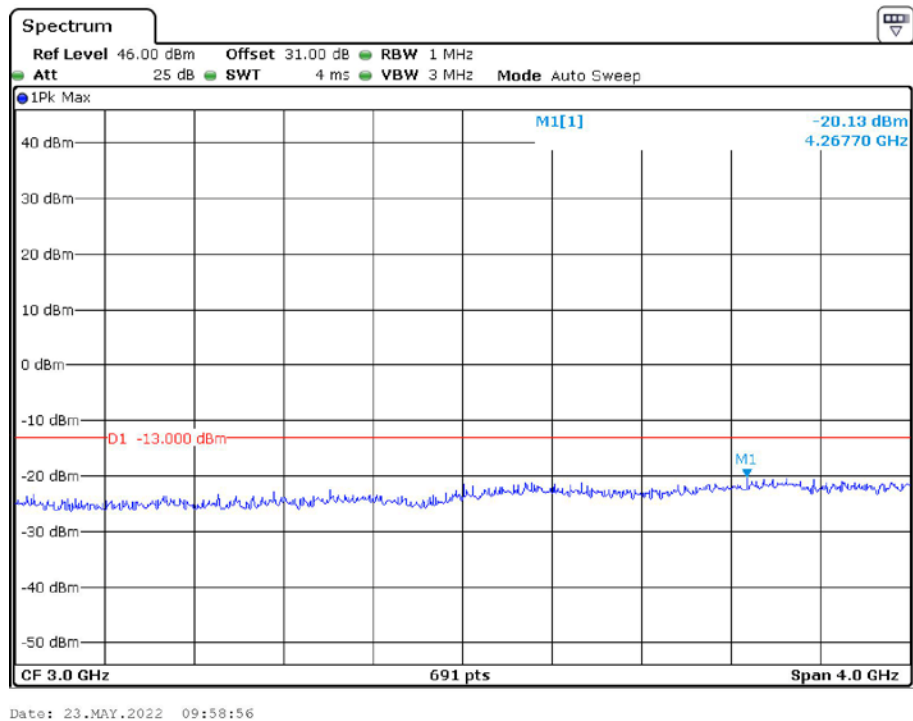
1 GHz – 5.0 GHz, 462.6375 MHz



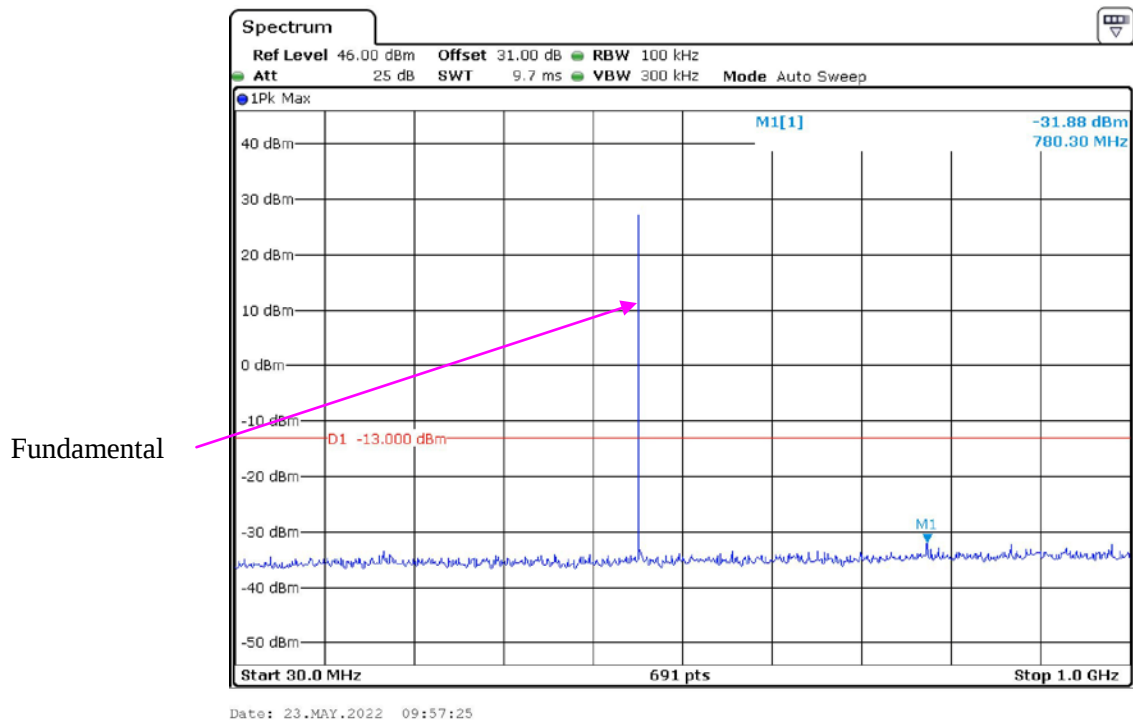
30 MHz – 1 GHz, 467.6250 MHz



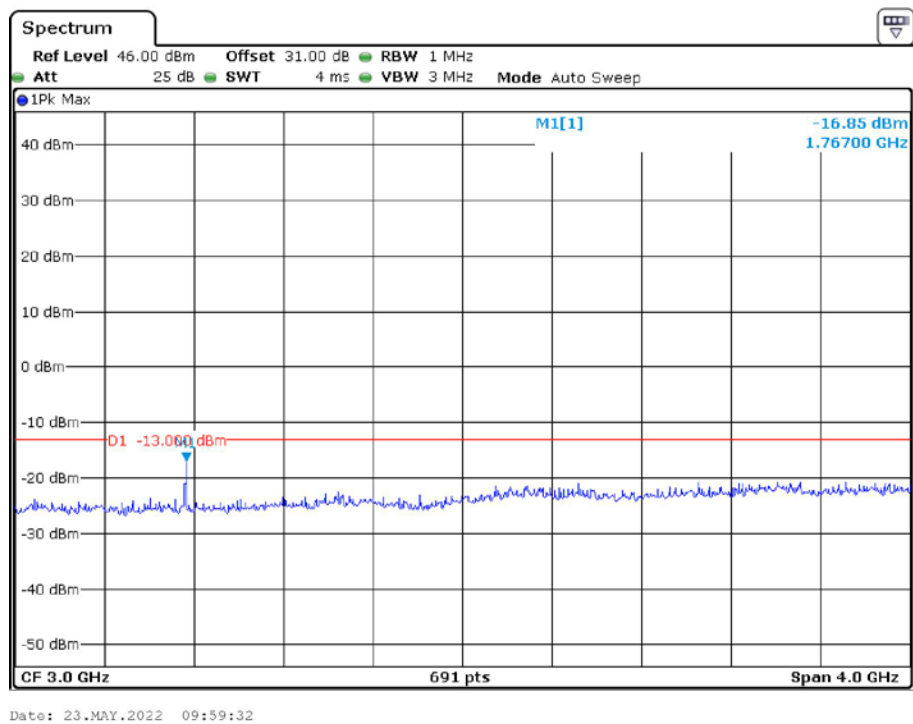
1 GHz – 5.0 GHz, 467.6250 MHz



30 MHz – 1 GHz, 467.6375 MHz



1 GHz – 5.0 GHz, 467.6375 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 nonconducting 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 = $43 + 10 \lg_{10}(\text{power out in Watts})$

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	59 %
ATM Pressure:	101.2 kPa

The testing was performed by Level Li on 2022-05-27.

Test Mode: Transmitting

Frequency (MHz)	Receiver Reading (dBm)	Turntable Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)				
462.6250MHz								
925.25	-58.01	216	1.6	H	9.27	-48.74	-13	35.74
925.25	-56.13	242	1.4	V	11.55	-44.58	-13	31.58
1850.5	-32.09	356	1.7	H	4.39	-27.7	-13	14.70
1850.5	-32.62	244	1.8	V	3.59	-29.03	-13	16.03
462.6375MHz								
925.275	-57.48	85	1.4	H	9.27	-48.21	-13	35.21
925.275	-58.18	159	1.3	H	11.55	-46.63	-13	33.63
1850.55	-32.97	349	2.1	V	4.39	-28.58	-13	15.58
1850.55	-31.92	239	2.0	V	3.59	-28.33	-13	15.33
467.6250MHz								
935.25	-53.65	182	1.4	H	9.22	-44.43	-13	31.43
935.25	-58.69	241	1.7	V	11.65	-47.04	-13	34.04
1870.5	-32.1	305	1.5	H	4.15	-27.95	-13	14.95
1870.5	-33.67	27	1.8	V	3.35	-30.32	-13	17.32
467.6375MHz								
935.275	-58.51	34	1.6	H	9.22	-49.29	-13	36.29
935.275	-56.6	130	2.2	V	11.65	-44.95	-13	31.95
1402.9125	-41.13	48	1.8	H	5.85	-35.28	-13	22.28
1402.9125	-38.06	241	1.8	V	5.8	-32.26	-13	19.26

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 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 (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 Cat Kang on 2022-05-23.

Test Mode: Transmitting

Reference Frequency: 462.6250 MHz, Limit: ± 5 ppm			
Environment Temperature (°C)	Voltage Supplied (V _{DC})	Measurement Frequency (MHz)	Frequency Error (ppm)
Frequency Stability Ver. Temperature			
50	3.7	462.625165	0.36
40	3.7	462.625188	0.41
30	3.7	462.625180	0.39
20	3.7	462.625154	0.33
10	3.7	462.625168	0.36
0	3.7	462.625175	0.38
-10	3.7	462.625193	0.42
-20	3.7	462.625171	0.37
-30	3.7	462.625183	0.40
Frequency Stability Ver. Input Voltage			
20	3.1	462.625174	0.38
20	4.3	462.625170	0.37

Reference Frequency: 462.6375 MHz, Limit: ± 5 ppm			
Environment Temperature (°C)	Voltage Supplied (V _{DC})	Measurement Frequency (MHz)	Frequency Error (ppm)
Frequency Stability Ver. Temperature			
50	3.7	462.637591	0.20
40	3.7	462.637600	0.22
30	3.7	462.637610	0.24
20	3.7	462.637589	0.19
10	3.7	462.637574	0.16
0	3.7	462.637619	0.26
-10	3.7	462.637607	0.23
-20	3.7	462.637590	0.19
-30	3.7	462.637611	0.24
Frequency Stability Ver. Input Voltage			
20	3.1	462.637602	0.22
20	4.3	462.637611	0.24

Reference Frequency: 467.6250 MHz, Limit: ± 5 ppm			
Environment Temperature (°C)	Voltage Supplied (V _{DC})	Measurement Frequency (MHz)	Frequency Error (ppm)
Frequency Stability Ver. Temperature			
50	3.7	467.625125	0.27
40	3.7	467.625130	0.28
30	3.7	467.625118	0.25
20	3.7	467.625128	0.27
10	3.7	467.625137	0.30
0	3.7	467.625125	0.27
-10	3.7	467.625152	0.33
-20	3.7	467.625129	0.28
-30	3.7	467.625153	0.33
Frequency Stability Ver. Input Voltage			
20	3.1	467.625138	0.30
20	4.3	467.625141	0.30

Reference Frequency: 467.6375 MHz, Limit: ± 2.5 ppm			
Environment Temperature (°C)	Voltage Supplied (V _{DC})	Measurement Frequency (MHz)	Frequency Error (ppm)
Frequency Stability Ver. Temperature			
50	3.7	467.637647	0.31
40	3.7	467.637616	0.25
30	3.7	467.637614	0.24
20	3.7	467.637624	0.27
10	3.7	467.637643	0.31
0	3.7	467.637642	0.30
-10	3.7	467.637646	0.31
-20	3.7	467.637651	0.32
-30	3.7	467.637650	0.32
Frequency Stability Ver. Input Voltage			
20	3.1	467.637635	0.29
20	4.3	467.637611	0.24

Note: The extreme voltage was declared by applicant.

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