

FCC PART 95

TEST REPORT

For

Quanzhou Wouxun Electronics Co., Ltd.

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

FCC ID: WVTWOXUN25

Report Type: Original Report	Product Type: TWO WAY RADIO(GMRS RADIO)
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Report Number:	RXM210426052-00B
Report Date:	2021-07-07
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Quanzhou Wouxun Electronics Co., Ltd.
Tested Model	KG-XS20G
Series Model	KG-XS20G Plus, KG-XS20G+, XS20G, XS20G Plus, KG-XS20GR, KG-XS20GX, KG-XS20GR Plus, KG-XS20GX Plus
Model Difference	See Declaration letter
Product Type	TWO WAY RADIO(GMRS RADIO)
Power Supply	DC 13.8V
Modulation Mode	FM
Operation Frequency	462.5500-462.7250MHz (main channels) 462.5625-462.7125MHz (interstitial channels) 467.5500-467.7250MHz (main channels)
Channel Spacing	25kHz
Maximum Output Power (conducted)	462.5500-462.7250MHz: 41.86dBm 462.5625-462.7125MHz: 34.88dBm 467.5500-467.7250MHz: 41.74dBm

**All measurement and test data in this report was gathered from production sample serial number: RXM210426052-1(Assigned by the BACL. The EUT supplied by the applicant was received on 2021-04-26)*

Objective

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

Related Submittal(s)/Grant(s)

FCC Part 15B CSR Submittal with FCC ID: WVTWOUXUN25.

Test Methodology

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

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

Measurement Uncertainty

Item	Uncertainty
Occupied Channel Bandwidth	$\pm 5\%$
RF output power, conducted	$\pm 0.61\text{dB}$
Unwanted Emissions, radiated	30MHz~1GHz: 5.85dB 1G~26.5GHz: 5.23dB
Unwanted Emissions, conducted	$\pm 1.5\text{dB}$
Temperature	$\pm 1.0^{\circ}\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 0.4\%$
Duty Cycle	1%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing in an engineering mode which was provided by the manufacturer.

Test channel list as below:

462 MHz main channels

Channel	Frequency (MHz)	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

462 MHz interstitial channels

Channel	Frequency (MHz)	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	/

467 MHz main channels

Channel	Frequency (MHz)	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

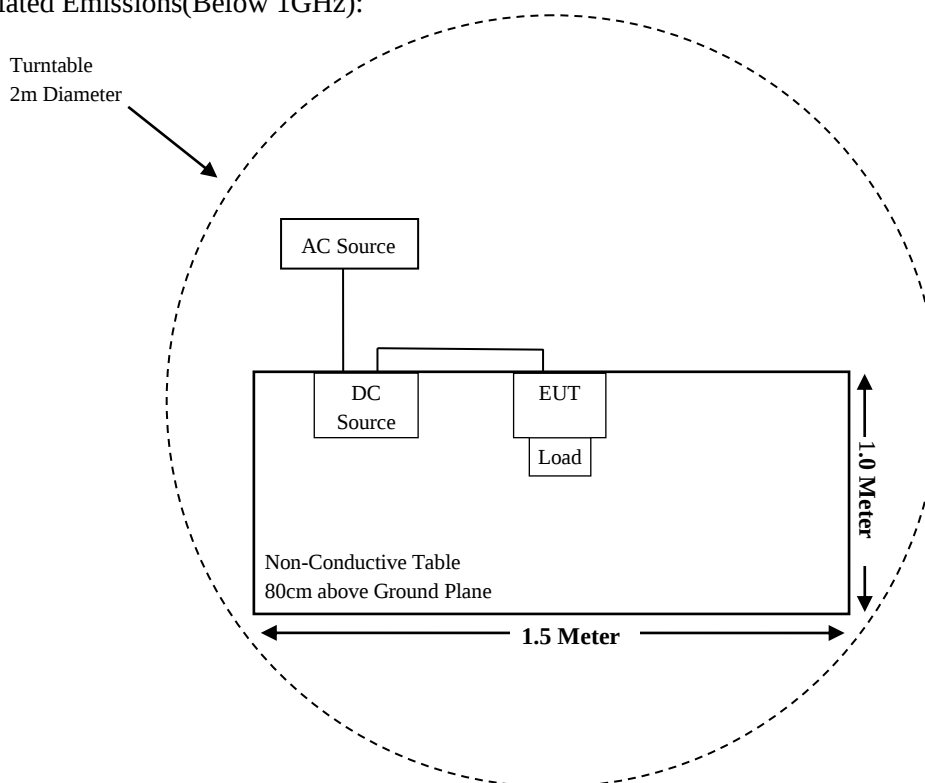
Manufacturer	Description	Model	Serial Number
Huaxiang	50OhmCoaxial Load	4.3/10TF20-8	17011301
ZHAOXIN	DC Power Supply	RXN-605D	DC002

External I/O Cable

Cable Description	Length (m)	From Port	To Port
Power Cable	1.5	EUT	DC Source
Power Cable	1.0	DC Source	AC Source

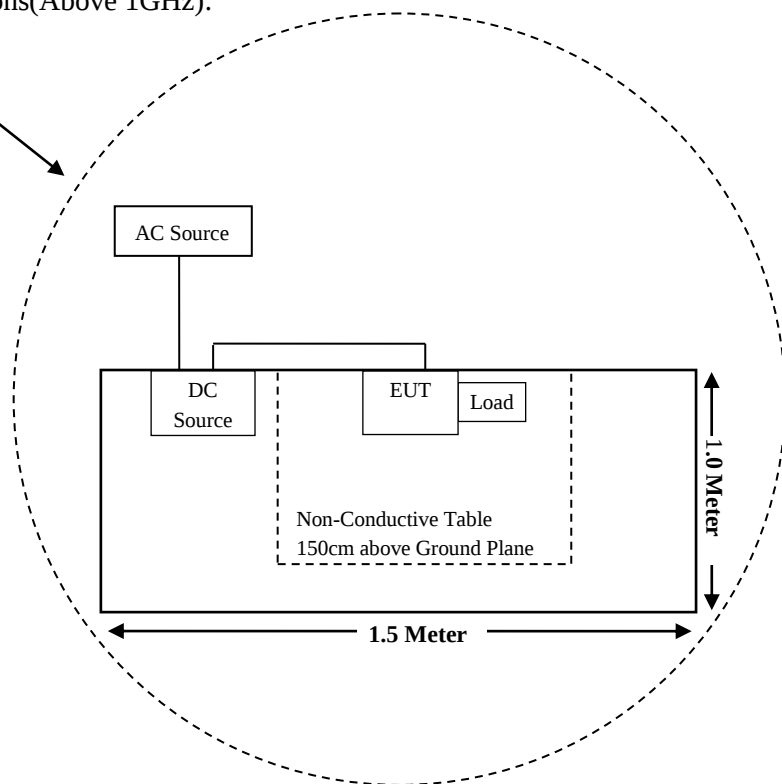
Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions(Above 1GHz):

Turntable
2m Diameter



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§95.1787(a)(4)	Antenna Requirement	Not Applicable (See Note 1)
§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

Note 1: The EUT has no digital data transmissions function.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2020-11-27	2021-11-26
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2020-08-05	2023-08-04
Sunol Sciences	Bilog antenna	JB3	A060217	2020-11-28	2023-11-27
HP	Signal Generator	N5183A	MY51040755	2020-11-27	2021-11-26
Sonoma Instrunent	Pre-amplifier	310N	171205	2020-08-14	2021-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-8	008	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2020-08-15	2021-08-14
Radiated Emission Test (Chamber 2#)					
HP	Signal Generator	N5183A	MY51040755	2020-11-27	2021-11-26
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2021-04-01	2022-03-31
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2020-07-15	2023-07-14
ETS-LINDGREN	Horn Antenna	3115	6229	2020-01-07	2023-01-06
A.H.Systems,inc	Amplifier	PAM-0118P	512	2020-08-14	2021-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	N/A	N/A
MICRO-COAX	Coaxial Cable	Cable-6	006	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2020-08-15	2021-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2020-08-15	2021-08-14
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2020-08-05	2021-08-04
Narda	Attenuator	10dB	010	2020-08-15	2021-08-14
BACL	Temperature & Humidity Chamber	BTH-150	30023	2020-11-25	2021-11-24
ZHAOXIN	DC Power Supply	RXN-605D	DC002	2020-10-10	2021-10-09
HP	RF communication test SET.	8920B	079	2021-04-01	2022-03-31
Wouxun	RF Cable	Wouxun C01	C01	Each Time	N/A

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

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.

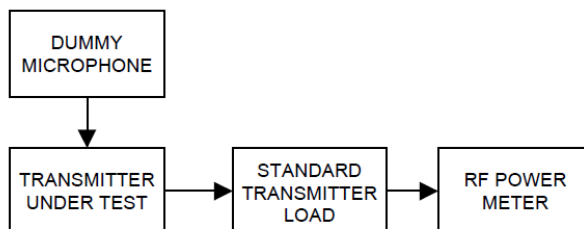
- (1) The transmitter output power of mobile, repeater and base stations must not exceed 50 Watts.
- (2) The transmitter output power of fixed stations must not exceed 15 Watts.

(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

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	24.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2021-06-04.

Test Result: Compliant.

Test Mode: Transmitting

Frequency (MHz)	Conducted Output Power (dBm)	Antenna Gain (dBi)	Cable loss (dB)	ERP (dBm)	Limit (dBm)
462.6250	41.86	5.5	1.36	43.85	47
462.6375	34.88	5.5	1.36	36.87	37
467.6250	41.74	5.5	1.36	43.73	47

Note: ERP=Conducted Output Power (dBm) +Antenna Gain (dBi)-Cable loss(dB)-2.15dB

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) For equipment operating with 25 kHz bandwidth channels between 406 and 512 MHz, 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.

For equipment operating on channels 12.5 kHz spaced channels in the frequency range 406-512 MHz.

At frequencies from 3000 Hz through 20,000 Hz the attenuation shall be greater than the attenuation at 1000 Hz by at least: $100 \log_{10}(f / 3000)$ dB

Test Procedure

Test Method: TIA/EIA-603-E

Test Data

Environmental Conditions

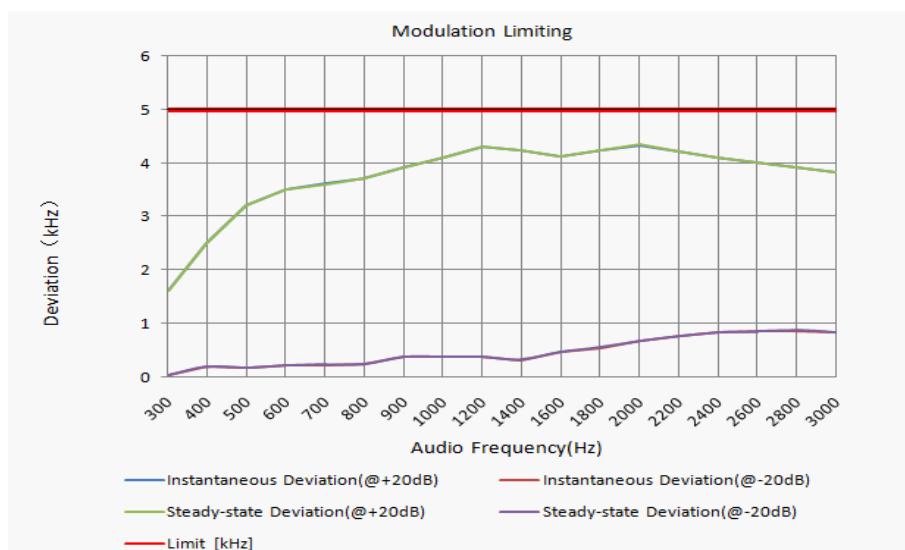
Temperature:	24.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2021-06-02.

Test Mode: Transmitting

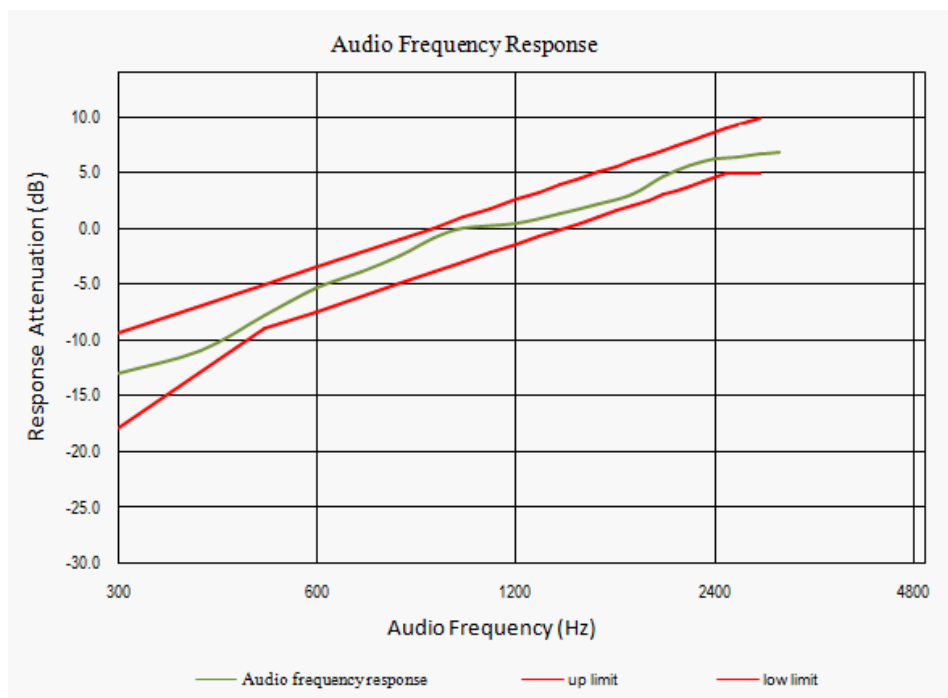
MODULATION LIMITING

Carrier Frequency: 462.6250MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	1.601	0.035	1.609	0.033	5.0
400	2.505	0.185	2.510	0.184	5.0
500	3.207	0.164	3.210	0.168	5.0
600	3.506	0.209	3.500	0.206	5.0
700	3.611	0.228	3.601	0.230	5.0
800	3.707	0.236	3.713	0.238	5.0
900	3.911	0.388	3.921	0.382	5.0
1000	4.102	0.385	4.105	0.381	5.0
1200	4.315	0.370	4.309	0.374	5.0
1400	4.231	0.317	4.235	0.322	5.0
1600	4.129	0.466	4.121	0.468	5.0
1800	4.236	0.544	4.237	0.550	5.0
2000	4.332	0.670	4.348	0.677	5.0
2200	4.205	0.757	4.205	0.764	5.0
2400	4.103	0.841	4.108	0.845	5.0
2600	4.003	0.856	4.012	0.848	5.0
2800	3.913	0.856	3.914	0.869	5.0
3000	3.822	0.836	3.832	0.834	5.0



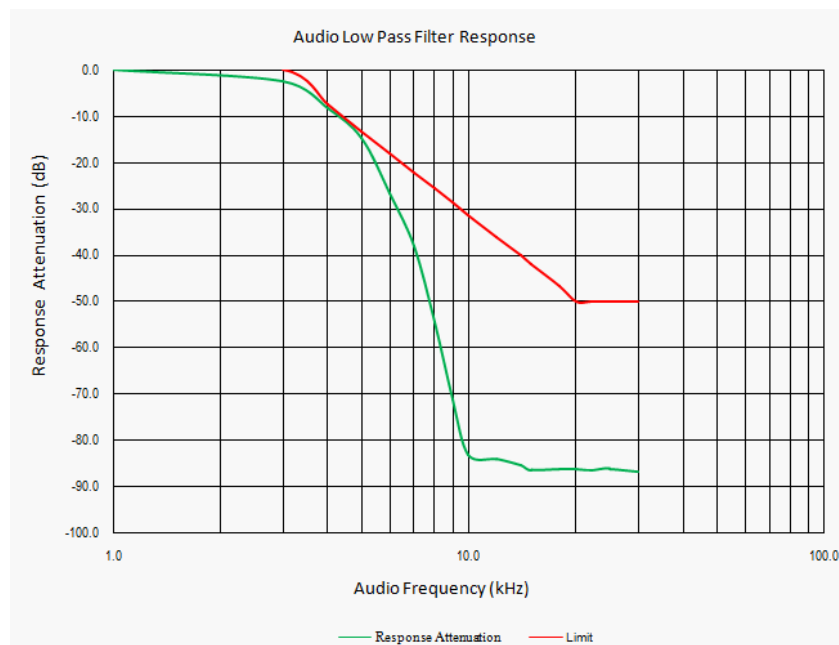
Audio Frequency Response

Carrier Frequency: 462.6250MHz	
Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.05
400	-10.90
500	-7.75
600	-5.36
700	-3.84
800	-2.48
900	-0.90
1000	0.00
1200	0.49
1400	1.37
1600	2.23
1800	3.10
2000	4.72
2200	5.70
2400	6.20
2600	6.47
2800	6.64
3000	6.85



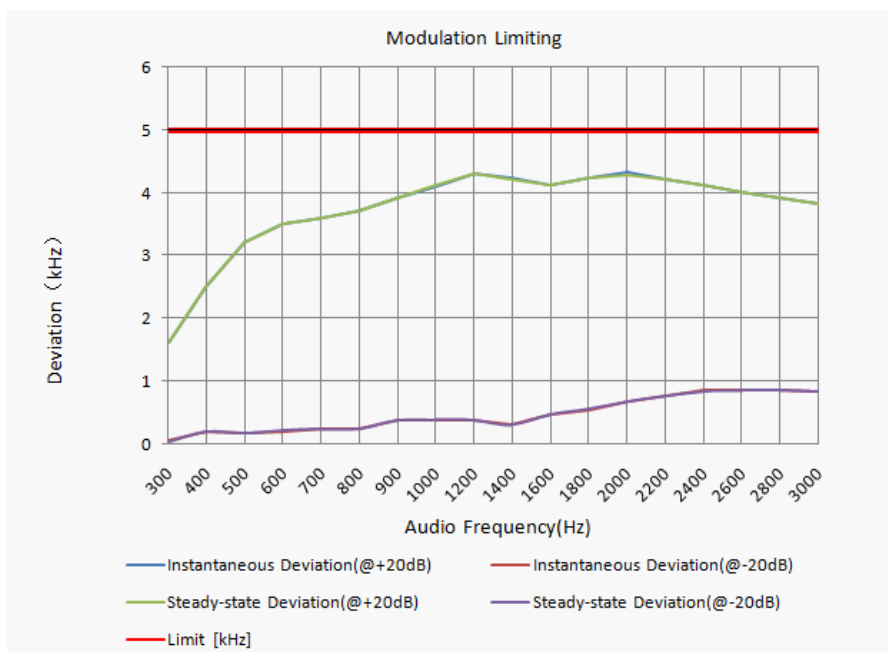
Audio Low Pass Filter Response

Carrier Frequency: 462.6250MHz		
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0	\
3.0	-2.5	0
4.0	-8.3	-7.5
5.0	-14.7	-13.3
6.0	-26.6	-18.1
7.0	-38.2	-22.1
8.0	-54.4	-25.6
9.0	-71.2	-28.6
10.0	-83.1	-31.4
12.0	-84.1	-36.1
14.0	-85.5	-40.1
15.0	-86.5	-41.9
18.0	-86.4	-46.7
20.0	-86.4	-50
22.0	-86.5	-50
25.0	-86.2	-50
30.0	-86.9	-50



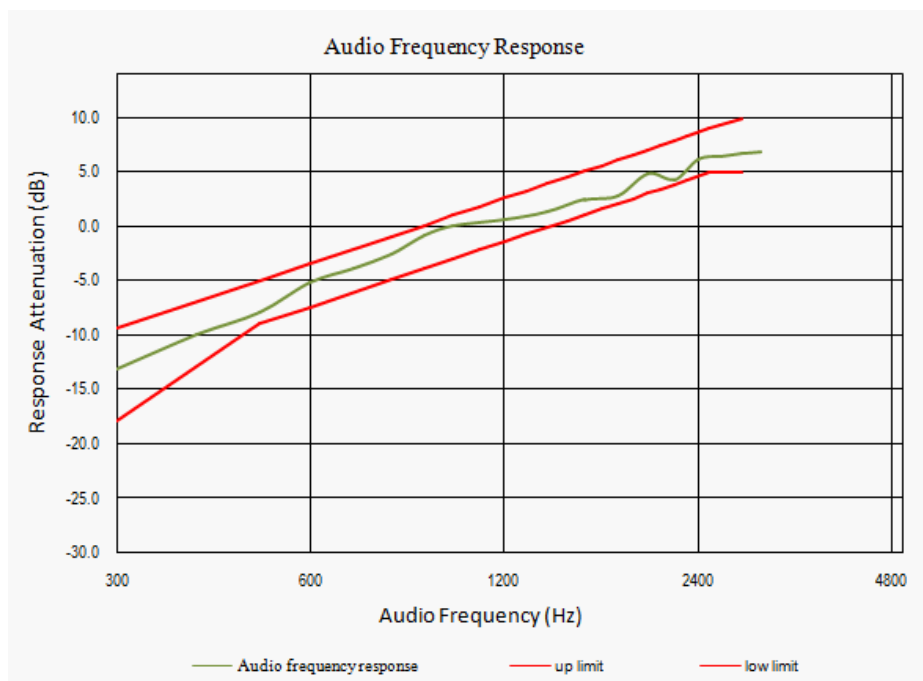
MODULATION LIMITING

Carrier Frequency: 462.6375MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	1.601	0.056	1.604	0.032	5.0
400	2.503	0.199	2.508	0.191	5.0
500	3.208	0.173	3.208	0.167	5.0
600	3.507	0.203	3.506	0.214	5.0
700	3.609	0.230	3.603	0.231	5.0
800	3.713	0.236	3.714	0.239	5.0
900	3.917	0.386	3.917	0.384	5.0
1000	4.103	0.388	4.114	0.387	5.0
1200	4.317	0.376	4.318	0.379	5.0
1400	4.229	0.314	4.219	0.313	5.0
1600	4.118	0.473	4.118	0.475	5.0
1800	4.237	0.544	4.234	0.552	5.0
2000	4.330	0.671	4.290	0.674	5.0
2200	4.205	0.761	4.205	0.764	5.0
2400	4.114	0.849	4.116	0.840	5.0
2600	4.001	0.847	4.007	0.849	5.0
2800	3.923	0.864	3.922	0.863	5.0
3000	3.836	0.836	3.835	0.834	5.0



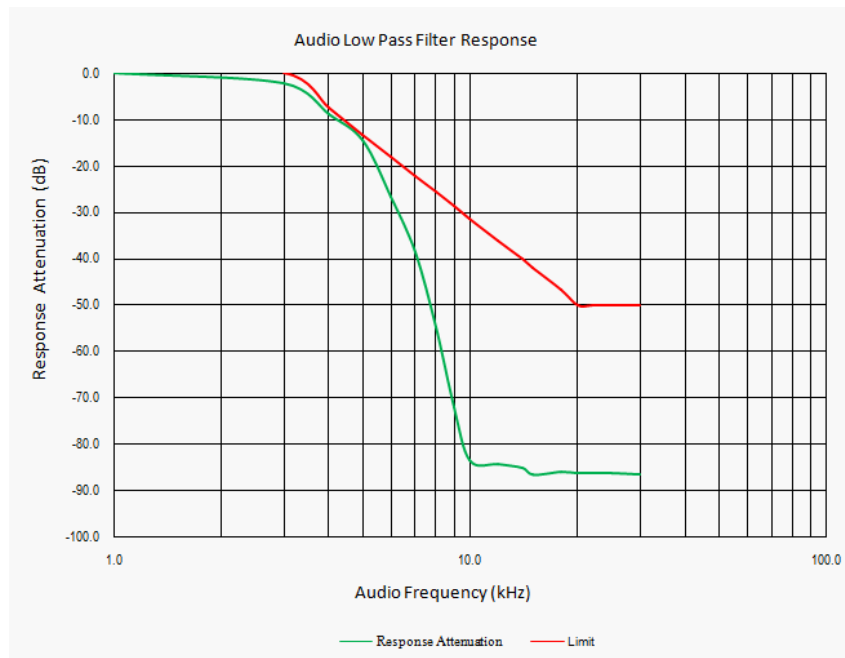
Audio Frequency Response

Carrier Frequency: 462.6375MHz	
Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.12
400	-10.00
500	-7.93
600	-5.14
700	-3.84
800	-2.50
900	-0.90
1000	0.00
1200	0.60
1400	1.29
1600	2.47
1800	2.81
2000	4.82
2200	4.28
2400	6.17
2600	6.45
2800	6.65
3000	6.90



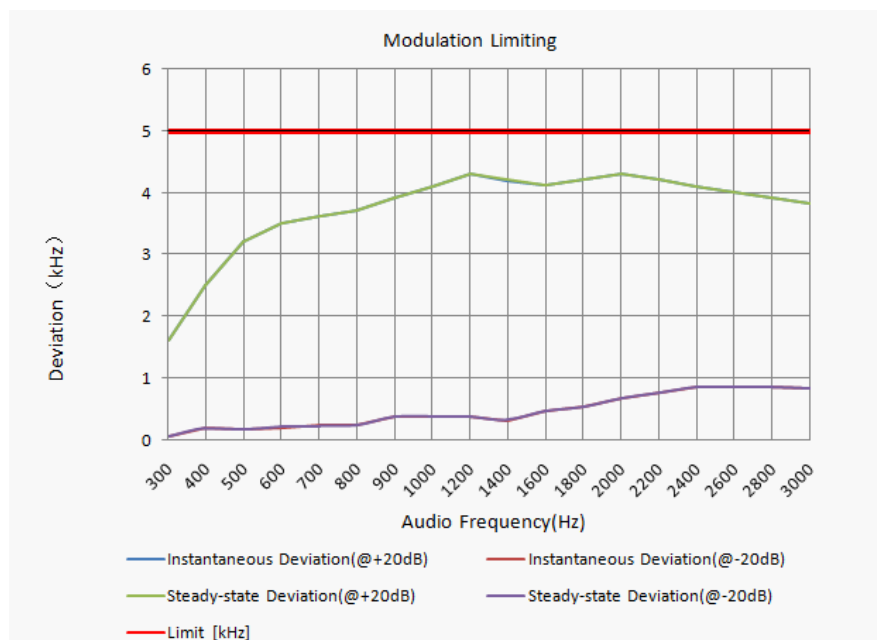
Audio Low Pass Filter Response

Carrier Frequency: 462.6375MHz		
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0	\
3.0	-2.2	0
4.0	-8.8	-7.5
5.0	-14.5	-13.3
6.0	-26.7	-18.1
7.0	-38.7	-22.1
8.0	-54.9	-25.6
9.0	-72.0	-28.6
10.0	-83.6	-31.4
12.0	-84.4	-36.1
14.0	-85.2	-40.1
15.0	-86.6	-41.9
18.0	-86.1	-46.7
20.0	-86.3	-50
22.0	-86.4	-50
25.0	-86.4	-50
30.0	-86.6	-50



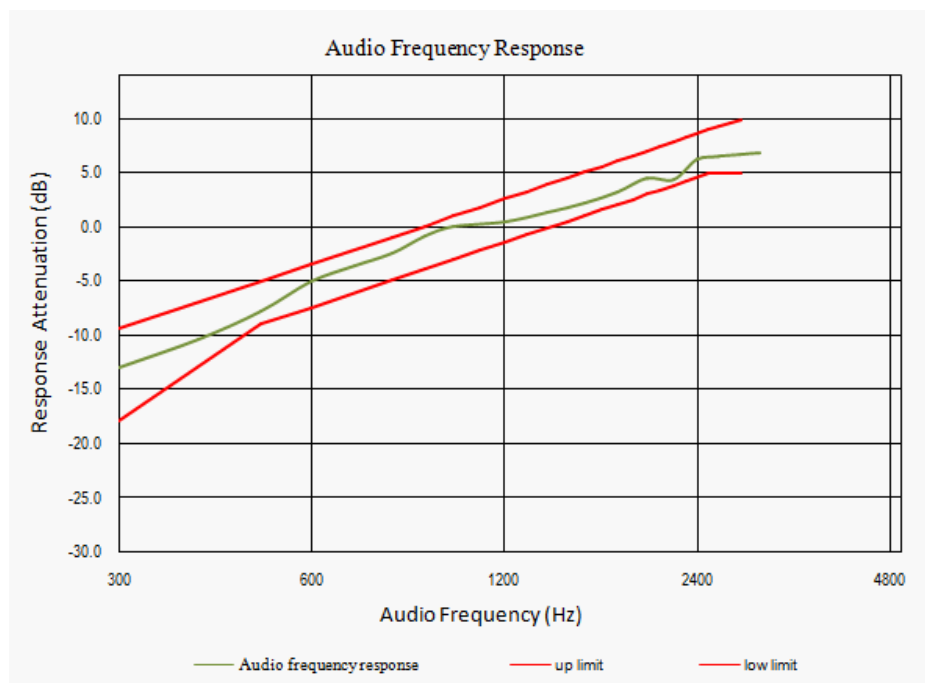
MODULATION LIMITING

Carrier Frequency: 467.6250MHz					
Audio Frequency (Hz)	Instantaneous		Steady-state		Limit (kHz)
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	
300	1.602	0.050	1.608	0.049	5.0
400	2.505	0.196	2.506	0.186	5.0
500	3.208	0.168	3.202	0.167	5.0
600	3.508	0.203	3.503	0.207	5.0
700	3.615	0.230	3.614	0.226	5.0
800	3.718	0.239	3.712	0.234	5.0
900	3.913	0.388	3.915	0.382	5.0
1000	4.111	0.387	4.106	0.387	5.0
1200	4.310	0.378	4.311	0.376	5.0
1400	4.203	0.315	4.214	0.324	5.0
1600	4.113	0.473	4.123	0.469	5.0
1800	4.224	0.544	4.222	0.545	5.0
2000	4.297	0.676	4.308	0.678	5.0
2200	4.205	0.757	4.205	0.755	5.0
2400	4.107	0.848	4.111	0.846	5.0
2600	4.014	0.847	4.002	0.854	5.0
2800	3.919	0.867	3.915	0.859	5.0
3000	3.824	0.832	3.830	0.834	5.0



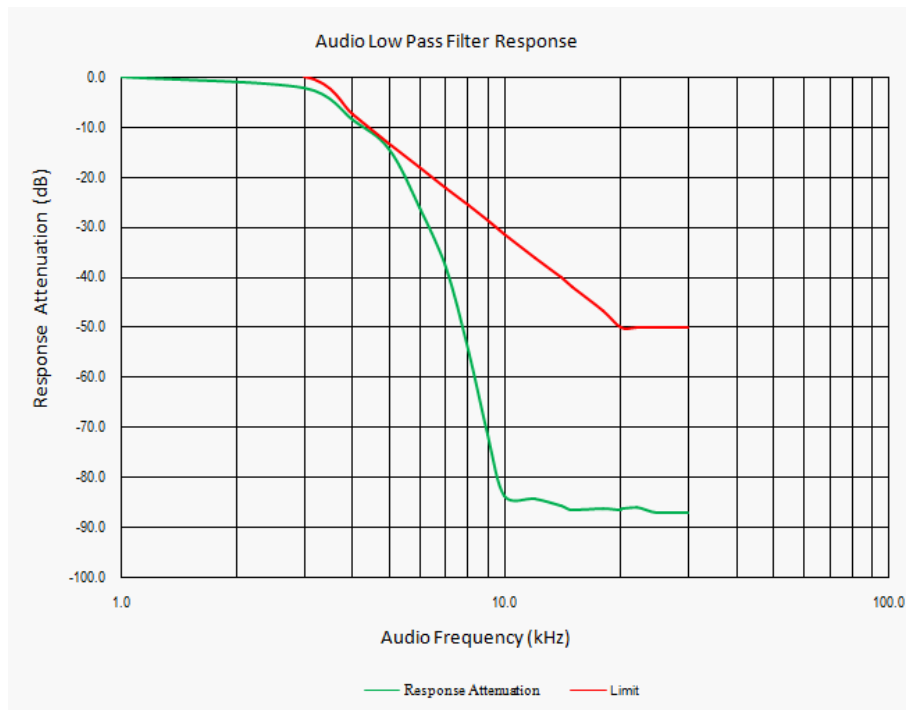
Audio Frequency Response

Carrier Frequency: 467.6250MHz	
Audio Frequency (Hz)	Response Attenuation (dB)
300	-13.04
400	-10.32
500	-7.79
600	-5.07
700	-3.59
800	-2.42
900	-0.89
1000	0.00
1200	0.43
1400	1.29
1600	2.14
1800	3.19
2000	4.46
2200	4.34
2400	6.19
2600	6.50
2800	6.76
3000	6.84



Audio Low Pass Filter Response

Carrier Frequency: 467.6250MHz		
Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1.0	0	\
3.0	-2.3	0
4.0	-8.6	-7.5
5.0	-14.3	-13.3
6.0	-26.2	-18.1
7.0	-38.1	-22.1
8.0	-54.4	-25.6
9.0	-71.4	-28.6
10.0	-83.7	-31.4
12.0	-84.3	-36.1
14.0	-85.8	-40.1
15.0	-86.6	-41.9
18.0	-86.2	-46.7
20.0	-86.4	-50
22.0	-86.0	-50
25.0	-87.0	-50
30.0	-87.0	-50



FCC §2.1049, §95.1773, §95.1779 - AUTHORIZED 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
A1D, A3E, F1D, G1D, F2D, F3E, G3E with audio filter	(1), (2), (7)
A1D, A3E, F1D, G1D, F3E, G3E without audio filter	(3), (4), (7)
H1D, J1D, R1D, H3E, J3E, R2E	(5), (6), (7)

(1) Filtering noted for GMRS transmitters refers to the requirement in §95.1775(e).

(2) Unwanted emission power may be measured as either mean power or peak envelope power, provided that the transmitter output power is measured the same way.

(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:	24.1-25.5 °C
Relative Humidity:	49-53 %
ATM Pressure:	101.8-102.6 kPa

*The testing was performed by Chao Gao on 2021-05-28.**Test Mode: Transmitting*

Modulation	fc (MHz)	99%Occupied Bandwidth (kHz)	26dB Bandwidth (kHz)	Limit (kHz)
FM	462.6250	10.420	15.540	20
	462.6375	10.275	15.480	20
	467.6250	10.420	15.450	20

Note: Emission bandwidth was based on calculation method instead of measurement.

Emission Designator

Per CFR 47 §2.201& §2.202, BW = 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.

Spectrum

Ref Level 50.00 dBm Offset 32.00 dB RBW 300 Hz
 Att 30 dB SWT 6.3 ms VBW 1 kHz Mode Auto FFT

1Pk Max

D1[1] -5.46 dBm
 Occ Bw 15.540 kHz
 M1[1] 12.58 dBm
 D2 13.730 dBm
 462.617910 MHz

CF 462.625 MHz 691 pts Span 100.0 kHz

Spectrum

Ref Level 50.00 dBm Offset 32.00 dB RBW 100 Hz

Att 30 dB SWT 19 ms VBW 1 kHz Mode Auto FFT

1Pk Max

Limit Check

Line MGRS-20k

PASS

PASS

M1[1]

39.89 dBm

462.625580 MHz

GMRS-20k

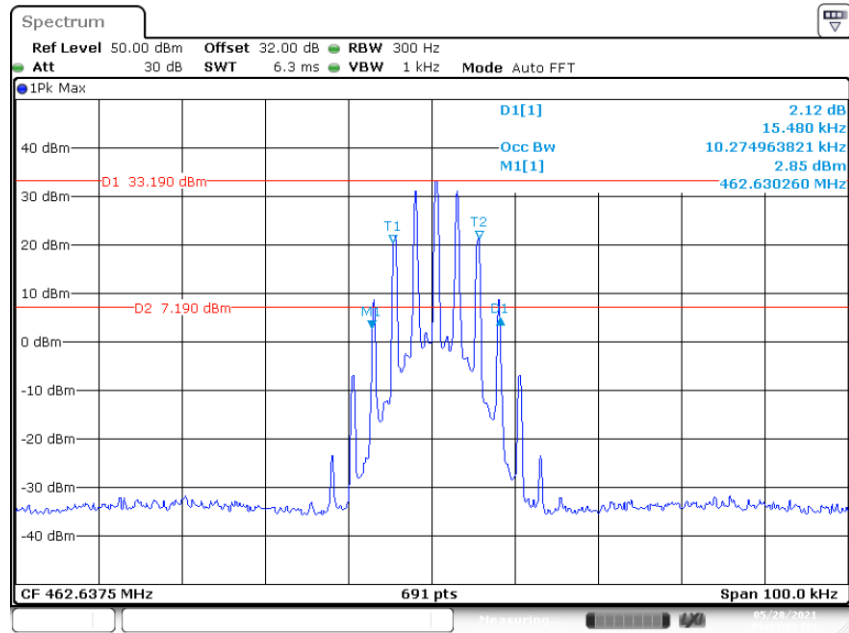
CF 462.625 MHz

691 pts

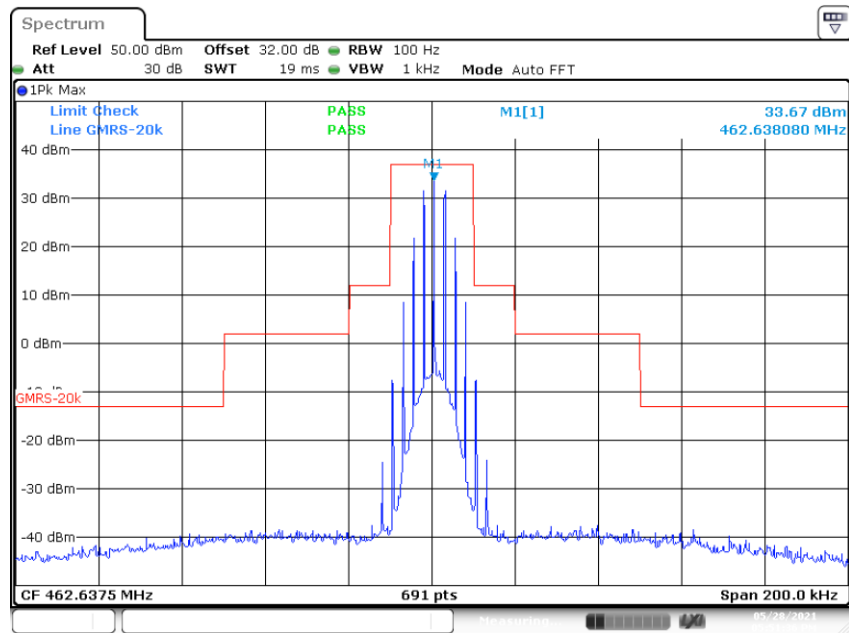
Span 200.0 kHz

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462.6375 MHz

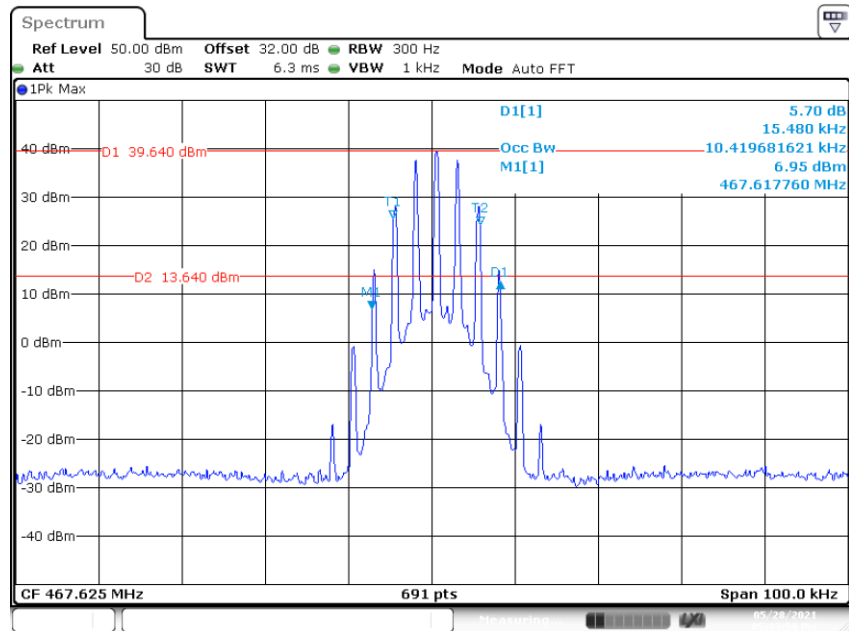


Date: 28.MAY.2021 17:35:02

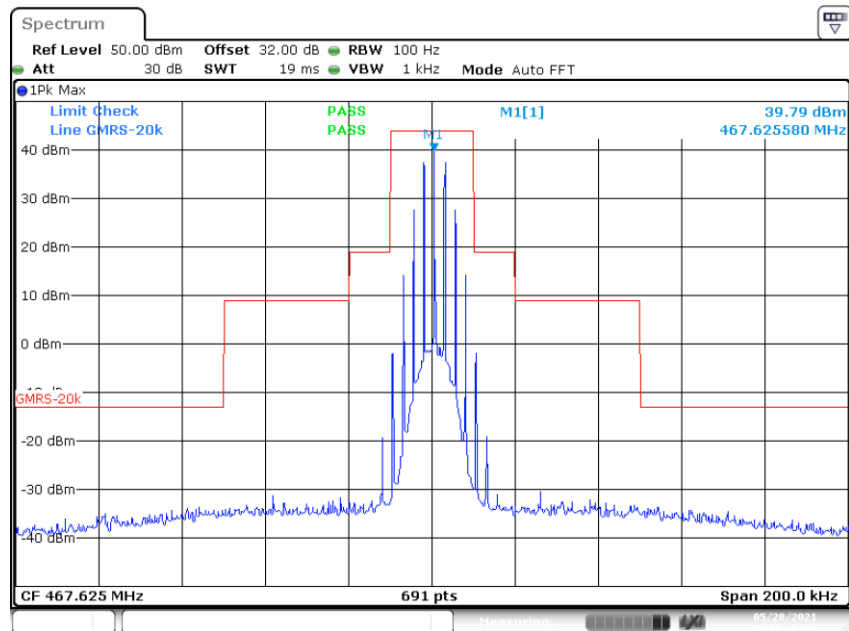


Date: 28.MAY.2021 17:51:36

467.6250 MHz



Date: 28.MAY.2021 17:33:59



Date: 28.MAY.2021 17:49:20

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

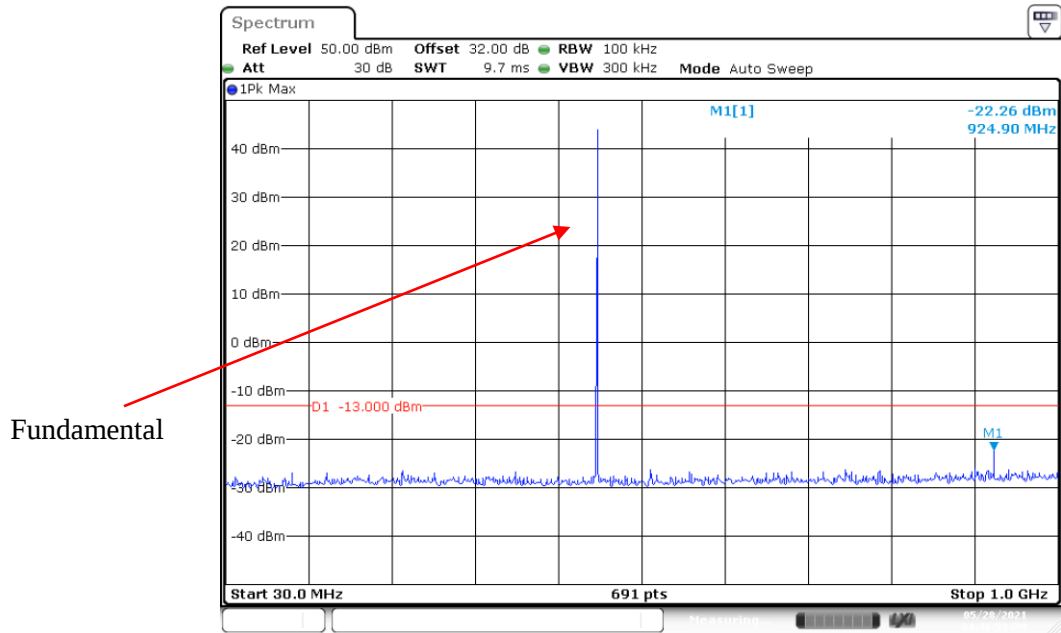
Temperature:	24.5 °C
Relative Humidity:	53 %
ATM Pressure:	101.6 kPa

The testing was performed by Chao Gao on 2021-05-28.

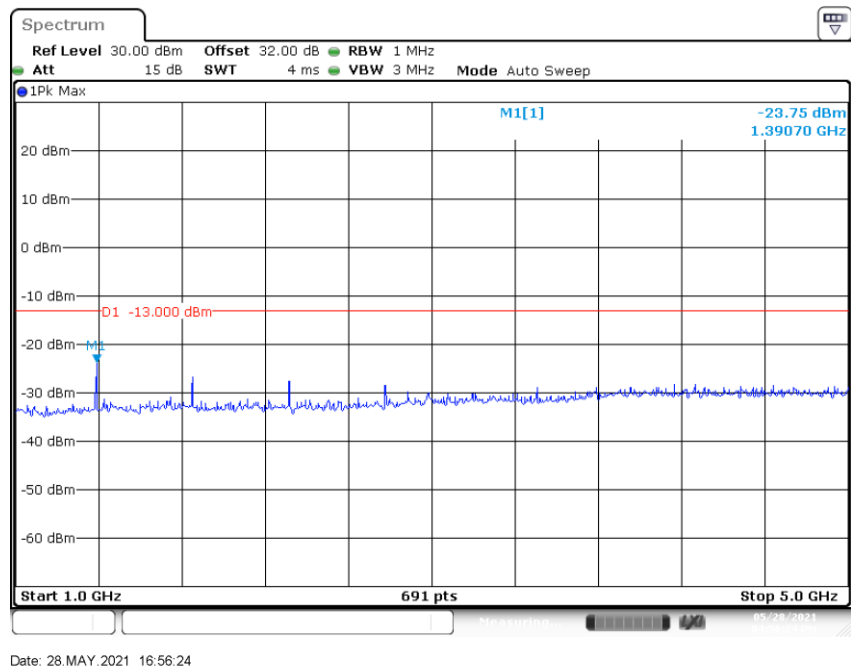
Test Mode: Transmitting

Please refer to the following plots.

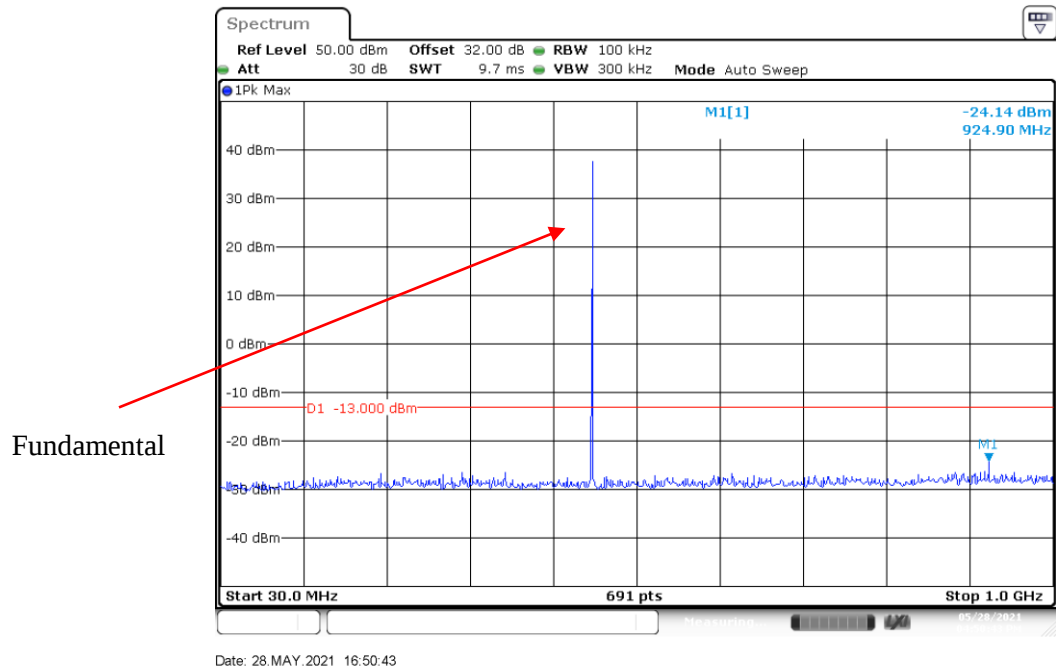
462.6250 MHz, 30 MHz – 1 GHz



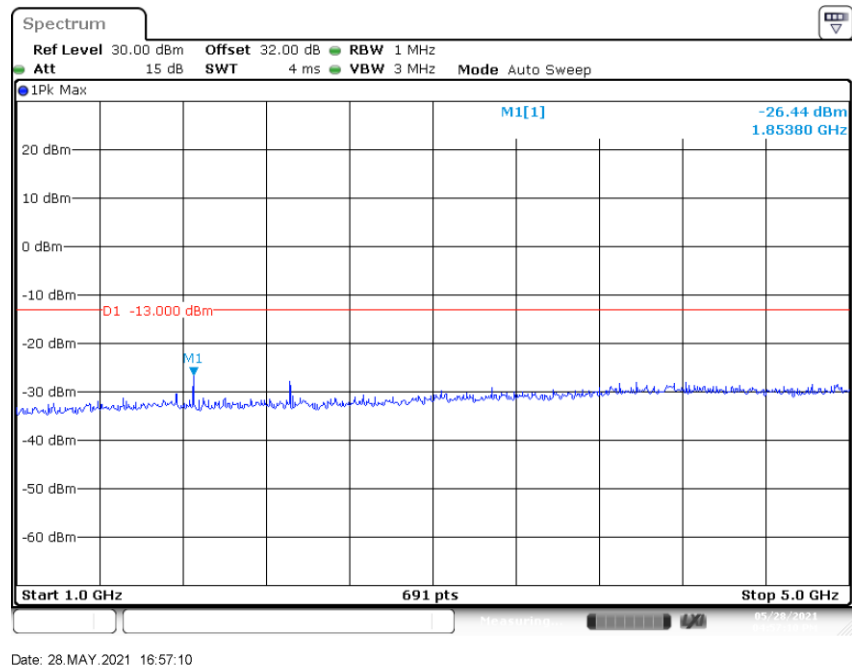
462.6250 MHz, 1 GHz - 5 GHz



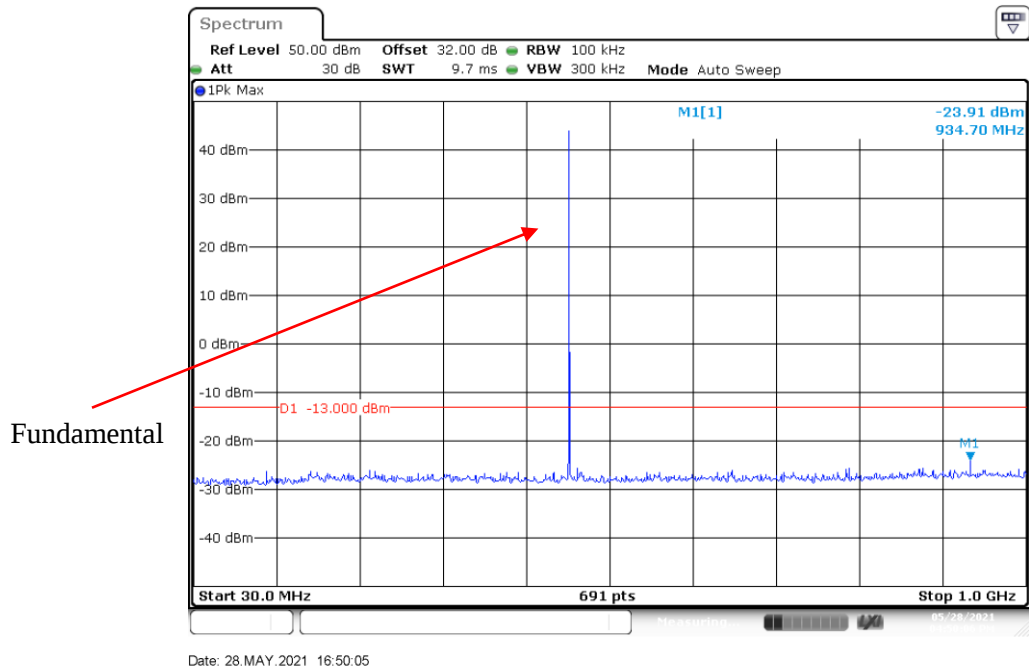
462.6375 MHz, 30 MHz – 1 GHz



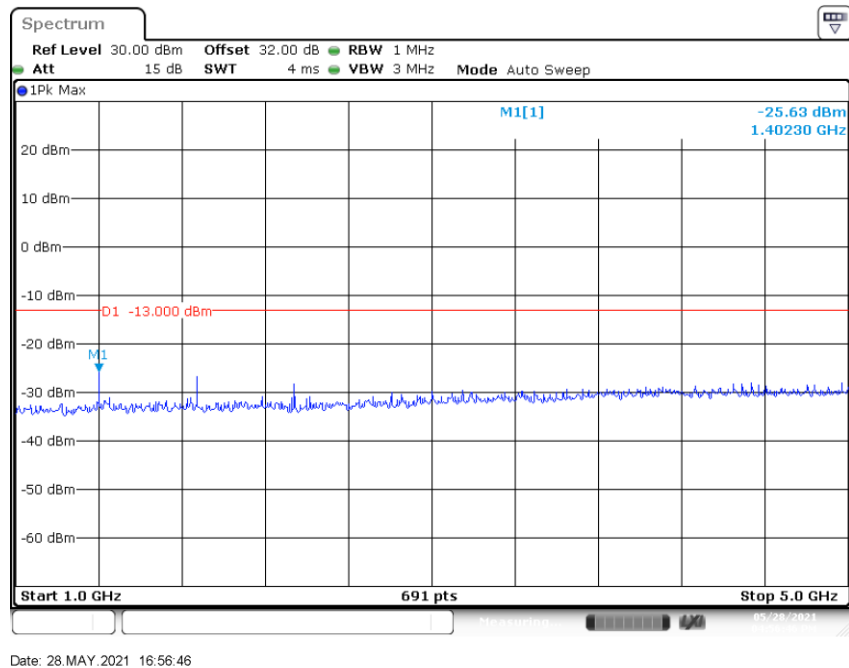
462.6375 MHz, 1 GHz - 5 GHz



467.6250 MHz, 30 MHz – 1 GHz



467.6250 MHz, 1 GHz - 5 GHz



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 = $43 + 10 \lg (\text{power out in Watts})$

Test Data**Environmental Conditions**

Temperature:	24.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2021-06-02.

Test Mode: Transmitting

30MHz-5GHz:

Frequency (MHz)	Receiver Reading (dBuV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/ dBi)			
FM, Frequency: 462.6250MHz										
925.25	40.12	126	150	H	-57.54	0.64	-1.05	-59.23	-13	46.23
925.25	42.33	114	150	V	-52.37	0.64	-1.05	-54.06	-13	41.06
1850.1	45.63	167	200	H	-66.31	0.84	8.76	-58.39	-13	45.39
1850.1	46.97	289	200	V	-64.97	0.84	8.76	-57.05	-13	44.05
FM, Frequency: 462.6375MHz										
925.275	37.36	223	150	H	-60.3	0.64	-1.05	-61.99	-13	48.99
925.275	38.68	199	150	V	-56.02	0.64	-1.05	-57.71	-13	44.71
1850.55	41.32	19	150	H	-70.62	0.84	8.76	-62.7	-13	49.7
1850.55	42.88	357	150	V	-69.06	0.84	8.76	-61.14	-13	48.14
FM, Frequency: 467.6250MHz										
935.25	40.65	170	150	H	-57.11	0.64	-1.09	-58.84	-13	45.84
935.25	42.37	47	150	V	-52.01	0.64	-1.09	-53.74	-13	40.74
1870.5	45.21	301	200	H	-66.6	0.84	8.79	-58.65	-13	45.65
1870.5	46.32	292	200	V	-65.49	0.84	8.79	-57.54	-13	44.54

Note:

Absolute Level = Substituted 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:	24.3 °C
Relative Humidity:	51 %
ATM Pressure:	101.2 kPa

The testing was performed by Chao Gao on 2021-06-02.

Test Mode: Transmitting

FM,Reference Frequency: 462.6375MHz				
Temperature (°C)	Voltage (V _{DC})	Reading (MHz)	Frequency Error (ppm)	Limit (ppm)
-30	13.8	462.63762	0.26	± 2.5
-20		462.63768	0.39	
-10		462.63775	0.54	
0		462.63781	0.67	
10		462.63785	0.76	
20		462.6379	0.86	
30		462.63793	0.93	
40		462.63798	1.04	
50		462.63803	1.15	
20	15.87	462.63795	0.97	
20	11.73	462.63781	0.67	

FM,Reference Frequency: 462.6250MHz				
Temperature (°C)	Voltage (V _{DC})	Reading (MHz)	Frequency Error (ppm)	Limit (ppm)
-30	13.8	462.62508	0.17	± 2.5
-20		462.62512	0.26	
-10		462.62516	0.35	
0		462.62522	0.48	
10		462.62528	0.61	
20		462.62534	0.73	
30		462.62539	0.84	
40		462.62545	0.97	
50		462.62551	1.10	
20	15.87	462.62543	0.93	
20	11.73	462.62533	0.71	

FM,Reference Frequency: 467.6250MHz				
Temperature (°C)	Voltage (V _{DC})	Reading (MHz)	Frequency Error (ppm)	Limit (ppm)
-30	13.8	467.62509	0.19	± 2.5
-20		467.62515	0.32	
-10		467.62521	0.45	
0		467.62526	0.56	
10		467.62532	0.68	
20		467.62537	0.79	
30		467.62543	0.92	
40		467.62549	1.05	
50		467.62555	1.18	
20	15.87	467.62538	0.81	
20	11.73	467.62531	0.66	

Declarations

1: BACL 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.

2: Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

3: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

4: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.

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