TEST REPORT

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Report No.: KST-FCR-170004

KOSTEC Co., Ltd.
http://www.kostec.org

1. Applicant

- Name : Midland Radio Corporation
- Address : 5900 Parretta Drive, Kansas City, Missouri United States 64120

2. Test Item

- Product Name: GMRS/FRS
- Model Name: XT511A
- Brand: Base Camp Radio
- FCC ID: MMAXT511A • IC : 3690A-XT511A

3. Manufacturer

- Name : Global Link Corporation Ltd.
- Address : 21/F Kolling Centre, 77-79 Granville Road, Tsim Sha Tsui Kowloon, Hong Kong

4. Date of Test : 2017. 07. 03. ~ 2017. 07. 04.

5. Test Method Used : FCC CFR 47, Part 95
RSS-GEN
RSS-210 Issue 9
ANSI/TIA-603-E-2016
ANSI C63.4-2014

6. Test Result : Compliance

7. Note: None

Supplementary Information

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with measurement procedures specified in ANSI/TIA-603-E-2016.

We attest to the accuracy of data and all measurements reported herein were performed by KOSTEC Co., Ltd. and were made under Chief Engineer's supervision. We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.

Affirmation	Tested by Name : Lee, Mi-Young (Signature)	Technical Manager Name : Park, Gyeong-Hyeon (Signature)

2017. 07. 06.

KOSTEC Co., Ltd.

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1. GENERAL INFORMATION

1.1 Test Facility

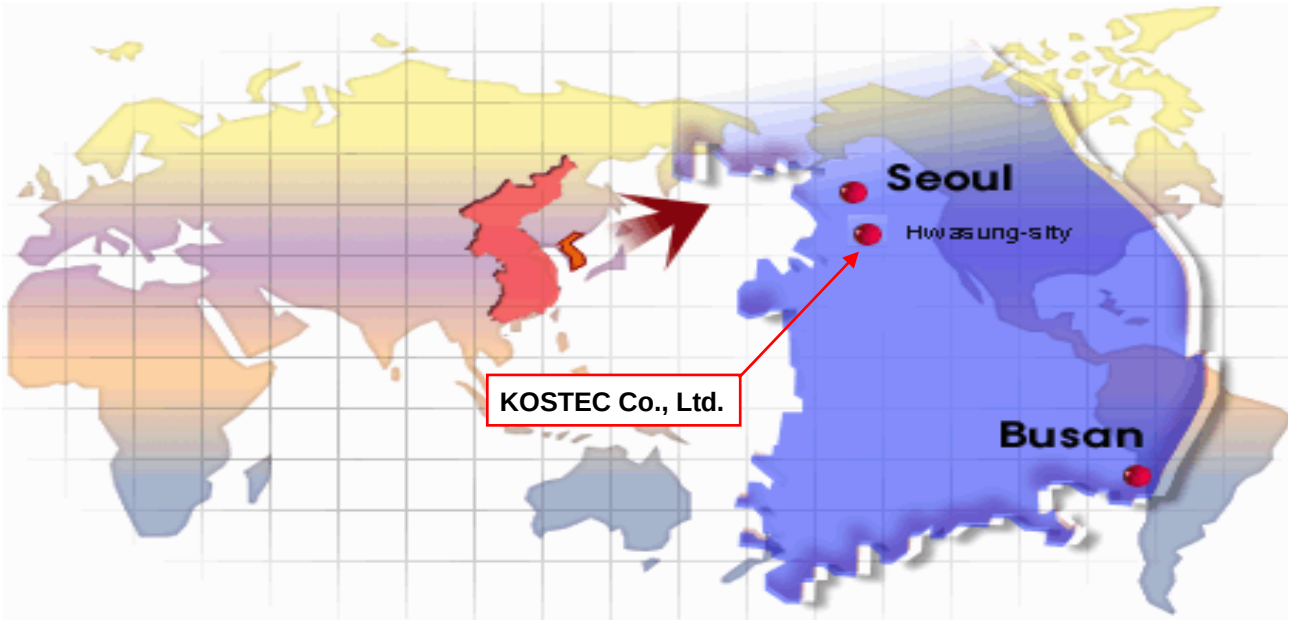
Test laboratory and address

KOSTEC Co., Ltd.
128(175-20,Annyeong-dong)406-gil sejaro, Hwaseong-si Gyeonggi-do, Korea

Registration information

KOLAS No. : 232
FCC Designation No. : KR0041
IC Registration Site No. : 8305A-1

1.2 Location



1.3 Revision History of test report

Rev.	Revisions	Effect page	Reviewed	Date
-	Initial issue	All	Gyeong Hyeon, Park	2017. 07. 06.

2. EQUIPMENT DESCRIPTION

The product specification described herein was declared by manufacturer. And refer to user's manual for the details.

Equipment Name	GMRS / FRS
Model No	XT511A
Usage	Family Radio Face Held Transmitter
Intended Operating Environment	General population/Uncontrolled exposure
Serial Number	A1709001000
Primary User Functions of EUT	2-Way Wireless Voice Communication
Rated output power	1.6 W (GMRS) / 0.2 W (FRS)
Max. E.R.P	1.5 W (GMRS) / 0.2 W (FRS)
Operating Frequency Range	GMRS/FRS : 462.562 5 MHz - 462.712 5 MHz FRS : 467.562 5 MHz - 467.712 5 MHz GMRS : 462.550 0 MHz - 462.725 0 MHz
Channel Number	22 EA
Channel Spacing	12.5 kHz
Modulation	FM
Occupied Bandwidth (99%)	9.93 kHz(GMRS) / 9.93 kHz(FRS)
Emission Designation	11K0F3E
Power Source	Ni-MH battery pack / 6.0 VDC nominal / 700 mAh
Antenna Description	Fixed external antenna, 0.45 dBi
FCC ID	MMAXT511A
IC	3690A-XT511A
Remark	The above DUT's information was declared by manufacturer. Please refer to the specifications or user manual for more detailed description.

3. SYSTEM CONFIGURATION FOR TEST

3.1 Characteristics of equipment

GMRS / FRS

3.2 Used peripherals list

Description	Model No.	Serial No.	Manufacture	Remark
AC-DC Adaptor	U090030D	None	Midland Radio Corporation	
Rechargeable Battery	BATT-5R	None	Midland Radio Corporation	
Ear/Mic	None	None	Midland Radio Corporation	

3.3 Product Modification

N/A

3.4 Operating Mode

Constantly transmitting with a carrier at maximum power.

3.5 Test Setup of EUT

3.6 Table for Carrier Frequencies

Channel	Freq. [MHz]	Description	Channel	Freq. [MHz]	Description
1	462.5625	GMRS	12	467.6625	FRS
2	462.5875	GMRS	13	467.6875	FRS
3	462.6125	GMRS	14	467.7125	FRS
4	462.6375	GMRS	15	462.5500	GMRS
5	462.6625	GMRS	16	462.5750	GMRS
6	462.6875	GMRS	17	462.6000	GMRS
7	462.7125	GMRS	18	462.6250	GMRS
8	467.5625	FRS	19	462.6500	GMRS
9	467.5875	FRS	20	462.6750	GMRS
10	467.6125	FRS	21	462.7000	GMRS
11	467.6375	FRS	22	462.7250	GMRS

Conclusion of worst-case for each mode of representative channel respectively

The EUT has 2 type of mode (GMRS and FRS). Each conducted output power as following;

Therefore all applicable requirements were tested to the two channels, the 22th for GMRS and the 14th for FRS.

Channel Description	CH	Frequency [MHz]	Conducted Power	
			[dBm]	[W]
GMRS	1	462.5625	31.52	1.42
	2	462.5875	31.36	1.37
	3	462.6125	31.36	1.37
	4	462.6375	31.36	1.37
	5	462.6625	31.36	1.37
	6	462.6875	31.36	1.37
	7	462.7125	31.36	1.37
FRS	8	**467.5625**	**23.19**	**0.21**
	9	467.5875	22.86	0.19
	10	467.6125	22.86	0.19
	11	467.6375	23.02	0.20
	12	467.6625	22.86	0.19
	13	467.6875	23.02	0.20
	14	467.7125	22.86	0.19
GMRS	15	**462.5500**	**31.52**	**1.42**
	16	462.5750	31.36	1.37
	17	462.6000	31.36	1.37
	18	462.6250	31.36	1.37
	19	462.6500	31.36	1.37
	20	462.6750	31.36	1.37
	21	462.7000	31.36	1.37
	22	462.7250	31.36	1.37

3.7 Used Test Equipment List

No.	Instrument	Model	S/N	Manufacturer	Due to cal date	Cal interval	used
1	T & H Chamber	EY-101	90E14260	TABAI ESPEC	2017.09.07	1 year	☒
2	T & H Chamber	SH-641	92006831	ESPEC CORP	2018.05.31	1 year	☐
3	Spectrum Analyzer	8563E	3846A10662	Agilent Technology	2018.02.02	1 year	☐
4	Spectrum Analyzer	8593E	3710A02859	Agilent Technology	2018.02.02	1 year	☐
5	Spectrum Analyzer	FSV30	20-353063	Rohde& Schwarz	2018.02.01	1 year	☐
6	Signal Analyzer	N9010A	MY56070441	Agilent Technologies	2018.05.15	1 year	☒
7	EMI Test Receiver	ESCI7	100823	Rohde& Schwarz	2018.01.31	1 year	☒
8	EMI Test Receiver	ESI	837514/004	Rohde& Schwarz	2017.09.07	1 year	☒
9	Vector Signal Analyzer	89441A	3416A02620	Agilent Technology	2018.02.03	1 year	☐
10	Network Analyzer	8753ES	US39172348	AGILENT	2017.09.06	1 year	☐
11	EPM Series Power meter	E4418B	GB39512547	Agilent Technology	2018.02.01	1 year	☐
12	RF Power Sensor	E9300A	MY41496631	Agilent Technology	2018.02.01	1 year	☐
13	Microwave Frequency Counter	5352B	2908A00480	Agilent Technology	2018.02.01	1 year	☐
14	Modulation Analyzer	8901A	3538A07071	Agilent Technology	2018.02.02	1 year	☒
15	Audio Analyzer	8903B	3514A16919	Agilent Technology	2018.01.31	1 year	☒
16	Audio Telephone Analyzer	DD-5601CID	520010281	CREDIX	2018.02.02	1 year	☐
17	Digital storage Oscilloscope	TDS3052	B015962	Tektronix	2017.09.06	1 year	☐
18	ESG-D Series Signal Generator	E4436B	US39260458	Agilent Technology	2018.02.02	1 year	☒
19	Vector Signal Generator	SMBV100A	257557	Rohde & Schwarz	2018.02.02	1 year	☐
20	Signal Generator	SMB100A	179628	Rohde & Schwarz	2018.05.18	1 year	☒
21	Tracking Source	85645A	070521-A1	Agilent Technology	2018.02.03	1 year	☐
22	SLIDAC	None	0207-4	Myoung sung Ele.	2018.01.31	1 year	☐
23	DC Power supply	DRP-5030	9028029	Digital Electronic Co.,Ltd	2018.02.01	1 year	☐
24	DC Power supply	6038A	3440A12674	Agilent Technology	2018.01.31	1 year	☒
25	DC Power supply	E3610A	KR24104505	Agilent Technology	2018.01.31	1 year	☐
26	DC Power supply	UP-3005T	68	Unicon Co.,Ltd	2018.01.31	1 year	☐
27	DC Power Supply	SM 3004-D	114701000117	DELTA ELEKTRONIKA	2018.01.31	1 year	☐
28	Dummy Load	8173	3780	Bird Electronic Co., Corp	2018.02.03	1 year	☐
29	Attenuator	50FH-030-500	140410 9433	JEW Idustries Inc.	2018.02.02	1 year	☐
30	Attenuator	765-20	9703	Narda	2017.09.06	1 year	☐
31	Attenuator	24-30-34	BX5630	Aeroflex / Weinschel	2017.12.27	1 year	☐
32	Attenuator	8498A	3318A09485	HP	2018.02.01	1 year	☐
33	Step Attenuator	8494B	3308A32809	HP	2018.02.02	1 year	☐
34	Attenuator	18B50W-20F	64671	INMET	2018.02.02	1 year	☐
35	Attenuator	10 dB	1	Rohde & Schwarz	2018.05.18	1 year	☐
36	Attenuator	10 dB	2	Rohde & Schwarz	2018.05.18	1 year	☐
37	Attenuator	10 dB	3	Rohde & Schwarz	2018.05.18	1 year	☐
38	Attenuator	10 dB	4	Rohde & Schwarz	2018.05.18	1 year	☐
39	Attenuator	54A-10	74564	WEINSCHEL	2018.05.18	1 year	☐
40	Attenuator	56-10	66920	WEINSCHEL	2018.05.18	1 year	☐
41	Power divider	11636B	51212	HP	2018.02.01	1 year	☐
42	3Way Power divider	KPDSU3W	00070365	KMW	2017.09.06	1 year	☐
43	4Way Power divider	70052651	173834	KRYTAR	2018.02.01	1 year	☐
44	3Way Power divider	1580	SQ361	WEINSCHEL	2018.05.18	1 year	☐
45	OSP	OSP120	101577	Rohde & Schwarz	2018.05.19	1 year	☐
46	White noise audio filter	ST31EQ	101902	SoundTech	2017.09.07	1 year	☐
47	Dual directional coupler	778D	17693	HEWLETT PACKARD	2018.02.02	1 year	☐
48	Dual directional coupler	772D	2839A00924	HEWLETT PACKARD	2018.02.02	1 year	☐
49	Band rejection filter	3TNF-0006	26	DOVER Tech	2018.02.03	1 year	☒
50	Band rejection filter	3TNF-0008	317	DOVER Tech	2018.02.03	1 year	☐

No.	Instrument	Model	S/N	Manufacturer	Due to cal date	Cal interval	used
51	Band rejection filter	3TNF-0007	311	DOVER Tech	2018.02.03	1 year	☐
52	Band rejection filter	WTR-BRF2442-84NN	09020001	WAVE TECH Co.,LTD	2018.02.02	1 year	☐
53	Band rejection filter	WRCJV12-5695-5725-5825-5855-50SS	1	Wainwright Instruments GmbH	2018.05.18	1 year	☐
54	Band rejection filter	WRCJV12-5120-5150-5350-5380-40SS	4	Wainwright Instruments GmbH	2018.05.18	1 year	☐
55	Band rejection filter	WRCGV10-2360-2400-2500-2540-50SS	2	Wainwright Instruments GmbH	2018.05.18	1 year	☐
56	Highpass Filter	WHJS1100-10EF	1	WAINWRIGHT	2018.02.02	1 year	☐
57	Highpass Filter	WHJS3000-10EF	1	WAINWRIGHT	2018.02.02	1 year	☐
58	Highpass Filter	WHNX6-5530-3000-26500-40CC	2	Wainwright Instruments GmbH	2018.05.19	1 year	☐
59	Highpass Filter	WHNX6-2370-7000-26500-40CC	4	Wainwright Instruments GmbH	2018.05.19	1 year	☐
60	WideBand Radio Communication Tester	CMW500	102276	Rohde & Schwarz	2018.02.03	1 year	☐
61	Radio Communication Tester	CMU 200	112026	Rohde & Schwarz	2018.02.03	1 year	☐
62	Bluetooth Tester	TC-3000B	3000B6A0166	TESCOM CO., LTD.	2018.02.03	1 year	☐
63	RF Up/Down Converter	DCP-1780	980901003	CREDIX	2018.02.03	1 year	☐
64	DECT Test set	CMD60	840677/005	Rohde& Schwarz	2017.09.06	1 year	☐
65	Loop Antenna	6502	9203-0493	EMCO	2019.05.29	2 year	☐
66	BiconiLog Antenna	3142B	9910-1432	EMCO	2018.04.25	2 year	☒
67	Trilog-Broadband Antenna	VULB 9168	9168-606	SCHWARZBECK	2018.09.09	2 year	☐
68	Horn Antenna	3115	2996	EMCO	2018.02.11	2 year	☒
69	Horn Antenna	BBHA9170	BBHA9170152	SCHWARZBECK	2019.04.25	2 year	☐
70	Antenna Master(3)	AT13	None	AUDIX	N/A	N/A	☒
71	Turn Table(3)	None	None	AUDIX	N/A	N/A	☒
72	PREAMPLIFIER(3)	8449B	3008A02577	Agilent	2018.02.01	1 year	☒
73	Antenna Master(10)	MA4000-EP	None	inno systems GmbH	N/A	N/A	☒
74	Turn Table(10)	None	None	inno systems GmbH	N/A	N/A	☒
75	AMPLIFIER(10)	TK-PA6S	120009	TESTEK	2018.01.31	1 year	☒
76	Antenna Mast	MA2000-EP	None	inno systems GmbH	N/A	N/A	☐
77	Turn Device	DE3700-RH	None	inno systems GmbH	N/A	N/A	☐

4. SUMMARY TEST RESULTS

Description of Test	FCC Rule	IC Rule	Reference Clause	Used	Test Result
RF Output Power	Part 95.639(a)(d)	RSS-210 E.2.4 RSS-210 E.3.5	Clause 5.1	☒	Compliance
Modulation Characteristics	Part 95.637(a)(b) Part 2.1047(a)	RSS-210 E.2.2 RSS-210 E.3.2	Clause 5.2	☒	Compliance
Occupied Bandwidth	Part 95.633(a)(c)	RSS-210 E.2.3 RSS-210 E.3.4	Clause 5.3	☒	Compliance
Emission Mask	Part 95.635(b)(1)(3)(7)	RSS-210 E.2.5 RSS-210 E.3.6	Clause 5.4	☒	Compliance
Frequency Stability	Part 95.621(b) Part 95.627(b)	RSS-210 E.2.6 RSS-210 E.3.7	Clause 5.5	☒	Compliance
Transmitter Radiated Unwanted Emissions	Part95.635(b7)	RSS-210 E.2.5 RSS-210 E.3.6	Clause 5.6	☒	Compliance
Compliance/pass : The EUT complies with the essential requirements in the standard. Not Compliance : The EUT does not comply with the essential requirements in the standard. N/A : The test was not applicable in the standard.					
Procedure Reference : FCC CFR 47, Part 95 RSS-GEN RSS-210 Issue 9 ANSI/TIA-603-E-2016 ANSI C 63.4-2014					

5. MEASUREMENT RESULTS

5.1 RF Output Power

5.1.1 Standard Applicable [FCC Part 95.639(a)(d) / RSS-210 A6.1.4,A6.2.4]

FCC Part 95.639(a) A GMRS transmitter may transmit with a maximum power of 5.0 W e.r.p.

FCC Part 95.639(d) For FRS, the maximum permissible transmitter output power under any operating conditions is 0.5 W effective radiated power (e.r.p.).

RSS-210 A6.1.4 The maximum permissible transmitter output power under any operating conditions is 0.5 W effective radiated power (e.r.p.). The radio shall be equipped with an integral antenna.

RSS-210 A6.2.4 A GMRS transmitter may transmit with a maximum power of 2 W e.r.p.

5.1.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) ℃
- Relative Humidity : (48 ~ 52) % R.H.

5.1.3 Measurement Procedure

The EUT was setup according to ANSI/TIA-603-E-2016 for compliance to FCC 47CFR part 95 requirements.

As a below test procedure (①~⑬), The result value of measurement is performed to condition of the below; The EUT will operate in continuous transmission mode during the time necessary to perform the measured of the frequency. Substitution method was performed to determine the actual P_{erp}(or P_{eirp}) emission levels of the EUT.

The following test procedure as below;

The test is performed in a fully pyramidal chamber to determine the accurate frequencies, after maximum emissions level will be checked on a test chamber and measuring distance is 3 m from EUT to test antenna.

① The EUT was set on with continuous transmission mode and placed on a 1.5 meter high non-conductive table on the chamber.

② The test antenna is used on Bi-Log antenna at above 30 MHz, and used on Horn antenna at 1 GHz and then the measurements are repeated with the test antenna for vertical and horizontal polarization. The output of the test antenna will be connected to a measuring receiver, and it is set to tuned over the required standard measuring frequency range.

③ At each frequency at which a relevant spurious component is detected, the test antenna will be raised and lowered through the specified range of heights until an maximum signal level is detected on the measuring receiver.

④ The EUT is position x, y, z axis on rotating through 360 degrees in the horizontal plane, until the Max. signal level is detected by the measuring receiver.

⑤ The receiver is scanned from requested measuring frequency band and then the maximum meter reading is recorded. The radiated emissions were measured with requested standard specification (detector and resolution bandwidth etc.)

⑥ The EUT was then removed and replaced with substitution antenna .The center of the antenna was approximately at the same location as the center of the EUT, and calibrated for the frequency of the spurious component detected.

⑦ Signal generator output port connected with substitution antenna input port. If necessary, may use shield cable between signal generator and substitution antenna

⑧ The frequency of the calibrated signal generator is set to frequency of the spurious component detected, and the input attenuator setting of the measuring receiver was adjust in order to increase the sensitivity of the measuring receiver, if necessary

⑨ The test antenna was raised and lowered through the specified range of heights to ensure that maximum signal is received.

⑩ The input signal to the substitution antenna was be adjusted until an equal or a known related level to that detected from the transmitter is obtained on the measuring receiver.

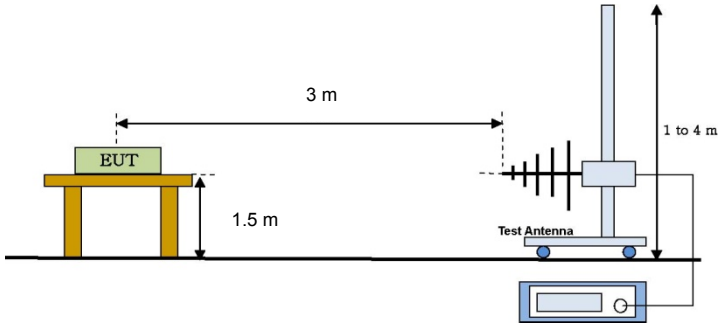
⑪ The input signal to the substitution antenna was be recorded as a power level and corrected for any change of input attenuator setting of the measuring receiver

⑫ The measure of P_{erp}(or P_{eirp}) the spurious components is the larger of the two power levels recorded for each spurious component at the input to the substitution antenna, corrected for the gain of the substitution antenna, if necessary.

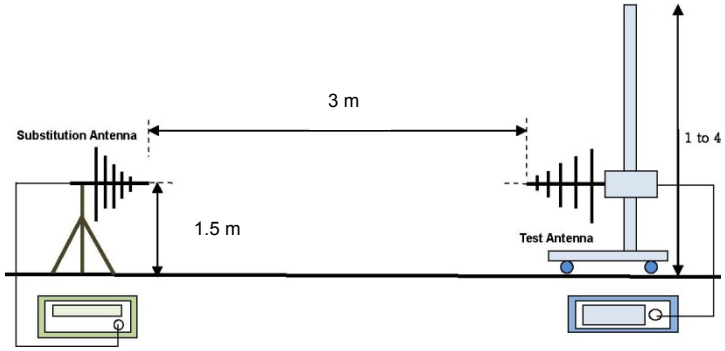
⑬ It is correction to signal generator's offset value. In this case of P_{erp}(or P_{eirp}) shall calculated as follow as formula ;

• P_{erp}(or P_{eirp}) = Signal generator level (dBm) – Cable loss(dB)

5.1.5 Test Setup



[Radiatedmeasurement setup_Below than 1 GHz]



[Effective Radiated Power measurement setup]

※ Above the test antenna is used on Horn antenna at above 1 GHz.

5.1.5 Measurement Result

Channel Description	CH	Frequency [MHz]	Effective Radiated Power		Limit [W]	Test Results
			[dBm]	[W]		
GMRS	15	462.5500	31.8	1.5	5	Compliance
FRS	8	467.5625	23.6	0.2	0.5	Compliance

5.2 Modulation Characteristecs

5.2.1 Standard Applicable [FCC Part 95.637(a)(b), Part 2.1047(a) / RSS-210 A6.1.2, A6.2.2]

Part 95.637(a)A GMRS transmitter that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 5 kHz. A FRS unit that transmits emission type F3E must not exceed a peak frequency deviation of plus or minus 2.5 kHz, and the audio frequency response must not exceed 3.125 kHz.

Part 95.637(b) Each GMRS transmitter, except a mobile station transmitter with a power output of 2.5 W or less, must automatically prevent a greater than normal audio level from causing over-modulation. The transmitter also must include audio frequency low pass filtering, unless it complies with the applicable paragraphs of § 95.631 (without filtering.) The filter must be between the modulation limiter and the modulated stage of the transmitter. At any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least 60 log10 (f/3) dB greater than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 kHz.

Part 2.1047(a) A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

RSS-210 A6.1.2 (c) The peak frequency deviation shall not exceed ±2.5 kHz. The limiter shall be followed by a low-pass filter to remove unwanted harmonics.

RSS-210 A6.2.2 (b) For emission types F1D, G1D, G3E, F3E or F2D, the peak frequency deviation shall not exceed ±5 kHz. GMRS transmitters must include an audio frequency low-pass filter, unless they comply with the appropriate emission masks in Section A6.2.5 below. The filter must be between the modulation limiter and the modulated stage of the transmitter. The filter attenuation must be as follows: for 3 kHz ≤ f ≤ 20 kHz, the attenuation is at least 60 log10(f, kHz/3) dB greater than the attenuation at 1 kHz; and for f > 20 kHz , the attenuation is at least 50 dB greater than the attenuation at 1 kHz.

5.2.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) ℃
- Relative Humidity : (48 ~ 52) % R.H.

5.2.3 Measurement Procedure

•Modulation Limit

The carrier frequency deviation was measured with the tone adjust the audio input for 60 % of rated system deviation at 1 kHz using this level as a reference (0 dB) and vary the input level from –20 to +20 dB. Record the frequency deviation obtained as a function of the input level at frequencies 0.1, 0.5, 1.0, 3.0 and 5.0 kHz. The maximum deviation was recorded at each test condition.

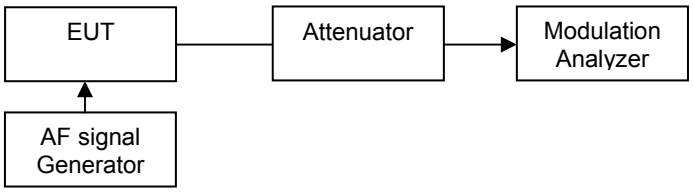
- **Audio frequency response**

The audio input level needed for a particular percentage of modulation was measured in accordance with ANSI/TIA-603-E-2016. Adjust the audio input for 20 % of rated system deviation at 1kHz using this level as a reference.Vary the Audio frequency from 100 Hz to 5 kHz and record the frequency deviation. Audio Frequency Response =20log10 (V_{FREQ}/V_{REF}).

•Audio Low Pass Filter Response

Apply a 1000 Hz tone from the audio signal generator and adjust the level per manufacturer's specifications. Record the dB level of the 1000 Hz tone as LEV_{REF}. Set the audio signal generator to the desired test frequency between 3000 Hz and the upper low pass filter limit. Record the dB level at the test frequency as LEV_{FREQ}. Calculate the audio frequency response at the test frequency as: low pass filter response = LEV_{FREQ} - LEV_{REF}

5.2.4 Test setup

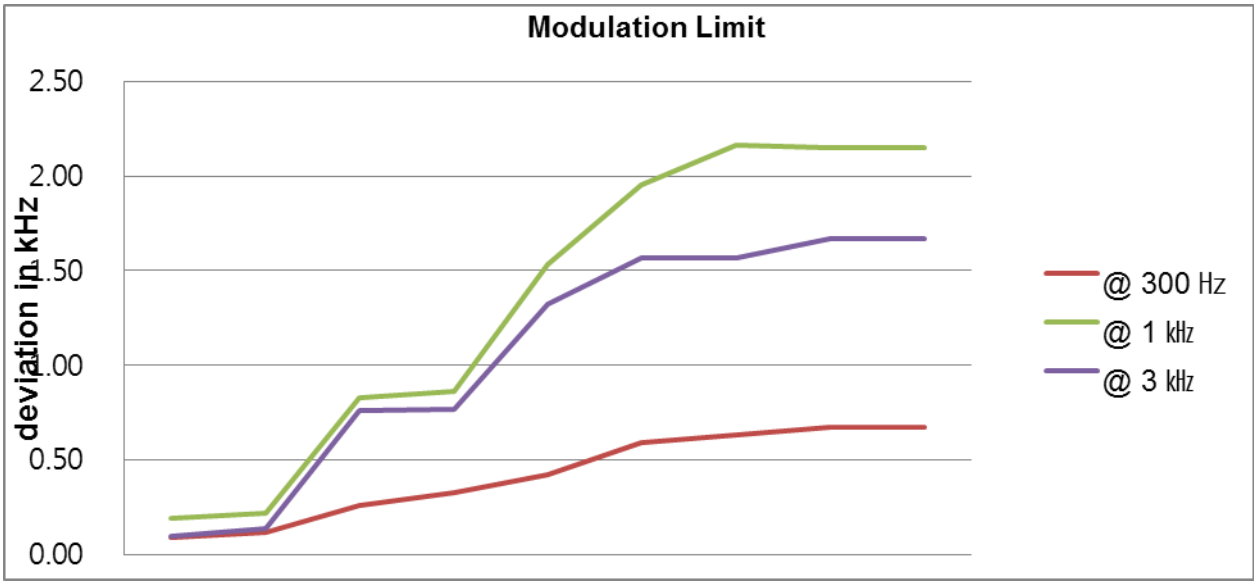


5.2.5 Measurement Result

- Modulation Limit

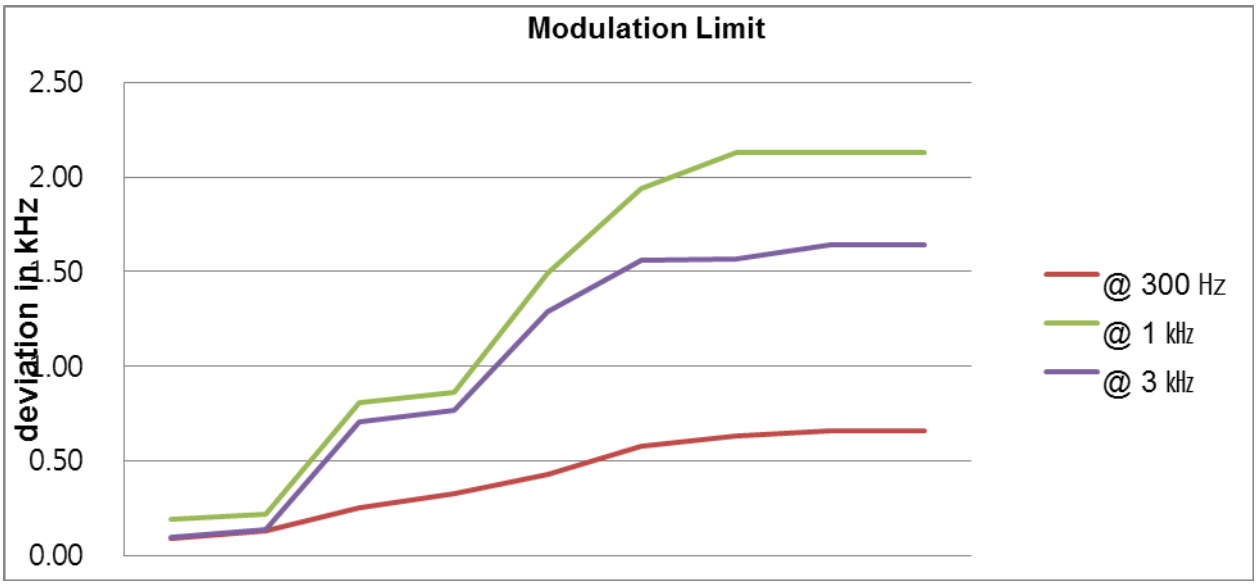
GMRS (Ch15 : 462.5500 MHz)

Audio input Level (dB)	Frequency Deviation (kHz)			Limit (kHz)
	@ 300 Hz	@ 1 kHz	@ 3kHz	
-20	0.09	0.19	0.10	5
-15	0.12	0.22	0.14	5
-10	0.26	0.83	0.76	5
-5	0.33	0.86	0.77	5
0	0.42	1.53	1.32	5
5	0.59	1.95	1.57	5
10	0.63	2.16	1.57	5
15	0.67	2.15	1.67	5
20	0.67	2.15	1.67	5
Test Results		Compliance		



FRS (Ch8 : 467.5625 MHz)

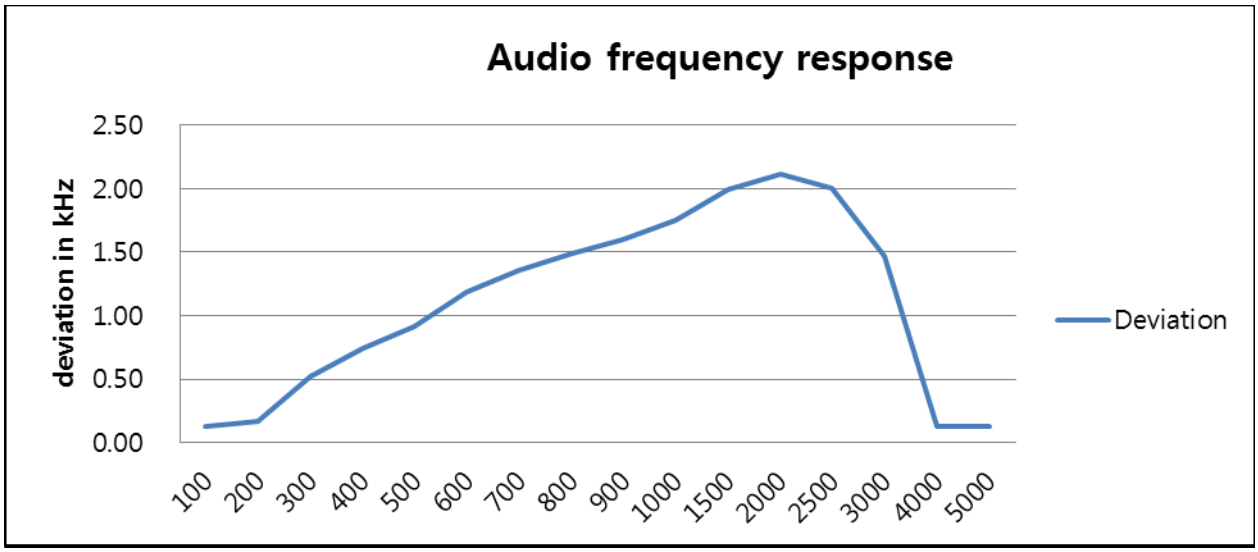
Audio input Level (dB)	Frequency Deviation (kHz)			Limit (kHz)
	@ 300 Hz	@ 1 kHz	@ 3kHz	
-20	0.09	0.19	0.10	2.5
-15	0.13	0.22	0.14	2.5
-10	0.25	0.81	0.71	2.5
5	0.33	0.86	0.77	2.5
0	0.43	1.49	1.29	2.5
5	0.58	1.94	1.56	2.5
10	0.63	2.13	1.57	2.5
15	0.66	2.13	1.64	2.5
20	0.66	2.13	1.64	2.5
Test Results		Compliance		



•Audio frequency response

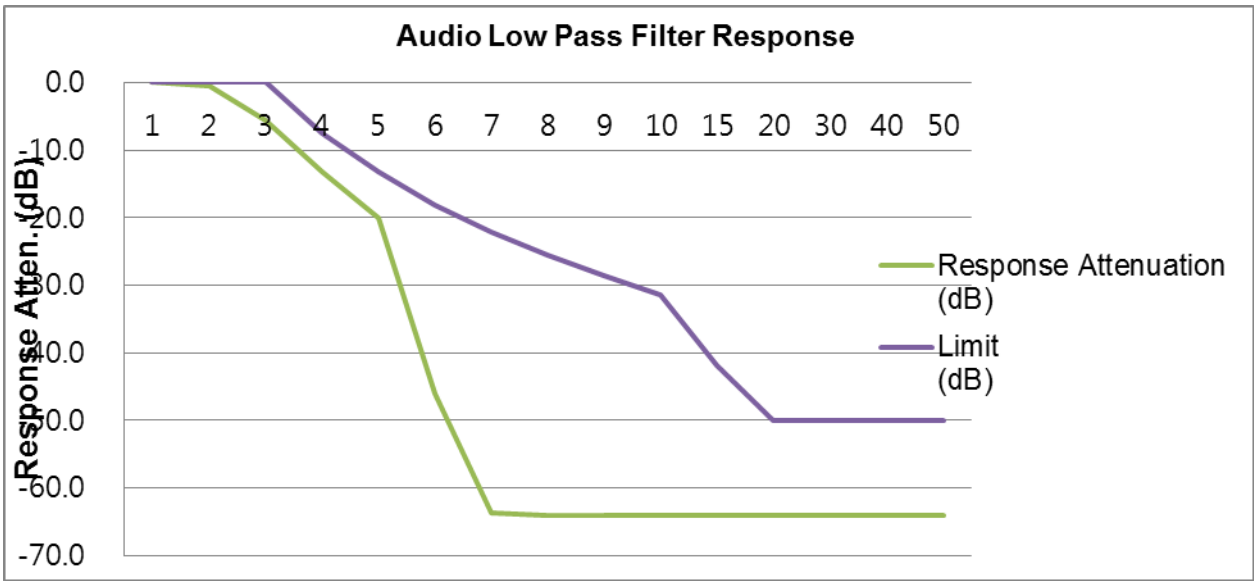
FRS (Ch8 : 467.5625 MHz)

Audio Frequency (Hz)	Frequency Deviation (kHz)	Limit (kHz)
100	0.13	3.125
200	0.17	3.125
300	0.52	3.125
400	0.74	3.125
500	0.91	3.125
600	1.19	3.125
700	1.36	3.125
800	1.49	3.125
900	1.60	3.125
1000	1.75	3.125
1500	1.99	3.125
2000	2.11	3.125
2500	2.00	3.125
3000	1.47	3.125
4000	0.13	3.125
5000	0.13	3.125
Test Results	Compliance	



• Audio Low Pass Filter Response

Audio Frequency (kHz)	Response Attenuation (dB)	Limit (dB)
1	0.0	0
2	-0.6	0
3	-5.7	0
4	-13.2	-7.5
5	-20.0	-13.3
6	-46.1	-18.1
7	-63.7	-22.1
8	-64.0	-25.6
9	-64.0	-28.6
10	-64.0	-31.4
15	-64.0	-41.9
20	-64.0	-50.0
30	-64.0	-50.0
40	-64.0	-50.0
50	-64.0	-50.0
Test Results	Compliance	



5.3 Occupied Bandwidth

5.3.1 Standard Applicable [FCC Part 95.633(a)(c),Part 2.1049 / RSS-210 A6.1.3, A6.2.3]

The Emission bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits.

FCC Part 95.633(a) / RSS-210 A6.2.3:

GMRS: The authorized bandwidth for emission types H1D, J1D, R1D, H3E, J3E and R3E is 4 kHz; for emission types A1D and A3E, it is 8 kHz; and for emission types F1D, G1D, F3E, G3E and F2D, it is 20 kHz.

FCC Part 95.633(c) / RSS-210 A6.1.3:

FRS: The authorized bandwidth for an FRS unit is 12.5 kHz.

5.3.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) ℃
- Relative Humidity : (48 ~ 52) % R.H.

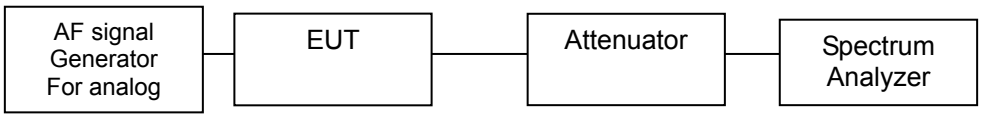
5.3.3 Measurement Procedure

1. The EUT was modulated by 2.5 kHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing).
2. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
3. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. The 99% occupied bandwidth is the frequency bandwidth of the signal power at the 99% channel power of occupied bandwidth.

The spectrum analyzer is set to the as follows :

- RBW : 300 Hz
- VBW : >3 x RBW
- Detector function : peak
- Trace : max hold

5.3.4 Test setup

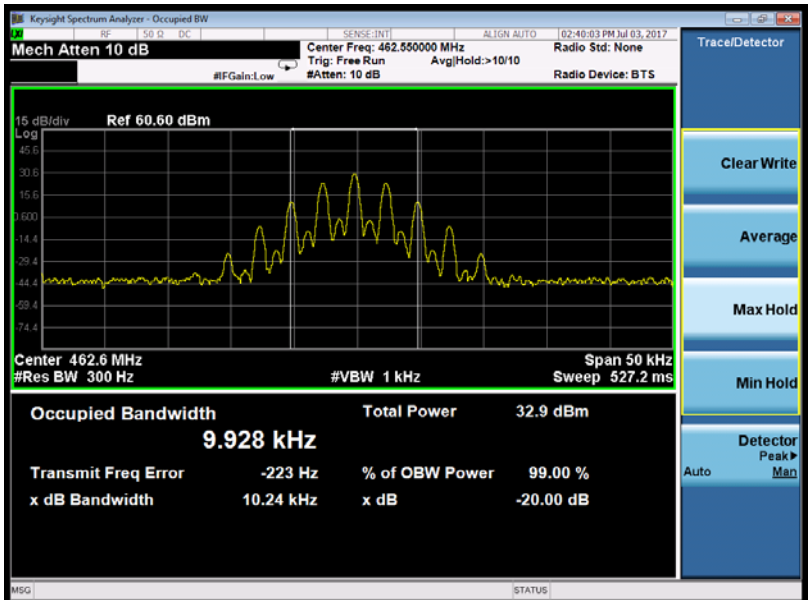


5.3.5 Measurement Result

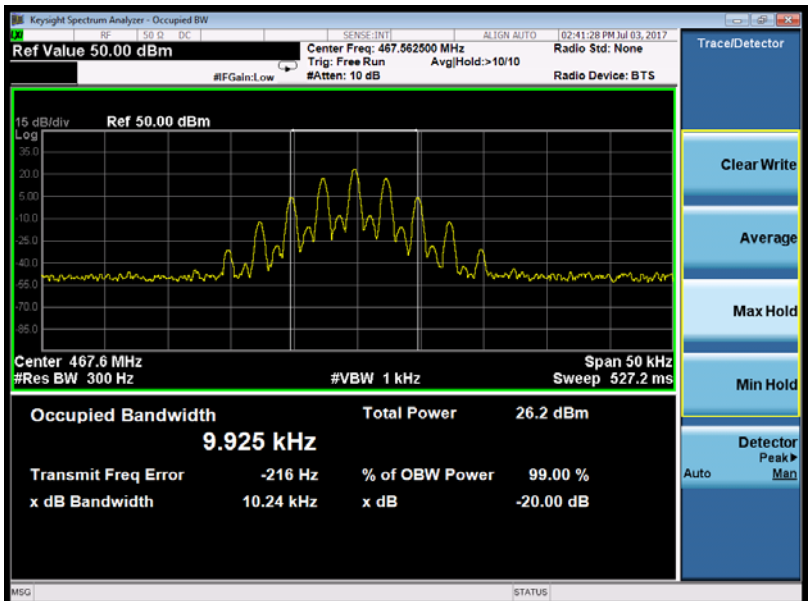
Channel Description	CH	Frequency [MHz]	99 % Bandwidth [kHz]	20 dB Bandwidth [kHz]	Limit [kHz]	Test Results
GMRS	15	462.5500	9.93	10.24	20	Compliance
FRS	8	467.5625	9.93	10.24	12.5	Compliance

5.3.6 Test Plot

GMRS (Ch15 : 462.5500 MHz)



FRS (Ch8 : 467.5625 MHz)



5.4 Emission Mask

5.4.1 Standard Applicable [FCC Part 95.635(b)(1)(3)(7) / RSS-210 A6.1.5, A6.2.5]

GMRS&FRS: Unwanted emissions shall be attenuated below the unmodulated carrier power in accordance with the following:

(1) At least 25 dB (decibels) on any frequency removed from the center of the authorized bandwidth by more than 50 % up to and including 100 % of the authorized bandwidth.

(3) At least 35 dB on any frequency removed from the center of the authorized bandwidth by more than 100 % up to and including 250 % of the authorized bandwidth.

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

5.4.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) ℃
- Relative Humidity : (48 ~ 52) % R.H.

5.4.3 Measurement Procedure

The EUT was modulated by 2.5 kHz Sine wave audio signal; the level of the audio signal employed is 16 dB greater than that necessary to produce 50 % of rated system deviation. Rated system deviation is 2.5 kHz.

The spectrum analyzer is set to the as follows
- RBW = 300 Hz
- VBW: >3xRBW

5.4.4 Test setup

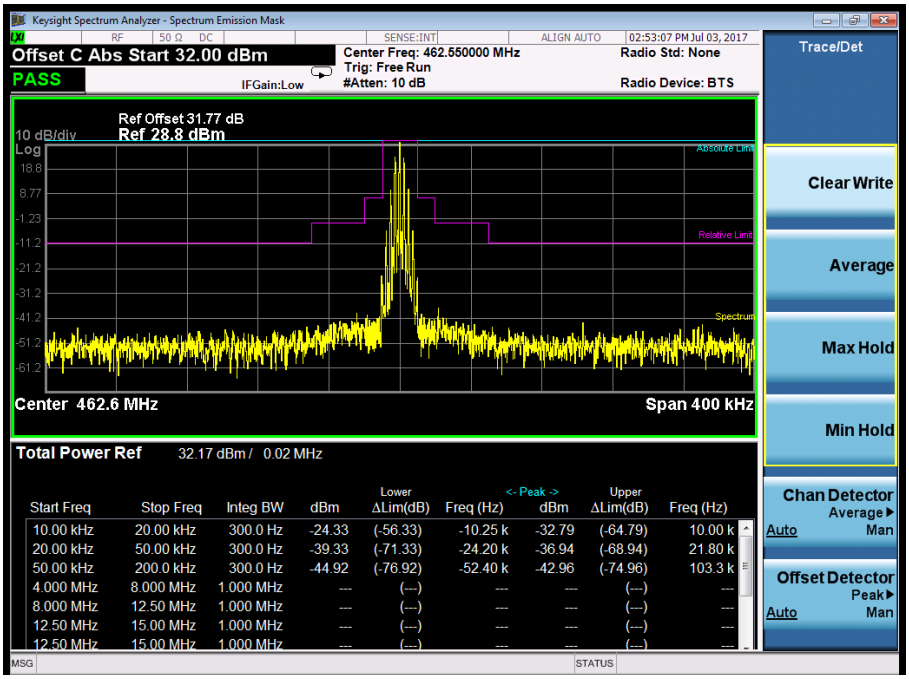
Please refer 5.3.4

5.4.5 Measurement Result

Compliance: please refer 5.4.6 for details

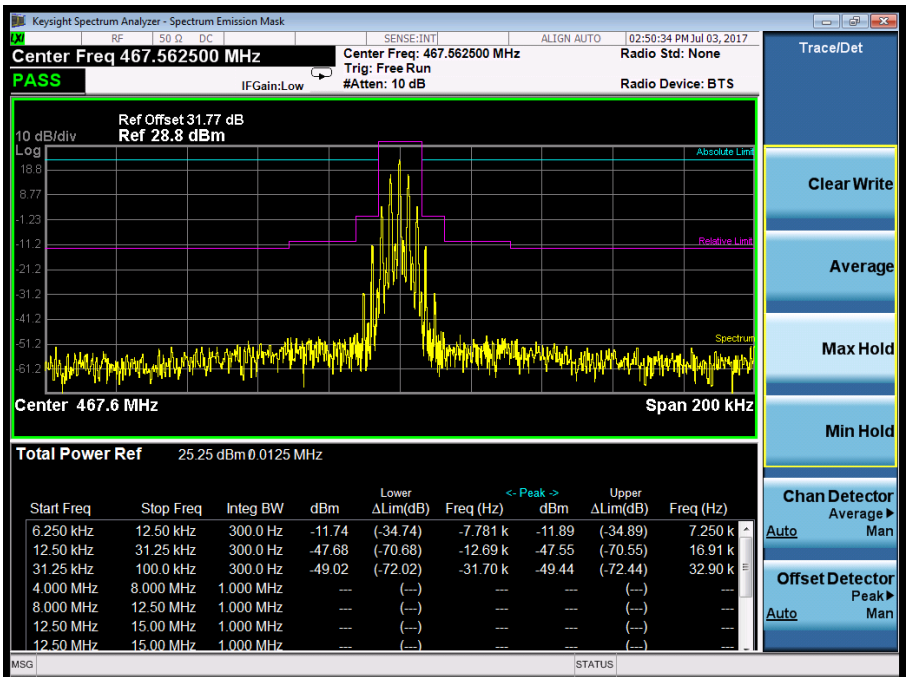
5.4.6 Test Plot

GMRS (Ch15 : 462.5500 MHz)



Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
10.00 kHz	20.00 kHz	300.0 Hz	-24.33	(-56.33)	-10.25 k	-32.79	(-64.79)	10.00 k
20.00 kHz	50.00 kHz	300.0 Hz	-39.33	(-71.33)	-24.20 k	-36.94	(-68.94)	21.80 k
50.00 kHz	200.0 kHz	300.0 Hz	-44.92	(-76.92)	-52.40 k	-42.96	(-74.96)	103.3 k
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

FRS (Ch8 : 467.5625 MHz)



Start Freq	Stop Freq	Integ BW	dBm	Lower ΔLim(dB)	Freq (Hz)	<- Peak -> dBm	Upper ΔLim(dB)	Freq (Hz)
6.250 kHz	12.50 kHz	300.0 Hz	-11.74	(-34.74)	-7.781 k	-11.89	(-34.89)	7.250 k
12.50 kHz	31.25 kHz	300.0 Hz	-47.68	(-70.68)	-12.69 k	-47.55	(-70.55)	16.91 k
31.25 kHz	100.0 kHz	300.0 Hz	-49.02	(-72.02)	-31.70 k	-49.44	(-72.44)	32.90 k
4.000 MHz	8.000 MHz	1.000 MHz	---	(---)	---	---	(---)	---
8.000 MHz	12.50 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---
12.50 MHz	15.00 MHz	1.000 MHz	---	(---)	---	---	(---)	---

Test Results	Compliance

5.5 Transmitter Radiated Unwanted Emissions

5.5.1 Standard Applicable [FCC Part 95.635(b7) / RSS-201 A6.1.5, A6.2.5]

According to FCC section 95.635(b7), the unwanted emission should be attenuated below TP by at least 43+10 log (Transmit Power) dB.

5.5.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) ℃
- Relative Humidity : (48 ~ 52) % R.H.

5.5.3 Measurement Procedure

Refer 5.1.3

5.5.4 Test Setup

Refer 5.1.4

5.5.5 Measurement Result

The following frequencies were selected based on the output power results.

Channel Description	CH	Freq. [MHz]	ERP power	
			[dBm]	[W]
GMRS	15	462.5500	31.8	1.5

Emission Frequency [MHz]	Ant Pol	Level below Carrier [dBc]	Margin [dB]	Limit [dBc]	Test Results
1 387.5	V	77.53	32.83	44.7	Compliance
1 849.2	V	82.13	37.43	44.7	Compliance
Note: The formula for limit is below; 43+10 log (P) where, P = EUT's output power in W Therefore 43+10log(1.5) = 44.7					

Channel Description	CH	Freq. [MHz]	ERP power	
			[dBm]	[W]
FRS	8	467.5625	23.6	0.2

Emission Frequency [MHz]	Ant Pol	Level below Carrier [dBc]	Margin [dB]	Limit [dBc]	Test Results
1 004.2	V	83.13	47.13	36	Compliance
1 486.5	V	85.25	49.25	36	Compliance
Note: The formula for limit is below; 43+10 log (P) where, P = EUT's output power in W Therefore 43+10log(0.2) = 36					

5.6 Frequency Stability

5.6.1 Standard Applicable [FCC Part 95.621(b), Part 95.627(b) / RSS-210 A6.1.6, A6.2.6]

The carrier frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.
FCC Part 95.621(b) / RSS-210 A6.1.6, RSS-210 A6.2.6
GMRS: The carrier frequency tolerance shall be better than ±5 ppm.
FRS: The carrier frequency tolerance shall be better than ±2.5 ppm.

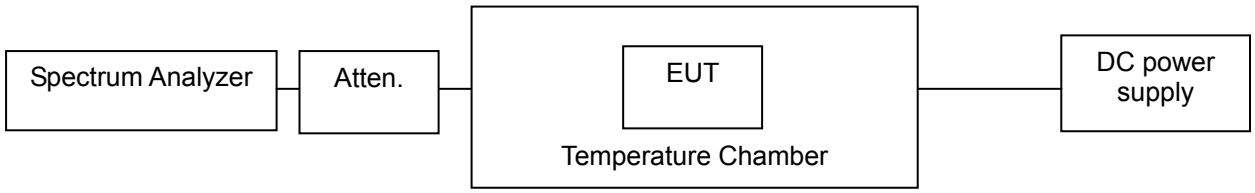
5.6.2 Test Environment conditions

- Ambient temperature : (21 ~ 22) ℃
- Relative Humidity : (48 ~ 52) % R.H.

5.6.3 Measurement Procedure

EUT connect to Spectrum analyzer, test is performed in T&H chamber.
These measurements shall also be performed at normal and extreme test conditions.
▪ Test Method : ANSI/TIA-603-E-2016, clause 3.2.2 for frequency stability tests
-Frequency stability with respect to ambient temperature
-Frequency stability when varying supply voltage

5.6.4 Test setup



5.6.5 Measurement Result

GMRS (Ch15 : 462.5500 MHz)

Temp(℃)	Power Supply	Measured Freq(MHz)	Freq Drift(ppm)
50	DC 6.0 (Vnom)	462.5502	0.29
40	DC 6.0 (Vnom)	462.550136	0.29
30	DC 6.0 (Vnom)	462.549811	-0.41
20	DC 6.0 (Vnom)	462.549798	-0.44
10	DC 6.0 (Vnom)	462.549788	-0.46
0	DC 6.0 (Vnom)	462.549811	-0.41
-10	DC 6.0 (Vnom)	462.549783	-0.47
-20	DC 6.0 (Vnom)	462.549772	-0.49
-30	DC 6.0 (Vnom)	462.549762	-0.51
Nom Temperature	DC 5.4 (Vmin)	462.549795	-0.44
Nom Temperature	DC 6.6 (Vmax)	462.549793	-0.45
Test Results		Compliance	

FRS (Ch8 : 467.5625 MHz)

Temp(℃)	Power Supply	Measured Freq(MHz)	Freq Drift(ppm)
50	DC 4.8 (Vnom)	467.562600	0.21
40	DC 4.8 (Vnom)	467.562597	0.21
30	DC 4.8 (Vnom)	467.562405	-0.20
20	DC 4.8 (Vnom)	467.562315	-0.40
10	DC 4.8 (Vnom)	467.562314	-0.40
0	DC 4.8 (Vnom)	467.562300	-0.43
-10	DC 4.8 (Vnom)	467.562283	-0.46
-20	DC 4.8 (Vnom)	467.562305	-0.42
-30	DC 4.8 (Vnom)	467.562309	-0.41
Nom Temperature	DC 4.3 (Vmin)	467.562311	-0.40
Nom Temperature	DC 5.3 (Vmax)	467.562320	-0.38
Test Results		Compliance	