



TEST REPORT

Part 95(A/B) & IC RSS-210(Issue 8)

Equipment Under Test FRS / GMRS
Model Name LXT600
FCC ID MMALXT600
IC Certification 3690A- LXT600
Applicant Midland Radio Corporation
Manufacturer Global Link
Date of test(s) 2012.04.09 ~ 2012.04.25, 2012.05.02
Date of issue 2012.05.03

Issued to

Midland Radio Corporation
5900 Parretta Drive Kansas City Missouri United States 64120

Issued by

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Revision history

Revision	Date of issue	Test report No.	Description
-	2012.04.27	KES-RF-120035	Initial
1	2012.05.03	KES-RF-120037	<Addition> 1. DC input into the final amplifier in the test report on page 7 of 37. 2. The frequency stability measurement in the report on page 34, 35 of 37. (FRS & GMRS-Low power) <Retest> 1. Retest the battery end point of frequency stability (GMRS-High power) in the report on page 34 of 37.



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1.0 General product description

Equipment under test	FRS / GMRS
Model name	LXT600
Serial number	N/A
Frequency Range	462.562 5 MHz ~ 462.712 5 MHz(GMRS Channels 1 ~7)
	467.562 5 MHz ~ 467.712 5 MHz(FRS Channels 8 ~ 14)
	462.550 0 MHz ~ 462.725 0 MHz(GMRS Channels 15 ~ 22)
Emission type	11K0F3E
E.R.P.	GMRS: 0.101 4 W(High power), 0.081 7 W(Low power) // FRS: 0.077 8 W
Number of channel	462.562 5 MHz ~ 462.712 5 MHz(GMRS Channels 1 ~7)
	467.562 5 MHz ~ 467.712 5 MHz(FRS Channels 8 ~ 14)
	462.550 0 MHz ~ 462.725 0 MHz(GMRS Channels 15 ~ 22)
Power source	3 × AAA Alkaline(4.5 V) // Rechargeable Ni-MH battery pack(3.6 V)

1.1 Information about variant model

Not applicable

1.2 Device modifications

No modifications were made during testing.

1.3 Test facility

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477-6, Hageo-ri, Yeosu-eup, Yeosu-gun, Gyeonggi-do, 469-803, Korea

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.4 Laboratory accreditations and listings

Country	Agency	Scope of accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	 343818
KOREA	KC	EMI (10 meter Open Area Test Site and two conducted sites) Radio (3 & 10 meter Open Area Test Sites and one conducted site)	 KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	 4769B-1



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1.5 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;

Mode	Channel No.	Frequency(MHz)	High / Low	Output power (dBm)	
				DC 4.5 V (Alkaline)	DC 3.6 V (Rechargeable battery)
GMRS	1	462.562 5	High	29.13	27.23
			Low	25.66	24.50
	2	462.587 5	High	29.17	27.19
			Low	25.58	24.42
	3	462.612 5	High	29.16	27.04
			Low	25.82	24.69
	4	462.637 5	High	29.12	27.11
			Low	25.73	24.66
	5	462.662 5	High	29.06	27.00
			Low	26.02	24.80
	6	462.687 5	High	29.16	27.22
			Low	25.76	24.83
	7	462.712 5	High	29.21	27.11
			Low	26.02	24.77
FRS	8	467.562 5	N/A	25.28	24.07
	9	467.587 5		24.31	23.37
	10	467.612 5		24.66	23.60
	11	467.637 5		24.62	23.78
	12	467.662 5		25.01	23.90
	13	467.687 5		25.02	24.03
	14	467.712 5		25.05	24.03



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GMRS	15	462.550 0	High	29.10	27.09
			Low	26.00	24.87
	16	462.575 0	High	29.18	27.14
			Low	26.24	24.79
	17	462.600 0	High	29.14	27.13
			Low	25.99	24.80
	18	462.625 0	High	29.28	27.34
			Low	26.15	24.83
	19	462.650 0	High	29.42	27.43
			Low	26.10	24.84
	20	462.675 0	High	29.43	27.37
			Low	26.16	24.90
	21	462.700 0	High	29.40	27.39
			Low	26.27	24.90
	22	462.725 0	High	29.39	27.38
			Low	26.31	24.96

Therefore all applicable requirements were tested to the three channels, the 20th & 22th for GMRS and the 8th for FRS.

DC input into the final amplifier

Mode	Voltage(V)	Current(A)	Power(W)
GMRS(High power)	4.5	0.606	2.727
GMRS(Low power)	4.5	0.482	2.169
FRS	4.5	0.472	2.124
GMRS(High power)	3.6	0.482	1.735
GMRS(Low power)	3.6	0.452	1.627
FRS	3.6	0.443	1.559



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2.0 Summary of tests

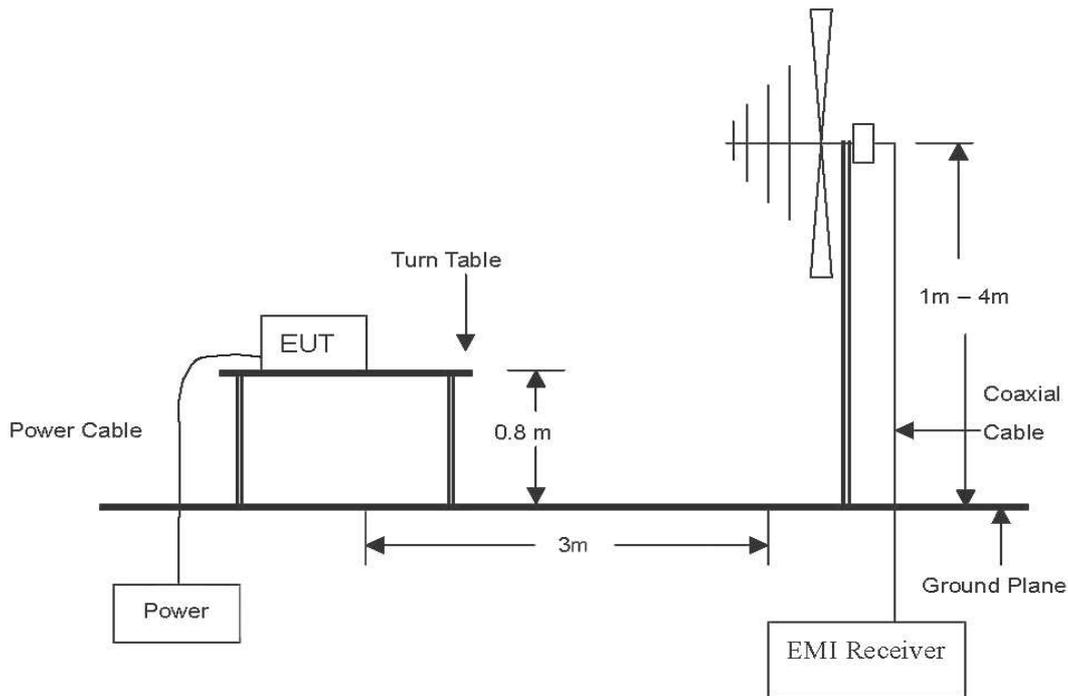
Section in FCC Part 95 & RSS-210	Parameter	Status
95.639 RSS-210 A6.1.4 RSS-210 A6.2.4	RF output power	C
95.637 RSS-210 A6.1.2 RSS-210 A6.2.2	Modulation limiting	C
2.1047	Audio frequency response	C
95.637 RSS-210 A6.2.2	Low-pass filter response	C
95.633, 95.635 RSS-210 A6.1.3 RSS-210 A6.2.3 RSS-210 A6.1.5 RSS-210 A6.2.5	Occupied bandwidth and emission mask	C
95.635 RSS-210 A6.1.5 RSS-201 A6.2.5	Radiated spurious emissions	C
95.621, 95.627 RSS-210 A6.1.6 RSS-201 A6.2.6	Frequency stability	C
Note: C=Complies NC=Not complies NT=Not tested NA=Not applicable		

2.1 Test data

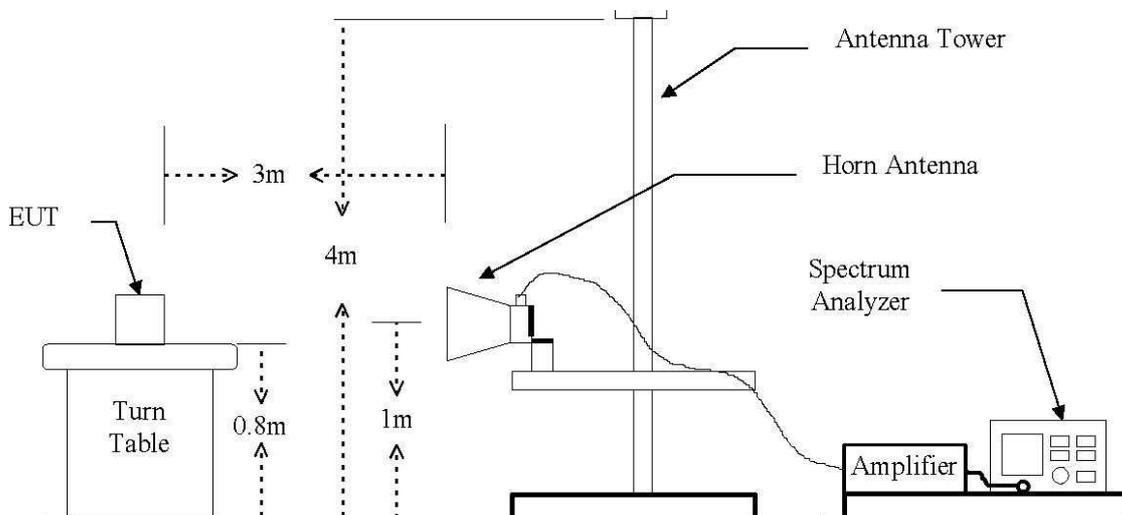
2.1.1 RF output power and radiated spurious emission

Test setup

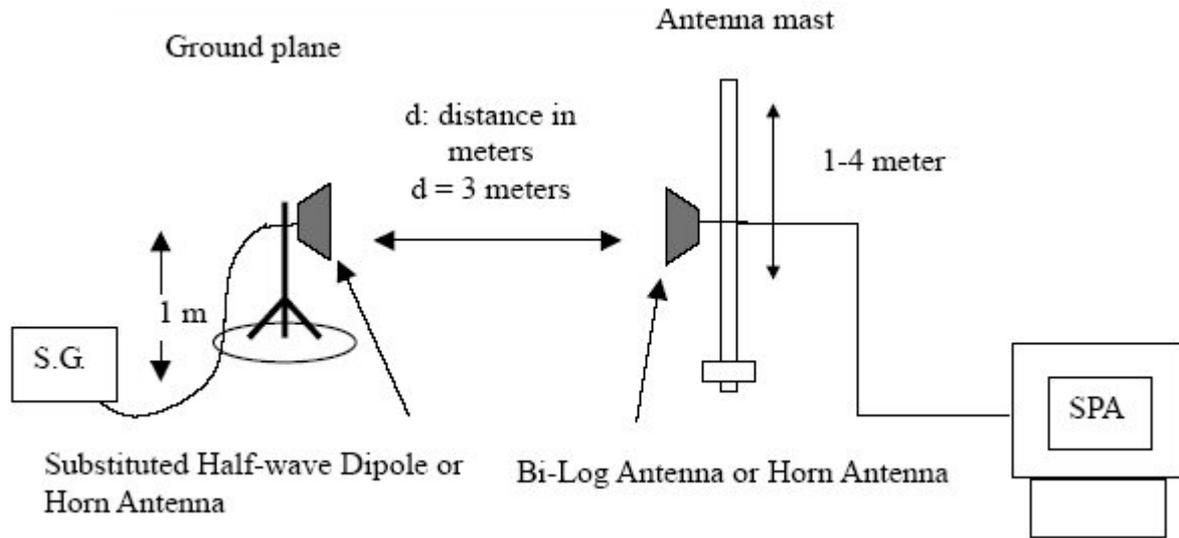
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.



The diagram below shows the test setup for substituted method





Test procedure: Based on ANSI/TIA 603C: 2004

RF output power & radiated spurious emissions

1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. During the measurement of the EUT, the resolution bandwidth was to 1 MHz and the video bandwidth was set to 1 MHz
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
7. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The EUT was replaced by half-wave dipole(below 1 000 MHz) or horn antenna(above 1 000 MHz) connected to a signal generator.
11. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
12. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
13. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
14. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
15. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.



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Limit

RF output power

§95.639

Power output shall not exceed 0.50 Watts effective radiated power for the FRS channels. There can be no provisions for increasing the power or varying the power.

No GMRS channel, under any condition of modulation, shall exceed:

1. 50W Carrier power (average TP during one modulated RF cycle) when transmitting emissions type A1D, F1D, G1D, A3E, F3E, or G3E.
2. 50W peak envelope TP when transmitting emission type H1D, J1D, R1D, H3E, J3E or R3E.

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.

Radiated spurious emissions

§95.635 & RSS-201 A6.1.5, A6.2.5

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

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Test results**RF output power****GMRS (High power) // DC 4.5 V**

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	E.R.P.	
				(dBm)	(W)
467.562 5	H	18.50	1.56	20.06	0.101 4
467.562 5	V	19.00	-0.30	18.70	0.074 1

GMRS (Low power) // DC 4.5 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	E.R.P.	
				(dBm)	(W)
462.725 0	H	18.50	0.62	19.12	0.081 7
462.725 0	V	21.00	-3.74	17.26	0.053 2

FRS // DC 4.5 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	E.R.P.	
				(dBm)	(W)
462.675 0	H	18.50	0.41	18.91	0.077 8
462.675 0	V	21.00	-3.12	17.88	0.061 4

GMRS (High power) // DC 3.6 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	E.R.P.	
				(dBm)	(W)
467.562 5	H	18.50	-0.55	17.95	0.062 4
467.562 5	V	19.00	-3.12	15.88	0.038 7

GMRS (Low power) // DC 3.6 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	E.R.P.	
				(dBm)	(W)
462.725 0	H	18.50	-2.64	15.86	0.038 5
462.725 0	V	21.00	-6.25	14.75	0.029 9

FRS // DC 3.6 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	E.R.P.	
				(dBm)	(W)
462.675 0	H	18.50	-2.19	16.31	0.042 8
462.675 0	V	21.00	-6.51	14.49	0.028 1



Radiated spurious emissions

GMRS (High power) // DC 4.5 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	Absolute level (dBm)	Spurious attenuation (dBc)	Limit (dBc)	Margin (dB)
925.350 0	H	-23.00	-13.61	-36.61	55.52	31.91	23.61
925.350 0	V	-23.00	-12.73	-35.73	54.64	31.91	22.73
1 388.025 0	H	-27.00	-10.79	-37.79	56.70	31.91	24.79
1 388.025 0	V	-27.00	-6.02	-33.02	51.93	31.91	20.02
1 850.700 0	H	-37.00	3.64	-33.36	52.27	31.91	20.36
1 850.700 0	V	-37.00	3.78	-33.22	52.13	31.91	20.22
2 313.375 0	H	-20.00	-17.26	-37.26	56.17	31.91	24.26
2 313.375 0	V	-20.00	-14.54	-34.54	53.45	31.91	21.54

Remark;

1. Spurious attenuation = EUT max. output power(dBm) - absolute level
2. Spurious attenuation limit in dB = 43 + 10log(power in watts)

GMRS (Low power) // DC 4.5 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	Absolute level (dBm)	Spurious attenuation (dBc)	Limit (dBc)	Margin (dB)
925.450 0	H	-23.00	-13.55	-36.55	55.67	32.12	23.55
925.450 0	V	-23.00	-12.97	-35.97	55.09	32.12	22.97
1 388.175 0	H	-27.00	-10.84	-37.84	56.96	32.12	24.84
1 388.175 0	V	-27.00	-6.01	-33.01	52.13	32.12	20.01
1 850.900 0	H	-37.00	3.68	-33.32	52.44	32.12	20.32
1 850.900 0	V	-37.00	3.78	-33.22	52.34	32.12	20.22
2 313.625 0	H	-20.00	-17.27	-37.27	56.39	32.12	24.27
2 313.625 0	V	-20.00	-14.52	-34.52	53.64	32.12	21.52

Remark;

1. Spurious attenuation = EUT max. output power(dBm) - absolute level
2. Spurious attenuation limit in dB = 43 + 10log(power in watts)

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FRS // DC 4.5 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	Absolute level (dBm)	Spurious attenuation (dBc)	Limit (dBc)	Margin (dB)
935.125 0	H	-23.00	-11.32	-34.32	54.38	33.06	21.32
935.125 0	V	-23.00	-10.88	-33.88	53.94	33.06	20.88
1 402.687 5	H	-30.00	-6.18	-36.18	56.24	33.06	23.18
1 402.687 5	V	-28.00	-3.98	-31.98	52.04	33.06	18.98
1 870.250 0	H	-30.00	-1.42	-31.42	51.48	33.06	18.42
1 870.250 0	V	-31.00	-0.73	-31.73	51.79	33.06	18.73
2 337.812 5	H	-21.00	-14.32	-35.32	55.38	33.06	22.32
2 337.812 5	V	-21.00	-12.17	-33.17	53.23	33.06	20.17

Remark;

1. Spurious attenuation = EUT max. output power(dBm) - absolute level
2. Spurious attenuation limit in dB = 43 + 10log(power in watts)

GMRS (High power) // DC 3.6 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	Absolute level (dBm)	Spurious attenuation (dBc)	Limit (dBc)	Margin (dB)
925.350 0	H	-23.00	-13.07	-36.07	52.38	29.31	23.07
925.350 0	V	-23.00	-12.99	-35.99	52.30	29.31	22.99
1 388.025 0	H	-27.00	-11.49	-38.49	54.80	29.31	25.49
1 388.025 0	V	-27.00	-6.13	-33.13	49.44	29.31	20.13
1 850.700 0	H	-37.00	3.52	-33.48	49.79	29.31	20.48
1 850.700 0	V	-37.00	3.82	-33.18	49.49	29.31	20.18
2 313.375 0	H	-20.00	-16.45	-36.45	52.76	29.31	23.45
2 313.375 0	V	-20.00	-13.58	-33.58	49.89	29.31	20.58

Remark;

1. Spurious attenuation = EUT max. output power(dBm) - absolute level
2. Spurious attenuation limit in dB = 43 + 10log(power in watts)

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GMRS (Low power) // DC 3.6 V

Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	Absolute level (dBm)	Spurious attenuation (dBc)	Limit (dBc)	Margin (dB)
925.450 0	H	-23.00	-15.97	-38.97	54.83	28.86	25.97
925.450 0	V	-23.00	-14.82	-37.82	53.68	28.86	24.82
1 388.175 0	H	-27.00	-12.21	-39.21	55.07	28.86	26.21
1 388.175 0	V	-27.00	-7.54	-34.54	50.40	28.86	21.54
1 850.900 0	H	-37.00	2.05	-34.95	50.81	28.86	21.95
1 850.900 0	V	-37.00	2.64	-34.36	50.22	28.86	21.36
2 313.625 0	H	-20.00	-18.23	-38.23	54.09	28.86	25.23
2 313.625 0	V	-20.00	-15.16	-35.16	51.02	28.86	22.16

Remark;

1. Spurious attenuation = EUT max. output power(dBm) - absolute level
2. Spurious attenuation limit in dB = 43 + 10log(power in watts)

FRS // DC 3.6 V

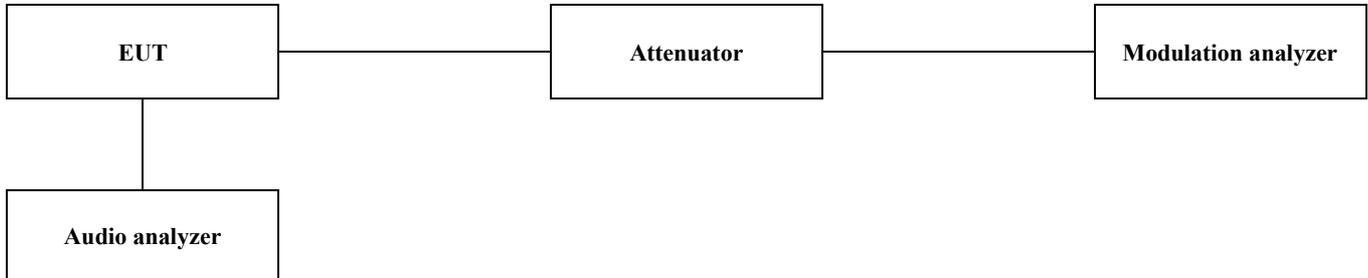
Frequency (MHz)	Ant. Pol. (H/V)	S.G. Level (dBm)	Correction factor (dB)	Absolute level (dBm)	Spurious attenuation (dBc)	Limit (dBc)	Margin (dB)
935.125 0	H	-23.00	-14.01	-37.01	54.96	30.95	24.01
935.125 0	V	-23.00	-13.47	-36.47	54.42	30.95	23.47
1 402.687 5	H	-30.00	-7.33	-37.33	55.28	30.95	24.33
1 402.687 5	V	-28.00	-5.47	-33.47	51.42	30.95	20.47
1 870.250 0	H	-30.00	-2.87	-32.87	50.82	30.95	19.87
1 870.250 0	V	-31.00	-2.11	-33.11	51.06	30.95	20.11
2 337.812 5	H	-21.00	-15.48	-36.48	54.43	30.95	23.48
2 337.812 5	V	-21.00	-13.24	-34.24	52.19	30.95	21.24

Remark;

1. Spurious attenuation = EUT max. output power(dBm) - absolute level
2. Spurious attenuation limit in dB = 43 + 10log(power in watts)

2.1.2 Modulation limiting

Test setup



Test procedure

TIA/EIA-603-C

Limit

§95.639

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

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 $3 \text{ kHz} \leq f \leq 20 \text{ kHz}$, the attenuation is at least $60 \log_{10}(f, \text{ kHz}/3)$ dB greater than the attenuation at 1 kHz; and for $f > 20 \text{ kHz}$, the attenuation is at least 50 dB greater than the attenuation at 1 kHz.



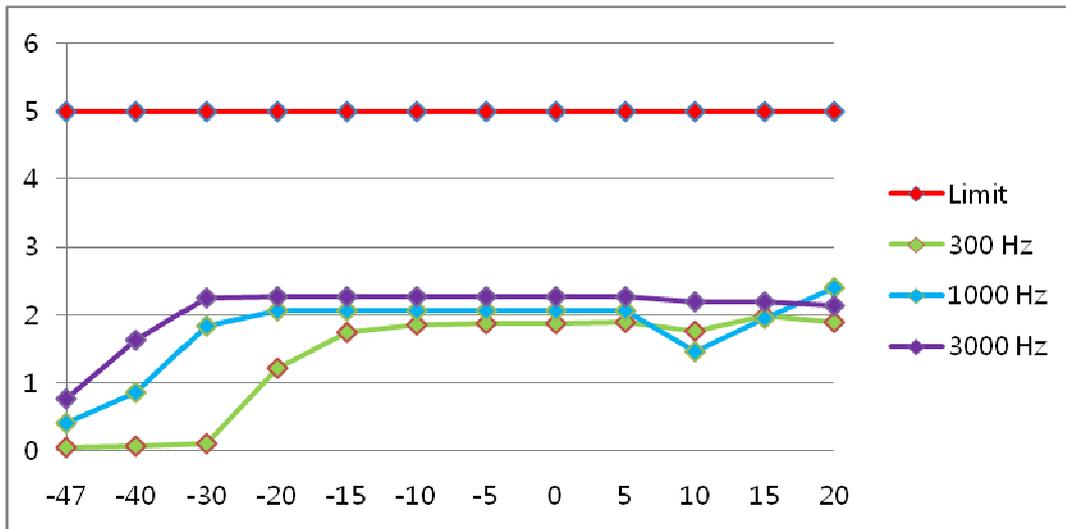
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Test results

GMRS

Audio level (dB)	Deviation at 300 Hz	Deviation at 1 kHz	Deviation at 3 kHz	Limit (kHz)
-47	0.06	0.41	0.76	5
-40	0.07	0.86	1.64	5
-30	0.10	1.83	2.25	5
-20	1.22	2.06	2.27	5
-15	1.74	2.07	2.27	5
-10	1.85	2.07	2.27	5
-5	1.88	2.07	2.27	5
0	1.88	2.06	2.27	5
5	1.89	2.06	2.27	5
10	1.76	1.46	2.19	5
15	1.98	1.95	2.20	5
20	1.89	2.41	2.14	5



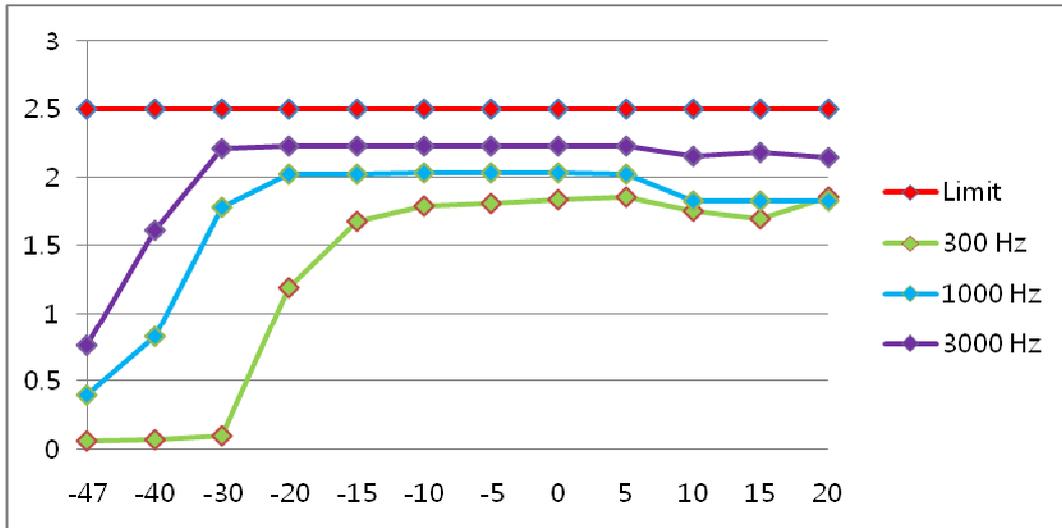


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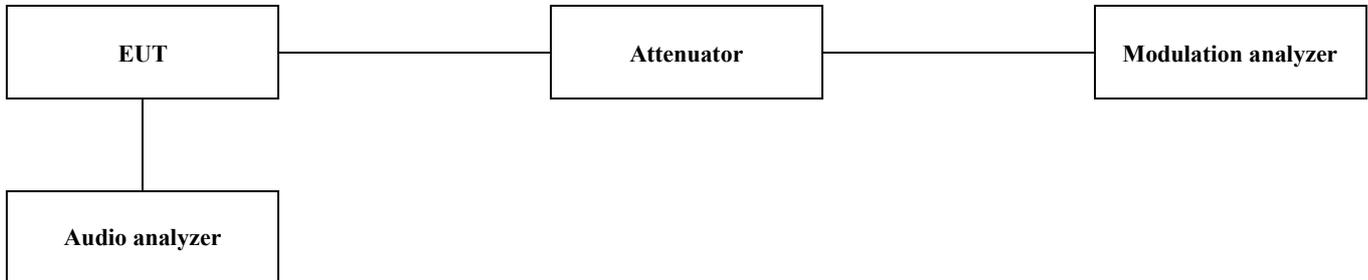
FRS

Audio level (dB)	Deviation at 300 Hz	Deviation at 1 kHz	Deviation at 3 kHz	Limit (kHz)
-47	0.06	0.40	0.76	2.5
-40	0.07	0.83	1.61	2.5
-30	0.10	1.78	2.21	2.5
-20	1.19	2.02	2.23	2.5
-15	1.68	2.02	2.23	2.5
-10	1.79	2.03	2.23	2.5
-5	1.81	2.03	2.23	2.5
0	1.84	2.03	2.23	2.5
5	1.85	2.02	2.23	2.5
10	1.75	1.83	2.15	2.5
15	1.70	1.83	2.18	2.5
20	1.85	1.83	2.14	2.5



2.1.3 Audio frequency response

Test setup



Test procedure

TIA/EIA-603-C

Limit

§2.1047

a) Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5 000 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.



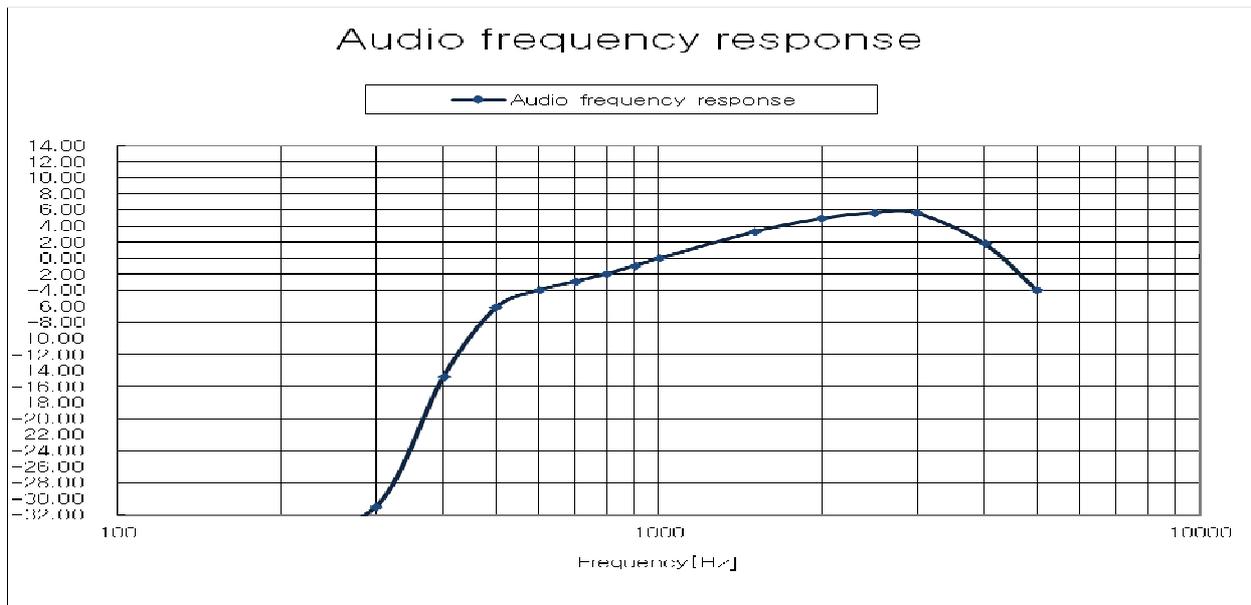
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Test results

GMRS

Audio frequency(Hz)	Deviation(kHz)	Response(dB)
100	0.02	-33.50
200	0.02	-33.50
300	0.02	-31.00
400	0.13	-14.75
500	0.35	-6.14
600	0.45	-3.96
700	0.51	-2.87
800	0.57	-1.91
900	0.64	-0.90
1 000	0.71	0.00
1 500	1.04	3.32
2 000	1.26	4.98
2 500	1.37	5.71
3 000	1.36	5.65
4 000	0.88	1.86
5 000	0.45	-3.96



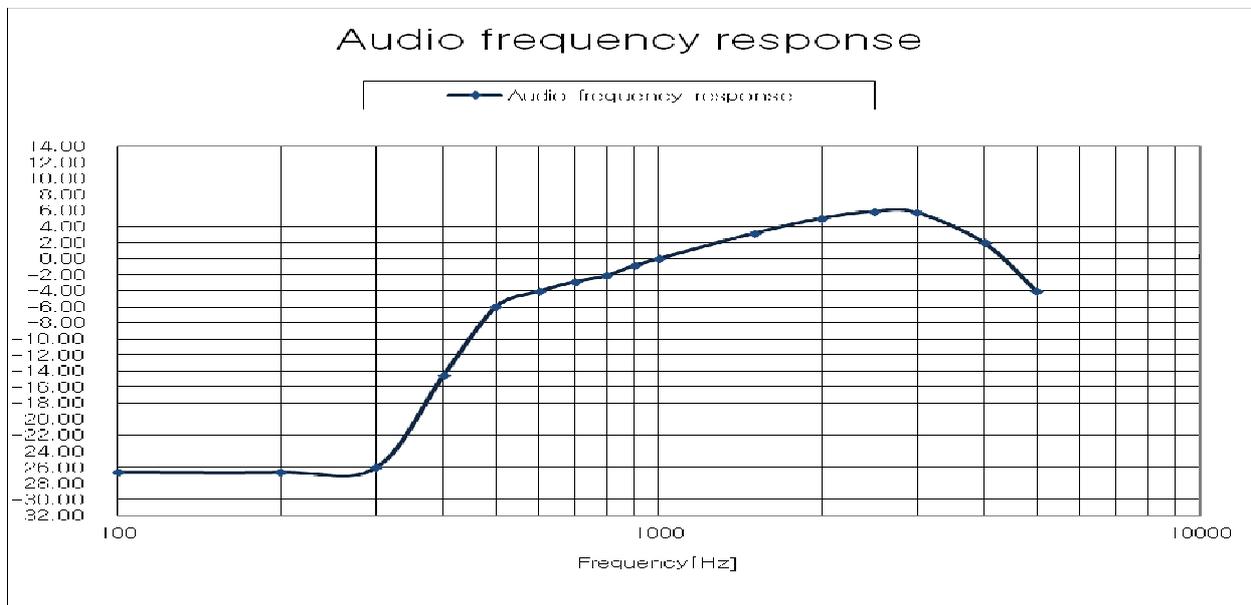


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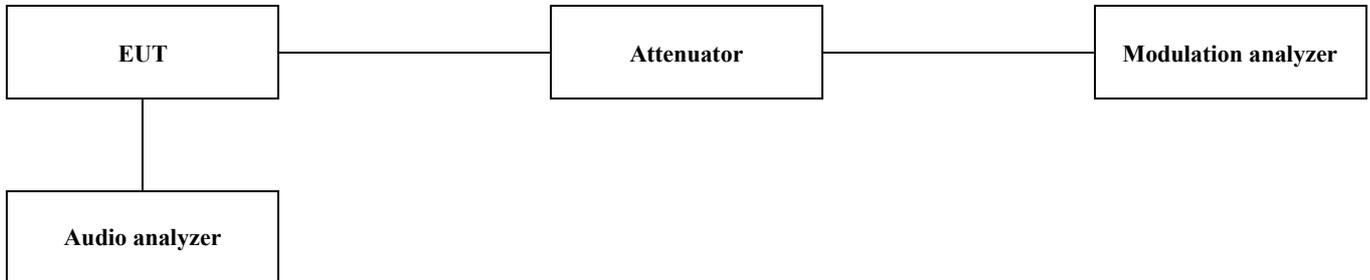
FRS

Audio frequency(Hz)	Deviation(kHz)	Response(dB)
100	0.02	-26.58
200	0.02	-26.58
300	0.02	-26.02
400	0.06	-14.54
500	0.16	-6.02
600	0.20	-4.08
700	0.23	-2.87
800	0.25	-2.14
900	0.29	-0.86
1 000	0.32	0.00
1 500	0.46	3.15
2 000	0.57	5.01
2 500	0.63	5.88
3 000	0.62	5.74
4 000	0.40	1.94
5 000	0.20	-4.08



2.1.4 Low-pass filter response

Test setup



Test procedure

TIA/EIA-603-C

Limit

§95.637 & RSS-210 A6.2.2

(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 $60 \log_{10}(f/3)$ 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.

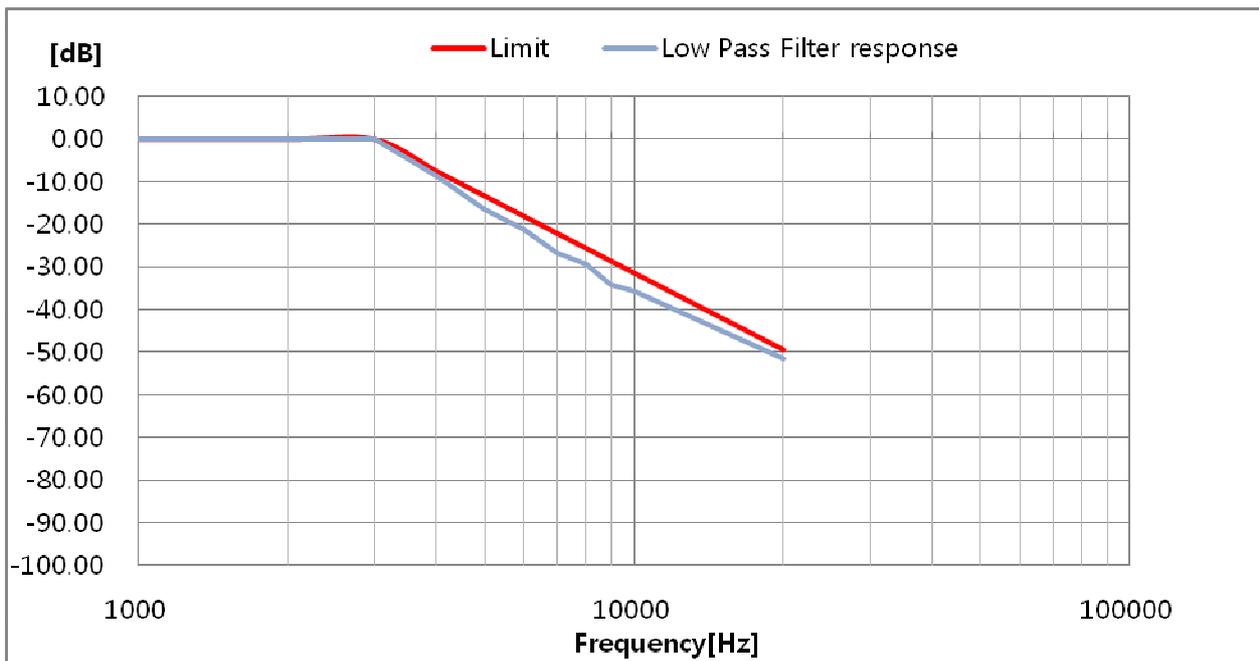


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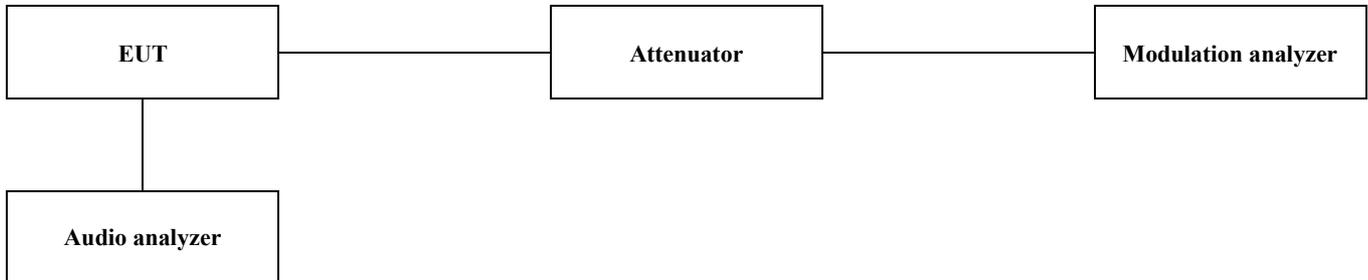
Test results

Audio frequency(Hz)	Deviation(kHz)	Response(dB)
1 000	0.00	0.00
2 000	0.00	0.00
3 000	0.00	0.00
4 000	-8.80	-7.50
5 000	-16.50	-13.31
6 000	-21.30	-18.06
7 000	-26.80	-22.08
8 000	-29.50	-25.56
9 000	-34.30	-28.63
10 000	-35.80	-31.37
20 000	-51.50	-49.43



2.1.5 Occupied bandwidth and emission mask

Test setup



Test procedure

TIA/EIA-603-C section 2.2.11

(Modulate the transmitter with a 2 500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50 % of rated system deviation.)

Limit

§95.633 & RSS-210 A6.1.3, A6.2.3

The authorized bandwidth (maximum permissible bandwidth of a transmission) for emission type H1D, J1D, R1D, H3E, J3E or R3E is 4 kHz. The authorized bandwidth for emission type A1D or A3E is 8 kHz. The authorized bandwidth for emission type F1D, G1D, F3E or G3E is 20 kHz.

The authorized bandwidth for emission type F3E or F2D transmitted by a FRS unit is 12.5 kHz.

§95.635 & RSS-210 A6.1.5, A6.2.5

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.

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.

At least $43 + 10 \log_{10}(T)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250 %.

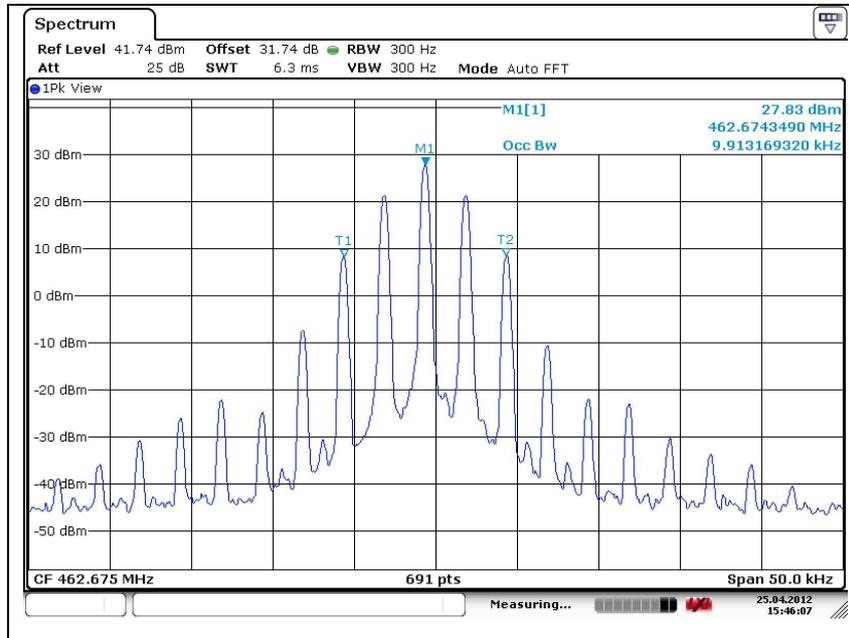


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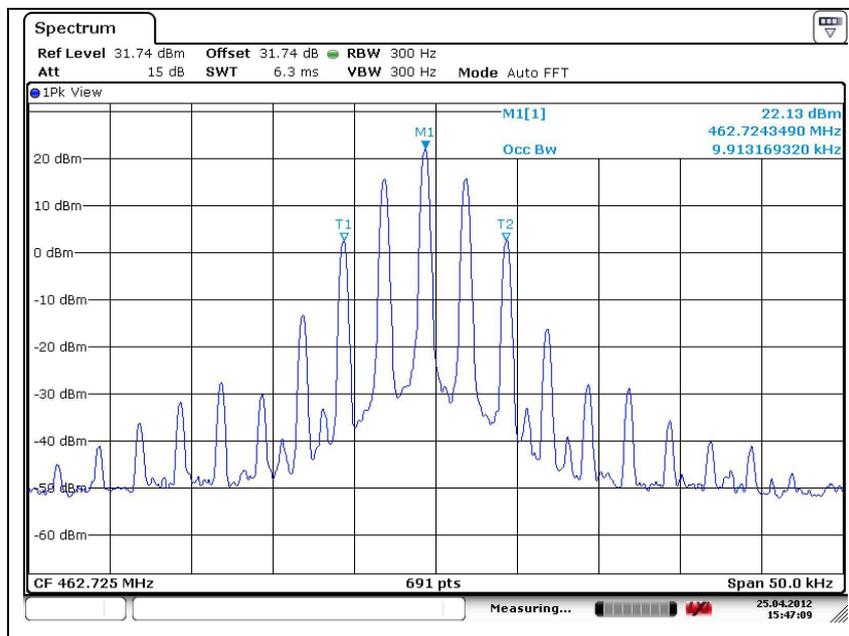
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Test results

99 % bandwidth for GMRS (High power) // DC 4.5 V



99 % bandwidth for GMRS (Low power) // DC 4.5 V

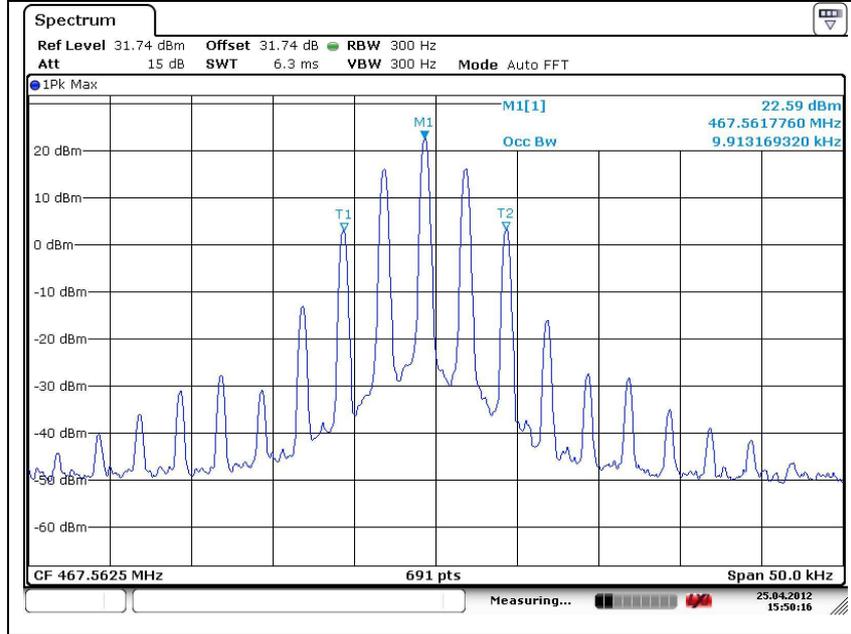




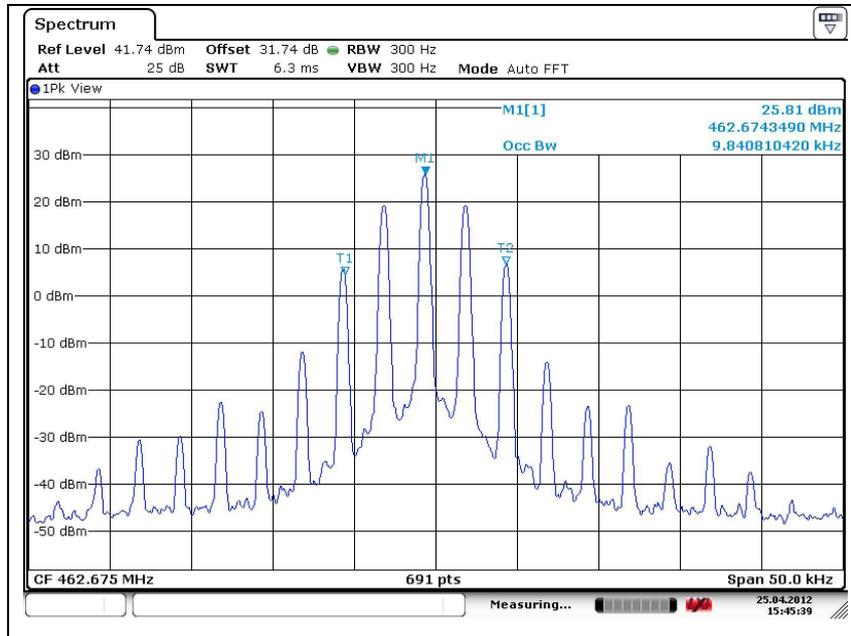
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99 % bandwidth for FRS// DC 4.5 V



99 % bandwidth for GMRS (High power) // DC 3.6 V

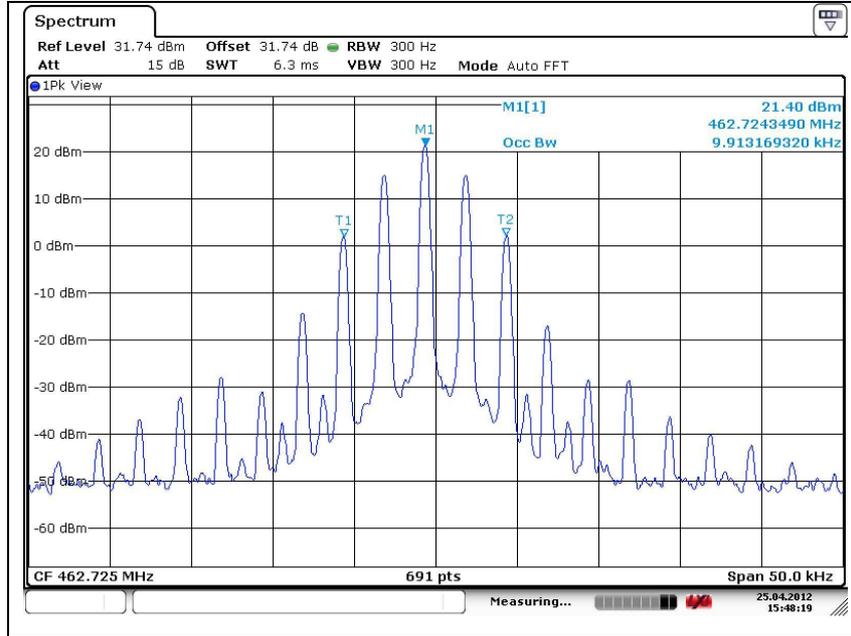




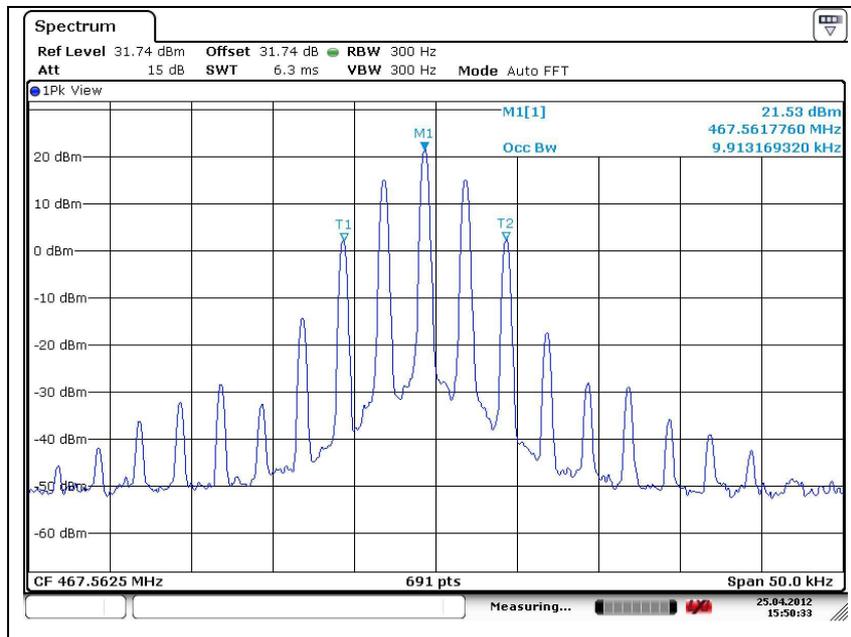
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99 % bandwidth for GMRS (Low power) // DC 3.6 V



99 % bandwidth for FRS// DC 3.6 V

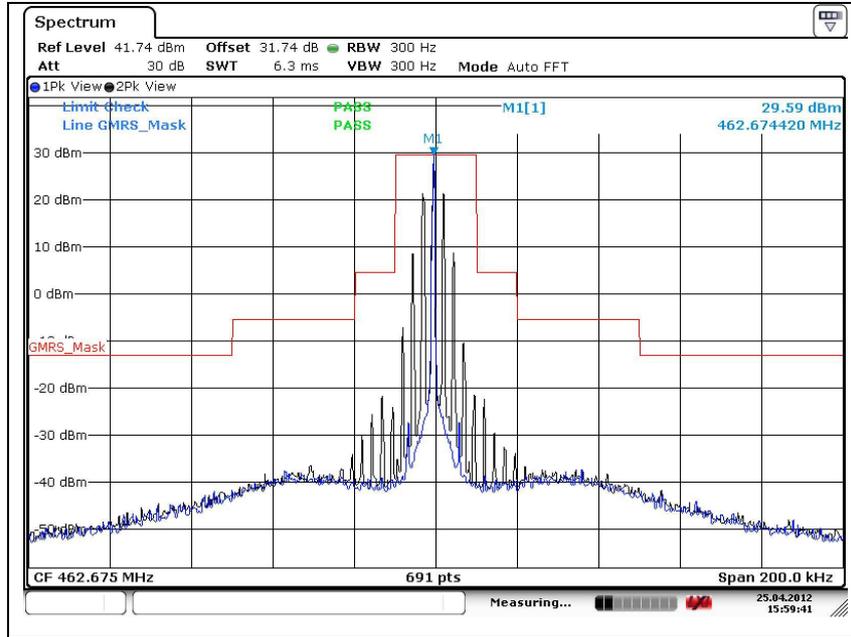




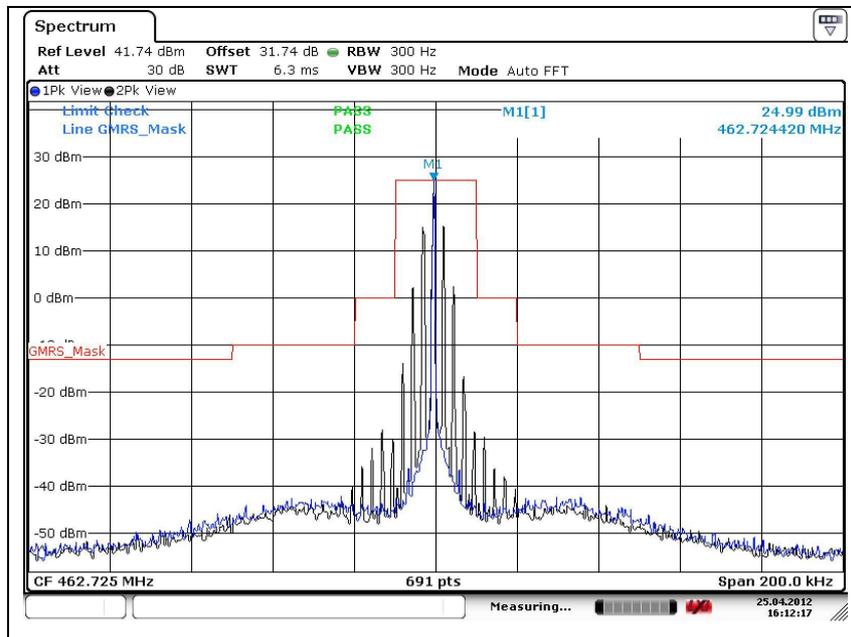
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Emission mask for GMRS (High power) // DC 4.5 V



Emission mask for GMRS (Low power) // DC 4.5 V

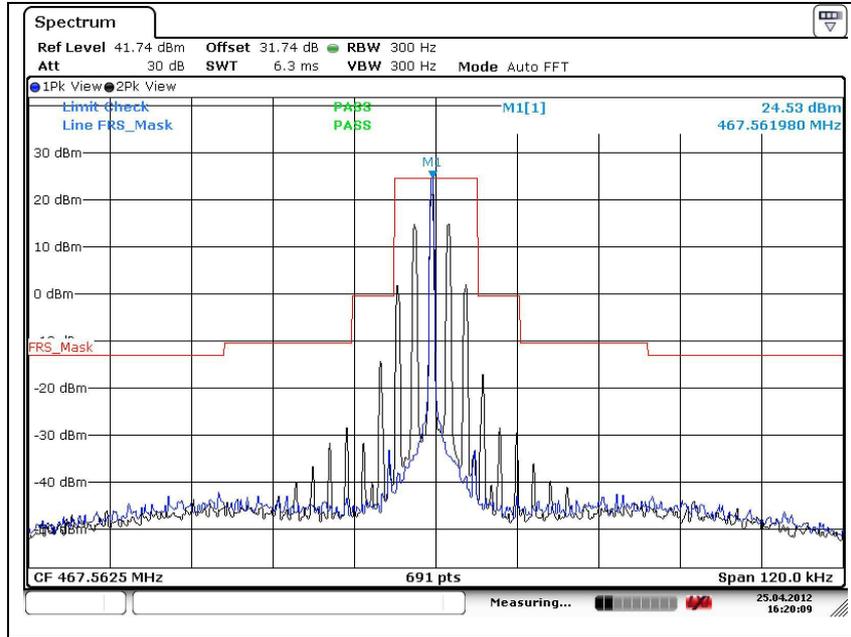




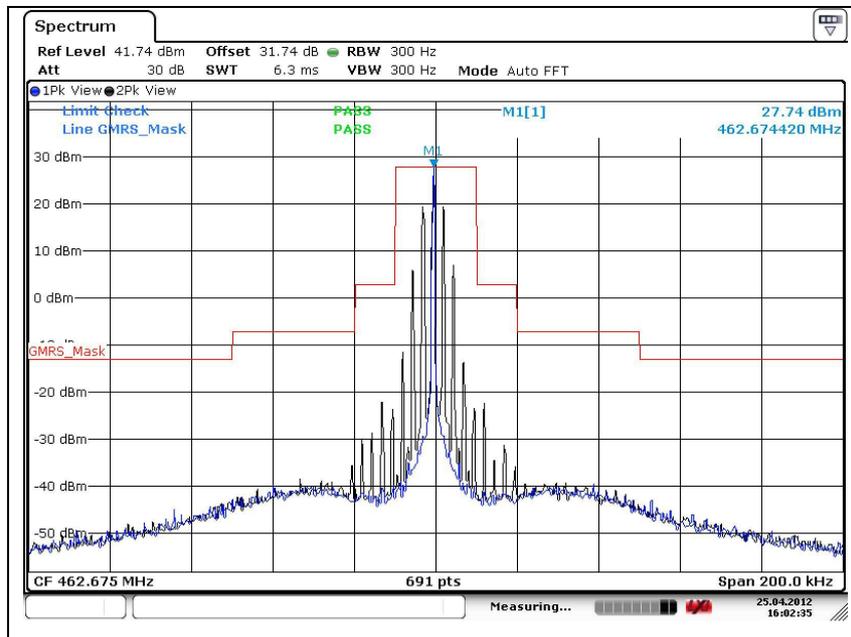
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Emission mask for FRS // DC 4.5 V

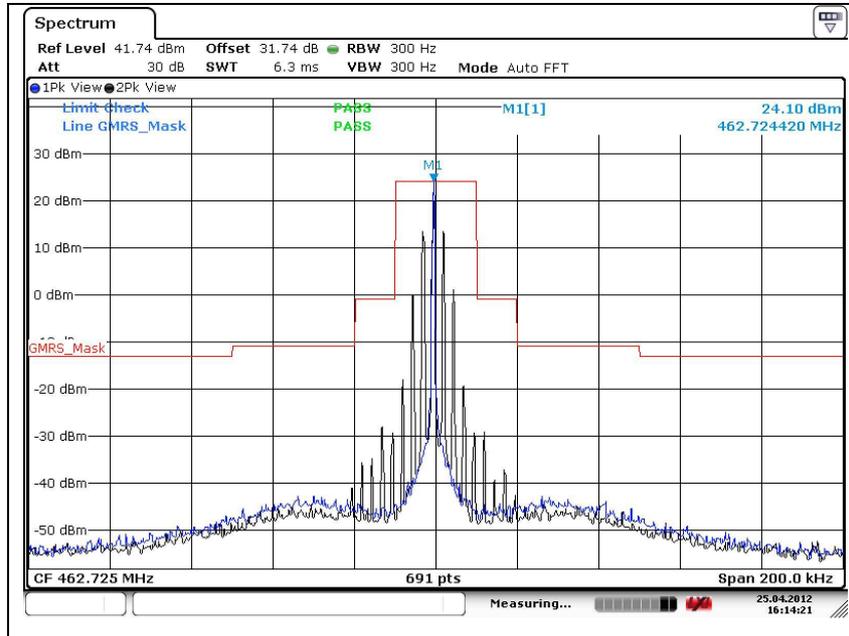


Emission mask for GMRS (High power) // DC 3.6 V

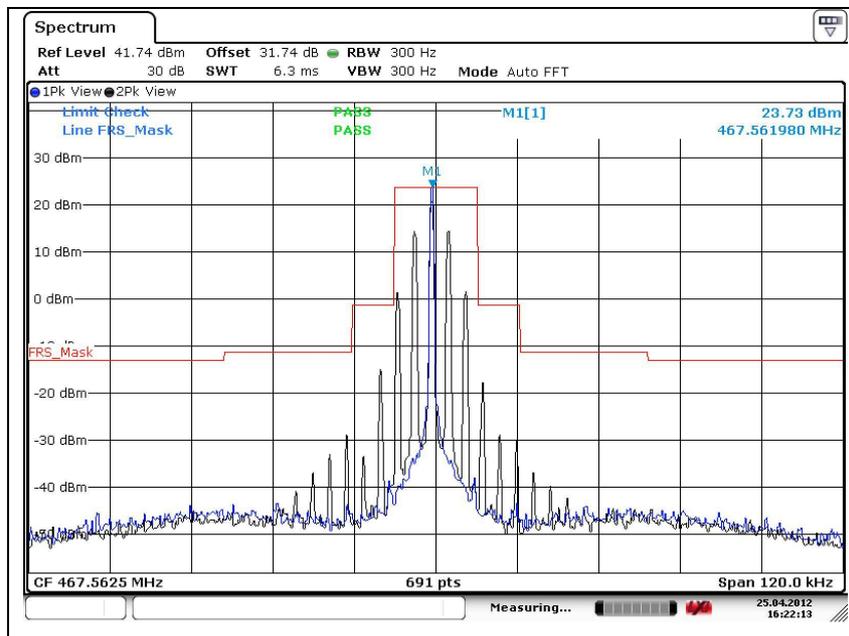




Emission mask for GMRS (Low power) // DC 3.6 V

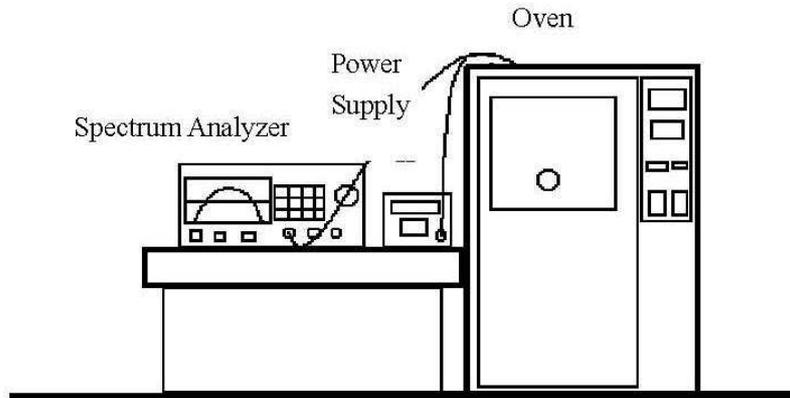


Emission mask for FRS // DC 3.6 V



2.1.6 Frequency stability

Test setup



Test procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. The transmission time was measured with the spectrum analyzer using RBW=1 kHz, VBW=1 kHz.
3. Set the temperature of chamber to -30°C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10°C decreased per stage until the highest temperature 50°C is measured, record all measured frequencies on each temperature step.

Frequency stability vs voltage;

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.



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Limit

§95.621

(b) Each GMRS transmitter for mobile station, small base station and control station operation must be maintained within a frequency tolerance of 0.000 5%. Each GMRS transmitter for base station (except small base), mobile relay station or fixed station operation must be maintained within a frequency tolerance of 0.000 25%.

§95.627

(b) Each FRS unit must be maintained within a frequency tolerance of 0.000 25%.

RSS-210 A6.1.6

FRS Devices: Carrier frequency tolerance shall be better than ± 5 ppm

RSS-210 A6.2.6

GMRS Devices: Carrier frequency tolerance shall be better than ± 5 ppm

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Test results

Assigned frequency (MHz): 462.675 0 (GMRS - High power)

Temperature (°C)	Measure frequency (MHz)	Frequency deviation (Hz)	Frequency deviation (ppm)	Frequency deviation (%)
-30	462.675 123	123	0.266	0.000 027
-20	462.674 855	-145	-0.313	-0.000 031
-10	462.674 970	-30	-0.065	-0.000 007
0	462.675 043	43	0.093	0.000 009
10	462.674 888	-112	-0.242	-0.000 024
20	462.674 421	-579	-1.251	-0.000 125
30	462.674 891	-109	-0.236	-0.000 024
40	462.674 906	-94	-0.203	-0.000 020
50	462.675 149	149	0.322	0.000 032

Temperature (°C)	Voltage (V)	Measure frequency (MHz)	Frequency deviation (ppm)	Frequency deviation (%)
20	2.10	462.674 435	-1.221	-0.000 122
20	5.18	462.674 494	-1.094	-0.000 109

Assigned frequency (MHz): 462.725 0 (GMRS - Low power)

Temperature (°C)	Measure frequency (MHz)	Frequency deviation (Hz)	Frequency deviation (ppm)	Frequency deviation (%)
-30	462.724 978	-22	-0.048	-0.000 005
-20	462.724 849	-151	-0.326	-0.000 033
-10	462.725 173	173	0.374	0.000 037
0	462.724 807	-193	-0.417	-0.000 042
10	462.724 856	-144	-0.311	-0.000 031
20	462.724 907	-93	-0.201	-0.000 020
30	462.725 072	72	0.156	0.000 016
40	462.724 943	-57	-0.123	-0.000 012
50	462.725 142	142	0.307	0.000 031

Temperature (°C)	Voltage (V)	Measure frequency (MHz)	Frequency deviation (ppm)	Frequency deviation (%)
20	2.10	462.724 857	-0.309	-0.000 031
20	5.18	462.724 914	-0.186	-0.000 019



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Assigned frequency (MHz): 467.5625 5 (FRS)

Temperature (°C)	Measure frequency (MHz)	Frequency deviation (Hz)	Frequency deviation (ppm)	Frequency deviation (%)
-30	467.562 573	73	0.156	0.000 016
-20	467.562 524	24	0.051	0.000 005
-10	467.562 655	155	0.332	0.000 033
0	467.562 682	182	0.389	0.000 039
10	467.562 431	-69	-0.148	-0.000 015
20	467.562 487	-13	-0.028	-0.000 003
30	467.562 340	-160	-0.342	-0.000 034
40	467.562 385	-115	-0.246	-0.000 025
50	467.562 672	172	0.368	0.000 037

Temperature (°C)	Voltage (V)	Measure frequency (MHz)	Frequency deviation (ppm)	Frequency deviation (%)
20	2.10	467.562 447	-0.113	-0.000 011
20	5.18	467.562 466	-0.073	-0.000 007



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Appendix A. Test equipment used for test

Equipment	Manufacturer	Model	Calibration due.
EMC Analyzer	Agilent	E7405A	2012.08.22
Spectrum analyzer	R&S	FSV30	2013.01.01
Vector signal generator	R&S	SMBV2100A	2013.01.10
Modulation analyzer	HP	8901B	2013.01.10
Audio analyzer	HP	8903B	2012.12.29
DC power supply	HP	6674A	2012.12.05
Temperature chamber	TABAI	MC711P	2012.05.06
Attenuator	BRID	8325	2012.05.04
Preamplifier	HP	2805A02570	2012.05.04
Trilog-BroadBand Antenna	Schwarzbeck	VULB 9168	2013.03.18
Horn Antenna	A.H.	SAS-571	2013.03.22
Horn Antenna	A.H.	SAS-571	2013.03.22
Dipole Antenna	R&S	VHAP	2013.04.29
Dipole Antenna	R&S	UHAP	2013.04.29
High pass filter	Mini-circuits	NHP-800+	2012.08.05

Peripheral devices

Device	Manufacturer	Model No.	Serial No.
N/A			

Appendix B. Test setup photo

Radiated field emissions

