

 <b>MOTOROLA SOLUTIONS</b>	 <b>TESTING CERT # 2786.01</b>																								
<b>MOTOROLA PENANG ADV. COMM. LABORATORY</b> Motorola Solutions Malaysia SDN BHD Plot 2A, Bayan Lepas Technoplex, 11900 Bayan Lepas, Penang, Malaysia.	<b>FCC TEST REPORT</b> <b>Report Revision : Rev.C</b>																								
<table><tr><td><b>Date/s Tested</b></td><td>: 22-JUL-2018 - 30-JUL-2018</td></tr><tr><td><b>Report Issue Date</b></td><td>: 06-AUG-2018</td></tr><tr><td><b>Manufacturer/Location</b></td><td>: Motorola Solutions Penang Plot 2, Bayan Lepas Technoplex, 11900 Bayan Lepas, Penang, Malaysia</td></tr><tr><td><b>Requestor</b></td><td>: CHENCHIA FANG</td></tr><tr><td><b>Product Type</b></td><td>: Portable</td></tr><tr><td><b>Model Number</b></td><td>: T6B22201GWRAAW</td></tr><tr><td><b>Frequency Band</b></td><td>: 462-468 MHz</td></tr><tr><td><b>Max. Output Power</b></td><td>: 2 W</td></tr><tr><td><b>Firmware Version</b></td><td>: NA</td></tr><tr><td><b>Applicant Name</b></td><td>: Motorola Solutions Inc</td></tr><tr><td><b>FCC Registration</b></td><td>: 461337</td></tr><tr><td><b>IC Registrations</b></td><td>: 109AK</td></tr></table>  <p><b>The equipment was tested accordance to the requirement listed below:</b></p> <p><b>FCC 47 CFR Part 95</b></p> <p><b>PASS</b></p>		<b>Date/s Tested</b>	: 22-JUL-2018 - 30-JUL-2018	<b>Report Issue Date</b>	: 06-AUG-2018	<b>Manufacturer/Location</b>	: Motorola Solutions Penang Plot 2, Bayan Lepas Technoplex, 11900 Bayan Lepas, Penang, Malaysia	<b>Requestor</b>	: CHENCHIA FANG	<b>Product Type</b>	: Portable	<b>Model Number</b>	: T6B22201GWRAAW	<b>Frequency Band</b>	: 462-468 MHz	<b>Max. Output Power</b>	: 2 W	<b>Firmware Version</b>	: NA	<b>Applicant Name</b>	: Motorola Solutions Inc	<b>FCC Registration</b>	: 461337	<b>IC Registrations</b>	: 109AK
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<p>Prepared By:</p>  <hr/> <p><b>Gan Boon Teong</b> <b>Test Personnel</b></p>	<p>Approved By:</p>  <hr/> <p><b>Vincent Foong</b> <b>Responsible Engineer</b></p>																								

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<b>Revision History</b>	<b>Description</b>	<b>Date</b>	<b>Originator</b>
Rev. A	Initial Report	<b>06-August-2018</b>	<b>Gan Boon Teong</b>
Rev. B	Amended table height for sections 6.1 and 6.7	<b>29-August-2018</b>	<b>Vincent Foong</b>
Rev. C	Add in Shield Box to Equipment List	<b>30-August-2018</b>	<b>Gan Boon Teong</b>

## 1.0. General Information

### EUT Description:

Tx Frequency range	
462.5625MHz to 467.7125MHz	
Antenna type gain	Fix antenna or integral antenna, -0.5dBi
Technologies	FM
Device voltage	4.5V dc

Channel number and frequency information:

Product channel table:

FRS Channels

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

*In §15.31 (m), Frequency range over which device operates in 1MHz or less, middle frequency of channel is selected to perform test.*

### General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, the EUT is to comply with the requirements of the following standards:

**ANSI C63.26**

**FCC Part 2 & 95**

## 2.0. Summary of Test Results

FCC Clause	Test Item	Result	Remark
95.567 95.1767	Maximum Output Power	Pass	NA
95.575 95.1775	Modulation Limiting	Pass	NA
95.575 95.1775	Audio Frequency Response	Pass	NA
95.1775	Audio Low Pass Filter	Pass	NA
95.565 95.1765	Frequency Stability	Pass	NA
95.573 95.1773	Emission Bandwidth	Pass	NA
95.579 95.1779	Unwanted Radiation	Pass	NA

## 3.0. Measurement Uncertainty

Measurement	Expanded Uncertainty (k=1.96) (±)
Maximum Output Power	5.01dB

#### 4.0. Equipment List

##### Analog ATE # 2

Description	Model	Serial Number	Calibration Date	Calibration Due Date
POWER SENSOR	E9326A	MY44420113	11-Sep-17	11-Sep-18
CHAMBER	PL-3KP	14011891	12-Feb-18	12-Feb-19
RF TRANSCEIVER CONTROLLER	AX2007AI	AX2007AI005	Not Required	Not Required
POWER METER	E4416A	MY45101705	15-Oct-16	15-Oct-18
SIGNAL GENERATOR	SMA100A	111382	4-Jul-17	4-Jul-20
TRANSCEIVER INTERFACE	8954A	2924A00823	5-Feb-18	5-Feb-19
AUDIO ANALYZER	8903B	3413A13846	4-Apr-18	4-Apr-19
MODULATION ANALYZER	8901B	2914A02038	22-Aug-17	22-Aug-18
SIGNAL GENERATOR	SMA100A	111423	2-Jul-16	2-Jul-19
SPECTRUM ANALYZER	8594E	3506A01703	29-Aug-17	29-Aug-18
DYNAMIC SIGNAL ANALYZER	35670A	MY42506847	1-Apr-18	1-Apr-19
POWER SUPPLY	6031A	3543A03355	17-Apr-18	17-Apr-19
ROHDE & SCHWARZ RF SHIELD BOX	CMW-Z10	1204.7000K02-103120-BC	Not Required	Not Required
Test Software	Analog ATE			
Version	2.4.5			
Test Software	FCC_FreqStability			
Version	Rev1.0.03			

##### FCC Transient

Description	Model	Serial Number	Calibration Date	Calibration Due Date
ATTENUATOR/SWITCH DRIVER	11713A	MY44321022	Not Required	Not Required
SWITCH CONTROL UNIT	3488A	CN37145920	Not Required	Not Required
OSCILLOSCOPE	MSO8064A	MY45003003	30-Oct-17	30-Oct-18
POWER SENSOR	E4412A	MY41501734	20-Sep-17	20-Sep-18
AUDIO ANALYZER	8903B	3413A14095	5-Feb-18	5-Feb-19
MODULATION ANALYZER	8901B	3226A03982	2-Oct-17	2-Oct-18
SIGNAL GENERATOR ( 0.1-1040 MHZ )	8657A	3025A02255	14-Oct-17	14-Oct-18
POWER METER	E4416A	MY50000116	20-Apr-18	20-Apr-20
SPECTRUM ANALYZER	E4445A	MY45301089	21-Jul-17	21-Jul-19
POWER SUPPLY	6031A	3121A02341	6-Jun-17	6-Jun-19
STEP ATTENUATOR	8494G	MY42143870	19-May-18	19-May-19
STEP ATTENUATOR	8494G	MY42144175	17-Sep-16	17-Sep-18
AUDIO ANALYZER	8903B	2533A00529	2-May-18	2-May-19
ROHDE & SCHWARZ RF SHIELD BOX	CMW-Z10	1204.7000K02-103120-BC	Not Required	Not Required

Test Software	FCC Transient
Version	Rev1.1.2

### EMC Chamber 1

Description	Model	Serial Number	Calibration Date	Calibration Due Date
DRG HORN FREQ.	SAS-571	719	18-Jul-17	18-Jul-19
DRG HORN FREQ.	SAS-571	720	2-Mar-17	2-Mar-19
POWER SUPPLY	6032A	2615A-01178	13-Jun-18	13-Jun-19
MICROWAVE SIGNAL GENERATOR	SMP04	100131	12-Jul-18	11-Jul-19
EMI TEST RECEIVER	ESIB26	100336	6-Jul-18	5-Jul-19
SIGNAL ANALYZER	FSV40	101103	4-Jul-18	3-Jul-19
5m Semi-anechoic Chamber	S800-HX	J2308	Not Required	Not Required
BILOG ANTENNA	CBL6112D	30991	23-Apr-18	23-Apr-19
BILOG ANTENNA	CBL6112B	2964	16-Feb-18	16-Feb-20
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170255	7-Nov-17	7-Nov-18
DATA LOGGER	SDL500	A.016776	18-Mar-17	18-Mar-19
LOOP ANTENNA	6502	203479	8-Aug-17	8-Aug-18
SYSTEM CONTROLLER	SC104V	050806-1	Not Required	Not Required
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	Not Required	Not Required
ANTENNA POSITIONING TOWER	TLT2	NA	Not Required	Not Required
18 - 40GHz PREAMPLIFIER	Miteq Hi Gain Sucoflex	002	Not Required	Not Required
PREAMPLIFIER	PAM-0118P	361	Not Required	Not Required
Test Software	EMC_FCC_IC_Bluetooth_RE_Test			
Version	EMC_FCC_RE_v1.5.1			

## **5.0. Test Mode Applicability and Test Channel Detail**

Test Frequency list:

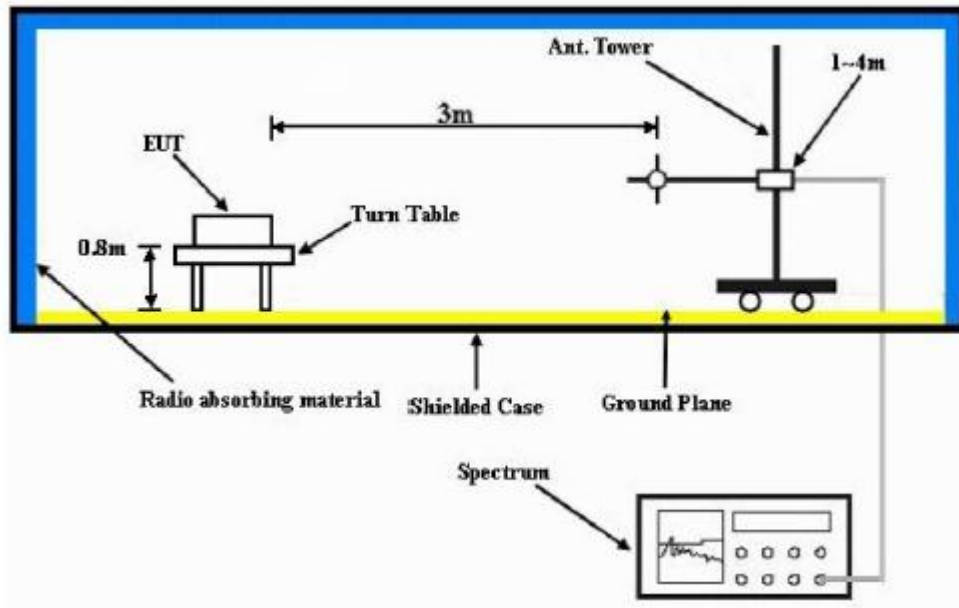
FRS

Channel	Frequency
4	462.6375 MHz
11	467.6375 MHz

## 6.0. Transmitter Test Parameters

### 6.1. Maximum Output Power

#### 6.1.1. Test Setup



- 1) The spectrum setting for Equivalent Isotropically Radiated Power (EIRP) is RBW = 100 kHz, VBW = 300 kHz. Detector Mode is RMS.
- 2) In the semi-anechoic chamber, setup as illustrated above the EUT placed on the 0.8m height (<1GHz) or 1.5m height (>1GHz) of Turn Table, rotated the table 45 degree each interval to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power for each degree interval. The “Read Value” is the spectrum reading of maximum power value.
- 3) The substitution antenna is substituted for EUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the Measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.



### 6.1.2. Test Limits

#### **§95.567 FRS Transmit Power**

Each FRS transmitter type must be designed such that the effective radiated power (ERP) on channels 8 through 14 does not exceed 0.5 Watts and the ERP on channels 1 through 7 and 15 through 22 does not exceed 2.0 Watts.

#### **§95.567 GMRS Transmitting Power Limits**

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.

### 6.1.3. Test Data

#### EIRP/ERP

S/N: 1754RV0015

Channel Spacing : 12.5 kHz

Accessory: NA

Tx Power: 2.000 Watts

Modulation: FM

Antenna Polarization	Frequency (MHz)	EIRP (dBm)	ERP (dBm)
Horiz.	462.6375	15.83	13.68
Vert.	462.6375	30.97	28.82

#### EIRP/ERP

S/N: 1754RV0015

Channel Spacing : 12.5 kHz

Accessory: NA

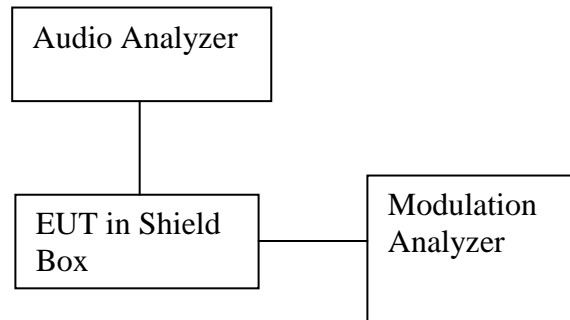
Tx Power: 0.500 Watts

Modulation: FM

Antenna Polarization	Frequency (MHz)	EIRP (dBm)	ERP (dBm)
Horiz.	467.6375	9.65	7.50
Vert.	467.6375	25.44	23.29

## 6.2. Modulation Limiting

### 6.2.1. Test Setup



- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Path loss for the measurement included.
- 3) Set the audio bandwidth filter to 15 kHz.
- 4) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 60% of the maximum deviation.
- 5) Record the frequency deviation as 0dB input level at 1kHz audio frequency.
- 6) Repeat the step and record the frequency deviation from -20dB to 20dB by 5dB increments and different audio freq 300Hz, 2.5 KHz and 3 KHz.

### 6.2.2. Test Limits

#### §95.575 FRS Modulation limits

Each FRS transmitter type must be designed such that the peak frequency deviation does not exceed 2.5 kHz, and the highest audio frequency contributing substantially to modulation must not exceed 3.125 kHz.

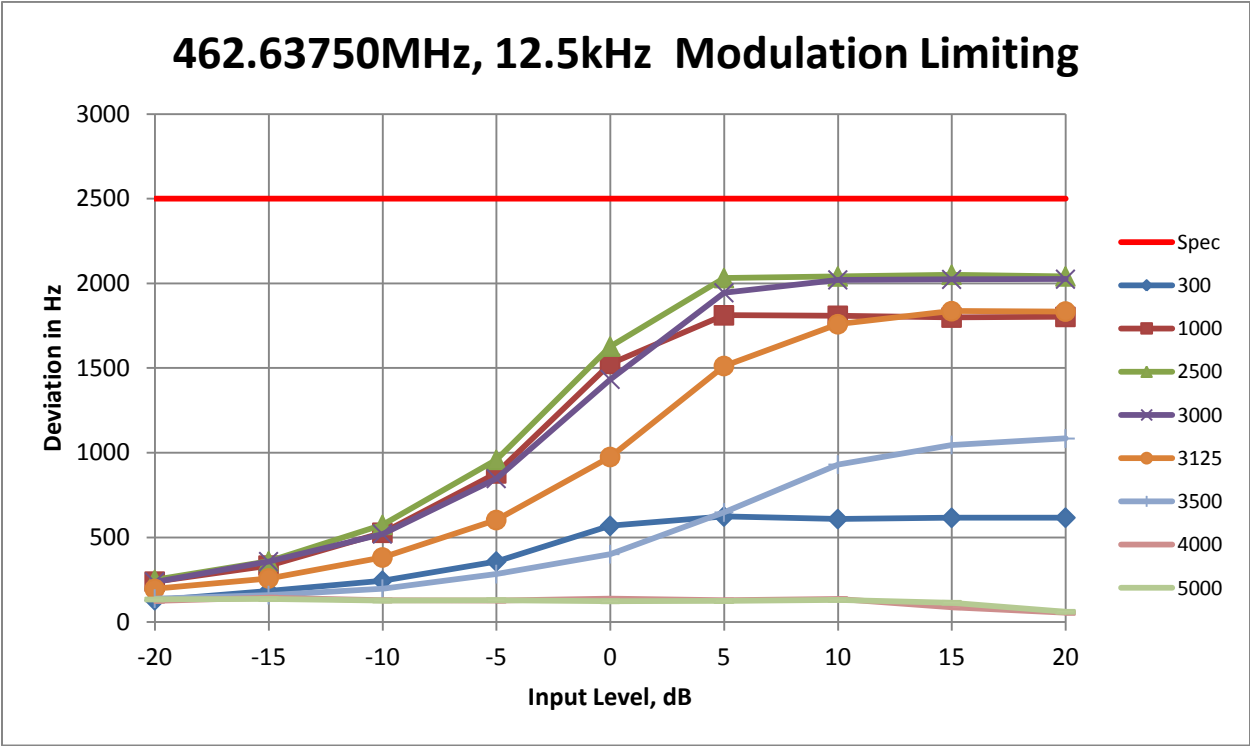
#### §95.1775 GMRS modulation requirements

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.

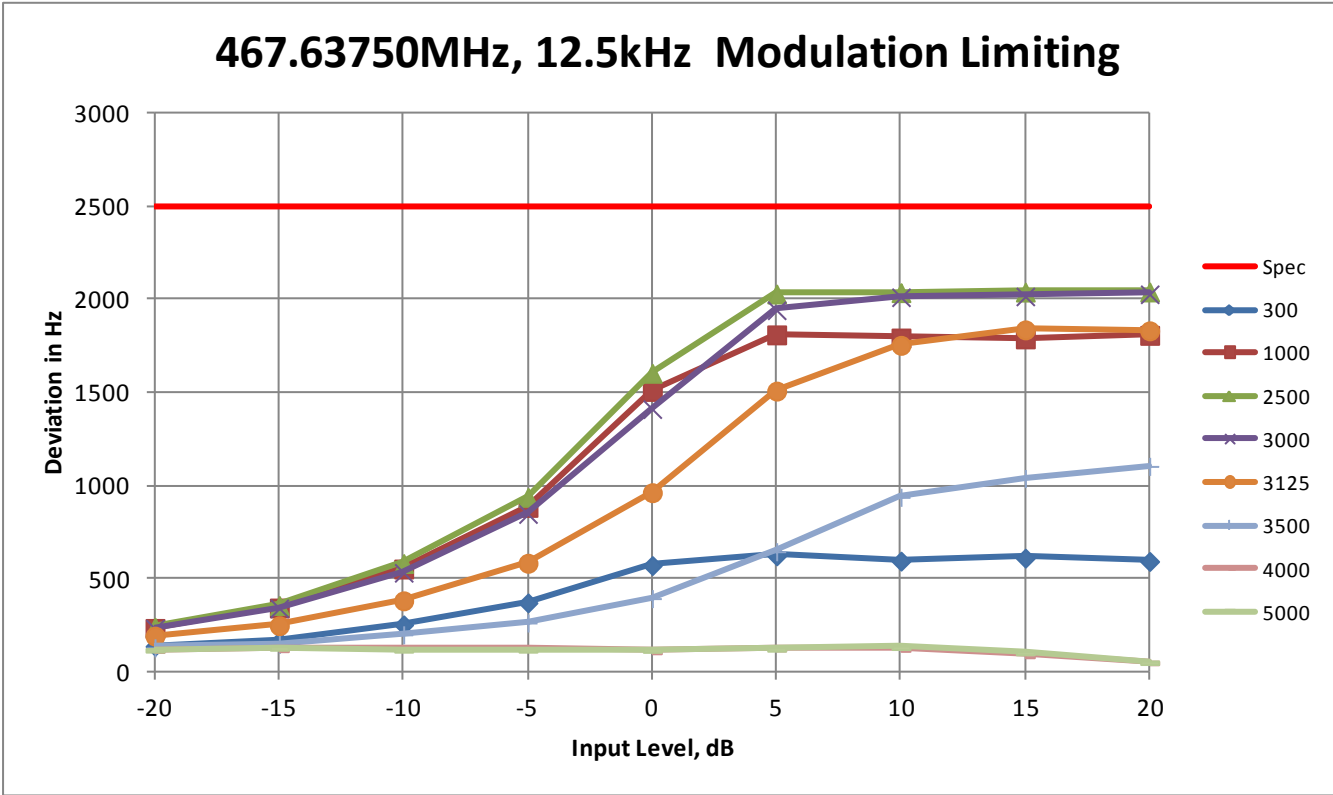
- (a) Main channels. The peak frequency deviation for emissions to be transmitted on the main channels must not exceed  $\pm 5$  kHz.
- (b) 462 MHz interstitial channels. The peak frequency deviation for emissions to be transmitted on the 462 MHz interstitial channels must not exceed  $\pm 5$  kHz.
- (c) 467 MHz interstitial channels. The peak frequency deviation for emissions to be transmitted on the 467 MHz interstitial channels must not exceed  $\pm 2.5$  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.

6.2.3. Test Result



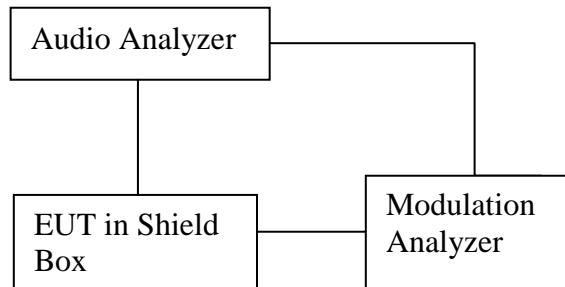
Frequency / Channel Spacing	462.63750MHz / 12.5kHz																	
Temperature, °C	25																	
Freq Deviation, Hz	300		1000		2500		3000		3125		3500		4000		5000		Spec	
Input Level, dB	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%
-20	129	5.2	239	9.6	250	10.0	237	9.5	196	7.9	139	5.6	125	5.0	134	5.4	2500	100
-15	184	7.3	334	13.4	359	14.4	358	14.3	258	10.3	160	6.4	145	5.8	136	5.4	2500	100
-10	245	9.8	528	21.1	575	23.0	520	20.8	382	15.3	198	7.9	129	5.1	128	5.1	2500	100
-5	358	14.3	878	35.1	959	38.3	848	33.9	603	24.1	284	11.3	127	5.1	130	5.2	2500	100
0	569	22.7	1525	61.0	1627	65.1	1434	57.3	975	39.0	402	16.1	138	5.5	123	4.9	2500	100
5	624	24.9	1812	72.5	2032	81.3	1945	77.8	1513	60.5	648	25.9	129	5.1	124	5.0	2500	100
10	609	24.3	1809	72.4	2041	81.7	2021	80.9	1759	70.4	931	37.2	137	5.5	131	5.2	2500	100
15	616	24.7	1799	71.9	2052	82.1	2024	81.0	1836	73.5	1046	41.9	88	3.5	115	4.6	2500	100
20	617	24.7	1803	72.1	2042	81.7	2025	81.0	1834	73.4	1084	43.4	55	2.2	61	2.5	2500	100



Frequency / Channel Spacing	467.63750MHz / 12.5kHz																	
Temperature, °C	25																	
Freq Deviation, Hz	300		1000		2500		3000		3125		3500		4000		5000		Spec	
Input Level, dB	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%	Dev, Hz	%
-20	140	5.6	236	9.5	243	9.7	235	9.4	195	7.8	132	5.3	117	4.7	119	4.7	2500	100
-15	167	6.7	346	13.8	360	14.4	344	13.8	251	10.0	150	6.0	121	4.8	129	5.1	2500	100
-10	256	10.2	556	22.2	585	23.4	535	21.4	385	15.4	202	8.1	125	5.0	118	4.7	2500	100
-5	374	14.9	887	35.5	941	37.6	851	34.0	587	23.5	266	10.6	127	5.1	118	4.7	2500	100
0	574	23.0	1510	60.4	1608	64.3	1415	56.6	966	38.6	397	15.9	110	4.4	117	4.7	2500	100
5	626	25.1	1814	72.6	2034	81.4	1946	77.9	1512	60.5	649	25.9	125	5.0	124	4.9	2500	100
10	598	23.9	1797	71.9	2041	81.7	2016	80.7	1758	70.3	941	37.6	123	4.9	133	5.3	2500	100
15	614	24.6	1793	71.7	2044	81.8	2021	80.8	1841	73.6	1042	41.7	88	3.5	104	4.2	2500	100
20	596	23.9	1812	72.5	2045	81.8	2032	81.3	1836	73.4	1107	44.3	51	2.0	52	2.1	2500	100

## 6.3. Audio Frequency Response

### 6.3.1. Test Setup



- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Path loss for the measurement included.
- 3) Set the audio bandwidth filter to 15 kHz and 50kHz.
- 4) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 20% of the maximum deviation.
- 5) On audio analyzer, set the rated level as reference to zero.
- 6) Vary the audio frequency from 300Hz to 3 kHz. Record the change in dB on the audio analyzer.

### 6.3.2. Test Limits:

#### §95.575 FRS modulation limits

Each FRS transmitter type must be designed such that the peak frequency deviation does not exceed 2.5 kHz, and the highest audio frequency contributing substantially to modulation must not exceed 3.125 kHz.

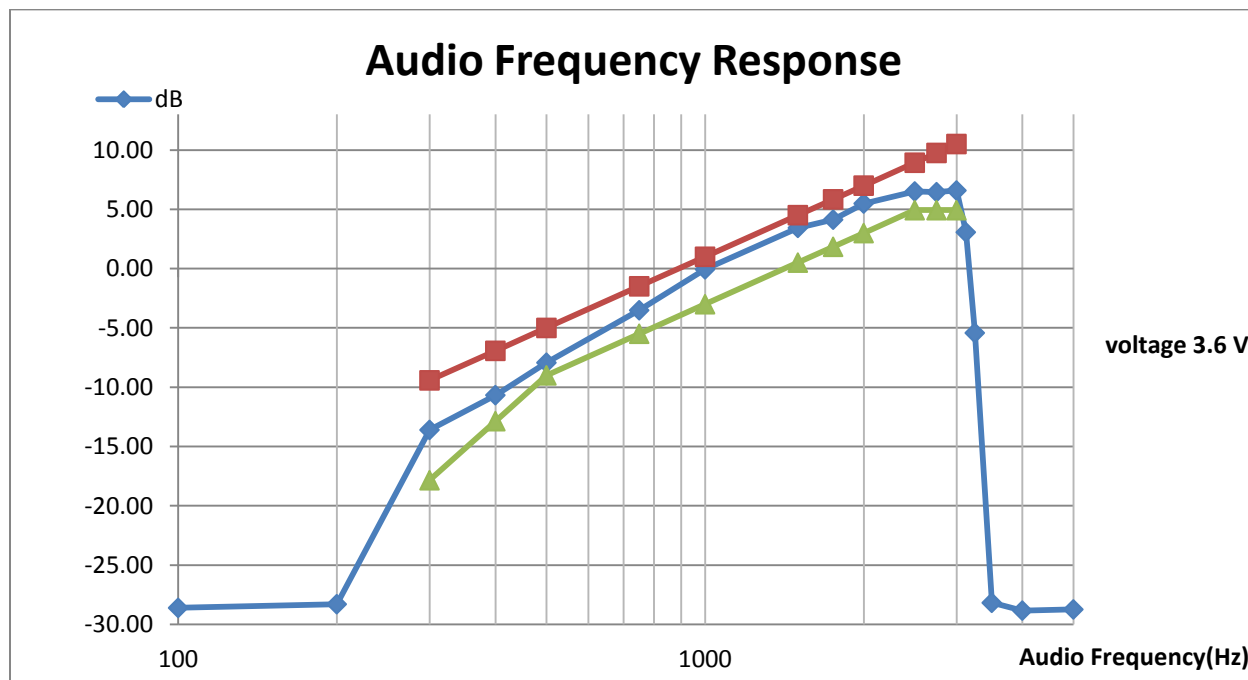
#### §95.1775 GMRS modulation requirements

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

### 6.3.3. Test Result

Frequency : 462.6375 MHz 2W

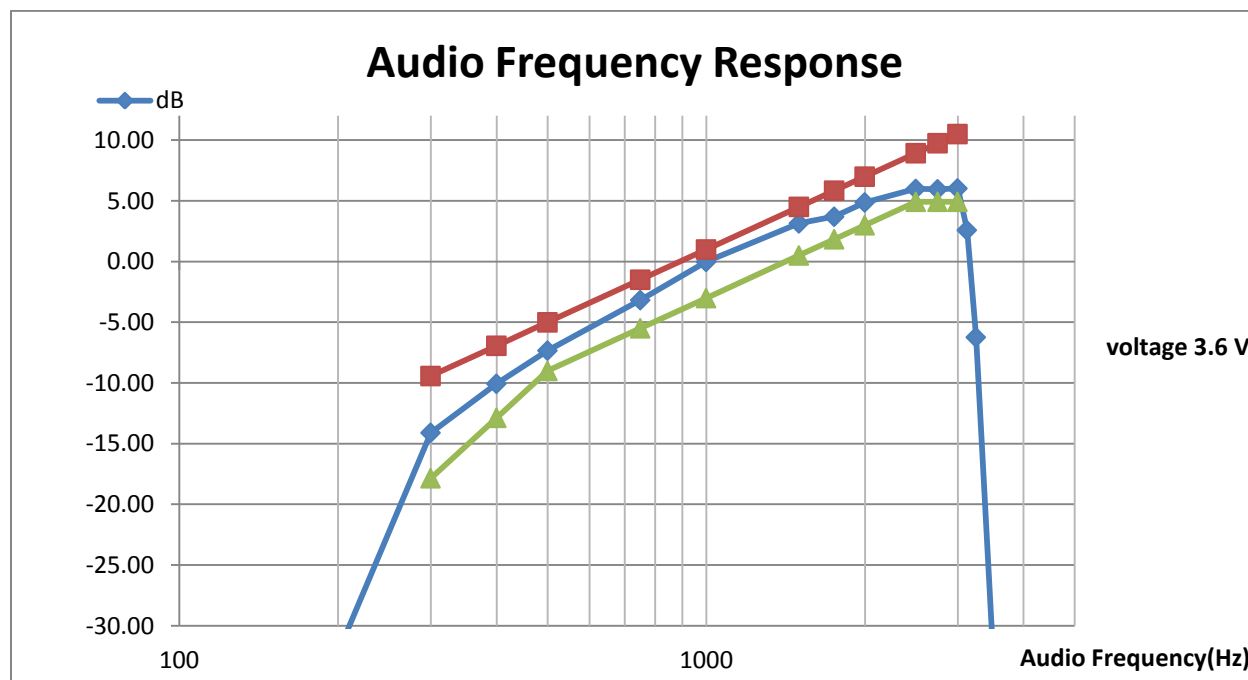
Temp. (°C)	25		
Audio Frequency(Hz)	dB	HighSide Specs	LowSide Specs
100	-28.61		
200	-28.30		
300	-13.60	-9.4218	-17.8436
400	-10.67	-6.9316	-12.8631
500	-7.93	-5.0000	-9.0000
750	-3.51	-1.4902	-5.4902
1000	-0.06	1.0000	-3.0000
1500	3.44	4.5098	0.5098
1750	4.13	5.8441	1.8441
2000	5.49	7.0000	3.0000
2500	6.51	8.9316	4.9316
2750	6.45	9.7566	4.9316
3000	6.59	10.5098	4.9316
3125	3.07		
3250	-5.42		
3500	-28.18		
4000	-28.84		
5000	-28.74		





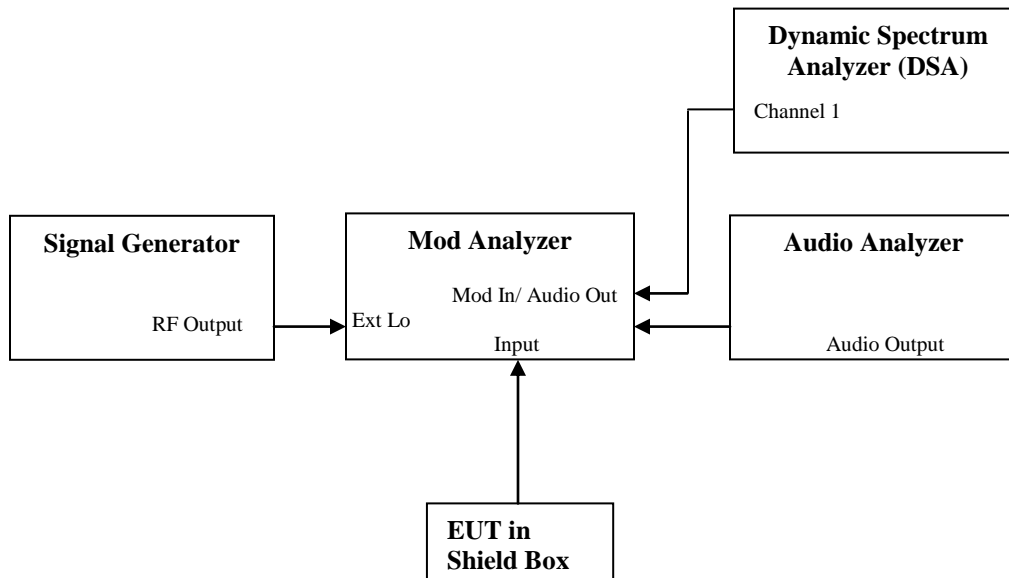
Frequency : 467.6375 MHz 0.5W

Temp. (°C)	25		
Audio Frequency(Hz)	dB	HighSide Specs	LowSide Specs
100	-32.15		
200	-32.22		
300	-14.10	-9.4218	-17.8436
400	-10.06	-6.9316	-12.8631
500	-7.33	-5.0000	-9.0000
750	-3.17	-1.4902	-5.4902
1000	-0.02	1.0000	-3.0000
1500	3.15	4.5098	0.5098
1750	3.70	5.8441	1.8441
2000	4.88	7.0000	3.0000
2500	5.99	8.9316	4.9316
2750	5.96	9.7566	4.9316
3000	6.03	10.5098	4.9316
3125	2.59		
3250	-6.23		
3500	-32.35		
4000	-32.41		
5000	-32.09		



## 6.4. Audio Low Pass Filter

### 6.4.1. Test Setup



- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Path loss for the measurement included.
- 3) Press 23.1SPCL on modulation analyzer to enable the external LO from Sigen.
- 4) Set the Sigen frequency to  $F_c + 1.5\text{MHz}$ , RF output level to 0dBm without modulation.
- 5) Transmit the radio and set the audio analyzer to 1 kHz audio frequency and 60% of the maximum deviation.
- 6) Up the amplitude by 20dB.
- 7) On DSA, get the reference point to 0dB.
- 8) Vary the frequency on audio analyzer from 3 kHz to 30 kHz, record the audio tone from DSA.

### 6.4.2. Test Limits:

#### **§95.1775 GMRS modulation requirements**

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

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

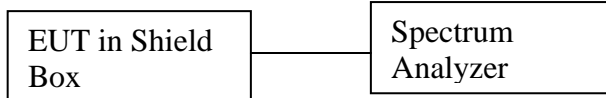
(2) At any frequency ( $f$  in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least  $60 \log(f/3)$  dB more than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB more than the attenuation at 1 kHz.

### **6.4.3. Test Result**

The EUT uses an internal IC low pass filter. The audio low pass filter response is not measurable per the filter manufacturer. Compliance to requirements will be demonstrated using the manufacturer's filter specification as described in the equipment Theory of Operation.

## 6.5. Frequency Stability

### 6.5.1. Test Setup



- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Transmit the DUT and record the freq in  $MCF_{MHz}$ .
- 3) Test in 2 conditions: Different Temperature & Supply Voltage input.
  - Temperature: Vary from -30°C to +50°C with Nominal supply voltage.
  - Supply Voltage: Vary +/-15 % in room temperature
- 4) Calculate the ppm frequency error by the following:

$$ppm\ error = \left( \frac{MCF_{MHz}}{ACF_{MHz}} - 1 \right) * 10^6$$

Where:  $MCF_{MHz}$  is the Measured Carrier Frequency in MHz  
 $ACF_{MHz}$  is the Assigned Carrier Frequency in MHz

### 6.5.2. Test Limits:

#### §95.565 FRS frequency accuracy

Each FRS transmitter type must be designed such that the carrier frequencies remain within  $\pm 2.5$  parts-per-million of the channel center frequencies specified in §95.563 during normal operating conditions.

#### §95.1765 GMRS frequency accuracy

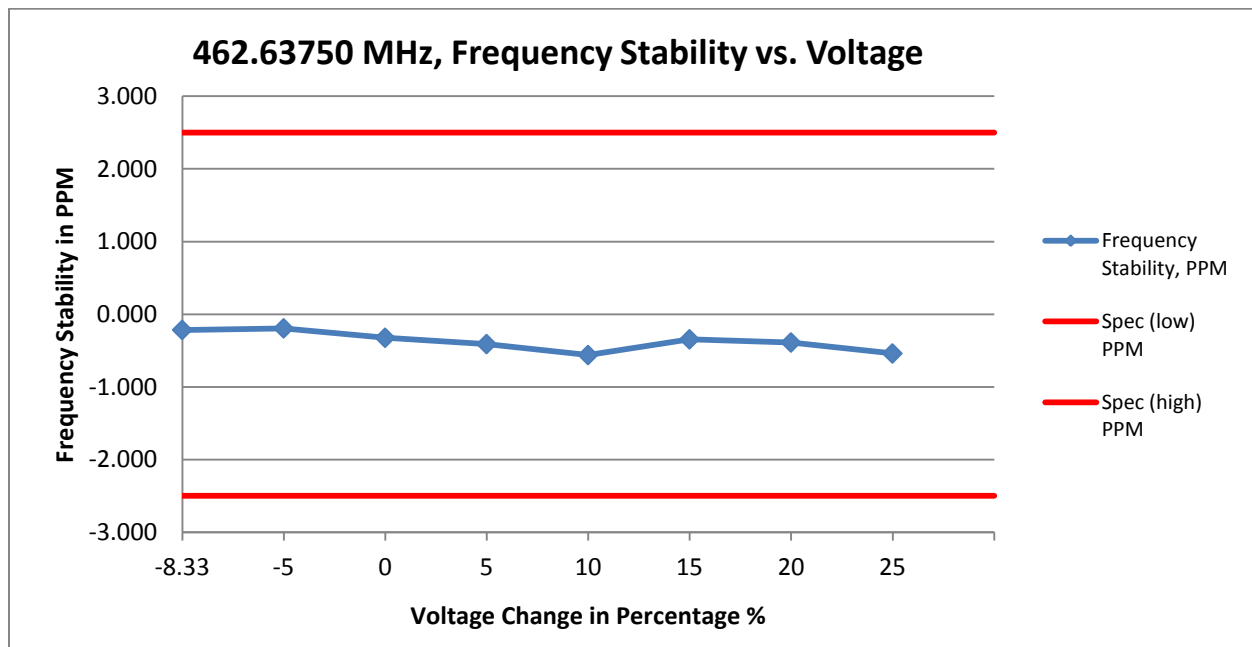
Each GMRS transmitter type must be designed to comply with the frequency accuracy requirements in this section under normal operating conditions. Operators of GMRS stations must also ensure compliance with these requirements.

- (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.

### 6.5.3. Test Result

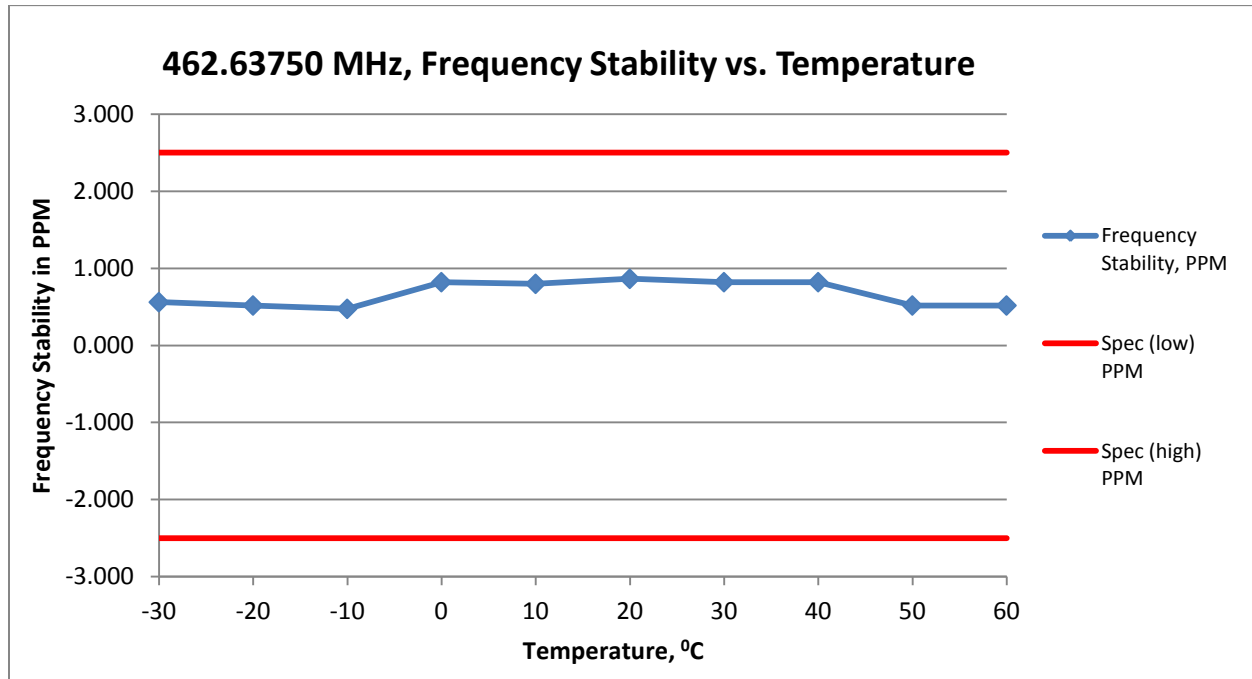
(i) Frequency Stability VS Voltage

Frequency / Channel Spacing	462.63750 MHz / 12.5 kHz				
Temperature, °C	25				
Voltage %	Voltage, V	Frequency, MHz	Frequency Stability, PPM	Spec (low) PPM	Spec (high) PPM
-8.33	3.300	462.637400	-0.216	-2.500	2.500
-5	3.420	462.637410	-0.195	-2.500	2.500
0	3.600	462.637350	-0.324	-2.500	2.500
5	3.780	462.637310	-0.411	-2.500	2.500
10	3.960	462.637240	-0.562	-2.500	2.500
15	4.140	462.637340	-0.346	-2.500	2.500
20	4.320	462.637320	-0.389	-2.500	2.500
25	4.500	462.637250	-0.540	-2.500	2.500



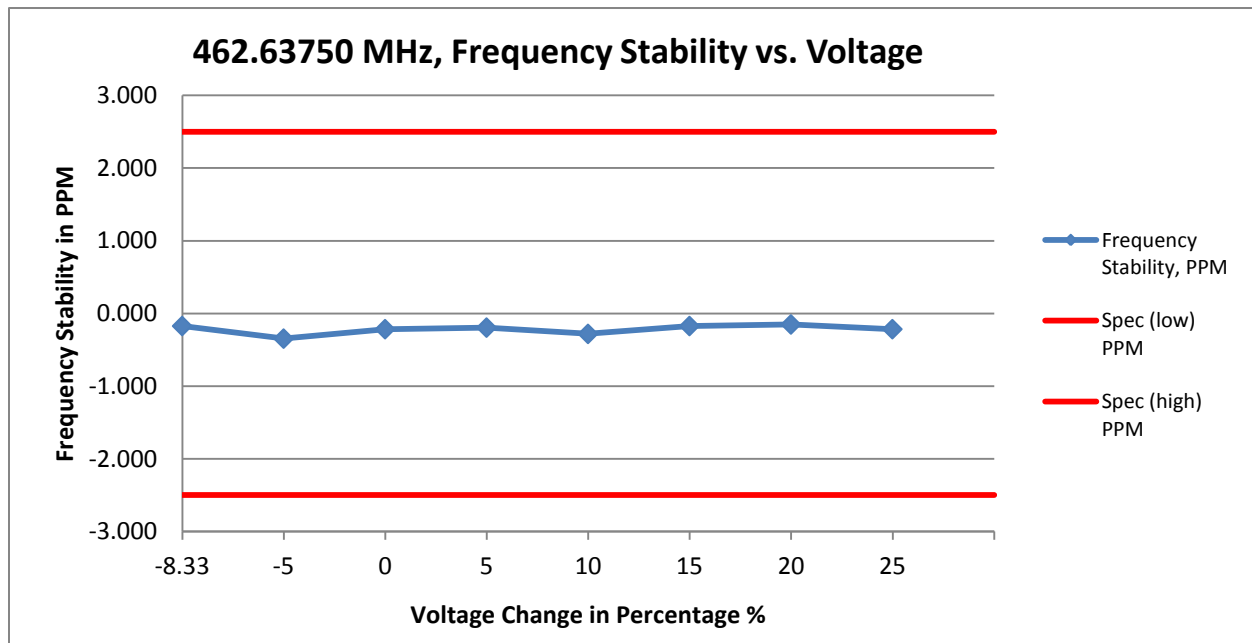
(ii) Frequency Stability VS temperature

Frequency / Channel Spacing	462.63750 MHz / 12.5 kHz			
Voltage, V	3.6			
Temperature, °C	Frequency, MHz	Frequency Stability, PPM	Spec (low) PPM	Spec (high) PPM
-30	462.637760	0.562	-2.500	2.500
-20	462.637740	0.519	-2.500	2.500
-10	462.637720	0.476	-2.500	2.500
0	462.637880	0.821	-2.500	2.500
10	462.637870	0.800	-2.500	2.500
20	462.637900	0.865	-2.500	2.500
30	462.637880	0.821	-2.500	2.500
40	462.637880	0.821	-2.500	2.500
50	462.637740	0.519	-2.500	2.500
60	462.637740	0.519	-2.500	2.500



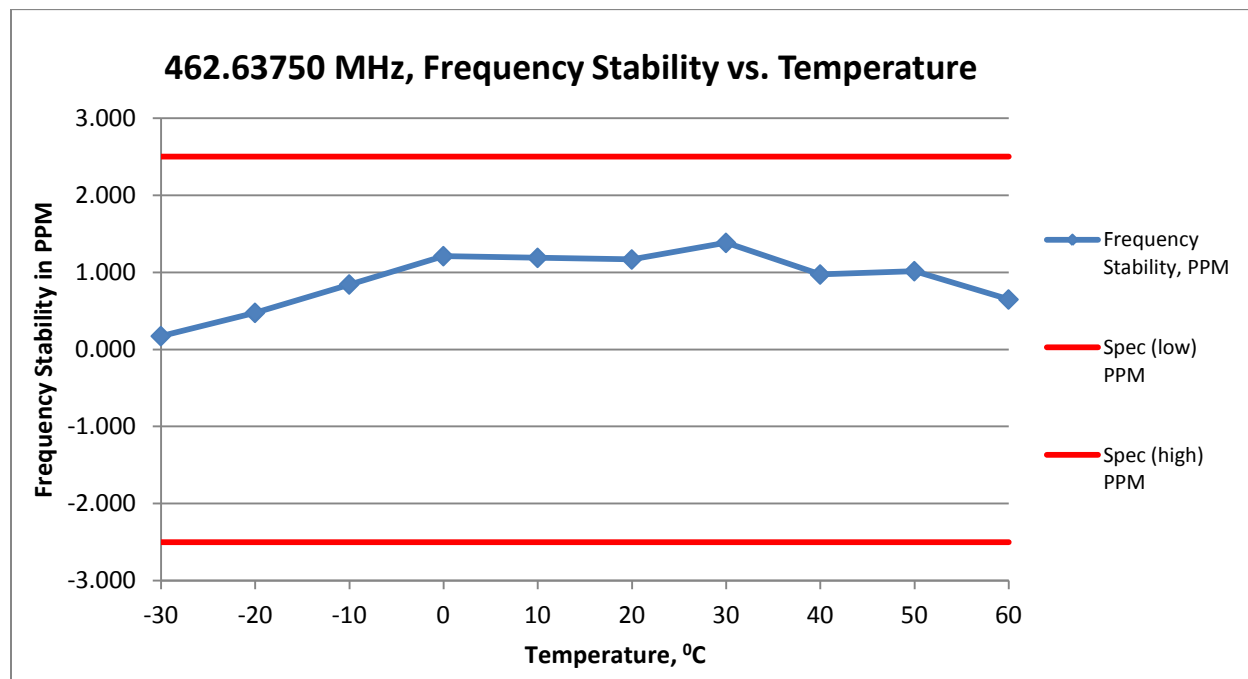
(i) Frequency Stability VS Voltage

Frequency / Channel Spacing	462.63750 MHz / 12.5 kHz				
Temperature, °C	25				
Voltage %	Voltage, V	Frequency, MHz	Frequency Stability, PPM	Spec (low) PPM	Spec (high) PPM
-8.33	3.300	462.637420	-0.173	-2.500	2.500
-5	3.420	462.637340	-0.346	-2.500	2.500
0	3.600	462.637400	-0.216	-2.500	2.500
5	3.780	462.637410	-0.195	-2.500	2.500
10	3.960	462.637370	-0.281	-2.500	2.500
15	4.140	462.637420	-0.173	-2.500	2.500
20	4.320	462.637430	-0.151	-2.500	2.500
25	4.500	462.637400	-0.216	-2.500	2.500



(ii) Frequency Stability VS temperature

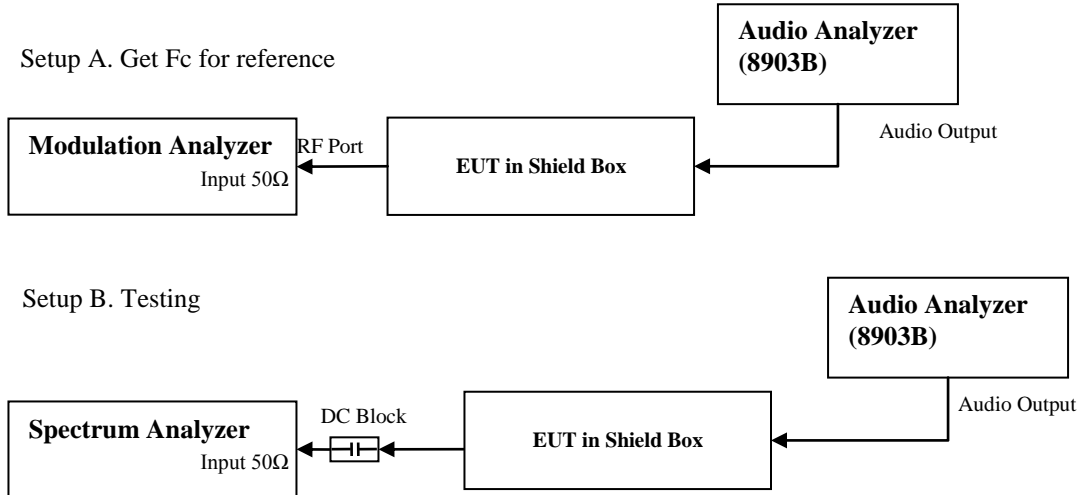
Frequency / Channel Spacing	462.63750 MHz / 12.5 kHz			
Voltage, V	3.6			
Temperature, °C	Frequency, MHz	Frequency Stability, PPM	Spec (low) PPM	Spec (high) PPM
-30	462.637580	0.173	-2.500	2.500
-20	462.637720	0.476	-2.500	2.500
-10	462.637890	0.843	-2.500	2.500
0	462.638060	1.210	-2.500	2.500
10	462.638050	1.189	-2.500	2.500
20	462.638040	1.167	-2.500	2.500
30	462.638140	1.383	-2.500	2.500
40	462.637950	0.973	-2.500	2.500
50	462.637970	1.016	-2.500	2.500
60	462.637800	0.648	-2.500	2.500





## 6.6. Emission Mask

### 6.6.1. Test Setup



- 1) The DUT transmitter output port was connected to Modulation Analyzer.
- 2) Path loss for the measurement included.
- 3) Key in the Fc to assigned center frequency with the span 100 kHz.
- 4) Set the spectrum analyzer with RBW= 300Hz and VBW= 900Hz.
- 5) Transmit the UUT and record the result.
- 6) Set modulation analyzer audio bandwidth filter to 15 kHz low pass filter and 50 kHz high pass filter.
- 7) Transmit the radio and set the audio analyzer to 2.5 kHz audio frequency and 60% of the maximum deviation.
- 8) Up the amplitude by 16dB and remove the audio tone from audio analyzer.
- 9) Capture the screen shot with and without modulation.

## 6.6.2. Test Limits:

### §95.579 FRS unwanted emissions limits

Each FRS transmitter type must be designed to satisfy the applicable unwanted emissions limits in this paragraph.

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

(1) 25 dB (decibels) in the frequency band 6.25 kHz to 12.5 kHz removed from the channel center frequency.

(2) 35 dB in the frequency band 12.5 kHz to 31.25 kHz removed from the channel center frequency.

(3)  $43 + 10 \log (P)$  dB in any frequency band removed from the channel center frequency by more than 31.25 kHz.

(b) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (a)(1) and (2) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (a)(3) is measured with a reference bandwidth of at least 30 kHz.

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

### §95.1779 GMRS unwanted emissions limits (1), (2), (7)

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.

(3)  $83 \log (f_d \div 5)$  dB on any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz up to and including 10 kHz.

(4)  $116 \log (f_d \div 6.1)$  dB or  $50 + 10 \log (P)$  dB, whichever is the lesser attenuation, on any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz), of more than 10 kHz up to and including 250% of the authorized bandwidth.

(5) 25 dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 150% of the authorized bandwidth.

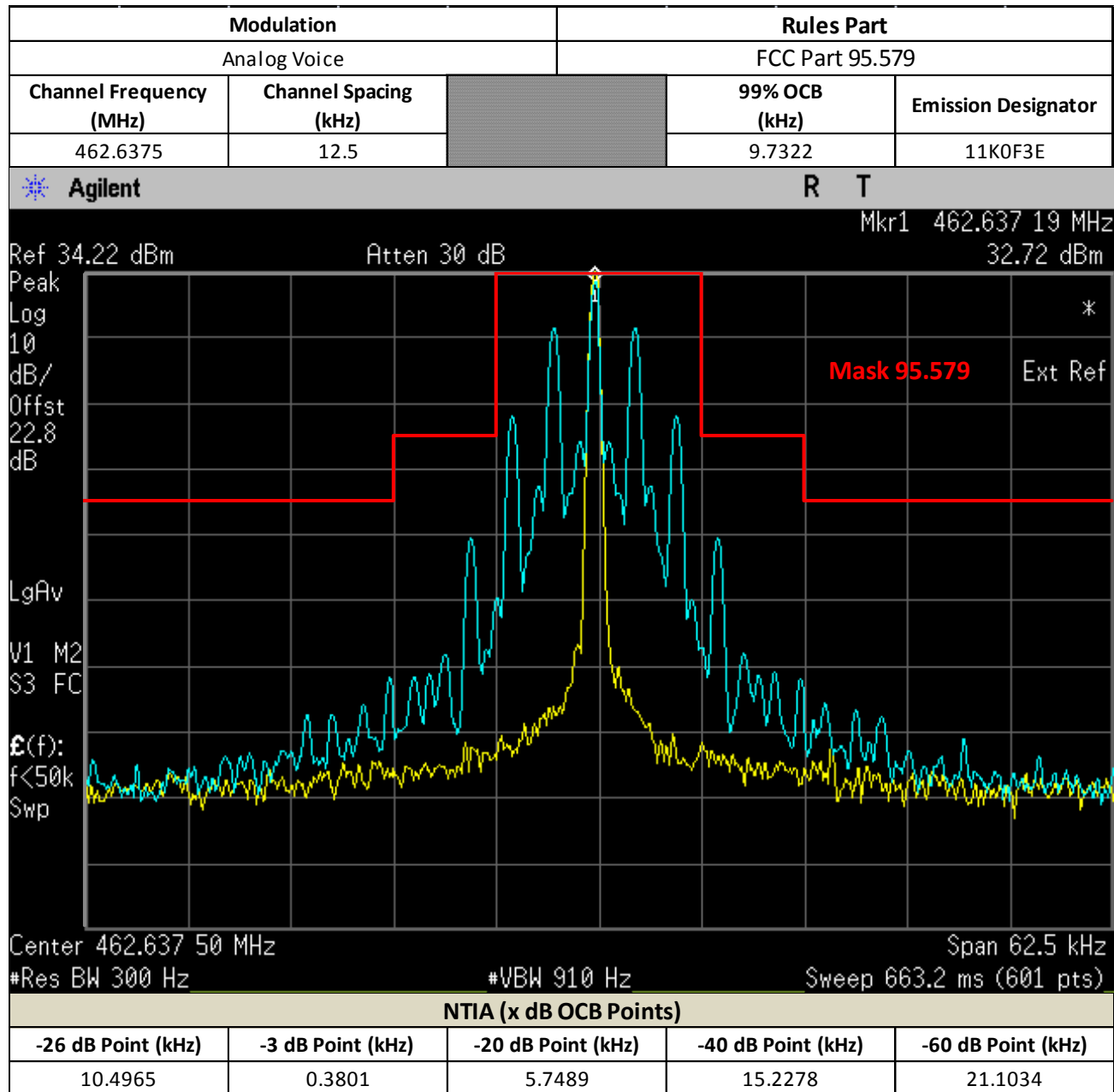
(6) 35 dB on any frequency removed from the center of the authorized bandwidth by more than 150% up to and including 250% of the authorized bandwidth.

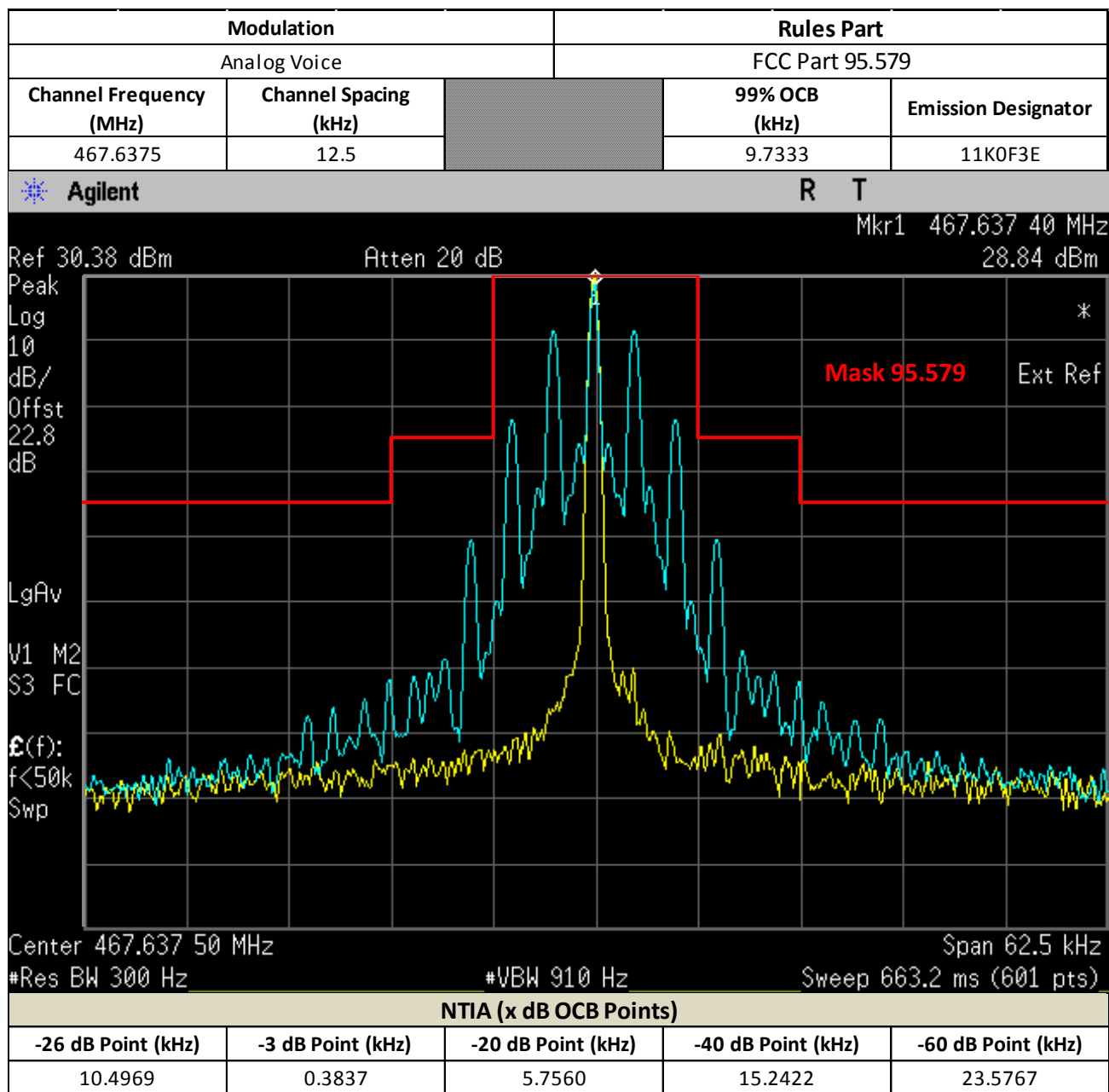
(7)  $43 + 10 \log (P)$  dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

(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.

### 6.6.1. Test Data

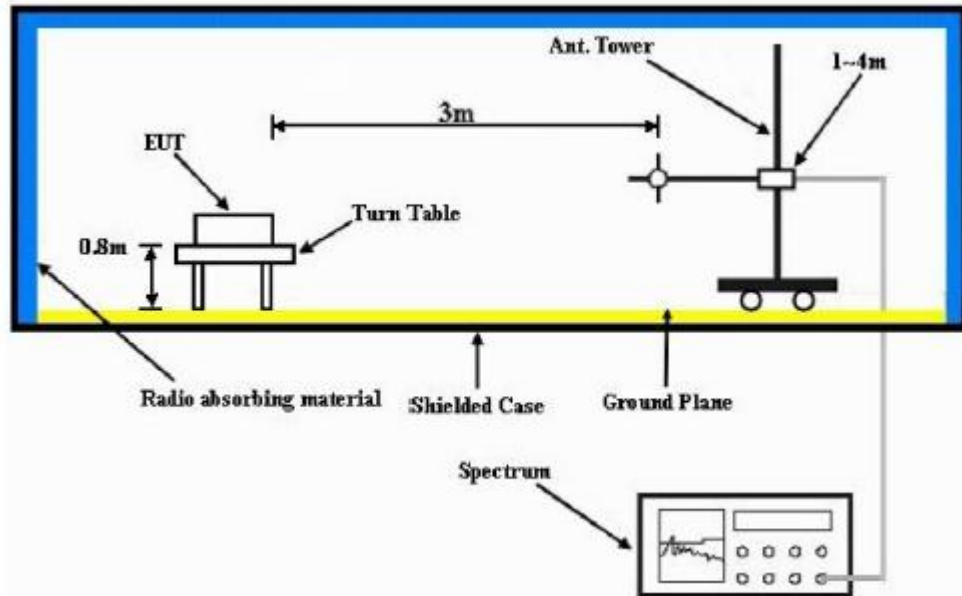




## 6.7. Radiated Spurious Emission

### 6.7.1. Test Setup

### 6.7.2. Test Setup



- 1) The spectrum setting for scanning Radiated Emission below 1 GHz is RBW = 100 kHz, VBW = 300 kHz and above 1 GHz is RBW = 1 MHz, VBW = 3 MHz. Detector mode is positive peak.
- 2) In the semi-anechoic chamber, setup as illustrated above the EUT placed on the 0.8m height (<1GHz) or 1.5m height (>1GHz) of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- 3) The substitution antenna is substituted for EUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.
- 4) Final Radiated Spurious Emission = “Read Value” + Measured substitution value.

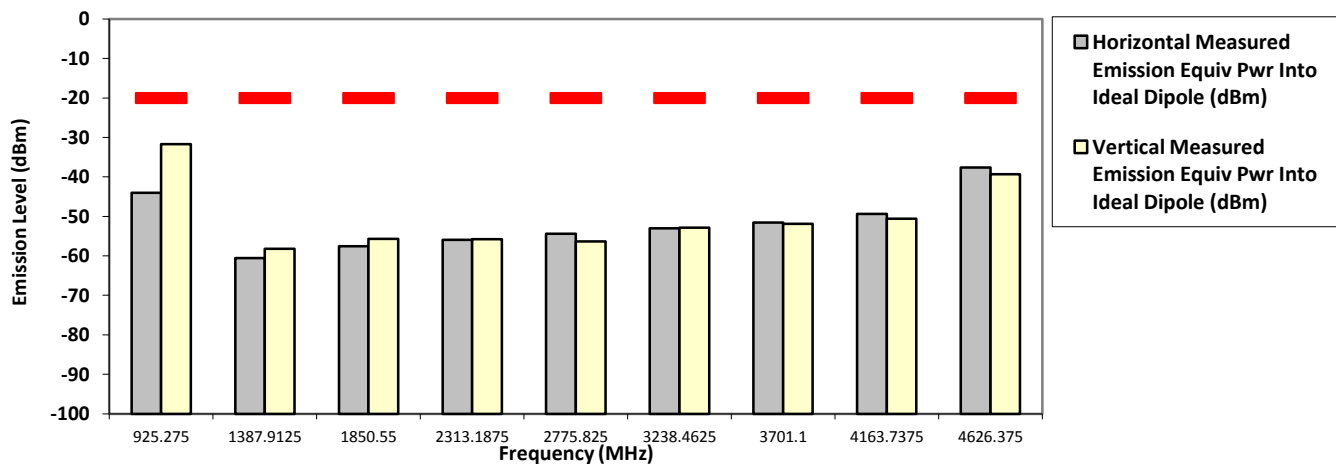
### 6.7.3. Test Result

**SAC Transmitter Radiated Emission:**

Model Number: T600	S/N: 1754RV0013	SR:12042-EMC-00014
Battery Part No: AA Alkaline	Accy Part No: NA	
462.637500 MHz	Test Mode: TX Analog	
12.5 kHz	2.000 Watt(s) /Max Power	

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
925.2750	-20.0000	-44.0000 *	-31.7100
1387.9125	-20.0000	-60.5635 **	-58.2177 **
1850.5500	-20.0000	-57.5965 **	-55.7068 **
2313.1875	-20.0000	-55.9121 **	-55.7557 **
2775.8250	-20.0000	-54.3928 **	-56.3305 **
3238.4625	-20.0000	-53.0252 **	-52.8424 **
3701.1000	-20.0000	-51.5276 **	-51.9273 **
4163.7375	-20.0000	-49.4188 **	-50.6284 **
4626.3750	-20.0000	-37.6500	-39.2900

#### RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.  
 Motorola Penang EMC Lab - Test Performed by: Nazrin & Qawiman  
 Mon, Jul 23, 2018

Remarks: \*\* Indicates the spurious emission could not be detected due to noise limitations or ambient.

\*Pursuant to CFR 47 Part 2.1057 ( c ), emissions attenuated more than 20 dB below the permissible limit are not reported  
 Temp(Deg): 23.5 Hum(%RH): 70.3

System MU: 5.01 dB

Remarks: 

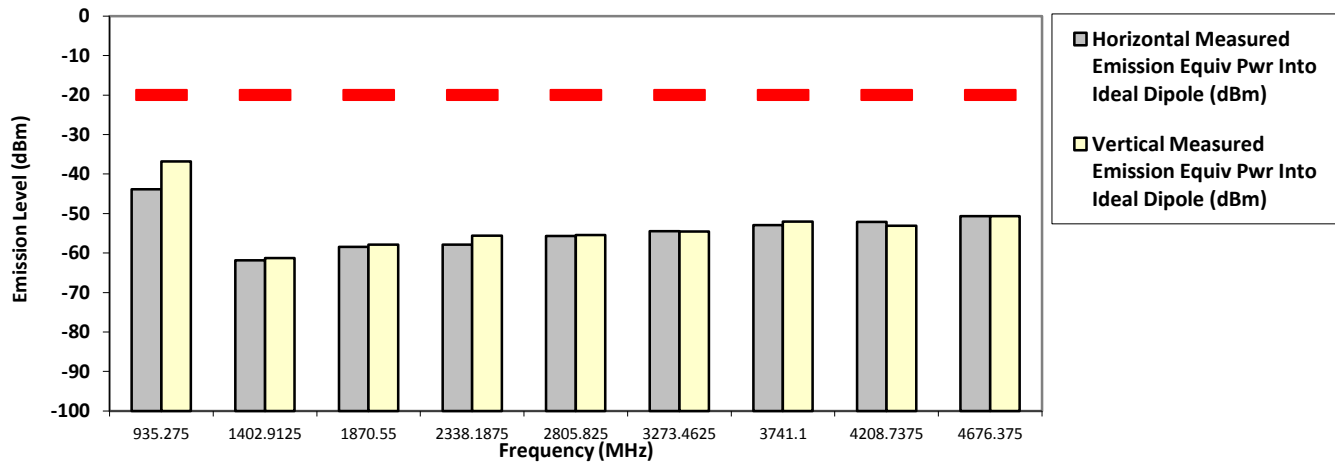
Passed Results	Marginal Results	Failed Results
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**SAC Transmitter Radiated Emission:**

**Model Number: T600**      **S/N: 1754RV0013**      **SR:12042-EMC-00014**  
**Battery Part No: AA Alkaline**      **Accy Part No: NA**  
**Test Mode: TX Analog**  
**467.637500 MHz**      **12.5 kHz**      **0.500 Watt(s) /Max Power**

Frequency (MHz)	Limit	Horizontal Measured Emission Equiv Pwr Into Ideal Dipole (dBm)	Vertical Measured Emission Equiv Pwr Into ideal Dipole (dBm)
935.2750	-20.0000	-43.8500 *	-36.7900
1402.9125	-20.0000	-61.8519 **	-61.2695 **
1870.5500	-20.0000	-58.4071 **	-57.8899 **
2338.1875	-20.0000	-57.8802 **	-55.5970 **
2805.8250	-20.0000	-55.6473 **	-55.4718 **
3273.4625	-20.0000	-54.4493 **	-54.5211 **
3741.1000	-20.0000	-52.8977 **	-52.0714 **
4208.7375	-20.0000	-52.0854 **	-53.0830 **
4676.3750	-20.0000	-50.6229 **	-50.6716 **

#### RADIATED SPURIOUS EMISSIONS



The data presented here was taken using the substitution method as found in the ANSI C63.26-2015 document.  
 Motorola Penang EMC Lab - Test Performed by: Nazrin & Qawiman      Mon, Jul 23, 2018

Remarks: \*\* Indicates the spurious emission could not be detected due to noise limitations or ambient.

\*Pursuant to CFR 47 Part 2.1057 ( c ), emissions attenuated more than 20 dB below the permissible limit are not reported  
 Temp(Deg): 23.5 Hum(%RH): 70.3

System MU: 5.01 dB

Remarks: Passed Results Marginal Results Failed Results



#### 6.7.4. Test limit

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

##### §95.579 FRS unwanted emissions limits

Each FRS transmitter type must be designed to satisfy the applicable unwanted emissions limits in this paragraph.

- (a) Attenuation requirements. The power of unwanted emissions must be attenuated below the carrier power output in Watts (P) by at least:
- (1) 25 dB (decibels) in the frequency band 6.25 kHz to 12.5 kHz removed from the channel center frequency.
  - (2) 35 dB in the frequency band 12.5 kHz to 31.25 kHz removed from the channel center frequency.
  - (3)  $43 + 10 \log(P)$  dB in any frequency band removed from the channel center frequency by more than 31.25 kHz.
- (b) Measurement bandwidths. The power of unwanted emissions in the frequency bands specified in paragraphs (a)(1) and (2) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency range specified in paragraph (a)(3) is measured with a reference bandwidth of at least 30 kHz.
- (c) Measurement conditions. The requirements in this section apply to each FRS transmitter type both with and without the connection of permitted attachments, such as an external speaker, microphone and/or power cord.

##### §95.1779 GMRS unwanted emissions limits (1), (2), (7)

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.

(3)  $83 \log (f_d \div 5)$  dB on any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 5 kHz up to and including 10 kHz.

(4)  $116 \log (f_d \div 6.1)$  dB or  $50 + 10 \log (P)$  dB, whichever is the lesser attenuation, on any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz), of more than 10 kHz up to and including 250% of the authorized bandwidth.

(5) 25 dB on any frequency removed from the center of the authorized bandwidth by more than 50% up to and including 150% of the authorized bandwidth.

(6) 35 dB on any frequency removed from the center of the authorized bandwidth by more than 150% 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.

- End of Test Report -