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Motorola Solutions, Inc

Application
For
FCC Part 95 - Certification

Two Ways Radio of GMRS, FRS and Weather Band receiver

(FCC ID: AZ489FT4924)

15010029HKG-001
MN/ cl
March 16, 2015

Intertek Testing Services Hong Kong Ltd.
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INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

Applicant	**:**	**Motorola Solutions, Inc**
Trade Name/Model No	**:**	**T461** **T400, T460, T465**
Date	**:**	**March 16, 2015**

This report concerns (check one:)Original Grant X Class II Change

Equipment Type: FRF – Part 95 Family Radio Face Held Transmitter
CXX - Communications Rcvr for use w/ licensed Tx and CBs

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes No X
If yes, defer until: date

Company Name agrees to notify the Commission by: date

of the intended date of announcement of the product so that the grant can be issued on that date.

Report prepared by:

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Table of Contents

EXHIBIT 1

GENERAL DESCRIPTION

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a Two Ways Radio with GMRS and FRS, and Weather Band operating between 462.5500MHz and 467.7125MHz. Weather band receiver operates between 161.650MHz and 162.550MHz.
The Channel 1 - 7 are shared channels for GMRS and FRS. Channel 4 is the representable channel to the test.
The EUT is powered by 3.6V (1 x 3.6V "Ni-MH" type rechargeable battery) or 4.5V (3 x "AA" size 1.5V alkaline batteries).

Transmitter Portion

(i) Type of Emission with filtering : GMRS: 5K60F3E with filtering; FRS: 5K64F3E

(ii) Frequency Range : GMRS/FRS: 462.5625MHz to 462.7125MHz
FRS: 467.5625MHz to 467.7125MHz
GMRS: 462.5500MHz to 462.7250MHz
Channel 1,2,3,4,5,6&7 are common channels for GMRS&FRS

(iii) Maximum Power Rating : GMRS: 1.71W ERP; FRS: 0.48W ERP

(iv) Antenna Type gain : Integral, vertically polarized with 2.15dBi antenna

(iv) dc voltage of radio frequency amplifying device: 4.5V
dc current of radio frequency amplifying device : 1100mA

The Model: T400, T460 and T465 are the same as the Model: T461 in hardware aspect. The difference in model number, color and trade name serves as marketing strategy.

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

1.2 Related Submittal(s) Grants

This is an Application for Certification of the transmitter portion of a GMRS + FRS Transceiver and weather band receiver. The receiver section of this Transceiver and digital device portion is subject to verification process.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009) and ANSI/TIA-603-C-2004. Conducted emission measurement were performed according to the procedures in ANSI C63.4 (2009). All radiated measurement were performed in 3m Chamber. All Radiated tests were performed at an antenna the EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

1.4 Test Facility

The 3m Chamber (FCC Site registration number : 435539) and conducted measurement facility used to collect the radiated data is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

EXHIBIT 2

SYSTEM TEST CONFIGURATION

2.0 System Test Configuration

2.1 Justification

The device was configured for testing in a typical fashion (as a customer would normally use it). The device was placed on a turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes. The device has been tested with headset and without headset when the radiated emissions are measured.

The device was powered by 3 x AA Size New Alkaline Battery / 3.6V Fully Charged rechargeable battery.

The frequency range of transmitter from 30MHz to 10^{th} harmonics was searched for spurious emissions from the device. The frequency range of weather band receiver from 30MHz to 2GHz was searched for spurious emissions from the device. Only those emissions reported were detected. All other emissions were at least 20 dB below the applicable limits.

For transmitter radiated spurious measurement, the spectrum analyzer resolution bandwidth was 10kHz for emissions below 1GHz, and 1MHz for emissions above 1GHz. Video bandwidth was 300kHz for emissions below 1GHz, and 3MHz for emissions above 1GHz. For receiver radiated spurious measurement, the spectrum analyzer resolution bandwidth was 100kHz for emission below 1GHz, and 1MHz for emissions above 1GHz. Video bandwidth was 3 times greater than resolution bandwidth.

All power-up methods were tested and the worst-case data were reported.

The following are all the test modes (only the worst-case was reported):
GMRS, Tx without headset
GMRS, Tx with headset
FRS (same as the all above cases)
Weather band receiver, without headset
Weather band receiver, with headset

2.2 EUT Exercising Software

There was no special software to exercise the device. Once the PTT button was pushed, a signal was transmitted.

2.3 Special Accessories

No special accessory is needed for compliance of this device.

2.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

2.5 Equipment Modification

No modifications by Motorola Solutions, Inc will be incorporated in each production model sold/leased in the United States.

2.6 Support Equipment

A headset with 1.2m unshielded cable.

The EUT has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief,these tests were performed using the measurement procedures described in this report. All instrumentations and accessories used to verify the EUT for compliance to the indicated standards are calibrated in accordance with ISO 17025:2005 requirements.

Testing was performed at Intertek Testing Services Hong Kong Ltd. Where meets the FCC listed site for certification application requirements stated in FCC Part 2 Section 2.948.

I attest that the nesscessary measurements were made under my supervision.

Attested by

Intertek Testing Services Hong Kong Ltd.
Agent for Motorola Solutions, Inc

Tested and Prepared by:

Koo Wai Ip
Digitally signed by Koo Wai Ip
Location: Intertek Testing Services Hong Kong Ltd.

Koo Wai Ip
Assistant Supervisor

Approved by:

Digitally signed by Nip Ming Fung, Melvin
Date: 2015.03.17 15:01:23 +08'00'

Nip Ming Fung, Melvin
Assistant Manager

March 16, 2015 *Date*

EXHIBIT 3

RF POWER OUTPUT

3.0 **RF Power Output (Section 2.1046(a), 95.639(a), 95.639(d))**

Testing Procedure

1. On a test site, the EUT shall be placed at 0.8m height on a wooden turntable, and in the position closest to normal use as declared by the applicant.

2. The test antenna shall be oriented initially for vertical polarisation located 3m from EUT to correspond to the 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. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.

5. 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.

6. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

7. 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.

8. The maximum signal level detected by the measuring receiver shall be noted.

9. The transmitter shall be replaced by a tuned dipole (substitution antenna).

10. The substitution antenna shall be orientated for vertical polarisation and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.

11. The substitution antenna shall be connected to a calibrated signal generator.

12. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.

14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, that 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.

15. 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.

16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarisation.

17. The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

Table 1

Motorola Solutions, Inc
T461

Transmission Power

Channel	Frequency	Effective Radiated Power		FCC 95.639 Limit	Margin
	(MHz)	(dBm)	(W)	(W)	(W)
1	462.5625	32.3	1.71	5.00	-3.29
2	462.5875	32.3	1.71	5.00	-3.29
3	462.6125	32.3	1.71	5.00	-3.29
4	462.6375	32.3	1.71	5.00	-3.29
5	462.6625	32.3	1.71	5.00	-3.29
6	462.6875	32.3	1.71	5.00	-3.29
7	462.7125	32.3	1.71	5.00	-3.29
8	467.5625	26.8	0.48	0.50	-0.02
9	467.5875	26.8	0.48	0.50	-0.02
10	467.6125	26.8	0.48	0.50	-0.02
11	467.6375	26.8	0.48	0.50	-0.02
12	467.6625	26.8	0.48	0.50	-0.02
13	467.6875	26.8	0.48	0.50	-0.02
14	467.7125	26.8	0.48	0.50	-0.02
15	462.5500	32.3	1.71	5.00	-3.29
16	462.5750	32.3	1.71	5.00	-3.29
17	462.6000	32.3	1.71	5.00	-3.29
18	462.6250	32.3	1.71	5.00	-3.29
19	462.6500	32.3	1.71	5.00	-3.29
20	462.6750	32.3	1.71	5.00	-3.29
21	462.7000	32.3	1.71	5.00	-3.29
22	462.7250	32.3	1.71	5.00	-3.29

Notes: 1) Negative sign in the margin column shows the value below limits.
2) Channel 1 - 7 are the shared channels for GMRS and FRS, data shown above is for GMRS. FRS data of Channel 1-7 are same as Channel 8-14.

Verdict: Pass

Test Engineer: Koo Wai Ip Date of Test: February 12, 2015

EXHIBIT 4

MODULATION CHARACTERISTICS

4.0 **Modulation Characteristics (Section 2.1047(a)(b), 95.637(a))**

In order to satisfy the 95.637(a) and 2.1047(b) requirements, Modulation Frequency Response and Modulation Limiting Characteristics are attached in Exhibit 4.1 & 4.2.

In order to satisfy the 2.1047(a) requirement, Audio Low Pass Filter Response is attached in Exhibit 4.3.

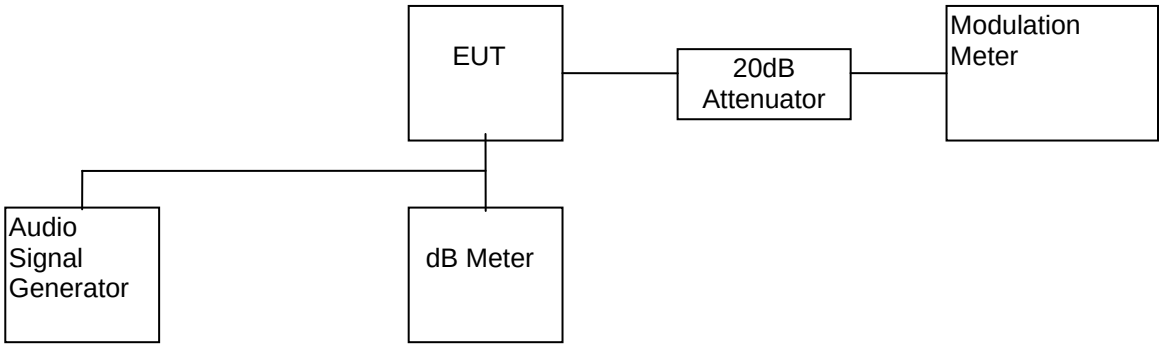
The modulation frequency response curve and modulation limiting characteristic curve are saving in following page.

The audio low pass frequency response curve is saving in following page.

4.1 Modulation Frequency Response (Section 2.1047(a), 95.637(a))

Testing Procedure

1) Set-up the test equipment in the following configuration:



2) Set the audio signal generator frequency to the sound pressure level 127.0dBSPL at the microphone of the EUT.
3) The frequency of the audio signal generator is changed from 100Hz to 5kHz.
4) Record the frequency deviation.
5) The peak frequency deviation must not exceed:

   GMRS + FRS : ±2.5kHz

6) Calculate the audio frequency response at each frequency as:

   response = 20 $\log_{10}$(DEV_{FREQ}/ DEV_{REF});

   DEV_{REF} = Frequency deviation at 1000Hz ;
   DEV_{FREQ} = Frequency deviation at 100 - 5000Hz ;

7) From the plot, audio frequency response rolls off before 3.125kHz.

C. Test Result

Table 2

Motorola Solutions, Inc
T461

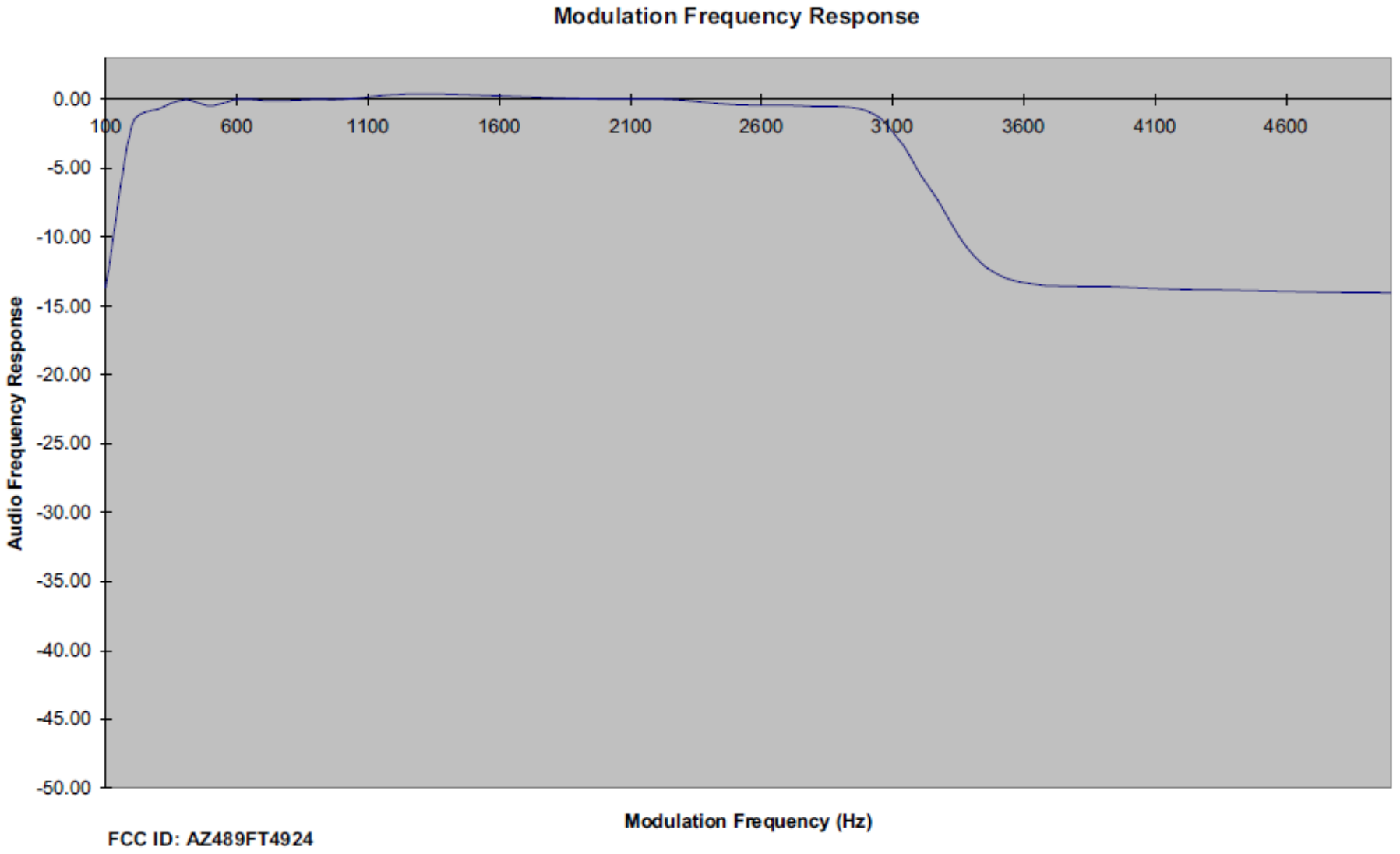
Modulation Frequency Response

Test Channel : 4
Input level = 127.0dBSPL

Modulation Frequency(Hz)	Frequency Deviation(kHz)	Audio Frequency Response (dB)
100	0.42	-13.64
200	1.64	-1.81
300	1.86	-0.72
400	2.01	-0.04
500	1.92	-0.44
600	2.02	0.00
700	2.00	-0.09
800	2.00	-0.09
900	2.02	0.00
1000	2.02	0.00
1250	2.12	0.42
1500	2.10	0.34
1750	2.06	0.17
2000	2.03	0.04
2250	2.02	0.00
2500	1.94	-0.35
2750	1.92	-0.44
3000	1.84	-0.81
3125	1.44	-2.94
3250	0.94	-6.64
3500	0.47	-12.67
4000	0.42	-13.64
5000	0.40	-14.07

Verdict: Pass

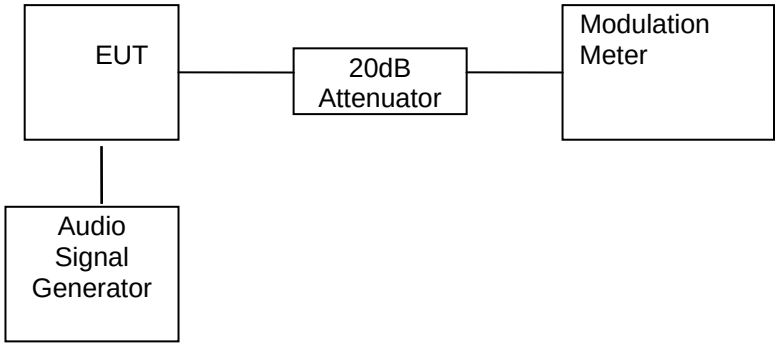
Test Engineer: Koo Wai Ip Date of Test: February 12, 2015


Modulation Frequency Response
0.00
-5.00
-10.00
-15.00
-20.00
-25.00
-30.00
-35.00
-40.00
-45.00
-50.00
100
600
1100
1600
2100
2600
3100
3600
4100
4600
Audio Frequency Response
Modulation Frequency (Hz)
FCC ID: AZ489FT4924

4.2 Modulation Limiting Characteristics (Section 2.1047(b), 95.637(a))

Testing Procedure

1) Set-up the test equipment in the following configuration:



2) Set the frequency of the audio signal generator to 500Hz and adjust the level from 47dBSPL to 137dBSPL.
3) Record the maximum value of plus or minus peak frequency deviation.
4) Repeat the above procedure with frequency 1000Hz, 2500Hz & 3125Hz.
5) The peak frequency deviation must not exceed:

   GMRS + FRS : ±2.5kHz

C. Test Result

Table 3

Motorola Solutions, Inc
T461

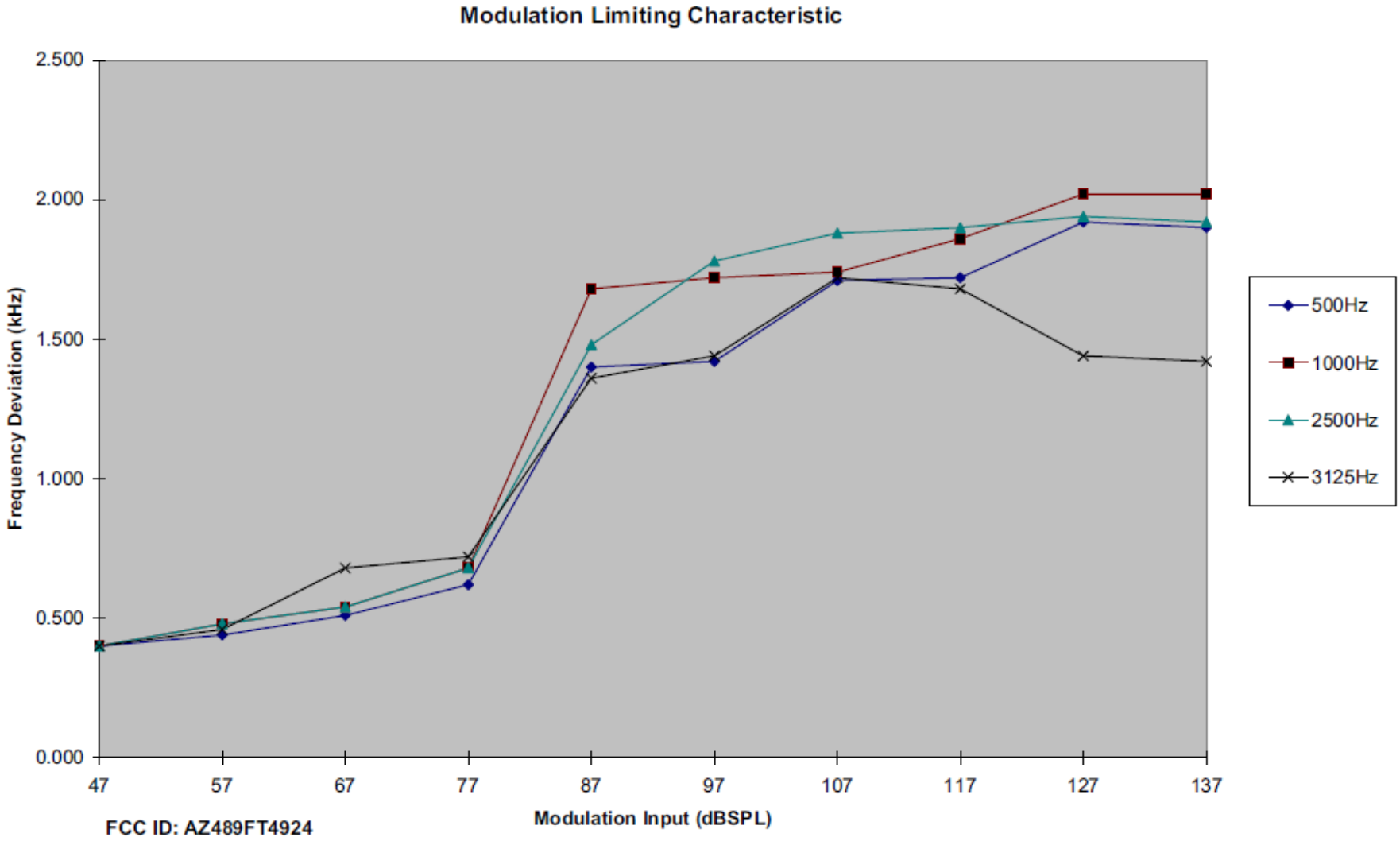
Modulation Limiting Characteristics

Test Channel : 4

Modulation Input (dBSPL)	Peak Frequency Deviation (kHz) at 500Hz	Peak Frequency Deviation (kHz) at 1000Hz	Peak Frequency Deviation (kHz) at 2500Hz	Peak Frequency Deviation (kHz) at 3125Hz
47	0.400	0.400	0.400	0.400
57	0.440	0.480	0.480	0.460
67	0.510	0.540	0.540	0.680
77	0.620	0.680	0.680	0.720
87	1.400	1.680	1.480	1.360
97	1.420	1.720	1.780	1.440
107	1.710	1.740	1.880	1.720
117	1.720	1.860	1.900	1.680
127	1.920	2.020	1.940	1.440
137	1.900	2.020	1.920	1.420

Verdict: Pass

Test Engineer: Koo Wai Ip Date of Test: February 12, 2015


Modulation Limiting Characteristic
2.500
2.000
1.500
1.000
0.500
0.000
Frequency Deviation (kHz)
47
57
67
77
87
97
107
117
127
137
Modulation Input (dBSPL)
500Hz
1000Hz
2500Hz
3125Hz
FCC ID: AZ489FT4924

4.3 Audio Low Pass Filter Response (Section 2.1047(a), 95.637(b))

Testing Procedure

1) Connect the audio signal generator to the input of the post limiter low pass filter and the dB meter to the output of the post limiter low pass filter.
2) 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}.
3) 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}.
4) Calculate the audio frequency response at the test frequency as:

   low pass filter response **=** LEV_{FREQ} **-** LEV_{REF}

5) Repeat the above procedure for all the desired test frequencies.

C. Test Result

Table 4

Motorola Solutions, Inc
T461

Low-Pass Filter Response

Test Channel : 4

Audio Input Strength = 2200mVrms

Frequency (kHz)	dB relative to 1 kHz	Part 95.637(b)
1	0.0	0.0
3	-10.0	0.0
4	-60.0	-7.5
5	-60.0	-13.3
6	-60.0	-18.1
8	-60.0	-25.6
10	-60.0	-31.4
15	-60.0	-41.9
20	-60.0	-50.0
30	-60.0	-50.0
40	-60.0	-50.0
50	-60.0	-50.0
60	-60.0	-50.0
70	-60.0	-50.0
80	-60.0	-50.0
90	-60.0	-50.0
100	-60.0	-50.0

Audio Output at 1kHz: 14.0dBV

Verdict: Pass

Test Engineer: Koo Wai Ip Date of Test: March 11, 2015

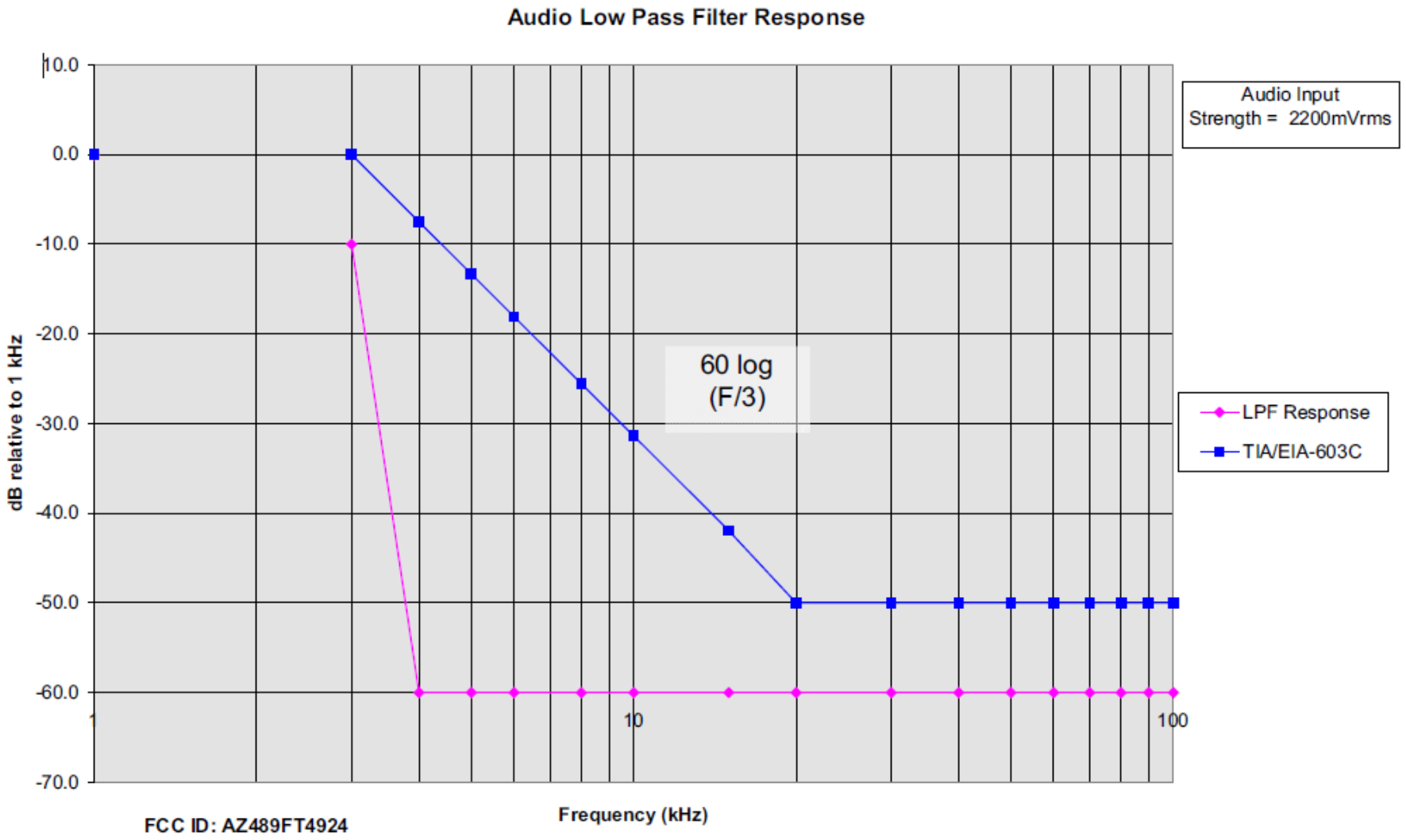

Audio Low Pass Filter Response
10.0
0.0
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
dB relative to 1 kHz
1
10
100
Frequency (kHz)
60 log
(F/3)
Audio Input
Strength = 2200mVrms
LPF Response
TIA/EIA-603C
FCC ID: AZ489FT4924

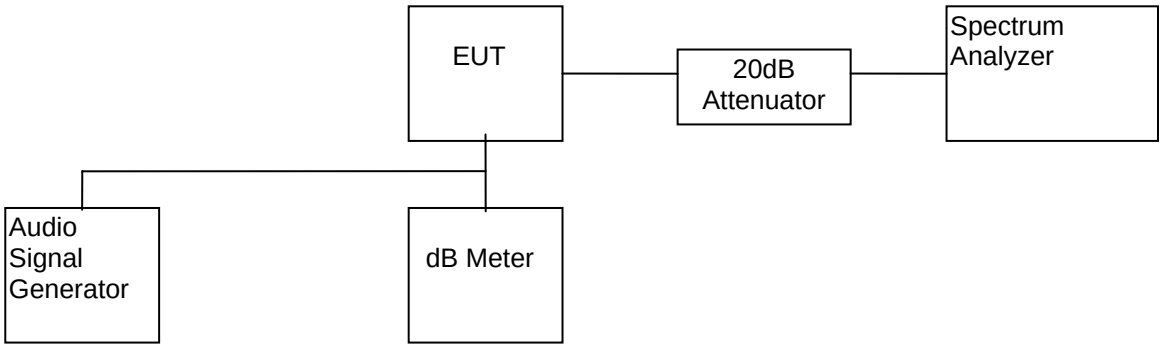
EXHIBIT 5

OCCUPIED BANDWIDTH

5.0 Occupied Bandwidth (Section 2.1049, 95.633(c))

Testing Procedure

1) Set-up the test equipment in the following configuration:



2) Set the level of audio signal generator to obtain 16 dB greater than required for 50% modulation.
3) The occupied bandwidth is measured with the spectrum analyzer set at 2kHz/div scan and 10dB/div.

C. Test Result

Table 5

Motorola Solutions, Inc
T461

System	Channel	Measured Bandwidth (kHz)	Limit (kHz)
GMRS	4	5.60	≤20
FRS	11	5.64	≤12.5

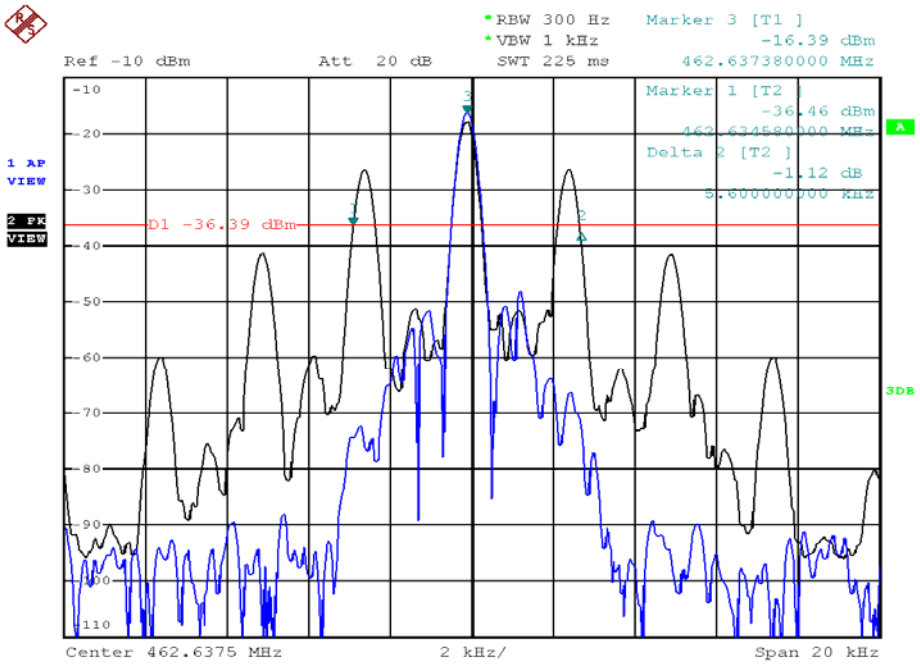
Verdict: Pass

The bandwidth plot is saving in following page.

Test Engineer: Koo Wai Ip Date of Test: February 12, 2015

Occupied Bandwidth Plots

Plot CH4



Plot CH11

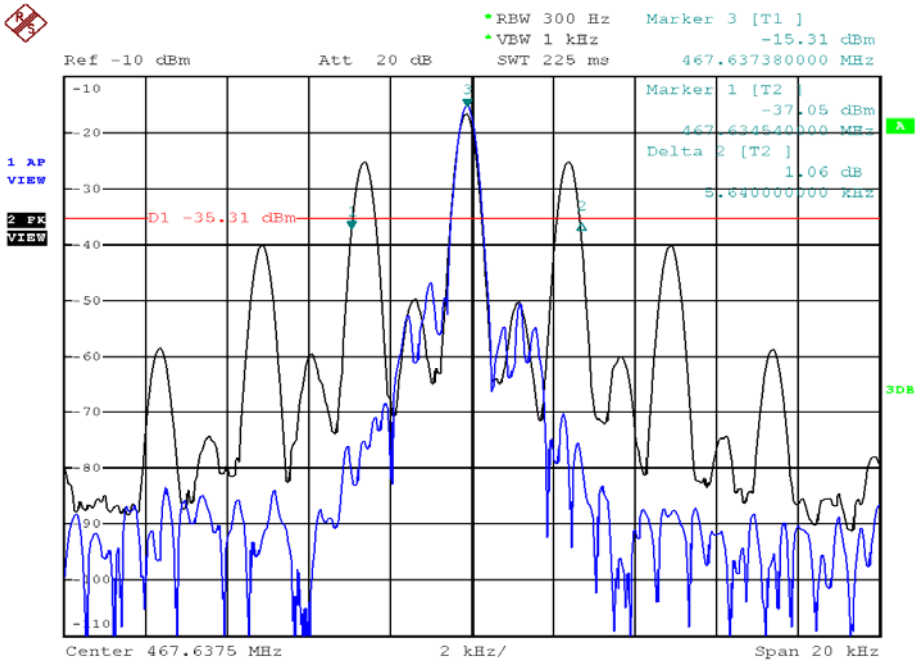


EXHIBIT 6

SPURIOUS EMISSION

6.0 **Spurious Emission**

In order to satisfy the 95.635(b) requirement, the spurious emission from the EUT are measured and shown in the Exhibit 6.1.

6.1 Power of Spurious Radiation (Section 2.1053, 95.635(b))

Testing Procedure

Radiated emission measurements were performed according to the procedures in ANSI/TIA-603-C-2004. All measurements were performed at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong

C. Radiated Emission Configuration Photograph

Worst Case Radiated Emission

The radiated emission configurations photograph is saving in the following page.

Configuration Photograph

Worst Case Radiated Emission

Model: T461

Configuration Photograph

Worst Case Radiated Emission

Model: T461

C. Test Result

Motorola Solutions, Inc
T461

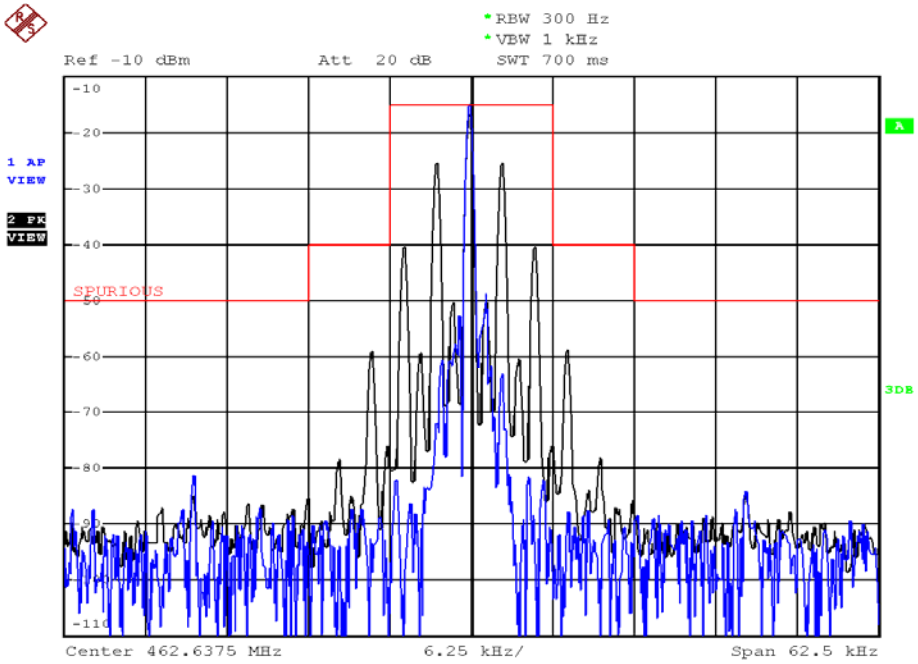
Table 6(a)

1) Unwanted emission from CARRIER ±6.25kHz to CARRIER ±31.25kHz

Region	Unwanted emission	
	Channel 4	Channel 11
CARRIER ±6.25kHz to ±12.5kHz	<25dB	<25dB
CARRIER ±12.5kHz to ±31.25kHz	<35dB	<35dB

Spurious Emission Plots

Plot CH4



Plot CH11

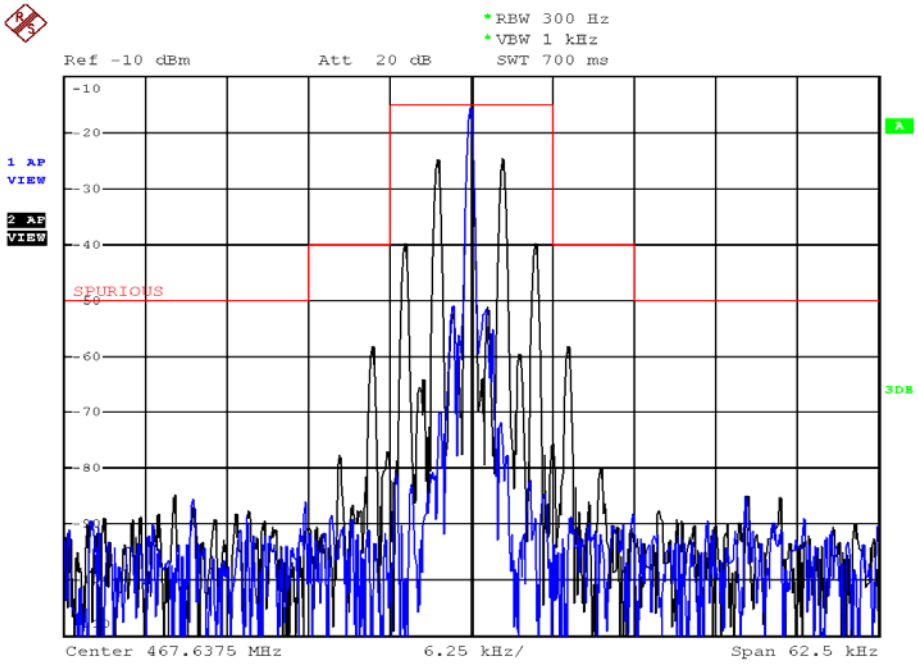


Table 6(b): Channel 4

Frequency (MHz)	Effective Radiated Power (dBm)	Transmission Power (dBm)	Attenuation (dBc)	Limit (dBc)	Margin (dB)
925.280	-31.6	32.3	63.9	45.3	-18.6
1387.920	-40.1	32.3	72.4	45.3	-27.1
1850.560	-41.8	32.3	74.1	45.3	-28.8
2313.200	-41.4	32.3	73.7	45.3	-28.4
2775.840	-44.2	32.3	76.5	45.3	-31.2
3238.480	-42.6	32.3	74.9	45.3	-29.6
3701.120	-40.5	32.3	72.8	45.3	-27.5
4163.760	-41.3	32.3	73.6	45.3	-28.3
4626.400	-42.6	32.3	74.9	45.3	-29.6

Remark: 1. Transmission power is 32.3 dBm or 2.3 dB(W).

2. According to Section 95.635(b7), the unwanted emission should be attenuated below TP by at least 43 + 10 $\log_{10}$ (TP) dB or 45.3 dB.

3. The test is performed according to ANSI/TIA-603-C-2004.

4. For emission <1000MHz, RBW = 100kHz, VBW >=RBW
For emission >1000MHz, RBW = 1MHz, VBW >=RBW

Verdict: Pass

Test Engineer: Koo Wai Ip Date of Test: February 12, 2015

Table 6(b): Channel 11

Frequency (MHz)	Effective Radiated Power (dBm)	Transmission Power (dBm)	Attenuation (dBc)	Limit (dBc)	Margin (dB)
935.274	-33.3	26.8	60.1	39.8	-20.3
1402.911	-44.0	26.8	70.8	39.8	-31.0
1870.548	-36.6	26.8	63.4	39.8	-23.6
2338.185	-44.1	26.8	70.9	39.8	-31.1
2805.822	-45.2	26.8	72.0	39.8	-32.2
3273.459	-40.9	26.8	67.7	39.8	-27.9
3741.096	-38.7	26.8	65.5	39.8	-25.7
4208.733	-40.2	26.8	67.0	39.8	-27.2
4676.370	-43.6	26.8	70.4	39.8	-30.6

Remark: 1. Transmission power is 26.8 dBm or -3.2 dB(W).

2. According to Section 95.635(b7), the unwanted emission should be attenuated below TP by at least 43 + 10 $\log_{10}$ (TP) dB or 39.8 dB.

3. The test is performed according to ANSI/TIA-603-C-2004.

4. For emission <1000MHz, RBW = 100kHz, VBW >=RBW
For emission >1000MHz, RBW = 1MHz, VBW >=RBW

Verdict: Pass

Test Engineer: Koo Wai Ip Date of Test: February 12, 2015

6.2 Field Strength of Radiation Emission and AC line Conducted Emission (Section 15.109 & 15.107)

Data is included worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

A. Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

A. Field Strength Calculation (cont'd)

Example

Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0 dB

AV = -10 dB

FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

B. Radiated Emission Configuration Photograph - Weather Band Receiver

Worst Case Radiated Emission
at
808.250 MHz

The worst case radiated emission configuration photograph is saving in the following page.

Configuration Photograph

Worst Case Radiated Emission

Weather Band Receiver

Model: T461

Configuration Photograph

Worst Case Radiated Emission

Weather Band Receiver

Model: T461

C. Radiated Emission Data - Weather Band Receiver

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 9.3 dB margin

Company: Motorola Solutions, Inc
Model: T461
Mode: Weather Band Receiver

Date of Test: February 12, 2015

Table 4(c)

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	161.650	28.7	16	16.0	28.7	43.5	-14.8
V	323.300	24.4	16	24.0	32.4	46.0	-13.6
V	484.950	23.8	16	26.0	33.8	46.0	-12.2
V	646.600	22.4	16	29.0	35.4	46.0	-10.6
V	808.250	21.7	16	31.0	36.7	46.0	-9.3
V	969.900	21.0	16	33.0	38.0	54.0	-16.0

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters.

3. Negative value in the margin column shows emission below limit.

Test Engineer: Koo Wai Ip

D. Conducted Emission Configuration Photograph

Worst Case Conducted Emission

GMRS/ FRS / Tx at 0.173 MHz

Weather band receiver at N/A MHz

The conducted emission configurations photograph is saving in the following page.

Configuration Photograph

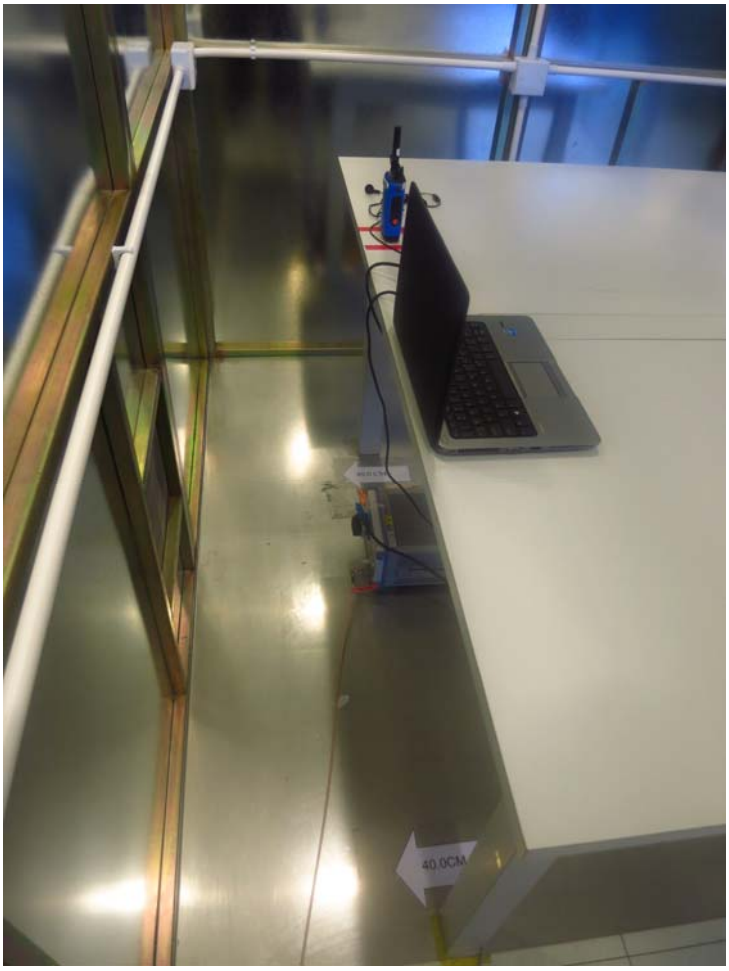
Worst Case Conducted Emission

Model: T461

Configuration Photograph

Worst Case Conducted Emission

Model: T461



Configuration Photograph

Worst Case ConductedEmission

Model: T461

D. AC Line Conducted Emission Data

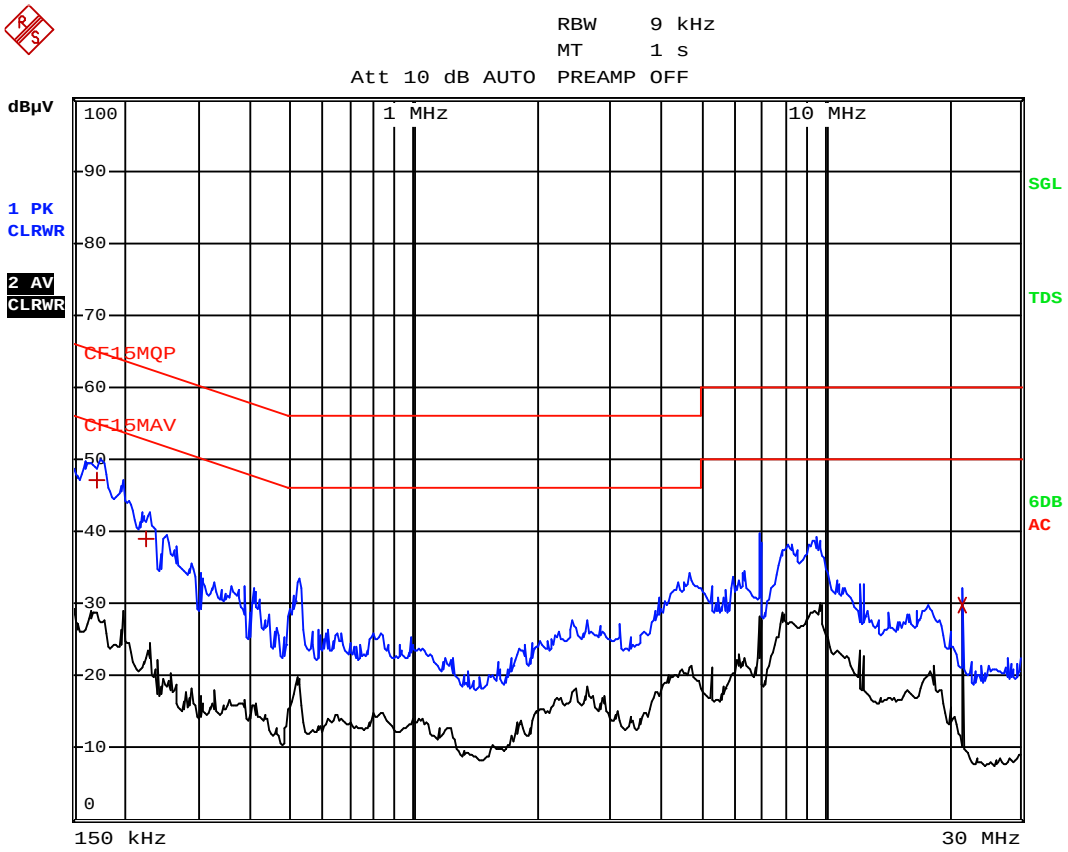
Judgement:

GMRS/ FRS/ Tx: Passed by 17.76 dB margin

Weather band receiver: Passed by >20 dB margin

The conducted emission test result is saving in the following page.

Mode: TX On



Date: 25.FEB.2015 07:19:09

Mode: TX On

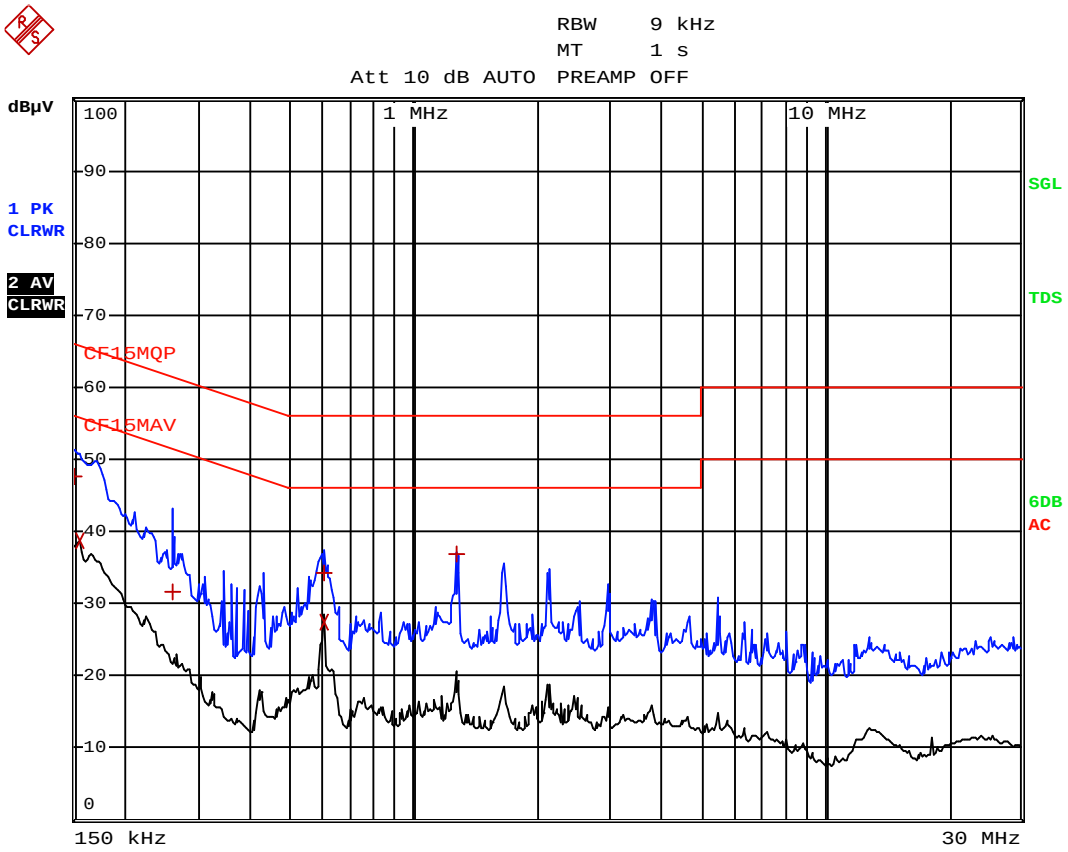
EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Quasi Peak	172.5 kHz	47.08 L1	-17.76
1 Quasi Peak	226.5 kHz	39.06 L1	-23.51
2 CISPR Average	21.7005 MHz	29.82 L1	-20.17

Date: 25.FEB.2015 07:18:33

Mode: Weather Band Receiver



Date: 18.NOV.2014 12:45:39

EXHIBIT 7

FREQUENCY STABILITY

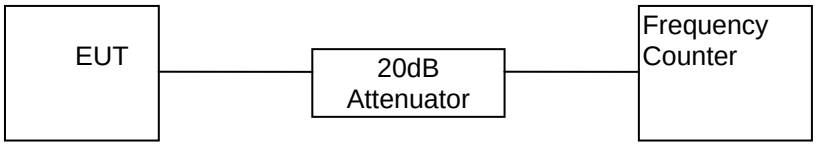
7.0 **Frequency Stability (Section 2.1055(a)(b)(d), 95.627(b) for FRS, 95.621(b) for GMRS)**

The frequency tolerance was tested in normal condition & over extreme ambient conditions with respect to voltage and temperature variation.

7.1 Frequency Tolerance (Section 95.627(b) for FRS, 95.621(b) for GMRS)

Testing Procedure

1) Set-up the test equipment in the following configuration:



2) Measure all transmit channel frequencies in MHz.

C. Test Result

Table 7

Motorola Solutions, Inc
T461

Frequency Tolerance

Channel	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)
1	462.5625	462.56235	-0.000032
2	462.5875	462.58735	-0.000032
3	462.6125	462.61235	-0.000032
4	462.6375	462.63735	-0.000032
5	462.6625	462.66235	-0.000032
6	462.6875	462.68735	-0.000032
7	462.7125	462.71235	-0.000032
8	467.5625	467.56235	-0.000032
9	467.5875	467.58735	-0.000032
10	467.6125	467.61235	-0.000032
11	467.6375	467.63735	-0.000032
12	467.6625	467.66235	-0.000032
13	467.6875	467.68735	-0.000032
14	467.7125	467.71235	-0.000032
15	462.5500	462.54985	-0.000032
16	462.5750	462.57485	-0.000032
17	462.6000	462.59985	-0.000032
18	462.6250	462.62485	-0.000032
19	462.6500	462.64985	-0.000032
20	462.6750	462.67485	-0.000032
21	462.7000	462.69985	-0.000032
22	462.7250	462.72485	-0.000032

FCC Limit for FRS (95.627(b)): ≤±0.00025%
FCC Limit for GMRS (95.607(b)): ≤±0.0005%

Verdict: Passed

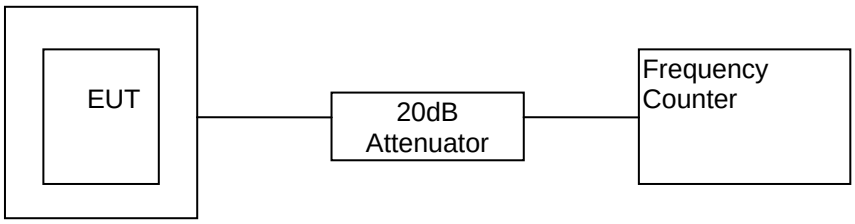
Test Engineer: Koo Wai Ip Date of Test: February 12, 2015

7.2 Frequency Stability - Temperature (Section 2.1055(a)(b), 95.627(b) for FRS, 95.621(b) for GMRS)

Testing Procedure

1) Set-up the test equipment in the following configuration:

Temperature Chamber



2) Set the Temperature Chamber to 20°C and stabilize the EUT temperature for one hour. Set transmitter ON for two minutes.
3) Measure the channel frequency of channel 4 in MHz.
4) Turn the EUT OFF.
5) Repeat the above procedure from -30°C to 50°C with 10°C increment for GMRS.
6) Repeat the above procedure from -20°C to 50°C with 10°C increment for FRS.

C. Test Result

Table 8(a)

Motorola Solutions, Inc
T461

Frequency Tolerance with Temperature Variation

Channel : 4

Temperature (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)	*Frequency Tolerance with reference to its value at +20°C (ppm)
-30#	462.63750	462.63772	0.000048	0.8
-20	462.63750	462.63716	-0.000073	-0.4
-10	462.63750	462.63756	0.000013	0.5
0	462.63750	462.63790	0.000086	1.2
10	462.63750	462.63790	0.000086	1.2
20	462.63750	462.63735	-0.000032	0.0
30	462.63750	462.63668	-0.000177	-1.4
40	462.63750	462.63650	-0.000216	-1.8
50	462.63750	462.63759	0.000019	0.5

Remark: 1) For GMRS, frequency tolerance must be maintained within a frequency tolerance of 0.0005%.
2) #Data is for GMRS compliance, not for FRS.

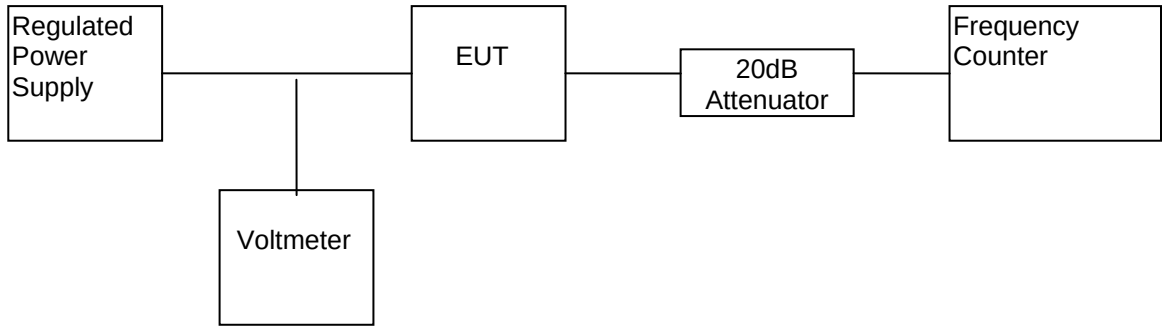
Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 12, 2015

7.3 Frequency Stability - Voltage (Section 2.1055(d), 95.627(b) for FRS, 95.621(b) for GMRS)

Testing Procedure

1) Set-up the test equipment in the following configuration:



2) Vary the level of regulated power supply to the manufacturer specified battery end point of the EUT.
3) Measure the channel frequency of channel 4 in MHz.

C. Test Result

Table 9

Motorola Solutions, Inc
T461

Frequency Deviation with Voltage Variation

The manufacturer specified battery end point 3.2V

Channel	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)
4	462.63750	462.63663	-0.000188

Remark: 1) For FRS, frequency tolerance must be maintained within a frequency tolerance of 0.00025%.
2) For GMRS, frequency tolerance must be maintained within a frequency tolerance of 0.0005%.
3) The test voltage is from primary supply voltage to 3.2V

Test Engineer: Koo Wai Ip Date of Test: February 12, 2015

EXHIBIT 8

EQUIPMENT LIST

Equipment List

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Roberts Antenna
Registration No.	EW-2251	EW-0159
Manufacturer	R&S	CDI
Model No.	ESCI	A100
Calibration Date	Dec. 04, 2014	May. 09, 2014
Calibration Due Date	Dec. 04, 2015	Nov. 09, 2015

Equipment	Spectrum Analyzer	Pyramidal Horn Antenna	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-0905	EW-1015
Manufacturer	R&S	EMCO	EMCO
Model No.	FSP40	3160-09	3115
Calibration Date	May 08, 2014	Jan. 28, 2014	Oct. 28, 2014
Calibration Due Date	May 08, 2015	Jul. 28, 2015	Apr. 28, 2016

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2251	EW-2501
Manufacturer	R&S	R&S
Model No.	ESCI	ESCI
Calibration Date	Dec. 04, 2014	Jan. 15, 2015
Calibration Due Date	Dec. 04, 2015	Jan. 15, 2016

3) Modulation Characterisitics

Equipment	Communication Service Monitor	Humidity Chamber
Registration No.	EW-1775	EW-2395
Manufacturer	R&S	Giant Force
Model No.	CMS54	AR
Calibration Date	Dec. 04, 2014	Oct. 09, 2014
Calibration Due Date	Nov. 22, 2015	Oct. 09, 2015