Giant Electronics Ltd.

Application
For
Certification

Two Way Radio with FRS and GMRS

(FCC ID: K7GT5000)

HK10091093-1
KS/ ac
November 9, 2010

Intertek Testing Services Hong Kong Ltd.
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EXHIBIT 1

GENERAL DESCRIPTION

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a Two Way Radio with FRS and GMRS operating between 462.5500MHz and 467.7125MHz. The EUT is powered by 4.5V d.c. (3 x 1.5V "AA" size alkaline batteries).

Transmitter Portion

(i)	Type of Emission	: 7K90F3E
(ii)	Frequency Range	: GMRS 15 Channels from 462.5500MHz to 462.7250MHz FRS 7 Channels from 467.5625MHz to 467.7125MHz
(iii)	Maximum Power Rating	: GMRS: 0.48W ERP; FRS: 0.26W ERP
(iv)	Antenna Type	: Integral

The Model: Giant T5010, Giant T5020, Motorola MC220PR are the same as the Model: Giant T5000 in hardware aspect except that Giant T5010 has 5 extra call tone and vox function and Giant T5020 has 5 extra call tone and vox function but without 22 RF channel scan function and Motorola MC220PR with difference on logo, packing and enclosure.

1.2 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003) and ANSI/TIA-603-C-2004. Conducted emission measurement were performed according to the procedures in ANSI C63..4 (2003). All radiated measurement were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. All Radiated tests were performed at an antenna the EUT distance of 3 meters, unless stated otherwise in the **"Justification Section"** of this Application.

1.3 Test Facility

The open area test site and conducted emission test site used to collect the emission data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. The test facility and site measurement data have been fully 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 new 1.5V “AA” alkaline batteries.

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.

This device supported several power-up methods (powered by rechargeable battery pack, alkaline batteries) 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)

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

Any modification installed previous to testing by Giant Electronics Ltd. will be incorporated in each production model sold/leased in the United States.

No modification were installed by Intertek Testing Services Hong Kong Ltd.

2.6 Support Equipment

A headset with 1.2m unshielded cable.

Confirmed by:

Sit Kim Wai, Ken
Manager
Intertek Testing Services Hong Kong Ltd.
Agent for Giant Electronics Ltd.

Signature

November 9, 2010 Date

EXHIBIT 3

RF POWER OUTPUT

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

A. Equipment Used

Equipment	**Brand Name**	**Model No.**
Log Periodic Antenna	EMCO	3148
Biconical Antenna	EMCO	3104C
Test receiver	Rohde & Schwarz	ESVS30
Tuned Dipole Antenna	CDI	A100
Signal Generator	IFR	2023B

B. 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

Giant Electronics Ltd.
Giant T5000

Transmission Power

Channel	Frequency	Effective Radiated Power		FCC 95.639 Limit	Margin
	(MHz)	(dBm)	(W)	(W)	(W)
1	462.5625	27.3	0.48	2.0	-1.52
2	462.5875	27.3	0.48	2.0	-1.52
3	462.6125	27.3	0.48	2.0	-1.52
4	462.6375	27.3	0.48	2.0	-1.52
5	462.6625	27.3	0.48	2.0	-1.52
6	462.6875	27.3	0.48	2.0	-1.52
7	462.7125	27.3	0.48	2.0	-1.52
8	467.5625	24.2	0.26	0.5	-0.24
9	467.5875	24.2	0.26	0.5	-0.24
10	467.6125	24.2	0.26	0.5	-0.24
11	467.6375	24.2	0.26	0.5	-0.24
12	467.6625	24.2	0.26	0.5	-0.24
13	467.6875	24.2	0.26	0.5	-0.24
14	467.7125	24.2	0.26	0.5	-0.24
15	462.5500	27.3	0.48	2.0	-1.52
16	462.5750	27.3	0.48	2.0	-1.52
17	462.6000	27.3	0.48	2.0	-1.52
18	462.6250	27.3	0.48	2.0	-1.52
19	462.6500	27.3	0.48	2.0	-1.52
20	462.6750	27.3	0.48	2.0	-1.52
21	462.7000	27.3	0.48	2.0	-1.52
22	462.7250	27.3	0.48	2.0	-1.52

Notes: Negative sign in the margin column shows the value below limits.

Verdict: Passed

For RF Safety, the information is saved with filename: RF exposure info.pdf

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

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.

For electronic filing, the modulation frequency response curve and modulation limiting characteristic curve are saved with filename: mfr.pdf and mlc.pdf respectively.

For electronic filing, the audio low pass frequency response curve is saved with filename: lpf.pdf.

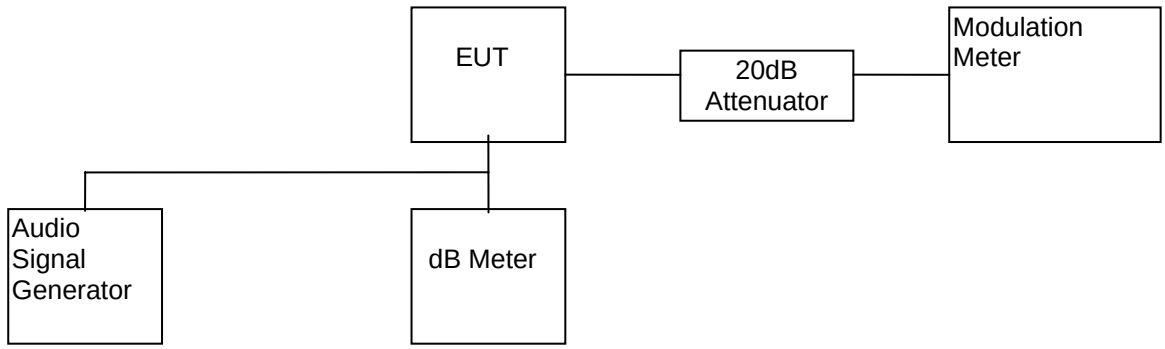
4.1 Modulation Frequency Response (Section 2.1047(a), 95.637(a))

A. Test Equipment

Equipment	Brand Name	Model No.
Audio Signal Generator	HP	HP8904A
AC Millivoltmeter	Leader	LMV-182A
20 dB RF Attenuator	Bird	8304-200-N
Radiocommunication Service Monitor	R&S	CMS54

B. Testing Procedure

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



2) Set the audio signal generator frequency to the sound pressure level 109dBSPL 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 : ±5kHz
   FRS : ±2.5kHz
   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

Giant Electronics Ltd.
Giant T5000

Modulation Frequency Response

Test Channel : 4
Input level = 109dBSPL

Modulation Frequency(Hz)	Modulation Index (%)
300	1.15
400	1.56
500	1.80
600	2.03
700	2.05
800	1.87
900	1.63
1000	1.47
1250	1.17
1500	0.94
1750	0.76
2000	0.64
2250	0.59
2500	0.50
2750	0.43
3000	0.38
3125	0.35
3250	0.31
3500	0.26
4000	0.16
5000	0.07

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

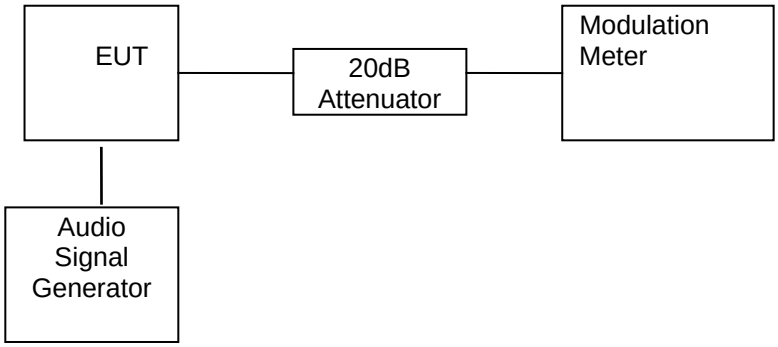
4.2 Modulation Limiting Characteristics (Section 2.1047(b), 95.637(a))

A. Test Equipment

Equipment	Brand Name	Model No.
Audio Signal Generator	HP	HP8904A
20 dB RF Attenuator	Bird	8304-200-N
Radiocommunication Service Monitor	R&S	CMS54

B. 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 : ±5kHz
FRS : ±2.5kHz
GMRS + FRS : ±2.5kHz

C. Test Result

Table 3

Giant Electronics Ltd.
Giant T5000

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	0.15	0.15	0.15	0.16
57	0.15	0.15	0.15	0.16
67	0.15	0.16	0.16	0.17
77	0.16	0.20	0.18	0.17
87	0.20	0.29	0.23	0.23
97	0.32	0.56	0.41	0.43
107	0.70	1.39	0.99	1.01
117	1.58	1.53	1.36	1.09
127	1.59	1.53	1.38	1.09
137	1.60	1.54	1.39	1.18

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

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

A. Test Equipment

Equipment	Brand Name	Model No.
Audio Signal Generator	HP	HP8904A
AC Millivoltmeter	Leader	LMV-182A

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.

EXHIBIT 5

OCCUPIED BANDWIDTH

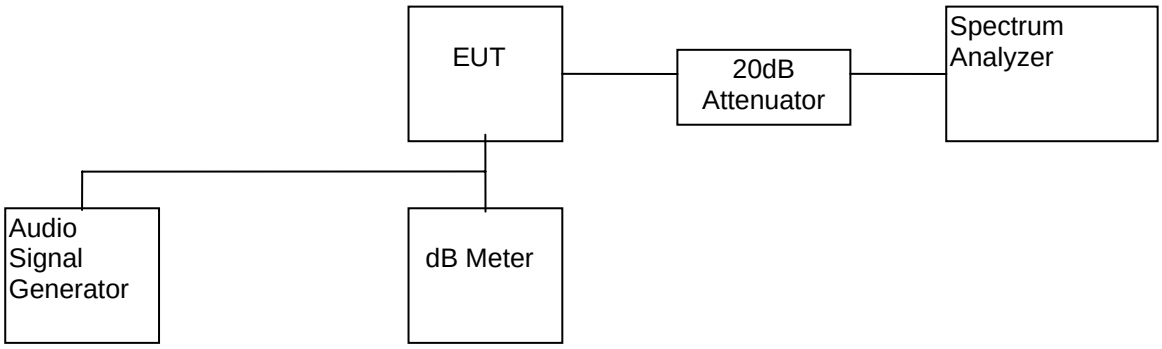
5.0 Occupied Bandwidth (Section 2.1049, 95.633(c))

A. Test Equipment

Equipment	Brand Name	Model No.
Audio Signal Generator	HP	HP8904A
AC Millivoltmeter	Leader	LMV-182A
20 dB RF Attenuator	Bird	8304-200-N
Spectrum Analyzer	HP	8951EM

B. 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

Giant Electronics Ltd.
Giant T5000

System	Channel	Measured Bandwidth (kHz)	Limit (kHz)
GMRS	4	5.80	≤20
FRS	11	7.90	≤12.5

Verdict: Passed

For the electronic filing, the bandwidth plot is saved with filename: bw.pdf

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

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))

A. Test Equipment

Equipment	Brand Name	Model No.
Antenna	EMCO	A100, 3148, 3104C, 3115
Spectrum Analyzer	ADVANTEST	U3661
Test receiver	Rohde & Schwarz	ESVS30
RF Filter	Trilithic	3VF500/1000-5-50-CC
Signal Generator	IFR	2023B

B. Testing Procedure

Radiated emission measurements were performed according to the procedures in ANSI/TIA-603-C-2004. All measurements were performed in Open Area Test Sites located at Roof Top of Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.

C. Radiated Emission Configuration Photograph

Worst Case Radiated Emission

For electronic filing, the radiated emission configurations photograph is saved with filename: config photos.pdf

C. Test Result

Giant Electronics Ltd.
Giant T5000

Table 6(a)

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

(Refer to the plots which is saved with filename: spurious.pdf)

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

Table 6(b): Channel 4

Frequency (MHz)	Effective Radiated Power (dBm)	Transmission Power (dBm)	Attenuation (dBc)	Limit (dBc)	Margin (dB)
925.288	-19.1	27.3	46.4	40.3	-6.1
1387.932	-35.0	27.3	62.3	40.3	-22.0
1850.576	-31.0	27.3	58.3	40.3	-18.0
2313.220	-38.0	27.3	65.3	40.3	-25.0
2775.864	-32.6	27.3	59.9	40.3	-19.6
3238.508	-32.7	27.3	60.0	40.3	-19.7
3701.152	-24.0	27.3	51.3	40.3	-11.0
4163.796	-30.7	27.3	58.0	40.3	-17.7
4626.440	-33.1	27.3	60.4	40.3	-20.1

Remark: 1. Transmission power is 29.8 dBm or -0.2 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 42.8 dB.

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

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

Table 6(b): Channel 11

Frequency (MHz)	Effective Radiated Power (dBm)	Transmission Power (dBm)	Attenuation (dBc)	Limit (dBc)	Margin (dB)
935.258	-25.6	24.2	49.8	37.2	-12.6
1402.887	-32.7	24.2	56.9	37.2	-19.7
1870.516	-32.3	24.2	56.5	37.2	-19.3
2338.145	-38.1	24.2	62.3	37.2	-25.1
2805.774	-33.5	24.2	57.7	37.2	-20.5
3273.403	-35.7	24.2	59.9	37.2	-22.7
3741.032	-26.1	24.2	50.3	37.2	-13.1
4208.661	-42.7	24.2	66.9	37.2	-29.7
4676.290	-34.7	24.2	58.9	37.2	-21.7

Remark: 1. Transmission power is 24.2 dBm or -5.8 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 37.2 dB.

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

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

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.

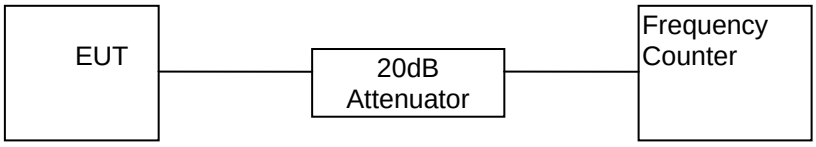
7.1 Frequency Tolerance (Section 95.627(b) for FRS, 95.621(b) for GMRS)

A. Test Equipment

Equipment	Brand Name	Model No.
20 dB RF Attenuator	Bird	8304-200-N
Frequency Counter	OPTOELECTRONICS	3000A

B. 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

Giant Electronics Ltd.
Giant T5000

Frequency Tolerance

Channel	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)
1	462.5625	462.56163	-0.000188
2	462.5875	462.58663	-0.000188
3	462.6125	462.61163	-0.000188
4	462.6375	462.63663	-0.000188
5	462.6625	462.66163	-0.000188
6	462.6875	462.68663	-0.000188
7	462.7125	462.71163	-0.000188
8	467.5625	467.56163	-0.000186
9	467.5875	467.58663	-0.000186
10	467.6125	467.61163	-0.000186
11	467.6375	467.63663	-0.000186
12	467.6625	467.66163	-0.000186
13	467.6875	467.68663	-0.000186
14	467.7125	467.71163	-0.000186
15	462.5500	462.54913	-0.000188
16	462.5750	462.57413	-0.000188
17	462.6000	462.59913	-0.000188
18	462.6250	462.62413	-0.000188
19	462.6500	462.64913	-0.000188
20	462.6750	462.67413	-0.000188
21	462.7000	462.69913	-0.000188
22	462.7250	462.72413	-0.000188

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

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

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

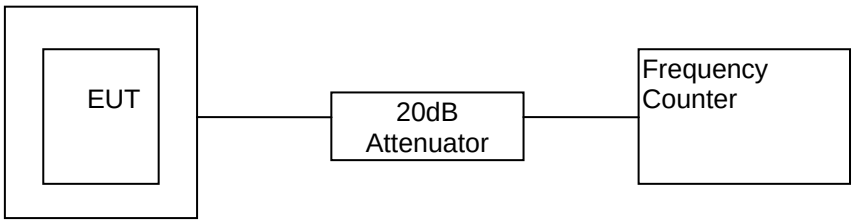
A. Test Equipment

Equipment	Brand Name	Model No.
20 dB RF Attenuator	Bird	8304-200-N
Frequency Counter	OPTOELECTRONICS	3000A

B. 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, 11 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)

Giant Electronics Ltd.
Giant T5000

Frequency Tolerance with Temperature Variation

Channel : 4

Temperature (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)
-20	462.63750	462.63796	0.000099
-10	462.63750	462.63833	0.000179
0	462.63750	462.63838	0.000190
10	462.63750	462.63800	0.000108
20	462.63750	462.63663	-0.000188
30	462.63750	462.63683	-0.000145
40	462.63750	462.63635	-0.000249
50	462.63750	462.63657	-0.000201

Remark: 1) For GMRS, frequency tolerance must be maintained within a frequency tolerance of 0.0005%.

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

C. Test Result

Table 8(b)

Giant Electronics Ltd.
Giant T5000

Frequency Tolerance with Temperature Variation

Channel : 11

Temperature (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)
-20	467.63750	467.63783	0.000071
-10	467.63750	467.63825	0.000160
0	467.63750	467.63850	0.000214
10	467.63750	467.63813	0.000135
20	467.63750	467.63663	-0.000186
30	467.63750	467.63658	-0.000197
40	467.63750	467.63646	-0.000222
50	467.63750	467.63671	-0.000169

Remark: 1) For GMRS, frequency tolerance must be maintained within a frequency tolerance of 0.0005%.

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004

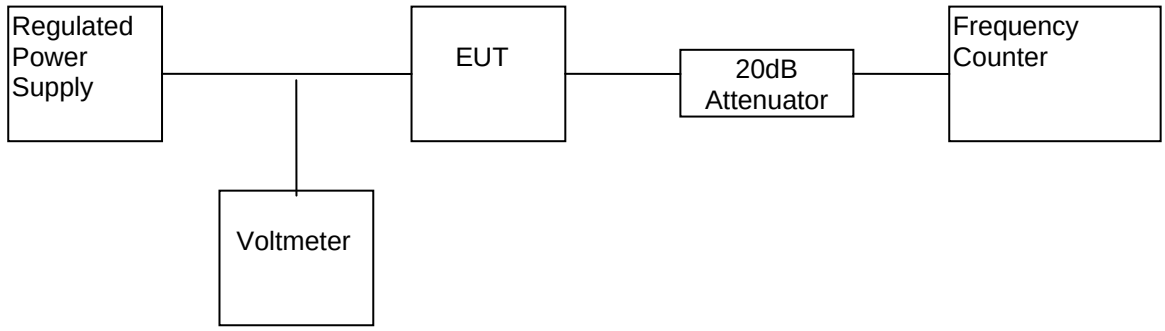
7.3 Frequency Stability - Voltage (Section 2.1055(d), 95.627(b) for FRS, 95.621(b) for GMRS)

A. Test Equipment

Equipment	Brand Name	Model No.
Regulated Power Supply	PAD	30-35L
20 dB RF Attenuator	Bird	8304-200-N
Voltage meter	Fluke	87
Frequency Counter	OPTOELECTRONICS	3000A

B. 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 and 11 in MHz.

C. Test Result

Table 9

Giant Electronics Ltd.
Giant T5000

Frequency Deviation with Voltage Variation

The manufacturer specified battery end point 3.50V

Channel	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)
4	462.63750	462.63700	-0.000108
11	467.63750	467.63700	-0.000107

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 3.5V

Test Engineer: Koo Wai Ip Date of Test: February 4, 2004