Giant Electronics Ltd.

Application
For
Certification

Two Way Radio with GMRS and FRS

(FCC ID: K7GT2007)

HK10020309-1
KS/ cl
April 01, 2010

Intertek Testing Services Hong Kong Ltd.
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INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

Applicant : Giant Electronics Ltd.
Trade Name/Model No : T2007
Date : April 01, 2010

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

Equipment Type: FRF – Part 95 Family Radio Face Held Transmitter

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 Way Radio with GMRS and FRS operating between 462.5500MHz and 467.7125MHz. The EUT is powered by 3.7V (3.7V "Li-ion" type rechargeable battery). The EUT is turned off when the EUT charging by charging tray.

Transmitter Portion

(i) Type of Emission	:	GMRS: 5K60F3E; FRS: 5K60F3E
(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: 0.49W ERP; FRS: 0.49W ERP
(iv) Antenna Type	:	Integral

The brief circuit description is saved with filename: descri.pdf

1.2 Related Submittal(s) Grants

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

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI/TIA-603-C-2004. 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.

1.4 Test Facility

The open area 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 internal battery, 3.7V "Li-ion", 700mAh.

The frequency range of transmitter from 30MHz to 10^{th} harmonics 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.

The following are all the test modes (only the worst-case was reported):
GMRS/FRS, Tx without headset
GMRS/FRS, Tx 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.

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

April 01, 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.
T2007

Transmission Power

Channel	Frequency	Effective Radiated Power		FCC 95.639 Limit	Margin
	(MHz)	(dBm)	(W)	(W)	(W)
1	462.5625	26.9	0.49	5.00	-4.51
2	462.5875	26.9	0.49	5.00	-4.51
3	462.6125	26.9	0.49	5.00	-4.51
4	462.6375	26.9	0.49	5.00	-4.51
5	462.6625	26.9	0.49	5.00	-4.51
6	462.6875	26.9	0.49	5.00	-4.51
7	462.7125	26.9	0.49	5.00	-4.51
8	467.5625	26.9	0.49	0.50	-0.01
9	467.5875	26.9	0.49	0.50	-0.01
10	467.6125	26.9	0.49	0.50	-0.01
11	467.6375	26.9	0.49	0.50	-0.01
12	467.6625	26.9	0.49	0.50	-0.01
13	467.6875	26.9	0.49	0.50	-0.01
14	467.7125	26.9	0.49	0.50	-0.01
15	462.5500	26.9	0.49	5.00	-4.51
16	462.5750	26.9	0.49	5.00	-4.51
17	462.6000	26.9	0.49	5.00	-4.51
18	462.6250	26.9	0.49	5.00	-4.51
19	462.6500	26.9	0.49	5.00	-4.51
20	462.6750	26.9	0.49	5.00	-4.51
21	462.7000	26.9	0.49	5.00	-4.51
22	462.7250	26.9	0.49	5.00	-4.51

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

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

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.

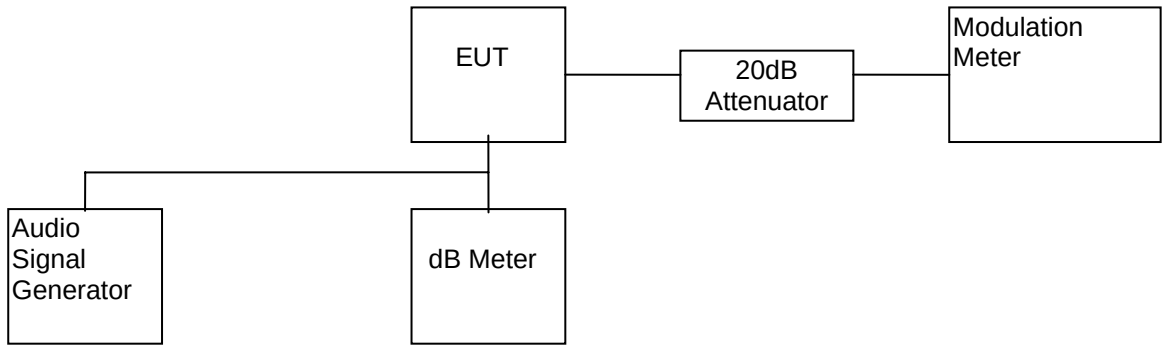
4.1 Modulation Frequency Response (Section 2.1047(a), 95.637(a))

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 83dBSPL 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

C. Test Result

Table 2

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T2007

Modulation Frequency Response

Test Channel : 4
Input level = 83dBSPL

Modulation Frequency (Hz)	Modulation index
100	0.44
200	0.22
300	0.15
400	0.13
500	0.13
600	0.15
700	0.17
800	0.16
900	0.19
1000	0.47
1250	0.50
1500	0.55
1750	0.77
2000	0.32
2250	0.20
2500	0.06
2750	0.05
3000	0.04
3125	0.05
3250	0.05
3500	0.04
4000	0.02
5000	0.01

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

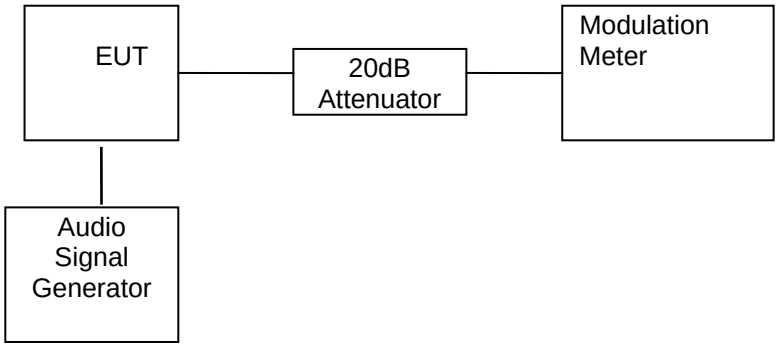
4.2 Modulation Limiting Characteristics (Section 2.1047(b), 95.637(a))

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 + FRS : ±2.5kHz

C. Test Result

Table 3

Giant Electronics Ltd.
T2007

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	0.045	0.045	0.045	0.045
57	0.045	0.047	0.046	0.046
67	0.045	0.071	0.062	0.064
77	0.046	0.183	0.142	0.141
87	0.129	0.912	0.755	0.724
97	0.672	1.690	1.563	1.025
107	1.437	1.807	1.640	0.938
117	1.570	1.870	1.537	0.940
127	1.547	1.873	1.490	0.912
137	1.534	1.947	1.490	0.899

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

4.3 Audio Low Pass Filter Response (Section 2.1047(a))

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.

C. Test Result

Table 4

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Low-Pass Filter Response

Test Channel : 4

Audio Input Strength = 200mVrms

Frequency (kHz)	dB relative to 1 kHz	TIA/EIA-603C
1	0.0	0.0
3	-2.0	0.0
4	-10.0	-7.5
5	-16.0	-13.3
6	-21.0	-18.1
8	-29.5	-25.6
10	-36.0	-31.4
15	-47.5	-41.9
20	-56.5	-50.0
30	-63.0	-50.0
40	-63.0	-50.0
50	-63.0	-50.0
60	-63.0	-50.0
70	-63.0	-50.0
80	-63.0	-50.0
90	-63.0	-50.0
100	-63.0	-50.0

Audio Output at 1kHz: -9.0dBV

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

EXHIBIT 5

OCCUPIED BANDWIDTH

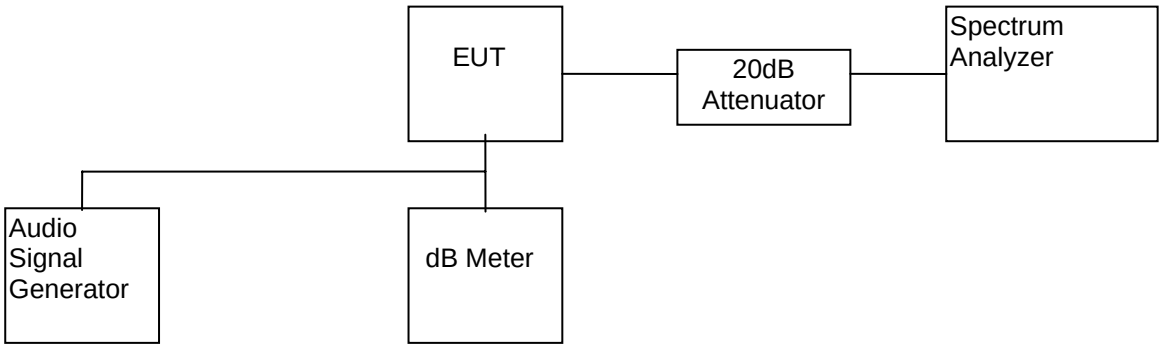
5.0 Occupied Bandwidth (Section 95.633(c))

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

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T2007

System	Channel	Measured Bandwidth (kHz)	Limit (kHz)
GMRS	4	5.6	≤20
FRS	11	5.6	≤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 11-18, 2010

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.
T2007

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 - Mode: Transmitter without Headset

Frequency (MHz)	Effective Radiated Power (dBm)	Transmission Power (dBm)	Attenuation (dBc)	Limit (dBc)	Margin (dB)
231.325	-46.0	26.9	72.9	39.9	-33.0
693.975	-45.5	26.9	72.4	39.9	-32.5
925.300	-36.6	26.9	63.5	39.9	-23.6
1156.625	-39.2	26.9	66.1	39.9	-26.2
1387.950	-37.0	26.9	63.9	39.9	-24.0
1850.600	-38.8	26.9	65.7	39.9	-25.8
2313.250	-35.0	26.9	61.9	39.9	-22.0
2775.900	-30.0	26.9	56.9	39.9	-17.0
3238.550	-34.9	26.9	61.8	39.9	-21.9
3701.200	-29.2	26.9	56.1	39.9	-16.2
4163.850	-33.9	26.9	60.8	39.9	-20.9
4626.500	-35.4	26.9	62.3	39.9	-22.4

Remark: 1. Transmission power is 26.9 dBm or -3.1 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 39.9 dB.

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

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

Table 6(c): Channel 4 - Mode: Transmitter with Headset

Frequency (MHz)	Effective Radiated Power (dBm)	Transmission Power (dBm)	Attenuation (dBc)	Limit (dBc)	Margin (dB)
231.325	-42.9	26.9	69.8	39.9	-29.9
693.975	-44.8	26.9	71.7	39.9	-31.8
925.300	-34.9	26.9	61.8	39.9	-21.9
1156.625	-39.0	26.9	65.9	39.9	-26.0
1387.950	-36.2	26.9	63.1	39.9	-23.2
1850.600	-37.0	26.9	63.9	39.9	-24.0
2313.250	-35.0	26.9	61.9	39.9	-22.0
2775.900	-29.6	26.9	56.5	39.9	-16.6
3238.550	-32.0	26.9	58.9	39.9	-19.0
3701.200	-29.2	26.9	56.1	39.9	-16.2
4163.850	-34.2	26.9	61.1	39.9	-21.2
4626.500	-36.5	26.9	63.4	39.9	-23.5

Remark: 1. Transmission power is 26.9 dBm or -3.1 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 39.9 dB.

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

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

EXHIBIT 7

FREQUENCY STABILITY

7.0 **Frequency Stability (Section 2.1055(a)(b)(d), 95.627(b))**

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

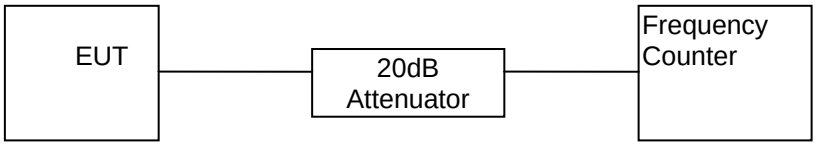
7.1 Frequency Tolerance (Section 95.627(b))

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

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T2007

Frequency Tolerance

Channel	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)
1	462.5625	462.56270	0.000043
2	462.5875	462.58770	0.000043
3	462.6125	462.61270	0.000043
4	462.6375	462.63770	0.000043
5	462.6625	462.66270	0.000043
6	462.6875	462.68770	0.000043
7	462.7125	462.71270	0.000043
8	467.5625	467.56270	0.000043
9	467.5875	467.58770	0.000043
10	467.6125	467.61270	0.000043
11	467.6375	467.63770	0.000043
12	467.6625	467.66270	0.000043
13	467.6875	467.68770	0.000043
14	467.7125	467.71270	0.000043
15	462.5500	462.55020	0.000043
16	462.5750	462.57520	0.000043
17	462.6000	462.60020	0.000043
18	462.6250	462.62520	0.000043
19	462.6500	462.65020	0.000043
20	462.6750	462.67520	0.000043
21	462.7000	462.70020	0.000043
22	462.7250	462.72520	0.000043

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

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

7.2 Frequency Stability - Temperature (Section 2.1055(a)(b), 95.627(b))

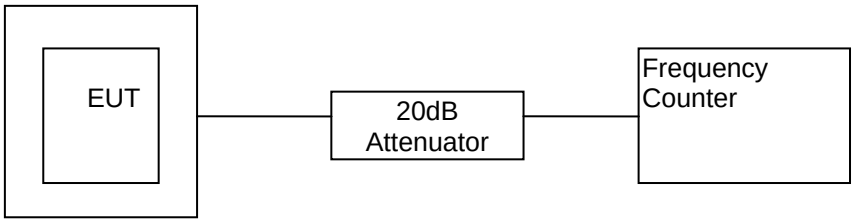
A. Test Equipment

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.
T2007

Frequency Deviation with Temperature Variation

Channel : 4

Temperature (°C)	Assigned Frequency (MHz)	Measured Frequency (MHz)	Deviation (%)	*Frequency Tolerance with reference to its value at +20°C (ppm)
-30	462.63750	462.63655	-0.000205	-2.5
-20	462.63750	462.63762	0.000026	-0.2
-10	462.63750	462.63810	0.000130	0.9
0	462.63750	462.63813	0.000136	0.9
10	462.63750	462.63812	0.000134	0.9
20	462.63750	462.63770	0.000043	0.0
30	462.63750	462.63764	0.000030	-0.1
40	462.63750	462.63740	-0.000022	-0.6
50	462.63750	462.63751	0.000002	-0.4

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%.

Verdict: Passed

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

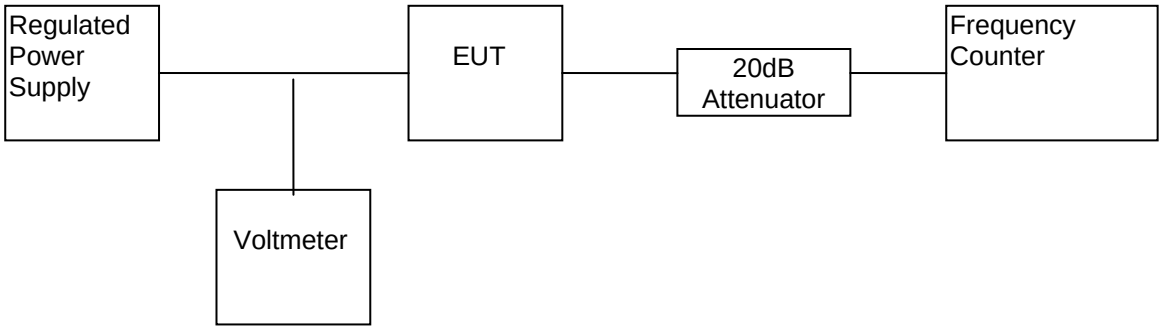
7.3 Frequency Stability - Voltage (Section 2.1055(d), 95.627(b))

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.
T2007

Frequency Deviation with Voltage Variation

The manufacturer specified battery end point 3.45V

Channel	Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)
4	462.63750	462.63777	0.000058
11	467.63750	467.63777	0.000058

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 3.45V

Test Engineer: Koo Wai Ip Date of Test: February 11-18, 2010

APPENDIX

EXHIBITS OF APPLICATION FOR CERTIFICATION