

#### Giant Electronics Ltd.

Application For Class II Permissive Change

Two Way Radio with GMRS and FRS

(FCC ID: K7GT5500)

0519822 TL/ Ann Choy December 15, 2005

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#### **MEASUREMENT/TECHNICAL REPORT**

Application : Giant Electronics Ltd.

Trade Name/Model No : Motorola T5570
Date : December 15, 2005

This report concerns (check one:)O	riginal Grant	_ Class II Cha	inge <u>X</u>		
Equipment Type: FRF – Part 95 Fa	Equipment Type: FRF – Part 95 Family Radio Face Held Transmitter				
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes NoX					
date  Company Name agrees to notify the Commission by:					
		date			
of the intended date of announce issued on that date.	ment of the produ	ict so that the	grant can be		
Report prepared by:	Tommy Leung Intertek Testing Services Hong Kong Ltd. 2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. Phone: 852-2173-8538 Fax: 852-2741-1693		Kong Ltd.		

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## List of attached file

Exhibit type	File Description	Filename
Cover Page	Purpose of Application	product change.pdf
Operation Description	Technical Description	descri.pdf
Test Report	Bandwidth Plot	bw.pdf
Test Report	Modulation Frequency Response	mfr.pdf
Test Report	Modulation Limit Characteristic	mlc.pdf
Test Report	Spurious Emission	spurious.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Test Report	Test Report	report.pdf
Test Setup Photo	Radiated Emission	config photos.doc
Internal Photo	Internal Photo	internal photos.doc
External Photo	External Photo	external photos.doc
Test Report	Audio Low Pass Filter Response	lpf.pdf
Test Report	Tune Up Procedure	tuneup.pdf
Test Report	Part List	partlist.pdf
Cover Letter	Confidentiality Request	request.pdf
RF Exposure Info	SAR Test Report	SAR report.pdf

## **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 3.6V (1 x 3.6V "Ni-MH" type rechargeable battery) or 4.5V (3 x "AA" size 1.5V alkaline batteries). According to the user manual instructions, the EUT is turned off while in charging tray.

**Transmitter Portion** 

(i) Type of Emission : GMRS: 10K5F3E; FRS: 10K4F3E

(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: 0.275W ERP; FRS: 0.265W ERP

(iv) Antenna Type : Integral

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

#### 1.2 Purpose of Application

The purpose of application is saved with filename: product change.pdf.

As the RF module remains unchanged and the base band circuit is changed, the following test results are included in this report.

- 1. Modulation Characteristics
- 2. Occupied Bandwidth
- 3. Spurious Emission
- 4. Frequency Stability

#### 1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2003) and ANSI/TIA-603-B-2002. All measurement were performed in Open Area Test Sites. Preliminary scans were performed in the Open Area Test Sites only to determine worst case modes. For each scan, the procedure of maximizing emissions in Appendices D and E were followed. 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 and conducted measurement facility 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. When the radiated emissions are measured.

The device was powered by 3 new "AA" size 1.5V alkaline batteries.

The frequency range from 30 MHz to 4.69 GHz 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.

#### 2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered on, a signal is 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. (Supplied by Client)

Confirmed by:

Tommy Leung Assistant Manager Intertek Testing Services Agent for Giant Electronics Ltd.

Almin	
V	Signature
December 15, 2005	Date

# EXHIBIT 3 MODULATION CHARACTERISTICS

## 3.0 Modulation Characteristics

In order to satisfy the 95.637(a) requirement, Modulation Frequency Response and Modulation Limit Characteristics are attached in Exhibit 4.1 & 4.2.

Plots for each tests are saved with filename: mfr.pdf and mlc.pdf

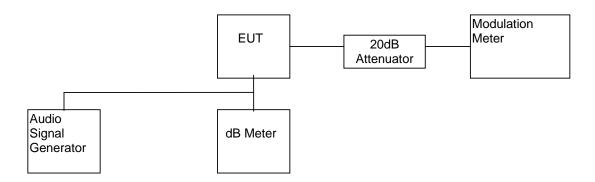
## 3.1 <u>Modulation Frequency Response</u>

#### 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
Communication Service Monitor	Marconi	2945

#### **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 102dBSPL at the microphone of the EUT.
- 3) The frequency of the audio signal generator is changed from 300Hz to 5kHz.
- 4) Record the frequency deviation.

#### C. Test Result

#### Table 1

## Giant Electronics Ltd. Motorola T5570

## **Modulation Frequency Response**

Test Channel : 4 Input level = 102dBSPL

Modulation Frequency (Hz)	Modulation index (%)
300	0.42
400	1.36
500	1.34
600	1.77
700	1.96
800	2.15
900	1.94
1000	1.85
1250	1.62
1500	1.39
1750	1.25
2000	0.97
2250	0.75
2500	0.50
2750	0.49
3000	0.57
3125	0.54
3250	0.50
3500	0.40
4000	0.25
5000	0.11

Test Engineer: Kenneth C. C. Lam Date of Test: September 21-December 5, 2005

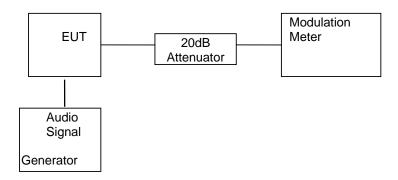
#### 3.2 <u>Modulation Limiting Characteristics (Section 2.1047(b))</u>

#### A. Test Equipment

Equipment	Brand Name	Model No.
Audio Signal Generator	HP	HP8904A
20 dB RF Attenuator	Bird	8304-200-N
Communication Service Monitor	Marconi	2945

#### **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.

#### C. Test Result

Table 2

## Giant Electronics Ltd. Motorola T5570

## **Modulation Limiting Characteristics**

Test Channel: 4

Modulation	Peak Frequency	Peak Frequency	Peak Frequency	Peak Frequency
Input	Deviation (kHz)	Deviation (kHz)	Deviation (kHz)	Deviation (kHz)
(dBSPL)	at 500Hz	at 1000Hz	at 2500Hz	at 3125Hz
47	0.042	0.042	0.042	0.042
57	0.042	0.043	0.043	0.043
67	0.043	0.055	0.044	0.050
77	0.048	0.102	0.063	0.098
87	0.085	0.542	0.154	0.514
97	0.451	1.553	0.774	1.518
107	1.116	2.035	1.918	1.704
117	1.948	2.058	1.951	1.612
127	2.028	2.088	1.951	1.562
137	2.044	2.145	1.984	1.542

Test Engineer: Kenneth C. C. Lam Date of Test: September 21-December 5, 2005

#### 3.3 Audio Low Pass Filter Response (Section 95.637(b))

#### A. Test Equipment

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

#### **B.** Testing Procedure

- 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<sub>FREQ</sub> - LEV<sub>REF</sub>

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

#### C. Test Result

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

## **EXHIBIT 4**

## **OCCUPIED BANDWIDTH**

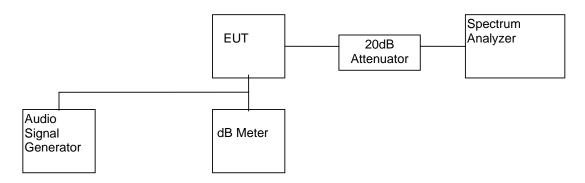
## 4.0 Occupied Bandwidth (Section 95.633(c))

#### 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

The occupied Bandwidth is measured to be 10.45 kHz for GMRS and 10.35kHz for FRS.

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

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## **EXHIBIT 5**

## **SPURIOUS EMISSION**

## 5.0 Spurious Emission (Section 95.635)

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

#### 5.1 Field Strength of Spurious Radiation (Section 95.635)

#### A. Test Equipment

Equipment	Brand Name	Model No.
Antenna	EMCO	A100, 3148, 3104C, 3115
Spectrum Analyzer	ADVANTEST	R3271
Test receiver	Rohde & Schwarz	ESVS30
RF Filter	Trilithic	3VF500/1000-5-50-CC

#### **B.** Testing Procedure

Radiated emission measurements were performed according to the procedures in ANSI C63.4(2003). 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.doc

#### C. Test Result

## Giant Electronics Ltd. Motorola T5570

## Table 3(a)

1) Unwanted emission from CARRIER  $\pm 6.25 \text{kHz}$  to CARRIER  $\pm 31.25 \text{kHz}$ 

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

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

Table 3(b): Channel 4

Frequency	Effective Radiated	Transmission Power	Attenuation	Limit	Margin
	Power				
(MHz)	(dBm)	(dBm)	(dBc)	(dB)	(dB)
231.318	-61.4	24.4	85.8	37.4	-48.4
693.955	-49.8	24.4	74.2	37.4	-36.8
925.274	-20.6	24.4	45.0	37.4	-7.6
1387.913	-32.6	24.4	57.0	37.4	-19.6
1850.550	-32.8	24.4	57.2	37.4	-19.8
2313.185	-28.8	24.4	53.2	37.4	-15.8
2775.822	-33.9	24.4	58.3	37.4	-20.9
3238.460	-34.9	24.4	59.3	37.4	-21.9
3701.097	-35.4	24.4	59.8	37.4	-22.4
4163.735	-39.4	24.4	63.8	37.4	-26.4

Remark: 1. Transmission power is 24.4 dBm or -5.6 dB(W).

- 2. According to Section 95.635(b7), the unwanted emission should be attenuated below TP by at least 43 + 10 log<sub>10</sub> (TP) dB or 37.4 dB.
- 3. The test is performed according to ANSI/TIA-603-B-2002.

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Table 3(b): Channel 11

Frequency	Effective Radiated	Transmission Power	Attenuation	Limit	Margin
	Power				
(MHz)	(dBm)	(dBm)	(dBc)	(dB)	(dB)
233.818	-45.6	24.2	69.8	37.2	-32.6
701.456	-47.9	24.2	72.1	37.2	-34.9
935.275	-25.9	24.2	50.1	37.2	-12.9
1402.914	-33.5	24.2	57.7	37.2	-20.5
1870.555	-36.8	24.2	61.0	37.2	-23.8
2338.188	-36.9	24.2	61.1	37.2	-23.9
2805.824	-34.9	24.2	59.1	37.2	-21.9
3273.462	-36.4	24.2	60.6	37.2	-23.4
3741.099	-35.8	24.2	60.0	37.2	-22.8
4208.732	-38.9	24.2	63.1	37.2	-25.9

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<sub>10</sub> (TP) dB or 37.2 dB.
- 3. The test is performed according to ANSI/TIA-603-B-2002.

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# EXHIBIT 6 FREQUENCY STABILITY

## 6.0 Frequency Stability

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

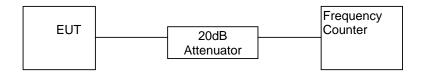
#### 6.1 Frequency Tolerance (Section 95.627)

## A. Test Equipment

Equipment	Brand Name	Model No.	
20 dB RF Attenuator	Bird	8304-200-N	
Frequency Counter	Phillips	PM6668	

## **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 4

## Giant Electronics Ltd. Motorola T5570

## **Frequency Tolerance**

Channel	Frequency	Measured	Tolerance
	(MHz)	Frequency (MHz)	(%)
1	462.5625	462.56308	0.000125
2	462.5875	462.58808	0.000125
3	462.6125	462.61308	0.000125
4	462.6375	462.63807	0.000123
5	462.6625	462.66308	0.000125
6	462.6875	462.68808	0.000125
7	462.7125	462.71307	0.000123
8	467.5625	467.56308	0.000124
9	467.5875	467.58808	0.000124
10	467.6125	467.61308	0.000124
11	467.6375	467.63808	0.000124
12	467.6625	467.66307	0.000122
13	467.6875	467.68807	0.000122
14	467.7125	467.71308	0.000124
15	462.5500	462.55058	0.000125
16	462.5750	462.57558	0.000125
17	462.6000	462.60058	0.000125
18	462.6250	462.62557	0.000123
19	462.6500	462.65058	0.000125
20	462.6750	462.67558	0.000125
21	462.7000	462.70058	0.000125
22	462.7250	462.72558	0.000125

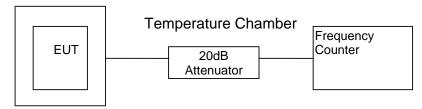
#### 6.2 Frequency Stability - Temperature (Section 2.1055)

#### A. Test Equipment

Equipment	Brand Name	Model No.	
20 dB RF Attenuator	Bird	8304-200-N	
Frequency Counter	Phillips	PM6668	

## **B.** Testing Procedure

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



- 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 -20°C to 50°C with 10°C increment.

#### C. Test Result

## Table 5(a)

## Giant Electronics Ltd. Motorola T5570

## **Frequency Deviation with Temperature Variation**

Channel: 4

Temperature	Assigned	Measured	Deviation	*Frequency Tolerance with
	Frequency	Frequency		reference to its value at +20°C
(°C)	(MHz)	(MHz)	(%)	(ppm)
-20	462.6375	462.63732	-0.000039	-1.6
-10	462.6375	462.63785	0.000076	-0.5
0	462.6375	462.63802	0.000112	-0.1
10	462.6375	462.63814	0.000138	0.2
20	462.6375	462.63807	0.000123	0.0
30	462.6375	462.63781	0.000067	-0.6
40	462.6375	462.63760	0.000022	-1.0
50	462.6375	462.63808	0.000125	0.0

<sup>\*</sup>Remark: This column is presentable for Industry Canada Certification only.

Test Engineer: Kenneth C. C. Lam Date of Test: September 21-December 5, 2005

#### C. Test Result

## Table 5(b)

## Giant Electronics Ltd. Motorola T5570

## **Frequency Deviation with Temperature Variation**

Channel: 11

Temperature	Assigned	Measured	Deviation	*Frequency Tolerance with
	Frequency	Frequency		reference to its value at +20°C
(°C)	(MHz)	(MHz)	(%)	(ppm)
-20	467.6375	467.63730	-0.000043	-1.7
-10	467.6375	467.63787	0.000079	-0.4
0	467.6375	467.63802	0.000111	-0.1
10	467.6375	467.63810	0.000128	0.0
20	467.6375	467.63808	0.000124	0.0
30	467.6375	467.63781	0.000066	-0.6
40	467.6375	467.63760	0.000021	-1.0
50	467.6375	467.63807	0.000122	0.0

<sup>\*</sup>Remark: This column is presentable for Industry Canada Certification only.

Test Engineer: Kenneth C. C. Lam Date of Test: September 21-December 5, 2005

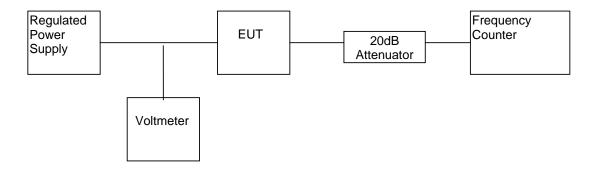
#### 6.3 Frequency Stability - Voltage (Section 2.995)

#### 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	Phillips	PM6668

#### **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 6

## Giant Electronics Ltd. Motorola T5570

## **Frequency Deviation with Voltage Variation**

The manufacturer specified battery end point 3.2V

Channel	Frequency	Measured	Tolerance
	(MHz)	Frequency (MHz)	(%)
4	462.63750	462.63796	0.000099
11	467.63750	467.63796	0.000098

#### **EXHIBIT 7**

#### **TECHNICAL SPECIFICATIONS**

7.0 **Technical Specifications** 

#### 7.1 Block Diagram

For electronic filing, the block diagram of the transceiver is saved with filename: block.pdf

Figure 7.1 Block Diagram

#### 7.2 Schematic Diagram

For electronic filing, the schematic diagram of the transceiver is saved with filename: circuit.pdf

Figure 7.2 Schematic Diagram

#### **EXHIBIT 8**

#### **PRODUCT LABELLING**

8.0 **Product Labelling** 

#### 8.1 Label Artwork & Location

Figure 8.1 Label Artwork & Location

An engineering drawing of the label which will be permanently affixed to the unit. For electronic filing, the label artwork & location are saved with filename: label.pdf

#### **EXHIBIT 9**

#### **PHOTOGRAPHS**

#### 9.0 **Equipment Photographs**

For electronic filing, photographs of the tested EUT are saved with filename: external photos.doc and internal photos.doc

#### **EXHIBIT 10**

#### **INSTRUCTION MANUAL**

#### 10.0 Instruction Manual

This manual will be provided to the end-user with each unit sold/leased in the United States.

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf

#### **EXHIBIT 11**

#### **TUNE UP PROCEDURE**

#### 11.0 Tune Up Procedure

For electronic filing, a preliminary copy of the Tune Up Procedure is saved with filename: tuneup.pdf

#### **EXHIBIT 12**

#### **PART LIST**

#### 12.0 Part List

For electronic filing, a preliminary copy of the Part List is saved with filename: partlist.pdf

#### **EXHIBIT 13**

#### **INPUT CURRENT**

#### 13.0 Input Current

The input current to final r.f. stage at 4.5VDC is 0.59A.

# EXHIBIT 14

#### **RF EXPOSURE INFO**

#### 14.0 RF Exposure Info

The RF Safety Information is shown on P.1 of User Manual.

For electronic filing, a SAR test is saved with filename: SAR report.pdf

# EXHIBIT 15 CONFIDENTIALITY REQUEST

#### 15.0 Confidentiality Request

For electronic filing, a confidentiality request is saved with filename: request.pdf