

**Giant Electronics Limited**

Application  
For  
Certification  
**(FCC ID: K7GT6500)**

May 19, 2004

0408191  
TL/ Ann Choy  
May 19, 2004

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**Intertek Testing Services Hong Kong Ltd.**

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# INTERTEK TESTING SERVICES

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## INTERTEK TESTING SERVICES

### MEASUREMENT/TECHNICAL REPORT

**Application** : Giant Electronics Limited  
**Trade Name/Model No** : Giant/ Motorola T6500  
Giant / Motorola T6550  
Giant T6510  
Giant T6520  
**Date** : May 19, 2004

This report concerns (check one:) Original Grant ☒ Class II Change \_\_\_\_\_

Equipment Type: GMRS + FRS

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes \_\_\_\_\_ No ☒  
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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# INTERTEK TESTING SERVICES

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## INTERTEK TESTING SERVICES

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List of attached file

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|-----------------------|---------------------------------|---------------------|
| 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               | radiated photos.doc |
| Internal Photo        | Internal Photo                  | internal photos.doc |
| External Photo        | External Photo                  | external photos.doc |
| Test Report           | Tune Up Procedure               | tuneup.pdf          |
| Test Report           | Part List                       | partlist.pdf        |
| Test Report           | Audio Low Pass Filter Response  | lpf.pdf             |
| Cover Letter          | Confidentiality Request         | request.pdf         |

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 1**

### **GENERAL DESCRIPTION**

## **INTERTEK TESTING SERVICES**

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### **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 4.5 Vd.c. (3 x 1.5V "AA" size alkaline batteries).

##### **Transmitter Portion**

- (i) Type of Emission : 10K3F3E
- (ii) Frequency Range : FRS 7 Channels from 467.5625MHz to 467.7125MHz  
GMRS 15 Channels from 462.5500MHz to 462.7250MHz
- (iii) Maximum Power Rating: FRS - 0.40W ERP, GMRS - 0.57W ERP
- (iv) Antenna Type : Integral

The Model: Giant / Motorola T6550, Giant T6510 and Giant T6520 are the same as the Model: Giant / Motorola T6500 is in hardware aspect. The difference in model number serves as marketing strategy and for cosmetic changes only.

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

## **Circuit Description (MODEL T6500)**

### **RF**

#### **I) TX Path**

1. The antenna port has given GMRS transmitted power and  $-118\text{dBm}$  sensitivity respectively.
2. There are matching network with TX/RX path switching between the antenna port and PA, it is consist with LC component and pin diode to match the PA to antenna with band pass filtering and isolating TX/RX path.
3. The path switching is consist of D509 and D508, the transmitted power will flow once the dc bias is given to these two diode and there will have 20 dB isolation between TX and RX path.
4. C508, L520, C507, and L505 act as matching network (MN) to match output of PA to be 50 ohm.
5. There have a driver Q502 before the power input to PA from VCO, the power input to driver and PA is 0dBm and +22dBm respectively.
6. L520 is air coil in order to reduce the power dissipation as high power flowing along this path.
7. There is a single VCO solution, VCO acts as carrier generator ( $\sim 0\text{dBm}$ ) in TX mode and local oscillator ( $\sim -9\text{dBm}$ ) in RX mode respectively.
8. The coil L509 acts as variable inductor for VCO voltage tuning. The VCO sensitivity is  $\sim 5\text{MHz/V}$  for both in TX mode and RX mode. The D506 acts as switching diode for 21.4MHz band switching. It is turned on in RX mode and off in TX mode by T4V.
9. Twin transistor Q504 and Q503 is used in VCO, one for VCO and the other for buffer amplifier to give better isolation between VCO and driver amplifier, VCO and the 1<sup>st</sup> mixer.
10. The modulated signal feeds from R559 and modulated with D506.
11. The loop filter is consist of LC component with 150Hz corner frequency in order to reject the reference frequency 3.125KHz.
12. The feedback frequency from VCO to PLL IC 502 is filtered with C522 and C527 in order to reject the reference frequency 3.125KHz.
13. The Q507 is turned on once the PLL is locked in TX mode.
14. 20.95MHz crystal X501 works with direct compensation circuit to give  $\pm 2.5\text{ppm}$  over  $-20^\circ\text{C}$  to  $+55^\circ\text{C}$ .
15. IC106 acts as voltage regulator to give stable voltage supply to +3V path.

## II) TWO WAY RX Path

1. C549 and L501 were used to match the antenna to 50 ohm input port of saw filter BPF501, the saw filter is used to attenuate the unwanted signal and 1<sup>st</sup> IF image signal.
2. Q512 acts as LNA between SAW filter and 1<sup>st</sup> mixer to amplify the wanted signal by 10dB.
3. The Q513 acts as the 1<sup>st</sup> mixer. The resultant signal of mixer output is two way RX - LO, which is equal to the 1<sup>st</sup> IF frequency of 21.4MHz.
4. The frequency of 1<sup>st</sup> LO is injected from VCO to mixer Q513. L519 and C553 act as matching network to match VCO to mixer input port and give better isolation between them in order to improve the problem of malfunction.
5. Q116 acts as switch to turn on the RX path in RX mode in order to save the power consumption and prevent the noise from audio output of IF IC picked up by transmitted carrier.
6. The 1<sup>st</sup> IF crystal filter BPF502 with +/- 3.75KHz bandwidth provide better adjacent selectivity and 2<sup>nd</sup> IF image rejection.
7. The FM IF IC IC501 integrate the IF limiter, demodulator, 2<sup>nd</sup> mixer and 2<sup>nd</sup> local oscillator.
8. The 2<sup>nd</sup> LO frequency is generated from the X501. The 2<sup>nd</sup> IF filter BPF503 is 4-pole 450KHz filter with +/-3KHz bandwidth (H type) to further enhance the adjacent channel selectivity.
9. Noise detector is used for signal detection which is built with the internal op-amp of IF IC and the level is tuned to 7~14dB SINAD with VR502.

## III) Weather Band RX Path

1. Q516 acts as LNA between BPF filter and 1<sup>st</sup> mixer to amplify the wanted signal by 10dB.
2. The Q515 acts as the 1<sup>st</sup> mixer. The resultant signal of mixer output is WX RX - LO, which is equal to the 1<sup>st</sup> IF frequency of 21.4MHz.

## BASEBAND

### (I) TX Path

#### I. Mic

The internal/external mic transfer the sound pressure into electrical signal. About 5mV at 1KHz, when the mic is placed 3 to 4 cm from the lips. This signal will send to the mic amplifier to increase the signal level for compressor IC to process.

## 2. Mic. Amplifier

The IC103 bias as a multi feedback high pass filter with 2-pole has a roll off at about 300Hz to reduce the hum noise. The voltage gain is about 18.3. The output will send to the input of compressor.

## 3. Compressor

The compressor IC104 compresses the audio signal to increase the average modulation level. The standard input level (0dB gain) of the compressor is 100mV. The output of compressor will send to next stage for emphasis.

## 4. Pre-emphasis

Pre-emphasis is implement with the IC103 to produce a frequency response of 6dB/octave. This circuit also limit the maximum deviation at 2.5KHz to met the specification (standard deviation ~ 1.5KHz, maximum deviation ~ 2.5KHz). The output will send to next stage for limiting.

# (II) RX Path

## 1. De-emphasis

The de-emphasis of the demodulated signal from RF section is implemented with IC102. The RC network has 2-pole with 0dB at 1KHz, 3.5dB at 0.5KHz and -20dB at 2.5KHz.

## 2. Expander

The expander IC104 expands the audio signal to reduce the noise level. The standard output level for the expander is 100mV. The output will send to the speaker amplifier through volume control.

## 3. Volume Control

The VR102 (volume control switch) has two function, the ON/OFF switch and speaker volume control.

## 4. Speaker Amplifier

The speaker amplifier IC105 amplifies the expander signal and output to the speaker. The speaker amplifier biases as a multi feedback HPF with 2-pole. The roll off is about 300Hz and the gain is about 39. The speaker amplifier can be mute by CPU through PIN 03 (High MUTE, Low UNMUTE). The maximum power output is about 150mW.

# (III) CTCSS/CDCSS

The CTCSS/CDCSS code generated by IC101. The IC102 acts as CTCSS/CDCSS filter to filter out the CTCSS/CDCSS tone from received audio

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### 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 the Transceiver is subject to verification process.

### 1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2001) and ANSI/TIA/EIA-603-1992. 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.

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### **EXHIBIT 2**

### **SYSTEM TEST CONFIGURATION**

## **INTERTEK TESTING SERVICES**

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### **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 1.5V "AA" alkaline batteries.

The frequency range from 30 MHz to 10<sup>th</sup> 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.

## INTERTEK TESTING SERVICES

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### 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.

A supplied headset is used during the test.

### 2.4 Measurement Uncertainty

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

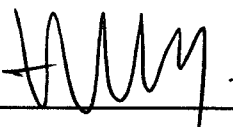
### 2.5 Equipment Modification

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

No modification were installed by Intertek Testing Services.

*Confirmed by:*

*Tommy Leung  
Supervisor  
Intertek Testing Services  
Agent for Giant Electronics Limited*

 Signature

May 19, 2004 Date

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 3**

### **RF POWER OUTPUT**

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### 3.0 **RF Power Output (Section 2.1046(a))**

#### A. Equipment Used

| Equipment            | Brand Name      | Model No.        |
|----------------------|-----------------|------------------|
| Biconical Antenna    | CDI             | B300             |
| Test receiver        | Rohde & Schwarz | ESVS30           |
| RF Filter            | Tailithic       | 3VF              |
| Tuned Dipole Antenna | CDI             | Robert Antenna 4 |
| Signal Generator     | Maconi          | 2024             |

#### B. Testing Procedure

1. On a test site, the EUT shall be placed at 1.5m height on a turn table, 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 quasi-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.

## **INTERTEK TESTING SERVICES**

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6. The transmitter shall then be 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 receiver, 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.

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## INTERTEK TESTING SERVICES

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Table 1

**Giant Electronics Limited  
Giant/ Motorola T6500**

**Transmission Power**

| Channel | Frequency<br>(MHz) | Effective Radiated Power |      | Limit<br>(W) | Margin<br>(W) |
|---------|--------------------|--------------------------|------|--------------|---------------|
|         |                    | (dBm)                    | (W)  |              |               |
| 1       | 462.5625           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 2       | 462.5875           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 3       | 462.6125           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 4       | 462.6375           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 5       | 462.6625           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 6       | 462.6875           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 7       | 462.7125           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 8       | 467.5625           | 26.0                     | 0.40 | 0.5          | -0.10         |
| 9       | 467.5875           | 26.0                     | 0.40 | 0.5          | -0.10         |
| 10      | 467.6125           | 26.0                     | 0.40 | 0.5          | -0.10         |
| 11      | 467.6375           | 26.0                     | 0.40 | 0.5          | -0.10         |
| 12      | 467.6625           | 26.0                     | 0.40 | 0.5          | -0.10         |
| 13      | 467.6875           | 26.0                     | 0.40 | 0.5          | -0.10         |
| 14      | 467.7125           | 26.0                     | 0.40 | 0.5          | -0.10         |
| 15      | 462.5500           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 16      | 462.5750           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 17      | 462.6000           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 18      | 462.6250           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 19      | 462.6500           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 20      | 462.6750           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 21      | 462.7000           | 27.5                     | 0.57 | 2.0          | -1.43         |
| 22      | 462.7250           | 27.5                     | 0.57 | 2.0          | -1.43         |

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

Test Engineer: Ken Sit

Date of Test: May 13, 2004

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**EXHIBIT 4**

**MODULATION CHARACTERISTICS**

## INTERTEK TESTING SERVICES

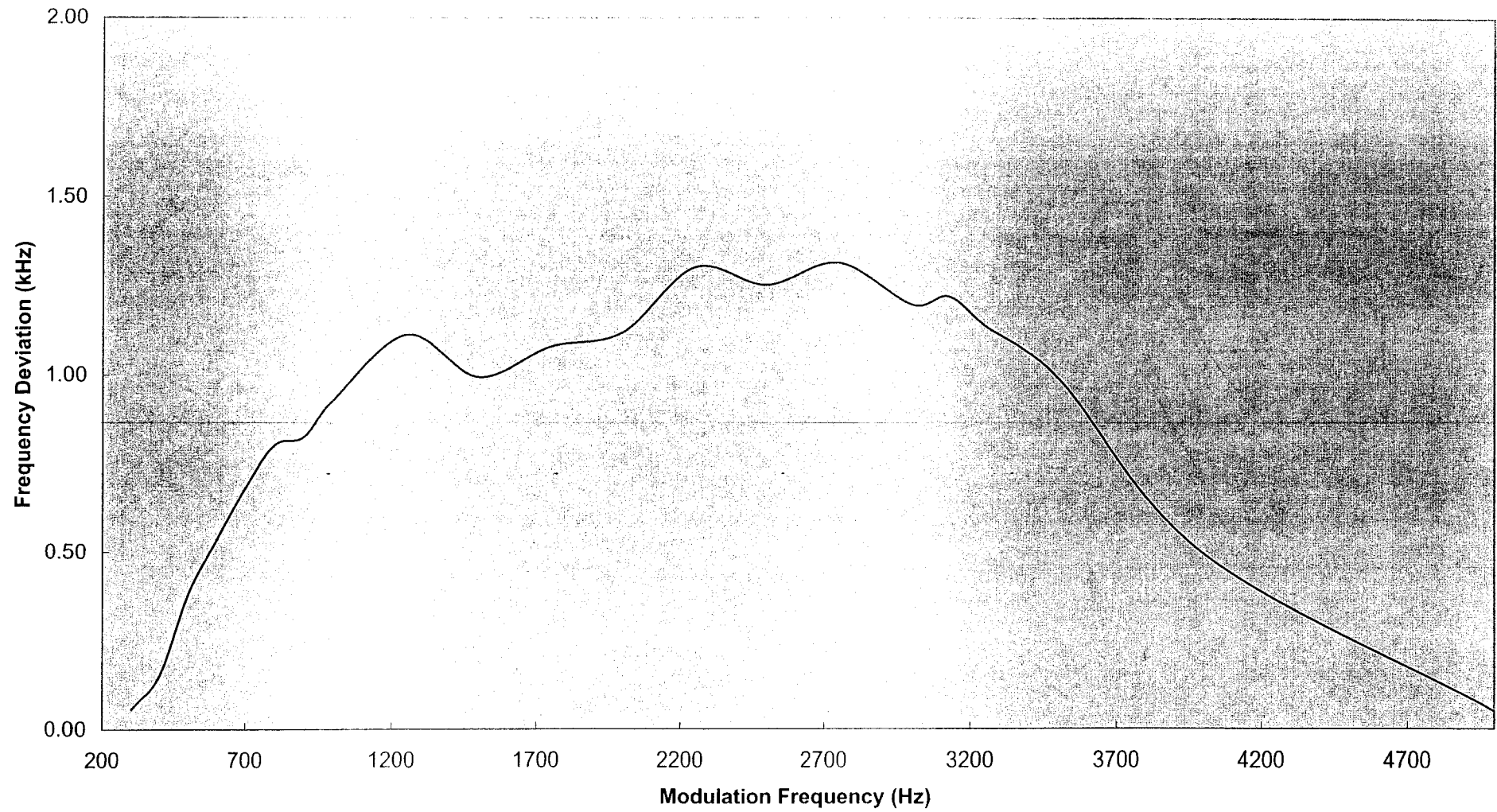
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### 4.0 Modulation Characteristics

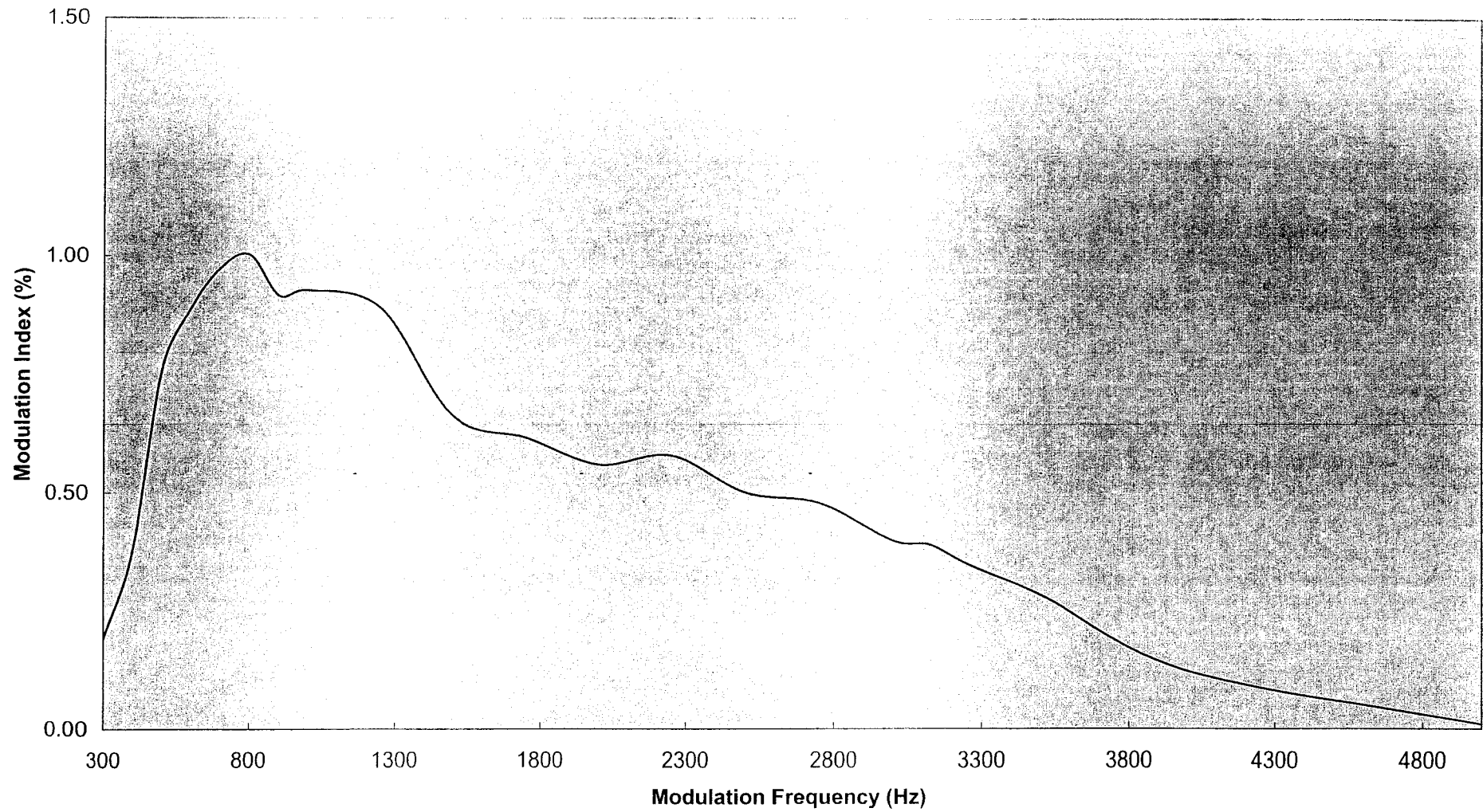
In order to satisfy the 95.637(a) requirement, Modulation Frequency Response and Modulation Limit Characteristics are attached in Exhibit 4.1 & 4.2.

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

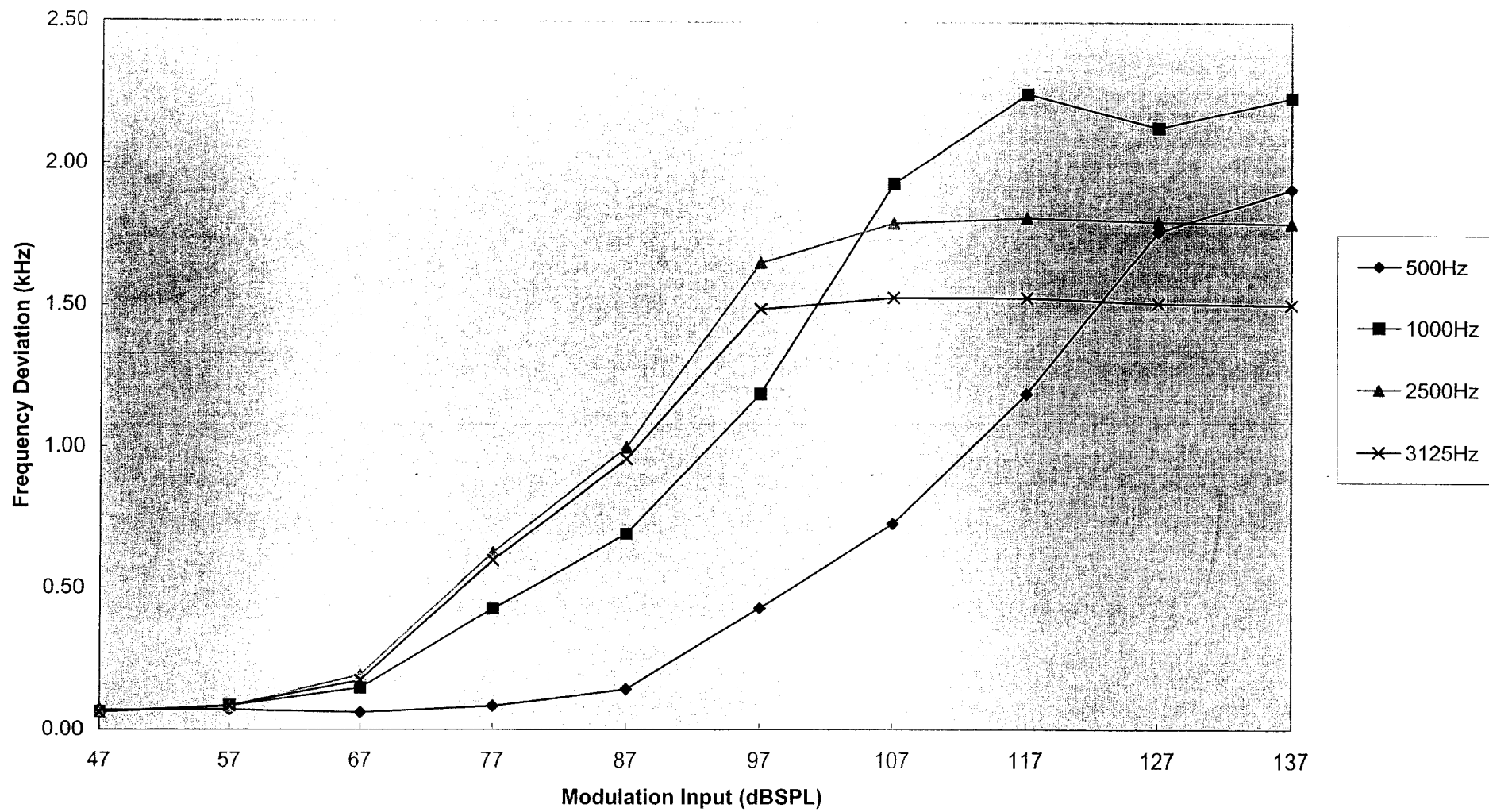
## Modulation Frequency Response



## Modulation Frequency Response



Modulation Limiting Characteristic



## INTERTEK TESTING SERVICES

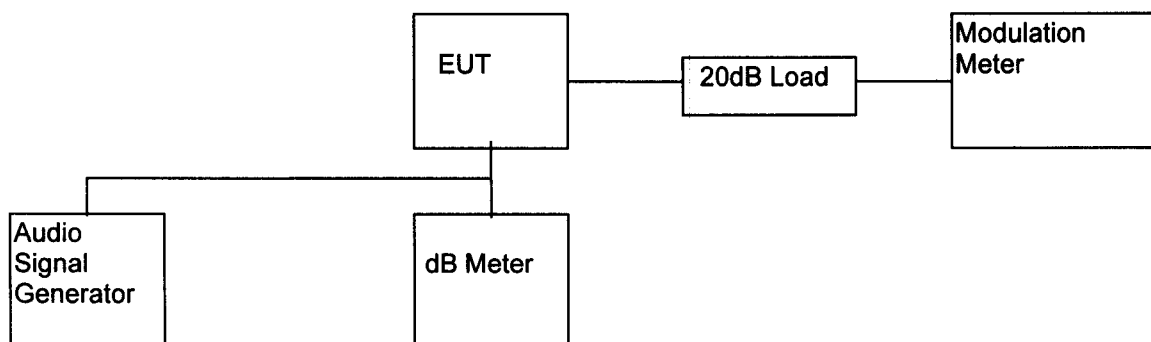
### 4.1 Modulation Frequency Response

#### A. Test Equipment

| Equipment              | Brand Name         | Model No.  |
|------------------------|--------------------|------------|
| Audio Signal Generator | Leader             | LFG-1300S  |
| dB meter               | Leader             | LMV-182A   |
| 20 dB RF Load          | Bird               | 8304-200-N |
| Modulation Meter       | Marconi Instrument | 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 97.0dB SPL 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.

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## INTERTEK TESTING SERVICES

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### C. Test Result

Table 2

Giant Electronics Limited  
Giant/ Motorola T6500

### Modulation Frequency Response

Test Channel : 4

Input level = 93.5dBSPL

| Modulation Frequency (Hz) | Modulation index (%) |
|---------------------------|----------------------|
| 300                       | 0.19                 |
| 400                       | 0.38                 |
| 500                       | 0.76                 |
| 600                       | 0.89                 |
| 700                       | 0.97                 |
| 800                       | 1.00                 |
| 900                       | 0.92                 |
| 1000                      | 0.93                 |
| 1250                      | 0.89                 |
| 1500                      | 0.66                 |
| 1750                      | 0.62                 |
| 2000                      | 0.56                 |
| 2250                      | 0.58                 |
| 2500                      | 0.50                 |
| 2750                      | 0.48                 |
| 3000                      | 0.40                 |
| 3125                      | 0.39                 |
| 3250                      | 0.35                 |
| 3500                      | 0.28                 |
| 4000                      | 0.12                 |
| 5000                      | 0.01                 |

Test Engineer: Ken Sit

Date of Test: May 13, 2004

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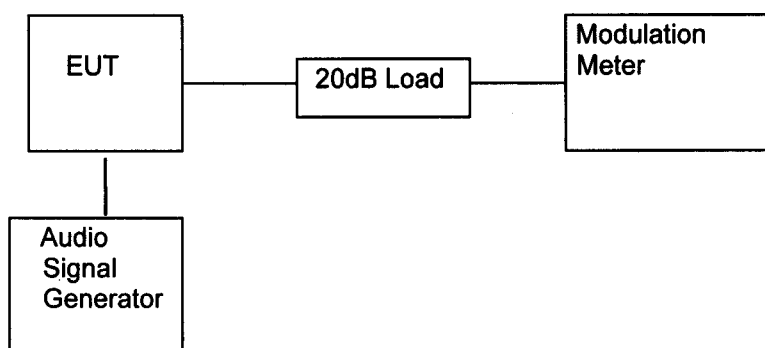
### 4.2 Modulation Limiting Characteristics (Section 2.1047(b))

#### A. Test Equipment

| Equipment              | Brand Name | Model No.  |
|------------------------|------------|------------|
| Audio Signal Generator | Leader     | LFG-1300S  |
| 20 dB RF Load          | Bird       | 8304-200-N |
| Modulation Meter       | Marconi    | 2950       |

#### 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 127dBSPL.
- 3) Record the maximum value of plus or minus peak frequency deviation.
- 4) Repeat the above procedure with frequency 1000Hz, 2500Hz & 3125Hz.

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### C. Test Result

Table 3

Giant Electronics Limited  
Giant/ Motorola T6500

### Modulation Limiting Characteristics

Test Channel : 4

| Modulation<br>Input<br>(dBSPL) | Peak Frequency<br>Deviation (kHz)<br>at 500Hz | Peak Frequency<br>Deviation (kHz)<br>at 1000Hz | Peak Frequency<br>Deviation (kHz)<br>at 2500Hz | Peak Frequency<br>Deviation (kHz)<br>at 3125Hz |
|--------------------------------|-----------------------------------------------|------------------------------------------------|------------------------------------------------|------------------------------------------------|
| 47                             | 0.07                                          | 0.06                                           | 0.07                                           | 0.06                                           |
| 57                             | 0.07                                          | 0.09                                           | 0.08                                           | 0.09                                           |
| 67                             | 0.06                                          | 0.15                                           | 0.19                                           | 0.17                                           |
| 77                             | 0.08                                          | 0.43                                           | 0.63                                           | 0.60                                           |
| 87                             | 0.14                                          | 0.69                                           | 1.00                                           | 0.96                                           |
| 97                             | 0.43                                          | 1.19                                           | 1.64                                           | 1.49                                           |
| 107                            | 0.73                                          | 1.93                                           | 0.79                                           | 1.53                                           |
| 117                            | 1.19                                          | 2.25                                           | 1.81                                           | 1.53                                           |
| 127                            | 1.76                                          | 2.13                                           | 1.80                                           | 1.51                                           |
| 137                            | 1.91                                          | 2.24                                           | 1.79                                           | 1.50                                           |

Test Engineer: Ken Sit

Date of Test: May 13, 2004

## INTERTEK TESTING SERVICES

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

#### A. Test Equipment

| Equipment              | Brand Name | Model No. |
|------------------------|------------|-----------|
| Audio Signal Generator | Leader     | LFG-1300S |
| dB meter               | 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:

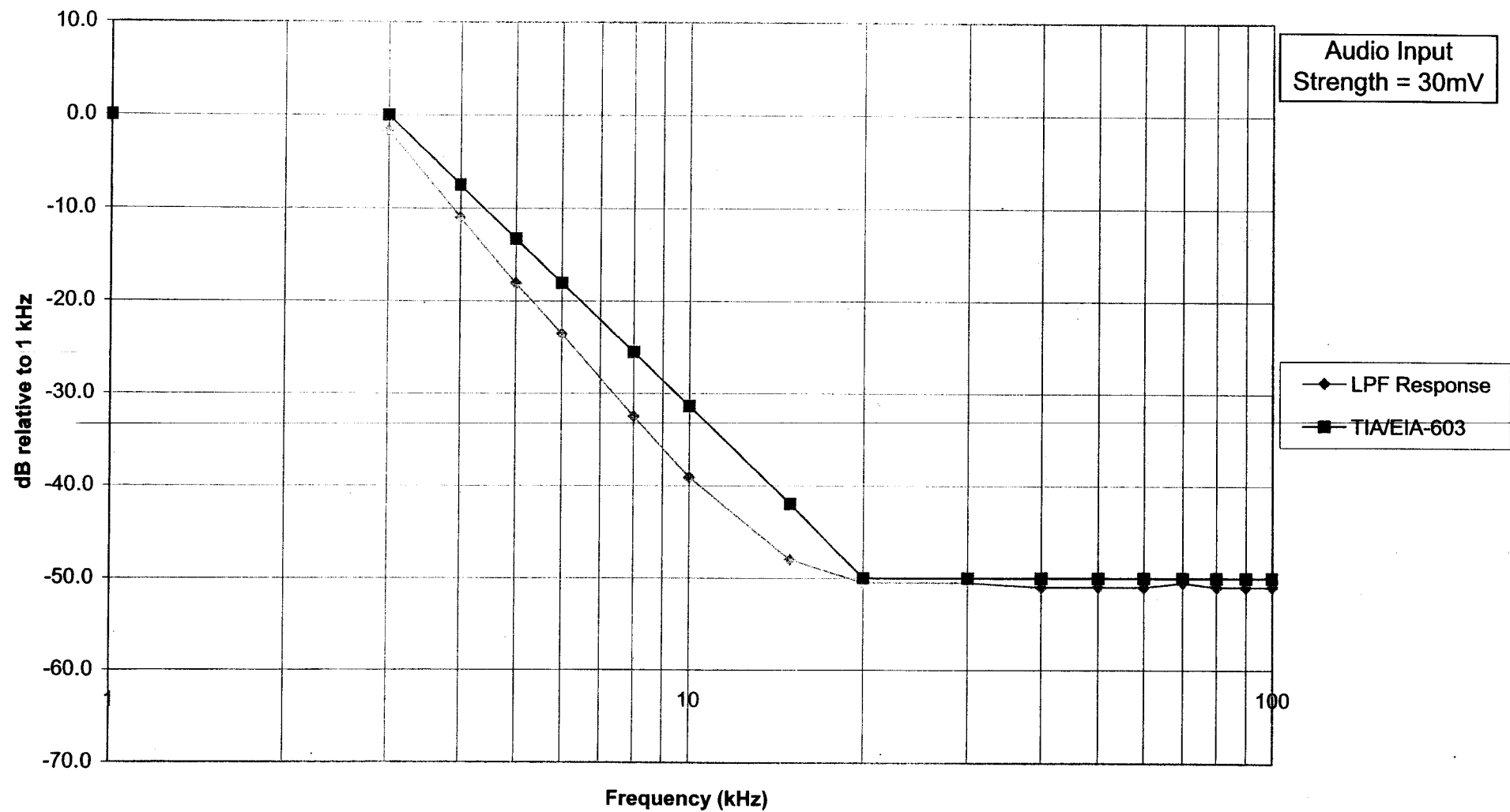
$$\text{low pass filter response} = LEV_{FREQ} - LEV_{REF}$$

- 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.

## Audio Low Pass Filter Response



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**INTERTEK TESTING SERVICES**

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**EXHIBIT 5**  
**OCCUPIED BANDWIDTH**

## INTERTEK TESTING SERVICES

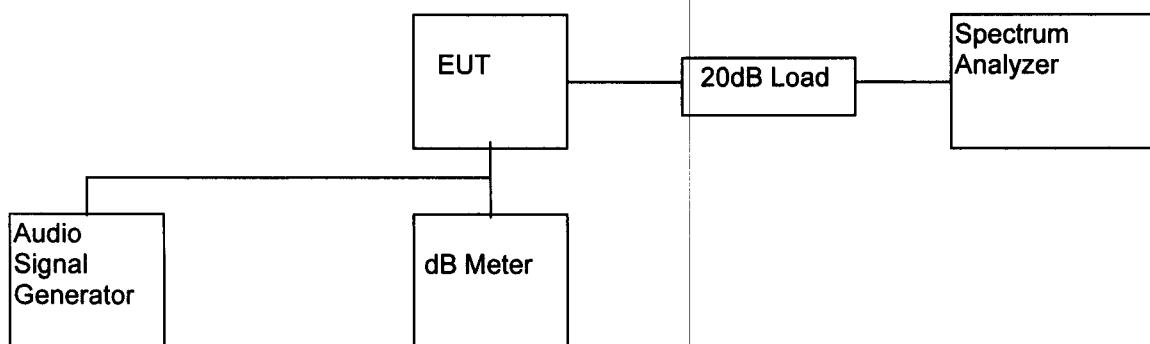
### 5.0 Occupied Bandwidth (Section 95.633(c))

#### A. Test Equipment

| Equipment              | Brand Name      | Model No.  |
|------------------------|-----------------|------------|
| Audio Signal Generator | Leader          | LFG-1300S  |
| dB meter               | Leader          | LMV-182A   |
| 20 dB RF Load          | Bird            | 8304-200-N |
| Spectrum Analyzer      | Hewlett Packard | 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 5kHz/div scan and 10dB/div.

#### C. Test Result

The occupied Bandwidth is measured to be 10.3 kHz.

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

Test Engineer: Ken Sit

Date of Test: May 13, 2004

tip

REF -25.0 dBm

AT 10 dB

MKR -10.25 KHz

.80 dB

PEAK

LOG

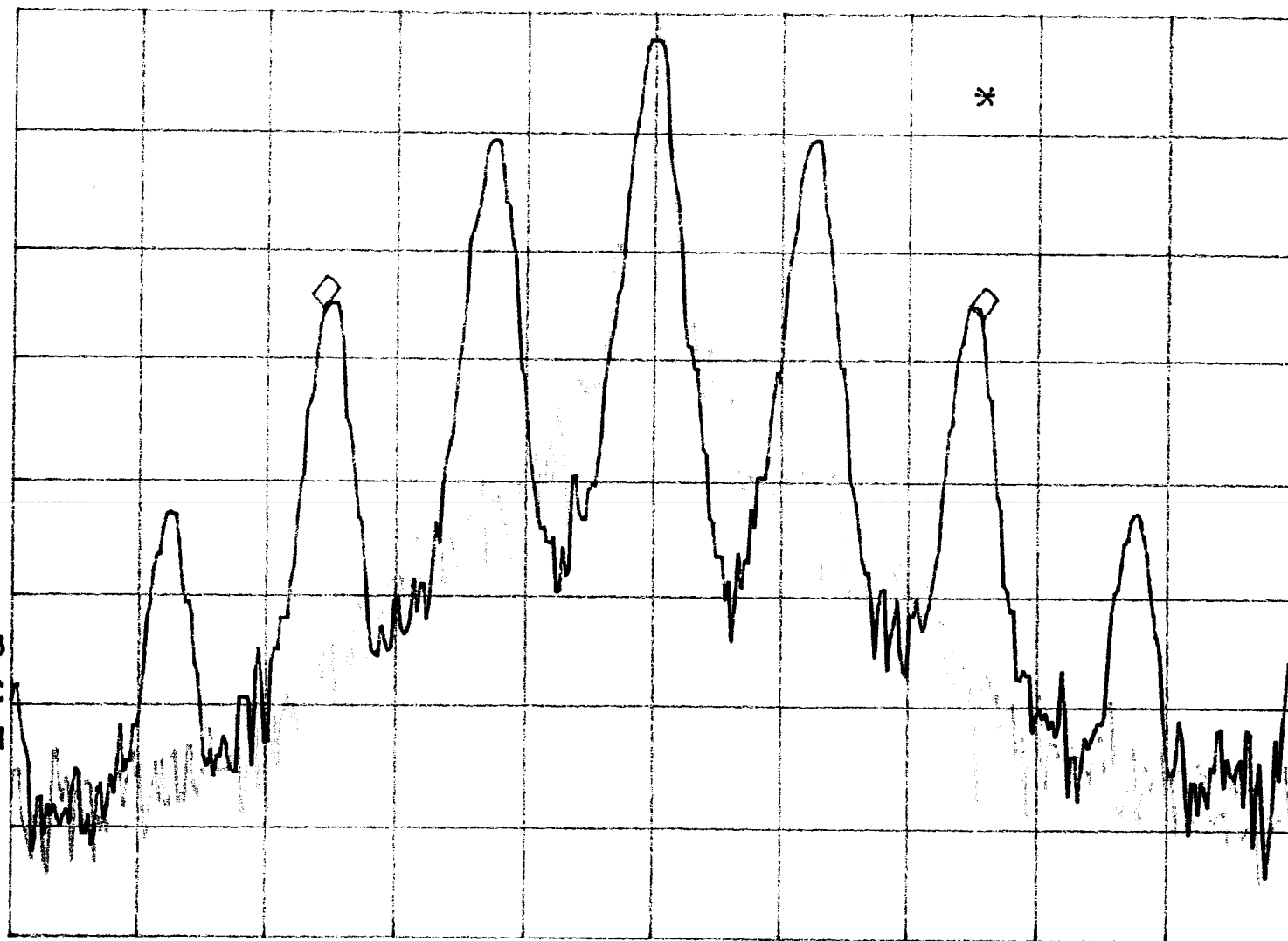
10

dB/

VA VB

SC FC

CORR



CENTER 467.63750 MHz

#RES BW 300 Hz

#VBW 300 Hz

SPAN 20.00 KHz

#SWP 1.00 sec

hp

REF -14.0 dBm

AT 10 dB

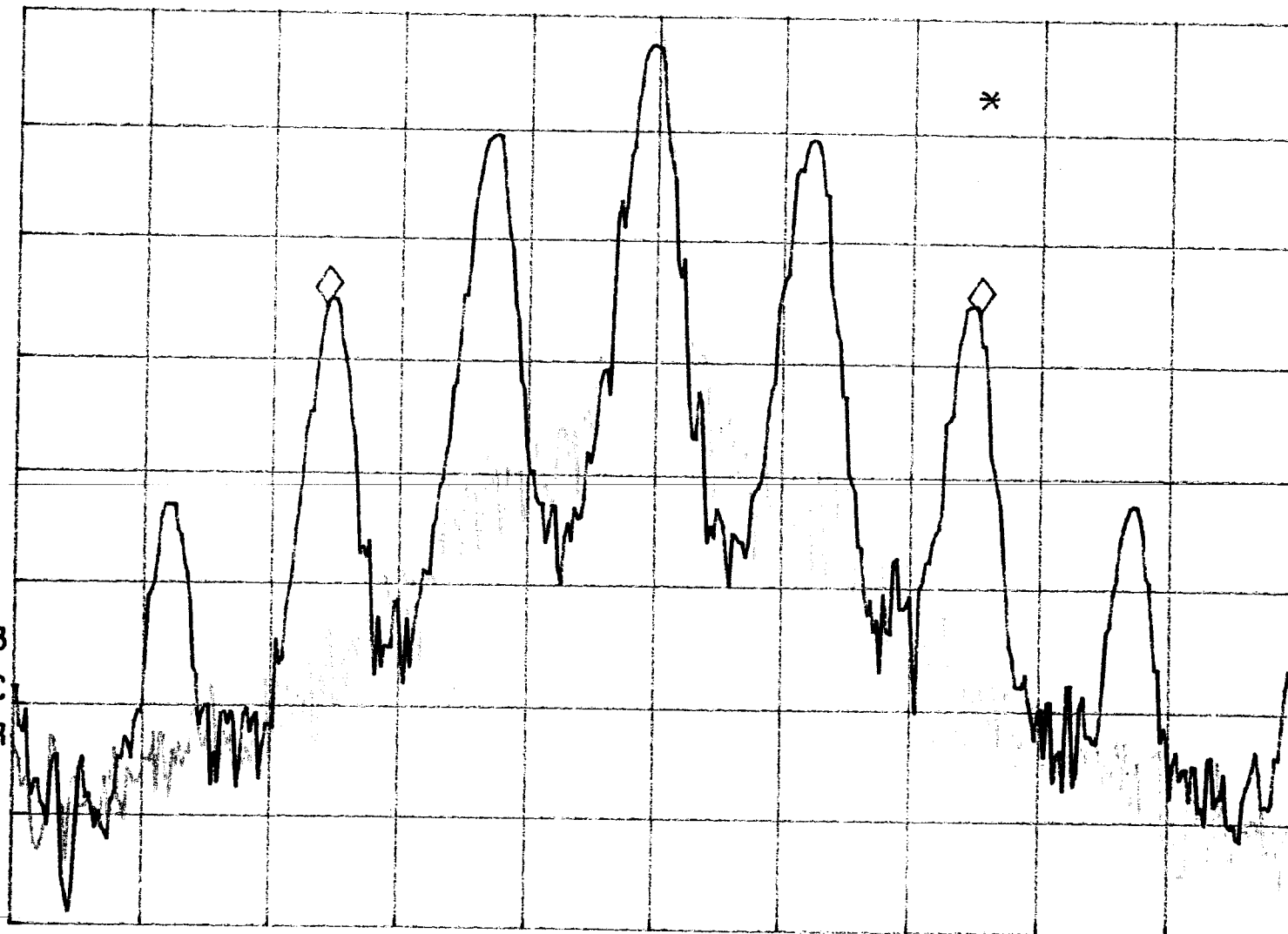
MKR -10.20 KHz  
.26 dB

PEAK

LOG

10  
dB/

VA VB  
SC FC  
CORR



CENTER 462.63750 MHz

#RES BW 300 Hz

#VBW 300 Hz

SPAN 20.00 KHz

#SWP 1.00 sec

---

**INTERTEK TESTING SERVICES**

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**EXHIBIT 6**  
**SPURIOUS EMISSION**

## INTERTEK TESTING SERVICES

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### 6.0 **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.

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## INTERTEK TESTING SERVICES

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

#### A. Test Equipment

| Equipment     | Brand Name      | Model No.            |
|---------------|-----------------|----------------------|
| Antenna       | CDI             | B100,B200,B300, Horn |
| Test receiver | Rohde & Schwarz | ESVS30               |
| RF Filter     | Tailithic       | 3VF                  |

#### B. Testing Procedure

Radiated emission measurements were performed according to the procedures in ANSI C63.4(2001). All measurements were performed in Open Area Test Sites located at Roof Top of Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.

## **INTERTEK TESTING SERVICES**

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### **C. Radiated Emission Configuration Photograph**

#### **Worst Case Radiated Emission**

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

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## INTERTEK TESTING SERVICES

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### C. Test Result

**Giant Electronics Limited  
Giant/ Motorola T6500**

**Table 4(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)

| Region                                                | Unwanted emission |            |
|-------------------------------------------------------|-------------------|------------|
|                                                       | Channel 4         | Channel 11 |
| CARRIER $\pm 6.25\text{kHz}$ to $\pm 12.5\text{kHz}$  | <25dB             | <25dB      |
| CARRIER $\pm 12.5\text{kHz}$ to $\pm 31.25\text{kHz}$ | <35dB             | <35dB      |

7/2

REF -15.0 dBm

AT 10 dB

PEAK

LOG

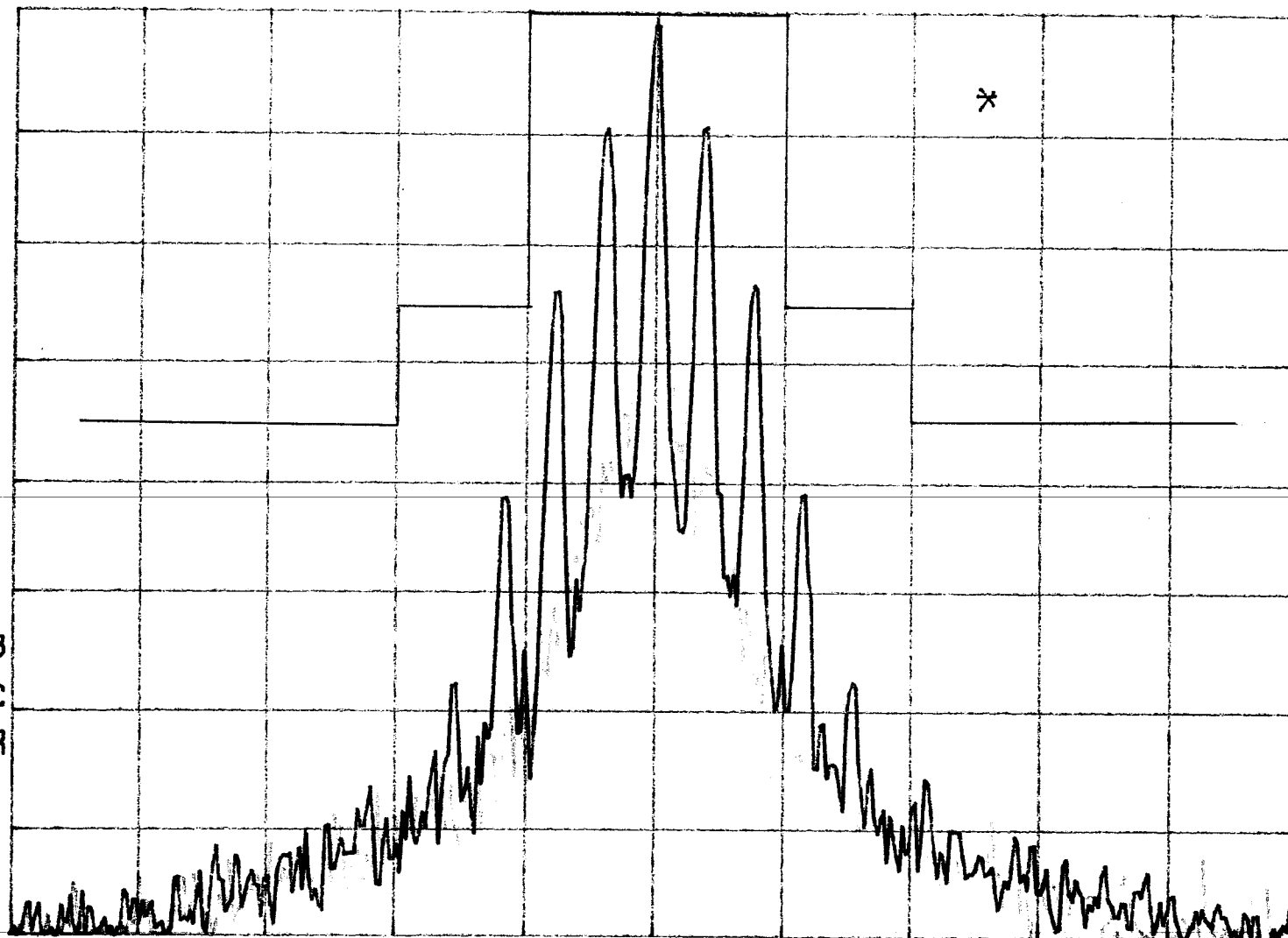
10

dB/

VA VB

SC FC

CORR



CENTER 462.63750 MHz

SPAN 65.00 kHz

#RES BW 300 Hz

#VBW 300 Hz

#SWP 2.17 sec

hp

REF -25.0 dBm

AT 10 dB

PEAK

LOG

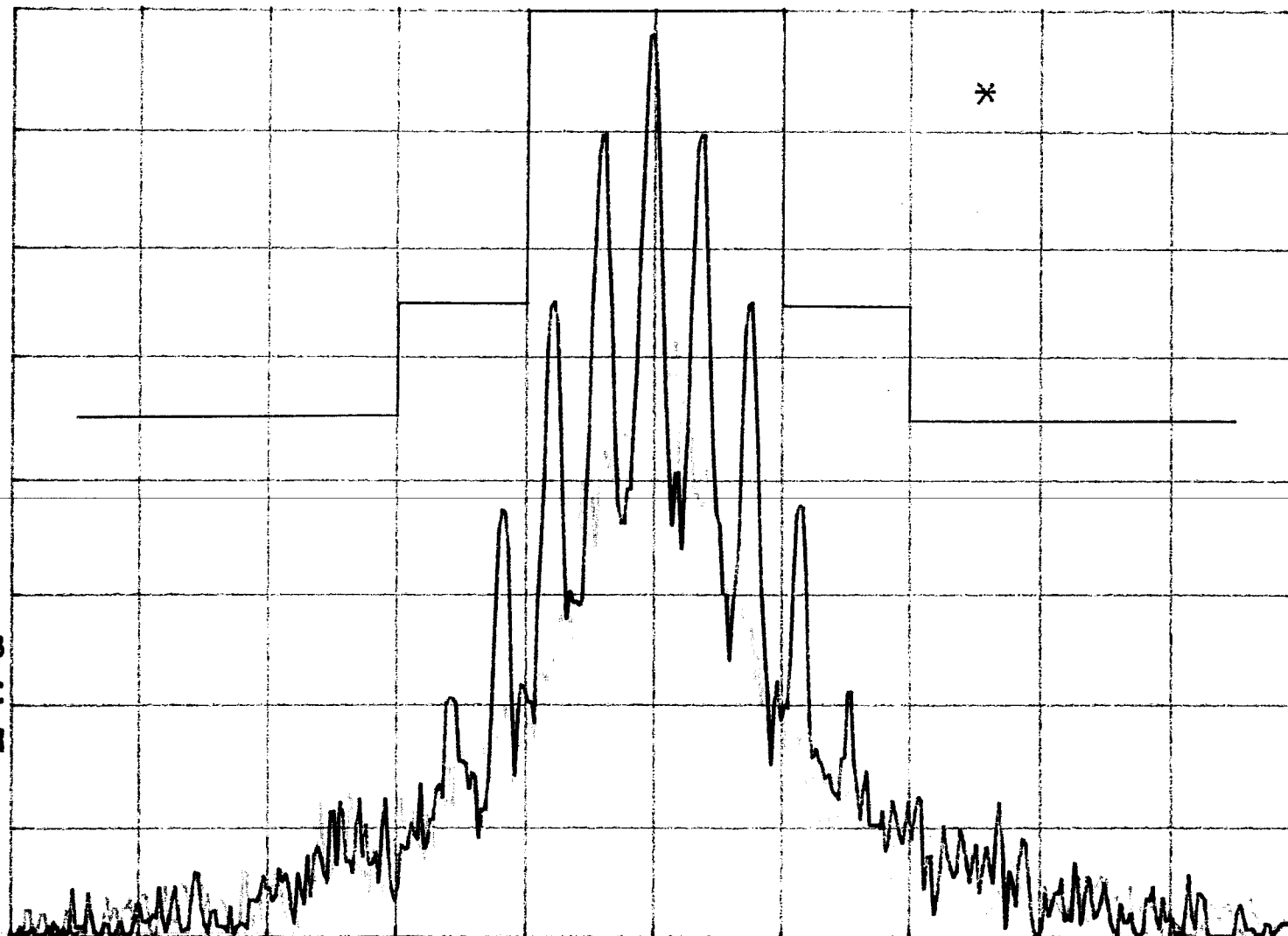
10

dB/

VA VB

SC FC

CORR



CENTER 467.63750 MHz

SPAN 65.00 kHz

#RES BW 300 Hz

#VBW 300 Hz

#SWP 2.17 sec

---

**INTERTEK TESTING SERVICES**

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**Table 4(b): Channel 4**

| <b>Frequency<br/>(MHz)</b> | <b>Effective<br/>Radiated<br/>Power<br/>(dBm)</b> | <b>Transmission<br/>Power<br/>(dBm)</b> | <b>Attenuation<br/>(dB)</b> | <b>Limit<br/>(dB)</b> | <b>Margin<br/>(dB)</b> |
|----------------------------|---------------------------------------------------|-----------------------------------------|-----------------------------|-----------------------|------------------------|
| 925.274                    | -26.4                                             | 27.5                                    | 53.9                        | 40.5                  | 13.4                   |
| 1387.872                   | -50.4                                             | 27.5                                    | 77.9                        | 40.5                  | 37.4                   |
| 1850.560                   | -53.4                                             | 27.5                                    | 80.9                        | 40.5                  | 40.4                   |
| 2313.120                   | -45.4                                             | 27.5                                    | 72.9                        | 40.5                  | 32.4                   |
| 2775.800                   | -36.8                                             | 27.5                                    | 64.3                        | 40.5                  | 23.8                   |
| 3238.368                   | -50.8                                             | 27.5                                    | 78.3                        | 40.5                  | 37.8                   |
| 3701.104                   | -51.6                                             | 27.5                                    | 79.1                        | 40.5                  | 38.6                   |
| 4163.709                   | -59.8                                             | 27.5                                    | 87.3                        | 40.5                  | 46.8                   |

- Remark: 1. Transmission power is 27.5 dBm or -2.5 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 40.5 dB.
3. The test is performed according to ANSI/TIA/EIA-603-1992.

Test Engineer: Ken Sit

Date of Test: May 13, 2004

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**INTERTEK TESTING SERVICES**

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**Table 4(b): Channel 11**

| <b>Frequency<br/>(MHz)</b> | <b>Effective<br/>Radiated<br/>Power<br/>(dBm)</b> | <b>Transmission<br/>Power<br/>(dBm)</b> | <b>Attenuation<br/>(dB)</b> | <b>Limit<br/>(dB)</b> | <b>Margin<br/>(dB)</b> |
|----------------------------|---------------------------------------------------|-----------------------------------------|-----------------------------|-----------------------|------------------------|
| 935.275                    | -26.7                                             | 26.0                                    | 52.7                        | 39.0                  | 13.7                   |
| 1402.874                   | -51.6                                             | 26.0                                    | 77.6                        | 39.0                  | 38.6                   |
| 1870.464                   | -53.4                                             | 26.0                                    | 79.4                        | 39.0                  | 40.4                   |
| 2338.104                   | -40.5                                             | 26.0                                    | 66.5                        | 39.0                  | 27.5                   |
| 2805.766                   | -38.1                                             | 26.0                                    | 64.1                        | 39.0                  | 25.1                   |
| 3273.406                   | -49.2                                             | 26.0                                    | 75.2                        | 39.0                  | 36.2                   |
| 3741.046                   | -50.8                                             | 26.0                                    | 76.8                        | 39.0                  | 37.8                   |
| 4208.686                   | -58.6                                             | 26.0                                    | 84.6                        | 39.0                  | 45.6                   |

- Remark: 1. Transmission power is 26 dBm or -4 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 dB.
3. The test is performed according to ANSI/TIA/EIA-603-1992.

Test Engineer: Ken Sit

Date of Test: May 13, 2004

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**INTERTEK TESTING SERVICES**

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**EXHIBIT 7**

**FREQUENCY STABILITY**

### 7.0 Frequency Stability

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

## INTERTEK TESTING SERVICES

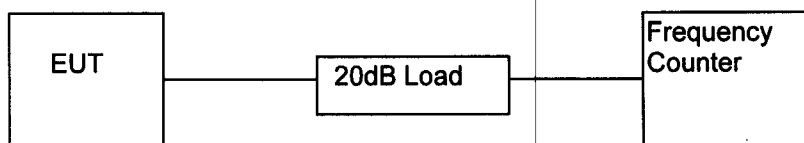
### 7.1 Frequency Tolerance (Section 95.627)

#### A. Test Equipment

| Equipment              | Brand Name | Model No.  |
|------------------------|------------|------------|
| Regulated Power Supply | PAD        | 30-35L     |
| 20 dB RF Load          | 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.

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**INTERTEK TESTING SERVICES**

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**C. Test Result****Table 5**

**Giant Electronics Limited  
Giant/ Motorola T6500**

**Frequency Tolerance**

| Channel | Frequency<br>(MHz) | Measured<br>Frequency (MHz) | Tolerance<br>(%) |
|---------|--------------------|-----------------------------|------------------|
| 1       | 462.5625           | 462.56260                   | 0.000022         |
| 2       | 462.5875           | 462.58756                   | 0.000013         |
| 3       | 462.6125           | 462.61254                   | 0.000009         |
| 4       | 462.6375           | 462.63753                   | 0.000006         |
| 5       | 462.6625           | 462.66252                   | 0.000004         |
| 6       | 462.6875           | 462.68753                   | 0.000006         |
| 7       | 462.7125           | 462.71253                   | 0.000006         |
| 8       | 467.5625           | 467.56252                   | 0.000004         |
| 9       | 467.5875           | 467.58751                   | 0.000002         |
| 10      | 467.6125           | 467.61251                   | 0.000002         |
| 11      | 467.6375           | 467.63751                   | 0.000002         |
| 12      | 467.6625           | 467.66250                   | 0.000000         |
| 13      | 467.6875           | 467.68750                   | 0.000000         |
| 14      | 467.7125           | 467.71251                   | 0.000002         |
| 15      | 462.5500           | 462.55001                   | 0.000002         |
| 16      | 462.5750           | 462.57500                   | 0.000000         |
| 17      | 462.6000           | 462.59999                   | -0.000002        |
| 18      | 462.6250           | 462.62499                   | -0.000002        |
| 19      | 462.6500           | 462.64999                   | -0.000002        |
| 20      | 462.6750           | 462.67496                   | -0.000009        |
| 21      | 462.7000           | 462.69995                   | -0.000011        |
| 22      | 462.7250           | 462.72494                   | -0.000013        |

## INTERTEK TESTING SERVICES

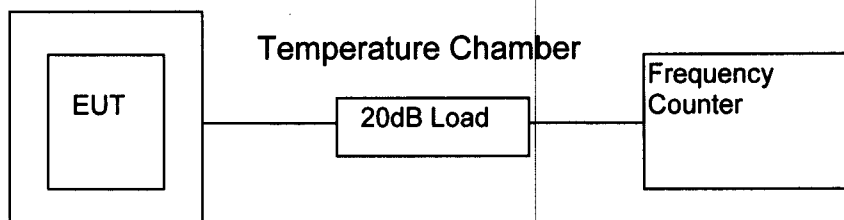
### 7.2 Frequency Stability - Temperature (Section 2.1055)

#### A. Test Equipment

| Equipment         | Brand Name | Model No.  |
|-------------------|------------|------------|
| 20 dB RF Load     | 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.

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**INTERTEK TESTING SERVICES**

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**C. Test Result****Table 6(a)**

**Giant Electronics Limited  
Giant/ Motorola T6500**

**Frequency Deviation with Temperature Variation**

Channel : 4

| Temperature (°C) | Assigned Frequency (MHz) | Measured Frequency (MHz) | % Deviation |
|------------------|--------------------------|--------------------------|-------------|
| -20              | 462.6375                 | 462.63663                | -0.000188   |
| -10              | 462.6375                 | 462.63732                | -0.000039   |
| 0                | 462.6375                 | 462.63775                | 0.000054    |
| 10               | 462.6375                 | 462.63782                | 0.000069    |
| 20               | 462.6375                 | 462.63753                | 0.000006    |
| 30               | 462.6375                 | 462.63731                | -0.000041   |
| 40               | 462.6375                 | 462.63712                | -0.000082   |
| 50               | 462.6375                 | 462.63759                | 0.000019    |

Test Engineer: Ken Sit

Date of Test: May 13, 2004

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## INTERTEK TESTING SERVICES

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### C. Test Result

**Table 6(b)**

**Giant Electronics Limited  
Giant/ Motorola T6500**

### **Frequency Deviation with Temperature Variation**

Channel : 11

| Temperature (°C) | Assigned Frequency (MHz) | Measured Frequency (MHz) | % Deviation |
|------------------|--------------------------|--------------------------|-------------|
| -20              | 467.6375                 | 467.63670                | -0.000171   |
| -10              | 467.6375                 | 467.63739                | -0.000024   |
| 0                | 467.6375                 | 467.63780                | 0.000064    |
| 10               | 467.6375                 | 467.63780                | 0.000064    |
| 20               | 467.6375                 | 467.63751                | 0.000002    |
| 30               | 467.6375                 | 467.63730                | -0.000043   |
| 40               | 467.6375                 | 467.63713                | -0.000079   |
| 50               | 467.6375                 | 467.63759                | 0.000019    |

Test Engineer: Ken Sit

Date of Test: May 13, 2004

## INTERTEK TESTING SERVICES

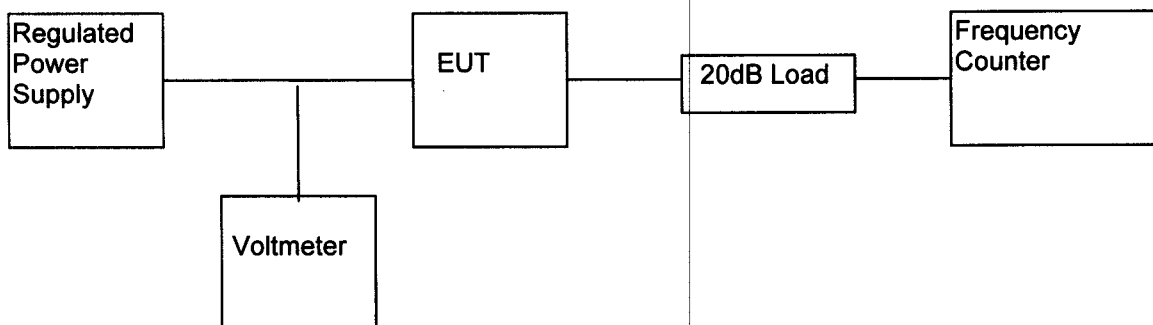
### 7.3 Frequency Stability - Voltage (Section 2.995)

#### A. Test Equipment

| Equipment              | Brand Name | Model No.  |
|------------------------|------------|------------|
| Regulated Power Supply | PAD        | 30-35L     |
| 20 dB RF Load          | 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.

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## INTERTEK TESTING SERVICES

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### C. Test Result

**Table 7**

**Giant Electronics Limited  
Giant/ Motorola T6500**

### **Frequency Deviation with Voltage Variation**

The manufacturer specified battery end point 3.50V

| Channel | Frequency<br>(MHz) | Measured<br>Frequency (MHz) | Tolerance<br>(%) |
|---------|--------------------|-----------------------------|------------------|
| 4       | 462.6375           | 462.63740                   | -0.000022        |
| 11      | 467.6375           | 467.63741                   | -0.000019        |

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**INTERTEK TESTING SERVICES**

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**EXHIBIT 8**  
**TECHNICAL SPECIFICATIONS**

**8.0 Technical Specifications**

### 8.1 Block Diagram

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

Figure 8.1 Block Diagram