

Greetsino Limited

Application
For
Certification

900MHz Cordless Telephone

(FCC ID: NQL9840)

WO# 9805143
CKL/at
September 18, 1998

- The test results reported in this report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report shall not be reproduced except in full without prior authorization from Intertek Testing Services Limited

FCC ID: NQL9840

LIST OF EXHIBITS

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INTERTEK TESTING SERVICES

MEASUREMENT/TECHNICAL REPORT

**Greatsino Limited - MODEL: MH9920 Series
FCC ID: NQL9840**

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

Equipment Type: Low Power Transmitter (example: computer, modem, transmitter, etc.)

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.

Transition Rules Request per 15.37? Yes _____ No X _____

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-1-96 Edition] provision.

Report prepared by:

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Intertek Testing Services.
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List of attached file

Exhibit type	Filename
Test Report	report. doc
Test Setup Photo	base.jpg, handset.jpg, conduct1.jpg, conduct2.jpg
External Photo	ophoto1.jpg, ophoto2.jpg
Internal Photo	iphoto1.jpg to iphoto17.jpg
Block Diagram	block.pdf
Schematic	circuit.pdf
ID Label	label.pdf
ID Location	location.pdf
User Manual	manual.pdf
Test Report	bw.pdf
Cover letter	letter.pdf
Circuit Description	descri.pdf
Test Report	conduct.pdf

EXHIBIT 1
GENERAL DESCRIPTION

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1.0 **General Description**

1.1 Product Description

The MH9920 Series are 900MHz Cordless Phone with Caller ID & Speakerphone. These models within this series belong to a family group of cordless phone, they are electrically and functionally identical, varying only in cosmetic details. The unit is capable of either tone or pulse dialing. The internal power supply's isolation is accomplished through a power transformer having an adequate dielectric rating. The circuit wiring is consistent under the requirement of part 68.

The handset unit consists of a keypad with twelve standard keys (0,...9,*,#), five function keys (memo, intercom, flash, tone and RE/PA), and one channel scan switch key. A talk key is provided to control pick/release telephone line in a toggle base.

The base unit has a intercom key, which is used to communicate the handset unit.

The family grouping list and circuit description are saved with filename: descri.pdf

Connection between the device and the telephone network is accomplished through the use of USOC RJ11C in the 2-wire loop calling central office line.

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1.2 Related Submittal(s) Grants

This is an Application for Certification of a cordless telephone system. Two transmitters are included in this Application. This specific report details the emission characteristics of each transmitter. The receivers are subject to the verification authorization process, in accordance with 15.101(b). A verification report has been prepared for the receiver sections of each device. The device is also subject to Part 68 Registration.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (1992). All measurements 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 for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to 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 radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This 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

For emission testing, the equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). During testing, all cables were manipulated to produce worst case emissions. The handset was powered by a fully charged battery.

For the measurements, the EUT is attached to a cardboard box and placed on the wooden turntable. If the base unit attaches to peripherals, they are connected and operational (as typical as possible). The handset is remotely located as far from the antenna and the base as possible to ensure full power transmission from the base. Else, the base is wired to transmit full power without modulation.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Detector function is in peak mode. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater. All emissions greater than 20 dB μ V/m are recorded.

Radiated emission measurement were performed from 30 MHz to tenth harmonics.

2.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

For emissions testing, the units were setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing.

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2.3 Support Equipment List and Description

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system (included inserted cards, which have grants) are:

HARDWARE:

The unit was operated standalone. An AC adapter (provided with the unit) was used to power the device. Its description is listed below.

- (1) AC adapter with two meter unshielded power cord permanently affixed.

CABLES:

- (1) Telecommunication cable with RJ11C connectors (1m, unshielded), terminated

OTHERS:

There are no special accessories necessary for compliance of this product.

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2.4 Equipment Modification

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

No modifications were installed by ETL Division, Intertek Testing Services Hong Kong Ltd.

All the items listed under section 2.0 of this report are confirmed by:

Confirmed by:

*C. K. Lam
Assistant Manager
Intertek Testing Services
Agent for Greatsino Limited*



Signature

September 18, 1998 Date

EXHIBIT 3
EMISSION RESULTS

3.0 **Emission Results**

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

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3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

where FS = Field Strength in dB μ V/m
 RA = Receiver Amplitude (including preamplifier) in dB μ V
 CF = Cable Attenuation Factor in dB
 AF = Antenna Factor in dB
 AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:-

$$FS = RR + LF$$

where FS = Field Strength in dB μ V/m
 RR = RA - AG in dB μ V
 LF = CF + AF in dB

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$\begin{aligned} RA &= 52.0 \text{ dB}\mu\text{V/m} \\ AF &= 7.4 \text{ dB} \\ CF &= 1.6 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ FS &= RR + LF \\ FS &= 23 + 9 = 32 \text{ dB}\mu\text{V/m} \end{aligned} \qquad \begin{aligned} RR &= 23.0 \text{ dB}\mu\text{V} \\ LF &= 9.0 \text{ dB} \end{aligned}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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3.2 Radiated Emission Configuration Photograph - Base Unit

Worst Case Radiated Emission

at 902.194 MHz

For electronic filing, the configuration photographs are saved with filename: base.jpg

INTERTEK TESTING SERVICES

3.3 Radiated Emission Data - Base Unit

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement : Passed by 7.4 dB

TEST PERSONNEL:



Tester Signature

Tommy W. L. Leung, Engineer
Typed/Printed Name

September 3, 1998
Date

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK
Mode : TX-Channel 1

Date of Test: August 15, 1998

Table 1, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
V	902.194	70.6	32.0	16	86.6	94	-7.4
V	1804.391	43.4	26.5	34	35.9	54	-18.1
H	*2706.589	39.7	29.1	34	34.8	54	-19.2
H	*3608.787	44.9	32.8	34	43.7	54	-10.3

- NOTES:
1. Peak Detector data
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Tommy W. L. Leung

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK
Mode : TX-Channel 20

Date of Test: August 15, 1998

Table 2, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
V	902.695	69.2	32.0	16	85.2	94	-8.8
V	1805.395	45.1	26.5	34	37.6	54	-16.4
V	*2708.084	41.7	29.1	34	36.8	54	-17.2
V	*3610.783	45.4	32.8	34	44.2	54	-9.8

- NOTES:
1. Peak Detector data
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Tommy W. L. Leung

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK
Mode : TX-Channel 40

Date of Test: August 15, 1998

Table 3, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
V	903.303	68.9	33.0	16	85.9	94	-8.1
V	1806.606	42.7	26.5	34	35.2	54	-18.8
H	*2709.906	37.7	29.1	34	32.8	54	-21.2
V	*3613.212	44.3	32.8	34	43.1	54	-10.9

- NOTES:
1. Peak Detector data
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Tommy W. L. Leung

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK
Mode : Stand by

Date of Test: August 15, 1998

Table 4, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
H	184.233	23.8	20	16	27.8	43.5	-15.7
H	221.197	23.9	17	16	24.9	46.0	-21.1
H	258.060	25.9	21	16	30.9	46.0	-15.1
H	294.927	23.4	22	16	29.4	46.0	-16.6
H	331.794	22.2	24	16	30.2	46.0	-15.8

- NOTES:
1. Peak Detector data
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Tommy W. L. Leung

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK
Mode : Charging

Date of Test: August 15, 1998

Table 5, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
H	184.233	23.8	20	16	27.8	43.5	-15.7
H	221.197	23.9	17	16	24.9	46.0	-21.1
H	258.060	25.9	21	16	30.9	46.0	-15.1
H	294.927	23.4	22	16	29.4	46.0	-16.6
H	331.794	22.2	24	16	30.2	46.0	-15.8

NOTES: 1. Peak Detector data

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

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

4. Horn antenna and average detector are used for the emission over 1000MHz.

* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Tommy W. L. Leung

INTERTEK TESTING SERVICES

3.4 Radiated Emission Configuration Photograph - Handset

Worst Case Radiated Emission

at 2780.071 MHz

For electronic filing, the configuration photographs are saved with filename: handset.jpg

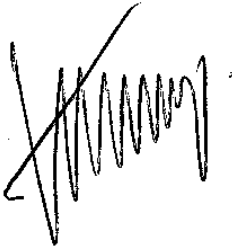
INTERTEK TESTING SERVICES

3.5 Radiated Emission Data - Handset

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

Judgement : Passed by 8.4 dB

TEST PERSONNEL:



Tester Signature

Tommy W. L. Leung, Engineer
Typed/Printed Name

September 3, 1998
Date

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK
Mode : TX-Channel 1

Date of Test: August 15, 1998

Table 6, Handset

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
V	926.129	62.5	33.0	16	79.5	94	-14.5
V	1852.258	45.7	26.5	34	38.2	54	-15.8
V	*2778.382	44.7	29.1	34	39.8	54	-14.2
H	*3704.521	30.1	32.8	34	28.9	54	-25.1

- NOTES:
1. Peak Detector data
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Tommy W. L. Leung

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK
Mode: TX-Channel 20

Date of Test: August 15, 1998

Table 7, Handset

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
V	926.690	58.8	33.0	16	75.8	94	-18.2
H	1853.389	44.6	26.5	34	37.1	54	-16.9
H	*2708.071	50.5	29.1	34	45.6	54	-8.4
H	*3706.760	44.8	32.8	34	43.6	54	-10.4

- NOTES:
1. Peak Detector data
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Tommy W. L. Leung

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK
Mode : TX-Channel 40

Date of Test: August 15, 1998

Table 8, Handset

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB μ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
V	927.306	58.2	33.0	16	75.2	94	-18.8
H	1854.609	42.3	26.5	34	34.8	54	-19.2
V	*2781.918	50.1	29.1	34	45.2	54	-8.8
H	*3709.224	42.2	32.8	34	41.0	54	-13.0

- NOTES:
1. Peak Detector data
 2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna and average detector are used for the emission over 1000MHz.
- * Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Tommy W. L. Leung

3.6 Radiated Emission on the bandedge

From the following plot, it shows that the fundamental emission is confined in the specified band. And there are shows that the emissions are at least 60 dB below the carrier level at band edge (902 and 928 MHz). It meet the requirement of section 15.249(c).

For electronic filing, the plots are saved with filename: bw.pdf

3.7 Line Conducted Configuration Photograph - Base Unit

Worst Case Line-Conducted Configuration

For electronic filing, the configuration photographs are saved with filename: conduct1.jpg & conduct2.jpg

INTERTEK TESTING SERVICES

3.8 Line Conducted Emission Configuration Data

The data on the following pages list the significant emission frequencies, the limit, and the margin of compliance.

Judgement : Passed by more than 20 dB

TEST PERSONNEL:



Tester Signature

Tommy W. L. Leung, Engineer
Typed/Printed Name

September 3, 1998
Date

INTERTEK TESTING SERVICES

Company: Greatsino Limited
Model: MH9921BK

Date of Test: August 15, 1998

Conducted Emissions

For electronic filing, the test data is saved with filename: conduct.pdf

EXHIBIT 4
EQUIPMENT PHOTOGRAPHS

4.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: (ophoto1.jpg) to (ophoto2.jpg) & (iphoto1.jpg) to (iphoto17.jpg)

EXHIBIT 5
PRODUCT LABELLING

5.0 **Product Labelling**

For engineering drawing of the label must be permanently affixed to the unit.

For electronic filing, the label artwork and label location are saved with filename: label.pdf and location.pdf

EXHIBIT 6
TECHNICAL SPECIFICATIONS

6.0 **Technical Specifications**

The electronic filing, the block diagram and circuit diagram are saved with filename: block.pdf and circuit.pdf

EXHIBIT 7
INSTRUCTION MANUAL

INTERTEK TESTING SERVICES

7.0 Instruction Manual

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

Please note that the required FCC Information to the User can be found on Page 40 and 41 of this manual.

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

EXHIBIT 8
SECURITY CODE INFORMATION

INTERTEK TESTING SERVICES

8.0 Security code information

The telephone has an internal security code with 65,536 possible combinations. Each time you pick up the HANDSET, the code is randomly set to a new combination.

Communication between HANDSET and BASE UNIT may not be possible in any of the following situation:

1. After a power failure.
2. After relocation the BASE UNIT by disconnecting the AC adaptor.
3. After replacing the HANDSET battery.

To reset, place the HANDSET on the BASE UNIT for 2 to 5 seconds.