Casio PhoneMate Inc.

Application
For
Certification

Cordless Telephone

(FCC ID:N2L2500FCC)

WO# 9805762
CKL/at
September 30, 1998

FCC ID: N2L2500FCC

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MEASUREMENT/TECHNICAL REPORT

Casio PhoneMate Inc. - MODEL: Casio PhoneMate 2500
FCC ID: N2L2500FCC

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

Equipment Type: Cordless Telephone (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:

C. K. Lam
Intertek Testing Services.
2/F., Garment Centre,
576 Castle Peak Road,
Kowloon, Hong Kong.
Phone: 852-2746-8211
Fax: 852-2785-5487

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Exhibit type	Filename
Test Report	report.doc
Test Setup Photo	base.jpg, handset.jpg
Test Setup Photo	conduct1.jpg, conduct2.jpg
Test Report	conduct.pdf
Test Report	bsbw.pdf
Test Report	hsbw.pdf
External Photo	ophoto1.jpg, ophoto2,jpg
Internal Photo	iphoto1.jpg to iphoto7.jpg
ID Label	label.pdf
ID Location	location.pdf
Block Diagram	block.pdf
Schematics	circuit.pdf, bcircuit.pdf, hcircuit.pdf
User Manual	manual,pdf
Technical Description	auto.pdf
Cover Letter Selection	letter.jpg
Technical Description	descri.pdf

EXHIBIT 1
GENERAL DESCRIPTION

1.0 **General Description**

1.1 Product Description

The equipment under test (EUT) is a 25-Channel Cordless Phone. 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,*,#), eight function keys (M1, M2, M3, vol., mute, store, LNR/P and flash) , and one channel switch key. A talk key is provided to control pick/release telephone line in a toggle base.

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

The circuit description is 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.

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 dBμV/m are recorded.

Radiated emission measurement were performed from 30 MHz to 1000 MHz.

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.

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.

2.4 Equipment Modification

Any modifications installed previous to testing by Casio PhoneMate Inc. 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 Casio PhoneMate Inc.

Signature

September 30, 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.

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 dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
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 dBµV/m
RR = RA - AG in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV 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 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
FS = RR + LF
FS = 23 + 9 = 32 dBµV/m

RR = 23.0 dBµV
LF = 9.0 dB

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

3.2 Radiated Emission Configuration Photograph - Base Unit

Worst Case Radiated Emission

Front view

at 46.970 MHz

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

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 7.0 dB

****

TEST PERSONNEL:

Tester Signature

Kenneth H. M. Lam, Engineer
Typed/Printed Name

September 30, 1998
Date

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : TX-Channel 1

Table 1, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBµV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
V	43.729	77.3	10	16	71.3	80.0	-8.7
H	87.459	38.5	9	16	31.5	43.5	-12.0
H	131.187	30.9	13	16	27.9	43.5	-15.6
H	306.061	31.0	23	16	38.0	46.0	-8.0

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 signs (-) in the margin column signify levels below the limits.

Test Engineer: Kenneth H. M. Lam

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : TX-Channel 15

Table 2, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBµV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
V	44.480	78.0	10	16	72.0	80.0	-8.0
H	88.960	38.2	9	16	31.2	43.5	-12.3
H	133.449	31.9	13	16	28.9	43.5	-14.6
H	222.400	25.8	18	16	27.8	46.0	-18.2

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 signs (-) in the margin column signify levels below the limits.

Test Engineer: Kenneth H. M. Lam

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : TX-Channel 25

Table 3, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBµV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
V	46.970	78.0	11	16	73.0	80.0	-7.0
H	93.940	38.0	10	16	32.0	43.5	-11.5
H	140.910	31.8	13	16	28.8	43.5	-14.7
H	234.880	25.5	19	16	28.5	46.0	-17.5
H	328.82	27.4	24	16	35.4	46.0	-10.6

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 signs (-) in the margin column signify levels below the limits.

Test Engineer: Kenneth H. M. Lam

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : Stand by

Table 4, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBµV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
No radiated emissions were detected above the measuring equipemtn noise floor, which is at least 20 dB below the applicable limits.							

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 signs (-) in the margin column signify levels below the limits.

Test Engineer: Kenneth H. M. Lam

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : Charging

Table 5, Base unit

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBµV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
No radiated emissions were detected above the measuring equipemtn noise floor, which is at least 20 dB below the applicable limits.							

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 signs (-) in the margin column signify levels below the limits.

Test Engineer: Kenneth H. M. Lam

3.4 Radiated Emission Configuration Photograph - Handset

Worst Case Radiated Emission

Front View

at 48.761 MHz

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

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 6.8 dB

****

TEST PERSONNEL:

Tester Signature

Kenneth H. M. Lam, Engineer
Typed/Printed Name

September 30, 1998
Date

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : TX-Channel 1

Table 6, Handset

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBµV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
V	48.761	78.2	11	16	73.2	80.0	-6.8
V	97.523	41.2	11	16	36.2	43.5	-7.3
H	146.284	33.2	13	16	30.2	43.5	-13.3
H	195.045	22.7	16	16	22.7	43.5	-20.8
H	243.807	19.4	20	16	23.4	46.0	-22.6

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 signs (-) in the margin column signify levels below the limits.

Test Engineer: Kenneth H. M. Lam

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : TX-Channel 12

Table 7, Handset

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBµV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
V	49.362	76.8	11	16	71.8	80.0	-8.2
H	148.085	39.1	13	16	36.1	43.5	-7.4
H	197.445	27.8	16	16	27.8	43.5	-15.7
H	246.807	20.6	20	16	24.6	46.0	-21.4
H	296.172	16.5	22	16	22.5	46.0	-23.5

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 signs (-) in the margin column signify levels below the limits.

Test Engineer: Kenneth H. M. Lam

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : TX-Channel 24

Table 8, Handset

Radiated Emissions

Polarity	Frequency (MHz)	Reading (dBµV)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dBµV/m)	Limit (dBµV/m)	Margin (dB)
V	49.991	75.9	11	16	70.9	80.0	-9.1
V	99.981	40.6	11	16	35.6	43.5	-7.9
H	149.974	30.4	13	16	27.4	43.5	-16.1
H	199.962	25.3	16	16	25.3	43.5	-18.2
H	249.955	18.1	20	16	22.1	46.0	-23.9

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 signs (-) in the margin column signify levels below the limits.

Test Engineer: Kenneth H. M. Lam

3.6 Line Conducted Configuration Photograph - Base Unit

Worst Case Line-Conducted Configuration

Front View

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

3.7 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

* All readings are peak unless stated otherwise.

TEST PERSONNEL:

Tester Signature

Kenneth H. M. Lam, Engineer
Typed/Printed Name

September 30, 1998
Date

Company: Casio PhoneMate Inc. Date of Test: August 1, 1998
Model: Casio PhoneMate 2500
Mode : TX

Conducted Emissions

For electronic filing, testing results are saved with filename: conduct.pdf

EXHIBIT 4
FREQUENCY DEVIATION

4.0 **Frequency Deviation**

Two stability tests were performed -- Frequency stability versus input voltage and frequency stability versus temperature. For both measurements, a 1 GHz frequency counter with temperature controlled time base is used.

The counter is coupled to the transmitter by coiling a pickup wire over the transmitter antenna or directly attaching it to the antenna, assuming a 50Ω antenna is used.

The frequency stability is measured at room temperature by varying the supply voltage (AC or DC, as required) from 85% through 115% of normal operating voltage. This test is not applicable if the unit uses battery power. For battery powered equipment, the batteries are new and fully charged.

Stability versus temperature testing is carried out with the aid of a Tabai Espec Corp, Model PR-3F(W) environmental chamber. The following procedure is followed during testing:

1. Cool the device to -20^{o}C and allow it to stabilize for 30 minutes. Record the frequency.

2. Heat the oven to +50^{o}C and allow it to stabilize for 30 minutes. Record the frequency of operation.

3. Compare the measurements and a room temperature measurement against the assigned frequency tolerance.

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency.

4.1.1 Measurement Data - Base Unit

Channel Frequency

Channel	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance %
1	43.72000	43.71992	-0.00018
2	43.74000	43.73992	-0.00018
3	43.82000	43.81992	-0.00018
4	43.84000	43.83992	-0.00018
5	43.92000	43.91992	-0.00018
6	43.96000	43.95992	-0.00018
7	44.12000	44.11992	-0.00018
8	44.16000	44.15992	-0.00018
9	44.18000	44.17992	-0.00018
10	44.20000	44.19992	-0.00018
11	44.32000	44.31992	-0.00018
12	44.36000	44.35992	-0.00018
13	44.40000	44.39992	-0.00018

4.1.1 Measurement Data - Base Unit (Cont'd...)

Channel Frequency

Channel	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance %
14	44.46000	44.45992	-0.00018
15	44.48000	44.47992	-0.00018
16	46.61000	46.60992	-0.00017
17	46.63000	46.62992	-0.00017
18	46.67000	46.66992	-0.00017
19	46.71000	46.70992	-0.00017
20	46.73000	46.72992	-0.00017
21	46.77000	46.76992	-0.00017
22	46.83000	46.82992	-0.00017
23	46.87000	46.86991	-0.00019
24	46.93000	46.92991	-0.00019
25	46.97000	46.96991	-0.00019

4.1.2 Measurement Data - Base Unit - Channel 1

Frequency Stability

Frequency Stability versus Source Voltage

	Voltage (Vac)	**Assigned Frequency (kHz)**	**Measured Frequency (kHz)**	**Frequency deviation (kHz)**	**Tolerance % (x 10^{-3})**
Nominal	120	43,720.00	43,719.92	-0.08	-0.18
85 %	102	43,720.00	43,719.92	-0.08	-0.18
115 %	138	43,720.00	43,719.92	-0.08	-0.18

Frequency Stability versus Temperature

Temperature (°C)	**Assigned Frequency (kHz)**	**Measured Frequency (kHz)**	**Frequency deviation (kHz)**	**Tolerance (%) (x 10^{-3})**
-20	43,720.00	43,719.60	-0.40	-0.91
25	43,720.00	43,719.92	-0.08	-0.18
50	43,720.00	43,720.02	0.02	0.05

Notes: All readings taken at base of antenna.

Legend (where appropriate)

* No emission was recorded at this environment. Thus, no frequency deviation can be found.

4.1.2 Measurement Data - Base Unit - Channel 25

Frequency Stability

Frequency Stability versus Source Voltage

	Voltage (Vac)	**Assigned Frequency (kHz)**	**Measured Frequency (kHz)**	**Frequency deviation (kHz)**	**Tolerance % (x 10^{-3})**
Nominal	120	46,970.00	46,969.91	-0.09	-0.19
85 %	102	46,970.00	46,969.91	-0.09	-0.19
115 %	138	46,970.00	46,969.91	-0.09	-0.19

Frequency Stability versus Temperature

Temperature (°C)	**Assigned Frequency (kHz)**	**Measured Frequency (kHz)**	**Frequency deviation (kHz)**	**Tolerance (%) (x 10^{-3})**
-20	46,970.00	46,969.60	-0.40	-0.85
25	46,970.00	46,969.91	-0.09	-0.19
50	46,970.00	46,970.01	0.01	0.02

Notes: All readings taken at base of antenna.

Legend (where appropriate)

* No emission was recorded at this environment. Thus, no frequency deviation can be found.

Test Results : From the two sets of tables for Base Unit - channel 1 & channel 25, the largest deviation from nominal frequency was -400 Hz, which was -0.00091% compared to the standard test frequency. The required minimum standard is 0.01% in §15.233(g)

4.2.1 Measurement Data - Handset

Channel Frequency

Channel	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance %
1	48.76000	48.76095	0.00195
2	48.84000	48.84093	-0.00190
3	48.86000	48.86096	0.00196
4	48.92000	48.92095	0.00194
5	49.02000	49.02029	0.00060
6	49.08000	49.08095	0.00194
7	49.10000	49.10095	0.00193
8	49.16000	49.16093	0.00189
9	49.20000	49.20095	0.00193
10	49.24000	49.24095	0.00193
11	49.28000	49.28096	0.00195
12	49.36000	49.36095	0.00192
13	49.40000	49.40095	0.00192

4.2.1 Measurement Data - Handset (Cont'd...)

Channel Frequency

Channel	Assigned Frequency (MHz)	Measured Frequency (MHz)	Tolerance % (x 10^{-3})
14	49.46000	49.46096	0.00192
15	49.50000	49.50095	0.00192
16	49.67000	49.67098	0.00197
17	49.84500	49.84594	0.00189
18	49.86000	49.86096	0.00193
19	49.77000	49.77098	0.00197
20	49.87500	49.87598	0.00196
21	49.83000	49.83095	0.00196
22	49.89000	49.89098	0.00196
23	49.93000	49.93097	0.00194
24	49.99000	49.99095	0.00190
25	49.97000	49.97098	0.00196

4.2.2 Measurement Data - Handset - Channel 1

Frequency Stability

Frequency Stability versus Source Voltage

	Voltage (Vdc)	**Assigned Frequency (kHz)**	**Measured Frequency (kHz)**	**Frequency deviation (kHz)**	**Tolerance % (x 10^{-3})**
Nominal	3.6	48,760.00	48,760.95	0.95	1.95
85 %	3.06	48,760.00	48,760.80	0.80	1.64
115 %	4.14	48,760.00	48,760.93	0.93	1.91

Frequency Stability versus Temperature

Temperature (^{o}C)	**Assigned Frequency (kHz)**	**Measured Frequency (kHz)**	**Frequency deviation (kHz)**	**Tolerance (%) (x 10^{-3})**
-20	48,760.00	48,761.44	1.44	2.95
25	48,760.00	48,760.95	0.95	1.95
50	48,760.00	48,760.62	0.62	1.27

Notes: All readings taken at base of antenna.

Legend (where appropriate)

* No emission was recorded at this environment. Thus, no frequency deviation can be found.

4.2.2 Measurement Data - Handset - Channel 25

Frequency Stability

Frequency Stability versus Source Voltage

	Voltage (Vdc)	**Assigned Frequency (kHz)**	**Measured Frequency (kHz)**	**Frequency deviation (kHz)**	**Tolerance % (x 10^{-3})**
Nominal	3.6	49,970.00	49,970.98	0.98	1.96
85 %	3.06	49,970.00	49.970.82	0.82	1.64
115 %	4.14	49,970.00	49.970.96	0.96	1.92

Frequency Stability versus Temperature

Temperature (^{o}C)	**Assigned Frequency (kHz)**	**Measured Frequency (kHz)**	**Frequency deviation (kHz)**	**Tolerance (%) (x 10^{-3})**
-20	49,970.00	49,971.44	1.44	2.88
25	49,970.00	49,970.98	0.98	1.96
50	49,970.00	49,970.62	0.62	1.24

Notes: All readings taken at base of antenna.

Legend (where appropriate)

* No emission was recorded at this environment. Thus, no frequency deviation can be found.

Test Results : From the two sets of tables for Handset - channel 1 & channel 25, the largest deviation from nominal frequency was 1440 Hz, which was 0.00295% compared to the standard test frequency. The required minimum standard is 0.01% in §15.233(g)

EXHIBIT 5
OPERATING BANDWIDTH

5.0 **Operating Bandwidth**

For measurements of bandwidth, the following procedure was followed by the test engineer:

(1) Set up the equipment such that the antenna is located close enough to give a full scale deflection of the unmodulated carrier.

(2) Plot the unmodulated carrier. Any residual guard tones should be left in place, as these will be present at all times in actual operation.

(3) Plot the bandwidth with all alerting tones active. These include ringing and "call" signals from the base, and any intercom functions available in the handset.

(4) Determine the worst case bandwidth using the following procedure:

(a) Disable all internal modulations, if possible.

(b) Apply a 2500 Hz signal to the audio input.

(c) Vary the input signal level and observe on the spectrum analyzer the waveform. Vary unit until a maximum deflection is observed. Record the input signal level. Record and plot the bandwidth deflection (100% modulation) measured at -26 dBC.

(d) **FOR A DEVICE WITH MODULATION LIMITING:**

Apply a 2500 Hz signal with the input level 16 dB greater than the level which produces 50% modulation. Plot and record the bandwidth.

(e) **FOR A DEVICE WITHOUT MODULATION LIMITING:**

Apply a 2500 Hz signal with the input level set for 85% modulation. If not possible, maximize the modulation percentage. Plot and record bandwidth.

(5) Complete the tables on the following pages.

5.1 Base Unit - Channel 1

Operating Bandwidth

kHz from Carrier	Amplitude Down from Carrier (dB)	Limit (kHz)
-8.00/7.88	26	±10
- 20	66.73	N/A
+ 20	68.31	N/A

Base Unit - Channel 25

kHz from Carrier	Amplitude Down from Carrier (dB)	Limit (kHz)
-8.00/8.13	26	±10
- 20	64.01	N/A
+ 20	69.36	N/A

Test Result: From the above two tables for Base Unit-channel 1 & channel 25, the modulated signal from base unit closest to band edge was 1.87 kHz below the upper band edge 46.980 MHz according to §15.233(d)

Bandwidth Plot - Base Unit

For electronic filing, bandwidth plot of base unit is save with file name: bsbw.pdf

5.2 Handset - Channel 1

Operating Bandwidth

kHz from Carrier	Amplitude Down from Carrier (dB)	Limit (kHz)
-8.00/8.00	26	±10
- 20	65.09	N/A
+ 20	64.72	N/A

Handset - Channel 25

kHz from Carrier	Amplitude Down from Carrier (dB)	Limit (kHz)
-8.37/7.88	26	±10
- 20	68.52	N/A
+ 20	70.38	N/A

Test Result: From the above two tables for Handset-channel 1 & channel 25, the modulated signal from base unit closest to band edge was 1.63 kHz above the lower band edge 49.960 MHz according to §15.233(d)

Bandwidth Plot - Handset

For electronic filing, bandwidth plot of handset is save with filename: hsbw.pdf

EXHIBIT 6
EQUIPMENT PHOTOGRAPHS

6.0 **Equipment Photographs**

Photographs of the tested EUT are attached.

For electronic filing, photographs of the tested sample are saved with filename: ophoto1.jpg, ophoto2.jpg, (iphoto1.jpg) to (iphoto7.jpg)

EXHIBIT 7
PRODUCT LABELLING

7.0 **Product Labelling**

The FCC ID label and label location are attached.

7.1 Label Artwork

Figure 7.1 FCC ID Label

An engineering drawing of the label which will be permanently affixed to the unit is attached. This label will be attached to the unit at the location shown in Exhibit 7.2.

For electronic filing, label artwork is saved wit filename: label.pdf

7.2 Label Location

Figure 7.2 Label Location

For electronic filing, label location is saved with filename: location.pdf

EXHIBIT 8
TECHNICAL SPECIFICATIONS

8.0 **Technical Specifications**

The block diagram and circuit diagram are attached in Exhibits 8.1 and 8.2 respectively.

Figure 8.1 Cordless Telephone Block Diagram

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

Figure 8.2 Cordless Telephone Circuit Diagram

For electronic filing, circuit diagram is saved with filename: circuit.pdf, bcircuit.pdf & hcircuit.pdf

EXHIBIT 9
INSTRUCTION MANUAL

9.0 Instruction Manual

For electronic filing, preliminary copy of instruction manual is saved with filename: manual.pdf

Please note that the required FCC Information to the User can be found on Page 9 of this manual.

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

EXHIBIT 10
SECURITY CODE INFORMATION

10.0 Security code information

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

EXHIBIT 11
AUTOMATIC CHANNEL SELECTION

11.0 Automatic Channel Selection

For electronic filing, the mechanism of automatic channel selection is saved with filename: auto.pdf