Songwave Electronics Ltd.

Application
For
Certification

2.4GHz 40 Channel Analog Modulation Cordless Phone with Caller ID

(FCC ID: Q9420050401)

0506175
TL/ 0506175
May 4, 2005

Intertek Testing Services Hong Kong Ltd.
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MEASUREMENT/TECHNICAL REPORT

Songwave Electronics Ltd. - MODEL: SW-928
FCC ID: Q9420050401

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

Equipment Type : DXT - Cordless Telephone

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 [12-08-03 Edition] Provision.

Report prepared by:

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Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission for Base	config photos.doc
Test Setup Photo	Radiated Emission for Handset	config photos.doc
Test Report	Emission Plot	emission.pdf
Test Setup Photo	Conducted Emission	config photos.doc
Test Report	Conducted Emission Test Result	conduct.pdf
External Photo	External Photo	external photos.doc
Internal Photo	Internal Photo	internal photos_base.doc internal photos_handset.doc
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
User Manual	FCC Information	fcc information.pdf

EXHIBIT 1
GENERAL DESCRIPTION

1.0 General Description

1.1 Product Description

The SW-928 is a 2.4GHz 40 Channel Analog Modulation Cordless Phone with Caller ID. 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 (CID, up, down, Opt, Dir, Edit, Menu, Pause), 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 antennas used in base unit and handset are integral, and the tested sample is a prototype.

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 (2001). 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. 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 emissions testing, the equipment under test (EUT) was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. 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 plastic stand if necessary 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. 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. The spurious emissions more than 20 dB below the permissible value are not reported.

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.

2.3 Support Equipment List and Description

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system 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) Base Unit: An AC adaptor (120VAC to 9VDC 1000mA, Model: AD48-091000)
(2) Handset: A "Ni-MH" type rechargeable battery (3.6V 600mAh)

CABLES:

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

OTHERS:

(1) 2 x “AA” size 1.5VDC backup battery for Base Unit

2.4 Measurement Uncertainty

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

2.5 Equipment Modification

Any modifications installed previous to testing by Songwave Electronics Ltd. 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:

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

Signature

May 08, 2005 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
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

at 2410.000 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: config photos.doc

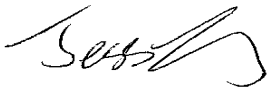
3.3 Radiated Emission Data - Base Unit

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

Judgement : Passed by 5.0 dB

****

TEST PERSONNEL:



Tester Signature

Jess Tang, Engineer
Typed/Printed Name

May 08, 2005
Date

Company: Songwave Electronics Ltd. Date of Test: April 5-29, 2005
Model: SW-928
Mode : TX-Channel 1

Table 1, Base unit

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
H	2400.250	93.5	34	29.4	88.9	94	-5.1
H	800.083	20.4	16	31.0	35.4	46	-10.6
H	*1600.167	47.6	34	27.2	40.8	54	-13.2
H	*4000.417	41.7	34	34.8	42.5	54	-11.5
V	*4800.500	42.0	34	34.9	42.9	54	-11.1
V	5600.583	41.0	34	36.6	43.6	54	-10.4
V	6400.667	40.3	34	36.9	43.2	54	-10.8
H	7200.750	38.6	34	37.9	42.5	54	-11.5

NOTES: 1. Peak detector is used for the emission measurement.

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 is used for the emission over 1000MHz.

5. Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9kHz to 25GHz.

* Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

Company: Songwave Electronics Ltd. Date of Test: April 5-29, 2005
Model: SW-928
Mode : TX-Channel 40

Table 2, Base unit

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
H	2410.000	93.6	34	29.4	89.0	94	-5.0
H	803.333	20.8	16	31.0	35.8	46	-10.2
H	*1606.667	47.7	34	27.2	40.9	54	-13.1
H	*4016.667	42.7	34	34.8	43.5	54	-10.5
V	*4820.000	43.2	34	34.9	44.1	54	-9.9
V	5623.333	40.6	34	36.6	43.2	54	-10.8
V	6426.667	39.9	34	36.9	42.8	54	-11.2
H	7230.000	38.1	34	37.9	42.0	54	-12.0

NOTES: 1. Peak detector is used for the emission measurement.

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 is used for the emission over 1000MHz.

5. Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9kHz to 25GHz.

* Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

3.4 Radiated Emission Configuration Photograph - Handset

Worst Case Radiated Emission

at 826.583 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: config photos.doc

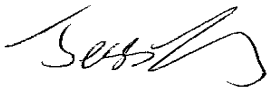
3.5 Radiated Emission Data - Handset

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

Judgement : Passed by 5.5 dB

****

TEST PERSONNEL:



Tester Signature

Jess Tang, Engineer
Typed/Printed Name

May 08, 2005
Date

Company: Songwave Electronics Ltd. Date of Test: April 5-29, 2005
Model: SW-928
Mode : TX-Channel 1

Table 3, Handset

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	2470.000	91.1	34	29.4	86.5	94	-7.5
V	823.333	25.2	16	31.0	40.2	46	-5.8
H	1646.667	49.6	34	27.2	42.8	54	-11.2
V	3293.333	45.7	34	31.9	43.6	54	-10.4
V	*4116.667	42.4	34	34.8	43.2	54	-10.8
V	*4940.000	42.0	34	34.9	42.9	54	-11.1

NOTES: 1. Peak detector is used for the emission measurement.

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 is used for the emission over 1000MHz.

5. Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9kHz to 25GHz.

* Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

Company: Songwave Electronics Ltd. Date of Test: April 5-29, 2005
Model: SW-928
Mode : TX-Channel 40

Table 4, Handset

Radiated Emissions

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	2479.750	91.5	34	29.4	86.9	94	-7.1
V	826.583	25.5	16	31.0	40.5	46	-5.5
H	1653.167	49.7	34	27.2	42.9	54	-11.1
V	3306.333	45.7	34	31.9	43.6	54	-10.4
V	*4132.917	42.4	34	34.8	43.2	54	-10.8
V	*4959.500	41.9	34	34.9	42.8	54	-11.2

NOTES: 1. Peak detector is used for the emission measurement.

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 is used for the emission over 1000MHz.

5. Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9kHz to 25GHz.

* Emission within the restricted band meets the requirement of part 15.205.

Test Engineer: Jess Tang

3.6 Radiated Emission on the bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band and they are at least 50dB below the carrier level at band edge (2400MHz and 2483.5MHz). It meets the requirement of section 15.249(d).

Emission Plot

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

3.7 Line Conducted Configuration Photograph - Base Unit

Worst Case Line-Conducted Configuration

at 16.935 MHz

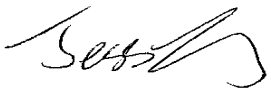
For electronic filing, the worst case line conducted configuration photographs are saved with filename: config photos.doc

3.8 Line Conducted Emission Data

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

Judgement : Passed by 15.7 dB margin

TEST PERSONNEL:



Tester Signature

Jess Tang, Engineer
Typed/Printed Name

May 08, 2005
Date

Company: Songwave Electronics Ltd. Date of Test: April 5-29, 2005
Model: SW-928

Conducted Emissions

For electronic filing, the conducted emission test result is saved with filename: conduct.pdf

EXHIBIT 4
EQUIPMENT PHOTOGRAPHS

4.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: external photos.doc & internal photos.doc

EXHIBIT 5
PRODUCT LABELLING

5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and location is saved with filename: label.pdf

EXHIBIT 6
TECHNICAL SPECIFICATIONS

6.0 **Technical Specifications**

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

EXHIBIT 7
INSTRUCTION MANUAL

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 is saved with filename: fcc information.pdf.

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

EXHIBIT 8
SECURITY CODE INFORMATION

8.0 Security code information

The telephone has an internal security code with 65,000 possible combinations. Each time the HANDSET is placed on the BASE UNIT, the code is randomly set to a new combination indicated by a beep.