June 15, 1999

Shenzhen Seg Technology Center
7/F., Blk. 2, Seg Science and Industry Park,
Huagiang Road North, Shenzhen,
China.
Tel. : 86 755 3262645
Fax. : 86 755 3346372

Dear Jacky Wang:

Enclosed you will find your file copy of a Part 15 Certification (FCC ID: OIYSEGSST9901). We have forwarded the original, along with your check for $940.00, to the FCC.

For your reference, FCC will normally take another 60 days for reviewing the report. Approval will then be granted when no query is sorted.

Please contact me if you have any questions regarding the enclosed material.

Sincerely,

Alfred Lo
Senior Supervisor

Enclosure

Shenzhen Seg Technology Center

Application
For
Certification

900MHz Direct Sequence Spread Spectrum
Cordless Telephone

(FCC ID: OIYSEGSST9901)

WO# 9901280
PKL/at
June 15, 1999

FCC ID: OIYSEGSST9901

LIST OF EXHIBITS

MEASUREMENT/TECHNICAL REPORT

Shenzhen Seg Technology Center - MODEL: SEG-SST-1
FCC ID: OIYSEGSST9901

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

Equipment Type: DSS-Part 15 Spread Spectrum 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:

Alfred Lo
Intertek Testing Service
2/F., Garment Centre,
576 Castle Peak Road,
Kowloon, Hong Kong.
Phone: 852-2173-8530
Fax: 852-2741-1693

Table of Contents

List of attached file

Exhibit type	File Description	filename
Cover Letter	Letter of Agency	letter.pdf
Test Report	Test Report	report.doc
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission for Base	base1.jpg, base2.jpg
Test Setup Photo	Radiated Emission for Handset	handset1.jpg, handset2.jpg
Test Report	Maximum Output Power Plot	bmaxop.pdf, hmaxop.pdf
Test Report	6 dB Bandwidth Plot	b6dB.pdf, h6dB.pdf
Test Report	Maximum Power Density Plot	bpowden.pdf, hpowden.pdf
Test Report	Out Band Antenna Conducted Emission Plot	bobantcon.pdf, hobantcon.pdf
Test Setup Photo	Conducted Emission	conduct1.jpg to conduct3.jpg
Test Report	Conducted Emission Test Result	conduct.pdf
Test Report	Jamming Test Setup	jamset.pdf
External Photo	External Photo	ophoto1.jpg, ophoto2.jpg
Internal Photo	Internal Photo	iphoto1.jpg to iphoto11.jpg
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

EXHIBIT 1
SUMMARY OF TEST RESULTS

1.0 Summary of Test

Shenzhen Seg Technology Center - MODEL: SEG-SST-1
FCC ID: OIYSEGSST9901

TEST	REFERENCE	RESULTS
Max. Output power	15.247(b)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(d)	Pass
Out of Band Antenna Conducted Emission	15.247(c)	Pass
Out of Band Radiated Emission	15.247 (c)	Not Applicable
Radiated Emission in Restricted Bands	15.35 (b)(c)	Pass
AC Conducted Emission	15.207	Pass
Radiated Emission from Digital Part	15.109	Pass
Processing Gain Measurements	15.247	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses a permanently attached antenna which, in accordance to Section 15.203, is considered sufficient to comply with the provisions of this section.

EXHIBIT 2
GENERAL DESCRIPTION

2.0 **General Description**

2.1 Product Description

The SEG-SST-1 is a 900MHz Direct Sequence Spread Spectrum Telephone. 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,*,#), six function keys R/P (Redial/Pause), Flash, Hold, Mute, Men (Memo) and Page. A Phone key is provided to control pick/release telephone line in a toggle base.

The base unit has an “Int’com” key, which is used to page the handset unit and to initiate intercom conversation.

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.

2.2 Related Submittal(s) Grants

This is an application for Certification of a DSS-Part 15 Spread Spectrum Transceiver. The device is also subject to Part 68 Registration.

2.3 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. All other measurements were made in accordance with the procedures in part 2 of CFR 47.

2.4 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 3
SYSTEM TEST CONFIGURATION

3.0 **System Test Configuration**

3.1 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 for frequencies below 1000MHz. The resolution is 1MHz or greater for frequencies above 1000MHz. All emissions greater than 20 dBμV/m are recorded.

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

3.2 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.

3.3 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

(2) Four shielded coaxial cable (50Ω) for processing gain measurement.

OTHERS:

(1) Two Mini-Circuits 20MHz-2GHz Power Splitter / Combiner with 50Ω input impedance (Processing Gain Measurement)

(2) Two DC-2GHz 20 dB Attentuators : (Processing Gain Measurement)

(3) Two DC-2GHz 3dB Attentuators : (Processing Gain Measurement)

(4) Marconi Communication Service Monitor, Model:2945

(5) Marconi 9kHz to 2.05GHz Signal Generator, Model: 2023B

3.4 Equipment Modification

Any modifications installed previous to testing by Shenzhen Seg Technology Center 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:

Alfred Lo
Senior Supervisor
Intertek Testing Services Hong Kong Ltd.
Agent for Shenzhen Seg Technology Center

_____Signature

June 15, 1999_____Date

EXHIBIT 4
MEASUREMENT RESULTS

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b) :

[ ] The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

[×] The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for maximum RES BW and power was read directly in dBm. External attenuation and cable loss were compensated by adding to SA raw reading.

For antennas with gains of 6 dBi or less, maximum allowed transmitter output is 1 watt (+30 dBm).

For antennas with gains greater than 6 dBi, transmitter output level must be decreased by an amount equal to (GAIN - 6) dBm.

(Base Unit) Maximum Antenna Gain = 2			
Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	903.6	18.1	64.6
Middle Channel:	914.4	18.5	70.8
High Channel:	926.4	18.7	74.1

Cable loss : 4.0 dB External Attenuation : 0 dB

Cable loss, external attenuation: [ ] included in OFFSET function
[x] added to SA raw reading

EUT Transmit Antenna Gain (dBi) + dBm max. Output level = 20.7 dBm (36 dBm or less)

Please refer to the attached plots for details:

Plot B1a: Low Channel Output Power
Plot B1b: Middle Channel Output Power
Plot B1c: High Channel Output Power

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b) - Continued:

(Handset Unit) Maximum Antenna Gain = 2 dB			
Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	903.6	17.6	57.5
Middle Channel:	914.4	17.0	50.1
High Channel:	926.4	16.5	44.7

Cable loss : 3.3 dB External Attenuation : 0 dB

Cable loss, external attenuation: [ ] included in OFFSET function
[x] added to SA raw reading

EUT Transmit Antenna Gain (dBi) + dBm max. Output level = 19.6 dBm (36 dBm or less)

Please refer to the attached plots for details:

Plot H1a: Low Channel Output Power
Plot H1b: Middle Channel Output Power
Plot H1c: High Channel output Power

For electronic filing, the above plots are saved with filename: bmaxop.pdf, hmaxop.pdf

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a)(2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

(Base Unit)	
Frequency (MHz)	6 dB Bandwidth (kHz)
914.4, 926.4	1160

Refer to the following plots for 6 dB bandwidth sharp:

Plot B2a: Low Channel 6 dB RF Bandwidth
Plot B2b: Middle Channel 6 dB RF Bandwidth
Plot B2c: High Channel 6 dB RF Bandwidth

For electronic filing, the above plots are saved with filename: b6dB.pdf

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a)(2) - Continued:

(Handset Unit)	
Frequency (MHz)	6 dB Bandwidth (kHz)
903.6, 914.4, 926.4	1160

Refer to the following plots for 6 dB bandwidth sharp:

Plot H2a: Low Channel 6 dB RF Bandwidth
Plot H2b: Middle Channel 6 dB RF Bandwidth
Plot H2c: High Channel 6 dB RF Bandwidth

For electronic filing, the above plots are saved with filename: h6dB.pdf

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

4.3 Maximum Power Density Reading, FCC Rule 15.247(d) :

The spectrum analyzer RES BW was set to 3 kHz. The START and STOP frequencies were set to the band edges of the maximum output passband. Id there is no clear maximum amplitude in any given portion of the band, it may be necessary to make measurements at a number of bands defined by several START and STOP frequency pairs. The specification calls for a 1 second interval at each 3 kHz bandwidth; total SWEEP TIME is calculated as follows:

SWEEP TIME (SEC) = (Fstop, kHz - Fstart, kHz)/3kHz

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated by adding to the SA raw reading.

(Base Unit)	
Frequency (MHz)	Power Density (dBm)
903.296	7.4

Frequency Span = 1500kHz

Sweep Time = Frequency Span/3kHz
= 500 seconds

Cable Loss: 4.0 dB

Refer to the following plots for power density data :

Plot B3a: Low Channel 6 dB power density
Plot B3b: Middle Channel 6 dB power density
Plot B3c: High Channel 6 dB power density

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

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

Maximum Power Density Reading, FCC Rule 15.247(d) - Continued:

(Handset Unit)	
Frequency (MHz)	Power Density (dBm)
903.294	6.9

Frequency Span = 1500kHz

Sweep Time = Frequency Span/3kHz
= 500 seconds

Cable Loss: 3.3 dB

Refer to the following plots for power density data :

Plot H3a: Low Channel 6 dB power density
Plot H3b: Middle Channel 6 dB power density
Plot H3c: High Channel 6 dB power density

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

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(c):

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Refer to the following plots for out of band conducted emissions data:

Plot B4a: Low Channel Emissions
Plot B4b: Middle Channel Emissions
Plot B4c: High Channel Emissions
Plot B4d.1 - B4d.2: Modulation Products Emissions
Plot H4a: Low Channel Emissions
Plot H4b: Middle Channel Emissions
Plot H4c: High Channel Emissions
Plot H4d.1 - H4d.2: Modulation Products Emissions

For electronic filing, the above plots are saved with filenames: bobantcon.pdf, hobantcon.pdf

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

4.5 Out of Band Radiated Emissions (for emissions in 4. above that are less than 26dB below carrier), FCC Rule 15.247(c):

For out of band emissions that are close to or that exceed the 20dB attenuation requirement described in the specification, radiated measurements were performed at a 3m separation distance to determine whether these emissions complied with the general radiated emission requirement.

[×] Not required
[ ] See attached data sheet

4.6 Transmitter Radiated Emissions in Restricted Bands, FCC Rule 15.35(b), (c):

Radiated emission measurements were performed from 30 MHz to 10000 MHz. Analyzer resolution is 100 kHz or greater for 30 MHz to 1000 MHz, 1 MHz for >1000 MHz.

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. All measurements were performed with peak detection unless otherwise specified.

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

4.7 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

4.8 Radiated Emission Configuration Photograph - Base Unit

Worst Case Radiated Emission

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: base1.jpg and base2.jpg

4.9 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 7.3 dB

****

TEST PERSONNEL:

Tester Signature

H. Y. Vu, Engineer
Typed/Printed Name

June 14, 1999.
Date

Company: Shenzhen Seg Technology Center Date of Test: April 11, 1999
Model: SEG-SST-1
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)
H	*2711.213	47.8	29.1	34	42.9	54.0	-11.1
H	*3614.597	45.1	32.8	34	43.9	54.0	-10.1

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: H.Y.Vu

Company: Shenzhen Seg Technology Center Date of Test: April 11, 1999
Model: SEG-SST-1
Mode : TX-Channel 10

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)
H	*2743.632	51.6	29.1	34	46.7	54.0	-7.3
H	*3657.788	46.9	32.8	34	45.7	54.0	-8.3

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: H. Y. Vu

Company: Shenzhen Seg Technology Center Date of Test: April 11, 1999
Model: SEG-SST-1
Mode : TX-Channel 20

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)
H	*2779.497	51.2	29.1	34	46.3	54.0	-7.7
H	*3705.838	44.6	32.8	34	43.4	54.0	-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 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: H. Y. Vu

4.10 Radiated Emission Configuration Photograph - Handset

Worst Case Radiated Emission

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: handset1.jpg and handset2.jpg

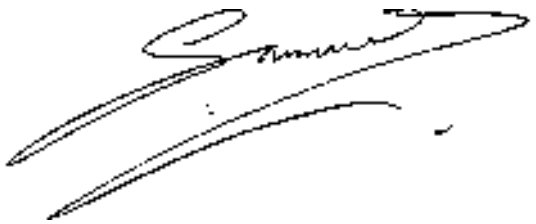
4.11 Radiated Emission Data - Handset

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

Judgement : Passed by 2.0 dB

****

TEST PERSONNEL:



Tester Signature

H. Y. Vu, Engineer
Typed/Printed Name

June 14, 1999
Date

Company: Shenzhen Seg Technology Center Date of Test: April 11, 1999
Model: SEG-SST-1
Mode : TX-Channel 1

Table 4, 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	*2711.126	54.6	29.1	34	49.7	54.0	-4.3

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: H.Y.Vu

Company: Shenzhen Seg Technology Center Date of Test: April 11, 1999
Model: SEG-SST-1
Mode : TX-Channel 10

Table 5, 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	*2743.54	56.7	29.1	34	51.8	54.0	-2.2

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 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: H. Y. Vu

Company: Shenzhen Seg Technology Center Date of Test: April 11, 1999
Model: SEG-SST-1
Mode : TX-Channel 20

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	*2779.980	56.9	29.1	34	52.0	54.0	-2.0

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: H. Y. Vu

Company: Shenzhen Seg Technology Center Date of Test: April 27, 1999
Model: SEG-SST-1

4.12 AC Line Conducted Emission, FCC Rule 15.207:

[ ] Not required; battery operation only

[×] Test data attached

4.13 Line Conducted Configuration Photograph - Base Unit

Worst Case Line-Conducted Configuration

at 0.45 MHz

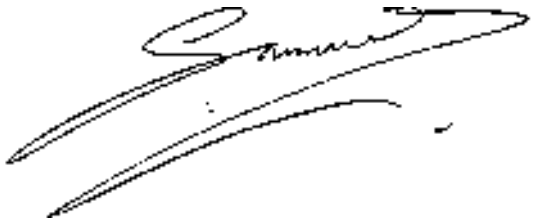
For electronic filing, the worst case line conducted configuration photographs are saved with filename: conduct1.jpg to conduct3.jpg

4.14 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 margin

TEST PERSONNEL:



Tester Signature

H. Y. Vu, Engineer
Typed/Printed Name

June 14, 1999
Date

4.15 Radiated Emissions from Digital Section of Transceiver (Transmitter), FCC Ref: 15.109

[ ] Not required - Not digital part

[×] Test results are attached

[ ] Included in the separated DOC report.

Company: Shenzhen Seg Technology Center Date of Test: April 11, 1999
Model: SEG-SST-1

Table 7

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	124.808	30.6	13	16	27.6	43.5	-15.9
H	182.413	33.3	20	16	37.3	43.5	-6.2
H	201.615	28.5	16	16	28.5	43.5	-15.0
H	220.880	31.8	17	16	32.8	46.0	-13.2
H	278.418	28.6	22	16	34.6	46.0	-11.4
H	288.017	31.2	22	16	37.2	46.0	-8.8
H	297.632	29.2	22	16	35.2	46.0	-10.8
H	316.880	33.7	23	16	40.7	46.0	-5.3
H	355.218	30.7	24	16	38.7	46.0	-7.3
H	374.427	28.7	24	16	36.7	46.0	-9.3
V	393.626	28.2	25	16	37.2	46.0	-8.8

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: H. Y. Vu

Company: Shenzhen Seg Technology Center Date of Test: May 20, 1999
Model: SEG-SST-1

4.16 Processing Gain Measurements, FCC Ref: 15247(e)

The processing gain shall be determined from the ratio in dB of the signal to noise ratio with the system spreading code turned OFF, to the signal to noise ratio with the system spreading code turned ON, as measured at the demodulated output of the receiver. The processing gain shall be at least 10 dB for a direct sequence spread spectrum system.

X	Refer to attached test procedure and data sheets.
	Refer to circuit analysis and processing gain calculations provided by manufacturer

4.17 Transmitter Duty Cycle Calculation and Measurements, FCC Rule 15.35(b), (c)

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEP function on the analyzer was set to ZERO SPAN. The transmitter ON time was determined from the resultant time-amplitude display:

Duty cycle = Maximum ON time in 100 msec/100

Duty cycle correction, dB = 20* log (DC)

	See attached spectrum analyzer chart (s) for transmitter timing
	See transmitter timing diagram provided by manufacturer
×	Not applicable, duty cycle was not used.

Processing Gain Measurement
Test Condition

Test condition

A. Bit Error Rate

The Bit Error Rate was recommended to be 10^{-3} by Rockwell Telecommunications, which is the manufacturer of the chipset, it is to ensure a satisfactory communication between Handset and Base unit.

B. Jamming Margin Method (Refer to the Rockwell's test procedure)

The Processing Gain was measured using the CW jamming margin method. Figure 1 & 2 shows the Test setup for the Handset and Base unit. The test consists of stepping a signal generator in 50 kHz increments across the passband of the system. At each point, the generator level required to produce the recommended Bit Error Rate (BER) (set at BER=10^{-3}) is recorded. This level is the jamming level. The output power of the transmitting unit is measured at the same point. The Jammer to Signal (J/S) ratio is then calculated. Discard the worst 20% of the J/S data points. The lowest remaining J/S ratio is used to calculate the processing gain.

The maximum implementation loss a system can claim in calculating processing gain is 2 dB. The equation to calculate the processing gain (Gp) is the following:

$Gp = (S/N)_o + Mj + Lsys$

Where Lsys = System losses,
Mj = jamming margin (J/S) in dB,
$(S/N)_o$ = signal to noise ratio required for a DBPSK system with BER of 10^{-3} = 8.0 dB

Therefore, the Processing gain

$Gp = 8.0\ dB + Mj + 2\ dB$

Jamming Test Setup

(For electronic filing, the setup is saved with filename: jamset.pdf)

Processing Gain Measurement
Set Up Procedure

FCC Test Support Program Application Note

What is needed:

A PC with two COMM ports
FCC Test Support Program
2 RX232 Adapter Boards
2 Modified Clip-on jumper wires
Unit-Under Test (UUT) - Handset or BaseStation or Both

Install the FCC Test Support Program onto the PC:

Run setup.exe which will install all the necessary files into the PC to run the visual basic program.

RS232 Adapter Boards:

Two Adapter boards will be needed to control the Handset and Basestation. The adapter is consist of an RS232 DB-9 connector (part number 613R08-004), an RS232 DRVR/RCVR IC (part number MAX242CWN) and a 4-pin JST shrouded connector (part number EHR-4 with 4 SEH-001T-P0.6). See Figure 1 for the schematic.

One end, as indicated on the schematic, goes to the PC COMM1 port and the other end goes to the serial test port on the Basestation (F5 on Rockwell's DCT BS schematics) or Handset (J2 on Rockwell's DCT HS schematics)

Modified Clip-On Jumper Wires:

In order to get access to the serial test port on the Handset or BaseStation, the UUT has to believe that itself is parked. To fake the "parked" condition, two jumper wires are needed. The jumper wire for the Basestation needs a resistor in series. To make the setup less confusing, it is recommended to make both jumper wires identical.

How to fake "parked" condition on the Basestation:

The Basestation thinks that the phone is parked when there is current flowing through charge pin (pin 12) on J4. To fake the "parked" condition, connect pin 12 to pin 10 (GND) with the 50 ohms jumper wire.

How to fake "parked" condition on the Handset:

The Handset thinks that itself is parked when there is a high voltage on Contact pin (CT3). To fake the "parked" condition, connect CT3 to VBAT. An obvious point will be the positive side of diode D1. *Please be aware that after the handset is parked, if the handset does not receive some commands through the serial interface in 50 seconds, the serial port will go into sleep mode.*

How to use the FCC test Support Program:

After the FCC test Support program is installed, run the fcc.exe file. Two options will be given, one is "Transmit Only test" and the other is "BER test". The "Transmit only test" is used to run most of the FCC required tests on DSSS cordless phone (FCC part 15.247a to d). The "BER test" is used to run the processing gain test (FCC part 15.247e).

The "transmit only test" is run in the continuous mode. The option buttons on the "transmit only test" are used to select the transmission parameters such as power level and channel number. Transmission starts when the START button is clicked. The transmission parameters may be changed, but the test stops and must be restarted by clicking the start button again.

The "BER test" is run in TDD mode. The option buttons are used to select power level and channel number. In addition, the master and slave relation between HS and BS can be selected. Once the START button is clicked, the status of the HS and BS will be reported in the test status window. When both "HS link established" and "BS link established" appear in the status window, the BER will be reported at a 10 second interval.

Test setup for Transmit Only test:

The "transmit only test" needs COMM1 only. No calibration is needed for this test.
1) Power the UUT (either the handset or the basestation).
2) Connect the UUT to COMM1 via the RS232 adapter board.
3) Use jumper wire to fake the "parked" condition.
4) Execute the FCC test support program to select desired parameters.
5) Remove the connector and the jumper from the UUT before exit the test program.
6) Continue on to run the real FCC tests.

Test setup for BER test:

The “BER test” needs both COMM1 and COMM2. The HS and BS need to be calibrated for this test.

1) Power both the handset and basestation.
2) Physically park the HS to the BS to calibrate the system.
3) Remove the HS from the BS.
4) Connect BS to COMM1 via the RS232 adapter board.
5) Use jumper wire to fake the “parked” condition on the BS.
6) Connect HS to COMM2 via the second RS232 adapter board.
7) Use jumper wire to fake the “parked” condition on the HS. (Don’t wait too long to do the next step)
8) Execute the FCC test support program to monitor the BER.

Processing Gain Measurement
Result

Company: Shenzhen Seg Technology Center
Model: SEG-SST-1
Mode: TX-Channel 1

Date of Test: May 20, 1999

Table 8, Base Unit

Processing Gain Measurement

Jammer Frequency (MHz)	J (dBm)	S (dBm)	Mj (J/S)	Processing Gain (dB)
903.270	-8.2	-8.58	0.38	10.38
903.320	-7.3	-8.58	1.28	11.28
903.370	-7.9	-8.58	0.68	10.68
903.420	-7.9	-8.58	0.68	10.68
903.470	-4.6	-8.58	3.98	13.98
903.570	-2.5	-8.58	6.08	16.08
903.620	-3.9	-8.58	4.68	14.68
903.670	-3.4	-8.58	5.18	15.18
903.770	-4.7	-8.58	3.88	13.88
903.870	-8.1	-8.58	0.48	10.48
903.920	-6.7	-8.58	1.88	11.88
904.020	-7.8	-8.58	0.78	10.78
904.070	-1.2	-8.58	7.38	17.38
904.120	-3.2	-8.58	5.38	15.38
904.170	-3.3	-8.58	5.28	15.28
904.220	-4.6	-8.58	3.98	13.98

Processing Gain : **10.38 dB**

Note:
1. GP = (S/N_O) + Mj + L_{SYS} = 8.0dB + Mj + 2dB
2. S = Signal Level
3. J = Output level of Signal Generator
4. Worst 20 % of Jamming Margin data (not shown) have been discarded (Section 15.247(e))

Company: Shenzhen Seg Technology Center Date of Test: May 20, 1999
Model: SEG-SST-1
Mode: TX-Channel 10

Table 9, Base Unit

Processing Gain Measurement

Jammer Frequency (MHz)	J (dBm)	S (dBm)	Mj (J/S)	Processing Gain (dB)
914.070	-8.5	-8.89	0.39	10.39
914.120	-7.2	-8.89	1.69	11.69
914.170	-8.0	-8.89	0.89	10.89
914.270	-4.4	-8.89	4.49	14.49
914.370	-2.4	-8.89	6.49	16.49
914.420	-3.5	-8.89	5.39	15.39
914.470	-3.4	-8.89	5.49	15.49
914.570	-4.6	-8.89	4.29	14.29
914.670	-8.0	-8.89	0.89	10.89
914.720	-6.7	-8.89	2.19	12.19
914.770	-8.4	-8.89	0.49	10.49
914.820	-7.7	-8.89	1.19	11.19
914.870	-1.1	-8.89	7.79	17.79
914.920	-3.1	-8.89	5.79	15.79
914.970	-3.0	-8.89	5.89	15.89
915.020	-4.5	-8.89	4.39	14.39

Processing Gain : **10.39 dB**

Note:
1. $GP = (S/N_O) + Mj + L_{SYS} = 8.0dB + Mj + 2dB$
2. S = Signal Level
3. J = Output level of Signal Generator
4. Worst 20 % of Jamming Margin data (not shown) have been discarded (Section 15.247(e))

Company: Shenzhen Seg Technology Center Date of Test: May 20, 1999
Model: SEG-SST-1
Mode: TX-Channel 20

Table 10, Base Unit

Processing Gain Measurement

Jammer Frequency (MHz)	J (dBm)	S (dBm)	Mj (J/S)	Processing Gain (dB)
926.870	-0.8	-8.46	7.66	17.66
926.920	-3.8	-8.46	4.66	14.66
926.970	-2.5	-8.46	5.96	15.96
927.070	-1.0	-8.46	7.46	17.46
927.120	0.2	-8.46	8.66	18.66
927.170	0.2	-8.46	8.66	18.66
927.220	2.2	-8.46	10.66	20.66
927.270	3.2	-8.46	11.66	21.66
927.320	3.2	-8.46	11.66	21.66
927.370	2.8	-8.46	11.26	21.26
927.420	2.8	-8.46	11.26	21.26
927.470	3.2	-8.46	11.66	21.66
927.520	3.2	-8.46	11.66	21.66
927.570	3.2	-8.46	11.66	21.66
927.620	3.2	-8.46	11.66	21.66
927.670	3.2	-8.46	11.66	21.66

Processing Gain : **14.66 dB**

Note:
1. GP = (S/N_O) + Mj + L_{SYS} = 8.0dB + Mj + 2dB
2. S = Signal Level
3. J = Output level of Signal Generator
4. Worst 20 % of Jamming Margin data (not shown) have been discarded (Section 15.247(e))

Company: Shenzhen Seg Technology Center
Model: SEG-SST-1
Mode: TX-Channel 1

Date of Test: May 20, 1999

Table 11, Handset

Processing Gain Measurement

Jammer Frequency (MHz)	J (dBm)	S (dBm)	Mj (J/S)	Processing Gain (dB)
903.640	-1.3	-7.84	6.54	16.54
903.740	-4.8	-7.84	3.04	13.04
903.890	-6.3	-7.84	1.54	11.54
903.940	-6.7	-7.84	1.14	11.14
904.040	1.3	-7.84	9.14	19.14
904.090	-3.7	-7.84	4.14	14.14
904.140	-0.2	-7.84	7.64	17.64
904.190	-4.3	-7.84	3.54	13.54
904.240	-0.5	-7.84	7.34	17.34
904.290	1.0	-7.84	8.84	18.84
904.340	2.7	-7.84	10.54	20.54
904.390	3.1	-7.84	10.94	20.94
904.440	3.1	-7.84	10.94	20.94
904.490	2.6	-7.84	10.44	20.44
904.540	2.9	-7.84	10.74	20.74
904.590	3.1	-7.84	10.94	20.94

Processing Gain : **11.14 dB**

Note:
1. $GP = (S/N_O) + Mj + L_{SYS} = 8.0dB + Mj + 2dB$
2. S = Signal Level
3. J = Output level of Signal Generator
4. Worst 20 % of Jamming Margin data (not shown) have been discarded (Section 15.247(e))

Company: Shenzhen Seg Technology Center Date of Test: May 20, 1999
Model: SEG-SST-1
Mode: TX-Channel 10

Table 12, Handset

Processing Gain Measurement

Jammer Frequency (MHz)	J (dBm)	S (dBm)	Mj (J/S)	Processing Gain (dB)
914.100	-6.0	-7.82	1.82	11.82
914.150	-6.9	-7.82	0.92	10.92
914.200	-7.3	-7.82	0.52	10.52
914.250	-3.6	-7.82	4.22	14.22
914.350	-2.0	-7.82	5.82	15.82
914.400	-3.0	-7.82	4.82	14.82
914.450	-2.2	-7.82	5.62	15.62
914.550	-3.5	-7.82	4.32	14.32
914.650	-7.3	-7.82	0.52	10.52
914.700	-5.9	-7.82	1.92	11.92
914.800	-6.7	-7.82	1.12	11.12
914.850	-1.1	-7.82	6.72	16.72
914.900	-2.2	-7.82	5.62	15.62
914.950	-3.2	-7.82	4.62	14.62
915.000	-3.9	-7.82	3.92	13.92
915.050	0.2	-7.82	8.02	18.02

Processing Gain : **10.52 dB**

Note:
1. GP = (S/N_O) + Mj + L_{SYS} = 8.0dB + Mj + 2dB
2. S = Signal Level
3. J = Output level of Signal Generator
4. Worst 20 % of Jamming Margin data (not shown) have been discarded (Section 15.247(e))

Company: Shenzhen Seg Technology Center Date of Test: May 20, 1999
Model: SEG-SST-1
Mode: TX-Channel 20

Table 13, Handset

Processing Gain Measurement

Jammer	J	S	Mj	Processing

Frequency (MHz)	(dBm)	(dBm)	(J/S)	Gain (dB)
926.100	-6.0	-8.33	2.33	12.33
926.150	-7.0	-8.33	1.33	11.33
926.250	-3.9	-8.33	4.43	14.43
926.350	-2.8	-8.33	5.53	15.53
926.400	-4.3	-8.33	4.03	14.03
926.450	-2.5	-8.33	5.83	15.83
926.550	-4.1	-8.33	4.23	14.23
926.650	-7.7	-8.33	0.63	10.63
926.700	-6.3	-8.33	2.03	12.03
926.750	-8.0	-8.33	0.33	10.33
926.800	-7.2	-8.33	1.13	11.13
926.850	-1.5	-8.33	6.83	16.83
926.900	-2.8	-8.33	5.53	15.53
926.950	-3.5	-8.33	4.83	14.83
927.000	-4.4	-8.33	3.93	13.93
927.050	-0.3	-8.33	8.03	18.03

Processing Gain : **10.33 dB**

Note:
1. GP = (S/N_O) + Mj + L_{SYS} = 8.0dB + Mj + 2dB
2. S = Signal Level
3. J = Output level of Signal Generator
4. Worst 20 % of Jamming Margin data (not shown) have been discarded (Section 15.247(e))

EXHIBIT 5
EQUIPMENT PHOTOGRAPHS

5.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: ophoto1.jpg to ophoto2.jpg & iphoto1.jpg to iphoto11.jpg

EXHIBIT 6
PRODUCT LABELLING

6.0 **Product Labelling**

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

EXHIBIT 7
TECHNICAL SPECIFICATIONS

7.0 **Technical Specifications**

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

EXHIBIT 8
INSTRUCTION MANUAL

8.0 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 at the "FCC Requirement" section of this manual.

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

EXHIBIT 9
SECURITY CODE INFORMATION

9.0 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.