

***EXHIBIT B***

***Measurement Report***

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# **MEASUREMENT REPORT of CORDLESS TELEPHONE**

**Applicant** : Senao International Co., Ltd  
**Model** : SN-525ST  
**EUT** : 900 MHz Digital Spread Spectrum Telephone  
**FCC ID** : NI302050010000

Test by :

***Training Research Co., Ltd.***

TEL : 886-2-7820280 FAX : 886-2-7857408

No. 5-3, Lane 21, Yen Chiu Yuan Rd., Sec. 4, Taipei, 11521 Taiwan R.O.C.

# CERTIFICATION

**We here by verify that:**

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (1992) as a reference. All test were conducted by *Training Research Co., Ltd.*, No. 5-3, Lane 21, Yen-Chiu-Yuan Rd., Sec. 4, Taipei, 11521 Taiwan, R.O.C. Also, we attest to the accuracy of each.

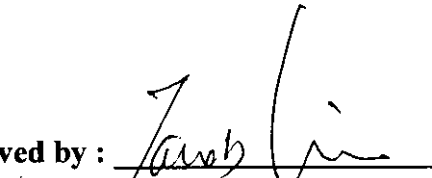
We further submit that the energy emitted by the sample EUT tested as described in the report is in compliance with the technical requirements set forth in the FCC Rules Part 15 Subpart C Section 15.233.

**Applicant** : Senao International Co., Ltd  
**Equipment** : 900MHz Digital Spread Spectrum Telephone  
**Model No.** : SN-525SST  
**FCC ID** : NI302050010000  
**Report No.** : S3915481  
**Test Date** : April 15, 1998

Prepared by :

  
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## I. GENERAL

### 1.1 Introduction

The following measurement report is submitted on behalf of Senao International Co., Ltd. in support of a Cordless Telephone certification in accordance with Part 2 Subpart J and Part 15 Subpart A and C of the Commission's Rules and Regulations.

### 1.2 Description of EUT

**EUT** : 900MHz Digital Spread Spectrum Telephone  
**Model** : SN-525SST  
**FCC ID** : NI302050010000  
**Frequency Range** : Base: 902 - 928 MHz  
                               Handset : 902 - 928 MHz  
**Support Channel** : 20 Channel  
**Modulation Skill** : TDMA / Spread spectrum  
**Security Code** : 12-bit P/N code, 8-bit scramble, 16-bit 2D  
**Power Type** : Base Powered by 120 Vac 60 Hz 10W / 9 Vdc 600 mA  
                               Handset powered by 3.6 V / 600 mA.  
**Power Cord** : Nonshielded  
**Phone Line** : RJ-11C => Nonshielded, 7' long, Plastic hoods, No bead  
  
**Applicant** : Senao International Co., Ltd.  
                               2F, No. 531, Chung Cheng Rd.,  
                               Hsin-Tien , Taipei, Taiwan .

### 1.3 Description of Support Equipment

In order to construct the minimum testing , following equipment were used as the support units.

**PSTN Simulator:** TRC Public Switched Telephone Network Simulator  
 Model No. : RC-PSTN-130  
 Serial No.: N/A  
**Notebook** : CER Notebook  
 Model No.: 386SL  
 Serial No.: 001855  
 Power Type: Linear  
 Power Core: unshielded, 6' long, Plastic hoods, No ferrite bead  
 FCC ID: Q8V486S

## 1.4 Configuration of System Under Test

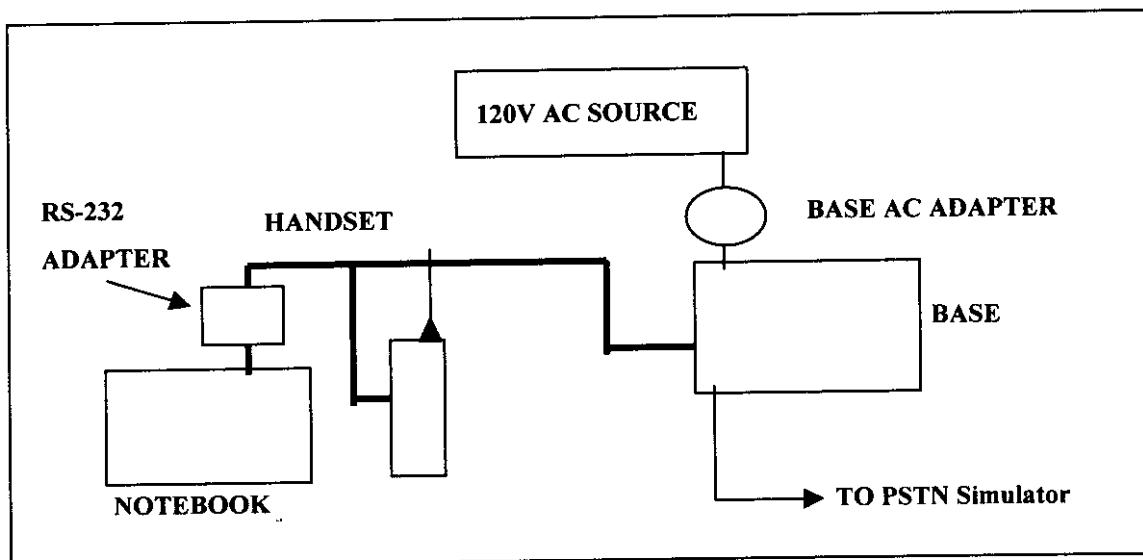


Fig. 1 Configuration of system under test

The tests below are run with the DCT transmitter set at high power in TDD mode. A serial port from a computer to the DCT UUT is needed to force selection of output power level and channel number.

The setting up procedure was recorded in Appendix A.

## 1.5 Verify the frequency and channel

### 1.5.1 Verify the Frequency Pairs

Channel	Base (MHz)	Handset (MHz)	Channel	Base (MHz)	Handset (MHz)
1	903.75705	904.91310	11	915.68147	915.59373
2	904.81473	904.79670	12	916.79937	916.80043
3	906.01130	906.00745	13	918.04500	918.04538
4	907.15800	907.17390	14	919.25046	919.26000
5	908.41860	908.40284	15	920.39976	920.39674
6	909.59774	909.56213	16	921.59832	921.60045
7	910.81230	910.79844	17	922.79462	922.73570
8	912.00220	912.01145	18	924.00045	924.00490
9	914.25116	914.20350	19	925.62306	925.61200
10	914.16320	915.78813	20	926.42505	925.32550

#### Note:

1. This is for sure that all frequencies are in 902 MHz to 928 MHz.
2. Section 15.31(m): Measurements on intentional radiators or receivers shall be performed at three frequencies for operating frequency range over 10 MHz. (The locations of these frequencies one near the top, one near the middle and one near the bottom.)
3. After test, the EUT operating frequencies are in 903.75 MHz to 926.42 MHz. So all the items as followed in testing report are need to test these three frequencies: top: channel 1, middle: channel 10, bottom: channel 20.

## **1.6 Test Procedure**

All measurements contained in this report were performed mainly according to the techniques described in ANSI C63.4 (1992) and the pre-setup was written on Appendix A, the detail setup was written on each test item.

## **1.7 Location of the Test Site**

The radiated emissions measurements required by the rules were performed on the three-meter, open-field test site maintained by Training Research Co., Ltd. No. 5-3, Lane 21, Yen-Chiu-Yuan Rd., Sec. 4, Taipei, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in a shielded enclosure also located at Training Research Co., Ltd. 1F, No. 569, Chung Hsiao E. Sec. 7, Taipei, Taiwan, R.O.C. Training Research Co., Ltd. is listed by the FCC as a facility available to do measurement work for others on a contract basis.

## **1.8 General Test Condition**

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests was chosen as that which produced the highest emission levels. However, only those conditions which the EUT was considered likely to encounter in normal use were investigated.

During test , the base and handset are tested separately. They were set in high power and continuously transmitting mode that controlled by computer. The ch01, ch10 and ch20 of base and handset were all tested .The setting up procedure is recorded on Appendix A.



## II. Section 15.207: Power line conducted emissions for AC powered units

### 2.1 Test Condition & Setup

The power line conducted emission measurements were performed in a shielded enclosure. The EUT was assembled on a wooden table which is 80 centimeters high, was placed 40 centimeters from the backwall and at least 1 meter from the sidewall.

Power was fed to the EUT from the public utility power grid through a line filter and EMCO Model 3825/2 Line Impedance Stabilization Networks (LISNs). The LISN housing, measuring instrumentation case, ground plane, etc., were electrically bonded together at the same RF potential. The Spectrum analyzer was connected to the AC line through an isolation transformer. The 50-ohm output of the LISN was connected to the spectrum analyzer directly. Conducted emission levels were in the CISPER quasi-peak detection mode. The analyzer's 6 dB bandwidth was set to 9 KHz. No post-detector video filter was used.

The spectrum was scanned from 450 KHz to 30 MHz. The physical arrangement of the test system and associated cabling was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude and frequency. All spurious emission frequencies were observed. The highest emission amplitudes relative to the appropriate limit were measured and have been recorded in paragraph 2.4.

There are three test conditions in this test item, the test procedure description as follows:

1. Base station transmit only:  
Using the RS-232 port of notebook and Rockwell software to control the base, handset.  
Then making access to the mode of continuous transmission. Three channels are tested, one in the top (CH01), one in the middle (CH10) and the other in bottom (CH20).
2. Idle state (handset park, on hook mode)
3. Intercom mode (off hook mode)

The setting up procedure is recorded on Appendix A.

### 2.2 List of Test Instruments

Manufacturer	Device	Model	Input impedance
Hewlett Packard	100Hz-1.5GHz Spectrum Analyzer	HP8591EM	50.00
EMCO	Line Impedance Stabilization Network	3825/2	50.00
TRC	Shielded Room	TRC-SR!	N/A

## 2.4 Test Result of Conducted Emissions

### 2.4.1 Base station transmit only

The following table shows a summary of the highest emissions of power line conducted emissions on the HOT and NATURAL conductors of the EUT power cord.

**Model No.** : SN-525SST  
**EUT** : 900MHz Digital Spread Spectrum Telephone

Table 1 Power Line Conducted Emissions (Channel 01)

(Channel 01)Power Connected Emissions			FCC Class B	
Conductor	Frequency (MHz)	Peak Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
Line 1	14.505	20.36	48	-27.64
	22.988	20.57	48	-27.43
	23.936	29.51	48	-18.49
	25.176	23.85	48	-24.15
	25.685	22.68	48	-25.32
	26.923	21.10	48	-26.90
	***			
LINE 2	4.361	18.42	48	-29.58
	9.734	18.64	48	-29.36
	23.499	19.91	48	-28.09
	24.009	27.94	48	-20.06
	25.248	21.31	48	-26.69
	26.923	19.16	48	-28.84
	***			

**NOTE :**

1. Margin = Peak Amplitude - Limit
2. A "+" sign in the margin column means the emission is OVER the Class B Limit and "-" sign of means UNDER the Class B limit.

Table 2 Power Line Conducted Emissions (Channel 10)

Power	Connected	Emissions	FCC	Class B
Conductor	Frequency (MHz)	Peak Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
LINE 1	19.995	19.64	48	-28.36
	24.009	26.68	48	-21.32
	25.176	25.83	48	-22.17
	26.341	20.71	48	-27.29
	26.851	19.35	48	-28.65
	***			
LINE 2	8.705	18.68	48	-29.32
	24.009	24.92	48	-23.08
	25.176	23.35	48	-24.65
	25.831	21.99	48	-26.01
	26.414	20.64	48	-27.36
	26.923	20.38	48	-27.62
	***			

## NOTE :

1. Margin = Peak Amplitude - Limit
2. A "+" sign in the margin column means the emission is OVER the Class B Limit and "-" sign of means UNDER the Class B limit.

Table 3 Power Line Conducted Emissions (Channel 20)

Power	Connected	Emissions	FCC	Class B
Conductor	Frequency (MHz)	Peak Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
Line1	14.652	21.08	48	-26.92
	20.068	24.30	48	-23.70
	20.287	25.77	48	-22.23
	21.017	23.58	48	-24.42
	23.134	22.90	48	-25.10
	23.426	24.57	48	-23.43
	24.009	27.37	48	-20.63
	25.176	25.08	48	-22.92
	25.685	22.02	48	-25.98
	27.942	20.65	48	-27.35
LINE2	1.779	18.73	48	-29.27
	17.728	18.56	48	-29.44
	20.068	21.46	48	-26.54
	20.287	21.85	48	-26.15
	22.113	21.94	48	-26.06
	24.009	26.84	48	-21.16
	25.176	23.49	48	-24.51
	25.758	22.34	48	-25.66
	26.414	21.51	48	-26.49
	26.851	19.86	48	-28.14

## NOTE :

1. Margin = Peak Amplitude- Limit
2. A "+" sign in the margin column means the emission is OVER the Class B Limit and "-" sign of means UNDER the Class B limit.

Table 4 Power Line Conducted Emissions (Idle state)

Power	Connected	Emissions	FCC	Class B
Conductor	Frequency (MHz)	Peak Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
LINE1	4.582	17.66	48	-30.34
	12.158	18.29	48	-29.71
	24.009	22.35	48	-25.65
	25.176	23.87	48	-24.13
	26.778	22.29	48	-25.71
	26.996	20.59	48	-27.41
	***			
LINE 2	2.222	18.29	48	-29.71
	11.938	18.38	48	-29.62
	20.068	18.90	48	-29.10
	20.725	20.20	48	-27.80
	24.009	28.06	48	-19.94
	25.176	28.12	48	-19.88
	26.341	23.32	48	-24.68
	26.923	20.92	48	-27.08
	***			

## NOTE :

1. Margin = Peak Amplitude - Limit .
2. A "+" sign in the margin column means the emission is OVER the Class B Limit and "-" sign of means UNDER the Class B limit.

Table 5 Power Line Conducted Emissions (Intercom)

Power	Connected	Emissions	FCC	Class B
Conductor	Frequency (MHz)	Peak Amplitude (dBuV)	Limit (dBuV)	Margin (dB)
Line 1	19.337	20.07	48	-27.93
	20.068	27.68	48	-20.32
	20.360	27.37	48	-20.63
	21.236	23.05	48	-24.95
	22.623	20.84	48	-27.16
	23.280	21.60	48	-26.40
	24.009	26.21	48	-21.79
	25.176	23.97	48	-24.03
	25.685	21.86	48	-26.65
Line 2	10.910	18.41	48	-29.59
	19.337	19.34	48	-28.66
	19.775	24.41	48	-23.59
	20.360	23.93	48	-24.07
	22.405	22.08	48	-25.92
	23.645	24.30	48	-23.70
	24.009	26.82	48	-21.18
	25.176	30.26	48	-17.74
	25.685	21.43	48	-26.57
	26.996	21.58	48	-26.42
	***			

## NOTE :

1. Margin = Peak Amplitude - Limit .
2. A "+" sign in the margin column means the emission is OVER the Class B Limit and "-" sign of means UNDER the Class B limit.

### III. Section 15.247(a)(2): Bandwidth for direct sequence system.

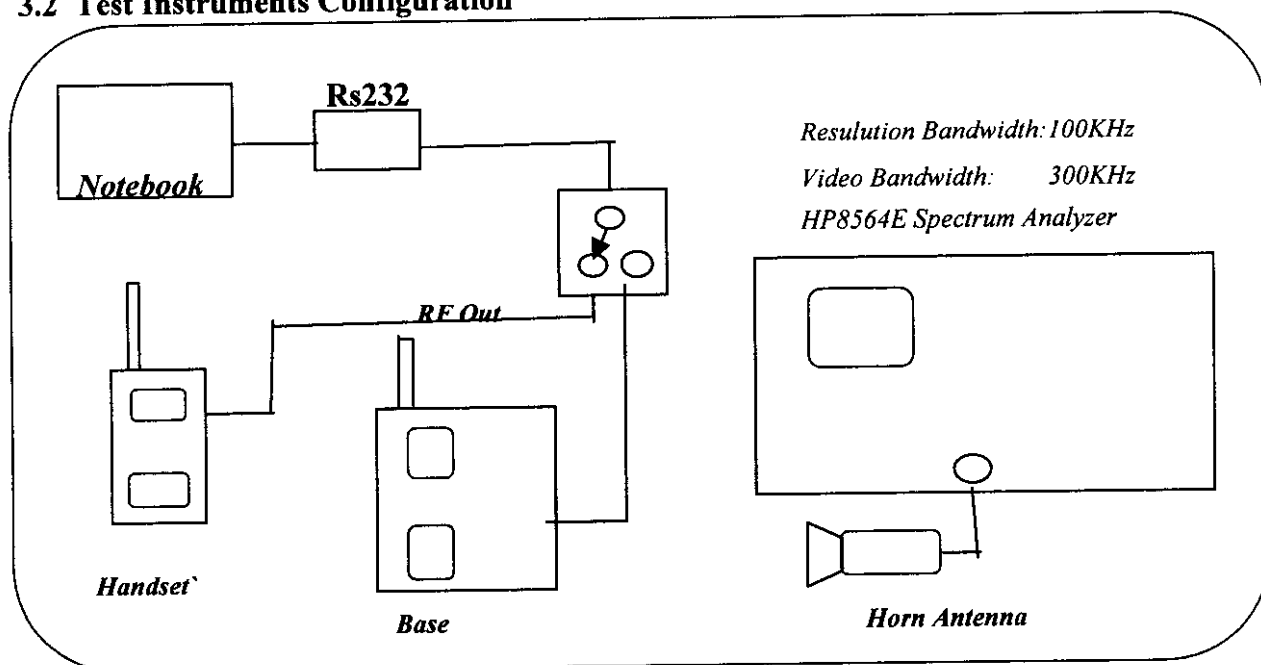
#### 3.1 Test Condition & Setup

The transmitter bandwidth measurements were performed in a shielded enclosure. The EUT was placed on a wooded table which is 0.8 meters height. the EUT was set to transmit continuously. Various channels were also investigated to find the maximum occupied bandwidth. The minimum 6 dB bandwidth shall be at least 500 KHz.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 KHz. Set the span >> RBW. The detector function was set to peak and hold mode to clearly observe the components.

Setting up procedure is written on Appendix A.

#### 3.2 Test Instruments Configuration



*P.S.A serial port from notebook computer to control the EUT at maximal power output and channel Number.*

Fig 10. Test Configuration of bandwidth for direct sequence system

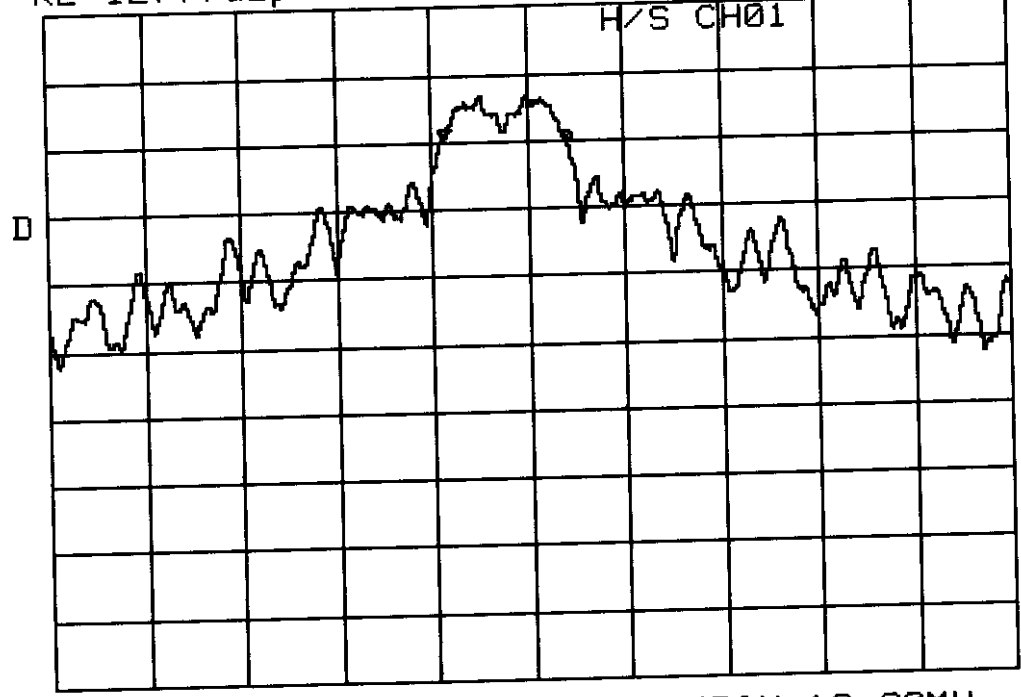
#### 3.3 List of Test Instruments

Manufacturer	Device	Model	Input Impedance
Hewlett Packard	.9KHz – 40 GHz Spectrum Analyzer	HP8564E	50.00

ATTEN 40dB  
RL 127.7dB $\mu$ V 10dB/

$\Delta$ MKR -.83dB  
1.28MHz

H/S CH01



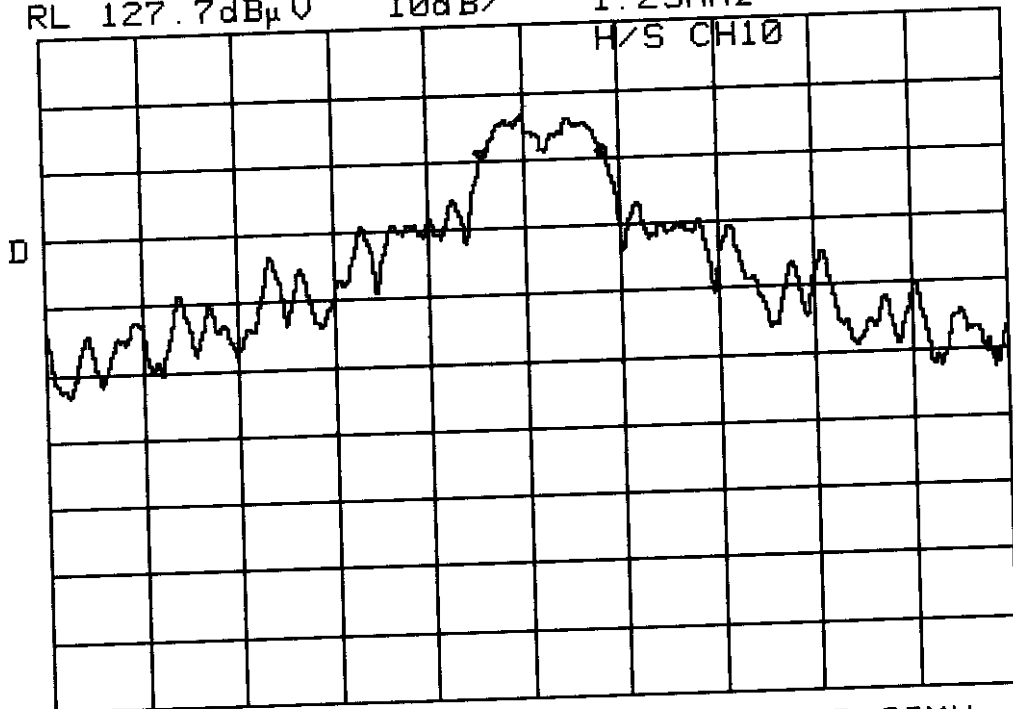
CENTER 905.07MHz SPAN 10.00MHz  
\*RBW 100kHz \*VBW 300kHz SWP 50.0ms



ATTEN 40dB  
RL 127.7dB $\mu$ V 10dB/

$\Delta$ MKR -.17dB  
1.25MHz

H/S CH10



CENTER 915.40MHz  
\*RBW 100kHz \*VBW 300kHz

SPAN 10.00MHz  
SWP 50.0ms

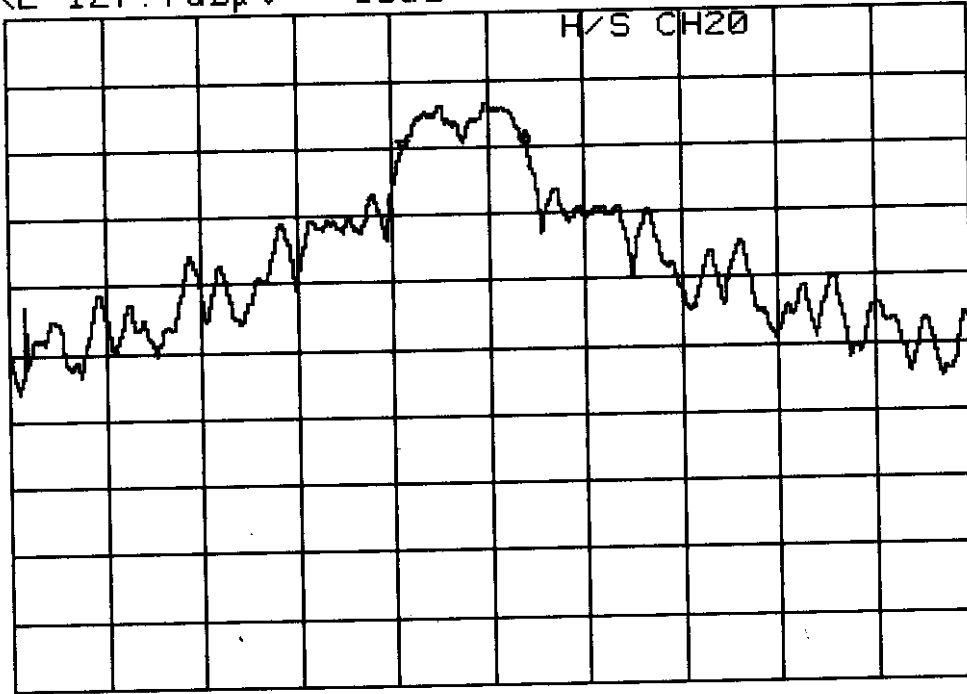
ATTEN 40dB  
RL 127.7dB $\mu$ V

10dB/

$\Delta$ MKR .34dB  
1.28MHz

H/S CH20

D



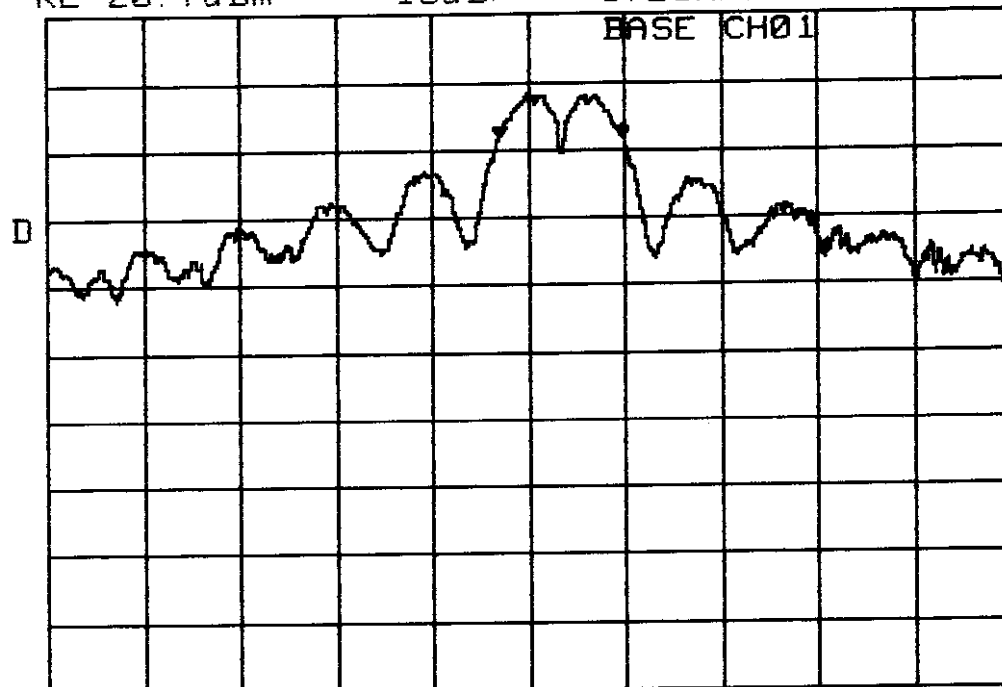
CENTER 927.87MHz  
\*RBW 100kHz \*VBW 300kHz

SPAN 10.00MHz  
SWP 50.0ms

ATTEN 40dB  
RL 20.7dBm

10dB/

$\Delta$ MKR -.34dB  
1.28MHz



CENTER 903.27MHz  
\*RBW 100kHz \*UBW 300kHz

SPAN 10.00MHz  
SWP 50.0ms

ATTEN 40dB  
RL 20.7dBm

10dB/

$\Delta$ MKR -.83dB  
1.28MHz

ATTEN 40dB

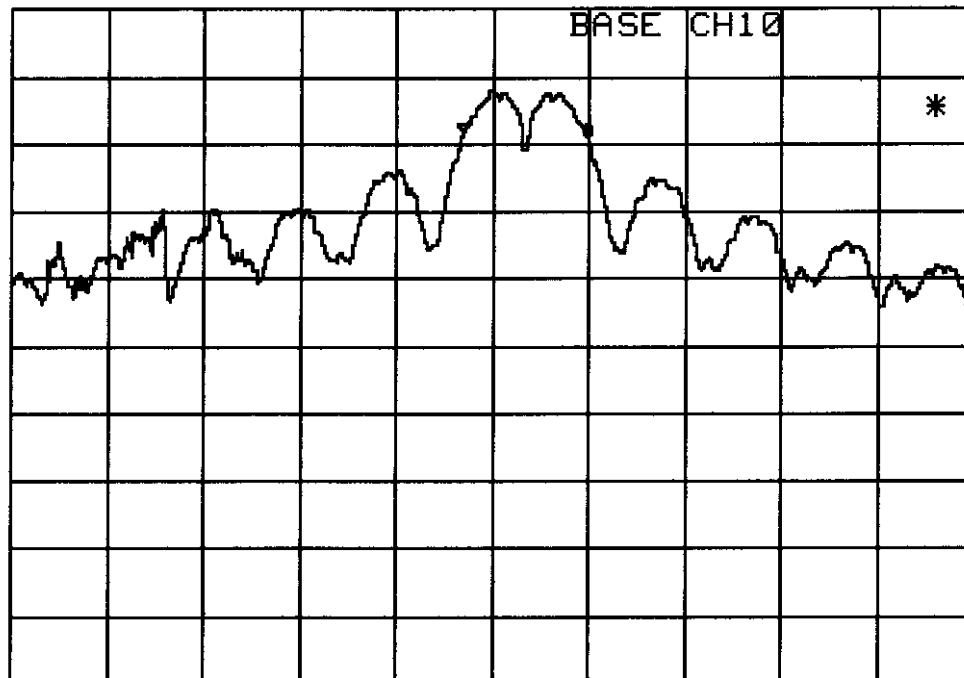
RL 20.7dBm

10dB/

$\Delta$ MKR -.83dB

1.28MHz

BASE CH10



CENTER 914.07MHz

\*RBW 100kHz

\*VBW 300kHz

SPAN 10.00MHz

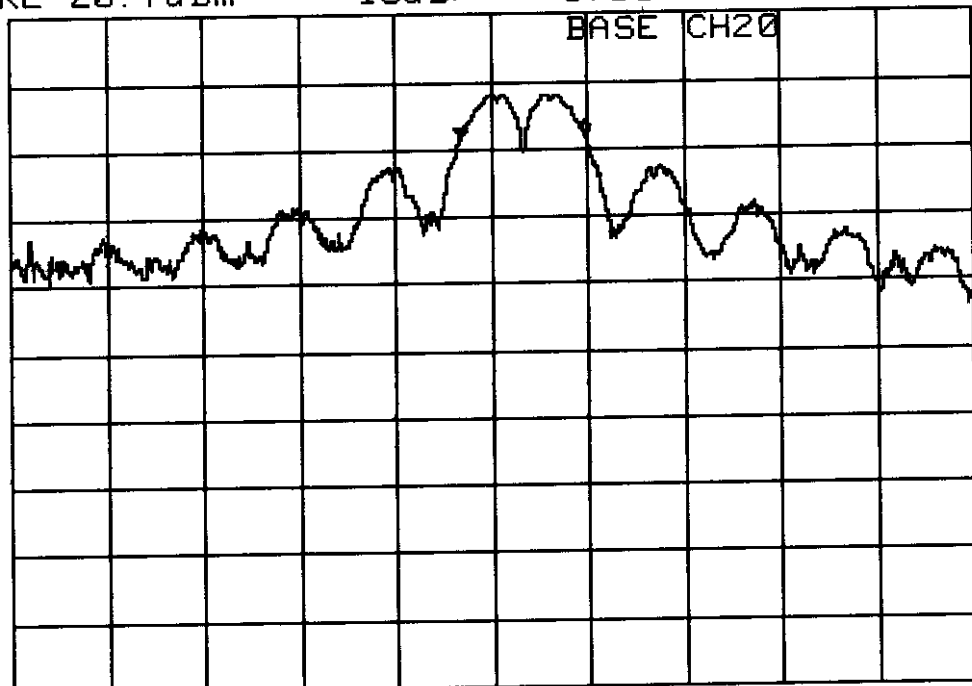
SWP 50.0ms

ATTEN 40dB  
RL 20.7dBm

10dB/

$\Delta$ MKR .17dB  
1.30MHz

BASE CH20



CENTER 926.07MHz  
\*RBW 100kHz

\*VBW 300kHz

SPAN 10.00MHz  
SWP 50.0ms

### **3.4 Test Result of Bandwidth**

#### **Bandwidth of Channel 1**

Bandwidth of Base : 1.28 MHz  
Bandwidth of Handset : 1.28 MHz  
The min. 6 dB BW at least : 500 KHz

#### **Bandwidth of Channel 10**

Bandwidth of Base : 1.28 MHz  
Bandwidth of Handset : 1.25 MHz  
The min. 6 dB BW at least : 500 KHz

#### **Bandwidth of Channel 20**

Bandwidth of Base : 1.30 MHz  
Bandwidth of Handset : 1.28 MHz  
The min. 6 dB BW at least : 500 KHz

Note :

1. The data in the above table are summarize the following attachment spectrum analyzer hard copy.
2. The attachment follow by this page and there is no page number.

## IV. Section 15.247(B): Power Output

### 4.1 Test Condition & Setup

Prior to open-field testing, the EUT was placed in a shielded enclosure and scanned at a close distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration which produced the highest emissions was noted so it could be reproduced later during the open-field tests. This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, open-field test site. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 8591A Spectrum Analyzer, EMCO Biconical Antenna (Model 3110) for 30 - 200 MHz, EMCO Log-Periodic Antenna (Model 3146) for 200 - 1000 MHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarization.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. The spectrum analyzer HP8568b used on this testing for frequency 30MHz to 1000MHz. No post-detector video filters were used in the test. Set the RB= 3 MHz, VB = 3MHz and the span = 5 MHz. The analyzer was operated in the maximum hold mode.

There are two test condition apply in this test item, the test procedure description as the following:

(1) Base and handset station transmit only :

Using the RS-232 port of notebook and Rockwell software to control the base , handset. Then making access to the mode of continuous transmission. three channel is tested, one in the top (CH01), one in the middle (CH10) and the other in bottom (CH20).

With the transmitter operating from a fully charged battery and using the internal antenna,

Radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to low, mid and high channels in the 902-928 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency.

#### 4.2 List of Test Instruments

Manufacturer	Device	Model	Input Impedance
Hewlett Packard	100Hz-1.5GHz Spectrum Analyze	HP8568B	50.00
Hewlett Packard	50kHz-22GHz Spectrum Analyzer	HP8592B	50.00
Hewlett Packard	10KHz-1GHz Quasi-peak Adapte	HP85650A	50.00
Hewlett Packard	20Hz-2GHz RF Preselector	HP85685A	50.00
Anritsu	0.1-1200MHz Preamplifier	MH648A	50.00
EMCO	20-300MHz Biconical Antenna	3110.00	50.00
EMCO	200-1000MHz Log-Periodic Antenna	3146.00	50.00
TRC	Open Field Test Site	TRC-OFTS1	N/A
TRC	Notch Filter	N/A	50.00



### 4.3 Test Result of Fundamental Emissions

The peak values of fundamental emissions from the EUT at various antenna heights , antenna polarization, EUT orientation , etc. are recorded on the following .

**Model No.** : SN-525SST

**EUT** : 900MHz Digital Spread Spectrum Telephone

Table 6 Open Field Fundamental Emissions

Channel	Frequency (MHz)	A.P. (H/V)	A.H. (CM)	Table (degree)	Amplitude (Peak ) (dBuV/m)	E.R.P.(Peak)	
						mW	dBm
Base 01	903.75	H	100.00	149	108.51	12.97	11.12
		V	100.00	48	115.78	69.22	18.40
Base 10	914.163	H	100.00	243	107.25	9.71	9.87
		V	100.00	156	112.71	34.14	15.33
Base 20	926.425	H	100.00	57	104.88	5.62	7.49
		V	100.00	167	111.51	25.89	14.13
Handset 01	904.913	H	100.00	37	99.4	1.59	2.01
		V	100.00	176	109.2	15.21	11.82
Handset 10	915.788	H	100.00	238	93.81	0.43	-3.66
		V	100.00	142	106.89	8.93	9.50
Handset 20	925.325	H	100.00	76	96.76	0.86	-0.65
		V	100.00	241	109.64	16.83	12.26

Note :

1. A.P. means antenna polarization, horizontal and vertical.
2. A.H. means antenna height.
3. Table means turntable turning position.
4. Amplitude means the fundamental emission measured.
5. Effective Radiation Power ( E.R.P.) =  $(E d)^2 / 30G$

E is the measured maximum field strength in V/m utilizing the maximum hold mode RBW ( 3MHz ).

G is the numeric gain of the transmitting antenna over an isotropic radiator (1.64).

d is the distance in meters from which the field strength was measured (3M).

Example : the Max Radiation Emission of base ch01 = 115.78 dBuV/m

$$10^{(115.78/20)} \times 10^{-6} = 0.61517 \text{ V}$$

$$\begin{aligned} \text{E.R.P.} &= (0.61517 \times 3)^2 / 49.2 = 69.22 \text{ mW} = 10 \times \log( 69.22 \text{ mW}/1\text{Mw}) \\ &= 18.40 \text{ dBm} \end{aligned}$$

## **V. Section 15.247 ( C )( 2 ): Spurious emissions ( Radiated )**

### **5.1 Test Condition & Setup**

Prior to open-field testing, the EUT was placed in a shielded enclosure and scanned at a close distance to determine its emission characteristics. The physical arrangement of the EUT was varied (within the scope of arrangements likely to be encountered in actual use) to determine the effect on the unit's emanations in amplitude, directivity, and frequency. The exact system configuration which produced the highest emissions was noted so it could be reproduced later during the open-field tests. This was done to ensure that the final measurements would demonstrate the worst-case interference potential of the EUT.

Final radiation measurements were made on a three-meter, open-field test site. The EUT system was placed on a nonconductive turntable which is 0.8 meters height, top surface 1.0 x 1.5 meter.

The spectrum was examined from 30 MHz to 1000 MHz using an Hewlett Packard 8591A Spectrum Analyzer, EMCO Biconical Antenna (Model 3110) for 30 - 200 MHz, EMCO Log-Periodic Antenna (Model 3146) for 200 - 1000 MHz and spectrum was examined from 1 GHz to 18GHz using an Hewlett Packard 8592A Spectrum Analyzer, EMCO Horn Antenna (Model 3115) for 1 G - 18 GMHz.

At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from one to four meters to find the maximum emission levels. Measurements were taken using both horizontal and vertical antenna polarizations.

Appropriate preamplifiers were used for improving sensitivity and precautions were taken to avoid overloading or desensitizing the spectrum analyzer. there are two spectrum analyzers use on this testing ,HP8568b for frequency 30MHz to 1000MHz, and HP8592A for frequency 1 GHz to 18 GHz. No post-detector video filters were used in the test. The spectrum analyzer's 6 dB bandwidth was set to 120 KHz (spectrum was examined from 30 MHz to 1000 MHz), the spectrum analyzer's 6 dB bandwidth was set to 1 MHz (spectrum was examined from 1 GHz to 18GHz) and the analyzer was operated in the maximum hold mode.

There are two test condition apply in this test item, the test procedure description as the following:

(1) Base and handset station transmit only :

Using the RS-232 port of notebook and Rockwell software to control the base , handset. Then making access to the mode of continuous transmission. three channel is tested, one in the top (CH01), one in the middle (CH10) and the other in bottom (CH20).

With the transmitter operating from a fully charged battery and using the internal antenna, radiates spurious emissions falling within the restricted bands of 15.209 were measured at operating frequencies corresponding to low, mid and high channels in the 902-928 MHz band.

The actual field intensity in decibels referenced to 1 microvolt per meter (dBuV/m) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency.

**For frequency between 30MHz to 1000MHz**

$$F_{Ia} \text{ (dBuV/m)} = F_{Ir} \text{ (dBuV)} + \text{Correction Factors}$$

$F_{Ia}$  : Actual Field Intensity

$F_{Ir}$  : Reading of the Field Intensity

$$\text{Correction Factors} = \text{Antenna Factor} + \text{Cable Loss}$$

**For frequency between 1 GHz to 18 GHz**

$$F_{Ia} \text{ (dBuV/m)} = F_{Ir} \text{ (dBuV)} + \text{Correction Factor} - \text{Duty Cycle}$$

$F_{Ia}$  : Actual Field Intensity

$F_{Ir}$  : Reading of the Field Intensity

$$\text{Correction Factors} = \text{Antenna Factor} + \text{Cable Loss} - \text{Distance Factor (9.54dB)} - \text{Amplifier Gain}$$

The setting up procedure is recorded on Appendix A.

**5.2 List of Test Instruments**

Manufacturer	Device	Model	Input Impedance
Hewlett Packard	9KHz-2.9 GHz Spectrum Analyze	HP8594EM	50.00
Hewlett Packard	50kHz-22GHz Spectrum Analyzer	HP8592A	50.00
Hewlett Packard	10KHz-1GHz Quasi-peak Adapte	HP85650A	50.00
Hewlett Packard	20Hz-2GHz RF Preselector	HP85685A	50.00
Hewlett Packard	1GHz-26.5GHz Preamplifier	HP8449B	50.00
Anritsu	0.1-1200MHz Preamplifier	MH648A	50.00
EMCO	20-300MHz Biconical Antenna	3110.00	50.00
EMCO	200-1000MHz Log-Periodic Antenna	3146.00	50.00
EMCO	1G-18GMHz Double Ridge Antenna	3115.00	50.00
TRC	Open Field Test Site	TRC-OFTS1	N/A
TRC	Notch Filter	N/A	50.00
TRC	Horn Antenna with Amplifier	TRC1	50.00

**5.2.1 Duty Cycle Factor Measurement**

The duty cycle factor measurement is performed in a shield enclosure . The test condition and setup is as same as paragraph III . Set the RB = 1MHz, VB=1MHz, and span = 0 MHz. Link the base and handset in the ch 10. Then get the Time of duty and cycle as follow page .

$$\text{The duty cycle factor} = 20 \log ( T_{\text{duty}} / T_{\text{cycle}} ) = 20 \log ( 1.95 / 4.05 ) = -6.34$$

10:39:00 APR 17, 1998

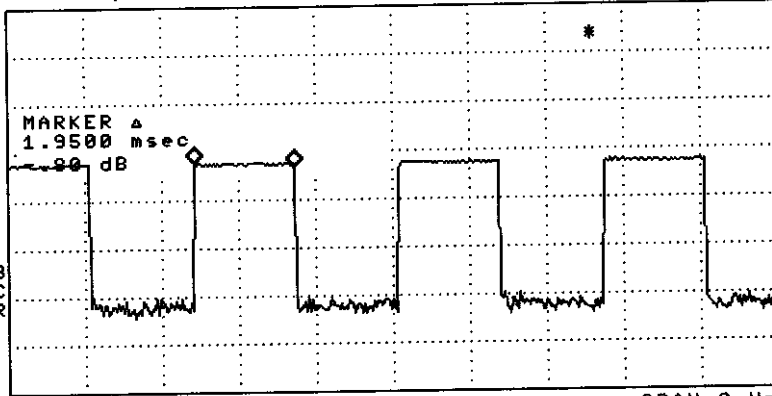
MKRΔ 1.9500 msec

REF 100.0 dBμV AT 10 dB

-1.80 dB

PEAK  
LOG  
10  
dB/

VA SB  
SC FC  
ACORR



MARKER  
NORMAL

MARKER  
AMPTD

SELECT  
1 2 3 4

MARKER 1  
ON OFF

More  
1 of 3

CENTER 918.986 MHz SPAN 0 Hz  
L #RES BW 3.0 MHz #VBW 3 MHz #SWP 15.0 msec

10:39:24 APR 17, 1998

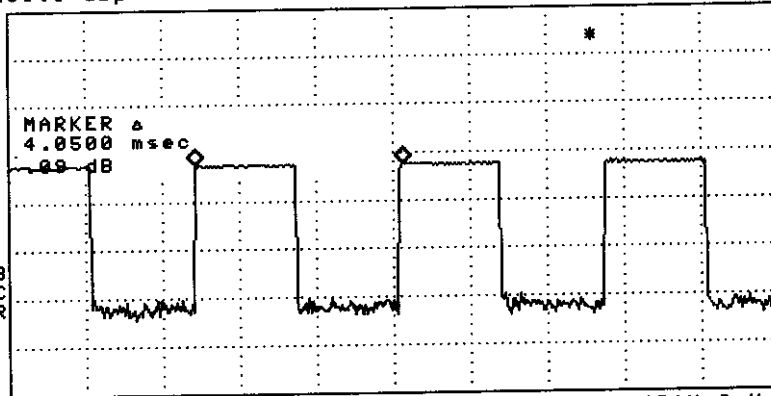
MKRΔ 4.0500 msec

REF 100.0 dBμV AT 10 dB

.09 dB

PEAK  
LOG  
10  
dB/

VA SB  
SC FC  
ACORR



MARKER  
NORMAL

MARKER  
AMPTD

SELECT  
1 2 3 4

MARKER 1  
ON OFF

More  
1 of 3

CENTER 918.986 MHz SPAN 0 Hz  
L #RES BW 3.0 MHz #VBW 3 MHz #SWP 15.0 msec

#### 5.4 Test Result of Second Harmonic

Set the spectrum RB= 3 MHz , VB = 3MHz and span = 5MHz. The correction factors of the second harmonic is . The second harmonic must lower 20 dB than the fundamental .

**Model No. :** SN-525SST

**EUT :** 900MHz Digital Spread Spectrum Telephone

Table 31. Second Harmonic Attenuation

Channel	Fundamental (MHz)	Fundamental (dBuV/m)	2 <sup>nd</sup> Harmonic (MHz)	2 <sup>nd</sup> Har. (dBuV/m)	Result (F/H dB)	Limit (dBc)	Margin (dBc)
B/S CH 01	903.75	115.78	1808	48.63	67.15	20.00	47.15
B/S CH 10	914.163	112.71	1829	46.63	66.08	20.00	46.08
B/S CH 20	926.425	111.51	1852	46.80	64.71	20.00	44.71
H/S CH 01	904.913	109.2	1807	56.13	53.07	20.00	33.07
H/S CH 10	915.788	106.89	1831	53.63	53.26	20.00	33.26
H/S CH 20	925.325	109.64	1855	50.80	58.84	20.00	38.84

**Note :**

1. The data in the above table are summarize the following attachment spectrum analyzer hard copy.
2. The attachment follow by this page and there is no page number.
3. Result = Fundamental – 2<sup>nd</sup> Harmonic must over 20 dBc .

## 5.5 Test Result of Spurious Radiated Emissions

### 5.5.1 Base and handset station transmit only

The highest peak values of radiated emissions from the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

**Model No. :** SN-525SST

**EUT :** 900MHz Digital Spread Spectrum Telephone

Table 7. Open Field Radiated Emissions For 30MHz -1 GMHz [Channel 1, Base Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table ( ° )			Limit (dBuV/m)	Margin (dB)
480.001	42.84	100.00	334	-15.34	27.50	46	-18.50
499.201	44.28	100.00	114	-14.73	29.55	46	-16.45
518.400	43.06	100.00	61	-14.01	29.05	46	-16.95
547.202	41.70	100.00	239	-12.71	28.99	46	-17.01
787.201	39.86	100.00	230	-6.75	33.11	46	-12.89
777.601	40.93	100.00	89	-6.73	34.20	46	-11.80
806.400	39.38	100.00	225	-6.67	32.71	46	-13.29
840.003	38.37	100.00	4	-6.41	31.96	46	-14.04

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 8. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 1, Base Horizontal]

Radiated Emission—				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table ( ° )				Limit (dBuV/m)	Margin (dB)
***								

Note:

1. Margin = Corrected - Limit.
2. peak amplitude+ Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB .

Table 9. Open Field Radiated Emissions For 30MHz -1 GMHz [Channel 1, Base Vertical]

Radiated Emission				Correction Factors	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)		Limit (dBuV/m)	Margin (dB)
480.001	54.39	100.00	141	-15.34	39.05	46	-6.95
499.201	56.36	100.00	195	-14.73	41.63	46	-4.37
518.400	55.94	100.00	199	-14.01	41.93	46	-4.07
547.202	52.45	100.00	160	-12.71	39.74	46	-6.26
787.201	43.09	100.00	82	-6.75	36.34	46	-9.66
777.601	43.95	100.00	8	-6.73	37.22	46	-8.78
806.400	43.45	100.00	313	-6.67	36.78	46	-9.22
840.003	40.35	100.00	0	-6.41	33.94	46	-12.06

Note:

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors= Corrected

Table 10. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 1, Base Vertical]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)		Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude+ Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB

Table 11. Open Field Radiated Emissions For 30 MHz -1 GMHz [Channel 10, Base Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table ( $^{\circ}$ )			Limit (dBuV/m)	Margin (dB)
343.683	45.88	100.00	160	-18.74	27.14	46	-18.86
384.001	43.13	100.00	79	-17.21	25.92	46	-20.08
480.000	42.27	100.00	83	-15.34	26.93	46	-19.07
499.201	43.04	100.00	55	-14.73	28.31	46	-17.69
720.000	38.07	100.00	51	-7.10	30.97	46	-15.03
787.201	40.11	100.00	348	-6.75	33.36	46	-12.64
806.801	37.63	100.00	42	-6.67	30.96	46	-15.04
859.202	37.31	100.00	172	-6.09	31.22	46	-14.78

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 12. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 10, Base Horizontal]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table ( $^{\circ}$ )				Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor+ Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB



Table 13. Open Field Radiated Emissions For 30 MHz -1 GHz [Channel 10, Base Vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
343.683	41.45	100.00	353	-18.74	22.71	46	-23.29
384.001	44.94	100.00	106	-17.21	27.73	46	-18.27
480.000	48.10	100.00	124	-15.34	32.76	46	-13.24
499.201	50.58	100.00	160	-14.73	35.85	46	-10.15
720.000	39.19	100.00	295	-7.10	32.09	46	-13.91
787.201	39.90	100.00	83	-6.75	33.15	46	-12.85
806.801	38.23	100.00	53	-6.67	31.56	46	-14.44
859.202	38.89	100.00	261	-6.09	32.80	46	-13.20

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 14. Open Field Radiated Emissions For 1 GHz -18 GHz [Channel 10, Base Vertical]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)				Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB

Table 15. Open Field Radiated Emissions For 30 MHz -1 GHz [Channel 20, Base Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
350.402	40.26	401.00	231	-18.39	21.87	46	-24.13
364.801	43.34	100.00	231	-17.69	25.65	46	-20.35
412.804	41.78	100.00	325	-17.01	24.77	46	-21.23
499.201	43.41	100.00	111	-14.73	28.68	46	-17.32
537.602	39.01	100.00	337	-13.132	25.88	46	-20.12
768.001	38.86	100.00	290	-6.83	32.03	46	-13.97
796.801	38.92	100.00	48	-6.71	32.21	46	-13.79
830.401	39.02	100.00	177	-6.52	32.50	46	-13.50

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

3. Table 16. Open Field Radiated Emissions For 1 GHz -18 GHz [Channel 20, Base Horizontal]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)				Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB

Table 17. Open Field Radiated Emissions For 30 MHz -1 GHz [Channel 20, Base Vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
350.402	43.20	100.00	127	-18.39	24.81	46	-21.19
364.801	43.42	100.00	60	-17.69	25.73	46	-20.27
412.804	50.73	100.00	196	-17.01	33.72	46	-12.28
499.201	55.61	100.00	178	-14.73	40.88	46	-5.12
537.602	47.82	100.00	273	-13.13	34.69	46	-11.31
768.001	41.92	100.00	35	-6.83	35.09	46	-10.91
796.801	42.77	100.00	325	-6.71	36.06	46	-9.94
830.401	40.00	100.00	2	-6.52	33.48	46	-12.52

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 18. Open Field Radiated Emissions For 1 GHz -18 GHz [Channel 20, Base Vertical]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)				Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB

Table 19. Open Field Radiated Emissions For 30 MHz -1 GMHz [Channel 01, Handset Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
374.401	56.22	100.00	52	-17.40	38.82	46.00	-7.18
384.002	56.64	100.00	60	-17.21	39.43	46	-6.57
393.601	57.07	100.00	47	-17.06	40.01	46	-5.99
403.399	46.42	100.00	189	-16.98	29.44	46	-16.56
441.601	52.54	100.00	6	-16.56	35.98	46	-10.02
518.399	41.17	100.00	36	-14.01	27.16	46	-17.37
566.399	40.65	100.00	19	-12.02	28.63	46	-17.37

*RB passed  
peaks  
w/o DC*

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 20. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 01, Handset Horizontal]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)				Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB

Table 21. Open Field Radiated Emissions For 30 MHz -1 GMHz [Channel 01, Handset Vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table ( $^{\circ}$ )			Limit (dBuV/m)	Margin (dB)
374.401	48.79	100.00	269	-17.40	31.39	46.00	-14.61
384.002	50.66	100.00	281	-17.21	33.45	46	-12.55
393.601	49.87	100.00	307	-17.06	32.81	46	-13.19
403.399	40.36	100.00	313	-16.98	23.38	46	-22.62
441.601	50.00	100.00	213	-16.56	33.44	46	-12.56
518.399	45.72	100.00	231	-14.01	31.71	46	-14.29
566.399	43.27	100.00	176	-12.02	31.25	46	-14.75

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors= Corrected

Table 22. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 01, Handset Vertical]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table ( $^{\circ}$ )				Limit (dBuV/m)	Margin (dB)
2714	48.8	100.00	267	-6.84	-6.34	35.62	54	-18.38
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected

Table 23. Open Field Radiated Emissions For 30 MHz -1 GMHz [Channel 10, Handset Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
127.401	48.47	100.00	100	-13.19	35.28	43.50	-8.22
345.600	54.85	401.00	185	-18.64	36.21	46	-9.79
364.799	56.63	100.00	194	-17.69	38.94	46	-7.06
383.999	56.36	100.00	194	-17.21	39.15	46	-6.85
412.799	56.54	100.00	178	-17.01	39.53	46	-6.47
477.330	42.34	401.00	213	-15.41	26.93	46	-19.07
489.599	45.56	401.00	190	-15.04	30.52	46	-15.48
518.398	42.31	100.00	62	-14.01	28.30	46	-17.70
585.597	39.73	100.00	184	-10.92	28.81	46	-17.19

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 24. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 10, Handset Horizontal]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)				Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB .

Table 25. Open Field Radiated Emissions For 30 MHz -1 GHz [Channel 10, Handset Vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
127.401	50.75	100.00	329	-13.19	37.56	43.50	-5.94
345.600	46.50	401.00	287	-18.64	27.86	46	-18.14
364.799	48.29	100.00	237	-17.69	30.60	46	-15.40
383.999	50.50	100.00	231	-17.21	33.29	46	-12.71
412.799	53.81	100.00	237	-17.01	36.80	46	-9.20
477.330	40.43	401.00	178	-15.41	25.02	46	-20.98
489.599	44.81	401.00	231	-15.04	29.77	46	-16.23
518.398	42.75	100.00	206	-14.01	28.74	46	-17.26
585.597	41.52	100.00	212	-10.92	30.60	46	-15.40

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 26. Open Field Radiated Emissions For 1 GHz -18 GHz [Channel 10, Handset Vertical]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)				Limit (dBuV/m)	Margin (dB)
2743	58.6	100.00	108	-6.84	-6.46	45.3	54	-8.7
3657	49.4	100.00	207	-2.8	-6.46	40.14	54	-13.86
4572	35.35	100.00	43	3.49	-6.46	32.38	54	-21.62

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB .

Table 27. Open Field Radiated Emissions For 30 MHz -1 GMHz [Channel 20, Handset Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
345.600	54.26	100.00	54	-18.64	35.62	46	-10.38
374.399	56.53	100.00	58	-17.40	39.13	46	-6.87
393.599	57.23	100.00	200	-17.06	40.17	46	-5.83
407.999	51.28	100.00	29	-17.02	34.26	46	-11.74
431.999	50.55	100.00	175	-16.77	33.78	46	-12.22
451.200	49.66	100.00	353	-16.23	33.43	46	-12.57
537.600	41.13	100.00	48	-13.13	28.00	46	-18.00
571.199	41.70	100.00	59	-11.83	29.87	46	-16.13

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 28. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 20, Handset Horizontal]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)				Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB .



Table 29. Open Field Radiated Emissions For 30 MHz -1 GMHz [Channel 20, Handset Vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
345.600	47.73	100.00	285	-18.64	29.09	46	-16.91
374.399	51.79	100.00	167	-17.40	34.39	46	-11.61
393.599	49.66	100.00	296	-17.06	32.60	46	-13.40
407.999	49.13	100.00	237	-17.02	32.11	46	-13.89
431.999	51.16	100.00	267	-16.77	34.39	46	-11.61
451.200	50.03	100.00	236	-16.23	33.80	46	-12.20
537.600	43.67	100.00	249	-13.13	30.54	46	-15.46
571.199	42.13	100.00	233	-11.83	30.30	46	-15.70

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

Table 30. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 20, Handset Vertical]

Radiated Emission				Correction Factors (dB)	Duty Cycle (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)				Limit (dBuV/m)	Margin (dB)
***								

Note :

1. Margin = Corrected - Limit.
2. peak amplitude + Correction Factor + Duty Cycle = Corrected
3. The emission above 1 GHz are all under 20 dB .

Table 29. Open Field Radiated Emissions For 30 MHz -1 GHz [Charge mode Horizontal]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
350.399	40.89	100.00	112	-18.39	22.50	46	-23.50
373.616	39.28	100.00	48	-17.42	21.86	46	-24.14
479.998	40.52	100.00	8	-15.34	25.18	46	-20.82
483.740	40.97	100.00	254	-15.22	25.75	46	-20.25
537.336	37.80	100.00	219	-13.14	24.66	46	-21.34
557.614	38.48	100.00	352	-12.32	26.16	46	-19.84
931.339	37.07	400.00	348	-5.78	31.29	46	-14.71
936.101	37.16	100.00	42	-5.77	31.39	46	-14.61

Table 27. Open Field Radiated Emissions For 30 MHz -1 GHz [Charge mode vertical]

Radiated Emission				Correction Factors (dB)	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)			Limit (dBuV/m)	Margin (dB)
350.399	45.87	100.00	106	-18.39	27.48	46	-18.52
373.616	39.96	100.00	119	-17.42	22.54	46	-23.46
479.998	43.13	100.00	309	-15.34	27.79	46	-18.21
483.740	38.71	100.00	94	-15.22	23.49	46	-22.51
537.336	38.06	401.00	329	-13.14	24.92	46	-21.08
557.614	38.24	100.00	182	-12.32	25.92	46	-20.08
931.339	37.35	400.00	278	-5.78	31.57	46	-14.43
936.101	37.60	100.00	30	-5.77	31.83	46	-14.17

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factors = Corrected

**VI Section 15.247(d): Power spectral density.**

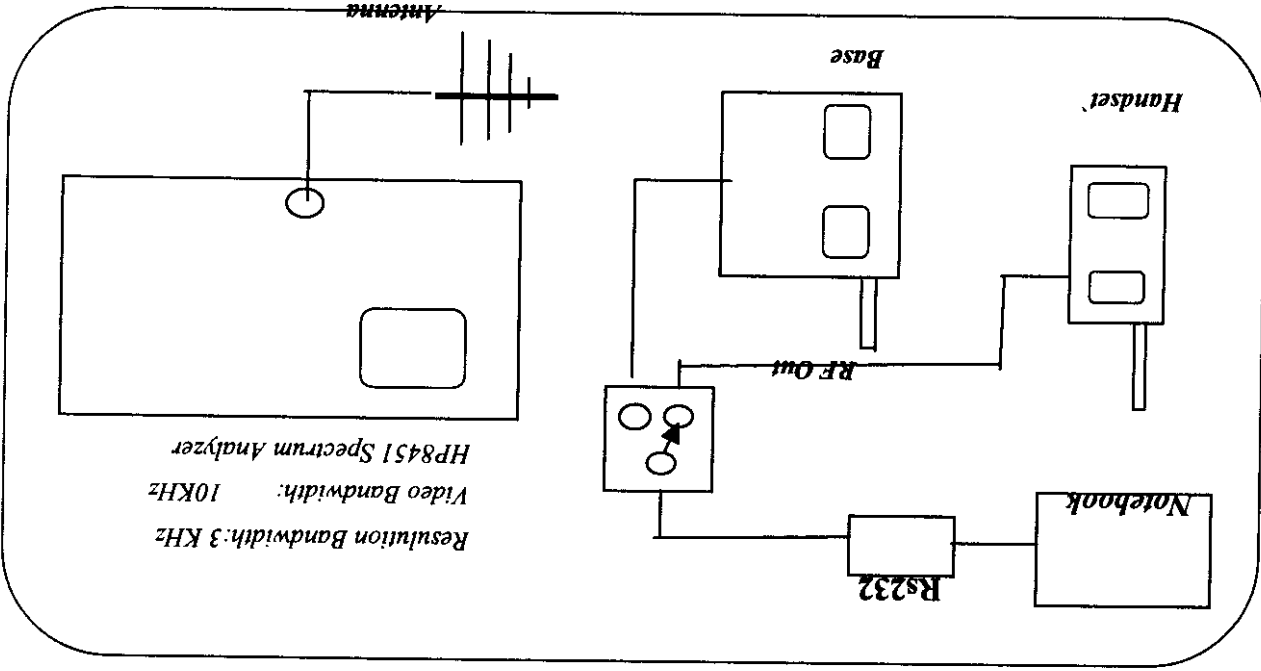
**6.1 Test Condition & Setup**

The tests below are running with the DCT transmitter set at high power in TDD mode. A serial port from a computer to the DCT UUT is needed to force selection of output power level and channel number. While testing, EUT was set to transmit continuously. A log antenna was connected with the spectrum analyzer.

The EUT is tested in open field site. Put EUT on the middle of a wooden table. Set spectrum analyzer RBW = 3 KHz, VBW > RBW (e.g. VBW = 10 KHz), Span = 1.5 MHz. Turn around the table to find maximum emission. Then set the Span = 300 KHz and sweep time = 100 sec. Peak the maximum emission again. The peak level measured must be no greater than +8 dBm.

The setting up procedure is recorded on Appendix A.

**6.2 Test Instruments Configuration**



*P.S.A serial port from notebook computer to control the EUT at maximal power output and channel Number.*

**Fig 12. Test Configuration of power spectral density**

**6.3 List of Test Instruments**

Manufacturer	Device	Model	Input Impedance
Hewlett Packard	9KHz-2.9 GHz Spectrum Analyzer	HP8594EM	50.00

15:43:46 14 APR 1998

BASE CH01

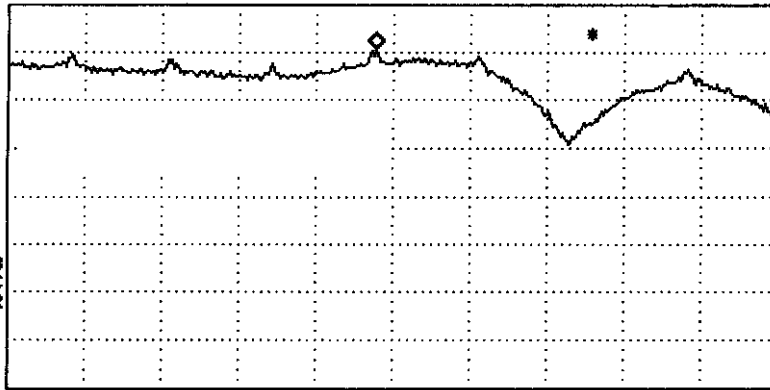
MKR 903.9508 MHz

REF 116.0 dB $\mu$ V AT 20 dB

106.95 dB $\mu$ V

PEAK  
LOG  
10  
dB/

VA WB  
SC FC  
CORR



CENTER 903.9575 MHz  
#RES BW 3.0 kHz

#VBW 10 kHz

SPAN 300.0 kHz  
#SWP 100 sec

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

More  
1 of 4

16:00:21 14 APR 1998

BASE CH10

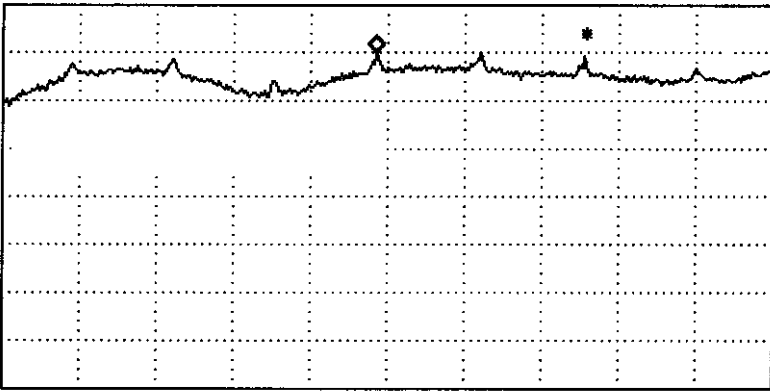
MKR 914.5903 MHz

REF 116.0 dB $\mu$ V AT 20 dB

105.91 dB $\mu$ V

PEAK  
LOG  
10  
dB/

VA WB  
SC FC  
CORR



CENTER 914.5948 MHz  
#RES BW 3.0 kHz

#VBW 10 kHz

SPAN 300.0 kHz  
#SWP 100 sec

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

More  
1 of 4

16:20:15 14 APR 1998

BASE CH20

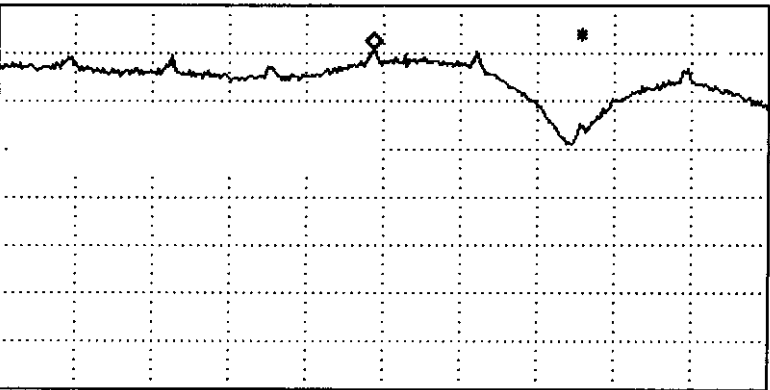
MKR 926.7508 MHz

REF 116.0 dB $\mu$ V AT 20 dB

106.78 dB $\mu$ V

PEAK  
LOG  
10  
dB/

VA WB  
SC FC  
CORR



CENTER 926.7545 MHz  
#RES BW 3.0 kHz

#VBW 10 kHz

SPAN 300.0 kHz  
#SWP 100 sec

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

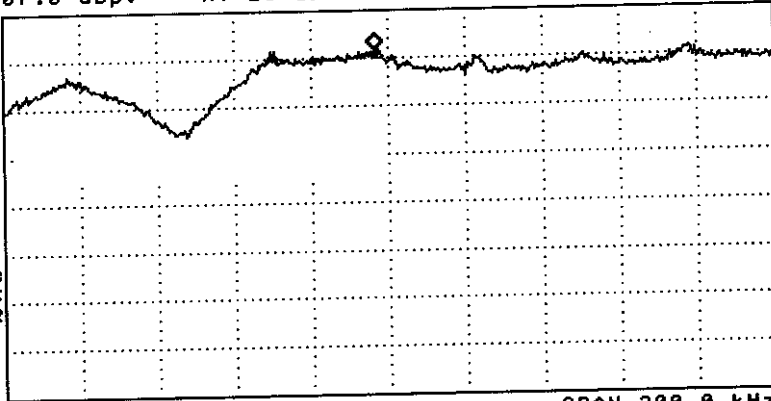
More  
1 of 4

16:41:28 15 APR 1998  
H/S CH01  
REF 107.0 dB $\mu$ V AT 10 dB

MKR 903.2373 MHz  
98.80 dB $\mu$ V

PEAK  
LOG  
10  
dB/

VA WB  
SC FC  
CORR



CENTER 903.2425 MHz #RES BW 3.0 kHz #VBW 10 kHz SPAN 300.0 kHz #SWP 100 sec

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

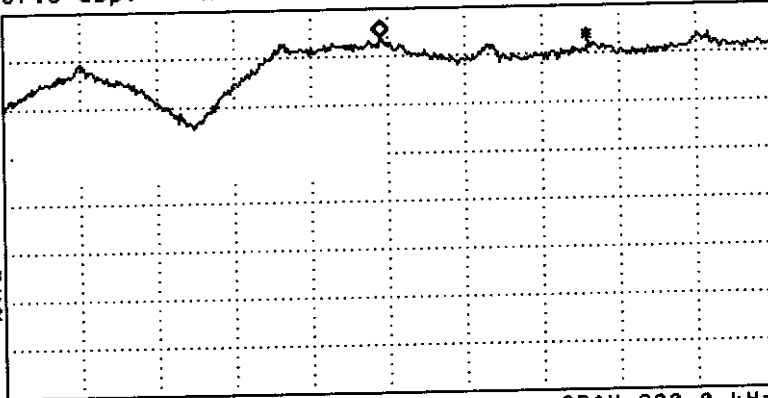
More  
1 of 4

16:50:03 15 APR 1998  
H/S CH10  
REF 107.0 dB $\mu$ V AT 10 dB

MKR 914.0353 MHz  
101.03 dB $\mu$ V

PEAK  
LOG  
10  
dB/

VA WB  
SC FC  
CORR



CENTER 914.0383 MHz #RES BW 3.0 kHz #VBW 10 kHz SPAN 300.0 kHz #SWP 100 sec

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

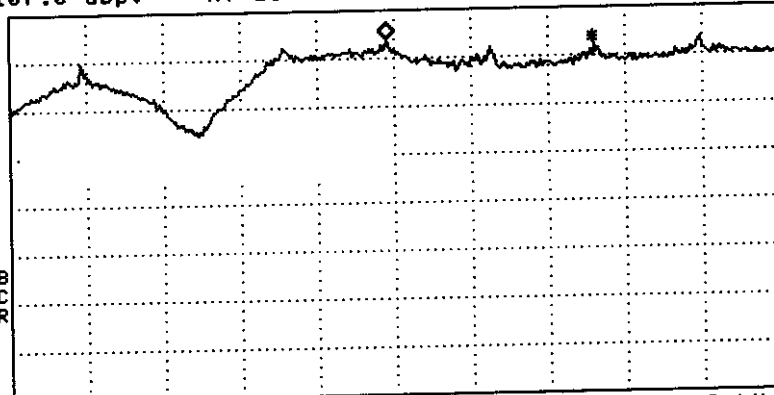
More  
1 of 4

16:58:19 15 APR 1998  
H/S CH20  
REF 107.0 dB $\mu$ V AT 10 dB

MKR 926.0368 MHz  
100.94 dB $\mu$ V

PEAK  
LOG  
10  
dB/

VA WB  
SC FC  
CORR



CENTER 926.0398 MHz #RES BW 3.0 kHz #VBW 10 kHz SPAN 300.0 kHz #SWP 100 sec

CLEAR  
WRITE A

MAX  
HOLD A

VIEW A

BLANK A

Trace  
A B C

More  
1 of 4

#### 6.4 Test Result of Power spectral density.

The following table shows a summary of the highest power out of UT.

**Model No. :** SN-525SST

**EUT :** 900MHz Digital Spread Spectrum Telephone

Table 33. Power Spectral Density

Channel	Frequency (MHz)	Ppr (dBuV)	CF (dB)	Ppq (dBm)	Limit (dB)	Margin (dB)
B/S CH 01	903.950	106.95	-5.62	3.94	8.00	-4.06
B/S CH 10	914.590	105.31	-5.74	2.17	8.00	-5.83
B/S CH 20	926.750	105.78	-5.79	2.60	8.00	-5.40
H/S CH 01	903.237	98.88	-5.63	-4.20	8.00	-12.20
H/S CH 10	914.035	101.03	-5.74	-2.14	8.00	-10.14
H/S CH 20	926.036	100.94	-5.81	-2.29	8.00	-10.29

Note :

1. The attachment follow by this page and there is no page number.
2. Ppr: spectrum read power density (using peak search mode), CF: correct factor Ppq: actual peak power density in the spread spectrum band.
3.  $Ppq = Ppr + CF$
4. Effective Radiation Power ( E.R.P.) =  $(E d )^2 / 30G$

E is the measured maximum field strength in V/m utilizing the maximum hold mode RBW ( 3KHz).

G is the numeric gain of the transmitting antenna over an isotropic radiator (1.64).

d is the distance in meters from which the field strength was measured (3M).

Example : the Max Radiation Emission of base ch01 =  $106.95 - 5.62 = 101.33$  dBuV/m

$$10^{(101.33/20)} \times 10^{-6} = 0.11654 \text{ V}$$

$$\begin{aligned} \text{E.R.P.} &= ( 0.11654 \times 3 )^2 / 49.2 = 2.48 \text{ mW} = 10 \times \log( 2.48 \text{ mW}/1\text{mW}) \\ &= 3.94 \text{ dBm} \end{aligned}$$

## VII Section 15.247(e): Processing Gain.

### 7.1 Test Condition & Setup

#### A. Bit Error Rate (Pe)

The subjective device RF module (base & handset) digital modulation by Differential Phase -Shift Keying (DPSK), the DPSK can use its previous waveform as the phase reference for demodulation and thus requires no coherent detection, which greatly simplifies the receiver structure but with some Bit Error Rate (BER) degradation because of noisy phase reference. There is tradeoff between system complexity and system performance. In order to driver the DPSK error probability, we observe that DPSK using differential coding, we observable that DPSK using different coding is essentially an orthogonal signal scheme. A binary 1 is transmitted a sequence of two pulse (P,P) or (-P,-P) over 2 To seconds (no transition). Similarly, a binary 0 is transmitted by a sequence of two plus (P,-P) or (-P,P) over 2 TO seconds (transition). Either of the pulse sequences used for binary 1 is orthogonal to either of the pulse sequences used for binary 0. Because no local carrier is generated for demodulation, the detection is noncoherent, with an effective pulse energy equal to 2 Ep (twice the energy of pulse P). The actual energy transmitted per digit only Ep, however, the same as in noncoherent FSK, Consequently, the performance of DPSK is 3 dB superior to that of noncoherent FSK, We can write Pe for DPSK as :

The major component inside the subjective device are supplied by Rock well, Included RF block transmitter (RF101), Receiver (RF 100), and Base band block ASIC (c8502-13), CODEC (10497-14), above 4 IC chips are affected the processing gain as following :

$$J/S = (W/RD) / (ED/NO) \text{ [without CODING]}$$

Where : W= Spread Chip Rate = Required Transmitted Base band Bandwidth.

Rb = Information Data Rate

Eb/No = Require Energy per Bit over noise Spectral Density for a Specific Bit Error Probability.

The subjective Device Information Data Rate are 80k and the Spread Chip Rate are 960k So the processing gain ( $10 \log w/Rb$ ) at least 10.79 dB( without Coding).

The ASIC (c8502-13) and CODEC (10497-14) these two chip included the coding function, So, it is great improve the processing gain and also improve the J/S ratio.

The Engineer work for Rock well System in Taiwan had pass us the information about the probability of error rate (Pe) must be lower than 0.001 that the system performance will satisfy for communication between Handset and Base station.

Why we need the Pe lower than 0.001, the Rockwell Semiconductor System is not explained, Since it relative with ASIC and Codec, it is confidential area that Rockwell is not allow to disdouse to the public.

When Pe = 0.001 and then Signal to Noise Ratio (S/N) = 6.2194 = 7.9dB. ✓ DPSK

## B. Jamming Margin Method

The Rockwell Semiconductor System give us a software operated in the personal computer, and use the computer series port COM1 and COM2 connect Handset and Base than we can measure the Bit Error Rate.

Using this software we can perform Jamming Margin method testing , The test consists of stepping a signal generator in 50 KHz increments across the pass band of the system (up to 960 KHz away in RI's DCT). At each point, the generator level required to produce the recommend Bit Error Rate (BER =  $10e - 3$ ) is recorded. This level is the jamming level. 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:

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

$$Gp = 8 \text{ dB} + Mj + 2 \text{ dB}$$

FCC regulation section 15.247 (e) rewire the processing gain of a direct sequence system shall be at least 10 dB, when Gp must be greater than 10 dB, then the Jammer must be greater than 0 dB.

The processing gain may be measured using the CW jamming margin method. The Jammer to Signal (J/S) ratio is then calculated. Discard the worst 20% of the J/S data points.

1. For avoid the handset and basestation are situation, so, the UUT were in low power mode.
2. The signal generator was selected in interference band, using this software we can perform Jamming Margin method testing, the test consists of stepping a signal generator is 50 KHz increments across the pass band of the system (up to 960 KHz away in RI's DCT). So, the BER will keep in 0.1%.

The setting up procedure is recorded on Appendix A.



## 7.2 Test Instruments Configuration

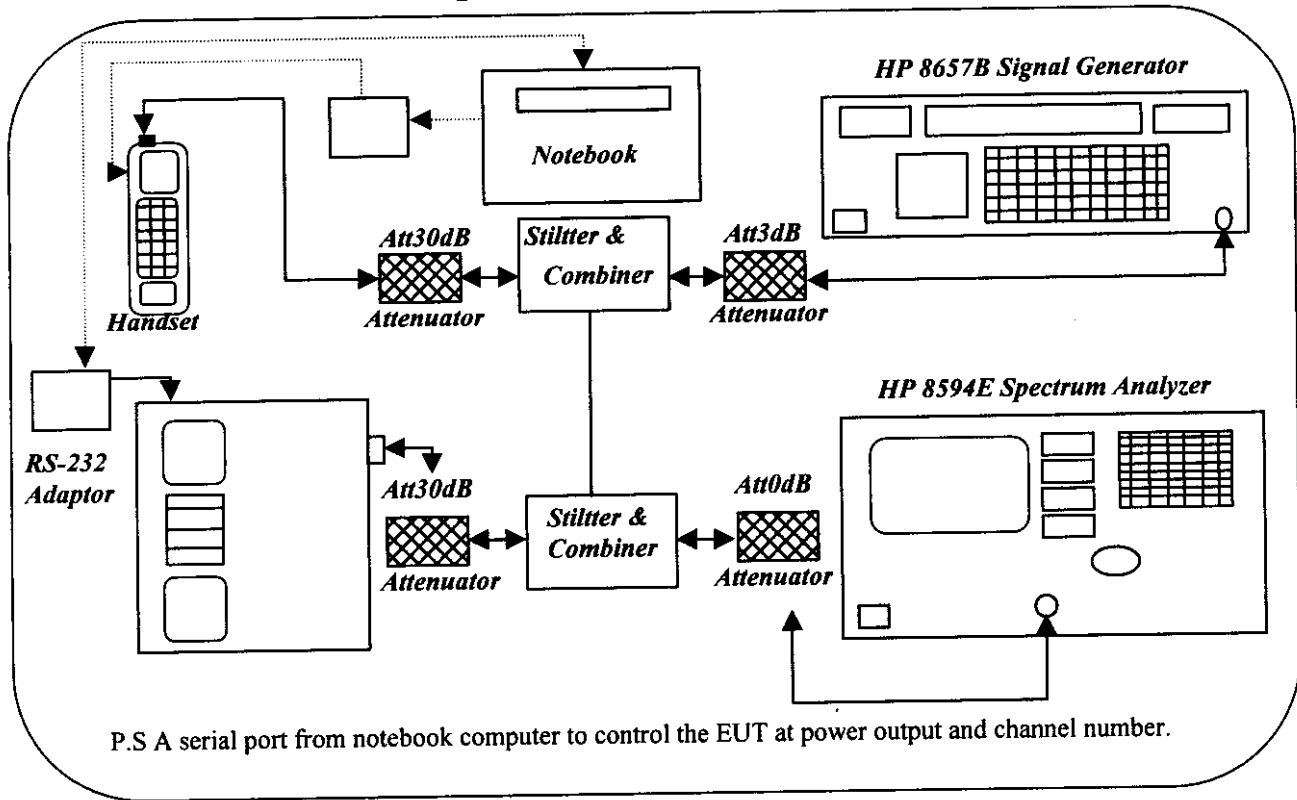


Fig 13. Test Configuration of processing gain for base station

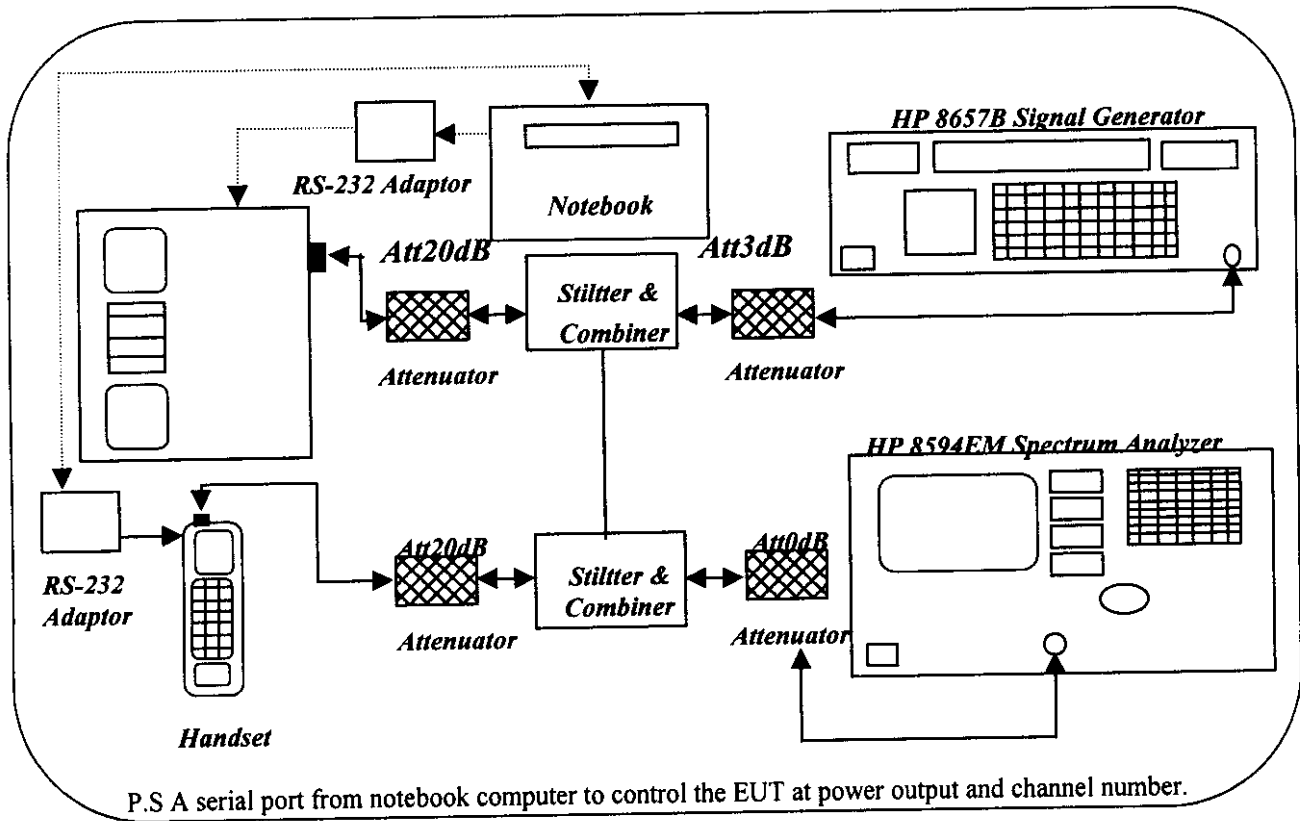


Fig. 14, Test Configuration of processing gain for handset

### 7.3 List of Test Instruments

Manufacturer	Device	Model	Input Impedance
Hewlett Packard	100Hz-1.8GHz Spectrum Analyzer	HP8592A	50.00
Hewlett Packard	100Hz-2.6GHz Signal Generator	HP8657B	50.00
Mini Circuits	10MHz-2GHz Power Splitter/Combiner	ZESC-2-11	50.00
Mini Circuits	DC-1.5GHz 3dB Attenuator	CAT-3	50.00
Mini Circuits	DC-1.5GHz 20dB Attenuator	CAT-20	50.00
Mini Circuits	DC-1.5GHz 30dB Attenuator	CAT-30	50.00

### 7.4 Test Procedure

According to the Fig. 13 of the page 42, combine the stuffs.

Measure the low power output of the channel 10 of the handset while the handset is in "Transmit-Only-Test" and the whole circuit is as same as Fig. 13. What we measure in this step is "S".

Change to the "BER Test " program. Increase the RF output of the signal generator till the BER is close to the 0.1% but under 0.1%.

Stop the program and turn off the base, handset then record the highest point of the spectrum. What we measure in this step is "J".

Star the Program again and test the next point.

### 7.5 Test Result of Processing Gain.

Model No. : SN-525SST

EUT : 900MHz Digital Spread Spectrum Telephone

Table. 34 Processing Gain [Channel 10, Base]

Jammer Frequency (MHz)	S (dBm)	J (dBm)	Mj (J/S)	Process Gain (dB)
913.65	-23.00	-20.22	2.78	12.68
913.70	-23.00	-19.15	3.85	13.75
913.75	-23.00	-19.61	3.39	13.29
913.80	-23.00	-22.36	0.64	10.54
913.85	-23.00	-21.70	1.30	11.20
913.90	-23.00	-17.78	5.22	15.12
913.95	-23.00	-22.81	0.19	10.09
914.00	-23.00	-22.42	0.58	10.48
914.05	-23.00	-21.25	1.75	11.65
914.10	-23.00	-20.33	2.67	12.57
914.15	-23.00	-21.83	1.17	11.07
914.20	-23.00	-23.66	-0.66	9.24
914.25	-23.00	-20.91	2.09	11.99
914.30	-23.00	-21.85	1.15	11.05
914.35	-23.00	-20.53	2.47	12.37
914.40	-23.00	-19.30	3.70	13.60
914.45	-23.00	-20.31	2.69	12.59
914.50	-23.00	-23.28	-0.28	9.62
914.55	-23.00	-22.03	0.97	10.87
914.60	-23.00	-23.14	-0.14	9.76
914.65	-23.00	-22.07	0.93	10.83
914.70	-23.00	-21.93	1.07	10.97
914.75	-23.00	-22.75	0.25	10.15
914.80	-23.00	-22.14	0.86	10.76
914.85	-23.00	-20.02	2.98	12.88
914.90	-23.00	-17.62	5.38	15.28
914.95	-23.00	-20.32	2.68	12.58
915.00	-23.00	-19.56	3.44	13.33
915.05	-23.00	-20.06	2.94	12.84
915.10	-23.00	-21.47	1.53	11.43

Test Result:

Processing Gain : 10.54 dB

Note:

1.  $GP=(S/No)+Mj+L_{sys}=7.9dB+Mj+2 dB$
2. S = Signal Level
3. J = Signal Generator RF Output

Table 35. Processing Gain [Channel 10, Handset]

Jammer Frequency (MHz)	S (dBm)	J (dBm)	Mj (J/S)	Process Gain (dB)
913.95	-33.32	-29.74	3.58	13.48
914.00	-33.32	-30.03	3.29	13.19
914.05	-33.32	-29.65	3.67	13.57
914.10	-33.32	-31.10	2.22	12.12
914.15	-33.32	-31.32	2.00	11.90
914.20	-33.32	-30.73	2.59	12.49
914.25	-33.32	-30.13	3.19	13.09
914.30	-33.32	-31.74	1.58	11.48
914.35	-33.32	-30.26	3.06	12.96
914.40	-33.32	-31.54	1.78	11.68
914.45	-33.32	-31.62	1.70	11.60
914.50	-33.32	-31.25	2.07	11.97
914.55	-33.32	-31.85	1.74	11.64
914.60	-33.32	-32.88	0.44	10.34
914.65	-33.32	-33.14	0.18	10.08
914.70	-33.32	-32.45	0.87	10.77
914.75	-33.32	-32.61	0.71	10.61
914.80	-33.32	-31.83	1.49	11.39
914.85	-33.32	-31.65	1.67	11.57
914.90	-33.32	-30.40	2.92	12.82
914.95	-33.32	-29.49	3.83	13.73
915.00	-33.32	-29.23	4.09	13.99
915.05	-33.32	-30.40	2.92	12.82
915.10	-33.32	-31.35	2.97	12.87
915.15	-33.32	-32.35	0.97	10.87
915.20	-33.32	-31.70	1.62	11.52
915.25	-33.32	30.85	2.47	12.37
915.30	-33.32	30.16	3.16	13.06
915.35	-33.32	28.56	4.76	14.66
915.40	-33.32	-27.90	5.42	15.32

**Test Result:**

Processing Gain : 11.39 dB

**Note:**

1.  $GP = (S/No) + Mj + Lsys = 7.9 \text{ dB} + Mj + 2 \text{ dB}$
2. S = Signal Level
3. J = Signal Generator RF Output

## **Appendix A**

### **Setting up Procedure**

1. Using a RS-232 adaptor which is given by customer connected with the com 1 of the computer.
2. The other end of the RS-232 adaptor is connected with the EUT.
3. Use the software which is given by the customer and operated in the windows to control the EUT's continuous transmission.

**Appendix B**

**Antenna Sketch**



# APPLICATION FOR APPROVAL

## 確 認 圖

TYPE NO.

機種名稱

ST-578-1

DRAWING NO.

圖面號碼

ST8507012

DATE

日期

SEP. 3. 1996

記事要項：



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# 產 品 規 範 書

客戶  
名稱

神腦

**1. 適用範圍：**

本規範書係伸縮式天線桿\_\_\_\_\_交貨時之檢驗規範。

**2. 構造尺寸：**

依照圖號 ST8507012

**3. 外觀：**

外觀不可有明顯之傷痕、凹處，及污點。(必要時製訂限度樣品)。

**4. 機械性能：**

本機種適用於下列項目：

4-1 天線桿之伸縮壓力：天線桿各節伸縮時需要壓力為最小 0.15 Kg，最大 2.0 Kg 之範圍內，1 來回算一次，以每分 6~8 次速度並需容易動作，其耐久性之伸縮次數為 1000 次以上。

~~4-2~~ 摺動 力：基管及彎頭下出入於外套管之所需力量為 \_\_\_\_\_ Kg ~ \_\_\_\_\_ Kg

4-3 耐抗張 力：固定基管底塞於向下垂直方向，使天線桿垂下，並將天線桿全伸長後，將先端之頭部部分懸吊 5.0 Kg 之靜荷重時，能耐久一分鐘以上。

4-4 耐振動 動：固定基管底塞於垂直方向並將天線桿全伸長之狀況下行水平方向 2% 之振幅 1,500 次 / 分鐘後天線桿之縮短率需於全長之 3% 以內。

4-5 耐彎曲 曲：將基管固定於水平方向並將天線桿全伸長並在天線帽部分懸吊 0.2 Kg 之靜荷重，經 1.0 分鐘後放下靜荷重時不得影響伸縮動作。

~~4-6~~ 彎曲扭 矩：初次 \_\_\_\_\_ Kg.cm ~ \_\_\_\_\_ Kg.cm  
1 來回算 1 次以每分 6~8 次以下之速度行 \_\_\_\_\_ 次彎曲後，將天線桿全伸長須能保持任意之位置。

~~4-7~~ 回轉扭 矩：初次 \_\_\_\_\_ Kg.cm ~ \_\_\_\_\_ Kg.cm  
鋼球嵌合在靜止式天線桿並將天線桿全伸長時可保持於指定位置。

**5. 檢 查：**

- 2 項：AQL 1.5 %
- 3 項：AQL 4.0 %
- 4-1 項：AQL 1.5 % (但耐久度試驗以 n = 5 A = 0 R = 1 為破壞試驗)。
- ~~4-2~~ 項：AQL 1.5 %
- 4-3 項：n = 0 A = 0 R = 1 為破壞試驗
- 4-4 項：n = 0 A = 0 R = 1 為破壞試驗
- 4-5 項：n = 0 A = 0 R = 1 為破壞試驗
- ~~4-6~~ 項：AQL 1.5 % (但耐久度試驗以 n = 5 A = 0 R = 1 為破壞試驗)。
- ~~4-7~~ 項：AQL 1.5 %

**6. 其 他：**

本規範如必要變更時需由雙方商洽後決定。

△			發行 85 年 9 月 3 日	承認	審核	審核	製表
△					26/9/3	林 9/3	龍 9/3
記號	年月日	變更、追加	No:				

# APPROVAL SHEET

CUSTOMER : 神腦企業開發有限公司

SENAO TELECOMMUNICATIONS ENTERPRISE GROUP.

MODEL NO. : GM-161T-101

DESCRIPTION: 90° FIXED TYPE ANTENNA

(CUSTOM APPROVAL)

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士誼科技事業有限公司  
JOYMAX ELECTRONICS CORP.

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## SPECIFICATION

### GENERAL

1. DESCRIPTION : 90° fixed type antenna which is useful for the construction of a CT-1 desk phone.
2. CUSTOMER : SENA TELECOMMUNICATIONS ENTERPRISE GROUP.
3. MODEL NO : GM-161T-101

### ELECTRICAL CHARACTERISTICS

1. FREQUENCY  
Tx : 959.5MHz  
Rx : 914.5MHz
2. IMPEDANCE : 50 Ohms nominal.
3. SWR  
Tx : Less than 1.6:1  
Rx : Less than 1.6:1
4. GAIN : 2dB
5. ADMITTED POWER RADIATION : 10W
6. TYPE OF RADIATION : Toroidal
7. POLARIZATION : Vertical
8. ELECTRICAL LENGTH :  $1/2 \lambda$

## MECHANICAL CHARACTERISTICS

1. APPEARANCE/DIMENSIONS : See fig.1.
2. CONNECTOR TYPE : TNC (Male)
3. FLEXIBILITY : It shall be possible to bend the whip round a rod (diameter :50mm) without remaining deformation. see fig.2.
4. BENDING TEST : No damage after 1000 cycles. See fig. 3.

## ENVIRONMENT CHARACTERISTICS

1. OPERATING TEMPERATURE RANGE : -20° C --- +65° C
2. STORAGE TEMPERATURE RANGE : -30° C --- +75° C



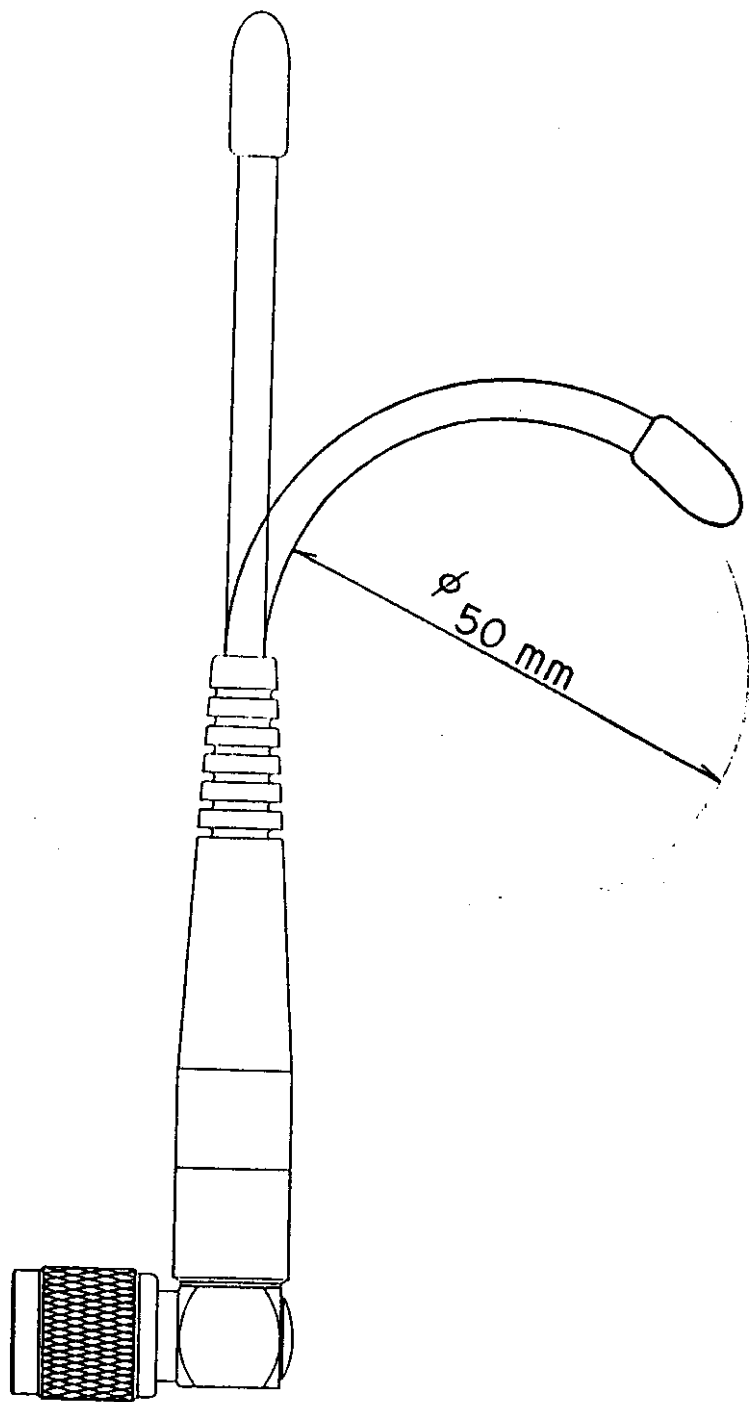


FIG. 2 FLEXIBILITY

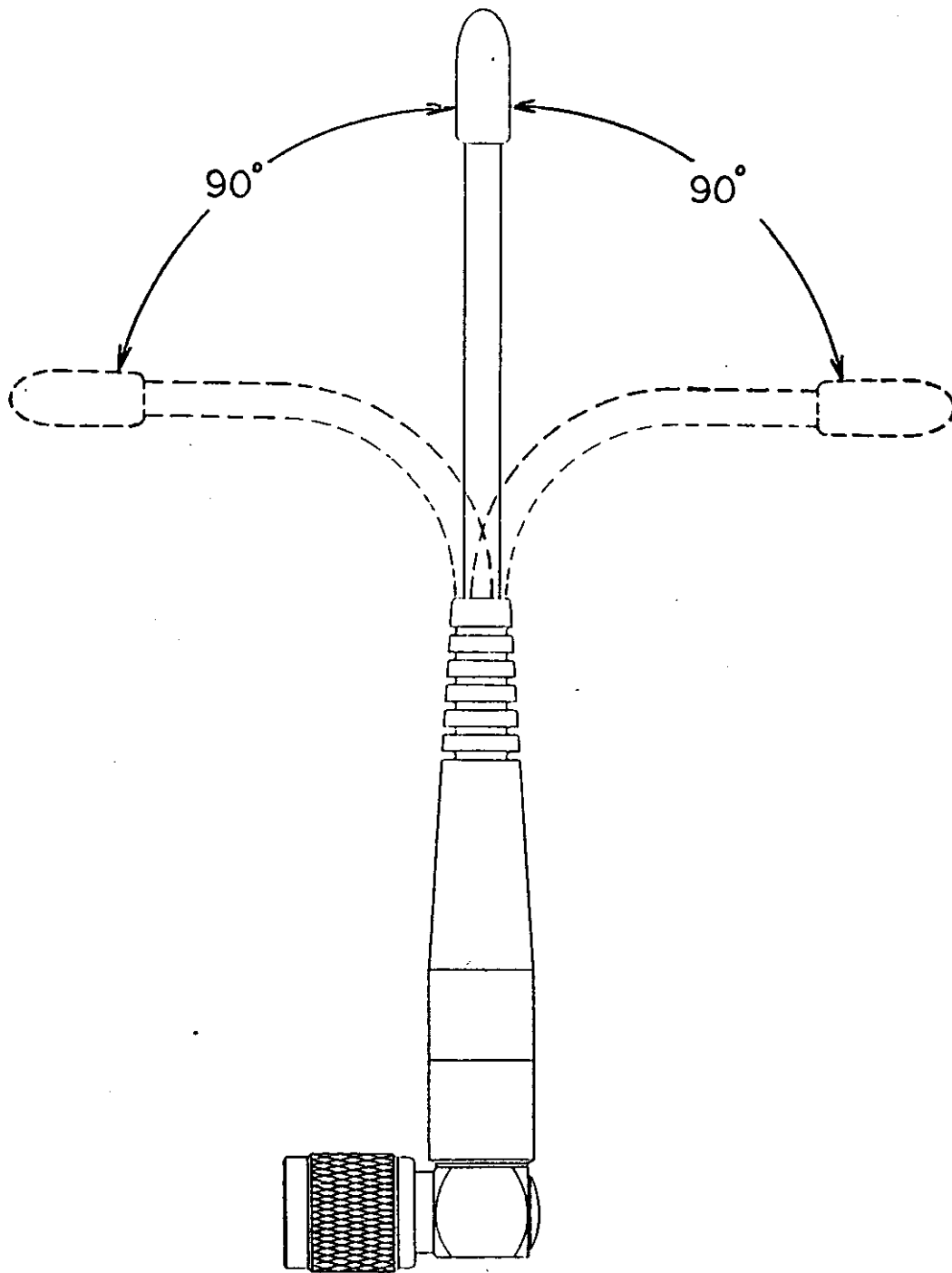


FIG. 3 BENDING TEST

## **Appendix C**

The antenna of the device is screwed inside the device, the user can not remove it freely without any tools from outside the device. This is comply with the FCC rules part 15.203



## Appendix D

# Security Code

### **Description of 900 MHz Direct Spectrum Cordless Phone**

The subject device's 20 independent channels, autoscan at link establishment and smart channel hopping combine to find the clearest channels at all times, automatically.

Spread spectrum technology ensures the highest level of security available in a cordless phone.

The spread spectrum technique provides better security than other solutions since only the receiver has a copy of the pre-assigned spreading code, making interception virtually impossible. The transmitting signal diluted over a large bandwidth with power density at any point being very light, so the signal goes unnoticed by other systems since they are not tuned to receive it. Moreover the scrambling code changes every 8 times the phone is parked, and there are millions of codes.

**Scrambler / Descrambler** A16-code randomizes the voice and supervisory data for transmission and reception, more than 64K scramble codes are available from the 16-bit maximal length pseudo-noise sequencer generator.

**Spread Spectrum Spreader** Each transmitted bit is multiplied with a 12-chip spreading code, meeting FCC Part 15.247 requirements.