2.3 Test configuration

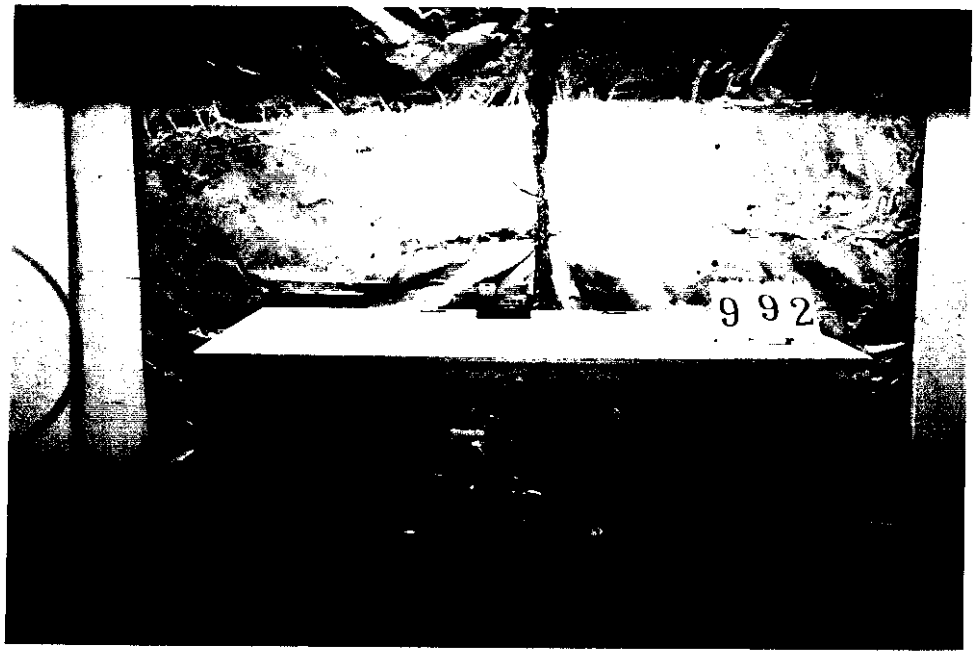

Fig. 3 Conducted emissions test placement (idle only)

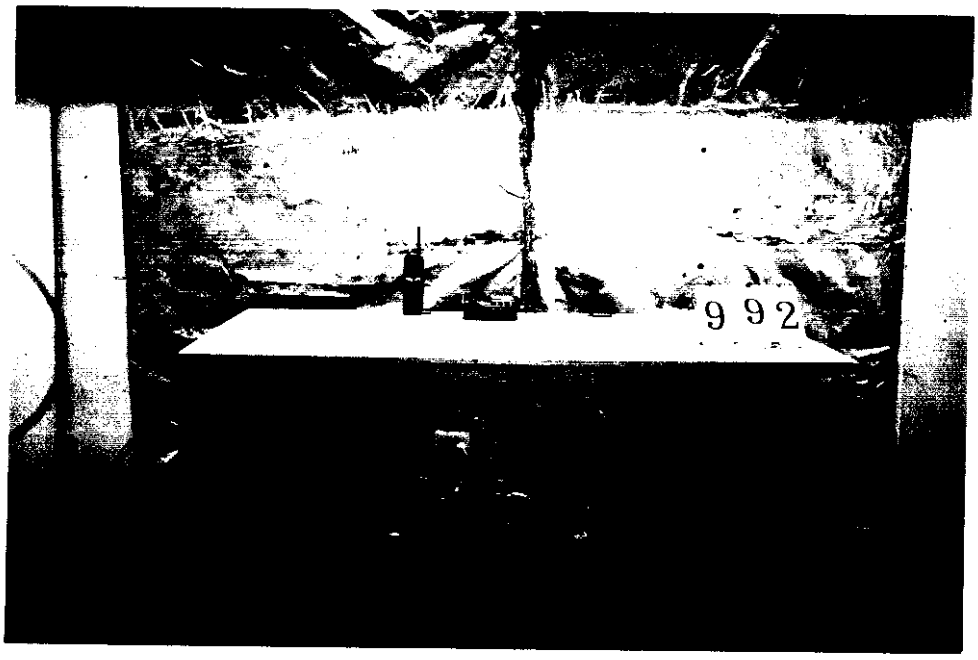

Fig. 4 Conducted emissions test placement (intercom only)

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MEASUREMENT REPORT
of
CORDLESS TELEPHONE

Applicant : Sony corporation

Model : SPP-SS965

EUT : 900 MHz Digital Spread Spectrum Telephone

FCC ID : AK8SPPSS965

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 : Sony Corporation

Equipment : 900MHz Digital Spread Spectrum Telephone

Model No. : SPP-SS965

FCC ID : AK8SPPSS965

Report No. : S2515992

Test Date : April 2, 1998

Prepared by : _____
STEPHEN CHEN

Approved by : _____
JACOB LIN

Test by :

Training Research Co., Ltd.

TEL : 886-2-27881332 FAX : 886-2-7857408

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

I. GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of Sony Corporation 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	:	SPP-SS965
FCC ID	:	AK8SPPSS965
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	:	Sony Corporation
		6-7-35, Kitashinagawa Shinagawa-ku
		Tokyo, Japan.

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

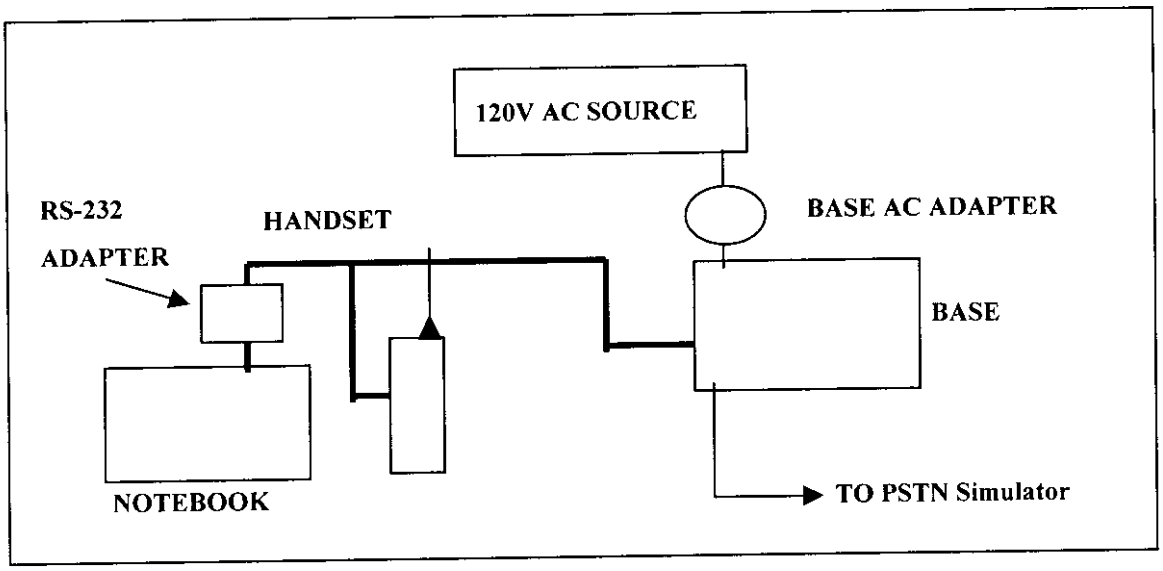


Fig. 1 Configuration of system under test

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	903.76305	903.46310	11	915.60237	915.59346
2	904.81145	904.79960	12	916.79945	916.80010
3	906.01145	906.00406	13	918.04500	918.04538
4	907.15800	907.17350	14	919.25046	919.26000
5	908.41200	908.40250	15	920.39976	920.39987
6	909.59705	909.59813	16	921.59892	921.60045
7	910.81230	910.79984	17	922.79972	922.79990
8	912.00220	912.01145	18	924.00045	924.00490
9	914.25116	914.20350	19	925.62306	925.61200
10	914.47520	914.52513	20	926.56305	926.48850

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 903.46 MHz to 926.56 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 tree test condition apply in this test item, the test procedure description as the following:

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 channel is 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. : SPP-SS965

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	9.875	17.39	48	-30.61
	22.988	17.98	48	-30.20
	23.280	19.30	48	-28.70
	25.176	18.74	48	-29.26
	25.977	18.69	48	-29.31
	26.923	18.03	48	-29.97
	***			
LINE 2	9.514	16.05	48	-31.95
	21.090	17.94	48	-30.06
	23.207	20.79	48	-27.21
	24.009	18.60	48	-29.40
	25.394	18.61	48	-29.39
	23.996	17.47	48	-30.53
	***			

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	1.262	15.44	48	-32.56
	9.587	18.30	48	-29.70
	23.280	19.49	48	-28.51
	25.176	19.82	48	-28.18
	26.632	19.73	48	-28.27
	27.142	18.56	48	-29.44
	***			
LINE 2	9.587	17.78	48	-30.22
	20.214	16.95	48	-31.05
	22.405	18.16	48	-29.84
	22.915	18.86	48	-29.14
	23.207	21.33	48	-26.67
	24.301	19.01	48	-28.99
	25.977	19.15	48	-28.85
	26.705	20.25	48	-27.75
	27.142	18.42	48	-29.58
	28.379	17.10	48	-30.90

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	7.822	16.89	48	-31.11
	9.587	16.50	48	-31.50
	11.130	16.45	48	-31.55
	22.550	17.92	48	-30.08
	23.207	19.54	48	-28.46
	25.176	19.70	48	-28.30
	25.977	19.29	48	-28.71
	26.923	18.60	48	-29.40
	***			
LINE2	9.587	16.99	48	-31.01
	20.944	17.83	48	-30.17
	21.456	16.84	48	-31.16
	23.280	20.03	48	-27.97
	24.301	17.91	48	-30.09
	25.977	19.47	48	-28.53
	26.851	18.39	48	-29.61
	***			

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 Conductor	Connected Frequency (MHz)	Emissions Peak Amplitude (dBuV)	FCC Class B Limit (dBuV)	Margin (dB)
LINE1	11.424	15.95	48	-32.05
	21.456	17.69	48	-30.31
	24.374	18.25	48	-29.75
	24.738	18.96	48	-29.04
	25.467	19.05	48	-28.95
	***			
LINE 2	1.410	15.86	48	-32.14
	25.176	18.35	48	-29.65
	26.778	18.48	48	-29.52
	26.923	18.55	48	-29.45
	***			

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 Conductor	Connected Frequency (MHz)	Emissions Peak Amplitude (dBuV)	FCC Class B Limit (dBuV)	Margin (dB)
Line 1	17.289	17.74	48	-30.26
	22.769	19.57	48	-28.43
	23.280	20.82	48	-27.18
	25.176	20.66	48	-27.34
	26.778	19.49	48	-28.51
	28.015	19.12	48	-28.88
	***			
Line 2	21.456	18.42	48	-29.58
	22.623	18.37	48	-29.63
	24.009	18.80	48	-29.20
	25.977	18.99	48	-29.01
	26.851	18.00	48	-30.00
	***			

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.

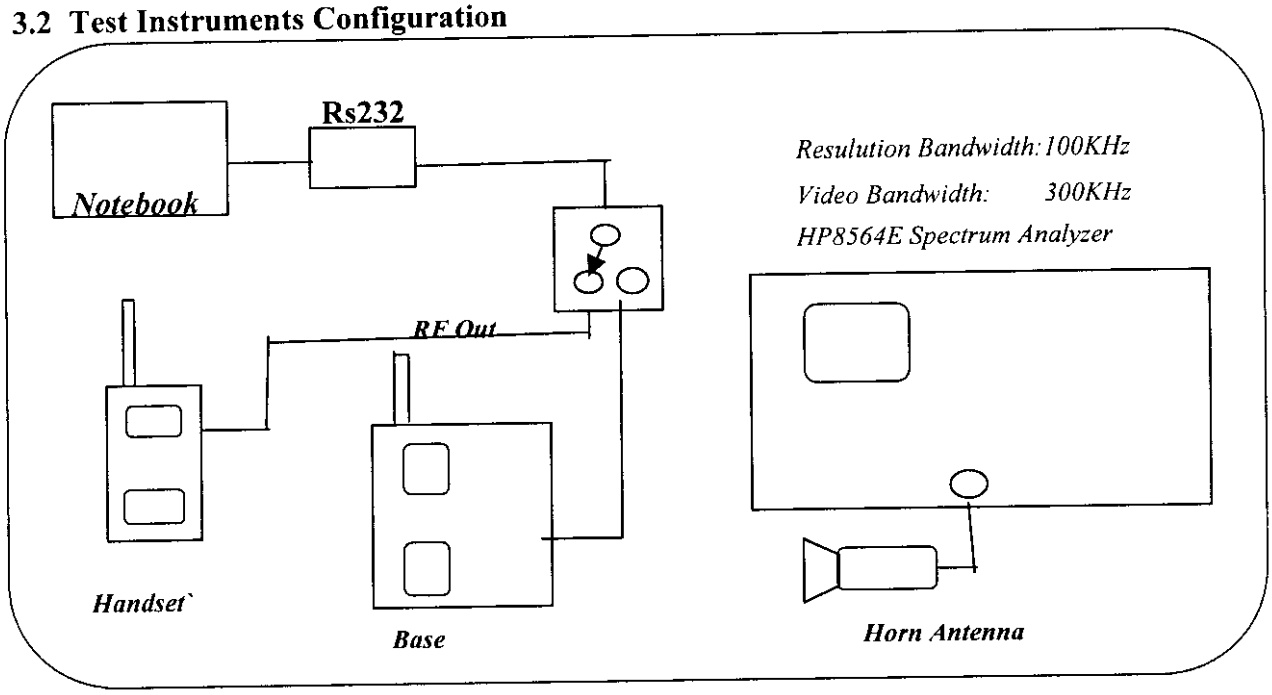
3.1 Test Condition & Setup

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

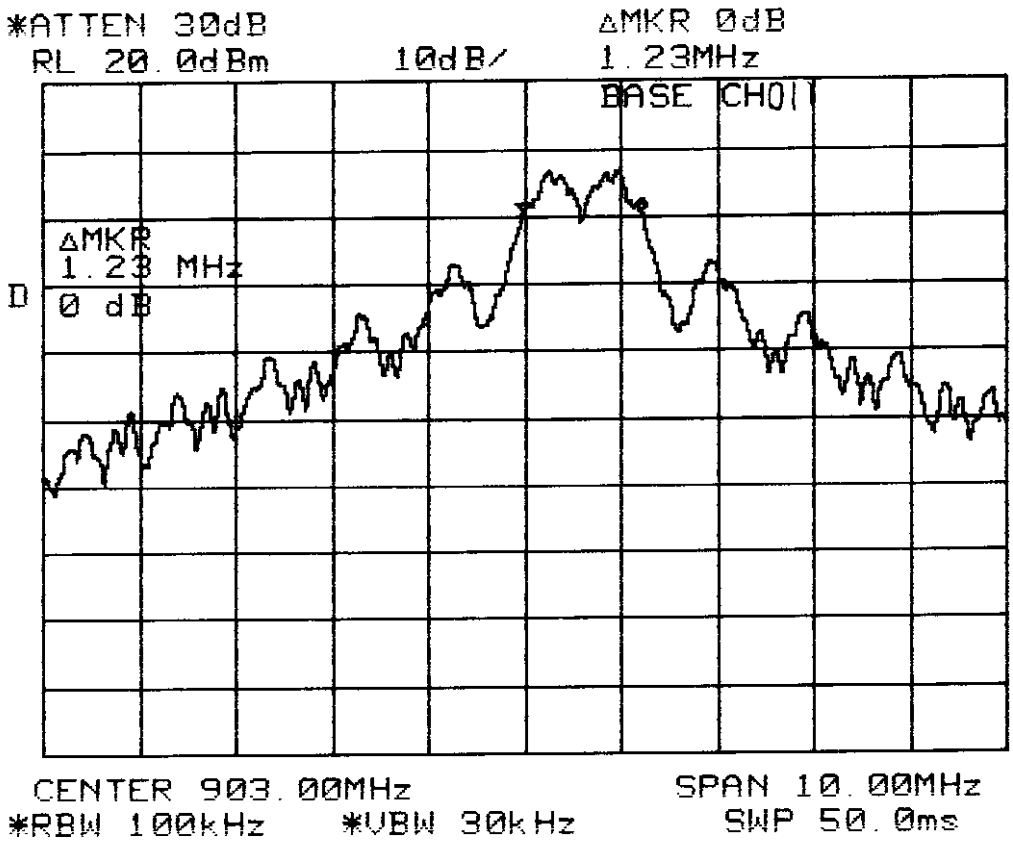


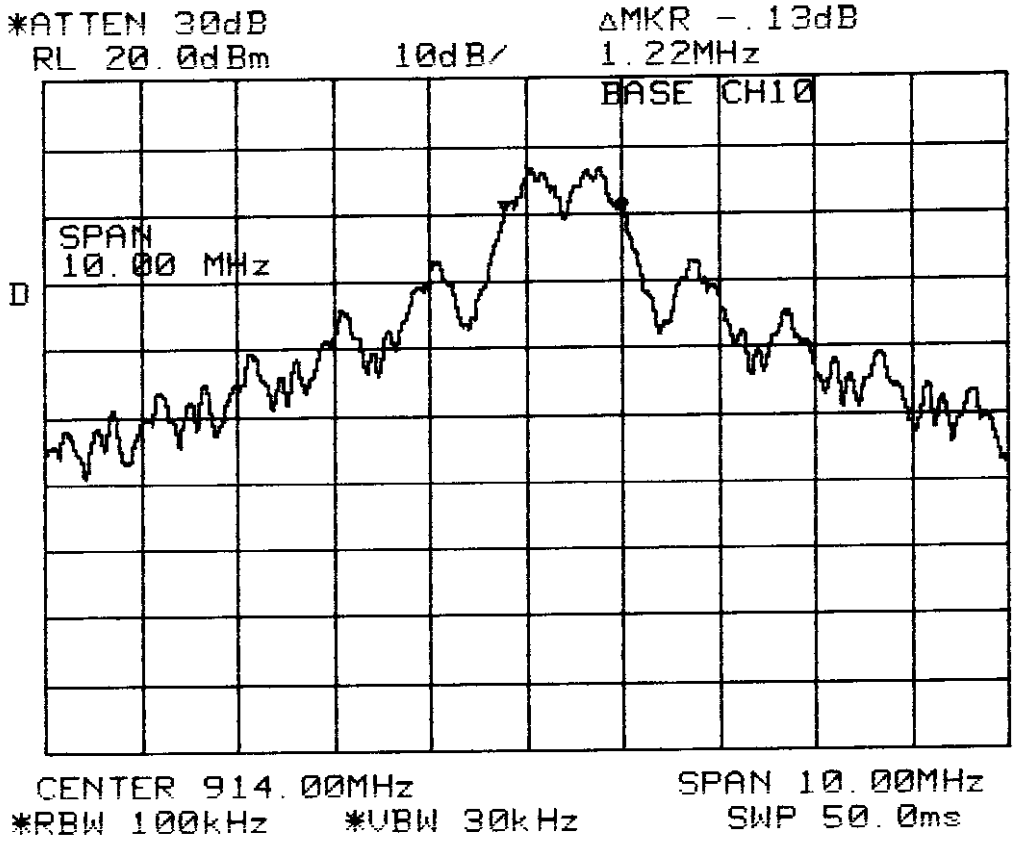
P.S.A serial port from notebook computer to control the EUT at maximal power output and channel Number.

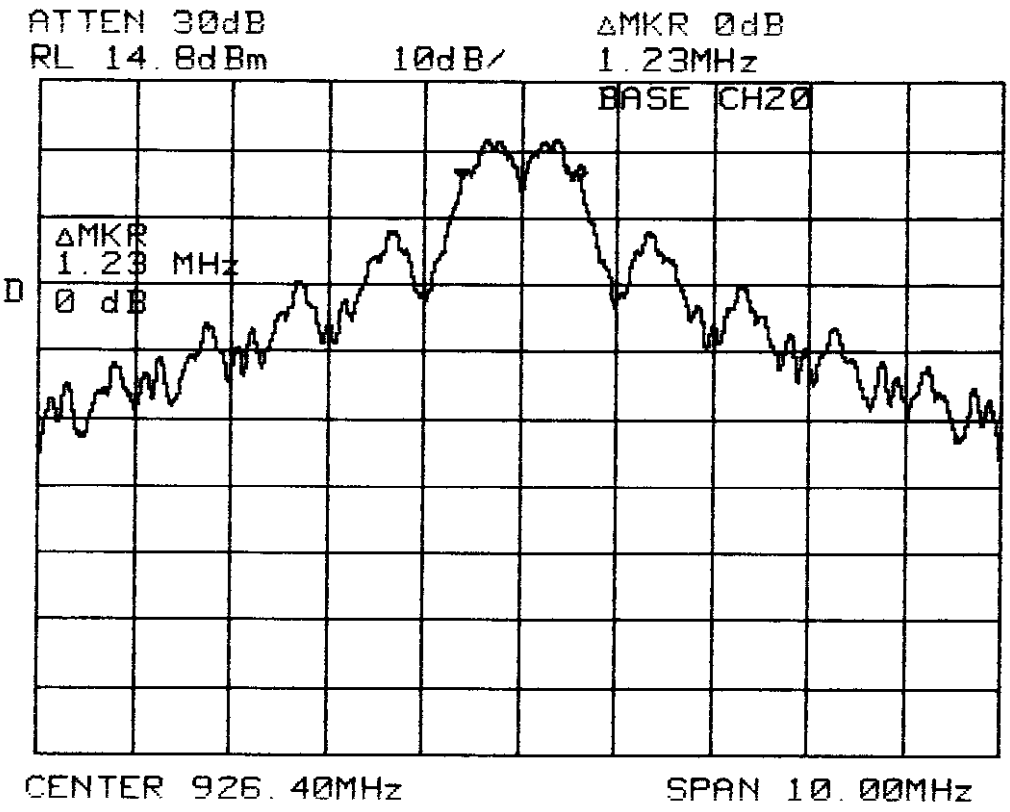
Fig 10. Test Configuration of bandwidth for direct sequence system

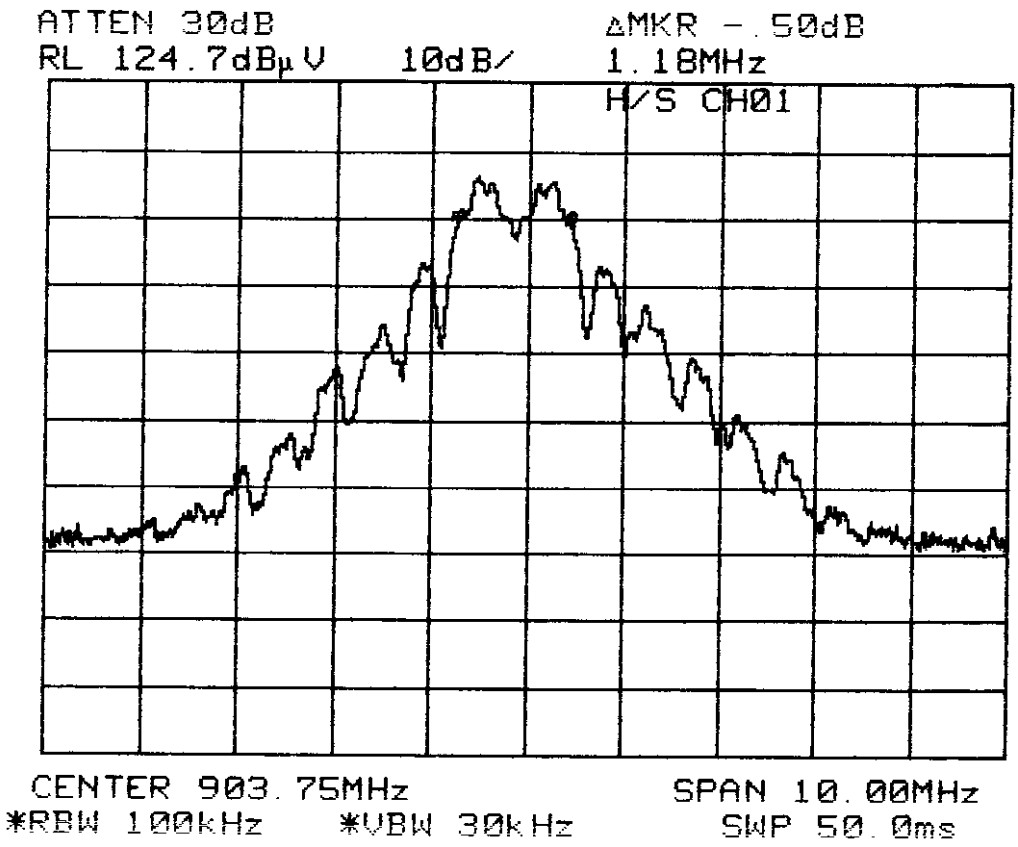
3.3 List of Test Instruments

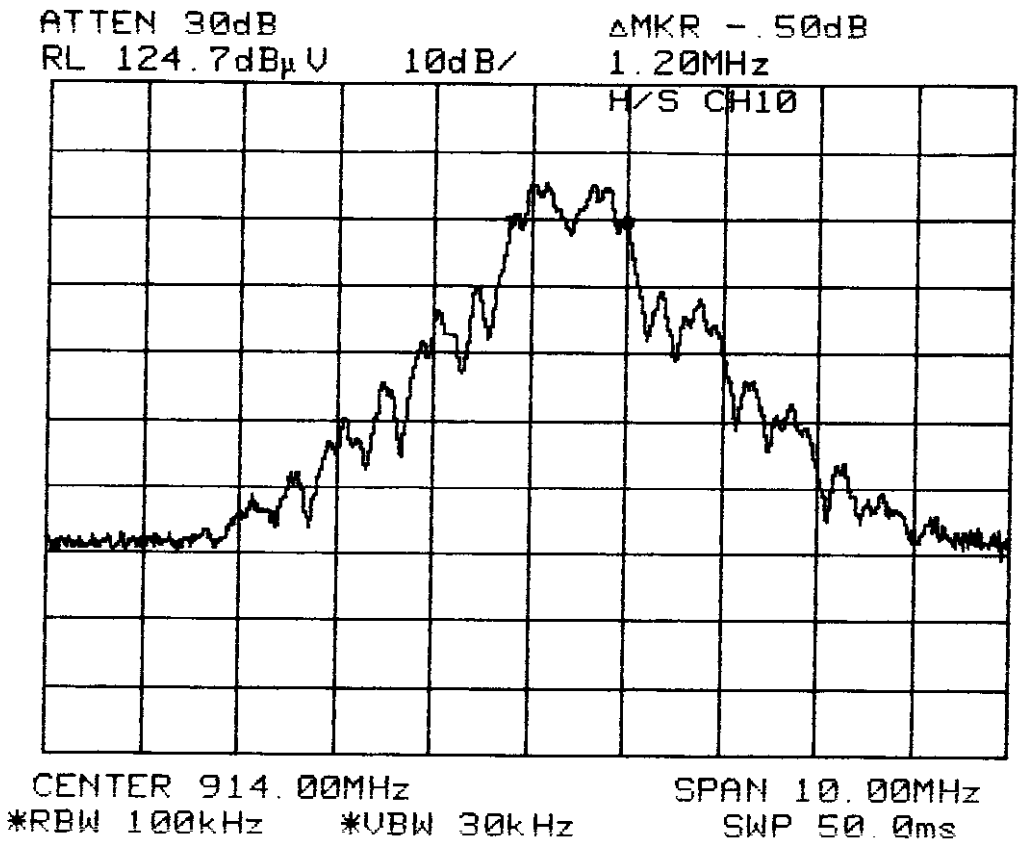
Manufacturer	Device	Model	Input Impedance
Hewlett Packard	.9KHz – 40 GHz Spectrum Analyzer	HP8564E	50.00

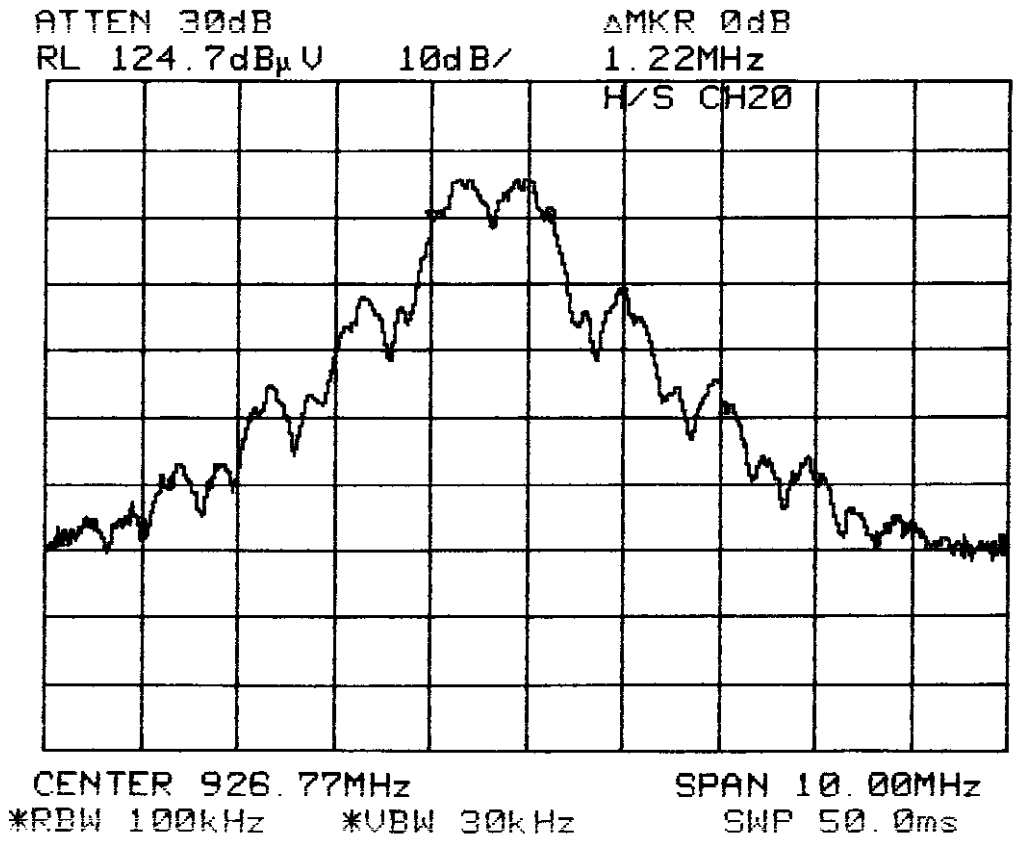

*ATTEN 30dB
RL 20.0dBm
10dB/
ΔMKR 0dB
1.23MHz
BASE CH01
ΔMKR
1.23 MHz
0 dB
D
CENTER 903.00MHz
SPAN 10.00MHz
*RBW 100kHz
*VBW 30kHz
SWP 50.0ms


*ATTEN 30dB
RL 20.0dBm
10dB/
ΔMKR -.13dB
1.22MHz
BASE CH10
SPAN
10.00 MHz
D
CENTER 914.00MHz
SPAN 10.00MHz
*RBW 100kHz
*VBW 30kHz
SWP 50.0ms


ATTEN 30dB
RL 14.8dBm
10dB/
ΔMKR 0dB
1.23MHz
BASE CH20
ΔMKR
1.23 MHz
0 dB
D
CENTER 926.40MHz
SPAN 10.00MHz


ATTEN 30dB
RL 124.7dBμV
10dB/
ΔMKR -.50dB
1.18MHz
H/S CH01
CENTER 903.75MHz
SPAN 10.00MHz
*RBW 100kHz
*VBW 30kHz
SWP 50.0ms


ATTEN 30dB
RL 124.7dBµV
10dB/
ΔMKR -.50dB
1.20MHz
H/S CH10
CENTER 914.00MHz
SPAN 10.00MHz
*RBW 100kHz
*VBW 30kHz
SWP 50.0ms


ATTEN 30dB
ΔMKR 0dB
RL 124.7dBμV
10dB/
1.22MHz
H/S CH20
CENTER 926.77MHz
SPAN 10.00MHz
*RBW 100kHz
*VBW 30kHz
SWP 50.0ms

3.4 Test Result of Bandwidth

Bandwidth of Channel 1

Bandwidth of Base : 1.238 MHz
Bandwidth of Handset : 1.18 MHz
The min. 6 dB BW at least : 500 KHz

Bandwidth of Channel 10

Bandwidth of Base : 1.22 MHz
Bandwidth of Handset : 1.20 MHz
The min. 6 dB BW at least : 500 KHz

Bandwidth of Channel 20

Bandwidth of Base : 1.23 MHz
Bandwidth of Handset : 1.22 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. : SPP-SS965

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	903.763	H	100.00	205.00	109.83	17.58	12.45
		V	100.00	48.00	112.49	32.45	15.11
Base 10	914.475	H	100.00	306.00	107.85	11.14	10.46
		V	100.00	156.00	112.30	31.06	14.92
Base 20	926.563	H	100.00	176.00	105.56	6.58	8.18
		V	100.00	307.00	111.99	28.92	14.61
Handset 01	903.463	H	100.00	250.00	104.05	4.64	6.66
		V	100.00	357.00	115.46	64.30	18.08
Handset 10	914.525	H	100.00	290.00	103.97	4.56	6.58
		V	100.00	109.00	115.53	65.35	18.15
Handset 20	926.488	H	100.00	133.00	104.44	5.08	7.05
		V	100.00	298.00	114.16	47.67	16.78

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 = 112. 49 dBuV/m

$10^{(112.49/20)} \times 10^{-6} = 0.42121$ V

E.R.P. = $(0.42121 \times 3)^2 / 49.2 = 32.45$ mW = 10 x log(32.45 mW/1Mw)

= 15.11 dBm

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

FIa (dBuV/m) = FIr (dBuV) + Correction Factors

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss

For frequency between 1 GHz to 18 GMHz

FIa(dBuV/m) = FIr(dBuV) + Correction Factor - Duty Cycle

FIa : Actual Field Intensity

FIr : Reading of the Field Intensity

Correction Factors = Antenna Factor + Cable Loss – Distance Factor (9.54dB)- Amplifier Gain

The setting up procedure is recorded on Appendix A.

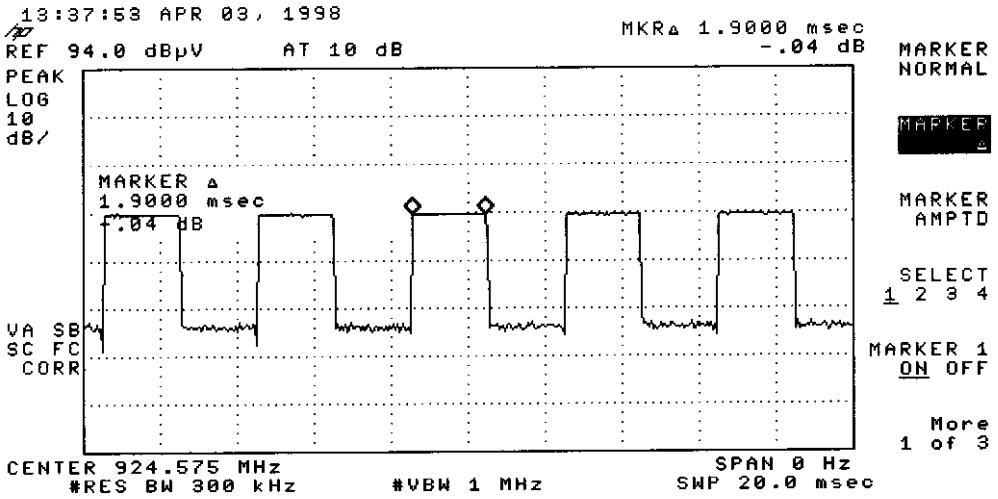
5.2 List of Test Instruments

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 .

The duty cycle factor = 20 log (T_{duty} / T_{cycle}) = 20 log (1.9 /4)= -6.46


13:37:53 APR 03, 1998
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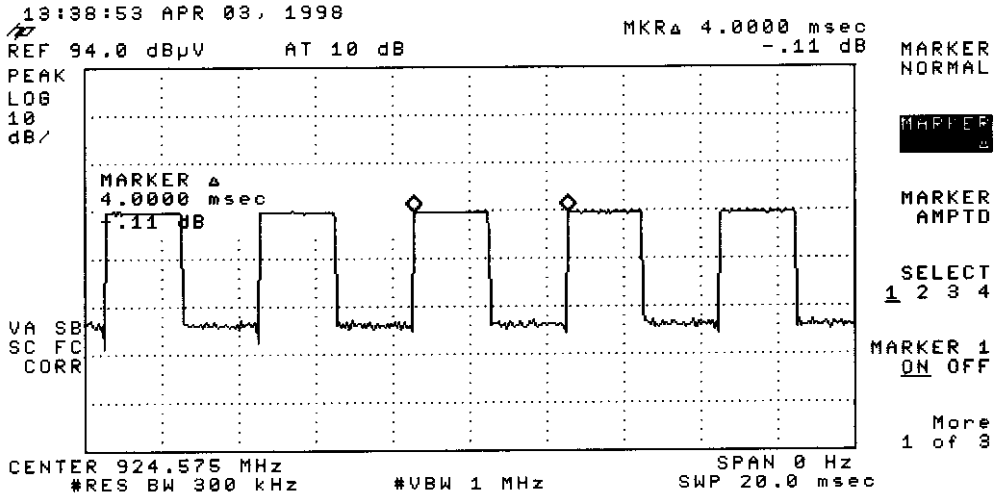
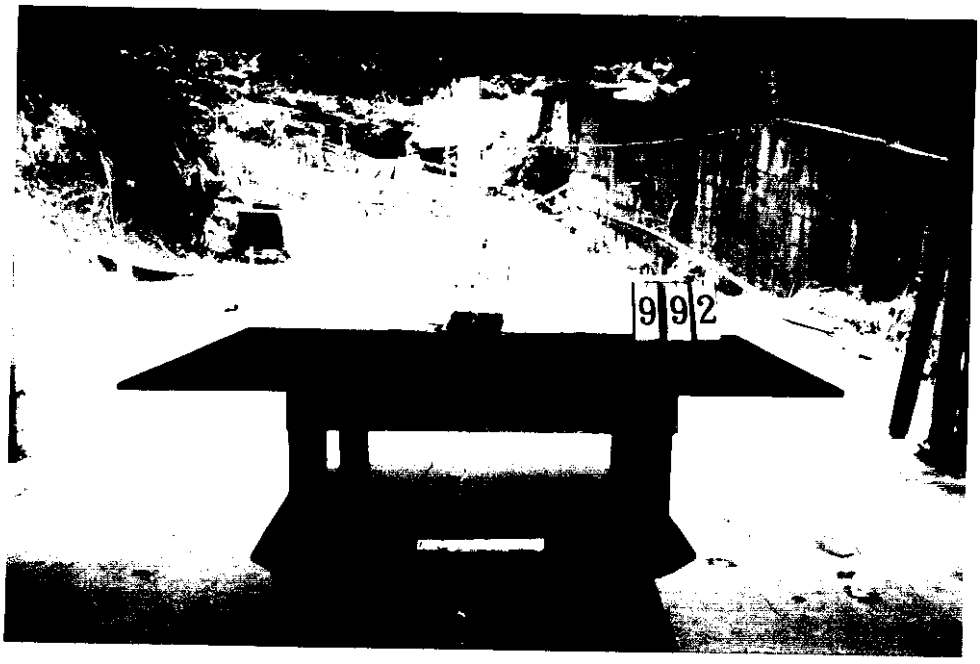
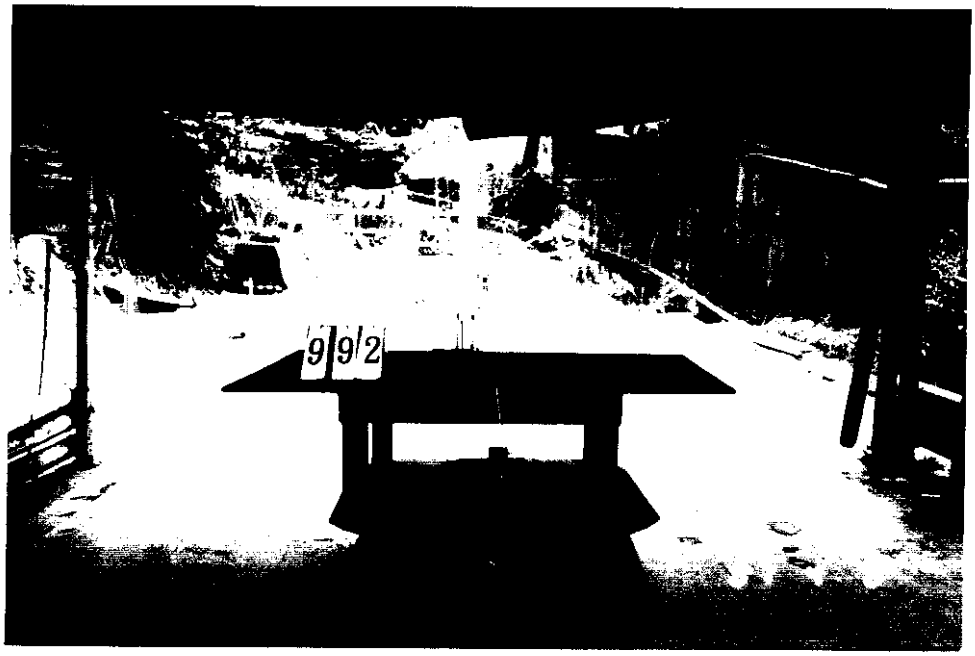
-.04 dB
REF 94.0 dBµV
AT 10 dB
PEAK
LOG
10
dB/
MARKER Δ
1.9000 msec
-.04 dB
VA SB
SC FC
CORR
MARKER
NORMAL
MARKER
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 3
CENTER 924.575 MHz
#RES BW 300 kHz
#VBW 1 MHz
SPAN 0 Hz
SWP 20.0 msec


13:38:53 APR 03, 1998
MKRΔ 4.0000 msec
-.11 dB
REF 94.0 dBµV
AT 10 dB
PEAK
LOG
10
dB/
MARKER Δ
4.0000 msec
-.11 dB
VA SB
SC FC
CORR
MARKER
NORMAL
MARKER
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 3
CENTER 924.575 MHz
#RES BW 300 kHz
#VBW 1 MHz
SPAN 0 Hz
SWP 20.0 msec

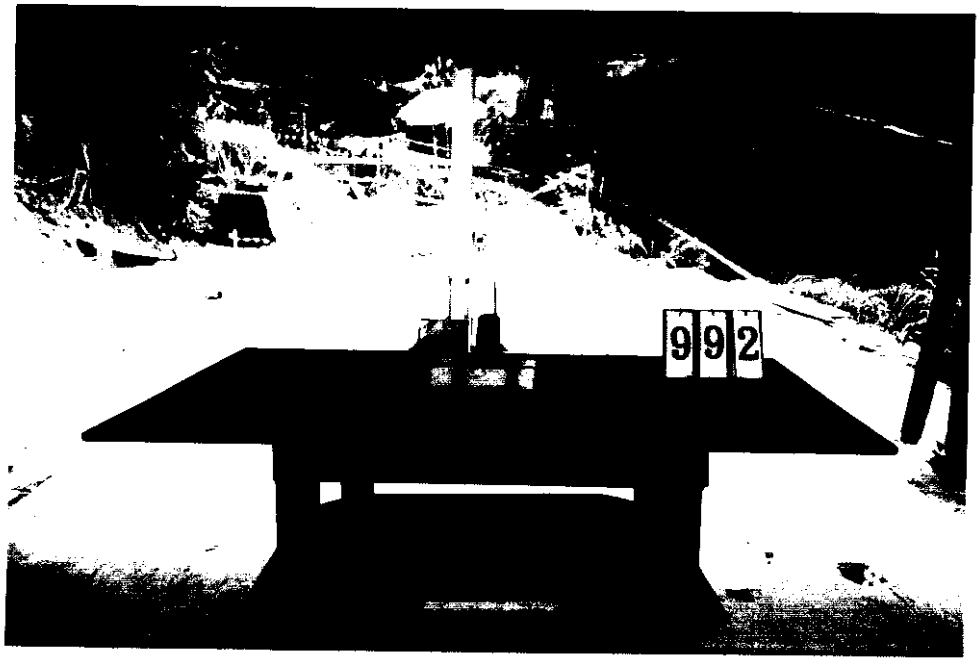
5.3 Test Instruments Configuration



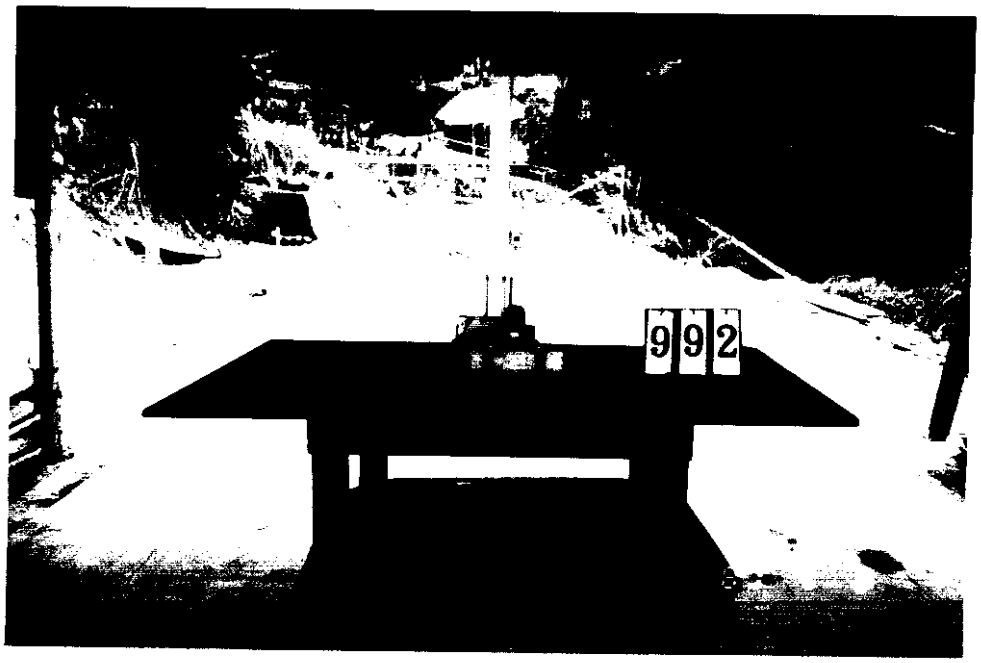
Pic 1 Front View of the Test Configuration (BASE)



Pic 2 Rear View of the Test Configuration (BASE)



Pic 1 Front View of the Test Configuration (HANDSET)



Pic 2 Rear View of the Test Configuration (HANDSET)

*** The test configuration for frequency between 1 GHz to 18 GHz is same as above .**

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. : SPP-SS965

EUT : 900MHz Digital Spread Spectrum Telephone

Table 31. Second Harmonic Attendation

Channel	Fundamental (MHz)	Fundamental (dBuV/m)	2nd Harmonic (MHz)	2nd Har. (dBuV/m)	Result (F/H dB)	Limit (dBc)	Margin (dBc)
B/S CH 01	903.763	112.34	1807	54.30	58.04	20.00	38.04
B/S CH 10	914.475	112.30	1828	49.63	62.94	20.00	42.94
B/S CH 20	926.563	111.99	1853	49.13	62.86	20.00	42.86
H/S CH 01	903.463	115.46	1807	56.26	59.2	20.00	39.2
H/S CH 10	914.525	115.53	1829	53.59	61.94	20.00	41.94
H/S CH 20	926.488	114.16	1853	51.76	62.4	20.00	42.4

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 – 2nd 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 form the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

Model No. : SPP-SS965

EUT : 900MHz Digital Spread Spectrum Telephone

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

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)
230.401	42.99	100.00	64	-8.23	34.76	46	-11.24
268.801	46.32	100.00	244	-6.45	39.87	46	-6.13
316.799	54.34	100.00	205	-19.04	35.30	46	-10.70
326.399	56.41	100.00	218	-19.03	37.38	46	-8.62
575.998	45.48	100.00	299	-11.56	33.92	46	-12.08
652.798	42.40	100.00	295	-8.75	33.65	46	-12.35
758.397	43.42	100.00	318	-6.89	36.53	46	-9.47

Note :

1. Margin = Corrected - Limit.
2. Peak Amplitude +Correction Factors = Corrected
3.

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

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)
2710	42.43	100.00	201	-6.84	-6.46	29.13	54	-24.87
***								

Note:

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

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)
230.401	39.77	100.00	125	-8.23	31.54	46	-14.46
268.801	40.33	100.00	195	-6.45	33.88	46	-12.12
316.799	47.57	100.00	66	-19.04	28.53	46	-17.47
326.399	48.53	100.00	58	-19.03	29.50	46	-16.50
575.998	44.77	100.00	289	-11.56	33.21	46	-12.79
652.798	43.24	100.00	214	-8.75	34.49	46	-11.51
758.397	46.96	100.00	307	-6.89	40.07	46	-5.93

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)
2710	44.27	100.00	206.00	-6.84	-6.46	30.97	54	-23.03
***								

Note :

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

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

Radiated Emission				Correction Factors	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
278.399	44.20	100.00	29	-5.99	38.21	46	-7.79
307.204	48.25	100.00	208	-15.01	33.24	46	-12.76
336.004	50.21	100.00	224	-18.96	31.25	46	-14.75
537.604	41.29	100.00	102	-13.13	28.16	46	-17.84
576.001	44.76	100.00	288	-11.56	33.20	46	-12.80
652.801	39.08	100.00	43	-8.75	30.33	46	-15.67
787.204	46.90	100.00	43	-6.75	40.15	46	-5.85

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	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2742	40.77	100.00	206	-6.84	-6.46	27.47	54	-26.53
***								

Note :

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

Table 13. Open Field Radiated Emissions For 30 MHz -1 GMHz [Channel 10, 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)
278.399	40.81	100.00	90	-5.99	34.82	46	-11.18
307.204	43.53	100.00	102	-15.01	28.52	46	-17.48
336.004	42.69	102.00	2	-18.96	23.73	46	-22.27
537.604	44.11	100.00	137	-13.13	30.98	46	-15.02
576.001	45.99	100.00	229	-11.56	34.43	46	-11.57
652.801	41.74	100.00	18	-8.75	32.99	46	-13.01
787.204	48.74	100.00	8	-6.75	41.99	46	-4.01

Note :

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

Table 14. Open Field Radiated Emissions For 1 GHz -18 GMHz [Channel 10, 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)
2742	44.27	100.00	143	-6.84	-6.46	30.97	54	-23.03
***								

Note :

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

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

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)
288.000	45.50	401.00	230	-5.45	40.05	46	-5.95
316.801	51.08	100.00	41	-19.04	32.04	46	-13.96
345.601	49.37	100.00	294	-18.64	30.73	46	-15.27
565.800	38.38	100.00	336	-12.04	26.34	46	-19.66
575.999	45.36	100.00	318	-11.56	33.80	46	-12.20
652.799	43.14	100.00	302	-8.75	34.39	46	-11.61
777.597	43.59	100	358	-6.73	36.86	46	-9.14

Note :

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

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

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)
2778	44.93	100.00	265	-6.84	-6.46	31.63	54	-22.37
***								

Note :

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

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

Radiated Emission				Correction Factors	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
288.000	46.09	100.00	77	-5.45	40.64	46	-5.36
316.801	44.74	100.00	65	-19.04	25.70	46	-20.30
345.601	47.60	100.00	278	-18.64	28.96	46	-17.04
565.800	40.27	100.00	195	-12.04	28.23	46	-17.77
575.999	46.59	100.00	200	-11.56	35.03	46	-10.97
652.799	42.36	100.00	254	-8.75	33.61	46	-12.39
777.597	50.19	100	305	-6.73	43.46	46	-2.54

Note :

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

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

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2778	40.27	100.00	167	-6.84	-6.46	26.97	54	-27.03
***								

Note :

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

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

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)
312.105	37.63	401.00	343	-19.01	18.62	46.00	-27.38
345.603	41.39	100.00	127	-18.64	22.75	46	-23.25
374.403	39.72	100.00	289	-17.40	22.32	46	-23.68
384.003	39.47	401.00	266	-17.21	22.26	46	-23.74
460.801	39.85	251.00	342	-15.88	23.97	46	-22.03
808.895	37.59	401.00	262	-6.66	30.93	46	-15.07

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	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)
2710	62.27	100.00	250	-6.84	-6.46	48.97	54	-5.03
3614	61.4	100.00	136	-2.8	-6.46	52.14	54	-1.86
4518	40.35	100.00	76	3.49	-6.46	37.38	54	-16.62

Note :

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

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

Radiated Emission				Correction Factors	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
312.105	37.68	250.00	177	-19.01	18.67	46	-27.33
345.603	43.41	100.00	141	-18.64	24.77	46	-21.23
374.403	44.64	100.00	81	-17.40	27.24	46	-18.76
384.003	44.71	100.00	229	-17.21	27.50	46	-18.50
460.801	43.73	100.00	187	-15.88	27.85	46	-18.15
808.895	44.55	100.00	5	-6.66	37.89	46	-8.11

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	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2710	56.6	100.00	107	-6.84	-6.46	43.3	54	-10.7
3614	55.23	100.00	49	-2.8	-6.46	45.97	54	-8.03
4518	37.18	100.00	302	3.49	-6.46	34.21	54	-19.79

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	Corrected Amplitude (dBuV/m)	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)		Limit (dBuV/m)	Margin (dB)
345.603	41.01	100.00	150	-18.64	22.37	46	-23.63
374.401	38.94	401.00	272	-17.40	24.54	46	-24.46
384.001	39.18	100.00	194	-17.21	21.97	46	-24.03
403.201	39.61	100.00	318	-16.98	22.63	46	-23.37
441.603	41.82	100.00	45	-16.56	25.26	46	-20.74
480.001	38.34	401.00	48	-15.34	23.00	46	-23.00
777.602	38.03	401.00	35	-6.73	31.30	46	-14.70

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	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)
2743	62.1	100.00	251	-6.84	-6.46	48.8	54	-5.2
3657	57.73	100.00	63	-2.8	-6.46	48.47	54	-5.53
4572	28.68	100.00	193	3.49	-6.46	35.71	54	-18.29

Note :

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

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

Radiated Emission				Correction Factors	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
345.603	43.59	100.00	230	-18.64	24.95	46	-21.05
374.401	46.13	100.00	109	-17.40	28.73	46	-17.27
384.001	45.92	100.00	178	-17.21	28.71	46	-17.29
403.201	47.30	100.00	118	-16.98	30.32	46	-15.68
441.603	48.67	100.00	295	-16.56	32.11	46	-13.89
480.001	45.53	100.00	283	-15.34	30.19	46	-15.81
777.602	47.15	100.00	107	-6.73	40.42	46	-5.58

Note :

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

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

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

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

Radiated Emission				Correction Factors	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
249.601	38.40	100.00	77	-7.21	31.19	46	-14.81
345.603	39.98	100.00	1	-18.64	21.34	46	-24.66
384.001	39.55	100.00	7	-17.21	22.34	46	-23.66
422.803	37.94	400.00	218	-16.92	21.02	46	-24.98
460.803	39.66	100.00	12	-15.88	23.78	46	-22.22
777.601	39.07	400.00	178	-6.73	32.34	46	-13.66
835.861	39.57	100.00	200	-6.46	33.11	46	-12.89

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	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (MHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2779	61.77	100.00	247	-6.84	-6.46	48.47	54	-5.53
3706	51.07	100.00	64	-2.8	-6.46	41.81	54	-12.19
4632	36.18	100.00	143	3.49	-6.46	33.21	54	-20.79

Note :

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

Table 29. Open Field Radiated Emissions For 30 MHz -1 GMHz [Channel 20, Handset 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)
249.601	37.60	401.00	213	-7.21	30.39	46	-15.61
345.603	42.27	100.00	258	-18.64	23.63	46	-22.37
384.001	45.25	100.00	126	-17.21	28.04	46	-17.96
422.803	47.94	401.00	282	-16.92	31.02	46	-14.98
460.803	46.12	100.00	177	-15.88	30.24	46	-15.76
777.601	45.21	100.00	194	-6.73	38.48	46	-7.52
835.861	44.99	100.00	230	-6.46	38.53	46	-7.47

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	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)
2779	55.43	100.00	308	-6.84	-6.46	42.13	54	-11.87
3706	45.73	100.00	172	-2.8	-6.46	36.47	54	-17.53
4632	33.85	100.00	247	3.49	-6.46	30.88	54	-23.12

Note :

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

VI Section 15.247(d): Power spectral density.

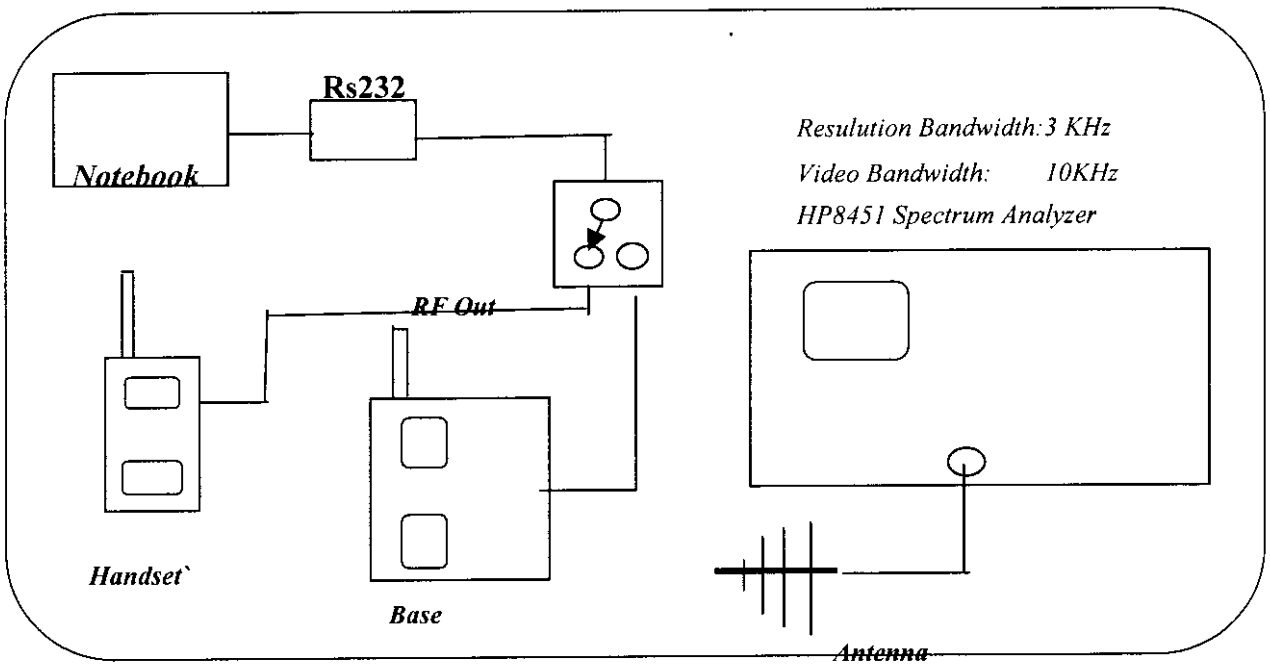
6.1 Test Condition & Setup

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

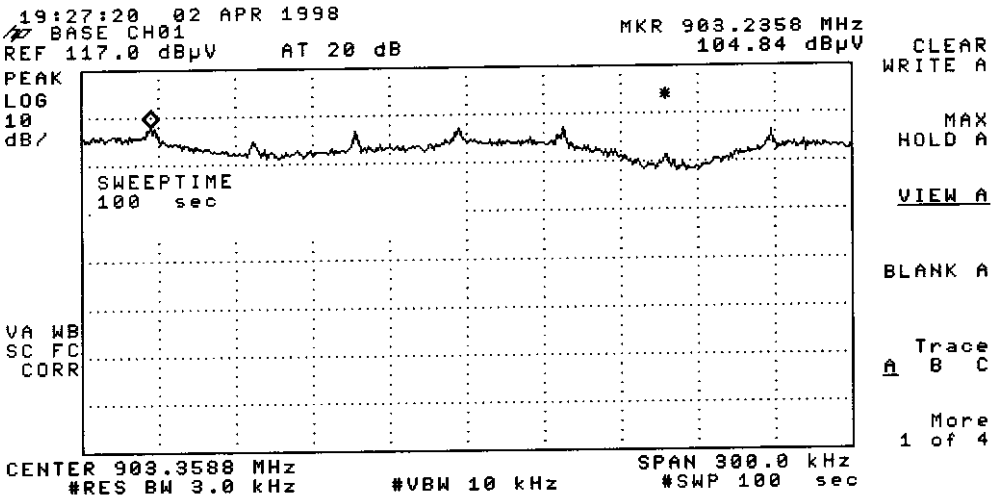


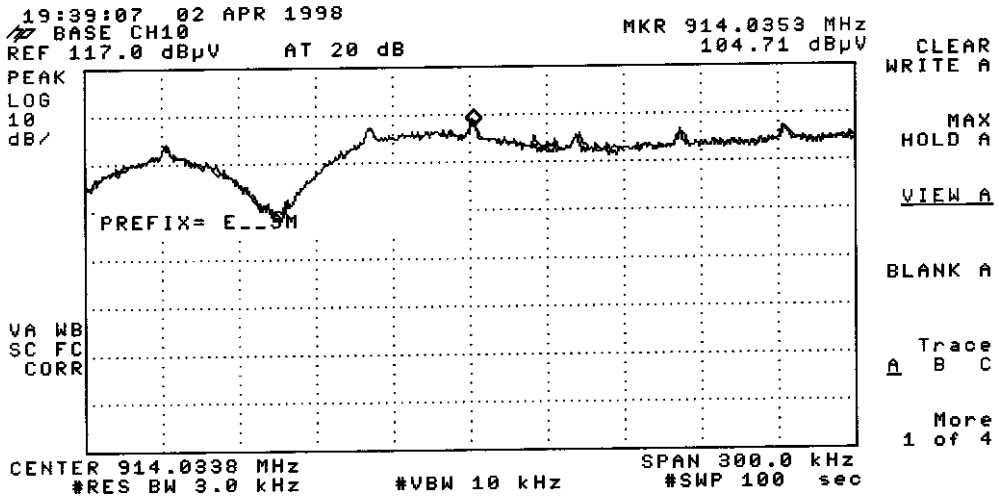
P.S.A serial port from notebook computer to control the EUT at maximal power output and channel Number.

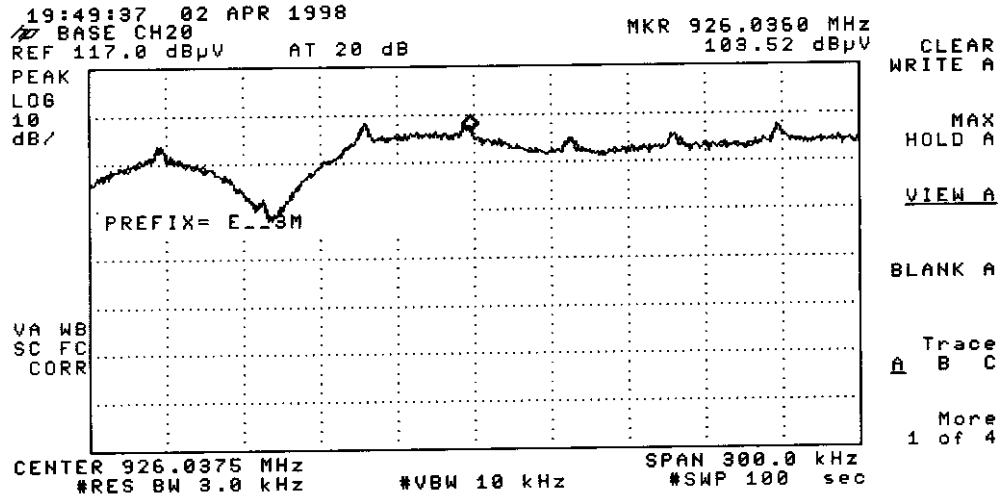
Fig 12. Test Configuration of power spectral density

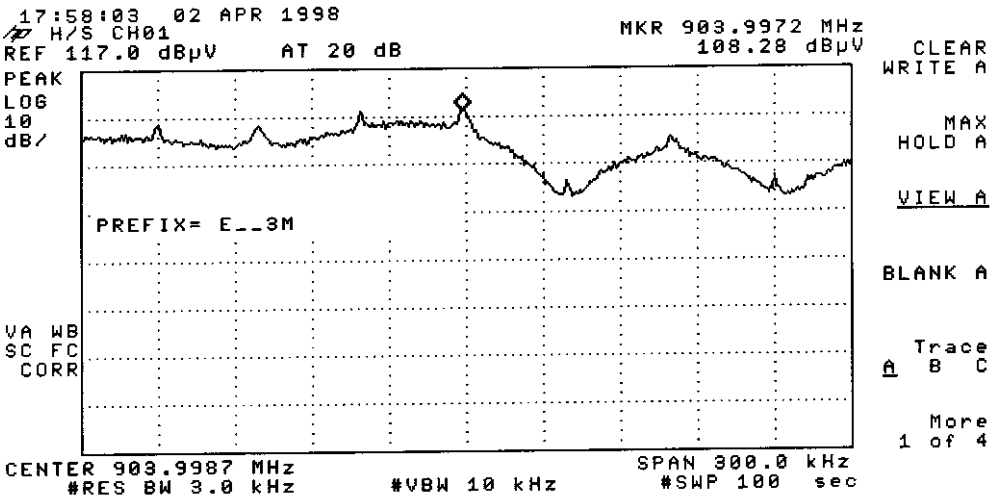
6.3 List of Test Instruments

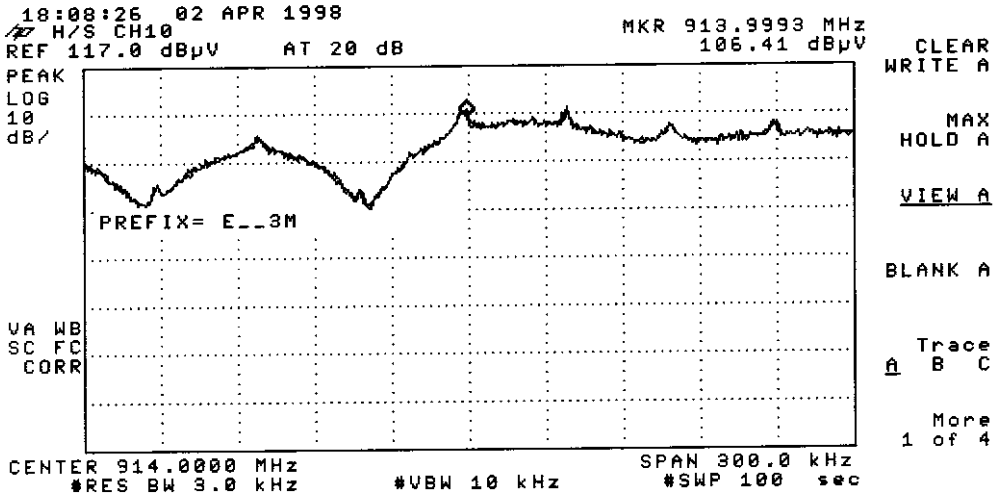
Manufacturer	Device	Model	Input Impedance
Hewlett Packard	9KHz-2.9 GHz Spectrum Analyze	HP8594EM	50.00

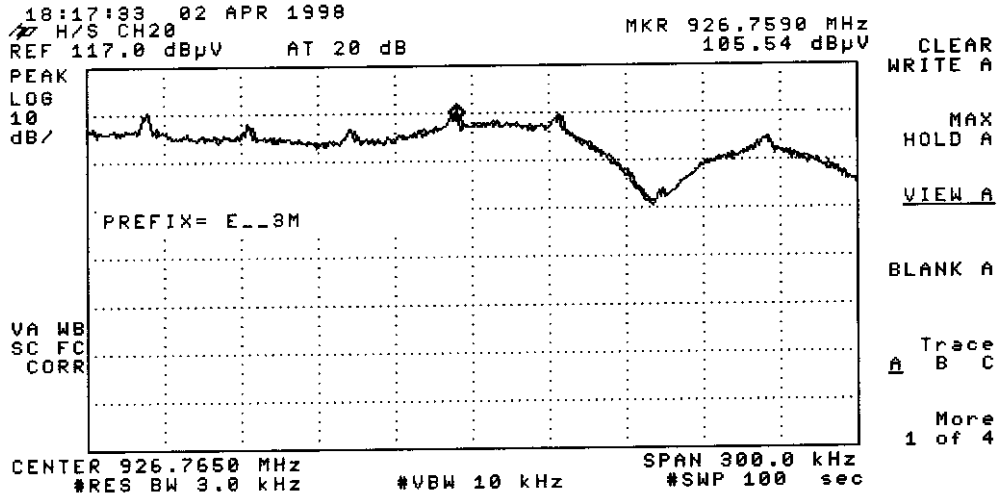

19:27:20 02 APR 1998
BASE CH01
REF 117.0 dBµV
AT 20 dB
MKR 903.2358 MHz
104.84 dBµV
PEAK
LOG
10
dB/
SWEEPTIME
100 sec
VA WB
SC FC
CORR
CLEAR
WRITE A
MAX
HOLD A
VIEW A
BLANK A
Trace
A B C
More
1 of 4
CENTER 903.3588 MHz
#RES BW 3.0 kHz
#VBW 10 kHz
SPAN 300.0 kHz
#SWP 100 sec


19:39:07 02 APR 1998
BASE CH10
REF 117.0 dBµV
AT 20 dB
MKR 914.0353 MHz
104.71 dBµV
PEAK
LOG
10
dB/
PREFIX= E__3M
VA WB
SC FC
CORR
CLEAR
WRITE A
MAX
HOLD A
VIEW A
BLANK A
Trace
A B C
More
1 of 4
CENTER 914.0338 MHz
#RES BW 3.0 kHz
#VBW 10 kHz
SPAN 300.0 kHz
#SWP 100 sec


19:49:37 02 APR 1998
BASE CH20
REF 117.0 dBµV
AT 20 dB
MKR 926.0360 MHz
103.52 dBµV
PEAK
LOG
10
dB/
PREFIX= E__3M
VA WB
SC FC
CORR
CLEAR
WRITE A
MAX
HOLD A
VIEW A
BLANK A
Trace
A B C
More
1 of 4
CENTER 926.0375 MHz
#RES BW 3.0 kHz
#VBW 10 kHz
SPAN 300.0 kHz
#SWP 100 sec


17:58:03 02 APR 1998
H/S CH01
REF 117.0 dBµV
AT 20 dB
MKR 903.9972 MHz
108.28 dBµV
PEAK
LOG
10
dB/
PREFIX= E__3M
VA WB
SC FC
CORR
CENTER 903.9987 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


18:08:26 02 APR 1998
H/S CH10
REF 117.0 dBµV
AT 20 dB
MKR 913.9993 MHz
106.41 dBµV
PEAK
LOG
10
dB/
PREFIX= E__3M
VA WB
SC FC
CORR
CENTER 914.0000 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


18:17:33 02 APR 1998
H/S CH20
REF 117.0 dBµV
AT 20 dB
MKR 926.7590 MHz
105.54 dBµV
PEAK
LOG
10
dB/
PREFIX= E__3M
VA WB
SC FC
CORR
CENTER 926.7650 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. : SPP-SS965

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	903.235	104.84	-5.62	1.81	8.00	-6.19
B/S CH 10	914.035	104.71	-5.74	1.58	8.00	-6.42
B/S CH 20	926.036	103.52	-5.79	0.33	8.00	-7.67
H/S CH 01	903.997	108.28	-5.63	5.26	8.00	-2.74
H/S CH 10	914.999	106.41	-5.74	3.28	8.00	-4.72
H/S CH 20	926.759	105.54	-5.81	2.32	8.00	-5.68

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 = 104.84-5.62=99.22 dBuV/m

$10^{(99.22/20)} \times 10^{-6} = 0.09141$ V

E.R.P. = $(0.09141 \times 3)^2 / 49.2 = 1.52$ mW = 10 x log(1.52 mW/1mW)

= 1.81 dBm

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 it's 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) [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.

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:

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

$$Gp = 8\ dB + Mj + 2\ dB$$

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.

7.2Test Instruments Configuration

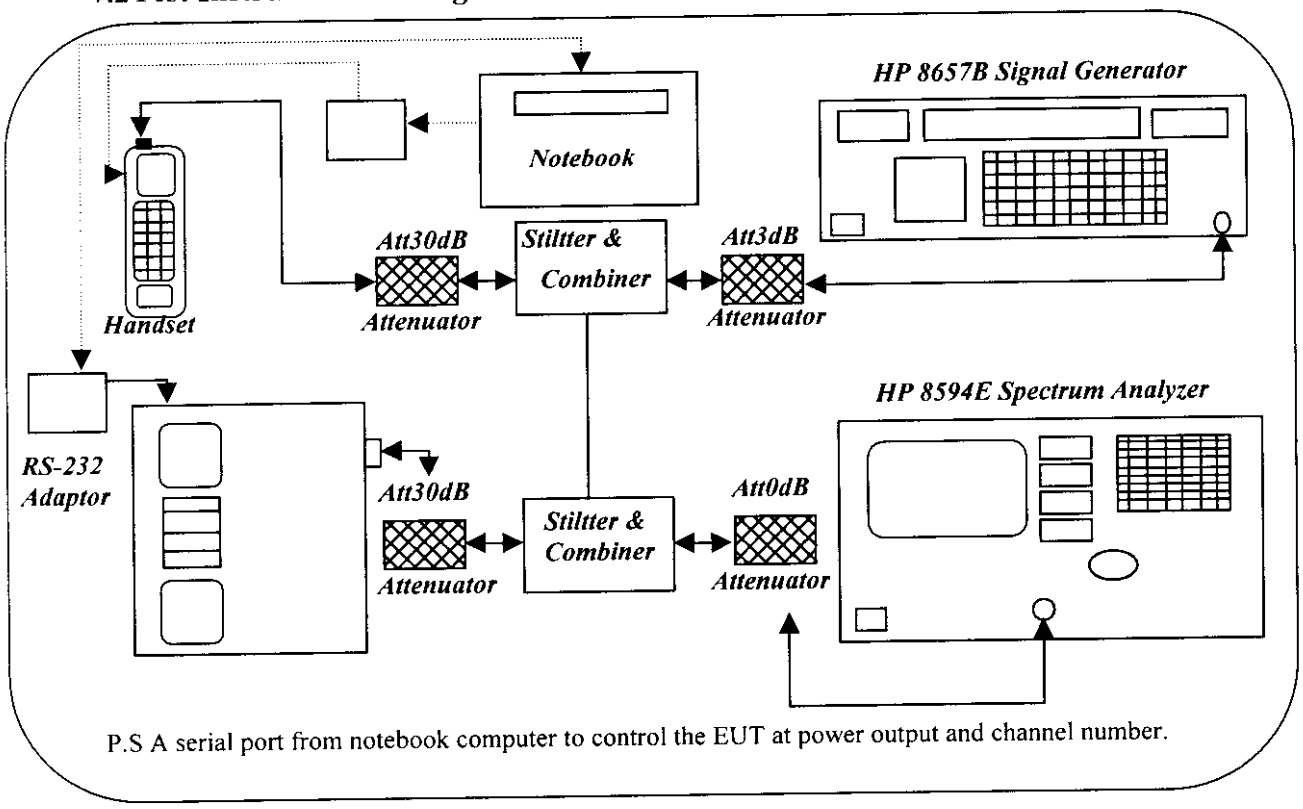


Fig 13. Test Configuration of processing gain for base station

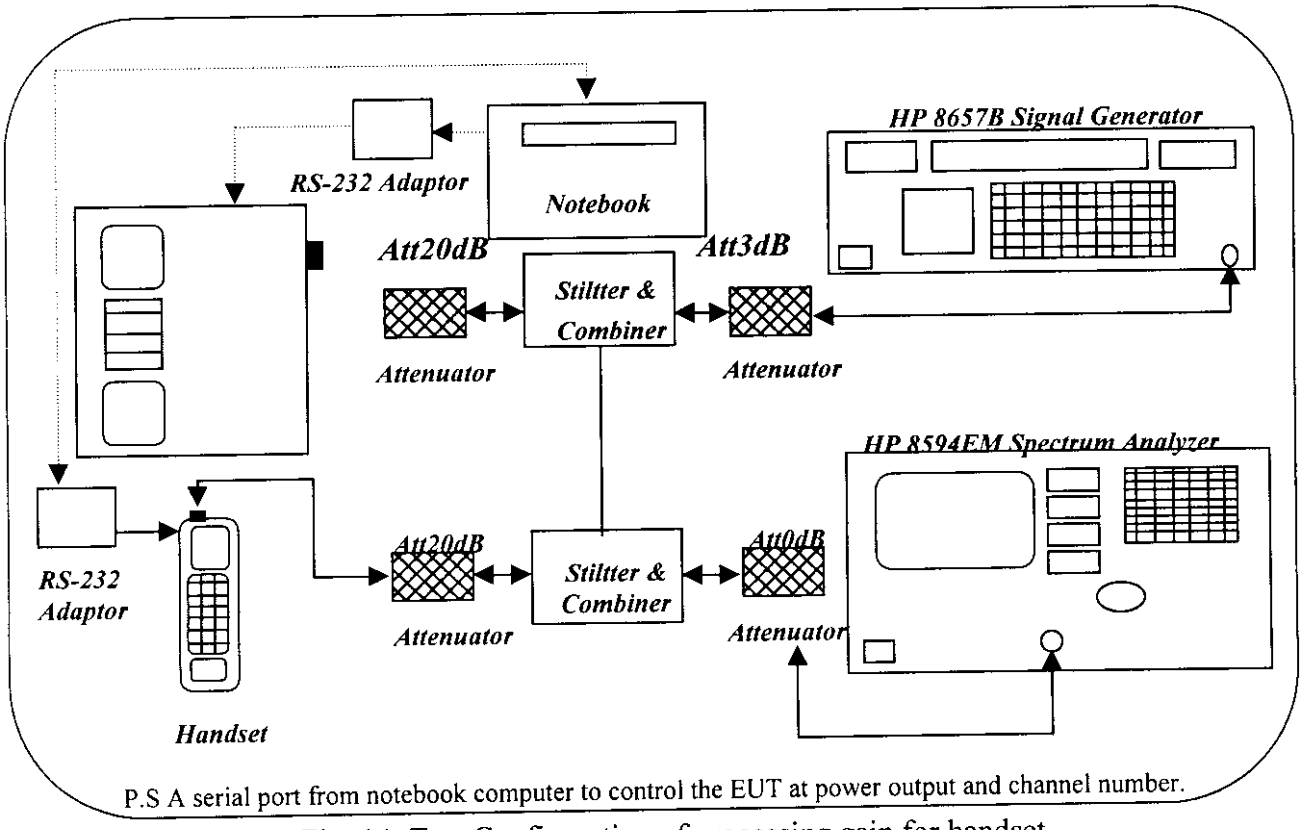


Fig. 14, Test Configuration of processing gain for handset

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 Stlitter/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. : SPP-SS965

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	-24.83	-21.69	3.14	13.04
913.70	-24.83	-21.06	3.77	13.67
913.75	-24.83	-22.14	2.69	12.59
913.80	-24.83	-21.48	3.35	13.25
913.85	-24.83	-22.07	4.76	14.66
913.90	-24.83	-21.66	3.17	13.07
913.95	-24.83	-21.86	2.97	12.87
914.00	-24.83	-23.54	1.29	11.19
914.05	-24.83	-23.28	1.55	11.45
914.10	-24.83	-22.61	2.22	12.12
914.15	-24.83	-23.86	0.97	10.87
914.20	-24.83	-24.46	0.37	10.27
914.25	-24.83	-23.97	0.86	10.76
914.30	-24.83	-23.77	1.06	10.96
914.35	-24.83	-23.04	1.79	11.69
914.40	-24.83	-23.49	1.34	11.24
914.45	-24.83	-23.51	1.32	11.22
914.50	-24.83	-24.01	0.82	10.72
914.55	-24.83	-21.43	3.40	13.30
914.60	-24.83	-24.12	0.72	10.62
914.65	-24.83	-22.15	2.67	12.57
914.70	-24.83	-22.69	2.14	12.04
914.75	-24.83	-24.53	0.30	10.20
914.80	-24.83	-22.60	2.23	12.13
914.85	-24.83	-20.46	4.37	14.27
914.90	-24.83	-20.25	4.58	14.48
914.95	-24.83	-19.87	4.96	14.86
915.00	-24.83	-21.98	3.19	13.09
915.05	-24.83	-19.58	5.25	15.15
915.10	-24.83	-20.10	4.73	14.63

Test Result:

Processing Gain : 10.96 dB

Note:

1. GP=(S/No)+Mj+Lsys=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	-22.14	-16.54	5.6	15.5
914.00	-22.14	-16.17	5.97	15.87
914.05	-22.14	-15.90	6.24	16.14
914.10	-22.14	-23.10	-0.96	9.84
914.15	-22.14	-16.47	5.67	15.57
914.20	-22.14	-18.43	3.71	13.61
914.25	-22.14	-19.83	2.31	12.21
914.30	-22.14	-16.77	5.37	15.27
914.35	-22.14	-19.85	2.29	12.19
914.40	-22.14	-23.68	-1.54	8.36
914.45	-22.14	-20.13	2.01	11.91
914.50	-22.14	-19.49	2.65	12.55
914.55	-22.14	-19.33	2.81	12.71
914.60	-22.14	-17.63	4.51	14.41
914.65	-22.14	-21.76	0.38	10.28
914.70	-22.14	-19.06	3.08	12.98
914.75	-22.14	-17.91	4.23	14.13
914.80	-22.14	-19.30	2.84	12.74
914.85	-22.14	-16.60	5.54	15.44
914.90	-22.14	-15.96	6.18	16.08
914.95	-22.14	-15.34	6.67	16.57
915.00	-22.14	-15.81	6.33	16.23
915.05	-22.14	-15.41	6.73	16.63
915.10	-22.14	-12.90	9.24	19.14
915.15	-22.14	-11.52	10.62	20.52
915.20	-22.14	-11.91	10.23	20.13
915.25	-22.14	-9.50	12.64	22.54
915.30	-22.14	-8.99	13.15	23.05
915.35	-22.14	-7.35	14.79	24.69
915.40	-22.14	-10.32	11.82	21.72

Test Result:

Processing Gain : 12.55 dB

Note:

1. GP = (S/No) + Mj + Lsys = 7.9 dB + Mj + 2 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

TOKO No	HAS050	REV No 00

1. APPLICABLE RANGE
This specification is applicable to the Antenna for a hand set of 900 MHZ cordless telephone.

2. APPEARANCE,STRUCTURE AND MATERIAL
As per drawing

3. ELECTRICAL CHARACTERISTIC
Conditions in measurment ; Helical Antenna shall perpendicularly put on the level copper plate (size;W600xD600xH1500) in the range of resonance frequency.

1) The range of resonance frequency : 740 ±30MHz
2) Input impedance : 50 Ωnominal
3) V.S.W.R : 2.5 MAX.
4) Insulation resistance : 500MΩ/DC500V
5) Withstand voltage : AC1500/minute

4. MECHANICAL CHARACTERISTIC
1) The intensity of fixing a cover or connector
The Axial direction : 40N (4.08 Kg) 5 second

2) Curve Vertical : withing 3 mm
Hoizontal : withing 5 mm

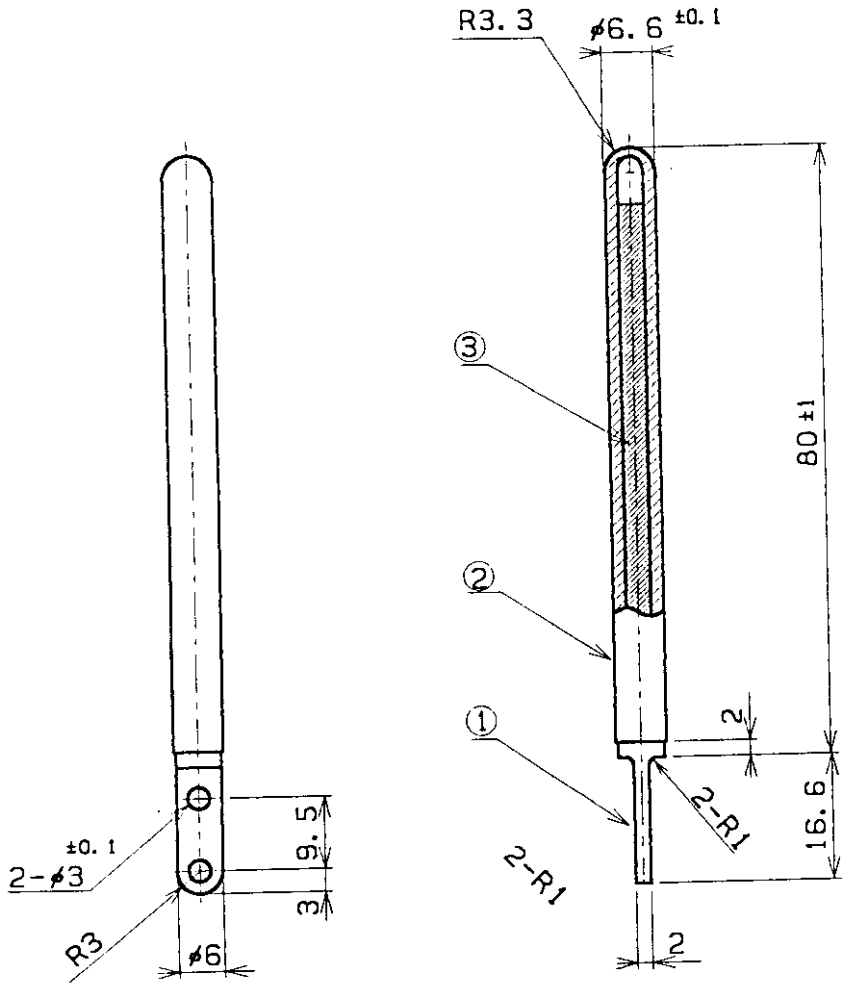
5. CIRCUMSTANCE CHARACTERISTIC
1) The temperature cycle : 65°C/25°C/-10°C(24Hr/ 1cl) 10 cl
Neither electrical nor mechanical abnormal characteristic shall occur.
2) The range of temperature in usage : -10°C～+60°C
Neither electrical nor mechanical abnormal characteristic shall occur.
3) The range of temperature for storage : -30°C～+70°C
Neither electrical nor mechanical abnormal characteristic shall occur.

6. WITHSTANDING CHARACTRISTIC
1) Vibraition-resistance : 10-55-10cl/minute,vibration width : 1.5mm
1500/1 minuite respectively
No abnormality shall occur.
2) Bending-resistance : bend up to ±60°/10 reciprocations
No abnormality shall occur.
3) Dropping-resistance : Vertically drop from the height of 1.5 m
It shall not broken.

7. PACKING : put in to the poly-back for each goods
8. MADE IN CHINA

APPROVED by 98-03-12
CHECKED by
PREPARED by D.KAKIUCHI 98-03-12

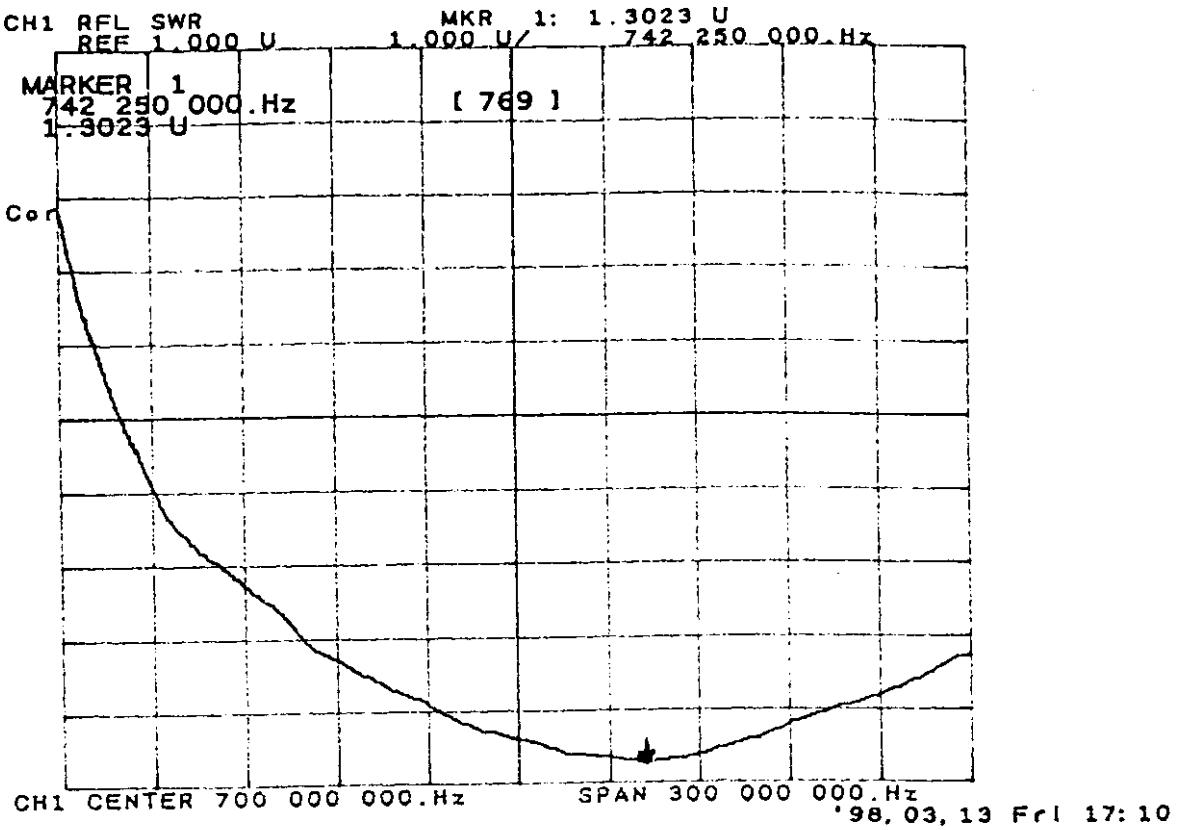
注) 1, 傷, ﾊﾞﾘ, 汚れ等外観に異常のないこと。

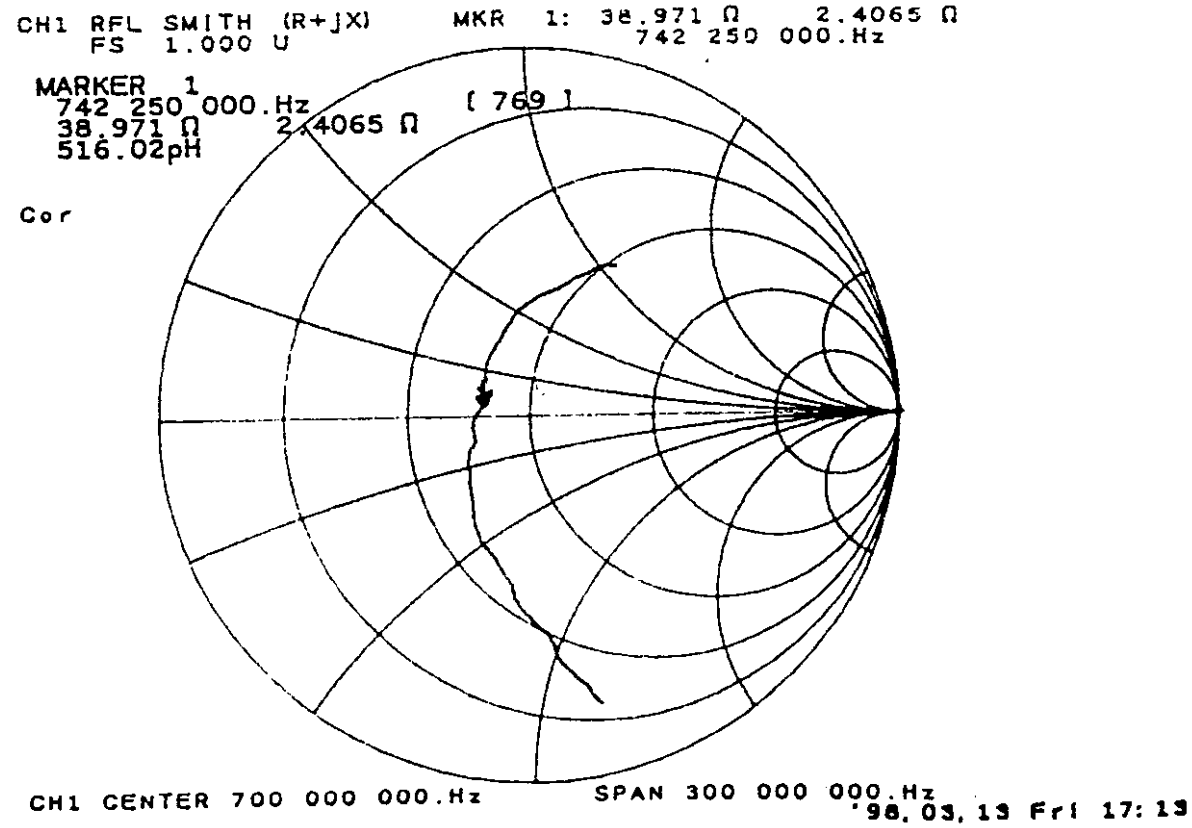


NO	PARTS NO	PARTS NAME	QTY	MATERIAL	PLATING	COLOR
3	A03-078-01	COVER	1	ELASTMER レザミンP-4090		BLACK
2	A11-004	FLEXIBLE SHAFT	1	SWRH		
1	A01-097	CONNECTOR	1	BSBM	Ni plated-2μ	

					一般公差	±0.2	TOKO NO		
					単位	mm	HEA-501-SZ-970-01		
					尺度	1/1	SPEC. NO:HAS050		
					図法	第三角図法	F		
1	抽出変更 970-00→970-01	D.F	98-03-13		承認	前内 98-02-10	名称	HELICAL ANTENNA	
					検図				
記号	変更内容	承認 担当	年月日		製図		形式	東芝 株式会社	
					設計	前内 98-02-10			

TOKO SAMPLE


CH1 RFL SWR
REF 1.000 U
MKR 1: 1.3023 U
1.000 U/
742 250 000.Hz
MARKER 1
742 250 000.Hz
1.3023 U
[769]
Cor
CH1 CENTER 700 000 000.Hz
SPAN 300 000 000.Hz
'98, 03, 13 Fri 17: 10


CH1 RFL SMITH (R+jX)
FS 1.000 U
MKR 1: 38.971 Ω 2.4065 Ω
742 250 000.Hz
MARKER 1
742 250 000.Hz
38.971 Ω 2.4065 Ω
516.02pH
[769]
Cor
CH1 CENTER 700 000 000.Hz
SPAN 300 000 000.Hz
'98, 03, 13 Fri 17: 13

TO: 佐藤 栄和 様

2/5

	ANTENNA	APVD.	CHKD.	DSGD.
MAR. 13. 1998	SPECIFICATION ANTIC			

1. General

1.1 Scope: This specification is applicable for the whip antenna, usable in a handset.

1.2 Operating temperature range : - 1 0 ~ + 6 0 °C

1.3 Storage temperature range : - 1 0 ~ + 7 0 °C

2. Electric performance

2.1 Resonance

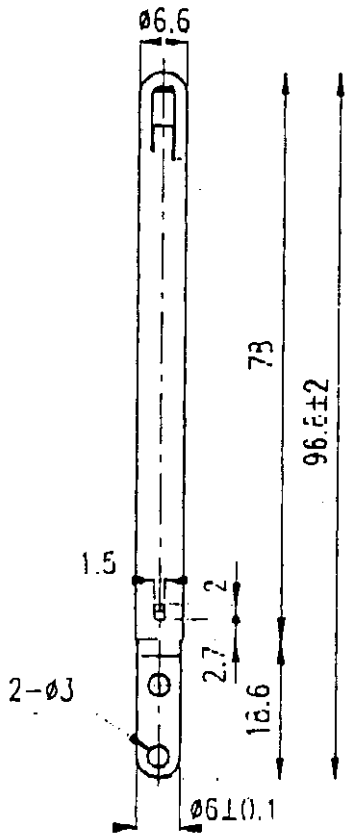
Frequncy : 902-928 MHz.

2.2 VSWR : Less than 3.0 at the resonance

2.3 Gain : Less than 0 dBd at 915 MHz.

MODEL: CPX-849

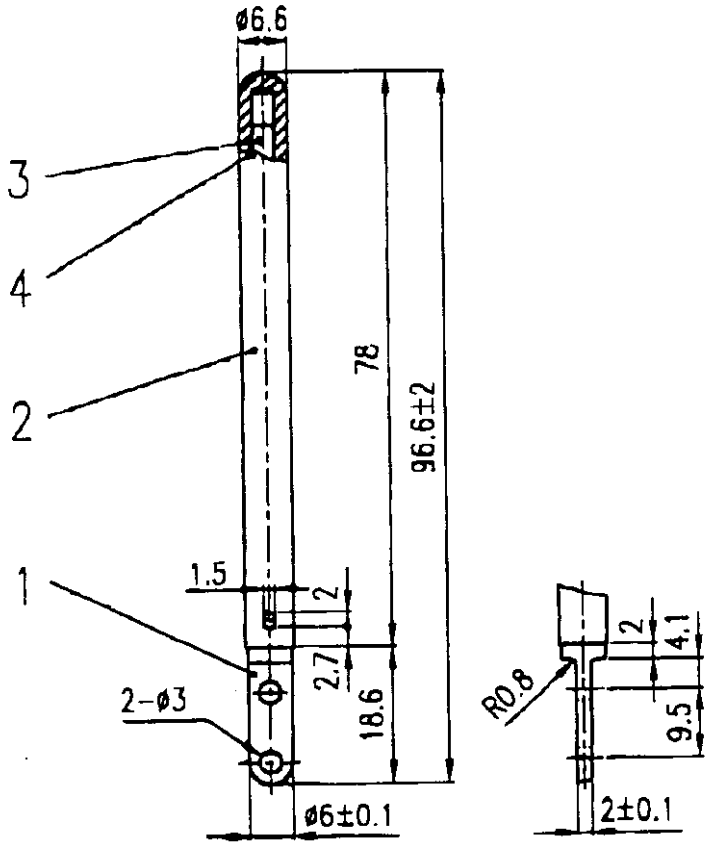
PARTS NO. 1-501-933-21



TONE SHINE ELECTRIC CO.LTD.

P/N : 1-501-933-21

PRODUCT CODE
TT02144



LTR	PART NAME	QTY	MATERIAL	REMARK
4	SPACER	1	SPONGE	
3	ELEMENT	1	PVC + WIRE	
2	COVER	1	ELASTOLLAN(C-95A)	DARK GRAY
1	ELEMENT HOLDER	1	ZDC-2	MFNi

TOLERANCES UNLESS OTHERWISE SPEC.	
ANGLE	±3°
ABOVE 100	±0.8
ABOVE 50 TO 100	±0.5
ABOVE 5 TO 50	±0.3
UP TO 5	±0.2

SYMB.	DESCRIPTION	DATE	APVD.

PROJ.	UNIT	SCALE	MODEL NO.
	mm	1/1	ANT1CB-144

APVD.	CHKD.	DSGD.	TITLE
渡辺 98.3.17	QC 98.3.17	QC 98.3.17	PRODUCT DRAWING

DRAWING NO. C98H0103

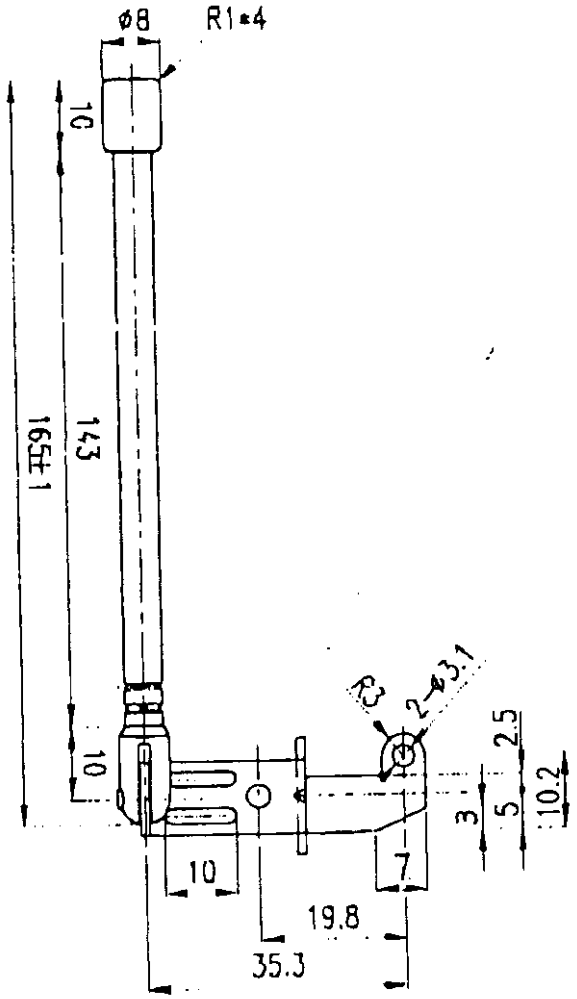
TONE-SHINE ERECTRONICS IND.,CO.,LTD.

	ANTENNA SPECIFICATION ANTRP	APVD.	CHKD.	DSGD.
MAR. 13. 1998				

1. General
   1.1 Scope: This specification is applicable for the Rod antenna, usable in a Baseset.
   1.2 Operating temperature range : −10 ~ +60 °C
   1.3 Storage temperature range : −10 ~ +70 °C
2. Electric performance
   2.1 Resonance
   Frequncy : 902~928 MHz.
   2.2 VSWR : Less than 3.0 at the resonance
   2.3 Gain : Less than 0 dBd at 915 MHz.

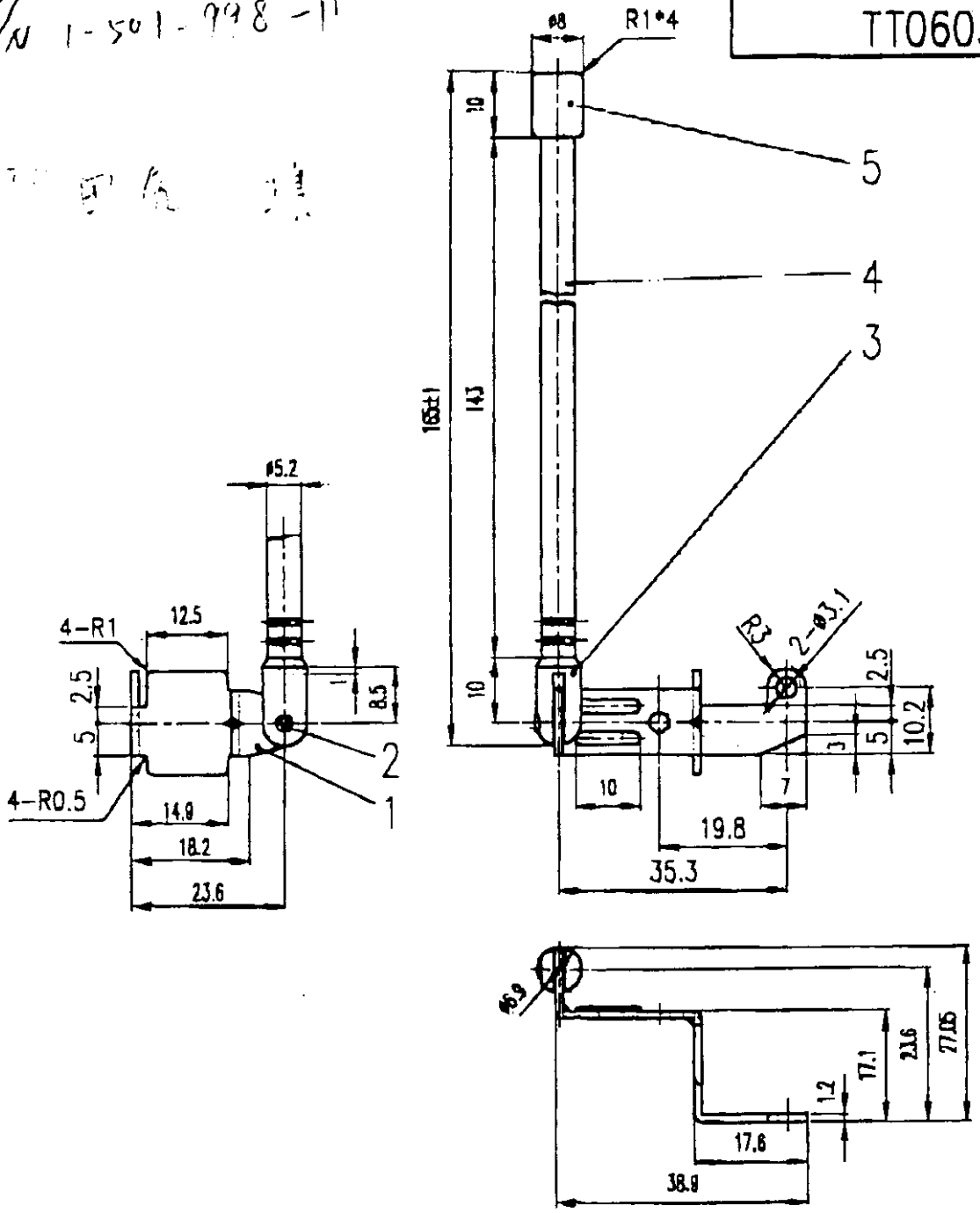
MODEL: CPX-849

PARTS NO. 1-501-998-11



P/N 1-501-998-11

PRODUCT CODE
TT06036



ANGLE	±3°	5	TOP	1	C3604BD	SnCo 2B or MBCrl
ABOVE 100	±0.8	4	POLE	1	C3700T	MBCrl
ABOVE 50 TO 100	±0.5	3	BASE	1	C3604BD	SnCo 2B or MBCrl
ABOVE 5 TO 50	±0.3	2	SCREW	1	SWRM	MBNil
UP TO 5	±0.2	1	PLATE	1	SPCC	BLACK, Ni
TOLERANCES UNLESS OTHERWISE SPEC.		LTR	PART NAME	QTY	MATERIAL	REMARK

SYMB.	DESCRIPTION	DATE	APVD.

PROJ.	UNIT	SCALE
	mm	1/1

APVD. CHKD. DSGD.

MODEL NO. ANTRPP-036

TITLE PRODUCT DRAWING

DRAWING NO. C97H1114

TONE-SHINE ERECTRONICS IND.,CO.,LTD.

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

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

Scambler / Descrambler A16-code randomizes the voice and supervisory data for trainsmission and reception, more than 64K scramble codes are availble from the 16-bit maximal length pesudo-noise sequencu generator.

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