MEASUREMENT REPORT
of
CORDLESS TELEPHONE

Applicant	: Sony Corporation
Model No.	: SPP-S9001, SPP-S9000, SPP-S9101, SPP-S9104
EUT	: 900 MHz S.S.T. Cordless Phone
FCC ID	: AK8SPPS9101
Report No.	: S2515986

Test by :

Training Research Co., Ltd.

TEL : 886-2-26935155 FAX : 886-2-26934440

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
Model No.	: SPP-S9001, SPP-S9000, SPP-S9101, SPP-S9104
EUT	: 900 MHz S.S.T. Cordless Phone
FCC ID	: AK8SPPS9101
Report No.	: S2515986
Test Date	: MAR. 30, 1999

Prepared by: JACK TSAI

Approved by: JACOB LIN

Test by :

Training Research Co., Ltd.

TEL: 886-2-26935155 FAX: 886-2-26934440

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

Tables of Contents

I . GENERAL

1.1 Introduction

The following measurement report is submitted on behalf of Applicant 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 S.S.T. Cordless Phone
Model No.	: SPP-S9001, SPP-S9000, SPP-S9101, SPP-S9104
FCC ID	: AK8SPPS9101
Frequency Range	: Base : 902 - 928 MHz Handset : 902 - 928 MHz
Support Channel	: 14 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 / 9 Vdc 450 mA Handset powered by 3.6 V / 600 mAh.
Power Cord	: Non-shielded
Data Cable	: RJ-11C x 1 => Non-shielded, 7' long, Plastic hoods, No bead
Applicant	: Sony Corporation 6-7-35, Kitashinagawa Shinagawa-Ku, Tokyo 141, Japan

1.3 Description of Support Equipment

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

PSTN Simulator	: King Design Public Switched Telephone Network Simulator
Model No.	: 8705-A
Serial No.	: N/A

Notebook	: CER Notebook
Model No.	: 386SL
Serial No.	: 001855
Power Type	: Linear
Power Core	: Non-shielded, 6' long, Plastic hoods, No ferrite bead
FCC ID	: Q8V486S

List of Exhibits

1.4 Configuration of System Under Test

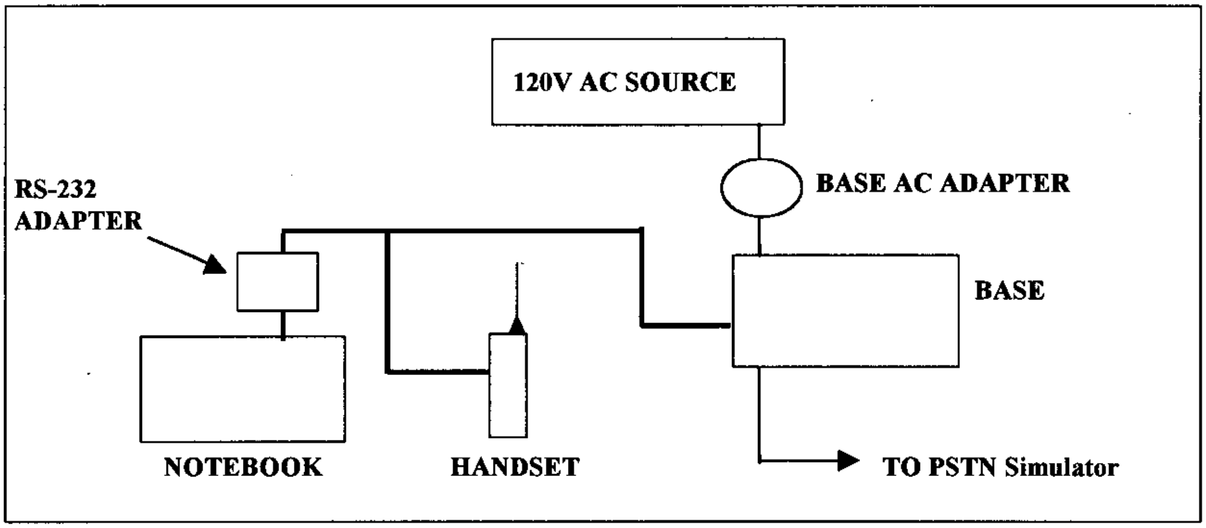


Fig. 1 Configuration of system under test

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	907.200	907.200	8	915.600	915.600
2	908.400	908.400	9	916.800	916.800
3	909.600	909.600	10	918.000	918.000
4	910.800	910.800	11	919.200	919.200
5	912.000	912.000	12	920.400	920.400
6	913.200	913.200	13	921.600	921.600
7	914.400	914.400	14	922.800	922.800

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 907.200 MHz to 922.800 MHz. So all the items as followed in testing report are need to test these three frequencies: top: channel 1, middle: channel 7, bottom: channel 14.

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. 2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, 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.

In test, the base and handset are tested separately. They were set in high power and continuously transmitting mode that controlled by computer. The ch1, ch7 and ch14 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 (CH07) and the other in bottom (CH14).
2. Idle state (handset park, on 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-S9001, SPP-S9000, SPP-S9101, SPP-S9104

EUT : 900MHz S.S.T. Cordless Phone

Table 1 Power Line Conducted Emissions (Channel 1)

Power	*Connected*	*Emissions*	*FCC Class B*	
Conductor	*Frequency (KHz)*	*Peak Amplitude (dBuV)*	*Limit (dBuV)*	*Margin (dB)*
Line 1	764.00	20.44	48.00	-27.56
	788.00	21.18	48.00	-26.82
	***			
LINE 2	***			

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 7)

Power	***Connected***	***Emissions***	***FCC Class B***	
Conductor	***Frequency (KHz)***	***Peak Amplitude (dBuV)***	***Limit (dBuV)***	***Margin (dB)***
Line 1	778.00	21.16	48.00	-26.84
	***			
LINE 2	***			

Table 3 Power Line Conducted Emissions (Channel 14)

Power Connected Emissions			FCC Class B	
Conductor	**Frequency (KHz)**	**Peak Amplitude (dBuV)**	**Limit (dBuV)**	**Margin (dB)**
Line 1	769.00	21.44	48.00	-26.56
	24470.00	20.04	48.00	-27.96
	***			
LINE 2	***			

Table 4 Power Line Conducted Emissions (Charging)

Power	***Connected***	***Emissions***	***FCC Class B***	
Conductor	***Frequency (KHz)***	***Peak Amplitude (dBuV)***	***Limit (dBuV)***	***Margin (dB)***
Line 1	773.00	22.31	48.00	-25.69
	***			
LINE 2	***			

Table 5 Power Line Conducted Emissions (Talking)

Power	***Connected***	***Emissions***	***FCC Class B***	
Conductor	***Frequency (KHz)***	***Peak Amplitude (dBuV)***	***Limit (dBuV)***	***Margin (dB)***
Line 1	783.00	20.46	48.00	-27.54
	***			
LINE 2	***			

Ⅲ. Section 15.247(a)(2): Bandwidth for Direct Sequence System.

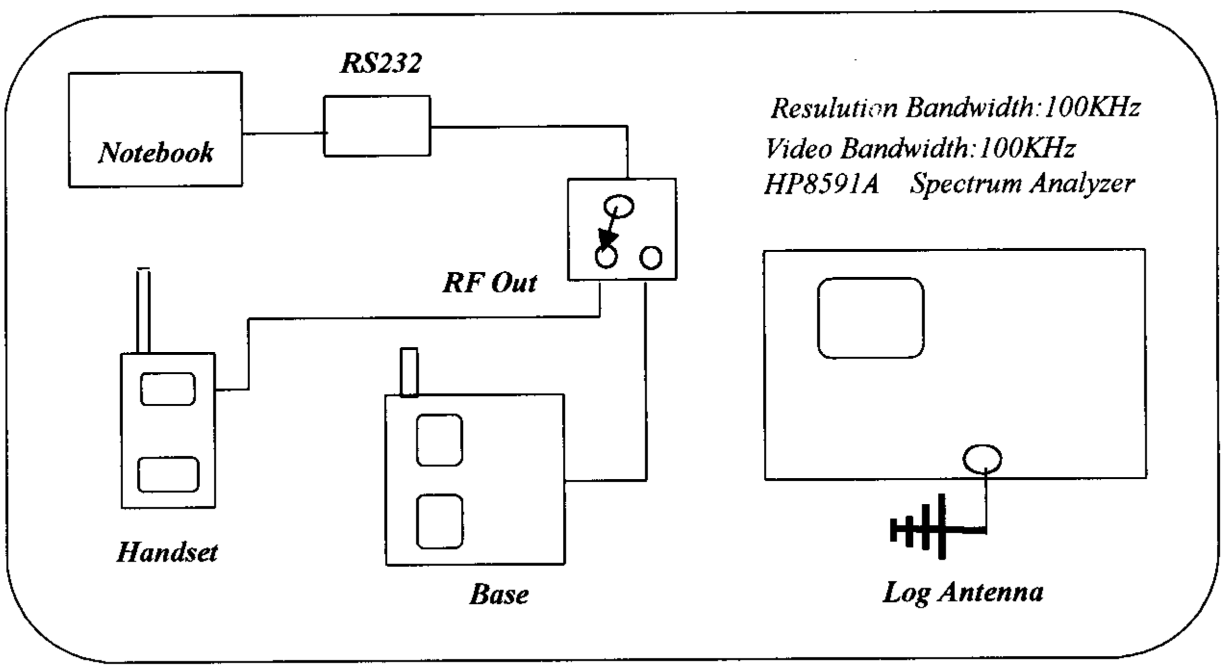
3.1 Test Condition & Setup

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	0.9KHz – 40 GHz Spectrum Analyzer	HP8591A	50.00
EMCO	Log-Antenna	3146	50.00

3.4 Test Result of Bandwidth

Bandwidth of Channel 1

Bandwidth of Base	: 1.54 MHz
Bandwidth of Handset	: 1.55 MHz
The min. 6 dB BW at least	: 500 KHz

Bandwidth of Channel 7

Bandwidth of Base	: 1.71 MHz
Bandwidth of Handset	: 1.54 MHz
The min. 6 dB BW at least	: 500 KHz

Bandwidth of Channel 14

Bandwidth of Base	: 1.73 MHz
Bandwidth of Handset	: 1.72 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.

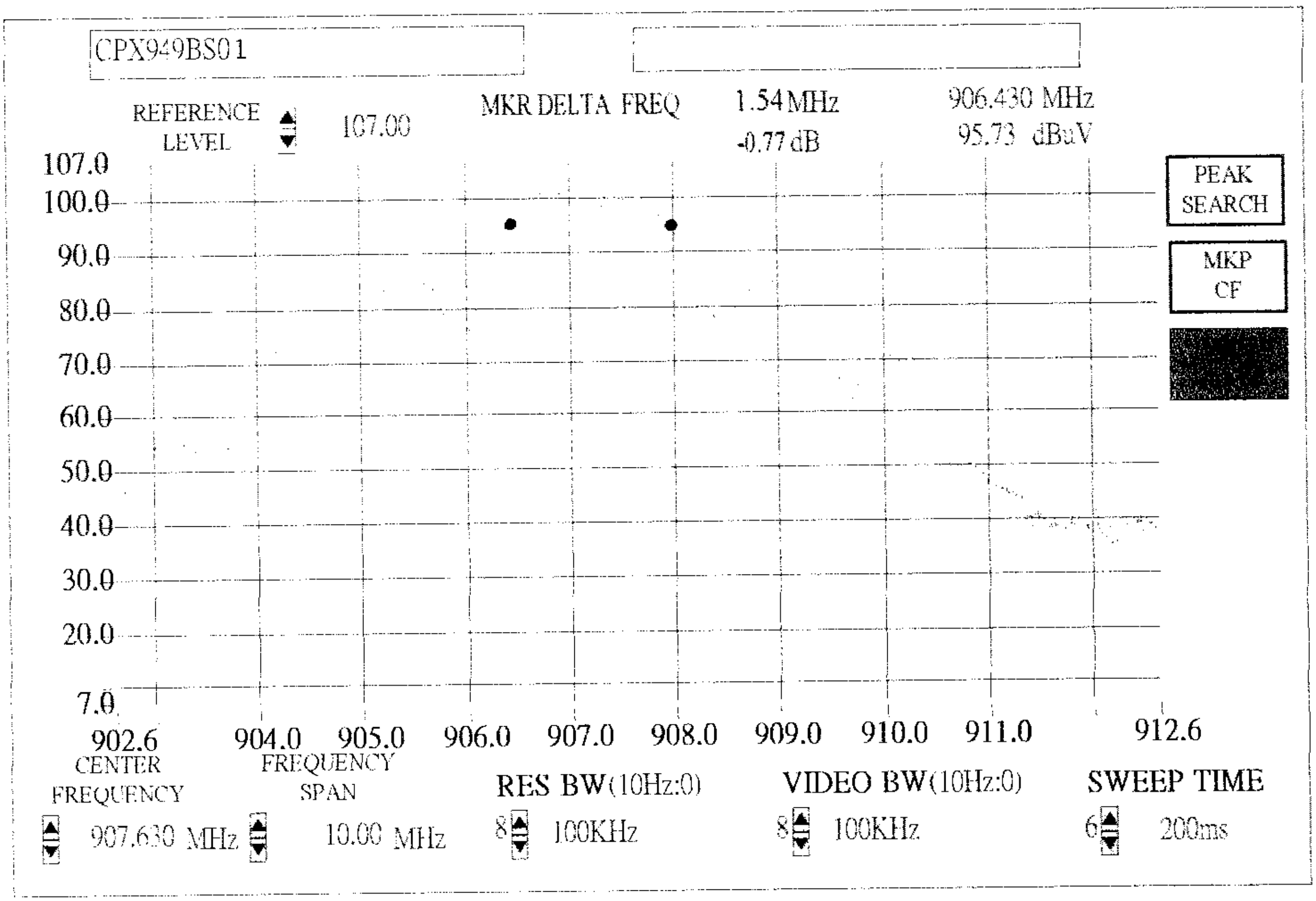
900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/22 at PM 08:25

14-1

Connector Pane

900MZa.vi

Front Panel

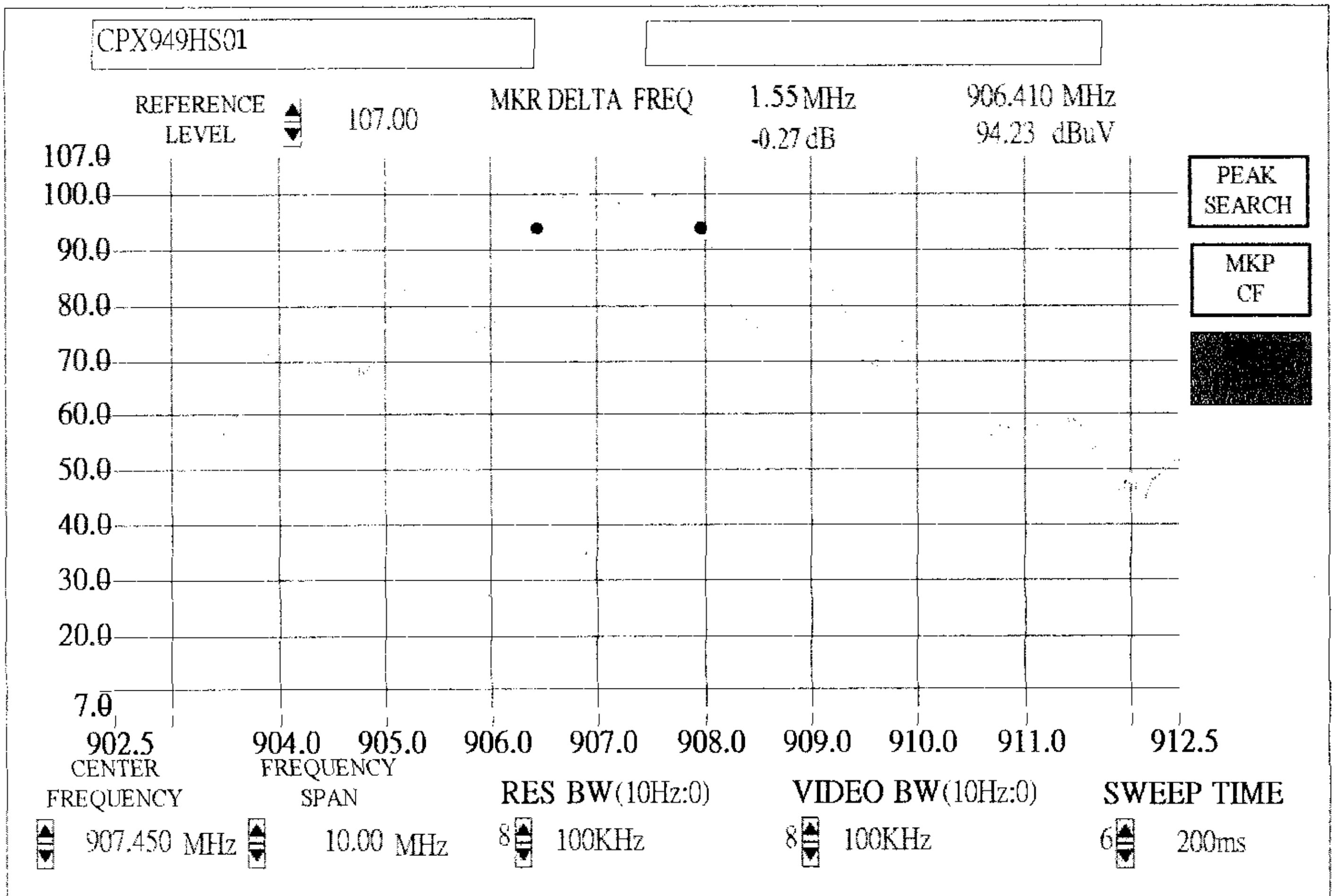


900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/20 at PM 03:25

Connector Pane

900MZa.vi

Front Panel

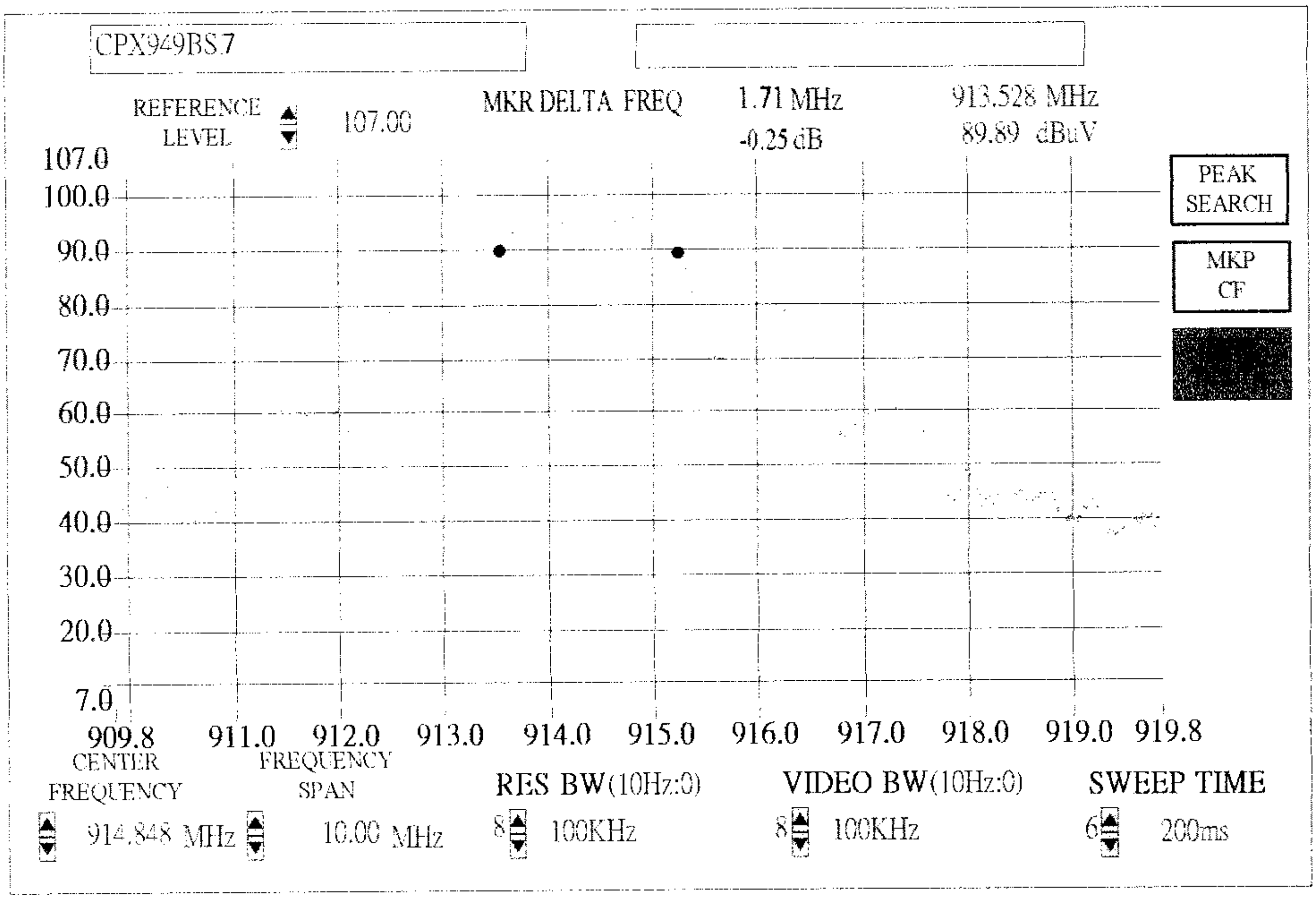


900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/22 at PM 10:08

Connector Pane

900MZa.vi

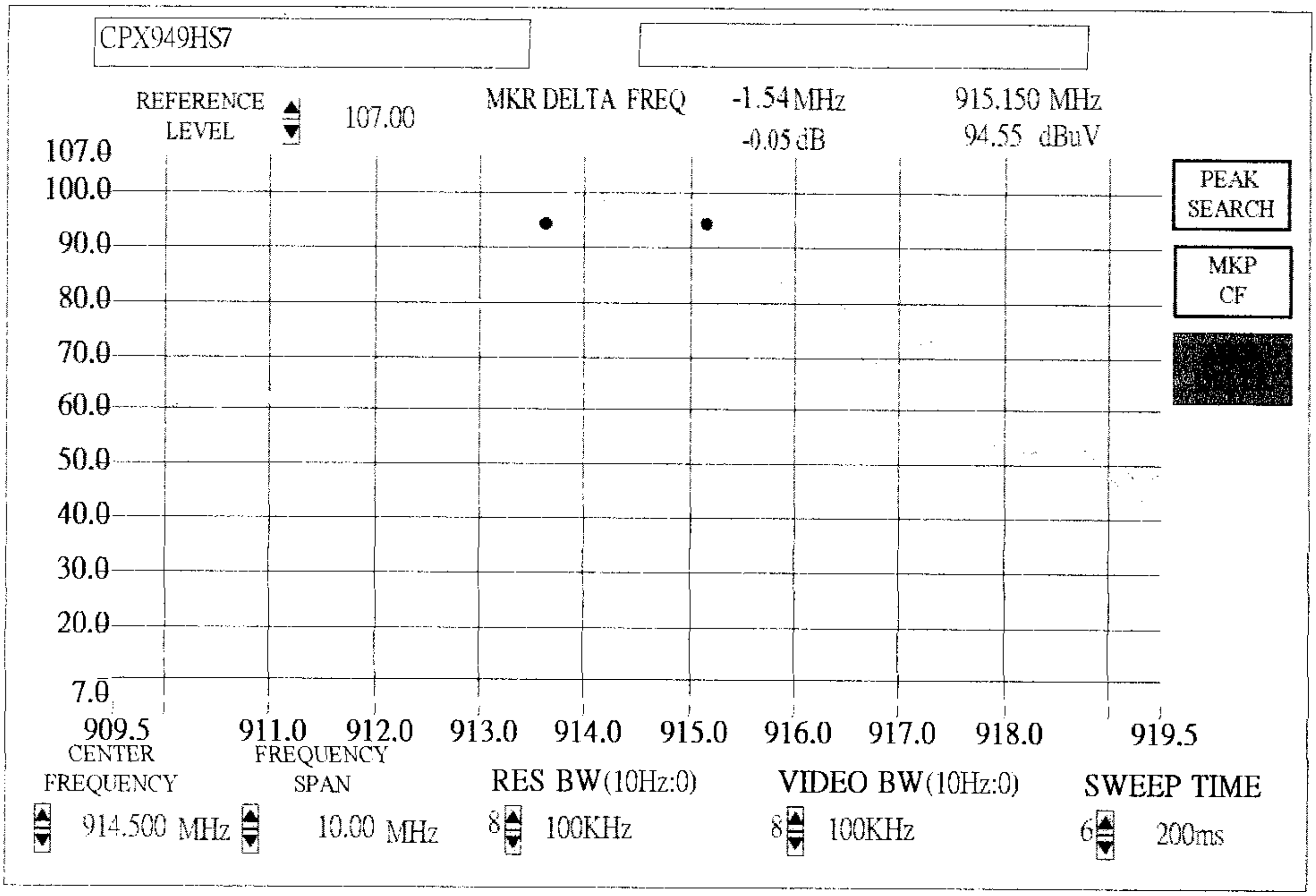
Front Panel



Connector Pane

900MZa.vi

Front Panel



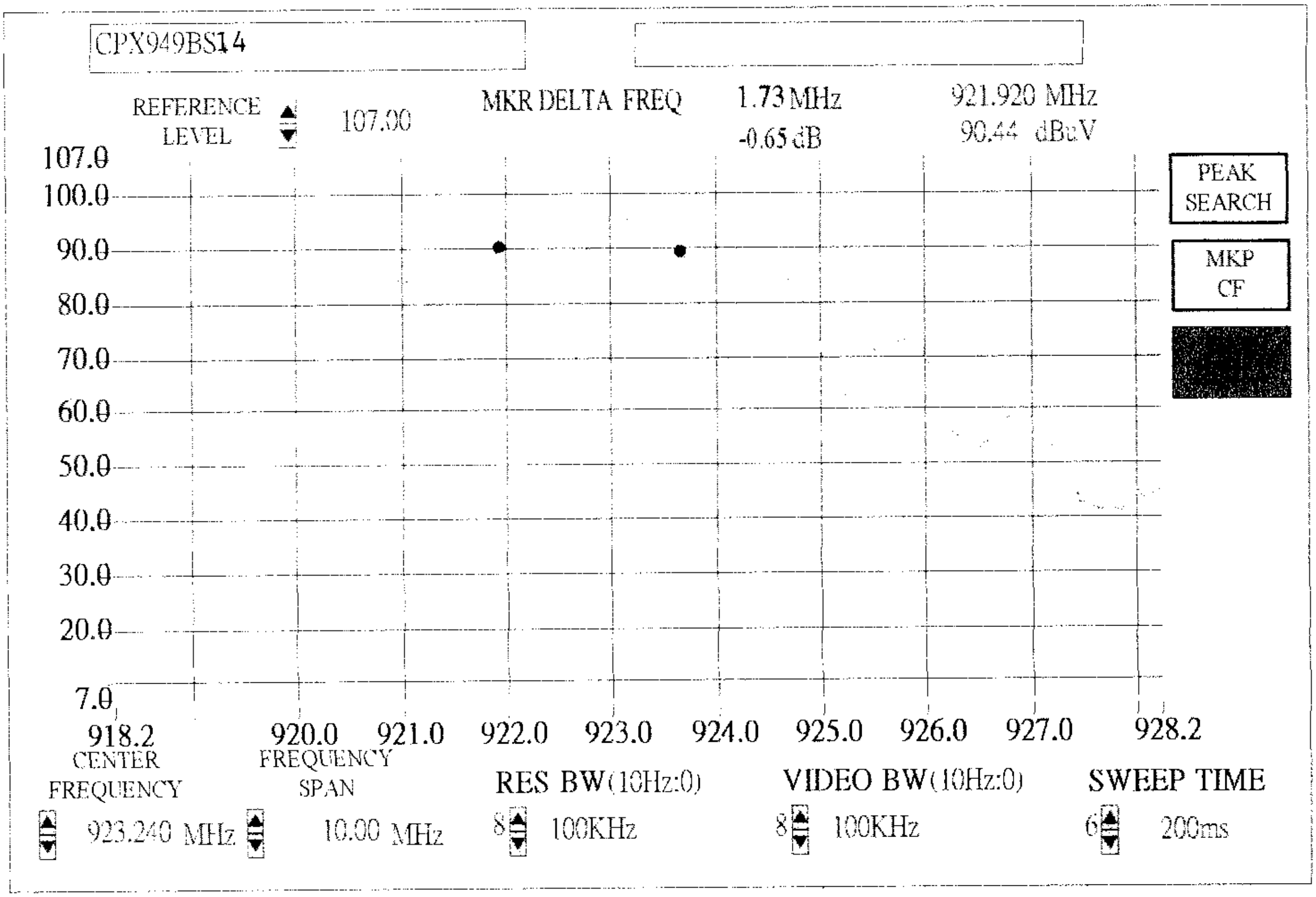
900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/22 at PM 10:29

14-5

Connector Pane

900MZa.vi

Front Panel

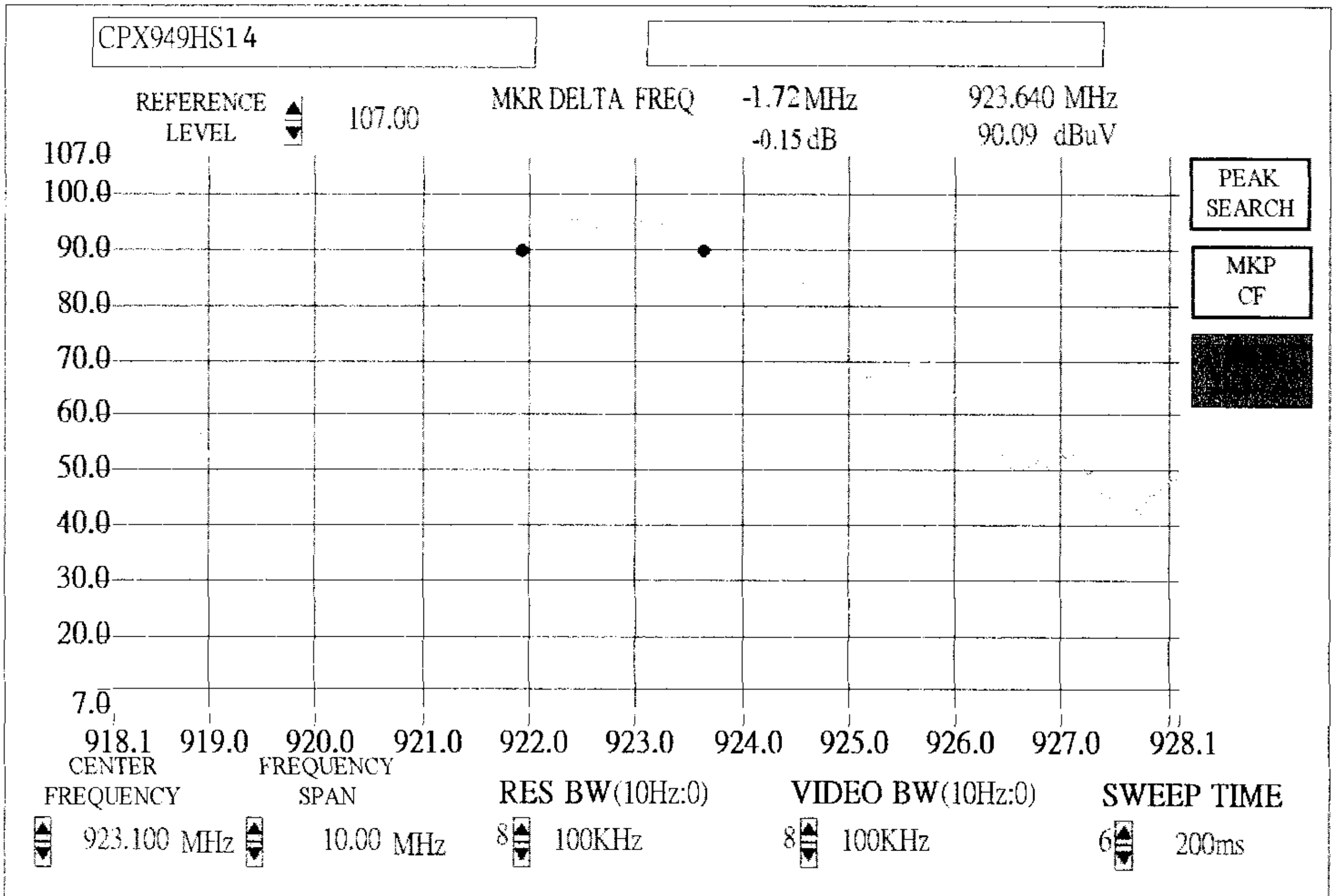


900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/20 at PM 04:32

Connector Pane

900MZa.vi

Front Panel



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 (CH07) and the other in bottom (CH14).

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-S9001, SPP-S9000, SPP-S9101, SPP-S9104

EUT : 900MHz S.S.T. Cordless Phone

Table 6 Open Field Fundamental Emissions

Channel	Frequency (MHz)	A.P. (H/V)	A.H. (M)	Table (degree)	Amplitude (dBuV/m)	CF (dB)	Corrected Amplitude (dBuV/m)	E.R.P.(Peak)	
								mW	dBm
Base 01	907.480	H	1.00	248	83.80	8.25	92.05	0.481	-3.179
		V	1.00	64	85.40	8.25	93.65	0.695	-1.579
Base 07	914.820	H	1.00	161	85.30	8.16	93.46	0.665	-1.769
		V	1.00	101	93.40	8.16	101.56	4.296	6.330
Base 14	923.240	H	1.00	220	85.10	7.90	93.00	0.599	-2.229
		V	1.00	61	85.60	7.90	93.50	0.672	-1.729
Handset 01	907.450	H	1.00	186	82.90	8.25	91.15	0.391	-4.079
		V	1.00	245	93.50	8.25	101.75	4.489	6.521
Handset 07	914.655	H	1.00	167	82.40	8.16	90.56	0.341	-4.669
		V	1.00	8	85.10	8.16	93.26	0.636	-1.969
Handset 14	923.260	H	1.00	187	87.10	7.90	95.00	0.949	-0.229
		V	1.00	310	94.60	7.90	102.50	5.335	7.271

Note:

1. A.P. means antenna polarization, horizontal and vertical.
2. A.H. means antenna height.
3. Table means turntable turning position.
4. Corrected Factor (C. F.) = Cable Loss + Antenna Factor – Amplified Gain
   Corrected Amplitude = Peak Amplitude + Corrected Factor
5. Amplitude means the fundamental emission measured.
6. 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 (1.00).

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

Example: the Max Radiation Emission of base ch01 = 92.05 dBuV/m

$10^{(92.05/20)} \times 10^{-6} = 0.04004$ V

E.R.P. = $(0.04004 \times 3)^2 / 30$ = 0.481 mW = 10 x log (0.481 mW/1mW) = -3.179 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 turn table 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 - 18 GHz.

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 channels is tested, one in the top (CH01), one in the middle (CH07) and the other in bottom (CH14).

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 GHz

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.

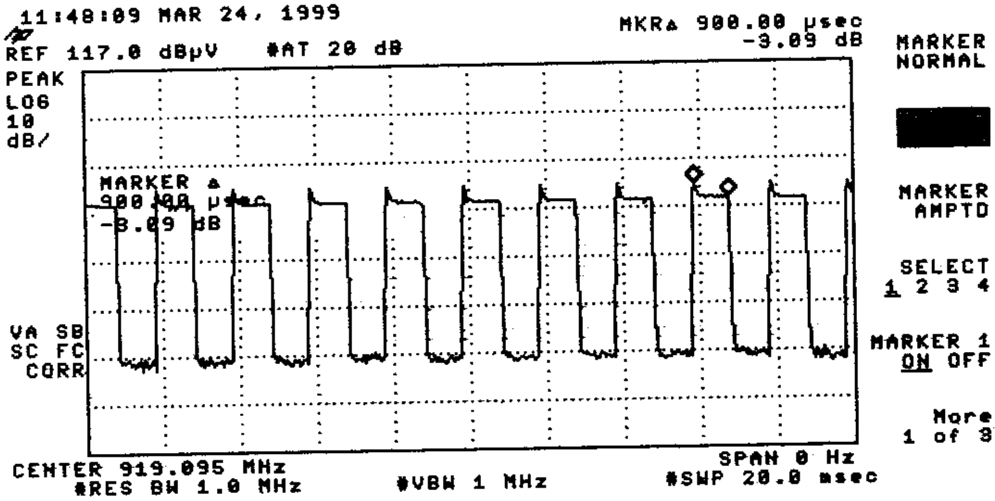
5.2 List of Test Instruments

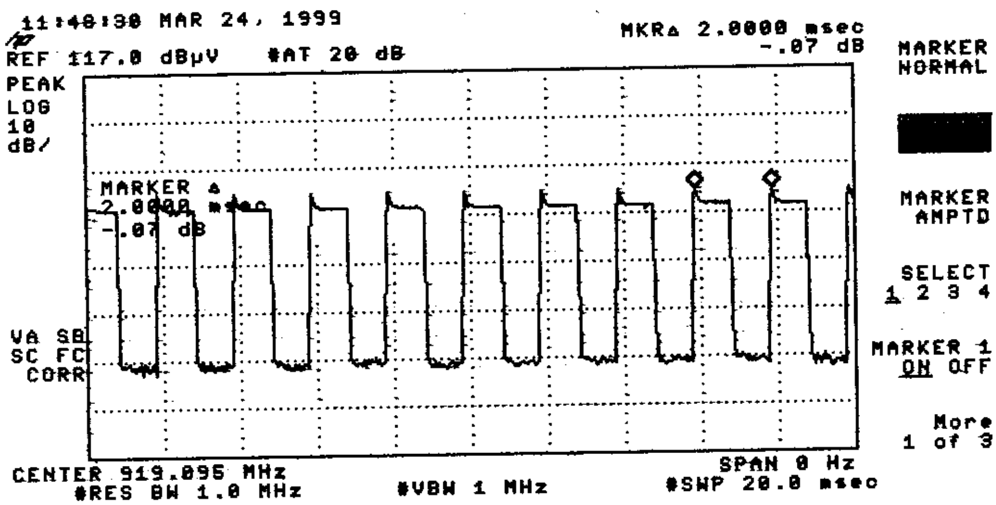
Manufacturer	Device	Model	Input Impedance
Hewlett Packard	9KHz-2.9 GHz Spectrum Analyze	HP8594EM	50.00
Hewlett Packard	50kHz-22GHz Spectrum Analyzer	HP8592A	50.00
Hewlett Packard	10KHz-1GHz Quasi-peak Adapte	HP85650A	50.00
Hewlett Packard	20Hz-2GHz RF Preselector	HP85685A	50.00
Hewlett Packard	1GHz-26.5GHz 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 ,then get the Time of duty and cycle as follow page.

The duty cycle factor = 20 log (T_{duty} / T_{cycle}) = 20 log (0.9000/2.0000) = - 6.93


11:48:09 MAR 24, 1999
REF 117.0 dBµV #AT 20 dB
MKR∆ 900.00 µsec
-3.09 dB
PEAK
LOG
10
dB/
MARKER ∆
900.00 µsec
-3.09 dB
VA SB
SC FC
CORR
CENTER 919.095 MHz
#RES BW 1.0 MHz
#VBW 1 MHz
SPAN 0 Hz
#SWP 20.0 msec
MARKER
NORMAL
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 3


11:48:30 MAR 24, 1999
REF 117.0 dBµV #AT 20 dB
MKR∆ 2.0000 msec
-.07 dB
PEAK
LOG
10
dB/
MARKER ∆
2.0000 msec
-.07 dB
VA SB
SC FC
CORR
CENTER 919.095 MHz
#RES BW 1.0 MHz
#VBW 1 MHz
SPAN 0 Hz
#SWP 20.0 msec
MARKER
NORMAL
MARKER
AMPTD
SELECT
1 2 3 4
MARKER 1
ON OFF
More
1 of 3

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-S9001, SPP-S9000, SPP-S9101, SPP-S9104

EUT : 900MHz S.S.T. Cordless Phone

Table 7 Second Harmonic Attendation

Channel	*Fundamental (MHz)*	*Fundamental (dBu V/m)*	*2nd Harmonic (GHz)*	*2nd Har. (dBu V/m)*	*Result (F/H dB)*	*Limit (dB)*	*Margin (dB)*
B/S CH 01	907.480	93.65	1.814	41.19	52.46	20.00	32.46
B/S CH 07	914.820	101.56	1.828	40.02	61.54	20.00	41.54
B/S CH 14	923.240	93.50	1.845	39.85	53.65	20.00	33.65
H/S CH 01	907.450	101.75	1.814	40.69	61.06	20.00	41.06
H/S CH 07	914.655	93.26	1.828	40.52	52.74	20.00	32.74
H/S CH 14	923.260	102.50	1.845	42.19	60.31	20.00	40.31

Note:

1.The data in the above table are summarize the following attachment spectrum analyzer hard copy.

2.Result = Fundamental – 2^{nd} Harmonic must over 20 dB.

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-S9001, SPP-S9000, SPP-S9101, SPP-S9104

EUT : 900MHz S.S.T. Cordless Phone

Table 8 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 1, 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)
278.400	46.40	1.00	71	-8.17	38.23	46.00	-7.77
297.600	47.00	1.00	100	-6.93	40.07	46.00	-5.93
***							

Note:

1.Margin = Corrected - Limit.

2.Peak Amplitude + Correction Factors = Corrected

Table 9 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 1, Base Horizontal]

Radiated Emission				*Correction Factors*	*Duty Cycle*	*Corrected Amplitude*	*FCC Class B (3 M)*	
Frequency (GHz)	*Amplitude (dBuV/m)*	*Ant.H. (cm)*	*Table (°)*	*(dB)*	*(dB)*	*(dBuV/m)*	*Limit (dBuV/m)*	*Margin (dB)*
2.71	46.12	100.00	116	-6.84	-6.93	32.35	54	-21.65
3.62	45.42	100.00	205	-5.64	-6.93	32.85	54	-21.15
4.53	40.71	100.00	96	3.91	-6.93	37.69	54	-16.31
***								

Note:

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factor + Duty Cycle = Corrected

Table 10 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 1, 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)
887.990	32.40	1.00	200	8.00	40.40	46.00	-5.60
928.790	29.70	1.00	240	7.75	37.45	46.00	-8.55
945.990	30.20	4.00	169	7.88	38.08	46.00	-7.92
***							

Table 11 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 1, Base Vertical]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.71	49.79	100.00	217	-6.84	-6.93	36.02	54	-17.98
3.62	40.76	100.00	334	-5.64	-6.93	28.19	54	-25.81
4.53	38.04	100.00	18	3.91	-6.93	35.02	54	-18.98
***								

Table 12 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 7, 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)***
278.400	46.40	1.00	64	-8.17	38.23	46.00	-7.77
297.600	47.90	1.00	115	-6.93	40.97	46.00	-5.03
***							

Table 13 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 7, Base Horizontal]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.74	45.46	100.00	148	-6.84	-6.93	31.69	54	-22.31
3.65	45.76	100.00	52	-5.64	-6.93	33.19	54	-20.81
4.55	40.87	100.00	263	3.91	-6.93	37.85	54	-16.15
***								

Table 14 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 7, 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)
895.190	29.30	1.00	202	8.09	37.39	46.00	-8.61
933.590	33.30	1.00	224	7.77	41.07	46.00	-4.93
943.190	29.60	1.00	99	7.87	37.47	46.00	-8.53
952.790	30.00	1.00	244	7.97	37.97	46.00	-8.03
***							

Table 15 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 7, Base Vertical]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.74	49.46	100.00	77	-6.84	-6.93	35.69	54	-18.31
3.65	40.42	100.00	182	-5.64	-6.93	27.85	54	-26.15
4.55	37.21	100.00	251	3.91	-6.93	34.19	54	-19.81
***								

Table 16 Open Field Radiated Emissions For 30MHz ～ 1GHz [Channel 14, 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)
127.400	48.30	4.00	244	-15.60	32.70	43.50	-10.80
297.600	47.80	1.00	98	-6.93	40.87	46.00	-5.13
932.390	27.70	1.00	111	7.75	35.45	46.00	-10.55
***							

Table 17 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 14, Base Horizontal]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.77	43.62	100.00	258	-6.84	-6.93	29.85	54	-24.15
3.67	42.42	100.00	307	-5.64	-6.93	29.85	54	-24.15
4.61	41.54	100.00	229	3.91	-6.93	38.52	54	-15.48
***								

Table 18 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 14, 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)
865.190	32.00	1.00	140	7.24	39.24	46.00	-6.76
884.390	26.10	1.00	172	7.84	33.94	46.00	-12.06
893.990	27.20	1.00	135	8.09	35.29	46.00	-10.71
932.390	33.60	1.00	224	7.75	41.35	46.00	-4.65
939.590	33.10	1.00	84	7.85	40.95	46.00	-5.05
941.990	32.60	1.00	237	7.87	40.47	46.00	-5.53
945.590	34.00	1.00	68	7.88	41.88	46.00	-4.12
***							

Table 19 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 14, Base Vertical]

Radiated Emission				*Correction Factors*	*Duty Cycle*	*Corrected Amplitude*	*FCC Class B (3 M)*	
Frequency (GHz)	*Amplitude (dBuV/m)*	*Ant.H. (cm)*	*Table (°)*	*(dB)*	*(dB)*	*(dBuV/m)*	*Limit (dBuV/m)*	*Margin (dB)*
2.77	48.62	100.00	192	-6.84	-6.93	34.85	54	-19.15
3.67	41.76	100.00	330	-5.64	-6.93	29.19	54	-24.81
4.61	36.87	100.00	52	3.91	-6.93	33.85	54	-20.15
***								

Table 20 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 1, 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)
897.600	22.10	1.00	142	8.10	30.20	46.00	-15.80
***							

Table 21 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 1, Handset Horizontal]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.71	62.29	100.00	177	-6.84	-6.93	48.52	54	-5.48
3.62	46.76	100.00	126	-5.64	-6.93	34.19	54	-19.81
4.53	45.54	100.00	28	3.91	-6.93	42.52	54	-11.48
5.43	32.23	100.00	335	9.72	-6.93	35.02	54	-18.98
6.34	27.40	100.00	49	9.72	-6.93	30.19	54	-23.81
7.25	32.06	100.00	228	9.72	-6.93	34.85	54	-19.15
***								

Table 22 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 1, 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)
868.800	26.60	1.00	37	7.39	33.99	46.00	-12.01
887.990	27.20	1.00	213	8.00	35.20	46.00	-10.80
897.600	32.80	1.00	70	8.10	40.90	46.00	-5.10
***							

Table 23 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 1, Handset Vertical]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.71	49.46	100.00	209	-6.84	-6.93	35.69	54	-18.31
3.62	46.76	100.00	145	-5.64	-6.93	34.19	54	-19.81
4.53	46.87	100.00	168	3.91	-6.93	43.85	54	-10.15
5.43	25.56	100.00	238	9.72	-6.93	28.35	54	-25.65
7.25	30.73	100.00	339	9.72	-6.93	33.52	54	-20.48
***								

Table 24 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 7, 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)
895.200	17.50	1.00	147	8.09	25.59	46.00	-20.41
***							

Table 25 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 7, Handset Horizontal]

Radiated Emission				*Correction Factors*	*Duty Cycle*	*Corrected Amplitude*	*FCC Class B (3 M)*	
Frequency (GHz)	*Amplitude (dBuV/m)*	*Ant.H. (cm)*	*Table (°)*	*(dB)*	*(dB)*	*(dBuV/m)*	*Limit (dBuV/m)*	*Margin (dB)*
2.74	58.62	100.00	206	-6.84	-6.93	44.85	54	-9.15
3.65	47.59	100.00	298	-5.64	-6.93	35.02	54	-18.98
4.55	42.71	100.00	33	3.91	-6.93	39.69	54	-14.31
5.46	30.90	100.00	106	9.72	-6.93	33.69	54	-20.31
7.30	31.40	100.00	147	9.72	-6.93	34.19	54	-19.81
***								

Table 26 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 7, 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)
866.400	23.20	1.00	35	7.29	30.49	46.00	-15.51
885.600	24.70	1.00	71	7.90	32.60	46.00	-13.40
895.200	25.60	1.00	351	8.09	33.69	46.00	-12.31
933.600	24.20	1.00	305	7.77	31.97	46.00	-14.03
***							

Table 27 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 7, Handset Vertical]

Radiated Emission				*Correction Factors*	*Duty Cycle*	*Corrected Amplitude*	*FCC Class B (3 M)*	
Frequency (GHz)	*Amplitude (dBuV/m)*	*Ant.H. (cm)*	*Table (°)*	*(dB)*	*(dB)*	*(dBuV/m)*	*Limit (dBuV/m)*	*Margin (dB)*
2.74	48.29	100.00	195	-6.84	-6.93	34.52	54	-19.48
3.65	47.92	100.00	331	-5.64	-6.93	35.35	54	-18.65
4.55	44.21	100.00	211	3.91	-6.93	41.19	54	-12.81
5.46	26.73	100.00	101	9.72	-6.93	29.52	54	-24.48
7.30	32.23	100.00	87	9.72	-6.93	35.02	54	-18.98
***								

Table 28 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 14, 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)***
855.600	20.20	1.00	127	6.92	27.12	46.00	-18.88
***							

Table 29 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 14, Handset Horizontal]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.77	57.46	100.00	267	-6.84	-6.93	43.69	54	-10.31
3.67	49.76	100.00	229	-5.64	-6.93	37.19	54	-16.81
4.61	40.21	100.00	305	3.91	-6.93	37.19	54	-16.81
5.52	30.73	100.00	184	9.72	-6.93	33.52	54	-20.48
7.39	30.56	100.00	191	9.72	-6.93	33.35	54	-20.65
***								

Table 30 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 14, 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)
865.200	26.00	1.00	26	7.24	33.24	46.00	-12.76
884.400	28.10	1.00	249	7.84	35.94	46.00	-10.06
932.400	30.70	1.00	9	7.75	38.45	46.00	-7.55
979.200	33.00	1.00	129	8.28	41.28	54.00	-12.72
***							

Table 31 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 14, Handset Vertical]

Radiated Emission				Correction Factors	Duty Cycle	Corrected Amplitude	FCC Class B (3 M)	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table (°)	(dB)	(dB)	(dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.77	47.12	100.00	295	-6.84	-6.93	33.35	54	-20.65
3.67	47.59	100.00	68	-5.64	-6.93	35.02	54	-18.98
4.61	40.37	100.00	158	3.91	-6.93	37.35	54	-16.65
5.52	26.73	100.00	224	9.72	-6.93	29.52	54	-24.48
7.39	32.90	100.00	15	9.72	-6.93	35.69	54	-18.31
***								

VI. Section 15.247(d): Power Spectral Density

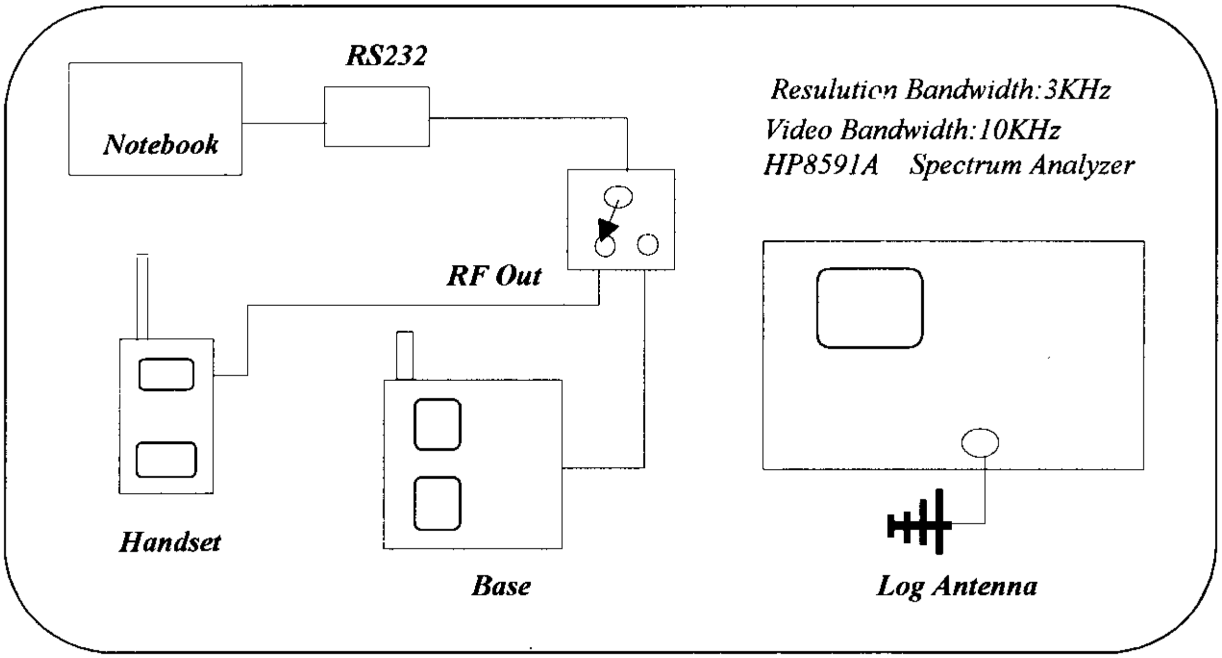
6.1 Test Condition & Setup

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

6.4 Required of Carrier frequency

If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified id § 15.209(a), whichever results in the lesser attenuation.

Test Condition & Setup: same as 3.1

Connector Pane

900MZa.vi

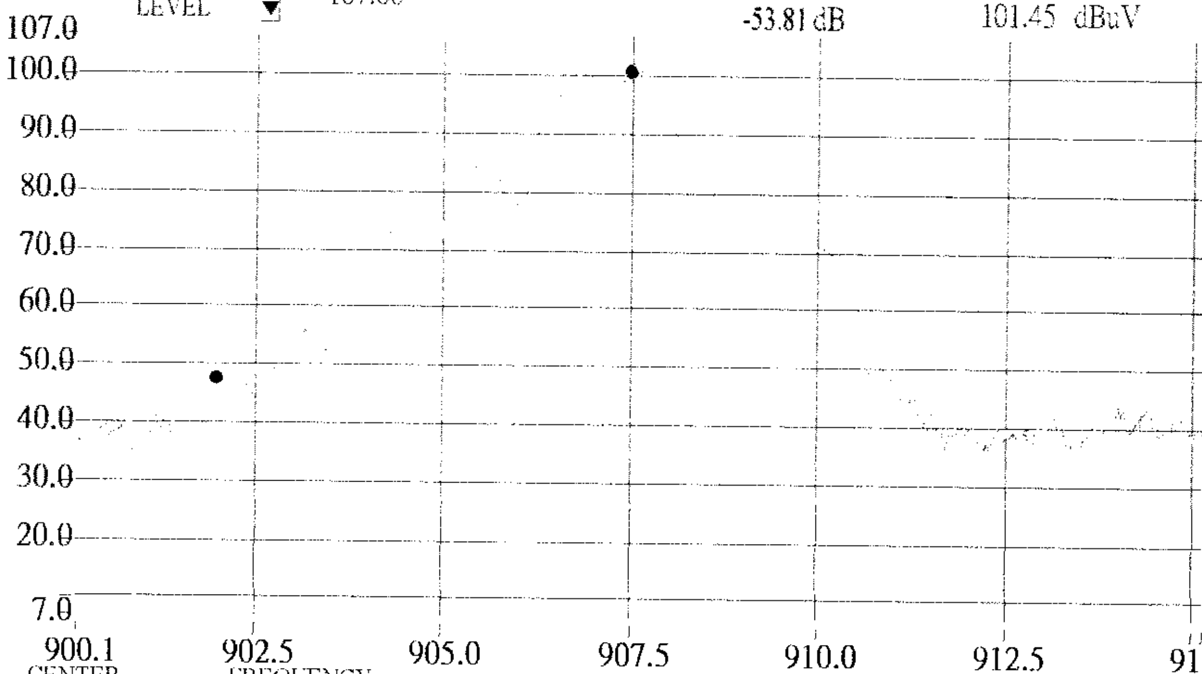
Front Panel

CPX949BS01

REFERENCE LEVEL 107.00

MKR DELTA FREQ -5.52 MHz -53.81 dB

907.480 MHz 101.45 dBuV



PEAK SEARCH

MKP CF

CENTER FREQUENCY 907.630 MHz

FREQUENCY SPAN 15.00 MHz

RES BW(10Hz:0) 8 100KHz

VIDEO BW(10Hz:0) 8 100KHz

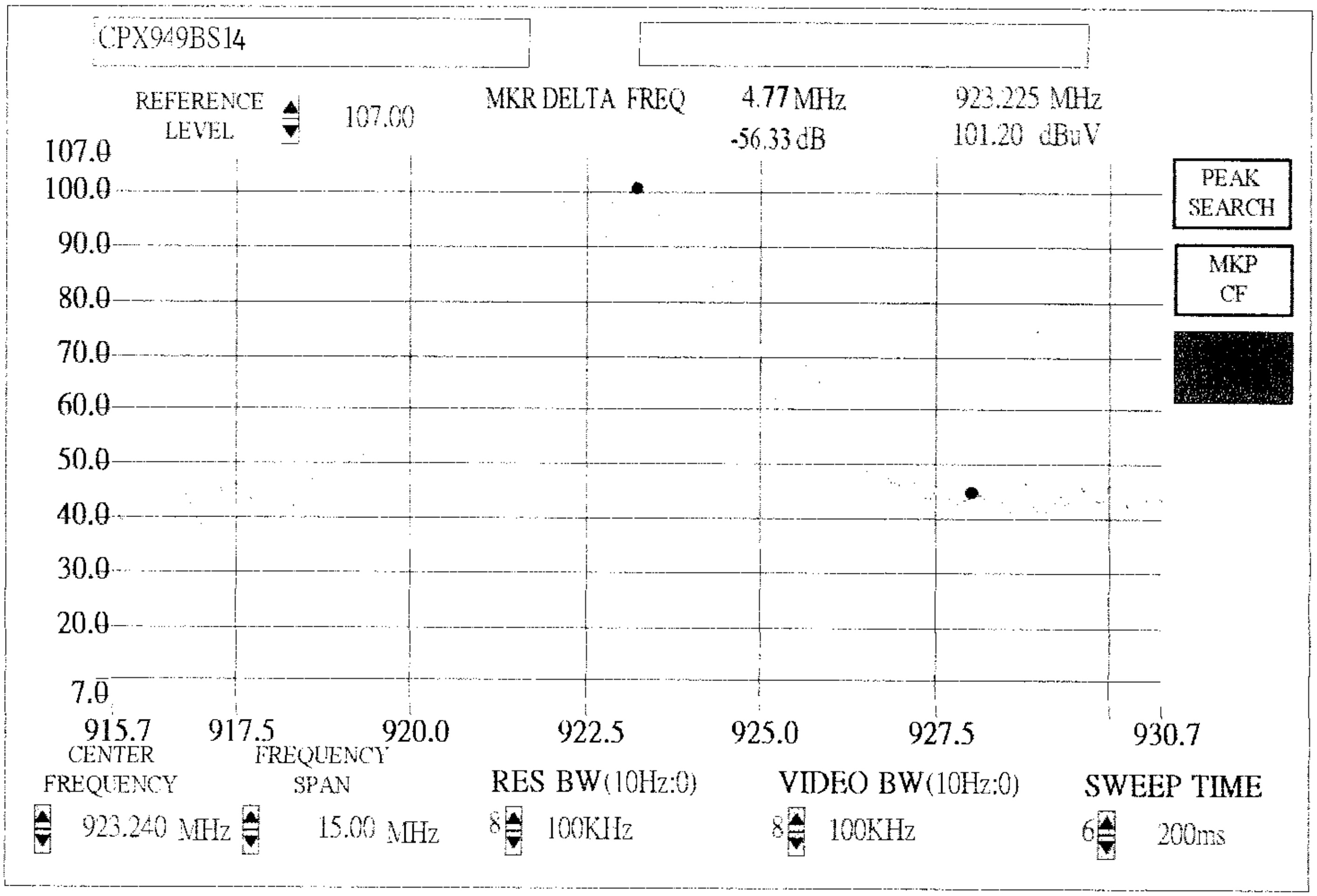
SWEEP TIME 6 200ms

900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/22 at PM 10:33

Connector Pane

900MZa.vi

Front Panel

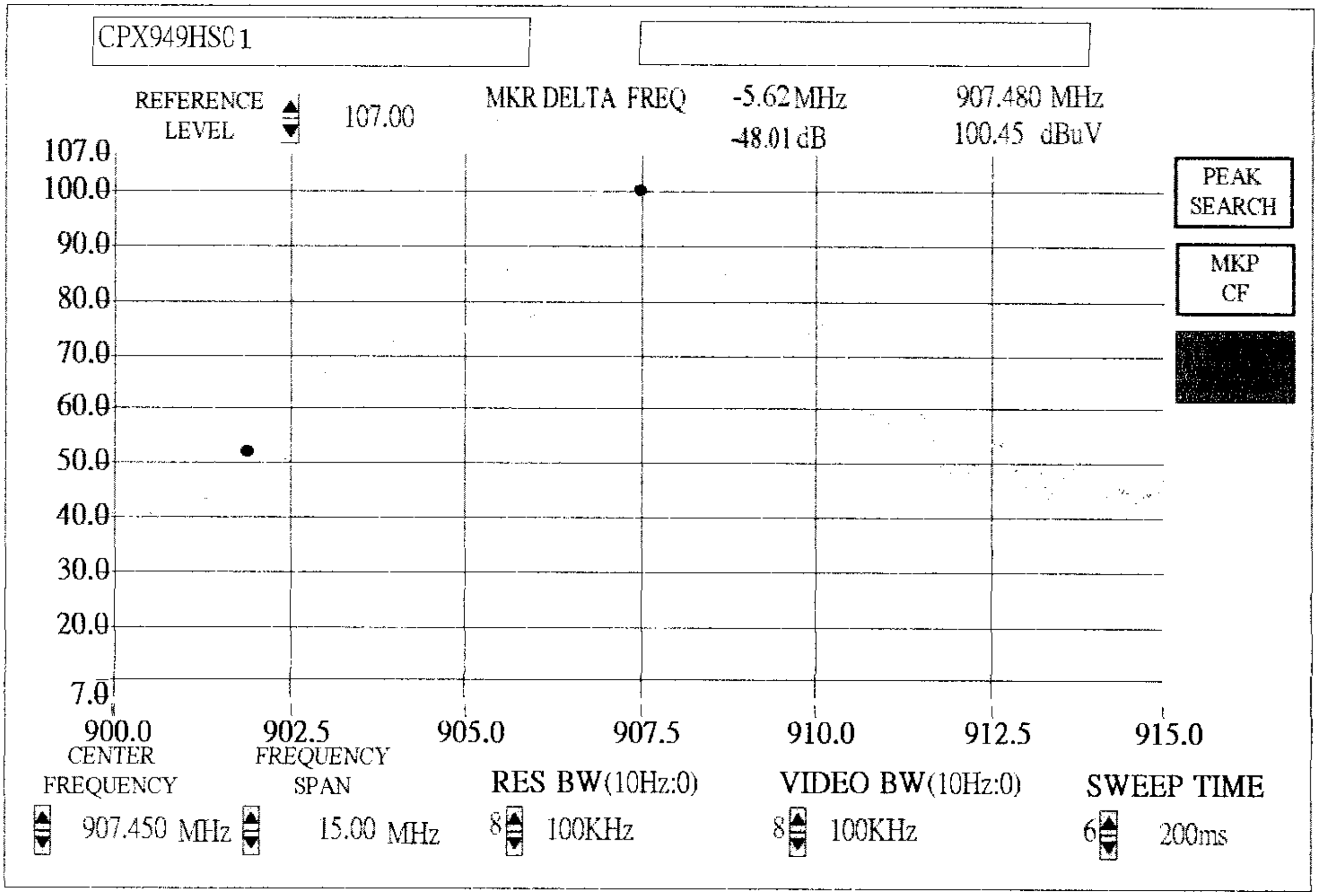


900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/20 at PM 03:31

Connector Pane

900MZa.vi

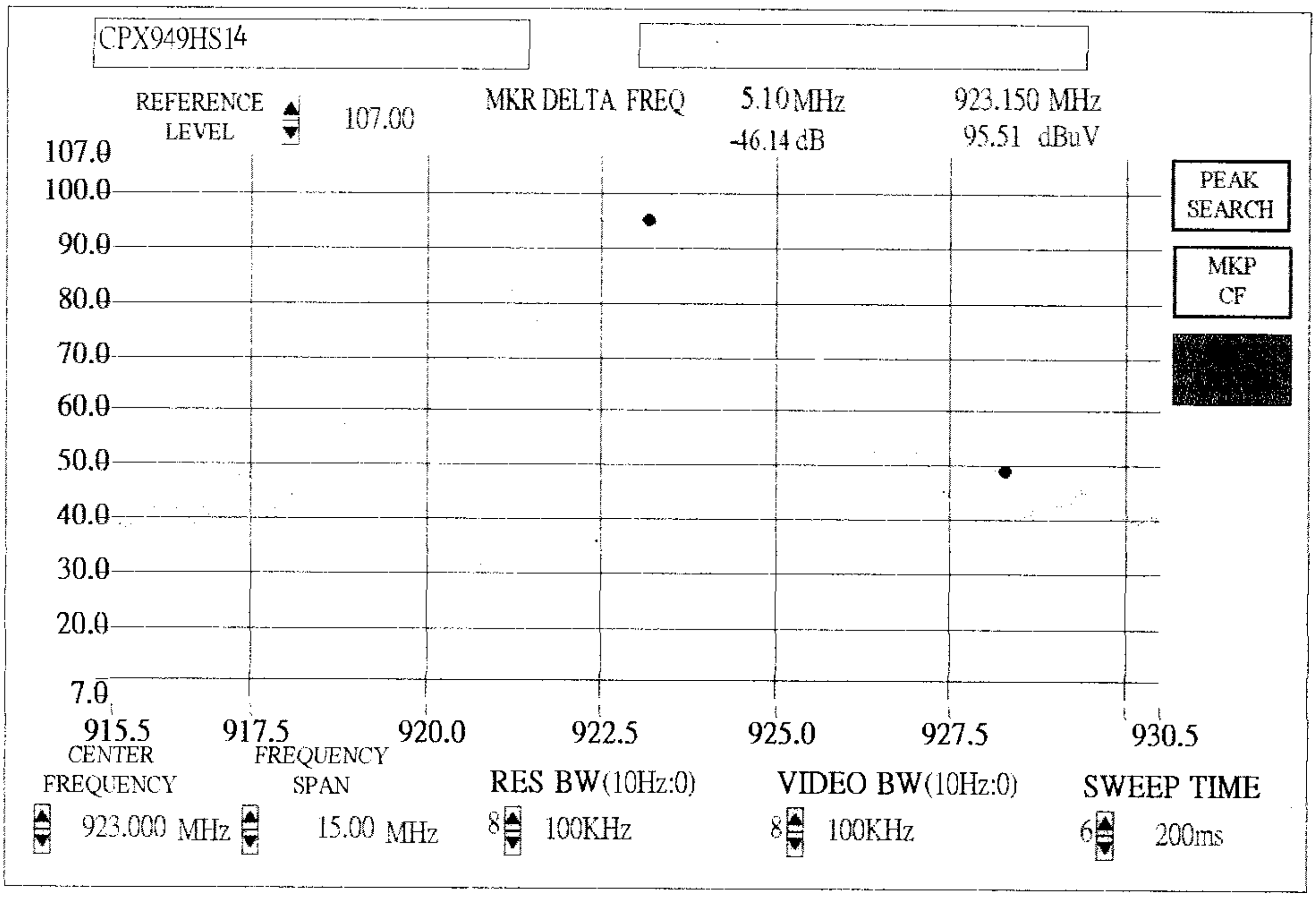
Front Panel



Connector Pane

900MZa.vi

Front Panel



6.5 Test Result of Power spectral density.

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

Model No. : SPP-S9001, SPP-S9000, SPP-S9101, SPP-S9104

EUT : 900MHz S.S.T. Cordless Phone

Table 33. Power Spectral Density

Channel	*Frequency (MHz)*	*Ppr (dBuV)*	*CF (dB)*	*Ppq (dBm)*	*Limit (dB)*	*Margin (dB)*
B/S CH 01	907.692	88.10	8.25	1.121	8.00	-6.879
B/S CH 07	914.841	85.89	8.16	-1.179	8.00	-9.179
B/S CH 14	923.242	86.30	7.90	-1.029	8.00	-9.029
H/S CH 01	907.448	86.60	8.25	-0.379	8.00	-8.379
H/S CH 07	914.500	86.71	8.16	-0.359	8.00	-8.359
H/S CH 14	923.054	85.11	7.90	-2.219	8.00	-10.219

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 (1.00).

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

Example: the Max Radiation Emission of base ch01 = 88.10 + 8.25 = 96.35 dBuV/m

$10^{(96.35/20)} \times 10^{-6} = 0.06569V$

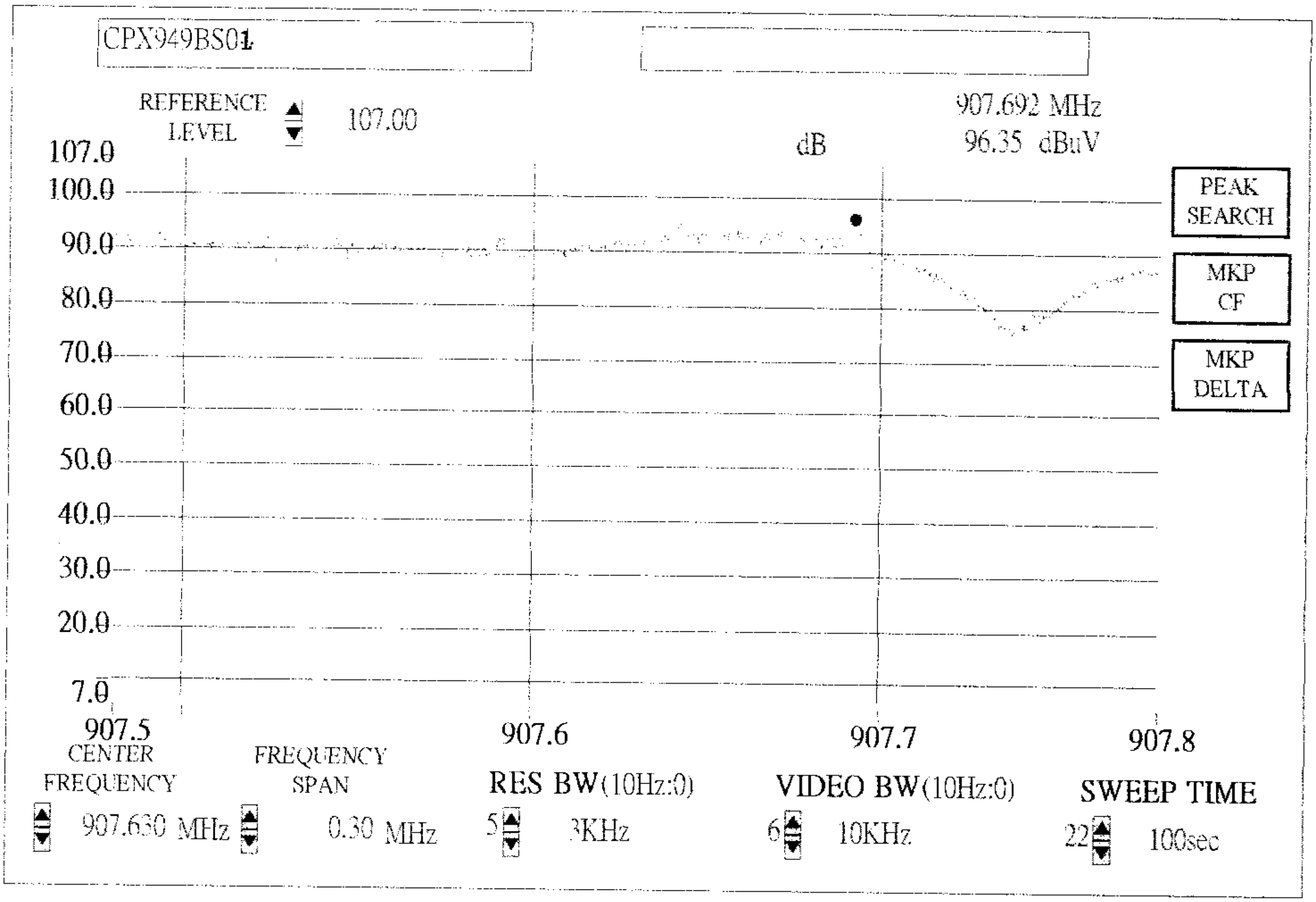
E.R.P. = $(0.06569 \times 3)^2 / 30$ = 1.295 mW = 10 x log (1.295 mW/1mW)

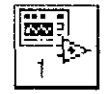
= 1.121 dBm

Connector Pane

900MZa.vi

Front Panel





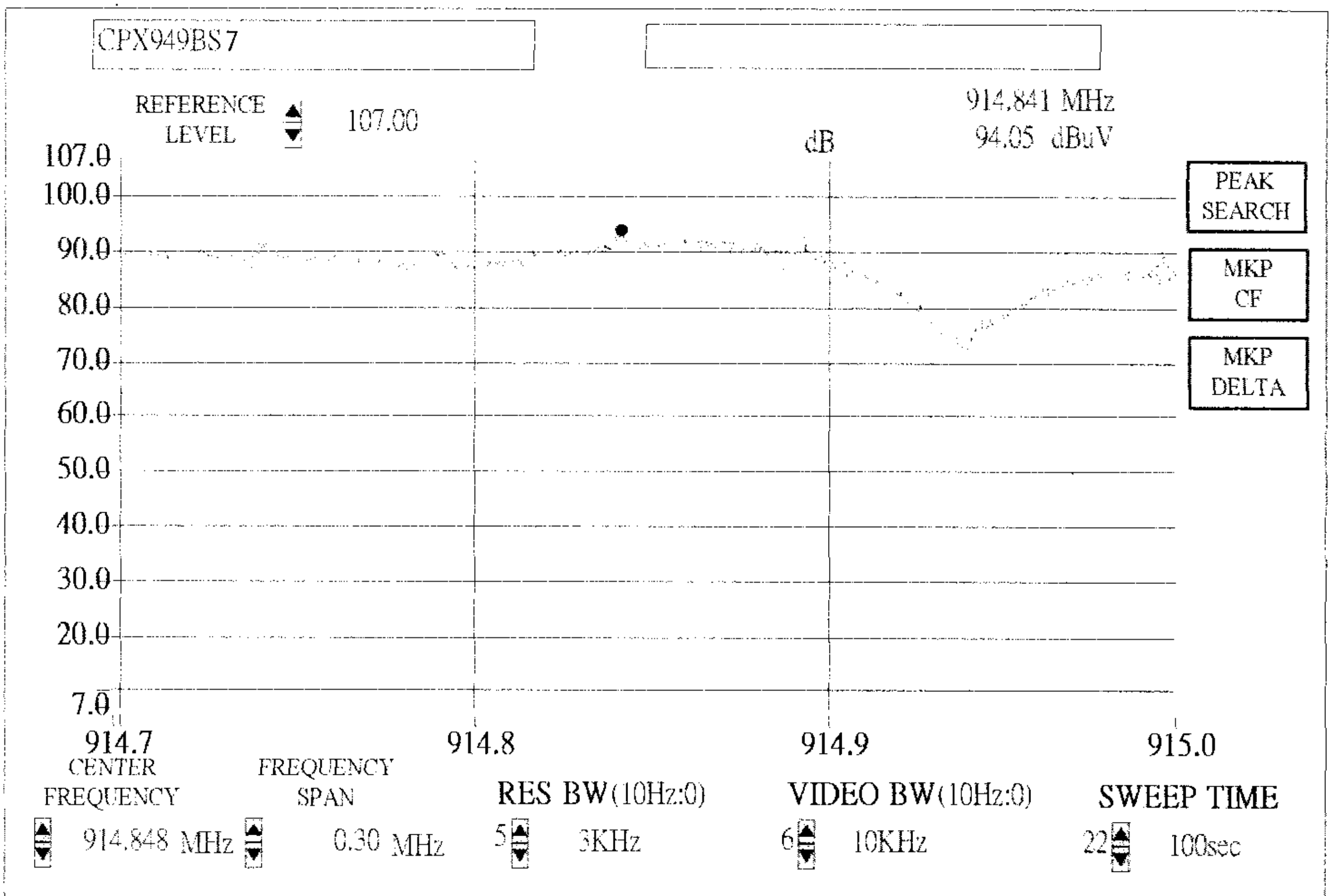
900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/22 at PM 10:16

50-2

Connector Pane

900MZa.vi

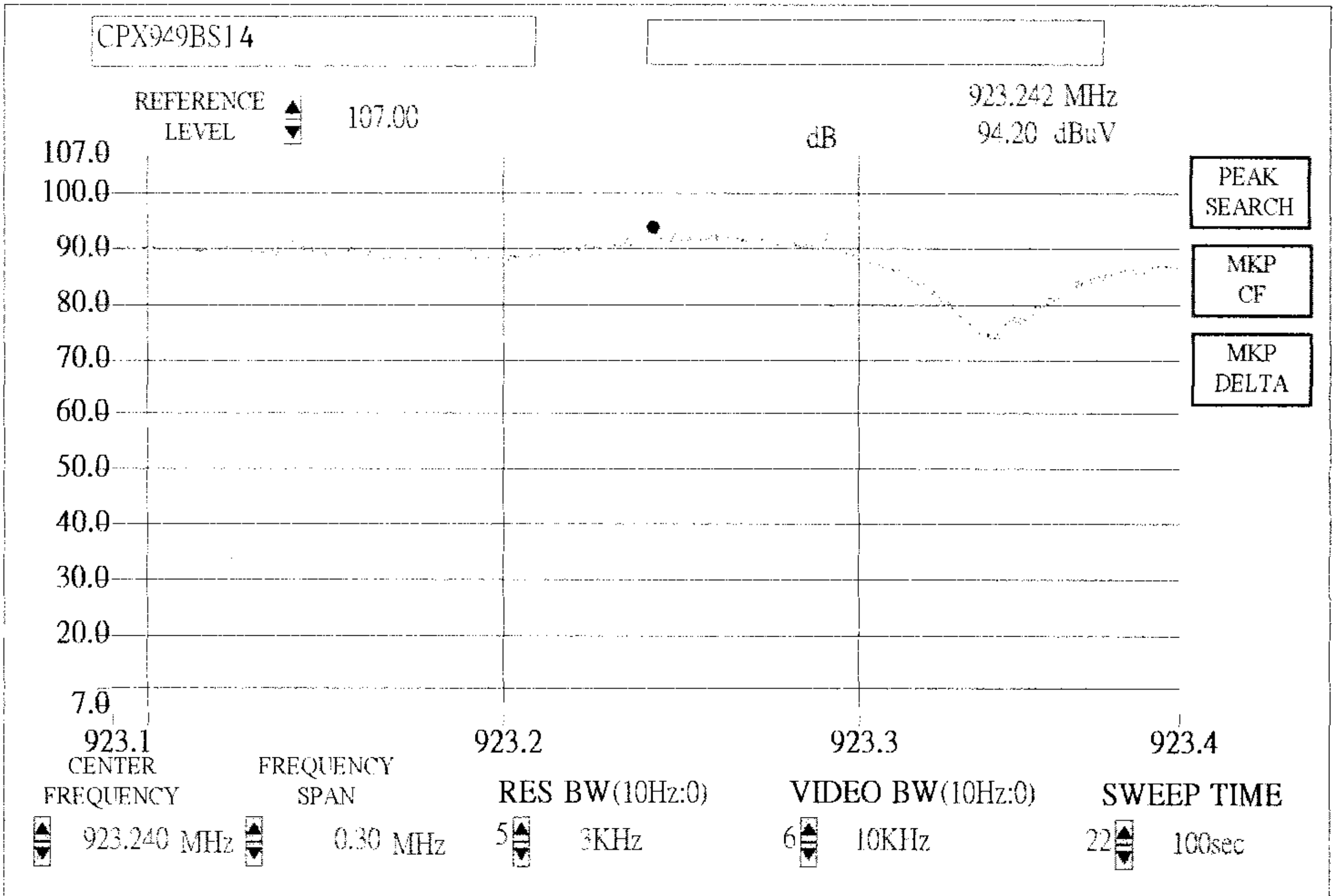
Front Panel



Connector Pane

900MZa.vi

Front Panel

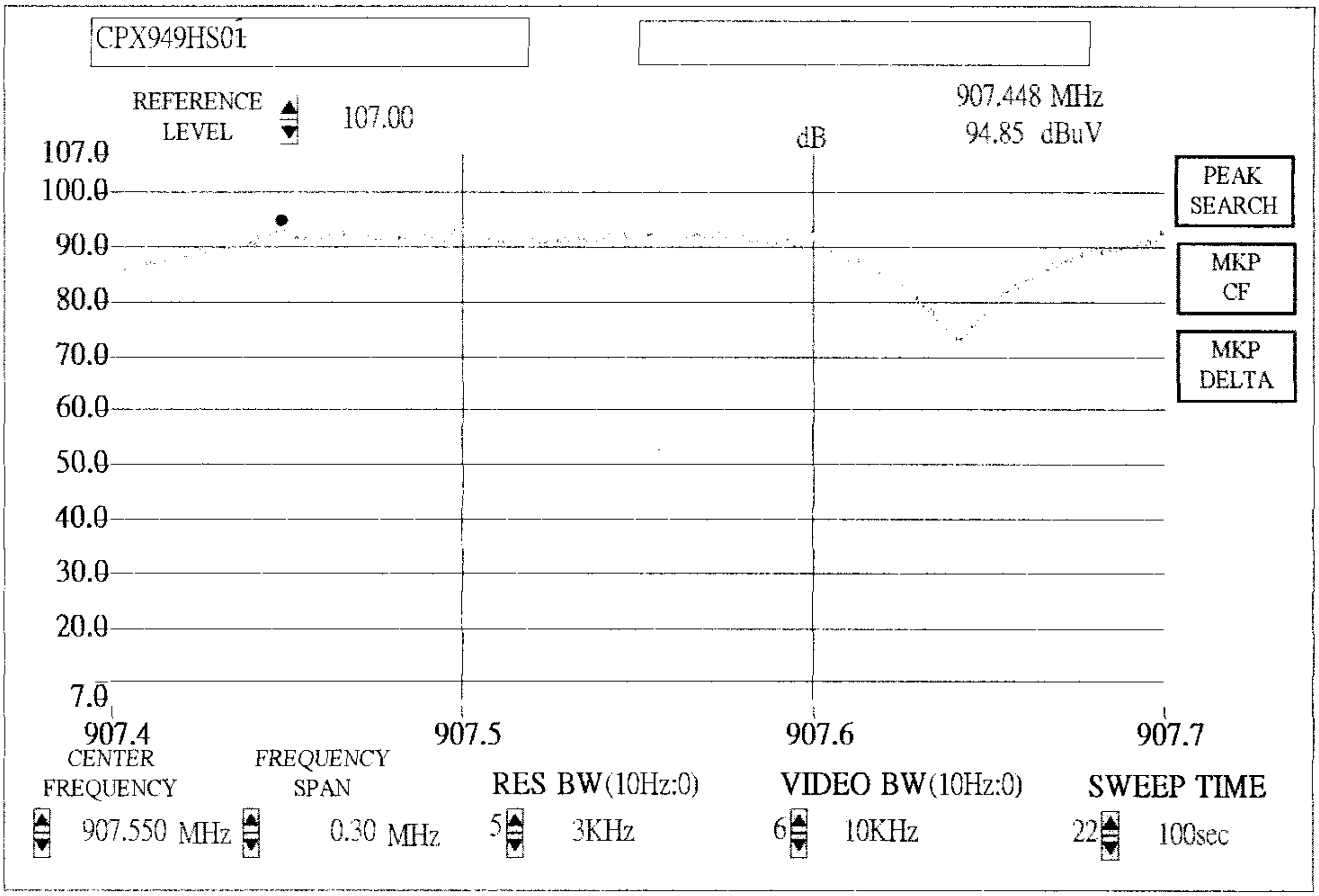


900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/20 at PM 03:38

Connector Pane

900MZa.vi

Front Panel



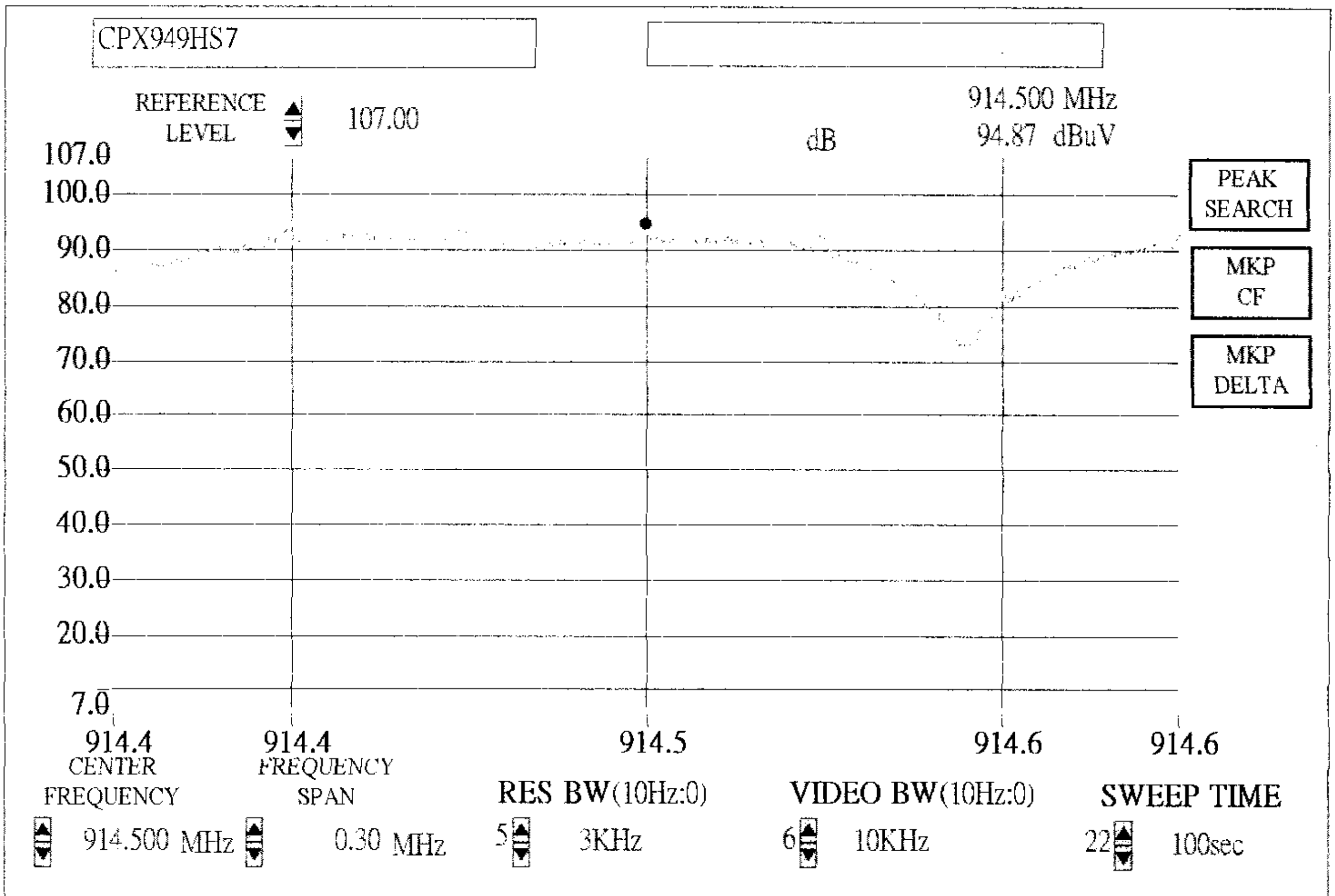
900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/20 at PM 04:05

50-5

Connector Pane

900MZa.vi

Front Panel



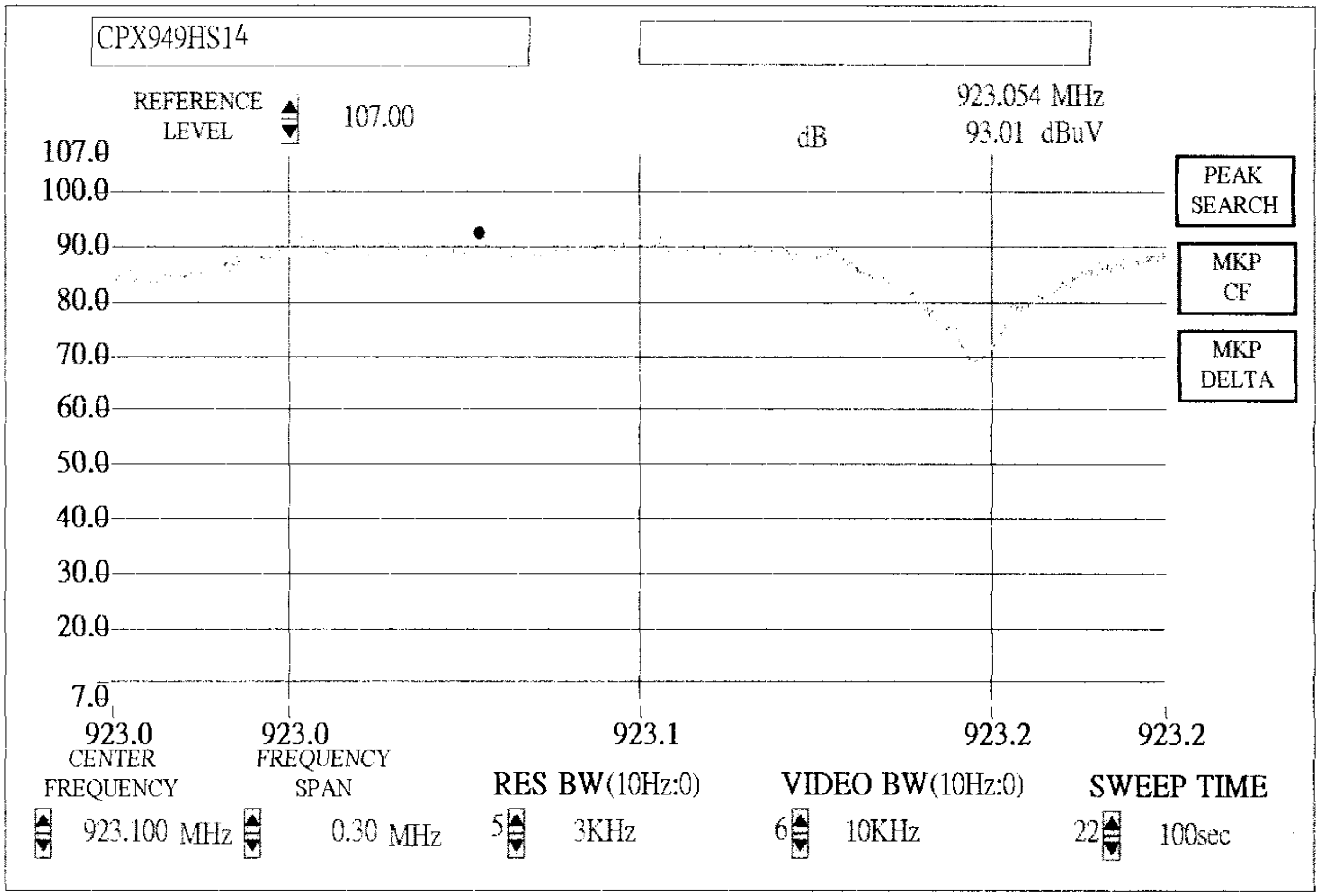
900MZa.vi
Last modified on 1998/12/25 at PM 02:27
Printed on 1999/3/20 at PM 04:29

50-6

Connector Pane

900MZa.vi

Front Panel



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.

7.2 Test Instruments Configuration

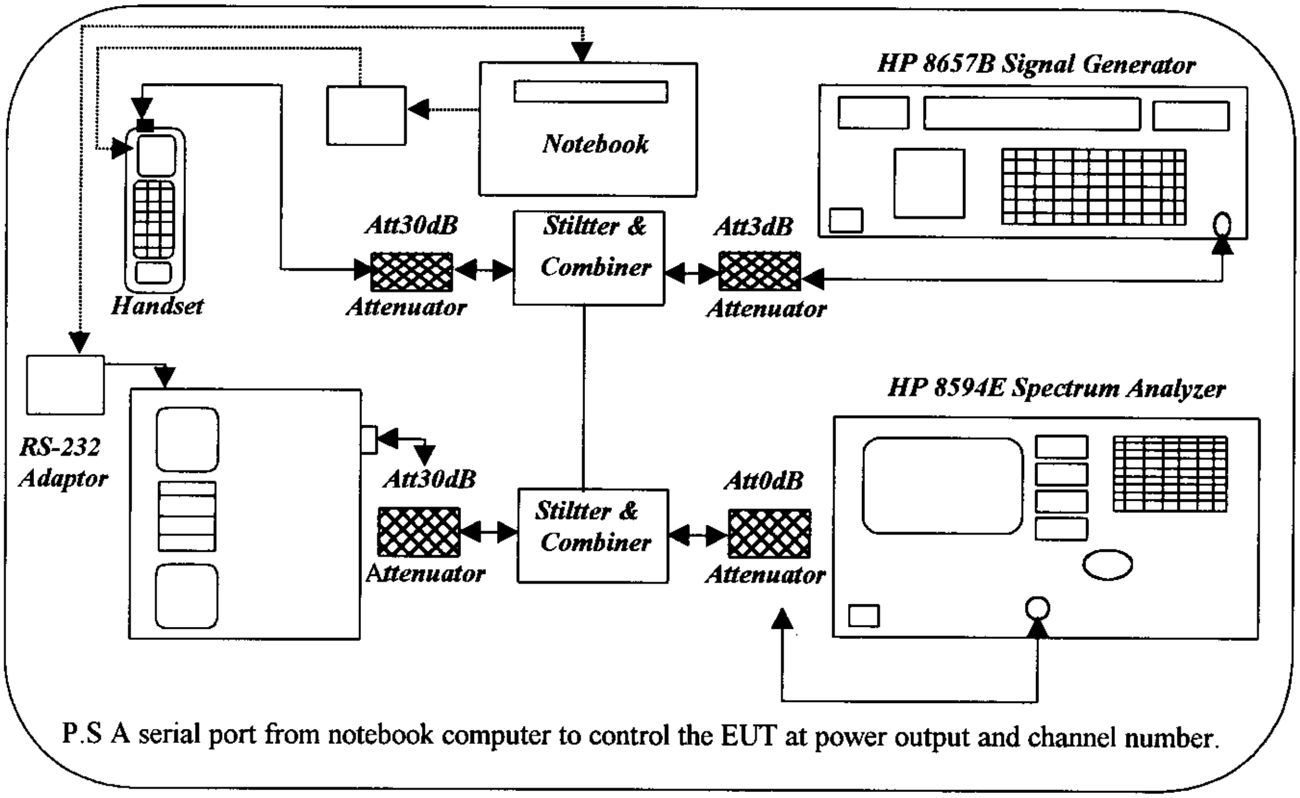


Fig 13. Test Configuration of processing gain for base station

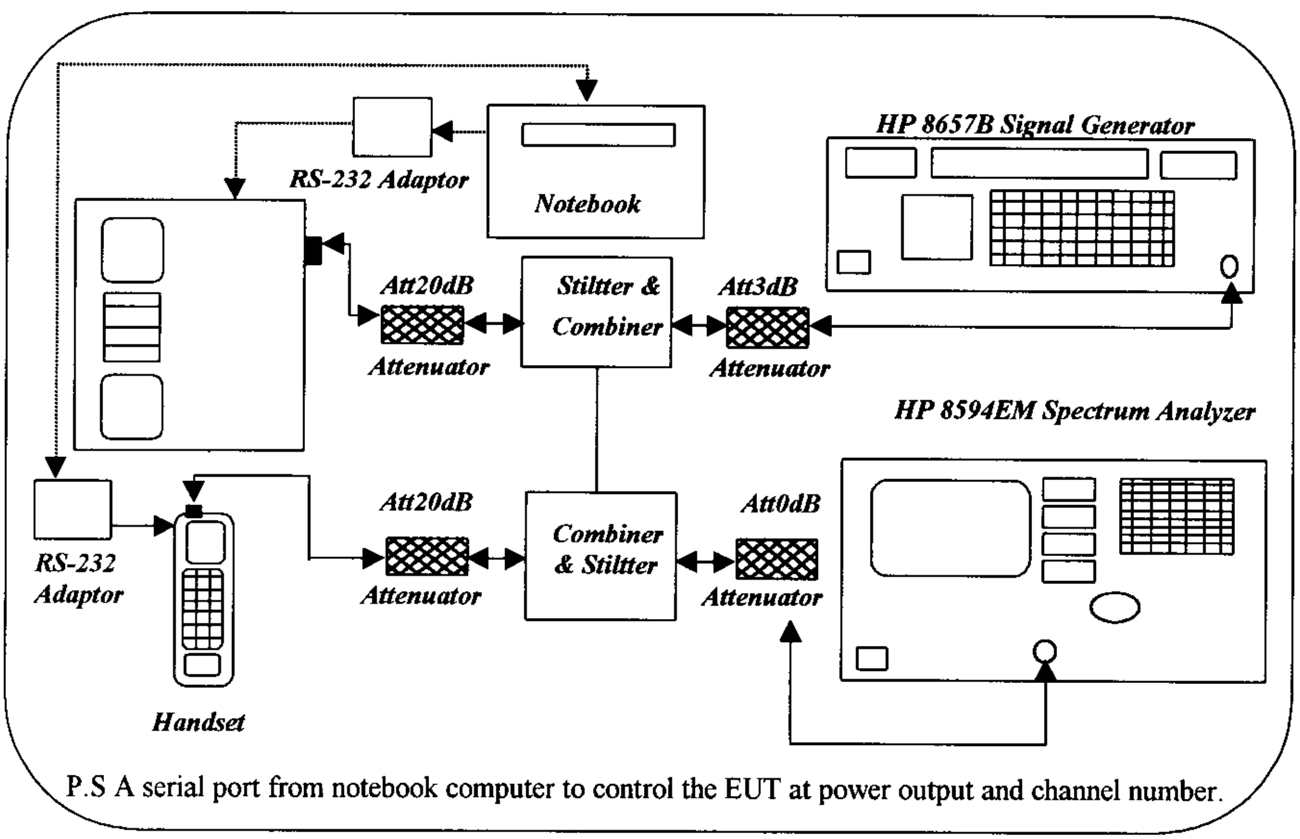


Fig. 14 Test Configuration of processing gain for handset

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 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 53, combine the stuffs.

Measure the low power output of the channel 7 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-S9001, SPP-S9000, SPP-S9101, SPP-S9104
EUT : 900MHz S.S.T. Cordless Phone

Table 34 Processing Gain [Channel 10, Base]

Jammer Frequency (MHz)	S (dBm)	J (dBm)	Mj (J/S)	Process Gain (dB)
914.400	-57.28	-55.16	2.12	12.02
914.450	-57.28	-55.59	1.69	11.59
914.500	-57.28	-54.36	2.92	12.82
914.550	-57.28	-53.94	3.34	13.24
914.600	-57.28	-53.65	3.63	13.53
914.650	-57.28	-53.32	3.96	13.86
914.700	-57.28	-54.46	2.82	12.72
914.750	-57.28	-52.64	4.64	14.54
914.800	-57.28	-52.05	5.23	15.13
914.850	-57.28	-52.50	4.78	14.68
914.900	-57.28	-52.17	5.11	15.01
914.950	-57.28	-51.95	5.33	15.23
915.000	-57.28	-51.67	5.61	15.51
915.050	-57.28	-51.23	6.05	15.95
915.100	-57.28	-50.89	6.39	16.29
915.150	-57.28	-51.77	5.51	15.41
915.200	-57.28	-50.45	6.83	16.73
915.250	-57.28	-50.44	6.84	16.74
915.300	-57.28	-51.46	5.82	15.72
915.350	-57.28	-50.06	7.22	17.12
915.400	-57.28	-50.09	7.19	17.09
915.450	-57.28	-50.02	7.26	17.16
915.500	-57.28	-51.01	6.27	16.17
915.550	-57.28	-50.28	7.00	16.90
915.600	-57.28	-50.26	7.02	16.92
915.650	-57.28	-50.17	7.11	17.01
915.700	-57.28	-50.19	7.09	16.99
915.750	-57.28	-50.26	7.02	16.92
915.800	-57.28	-50.21	7.07	16.97
915.850	-57.28	-50.16	7.12	17.02

Test Result : Processing Gain: 13.53 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)
914.400	-57.44	-54.30	3.14	13.04
914.450	-57.44	-55.62	1.82	11.72
914.500	-57.44	-54.45	2.99	12.89
914.550	-57.44	-54.59	2.85	12.75
914.600	-57.44	-53.76	3.68	13.58
914.650	-57.44	-54.09	3.35	13.25
914.700	-57.44	-54.11	3.33	13.23
914.750	-57.44	-53.65	3.79	13.69
914.800	-57.44	-53.63	3.81	13.71
914.850	-57.44	-52.39	5.05	14.95
914.900	-57.44	-55.12	2.32	12.22
914.950	-57.44	-51.91	5.53	15.43
915.000	-57.44	-52.80	4.64	14.54
915.050	-57.44	-52.35	5.09	14.99
915.100	-57.44	-50.23	7.21	17.11
915.150	-57.44	-50.91	6.53	16.43
915.200	-57.44	-50.40	7.04	16.94
915.250	-57.44	-50.79	6.65	16.55
915.300	-57.44	-50.75	6.69	16.59
915.350	-57.44	-49.03	8.41	18.31
915.400	-57.44	-49.31	8.13	18.03
915.450	-57.44	-49.29	8.15	18.05
915.500	-57.44	-49.90	7.54	17.44
915.550	-57.44	-49.68	7.76	17.66
915.600	-57.44	-48.67	8.77	18.67
915.650	-57.44	-48.05	9.39	19.29
915.700	-57.44	-48.51	8.93	18.83
915.750	-57.44	-48.41	9.03	18.93
915.800	-57.44	-47.90	9.54	19.44
915.850	-57.44	-47.89	9.55	19.45

Test Result : Processing Gain: 13.23 dB

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

2. S = Signal Level

3. J = Signal Generator RF Output

Appendix A

Setting up Procedure

1. Using an RS-232 Adaptor that 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 that is given by the customer and operated in the windows to control the EUT's continuous transmission.

Appendix B

Antenna Sketch

Système international d'Unités

SCALE FOR MICROFILM

General

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

1.2 Operating temperature range : −10～+60° C

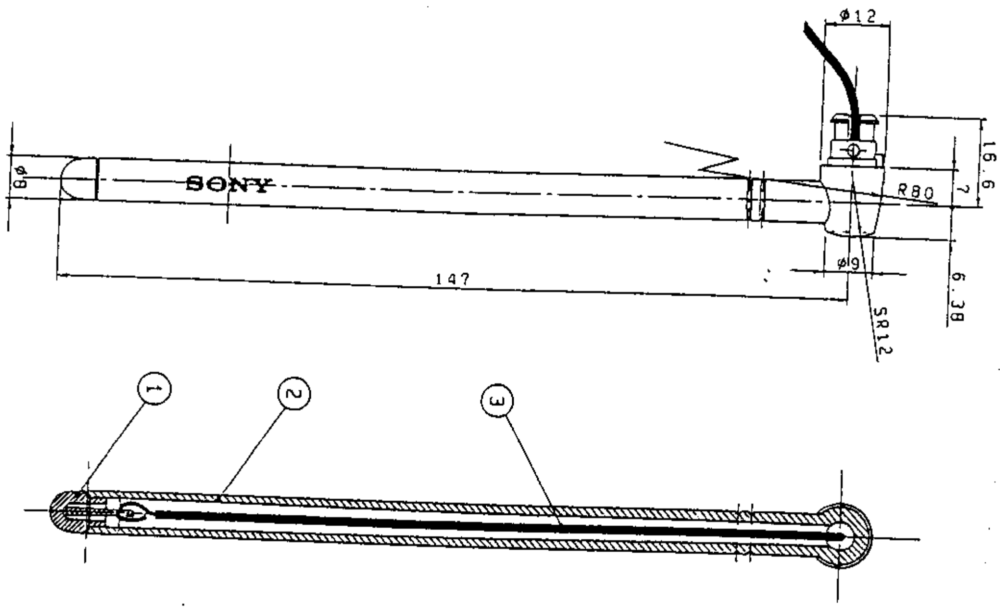
1.3 Storage temperature range : −10～+70° C

Electric performance

2.1 Resonance Frequency : 902 − 928 MHz

2.2 VSWR : Less than 3.0 at the resonance

2.3 Gain : Less than 0 dBd at 915MHz



DRAWING

SONY STANDARD

Unit 単位 : mm Scale 尺度 / Tolerance 公差

HISTORY × COUNT	SUFFIX / REPL.	ECN−NO.	DATE	REVISION	SIGN.
6 ×		−	' . .		
5 ×		−	' . .		
4 ×		−	' . .		
3 ×		−	' . .		
2 ×		−	' . .		
1 ×		−	' . .		

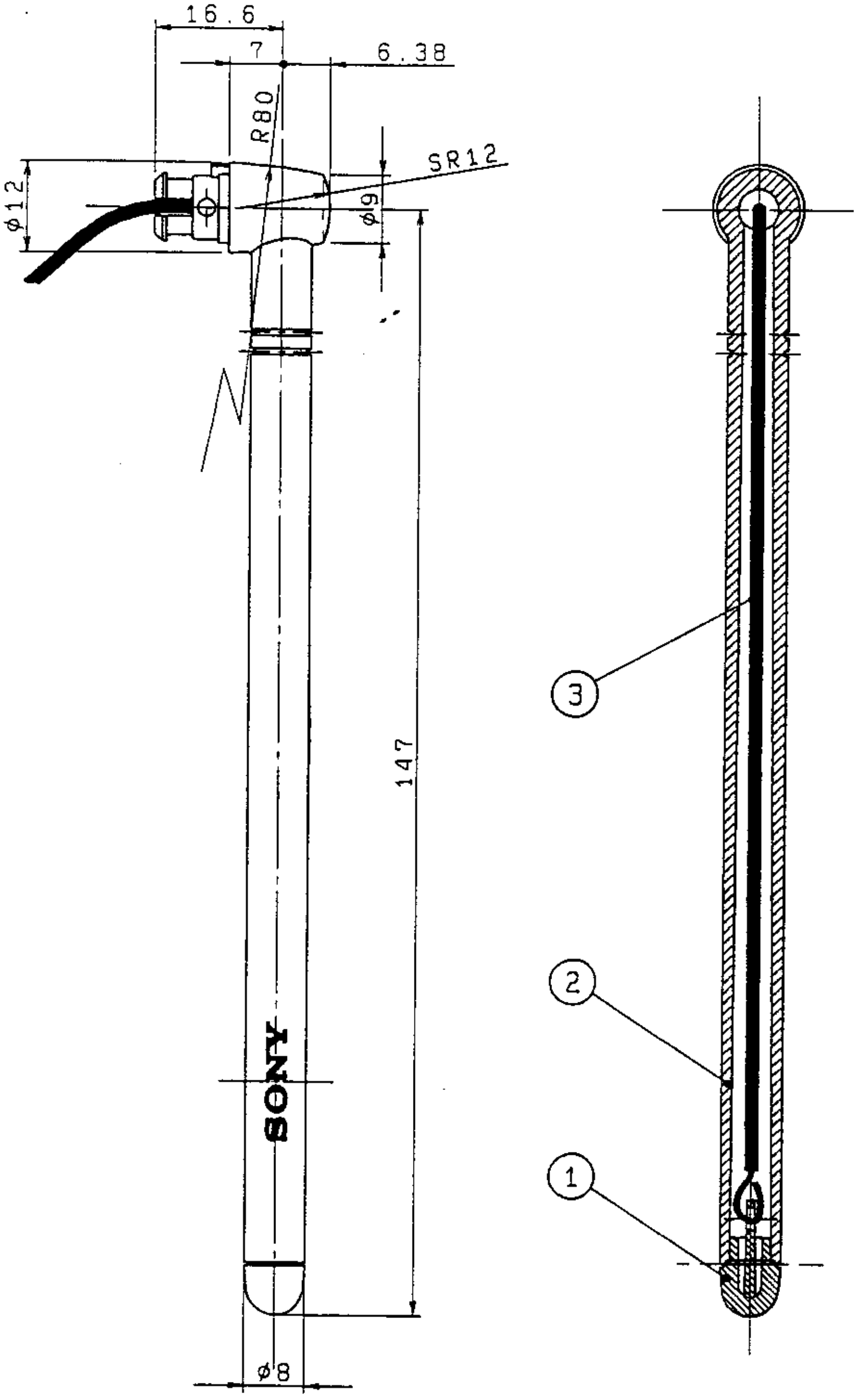
TENTATIVE PART NO. 0 − − −

TITLE／DESCRIPTION
(E) ANTENNA
(J)

PLANNED BY: PMC TCM第3商品部 | CHECKED BY | APPROVED BY | APPROVED BY

PART NO. | DRAWING NO. | SHEET

SONY



NO. 番号	MATERIAL 材料	NAME 名称	QUANTITY 数量	REMARK 備考
1	PC	CAP(ANTENNA)	1	
2	PC	BODY(ANTENNA)	1	
3	AWG-20	WIRE	1	L=205

NOTE1) NO INDICATING DRAFTS ARE WITHIN THE TOLERANCE.

2) THE POSITION OF THE GATE AND CAVITY NO. ARE DECIDED THE MEETING

3) THE MARKS OF EJECTER PINS ARE DENTS.

4) THE SURFACE HAS NO SCRATCH. DIRT. BAD PRINTING.

5) THE SURFACE OF THE CAVITY IS APPEARANCE WHICH HAS MOLD ETCHING

THE ETCHING GRADE IS (NIPPON ETCHING HN-3000G)

STS-3

L ≤ 4	±0.2
4 < L ≤ 16	±0.3
16 < L ≤ 63	±0.4
63 < L ≤ 250	±0.5
250 < L	±0.7

DRAWING (TYPE D47)

SONY STANDARD '90.10

SCALE | DESCRIPTION | PART NO. | SHEET

Si Système International d'Unités

SCALE FOR MICROFILM 0 50

General

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

1.2 Operating temperature range : −10～+60° C

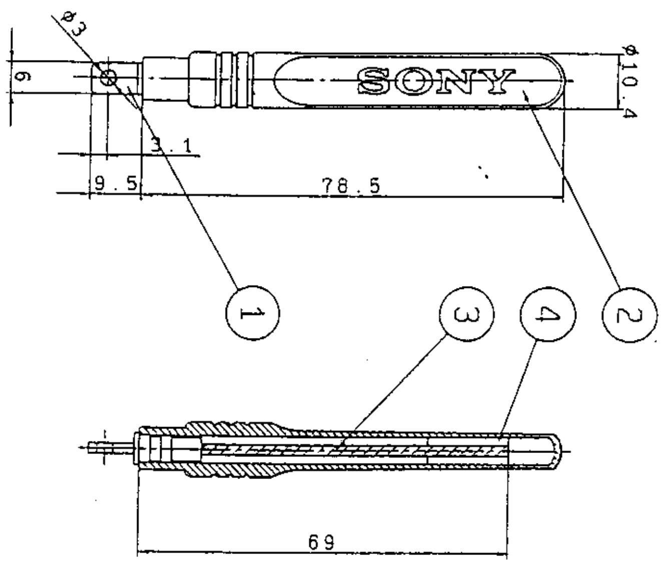
1.3 Storage temperature range : −10～+70° C

Electric performance

2.1 Resonance Frequency : 902 − 928 MHz

2.2 VSWR : Less than 3.0 at the resonance

2.3 Gain : Less than 0 dBd at 915MHz



SONY STANDARD DRAWING

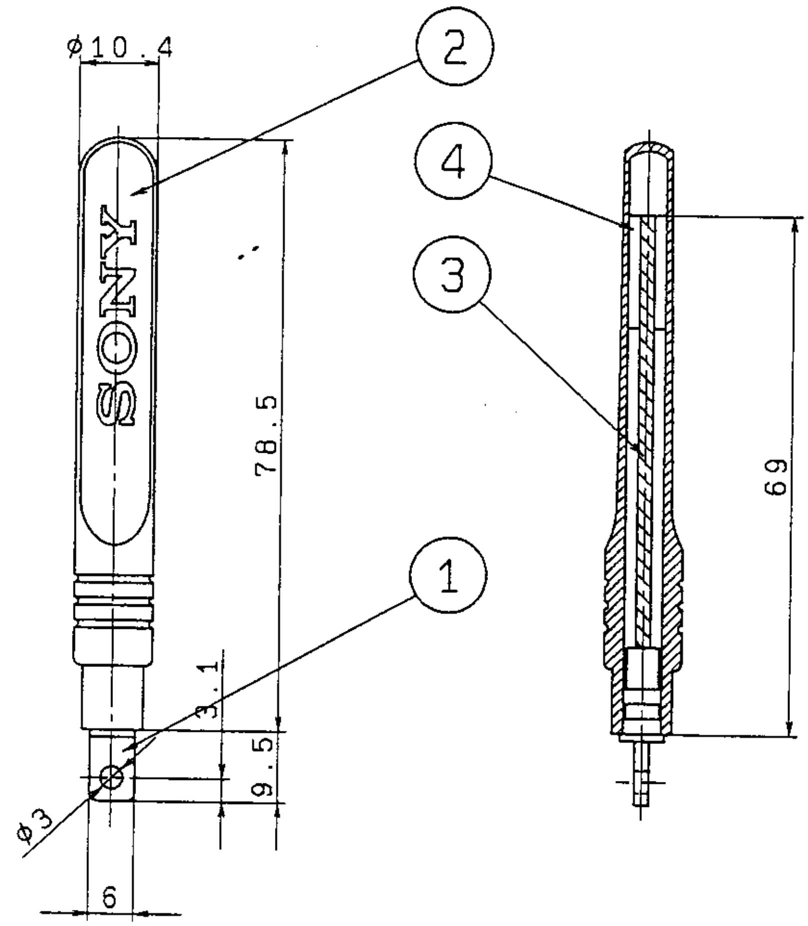
Unit 単位 : mm Scale 尺度 / Tolerance 公差

HISTORY × COUNT	SUFFIX / REPL	ECN—NO.	DATE	REVISION	SIGN.
6 ×		-	. .		
5 ×		-	. .		
4 ×		-	. .		
3 ×		-	. .		
2 ×		-	. .		
1 ×		-	. .		

AMF CHECK

TENTATIVE PART NO.	TITLE/DESCRIPTION
0 - - -	(E) ANTENNA
	(J)

PLANNED BY	CHECKED BY	APPROVED BY	APPROVED BY	PART NO.	DRAWING NO.	SHEET
PMC TCM第3商品部 '99. 3. 25 岡地			辻	- - -	SB-	1/



NO. 番号	MATERIAL 材料	NAME 名称	QUANTITY 数量	REMARK 備考
1	C3604BD	ELEMENT HOLDER	1	Ni-Plate 2u
2	ELASTOLLAN	COVER	1	GRAY
3	ELEMENT	WIRE	1	
4	SPACER	SPONGE	1	

STS-3

L≦ 4	±0.2
4<L≦ 16	±0.3
16<L≦ 63	±0.4
63<L≦250	±0.5
250<L	±0.7

NOTE1) THE SURFACE OF THE CAVITY IS APPEARANCE WHICH HAS MOLD ETCHING

THE ETCHING GRADE IS (NIPPON ETCHING HN-3000G)

DRAWING (TYPE D47)

SONY STANDARD '90.10

SCALE | DESCRIPTION ANTENNA | PART NO. | SHEET

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.