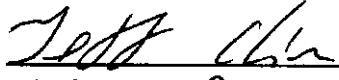
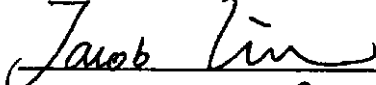
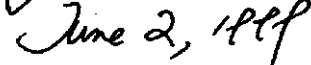


|                         |                                                                                                                          |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Report No.              | N1315266                                                                                                                 |
| Specifications          | FCC Part 15.109(g), Class B                                                                                              |
| Test Method             | ANSI C63.4 1992                                                                                                          |
| Applicant address       | 2F, NO. 28, INDUSTRY EAST 9 <sup>TH</sup> RD.,<br>SCIENCE PARK, HSIN-CHU, TAIWAN                                         |
| Applicant Items tested  | NATIONAL DATACOMM CORPORATION<br>5 PORT SOHOWARE 10/100 FAST HUB                                                         |
| Model No.               | NDH305, DH305 (Sample # N13266)                                                                                          |
| Results                 | Compliance (As detailed within this report)                                                                              |
| Sample received data    | 04/26/1999 (month / day / year)                                                                                          |
| Prepared by             |  project engineer                     |
| Authorized by           |  Vice General Manager<br>(Jacob Lin)  |
| Issue date              |  June 2, 1999<br>(month / day / year) |
| Modifications           | None                                                                                                                     |
| Tested by               | Training Research Co., Ltd.                                                                                              |
| Office and Open site at | No. 15, Lane 530, Pa-Lian RD., Sec. 1, Hsi-Chih Town,<br>Taipei Hsien, Taiwan, R.O.C.                                    |

**Conditions of issue:**

- (1) This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.
- (2) This report must not be used by the client to claim product endorsement by NVLAP or any agency of U.S. Government.

★ FCC ID: IOUNDH305S01

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## ***Chapter 1 Introduction***

### ***Description of EUT:***

HUB is a data transmission / receiver facility. It was connected to Lan card installed in the PC or compatible computer and makes your data equipment available to transmit / receive data via the EUT. During testing the EUT was operated at Tx or Rx mode for each emission measured. This was done in order to insure that maximum emission levels were attained.

### ***Connections of EUT:***

- (1) The power jack of EUT was connected with the AC power source via a power adapter.
- (2) UTP 1 port was connected with a Lan card installed in the nearby PC.
- (3) UTP 5 port was connected with another Lan card installed in another PC located remotely.
- (4) The other UTP ports were terminated.

### ***Test method:***

Pretest was found that the emission of operating mode is worse than standby mode. So, The final test is made at the operating mode.

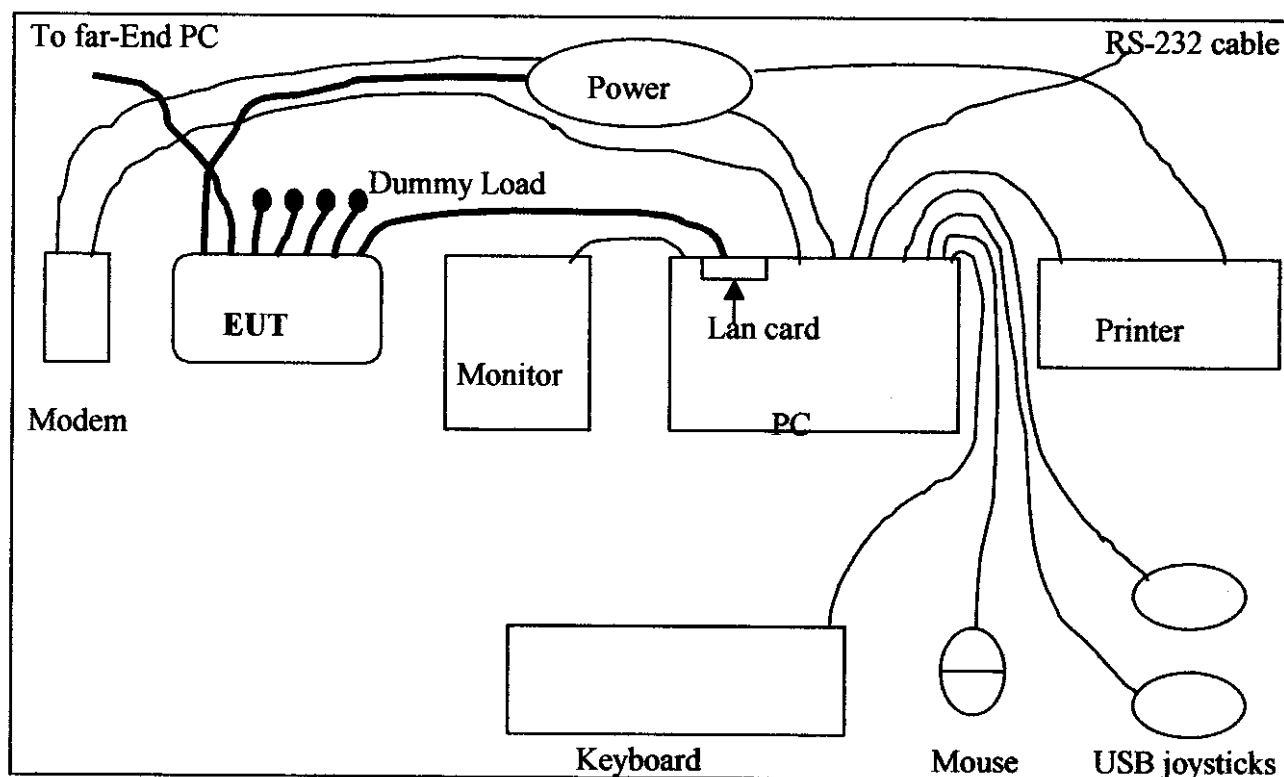
During pretest, there were three modes testing: 10 x 10MHz, 10 x 100MHz, 100 x 100MHz.

During testing, the EUT was operated at “transmitting” and “receiving” mode simultaneously.

The test placement as the photographs showed is the worst case emission placed. (If the emission is close to the ambient, the resolution BW and view resolution will be reduced and the data will be recorded by detection of maximum hold peak mode.)

***The testing configuration of test setup is showing in the next page.***

## **Configuration of test setup**



### **Connections:**

#### **PC:**

- \*Serial A port --- a external modem with 76 cm shielded RS-232 cable
  - \*Serial B port --- a 76 cm shielded RS232 cable
  - \*Printer port --- a Printer with 1.2m length data cable
  - \*Monitor port --- a monitor with 1m length data cable
  - \*Keyboard port --- a Keyboard with 1m length data cable
  - \*Mouse port --- a Mouse with 0.7m long of data cable
  - \*USB ports --- two USB joysticks with 1.5m long, shielded, no ferrite bead data cable
- (Each port on PC is connected with suitable device)

#### **Lan Card**

- \*RJ-45 jack --- via a 3m long, non-shielded, no ferrite bead, RJ-45 cable to EUT.

**EUT:**

- \*UTP 1 port --- via a 1m long, non-shielded, no ferrite bead, RJ-45 cable to the RJ-45 jack of the Lan card that installed in PC.
- \*UTP 2~4 port --- connect with a 1m long, non-shielded, no ferrite bead, RJ-45 cable that terminated with 200ohm.
- \*UTP 5 port --- via a 30m long, non-shielded, no ferrite bead, RJ-45 cable to another Lan card that installed in another PC located in far-end.
- \*Power jack --- connect with a power adapter that the power cable is 1.8m long, non-shielded, with ferrite bead.

**List of support equipment****Conducted (Radiated) test:**

**PC : HP**  
Model : VE6/350 SERIES 8  
Serial No. : SG91002329  
FCC ID : DoC Approval  
Power type : AC 100~127 / 200~240 VAC, Switching  
Power cord : non-Shielded, 1.7m long, Plastic, no ferrite core

**Monitor : HP**  
Model No. : D2821  
Serial No. : TW 73512262 (TW 73147163)  
FCC ID : A3KMO64  
Power type : AC 110~120 / 220~240 VAC, Switching  
Power cord : Non-Shielded, 3m long, no ferrite core  
Data cable : Shielded, 1.8m long, with ferrite core

**Keyboard : Digital**  
Model No. : KB-5923  
Serial No. : 9S74904837 (9S74904665)  
FCC ID : E8HKB-5923  
Power type : By PC  
Data cable : Shielded, 1.8m long, with ferrite core

**Printer : HP**  
Model No. : C2642A  
Serial No. : SG69A196GV  
FCC ID : B94C2642X  
Power type : 110 VAC, 60Hz  
Power cord : Non-shielded, 2m long, no ferrite core  
Data cable : Shielded, 1.84m long, no ferrite core (1.7m)

**Modem** : **ACEEX**  
Model No. : XDM-56V14  
FCC ID : IFAXDM-56V14  
Power type : 110VAC, 60HZ/ 9VAC, 1A  
Power cord : Non-shielded, 1.9m long, no ferrite cord  
Data cable : RS232, Shielded, 1.2m long, no ferrite core  
RJ11C x 2, 7' long non-shielded, no ferrite core

**Mouse** : **Hewlett Packard Mouse**  
Model No. : C3751B  
Serial No. : LCA52707170  
FCC ID : DZL210582  
Power type : Powered by PC  
Power Cable : Non – Shielded. 5.5' long, Plastic hoods, No ferrite bead

**Joystick** : **Padix**  
Model : QF-3U, QF-305U, QF-606U, QF-707U ( DoC Approval )  
Power Type : By PC

**Lan Card** : **DELTA**  
Model No. : AEF380-TX  
Serial No. : N/A  
Power Type : Powered by PC  
Data Cable : UTP, 7', Plastic RJ-45 hoods, No ferrite bead.

## ***Chapter 2 Conducted emission test***

### ***Test condition and setup:***

All the equipment is placed and setup according to the ANSI C63.4-1992.

The EUT is assembled on a wooden table that is 80 cm high, is placed 40 cm from the back-wall that is a vertical conducting plane. One LISN is for EUT, the other LISN is for support equipment. They are all placed on the conductive ground. The EUT's LISN connect a line switch box for selecting L1 or L2, then connect to a preamplifier and spectrum.

The spectrum scans from 450KHz to 30MHz. Conducted emission levels are detected at max. peak mode. But if the max. peak mode failed, it will be measured by CISPR's quasi-peak detection mode.

While testing, there is the worst-emission plot printed at peak detection mode, and there are more than 6 highest emissions relative to limit recorded. The plot is kept as the original data, not included in test report.

### ***List of test Instrument:***

| <u>Instrument Name</u> | <u>Model No.</u> | <u>Brand</u> | <u>Serial No.</u> | <u>Calibration Date</u> |                  |
|------------------------|------------------|--------------|-------------------|-------------------------|------------------|
|                        |                  |              |                   | <u>Last time</u>        | <u>Next time</u> |
| Spectrum analyzer      | 8594EM           | H P          | 3710A00279        | 01/07/99                | 01/07/00         |
| LISN (EUT)             | 3825/2           | EMCO         | 9411-2284         | 05/20/99                | 05/20/00         |
| LISN (Support E.)      | AC3-001          | TRC          | -----             | 05/20/99                | 05/20/00         |
| Preamplifier           | AC3-002          | TRC          | -----             | 05/20/99                | 05/20/00         |
| Line switch box        | AC3-003          | TRC          | -----             | 05/20/99                | 05/20/00         |

The level of confidence of 95%, the uncertainty of measurement of conducted emission is  $\pm 2.4$  dB.

***Test Result: Pass (Appendix A)***

### ***Chapter 3 Radiated emission test***

#### ***Test condition and setup:***

**Pretest:** Prior to the final test (OATS test), the EUT is placed in a anechoic chamber and scan from 30MHz to 1GHz. This is done to ensure the radiation exactly emits form the EUT.

**Final test:** Final radiation measurements are made on a **3 - meter, open-field** test site. The EUT is placed on a nonconductive table that is 0.8m height, the top surface is 1.0 x 1.5 meter. The placement is according to ANSI C63.4-1992.

The spectrum is examined from 30 MHz to 1000 MHz measured by HP spectrum.

The EMCO whole range Antenna is used to measure frequency from 30 MHz to 1GHz. The final test is used the spectrum HP 8594EM.

Measure more than six top marked frequencies generated form pretest by computer step by step at each frequency. The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meters to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

Appropriated preamplifier which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading. The spectrum analyzer's 6dB bandwidth is set to 120 KHz, and the EUT is measured at quasi-peak mode.

If the emission is close to the frequency band of ambient, the data will be rechecked by the tester and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from anechoic chamber will be taken as the final data.

#### ***List of test Instrument:***

#### **Calibration Date**

| <u>Instrument Name</u>                                       | <u>Model No.</u> | <u>Brand</u> | <u>Serial No.</u> | <u>Last</u> | <u>Next</u> |
|--------------------------------------------------------------|------------------|--------------|-------------------|-------------|-------------|
| Spectrum analyzer                                            | 8594EM           | H P          | 3619A00198        | 11/17/98    | 11/17/99    |
| RF Pre-selector                                              | AC4-001          | TRC          | -----             | 05/20/99    | 05/20/00    |
| Antenna (30M-2G Hz)                                          | 3141             | EMCO         | 9711-1076         | 12/17/98    | 12/17/99    |
| Open test side (Antenna, Amplify, cable calibrated together) |                  |              |                   | 05/20/99    | 05/20/00    |

The level of confidence of 95%, the uncertainty of measurement of radiated emission is  $\pm 4.96$  dB.

#### **Test Result: Pass (Appendix B)**

## Appendix A

### Conducted Emission Test Result: ( 10 X 10 MHz )

Testing room: Temperature : 28 ° C Humidity : 45 % RH

#### Line 1

| FREQUENCY<br>( KHz ) | READING AMPLITUDE      |                              |                           | LIMIT                        |                           | MARGIN<br>( dB ) |
|----------------------|------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------|
|                      | Peak<br>(dB $\mu$ V/m) | Quasi-peak<br>(dB $\mu$ V/m) | Average<br>(dB $\mu$ V/m) | Quasi-Peak<br>(dB $\mu$ V/m) | Average<br>(dB $\mu$ V/m) |                  |
| 590                  | 25.03                  | *** **                       | *** **                    | 48.00                        | *** **                    | -22.97           |
| 749                  | 23.80                  | *** **                       | *** **                    | 48.00                        | *** **                    | -24.20           |
| 803                  | 23.51                  | *** **                       | *** **                    | 48.00                        | *** **                    | -24.49           |
| 862                  | 23.04                  | *** **                       | *** **                    | 48.00                        | *** **                    | -24.96           |
| 3750                 | 24.03                  | *** **                       | *** **                    | 48.00                        | *** **                    | -23.97           |
| 13740                | 22.36                  | *** **                       | *** **                    | 48.00                        | *** **                    | -25.64           |
| 16260                | 24.53                  | *** **                       | *** **                    | 48.00                        | *** **                    | -23.47           |
| 17570                | 23.99                  | *** **                       | *** **                    | 48.00                        | *** **                    | -24.01           |
| 23650                | 26.94                  | *** **                       | *** **                    | 48.00                        | *** **                    | -21.06           |
| 28160                | 23.73                  | *** **                       | *** **                    | 48.00                        | *** **                    | -24.27           |

#### Line 2

| FREQUENCY<br>( KHz ) | READING AMPLITUDE      |                              |                           | LIMIT                        |                           | MARGIN<br>( dB ) |
|----------------------|------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------|
|                      | Peak<br>(dB $\mu$ V/m) | Quasi-peak<br>(dB $\mu$ V/m) | Average<br>(dB $\mu$ V/m) | Quasi-Peak<br>(dB $\mu$ V/m) | Average<br>(dB $\mu$ V/m) |                  |
| 586                  | 26.12                  | *** **                       | *** **                    | 48.00                        | *** **                    | -21.88           |
| 645                  | 29.29                  | *** **                       | *** **                    | 48.00                        | *** **                    | -18.71           |
| 749                  | 28.95                  | *** **                       | *** **                    | 48.00                        | *** **                    | -19.05           |
| 808                  | 31.30                  | *** **                       | *** **                    | 48.00                        | *** **                    | -16.70           |
| 910                  | 26.74                  | *** **                       | *** **                    | 48.00                        | *** **                    | -21.26           |
| 3750                 | 36.34                  | *** **                       | *** **                    | 48.00                        | *** **                    | -11.66           |
| 13740                | 30.41                  | *** **                       | *** **                    | 48.00                        | *** **                    | -17.59           |
| 15050                | 25.31                  | *** **                       | *** **                    | 48.00                        | *** **                    | -22.69           |
| 26220                | 25.94                  | *** **                       | *** **                    | 48.00                        | *** **                    | -22.06           |
| 28160                | 25.63                  | *** **                       | *** **                    | 48.00                        | *** **                    | -22.37           |

**Conducted Emission Test Result: ( 10 X 100 MHz )**

Testing room: Temperature : 28 ° C Humidity : 45 % RH

***Line 1***

| FREQUENCY<br>( KHz ) | READING AMPLITUDE |                        |                     | LIMIT                  |                     | MARGIN<br>( dB ) |
|----------------------|-------------------|------------------------|---------------------|------------------------|---------------------|------------------|
|                      | Peak<br>(dBμV/m)  | Quasi-peak<br>(dBμV/m) | Average<br>(dBμV/m) | Quasi-Peak<br>(dBμV/m) | Average<br>(dBμV/m) |                  |
| 862                  | 29.39             | *** **                 | *** **              | 48.00                  | *** **              | -18.61           |
| 3750                 | 34.38             | *** **                 | *** **              | 48.00                  | *** **              | -13.62           |
| 15600                | 27.94             | *** **                 | *** **              | 48.00                  | *** **              | -20.06           |
| 16260                | 30.85             | *** **                 | *** **              | 48.00                  | *** **              | -17.15           |
| 17700                | 28.05             | *** **                 | *** **              | 48.00                  | *** **              | -19.95           |
| 18210                | 31.62             | *** **                 | *** **              | 48.00                  | *** **              | -16.38           |
| 18850                | 27.87             | *** **                 | *** **              | 48.00                  | *** **              | -20.13           |
| 19750                | 30.08             | *** **                 | *** **              | 48.00                  | *** **              | -17.92           |
| 21560                | 27.89             | *** **                 | *** **              | 48.00                  | *** **              | -20.11           |
| 23050                | 28.02             | *** **                 | *** **              | 48.00                  | *** **              | -19.98           |

***Line 2***

| FREQUENCY<br>( KHz ) | READING AMPLITUDE |                        |                     | LIMIT                  |                     | MARGIN<br>( dB ) |
|----------------------|-------------------|------------------------|---------------------|------------------------|---------------------|------------------|
|                      | Peak<br>(dBμV/m)  | Quasi-peak<br>(dBμV/m) | Average<br>(dBμV/m) | Quasi-Peak<br>(dBμV/m) | Average<br>(dBμV/m) |                  |
| 862                  | 34.58             | *** **                 | *** **              | 48.00                  | *** **              | -13.42           |
| 3750                 | 36.17             | *** **                 | *** **              | 48.00                  | *** **              | -11.83           |
| 6260                 | 33.13             | *** **                 | *** **              | 48.00                  | *** **              | -14.87           |
| 13740                | 30.20             | *** **                 | *** **              | 48.00                  | *** **              | -17.80           |
| 15600                | 29.87             | *** **                 | *** **              | 48.00                  | *** **              | -18.13           |
| 16260                | 33.13             | *** **                 | *** **              | 48.00                  | *** **              | -14.87           |
| 18850                | 30.23             | *** **                 | *** **              | 48.00                  | *** **              | -17.77           |
| 19750                | 31.77             | *** **                 | *** **              | 48.00                  | *** **              | -16.23           |
| 20260                | 30.13             | *** **                 | *** **              | 48.00                  | *** **              | -17.87           |
| 26220                | 31.60             | *** **                 | *** **              | 48.00                  | *** **              | -16.40           |

**Conducted Emission Test Result: ( 100 X 100 MHz )**

Testing room: Temperature : 28 ° C Humidity : 45 % RH

**Line 1**

| FREQUENCY<br>( KHz ) | READING AMPLITUDE      |                              |                           | LIMIT                        |                           | MARGIN<br>( dB ) |
|----------------------|------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------|
|                      | Peak<br>(dB $\mu$ V/m) | Quasi-peak<br>(dB $\mu$ V/m) | Average<br>(dB $\mu$ V/m) | Quasi-Peak<br>(dB $\mu$ V/m) | Average<br>(dB $\mu$ V/m) |                  |
| 15600                | 28.56                  | *** **                       | *** **                    | 48.00                        | *** **                    | -19.44           |
| 16260                | 36.33                  | *** **                       | *** **                    | 48.00                        | *** **                    | -11.67           |
| 16800                | 30.36                  | *** **                       | *** **                    | 48.00                        | *** **                    | -17.64           |
| 17700                | 34.95                  | *** **                       | *** **                    | 48.00                        | *** **                    | -13.05           |
| 18980                | 32.48                  | *** **                       | *** **                    | 48.00                        | *** **                    | -15.52           |
| 19750                | 32.97                  | *** **                       | *** **                    | 48.00                        | *** **                    | -15.03           |
| 22310                | 28.39                  | *** **                       | *** **                    | 48.00                        | *** **                    | -19.61           |
| 23050                | 33.85                  | *** **                       | *** **                    | 48.00                        | *** **                    | -14.15           |
| 24300                | 29.34                  | *** **                       | *** **                    | 48.00                        | *** **                    | -18.66           |
| 29180                | 29.23                  | *** **                       | *** **                    | 48.00                        | *** **                    | -18.77           |

**Line 2**

| FREQUENCY<br>( KHz ) | READING AMPLITUDE      |                              |                           | LIMIT                        |                           | MARGIN<br>( dB ) |
|----------------------|------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------|
|                      | Peak<br>(dB $\mu$ V/m) | Quasi-peak<br>(dB $\mu$ V/m) | Average<br>(dB $\mu$ V/m) | Quasi-Peak<br>(dB $\mu$ V/m) | Average<br>(dB $\mu$ V/m) |                  |
| 803                  | 31.46                  | *** **                       | *** **                    | 48.00                        | *** **                    | -16.54           |
| 851                  | 33.07                  | *** **                       | *** **                    | 48.00                        | *** **                    | -14.93           |
| 16480                | 32.00                  | *** **                       | *** **                    | 48.00                        | *** **                    | -16.00           |
| 16800                | 32.43                  | *** **                       | *** **                    | 48.00                        | *** **                    | -15.57           |
| 17350                | 32.50                  | *** **                       | *** **                    | 48.00                        | *** **                    | -15.50           |
| 18340                | 33.96                  | *** **                       | *** **                    | 48.00                        | *** **                    | -14.04           |
| 19620                | 32.76                  | *** **                       | *** **                    | 48.00                        | *** **                    | -15.24           |
| 20510                | 32.47                  | *** **                       | *** **                    | 48.00                        | *** **                    | -15.53           |
| 21560                | 32.50                  | *** **                       | *** **                    | 48.00                        | *** **                    | -15.50           |
| 24470                | 32.55                  | *** **                       | *** **                    | 48.00                        | *** **                    | -15.45           |

## **Appendix B**

### **Radiated Emission Test Result: (Horizontal) ( 10 X 100 MHz )**

Test Conditions:

Testing room : Temperature : 25 ° C      Humidity : 30 % RH

Testing site : Temperature : 25 ° C      Humidity : 42 % RH

| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Corrected Amplitude | Class B limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------|--------|
| MHz       | dBμV              | m           | degree | dB/m               | dBμV/m              | dBμV/m        | dB     |

|         |       |      |     |        |       |       |        |
|---------|-------|------|-----|--------|-------|-------|--------|
| 350.000 | 61.69 | 0.99 | 98  | -19.58 | 42.11 | 46.00 | -3.89  |
| 375.000 | 57.66 | 0.99 | 283 | -18.73 | 38.93 | 46.00 | -7.07  |
| 400.010 | 53.67 | 0.99 | 131 | -17.95 | 35.72 | 46.00 | -10.28 |
| ***     |       |      |     |        |       |       |        |
|         |       |      |     |        |       |       |        |
|         |       |      |     |        |       |       |        |
|         |       |      |     |        |       |       |        |
|         |       |      |     |        |       |       |        |
|         |       |      |     |        |       |       |        |
|         |       |      |     |        |       |       |        |
|         |       |      |     |        |       |       |        |

Note:

1. Margin = Amplitude - limit, if margin is minus means under limit.

2. Corrected Amplitude = Reading Amplitude + Correction Factors

3. Correction factor = Antenna factor + ( Cable Loss - Amplitude gain)

(For example: 30MHz correction factor = 15.5 + (-15.26) = 0.24 dB/m)

***Radiated Emission Test Result: (Vertical) ( 10 X 100 MHz )***

| Frequency | Reading<br>Amplitude | Ant.<br>Height | Table  | Correction<br>Factors | Corrected<br>Amplitude | Class B<br>limit | Margin |
|-----------|----------------------|----------------|--------|-----------------------|------------------------|------------------|--------|
| MHz       | dBμV                 | m              | degree | dB/m                  | dBμV/m                 | dBμV/m           | dB     |
| 32.020    | 48.44                | 0.99           | 340    | -23.40                | 25.04                  | 40.00            | -14.96 |
| 43.520    | 50.26                | 0.99           | 233    | -22.17                | 28.09                  | 40.00            | -11.91 |
| 77.220    | 61.68                | 2.50           | 235    | -24.17                | 37.51                  | 40.00            | -2.49  |
| 81.200    | 59.81                | 0.99           | 320    | -25.96                | 33.85                  | 40.00            | -6.15  |
| 125.000   | 53.23                | 4.00           | 345    | -21.89                | 31.34                  | 43.50            | -12.16 |
| 130.020   | 53.55                | 0.99           | 115    | -21.75                | 31.80                  | 43.50            | -11.70 |
| 250.000   | 58.27                | 0.99           | 81     | -22.68                | 35.59                  | 46.00            | -10.41 |
| 350.000   | 54.28                | 0.99           | 74     | -19.58                | 34.70                  | 46.00            | -11.30 |
| ***       |                      |                |        |                       |                        |                  |        |
|           |                      |                |        |                       |                        |                  |        |
|           |                      |                |        |                       |                        |                  |        |

***Final statement:***

***This test report, measurements made by TRC are traceable to the NIST.***

# ***EXHIBIT B***

## ***Measurement Report***

# **MEASUREMENT REPORT of CORDLESS TELEPHONE**

**Applicant** : GVC CORPORATION  
**Model No.** : MH-9988  
**EUT** : 900 MHz S.S.T. Cordless Phone  
**FCC ID** : DK4MH9988BK  
**Report No.** : G0115637

**Test by :**

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

**TEL : 886-2-26935155      FAX : 886-2-26934440**  
2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan, R.O.C.

# CERTIFICATION

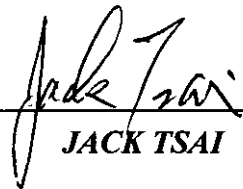
**We here by verify that:**

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.*, 2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan, R.O.C. Also, we attest to the accuracy of each.

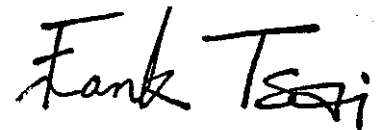
We further submit that the energy emitted by the sample EUT tested as described in the report is in compliance with the technical requirements set forth in the FCC Rules Part 15 Subpart C Section 15.233.

**Applicant** : GVC CORPORATION  
**Model No.** : MH-9988  
**EUT** : 900 MHz S.S.T. Cordless Phone  
**FCC ID** : DK4MH9988BK  
**Report No.** : G0115637  
**Test Date** : Aug. 16, 1999

Prepared by:

  
JACK TSAI

Approved by:

  
FRANK TSAI

Test by :

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

TEL: 886-2-26935155

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2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan, R.O.C.

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## 1.4 Configuration of System Under Test

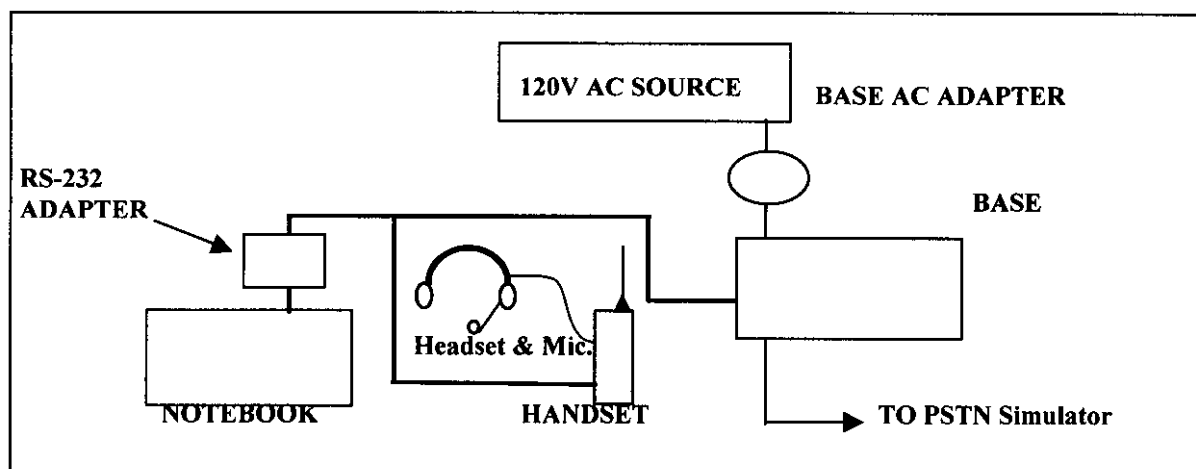


Fig. 1 Configuration of system under test

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       | 905.023   | 904.520      | 11      | 915.300   | 915.300      |
| 2       | 904.700   | 904.700      | 12      | 916.500   | 916.500      |
| 3       | 906.900   | 906.900      | 13      | 918.700   | 918.700      |
| 4       | 907.100   | 907.100      | 14      | 919.900   | 919.900      |
| 5       | 908.300   | 908.300      | 15      | 920.100   | 920.100      |
| 6       | 909.500   | 909.500      | 16      | 921.300   | 921.300      |
| 7       | 910.700   | 910.700      | 17      | 922.500   | 922.500      |
| 8       | 912.900   | 912.900      | 18      | 924.700   | 924.700      |
| 9       | 913.100   | 913.100      | 19      | 925.900   | 925.900      |
| 10      | 915.575   | 915.072      | 20      | 927.133   | 926.128      |

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 904.520 MHz to 927.133 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.

In 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.

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.

## **1.8 General Test Condition**

The radiated emissions measurements required by the rules were performed on the three-meter, Anechoic Chamber (Registration Number: 93906) maintained by Training Research Co., Ltd. 1F., No. 2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, 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. B1, 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.

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

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.

## **1.6 Test Procedure**

## **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)

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. : MH-9988  
EUT : 900MHz S.S.T. Cordless Phone

**Table 1 Power Line Conducted Emissions (Channel 1)**

| <i>Power</i>     | <i>Connected</i>           | <i>Emissions</i>                 | <i>FCC</i>              | <i>Class B</i>         |
|------------------|----------------------------|----------------------------------|-------------------------|------------------------|
| <i>Conductor</i> | <i>Frequency<br/>(KHz)</i> | <i>Peak Amplitude<br/>(dBuV)</i> | <i>Limit<br/>(dBuV)</i> | <i>Margin<br/>(dB)</i> |
| Line 1           | 464.00                     | 36.86                            | 48.00                   | -11.14                 |
|                  | 477.00                     | 37.25                            | 48.00                   | -10.75                 |
|                  | 489.00                     | 37.77                            | 48.00                   | -10.23                 |
|                  | 512.00                     | 38.25                            | 48.00                   | -9.75                  |
|                  | 538.00                     | 38.65                            | 48.00                   | -9.35                  |
|                  | 553.00                     | 38.12                            | 48.00                   | -9.88                  |
|                  | 568.00                     | 38.46                            | 48.00                   | -9.54                  |
|                  | 601.00                     | 37.97                            | 48.00                   | -10.03                 |
|                  | 628.00                     | 36.63                            | 48.00                   | -11.37                 |
|                  | 650.00                     | 35.81                            | 48.00                   | -12.19                 |
| LINE 2           | 455.00                     | 40.86                            | 48.00                   | -7.14                  |
|                  | 489.00                     | 40.06                            | 48.00                   | -7.94                  |
|                  | 508.00                     | 39.82                            | 48.00                   | -8.18                  |
|                  | 538.00                     | 38.86                            | 48.00                   | -9.14                  |
|                  | 553.00                     | 38.83                            | 48.00                   | -9.17                  |
|                  | 593.00                     | 37.72                            | 48.00                   | -10.28                 |
|                  | 637.00                     | 36.43                            | 48.00                   | -11.57                 |
|                  | 692.00                     | 35.45                            | 48.00                   | -12.55                 |
|                  | 719.00                     | 35.07                            | 48.00                   | -12.93                 |
|                  | 1215.00                    | 35.39                            | 48.00                   | -12.61                 |

**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 2 Power Line Conducted Emissions (Channel 10)**

| <i>Power</i>     | <i>Connected</i>           | <i>Emissions</i>                 | <i>FCC</i>              | <i>Class B</i>         |
|------------------|----------------------------|----------------------------------|-------------------------|------------------------|
| <i>Conductor</i> | <i>Frequency<br/>(KHz)</i> | <i>Peak Amplitude<br/>(dBuV)</i> | <i>Limit<br/>(dBuV)</i> | <i>Margin<br/>(dB)</i> |
| Line 1           | 461.00                     | 36.61                            | 48.00                   | -11.39                 |
|                  | 470.00                     | 36.44                            | 48.00                   | -11.56                 |
|                  | 486.00                     | 36.83                            | 48.00                   | -11.17                 |
|                  | 515.00                     | 37.88                            | 48.00                   | -10.12                 |
|                  | 538.00                     | 38.01                            | 48.00                   | -9.99                  |
|                  | 549.00                     | 38.10                            | 48.00                   | -9.90                  |
|                  | 571.00                     | 38.39                            | 48.00                   | -9.61                  |
|                  | 590.00                     | 38.09                            | 48.00                   | -9.91                  |
|                  | 628.00                     | 37.16                            | 48.00                   | -10.84                 |
|                  | 650.00                     | 36.78                            | 48.00                   | -11.22                 |
| LINE 2           | 452.00                     | 40.86                            | 48.00                   | -7.14                  |
|                  | 467.00                     | 40.82                            | 48.00                   | -7.18                  |
|                  | 508.00                     | 39.84                            | 48.00                   | -8.16                  |
|                  | 530.00                     | 39.03                            | 48.00                   | -8.97                  |
|                  | 549.00                     | 38.40                            | 48.00                   | -9.60                  |
|                  | 604.00                     | 36.95                            | 48.00                   | -11.05                 |
|                  | 658.00                     | 34.45                            | 48.00                   | -13.55                 |
|                  | 966.00                     | 32.59                            | 48.00                   | -15.41                 |
|                  | 991.00                     | 32.55                            | 48.00                   | -15.45                 |
|                  | 1021.00                    | 32.56                            | 48.00                   | -15.44                 |

**Table 3 Power Line Conducted Emissions (Channel 20)**

| <i>Power</i>     | <i>Connected</i>           | <i>Emissions</i>                 | <i>FCC</i>              | <i>Class B</i>         |
|------------------|----------------------------|----------------------------------|-------------------------|------------------------|
| <i>Conductor</i> | <i>Frequency<br/>(KHz)</i> | <i>Peak Amplitude<br/>(dBuV)</i> | <i>Limit<br/>(dBuV)</i> | <i>Margin<br/>(dB)</i> |
| Line 1           | 461.00                     | 36.54                            | 48.00                   | -11.46                 |
|                  | 470.00                     | 37.02                            | 48.00                   | -10.98                 |
|                  | 489.00                     | 37.06                            | 48.00                   | -10.94                 |
|                  | 508.00                     | 37.67                            | 48.00                   | -10.33                 |
|                  | 524.00                     | 37.79                            | 48.00                   | -10.21                 |
|                  | 545.00                     | 38.15                            | 48.00                   | -9.85                  |
|                  | 571.00                     | 38.25                            | 48.00                   | -9.75                  |
|                  | 597.00                     | 37.84                            | 48.00                   | -10.16                 |
|                  | 641.00                     | 36.64                            | 48.00                   | -11.36                 |
|                  | 654.00                     | 35.95                            | 48.00                   | -12.05                 |
| LINE 2           | 461.00                     | 40.98                            | 48.00                   | -7.02                  |
|                  | 489.00                     | 40.39                            | 48.00                   | -7.61                  |
|                  | 505.00                     | 39.75                            | 48.00                   | -8.25                  |
|                  | 515.00                     | 39.77                            | 48.00                   | -8.23                  |
|                  | 530.00                     | 39.22                            | 48.00                   | -8.78                  |
|                  | 560.00                     | 38.40                            | 48.00                   | -9.60                  |
|                  | 590.00                     | 37.81                            | 48.00                   | -10.19                 |
|                  | 620.00                     | 36.51                            | 48.00                   | -11.49                 |
|                  | 654.00                     | 35.79                            | 48.00                   | -12.21                 |
|                  | 675.00                     | 34.67                            | 48.00                   | -13.33                 |

**Table 4 Power Line Conducted Emissions (Charging)**

| <i>Power</i>     | <i>Connected</i>           | <i>Emissions</i>                 | <i>FCC</i>              | <i>Class B</i>         |
|------------------|----------------------------|----------------------------------|-------------------------|------------------------|
| <i>Conductor</i> | <i>Frequency<br/>(KHz)</i> | <i>Peak Amplitude<br/>(dBuV)</i> | <i>Limit<br/>(dBuV)</i> | <i>Margin<br/>(dB)</i> |
| Line 1           | 464.00                     | 38.86                            | 48.00                   | -9.14                  |
|                  | 499.00                     | 40.88                            | 48.00                   | -7.12                  |
|                  | 515.00                     | 41.12                            | 48.00                   | -6.88                  |
|                  | 530.00                     | 40.91                            | 48.00                   | -7.09                  |
|                  | 560.00                     | 39.72                            | 48.00                   | -8.28                  |
|                  | 597.00                     | 37.63                            | 48.00                   | -10.37                 |
|                  | 628.00                     | 35.73                            | 48.00                   | -12.27                 |
|                  | 773.00                     | 33.87                            | 48.00                   | -14.13                 |
|                  | 813.00                     | 33.89                            | 48.00                   | -14.11                 |
|                  | 868.00                     | 33.80                            | 48.00                   | -14.20                 |
| LINE 2           | 455.00                     | 39.30                            | 48.00                   | -8.70                  |
|                  | 477.00                     | 39.55                            | 48.00                   | -8.45                  |
|                  | 489.00                     | 39.29                            | 48.00                   | -8.71                  |
|                  | 512.00                     | 38.58                            | 48.00                   | -9.42                  |
|                  | 553.00                     | 36.60                            | 48.00                   | -11.40                 |
|                  | 633.00                     | 34.96                            | 48.00                   | -13.04                 |
|                  | 645.00                     | 34.81                            | 48.00                   | -13.19                 |
|                  | 688.00                     | 35.99                            | 48.00                   | -12.01                 |
|                  | 739.00                     | 34.96                            | 48.00                   | -13.04                 |
|                  | 1021.00                    | 35.04                            | 48.00                   | -12.96                 |

**Table 5 Power Line Conducted Emissions (Linking)**

| <i>Power</i>     | <i>Connected</i>                 | <i>Emissions</i>                       | <i>FCC</i>                    | <i>Class B</i>               |
|------------------|----------------------------------|----------------------------------------|-------------------------------|------------------------------|
| <i>Conductor</i> | <i>Frequency</i><br><i>(KHz)</i> | <i>Peak Amplitude</i><br><i>(dBuV)</i> | <i>Limit</i><br><i>(dBuV)</i> | <i>Margin</i><br><i>(dB)</i> |
| Line 1           | 457.00                           | 35.85                                  | 48.00                         | -12.15                       |
|                  | 467.00                           | 36.68                                  | 48.00                         | -11.32                       |
|                  | 499.00                           | 38.92                                  | 48.00                         | -9.08                        |
|                  | 524.00                           | 39.52                                  | 48.00                         | -8.48                        |
|                  | 545.00                           | 39.65                                  | 48.00                         | -8.35                        |
|                  | 568.00                           | 39.36                                  | 48.00                         | -8.64                        |
|                  | 590.00                           | 38.94                                  | 48.00                         | -9.06                        |
|                  | 615.00                           | 38.08                                  | 48.00                         | -9.92                        |
|                  | 637.00                           | 37.79                                  | 48.00                         | -10.21                       |
|                  | 650.00                           | 37.06                                  | 48.00                         | -10.94                       |
| LINE 2           | 461.00                           | 40.56                                  | 48.00                         | -7.44                        |
|                  | 486.00                           | 40.04                                  | 48.00                         | -7.96                        |
|                  | 524.00                           | 39.12                                  | 48.00                         | -8.88                        |
|                  | 542.00                           | 38.36                                  | 48.00                         | -9.64                        |
|                  | 571.00                           | 36.99                                  | 48.00                         | -11.01                       |
|                  | 593.00                           | 36.04                                  | 48.00                         | -11.96                       |
|                  | 604.00                           | 35.45                                  | 48.00                         | -12.55                       |
|                  | 1156.00                          | 33.72                                  | 48.00                         | -14.28                       |
|                  | 1224.00                          | 35.17                                  | 48.00                         | -12.83                       |
|                  | 1274.00                          | 36.65                                  | 48.00                         | -11.35                       |

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

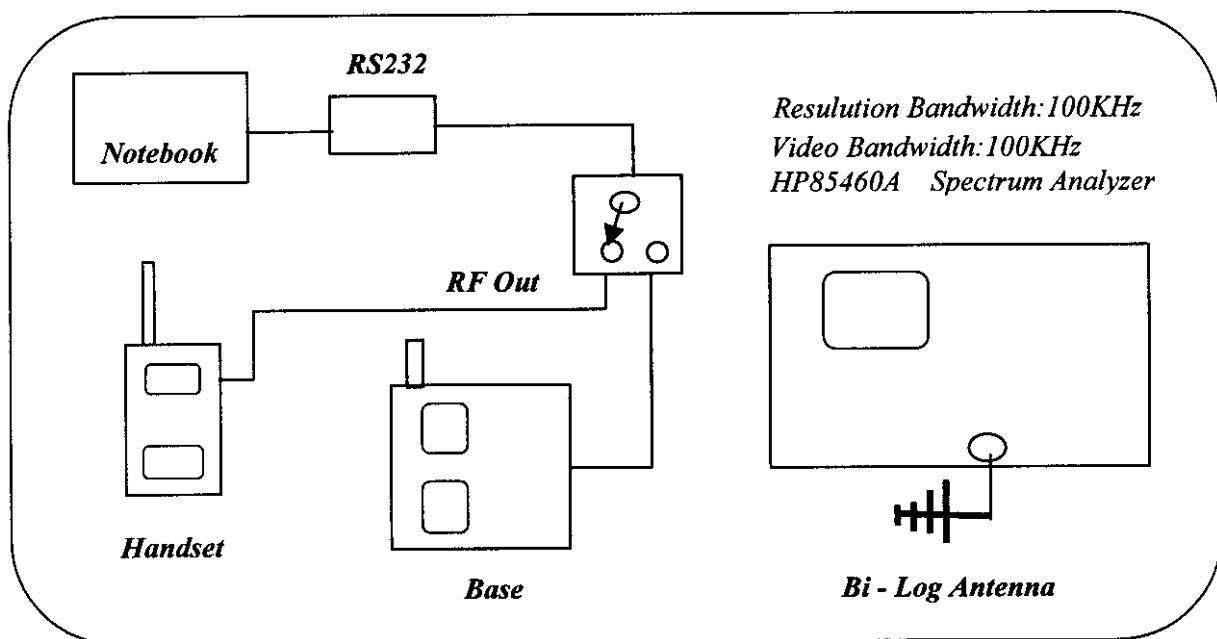
#### 3.1 Test Condition & Setup

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 – 6GHz EMI Receiver   | HP85460A  | 50.00           |
| M.E.            | 30MHz-1.5GHz Bi-Log Antenna | VULB 9160 | 50.00           |

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

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

Bandwidth of Base : 1.57 MHz

Bandwidth of Handset : 1.57 MHz

The min. 6 dB BW at least : 500 KHz

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

Bandwidth of Base : 1.55 MHz

Bandwidth of Handset : 1.57 MHz

The min. 6 dB BW at least : 500 KHz

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

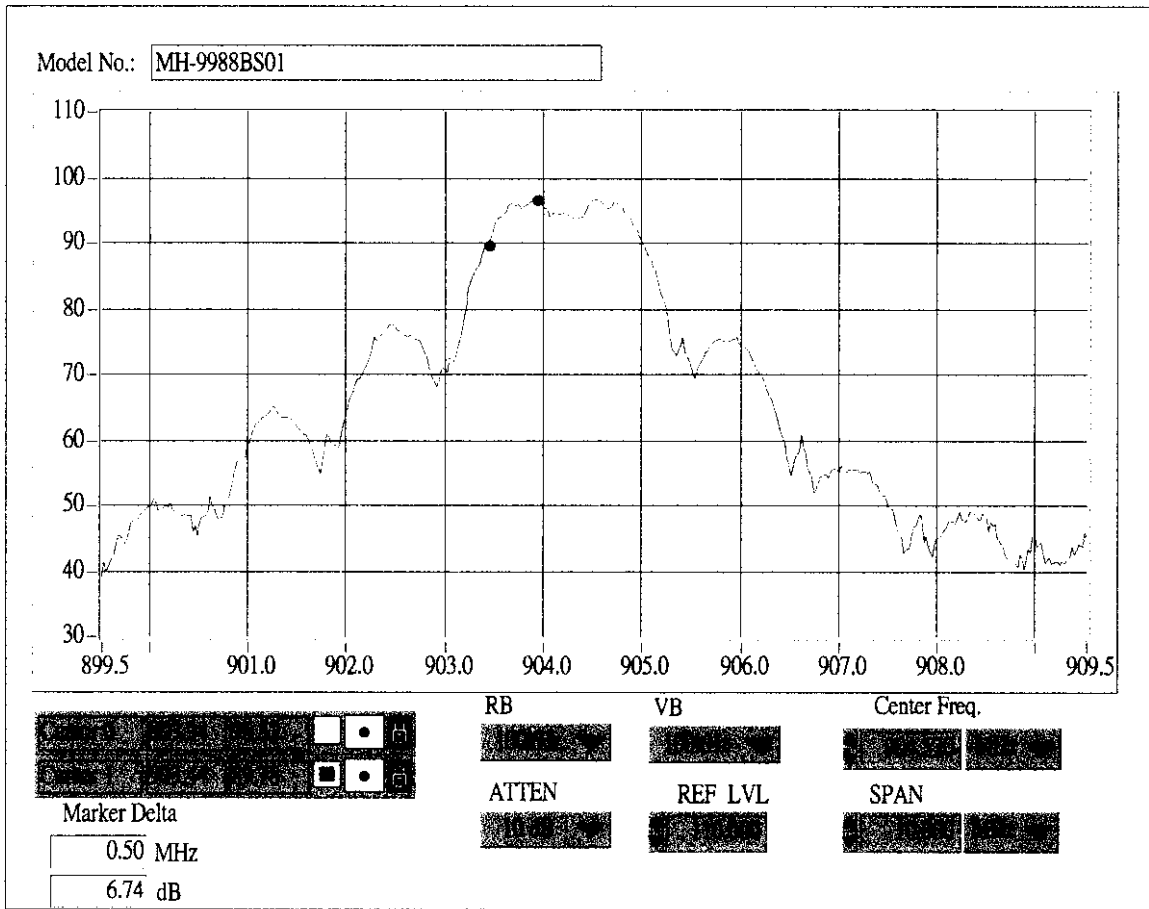
Bandwidth of Base : 1.57 MHz

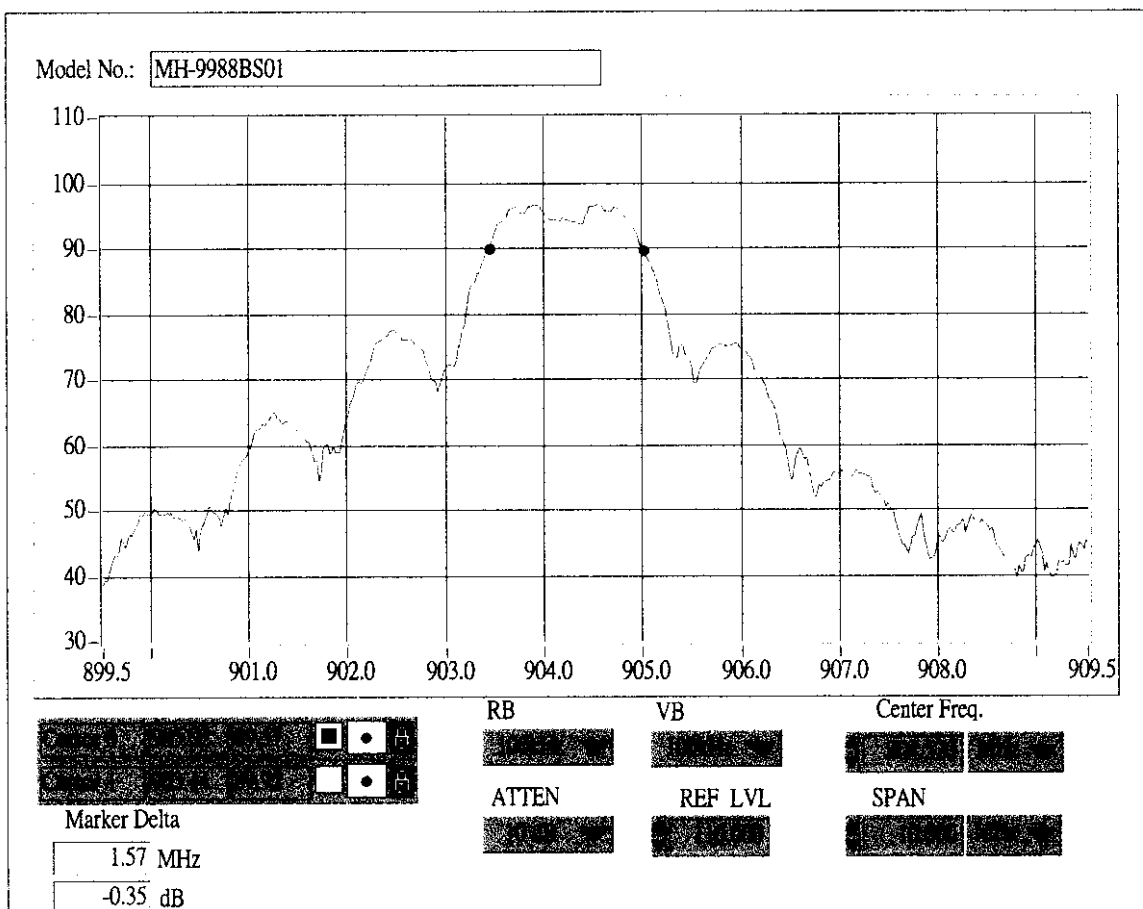
Bandwidth of Handset : 1.57 MHz

The min. 6 dB BW at least : 500 KHz

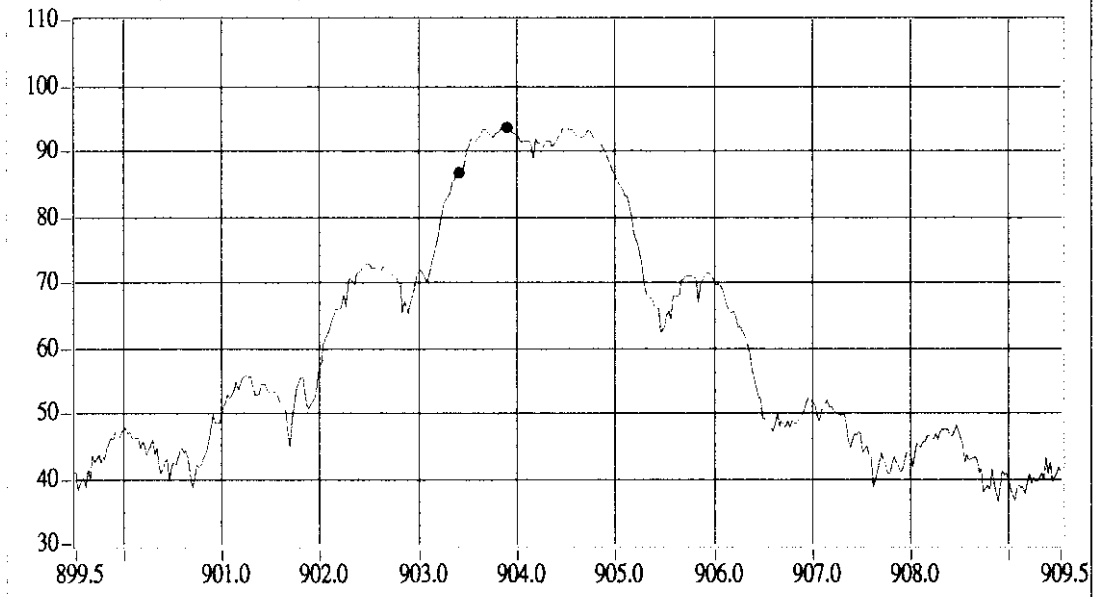
Note:

- 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.





Model No.: MH-9988HS01



Marker Delta

0.47 MHz

6.96 dB

RB

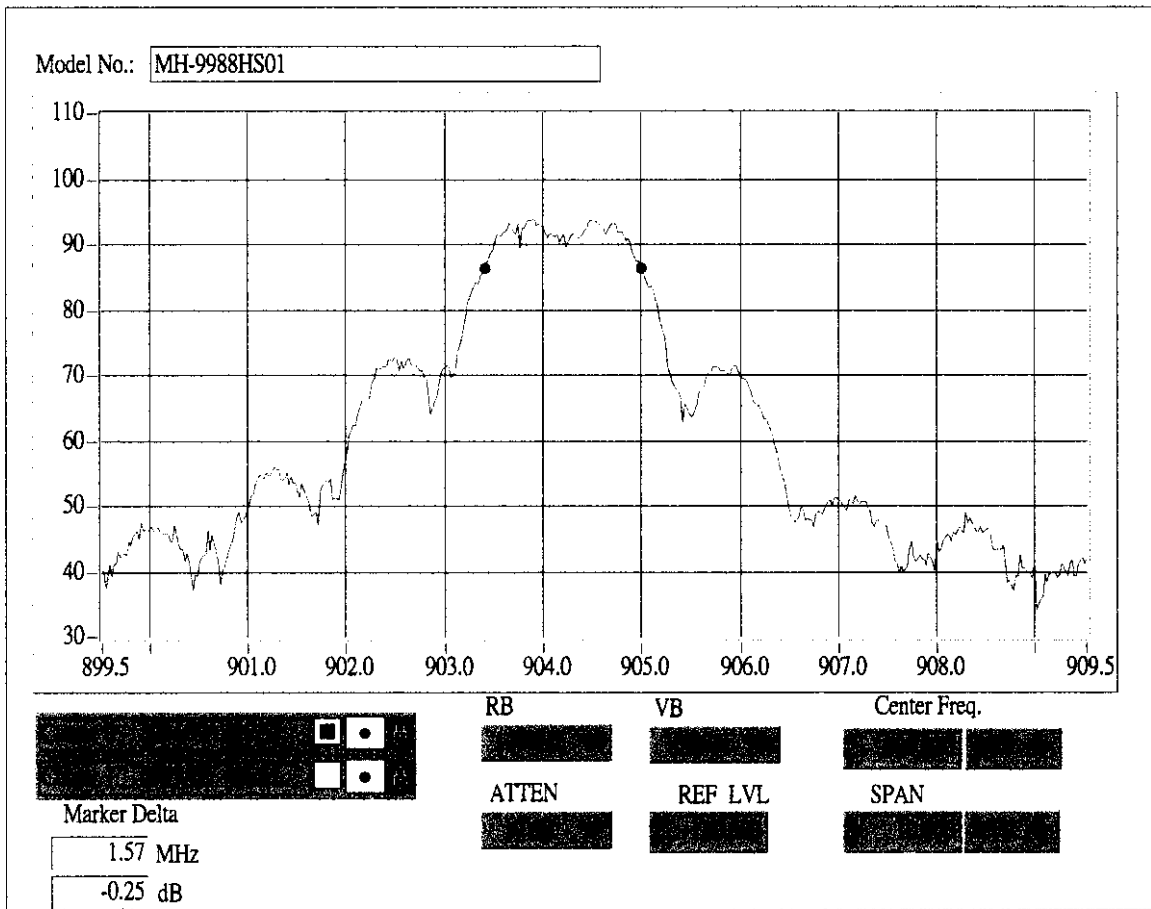
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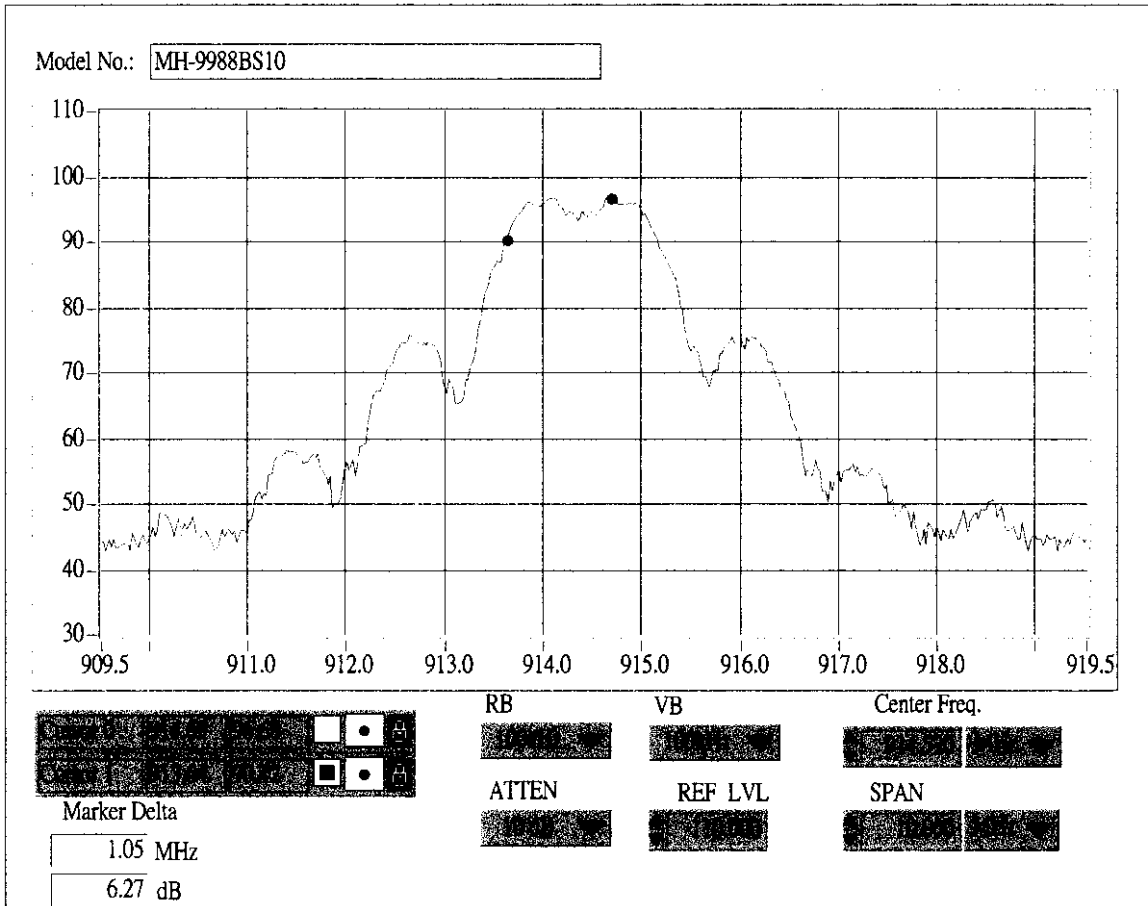
VB

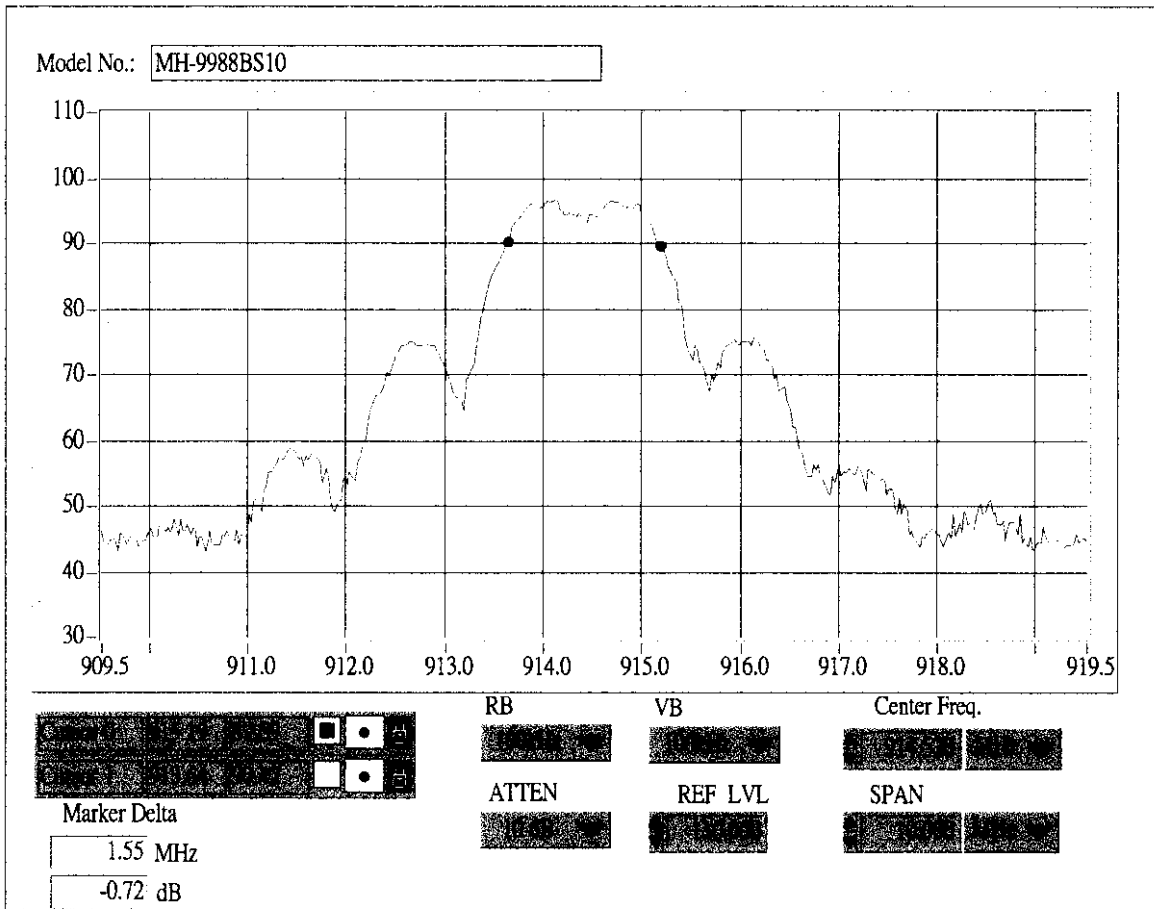
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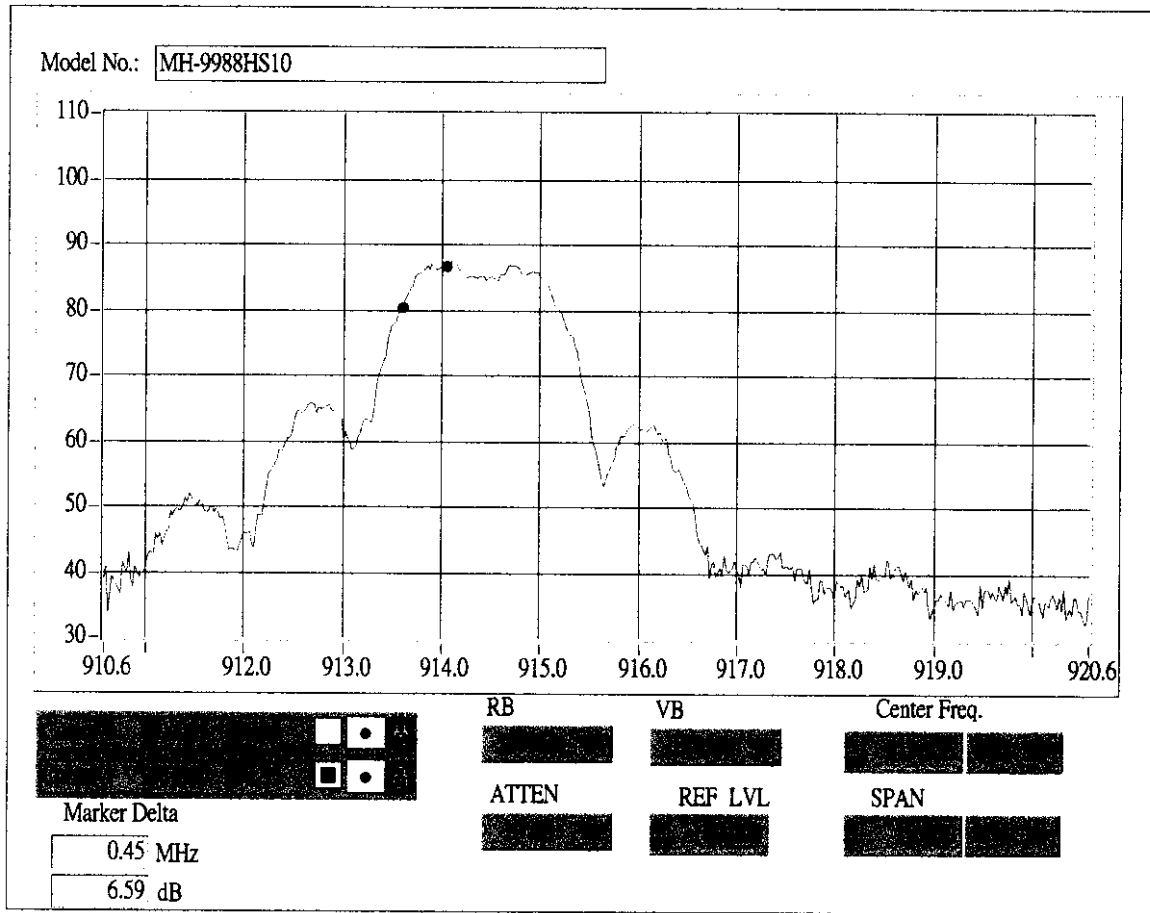
Center Freq.

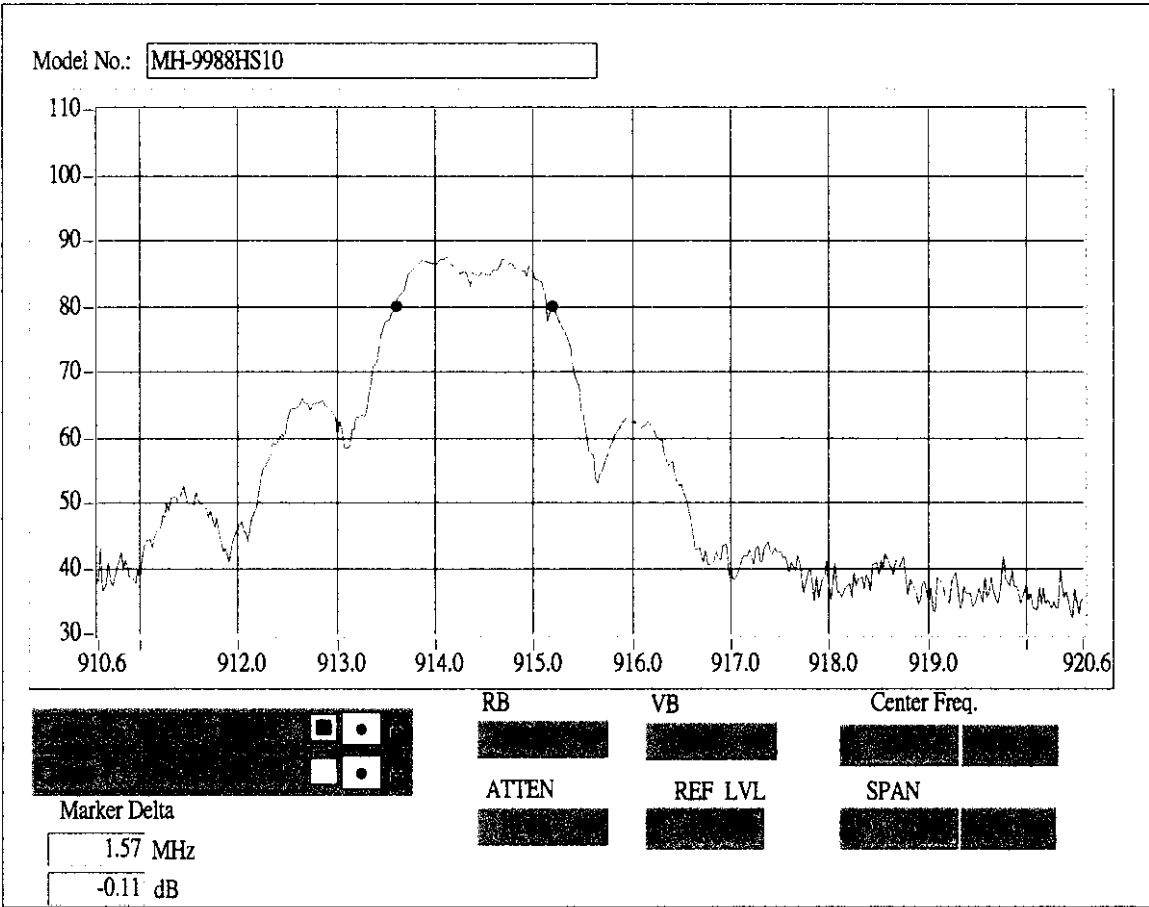
SPAN

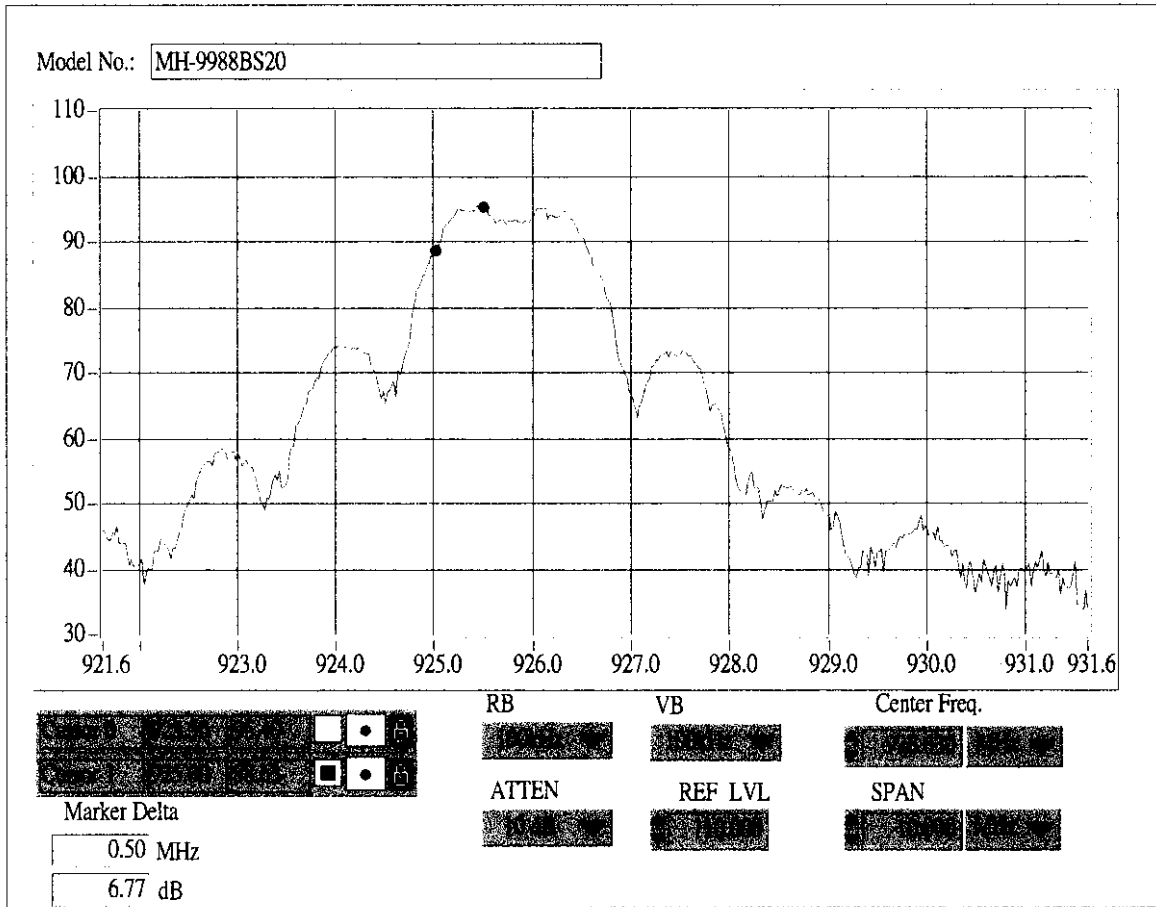




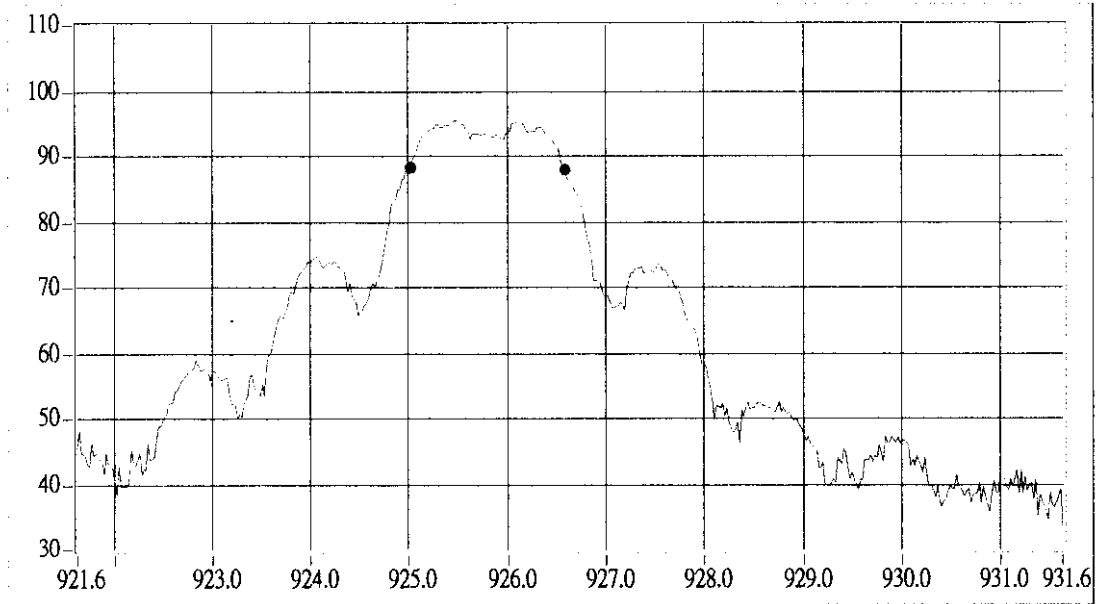








Model No.: MH-9988BS20



Marker Delta  
1.57 MHz  
-0.43 dB

RB



ATTEN



VB



REF LVL

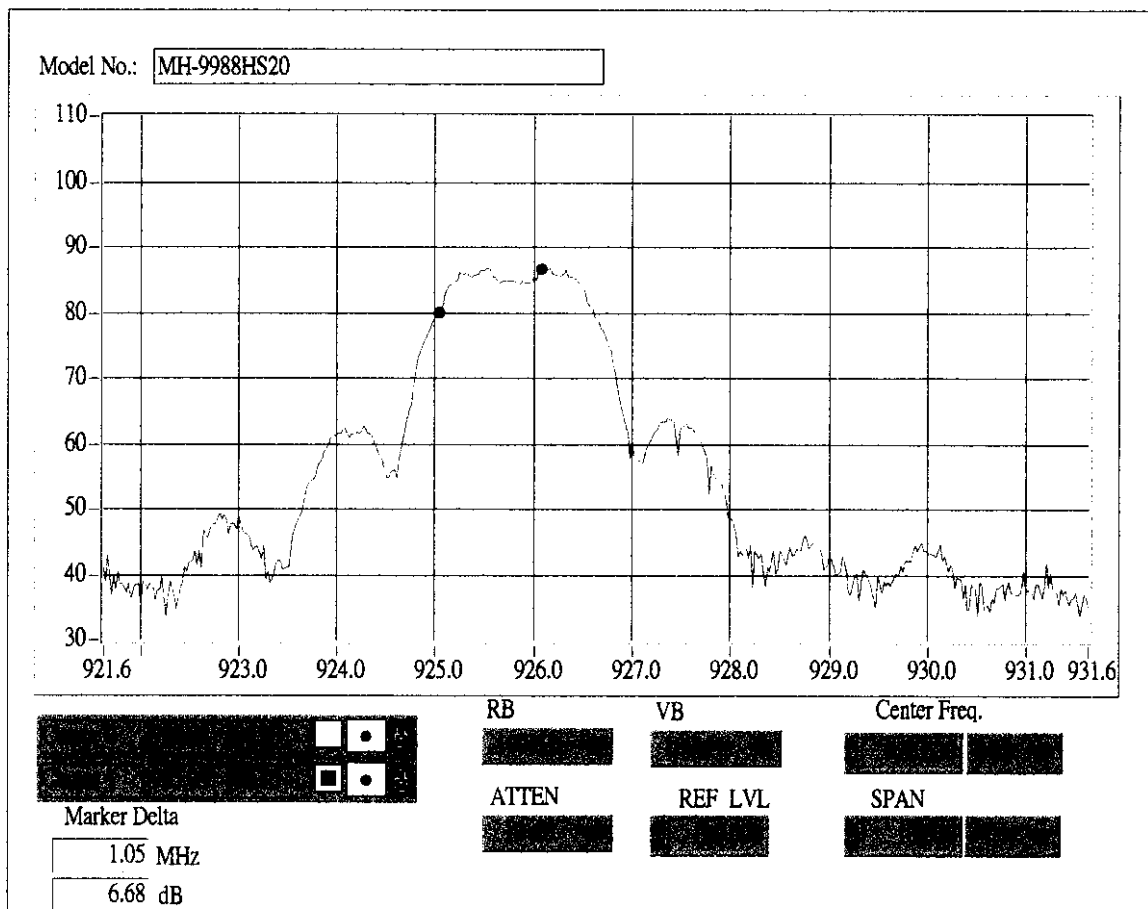


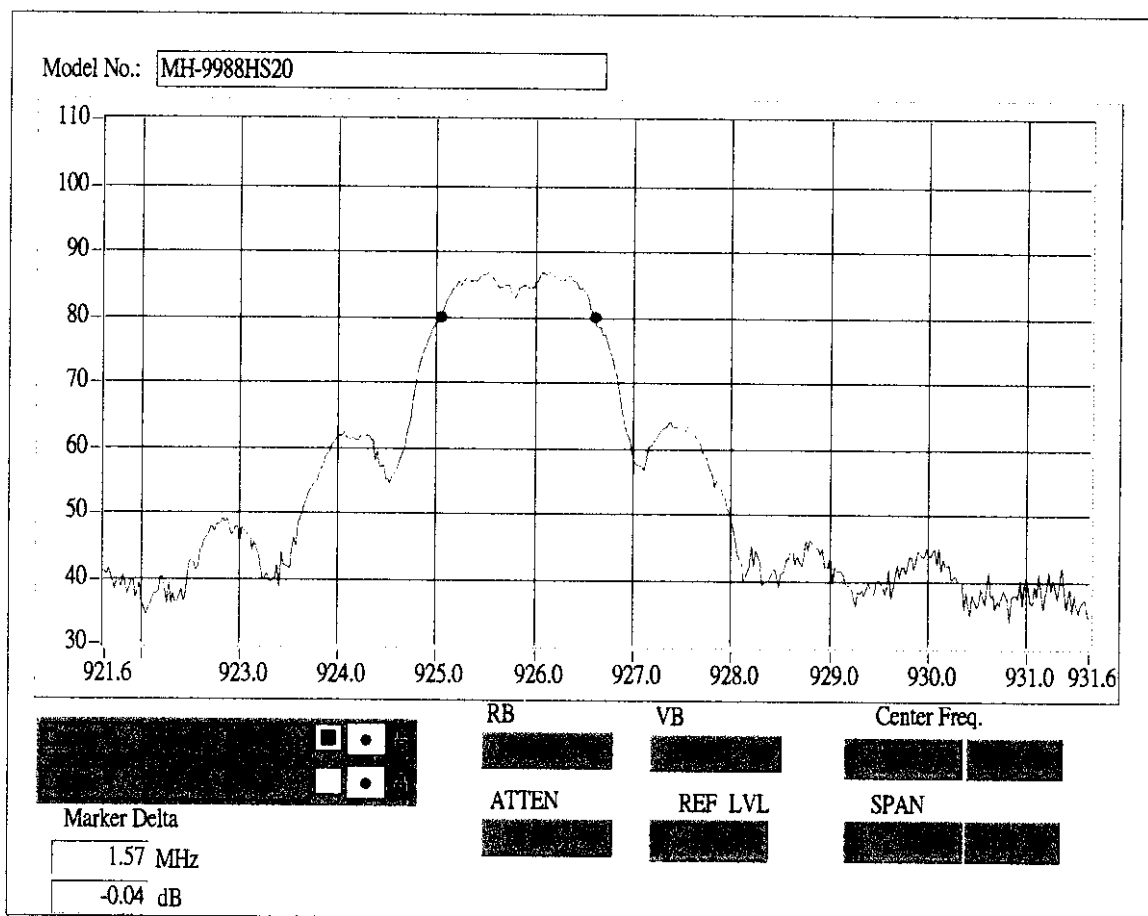
Center Freq.



SPAN







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

### **4.1 Test Condition & Setup**

The EUT was placed in a anechoic chamber and scanned at 3 meter 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 final 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, anechoic chamber. 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 85460A EMI Receiver, M.E.whole range Bi-Log antenna (Model No.: VULB9160) is used to measure frequency from 30 MHz to 1GHz.The final test is used the spectrum HP 85460A. 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 HP85460A 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**

| <u>Manufacturer</u> | <u>Device</u>               | <u>Model</u> | <u>Input Impedance</u> |
|---------------------|-----------------------------|--------------|------------------------|
| Hewlett Packard     | .9KHz – 6GHz EMI Receiver   | HP85460A     | 50.00                  |
| M.E.                | 30MHz-1.5GHz Bi-Log Antenna | VULB 9160    | 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. :** MH-9988

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

**Table 6 Open Field Fundamental Emissions**

| Channel    | Frequency<br>(MHz) | A.P.<br>(H/V) | A.H.<br>(M) | Table<br>(degree) | Amplitude<br>(dBuV/m) | CF<br>(dB) | Corrected<br>Amplitude<br>(dBuV/m) | E.R.P.(Peak) |         |
|------------|--------------------|---------------|-------------|-------------------|-----------------------|------------|------------------------------------|--------------|---------|
|            |                    |               |             |                   |                       |            |                                    | mW           | dBm     |
| Base 01    | 904.520            | H             | 1.00        | 241               | 127.99                | -27.96     | 100.03                             | 3.021        | 4.801   |
|            | 905.023            | V             | 1.00        | 16                | 131.73                | -27.96     | 103.77                             | 7.147        | 8.541   |
| Base 10    | 915.575            | H             | 1.00        | 310               | 127.46                | -28.04     | 99.42                              | 2.625        | 4.191   |
|            | 915.575            | V             | 1.00        | 11                | 127.97                | -28.04     | 99.93                              | 2.952        | 4.701   |
| Base 20    | 926.128            | H             | 1.00        | 120               | 127.71                | -28.21     | 99.50                              | 2.674        | 4.271   |
|            | 927.133            | V             | 1.00        | 96                | 131.20                | -28.21     | 102.99                             | 5.972        | 7.761   |
| Handset 01 | 905.023            | H             | 1.00        | 108               | 101.76                | -27.96     | 73.80                              | 0.007        | -21.429 |
|            | 904.520            | V             | 1.00        | 45                | 128.20                | -27.96     | 100.24                             | 3.170        | 5.011   |
| Handset 10 | 915.575            | H             | 1.00        | 177               | 122.00                | -28.04     | 93.96                              | 0.747        | -1.269  |
|            | 915.072            | V             | 1.00        | 280               | 127.57                | -28.04     | 99.53                              | 2.692        | 4.301   |
| Handset 20 | 927.133            | H             | 1.00        | 118               | 119.10                | -28.22     | 90.88                              | 0.367        | -4.349  |
|            | 926.128            | V             | 1.00        | 319               | 127.39                | -28.21     | 99.18                              | 2.484        | 3.951   |

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 = 100.03 dBuV/m

$$10^{(100.03/20)} \times 10^{-6} = 0.100346 \text{ V}$$

$$\text{E.R.P.} = (0.100346 \times 3)^2 / 30 = 3.021 \text{ mW} = 10 \times \log (3.021 \text{ mW}/1\text{mW}) = 4.801 \text{ dBm}$$

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

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

The EUT was placed in a anechoic chamber and scanned at 3 meter 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 final 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, anechoic chamber. 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 85460A EMI Receiver, M.E.whole range Bi-Log antenna (Model No.: VULB9160) is used to measure frequency from 30 MHz to 1GHz.The final test is used the spectrum HP 85460A 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 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 polarization.

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 , HP 85460A 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.

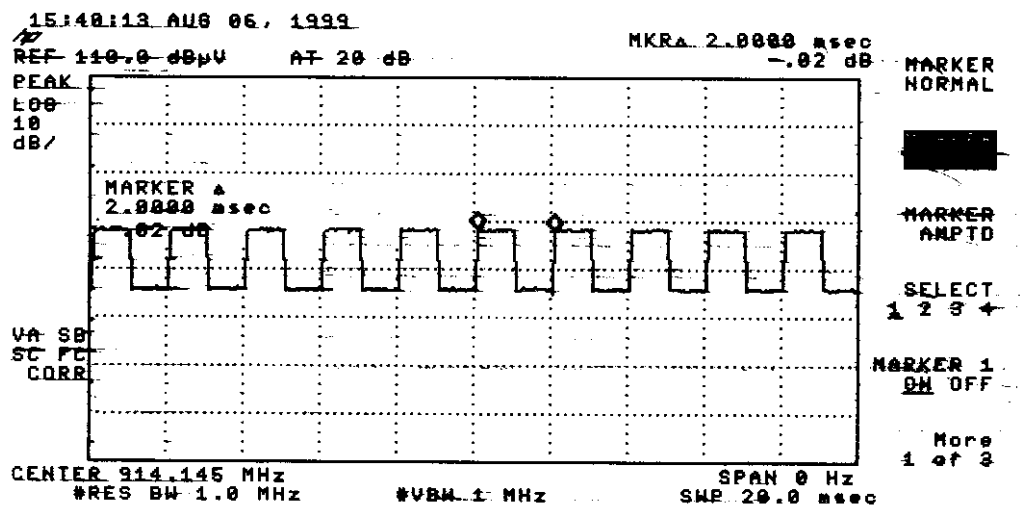
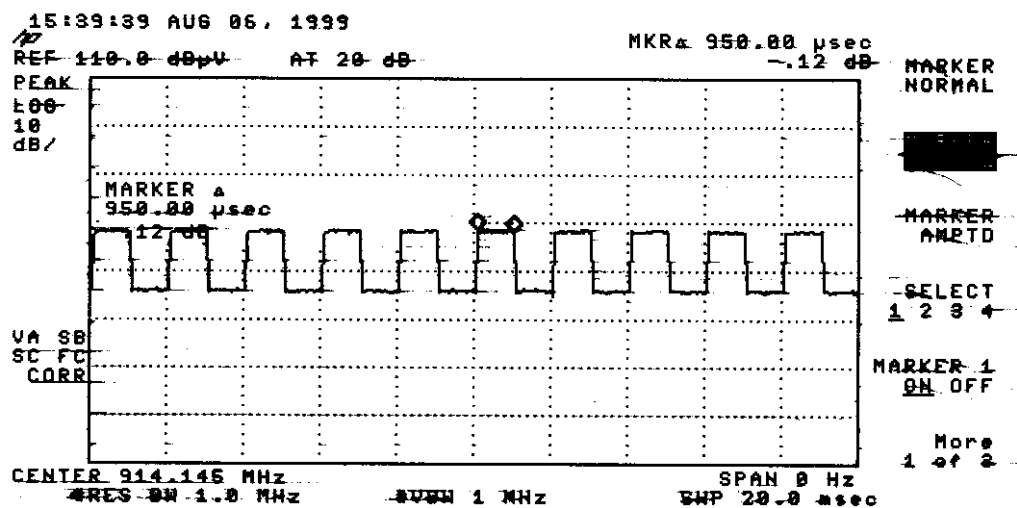
There are two test condition apply in this test item, the test procedure description as the following:

(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 (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**

$$Fla \text{ (dBuV/m)} = Flr \text{ (dBuV)} + \text{Correction Factors}$$

Fla : Actual Field Intensity

Flr : Reading of the Field Intensity

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

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

$$Fla \text{ (dBuV/m)} = Flr \text{ (dBuV)} + \text{Correction Factor} - \text{Duty Cycle}$$

Fla : Actual Field Intensity

Flr : Reading of the Field Intensity

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

The setting up procedure is recorded on Appendix A.

## 5.2 List of Test Instruments

| Manufacturer    | Device                           | Model     | Input Impedance |
|-----------------|----------------------------------|-----------|-----------------|
| Hewlett Packard | .9KHz – 6GHz EMI Receiver        | HP85460A  | 50.00           |
| M.E.            | 30MHz-1.5GHz Bi-Log Antenna      | VULB 9160 | 50.00           |
| Hewlett Packard | .50KHz – 22GHz Spectrum Analyzer | HP8592A   | 50.00           |
| EMCO            | 1G-18GMHz Double Ridge Antenna   | 3115.00   | 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.

$$\text{The duty cycle factor} = 20 \log ( T_{\text{duty}} / T_{\text{cycle}} ) = 20 \log ( 0.95000 / 2.00000 ) = - 6.466$$

#### 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. : MH-9988

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

**Table 7 Second Harmonic Attenuation**

| <b>Channel</b> | <b>Fundamental<br/>(MHz)</b> | <b>Fundamental<br/>(dBuV/m)</b> | <b>2<sup>nd</sup> Harmonic<br/>(GHz)</b> | <b>2<sup>nd</sup> Har.<br/>(dBuV/m)</b> | <b>Result<br/>(F/H dB)</b> | <b>Limit<br/>(dB)</b> | <b>Margin<br/>(dB)</b> |
|----------------|------------------------------|---------------------------------|------------------------------------------|-----------------------------------------|----------------------------|-----------------------|------------------------|
| B/S CH 01      | 905.023                      | 103.77                          | 1.812                                    | 57.45                                   | 46.32                      | 20.00                 | 26.32                  |
| B/S CH 10      | 915.575                      | 99.93                           | 1.832                                    | 50.47                                   | 49.46                      | 20.00                 | 29.46                  |
| B/S CH 20      | 927.133                      | 102.99                          | 1.855                                    | 59.68                                   | 43.31                      | 20.00                 | 23.31                  |
| H/S CH 01      | 904.520                      | 100.24                          | 1.812                                    | 54.29                                   | 45.95                      | 20.00                 | 25.95                  |
| H/S CH 10      | 915.072                      | 99.53                           | 1.832                                    | 54.01                                   | 45.52                      | 20.00                 | 25.52                  |
| H/S CH 20      | 926.128                      | 99.18                           | 1.857                                    | 52.55                                   | 46.63                      | 20.00                 | 26.63                  |

Note:

1. The data in the above table are summarize the following attachment spectrum analyzer hard copy.
2. Result = Fundamental – 2<sup>nd</sup> 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 from the EUT at various antenna heights, antenna polarizations, EUT orientation, etc. are recorded on the following.

**Model No.** : MH-9988

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

**Table 8 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 1, Base Horizontal]**

| <i>Radiated Emission</i> |                           |                   |                    | <i>Correction Factors</i> | <i>Corrected Amplitude</i> | <i>FCC Class B ( 3 m )</i> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|----------------------------|----------------------------|--------------------|
| <i>Frequency (MHz)</i>   | <i>Amplitude (dBuV/m)</i> | <i>Ant.H. (m)</i> | <i>Table ( ° )</i> |                           |                            | <i>Limit (dBuV/m)</i>      | <i>Margin (dB)</i> |
| 403.740                  | 60.38                     | 1.00              | 18                 | -18.22                    | 42.16                      | 46.00                      | -3.84              |
| 422.850                  | 59.84                     | 1.00              | 104                | -18.70                    | 41.14                      | 46.00                      | -4.86              |
| 489.637                  | 62.74                     | 1.00              | 307                | -20.40                    | 42.34                      | 46.00                      | -3.66              |
| 509.267                  | 62.63                     | 2.00              | 227                | -20.64                    | 41.99                      | 46.00                      | -4.01              |
| 768.840                  | 69.34                     | 1.00              | 135                | -25.66                    | 43.68                      | 46.00                      | -2.32              |
| 787.935                  | 70.02                     | 1.00              | 256                | -26.28                    | 43.74                      | 46.00                      | -2.26              |
| 806.533                  | 71.40                     | 2.00              | 62                 | -26.63                    | 44.77                      | 46.00                      | -1.23              |
| 816.080                  | 70.82                     | 1.00              | 77                 | -26.54                    | 44.28                      | 46.00                      | -1.72              |
| 825.628                  | 71.24                     | 1.00              | 238                | -26.60                    | 44.64                      | 46.00                      | -1.36              |
| ***                      |                           |                   |                    |                           |                            |                            |                    |
|                          |                           |                   |                    |                           |                            |                            |                    |
|                          |                           |                   |                    |                           |                            |                            |                    |

Note:

1. Margin = Corrected - Limit.

2. Peak Amplitude + Correction Factors = Corrected

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

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b><br>( dB ) | <b>Duty Cycle</b><br>( dB ) | <b>Corrected Amplitude</b><br>(dBuV/m) | <b>FCC Class B ( 3 M )</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|-------------------------------------|-----------------------------|----------------------------------------|----------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( " )</b> |                                     |                             |                                        | <b>Limit (dBuV/m)</b>      | <b>Margin (dB)</b> |
| 2.68                     | 49.58                     | 1.00              | 88                 | -6.84                               | -6.46                       | 36.28                                  | 54                         | -17.72             |
| 3.48                     | 54.42                     | 1.00              | 325                | -5.64                               | -6.46                       | 42.32                                  | 54                         | -11.68             |
| 3.59                     | 50.59                     | 1.00              | 120                | -5.64                               | -6.46                       | 38.49                                  | 54                         | -15.51             |
| 4.50                     | 45.87                     | 1.00              | 109                | 3.91                                | -6.46                       | 43.32                                  | 54                         | -10.68             |
| 5.32                     | 29.90                     | 1.00              | 338                | 9.72                                | -6.46                       | 33.16                                  | 54                         | -20.84             |
| 5.41                     | 41.56                     | 1.00              | 68                 | 9.72                                | -6.46                       | 44.82                                  | 54                         | -9.18              |
| 6.31                     | 40.23                     | 1.00              | 191                | 9.72                                | -6.46                       | 43.49                                  | 54                         | -10.51             |
| ***                      |                           |                   |                    |                                     |                             |                                        |                            |                    |
|                          |                           |                   |                    |                                     |                             |                                        |                            |                    |
|                          |                           |                   |                    |                                     |                             |                                        |                            |                    |

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<br>(dB) | Corrected Amplitude<br>(dBuV/m) | FCC Class B<br>(3 M) |                |
|--------------------|-----------------------|---------------|----------------|----------------------------|---------------------------------|----------------------|----------------|
| Frequency<br>(MHz) | Amplitude<br>(dBuV/m) | Ant.H.<br>(m) | Table<br>( ° ) |                            |                                 | Limit<br>(dBuV/m)    | Margin<br>(dB) |
| 489.637            | 63.27                 | 1.00          | 171            | -20.40                     | 42.87                           | 46.00                | -3.13          |
| 509.267            | 64.68                 | 2.00          | 107            | -20.64                     | 44.04                           | 46.00                | -1.96          |
| 624.622            | 64.48                 | 1.00          | 263            | -23.20                     | 41.28                           | 46.00                | -4.72          |
| 788.437            | 69.70                 | 1.00          | 98             | -26.30                     | 43.40                           | 46.00                | -2.60          |
| ***                |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |

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

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Duty Cycle</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|-------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                   |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 2.68                     | 52.96                     | 1.00              | 230                | -6.84                     | -6.46             | 39.66                      | 54                       | -14.34             |
| 3.37                     | 44.59                     | 1.00              | 121                | -5.64                     | -6.46             | 32.49                      | 54                       | -21.51             |
| 3.59                     | 53.59                     | 1.00              | 35                 | -5.64                     | -6.46             | 41.49                      | 54                       | -12.51             |
| 4.50                     | 46.71                     | 1.00              | 217                | 3.91                      | -6.46             | 44.16                      | 54                       | -9.84              |
| 5.41                     | 37.73                     | 1.00              | 155                | 9.72                      | -6.46             | 40.99                      | 54                       | -13.01             |
| 6.31                     | 37.06                     | 1.00              | 200                | 9.72                      | -6.46             | 40.32                      | 54                       | -13.68             |
| ***                      |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |

Table 12 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 10, Base Horizontal]

| Radiated Emission  |                       |               |                | Correction Factors<br>(dB) | Corrected Amplitude<br>(dBuV/m) | FCC Class B<br>(3 M) |                |
|--------------------|-----------------------|---------------|----------------|----------------------------|---------------------------------|----------------------|----------------|
| Frequency<br>(MHz) | Amplitude<br>(dBuV/m) | Ant.H.<br>(m) | Table<br>( ° ) |                            |                                 | Limit<br>(dBuV/m)    | Margin<br>(dB) |
| 403.740            | 59.57                 | 1.00          | 11             | -18.22                     | 41.35                           | 46.00                | -4.65          |
| 470.385            | 61.51                 | 2.00          | 189            | -20.05                     | 41.46                           | 46.00                | -4.54          |
| 490.015            | 61.87                 | 1.00          | 205            | -20.41                     | 41.46                           | 46.00                | -4.54          |
| 787.935            | 71.18                 | 1.00          | 223            | -26.28                     | 44.90                           | 46.00                | -1.10          |
| 806.533            | 71.26                 | 1.00          | 15             | -26.63                     | 44.63                           | 46.00                | -1.37          |
| 893.465            | 69.57                 | 2.00          | 248            | -27.74                     | 41.83                           | 46.00                | -4.17          |
| 895.977            | 69.25                 | 1.00          | 139            | -27.80                     | 41.45                           | 46.00                | -4.55          |
| ***                |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |

**Table 13 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 10, Base Horizontal]**

| Radiated Emission  |                       |               |                | Correction Factors<br>( dB ) | Duty Cycle<br>( dB ) | Corrected Amplitude<br>(dBuV/m) | FCC Class B<br>( 3 M ) |                |
|--------------------|-----------------------|---------------|----------------|------------------------------|----------------------|---------------------------------|------------------------|----------------|
| Frequency<br>(GHz) | Amplitude<br>(dBuV/m) | Ant.H.<br>(m) | Table<br>( ° ) |                              |                      |                                 | Limit<br>(dBuV/m)      | Margin<br>(dB) |
| 2.71               | 48.62                 | 1.00          | 52             | -6.84                        | -6.46                | 35.32                           | 54                     | -18.68         |
| 3.65               | 53.09                 | 1.00          | 120            | -5.64                        | -6.46                | 40.99                           | 54                     | -13.01         |
| 4.55               | 47.04                 | 1.00          | 335            | 3.91                         | -6.46                | 44.49                           | 54                     | -9.51          |
| 5.46               | 42.40                 | 1.00          | 327            | 9.72                         | -6.46                | 45.66                           | 54                     | -8.34          |
| 6.37               | 37.90                 | 1.00          | 85             | 9.72                         | -6.46                | 41.16                           | 54                     | -12.84         |
| 7.30               | 34.06                 | 1.00          | 320            | 9.72                         | -6.46                | 37.32                           | 54                     | -16.68         |
| ***                |                       |               |                |                              |                      |                                 |                        |                |
|                    |                       |               |                |                              |                      |                                 |                        |                |
|                    |                       |               |                |                              |                      |                                 |                        |                |
|                    |                       |               |                |                              |                      |                                 |                        |                |

**Table 14 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 10, Base Vertical]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (MHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 470.385                  | 61.01                     | 1.00              | 135                | -20.05                    | 40.96                      | 46.00                    | -5.04              |
| 489.637                  | 63.27                     | 1.00              | 85                 | -20.40                    | 42.87                      | 46.00                    | -3.13              |
| 624.622                  | 64.28                     | 1.00              | 154                | -23.20                    | 41.08                      | 46.00                    | -4.92              |
| 934.168                  | 71.51                     | 2.00              | 199                | -28.35                    | 43.16                      | 46.00                    | -2.84              |
| ***                      |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |

**Table 15 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 10, Base Vertical]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Duty Cycle</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|-------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                   |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 2.71                     | 51.96                     | 1.00              | 252                | -6.84                     | -6.46             | 38.66                      | 54                       | -15.34             |
| 3.65                     | 53.92                     | 1.00              | 72                 | -5.64                     | -6.46             | 41.82                      | 54                       | -12.18             |
| 4.55                     | 45.71                     | 1.00              | 235                | 3.91                      | -6.46             | 43.16                      | 54                       | -10.84             |
| 5.46                     | 38.06                     | 1.00              | 127                | 9.72                      | -6.46             | 41.32                      | 54                       | -12.68             |
| 6.37                     | 35.23                     | 1.00              | 77                 | 9.72                      | -6.46             | 38.49                      | 54                       | -15.51             |
| 7.30                     | 32.90                     | 1.00              | 113                | 9.72                      | -6.46             | 36.16                      | 54                       | -17.84             |
| ***                      |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |

Table 16 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 20, Base Horizontal]

| Radiated Emission  |                       |               |                | Correction Factors<br>(dB) | Corrected Amplitude<br>(dBuV/m) | FCC Class B<br>(3 M) |                |
|--------------------|-----------------------|---------------|----------------|----------------------------|---------------------------------|----------------------|----------------|
| Frequency<br>(MHz) | Amplitude<br>(dBuV/m) | Ant.H.<br>(m) | Table<br>( ° ) |                            |                                 | Limit<br>(dBuV/m)    | Margin<br>(dB) |
| 403.740            | 60.00                 | 1.00          | 33             | -18.22                     | 41.78                           | 46.00                | -4.22          |
| 490.015            | 63.19                 | 1.00          | 147            | -20.41                     | 42.78                           | 46.00                | -3.22          |
| 806.533            | 71.43                 | 1.00          | 97             | -26.63                     | 44.80                           | 46.00                | -1.20          |
| 826.130            | 70.89                 | 1.00          | 166            | -26.61                     | 44.28                           | 46.00                | -1.72          |
| ***                |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |

**Table 17 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 20, Base Horizontal]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Duty Cycle</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|-------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                   |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 2.77                     | 50.12                     | 1.00              | 82                 | -6.84                     | -6.46             | 36.82                      | 54                       | -17.18             |
| 3.48                     | 46.76                     | 1.00              | 172                | -5.64                     | -6.46             | 34.66                      | 54                       | -19.34             |
| 3.67                     | 55.09                     | 1.00              | 203                | -5.64                     | -6.46             | 42.99                      | 54                       | -11.01             |
| 4.61                     | 46.21                     | 1.00              | 188                | 3.91                      | -6.46             | 43.66                      | 54                       | -10.34             |
| 5.54                     | 44.73                     | 1.00              | 77                 | 9.72                      | -6.46             | 47.99                      | 54                       | -6.01              |
| 6.84                     | 38.06                     | 1.00              | 13                 | 9.72                      | -6.46             | 41.32                      | 54                       | -12.68             |
| 7.39                     | 39.06                     | 1.00              | 333                | 9.72                      | -6.46             | 42.32                      | 54                       | -11.68             |
| ***                      |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |

**Table 18 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 20, Base Vertical]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (MHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 490.015                  | 63.71                     | 1.00              | 295                | -20.41                    | 43.30                      | 46.00                    | -2.70              |
| 586.278                  | 63.87                     | 1.00              | 25                 | -22.76                    | 41.11                      | 46.00                    | -4.89              |
| 605.025                  | 64.40                     | 1.00              | 140                | -23.26                    | 41.14                      | 46.00                    | -4.86              |
| 787.935                  | 69.50                     | 1.00              | 205                | -26.28                    | 43.22                      | 46.00                    | -2.78              |
| 826.130                  | 68.86                     | 1.00              | 89                 | -26.61                    | 42.25                      | 46.00                    | -3.75              |
| 893.465                  | 71.19                     | 1.00              | 336                | -27.74                    | 43.45                      | 46.00                    | -2.55              |
| ***                      |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |

**Table 19 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 20, Base Vertical]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Duty Cycle</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|-------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                   |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 2.77                     | 52.46                     | 1.00              | 282                | -6.84                     | -6.46             | 39.16                      | 54                       | -14.84             |
| 3.67                     | 55.42                     | 1.00              | 170                | -5.64                     | -6.46             | 43.32                      | 54                       | -10.68             |
| 4.61                     | 47.87                     | 1.00              | 320                | 3.91                      | -6.46             | 45.32                      | 54                       | -8.68              |
| 5.54                     | 38.73                     | 1.00              | 68                 | 9.72                      | -6.46             | 41.99                      | 54                       | -12.01             |
| 6.84                     | 37.90                     | 1.00              | 227                | 9.72                      | -6.46             | 41.16                      | 54                       | -12.84             |
| 7.39                     | 34.90                     | 1.00              | 101                | 9.72                      | -6.46             | 38.16                      | 54                       | -15.84             |
| ***                      |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |

**Table 20 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 1, Handset Horizontal]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (MHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 105.927                  | 52.28                     | 1.00              | 176                | -11.75                    | 40.53                      | 43.50                    | -2.97              |
| 115.608                  | 49.64                     | 1.00              | 109                | -12.81                    | 36.83                      | 43.50                    | -6.67              |
| 153.398                  | 55.01                     | 1.00              | 250                | -14.93                    | 40.08                      | 43.50                    | -3.42              |
| 163.213                  | 52.12                     | 1.00              | 134                | -14.86                    | 37.26                      | 43.50                    | -6.24              |
| 203.785                  | 51.03                     | 1.00              | 218                | -12.69                    | 38.34                      | 46.00                    | -7.66              |
| ***                      |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |

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

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b><br><br>( dB ) | <b>Duty Cycle</b><br><br>( dB ) | <b>Corrected Amplitude</b><br><br>(dBuV/m) | <b>FCC Class B ( 3 M )</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|-----------------------------------------|---------------------------------|--------------------------------------------|----------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                                         |                                 |                                            | <b>Limit (dBuV/m)</b>      | <b>Margin (dB)</b> |
| 2.68                     | 59.62                     | 1.00              | 223                | -6.84                                   | -6.46                           | 46.32                                      | 54                         | -7.68              |
| 3.59                     | 50.76                     | 1.00              | 25                 | -5.64                                   | -6.46                           | 38.66                                      | 54                         | -15.34             |
| 4.50                     | 46.54                     | 1.00              | 220                | 3.91                                    | -6.46                           | 43.99                                      | 54                         | -10.01             |
| 5.41                     | 38.40                     | 1.00              | 179                | 9.72                                    | -6.46                           | 41.66                                      | 54                         | -12.34             |
| 6.31                     | 35.90                     | 1.00              | 318                | 9.72                                    | -6.46                           | 39.16                                      | 54                         | -14.84             |
| 8.13                     | 33.23                     | 1.00              | 108                | 9.72                                    | -6.46                           | 36.49                                      | 54                         | -17.51             |
| 9.94                     | 32.56                     | 1.00              | 97                 | 9.72                                    | -6.46                           | 35.82                                      | 54                         | -18.18             |
| ***                      |                           |                   |                    |                                         |                                 |                                            |                            |                    |
|                          |                           |                   |                    |                                         |                                 |                                            |                            |                    |
|                          |                           |                   |                    |                                         |                                 |                                            |                            |                    |

**Table 22 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 1, Handset Vertical]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (MHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 105.927                  | 46.98                     | 1.00              | 76                 | -11.75                    | 35.23                      | 43.50                    | -8.27              |
| 153.775                  | 49.02                     | 1.00              | 169                | -14.96                    | 34.06                      | 43.50                    | -9.44              |
| 173.028                  | 49.02                     | 1.00              | 240                | -13.84                    | 35.18                      | 43.50                    | -8.32              |
| 211.532                  | 45.76                     | 1.00              | 135                | -11.57                    | 34.19                      | 43.50                    | -9.31              |
| 432.600                  | 62.72                     | 1.00              | 21                 | -19.02                    | 43.70                      | 46.00                    | -2.30              |
| 787.935                  | 71.03                     | 1.00              | 208                | -26.28                    | 44.75                      | 46.00                    | -1.25              |
| 895.475                  | 71.64                     | 1.00              | 279                | -27.79                    | 43.85                      | 46.00                    | -2.15              |
| ***                      |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |

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

| Radiated Emission  |                       |               |                | Correction Factors<br>( dB ) | Duty Cycle<br>( dB ) | Corrected Amplitude<br>(dBuV/m) | FCC Class B<br>( 3 M ) |                |
|--------------------|-----------------------|---------------|----------------|------------------------------|----------------------|---------------------------------|------------------------|----------------|
| Frequency<br>(GHz) | Amplitude<br>(dBuV/m) | Ant.H.<br>(m) | Table<br>( ° ) |                              |                      |                                 | Limit<br>(dBuV/m)      | Margin<br>(dB) |
| 2.71               | 60.46                 | 1.00          | 23             | -6.84                        | -6.46                | 47.16                           | 54                     | -6.84          |
| 3.59               | 50.76                 | 1.00          | 215            | -5.64                        | -6.46                | 38.66                           | 54                     | -15.34         |
| 4.50               | 54.87                 | 1.00          | 331            | 3.91                         | -6.46                | 52.32                           | 54                     | -1.68          |
| 5.41               | 41.23                 | 1.00          | 174            | 9.72                         | -6.46                | 44.49                           | 54                     | -9.51          |
| 6.31               | 40.73                 | 1.00          | 55             | 9.72                         | -6.46                | 43.99                           | 54                     | -10.01         |
| 7.22               | 34.06                 | 1.00          | 78             | 9.72                         | -6.46                | 37.32                           | 54                     | -16.68         |
| 8.13               | 33.56                 | 1.00          | 297            | 9.72                         | -6.46                | 36.82                           | 54                     | -17.18         |
| ***                |                       |               |                |                              |                      |                                 |                        |                |
|                    |                       |               |                |                              |                      |                                 |                        |                |
|                    |                       |               |                |                              |                      |                                 |                        |                |
|                    |                       |               |                |                              |                      |                                 |                        |                |

**Table 24 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 10, Handset Horizontal]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (MHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 105.927                  | 48.34                     | 2.00              | 311                | -11.75                    | 36.59                      | 46.00                    | -9.41              |
| 115.608                  | 48.24                     | 2.00              | 174                | -12.81                    | 35.43                      | 46.00                    | -10.57             |
| 134.665                  | 47.20                     | 2.00              | 275                | -13.69                    | 33.51                      | 46.00                    | -12.49             |
| 153.398                  | 54.81                     | 1.00              | 69                 | -14.93                    | 39.88                      | 46.00                    | -6.12              |
| 163.213                  | 56.58                     | 1.00              | 328                | -14.86                    | 41.72                      | 46.00                    | -4.28              |
| 173.028                  | 51.46                     | 1.00              | 86                 | -13.84                    | 37.62                      | 46.00                    | -8.38              |
| 230.785                  | 49.93                     | 1.00              | 207                | -12.69                    | 37.24                      | 46.00                    | -8.76              |
| ***                      |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |

**Table 25 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 10, Handset Horizontal]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b><br><br>( dB ) | <b>Duty Cycle</b><br><br>( dB ) | <b>Corrected Amplitude</b><br><br>(dBuV/m) | <b>FCC Class B ( 3 M )</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|-----------------------------------------|---------------------------------|--------------------------------------------|----------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                                         |                                 |                                            | <b>Limit (dBuV/m)</b>      | <b>Margin (dB)</b> |
| 2.71                     | 59.29                     | 1.00              | 300                | -6.84                                   | -6.46                           | 45.99                                      | 54                         | -8.01              |
| 3.65                     | 53.59                     | 1.00              | 187                | -5.64                                   | -6.46                           | 41.49                                      | 54                         | -12.51             |
| 4.55                     | 48.04                     | 1.00              | 253                | 3.91                                    | -6.46                           | 45.49                                      | 54                         | -8.51              |
| 5.46                     | 43.73                     | 1.00              | 72                 | 9.72                                    | -6.46                           | 46.99                                      | 54                         | -7.01              |
| 6.37                     | 38.40                     | 1.00              | 192                | 9.72                                    | -6.46                           | 41.66                                      | 54                         | -12.34             |
| 8.21                     | 38.40                     | 1.00              | 26                 | 9.72                                    | -6.46                           | 38.16                                      | 54                         | -12.34             |
| ***                      |                           |                   |                    |                                         |                                 |                                            |                            |                    |
|                          |                           |                   |                    |                                         |                                 |                                            |                            |                    |
|                          |                           |                   |                    |                                         |                                 |                                            |                            |                    |
|                          |                           |                   |                    |                                         |                                 |                                            |                            |                    |

Table 26 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 10, Handset Vertical]

| Radiated Emission  |                       |               |                | Correction Factors<br>(dB) | Corrected Amplitude<br>(dBuV/m) | FCC Class B<br>(3 M) |                |
|--------------------|-----------------------|---------------|----------------|----------------------------|---------------------------------|----------------------|----------------|
| Frequency<br>(MHz) | Amplitude<br>(dBuV/m) | Ant.H.<br>(m) | Table<br>( ° ) |                            |                                 | Limit<br>(dBuV/m)    | Margin<br>(dB) |
| 105.927            | 48.45                 | 1.00          | 115            | -11.75                     | 36.70                           | 43.50                | -6.80          |
| 153.398            | 50.66                 | 1.00          | 74             | -14.93                     | 35.73                           | 43.50                | -7.77          |
| 432.600            | 57.11                 | 1.00          | 258            | -19.02                     | 38.09                           | 46.00                | -7.91          |
| 509.267            | 61.36                 | 1.00          | 39             | -20.64                     | 40.72                           | 46.00                | -5.28          |
| 787.935            | 70.61                 | 1.00          | 215            | -26.28                     | 44.33                           | 46.00                | -1.67          |
| 797.985            | 70.80                 | 1.00          | 147            | -26.59                     | 44.21                           | 46.00                | -1.79          |
| ***                |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |

**Table 27 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 10, Handset Vertical]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b><br>( dB ) | <b>Duty Cycle</b><br>( dB ) | <b>Corrected Amplitude</b><br>(dBuV/m) | <b>FCC Class B ( 3 M )</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|-------------------------------------|-----------------------------|----------------------------------------|----------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                                     |                             |                                        | <b>Limit (dBuV/m)</b>      | <b>Margin (dB)</b> |
| 2.71                     | 59.79                     | 1.00              | 123                | -6.84                               | -6.46                       | 46.49                                  | 54                         | -7.51              |
| 3.65                     | 50.09                     | 1.00              | 166                | -5.64                               | -6.46                       | 37.99                                  | 54                         | -16.01             |
| 4.55                     | 52.37                     | 1.00              | 329                | 3.91                                | -6.46                       | 49.82                                  | 54                         | -4.18              |
| 5.46                     | 42.06                     | 1.00              | 8                  | 9.72                                | -6.46                       | 45.32                                  | 54                         | -8.68              |
| 6.37                     | 38.40                     | 1.00              | 204                | 9.72                                | -6.46                       | 41.66                                  | 54                         | -12.34             |
| 7.30                     | 33.23                     | 1.00              | 221                | 9.72                                | -6.46                       | 36.49                                  | 54                         | -8.68              |
| 8.21                     | 32.56                     | 1.00              | 107                | 9.72                                | -6.46                       | 35.82                                  | 54                         | -12.34             |
| ***                      |                           |                   |                    |                                     |                             |                                        |                            |                    |
|                          |                           |                   |                    |                                     |                             |                                        |                            |                    |
|                          |                           |                   |                    |                                     |                             |                                        |                            |                    |

**Table 28 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 20, Handset Horizontal]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (MHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 105.927                  | 50.57                     | 1.00              | 251                | -11.75                    | 38.82                      | 43.50                    | -4.68              |
| 115.608                  | 52.96                     | 2.00              | 207                | -12.81                    | 40.15                      | 43.50                    | -3.35              |
| 153.398                  | 52.98                     | 1.00              | 156                | -14.93                    | 38.05                      | 43.50                    | -5.45              |
| 163.213                  | 54.21                     | 1.00              | 90                 | -14.86                    | 39.35                      | 43.50                    | -4.15              |
| 173.028                  | 50.47                     | 1.00              | 116                | -13.84                    | 36.63                      | 43.50                    | -6.87              |
| 211.532                  | 45.85                     | 2.00              | 308                | -11.57                    | 34.28                      | 43.50                    | -9.22              |
| 230.785                  | 55.15                     | 1.00              | 227                | -12.69                    | 42.46                      | 46.00                    | -3.54              |
| ***                      |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |
|                          |                           |                   |                    |                           |                            |                          |                    |

**Table 29 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 20, Handset Horizontal]**

| <b>Radiated Emission</b> |                           |                   |                    | <b>Correction Factors</b> | <b>Duty Cycle</b> | <b>Corrected Amplitude</b> | <b>FCC Class B (3 M)</b> |                    |
|--------------------------|---------------------------|-------------------|--------------------|---------------------------|-------------------|----------------------------|--------------------------|--------------------|
| <b>Frequency (GHz)</b>   | <b>Amplitude (dBuV/m)</b> | <b>Ant.H. (m)</b> | <b>Table ( ° )</b> |                           |                   |                            | <b>Limit (dBuV/m)</b>    | <b>Margin (dB)</b> |
| 2.77                     | 58.12                     | 1.00              | 331                | -6.84                     | -6.46             | 44.82                      | 54                       | -9.18              |
| 3.67                     | 52.42                     | 1.00              | 109                | -5.64                     | -6.46             | 40.32                      | 54                       | -13.68             |
| 4.61                     | 46.54                     | 1.00              | 105                | 3.91                      | -6.46             | 43.99                      | 54                       | -10.01             |
| 5.54                     | 42.56                     | 1.00              | 224                | 9.72                      | -6.46             | 45.82                      | 54                       | -8.18              |
| 6.48                     | 40.56                     | 1.00              | 18                 | 9.72                      | -6.46             | 43.82                      | 54                       | -10.18             |
| 7.39                     | 38.13                     | 1.00              | 223                | 9.72                      | -6.46             | 41.39                      | 54                       | -12.61             |
| 8.32                     | 32.23                     | 1.00              | 94                 | 9.72                      | -6.46             | 35.49                      | 54                       | -18.51             |
| 9.26                     | 32.56                     | 1.00              | 199                | 9.72                      | -6.46             | 35.82                      | 54                       | -18.18             |
| ***                      |                           |                   |                    |                           |                   |                            |                          |                    |
|                          |                           |                   |                    |                           |                   |                            |                          |                    |

Table 30 Open Field Radiated Emissions For 30MHz ~ 1GHz [Channel 20, Handset Vertical]

| Radiated Emission  |                       |               |                | Correction Factors<br>(dB) | Corrected Amplitude<br>(dBuV/m) | FCC Class B<br>(3 M) |                |
|--------------------|-----------------------|---------------|----------------|----------------------------|---------------------------------|----------------------|----------------|
| Frequency<br>(MHz) | Amplitude<br>(dBuV/m) | Ant.H.<br>(m) | Table<br>( ° ) |                            |                                 | Limit<br>(dBuV/m)    | Margin<br>(dB) |
| 105.927            | 47.67                 | 1.00          | 118            | -11.75                     | 35.92                           | 43.50                | -7.58          |
| 115.608            | 50.56                 | 1.00          | 208            | -12.81                     | 37.75                           | 43.50                | -5.75          |
| 153.775            | 53.21                 | 1.00          | 351            | -14.96                     | 38.25                           | 43.50                | -5.25          |
| 230.785            | 52.77                 | 1.00          | 99             | -12.69                     | 40.08                           | 46.00                | -5.92          |
| 470.385            | 61.49                 | 1.00          | 107            | -20.05                     | 41.44                           | 46.00                | -4.56          |
| 787.935            | 70.48                 | 1.00          | 251            | -26.28                     | 44.20                           | 46.00                | -1.80          |
| 797.482            | 70.62                 | 1.00          | 33             | -26.59                     | 44.03                           | 46.00                | -1.97          |
| 896.982            | 71.16                 | 1.00          | 148            | -27.82                     | 43.34                           | 46.00                | -2.66          |
| ***                |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |
|                    |                       |               |                |                            |                                 |                      |                |

**Table 31 Open Field Radiated Emissions For 1GHz ~ 18GHz [Channel 20, Handset Vertical]**

| Radiated Emission  |                       |                |                | Correction Factors<br>( dB ) | Duty Cycle<br>( dB ) | Corrected Amplitude<br>(dBuV/m) | FCC Class B<br>( 3 M ) |                |
|--------------------|-----------------------|----------------|----------------|------------------------------|----------------------|---------------------------------|------------------------|----------------|
| Frequency<br>(GHz) | Amplitude<br>(dBuV/m) | Ant.H.<br>(cm) | Table<br>( ° ) |                              |                      |                                 | Limit<br>(dBuV/m)      | Margin<br>(dB) |
| 2.77               | 60.29                 | 1.00           | 31             | -6.84                        | -6.46                | 46.99                           | 54                     | -7.01          |
| 3.67               | 53.92                 | 1.00           | 307            | -5.64                        | -6.46                | 41.82                           | 54                     | -12.18         |
| 4.61               | 51.71                 | 1.00           | 110            | 3.91                         | -6.46                | 49.16                           | 54                     | -4.84          |
| 5.54               | 42.56                 | 1.00           | 44             | 9.72                         | -6.46                | 45.82                           | 54                     | -8.18          |
| 6.48               | 39.40                 | 1.00           | 158            | 9.72                         | -6.46                | 42.66                           | 54                     | -11.34         |
| 7.41               | 35.73                 | 1.00           | 83             | 9.72                         | -6.46                | 38.99                           | 54                     | -15.01         |
| ***                |                       |                |                |                              |                      |                                 |                        |                |
|                    |                       |                |                |                              |                      |                                 |                        |                |
|                    |                       |                |                |                              |                      |                                 |                        |                |
|                    |                       |                |                |                              |                      |                                 |                        |                |

## **VI. Section 15.247(d): Power Spectral Density**

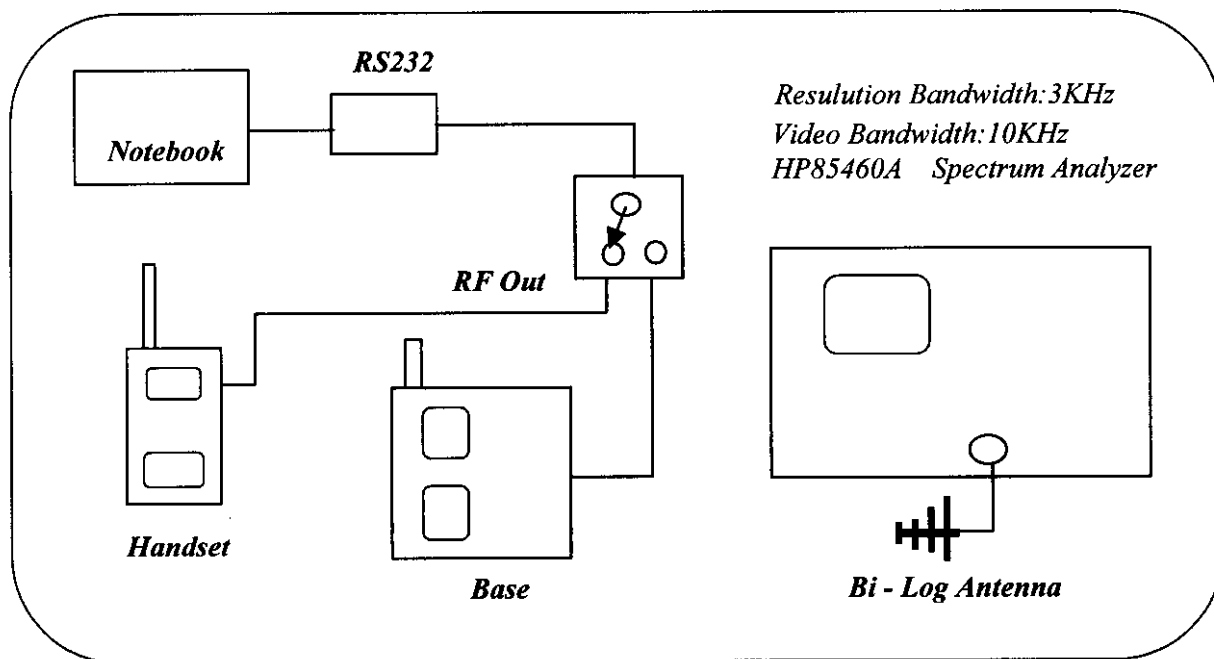
### **6.1 Test Condition & Setup**

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 + 8dBm.

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

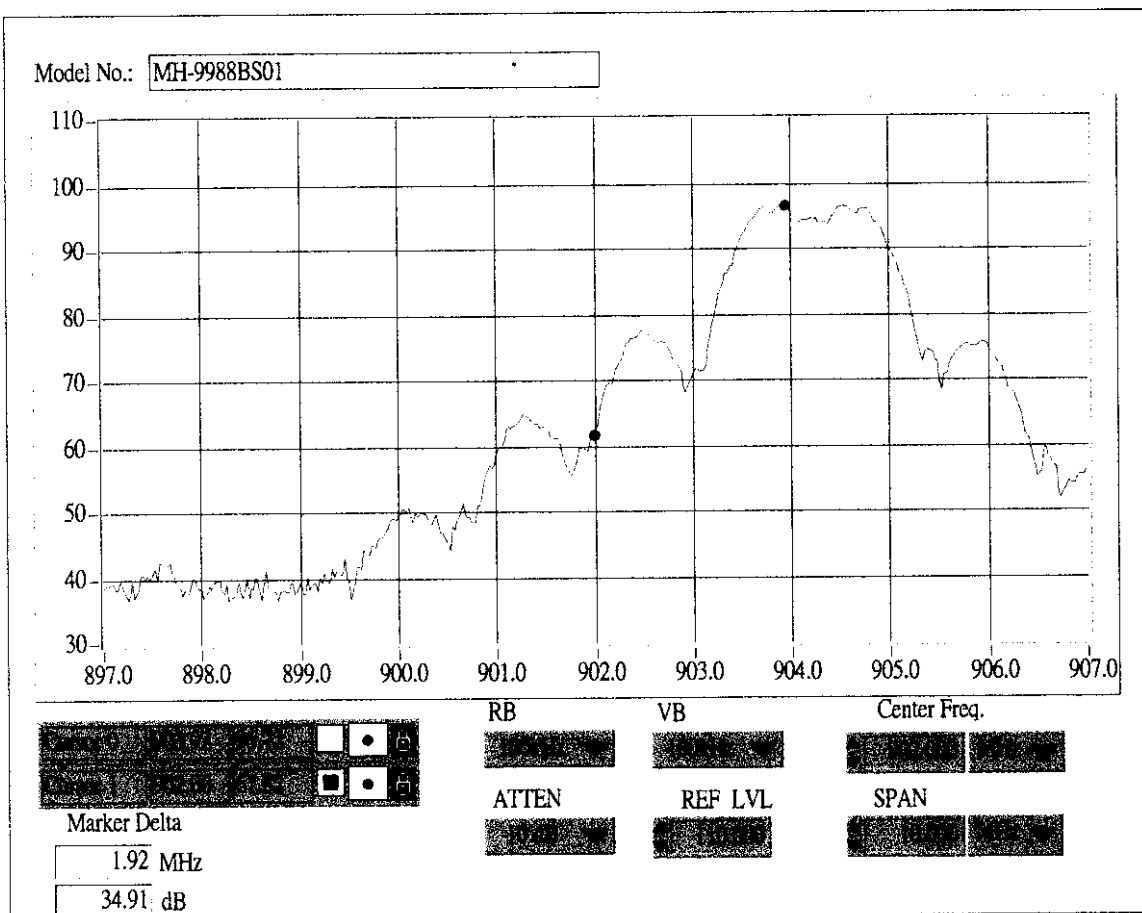
## 6.3 List of Test Instruments

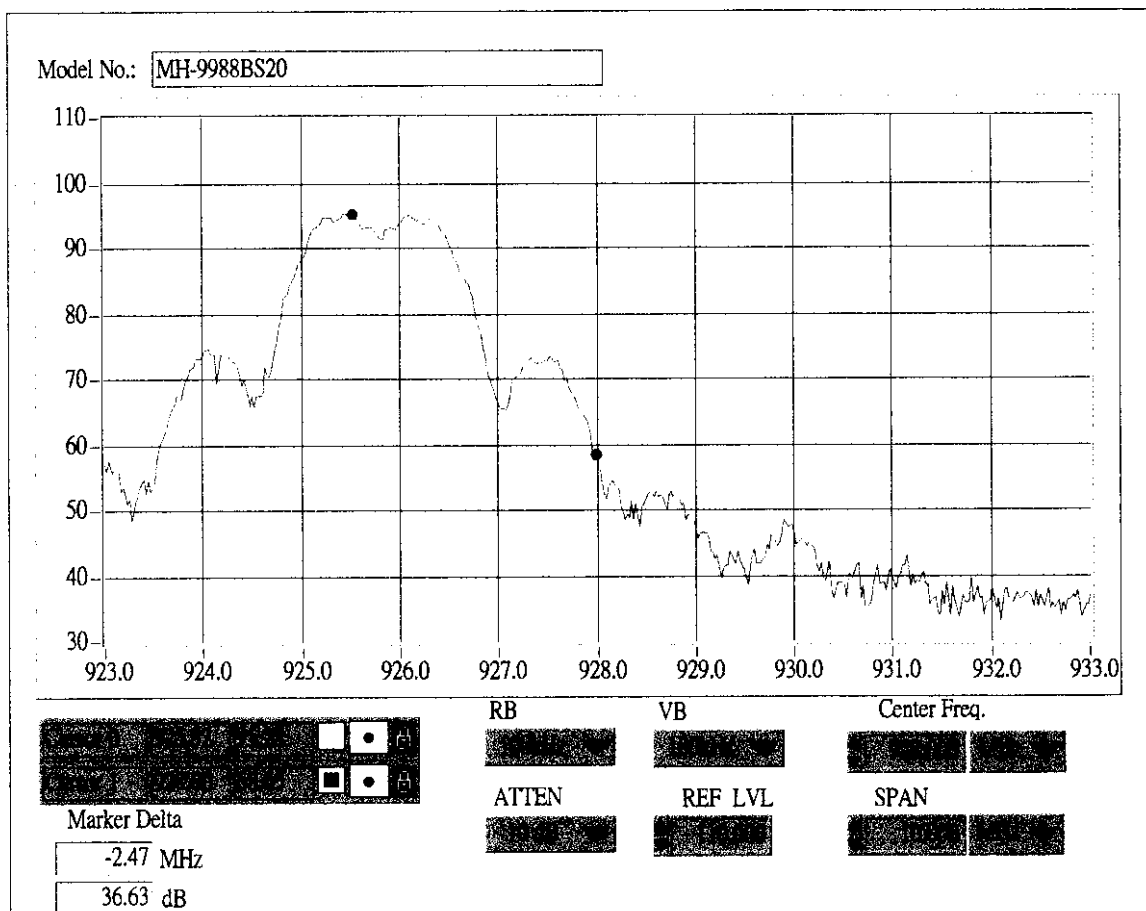
| Manufacturer    | Device                      | Model     | Input Impedance |
|-----------------|-----------------------------|-----------|-----------------|
| Hewlett Packard | .9KHz – 6GHz EMI Receiver   | HP85460A  | 50.00           |
| M.E.            | 30MHz-1.5GHz Bi-Log Antenna | VULB 9160 | 50.00           |

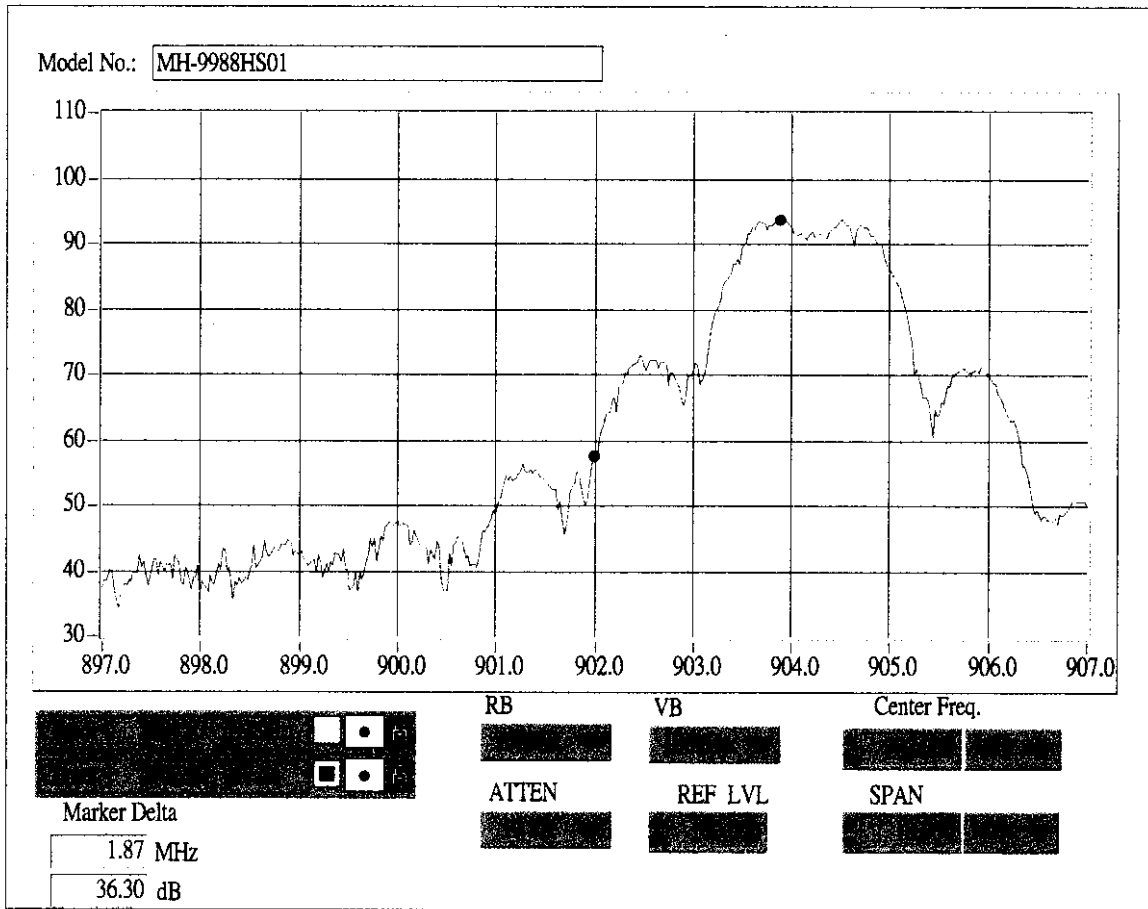
#### **6.4 Required of Carrier frequency**

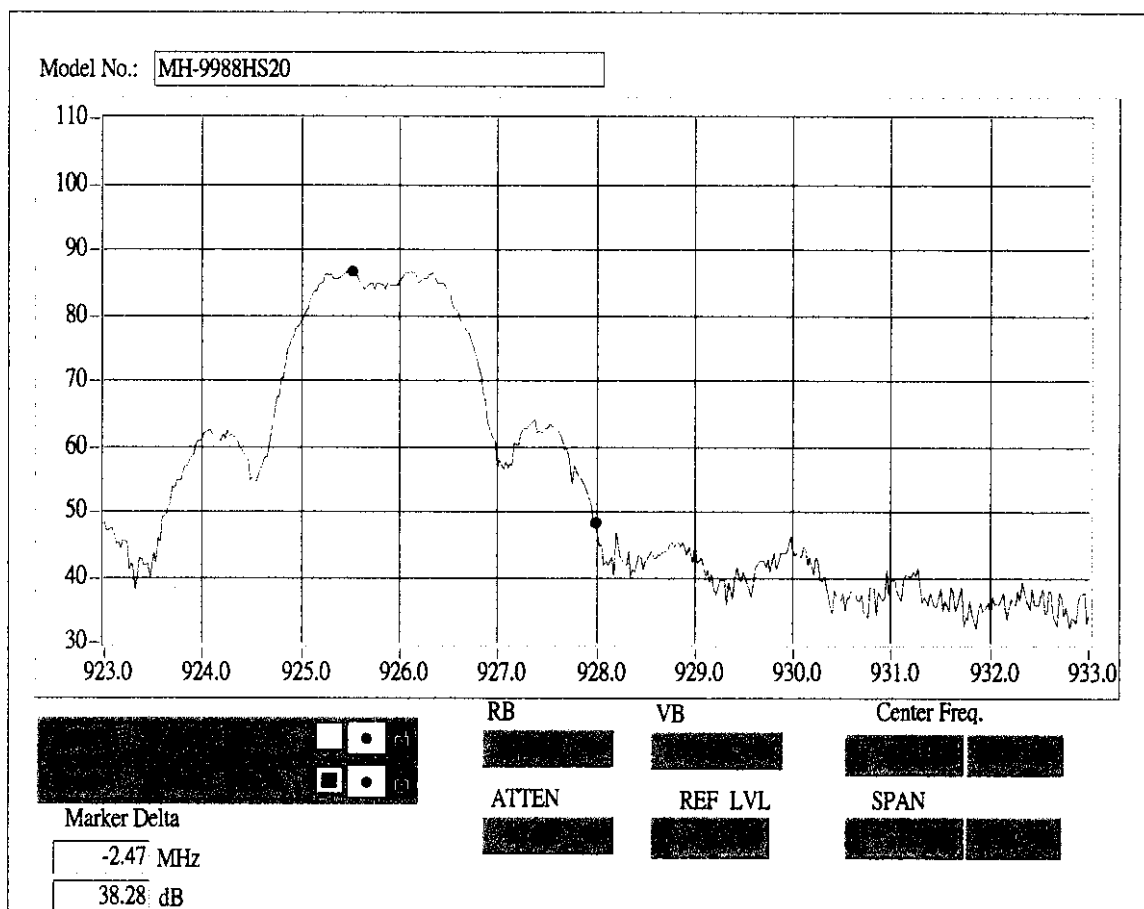
If any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains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

Test Condition & Setup: same as 3.1









## 6.5 Test Result of Power spectral density.

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

**Model No.** : MH-9988

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

**Table 33. Power Spectral Density**

| <i>Channel</i> | <i>Frequency<br/>(MHz)</i> | <i>Ppr<br/>(dBuV)</i> | <i>CF<br/>(dB)</i> | <i>Ppq<br/>(dBm)</i> | <i>Limit<br/>(dB)</i> | <i>Margin<br/>(dB)</i> |
|----------------|----------------------------|-----------------------|--------------------|----------------------|-----------------------|------------------------|
| B/S CH 01      | 904.52                     | 116.68                | -27.96             | -6.51                | 8.00                  | -14.51                 |
| B/S CH 10      | 915.63                     | 119.01                | -28.04             | -4.26                | 8.00                  | -12.26                 |
| B/S CH 20      | 927.17                     | 124.96                | -28.21             | 1.52                 | 8.00                  | -6.48                  |
| H/S CH 01      | 904.52                     | 112.55                | -27.96             | -10.64               | 8.00                  | -18.64                 |
| H/S CH 10      | 915.07                     | 123.18                | -28.04             | -0.09                | 8.00                  | -8.09                  |
| H/S CH 20      | 927.13                     | 108.21                | -28.21             | -15.23               | 8.00                  | -23.23                 |

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).

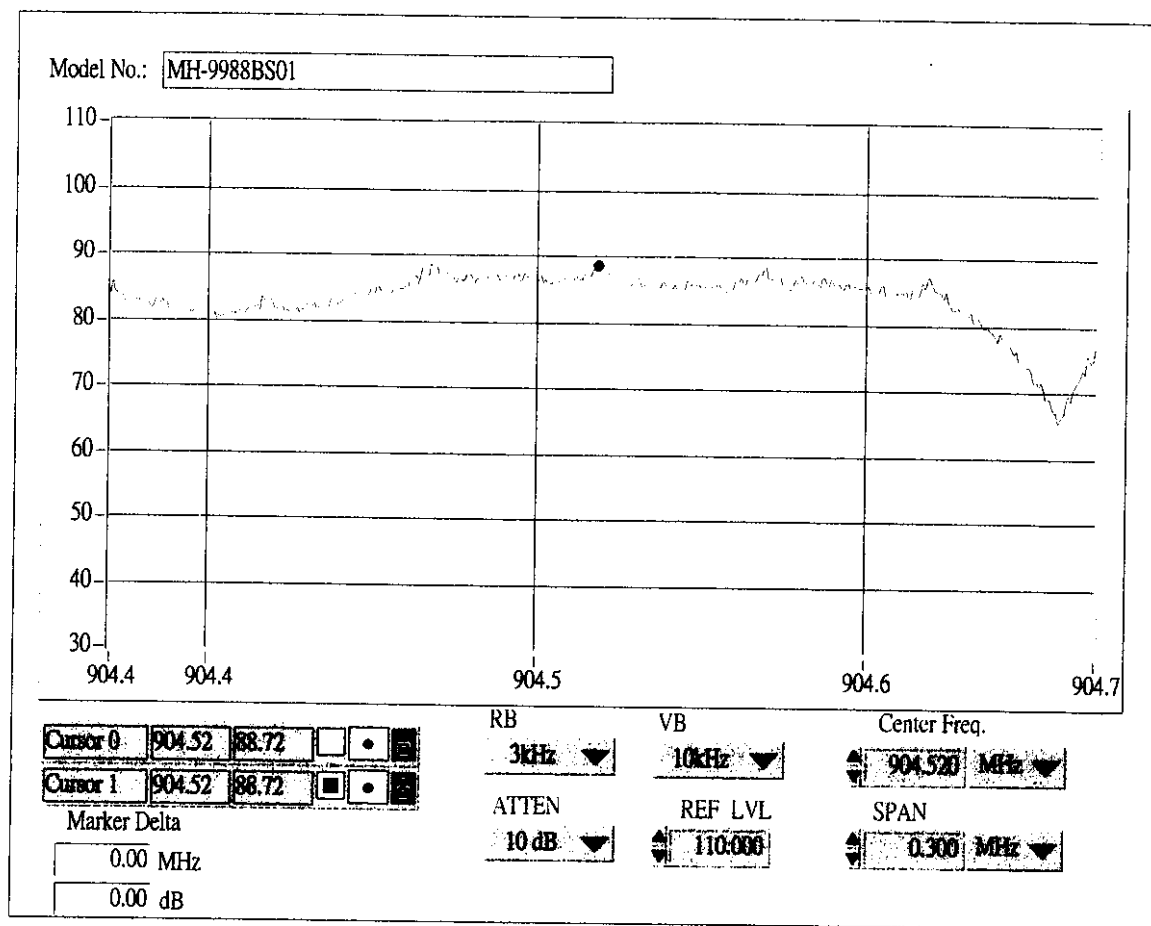
G is the numeric gain of the transmitting antenna over an isotropic radiator (1.00).

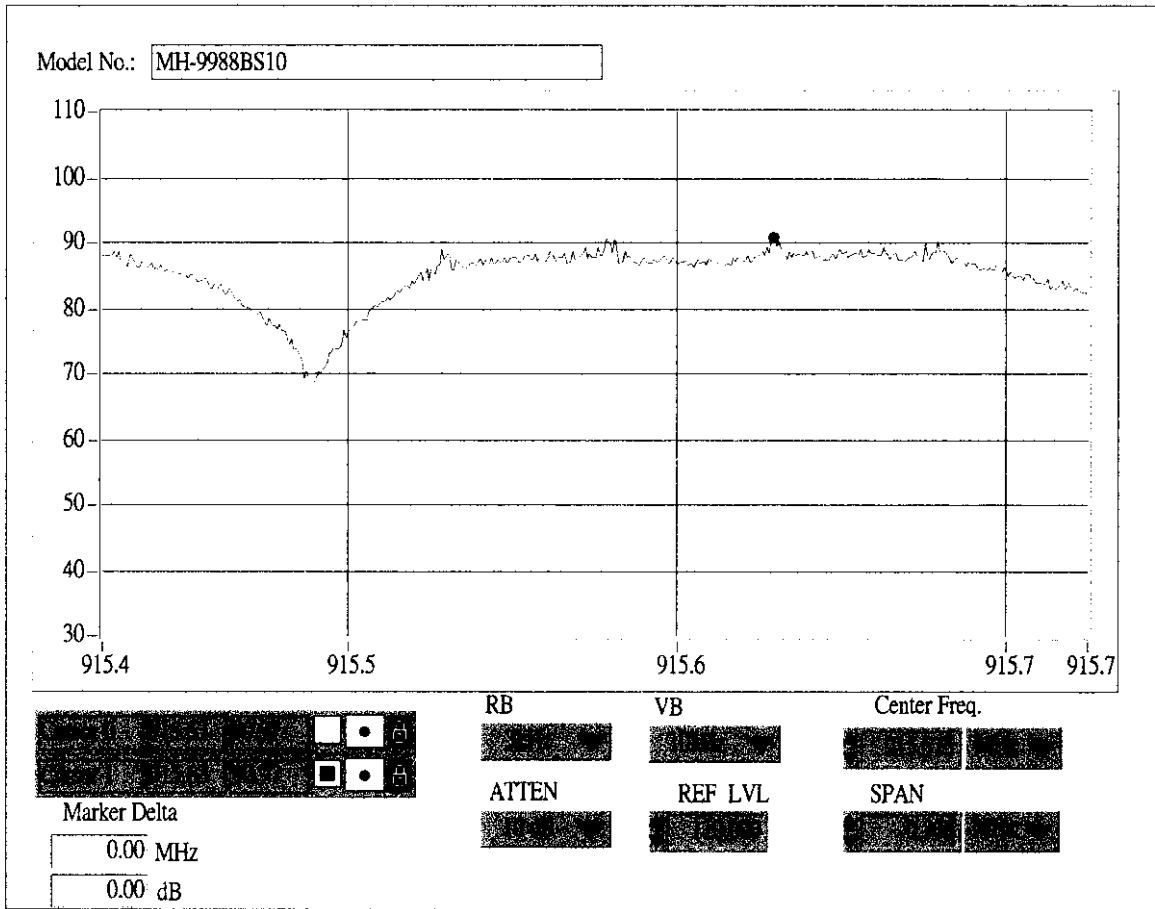
d is the distance in meters from which the field strength was measured (3M).

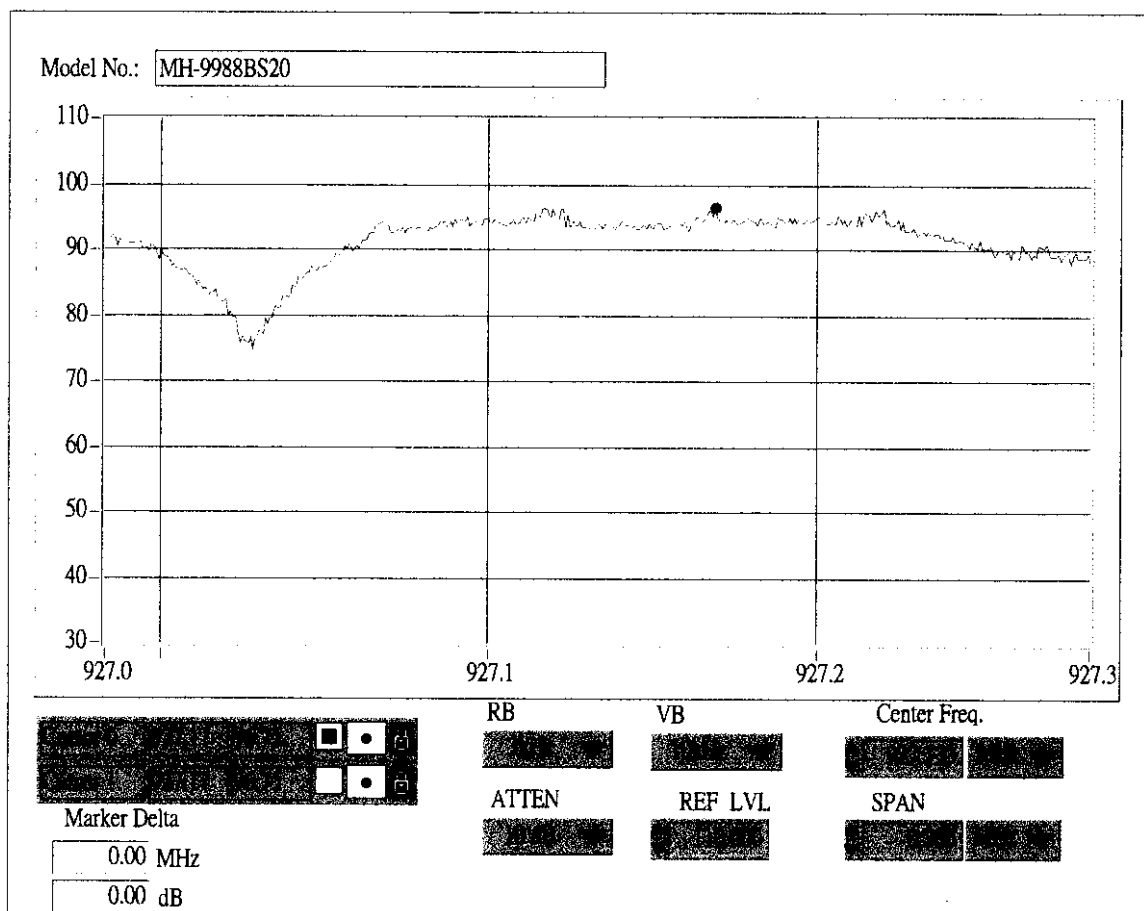
Example: the Max Radiation Emission of base ch01 = 116.68 + (-27.96) = 88.72 dBuV/m

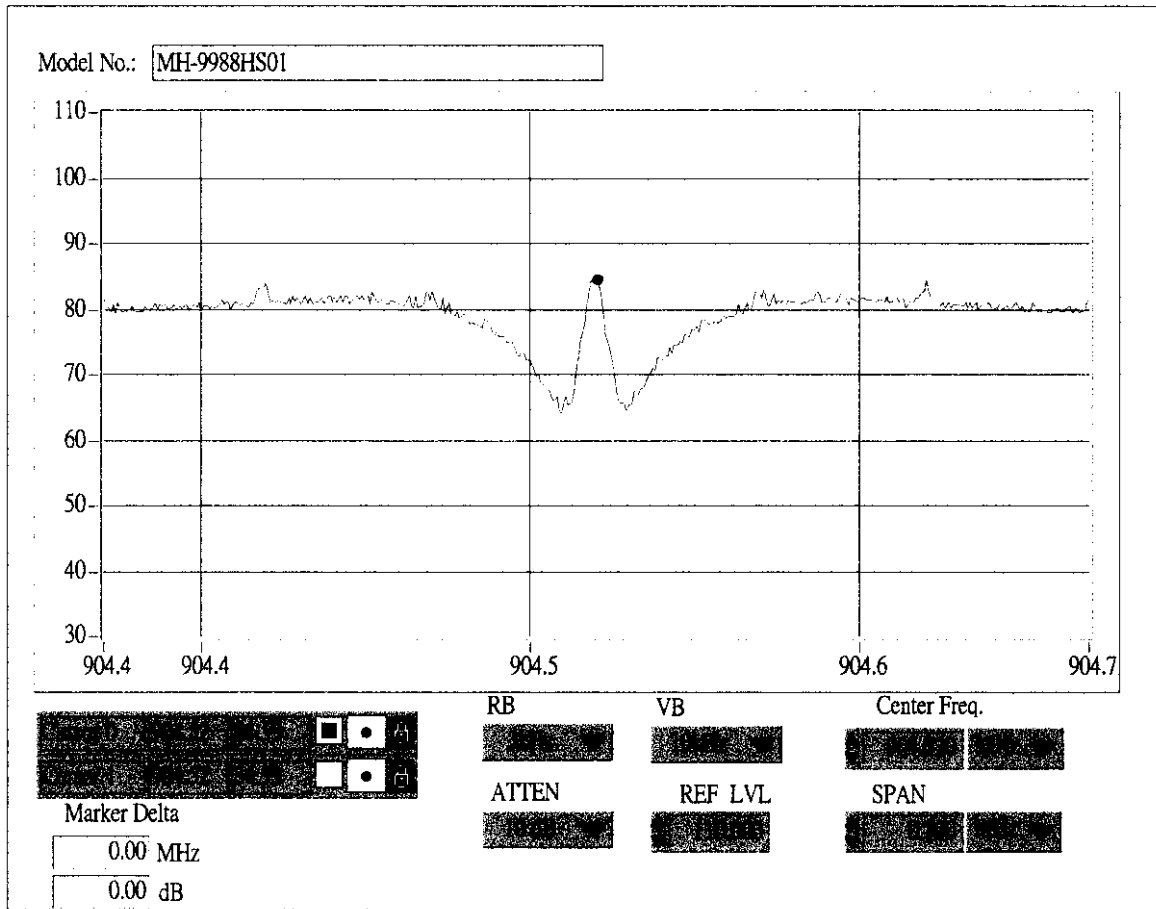
$$10^{(88.72/20)} \times 10^{-6} = 0.027290 \text{ V}$$

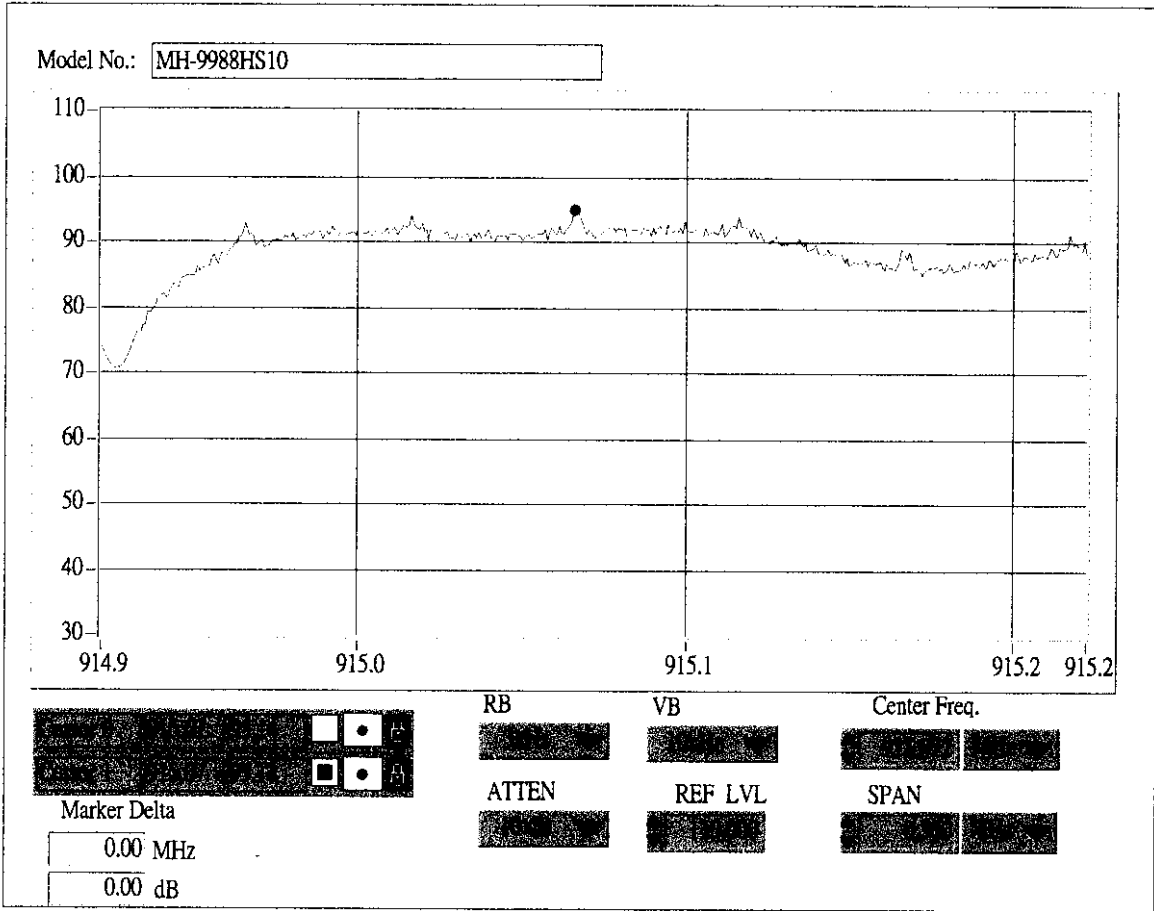
$$\begin{aligned} \text{E.R.P.} &= (0.027290 \times 3)^2 / 30 = 0.223420 \text{ mW} = 10 \times \log (0.223420 \text{ mW}/1\text{mW}) \\ &= -6.51 \text{ dBm} \end{aligned}$$

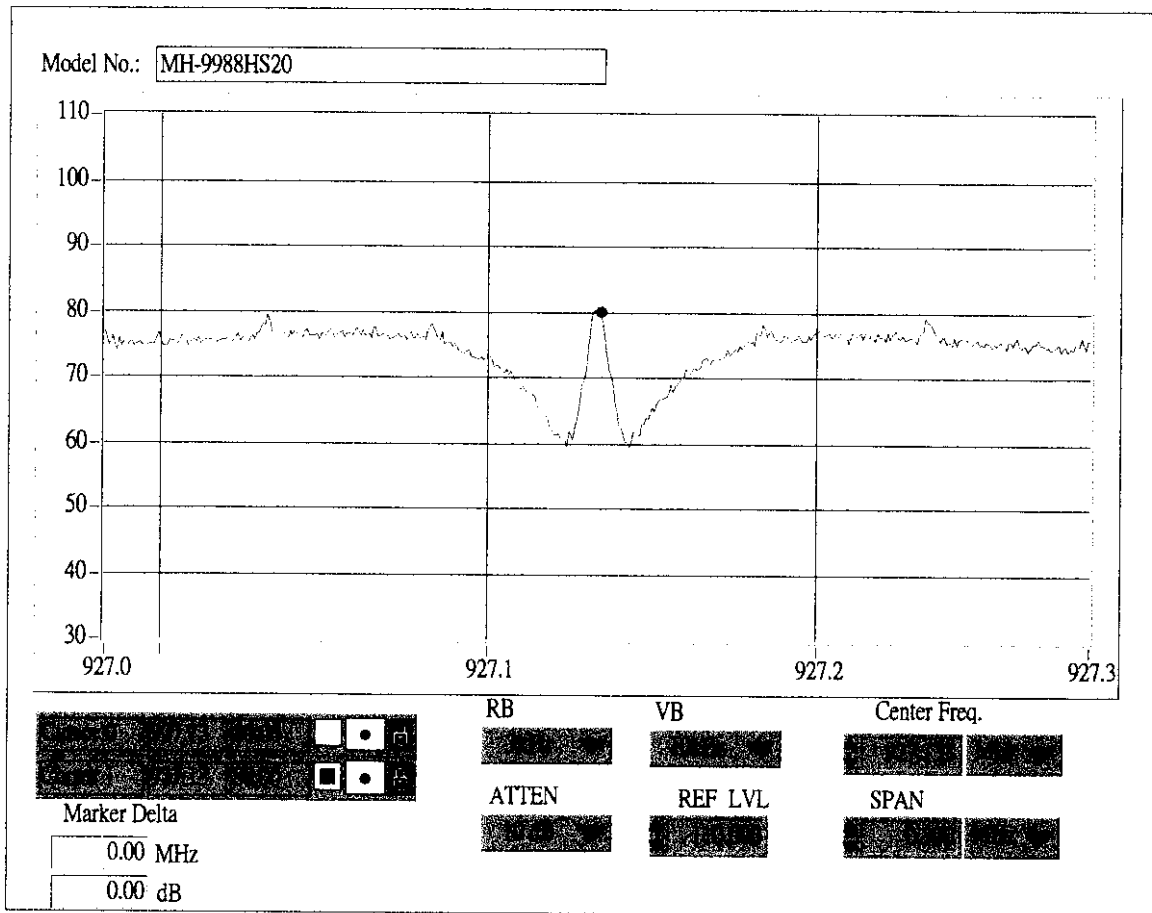












## VII. Section 15.247(e): Processing Gain

### 7.1 Test Condition & Setup

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

The subjective device RF module (base & handset) digital modulation by Differential Phase -Shift Keying (DPSK), the DPSK can use its previous waveform as the phase reference for demodulation and thus requires no coherent detection, which greatly simplifies the receiver structure but with some Bit Error Rate (BER) degradation because of noisy phase reference. There is tradeoff between system complexity and system performance. In order to drive 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 T<sub>0</sub> seconds (no transition). Similarly, a binary 0 is transmitted by a sequence of two plus (P,-P) or (-P,P) over 2 T<sub>0</sub> 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 E<sub>p</sub> (twice the energy of pulse P). The actual energy transmitted per digit only E<sub>p</sub>, however, the same as in noncoherent FSK, Consequently, the performance of DPSK is 3 dB superior to that of noncoherent FSK, We can write P<sub>e</sub> for DPSK as :

The major component inside the subjective device are supplied by Rockwell, 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 :

$$J/S = (W/R_b) / (E_b/N_0) \text{ [without CODING]}$$

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

R<sub>b</sub> = Information Data Rate

E<sub>b</sub>/N<sub>0</sub> = 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/R<sub>b</sub>) 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 Rockwell System in Taiwan had pass us the information about the probability of error rate (P<sub>e</sub>) must be lower than 0.001 that the system performance will satisfy for communication between Handset and Base station.

Why we need the P<sub>e</sub> 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 P<sub>e</sub> = 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 ( $G_p$ ) is the following:

$$G_p = (S/N) + M_j + L_{sys}$$

$$G_p = 8 \text{ dB} + M_j + 2 \text{ dB}$$

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

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

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

The setting up procedure is recorded on Appendix A.

## 7.2 Test Instruments Configuration

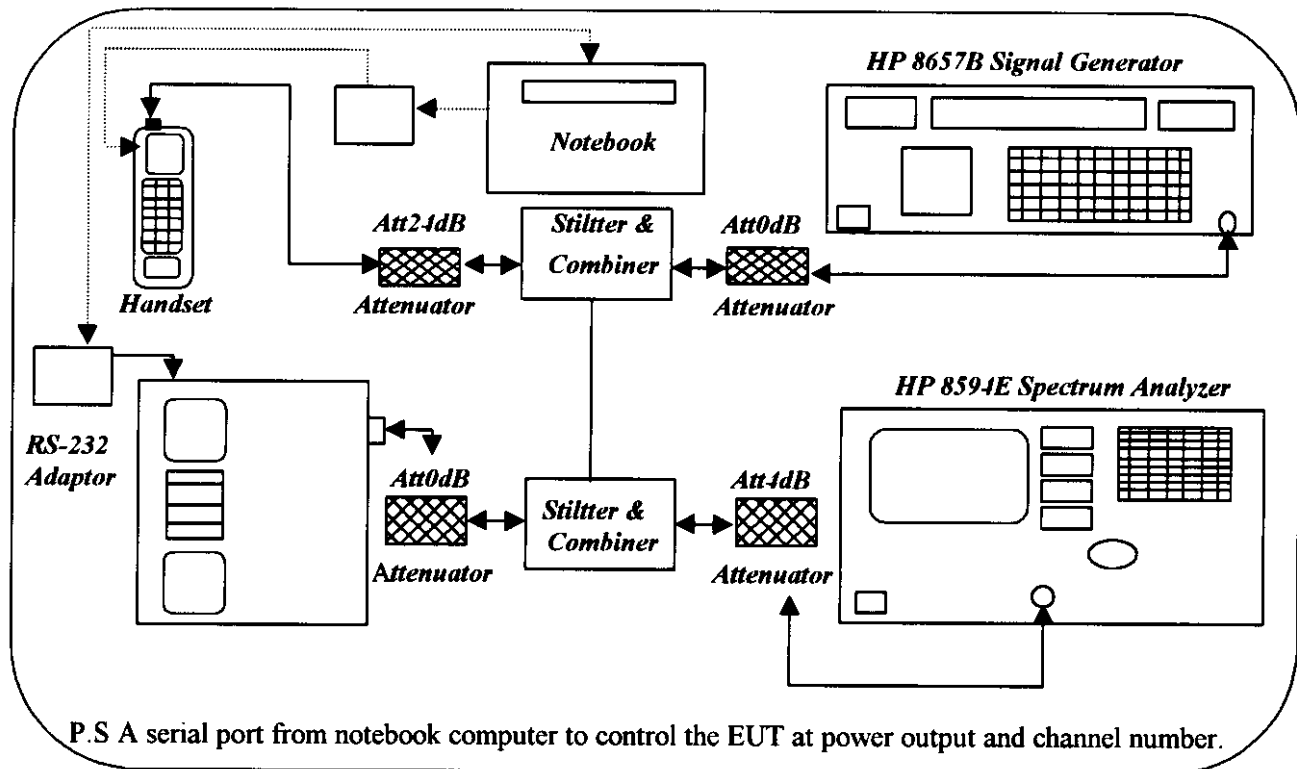


Fig 13. Test Configuration of processing gain for base station

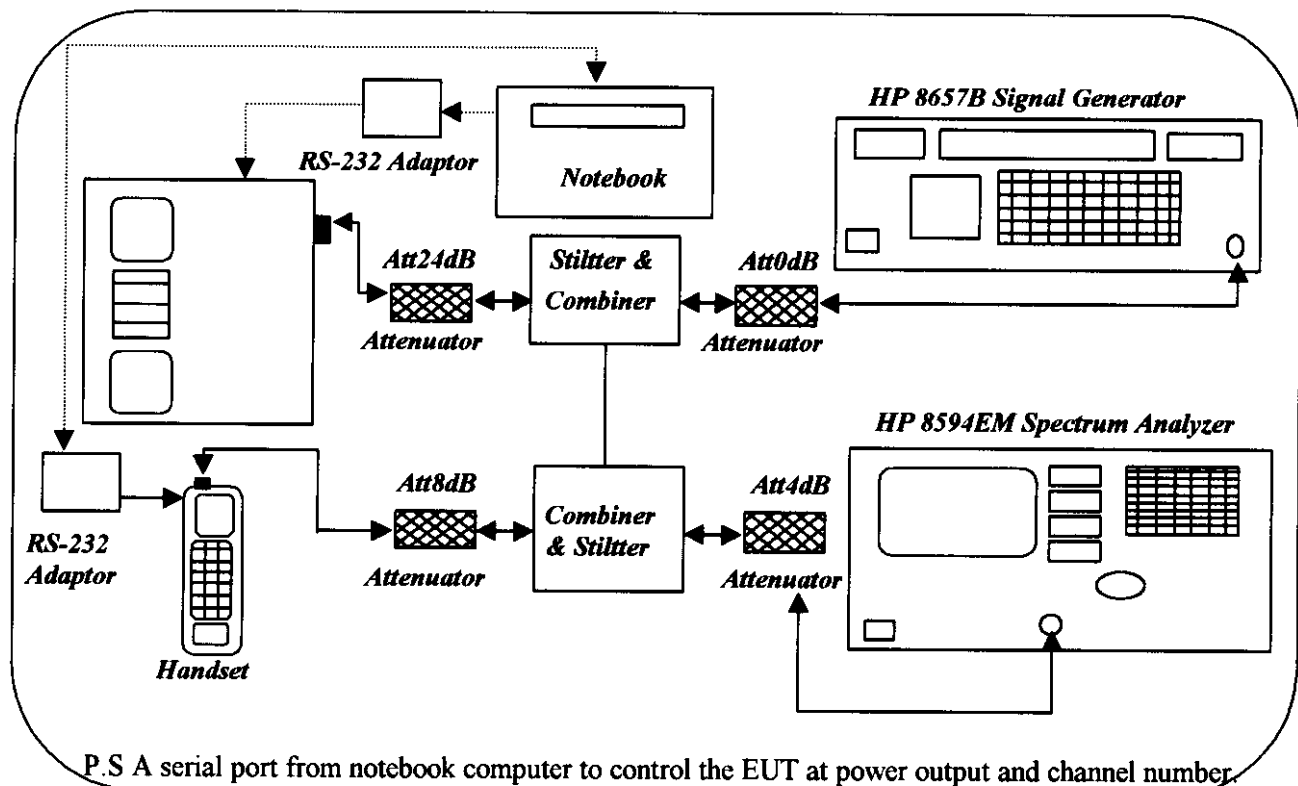


Fig. 14 Test Configuration of processing gain for handset

**7.3 List of Test Instruments**

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

**7.4 Test Procedure**

According to the Fig. 13 of the page 53, 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.** : MH-9988

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

**Table 34 Processing Gain [Channel 10, Base]**

| Jammer Frequency<br>(MHz) | S<br>(dBm) | J<br>(dBm) | Mj<br>(J/S) | Process Gain<br>(dB) |
|---------------------------|------------|------------|-------------|----------------------|
| 914.600                   | -47.91     | -46.50     | 1.41        | 11.31                |
| 914.650                   | -47.91     | -46.44     | 1.47        | 11.37                |
| 914.700                   | -47.91     | -45.85     | 2.06        | 11.96                |
| 914.750                   | -47.91     | -45.88     | 2.03        | 11.93                |
| 914.800                   | -47.91     | -44.92     | 2.99        | 12.89                |
| 914.850                   | -47.91     | -44.80     | 3.11        | 13.01                |
| 914.900                   | -47.91     | -44.85     | 3.06        | 12.96                |
| 914.950                   | -47.91     | -44.76     | 3.15        | 13.05                |
| 915.000                   | -47.91     | -44.77     | 3.14        | 13.04                |
| 915.050                   | -47.91     | -44.60     | 3.31        | 13.21                |
| 915.100                   | -47.91     | -44.52     | 3.39        | 13.29                |
| 915.150                   | -47.91     | -44.45     | 3.46        | 13.36                |
| 915.200                   | -47.91     | -44.50     | 3.41        | 13.31                |
| 915.250                   | -47.91     | -44.40     | 3.51        | 13.41                |
| 915.300                   | -47.91     | -44.30     | 3.61        | 13.51                |
| 915.350                   | -47.91     | -44.22     | 3.69        | 13.59                |
| 915.400                   | -47.91     | -44.17     | 3.74        | 13.64                |
| 915.450                   | -47.91     | -44.02     | 3.89        | 13.79                |
| 915.500                   | -47.91     | -43.88     | 4.03        | 13.93                |
| 915.550                   | -47.91     | -43.85     | 4.06        | 13.96                |
| 915.600                   | -47.91     | -43.80     | 4.11        | 14.01                |
| 915.650                   | -47.91     | -43.61     | 4.30        | 14.20                |
| 915.700                   | -47.91     | -43.50     | 4.41        | 14.31                |
| 915.750                   | -47.91     | -43.52     | 4.39        | 14.29                |
| 915.800                   | -47.91     | -43.40     | 4.51        | 14.41                |
| 915.850                   | -47.91     | -43.20     | 4.71        | 14.61                |
| 915.900                   | -47.91     | -43.10     | 4.81        | 14.71                |
| 915.950                   | -47.91     | -42.95     | 4.96        | 14.86                |
| 916.000                   | -47.91     | -42.97     | 4.94        | 14.84                |
| 916.050                   | -47.91     | -42.60     | 5.31        | 15.21                |

### **Test Result : Processing Gain: 13.01 dB**

Note: 1.  $GP = (S/No) + Mj + L_{sys} = 7.9\text{dB} + Mj + 2\text{dB}$

2. S = Signal Level

3. J = Signal Generator RF Output

**Table 35 Processing Gain [Channel 10, Handset]**

| Jammer Frequency<br>(MHz) | S<br>(dBm) | J<br>(dBm) | Mj<br>(J/S) | Process Gain<br>(dB) |
|---------------------------|------------|------------|-------------|----------------------|
| 914.600                   | -47.91     | -46.60     | 1.31        | 11.21                |
| 914.650                   | -47.91     | -46.55     | 1.36        | 11.26                |
| 914.700                   | -47.91     | -46.21     | 1.70        | 11.60                |
| 914.750                   | -47.91     | -45.77     | 2.14        | 12.04                |
| 914.800                   | -47.91     | -45.75     | 2.16        | 12.06                |
| 914.850                   | -47.91     | -45.22     | 2.69        | 12.59                |
| 914.900                   | -47.91     | -44.82     | 3.09        | 12.99                |
| 914.950                   | -47.91     | -44.81     | 3.10        | 13.00                |
| 915.000                   | -47.91     | -44.75     | 3.16        | 13.06                |
| 915.050                   | -47.91     | -44.72     | 3.19        | 13.09                |
| 915.100                   | -47.91     | -44.70     | 3.21        | 13.11                |
| 915.150                   | -47.91     | -44.66     | 3.25        | 13.15                |
| 915.200                   | -47.91     | -44.68     | 3.23        | 13.13                |
| 915.250                   | -47.91     | -44.52     | 3.39        | 13.29                |
| 915.300                   | -47.91     | -44.33     | 3.58        | 13.48                |
| 915.350                   | -47.91     | -44.35     | 3.56        | 13.46                |
| 915.400                   | -47.91     | -44.26     | 3.65        | 13.55                |
| 915.450                   | -47.91     | -44.21     | 3.70        | 13.60                |
| 915.500                   | -47.91     | -43.85     | 4.06        | 13.96                |
| 915.550                   | -47.91     | -43.88     | 4.03        | 13.93                |
| 915.600                   | -47.91     | -43.74     | 4.17        | 14.07                |
| 915.650                   | -47.91     | -43.65     | 4.26        | 14.16                |
| 915.700                   | -47.91     | -43.52     | 4.39        | 14.29                |
| 915.750                   | -47.91     | -43.50     | 4.41        | 14.31                |
| 915.800                   | -47.91     | -43.24     | 4.67        | 14.57                |
| 915.850                   | -47.91     | -43.15     | 4.76        | 14.66                |
| 915.900                   | -47.91     | -42.77     | 5.14        | 15.04                |
| 915.950                   | -47.91     | -42.72     | 5.19        | 15.09                |
| 916.000                   | -47.91     | -42.75     | 5.16        | 15.06                |
| 916.050                   | -47.91     | -42.41     | 5.50        | 15.40                |

**Test Result : Processing Gain: 12.99 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***

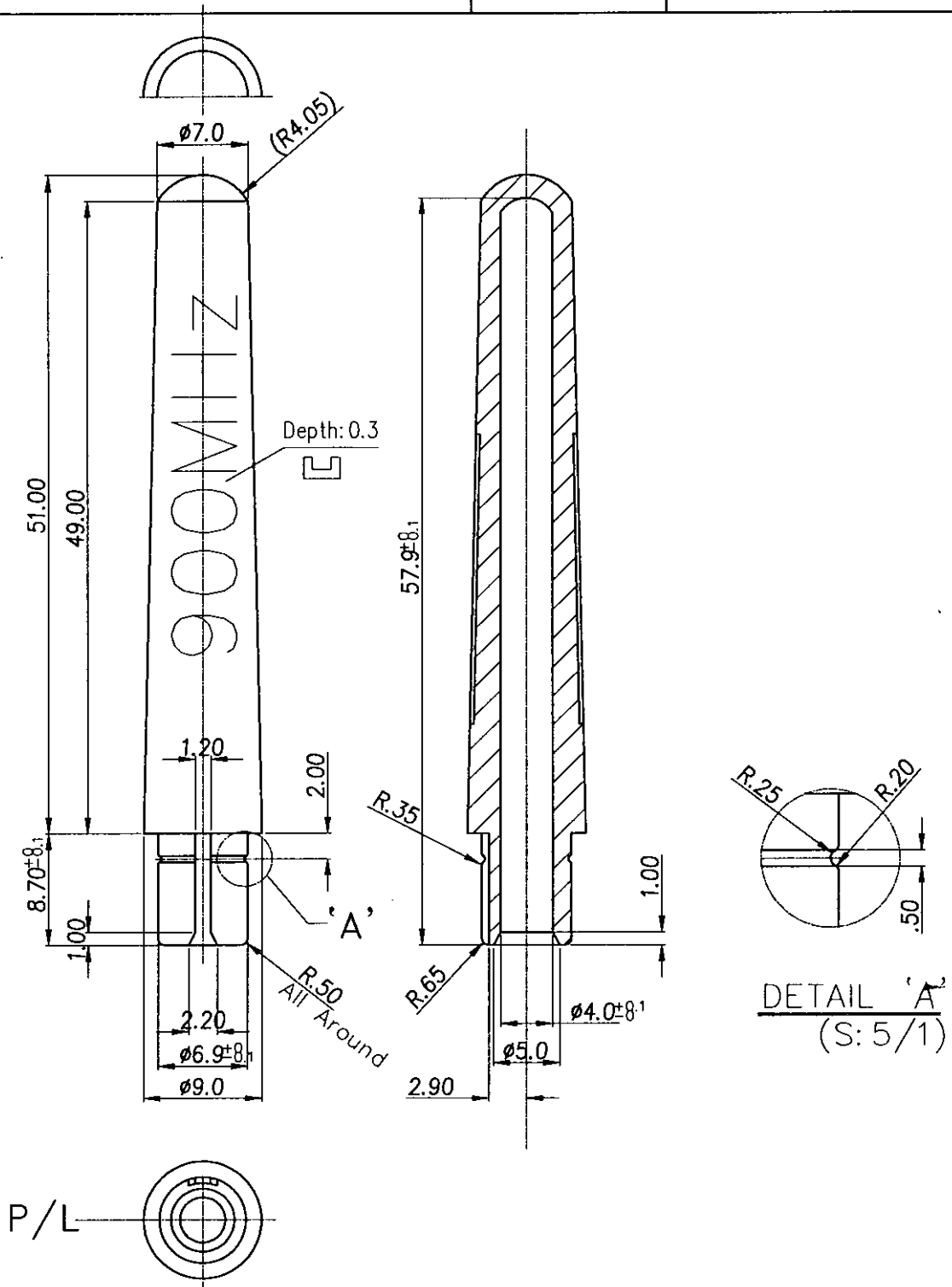
### **Setting up Procedure**

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***

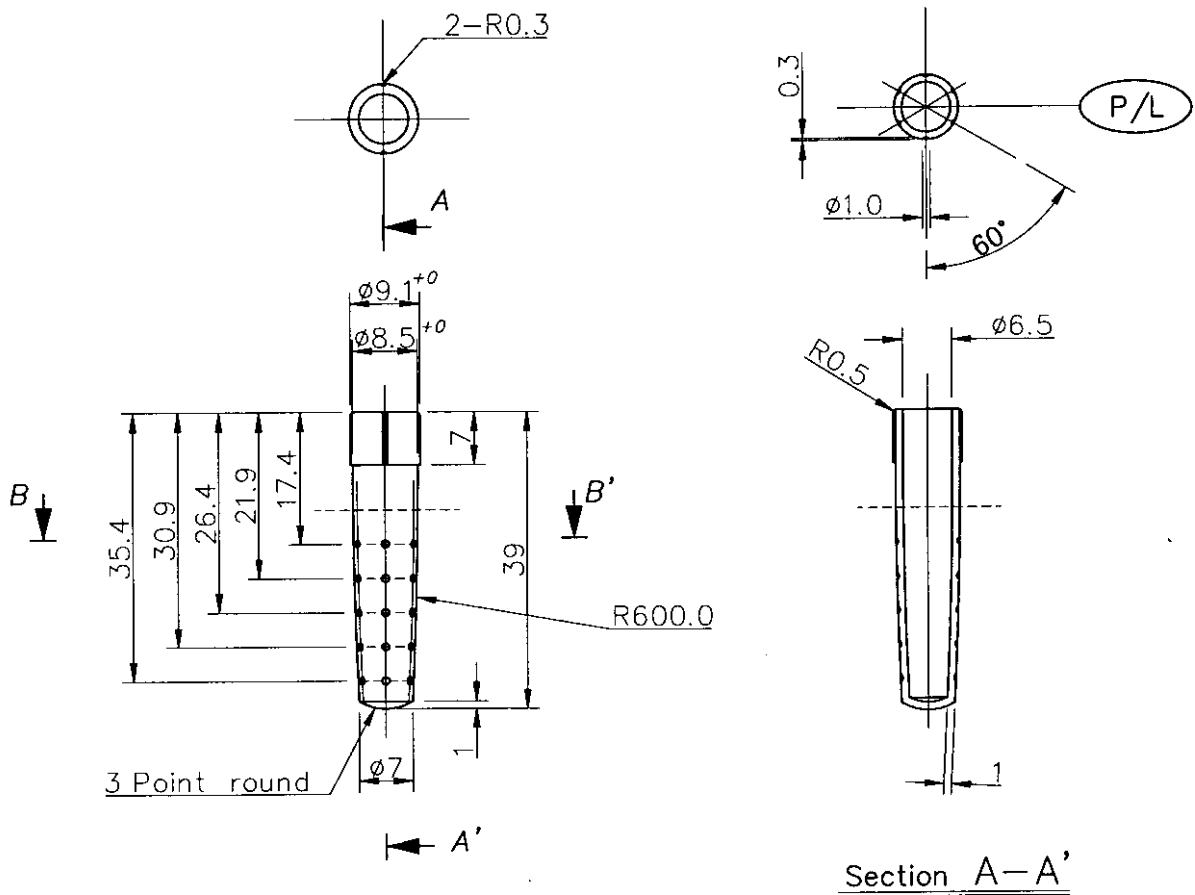
### **Antenna Sketch**

| REV | DESCRIPTION | DATE | APPROVED |
|-----|-------------|------|----------|
| △   |             |      |          |



|                  |             |         |      |          |        |              |       |               |        |            |  |         |   |
|------------------|-------------|---------|------|----------|--------|--------------|-------|---------------|--------|------------|--|---------|---|
|                  |             |         |      |          |        | URETHANE     | 1     |               |        |            |  |         |   |
| NO               | DESCRIPTION |         |      |          |        | MATERIAL     | Q'ty  | SPECIFICATION |        | TREAT      |  | REMARKS |   |
| TOLERANCE<br>(+) |             | 1-4     | 4-16 | 16-63    | 63-250 | 250-500      | ANGLE | SCALE         | 2<br>1 | 1999.01.21 |  | REV     | 0 |
|                  | A           | 0.05    | 0.07 | 0.1      | 0.2    | 0.3          | ±     |               |        |            |  |         |   |
|                  | B           | 0.10    | 0.20 | 0.3      | 0.5    | 0.8          |       | UNIT          | M/M    | CAD NO.    |  |         |   |
|                  | C           | 0.25    | 0.35 | 0.5      | 0.7    | 1.5          |       |               |        |            |  |         |   |
| DRAW & DESIGN    |             | DET.CHE |      | APPROVAL |        | NAME         |       | MH-9024(Base) |        |            |  |         |   |
|                  |             |         |      |          |        | Cap, Antenna |       |               |        |            |  |         |   |
|                  |             |         |      |          |        | SHEET        |       |               |        |            |  |         |   |

| REV | DESCRIPTION | DATE | APPROVED |
|-----|-------------|------|----------|
| △   |             |      |          |



**NOTES : (UNLESS OTHERWISE SPECIFIED)**

1. MOLD CONSTRUCTION TO BE APPROVED BY UNCOM.
2. FINISH; EXTERIOR SURFACES TO BE VERY HIGH GLOSS. VISIBLE SIDES
3. VISIBLE SIDES TO BE FREE FROM SINK, FLOW, EJECTOR PIN MARK, WELD LINE AND OTHER COSMETIC DEFECTS INCLUDING.
4. SMALL ALPHABET IN '' (SINGLE QUOTATION MARKS) ARE FOR SAME DESIGN ONLY.
5. ALL DRAFT TO BE 5°.
6. WALL THICKNESS TO BE 1.0mm/m
7. RIB THICKNESS TO BE 0.8/1.0
8. ALL BOSSES, RIBS DRAFT TO BE 1°
9. INTERIOR (NON-APPEARANCE) RADII TO BE 0.3

**TOOL MAT'L**

| No | DESCRIPTION | QTY | MATERIAL | REMARKS     |
|----|-------------|-----|----------|-------------|
| 1  | CAVITY      |     | HAK-81   | (HRC 48~50) |
| 2  | CORE        |     | SKD-61   |             |
| 3  | SLIDE CORE  |     | KP-4M    |             |
| 4  | INSERT CORE |     |          |             |

|                  |             |      |         |       |          |          |                |           |                                     |           |          |         |    |
|------------------|-------------|------|---------|-------|----------|----------|----------------|-----------|-------------------------------------|-----------|----------|---------|----|
|                  |             |      |         |       |          | URETHANE | 1              |           |                                     |           |          |         |    |
| NO               | DESCRIPTION |      |         |       |          | MATERIAL |                | Q'ty      | SPECIFICATION                       |           | TREAT    | REMARKS |    |
| TOLERANCE<br>(+) |             | 1-4  | 4-16    | 16-63 | 63-250   | 250-500  | ANGLE          | SCALE     | <div><div>1</div><div>1</div></div> | 1999.1.16 |          | REV     | 0  |
|                  | A           | 0.05 | 0.07    | 0.1   | 0.2      | 0.3      | ±              |           |                                     |           |          |         |    |
|                  | B           | 0.10 | 0.20    | 0.3   | 0.5      | 0.8      |                | UNIT      | M/M                                 | CAD NO.   | 9026anca |         |    |
|                  | C           | 0.25 | 0.35    | 0.5   | 0.7      | 1.5      |                |           |                                     |           |          |         |    |
| DRAW & DESIGN    |             |      | DET.CHE |       | APPROVAL |          | NAME           | MH9026    |                                     |           |          |         |    |
|                  |             |      |         |       |          |          | CAP, H/ANTENNA |           |                                     |           |          |         |    |
| Unicom Co., LTD  |             |      |         |       |          |          | DWG NO         | 216 - 257 |                                     |           | SHEET    |         | 05 |

## ***Appendix C***

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

## ***Appendix D***

### **Security Code**

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

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

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

The spread 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 trainssmitting 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 scrambling 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.

# ***EXHIBIT C***

## ***User Manual***