# MEASUREMENT/TECHNICAL REPORT

**APPLICTNT:** Wintime Electronics Corp.

**MODEL NO.:** PEN3

**FCC ID:** G54PEN3

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

**Equipment type:** Pen

Deferred grant requested per 47CFR 0.457(d)(1)(ii)?
Yes _____ No ✓ If yes, defer until: _____ (date)
We, the undersigned, agree to notify the Commission by (date) _____ / _____ / _____ of the intended date of announce ment of the product so that the grant can be issued on that date.

Transiyion Rules Request per 15.37? Yes _____ No ✓
If no, assumed Part 15, Subpart B for unintentional radiator the new 47 CFR (10-1-90 Edition) provision.

**Report Prepared**

**by Testing House :** **Neutron Engineering Inc.**

**for Company Name:** Wintime Electronics Corp.

**Address:** 9Fl., No. 738, Chung Cheng Rd., Chung Ho City, Taipei Hsine, Taiwan, R.O.C.

**Applicant Signature :** Hanker Hsu

**Hanker Hsu/Manager**

# CERTIFICATION

**We hereby certify that:**
The test data, data evaluation , test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (1992) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Part 15, Subpart C.

| | | |
|---|---|---|
| **Prepared by:** | Sherry Kuo | Sherry Kuo |
| **Reviewed by:** | Andy Chiu | Andy Chiu |
| **Approved by:** | George Yao | George Yao |
| **Issued Date :** | Apr. 8, 2000 | |
| **Report No. :** | NEI-FCCB-00009 | |
| **Company Stamp:** | | |

***NEUTRON ENGINEERING INC.***
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# Table of Contents

# 1. GENERAL INFORMATION

## 1-1. Product Description

The Wintime Electronics Corp. Corded Stylus-Pen, Model: PEN3 (referred to as the EUT in this report) is a part of digitizing tablet composite system. It is designed as an "Input Device" for IBM compatible PC.

The EUT designed with a LC-circuit that intentionally generates a 230KHz frequency and emits radio frequency by induction. The EUT therefore be considered as a part of composite system that covering computer peripheral and intentional radiator.

## 1-2. Related Submittal(s) / Grant (s)

This is a separate application for filing the intentional radiator portion of computing device peripheral testing. The corded stylus-pen (transmitter) intended to operate with a certified digitizer tablet that authorized by DoC.

Relative submittal(s) for Subpart B, unintentional radiator, compliance testing of the EUT has been filed at the same time with this application under Declaration of Conformity.

## 1-3. Tested System Details

The FCC IDs for all equipments, plus descriptions of all cables used in the tested system (including inserted cards, which have grants) are:

| Model No. | FCC ID | Equipment | Cable |
|---|---|---|---|
| CP-403B | N/A(3) | Digitizing Tablet | Shielded Data Cable |
| DM-1414V | N/A(3) | Modem | N/A |
| PEN3(1) | G54PEN3 | Stylus-Pen | Shielded Data Cable |
| 444 | N/A(3) | PC | Shielded Power Cord. |
| CM753ET | N/A(3) | Color Monitor | Shielded Data Cable(2)<br>Un-Shielded Power Cord |
| DPU-414 | N/A(3) | Printer | Shielded Parallel Data Cable<br>Un-Shielded Power Cord |
| FDA-104GA | F4ZFDA-104G | Keyboard | Shielded Data Cable |
| M-S34 | DZL211029 | Mouse | Shielded Data Cable |
| | | | |
| | | | |

Notes:

(1) EUT submitted for grant.
(2) Monitor's attached video cable without ferrite core.
(3) The support equipment was authorized by Declaration of Conformity.

## 1-4. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (1992). Radiated testing was performed at an antenna to EUT distance 1 meters.

## 1-5. Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of No.132-1, Lane 329, Sec. 2, Palain Road Shijr 221, Taipei, Taiwan, R.O.C. of NEUTRON ENGINEERING INC. This site has been fully described in report dated Jan. 25, 1999, submitted to your office, and accepted in a letter dated Sep. 02, 1999(Reg. No. 95335).

## 2. System Test Configuration

### 2-1. Justification

The system was configured for testing in a typical fashion (as a customer would normally use it.) The stylus-pen was connected to the digitizing table which connected to support equipment-personal computer. Peripherals of PC, such as monitor, keyboard, printer, mouse, and modem were contained in this system in order to comply with the ANSI C63.4 / CISPR22 Rules requirement. The PC operated in the default 640¡ Ñ480/31.5 KHz VGA Graphic mode. This operated condition was tested and used to collect the included data.

Also, the measurement for the intentional radiator covering the frequency range from 230 KHz to the 10th harmonic 2300 KHz. Further, the radiated emission measurements was made at by a loop antenna at 1 meter distance to EUT.

The tested results was extrapolated to the specified distance by using the square of an inverse linear distance extrapolation factor(40dB/decade)

### 2-2. EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disk, was inserted into driver A and is auto-starting on power-up. Once load, the program sequentially exercise each system component in turn. The sequence used is:

1. Read (write) from (to) mass storage device (Disk).
2. Send “H” pattern to video port device (Monitor).
3. Send “H” pattern to parallel port device (Printer).
4. Send “H” pattern to com1 port device (EUT).
5. Send “H” pattern to com2 port device (Modem).
6. Repeated from 2 to 6 continuously.

As the keyboard, modem, and the digitizer/composite system are strictly input devices, no data is transmitted to (from) them during test. They are, however, continuously scanned for data input activity.

**2-3. Special Accessories**

N/A

**2-4. Equipment Modifications**

Not available for this EUT intended for grant.

| | | | |
|---|---|---|---|
| **Applicant Signature:** | Hanker Hsu | **Date:** | Apr. 8, 2000 |
| **Type/Printed Name:** | Hanker Hsu | **Position:** | Manager |

## 2.5 Configuration of Tested System

The configuration of tested system is described as the block diagram shown in next page Figure 3.1 and details information of I/O cable an power cord connection are tabulated as Table A and B. The monitor is powered from a floor mounted receptacle ( referred to as the wall outlet in the previous described )was tested.

**TABLE A - Test Equipment**

| Item | Equipment | Mfr. | Model/Type No. | I/O Port | FCC ID | Remark |
|---|---|---|---|---|---|---|
| E-1 | PC | IBM | 444 | | N/A(3) | |
| E-2 | Monitor | HITACHI | CM753ET | VGA Port | N/A(3) | |
| E-3 | Pen Tablet | Wintime | CP-403B | Serial Port | N/A(3) | * |
| E-4 | Printer | SII | DPU-414 | Centronic Port | N/A(3) | |
| E-5 | Modem | ACEEX | DM-1414V | Com 2 Port | N/A(3) | |
| E-6 | Keyboard | Forward | FDA-104GA | PS/2 Port | F4ZFDA-104G | |
| E-7 | Corded Stylus Pen | Wintime | PEN3 | N/A | G54PEN3 | EUT |
| E-8 | Mouse | HP | M-S34 | PS/2 Port | DZL211029 | |
| | | | | | | |

**Remark:**

(1) Unless otherwise denoted as EUT in [Remark] column , device(s) used in tested system is a support equipment.

(2) Unless otherwise marked as * in [Remark] column, Neutron consigns the supporting equipment(s) to the tested system.

(3) The support equipment was authorized by Declaration of Confirmation.

## Table B. - Information Cable Information

| Item | I/O Cable | Device Connected | Shielded | Ferrite | Detachable/Permanently | Note |
|---|---|---|---|---|---|---|
| C-1 | VGA Cable | PC-Monitor | Yes | No | Permanently attached on Monitor | |
| C-2 | Centronics Cable | PC-Printer | Yes | No | Part of Printer, Detachable | |
| C-3 | Keyboard Cable | PC-Keyboard | Yes | No | Permanently attached on Keyboard | |
| C-4 | RS-232C Cable | PC-Modem | Yes | No | Part of Modem, Detachable | |
| C-5 | Data Cable | PC-EUT | Yes | No | Detachable type | * |
| C-6 | Mouse Cable | PC-Mouse | Yes | No | Permanently attached on Mouse | |
| C-7 | Data Cable | EUT-Corded Pen | Yes | No | Detachable type | * |
| | | | | | | |
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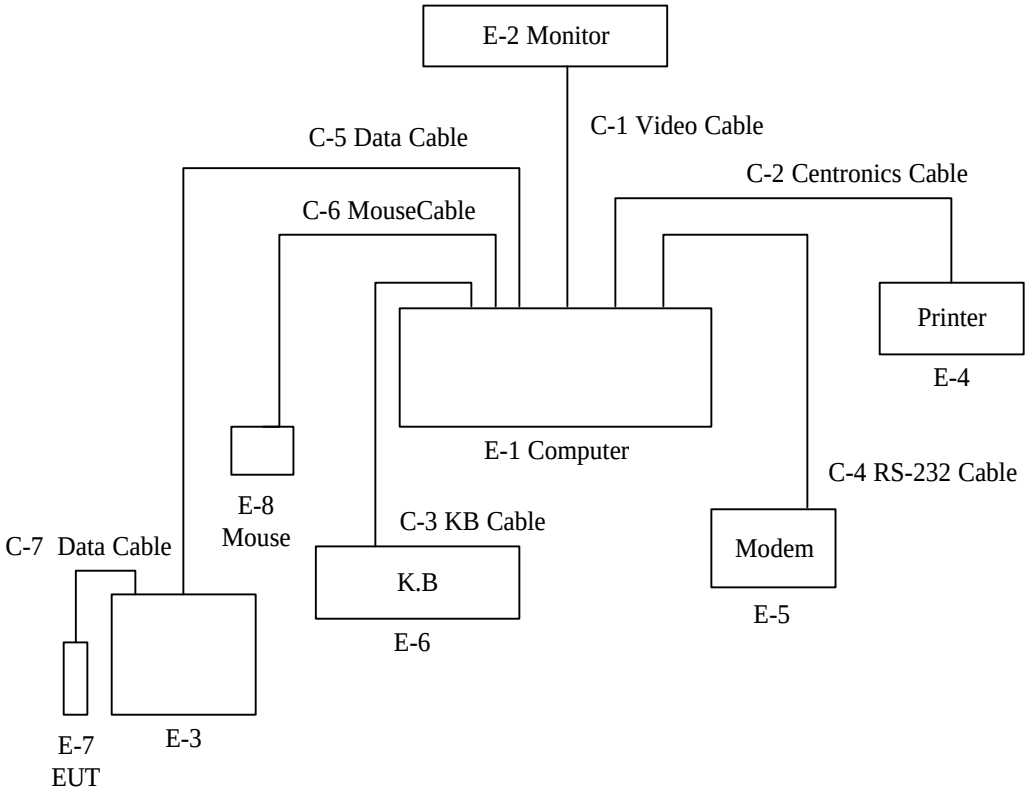
Note:

(1) Unless otherwise marked as * in [ Remark ] colum, Neutron consigns the supporting equipment(s) to the tested system.

**Flgure 3.1 Configuration of Tested System**

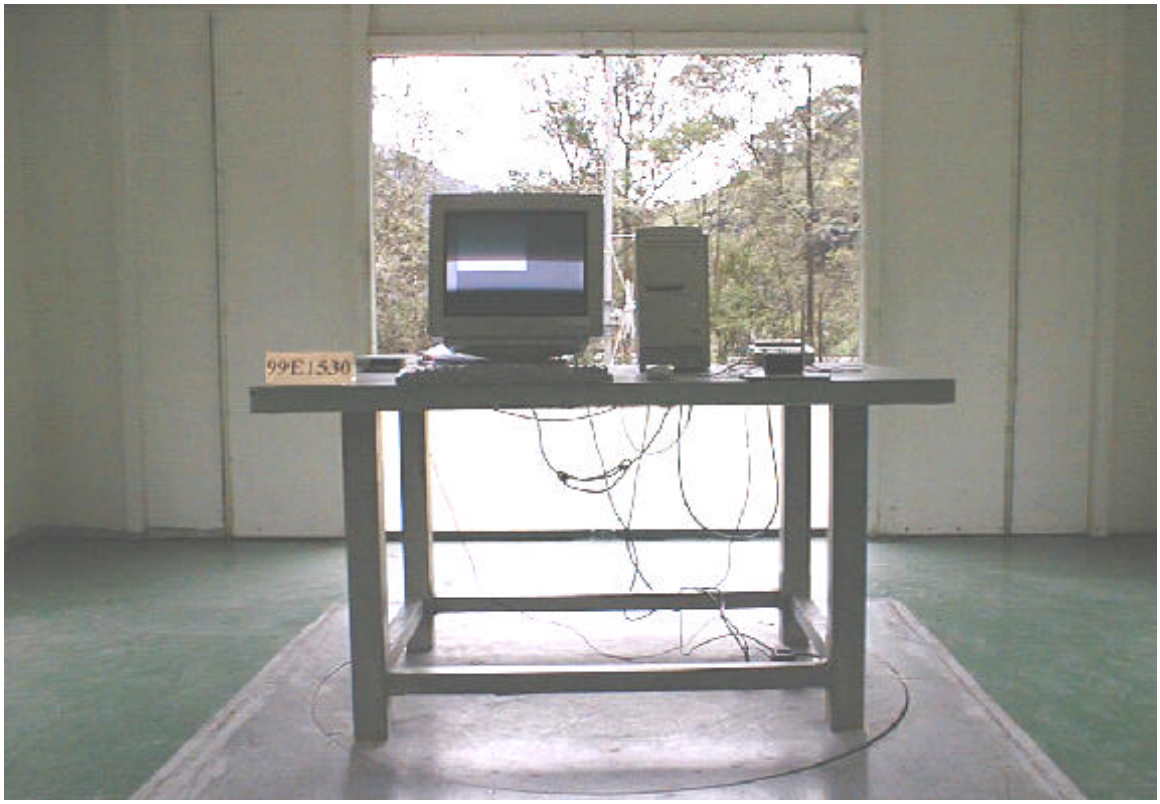


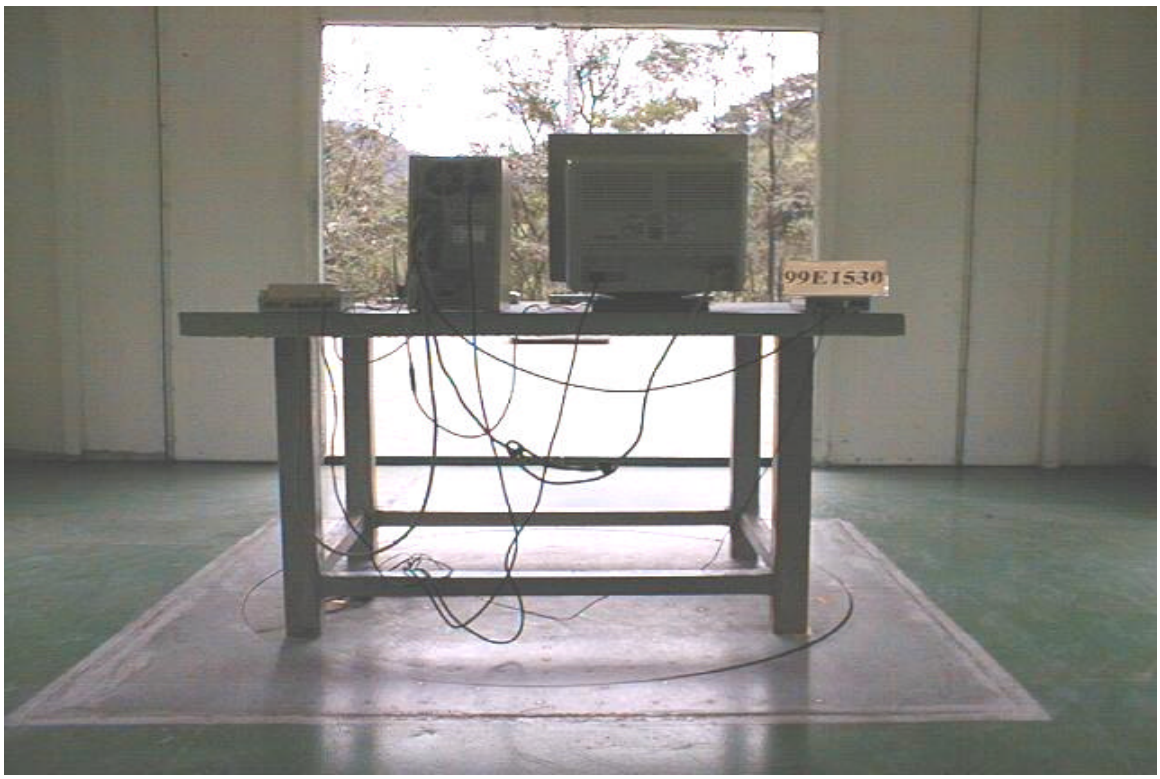
# 3. Conducted and Radiated Measurement Photos

## 3-1. Conducted Measurement Photos


# 3. Conducted and Radiated Measurement Photos

## 3-2. Radiated Measurement Photos



## 4. Conducted Emission Datas

**4.1** The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

**Judgement:** Passed by **-3.42** **dB** in mode of **Neutral** terminal **7.45** **MHz**

| Freq. | Terminal | Measured(dBuV) | | Limits(dBuV) | | Safe Margins | |
|---|---|---|---|---|---|---|---|
| (MHz) | L/N | QP-Mode | AV-Mode | QP-Mode | AV-Mode | (dBuV) | Note |
| 0.17 | Line | 44.19 | * | 48.00 | 38.00 | -3.81 | (QP) |
| 0.43 | Line | 38.01 | * | 48.00 | 38.00 | -9.99 | (QP) |
| 0.51 | Line | 37.61 | * | 48.00 | 38.00 | -10.39 | (QP) |
| 0.59 | Line | 35.61 | * | 48.00 | 38.00 | -12.39 | (QP) |
| 11.32 | Line | 43.88 | * | 48.00 | 38.00 | -4.12 | (QP) |
| 0.15 | Neutral | 44.16 | * | 48.00 | 38.00 | -3.84 | (QP) |
| 0.43 | Neutral | 37.81 | * | 48.00 | 38.00 | -10.19 | (QP) |
| 0.51 | Neutral | 38.01 | * | 48.00 | 38.00 | -9.99 | (QP) |
| 7.45 | Neutral | 44.58 | * | 48.00 | 38.00 | -3.42 | (QP) |
| 28.15 | Neutral | 42.67 | * | 48.00 | 38.00 | -5.33 | (QP) |

Remark:

(1) Reading inwhich marked as QP means measurements by using are Quasi-Peak Mode with Detector BW=9KHz; SPA setting in RBW=100KHz,VBW =100KHz, Swp. Time = 0.3 sec./MHz. Reading inwhich marked as AV means measurements by using are Average Mode with instrument setting in RBW=1MHz,VBW=10Hz, Swp. Time =0.3 sec./MHz.

(2) All readings are QP Mode value unless otherwise stated AVG in colum of [ Note ]. If the QP Mode Measured value compliance with the QP Limits and lower than AVG Limits, the EUT shall be deemd to meet both QP & AVG Limits and then only QP Mode was measured, but AVG Mode didn't perform.In this case, a " * " marked in AVG Mode colum of Interference Voltage Measured.

(3) Measuring frequency range from 150KHz to 30MHz.

Review: Andy Chiu Test Personnel.: John Date: Mar. 22, 2000

## 5. Radiated Emission Datas

**5.1** The following data lists the significant emission frequencies, measured levels, plus the limit. Explanation of field strength limit calculation is given in paragrapg 6.1.

Condition : Test Distance : 1 meter

Type of Antenna: Loop Antenna

| Freq. ( KHz ) | Frequency Within Band (MHz) | Receiver* Reading in dBuV/m | Factor (dB) Cable Loss | Field Strength (uV/m) | Required Measurement Distance(m) | Limitation Converted 1 m dist. (dBuV/m) | Over Limit |
|---|---|---|---|---|---|---|---|
| 231 | 0.009-0.49 | 64.03 | 0.1 | 10.39 | 300 | 119.42 | -55.39 |
| 461 | 0.009-0.49 | 60.17 | 0.1 | 5.21 | 300 | 113.42 | -53.25 |
| 692 | 0.49 | 42.70 | 0.1 | 34.68 | 30 | 89.89 | -47.19 |
| 922 | ↑ | 46.74 | 0.1 | 26.03 | 30 | 87.39 | -40.65 |
| 1153 | ↓ | 42.90 | 0.2 | 20.82 | 30 | 85.45 | -42.55 |
| 1386 | | 37.01 | 0.2 | 17.32 | 30 | 83.85 | -46.84 |
| 1614 | 1.705 | 40.47 | 0.2 | 14.87 | 30 | 82.53 | -42.06 |
| 1845 | ↑ | 39.05 | 0.3 | 30.00 | 30 | 88.63 | -49.58 |
| 2072 | ↓ | 35.64 | 0.3 | 30.00 | 30 | 88.63 | -52.99 |
| 2301 | 30 | 35.29 | 0.3 | 30.00 | 30 | 88.63 | -53.34 |

* All receiver readings (the measured field strength levels) are measured from loop antenna directly.
* The emission limits shown in the above table are base on measurements employing a quasi-peak dectorexcept for the frequency bands 9-90 KHz, 110-490 KHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing an average dector.
* The tighter limit applies at the band edges.
* **Remark:** "**" means that the noise emission is too low to detect by Field Strength Meter.

Review¡ G Andy Chu Test Personnel.¡ G John Date: Mar. 29, 2000

### 5-2.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain (if any) from the measured reading.The basic equation with a sample calculation is as follows:

**FS = RA + AF + CL - AG**

**Where FS = Field Strength**

**RA = Receiver Amplitude**

**AF = Antenna Factor (1)**

**CL = Cable Attenuation Factor (1)**

**AG = Amplifier Gain (1) (2)**

**Remark :**

(1) The Correction Factor = AF + CF - AG, as shown in the data tables' Correction Factor column.

(2) AG is not available for Neutron's Open Site Facility

**Example of Calculation:**

Assume a Receiver Reading of 23.7 dBuV is obtained with an Antenna Factor of 7.2 dB and a Cable Factor of 1.1 dBuV. Then:

1. The Correction Factor will be caculated by

**Correction Factor = AF + CF - AG = 7.2 + 1.1 - 0 = 8.3 (dB)**

as shown in the data tables' Correction Factor column.

2. The Field Strength will be calculated by

**FS = RA + Correction Factor = 23.7 + 8.3 = 32 (dBuV/m).**

FS is the value shown in the data tables' Corrected Reading column and RA is the value shown in

the data tables' Receiver Reading column.The 32 dBuV/m value was mathematically converted

to its corresponding level in uV/m as:

**$Log^{-1}$ ¡ ¿32.0dBuV/m)/20¡ j ×39.8 (uV/m)**

### 5-2.2. Field Strength Limits Calculation

The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength (uV/m) | Measurement Distance (m) |
|---|---|---|
| 0.009 - 0.490 ..... | 2400/F (KHz) | 300 |
| 0.490 - 1.705 ..... | 24000/F (KHz) | 30 |
| 1.705 - 30.0 ..... | 30 | 30 |
| 30 - 88 ..... | 100 | 3 |
| 88 - 216 ..... | 150 | 3 |
| 216 - 960 ..... | 200 | 3 |
| above 960 ..... | 500 | 3 |

As the Test Methodology mentioned in Section 1-4, the measurement distance between the EUT and Loop Antenna was selected by 1 meter, the Field strength Limits of each frequency band are calculated by the following equation to convert its corresponding distance to 1 meter:

**Ed2 / Ed1 = ( d2/d1 ) square.....equation ( 1 )**

**where d1 will be 1 meter, then**

**E1 = Ed2 * ( d2 ) /1m square .....equation ( 2 )**

**where E1 denotes the field strength limit at measurement distance 1 meter.**

The measured field strength levels are read from receiver directly in dBuv/m unit. For easy to compare with field strength limits, taking command logarithm both side of equation (2), then it will be calculated as equation (3) in dBuV/m unit.

20 log (E1) = 20 log [ (Ed2) * (d2) square ], then

20 log (E1) = 20 log (Ed2) + 40 log (d2).....equation (3)

**5-2-2 Example for calculation**

1. Frequency located in band of 0.009-0.490 MHz, the field strength limit of each frequency be caculated as

**20 log 2400 / F (KHz) + 40 log 300**

Assume a frequency of 120 KHz be calculated, then the Field strength Limit in dBuV will be obtained

**20 log (2400 / 120) + 40 log 300 = 125.1 dBuV/m**

2. Frequency located in band of 0.490 – 1.705 MHz, the field strength limit of each frequency be caculated as

**20 log 24000 / F (KHz) + 40 log 30**

Assume a frequency of 600KHz becalculated, then the Field Strength Limit in dBuV will be obtained

**20 log (24000 / 600) + 40 log 30 = 91.1 dBuV/m**

3. Frequency located in band of 30-88 MHz, the field strength limit of each frequency be caculated as

**20 log 30 + 40 log 30**

Assume a frequency of 6 MHz be calculated, then the Field Strength Limit in dBuV will be obtained

**20 log 30 + 40 log 30 = 88.6 dBuV/m**

4. Frequency located in band of 30-88 MHz, the field strength limit of each frequency be caculated as

**20 log 100 + 40 log 3**

Assume a frequency of 60 MHz be calculated, then the Field Strength Limit in dBuV will be obtained

**20 log 100 + 40 log 3 = 59.1 dBuV/m**

## 5-3. Correction Factor VS Frequency

| Frequency (MHz) | Antenna Factor (dB) | Cable Loss (dB) |
|---|---|---|
| 30.00 | 11.10 | 0.90 |
| 35.00 | 10.80 | 0.50 |
| 40.00 | 11.20 | 1.00 |
| 45.00 | 11.50 | 0.80 |
| 50.00 | 11.30 | 1.00 |
| 55.00 | 10.50 | 1.30 |
| 60.00 | 9.90 | 1.00 |
| 65.00 | 8.70 | 1.50 |
| 70.00 | 7.60 | 1.20 |
| 75.00 | 6.40 | 1.40 |
| 80.00 | 6.10 | 1.30 |
| 85.00 | 7.00 | 1.40 |
| 90.00 | 8.00 | 1.70 |
| 95.00 | 10.00 | 1.50 |
| 100.00 | 11.20 | 1.90 |
| 110.00 | 12.60 | 2.00 |
| 120.00 | 13.00 | 1.80 |
| 130.00 | 12.50 | 1.80 |
| 140.00 | 12.00 | 2.00 |
| 150.00 | 12.00 | 2.20 |
| 160.00 | 13.20 | 2.40 |
| 170.00 | 14.80 | 2.50 |
| 180.00 | 16.30 | 2.50 |
| 190.00 | 17.00 | 2.50 |
| 200.00 | 17.30 | 2.40 |
| 225.00 | 10.50 | 2.70 |
| 250.00 | 11.70 | 3.10 |
| 275.00 | 12.80 | 3.70 |
| 300.00 | 14.50 | 4.00 |
| 325.00 | 14.00 | 4.50 |
| 350.00 | 14.20 | 4.50 |
| 375.00 | 14.60 | 4.60 |
| 400.00 | 15.10 | 4.80 |
| 450.00 | 16.20 | 5.40 |
| 500.00 | 17.60 | 6.50 |
| 550.00 | 17.80 | 7.00 |
| 600.00 | 18.40 | 7.10 |
| 650.00 | 19.50 | 7.10 |
| 700.00 | 20.80 | 7.20 |
| 750.00 | 20.50 | 7.50 |
| 800.00 | 21.10 | 8.00 |
| 850.00 | 22.40 | 8.60 |
| 900.00 | 23.50 | 8.90 |
| 950.00 | 24.00 | 9.70 |
| 1000.00 | 24.80 | 10.30 |