

FCC/RB/EL/99 JAN 08 1999

MEASUREMENT/TECHNICAL REPORT

APPLICNT: TECO IMAGE SYSTEMS CO., LTD.

MODEL NO.: DC3500

FCC ID: NSCDC3500

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

Equipment type: Digital Camera

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 announcement of the product so that the grant can be issued on that date.

Transition 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: TECO IMAGE SYSTEMS CO., LTD.

Address: 2nd Fl., 1568-1 Chung Shan Rd., Sec. 1 Kuang-Ln, Taoyuan Hsien, Taiwan, R.O.C.

Applicant Signature :

Yangwan Yang

Yangman Jang / Project 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 CLASS B conducted and radiated emission limits of FCC Rules Part 15, Subpart B.

Prepared by : Sherry Kuo

Sherry kuo

Reviewed by : Andy Chiu

Andy Chiu

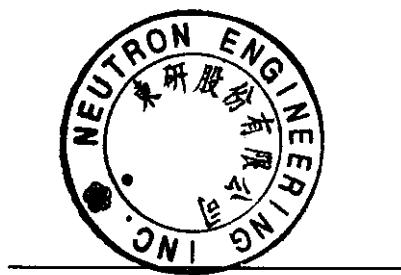
Approved by : George Yao

George Yao

Issued Date : Dec. 31, 1998

Report No. : NEI-FCCB-98233

Company Stamp :



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1. GENERAL INFORMATION

1-1. Product Description

The Teco Image Systems Co., Ltd. Model DC3500 (referred to as the EUT in this report) is a digital camera features as both the portable camera as well as the tethered PC camera. As a portable camera, it can snap color pictures directly from the field. When it is connected to PC's serial port, then the user's can not only download portable pictures, but also preview, snap and edit images under the Windows software.

Following described the summarized feature of EUT:

1. Image Sensor 1/3" (approx. 350K pixels)
2. Image Resolution Fine 640 (H) X 480 (V) / Normal 320 (H) X 240 (V)
3. Storage Flash Memory Card (1 MB)/(2 MB)
4. Shutter CCD electronic shutter
5. PC I/F RS-232C
6. Power DC +3 V, may be battery supplied, AC/DC Adapter supplied, or from PC KB connector.

A more detailed and/or technical description of EUT is attached in **User's Manual**.

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

This submittals is intended for filing a Class II Permissive Change for the certified equipment FCC ID NSCDC3500 (date of grant June 3, 1998)

1-3. Change(s) Description

This re-submittal report for the certified equipment arises from the change in the follows:

An additional T-type cable connector, detachable, shielded type for supplying a DC Voltage from KB port on PC will be marketed with the current equipment as an optional cable accessory.

1-4. 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 |
|-----------------------|--------------------|---------------------------------|--|
| DC3500 SCP48-31000 | NSCDC3500 | Digital Camera AC/DC Adaptor | Shielded Data Cable Unshielded Power Cord |
| 4500DC-E | GWGMULTI82 | Monitor | Shielded Data Cable ⁽²⁾ Un-Shielded Power Cord |
| 93V | ANO6282 | PC | Shielded Power Cord |
| DPU-414 | N/A ⁽³⁾ | Printer, Parallel I/F | Shielded Parallel Data Cable Un-Shielded Power Cord |
| AT-1200CK | E2O5OV1200CK | Modem, Serial I/F | Shielded Serial Data Cable Un-Shielded Power Cord |
| FDA-102A | F4Z4K3FDA-102A | Keyboard | Shielded Data Cable |
| SERIES 2-7S | DZL6QBS2 | Mouse | Shielded Data Cable |
| | | | |
| | | | |
| | | | |
| | | | |

Notes:

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

1-5. 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 10 meters.

1-6. Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of No. 5, All 2, Lane 220, Kang Lo St., Nei Hwu, Taipei, Taiwan, R.O.C. of NEUTRON ENGINEERING INC. This site has been fully described in report dated July 09, 1996 Submitted to your office, and accepted in a letter dated March 28, 1998 (31040/SIT-1300F2).

3. System Test Configuration

3-1. Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). The Digital Camera was connected to support equipment-personal computer and used to receive the video signal of outside. Peripherals of PC such as monitor, printer, modem, keyboard and mouse were contained in this testing system in order to comply with ANSI C63.4 /CISPR22 (1996) Rules requirement. The PC operated in pixel resolution 640x480/31.5 KHz, true color, mode. This operating condition was tested and used to collect the data included.

3-2. 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 loaded, the program sequentially exercises each system component in turn. The sequence used is:

1. Read object image from CCD sensor (EUT) to PC RS-232 port.
2. Send picture from PC to the video port device (Monitor).
3. Repeated from 1 to 2 continuously.

The keyboard, mouse, modem as well as the printer are strictly connected only, no data is transmitted to (from) them during test. They are, however, continuously scanned for data input activity.

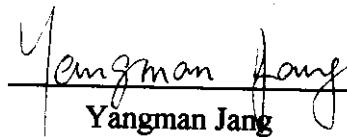
3-3. Special Accessories

A special detachable type data Cable, non-shielded, without ferrite core attached, incorporated with a 9 pin D-Sub connector, provides EUT connection to PC RS-232C serial COM port. Also, a T-type cable connector, detachable, non-shielded, provided for supplying a DC Voltage from KB connector on PC. Those interface cables are normally supplied by the applicant.

3-4. Equipment Modifications

N/A

Applicant Signature :


Yangman Jang

Type/Printed Name :

Date :

Dec. 31, 1998

Position :

Project Manager

3.5 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 and 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 | Digital Camera | TECO | DC3500 | COM1 Port | NSCDC3500 | EUT |
| E-2 | Monitor | Optiquest | 4500DC-E | VGA Port | GWGMULTI82 | |
| E-3 | PC | IBM | 93V | | ANO6282 | |
| E-4 | Printer, Parallel I/F | SII | DPU-414 | Printer Port | N/A(3) | |
| E-5 | Modem, Serial I/F | Datatronics | AT-1200CK | COM2 Port | E2O5OV1200CK | |
| E-6 | Keyboard | ACER | 6311 | PS/2 Port | FVI6311-K | |
| E-7 | Mouse | Logitech | SERIES 2-7S | PS/2 port | DZL6QBS2 | |
| | | | | | | |

Remark:

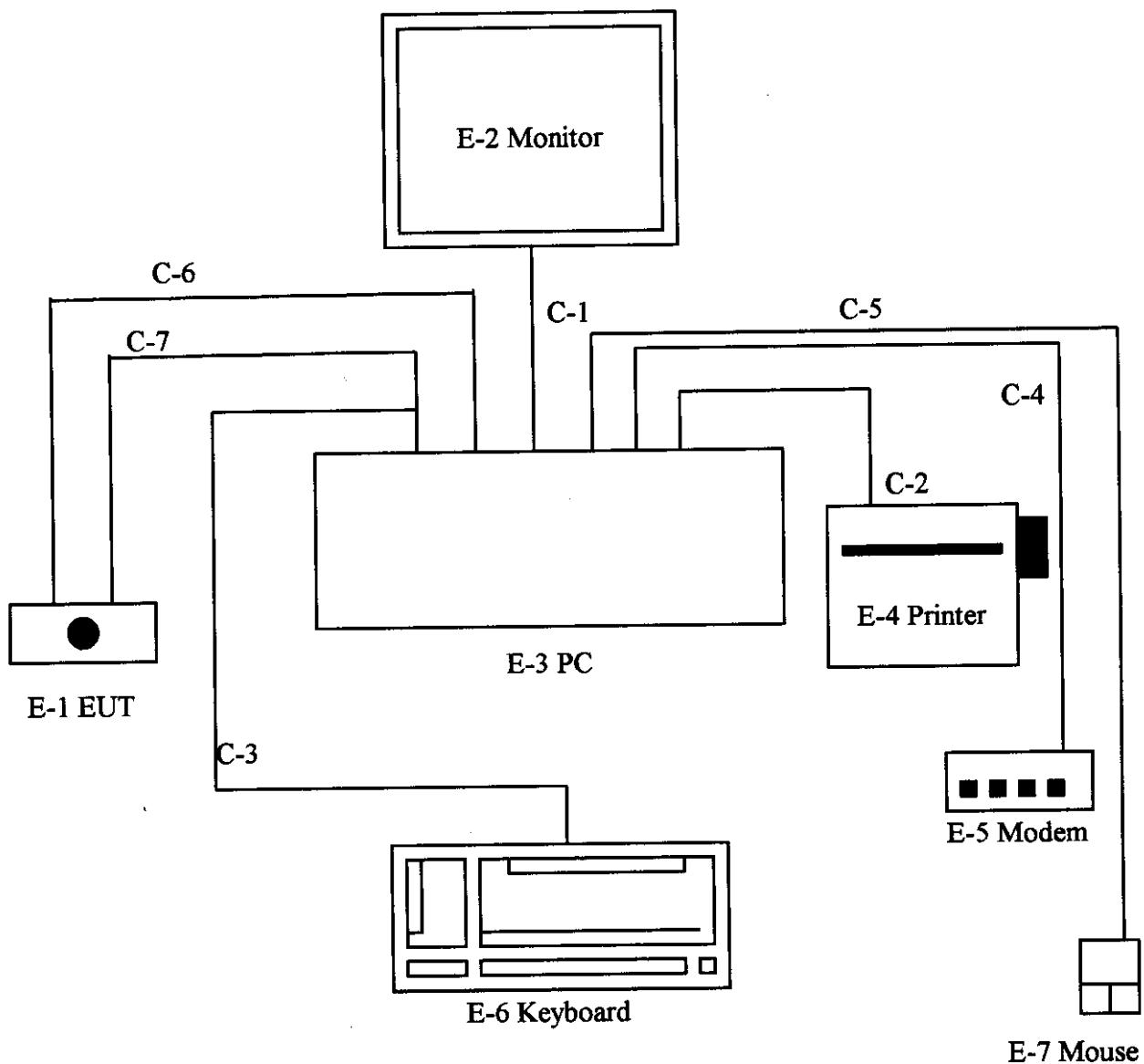
- (1) Unless otherwise denoted as EUT in 「Remark」 column , device(s) used in tested system is a support equipment.
- (2) Unless otherwise marked as ※ in 「Remark」 column, Neutron consigns the supporting equipment(s) to the tested system.
- (3) The support equipment was passed by Declaration of Conformity.

Table B. - Informations Cable Information

| Item | I/O Cable | Device Connected | Shielded | Ferrite | Detachable/Permanently | Note |
|------|------------------|------------------|----------|---------|------------------------|------|
| C-1 | Video Cable | Monitor-PC | Yes | No | Permanently attached | |
| C-2 | Centronics Cable | PC-Printer | Yes | No | Detachable type | |
| C-3 | Keyboard Cable | PC-Keyboard | Yes | No | Permanently attached | |
| C-4 | RS-232 Cable | PC-Modem | Yes | No | Detachable type | |
| C-5 | Mouse Cable | PC-Mouse | Yes | No | Permanently attached | |
| C-6 | I/O Cable | EUT-PC | Yes | No | Detachable type | ※ |
| C-7 | T-type Cable | EUT-PC | Yes | No | Detachable type | ※ |
| | | | | | | |
| | | | | | | |

Note:

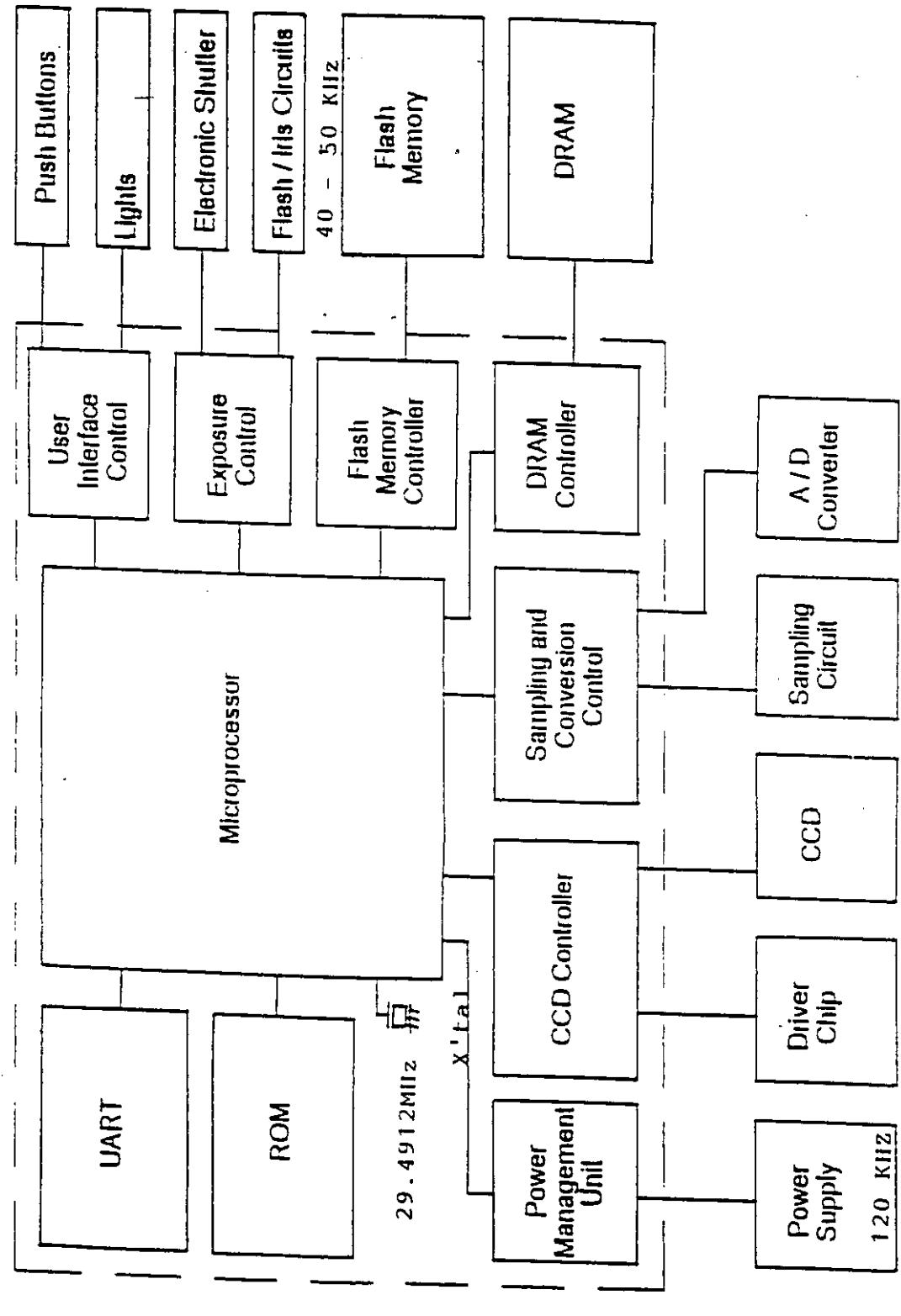
- (1) Unless otherwise marked as ※ in 「Remark」 colum, Neutron consigns the supporting equipment(s) to the tested system.

Figure 3.1 Configuration of Tested System

4. Block Diagram(s)

Figure 4.1 Block diagram of system, Page 13.A

Digital Camera Diagram



6. Conducted Emission Datas

- 6.1 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.

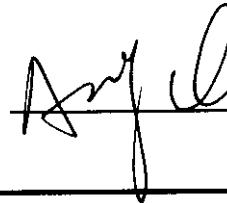
Judgement: Passed by **-12.85 dB** in mode of **Neutral terminal 0.52 MHz**

| Freq. (MHz) | Terminal L/N | Measured(dBuV) | | Limits(dBuV) | | (dBuV) | Safe Margins (Note) |
|----------------|-----------------|----------------|---------|--------------|---------|--------|------------------------|
| | | QP-Mode | AV-Mode | QP-Mode | AV-Mode | | |
| 0.28 | Line | 45.14 | * | 60.91 | 50.91 | -15.77 | (QP) |
| 0.36 | Line | 43.76 | * | 58.78 | 48.78 | -15.02 | (QP) |
| 0.51 | Line | 42.37 | * | 56.00 | 46.00 | -13.63 | (QP) |
| 0.64 | Line | 41.77 | * | 56.00 | 46.00 | -14.23 | (QP) |
| 0.76 | Line | 41.04 | * | 56.00 | 46.00 | -14.96 | (QP) |
| 0.28 | Neutral | 45.09 | * | 60.85 | 50.85 | -15.76 | (QP) |
| 0.40 | Neutral | 42.05 | * | 57.85 | 47.85 | -15.80 | (QP) |
| 0.52 | Neutral | 43.15 | * | 56.00 | 46.00 | -12.85 | (QP) |
| 0.64 | Neutral | 42.22 | * | 56.00 | 46.00 | -13.78 | (QP) |
| 0.76 | Neutral | 41.31 | * | 56.00 | 46.00 | -14.69 | (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 :



Test Personnel :

Riker 1154

Date:

Dec. 24, 1998

7. Radiated Emission Data

- 7.1 The following data lists the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, as well as the limit. Explanation of the Correction Factor is given in paragraph 7.2.

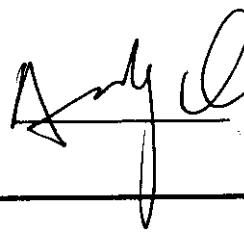
Judgement: Passed by **-3.75 dB** in polarity of **Vertical 145.94 MHz**

| Freq. (MHz) | Ant. H/V | Reading(RA) (dBuV) | Corr.Factor(CF) (dB) | Measured(FS) (dBuV/m) | Limits(QP) (dBuV/m) | Safe Margins (dBuV/m) | Note |
|----------------|-------------|-----------------------|-------------------------|--------------------------|------------------------|--------------------------|------|
| 67.91 | H | 31.93 | - 7.53 | 24.40 | 30.00 | - 5.60 | |
| 118.23 | H | 27.13 | - 2.23 | 24.90 | 30.00 | - 5.10 | |
| 145.94 | V | 29.21 | - 2.96 | 26.25 | 30.00 | - 3.75 | |
| 157.84 | H | 26.98 | - 1.75 | 25.23 | 30.00 | - 4.77 | |
| 177.39 | V | 23.42 | 1.49 | 24.91 | 30.00 | - 5.09 | |
| 199.42 | V | 23.12 | 2.69 | 25.81 | 30.00 | - 4.19 | |
| 204.80 | H | 29.80 | - 3.65 | 26.15 | 30.00 | - 3.85 | |
| 232.80 | V | 31.37 | - 3.30 | 28.07 | 37.00 | - 8.93 | |
| 333.60 | H | 28.93 | 1.57 | 30.50 | 37.00 | - 6.50 | |
| 400.00 | H | 24.82 | 2.89 | 27.71 | 37.00 | - 9.29 | |
| 466.40 | V | 23.60 | 5.40 | 29.00 | 37.00 | - 8.00 | |
| 499.20 | V | 25.61 | 7.06 | 32.67 | 37.00 | - 4.33 | |

Remark :

- (1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz ; SPA setting in RBW=1MHz, VBW =1MHz, Swp. Time = 0.3 sec./MHz.
- (2) All readings are Peak unless otherwise stated QP in column of "Note". Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- (3) Measuring frequency range from 30MHz to 1000MHz.
- (4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table.

Review :



Test Personnel :

Riker 1154

Date:

Dec.19, 1998

7-2. 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:

$$\mathbf{FS = RA + AF + CL - AG}$$

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 + CL - 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 dB. Then:

1. The Correction Factor will be calculated by

$$\mathbf{Correction Factor = AF + CL - AG = 7.2 + 1.1 - 0 = 8.3 (dB)}$$

as shown in the data tables' Correction Factor column.

2. The Field Strength will be calculated by

$$\mathbf{FS = RA + Correction Factor = 23.7 + 8.3 = 32 (dBuV/m).}$$

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:

$$\mathbf{Log^{-1} [(32.0dBuV/m)/20] = 39.8 (uV/m)}$$

7-3. Correction Factor VS Frequency

| Frequency (MHz) | Antenna Factor (dB) | Cable Loss (dB) |
|------------------------|----------------------------|------------------------|
| 30.00 | 11.10 | 0.20 |
| 35.00 | 10.80 | 0.00 |
| 40.00 | 11.20 | 0.40 |
| 45.00 | 11.50 | 0.40 |
| 50.00 | 11.30 | 0.90 |
| 55.00 | 10.50 | 0.00 |
| 60.00 | 9.90 | 0.00 |
| 65.00 | 8.70 | 0.20 |
| 70.00 | 7.60 | 0.00 |
| 75.00 | 6.40 | 0.50 |
| 80.00 | 6.10 | 0.10 |
| 85.00 | 7.00 | 0.80 |
| 90.00 | 8.00 | 0.30 |
| 95.00 | 10.00 | 0.40 |
| 100.00 | 11.20 | 0.60 |
| 110.00 | 12.60 | 0.60 |
| 120.00 | 13.00 | 0.60 |
| 130.00 | 12.50 | 0.50 |
| 140.00 | 12.00 | 0.20 |
| 150.00 | 12.00 | 1.00 |
| 160.00 | 13.20 | 1.20 |
| 170.00 | 14.80 | 1.60 |
| 180.00 | 16.30 | 1.90 |
| 190.00 | 17.00 | 1.90 |
| 200.00 | 17.30 | 1.40 |
| 225.00 | 10.50 | 1.10 |
| 250.00 | 11.70 | 2.00 |
| 275.00 | 12.80 | 2.40 |
| 300.00 | 14.50 | 2.40 |
| 325.00 | 14.00 | 1.90 |
| 350.00 | 14.20 | 2.40 |
| 375.00 | 14.60 | 2.90 |
| 400.00 | 15.10 | 2.70 |
| 450.00 | 16.20 | 3.20 |
| 500.00 | 17.60 | 3.70 |
| 550.00 | 17.80 | 3.90 |
| 600.00 | 18.40 | 4.30 |
| 650.00 | 19.50 | 4.00 |
| 700.00 | 20.80 | 4.10 |
| 750.00 | 20.50 | 5.30 |
| 800.00 | 21.10 | 5.90 |
| 850.00 | 22.40 | 5.80 |
| 900.00 | 23.50 | 5.50 |
| 950.00 | 24.00 | 6.30 |
| 1000.00 | 24.80 | 5.20 |

8. Photos of Tested EUT:

The following photos are attached:

Photo # 1. Front View