# EMC

## TEST REPORT

REPORT NO. : CE87071506
MODEL NO. : SBC-411E, WCL-486, SBC-456, SBC-456E, SBC-357, SBC-411
DATE OF TEST : July 15 ~ Aug. 7, 1998

PREPARED FOR: AAEON TECHNOLOGY INC.

ADDRESS : 1F, NO. 6, ALLEY 6, LANE 45, PAO-HSIN RD., HSIN-TIEN CITY, TAIPEI, TAIWAN, R.O.C.

PREPARED BY:

NVLAP®
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ADVANCE DATA TECHNOLOGY CORPORATION
12F, NO.1, SEC.4, NAN-KING EAST RD.,
TAIPEI, TAIWAN, R.O.C.

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# 1. CERTIFICATION

Issue date: Aug. 8, 1998

| | | |
|---|---|---|
| Product | : | CPU BOARD |
| Trade Name | : | AAEON |
| Model No. | : | SBC-411E, WCL-486, SBC-456, SBC-456E, SBC-357, SBC-411 |
| Applicant | : | AAEON TECHNOLOGY INC. |
| Standard | : | EN 55022:1994+A1:1995+A2:1997, Class A **EN 50082-2:1995**<br>EN 61000-4:2:1995<br>EN 61000-4-3:1996<br>EN 61000-4-4:1995<br>EN 61000-4-6:1996<br>EN 61000-4-8:1993<br>ENV 50204:1995 |

We hereby certify that one sample of the designation has been tested in our facility from July 15 to Aug. 7, 1998. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

CHECKED BY : Sharon Hsiung , DATE: 8/8/98

( Sharon Hsiung )

APPROVED BY : Mike Su , DATE: 8/8/98

( Mike Su)

**ADVANCE DATA TECHNOLOGY CORPORATION**

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# 2. GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | | |
|---|---|---|
| Product | : | CPU BOARD |
| Model No. | : | SBC-411E, WCL-486, SBC-456, SBC-456E, SBC-357, SBC-411 |
| Power Supply Type | : | DC (from PC) |
| Data Cable | : | N/A |

Note: The EUT has six model names which are identical to each other in all aspects except for the following:

* SBC-411E and WCL-486 are identical to each other, except for the model names. It has 2 Ethernet function, without VGA function.
* SBC-411 is identical to SBC-411E, except that it is without Ethernet function.
* SBC-456E has 1 Ethernet function and VGA function (1027x768 256 colors)
* SBC-456 is identical to SBC-456E, except this model is without Ethernet function.
* SBC-357 is without Ethernet function but has VGA on board (1024x768 256 colors).

From the above models, three models were selected as representative models for the test, as the following :

* Model : SBC-411E
* Model : SBC-456E
* Model : SBC-357

For more detailed features description, please refer to ATTACHMENT 1 - TECHNICAL DESCRIPTION OF EUT and User's Manual.

## 2.2 GENERAL DESCRIPTION OF APPLIED STANDARD

The EUT is a kind of Information Technology Equipment which could be used in industrial area and according to the manufacturer's specifications, it was tested according to the following standards:

EN 55022:1994+A1:1995+A2:1997, Class A

**EN 50082-2:1995**
EN 61000-4-2:1995
EN 61000-4-3:1996
EN 61000-4-4:1995
EN 61000-4-6:1996
EN 61000-4-8:1993
ENV 50204:1995

All tests are performed and recorded as per above standards.

## 2.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories are used to form representative test configuration during the tests.

**FOR EMISSION TEST (For Model : SBC-411E)**

| No | Product | Brand | Model No. | Serial No. | I/O Cable |
|---|---|---|---|---|---|
| 1 | COLOR MONITOR | ADI | 937G | 649015T00102093A | Nonshielded Signal (1.2m) Shielded Power (1.8m) |
| 2 | PRINTER | HP | 2225C+ | P101004 | Nonshielded Signal (1.2m) |
| 3 | MODEM | ACEEX | 1414 | 980020540 | Shielded signal (1.2m) |
| 4 | KEYBOARD | FORWARD | FDA-104GA | FDKB8110112 | Shielded Signal (1.4m) |
| 5 | MOUSE | DEXIN | A2P800A | 80110013 | Shielded signal (1.4m) |
| 6 | PC | ADI | DUO PC-C | A95002100003 | Nonshielded power (1.8m) |
| 7 | PC | IBM | 6560-T7T | 9983708 | Nonshielded power (1.8m) |
| 8 | MONITOR | ACER | 7134T | M500233564 | Shielded signal (1.8m) Nonshielded power (1.8m) |
| 9 | MONITOR | ADI | PD-959 | FCC DoC | Shielded signal (1.8m) Nonshielded power (1.8m) |
| 10 | KEYBOARD x 2 | HP | C3758A | K101085 | Nonshielded signal (1.4m) |
| 11 | MOUSE | DEXIN | A2P800A | 80110012 | Shielded signal (1.5m) |
| 12 | MOUSE | LOGITECH | M-M30 | LTR53500777 | Shielded signal (1.4m) |
| 13 | HUB x 2 | ACCTON | EN2040 | 544019648EN20401 44040-104 | Shielded signal-- 10m to EUT; 3.0m to PC Shielded power (1.9m) |

Note: The EUT acted SERVER PC and communicated with support unit 6-12 which acted as two WORKSTATION PCs and systems of communication partner via support unit 13.

**(For Model : SBC-456E)**

| No | Product | Brand | Model No. | Serial No. | I/O Cable |
|---|---|---|---|---|---|
| 1 | COLOR MONITOR | ADI | PD-959 | 730020U00100265 | Nonshielded Signal (1.2m) Shielded Power (1.8m) |
| 2 | PRINTER | HP | 2225C+ | P101004 | Nonshielded Signal (1.2m) |
| 3 | KEYBOARD | FORWARD | FDA-104GA | FDKB8110112 | Shielded Signal (1.4m) |
| 4 | MOUSE | LOGITECH | M-M30 | LTR53500777 | Shielded signal (1.4m) |
| 5 | MODEM | ACEEX | 1414 | 980020501 980020540 980020569 | Shielded signal (1.2m) |
| 6 | PC | IBM | 6560-T7T | 9983708 | Nonshielded power (1.8m) |
| 7 | MONITOR | ACER | 7134T | M500233564 | Shielded signal (1.8m) Nonshielded power (1.8m) |
| 8 | KEYBOARD | HP | C3758A | K101085 | Nonshielded signal (1.4m) |
| 9 | MOUSE | HP | M-S34 | LZA72033314 | Shielded signal (1.5m) |
| 10 | HUB | ACCTON | EN2040 | FCC Approved | Shielded signal-- 10m to EUT; 3.0m to PC Shielded power (1.9m) |

Note: The EUT acted SERVER PC and communicated with support unit 6-9 which acted as WORKSTATION PCs and systems of communication partner via support unit 10.

**(For Model : SBC-357)**

| No | Product | Brand | Model No. | Serial No. | I/O Cable |
|---|---|---|---|---|---|
| 1 | COLOR MONITOR | ADI | PD-959 | 730020U00100265 | Nonshielded Signal (1.2m)<br>Shielded Power (1.8m) |
| 2 | PRINTER | HP | 2225C+ | P101004 | Nonshielded Signal (1.2m) |
| 3 | KEYBOARD | FORWARD | FDA-104GA | FDKB8110112 | Shielded Signal (1.4m) |
| 4 | MOUSE | LOGITECH | M-M30 | LTR53500777 | Shielded signal (1.4m) |
| 5 | MODEM X 3 | ACEEX | 1414 | 980020501<br>980020540<br>980020569 | Shielded signal (1.2m) |

**FOR IMMUNITY TEST (For Model : SBC-411E)**

| No | Product | Brand | Model No. | Serial No. | I/O Cable |
|---|---|---|---|---|---|
| 1 | COLOR MONITOR | ACTION | MV-0951 | N/A | Nonshielded Signal (1.2m)<br>Shielded Power (1.8m) |
| 2 | PRINTER | HP | C2145A | SG5BN160G | Nonshielded Signal (1.2m) |
| 3 | MODEM | ACEEX | 1414 | 980020528 | Shielded signal (1.2m) |
| 4 | KEYBOARD | HP | C2753A | C3753-60223 | Shielded Signal (1.4m) |
| 5 | MOUSE | DEXIN | A2P800A | 80110026 | Shielded signal (1.4m) |
| 6 | PC | ADI | DUO PC-C | A95002100003 | Nonshielded power (1.8m) |
| 7 | PC | IBM | 6560-T7T | 9983708 | Nonshielded power (1.8m) |
| 8 | MONITOR | ACER | 7134T | M500233564 | Shielded signal (1.8m)<br>Nonshielded power (1.8m) |
| 9 | MONITOR | ADI | PD-959 | FCC DoC | Shielded signal (1.8m)<br>Nonshielded power (1.8m) |
| 10 | KEYBOARD x 2 | HP | C3758A | K101085 | Nonshielded signal (1.4m) |
| 11 | MOUSE | DEXIN | A2P800A | 80110012 | Shielded signal (1.5m) |
| 12 | MOUSE | LOGITECH | M-M30 | LTR53500777 | Shielded signal (1.4m) |
| 13 | HUB x 2 | ACCTON | EN2040 | 544019648EN20401<br>44040-104 | Shielded signal-- 10m to EUT; 3.0m to PC<br>Shielded power (1.9m) |

Note: The EUT acted SERVER PC and communicated with support unit 6-12 which acted as two WORKSTATION PCs and systems of communication partner via support unit 13.

**(For Model : SBC-456E)**

| No | Product | Brand | Model No. | Serial No. | I/O Cable |
|---|---|---|---|---|---|
| 1 | COLOR MONITOR | ACTION | MV-0951 | N/A | Nonshielded Signal (1.2m)<br>Shielded Power (1.8m) |
| 2 | PRINTER | HP | C2145A | SG5BN160G | Nonshielded Signal (1.2m) |
| 3 | MODEM | ACEEX | 1414 | 980020528 | Shielded signal (1.2m) |
| 4 | KEYBOARD | HP | C2753A | C3753-60223 | Shielded Signal (1.4m) |
| 5 | MOUSE | DEXIN | A2P800A | 80110026 | Shielded signal (1.4m) |
| 6 | PC | IBM | 6560-T7T | 9983708 | Nonshielded power (1.8m) |
| 7 | MONITOR | ACER | 7134T | M500233564 | Shielded signal (1.8m)<br>Nonshielded power (1.8m) |
| 8 | KEYBOARD | HP | C3758A | K101085 | Nonshielded signal (1.4m) |
| 9 | MOUSE | HP | M-S34 | LZA72033314 | Shielded signal (1.5m) |
| 10 | HUB | ACCTON | EN2040 | FCC Approved | Shielded signal-- 10m to EUT; 3.0m to PC<br>Shielded power (1.9m) |

Note: The EUT acted SERVER PC and communicated with support unit 6-9 which acted as WORKSTATION PCs and systems of communication partner via support unit 10.

(For Model : SBC-357)

| No | Product | Brand | Model No. | Serial No. | I/O Cable |
|---|---|---|---|---|---|
| 1 | COLOR MONITOR | ACTION | MV-0951 | N/A | Nonshielded Signal (1.2m) Shielded Power (1.8m) |
| 2 | PRINTER | HP | C2145A | SG5BN160G | Nonshielded Signal (1.2m) |
| 3 | MODEM | ACEEX | 1414 | 980020528 | Shielded signal (1.2m) |
| 4 | KEYBOARD | HP | C2753A | C3753-60223 | Shielded Signal (1.4m) |
| 5 | MOUSE | DEXIN | A2P800A | 80110026 | Shielded signal (1.4m) |

## 2.4 TEST SETUP

Please refer to the photos of test configuration in Item 6.

# 3. TEST INSTRUMENTS

## 3.1 TEST INSTRUMENTS (EMISSION)

**RADIATED EMISSION MEASUREMENT**

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| HP Spectrum Analyzer | E4411A | US37360834 | Sept. 28, 1998 |
| CHASE Preamplifier | CPA9231A/4 | 3215 | Oct. 31, 1998 |
| ROHDE & SCHWARZ TEST RECEIVER | ESVS 30 | 841977/002 | Jan. 08, 1999 |
| SCHWARZBECK Tunable Dipole Antenna | VHA 9103<br>UHA 9105 | E101051<br>E101055 | Nov. 28, 1998 |
| CHASE BiLOG Antenna | CBL6112 | 2074 | Dec. 25, 1998 |
| CHANCE Turn Table & Tower Controller | ACS-I | N/A | N/A |
| Open Field Test Site | Site 6 | ADT-R06 | Dec. 23, 1998 |

Note: 1. The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

**CONDUCTED EMISSION MEASUREMENT**

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| ROHDE & SCHWARZ Test Receiver | ESHS30 | 828109/007 | Aug. 4, 1998 |
| ROHDE & SCHWARZ Artificial Mains Network | ESII2-Z5 | 892107/003 | July 22, 1998 |
| EMCO L.I.S.N. | 3825/2 | 9504-2359 | Aug. 1, 1998 |
| Shielded Room | Site 3 | ADT-C03 | N/A |

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMA's document NIS81.

2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.

## 3.2 TEST INSTRUMENTS (IMMUNITY)

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|---|---|---|---|
| KeyTek, ESD Test System | 2000 | 9105240/41 | Aug. 10, 1998 |
| KeyTek, ESD Simulator | MZ-15/EC | 92022232 | April 15, 1999 |
| KeyTek, EFT Generator | CE-40 | 9508257 | Sept. 9, 1998 |
| KeyTek, Capacitive Clamp | CE-40-CCL | 9508259 | Sept. 9, 1998 |
| ROHDE & SCHWARZ Signal Generator | SMY01 | 840490/009 | Sept. 29, 1998 |
| KALMUS Power Amplifier | LA1000V | 091995-1 | N/A |
| KALMUS Power Amplifier | 757LC | 091995-2 | N/A |
| HOLADAY Field Probe | HI-4422 | 89915 | Oct. 12, 1998 |
| EMCO BiconiLog Antenna | 3141 | 1001 | N/A |
| COMTEST Compact Full Anechoic Chamber (7x3x3 m) | CFAC | ADT-S01 | Aug. 4, 1999 |

Note: The calibration interval of the above test instruments is 12 months.
And the calibrations are traceable to NML/ROC and NIST/USA.

# 4. TEST RESULTS (EMISSION)

## 4.1 RADIO DISTURBANCE

| | | |
|---|---|---|
| Product Family Standard | : | EN 55022+A1:1995+A2:1997, Class B |
| Frequency Range | : | 0.15 - 30 MHz (Conducted Emission) |
| | | 30 - 1000 MIz (Radiated Emission) |
| Input Voltage | : | 230 Vac, 50 Hz (to PC) |
| Temperature | : | 28 ℃ |
| Humidity | : | 65 % |
| Atmospheric Pressure | : | 997 mbar |

| TEST RESULT | Remarks |
|---|---|
| PASS | Minimum passing margin of conducted emission: -15.1 dB at 0.156 MHz<br>Minimum passing margin of radiated emission: -2.5 dB at 109.40 & 226.60 MHz |

### 4.1.1 EUT OPERATION CONDITION

1. Turn on the power of all equipments.
2. Industrial PC reads a test program to enable all functions.
3. Industrial PC reads and writes messages from HDD.
4. Industrial PC sends and receives messages to and from WORKSTATION PC via a LAN cable.
5. Industrial PC sends "H" messages to monitor and monitor display "H" patterns on screen.
6. Industrial PC sends "H" messages to modem.
7. Industrial PC sends "H" messages to printer, and the printer prints them on paper.
8. Repeat steps 2-8.

## 4.1.2 TEST DATA OF CONDUCTED EMISSION (A)

EUT: **CPU BOARD** MODEL: **SBC-411E**

6 dB Band Width: 10 kHz

TEST PERSONNEL: San Lin

| Freq. | L Level | | N Level | | Limit | | Margin [dB (μV)] | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dB (μV)] | | [dB (μV)] | | [dB (μV)] | | L | | N | |
| | QP | AV | QP | AV | QP | AV | QP | AV | QP | AV |
| 0.210 | 43.10 | - | 44.40 | - | 79.00 | 66.00 | -35.9 | - | -34.6 | - |
| 0.300 | 41.70 | - | 42.50 | - | 79.00 | 66.00 | -37.3 | - | -36.5 | - |
| 1.240 | 35.60 | - | 33.30 | - | 73.00 | 60.00 | -37.4 | - | -39.7 | - |
| 2.010 | 35.20 | - | 33.60 | - | 73.00 | 60.00 | -37.8 | - | -39.4 | - |
| 4.950 | 38.10 | - | 37.90 | - | 73.00 | 60.00 | -34.9 | - | -35.1 | - |
| 10.000 | 46.50 | - | 56.00 | - | 73.00 | 60.00 | -26.5 | - | -17.0 | - |

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
4. The emission level of other frequencies were very low against the limit.
5. Margin value = Emission level - Limit value

ADT CO. Shielded Room 3
EN55022 CLASS A

15. Jul 98 19:56

EUT: SBC-411E
Test Spec: LISN : L

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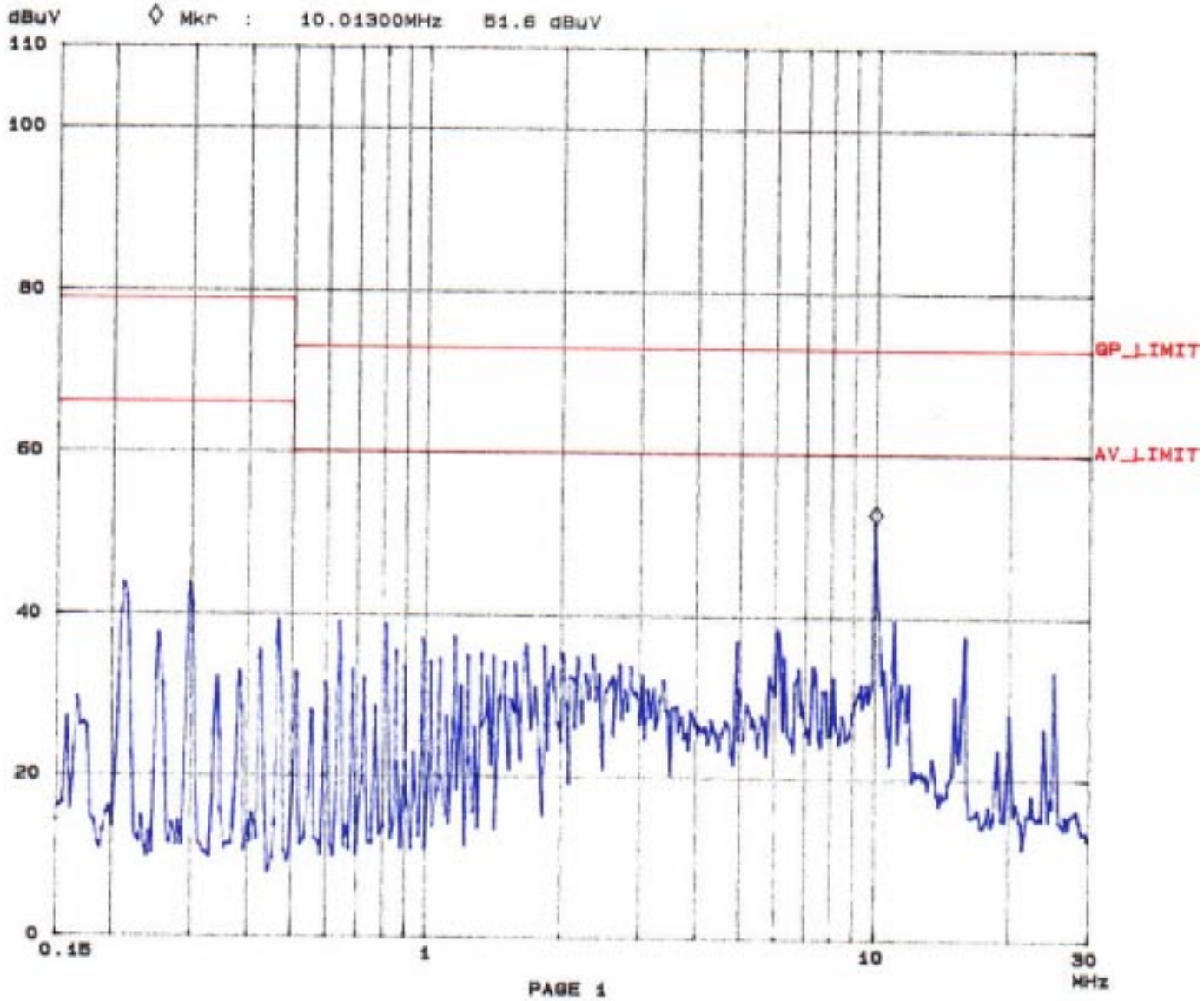
Tested by San Lim

Fast Scan Settings (3 Ranges)

| Frequencies | | | Receiver Settings | | | | | |
|---|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 450k | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 80dB |
| 450k | 5M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 80dB |
| 5M | 30M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 80dB |



ADT CO. Shielded Room 3
EN55022 CLASS A

15. Jul 98 19:44

EUT: SBC-411E
Test Spec: LISN : N

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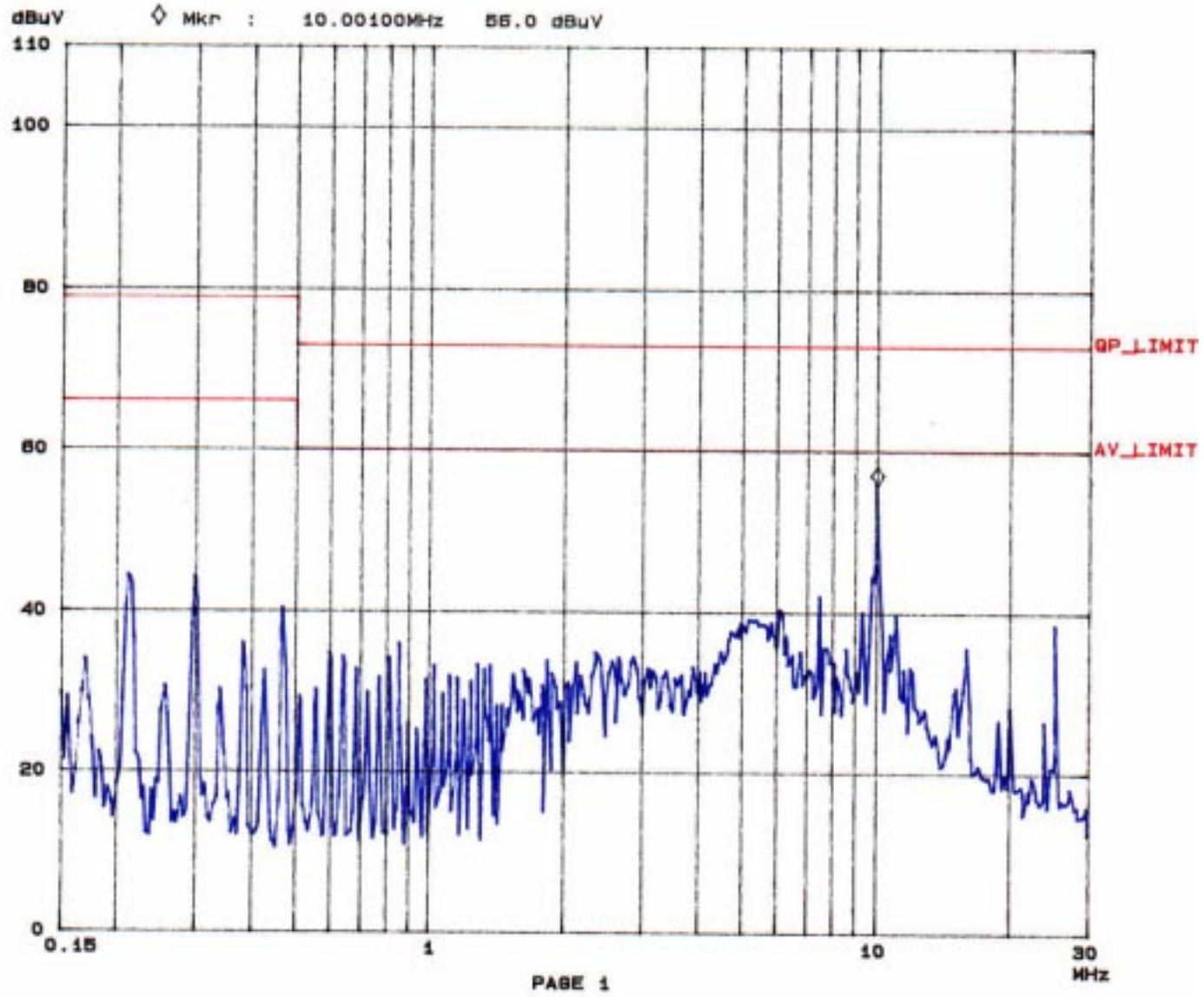
Page 11-2
Tested by San Lin

Fast Scan Settings (3 Ranges)

| Frequencies | | | Receiver Settings | | | | | |
|---|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 450k | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 450k | 5M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 5M | 30M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |

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## 4.1.3 TEST DATA OF CONDUCTED EMISSION (B)

EUT: **CPU BOARD** MODEL: **SBC-456E**

6 dB Bandwidth: 10 kHz

TEST PERSONNEL: San Lin

| Freq. | L Level | | N Level | | Limit | | Margin [dB (μV)] | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dB (μV)] | | [dB (μV)] | | [dB (μV)] | | L | | N | |
| | QP | AV | QP | AV | QP | AV | QP | AV | QP | AV |
| 0.156 | 61.90 | - | 61.80 | - | 79.00 | 66.00 | -17.1 | - | -17.2 | - |
| 0.180 | 51.00 | - | 49.70 | - | 79.00 | 66.00 | -28.0 | - | -29.3 | - |
| 0.270 | 44.10 | - | 44.90 | - | 79.00 | 66.00 | -34.9 | - | -34.1 | - |
| 0.750 | 36.40 | - | 36.70 | - | 73.00 | 60.00 | -36.6 | - | -36.3 | - |
| 1.710 | 36.10 | - | 35.80 | - | 73.00 | 60.00 | -36.9 | - | -37.2 | - |
| 3.900 | 41.60 | - | 39.60 | - | 73.00 | 60.00 | -31.4 | - | -33.4 | - |

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
4. The emission level of other frequencies were very low against the limit.
5. Margin value = Emission level - Limit value

ADT CO. Shielded Room 3
EN55022 CLASS A

28. Jul 98 16:40

EUT: SBC-456E
Test Spec: LISN : L

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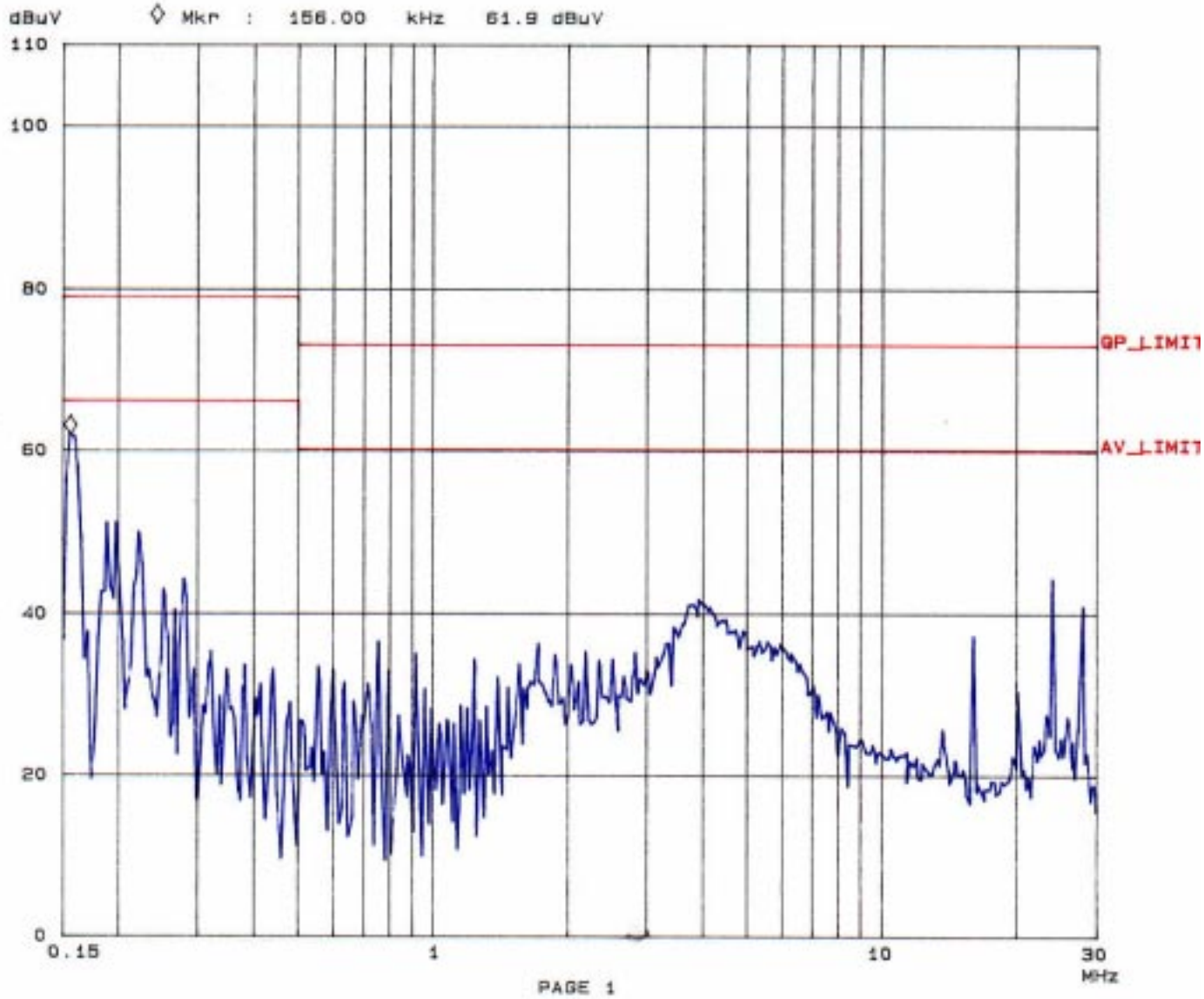
Tested by San Lin

Fast Scan Settings (3 Ranges)

| Frequencies | | | Receiver Settings | | | | | |
|---|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpAge |
| 150k | 450k | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 450k | 5M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 5M | 30M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |

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ADT CO. Shielded Room 3
EN55022 CLASS A

28. Jul 98 16:47

EUT: SBC-456E
Test Spec: LISN : N

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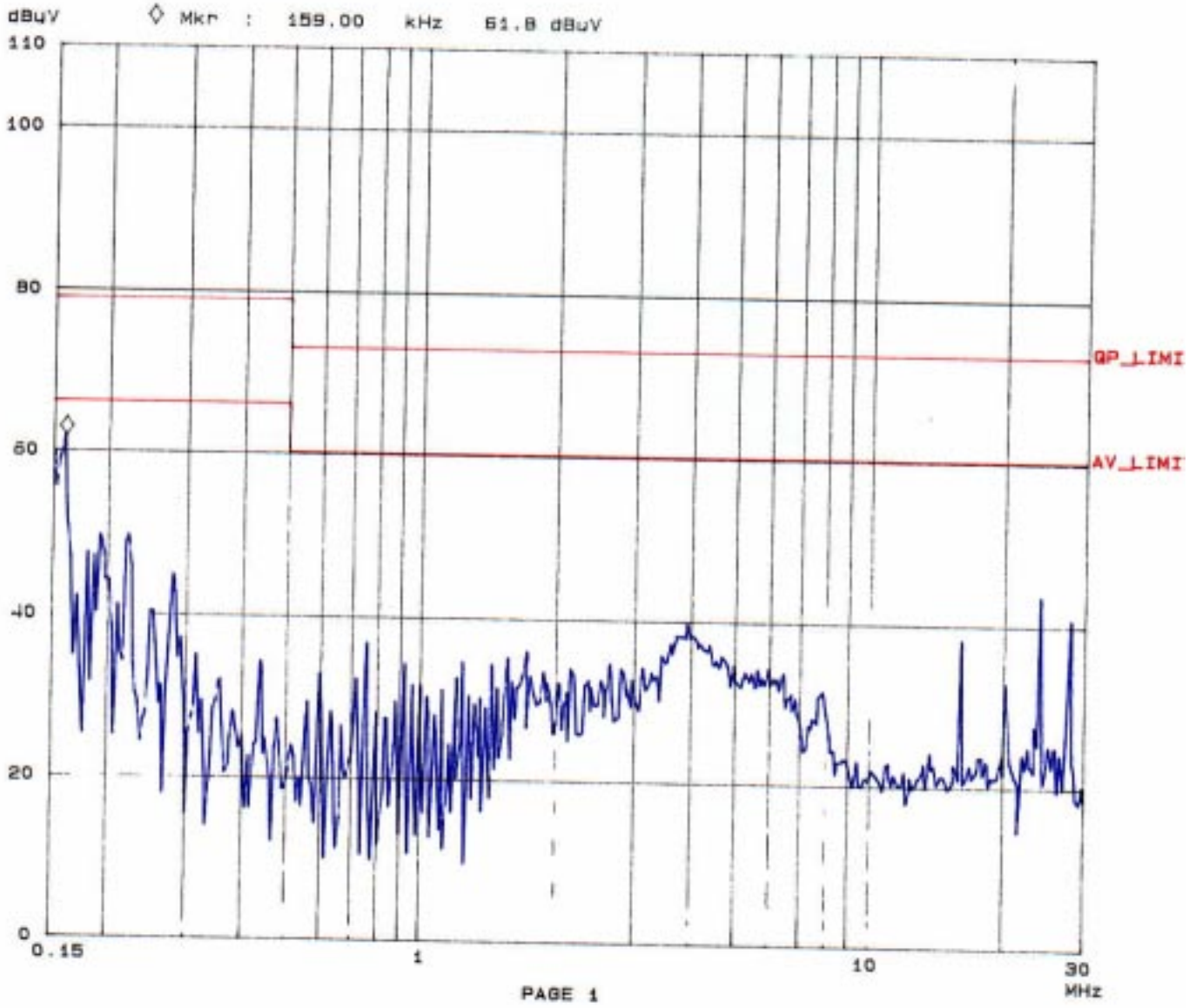
Tested by San Lin

Fast Scan Settings (3 Ranges)

| Frequencies | | | Receiver Settings | | | | | |
|---|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 450k | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 450k | 5M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 5M | 30M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |



## 4.1.4 TEST DATA OF CONDUCTED EMISSION (C)

EUT: **CPU BOARD** MODEL: **SBC-357**

6 dB Bandwidth: 10 kHz

TEST PERSONNEL: San Lin

| Freq. | L Level | | N Level | | Limit | | Margin [dB (μV)] | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dB (μV)] | | [dB (μV)] | | [dB (μV)] | | L | | N | |
| | QP | AV | QP | AV | QP | AV | QP | AV | QP | AV |
| 0.156 | 62.20 | - | 63.90 | - | 79.00 | 66.00 | -16.8 | - | -15.1 | - |
| 0.220 | 50.90 | - | 50.40 | - | 79.00 | 66.00 | -28.1 | - | -28.6 | - |
| 0.590 | 37.80 | - | 37.00 | - | 73.00 | 60.00 | -35.2 | - | -36.0 | - |
| 1.230 | 34.90 | - | 34.60 | - | 73.00 | 60.00 | -38.1 | - | -38.4 | - |
| 1.710 | 33.60 | - | 33.40 | - | 73.00 | 60.00 | -39.4 | - | -39.6 | - |
| 3.900 | 41.80 | - | 40.80 | - | 73.00 | 60.00 | -31.2 | - | -32.2 | - |

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
4. The emission level of other frequencies were very low against the limit.
5. Margin value = Emission level - Limit value

## 4.1.4 TEST DATA OF CONDUCTED EMISSION (C)

EUT: **CPU BOARD** MODEL: **SBC-357**

6 dB Bandwidth: 10 kHz

TEST PERSONNEL: San Lin

| Freq. | L Level | | N Level | | Limit | | Margin [dB (μV)] | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dB (μV)] | | [dB (μV)] | | [dB (μV)] | | L | | N | |
| | QP | AV | QP | AV | QP | AV | QP | AV | QP | AV |
| 0.156 | 62.20 | - | 63.90 | - | 79.00 | 66.00 | -16.8 | - | -15.1 | - |
| 0.220 | 50.90 | - | 50.40 | - | 79.00 | 66.00 | -28.1 | - | -28.6 | - |
| 0.590 | 37.80 | - | 37.00 | - | 73.00 | 60.00 | -35.2 | - | -36.0 | - |
| 1.230 | 34.90 | - | 34.60 | - | 73.00 | 60.00 | -38.1 | - | -38.4 | - |
| 1.710 | 33.60 | - | 33.40 | - | 73.00 | 60.00 | -39.4 | - | -39.6 | - |
| 3.900 | 41.80 | - | 40.80 | - | 73.00 | 60.00 | -31.2 | - | -32.2 | - |

Remarks:
1. "*": Undetectable
2. Q.P. and AV. are abbreviations of quasi-peak and average individually.
3. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
4. The emission level of other frequencies were very low against the limit.
5. Margin value = Emission level - Limit value

ADT CO. Shielded Room 3
EN55022 CLASS A

28. Jul 98 15:37

EUT: 98C-357
Test Spec: LISN : L

Report No. CE&7071506
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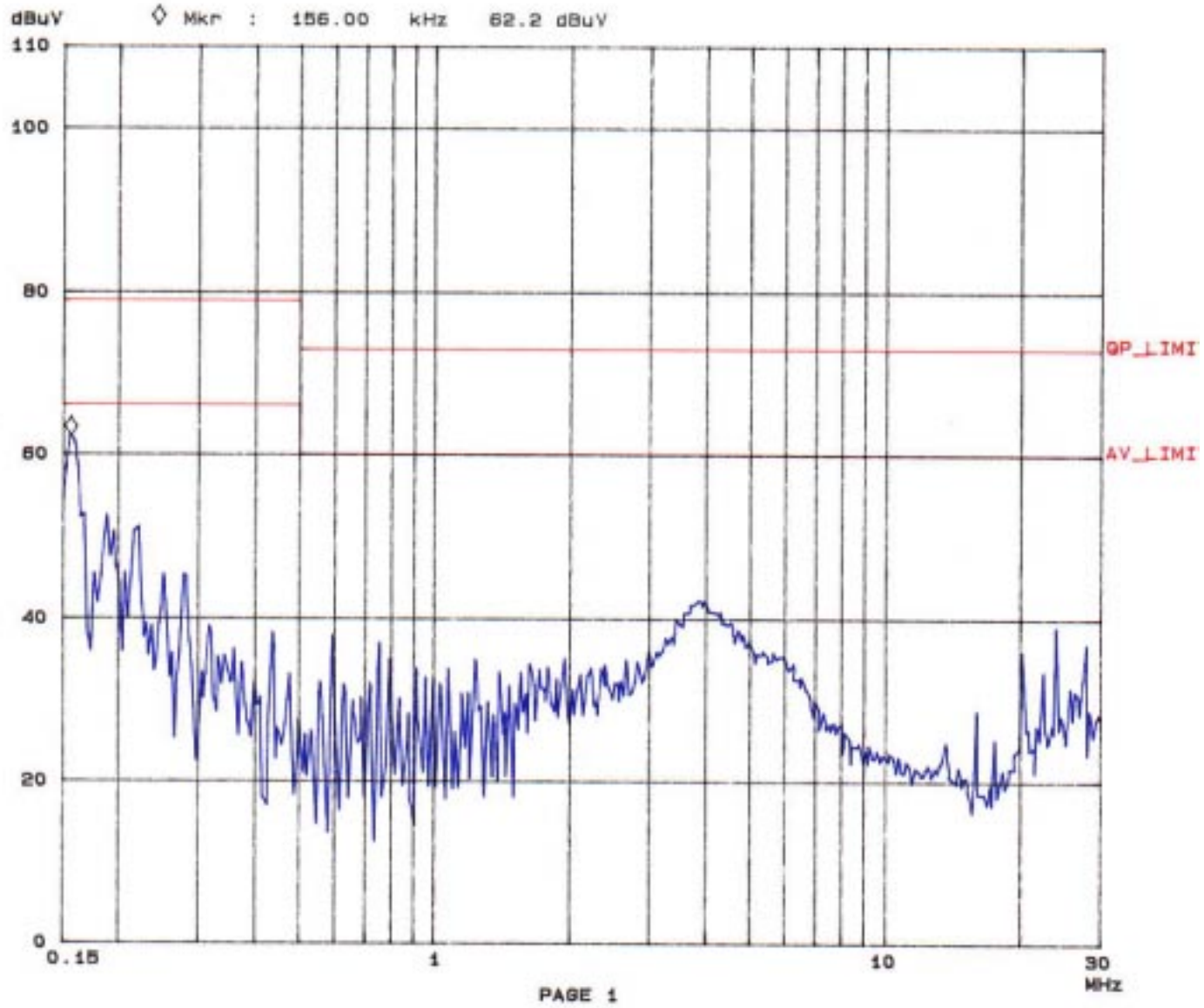
Tested by San Lin

Fast Scan Settings (3 Ranges)

| Frequencies | | | Receiver Settings | | | | | |
|---|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 450k | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 450k | 5M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 5M | 30M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |




PAGE 1

ADT CO. Shielded Room 3
EN55022 CLASS A

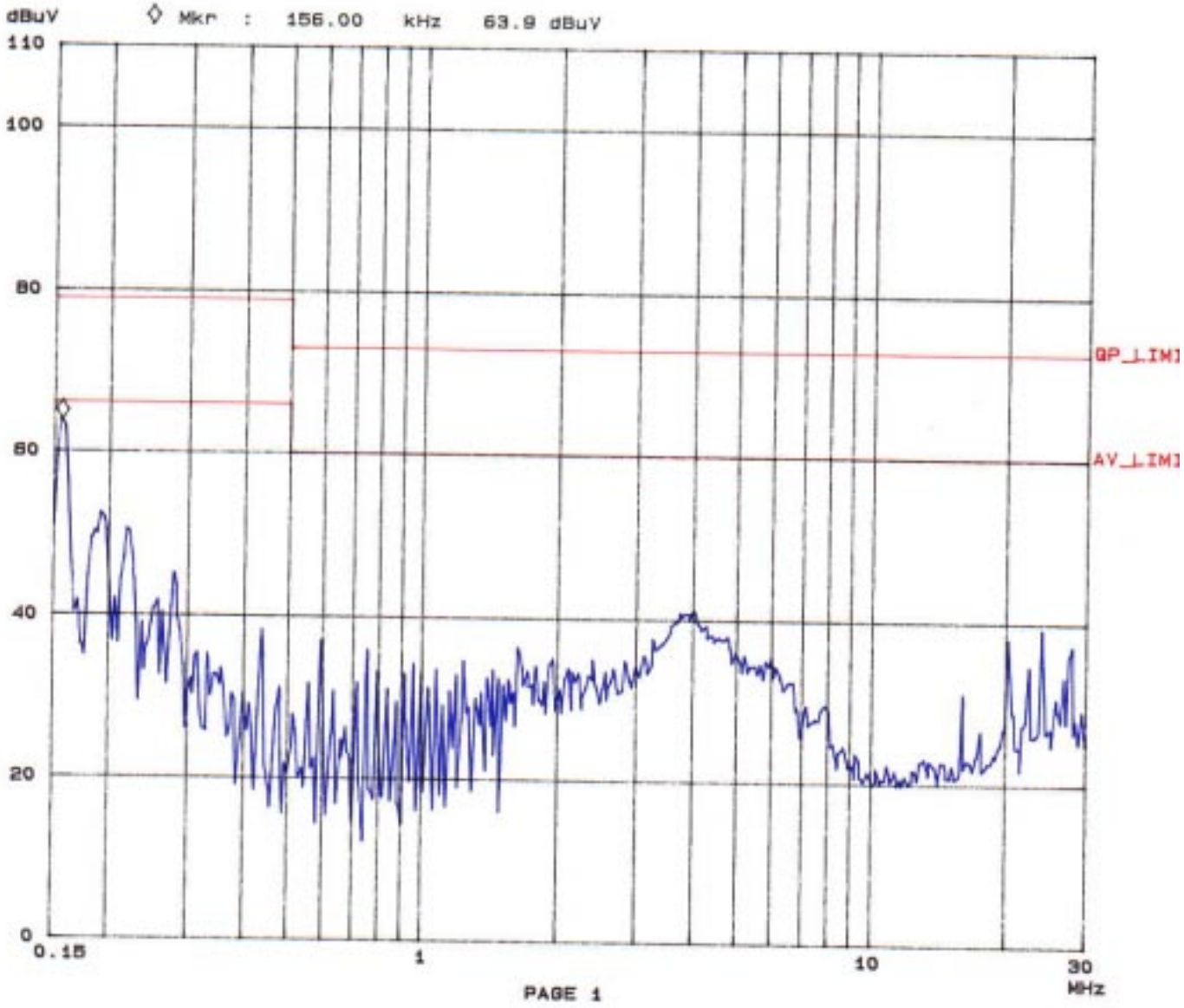
28. Jul 98 15:26

EUT: SBC-367
Test Spec: LISN : N

Report No. CE870715O6
Page 13-2
Tested by San Lin

Fast Scan Settings (3 Ranges)

| Frequencies | | | Receiver Settings | | | | | |
|---|---|---|---|---|---|---|---|---|
| Start | Stop | Step | IF BW | Detector | M-Time | Atten | Preamp | OpRge |
| 150k | 450k | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 450k | 5M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |
| 5M | 30M | 3k | 10k | PK | 0.05ms | 10dBLN | OFF | 60dB |



## 4.1.5 TEST DATA OF RADIATED EMISSION (A)

EUT: **CPU BOARD** MODEL: **SBC-411E**

ANTENNA: CHASE BILOG CBL6112 POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: San Lin

| Frequency (MHz) | Correction Factor (dB/m) | Reading Data (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 64.25 | 8.2 | 17.8 | 26.0 | 40.0 | -14.0 |
| 116.18 | 15.3 | 17.3 | 32.6 | 40.0 | -7.4 |
| 132.83 | 14.0 | 16.1 | 30.1 | 40.0 | -9.9 |
| 149.29 | 12.1 | 15.6 | 27.7 | 40.0 | -12.3 |
| 216.17 | 12.0 | 14.2 | 26.2 | 40.0 | -13.8 |
| 226.55 | 12.9 | 21.3 | 34.2 | 40.0 | -5.8 |
| 233.87 | 13.6 | 14.1 | 27.7 | 47.0 | -19.3 |
| 255.09 | 16.2 | 15.0 | 31.2 | 47.0 | -15.8 |
| 265.56 | 16.5 | 27.0 | 43.5 | 47.0 | -3.5 |

REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) +Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

## TEST DATA OF RADIATED EMISSION (A)

EUT: **CPU BOARD** MODEL: **SBC-411E**

ANTENNA: CHASE BILOG CBL6112 POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: San Lin

| Frequency (MHz) | Correction Factor (dB/m) | Reading Data dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 109.40 | 14.4 | -4.4 | 10.1 | 40.0 | -29.9 |
| 109.40 | 14.4 | 23.0 | 37.5 | 40.0 | -2.5 |
| 116.20 | 14.3 | 20.9 | 35.2 | 40.0 | -4.8 |
| 132.80 | 13.7 | 23.0 | 36.7 | 40.0 | -3.3 |
| 135.30 | 13.6 | 16.2 | 29.8 | 40.0 | -10.2 |
| 182.60 | 9.9 | 19.2 | 29.1 | 40.0 | -10.9 |
| 216.20 | 12.5 | 16.6 | 29.1 | 40.0 | -10.9 |
| 226.60 | 13.0 | 24.5 | 37.5 | 40.0 | -2.5 |
| 233.90 | 13.3 | 15.8 | 29.1 | 47.0 | -17.9 |
| 265.50 | 15.6 | 17.4 | 33.0 | 47.0 | -14.0 |

REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) +Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

## 4.1.6 TEST DATA OF RADIATED EMISSION (B)

EUT: **CPU BOARD** MODEL: **SBC-456E**

ANTENNA: CHASE BILOG CBL6112 POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: San Lin

| Frequency (MHz) | Correction Factor (dB/m) | Reading Data (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 113.16 | 15.0 | 15.0 | 30.0 | 40.0 | -10.0 |
| 116.93 | 15.3 | 18.2 | 33.5 | 40.0 | -6.5 |
| 120.85 | 15.5 | 13.4 | 28.9 | 40.0 | -11.1 |
| 122.85 | 15.3 | 15.6 | 30.9 | 40.0 | -9.1 |
| 152.69 | 11.8 | 15.1 | 26.9 | 40.0 | -13.1 |
| 200.48 | 10.5 | 11.5 | 22.0 | 40.0 | -18.0 |
| 233.85 | 13.6 | 12.6 | 26.2 | 47.0 | -20.8 |

REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) +Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

## TEST DATA OF RADIATED EMISSION (B)

EUT: **CPU BOARD** MODEL: **SBC-456E**

ANTENNA: CHASE BILOG CBL6112 POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: San Lin

| Frequency (MHz) | Correction Factor (dB/m) | Reading Data (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 56.25 | 8.8 | 27.9 | 36.7 | 40.0 | -3.3 |
| 72.25 | 7.2 | 24.4 | 31.6 | 40.0 | -8.4 |
| 112.47 | 14.4 | 15.9 | 30.3 | 40.0 | -9.7 |
| 116.94 | 14.3 | 21.2 | 35.5 | 40.0 | -4.5 |
| 120.03 | 14.3 | 19.6 | 33.9 | 40.0 | -6.1 |
| 133.60 | 13.6 | 16.9 | 30.5 | 40.0 | -9.5 |
| 233.89 | 13.3 | 24.4 | 37.7 | 47.0 | -9.3 |

REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) +Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

## 4.1.7 TEST DATA OF RADIATED EMISSION (C)

EUT: **CPU BOARD** MODEL: **SBC-357**

ANTENNA: CHASE BILOG CBL6112 POLARITY: Horizontal

DETECTOR FUNCTION: Quasi-pcak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: San Lin

| Frequency (MHz) | Correction Factor (dB/m) | Reading Data (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 126.68 | 14.8 | 19.5 | 34.3 | 40.0 | -5.7 |
| 139.06 | 13.2 | 20.9 | 34.1 | 40.0 | -5.9 |
| 152.68 | 11.8 | 24.6 | 36.4 | 40.0 | -3.6 |
| 157.32 | 11.3 | 22.0 | 33.3 | 40.0 | -6.7 |
| 160.44 | 11.1 | 19.9 | 31.0 | 40.0 | -9.0 |
| 163.60 | 11.0 | 19.5 | 30.5 | 40.0 | -9.5 |
| 169.90 | 10.9 | 19.7 | 30.6 | 40.0 | -9.4 |

REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) +Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

## TEST DATA OF RADIATED EMISSION (C)

EUT: **CPU BOARD** MODEL: **SBC-357**

ANTENNA: CHASE BILOG CBL6112 POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak 6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz MEASURED DISTANCE: 10 M

TEST PERSONNEL: San Lin

| Frequency (MHz) | Correction Factor (dB/m) | Reading Data (dBuV) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) |
|---|---|---|---|---|---|
| 119.71 | 14.3 | 16.0 | 30.3 | 40.0 | -9.7 |
| 132.14 | 13.7 | 14.7 | 28.4 | 40.0 | -11.6 |
| 144.73 | 13.1 | 18.3 | 31.4 | 40.0 | -8.6 |
| 154.61 | 12.6 | 22.2 | 34.8 | 40.0 | -5.2 |
| 157.30 | 12.4 | 24.4 | 36.8 | 40.0 | -3.2 |
| 159.33 | 12.3 | 22.7 | 35.0 | 40.0 | -5.0 |
| 163.61 | 11.8 | 23.7 | 35.5 | 40.0 | -4.5 |
| 169.89 | 11.0 | 20.4 | 31.4 | 40.0 | -8.6 |
| 210.75 | 12.3 | 18.3 | 30.6 | 40.0 | -9.4 |
| 220.23 | 12.7 | 21.4 | 34.1 | 40.0 | -5.9 |
| 220.25 | 12.7 | 18.8 | 31.5 | 40.0 | -8.5 |

REMARKS :
1. Emission level (dBuV/m) = Correction Factor(dB/m) +Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value

# 5. TEST RESULTS (IMMUNITY)

## 5.1 GENERAL DESCRIPTION

| | | | |
|---|---|---|---|
| Basic Standard | : | EN61000-4-2 | (Electrostatic Discharge Test, ESD) |
| | | EN61000-4-3 | (Radiated Radio-Frequency Disturbance Test, RS) |
| | | EN61000-4-4 | (Electrical Fast Transient/Burst Test, EFT) |
| | | EN61000-4-6 | (Conducted Radio Frequency Disturbances Test, CS) |
| | | EN61000-4-8 | (Power Frequency Magnetic Field Test) |
| | | ENV50204 | (Radio-Frequency Electromagnetic Field, Pulse modulated) |
| Generic Standard | : | EN 50082-2 | |
| Input Voltage | : | 230 Vac, 50 Hz (to power of Industrial PC) | |
| Temperature | : | 24 ℃ | |
| Humidity | : | 58 % | |
| Atmospheric Pressure | : | 998 mbar | |

## 5.2 PERFORMANCE CRITERIA DESCRIPTION

Criterion A - The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion B - The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended.

Criterion C - Temporary loss of function is allowed, provided the function is self recoverable or can be restored by the operation of the controls.

## 5.3 EUT OPERATION CONDITION

Industrial PC runs a test program to access FDD/HDD/MODEM/PRINTER sequentially and show the result on monitor screen.

## 5.4 TEST RESULT OF ELECTROSTATIC DISCHARGE (ESD)

| | | |
|---|---|---|
| Basic Standard | : | EN61000-4-2 |
| Generic Standard | : | EN 50082-2 |
| Discharge Impedance | : | 330 ohm / 150 pF |
| Discharge Voltage (Direct/Indirect) | : | Air Discharge - 8 kV (Direct/Indirect)<br>Contact Discharge - 4 kV |
| Polarity | : | Positive/Negative |
| Number of Discharge | : | Minimum 10 times at each test point |
| Discharge Mode | : | Single Discharge |
| Discharge Period | : | 1 second minimum |
| Test Personnel | : | |

| Test Result | | Remarks |
|---|---|---|
| Criterion A | PASS | Model: SBC-411E, SBC-456E & SBC-357 |

## OBSERVATION DESCRIPTION

| Direct Application | | | Test Result | |
|---|---|---|---|---|
| Discharge Level (kV) | Polarity (+/-) | Test Point | Contact Discharge | Air Discharge |
| 4 | +/- | 1~4 | N/A | Note 1 |
| 8 | +/- | 1 , 4 | Note 1 | N/A |

Description of test point:

1. Metal case
2. FDD
3. Power switch
4. In/Out Port

| Indirect Application | | | Test Result | |
|---|---|---|---|---|
| Discharge Level (kV) | Polarity (+/-) | Test Point | Horizontal Coupling | Vertical Coupling |
| 4 | +/- | 1 ~ 4 | Note 1 | Note 1 |

Description of test point:

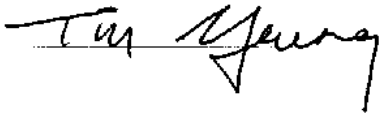
1. Front side
2. Right side
3. Left side
4. Rear side

Description of test result:

Note 1: There was no change compared with initial operation during the test.

## 5.5 TEST RESULT OF RADIATED RADIO FREQUENCY DISTURBANCES (RS)

| | | |
|---|---|---|
| Basic Standard | : | EN 61000-4-3 |
| Generic Standard | : | EN 50082-2 |
| Frequency range | : | 80 MHz - 1000 MHz |
| Field strength | : | 10 V/m |

| | | |
|---|---|---|
| Test distance | : | 3 m |
| Test Personnel | : |  |

| Test Result | | Remarks |
|---|---|---|
| **Criterion A** | **PASS** | Model: SBC-411E, SBC-456E & SBC-357 |

Note: Four sides of EUT are verified separately.

## OBSERVATION DESCRIPTION

There is no change compared with initial operation during the test.

## 5.6 TEST RESULT OF ELECTRICAL FAST TRANSIENT/BURST (EFT/BURST)

| | | |
|---|---|---|
| Basic Standard | : | EN61000-4-4 |
| Generic Standard | : | EN 50082-2 |
| Test Voltage | : | Power Line - 2 kV (to power of Industrial PC)<br>Signal/Control Line – 1kV |
| Polarity | : | Positive/Negative |
| Impulse Frequency | : | 5 kHz |
| Tr / Tn | : | 5/50 ns |
| Burst Duration | : | 15 ms |
| Burst Period | : | 300 ms |
| Test Duration | : | Not less than 1 min. |
| Test Personnel | : | |

| Test Result | | Remarks |
|---|---|---|
| Criterion A | PASS | Model: SBC-411E, SBC-456E & SBC-357 |

### OBSERVATION DESCRIPTION (Model: SBC-411E & SBC-456E)

| Test Point | Polarity | Test Level (kV) | Result |
|---|---|---|---|
| L1 | +/- | 2 | Note 1 |
| L2 | +/- | 2 | Note 1 |
| GND | +/- | 2 | Note 1 |
| Signal / Control Line | +/- | 1 | Note 1 |

### OBSERVATION DESCRIPTION (Model: SBC-357)

| Test Point | Polarity | Test Level (kV) | Result |
|---|---|---|---|
| L1 | +/- | 2 | Note 1 |
| L2 | +/- | 2 | Note 1 |
| GND | +/- | 2 | Note 1 |

Description of test result:

Note 1: There was no change compared to initial operation during the test.

## 5.7 TEST RESULT OF CONDUCTED RADIO FREQUENCY DISTURBANCES (CS)

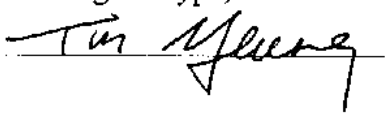
| | | |
|---|---|---|
| Basic Standard | : | EN 61000-4-6 |
| Generic Standard | : | EN 50082-2 |
| Frequency range | : | 0.15 MHz - 80 MHz |
| Field strength | : | 10 V/m |
| Modulation | : | 1kHz Sine Wave, 80%, AM Modulation |
| Frequency step | : | 1 % of fundamental |
| Coupled cable | : | Power Mains, Unshielded |
| Coupling device | : | CDN-M3 (3 wires) |
| Test Personnel | : | |

| Test Result | | Remarks |
|---|---|---|
| Criterion A | PASS | Model: SBC-411E, SBC-456E & SBC-357 |

## OBSERVATION DESCRIPTION

There is no change compared with initial operation during the test.

## 5.8 TEST RESULT OF POWER FREQUENCY MAGNETIC FIELD

| | | |
|---|---|---|
| Basic Standard | : | EN61000-4-8 |
| Generic Standard | : | EN50 082-2 |
| Frequency range | : | 50Hz |
| Field strength | : | 30 A/m |
| Observation Time | : | 1 minute |
| Inductance coil | : | Rectangular type, 1mx1m |
| Test Personnel | : |  |

| Test Result | | Remarks |
|---|---|---|
| **Criterion A** | **PASS** | Model: SBC-411E, SBC-456E & SBC-357 |

## OBSERVATION DESCRIPTION

There was no change compared with initial operation during the test.

## 5.9 TEST RESULT OF RADIO-FREQUENCY ELECTROMAGNETIC FIELD, PULSE MODULATED

| | | |
|---|---|---|
| Basic Standard | : | ENV 50204 |
| Generic Standard | : | EN 50082-2 |
| Frequency range | : | 900 +/- 5 MHz |
| Field strength | : | 10 V/m |
| Modulation | : | 200Hz, Square Wave, 50% Duty Cycle |
| Dewell Time | : | 30 second |
| Polarity of Antenna | : | Horizontal and Vertical |
| Test distance | : | 3 m |
| Test Personnel | : | |

| Test Result | | Remarks |
|---|---|---|
| Criterion A | PASS | Model: SBC-411E, SBC-456E & SBC-357 |

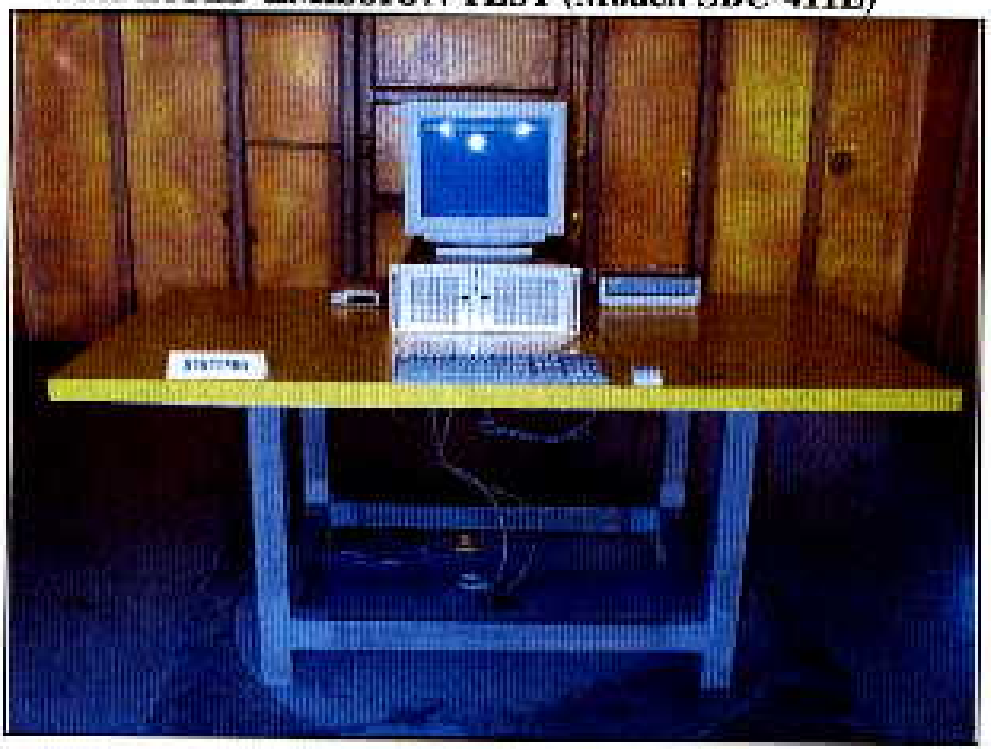
Note: Four sides of EUT are verified separately.

## OBSERVATION DESCRIPTION

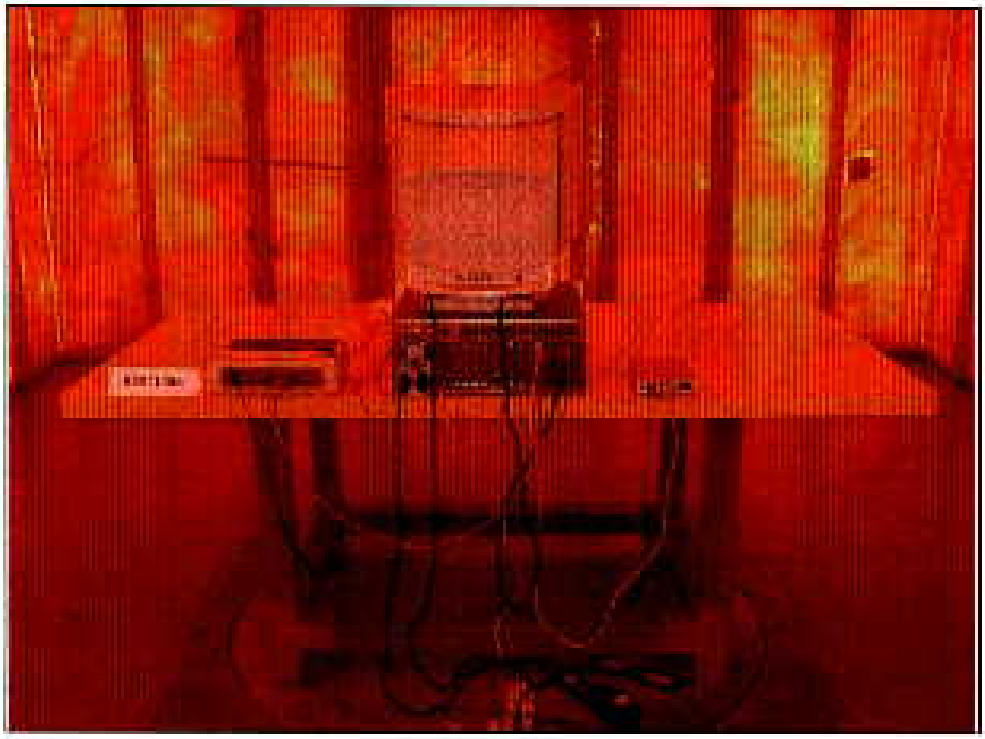
There is no change compared with initial operation during the test.

## 6. PHOTOGRAPHS OF THE TEST CONFIGURATION

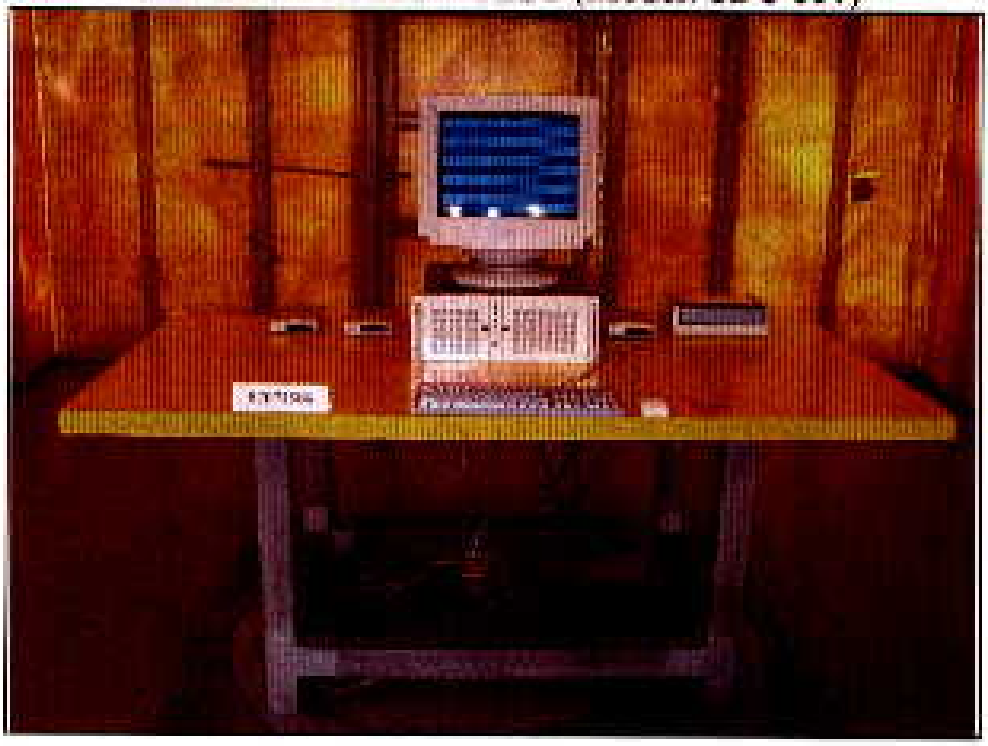
**RADIATED EMISSION TEST (Model: SBC-411E)**

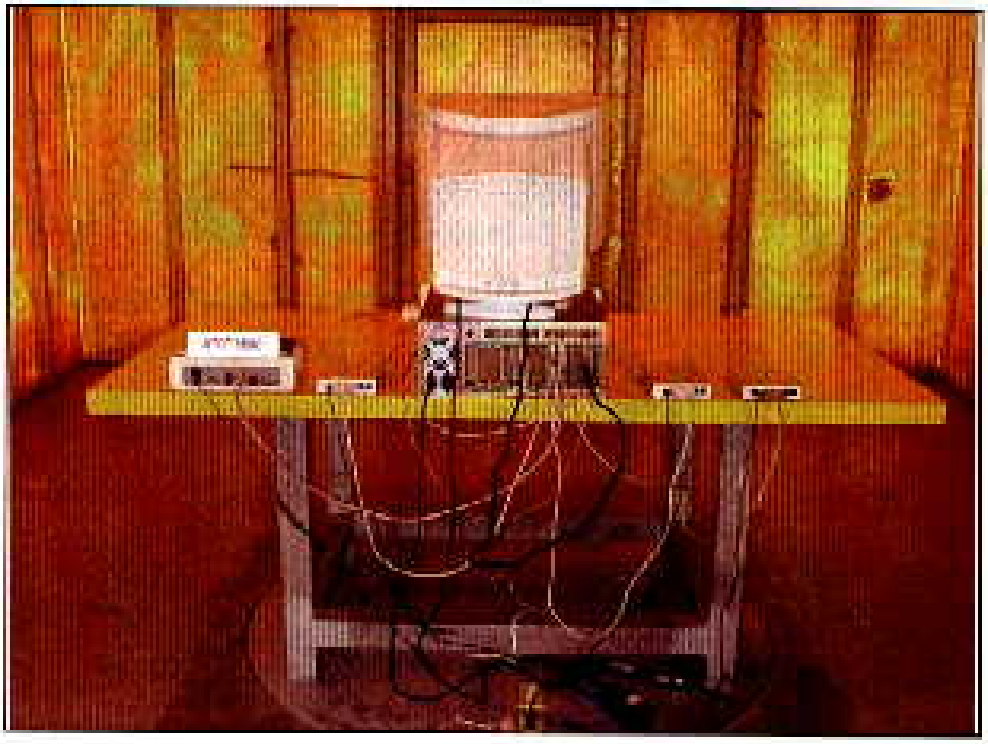


## RADIATED EMISSION TEST (Model: SBC-456E)

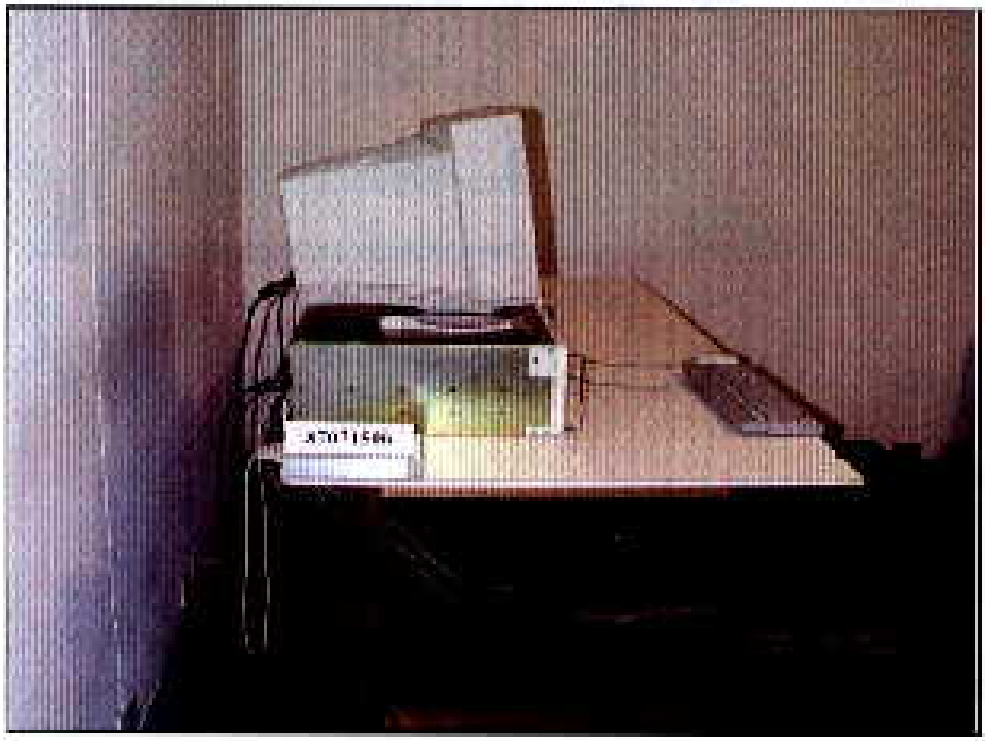


## RADIATED EMISSION TEST (Model: SBC-357)





## CONDUCTED EMISSION TEST (Model: SBC-411E)



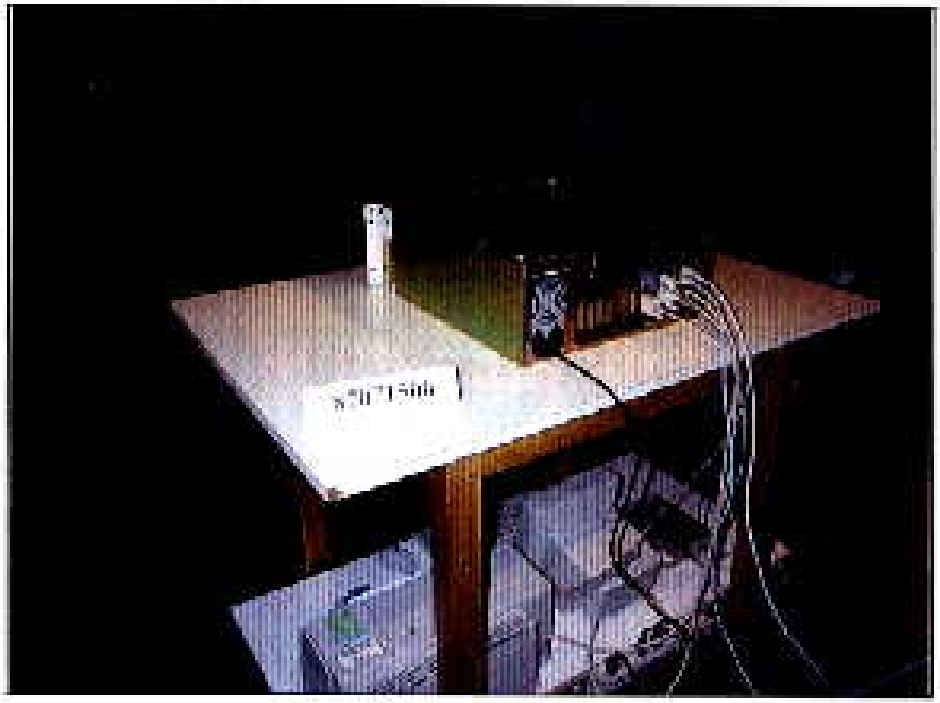
## CONDUCTED EMISSION TEST (Model: SBC-456E)

## CONDUCTED EMISSION TEST (Model: SBC-357)

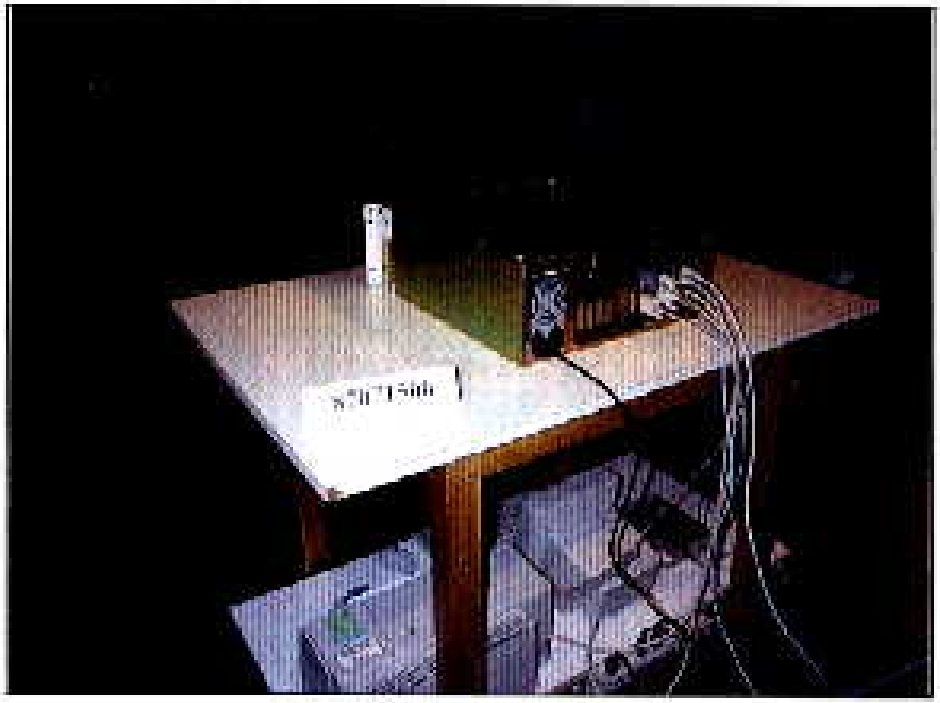
## ESD TEST (Model : SBC-456E)


## ESD TEST (Model : SBC-357)


# RS TEST (AM MODULATION AND PULSE MODULATION)
## (Model : SBC-411E)



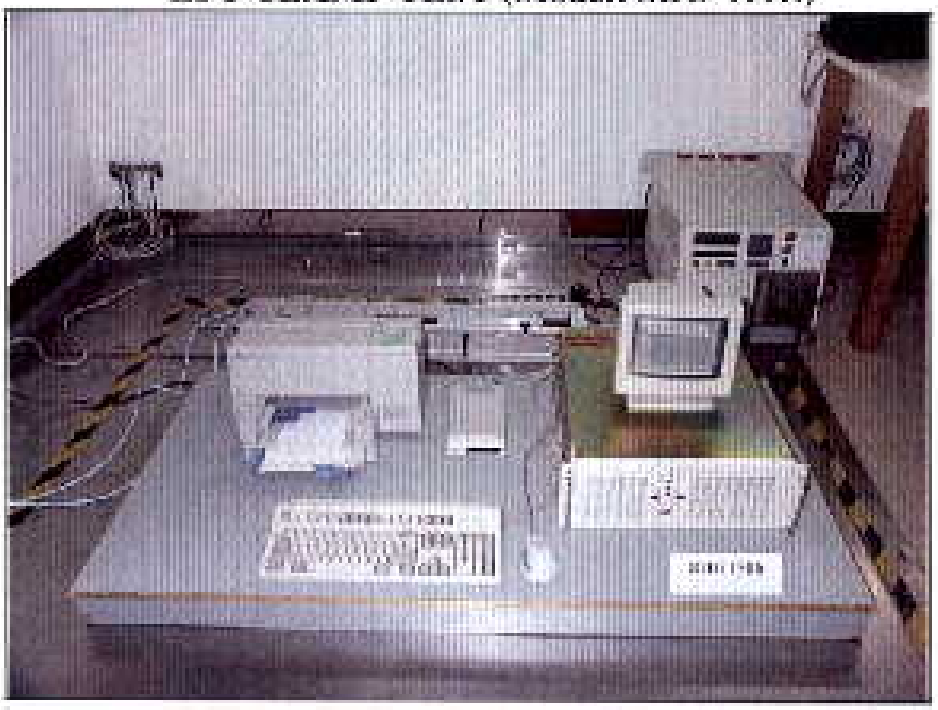
## RS TEST (AM MODULATION AND PULSE MODULATION)
## (Model : SBC-411E)



## RS TEST (AM MODULATION AND PULSE MODULATION)
## (Model : SBC-357)

## EFT TEST (Model: SBC-411E)

## EFT CLAMP TEST (Model: SBC-411E)



## EFT TEST (Model: SBC-456E)


## EFT CLAMP TEST (Model: SBC-456E)

## EFT TEST (Model: SBC-357)

## CONDUCTED SUSCEPTIBILITY TEST
## (Model: SBC-411E)

## CONDUCTED SUSCEPTIBILITY CLAMP TEST
## (Model: SBC-411E)

## CONDUCTED SUSCEPTIBILITY TEST
## (Model: SBC-456E)

## CONDUCTED SUSCEPTIBILITY CLAMP TEST
## (Model: SBC-456E)

## MAGNETIC TEST (Model: SBC-411E)

## MAGNETIC TEST (Model: SBC-456E)

## MAGNETIC TEST (Model: SBC-357)

# CONSTRUCTION PHOTOS OF EUT


87071506
SBC-411E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SBC-411E


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SBC-411E


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SBC-456E


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