

# FCC ID PER PART 18 EMI MEASUREMENT AND TEST REPORT


For

**Shunde MD Microwave Oven Manufactory Co., Ltd.**

Penglai Road, Beijiao, Shunde,  
Guangdong, P.R. China

FCC ID: PU7E8528P-B

November 12, 2001

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| <b>This Report Concerns:</b><br><input checked="" type="checkbox"/> Original Report   | <b>Equipment Type:</b><br>Microwave Oven –<br>Consumer ISM Equipment |
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| <b>Test Date:</b> October 29, 2001  |  |
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## 1 - GENERAL INFORMATION

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### 1.1 Product Description for Equipment Under Test (EUT)

The *Shunde MD Microwave Oven Manufactory Co., Ltd.*'s model, *E8528P-B* or the "EUT" as referred to in this report is a microwave oven which measures approximately 15.00"L x 20.25"W x 11.25"H.

The EUT provides following features:

- Micro Wave Main Unit  
Manufacturer: SAMSUNG  
Model: OM75S(31)  
Serial#: 19BC010511
- X-FORM  
Manufacturer: JYEPS'S  
Model: KHT-N851AMD  
Serial #0108173JQ
- Power and Time Controller  
Manufacturer: HT Circuitis  
Model: E21EBU/E21FBU  
Serial #: None

### 1.2 Objective

The following test report is prepared on behalf of *Shunde MD Microwave Oven Manufactory Co., Ltd.* in accordance with Part 2, Subpart J, and Part 18, Subparts A, B and C of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC Part 18 limits for Industrial, Scientific and Medical Equipment.

### 1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –1992, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory Corporation. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### 1.4 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Suite 2, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992 and CISPR 22.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test sites has been listed with the FCC and approved by the VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 11: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

### 1.5 Test Equipment List and Details

| Manufacturer      | Description          | Model            | Serial Number | Last Cal. Data | Cal. Due Data |
|-------------------|----------------------|------------------|---------------|----------------|---------------|
| HP                | Spectrum Analyzer    | 8564E            | 08303         | 12/6/00        | 12/6/01       |
| HP                | Spectrum Analyzer    | 8593B            | 2919A00242    | 12/20/00       | 12/20/01      |
| HP                | Amplifier            | 8349B            | 2644A02662    | 12/20/00       | 12/20/01      |
| HP                | Quasi-Peak Adapter   | 85650A           | 917059        | 12/6/00        | 12/6/01       |
| HP                | Amplifier            | 8447E            | 1937A01046    | 12/6/00        | 12/6/01       |
| A.H. System       | Horn Antenna         | SAS0200/571      | 261           | 12/27/00       | 12/27/01      |
| Com-Power         | Log Periodic Antenna | AL-100           | 16005         | 11/2/00        | 11/2/02       |
| Com-Power         | Biconical Antenna    | AB-100           | 14012         | 11/2/00        | 11/2/02       |
| Solar Electronics | LISN                 | 8012-50-R-24-BNC | 968447        | 12/28/00       | 12/28/01      |
| Com-Power         | LISN                 | LI-200           | 12208         | 12/20/00       | 12/20/01      |
| Com-Power         | LISN                 | LI-200           | 12005         | 12/20/00       | 12/20/01      |
| BACL              | Data Entry Software  | DES1             | 0001          | 12/20/00       | 12/20/01      |

### 1.6 Local Support Equipment List and Details

| Manufacturer        | Description                 | Model | Serial Number | FCC ID |
|---------------------|-----------------------------|-------|---------------|--------|
| TDGC                | Variable Voltage Controller | 2KVA  | 026           | None   |
| VALHALLA SCIENTIFIC | Digital Power Analyzer      | 2101  | 20314         | DOC    |
| BACL Corp.          | Power Switching Box         | #1    | 04            | None   |

## **2 – OPERATING CONDITION/TEST CONFIGURATION**

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### **2.1 Justification**

The EUT was provided for tests as a stand-alone device. It was prepared for testing in accordance with the manufacturer's instructions. The EUT was operated at maximum (continuous) RF output power. The loads consisted of water in a glass beaker in the amounts specified in the test procedure.

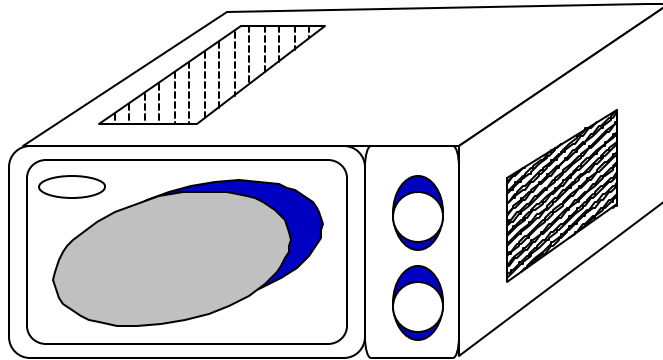
### **2.2 Schematics / Block Diagram**

Appendix A contains a copy of the EUT's block diagram as reference.

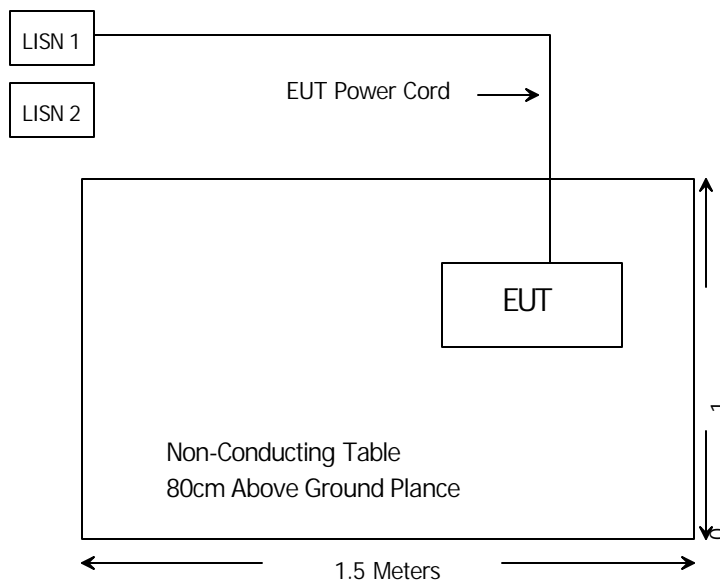
### **2.3 Equipment Modifications**

No modification to the EUT was made by BACL Corp to make sure the EUT comply with applicable limits.

## 2.4 Configuration of Test System



## 2.5 Test Setup Block Diagram



on second and third harmonic: Two loads, one of 700 and the other of 300 milliliters, of water are used. Each load is tested both with the beaker located in the center of the oven and with it in the right front corner.



measurement distance. Power Output is the measured output power in watts.

| Manufacturer | Model Number | LFS   | dB(µV/M) | dB(µV/M)@3m | dB(µV/M)@1m |
|--------------|--------------|-------|----------|-------------|-------------|
| Midea        | E8528P-B     | 32.52 | 30.24    | 70.24       | 80.24       |



### 3.5 Operating Frequency Measurement

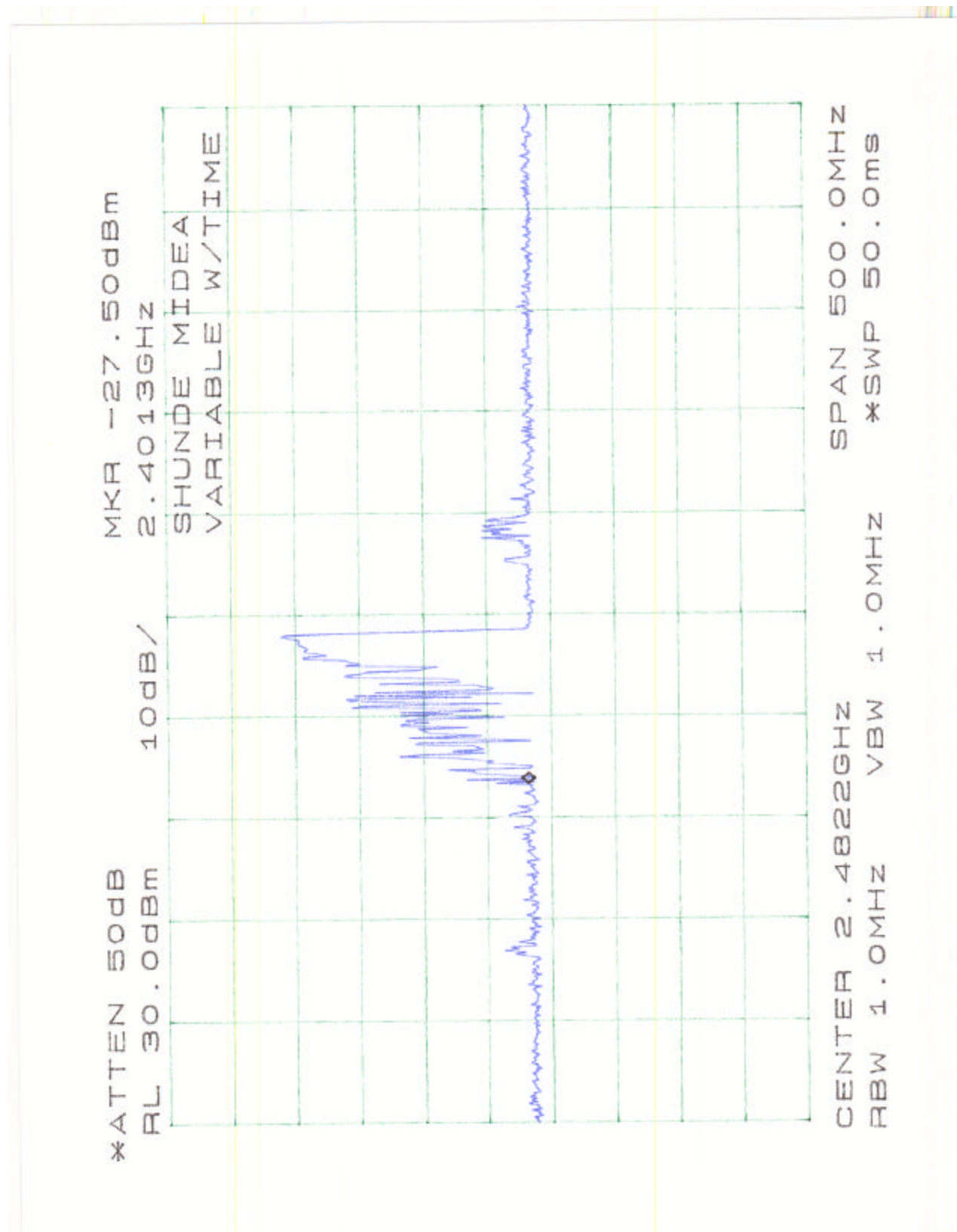
#### 3.5.1 Variation in Operating Frequency with Time

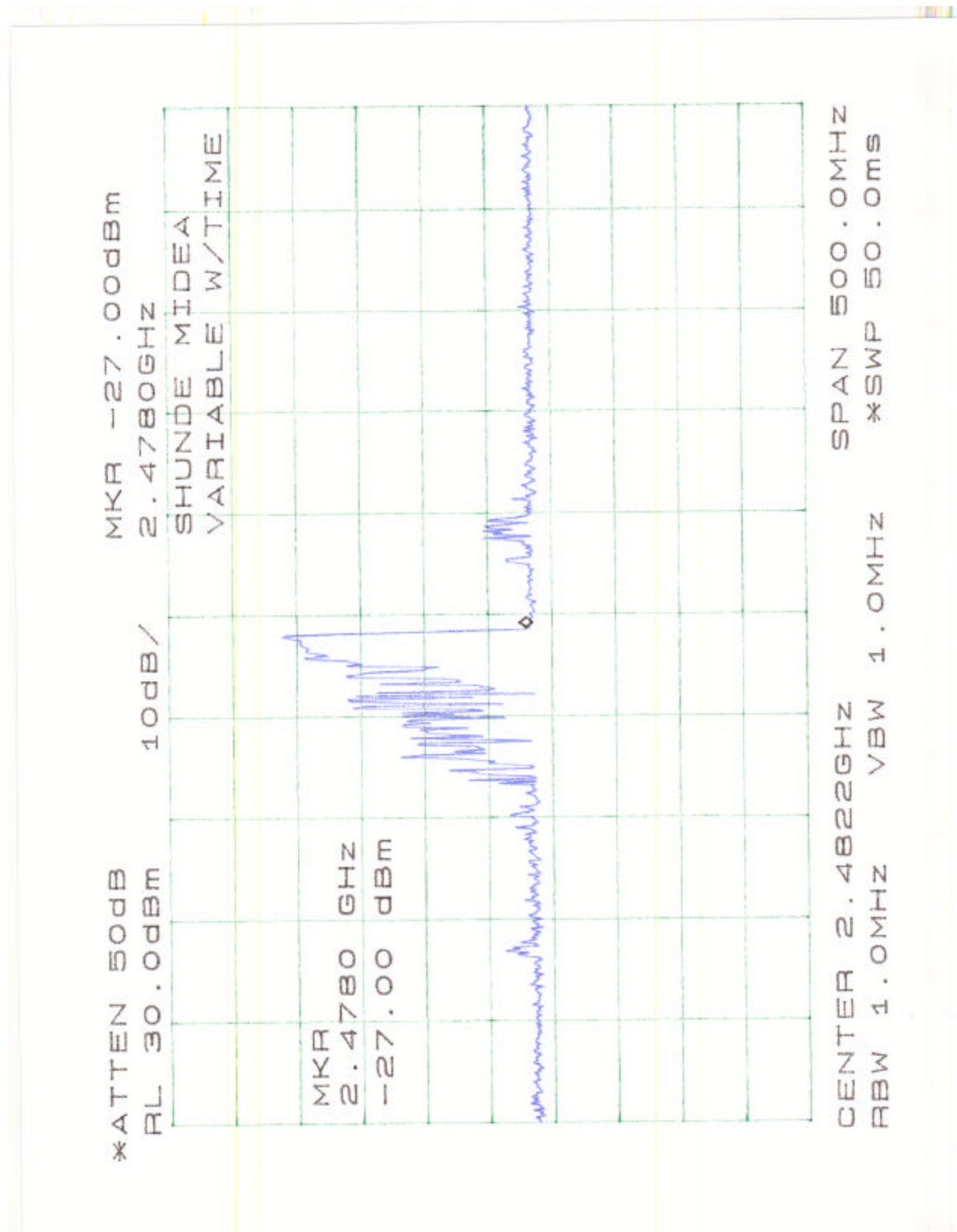
The operating frequency was measured using a spectrum analyzer. Starting with the EUT at room temperature, a 2600ml water load was placed in the center of the oven and the oven was operated at maximum output power. The fundamental operating frequency was monitored until the water load was reduced to 20 percent of the original load.

The results of this test are as follows:

| Manufacturer | Model    | Minimum Frequency | Maximum Frequency |
|--------------|----------|-------------------|-------------------|
| Midea        | E8528P-B | 2401 MHz          | 2478 MHz          |

Refer to data pages of 10 to 11 for details of the variation in operating frequency with time measurement.





### 3.5.2 Variation in Operating Frequency with Line Voltage

The EUT was operated / warmed by at least 10 minutes of use with a 2600ml water load at room temperature at the beginning of the test. Then the operating frequency was monitored as the input voltage was varied between 80 and 125 percent of the nominal rating.

The results of this test are as follows:

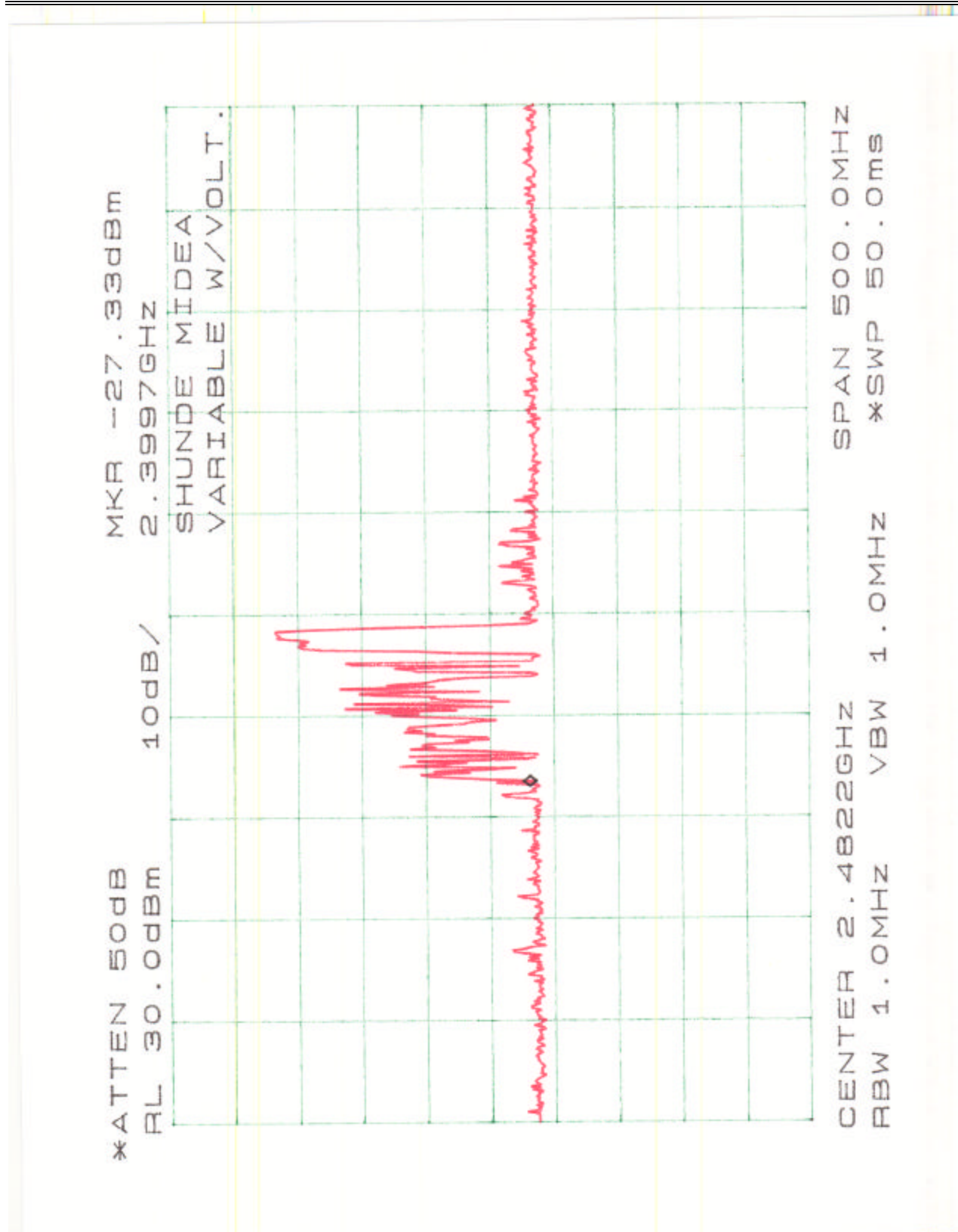
Line voltage varied from 96Vac to 150Vac.

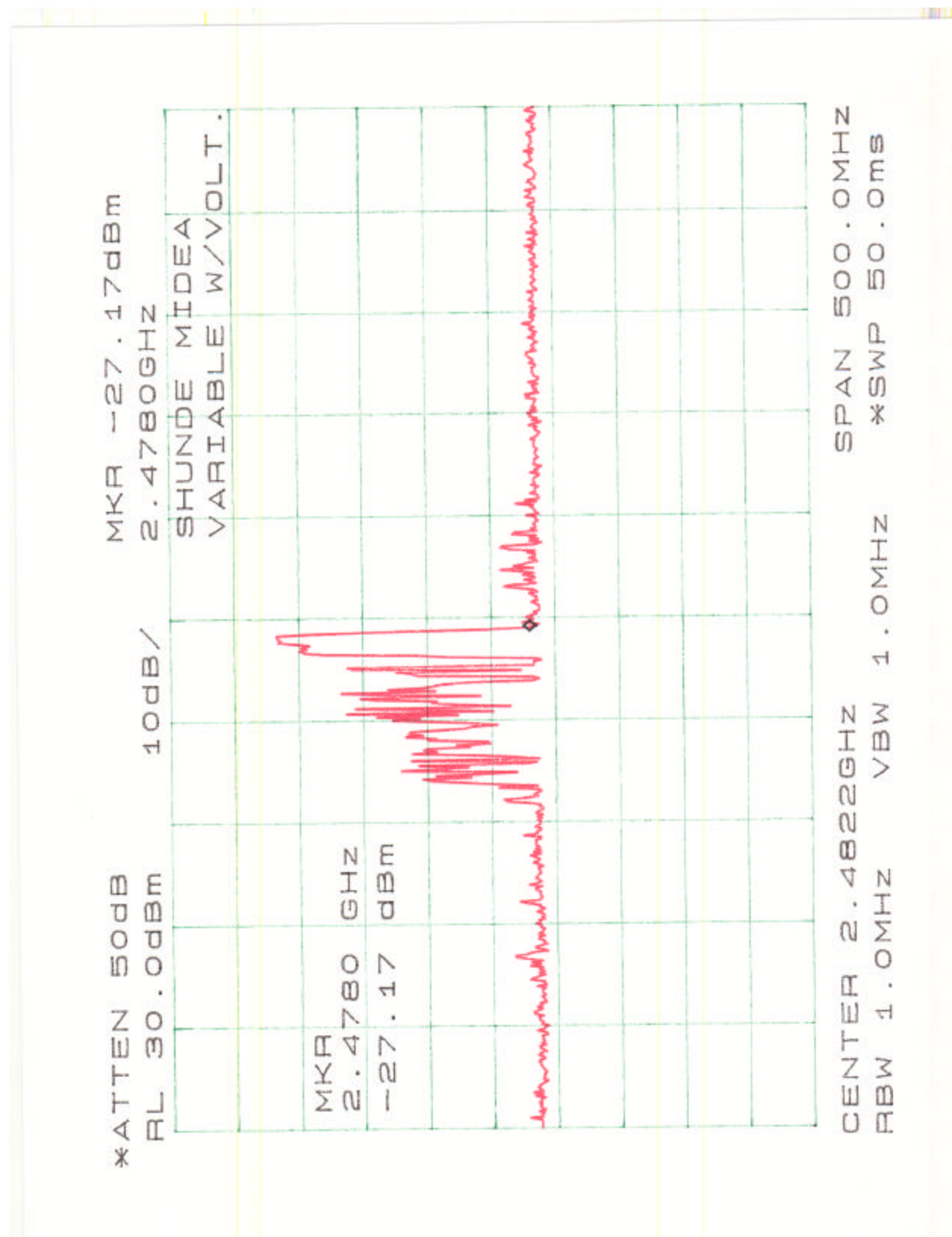
| Manufacturer | Model    | Minimum Frequency | Maximum Frequency |
|--------------|----------|-------------------|-------------------|
| Midea        | E8528P-B | 2400 MHz          | 2478 MHz          |

**Minimum frequency allowed: 2400MHz**

**Maximum frequency allowed: 2500MHz**

Please refer to following pages for details of the variation in operating frequency with line voltage measurement.





## 4 - RADIATED EMISSION DATA

### 4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is  $\pm 4.0$  dB.

### 4.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4 – 1992. The specification used was the FCC part 18 Subpart C limits.

The EUT was placed on the edge of the turntable. The EUT was connected to 110Vac/60Hz power source.

### 4.3 Spectrum Analyzer Setup

According to FCC rules, 47 CFR 18.309(a), the EUT was tested to 10th harmonic (24GHz).

During the radiated emission test, the spectrum analyzer was set with the following configurations:

|                                    |         |
|------------------------------------|---------|
| Start Frequency .....              | 30 MHz  |
| Stop Frequency .....               | 24 GHz  |
| Sweep Speed .....                  | Auto    |
| IF Bandwidth .....                 | 1 MHz   |
| Video Bandwidth .....              | 1 MHz   |
| Quasi-Peak Adapter Bandwidth ..... | 120 kHz |
| Quasi-Peak Adapter Mode .....      | Normal  |
| Resolution Bandwidth .....         | 1MHz    |

### 4.4 Test Procedure

For the radiated emissions test, the power cord of the EUT was connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB $\mu$ V of specified limitations), and are distinguished with a "Qp" in the data table.

The EUT was in the normal (naï ve) operating mode during the final qualification test to represent the worst results.

## 4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

## 4.6 Summary of Test Results

According to the data in section 4.7, the EUT complied with the FCC Part 18 Subpart C, and had the worst margin of:

**-2.5 dBmV at 4946 MHz in the Vertical polarization, 30MHz to 24GHz.**

## 4.7 Radiated Emissions Test Result Data

### 4.7.1 Final Test Data, 30MHz –24GHz, 3 Meters

| INDICATED     |              | TABLE        | ANTENNA      |            | CORRECTION FACTOR |          |         | CORRECTED AMPLITUDE | FCC PART 18  |           |
|---------------|--------------|--------------|--------------|------------|-------------------|----------|---------|---------------------|--------------|-----------|
| Frequency MHz | Ampl. dBmV/m | Angle Degree | Height Meter | Polar H/ V | Antenna dBmV/m    | Cable dB | Amp. dB | Corr. Ampl. dBmV/m  | Limit dBmV/m | Margin dB |
| 2470.00       | 125.5        | 145          | 1.0          | V          | 28.1              | 3.4      | 31.5    | 125.5               |              |           |
| 2470.00       | 119.0        | 180          | 1.4          | H          | 28.1              | 3.4      | 31.5    | 119.0               |              |           |
| 4946.00       | 62.8         | 45           | 1.2          | V          | 32.5              | 4.9      | 32.5    | 67.7                | 70.2         | -2.5      |
| 4946.00       | 62.3         | 180          | 1.2          | H          | 32.5              | 4.9      | 32.5    | 67.2                | 70.2         | -3.0      |
| 7438.00       | 57.8         | 360          | 1.2          | V          | 35.1              | 5.6      | 32.0    | 66.6                | 70.2         | -3.7      |
| 7438.00       | 57.5         | 360          | 1.4          | H          | 35.1              | 5.6      | 32.0    | 66.2                | 70.2         | -4.0      |
| 9896.00       | 55.5         | 360          | 1.2          | V          | 35.1              | 5.6      | 31.5    | 64.7                | 70.2         | -5.5      |
| 9896.00       | 52.5         | 360          | 1.4          | H          | 35.1              | 5.6      | 31.5    | 61.7                | 70.2         | -8.5      |
| 12366.00      | 52.2         | 180          | 1.2          | V          | 35.1              | 5.6      | 32.9    | 60.0                | 70.2         | -10.2     |
| 14865.00      | 50.8         | 90           | 1.2          | V          | 35.1              | 5.6      | 33.6    | 58.0                | 70.2         | -12.3     |
| 12366.00      | 50.0         | 180          | 1.4          | H          | 35.1              | 5.6      | 32.9    | 57.8                | 70.2         | -12.4     |
| 14865.00      | 42.8         | 180          | 1.4          | H          | 35.1              | 5.6      | 33.6    | 49.9                | 70.2         | -20.3     |