



## **EMI TEST REPORT**

JQA File No. : 400-70128

Model No. : HEI-18YT

Type of Equipment : Tour Mic(Transmitter)

Regulations Applied : CFR 47 FCC Rules and Regulations Part 74

FCC ID : VGWHEI-18Y

Applicant : Seiden Electric Engineering Co., Ltd.

Address : 1842-10 Kimagase, Noda-shi, Chiba-ken, 270-0222 Japan

Manufacturer : Seiden Electric Engineering Co., Ltd.

Address : 1842-10 Kimagase, Noda-shi, Chiba-ken, 270-0222 Japan

Received date of EUT : May 19, 2007

**Test Result : Passed**

Test results in this report are obtained in use of equipment that is traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan and Communication Research Laboratory (CRL) of Japan.

The test results only respond to the tested sample. This report should not be reproduced except in full, without the written approval of JQA EMC Engineering Dept. Testing Div.

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**1 DOCUMENTATION****1.1 TEST REGULATION**

FCC Rules and Regulations Part 74 Subpart H Low Power Auxiliary Stations

**Test procedure :**

RF power output, modulation characteristics, occupied bandwidth, field strength of spurious radiation and frequency stability tests were performed according to the procedures in FCC Rules and Regulations Part 2.

**1.2 GENERAL INFORMATION****1.2.1 Test facility :**

- 1) Test Facility located at EMC Engineering Dept. Testing Div. :
  - No.2 and 3 Anechoic Chambers(3 meters Site).
  - Shielded Enclosure.
- 2) EMC Engineering Dept. Testing Div. is accredited under the National Voluntary Laboratory accreditation Program for satisfactory compliance established in title 15, Part 285 Code of Federal Regulations.  
NVLAP Lab Code : 200189-0 (Effective through : June 30, 2008)

**1.2.2 Description of the Equipment Under Test (EUT) :**

- 1) Type of Equipment : Tour Mic(Transmitter)
  - 2) Product Type : Prototype
  - 3) Category : Licensed Non-Broadcast Transmitter  
Worn On Body
  - 4) EUT Authorization : Certification
  - 5) FCC ID : VGWHEI-18Y
  - 6) Trade Name : None
  - 7) Model No. : HEI-18YT
  - 8) Operating Frequency Range : 802.000 MHz - 803.800 MHz
  - 9) Highest Frequency Used in the EUT : 803.800 MHz
  - 10) Necessary Bandwidth : 20 kHz (=2M+2D)  
(M: Maximum modulation = 3 kHz  
D: Peak frequency deviation = 7 kHz)
- \* Peak frequency deviation is designed by manufacturer.
- 11) RF Output Power : 8.5 mW (Manufacturer defined)
  - 12) Emission Designator : 20KF3E
  - 13) Serial No. : None
  - 14) Date of Manufacture : None
  - 15) Power Rating : DC 3.0V(Battery)
  - 16) EUT Grounding : None

**1.2.3 Definitions for symbols used in this test report :**

- x - indicates that the listed condition, standard or equipment is applicable for this report.
- \_\_\_ - indicates that the listed condition, standard or equipment is not applicable for this report.

### 1.3 TEST CONDITION

#### 1.3.1 The measurement of the RF power output the Radiated Emission(30 MHz - 1000 MHz)

  x   - was performed in the following test site.

     - was not applicable.

##### Test location :

Safety & EMC Center EMC Engineering Dept. Testing Div.  
21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

  x   - Anechoic Chamber A (3 meters)

     - Anechoic Chamber B (3 meters)

##### Validation of Site Attenuation :

- 1) Last Confirmed Date :March, 2007
- 2) Interval :1 year

##### Used test instruments :

Type	Number of test instruments (Refer to Appendix)
Test Receiver	11
Cable	38
Antenna	22, 24, 26, 28
RF Amplifier	N/A
Signal Generator	62
Power Meter	65
Power Sensor	66

**1.3.2 The measurement of the Radiated Emission(Above 1000 MHz)**

  x   - was performed in the following test site.

       - was not applicable.

**Test location :**

Safety & EMC Center EMC Engineering Dept. Testing Div.  
21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

  x   - Anechoic Chamber A (3 meters)

       - Anechoic Chamber B (3 meters)

**Validation of Site Attenuation :**

1) Last Confirmed Date :March, 2007

2) Interval :1 year

**Used test instruments :**

Type	Number of test instruments (Refer to Appendix)
Test Receiver	13
Spectrum Analyzer	N/A
Cable	46, 195
Antenna	31
RF Amplifier	57
Band Reject Filter	N/A
High Pass Filter	N/A

**1.3.3 The measurement of the Conducted Spurious Emission**

  x   - was performed in the following test site.

       - was not applicable.

**Used test instruments :**

Type	Number of test instruments (Refer to Appendix)
Test Receiver	N/A
Spectrum Analyzer	13
Cable	45
Attenuator	80
RF Amplifier	N/A
Signal Generator	62

**1.3.4 The measurement of the Modulation Characteristics and the Occupied Bandwidth**

  x   - was performed.  
     - was not applicable.

**Used test instruments :**

Type	Number of test instruments (Refer to Appendix)
Test Receiver	13
Spectrum Analyzer	N/A
Function Generator	58
FM Linear Detector	68
Level Meter	69
Cable	47
Attenuator	--
Antenna	82
DC Power Supply	77

**1.3.5 The measurement of the Frequency Stability**

  x   - was performed.  
     - was not applicable.

**Used test instruments :**

Type	Number of test instruments (Refer to Appendix)
Frequency Counter	75
Antenna	--
Cable	47
Attenuator	82
Oven	76
DC Power Supply	77

**1.4 EUT MODIFICATION / Deviation from Standard****1.4.1 EUT MODIFICATION**

- x   - No modifications were conducted by JQA to achieve compliance to Class B levels.  
     - To achieve compliance to Class B levels, the following changes were made by JQA during the compliance test.

The modifications will be implemented in all production models of this equipment.

Applicant :

Date :

Typed Name :

Position :

Signatory : \_\_\_\_\_

**1.4.2 Deviation from Standard:**

- x   - No deviations from the standard described in clause 1.1.  
     - The following deviations were employed from the standard described in clause 1.1:

\_\_\_\_\_  
\_\_\_\_\_

**1.5 TEST RESULTS**

**RF Power Output [§74.861(e)(1)(ii)]**        x   - **Applicable**      \_\_\_ - **NOT Applicable**

The requirements are        x   - **PASSED**      \_\_\_ - **NOT PASSED**

**Remarks :**

**Modulation Characteristics [§74.861(e)(3)]**        x   - **Applicable**      \_\_\_ - **NOT Applicable**

The requirements are        x   - **PASSED**      \_\_\_ - **NOT PASSED**

**Remarks:**

**Occupied Bandwidth [§74.861(e)(6)]**        x   - **Applicable**      \_\_\_ - **NOT Applicable**

The requirements are        x   - **PASSED**      \_\_\_ - **NOT PASSED**

**Remarks:**

**Spurious Radiation [§74.861(e)(6)]**        x   - **Applicable**      \_\_\_ - **NOT Applicable**

The requirements are        x   - **PASSED**      \_\_\_ - **NOT PASSED**

**Remarks:**

**Frequency Stability [§74.861(e)(4)]**        x   - **Applicable**      \_\_\_ - **NOT Applicable**

The requirements are        x   - **PASSED**      \_\_\_ - **NOT PASSED**

**Remarks:**



**1.6 SUMMARY****General Remarks :**

The EUT was tested according to the requirements of FCC Rules and Regulations Part 74 Subpart H under the test configuration, as shown in clause 1.7 to 1.10. The conclusion for the test items of which are required by the applied regulation is indicated under the test result.

**Test Result :**

The "as received" sample;

- x   - fulfill the test requirements of the regulation mentioned on clause 1.1.
- fulfill the test requirements of the regulation mentioned on clause 1.1, but with certain qualifications.
- doesn't fulfill the test regulation mentioned on clause 1.1.

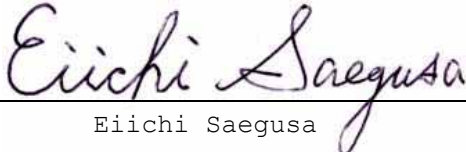
Begin of testing : May 19, 2007

End of testing : June 26, 2007

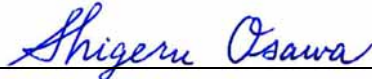
**- JAPAN QUALITY ASSURANCE ORGANIZATION -**

Approved by:

Issued by:



Eiichi Saegusa  
Manager  
Testing Division  
JQA EMC Engineering Dept.



Shigeru Osawa  
Assistant Manager  
Testing Division  
JQA EMC Engineering Dept.

**1.7 TEST CONFIGURATION / OPERATION OF EUT****1.7.1 Test Configuration**

The equipment under test (EUT) consists of :

Symbol	Item	Manufacturer	Model No.	FCC ID	Serial No.
A	Tour Mic (Transmitter)	Seiden Electric Engineering Co., Ltd.	HEI-18YT	VGWHEI-18Y	None

The measurements was carried out with the following supported connected :

Symbol	Item	Manufacturer	Model No.	FCC ID	Serial No.
B	Microphone	None	None	None	None

Type of cable :

Symbol	Description	Identification (Manufacturer etc.)	Shielded YES / NO	Ferrite Core	Connector type Shielded YES / NO	Length (m)
1	Cable (For Microphone)	-	No	No	No	2.10

The measurement was carried out with the following support equipment connected :

**1.7.2 Operating condition**

The operating condition is the special mode, which is continuous operation mode. And, this mode was set by manufacturer.

Power supply Voltage : 3.0VDC (Fresh Alkaline Battery used) or DC power supply

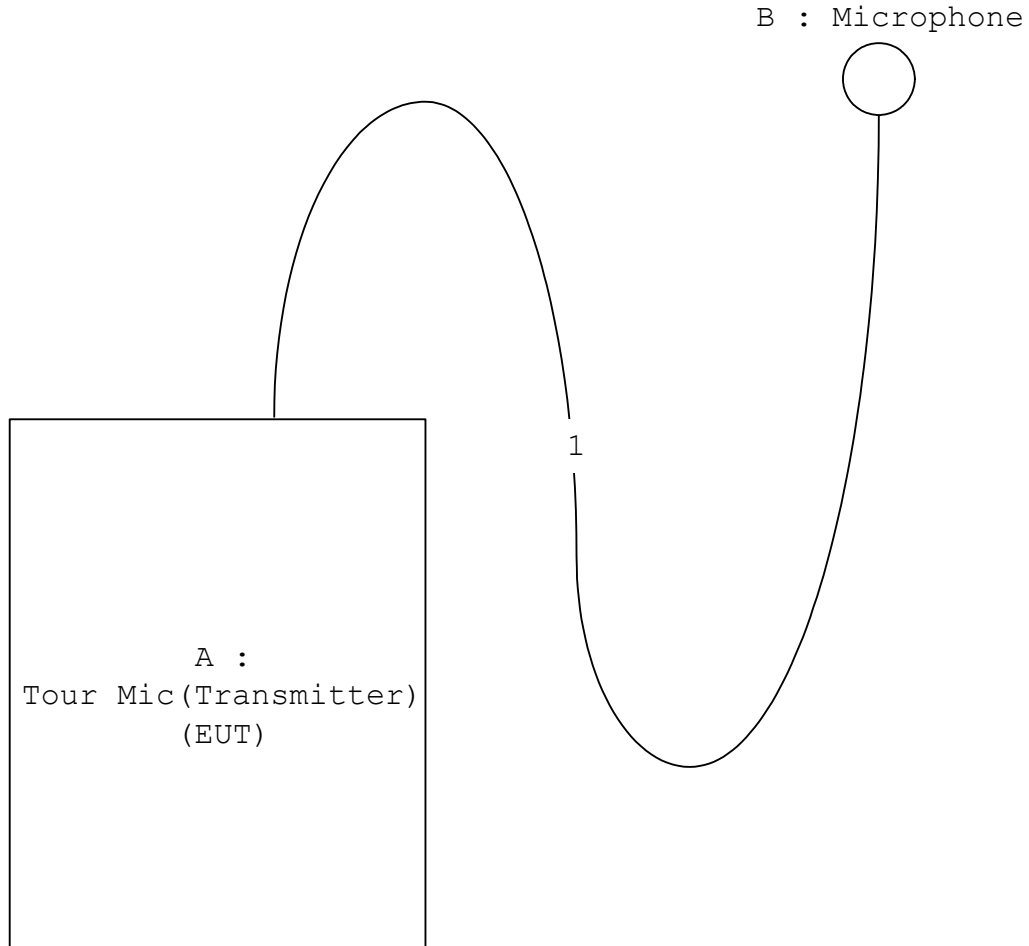
The tests have been carried out under the transmitting condition.

Operating Channel and Frequency: 0 ch (802.000 MHz), 5 ch (803.000 MHz) and 9 ch (803.800 MHz)

**1.7.3 Generating and Operating frequency of EUT**

TX: 0 ch (802.000 MHz), 5 ch (803.000 MHz) and 9 ch (803.800 MHz) operation  
Clock Frequency: 21.4 MHz and 450 kHz

**1.8 EUT ARRANGEMENT (DRAWINGS)**



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**1.9 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)****1.9.1 RF Power Output and Radiated Emission (30 MHz - 1000 MHz) :**

The radiated power output and the field strength of the transmitter harmonic and spurious radiation were measured at the distance at 3 meters away from the transmitter under test which was placed on a wooden turntable 0.8 meter in height. The receiving antenna was oriented for vertical polarization and raised or lowered through 1 to 4 meters until the maximum signal level was detected on the measuring instrument. The transmitter under test was rotated through 360° until the maximum signal was received. The measurement was repeated with the receiving antenna in the horizontal polarization.

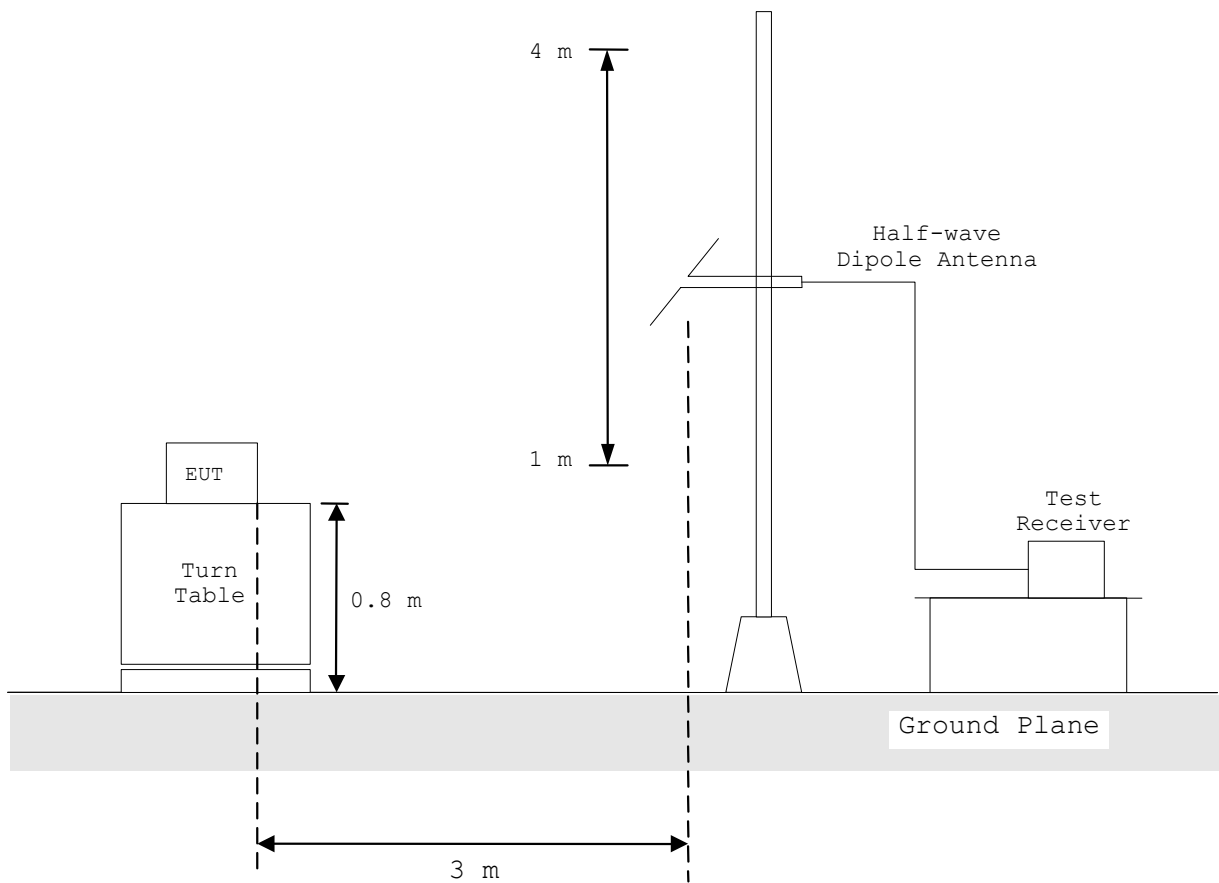
The transmitter was removed and replaced with a half-wave dipole antenna. The center of the half-wave dipole antenna was placed approximately at the same location as the center of the transmitter. (In the case of the lower frequencies, where the half-wave dipole antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such a case the lower end of the antenna was adjusted to 0.3m above the ground). The half-wave dipole antenna was fed with a signal generator, and the output level of the signal generator was adjusted to obtain the previously recorded maximum reading at the particular harmonics and spurious frequency and recorded. This procedure was repeated with the receiving antenna and the half-wave dipole antenna in the orthogonal polarization.

The input power into the half-wave dipole antenna was calculated from the impedance and signal generator voltage obtained in these reading. The level of the harmonics and spurious emissions in dB were calculated from the following formula:

$$\text{Attenuation (dB)} = 10 \log_{10} \frac{\text{Transmitter Power (ERP)}}{\text{Calculated Spurious Power}}$$

## Anechoic Chamber

- Side View -



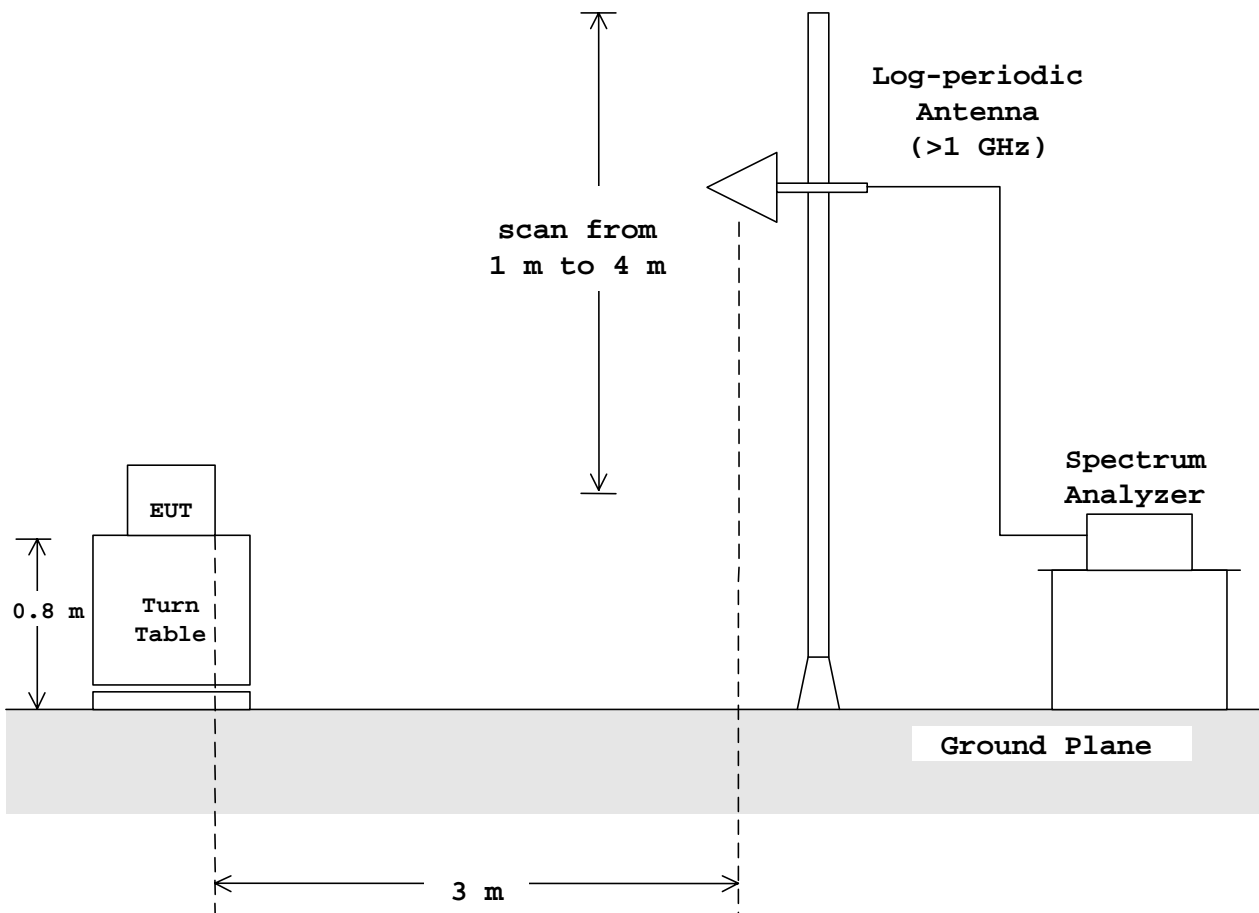
**1.9.2 Radiated Emission (Above 1 GHz) :**

The preliminary radiated emissions measurements were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

**Anechoic Chamber**

- Side View -



**1.9.3 Conducted Emission:**

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

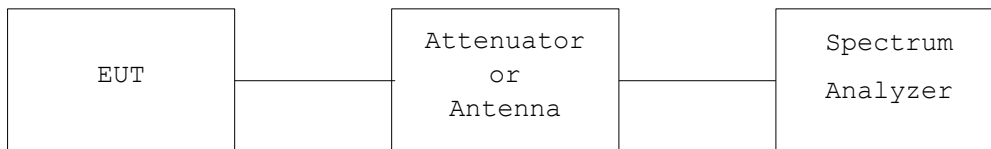
RBW = 10 kHz (below 1 GHz) and 1 MHz (above 1 GHz)

VBW  $\geq$  3 times RBW

Sweep  $\leq$  2000 Hz per second

Detector function = mean or average power

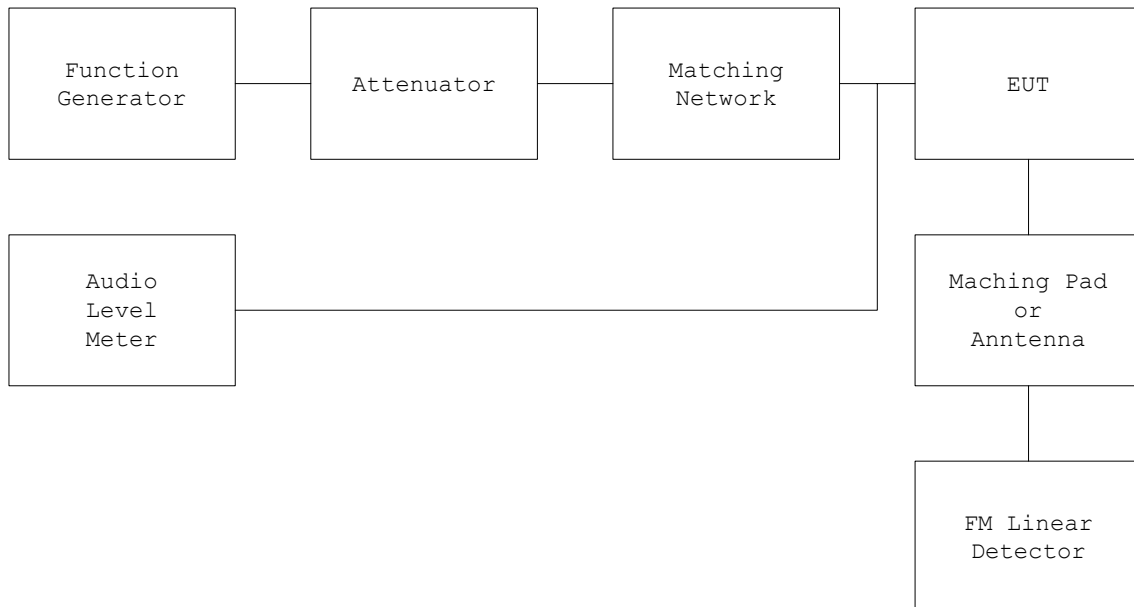
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.



#### 1.9.4 Modulation Characteristics

The audio signal generator was connected to the input circuit of the unit under test through a matching network. The audio signal input was adjusted to obtain 50% modulation at the maximum audio frequency response of the transmitter, and this point was taken as the 0 dB reference level. The frequency of the input signal was changed from 100 Hz to 20 kHz and the input level to obtain 50% modulation was plotted.

The modulation response was measured up to maximum modulation for each of three tones: 100 Hz, 2500 Hz and 15 kHz. The audio input level was changed from 10% modulation up to maximum rated modulation.

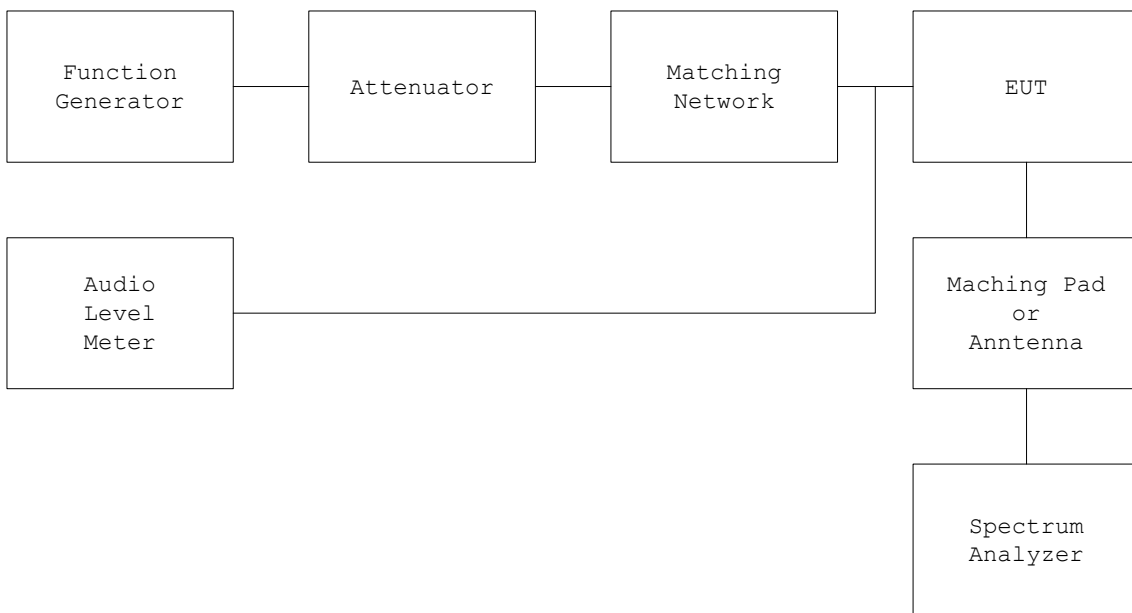




**1.9.5 Occupied Bandwidth :**

According to description of FCC Rules §2.1049, the occupied bandwidth measurements were carried out. By using a spectrum analyzer the measurements of the emission were made under the transmitting modes of the EUT.

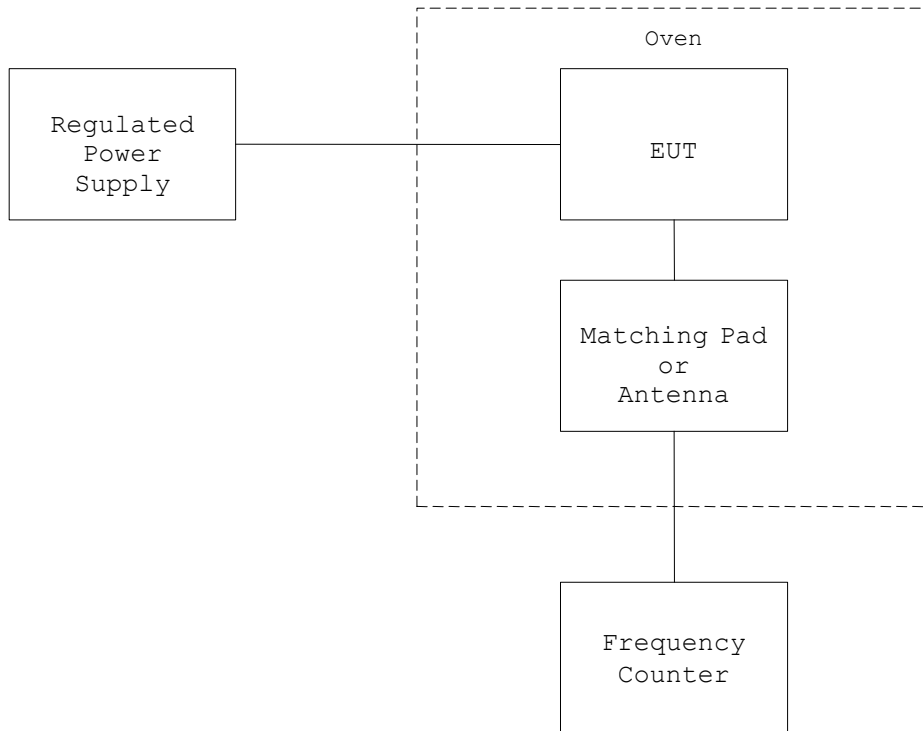
The transmitter was modulated at the input level producing 85% modulation at the maximum response frequency, and with the frequency 2500 Hz.



**1.9.6 Frequency Stability :**

The transmitter was placed in the temperature cycle chamber and was kept at a temperature of  $-30^{\circ}\text{C} \pm 1^{\circ}\text{C}$  for approximately one hour. The rated test voltage was applied to the transmitter and the unit was turned on for ten minutes. The transmit frequency was measured during this period and recorded. A similar measurement was performed with the temperatures changed from  $-20^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  at interval of  $10^{\circ}\text{C}$ . In the latter case, the unit was kept for approximately one hour at the prescribed temperature after completion of the test preceding with it.

The frequency stability tests were performed at the normal supply voltage and if required, with variation of primary supply voltage. (Refer to FCC Rules §2.1055)



**1.10 TEST ARRANGEMENT (PHOTOGRAPHS)****PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT**

Photograph present configuration with maximum emission



- X axis -



- Y axis -

**PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT**

Photograph present configuration with maximum emission



- Z axis -

**TEST DATA****2.1 RF Power Output**Date : June 19, 2007  
Temp.: 24 °C Humi.: 33 %


Frequency Range: 802.000 MHz - 803.800 MHz

Frequency (MHz)	Meter Reading for EUT (dBμ)	Antenna Input Level for Substitution (dBm)	Antenna Gain (dBi)	Output Power ERP (mW)
802.000	73.1	-0.42	2.15	0.91
803.000	77.4	4.20	2.15	2.63
803.800	73.3	-0.32	2.15	0.93

- Note:
1. Specified limit (§74.861(e)(1)(ii)); 250 mW
  2. A sample calculation:  
$$\text{ERP} = 10^{(\text{AIL} / 10)} = 10^{(-0.42 / 10)} = 0.91 \text{ (mW)}$$

ERP : Output Power  
AIL : Antenna Input Level for Substitution
  3. Measurement has been performed as Substitution Method as described on TIA-603-B.

Tested by :

  
Katsunori Miura  
Testing Engineer

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## 2.2 Modulation Characteristics

Date : June 26, 2007  
Temp.: 26°C Humi.: 44 %

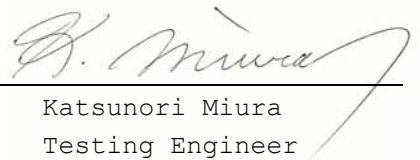
### Measurements Results :

Maximum deviation(100%): 7 kHz(Manufacturer specified)

Specified Limits: Max deviation  $\pm$  75 kHz( $\S$ 74.861(e)(3))

Refer to the attached graphs.

Tested by :

  
Katsunori Miura  
Testing Engineer

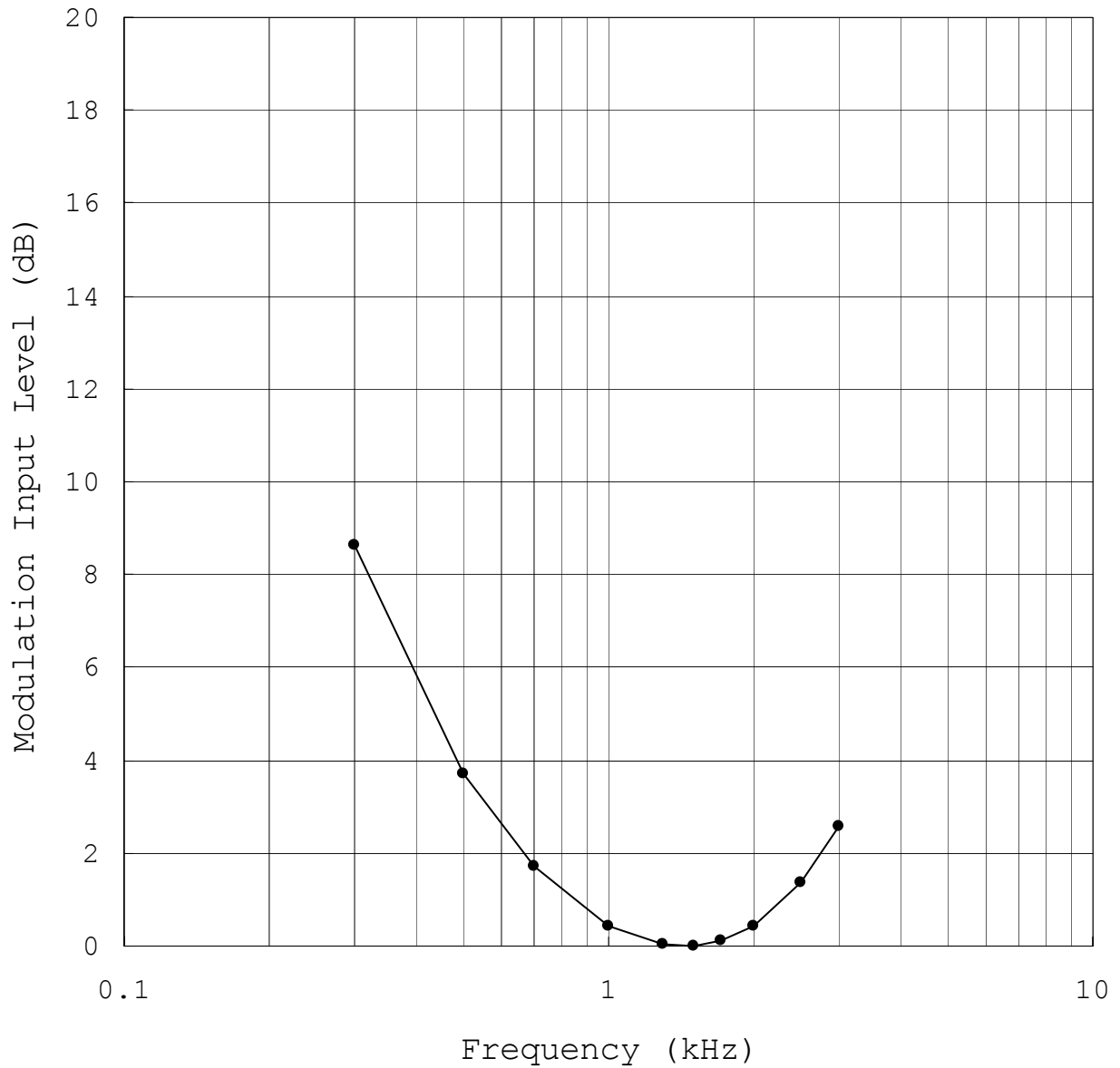
## Audio Frequency Response

FCC ID : VGVHEI-18Y

Model : HEI-18YT

Test Frequency : 802.000MHz

0dB : -40.97dBV



## Modulation Characteristics

FCC ID :

Model : HEI-18YT

Mode of EUT : Transmit

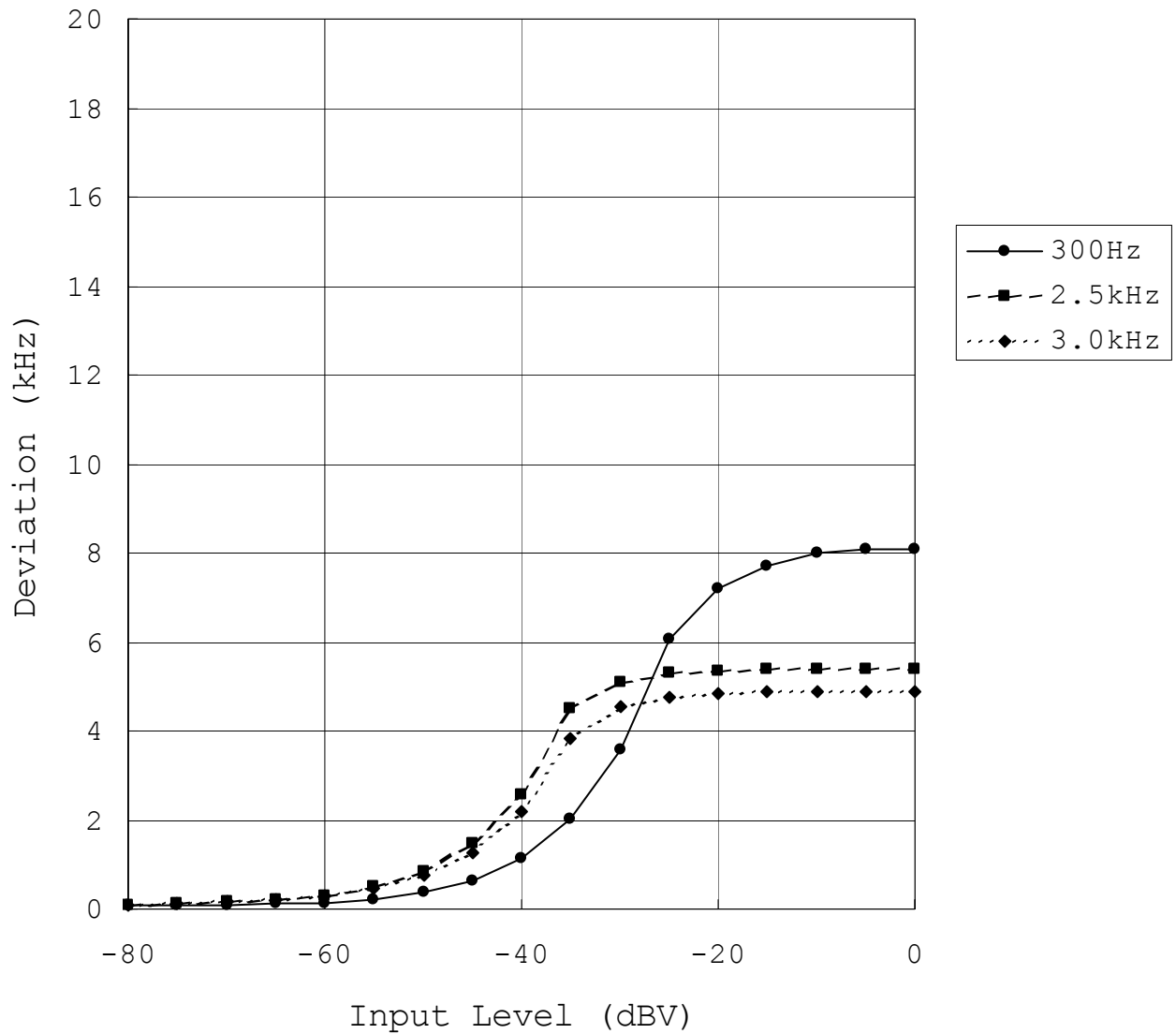
Input terminal : Microphone (300Hz/2.5kHz/3.0kHz)

Input Level (85% Modulation) : 300Hz/-22.15dBV

2.5kHz/-34.76dBV

3.0kHz/-34.18dBV

Carrier Frequency : 802.000MHz





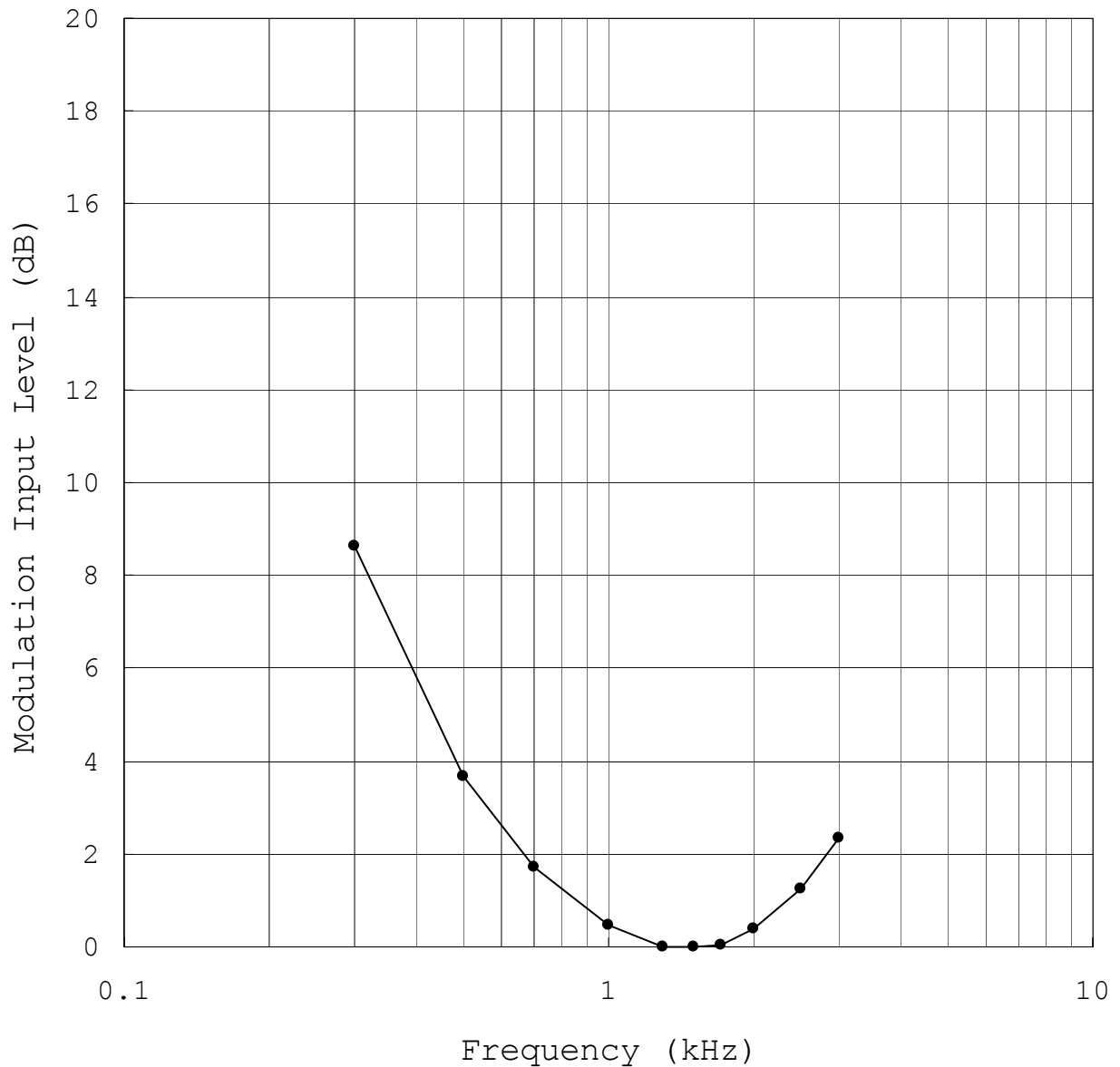
## Audio Frequency Response

FCC ID : VGVHEI-18Y

Model : HEI-18YT

Test Frequency : 803.000MHz

0dB : -40.64dBV



## Modulation Characteristics

FCC ID :

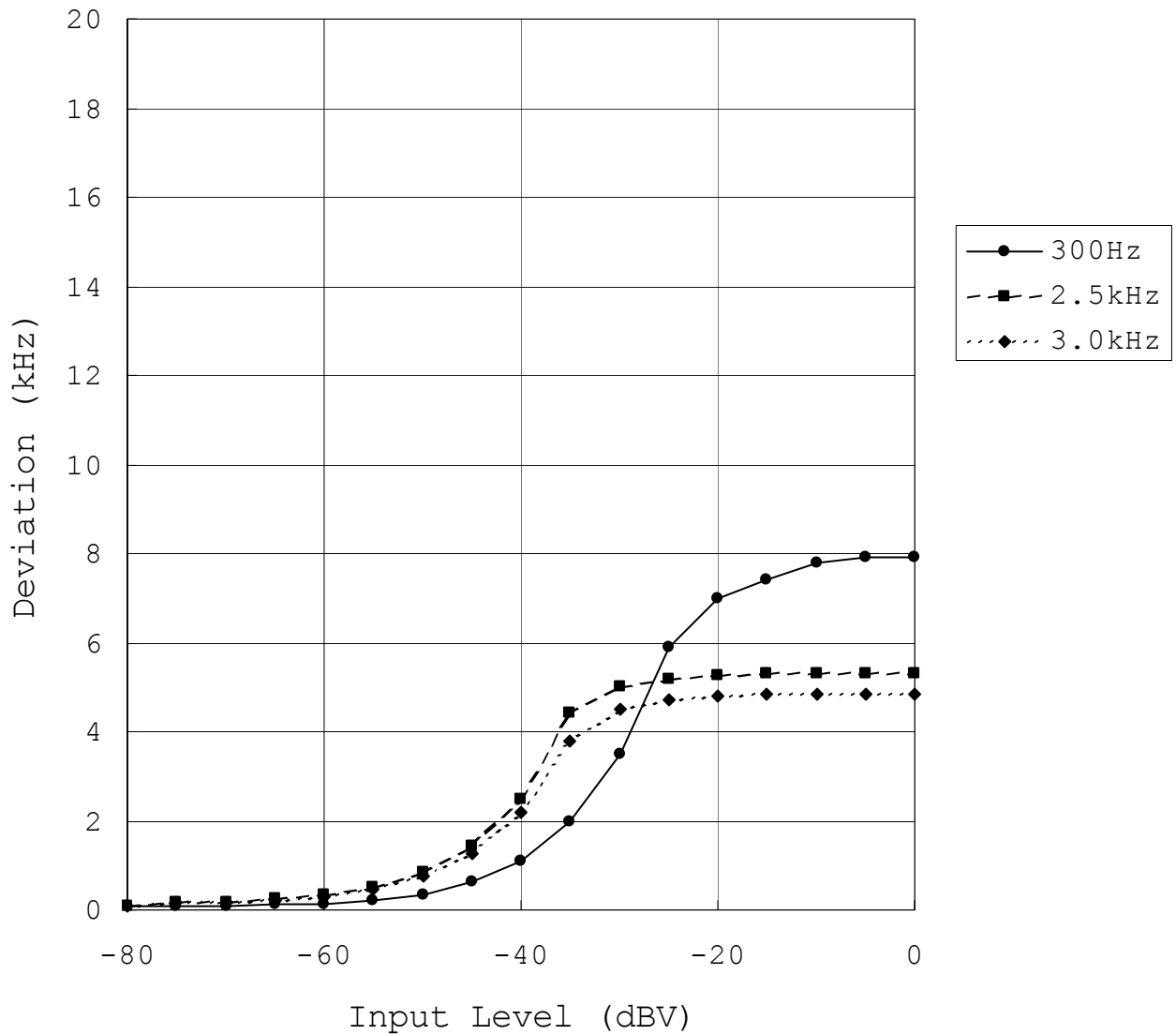
Model : HEI-18YT

Mode of EUT : Transmit

Input terminal : Microphone(300Hz/2.5kHz/3.0kHz)

Input Level(85% Modulation) : 300Hz/-21.14dBV  
 2.5kHz/-34.22dBV  
 3.0kHz/-33.30dBV

Carrier Frequency : 803.000MHz



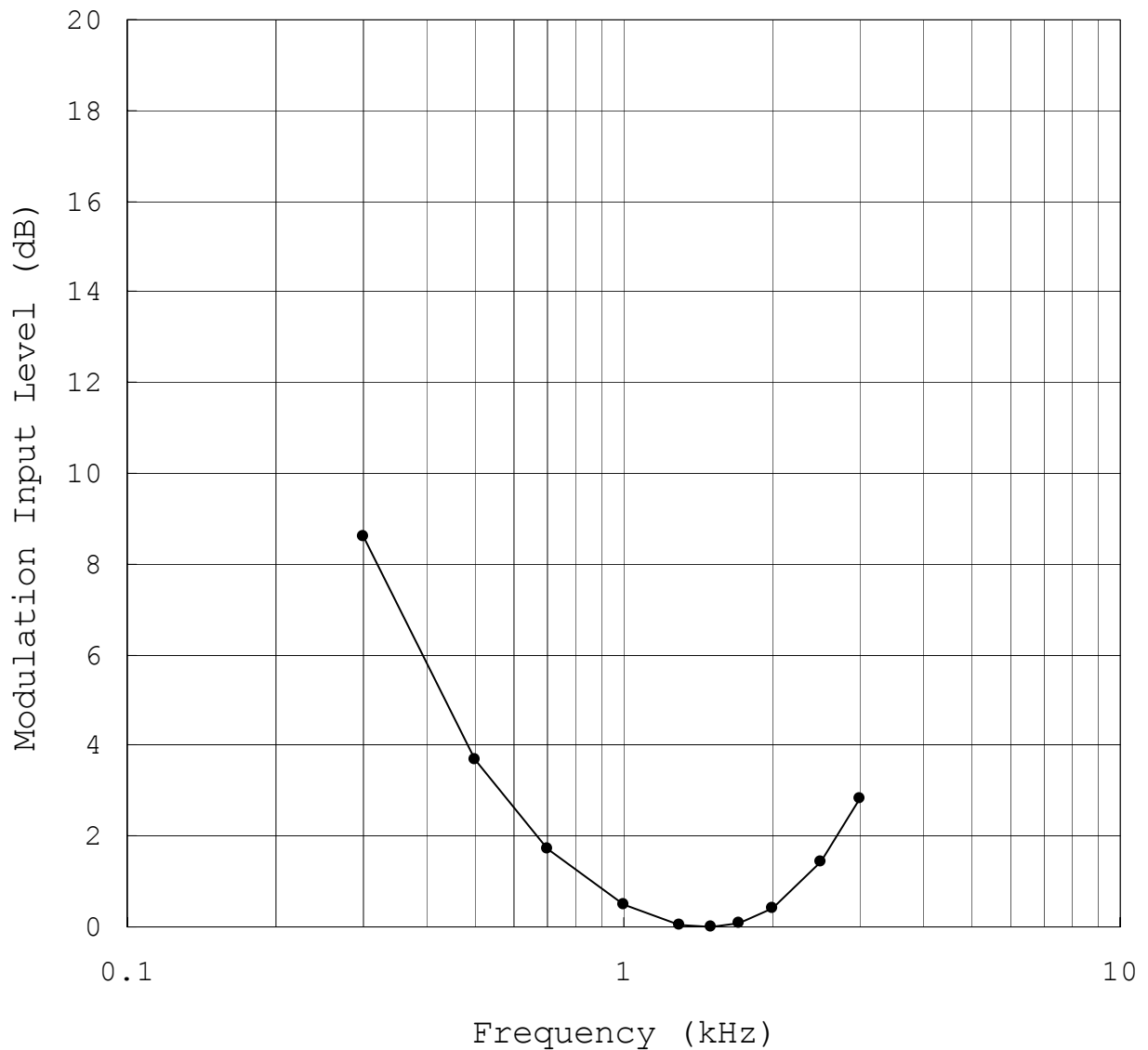
## Audio Frequency Response

FCC ID : VGVHEI-18Y

Model : HEI-18YT

Test Frequency : 803.800MHz

0dB : -41.00dBV



## Modulation Characteristics

FCC ID :

Model : HEI-18YT

Mode of EUT : Transmit

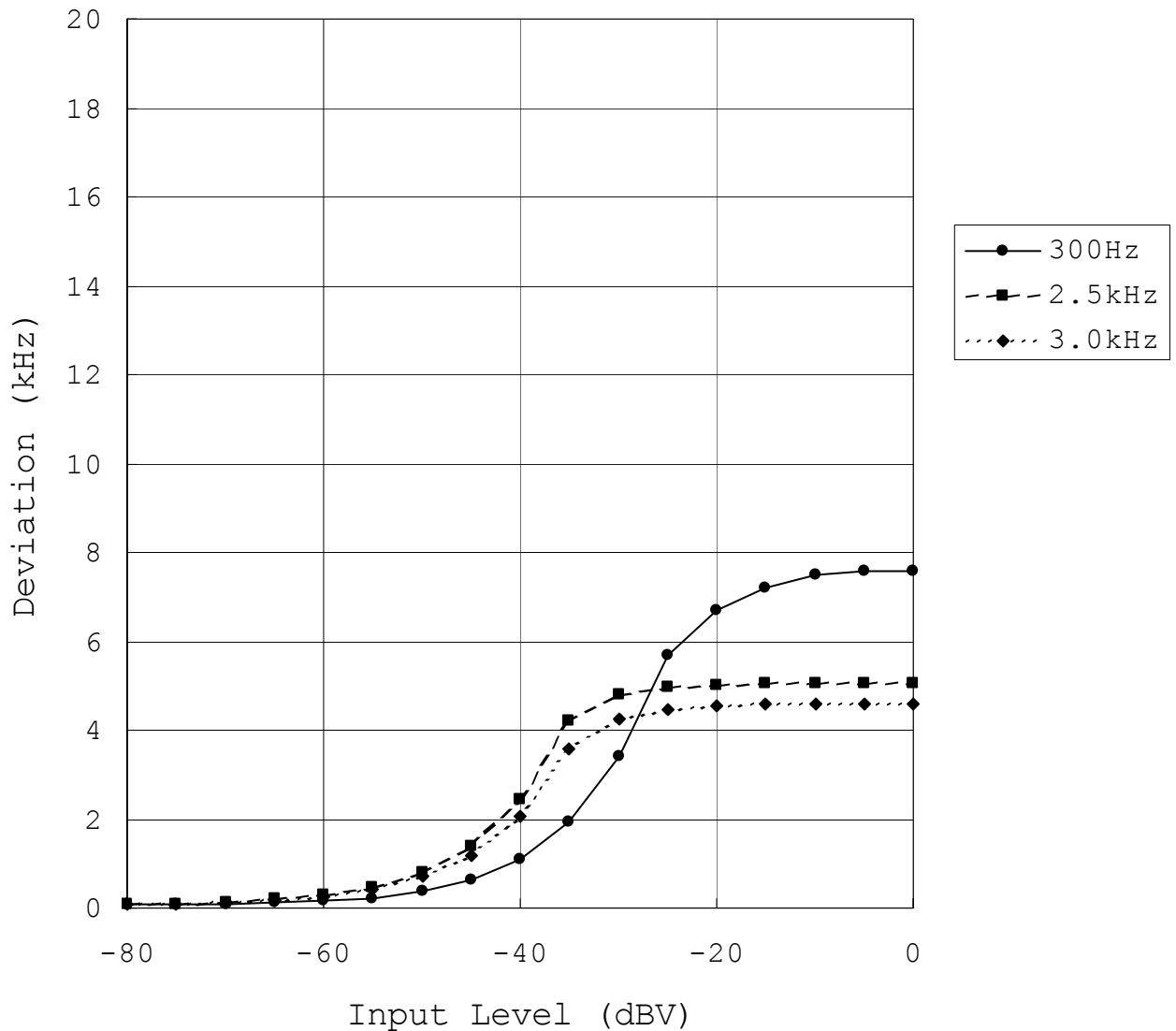
Input terminal : Microphone(300Hz/2.5kHz/3.0kHz)

Input Level(85% Modulation) : 300Hz/-21.64dBV

2.5kHz/-34.72dBV

3.0kHz/-33.63dBV

Carrier Frequency : 803.800MHz



### 2.3 Radiated Emissions Measurement

Date : June 25, 2007  
 Temp.: 27 °C Humi.: 44 %

Operating Frequency : 802.000 MHz  
 Reference Carrier Power (ERP) : 0.91 mW  
 Distance of Measurement : 3.0 m

Frequency (MHz)	Substituted Power ERP (dBm)		Limits (dB)	Attenuation Ratio (dB)	
	Horiz.	Vert.		Horiz.	Vert.
391.455	-56.4	-57.3	12.6	56.0	56.9
401.014	-48.8	-49.5	12.6	48.3	49.0
1203.000	-38.9	-40.1	12.6	38.5	39.7
1604.000	-45.5	-44.8	12.6	45.1	44.4
2005.000	-46.4	-45.5	12.6	46.0	45.1
2406.000	-49.5	-49.5	12.6	49.1	49.1
2807.000	-37.8	-38.6	12.6	37.4	38.2
3208.000	-45.6	-45.5	12.6	45.2	45.1
3609.000	-46.1	-47.1	12.6	45.7	46.7
4010.000	-42.4	-43.5	12.6	42.4	43.5
4411.000	-41.2	-42.3	12.6	41.2	42.3
4812.000	< -48.9	< -48.9	12.6	> 48.9	> 48.9
5213.000	< -48.2	< -48.2	12.6	> 48.2	> 48.2
5614.000	< -47.6	< -47.6	12.6	> 47.6	> 47.6
6015.000	< -47.0	< -47.0	12.6	> 47.0	> 47.0
6416.000	< -46.4	< -46.4	12.6	> 46.4	> 46.4
6817.000	< -45.9	< -45.9	12.6	> 45.9	> 45.9
7218.000	< -45.4	< -45.4	12.6	> 45.4	> 45.4
7619.000	< -44.8	< -44.8	12.6	> 44.8	> 44.8
8020.000	< -44.4	< -44.4	12.6	> 44.4	> 44.4


Operating Frequency : 803.000 MHz  
 Reference Carrier Power (ERP) : 2.63 mW  
 Distance of Measurement : 3.0 m

Frequency (MHz)	Substituted Power ERP (dBm)		Limits (dB)	Attenuation Ratio (dB)	
	Horiz.	Vert.		Horiz.	Vert.
390.918	-59.2	-62.9	17.2	63.4	67.1
401.512	-48.2	-51.6	17.2	52.4	55.8
1204.500	-40.0	-40.1	17.2	44.2	44.3
1606.000	-38.8	-39.2	17.2	43.0	43.4
2007.500	-39.6	-41.7	17.2	43.8	45.9
2409.000	-46.2	-45.5	17.2	50.4	49.7
2810.500	-37.1	-37.4	17.2	41.3	41.6
3212.000	-44.7	-43.2	17.2	48.9	47.4
3613.500	-41.5	-41.6	17.2	45.7	45.8
4015.000	-37.6	-39.5	17.2	37.6	39.5
4416.500	< -49.6	< -49.6	17.2	> 49.6	> 49.6
4818.000	< -48.9	< -48.9	17.2	> 48.9	> 48.9
5219.500	< -48.2	< -48.2	17.2	> 48.2	> 48.2
5621.000	< -47.6	< -47.6	17.2	> 47.6	> 47.6
6022.500	< -47.0	< -47.0	17.2	> 47.0	> 47.0
6424.000	< -46.4	< -46.4	17.2	> 46.4	> 46.4
6825.500	< -45.9	< -45.9	17.2	> 45.9	> 45.9
7227.000	< -45.3	< -45.3	17.2	> 45.3	> 45.3
7628.500	< -44.8	< -44.8	17.2	> 44.8	> 44.8
8030.000	< -44.3	< -44.3	17.2	> 44.3	> 44.3

Operating Frequency : 803.800 MHz  
 Reference Carrier Power (ERP) : 0.93 mW  
 Distance of Measurement : 3.0 m

Frequency (MHz)	Substituted Power ERP (dBm)		Limits (dB)	Attenuation Ratio (dB)	
	Horiz.	Vert.		Horiz.	Vert.
392.552	-55.1	-59.4	12.7	54.8	59.1
401.909	-48.2	-49.6	12.7	47.8	49.2
1205.700	-39.1	-40.3	12.7	38.8	40.0
1607.600	-44.4	-43.9	12.7	44.1	43.6
2009.500	-43.6	-44.7	12.7	43.3	44.4
2411.400	-48.6	-47.2	12.7	48.3	46.9
2813.300	-39.4	-39.1	12.7	39.1	38.8
3215.200	-47.3	-46.6	12.7	47.0	46.3
3617.100	-43.2	-44.8	12.7	42.9	44.5
4019.000	-43.0	-44.3	12.7	43.0	44.3
4420.900	< -49.6	< -49.6	12.7	> 49.6	> 49.6
4822.800	< -48.9	< -48.9	12.7	> 48.9	> 48.9
5224.700	< -48.2	< -48.2	12.7	> 48.2	> 48.2
5626.600	< -47.6	< -47.6	12.7	> 47.6	> 47.6
6028.500	< -47.0	< -47.0	12.7	> 47.0	> 47.0
6430.400	< -46.4	< -46.4	12.7	> 46.4	> 46.4
6832.300	< -45.9	< -45.9	12.7	> 45.9	> 45.9
7234.200	< -45.3	< -45.3	12.7	> 45.3	> 45.3
7636.100	< -44.8	< -44.8	12.7	> 44.8	> 44.8
8038.000	< -44.3	< -44.3	12.7	> 44.3	> 44.3

- Note: 1. The spectrum was checked from 30 MHz to 10th harmonics.  
 All emissions not listed were found to be more than 20 dB below the limits.
2. The symbol of "<" means "or less".
3. Specified Limits: (§74.861(e) (6) (iii))  
 Attenuation Ratio =  $43 + 10\log_{10}(\text{mean output power in watt})$   
 This Limit is equivalent to -13 dBm(absolute value).
4. Measuring Instrument Setting:  
 Less than 1000 MHz  
 Detector function : Average  
 IF Bandwidth : 120 kHz  
 Above 1000 MHz  
 Resolution Bandwidth : 1 MHz

Tested by :   
 Katsunori Miura  
 Testing Engineer

**2.4 Conducted Emissions Measurement**Date : June 25, 2007  
Temp.: 27 °C Humi.: 44 %**2.4.1 Carrier Level**

Frequency Range: 802.000 MHz - 803.800 MHz

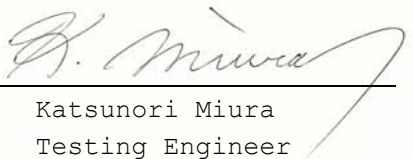
Frequency (MHz)	Cable Loss (dB)	Attenuator Loss (dB)	Meter Reading (dBm)	Output Power (dBm)
802.000	0.46	10.05	-6.35	4.16
803.000	0.46	10.05	-7.30	3.21
803.800	0.46	10.05	-5.78	4.73

Note: 1. Specified limit (§74.861(e)(1)(ii)); 250 mW(24.0 dBm)  
2. A sample calculation:  
Output Level = CL + ATT + MR = 0.46 + 10.05 + ( -6.35 ) = 4.16 (dBm)  
CL : Cable Loss  
ATT : Attenuator Loss  
MR : Meter Reading

**2.4.2 Spurious Level**

Operating Frequency : 802.000 MHz, 803.000 MHz and 803.800 MHz

In the case of all operating frequency, other spurious levels are 20 dB below the limit.

Tested by :   
Katsunori Miura  
Testing Engineer



## 2.5 Occupied Bandwidth Measurement

Date : June 28, 2007  
Temp.: 27°C Humi.: 52 %

### Measurements Results :


Necessary Bandwidth: 20 kHz (Manufacturer specified)  
Maximum Deviation (100%): 7 kHz (Manufacturer specified)  
5.40 kHz (Measurement value of 0ch(802.000MHz))  
5.30 kHz (Measurement value of 5ch(803.000MHz))  
5.05 kHz (Measurement value of 9ch(803.800MHz))

Input Level: 85% modulation point of Measurement value

Specified Limits: (§74.861(e)(6)(i)(ii))

Refer to the attached graphs.

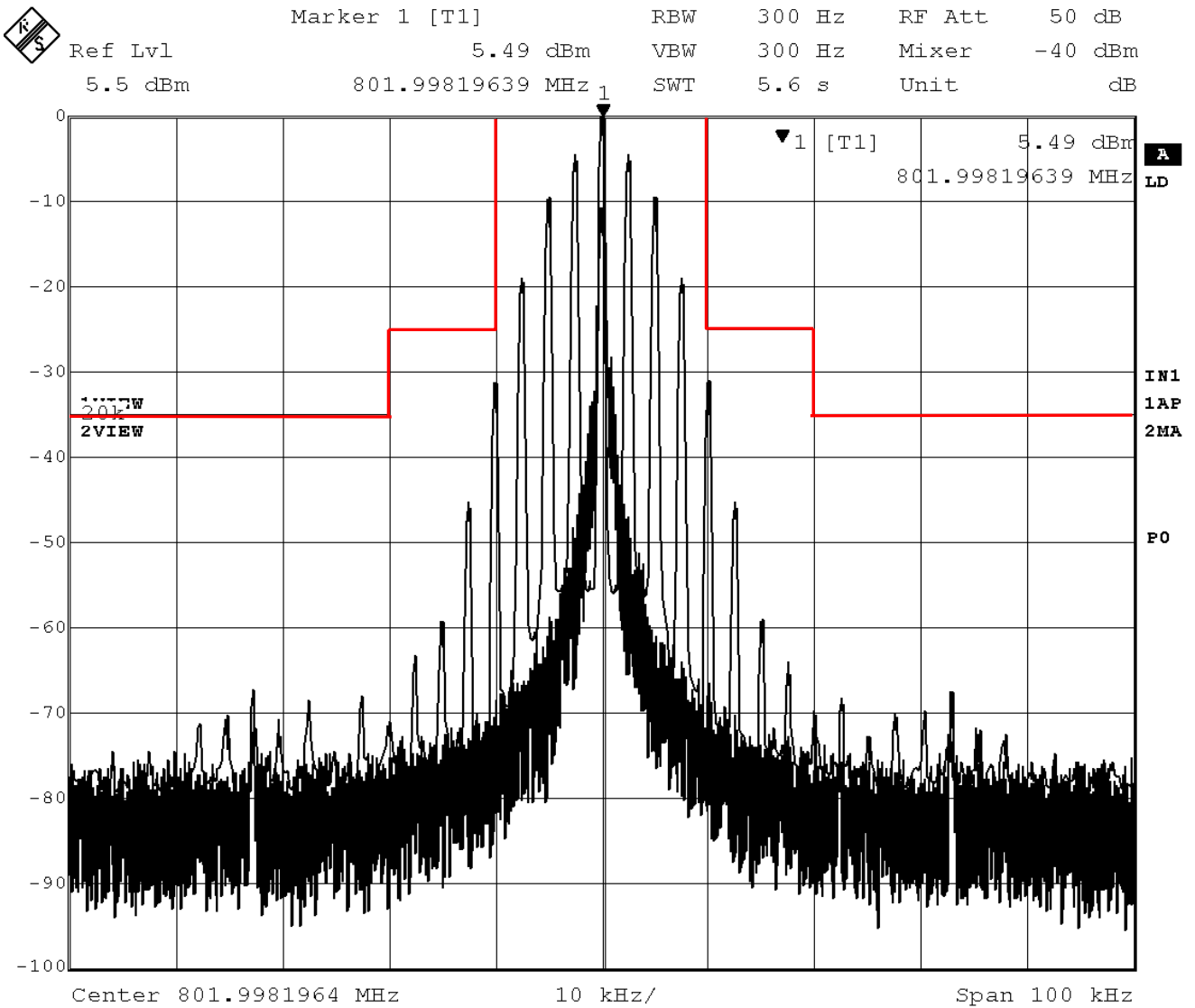
Tested by :

  
Katsunori Miura  
Testing Engineer

## Emission Limitation

FCC ID : VGVHEI-18Y  
 Model : HEI-18YT

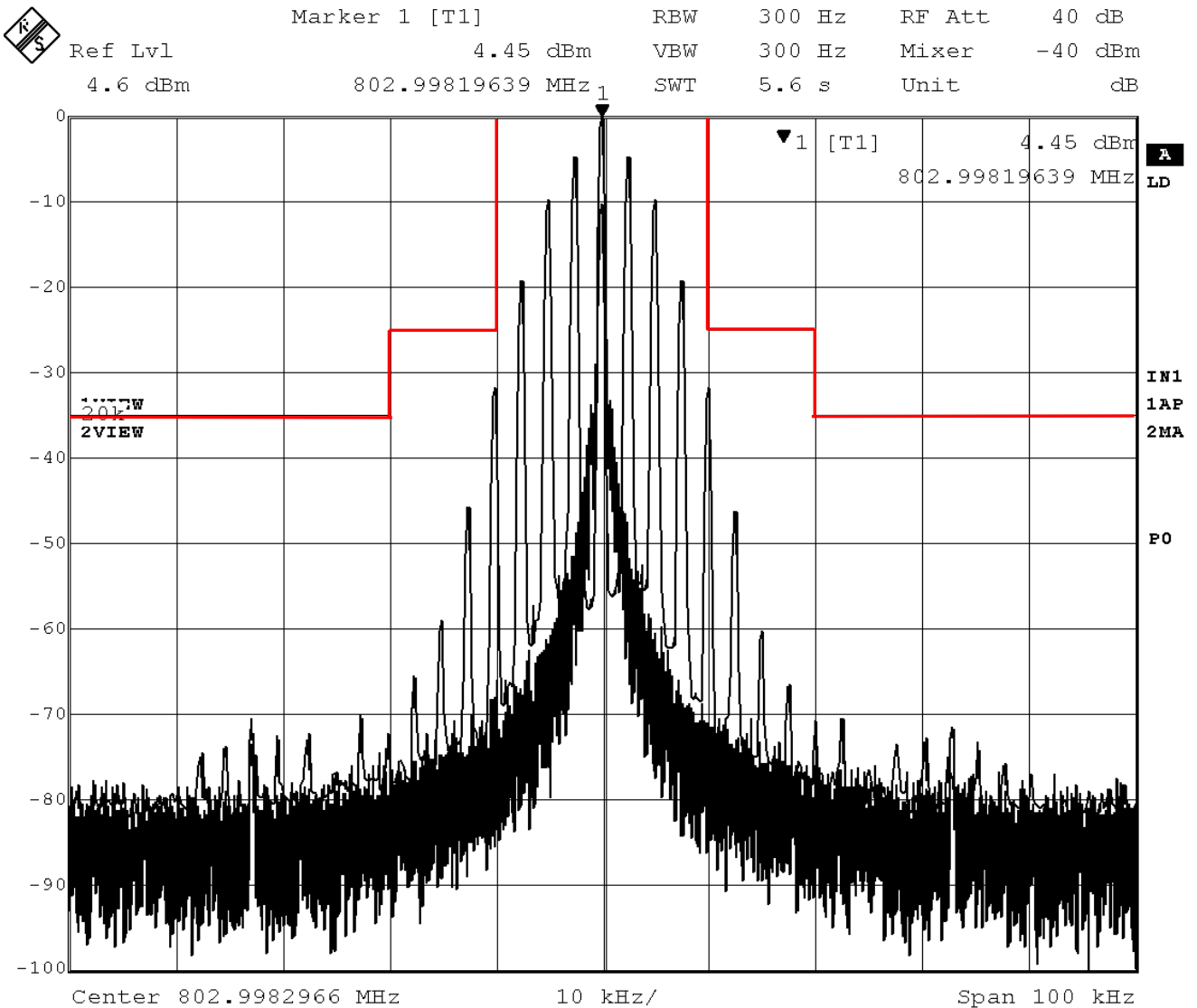
Model of EUT : Transmit  
 Carrier Frequency : 802.000MHz  
 Reference Carrier Level and 2.5kHz, -34.76dBV



## Emission Limitation

FCC ID : VGVHEI-18Y  
 Model : HEI-18YT

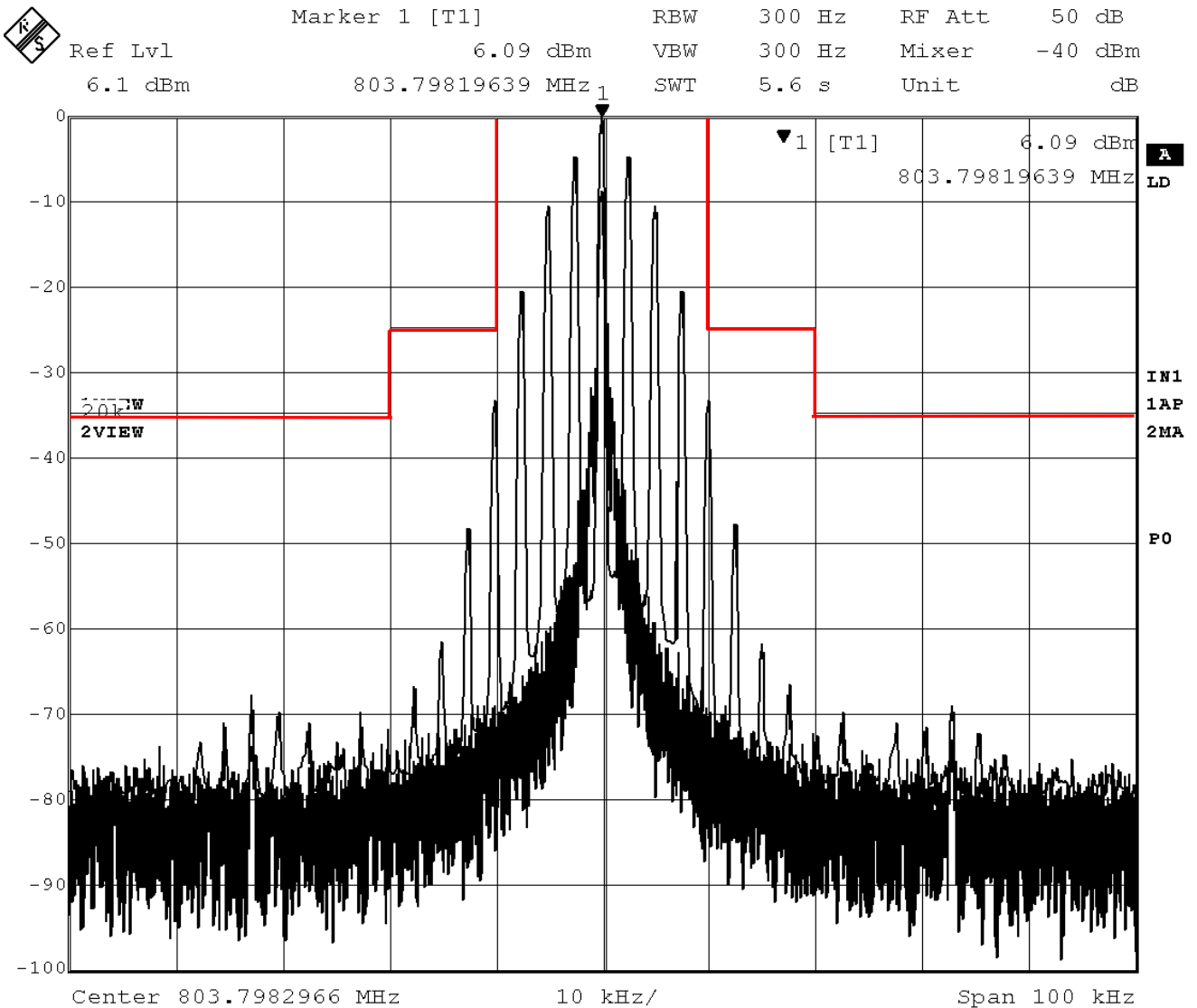
Model of EUT : Transmit  
 Carrier Frequency : 803.000MHz  
 Reference Carrier Level and 2.5kHz, -34.22dBV



## Emission Limitation

FCC ID : VGVHEI-18Y  
 Model : HEI-18YT

Model of EUT : Transmit  
 Carrier Frequency : 803.800MHz  
 Reference Carrier Level and 2.5kHz, -34.72dBV



## 2.6 Frequency Stability Measurement

Date : June 26, 2007  
 Temp.: 25°C Humi.: 55 %

Ambient Temp. ( °C)	Frequency (MHz)	Transmitting Frequency (MHz)	Maximum Tolerance (%)
-30	802.000	801.995980	-0.000501
	803.000	802.995254	-0.000591
	803.800	803.795378	-0.000575
-20	802.000	802.000318	+0.000040
	803.000	803.000360	+0.000045
	803.800	803.800124	+0.000015
-10	802.000	802.002903	+0.000362
	803.000	803.002887	+0.000360
	803.800	803.802898	+0.000361
0	802.000	802.003290	+0.000410
	803.000	803.003315	+0.000413
	803.800	803.803301	+0.000411
+10	802.000	802.002528	+0.000315
	803.000	803.002455	+0.000306
	803.800	803.802554	+0.000318
+20	802.000	802.000209	+0.000026
	803.000	803.000108	+0.000013
	803.800	803.800196	+0.000024
+30	802.000	801.998644	-0.000169
	803.000	802.998533	-0.000183
	803.800	803.798497	-0.000187
+40	802.000	801.996387	-0.000450
	803.000	802.996331	-0.000457
	803.800	803.796431	-0.000444
+50	802.000	801.994535	-0.000681
	803.000	802.994628	-0.000669
	803.800	803.794545	-0.000679


Supply Voltage: 3.0VDC  
 Specified limit:  $\pm 0.005\%$  (74.861(e)(4))

Ambient Temp. ( °C)	Frequency (MHz)	Transmitting Frequency (MHz)	Maximum Tolerance (%)
-30	802.000	801.995827	-0.000520
	803.000	802.995190	-0.000599
	803.800	803.795626	-0.000544
-20	802.000	802.000206	+0.000026
	803.000	803.000401	+0.000050
	803.800	803.800167	+0.000021
-10	802.000	802.002837	+0.000354
	803.000	803.002823	+0.000352
	803.800	803.802816	+0.000350
0	802.000	802.003207	+0.000400
	803.000	803.003230	+0.000402
	803.800	803.803223	+0.000401
+10	802.000	802.002396	+0.000299
	803.000	803.002396	+0.000298
	803.800	803.802514	+0.000313
+20	802.000	801.999805	-0.000024
	803.000	802.999844	-0.000019
	803.800	803.799907	-0.000012
+30	802.000	801.998378	-0.000202
	803.000	802.998356	-0.000205
	803.800	803.798265	-0.000216
+40	802.000	801.996138	-0.000482
	803.000	802.996137	-0.000481
	803.800	803.796262	-0.000465
+50	802.000	801.994301	-0.000711
	803.000	802.994365	-0.000702
	803.800	803.794313	-0.000708

Supply Voltage: 2.55V(Battery operating and point,  
 Manufacturer defined.)

Specified limit:±0.005% (74.861(e)(4))

Tested by :

  
 Katsunori Miura  
 Testing Engineer

# Appendix

## Test Instruments List

30-Jun-2007

No	Type	Model	Manufacturer	Serial	ID	Last Cal.	Interval
<b><u>Test Facilities:</u></b>							
1	Anechoic Chamber A	-	TDK	-	800-01-502E0	Mar 2007	1 Year
2	Anechoic Chamber B	-	TDK	-	800-01-503E0	Mar 2007	1 Year
3	Shield Room A	-	TDK	-	800-01-501E0	-	-
4	Shield Room B	-	Ray Proof	-	800-01-010E0	-	-
5	Shield Room C	-	TDK	-	800-01-504E0	-	-
6	Shield Room D	-	Emerson	-	800-01-022E0	-	-
7	Shield Room E	-	TDK	-	800-01-505E0	-	-

**Measuring Instruments:**

10	Test Receiver	ESHS10	Rohde & Schwarz	835871/004	119-01-505E0	Apr 2007	1 Year
11	Test Receiver	ESVS10	Rohde & Schwarz	826148/002	119-03-504E0	Apr 2007	1 Year
12	Test Receiver	ESVS10	Rohde & Schwarz	832699/001	119-03-506E0	Apr 2007	1 Year
13	Test Receiver	ESI26	Rohde & Schwarz	100043	119-04-511E0	Aug 2006	1 Year
14	Spectrum Analyzer	R3182	Advantest	120600581	122-02-521E0	Mar 2007	1 Year
17	Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	122-02-517E0	Apr 2007	1 Year
18	RF Pre-selector	85685A	Hewlett Packard	2901A00933	122-02-519E0	Apr 2007	1 Year
19	Spectrum Analyzer	R3132	Advantest	120500072	122-02-520E0	Sep 2006	1 Year
20	Spectrum Analyzer	R3132	Advantest	150400998	122-02-523E0	Jul 2006	1 Year
65	Power Meter	436A	Hewlett Packard	1725A01930	100-02-501E0	Apr 2007	1 Year
66	Power Sensor	8482A	Hewlett Packard	1551A01013	100-02-501E0	Apr 2007	1 Year
67	Power Sensor	8485A	Hewlett Packard	2942A08969	100-04-021E0	Apr 2007	1 Year
68	FM Linear Detector	MS61A	Anritsu	M77486	123-02-008E0	Oct 2006	1 Year
69	Level Meter	ML422C	Anritsu	M87571	114-02-501E0	Jun 2007	1 Year
70	Measuring Amplifier	2636	B & K	1614851	082-01-502E0	May 2007	1 Year
75	Frequency Counter	53131A	Hewlett Packard	3546A11807	102-02-075E0	May 2007	1 Year
83	FFT Analyzer	R9211C	Advantest	02020253	122-02-506E0	Jun 2007	1 Year
84	Noise Meter	MN-446	Meguro	53030478	082-01-144E0	Apr 2007	1 Year
86	Peak Power Analyzer	8990A/84815A	Hewlett Packard	3220A00486/ 3227A00118	100-02-016E0	Apr 2007	1 Year
163	Digital Oscilloscope	54502A	Hewlett Packard	2934A05573	121-02-502E0	May 2007	1 Year
165	Multimeter	VOAC7413	Iwatsu Electric	0267973	114-02-502E0	Apr 2007	1 Year
172	Test Receiver	ESCI	Rohde & Schwarz	100408	119-04-512E0	Sep 2006	1 Year

**Antennas:**

21	Loop Antenna	HFH2-Z2	Rohde & Schwarz	881058/62	119-05-033E0	Jun 2007	1 Year
22	Dipole Antenna	KBA-511	Kyoritsu	0-170-1	119-05-506E0	Oct 2006	1 Year
23	Dipole Antenna	KBA-511A	Kyoritsu	0-201-13	119-05-504E0	Oct 2006	1 Year
24	Dipole Antenna	KBA-611	Kyoritsu	0-147-14	119-05-507E0	Oct 2006	1 Year
25	Dipole Antenna	KBA-611	Kyoritsu	0-170-1	119-05-505E0	Oct 2006	1 Year
27	Biconical Antenna	BBA9106	Schwarzbeck	-	119-05-078E0	Nov 2006	1 Year
28	Log-periodic Antenna	UHALP9107	Schwarzbeck	-	119-05-079E0	Nov 2006	1 Year
31	Horn Antenna	3115	EMC Test Systems	6442	119-05-514E0	Jan 2006	2 Year
32	Horn Antenna	3116	EMC Test Systems	2547	119-05-515E0	May 2005	2 Year
167	Biconical Antenna	BBA9106	Schwarzbeck	VHA91032325	119-05-520E0	May 2007	1 Year
168	Log-periodic Antenna	UHALP9108A	Schwarzbeck	0666	119-05-521E0	May 2007	1 Year
169	Biconical Antenna	BBA9106	Schwarzbeck	VHA91032399	119-05-522E0	May 2007	1 Year
170	Log-periodic Antenna	UHALP9108A	Schwarzbeck	0724	119-05-523E0	May 2007	1 Year



30-Jun-2007

No	Type	Model	Manufacturer	Serial	ID	Last Cal.	Interval
<b><u>Cables:</u></b>							
38	RF Cable	5D-2W	Fujikura	-	155-21-001E0	Feb 2007	1 Year
39	RF Cable	5D-2W	Fujikura	-	155-21-002E0	Feb 2007	1 Year
40	RF Cable	3D-2W	Fujikura	-	155-21-005E0	Apr 2007	1 Year
41	RF Cable	3D-2W	Fujikura	-	155-21-006E0	Apr 2007	1 Year
42	RF Cable	3D-2W	Fujikura	-	155-21-007E0	Apr 2007	1 Year
43	RF Cable	RG213/U	Rohde & Schwarz	-	155-21-010E0	Apr 2007	1 Year
44	RF Cable(10m)	S 04272B	Suhner	-	155-21-011E0	May 2007	1 Year
45	RF Cable(1.5m 18GHz)	S 04272B	Suhner	-	155-21-012E0	May 2007	1 Year
46	RF Cable(1m 18GHz)	SUCOFLEX	Suhner	-	155-21-013E0	May 2007	1 Year
47	RF Cable(1m N)	S 04272B	Suhner	-	155-21-015E0	Jun 2007	1 Year
48	RF Cable(1m 26GHz)	SUCOFLEX 104E	Suhner	14543/4E	155-21-016E0	Dec 2006	1 Year
49	RF Cable(4m 26GHz)	SUCOFLEX	Suhner	190630	155-21-017E0	Dec 2006	1 Year
50	RF Cable(10m)	F130-S1S1-394	MEGA PHASE	10510	155-21-018E0	Dec 2006	1 Year
51	RF Cable(5m)	3D-2W	Fujikura	-	155-21-009E0	Apr 2007	1 Year
52	RF Cable(7m)	RG223/U	Suhner	-	155-21-021E0	May 2007	1 Year
195	RF Cable(10m)	F130-S1S1-394	MEGA PHASE	20051	155-21-020E0	Apr 2007	1 Year
<b><u>Networks:</u></b>							
33	LISN	KNW-407	Kyoritsu	8-833-6	149-04-052E0	Apr 2007	1 Year
34	LISN	KNW-407	Kyoritsu	8-855-2	149-04-055E0	Apr 2007	1 Year
35	LISN	KNW-407	Kyoritsu	8-1130-6	149-04-062E0	Apr 2007	1 Year
36	LISN	KNW-242C	Kyoritsu	8-837-13	149-04-054E0	Apr 2007	1 Year
37	Absorbing Clamp	MDS21	Luthi	03293	119-06-506E0	Aug 2006	1 Year
164	LISN	KNW-403D	Kyoritsu	8-1474-3	149-04-059E0	Apr 2007	1 Year
173	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	-	156-01-501E0	Apr 2007	1 Year
174	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	-	156-01-502E0	Apr 2007	1 Year
175	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	-	156-01-503E0	Apr 2007	1 Year
194	High Impedance Probe	HP-2	JQA	001	149-06-503E0	Oct 2006	1 Year
<b><u>Amplifiers:</u></b>							
53	AF Amplifier	P-500L	Accuphase	BOY806	127-01-501E0	Feb 2007	1 Year
54	RF Amplifier	WJ-6882-814	Watkins-Johnson	0414	127-04-017E0	Jun 2007	1 Year
55	RF Amplifier	WJ-5315-556	Watkins-Johnson	106	127-04-006E0	Jun 2007	1 Year
56	RF Amplifier	WJ-5320-307	Watkins-Johnson	645	127-04-005E0	Jun 2007	1 Year
57	RF Amplifier	JS4-00102600- 28-5A	MITEQ	669167	127-04-502E0	Apr 2007	1 Year
<b><u>Generators:</u></b>							
58	Function Generator	3325B	Hewlett Packard	2847A03284	118-08-124E0	Jul 2006	1 Year
59	Function Generator	VP-7422A	Matsushita Communication	050351E122	118-08-503E0	Jul 2006	1 Year
60	Signal Generator	8664A	Hewlett Packard	3035A00140	118-03-014E0	May 2007	1 Year
61	Signal Generator	8664A	Hewlett Packard	3438A00756	118-04-502E0	May 2007	1 Year
62	Signal Generator	6061A	Gigatronics	5130593	118-04-024E0	Mar 2007	1 Year

No	Type	Model	Manufacturer	Serial	ID	Last Cal.	Interval
30-Jun-2007							
<b>Others:</b>							
63	Termination(50)	-	Suhner	-	154-06-501E0	Jan 2007	1 Year
64	Termination(50)	-	Suhner	-	154-06-502E0	Jan 2007	1 Year
71	Microphone	4134	B & K	1253497	147-01-502E0	May 2007	1 Year
72	Preamplifier	2639	B & K	1268763	127-01-504E0	-	-
73	Pistonphone	4220	B & K	1165008	147-02-501E0	Mar 2007	1 Year
74	Artificial Mouth	4227	B & K	1274869	-	-	-
76	Oven	-	Ohnishi	-	023-02-018E0	-	-
77	DC Power Supply	6628A	Hewlett Packard	3224A00284	072-05-503E0	Jun 2007	1 Year
78	Band RejectFilter	BRM12294	Micro-tronics	003	149-01-501E0	Jan 2007	1 Year
79	High Pass Filter	F-100-4000-5-R	RLC Electronics	0149	149-01-502E0	Feb 2007	1 Year
80	Attenuator	43KC-10	Anritsu	-	148-03-506E0	Feb 2007	1 Year
81	Attenuator	43KC-20	Anritsu	-	148-03-507E0	Feb 2007	1 Year
82	Attenuator	355D	Hewlett Packard	219-10782	148-03-065E0	Apr 2007	1 Year
85	RF Detector	75KC-50	Anritsu	305002	100-02-506E0	Jul 2006	1 Year