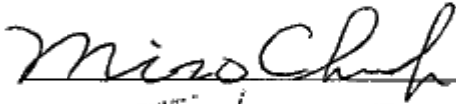



Report No.	S0774101	
Specifications	FCC Part 74 – Certification	
Test Method	ANSI C63.4 1992	
Applicant address	23, Lane 2, Jing Wu Road, Taichung, Taiwan, R.O.C.	
Applicant	Sekaku Electron Industry Co., Ltd.	
Items tested	Wireless Microphone	
Model No.	JW-86P (Sample # S07792)	
Results	<b>Compliance</b> (As detailed within this report)	
Date	02/27/2001 (month / day / year) (Sample received)	
	03/08/2001 (month / day / year) (Test)	
Prepared by		Project Engineer
Authorized by		General Manager (Frank Tsai)
Issue date	August 17, 2001	(month / day / year)
<b>Modifications</b>	<b>None</b>	
Tested by	Training Research Co., Ltd.	
Office at	2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan	
Anechoic Chamber at	2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan	

**Conditions of issue:**

- (1) This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.
- (2) This report must not be used by the client to claim product endorsement by NVLAP or nay agency of U.S. Government.

★ FCC ID : H38JW-86P

Report No.: S0774101

Training Research Co., Ltd., TEL: 886-2-26935155, Fax: 886-2-26934440

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## ***Chapter 0 Application for Certification***

- 2.1033 ( c )( 1 ) : **Sekaku Electron Industry Co., Ltd.** – applicant and manufacturer
- 2.1033 ( c )( 2 ) : The equipment is a transmitter, wireless microphone  
Model No.: JW-86P
- 2.1033 ( c )( 3 ) : Quantity production is planned. See Exhibit C
- 2.1033 ( c )( 4 ) : Type of emission – F3E- FM Modulation
- 2.1033 ( c )( 5 ) : 100Hz ~ 13.156KHz
- 2.1033 ( c )( 6 ) : 2.14 mW
- 2.1033 ( c )( 7 ) : Specification of 250 mW is met by the equipment in the applicable  
Part 74.861 (e)(1)
- 2.1033 ( c )( 8 ) : Final RF amplifier stage current : 9V
- 2.1033 ( c )( 9 ) : Description follows
- 2.1033 ( c )( 10 ) : Complete circuit diagrams are included. No modification was made
- 2.1033 ( c )( 11 ) : See Exhibit A. Instruction sheet to user included
- 2.1033 ( c )( 12 ) : See Exhibit F.
- 2.1033 ( c )( 13 ) : N/A
- 2.1033 ( c )( 14 ) : Description follows.
- 2.1033 ( c )( 15 ) : N/A
- 2.1033 ( c )( 16 ) : N/A
- 2.1033 ( c )( 17 ) : N/A

## **Chapter 1 GENERAL**

### **1.1 Introduction :**

The following measurement report is submitted on behalf of Sekaku Electron Industry Co., Ltd. in support of a wireless microphone certification in accordance with FCC Rules. 2.1031, 2.1046, 2.1047, 2.1049, 2.1053, 2.1055, 74.801 and 74.861.

#### **Description of EUT :**

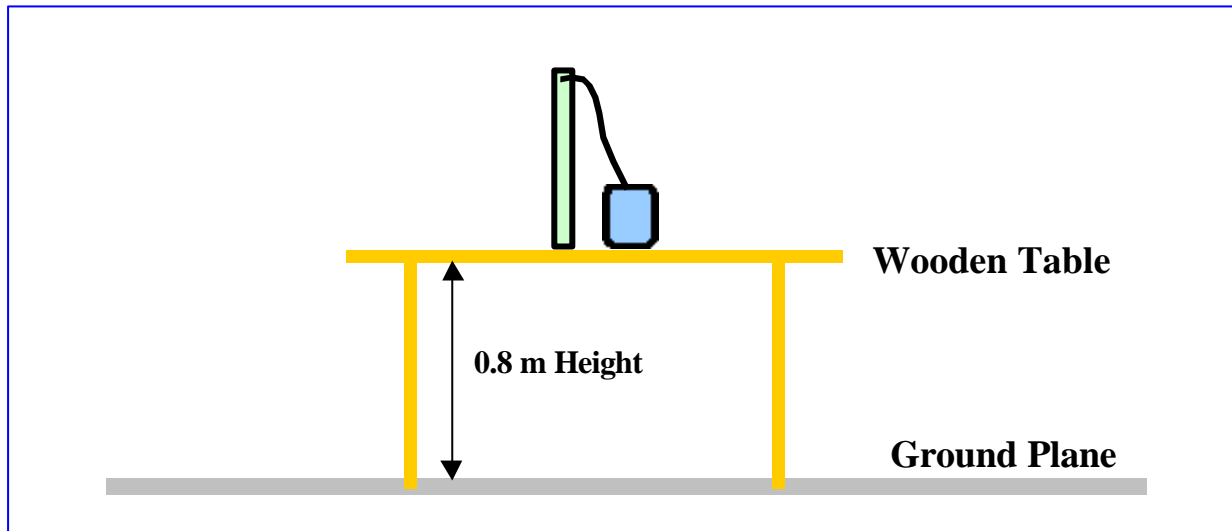
EUT	:	WIRELESS MICROPHONE
Model No.	:	JW-86P
Carrier Frequency Range	:	794 ~ 806 MHz
RF Power Output	:	2.14 mW
Supply Voltage	:	DC 9V
Supply Current	:	30 mA
Frequency Response	:	100Hz ~ 13.156KHz
Frequency Stability	:	0.005%
Operating Temperature	:	- 30 to + 50 degree centigrade

Wireless microphone is a transmitter which operates in the frequency range of 794 ~ 806 MHz. (794.900MHz, 800.200MHz and 804.900MHz tested) This microphone is worn by a performer and other participants in a program, filming, reporting ...etc.

### **1.2 Description of Support Equipment :**

N/A

### 1.3 Configuration of Test Setup



### 1.4 Location of the Measurement Site :

The radiated emissions measurements required by the Rules were performed on the Three-meter, anechoic chamber at test site maintained by **Training Research Co., Ltd.**, No. 2, Lane 194, Huan-Ho Street, Hsichih, Taipei Hsien 221, Taiwan. Complete description and measurement data have been placed on file with the Commission. The conducted power line Emissions tests were performed in a shielded enclosure also located at the above facility.

**Training Research Co., Ltd.** is listed by the FCC (Registration Number: 93906) as a facility available to do measurement work for others on a contract basis.

### 1.5 General Test Condition :

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions, which the EUT was considered likely to encounter in normal use were investigated.

## Chapter 2 Power Output Measurement

### 2.1 Rules and Specification Limits

2.1046(a), ANSI/ TIA/ EIA-603-1992, Paragraph 2.2.1.

74.861 ( e )( 1 ) : The power of the measured unmodulated carrier power at output of the transmitter power amplifier ( antenna input power ) may not exceed the following:

1. 54 – 72, 76 – 88 and 174 – 216 MHz band 50 mW.
2. 470 – 608 and 614 – 806 MHz band 250 mW.

### 2.2 Test condition and setup :

1. Measurement was made on anechoic chamber. The EUT system was placed on non-conductive turntable which is 0.8 meters height, top surface 1.0 X 1.5 meter. The EUT was placed in three direction of the space in order to obtain maximum emission.
2. A SCHAFFNER whole range antenna with horizontal and vertical polarization was raised from 1 – 4 meter as well as the turntable was rotate from 0 to 360 degree to search for the maximum Field Strength Spectrum where the spectrum analyzer was operated in the quasi-peak detection mode. Recorded all the values, which measured under horizontal and vertical position for the bi-long antenna.
3. The following procedures were used to convert the emission levels measured in decibels referenced to 1 micro volt (dBμV) into field intensity in Watt.
  - (1) The actual field intensity in decibels referenced to 1 micro volt per meter (dBμV/m) is determined by algebraically adding the measured reading in dBμV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency.
  - (2) The field intensity in Volt can then be determined by the following equation:
$$FI(\text{Volt}) = 10^{FI(\text{dB}\mu\text{V}/\text{m}) / 20} \times 10^{-6}$$

$$FI_a(\text{dBmV}/\text{m}) = FI_r(\text{dBmV}) - \text{Corrected (dB)}$$

$$\text{Corrected (dB)} = AF(\text{dB}) + [CL(\text{dB}) - \text{Amplitude Gain}]$$

FI<sub>a</sub> : Actual Field Intensity

FI<sub>r</sub> : Reading of the Field Intensity

AF : Antenna Factor

CL : Cable Loss

The field intensity in Watt can then be determined by the following equation :

$$P (\text{watt}) = FI^2 (\text{Volt}) \times d^2 (\text{meter}) / 49.2$$

P : Power in Watt

D : Measurement Distance ( 3 m )

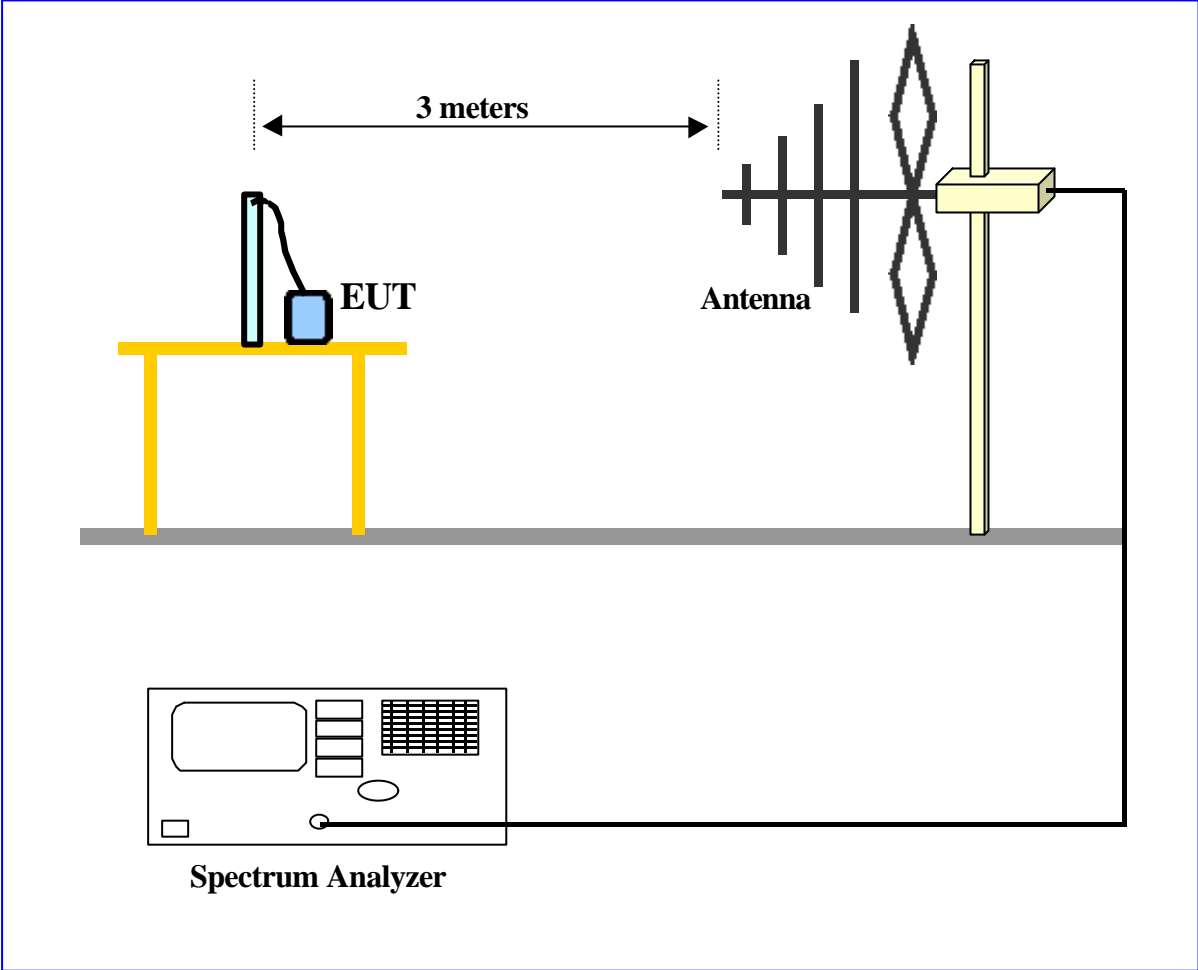
### **2.3 List of test Instrument :**

<u>Instrument Name</u>	<u>Model No.</u>	<u>Brand</u>	<u>Serial No.</u>	<u>Calibration Date</u>	
				<u>Last time</u>	<u>Next time</u>
EMI Receiver	8546A	H P	3520A00242	10/01/00	10/01/01
RF Filter Section	85460A	H P	3448A00217	10/01/00	10/01/01
Bi-log Antenna	CBL6141A	Schaffner	4151	06/28/00	06/28/01
Switch/Control Unit (> 30MHz)	3488A	HP	N/A	11/20/00	11/20/01
Auto Switch Box (> 30MHz)	ASB-01	TRC	9904-01	11/20/00	11/20/01
Spectrum Analyzer	8564E	HP	US36433002	08/03/00	08/03/01
Microwave Preamplifier	83051A	HP	3232A00347	08/04/00	08/04/01
Horn Antenna	3115	EMCO	9704 – 5178	08/09/00	08/09/01

The level of confidence of 95%, the uncertainty of measurement of radiated emission is  $\pm 4.96$  dB.



2.4 Measurement Configuration



## 2.5 Measurement Result

(1) Frequency: 794.900 MHz

$$\begin{aligned} \text{Corrected (dB)} &= \text{AF(dB)} + [\text{CL(dB)} - \text{Amplitude Gain}] \\ &= -5.25 \text{ dB/m} \end{aligned}$$

$$\begin{aligned} \text{FI}_a \text{ (dBmV/m)} &= \text{FI}_r \text{ (dBm)} - \text{Corrected (dB)} \\ &= (-3.8) - (-5.25) \\ &= 1.45 \text{ dBm} \end{aligned}$$

The maximum field measured is 1.45 dBm

$$\text{FI ( Volt )} = 10^{98.82/20} \times 10^{-6} = 0.08736 \text{ V}$$

$$\text{FI ( mW )} = (0.07393 \times 3)^2 / 49.2 = 1.396 \text{ mW}$$

Angle of Turn Table (°)	Spectrum Reading (dBm)	Corrected (dB)	Actually Value (dBm)	E. R. P. (mW)	8 Position of Average (mW)
0°	-5.23	-5.25	0.02	1.00	<b>0.95</b>
45°	-5.99	-5.25	-0.74	0.84	
90°	-4.31	-5.25	0.94	1.24	
135°	-4.63	-5.25	0.62	1.15	
180°	-5.10	-5.25	0.15	1.03	
225°	-20.53	-5.25	-15.28	0.03	
270°	-3.85	-5.25	1.40	1.38	
315°	-5.42	-5.25	-0.17	0.96	

**(2) Frequency: 800.200 MHz**

$$\begin{aligned} \text{Corrected (dB)} &= \text{AF(dB)} + [\text{CL(dB)} - \text{Amplitude Gain}] \\ &= -5.25 \text{ dBm} \end{aligned}$$

$$\begin{aligned} \text{FI}_a \text{ (dBmV/m)} &= \text{FI}_r \text{ (dBm)} - \text{Corrected (dB)} \\ &= (-4.43) - (-5.25) \\ &= 0.82 \text{ dBm} \end{aligned}$$

The maximum field measured is 0.82dBm

$$\text{FI ( Volt )} = 10^{98.19/20} \times 10^{-6} = 0.08118 \text{ V}$$

$$\text{FI ( mW )} = (0.08118 \times 3)^2 / 49.2 = 1.20 \text{ mW}$$

Angle of Turn Table (°)	Spectrum Reading (dBm)	Corrected (dB)	Actually Value (dBm)	E. R. P. (mW)	8 Position of Average (mW)
0°	-6.52	-5.25	-1.27	0.74	<b>0.68</b>
45°	-8.86	-5.25	-3.61	0.43	
90°	-8.12	-5.25	-2.87	0.51	
135°	-5.31	-5.25	-0.06	0.98	
180°	-5.33	-5.25	0.08	1.01	
225°	-13.63	-5.25	-8.38	0.14	
270°	-5.13	-5.25	0.12	1.02	
315°	-7.46	-5.25	-2.21	0.61	

**(3) Frequency: 804.900 MHz**

$$\begin{aligned} \text{Corrected (dB)} &= \text{AF(dB)} + [\text{CL(dB)} - \text{Amplitude Gain}] \\ &= -5.29 \text{ dB/m} \end{aligned}$$

$$\begin{aligned} \text{FI}_a \text{ (dBmV/m)} &= \text{FI}_r \text{ (dBm)} - \text{Corrected (dB)} \\ &= (-1.97) - (-5.29) \\ &= 3.32 \text{ dBm} \end{aligned}$$

The maximum field measured is 3.32 dBm

$$\text{FI ( Volt )} = 10^{100.69/20} \times 10^{-6} = 0.10826 \text{ V}$$

$$\text{FI ( mW )} = (0.10836 \times 3)^2 / 49.2 = 2.14 \text{ mW}$$

Angle of Turn Table (°)	Spectrum Reading (dBm)	Corrected (dB)	Actually Value (dB μ V/m)	E. R. P. (mW)	8 Position of Average (mW)
0°	-4.18	-5.29	1.07	1.27	<b>1.31</b>
45°	-6.79	-5.29	-1.50	0.70	
90°	-4.75	-5.29	0.54	1.13	
135°	-2.20	-5.29	3.09	2.03	
180°	-5.57	-5.29	-0.28	0.93	
225°	-7.23	-5.29	-1.94	0.63	
270°	-2.26	-5.29	3.03	2.00	
315°	-2.71	-5.29	2.58	1.81	

## **Chapter 3 Modulation Characteristics Measurement**

### **3.1 Rules and Specification Limits**

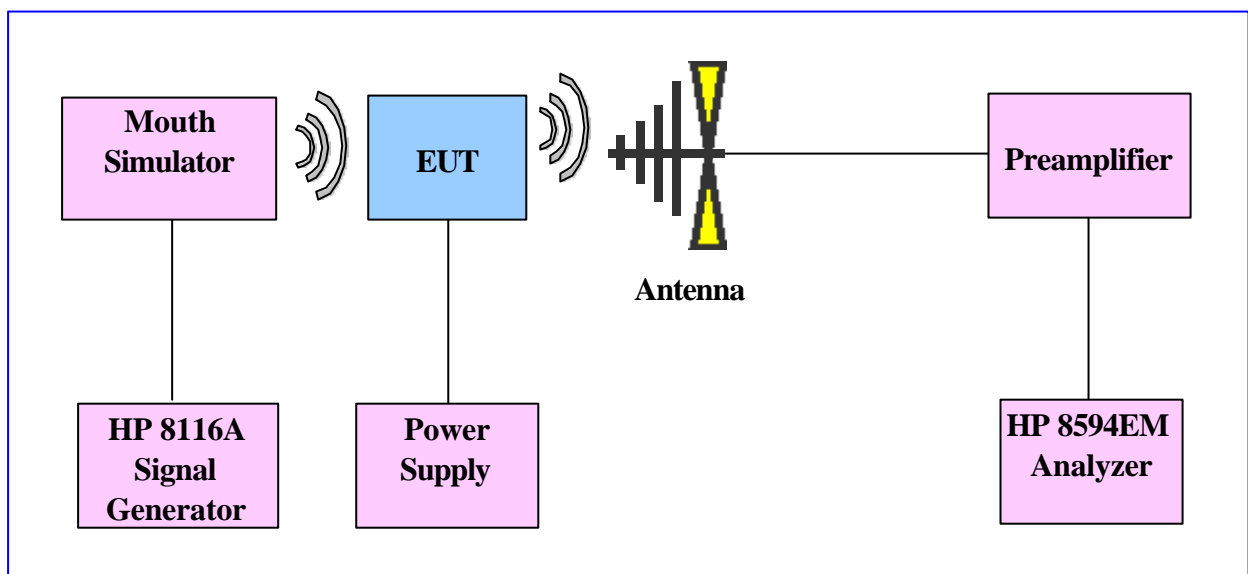
2.1047 ( a ), ANSI/ TIA/ EIA-603-1992, Paragraph 2.2.6.

Voice modulated communication equipment

2.1047 ( b ), ANSI/ TIA/ EIA-603-1992, Paragraph 2.2.3.

Equipment which employs modulation limiting

### **3.2 Test Configuration & List of Test Instruments**



#### **List of test instrument:**

<u>Manufacturer</u>	<u>Device</u>	<u>Model No.</u>	<u>Input Impedance</u>
HP	Dynamic Signal Analyzer	HP35660A	50
HP	Signal Generator 50 MHz	HP8116A	50
SCHAFFNER	Bi-log Antenna	CBL6141A	50
Farnell	Modulation Meter	AMM2000	50
TRC	Preamplifier	TRC001	50

### ***3.3 Frequency Response of Audio Modulation Circuit and Low Pass Filter Measurement Condition & Setup***

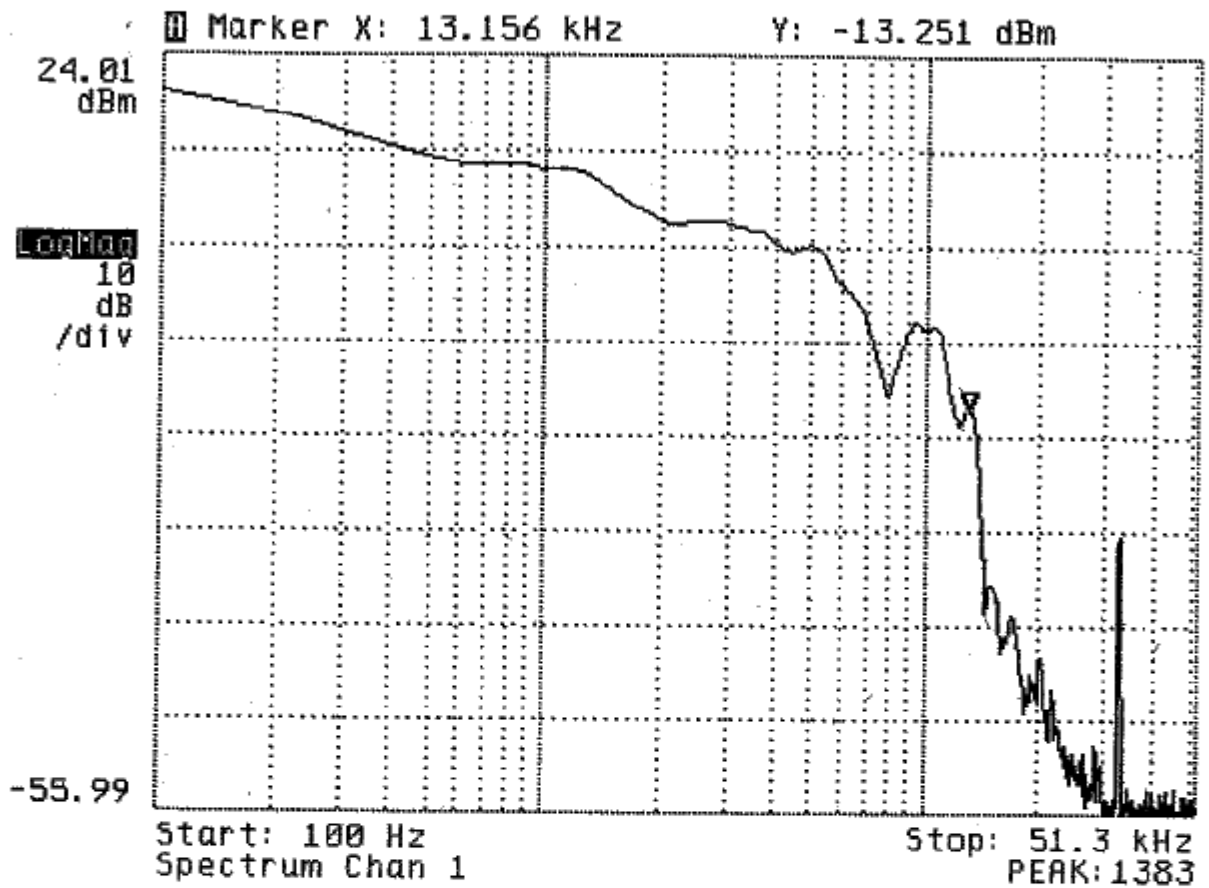
#### **2.1047 ( a )**

1. The EUT and test equipment were set up as shown on the Section 4.2.
2. The Plus/Function generator was connected to the microphone of EUT, via an artificial mouth simulator.
3. The audio signal input was adjusted to obtain 50% modulation at 1 kHz.
4. With input levels held constant and below limiting at all frequencies, the generator was varied from 100 Hz to 51.3 kHz.
5. The response in dBm relative to 1kHz was then measured, using the HP 35660A Dynamic Signal Analyzer as follow page.

Offset: OFF  
X Ref: 51.2 kHz

Y Ref: -26.99 dBm

Meas



### ***3.4 Modulation Limiting Measurement Condition & Setup***

#### **2.1047 ( b )**

1. The Plus/Function generator was connected to the microphone of EUT, via an artificial mouth simulator.
2. The modulation response was measured for each of four frequencies: 100Hz, 1kHz, 3.812kHz and 9.572kHz.
3. The input level was varied from 30% modulation to at least 20dB higher than the saturation point.
4. Measurements were performed for both negative and positive modulation and the respective results were recorded.
5. Measurement results as Chart 3.1 to 3.2



Chart 3.1 Modulation Limiting Measurement Negative

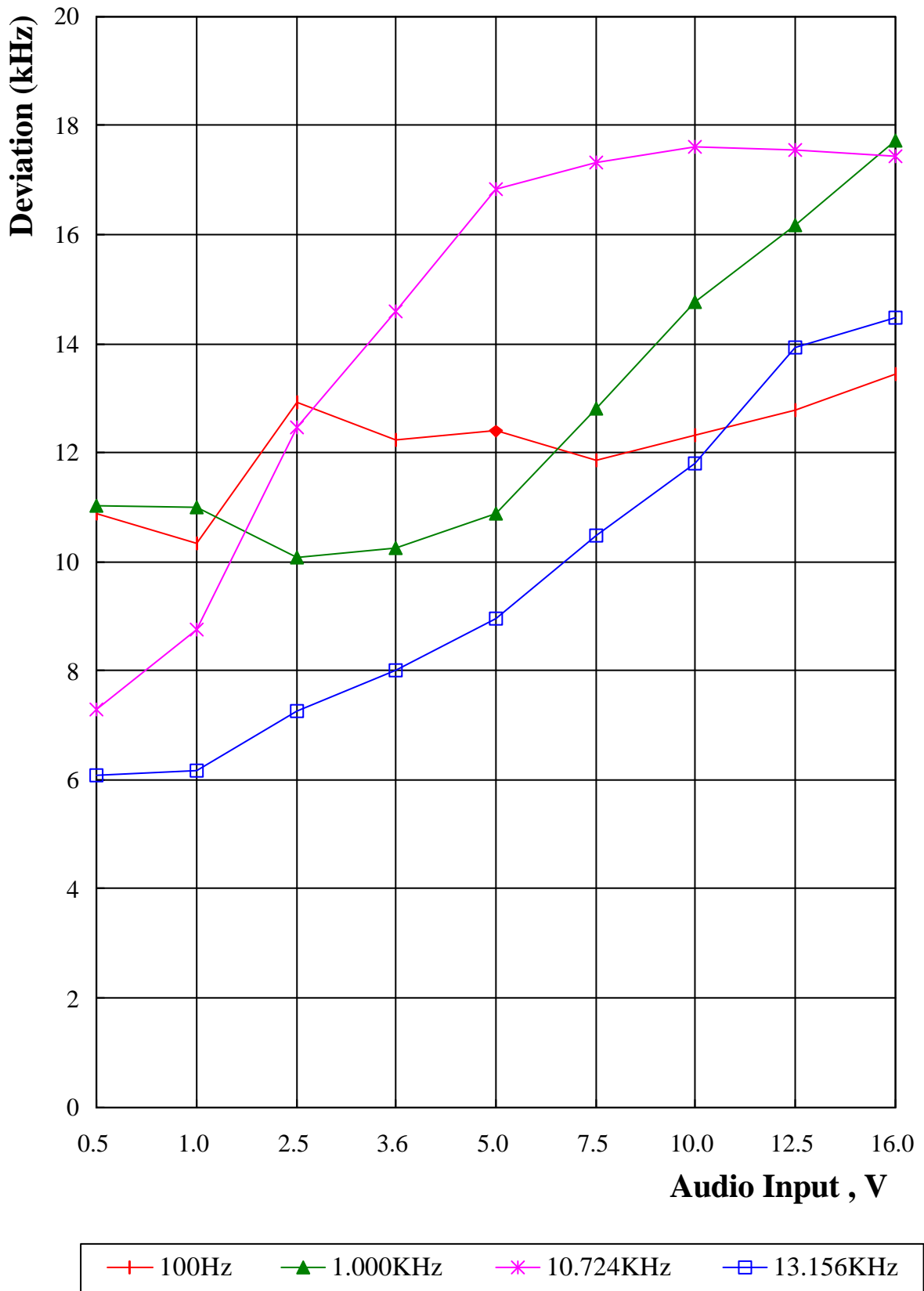
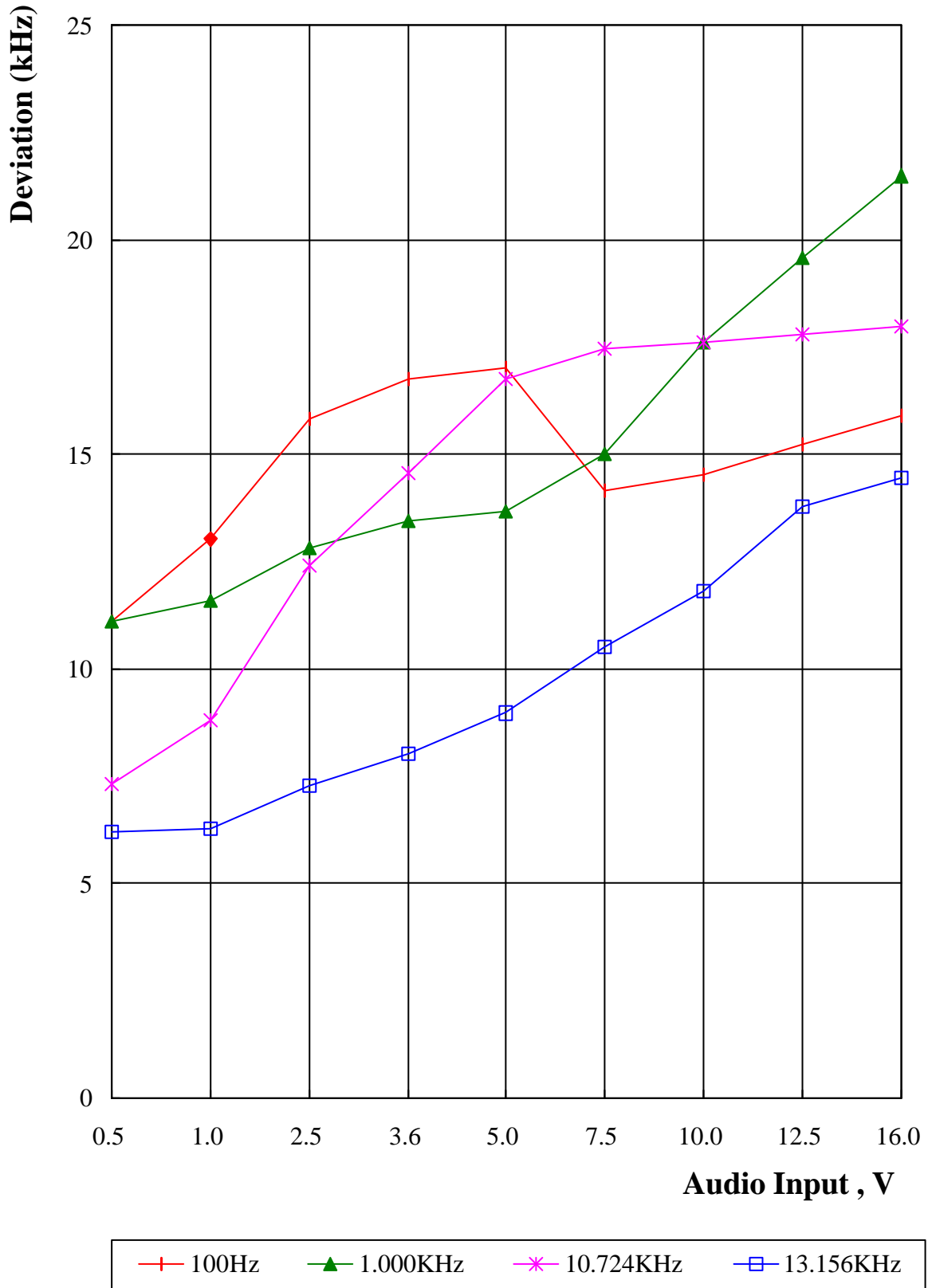


Chart 3.2 Modulation Limiting Measurement Positive



## Chapter 4 Occupied Bandwidth Measurement

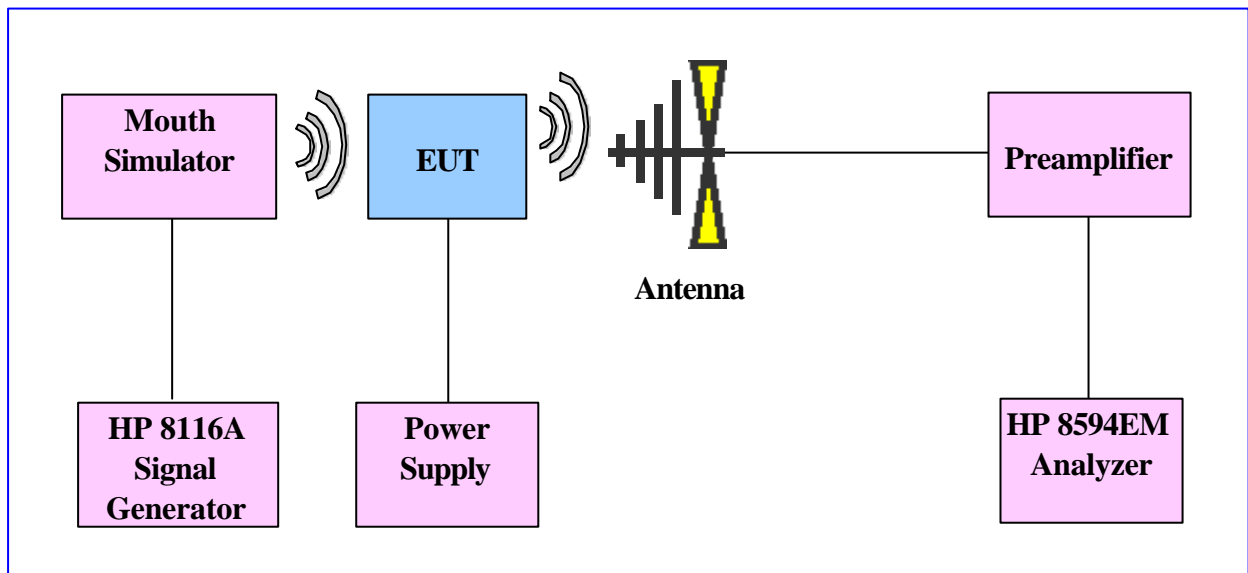
### 4.1 Rules and Specification Limits

2.1049 ( c ) ( 1 ) : ANSI/ TIA / EIA-603-1992, Paragraph 2.2.11.

74.861 ( e ) ( 3 ) : Any form of modulation may be used. A maximum deviation of  $\pm 75$  kHz is permitted when frequency modulation is employed.

74.861 ( e ) ( 5 ) : The operation bandwidth shall not exceed 200kHz.

### 4.2 Test Configuration & List of Test Instruments



#### List of test Instrument :

<u>Instrument Name</u>	<u>Model No.</u>	<u>Brand</u>	<u>Input Impedance</u>
Spectrum analyzer (9K~1.8GHz)	8594EM	HP	50
Preamplifier (30MHz~1GHz)	TRC001	TRC	50
Signal Generator 50 MHz	HP8116A	HP	50
Bi-log Antenna	CBL6141A	SCHAFFNER	50

### **4.3 Measurement Procedure**

1. Connect the EUT as Section 4.2 .
2. Plot the unmodulated chart shows on spectrum.
3. Set the output of the signal generator to 100Hz, 1kHz, 10.724kHz and 13.156kHz. Increase the amplitude of the signal, while monitoring the modulation meter. Until modulation is max. Measure the bandwidth under 26 dB compared to the unmodulated fundamental carrier peak level of the modulated signal displayed on the spectrum analyzer.
4. The occupied Bandwidth was measured as follow pages.

### **4.4 Measurement Result**

The occupied bandwidth's plot is presented on following pager, which illustrates compliance with the rules.

Calculation of Necessary Bandwidth ( Bn )

$$B_n = 2M + 2D$$

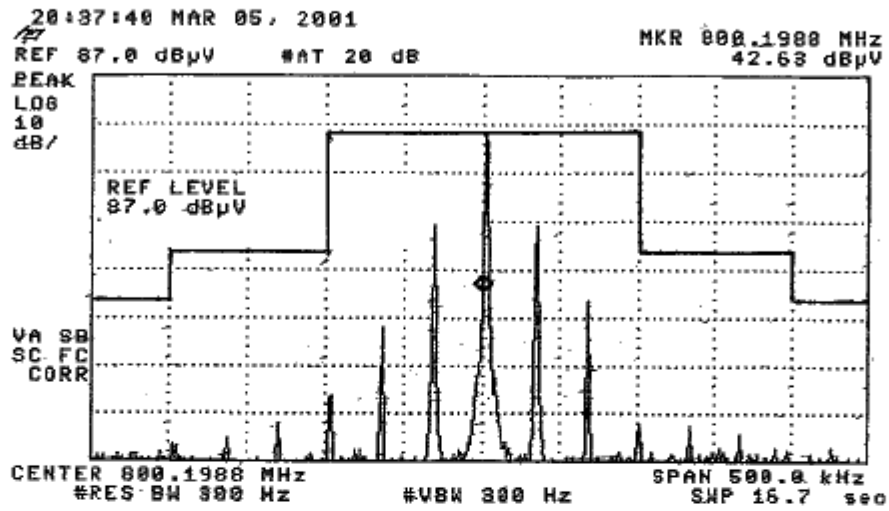
$$M = \text{Max. Modulation Frequency} = 13.156 \text{ kHz}$$

$$D = \text{Peak Frequency Deviation} = 21.500 \text{ kHz ( Chart 3-1 )}$$

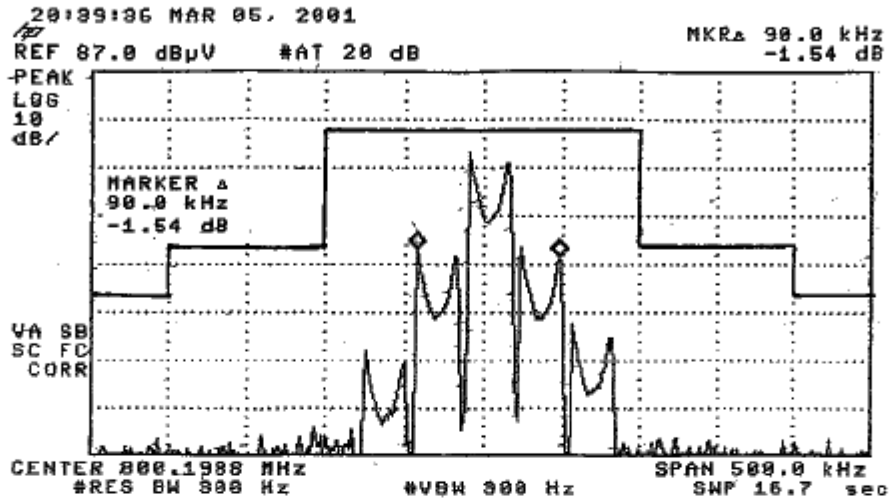
$$K = 1$$

$$B_n = 69.312 \text{ kHz}$$

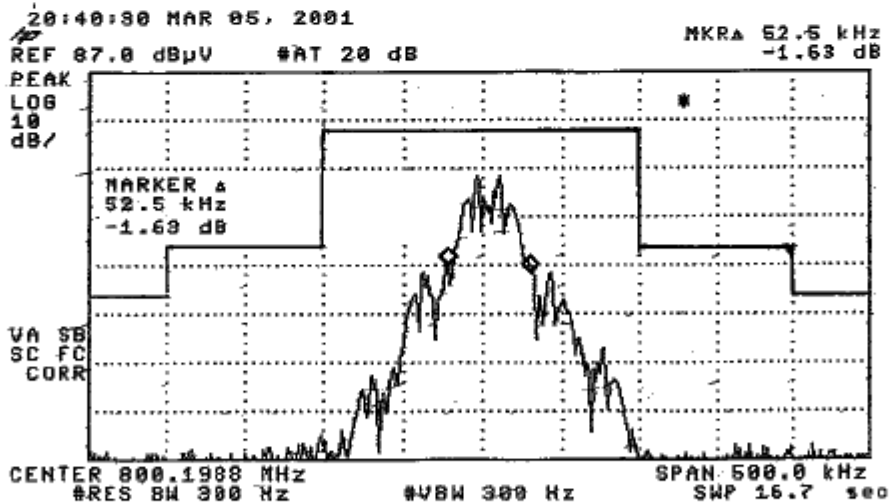
Unmodulation



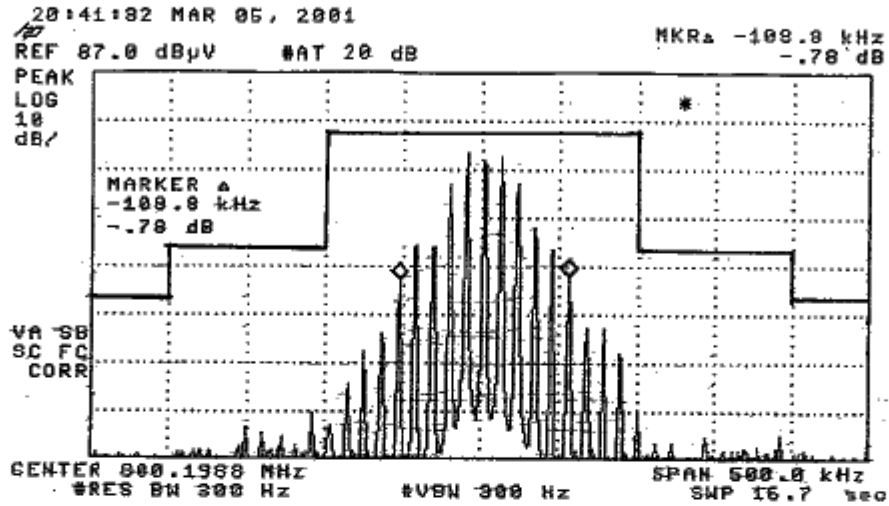
100Hz



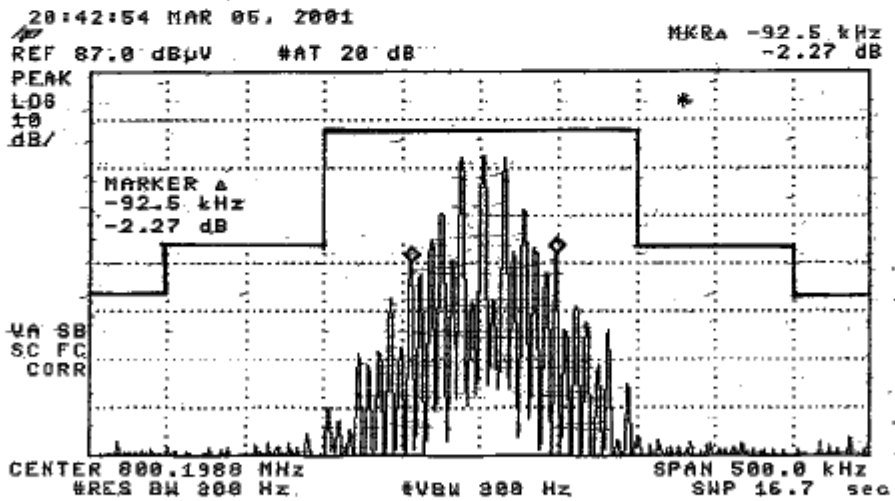
1KHz



10.724KHz



13.156KHz



## ***Chapter 5 Field Strength of Spurious Radiation Measurement***

### ***5.1 Rules and Specification Limits***

#### **2.1053 ( a ) : ANSI/ TIA/ EIA-603-1992, Paragraph 2.2.12**

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, Power leads, or intermediate circuit elements under normal conditions of installation and operation.

#### **74.861( e ) ( 6 ) (iii) :**

Spurious and harmonics must be at least  $43 + 10 \log (\text{Output Power})$  below the Carrier peak

#### **2.1057 :**

In all measurements set forth , the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10<sup>th</sup> harmonic of the carrier frequency.

### ***5.2 Measurement Condition & Setup***

**Pretest :** The EUT is placed in a anechoic chamber, and scan from 30MHz to 1GHz. This is done to ensure the radiation exactly emits form the EUT.

**Final test :** Final radiation measurements is made on a **3 - meter, anechoic chamber**. The EUT is placed on a nonconductive table, which is 0.8m height, the top surface is 1.0 x 1.5 meter. All the placement is according to ANSI C63.4 - 1992.

The spectrum is examined from 30 MHz to 18 GHz measured by HP spectrum.

The SCHAFFNER and EMCO whole range Antenna is used to measure frequency from 30 MHz to 18 GHz. The final test is used the spectrum HP 8546A, HP 85460A and 8564E.

Measure more than six top marked frequencies generated form pretest by computer step by step at each frequency. The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meter to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

Appropriated preamplifier which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading .The spectrum analyzer's 6dB bandwidth is set to 120 K Hz , and the EUT is measured at quasi-peak mode.



If the emission is close to the frequency band of ambient, the tester will recheck the data and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from anechoic will be taken as the final data.

The actual field intensity in decibels referenced to 1 micro volt per meter (dB $\mu$ V/m) is determined by algebraically adding the measured reading in dB $\mu$ V, the antenna factor (dB) and cable loss (dB) at the appropriate frequency.

(1) Band of Frequency: (30M Hz ~ 1G Hz)

$$FI_a \text{ (dB}\mu\text{V/m)} = FI_r \text{ (dB}\mu\text{V)} - \text{Corrected (dB)}$$

$$\text{Corrected (dB)} = \text{AF(dB)} + \text{CL (dB)} - \text{Amplifier Gain}$$

FI<sub>a</sub> : Actual Field Intensity

FI<sub>r</sub> : Reading of the Field Intensity

AF : Antenna Factor

CL : Cable Loss

(2) Band of Frequency: (1G Hz ~ 18 G Hz)

$$FI_a \text{ (dB}\mu\text{V/m)} = FI_r \text{ (dB}\mu\text{V)} + \text{AF (dB)} + \text{CL(dB)}$$

FI<sub>a</sub> : Actual Field Intensity

FI<sub>r</sub> : Reading of the Field Intensity

AF : Antenna Factor

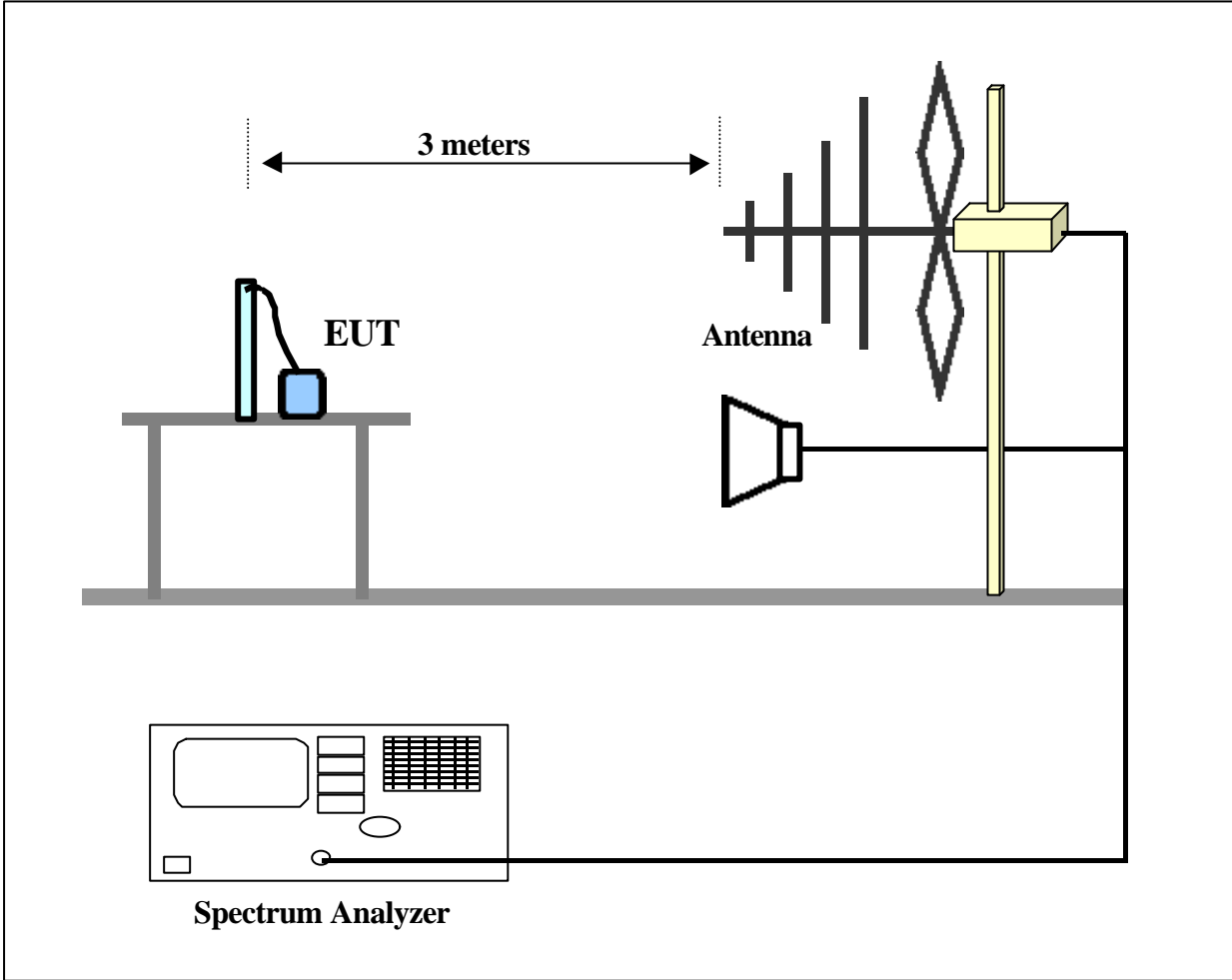
CL : Cable Loss

### **5.3 List of Measurement Instruments**

Instrument Name	Model No.	Brand	Serial No.	<b><u>Calibration Date</u></b>	
				Last time	Next time
EMI Receiver	8546A	H P	3520A00242	10/01/00	10/01/01
RF Filter Section	85460A	H P	3448A00217	10/01/00	10/01/01
Bi-log Antenna	CBL6141A	Schaffner	4151	06/28/00	06/28/01
Switch/Control Unit (> 30MHz)	3488A	HP	N/A	11/20/00	11/20/01
Auto Switch Box (> 30MHz)	ASB-01	TRC	9904-01	11/20/00	11/20/01
Spectrum Analyzer	8564E	HP	US36433002	08/03/00	08/03/01
Microwave Preamplifier	83051A	HP	3232A00347	08/04/00	08/04/01
Horn Antenna	3115	EMCO	9704 – 5178	08/09/00	08/09/01
Anechoic Chamber & cable calibrated together				05/20/00	05/20/01

The level of confidence of 95%, the uncertainty of measurement of radiated emission is  $\pm 4.96$  dB.

5.4 Measurement Configuration



Test Configuration



**5.5 Measurement Result:**

**( Test Frequency: 794.900MHz , Horizontal , 30 MHz ~ 1 GHz )**

Test Conditions:

Testing room :    Temperature : 26 °C    Humidity : 73 % RH  
 Testing site    :    Temperature : 31 °C    Humidity : 75 % RH

<i>Frequency</i>	<i>Reading Amplitude</i>	<i>Ant. Height</i>	<i>Table</i>	<i>Correction Factors</i>	<i>Corrected Power</i>	<i>Attenuated below the mean power</i>	<i>minimum Attenuation limit</i>
MHz	dBm	m	degree	dB	dBm	dB	dB

198.727	-44.00	1.00	136	-4.65	-48.65	48.43	14.39
397.452	-41.14	1.00	57	-6.09	-47.23	47.01	14.39
***							

Note:

1. Corrected Amplitude = Reading Amplitude – Correction Factors
2. Mean Power =  $10 \log (p) \text{ (dB)} = 10 \log ( 0.95 ) = -0.22$   
 Attenuated below the mean power = P – Corrected Power  
 (For example :  $-0.22 - ( - 48.65 ) = 48.43 \text{ (dB) }$ )
3. Attenuation required =  $43 + 10 \log ( 1.38 \text{ mW } ) = 14.39$

**Measurement Result:**

**( Test Frequency: 794.900MHz , Horizontal , 1GHz ~ 18GHz )**

<b>Radiated Emission</b>				<b>Correction Factors</b>	<b>Corrected Amplitude</b> dBm	<b>Attenuated below the mean power</b> (dB)	<b>minimum Attenuation Limit</b> (dB)
<b>Frequency</b> (GHz)	<b>Amplitude</b> (dBm)	<b>Ant. H.</b> (cm)	<b>Table</b> ( ° )	( dB )			

1.589	-38.84	1.00	32	-4.67	-34.17	33.95	14.39
2.380	-31.80	1.00	224	1.32	-33.12	32.9	14.39
2.770	-31.16	1.00	34	2.69	-33.85	33.63	14.39
2.980	-16.33	1.00	48	3.42	-19.75	19.53	14.39
***							

***Radiated Emission Test Result:***

***( Test Frequency: 794.900MHz , Vertical , 30MHz ~ 1GHz )***

<i>Frequency</i>	<i>Reading Amplitude</i>	<i>Ant. Height</i>	<i>Table</i>	<i>Correction Factors</i>	<i>Corrected Power</i>	<i>Attenuated below the mean power</i>	<i>minimum Attenuation limit</i>
MHz	dBm	m	degree	dB/m	dBm	dB	dB

198.727	-49.06	3.96	8	-3.12	-45.94	45.72	14.39
397.451	-52.00	1.00	45	-7.52	-44.48	44.26	14.39
***							

***Radiated Emission Test Result:***

***( Test Frequency: 794.900MHz , Vertical , 1GHz ~ 18GHz )***

<i>Radiated Emission</i>				<i>Correction Factors</i>	<i>Corrected Amplitude</i> dBm	<i>Attenuated below the mean power</i> (dB)	<i>minimum Attenuation Limit</i> (dB)
<i>Frequency</i> (GHz)	<i>Amplitude</i> (dBm)	<i>Ant. H.</i> (cm)	<i>Table</i> ( ° )	( dB )			

1.589	-36.96	1.00	134	-5.64	-31.32	31.10	14.39
2.380	-38.38	1.00	327	-1.05	-37.33	37.11	14.39
2.770	-48.41	1.00	50	-0.94	-47.47	47.25	14.39
2.980	-36.41	1.00	94	-0.87	-35.54	35.32	14.39
***							



**Measurement Result:**

( Test Frequency: 800.200MHz , Horizontal , 30MHz ~ 1GHz )

<i>Frequency</i>	<i>Reading Amplitude</i>	<i>Ant. Height</i>	<i>Table</i>	<i>Correction Factors</i>	<i>Corrected Power</i>	<i>Attenuated below the mean power</i>	<i>minimum Attenuation limit</i>
MHz	dBm	m	degree	dB/m	dBm	dB	dB

200.049	-49.77	1.00	150	-3.11	-46.66	44.99	13.08
400.100	-57.16	2.47	7	-7.54	-49.62	47.95	13.08
600.148	-48.32	1.00	84	-4.53	-43.79	42.12	13.08
***							

Note:

1. Corrected Amplitude = Reading Amplitude – Correction Factors

2. Mean Power =  $10 \log (p) \text{ (dB)} = 10 \log ( 0.68 ) = -1.67$

Attenuated below the mean power = P – Corrected Power

(For example 794.9MHz :  $(-0.22) - ( - 48.65 ) = 48.43 \text{ (dB)}$  )

3. Attenuation required =  $43 + 10 \log ( 1.02 \text{ mW } ) = 13.08$

**Measurement Result:**

**( Test Frequency: 800.200MHz , Horizontal , 1GHz ~ 18GHz )**

<b>Radiated Emission</b>				<b>Correction Factors</b>	<b>Corrected Amplitude</b> dBm	<b>Attenuated below the mean power</b> (dB)	<b>minimum Attenuation Limit</b> (dB)
<b>Frequency</b> (GHz)	<b>Amplitude</b> (dBm)	<b>Ant. H.</b> (cm)	<b>Table</b> ( ° )	<b>( dB )</b>			

1.400	-34.13	1.00	9	-4.63	-29.5	27.83	13.08
1.600	-35.12	1.00	141	-5.91	-29.21	27.54	13.08
2.390	-32.49	1.00	95	-1.05	-31.44	29.77	13.08
2.790	-38.46	1.00	417	-0.93	-37.53	35.86	13.08
3.000	-29.81	1.00	206	-0.87	-28.94	27.27	13.08
3.190	-35.98	1.00	4	-1.49	-34.49	32.82	13.08
5.990	-74.26	1.00	189	-36.39	-37.87	36.2	13.08
6.800	-74.82	1.00	206	-38.08	-36.74	35.07	13.08
7.410	-79.39	1.00	40	-40.87	-38.52	36.85	13.08
7.610	-78.67	1.00	146	-41.35	-37.32	35.65	13.08
***							

**Radiated Emission Test Result:**

*( Test Frequency: 800.200MHz , Vertical , 30MHz ~ 1GHz )*

<i>Frequency</i>	<i>Reading Amplitude</i>	<i>Ant. Height</i>	<i>Table</i>	<i>Correction Factors</i>	<i>Corrected Power</i>	<i>Attenuated below the mean power</i>	<i>minimum Attenuation limit</i>
MHz	dBm	m	degree	dB/m	dBm	dB	dB

200.052	-54.20	2.44	56	-5.14	-49.06	47.39	13.08
600.152	-51.37	1.00	13	-5.33	-46.04	47.71	13.08
***							

**Radiated Emission Test Result:**

**( Test Frequency: 800.200MHz , Vertical , 1GHz ~ 18GHz )**

<b>Radiated Emission</b>				<b>Correction Factors</b>	<b>Corrected Amplitude</b> dBm	<b>Attenuated below the mean power</b> (dB)	<b>minimum Attenuation Limit</b> (dB)
<b>Frequency</b> (GHz)	<b>Amplitude</b> (dBm)	<b>Ant. H.</b> (cm)	<b>Table</b> ( ° )	<b>( dB )</b>			

1.400	-33.3	2.44	10	-3.79	-29.51	31.18	13.08
1.600	-40.35	1.00	58	-4.85	-35.5	37.17	13.08
2.390	-31.23	1.00	151	-1.36	-29.87	31.54	13.08
2.790	-24.6	1.00	206	-2.76	-21.84	23.51	13.08
3.000	-21.91	1.00	27	-3.49	-18.42	20.09	13.08
3.190	-32.83	1.00	116	-1.67	-31.16	32.83	13.08
5.990	-84.09	1.00	237	-35.72	-48.37	50.04	13.08
6.800	-81.3	1.00	308	-38.32	-42.98	44.65	13.08
7.000	-83.04	1.00	346	-37.67	-45.37	47.04	13.08
7.200	-84.8	1.00	15	-38.71	-46.09	47.76	13.08
7.410	-85.32	1.00	97	-39.80	-45.52	47.19	13.08
7.610	-81.22	1.00	2	-40.20	-41.02	42.69	13.08

**Measurement Result:**

**( Test Frequency: 804.900MHz , Horizontal , 30MHz ~ 1GHz )**

<i>Frequency</i>	<i>Reading Amplitude</i>	<i>Ant. Height</i>	<i>Table</i>	<i>Correction Factors</i>	<i>Corrected Power</i>	<i>Attenuated below the mean power</i>	<i>minimum Attenuation limit</i>
MHz	dBm	m	degree	dB/m	dBm	dB	dB

201.227	-47.97	1.00	150	-3.07	-44.90	43.73	16.07
402.452	-47.68	1.00	28	-7.42	-40.26	37.42	16.07
***							

Note:

1. Corrected Amplitude = Reading Amplitude – Correction Factors
2. Mean Power =  $10 \log (p) \text{ (dB)} = 10 \log ( 1.31 ) = 1.17$   
 Attenuated below the mean power = P – Corrected Power  
 (For example 794.9MHz :(-0.22) – ( - 48.65 ) ) = 48.43 (dB) )
3. Attenuation required = 43 +  $10 \log ( 2.03 \text{ mW } ) = 16.07$

**Measurement Result:**

**( Test Frequency: 804.900MHz , Horizontal , 1GHz ~ 18GHz )**

<b>Radiated Emission</b>				<b>Correction Factors</b>	<b>Corrected Amplitude</b> dBm	<b>Attenuated below the mean power</b> (dB)	<b>minimum Attenuation Limit</b> (dB)
<b>Frequency</b> (GHz)	<b>Amplitude</b> (dBm)	<b>Ant. H.</b> (cm)	<b>Table</b> ( ° )	<b>( dB )</b>			

1.207	-42.12	1.00	64	-4.51	-37.61	36.44	16.07
1.609	-36.93	1.00	150	-5.78	-31.15	29.98	16.07
2.010	-46.94	1.00	29	-1.67	-45.27	44.1	16.07
2.410	-42.24	1.00	146	-1.04	-41.2	40.03	16.07
2.810	-39.19	1.00	228	-0.92	-38.27	37.1	16.07
3.010	-41.17	1.00	339	-0.90	-40.27	39.1	16.07
3.220	-40.39	1.00	8	-1.59	-38.8	37.63	16.07
***							

**Radiated Emission Test Result:**

*( Test Frequency: 804.900MHz , Vertical , 30MHz ~ 1GHz )*

<i>Frequency</i>	<i>Reading Amplitude</i>	<i>Ant. Height</i>	<i>Table</i>	<i>Correction Factors</i>	<i>Corrected Power</i>	<i>Attenuated below the mean power</i>	<i>minimum Attenuation limit</i>
MHz	dBm	m	degree	dB/m	dBm	dB	dB

201.226	-52.68	2.47	4	-5.05	-47.63	46.46	16.07
402.452	-48.39	1.00	9	-6.11	-42.28	41.11	16.07
***							

**Radiated Emission Test Result:**

**( Test Frequency: 804.900MHz , Vertical , 1GHz ~ 18GHz )**

<b>Radiated Emission</b>				<b>Correction Factors</b>	<b>Corrected Amplitude</b> dBm	<b>Attenuated below the mean power</b> (dB)	<b>minimum Attenuation Limit</b> (dB)
<b>Frequency</b> (GHz)	<b>Amplitude</b> (dBm)	<b>Ant. H.</b> (cm)	<b>Table</b> ( ° )	<b>( dB )</b>			

1.207	-46.09	1.00	35	-3.15	-42.94	44.61	16.07
1.609	-39.08	1.00	35	-4.71	-34.37	36.04	16.07
2.010	-46.39	1.00	39	-0.98	-45.41	47.08	16.07
2.410	-34.30	1.00	167	1.43	-35.73	37.40	16.07
2.810	-24.68	1.00	229	2.83	-27.51	29.18	16.07
3.010	-25.58	1.00	64	3.40	-28.98	30.65	16.07
3.220	-32.61	1.00	181	1.39	-34.00	35.67	16.07
3.420	-34.49	1.00	38	-0.53	-33.96	35.63	16.07
3.620	-71.65	1.00	239	-33.09	-33.09	37.39	16.07
***							



## **Chapter 6 Frequency Stability Tolerance Measurement**

### **6.1 Rules and Specification Limits**

2.1055, ANSI/ TIA/ EIA-603-1992, Paragraph 2.2.2 .

74.861( e )( 4 ): The frequency tolerance of the transmitter shall be 0.005 percent.

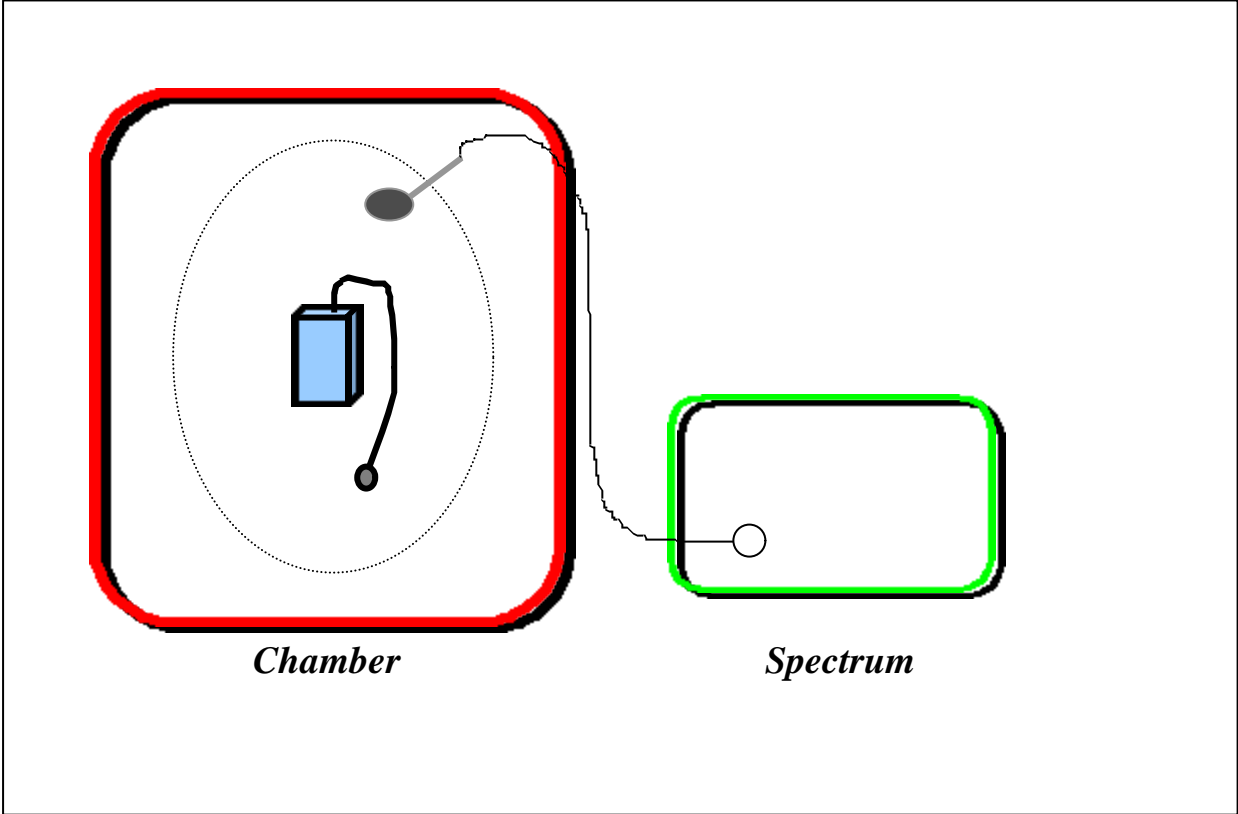
### **6.2 Measurement Condition & Setup with Temperature Variation**

1. Place the EUT in the chamber, powered in its normal operation.
2. Set the temperature of the chamber -30 degree Centigrade. Allow the equipment to stabilize at that temperature.
3. Measured the carrier frequency using preamplifier and frequency counter.
4. Repeated procedures 1 to 3 from -20 to 50 degree Centigrade at intervals of 10 degree.

### **6.3 List of Measurement Instruments with Temperature Variation List of test Instrument :**

<u>Instrument Name</u>	<u>Model No.</u>	<u>Brand</u>	<u>Remark</u>
Spectrum Analyzer	8591A	H P	1.8GHz
Temperature Chamber	THS-MV2	King Son	
Near field Probe	7405-901	EMCO	
Power Supply	GPR-6030	Good Will	
Auto Transformer	Powerstat	Supprior Elec. Co.	

6.4 Measurement Configuration of Temperature Variation Test:



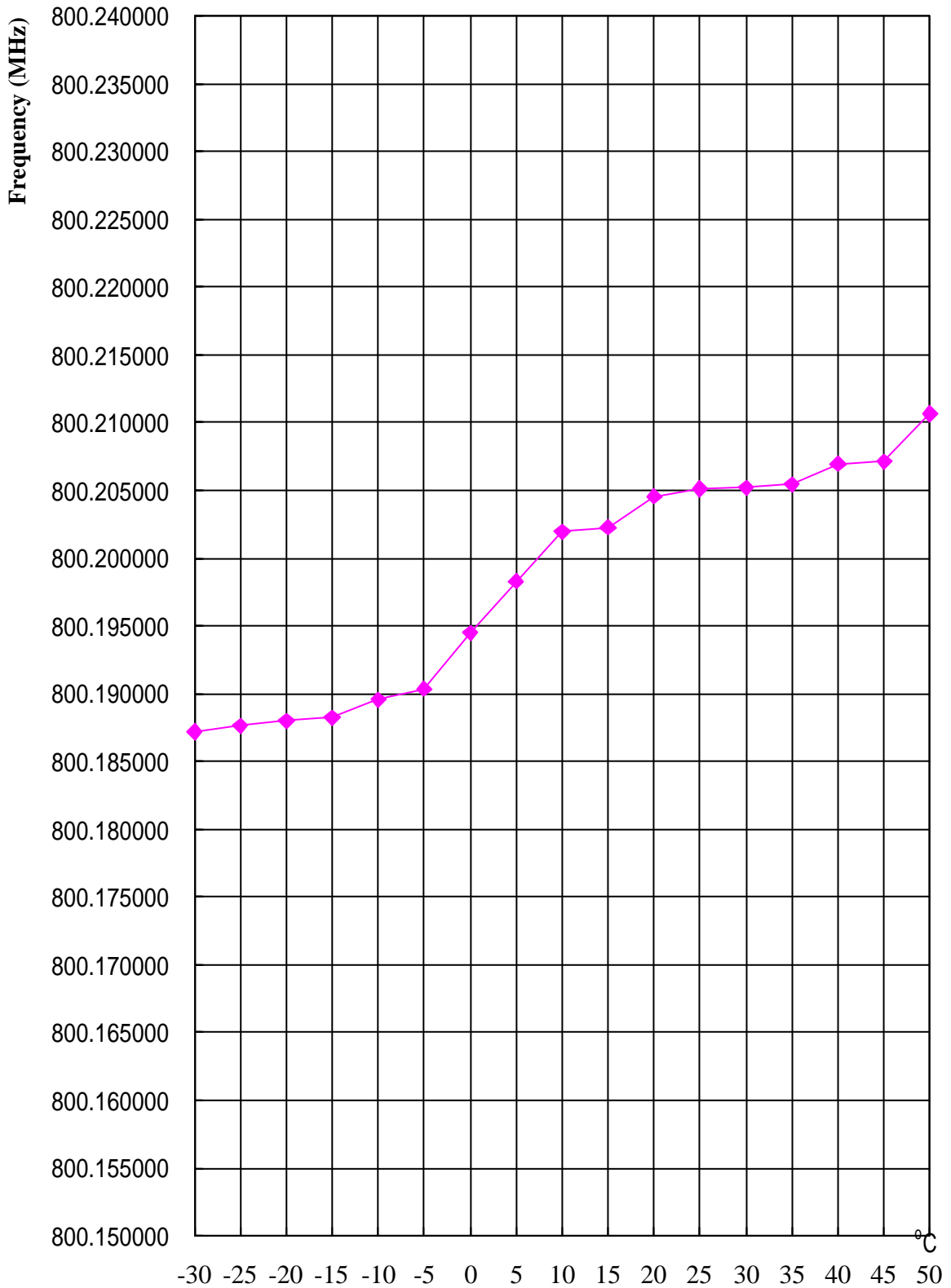
**6.5 Measurement Result with Temperature Variation**

A plot and table is presented which illustrates compliance with the rule where the center frequency is 800.200MHz.

**Temperature Variation Table**

<i>Temperature ( Centigrade )</i>	<i>Frequency ( MHz )</i>	<i>Tolerance ( MHz )</i>
-30	800.187216	800.159990 ~ 800.240010
-25	800.187643	800.159990 ~ 800.240010
-20	800.187995	800.159990 ~ 800.240010
-15	800.188223	800.159990 ~ 800.240010
-10	800.189561	800.159990 ~ 800.240010
-5	800.190374	800.159990 ~ 800.240010
0	800.194504	800.159990 ~ 800.240010
5	800.198320	800.159990 ~ 800.240010
10	800.201977	800.159990 ~ 800.240010
15	800.202281	800.159990 ~ 800.240010
20	800.204568	800.159990 ~ 800.240010
25	800.205112	800.159990 ~ 800.240010
30	800.205225	800.159990 ~ 800.240010
35	800.205445	800.159990 ~ 800.240010
40	800.206963	800.159990 ~ 800.240010
45	800.207137	800.159990 ~ 800.240010
50	800.210662	800.159990 ~ 800.240010

Temperatuer Variation Vs. Frequency Chart



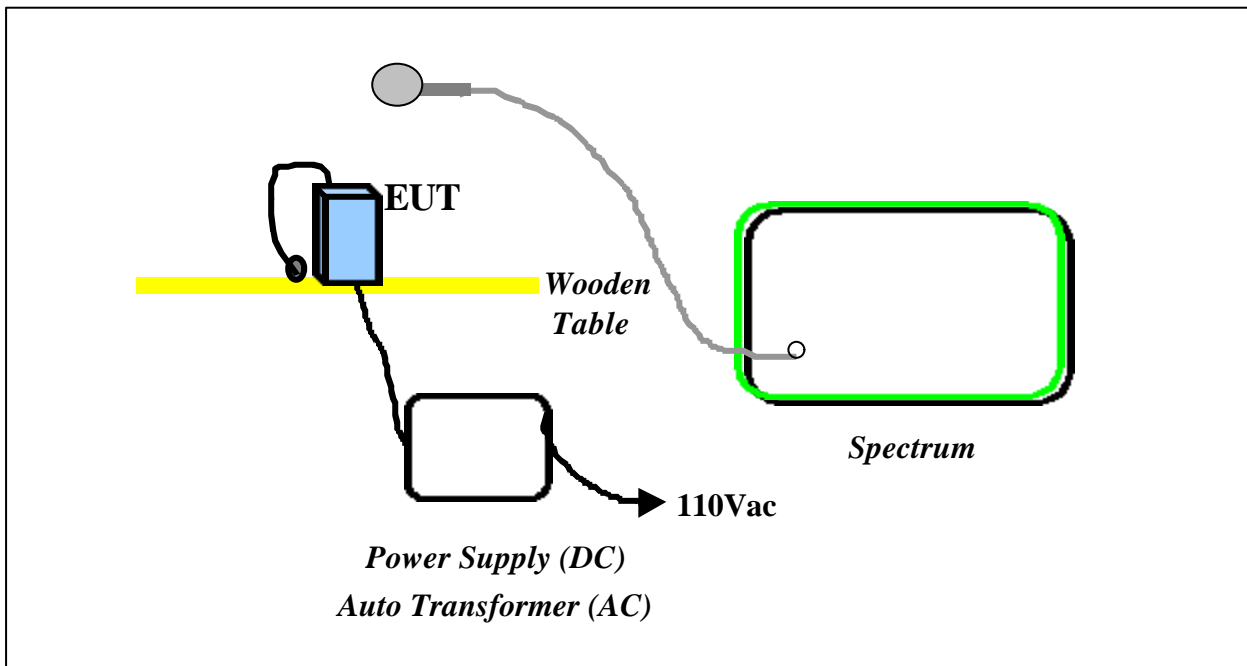
**6.6 Measurement Condition & Setup with Voltage Variation**

1. Attached the power line of the power supply to the battery position of the EUT.
2. Tuned the output power level to battery end point, 85 %, 100%, 115% of the normal operation power of EUT.
3. Recorded the frequency with a frequency counter.

**6.7 List of Test Instrument :**

<u>Instrument Name</u>	<u>Model No.</u>	<u>Brand</u>	<u>Remark</u>
Spectrum Analyzer	8591A	H P	1.8GHz
Temperature Chamber	THS-MV2	King Son	
Near field Probe	7405-901	EMCO	
Power Supply	GPR-6030	Good Will	
Auto Transformer	Powerstat	Supprior Elec. Co.	

**6.8 Configuration of Voltage Variation Test :**



### 6.9 Measurement Result with Voltage Variation

*Frequency Stability of Voltage Variation Measurement Table*

<i>Supply Voltage ( Volt )</i>	<i>Frequency ( MHz )</i>	<i>Tolerance ( MHz )</i>
7.65 ( 85% )	800.207464	800.159990 ~ 800.240010
9 ( 100% )	800.207981	800.159990 ~ 800.240010
10.35 ( 115% )	800.209381	800.159990 ~ 800.240010
<b>Endpoint-Voltage: 2.70V</b>		

*Voltage Variation Vs. Frequency Chart*

