Report No.	S0774792
Specifications Test Method	FCC Part 74 – Certification 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 Model No.	Wireless Microphone UT-86P (Sample # S07792)
Results Date	**Compliance** (As detailed within this report) 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	*March 30, 2001* (month / day / year)
Modifications	**None**
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 : H38UT-86P***

Contents

Chapter 0 Application for Certification 4

Chapter 1 General

1.1 Introduction 5
1.2 Description of Support Equipment 5
1.3 Configuration of System Under Test 6
1.4 Location of the Measurement Site 6
1.5 General Test Condition 6

Chapter 2 Power Output Measurement

2.1 Rules and Specification Limits 7
2.2 Measurement Condition and Setup 7
2.3 List of Measurement Instrument 8
2.4 Measurement Configuration 9
2.5 Measurement Result 10

Chapter 3 Modulation Characteristics Measurement

3.1 Rules and Specification Limits 13
3.2 Test Configuration & List of Test Instruments 13
3.3 Frequency Response of Audio Low Pass Filter Measurement Condition & Setup 14
3.4 Modulation Limiting Measurement Condition & Setup 16

Chapter 4 Occupied Bandwidth Measurement & Calculation

4.1 Rules and Specification Limits 19
4.2 Test Condition & Test Instruments 19
4.3 Measurement Procedure 20
4.4 Measurement Result 20

Chapter 5 Field Strength of Spurious Radiation Measurement

5.1 Rules and Specification Limits 24
5.2 Measurement Condition & Setup 24
5.3 List of Measurement Instruments 26
5.4 Measurement Configuration 27
5.5 Measurement Result 29

Chapter 6 Frequency Stability Tolerance Measurement

6.1 Rules and Specification limits 41
6.2 Measurement Condition & Setup with Temperature Variation 41
6.3 List of Measurement Instruments with Temperature Variation 41
6.4 Measurement Configuration with Temperature Variation 42
6.5 Measurement Result with Temperature Variation 43
6.6 Measurement Condition & Setup with Voltage Variation 45
6.7 List of Measurement Instruments with Voltage Variation 45
6.8 Measurement Configuration with Voltage Variation 45
6.9 Measurement Result with Voltage Variation 46

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.: UT-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) : 0.520 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 :

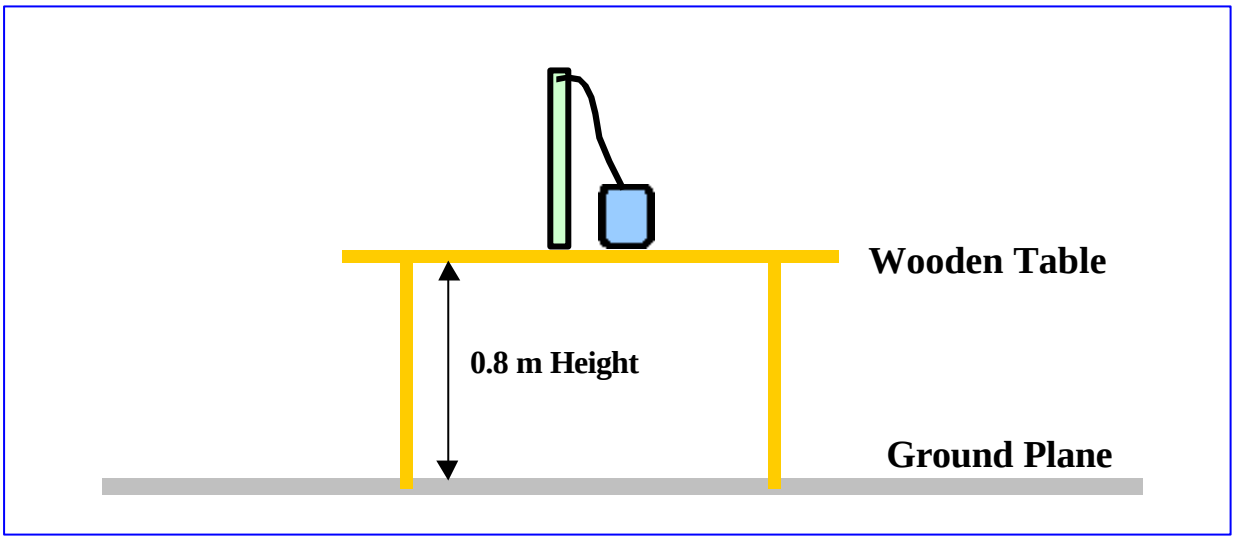
EUT	:	WIRELESS MICROPHONE
Model No.	:	UT-86P
Carrier Frequency Range	:	794 ~ 806 MHz
RF Power Output	:	0.520 mW
Supply Voltage	:	DC 9V
Supply Current	:	30 mA
Frequency Response	:	100Hz ~ 13.156KHz
Frequency Stability	:	0.005%
Operating Temperature	:	– 30 to + 50 degree centigrade

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 tactor (dB), and cable loss (dB) at the appropriate frequency.
   (2) The field intensity in Volt can then be determined by the following equation:
   $FI(Volt) = 10^{FI\ (dB\mu V/m)\ /\ 20} \times 10^{-6}$

FI_a(dBm V/m) = FI_r (dBm V) – Corrected (dB)
Corrected (dB) = AF(dB) + [CL(dB) – Amplitude Gain]

FI_a : Actual Field Intensity
FI_r : 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 (watt) = FI ^{2}(Volt) X d^2 (meter) / 49.2

P : Power in Watt

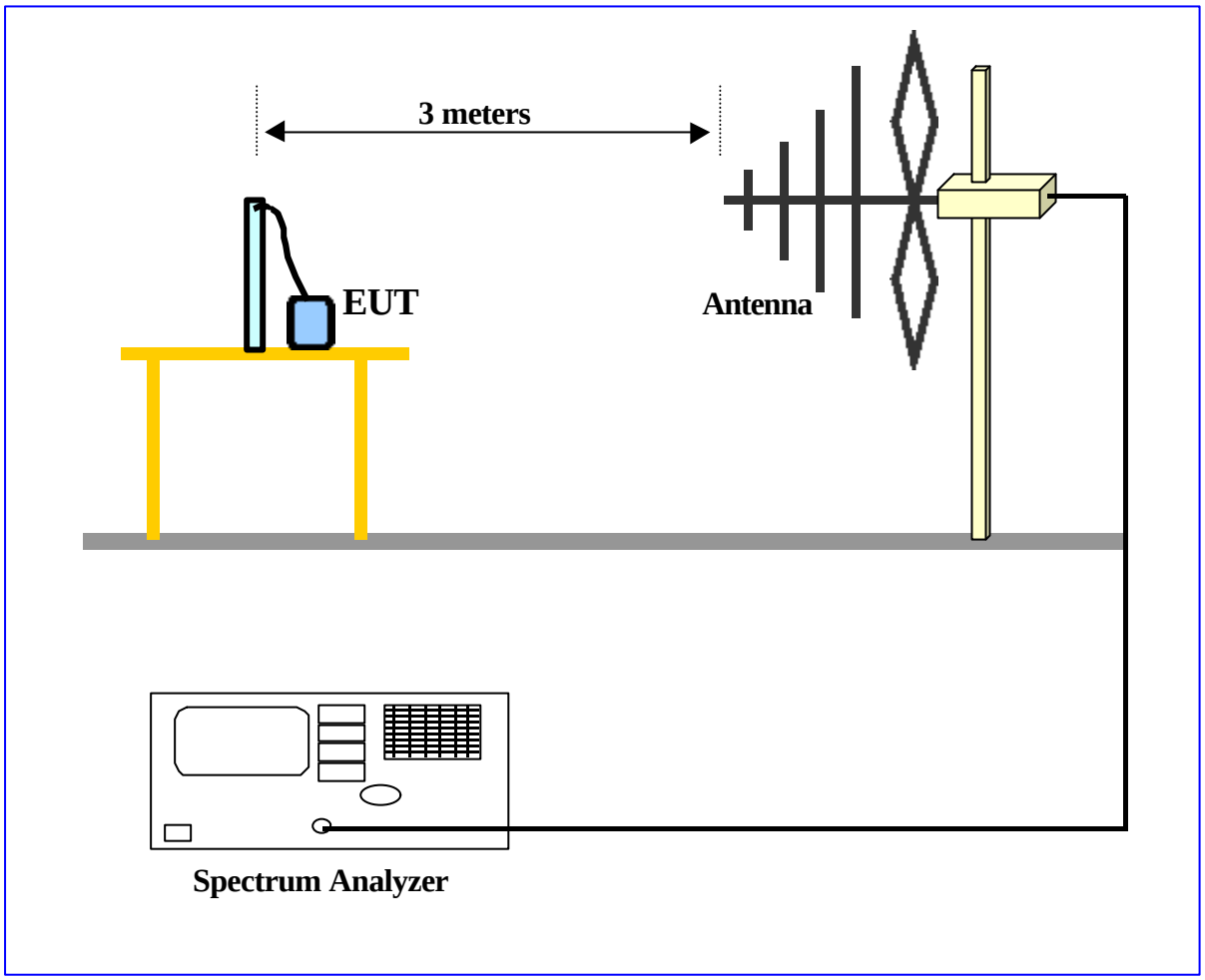
D : Measurement Distance (3 m)

2.3 List of test Instrument :

				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	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	11/20/99	11/20/00
Auto Switch Box (> 30MHz)	ASB-01	TRC	9904-01	11/20/99	11/20/00
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 ± 4.96 dB.

2.4 Measurement Configuration



2.5 Measurement Result

(1) Frequency: 794.900 MHz

Corrected (dB) = AF(dB) + [CL(dB) – Amplitude Gain]

= –26.25 dB/m

FI_a (dBmV/m) = FI_r (dBmV) – Corrected (dB)

= 66.59 – (–26.25)

= 92.84 dBmV/m

The maximum field measured is 92.84 dBmV/m

FI (Volt) = $10^{92.84/20}$ X 10^{-6} = 0. 04385 V

FI (mW) = $(0.04385 \text{ X } 3)^2$/ 49.2 = 0.351785 mW

Angle of Turn Table (°)	Spectrum Reading (dB µV/m)	Corrected (dB)	Actually Value (dB µV/m)	E. R. P. (mW)	8 Position of Average (mW)
0°	65.16	-26.25	91.41	0.25309	**0.27008**
45°	64.40	-26.25	90.65	0.21246	
90°	66.08	-26.25	92.33	0.31281	
135°	65.76	-26.25	92.01	0.29059	
180°	65.29	-26.25	91.54	0.26078	
225°	49.86	-26.25	76.11	0.00747	
270°	66.54	-26.25	92.79	0.34776	
315°	67.90	-26.25	94.15	0.47564	

(2) Frequency: 800.200 MHz

Corrected (dB) = AF(dB) + [CL(dB) – Amplitude Gain]

= –26.64 dB/m

FI_a (dBmV/m) = FI_r (dBmV) – Corrected (dB)

= 65.99 – (–26.64)

= 92.63 dBmV/m

The maximum field measured is 92.63 dBmV/m

FI (Volt) = $10^{92.63/20}$ X 10^{-6} = 0. 04281 V

FI (mW) = $(0.04281 \text{ X } 3)^2$/ 49.2 = 0.335179 mW

Angle of Turn Table (°)	Spectrum Reading (dB µV/m)	Corrected (dB)	Actually Value (dB µV/m)	E. R. P. (mW)	8 Position of Average (mW)
0°	63.90	-26.64	90.54	0.20715	**0.21077**
45°	61.56	-26.64	88.20	0.12086	
90°	62.30	-26.64	88.94	0.14331	
135°	65.11	-26.64	91.75	0.27370	
180°	65.25	-26.64	91.89	0.28267	
225°	56.79	-26.64	83.43	0.04030	
270°	65.29	-26.64	91.93	0.28528	
315°	65.96	-26.64	92.60	0.33287	

(3) Frequency: 804.900 MHz

Corrected (dB) = AF(dB) + [CL(dB) – Amplitude Gain]

= –26.17 dB/m

FI_a (dBmV/m) = FI_r (dBmV) – Corrected (dB)

= 68.37 – (–26.17)

= 94.54 dBmV/m

The maximum field measured is 94.54 dBmV/m

FI (Volt) = $10^{94.54/20}$ X 10^{-6} = 0.05333 V

FI (mW) = $(0.05333 \text{ X } 3)^2$/ 49.2 = 0.520328 mW

Angle of Turn Table (°)	Spectrum Reading (dB µV/m)	Corrected (dB)	Actually Value (dB µV/m)	E. R. P. (mW)	8 Position of Average (mW)
0°	66.12	-26.17	92.29	0.30994	**0.31961**
45°	63.55	-26.17	89.72	0.17151	
90°	65.59	-26.17	91.76	0.27433	
135°	68.14	-26.17	94.31	0.49349	
180°	64.77	-26.17	90.94	0.22713	
225°	63.11	-26.17	89.28	0.15498	
270°	68.08	-26.17	94.25	0.48672	
315°	67.63	-26.17	93.80	0.43881	

Chapter 3 Modulation Characteristics Measurement

3.1 Rules and Specification Limits

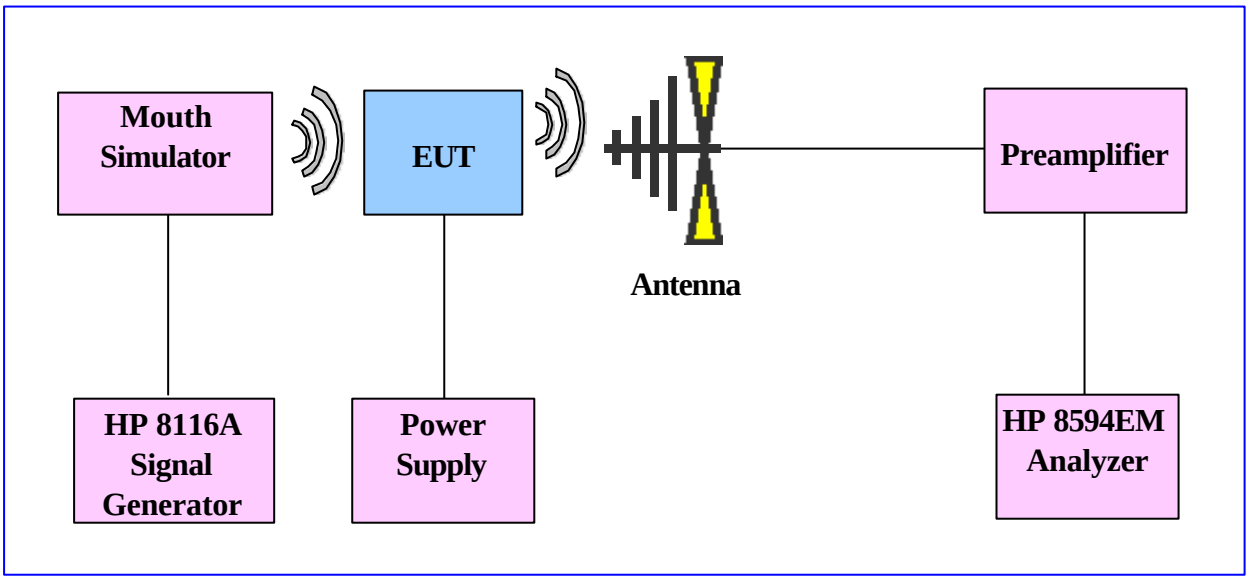
2.1047 (a), ANSI/ TIA/ EIA-603-1992, Paragraph 2.2.6.

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



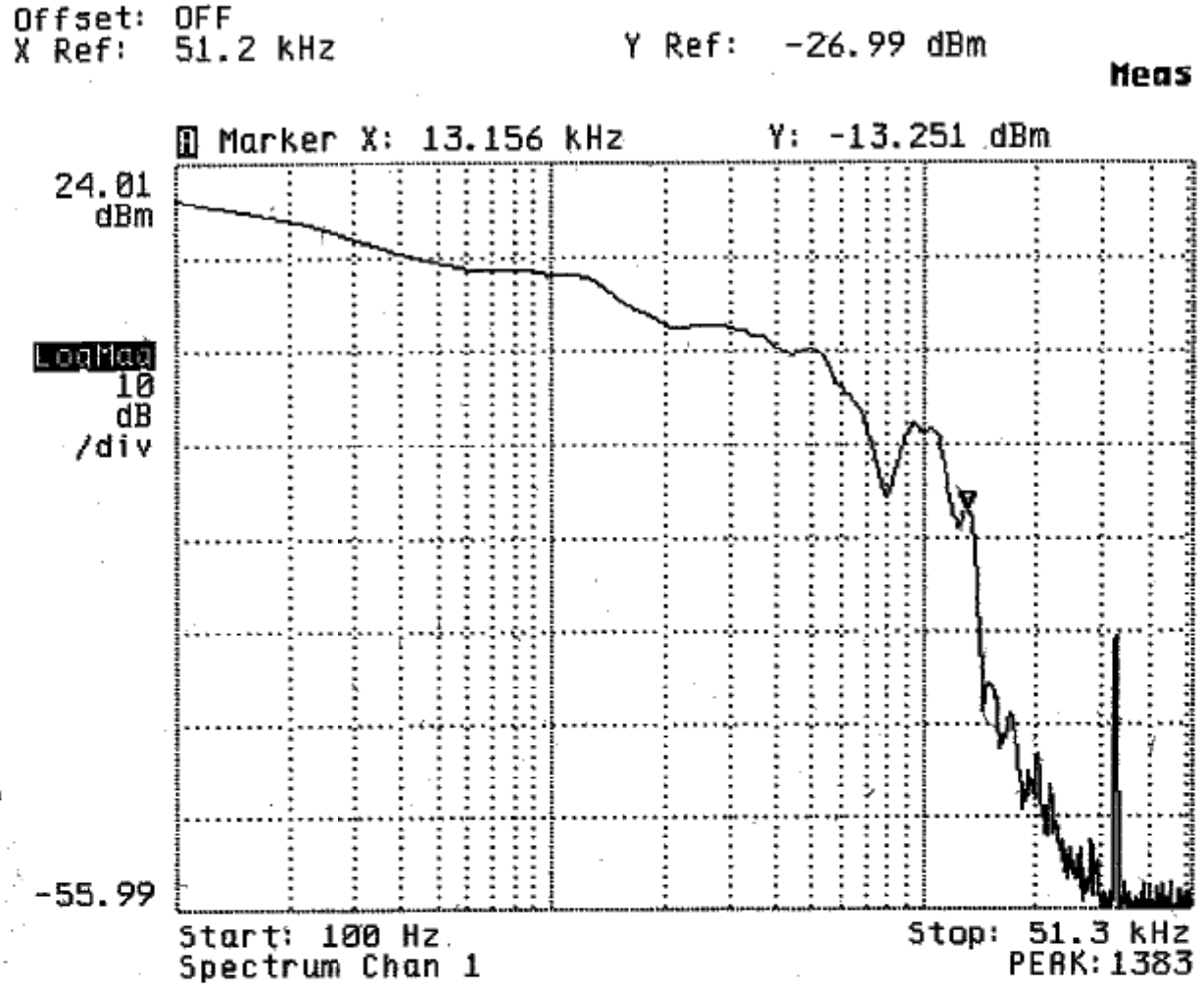
List of test instrument:

Manufacturer	Device	Model No.	Input Impedance
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
Marker X: 13.156 kHz
Y: -13.251 dBm
24.01
dBm
LogMag
10
dB
/div
-55.99
Start: 100 Hz
Spectrum Chan 1
Stop: 51.3 kHz
PEAK: 1383

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 Measuerment Negative

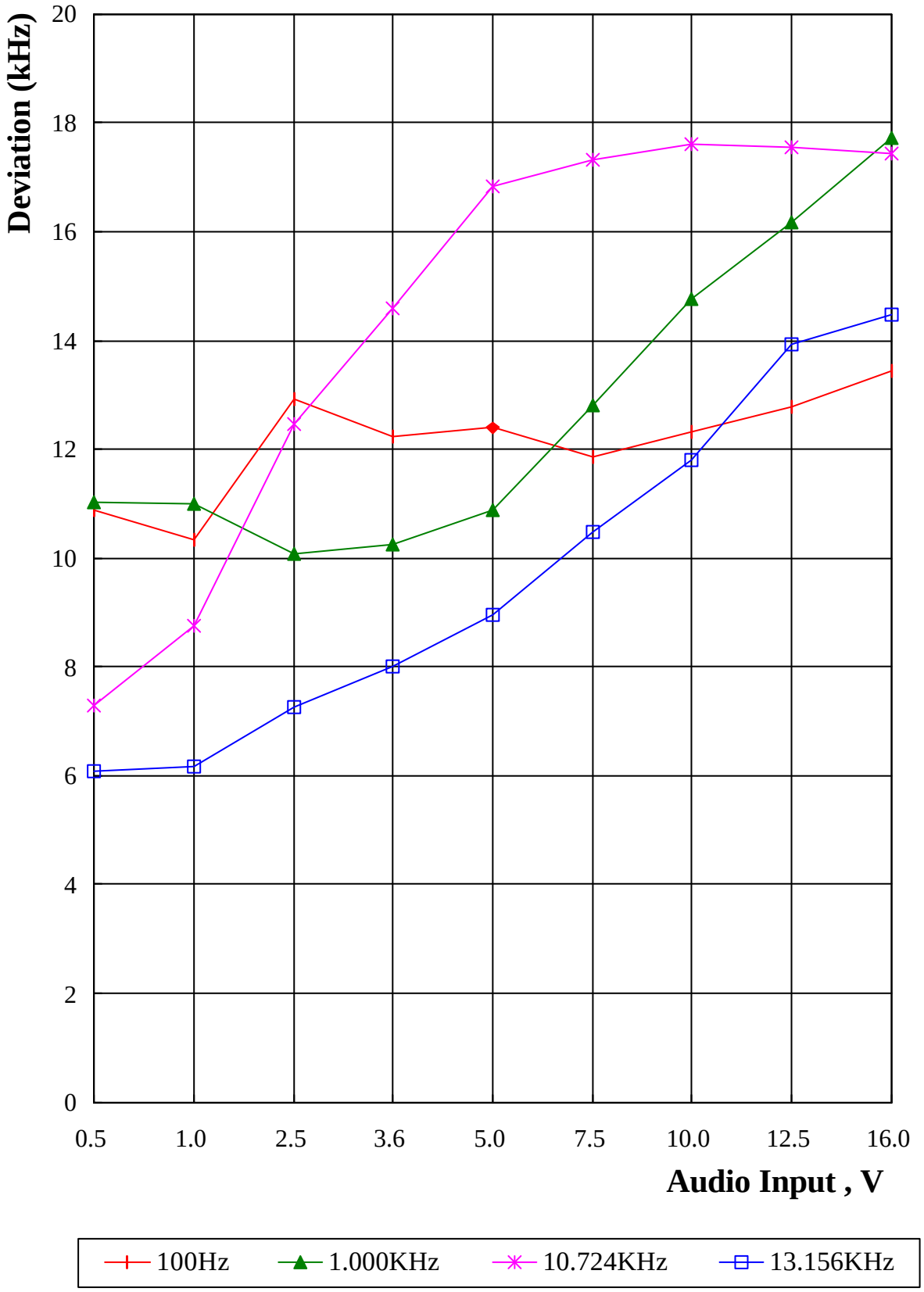
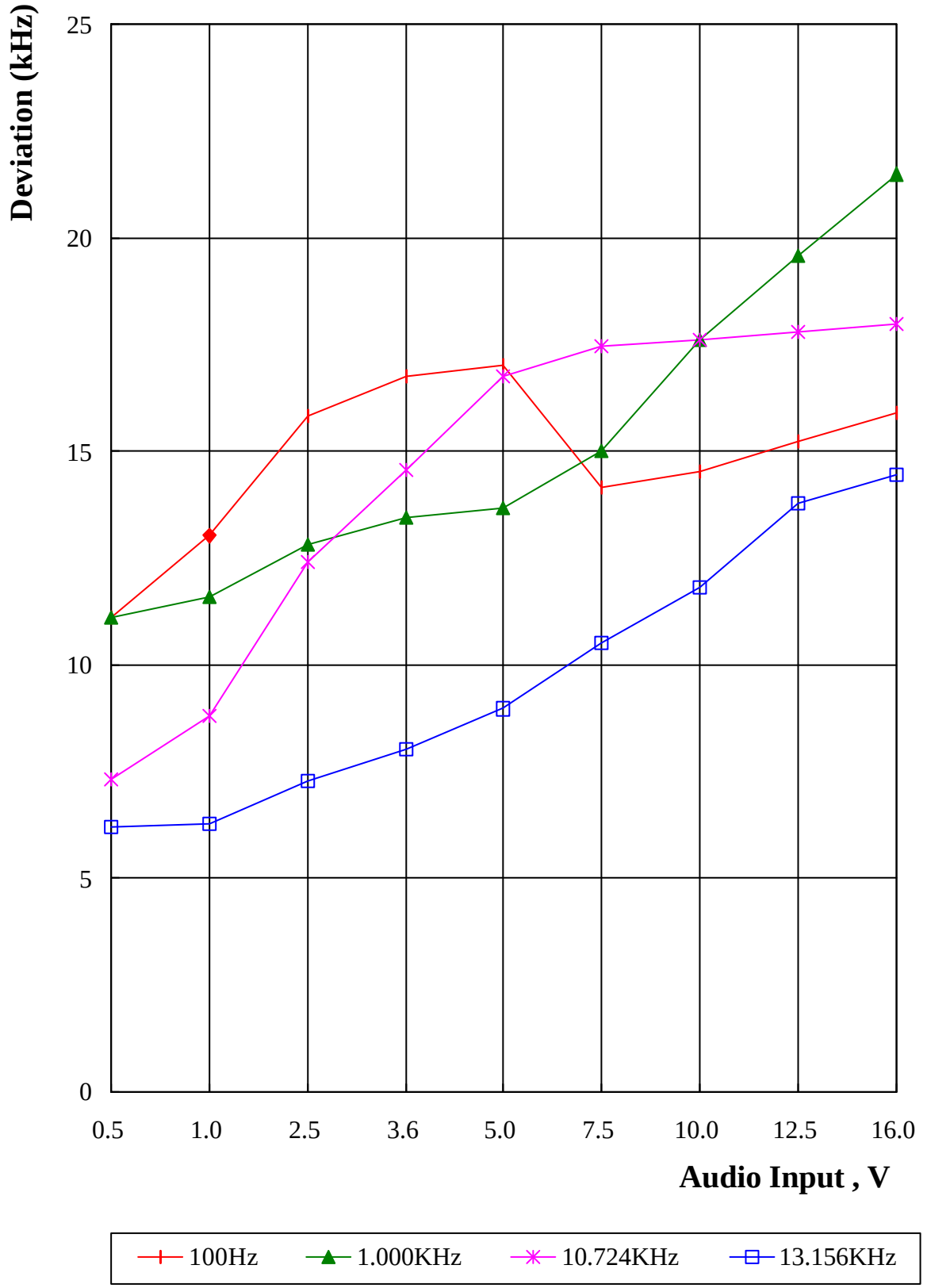


Chart 3.2 Modulation Limiting Measuerment Positive



Chapter 4 Occupied Bandwidth Measurement

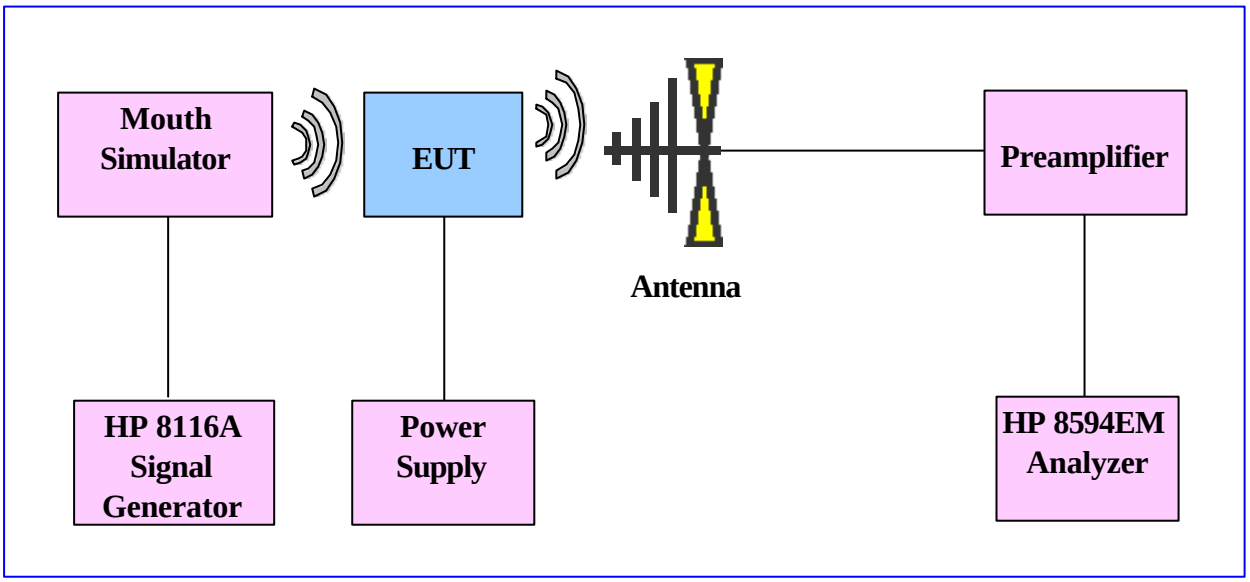
4.1 Rules and Specification Limits

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 ±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 :

Instrument Name	Model No.	Brand	Input Impedance
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)

Bn = 2M + 2D

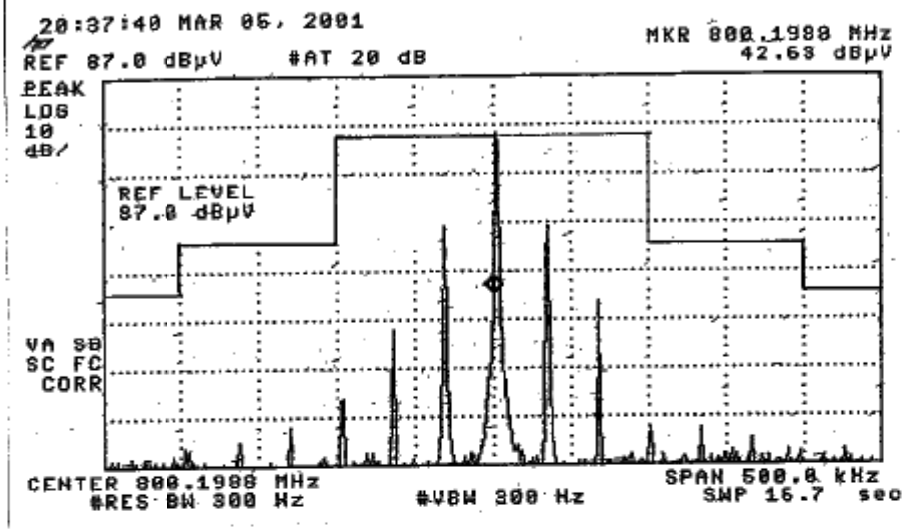
M = Max. Modulation Frequency = 21.500 kHz

D = Peak Frequency Deviation = 13.156 kHz (Chart 3-1)

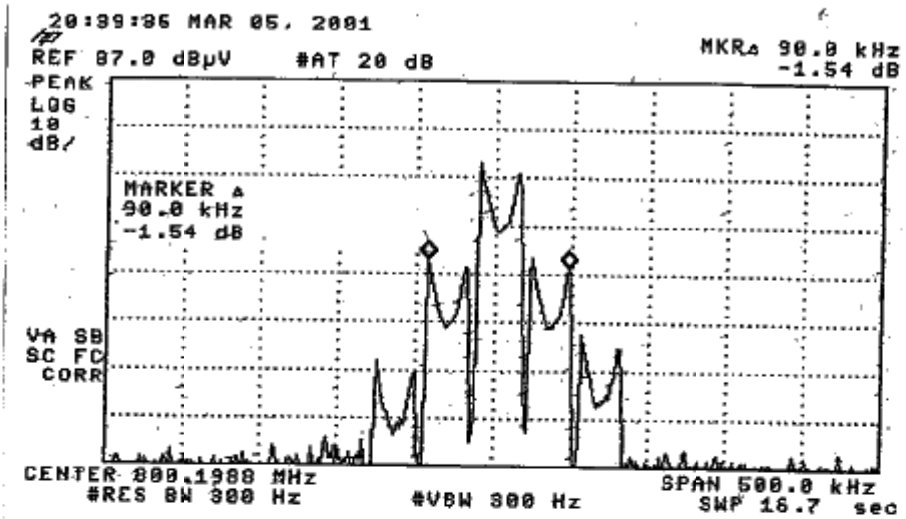
K = 1

Bn = 69.312 kHz

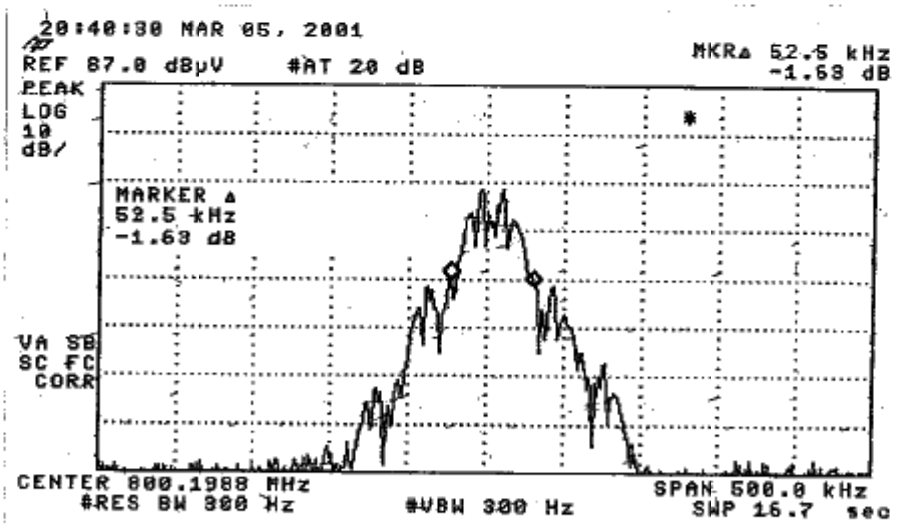
Unmodulation



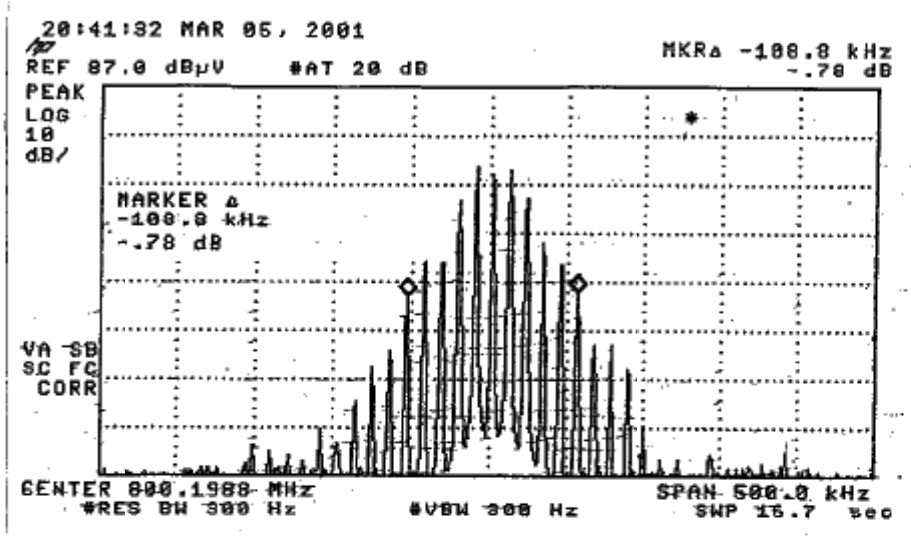
100Hz


20:39:36 MAR 05, 2001
REF 87.0 dBµV
#AT 20 dB
MKRΔ 90.0 kHz
-1.54 dB
PEAK
LOG
10
dB/
MARKER Δ
90.0 kHz
-1.54 dB
VA SB
SC FC
CORR
CENTER 800.1988 MHz
#RES BW 300 Hz
#VBW 300 Hz
SPAN 500.0 kHz
SWP 16.7 sec

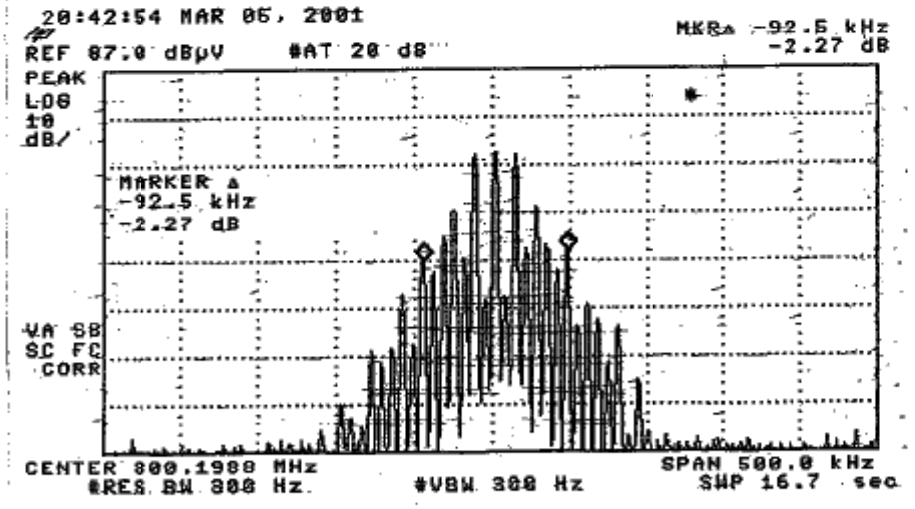
1KHz


20:40:30 MAR 05, 2001
REF 87.0 dBµV
#AT 20 dB
MKRΔ 52.5 kHz
-1.63 dB
PEAK
LOG
10
dB/
MARKER Δ
52.5 kHz
-1.63 dB
VA SB
SC FC
CORR
CENTER 800.1988 MHz
#RES BW 300 Hz
#VBW 300 Hz
SPAN 500.0 kHz
SWP 16.7 sec

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 (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^{th} 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 (dBμV/m) is determined by algebraically adding the measured reading in dBμV, the antenna factor (dB) and cable loss (dB) at the appropriate frequency.

(1) Band of Frequency: (30M Hz ~ 1G Hz)
FI_a (dBμV/m) = FI_r (dBμV) – Corrected (dB)
Corrected (dB) = AF(dB) + CL (dB) – Amplifier Gain
FI_a : Actual Field Intensity
FI_r : Reading of the Field Intensity
AF : Antenna Factor
CL : Cable Loss

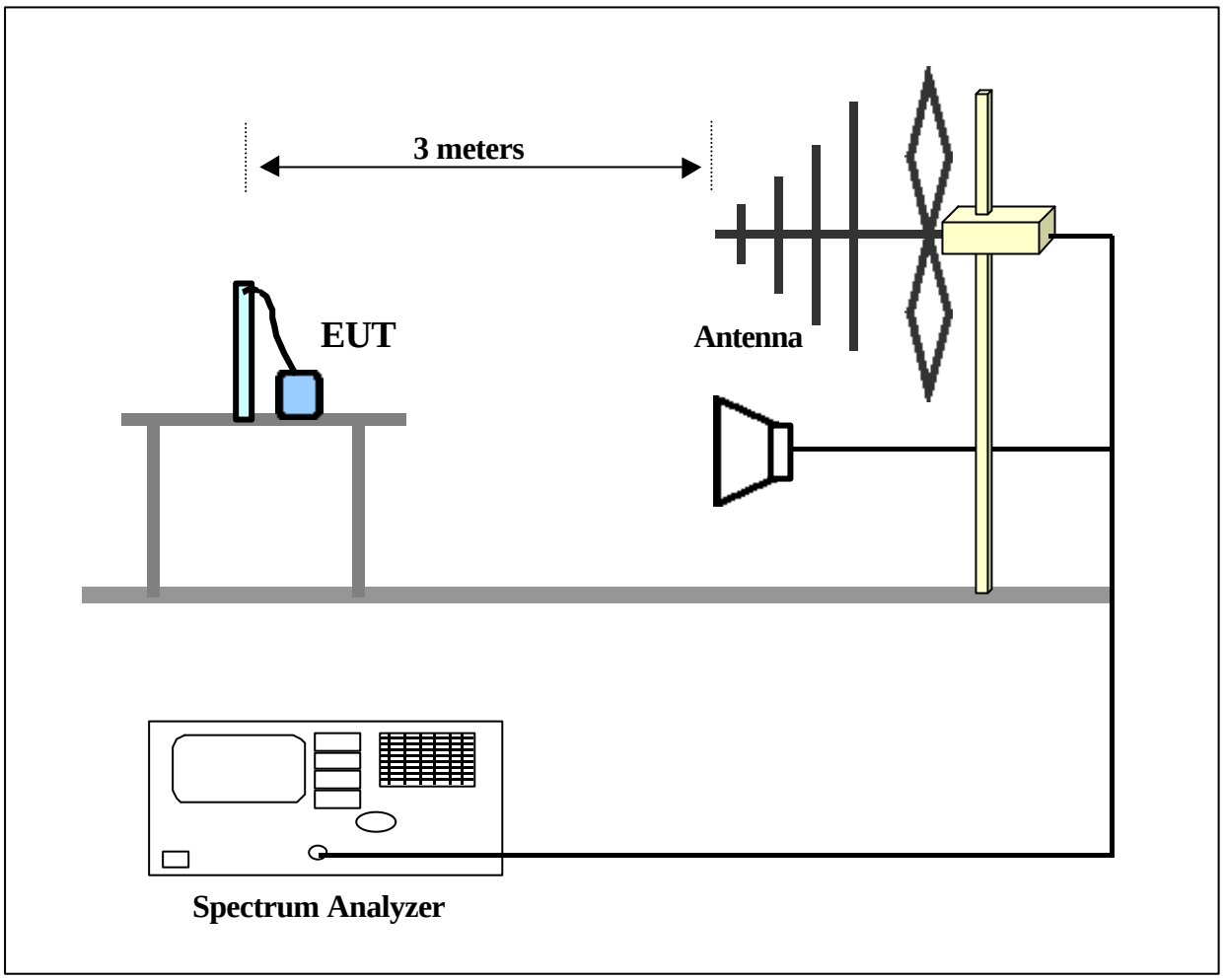
(2) Band of Frequency: (1G Hz ~ 18 G Hz)
FI_a (dBμV/m) = FI_r (dBμV) + AF (dB) + CL(dB)
FI_a : Actual Field Intensity
FI_r : Reading of the Field Intensity
AF : Antenna Factor
CL : Cable Loss

5.3 List of Measurement Instruments

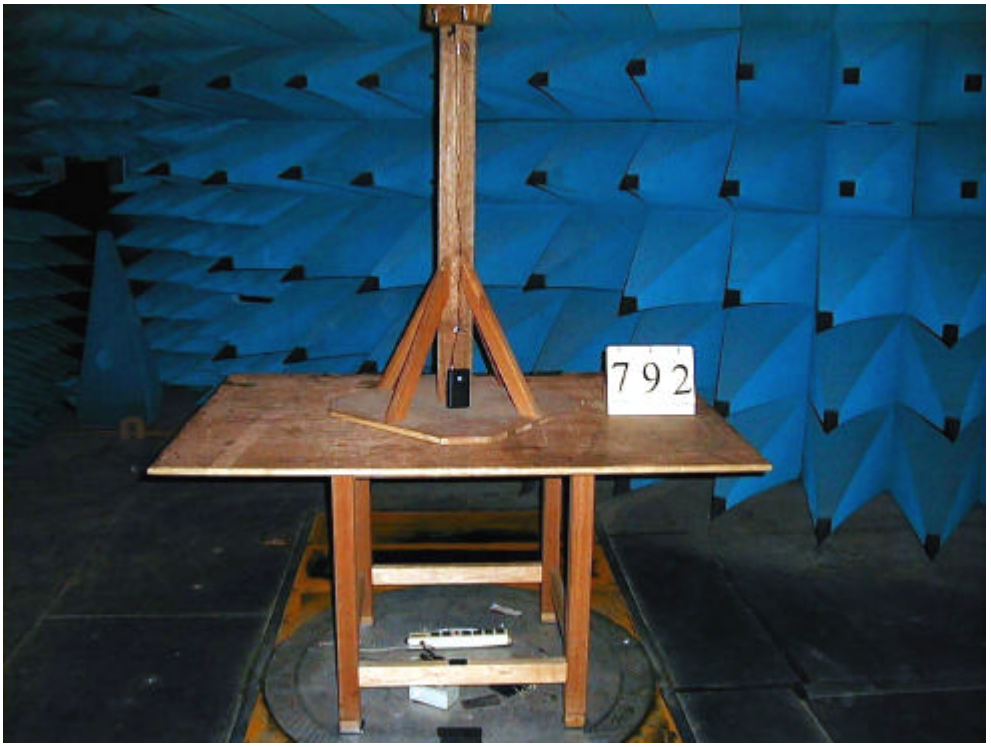
				Calibration Date	
Instrument Name	Model No.	Brand	Serial No.	Last time	Next time
EMI Receiver	8546A	H P	3520A00242	10/01/00	10/01/01
RF Filter Section	85460A	H P	3448A00217	10/01/00	10/01/01
Bi-log Antenna	CBL6141A	Schaffner	4151	06/28/00	06/28/01
Switch/Control Unit (> 30MHz)	3488A	HP	N/A	11/20/99	11/20/00
Auto Switch Box (> 30MHz)	ASB-01	TRC	9904-01	11/20/99	11/20/00
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 ± 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

Frequency	*Reading Amplitude*	*Ant. Height*	*Table*	*Correction Factors*	*Corrected Amplitude*	*Limit*	*Margin*
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
198.727	33.57	1.00	150	-13.32	46.89	84.38	-37.49
397.452	27.91	1.00	27	-19.59	47.50	84.38	-37.49
***							

Note:

1. Margin = Amplitude - limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude Gain)
   (For example : 30MHz correction Amplitude = 15.5 – (–15.26) = 30.76 dB/m)
4. Attenuation required = 43 + 10 log (0.351785 mW) = 8.46
   Limit = 92.84 – (8.46) = 84.38

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

Radiated Emission				*Correction Factors*	*Corrected Amplitude* (dBμV/m)	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude* (dBμV/m)	*Ant. H.* (cm)	*Table* (°)	(dB)		*Limit* (dBμV/m)	*Margin* (dB)
1.589	68.03	1.00	64	-8.67	59.36	84.38	-25.02
2.380	64.14	1.00	198	-8.67	55.47	84.38	-28.91
2.770	51.97	1.00	44	-6.84	45.13	84.38	-39.25
2.980	62.81	1.00	10	-6.84	55.97	84.38	-28.41
***							

Note:

1. Margin = Corrected - Limit.
2. Peak Amplitude + Correction Factor = Corrected

Radiated Emission Test Result:
(Test Frequency: 794.900MHz , Vertical , 30MHz ~ 1GHz)

Frequency	*Reading Amplitude*	*Ant. Height*	*Table*	*Correction Factors*	*Corrected Amplitude*	*Limit*	*Margin*
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
198.727	30.86	3.96	11	-13.54	44.40	84.38	-39.98
397.451	25.16	1.00	6	-19.14	44.30	84.38	-39.98
***							

Radiated Emission Test Result:
(Test Frequency: 794.900MHz , Vertical , 1GHz ~ 18GHz)

Radiated Emission				*Correction Factors*	*Corrected Amplitude* (dBμV/m)	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude* (dBμV/m)	*Ant. H.* (cm)	*Table* (°)	(dB)		*Limit* (dBμV/m)	*Margin* (dB)
1.589	64.21	1.00	134	-8.67	55.54	84.38	-28.84
2.380	65.97	1.00	327	-8.67	57.30	84.38	-27.08
2.770	61.97	1.00	50	-6.84	55.13	84.38	-29.25
2.980	74.31	1.00	94	-6.84	67.47	84.38	-16.91
***							

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

Frequency	*Reading Amplitude*	*Ant. Height*	*Table*	*Correction Factors*	*Corrected Amplitude*	*Limit*	*Margin*
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
200.049	32.79	1.00	150	-13.40	46.19	84.38	-38.19
400.100	22.68	2.47	7	-19.71	42.39	84.38	-38.19
600.148	24.69	1.00	84	-23.25	47.94	84.38	-36.44
***							

Note:

1. Margin = Amplitude - limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude Gain)
   (For example : 30MHz correction Amplitude = 15.5 – (–15.26) = 30.76 dB/m)
4. Attenuation required = 43 + 10 log (0.335179 mW) = 8.25
   Limit = 92.63 – (8.25) = 84.38

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

Radiated Emission				*Correction Factors*	*Corrected Amplitude* (dBμV/m)	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude* (dBμV/m)	*Ant. H.* (cm)	*Table* (°)	(dB)		*Limit* (dBμV/m)	*Margin* (dB)
1.400	72.05	1.00	9	-8.67	63.38	84.38	-21.00
1.600	70.25	1.00	141	-8.67	61.58	84.38	-22.80
2.390	69.97	1.00	95	-8.67	61.30	84.38	-23.08
2.790	61.81	1.00	417	-6.84	54.97	84.38	-29.41
3.000	69.31	1.00	206	-6.84	62.47	84.38	-21.91
3.190	63.64	1.00	4	-6.84	56.80	84.38	-27.58
5.990	38.58	1.00	189	9.72	48.30	84.38	-36.08
6.800	40.91	1.00	206	9.72	50.63	84.38	-33.75
7.410	42.48	1.00	40	9.72	52.20	84.38	-32.18
7.610	42.75	1.00	146	9.72	52.47	84.38	-31.91
***							

Radiated Emission Test Result:
(Test Frequency: 800.200MHz , Vertical , 30MHz ~ 1GHz)

Frequency	*Reading Amplitude*	*Ant. Height*	*Table*	*Correction Factors*	*Corrected Amplitude*	*Limit*	*Margin*
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
200.052	30.39	2.44	56	-13.64	44.03	84.38	-40.35
600.152	22.44	1.00	13	-23.56	46.00	84.38	-40.35
***							

Radiated Emission Test Result:
(Test Frequency: 800.200MHz , Vertical , 1GHz ~ 18GHz)

Radiated Emission				*Correction Factors*	*Corrected Amplitude* (dBμV/m)	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude* (dBμV/m)	*Ant. H.* (cm)	*Table* (°)	(dB)		*Limit* (dBμV/m)	*Margin* (dB)
1.400	71.20	2.44	10	-8.67	62.53	84.38	-21.85
1.600	62.90	1.00	58	-8.67	54.23	84.38	-30.15
2.390	69.14	1.00	151	-8.67	60.47	84.38	-23.91
2.790	73.81	1.00	206	-6.84	66.97	84.38	-17.41
3.000	75.47	1.00	27	-6.84	68.63	84.38	-15.75
3.190	63.81	1.00	116	-6.84	56.97	84.38	-27.41
5.990	47.41	1.00	237	9.72	57.13	84.38	-27.25
6.800	54.91	1.00	308	9.72	64.63	84.38	-19.75
7.000	51.41	1.00	346	9.72	61.13	84.38	-23.25
7.200	51.25	1.00	15	9.72	60.97	84.38	-23.41
7.410	52.41	1.00	97	9.72	62.13	84.38	-22.25
7.610	57.08	1.00	2	9.72	66.80	84.38	-17.58

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

Frequency	*Reading Amplitude*	*Ant. Height*	*Table*	*Correction Factors*	*Corrected Amplitude*	*Limit*	*Margin*
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
201.227	34.45	1.00	150	-13.49	47.94	84.38	-36.44
402.452	32.01	1.00	28	-19.81	51.82	84.38	-36.44
***							

Note:

1. Margin = Amplitude – limit, *if margin is minus means under limit.*
2. Corrected Amplitude = Reading Amplitude – Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude Gain)
   (For example : 30MHz correction Amplitude = 15.5 – (–15.26) = 30.76 dB/m)
4. Attenuation required = 43 + 10 log (0.520328 mW) = 10.16
   Limit = 94.54 – (10.16) = 84.38

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

Radiated Emission				*Correction Factors*	*Corrected Amplitude* (dBμV/m)	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude* (dBμV/m)	*Ant. H.* (cm)	*Table* (°)	(dB)		*Limit* (dBμV/m)	*Margin* (dB)
1.207	66.14	1.00	64	-8.67	57.47	84.38	-26.91
1.609	68.37	1.00	150	-8.67	59.70	84.38	-24.68
2.010	57.80	1.00	29	-8.67	49.13	84.38	-35.25
2.410	60.11	1.00	146	-8.64	51.47	84.38	-32.91
2.810	60.97	1.00	228	-6.84	54.13	84.38	-30.25
3.010	57.97	1.00	339	-6.84	51.13	84.38	-33.25
3.220	59.31	1.00	8	-6.84	52.47	84.38	-31.91
***							

Radiated Emission Test Result:
(Test Frequency: 804.900MHz , Vertical , 30MHz ~ 1GHz)

Frequency	*Reading Amplitude*	*Ant. Height*	*Table*	*Correction Factors*	*Corrected Amplitude*	*Limit*	*Margin*
MHz	dBμV	m	degree	dB/m	dBμV/m	dBμV/m	dB
201.226	31.72	2.47	4	-13.72	45.44	84.38	-38.94
402.452	29.99	1.00	9	-19.36	49.35	84.38	-38.94
***							

Radiated Emission Test Result:
(Test Frequency: 804.900MHz , Vertical , 1GHz ~ 18GHz)

Radiated Emission				*Correction Factors*	*Corrected Amplitude* (dBμV/m)	*FCC Class B (3 m)*	
Frequency (GHz)	*Amplitude* (dBμV/m)	*Ant. H.* (cm)	*Table* (°)	(dB)		*Limit* (dBμV/m)	*Margin* (dB)
1.207	59.45	1.00	35	-8.67	50.78	84.38	-33.60
1.609	64.08	1.00	35	-8.67	55.41	84.38	-28.97
2.010	56.97	1.00	39	-8.67	48.30	84.38	-36.08
2.410	63.11	1.00	167	-8.64	54.47	84.38	-29.91
2.810	67.97	1.00	229	-6.84	61.13	84.38	-23.25
3.010	64.97	1.00	64	-6.84	58.13	84.38	-26.25
3.220	61.14	1.00	181	-6.84	54.30	84.38	-30.08
3.420	62.31	1.00	38	-6.84	55.47	84.38	-28.91
3.620	57.61	1.00	239	-5.64	51.97	84.38	-32.41
***							

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.

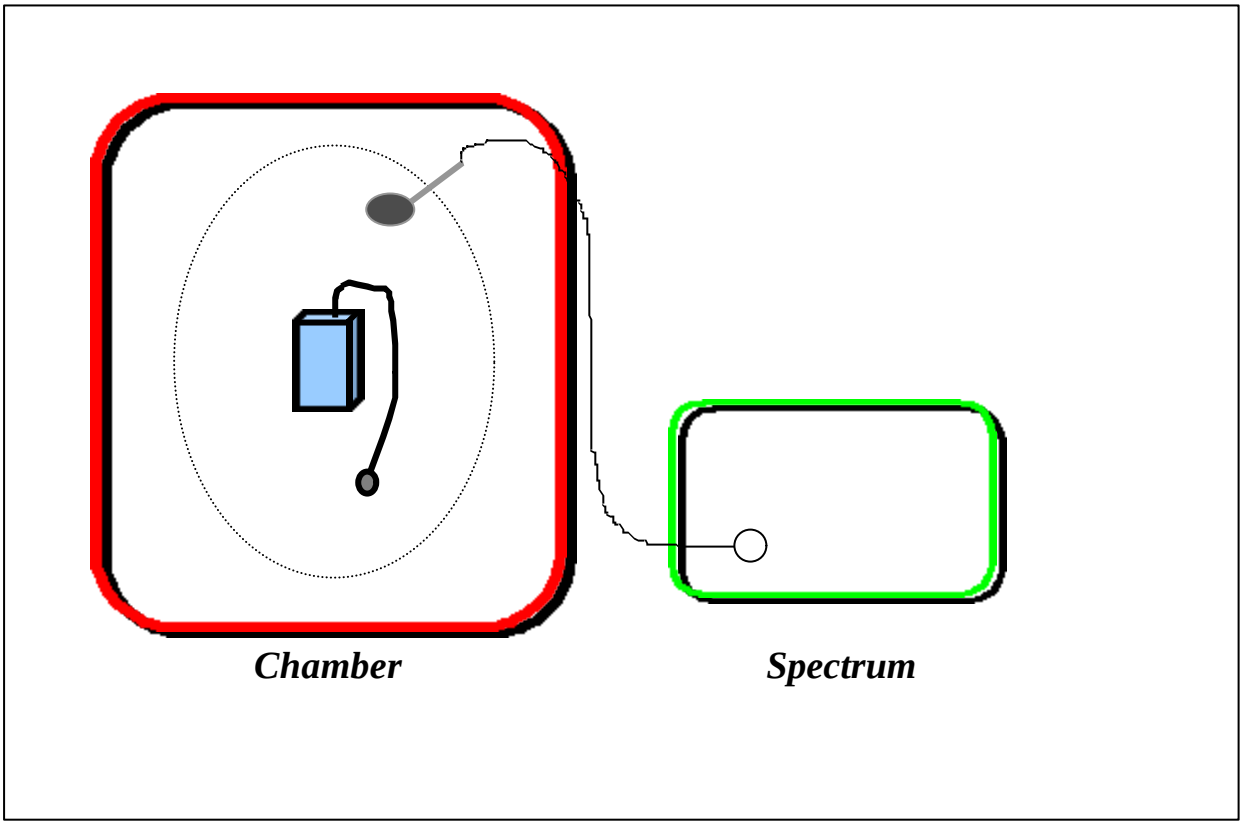
6.2 Measurement Condition & Setup with Temperature Variation

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 internals of 10 degree.

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

Instrument Name	Model No.	Brand	Remark
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:



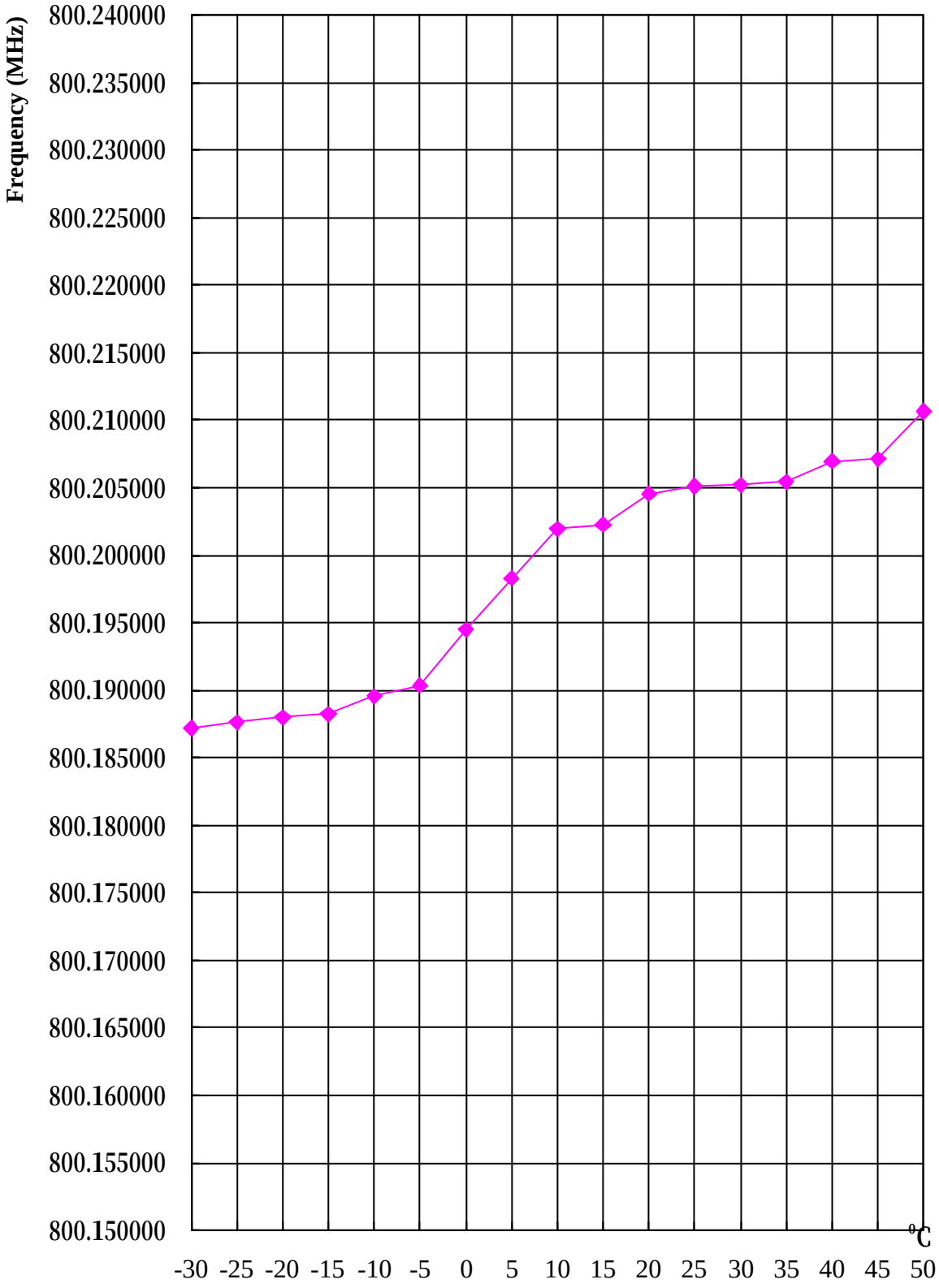
6.5 Measurement Result with Temperature Variation

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

Temperature Variation Table

Temperature (Centigrade)	*Frequency (MHz)*	*Tolerance (MHz)*
-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



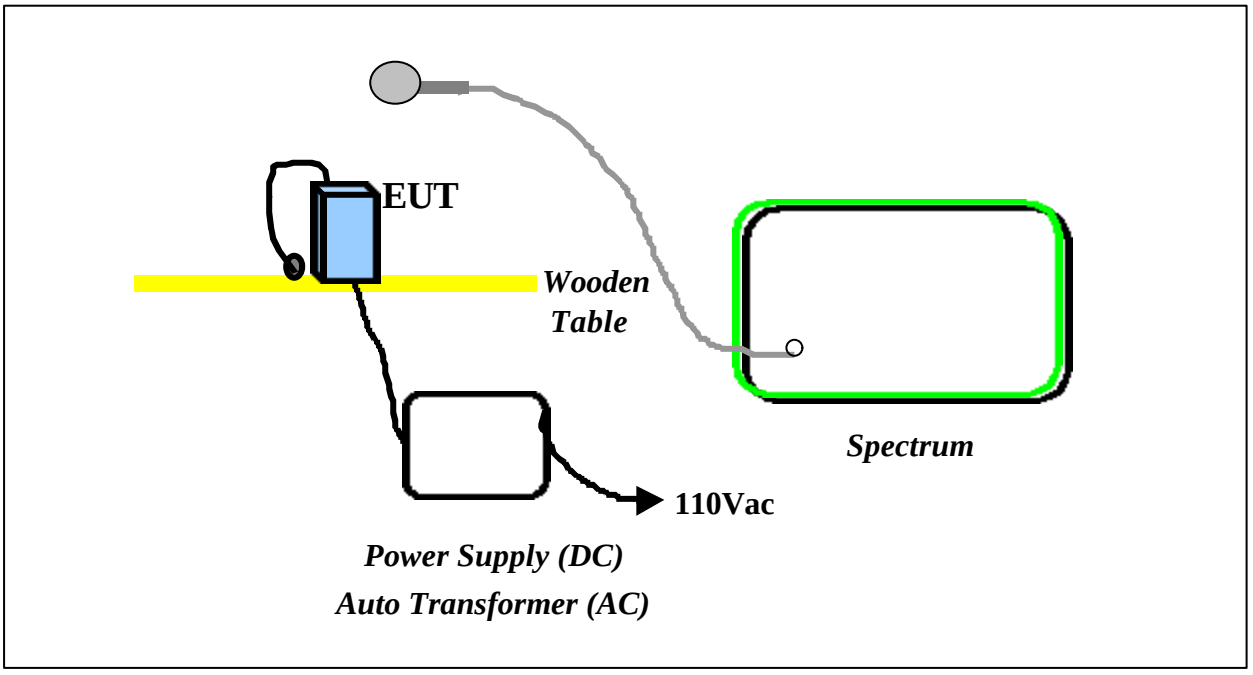
6.6 Measurement Condition & Setup with Voltage Variation

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 :

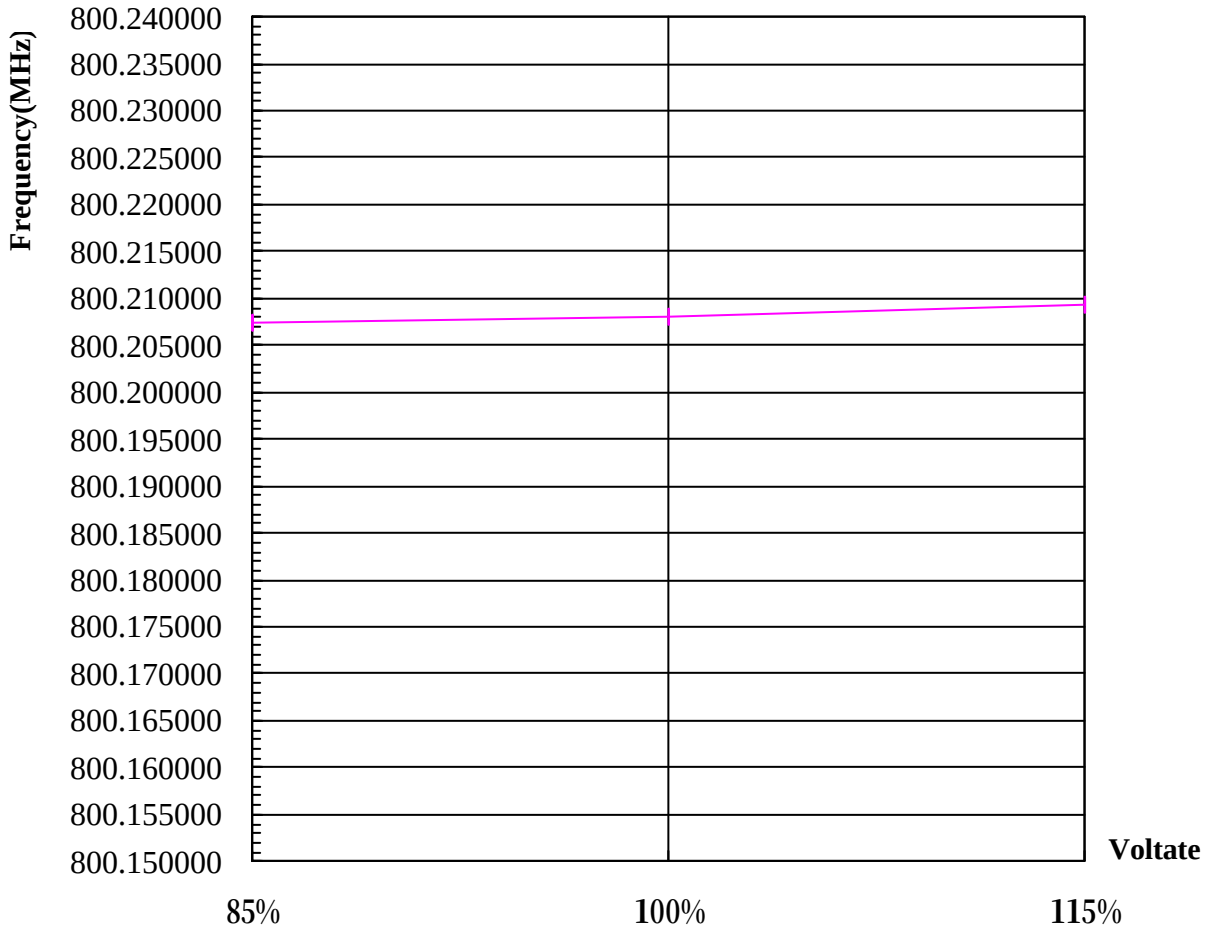
Instrument Name	Model No.	Brand	Remark
Spectrum Analyzer	8591A	H P	1.8GHz
Temperature Chamber	THS-MV2	King Son	
Near field Probe	7405-901	EMCO	
Power Supply	GPR-6030	Good Will	
Auto Transformer	Powerstat	Supprior Elec. Co.	

6.8 Configuration of Voltage Variation Test :



6.9 Measurement Result with Voltage Variation

Frequency Stability of Voltage Variation Measurement Table

Supply Voltage (Volt)	*Frequency (MHz)*	*Tolerance (MHz)*
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
Endpoint-Voltage: 2.70V		

Voltage Variation Vs. Frequency Chart