

***EXHIBIT B***

***Test Report***

Report No.

M1274848

Specifications  
Test Method

FCC Part 74 – Certification  
ANSI C63.4 1992

Applicant  
address

NO. 85, CHANG HSING FIRST STREET, TAI-TZU  
VILLAGE, JEN-TE HSIAN, TAINAN HSIEN, TAIWAN

Applicant  
Items tested  
Model No.

WA-GOL INDUSTRIAL CO., LTD.  
WIRELESS MICROPHONE TRANSMITTER  
HH-03M

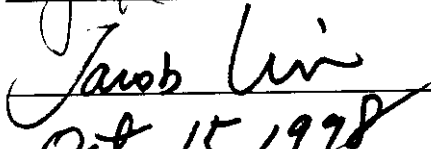
Results  
Sample received  
date

As detailed within this report  
09/17/1998 (month / day / year )

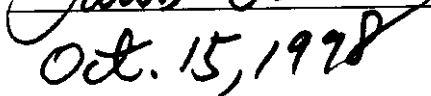
Prepared by

 project engineer

Authorized by

 Vice General Manager  
( Jacob Lin )

Issue date

 ( month / day / year )

**Modifications**

None

Tested by

Training Research Co., Ltd.

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Open site at

No. 5-3, Lane 21, Yen Chiu Yuan Rd., Sec.4, Taipei Taiwan

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- (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 : JEBHH-03M

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**Chapter 0 Application for Certification**

- 2.983 ( a ) : WA-GOL INDUSTRIAL CO., LTD. –applicant and manufacturer
- 2.983 ( b ) : The equipment is a transmitter, wireless microphone  
Model : HH-03M
- 2.983 ( c ) : Quantity production is planned
- 2.983 ( d ) ( 1 ) : Type of emission – F3E- FM Modulation
- 2.983 ( d ) ( 2 ) : 100 Hz – 12 KHz
- 2.983 ( d ) ( 3 ) : 0.094 mW
- 2.983 ( d ) ( 4 ) : Specification of 250 mW is met by the equipment in the applicable part 74.861 (e)(1)
- 2.983 ( d ) ( 5 ) : Final RF amplifier stage current : 25mA, 9V Battery
- 2.983 ( d ) ( 6 ) : Description follows
- 2.983 ( d ) ( 7 ) : Complete circuit diagrams are included . No modification was made.
- 2.983 ( d ) ( 8 ) : Instruction sheet to user included.
- 2.983 ( d ) ( 9 ) : Tune up procedure follows
- 2.983 ( d ) (11) : Description follows
- 2.983 ( d ) (12) : N/A

## Chapter 1 GENERAL

### 1.1 Introduction :

The following measurement report is submitted on behalf of *WA-GOL INDUSTRIAL CO., LTD* in support of a wireless microphone certification in accordance with FCC Rules. 2.981 through 2.999 and 74.861.

### Description of EUT :

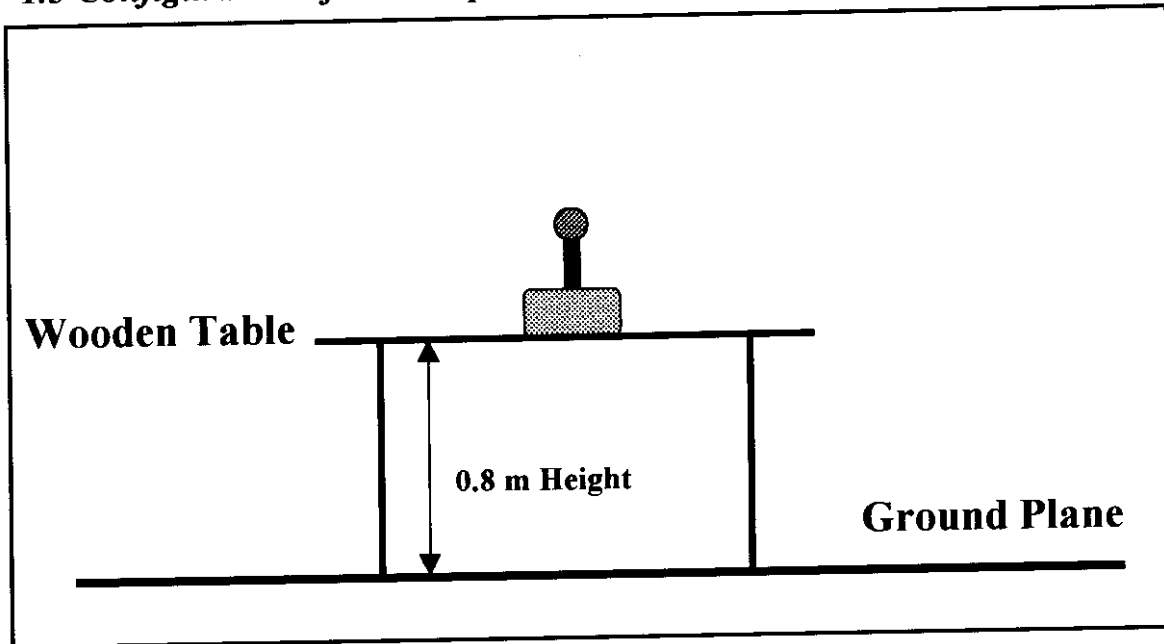
EUT	:	WIRELESS MICROPHONE TRANSMITTER
Model	:	HH-03M
Carrier Frequency Range	:	174 ~ 216 MHz
RF Power Output	:	0.094 mW
Supply Voltage	:	DC 9V
Supply Current	:	25 mA
Frequency Response	:	100 Hz ~ 12 KHz
Frequency Stability	:	0.005%
Operating Temperature	:	-30 to +50 degree centigrade

Wireless microphone is a transmitter which operates in the frequency range of 174 ~ 216 MHz. ( 192.600 MHz tested ) This microphone is worn by a performer and other participants in a program, filming, reporting ... etc. The relative receiver of this microphone's FCCID: JEBVH-101 or FCC ID : JEBVH-110 or FCC ID : JEBVH-120 is in applying.

### 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, open-field test site maintained by Training Research CO., Ltd., No. 5-3, Lane 21, Yen-Chiu-Yuan Rd., Sec. 4, Taipei, Taiwan, R.O.C. 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 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 was 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**

2.985

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 W.

### **2.2 Test condition and setup :**

1. Measurement was made on open-field test site. 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 ECO 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 biconical antenna.
3. The following procedures were used to convert the emission levels measured in decibels referenced to 1 microvolt (dBuV ) into field intensity in Watt.
  - (1) The actual field intensity in decibels referenced to 1 micro volt per meter ( dBuV/m ) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency.

$$\mathbf{FI_a(dBuV/m) = FI_r( dBuV) + Corrected (dB)}$$

$$\mathbf{Corrected (dB) = AF(dB) + CL(dB)}$$

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

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

AF : Antenna Factor

CL : Cable Loss

- (2) The field intensity in Volt can then be determined by the following equation:

$$FI(\text{Volt}) = 10^{FI(\text{dBuV/m}) / 20} \times 10^{-6}$$

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

$$P(\text{watt}) = FI^2(\text{Volt}) \times d^2(\text{meter}) / 30$$

P : Power in Watt

D : Measurement Distance ( 3 M )

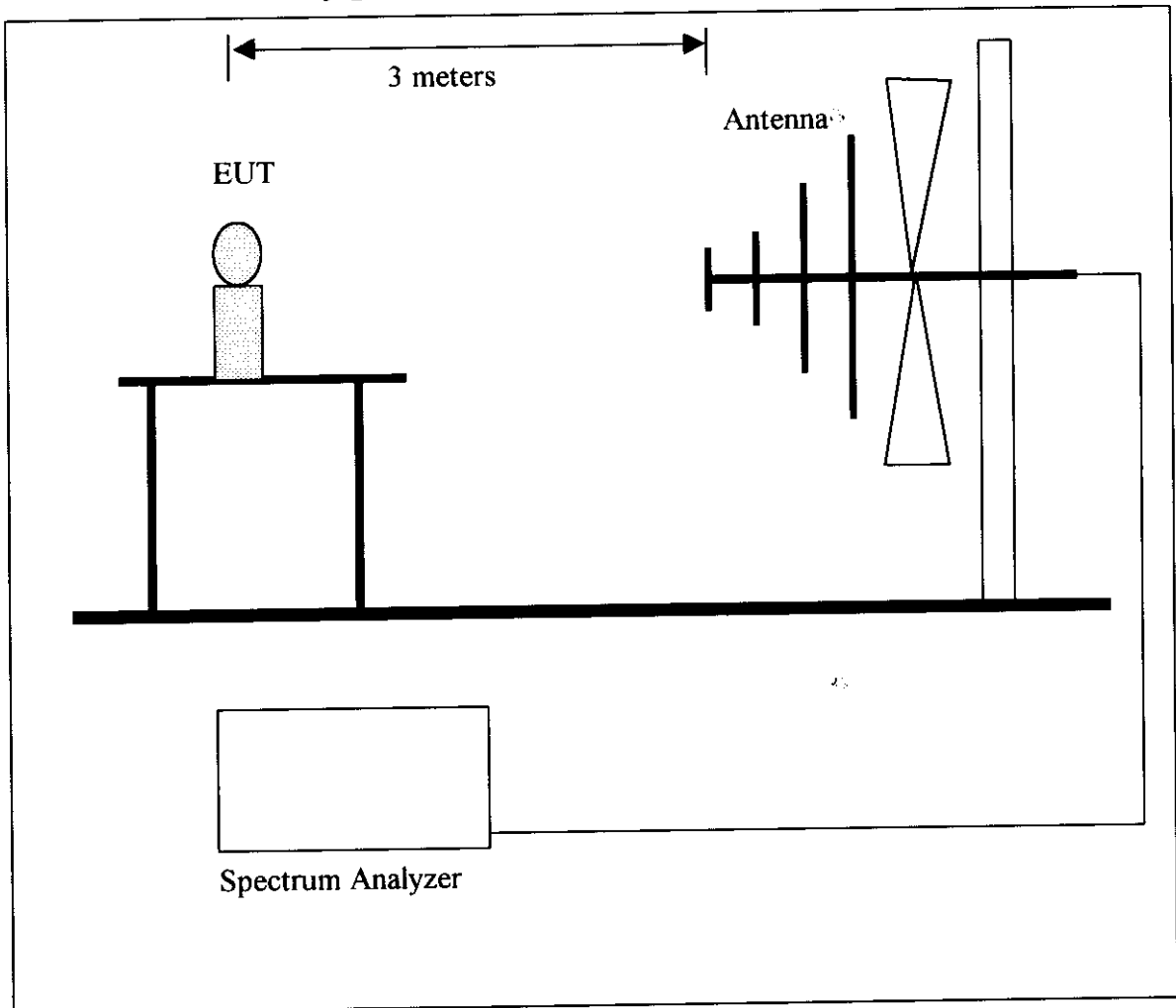


**2.3 List of test Instrument :**

Instrument name	Model No.	Brand	Serial No.	Calibration Date	
				Last	Next
Spectrum analyzer	8568B	H P	3004A18617	05/15/98	05/15/99
Quasi-peak Adapter	85650A	H P	2521A00984	05/15/98	05/15/99
RF Pre-selector	85685A	H P	2947A01011	05/15/98	05/15/99
Spectrum analyzer	8591A	H P	2919A00263	01/07/98	01/07/99
Antenna (30M-2G Hz)	3142	EMCO	1296	06/10/98	06/10/99
Open test side (Antenna, Amplify, cable calibrated together)				05/15/98	05/15/99

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

$$\begin{aligned}\text{Corrected (dB)} &= \text{AF(dB)} + \text{CL(dB)} \\ &= -21.13 \text{ dB/m}\end{aligned}$$

$$\begin{aligned}\text{FI}_a(\text{dBuV/m}) &= \text{FI}_r(\text{dBuV}) + \text{Corrected (dB)} \\ &= 106.09 - 21.13 = 84.96 \text{ dBuV/m}\end{aligned}$$

The maximum field measured is 84.96 dBuV/m .

$$\text{FI ( Volt )} = 10^{84.96/20} \times 10^{-6} = 0.01770 \text{ V}$$

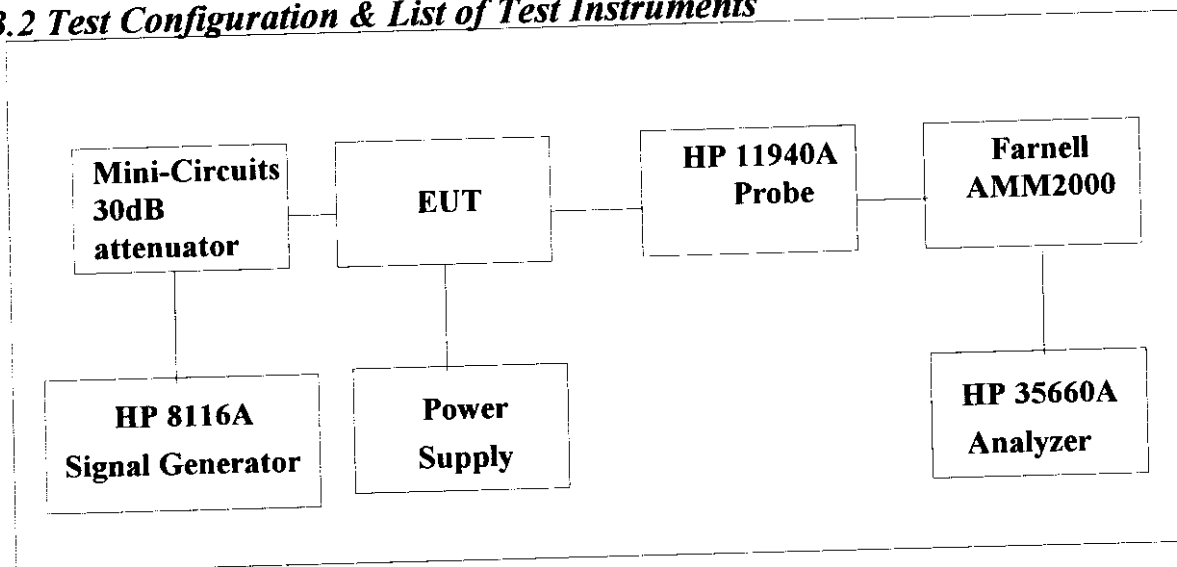
$$\text{FI ( mW )} = (0.01770 \times 3)^2 / 30 = 0.094 \text{ mW}$$

## Chapter 3 Modulation Characteristics Measurement

### 3.1 Rules and Specification Limits

- 2.987( a ) Voice modulated communication equipment
- 4. 987( b ) Equipment which employs modulation limiting

### 3.2 Test Configuration & List of Test Instruments



#### List of test instrument :

Manufacturer	Device	Model	Input Impedance
HP	Dynamic Signal Analyzer	HP35660A	50
HP	Signal Generator 50 MHz	HP8116A	50
Farnell	Modulation Meter	AMM2000	---
HP	Close-Field Probe 30M~1GHz	11940A	---

### 3.3 Frequency Response of Audio Modulation Circuit Measurement

#### Condition & Setup

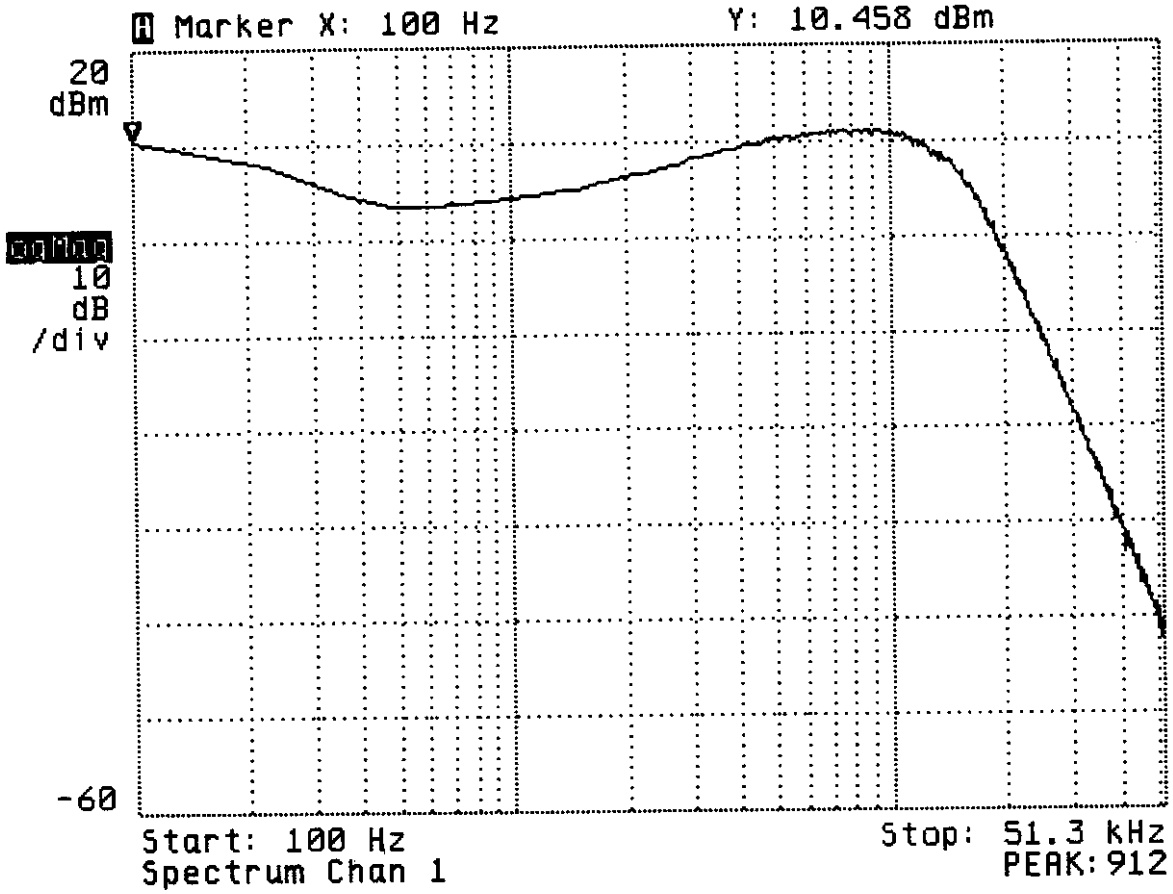
##### 2.987 ( a )

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 audio input circuit/microphone of the EUT.
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 dBVrms relative to 1kHz was then measured, using the HP 35660A Dynamic Signal Analyzer as follow page that have no page number.

Center: 25.7 kHz  
Span: 51.2 kHz  
Resolution: 100 Hz

Span: 51.2 kHz  
Rec Lg: 7.812 ms

Meas



Frequency Response of Audio Modulation Circuit Measurement

### ***3.4 Frequency Response of Audio Low Pass Filter Measurement Condition & Setup***

1. The measurement condition and setup as Section 3.3 .
2. With input levels held constant and below limiting at all frequencies , the generator was varied from 1KHz to 102.5 KHz.
3. The response in dBVrms relative to 1KHz was then measured, using the HP 35660A Dynamic Signal Analyzer as follow page that have no page number.

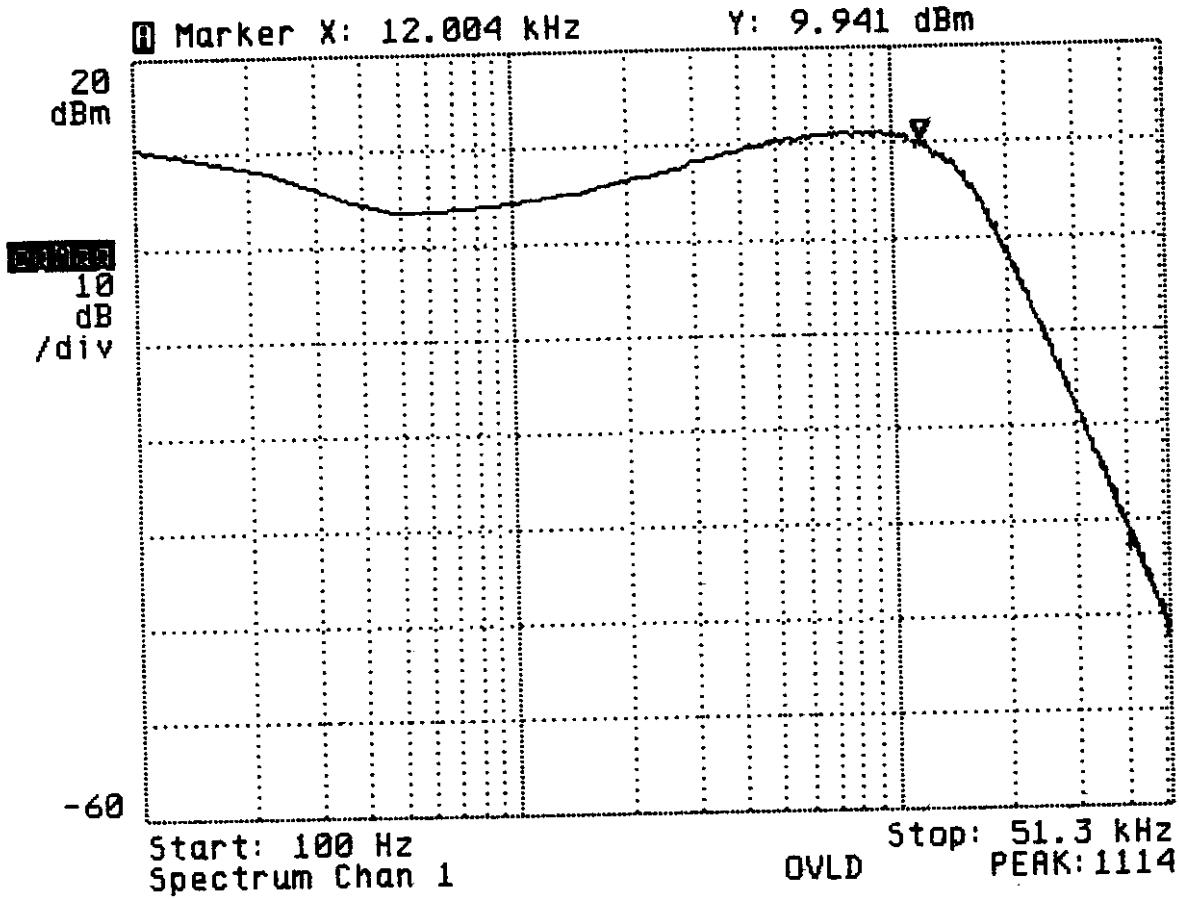
### ***3.5 Modulation Limiting Measurement Condition & Setup***

1. The signal generator was connected to the input of the EU1 as for “Frequency Response of the Modulating Circuit”.
2. The modulation response was measured for each of three frequencies : 100Hz, 3.940KHz and 12.004KHz.
3. The input level was varied from 30% modulation to at least 20 dB 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

Center: 25.7 kHz  
Span: 100 Hz

Span: 51.2 kHz  
Rec Lg: 7.812 ms

Meas



Frequency Response of Audio Low Pass Filter Measurement

Chart 3.1 Modulation Limiting Measurement Negative

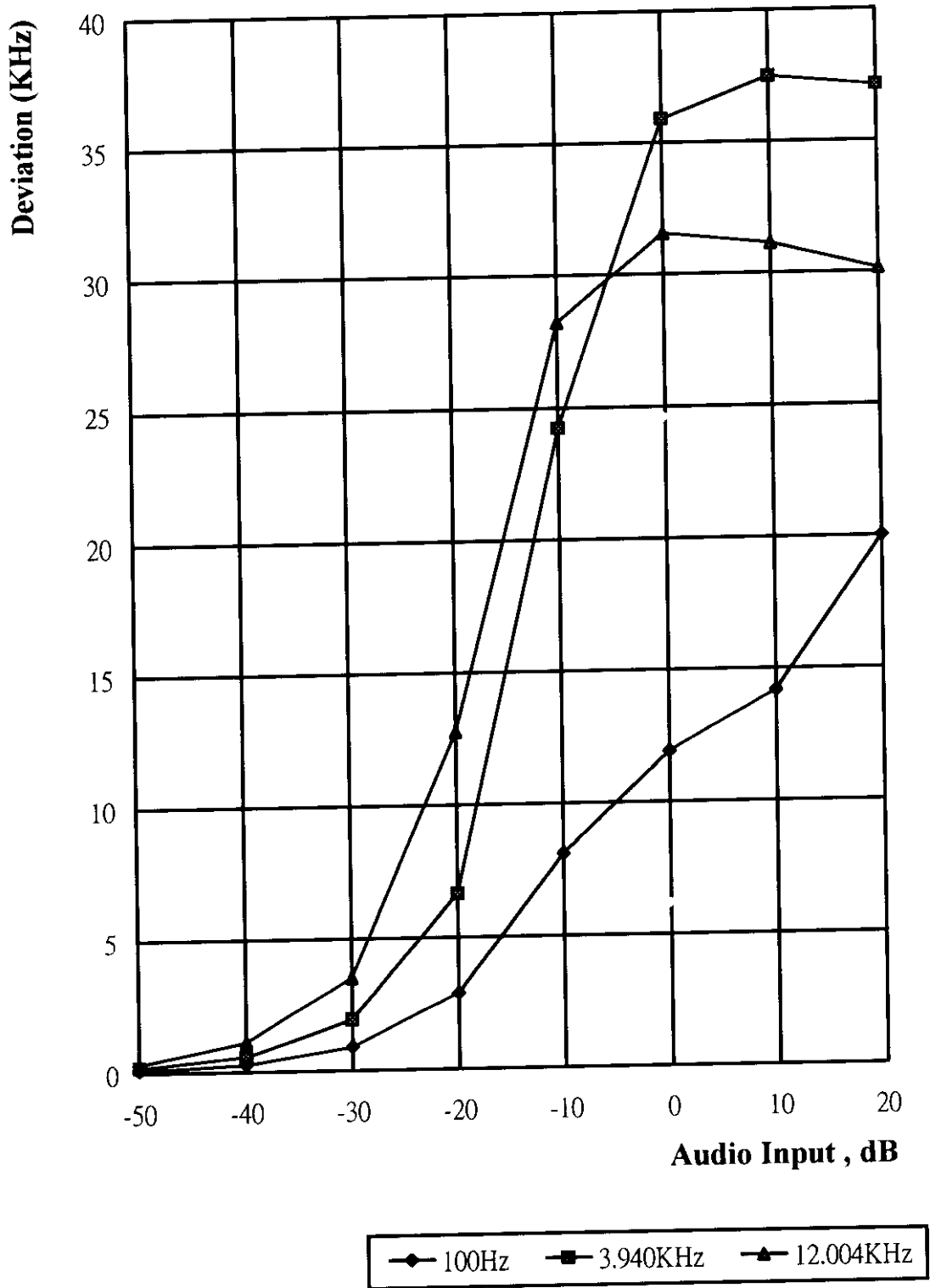
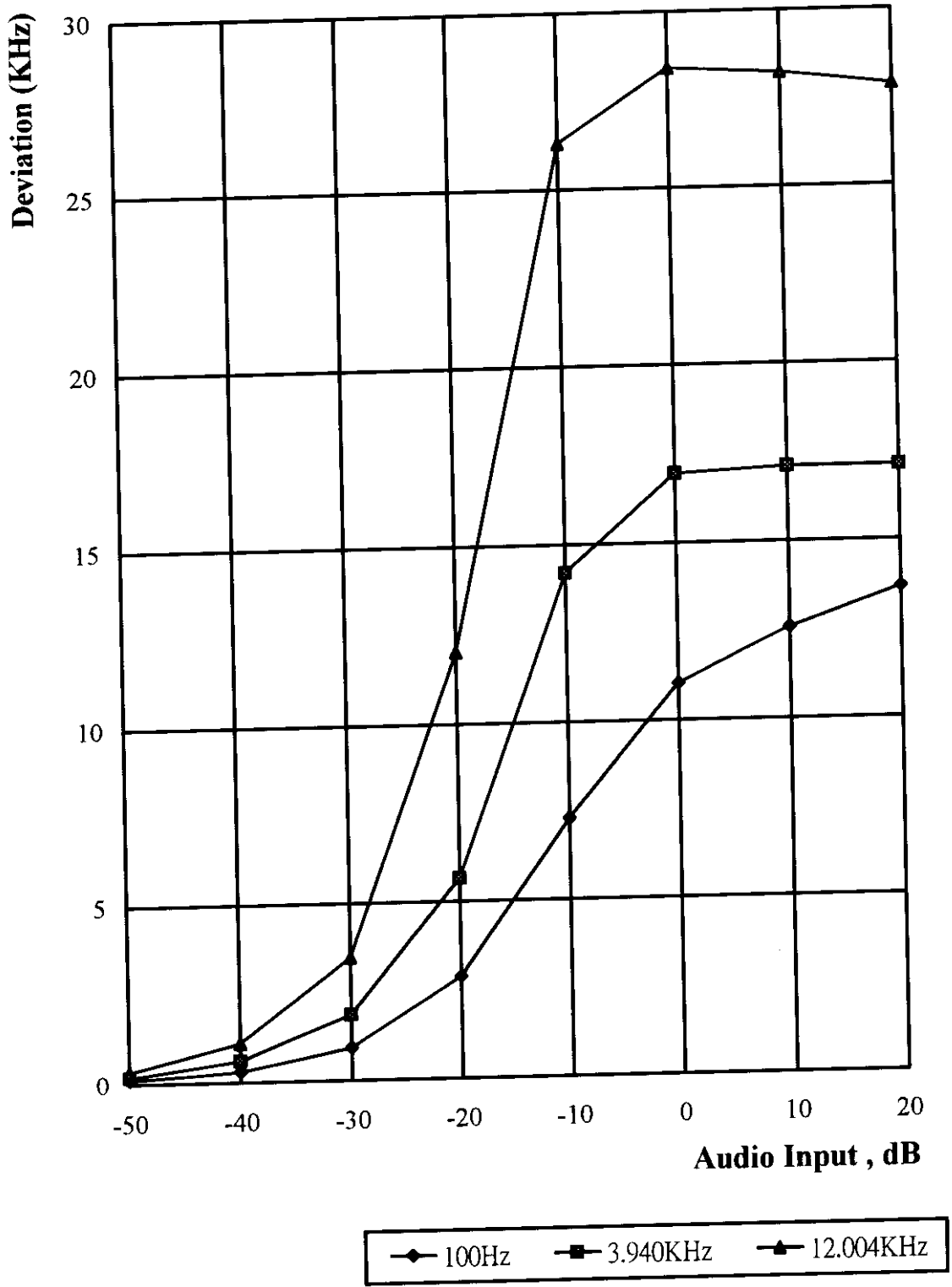


Chart 3.2 Modulation Limiting Measurement Positive





## Chart 4 Occupied Bandwidth Measurement

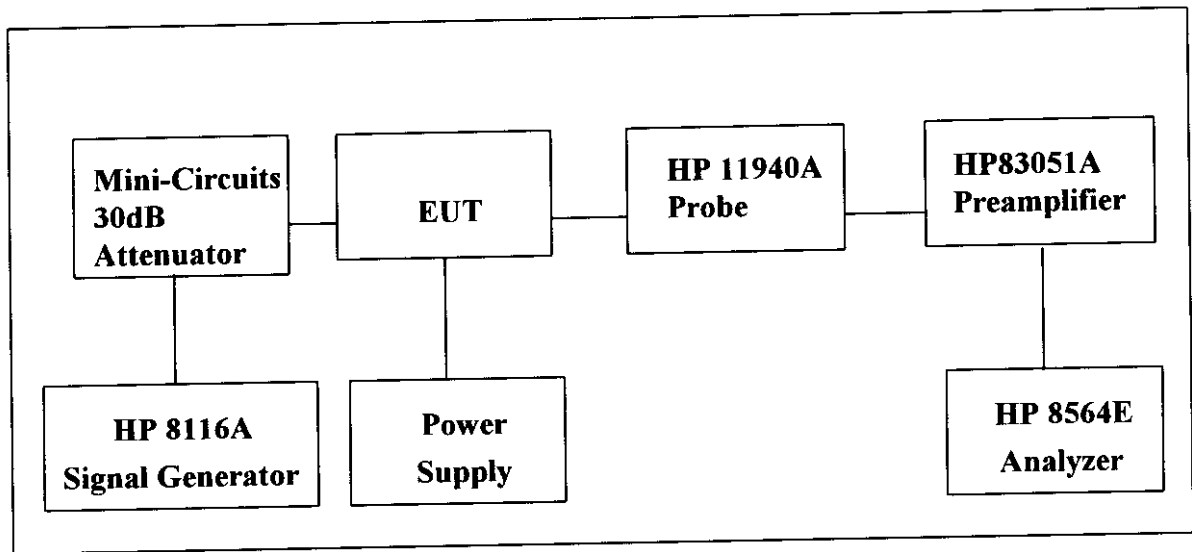
### 4.1 Rules and Specification Limits

2.989 .

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 200 KHz.

### 4.2 Test Configuration & List of Test Instruments



#### List of test Instrument :

Instrument name	Model No.	Brand	Serial No.
Spectrum analyzer (9K~40GHz)	8564E	HP	
Preamplifier (45M~50GHz)	83051A	HP	VS36433002
Close-Field Probe 30M~1GHz	11940A	HP	----

### **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 100 Hz, 3. 940KHz and 12.004KHz. 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 two pages.

### **4.4 Measurement Result**

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

Calculation of Necessary Bandwidth ( Bn )

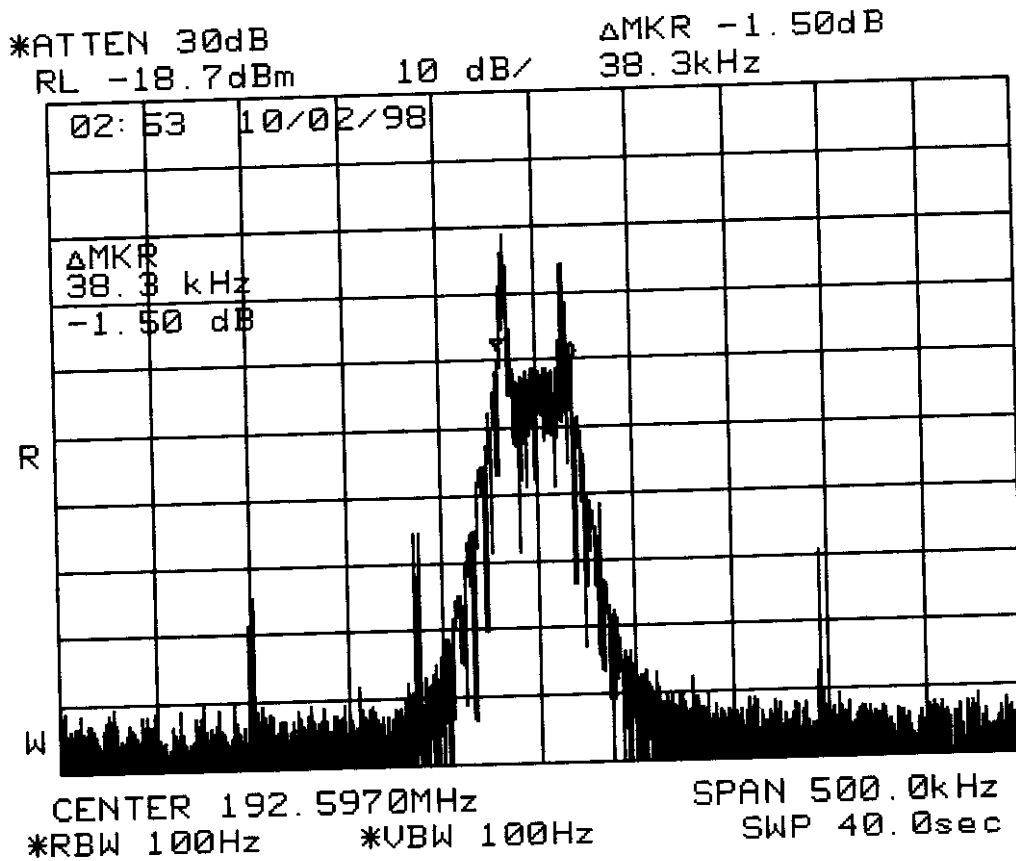
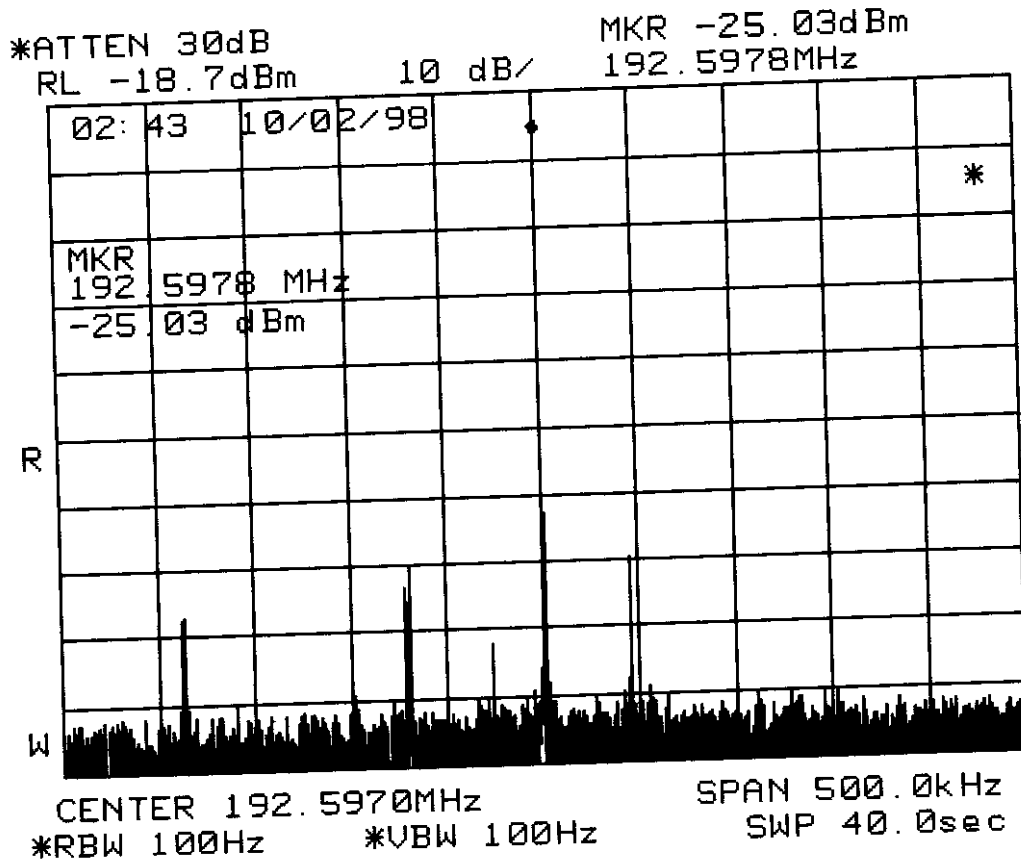
$$B_n = 2M + 2D$$

$$M = \text{Max. Modulation Frequency} = 12.004 \text{ KHz}$$

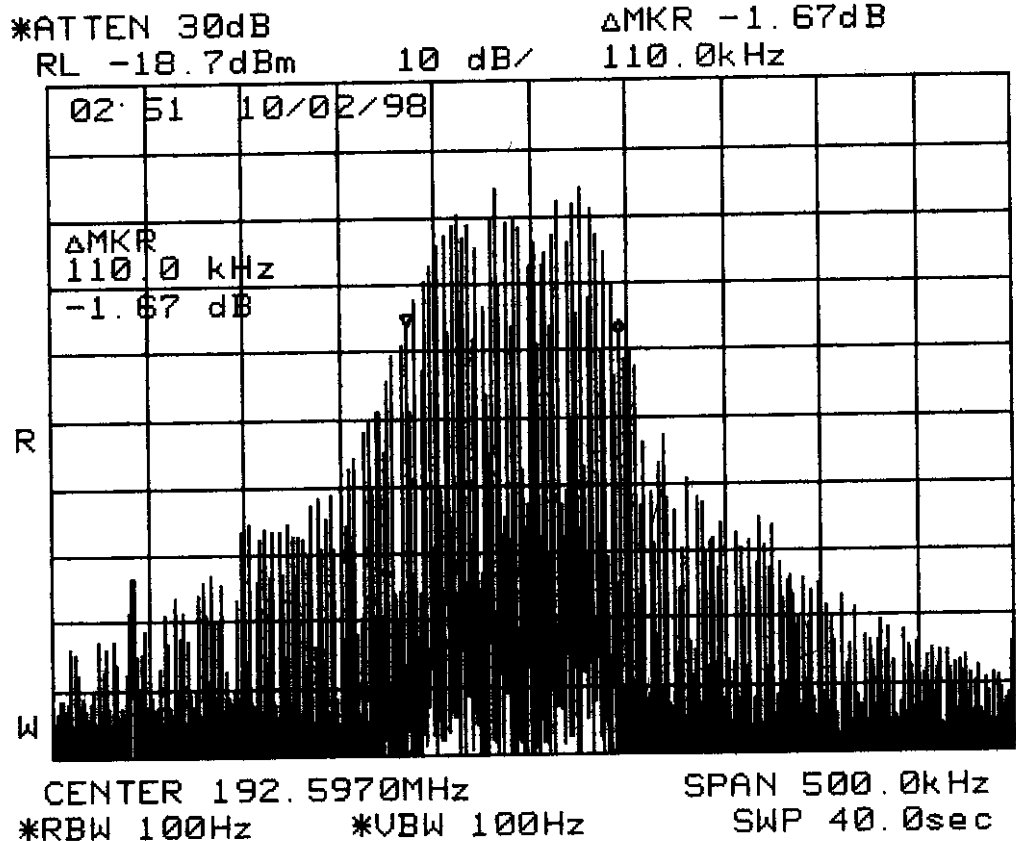
$$D = \text{Peak Frequency Deviation} = 37.530 \text{ KHz} \quad (\text{Chart 3-1})$$

$$K = 1$$

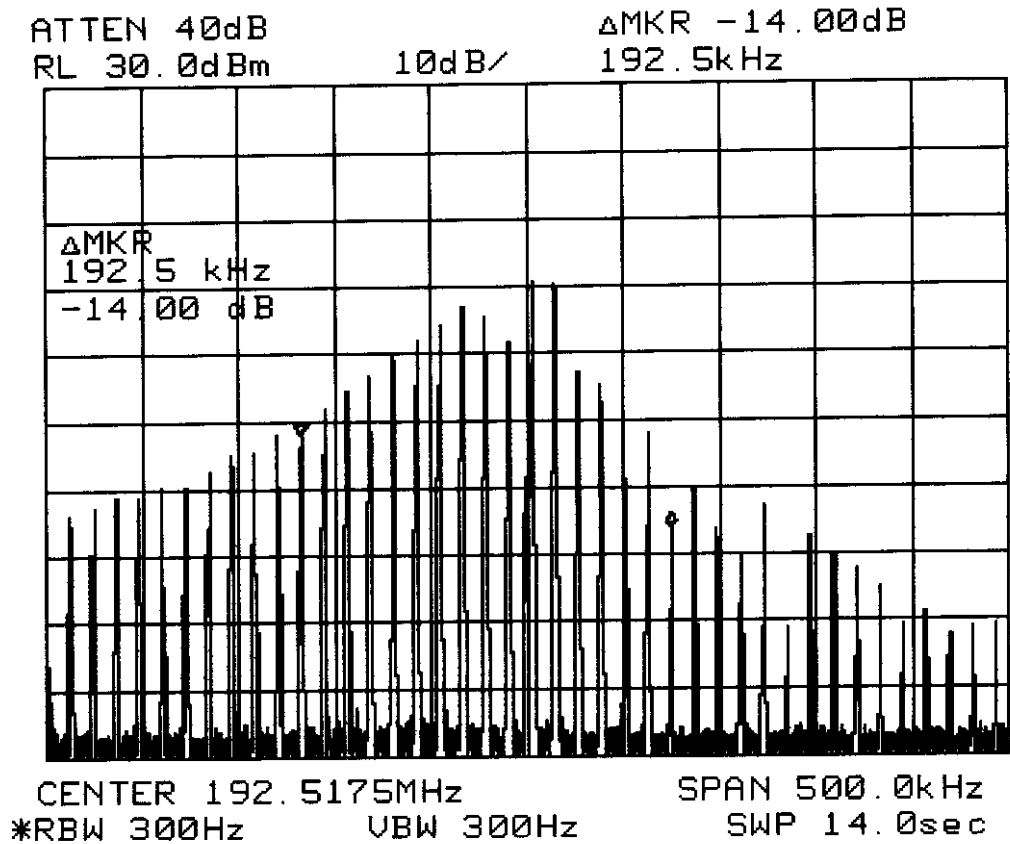
$$B_n = 99.068 \text{ KHz}$$



100Hz



3.94 kHz



12.004 kHz

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

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

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

**2.997 :** 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 :** Prior to the final test (OATS test) ,the EUT is placed in a shielded enclosure, GTEM, 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, open-field** test site. The EUT is placed on a nonconductive table which is 0.8 m 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 EMCO whole range Antenna is used to measure frequency from 30 MHz to 18 GHz. The final test is used the spectrum HP 8591A & HP 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 data will be rechecked by the tester and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from GTEM will be taken as the final data.

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

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

$FI_a$  : Actual Field Intensity

$FI_r$  : Reading of the Field Intensity

$AF$  : Antenna Factor

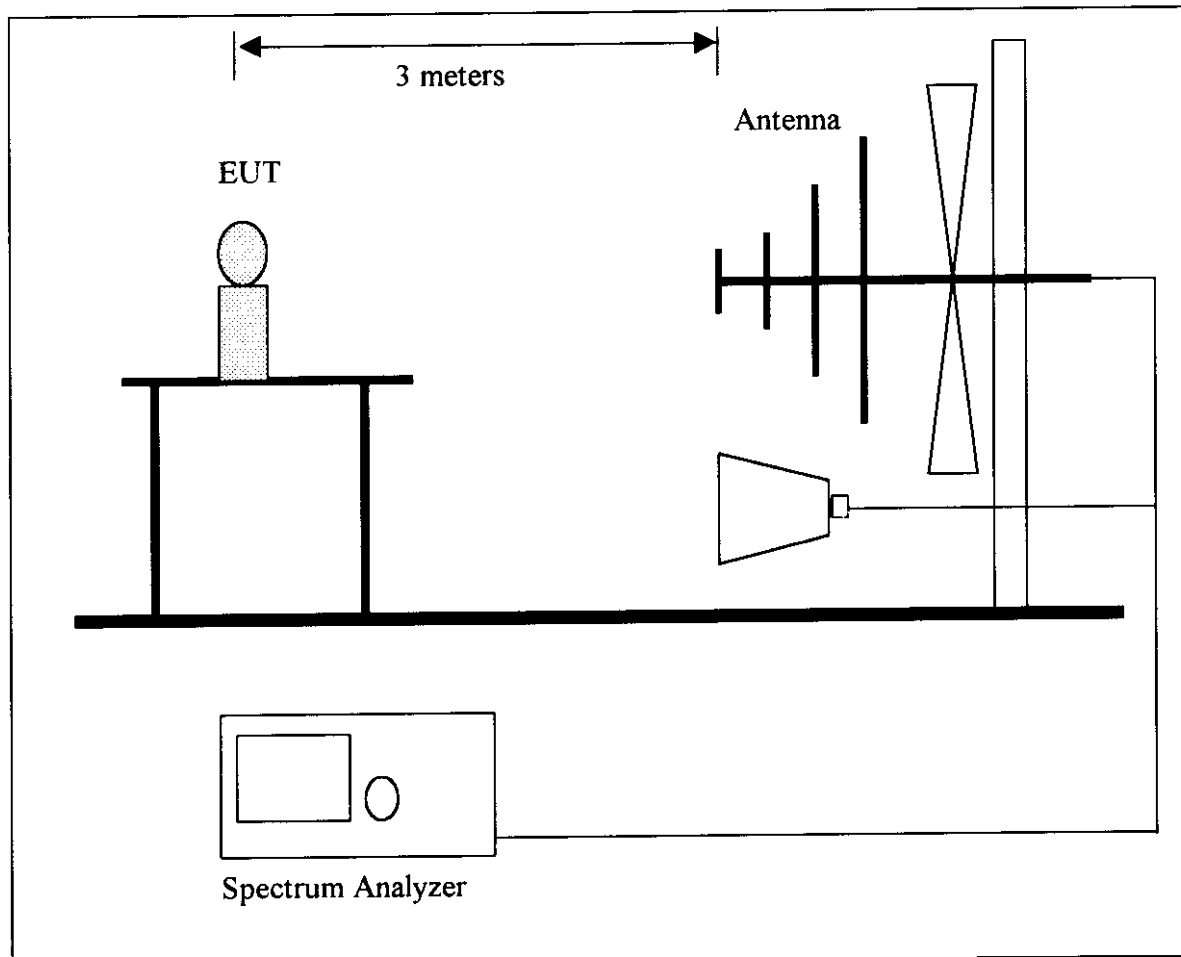
$CL$  : Cable Loss

**5.3 List of Measurement Instruments**

Instrument name	Model No.	Brand	Serial No.	Calibration Date	
				Last	Next
Spectrum analyzer	8568B	H P	3004A18617	05/15/98	05/15/99
Quasi-peak Adapter	85650A	H P	2521A00984	05/15/98	05/15/99
RF Pre-selector	85685A	H P	2947A01011	05/15/98	05/15/99
Spectrum analyzer	8591A	H P	2919A00263	01/07/98	01/07/99
Spectrum analyzer	8564E	H P	US36433002	08/09/98	08/09/99
Antenna(30M-2G Hz)	3142	EMCO	1296	06/10/98	06/10/99
Antenna(1G-18G Hz)	3142	EMCO	5178	08/09/98	08/09/99
Open test side(Antenna, Amplify, cable calibrated together)				05/15/98	05/15/99

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

**5.4 Measurement Configuration**



**5.5 Measurement Result : (Horizontal for 30 MHz ~ 1 GHz)**

Test Conditions:

Testing room : Temperature : 22 °C                      Humidity : 71 % RH  
 Testing site : Temperature : 28 °C                      Humidity : 80 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	limit	Margin
MHz	dBuV	m	degree	dB/m	dBuV/m	dBuV/m	dB

181.450	46.84	1.00	23	-21.75	25.09	82.23	-57.14
240.750	48.62	1.00	270	-19.16	29.46	82.23	-50.30
288.900	48.32	1.00	199	-16.39	31.93	82.23	-48.29
385.200	47.40	1.00	109	-13.46	33.94	82.23	-48.29
577.800	22.89	1.00	56	-12.27	33.94	82.23	-48.29
770.390	23.95	1.00	165	-12.34	10.62	82.23	-71.61
818.550	23.88	1.00	136	-12.50	11.61	82.23	-70.62
914.840	25.51	1.00	219	-14.51	11.38	82.23	-70.85
962.990	26.97	1.00	102	-15.60	11.00	82.23	-71.23
***							

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 factor = 15.5 + (-15.26) = 0.24 dB/m )
4. Attenuation required = 43 + 10 log ( 0.094 mW ) = 2.73  
 Limit = 84.96 - 2.73 = 82.23

**Measurement Result : (Horizontal for 1 GHz ~ 18 GHz)**

Radiated Emission				Correction Factors ( dB )	Corrected Amplitude (dBuV/m)	FCC Class B ( 3 M )	
Frequency (GHz)	Amplitude (dBuV/m)	Ant. H. (cm)	Table ( ° )			Limit (dBuV/m)	Margin (dB)
1.010	38.12	100.00	219	-8.67	29.45	54	-24.55
1.057	35.62	100.00	14	-8.67	26.95	54	-27.05
1.107	31.29	100.00	220	-8.67	22.62	54	-31.38
1.203	31.95	100.00	339	-8.67	23.28	54	-30.72
1.253	34.79	100.00	141	-8.67	26.12	54	-27.88
1.300	31.95	100.00	113	-8.67	23.28	54	-30.72
1.347	37.95	100.00	261	-8.67	29.28	54	-24.72
1.397	35.95	100.00	41	-8.67	27.28	54	-26.72
1.443	38.29	100.00	160	-8.67	29.62	54	-24.38
1.493	35.62	100.00	99	-8.67	26.95	54	-27.05
1.590	33.12	100.00	131	-8.67	24.45	54	-29.55
1.637	35.29	100.00	120	-8.67	26.62	54	-27.38
1.683	35.95	100.00	59	-8.67	27.28	54	-26.72
1.807	38.62	100.00	241	-8.67	29.95	54	-24.05
1.820	35.95	100.00	137	-8.67	27.28	54	-26.72
***							

Note:

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



**Radiated Emission Test Result : (Vertical for 30 MHz ~ 1 GHz)**

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	limit	Margin
MHz	dBuV	m	degree	dB/m	dBuV/m	dBuV/m	dB

181.450	50.69	1.00	10	-21.75	28.94	82.23	-53.29
240.750	63.30	1.00	280	-19.16	41.86	82.23	-31.01
288.900	58.25	1.00	204	-16.39	51.22	82.23	-31.01
385.200	64.68	1.00	140	-13.46	51.22	82.23	-31.01
577.800	27.52	1.00	258	-12.27	15.25	82.23	-66.98
770.390	30.65	1.00	130	-12.34	18.31	82.23	-63.92
818.550	33.71	1.00	200	-12.50	21.21	82.23	-61.02
914.840	29.13	1.00	83	-14.51	14.62	82.23	-67.61
962.990	29.40	1.00	162	-15.60	13.80	82.23	-68.43
***							

**Radiated Emission Test Result : (Vertical for 1G Hz ~ 18 GHz)**

Radiated Emission				Correction Factors ( dB )	Corrected Amplitude (dBuV/m)	FCC Class B ( 3 M )	
Frequency (GHz)	Amplitude (dBuV/m)	Ant.H. (cm)	Table ( ° )			Limit (dBuV/m)	Margin (dB)
1.010	38.12	100.00	219	-8.67	36.78	54	-17.22
1.057	35.62	100.00	14	-8.67	36.95	54	-17.05
1.107	31.29	100.00	220	-8.67	32.12	54	-21.88
1.153	31.95	100.00	339	-8.67	34.78	54	-19.22
1.183	34.79	100.00	141	-8.67	30.45	54	-23.55
1.190	31.95	100.00	113	-8.67	31.78	54	-22.22
1.203	37.95	100.00	261	-8.67	34.45	54	-19.55
1.253	35.95	100.00	41	-8.67	39.78	54	-14.22
1.300	38.29	100.00	160	-8.67	38.28	54	-15.72
1.347	35.62	100.00	99	-8.67	43.78	54	-10.22
1.397	33.12	100.00	131	-8.67	43.45	54	-10.55
1.443	35.29	100.00	120	-8.67	40.62	54	-13.38
1.493	35.95	100.00	59	-8.67	30.78	54	-23.22
1.590	38.62	100.00	241	-8.67	32.62	54	-21.38
1.637	35.95	100.00	137	-8.67	37.95	54	-16.05
1.683	35.95	100.00	59	-8.67	36.95	54	-23.22
1.807	38.62	100.00	241	-8.67	33.45	54	-21.38
1.820	35.95	100.00	137	-8.67	40.12	54	-16.05
***							

## **Chart 6 Frequency Stability Tolerance Measurement**

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

2.995

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

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

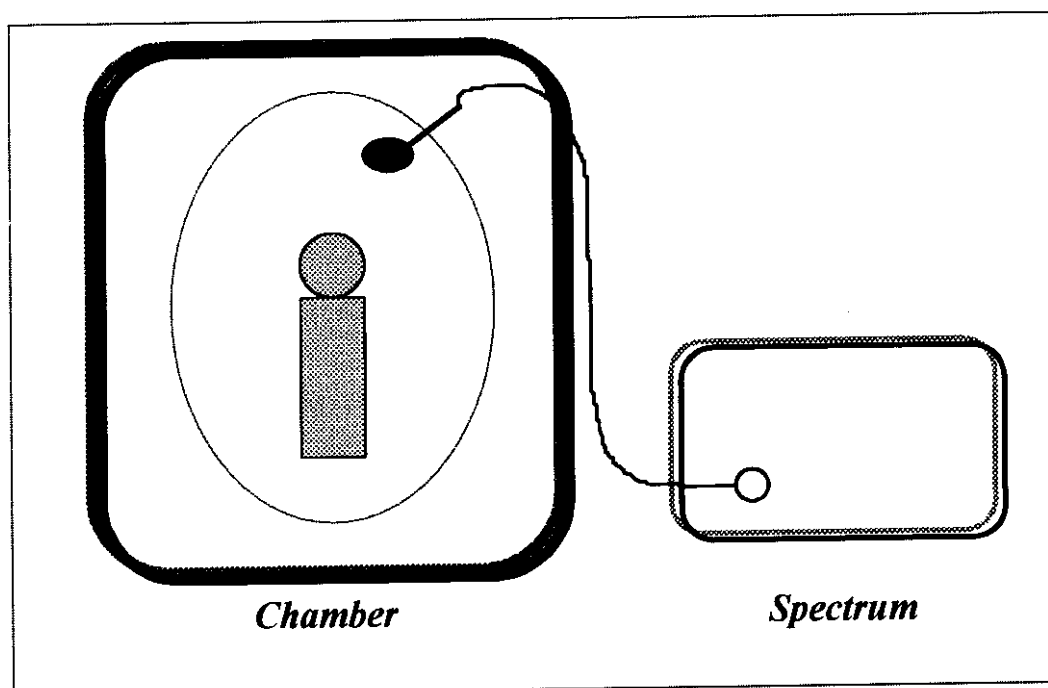
1. Place the EUT in the chamber, powered in its normal operation.
2. Set the temperature of the chamber -30 degree Centigrade. Allow the equipment to stabilize at that temperature.
3. Measured the carrier frequency using preamplifier and frequency counter.
4. Repeated procedures 1 to 3 from -20 to 50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

### **6.4 Measurement Configuration of Temperature variation test :**



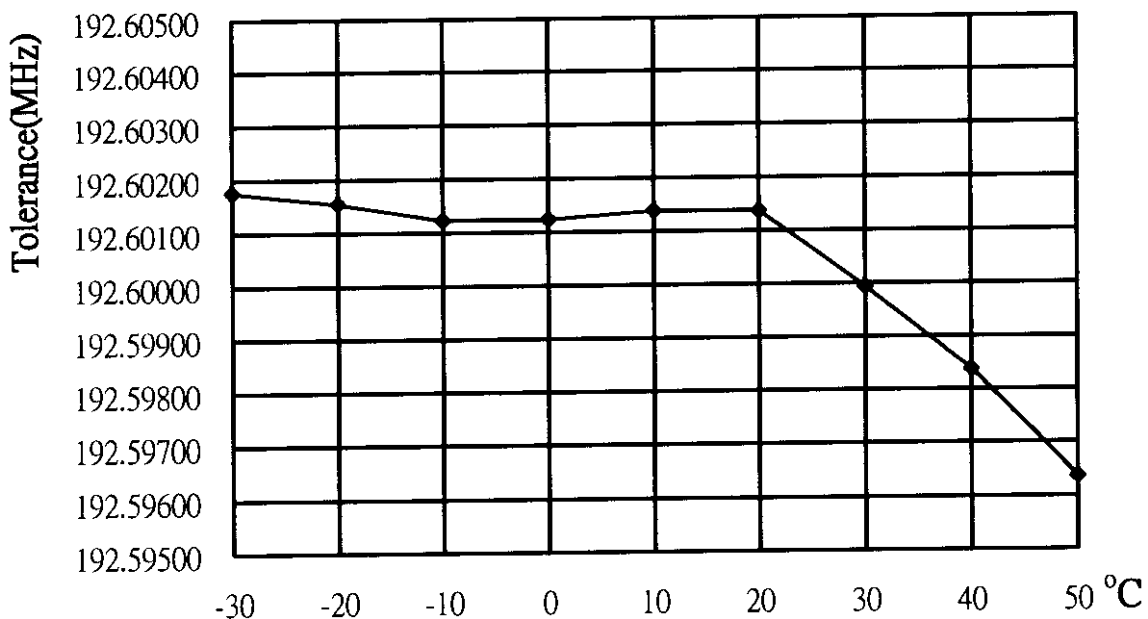
### 6.5 Measurement Result with Temperature Variation

A plot and table is presented which illustrates compliance with the rule where the center frequency is 192.600 MHz.

Temperature Variation Table

Temperature ( Centigrade )	Frequency ( MHz )	Tolerance ( MHz )
-30	192.60176	192.59037~192.60963
-20	192.60155	192.59037~192.60963
-10	192.60123	192.59037~192.60963
0	192.60124	192.59037~192.60963
10	192.60139	192.59037~192.60963
20	192.60137	192.59037~192.60963
30	192.59993	192.59037~192.60963
40	192.59837	192.59037~192.60963
50	192.59637	192.59037~192.60963

Temperatuer Variation Vs. Frequency Chart



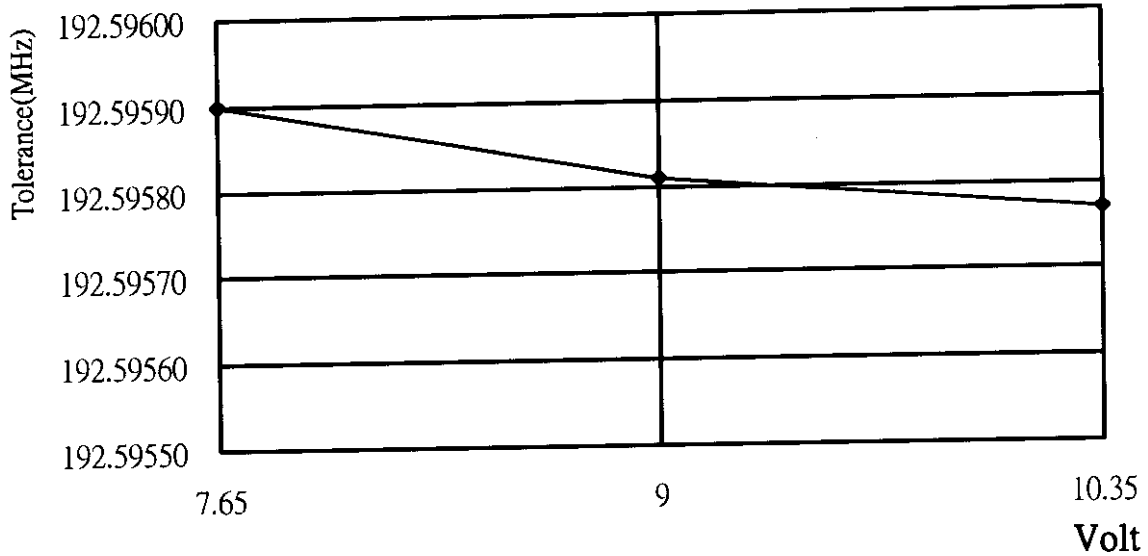


**6.9 Measurement Result with Voltage Variation**

Frequency Stability of Voltage Variation Measurement Table

Supply Voltage ( Volt )	Frequency ( MHz )	Tolerance ( MHz )
7.65 ( 85% )	192.59590	192.59037~192.60963
9.00 ( 100% )	192.59581	192.59037~192.60963
10.35 ( 115% )	192.59577	192.59037~192.60963
Endpoint-Voltage : 6.00 V		

**Voltage Variation Vs. Frequency Chart**



To: Frank Tsai, Training Research Co., Ltd.  
From: Joe Dichoso  
jdichoso@fcc.gov  
FCC Application Processing Branch

Re: FCC ID JEBHH-03M

Applicant: Wa Gol Industrial Co Ltd  
Correspondence Reference Number: 4924  
731 Confirmation Number: EA92275  
Date of Original E-Mail: 12/2/98

Subject: wireless microphone

- 1) Calculate the output power using  $ERP=(E*d)^2/49.2$ .
- 2) Submit a occupied bandwidth plot with the device at maximum modulation 12 kHz. Show the undmodulated carrier on the same plot for reference.

The items indicated above must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 60 days of the original e-mail date may result in application dismissal pursuant to Section 2.917(c) and forfeiture of the filing fee pursuant to Section 1.1106

DO NOT Reply to this email by using the Reply button. In order for your response to be processed expeditiously, you must upload your response via the Internet at [www.fcc.gov](http://www.fcc.gov), Electronic Filing, OET Equipment Authorization Electronic Filing. If the response is submitted through Add Attachments, a message which informs the processing staff that a new exhibit has been submitted must also be submitted via Submit Correspondence. Also, please note that partial responses increase processing time and should not be submitted.

Any questions about the content of this correspondence should be directed to the e-mail address listed below the name of the sender.

1/3

**TRC Training Research Co., Ltd.**

**Address: 5F., NO. 571, CHUNG HSIAO E. RD., SEC. 7,  
TAIPEI, TAIWAN.**

**TEL:886-2-27881332**

**FAX:886-2-27857408**

**TO: FCC**

**FROM: Mr. Jack Tsai**

**ATTN: Mr. Jos Dichoso**

**DATE: DEC. 17, 1998**

**Total Page: 8 (Included this page)**

**Subject : Reply FCC message for Reference Number: 5002.**

**Reference FCC ID: JEBHH-03M**

**Applicant: Wa-Gol industrial Co Ltd.**

**Dear Mr. Jos,**

**Firstly, thank your instruction.**

**We correct page 7, 9, 21, 23 of report and FCC form 731 according to your  
messaged.**

**We tested occupied bandwidth of maximum modulation 12KHz and  
unmodulated.**

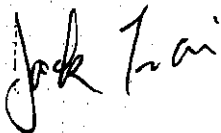
**So we change rated RF power output of FCC Form 731 for 0.0576 mW  
(According to page 9 of report.)**

**The following page for your required information.**

**Please check it.**

**If any question regarding this application, please tell me.**

**Best regards,**





2/3

FEDERAL COMMUNICATIONS COMMISSION  
Equipment Authorization Division, Applications Processing Branch  
7435 Oakland Mills Road, Columbia, MD 21046  
Telephone: (301) 362-3000, Facsimile: (301) 344-2050

Date: December 7, 1998 10:01 am

From: Joe Dichoso

Telephone: (301) 362-3024

To: Frank Tsai

Organization: Training Research Co., Ltd.

Telephone: 886227881332

Facsimile: 886227857408

This cover sheet is page 1 of \_\_\_\_\_. Please direct inquiries to the sender at the above extension.

Reference FCC ID: JEBHH-03M

Applicant: Wa Gol Industrial Co Ltd

The items indicated below must be submitted before processing can continue on the above referenced application. Failure to provide the requested information within 60 days may result in application dismissal pursuant to Section 2.917(c) and forfeiture of the filing fee pursuant to Section 1.1108.

- 1) Calculate the output power using  $ERP = (E \cdot d)^2 / 49.2$ .
- 2) Submit a occupied bandwidth plot with the device at maximum modulation 12 kHz. Show the unmodulated carrier on the same plot for reference.

Replies to this letter MUST contain the Reference Number: 5002

318

**SECTION IV - Enter FCC ID from Page 1, Section I** ▶ JEBHH-UJM

(a) Instead of Applicant, FCC is authorized to mail original Grant to: (See instructions)

Firm name, number, street, City, State/Country, ZIP/Postal Code  
**Training Research Co., Ltd.**  
**P. O. BOX 4-18, Nankang, Taipei, Taiwan.**

(b) Name, Title and Mail Stop, if any, of person at above address to receive Grant: (If 1.(a) is completed, this item must be completed)  
**Frank Tsai**

(a) Technical contact: Firm name, contact person, number, street, City, State/Country, ZIP/Postal Code <b>Jack Tsai</b>	(b) Telephone No. (Area/Country/City code, No. and Ext.) <b>886227881332</b>
	(c) FAX No. (Area/Country/City code and No.) <b>886227857408</b>

(d) Internet e-mail address:

(a) Non-Technical contact: Firm name, contact person, number, street, City, State/Country, ZIP/Postal Code <b>Grace Tsai</b>	(f) Telephone No. (Area/Country/City code, No. and Ext.) <b>886227881332</b>
	(g) FAX No. (Area/Country/City code and No.) <b>886227857408</b>

(h) Internet e-mail address:

3. Does this application include a request for confidentiality for any portion(s) of the data contained in this application pursuant to 47 CFR §0.439 of the Commission's Rules? If "Yes" see instructions.  Yes  No

4. Does the applicant request that the Commission defer grant of this application pursuant to 47 CFR §0.457(d)(1)(B)? (See instructions)  Yes  No

5. Type of equipment authorization requested: (check one box only)  Certification  Type Acceptance  Notification

3.(a) Equipment Code and description: (See instructions, page 4)    **Wireless Microphone**

(b) Equipment will be operated under FCC Rule Part(s): **74**

7. Application is for: (Check one box only)

<input checked="" type="checkbox"/> 1. Original equipment! (See instructions)	<input type="checkbox"/> 2. Change in identification of presently authorized equipment	<input type="checkbox"/> 3. Class II permissive change or modification of presently authorized equipment (See instructions)
---	--	---

ORIGINAL FCC ID: \_\_\_\_\_ Grant date: \_\_\_\_\_

8. EQUIPMENT SPECIFICATIONS: (See instructions)

(a) Frequency range in MHz	(b) Rated RF power output in watts	(c) Frequency tolerance % Hz ppm	(d) Emission designator (See 47 CFR §2.201 and §2.202)	(e) Microprocessor model number
174-216 MHz	0.057mW	+/-0.005%	99K06F3E	N/A

9. Is the equipment in this application:

(a) a composite device subject to more than one type of equipment authorization?  Yes  No

(b) part of a system that operates with, or is marketed with, another device that requires an equipment authorization?  Yes  No

If either of the above questions is answered "Yes" complete items 18.(a) and (b). (See instructions)

4/3

**Chapter 2 Power Output Measurement****2.1 Rules and Specification Limits**

2.985

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 W.

**2.2 Test condition and setup :**

1. Measurement was made on open-field test site. 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 ECO 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 biconical antenna.
3. The following procedures were used to convert the emissio.. levels measured in decibels referenced to 1 microvolt (dBuV) into field intensity in Watt.
  - (1) The actual field intensity in decibels referenced to 1 micro volt per meter ( dBuV/m ) is determined by algebraically adding the measured reading in dBuV, the antenna factor (dB), and cable loss (dB) at the appropriate frequency.

$$FI_a(\text{dBuV/m}) = FI_r(\text{dBuV}) + \text{Corrected (dB)}$$

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

$FI_a$  : Actual Field Intensity

$FI_r$  : Reading of the Field Intensity

AF : Antenna Factor

CL : Cable Loss

- (2) The field intensity in Volt can then be determined by the following equation:

$$FI(\text{Volt}) = 10^{FI(\text{dBuV/m}) / 20} \times 10^{-6}$$

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 )

**Test Report**

9/28

5/8

**2.5 Measurement Result**

$$\begin{aligned}\text{Corrected (dB)} &= \text{AF(dB)} + \text{CL(dB)} \\ &= -21.13 \text{ dB/m}\end{aligned}$$

$$\begin{aligned}\text{FI}_s(\text{dBuV/m}) &= \text{FI}_r(\text{dBuV}) + \text{Corrected (dB)} \\ &= 106.09 - 21.13 = 84.96 \text{ dBuV/m}\end{aligned}$$

The maximum field measured is 84.96 dBuV/m .

$$\text{FI ( Volt )} = 10^{84.96/20} \times 10^{-6} = 0.01770 \text{ V}$$

$$\text{FI ( mW )} = (0.01770 \times 3)^2 / 49.2 = 0.057 \text{ mW}$$

**Test Report**

21/28

**5.5 Measurement Result : (Horizontal for 30 MHz ~ 1 GHz)****Test Conditions:**

Testing room : Temperature : 22 °C

Humidity : 71 % RH

Testing site : Temperature : 28 °C

Humidity : 80 % RH

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	limit	Margin
MHz	dBuV	m	degree	dB/m	dBuV/m	dBuV/m	dB

181.450	46.84	1.00	23	-21.75	25.09	84.38	-59.29
240.750	48.62	1.00	270	-19.16	29.46	84.38	-54.92
288.900	48.32	1.00	199	-16.39	31.93	84.38	-52.45
385.200	47.40	1.00	109	-13.46	33.94	84.38	-50.44
577.800	22.89	1.00	56	-12.27	10.62	84.38	-73.76
770.390	23.95	1.00	165	-12.34	11.61	84.38	-72.77
818.550	23.88	1.00	136	-12.50	11.38	84.38	-73.00
914.840	25.51	1.00	219	-14.51	11.00	84.38	-73.38
962.990	26.97	1.00	102	-15.60	11.37	84.38	-73.01
***							

**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 factor = 15.5 + (-15.26) = 0.24 dB/m )
4. Attenuation required =  $43 + 10 \log ( 0.057 \text{ mW} ) = 0.58$   
Limit =  $84.96 - 0.58 = 84.38$

**Test Report**

23/28

7/B

**Radiated Emission Test Result : (Vertical for 30 MHz ~ 1 GHz)**

Frequency	Reading Amplitude	Ant. Height	Table	Correction Factors	Corrected Amplitude	limit	Margin
MHz	dBuV	m	degree	dB/m	dBuV/m	dBuV/m	dB

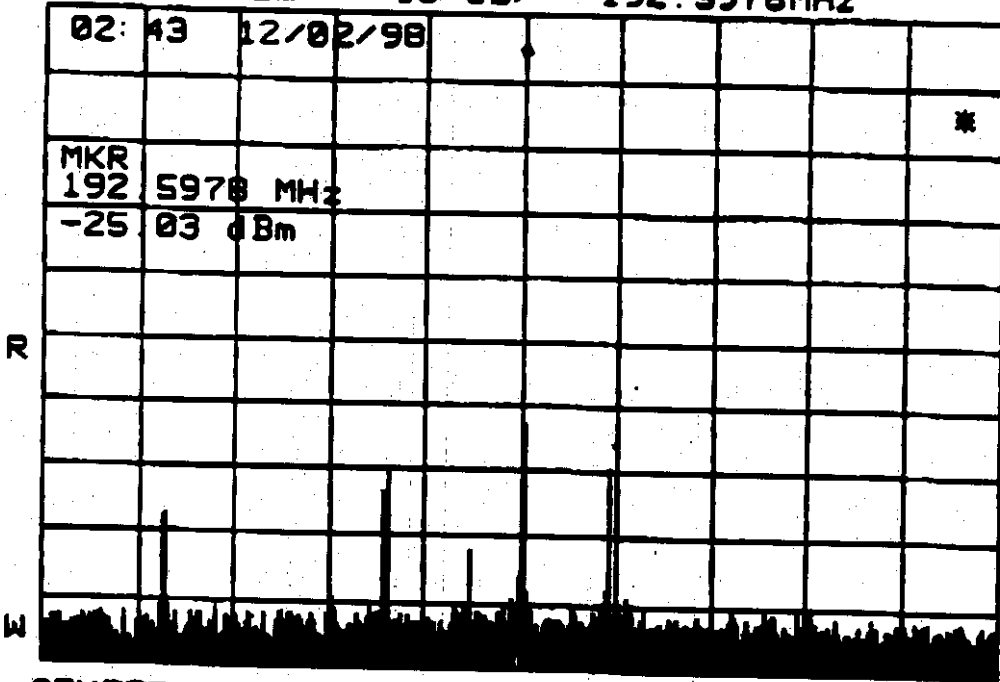
181.450	50.69	1.00	10	-21.75	28.94	84.38	-55.44
240.750	63.30	1.00	280	-19.16	44.14	84.38	-40.24
288.900	58.25	1.00	204	-16.39	41.86	84.38	-42.52
385.200	64.68	1.00	140	-13.46	51.22	84.38	-33.16
577.800	27.52	1.00	258	-12.27	15.25	84.38	-69.13
770.390	30.65	1.00	130	-12.34	18.31	84.38	-66.07
818.550	33.71	1.00	200	-12.50	21.21	84.38	-63.17
914.840	29.13	1.00	83	-14.51	14.62	84.38	-69.76
962.990	29.40	1.00	162	-15.60	13.80	84.38	-70.58
***							

Report No.:MI274848, Wireless microphone transmitter, FCC Part 74 - Certification

Test date: 10/06/98, Training Research Co., Ltd., TEL:886-2-27881332, Fax:886-2-27857408

7/3

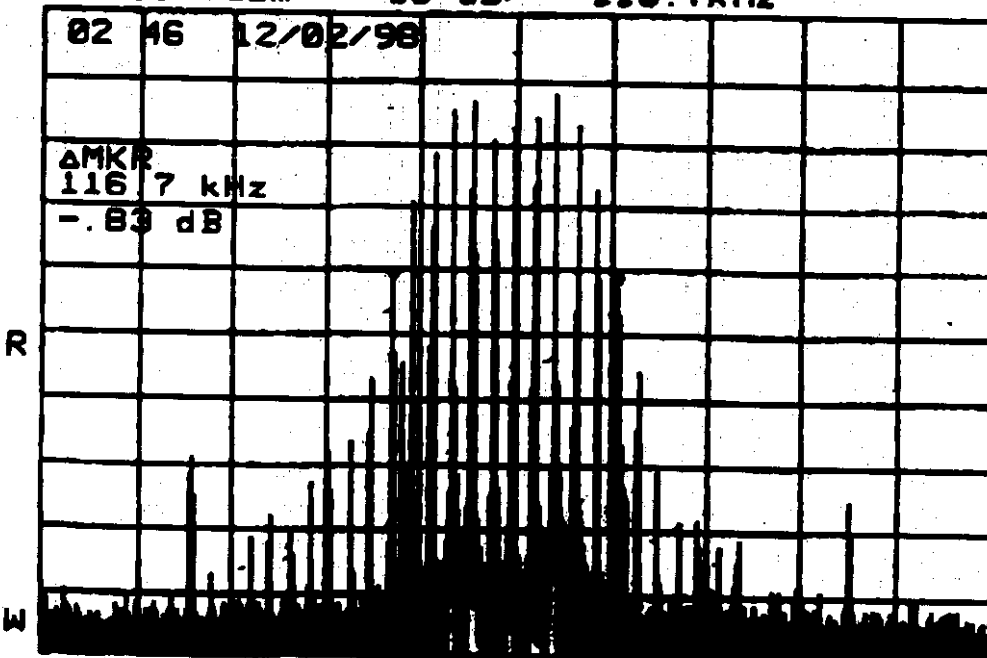
\*ATTEN 30dB  
RL -18.7dBm 10 dB/ MKR -25.03dBm  
192.5978MHz



Unmodulated

CENTER 192.5978MHz SPAN 500.0kHz  
\*RBW 100Hz \*VBW 100Hz SWP 40.0sec

\*ATTEN 30dB  
RL -18.7dBm 10 dB/ ΔMKR -.83dB  
116.7kHz



Maximum modulation  
at 12kHz

CENTER 192.5978MHz SPAN 500.0kHz  
\*RBW 100Hz \*VBW 100Hz SWP 40.0sec