

***FCC Part 74 Subpart H***  
***EMI TEST REPORT***

*of*

E.U.T. : Transmitter / Wireless  
Microphone

FCC ID. : JEBQT-20

MODEL : QT-20

Working Frequency : 174-216MHz

*for*

APPLICANT : WA GOL INDUSTRIAL CO., LTD.

ADDRESS : No. 85 Chang Hsing First Street, Tai-tzu Village,  
Jen-Te Hsian, Tainan Hsien, Taiwan, R.O.C.

Test Performed by

**ELECTRONICS TESTING CENTER, TAIWAN**

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Report Number : ET91R-06-083-03

## TEST REPORT CIRTIFICATION

Applicant : WA GOL INDUSTRIAL CO., LTD.  
No. 85 Chang Hsing First Street, Tai-tzu Village, Jen-Te Hsian,  
Tainan Hsien, Taiwan, R.O.C.

Manufacturer : WA GOL INDUSTRIAL CO., LTD.  
No. 85 Chang Hsing First Street, Tai-tzu Village, Jen-Te Hsian,  
Tainan Hsien, Taiwan, R.O.C.

Description of EUT :

- a) Type of EUT : Transmitter / Wireless Microphone
- b) Trade Name : MASCOT
- c) Model No. : QT-20
- d) FCC ID : JEBQT-20
- e) Working Frequency : 174-216MHz
- f) Power Supply : DC 3V Batteries

Regulation Applied : FCC Rules and Regulations Part 74 Subpart H (2001)

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Issued Date : Jul. 15, 2002

Test Engineer : Jeff Chuang  
( Jeff Chuang )

Approve & Authorized Signer : Will Yauo  
Will Yauo, Manager  
EMC Dept. II of ELECTRONICS  
TESTING CENTER, TAIWAN

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## 1. GENERAL INFORMATION

### 1.1 Product Description

a) Type of EUT	: Transmitter / Wireless Microphone
b) Trade Name	: MASCOT
c) Model No.	: QT-20
d) FCC ID	: JEBQT-20
e) Working Frequency	: 174-216MHz
f) Power Supply	: DC 3V Batteries

### 1.2 Characteristics of Device:

The EUT is a frequency modulation Transmitter / Wireless Microphone with following features :

Operation Frequency Range: 174MHz to 216MHz. Type of emission is 180KF3E for headset.

1. To adjust GT/MT Switch, and Gain Control, Simply push down both snap locks on the sides of battery cover and flip it backwards to expose the adjustment panel.
2. Before power on, ascertain if same channel was set up for both receiver and microphone. If not adjust to same channel accordingly.
3. The LED indicator flashes briefly when power on indicating normal battery status. If not flash occurs it has either no battery, the battery is drained or installed incorrectly. Change accordingly.
4. Plug the microphone connector into the input jack and tighten the connector screw by clockwise direction.

### 1.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4. and section 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, and 2.1055 of Part 2 of CFR 47

### 1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No. 34, Lin 5, Ding Fu Tsun, Linkou Hsiang, Taipei Hsien, Taiwan, R.O.C.

This site has been fully described in a report submitted to your office, and accepted in a letter dated Feb. 10, 2000.

## 2. REQUIREMENTS OF PROVISIONS

### 2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

### 2.2 Frequencies Available

According to sec. 74.802 of Part 74, the following frequencies are available for low power auxiliary station :

Frequencies (MHz)	
26.100-26.480	455.000-456.000
54.000-72.000	470.000-488.000
76.000-88.000	488.000-494.000
161.625-161.775	614.000-806.000
174.000-216.000	450.000-451.000
944.000-952.000	

### 2.3 Requirements for Radio Equipment on Certification

#### (1) RF Output Power

For transmitters, the power output shall be measured at the RF output terminals.

#### (2) Modulation Characteristics

For Voice Modulated Communication Equipment, a curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.

#### (3) Occupied Bandwidth

For radiotelephone transmitter, other than single sideband or independent sideband transmitter, when modulated by a 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

#### (4) Spurious Emissions at Antenna Terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

**(5) Field Strength of Spurious Emissions**

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

**(6) Frequencies Tolerance**

- a) The frequency stability shall be measured with variation of ambient temperature.
- b) The frequency stability shall be measured with variation of primary supply voltage.

**2.4 Labeling Requirement**

Each equipment for which a type acceptance application is filed on or after May 1,1981, shall bear an identification plate or label pursuant to § 2.925 ( Identification of equipment ) and § 2.926 (FCC identifier) .

### 3. OUTPUT POWER MEASUREMENT

#### 3.1 Provision Applicable

According to § 74.861(e)(1)(i), the output power shall not exceed 250 milliwatts.

#### 3.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power as measured in chapter 3.
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 100 kHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° , and record the highest value indicated on spectrum analyzer as reference value.
4. Repeat step 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.
6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1 GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on spectrum analyzer. Record this value for result calculated.
7. Repeat step 6 until all frequencies need to be measured were complete.
8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

Figure 2 : Frequencies measured below 1 GHz configuration

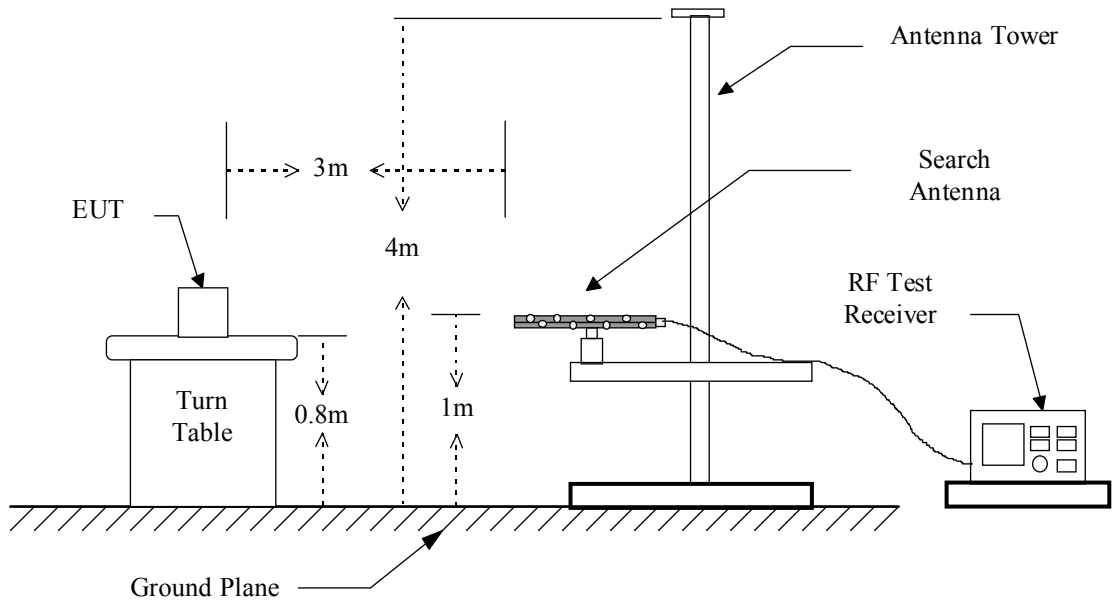
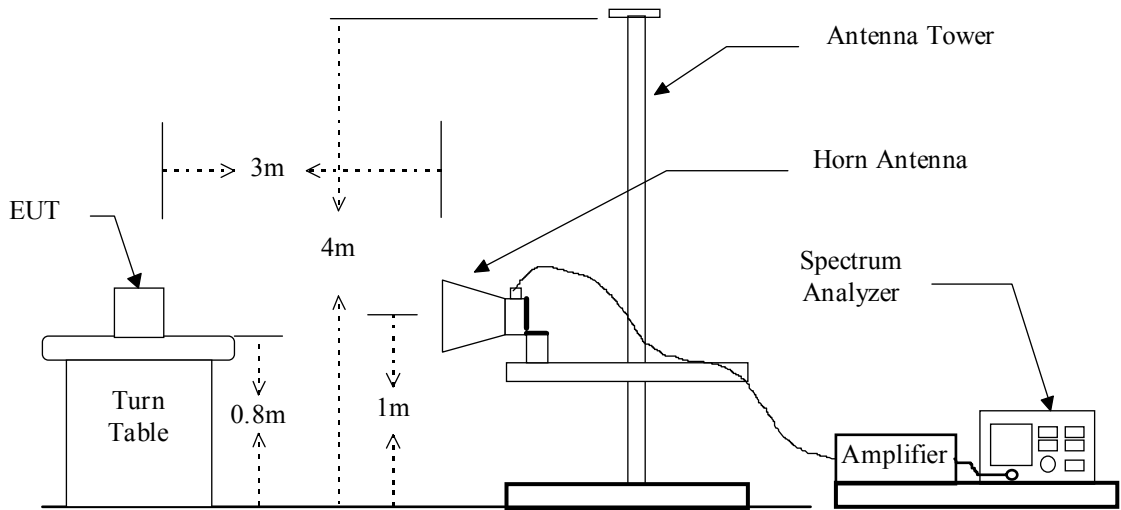


Figure 1 : Frequencies measured above 1 GHz configuration





### 3.3 Test Data

#### A. Channel Low (ERP)

Operated mode : Normal

Test Date : Jul. 03, 2002

Temperature : 25 °C

Humidity : 60 %

Frequency (MHz)	Meter Reading (dB $\mu$ V/m)	SG Reading (dBm)	Cable Loss (dB)	Result (dBm)	Output Power (mW)	Limit (dBm)
174.591	79.8	2.0	0.5	1.5	1.41	27.0

#### B. Channel Mid (ERP)

Operated mode : Normal

Test Date : Jul. 03, 2002

Temperature : 25 °C

Humidity : 60 %

Frequency (MHz)	Meter Reading (dB $\mu$ V/m)	SG Reading (dBm)	Cable Loss (dB)	Result (dBm)	Output Power (mW)	Limit (dBm)
195.594	79.1	4.6	0.5	4.1	2.57	27.0

#### C. Channel High (ERP)

Operated mode : Normal

Test Date : Jul. 03, 2002

Temperature : 25 °C

Humidity : 60 %

Frequency (MHz)	Meter Reading (dB $\mu$ V/m)	SG Reading (dBm)	Cable Loss (dB)	Result (dBm)	Output Power (mW)	Limit (dBm)
215.850	76.2	1.5	0.6	0.9	1.23	27.0

### 3.3 Result Calculation

Result calculation is as following :

Result = SG Reading + Cable Loss + Antenna Gain Corrected

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

$$mW = \log^{-1} \left[ \frac{\text{Result(dBm)}}{10} \right]$$

### 3.4 Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
EMI Test Receiver	R&S	ESBI	05/25/2003
Plotter	HP	7440A	N/A

## 4. MODULATION CHARACTERISTICS

### 4.1 Provisions Applicable

According to § 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be measured.

### 4.2 Measurement Method

#### A) Frequency response of audio circuits

1. Position the EUT as shown in figure 3.
2. Vary the modulating frequency from 100 Hz to 5000 Hz with varying the input voltage from 0V to maximum permitted input voltage, and observe the change in output.

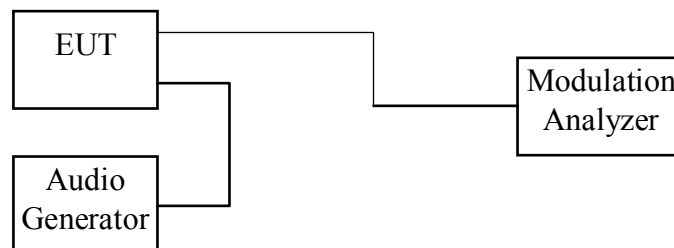
#### B) Modulation Limit

1. Position the EUT as shown in figure 3, adjust the audio input frequency to 100 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

#### C) Frequency response of all circuits

1. Position the EUT as shown in figure 3.
2. Vary the modulating frequency from 100 Hz to 15000 Hz with constant input voltage (derived from 5.4(a) of this test report), and observe the change in output.

Figure 3 : Modulation characteristic measurement configuration

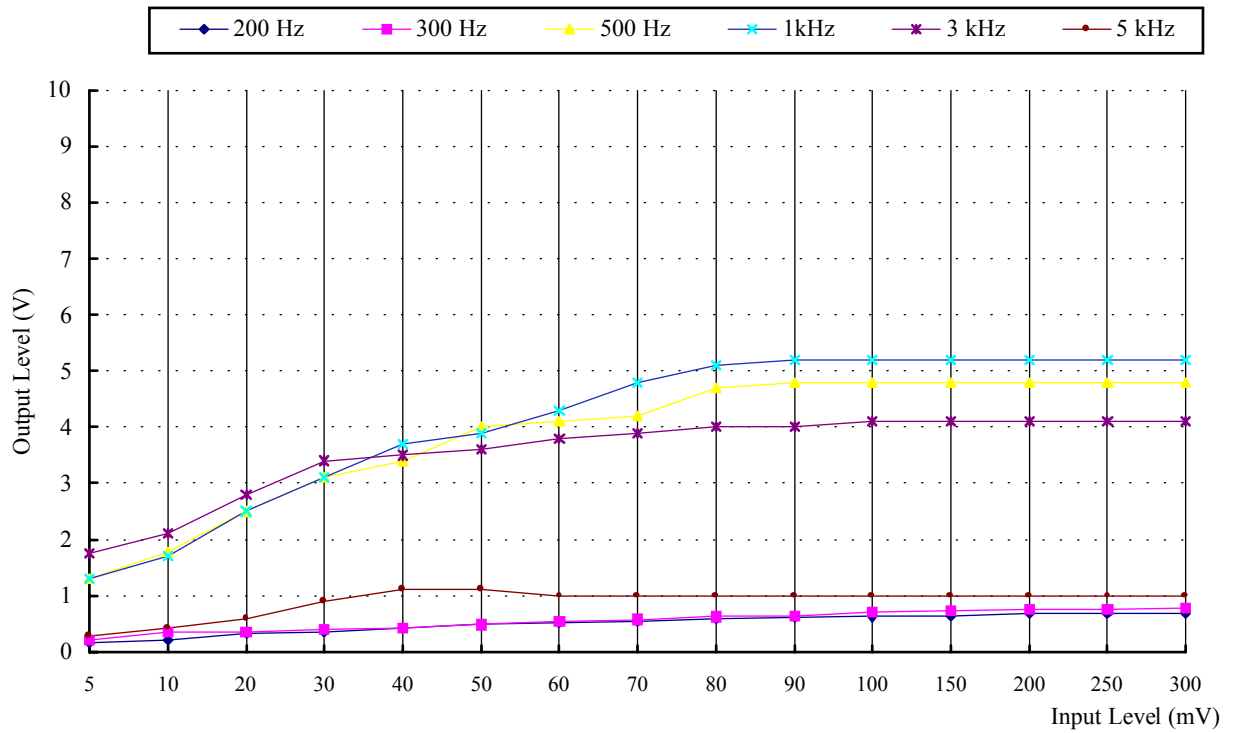


### 4.3 Measurement Instrument

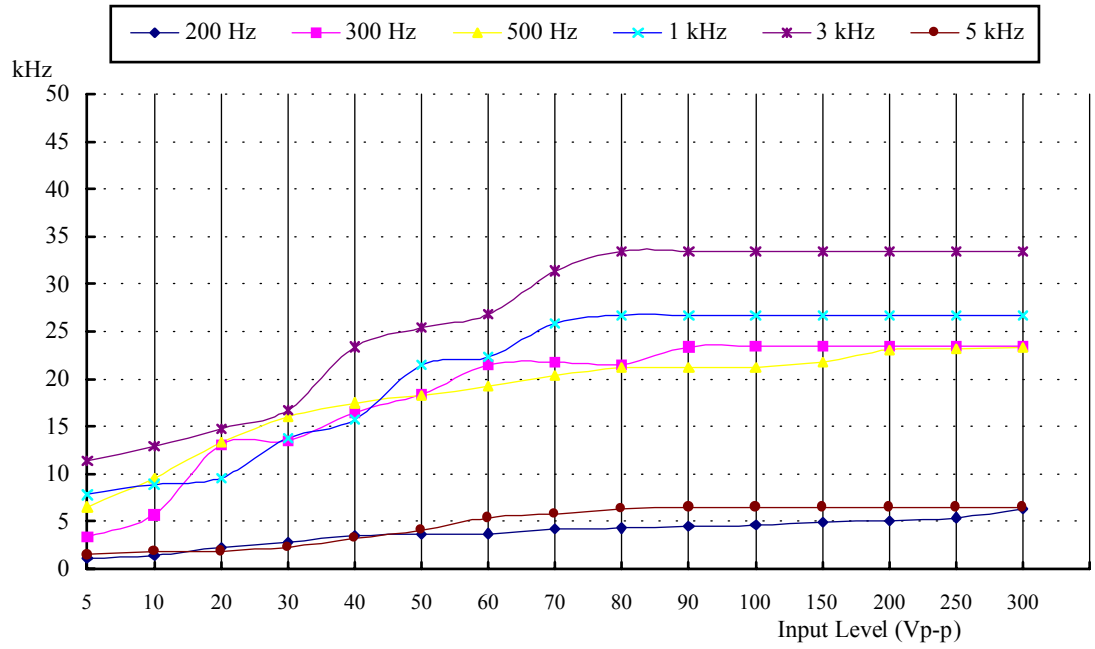
Equipment	Manufacturer	Model No.	Next Cal. Date
Modulation Analyzer	Hewlett-Packard	8901A	12/01/2002
Multifunction Synthesizer	Hewlett-Packard	8904A	11/24/2002
Oscilloscope	Lecroy	9350A	12/01/2002

### 4.4 Measurement Result

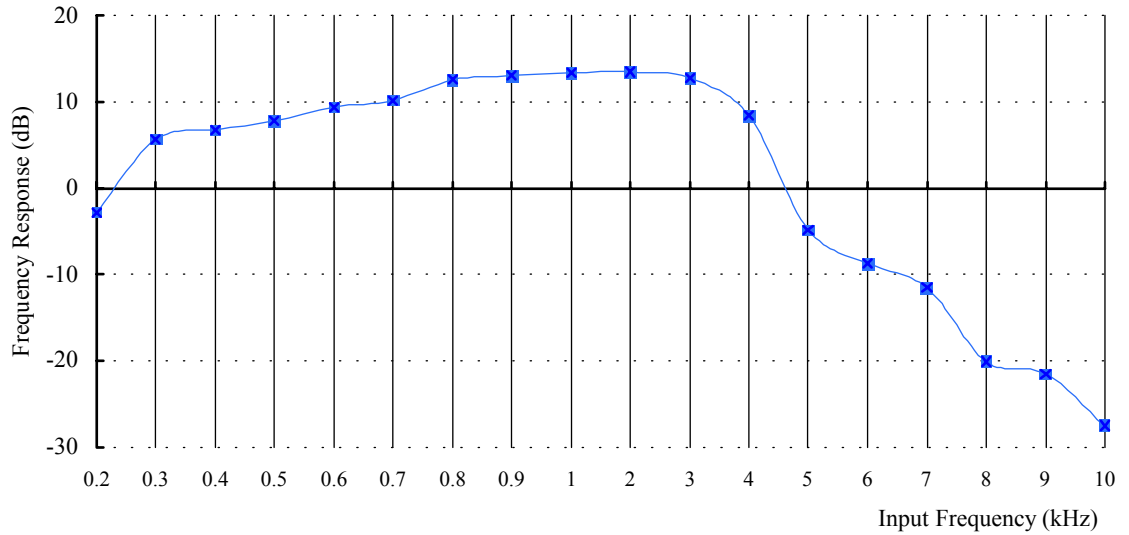
A). Frequency response



B). Modulation Limit



C). Frequency response of all circuits



## 5. OCCUPIED BANDWIDTH OF EMISSION

### 5.1 Provisions Applicable

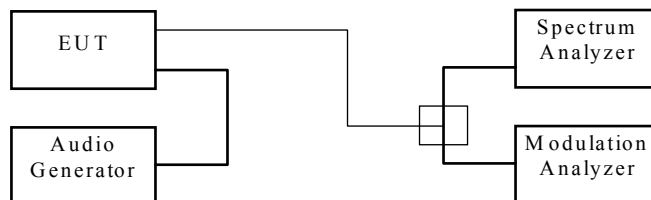
According to § 2.1049 (c)(1), For radiotelephone transmitter, other than single sideband or independent sideband transmitter, when modulated by a 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

According to § 74.861( e)(5), the frequency emission bandwidth shall not exceed 200 kHz.

### 5.2 Measurement Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4, and Install new batteries in the EUT. Turn on the EUT and set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Apply a 2.5 kHz modulation signal to EUT and measure the frequencies of the modulated signal from the EUT where it is the specified number of dB below the reference level set in step 2. This is the occupied bandwidth specified.

Figure 4 : Occupied bandwidth measurement configuration

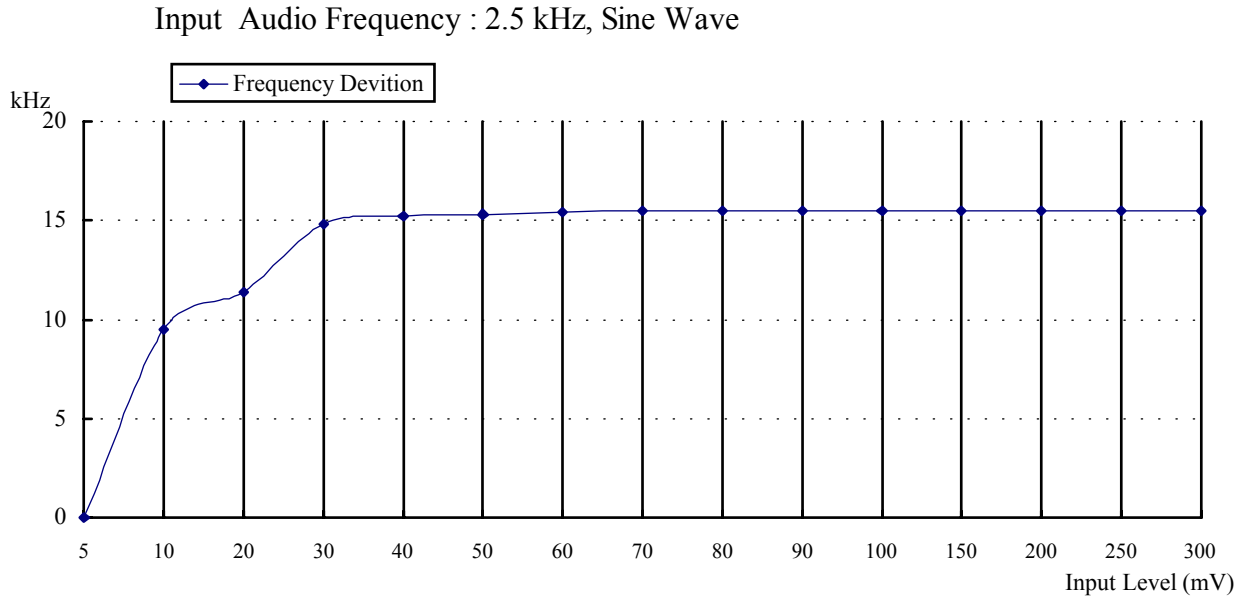


### 5.3 Occupied Bandwidth Test Equipment

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	R&S	ESBI	05/25/2003
Modulation Analyzer	Hewlett-Packard	8901A	12/01/2002
Multifunction Synthesizer	Hewlett-Packard	8904A	11/24/2002
Plotter	Hewlett-Packard	7440A	N/A

## 5.4 Bandwidth Measured

### 5.4.1 Input Level Derived



The Level input to produce 50% modulation is 50 mV, therefore the magnitude 16 dB greater than it is 315.5 mV.

### 5.4.2 Occupied Bandwidth Plotted

The Channel Low 26 dB Bandwidth is 66.5KHz.  
 The Channel Mid 26 dB Bandwidth is 65.0KHz.  
 The Channel High 26 dB Bandwidth is 79.5KHz.

**Please see appendix 1 for plotted data.**

## 6. FIELD STRENGTH OF EMISSION

### 6.1 Provisions Applicable

According to § 2.1053, measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

According to § 74.861(e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

- (i) on any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.
- (ii) on any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.
- (iii) on any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth shall be attenuated below the unmodulated carrier by at least 43 plus 10 Log(output power in watts) dB.

### 6.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power as measured in chapter 3.
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 100 kHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 °, and record the highest value indicated on spectrum analyzer as reference value.
4. Repeat step 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.
6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1 GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on spectrum analyzer. Record this value for result calculated.

7. Repeat step 6 until all frequencies need to be measured were complete.
8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

### 6.3 Measuring Instrument

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	Hewlett-Packard	8568B	01/10/2003
Quasi Peak Detector	Hewlett-Packard	85650A	01/10/2003
Pre-selector	Hewlett-Packard	85685A	01/10/2003
Spectrum Analyzer	Hewlett-Packard	8564E	05/16/2003
Horn Antenna	EMCO	3115	05/14/2003
Log periodic Antenna	EMCO	3146	11/02/2002
Biconical Antenna	EMCO	3110B	11/02/2002
Preamplifier	Hewlett-Packard	8449B	05/10/2003
Preamplifier	Hewlett-Packard	8447D	10/14/2002

Measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz



## 6.4 Measuring Data

### A. Channel Low

Operated mode : Normal  
Temperature : 25°C

Test Date : Jul. 03, 2002  
Humidity : 60%

Unmodulated carrier output power is 1.5 dBm , or 1.41 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$-13.5-[43+10\log(\text{carrier output power in W})], \text{ or } -13\text{dBm}$$

Frequency (MHz)	Meter Reading (dBuV)		SG Reading (dBm)		Cable Loss (dB)	Result (dBm)		Limit (dBm)	Margin (dB)
	H	V	H	V		H	V		
349.185	37.0	35.3	-44.3	-44.1	0.5	-45.4	-45.2	-13.0	-32.2
523.779	16.8	13.2	-59.4	-59.6	1.1	-60.7	-60.9	-13.0	-47.7
698.373	---	---	---	---	---	---	---	-13.0	---
872.967	---	---	---	---	---	---	---	-13.0	---
1047.561	---	---	---	---	---	---	---	-13.0	---
1222.155	---	---	---	---	---	---	---	-13.0	---
1396.749	---	---	---	---	---	---	---	-13.0	---
1571.343	---	---	---	---	---	---	---	-13.0	---
1745.937	---	---	---	---	---	---	---	-13.0	---

Note :

1. Remark “---“ means that the emission level is too weak to be detected.
2. Result calculation is as following :  
Result = SG Reading + Cable Loss + Antenna Gain Corrected  
Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.
3. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

**B. Channel Mid**

Operated mode : Normal  
 Temperature : 25°C

Test Date : Jul. 03, 2002  
 Humidity : 60%

Unmodulated carrier output power is 4.1 dBm , or 2.57 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$-11.6-[43+10\log(\text{carrier output power in W})], \text{ or } -13\text{dBm}$$

Frequency (MHz)	Meter Reading (dBuV)		SG Reading (dBm)		Cable Loss (dB)	Result (dBm)		Limit (dBm)	Margin (dB)
	H	V	H	V		H	V		
391.190	47.3	41.5	-33.1	-37.9	1.0	-34.1	-38.9	-13.0	-21.1
586.786	34.3	28.4	-39.5	-41.7	1.4	-60.9	-43.1	-13.0	-30.1
782.382	10.8	6.8	-59.3	-61.4	1.5	-60.8	-62.9	-13.0	-47.8
977.978	---	---	---	---	---	---	---	-13.0	---
1173.574	---	---	---	---	---	---	---	-13.0	---
1369.170	---	---	---	---	---	---	---	-13.0	---
1564.766	---	---	---	---	---	---	---	-13.0	---
1760.362	---	---	---	---	---	---	---	-13.0	---
1955.958	---	---	---	---	---	---	---	-13.0	---

Note :

1. Remark “---“ means that the emission level is too weak to be detected.
2. Result calculation is as following :  
 Result = SG Reading + Cable Loss + Antenna Gain Corrected  
 Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.
3. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

**C. Channel High**

Operated mode : Normal  
Temperature : 25°C

Test Date : Jul. 03, 2002  
Humidity : 60%

Unmodulated carrier output power is 0.9 dBm , or 1.23 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$-11.9-[43+10\log(\text{carrier output power in W})], \text{ or } -13\text{dBm}$$

Frequency (MHz)	Meter Reading (dBuV)		SG Reading (dBm)		Cable Loss (dB)	Result (dBm)		Limit (dBm)	Margin (dB)
	H	V	H	V		H	V		
431.700	37.6	34.5	-41.0	-40.0	1.0	-42.0	-41.0	-13.0	-28.0
647.550	15.5	13.8	-58.3	-57.7	1.4	-59.8	-59.2	-13.0	-46.2
863.400	---	---	---	---	---	---	---	-13.0	---
1079.250	---	---	---	---	---	---	---	-13.0	---
1295.100	---	---	---	---	---	---	---	-13.0	---
1510.950	---	---	---	---	---	---	---	-13.0	---
1726.800	---	---	---	---	---	---	---	-13.0	---
1942.650	---	---	---	---	---	---	---	-13.0	---
2158.500	---	---	---	---	---	---	---	-13.0	---

Note :

1. Remark “---“ means that the emission level is too weak to be detected.
2. Result calculation is as following :  

$$\text{Result} = \text{SG Reading} + \text{Cable Loss} + \text{Antenna Gain Corrected}$$
 Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.
3. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

## **6.5 Radiated Measurement Photos**

Please see Setup Photos in Exhibit F.

## 7. FREQUENCY STABILITY MEASUREMENT

### 7.1 Provisions Applicable

According to § 2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  centigrade, and according to § 2.1055 (d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to § 74.861(e)(4), the frequency tolerance of the transmitter shall be 0.005 percent.

### 7.2 Measurement Procedure

#### A) Frequency stability versus environmental temperature

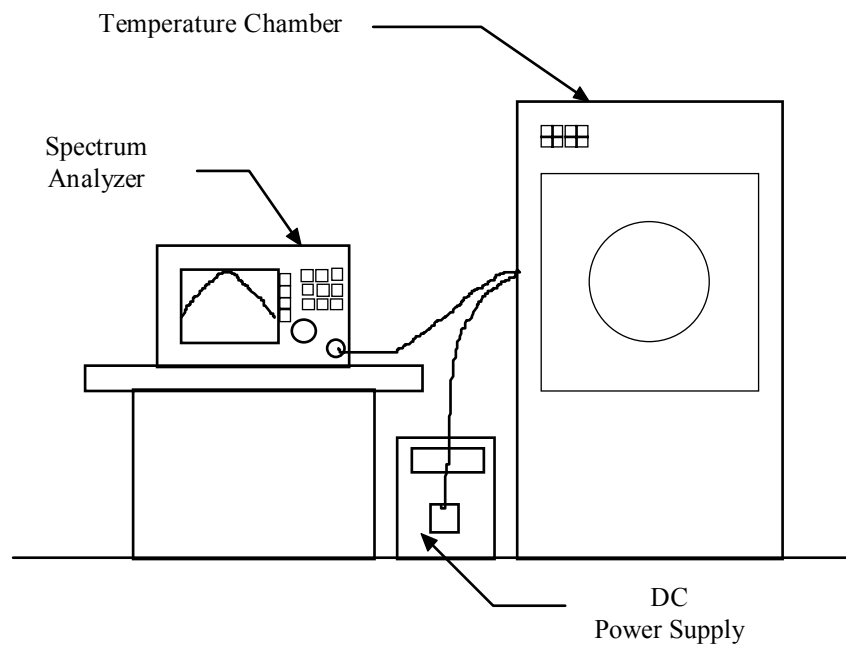
1. Setup the configuration per figure 5 for frequencies measured at ambient temperature if it is within  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . Otherwise, an environmental chamber set for a temperature of  $20^{\circ}\text{C}$  shall be used. Install new batteries in the EUT.
2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. Set the temperature of chamber to  $50^{\circ}\text{C}$ . Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a  $10^{\circ}\text{C}$  decreased per stage until the lowest temperature  $-30^{\circ}\text{C}$  is measured, record all measurement frequencies.

#### B) Frequency stability versus input voltage

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within  $15^{\circ}\text{C}$  to  $25^{\circ}\text{C}$ . Otherwise, an environmental chamber set for a temperature of  $20^{\circ}\text{C}$  shall be used. Install new batteries in the EUT.

2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. For battery operated only device, supply the EUT primary voltage at the battery operating end point which is specified by the manufacturer and record the frequency.

Figure 5 : Frequency stability measurement configuration



### 7.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Next Cal. Date
Spectrum Analyzer	HP	8564E	05/16/2003
Temperature Chamber	ACS	EOS 200T	01/17/2003

## 7.4 Measurement Data

### A1. Frequency stability versus environment temperature

Reference Frequency : 174.591 MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	New Batt.	174.5921	0.00064	174.5855	-0.00314	174.5848	-0.00354
40	New Batt.	174.5976	0.00375	174.5949	0.00221	174.5862	-0.00278
30	New Batt.	174.5897	-0.00076	174.5844	-0.00376	174.5912	0.00013
20	New Batt.	174.5850	-0.00344	174.5947	0.00211	174.5970	0.00346
10	New Batt.	174.5950	0.00227	174.5873	-0.00210	174.5865	-0.00256
0	New Batt.	174.5844	-0.00377	174.5938	0.00163	174.5888	-0.00128
-10	New Batt.	174.5957	0.00267	174.5845	-0.00372	174.5896	-0.00079
-20	New Batt.	174.5937	0.00156	174.5889	-0.00119	174.5854	-0.00322

### A2. Frequency stability versus end-point supplied voltage (2Vdc)

Reference Frequency : 174.591 MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	End-Point	174.5975	0.00371	174.5960	0.00285	174.5861	-0.00283

## B1. Frequency stability versus environment temperature

Reference Frequency : 195.594 MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	New Batt.	195.5936	-0.00020	195.5939	-0.00004	195.5941	0.00004
40	New Batt.	195.5942	0.00011	195.5936	-0.00021	195.5940	0.00002
30	New Batt.	195.5937	-0.00018	195.5936	-0.00023	195.5941	0.00003
20	New Batt.	195.5940	0.00000	195.5942	0.00013	195.5936	-0.00022
10	New Batt.	195.5937	-0.00015	195.5937	-0.00015	195.5941	0.00003
0	New Batt.	195.5944	0.00020	195.5936	-0.00019	195.5943	0.00017
-10	New Batt.	195.5943	0.00016	195.5938	-0.00012	195.5940	0.00002
-20	New Batt.	195.5937	-0.00014	195.5939	-0.00007	195.5940	0.00002

## B2. Frequency stability versus end-point supplied voltage (2Vdc)

Reference Frequency : 195.594 MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	End-Point	195.5941	0.00007	195.5944	0.00020	195.5940	0.00002



## C1. Frequency stability versus environment temperature

Reference Frequency : 215.850 MHz                      Limit : 0.005%							
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	New Batt.	215.8506	0.00027	215.8418	-0.00378	215.8552	0.00239
40	New Batt.	215.8424	-0.00352	215.8570	0.00325	215.8431	-0.00318
30	New Batt.	215.8521	0.00096	215.8551	0.00235	215.8418	-0.00381
20	New Batt.	215.8535	0.00163	215.8421	-0.00364	215.8428	-0.00333
10	New Batt.	215.8484	-0.00076	215.8475	-0.00116	215.8558	0.00268
0	New Batt.	215.8428	-0.00333	215.8510	0.00049	215.8524	0.00110
-10	New Batt.	215.8577	0.00357	215.8453	-0.00220	215.8438	-0.00288
-20	New Batt.	215.8514	0.00063	215.8440	-0.00279	215.8460	-0.00185

## C2. Frequency stability versus end-point supplied voltage (2Vdc)

Reference Frequency : 215.850 MHz                      Limit : 0.005%							
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	End-Point	215.8575	0.00346	215.8460	-0.00186	215.8489	-0.00051

## **8 CONDUCTED EMISSION MEASUREMENT**

### **8.1 Standard Applicable**

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to § 15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

For intentional device, Line Conducted Emission Limits are in accordance to § 15.207(a), any emissions level shall not exceed 48 dBuV.

## **Appendix 1 : Occupied Emission Bandwidth Plotted Data**

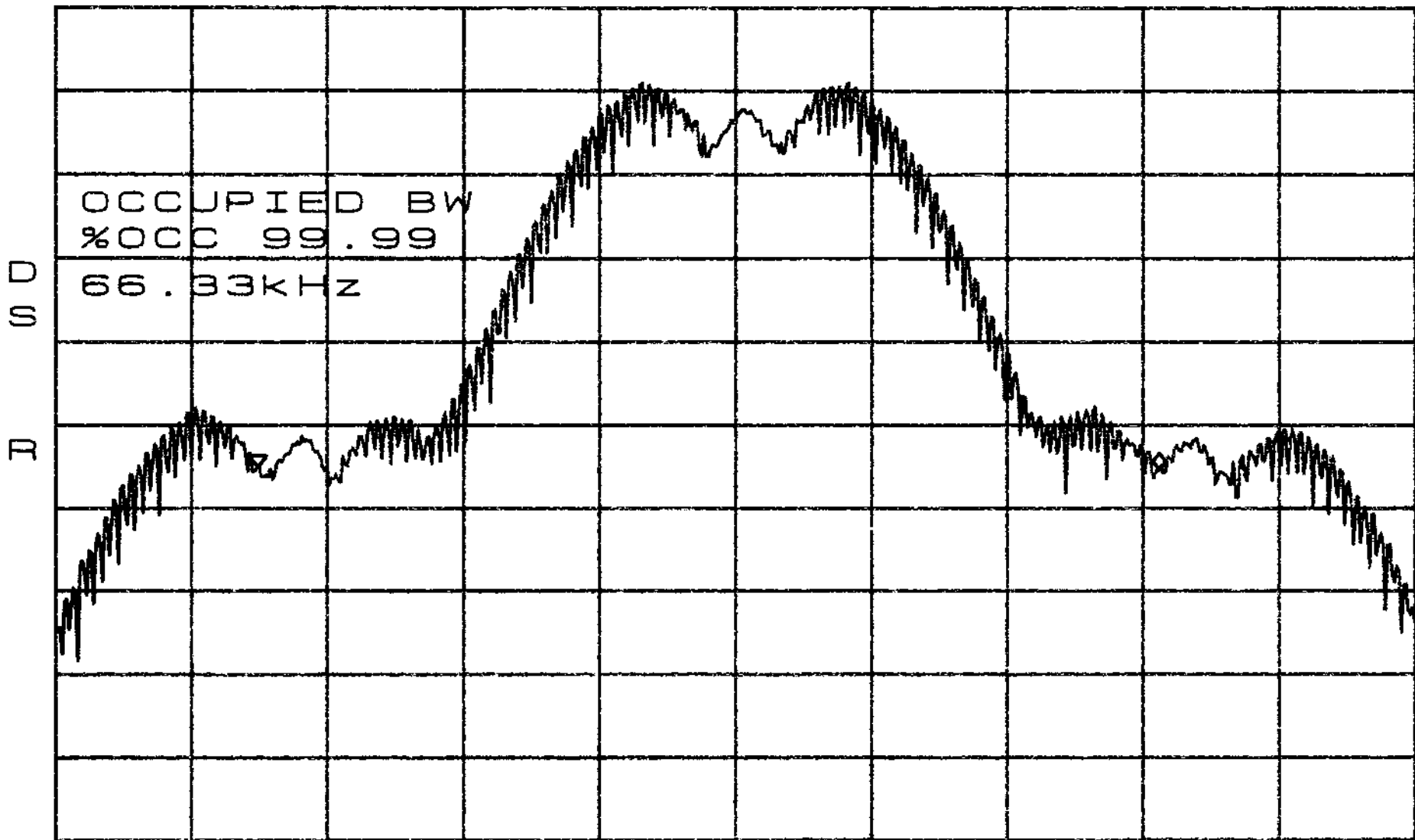
ATTEN 10dB

$\Delta MKR$  .34dB

RL 6.5dBm

10dB/

66.5kHz



OCCUPIED BW  
%OCC 99.99  
66.33kHz

CENTER 174.5930MHz

SPAN 100.0kHz

\*RBW 3.0kHz

VBW 3.0kHz

SWP 67.0ms

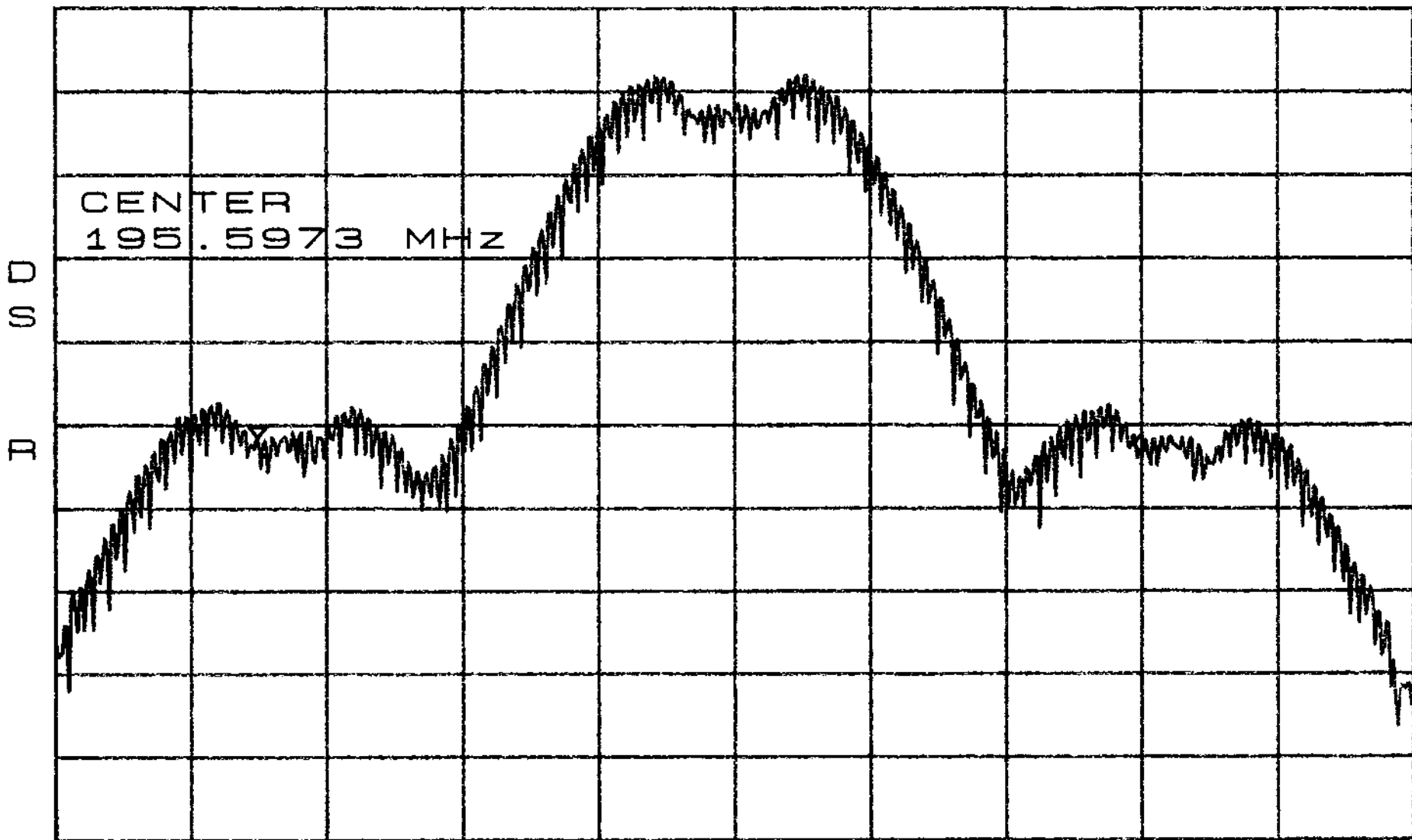
ATTEN 10dB

RL -3.5dBm

$\Delta$ MKR -1.33dB

10dB/

65.0KHz



CENTER 195.5973MHz

SPAN 100.0KHz

\*RBW 3.0KHz

VBW 3.0KHz

SWP 67.0ms

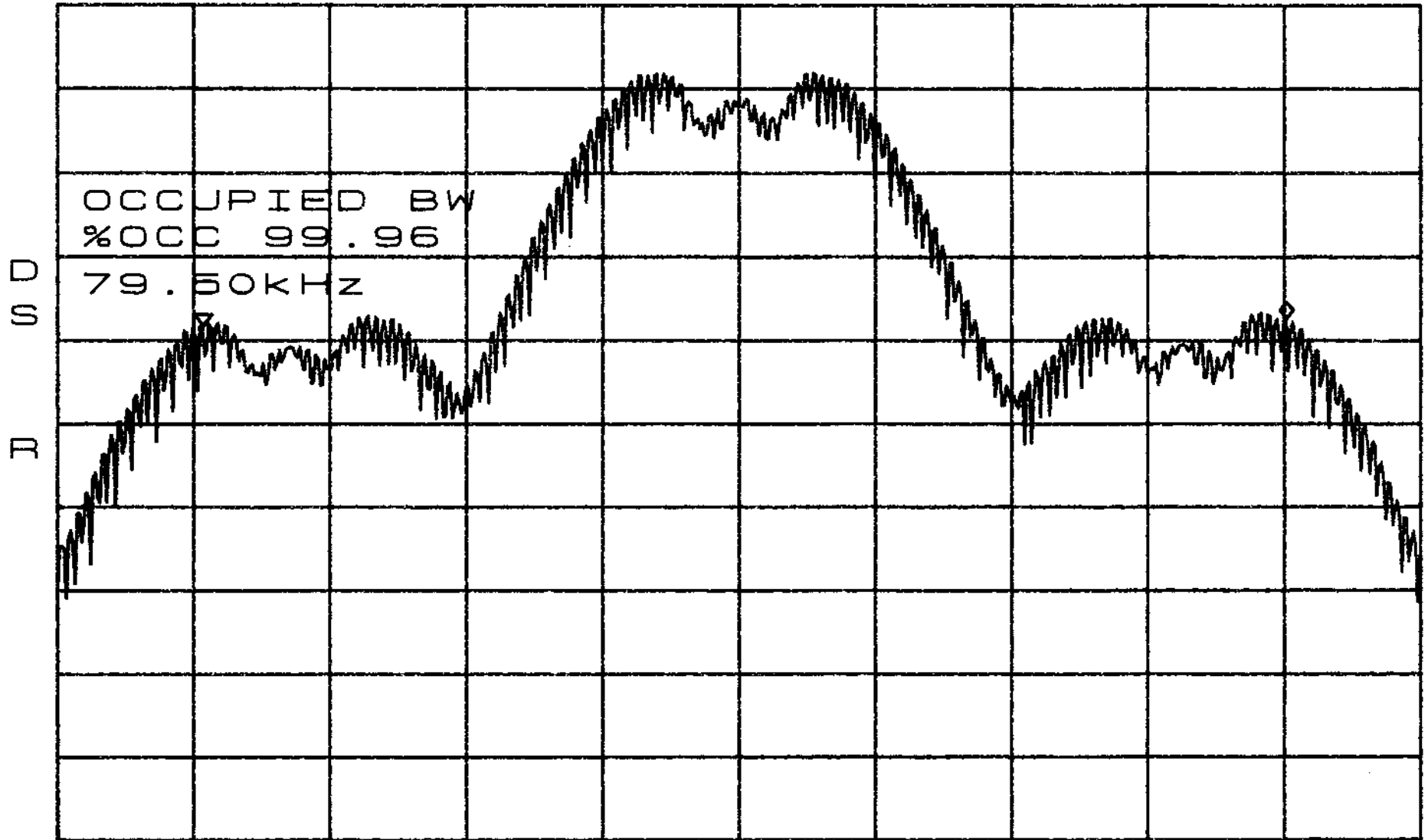
ATTEN 20dB

$\Delta MKR$  9.17dB

RL 6.5dBm

10dB/

79.5kHz



CENTER 215.8403MHz

SPAN 100.0kHz

\*RBW 3.0kHz

VBW 3.0kHz

SWP 67.0ms