FCC TEST REPORT

FCC ID : BEK9E3UB-4

Applicant : Nady Systems Inc
Address : 6701 Bay Street Emeryville California United States

Equipment Under Test (EUT) :

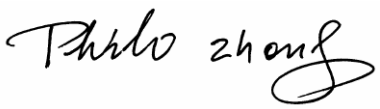
Product description : Wireless Microphone

Model No. : UB-4

Standards : FCC Part 74

Date of Test : June 30 to July 2, 2009

Test Engineer **: Olic huang**

Reviewed By **:** 

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2 Contents

Page

1 COVER PAGE 1

2 CONTENTS 2

3 TEST SUMMARY 4

4 GENERAL INFORMATION 5

4.1 CLIENT INFORMATION 5
4.2 GENERAL DESCRIPTION OF E.U.T. 5
4.3 DETAILS OF E.U.T. 5
4.4 DESCRIPTION OF SUPPORT UNITS 5
4.5 STANDARDS APPLICABLE FOR TESTING 5
4.6 TEST FACILITY 6
4.7 TEST LOCATION 6

5 EQUIPMENT USED DURING TEST 7

6 CONDUCTED EMISSION TEST 10

7 MAXIMUM POWER OUTPUT 11

7.1 RULES AND LIMITS 11
7.2 TEST EQUIPMENT 11
7.3 TEST PROCEDURE 11
7.4 RESULT CALCULATION 12
7.5 MEASUREMENT RESULT 12

8 MODULATION CHARACTERISTICS 13

8.1 RULES AND LIMITS 13
8.2 TEST EQUIPMENT 13
8.3 FREQUENCY RESPONSE OF AUDIO MODULATION CIRCUIT AND LOW PASS FILTER MEASUREMENT 13
8.4 CONDITION & SETUP 13
8.5 MEASUREMENT RESULT 14
8.6 MODULATION LIMITING MEASUREMENT CONDITION & SETUP 17
8.7 MEASUREMENT RESULT 17

9 OCCUPIED BANDWIDTH 20

9.1 RULES AND LIMITS 20
9.2 TEST EQUIPMENT 20
9.3 TEST PROCEDURE 20
9.4 MEASUREMENT RESULT 21

10 FIELD STRENGTH OF SPURIOUS RADIATION 36

10.1 RULES AND LIMITS 36
10.2 TEST EQUIPMENT 36
10.3 TEST PROCEDURE 36
10.4 MEASUREMENT RESULT 38

11 FREQUENCY STABILITY TOLERANCE 41

11.1 RULES AND LIMITS 41
11.2 TEST EQUIPMENT 41
11.3 TEMPERATURE VARIATION TEST PROCEDURE 41
11.4 MEASUREMENT RESULT 42
11.5 VOLTAGE VARIATION TEST PROCEDURE 44

11.6 MEASUREMENT RESULT 44

12 PHOTOGRAPHS OF TESTING 46

12.1 RADIATION EMISSION TEST VIEW FOR 30MHZ-1000MHZ 46
12.2 RADIATION EMISSION TEST VIEW FOR 1GHZ-10GHZ 46

13 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS 47

13.1 EUT - FRONT VIEW 47
13.2 EUT - BACK VIEW 47
13.3 PCB - FRONT VIEW 48
13.4 PCB - BACK VIEW 48

14 FCC ID LABEL 49

3 Test Summary

Test Item	Test Standard	Test Method	Test Result
Radiated Emission	FCC PART 74: 2004	Section 74.861 (e)(6)	PASS
Occupied Bandwidth	FCC PART 74: 2004	Section 74.861 (e)(5)	PASS
Maximum Output Power	FCC PART 74: 2004	Section 74.861 (e)(1)(i)	PASS
Frequency Stability Tolerance	FCC PART 74: 2004	Section 74.861 (e)(4)	PASS
Audio Low Pass Filter	FCC Part 2: 2004	FCC Part 2.1047(a).	PASS
Audio Frequency Response	FCC Part 2: 2004	FCC Part 2.1047(a).	PASS
Modulation Limiting	FCC Part 2: 2004 FCC PART 74: 2004	FCC Part 2.1047(b). Section 74.861 (e)(3)	PASS

4 General Information

4.1 Client Information

Applicant:	Nady Systems Inc
Address of Applicant:	6701 Bay Street Emeryville California United States
Manufacturer:	Nady Systems Inc
Address of Manufacture:	6701 Bay Street Emeryville California United States

4.2 General Description of E.U.T.

Product description:	Wireless Microphone
Model No.:	UB-4

4.3 Details of E.U.T.

Power Supply:	DC 9V Battery

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Standards Applicable for Testing

The customer requested FCC tests for a Wireless Microphone. The radiated emission test was performed according to the procedures of ANSI TIA/ELA 603 and FCC CFR47 Part 74.861, 2.1046, 2.1047.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581,June 24， 2008.

- **IC – Registration No.:IC 7760**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration IC7760,July 24， 2008.

4.7 Test Location

All Emissions testswere performed at:-
1/F, Fukangtai Building,West Baima Rd.,Songgang Street, Baoan District, Shenzhen 518105, Guangdong,China.

5 Equipment Used during Test

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY45114943	W2008001	9k-26.5GHz	Aug-08	Aug-09	Wws20081596	±1dB
Trilog Broadband Antenne 30-3000 MHz	SCHWARZBECK MESS-ELEKTROM/ VULB9163	336	W2008002	30-3000 MHz	Aug-08	Aug-09		±1dB
Broad-band Horn Antenna 1-18 GHz	SCHWARZBECK MESS-ELEKTROM/ VULB9163	667	W2008003	1-18GHz	Aug-08	Aug-09		f＜10 GHz：±1dB 10GHz＜f＜18 GHz：±1.5dB
Broadband Preamplifier 0.5-18 GHz	SCHWARZBECK MESS-ELEKTROM/ BBV 9718	9718-148	W2008004	0.5-18GHz	Aug-08	Aug-09		±1.2dB
10m Coaxial Cable with N-male Connectors usable up to 18GHz,	SCHWARZBECK MESS-ELEKTROM/ AK 9515 H	-	-	-	Aug-08	Aug-09		-
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connector	SCHWARZBECK MESS-ELEKTROM/ AK 9513				Aug-08	Aug-09		
Positioning Controller	C&C LAB/ CC-C-IF				N/A	N/A		
Color Monitor	SUNSPO/ SP-14C				N/A	N/A		
Test Receiver	ROHDE&SCHWARZ/ ESPI	101155	W2005001	9k-3GHz	Jul-08	Jul-09	Wws20080942	±1dB
EMI Receiver	Beijingkehuan	KH3931		9k-1GHz	Aug-08	Aug-09		
Two-Line V-Network	ROHDE&SCHWARZ/ ENV216	100115	W2005002	50Ω/50μH	Jul-08	Jul-09	Wws20080941	±10%
V－LISN	SCHWARZBECK MESS－ELEKTRONIK	NSLK 8128	8128-259	9k-30MHz	Jul-08	Jul-09		

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
Absorbing Clamp	ROHDE&SCHWARZ/ MDS-21	100205	W2005003	impandance50 Ω loss ： 17 dB	Jul-08	Jul-09	Wws20080943	±1dB
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZBECK MESS-ELEKTROM/ AK 9514				Aug-08	Aug-09		
Digital Power Analyzer	Em Test AG/Switzerland/ DPA 500	V0745103095	W2008012	Power：2000VA Vol-range：0-300V Freq_range：10-80Hz	Aug-08	Aug-09	Wwd20081185	Voltage distinguish:0.025% Power_freq distinguish:0.02Hz
Power Source	Em Test AG/Switzerland/ ACS 500	V0745103096	W2008013	Vol-range：0-300V Power_freq：10-80Hz				
Electrostatic Discharge Simulator	Em Test AG/Switzerland/DITO	V0745103094	W2008005	Contact discharge：500V-10KV Air diacharge：500V-16.5KV	Aug-08	Aug-09	Wwc20082400	7.5A current will be changed in V_m=1.5V
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Fraq-range：9K-1GHz RF voltage：-60 dBm-+10dBm	Aug-08	Aug-09	Wws20081890	Power_freq distinguish0.1Hz RFeletricity distinguish 0.1 B
CDN M-Type	TESEQ GmbH/ CDN M016	25112	W2008009	Voltage correct factor 9.5 dB	Aug-08	Aug-09	Wwc20082396	150K-80MHz：±1dB 80-230MHz: -2-+3dB
EM-Clamp	TESEQ GmbH/ KEMZ 801	25453	W2008010	Freq_range：0.15-1000 MHz	Aug-08	Aug-09	Wwc20082397	0.3-400 MHz：±4dB Other freq：±5dB
Attenuator 6dB	TESEQ GmbH/ ATN6050	25365			Aug-08	Aug-09	Wws20081597	
All Modules Generator	SCHAFFNER/ 6150	34579	W2008006	voltage:200V-4.4KV Pulse current：100A-2.2KA	Aug-08	Aug-09	Wwc20082401	voltage: ±10% Pulse current：±10%
Capacitive Coupling Clamp	SCHAFFNER/ CDN 8014	25311			Aug-08	Aug-09	Wwc20082398	-

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
Signal and Data Line Coupling Network	SCHAFFNER/ CDN 117	25627	W2008011	1.2/50μS	Aug-08	Aug-09	Wwc200 82399	-
AC Power Supply	TONGYUN/ DTDGC-4				Aug-08	Aug-09	Wws200 80944	-
Exposure Level Tester ELT-400	Narda Safety TEST Solutions/2304 /03	M-0155	w2008022	Test freq range：1—400kHz	Aug-08	Aug-09	Wwd200 81191	Test uncertainly：1—120kHz:±1.83%, 120 kHz-400 kHz: ±4.06%
Magnetic Field Probe 100cm^2	Narda Safety TEST Solutions/2300 /90.10	M-1070	w2008021	Test freq range：1—400kHz				Test uncertainly：1Hz-10Hz: ±16.2%, 10Hz -120kHz:±2.2%, 120 kHz-400 kHz: ±4.7%
Active Loop Antenna Charger 10kHz-30MHz	Beijing Dazhi / ZN30900A	-	-	10kHz-30MHz	Aug-08	Aug-09		±1dB

6 Conducted Emission Test

According to the rule of section 15.207(c), owing to the DC operation of EUT, this test is not performed.

7 Maximum Power Output

7.1 Rules and Limits

2.1046(a), ANSI/TIA/EIA-603-2003, Paragraph 2.2.1

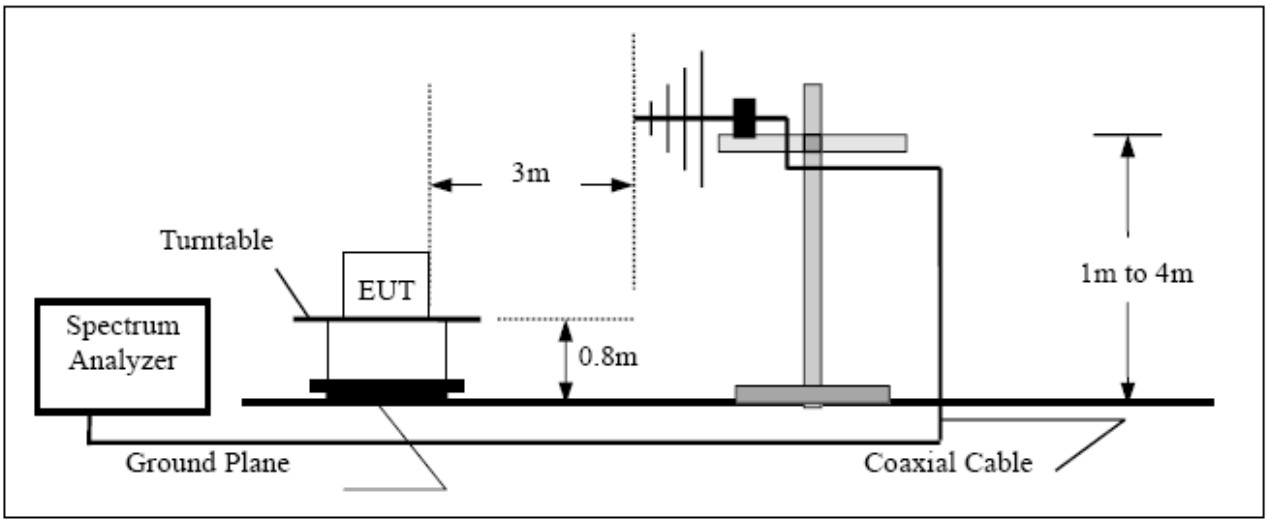
74.861(e)(1): the power of the measured un-modulated carrier power at output of the transmitter power amplifier (antenna input power) may not exceed the following:

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

7.2 Test Equipment

Please refer to Section 5 this report.

7.3 Test Procedure



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*1.5 meter, Raise and lower the test antenna from 1m to 4m with the transmitter facing the antenna. The EUT was placed in three direction of the space in order to obtain maximum emission.
2. New battery were installed in the equipment under test for radiated emissions test.
3. This is a handhold device, The radiation emission should be tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
4. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
5. All data was recorded in the peak detection mode if the test data under the limit 6dB.
6. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

7.4 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.

$mW=\log^{-1}[Result(dBm)/10]$

7.5 Measurement Result

Test Frequency: 944.2MHz

Antenna Polarity	Spectrum Reading (dBm)	E.R.P. (mW)	Limit (W)
V	12.12	16.29	0.25
H	11.25	13.35	

Test Frequency: 947.3MHz

Antenna Polarity	Spectrum Reading (dBm)	E.R.P. (mW)	Limit (W)
V	12.03	15.96	0.25
H	11.58	14.39	

Test Frequency: 951.6MHz

Antenna Polarity	Spectrum Reading (dBm)	E.R.P. (mW)	Limit (W)
V	12.03	15.96	0.25
H	11.65	14.62	

8 Modulation Characteristics

8.1 Rules and Limits

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

Voice modulated communication equipment , the frequency response of the audio modulating circuit over a range of 100Hz to 5000Hz shall be measured. For equipment required to have an audio low-pass filter, the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be measured.

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

Equipment which employs modulation limiting

74.861(e)(3), ANSI/TIA/EIA-603-1992

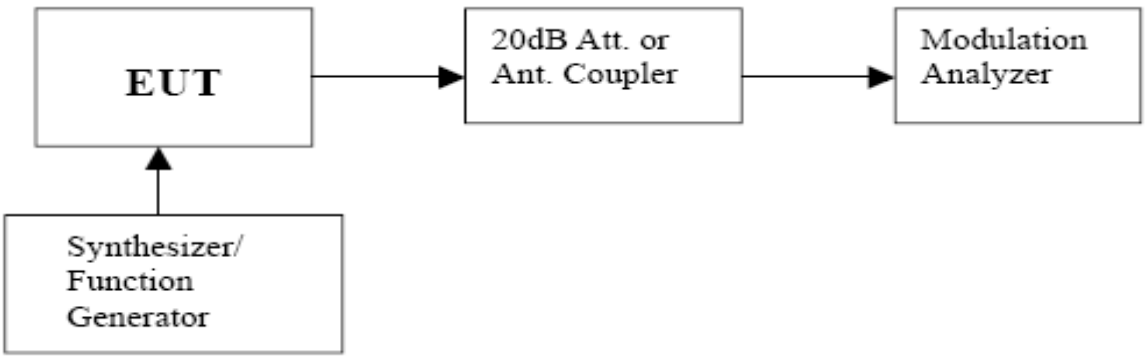
Any form of modulation may be used. A maximum deviation of ± 75KHz is permitted when frequency modulation is employed.

8.2 Test Equipment

Please refer to Section 5 this report.

8.3 Frequency Response of Audio Modulation Circuit and Low Pass Filter Measurement

8.4 Condition & Setup

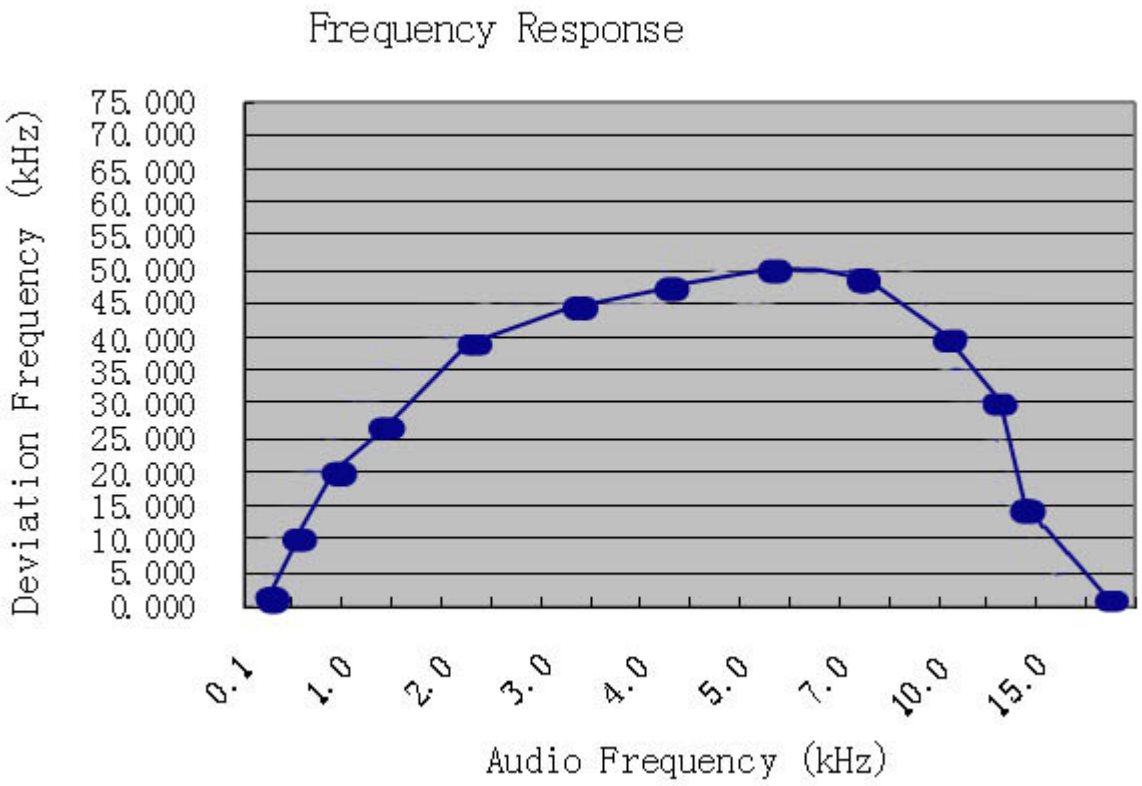


2.1047(a)

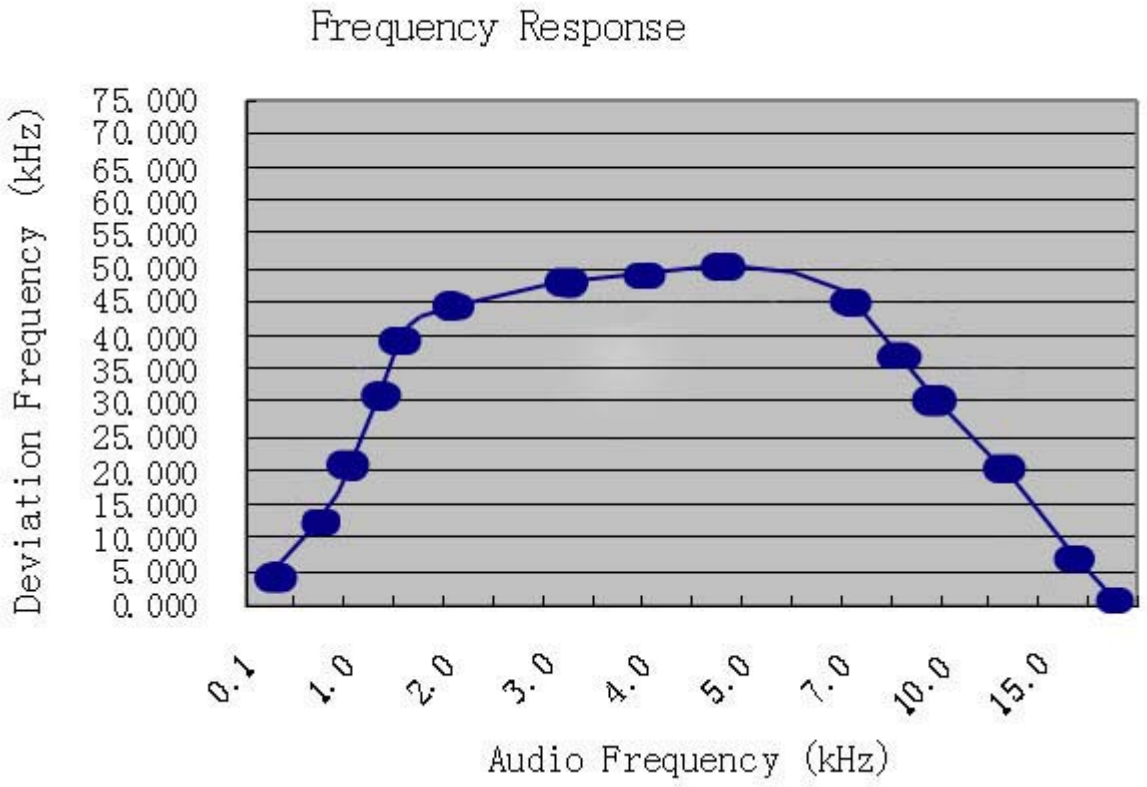
1. The EUT and test equipment were set up as shown on the above graph.
2. Adjust the audio input for 20% of rated system deviation at 1KHz using this level as a reference (0dB) .
3. Vary the audio frequency from 100Hz to 15000Hz

8.5 Measurement Result

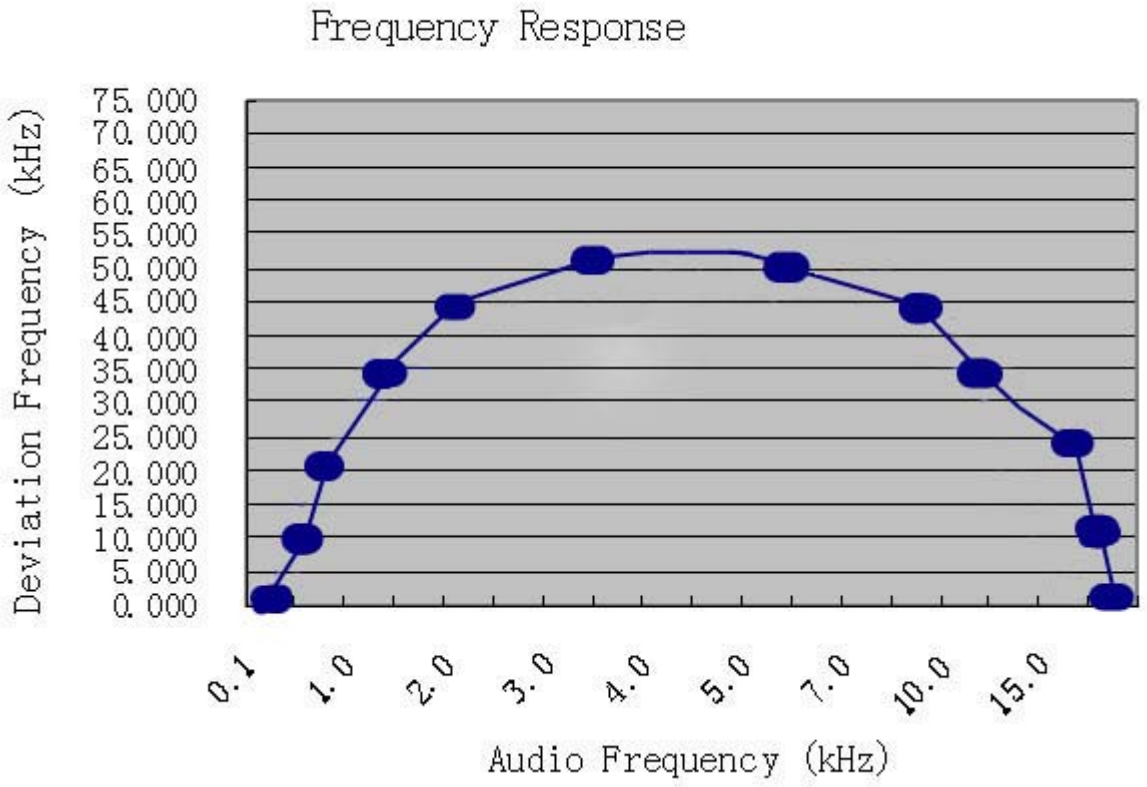
Test Frequency: 944.2MHz



Test Frequency: 947.3MHz



Test Frequency: 951.6MHz



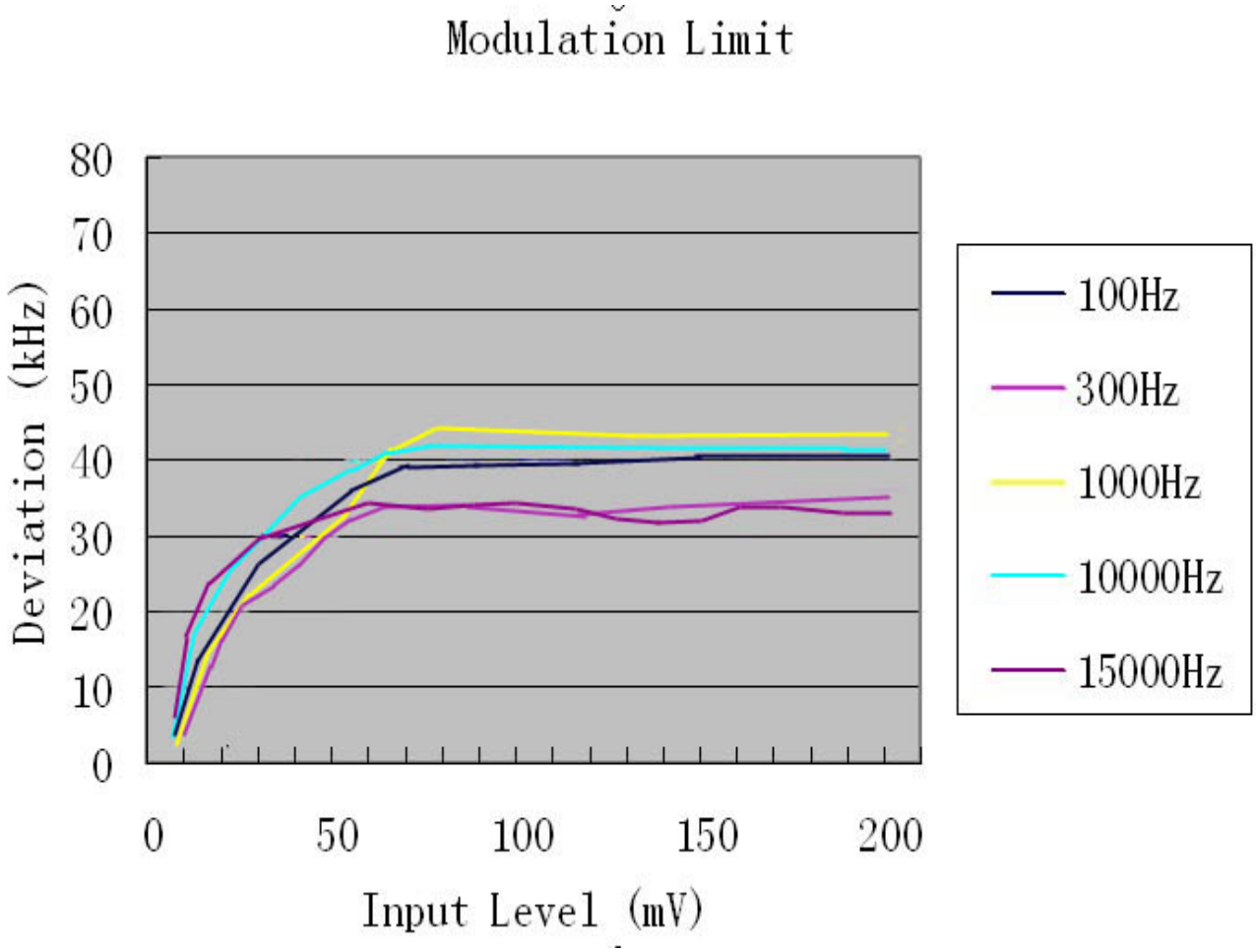
8.6 Modulation Limiting Measurement Condition & Setup

2.1047(b)

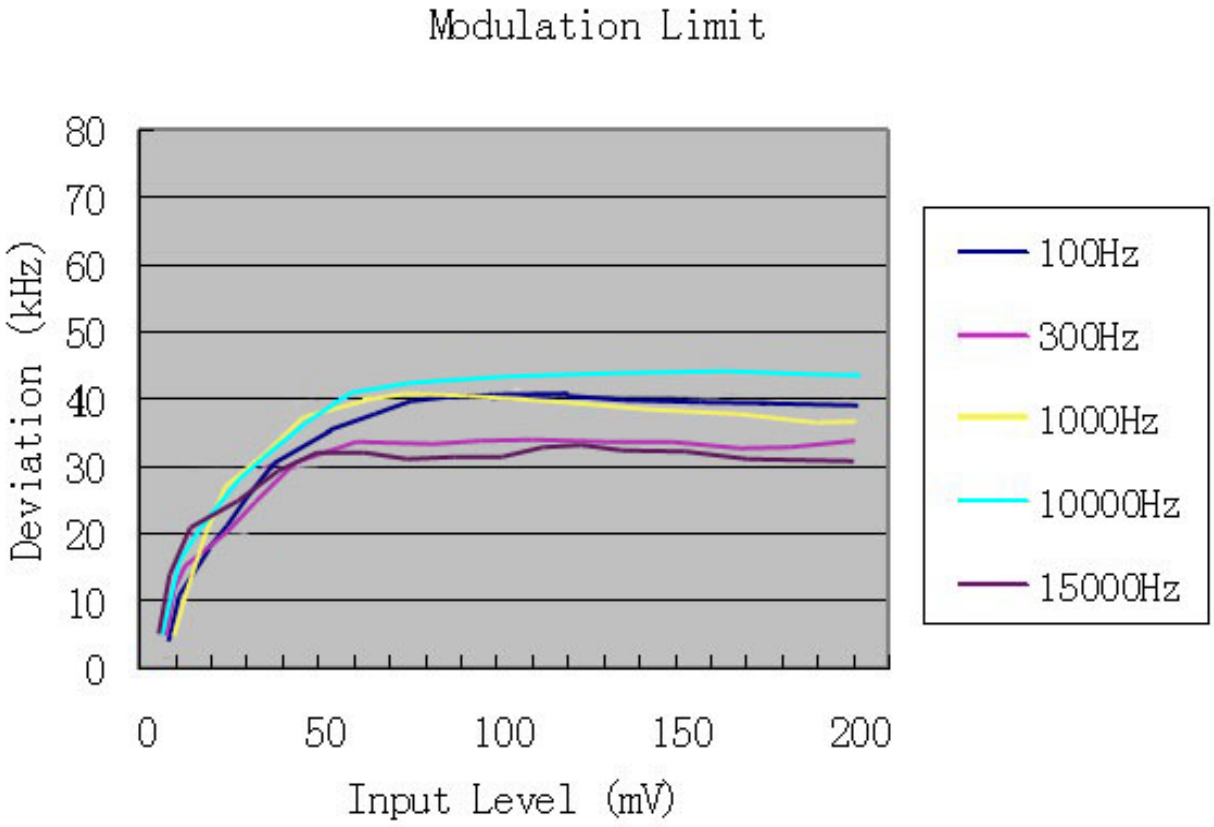
1. The Plus/Function generator was connected to the microphone of EUT, via an artifical mouth simulator.
2. Adjust the audio input frequency from 100Hz to 15000 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.
3. Repeat step 2 with changing the input frequency for 100, 300, 1000, 10000 and 15000 Hz in sequence.

8.7 Measurement Result

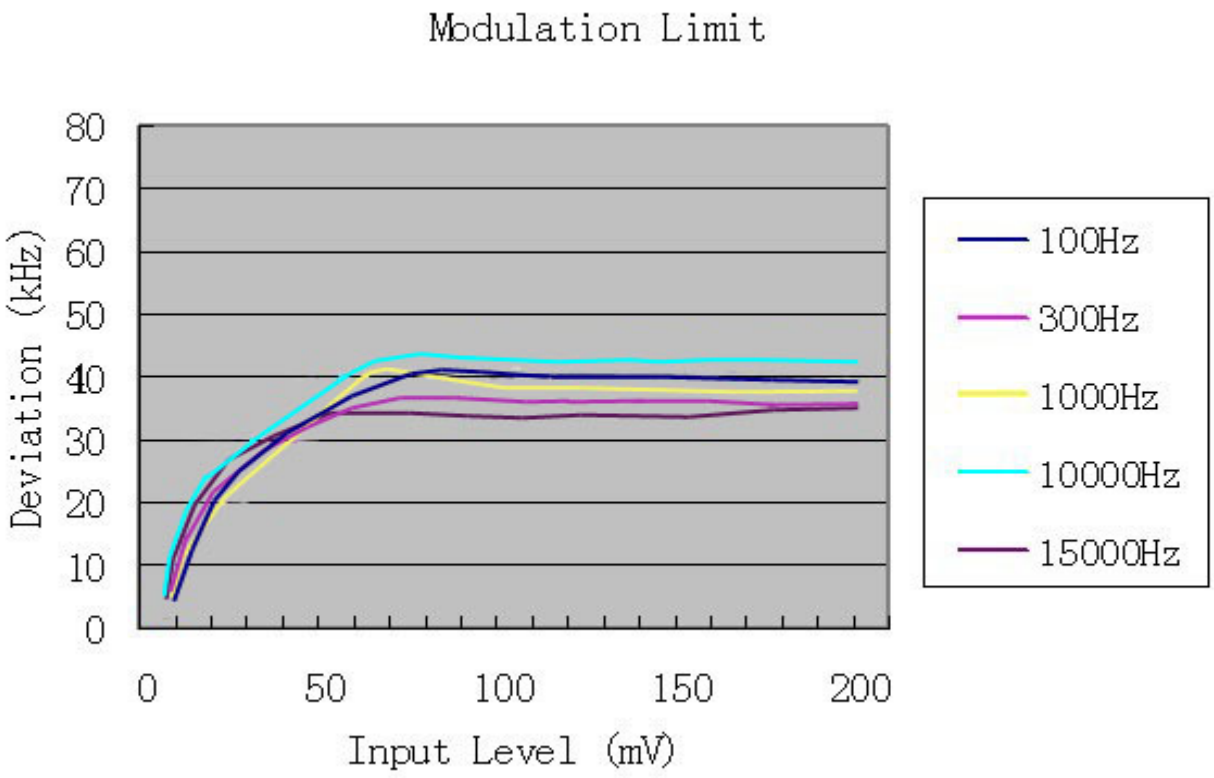
Test Frequency: 944.2MHz



Test Frequency: 947.3MHz



Test Frequency: 951.6MHz



9 Occupied Bandwidth

9.1 Rules and Limits

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

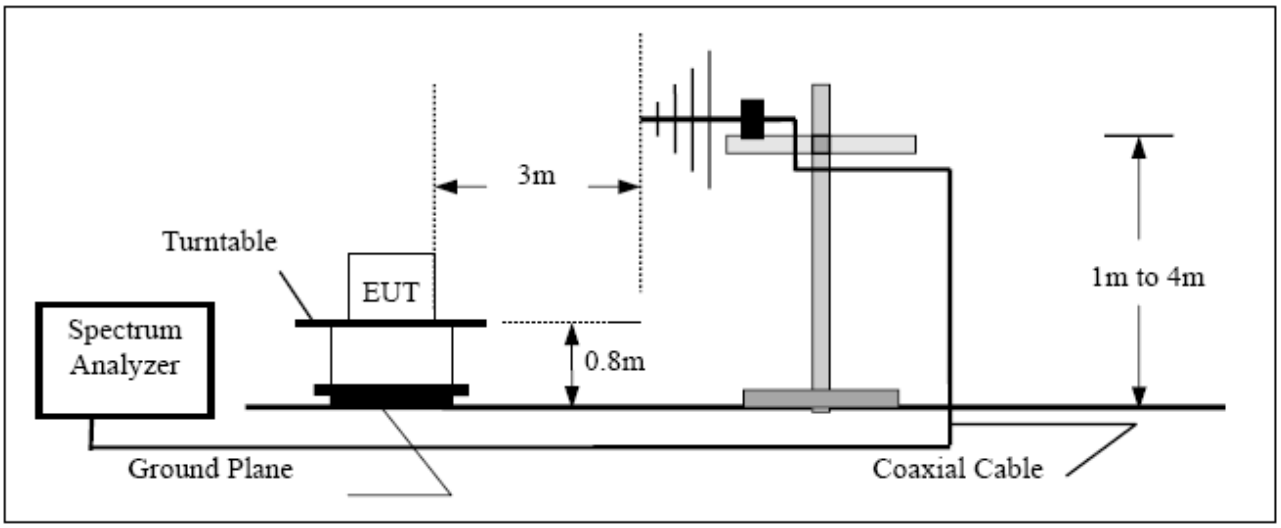
74.861(e)(3): Any form of modulation may be used. A maximum deviation of ± 75kHz is permitted when frequency modulation is employed.

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

9.2 Test Equipment

Please refer to Section 5 this report.

9.3 Test Procedure

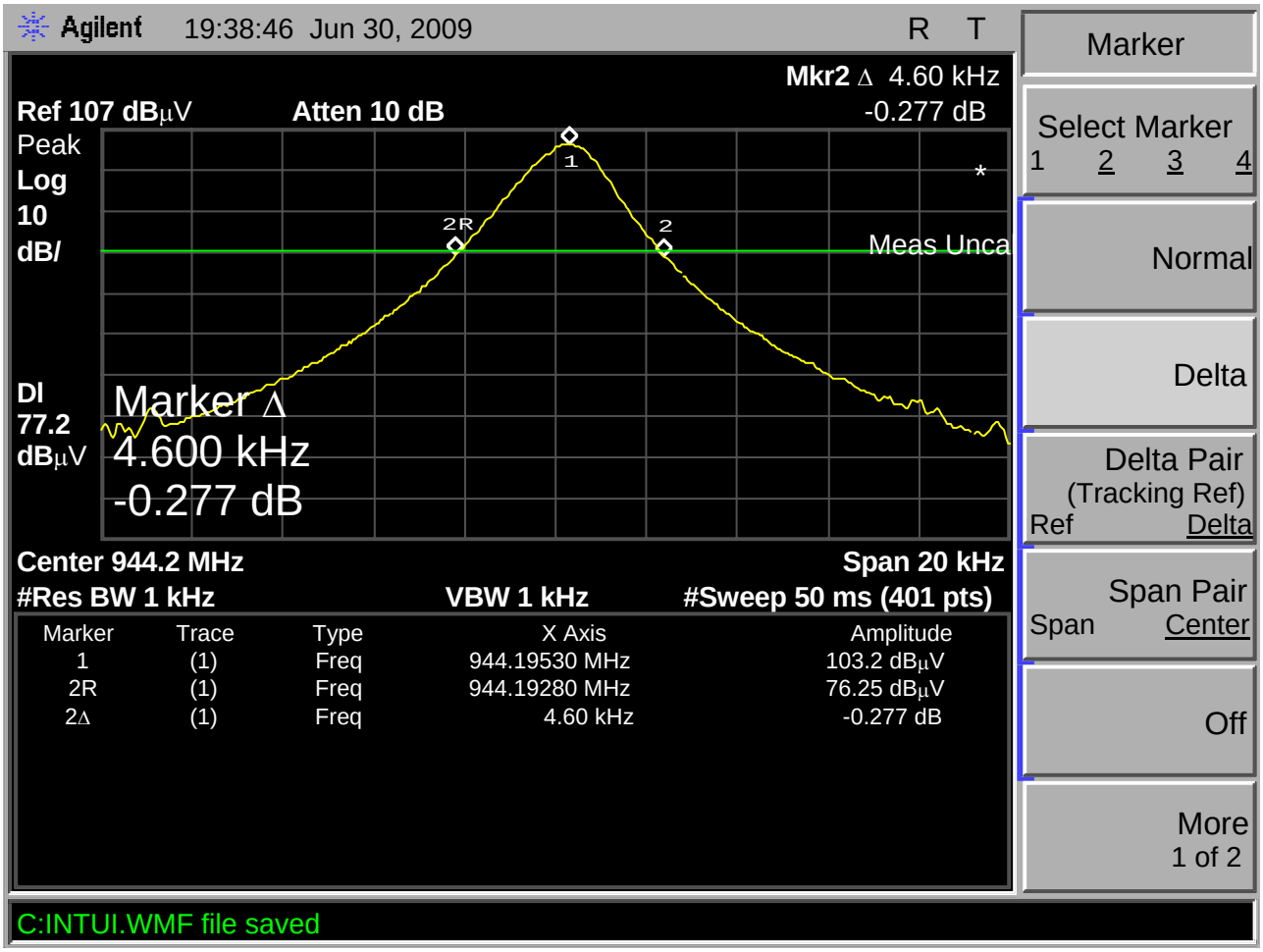


1. Connect the EUT as above graph.
2. Plot the unmodulated chart shows on spectrum.
3. Set the output of the signal generator to 300Hz, 1kHz, 1.5kHz, 2.5kHz. Increase the amplitude of the signal, while monitoring the modulation meter. Until modulation is maximum measure the bandwidth under 26dB compared to the unmodulated fundamental carrier peak level of the modulated signal displayed on the spectrum analyzer.

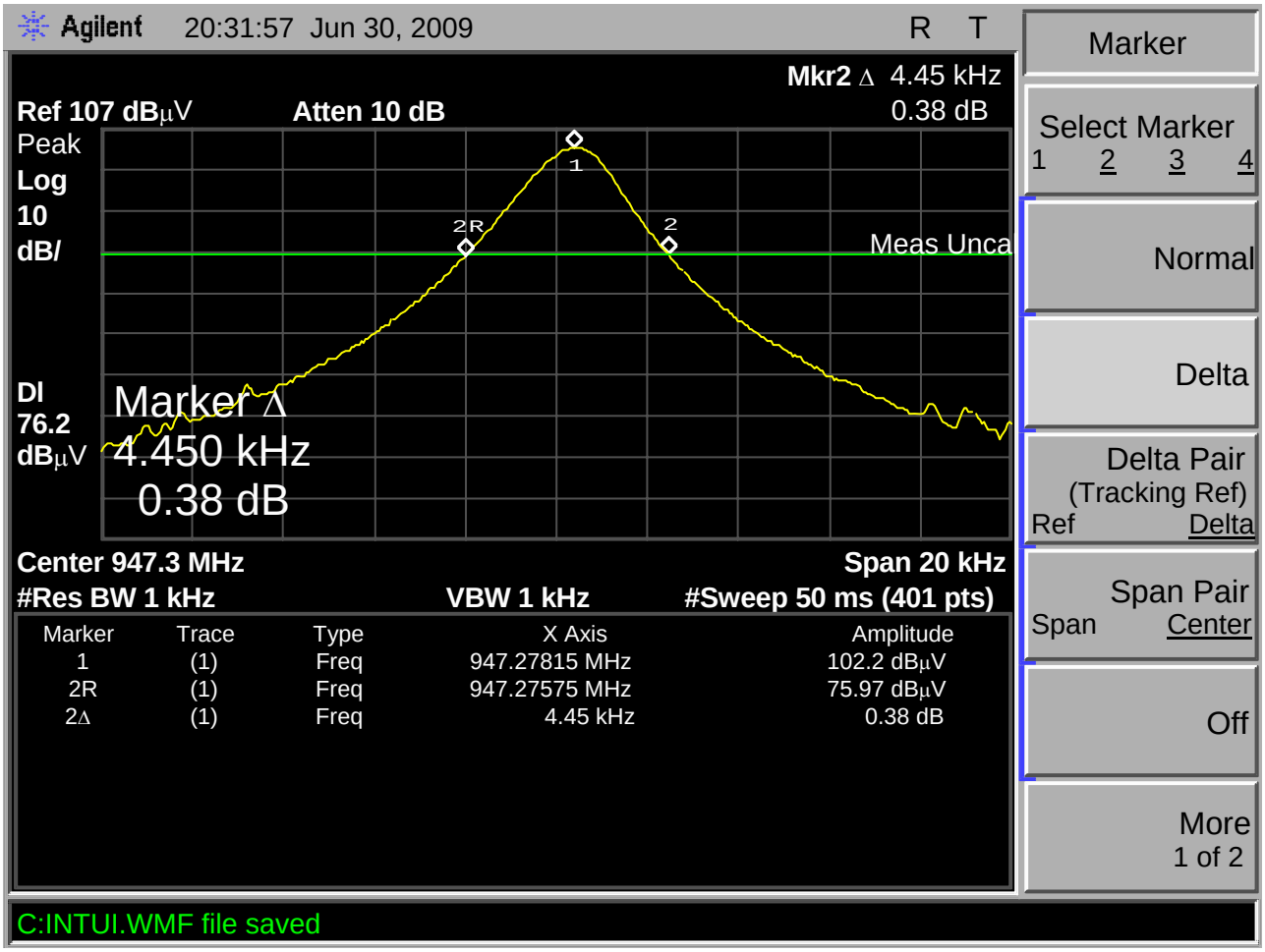
9.4 Measurement Result

Unmodulation

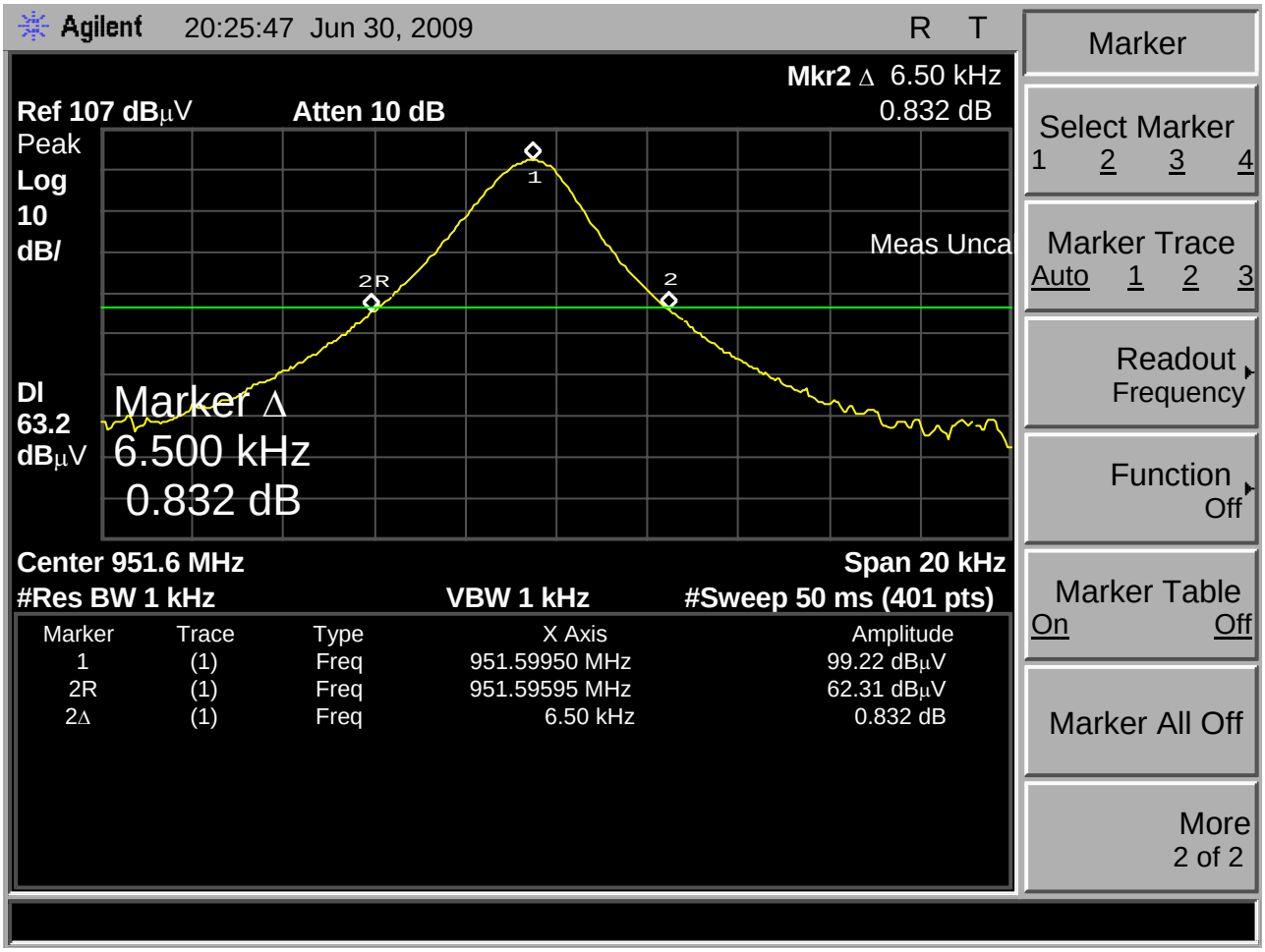
Test Frequency: 944.2MHz



Test Frequency: 947.3MHz

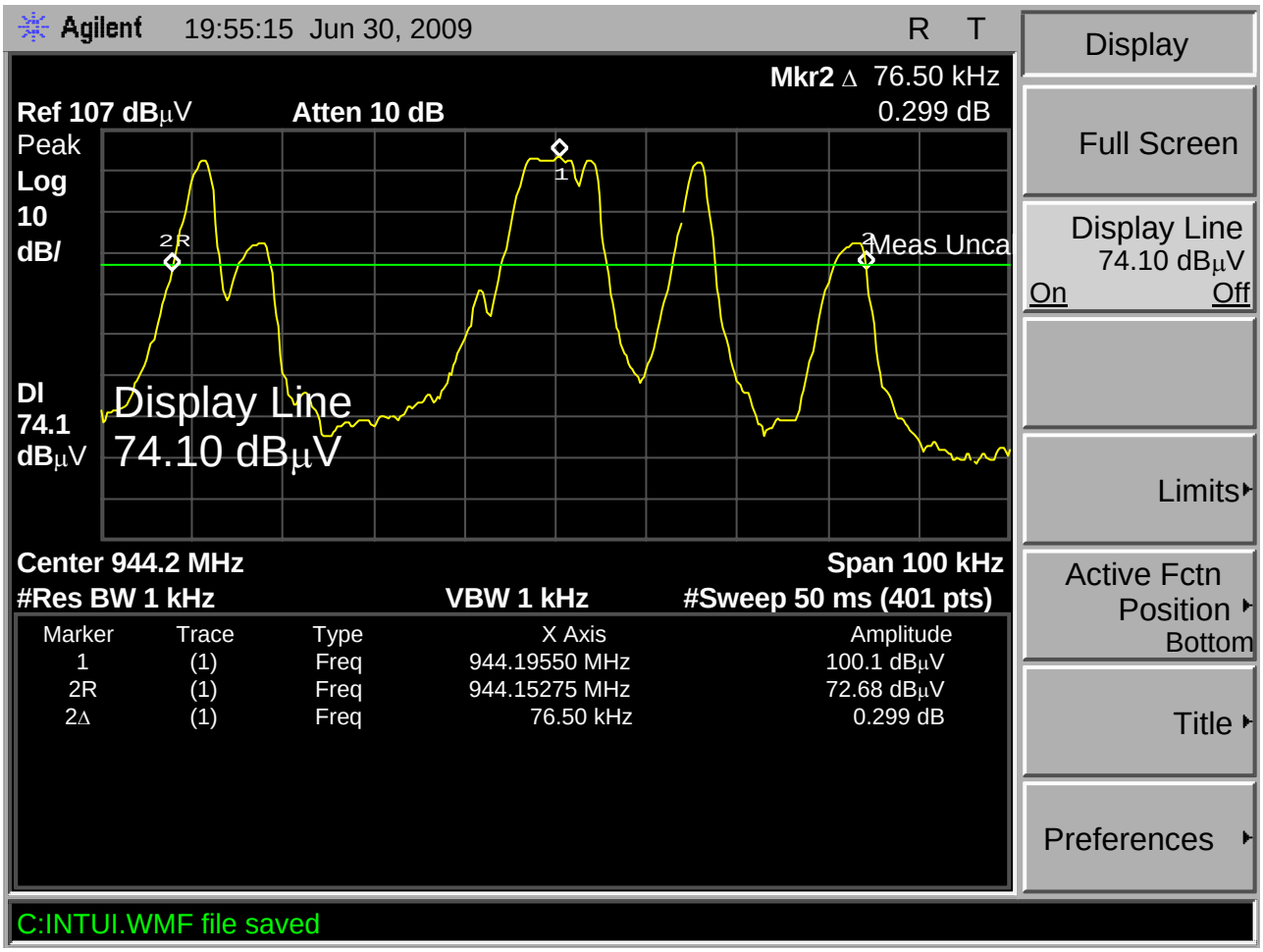


Test Frequency: 951.6MHz

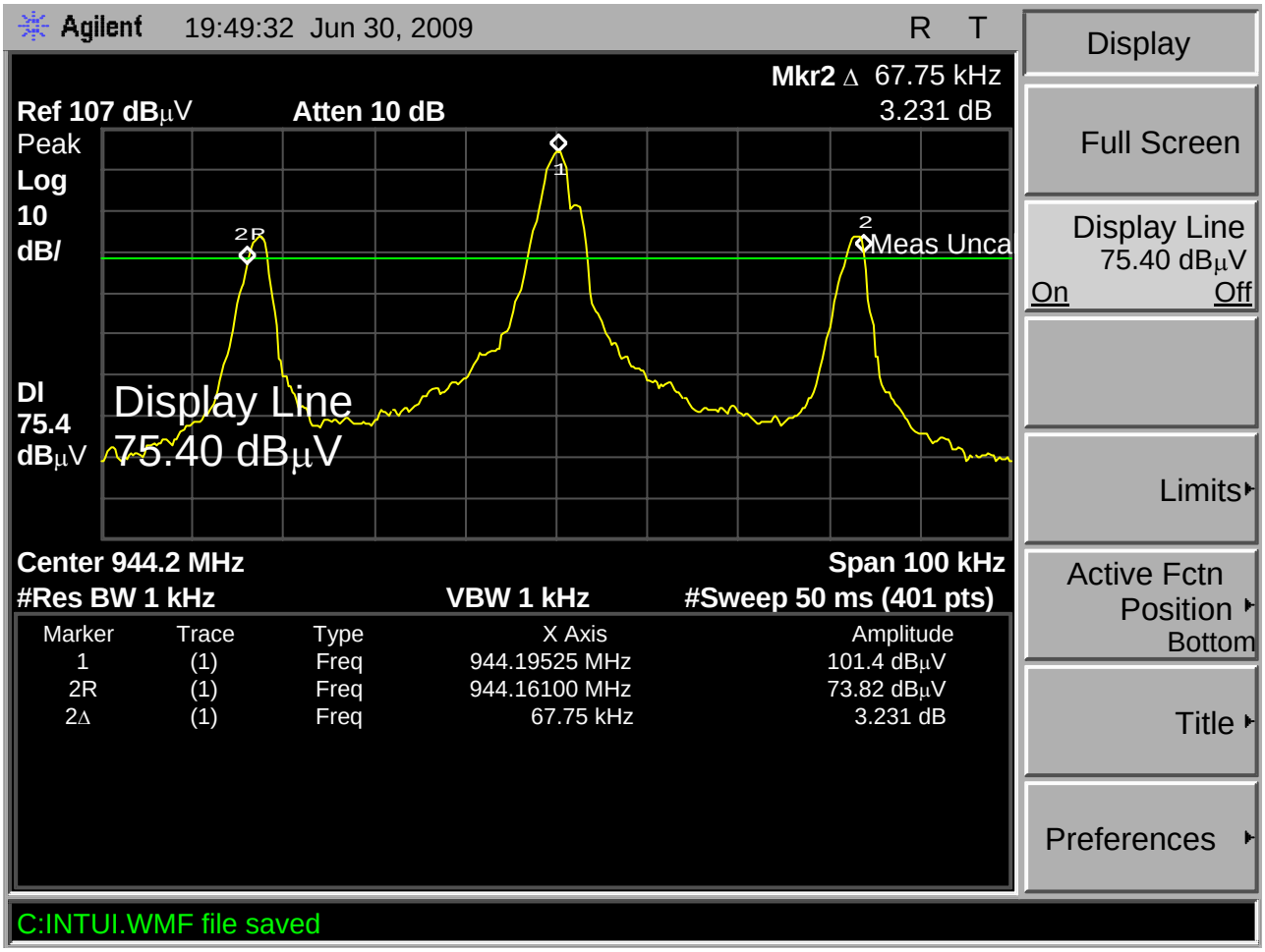


Test Frequency: 944.2MHz

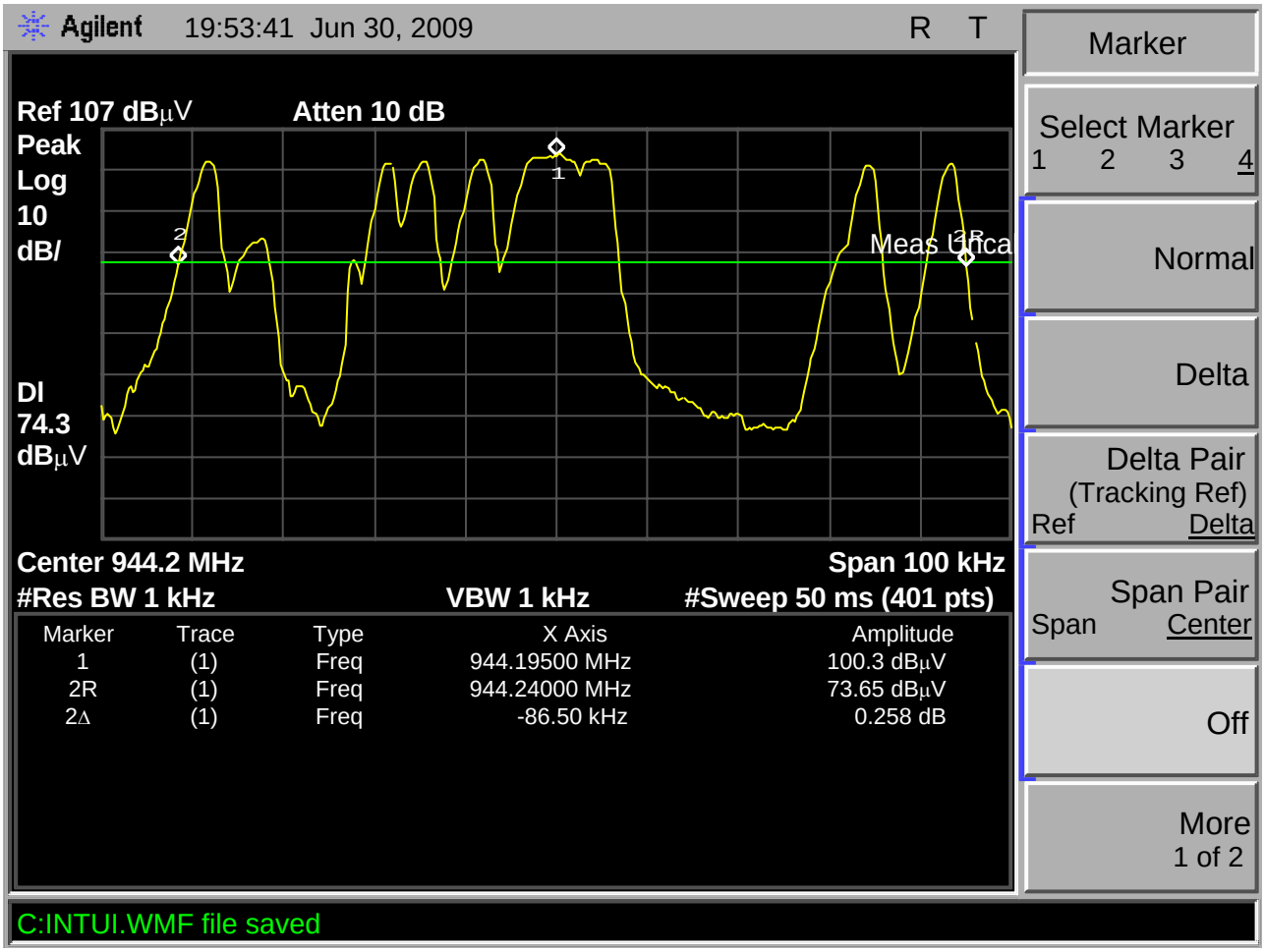
300Hz



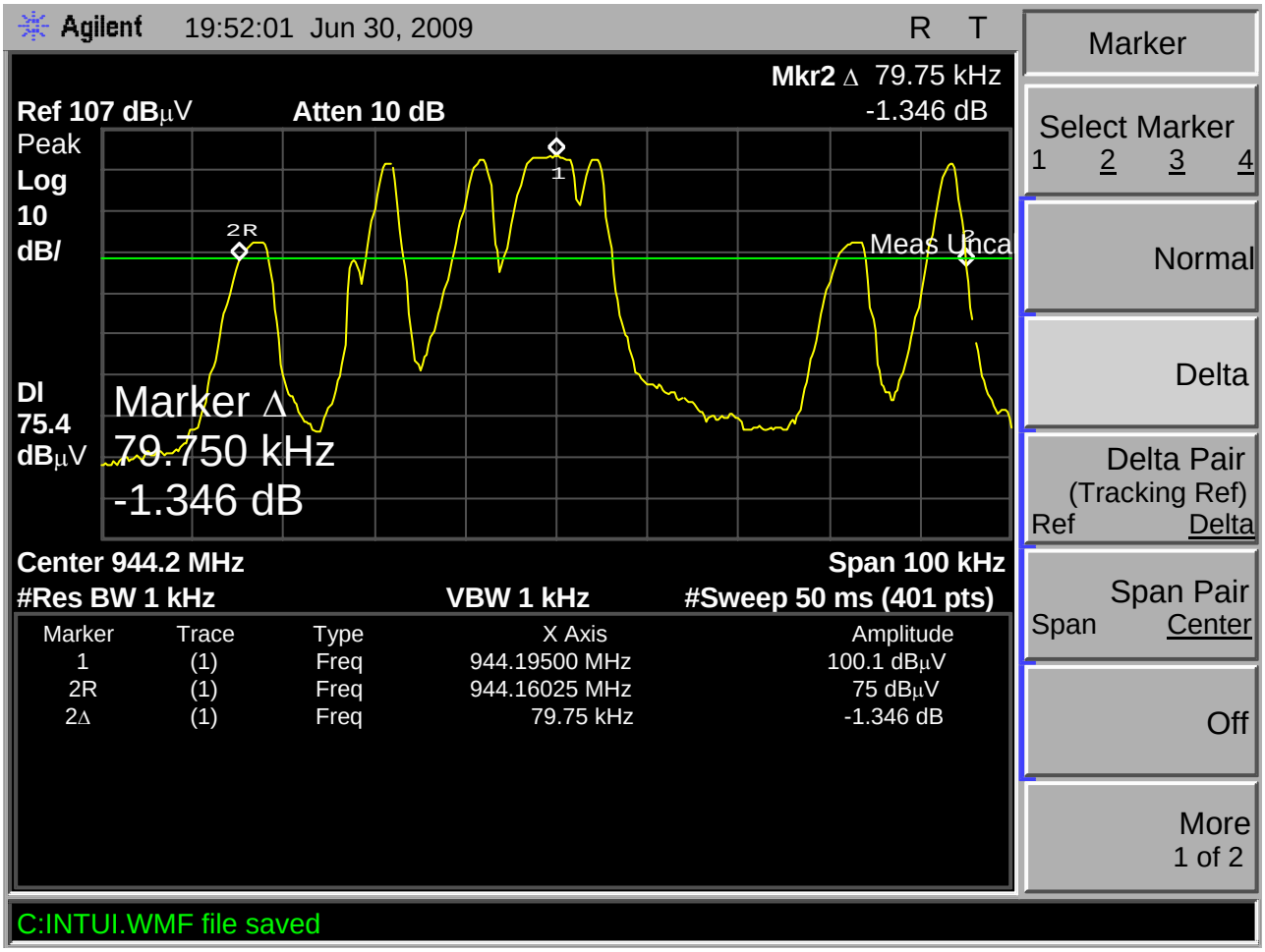
1kHz modulation



1.5kHz modulation

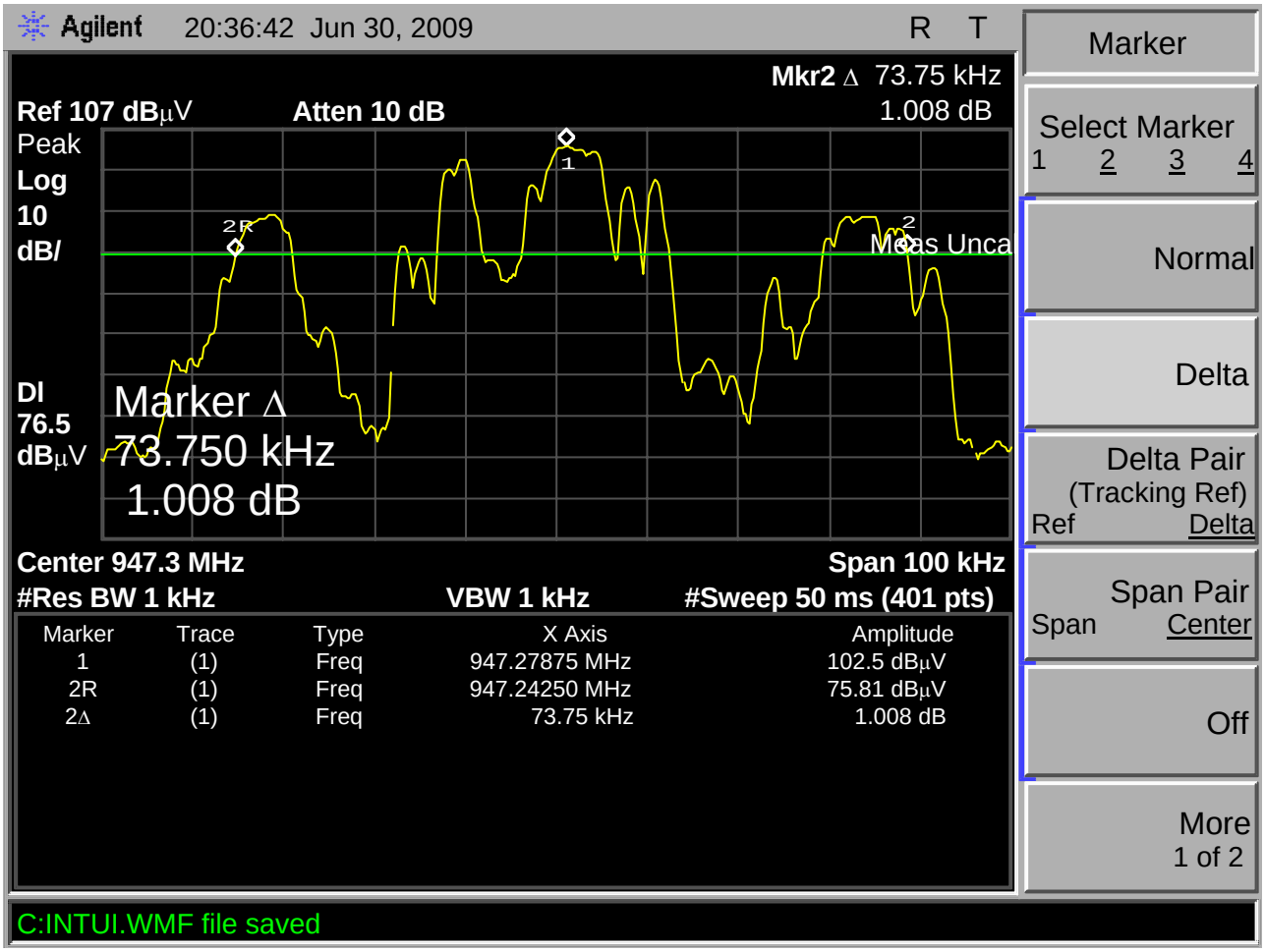


2.5kHz modulation

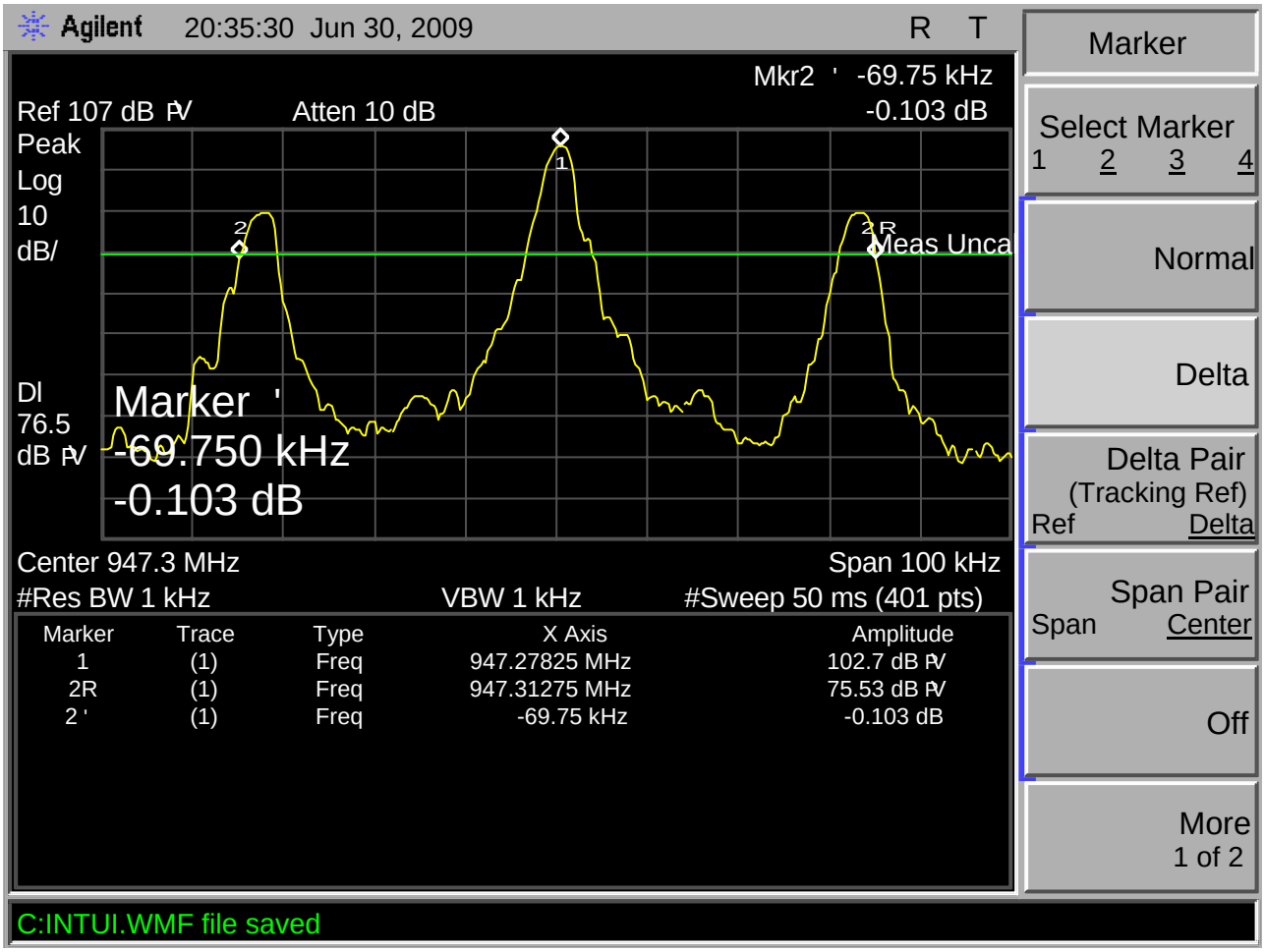


Test Frequency: 947.3MHz

300Hz



1kHz modulation



10.4 Measurement Result

Unmodulated carrier output power is 12.12dBm, or 162.9296(ERP). The limit of spurious or harmonics is calculated as following:
12.12-[43+10log(carrier output power in W)], or -13dBm

Test Frequency: 944.2MHz

Horizontal

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
125.22	-40.13	-13	-27.13
609.48	-37.24	-13	-24.24
1628.19	-38.22	-13	-25.22
2316.56	-35.68	-13	-22.68
4281.74	-39.85	-13	-26.85

Vertical

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
201.71	-42.28	-13	-28.88
426.56	-48.59	-13	-35.59
905.01	-45.25	-13	-32.25
1572.64	-46.46	-13	-33.46
2264.17	-39.33	-13	-26.33

Test Frequency: 947.3MHz

Horizontal

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
125.22	-50.13	-13	-37.13
609.48	-47.24	-13	-34.24
1628.19	-48.22	-13	-35.22
2316.56	-45.68	-13	-32.68
4281.74	-49.85	-13	-36.85

Vertical

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
201.71	-42.28	-13	-38.88
426.56	-48.59	-13	-35.59
905.01	-45.25	-13	-32.25
1572.64	-46.46	-13	-33.46
2264.17	-49.33	-13	-36.33

Test Frequency: 951.6MHz

Horizontal

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
125.22	-40.13	-13	-27.13
609.48	-47.24	-13	-34.24
1628.19	-48.22	-13	-35.22
2316.56	-45.68	-13	-32.68
4281.74	-49.85	-13	-36.85

Vertical

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
201.71	-42.28	-13	-28.88
426.56	-48.59	-13	-35.59
905.01	-45.25	-13	-32.25
1572.64	-46.46	-13	-33.46
2264.17	-49.33	-13	-36.33

11 Frequency Stability Tolerance

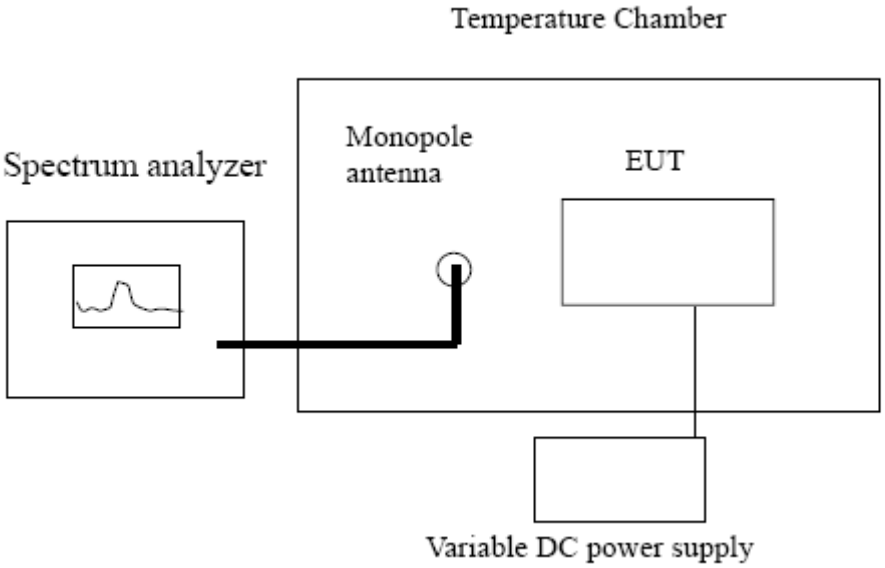
11.1 Rules and Limits

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

11.2 Test Equipment

Please refer to Section 5 this report.

11.3 Temperature Variation Test Procedure



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 -30 to 50 degree centigrade at internals of 10 degree.

11.4 Measurement Result

A plot and table is presented which illustrate compliance with the rule where the center frequency is 944.2MHz，947.3MHz，951.6MHz.

Test Frequency: 944.2MHz

Temperature Variation Table

Temperature(Centigrade)	Frequency (MHz)	Tolerance (MHz)
-30	944.20182	944.15279 to 944.24721
-20	944.19954	
-10	944.20187	
0	944.20875	
10	944.19984	
20	944.19874	
30	944.19985	
40	944.20150	
50	944.19870	

Test Frequency: 947.3MHz

Temperature Variation Table

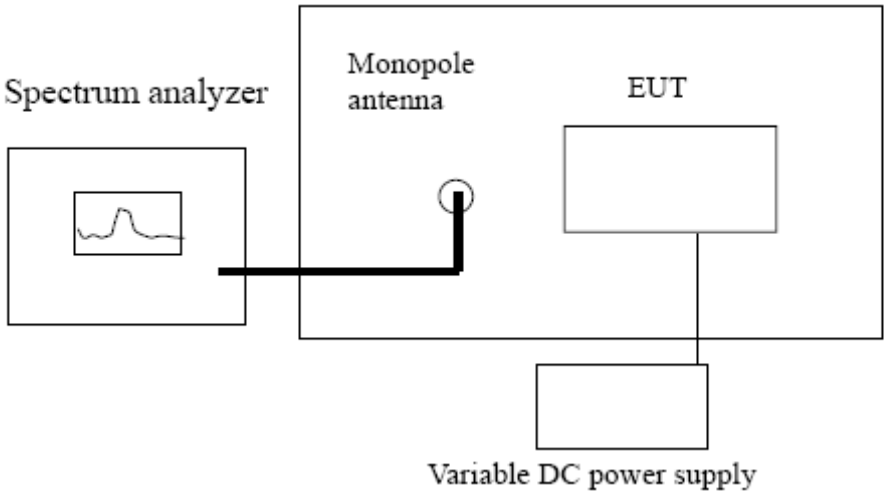
Temperature(Centigrade)	Frequency(MHz)	Tolerance(MHz)
-30	947.29875	947.25262 to 947.34736
-20	947.31251	
-10	947.30202	
0	947.30204	
10	947.29880	
20	947.29875	
30	947.30987	
40	947.29887	
50	947.29989	

Test Frequency: 951.6MHz

Temperature Variation Table

Temperature(Centigrade)	Frequency(MHz)	Tolerance(MHz)
-30	951.59889	951.55242 to 951.64758
-20	951.60205	
-10	951.60201	
0	951.60354	
10	951.60152	
20	951.59987	
30	951.60121	
40	951.59872	
50	951.60184	

11.5 Voltage Variation Test Procedure



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.

11.6 Measurement Result

Frequency Stability of Voltage Variation Measurement Table

Test Frequency: 944.2MHz

Supply Voltage (Volt)	Frequency (MHz)	Tolerance (MHz)
7.65(85%)	944.19875	944.15279
9(100%)	944.19884	to
10.35(115%)	944.19854	944.24721

Test Frequency: 947.3MHz

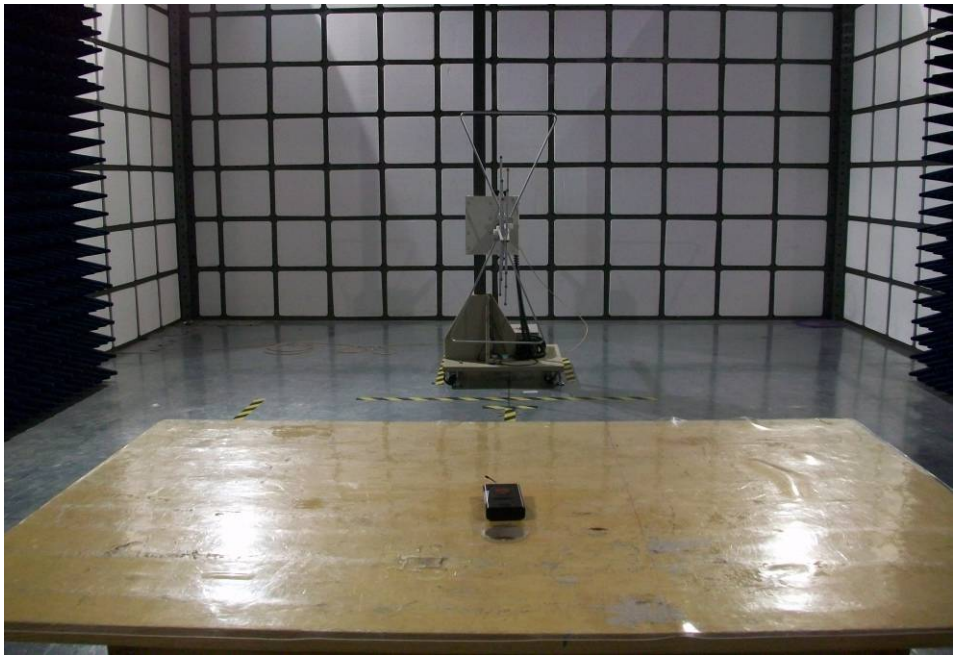
Supply Voltage (Volt)	Frequency (MHz)	Tolerance (MHz)
7.65(85%)	947.31141	947.25262
9(100%)	947.30201	to
10.35(115%)	947.30054	947.34736

Test Frequency: 951.6MHz

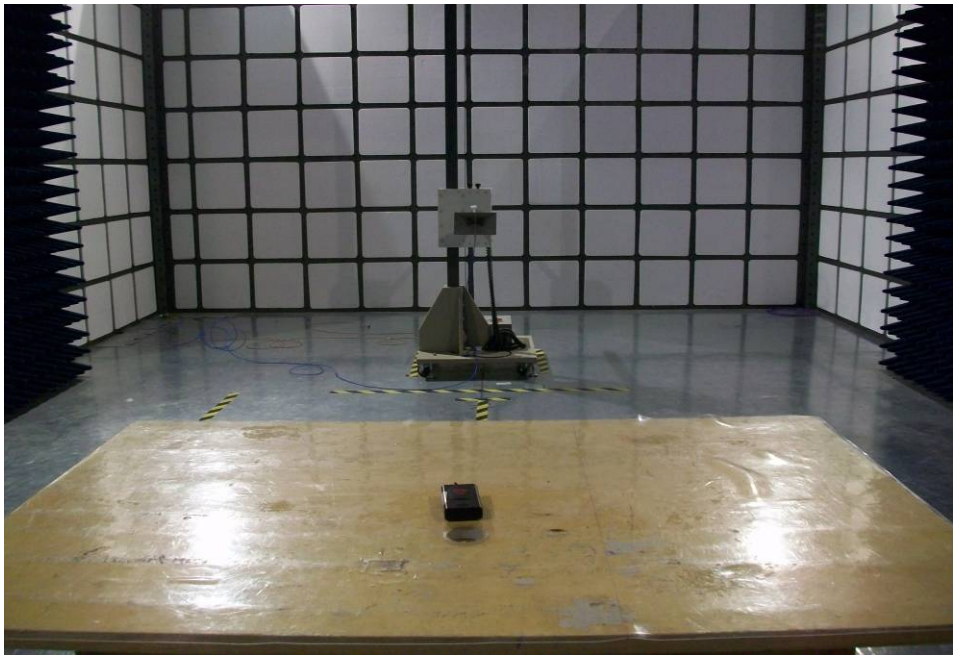
Supply Voltage (Volt)	Frequency (MHz)	Tolerance (MHz)
7.65(85%)	951.60121	951.55242 to 951.64758
9(100%)	951.60072	
10.35(115%)	951.60111	

12 Photographs of Testing

12.1 Radiation Emission Test View For 30MHz-1000MHz



12.2 Radiation Emission Test View For 1GHz-10GHz

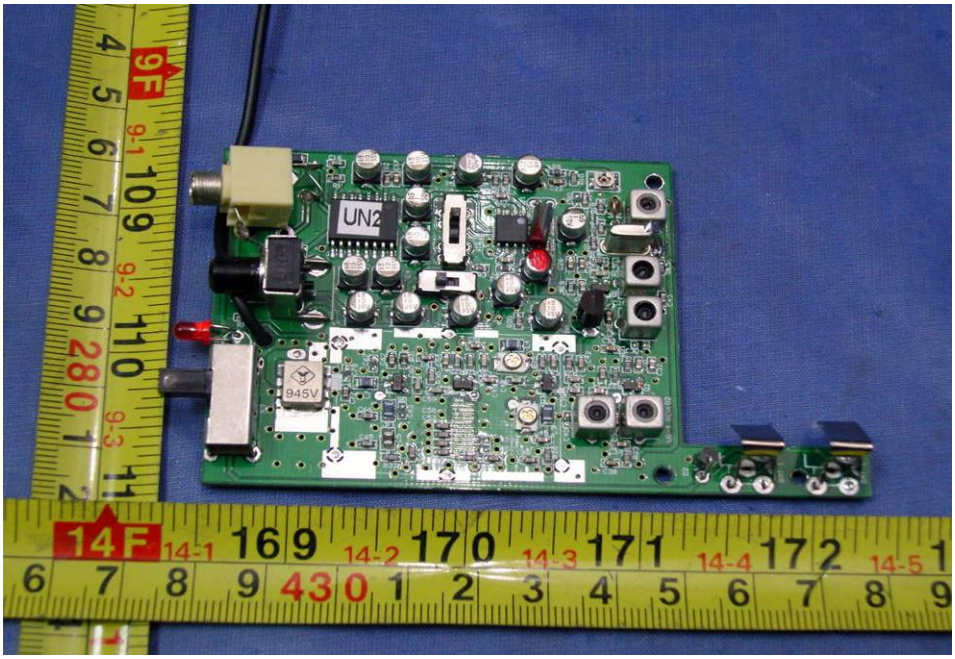


13 Photographs - Constructional Details

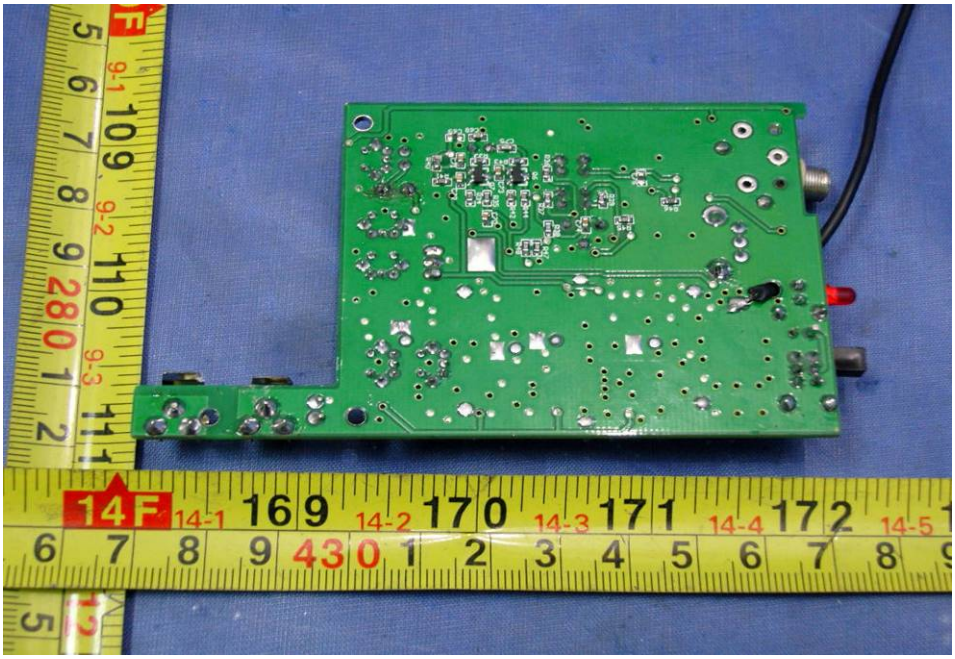
13.1 EUT - Front View

13.2 EUT - Back View

13.3 PCB - Front View

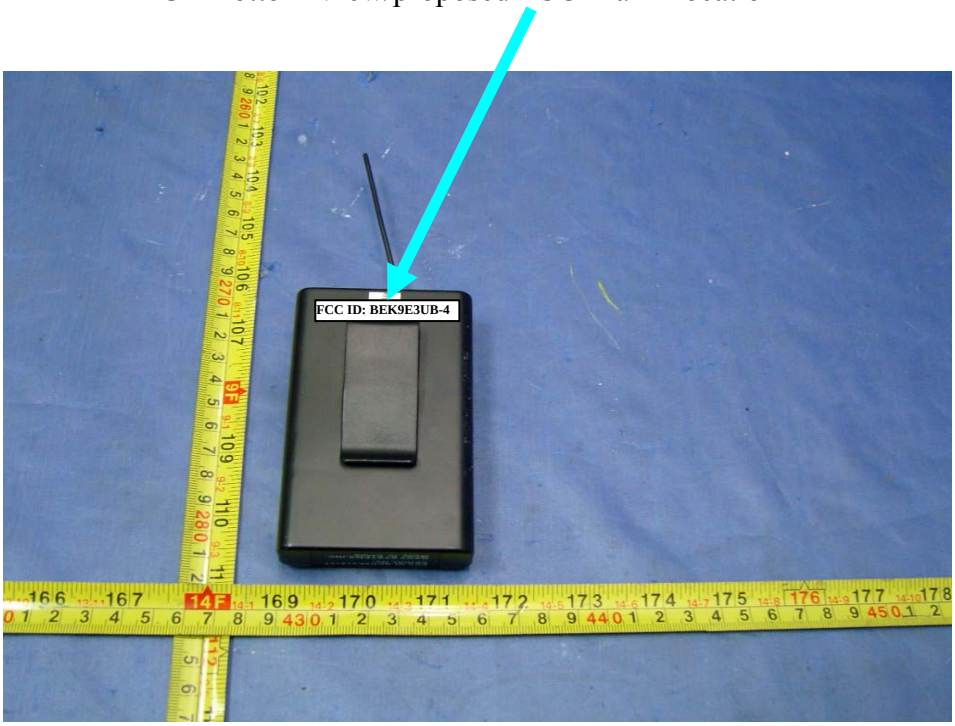


13.4 PCB - Back View



14 FCC ID Label

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT

EUT Bottom View/proposed FCC Mark Location