

FCC TEST REPORT

FCC ID : BEK9E3UH-4

Applicant : Nady Systems Inc

Address : 6701 Bay Street Emeryville California United States

Equipment Under Test (EUT) :

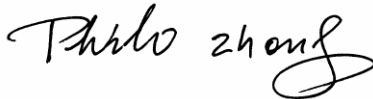
Product description : Wireless Microphone

Model No. : UH-4

Standards : FCC Part 74

Date of Test : June 30 to July 2, 2009

Test Engineer : Olic huang

Reviewed By : 

PERPARED BY:

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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.: UH-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 tests were 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	MY451149 43	W2008001	9k-26.5GHz	Aug-08	Aug-09	Wws200 81596	±1dB
Trilog Broadband Antenne 30-3000 MHz	SCHWARZB ECK MESS-ELEK TROM/ VULB9163	336	W2008002	30-3000 MHz	Aug-08	Aug-09		±1dB
Broad-band Horn Antenna 1-18 GHz	SCHWARZB ECK MESS-ELEK TROM/ 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	SCHWARZB ECK MESS-ELEK TROM/ 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,	SCHWARZB ECK MESS-ELEK TROM/ AK 9515 H	-	-	-	Aug-08	Aug-09		-
10m 50 Ohm Coaxial Cable with N-plug, individual length, usable up to 3(5)GHz, Connector	SCHWARZB ECK MESS-ELEK TROM/ AK 9513				Aug-08	Aug-09		
Positioning Controller	C&C LAB/ CC-C-IF				N/A	N/A		
Color Monitor	SUNSP0/ SP-14C				N/A	N/A		
Test Receiver	ROHDE&SC HWAZ/ ESPI	101155	W2005001	9k-3GHz	Jul-08	Jul-09	Wws200 80942	±1dB
EMI Receiver	Beijingkehuan	KH3931		9k-1GHz	Aug-08	Aug-09		
Two-Line V-Network	ROHDE&SC HWAZ/ ENV216	100115	W2005002	50Ω/50μH	Jul-08	Jul-09	Wws200 80941	±10%
V—LISN	SCHWARZB ECK 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&SC HWAZ/ MDS-21	100205	W2005003	impedance 50 Ω loss : 17 dB	Jul-08	Jul-09	Wws200 80943	± 1 dB
10m 50 Ohm Coaxial Cable with N-plug, individual length, usable up to 3(5)GHz, Connectors	SCHWARZB ECK MESS-ELEK TROM/ AK 9514				Aug-08	Aug-09		
Digital Power Analyzer	Em Test AG/Switzerland/ DPA 500	V07451 03095	W2008012	Power: 2000VA Vol-range: 0-300V Freq_range: 10-80Hz	Aug-08	Aug-09	Wwd200 81185	Voltage distinguish: 0.025% Power_freq distinguish: 0.02Hz
Power Source	Em Test AG/Switzerland/ ACS 500	V07451 03096	W2008013	Vol-range: 0-300V Power_freq: 10-80Hz				
Electrostatic Discharge Simulator	Em Test AG/Switzerland/ DITO	V07451 03094	W2008005	Contact discharge: 500V-10KV Air discharge: 500V-16.5KV	Aug-08	Aug-09	Wwc200 82400	7.5A current will be changed in $V_m=1.5V$
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Freq-range: 9K-1GHz RF voltage: -60 dBm-+10dBm	Aug-08	Aug-09	Wws200 81890	Power_freq distinguish: 0.1Hz RFelectricity distinguish 0.1 B
CDN M-Type	TESEQ GmbH/ CDN M016	25112	W2008009	Voltage correct factor 9.5 dB	Aug-08	Aug-09	Wwc200 82396	150K-80MHz: ± 1 dB 80-230MHz: -2-+3dB
EM-Clamp	TESEQ GmbH/ KEMZ 801	25453	W2008010	Freq_range: 0.15-1000 MHz	Aug-08	Aug-09	Wwc200 82397	0.3-400 MHz: ± 4 dB Other freq: ± 5 dB
Attenuator 6dB	TESEQ GmbH/ ATN6050	25365			Aug-08	Aug-09	Wws200 81597	
All Modules Generator	SCHAFFNER/ 6150	34579	W2008006	voltage: 200V-4.4KV Pulse current: 100A-2.2KA	Aug-08	Aug-09	Wwc200 82401	voltage: $\pm 10\%$ Pulse current: $\pm 10\%$
Capacitive Coupling Clamp	SCHAFFNER/ CDN 8014	25311			Aug-08	Aug-09	Wwc200 82398	-

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	1.2/50 μ S	Aug-08	Aug-09	Wwc20082399	-
AC Power Supply	TONGYUN/DTDGC-4				Aug-08	Aug-09	Wws20080944	-
Exposure Level Tester ELT-400	Narda Safety TEST Solutions/2304/03	M-0155	w2008022	Test freq range: 1 — 400kHz	Aug-08	Aug-09	Wwd20081191	Test uncertainty: 1 — 120kHz: $\pm$ 1.83%, 120 kHz-400 kHz: $\pm$ 4.06%
Magnetic Field Probe 100cm ²	Narda Safety TEST Solutions/2300/90.10	M-1070	w2008021	Test freq range: 1 — 400kHz				Test uncertainty: 1Hz-10Hz: $\pm$ 16.2%, 10Hz -120kHz: $\pm$ 2.2%, 120 kHz-400 kHz: $\pm$ 4.7%
Active Loop Antenna Charger 10kHz-30MHz	Beijing Dazhi / ZN30900A	-	-	10kHz-30MHz	Aug-08	Aug-09		$\pm$ 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

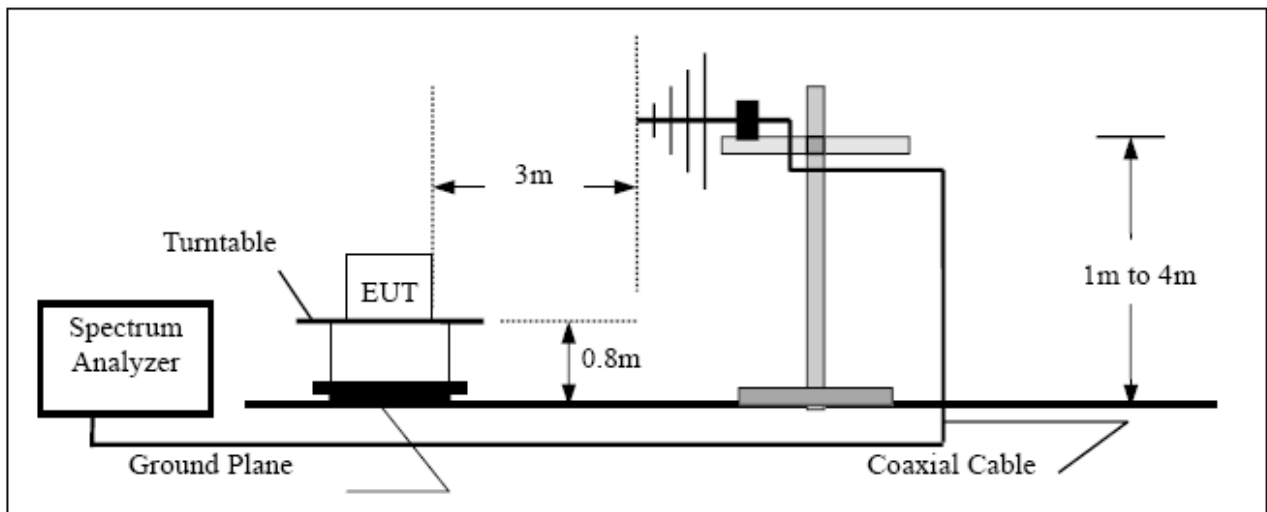
74.861(e)(1): the power of the measured un-modulated carrier power at output of the transmitter power amplifier (antenna input power) may not exceed the following:

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 handheld 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.

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

7.5 Measurement Result

Test Frequency: 944.2MHz

Antenna Polarity	Spectrum Reading (dBm)	E.R.P. (mW)	Limit (W)
V	12.23	16.71	0.25
H	11.65	14.62	

Test Frequency: 947.3MHz

Antenna Polarity	Spectrum Reading (dBm)	E.R.P. (mW)	Limit (W)
V	12.12	16.29	0.25
H	12.01	15.88	

Test Frequency: 951.6MHz

Antenna Polarity	Spectrum Reading (dBm)	E.R.P. (mW)	Limit (W)
V	12.03	15.96	0.25
H	11.86	15.35	

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

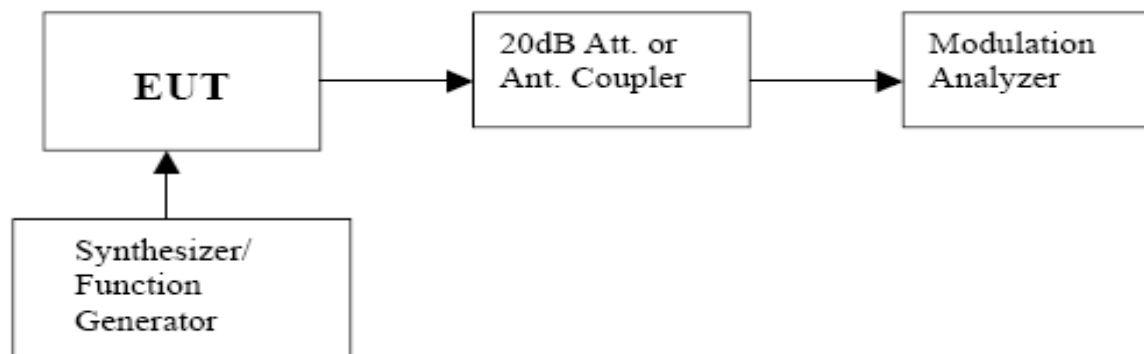
Any form of modulation may be used. A maximum deviation of $\pm 75\text{KHz}$ is permitted when frequency modulation is employed.

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

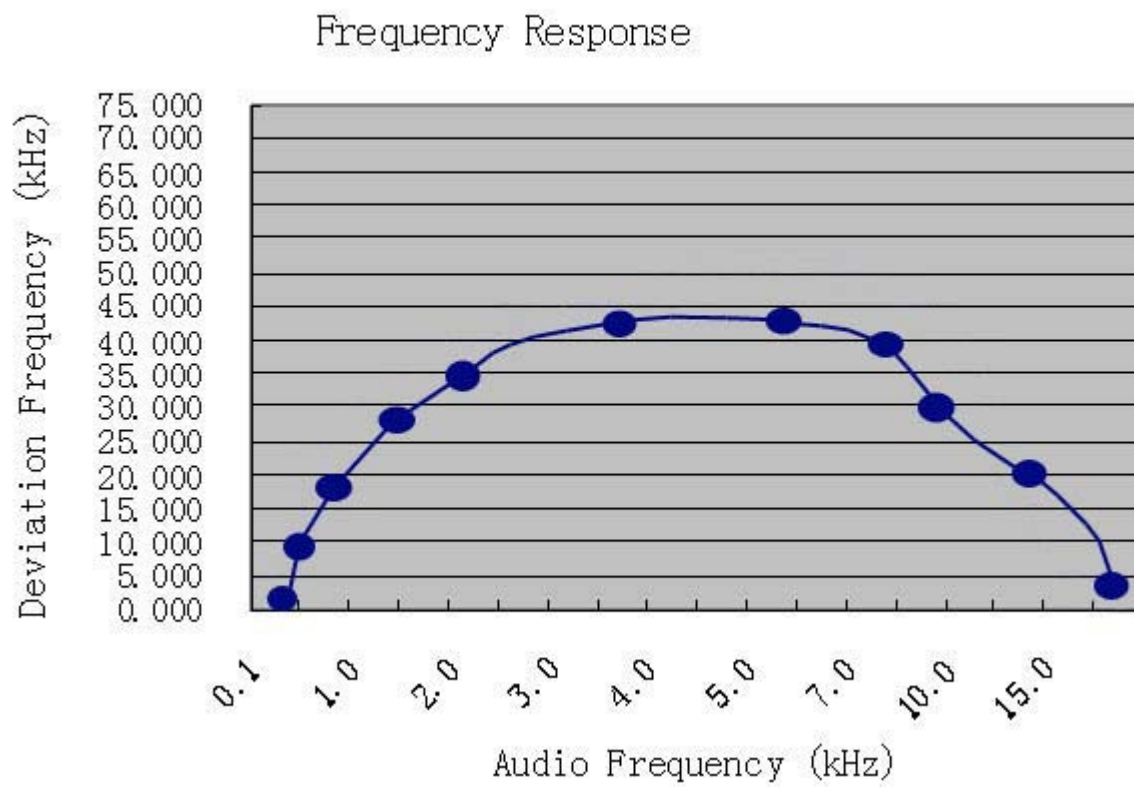


2.1047(a)

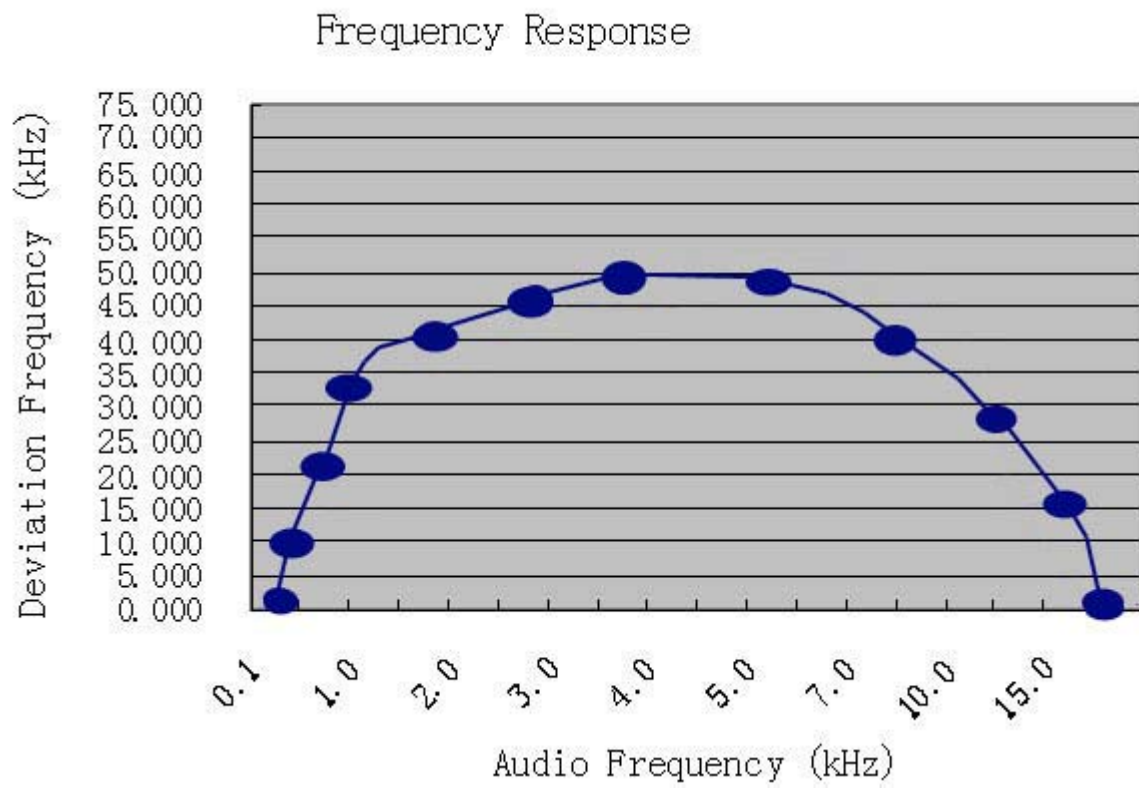
1. The EUT and test equipment were set up as shown on the above graph.
2. Adjust the audio input for 20% of rated system deviation at 1KHz using this level as a reference (0dB) .
3. Vary the audio frequency from 100Hz to 15000Hz

8.5 Measurement Result

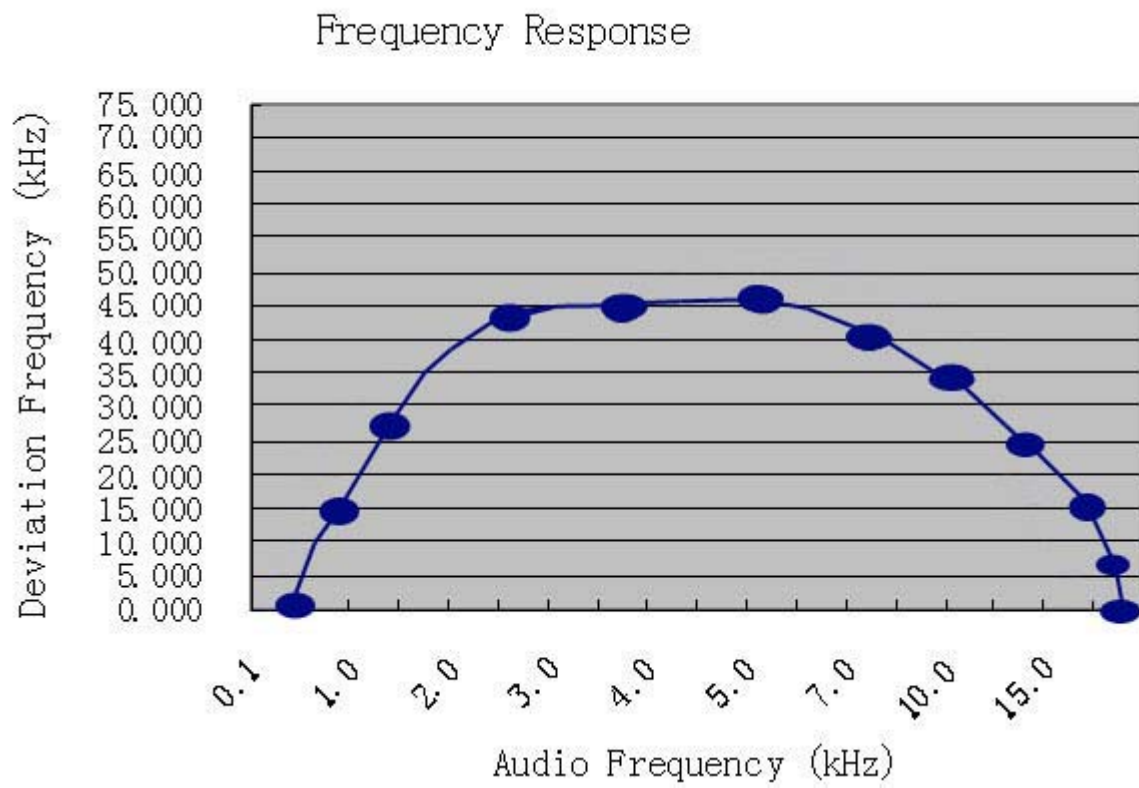
Test Frequency: 944.2MHz



Test Frequency: 947.3MHz



Test Frequency: 951.6MHz



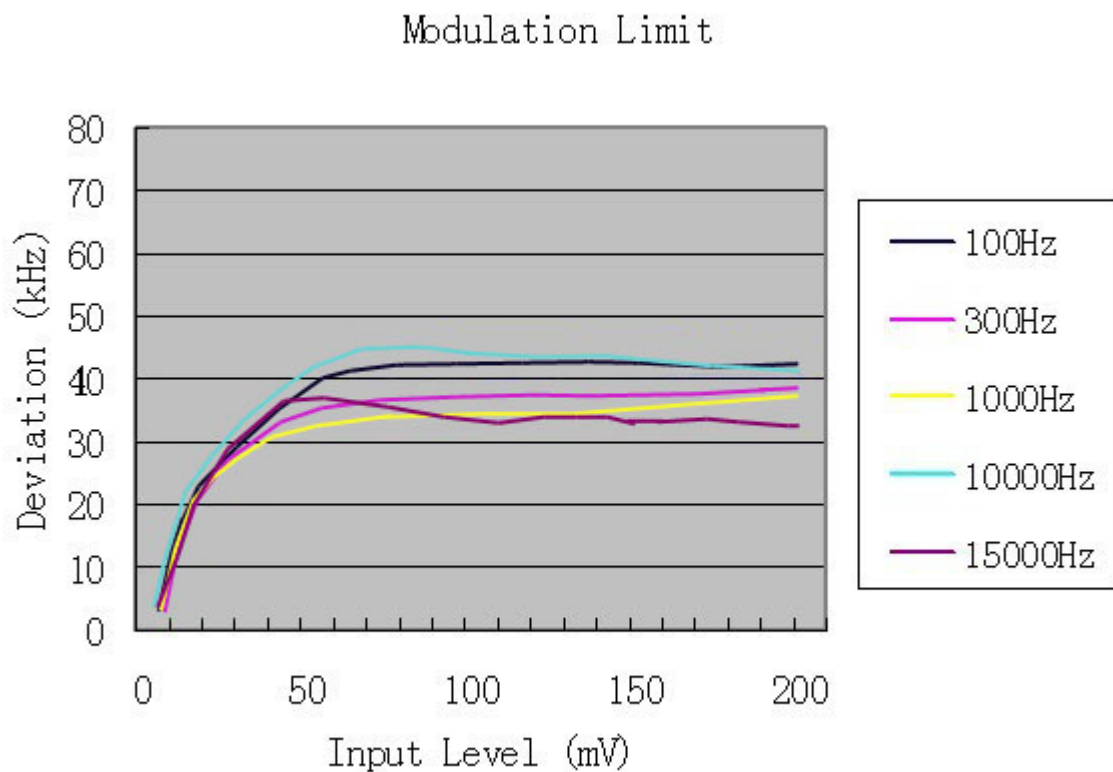
8.6 Modulation Limiting Measurement Condition & Setup

2.1047(b)

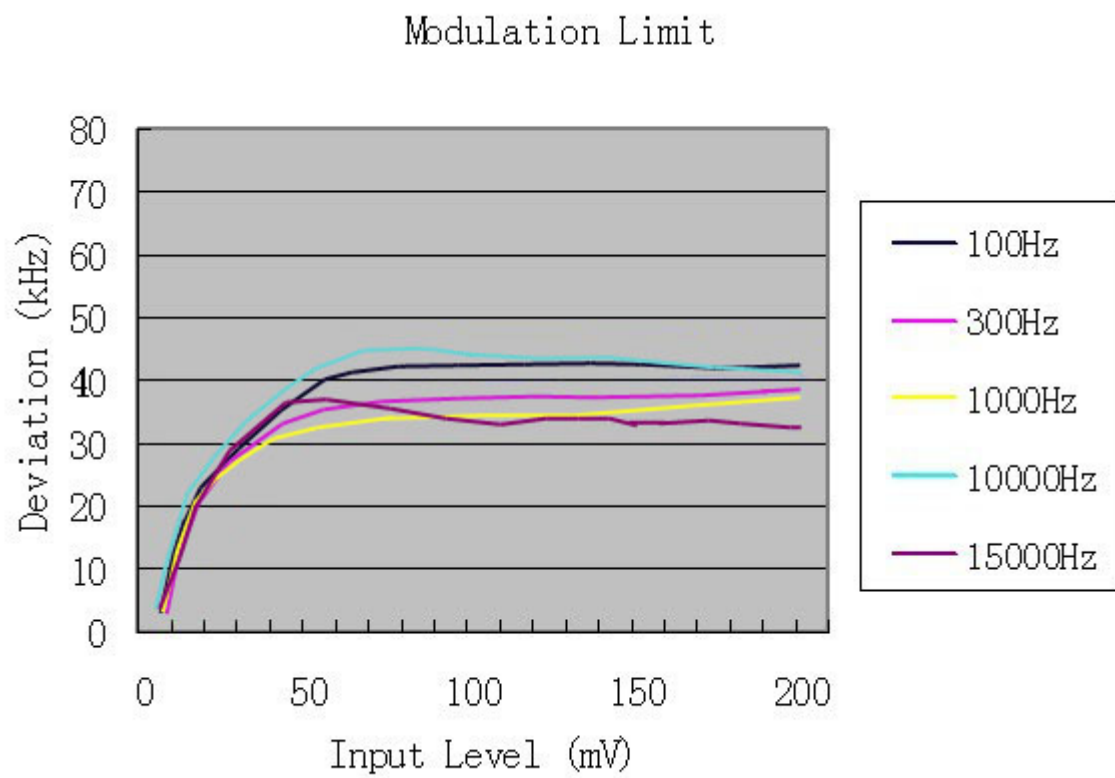
1. The Plus/Function generator was connected to the microphone of EUT, via an artificial mouth simulator.
2. Adjust the audio input frequency from 100Hz to 15000 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective 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

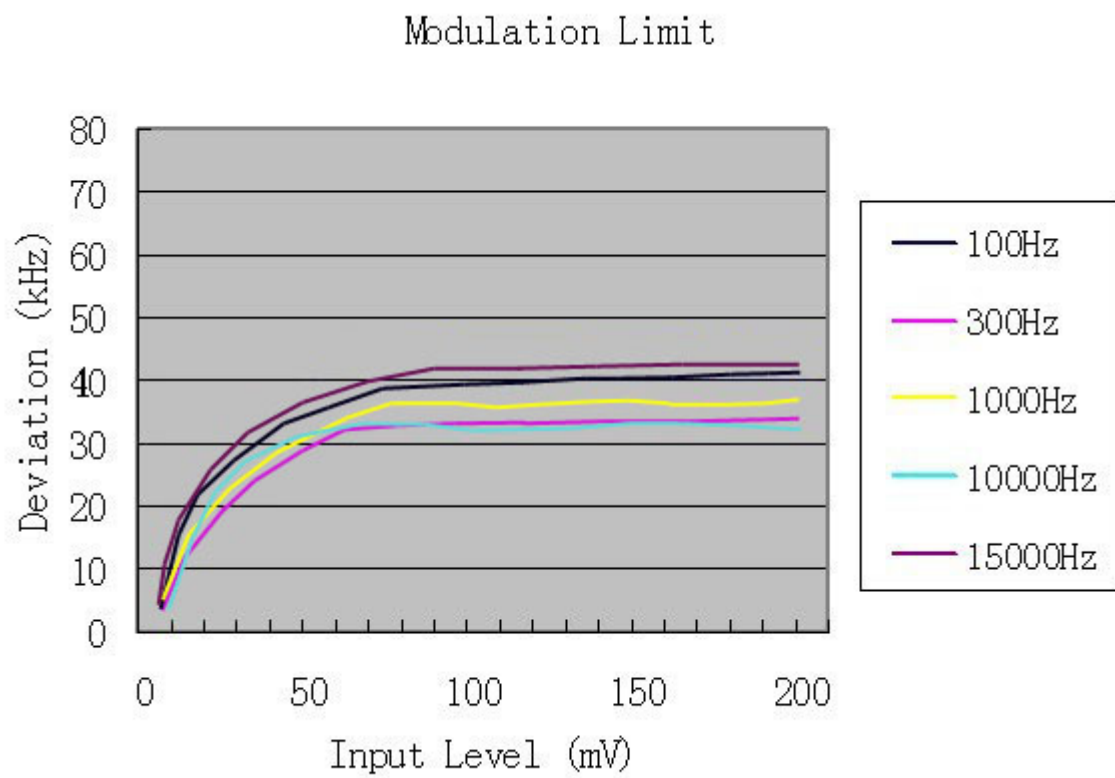
Test Frequency: 944.2MHz



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

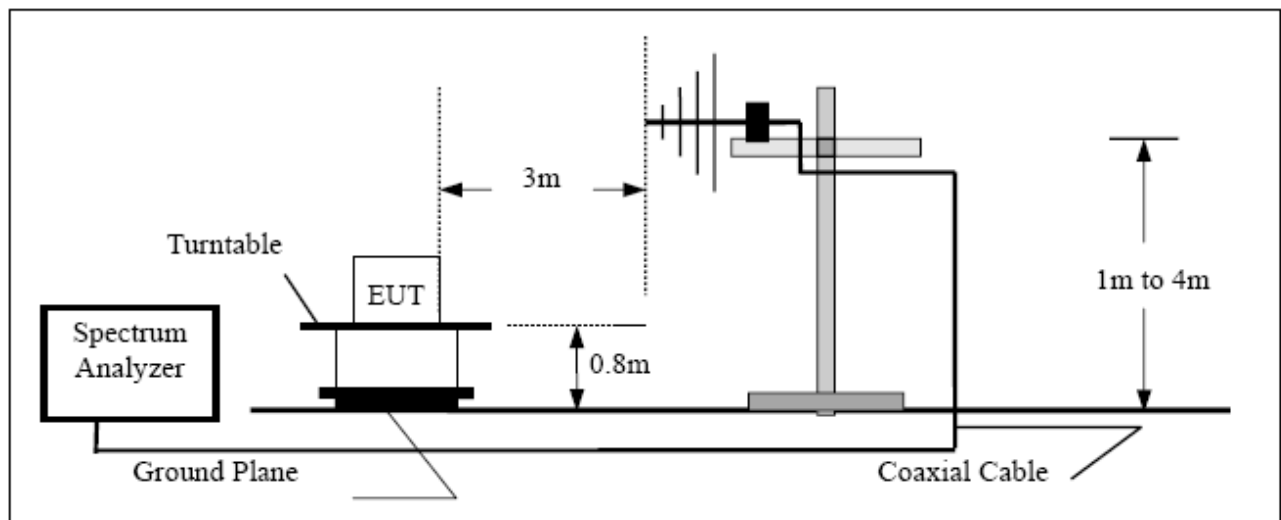
74.861(e)(3): Any form of modulation may be used. A maximum deviation of $\pm 75\text{kHz}$ is permitted when frequency modulation is employed.

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

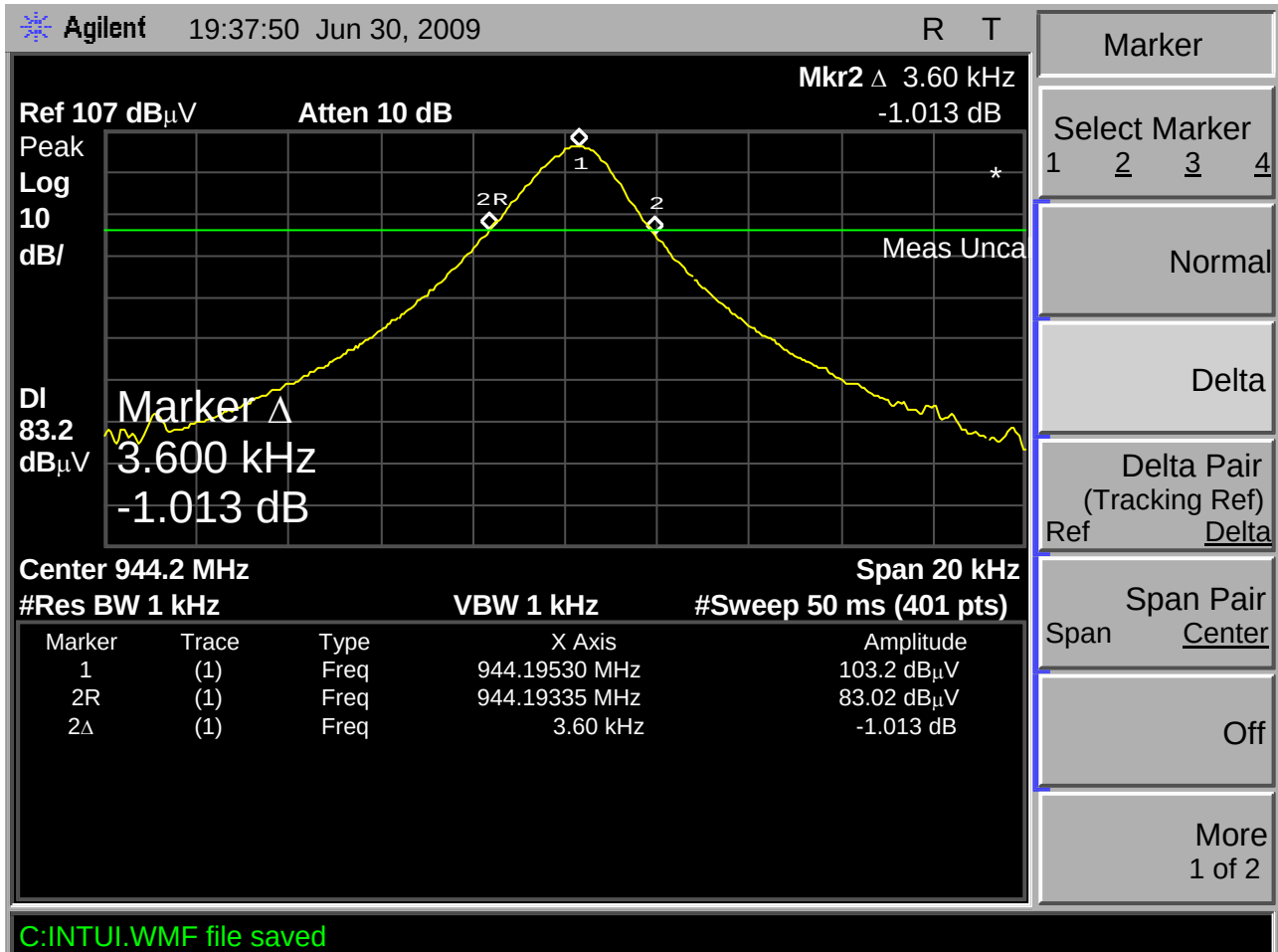


1. Connect the EUT as above graph.
2. Plot the unmodulated chart shows on spectrum.
3. Set the output of the signal generator to 300Hz, 1kHz, 1.5kHz, 2.5kHz. Increase the amplitude of the signal, while monitoring the modulation meter. Until modulation is maximum measure the bandwidth under 26dB compared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

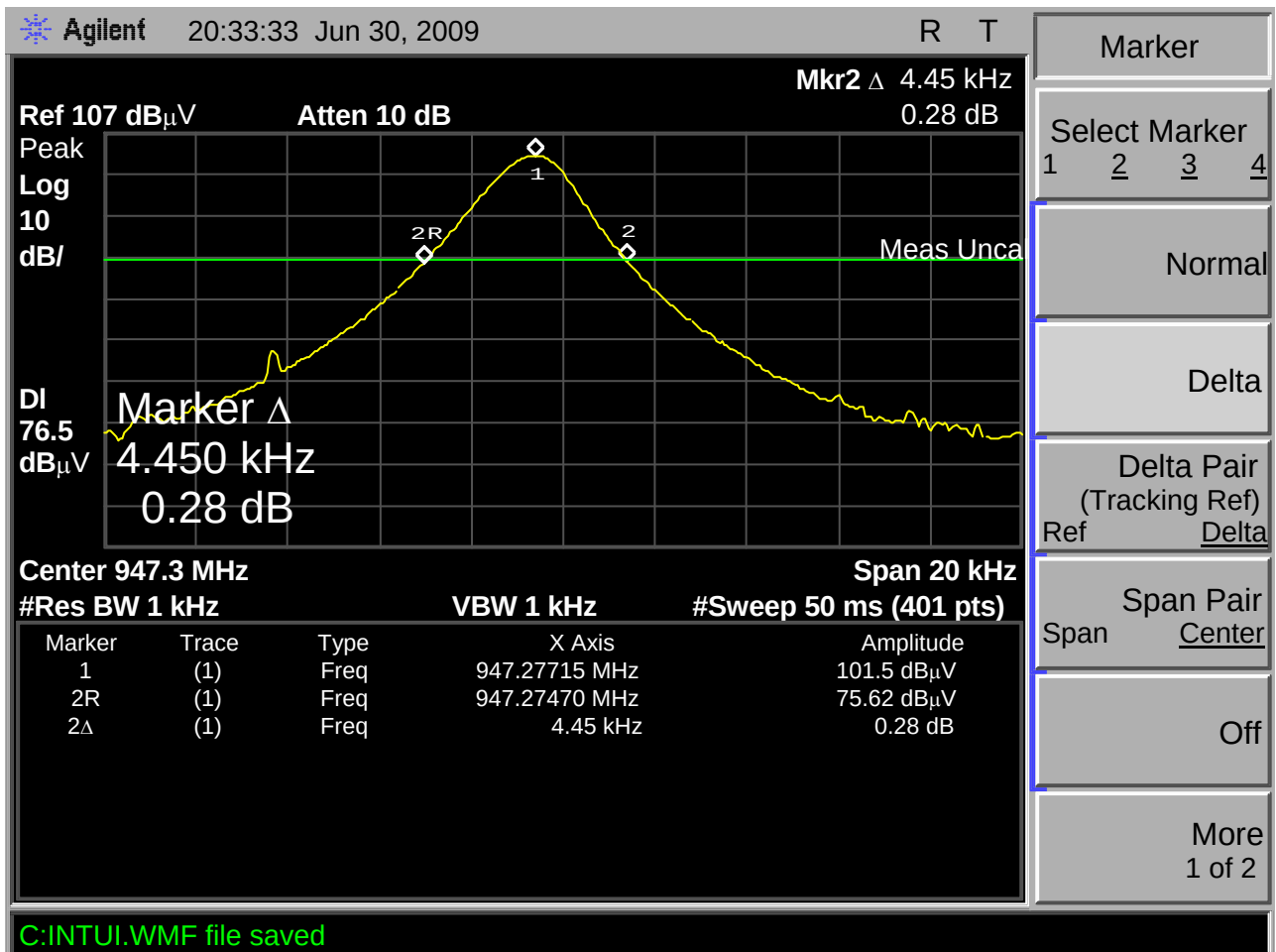
9.4 Measurement Result

Unmodulation

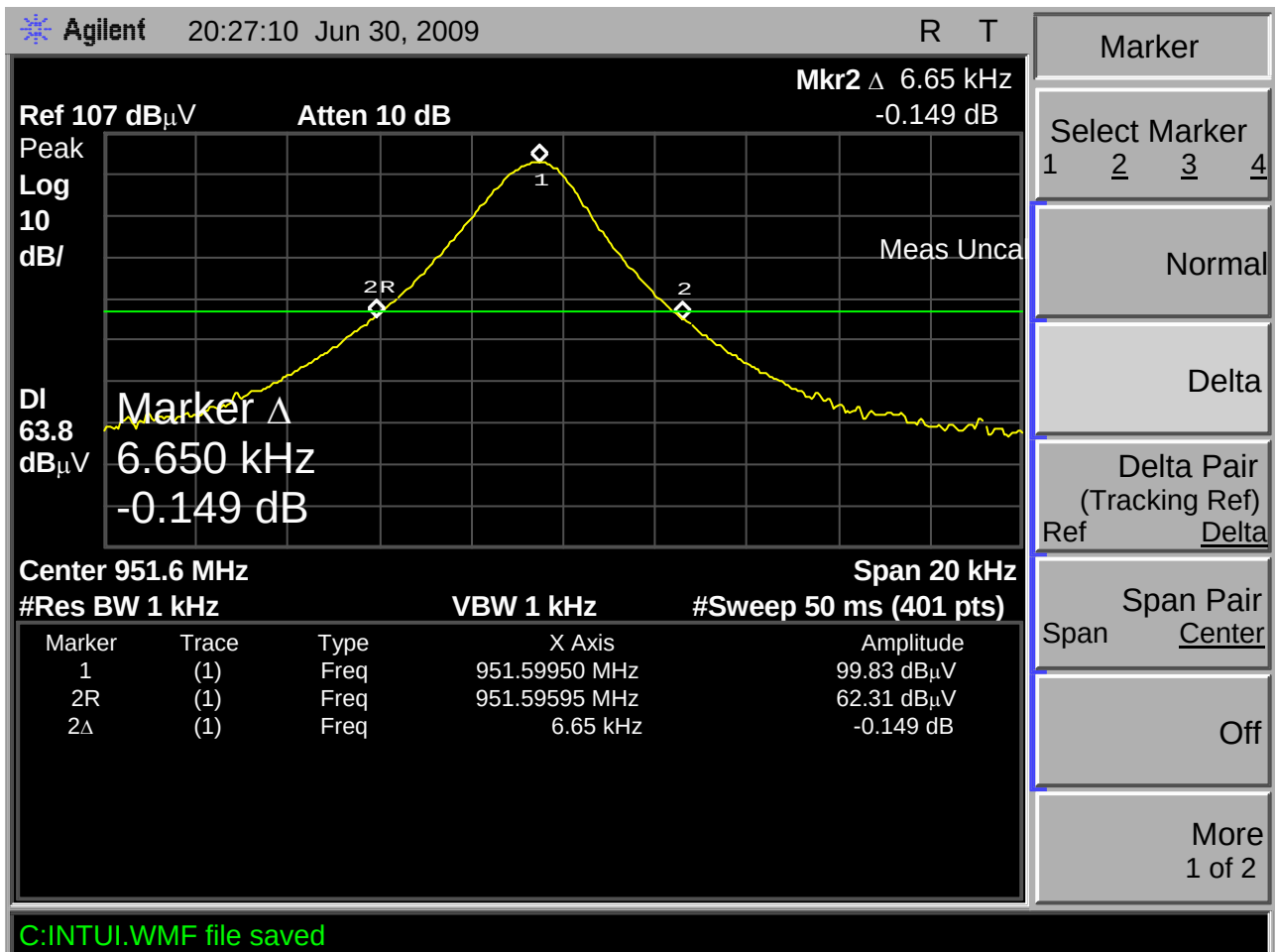
Test Frequency: 944.2MHz



Test Frequency: 947.3MHz

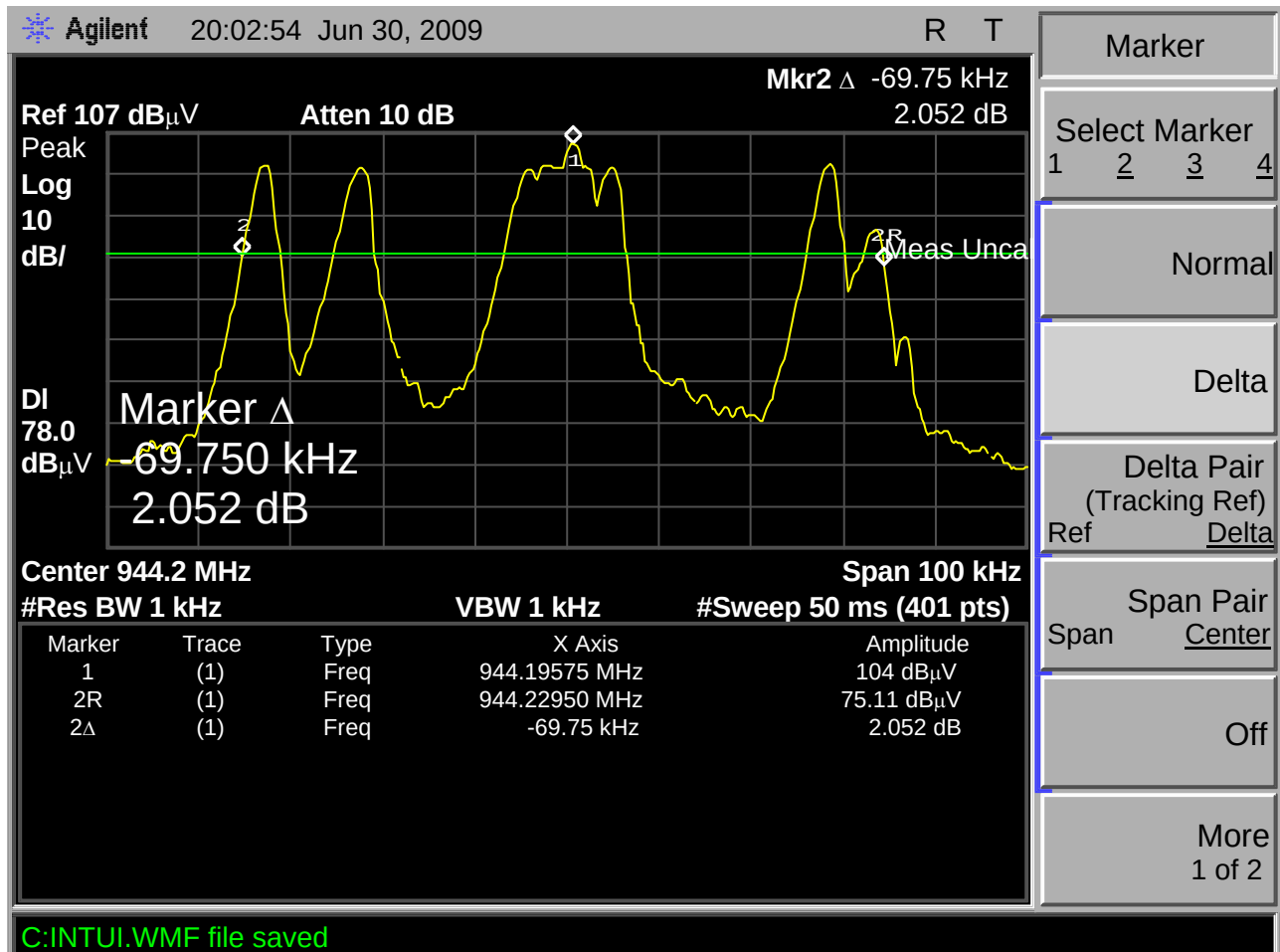


Test Frequency: 951.6MHz

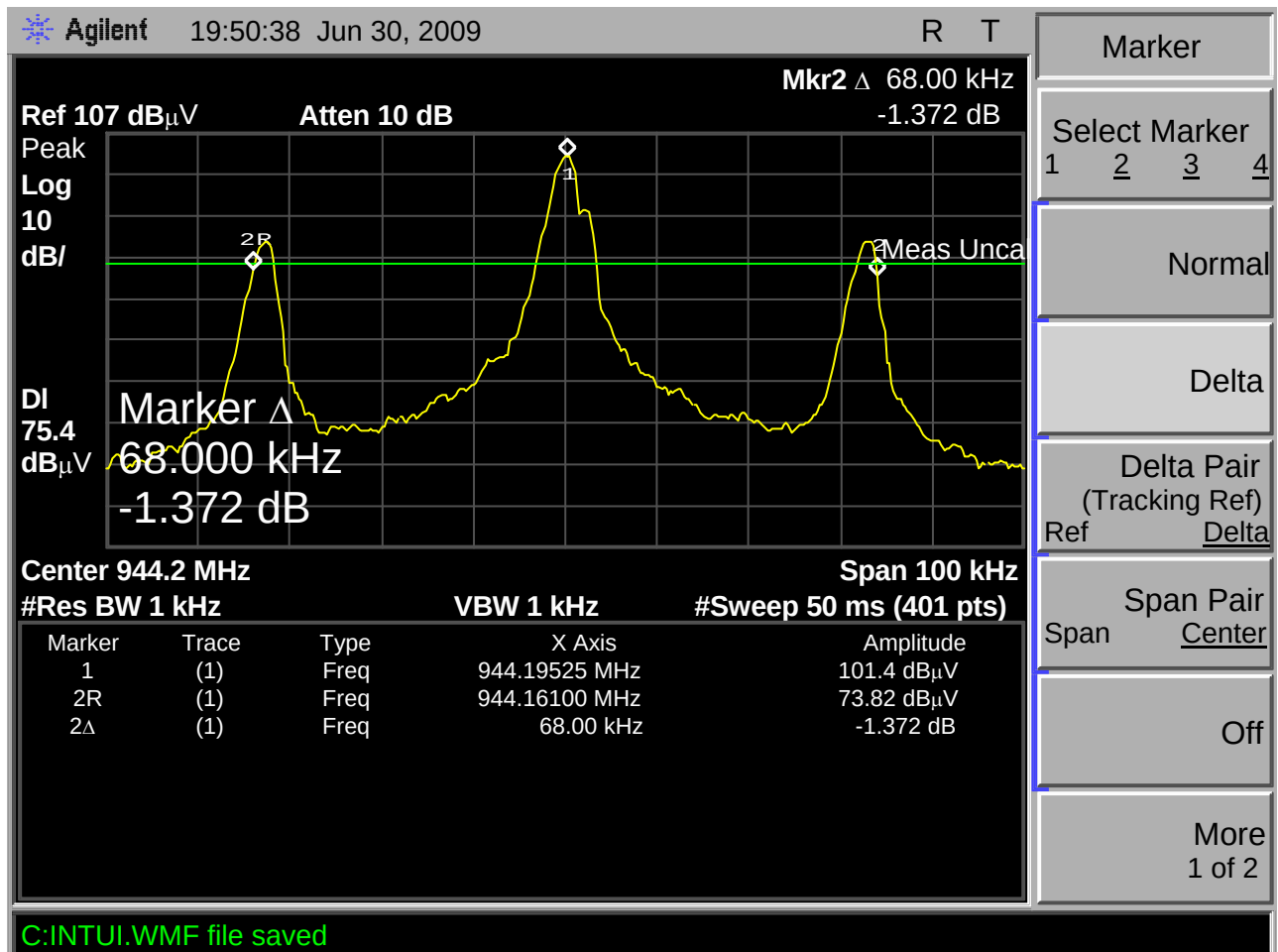


Test Frequency: 944.2MHz

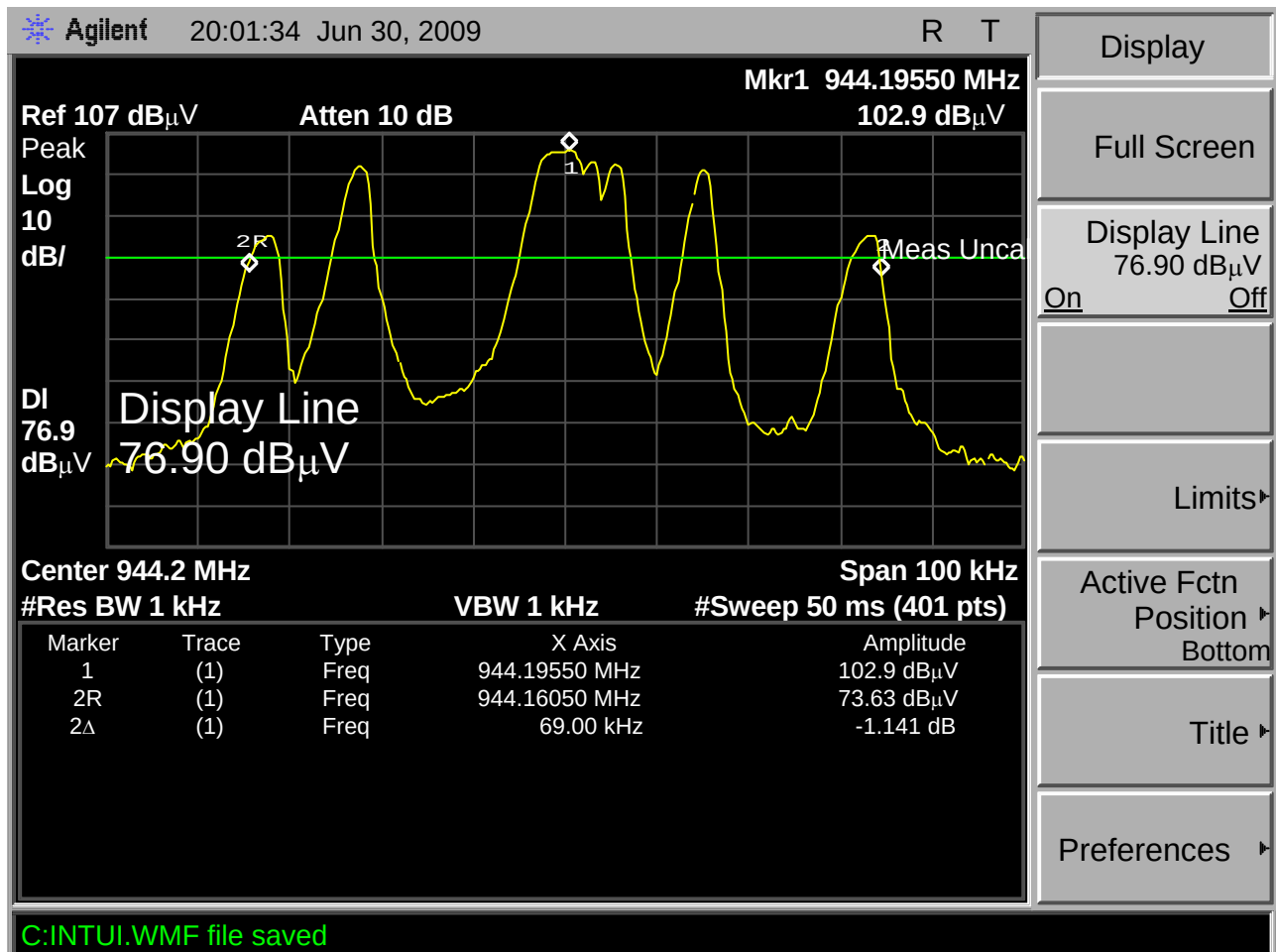
300Hz



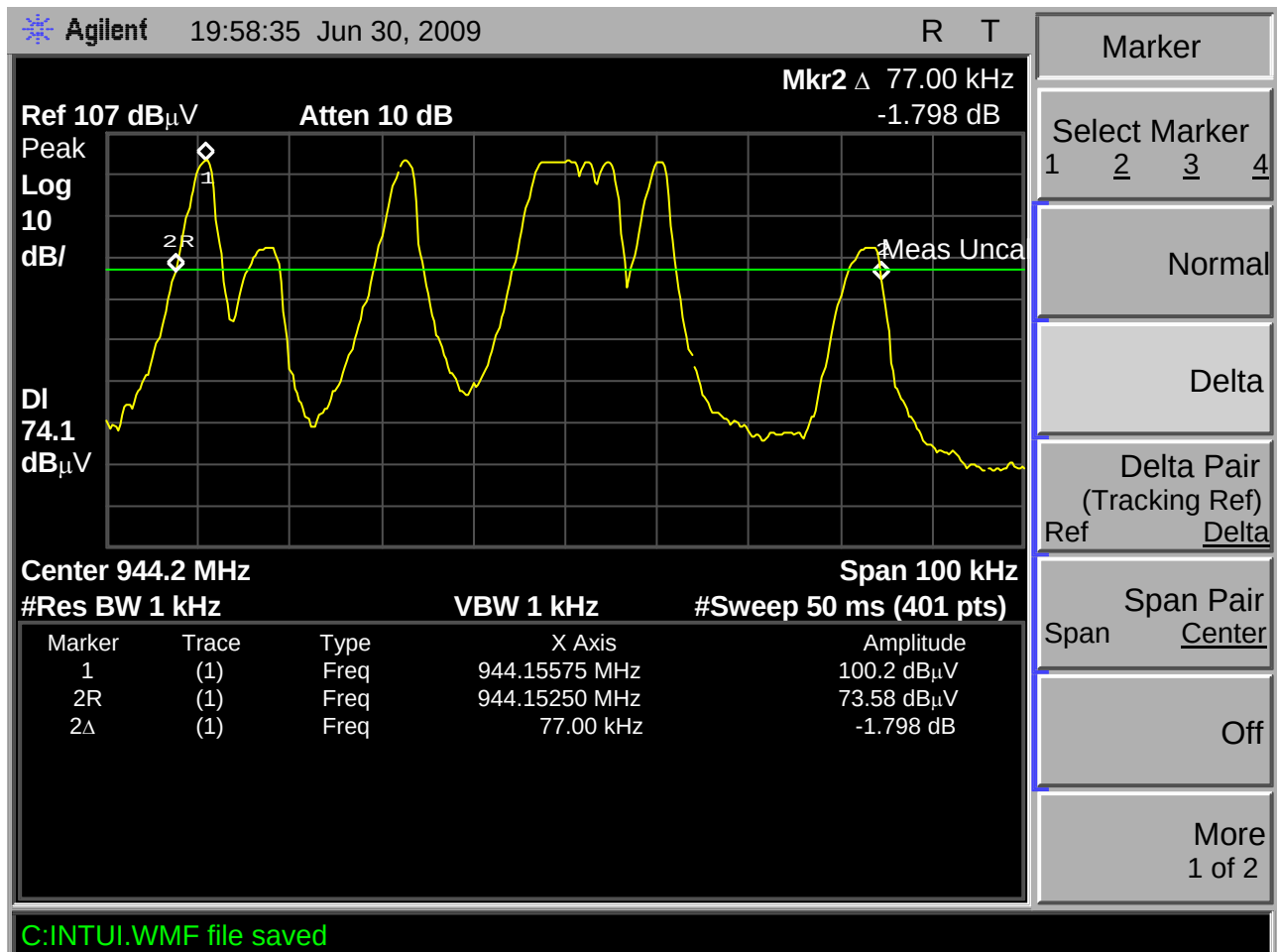
1kHz modulation



1.5kHz modulation

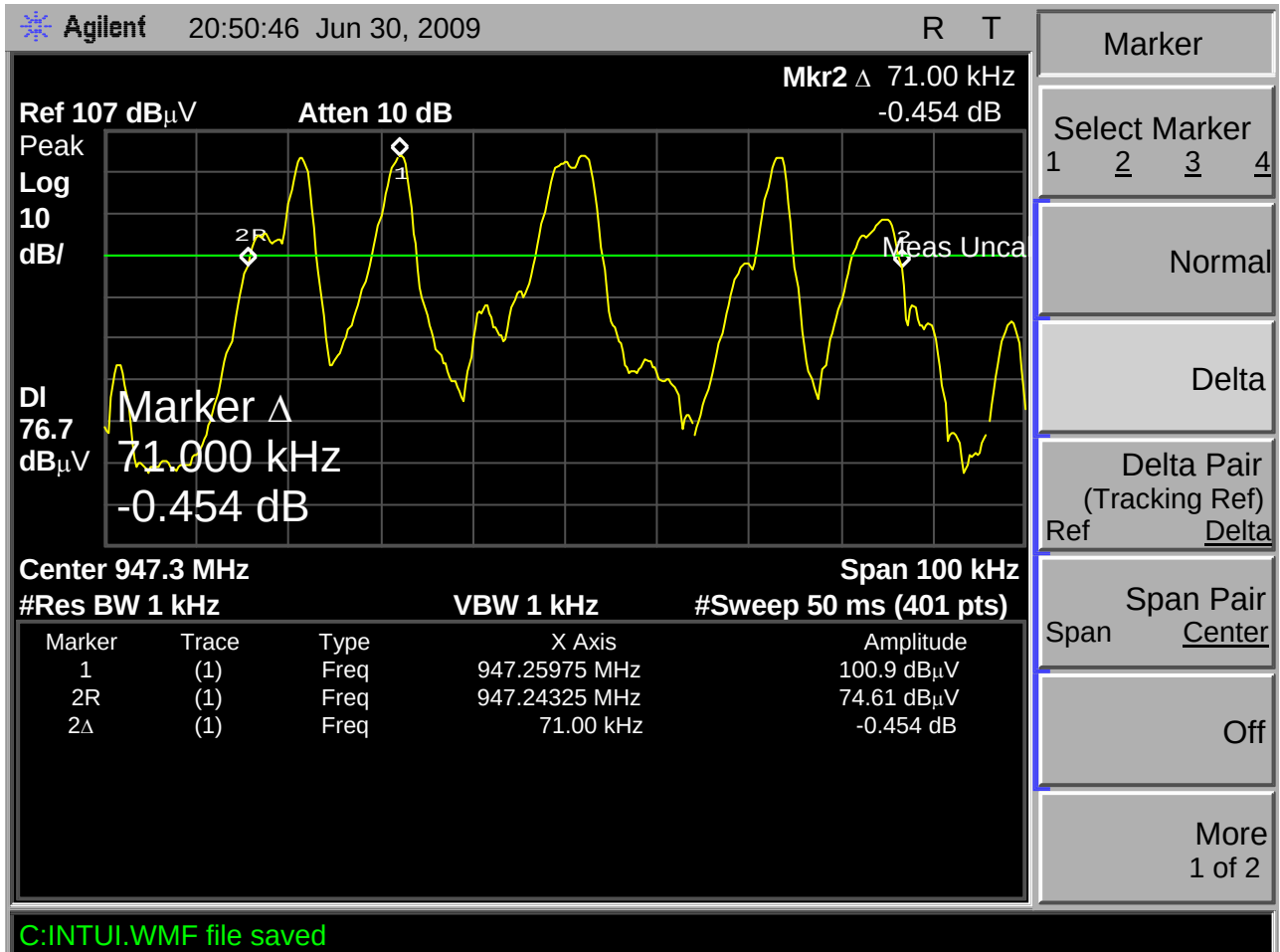


2.5kHz modulation

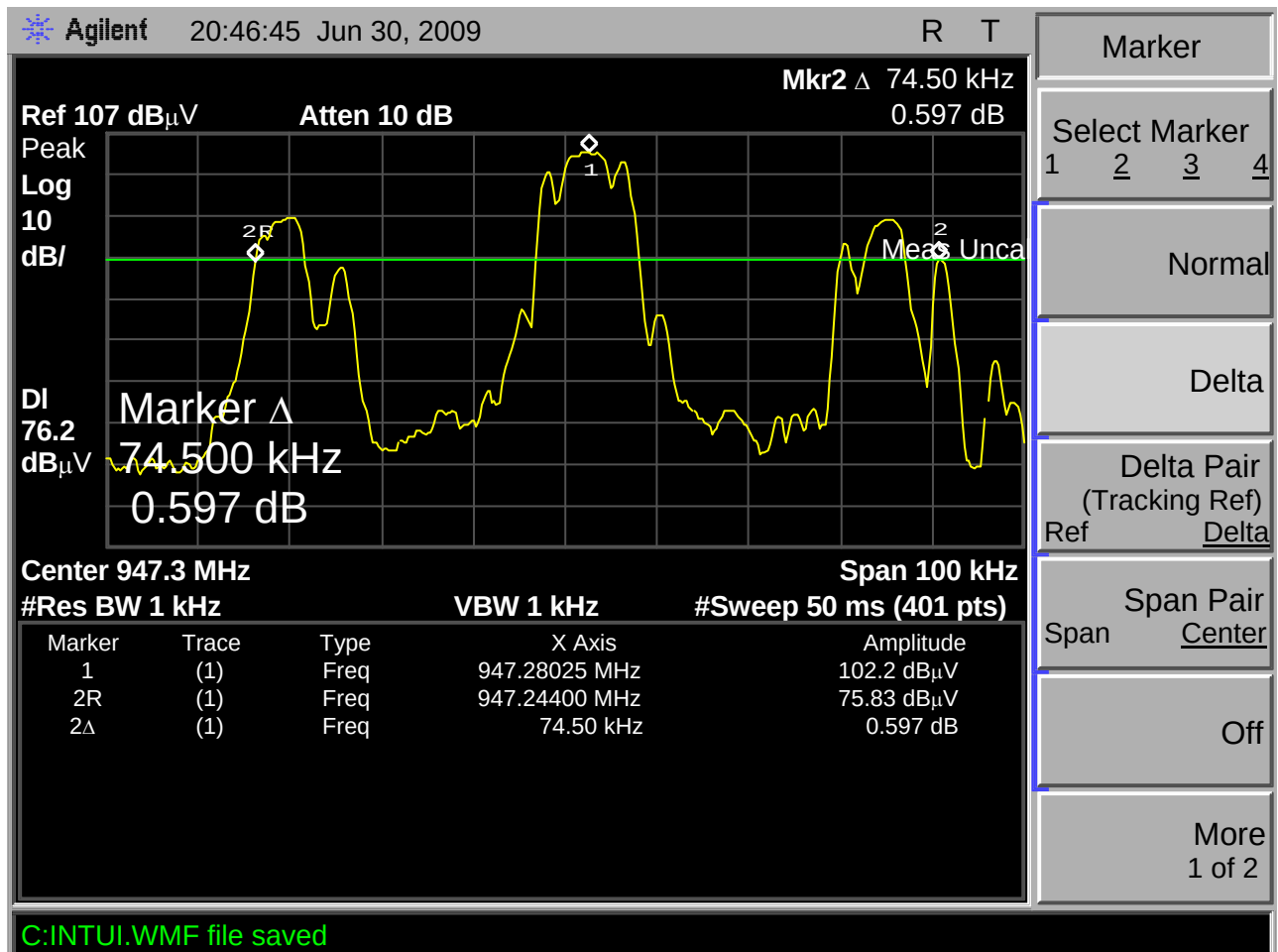


Test Frequency: 947.3MHz

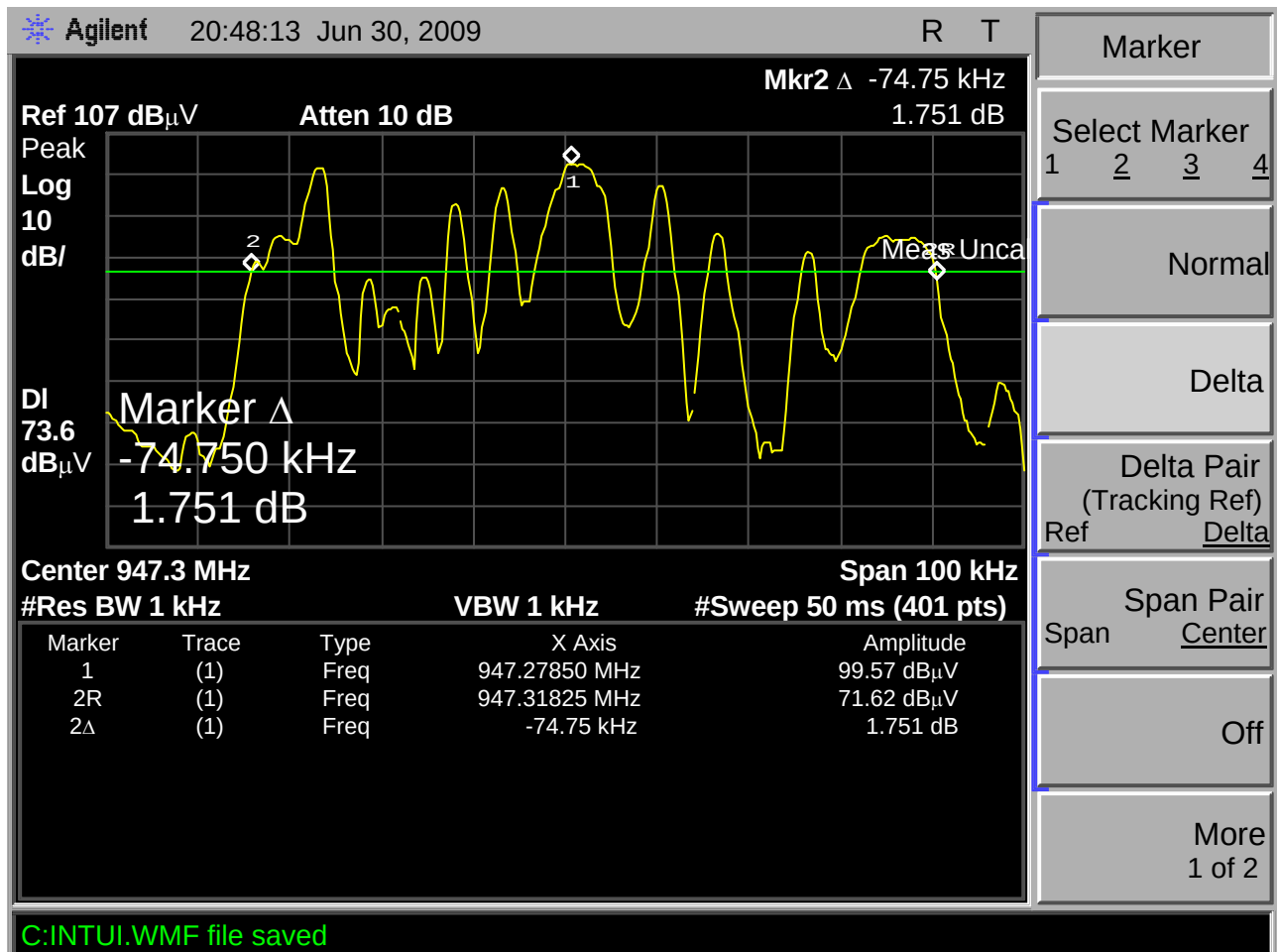
300Hz



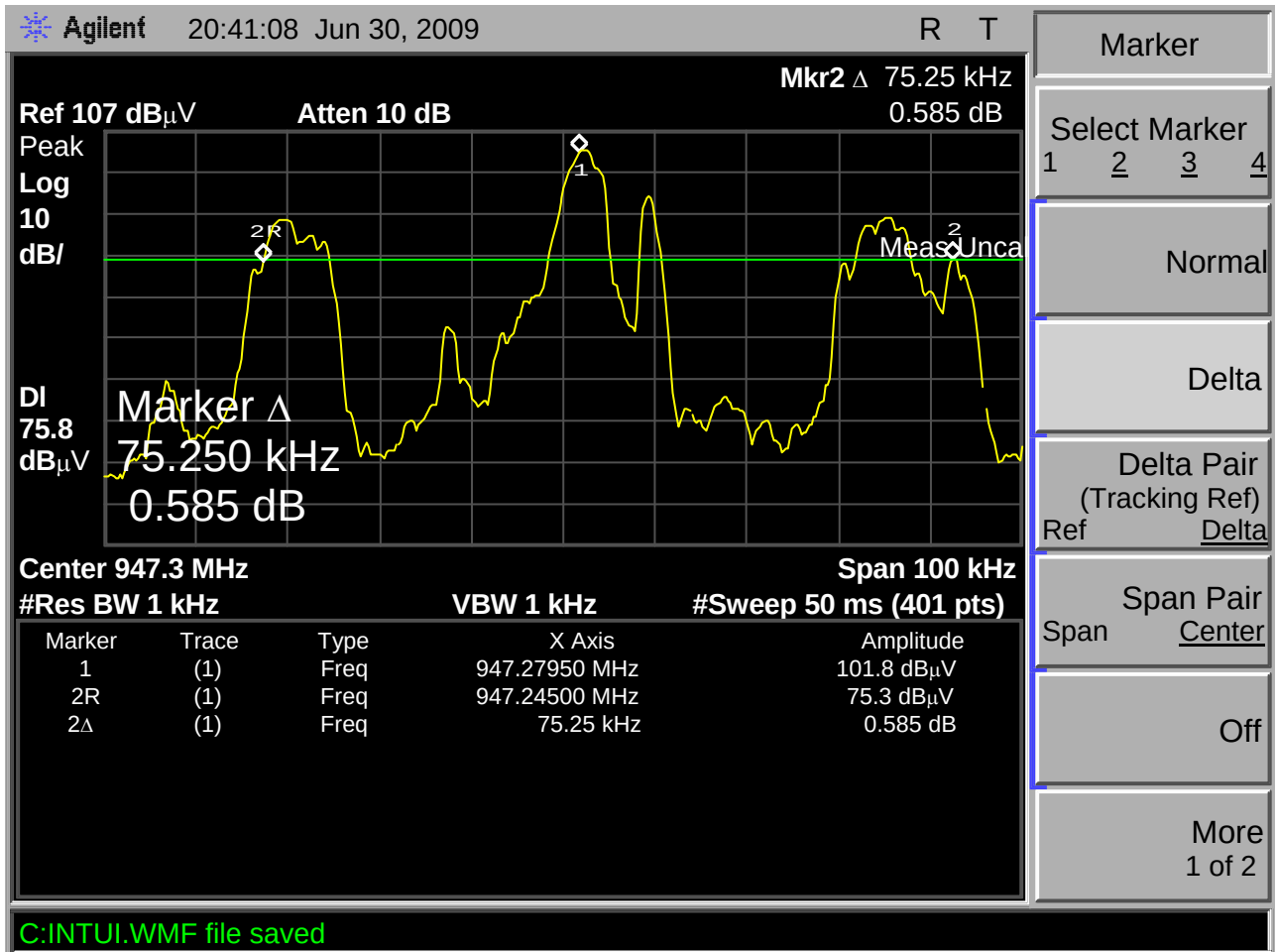
1kHz modulation



1.5kHz modulation

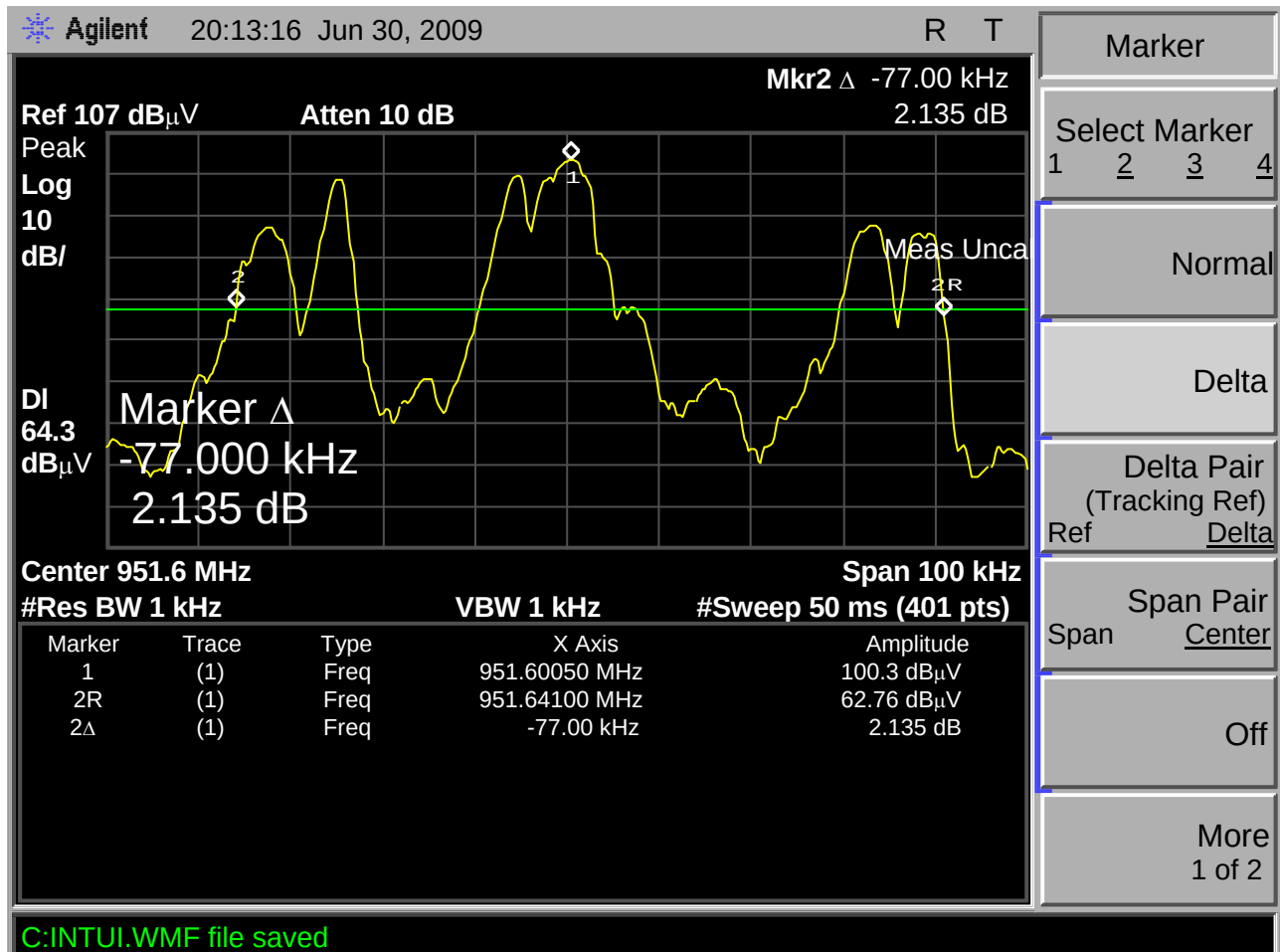


2.5kHz modulation

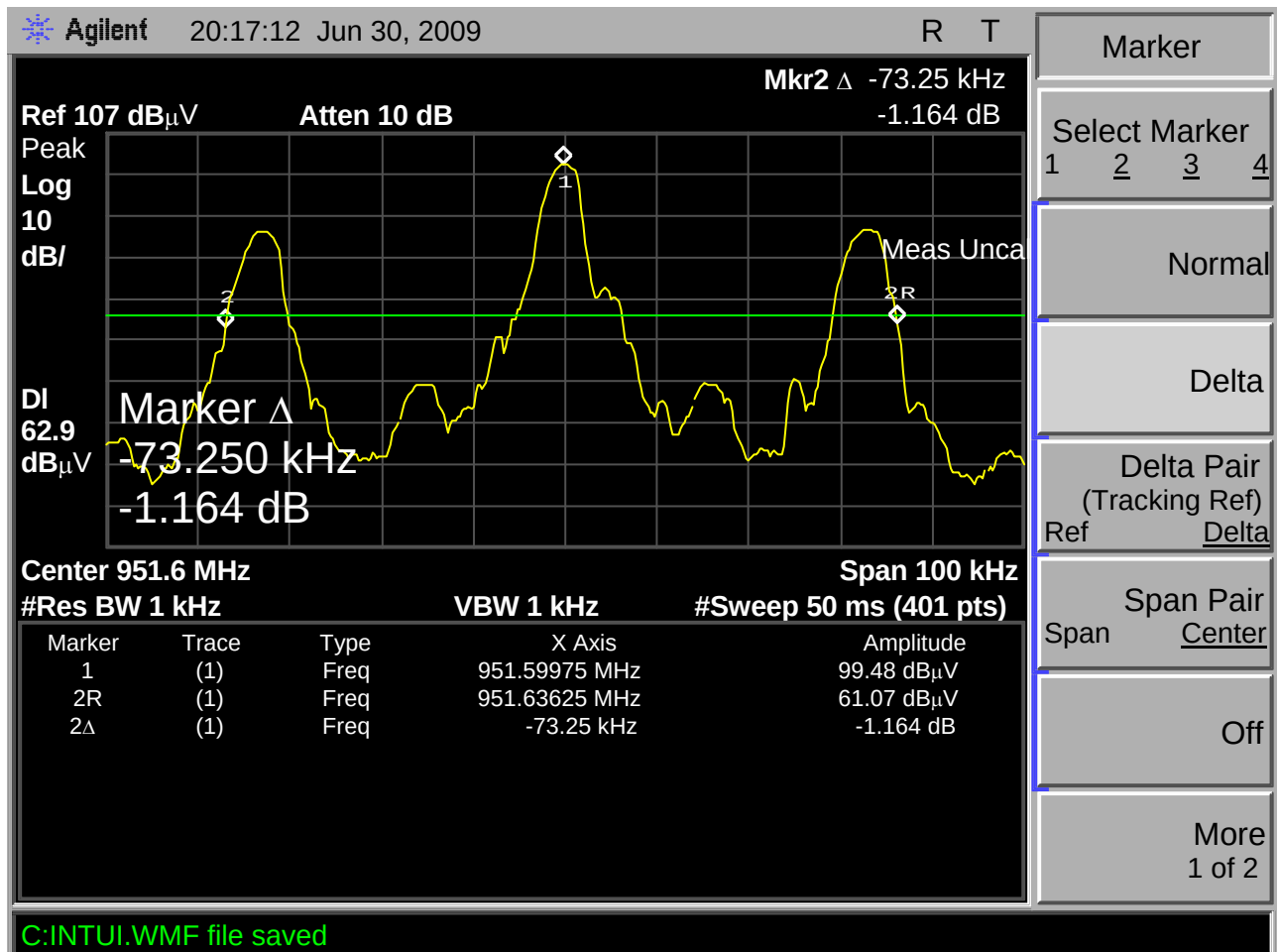


Test Frequency: 951.6MHz

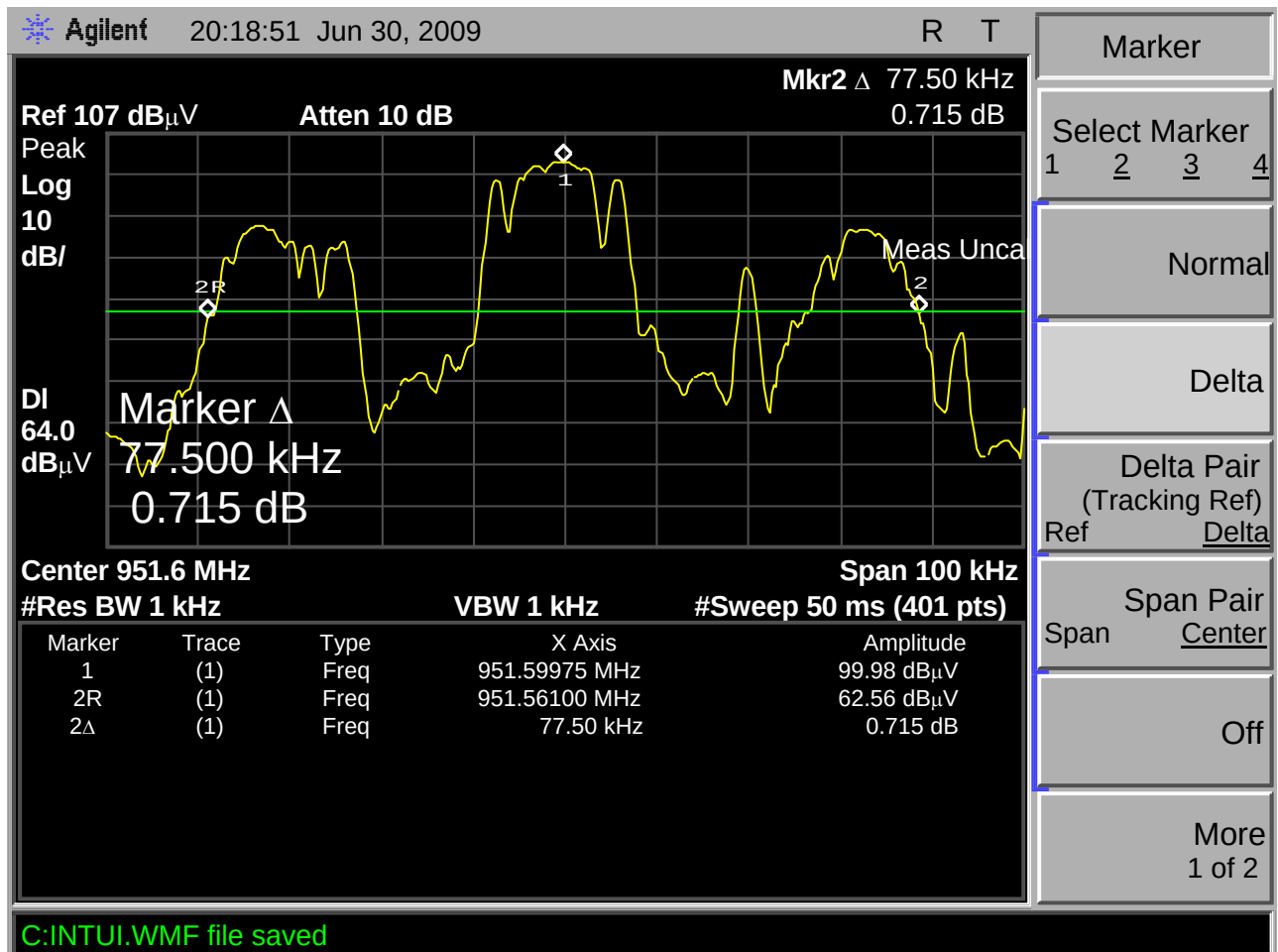
300Hz



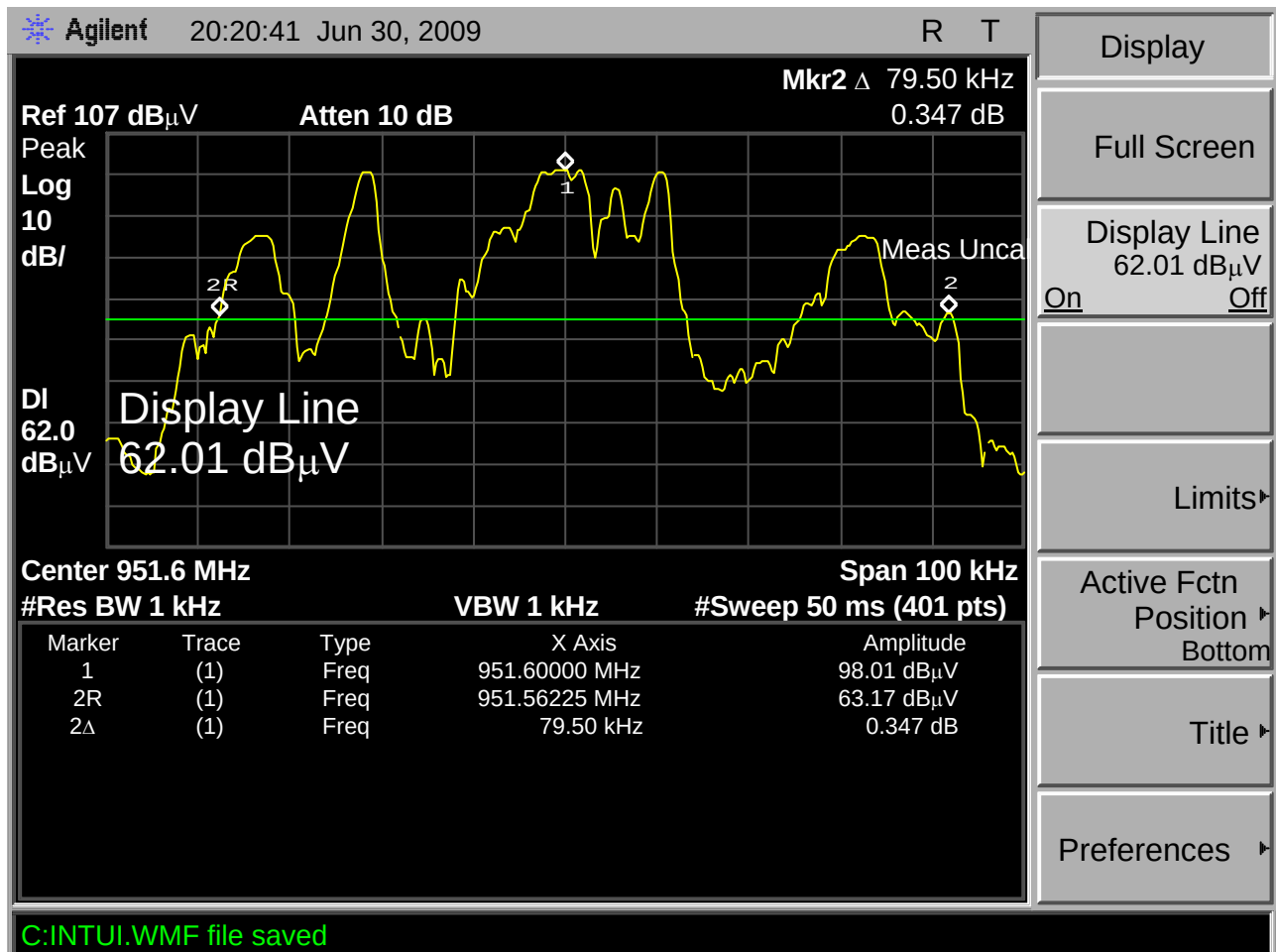
1kHz modulation



1.5kHz modulation



2.5kHz modulation



10 Field Strength of Spurious Radiation

10.1 Rules and Limits

2.1053(a): ANSI-603-1992, Paragraph 2.2.12

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

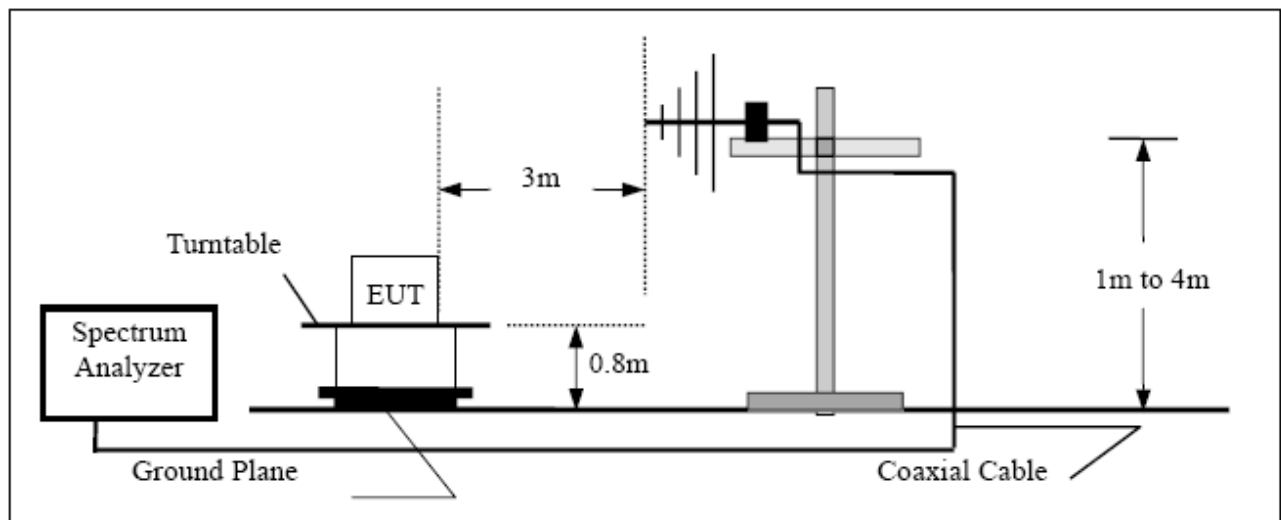
74.861(e)(6)(iii): Spurious and harmonics must be at least $43 + 10\log(\text{output power})$ below the carrier peak

2.1057: in all measurements set forth, the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency

10.2 Test Equipment

Please refer to Section 5 this report.

10.3 Test Procedure



1. Connected the equipment as above graph.
2. Place the transmitter to be tested on the turntable in the standard test site. The transmitter is Transmitting into a non-radiating load, which is placed on the turntable. The RF cable to this load should be of minimum length.
4. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
5. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

6. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
7. New battery were installed in the equipment under test for radiated emissions test, the transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. The measurement shall be repeated with the test antenna set to horizontal polarization.
11. Replace the antenna with a proper antenna (substitution antenna).
12. The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
13. The substitution antenna shall be connected to a calibrated signal generator.
14. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
15. The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
16. The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
17. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
18. The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
19. This is a handheld 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
20. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

10.4 Measurement Result

Unmodulated carrier output power is 12.23dBm, or 167.1091mW(ERP). The limit of spurious or harmonics is calculated as following:

$12.23 - [43 + 10 \log(\text{carrier output power in W})]$, or -13dBm

Test Frequency: 944.2MHz

Horizontal

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
125.22	-37.25	-13	-23.75
609.48	-38.69	-13	-25.31
1523.36	-37.56	-13	-23.44
2413.25	-38.36	-13	-24.64
4635.85	-38.12	-13	-24.88

Vertical

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
165.23	-44.54	-13	-30.46
356.98	-45.68	-13	-31.32
987.25	-46.74	-13	-32.26
1687.25	-46.12	-13	-32.88
3698.25	-45.87	-13	-32.13

Test Frequency: 947.3MHz

Horizontal

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
203.12	-48.62	-13	-34.38
365.25	-46.84	-13	-32.16
1589.63	-45.65	-13	-31.35
2413.58	-44.98	-13	-30.02
3698.36	-47.52	-13	-34.48

Vertical

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
165.54	-44.25	-13	-30.75
256.35	-44.25	-13	-30.75
875.69	-45.47	-13	-31.53
1602.32	-44.78	-13	-31.22
3652.31	-46.98	-13	-32.02

Test Frequency: 951.6MHz

Horizontal

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
231.25	-44.25	-13	-30.75
562.36	-44.63	-13	-31.37
1645.36	-45.25	-13	-31.75
2413.03	-45.68	-13	-31.32
3698.25	-44.27	-13	-31.73

Vertical

Frquency (MHz)	Reading Amplitude (dBm)	Limit (dBm)	Margin (dBm)
165.36	-44.58	-13	-30.42
563.21	-44.80	-13	-30.20
875.63	-45.25	-13	-31.72
1652.25	-45.87	-13	-31.13
3265.32	-48.52	-13	-34.48

11 Frequency Stability Tolerance

11.1 Rules and Limits

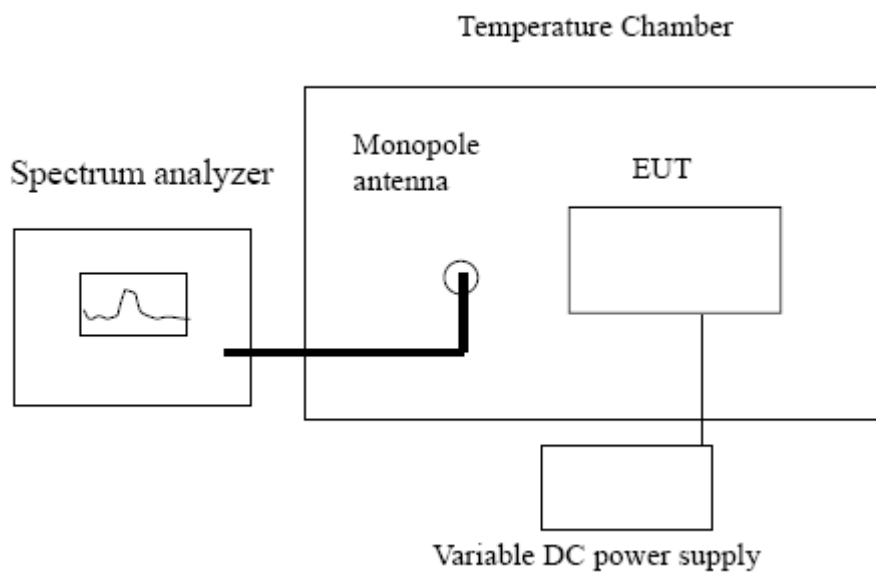
2.1055, ANSI/TIA/EIA-603-1992, Paragraph 2.2.2.

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	944.20985	944.15279 to 944.24721
-20	944.20921	
-10	944.20974	
0	944.20823	
10	944.19682	
20	944.19888	
30	944.19923	
40	944.20201	
50	944.19950	

Test Frequency: 947.3MHz

Temperature Variation Table

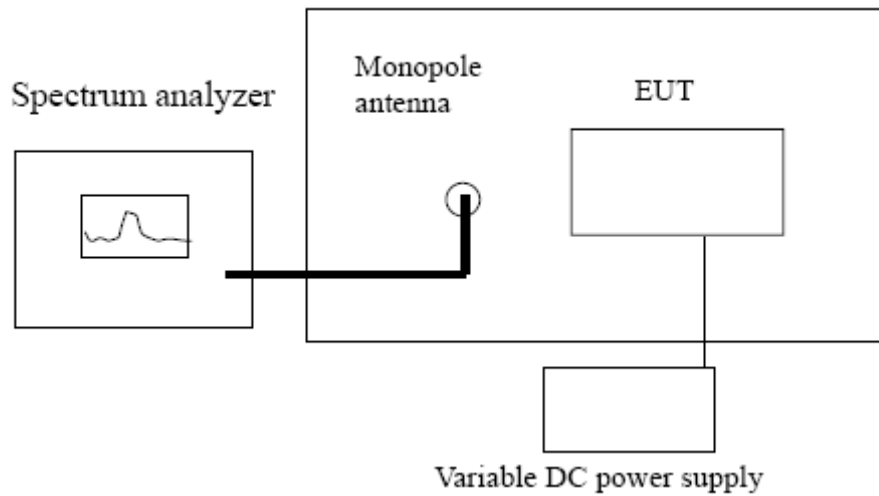
Temperature(Centigrade)	Frequency(MHz)	Tolerance(MHz)
-30	947.29814	947.25262 to 947.34738
-20	947.30221	
-10	947.30232	
0	947.30216	
10	947.29574	
20	947.29878	
30	947.3010	
40	947.29898	
50	947.29997	

Test Frequency: 951.6MHz

Temperature Variation Table

Temperature(Centigrade)	Frequency(MHz)	Tolerance(MHz)
-30	951.59987	951.55242 to 951.64758
-20	951.60120	
-10	951.60147	
0	951.60123	
10	951.59955	
20	951.59980	
30	951.60125	
40	951.59987	
50	951.60120	

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%)	944.20121	944.15279 to 944.24721
9(100%)	944.20101	
10.35(115%)	944.19998	

Test Frequency: 947.3MHz

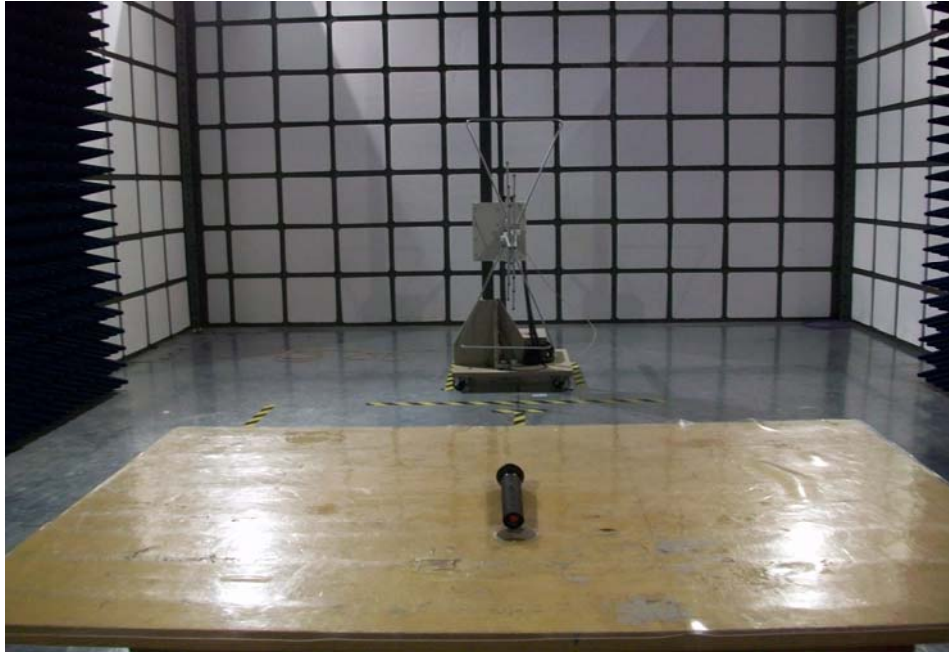
Supply Voltage (Volt)	Frequency (MHz)	Tolerance (MHz)
7.65(85%)	947.30198	947.25262 to 947.34738
9(100%)	947.30101	
10.35(115%)	947.30171	

Test Frequency: 951.6MHz

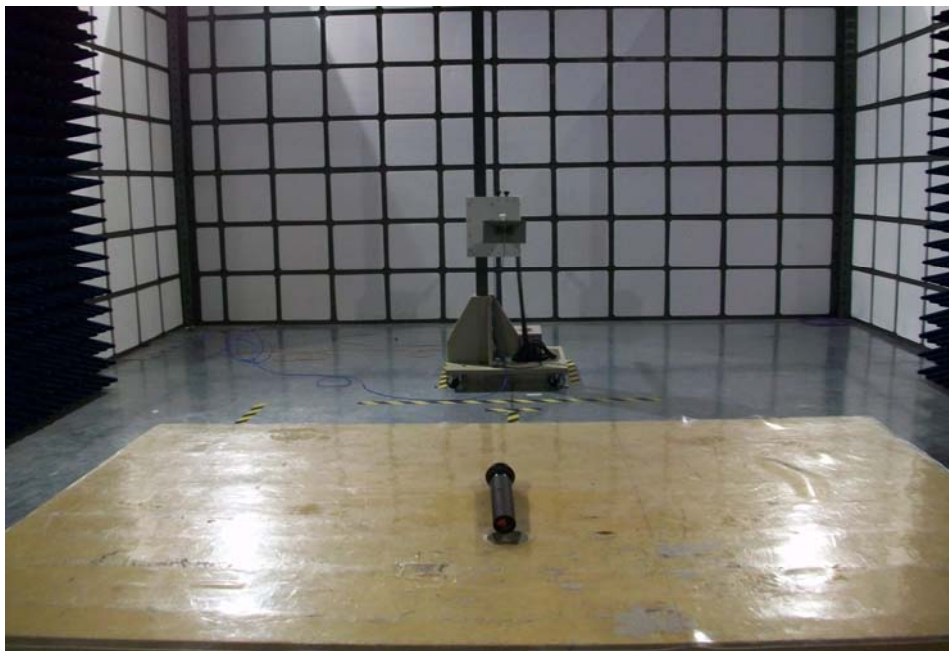
Supply Voltage (Volt)	Frequency (MHz)	Tolerance (MHz)
7.65(85%)	951.60147	951.55242 to 951.64758
9(100%)	951.60190	
10.35(115%)	951.60102	

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

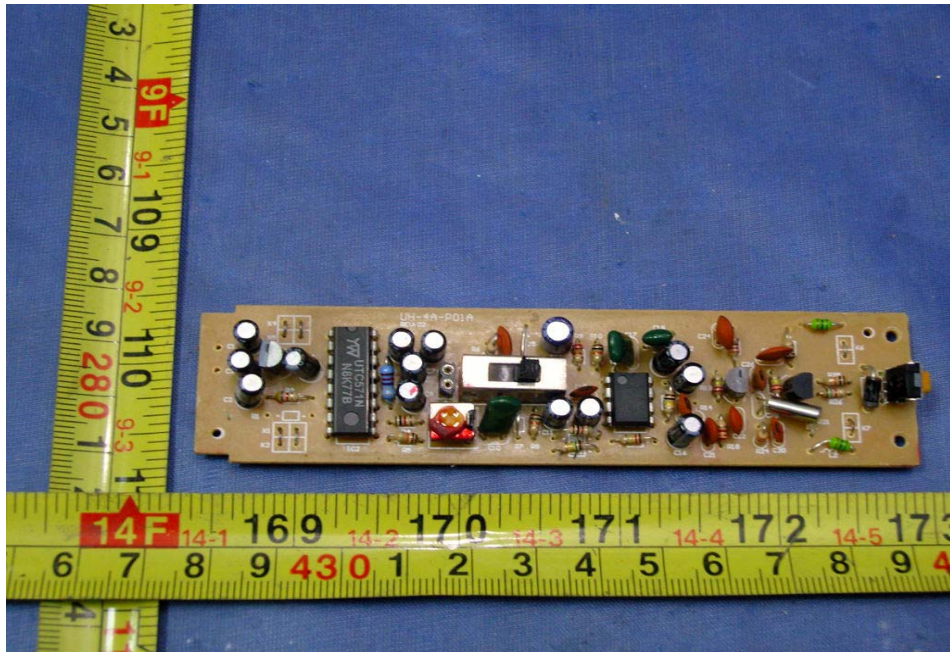
13.1 EUT - Front View



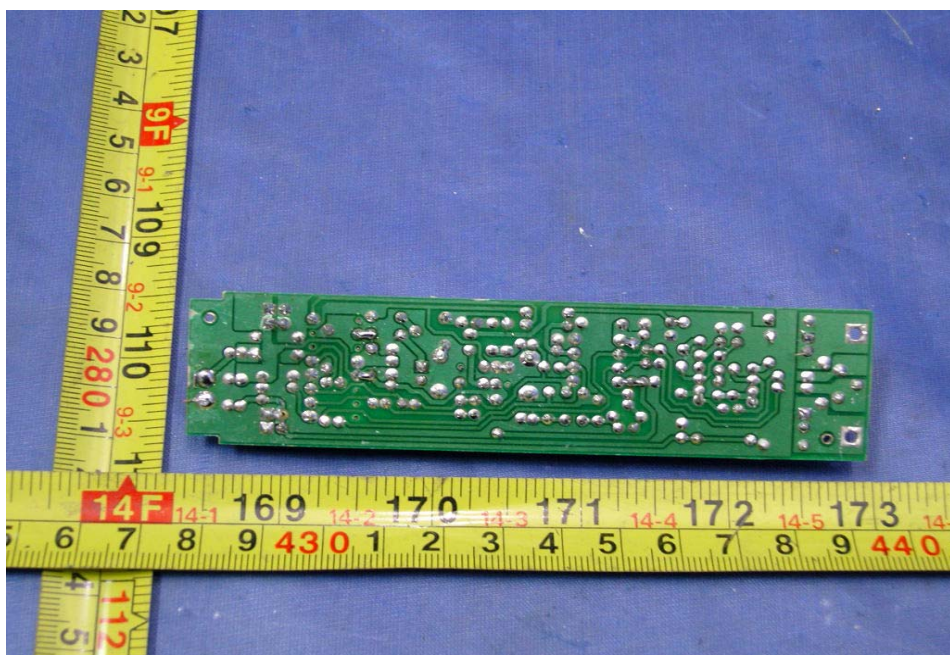
13.2 EUT - Back View



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

