



Test Report

Product Name : Seecode Tube

Model No. : HF-921

FCC ID : VUMTUBE

Applicant : Seecode Technology Ltd. & Co. KG

Address : Roesrather Strasse 333, 51107 Koeln, Germany

Date of Receipt : 2008/08/28

Issued Date : 2008/09/22

Report No. : 089S028-RF-US-P06V01

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Test Report Certification

Issued Date : 2008/09/22

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Product Name : Seecode Tube

Applicant : Seecode Technology Ltd. & Co. KG

Address : Roesrather Strasse 333, 51107 Koeln, Germany

Manufacturer : Shanghai Flaircomm Technologies Inc

Address : No. 5, Bibo Road, Keyuan Building 4F, Zhangjiang
Hi-Tech Park, Shanghai 201203 P.R. China

Model No. : HF-921

FCC ID : VUMTUBE

EUT Voltage : DC 3.7V

Trade Name : Seecode

Applicable Standard : FCC CFR Title 47 Part 15 Subpart C: 2007
ANSI C63.4: 2003

Test Result : Complied

Performed Location : SuZhou EMC laboratory
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FCC Registration Number: 800392

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Laboratory Information

We , **Quietek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited by the following accreditation Bodies in compliance with ISO 17025, EN 45001 and Guide 25:

Taiwan R.O.C.	: BSMI, DGT, CNLA
Germany	: TUV Rheinland
Norway	: Nemko, DNV
USA	: FCC, NVLAP
Japan	: VCCI

The related certificate for our laboratories about the test site and management system can be downloaded from Quietek Corporation's Web Site : <http://tw.quietek.com/modules/myalbum/>
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 EUT Photograph..... 錯誤! 尚未定義書籤。

1. General Information

1.1. EUT Description

Product Name	Seecode Tube
Trade Name	Seecode
Model No.	HF-921
FCC ID	VUMTUBE
Working Voltage	DC 3.7V
Frequency Range	2402 - 2480 MHz
Channel Number	79
Type of Modulation	FHSS
Data Rate	723 kbps
Channel Control	Auto
Antenna Type	Trace Antenna
Antenna Gain	Refer to the "Antenna List"

Component	
Car Charger	<p>Manufacturer: Shanghai Flaircomm Technologies Inc</p> <p>M/N: TTX-GC-196C</p> <p>Input: 12~24VDC</p> <p>Output: 5.0VDC, 500mA</p> <p>Cable Out: Non-Shielded, 1.8m</p>
USB Cable	<p>Manufacturer: MORETHANALL(CHANGZHOU)ELECTRONICS CO.,LTD</p> <p>M/N: YK-C008-USB002</p>

Bluetooth Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
00	2402 MHz	01	2403 MHz	02	2404 MHz	03	2405 MHz
04	2406 MHz	05	2407 MHz	06	2408 MHz	07	2409 MHz
08	2410 MHz	09	2411 MHz	10	2412 MHz	11	2413 MHz
12	2414 MHz	13	2415 MHz	14	2416 MHz	15	2417 MHz
16	2418 MHz	17	2419 MHz	18	2420 MHz	19	2421 MHz
20	2422 MHz	21	2423 MHz	22	2424 MHz	23	2425 MHz
24	2426 MHz	25	2427 MHz	26	2428 MHz	27	2429 MHz
28	2430 MHz	29	2431 MHz	30	2432 MHz	31	2433 MHz
32	2434 MHz	33	2435 MHz	34	2436 MHz	35	2437 MHz
36	2438 MHz	37	2439 MHz	38	2440 MHz	39	2441 MHz
40	2442 MHz	41	2443 MHz	42	2444 MHz	43	2445 MHz
44	2446 MHz	45	2447 MHz	46	2448 MHz	47	2449 MHz
48	2450 MHz	49	2451 MHz	50	2452 MHz	51	2453 MHz
52	2454 MHz	53	2455 MHz	54	2456 MHz	55	2457 MHz
56	2458 MHz	57	2459 MHz	58	2460 MHz	59	2461 MHz
60	2462 MHz	61	2463 MHz	62	2464 MHz	63	2465 MHz
64	2466 MHz	65	2467 MHz	66	2468 MHz	67	2469 MHz
68	2470 MHz	69	2471 MHz	70	2472 MHz	71	2473 MHz
72	2474 MHz	73	2475 MHz	74	2476 MHz	75	2477 MHz
76	2478 MHz	77	2479 MHz	78	2480 MHz	N/A	N/A

Antenna List

Antenna	Manufacturer	Model No.	Peak Gain
Bluetooth Antenna	Flaircomm Technologies Inc	HF921	0.54dBi for 2.4GHz

1.2. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit

1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	N/A	N/A	N/A	N/A	N/A

1.4. Configuration of Tested System

Connection Diagram	
<div><div><div>EUT</div></div></div>	
Signal Cable Type	Signal cable Description

1.5. EUT Exercise Software

1	Setup the EUT and simulators as shown on above
2	Connect the EUT to PC via a control board and a RS232 cable.
3	Execute the Blue Test program (CSR) on the PC.
4	Setup the test channel and the test mode press ok to start the Continue Transmit.

2. Technical Test

2.1. Summary of Test Result

- ☒ No deviations from the test standards
- ☐ Deviations from the test standards as below description:

Performed Test Item	Normative References	Test Performed	Deviation
Conducted Emission	FCC CFR Title 47 Part 15 Subpart C: 2007 Section 15.207	Yes	No
Radiated Emission	FCC CFR Title 47 Part 15 Subpart C: 2007 Section 15.209	Yes	No
20dB Bandwidth	FCC CFR Title 47 Part 15 Subpart C: 2007 Section 15.247(a)(1)	Yes	No
Carrier Frequency Separation	FCC CFR Title 47 Part 15 Subpart C: 2007 Section 15.247(a)(1)	Yes	No
Number of Hopping Frequencies	FCC CFR Title 47 Part 15 Subpart C: 2007 Section 15.247(a)(1)(iii)	Yes	No
Time of Occupancy (Dwell Time)	FCC CFR Title 47 Part 15 Subpart C: 2007 Section 15.247(a)(1)(iii)	Yes	No
Peak Output Power	FCC CFR Title 47 Part 15 Subpart C: 2007 Section 15.247(b)(1)	Yes	No
Band-edge Compliance of RF Conducted Emissions	FCC CFR Title 47 Part 15 Subpart C: 2007 Section 15.215(c), 15.247(d)	Yes	No
Spurious RF Conducted Emissions	FCC CFR Title 47 Part 15 Subpart C: 2007 15.247(d)	Yes	No
Radiated Emission Band Edge	FCC CFR Title 47 Part 15 Subpart C: 2007 15.247(d)	Yes	No

2.2. Test Environment

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	21
Humidity (%RH)	25-75	50
Barometric pressure (mbar)	860-1060	950-1000

3. Conducted Emission

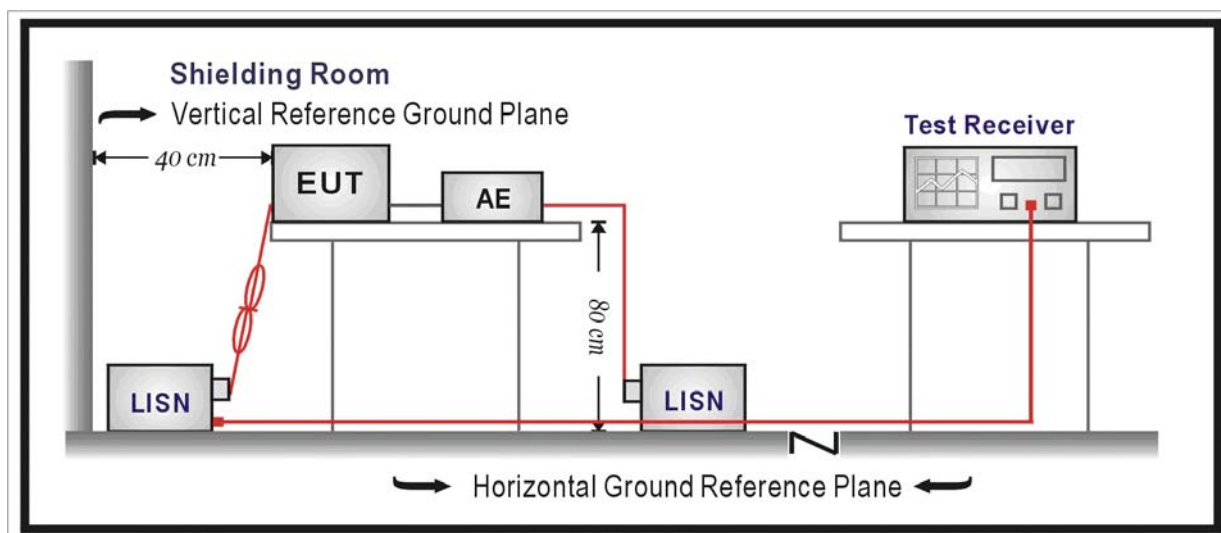
3.1. Test Equipment

Conducted Emission / SR-1

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
EMI Test Receiver	R&S	ESCI	100726	2008/06/28
Two-Line V-Network	R&S	ENV216	100013	2008/06/28
Two-Line V-Network	R&S	ENV216	100014	2008/06/28
50ohm Coaxial Switch	Anritsu	MP59B	6200464462	2007/11/25
50ohm Termination	SHX	TF2	07081401	2007/10/19
Coaxial Cable	Luthi	RG214	519358	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH004	2008/03/31

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

3.2. Test Setup



3.3. Limit

FCC Part 15 Subpart C Paragraph 15.207 Limits		
Frequency (MHz)	QP (dBuV)	AV (dBuV)
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

3.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

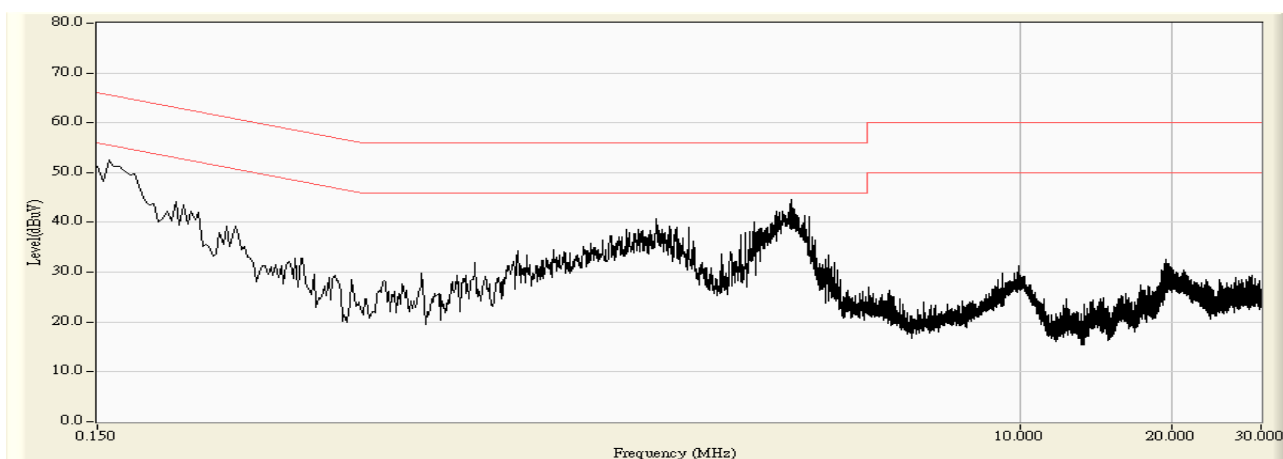
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

3.5. Uncertainty

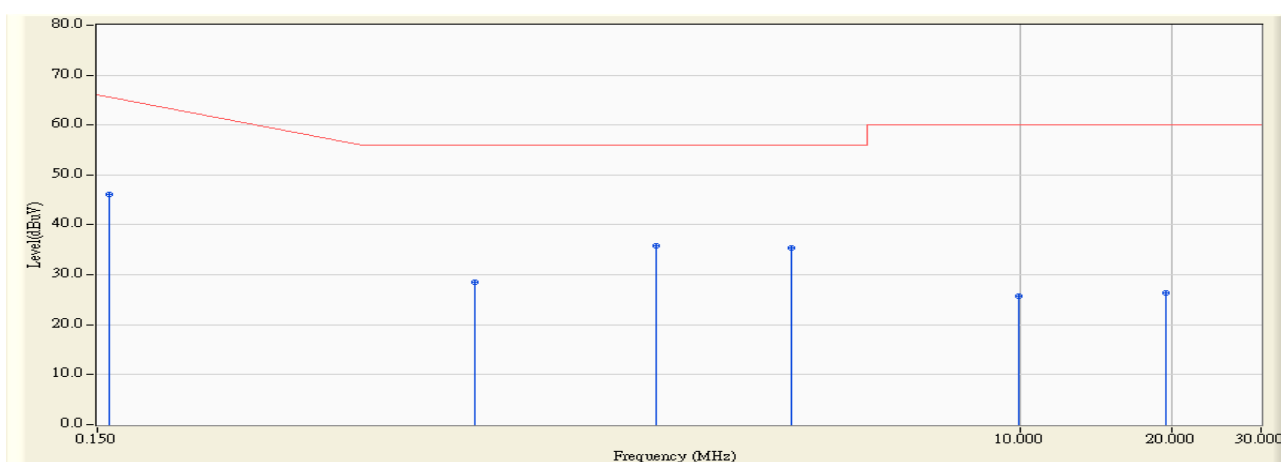
The measurement uncertainty is defined as ± 2.02 dB

3.6. Test Result

Engineer : Robin	
Site : SR-1 (Conducted Emission and Power Disturbance Test)	Time : 2008/10/06 - 09:56
Limit : FCC_Part15.207_00M_QP	Margin : 10
EUT : Seecode Tube	Probe : ENV216_100013(0.009-30MHz) - Line1
Power : AC 120V/60Hz	Note : Mode 1: Transmit

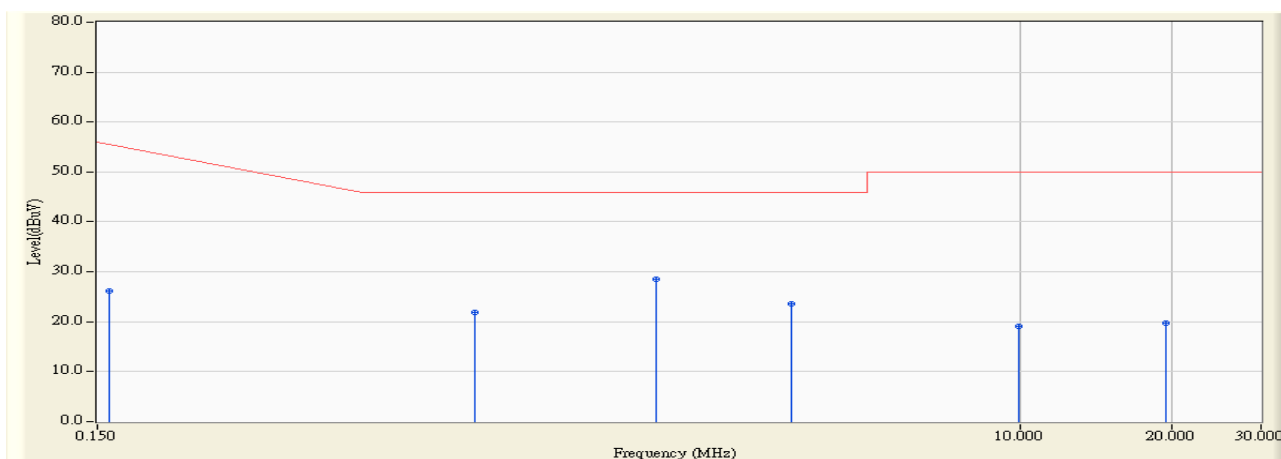


Engineer : Robin	
Site : SR-1 (Conducted Emission and Power Disturbance Test)	Time : 2008/10/06 - 09:58
Limit : FCC_Part15.207_00M_QP	Margin : 0
EUT : Seecode Tube	Probe : ENV216_100013(0.009-30MHz) - Line1
Power : AC 120V/60Hz	Note : Mode 1: Transmit



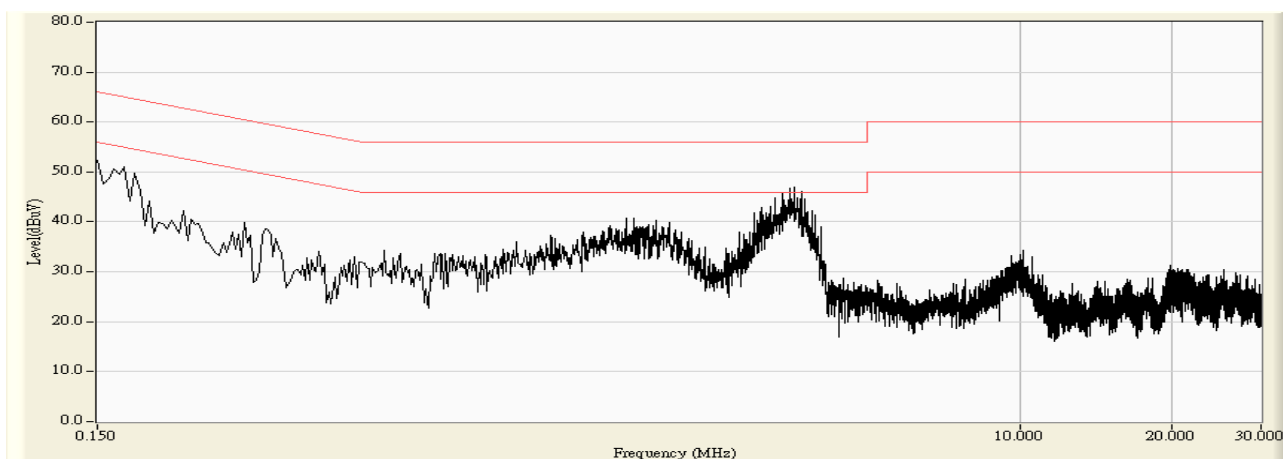
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	*	0.158	10.256	35.800	46.056	-19.715	65.771	QUASIPeAK
2		0.838	9.700	18.900	28.600	-27.400	56.000	QUASIPeAK
3		1.914	9.845	25.900	35.745	-20.255	56.000	QUASIPeAK
4		3.526	9.820	25.600	35.420	-20.580	56.000	QUASIPeAK
5		9.978	9.950	15.800	25.750	-34.250	60.000	QUASIPeAK
6		19.510	10.166	16.200	26.366	-33.634	60.000	QUASIPeAK

Engineer : Robin	
Site : SR-1 (Conducted Emission and Power Disturbance Test)	Time : 2008/10/06 - 09:58
Limit : FCC_Part15.207_00M_AV	Margin : 0
EUT : Seecode Tube	Probe : ENV216_100013(0.009-30MHz) - Line1
Power : AC 120V/60Hz	Note : Mode 1: Transmit

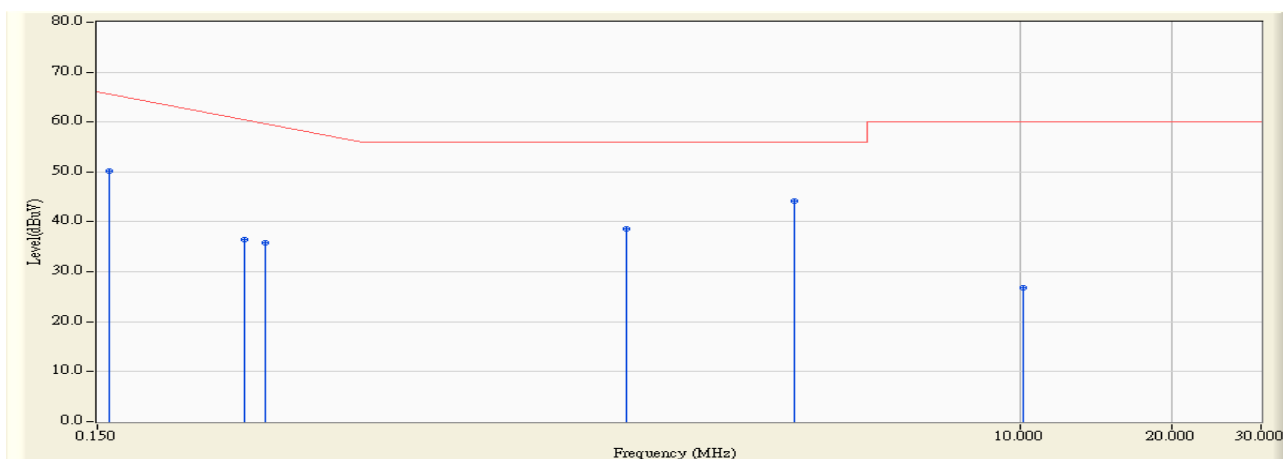


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.158	10.256	16.000	26.256	-29.515	55.771	AVERAGE
2		0.838	9.700	12.200	21.900	-24.100	46.000	AVERAGE
3	*	1.914	9.845	18.600	28.445	-17.555	46.000	AVERAGE
4		3.526	9.820	13.800	23.620	-22.380	46.000	AVERAGE
5		9.978	9.950	9.200	19.150	-30.850	50.000	AVERAGE
6		19.510	10.166	9.500	19.666	-30.334	50.000	AVERAGE

Engineer : Robin	
Site : SR-1 (Conducted Emission and Power Disturbance Test)	Time : 2008/10/06 - 10:00
Limit : FCC_Part15.207_00M_QP	Margin : 10
EUT : Seecode Tube	Probe : ENV216_100013(0.009-30MHz) - Line2
Power : AC 120V/60Hz	Note : Mode 1: Transmit

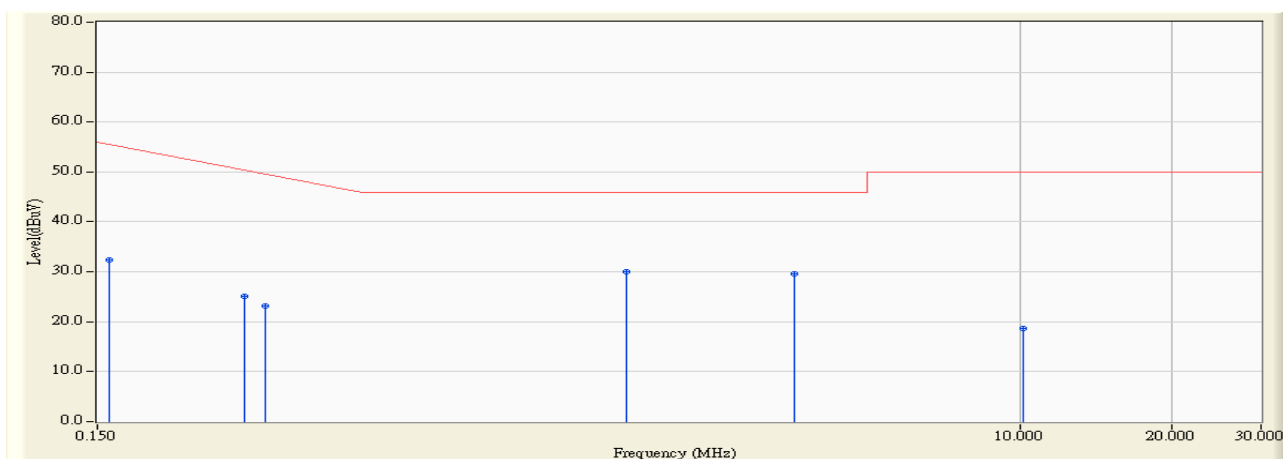


Engineer : Robin	
Site : SR-1 (Conducted Emission and Power Disturbance Test)	Time : 2008/10/06 - 10:02
Limit : FCC_Part15.207_00M_QP	Margin : 0
EUT : Seecode Tube	Probe : ENV216_100013(0.009-30MHz) - Line2
Power : AC 120V/60Hz	Note : Mode 1: Transmit



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.158	9.712	40.400	50.112	-15.659	65.771	QUASIPeAK
2		0.294	9.553	27.000	36.553	-25.333	61.886	QUASIPeAK
3		0.322	9.583	26.200	35.783	-25.303	61.086	QUASIPeAK
4		1.670	9.800	28.800	38.600	-17.400	56.000	QUASIPeAK
5	*	3.578	9.760	34.500	44.260	-11.740	56.000	QUASIPeAK
6		10.142	9.969	16.800	26.769	-33.231	60.000	QUASIPeAK

Engineer : Robin	
Site : SR-1 (Conducted Emission and Power Disturbance Test)	Time : 2008/10/06 - 10:02
Limit : FCC_Part15.207_00M_AV	Margin : 0
EUT : Seecode Tube	Probe : ENV216_100013(0.009-30MHz) - Line2
Power : AC 120V/60Hz	Note : Mode 1: Transmit



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.158	9.712	22.700	32.412	-23.359	55.771	AVERAGE
2		0.294	9.553	15.600	25.153	-26.733	51.886	AVERAGE
3		0.322	9.583	13.500	23.083	-28.003	51.086	AVERAGE
4	*	1.670	9.800	20.200	30.000	-16.000	46.000	AVERAGE
5		3.578	9.760	19.900	29.660	-16.340	46.000	AVERAGE
6		10.142	9.969	8.600	18.569	-31.431	50.000	AVERAGE

4. Radiated Emission

4.1. Test Equipment

☒ Radiated Emission / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4408B	MY45102679	2008/06/11
EMI Test Receiver	R&S	ESCI	100573	2008/05/10
Preamplifier	Quietek	AP-025C	QT-AP003	2007/11/25
Preamplifier	Quietek	AP-180C	CHM-0602012	2007/11/25
Bilog Type Antenna	Schaffner	CBL6112B	2932	2007/11/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	496	2008/06/28
High-Pass Filter	Wainwright	WHKX2.8/18G-12SS	SN1	2008/03/03
Band Reject Filter	Wainwright	WRCG2400/2485-2375 /2510-60/11SS	SN9	2008/03/03
High-Pass Filter	Wainwright	WHKX7.0/18G-8SS	SN16	2008/03/03
Low-Pass Filter	Wainwright	WLKS4500-9SS	SN2	2008/03/03
50ohm Coaxial Switch	Anritsu	MP59B	6200447304	2007/11/25
Coaxial Cable	Huber+Suhner	AC2-C	04	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH002	2008/03/31

☐ Radiated Emission / AC-3

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2008/04/24
EMI Test Receiver	R&S	ESCI	100176	2007/11/15
Preamplifier	Quietek	AP-025C	QT-AP004	2007/11/25
Preamplifier	Quietek	AP-180C	CHM-0602012	2007/11/25
Bilog Type Antenna	Schaffner	CBL6112D	22254	2007/11/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	496	2008/06/28
High-Pass Filter	Wainwright	WHKX2.8/18G-12SS	SN1	2008/03/03
Band Reject Filter	Wainwright	WRCG2400/2485-2375 /2510-60/11SS	SN9	2008/03/03
High-Pass Filter	Wainwright	WHKX7.0/18G-8SS	SN16	2008/03/03
Low-Pass Filter	Wainwright	WLKS4500-9SS	SN2	2008/03/03
50ohm Coaxial Switch	Anritsu	MP59B	6200464463	2007/11/25
Coaxial Cable	Huber+Suhner	AC2-C	05	2007/11/25

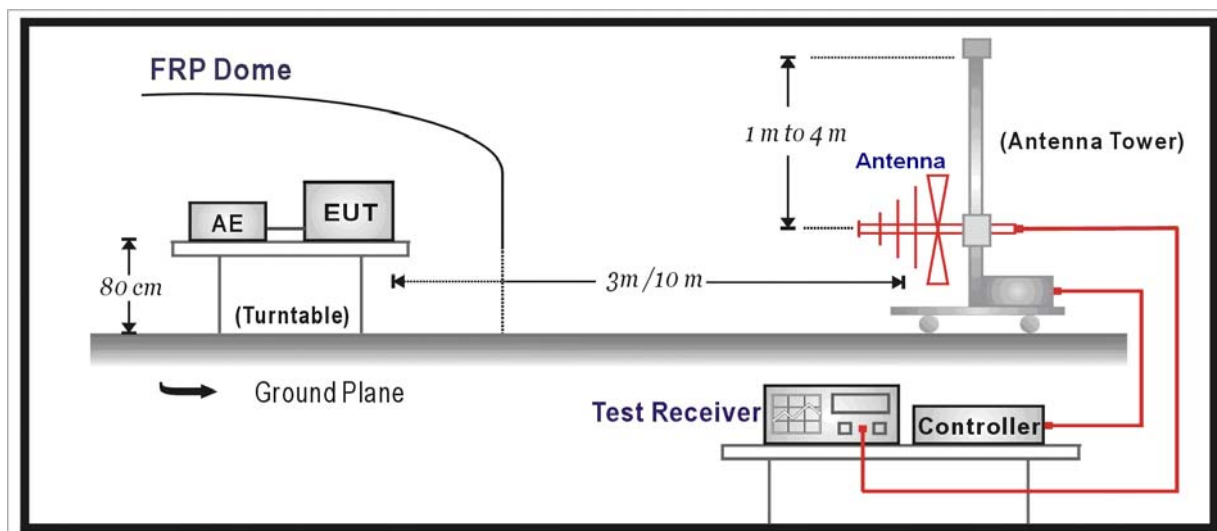
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH003	2008/03/31
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Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

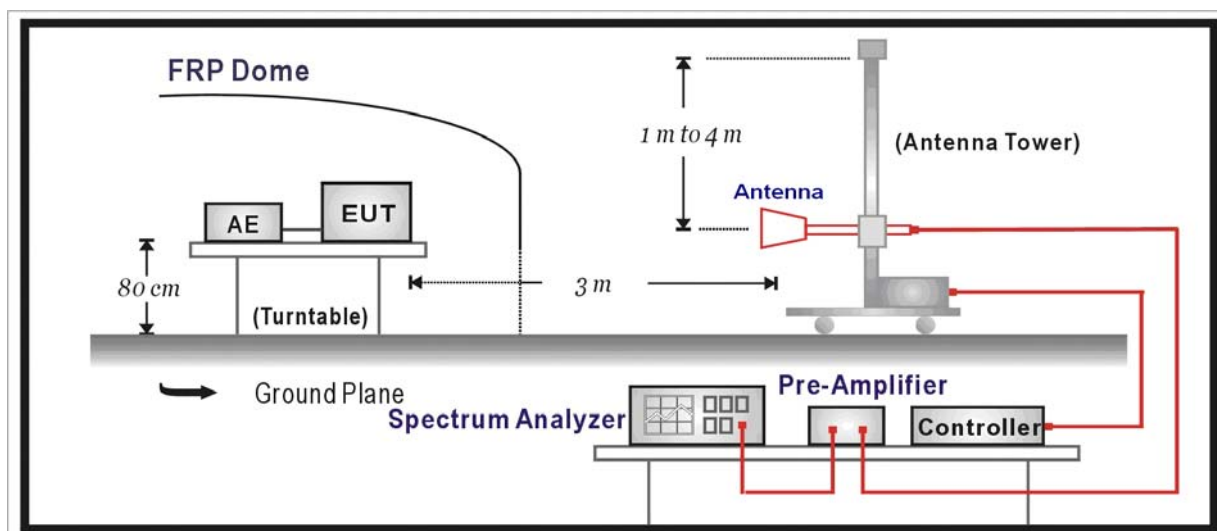
Note 2: The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



4.3. Limit

FCC Part 15 Subpart C Paragraph 15.209		
Frequency (MHz)	Distance (m)	Level (dBuV/m)
30 - 88	3	40
88 - 216	3	43.5
216 - 960	3	46
Above 960	3	54

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

4.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

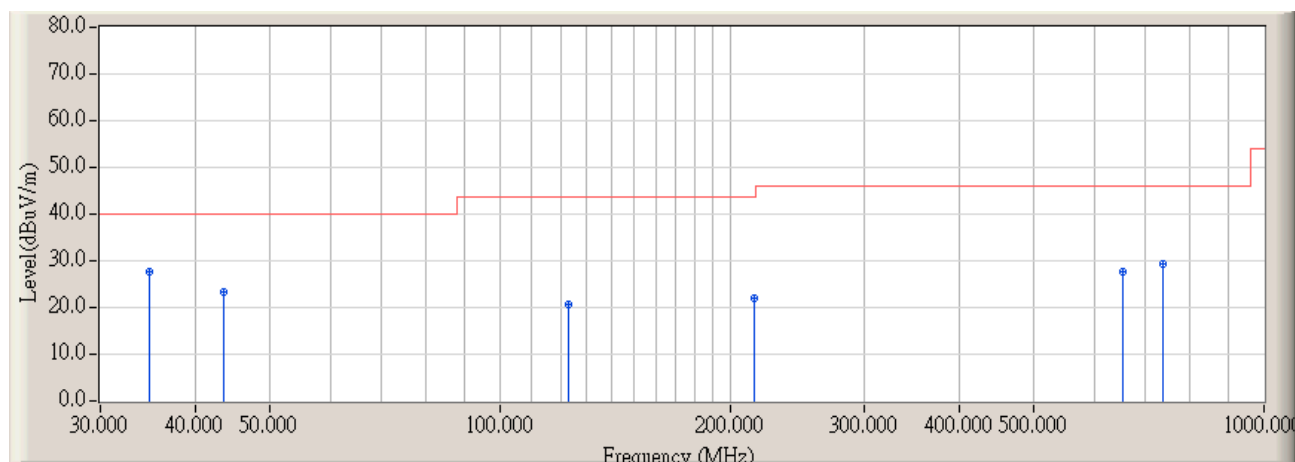
Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the "cone of radiation" of EUT. This horn 3dB beamwidth is 60 degrees for H-plane and 90 degrees for E-plane.

4.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
below 1G is defined as ± 3.8 dB

4.6. Test Result

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_QP	Margin : 0
EUT : HF921	Probe : CBL6141A_4278(30-2000MHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402MHz

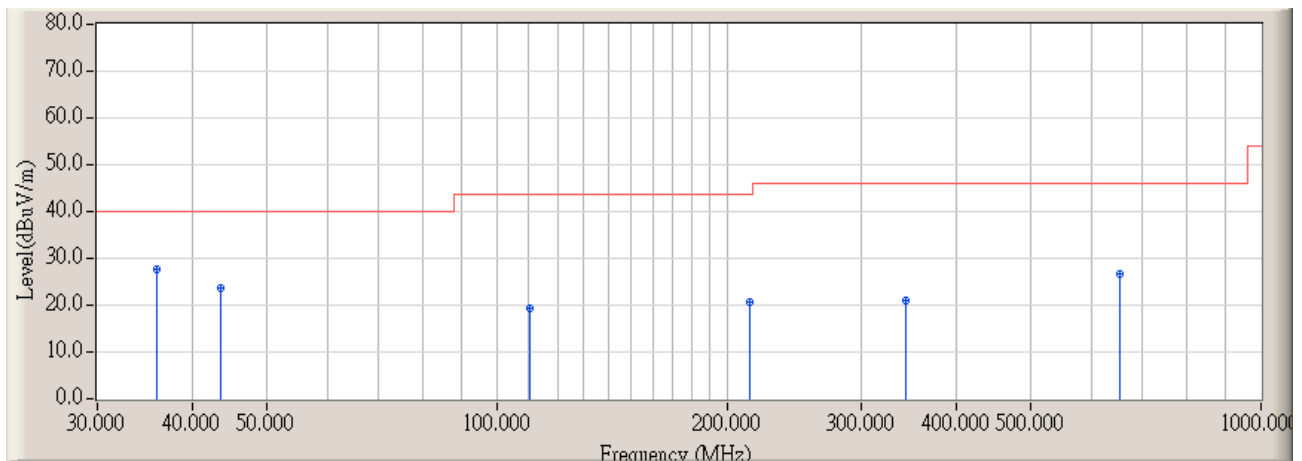


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1	*	34.850	-0.891	28.496	27.605	-12.395	40.000	QUASIPeAK	105.100	20.500
2		43.580	-5.189	28.382	23.193	-16.807	40.000	QUASIPeAK	110.000	125.000
3		123.120	-9.882	30.451	20.569	-22.951	43.520	QUASIPeAK	100.000	234.900
4		215.270	-9.607	31.730	22.123	-21.397	43.520	QUASIPeAK	100.000	25.900
5		652.740	-0.110	27.691	27.581	-18.439	46.020	QUASIPeAK	102.000	189.900
6		738.100	1.293	27.876	29.169	-16.851	46.020	QUASIPeAK	135.800	312.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_QP	Margin : 0
EUT : HF921	Probe : CBL6141A_4278(30-2000MHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402MHz

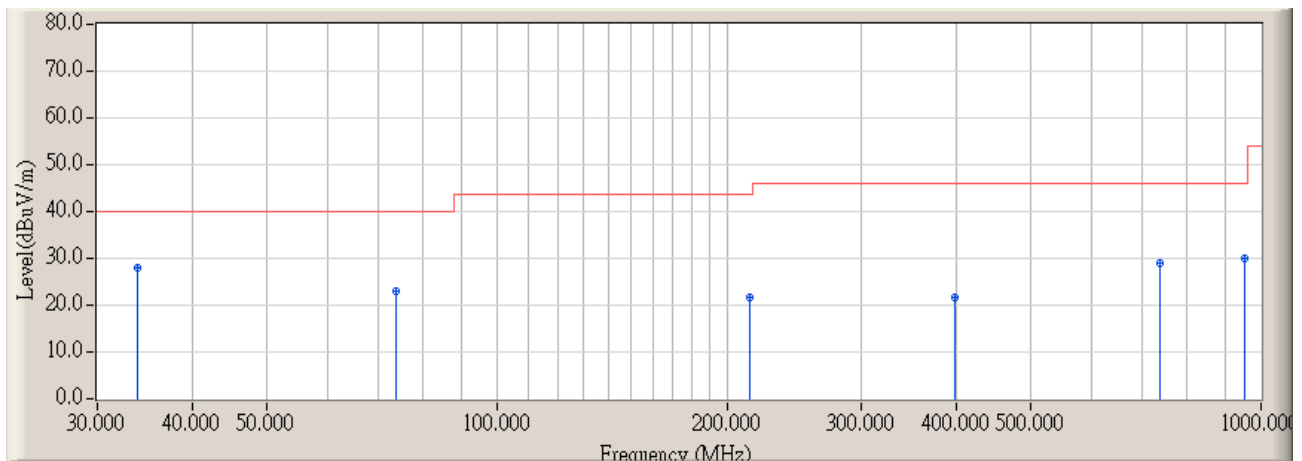


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1	*	35.820	-1.383	29.039	27.656	-12.344	40.000	QUASIPeAK	100.000	122.000
2		43.580	-5.189	28.937	23.748	-16.252	40.000	QUASIPeAK	112.900	12.700
3		110.510	-10.578	29.777	19.199	-24.321	43.520	QUASIPeAK	111.000	152.900
4		214.300	-9.708	30.289	20.581	-22.939	43.520	QUASIPeAK	100.000	278.900
5		342.340	-6.284	27.246	20.962	-25.058	46.020	QUASIPeAK	100.000	240.000
6		652.740	-0.110	26.802	26.692	-19.328	46.020	QUASIPeAK	100.000	162.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_QP	Margin : 0
EUT : HF921	Probe : CBL6141A_4278(30-2000MHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2441MHz

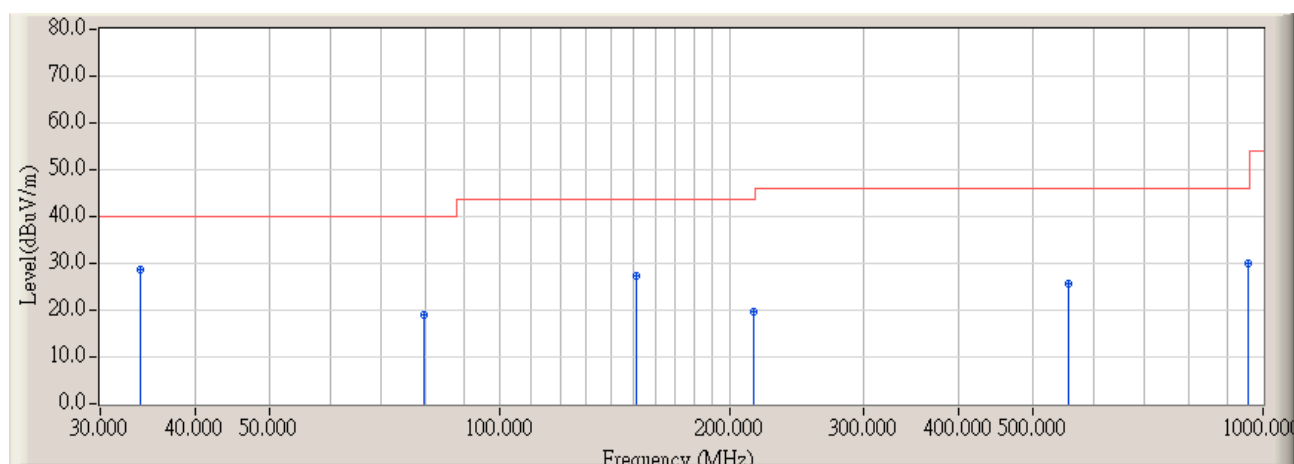


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1	*	33.880	-0.365	28.243	27.878	-12.122	40.000	QUASIPeAK	109.100	252.000
2		73.650	-14.364	37.307	22.943	-17.057	40.000	QUASIPeAK	100.000	23.400
3		214.300	-9.708	31.411	21.703	-21.817	43.520	QUASIPeAK	102.000	156.200
4		397.630	-5.007	26.801	21.794	-24.226	46.020	QUASIPeAK	100.000	235.000
5		738.100	1.293	27.761	29.054	-16.966	46.020	QUASIPeAK	115.000	219.900
6		953.440	3.768	26.180	29.948	-16.072	46.020	QUASIPeAK	109.200	231.600

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_QP	Margin : 0
EUT : HF921	Probe : CBL6141A_4278(30-2000MHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2441MHz

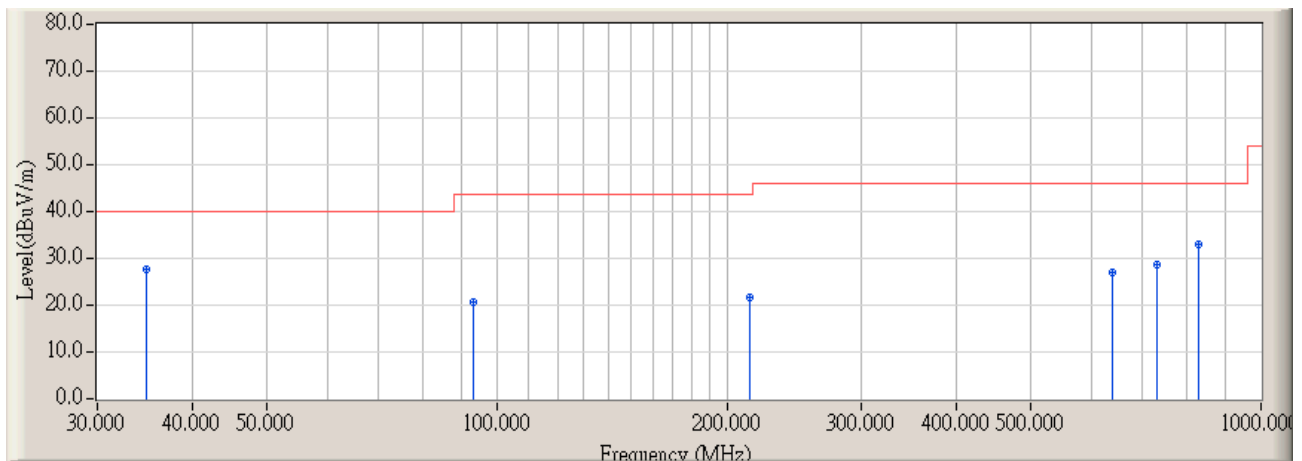


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1	*	33.880	-0.365	28.945	28.580	-11.420	40.000	QUASIPeAK	100.100	126.000
2		79.470	-13.802	32.909	19.107	-20.893	40.000	QUASIPeAK	120.100	221.000
3		151.250	-9.499	36.993	27.494	-16.026	43.520	QUASIPeAK	100.000	25.000
4		215.270	-9.607	29.212	19.605	-23.915	43.520	QUASIPeAK	100.000	264.000
5		555.740	-1.749	27.252	25.503	-20.517	46.020	QUASIPeAK	122.000	158.000
6		958.290	3.832	26.058	29.890	-16.130	46.020	QUASIPeAK	110.000	233.800

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_QP	Margin : 0
EUT : HF921	Probe : CBL6141A_4278(30-2000MHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480MHz

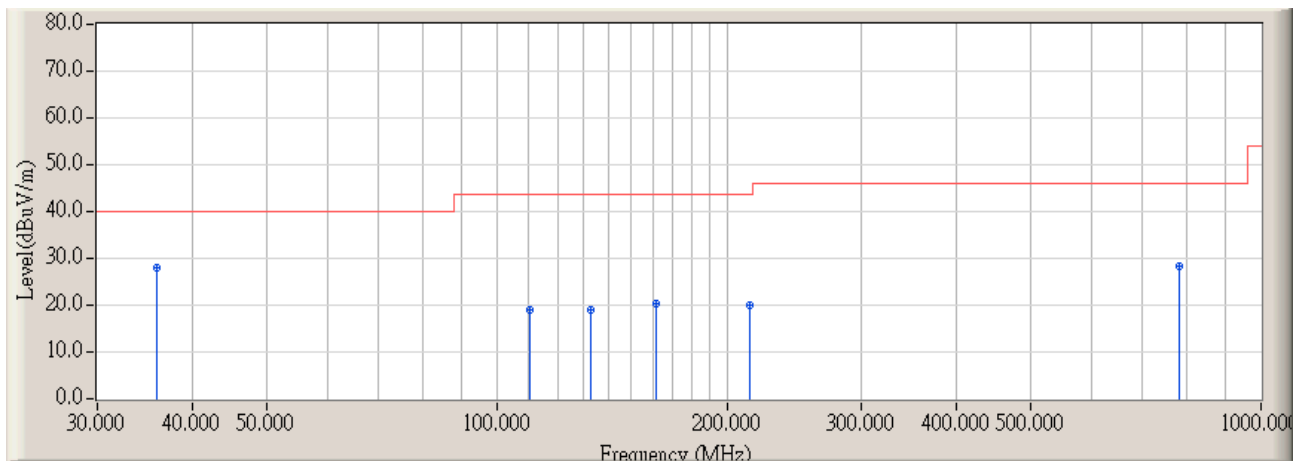


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1	*	34.850	-0.891	28.604	27.713	-12.287	40.000	QUASIPeAK	120.600	85.000
2		93.050	-12.329	33.130	20.801	-22.719	43.520	QUASIPeAK	113.600	165.800
3		214.300	-9.708	31.395	21.687	-21.833	43.520	QUASIPeAK	102.500	244.600
4		638.190	-0.567	27.698	27.131	-18.889	46.020	QUASIPeAK	100.000	115.900
5		731.310	1.130	27.541	28.671	-17.349	46.020	QUASIPeAK	104.600	79.500
6		827.340	1.867	31.123	32.990	-13.030	46.020	QUASIPeAK	100.000	166.800

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_QP	Margin : 0
EUT : HF921	Probe : CBL6141A_4278(30-2000MHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480MHz

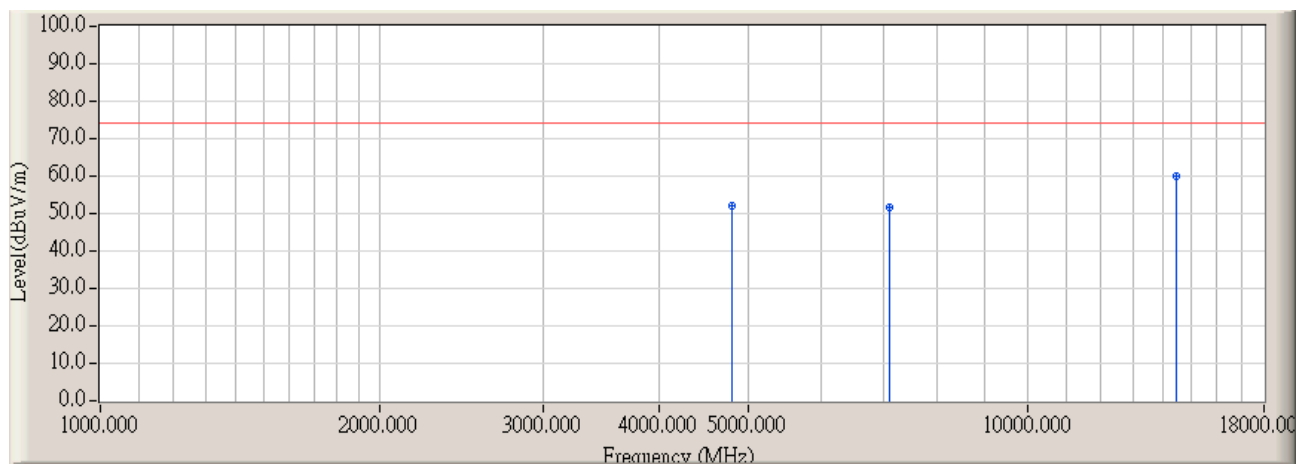


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1	*	35.820	-1.383	29.291	27.908	-12.092	40.000	QUASIPeAK	100.000	93.500
2		110.510	-10.578	29.475	18.897	-24.623	43.520	QUASIPeAK	205.600	311.500
3		132.820	-9.428	28.309	18.881	-24.639	43.520	QUASIPeAK	112.600	49.800
4		161.920	-10.004	30.480	20.476	-23.044	43.520	QUASIPeAK	123.600	185.500
5		214.300	-9.708	29.579	19.871	-23.649	43.520	QUASIPeAK	100.000	108.500
6		781.750	1.626	26.554	28.180	-17.840	46.020	QUASIPeAK	100.000	147.500

Note:

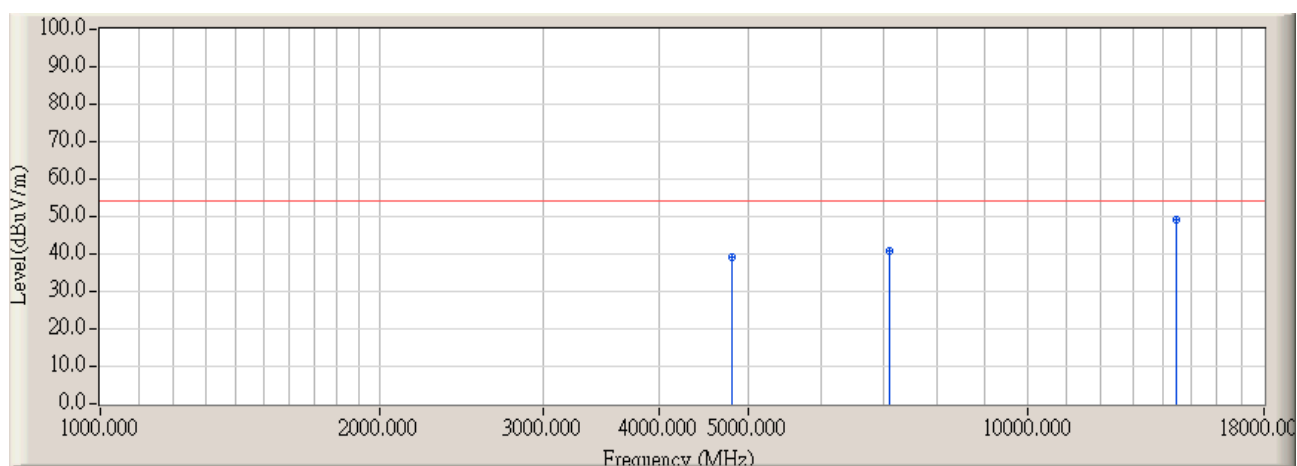
1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402MHz



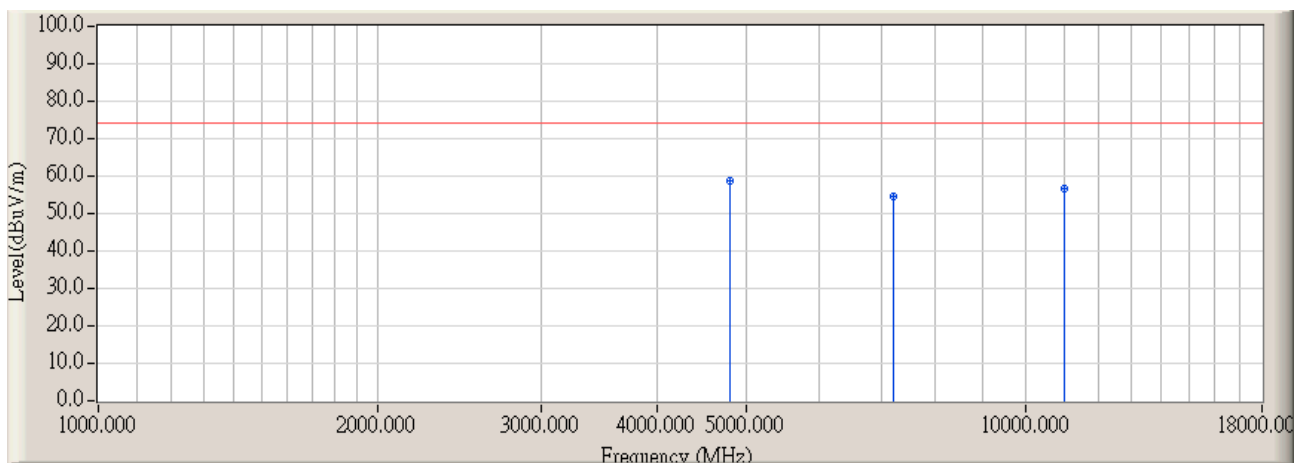
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4808.000	3.550	48.590	52.140	-21.830	73.970	PEAK	102.500	184.000
2		7103.000	12.260	39.579	51.839	-22.131	73.970	PEAK	100.000	146.000
3	*	14498.000	22.060	37.948	60.008	-13.962	73.970	PEAK	103.600	193.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402MHz



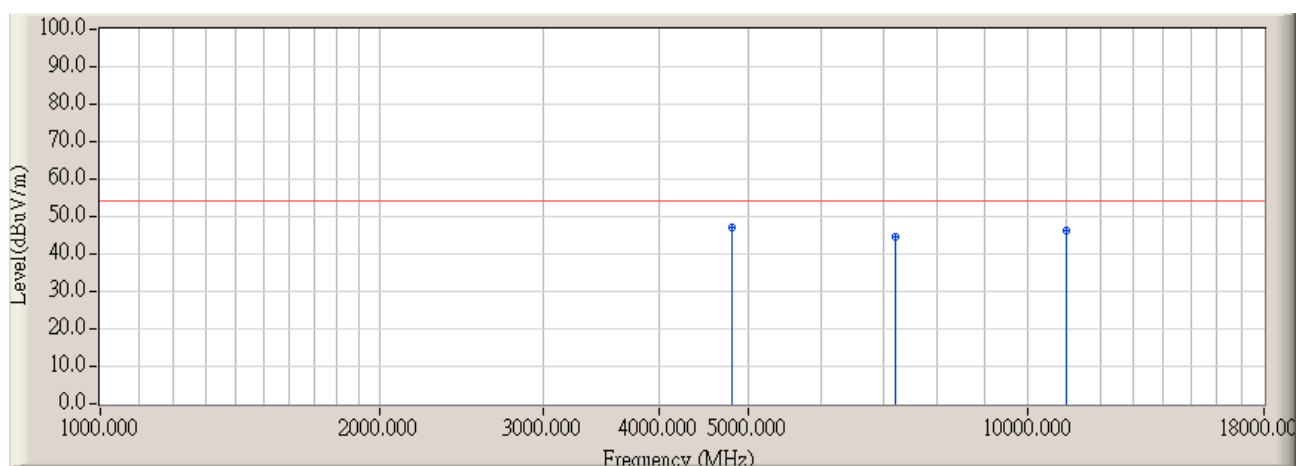
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4808.000	3.550	35.800	39.350	-14.620	53.970	AVERAGE	102.500	184.000
2		7103.000	12.260	28.700	40.960	-13.010	53.970	AVERAGE	100.000	146.000
3	*	14498.000	22.060	27.000	49.060	-4.910	53.970	AVERAGE	103.600	193.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402MHz



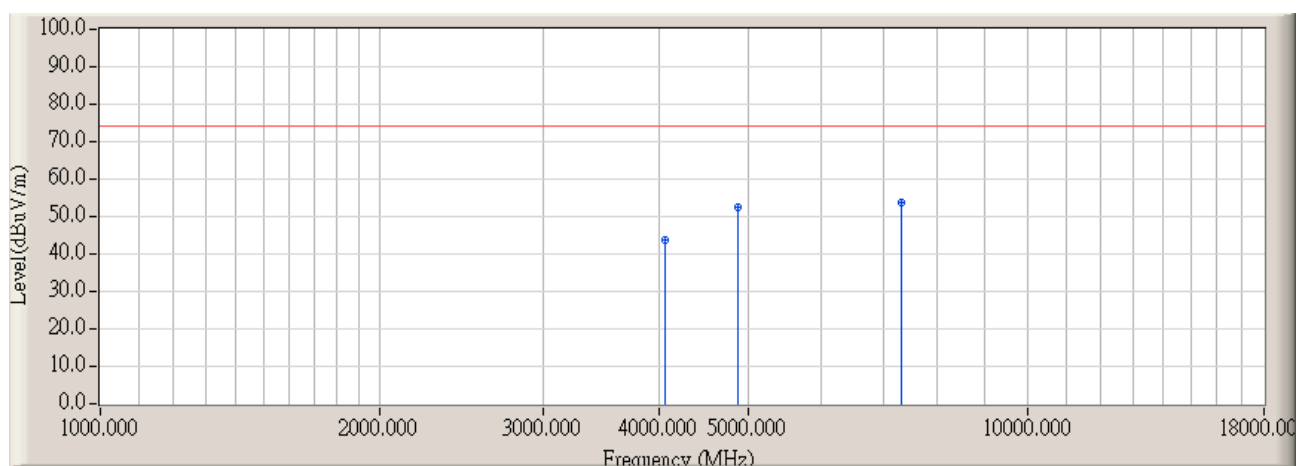
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1	*	4808.000	3.550	55.399	58.949	-15.021	73.970	PEAK	104.000	62.000
2		7205.000	12.290	42.406	54.696	-19.274	73.970	PEAK	100.000	184.000
3		11030.000	17.180	39.356	56.536	-17.434	73.970	PEAK	120.000	147.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:08
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402MHz



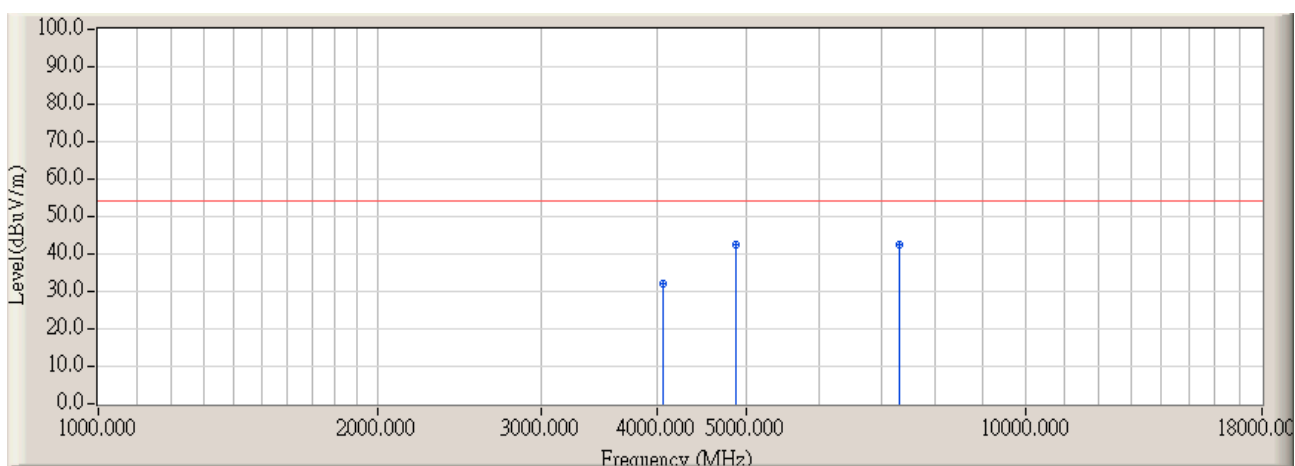
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1	*	4808.000	3.550	43.500	47.050	-6.920	53.970	AVERAGE	104.000	62.000
2		7205.000	12.290	32.500	44.790	-9.180	53.970	AVERAGE	100.000	184.000
3		11030.000	17.180	28.900	46.080	-7.890	53.970	AVERAGE	120.000	147.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:09
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2441MHz



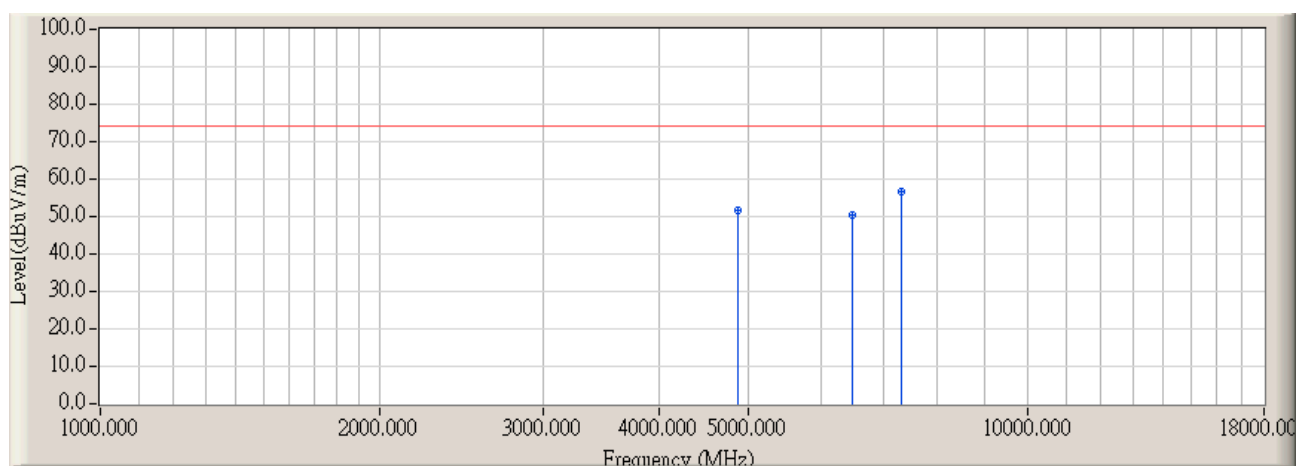
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4060.000	1.090	42.496	43.586	-30.384	73.970	PEAK	100.000	26.400
2		4876.000	3.640	49.046	52.686	-21.284	73.970	PEAK	102.600	193.000
3	*	7324.000	11.960	41.876	53.836	-20.134	73.970	PEAK	118.000	96.300

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:09
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2441MHz



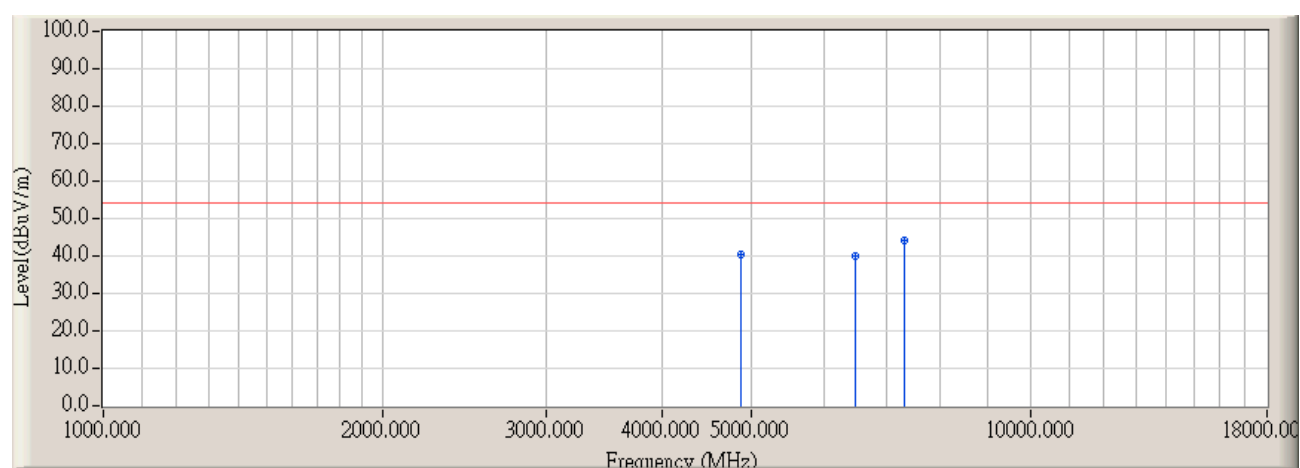
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4060.000	1.090	31.200	32.290	-21.680	53.970	AVERAGE	104.000	62.000
2	*	4876.000	3.640	39.000	42.640	-11.330	53.970	AVERAGE	100.000	184.000
3		7324.000	11.960	30.500	42.460	-11.510	53.970	AVERAGE	120.000	147.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:09
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2441MHz



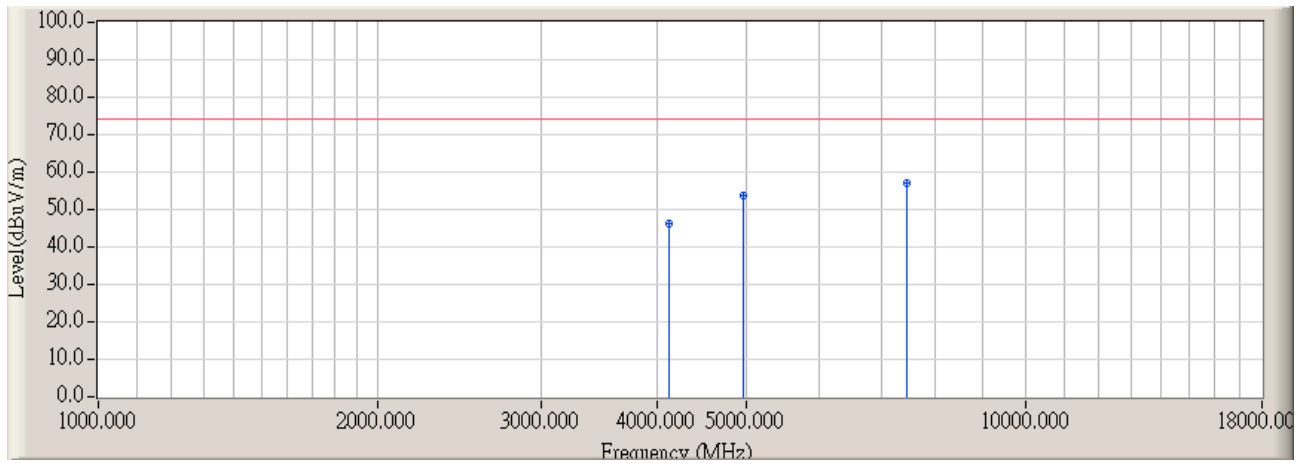
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4876.000	3.640	47.942	51.582	-22.388	73.970	PEAK	100.000	198.000
2		6474.000	8.340	42.146	50.486	-23.484	73.970	PEAK	102.000	117.000
3	*	7324.000	11.960	44.649	56.609	-17.361	73.970	PEAK	100.000	126.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:09
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2441MHz



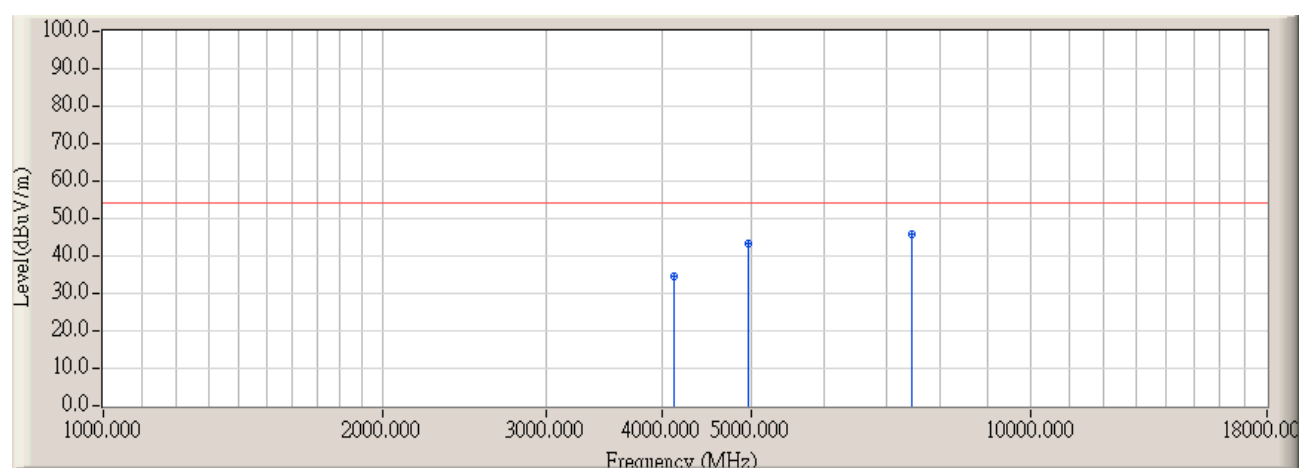
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4876.000	3.640	36.600	40.240	-13.730	53.970	AVERAGE	100.000	198.000
2		6474.000	8.340	31.500	39.840	-14.130	53.970	AVERAGE	102.000	117.000
3	*	7324.000	11.960	32.100	44.060	-9.910	53.970	AVERAGE	100.000	126.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:09
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480MHz



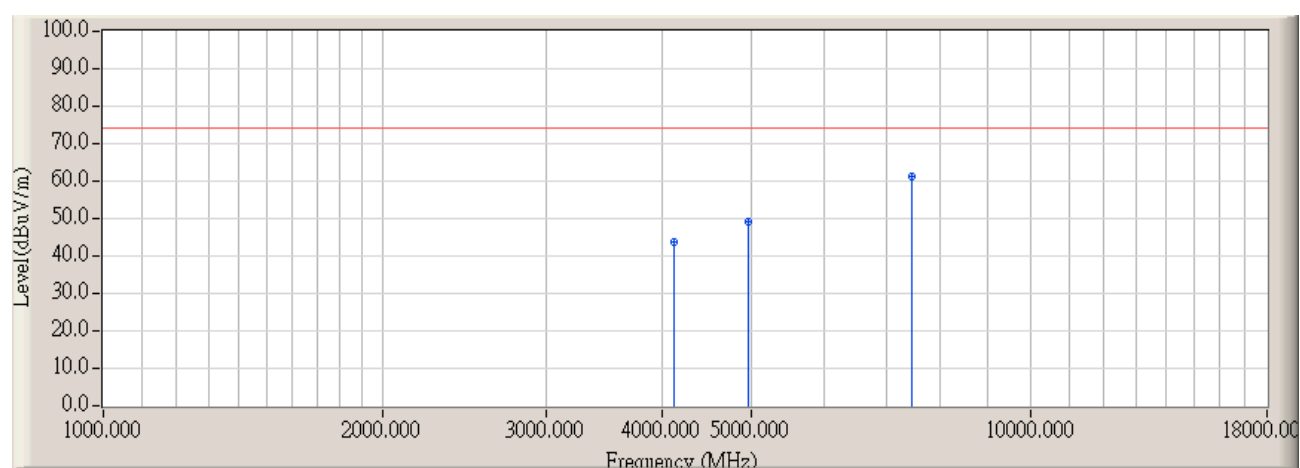
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4128.000	1.180	45.120	46.300	-27.670	73.970	PEAK	105.400	85.000
2		4961.000	4.110	49.488	53.598	-20.372	73.970	PEAK	110.400	208.000
3	*	7443.000	11.460	45.481	56.941	-17.029	73.970	PEAK	105.100	174.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:09
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480MHz



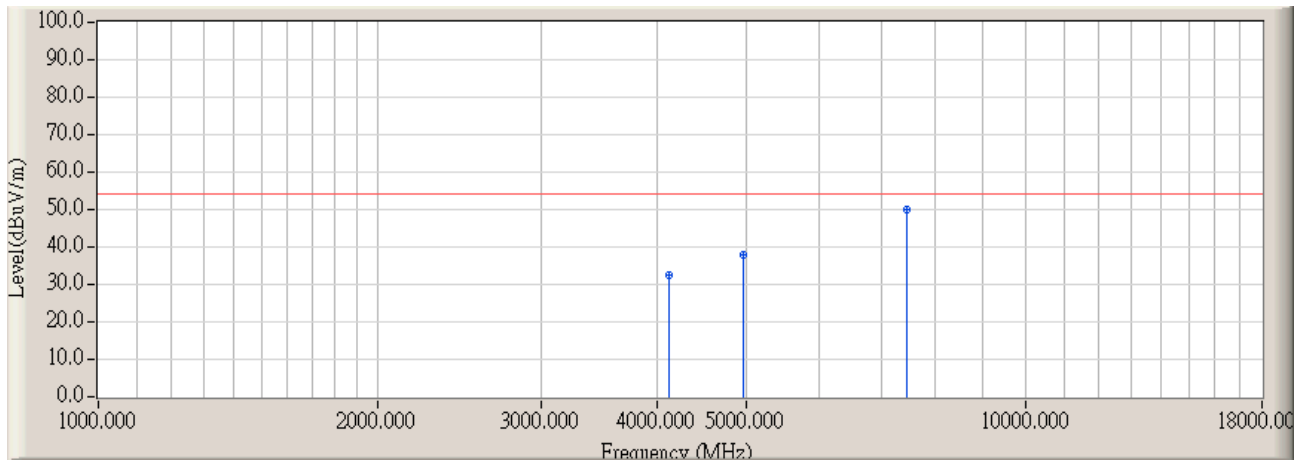
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4128.000	1.180	33.600	34.780	-19.190	53.970	AVERAGE	105.400	85.000
2		4961.000	4.110	39.100	43.210	-10.760	53.970	AVERAGE	110.400	208.000
3	*	7443.000	11.460	34.500	45.960	-8.010	53.970	AVERAGE	105.100	174.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:09
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4128.000	1.180	42.561	43.741	-30.229	73.970	PEAK	105.400	85.000
2		4961.000	4.110	45.193	49.303	-24.667	73.970	PEAK	110.400	208.000
3	*	7443.000	11.460	49.656	61.116	-12.854	73.970	PEAK	105.100	174.000

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/09 - 17:09
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type	Ant Pos (cm)	Table Pos (deg)
1		4128.000	1.180	31.500	32.680	-21.290	53.970	AVERAGE	105.400	85.000
2		4961.000	4.110	33.900	38.010	-15.960	53.970	AVERAGE	110.400	208.000
3	*	7443.000	11.460	38.500	49.960	-4.010	53.970	AVERAGE	105.100	174.000

5. 20dB Bandwidth

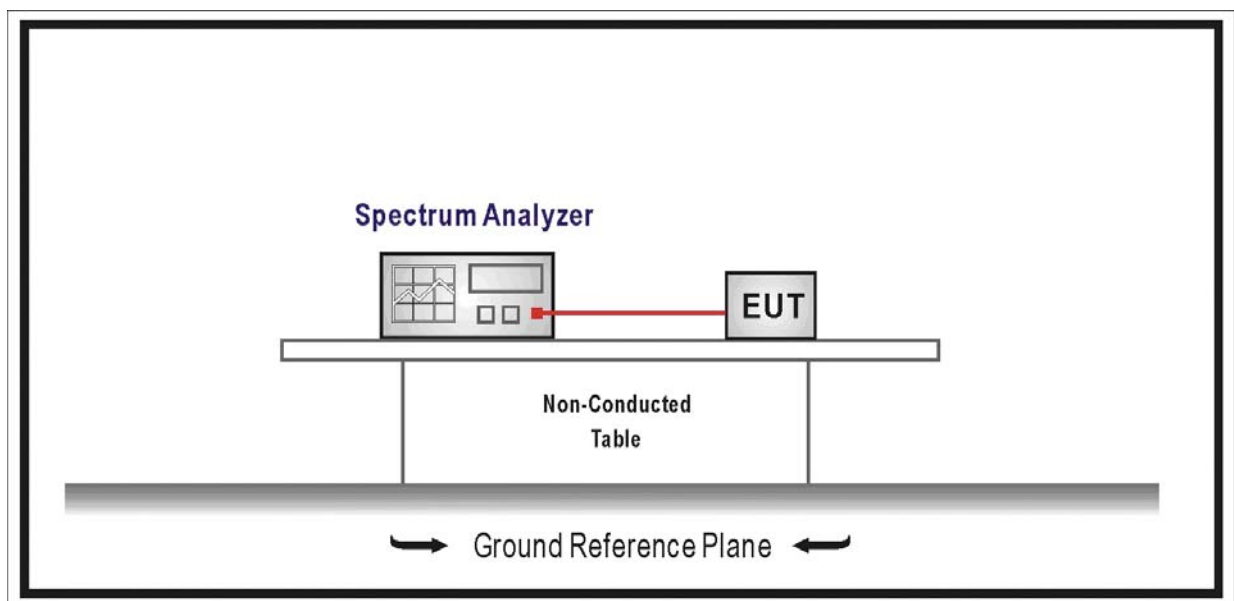
5.1. Test Equipment

20dB Bandwidth / AC-4

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Coaxial Cable	Huber+Suhner	AC4-RF	09	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2008/03/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

5.2. Test Setup



5.3. Limit

- For frequency hopping systems operating in 2400-2483.5 MHz band, no limitation.
- For frequency hopping systems operating in 902-928 MHz band, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- For frequency hopping systems operating in 5725-5850 MHz band, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.

5.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

Use the following spectrum analyzer settings:

Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel

RBW \geq 1% of the 20dB bandwidth

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.

Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

5.5. Uncertainty

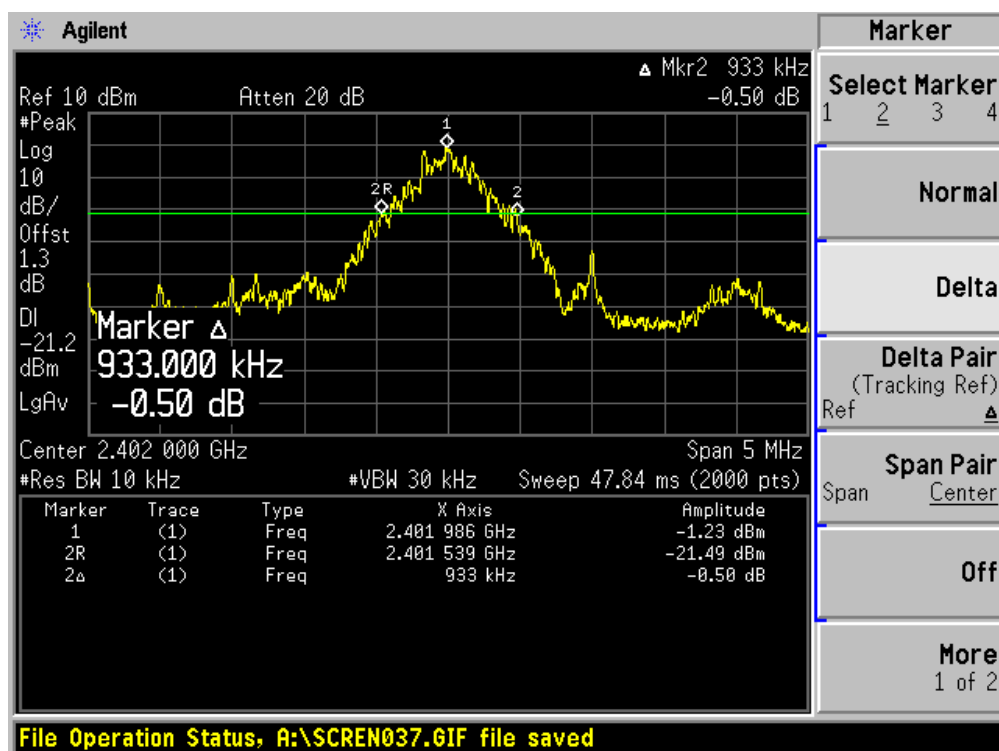
The measurement uncertainty is defined as ± 1 kHz

5.6. Test Result

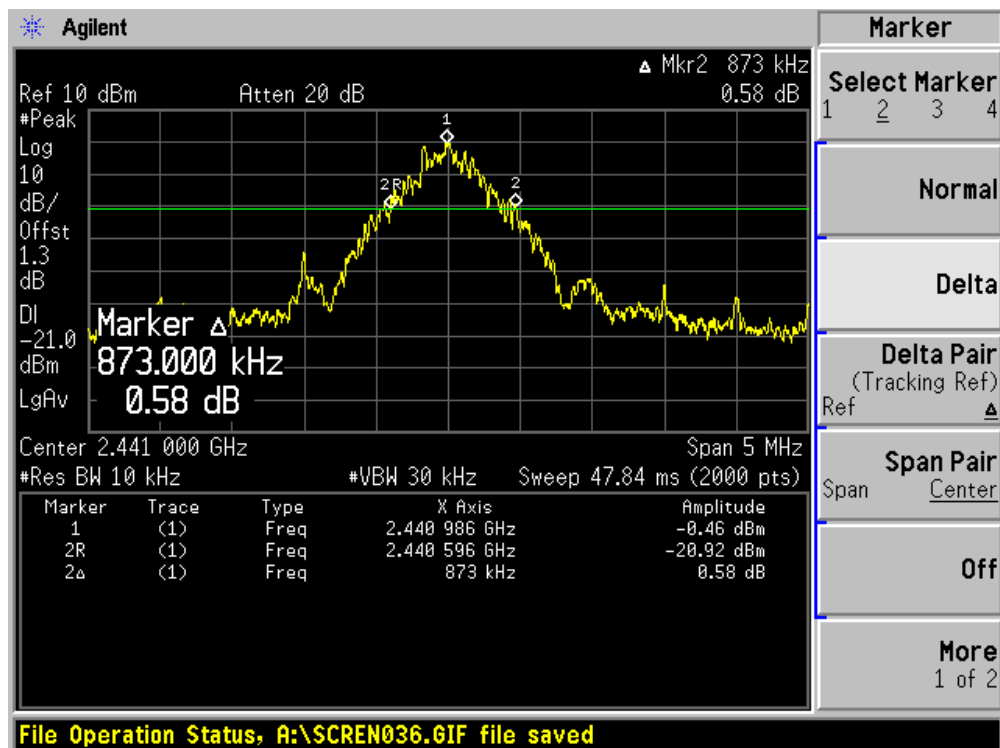
Product	:	Seecode Tube
Test Item	:	20dB Bandwidth
Test Site	:	AC-4
Test Mode	:	Mode 1: Transmit

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Result
00	2402	933	N/A	Pass
39	2441	873	N/A	Pass
78	2480	933	N/A	Pass

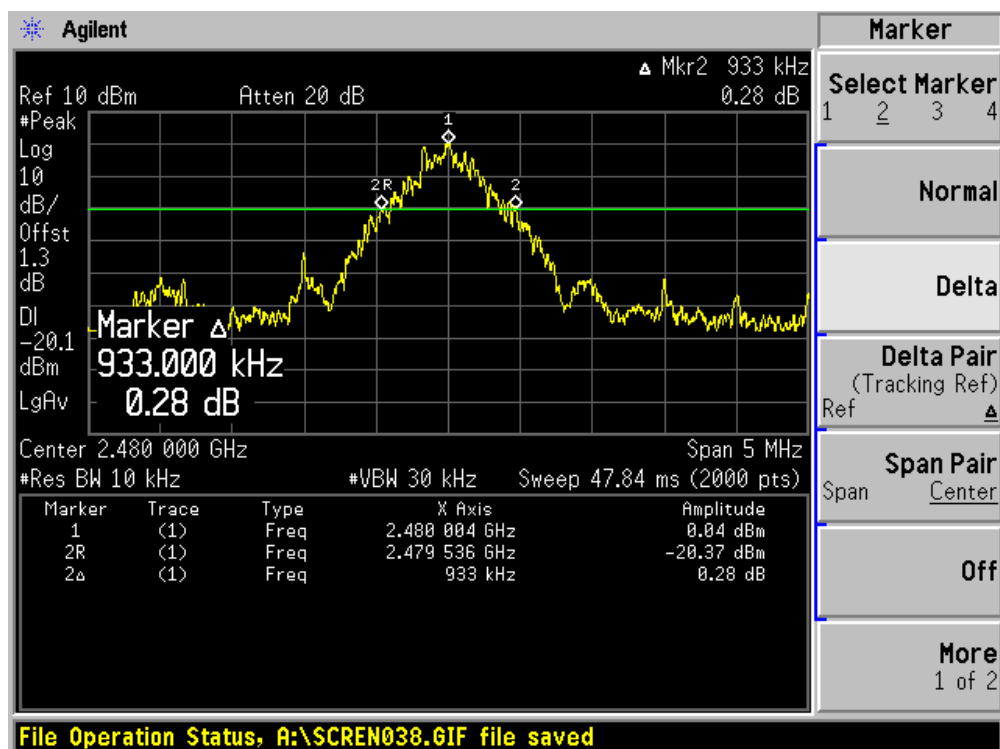
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



6. Carrier Frequency Separation

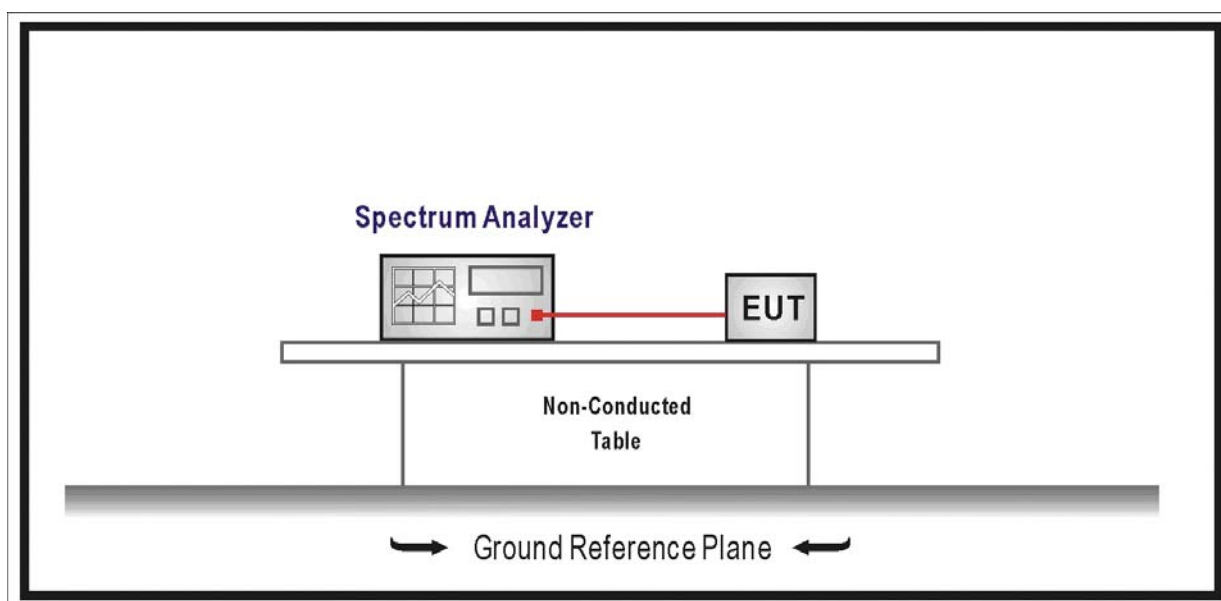
6.1. Test Equipment

Carrier Frequency Separation / AC-4

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Coaxial Cable	Huber+Suhner	AC4-RF	09	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2008/03/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

6.2. Test Setup



6.3. Limit

- Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each

transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

- For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

6.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = wide enough to capture the peaks of two adjacent channels

Resolution (or IF) Bandwidth (RBW) \geq 1% of the span

Video (or Average) Bandwidth VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

6.5. Uncertainty

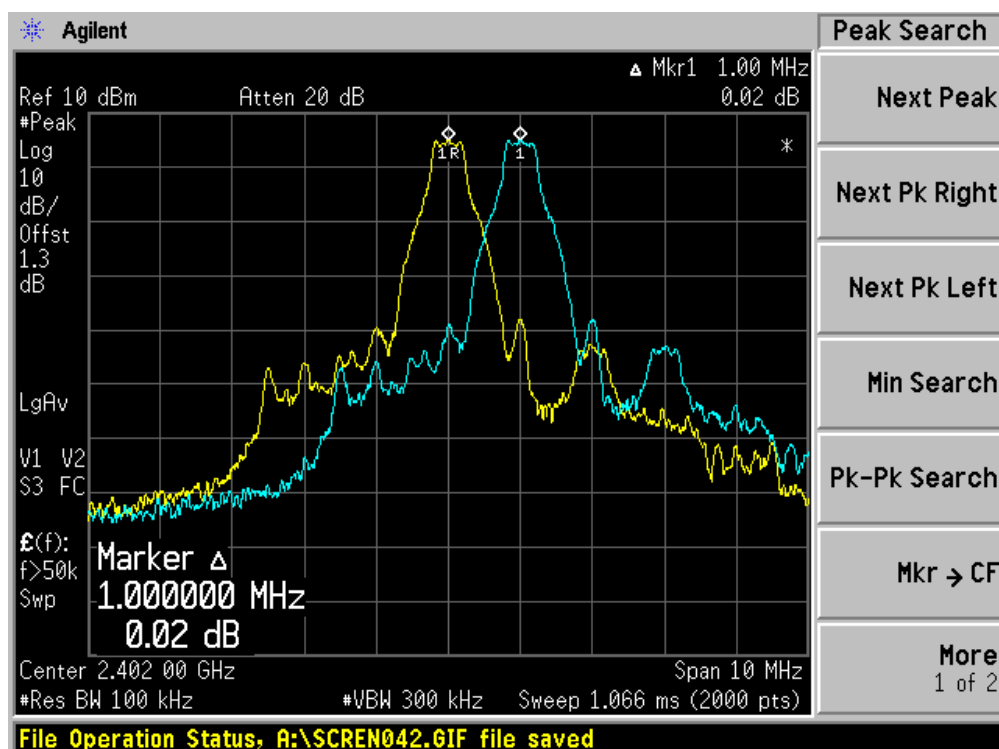
The measurement uncertainty is defined as ± 1 kHz

6.6. Test Result

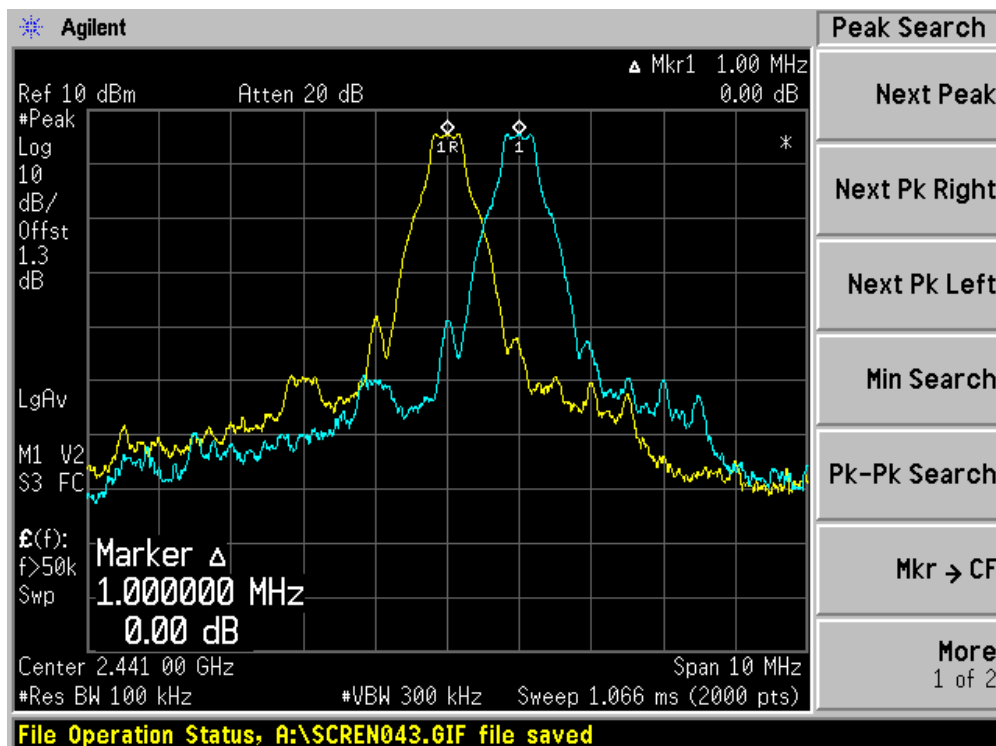
Product	:	Seecode Tube
Test Item	:	Carrier Frequency Separation
Test Site	:	AC-4
Test Mode	:	Mode 1: Transmit

Channel No.	Frequency (MHz)	Carrier Frequency Separation (kHz)	Limit (kHz)	Result
00	2402	1000	>25 kHz or 2/3 of 20 dB BW	Pass
39	2441	1000	>25 kHz or 2/3 of 20 dB BW	Pass
78	2480	1000	>25 kHz or 2/3 of 20 dB BW	Pass

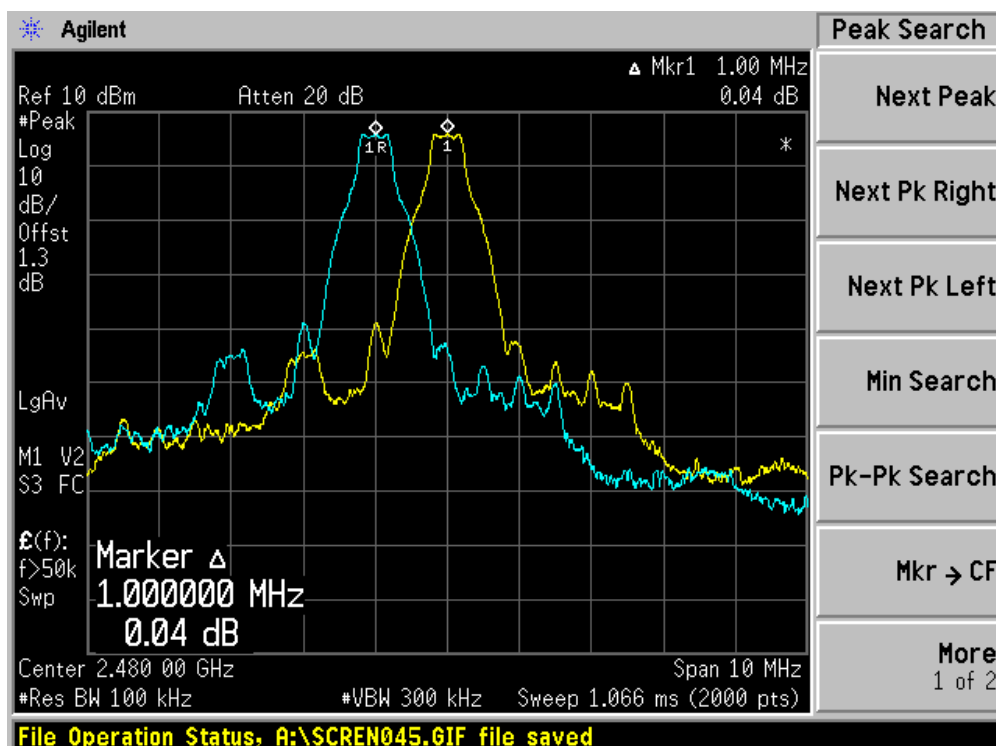
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



7. Number of Hopping Frequencies

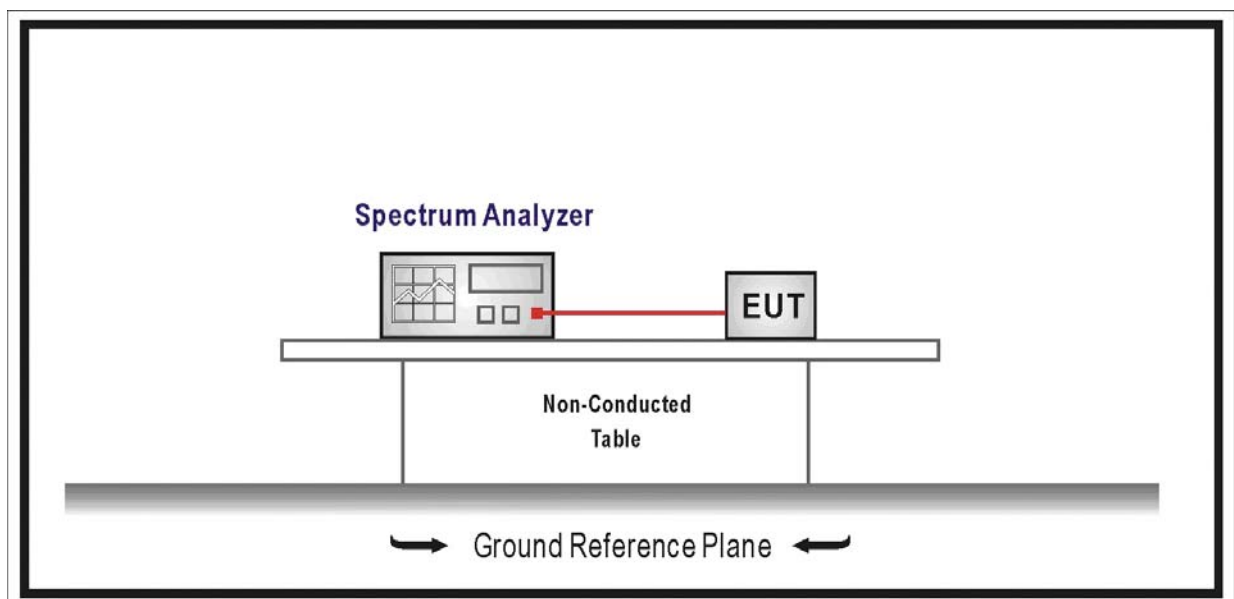
7.1. Test Equipment

Number of Hopping Frequencies / AC-4

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Coaxial Cable	Huber+Suhner	AC4-RF	09	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2008/03/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

7.2. Test Setup



7.3. Limit

- For frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.
- For frequency hopping systems operating in 902-928 MHz band shall use at least 50 hopping frequencies.
- For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

7.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW \geq 1% of the span

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to bread the span up to sections, in order to clearly show all of the hopping frequencies.

7.5. Uncertainty

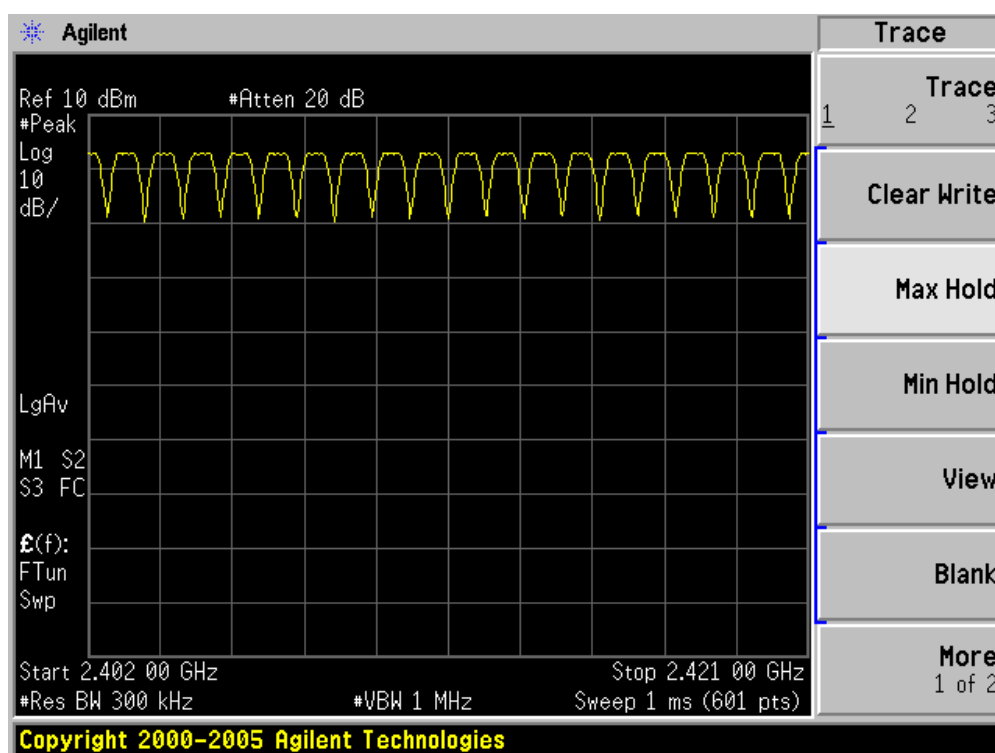
The measurement uncertainty is defined as ± 1 kHz

7.6. Test Result

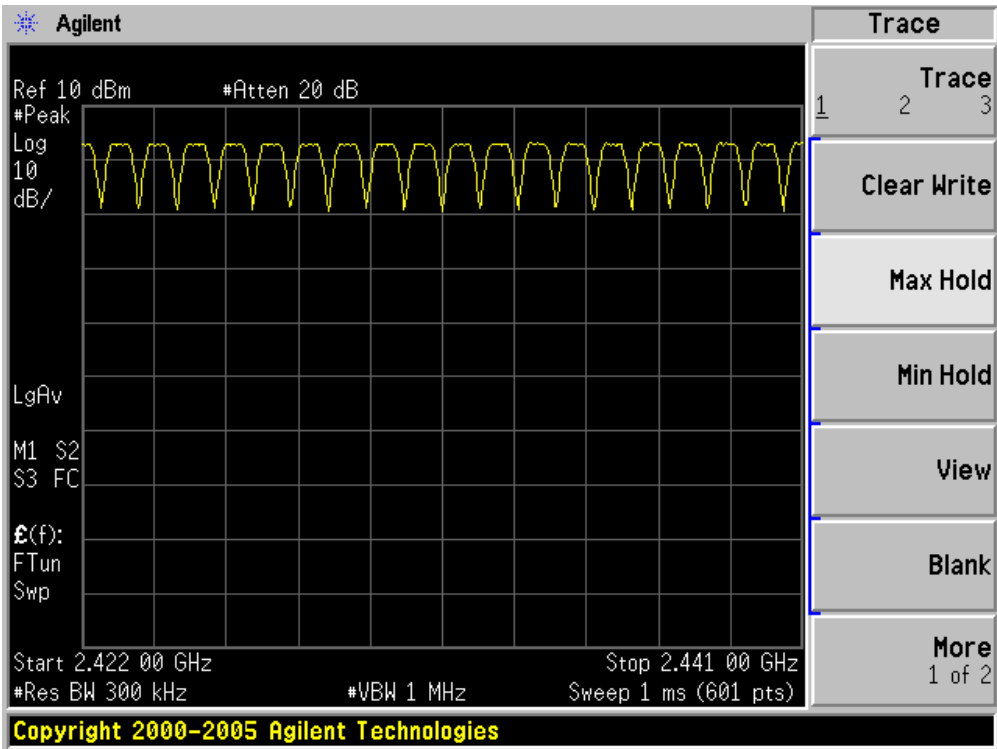
Product	:	Seecode Tube
Test Item	:	Number of Hopping Frequencies
Test Site	:	AC-4
Test Mode	:	Mode 1: Transmit

Frequency Band (MHz)	Number of Hopping Frequencies	Limit	Result
2400 - 2483.5	79	>15	Pass

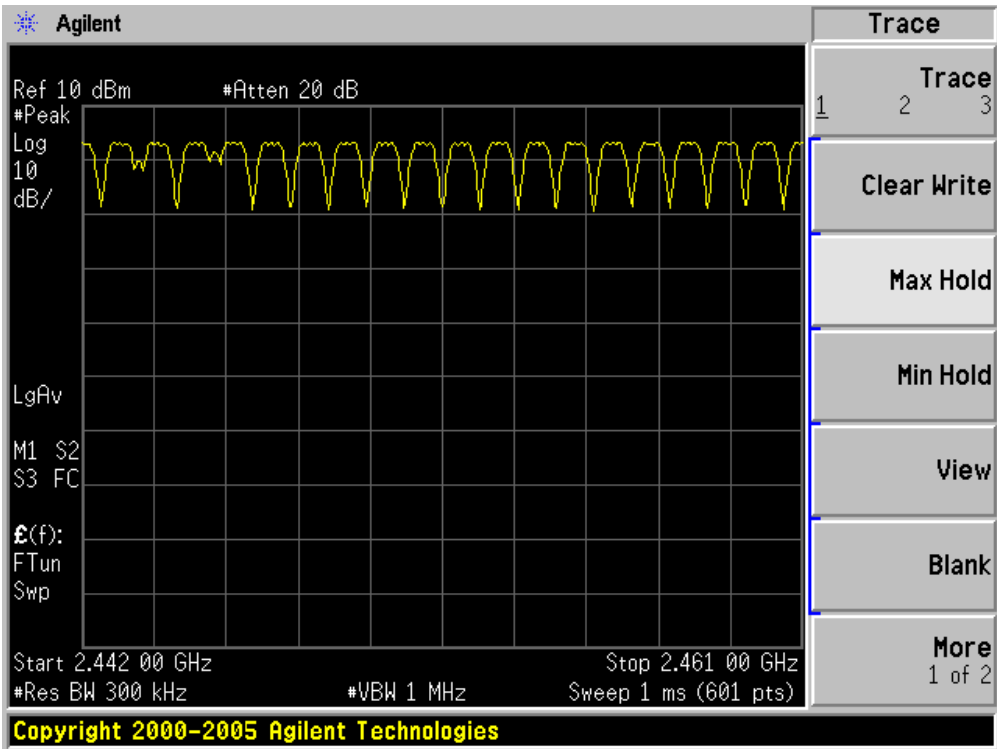
2402 - 2421 MHz



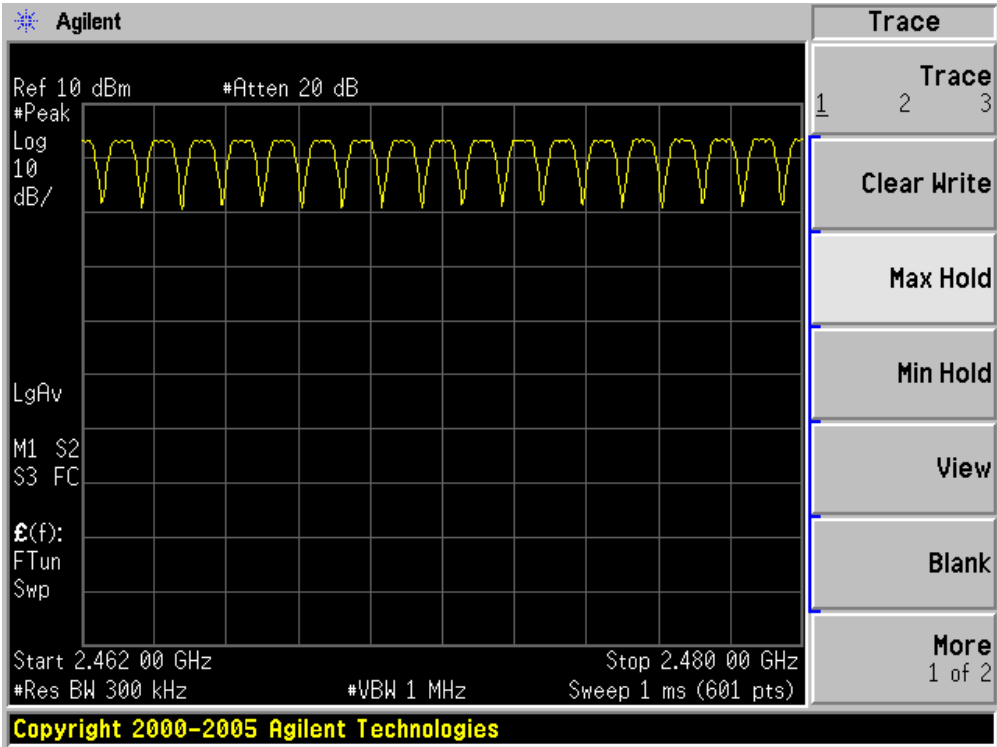
2422 - 2441 MHz



2442 - 2461 MHz



2462 - 2480 MHz



8. Time of Occupancy (Dwell Time)

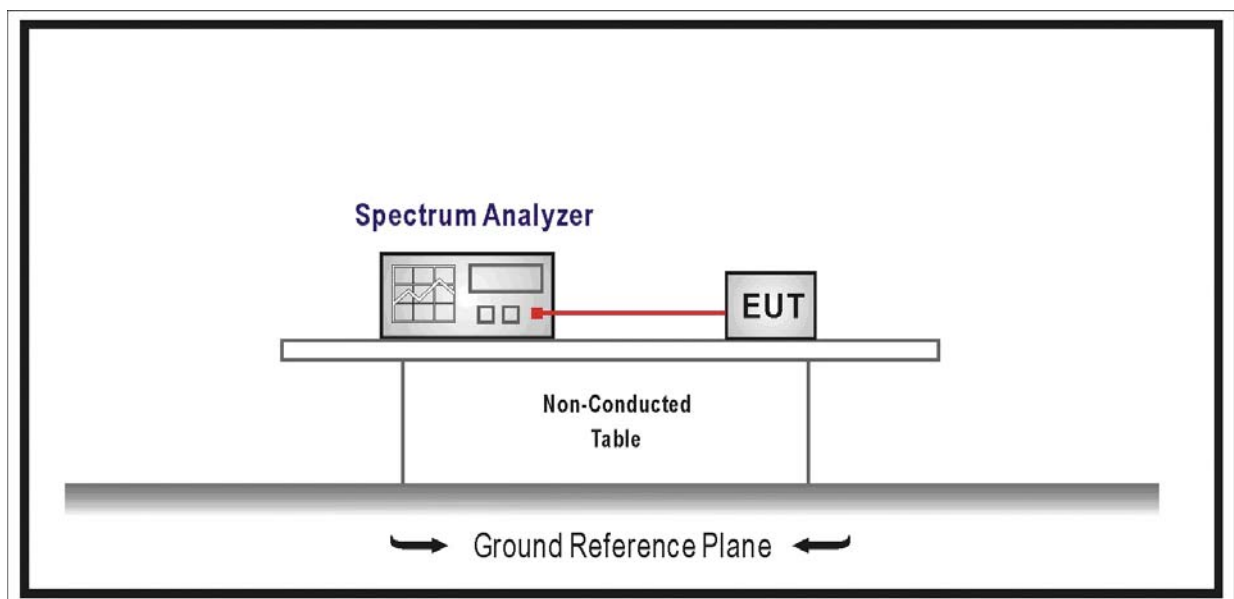
8.1. Test Equipment

Time of Occupancy (Dwell Time) / AC-4

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Coaxial Cable	Huber+Suhner	AC4-RF	09	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2008/03/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

8.2. Test Setup



8.3. Limit

- For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

- Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.
- Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

8.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

RBW = 1MHz

VBW \geq RBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

8.5. Uncertainty

The measurement uncertainty is defined as ± 0.1 us

8.6. Test Result

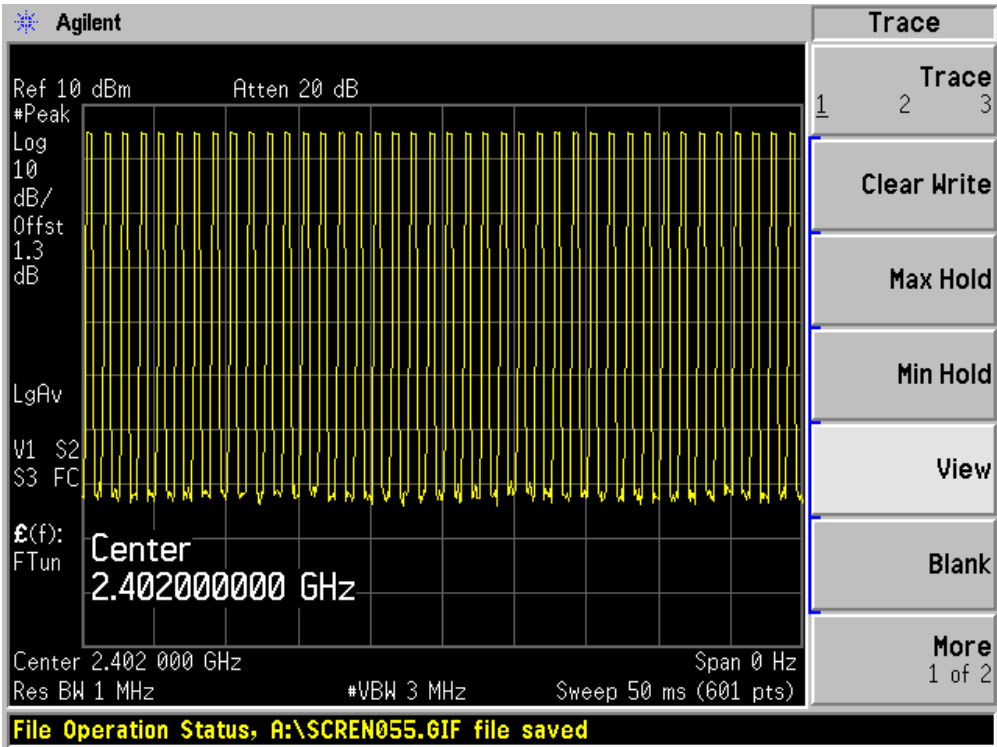
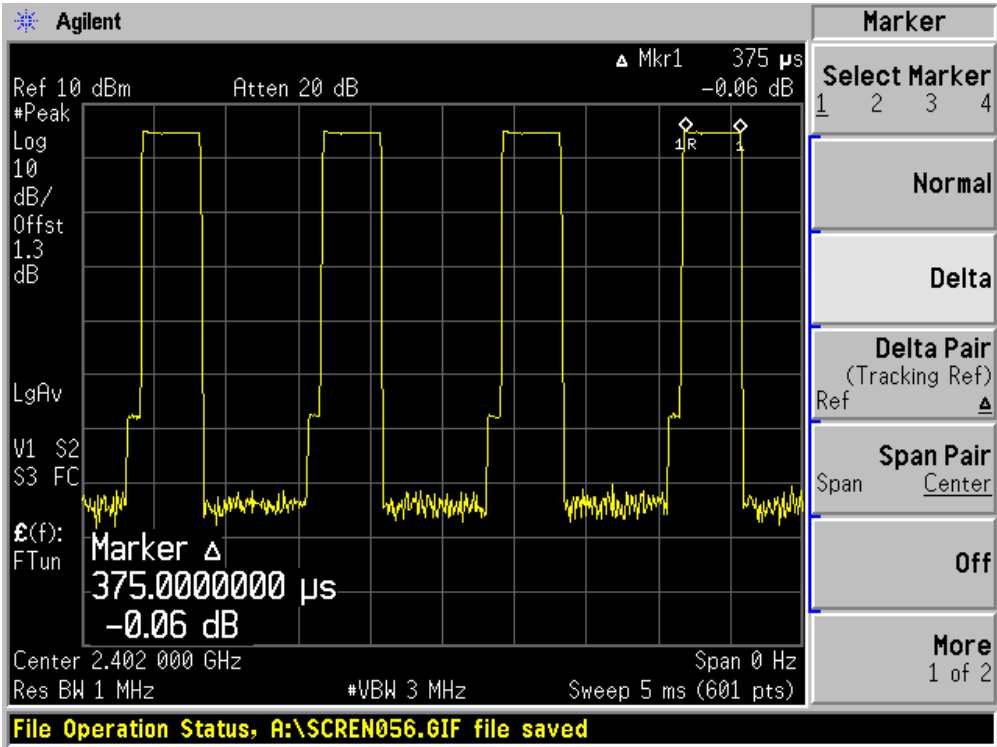
Product	:	Seecode Tube
Test Item	:	Time of Occupancy (Dwell Time)
Test Site	:	AC-4
Test Mode	:	Mode 1: Transmit

Channel No.	Frequency (MHz)	Time of Occupancy (ms)	Limit (ms)	Result
00	2402	120.173	< 400	Pass
39	2441	120.173	< 400	Pass
78	2480	120.173	< 400	Pass

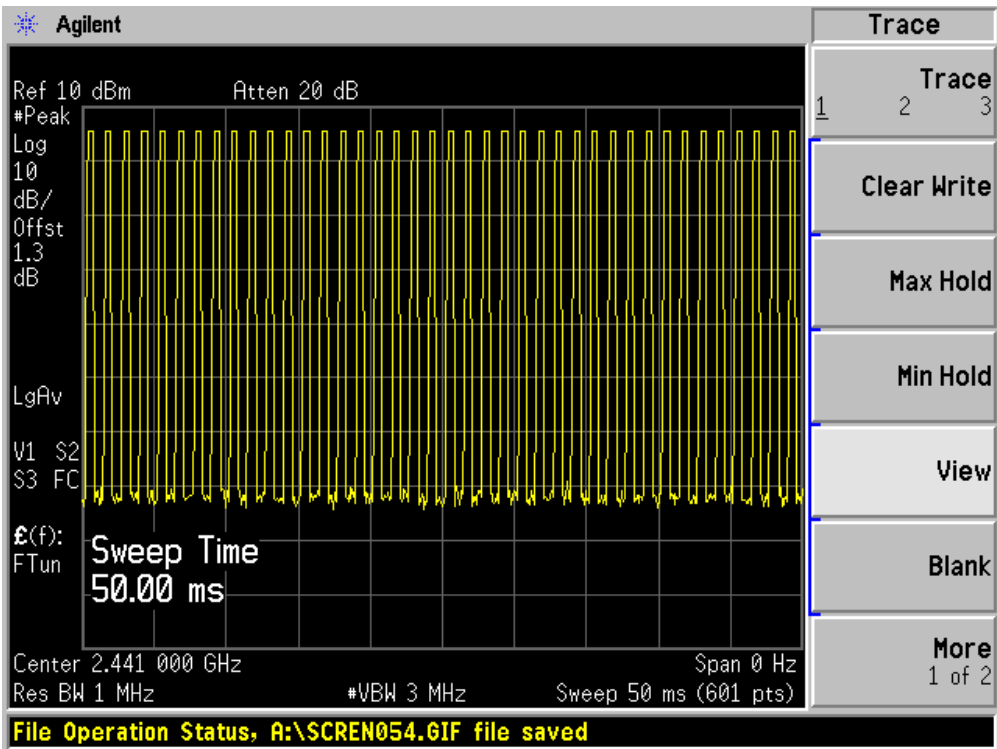
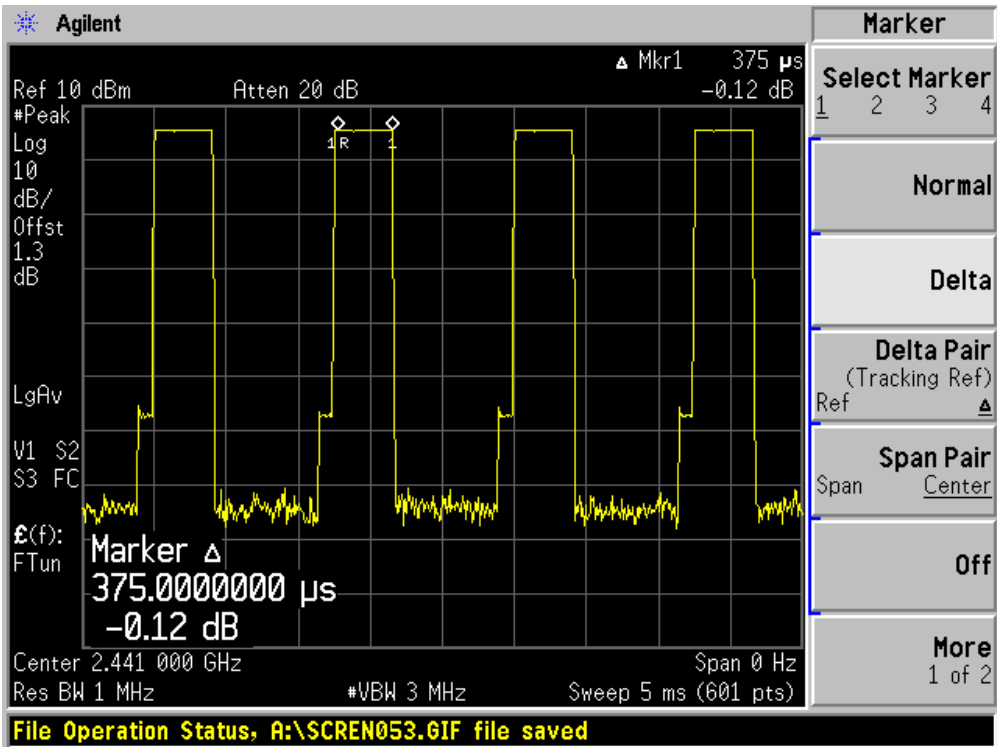
Test Time Period: $0.4 \times 79 = 31.6\text{sec}$, Hopping Times Within 1sec: $40/50\text{msec} = 800\text{ hops/sec}$.

- 2402MHz, The Maximum Occupancy Time Within 31.6sec: $(375.0 \mu\text{s} \times 800) / 79 \times 31.6 = 120.173\text{msec}$
- 2441MHz, The Maximum Occupancy Time Within 31.6sec: $(375.0 \mu\text{s} \times 800) / 79 \times 31.6 = 120.173\text{msec}$
- 2480MHz, The Maximum Occupancy Time Within 31.6sec: $(375.0 \mu\text{s} \times 800) / 79 \times 31.6 = 120.173\text{msec}$

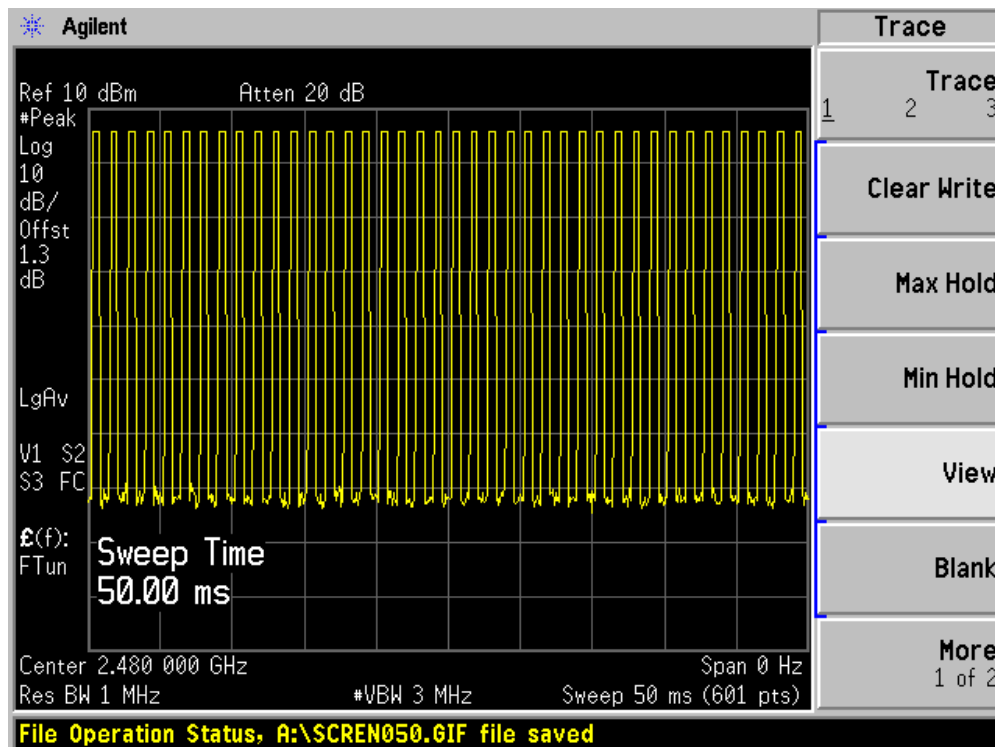
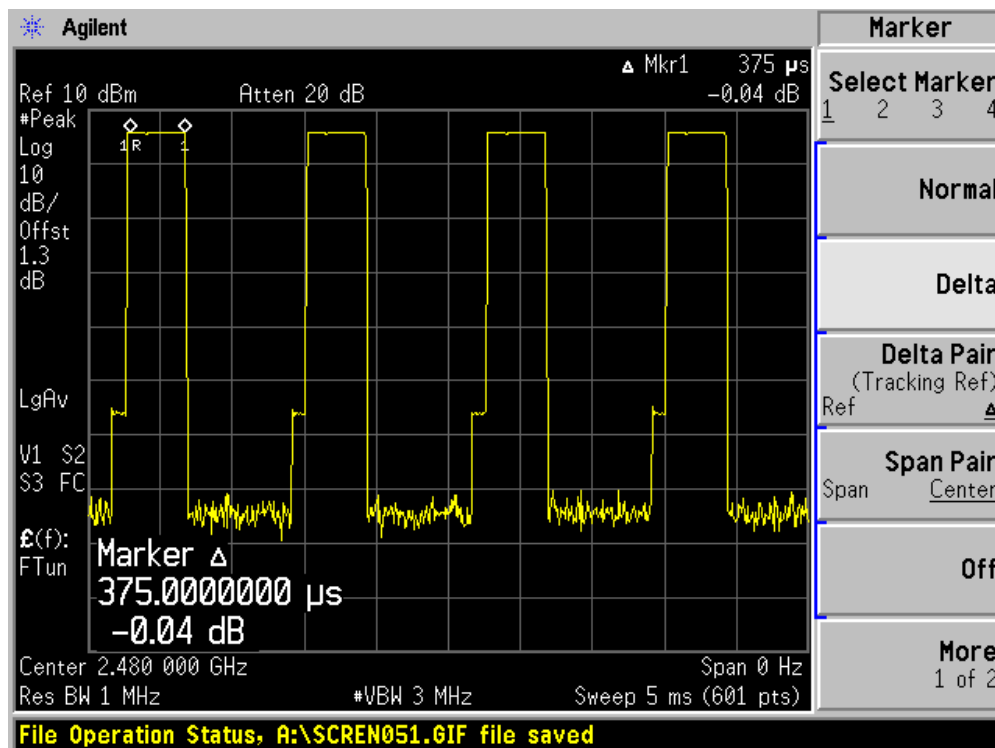
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



9. Peak Output Power

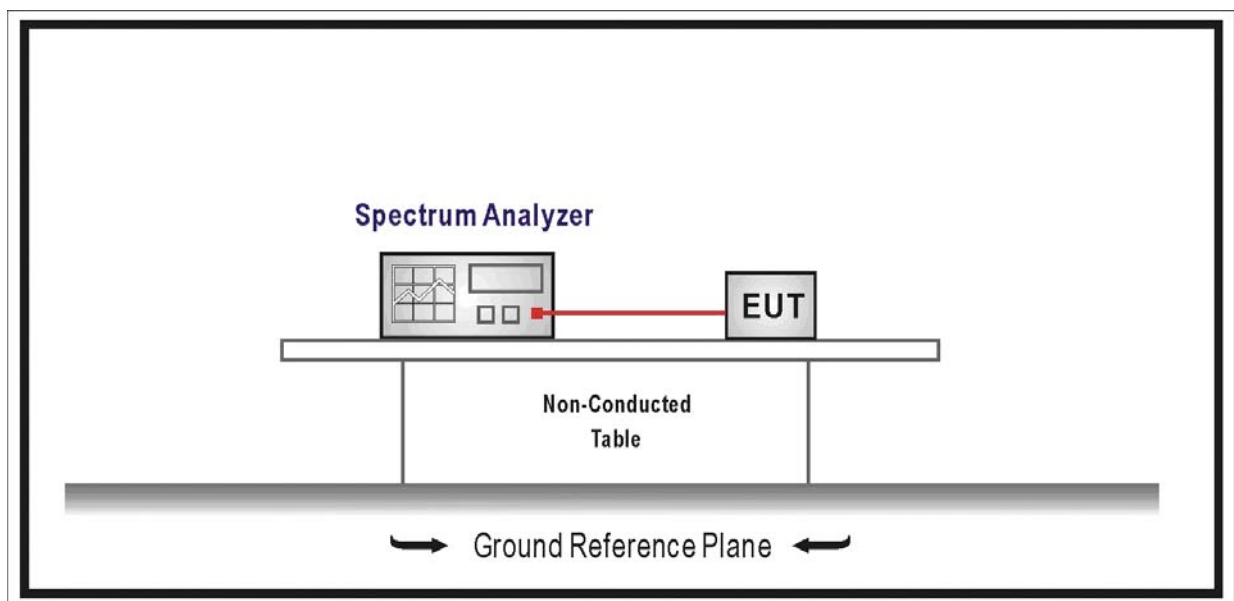
9.1. Test Equipment

Peak Output Power / AC-4

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Coaxial Cable	Huber+Suhner	AC4-RF	09	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2008/03/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

9.2. Test Setup



9.3. Limit

- For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
- For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

Note: the conducted output power limit specified above is based on the use the antennas with directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

9.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

Use the following spectrum analyzer settings:

Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel

RBW > the 20 dB bandwidth of the emission being measured.

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don't forget added the external attenuation and cable loss).

9.5. Uncertainty

The measurement uncertainty is defined as ± 1.0 dB

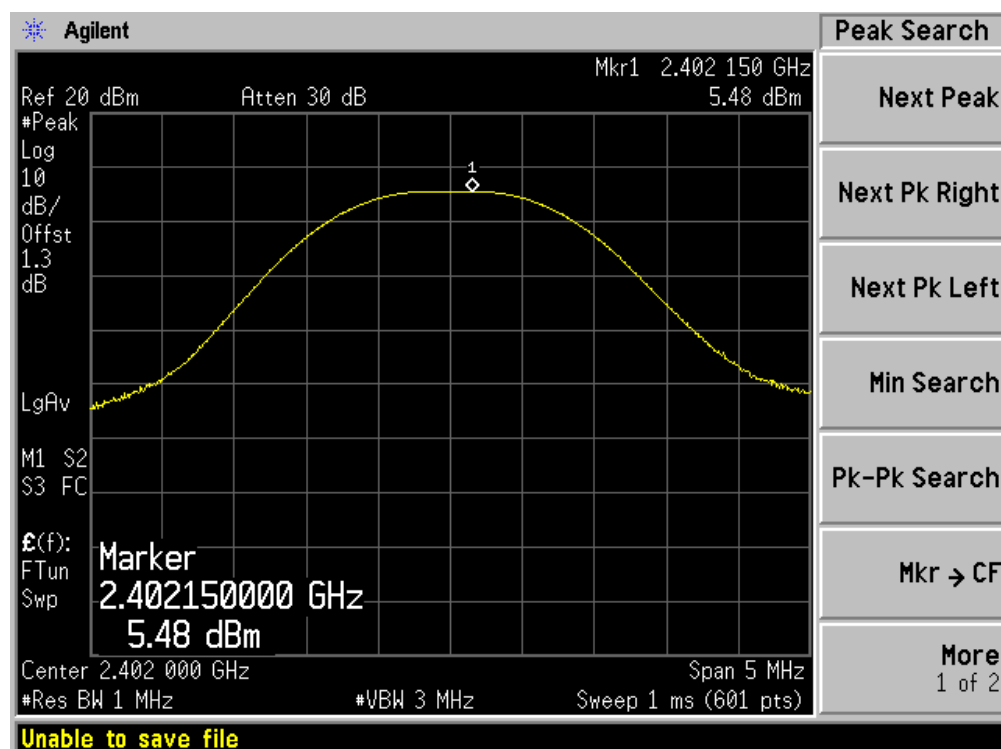
9.6. Test Result

Product	:	Seecode Tube
Test Item	:	Peak Output Power
Test Site	:	AC-4
Test Mode	:	Mode 1: Transmit

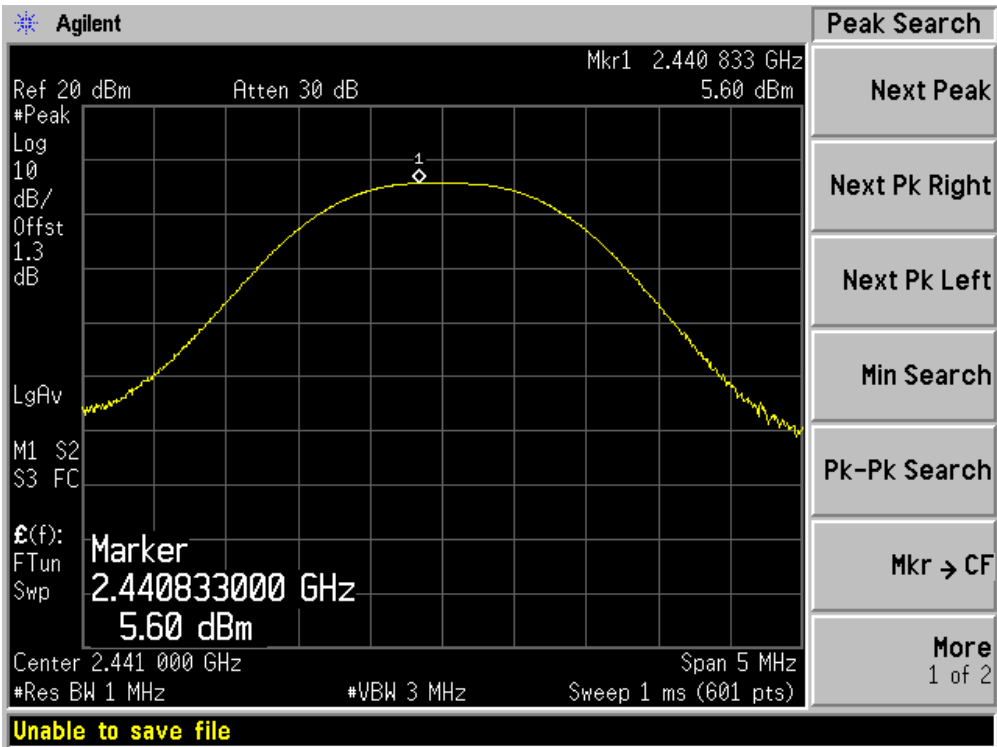
Channel No.	Frequency (MHz)	Measurement Level (dBm)	External Attenuation (dBm)	Peak Output Power (dBm)	Limit (dBm)	Result
00	2402	5.48	0.32	5.8	30	Pass
39	2441	5.60	0.35	5.95	30	Pass
78	2480	5.79	0.40	6.19	30	Pass

Note: The antenna gain of transmitter is less than 6 dBi and other than fixed, point-to-point operation, therefore the limit is 30 dBm.

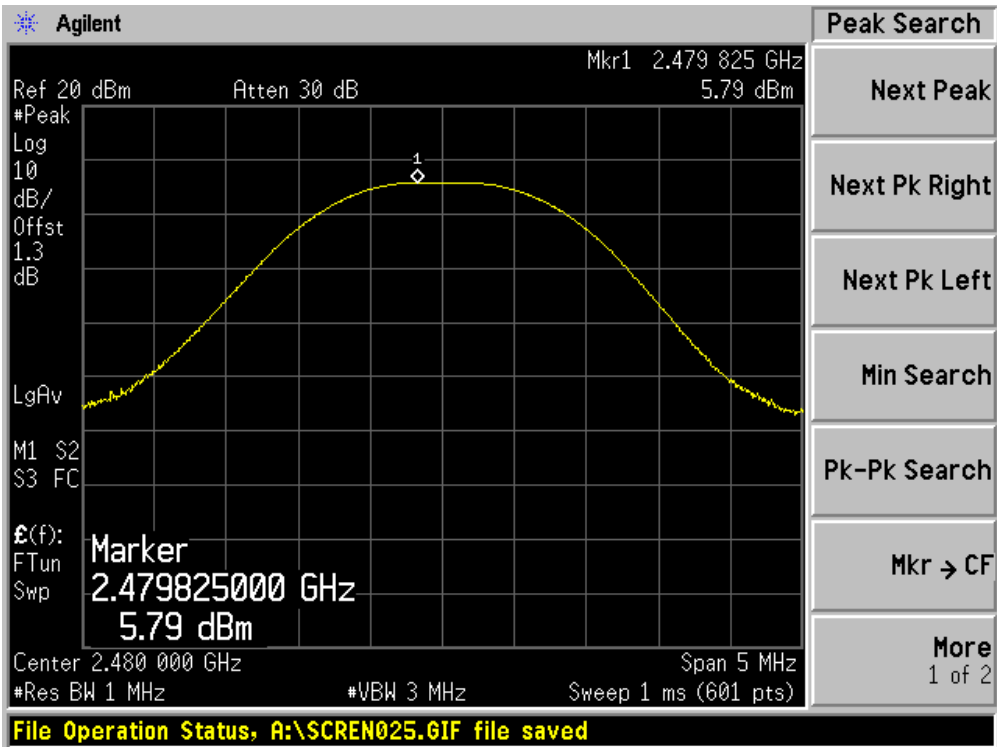
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



10. Band-edge Compliance of RF Conducted Emissions

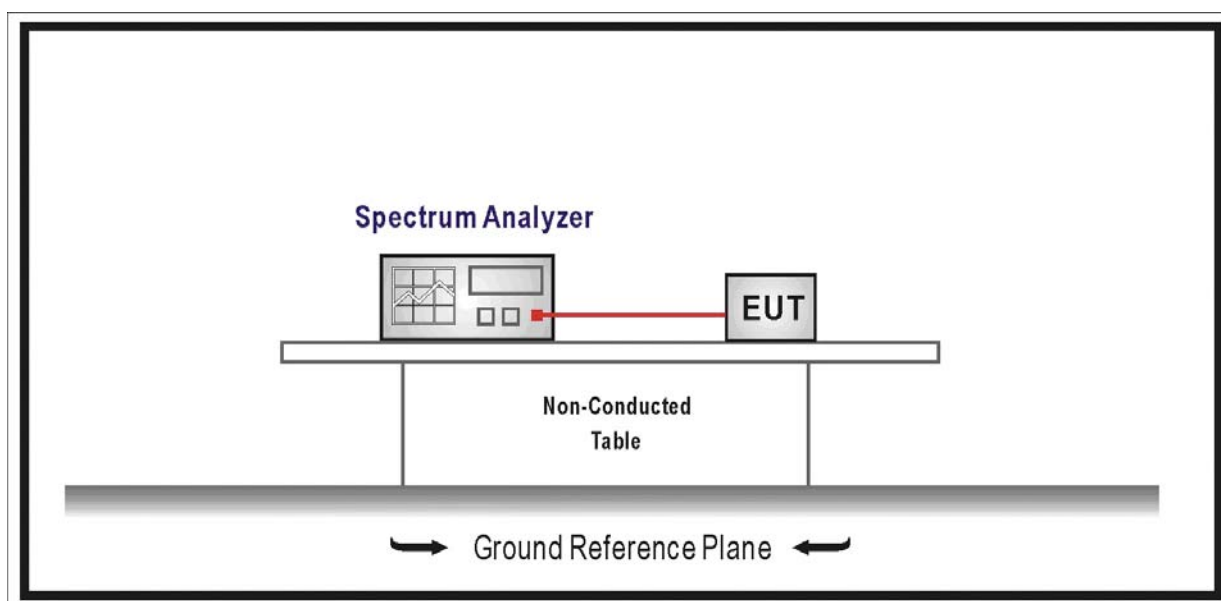
10.1. Test Equipment

Band-edge Compliance of RF Conducted Emissions / AC-4

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Coaxial Cable	Huber+Suhner	AC4-RF	09	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2008/03/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

10.2. Test Setup



10.3. Limit

- Intentional radiators operating under the alternative provisions to the general emission limits as contained in 15.217 through 15.257 and in Subpart E of FCC part 15, must be designed to ensure that 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
- In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is

produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) of FCC part 15 is not required.

10.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation.

RBW \geq 1% of the span

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge.

Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.

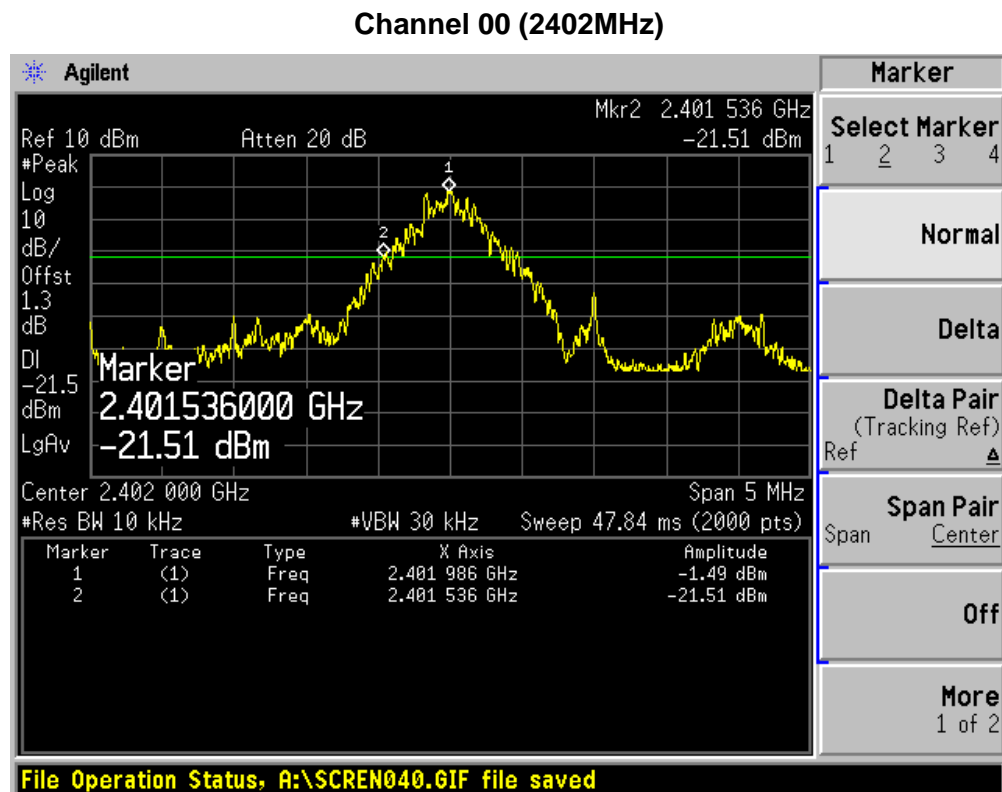
Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

10.5. Uncertainty

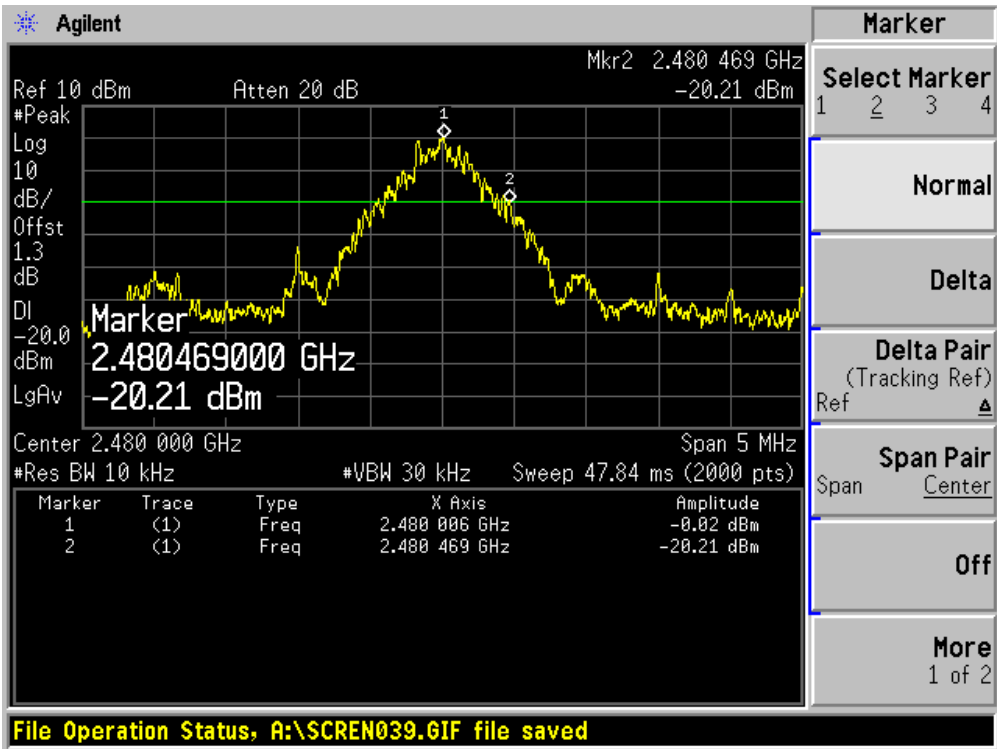
The measurement uncertainty is defined as ± 1.0 dB

10.6. Test Result

Product	:	Seecode Tube
Test Item	:	Band-edge Compliance of RF Conducted Emissions
Test Site	:	AC-4
Test Mode	:	Mode 1: Transmit



Channel 78 (2480MHz)



11. Spurious RF Conducted Emissions

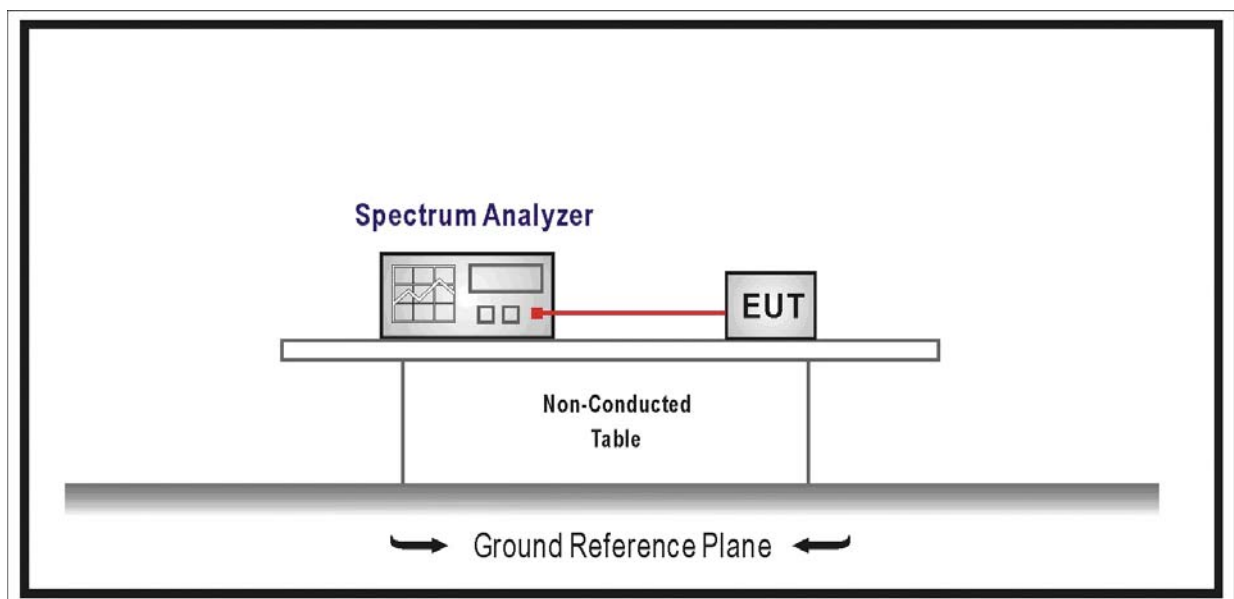
11.1. Test Equipment

Spurious RF Conducted Emissions / AC-4

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4446A	MY45300103	2008/06/11
Coaxial Cable	Huber+Suhner	AC4-RF	09	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH007	2008/03/09

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

11.2. Test Setup



11.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this

paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) of FCC part 15 is not required.

11.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

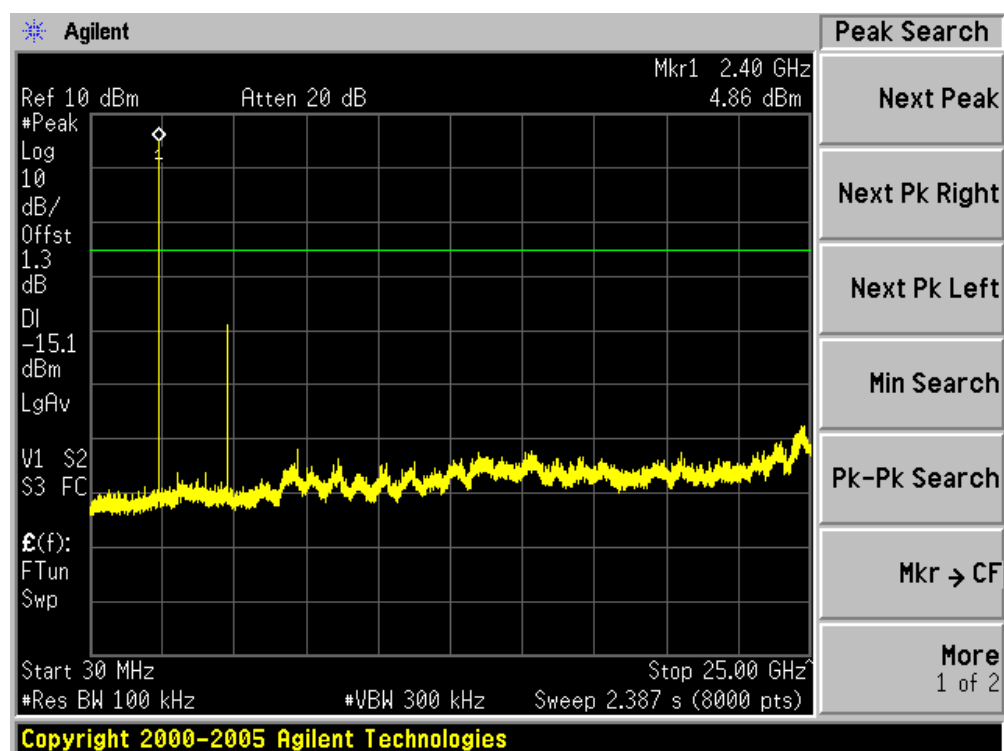
11.5. Uncertainty

The measurement uncertainty is defined as ± 1.0 dB

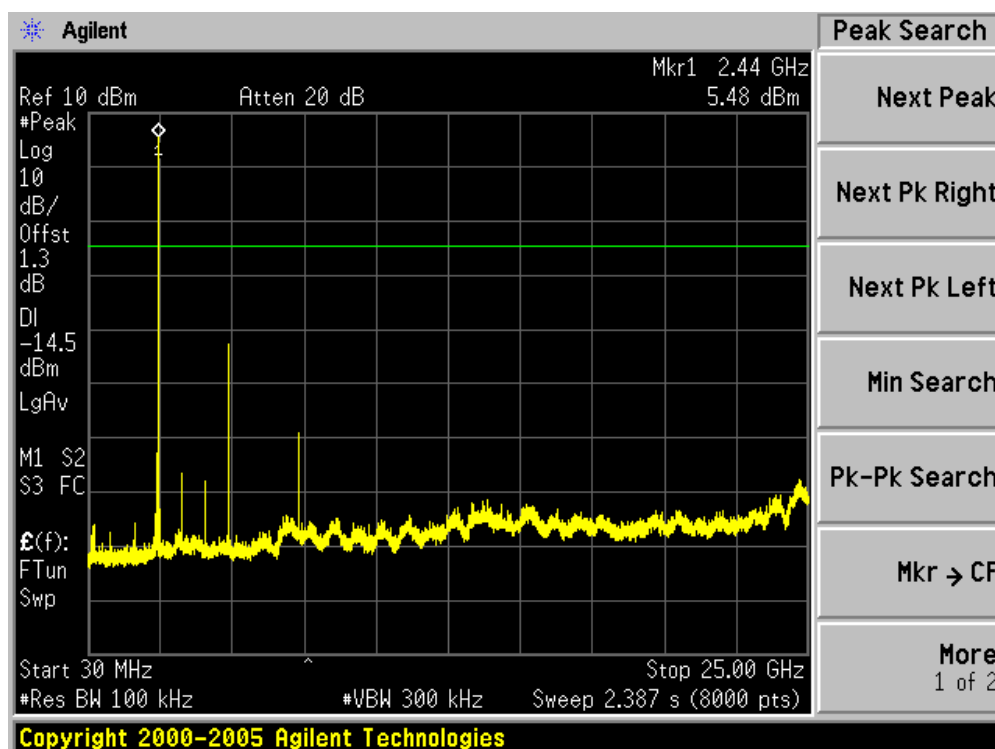
11.6. Test Result

Product	:	Seecode Tube
Test Item	:	Spurious RF Conducted Emissions
Test Site	:	AC-4
Test Mode	:	Mode 1: Transmit

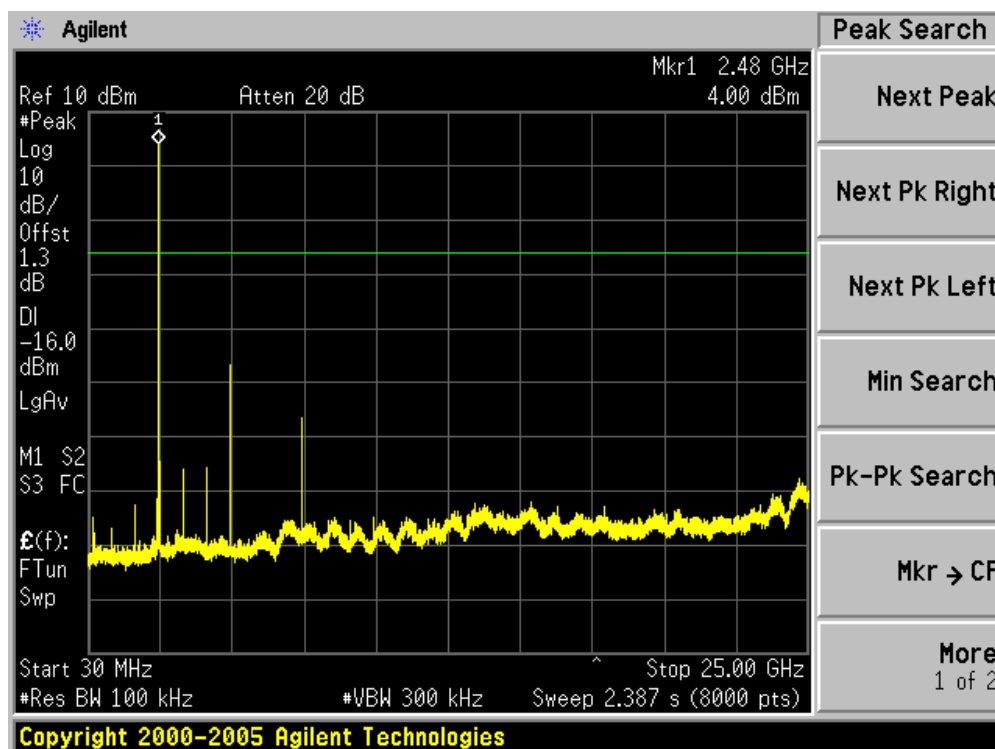
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



12. Radiated Emission Band Edge

12.1. Test Equipment

☒ Radiated Emission Band Edge / AC-2

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	E4408B	MY45102679	2007/11/12
EMI Test Receiver	R&S	ESCI	100573	2008/05/10
Preamplifier	Quietek	AP-025C	QT-AP003	2007/11/25
Preamplifier	Quietek	AP-180C	CHM-0602012	2007/11/25
Bilog Type Antenna	Schaffner	CBL6112B	2932	2007/11/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	496	2008/06/28
50ohm Coaxial Switch	Anritsu	MP59B	6200447304	2007/11/25
Coaxial Cable	Huber+Suhner	AC2-C	04	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH002	2008/03/31

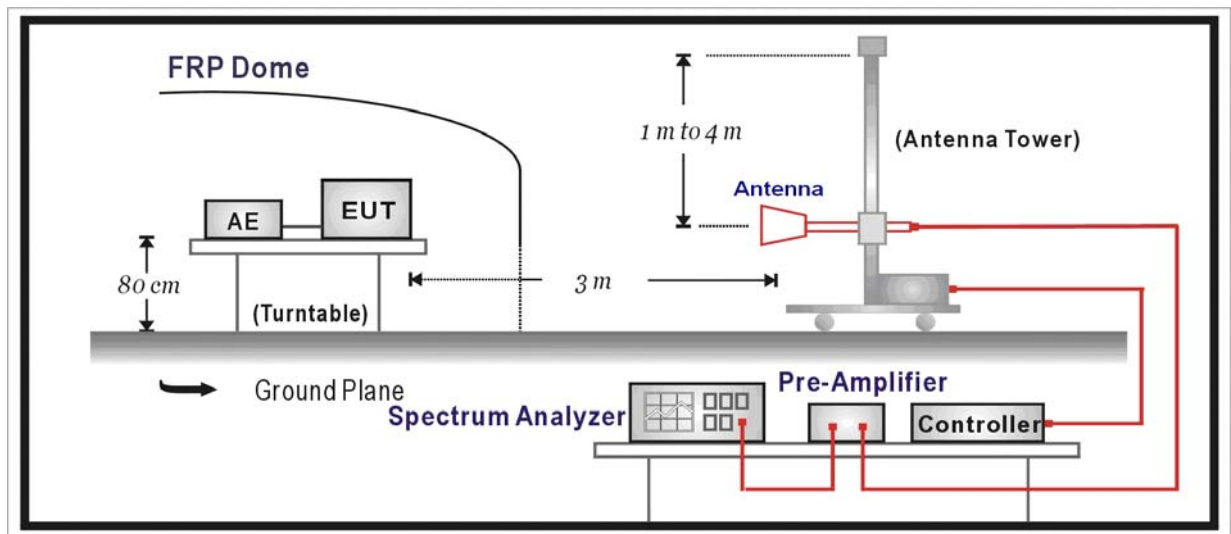
☐ Radiated Emission Band Edge / AC-3

Instrument	Manufacturer	Type No.	Serial No.	Cal. Date
Spectrum Analyzer	Agilent	N9010A	MY48030494	2008/04/24
EMI Test Receiver	R&S	ESCI	100176	2007/11/15
Preamplifier	Quietek	AP-025C	QT-AP004	2007/11/25
Preamplifier	Quietek	AP-180C	CHM-0602012	2007/11/25
Bilog Type Antenna	Schaffner	CBL6112D	22254	2007/11/22
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	496	2008/06/28
50ohm Coaxial Switch	Anritsu	MP59B	6200464463	2007/11/25
Coaxial Cable	Huber+Suhner	AC2-C	05	2007/11/25
Temperature/Humidity Meter	zhicheng	ZC1-2	QT-TH003	2008/03/31

Note 1: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Note 2: The test instruments marked with "X" are used to measure the final test results.

12.2. Test Setup



12.3. Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) of FCC part 15.

12.4. Test Procedure

According to FCC Public Notice DA 00-705, March 30, 2000.

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being

corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.

Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit of FCC part 15.

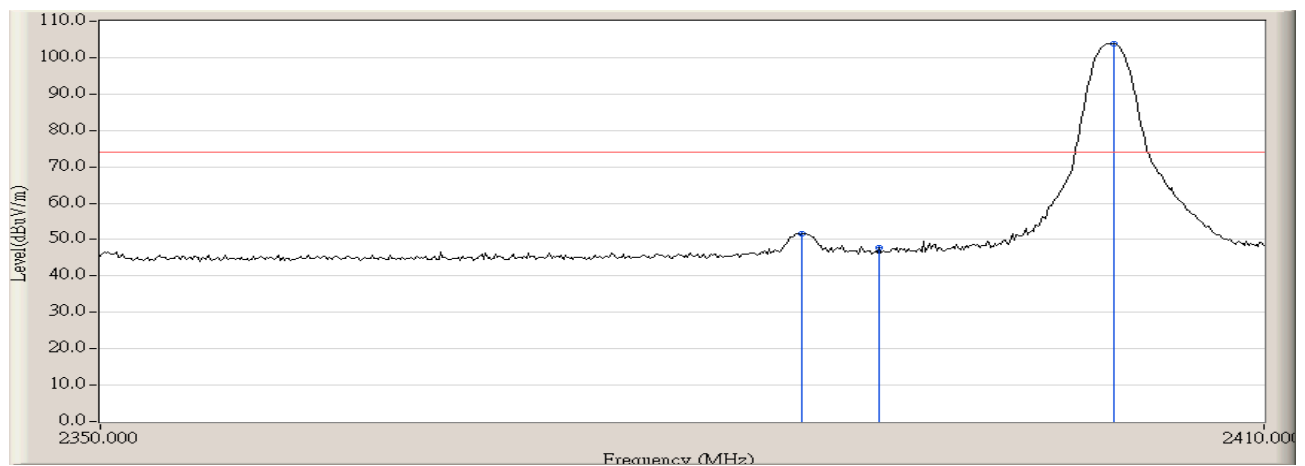
If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

12.5. Uncertainty

The measurement uncertainty above 1G is defined as $\pm 3.9 \text{ dB}$
below 1G is defined as $\pm 3.8 \text{ dB}$

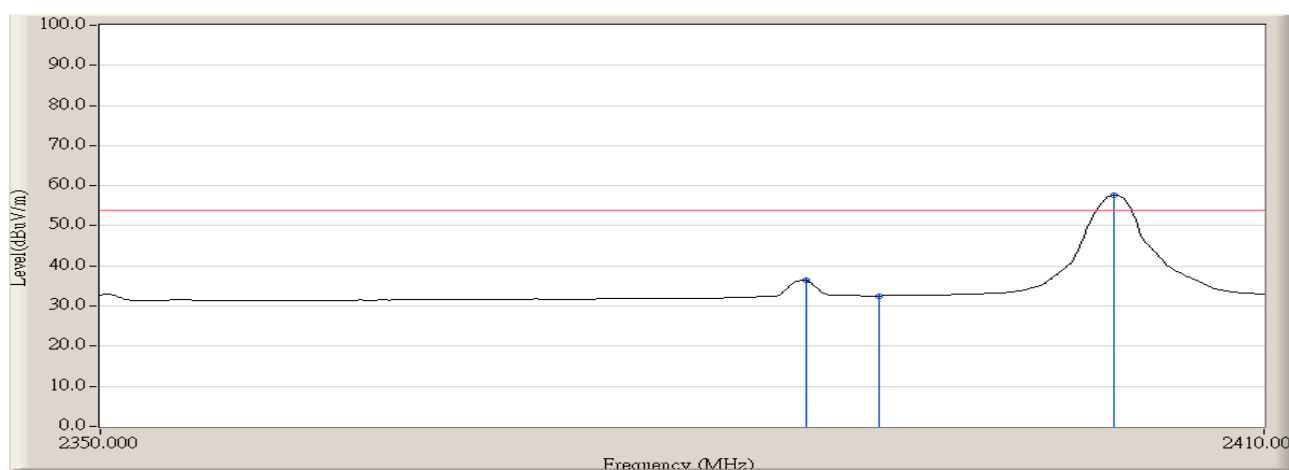
12.6. Test Result

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/04 - 13:57
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402 MHz



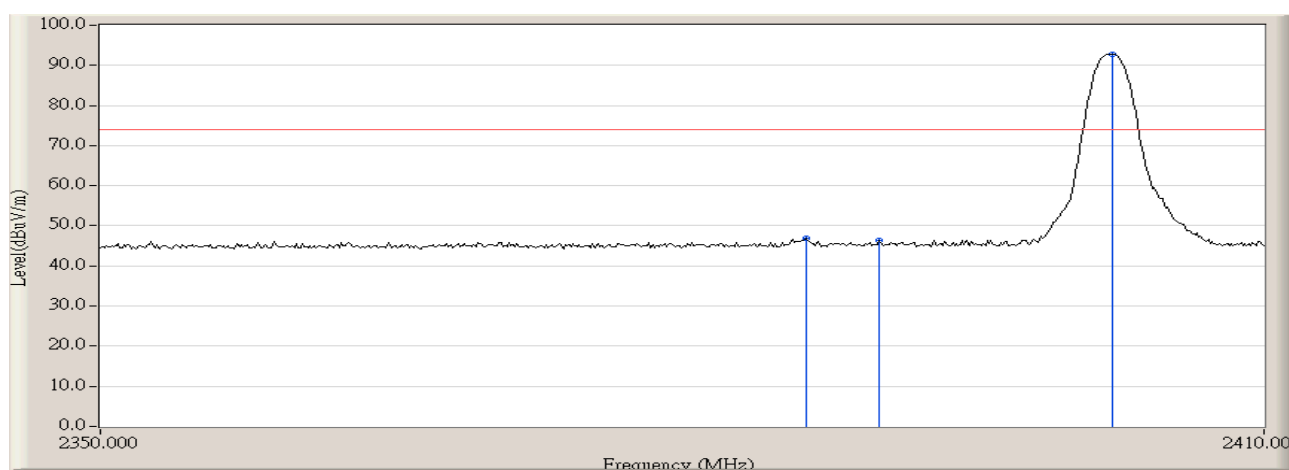
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2386.000	-3.213	54.866	51.652	-22.318	73.970	PEAK
2		2390.000	-3.202	50.848	47.646	-26.324	73.970	PEAK
3	*	2402.200	-3.199	106.937	103.737	29.767	73.970	PEAK

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/04 - 14:00
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402 MHz



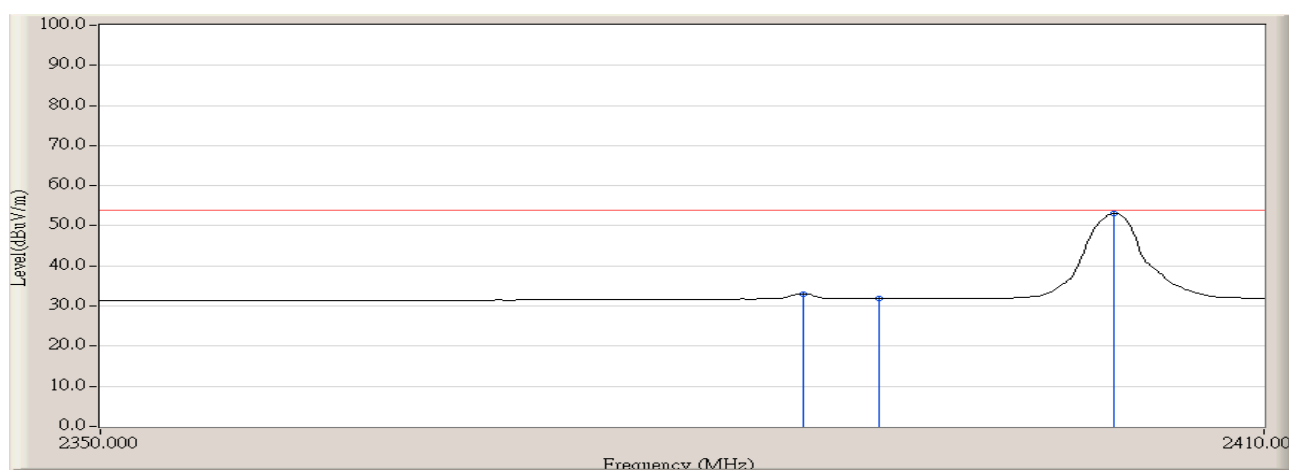
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2386.200	-3.213	39.567	36.354	-17.616	53.970	AVERAGE
2		2390.000	-3.202	35.760	32.558	-21.412	53.970	AVERAGE
3	*	2402.200	-3.199	60.884	57.684	3.714	53.970	AVERAGE

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/04 - 14:04
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402 MHz



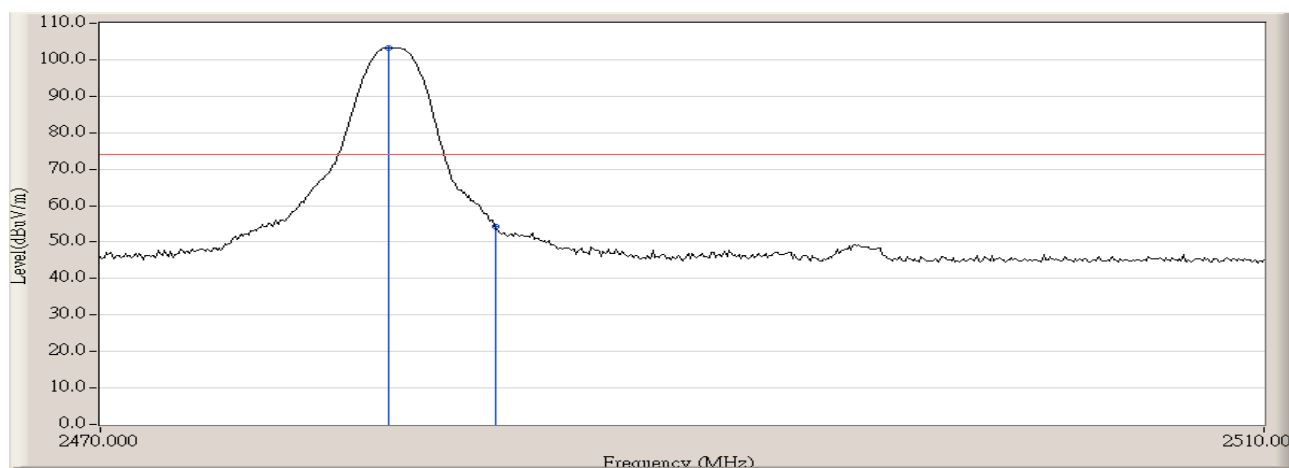
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2386.200	-3.213	50.119	46.906	-27.064	73.970	PEAK
2		2390.000	-3.202	49.449	46.247	-27.723	73.970	PEAK
3	*	2402.100	-3.199	95.915	92.715	18.745	73.970	PEAK

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/04 - 14:05
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2402 MHz



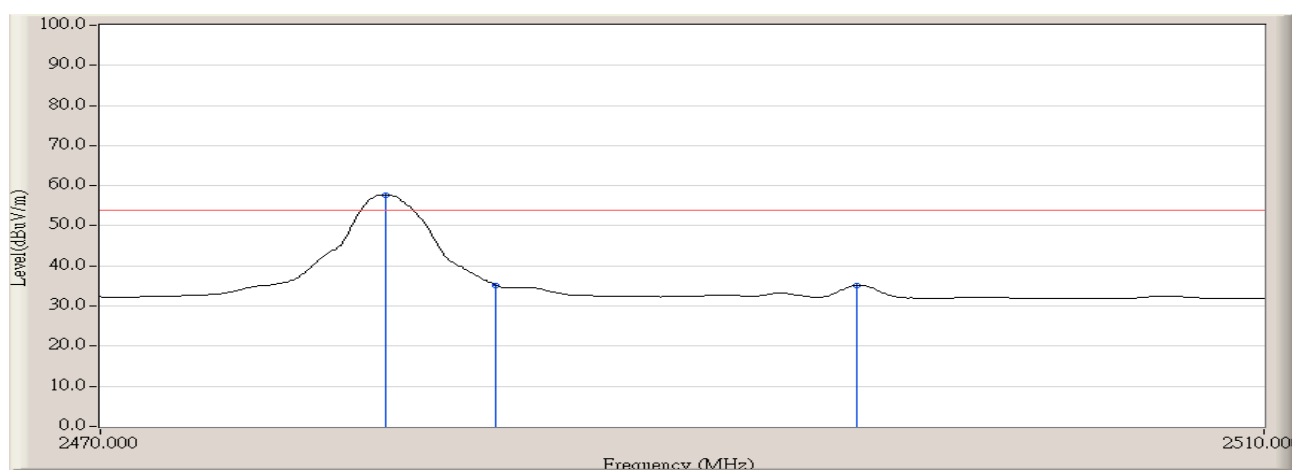
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		2386.100	-3.213	36.294	33.081	-20.889	53.970	AVERAGE
2		2390.000	-3.202	35.097	31.895	-22.075	53.970	AVERAGE
3	*	2402.200	-3.199	56.248	53.048	-0.922	53.970	AVERAGE

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/04 - 13:47
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480 MHz



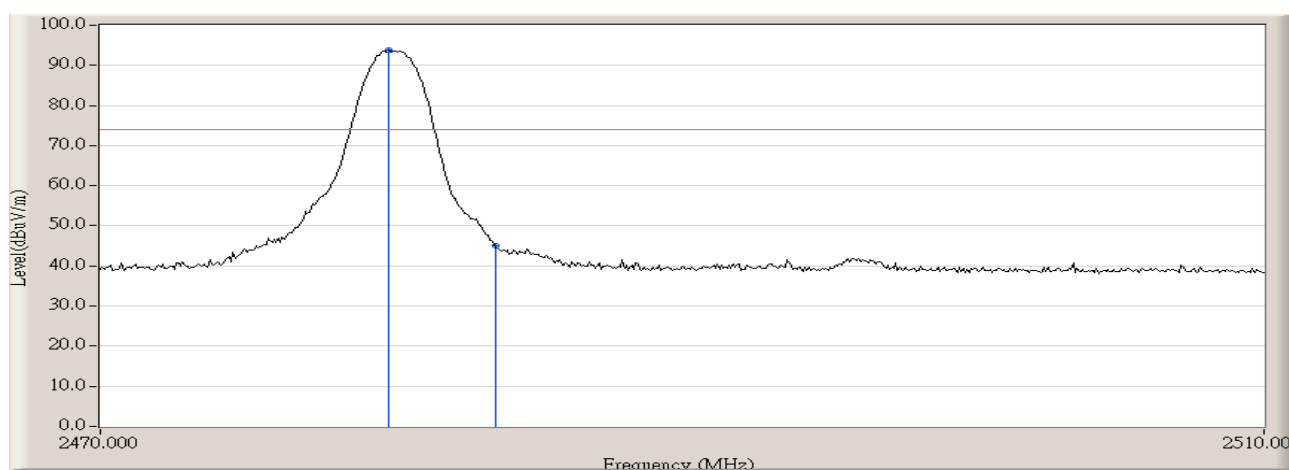
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2479.867	-3.188	106.539	103.352	29.382	73.970	PEAK
2		2483.500	-3.177	57.332	54.155	-19.815	73.970	PEAK

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/04 - 13:48
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - HORIZONTAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480 MHz



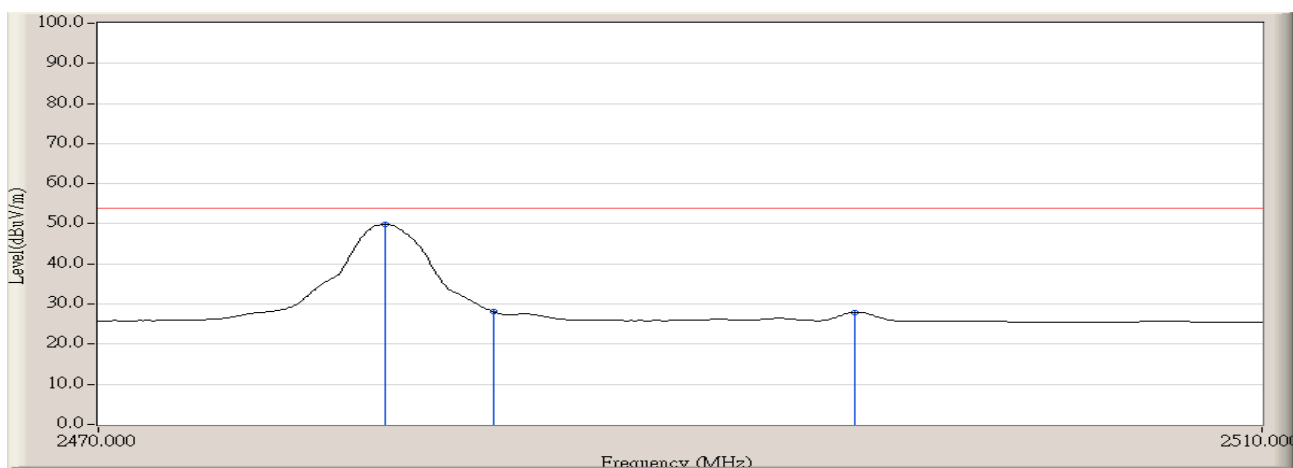
		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2479.733	-3.187	60.936	57.748	3.778	53.970	AVERAGE
2		2483.500	-3.177	38.404	35.227	-18.743	53.970	AVERAGE
3		2495.933	-3.140	38.278	35.138	-18.832	53.970	AVERAGE

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/04 - 13:41
Limit : FCC_SpartC_15.209_03M_PK	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480 MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2479.867	-3.188	96.896	93.709	19.739	73.970	PEAK
2		2483.500	-3.177	48.165	44.988	-28.982	73.970	PEAK

Engineer : Sky	
Site : AC-2 (3m Semi-Anechoic Chamber)	Time : 2008/09/04 - 13:43
Limit : FCC_SpartC_15.209_03M_AV	Margin : 0
EUT : HF921	Probe : BBHA9120D_499(1-18GHz) - VERTICAL
Power : DC 12V	Note : Mode 1: Transmit at channel 2480 MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	2479.800	-3.187	53.014	49.826	-4.144	53.970	AVERAGE
2		2483.500	-3.177	31.221	28.044	-25.926	53.970	AVERAGE
3		2495.933	-3.140	31.126	27.986	-25.984	53.970	AVERAGE