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CERTIFICATION OF COMPLIANCE

SAMSUNG ELECTRONICS CO., LTD.

416, Maetan-3dong, Yeongtong-Du, Suwon City,
Gyeonggi-Do, Korea

Dates of Tests: June 14 ~ 29, 2007

Test Report S/N: DR50110708F

Test Site : DIGITAL EMC CO., LTD.

FCC ID

A3LYABH270

APPLICANT

SAMSUNG ELECTRONICS CO., LTD.

FCC Classification	: Frequency Hopping Spread Spectrum (FHSS)
Device name	: Bluetooth Headset
Manufacturer	: CRESYN Co., Ltd.
FCC ID	: A3LYABH270
Model name	: YA-BH270
Test Device Serial number	: Identical prototype
FCC Rule Part(s)	: FCC Part 15.247 Subpart C ANSI C-63.4-2003
Frequency Range	: 2402 ~ 2480 MHz
Max. Output power	: 4.21 dBm Conducted
Data of issue	: August 16, 2007

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



NVLAP LAB CODE 200559-0

TABLE OF CONTENTS

1. GENERAL INFORMATION	-----	3
2. INFORMATION ABOUT TEST ITEM	-----	4
3. TEST REPORT	-----	5
3.1 SUMMARY OF TESTS	-----	5
3.2 TRANSMITTER REQUIREMENTS	-----	6
3.2.1 CARRIER FREQUENCY SEPARATION	-----	6
3.2.2 NUMBER OF HOPPING FREQUENCIES	-----	8
3.2.3 20 dB BANDWIDTH	-----	11
3.2.4 TIME OF OCCUPANCY (Dwell Time)	-----	14
3.2.5 PEAK OUTPUT POWER	-----	18
3.2.6 CONDUCTED SPURIOUS EMISSIONS	-----	21
3.2.7 RADIATED EMISSIONS	-----	28
3.2.8 AC LINE CONDUCTED EMISSIONS	-----	35
APPENDIX TEST EQUIPMENT FOR TESTS	-----	36

1. General information

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

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Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".
This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200559-0.

Test operator: engineer

August 16, 2007

Dong -Chul CHA



Data

Name

Signature

Report Reviewed By: manager

August 16, 2007

Harvay Sung



Data

Name

Signature

Ordering party:

Company name : CRESYN Co., Ltd.
Address : 8-22, Jamwon-Dong, Seocho-Gu,
City/town : Seoul
Country : Korea
Date of order : June 04, 2007

2. Information about test item

A3LYABH270

2.1 Equipment information

Equipment model no.	YA-BH270
Equipment serial no.	Identical prototype
Type of equipment	Bluetooth Headset
Frequency band	2402 ~ 2480 MHz
Type of Modulation	GFSK
Channel Access Protocol	Frequency Hopping
Channel Spacing	1.0 MHz
Type of antenna	Ceramic Chip Antenna

2.2 Tested frequency

Frequency	TX	RX
Low frequency	2402MHz	2402MHz
Middle frequency	2441MHz	2441MHz
High frequency	2480MHz	2480MHz

2.3 Tested environment

Temperature	: 15 ~ 35 (°C)
Relative humidity content	: 20 ~ 75 %
Air pressure	: 86 ~ 103 kPa
Details of power supply	: 3.7 VDC from Battery

2.4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
-	-	-	-
-	-	-	-
-	-	-	-

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

-> None

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
I. Test Items				
15.247(a)	Carrier Frequency Separation	> 25 kHz	Conducted	C
	Number of Hopping Frequencies	> 75 hops		C
	20 dB Bandwidth	< 1 MHz		C
	Dwell Time	0.4 seconds within a 30 second period per any frequency		C
15.247(b)	Transmitter Output Power	< 1Watt		C
15.247(c)	Band-edge /Conducted	The radiated emission to any 100 kHz of outband shall be at least 20dB below the highest inband spectral density.		C
	Conducted Spurious Emissions			C
15.205 15.209	Radiated Emissions	FCC 15.209 Limits	Radiated	C
15.207	AC Conducted Emissions	EN 55022	AC Line Conducted	N/A
Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable				

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003

3.2 Transmitter requirements

3.2.1 Carrier Frequency Separation

Procedure:

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz (1% of the span or more) Sweep = auto

VBW = 30 kHz Detector function = peak

Trace = max hold

Measurement Data:

Frequency of marker #1 (MHz)	Frequency of marker #2 (MHz)	Test Results	
		Carrier Frequency Separation (MHz)	Result
2441.017	2442.017	1.000	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

Measurement Setup

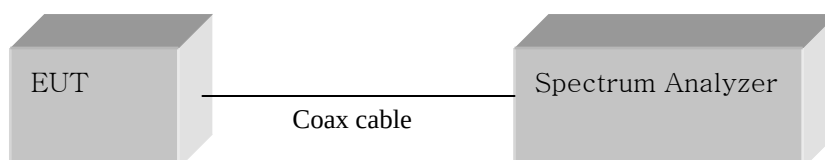
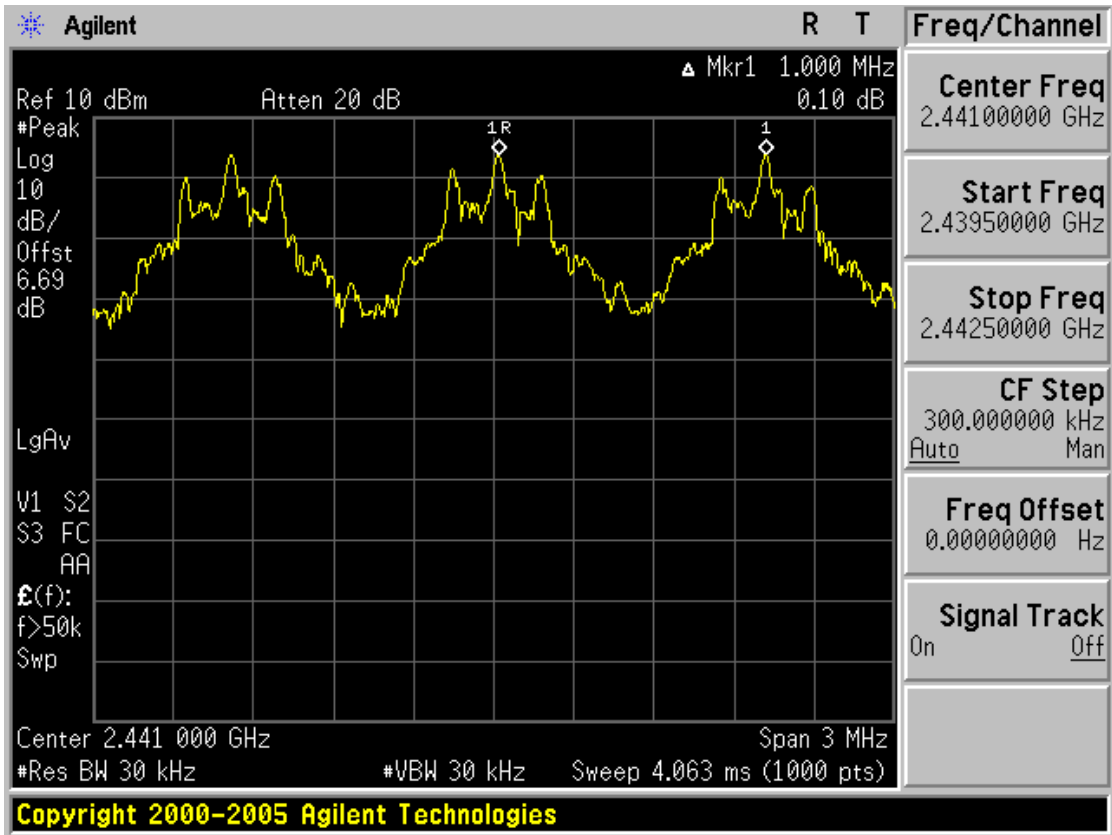


Figure 1: Measurement setup for the carrier frequency separation

Carrier Frequency Separation



3.2.2 Number of Hopping Frequencies

Procedure:

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

The spectrum analyzer is set to:

- Frequency range
- 1: Start = 2389.5MHz, Stop = 2414.5 MHz
- 2: Start = 2414.5MHz, Stop = 2439.5 MHz
- 3: Start = 2439.5MHz, Stop = 2464.5 MHz
- 4: Start = 2464.5MHz, Stop = 2489.5 MHz
- RBW = 300 kHz (1% of the span or more)
- Sweep = auto
- VBW = 300 kHz (VBW ≥ RBW)
- Detector function = peak
- Trace = max hold
- Span = 25MHz

Measurement Data: **Complies**

Total number of Hopping Channels	79
----------------------------------	----

- See next pages for actual measured spectrum plots.

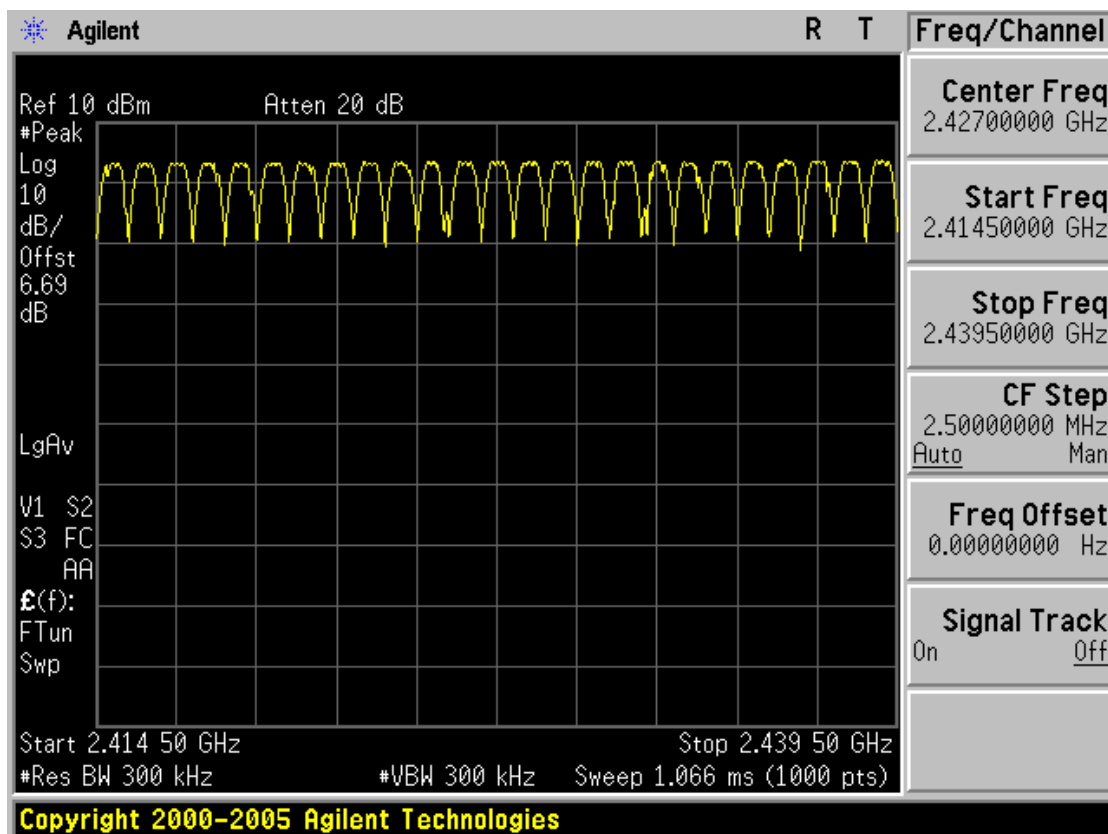
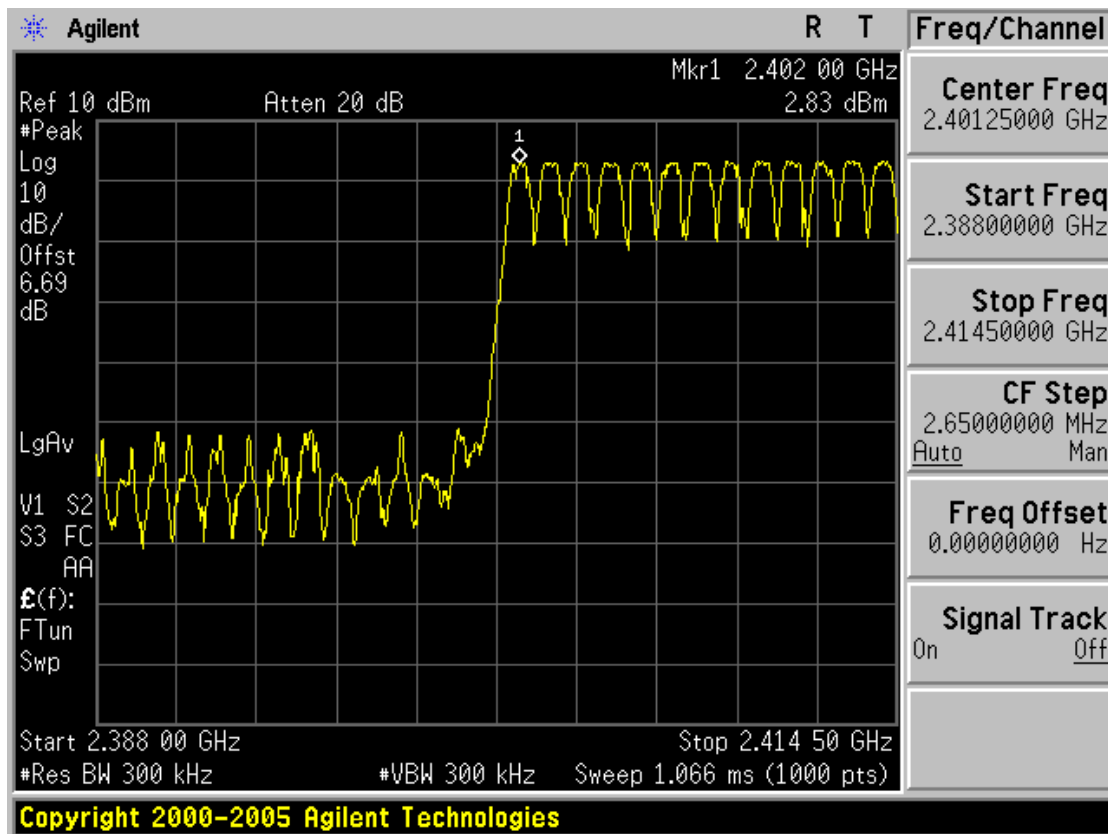
Minimum Standard:

At least 75 hopes

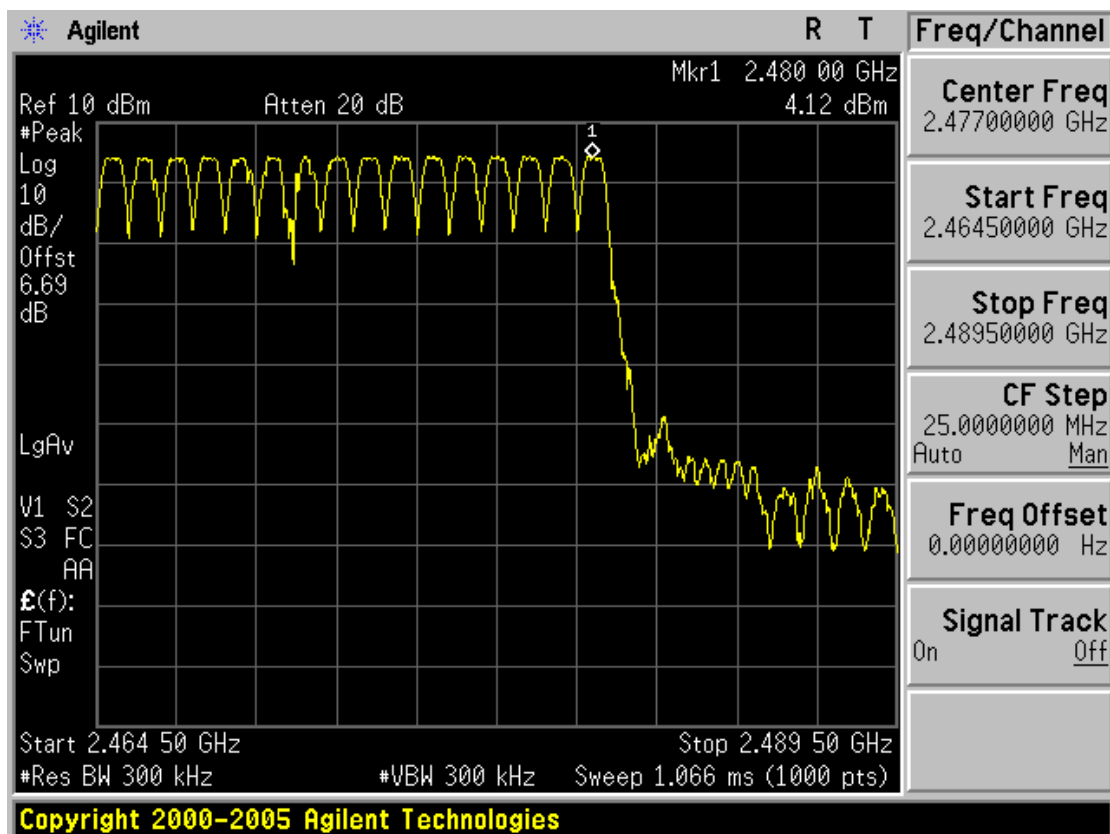
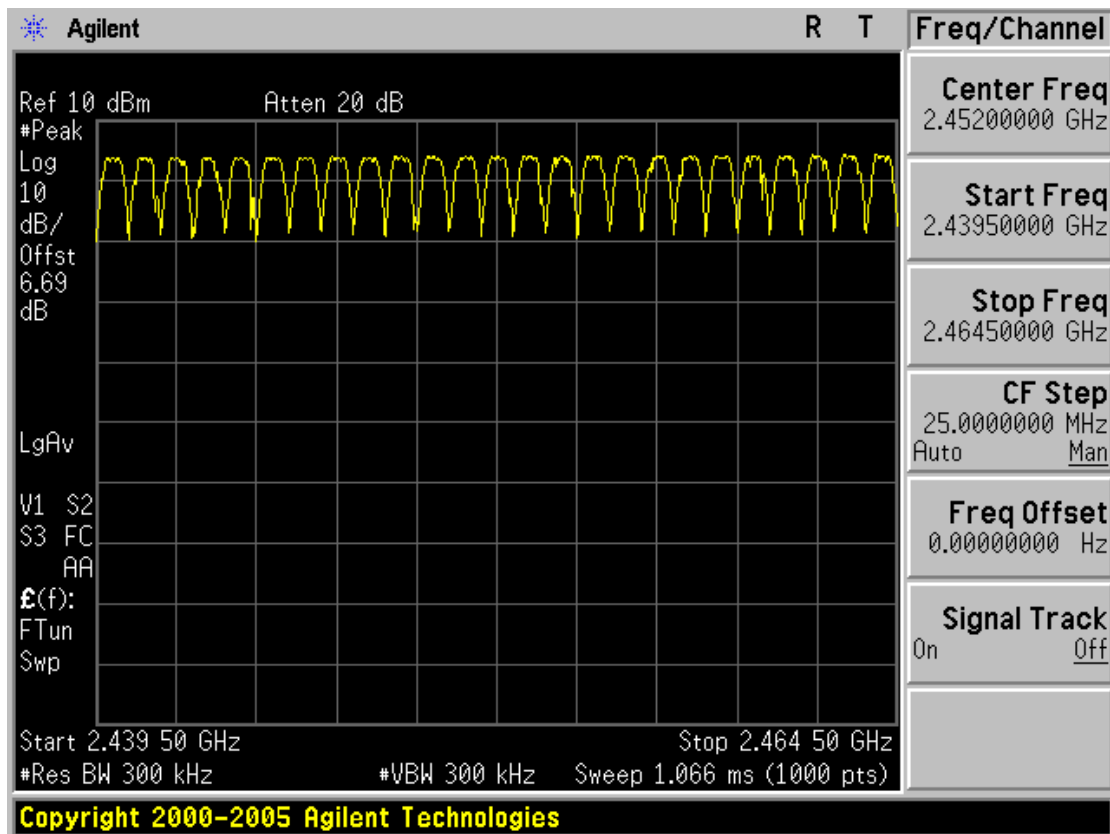
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Number of Hopping Frequencies



Number of Hopping Frequencies



3.2.3 20 dB Bandwidth

Procedure:

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB 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.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 2 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 10 kHz (1% of the 20dB bandwidth or more) Sweep = auto

VBW = 30 kHz ($VBW \geq RBW$) Detector function = peak

Trace = max hold

Measurement Data:

Frequency (MHz)	Channel No.	Test Results	
		Measured Bandwidth (MHz)	Result
2402	1	0.886	Complies
2441	40	0.886	Complies
2480	79	0.886	Complies

- See next pages for actual measured spectrum plots.

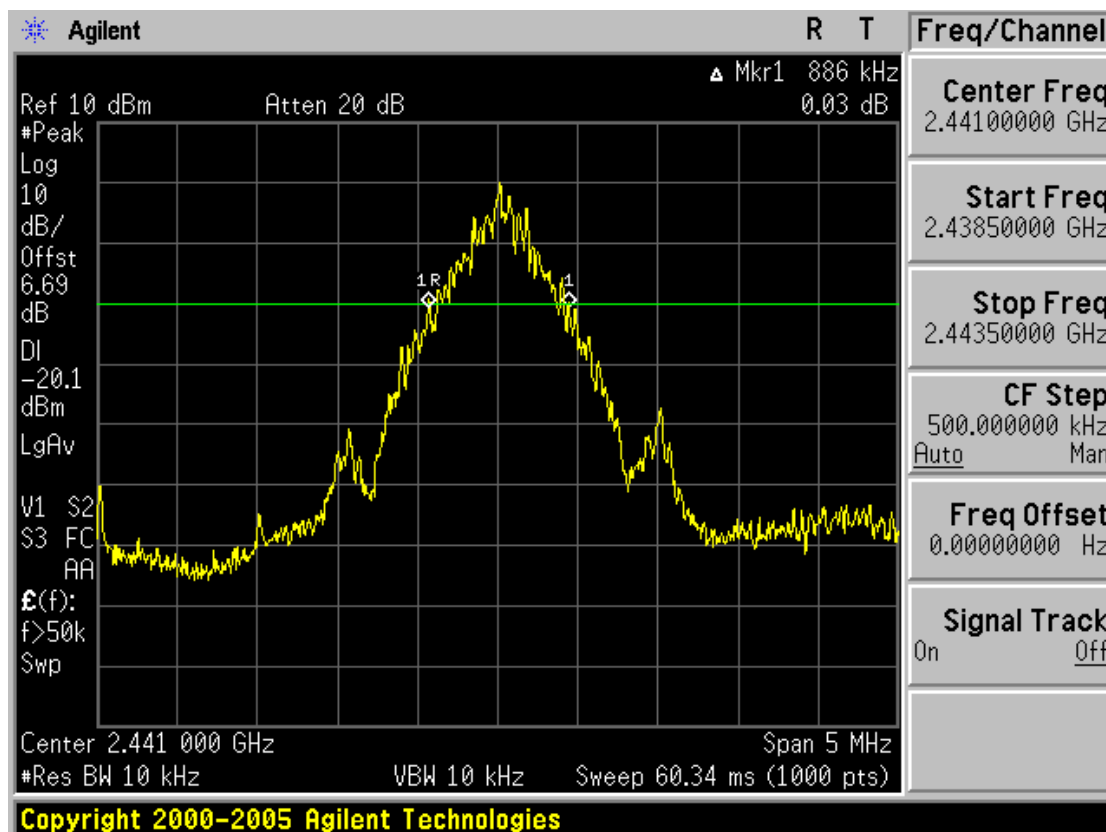
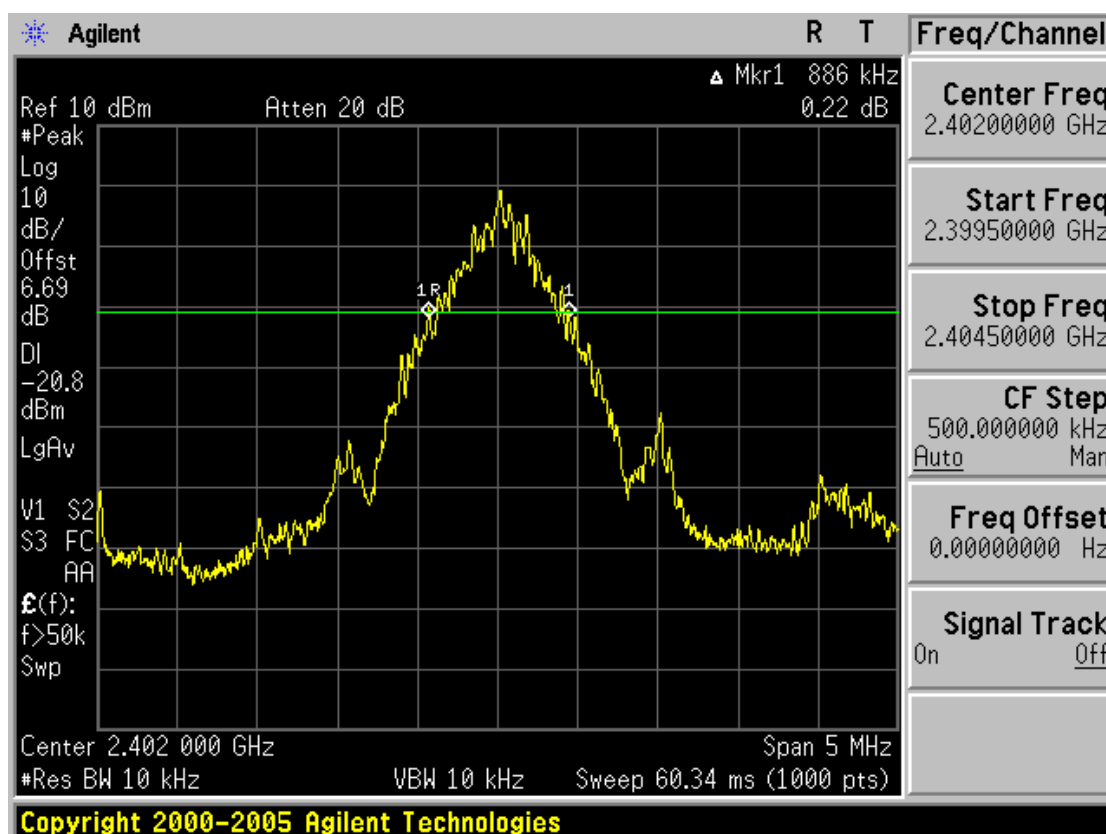
Minimum Standard:

The transmitter shall have a maximum 20dB bandwidth of 1 MHz.

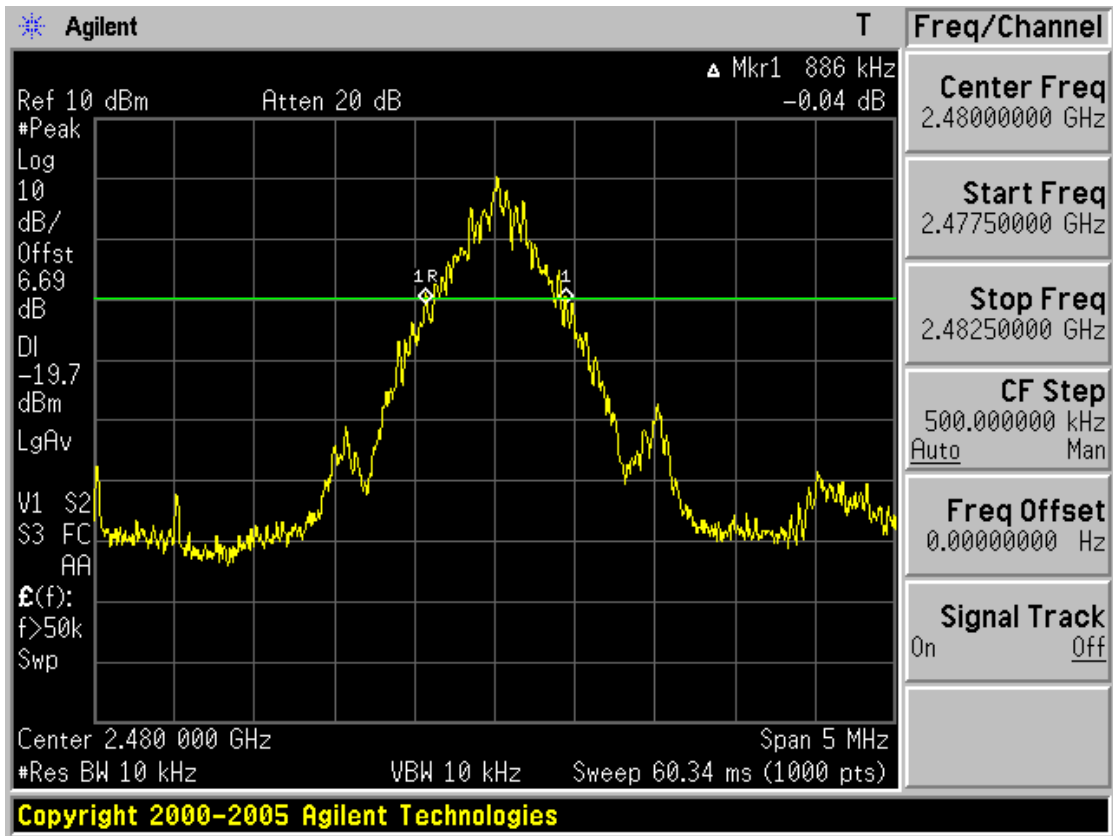
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

20 dB Bandwidth



20 dB Bandwidth



3.2.4 Time of Occupancy (Dwell Time)

Procedure:

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Center frequency = 2441 MHz

Span = zero

RBW = 1 MHz

VBW = 1 MHz (VBW $\geq$ RBW)

Trace = max hold

Detector function = peak

Measurement Data:

Packet Type	Burst duration in one hop (us)	Test Results	
		Dwell Time (ms)	Result
DH 1	422.9	135.374	Complies
DH 3	1674	269.781	Complies
DH 5	2919	310.844	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

0.4 seconds within a 30 second period per any frequency

Measurement Setup

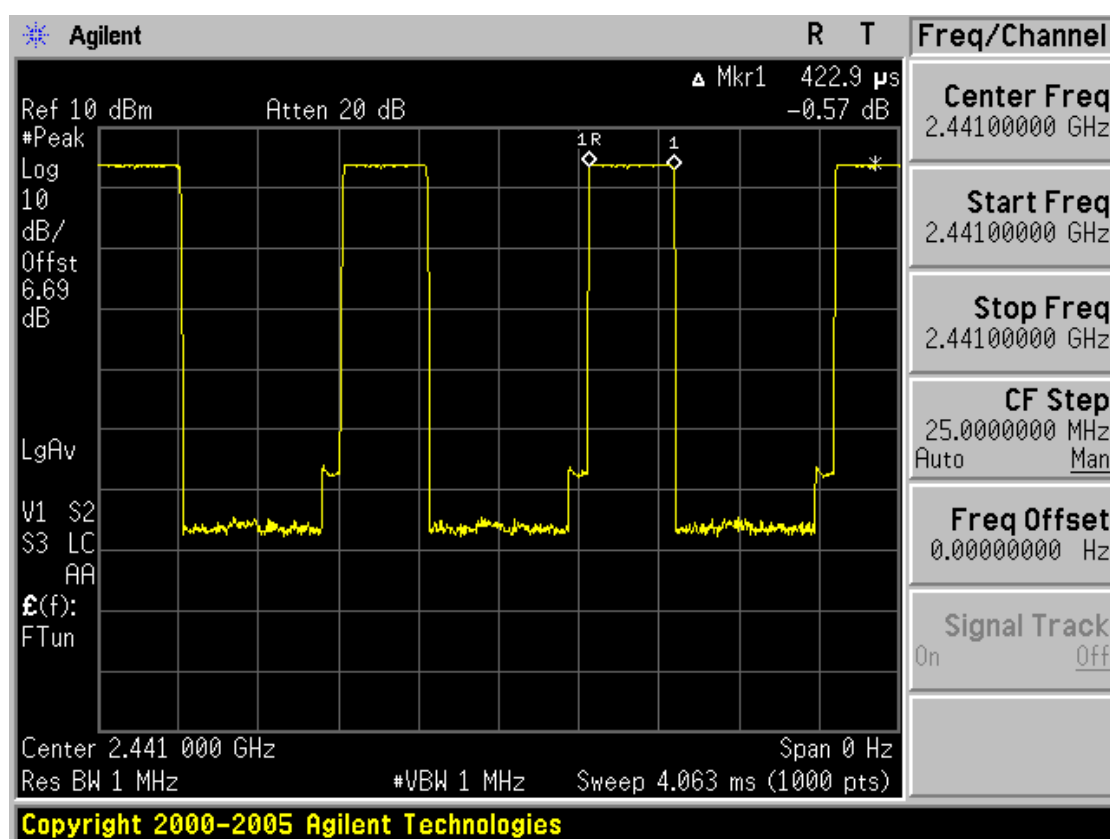
Same as the Chapter 3.2.1 (Figure 1)

Time of Occupancy for Packet Type DH 1

$0.4 \times 79 = 31.6$ seconds you have $10.13 \times 31.6 = 320.11$ times of appearance.

Each 1x-time per appearance is 422.9 us

So we have $320.11 \times 422.9\mu\text{s} = 135.374 \text{ ms}$ per 31.6 seconds.

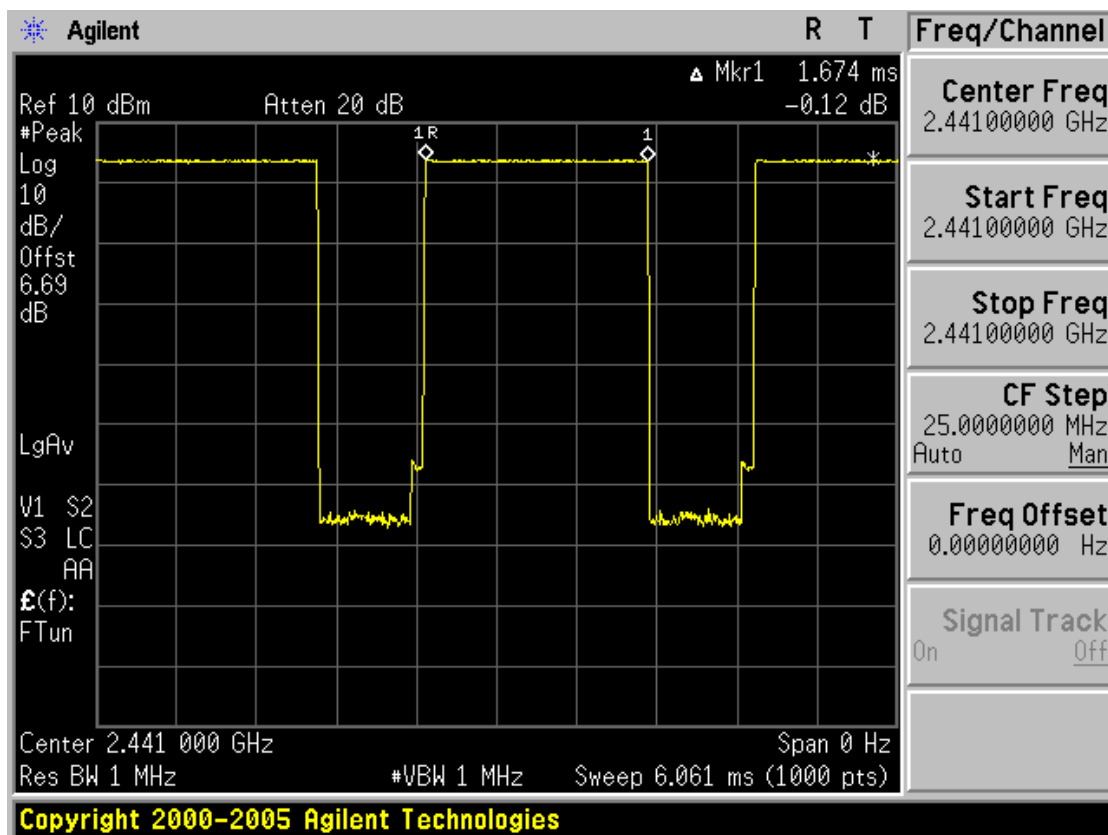


Time of Occupancy for Packet Type DH 3

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 us with 79 channels. A DH 3 Packet need 3 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case $1600/4 = 400$ hops per second with 79 channels. So you have each channel $400/79 = 5.1$ times per second and so for a period of $0.4 \times 79 = 31.6$ seconds you have $5.1 \times 31.6 = 161.16$ times of appearance.

Each Tx-time per appearance is 1.674 ms

So we have $161.16 \times 1.674 \text{ ms} = 269.781 \text{ ms}$ per 31.6 seconds.

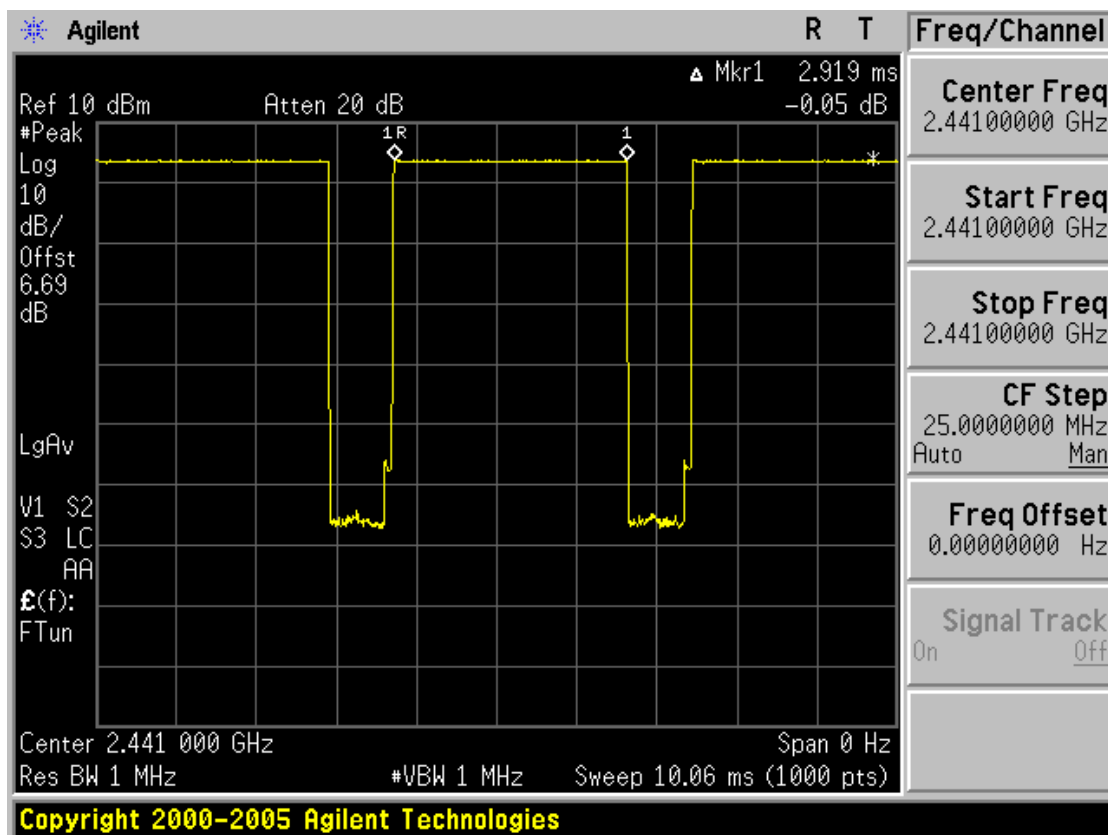


Time of Occupancy for Packet Type DH 5

The system makes worst case 1600 hops per second or 1 time slot has a length of 625 us with 79 channels. A DH 5 Packet need 5 time slot for transmitting and 1 time slot for receiving. Then the system makes worst case $1600/6 = 266.67$ hops per second with 79 channels. So you have each channel $266.67/79 = 3.37$ times per second and so for a period of $0.4 \times 79 = 31.6$ seconds you have $3.37 \times 31.6 = 106.49$ times of appearance.

Each Tx-time per appearance is 2.919 ms

So we have $106.49 \times 2.919 \text{ ms} = 310.844 \text{ ms}$ per 31.6 seconds.



3.2.5 Peak Output Power

Procedure:

The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 1 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 1 MHz (VBW $\geq$ RBW)

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data:

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	1	2.95	1.972	Complies
2441	40	3.74	2.365	Complies
2480	79	4.21	2.636	Complies

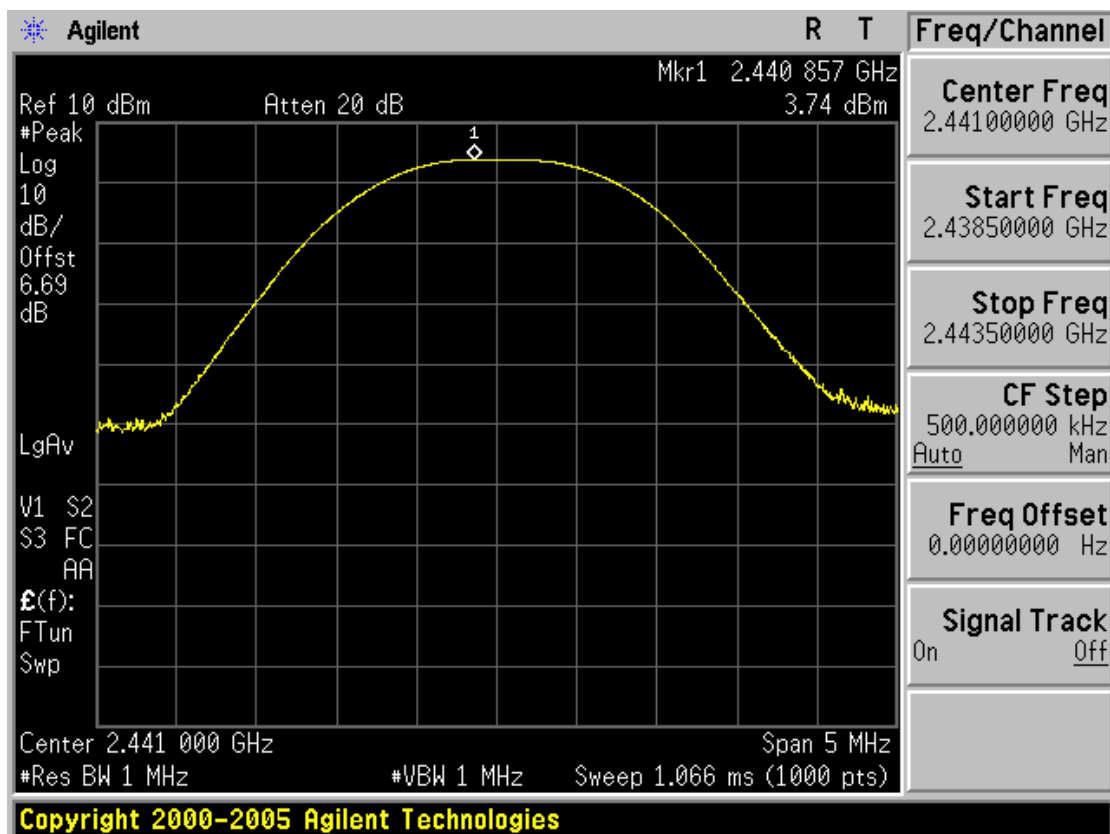
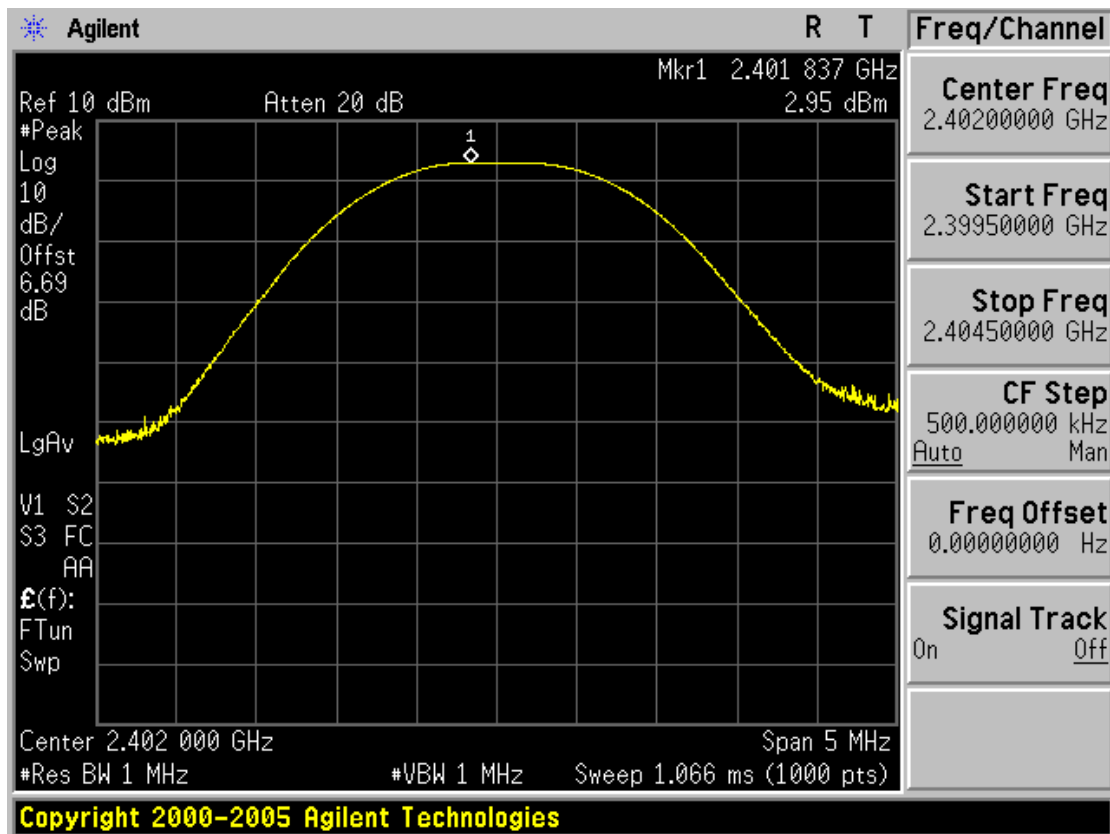
- See next pages for actual measured spectrum plots.

Minimum Standard:	< 1W
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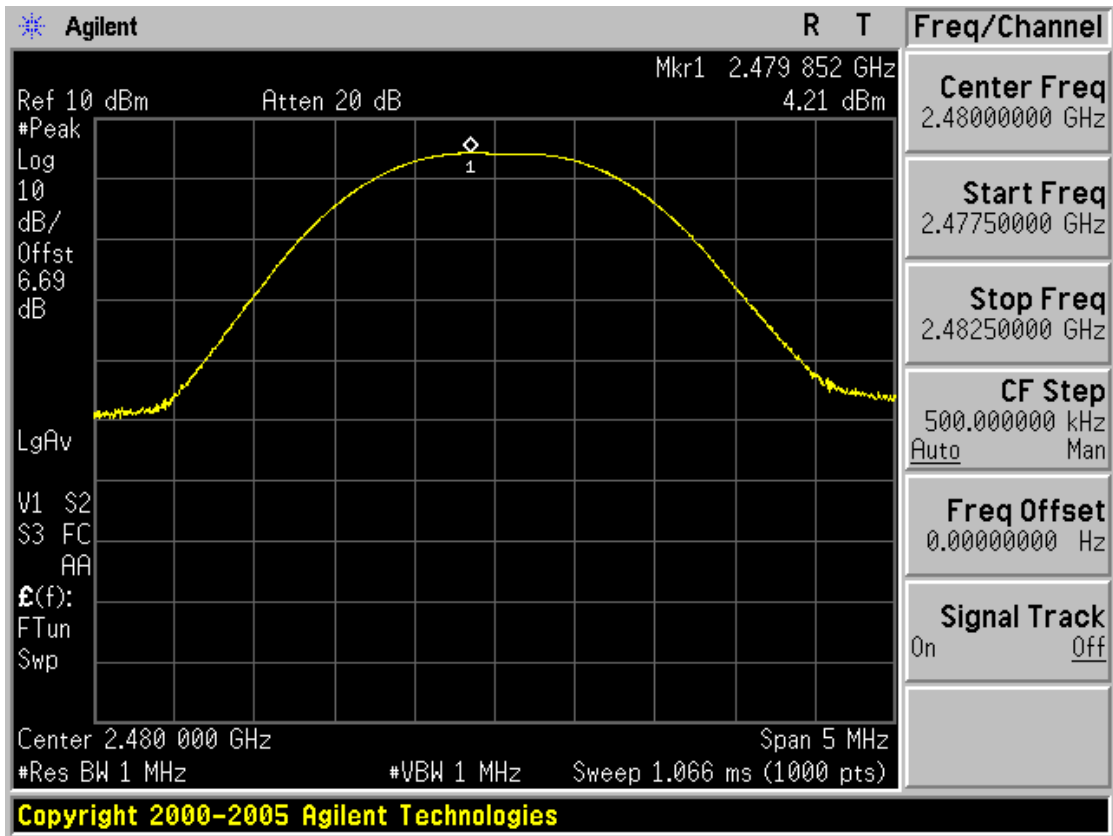
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Peak Output Power



Peak Output Power



3.2.6 Conducted Spurious Emissions

Procedure:

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

RBW = 100 kHz

VBW = 100 kHz

Span = 100 MHz

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data: Complies

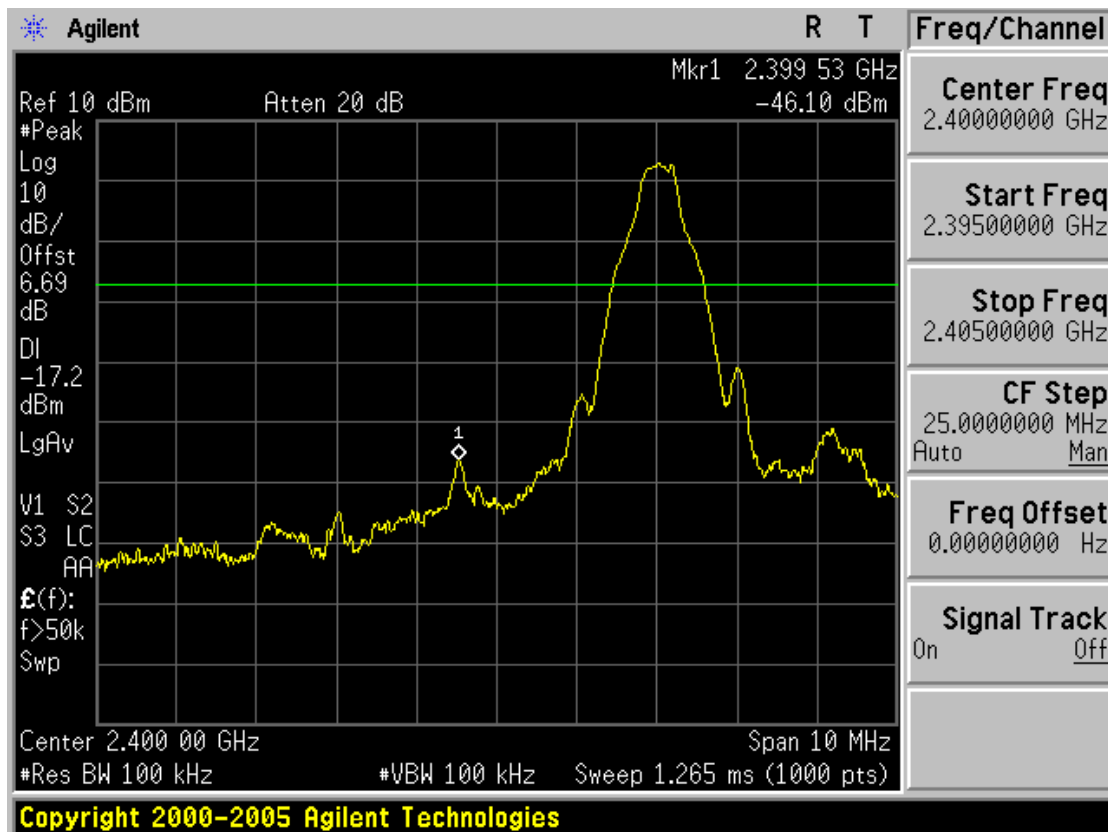
- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
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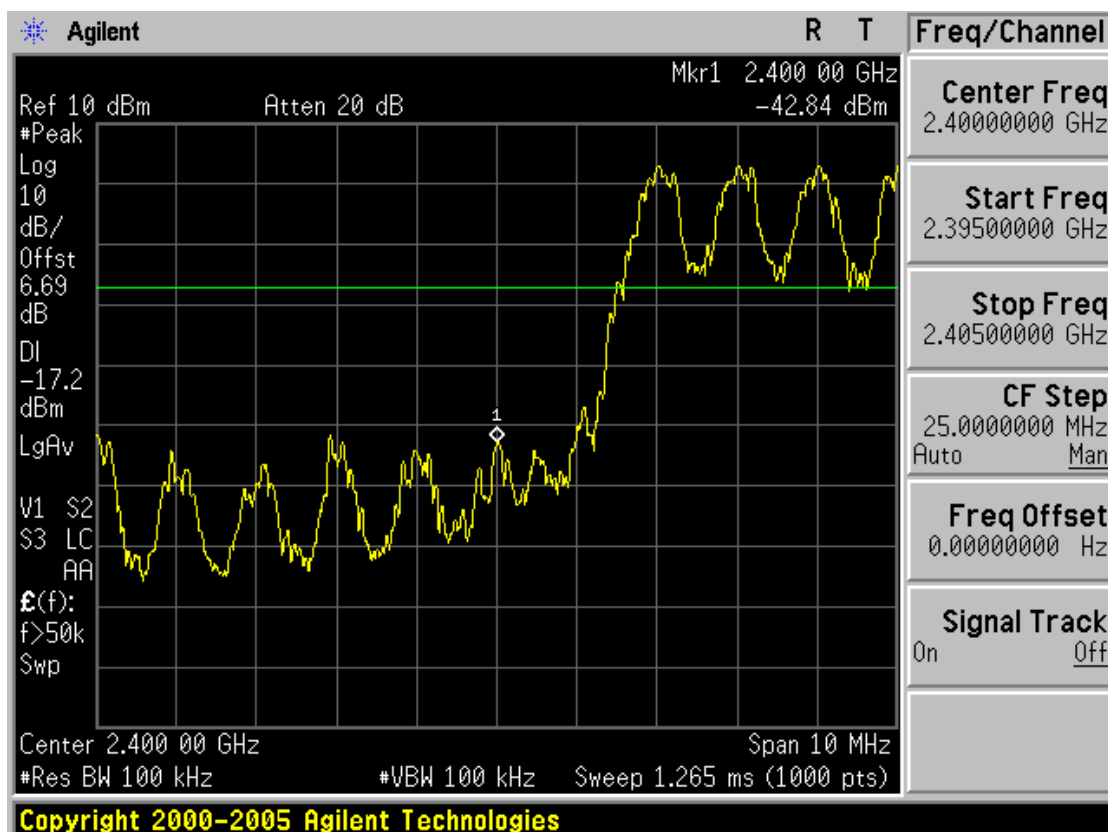
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

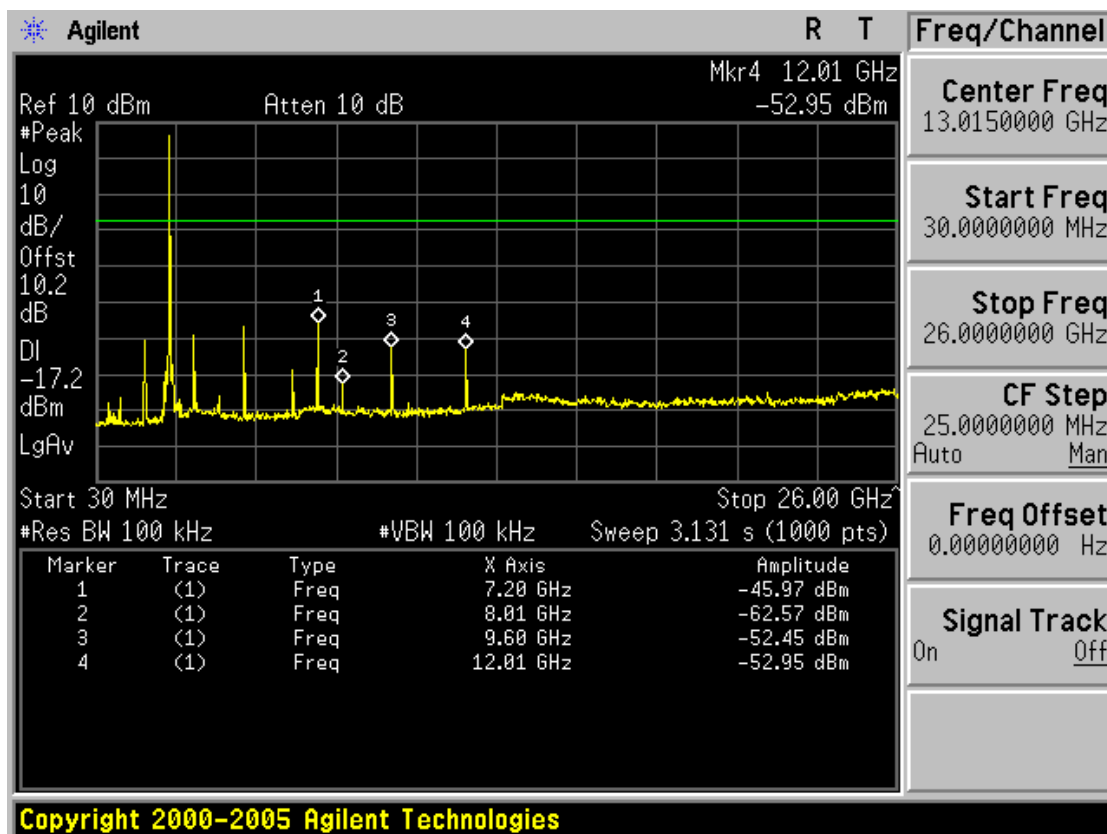
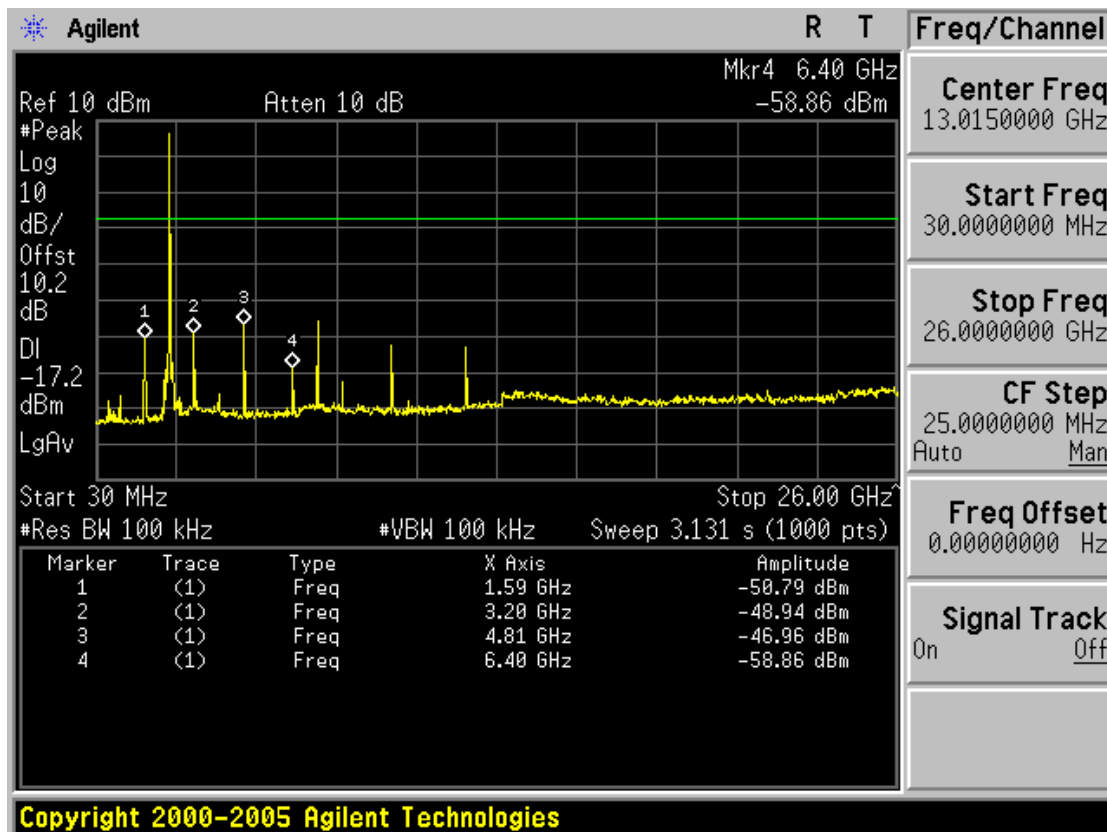
Low band with hopping disabled



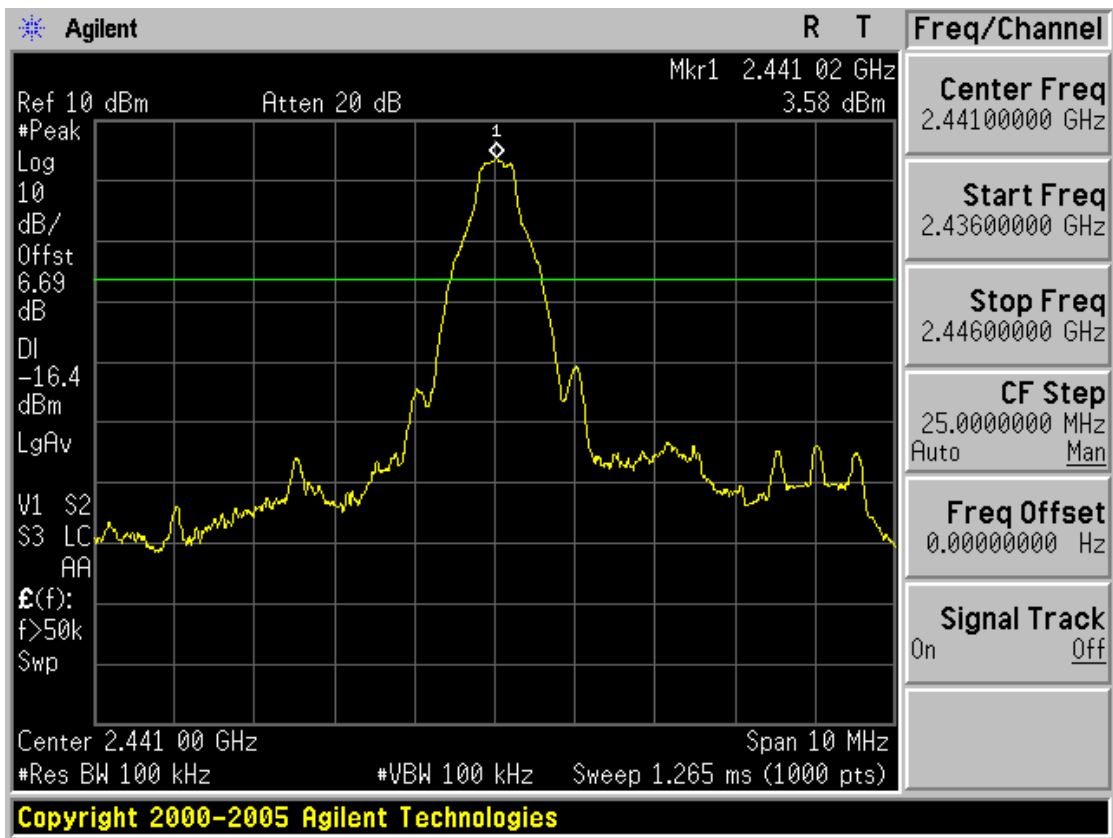
Low band with hopping enabled



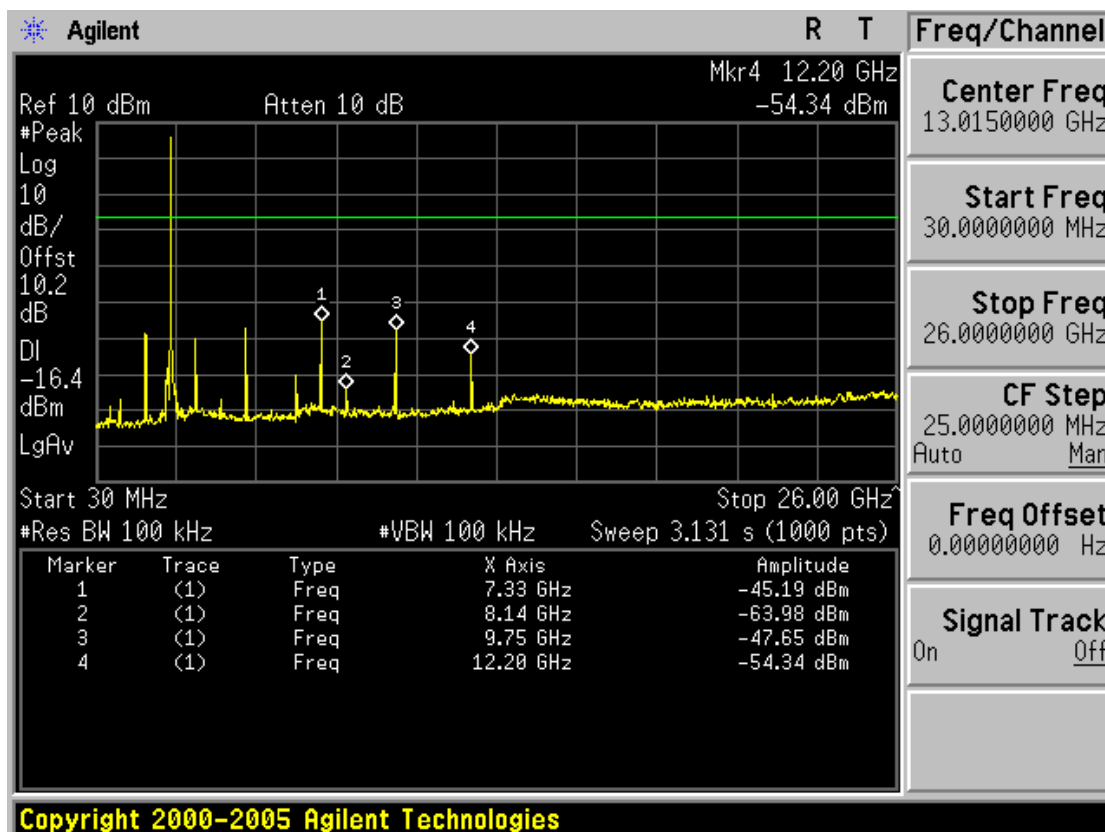
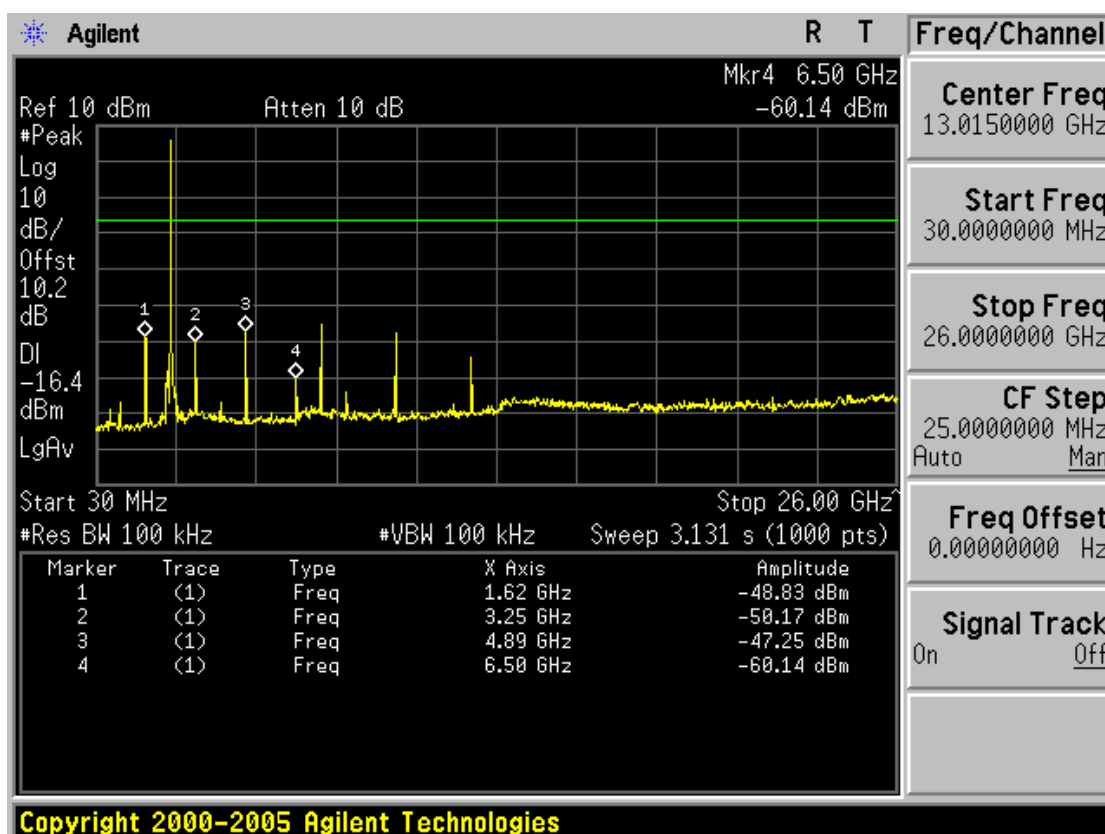
Low channel spurious



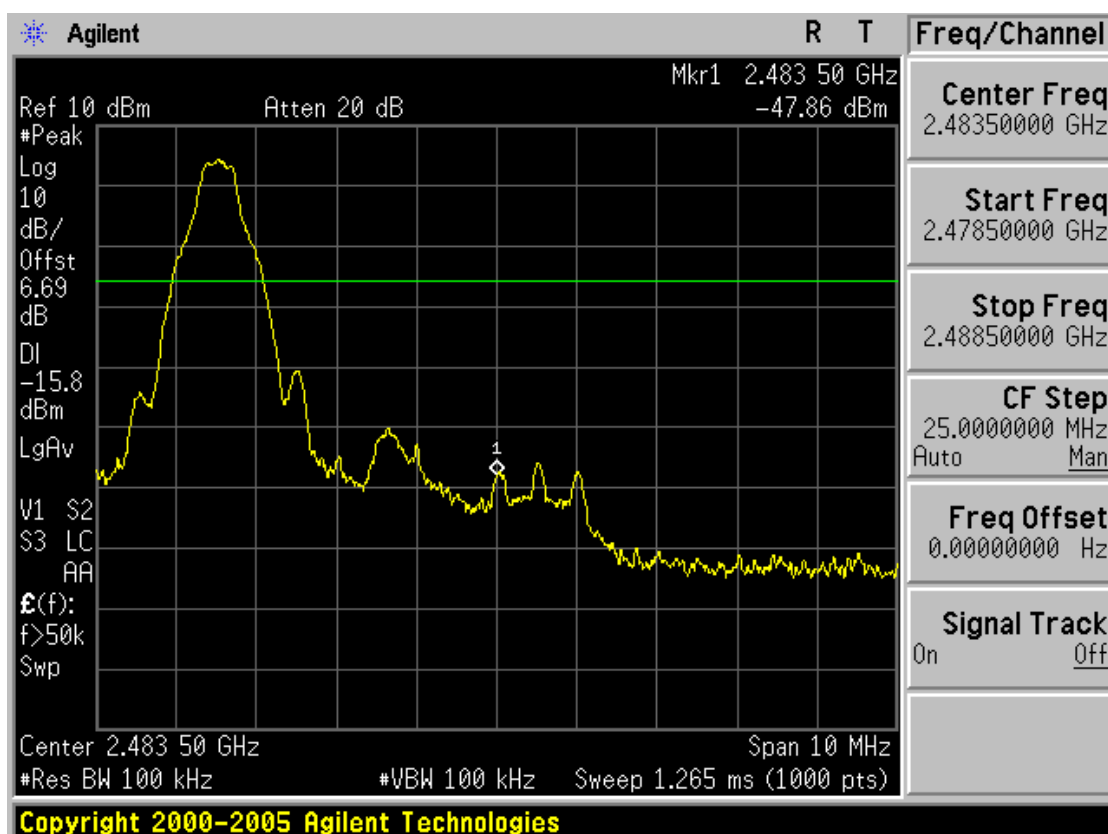
Mid channel ref



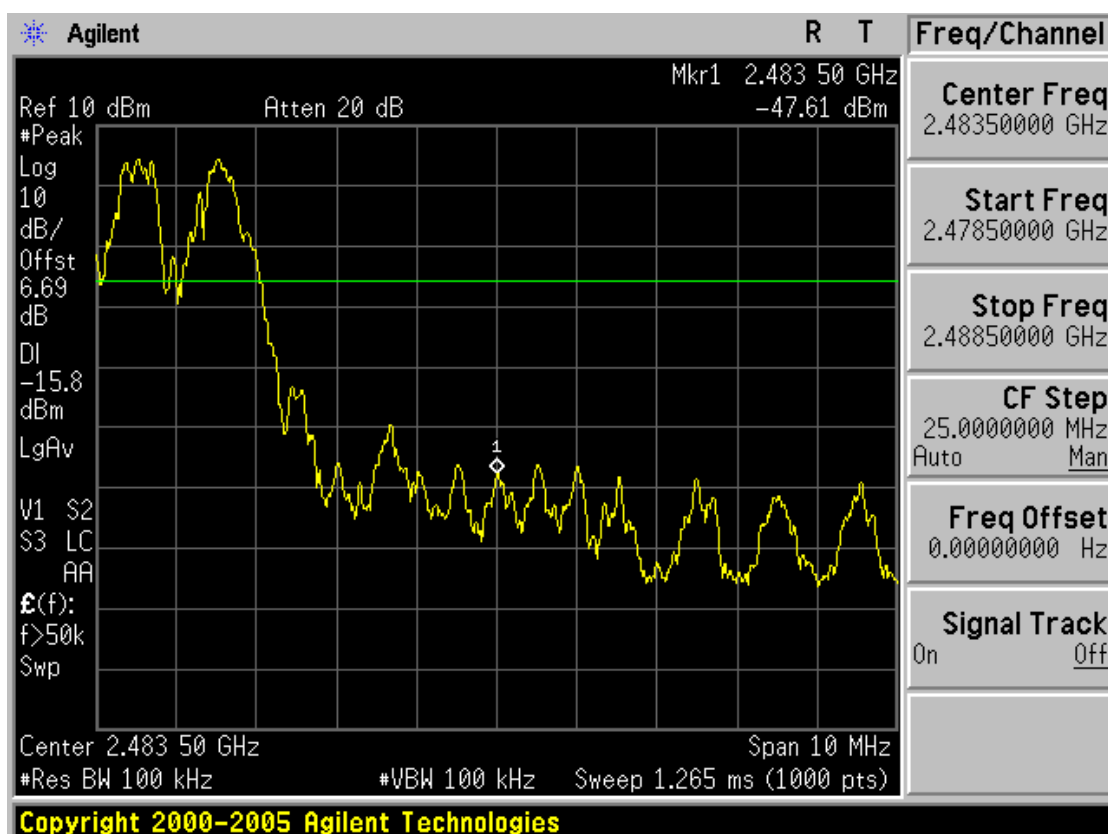
Mid channel spurious



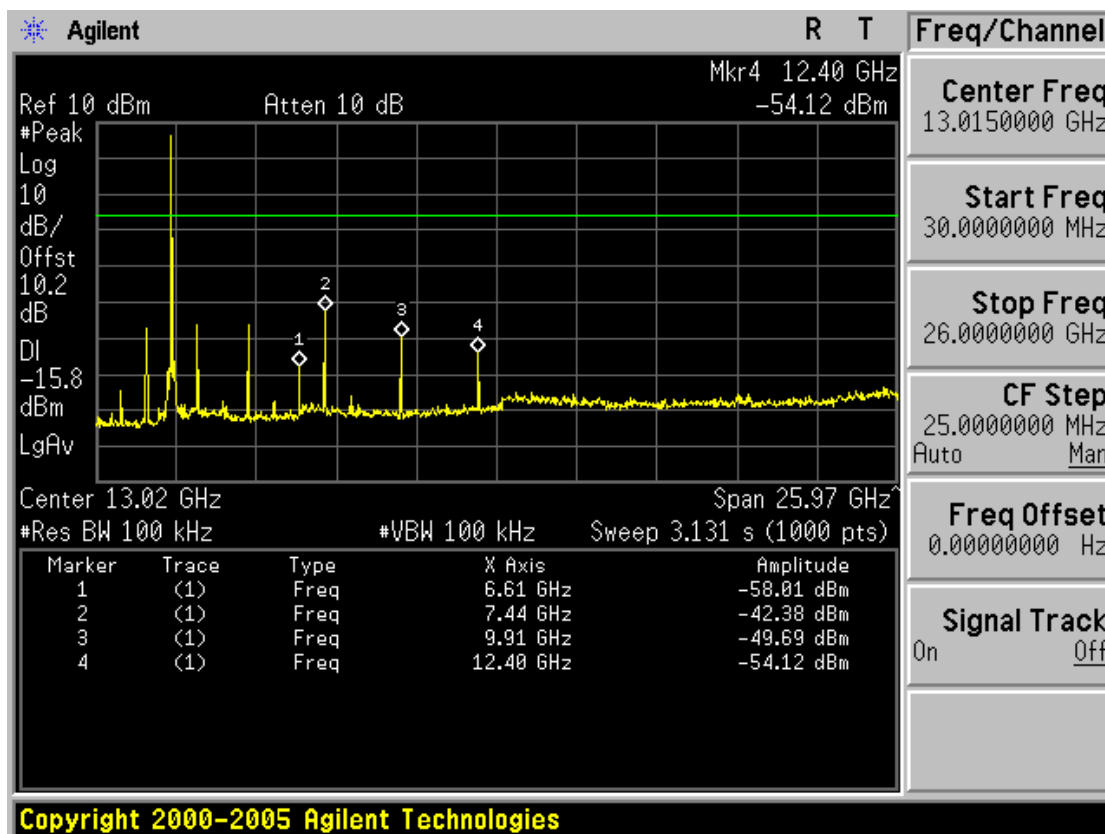
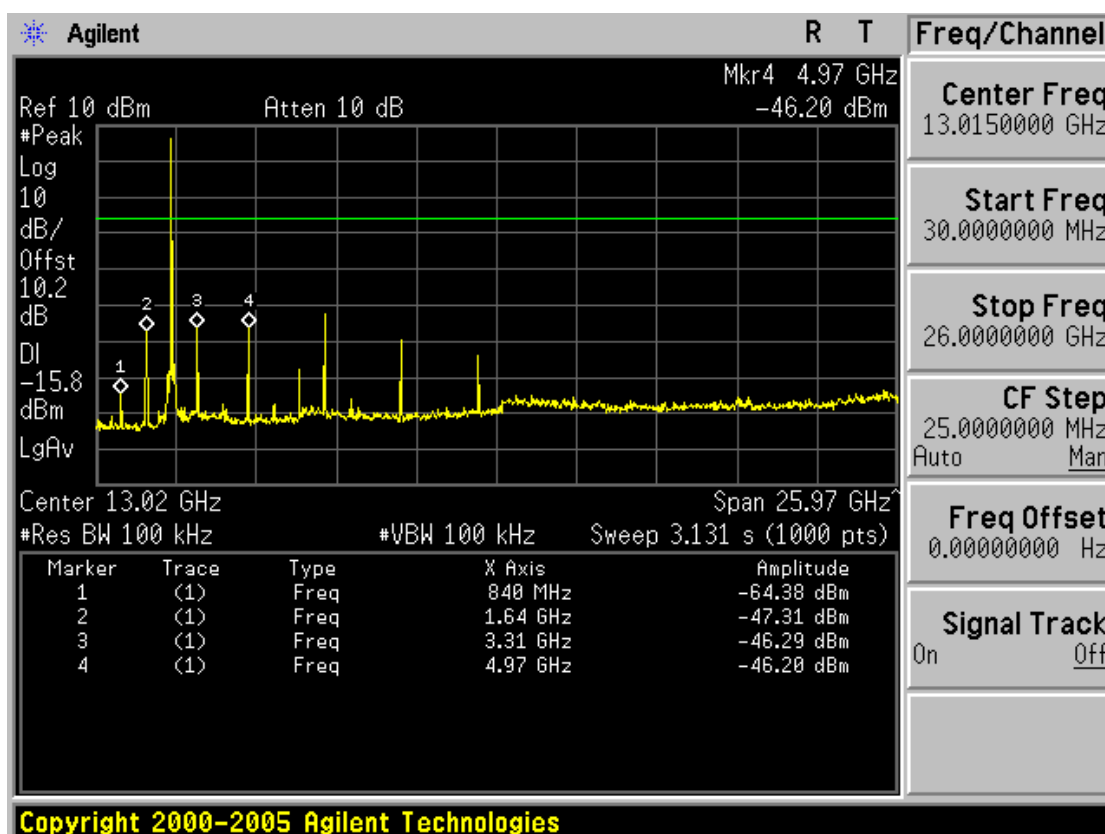
High band with hopping disabled



High band with hopping enabled



High channel spurious



3.2.7 Radiated Emissions

Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic.

RBW = 120 kHz (30MHz ~ 1 GHz)

= 1 MHz (1 GHz ~ 10th harmonic)

Trace = max hold

VBW $\geq$ RBW (Peak)

VBW = 10Hz (Average)

Sweep = auto

Measurement Data: **Complies**

- No emissions were detected at a level greater than 10dB below limit.
- Refer to the next page.

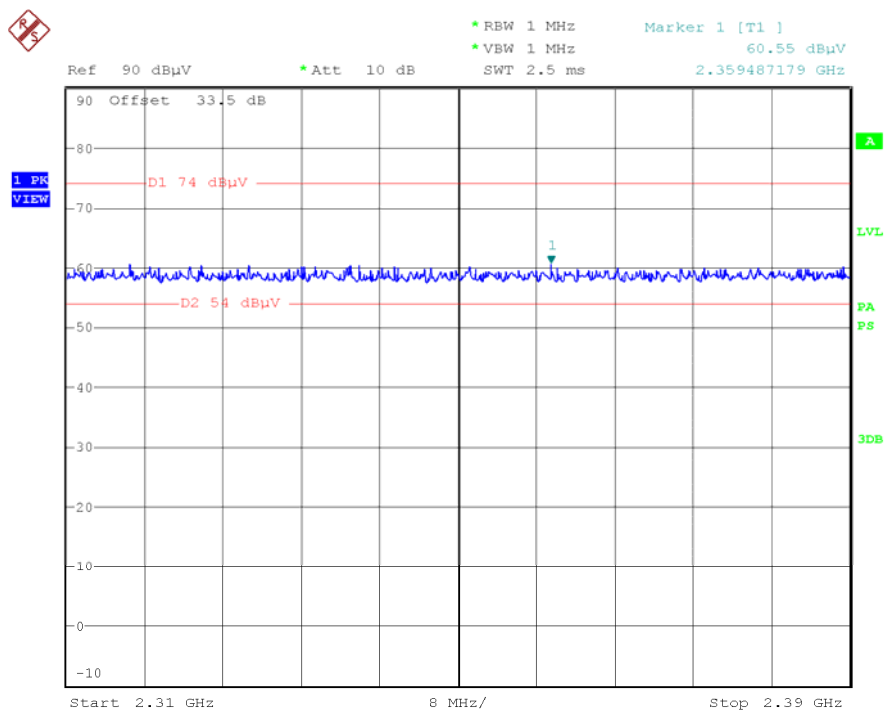
Minimum Standard: FCC Part 15.205 (a), 15.205(b), 15.209(a) and (b)

Limit : FCC P15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

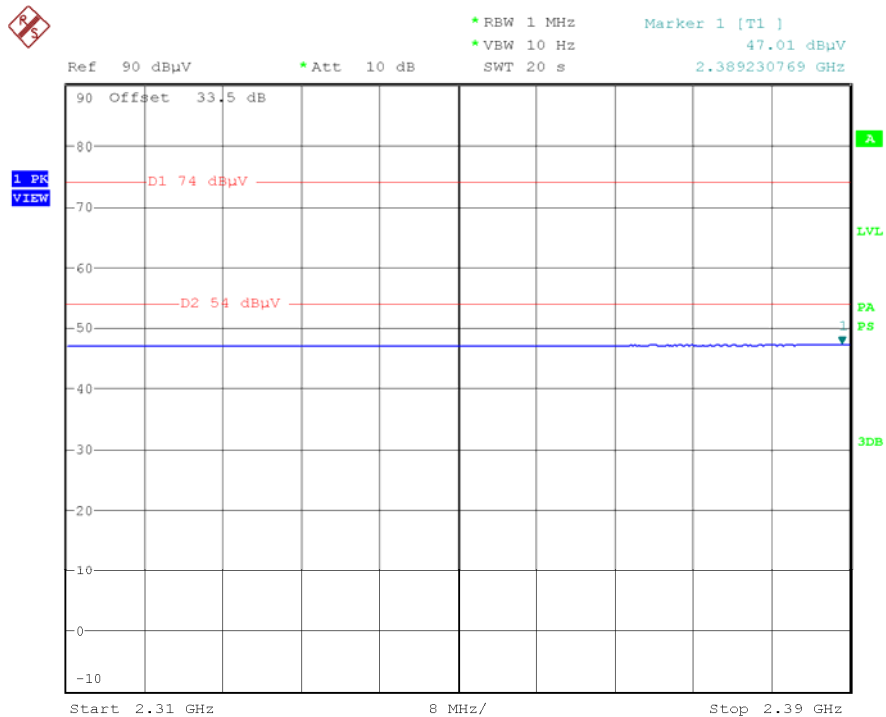
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

Restricted Band Edge: Low Channel (Peak, Horizontal)



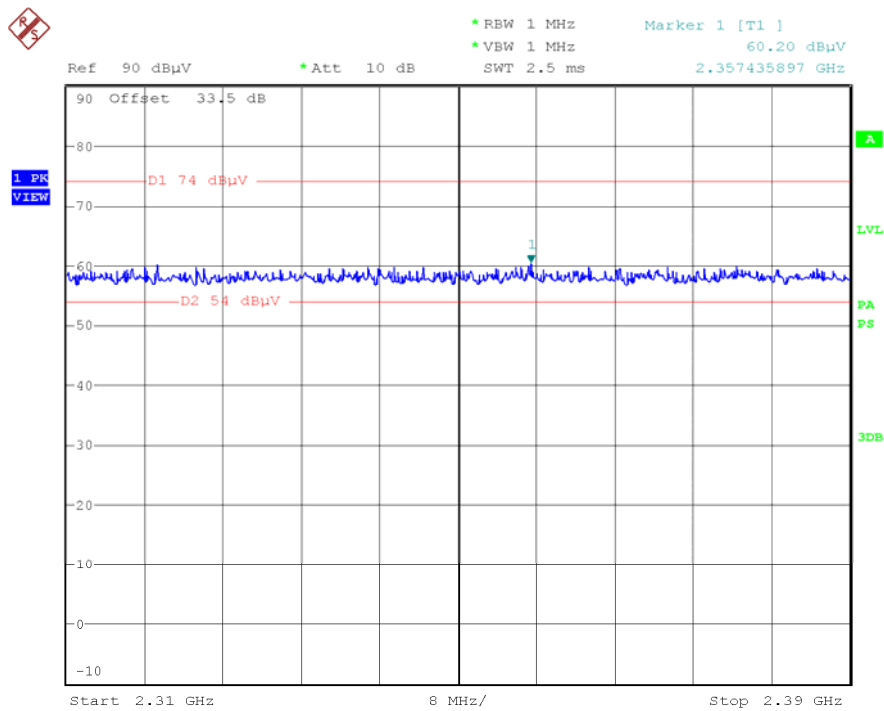
Date: 16.JUN.2007 10:49:38

Restricted Band Edge: Low Channel (Average, Horizontal)



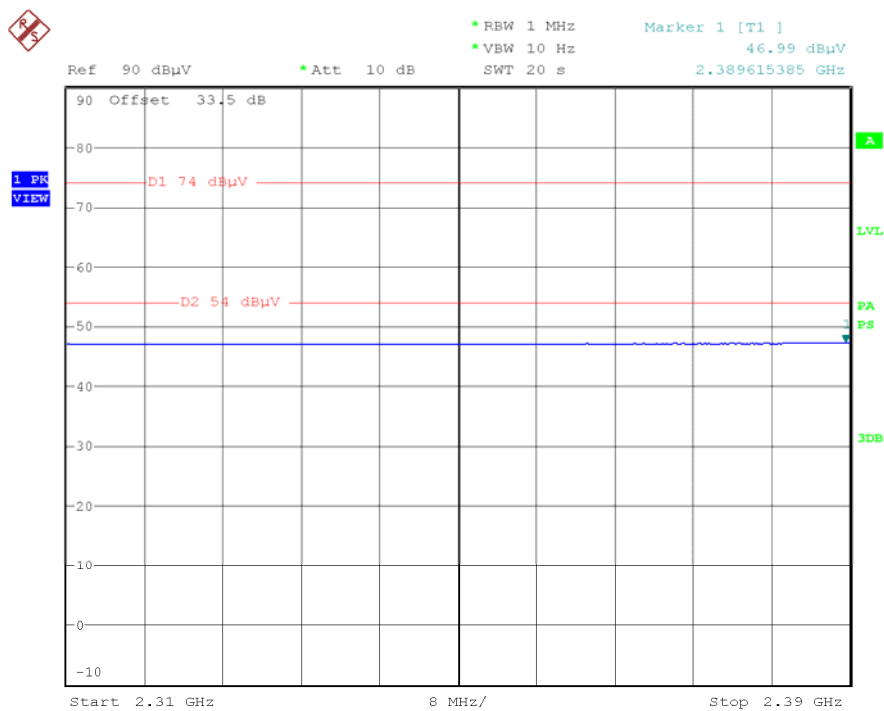
Date: 16.JUN.2007 10:51:14

Restricted Band Edge: Low Channel (Peak, Vertical)



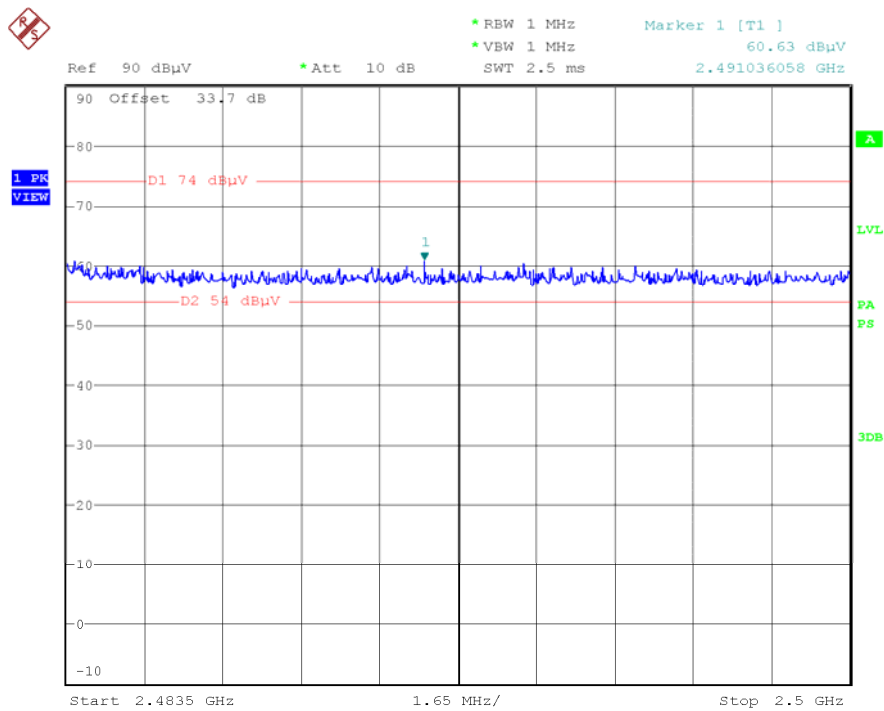
Date: 16.JUN.2007 11:05:55

Restricted Band Edge: Low Channel (Average, Vertical)



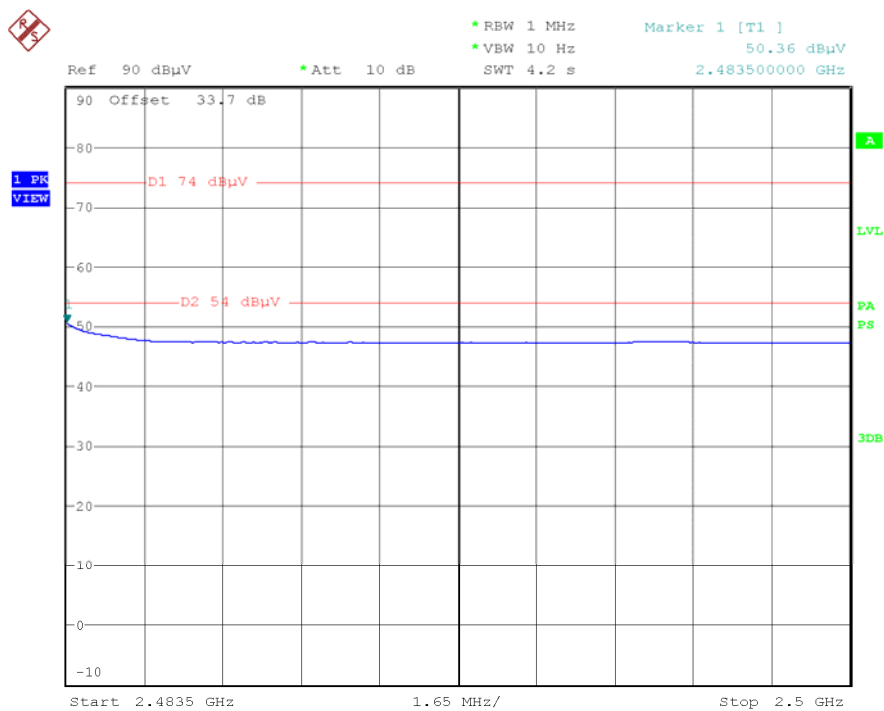
Date: 16.JUN.2007 11:08:08

Restricted Band Edge: High Channel (Peak, Horizontal)



Date: 16.JUN.2007 11:28:23

Restricted Band Edge: High Channel (Average, Horizontal)



Date: 16.JUN.2007 11:29:23

Radiated Spurious Emission Data(Harmonics)

<u>Low Channel(2402MHz)</u>										
Frequency (MHz)	ANT Pol. (H/V)	Reading Value (dBuV)		T.F (dB)	Result (dBuV)		Limit (dBuV)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4804	H	55.71	46.61	5.32	61.03	51.93	74	54	12.97	2.07
7206	V	46.30	35.19	10.69	56.99	45.88	74	54	17.01	8.12
-	-	-	-	-	-	-	-	-	-	-
<u>Middle Channel(2441MHz)</u>										
Frequency (MHz)	ANT Pol. (H/V)	Reading Value (dBuV)		T.F (dB)	Result (dBuV)		Limit (dBuV)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4882	H	51.87	43.34	5.75	57.62	49.09	74	54	16.38	4.91
7323	V	46.21	35.59	10.86	57.07	46.45	74	54	16.93	7.55
-	-	-	-	-	-	-	-	-	-	-
<u>High Channel(2480MHz)</u>										
Frequency (MHz)	ANT Pol. (H/V)	Reading Value (dBuV)		T.F (dB)	Result (dBuV)		Limit (dBuV)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4960	H	54.24	45.47	6.12	60.36	51.59	74	54	13.64	2.41
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Not. 1. No other emissions were detected at a level greater than 20dB below limit.

2. T.F(Total Factor) = Cable Loss + Ant Factor –AMP Gain

3. Result = Reading Value + T.F

4. Margin = Limit - Result

Radiated Spurious Emission Data(Other Emissions)

(Continued...)

Other Emissions														
Frequency (MHz)	ANT Pol. (H/V)	Reading Value (dBuV)			T.F (dB)	Result (dBuV)			Limit (dBuV)			Margin (dB)		
		PK	QP	AV		PK	QP	AV	PK	QP	AV	PK	QP	AV
85.180	V		49.65		-18.85		30.80			40.00			9.20	
111.620	V		50.31		-14.28		36.03			43.50			7.47	
332.380	V		44.01		-8.25		35.76			46.00			10.24	
665.040	V		40.19		-3.75		36.44			46.00			9.56	

Not. 1. No other emissions were detected at a level greater than 20dB below limit.

2. T.F(Total Factor) = Cable Loss + Ant Factor –AMP Gain

3. Result = Reading Value + T.F

4. Margin = Limit - Result

3.2.8 AC Line Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: **N/A**

-This device use USB charging mode only without AC/DC adaptor.

Also when this device is in USB charging mode, the Bluetooth TX/RX mode is disabled.

Therefore conducted emission test is omitted.

Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Measurement Setup

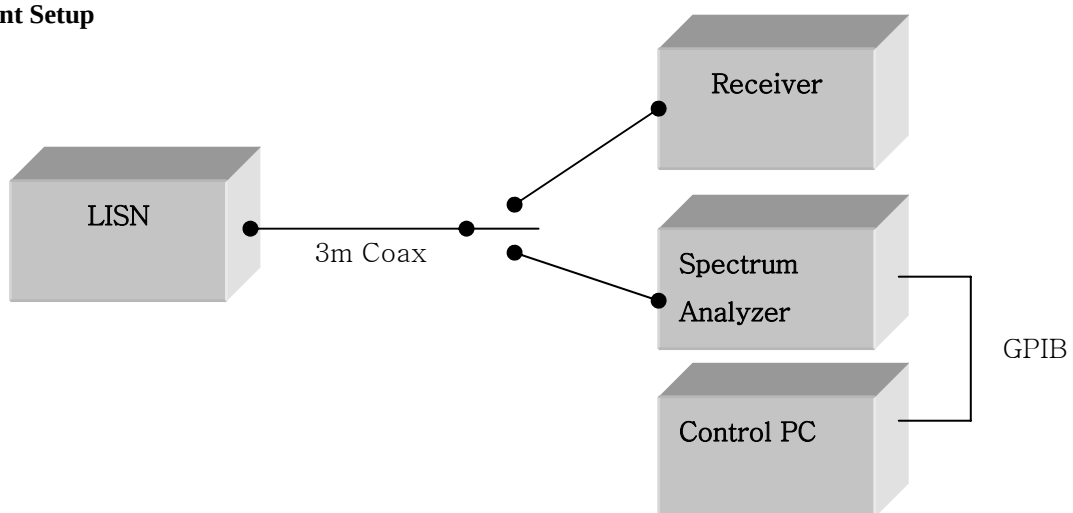


Figure 2: Measurement setup for AC Conducted Emission

APPENDIX

TEST EQUIPMENT FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
01	Spectrum Analyzer	Agilent	E4440A	05/10/07	MY45304199
02	Spectrum Analyzer	H.P	8563E	06/10/07	3551A04634
03	Power Meter	H.P	EPM-442A	06/07/08	GB37170413
04	Power Sensor	H.P	8481A	14/07/08	3318A96332
05	Frequency Counter	H.P	5342A	15/09/07	2119A04450
06	Multifunction Synthesizer	H.P	8904A	12/10/07	3633A08404
07	Signal Generator	Rohde Schwarz	SMR20	21/03/08	101251
08	Signal Generator	H.P	E4421A	06/07/08	US37230529
09	Audio Analyzer	H.P	8903B	06/07/08	3011A0944B
10	Modulation Analyzer	H.P	8901B	10/07/08	3028A03029
11	Oscilloscope	Tektronix	TDS3052	01/10/07	B016821
12	8960 Series 10 Wireless Comms Test Set	Agilent	Z5515C	13/06/08	GB43461134
13	Universal Radio Communication Test	Rohde Schwarz	CMU200	21/03/08	107631
14	CDMA Mobile Station Test Set	H.P	8924C	15/09/07	US35360688
15	PCS Interface	HP	83236B	15/09/07	3711J03014
16	Multi system Ue Tester	Japan Radid Co., Ltd	NJZ-2000	20/11/07	ET00095
17	Power Splitter	WEINSCHL	1593	14/10/07	332
18	BAND Reject Filter	Microwave Circuits	N0308372	19/10/07	3125-01DC0312
19	BAND Reject Filter	Wainwright	WRCG1750	19/10/07	SN2
20	AC Power supply	DAEKWANG	5KVA	20/03/08	N/A
21	DC Power Supply	H.P	6622A	20/03/08	465487
22	HORN ANT	EMCO	3115	16/08/07	6419
23	HORN ANT	EMCO	3115	16/08/07	21097
24	HORN ANT	A.H.Systems	SAS-574	16/08/07	154
25	HORN ANT	A.H.Systems	SAS-574	16/08/07	155
26	Dipole Antenna	Schwarzbeck	VHA9103	18/11/07	2116
27	Dipole Antenna	Schwarzbeck	VHA9103	18/11/07	2117
28	Dipole Antenna	Schwarzbeck	UHA9105	18/11/07	2261
29	Dipole Antenna	Schwarzbeck	UHA9105	18/11/07	2262
30	Loop Antenna	ETS	6502	22/11/07	3471

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	S/N
31	TEMP & HUMIDITY Chamber	JISCO	J-RHC2	13/09/07	021031
32	RFI/FIELD Intensity Meter	Kyorits	KNM-504D	21/07/08	4N-161-4
33	Frequency Converter	Kyorits	KCV-604C	21/07/08	4-230-3
34	Log Periodic Antenna	Schwarzbeck	UHALP9108A1	26/09/08	1098
35	Biconical Antenna	Schwarzbeck	VHA9103	12/09/07	2233
36	Digital Multimeter	H.P	34401A	20/03/08	3146A13475
37	Attenuator (10dB)	WEINSCHEL	23-10-34	17/10/07	BP4386
38	High-Pass Filter	ANRITSU	MP526	13/10/07	M27756
39	Attenuator (3dB)	Agilent	8491B	10/07/08	58177
40	Attenuator (10dB)	WEINSCHEL	23-10-34	26/01/08	BP4387
41	Attenuator (30dB)	H.P	8498A	17/10/07	50101
42	Amplifier (25dB)	Agilent	8447D	12/04/08	2944A10144
43	Amplifier (30dB)	Agilent	8449B	13/10/07	3008A01590
44	Position Controller	TOKIN	5901T	N/A	14173
45	Driver	TOKIN	5902T2	N/A	14174
46	Spectrum Analyzer	Agilent	8594E	04/11/07	3649A05889
47	RFI/FIELD Intensity Meter	Kyorits	KNW-2402	11/07/08	4N-170-3
48	LISN	Kyorits	KNW-407	19/08/07	8-317-8
49	LISN	Kyorits	KNW-242	09/10/07	8-654-15
50	CVCF	NF Electronic	4400	N/A	344536 4420064
51	Software	ToYo EMI	EP5/RE	N/A	Ver 2.0.800
52	Software	ToYo EMI	EP5/CE	N/A	Ver 2.0.801
53	Software	AUDIX	e3	N/A	Ver 3.0
54	Software	Agilent	Benchlink	N/A	A.01.09 021211