DIGITAL EMC CO., LTD.

683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
Tel: +82-31-321-2664 Fax: +82-31-321-1664
http://www.digitalemc.com

CERTIFICATION OF COMPLIANCE

Firmtech Co., Ltd
B-606, Ssangyong IT Twin Tower, Sangdaewon-dong, 442-5,
Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea

Dates of Tests: August 24 ~ 28, 2009
Test Report S/N: DR50110909A
Test Site : DIGITAL EMC CO., LTD.

FCC ID **U8D-FB200AS**

APPLICANT **Firmtech Co., Ltd**

FCC Equipment Class	:	**Part 15 Spread Spectrum Transmitter(DSS)**
Device name	:	**Bluetooth Adapter**
Manufacturer	:	**Firmtech Co., Ltd**
FCC ID	:	**U8D-FB200AS**
Model name	:	**FB200AS**
Test Device Serial number	:	**Identical prototype**
FCC Rule Part(s)	:	**FCC Part 15.247 Subpart C**
		ANSI C63.4-2003
Frequency Range	:	**2402 ~ 2480 MHz**
Max. Output power	:	**7.16 dBm Conducted**
Data of issue	:	**September 04, 2009**

TABLE OF CONTENTS

1. General information

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.
Address: 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080
http://www.digitalemc.com E-mail: Harveysung@digitalemc.com
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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".

Tested by: Engineer

Data	Name	Signature
September 04, 2009	D.C. Cha	

Reviewed by: Manager

Data	Name	Signature
September 04, 2009	W.J. Lee	

Applicant:

Company name	:	Firmtech Co., Ltd
Address	:	B-606, Ssangyong IT Twin Tower, Sangdaewon-dong, 442-5, Jungwon-gu,
City/town	:	Seongnam-si, Gyeonggi-do
Country	:	Korea
Date of order	:	August 27, 2009

2. Information about test item

U8D-FB200AS

2.1 Equipment information

Equipment model name	FB200AS	
Equipment serial no.	Identical prototype	
Type of equipment	Bluetooth Adapter	
Frequency band	2402 ~ 2480 MHz	
Type of Modulation	☒	GFSK for 1Mbps
	☐	π/4-DQPSK for 2Mbps
	☐	8DPSK for 3Mbps
Spread Spectrum	Frequency Hopping	
Channel Spacing	1.0 MHz	
Power	DC 5V from USB	
Type of antenna	Dipole Antenna	

2.2 Tested frequency

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

2.3 Tested environment

Temperature	:	15 ~ 35 (°C)
Relative humidity content	:	20 ~ 75 %
Air pressure	:	86 ~ 103 kPa
Details of power supply	:	DC 5V from USB

2.4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Mouse	MOC5UO	HOFOOJYN	Dell	-
Monitor	FLATRONW2261V-PF	906NDQA8P924	LG	-
Computer	DM-V60	740W97A500076L	Samsung	-
Keyboard	SK-8115	NA	Dell	-
Printer	SRP-770	SRP77008060035	BIXOLON	-

2.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing → None

2.6 Antenna Requirement of Part 15.

The antenna connector of this device is a SMA plug reverse type connector which is unique connector type.

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit (Using in 2400 ~ 2483.5MHz)	Test Condition	Status (note 1)
I. Test Items				
15.247(a)	Carrier Frequency Separation	>= 20dB BW or >= Two-Thirds of the 20dB BW	Conducted	C
	Number of Hopping Frequencies	>= 15 hops		C
	20 dB Bandwidth	None		C
	Dwell Time	=< 0.4 seconds		C
15.247(b)	Transmitter Output Power	=< 1Watt , if CHs >= 75 Others =<0.125W		C
15.247(c)	Band-edge /Conducted	The radiated emission to any 100 kHz of out-band shall be at least 20dB below the highest in-band 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	C

Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003, DA00-705

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

RBW = 30KHz Sweep = auto

VBW = 30KHz 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
2400.994	2442.002	1.008	Comply

- See next pages for actual measured spectrum plots.

- Minimum Standard:

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 125 mW

- Measurement Setup

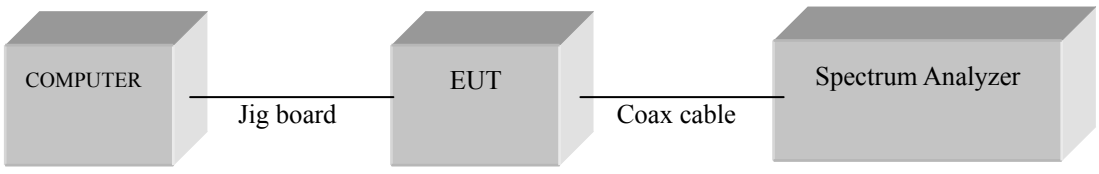
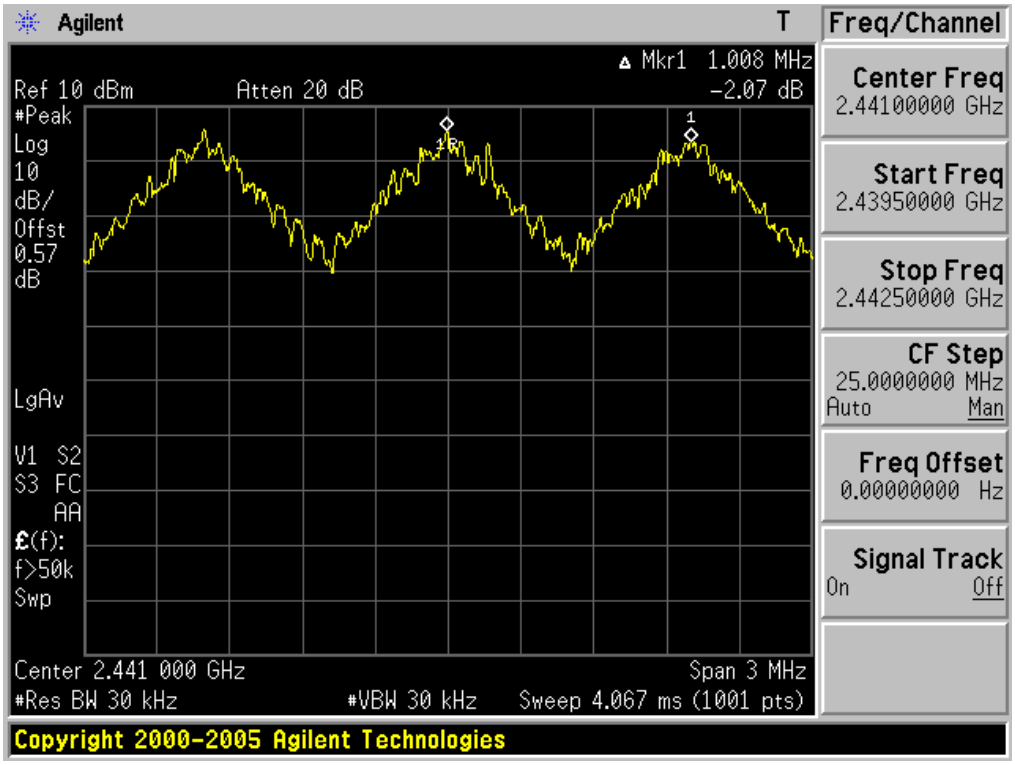


Figure 1: Measurement setup for the carrier frequency separation

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: Comply

Total number of Hopping Channels	79

- See next pages for actual measured spectrum plots.

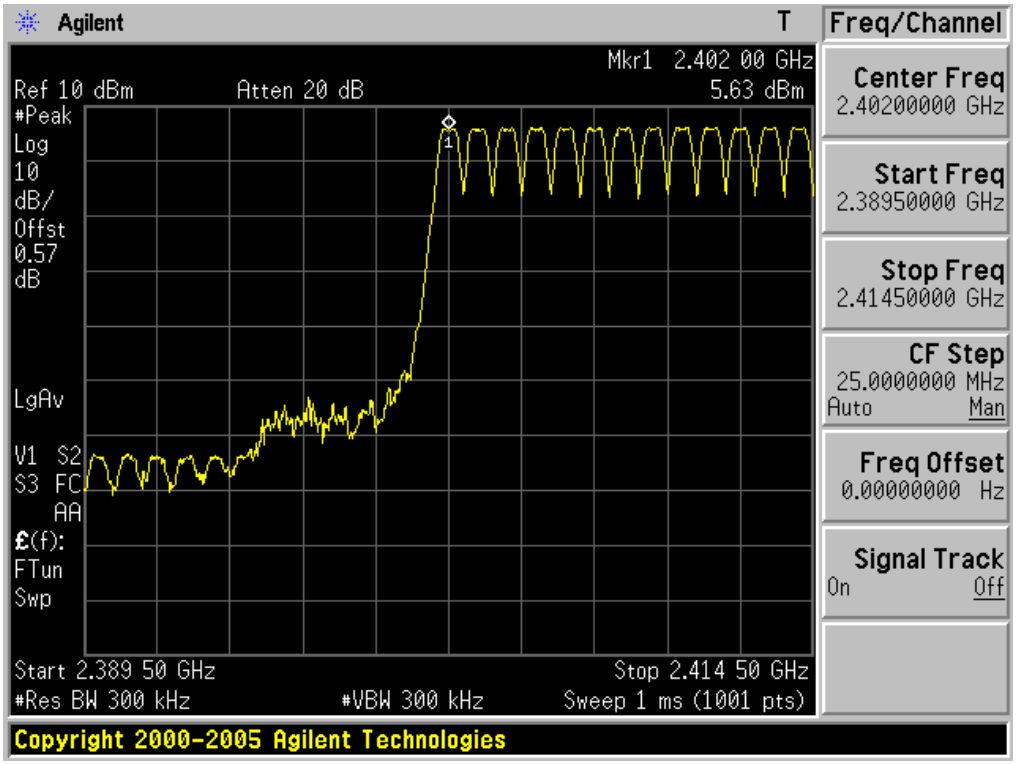
- Minimum Standard:

At least 15 hopes

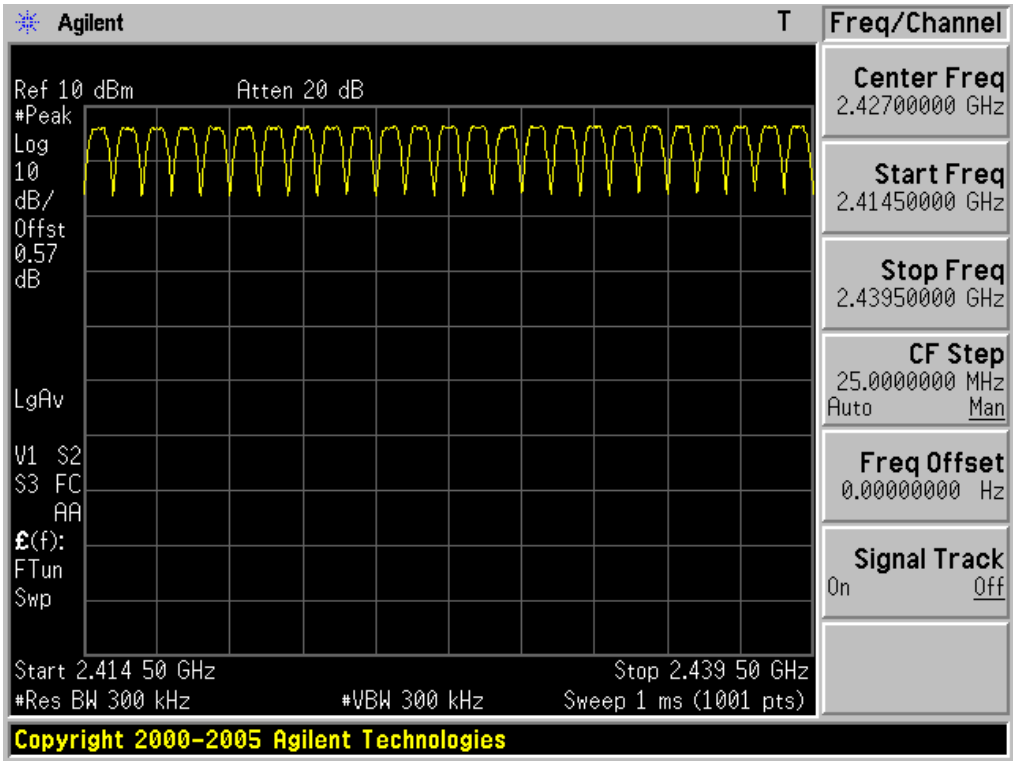
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

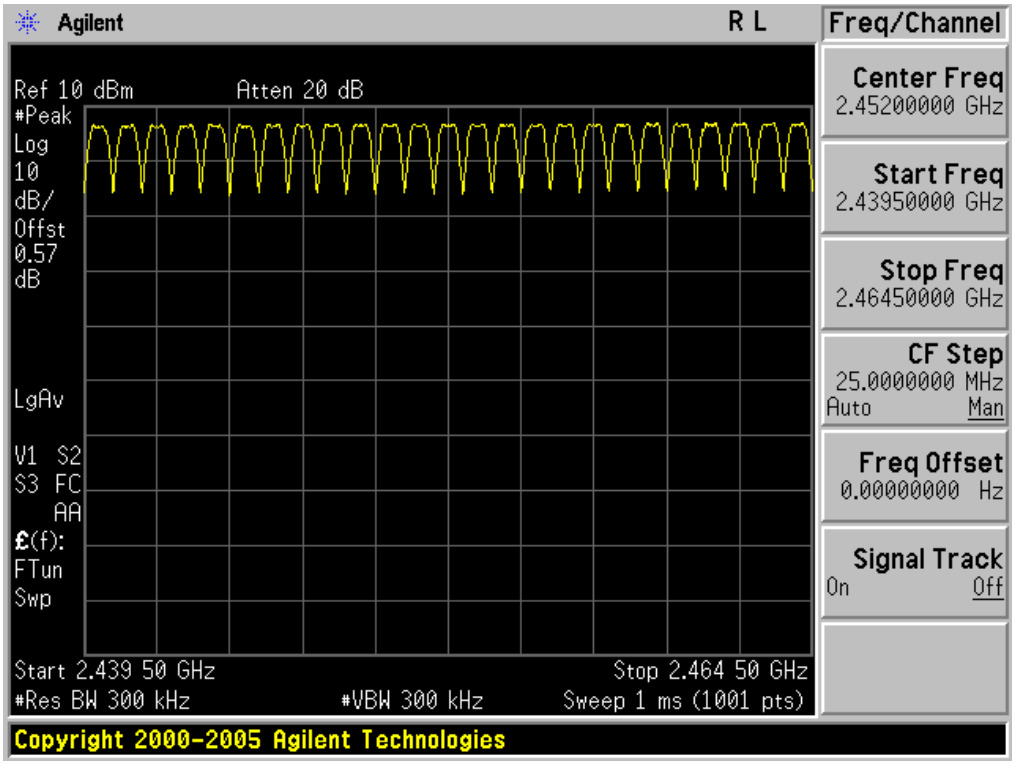
Number of Hopping Frequencies 1



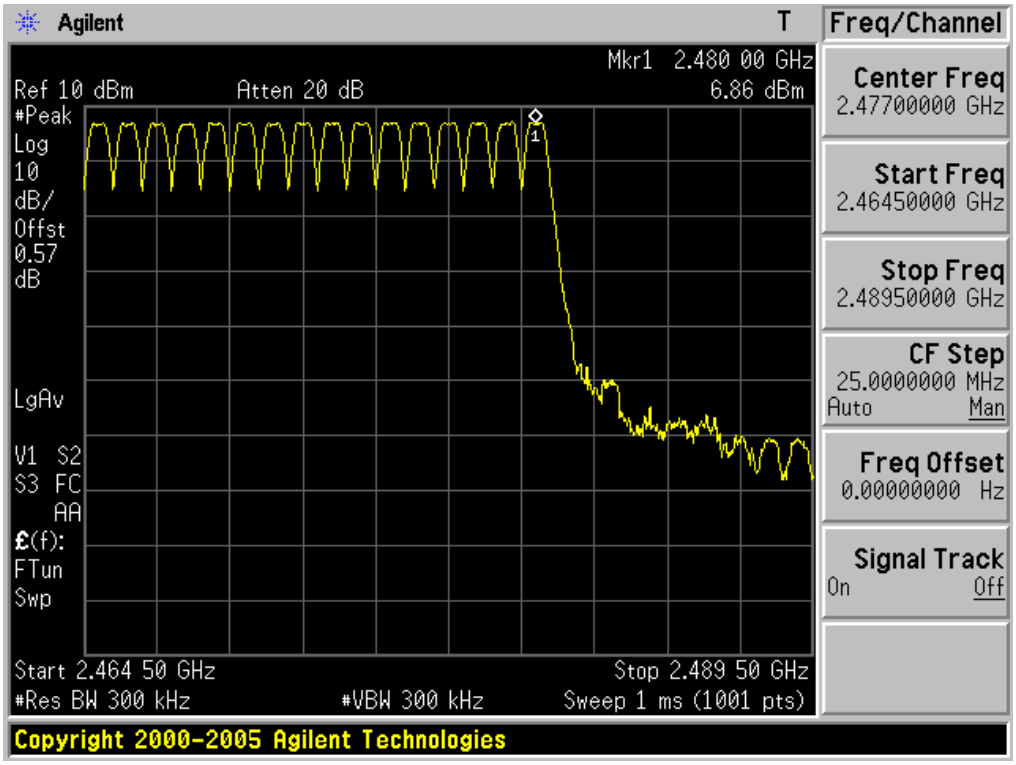
Number of Hopping Frequencies 2



Number of Hopping Frequencies 3



Number of Hopping Frequencies 4



3.2.3 20 dB Bandwidth

- Procedure:

The bandwidth at 20 dB below the highest in-band 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 = approximately 2 or 3 times of the 20 dB bandwidth

RBW = 10 kHz

Sweep = auto

VBW = 10 kHz (VBW ≥ RBW)

Detector function = peak

Trace = max hold

- Measurement Data:

Frequency (MHz)	Channel No.	Test Results	
		Measured Bandwidth (MHz)	Result
2402	**1**	**0.940**	**Comply**
2441	**40**	**0.940**	**Comply**
2480	**79**	**0.940**	**Comply**

- See next pages for actual measured spectrum plots.

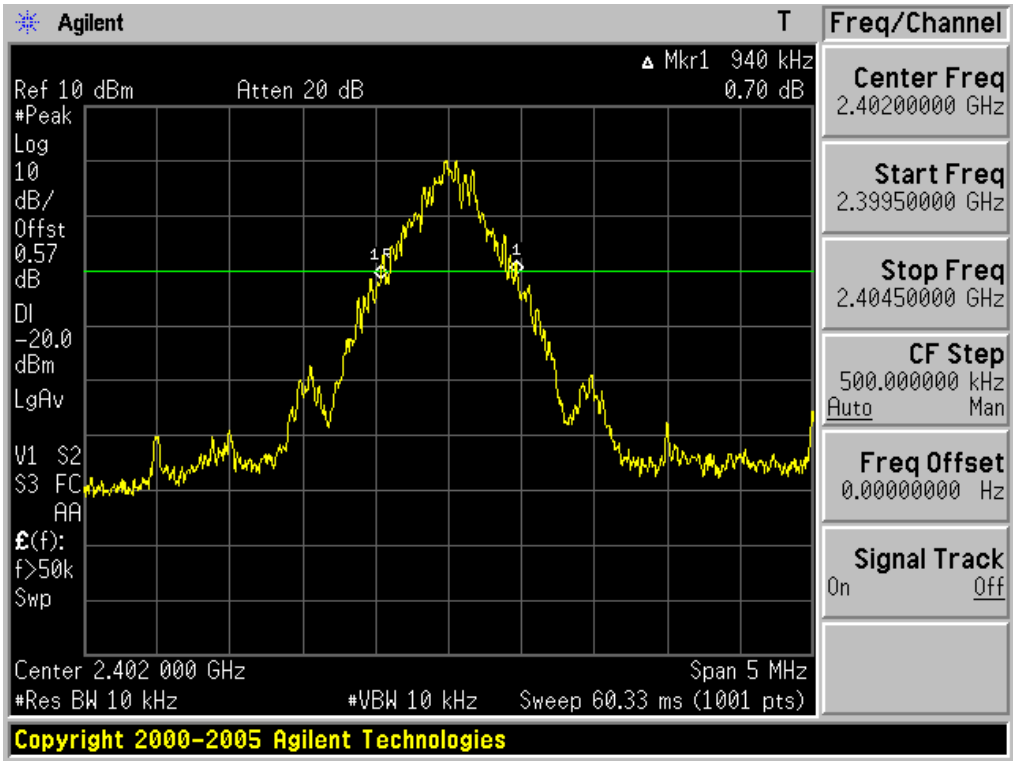
- Minimum Standard:

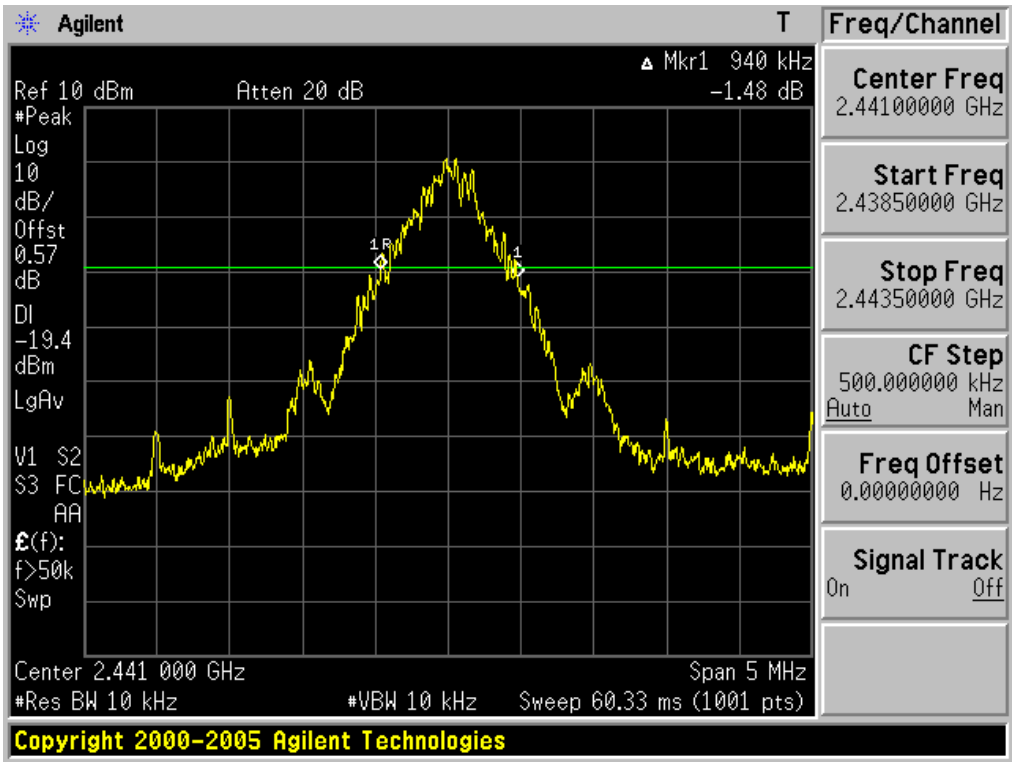
None

- Measurement Setup

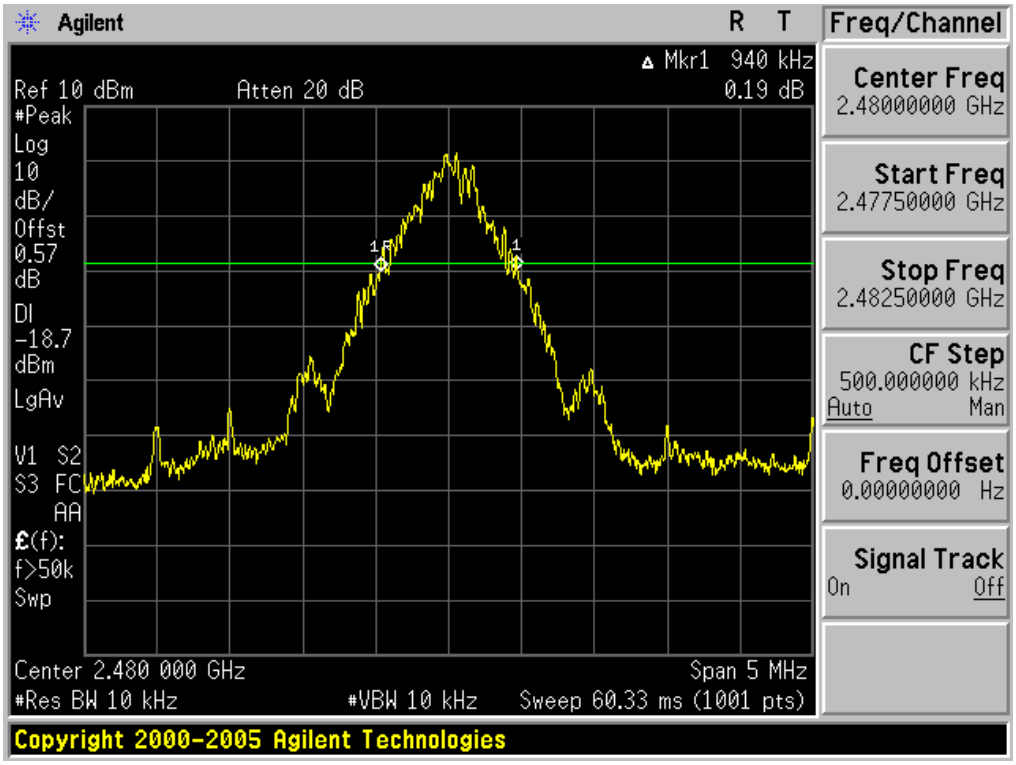
Same as the Chapter 3.2.1 (Figure 1)

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 ≥ RBW)

Trace = max hold Detector function = peak

- Measurement Data: See next pages for actual measured spectrum plots.

Packet Type	Burst On Time (ms)	Period (ms)	Number of hopping Channels	DWELL TIME (s)	Result
DH 5	**2.895**	**3.750**	**79**	**0.309**	**Comply**

Note: Each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event.

DWELL TIME=(0.4 x Number of hopping Channels) x Burst On time / (period x Number of hopping Channels)

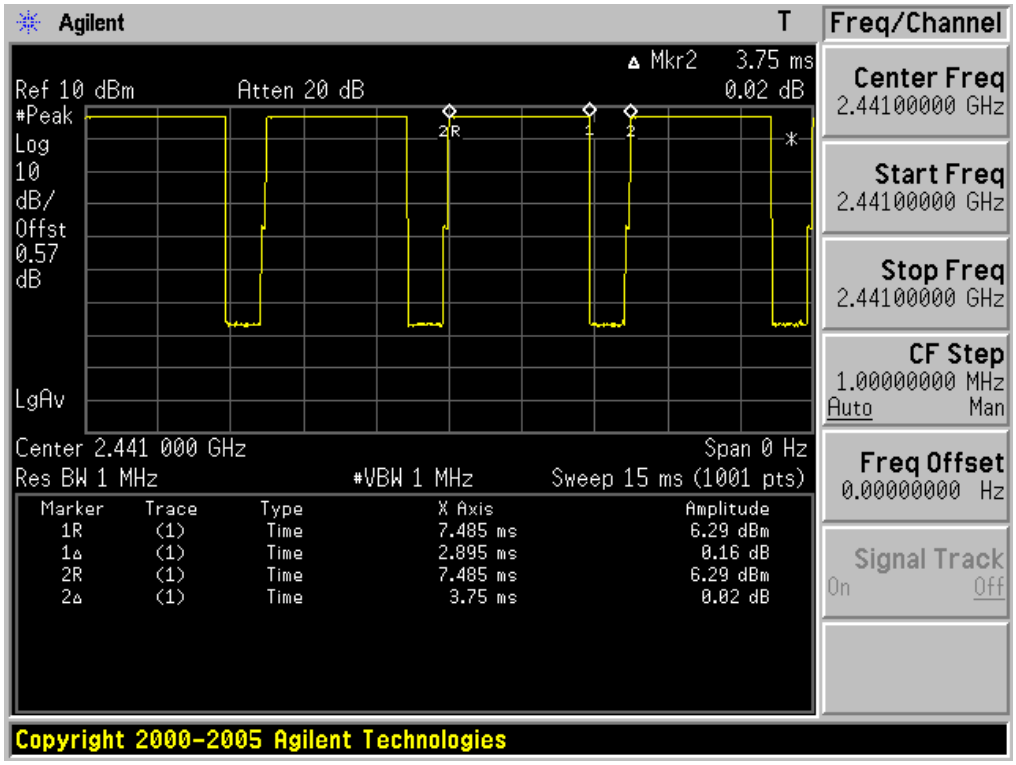
- Minimum Standard:

No greater than 0.4 seconds

- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Time of Occupancy for Packet Type DH 5



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 ≥ RBW) Detector function = peak

Trace = max hold Sweep = auto

- Measurement Data:

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	1	5.98	3.96	Comply
2441	40	6.55	4.52	Comply
2480	**79**	**7.16**	**5.20**	Comply

- See next pages for actual measured spectrum plots.

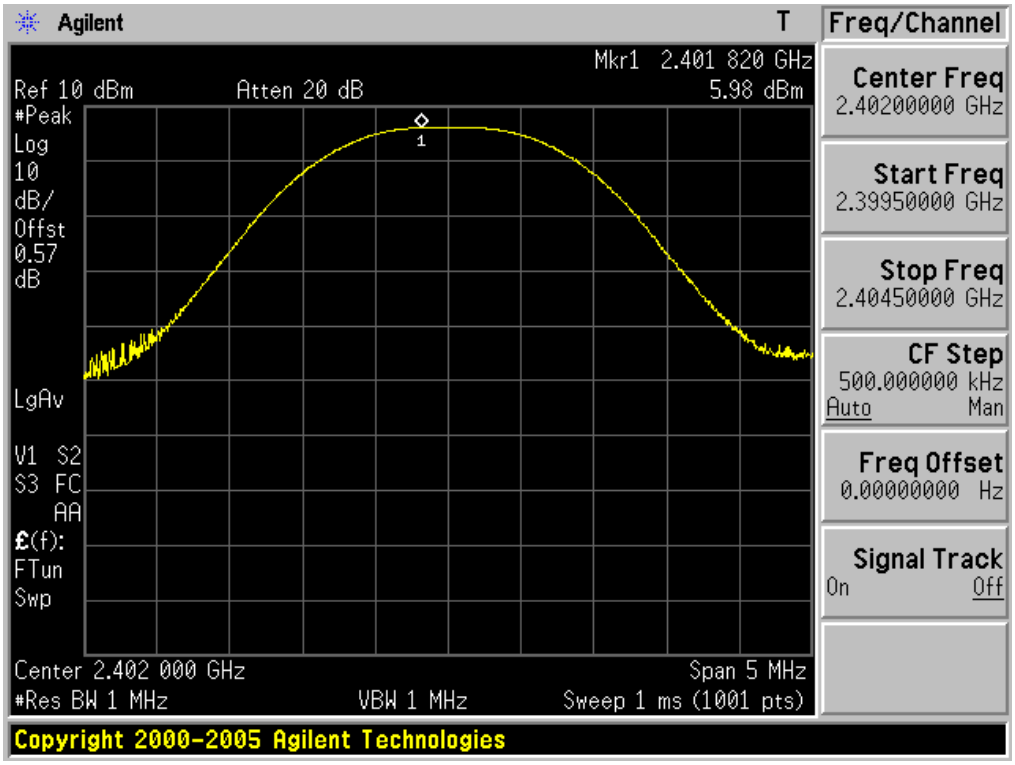
- Minimum Standard:

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**

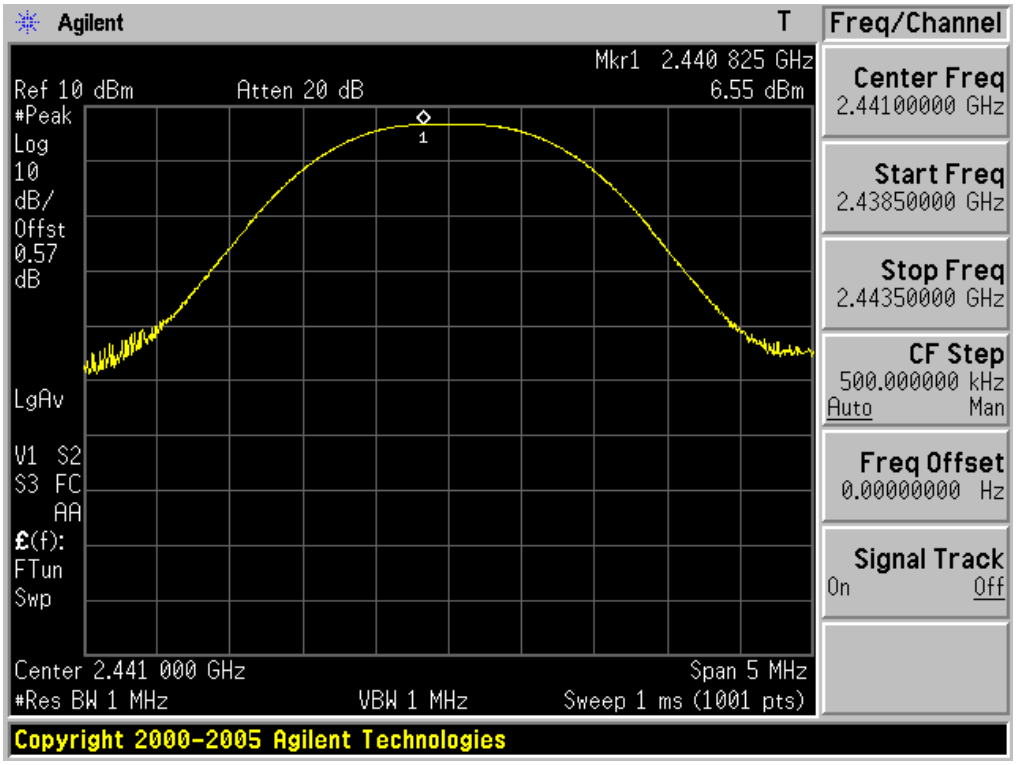
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

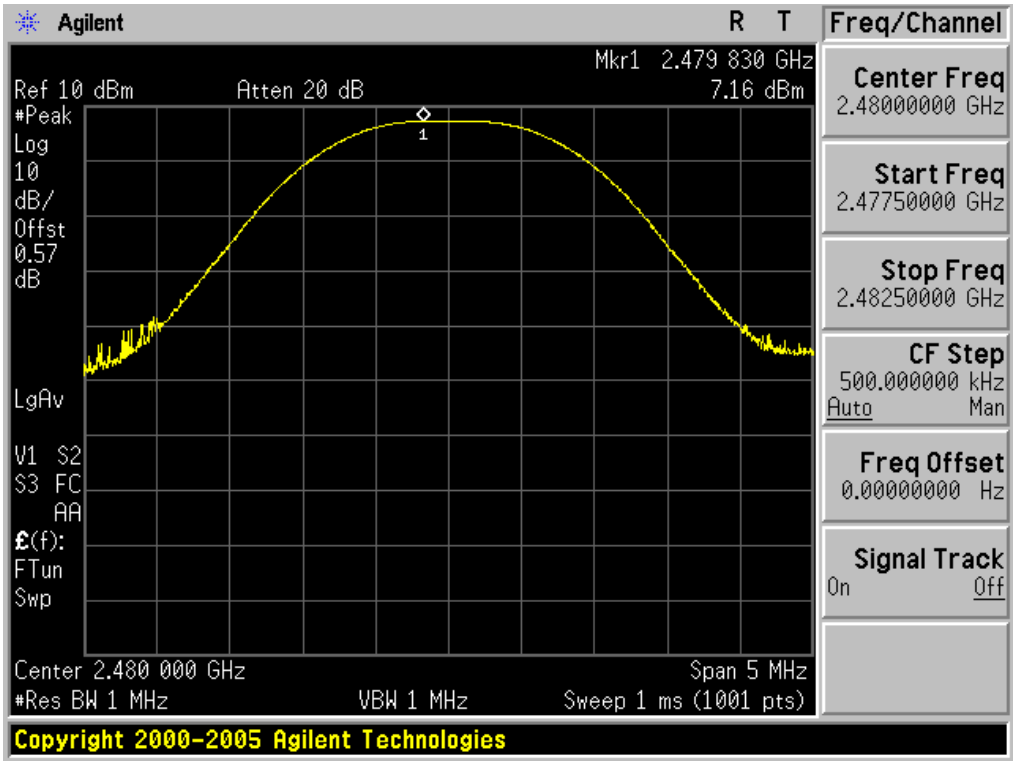
Peak Output Power



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

Detector function = peak

Trace = max hold Sweep = auto

- Measurement Data: Comply

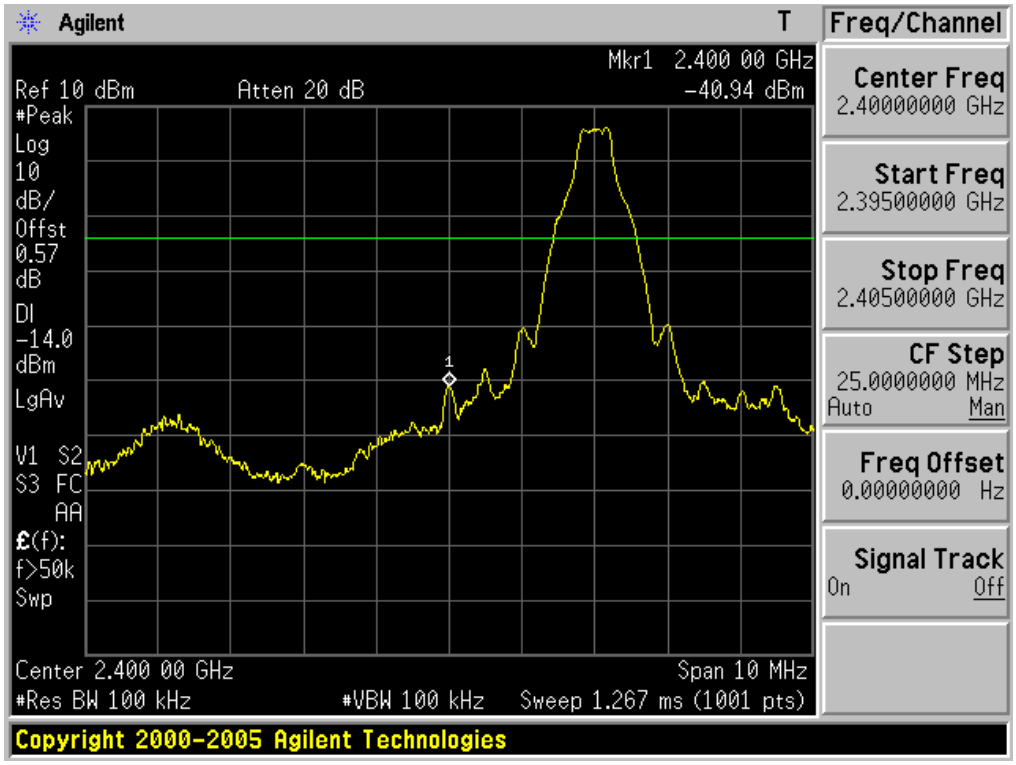
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc

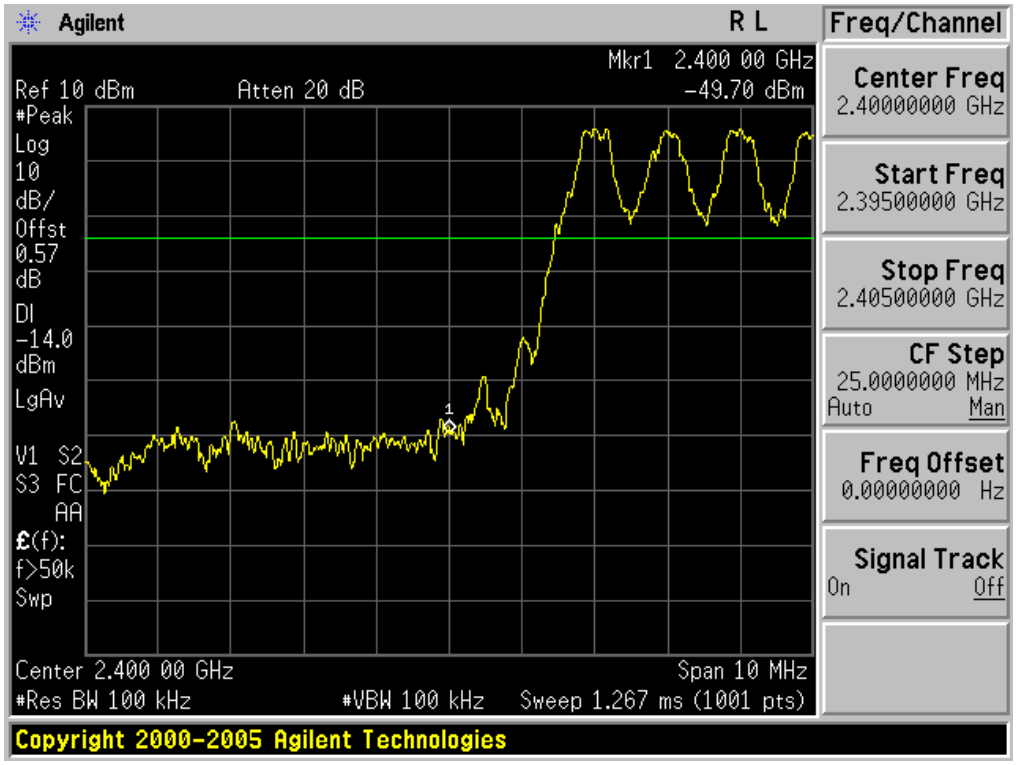
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

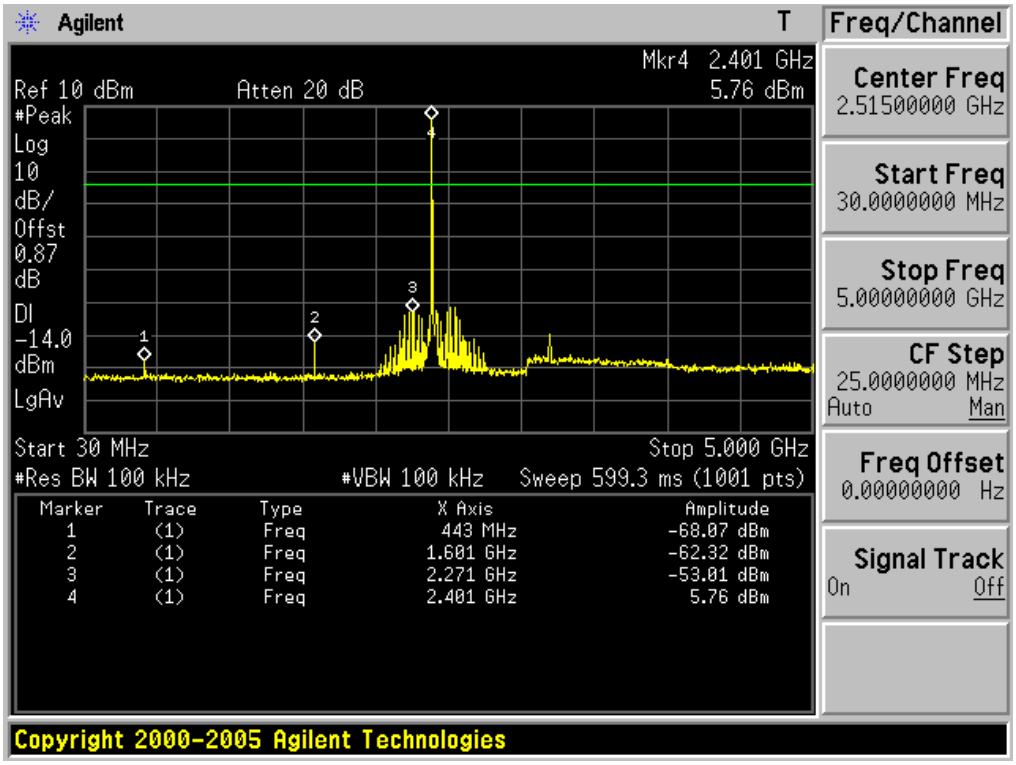
Low band with hopping disabled

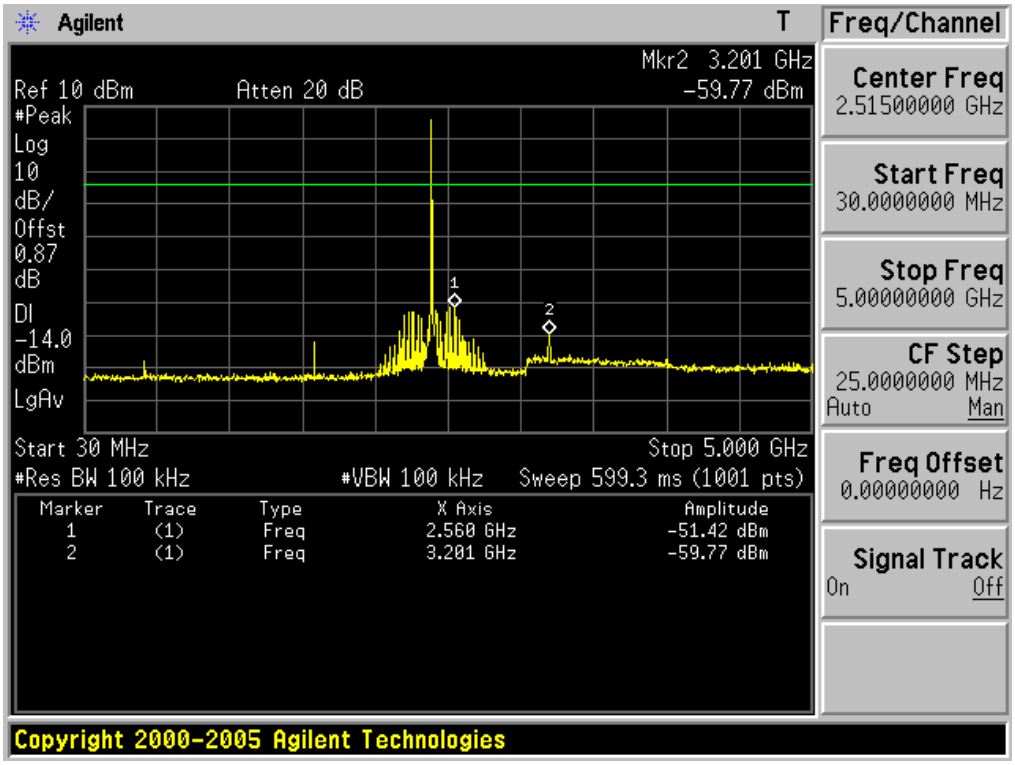


Low band with hopping enabled



Low channel spurious





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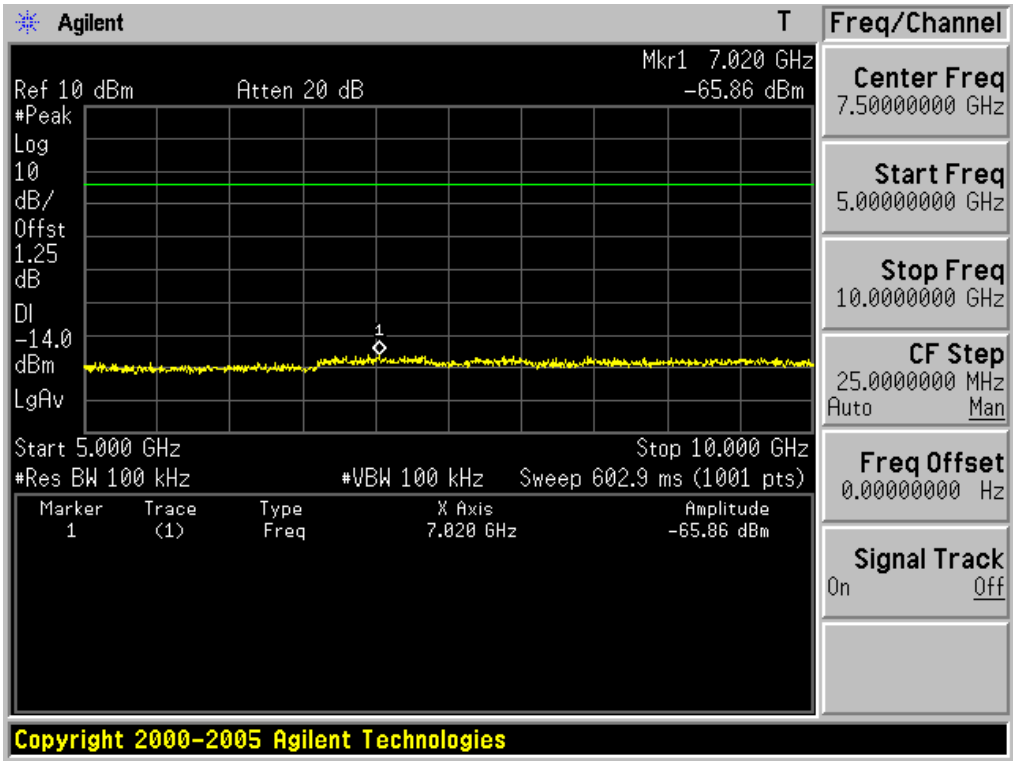

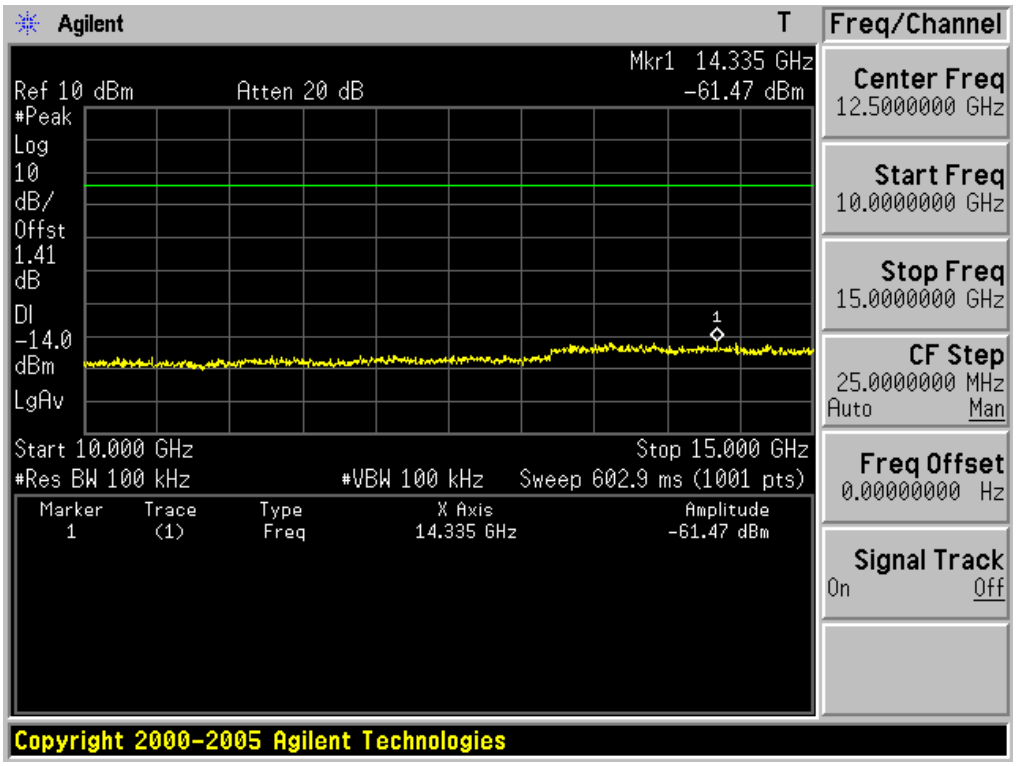

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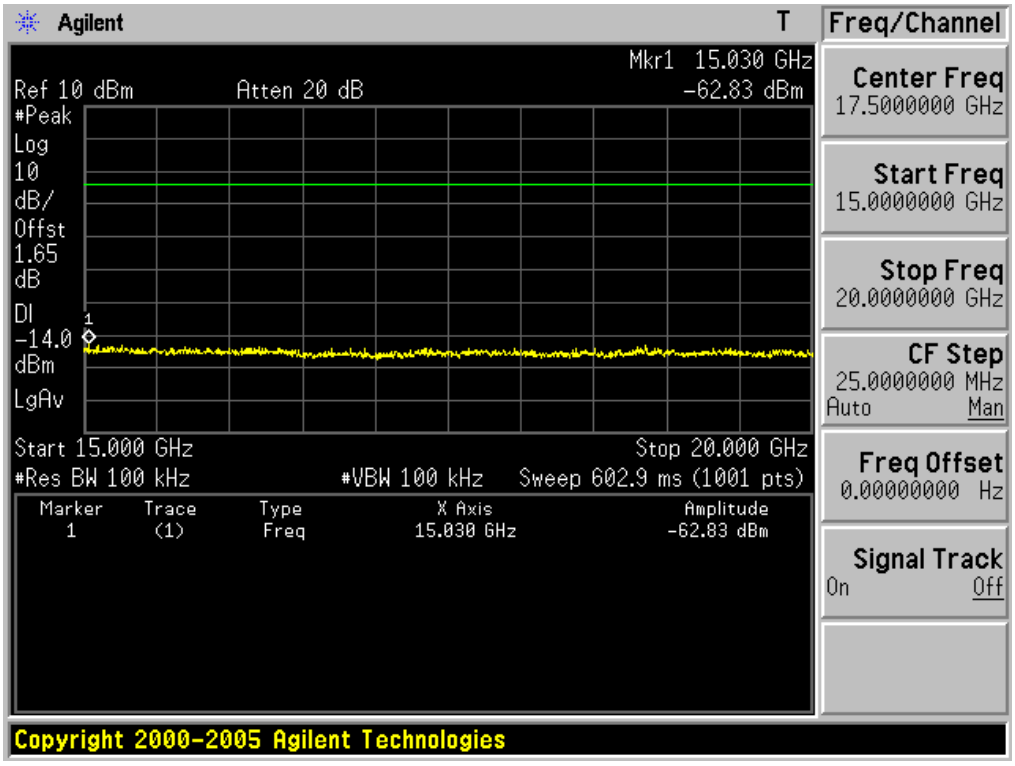
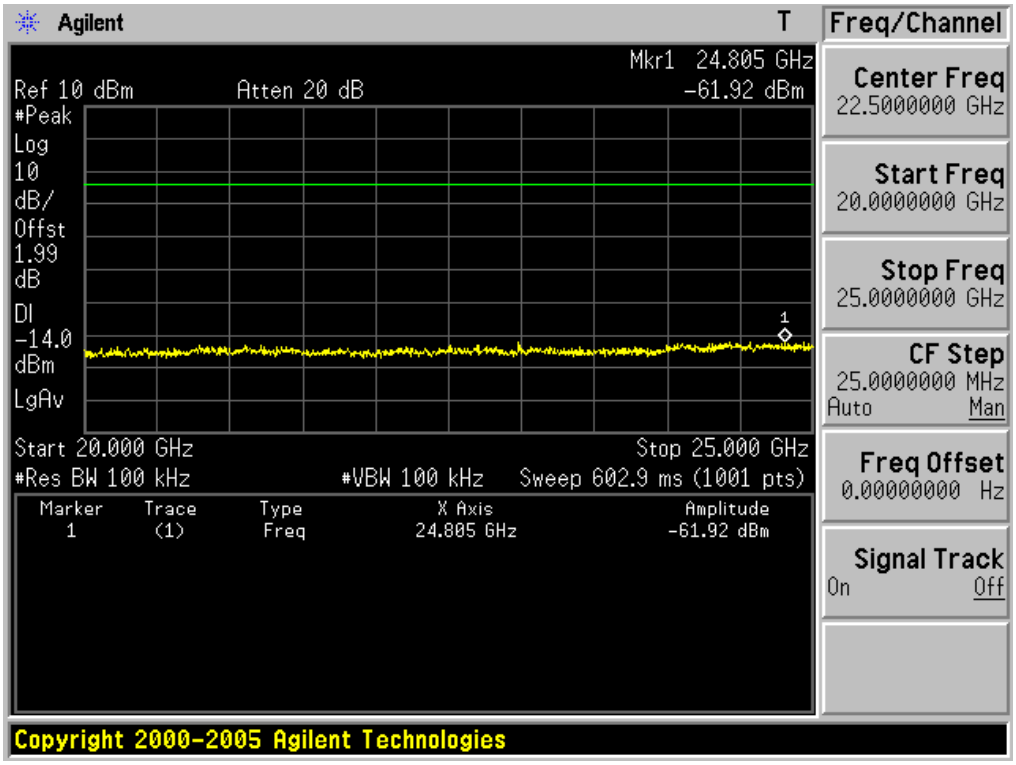
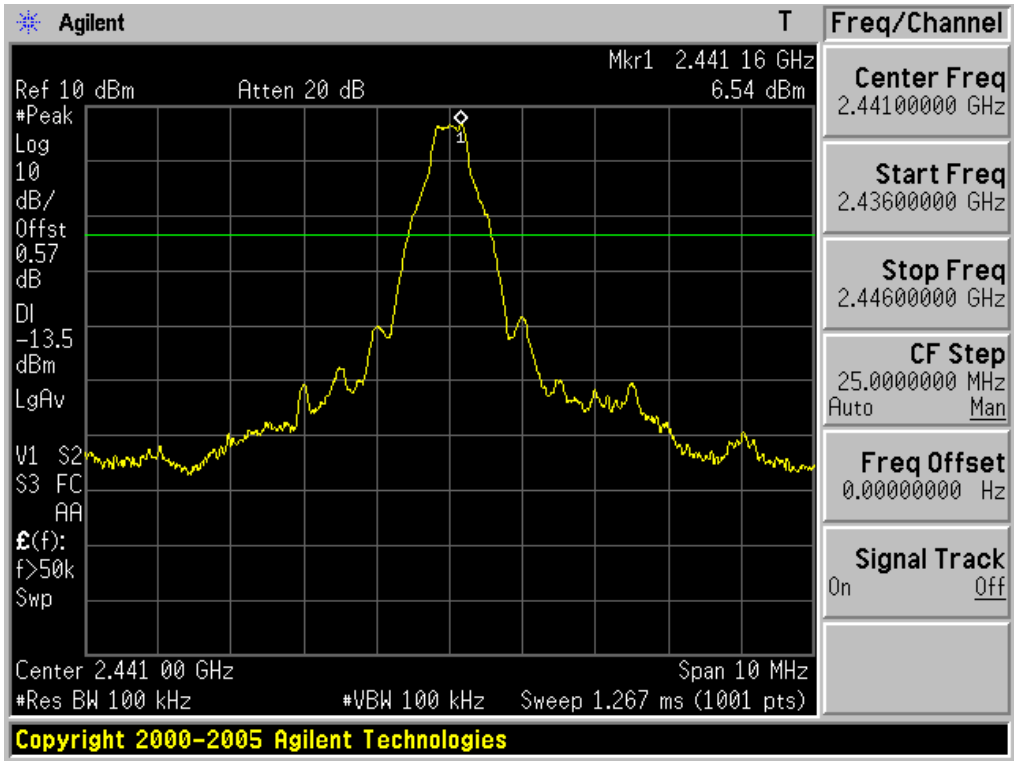




Mid channel ref



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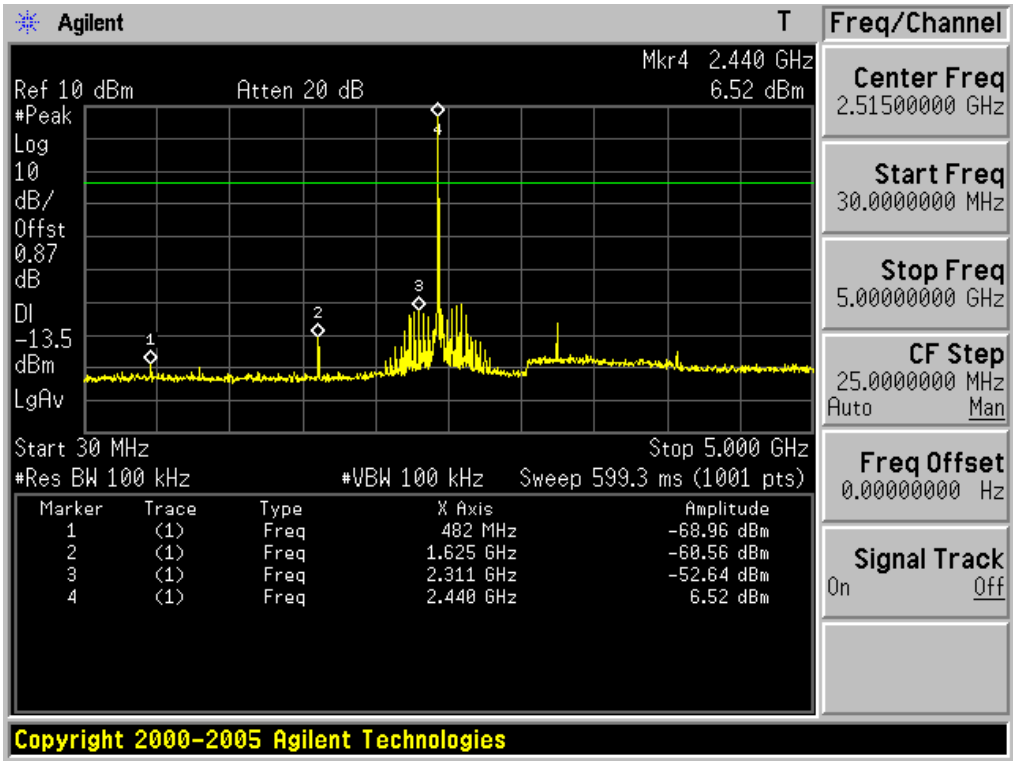

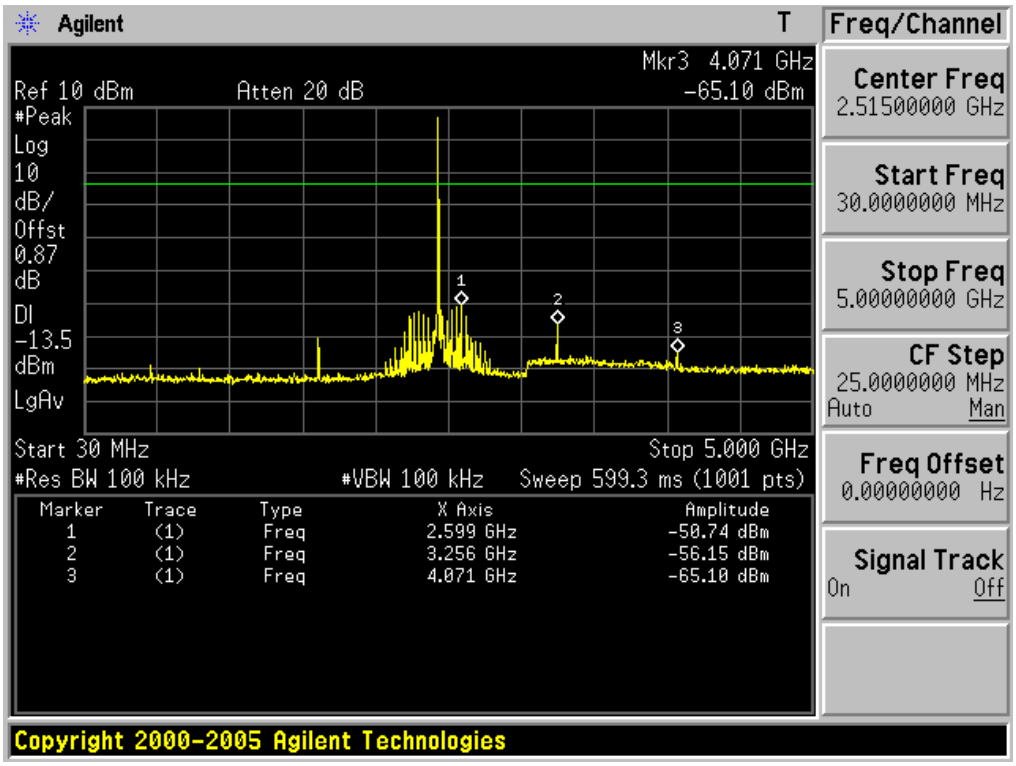

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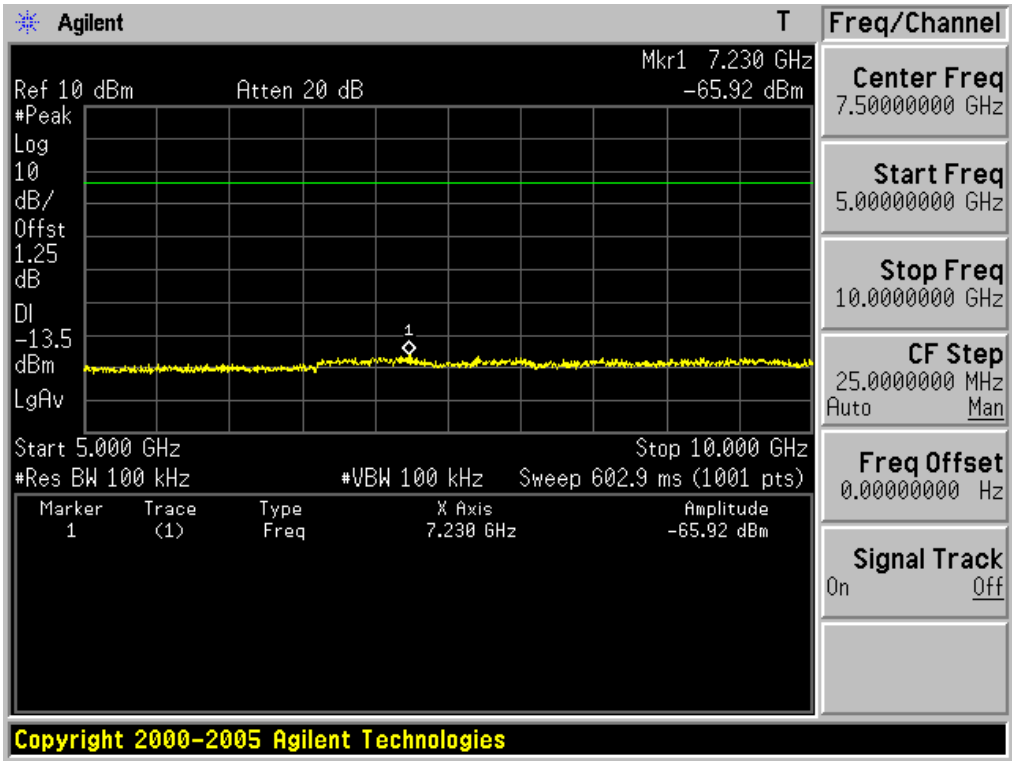

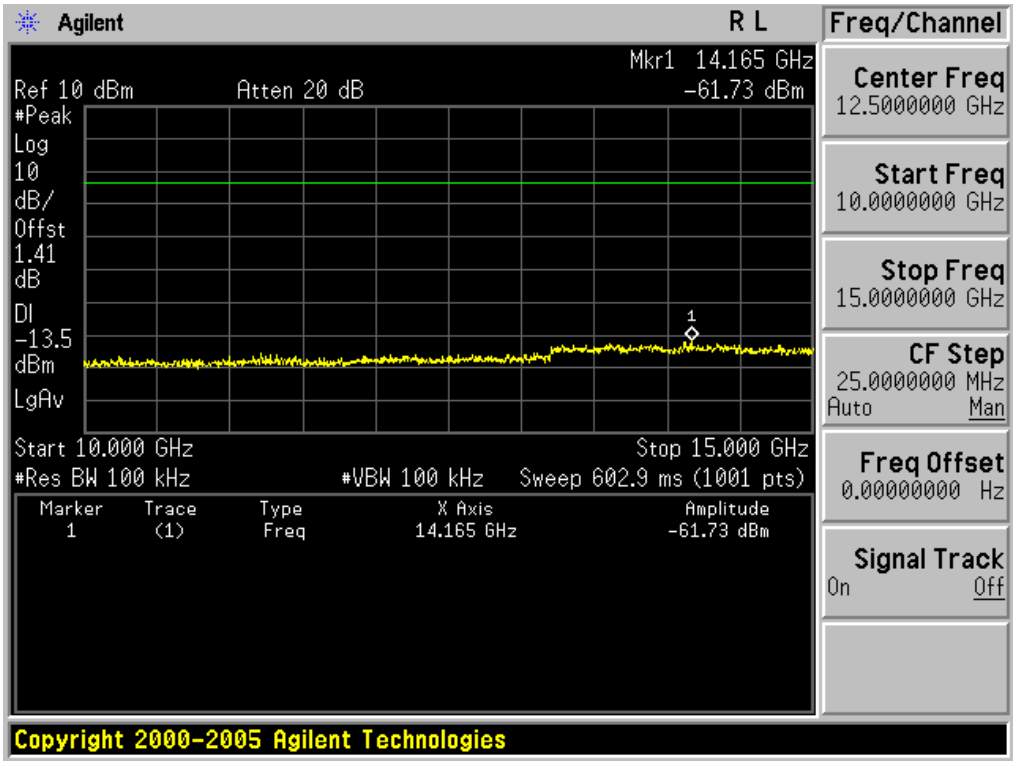

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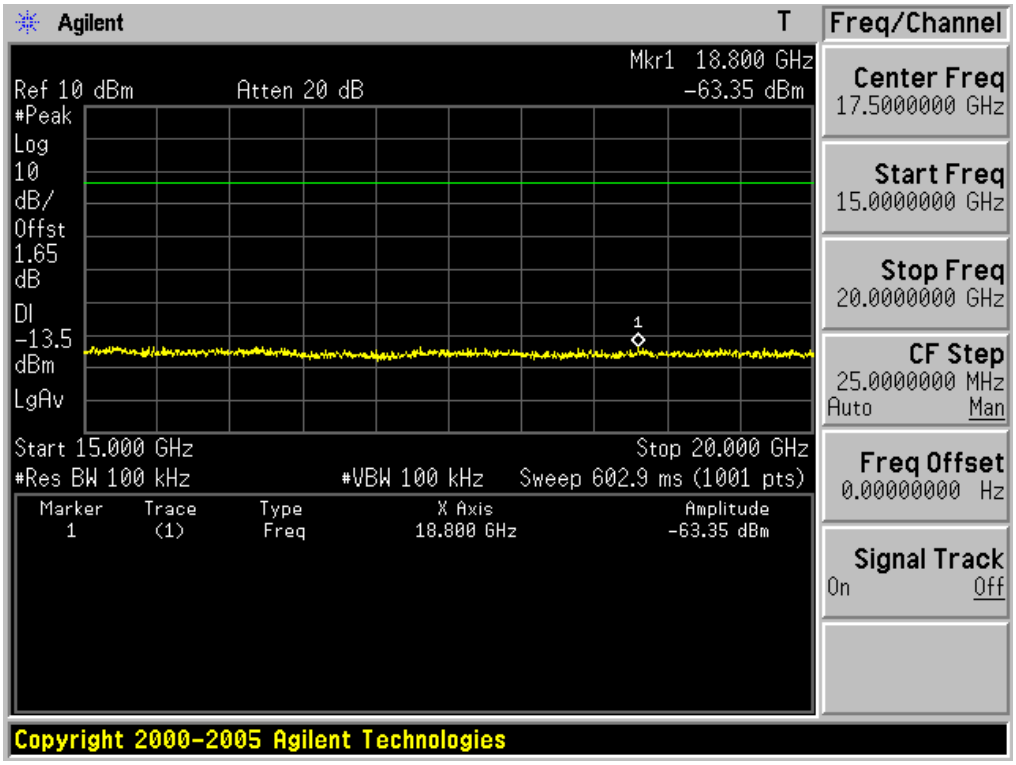
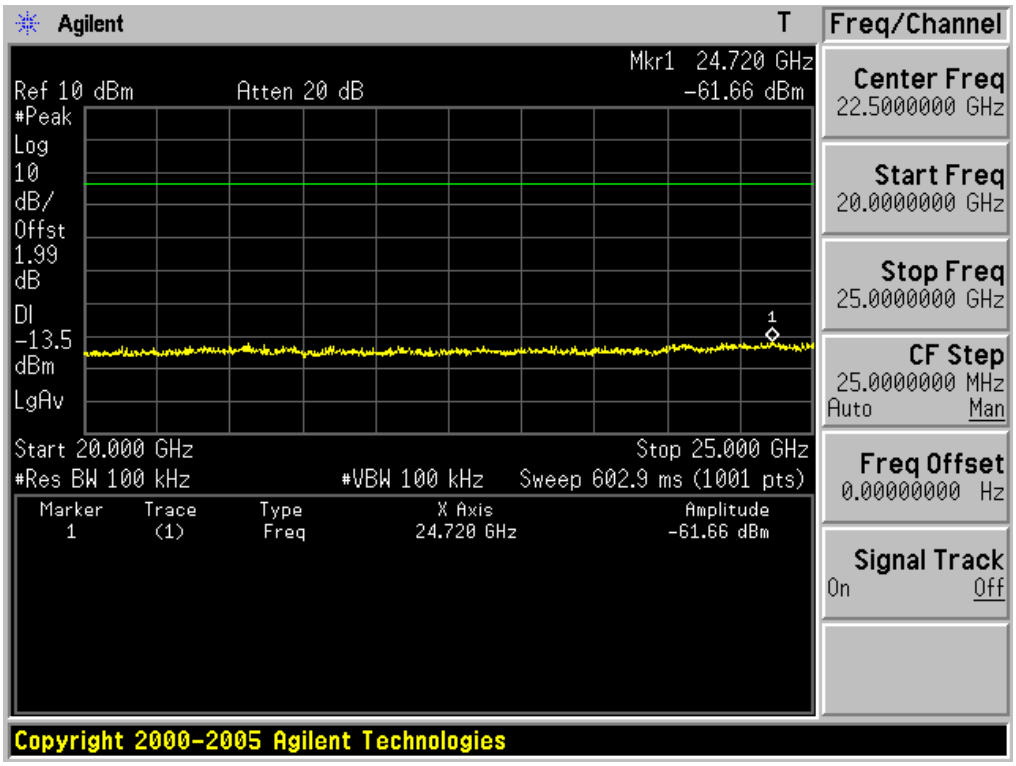
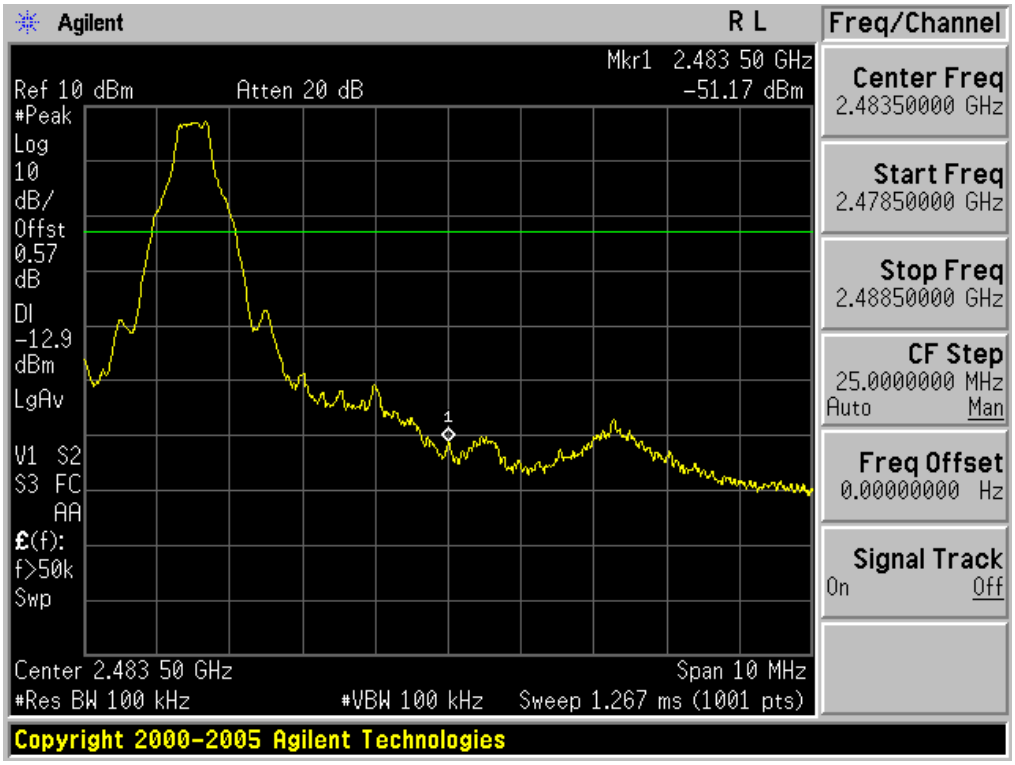
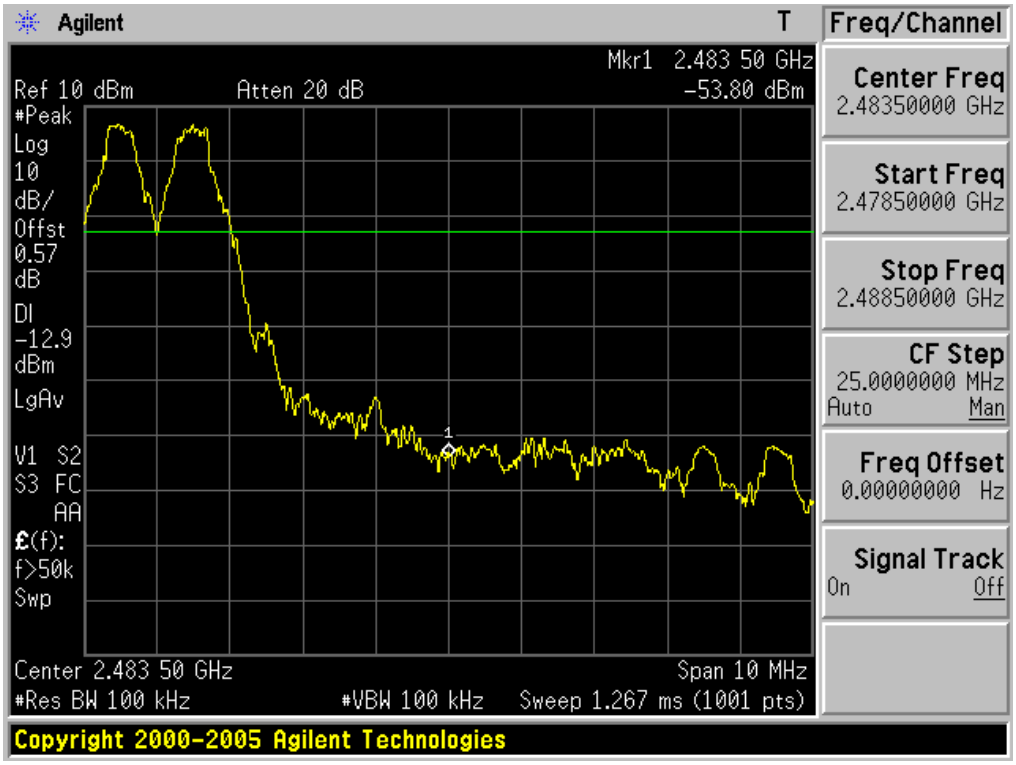




High band with hopping disabled



High band with hopping enabled



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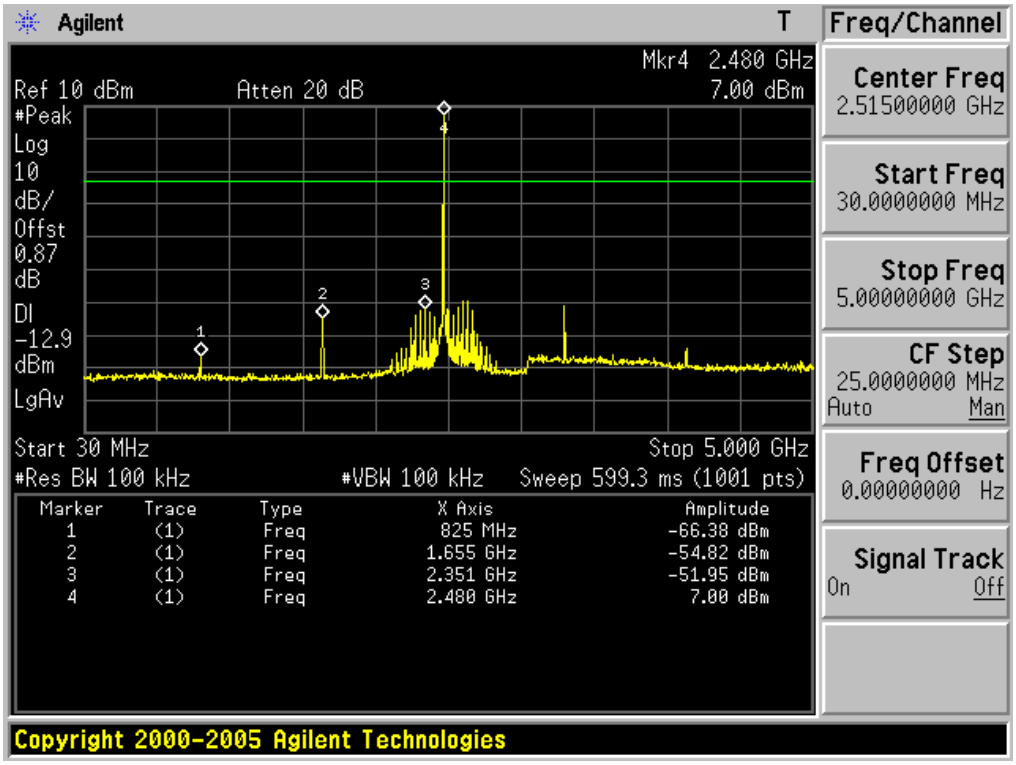
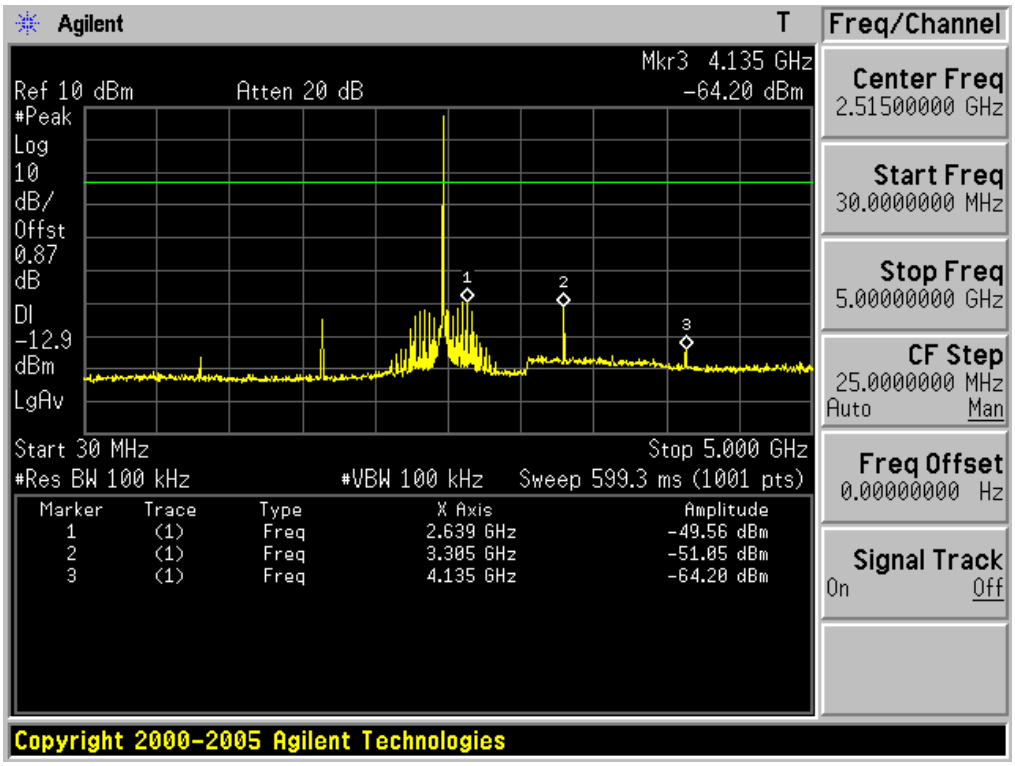
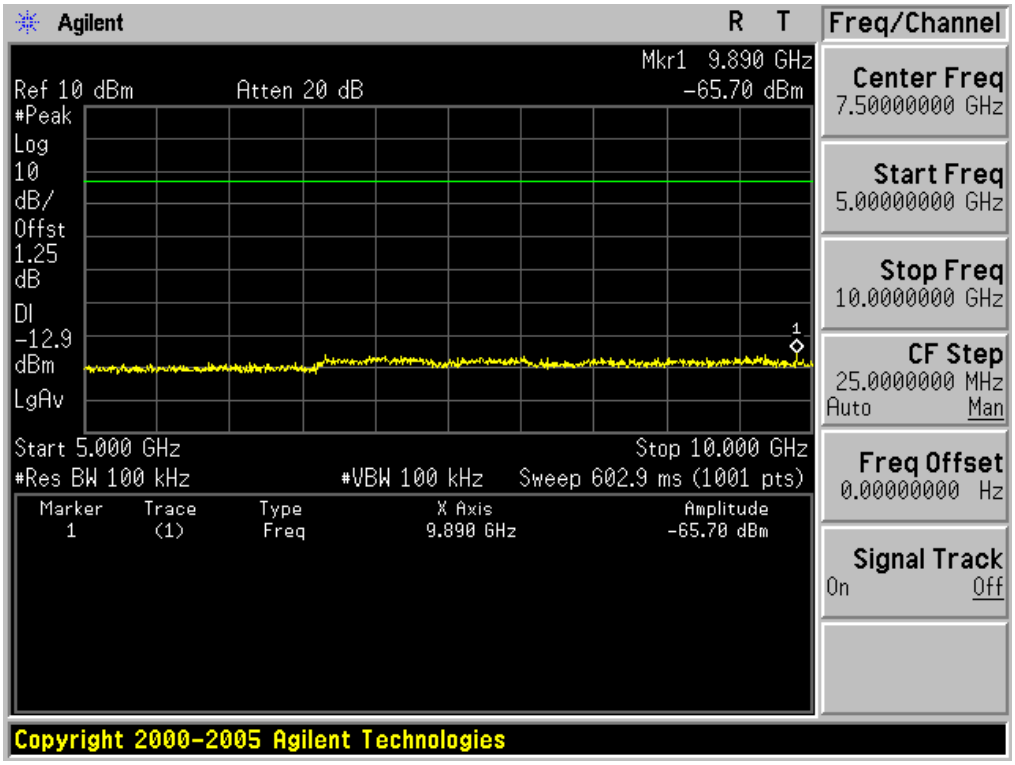
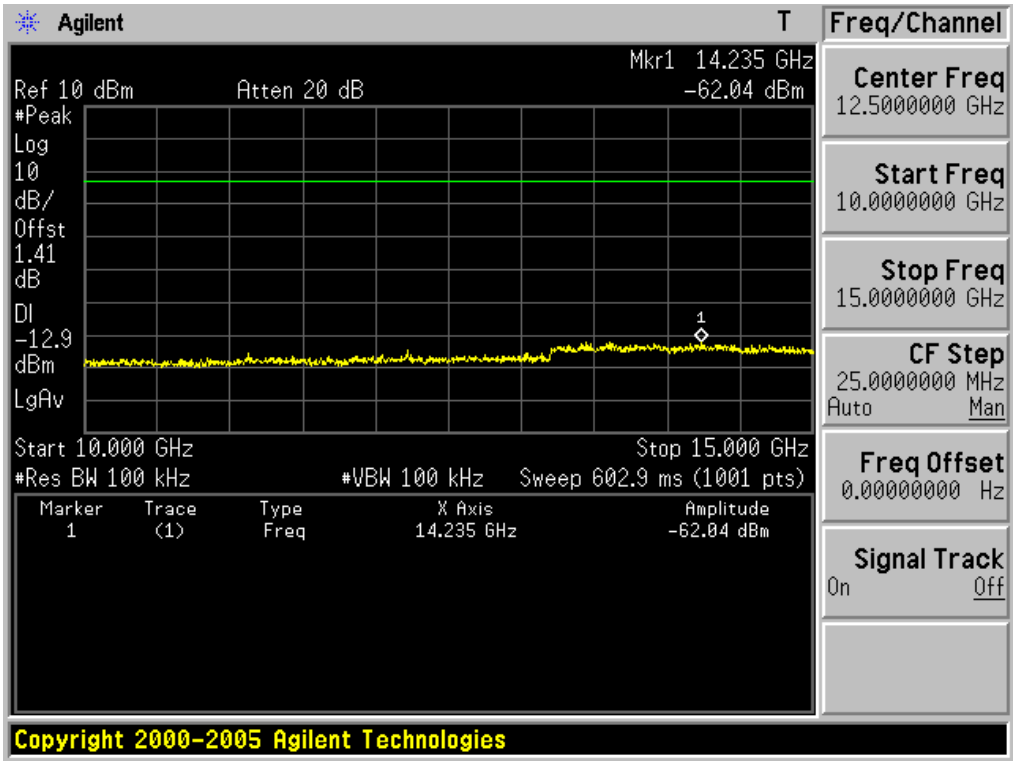




High channel spurious





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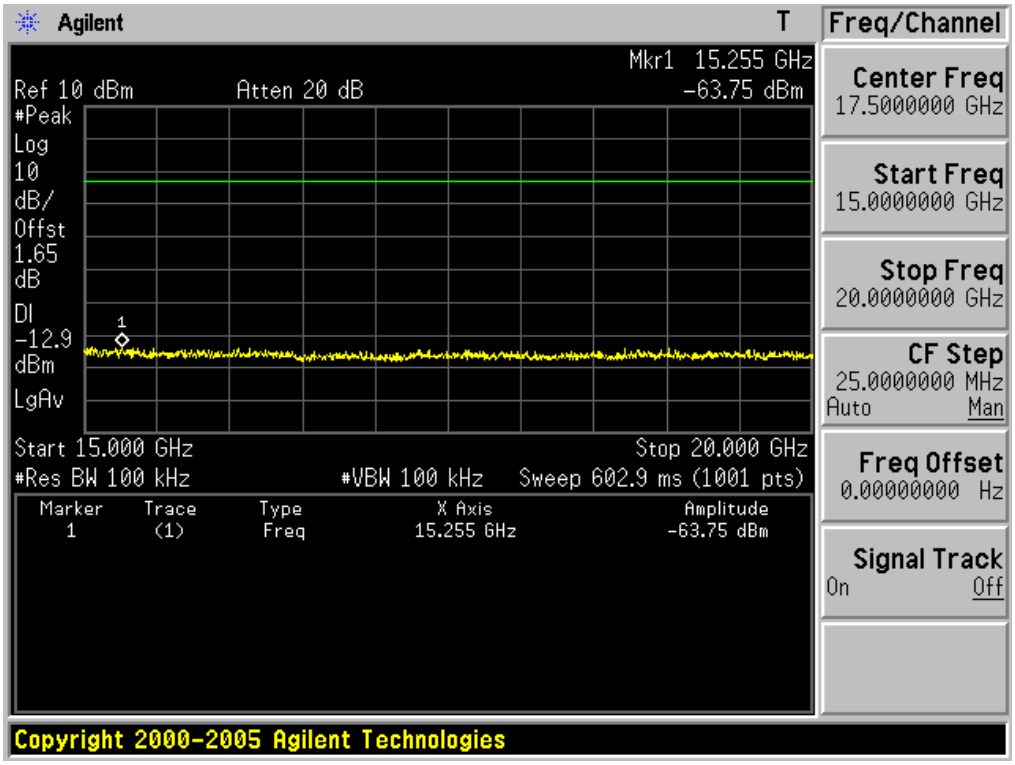
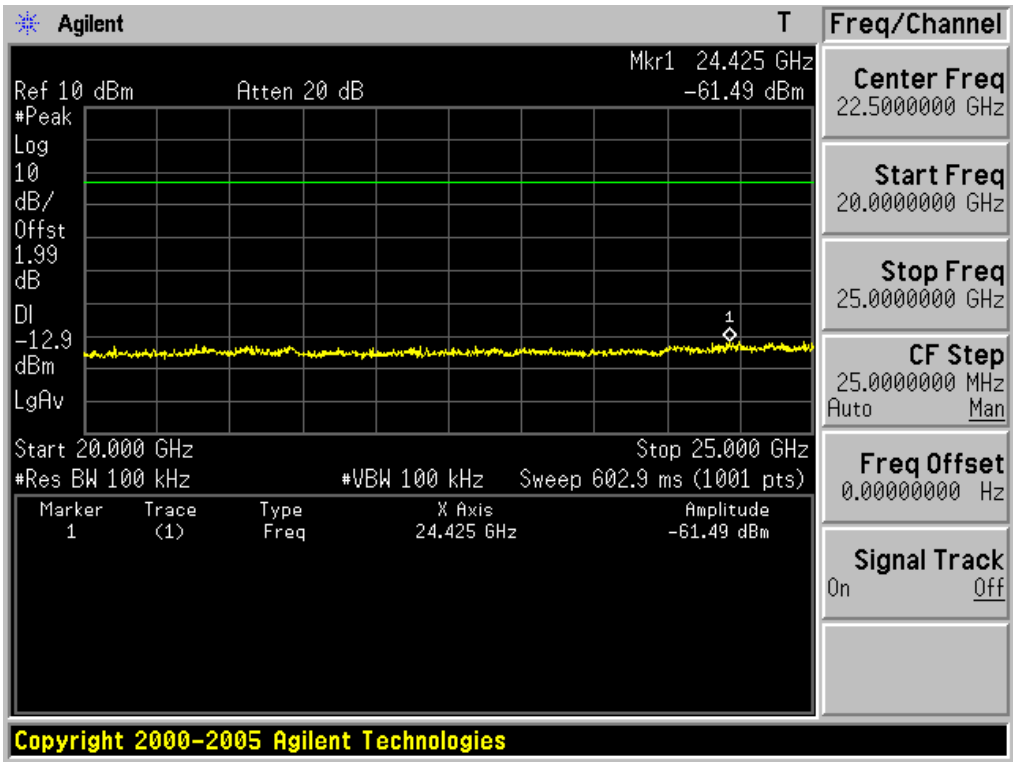




3.2.7 Radiated Emissions

- 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 = Low, Middle, High channels - Frequency Range = 30 MHz ~ 10th harmonic.
- RBW = 120 kHz (30MHz ~ 1 GHz), VBW ≥ RBW (Peak)
  = 1 MHz (1 GHz ~ 10th harmonic), VBW = 10Hz (Average)
- Trace = max hold - Sweep = auto

- Measurement Data: Comply (Refer to the next page.)

Note. 1: Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea. So it's not an emission from this device.

- Minimum Standard:

▪ FCC Part 15.209(a) and (b)

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.

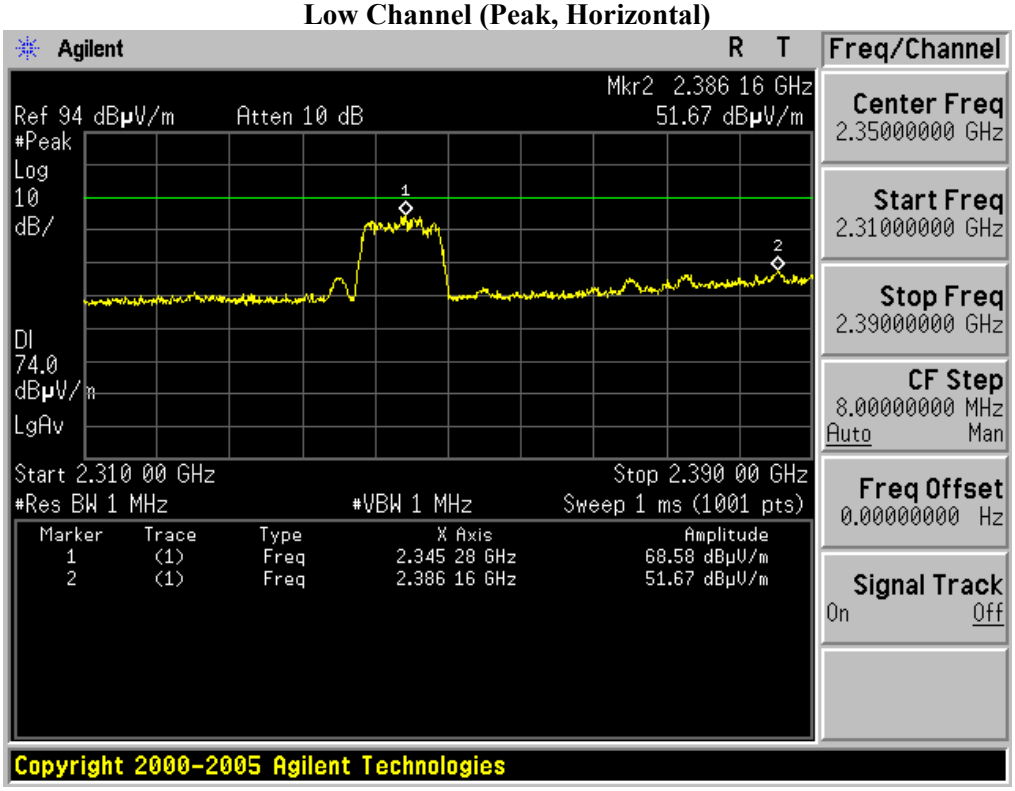
▪ FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3.6 ~ 4.4	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~ 156.52525	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.7 ~ 156.9	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	162.0125 ~ 167.17	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	167.72 ~ 173.2	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	240 ~ 285	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	322 ~ 335.4	2655 ~ 2900	13.25 ~ 13.4	
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	960 ~ 1240	3345.8 ~ 3358		

▪ FCC Part 15.205(b): The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

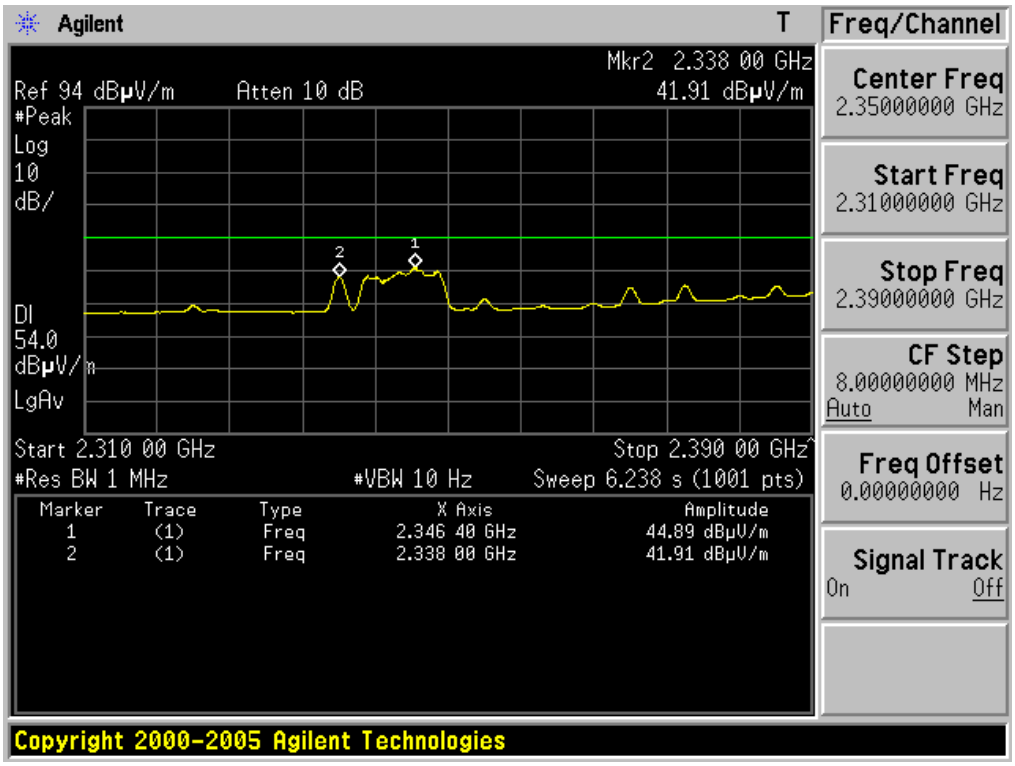
- Measurement Data : Restricted Band Edge

Low Channel (Peak, Horizontal)



Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

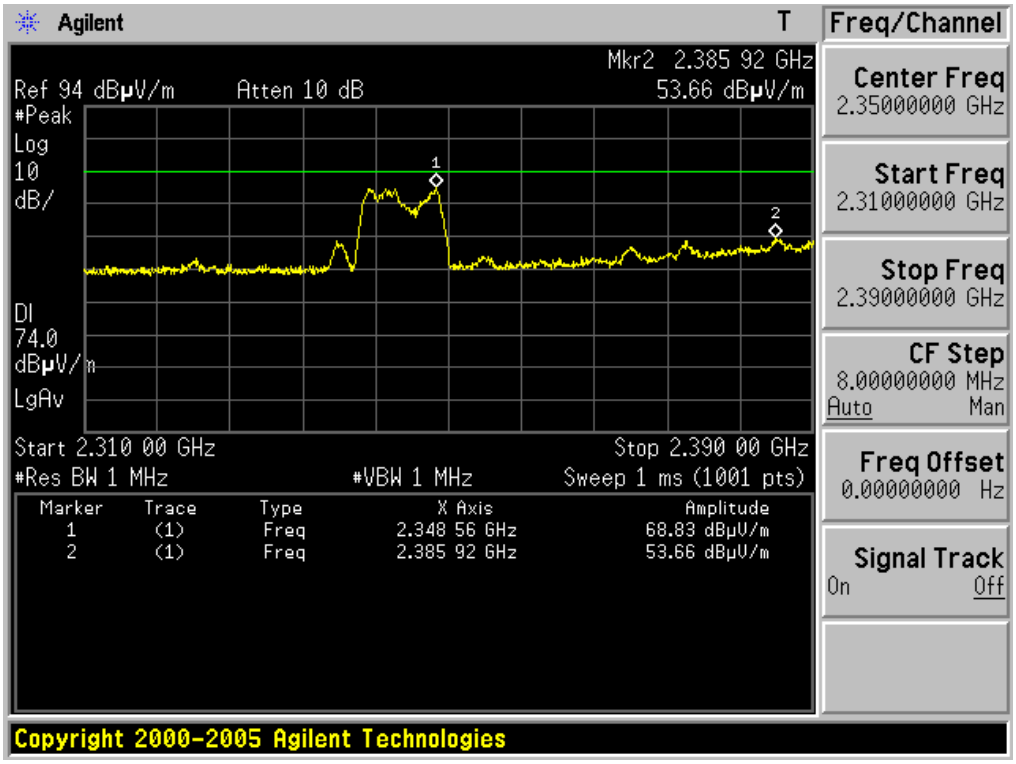
Low Channel (Average, Horizontal)



Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

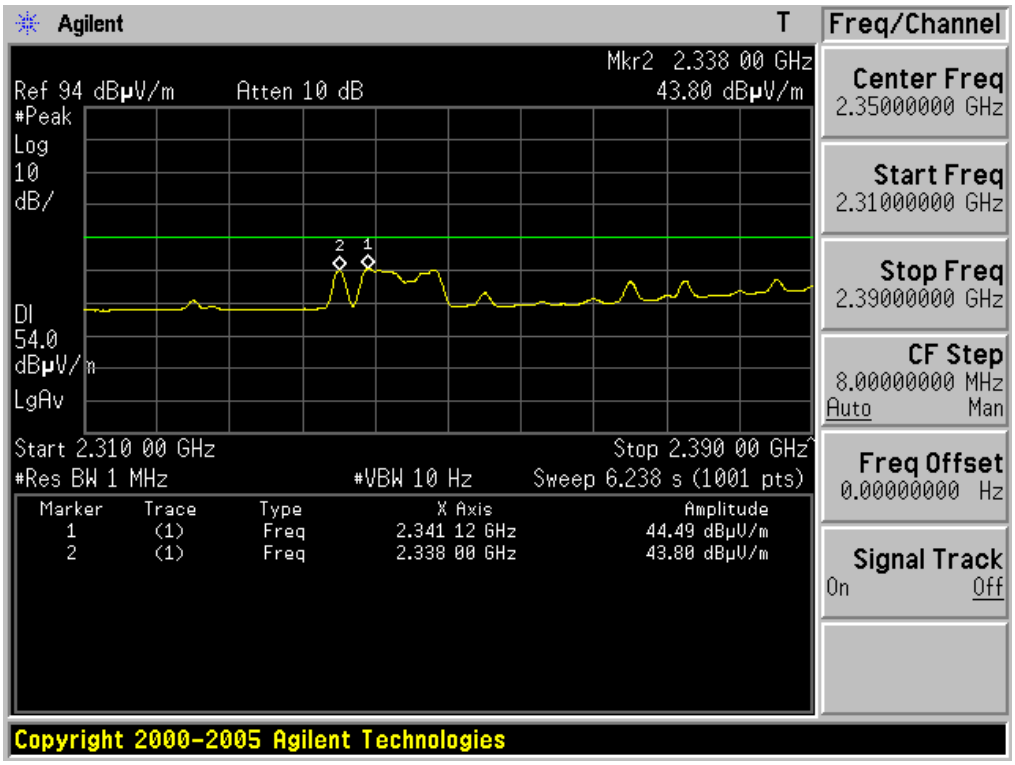
- Measurement Data: Restricted Band Edge

Low Channel (Peak, Vertical)



Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

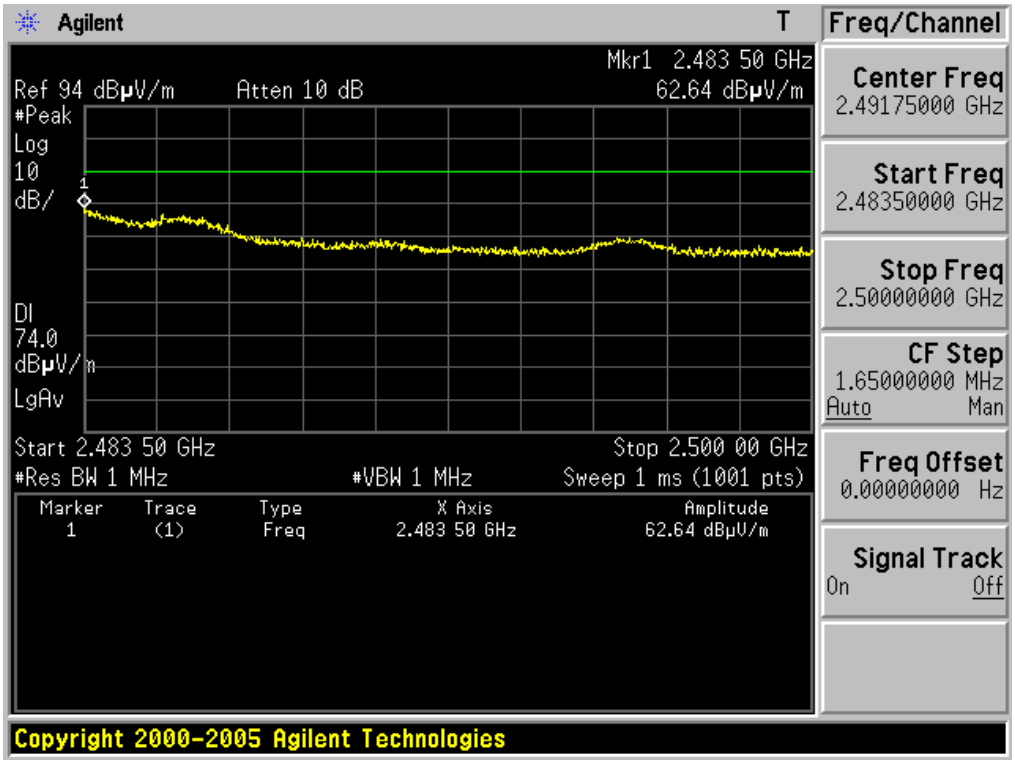
Low Channel (Average, Vertical)



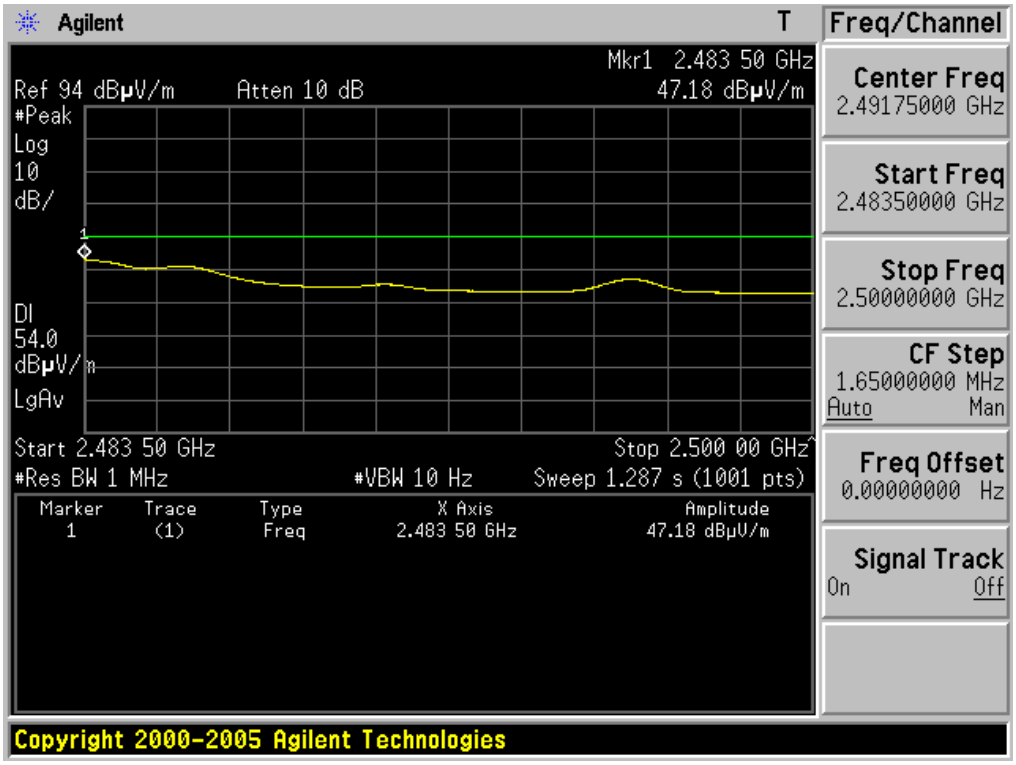
Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

- Measurement Data: Restricted Band Edge

High Channel (Peak, Horizontal)

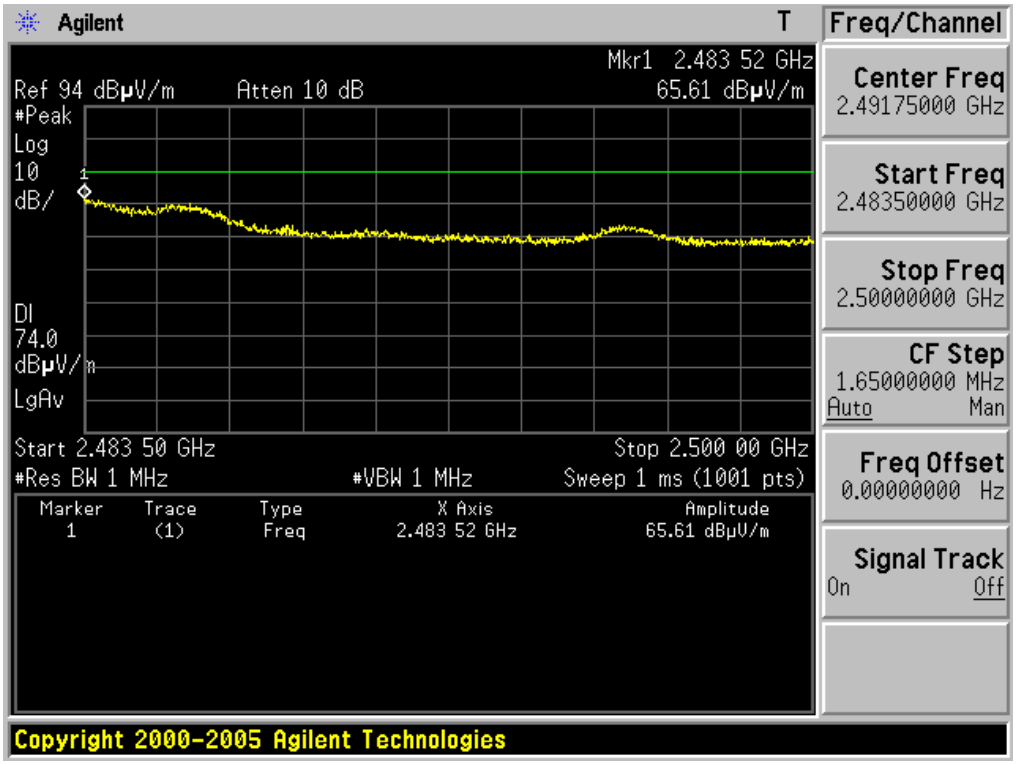


High Channel (Average, Horizontal)

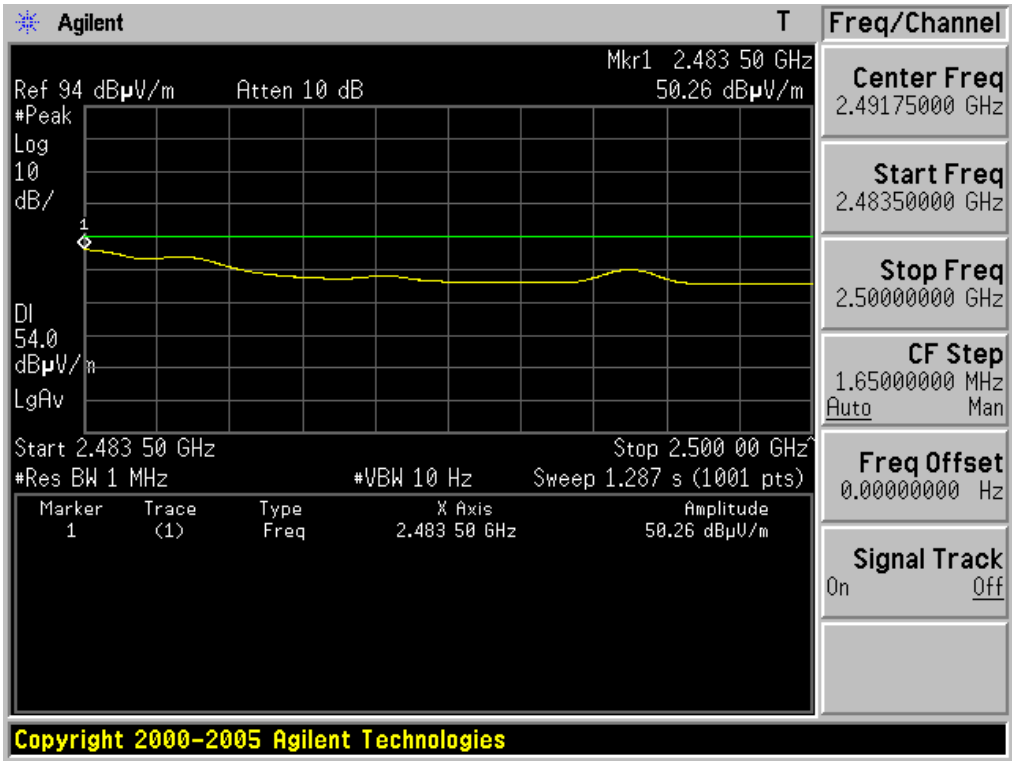


- Measurement Data: Restricted Band Edge

High Channel (Peak, Vertical)



High Channel (Average, Vertical)



- Measurement Data: Low Channel & Test Frequency range = 30MHz ~ 1GHz

Digital EMC

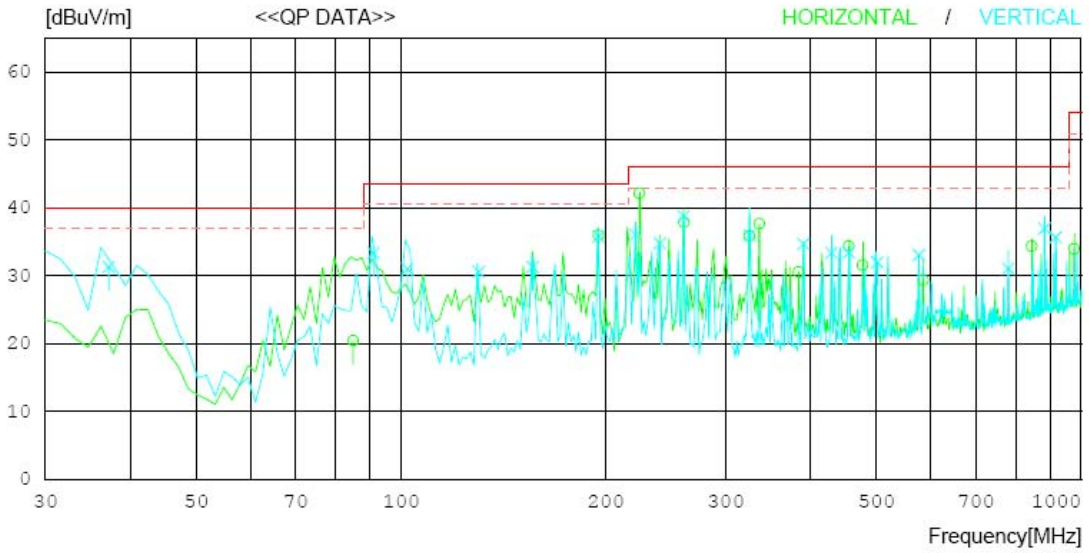
RADIATED EMISSION

Date : 2009-08-27

Model Name	:	FB200AS	Reference No.	:	Identical protoype
Model No.	:		Power Supply	:	120V 60Hz
Serial No.	:	TX: 2402MHz	Temp/Humi	:	22'C 45%
Test Condition	:		Operator	:	D.C.CHA

Memo :

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	224.000	51.1	12.0	2.1	23.0	42.2	46.0	3.8	201	358
2	85.001	33.4	8.3	1.3	22.5	20.5	40.0	19.5	201	57
3	195.096	46.1	10.7	2.0	22.8	36.0	43.5	7.5	100	1
4	260.574	45.5	13.3	2.3	23.2	37.9	46.0	8.1	100	58
5	325.033	42.2	14.6	2.7	23.6	35.9	46.0	10.1	100	1
6	336.000	43.9	14.8	2.7	23.7	37.7	46.0	8.3	100	1
7	384.006	35.9	15.7	2.9	23.9	30.6	46.0	15.4	100	1
8	455.176	38.8	16.5	3.3	24.2	34.4	46.0	11.6	201	358
9	476.869	35.7	16.7	3.4	24.2	31.6	46.0	14.4	201	57
10	845.322	33.5	19.5	4.8	23.4	34.4	46.0	11.6	100	1
11	585.231	31.8	18.0	3.9	24.3	29.4	46.0	16.6	100	58
12	975.304	31.1	20.5	5.3	22.9	34.0	54.0	20.0	100	1
----- Vertical ------										
13	91.041	45.3	9.3	1.3	22.5	33.4	43.5	10.1	100	358
14	102.171	41.1	11.0	1.4	22.5	31.0	43.5	12.5	100	260
15	195.081	45.9	10.7	2.0	22.8	35.8	43.5	7.7	100	254
16	221.070	45.1	11.9	2.1	23.0	36.1	46.0	9.9	100	52
17	260.108	46.4	13.3	2.3	23.2	38.8	46.0	7.2	100	128
18	325.173	42.3	14.6	2.7	23.6	36.0	46.0	10.0	100	143
19	390.131	39.8	15.8	3.0	23.9	34.7	46.0	11.3	100	358

- Measurement Data: Low Channel & Test Frequency range = 1GHz ~ 25GHz

Frequency (MHz)	ANT Pol	Reading(dBuV)			T.F (dB)	Result(dBuV/m)			Limit(dBuV/m)			Margin(dB)		
		QP	PK	AV		QP	PK	AV	QP	PK	AV	QP	PK	AV
4804	Hor	-	47.53	36.82	6.15	-	53.68	42.97	-	74.00	54.00	-	20.32	11.03
4804	Ver	-	48.87	39.43	6.15	-	55.02	45.58	-	74.00	54.00	-	18.98	8.42

Note.

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. Sample Calculation.

   Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL - AG

   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

- Measurement Data : Middle Channel & Test Frequency range = 30MHz ~ 1GHz

Digital EMC

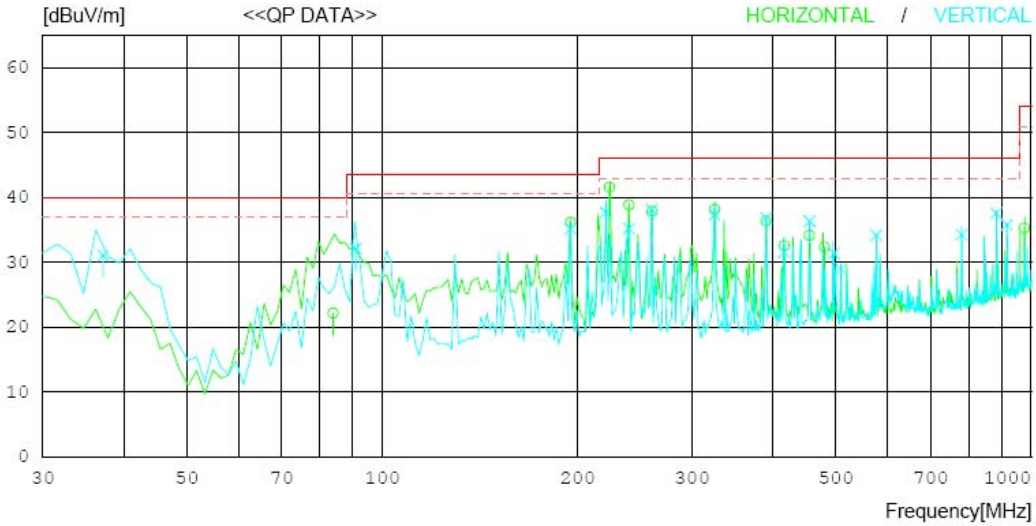
RADIATED EMISSION

Date : 2009-08-27

Model Name	:	FB200AS	Reference No.	:	Identical protoype
Model No.	:		Power Supply	:	120V 60Hz
Serial No.	:	TX: 2441MHz	Temp/Humi	:	22'C 45%
Test Condition	:		Operator	:	D.C.CHA

Memo :

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	84.002	35.3	8.1	1.3	22.5	22.2	40.0	17.8	201	358
2	195.077	46.3	10.7	2.0	22.8	36.2	43.5	7.3	101	1
3	223.990	50.5	12.0	2.1	23.0	41.6	46.0	4.4	101	1
4	240.021	47.0	12.7	2.2	23.0	38.9	46.0	7.1	101	1
5	260.576	45.5	13.3	2.3	23.2	37.9	46.0	8.1	101	1
6	325.096	44.5	14.6	2.7	23.6	38.2	46.0	7.8	101	253
7	390.134	41.5	15.8	3.0	23.9	36.4	46.0	9.6	101	1
8	975.424	32.4	20.5	5.3	22.9	35.3	54.0	18.7	101	1
9	480.015	36.5	16.7	3.4	24.2	32.4	46.0	13.6	201	358
10	416.196	37.5	16.1	3.1	24.1	32.6	46.0	13.4	101	1
11	455.176	38.6	16.5	3.3	24.2	34.2	46.0	11.8	101	1
----- Vertical ------										
12	37.140	37.5	15.1	0.9	22.4	31.1	40.0	8.9	100	358
13	91.047	44.0	9.3	1.3	22.5	32.1	43.5	11.4	100	260
14	195.041	45.3	10.7	2.0	22.8	35.2	43.5	8.3	100	358
15	221.040	46.7	11.9	2.1	23.0	37.7	46.0	8.3	100	154
16	240.020	43.3	12.7	2.2	23.0	35.2	46.0	10.8	100	311
17	260.105	45.8	13.3	2.3	23.2	38.2	46.0	7.8	100	331
18	325.093	43.7	14.6	2.7	23.6	37.4	46.0	8.6	199	233
19	390.172	42.0	15.8	3.0	23.9	36.9	46.0	9.1	199	199

- Measurement Data: Middle Channel & Test Frequency range = 1GHz ~ 25GHz

Frequency (MHz)	ANT Pol	Reading(dBuV)			T.F (dB)	Result(dBuV/m)			Limit(dBuV/m)			Margin(dB)		
		QP	PK	AV		QP	PK	AV	QP	PK	AV	QP	PK	AV
4882	Hor	-	48.74	39.22	6.44	-	55.18	45.66	-	74.00	54.00	-	18.82	8.34
4882	Ver	-	48.92	39.11	6.44	-	55.36	45.55	-	74.00	54.00	-	18.64	8.45

Note.

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. Sample Calculation.

   Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL - AG

   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

- Measurement Data: High Channel & Test Frequency range = 30MHz ~ 1GHz

Digital EMC

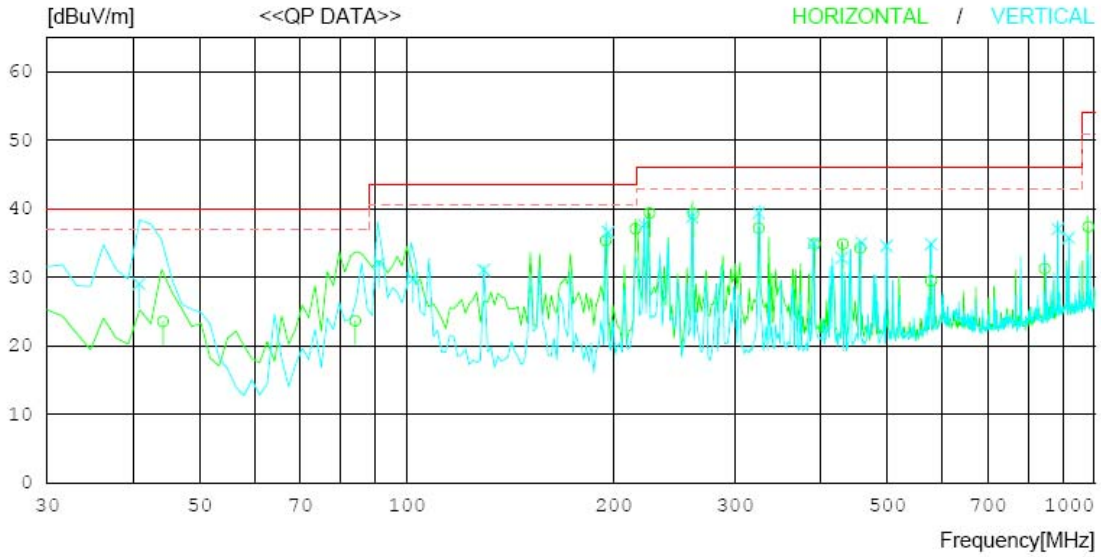
RADIATED EMISSION

Date : 2009-08-27

Model Name	:	FB200AS	Reference No.	:	Identical protoype
Model No.	:		Power Supply	:	120V 60Hz
Serial No.	:	TX: 2480MHz	Temp/Humi	:	22'C 45%
Test Condition	:		Operator	:	D.C.CHA

Memo :

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	44.191	34.3	10.7	1.0	22.4	23.6	40.0	16.4	301	270
2	84.121	36.8	8.1	1.3	22.5	23.7	40.0	16.3	301	358
3	194.807	45.5	10.7	2.0	22.8	35.4	43.5	8.1	101	358
4	215.006	46.4	11.6	2.1	23.0	37.1	43.5	6.4	101	96
5	225.466	48.2	12.0	2.2	23.0	39.4	46.0	6.6	101	358
6	260.949	46.9	13.3	2.3	23.2	39.3	46.0	6.7	101	70
7	324.914	43.5	14.6	2.7	23.6	37.2	46.0	8.8	201	1
8	391.471	40.0	15.8	3.0	23.9	34.9	46.0	11.1	101	208
9	430.486	39.5	16.3	3.2	24.1	34.9	46.0	11.1	301	270
10	456.404	38.7	16.5	3.3	24.2	34.3	46.0	11.7	301	358
11	979.507	34.5	20.5	5.3	22.9	37.4	54.0	16.6	101	358
12	846.316	30.4	19.5	4.8	23.4	31.3	46.0	14.7	101	96
13	578.757	32.0	17.9	3.9	24.3	29.5	46.0	16.5	101	358
----- Vertical ------										
14	40.785	37.6	13.0	0.9	22.4	29.1	40.0	10.9	100	173
15	91.103	44.0	9.3	1.3	22.5	32.1	43.5	11.4	100	1
16	102.030	39.9	11.0	1.4	22.5	29.8	43.5	13.7	100	161
17	196.236	46.8	10.7	2.0	22.9	36.6	43.5	6.9	100	1
18	221.384	46.7	11.9	2.1	23.0	37.7	46.0	8.3	100	1
19	129.382	40.2	11.9	1.6	22.6	31.1	43.5	12.4	100	1

- Measurement Data: High Channel & Test Frequency range = 1GHz ~ 25GHz

Frequency (MHz)	ANT Pol	Reading(dBuV)			T.F (dB)	Result(dBuV/m)			Limit(dBuV/m)			Margin(dB)		
		QP	PK	AV		QP	PK	AV	QP	PK	AV	QP	PK	AV
4960	Hor	-	49.06	40.45	6.80	-	55.86	47.25	-	74.00	54.00	-	18.14	6.75
4960	Ver	-	49.05	40.07	6.80	-	55.85	46.87	-	74.00	54.00	-	18.15	7.13

Note

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. Sample Calculation.

   Margin = Limit – Result / Result = Reading + T.F / T.F = AF + CL - AG

   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

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 and average detector mode 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: **Comply** (Refer to the next page.)

- 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

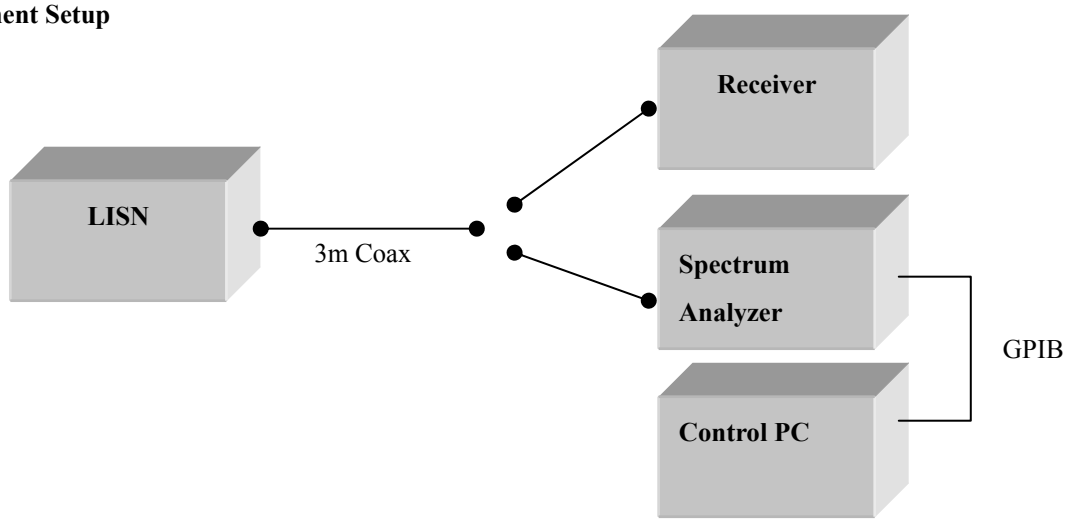
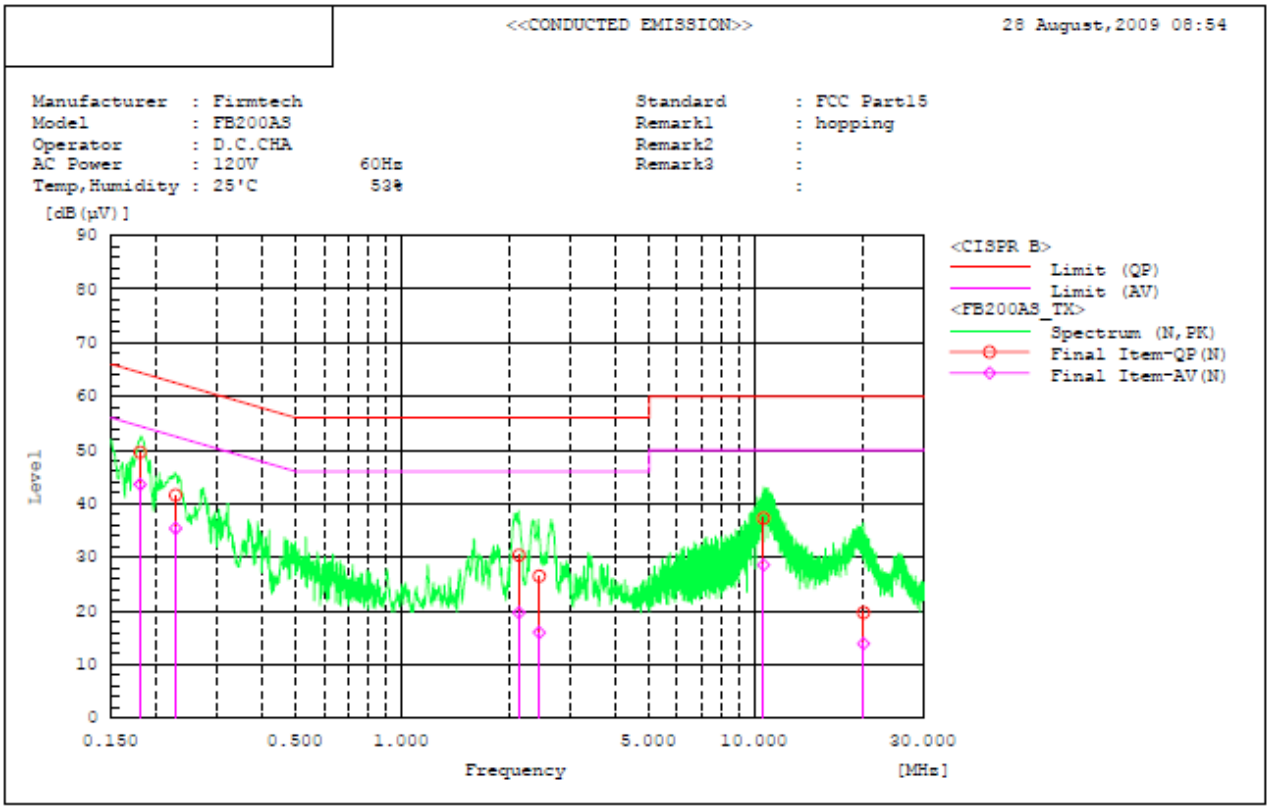
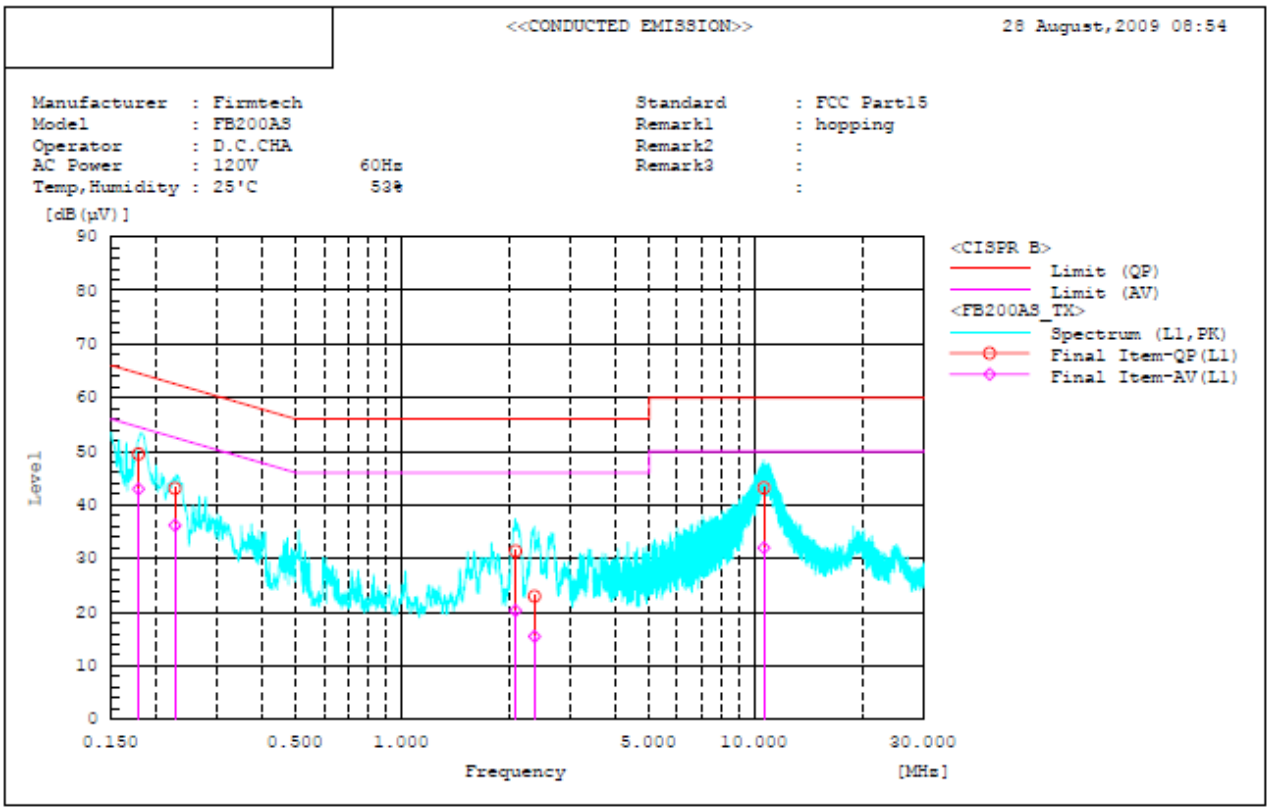


Figure 2: Measurement setup for AC Conducted Emission

- Conducted Emission Graph -





- Conducted Emission List -

<<CONDUCTED EMISSION>>

28 August,2009 08:54

Standard : FCC Part15
Manufacturer : Firmtech
Model : FB200AS
Operator : D.C.CHA
AC Power : 120V 60Hz
Temp,Humidity : 25'C 53%
Remark1 : hopping
Remark2 :
Remark3 :

Final Result

--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.181	49.5	43.5	0.1	49.6	43.6	64.4	54.4	14.8	10.8	
2	0.228	41.5	35.3	0.1	41.6	35.4	62.5	52.5	20.9	17.1	
3	2.140	30.2	19.5	0.2	30.4	19.7	56.0	46.0	25.6	26.3	
4	2.442	26.3	15.8	0.2	26.5	16.0	56.0	46.0	29.5	30.0	
5	10.535	36.8	28.1	0.5	37.3	28.6	60.0	50.0	22.7	21.4	
6	20.212	18.7	12.9	1.0	19.7	13.9	60.0	50.0	40.3	36.1	

--- L1 Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]	[dB]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.179	49.4	42.9	0.1	49.5	43.0	64.5	54.5	15.0	11.5	
2	0.227	43.0	36.1	0.1	43.1	36.2	62.6	52.6	19.5	16.4	
3	2.092	31.2	20.1	0.2	31.4	20.3	56.0	46.0	24.6	25.7	
4	10.559	42.7	31.5	0.5	43.2	32.0	60.0	50.0	16.8	18.0	
5	2.367	22.8	15.3	0.2	23.0	15.5	56.0	46.0	33.0	30.5	

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)	Next.Due.Date (dd/mm/yy)	S/N
☒	Spectrum Analyzer	Agilent	E4440A	06/11/08	06/11/09	MY45304199
☐	Spectrum Analyzer	Rohde Schwarz	FSQ26	05/06/09	05/06/10	200445
☐	Spectrum Analyzer(RE)	H.P	8563E	13/10/08	13/10/09	3551A04634
☐	Power Meter	H.P	EMP-442A	02/07/09	02/07/10	GB37170413
☐	Power Sensor	H.P	8481A	02/07/09	02/07/10	3318A96332
☐	Power Divider	Agilent	11636B	04/12/08	04/12/09	56471
☐	Power Splitter	Anritsu	K241B	14/10/08	14/10/09	020611
☐	Power Splitter	Anritsu	K241B	02/07/09	02/07/10	017060
☐	Frequency Counter	H.P	5342A	13/07/09	13/07/10	2119A04450
☐	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/08	10/10/09	30604493/021031
☒	Digital Multimeter	H.P	34401A	13/03/09	13/03/10	3146A13475
☐	Multifuction Synthesizer	HP	8904A	06/10/08	06/10/09	3633A08404
☒	Signal Generator	Rohde Schwarz	SMR20	13/03/09	13/03/10	101251
☐	Signal Generator	H.P	ESG-3000A	02/07/09	02/07/10	US37230529
☐	Vector Signal Generator	Rohde Schwarz	SMJ100A	02/02/09	02/02/10	100148
☐	Audio Analyzer	H.P	8903B	02/07/09	02/07/10	3011A09448
☐	Modulation Analyzer	H.P	8901B	02/07/09	02/07/10	3028A03029
☐	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	02/07/09	02/07/10	GB43461134
☐	Universal Radio communication Tester	Rohde Schwarz	CMU 200	19/05/09	19/05/10	106760
☐	Bluetooth Tester	TESCOM	TC-3000B	02/07/09	02/07/10	3000B000268
☐	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-3
☒	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-2
☒	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-4
☐	AC Power supply	DAEKWANG	5KVA	13/03/09	13/03/10	20060321-1
☒	DC Power Supply	HP	6622A	13/03/09	13/03/10	3448A03760
☐	DC Power Supply	HP	6633A	13/03/09	13/03/10	3524A06634
☐	BAND Reject Filter	Microwave Circuits	N0308372	06/10/08	06/10/09	3125-01DC0352
☐	BAND Reject Filter	Wainwright	WRCG1750	06/10/08	06/10/09	2
☐	High-Pass Filter	ANRITSU	MP526D	06/10/08	06/10/09	MP27756
☐	High-pass filter	Wainwright	WHKX2.1	N/A	N/A	1
☒	High-Pass Filter	Wainwright	WHKX3.0	N/A	N/A	9
☐	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	10
☐	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	27
☐	Tunable Notch Filter	Wainwright	WRCT1900.0/ 2200.0-5/40-10SSK	N/A	N/A	7
☒	HORN ANT	ETS	3115	17/06/09	17/06/10	6419
☐	HORN ANT	ETS	3115	10/09/08	10/09/09	21097
☐	HORN ANT	A.H.Systems	SAS-574	10/06/09	10/06/10	154
☐	HORN ANT	A.H.Systems	SAS-574	10/06/09	10/06/10	155

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
☐	Dipole Antenna	Schwarzbeck	VHA9103	25/11/08	25/11/09	2116
☐	Dipole Antenna	Schwarzbeck	VHA9103	25/11/08	25/11/09	2117
☐	Dipole Antenna	Schwarzbeck	UHA9105	25/11/08	25/11/09	2261
☐	Dipole Antenna	Schwarzbeck	UHA9105	25/11/08	25/11/09	2262
☐	LOOP ANTENNA	ETS	6502	13/10/08	13/10/09	3471
☐	Coaxial Fixed Attenuators	Agilent	8491B	02/07/09	02/07/10	MY39260700
☐	Coaxial Fixed Attenuators	Agilent	8491B	02/07/09	02/07/10	MY39260699
☐	Attenuator (10dB)	WEINSCHEL	23-10-34	01/10/08	01/10/09	BP4386
☐	Attenuator (10dB)	WEINSCHEL	23-10-34	19/01/09	19/01/10	BP4387
☐	Attenuator (20dB)	WEINSCHEL	86-20-11	06/10/08	06/10/09	432
☐	Attenuator (10dB)	WEINSCHEL	86-10-11	06/10/08	06/10/09	446
☐	Attenuator (10dB)	WEINSCHEL	86-10-11	06/10/08	06/10/09	408
☐	Attenuator (40dB)	WEINSCHEL	57-40-33	01/10/08	01/10/09	NN837
☐	Attenuator (30dB)	JFW	50FH-030-300	13/03/09	13/03/10	060320-1
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	02/07/09	02/07/10	788
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	02/07/09	02/07/10	790
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0215CAN	02/07/09	02/07/10	112
☒	Amplifier (30dB)	Agilent	8449B	13/10/08	13/10/09	3008A01590
☐	Amplifier	EMPOWER	BBS3Q7ELU	02/02/09	02/02/10	1020
☐	RF Power Amplifier	OPHIRRF	5069F	02/07/09	02/07/10	1006
☒	EMI TEST RECEIVER	R&S	ESU	02/02/09	02/02/10	100014
☒	BILOG ANTENNA	SCHAFFNER	CBL6112D	30/09/08	30/09/09	22609
☒	Amplifier (22dB)	H.P	8447E	05/02/09	05/02/10	2945A02865
☐	EMI TEST RECEIVER	R&S	ESCI	12/05/09	12/05/10	100364
☐	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A	30/05/09	30/05/10	590
☐	BICONICAL ANT.	Schwarzbeck	VHA 9103	02/06/09	02/06/10	2233
☒	LOG-PERIODIC ANT.	Schwarzbeck	UHALP 9108-A1	30/09/08	30/09/09	1098
☒	BICONICAL ANT.	Schwarzbeck	VHA 9103	30/09/08	30/09/09	91031946
☐	Low Noise Pre Amplifier	TSJ	MLA-100K01-B01-2	13/03/09	13/03/10	1252741
☒	Amplifier (25dB)	Agilent	8447D	12/05/09	12/05/10	2944A10144
☐	Amplifier (25dB)	Agilent	8447D	03/07/09	03/07/10	2648A04922
☒	Spectrum Analyzer(CE)	H.P	8591E	26/04/09	26/04/10	3649A05889
☒	LISN	Kyoritsu	KNW-407	03/07/09	03/07/10	8-317-8
☒	LISN	Kyoritsu	KNW-242	13/10/08	13/10/09	8-654-15
☒	CVCF	NF Electronic	4420	N/A	N/A	304935/337980
☒	DC BLOCK	Hyuplip	KEL-007	N/A	N/A	7-1581-5
☒	50 ohm Terminator	HME	CT-01	22/01/09	22/01/10	N/A
☒	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	03/07/09	03/07/10	4N-170-3