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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: April 16 ~ 23, 2009
 Test Report S/N: DR50110904Y
 Test Site : DIGITAL EMC CO., LTD.

FCC ID

U8D-FB100AS

APPLICANT

Firmtech Co., Ltd

FCC Equipment Class : **Part 15 Spread Spectrum Transmitter(DSS)**
Device name : **Bluetooth Serial Adapter**
Manufacturer : **Firmtech Co., Ltd**
FCC ID : **U8D-FB100AS**
Model name : **FB100AS**
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 : **11.31 dBm Conducted**
Data of issue : **April 29, 2009**

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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

April 29, 2009

D.C. Cha



Data

Name

Signature

Reviewed by: Technical Director

April 29, 2009

Harvey Sung



Data

Name

Signature

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 : February 13, 2009

2. Information about test item

U8D-FB100AS

2.1 Equipment information

Equipment model no.	FB100AS
Equipment serial no.	Identical prototype
Type of equipment	Bluetooth Serial Adapter
Frequency band	2402 ~ 2480 MHz
Type of Modulation	GFSK
Spread Spectrum	Frequency Hopping
Channel Spacing	1.0 MHz
Power	DC 5V from USB
Type of antenna	Dipole Antenna

- This device does not have EDR function.

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	: DC 5V from USB

2.4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Mouse	GOM3000VE	NA	GP Electronics	-
Monitor	9227-AB1	NA	Lenovo	-
Computer	DM-V60	671K9NCP100324M	Samsung	-
Keyboard	SEM-DT35US	NA	Dongguan Samsung Electro-Mechanics	-
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 15.203

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	$\geq 20\text{dB BW}$ or \geq 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	$\leq 1\text{Watt}$, if CHs ≥ 75 Others $\leq 0.125\text{W}$		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 = Wide enough to capture the peaks of two adjacent channels

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz

Detector function = peak

Trace = max hold

- Measurement Data:

Mode	Frequency of marker #1 (MHz)	Frequency of marker #2 (MHz)	Test Results	
			Carrier Frequency Separation (MHz)	Result
DH5 Mode	2400.995	2441.995	1.000	Comply
Inquiry Mode	2440.983	2443.000	2.017	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

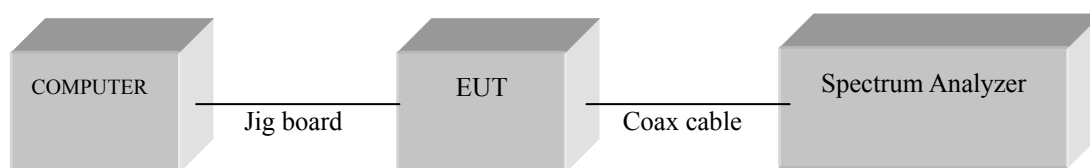
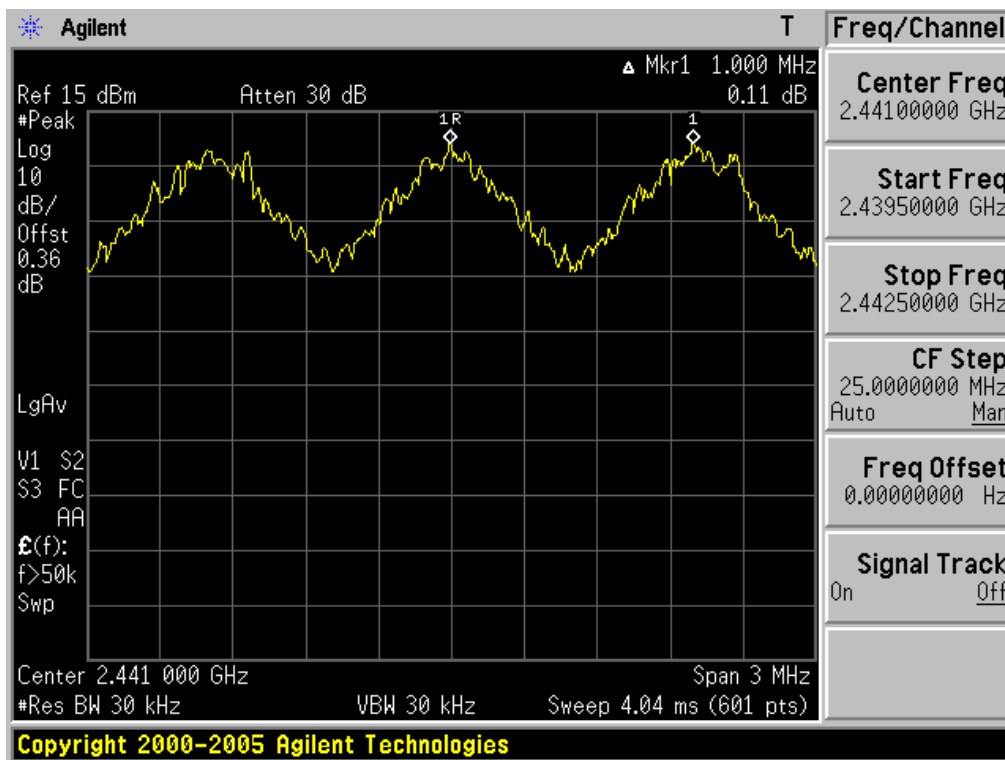
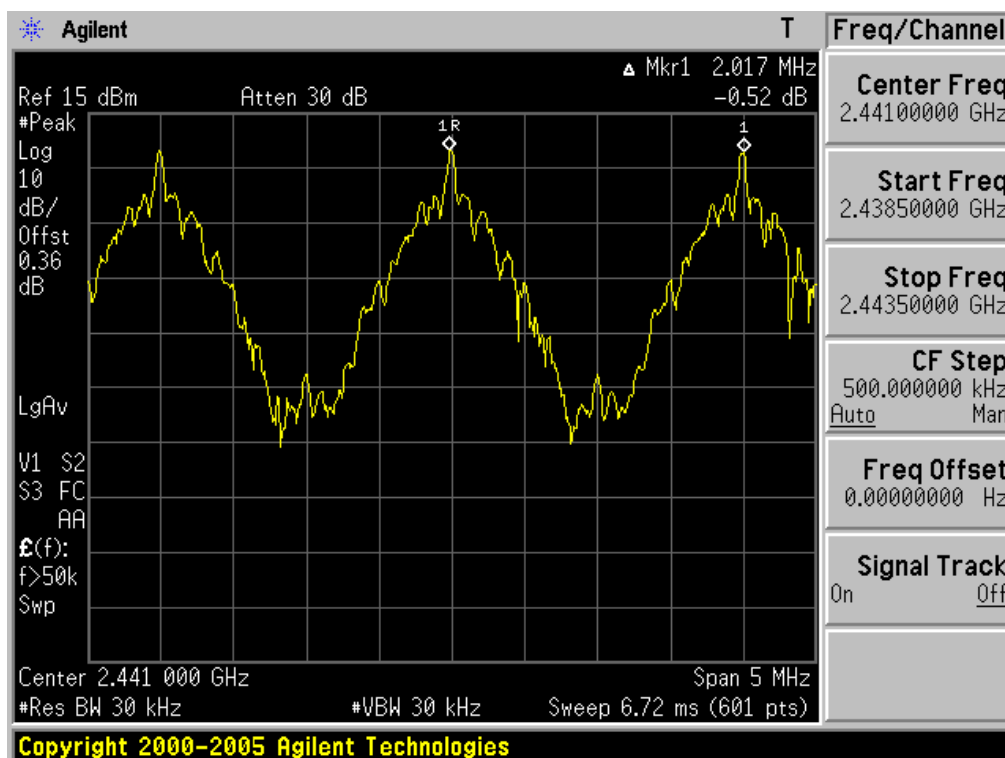


Figure 1: Measurement setup for the carrier frequency separation

Carrier Frequency Separation (DH5 Mode)



Carrier Frequency Separation (Inquiry Mode)



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:

RBW = 300 kHz (1% of the span or more) Sweep = auto
 VBW = 300 kHz (VBW ≥ RBW) Detector function = peak
 Trace = max hold

- Measurement Data: Comply

	Total number of Hopping Channels
DH5 Mode	79
Inquire Mode	32

- See next pages for actual measured spectrum plots.

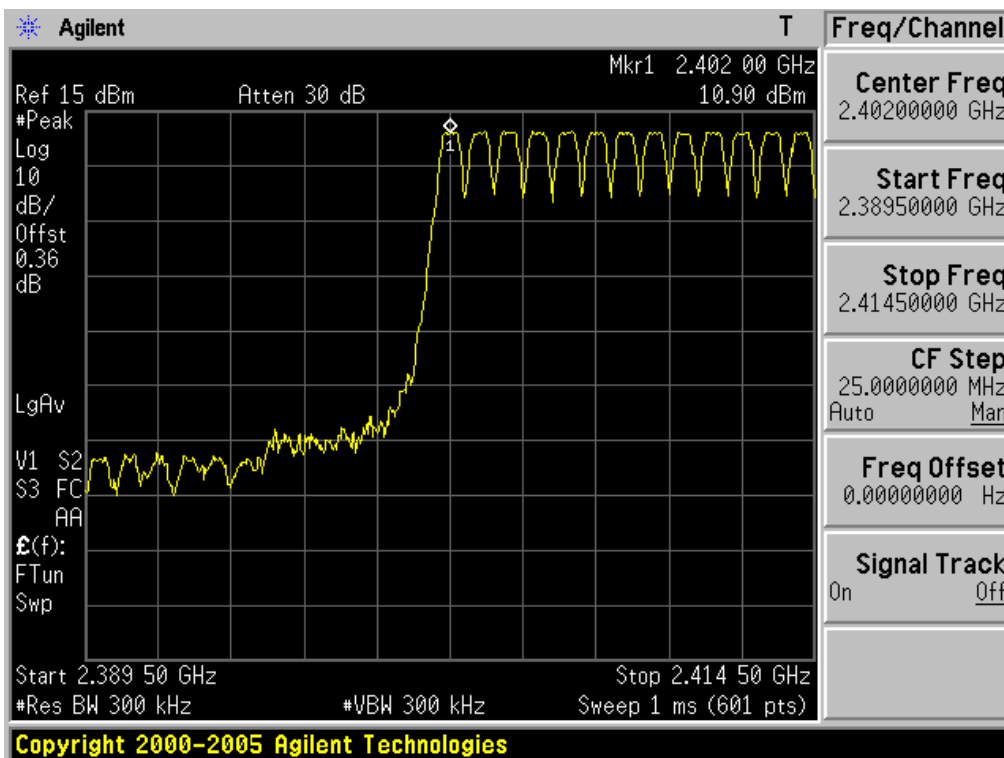
- Minimum Standard:

At least 15 hops

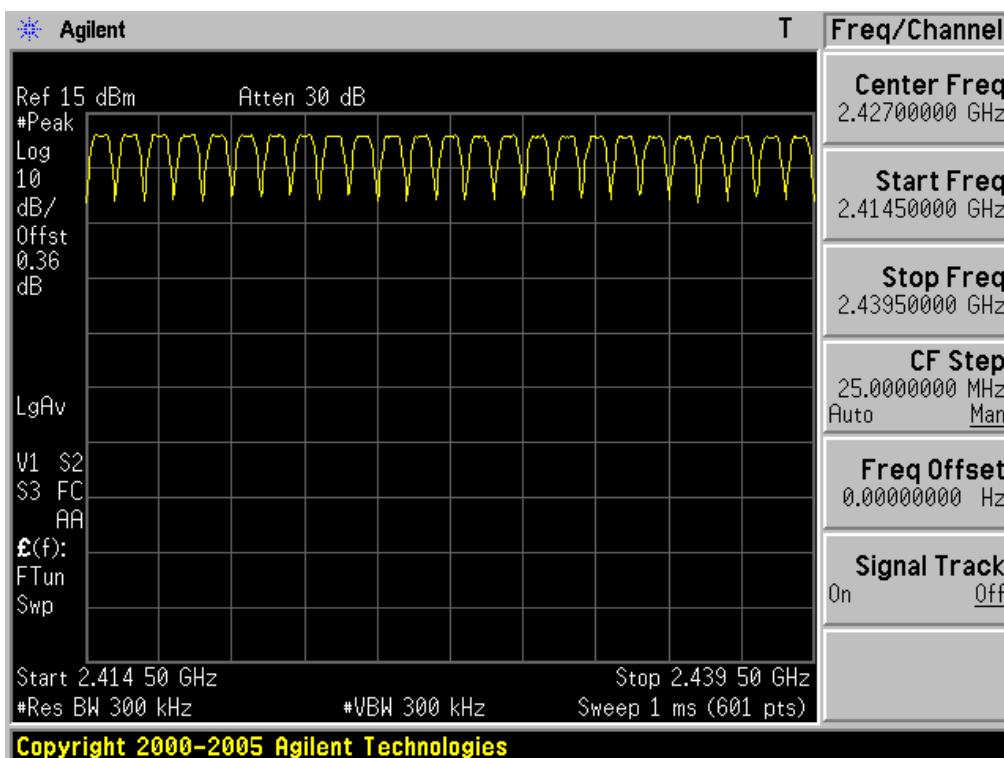
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

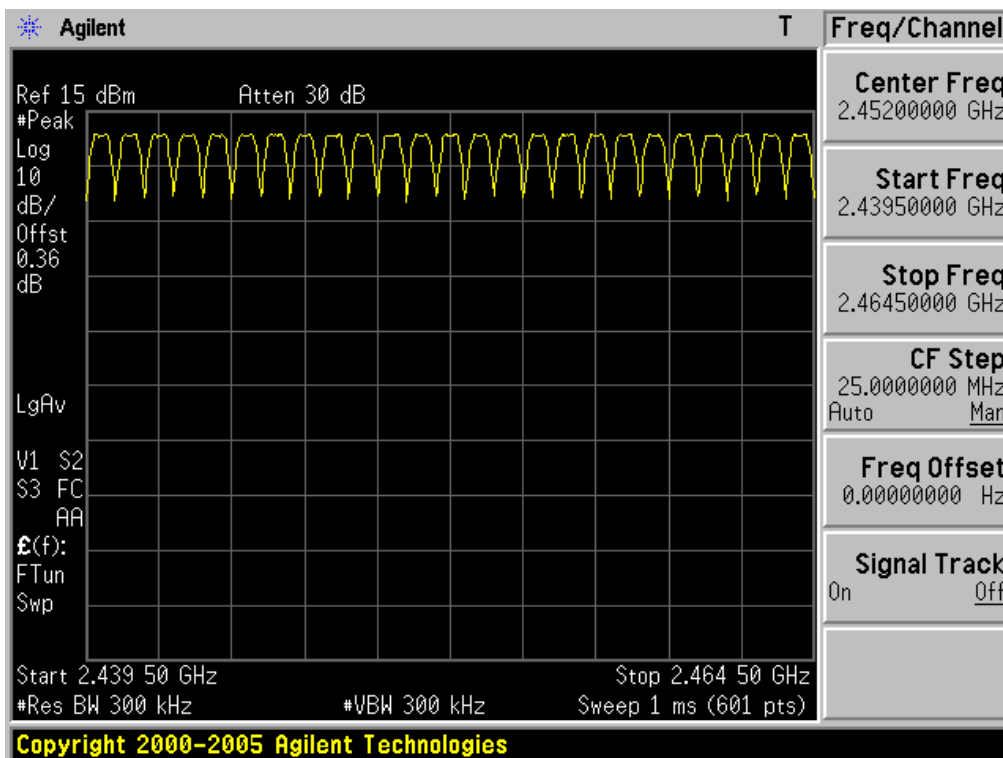
DH5 Mode - Number of Hopping Frequencies 1



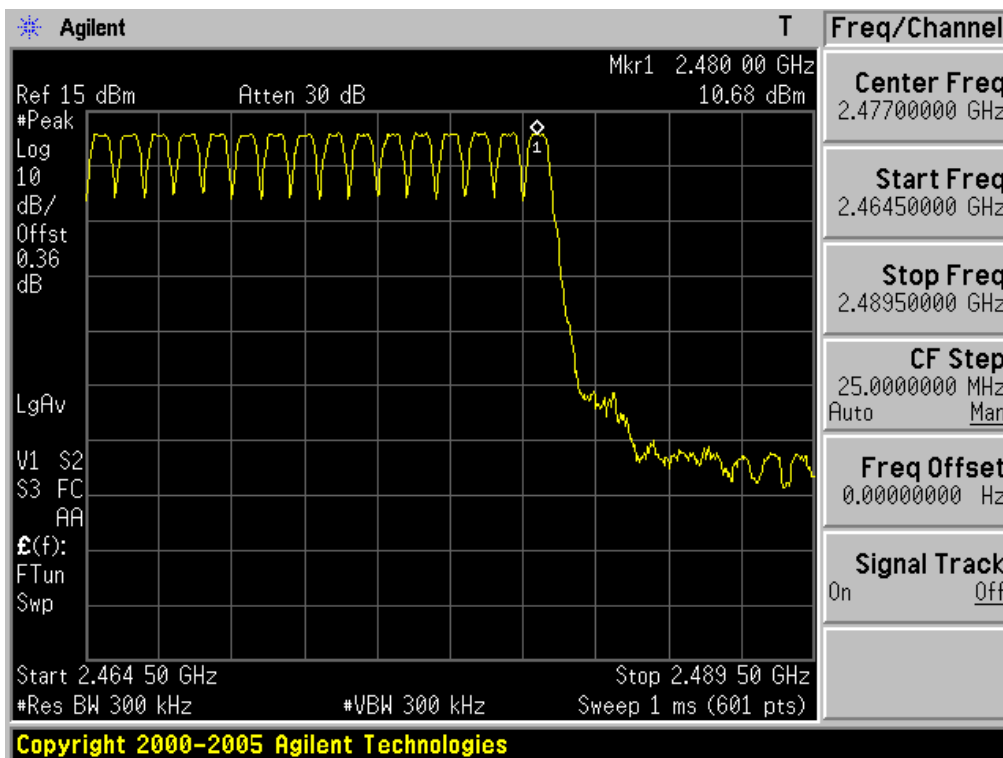
DH5 Mode - Number of Hopping Frequencies 2



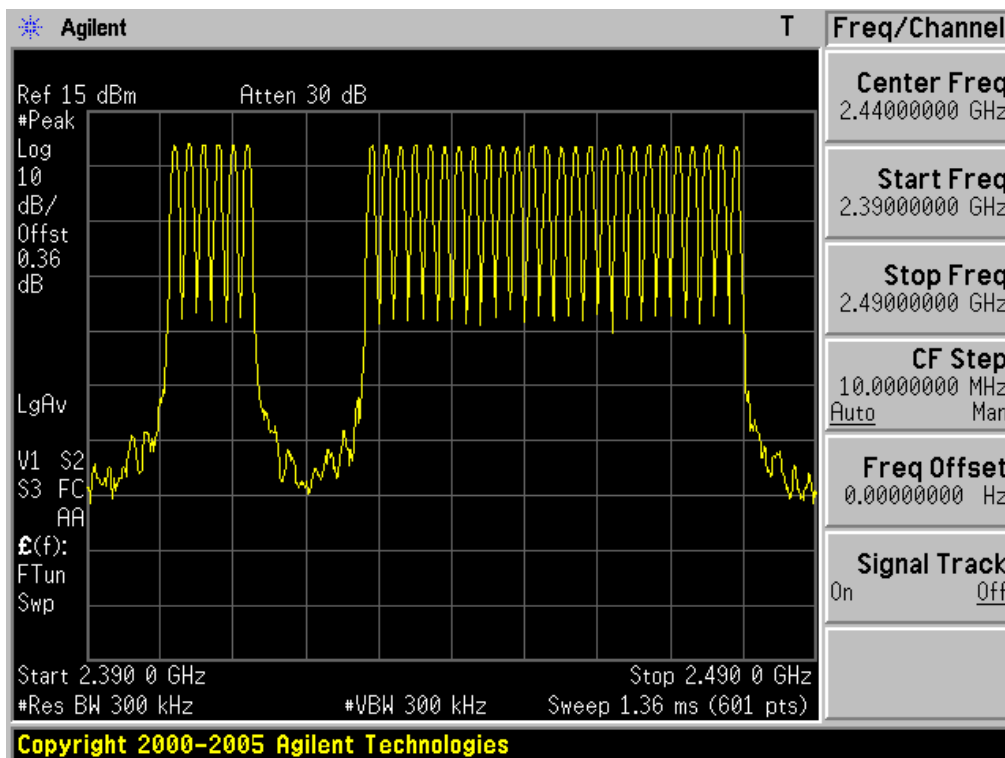
DH5 Mode - Number of Hopping Frequencies 3



DH5 Mode - Number of Hopping Frequencies 4



Inquiry Mode - Number of Hopping Frequencies 1



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 = 5 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

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

VBW = 10 kHz (VBW ≥ RBW) Detector function = peak

Trace = max hold

- Measurement Data:

Mode	Tested Frequency (MHz)	Test Results	
		Carrier Frequency Separation (MHz)	Result
DH5 Mode	2402	0.950	Comply
	2441	0.950	Comply
	2480	0.950	Comply
Inquiry Mode	2441	0.633	Comply

- See next pages for actual measured spectrum plots.

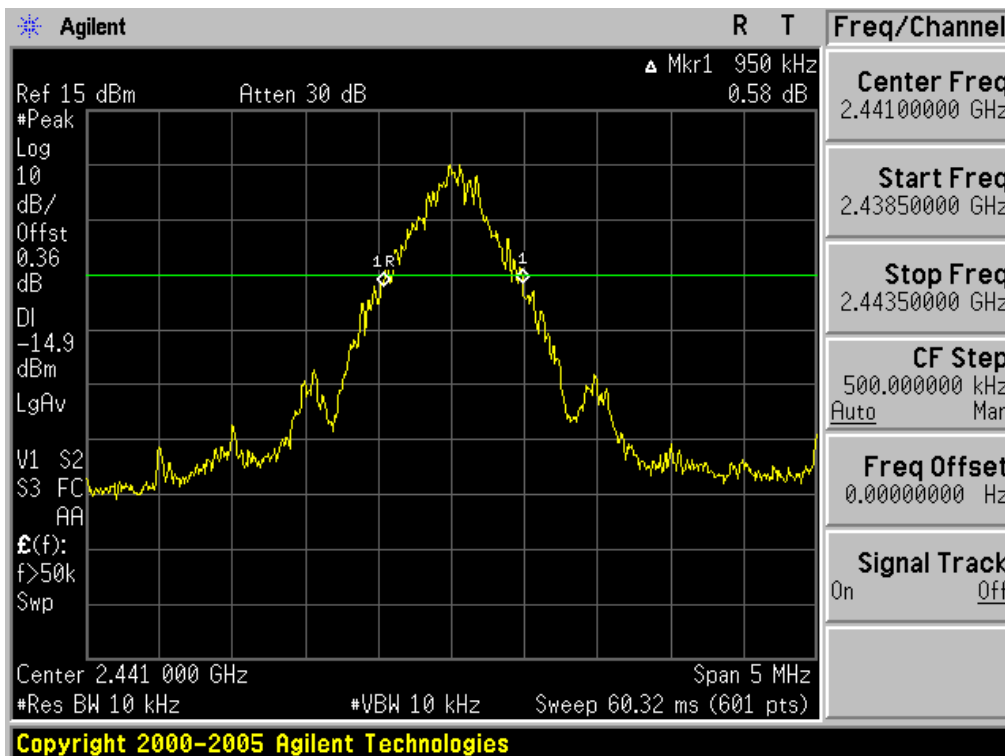
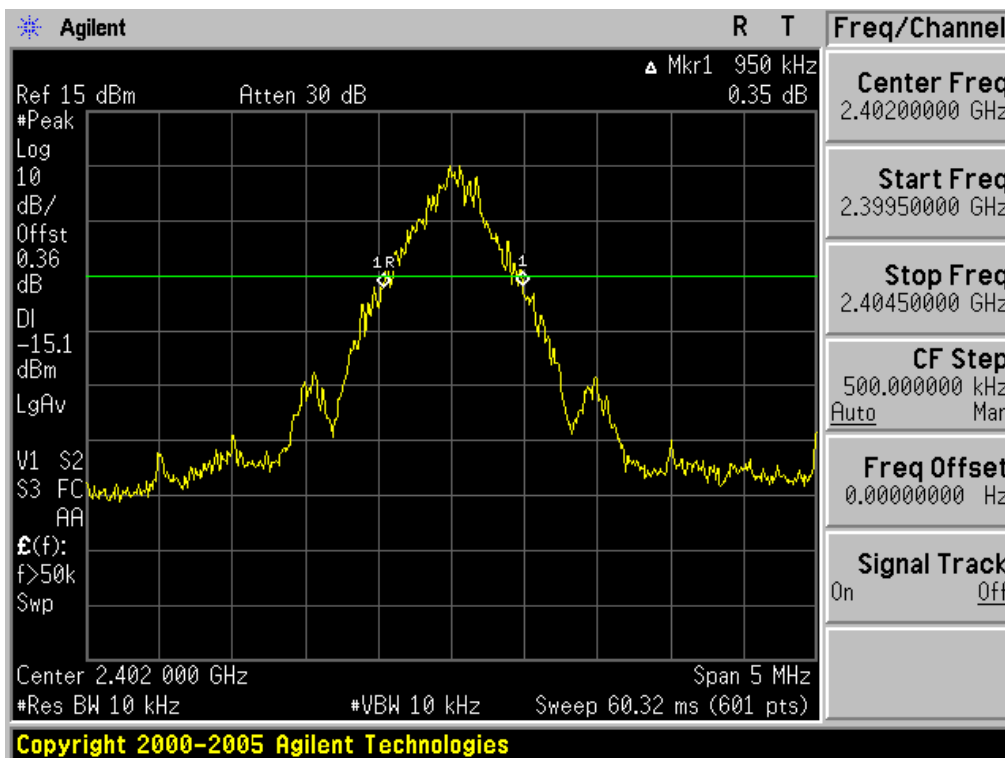
- Minimum Standard:

None

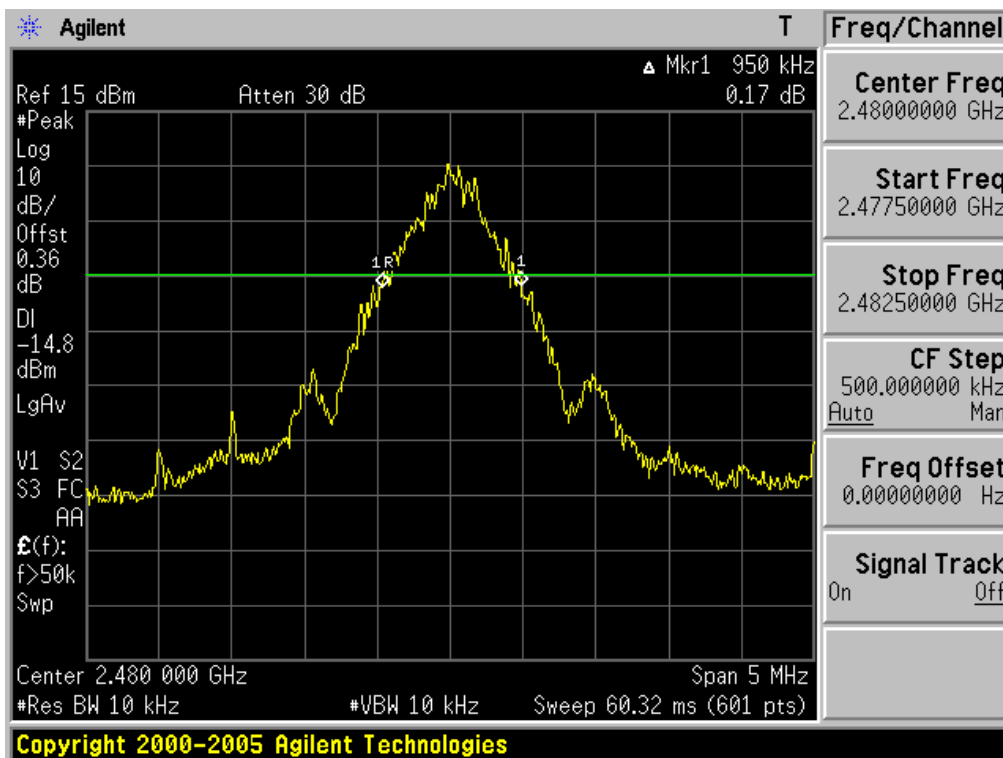
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

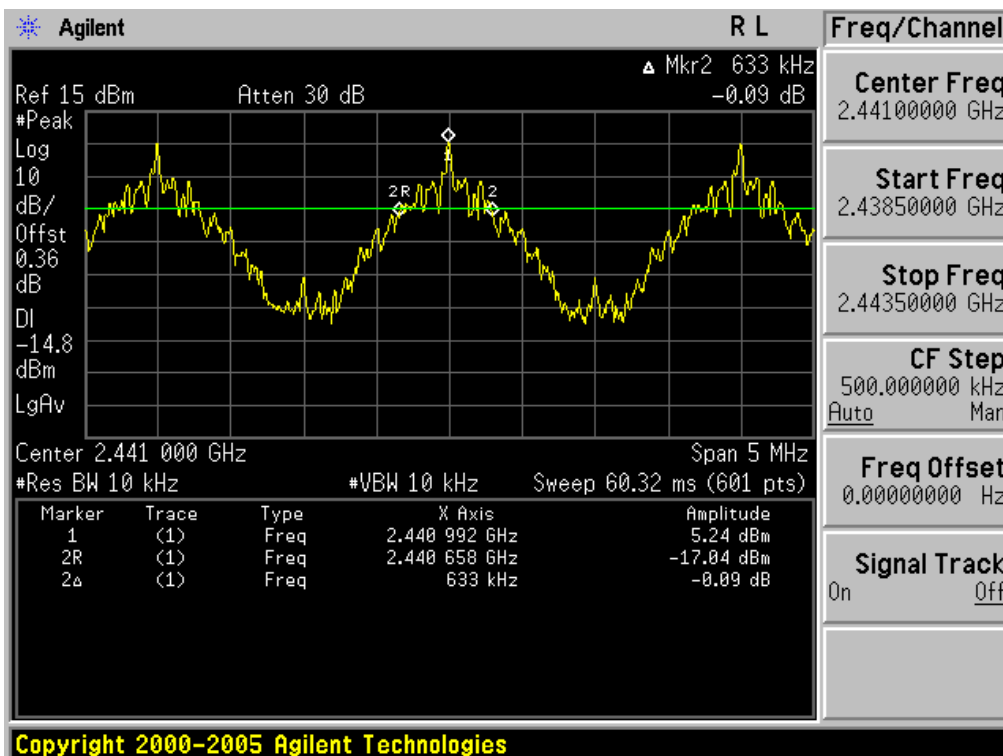
20 dB Bandwidth (DH5 Mode)



20 dB Bandwidth (DH5 Mode)



20 dB Bandwidth (Inquiry Mode)



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:** See next pages for actual measured spectrum plots.

- Minimum Standard:

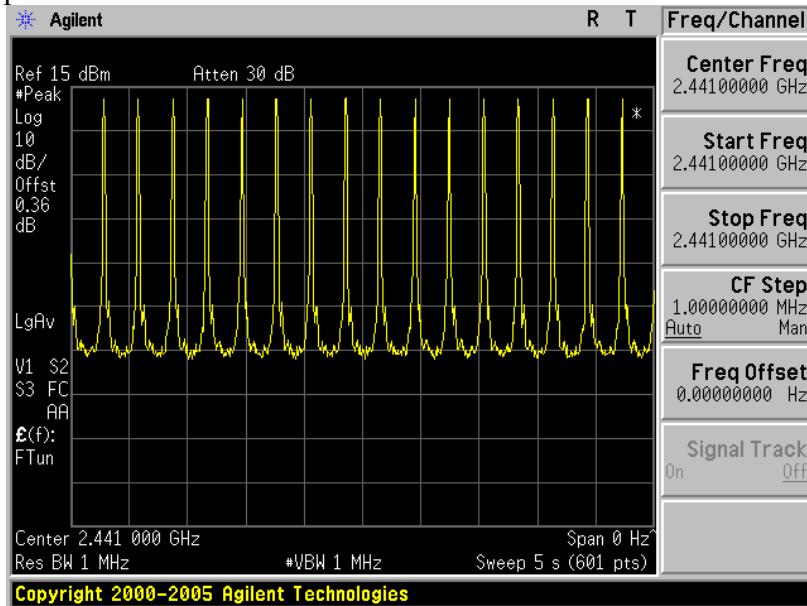
No greater than 0.4 seconds

- Measurement Setup

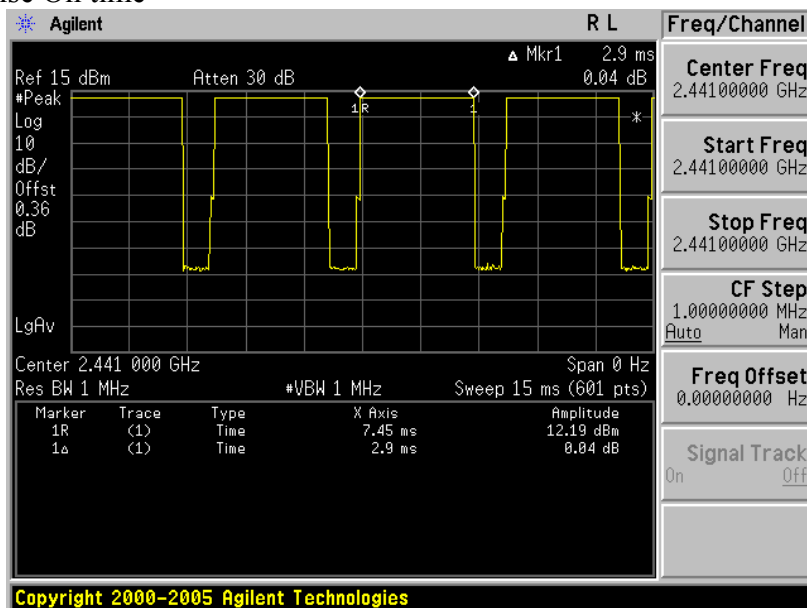
Same as the Chapter 3.2.1 (Figure 1)

Time of Occupancy for Packet Type DH 5

1. Hop count in 5sec



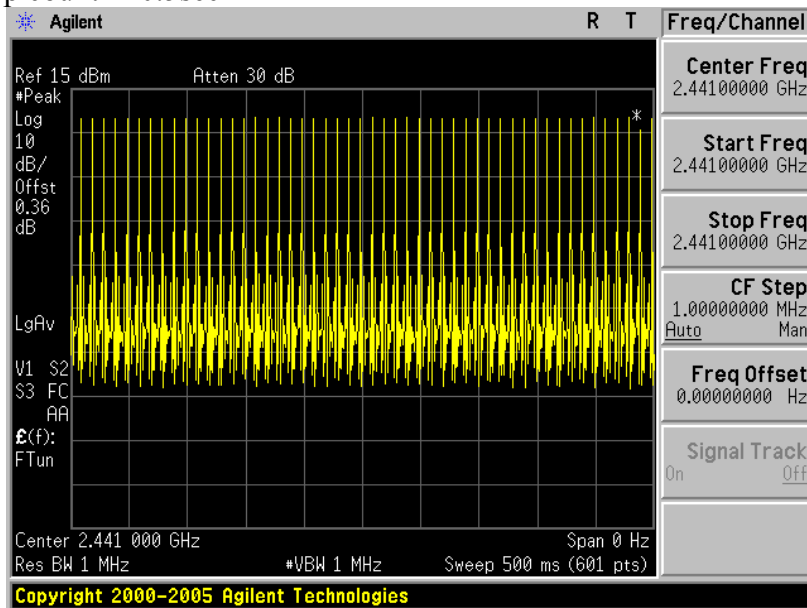
2. Pulse On time



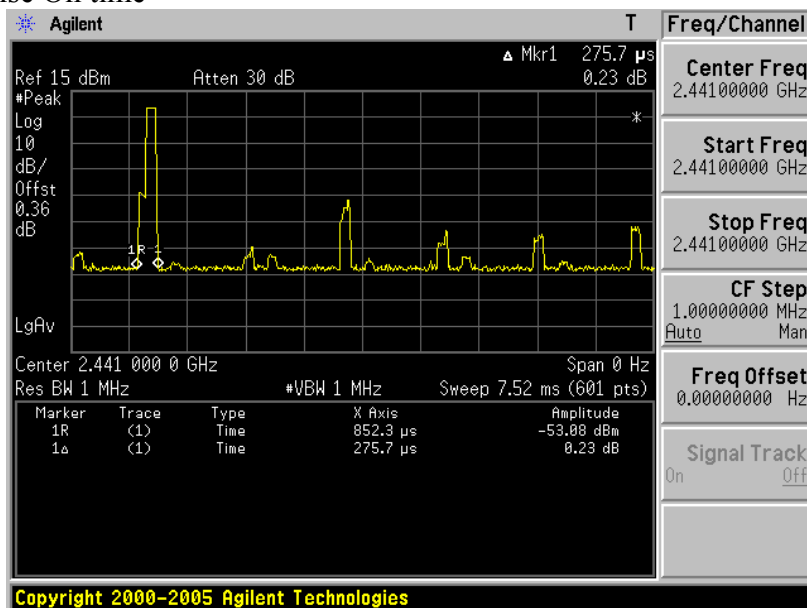
- Pulse Time = 2.9ms = 0.0029s
- Hop count per second = 16(Hop count in 5 sec) / 5 sec = 3.2
- Period Time = Cumber of channels * 0.4s = 79 * 0.4 = 31.6s
- Dwell Time = Hop count per second * Period Time * Pulse Time
= 3.2 * 31.6 * 0.0029= **0.29325s**

Time of Occupancy for Packet Type Inquiry Mode

1. Hop count in 0.5sec



2. Pulse On time



- Pulse Time = 276us = 0.000276s
- Hop count per second = 50(Hop count in 0.5 sec) * 2 = 100
- Period Time = Cumber of channels * 0.4s = 32 * 0.4 = 12.8s
- Dwell Time = Hop count per second * Period Time * Pulse Time
= 100 * 12.8 * 0.000276= **0.35328s**

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:

Mode	Frequency (MHz)	Test Results		
		dBm	mW	Result
DH5	2402	11.31	13.52	Comply
	2441	10.78	11.97	Comply
	2480	10.94	12.42	Comply
Inquiry Mode	2402	8.82	7.62	Comply
	2441	8.38	6.89	Comply
	2479	8.47	7.03	Comply

- See next pages for actual measured spectrum plots.

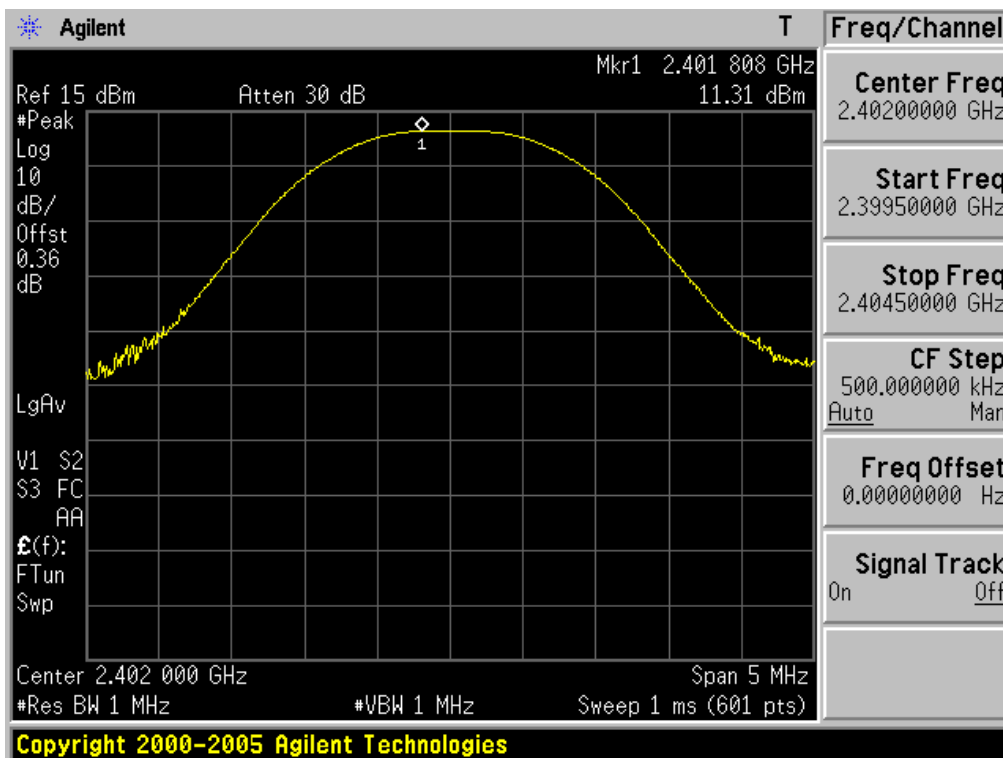
- Minimum Standard:

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**

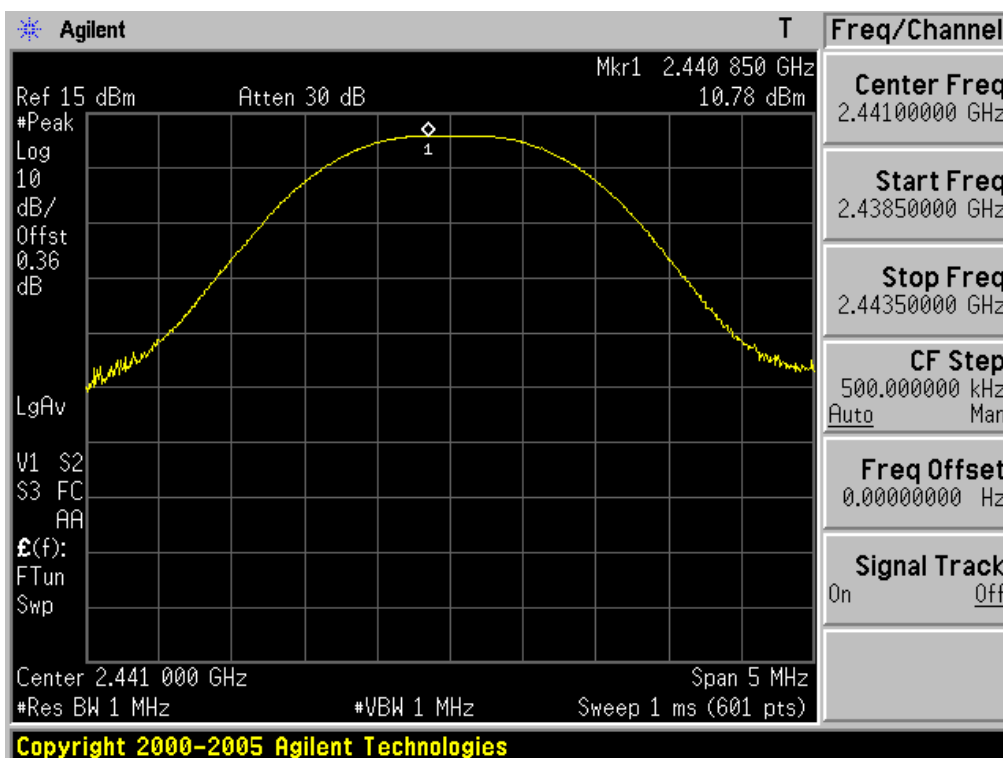
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

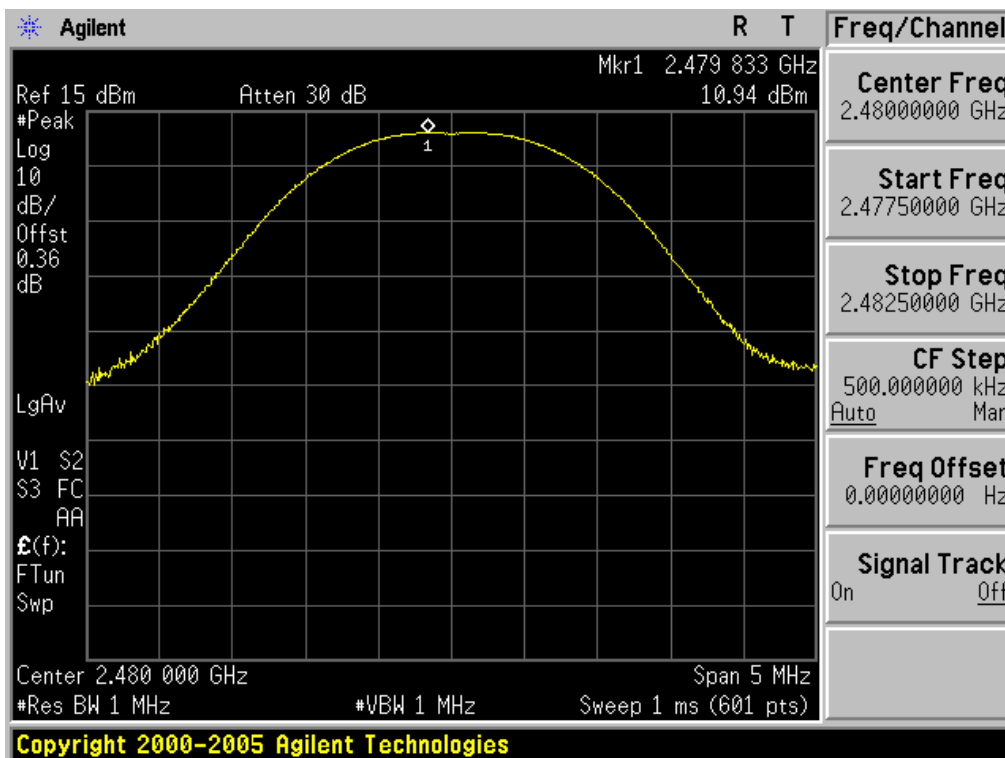
Peak Output Power (DH5 Mode)



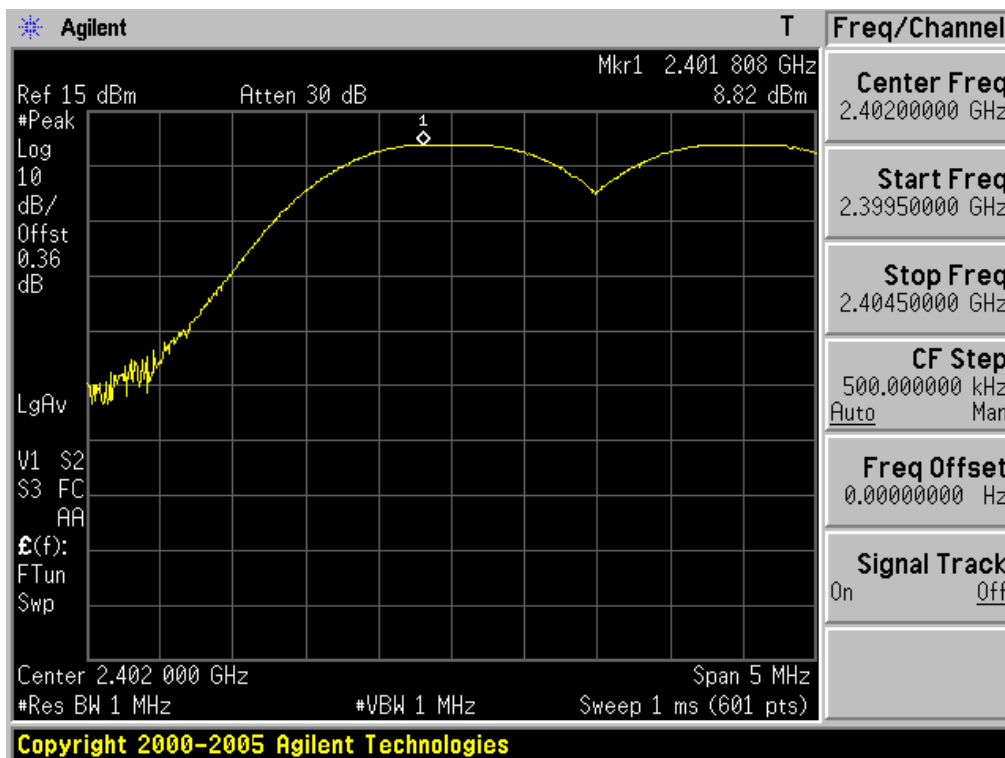
Peak Output Power (DH5 Mode)



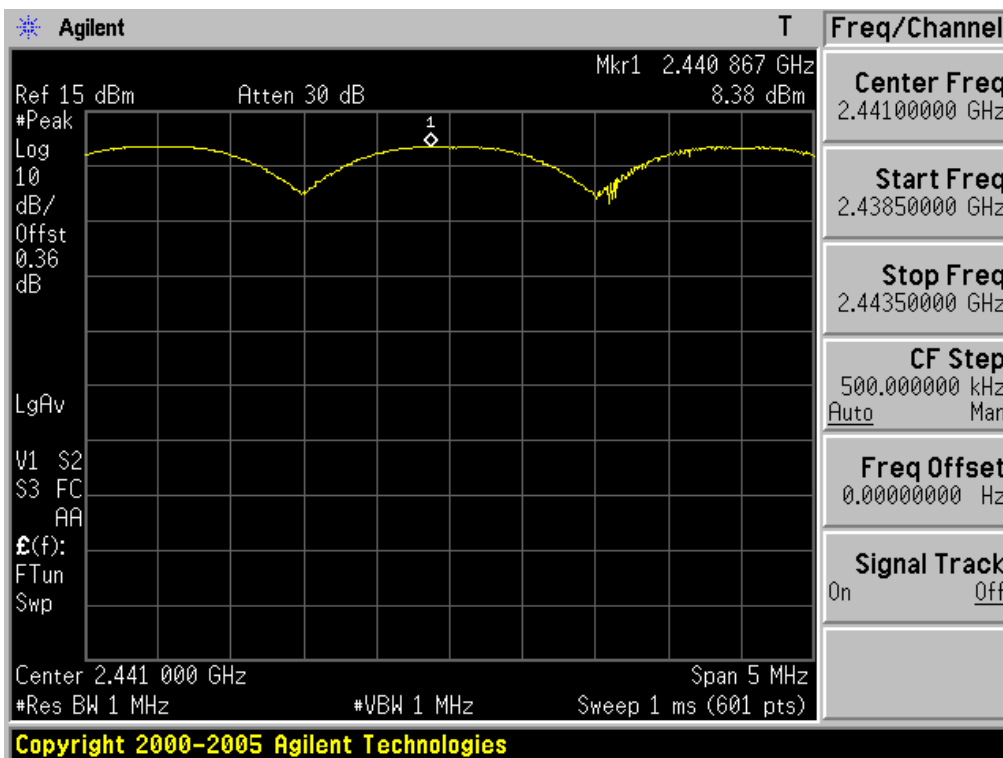
Peak Output Power (DH5 Mode)



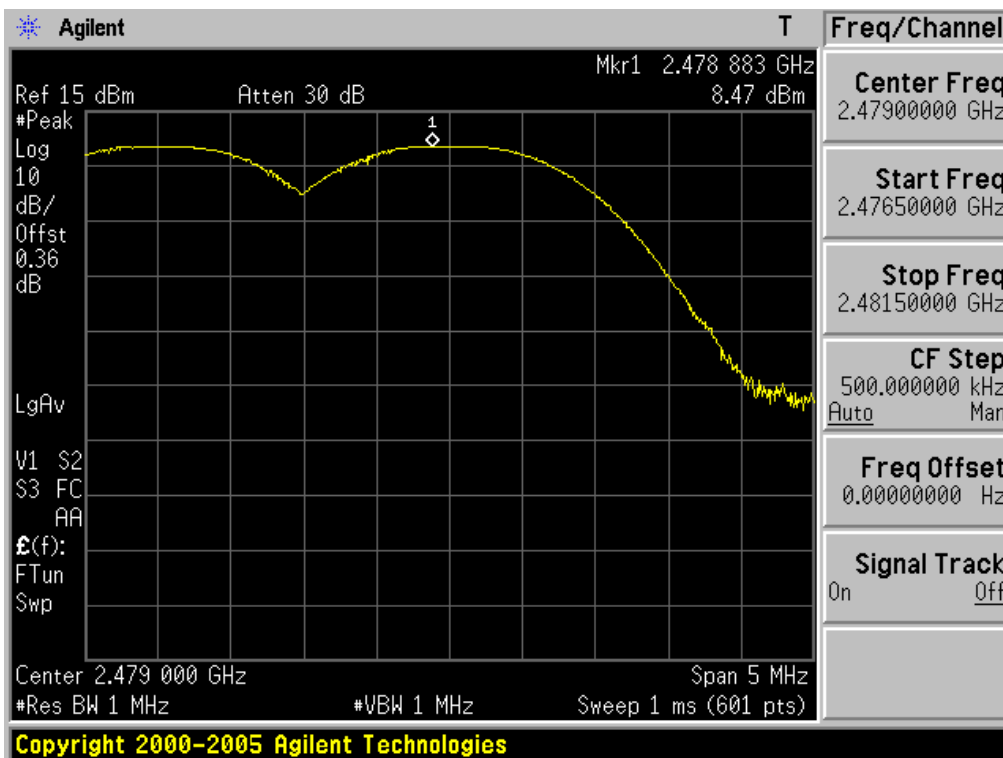
Peak Output Power (Inquiry Mode)



Peak Output Power (Inquiry Mode)



Peak Output Power (Inquiry Mode)



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

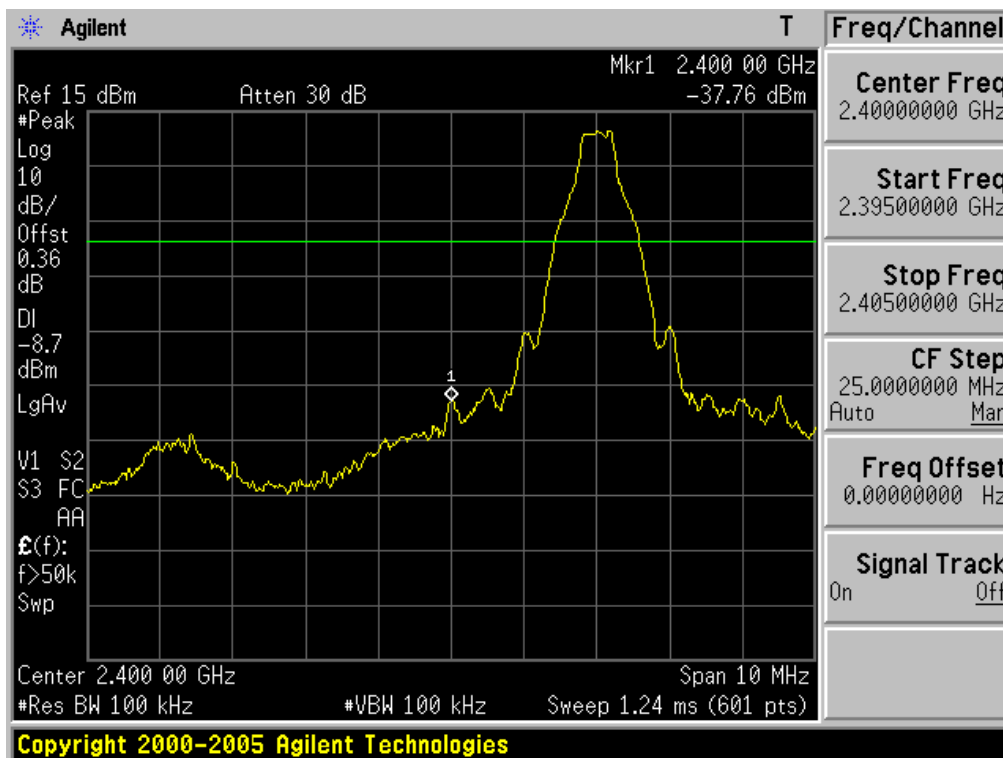
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
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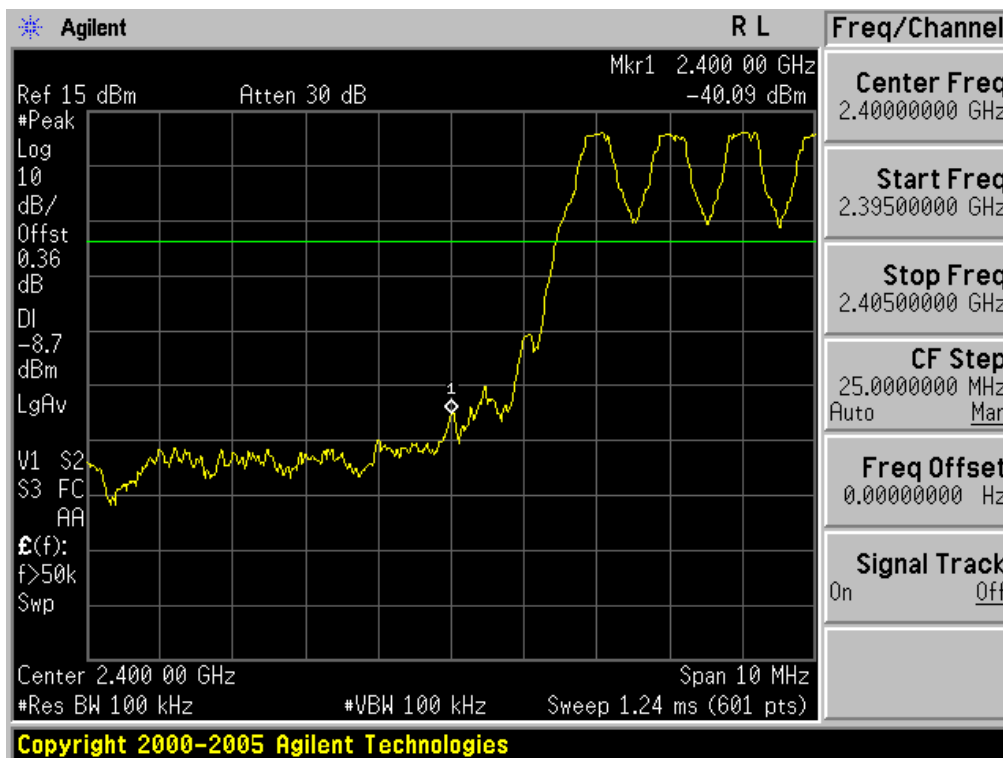
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

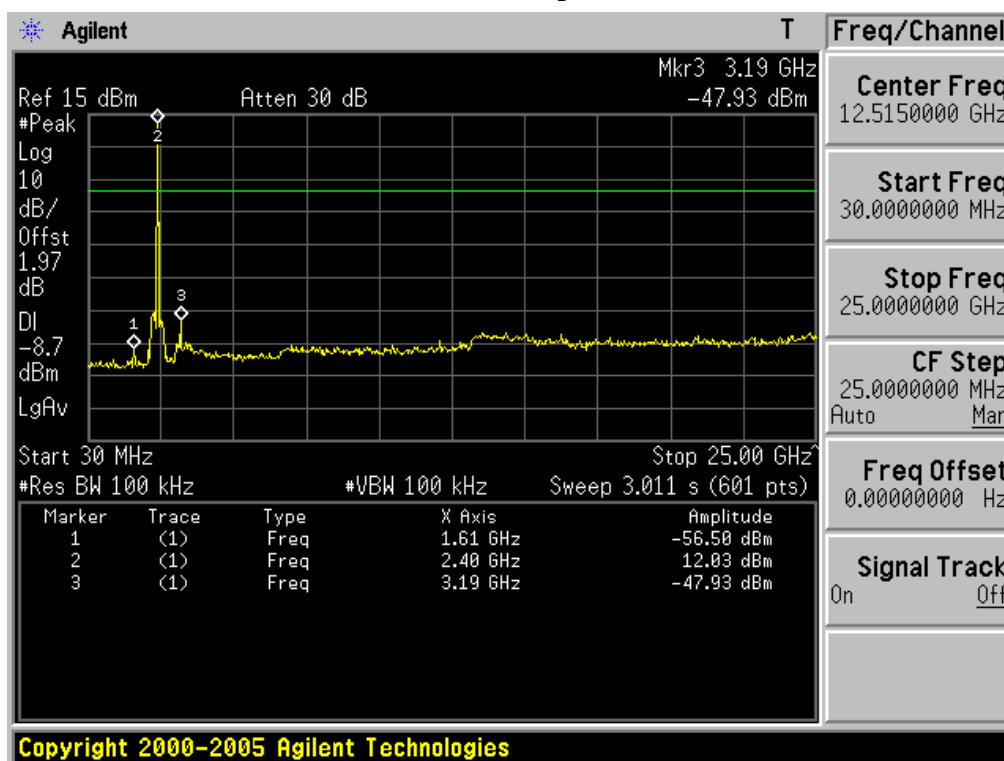
Low band with hopping disabled



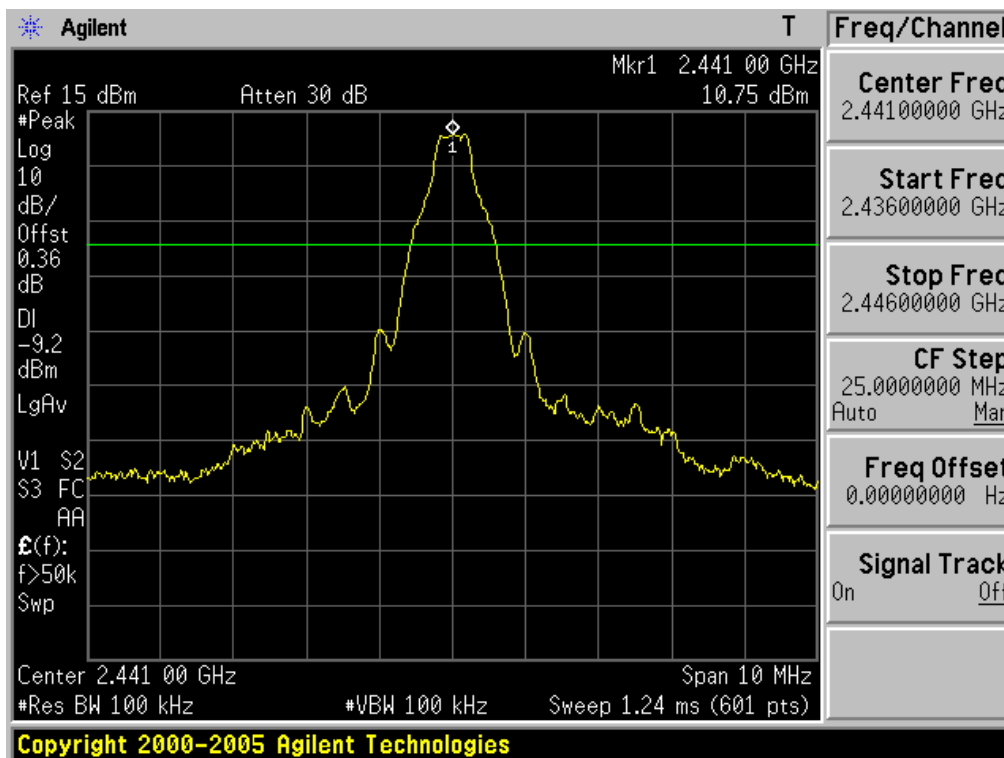
Low band with hopping enabled



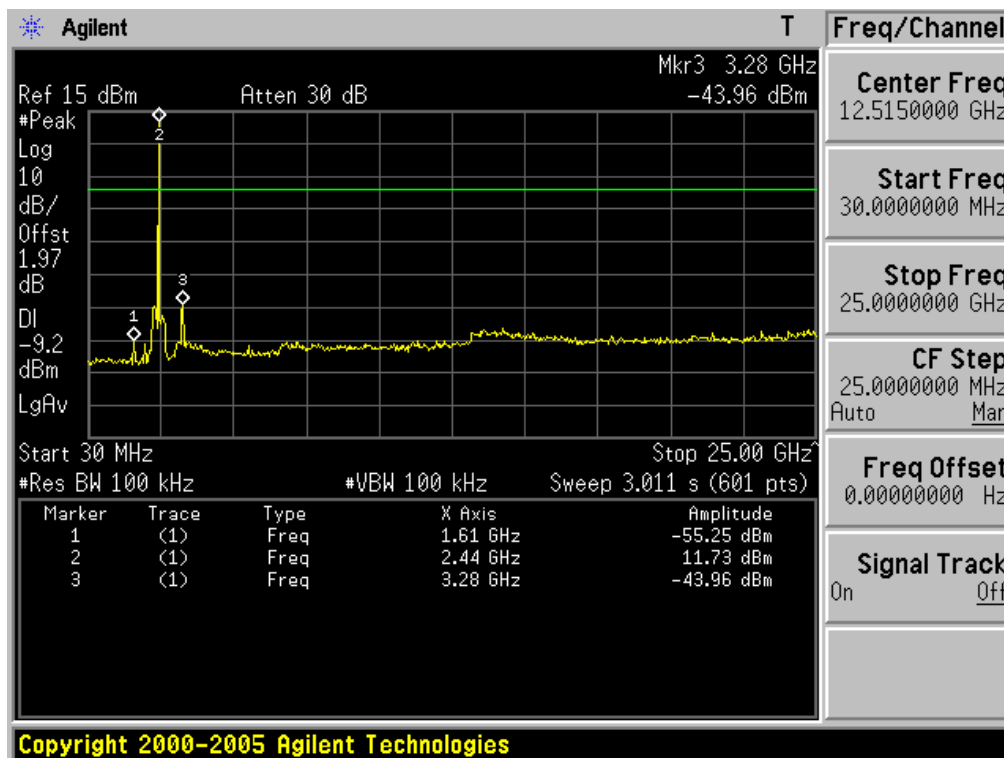
Low channel spurious



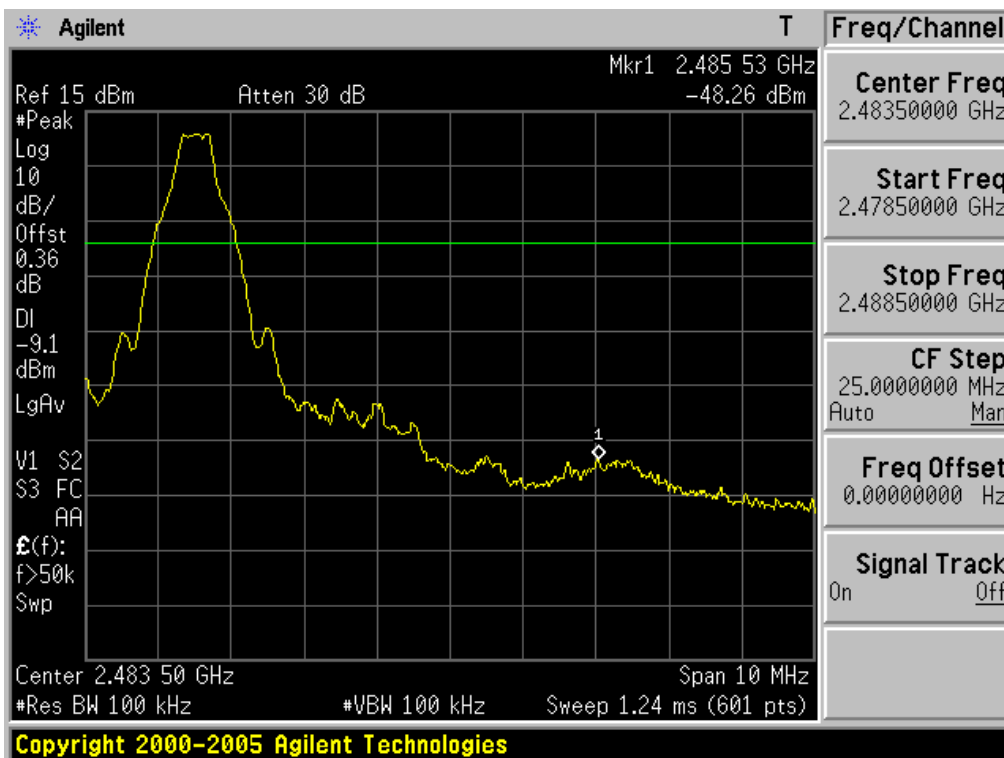
Mid channel ref



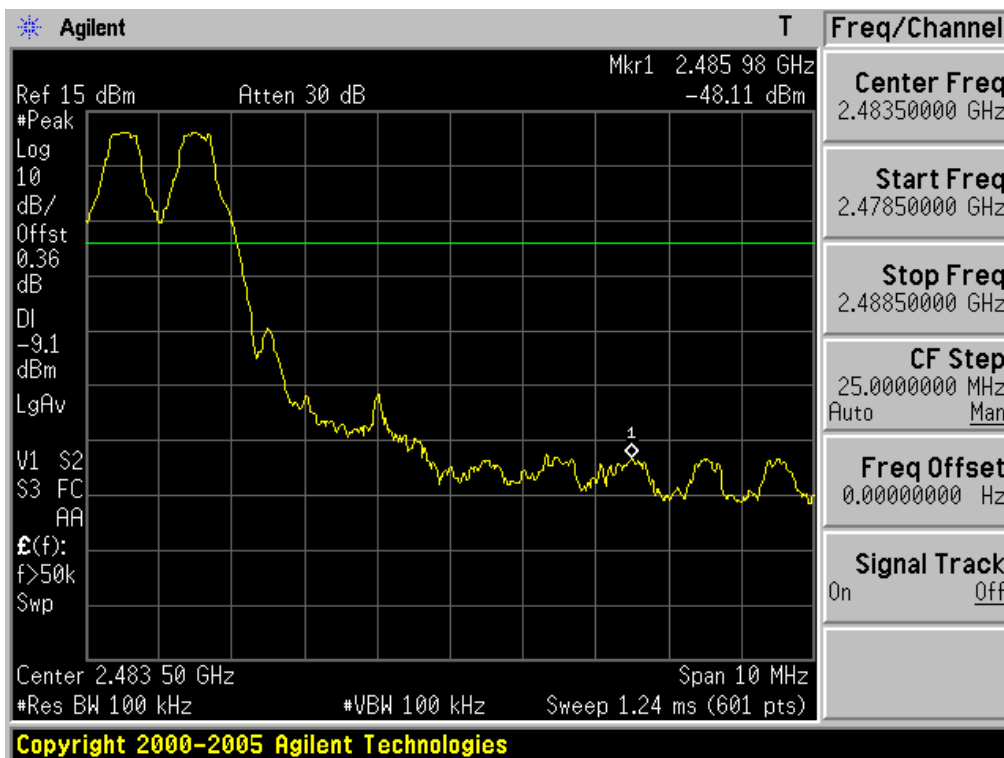
Mid channel spurious



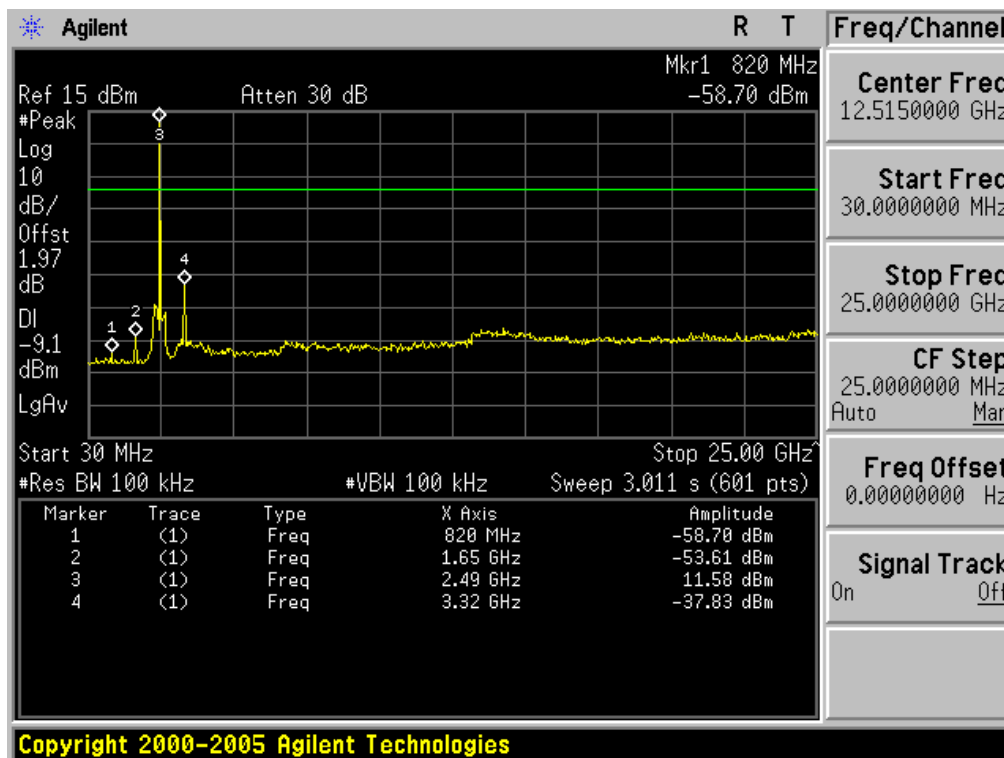
High band with hopping disabled



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 = 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

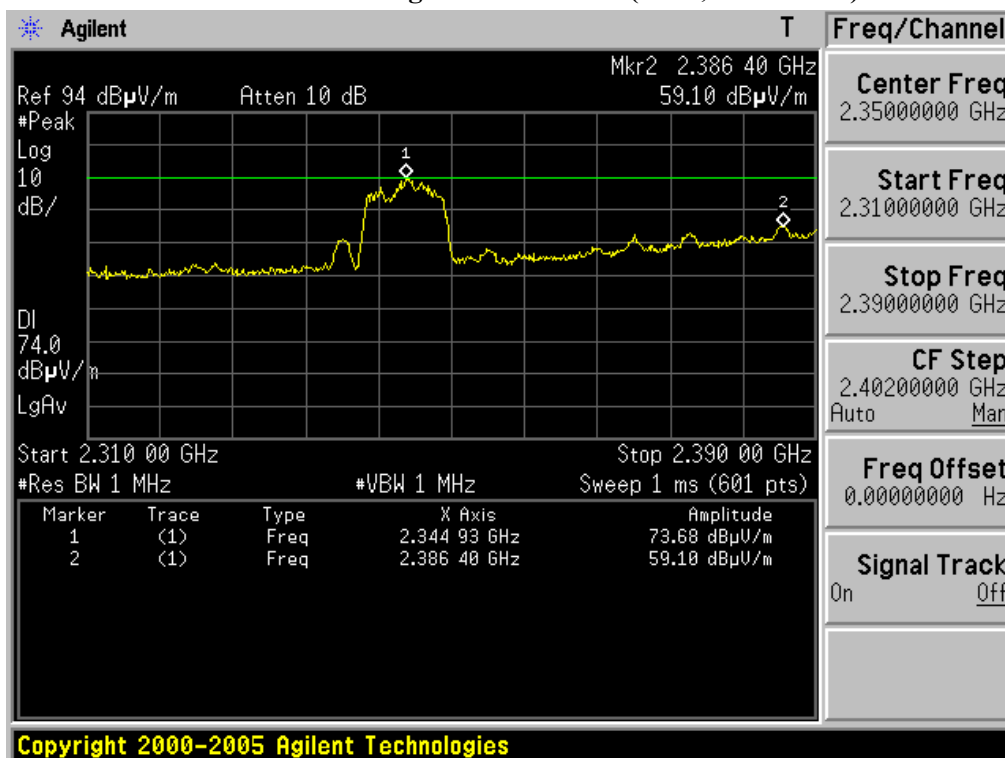
** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part,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

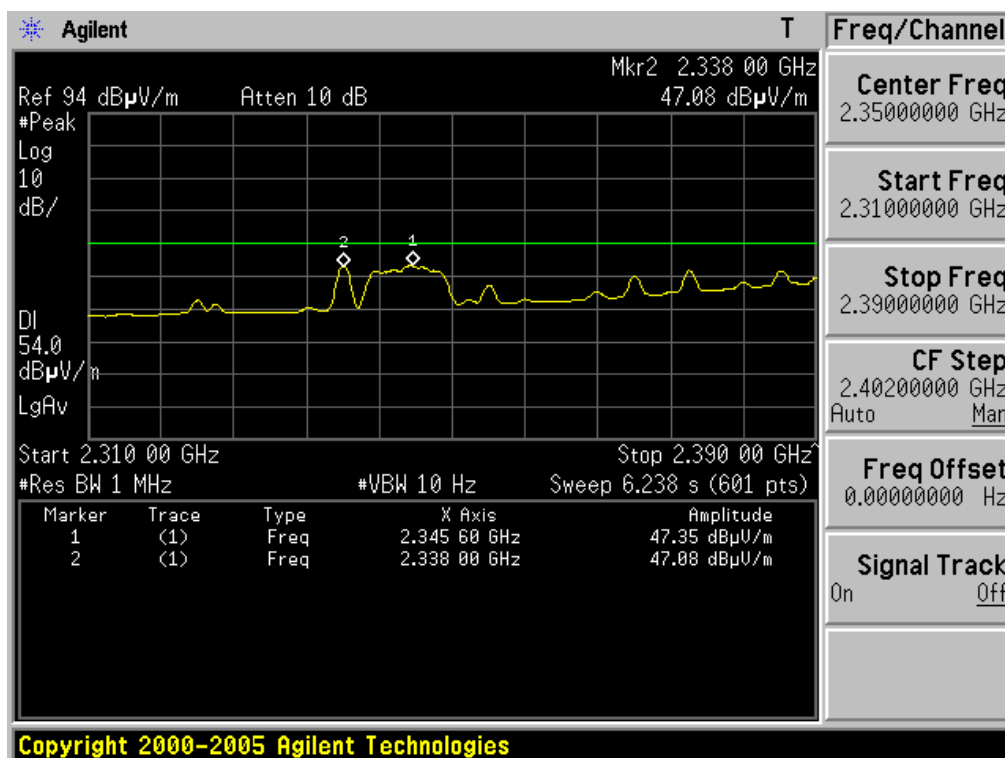
▪ FCC Part 15.205(b): The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak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

Restricted Band Edge: Low Channel (Peak, Horizontal)



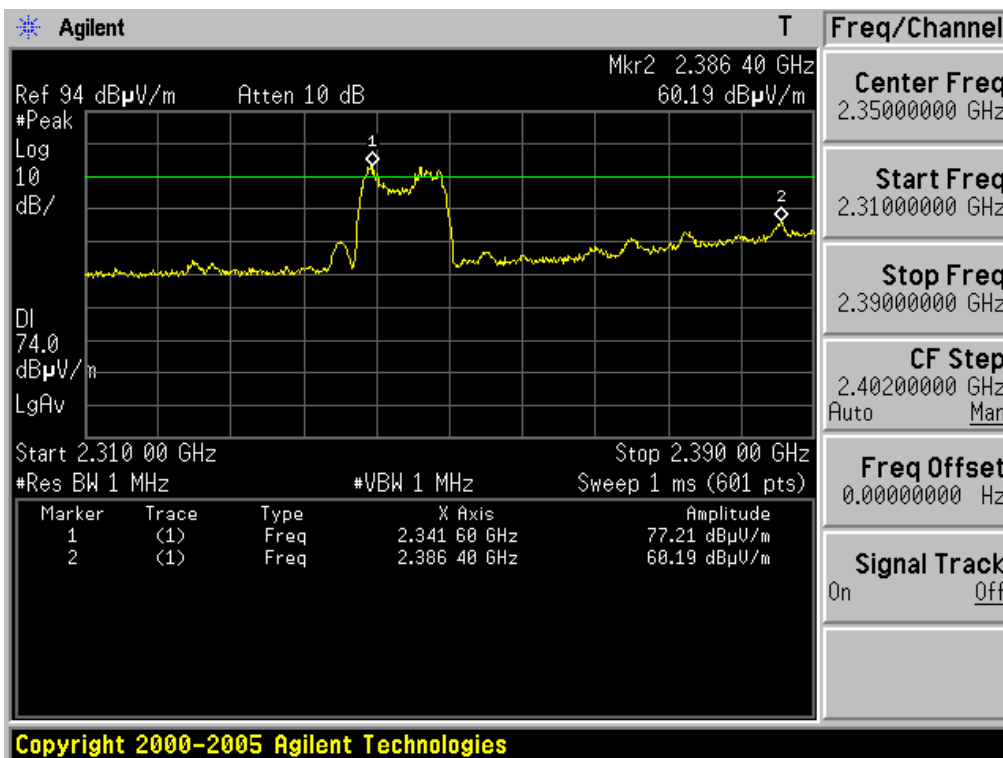
Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

Restricted Band Edge: Low Channel (Average, Horizontal)



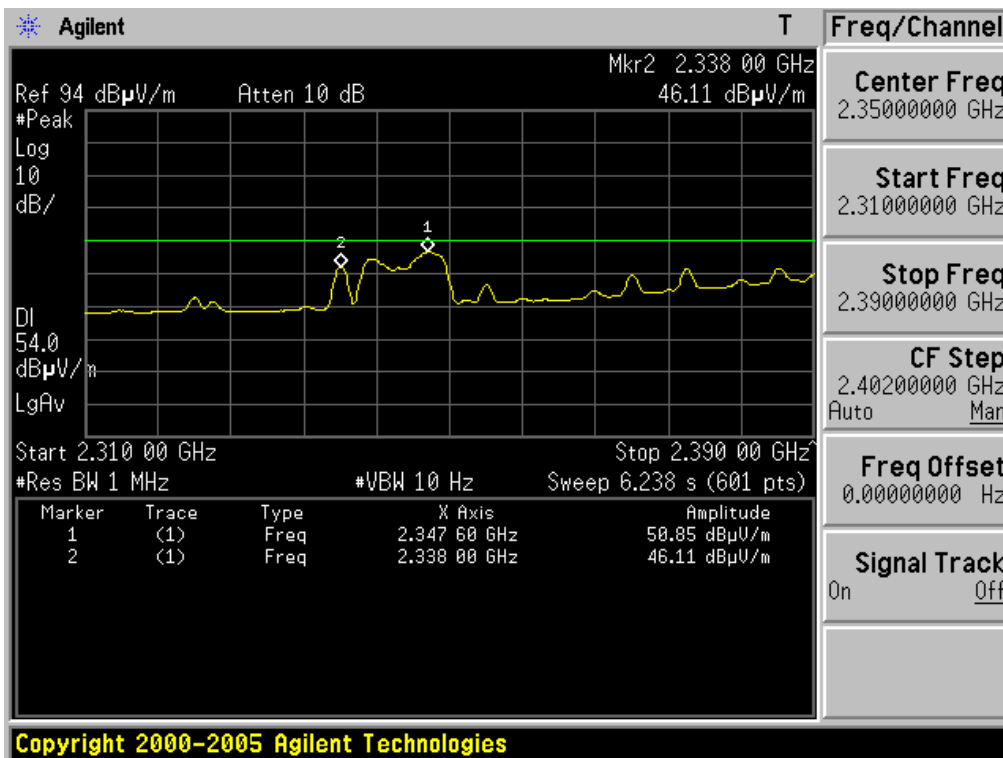
Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

Restricted Band Edge: Low Channel (Peak, Vertical)



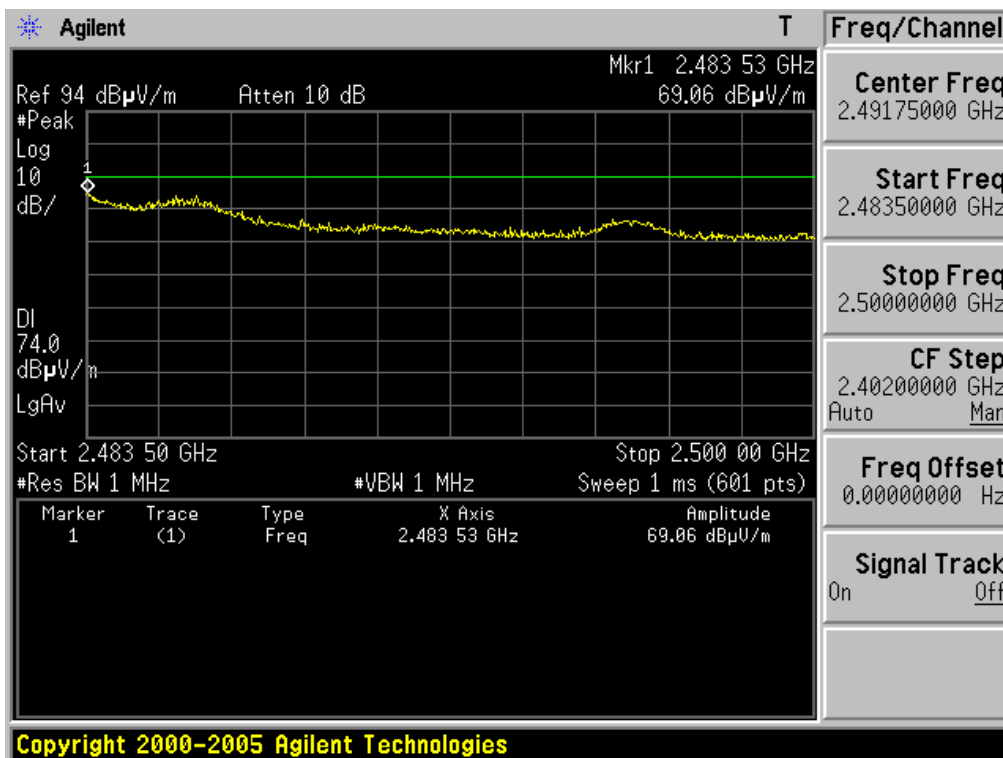
Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

Restricted Band Edge: Low Channel (Average, Vertical)

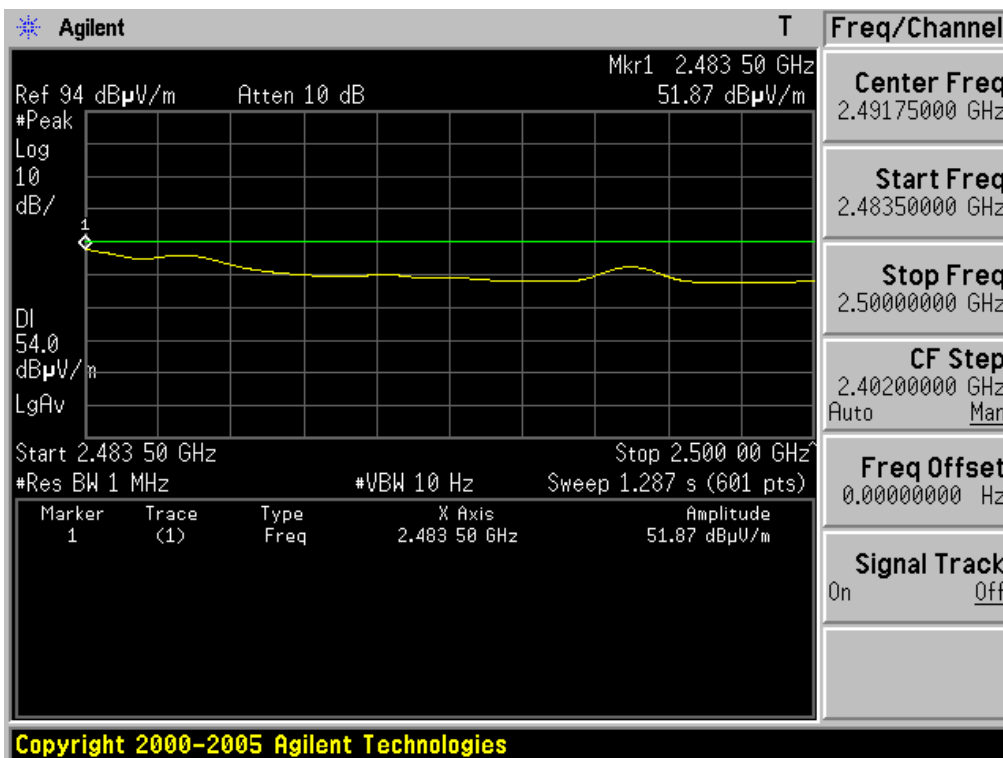


Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

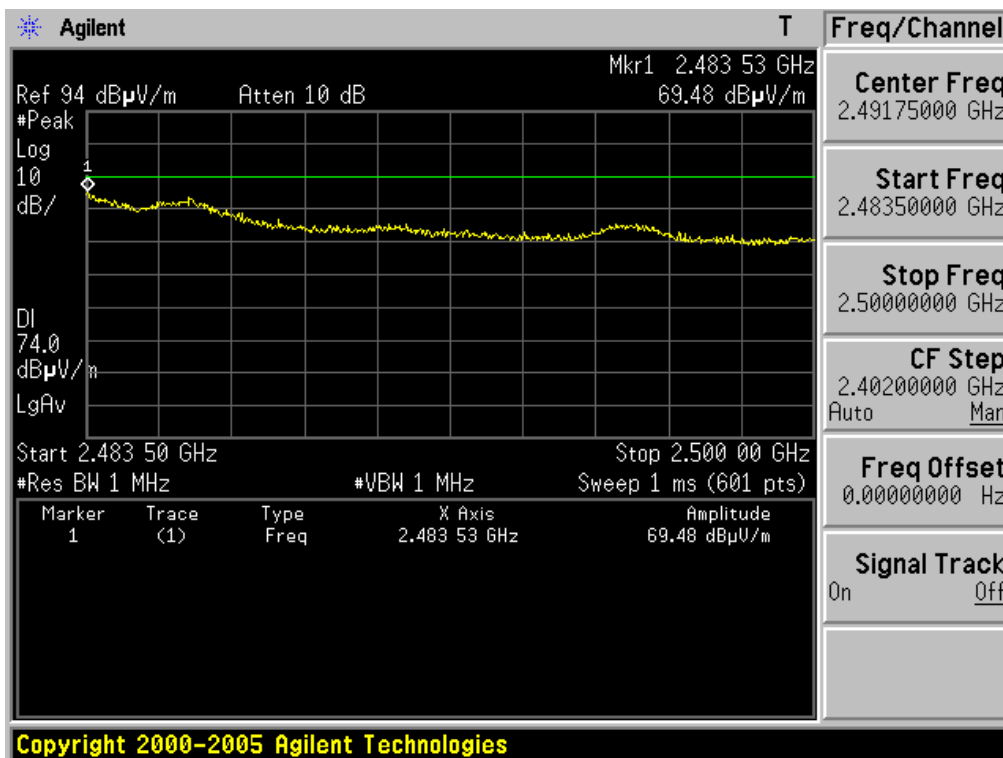
Restricted Band Edge: High Channel (Peak, Horizontal)



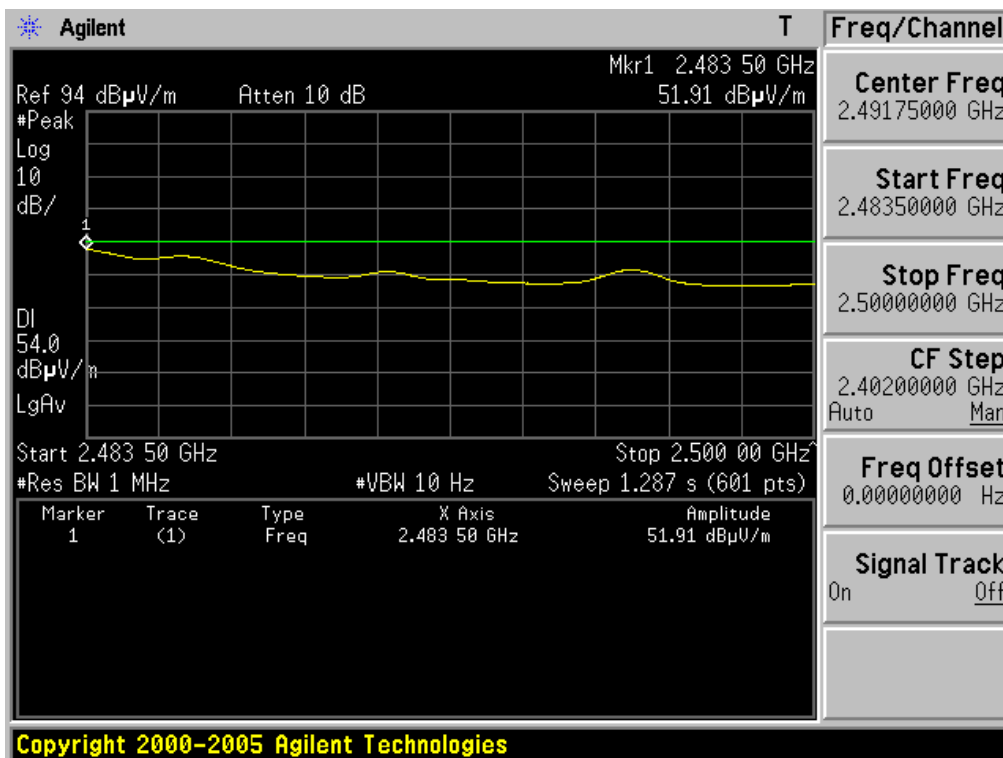
Restricted Band Edge: High Channel (Average, Horizontal)



Restricted Band Edge: High Channel (Peak, Vertical)



Restricted Band Edge: High Channel (Average, Vertical)



- Measurement Data:

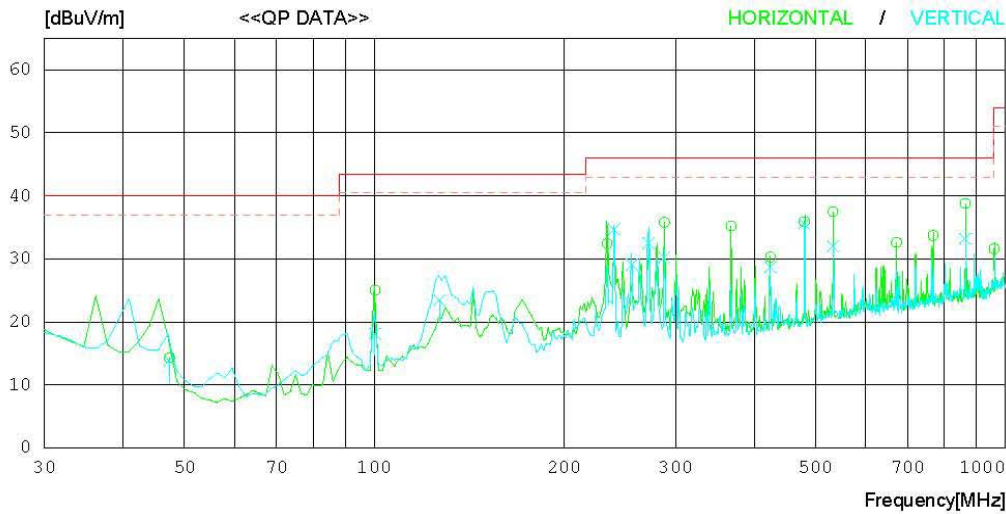


RADIATED EMISSION

Date : 2009-04-22

Model Name : FB100AS
 Model No. :
 Serial No. : Identical prototype
 Test Condition : TX:2402MHz
 Reference No. :
 Power Supply : 120V 60Hz
 Temp/Humi : 19°C 33%
 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	47.380	24.6	11.1	1.0	22.4	14.3	40.0	25.7	124	0
2	100.220	35.6	10.5	1.4	22.5	25.0	43.5	18.5	324	86
3	233.860	41.0	12.3	2.1	23.0	32.4	46.0	13.6	100	263
4	288.045	43.1	13.8	2.3	23.4	35.8	46.0	10.2	121	249
5	367.500	40.7	15.5	2.8	23.8	35.2	46.0	10.8	195	267
6	480.000	39.9	17.0	3.2	24.2	35.9	46.0	10.1	158	234
7	533.080	40.7	17.7	3.4	24.3	37.5	46.0	8.5	134	237
8	672.003	34.1	18.6	3.9	24.0	32.6	46.0	13.4	100	207
9	768.000	34.0	19.2	4.2	23.7	33.7	46.0	12.3	117	210
10	864.000	38.1	19.5	4.5	23.3	38.8	46.0	7.2	100	216
11	960.000	29.1	20.4	4.9	22.8	31.6	46.0	14.4	174	352
12	424.120	34.9	16.5	3.0	24.1	30.3	46.0	15.7	196	0
----- Vertical -----										
13	47.380	24.1	11.1	1.0	22.4	13.8	40.0	26.2	100	325
14	100.220	28.7	10.5	1.4	22.5	18.1	43.5	25.4	103	290
15	127.000	32.9	11.6	1.5	22.6	23.4	43.5	20.1	100	285
16	240.000	43.0	12.6	2.1	23.0	34.7	46.0	11.3	100	157
17	272.020	40.0	13.5	2.3	23.3	32.5	46.0	13.5	100	129
18	424.080	33.3	16.5	3.0	24.1	28.7	46.0	17.3	100	0
19	480.000	39.5	17.0	3.2	24.2	35.5	46.0	10.5	100	145
20	533.080	35.2	17.7	3.4	24.3	32.0	46.0	14.0	299	172
21	864.010	32.5	19.5	4.5	23.3	33.2	46.0	12.8	100	124
22	288.020	37.5	13.8	2.3	23.4	30.2	46.0	15.8	104	1
23	256.000	36.9	13.2	2.2	23.2	29.1	46.0	16.9	256	335

Harmonic Measurement Data: Fundamental Frequency = 2402MHz

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
2210	Hor	-	50.24	42.03	-2.57	-	47.67	39.46	-	74.00	54.00	-	26.33	14.54
2210	Ver	-	51.91	43.71	-2.57	-	49.34	41.14	-	74.00	54.00	-	24.66	12.86
2242	Hor	-	51.35	42.59	-2.57	-	48.78	40.02	-	74.00	54.00	-	25.22	13.98
2242	Ver	-	52.80	45.16	-2.57	-	50.23	42.59	-	74.00	54.00	-	23.77	11.41
2274	Hor	-	52.35	44.34	-2.31	-	50.04	42.03	-	74.00	54.00	-	23.96	11.97
2274	Ver	-	54.37	46.51	-2.31	-	52.06	44.20	-	74.00	54.00	-	21.94	9.80
2498	Hor	-	57.97	49.58	-1.26	-	56.71	48.32	-	74.00	54.00	-	17.29	5.68
2498	Ver	-	58.95	50.36	-1.26	-	57.69	49.10	-	74.00	54.00	-	16.31	4.90
4804	Hor	-	51.08	43.89	6.25	-	57.33	50.14	-	74.00	54.00	-	16.67	3.86
4804	Ver	-	53.14	45.26	6.25	-	59.39	51.51	-	74.00	54.00	-	14.61	2.49

Note.

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. If peak result meet AV limit, AV measurement is omitted.
3. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

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

- Measurement Data:



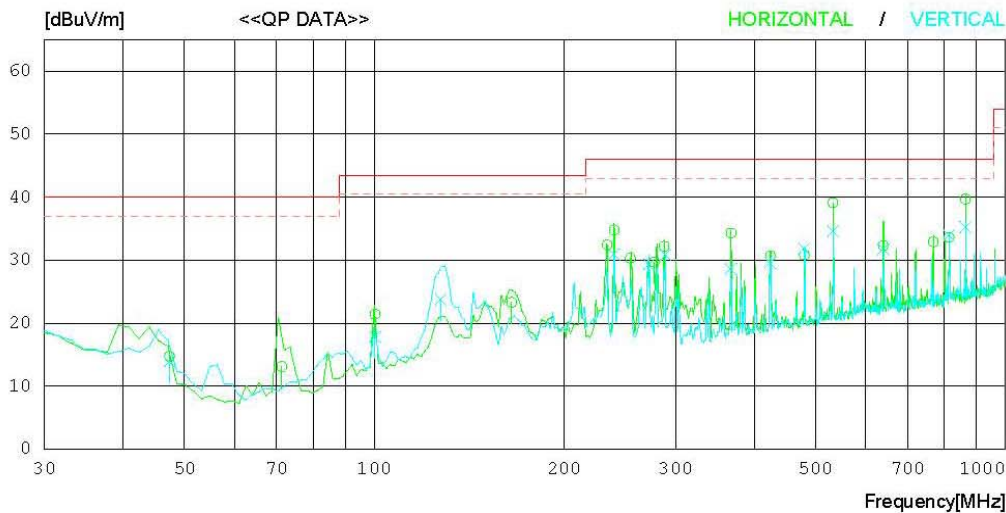
RADIATED EMISSION

Date : 2009-04-22

Model Name : FB100AS Reference No. :
 Model No. : Power Supply : 120V 60Hz
 Serial No. : Identical prototype Temp/Humi : 19°C 33%
 Test Condition : TX:2441MHz 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	47.380	25.0	11.1	1.0	22.4	14.7	40.0	25.3	101	248
2	71.290	28.0	6.4	1.2	22.5	13.1	40.0	26.9	101	252
3	100.230	32.0	10.5	1.4	22.5	21.4	43.5	22.1	221	358
4	165.110	34.2	10.0	1.7	22.6	23.3	43.5	20.2	192	358
5	240.000	43.1	12.6	2.1	23.0	34.8	46.0	11.2	201	249
6	233.860	41.0	12.3	2.1	23.0	32.4	46.0	13.6	201	180
7	254.470	38.0	13.2	2.2	23.1	30.3	46.0	15.7	101	244
8	277.500	37.2	13.6	2.3	23.4	29.7	46.0	16.3	125	112
9	287.960	39.5	13.8	2.3	23.4	32.2	46.0	13.8	101	358
10	367.510	39.8	15.5	2.8	23.8	34.3	46.0	11.7	301	0
11	424.113	35.3	16.5	3.0	24.1	30.7	46.0	15.3	101	216
12	480.100	34.8	17.0	3.2	24.2	30.8	46.0	15.2	201	1
13	533.080	42.3	17.7	3.4	24.3	39.1	46.0	6.9	182	358
14	639.990	34.0	18.6	3.8	24.1	32.3	46.0	13.7	201	79
15	864.000	39.0	19.5	4.5	23.3	39.7	46.0	6.3	121	250
16	814.220	33.2	19.5	4.3	23.4	33.6	46.0	12.4	101	358
17	769.000	33.2	19.2	4.2	23.7	32.9	46.0	13.1	301	0
----- Vertical -----										
18	47.380	24.2	11.1	1.0	22.4	13.9	40.0	26.1	100	358
19	100.240	28.4	10.5	1.4	22.5	17.8	43.5	25.7	104	238
20	127.300	33.2	11.6	1.5	22.6	23.7	43.5	19.8	199	358
21	240.100	39.2	12.6	2.1	23.0	30.9	46.0	15.1	100	1
22	272.400	36.8	13.5	2.3	23.3	29.3	46.0	16.7	199	212
23	289.500	38.0	13.8	2.4	23.4	30.8	46.0	15.2	100	273
24	533.110	37.8	17.7	3.4	24.3	34.6	46.0	11.4	100	1
25	480.000	35.9	17.0	3.2	24.2	31.9	46.0	14.1	100	1
26	864.000	34.5	19.5	4.5	23.3	35.2	46.0	10.8	100	1
27	814.390	33.5	19.5	4.3	23.4	33.9	46.0	12.1	100	1
28	424.120	34.2	16.5	3.0	24.1	29.6	46.0	16.4	100	321
29	367.510	34.1	15.5	2.8	23.8	28.6	46.0	17.4	100	1
30	640.913	33.4	18.6	3.8	24.1	31.7	46.0	14.3	100	1

Harmonic Measurement Data: Fundamental Frequency = 2441MHz

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
2249	Hor	-	51.39	43.26	-2.48	-	48.91	40.78	-	74.00	54.00	-	25.09	13.22
2249	Ver	-	48.99	40.17	-2.48	-	46.51	37.69	-	74.00	54.00	-	27.49	16.31
4882	Hor	-	50.43	41.79	6.55	-	56.98	48.34	-	74.00	54.00	-	17.02	5.66
4882	Ver	-	52.99	45.24	6.55	-	59.54	51.79	-	74.00	54.00	-	14.46	2.21
7323	Hor	-	45.67	34.41	12.17	-	57.84	46.58	-	74.00	54.00	-	16.16	7.42
7323	Ver	-	45.96	34.10	12.17	-	58.13	46.27	-	74.00	54.00	-	15.87	7.73

Note.

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. If peak result meet AV limit, AV measurement is omitted.
3. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

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

- Continue next to page

- Measurement Data:



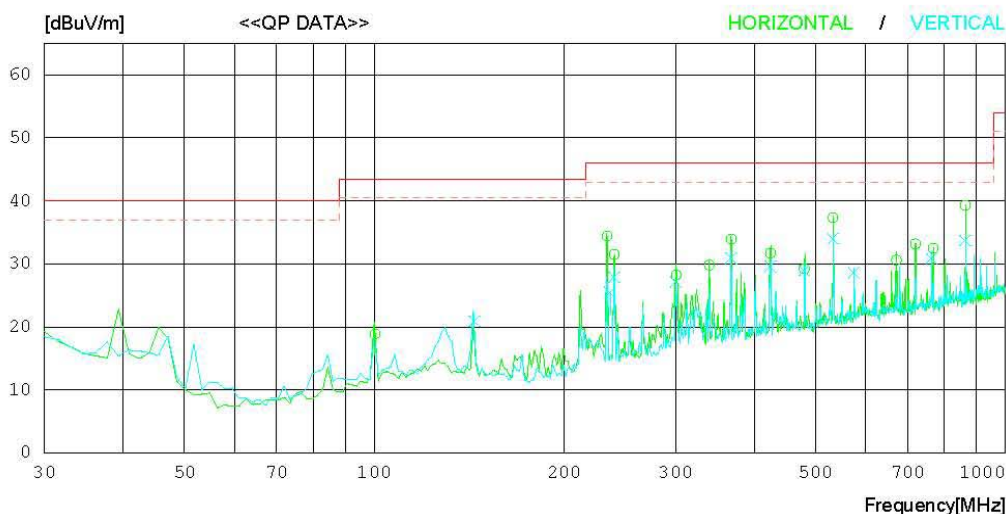
RADIATED EMISSION

Date : 2009-04-23

Model Name : FB100AS Reference No. :
 Model No. : Power Supply : 120V 60Hz
 Serial No. : Identical prototype Temp/Humi : 19°C 33%
 Test Condition : TX:2480MHz 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	100.250	29.5	10.5	1.4	22.5	18.9	43.5	24.6	101	1
2	233.920	43.0	12.3	2.1	23.0	34.4	46.0	11.6	101	222
3	239.970	39.8	12.6	2.1	23.0	31.5	46.0	14.5	201	359
4	300.700	35.2	14.0	2.4	23.4	28.2	46.0	17.8	301	244
5	367.560	39.4	15.5	2.8	23.8	33.9	46.0	12.1	101	1
6	339.350	36.0	14.9	2.6	23.7	29.8	46.0	16.2	101	1
7	424.190	36.3	16.5	3.0	24.1	31.7	46.0	14.3	201	0
8	480.000	33.2	17.0	3.2	24.2	29.2	46.0	16.8	201	0
9	533.110	40.5	17.7	3.4	24.3	37.3	46.0	8.7	101	113
10	864.030	38.6	19.5	4.5	23.3	39.3	46.0	6.7	101	220
11	719.950	34.3	18.8	4.0	23.9	33.2	46.0	12.8	201	0
12	768.190	32.8	19.2	4.2	23.7	32.5	46.0	13.5	201	0
13	671.870	32.1	18.6	3.9	24.0	30.6	46.0	15.4	101	113
----- Vertical -----										
14	144.040	31.2	10.7	1.6	22.6	20.9	43.5	22.6	100	239
15	240.000	36.2	12.6	2.1	23.0	27.9	46.0	18.1	100	358
16	236.300	34.0	12.4	2.1	23.0	25.5	46.0	20.5	100	0
17	300.670	34.1	14.0	2.4	23.4	27.1	46.0	18.9	100	358
18	367.470	36.4	15.5	2.8	23.8	30.9	46.0	15.1	100	0
19	424.160	34.2	16.5	3.0	24.1	29.6	46.0	16.4	100	310
20	480.000	33.0	17.0	3.2	24.2	29.0	46.0	17.0	199	1
21	533.100	37.2	17.7	3.4	24.3	34.0	46.0	12.0	100	141
22	575.980	31.0	18.3	3.6	24.3	28.6	46.0	17.4	199	262
23	763.490	31.2	19.1	4.2	23.7	30.8	46.0	15.2	299	141
24	864.000	33.0	19.5	4.5	23.3	33.7	46.0	12.3	199	320

Harmonic Measurement Data: Fundamental Frequency = 2480MHz

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
2256	Hor	-	49.54	39.71	-2.52	-	47.02	37.19	-	74.00	54.00	-	26.98	16.81
2256	Ver	-	50.82	40.85	-2.52	-	48.30	38.33	-	74.00	54.00	-	25.70	15.67
4960	Hor	-	50.09	41.76	6.92	-	57.01	48.68	-	74.00	54.00	-	16.99	5.32
4960	Ver	-	51.84	43.49	6.92	-	58.76	50.41	-	74.00	54.00	-	15.24	3.59
7440	Hor	-	45.44	32.46	12.32	-	57.76	44.78	-	74.00	54.00	-	16.24	9.22
7440	Ver	-	45.76	32.58	12.32	-	58.08	44.90	-	74.00	54.00	-	15.92	9.10

Note.

4. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
5. If peak result meet AV limit, AV measurement is omitted.
6. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

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

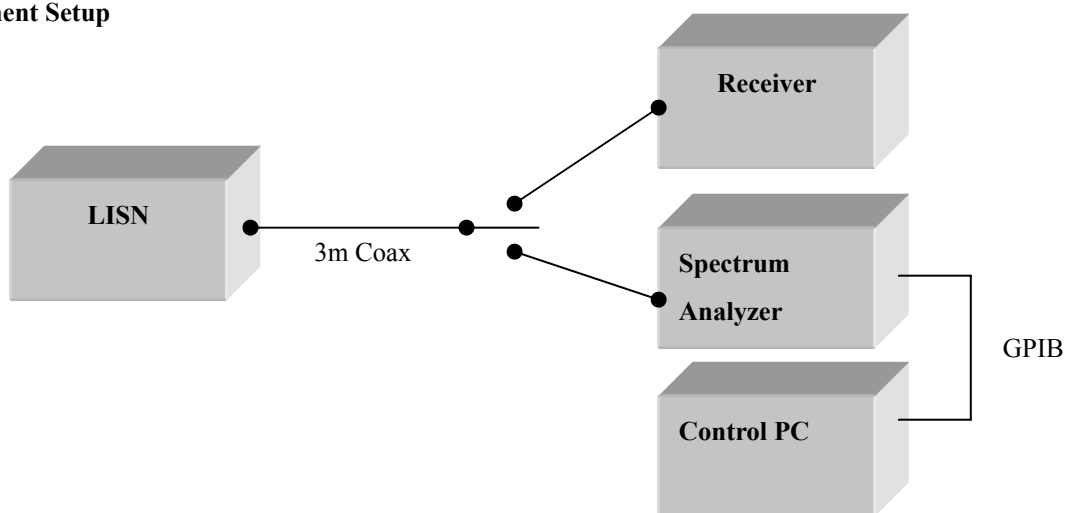
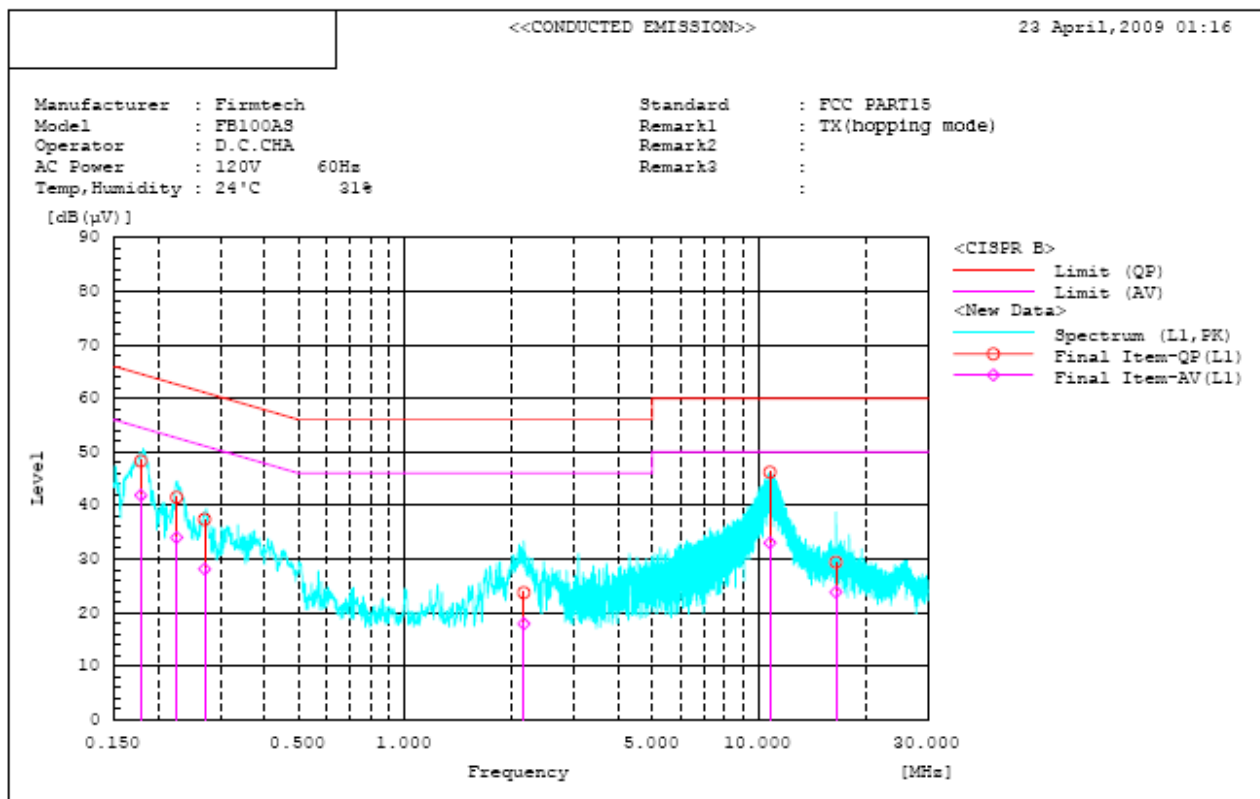
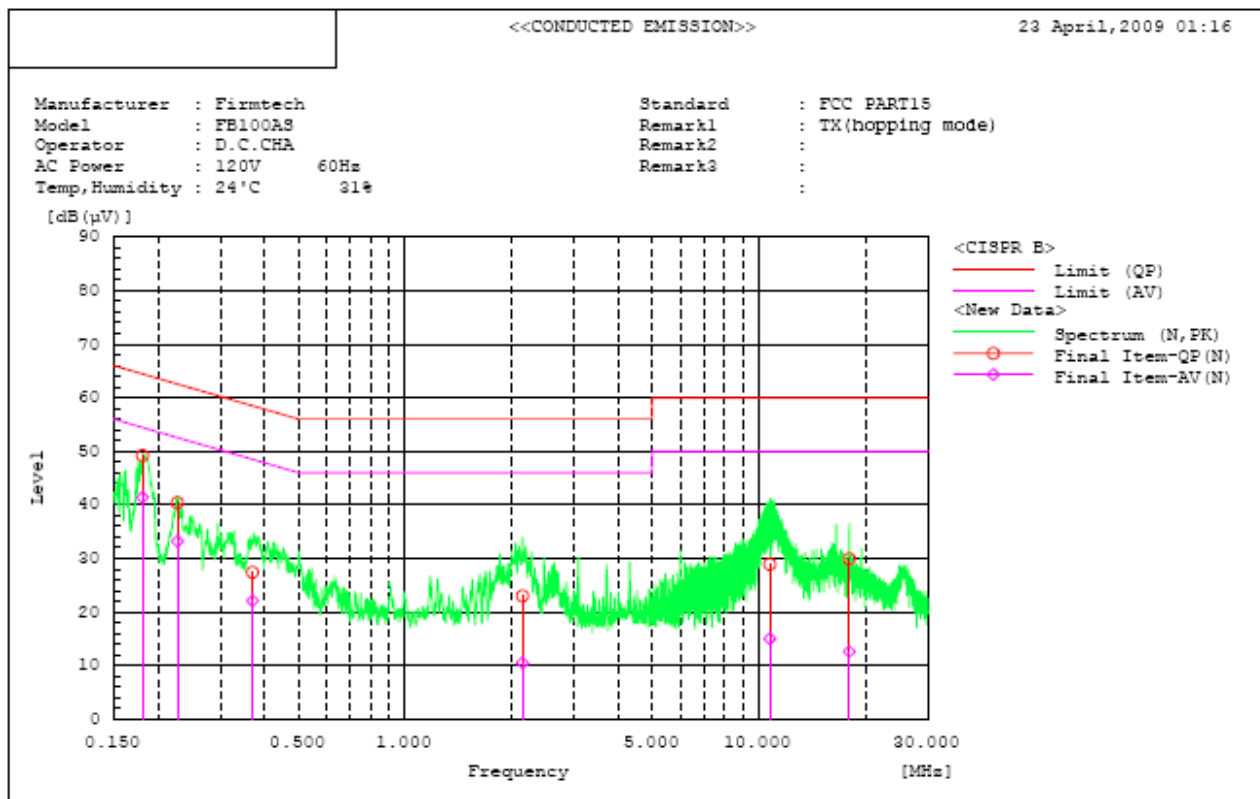


Figure 2: Measurement setup for AC Conducted Emission

- Conducted Emission Graph -



- Conducted Emission List -

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*****
<<CONDUCTED EMISSION>>
23 April, 2009 01:16

Standard      : FCC PART15
Manufacturer  : Firmtech
Model         : FB100AS
Operator      : D.C.CHA
AC Power      : 120V   60Hz
Temp, Humidity : 24°C   31%
Remark1       : TX(hopping mode)
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	49.1	41.3	0.1	49.2	41.4	64.4	54.4	15.2	13.0	
2	0.227	40.2	33.0	0.2	40.4	33.2	62.6	52.6	22.2	19.4	
3	2.146	22.7	10.2	0.3	23.0	10.5	56.0	46.0	33.0	35.5	
4	0.370	27.2	21.9	0.2	27.4	22.1	58.5	48.5	31.1	26.4	
5	10.732	28.3	14.4	0.6	28.9	15.0	60.0	50.0	31.1	35.0	
6	18.000	29.0	11.7	0.9	29.9	12.6	60.0	50.0	30.1	37.4	

--- 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	47.9	41.5	0.4	48.3	41.9	64.5	54.5	16.2	12.6	
2	0.226	41.1	33.6	0.4	41.5	34.0	62.6	52.6	21.1	18.6	
3	2.164	23.2	17.4	0.5	23.7	17.9	56.0	46.0	32.3	28.1	
4	10.741	45.4	32.2	0.8	46.2	33.0	60.0	50.0	13.8	17.0	
5	16.510	28.5	22.9	0.9	29.4	23.8	60.0	50.0	30.6	26.2	
6	0.271	37.0	27.7	0.4	37.4	28.1	61.1	51.1	23.7	23.0	

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
<input checked="" type="checkbox"/>	Spectrum Analyzer	Agilent	E4440A	06/11/08	06/11/09	MY45304199
<input type="checkbox"/>	Spectrum Analyzer	Rohde Schwarz	FSQ26	02/02/09	02/02/10	200347
<input type="checkbox"/>	Spectrum Analyzer(RE)	H.P	8563E	13/10/08	13/10/09	3551A04634
<input type="checkbox"/>	Power Meter	H.P	EMP-442A	10/07/08	10/07/09	GB37170413
<input type="checkbox"/>	Power Sensor	H.P	8481A	14/07/08	14/07/09	3318A96332
<input type="checkbox"/>	Power Divider	Agilent	11636B	04/12/08	04/12/09	56471
<input type="checkbox"/>	Power Splitter	Anritsu	K241B	14/10/08	14/10/09	020611
<input type="checkbox"/>	Frequency Counter	H.P	5342A	16/09/08	16/09/09	2119A04450
<input type="checkbox"/>	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/08	10/10/09	30604493/021031
<input checked="" type="checkbox"/>	Digital Multimeter	H.P	34401A	13/03/09	13/03/10	3146A13475
<input type="checkbox"/>	Multifunction Synthesizer	HP	8904A	06/10/08	06/10/09	3633A08404
<input checked="" type="checkbox"/>	Signal Generator	Rohde Schwarz	SMR20	13/03/09	13/03/10	101251
<input checked="" type="checkbox"/>	Signal Generator	H.P	ESG-3000A	09/07/08	09/07/09	US37230529
<input type="checkbox"/>	Vector Signal Generator	Rohde Schwarz	SMJ100A	02/02/09	02/02/10	100148
<input type="checkbox"/>	Audio Analyzer	H.P	8903B	09/07/08	09/07/09	3011A09448
<input type="checkbox"/>	Modulation Analyzer	H.P	8901B	18/07/08	18/07/09	3028A03029
<input type="checkbox"/>	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	31/07/08	31/07/09	GB43461134
<input type="checkbox"/>	Universal Radio communication Tester	Rohde Schwarz	CMU 200	13/03/09	13/03/10	107631
<input type="checkbox"/>	Bluetooth Tester	TESCOM	TC-3000A	16/12/08	16/12/09	3000A4A0121
<input type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-3
<input checked="" type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-2
<input type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-4
<input type="checkbox"/>	AC Power supply	DAEKWANG	5KVA	13/03/09	13/03/10	20060321-1
<input type="checkbox"/>	DC Power Supply	HP	6622A	13/03/09	13/03/10	3448A03760
<input type="checkbox"/>	DC Power Supply	HP	6633A	13/03/09	13/03/10	3524A06634
<input type="checkbox"/>	BAND Reject Filter	Microwave Circuits	N0308372	06/10/08	06/10/09	3125-01DC0352
<input type="checkbox"/>	BAND Reject Filter	Wainwright	WRCG1750	06/10/08	06/10/09	2
<input type="checkbox"/>	High-Pass Filter	ANRITSU	MP526D	06/10/08	06/10/09	MP27756
<input type="checkbox"/>	High-pass filter	Wainwright	WHKX2.1	N/A	N/A	1
<input checked="" type="checkbox"/>	High-Pass Filter	Wainwright	WHKX3.0	N/A	N/A	9
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	10
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	27
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCT1900.0 /2200.0-5/40-10SSK	N/A	N/A	7
<input checked="" type="checkbox"/>	HORN ANT	ETS	3115	13/06/08	13/06/09	6419
<input type="checkbox"/>	HORN ANT	ETS	3115	10/09/08	10/09/09	21097
<input type="checkbox"/>	HORN ANT	A.H.Systems	SAS-574	13/06/08	13/06/09	154
<input type="checkbox"/>	HORN ANT	A.H.Systems	SAS-574	13/06/08	13/06/09	155
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	VHA9103	25/11/08	25/11/09	2116
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	VHA9103	25/11/08	25/11/09	2117
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	UHA9105	25/11/08	25/11/09	2261
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	UHA9105	25/11/08	25/11/09	2262

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
<input type="checkbox"/>	Coaxial Fixed Attenuators	Agilent	8491B	01/08/08	01/08/09	MY39260700
<input type="checkbox"/>	Coaxial Fixed Attenuators	Agilent	8491B	15/07/08	15/07/09	MY39260699
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHHEL	23-10-34	01/10/08	01/10/09	BP4386
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHHEL	23-10-34	19/01/09	19/01/10	BP4387
<input type="checkbox"/>	Attenuator (20dB)	WEINSCHHEL	86-20-11	06/10/08	06/10/09	432
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHHEL	86-10-11	06/10/08	06/10/09	446
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHHEL	86-10-11	06/10/08	06/10/09	408
<input type="checkbox"/>	Attenuator (40dB)	WEINSCHHEL	57-40-33	01/10/08	01/10/09	NN837
<input type="checkbox"/>	Attenuator (30dB)	JFW	50FH-030-300	13/03/09	13/03/10	060320-1
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	11/07/08	11/07/09	788
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	11/07/08	11/07/09	790
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0215CAN	11/07/08	11/07/09	112
<input checked="" type="checkbox"/>	Amplifier (30dB)	Agilent	8449B	13/10/08	13/10/09	3008A01590
<input type="checkbox"/>	Amplifier	EMPOWER	BBS3Q7ELU	02/02/09	02/02/10	1020
<input type="checkbox"/>	RF Power Amplifier	OPHIRRF	5069F	09/07/08	09/07/09	1006
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	R&S	ESU	02/02/09	02/02/10	100014
<input checked="" type="checkbox"/>	BILOG ANTENNA	SCHAFFNER	CBL6112B	13/06/08	13/06/09	2737
<input checked="" type="checkbox"/>	Amplifier (22dB)	H.P	8447E	05/02/09	05/02/10	2945A02865
<input type="checkbox"/>	EMI TEST RECEIVER	R&S	ESCI	13/05/08	13/05/09	100364
<input type="checkbox"/>	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A	13/06/08	13/06/09	590
<input type="checkbox"/>	BICONICAL ANT.	Schwarzbeck	VHA 9103	13/06/08	13/06/09	2233
<input type="checkbox"/>	LOG-PERIODIC ANT.	Schwarzbeck	UHALP 9108-A1	30/09/08	30/09/09	1098
<input type="checkbox"/>	BICONICAL ANT.	Schwarzbeck	VHA 9103	30/09/08	30/09/09	91031946
<input type="checkbox"/>	Low Noise Pre Amplifer	TSJ	MLA-100K01-B01-2	13/03/09	13/03/10	1252741
<input type="checkbox"/>	Amplifier (25dB)	Agilent	8447D	21/05/08	21/05/09	2944A10144
<input type="checkbox"/>	Amplifier (25dB)	Agilent	8447D	18/08/08	18/08/09	2648A04922
<input checked="" type="checkbox"/>	Spectrum Analyzer(CE)	H.P	8591E	26/04/09	26/04/10	3649A05889
<input type="checkbox"/>	LISN	Kyoritsu	KNW-407	04/08/08	04/08/09	8-317-8
<input checked="" type="checkbox"/>	LISN	Kyoritsu	KNW-242	11/09/08	11/09/09	8-654-15
<input checked="" type="checkbox"/>	CVCF	NF Electronic	4420	N/A	N/A	304935/337980
<input checked="" type="checkbox"/>	DC BLOCK	Hyuplip	KEL-007	N/A	N/A	7-1581-5
<input checked="" type="checkbox"/>	50 ohm Terminator	HME	CT-01	22/01/09	22/01/10	N/A
<input checked="" type="checkbox"/>	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	11/09/08	11/09/09	4N-170-3