



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.digitalemcc.com>

CERTIFICATION OF COMPLIANCE

LG Electronics USA.

1000 Sylvan Avenue Englewood Cliffs New Jersey United States

Dates of Tests: January 05 ~ 10, 2009

Test Report S/N: DR50110901AO

Test Site : DIGITAL EMC CO., LTD.

FCC ID

BEJHBM220

APPLICANT

LG Electronics USA.

FCC Equipment Class	:	Part 15 Spread Spectrum Transmitter(DSS)
Device name	:	BLUETOOTH Mono Headset
Manufacturer	:	LG Electronics USA.
FCC ID	:	BEJHBM220
Model name	:	HBM-220
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	:	5.46 dBm Conducted
Data of issue	:	January 13, 2009

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

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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

Tel: +82-31-321-2664 Fax: +82-31-321-1664

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

January 13, 2009

D.C. Cha



Data

Name

Signature

Report Reviewed By: Technical Director

January 13, 2009

Harvey Sung



Data

Name

Signature

Ordering party:

Company name : LG Electronics Inc.

Address : LG Twin Tower West Tower 22F Yoido-dong, Youngdungpo-gu

City/town : Seoul

Country : Korea

Date of order : December 22, 2008

2. Information about test item

BEJHBM220

2.1 Equipment information

Equipment model no.	HBM-220
Equipment serial no.	Identical prototype
Type of equipment	BLUETOOTH Mono Headset
Frequency band	2402 ~ 2480 MHz
Type of Modulation	GFSK
Spread Spectrum	Frequency Hopping
Channel Spacing	1.0 MHz
Type of antenna	Monopole 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	: 3.7 V DC

2.4 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
Adapter	STA-P51WR	RC73170608	SUNLIN	DC 4.8V, 0.9A
Battery	B041230Q28	N/A	TCL HYPER-POWER BATTERIES	DC 3.7V, 115mAh
Battery	B041230Q39	N/A	TCL HYPER-POWER BATTERIES	DC 3.7V, 115mAh

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 (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 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	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 = 3 MHz (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:

Frequency of marker #1 (MHz)	Frequency of marker #2 (MHz)	Test Results	
		Carrier Frequency Separation (MHz)	Result
2441.000	2442.005	1.005	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

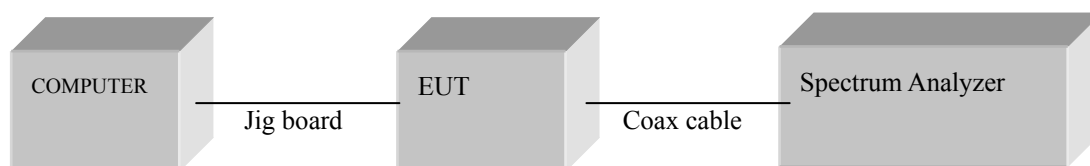
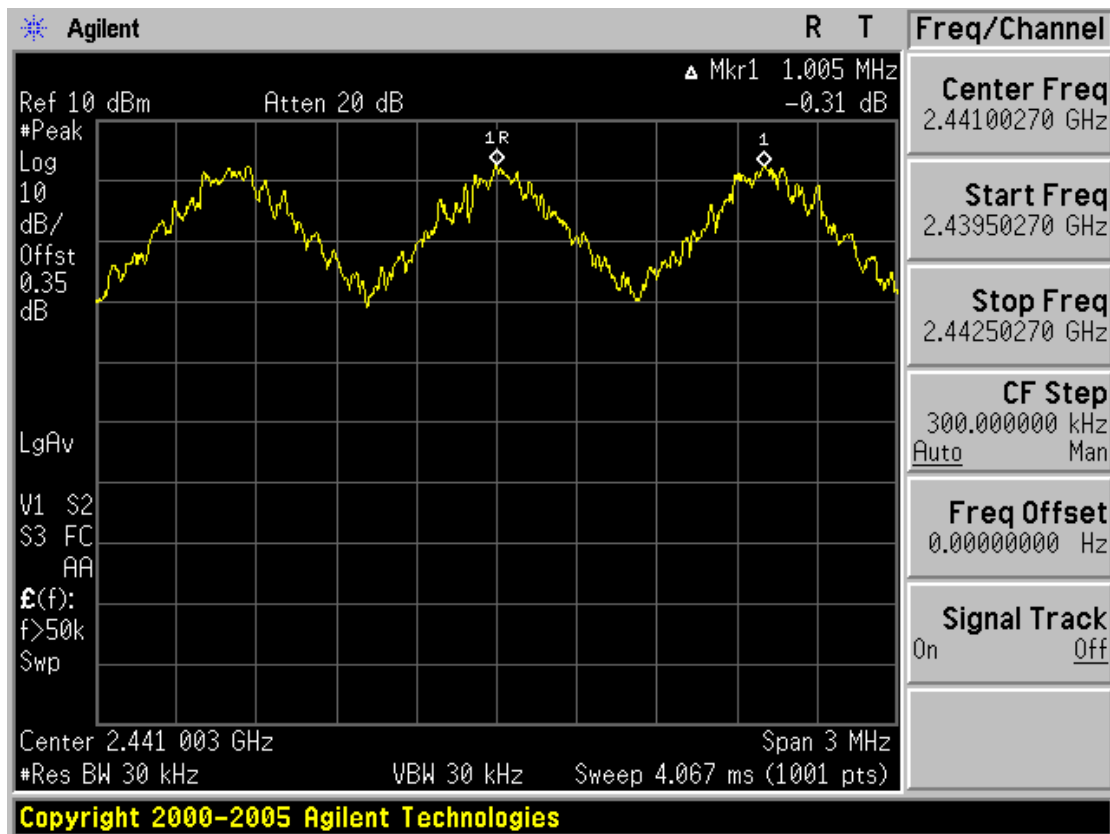


Figure 1: Measurement setup for the carrier frequency separation

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 $\geq$ RBW) Detector function = peak

Trace = max hold Span = 25MHz

- Measurement Data: **Comply**

Total number of Hopping Channels	79
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- See next pages for actual measured spectrum plots.

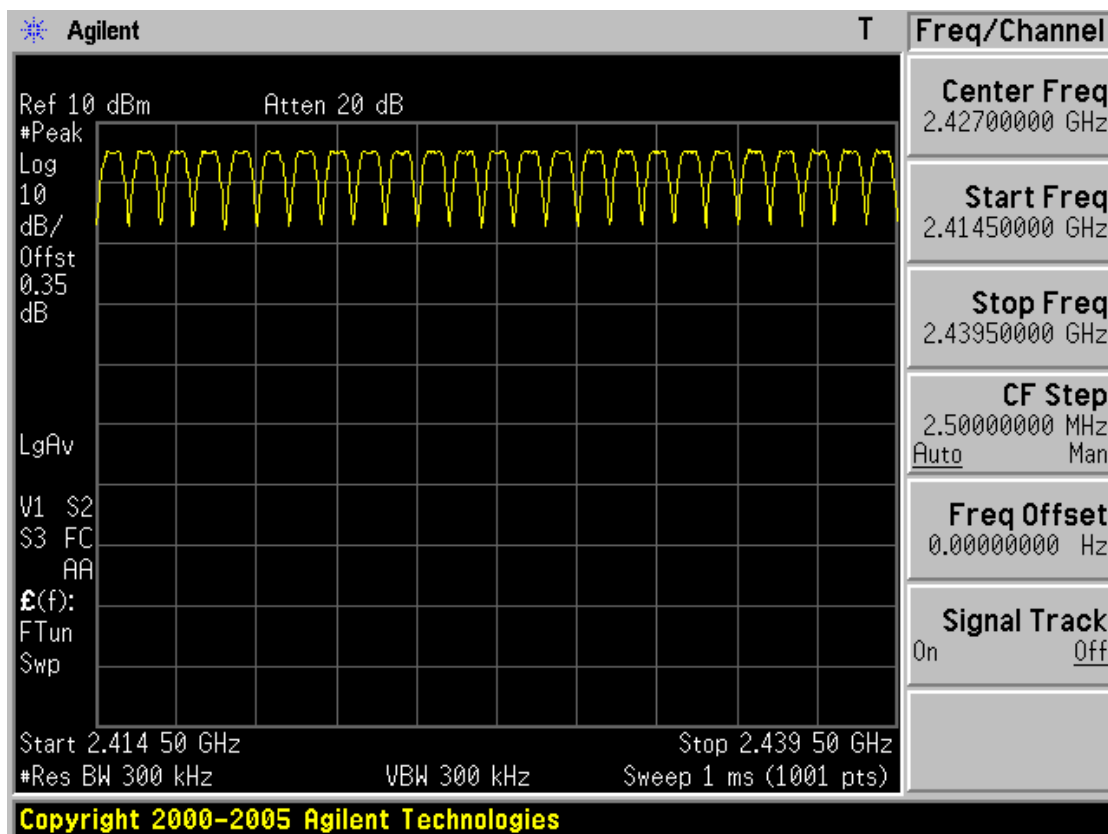
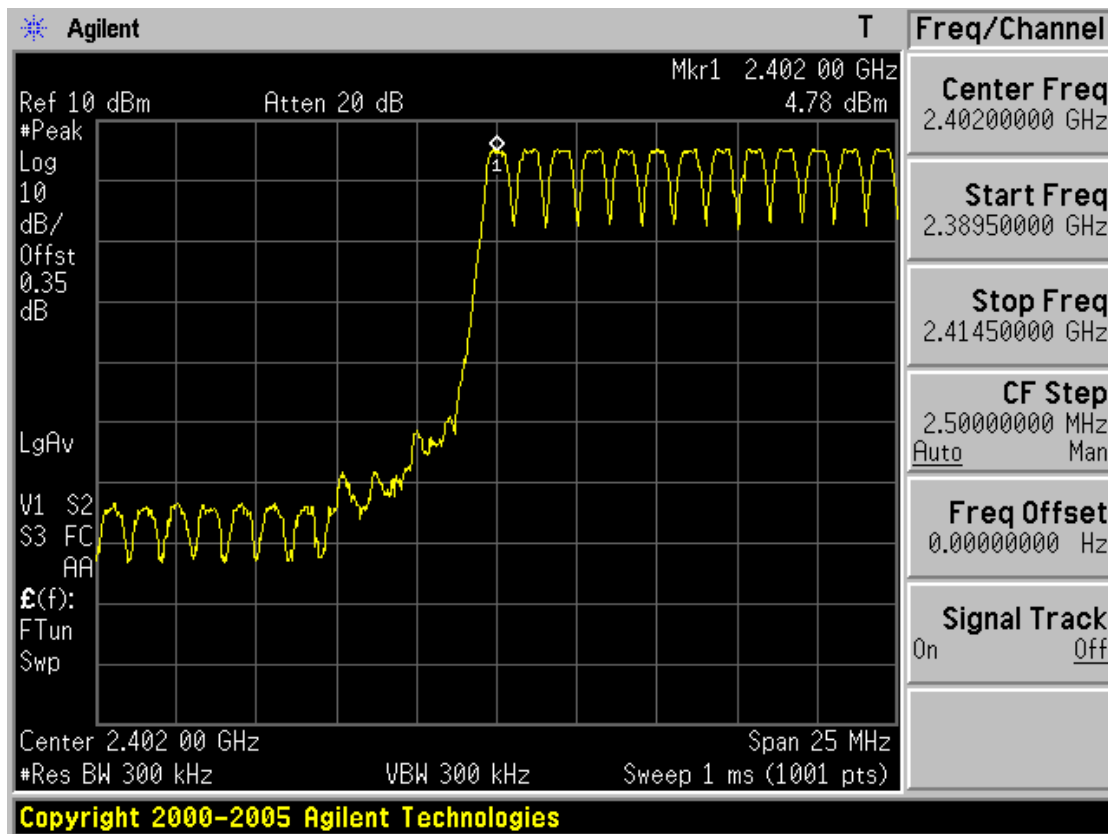
- Minimum Standard:

At least 15 hops

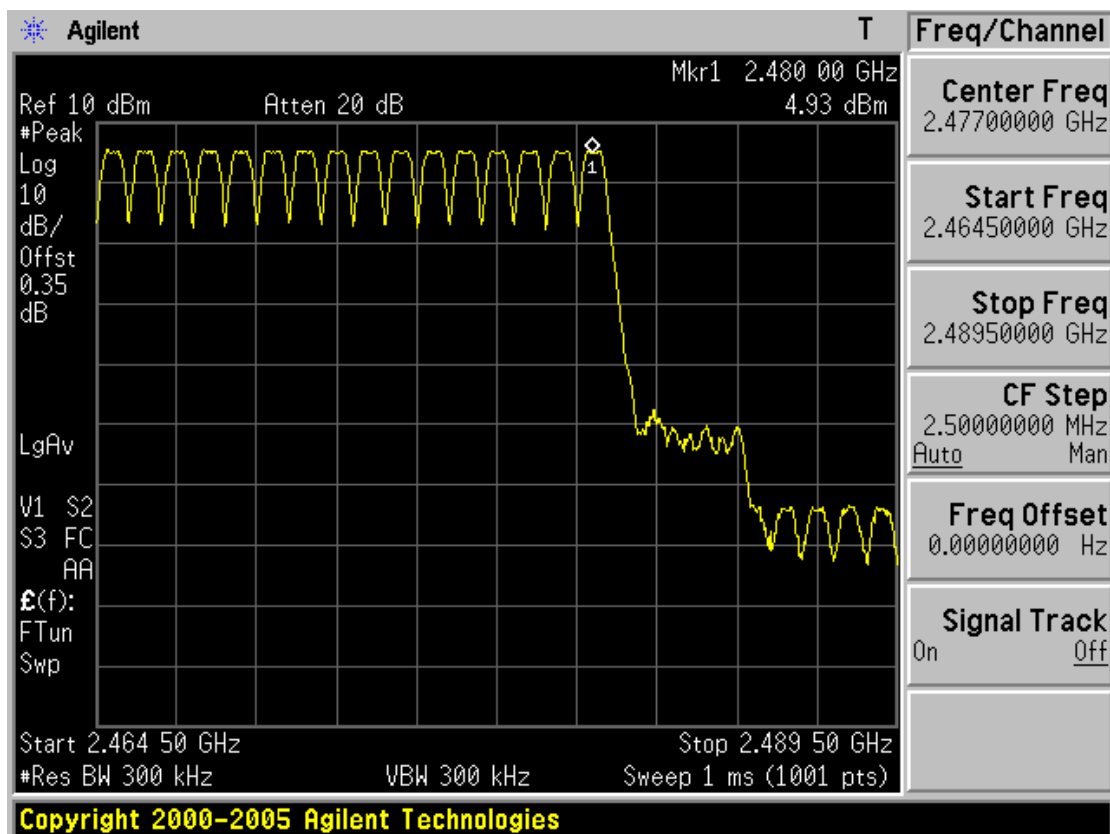
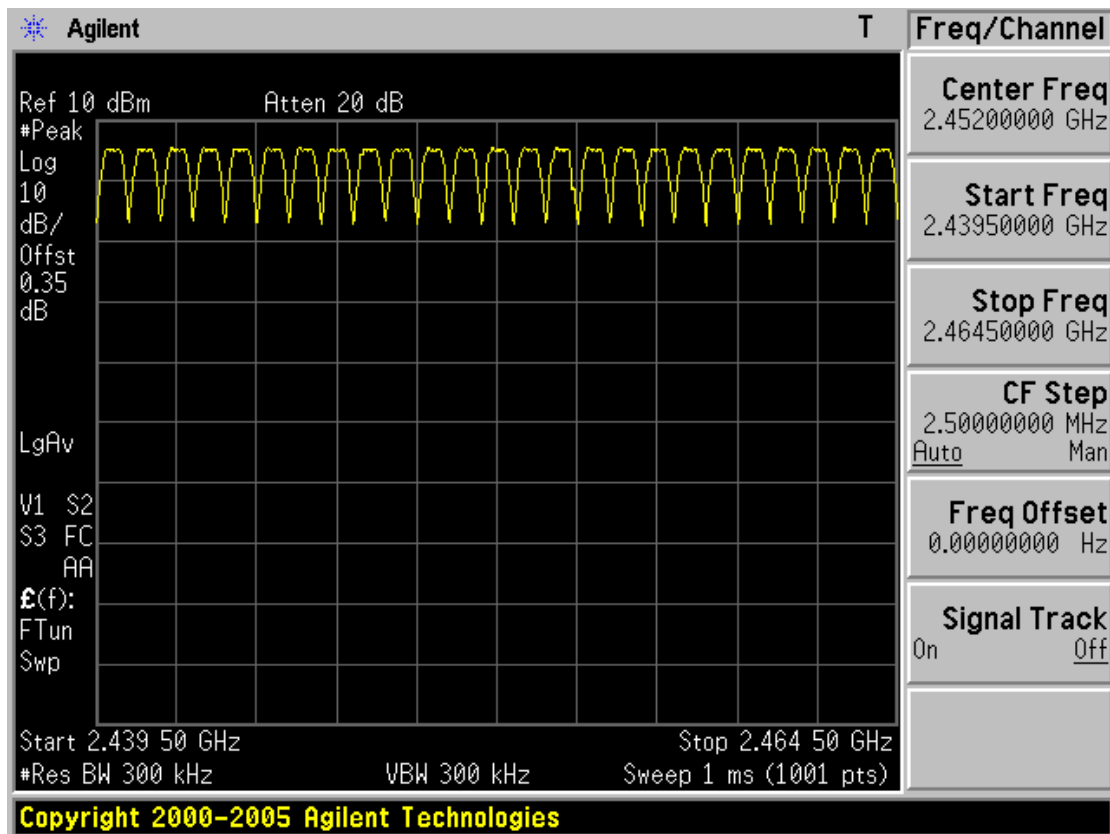
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

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 = 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 $\geq$ RBW) Detector function = peak

Trace = max hold

- Measurement Data:

Frequency (MHz)	Channel No.	Test Results	
		Measured Bandwidth (MHz)	Result
2402	1	0.930	Comply
2441	40	0.930	Comply
2480	79	0.930	Comply

- See next pages for actual measured spectrum plots.

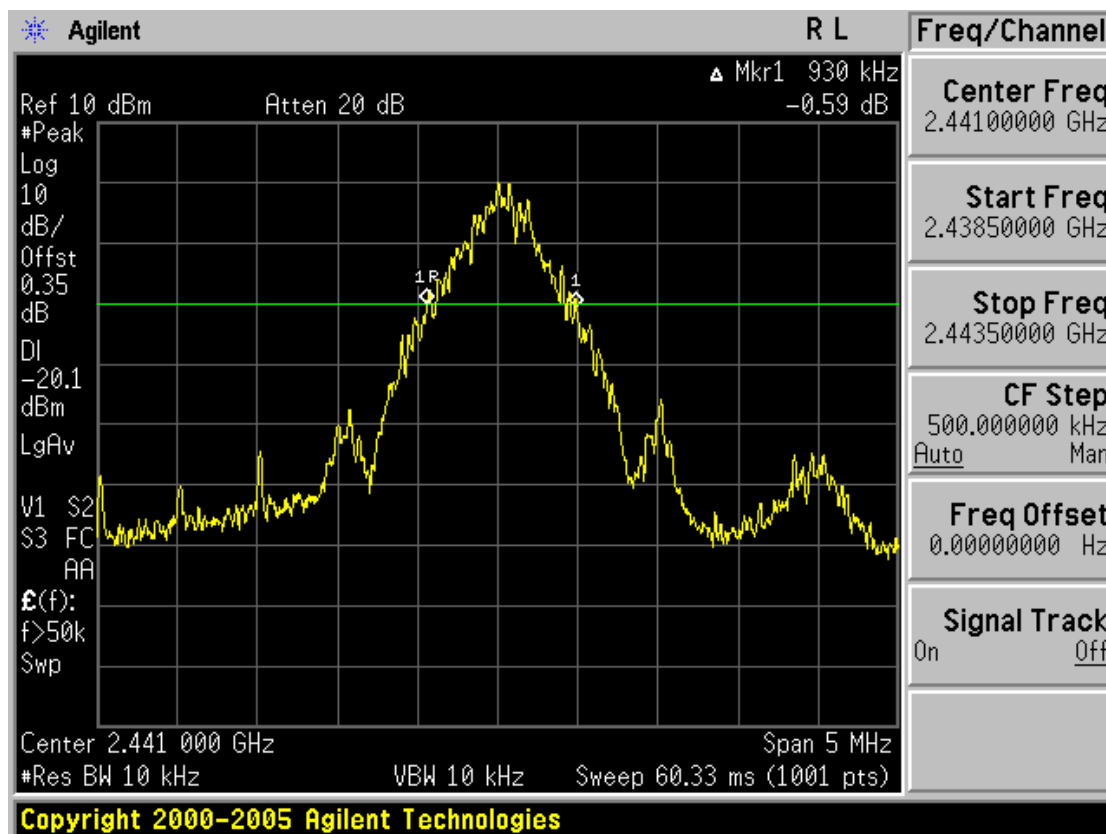
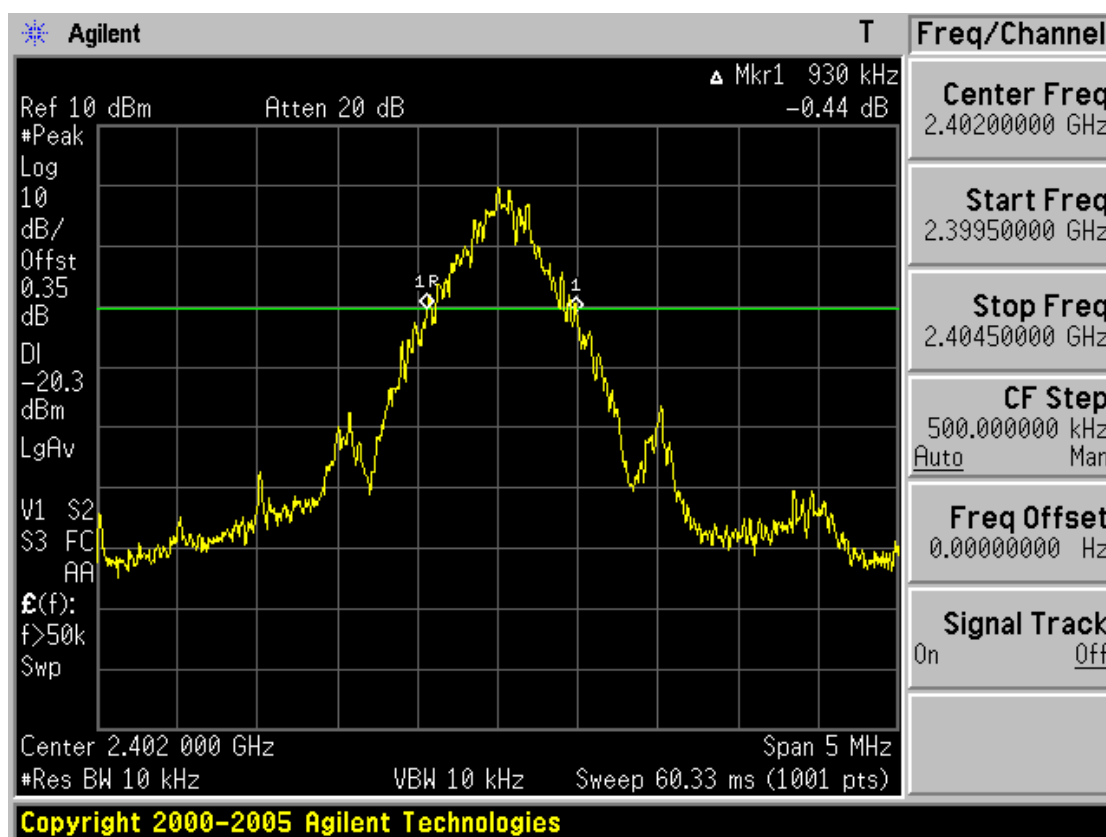
- Minimum Standard:

None

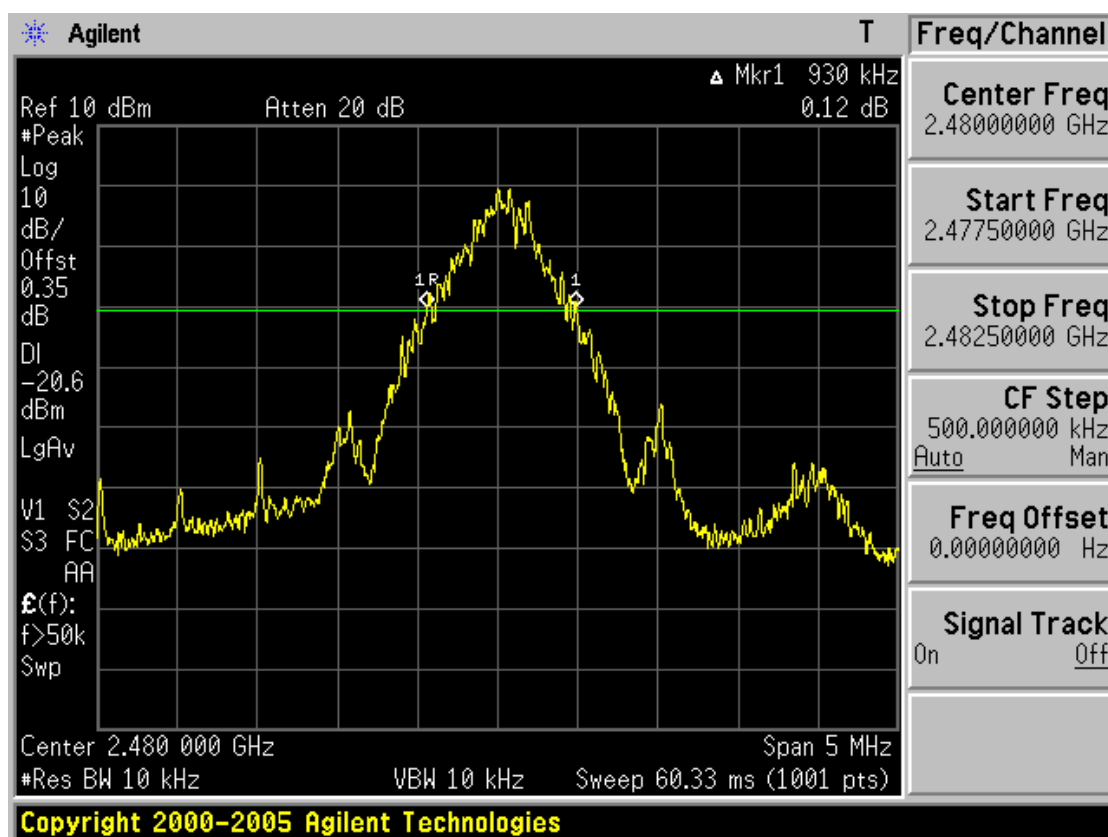
- Measurement Setup

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 $\geq$ 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	2.90	3.75	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.

$$\text{DWELL TIME} = (0.4 \times \text{Number of hopping Channels}) \times \text{Burst On time} / (\text{period} \times \text{Number of hopping Channels})$$

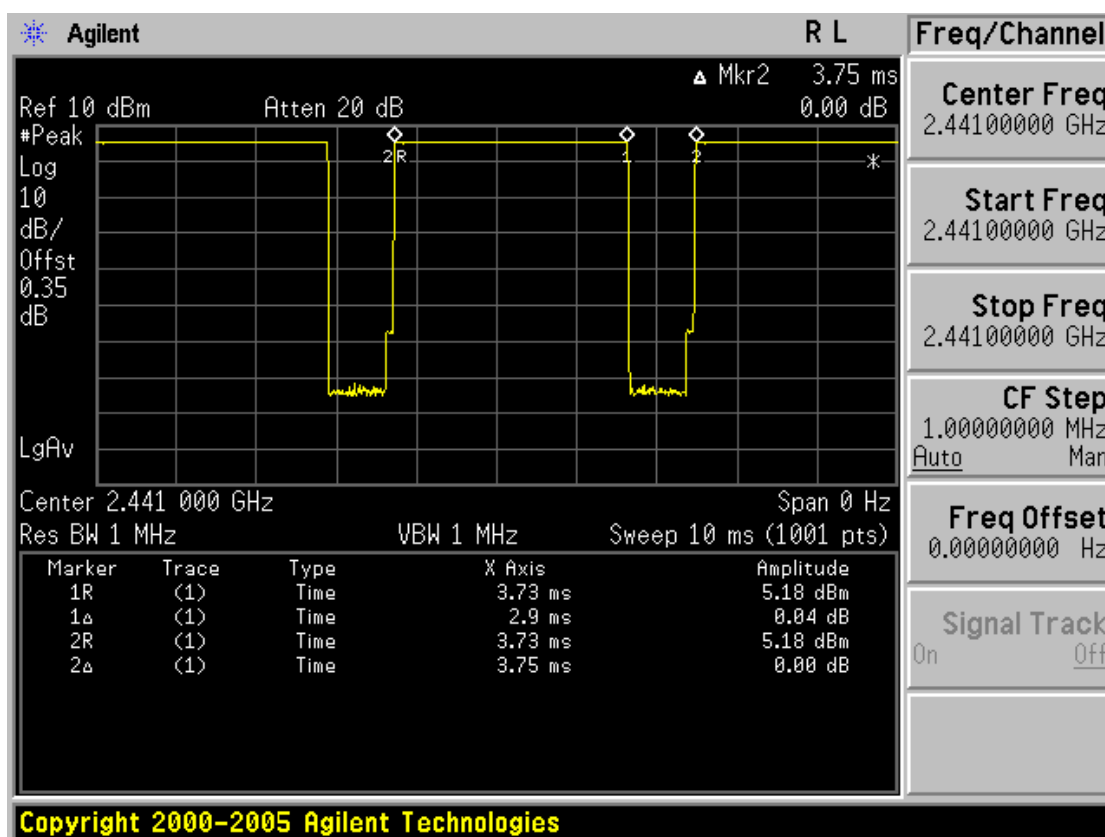
- Minimum Standard:

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 $\geq$ RBW)

Detector function = peak

Trace = max hold

Sweep = auto

- Measurement Data:

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	1	5.20	3.311	Comply
2441	40	5.46	3.516	Comply
2480	79	5.36	3.436	Comply

- See next pages for actual measured spectrum plots.

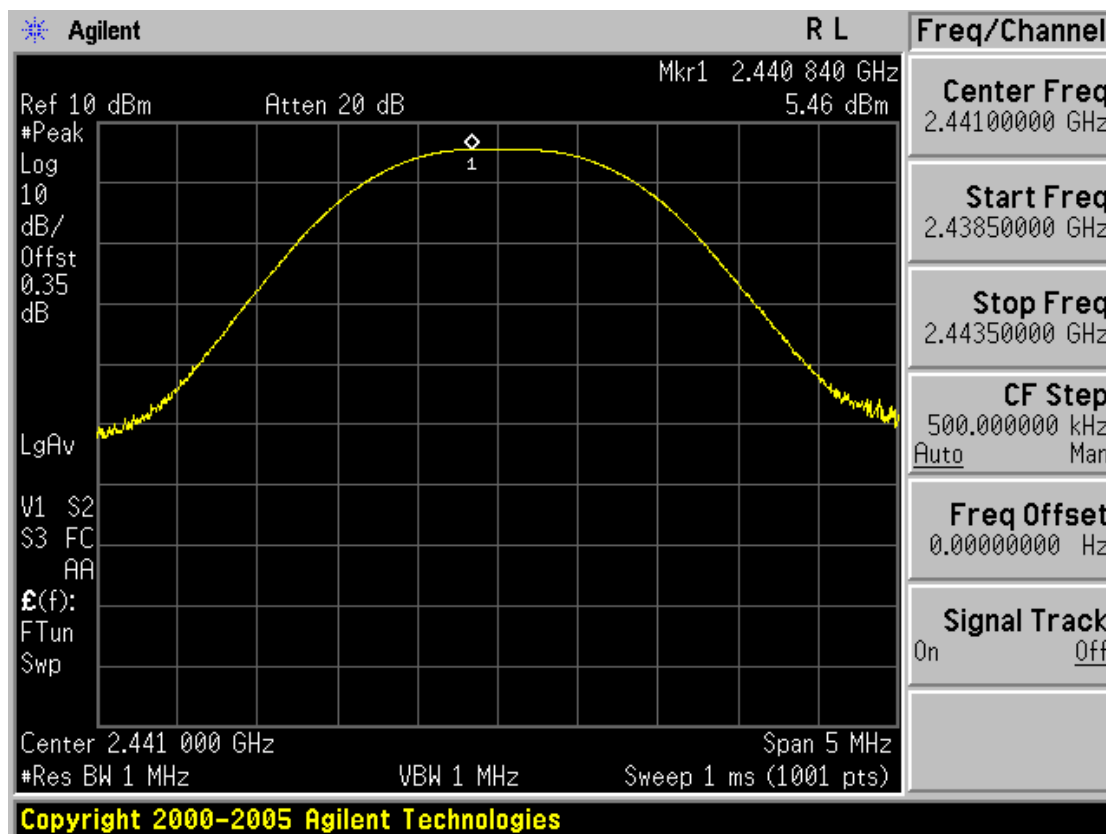
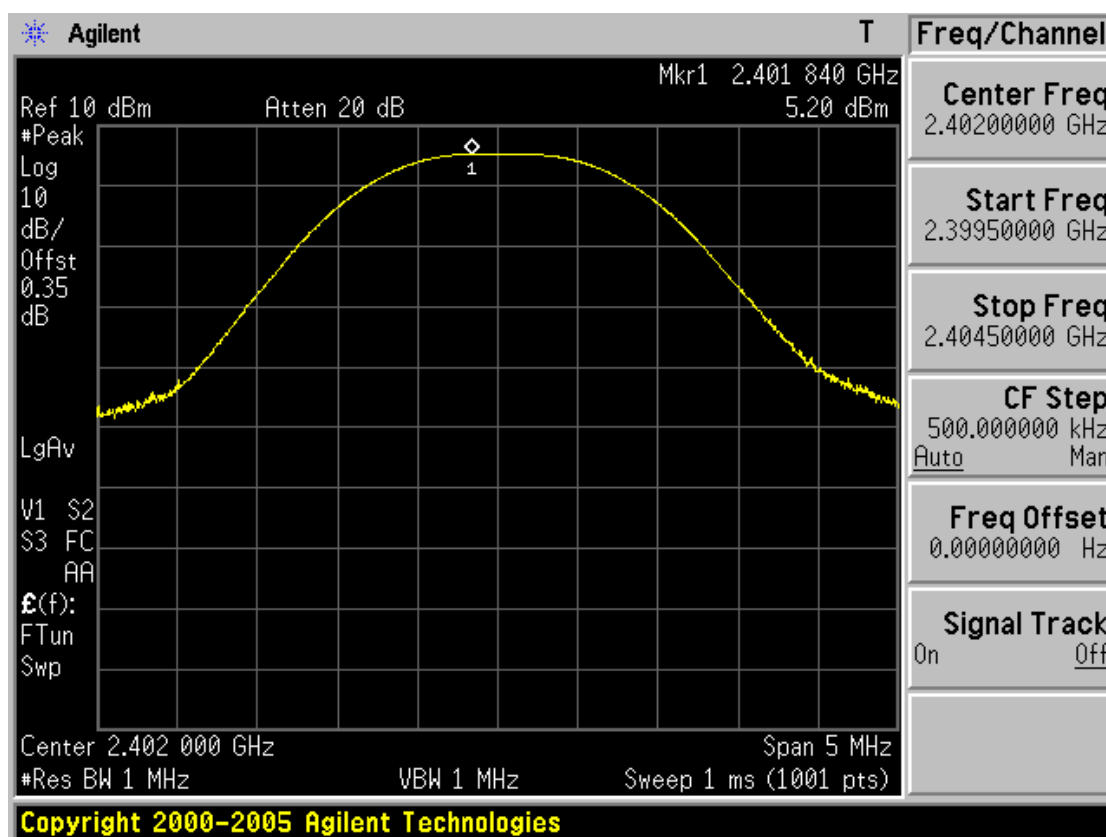
- Minimum Standard:

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**

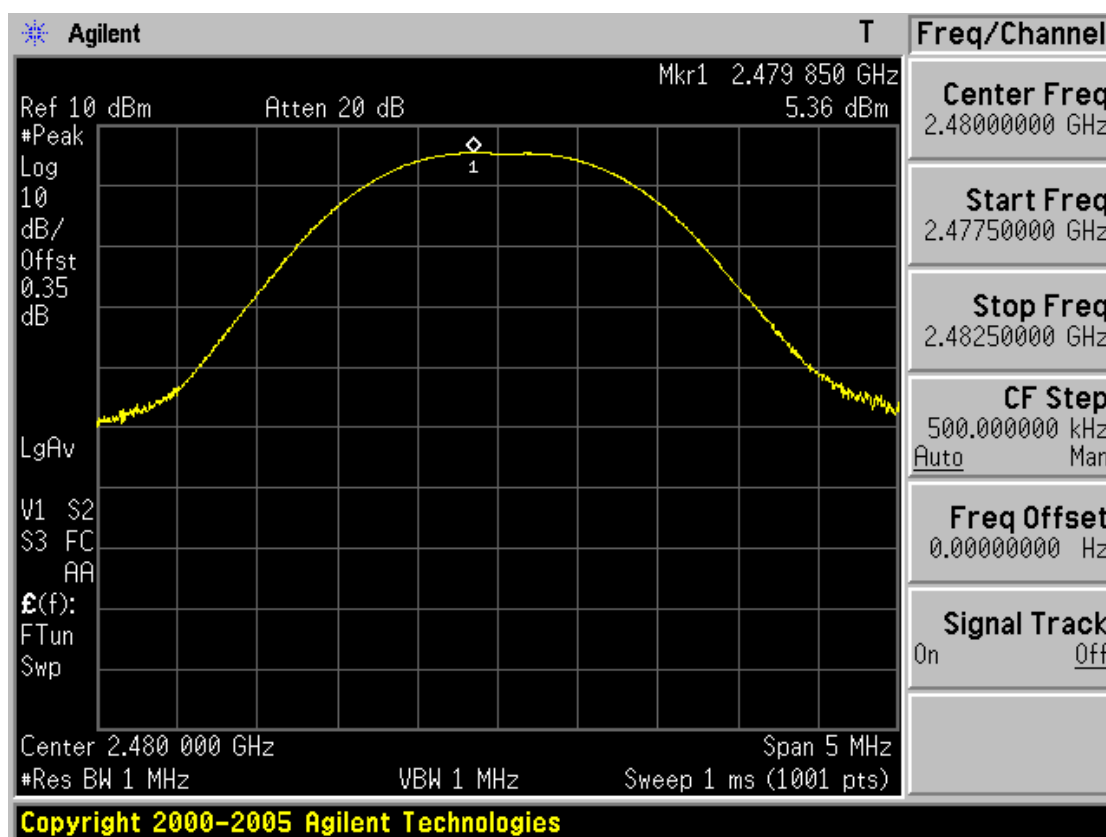
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Peak Output Power



Peak Output Power



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**

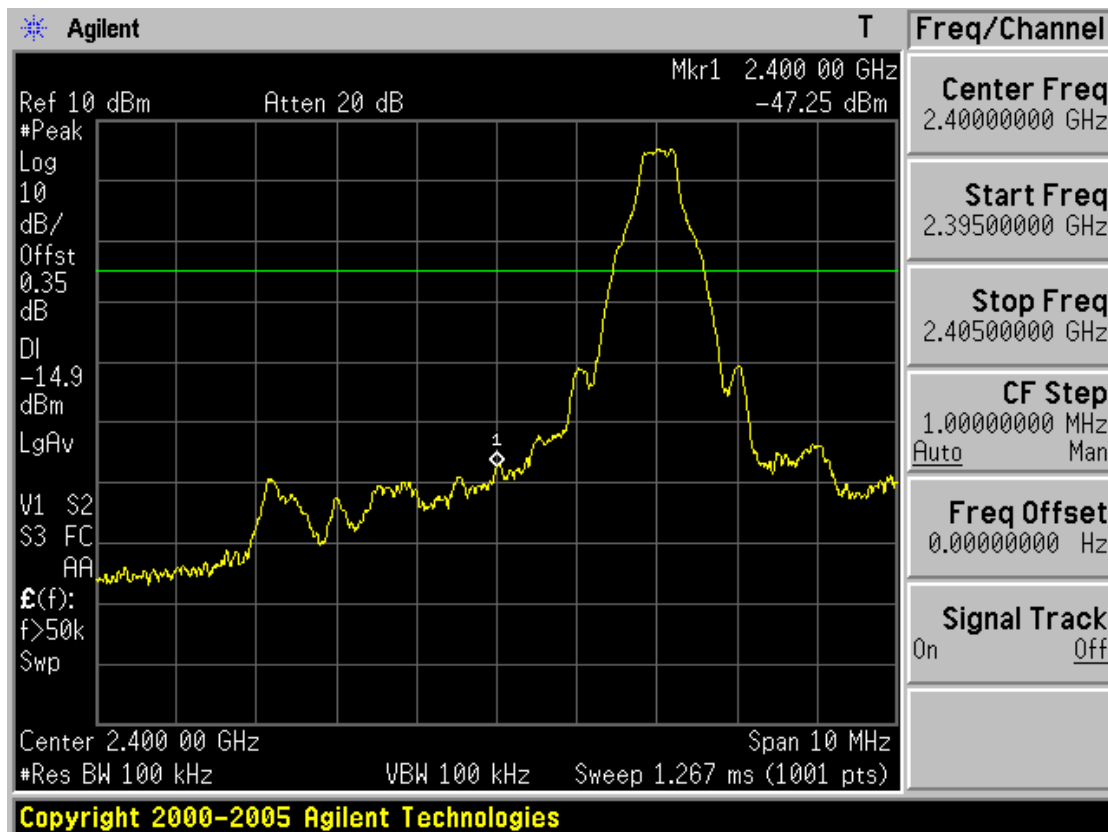
- See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
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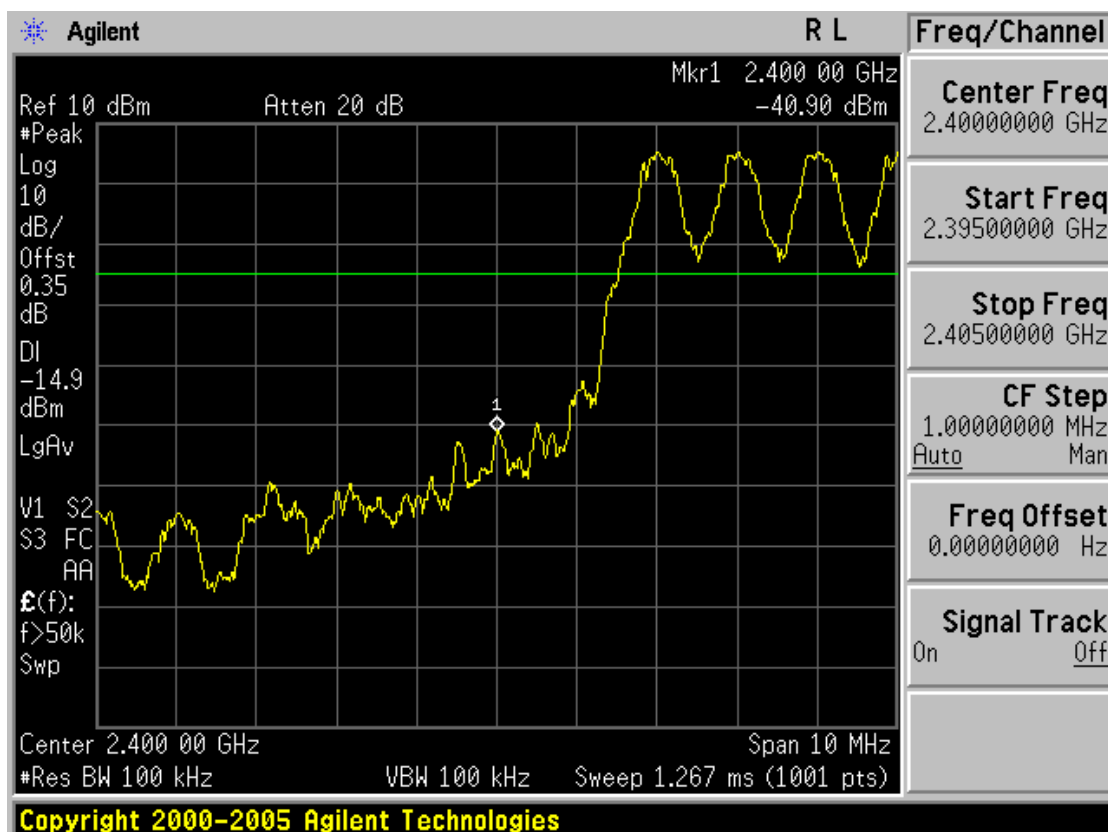
- Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

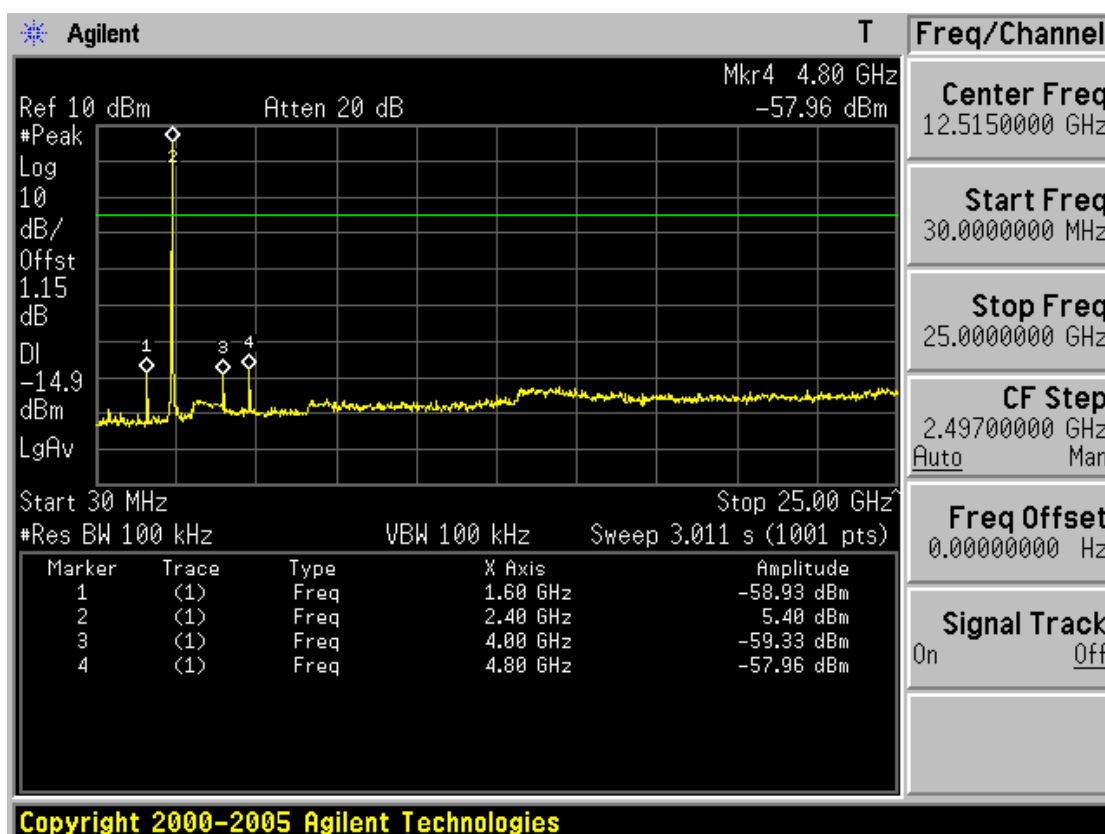
Low band with hopping disabled



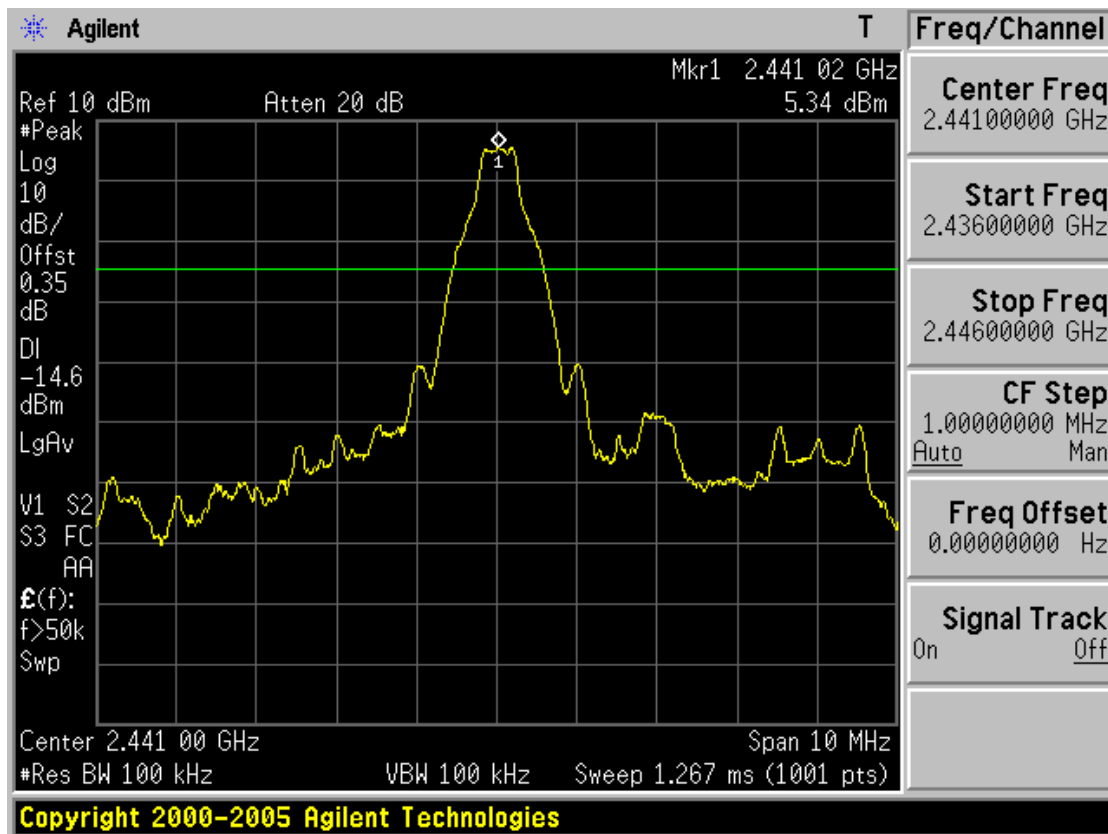
Low band with hopping enabled



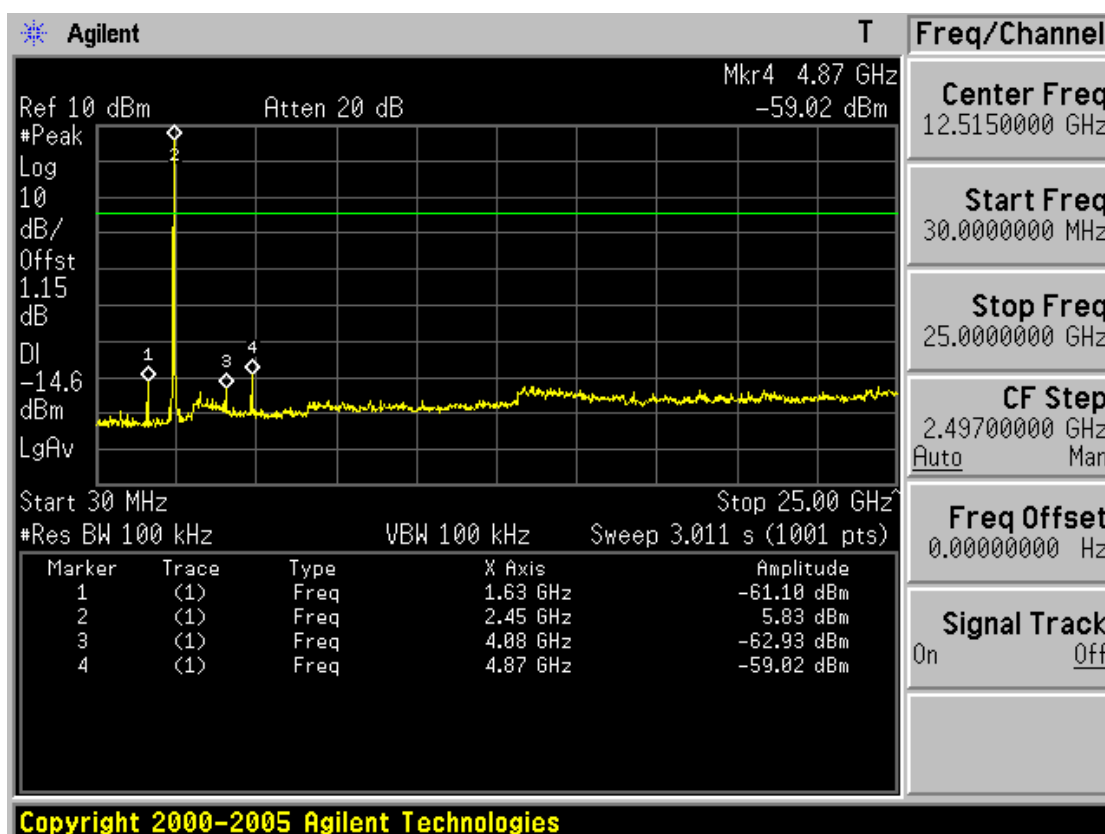
Low channel spurious



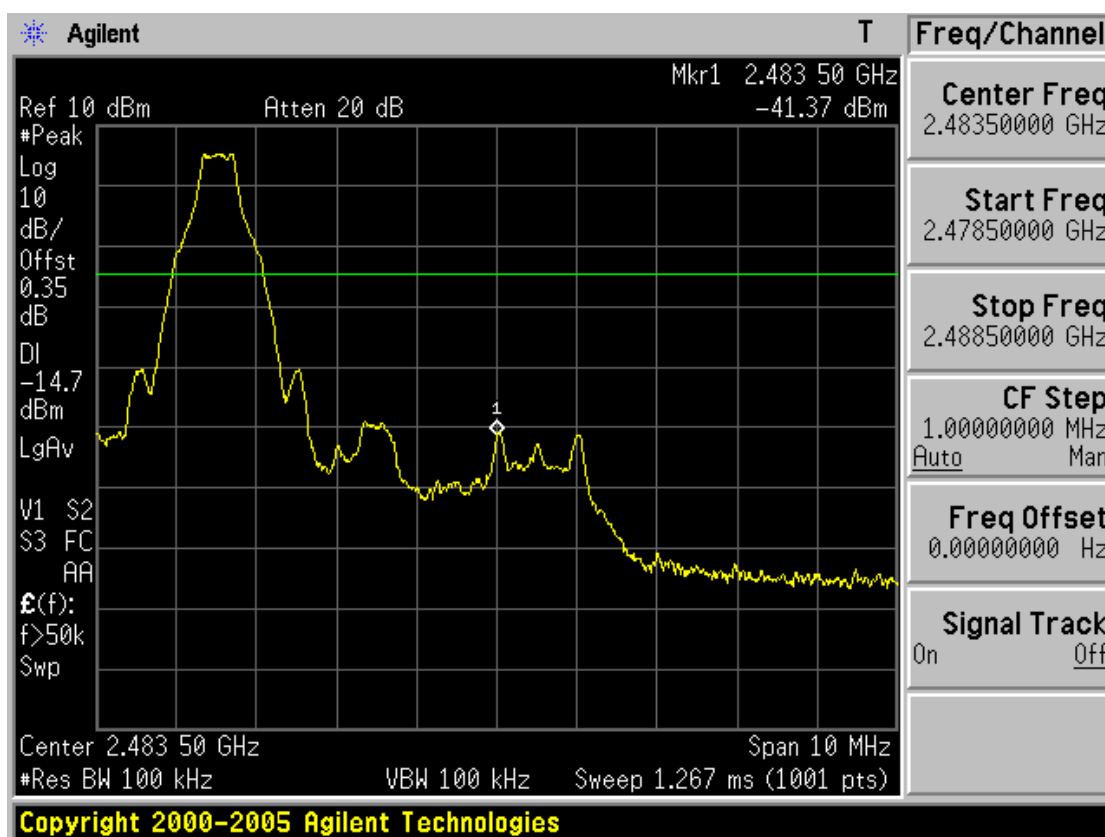
Mid channel ref



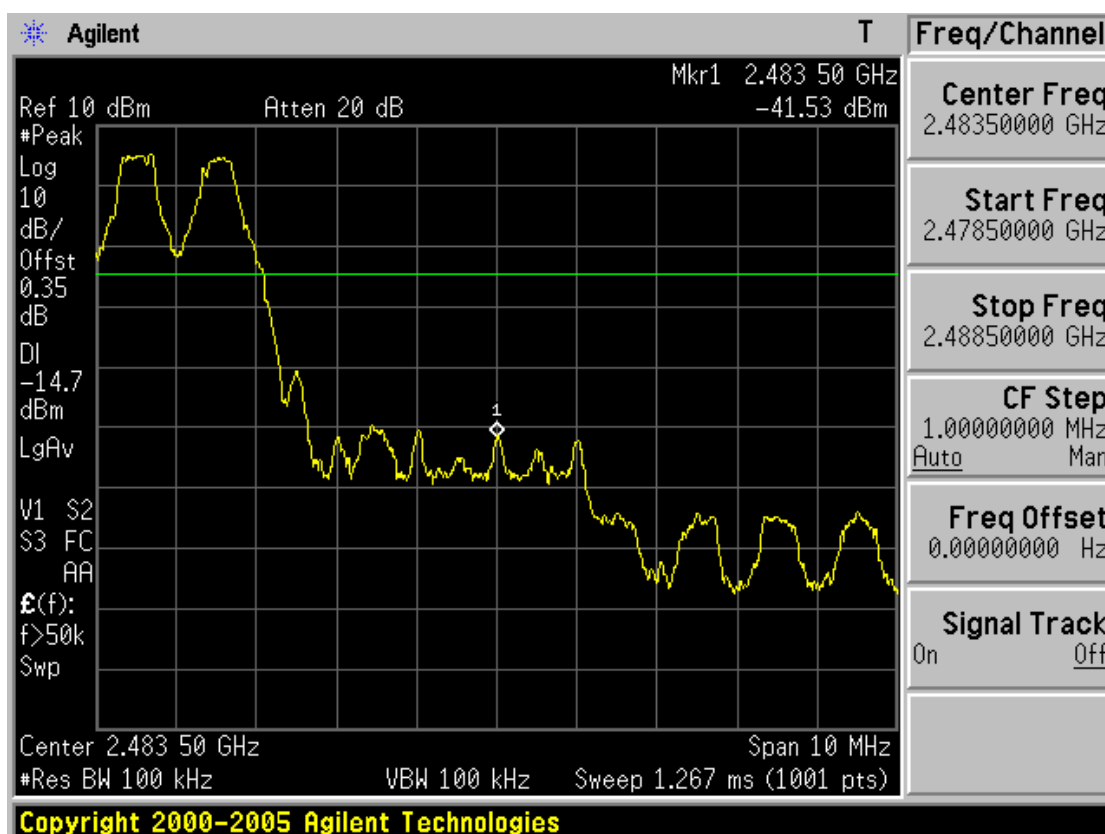
Mid channel spurious



High band with hopping disabled



High band with hopping enabled



- Procedure:

The spectrum analyzer is set to:

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

- Test Case 1: Headset Mode + Battery(M/N: B041230Q28)
- Test Case 2: Headset Mode + Battery(M/N: B041230Q39)
- Test Case 3: Headset Mode + Battery(M/N: B041230Q28) + Adaptor (STA-P51WR)
- Test Case 4: Headset Mode + Battery(M/N: B041230Q39) + Adaptor (STA-P51WR)

- Minimum Standard:

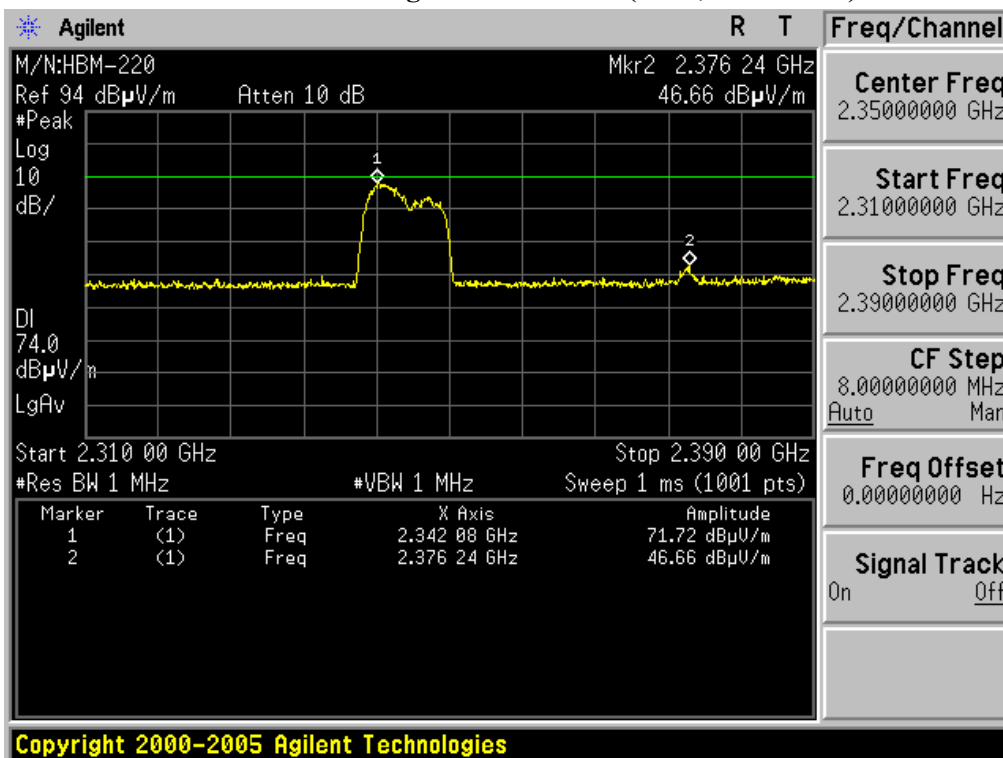
Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

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

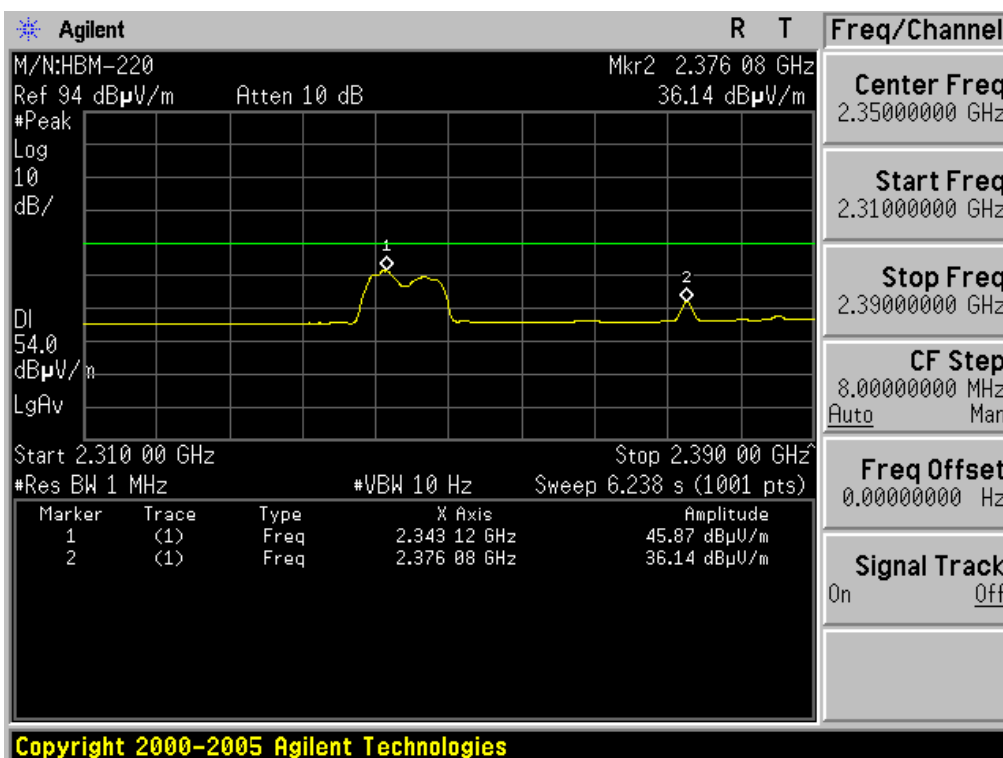
• **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR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

TEST CASE 1

Restricted Band Edge: Low Channel (Peak, Horizontal)

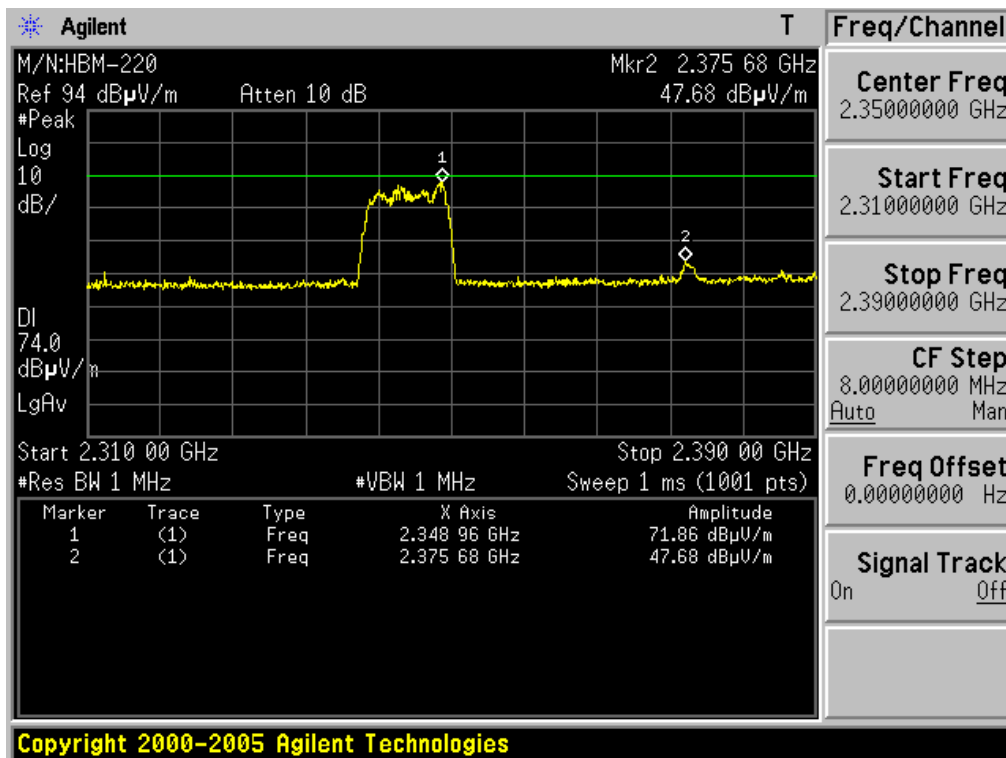


Restricted Band Edge: Low Channel (Average, Horizontal)

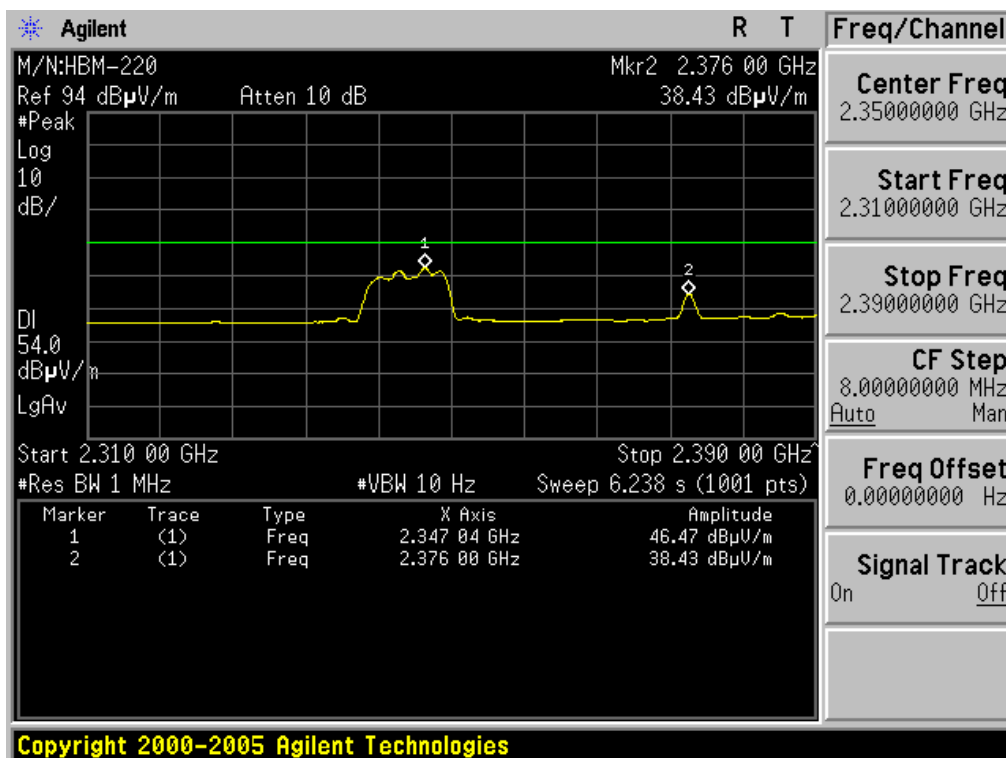


TEST CASE 1

Restricted Band Edge: Low Channel (Peak, Vertical)

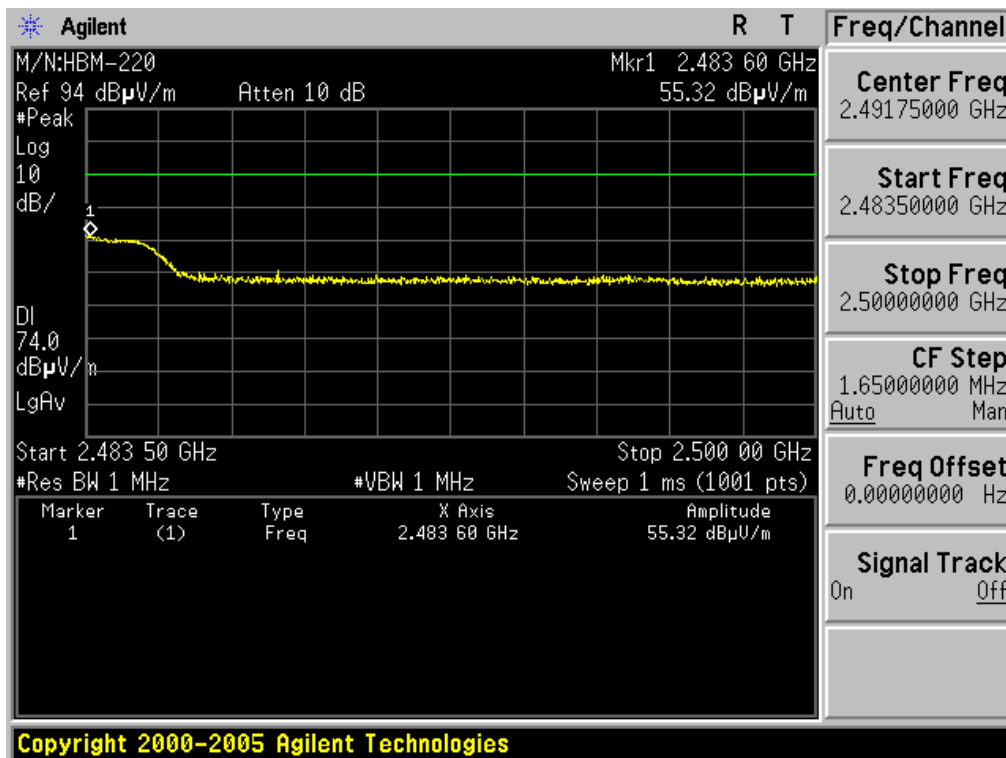


Restricted Band Edge: Low Channel (Average, Vertical)

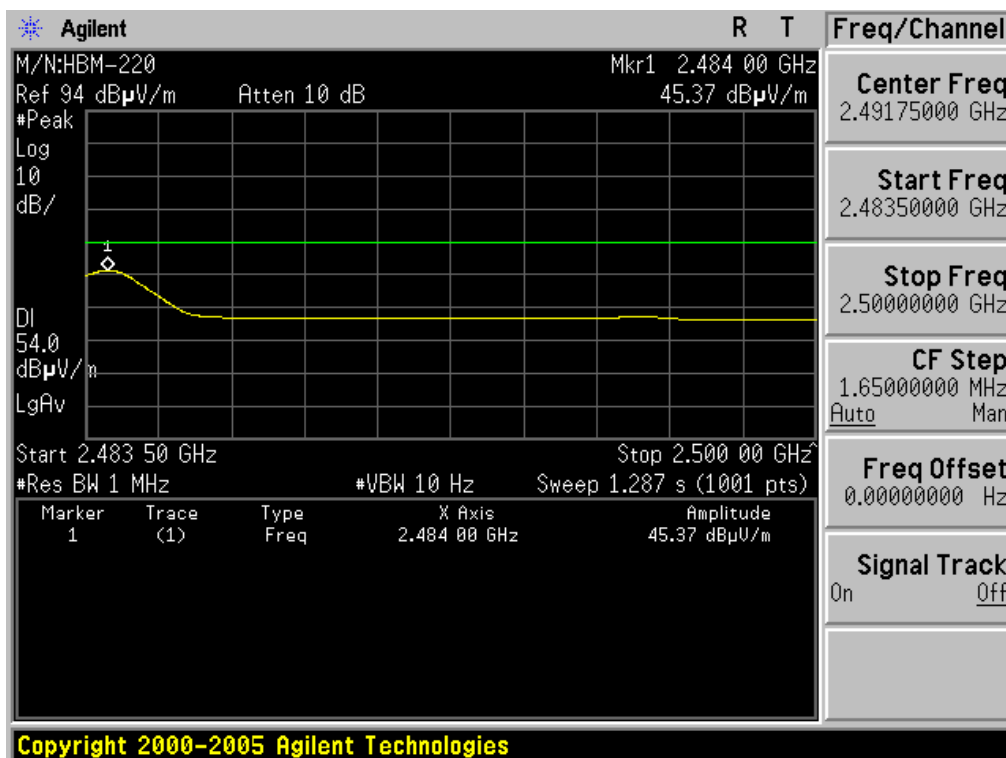


TEST CASE 1

Restricted Band Edge: High Channel (Peak, Horizontal)

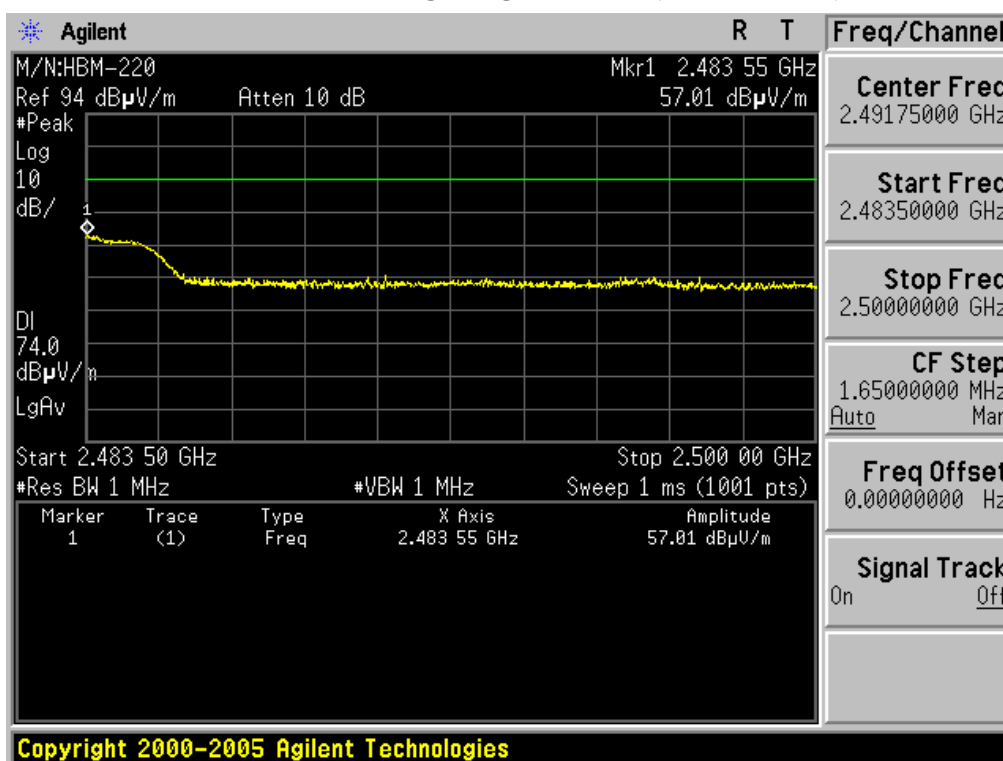


Restricted Band Edge: High Channel (Average, Horizontal)

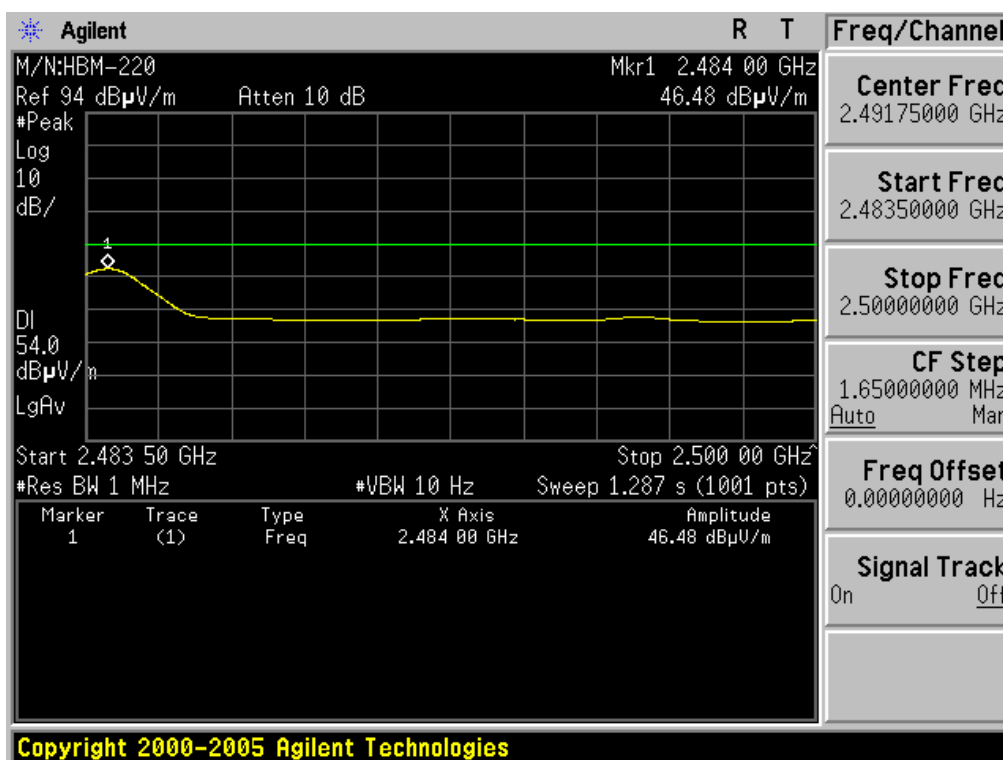


TEST CASE 1

Restricted Band Edge: High Channel (Peak, Vertical)

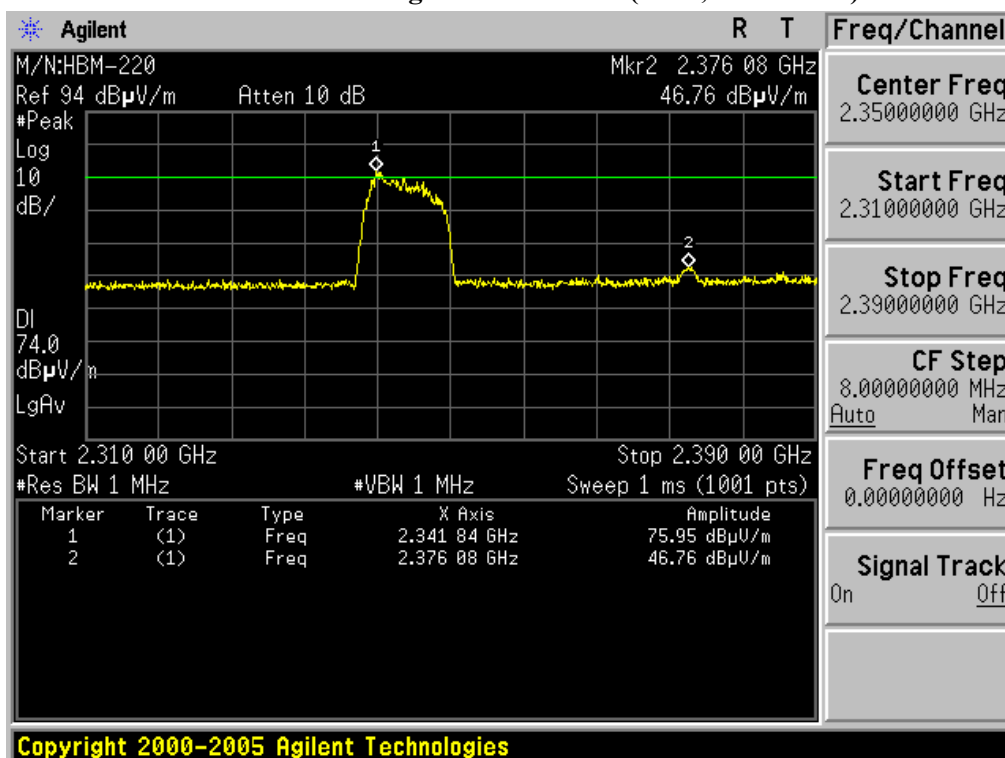


Restricted Band Edge: High Channel (Average, Vertical)

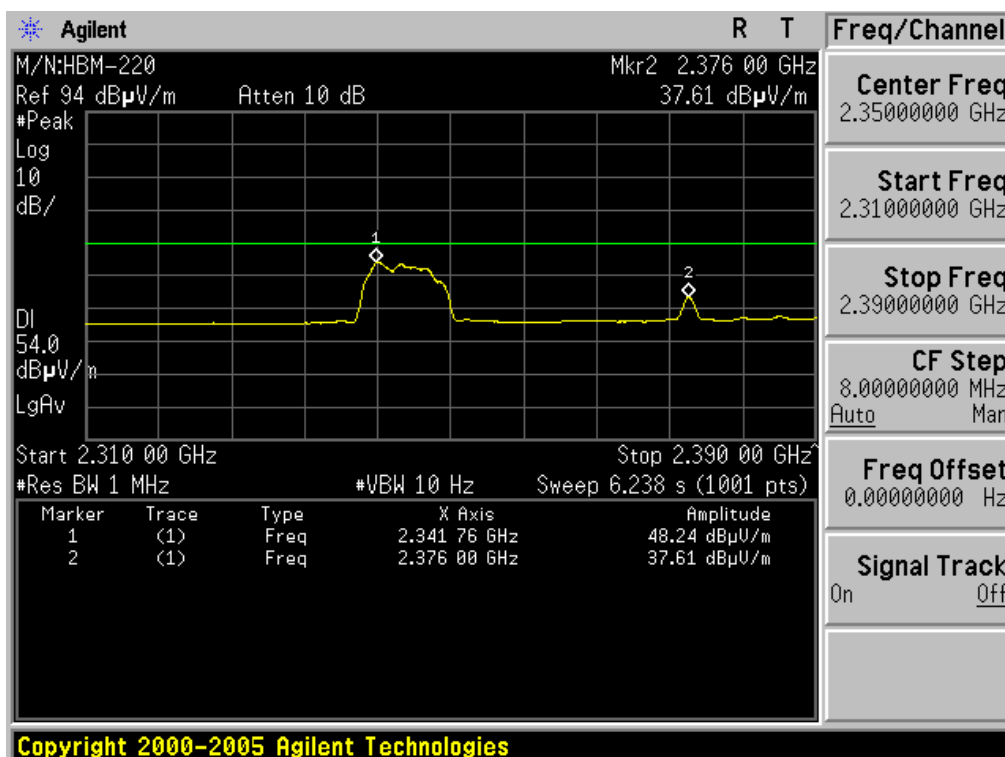


TEST CASE 2

Restricted Band Edge: Low Channel (Peak, Horizontal)

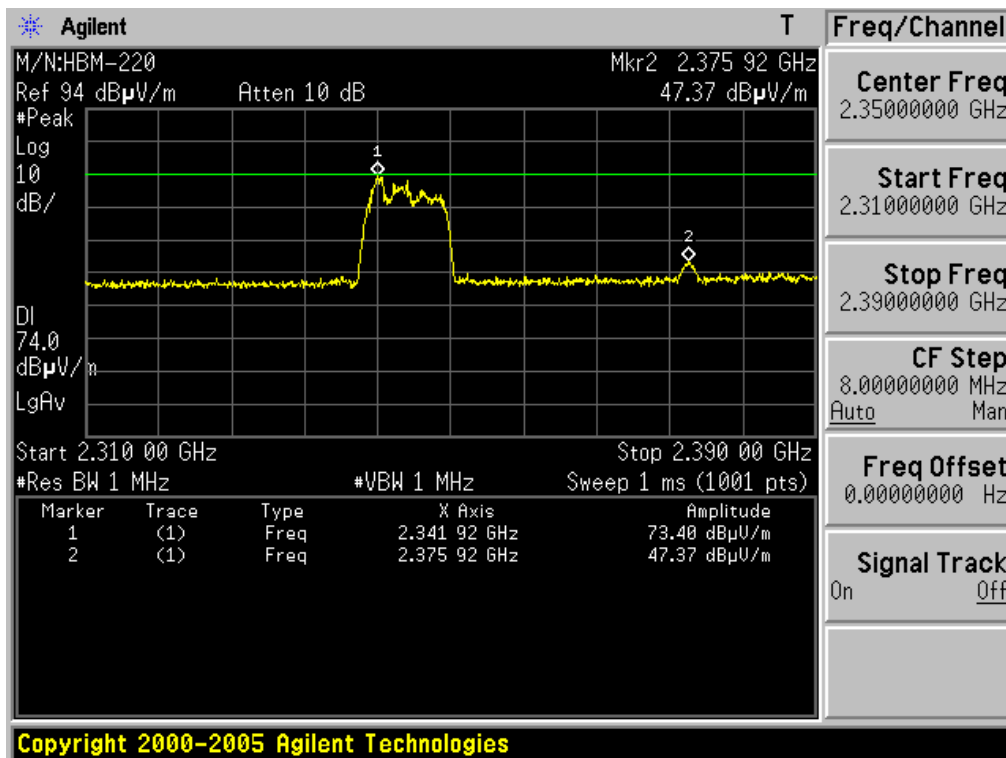


Restricted Band Edge: Low Channel (Average, Horizontal)

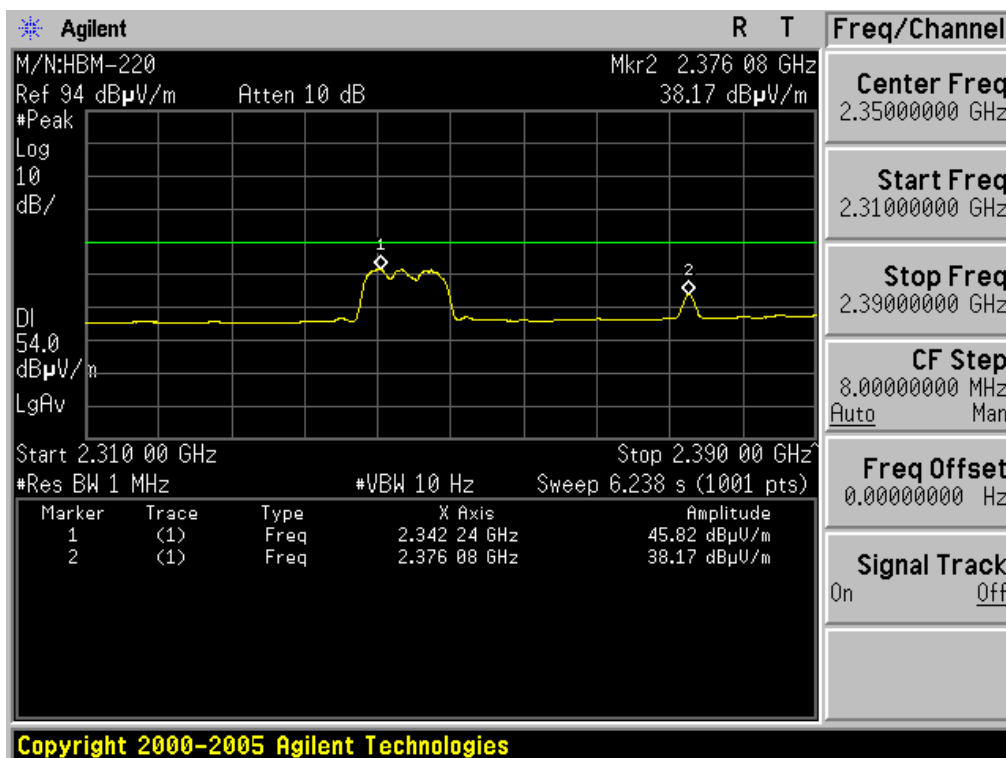


TEST CASE 2

Restricted Band Edge: Low Channel (Peak, Vertical)

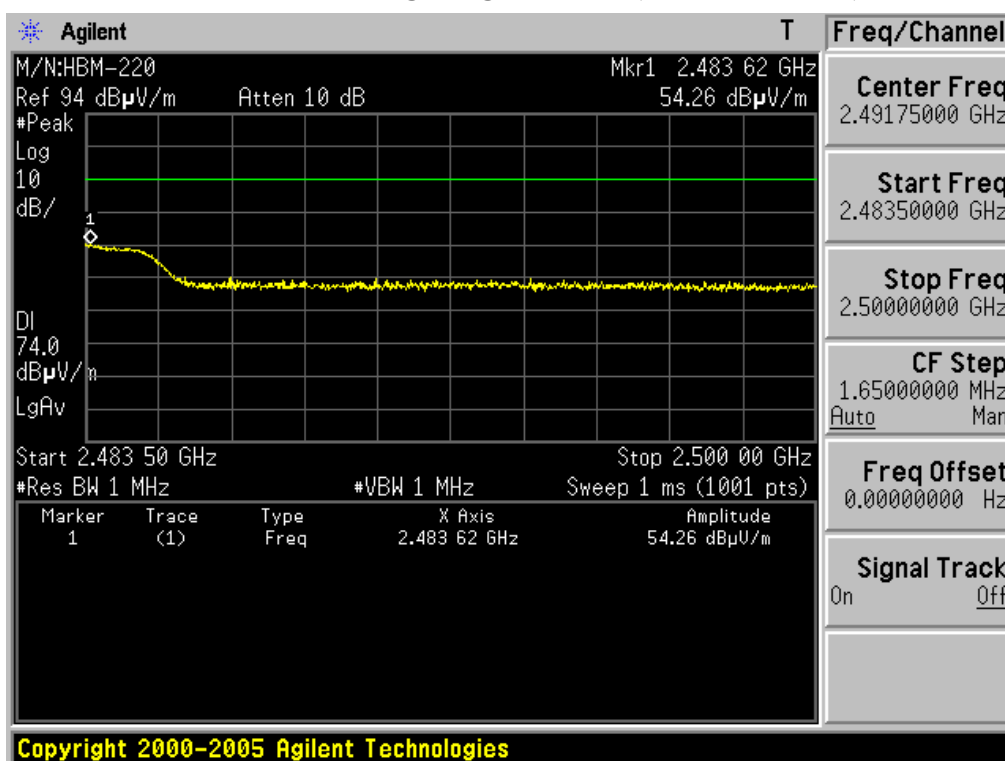


Restricted Band Edge: Low Channel (Average, Vertical)

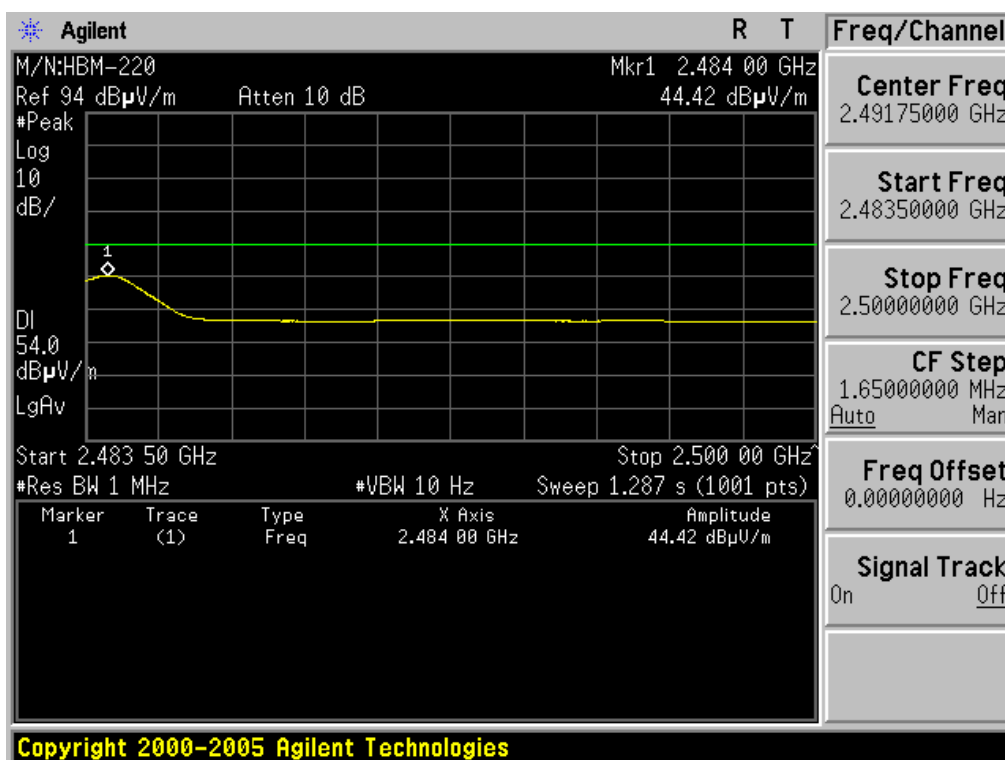


TEST CASE 2

Restricted Band Edge: High Channel (Peak, Horizontal)

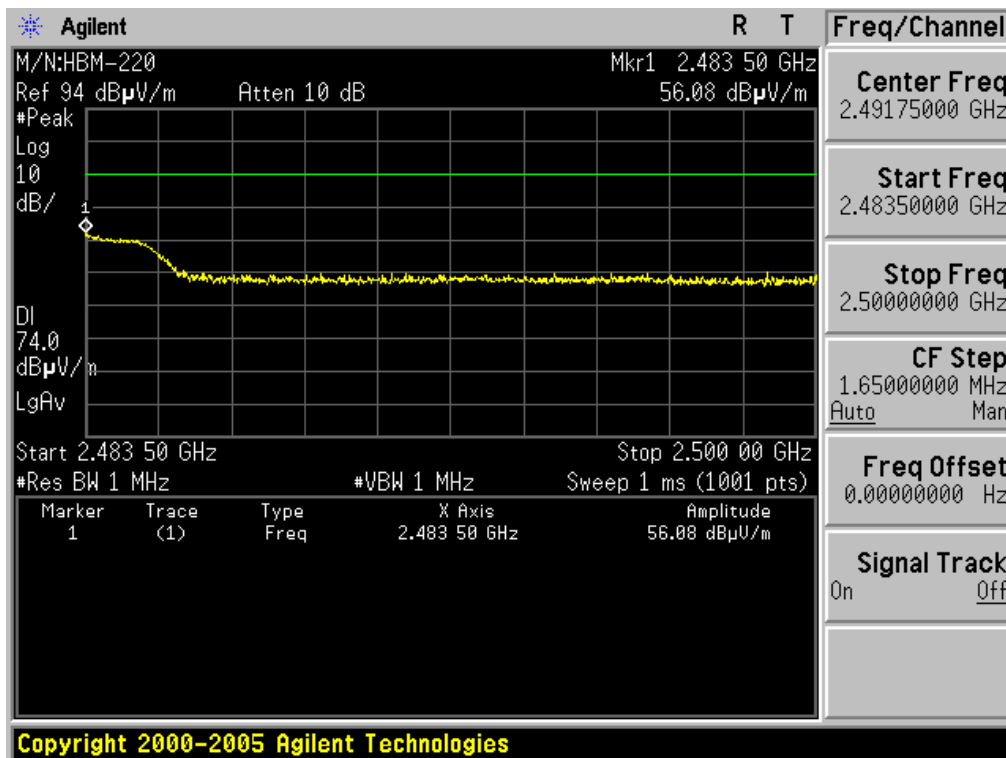


Restricted Band Edge: High Channel (Average, Horizontal)

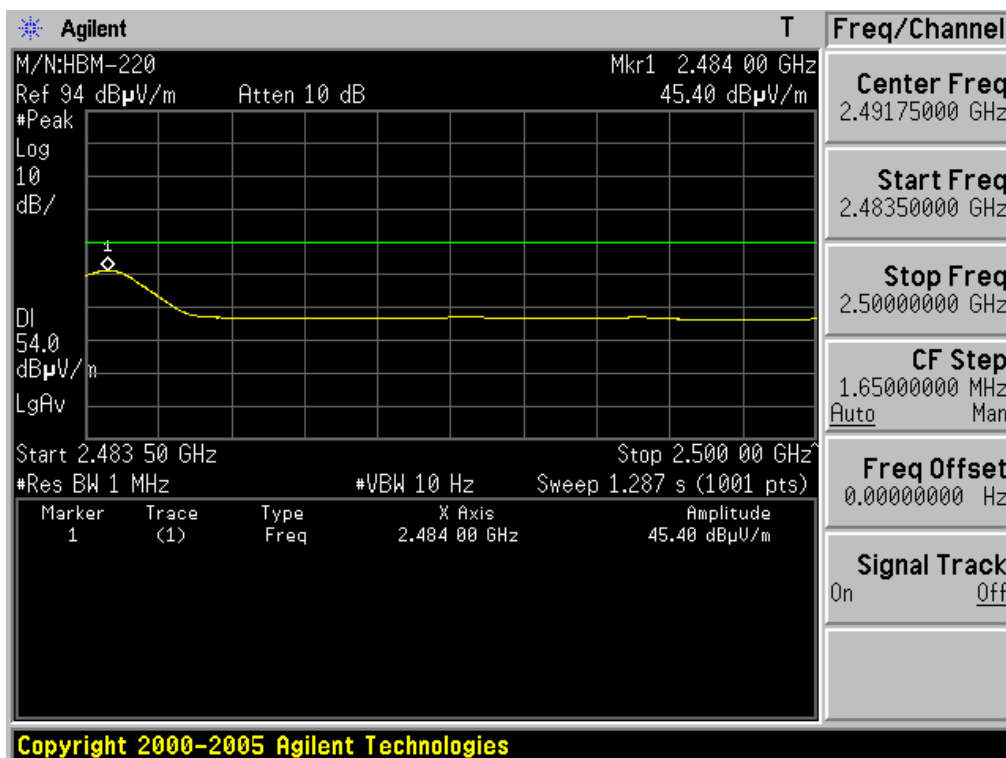


TEST CASE 2

Restricted Band Edge: High Channel (Peak, Vertical)

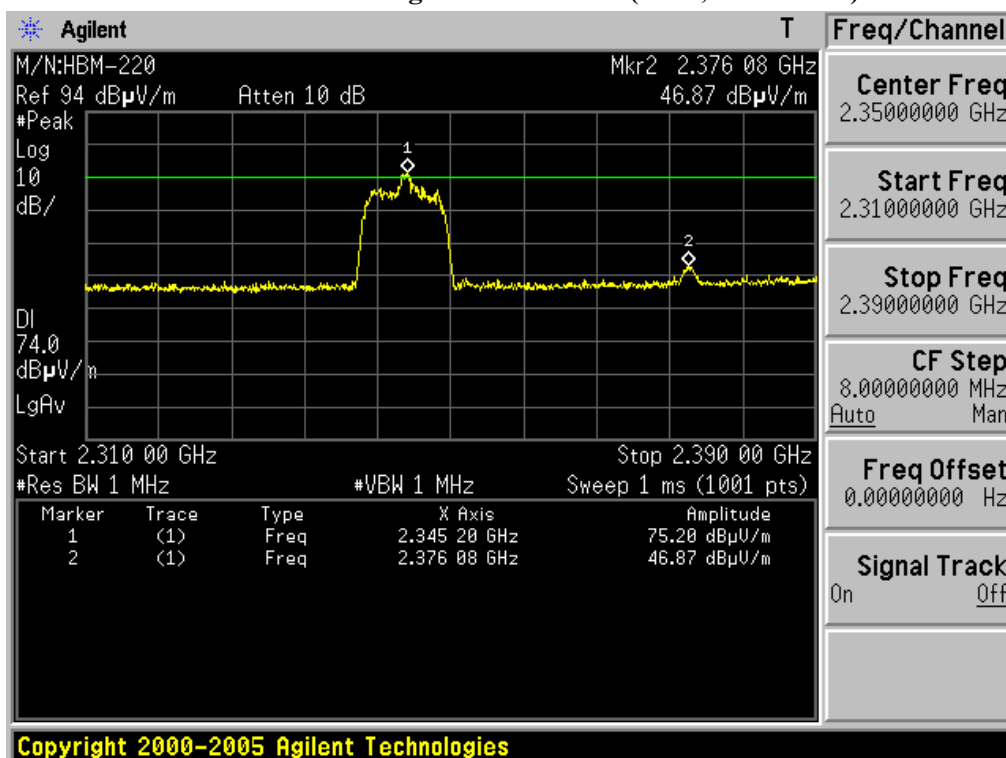


Restricted Band Edge: High Channel (Average, Vertical)

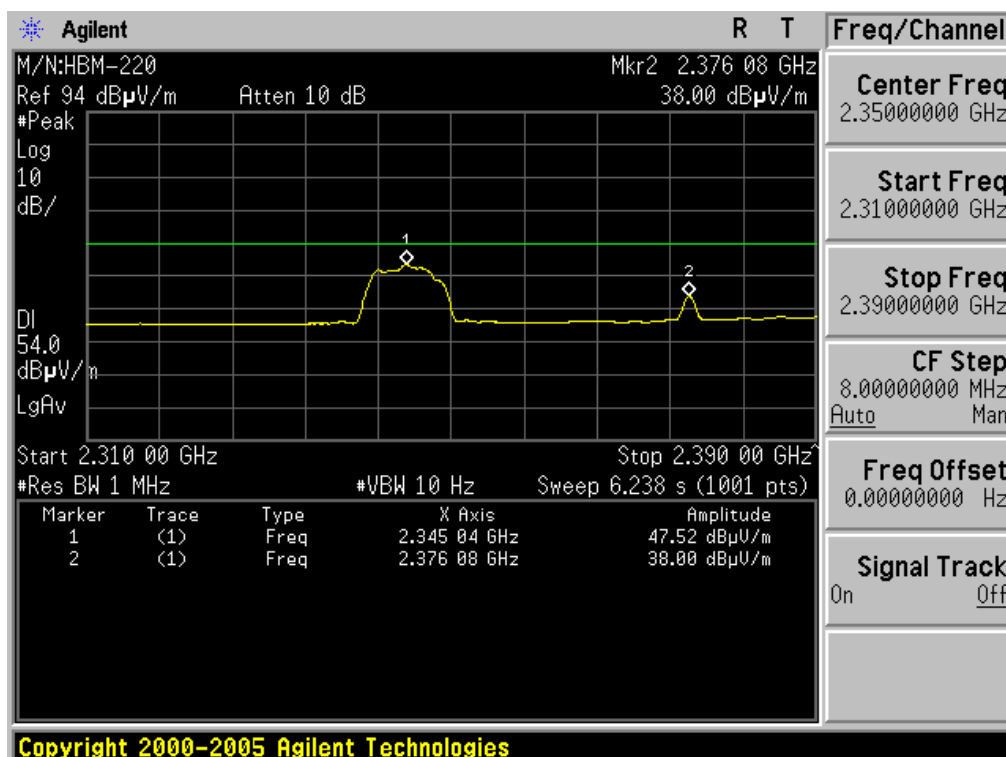


TEST CASE 3

Restricted Band Edge: Low Channel (Peak, Horizontal)

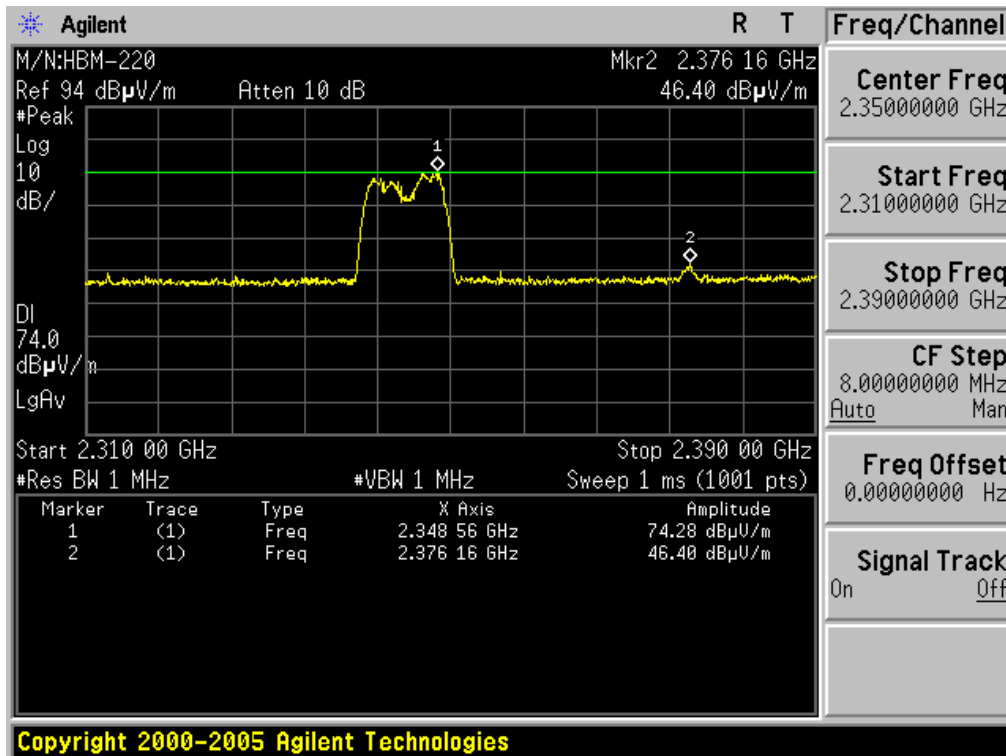


Restricted Band Edge: Low Channel (Average, Horizontal)

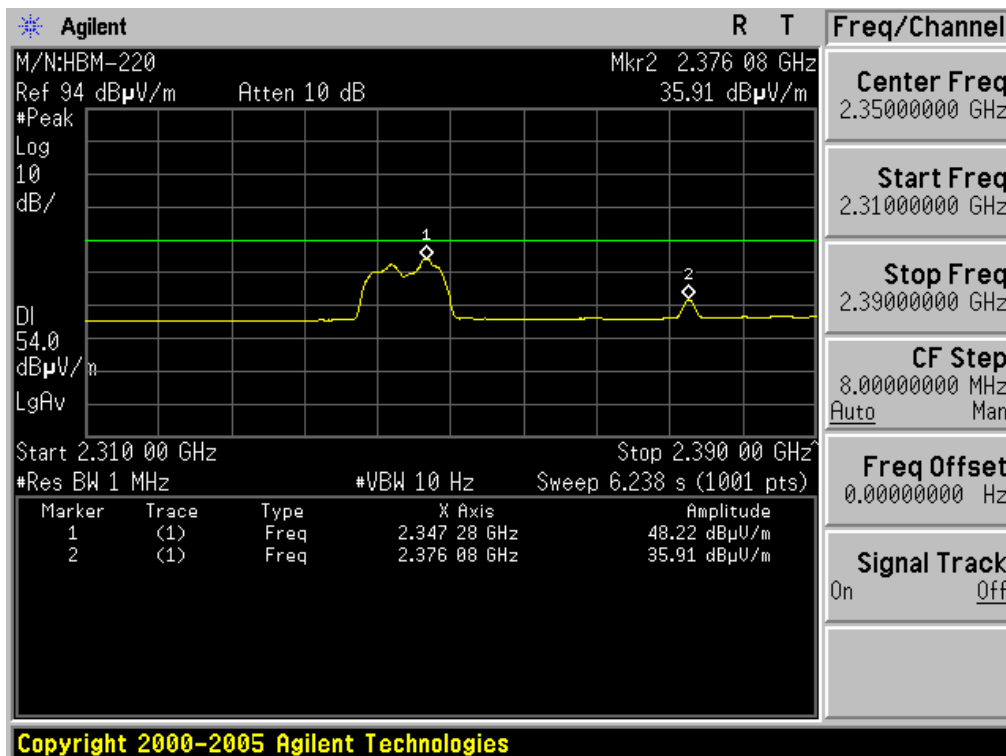


TEST CASE 3

Restricted Band Edge: Low Channel (Peak, Vertical)

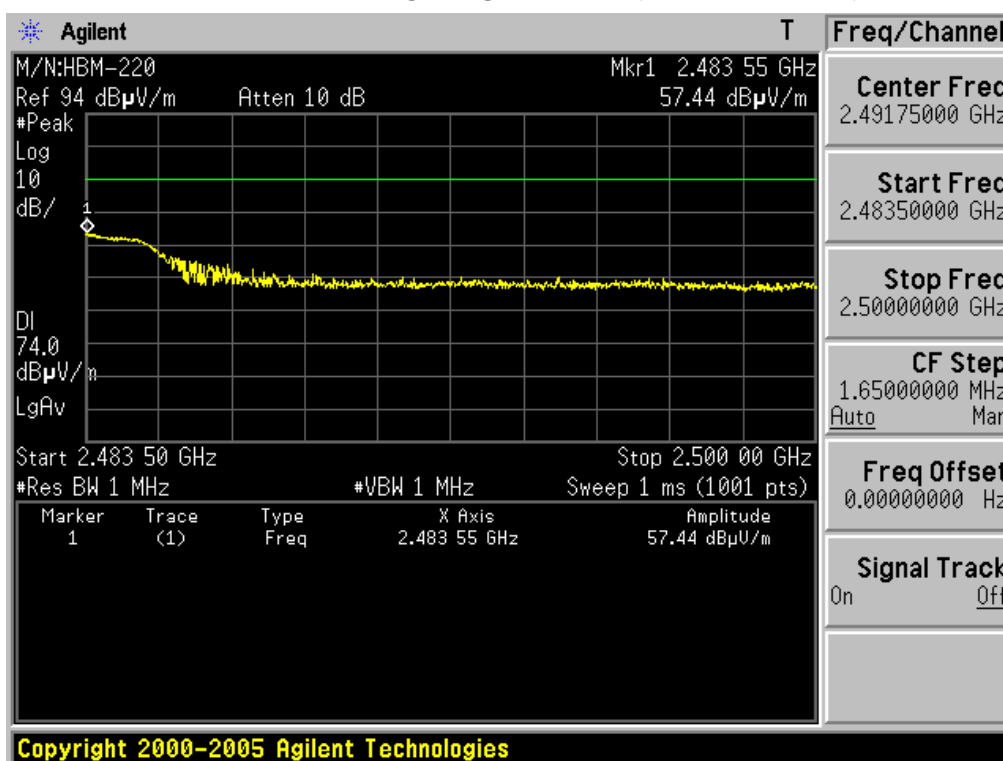


Restricted Band Edge: Low Channel (Average, Vertical)

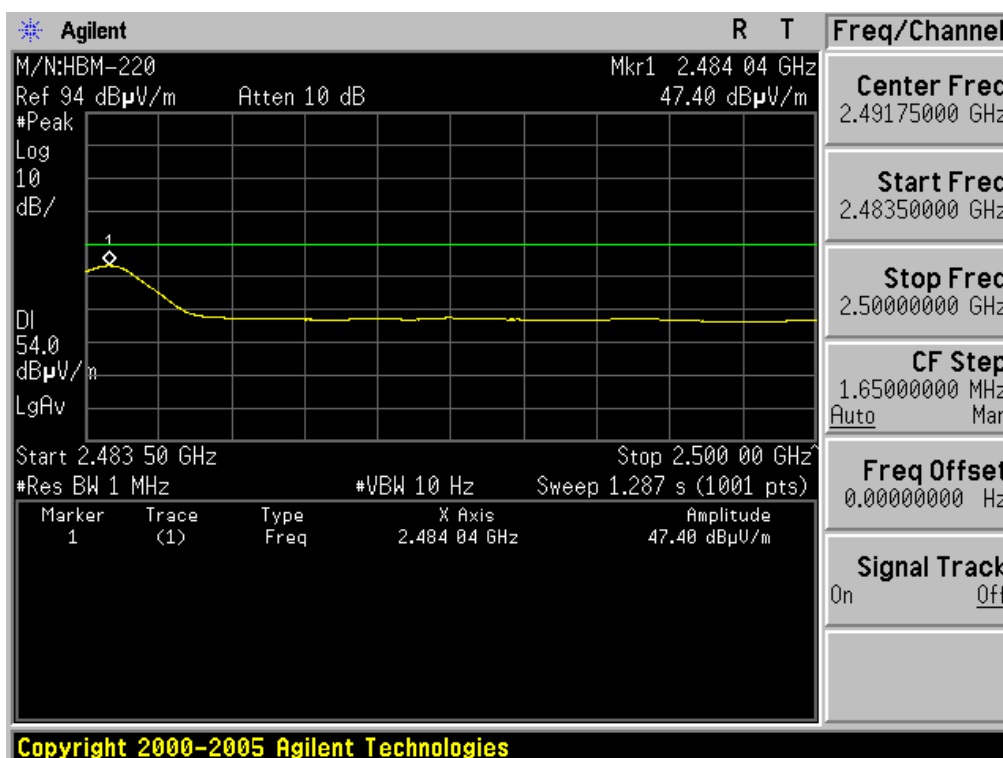


TEST CASE 3

Restricted Band Edge: High Channel (Peak, Horizontal)

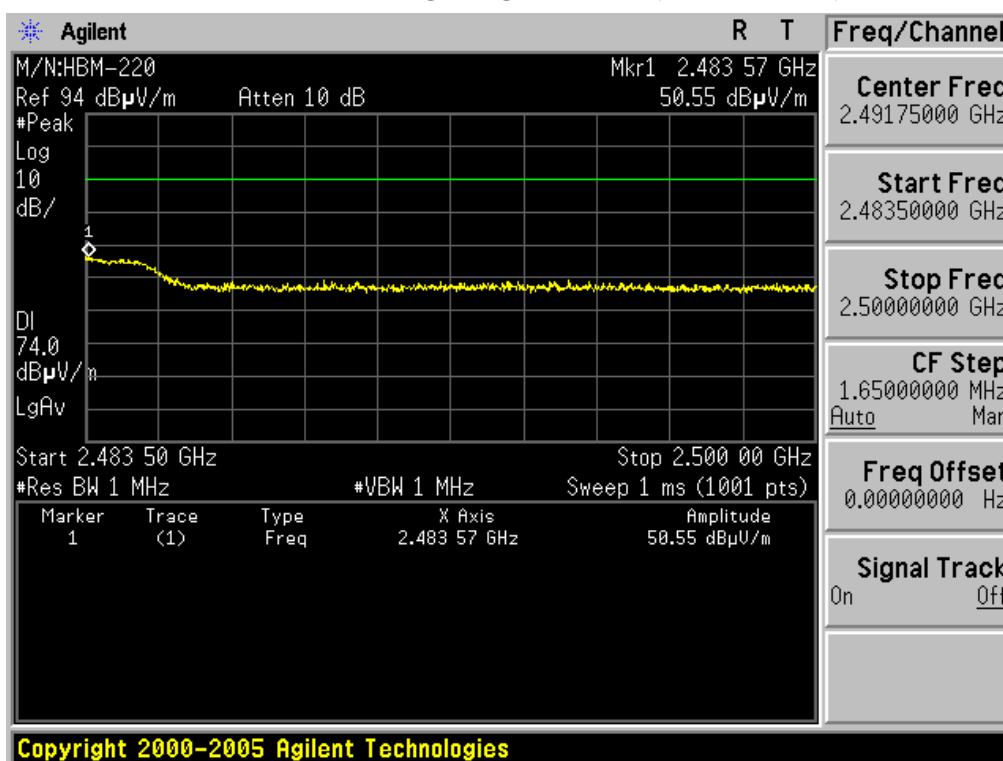


Restricted Band Edge: High Channel (Average, Horizontal)

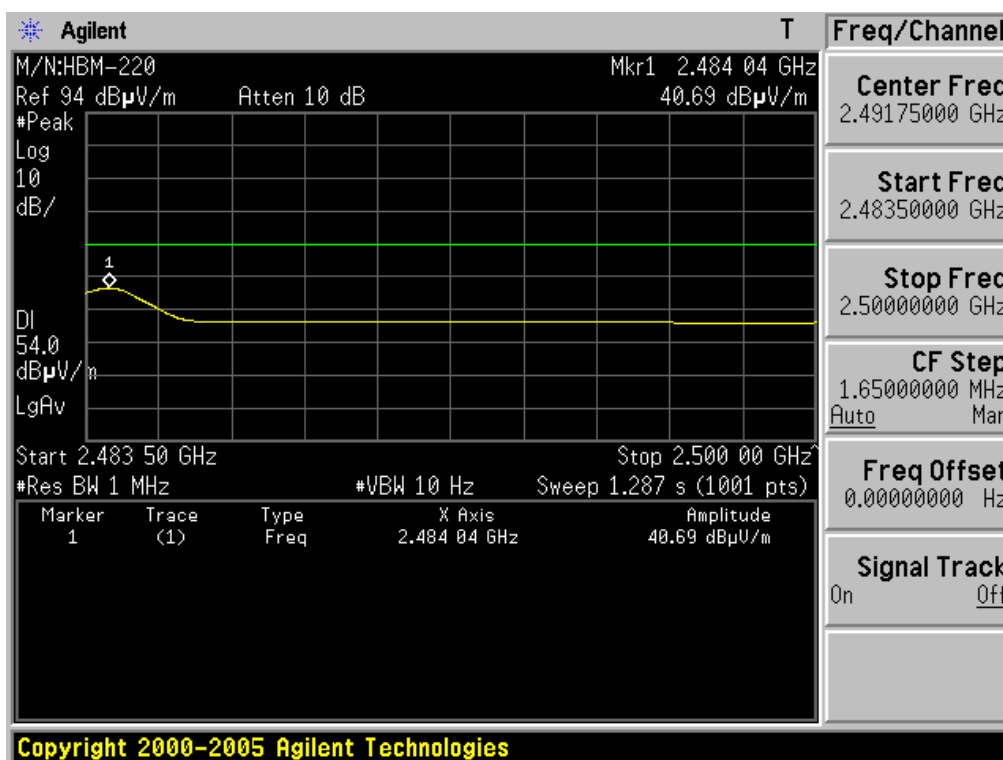


TEST CASE 3

Restricted Band Edge: High Channel (Peak, Vertical)

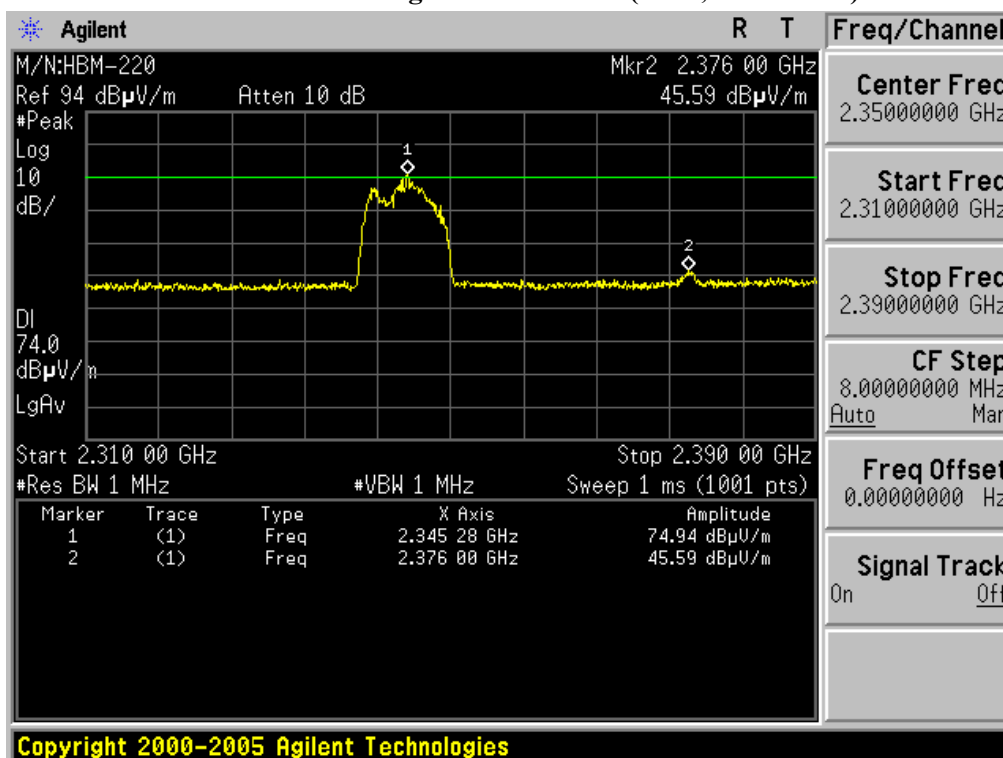


Restricted Band Edge: High Channel (Average, Vertical)

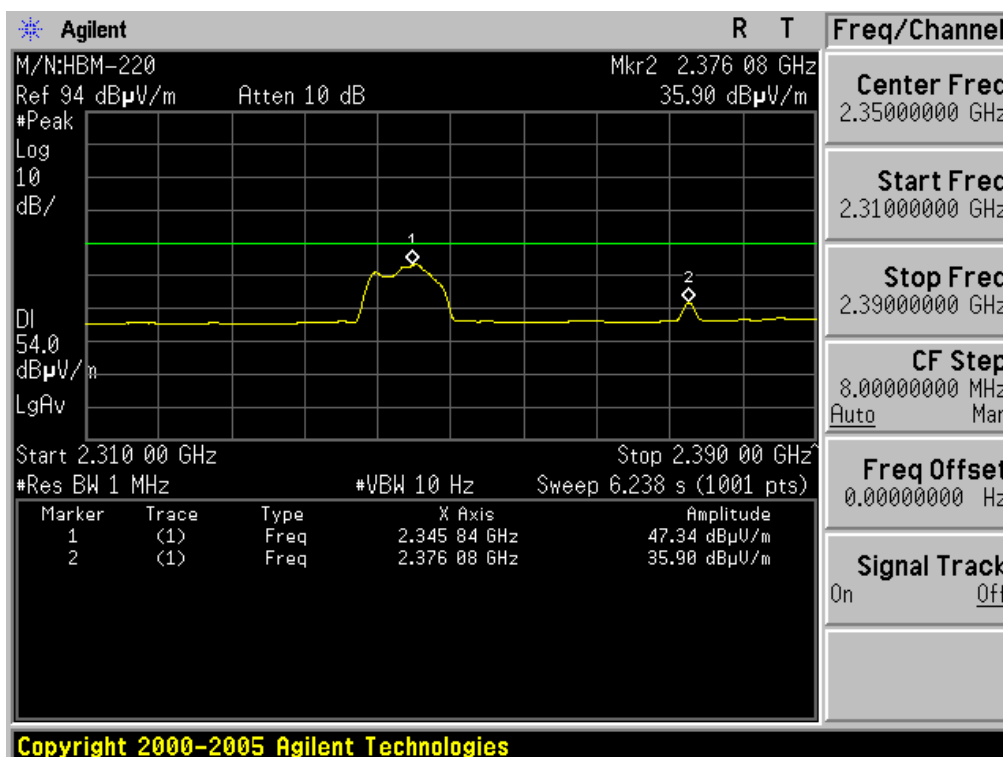


TEST CASE 4

Restricted Band Edge: Low Channel (Peak, Horizontal)

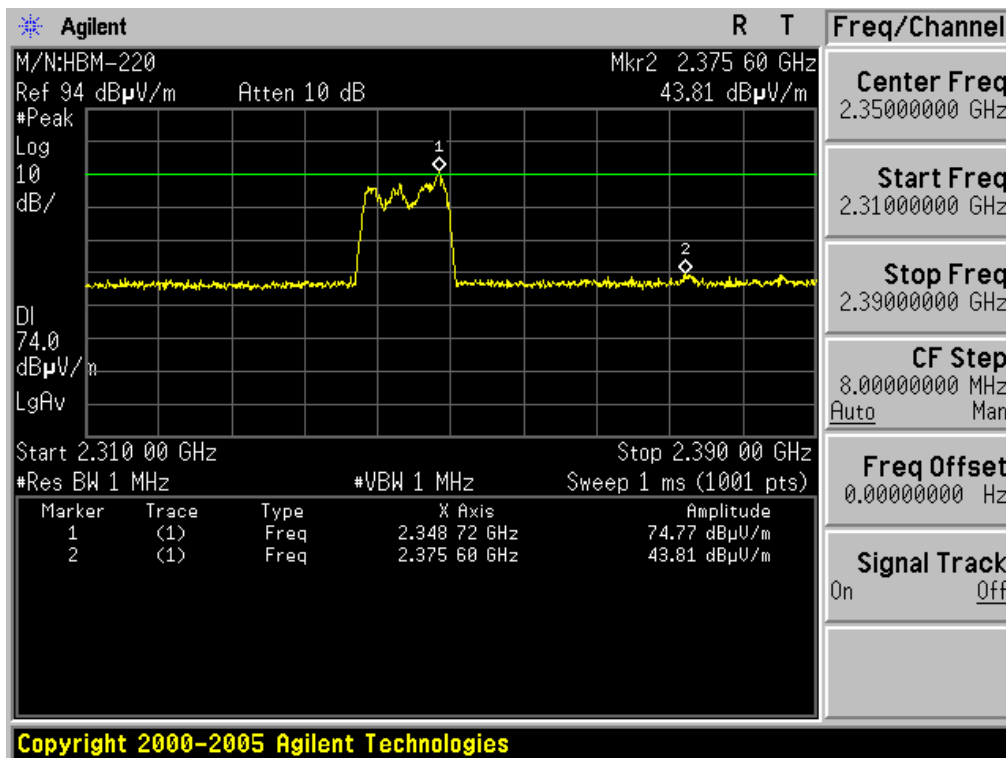


Restricted Band Edge: Low Channel (Average, Horizontal)

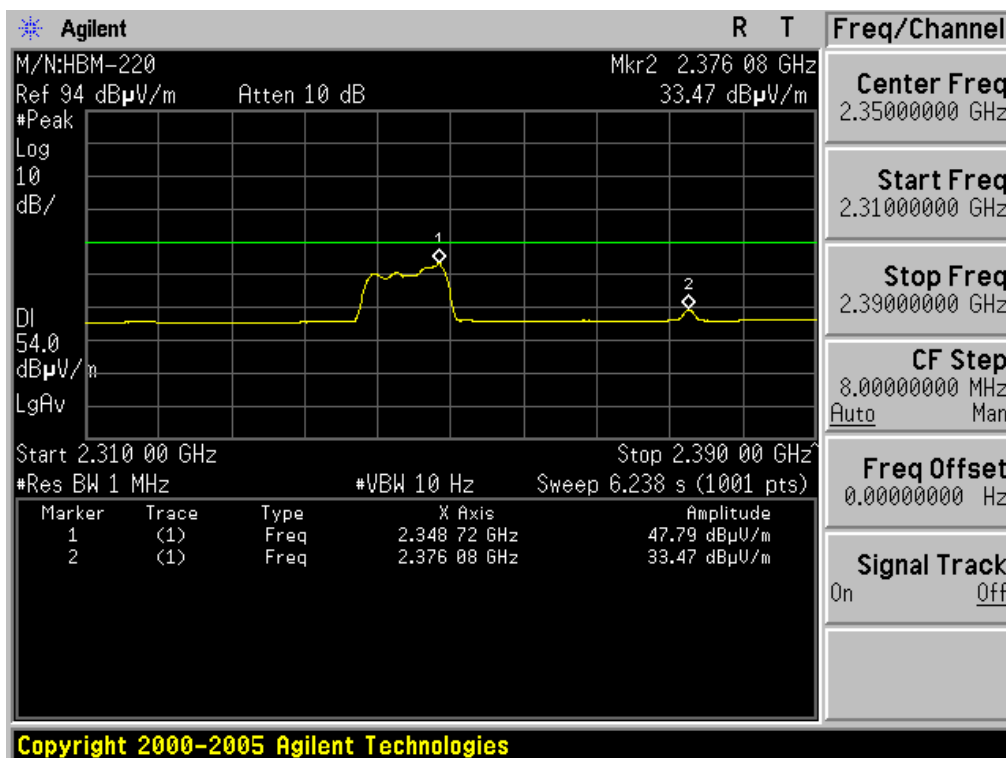


TEST CASE 4

Restricted Band Edge: Low Channel (Peak, Vertical)

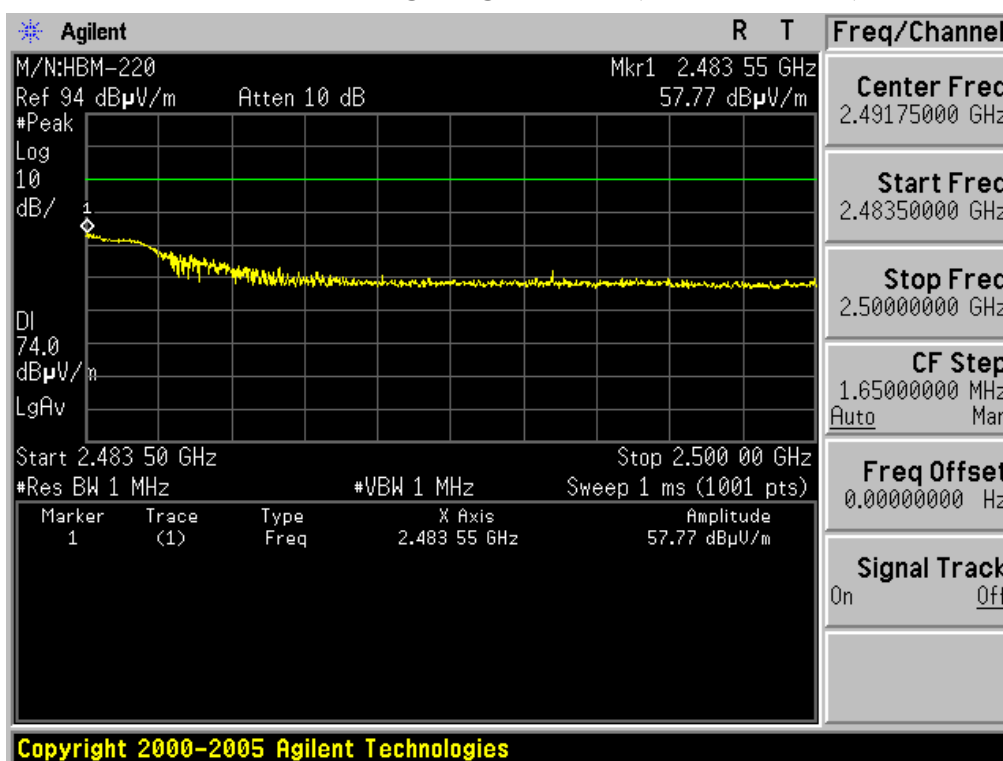


Restricted Band Edge: Low Channel (Average, Vertical)

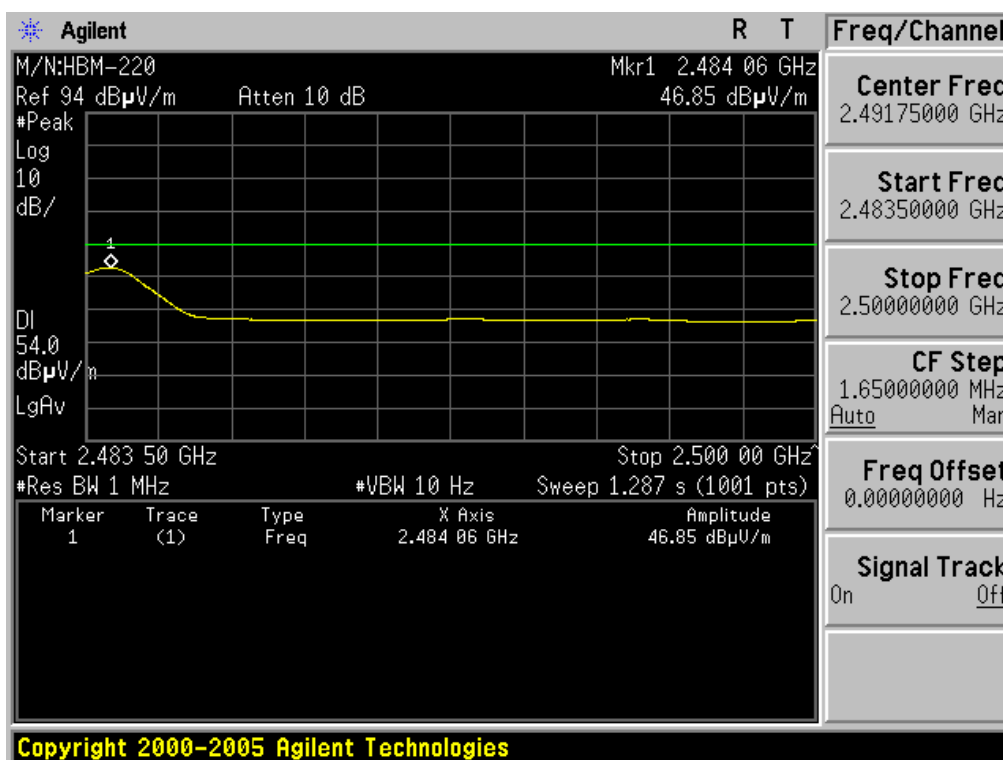


TEST CASE 4

Restricted Band Edge: High Channel (Peak, Horizontal)

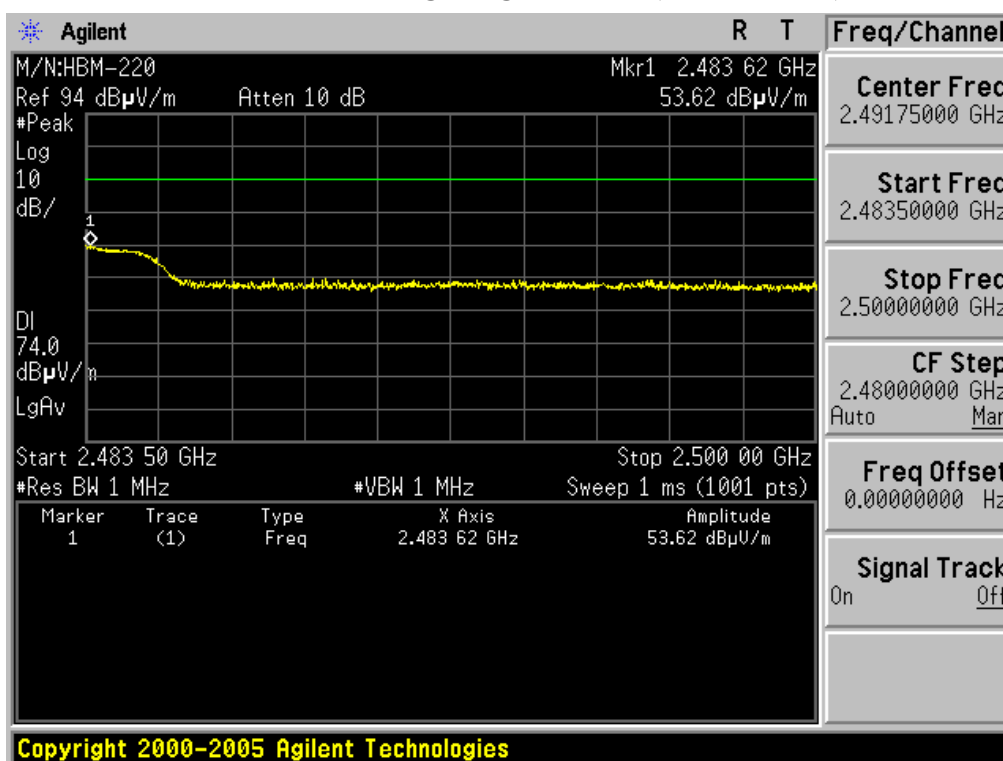


Restricted Band Edge: High Channel (Average, Horizontal)

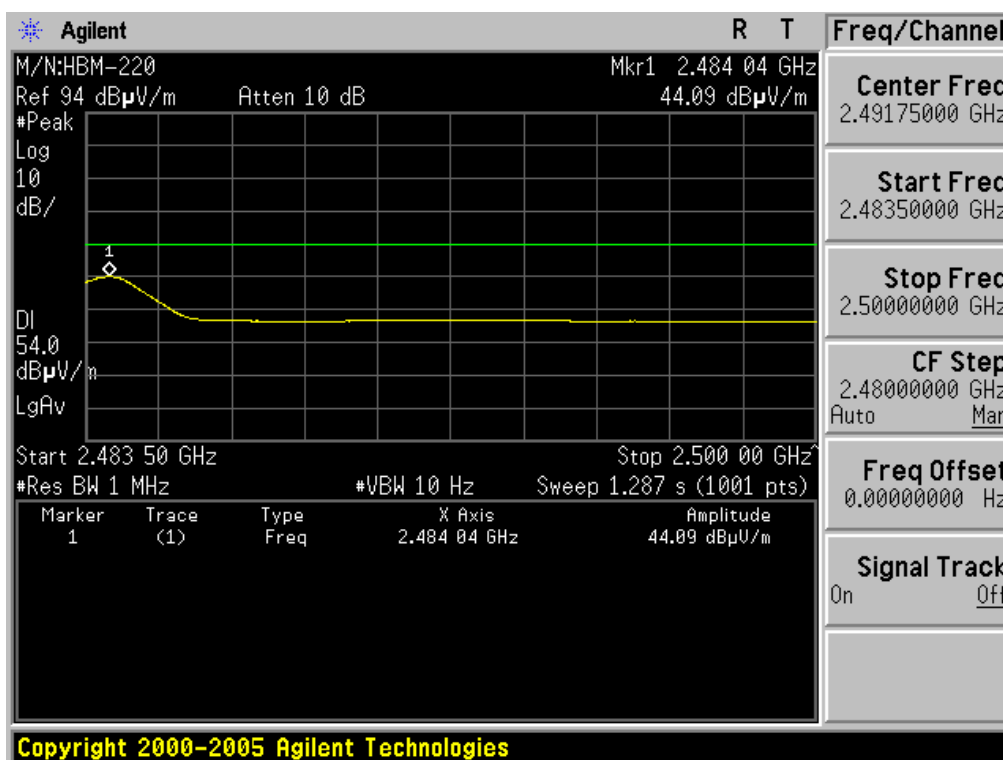


TEST CASE 4

Restricted Band Edge: High Channel (Peak, Vertical)



Restricted Band Edge: High Channel (Average, Vertical)



- Measurement Data: Test Case 1

Harmonic and other emissions 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
4804.000	Hor	-	47.42	39.02	6.37	-	53.79	45.39	-	74.00	54.00	-	20.21	8.61
4804.000	Ver	-	49.44	41.19	6.37	-	55.81	47.56	-	74.00	54.00	-	18.19	6.44
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Harmonic and other emissions 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
4882.000	Hor	-	47.68	39.17	6.69	-	54.37	45.86	-	74.00	54.00	-	19.63	8.14
4882.000	Ver	-	50.71	42.91	6.69	-	57.40	49.60	-	74.00	54.00	-	16.60	4.40
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Harmonic and other emissions 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
4960.000	Hor	-	47.64	38.48	7.18	-	54.82	45.66	-	74.00	54.00	-	19.18	8.34
4960.000	Ver	-	49.39	41.76	7.18	-	56.57	48.94	-	74.00	54.00	-	17.43	5.06
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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: Test Case 2

(Continued...)

Harmonic and other emissions 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
4804.000	Hor	-	47.53	39.19	6.37	-	53.90	45.56	-	74.00	54.00	-	20.10	8.44
4804.000	Ver	-	49.51	41.63	6.37	-	55.88	48.00	-	74.00	54.00	-	18.12	6.00
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Harmonic and other emissions 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
4882.000	Hor	-	48.98	40.88	6.69	-	55.67	47.57	-	74.00	54.00	-	18.33	6.43
4882.000	Ver	-	51.31	43.70	6.69	-	58.00	50.39	-	74.00	54.00	-	16.00	3.61
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Harmonic and other emissions 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
4960.000	Hor	-	47.87	39.22	7.18	-	55.05	46.40	-	74.00	54.00	-	18.95	7.60
4960.000	Ver	-	49.82	42.48	7.18	-	57.00	49.66	-	74.00	54.00	-	17.00	4.34
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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: Test Case 3

(Continued...)

Harmonic and other emissions 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
377.397	Ver	36.1	-	-	-5.5	30.6	-	-	46.0	-	-	15.4	-	-
429.502	Hor	33.0	-	-	-4.6	28.4	-	-	46.0	-	-	17.6	-	-
431.905	Ver	37.9	-	-	-4.5	33.4	-	-	46.0	-	-	12.6	-	-
4804.000	Hor	-	45.41	34.06	6.37	-	51.78	40.43	-	74.00	54.00	-	22.22	13.57
4804.000	Ver	-	47.25	37.42	6.37	-	53.62	43.79	-	74.00	54.00	-	20.38	10.21
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Harmonic and other emissions 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
382.807	Ver	31.8	-	-	-5.2	26.6	-	-	46.0	-	-	19.4	-	-
426.076	Ver	34.1	-	-	-4.7	29.4	-	-	46.0	-	-	16.6	-	-
430.807	Hor	34.7	-	-	-4.5	30.2	-	-	46.0	-	-	15.8	-	-
4882.000	Hor	-	45.73	34.98	6.69	-	52.42	41.67	-	74.00	54.00	-	21.58	12.33
4882.000	Ver	-	46.62	37.45	6.69	-	53.31	44.14	-	74.00	54.00	-	20.69	9.86
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Harmonic and other emissions 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
378.204	Ver	33.9	-	-	-5.4	28.5	-	-	46.0	-	-	17.5	-	-
430.679	Hor	34.3	-	-	-4.5	29.8	-	-	46.0	-	-	16.2	-	-
430.679	Ver	38.5	-	-	-4.5	34.0	-	-	46.0	-	-	12.0	-	-
4960.000	Hor	-	46.01	35.61	7.18	-	53.19	42.79	-	74.00	54.00	-	20.81	11.21
4960.000	Ver	-	47.90	38.16	7.18	-	55.08	45.34	-	74.00	54.00	-	18.92	8.66
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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: Test Case 4

(Continued...)

Harmonic and other emissions 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
432.042	Ver	41.1	-	-	-4.5	36.6	-	-	46.0	-	-	9.4	-	-
443.221	Hor	33.8	-	-	-4.4	29.4	-	-	46.0	-	-	16.6	-	-
467.959	Ver	34.4	-	-	-4.2	30.2	-	-	46.0	-	-	15.8	-	-
4804.000	Hor	-	46.52	35.27	6.37	-	52.89	41.64	-	74.00	54.00	-	21.11	12.36
4804.000	Ver	-	47.88	38.62	6.37	-	54.25	44.99	-	74.00	54.00	-	19.75	9.01
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Harmonic and other emissions 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
437.551	Ver	37.2	-	-	-4.5	32.7	-	-	46.0	-	-	13.3	-	-
445.403	Hor	38.5	-	-	-4.4	34.1	-	-	46.0	-	-	11.9	-	-
463.924	Ver	36.2	-	-	-4.2	32.0	-	-	46.0	-	-	14.0	-	-
4882.000	Hor	-	47.63	36.74	6.69	-	54.32	43.43	-	74.00	54.00	-	19.68	10.57
4882.000	Ver	-	47.96	39.68	6.69	-	54.65	46.37	-	74.00	54.00	-	19.35	7.63
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Harmonic and other emissions 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
442.787	Ver	37.2	-	-	-4.4	32.8	-	-	46.0	-	-	13.2	-	-
445.383	Hor	37.1	-	-	-4.4	32.7	-	-	46.0	-	-	13.3	-	-
4960.000	Hor	-	45.51	35.88	7.18	-	52.69	43.06	-	74.00	54.00	-	21.31	10.94
4960.000	Ver	-	47.74	39.55	7.18	-	54.92	46.73	-	74.00	54.00	-	19.08	7.27
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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** (See next pages for actual measured spectrum plots.)

Note. 1: This test item was performed with following 2 configurations

- Test Case 1: Headset Mode + Battery(M/N: B041230Q28) + Adaptor (STA-P51WR)
- Test Case 2: Headset Mode + Battery(M/N: B041230Q39) + Adaptor (STA-P51WR)

- 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

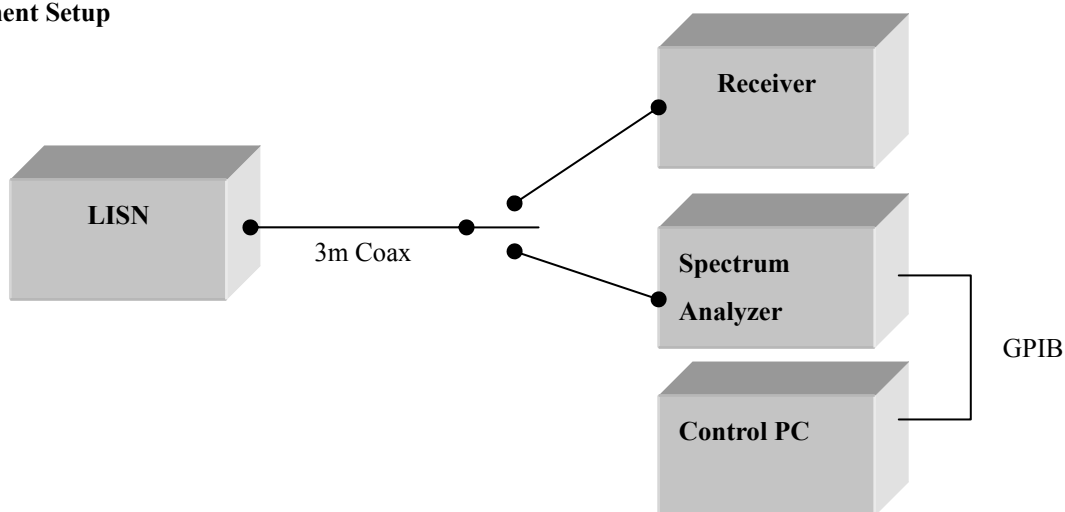
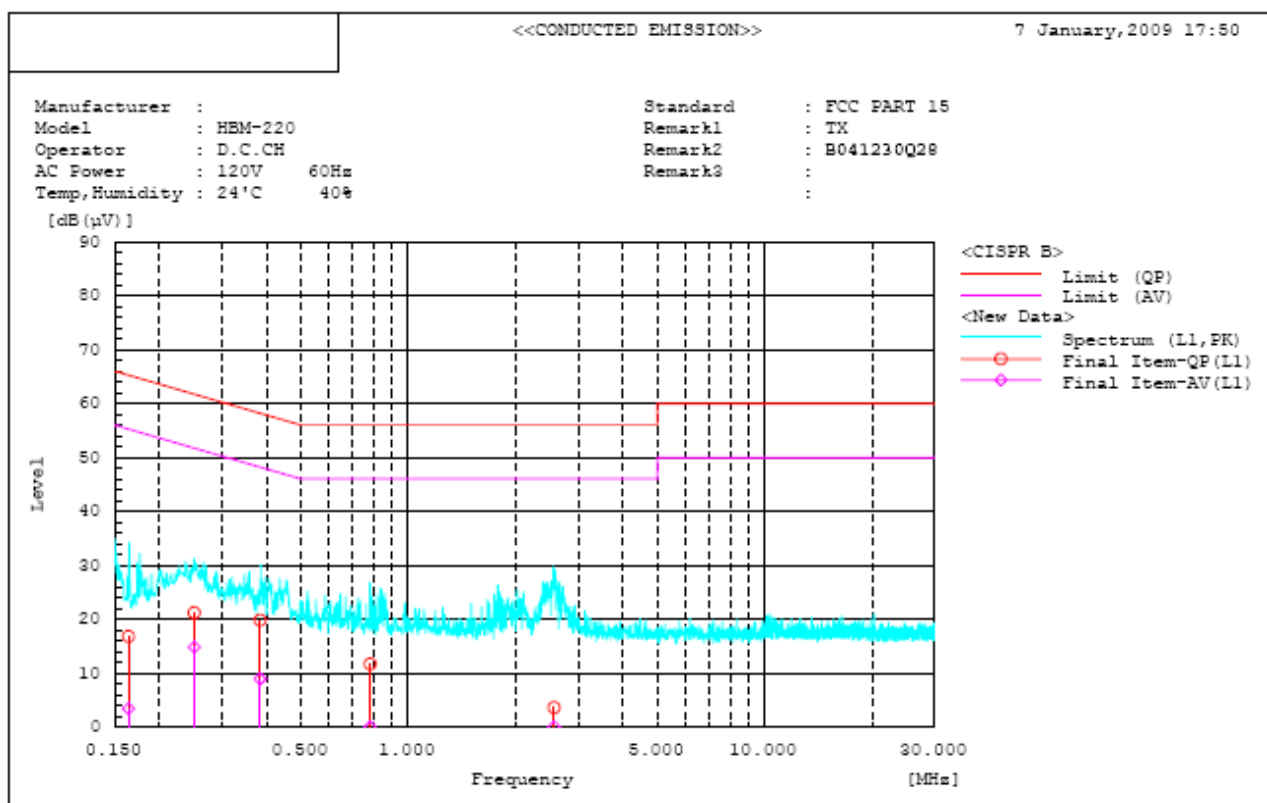
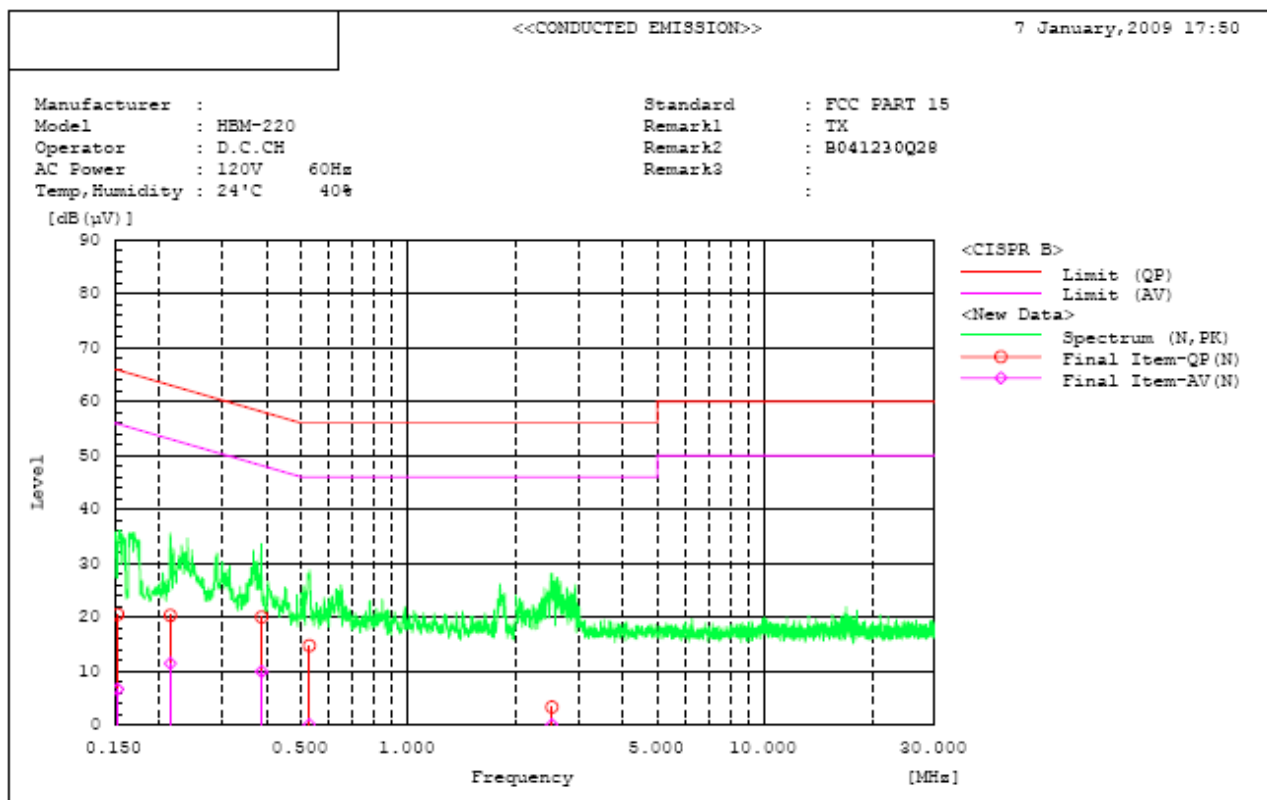


Figure 2: Measurement setup for AC Conducted Emission

Test Case 1 - Conducted Emission Graph -



Test Case 1

- Conducted Emission List -

<<CONDUCTED EMISSION>>

7 January, 2009 17:50

Standard : FCC PART 15
 Manufacturer :
 Model : HBM-220
 Operator : D.C.CH
 AC Power : 120V 60Hz
 Temp, Humidity : 24°C 40%
 Remark1 : TX
 Remark2 : B041230Q28
 Remark3 :

Final Result

--- N Phase ---

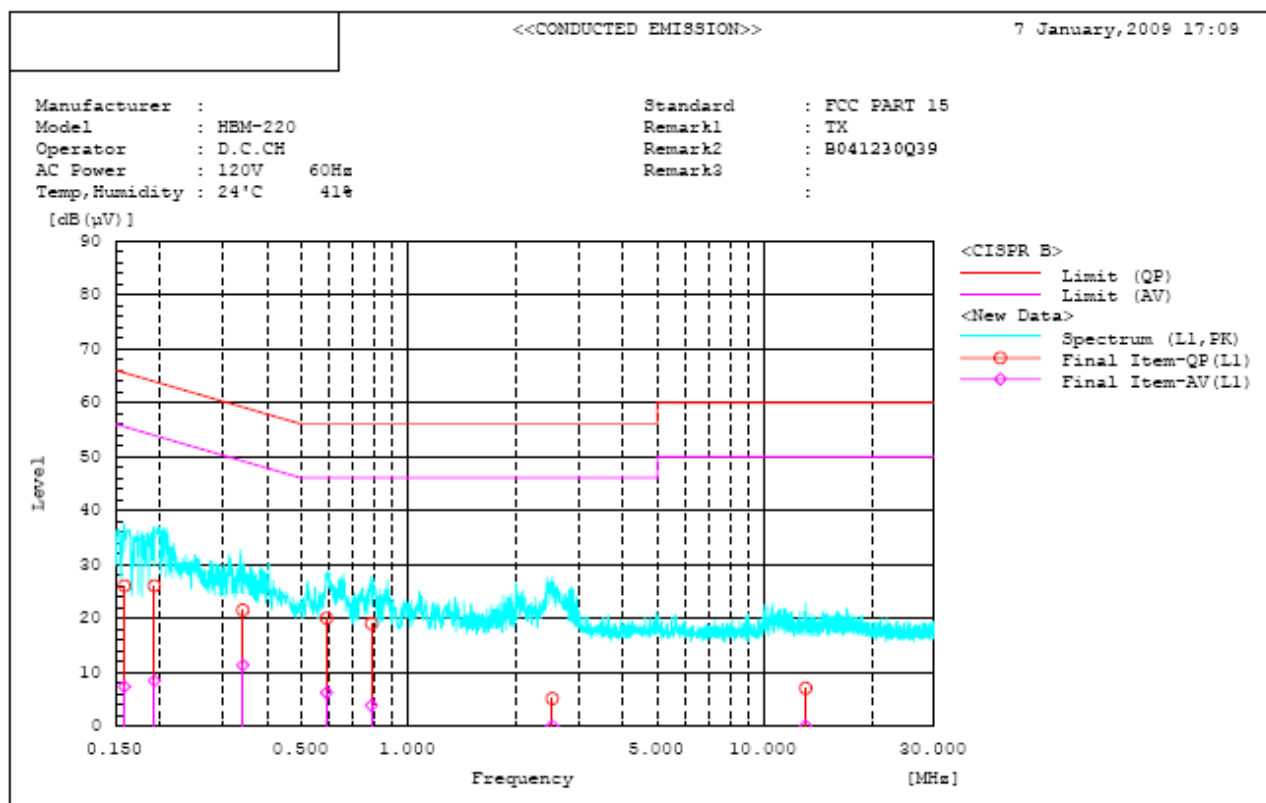
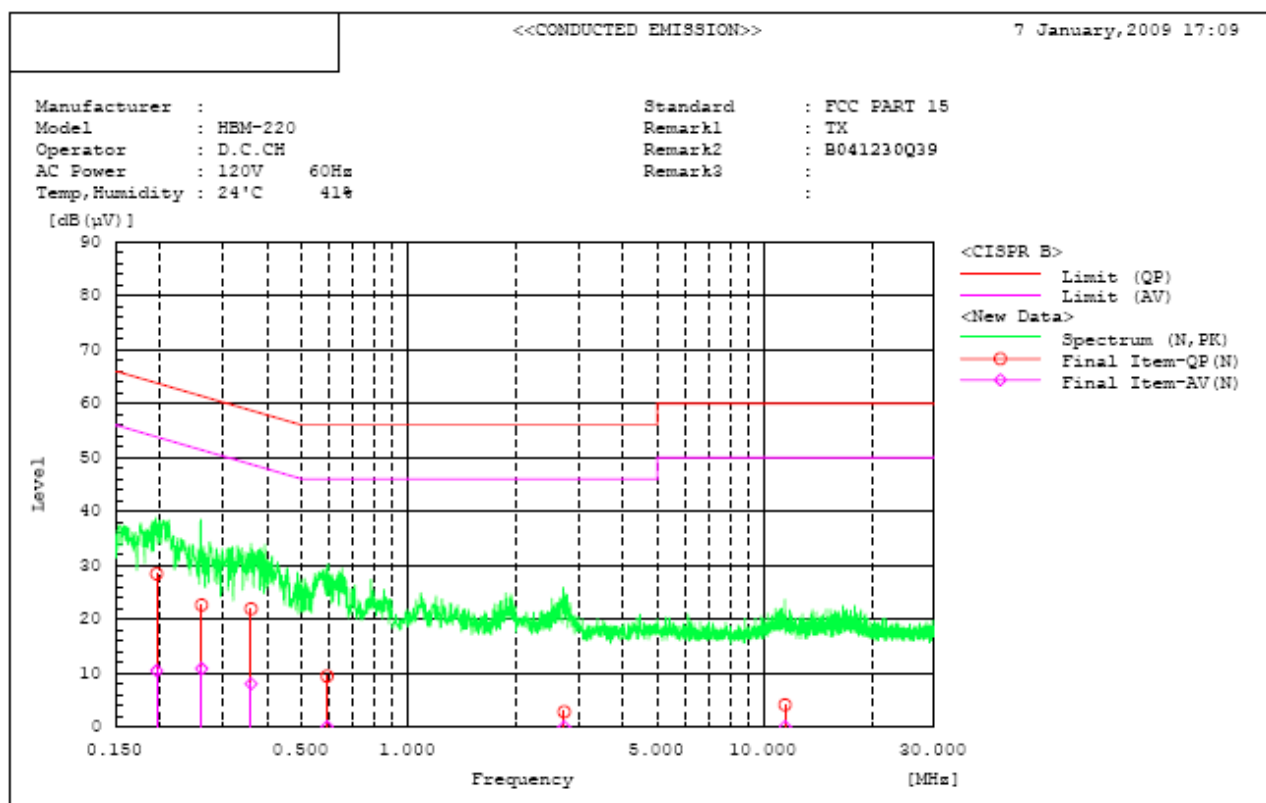
No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV	Remark
	[MHz]	[dB(μV)]	[dB(μV)]		[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.153	20.3	6.4	0.2	20.5	6.6	65.8	55.8	45.3	49.2	
2	0.215	20.2	11.3	0.1	20.3	11.4	63.0	53.0	42.7	41.6	
3	0.388	19.8	9.7	0.2	20.0	9.9	59.1	49.1	39.1	38.2	
4	0.528	14.5	0.0	0.2	14.7	0.0	56.0	46.0	41.3	0.0	
5	2.530	3.0	0.0	0.3	3.3	0.0	56.0	46.0	52.7	0.0	

--- 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(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.164	16.4	3.0	0.4	16.8	3.4	65.3	55.3	48.5	51.9	
2	0.384	19.4	8.5	0.4	19.8	8.9	59.2	49.2	39.4	39.3	
3	0.251	20.9	14.4	0.4	21.2	14.8	61.7	51.7	40.5	36.9	
4	0.782	11.3	0.0	0.4	11.7	0.0	56.0	46.0	44.3	0.0	
5	2.666	3.0	0.0	0.6	3.6	0.0	56.0	46.0	52.4	0.0	

Test Case 2

- Conducted Emission Graph -



Test Case 2

- Conducted Emission List -

***** <<CONDUCTED EMISSION>> *****

7 January, 2009 17:09

Standard : FCC PART 15
 Manufacturer :
 Model : HBM-220
 Operator : D.C.CH
 AC Power : 120V 60Hz
 Temp, Humidity : 24°C 41%
 Remark1 : TX
 Remark2 : B041230Q39
 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(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.196	28.3	10.3	0.1	28.4	10.4	63.8	53.8	35.4	43.4	
2	0.262	22.4	10.6	0.2	22.6	10.8	61.4	51.4	38.8	40.6	
3	0.361	21.7	7.8	0.2	21.9	8.0	58.7	48.7	36.8	40.7	
4	0.590	9.2	0.0	0.2	9.4	0.0	56.0	46.0	46.6	0.0	
5	2.737	2.5	0.0	0.3	2.8	0.0	56.0	46.0	53.2	0.0	
6	11.415	3.5	0.0	0.6	4.1	0.0	60.0	50.0	55.9	0.0	

--- 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(μV)]	[dB(μV)]	[dB(μV)]	[dB(μV)]	[dB]	[dB]	
1	0.159	25.6	6.9	0.4	26.0	7.3	65.5	55.5	39.5	48.2	
2	0.193	25.6	8.0	0.4	26.0	8.4	63.9	53.9	37.9	45.5	
3	0.342	21.1	10.9	0.4	21.5	11.3	59.2	49.2	37.7	37.9	
4	0.588	19.6	5.8	0.4	20.0	6.2	56.0	46.0	36.0	39.8	
5	0.786	18.6	3.4	0.4	19.0	3.8	56.0	46.0	37.0	42.2	
6	2.534	4.5	0.0	0.6	5.1	0.0	56.0	46.0	50.9	0.0	
7	13.060	6.2	0.0	0.8	7.0	0.0	60.0	50.0	53.0	0.0	

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
☒	Spectrum Analyzer	Agilent	E4440A	06/11/08	06/11/09	MY45304199
☐	Spectrum Analyzer(RE)	H.P	8563E	13/10/08	13/10/09	3551A04634
☐	Spectrum Analyzer	Rohde Schwarz	FSP	09/09/08	09/09/09	100385
☐	Power Meter	H.P	EMP-442A	10/07/08	10/07/09	GB37170413
☐	Power Sensor	H.P	8481A	14/07/08	14/07/09	3318A96332
☐	Power Divider	Agilent	11636B	04/12/08	04/12/09	56471
☐	Power Splitter	Anritsu	K241B	14/10/08	14/10/09	020611
☐	Frequency Counter	H.P	5342A	16/09/08	16/09/09	2119A04450
☐	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/08	10/10/09	30604493/021031
☐	Digital Multimeter	H.P	34401A	20/03/08	20/03/09	3146A13475
☒	Thermo hygrograph	SATO	NS II-Q	06/10/08	06/10/09	1503512
☒	Thermo hygrograph	SATO	NS II-Q	17/10/08	17/10/09	1506426
☐	Multifuction Synthesizer	HP	8904A	06/10/08	06/10/09	3633A08404
☒	Signal Generator	Rohde Schwarz	SMR20	02/04/08	02/04/09	101251
☒	Signal Generator	H.P	ESG-3000A	09/07/08	09/07/09	US37230529
☐	Vector Signal Generator	Rohde Schwarz	SMJ100A	17/01/08	17/01/09	100148
☐	Audio Analyzer	H.P	8903B	09/07/08	09/07/09	3011A09448
☐	Modulation Analyzer	H.P	8901B	18/07/08	18/07/09	3028A03029
☐	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	31/07/08	31/07/09	GB43461134
☐	Universal Radio communication Tester	Rohde Schwarz	CMU 200	02/04/08	02/04/09	107631
☐	Bluetooth Tester	TESCOM	TC-3000A	16/12/08	16/12/09	3000A4A0121
☐	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
☐	AC Power supply	DAEKWANG	5KVA	20/03/08	20/03/09	20060321-1
☒	DC Power Supply	HP	6622A	20/03/08	20/03/09	3448A03760
☐	DC Power Supply	HP	6633A	20/03/08	20/03/09	3524A06634
☐	HORN ANT	ETS	3115	13/06/08	13/06/09	6419
☒	HORN ANT	ETS	3115	10/09/08	10/09/09	21097
☐	HORN ANT	A.H.Systems	SAS-574	13/06/08	13/06/09	154
☐	HORN ANT	A.H.Systems	SAS-574	13/06/08	13/06/09	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
☐	Coaxial Fixed Attenuators	Agilent	8491B	01/08/08	01/08/09	MY39260700
☐	Coaxial Fixed Attenuators	Agilent	8491B	15/07/08	15/07/09	MY39260699
☐	Attenuator (10dB)	WEINSCHL	23-10-34	01/10/08	01/10/09	BP4386
☐	Attenuator (20dB)	WEINSCHL	86-20-11	06/10/08	06/10/09	432
☐	Attenuator (10dB)	WEINSCHL	86-10-11	06/10/08	06/10/09	446
☐	Attenuator (10dB)	WEINSCHL	86-10-11	06/10/08	06/10/09	408
☐	Attenuator (40dB)	WEINSCHL	57-40-33	01/10/08	01/10/09	NN837
☐	Attenuator (30dB)	JFW	50FH-030-300	24/03/08	24/03/09	060320-1
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	11/07/08	11/07/09	788
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	11/07/08	11/07/09	790
☐	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0215CAN	11/07/08	11/07/09	112
☒	Amplifier (30dB)	Agilent	8449B	13/10/08	13/10/09	3008A01590
☐	RF Power Amplifier	OPHIRRF	5069F	09/07/08	09/07/08	1006
☐	Software	Agilent	Benchlink	N/A	N/A	A.01.09 021211
☐	EMI TEST RECEIVER	R&S	ESU	Calibrating	Calibrating	100014
☐	BILOG ANTENNA	SCHAFFNER	CBL6112B	13/06/08	13/06/09	2737
☐	Amplifier (22dB)	H.P	8447E	27/02/08	27/02/09	2945A02865
☐	Position Controller	TOKIN	5905A	N/A	N/A	N/A
☐	Software	ToYo EMI	EP5/RE	N/A	N/A	Ver 2.0.800
☒	EMI TEST RECEIVER	R&S	ESCI	13/05/08	13/05/09	100364
☒	Log Periodic Antenna	Schwarzbeck	UHALP9108A1	30/09/08	30/09/09	1098
☒	Biconical Antenna	Schwarzbeck	VHA9103	13/06/08	13/06/09	2233
☒	Amplifier (25dB)	Agilent	8447D	21/05/08	21/05/09	2944A10144
☒	Position Controller	TOKIN	5901T	N/A	N/A	14173
☒	Software	AUDIX	e3	N/A	N/A	Ver 3.0
☒	Driver	TOKIN	5902T2	N/A	N/A	14174
☒	Spectrum Analyzer(CE)	H.P	8591E	26/04/08	26/04/09	3649A05889
☐	LISN	Kyorits	KNW-407	04/08/08	04/08/09	8-317-8
☒	LISN	Kyorits	KNW-242	11/09/08	11/09/09	8-654-15
☒	CVCF	NF Electronic	4420	21/03/08	21/03/09	304935/337980
☒	Software	ToYo EMI	EP5/CE	N/A	N/A	Ver 2.0.801
☒	DC BLOCK	Hyuplip	KEL-007	N/A	N/A	7-1581-5
☐	50 ohm Terminator	HME	CT-01	30/01/08	30/01/09	N/A
☒	RFI/FIELD Intensity Meter	Kyorits	KNW-2402	11/09/08	11/09/09	4N-170-3