

# RF TEST REPORT

Test item : RF Remote Controller  
Model No. : AKB732955  
Order No. : 1008-00803  
Date of receipt : 2010-08-31  
Test duration : 2010-09-08 ~ 2010-09-20  
Date of issue : 2010-09-29  
Use of report : FCC Original Grant

Applicant : LG Electronics USA.  
1000 Sylvan Avenue Englewood Cliffs, New Jersey, United States

Test laboratory : Digital EMC Co., Ltd.  
683-3, Yubang-Dong, Cheoin-Gu, Yongin-Si, Kyunggi-Do, 449-080, Korea

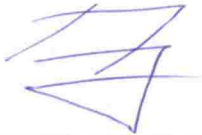
Test specification : FCC Part 15.247 Subpart C  
ANSI C63.4-2003

Test environment : See appended test report

Test result :  Pass  Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DIGITAL EMC CO., LTD.

Tested by:



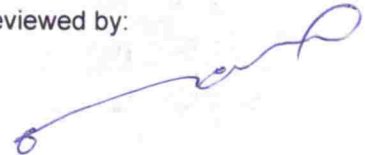
Engineer  
D.C. Cha

Witnessed by:

N/A

N/A

Reviewed by:



Manager  
W.J. Lee

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## 1. Equipment information

### 1.1 Equipment description

FCC Equipment Class	Part 15 Spread Spectrum Transmitter (DSS)
Equipment type	RF Remote Controller
Equipment model name	AKB732955
Equipment add model name	N/A
Equipment serial no.	Identical prototype
Frequency band	2403.50 ~ 2478.30 MHz
Spread Spectrum	Frequency Hopping
Modulation type	MSK
Transmission Rate	250Kbps
Power	DC 3.0 V
Antenna type	Internal Type: Chip Antenna (Max. peak gain: 1.99 dBi)

### 1.2 Ancillary equipment

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

## 2. Information about test items

### 2.1 Test mode

This device was tested in maximum duty mode at maximum power of hopping enable / disable mode.

<b>Test Case 1</b>	-
<b>Test Case 2</b>	-
<b>Test Case 3</b>	-

### 2.2 Auxiliary equipment

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

### 2.3 Tested frequency

- Hopping Function: Enable

	TX Frequency (MHz)	RX Frequency (MHz)
<b>Hopping Band</b>	2403.50 ~ 2478.30	2403.50 ~ 2478.30

- Hopping Function: Disable

	TX Frequency (MHz)	RX Frequency (MHz)
<b>Lowest Channel</b>	2403.50	2403.50
<b>Middle Channel</b>	2442.09	2442.09
<b>Highest Channel</b>	2478.30	2478.30

### 2.4 Tested environment

<b>Temperature</b>	: 23 ~ 26 °C
<b>Relative humidity content</b>	: 32 ~ 46 % R.H.
<b>Details of power supply</b>	: DC 3.0 V

### 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
<b>I. Transmit mode (Tx)</b>				
15.247(a)	Carrier Frequency Separation	$\geq 20\text{dB BW}$ or $\geq$ Two-Thirds of the 20dB BW	Conducted	<b>C</b>
	Number of Hopping Frequencies	$\geq 15$ hops		<b>C</b>
	20 dB Bandwidth	None		<b>C</b>
	Dwell Time	$\leq 0.4$ seconds		<b>C</b>
15.247(b)	Transmitter Output Power	$\leq 1\text{Watt}$ , if CHs $\geq 75$ Others $\leq 0.125\text{W}$		<b>C</b>
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.		<b>C</b>
	Conducted Spurious Emissions			<b>C</b>
15.205, 15.209	Radiated Spurious Emissions	FCC 15.209 Limits	Radiated	<b>C</b> Note.2
15.207	AC Conducted Emissions	EN 55022	AC Line Conducted	<b>NA</b> Note.3
15.203	Antenna Requirements	FCC 15.203	-	<b>C</b>
<p>Note 1: <b>C</b>=Comply    <b>NC</b>=Not Comply    <b>NT</b>=Not Tested    <b>NA</b>=Not Applicable</p> <p>Note 2: This test item was performed in each axis. and the worst case data were reported.</p> <p>Note3: Conducted emission test in not applicable. Because the power of the EUT is supplied from a battery.</p>				

The sample was tested according to the following specification:  
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 = 1% of the span or more

Sweep = auto

VBW =  $\geq$  RBW

Detector function = peak

Trace = max hold

#### - Measurement Data: **Comply**

Hopping Mode	Peak of center channel (MHz)	Peak of adjacent Channel (MHz)	Test Result (MHz)
Enable	2442.153	2444.428	2.275

See next page for actual measured spectrum plot.

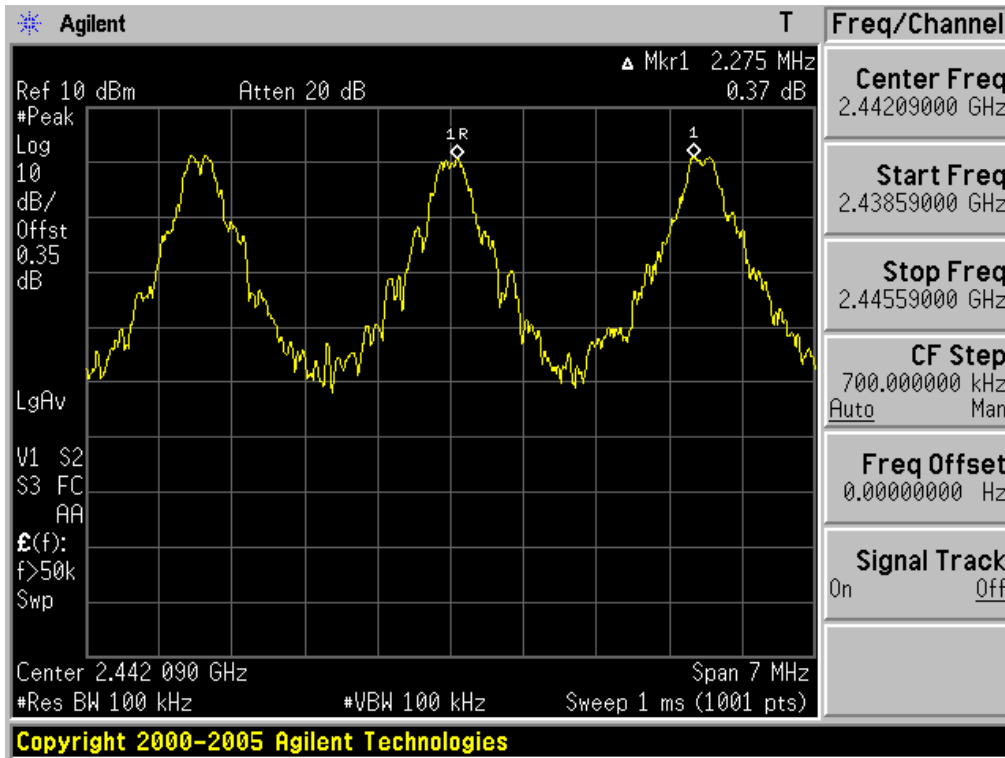
#### - Minimum Standard:

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

**Carrier Frequency Separation**

Hopping mode: Enable



### 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:

Span = 25MHz  
 Plot 1: Start Frequency = 2389.5MHz, Stop Frequency = 2414.5 MHz  
 Plot 2: Start Frequency = 2414.5MHz, Stop Frequency = 2439.5 MHz  
 Plot 3: Start Frequency = 2439.5MHz, Stop Frequency = 2464.5 MHz  
 Plot 4: Start Frequency = 2464.5MHz, Stop Frequency = 2489.5 MHz

RBW = 1% of the span or more  
 VBW =  $\geq$  RBW  
 Trace = max hold  
 Sweep = auto  
 Detector function = peak

**- Measurement Data: Comply**

Hopping mode	Test Result (Total Hops)
Enable	32

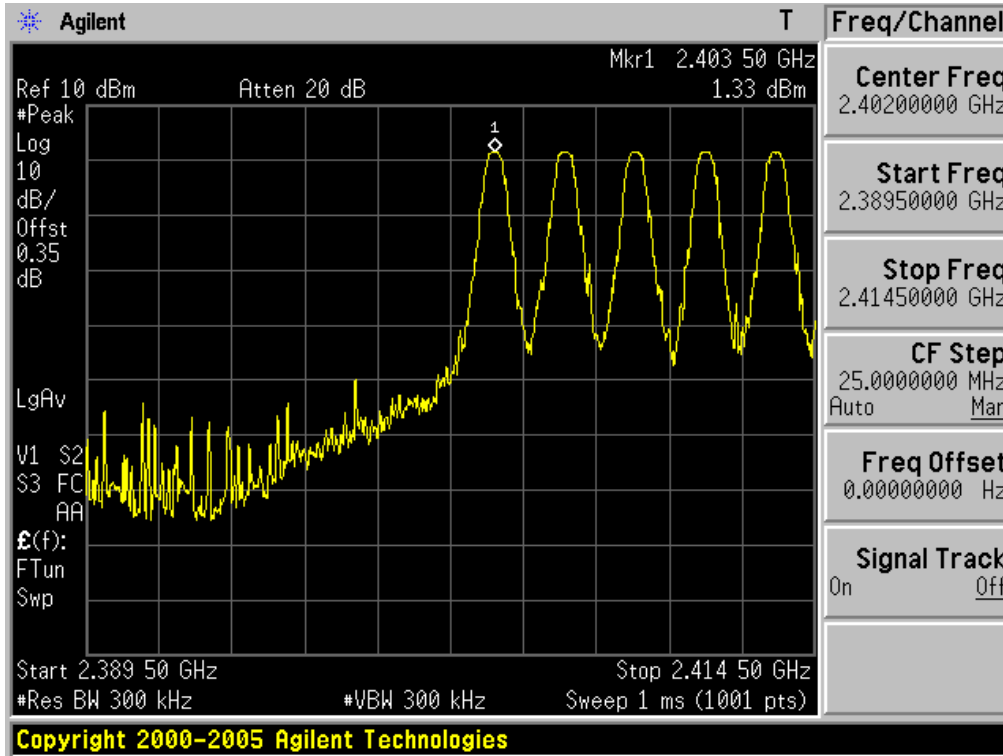
Note 1: See next pages for actual measured spectrum plots.

**- Minimum Standard:**

At least 15 hops

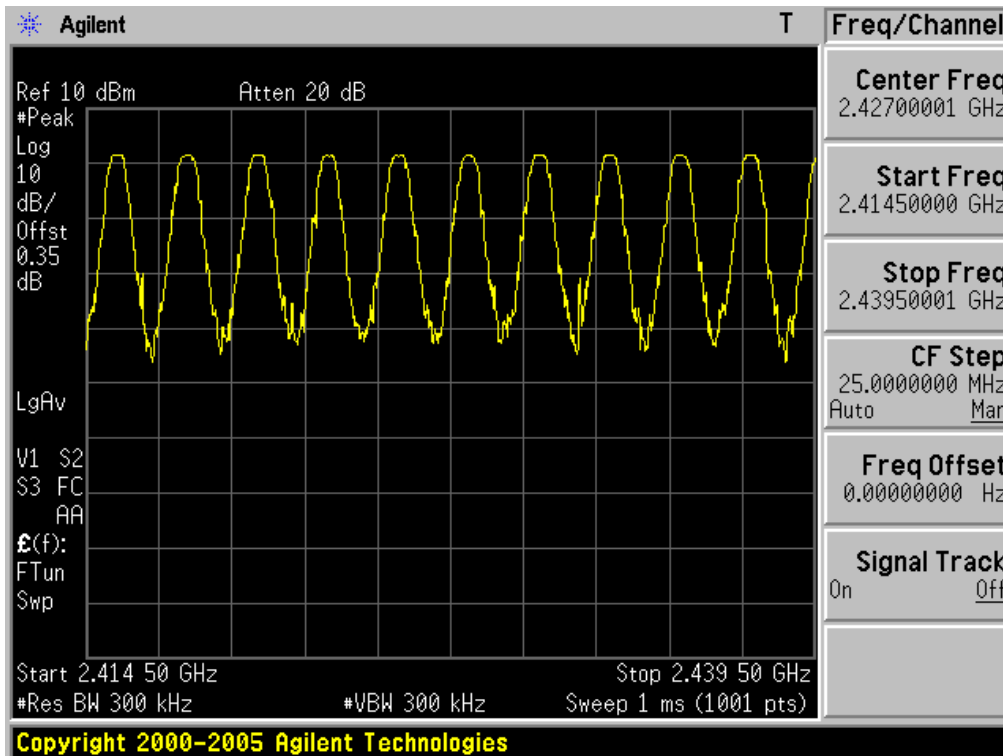
### Number of Hopping Frequencies 1

Hopping mode: Enable



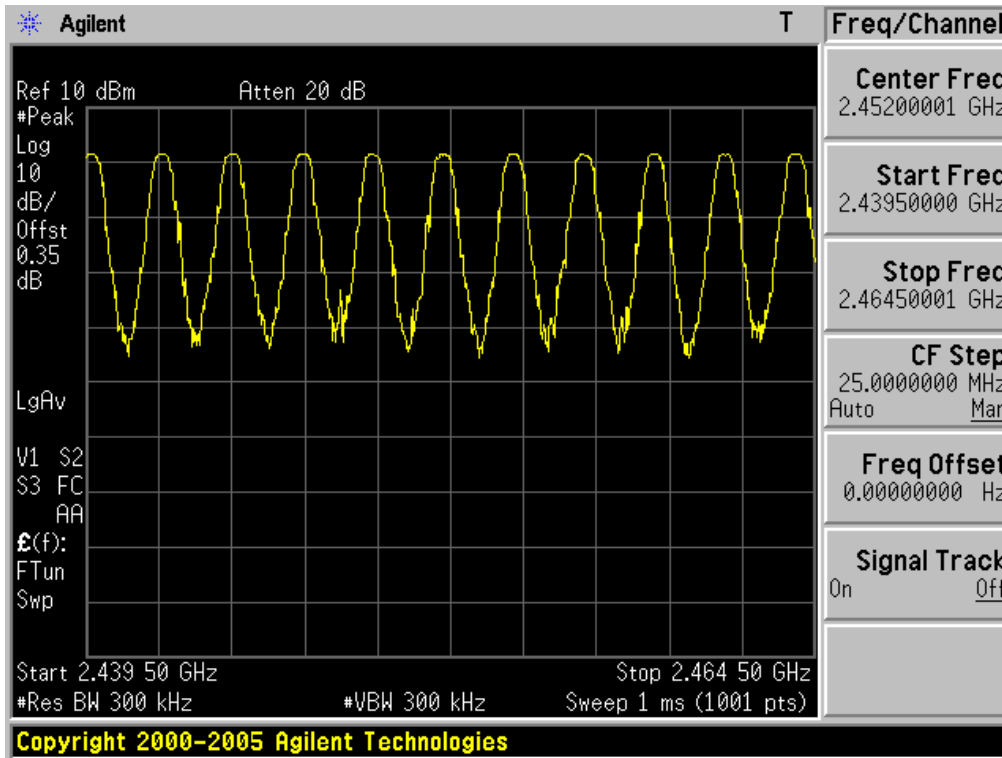
### Number of Hopping Frequencies 2

Hopping mode: Enable



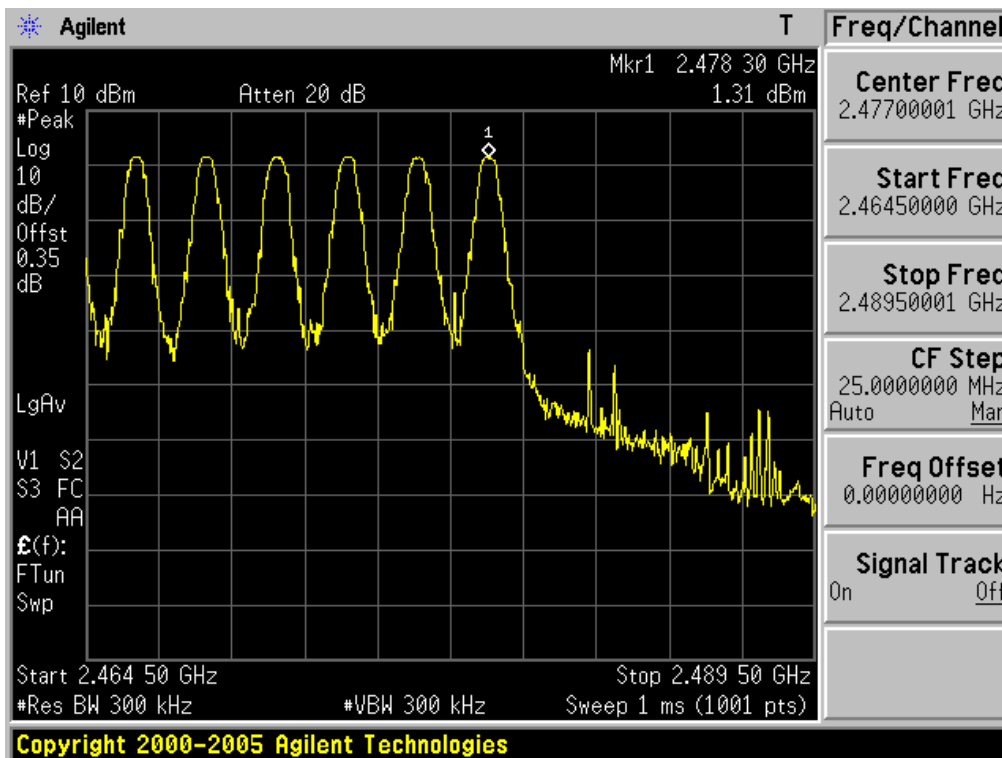
**Number of Hopping Frequencies 3**

Hopping mode: Enable



**Number of Hopping Frequencies 4**

Hopping mode: Enable



### 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 Frequencies

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

RBW = 1% of the 20dB bandwidth or more

VBW =  $\geq$  RBW

Trace = max hold

Sweep = auto

Detector function = peak

#### - Measurement Data: **Comply**

Hopping mode	Tested Channel	Test Results (MHz)
Disable	Lowest	0.785
	Middle	0.760
	Highest	0.780

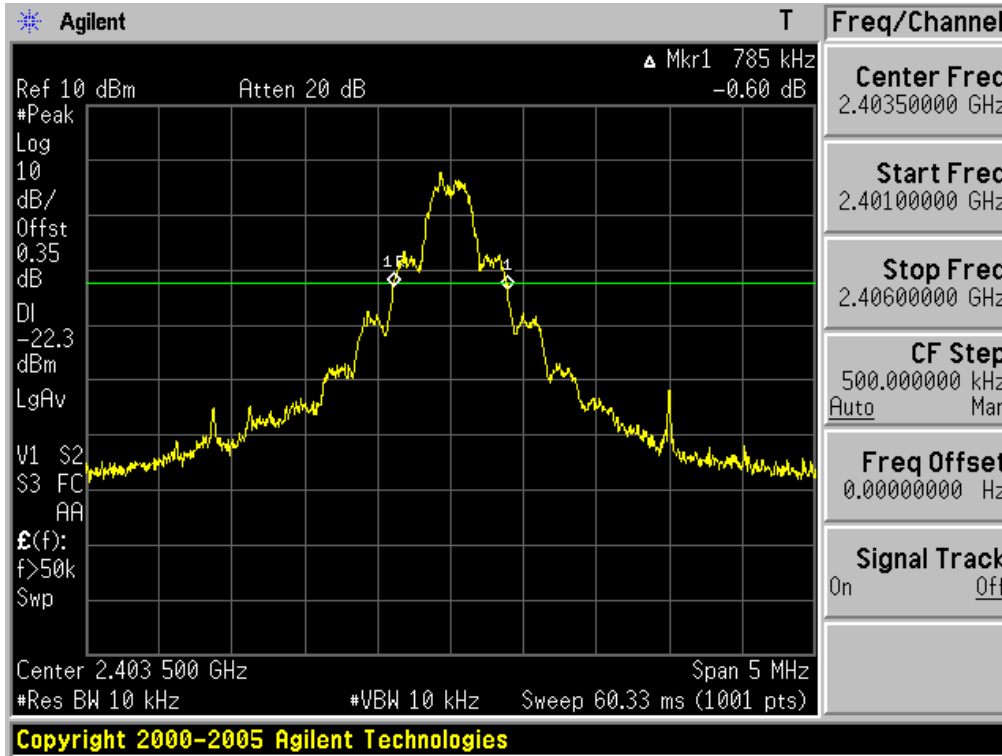
Note 1: See next pages for actual measured spectrum plots.

#### - Minimum Standard:

None

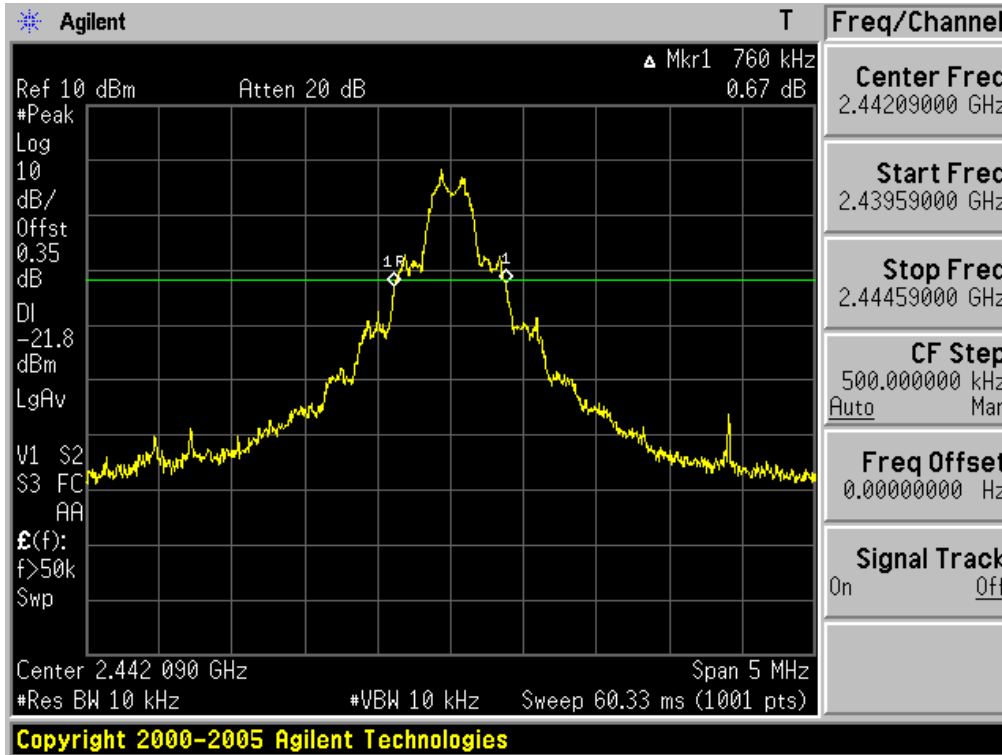
### 20dB Bandwidth

### Lowest Channel



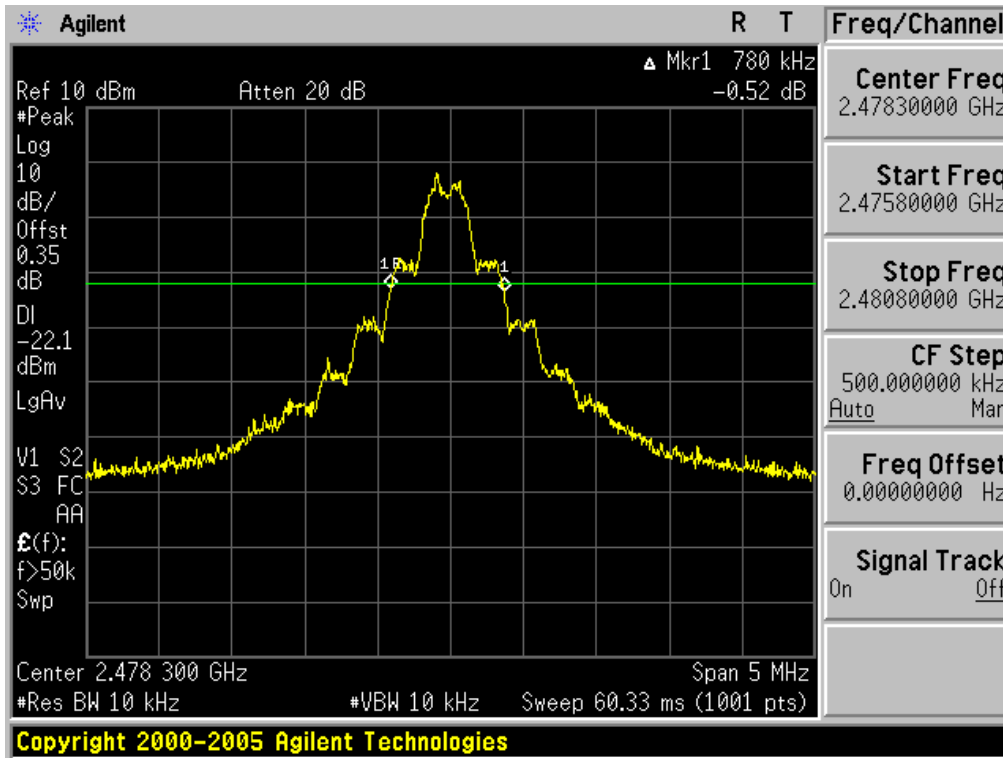
### 20dB Bandwidth

### Middle Channel



20dB Bandwidth

Highest Channel



### 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

RBW = 1 MHz

Trace = max hold

Span = zero

VBW =  $\geq$  RBW

Detector function = peak

**- Measurement Data: Comply**

Hopping mode	Burst On Time (ms)	Period (ms)	Number of hopping Channels	Test Result (s)
Enable	3.8	37.8	32	0.0402

Note 1: 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 =  $(0.4 \times \text{Number of hopping Channels}) \times \text{Burst On time} / (\text{period} \times \text{Number of hopping Channels})$

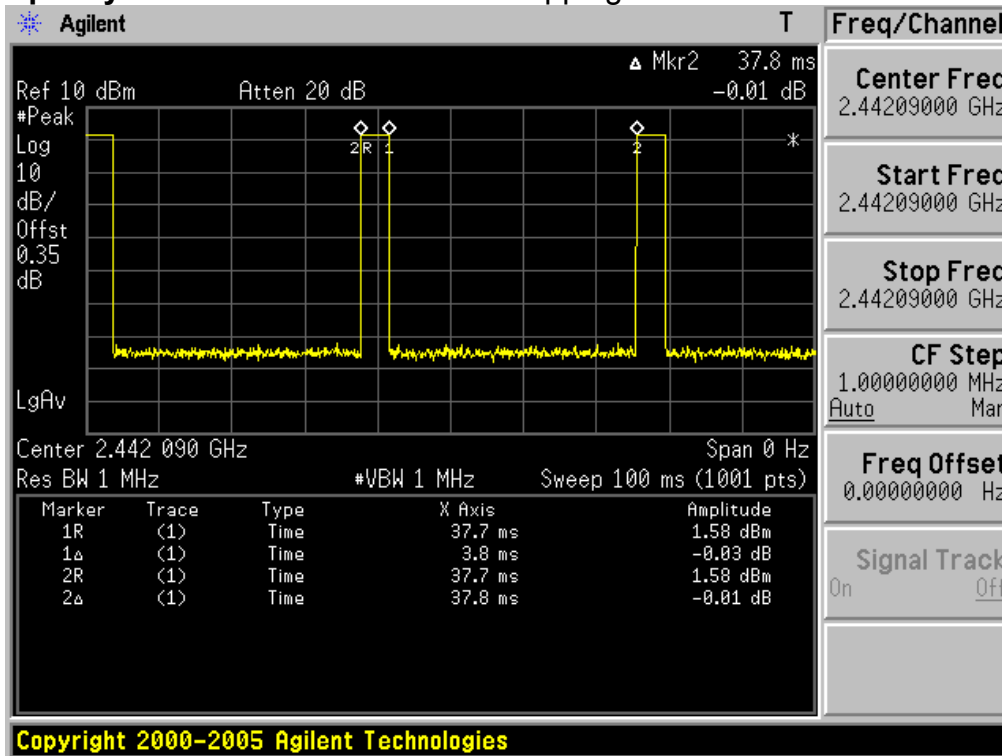
Note 2: See next pages for actual measured spectrum plots.

**- Minimum Standard:**

No greater than 0.4 seconds
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Time of Occupancy

Hopping mode: Enable



### 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 Frequencies

Span = approximately 5 times of the 20 dB bandwidth

RBW = greater than the 20dB bandwidth of the emission being measured

VBW =  $\geq$  RBW

Trace = max hold

Detector function = peak

Sweep = auto

#### - Measurement Data: **Comply**

Hopping mode	Tested Channel	Test Results	
		dBm	mW
Disable	Lowest	1.57	1.435
	Middle	1.54	1.426
	Highest	1.46	1.400

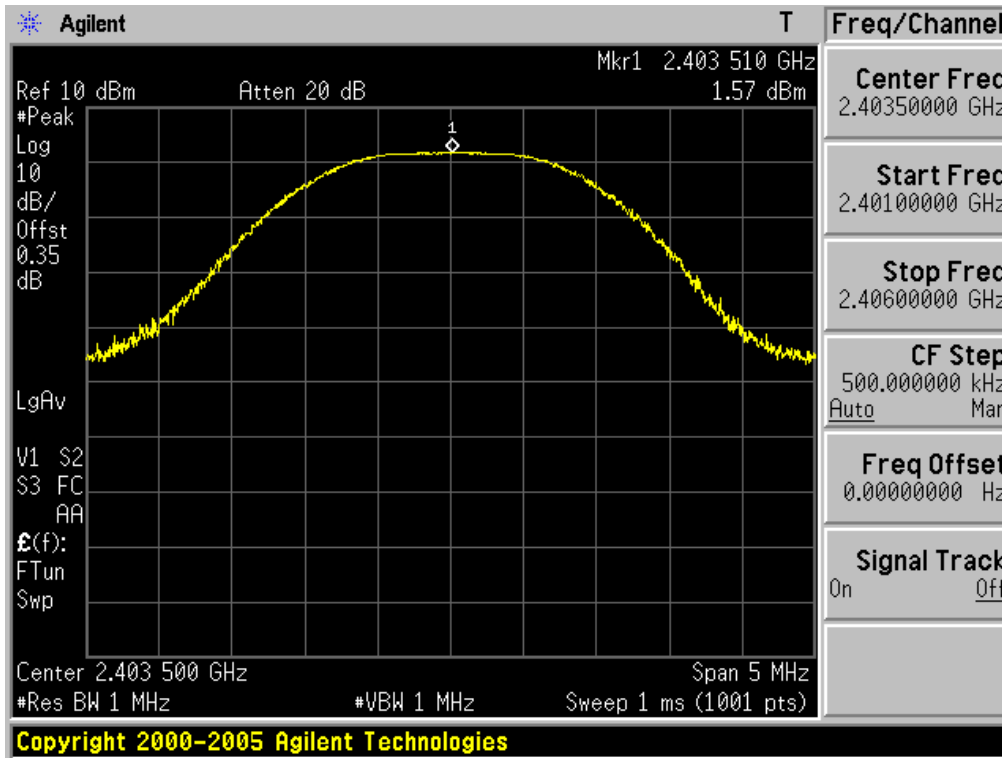
Note 1: See next pages for actual measured spectrum plots.

#### - 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**

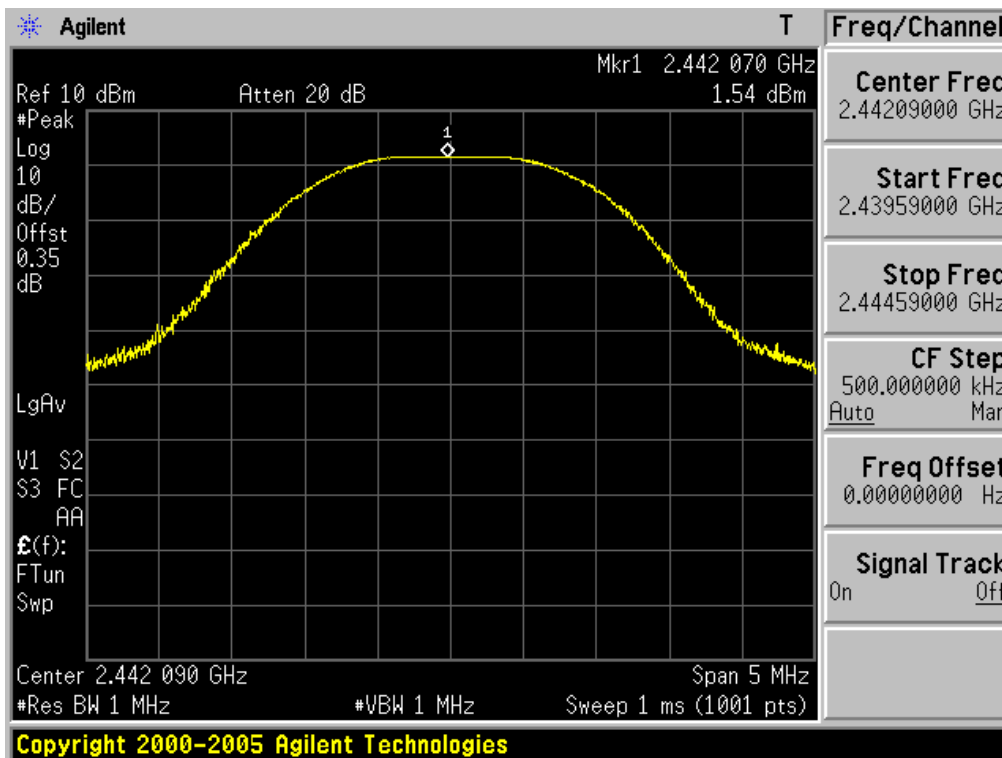
Peak Output Power

Lowest Channel



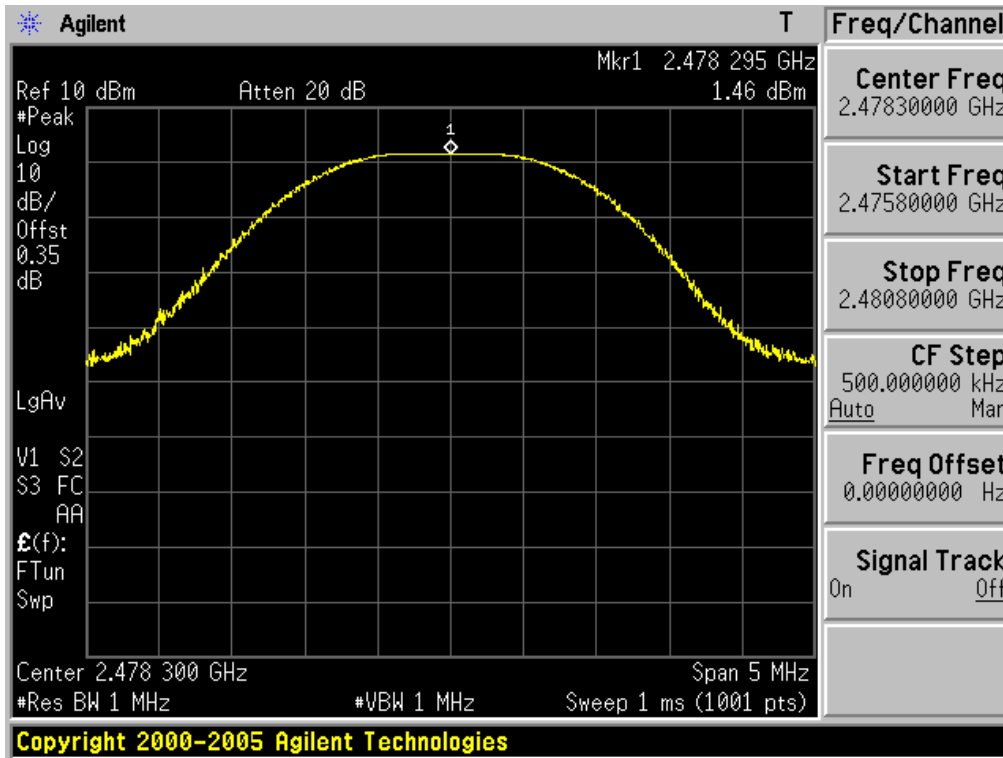
Peak Output Power

Middle Channel



Peak Output Power

Highest Channel



### 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.

For Band-edge testing the spectrum analyzer is set to:

Tested frequency = the highest and the lowest Frequencies

Center frequency = 2400MHz, 2483.5MHz

Span = 20MHz

Detector function = peak

RBW = 1% of the span

VBW =  $\geq$  RBW

Trace = max hold

Sweep = auto

For spurious testing the spectrum analyzer is set to:

Tested frequency = the highest, middle and the lowest Frequencies

RBW = 100 kHz

VBW =  $\geq$  RBW

Detector function = peak

Sweep = auto

Trace = max hold

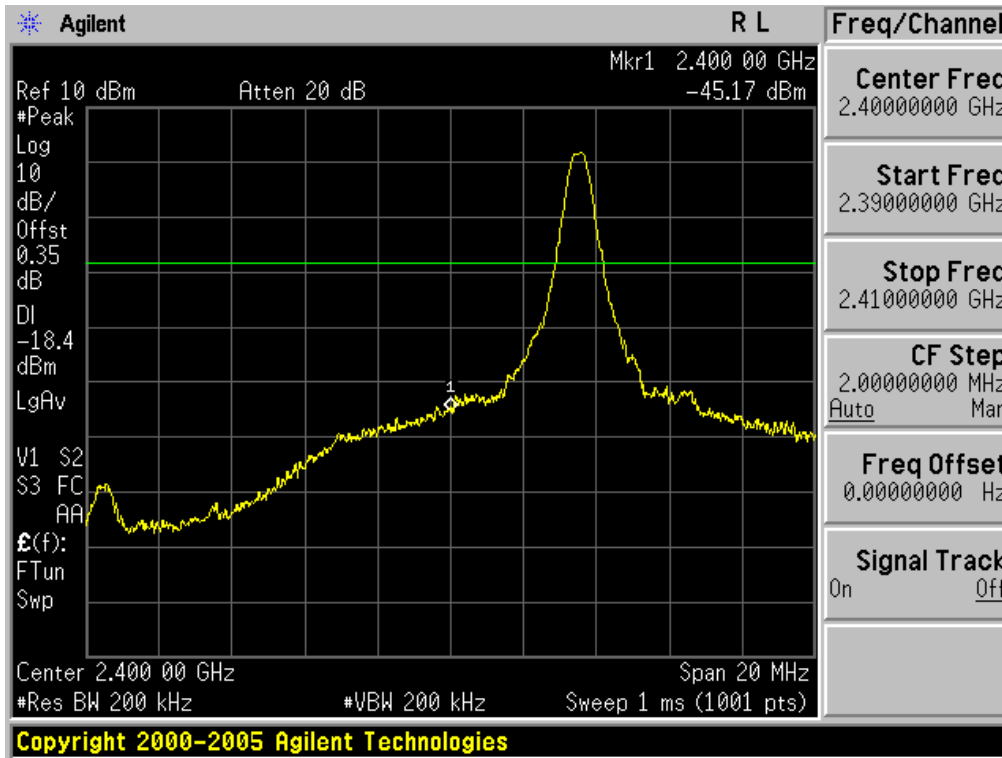
#### - Measurement Data: **Comply**

Note 1: See next pages for actual measured spectrum plots.

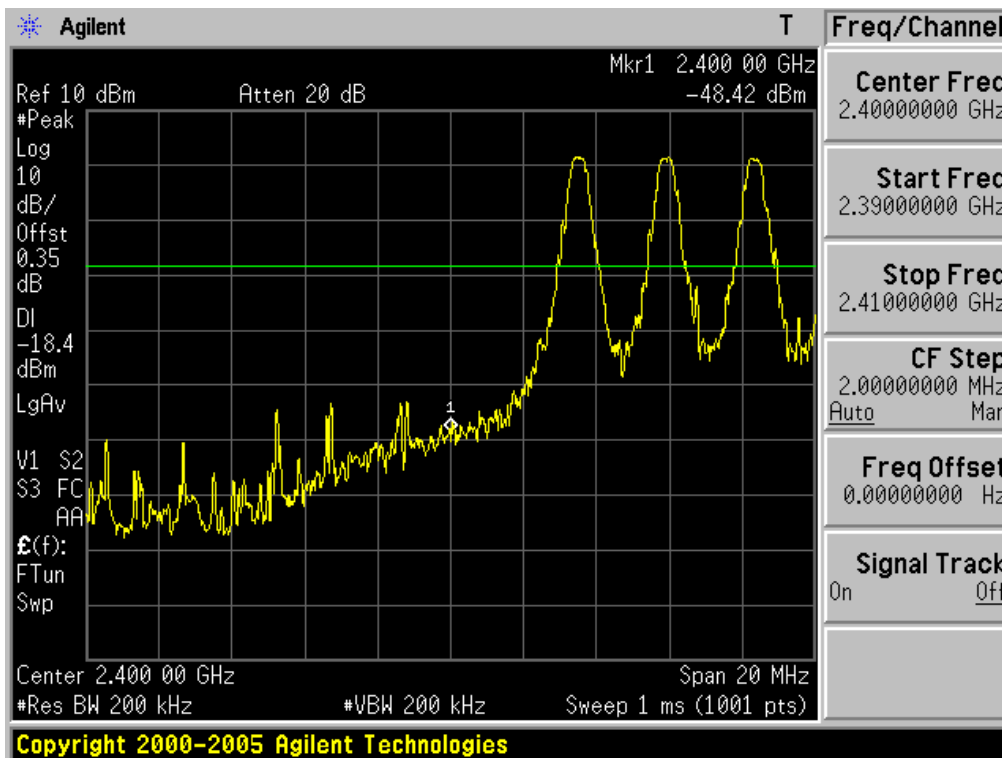
#### - Minimum Standard:

Minimum Standard:	> 20 dBc
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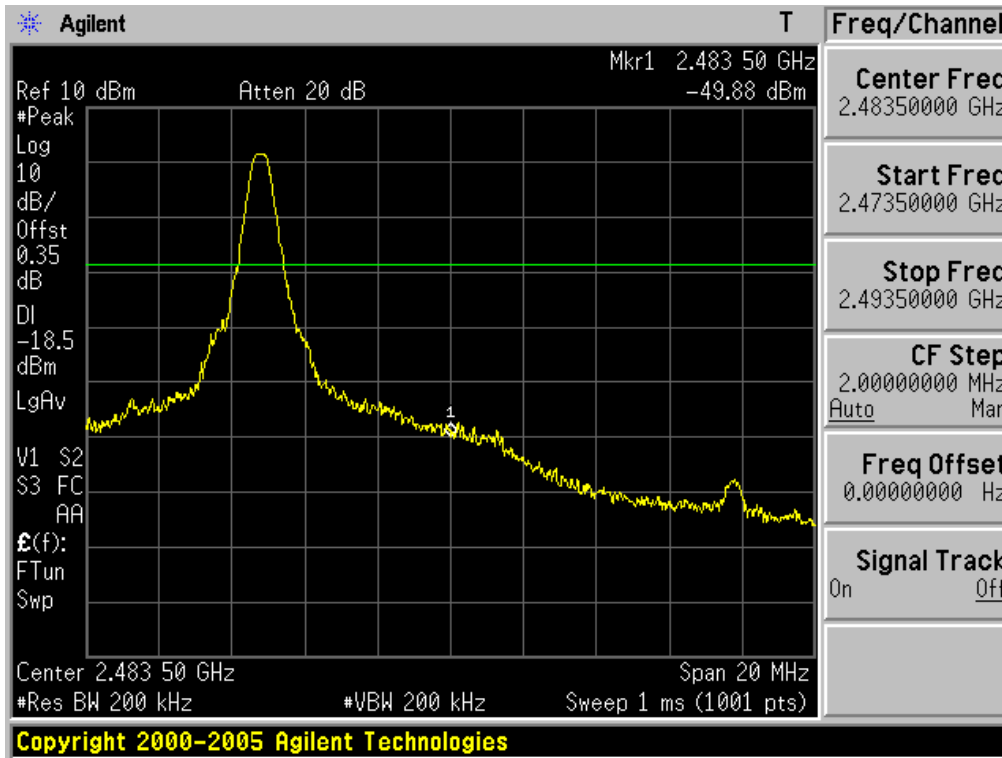
**Low Band-edge**      Hopping mode: Disable



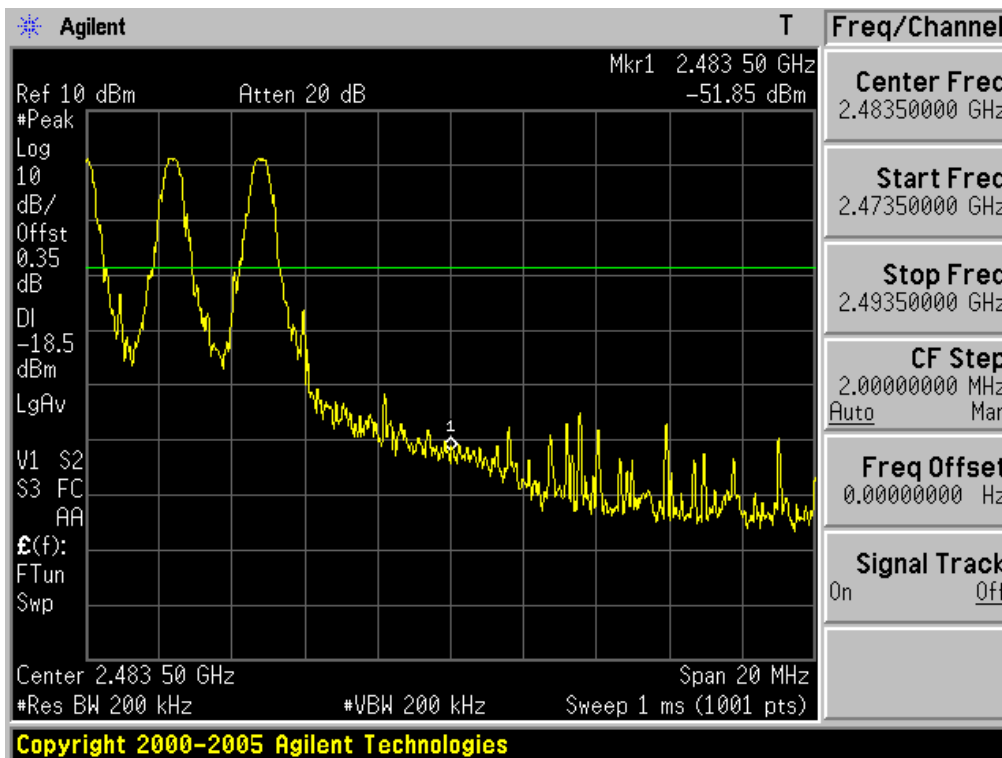
**Low Band-edge**      Hopping mode: Enable



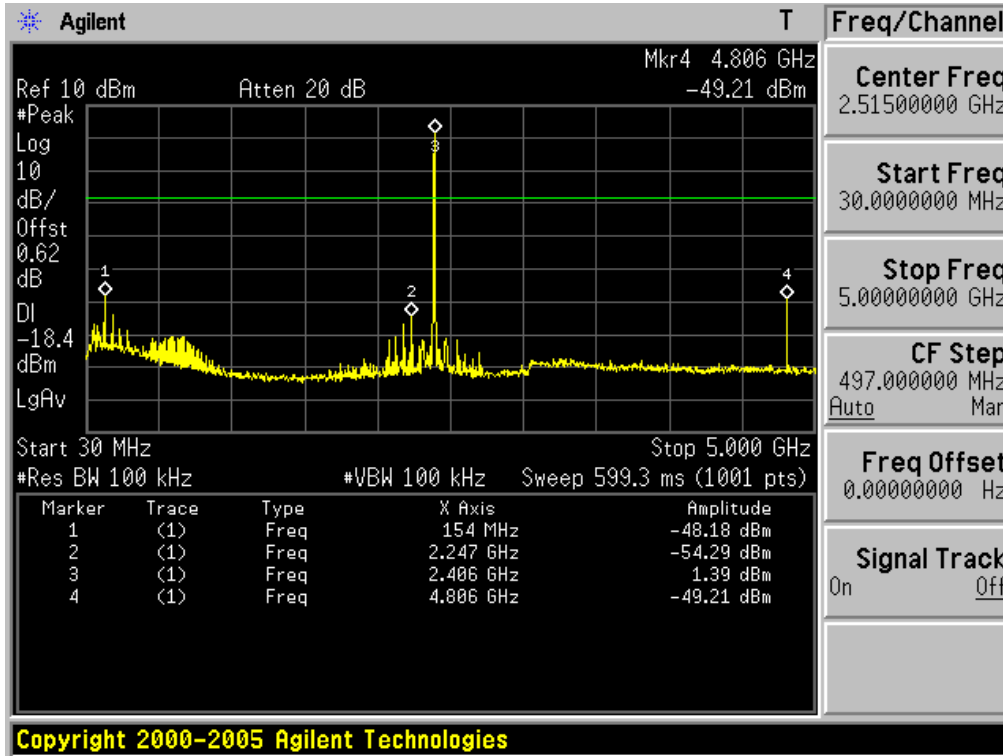
**High Band-edge**      Hopping mode: Disable



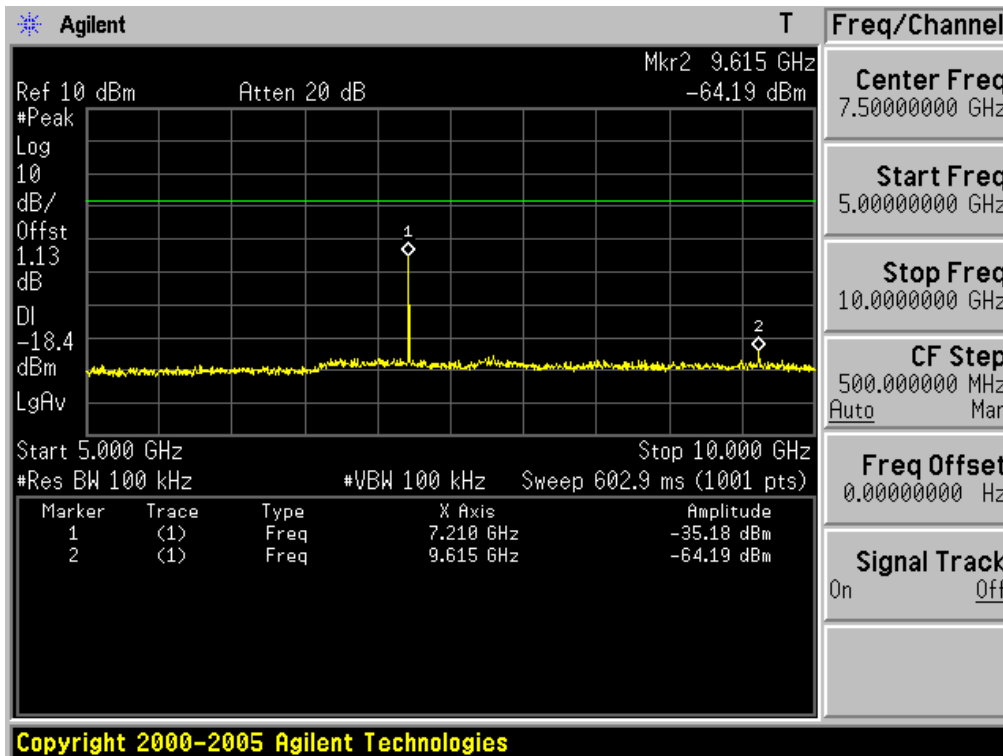
**High Band-edge**      Hopping mode: Enable



**30MHz ~ 5GHz Conducted Spurious Emissions Lowest Channel**

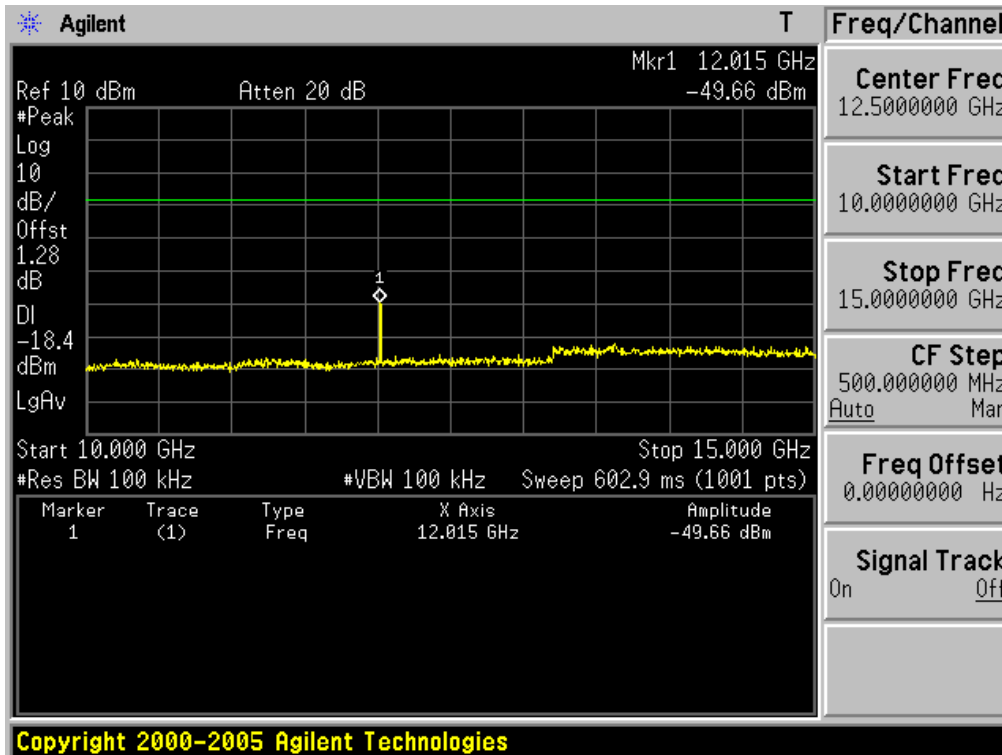


**5GHz ~ 10GHz Conducted Spurious Emissions Lowest Channel**



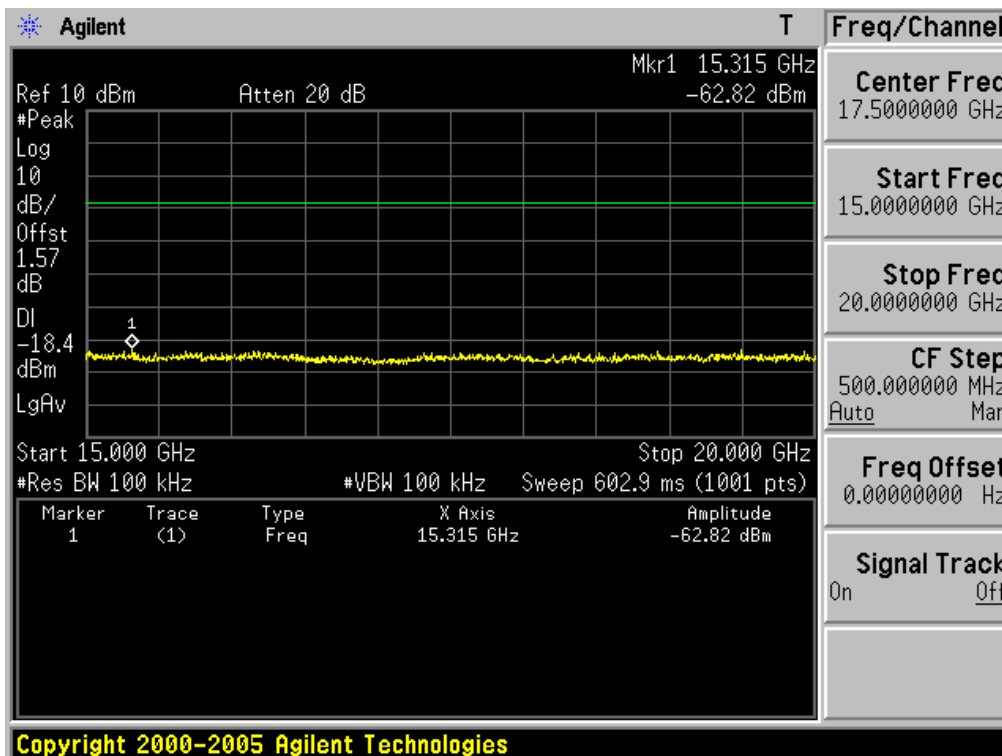
10GHz ~ 15GHz Conducted Spurious Emissions

Lowest Channel



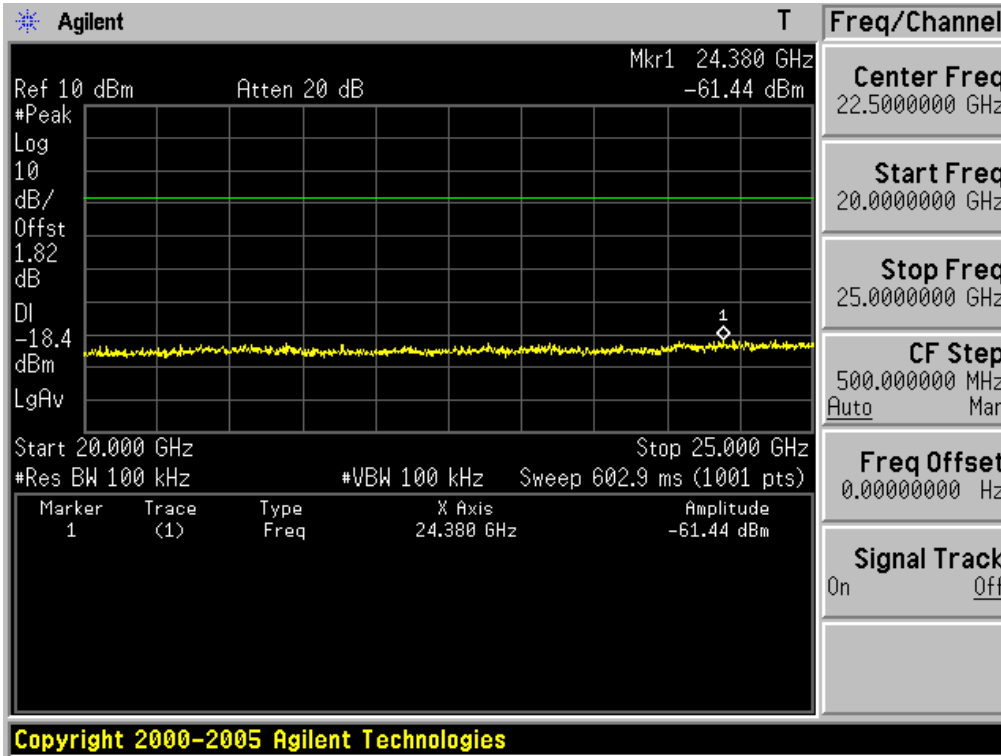
15GHz ~ 20GHz Conducted Spurious Emissions

Lowest Channel



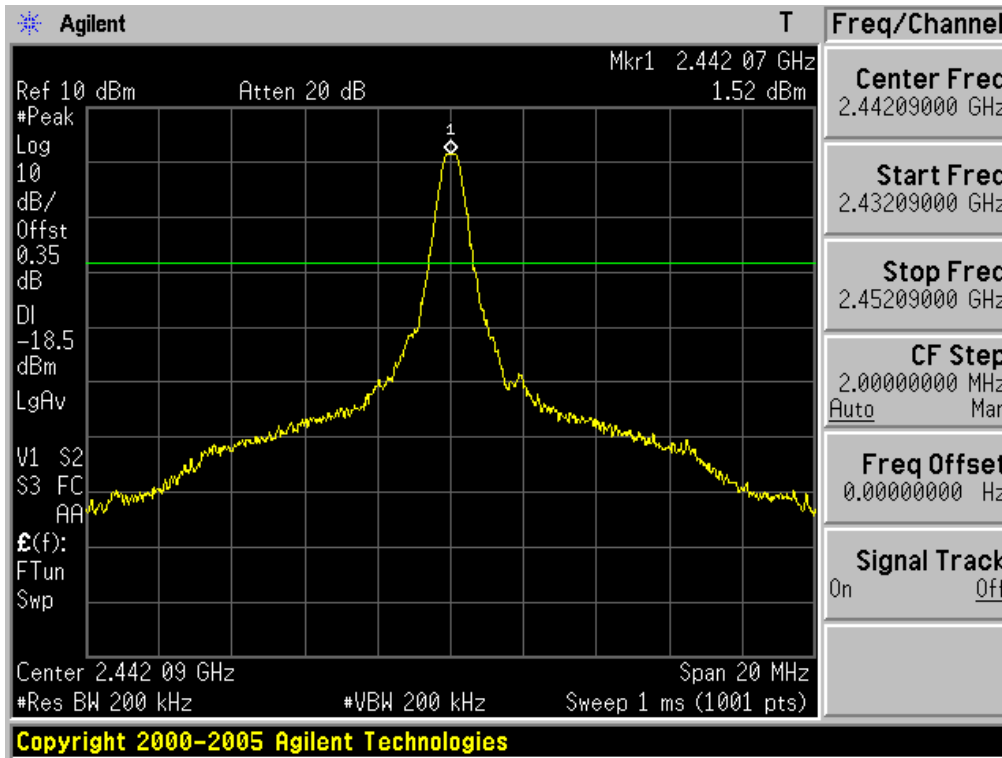
20GHz ~ 25GHz Conducted Spurious Emissions

Lowest Channel



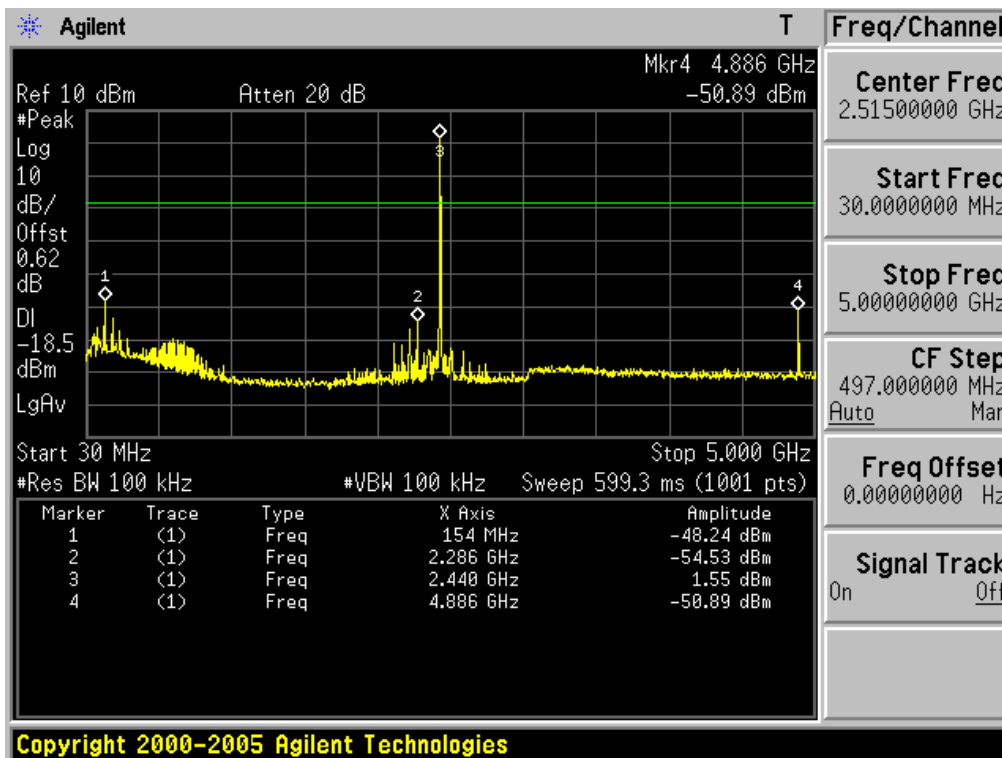
Reference for limit

Middle Channel

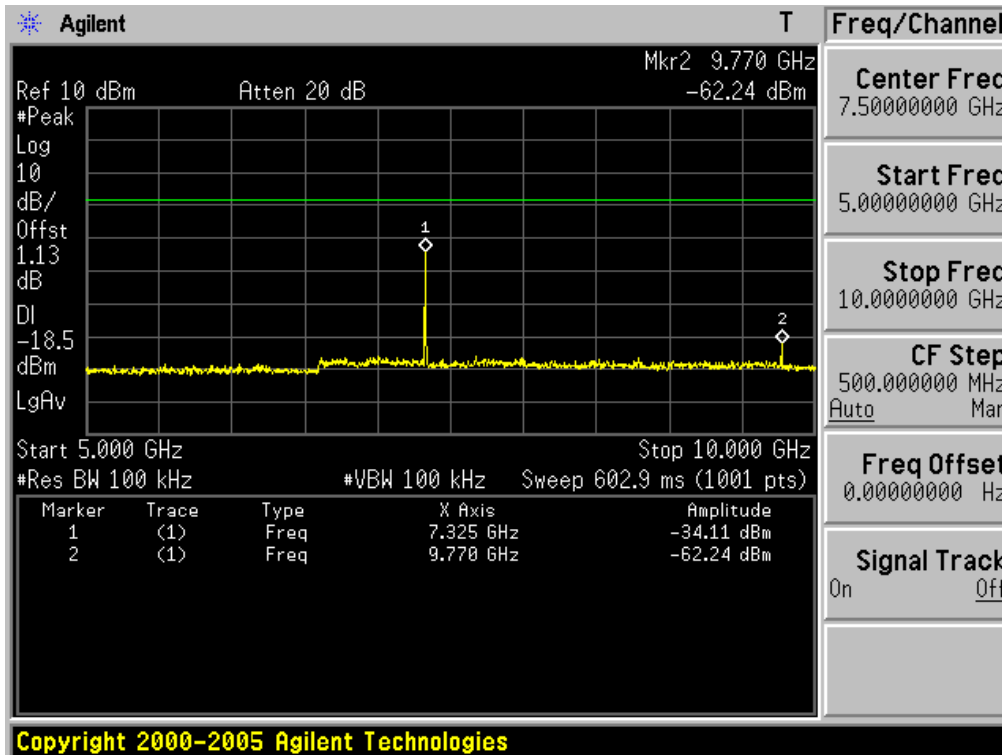


30MHz ~ 5GHz Conducted Spurious Emissions

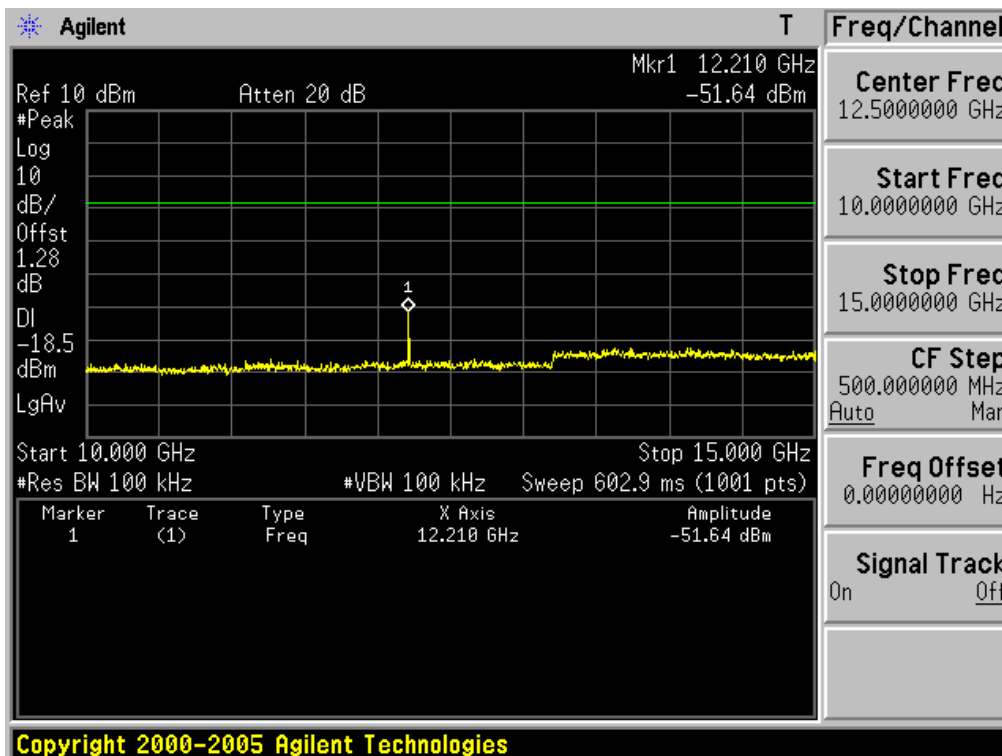
Middle Channel



**5GHz ~ 10GHz Conducted Spurious Emissions Middle Channel**

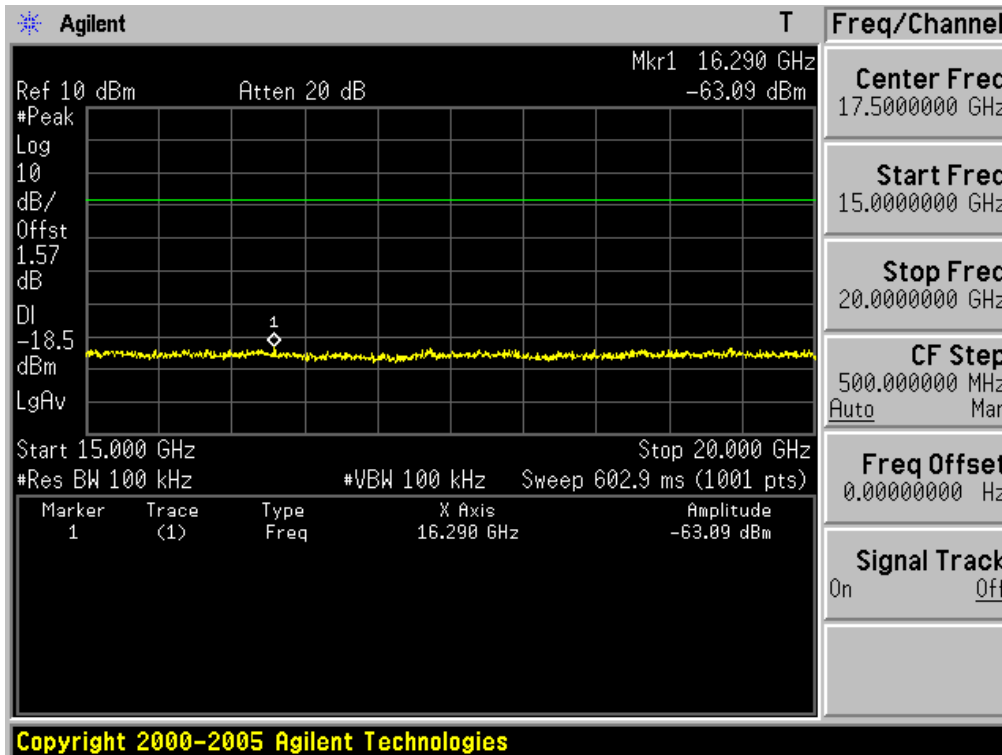


**10GHz ~ 15GHz Conducted Spurious Emissions Middle Channel**



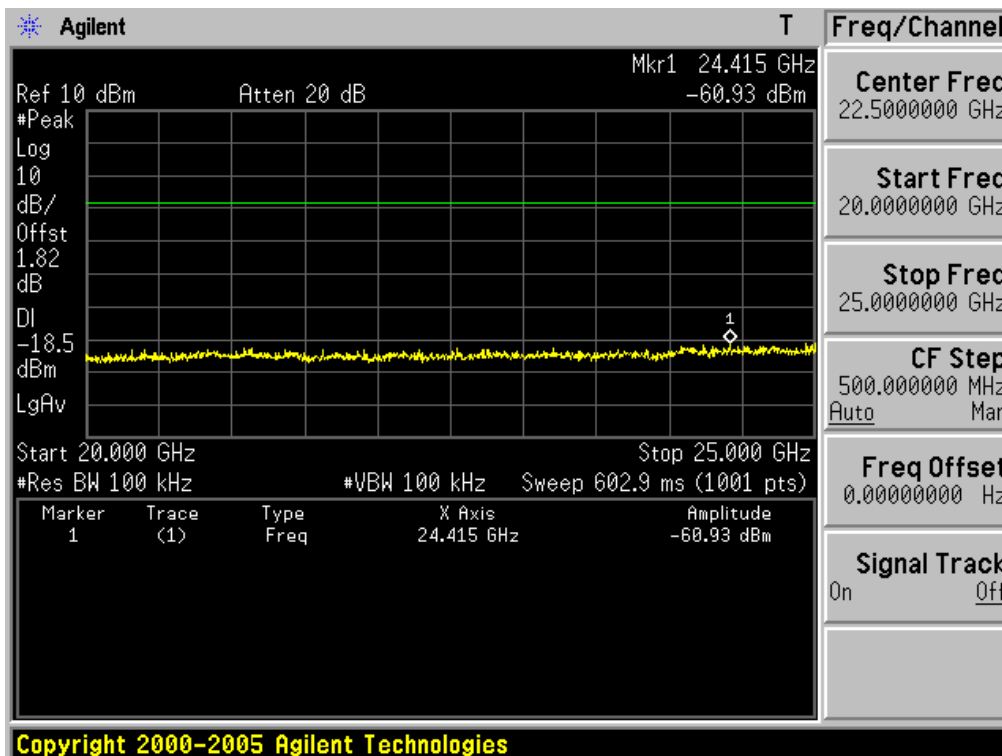
15GHz ~ 20GHz Conducted Spurious Emissions

Middle Channel

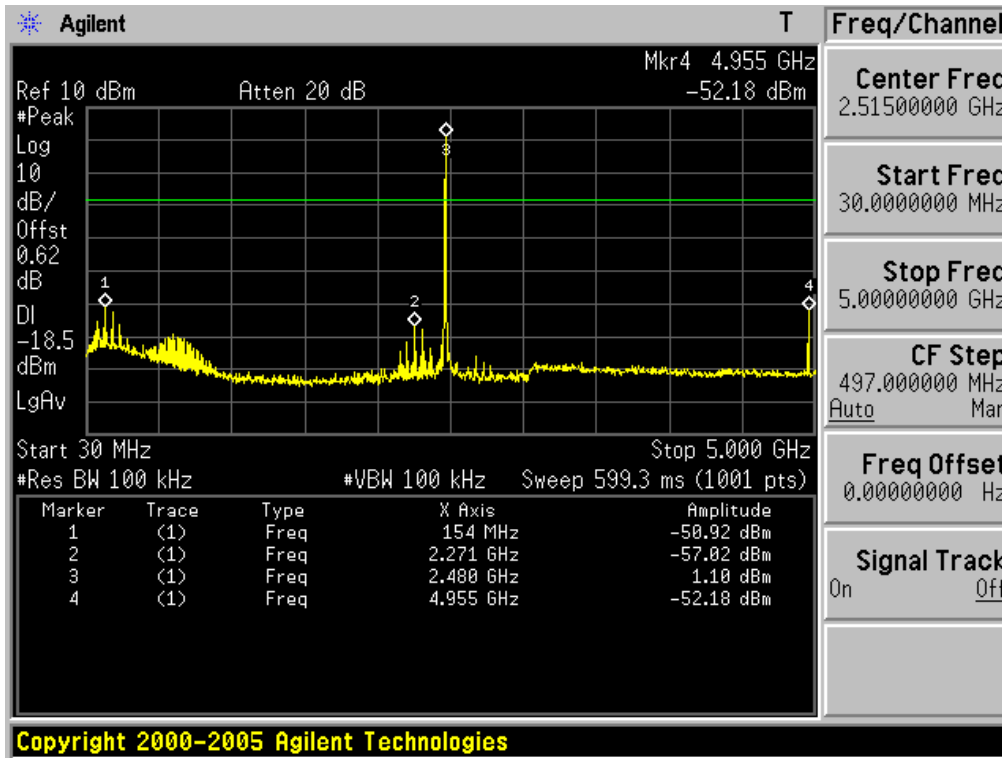


20GHz ~ 25GHz Conducted Spurious Emissions

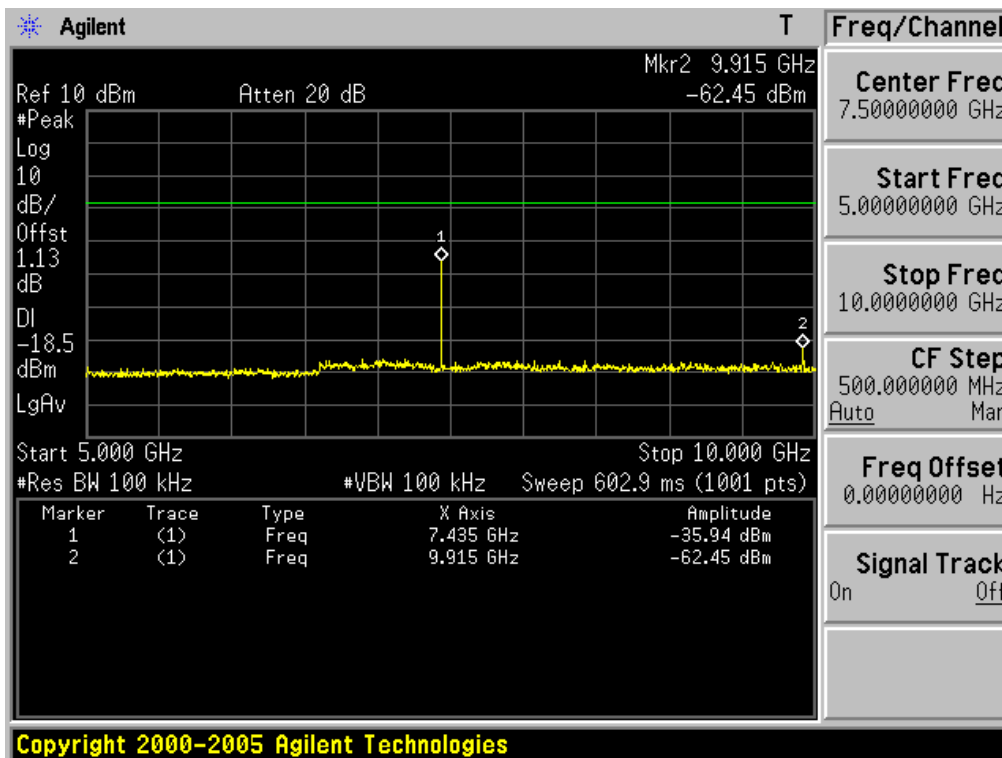
Middle Channel



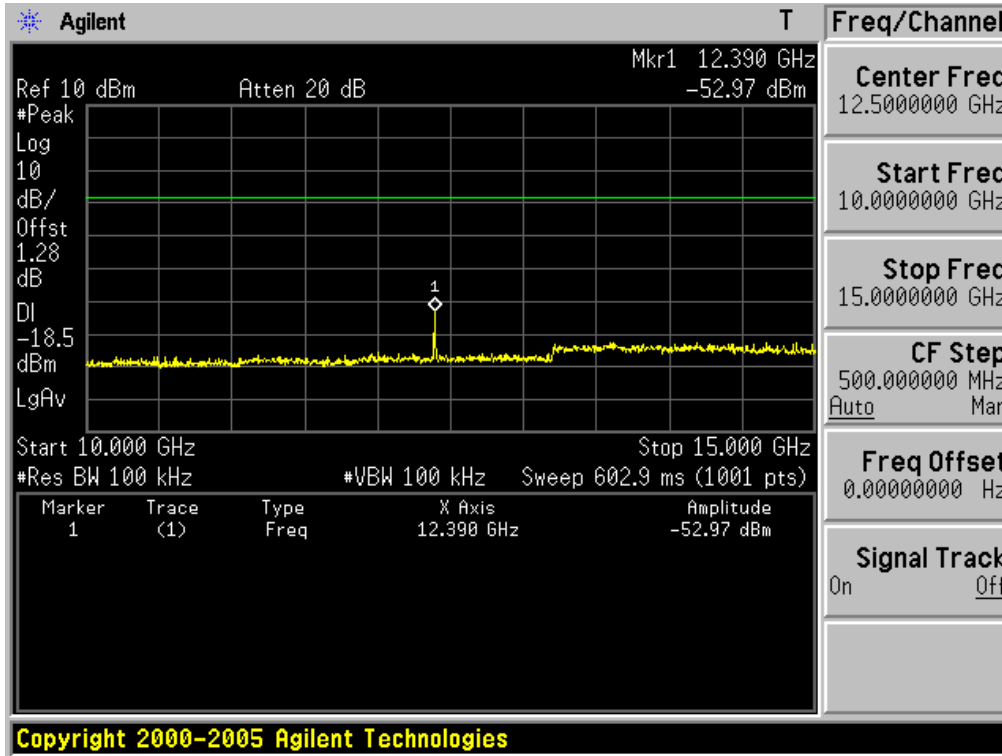
**30MHz ~ 5GHz Conducted Spurious Emissions Highest Channel**



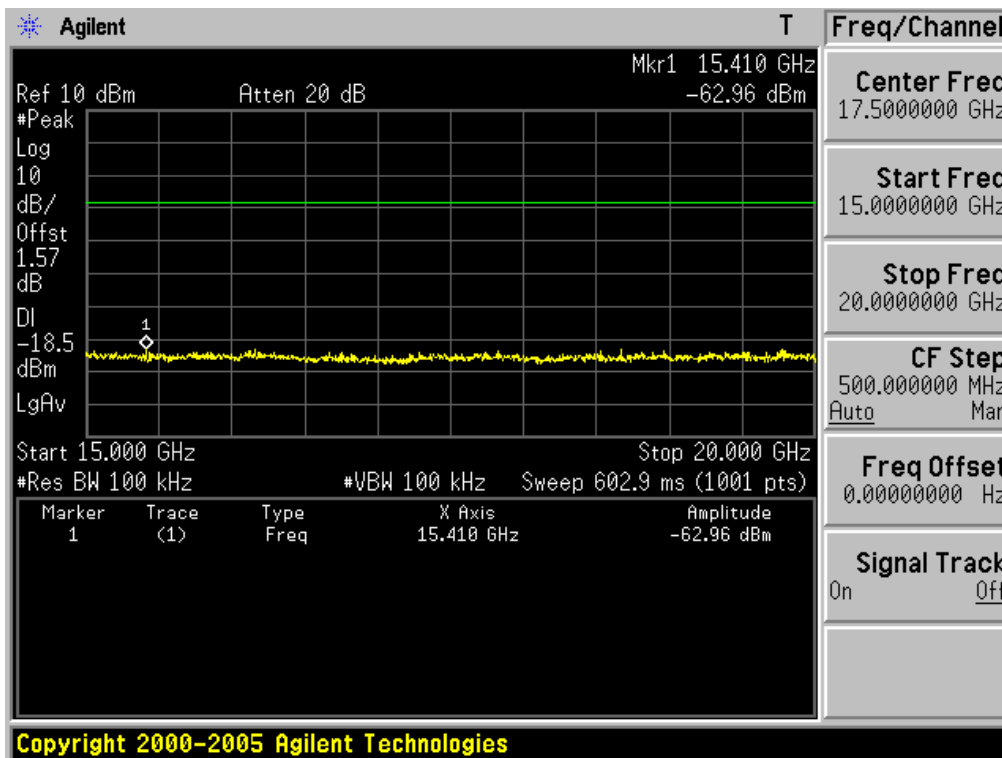
**5GHz ~ 10GHz Conducted Spurious Emissions Highest Channel**



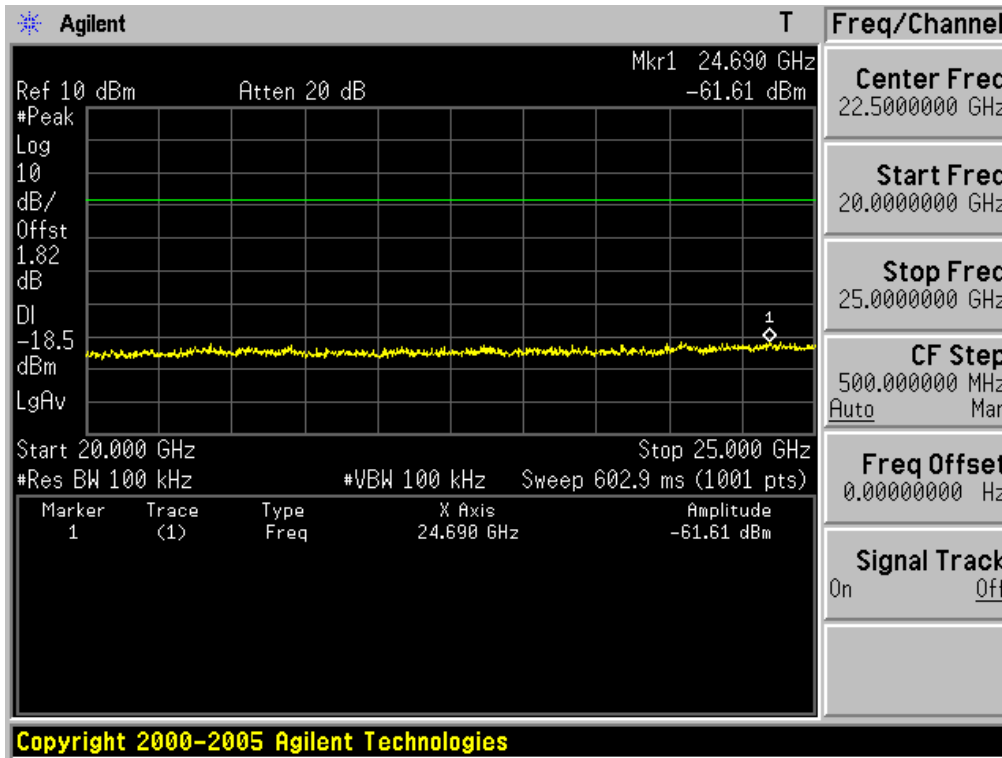
**10GHz ~ 15GHz Conducted Spurious Emissions Highest Channel**



**15GHz ~ 20GHz Conducted Spurious Emissions Highest Channel**



20GHz ~ 25GHz Conducted Spurious Emissions Highest Channel



### 3.2.7 Radiated Spurious 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:

Tested frequency = Low, Middle, High Frequencies

Frequency Range = 30 MHz ~ 10th harmonic.

RBW and VBW =

1. Frequency range: 30MHz ~ 1GHz

RBW = 120KHz / VBW =  $\geq$  RBW

2. Frequency range: 1GHz ~ 10<sup>th</sup> harmonics

Peak mode: RBW = 1MHz / VBW =  $\geq$  RBW

Average mode: RBW = 1MHz / VBW = 10Hz

Detector function = Peak

Sweep = auto

Trace = max hold

#### - Measurement Data: **Comply**

Note 1: See next pages for actual measured spectrum plots and data.

#### - 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

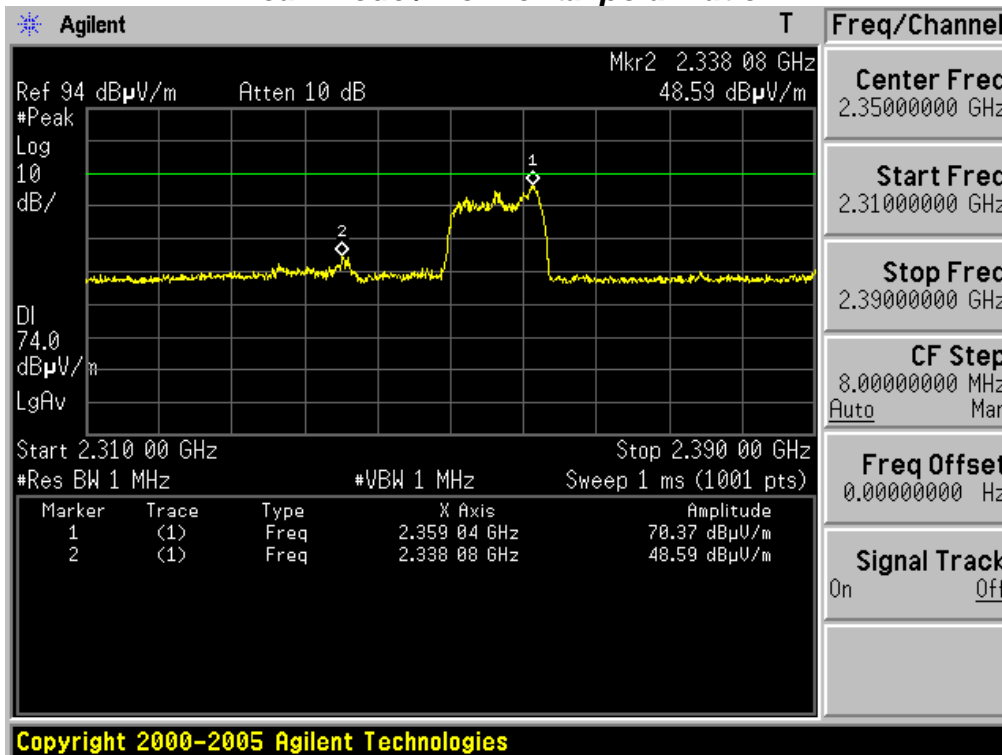
\*\* Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, 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	3600 ~ 4400	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		

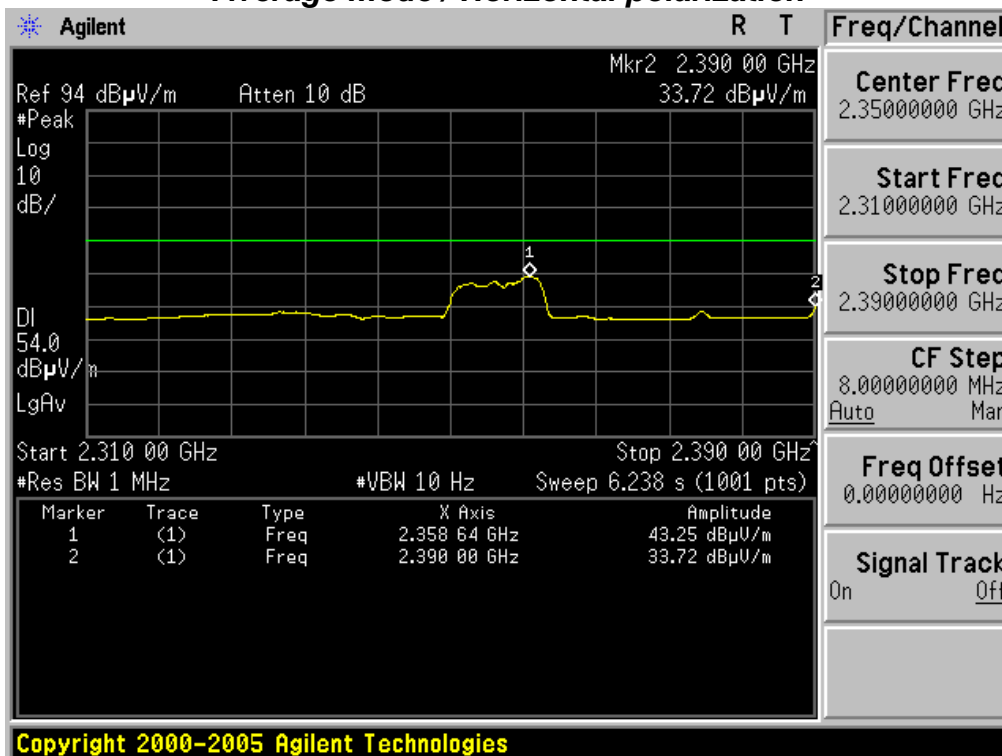
• **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR 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**    Lowest Channel    &    The worst case EUT position: X-axis  
**Peak mode / Horizontal polarization**



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

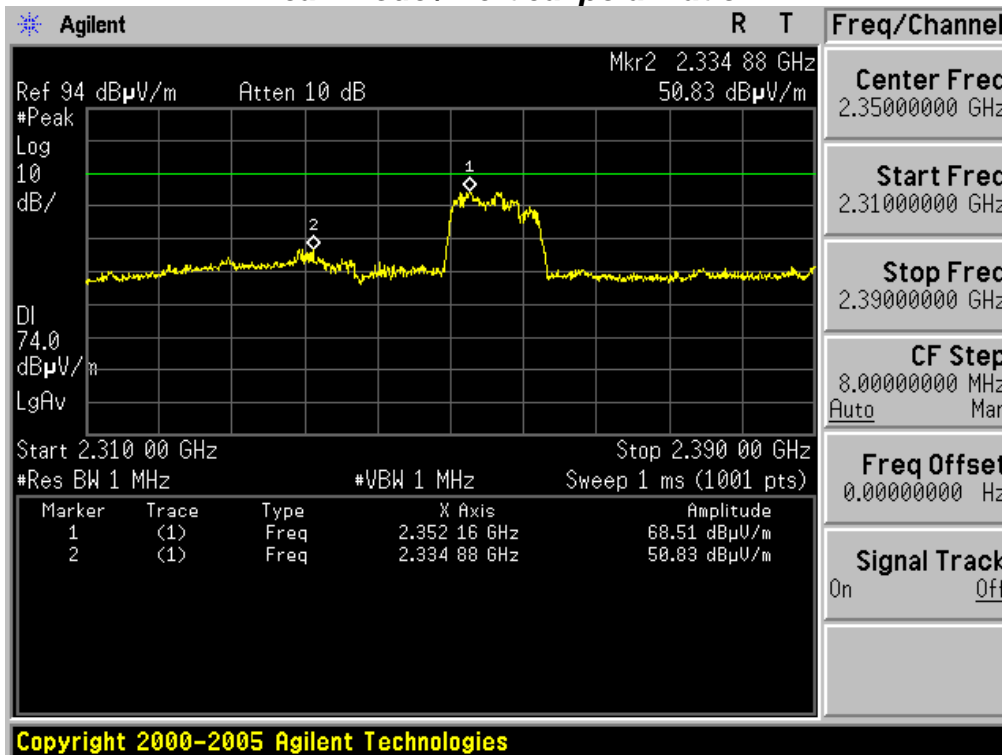
**Restricted Band Edge**    Lowest Channel    &    The worst case EUT position: X-axis  
**Average mode / Horizontal polarization**



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

**Restricted Band Edge**    **Lowest Channel**    &    **The worst case EUT position: Z-axis**

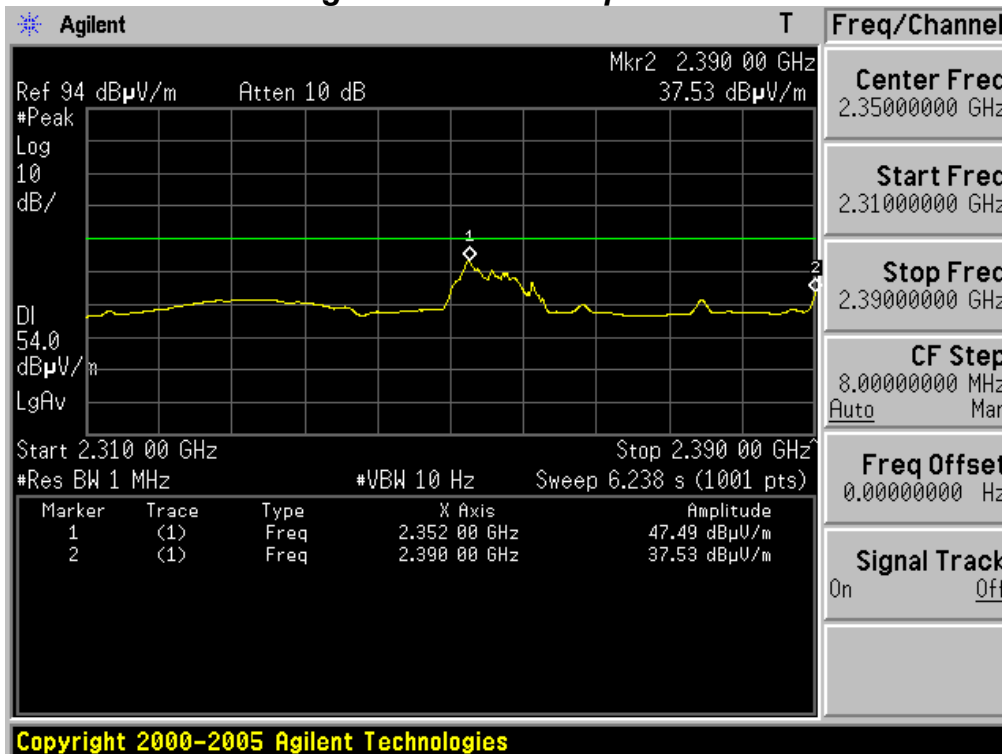
**Peak mode / Vertical polarization**



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

**Restricted Band Edge**    **Lowest Channel**    &    **The worst case EUT position: Z-axis**

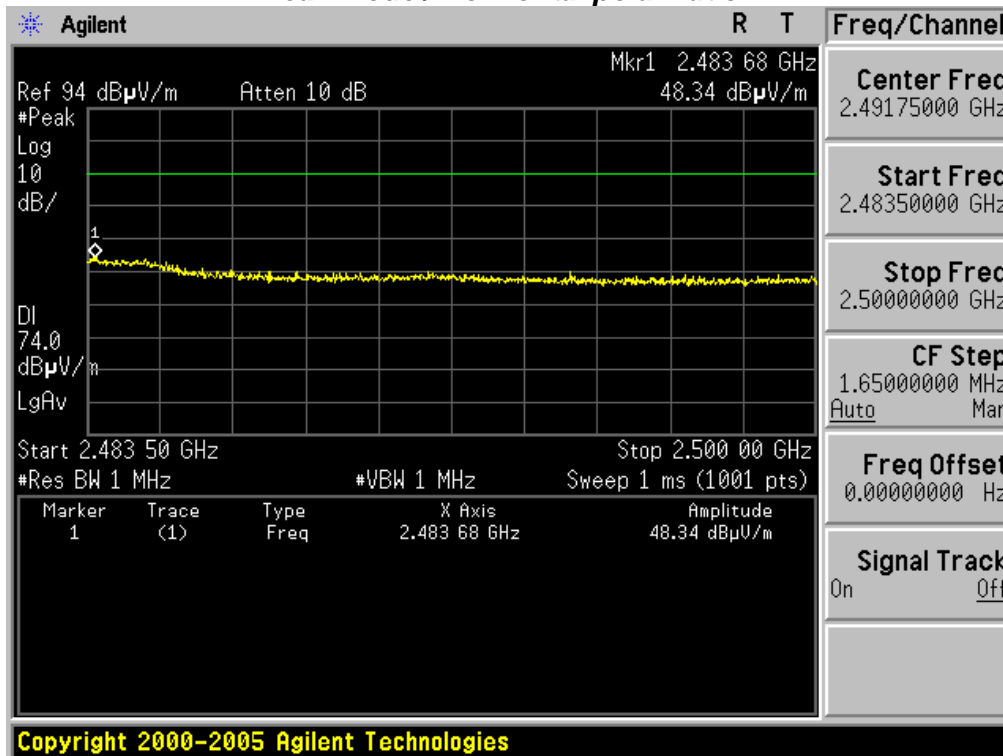
**Average mode / Vertical polarization**



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

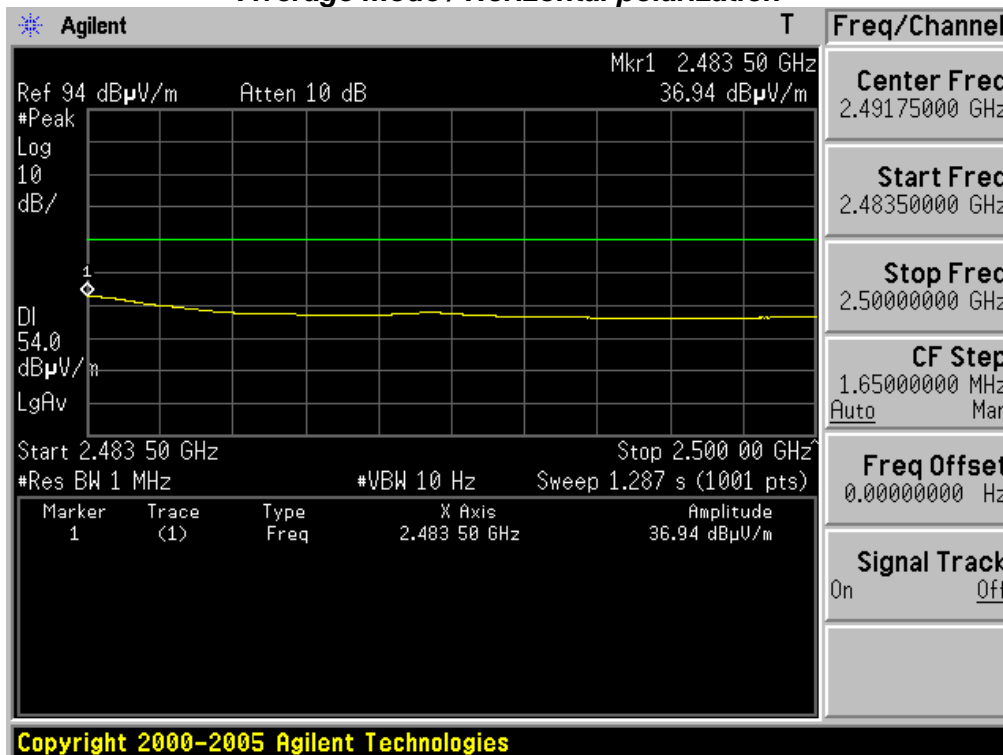
**Restricted Band Edge Highest Channel & The worst case EUT position: X-axis**

**Peak mode / Horizontal polarization**



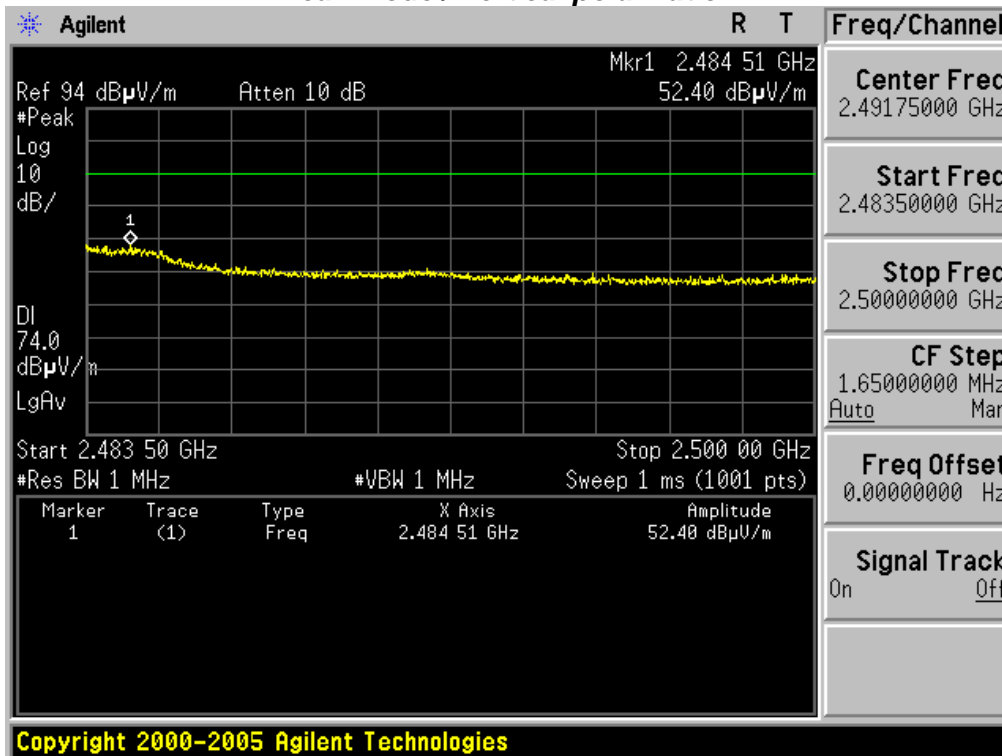
**Restricted Band Edge Highest Channel & The worst case EUT position: X-axis**

**Average mode / Horizontal polarization**



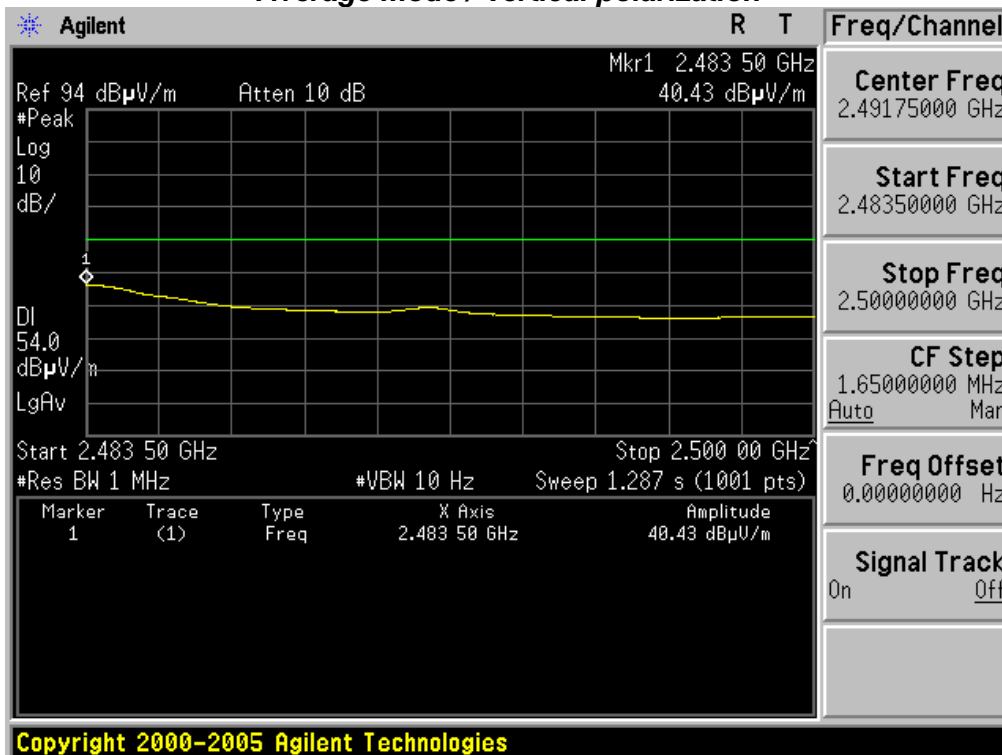
**Restricted Band Edge Highest Channel & The worst case EUT position: X-axis**

**Peak mode / Vertical polarization**



**Restricted Band Edge Highest Channel & The worst case EUT position: X-axis**

**Average mode / Vertical polarization**



30MHz ~ 1GHz Radiated Spurious Emissions Lowest Channel



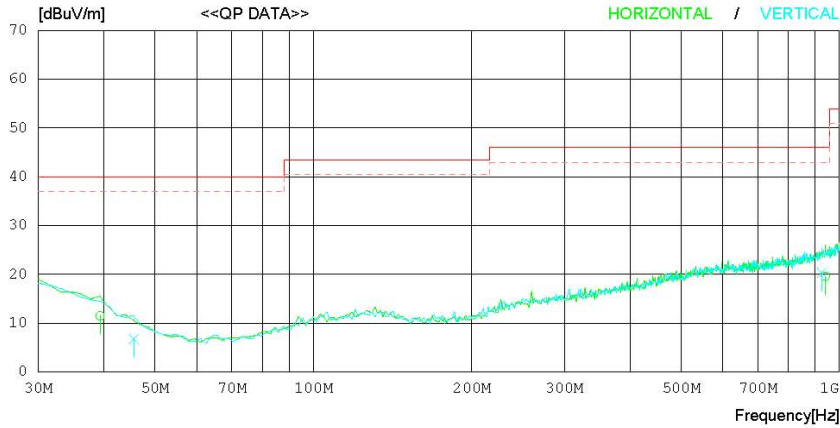
RADIATED EMISSION

Date : 2010-09-08

Model Name : AKB732955 Reference No. :  
 Model No. : Power Supply : DC 3.0 V  
 Serial No. : Identical prototype Temp/Humi : 26 °C 32 % R.H.  
 Test Condition : TX / 2403.50 MHz 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	39.330	19.4	13.9	0.8	22.6	11.5	40.0	28.5	100	125
2	940.932	17.9	21.0	3.7	23.0	19.6	46.0	26.4	103	320
----- Vertical -----										
3	45.620	18.2	10.3	0.8	22.6	6.7	40.0	33.3	103	120
4	925.387	18.9	20.8	3.7	23.1	20.3	46.0	25.7	102	98

- Note: Above listed point data is the worst case data.

30MHz ~ 1GHz Radiated Spurious Emissions Middle Channel



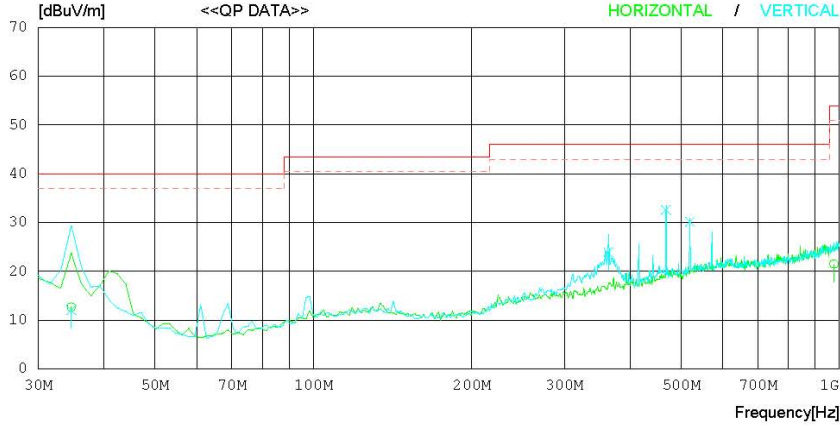
RADIATED EMISSION

Date : 2010-09-20

Model Name : AKB732955 Reference No. :  
 Model No. : Power Supply : DC 3.0 V  
 Serial No. : Identical prototype Temp/Humi : 27 °C 46 % R.H.  
 Test Condition : TX / 2442.09 MHz 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	34.663	18.5	16.0	0.8	22.6	12.7	40.0	27.3	102	165
2	976.676	19.2	21.4	3.8	22.9	21.5	54.0	32.5	100	244
----- Vertical -----										
3	34.671	17.9	16.0	0.8	22.6	12.1	40.0	27.9	102	174
4	364.005	30.5	15.3	2.2	24.1	23.9	46.0	22.1	103	268
5	467.979	37.5	17.1	2.5	24.5	32.6	46.0	13.4	101	108
6	519.990	34.1	17.9	2.7	24.5	30.2	46.0	15.8	100	168

- Note: Above listed point data is the worst case data.

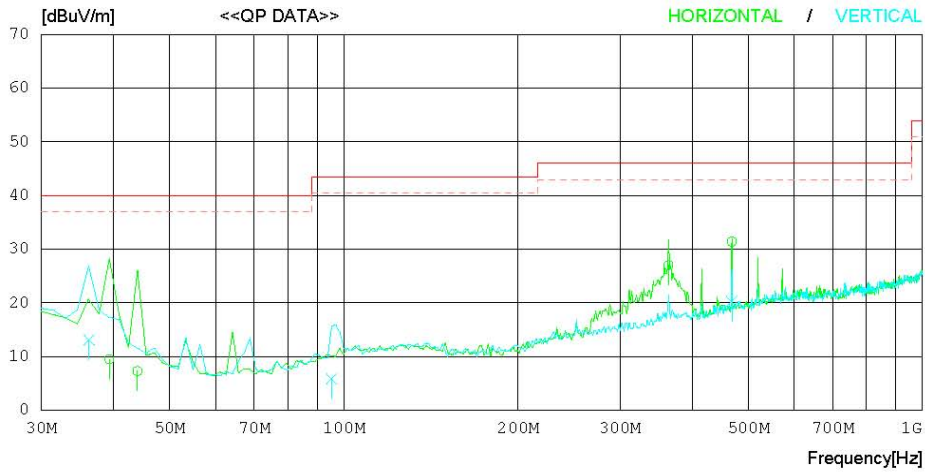
30MHz ~ 1GHz Radiated Spurious Emissions Highest Channel



**RADIATED EMISSION**

Date : 2010-09-18

Model Name	: AKB732955	Reference No.	:
Model No.	:	Power Supply	: DC 3.0 V
Serial No.	: Identical prototype	Temp/Humi	: 27 °C 46 % R.H.
Test Condition	: TX / 2478.30 MHz	Operator	: D.C.CHA
Memo	: Z-axis		
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	39.331	17.4	13.9	0.8	22.6	9.5	40.0	30.5	101	151
2	43.990	17.9	11.2	0.8	22.6	7.3	40.0	32.7	101	128
3	363.944	33.6	15.3	2.2	24.1	27.0	46.0	19.0	100	91
4	468.377	36.2	17.2	2.5	24.5	31.4	46.0	14.6	101	258
----- Vertical -----										
5	36.274	19.6	15.3	0.8	22.6	13.1	40.0	26.9	105	121
6	95.299	17.7	9.7	1.2	22.7	5.9	43.5	37.6	100	358
7	468.364	25.1	17.2	2.5	24.5	20.3	46.0	25.7	100	214

- Note: Above listed point data is the worst case data.

## 1GHz ~ 25GHz Radiated Spurious Emissions

### ▪ Lowest Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position	Reading(dBuV)		T.F (dB/m)	D.C.F	Result(dBuV/m)		Limit(dBuV/m)		Margin(dB)	
			PK	AV			PK	AV	PK	AV	PK	AV
4806.995	H	Y axis	52.96	50.16	5.14	-28.40	29.70	26.90	74.00	54.00	44.30	27.10
4806.820	V	Y axis	53.63	50.69	5.14	-28.40	30.37	27.43	74.00	54.00	43.63	26.57
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-

### ▪ Middle Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position	Reading(dBuV)		T.F (dB/m)	D.C.F	Result(dBuV/m)		Limit(dBuV/m)		Margin(dB)	
			PK	AV			PK	AV	PK	AV	PK	AV
4884.280	H	Y axis	52.29	48.40	5.32	-28.40	29.21	25.32	74.00	54.00	44.79	28.68
4884.050	V	Y axis	52.12	48.89	5.32	-28.40	29.04	25.81	74.00	54.00	44.96	28.19
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-

### ▪ Highest Channel

Frequency (MHz)	ANT Pol	The worst case EUT Position	Reading(dBuV)		T.F (dB/m)	D.C.F	Result(dBuV/m)		Limit(dBuV/m)		Margin(dB)	
			PK	AV			PK	AV	PK	AV	PK	AV
4956.375	H	Y axis	50.87	45.99	5.90	-28.40	28.37	23.49	74.00	54.00	45.63	30.51
4956.565	V	Y axis	51.52	47.68	5.90	-28.40	29.02	25.18	74.00	54.00	44.98	28.82
-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-

#### Note.

1. Except for the above table: All other spurious emissions were less than 50dB for the limit.
2. Sample Calculation.  

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} + \text{D.C.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$
Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain,  
D.C.F (Duty Cycle Correction Factor) =  $20\log(\text{The worst Case DWELL Time} / 100\text{ms})$   
=  $20\log(3.8 \text{ ms} / 100 \text{ ms}) = -28.40 \text{ dB}$

### 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: N/A**

Note 1: Conducted emission test is not applicable. Because the power of the EUT is supplied from a battery.

**- 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

### 3.2.9 Antenna Requirements

**- Procedure:**

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

**- Conclusion: **Comply****

The antenna is permanently attached by soldering. (Refer to Internal Photo file.)

**- Minimum Standard:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions.

# **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	25/09/09	Calibrating	MY45304199
<input type="checkbox"/>	Spectrum Analyzer	Rohde Schwarz	FSQ26	25/02/10	25/02/11	200445
<input type="checkbox"/>	Spectrum Analyzer(RE)	H.P	8563E	13/10/09	13/10/10	3551A04634
<input type="checkbox"/>	Power Meter	H.P	EPM-442A	01/07/10	01/07/11	GB37170413
<input type="checkbox"/>	Power Sensor	H.P	8481A	01/07/10	01/07/11	3318A96332
<input type="checkbox"/>	Power Divider	Agilent	11636B	13/10/09	13/10/10	56471
<input type="checkbox"/>	Power Splitter	Anritsu	K241B	13/10/09	13/10/10	20611
<input type="checkbox"/>	Power Splitter	Anritsu	K241B	01/07/10	01/07/11	017060
<input type="checkbox"/>	Frequency Counter	H.P	5342A	01/07/10	01/07/11	2119A04450
<input type="checkbox"/>	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/09	10/10/10	30604493/021031
<input checked="" type="checkbox"/>	Digital Multimeter	H.P	34401A	12/03/10	12/03/11	3146A13475, US36122178
<input type="checkbox"/>	Multifunction Synthesizer	HP	8904A	06/10/09	06/10/10	3633A08404
<input checked="" type="checkbox"/>	Signal Generator	Rohde Schwarz	SMR20	12/03/10	12/03/11	101251
<input type="checkbox"/>	Signal Generator	H.P	ESG-3000A	01/07/10	01/07/11	US37230529
<input type="checkbox"/>	Vector Signal Generator	Rohde Schwarz	SMJ100A	11/01/10	11/01/11	100148
<input type="checkbox"/>	Vector Signal Generator	Rohde Schwarz	SMBV100A	23/02/10	23/02/11	255571
<input type="checkbox"/>	Audio Analyzer	H.P	8903B	02/07/10	02/07/11	3011A09448
<input type="checkbox"/>	Modulation Analyzer	H.P	8901B	01/07/10	01/07/11	3028A03029
<input type="checkbox"/>	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	02/07/10	02/07/11	GB43461134
<input type="checkbox"/>	Universal Radio communication Tester	Rohde Schwarz	CMU 200	12/03/10	12/03/11	106760
<input type="checkbox"/>	Bluetooth Tester	TESCOM	TC-3000B	01/07/10	01/07/11	3000B000268
<input type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	28/01/10	28/01/11	090205-3
<input checked="" type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	28/01/10	28/01/11	090205-2
<input type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	28/01/10	28/01/11	090205-4
<input type="checkbox"/>	AC Power supply	DAEKWANG	5KVA	12/03/10	12/03/11	20060321-1
<input checked="" type="checkbox"/>	DC Power Supply	HP	6622A	12/03/10	12/03/11	3448A03760
<input type="checkbox"/>	DC Power Supply	HP	6633A	12/03/10	12/03/11	3524A06634
<input type="checkbox"/>	DC Power Supply	Protek	PWS-3010D	13/10/09	13/10/10	4072702
<input type="checkbox"/>	BAND Reject Filter	Microwave Circuits	N0308372	06/10/09	06/10/10	3125-01DC0352
<input type="checkbox"/>	BAND Reject Filter	Wainwright	WRCG1750	06/10/09	06/10/10	2
<input type="checkbox"/>	High-Pass Filter	ANRITSU	MP526D	06/10/09	06/10/10	M27756
<input type="checkbox"/>	High-pass filter	Wainwright	WHNX2.1	N/A	N/A	1
<input checked="" type="checkbox"/>	High-pass filter	Wainwright	WHNX3.0	N/A	N/A	9
<input type="checkbox"/>	High-pass filter	Wainwright	WHNX5.0	N/A	N/A	8
<input type="checkbox"/>	High-Pass Filter	Wainwright	WHKX8.5	N/A	N/A	1
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	32
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	53
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCT1900.0/ 2200.0-5/40-10SSK	N/A	N/A	30
<input type="checkbox"/>	HORN ANT	ETS	3115	23/09/09	Calibrating	21097
<input checked="" type="checkbox"/>	HORN ANT	ETS	3115	14/07/10	14/07/11	6419
<input checked="" type="checkbox"/>	HORN ANT	A.H.Systems	SAS-574	10/06/09	10/06/11	154
<input type="checkbox"/>	HORN ANT	A.H.Systems	SAS-574	10/06/09	10/06/11	155

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	VHA9103	06/10/09	06/10/10	2116
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	VHA9103	06/10/09	06/10/10	2117
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	UHA9105	05/10/09	05/10/10	2261
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	UHA9105	05/10/09	05/10/10	2262
<input type="checkbox"/>	LOOP Antenna	ETS	6502	05/11/09	05/11/10	3471
<input type="checkbox"/>	Coaxial Fixed Attenuators	Agilent	8491B	01/07/10	01/07/11	MY39260700
<input type="checkbox"/>	Attenuator (3dB)	WEINSCHHEL	56-3	16/12/09	16/12/10	Y2342
<input type="checkbox"/>	Attenuator (3dB)	WEINSCHHEL	56-3	16/12/09	16/12/10	Y2370
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHHEL	23-10-34	01/10/09	01/10/10	BP4386
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHHEL	23-10-34	11/01/10	11/01/11	BP4387
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHHEL	31696	06/10/09	06/10/10	446
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHHEL	31696	06/10/09	06/10/10	408
<input type="checkbox"/>	Attenuator (20dB)	WEINSCHHEL	86-20-11	06/10/09	06/10/10	432
<input type="checkbox"/>	Attenuator (30dB)	JFW	50FH-030-300	12/03/10	12/03/11	060320-1
<input type="checkbox"/>	Attenuator (40dB)	WEINSCHHEL	57-40-33	01/10/09	01/10/10	NN837
<input type="checkbox"/>	Termination	H.P	HP-909D	02/07/10	02/07/11	02750
<input type="checkbox"/>	Termination	H.P	HP-909D	02/07/10	02/07/11	02702
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	01/07/10	01/07/11	788
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	01/07/10	01/07/11	790
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0215CAN	01/07/10	01/07/11	112
<input checked="" type="checkbox"/>	Amplifier (30dB)	Agilent	8449B	23/04/10	23/04/11	3008A01590
<input type="checkbox"/>	Amplifier (30dB)	H.P	8449B	13/05/10	13/05/11	3008A00370
<input type="checkbox"/>	Amplifier	EMPOWER	BBS3Q7ELU	02/11/09	02/11/10	1020
<input type="checkbox"/>	RF Power Amplifier	OPHIRRF	5069F	01/07/10	01/07/11	1006
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	R&S	ESU	29/01/10	29/01/11	100014
<input checked="" type="checkbox"/>	BILOG ANTENNA	SCHAFFNER	CBL 6112D	28/10/09	28/10/10	22609
<input checked="" type="checkbox"/>	Amplifier (22dB)	H.P	8447E	29/01/10	29/01/11	2945A02865
<input type="checkbox"/>	EMI TEST RECEIVER	R&S	ESCI	12/05/10	12/05/11	100364
<input type="checkbox"/>	LOG-PERIODIC ANT.	Schwarzbeck	UHALP 9108 A-1	07/10/09	07/10/10	1098
<input type="checkbox"/>	BICONICAL ANT.	Schwarzbeck	VHA 9103	06/10/09	06/10/10	91031946
<input type="checkbox"/>	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A	07/07/10	07/07/11	590
<input type="checkbox"/>	Low Noise Pre Amplifier	TSJ	MLA-100K01-B01-2	12/03/10	12/03/11	1252741
<input type="checkbox"/>	Amplifier (25dB)	Agilent	8447D	12/03/10	12/03/11	2944A10144
<input type="checkbox"/>	Amplifier (25dB)	Agilent	8447D	01/07/10	01/07/11	2648A04922
<input type="checkbox"/>	Spectrum Analyzer(CE)	H.P	8591E	12/03/10	12/03/11	3649A05889
<input type="checkbox"/>	LISN	Kyoritsu	KNW-407	29/01/10	29/01/11	8-317-8
<input type="checkbox"/>	LISN	Kyoritsu	KNW-242	29/01/10	29/01/11	8-654-15
<input type="checkbox"/>	CVCF	NF Electronic	4420	12/03/10	12/03/11	304935/337980
<input type="checkbox"/>	50 ohm Terminator	HME	CT-01	12/01/10	12/01/11	N/A
<input type="checkbox"/>	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	02/07/10	02/07/11	4N-170-3