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CERTIFICATION TEST REPORT

Report Number: 2010 05149324 FCC

Project Number: 43699

Nex Number: 149324

Applicant: CLARITY DESIGN
13029 DANIELSON STREET SUITE 100
Poway, CA 92064

Equipment Under Test (EUT): WiFi SD CARD


Model: 5006

FCC ID: YC7-5006

IC: 8962A-5006

In Accordance With: FCC Part 15 Subpart C, 15.247
IC RSS-210 Issue 7 June 2007
IC RSS-Gen Issue 2 June 2007

Tested By: Nemko USA Inc.
11696 Sorrento Valley Road, Suite F
San Diego, CA 92121

Authorized By: 
Alan Laudani, EMC/RF Test Engineer

Date: May 7, 2010

Total Number of Pages: 83



Section1: Summary of Test Results

General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15; Subpart C and IC RSS-210. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC and IC.

The assessment summary is as follows:

Apparatus Assessed:	WiFi SD Card
Model:	5006
Specification:	FCC Part 15 Subpart C, 15.247 IC RSS-210 Issue 7 June 2007
Date Received in Laboratory:	April 30, 2010
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None





1.1 Report Release History

REVISION	DATE	COMMENTS
-	May 7, 2010	Prepared By: Ferdinand Custodio
-	May 7, 2010	Initial Release: Alan Laudani

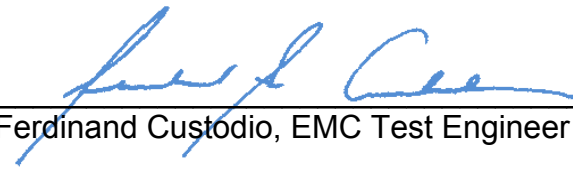
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Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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TESTED BY: 
Ferdinand Custodio, EMC Test Engineer

Date: May 7, 2010





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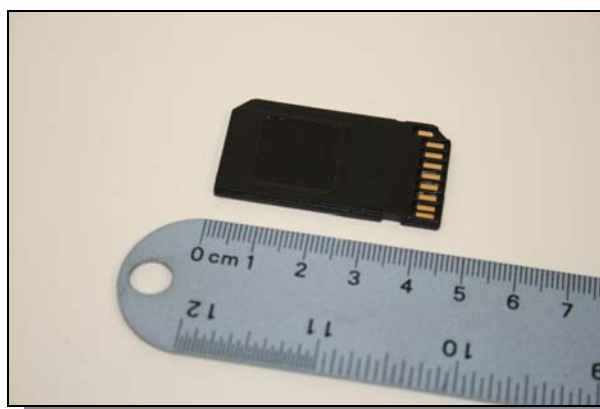


Section 2: Equipment Under Test

2.1 Product Identification

The Equipment Under Test was indentified as follows:

Clarity Design 5006 WiFi SD Card



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2.2 Samples Submitted for Assessment

The following sample of the apparatus and antenna have been submitted for type assessment:

Sample No.	Description	Serial No.
149324-1	5006 WiFi SD CARD	N/A





2.3 Theory of Operation

The 5006 WiFi SD Card is an 801.11b/g module designed for wireless communication between a host system and an access point or other 802.11b/g compatible device.

2.4 Technical Specifications of the EUT

Manufacturer:	Clarity Design
Operating Frequency:	2412.0 MHz to 2462.0 MHz in the 2400-2483.5 MHz Band
Number of Operating Frequencies:	11
Rated Power:	77.0 mW (“b” mode) 86.0 mW (“g” mode)
Modulation:	802.11 b/g
Reference Designator:	17M6W7D (802.11g) 15M6G1D (802.11b)
Antenna Type:	2.4 GHz SMD Antenna. Max. peak gain of 4.4dBi.
Antenna Connector:	Integral
Power Source:	3.3VDC from standard SD card slot

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Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.247

Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands.

IC RSS-210 Issue 7 June 2007

Low-power Licence-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment. Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

IC RSS-Gen Issue 2 June 2007

General Requirements and Information for the Certification of Radio-communication Equipment

3.2 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	16-24 °C
Humidity range	38-82%
Pressure range	102.0 – 102.3 kPa
Power supply range	3.3VDC as per SDIO standard



3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
E1009	Multimeter	Fluke	287	11610042	12/18/2009	12/18/2010
911	Spectrum Analyzer	Agilent	E4440A	US41421266	12/17/2009	12/17/2010
E1019	Two Line V-Network	Rohde & Schwarz	ENV216	101045	3/12/2010	3/12/2011
E1018	9kHz to 7GHz Spectrum Analyzer	Rohde & Schwarz	FSP7	835363/0003	1/22/2010	1/22/2011
946	Peak Power Sensor	Hewlett Packard	84815A 0.05-18GHz (-40 to 20dBm)	3318A01726	9/16/2009	9/16/2010
947	Peak Power Analyzer	Hewlett Packard	8991A	3621A00906	9/16/2009	9/16/2010
114	Antenna, Bicon	EMCO	3104	2997	3/5/2010	3/5/2012
110	Antenna, LPA	Electrometrics	LPA-25	1217	1/10/2009	2/10/2011
877	Antenna, DRG Horn, .7-18GHz	AH Systems	SAS-571	688	7/28/2008	7/28/2010
919	Preamplifier	Spacek Labs MM-Wave Technology	100MHz to 40GHz	3M12 (SLK-35-3) and 3M13 (SLKa-35-4)	11/30/2009	11/30/2010
898	EMI Receiver & filter set	HP	8546A	3625A00348	5/31/2009	5/31/2010
899	Filter Section	HP	85460A	3448A00288	5/31/2009	5/31/2010

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Registration of the OATS are on file with the Federal Communications Commission, under Registration Number 90579, the VCCI under registration number R-3027, and are also registered with Industry Canada under Site Numbers 2040B-1 and 2040B-2.



Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Test Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.





Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C:
IC RSS-210 Issue 7 June 2007 Annex 8
IC RSS-Gen Issue 2 June 2007

The column headed “Required” indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No: not applicable / not relevant
- Y Yes: Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 Test Results

Part 15C		Test Description	Required	Result
15.207 (a)	RSS-Gen 7.2.2	Conducted Emission Limit	Y	Pass
15.215(c)	RSS-Gen 4.6.1	20 dB Bandwidth	Y	Pass
15.247(a)(2)	RSS-210 A8.2 (a)	Minimum 6dB RF Bandwidth	Y	Pass
15.247(b)(3)	RSS-Gen 4.8	Peak Output Power	Y	Pass
15.247(d)		Band-edge Compliance of RF Conducted Emissions	Y	Pass
15.247 (d)	RSS-210 A8.5	Spurious RF Conducted Emissions	Y	Pass
15.247 (d)	RSS-Gen 4.9	Spurious Radiated Emissions	Y	Pass
15.247(e)	RSS-210 A8.2 (b)	Power Spectral Density for Digitally Modulated Devices	Y	Pass
	RSS-Gen 4.10	Receiver Spurious Emissions	Y	Pass





Appendix A: Test Results

Section 15.207(a) – Power Line Conducted Emissions

15.207(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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.

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Test Conditions:

Sample Number:	5006	Temperature:	21°C
Date:	May 3, 2010	Humidity:	43 %
Modification State:	Low ,Mid and High Channel (b and g mode)	Tester:	FSCustodio
		Laboratory:	Nemko

Test Results:

See attached plots

Additional Observations:

- EUT was pretested using the following modes: Low channel, Mid channel and High channel. Only the worst case presented (Low Channel for “b” mode and Mid channel for “g” mode).
- Test parameters are internal to the automated test software used (R&S®ES-SCAN Version 2.3) for conducted emission test.
- Red limit line is Quasi Peak limit while pink limit line is Average limit.
- ∇ represents final quasi peak measurements while ∇ represent final average measurements.
- Six sub ranges were created in order to have at least six measurements in each range.





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EMI Measurement Test Report

Device Under Test: Whitney WiFi SD Card
 Operator Name: FSCustodio
 Test Specification: FCC Class B Conducted Emissions
 Comment: Line 1 Low Channel "b" mode

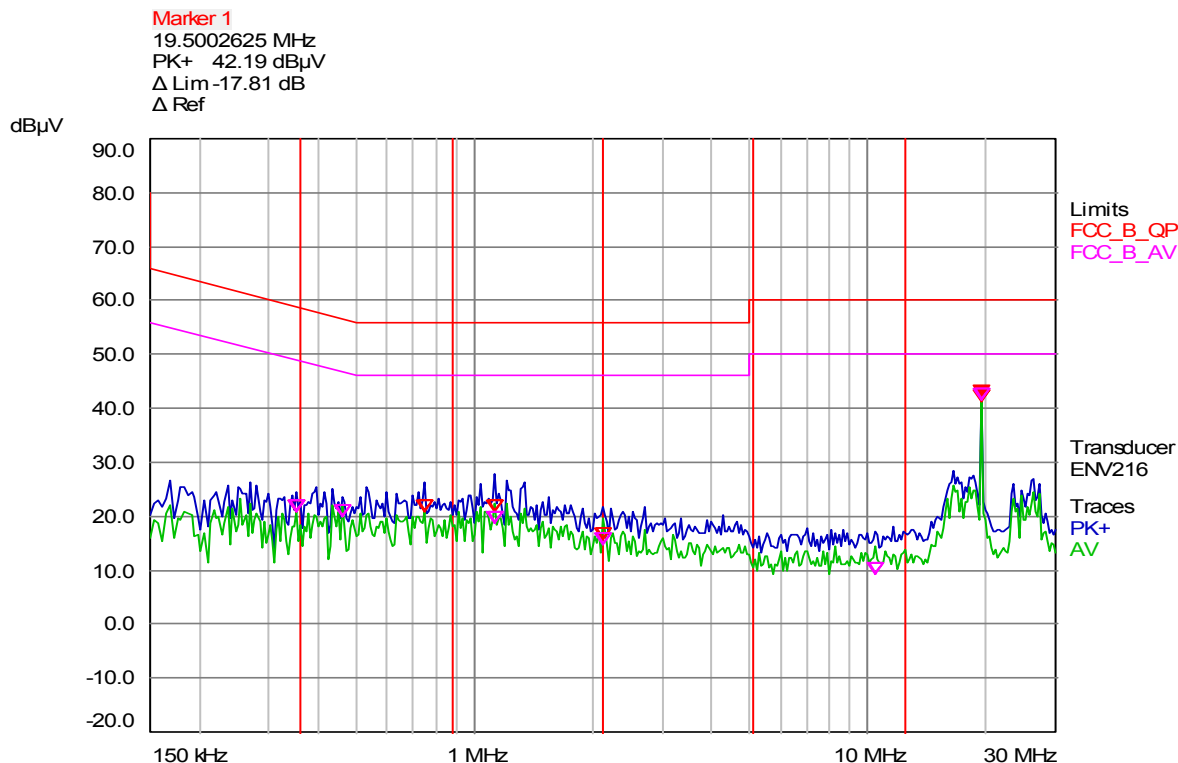
Sweep Settings (1 Range)

Frequencies			Analyzer Settings					
Start	Stop	Sweep Points	Res BW	Sweep Time	Atten	Preamp	Pre-selector	Ref Level
150 kHz	30 MHz	8001	9 kHz (6dB)	1 s	Auto	Off	Off	80 dBμV

Final Measurement

Detectors: QP , AV
 Peaks: 6
 Meas Time: 1 s
 Acc. Margin: 40 dB

Pre-measurement Graph



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Final Measurement Results

Trace	Frequency (MHz)	Level (dB μ V)	Limit (dB μ V)	Delta Limit (dB)
1 QP	0.351488	20.68	58.93	-38.25
2 AV	0.351488	20.94	48.93	-27.99
2 AV	0.463425	19.81	46.63	-26.82
1 QP	0.747	20.86	56.00	-35.14
1 QP	1.123856	20.81	56.00	-35.19
2 AV	1.123856	18.82	46.00	-27.18
1 QP	2.123831	15.73	56.00	-40.27
2 AV	2.123831	14.81	46.00	-31.19
2 AV	10.451981	9.28	50.00	-40.72
1 QP	19.500263	41.25	60.00	-18.75
2 AV	19.500263	41.51	50.00	-8.49

* = limit exceeded





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EMI Measurement Test Report

Device Under Test: Whitney WiFi SD Card
 Operator Name: FSCustodio
 Test Specification: FCC Class B Conducted Emissions
 Comment: Line 2 Low Channel "b" mode

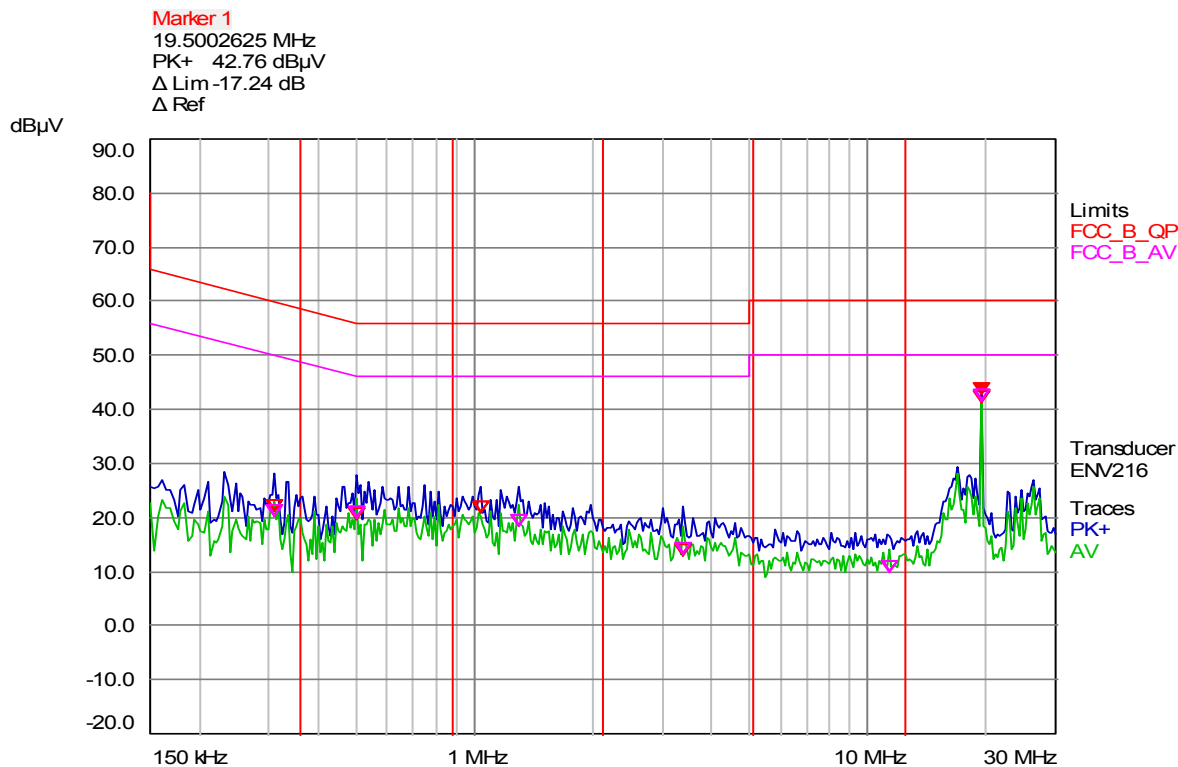
Sweep Settings (1 Range)

Frequencies			Analyzer Settings					
Start	Stop	Sweep Points	Res BW	Sweep Time	Atten	Preamp	Pre-selector	Ref Level
150 kHz	30 MHz	8001	9 kHz (6dB)	1 s	Auto	Off	Off	80 dBμV

Final Measurement

Detectors: QP , AV
 Peaks: 6
 Meas Time: 1 s
 Acc. Margin: 40 dB

Pre-measurement Graph



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Final Measurement Results

Trace	Frequency (MHz)	Level (dB μ V)	Limit (dB μ V)	Delta Limit (dB)
1 QP	0.310444	21.13	59.96	-38.83
2 AV	0.310444	20.36	49.96	-29.60
1 QP	0.504469	19.76	56.00	-36.24
2 AV	0.504469	20.04	46.00	-25.96
1 QP	1.041769	20.93	56.00	-35.07
2 AV	1.291763	18.29	46.00	-27.71
1 QP	3.392456	12.85	56.00	-43.15
2 AV	3.392456	13.19	46.00	-32.81
2 AV	11.325094	10.01	50.00	-39.99
1 QP	19.500263	41.40	60.00	-18.60
2 AV	19.500263	41.69	50.00	-8.31

* = limit exceeded





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EMI Measurement Test Report

Device Under Test: Whitney WiFi SD Card
Operator Name: FSCustodio
Test Specification: FCC Class B Conducted Emissions
Comment: Line 1 Mid Channel "g" mode

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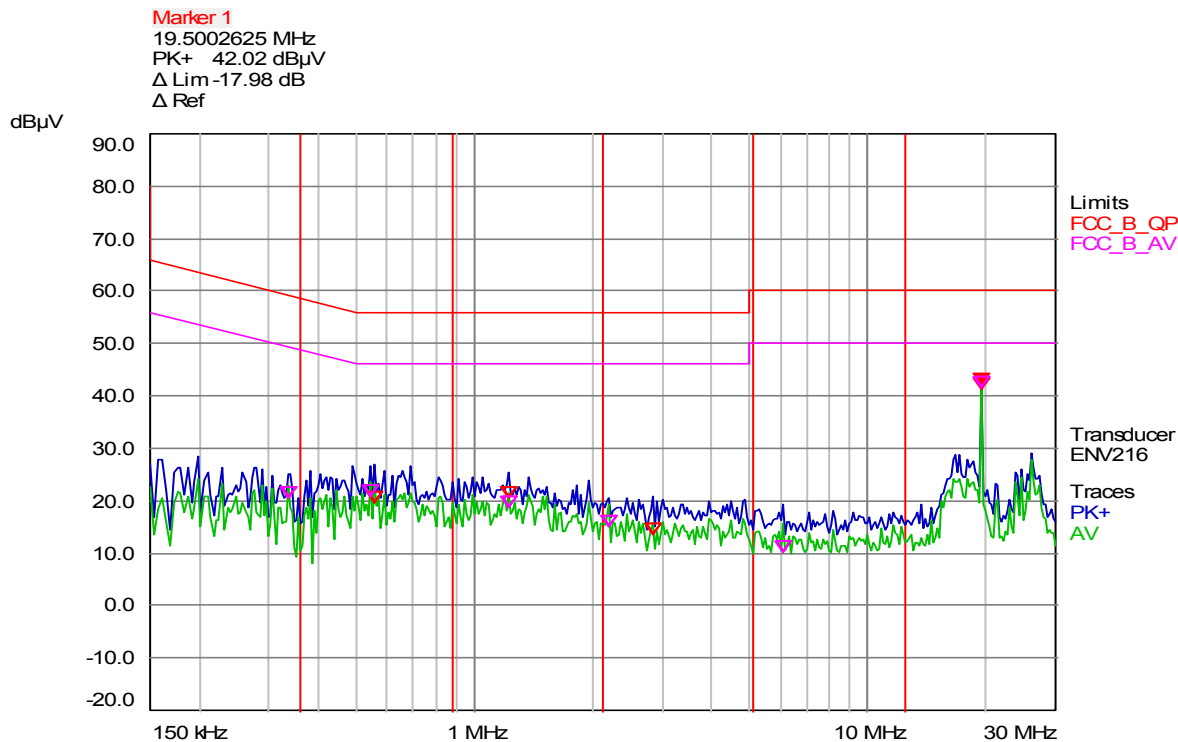
Sweep Settings (1 Range)

Frequencies			Analyzer Settings					
Start	Stop	Sweep Points	Res BW	Sweep Time	Atten	Preamp	Pre-selector	Ref Level
150 kHz	30 MHz	8001	9 kHz (6dB)	1 s	Auto	Off	Off	80 dB μ V

Final Measurement

Detectors: QP , AV Meas Time: 1 s
Peaks: 6 Acc. Margin: 40 dB

Pre-measurement Graph



Final Measurement Results

Trace	Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Delta Limit (dB)
1 QP	0.336563	20.64	59.29	-38.65
2 AV	0.336563	20.44	49.29	-28.85
2 AV	0.541781	20.76	46.00	-25.24
1 QP	0.556706	19.66	56.00	-36.34
1 QP	1.228331	20.55	56.00	-35.45
2 AV	1.228331	18.83	46.00	-27.17
2 AV	2.205919	15.06	46.00	-30.94
1 QP	2.840231	13.65	56.00	-42.35
2 AV	6.108806	10.20	50.00	-39.80
1 QP	19.500263	41.31	60.00	-18.69
2 AV	19.500263	41.64	50.00	-8.36

* = limit exceeded





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EMI Measurement Test Report

Device Under Test: Whitney WiFi SD Card
 Operator Name: FSCustodio
 Test Specification: FCC Class B Conducted Emissions
 Comment: Line 2 Mid Channel "g" mode

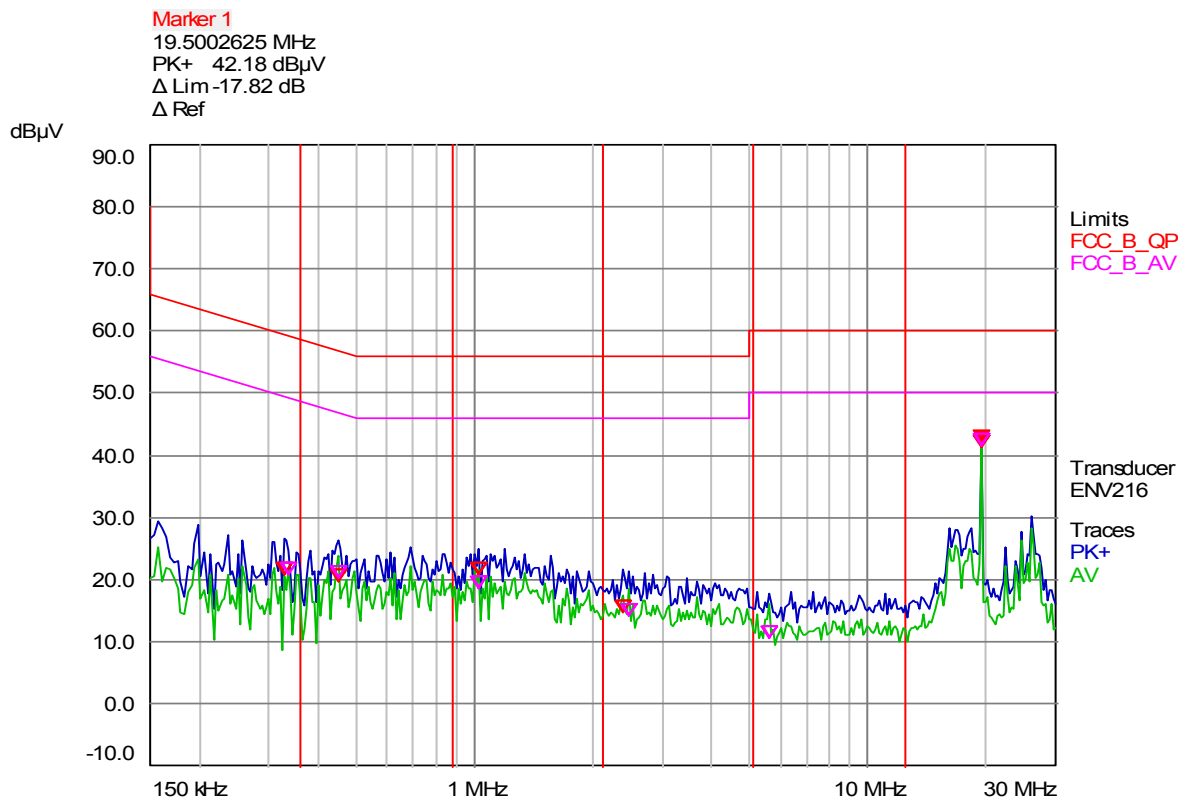
Sweep Settings (1 Range)

Frequencies			Analyzer Settings					
Start	Stop	Sweep Points	Res BW	Sweep Time	Atten	Preamp	Pre-selector	Ref Level
150 kHz	30 MHz	8001	9 kHz (6dB)	1 s	Auto	Off	Off	80 dBμV

Final Measurement

Detectors: QP , AV Meas Time: 1 s
 Peaks: 6 Acc. Margin: 40 dB

Pre-measurement Graph



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Final Measurement Results

Trace	Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Delta Limit (dB)
1 QP	0.3291	20.73	59.47	-38.74
2 AV	0.336563	20.87	49.29	-28.42
1 QP	0.452231	19.71	56.83	-37.12
2 AV	0.452231	20.22	46.83	-26.61
1 QP	1.026844	20.83	56.00	-35.17
2 AV	1.026844	18.64	46.00	-27.36
1 QP	2.373825	14.73	56.00	-41.27
2 AV	2.459644	14.09	46.00	-31.91
2 AV	5.6424	10.36	50.00	-39.64
1 QP	19.500263	41.30	60.00	-18.70
2 AV	19.500263	41.60	50.00	-8.40

* = limit exceeded





Section 15.215(c) – 20 dB Bandwidth

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

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4.6.1 – Occupied Bandwidth

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

Test Conditions:

Sample Number:	5006	Temperature:	24°C
Date:	April 30, 2010	Humidity:	38 %
Modification State:	Low ,Mid and High Channel (b and g mode)	Tester:	FSCustodio
		Laboratory:	Nemko

Test Results:

See attached plots.

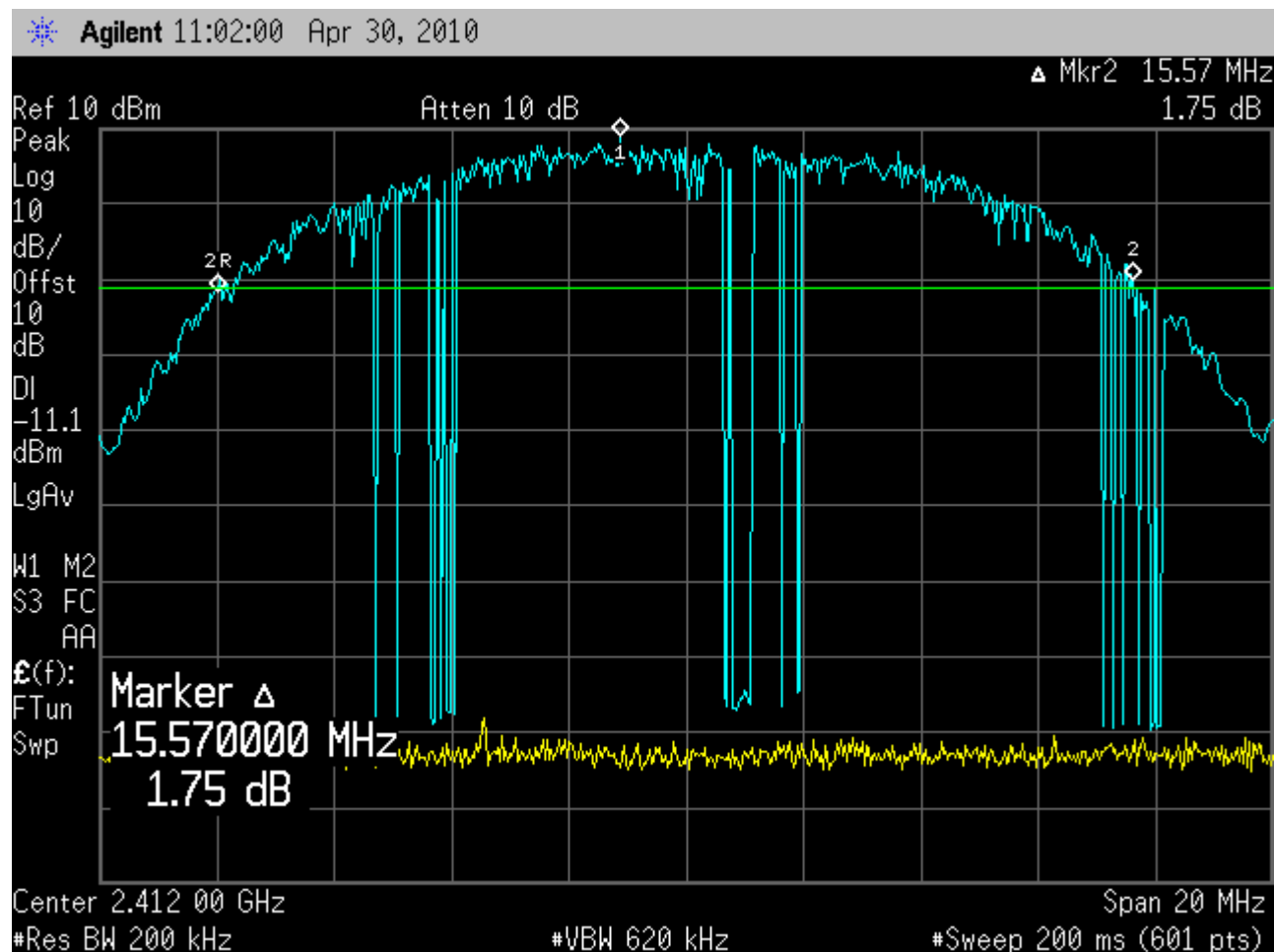
Additional Observations:

- Span is wide enough to capture the channel transmission
- RBW is 1% of the span
- VBW is 3X RBW



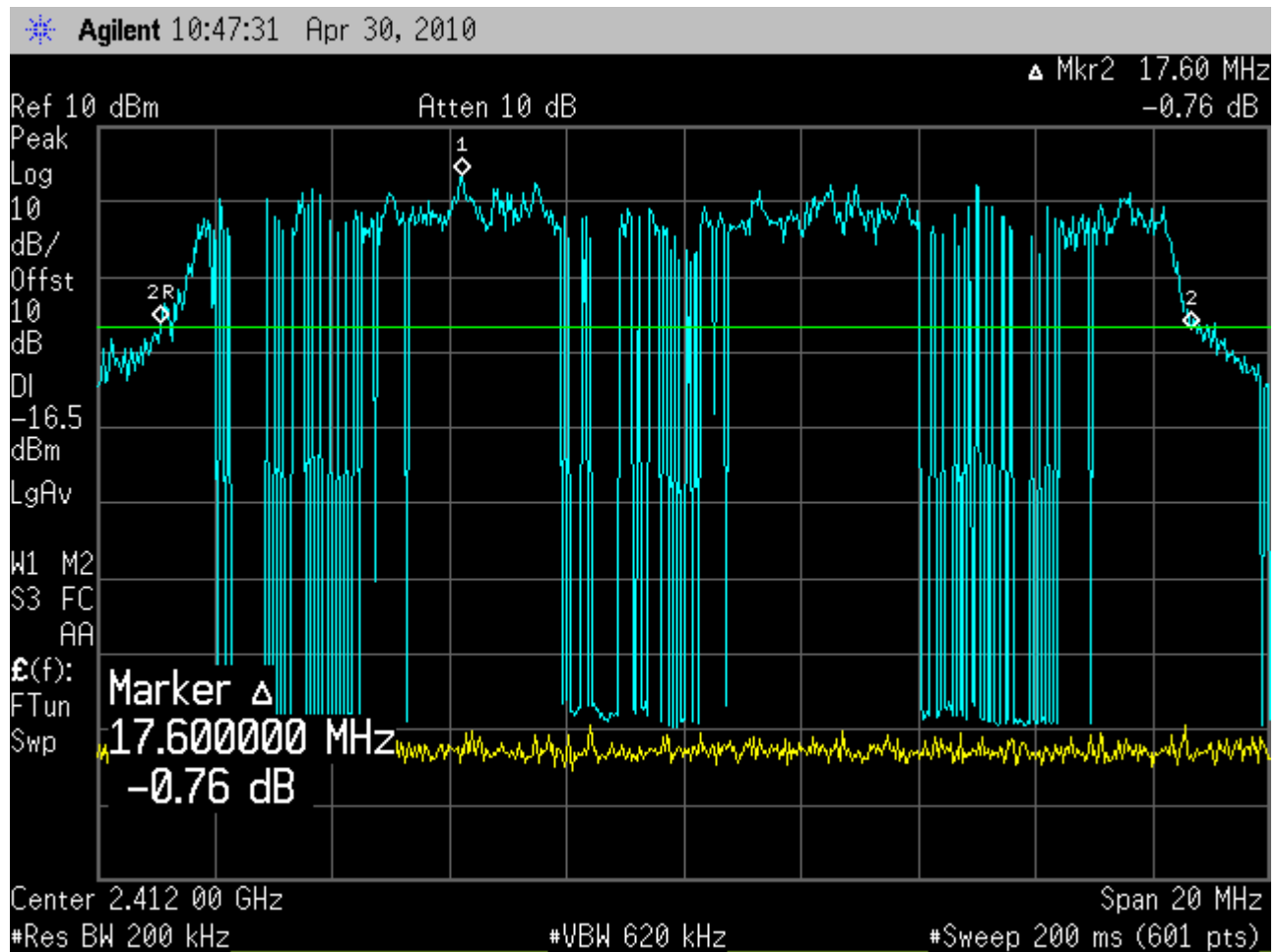
- Sweep is auto
- Detector is Peak
- Trace is Max Hold
- 99% OBW will be $10\log(1\%) = -20\text{dB}$
- A peak output max hold reading was taken, a display line was drawn 20 dB lower than peak level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.
- Observed maximum 20 dB BW is 17.63 MHz ("g" mode high channel).
- $2412\text{ MHz} - 8.815\text{ MHz} = 2403.185\text{ MHz}$ (within the frequency band)
- $2462\text{ MHz} + 8.815\text{ MHz} = 2470.815\text{ MHz}$ (within the frequency band)



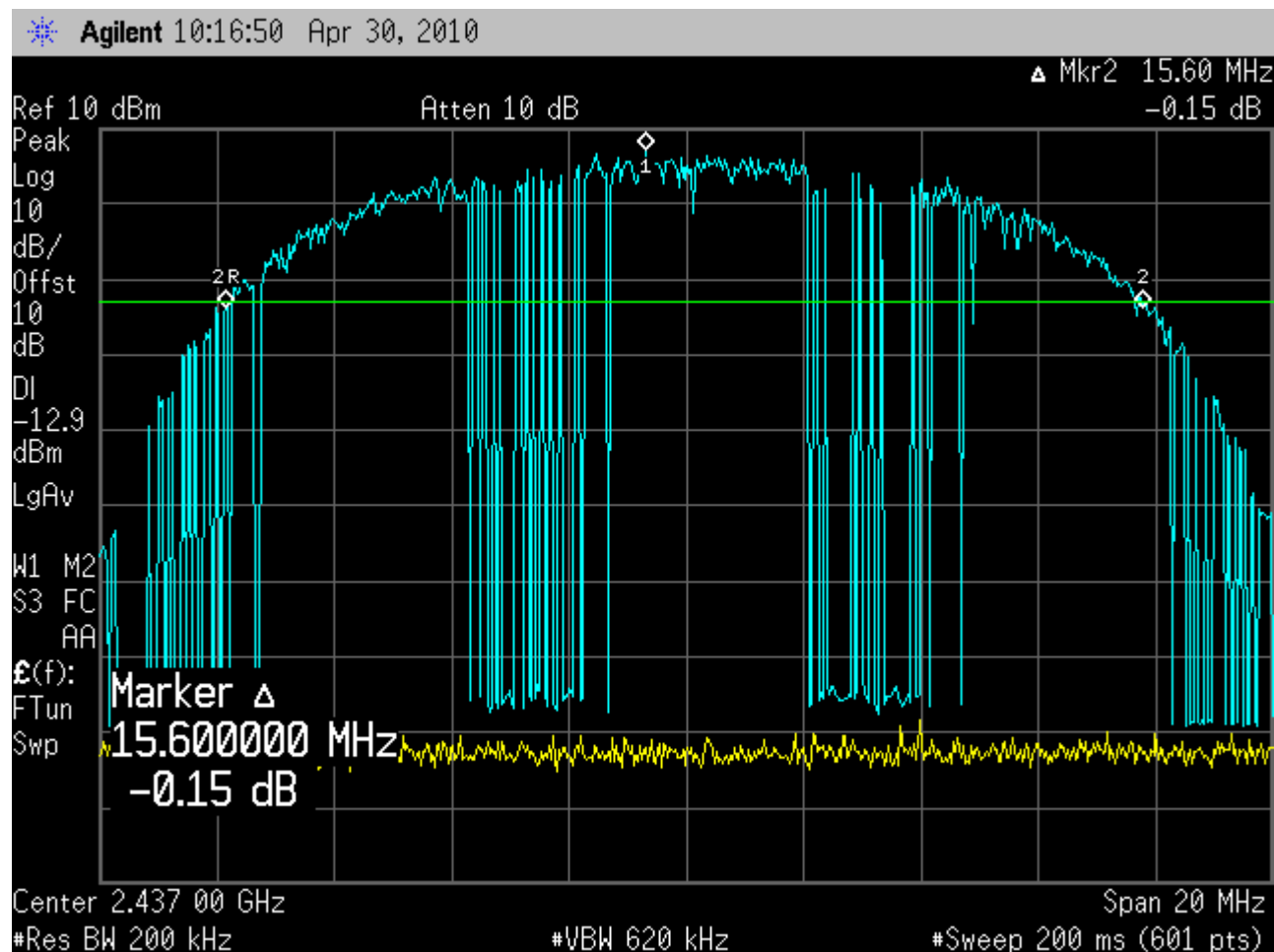


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("b" mode Low Channel) Observed 20 dB Bandwidth is 15.57 MHz

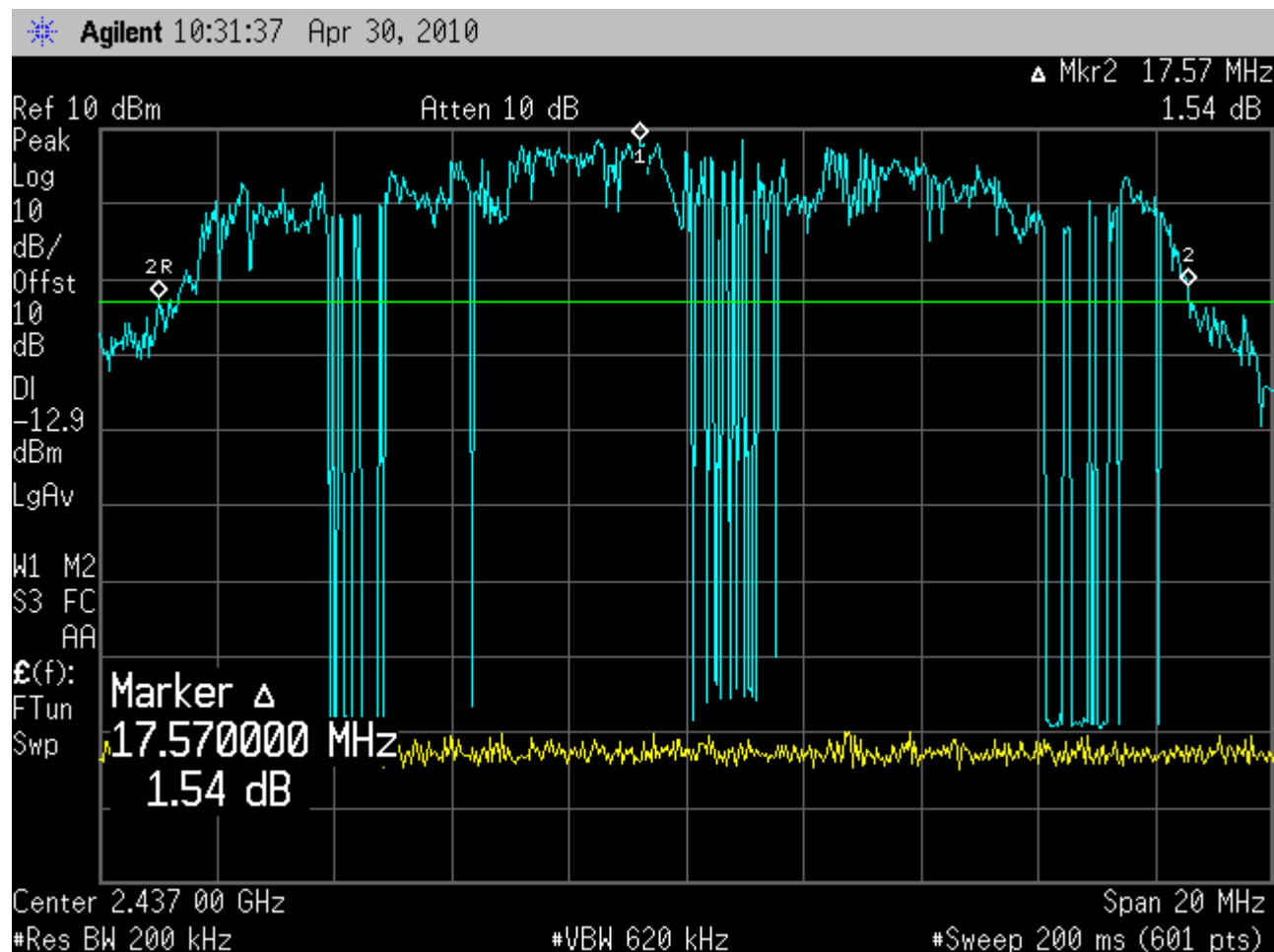


("g" mode Low Channel) Observed 20 dB Bandwidth is **17.6 MHz**



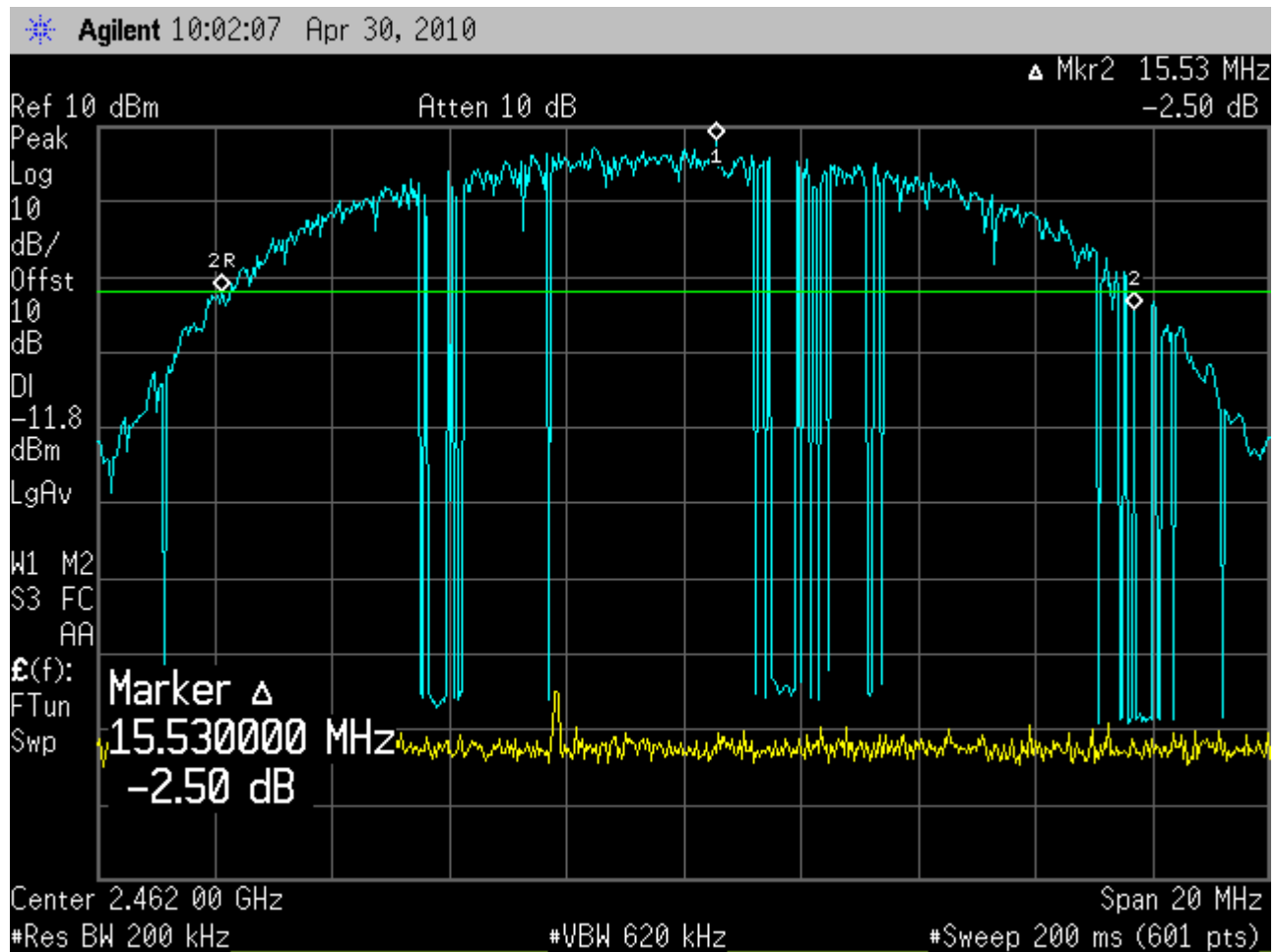
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("b" mode Mid Channel) Observed 20 dB Bandwidth is **15.6 MHz**

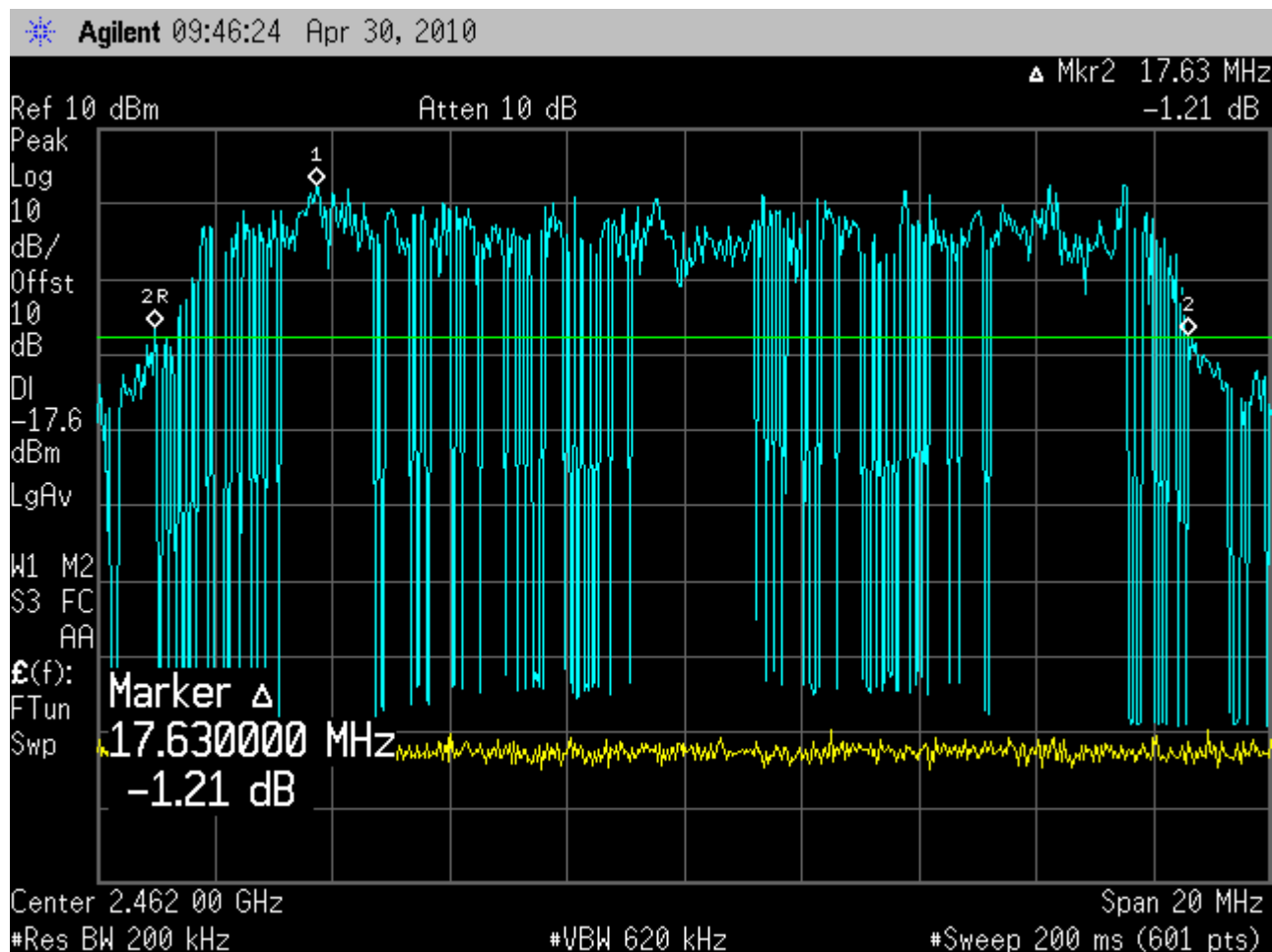


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("g" mode Mid Channel) Observed 20 dB Bandwidth is **17.57 MHz**



("b" mode High Channel) Observed 20 dB Bandwidth is **15.53 MHz**



("g" mode High Channel) Observed 20 dB Bandwidth is **17.63 MHz**



Section 15.247(a)(2) – Minimum 6dB RF Bandwidth

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Test Conditions:

Sample Number:	5006	Temperature:	24°C
Date:	April 30, 2010	Humidity:	38 %
Modification State:	Low ,Mid and High Channel (B and G mode)	Tester:	FSCustodio
		Laboratory:	Nemko

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Test Results:

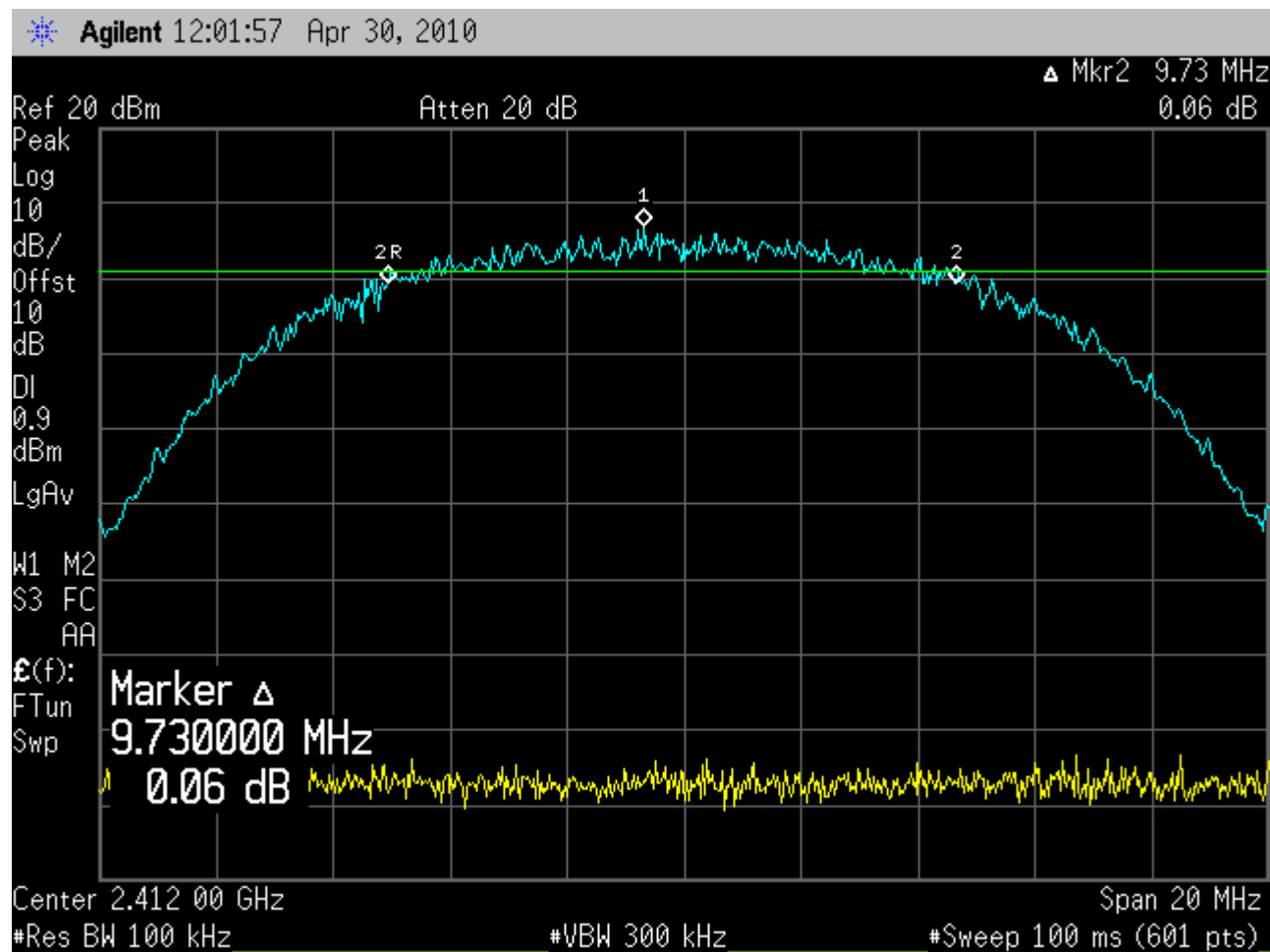
See attached plots.

Additional Observations:

- This is a conducted test
- RBW is set to 100kHz
- VBW is 3X RBW
- Sweep is auto
- Detector is Peak
- Trace is Max Hold
- For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was plotted; a DISPLAY line was drawn 6 dB lower than PEAK level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

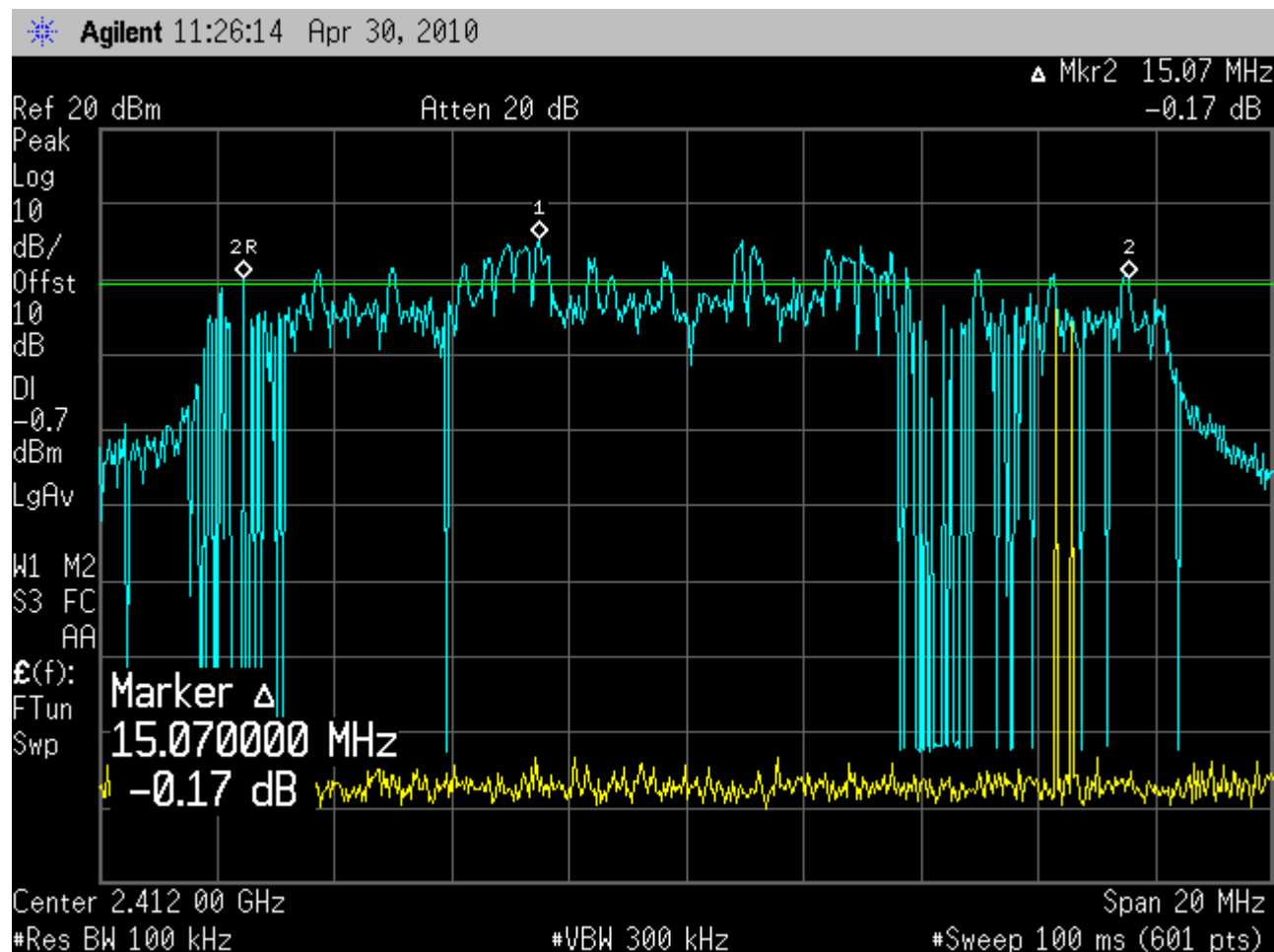
Channel Range	“b” mode 6 dB bandwidth	“g” mode 6 dB bandwidth
Low (2412 MHz)	9.73 MHz	15.07 MHz
Mid (2437 MHz)	10.13 MHz	16.3 MHz
High (2462 MHz)	10.7 MHz	14.97 MHz



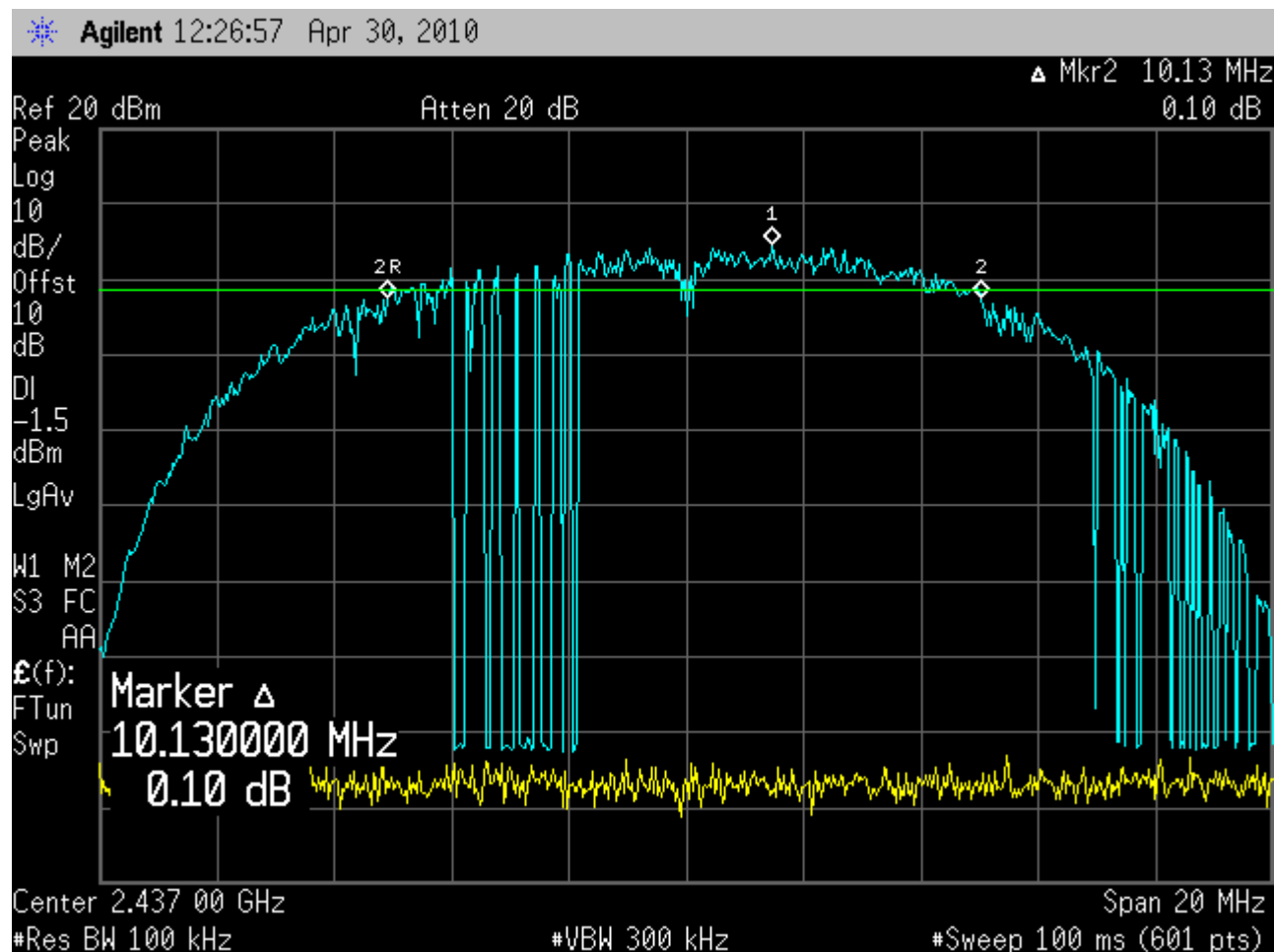


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("b" mode Low Channel) Observed 6 dB Bandwidth is **9.73 MHz**



("g" mode Low Channel) Observed 6 dB Bandwidth is **15.07 MHz**

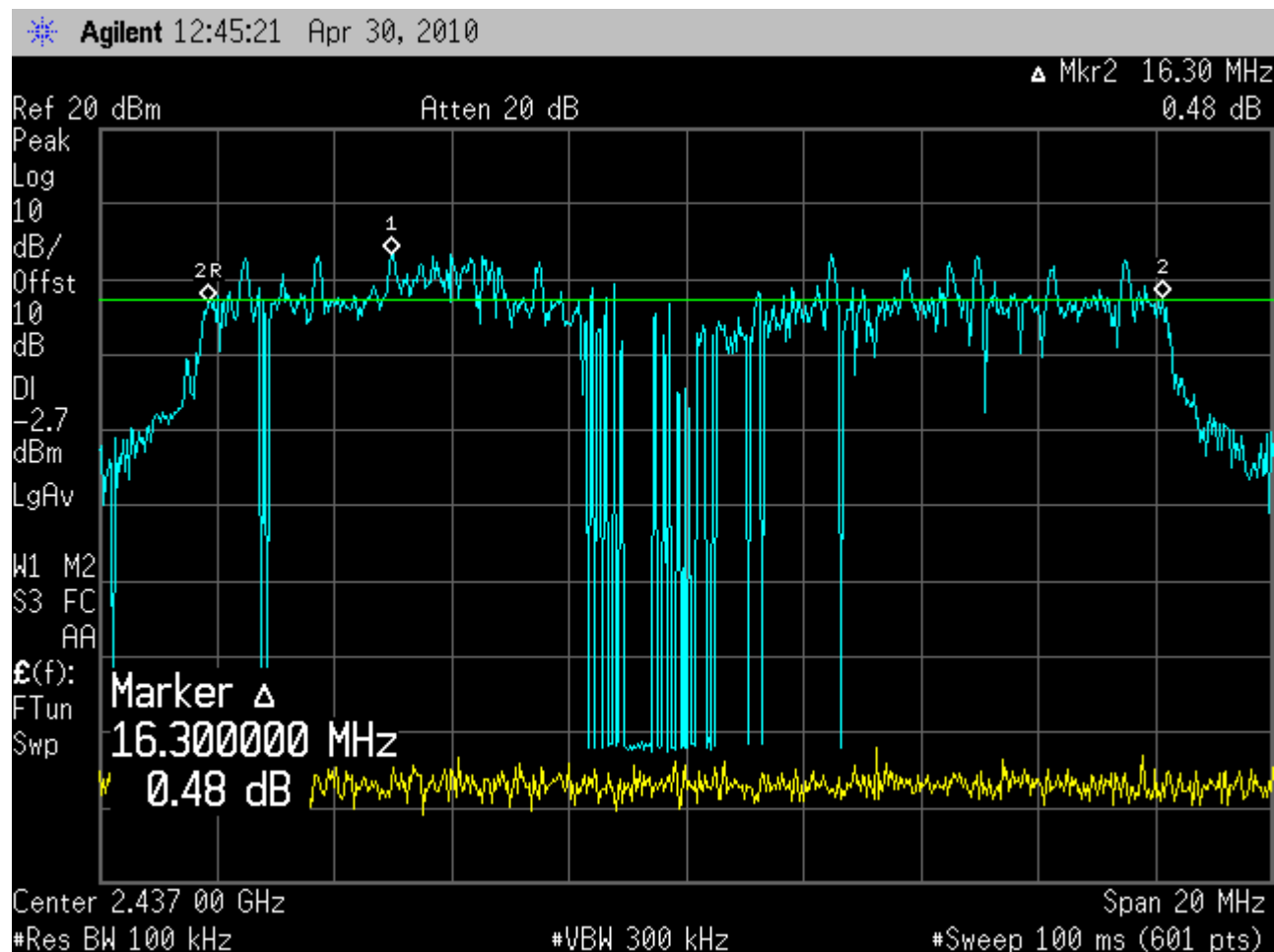


("b" mode Mid Channel) Observed 6 dB Bandwidth is **10.13 MHz**

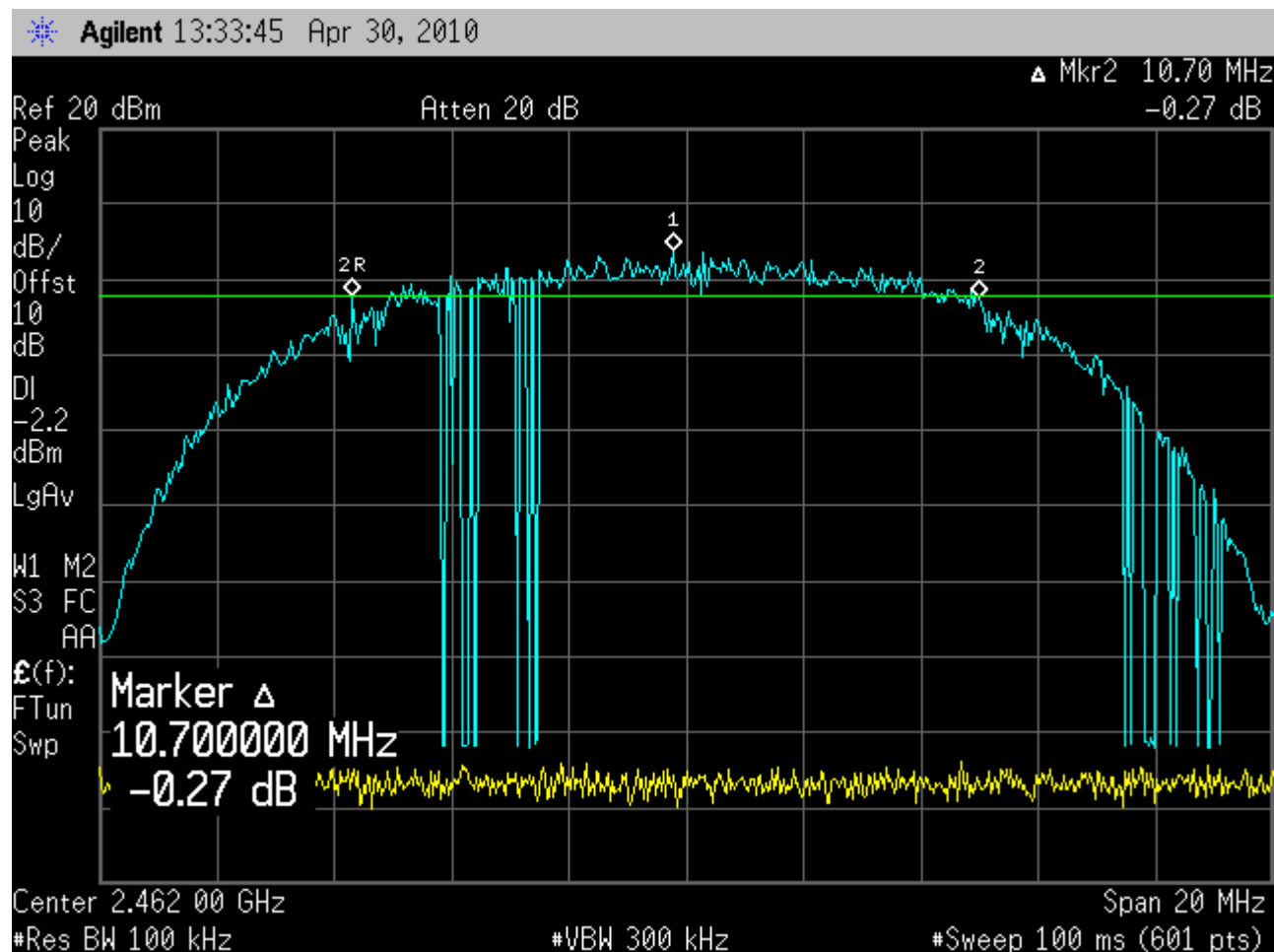


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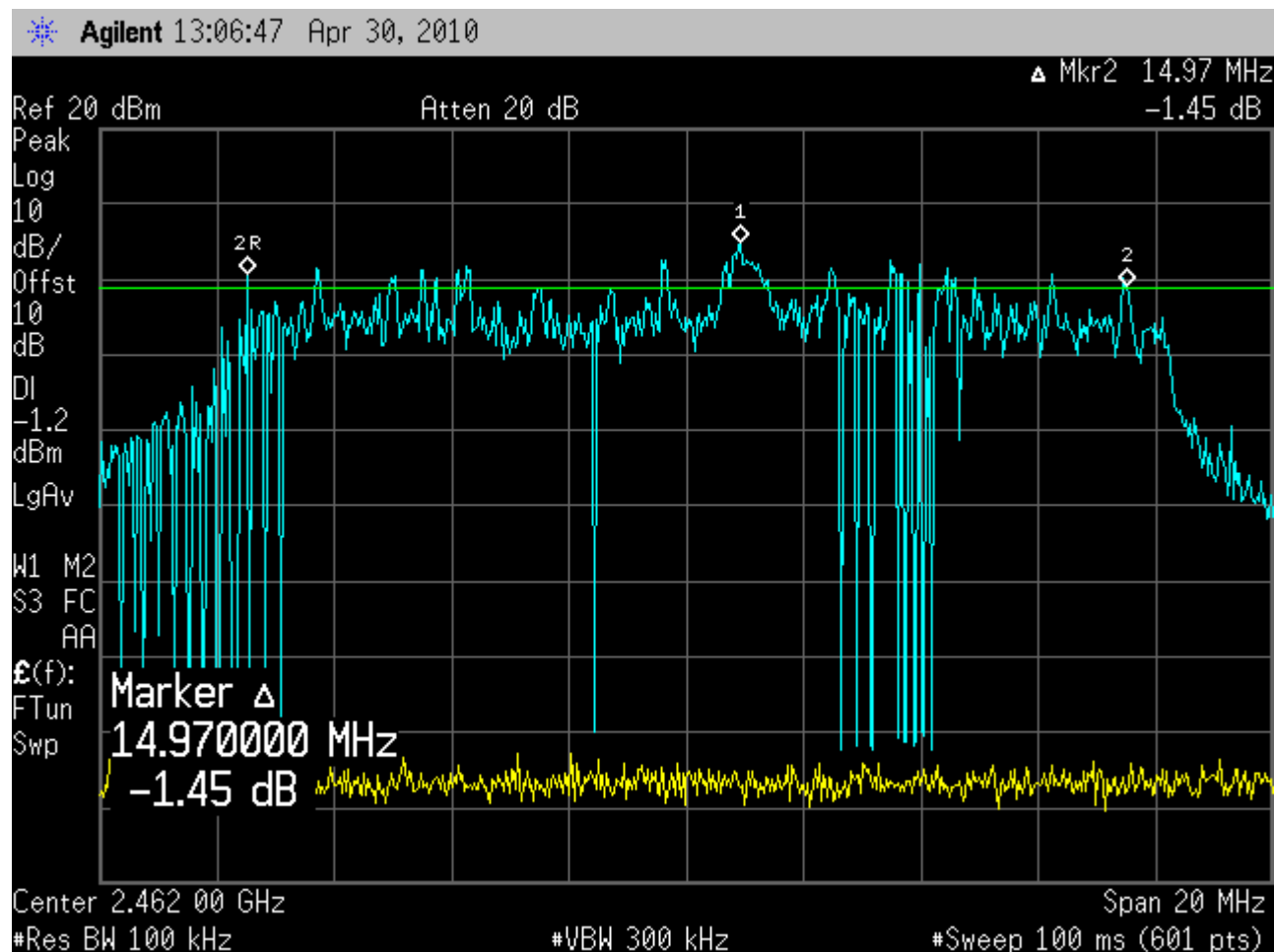


("g" mode Mid Channel) Observed 6 dB Bandwidth is 16.3 MHz



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("b" mode High Channel) Observed 6 dB Bandwidth is **10.70 MHz**



("g" mode High Channel) Observed 6 dB Bandwidth is **14.97 MHz**

Section 15.247(b)(1) – Peak Output Power

(3) For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

Test Conditions:

Sample Number:	5006	Temperature:	21°C
Date:	April 30, 2010	Humidity:	43 %
Modification State:	Low ,Mid and High Channel (b and g mode)	Tester:	FSCustodio
		Laboratory:	Nemko

Test Results:

Peak Power Analyzer used on this test

Additional Observations:

- This is a conducted test. A 10dB attenuator was placed between the sensor and the antenna port. Additional 0.8 dB was added for the cable assembly used.. Total offset used is 10.8 dB.
- The EUT was configured to transmit modulated during investigation.
- Input voltage to the EUT is defined by Part E1 SDIO specifications V2.00 (SD card specs). The EUT is designed to operate optimally at a standard voltage of 3.3VDC. Voltage to the module is supplied by a host SD card slot which follows the above referenced specification and can't be modified on the host embedded processor.

Channel Range	Peak Power Output (dBm) “b” mode	Peak Power Output (dBm) “g” mode
Low (2412 MHz)	18.87	18.42
Mid (2437 MHz)	17.73	19.35
High (2462 MHz)	17.97	17.74

Peak Output Power = 18.87 dBm or **77.0 mW (“b” mode)**

Peak Output Power = 19.35 dBm or **86.0 mW (“g” mode)**



Section 15.247(d) – Band-edge Compliance of RF Conducted Emissions

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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Test Conditions:

Sample Number:	5006	Temperature:	24°C
Date:	April 30, 2010	Humidity:	38 %
Modification State:	Low and High Channel (b and g mode)	Tester:	FSCustodio
		Laboratory:	Nemko

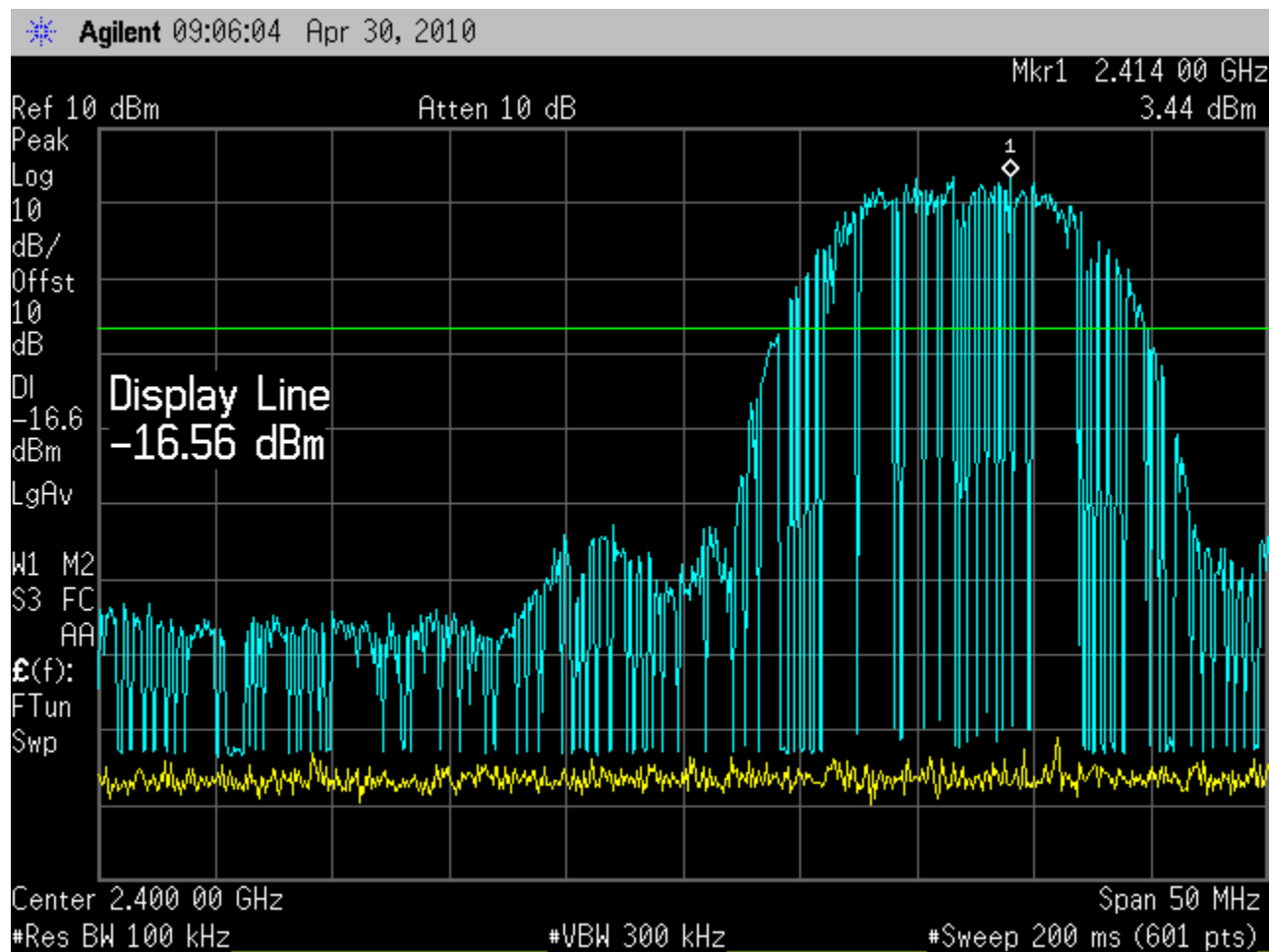
Test Results:

See attached plots.

Additional Observations:

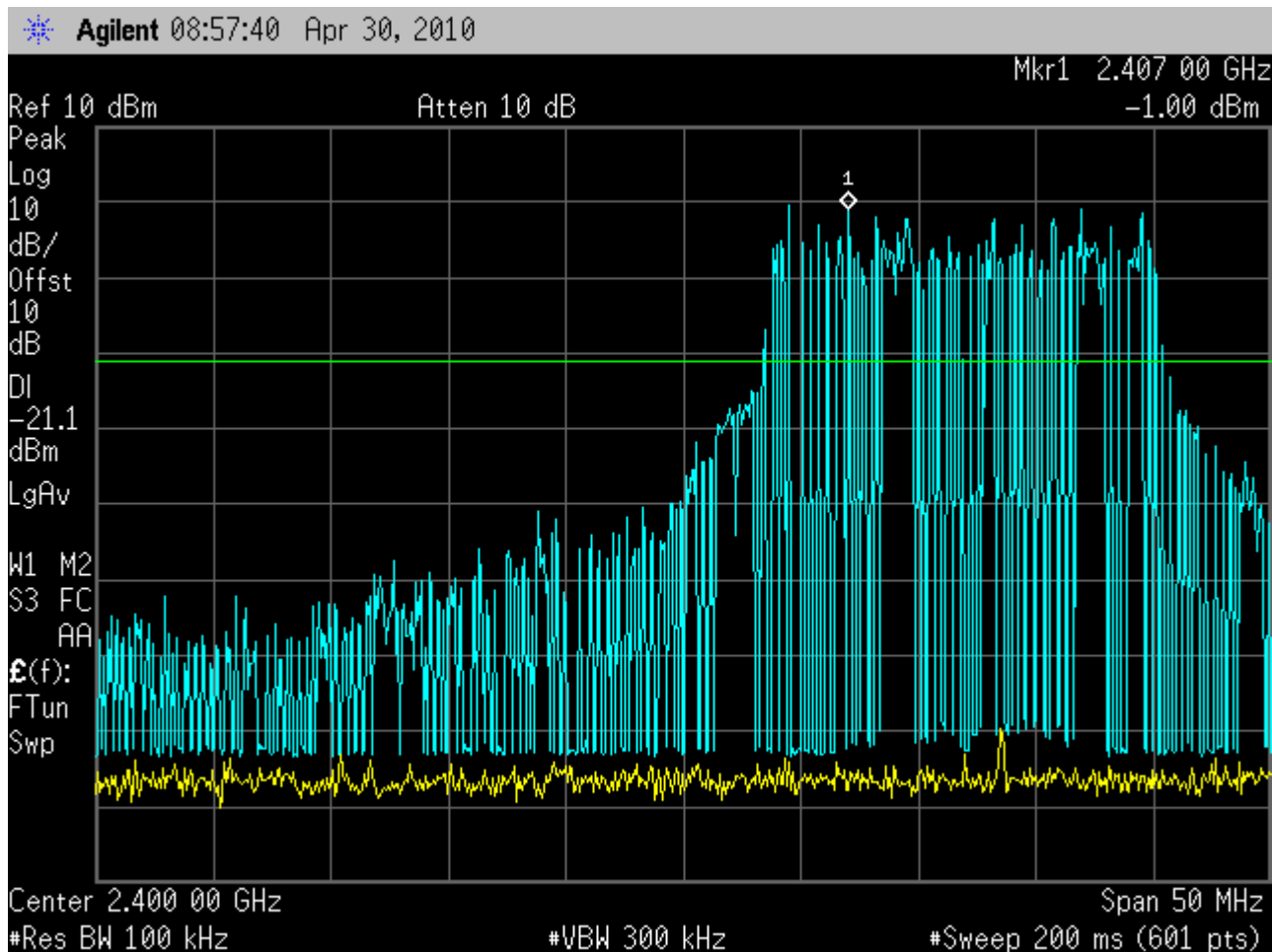
- This is a conducted test.
- Span is wide enough to capture the peak level of the emission operating on the channel closest to the band edges (Lower and Upper).
- RBW is 100kHz
- VBW is 3X RBW
- Sweep is auto.
- Detector is Peak
- Trace is Max Hold
- For each investigation, the peak level reading was taken and a display line was drawn 20 dBc below this level which will be the limit for this test.



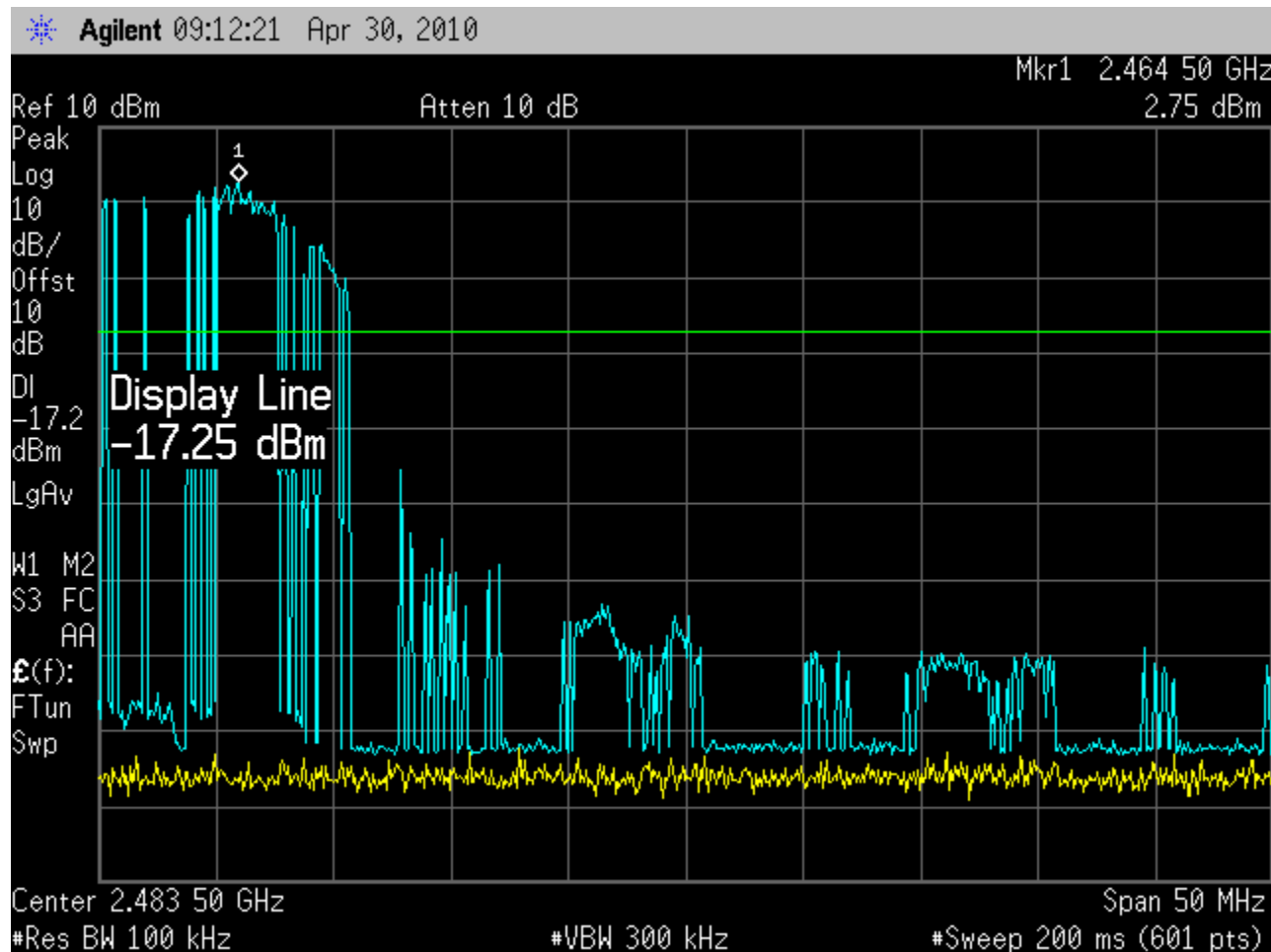


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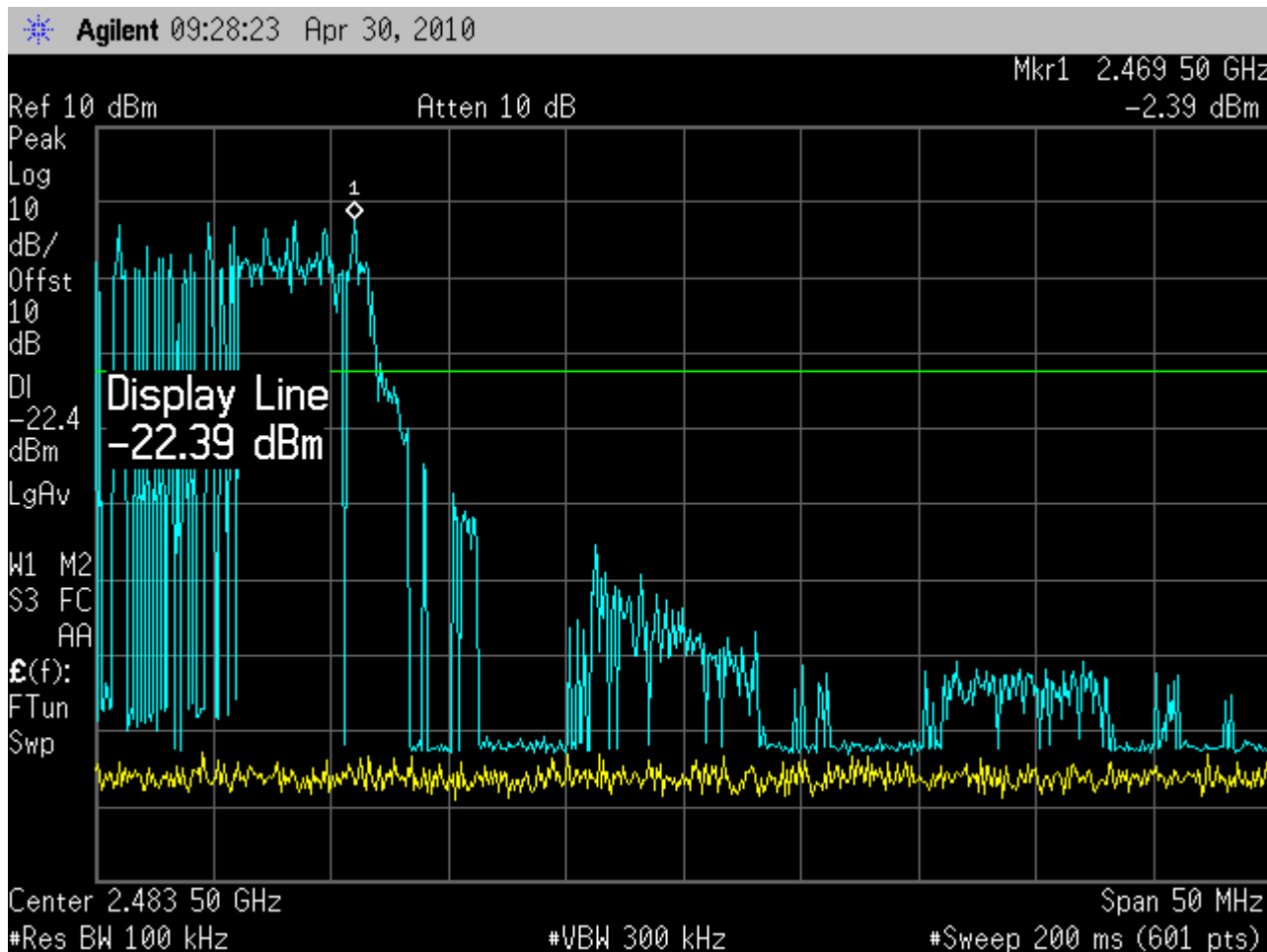
Low Channel "b" mode centered at 2400 MHz



Low Channel "g" mode centered at 2400 MHz



High Channel "b" mode centered at 2483.5 MHz



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High Channel "g" mode centered at 2483.5 MHz



Section 15.247(d) – Spurious RF Conducted Emissions

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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Test Conditions:

Sample Number:	5006	Temperature:	24°C
Date:	April 30, 2010	Humidity:	38 %
Modification State:	Low and High Channel (b and g mode)	Tester:	FSCustodio
		Laboratory:	Nemko

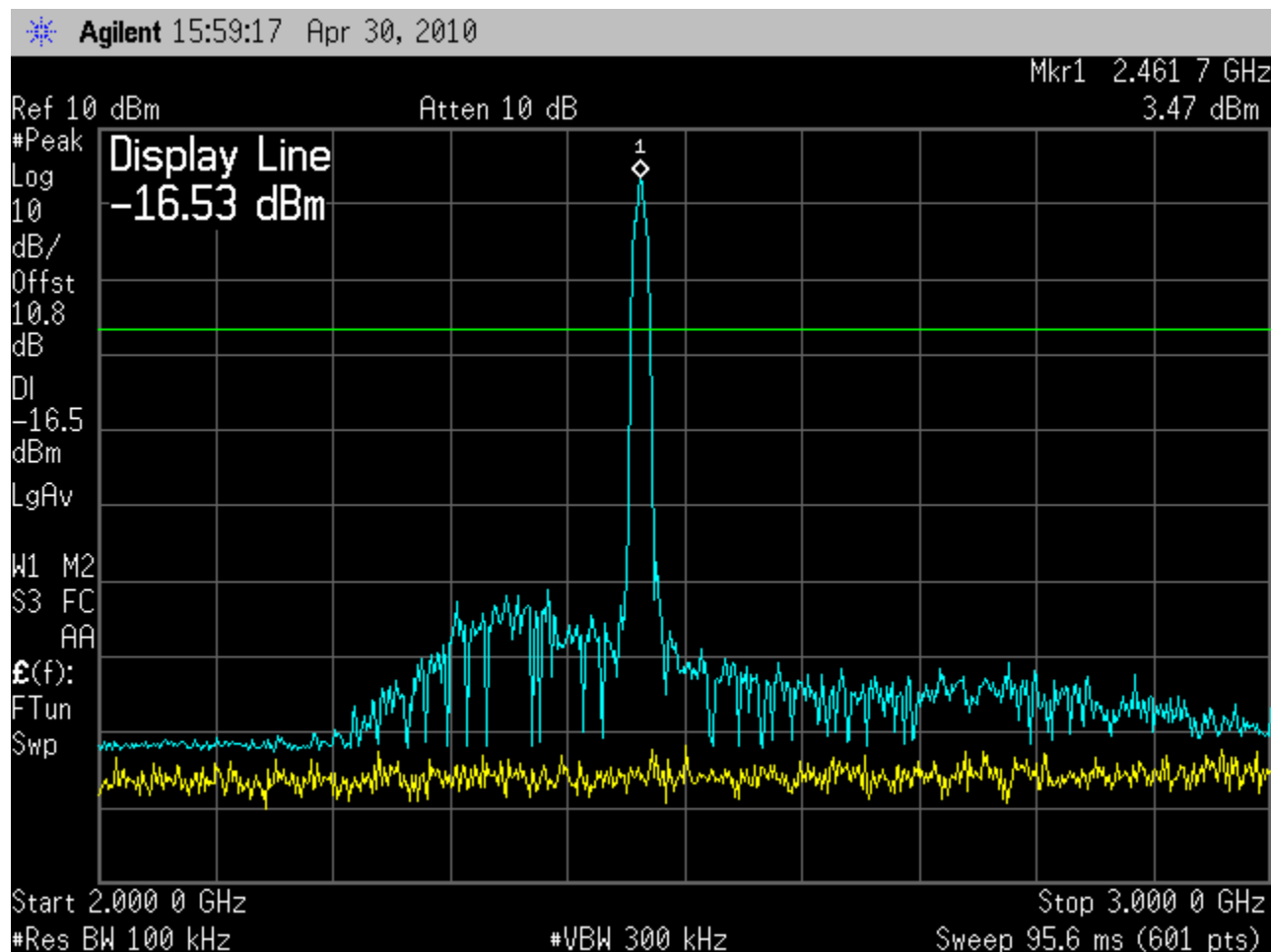
Test Results:

See attached plots.

Additional Observations:

- This is a conducted test. The 10.8dB offset is from the attenuator and cable assembly used.
- The peak level reading was taken at the carrier frequency then a display line was drawn 20 dBc below this level which will be the limit for this test.
- VBW is 3X RBW
- Sweep is auto.
- Detector is Peak
- Trace is Max Hold
- EUT complies.
- High Channel data presented (both “b” and “g” mode), Low and Mid Channel data located in Appendix B.



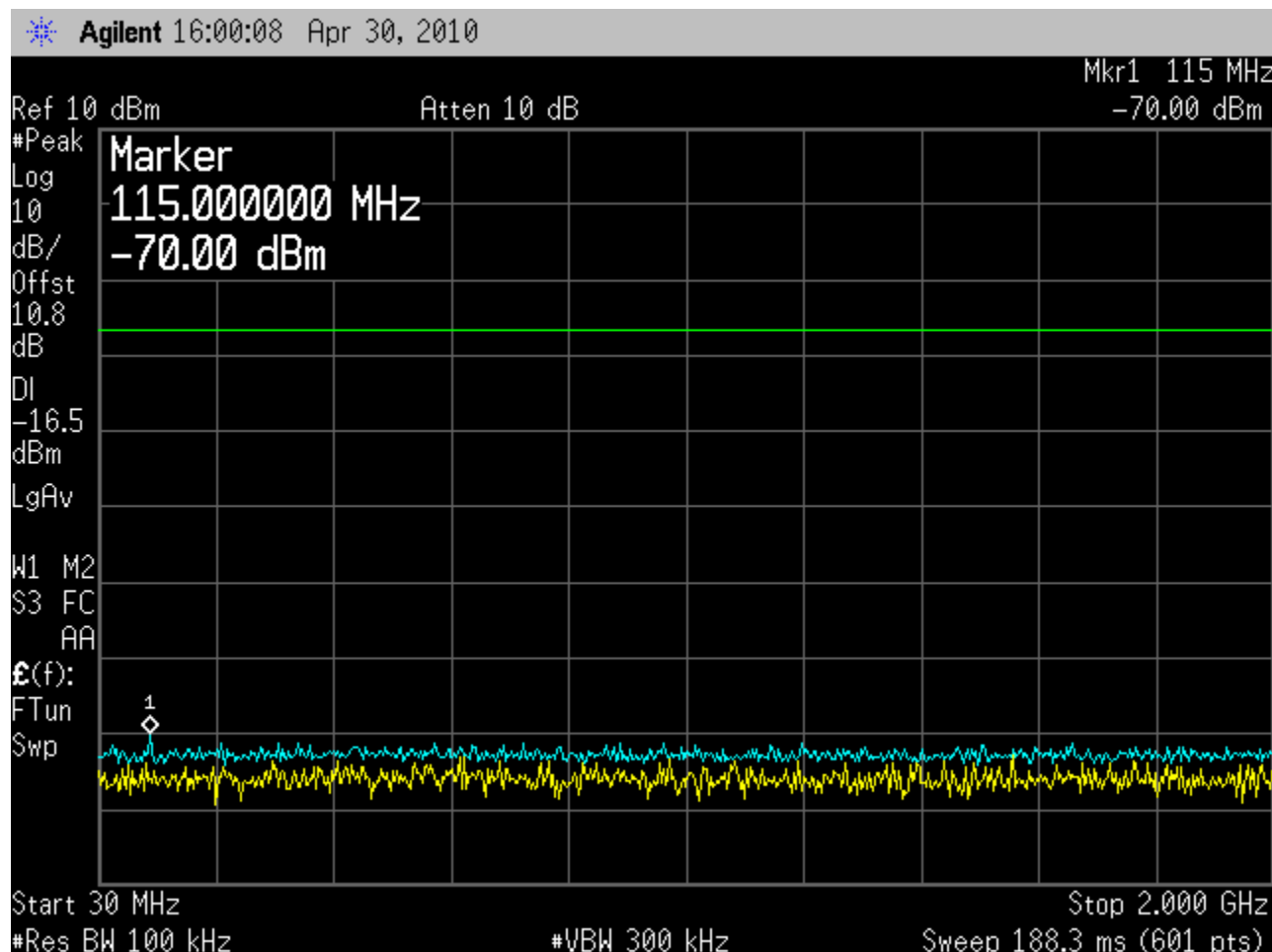


High Channel ("b" mode) - Plots from 2 GHz to 3 GHz , Display Line is -16.53 dBm which is 20dB below the highest in band emission.

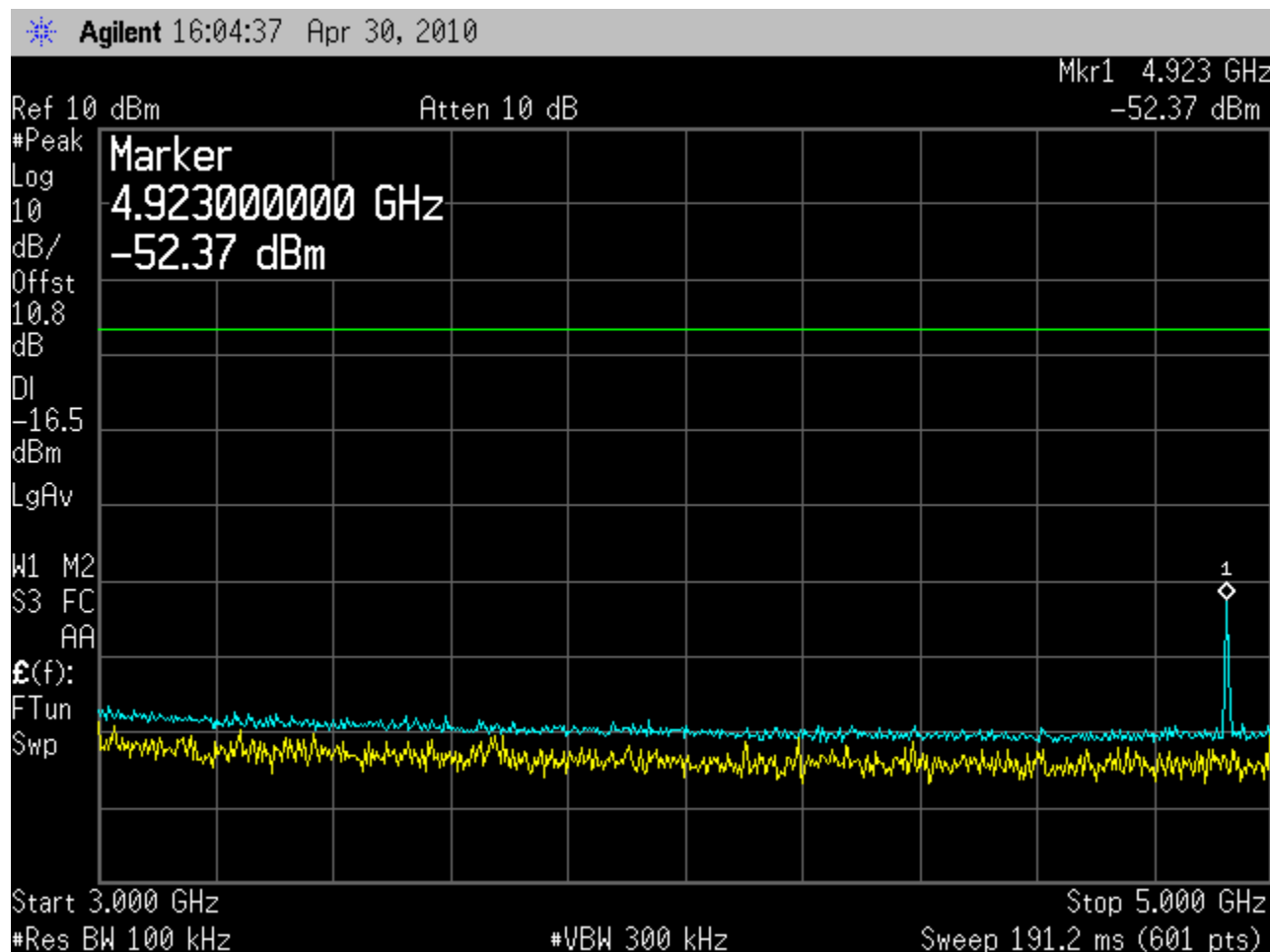


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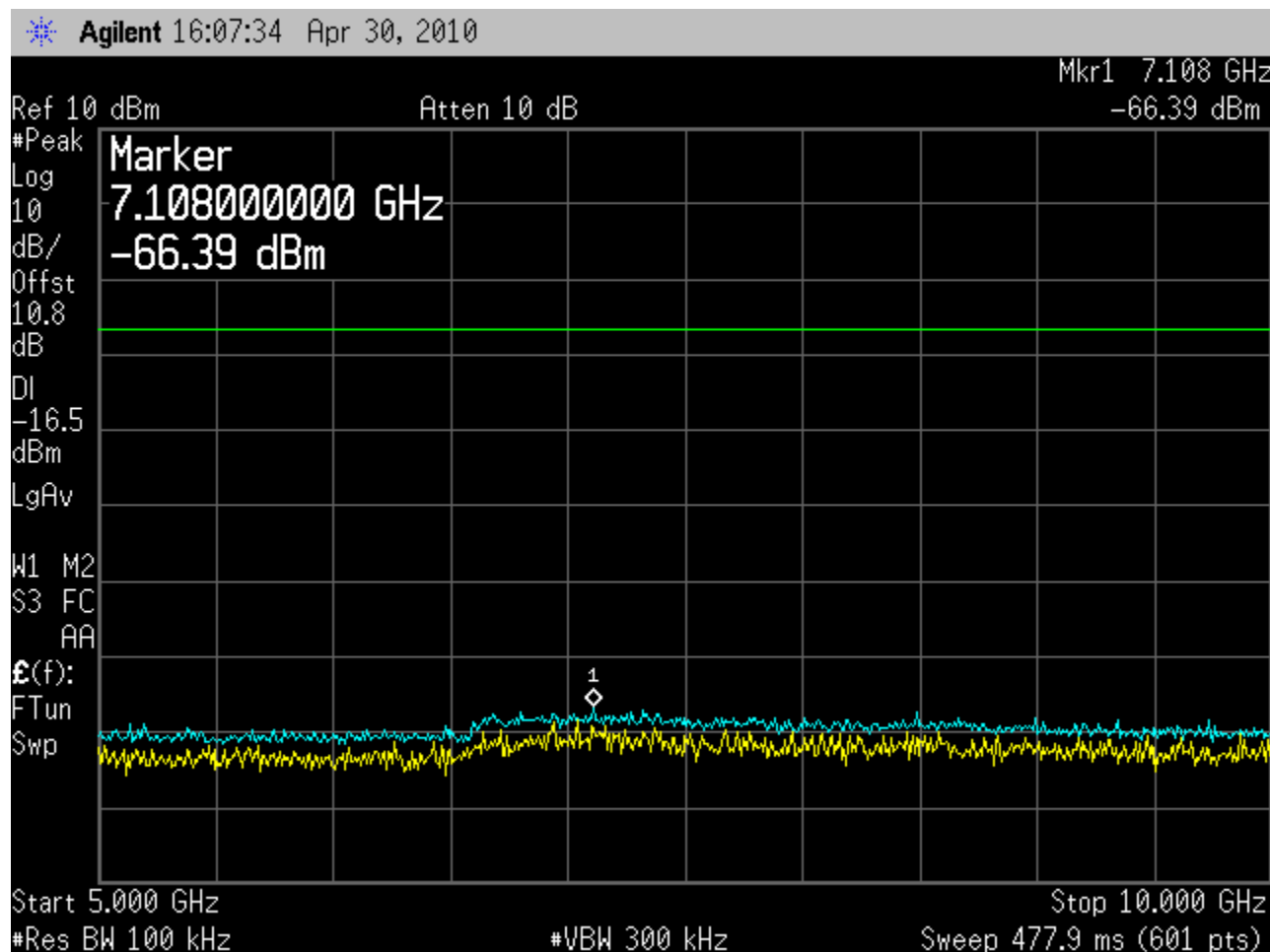




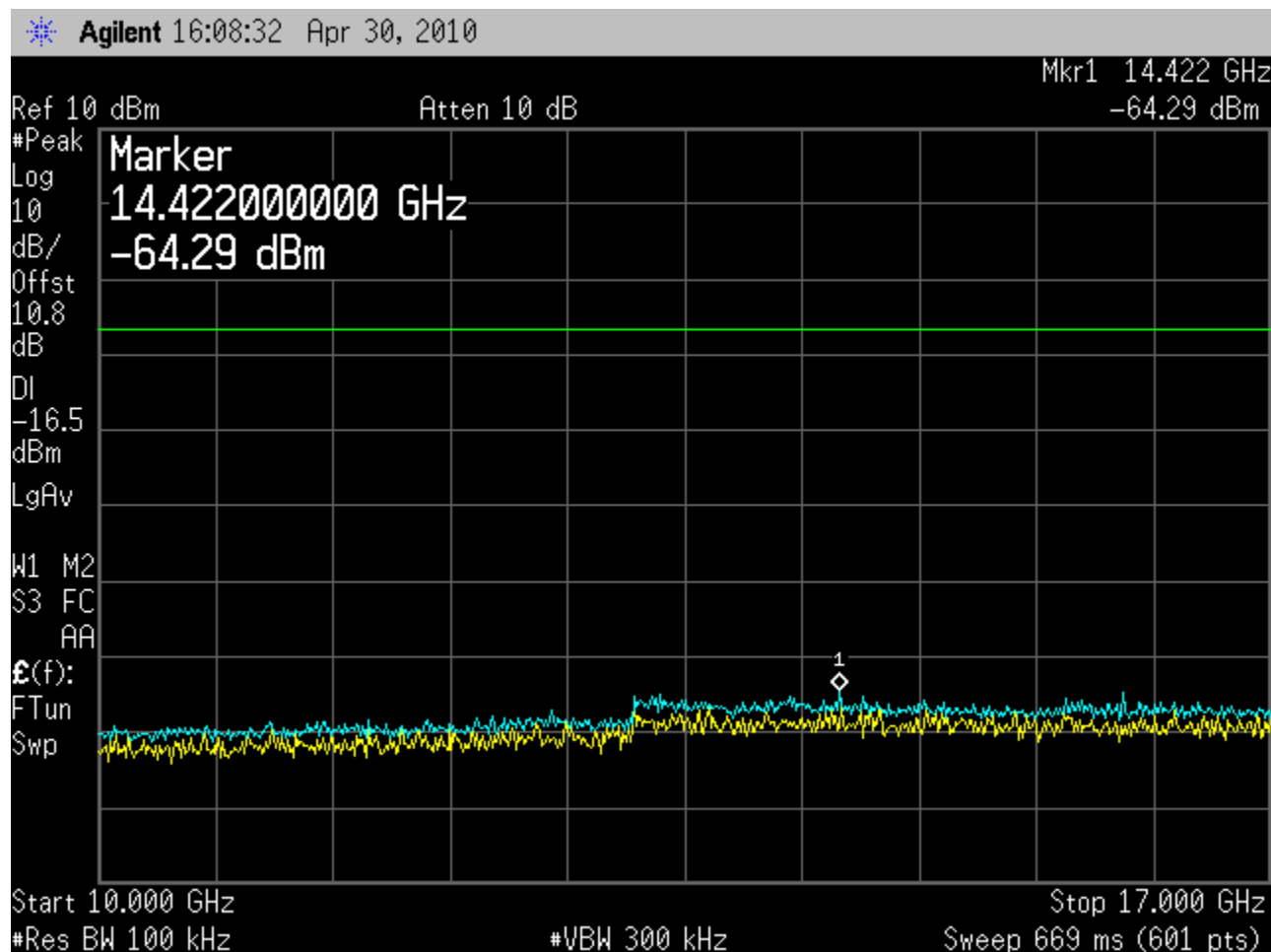
High Channel (“b” mode) - Plots from 30 MHz to 2 GHz , Display Line is -16.53 dBm which is 20dB below the highest in band emission.



High Channel ("b" mode) - Plots from 3 GHz to 5 GHz , Display Line is -16.53 dBm which is 20dB below the highest in band emission.

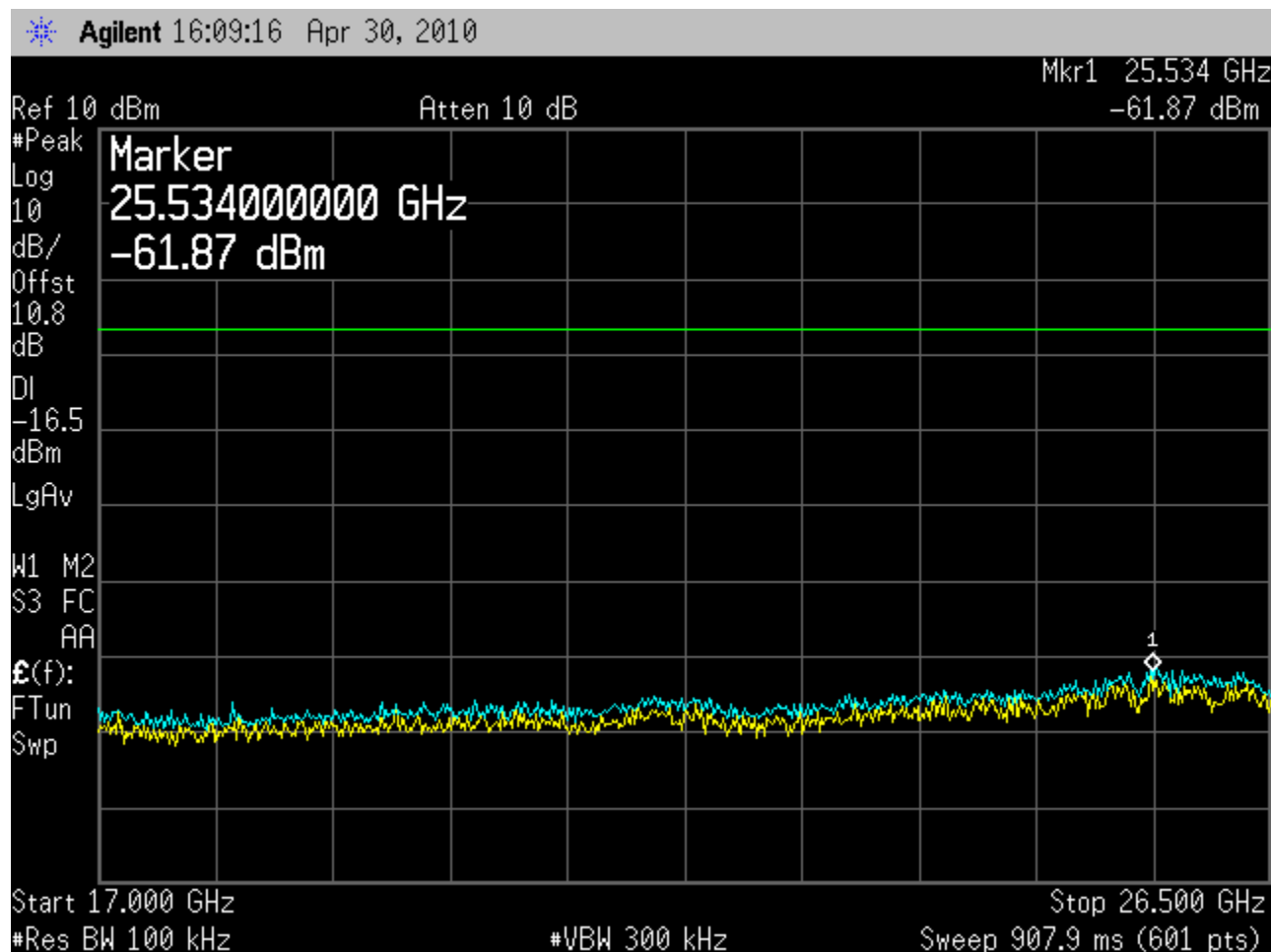


High Channel ("b" mode) - Plots from 5 GHz to 10 GHz , Display Line is -16.53 dBm which is 20dB below the highest in band emission.

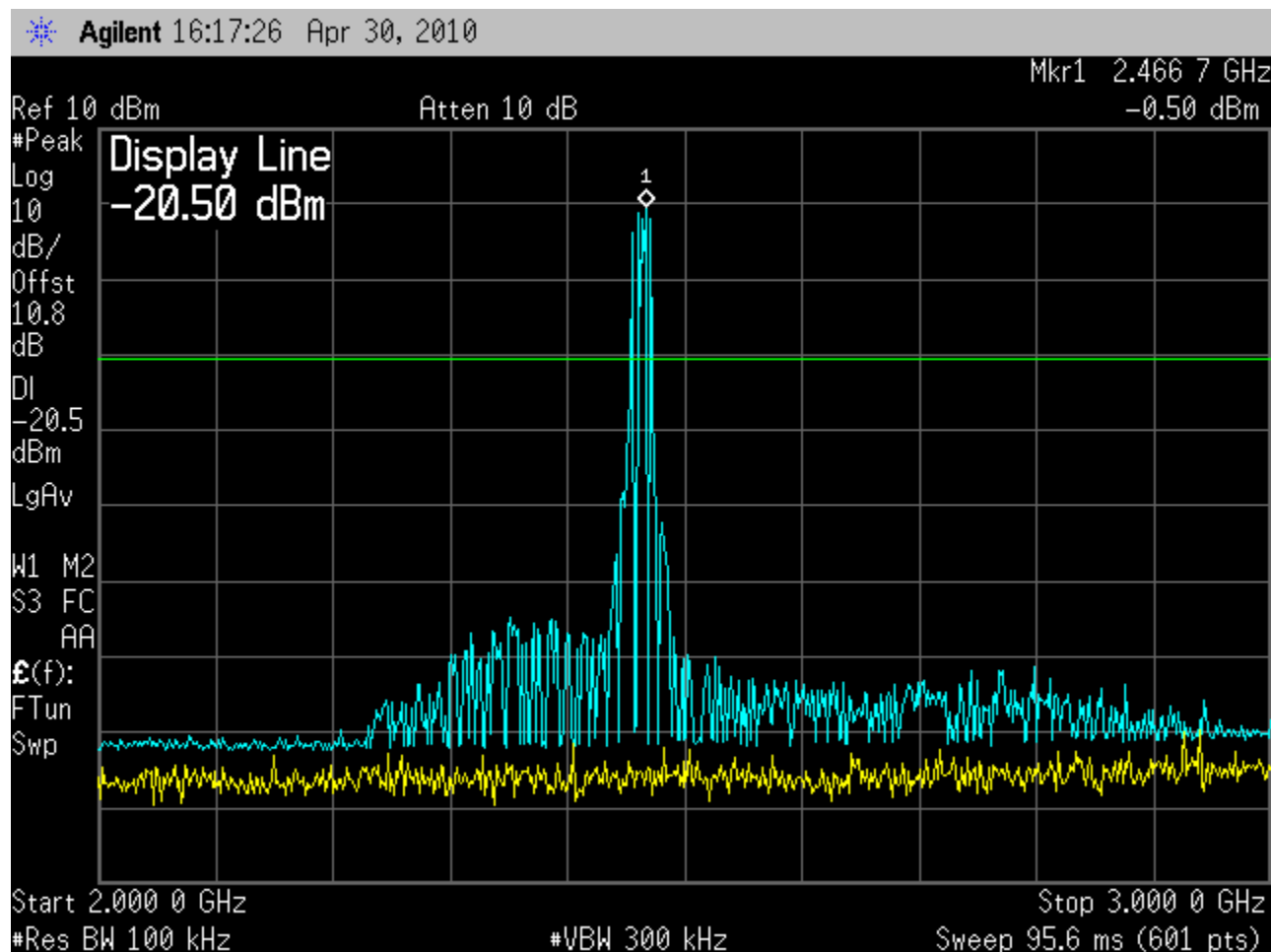


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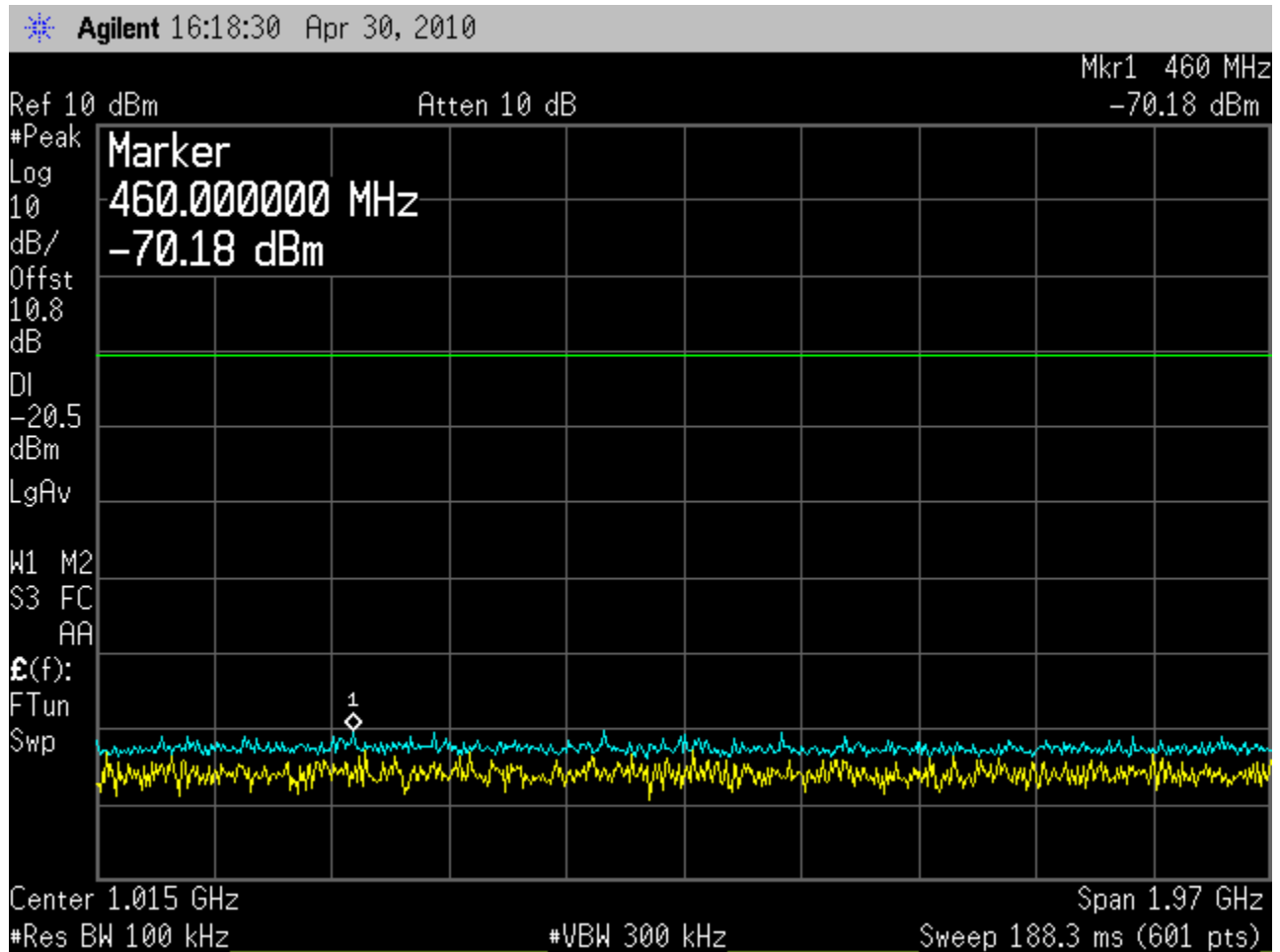
High Channel (“b” mode) - Plots from 10 GHz to 17 GHz , Display Line is -16.53 dBm which is 20dB below the highest in band emission.



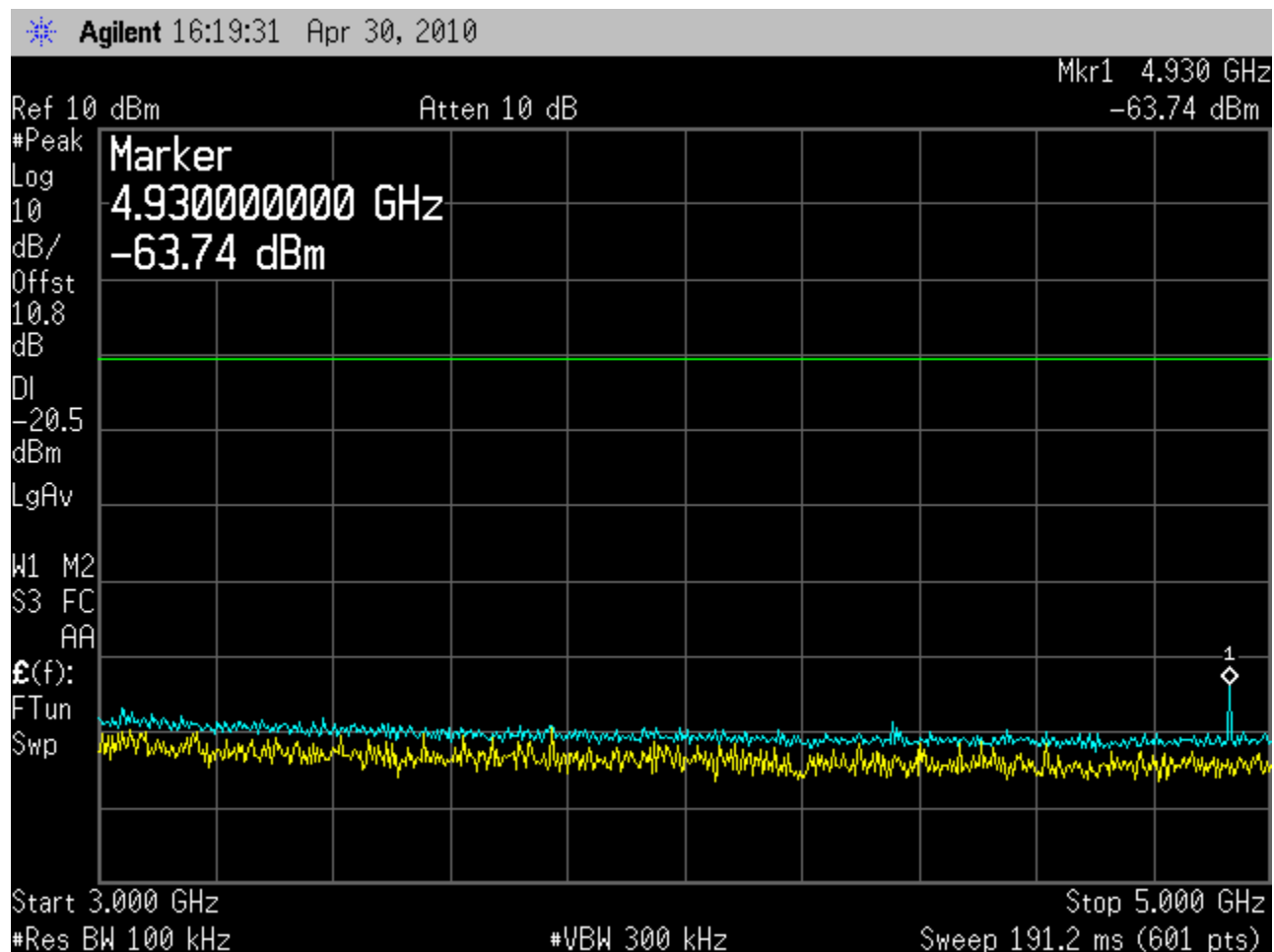
High Channel ("b" mode) - Plots from 17 GHz to 26.5 GHz , Display Line is -16.53 dBm which is 20dB below the highest in band emission.



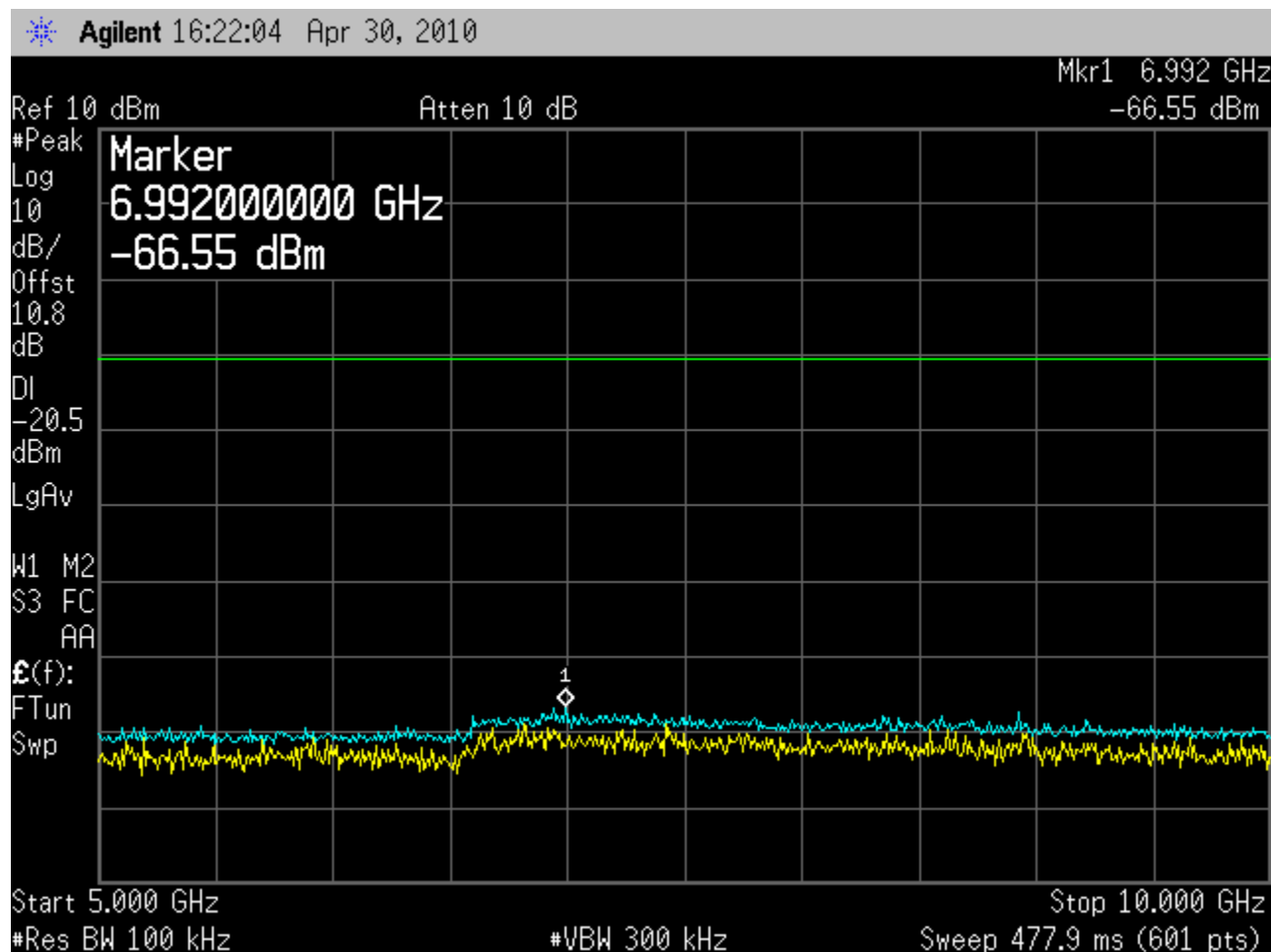
High Channel (“g” mode) - Plots from 2 GHz to 3 GHz , Display Line is -20.50 dBm which is 20dB below the highest in band emission.



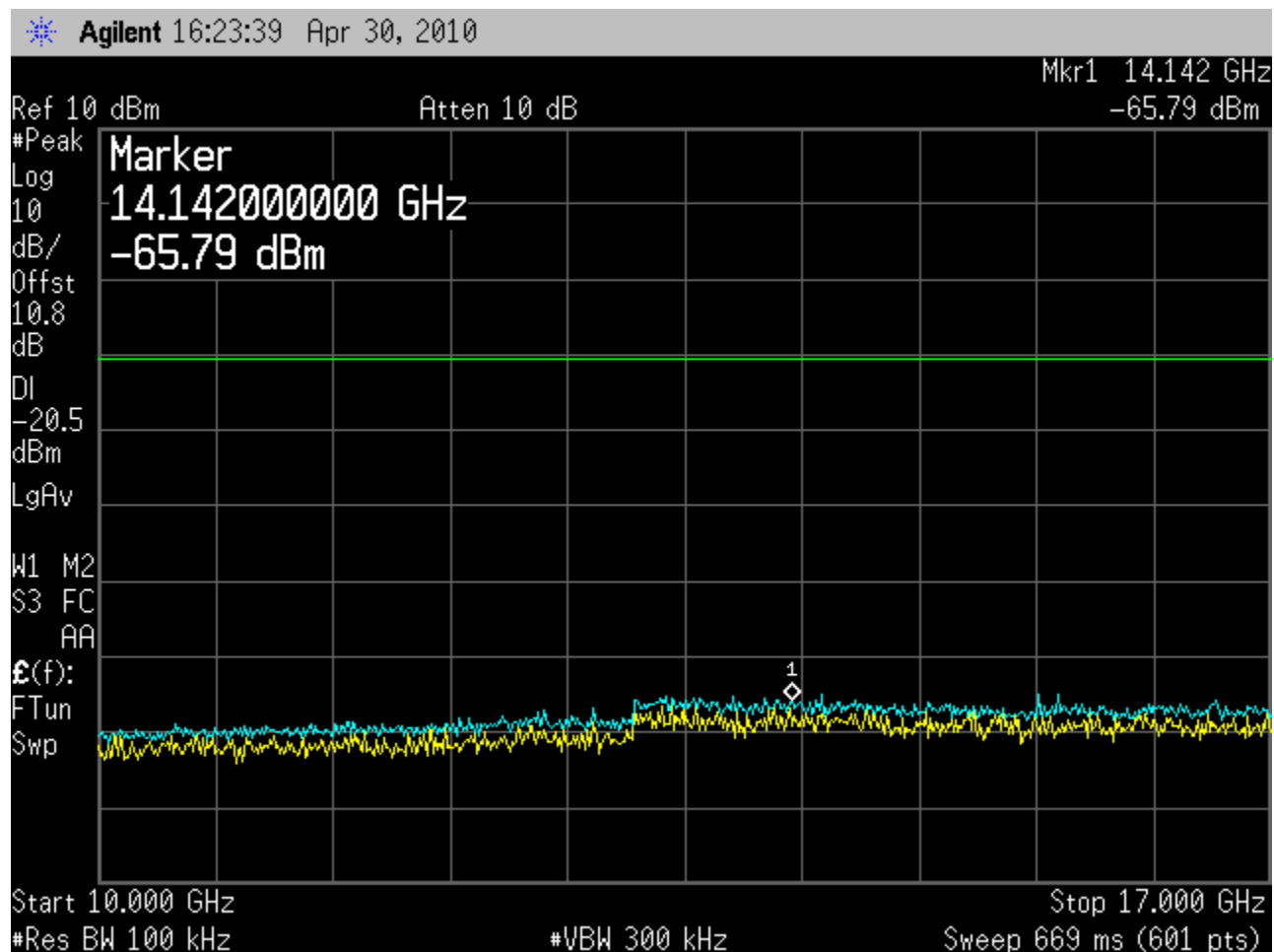
High Channel ("g" mode) - Plots from 30 MHz to 2 GHz , Display Line is -20.50 dBm which is 20dB below the highest in band emission.



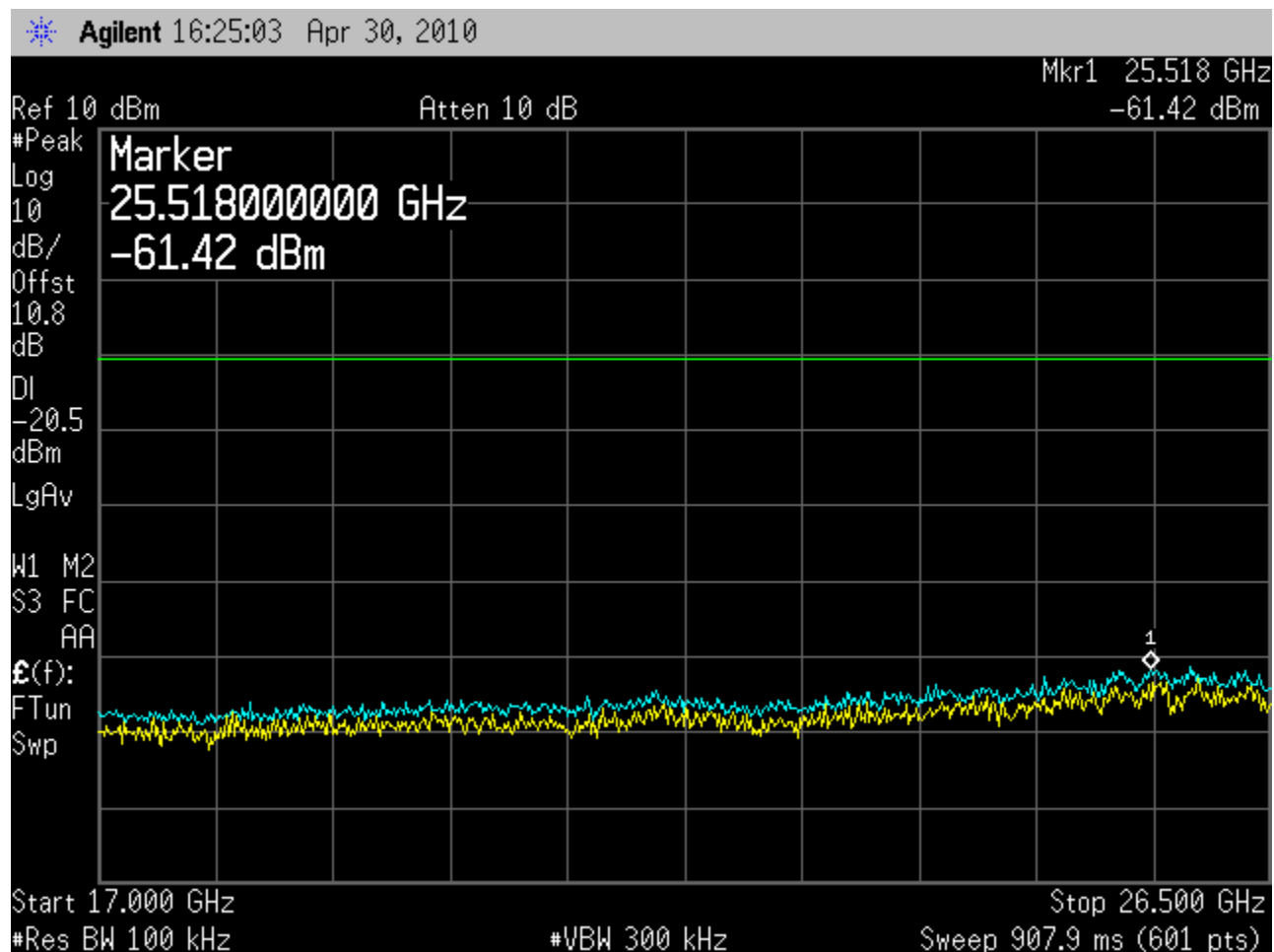
High Channel ("g" mode) - Plots from 3 GHz to 5 GHz , Display Line is -20.50 dBm which is 20dB below the highest in band emission.



High Channel (“g” mode) - Plots from 5 GHz to 10 GHz , Display Line is -20.50 dBm which is 20dB below the highest in band emission.



High Channel (“g” mode) - Plots from 10 GHz to 17 GHz , Display Line is -20.50 dBm which is 20dB below the highest in band emission.



High Channel ("g" mode) - Plots from 17 GHz to 26.5 GHz , Display Line is -20.50 dBm which is 20dB below the highest in band emission.



Section 15.247(d) – Spurious Radiated Emissions

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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Test Conditions:

Sample Number:	5006	Temperature:	16°C
Date:	May 4, 2010	Humidity:	82 %
Modification State:	Low, Mid and High Channel (b and g mode)	Tester:	FSCustodio
		Laboratory:	SOATS

Test Results:

See attached plots.

Additional Observations:

- The Spectrum was searched from 30MHz to 26500 MHz.
 There are no emissions found that do not comply to the restricted bands defined in **FCC Part 15 Subpart C, 15.205** or **Part 15.247(d)**.
- The EUT was measured on three orthogonal axes.
- Voltage is set as per SD card standard (3.3VDC).
- All emissions investigated were verified coming from the host embedded computer.

Sample Computation (following page data):

$$\begin{aligned}
 \text{Correction factor @ 156.0MHz} &= -15.7 \\
 &= \text{Antenna factor} + \text{Cable loss} - \text{Preamp gain} \\
 &= 13.7 + 2.0 - 0 \\
 \text{Corrected reading} &= \text{Max. reading} + \text{Correction factor} \\
 &= 7.4 + (15.7) \\
 &= 23.1 \text{ dB}\mu\text{V/m}
 \end{aligned}$$





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Radiated Emissions Data

Job # : 43699 Date : 5/4/2010 Page 1 of 1
 NEX # : 149324 Time : 8AM
 Staff : FSC

Client Name : Clarity Design EUT Voltage : 3.3VDC
 EUT Name : WiFi SD Card EUT Frequency : _____
 EUT Model # : 5006 Phase: _____
 EUT Serial # : N/A NOATS _____
 EUT Config. : "b" mode @ low channel SOATS X
 Distance < 1000 MHz: 3 m
 Distance > 1000 MHz: 3 m

Specification : CFR47 Part 15, Subpart B, Class B

Loop Ant. # : NA
 Bicon Ant.#: 114_3m Temp. (°C) : 16
 Log Ant.#: 110_3m Humidity (%) : 82
 DRG Ant. # NA Spec Analyzer #: 898/899
 Cable LF#: SOATS Analyzer Display #: N/A
 Cable HF#: NA Quasi-Peak Detector #: 898/899
 Preamp LF#: NA Preselector #: N/A
 Preamp HF# NA

Quasi-Peak	RBW: 120 kHz
	Video Bandwidth 300 kHz
Peak	RBW: 1 MHz
	Video Bandwidth 3 MHz
Average	RBW: 1 MHz
	Video Bandwidth 10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
 Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
156.0	7.4	6.8	Q		1.0	7.4	23.1	43.5	-20.4	Pass	
760.6	10.0	8.0	Q		1.0	10.0	36.1	46.0	-10.0	Pass	
936.0	16.6	11.1	Q		1.0	16.6	45.3	46.0	-0.8	Pass	

Below 1GHz Emissions Data ("b" mode)



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Radiated Emissions Data

Job # : 43699 Date : 5/4/2010 Page 1 of 1
NEX # : 149324 Time : 12:30PM
Staff : FSC

Client Name : Clarity Design
EUT Name : WiFi SD Card
EUT Model # : 5006
EUT Serial # : N/A
EUT Config. : "b" mode

EUT Voltage : 3.3VDC
EUT Frequency : _____
Phase: _____
NOATS _____
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : CFR47 Part 15, Subpart B, Class B
Loop Ant. # : NA
Bicon Ant.#: NA Temp. (°C) : 18
Log Ant.#: NA Humidity (%) : 72
DRG Ant. # : 877 Spec Analyzer #: 911
Cable LF#: NA Analyzer Display #: N/A
Cable HF#: SOATS Quasi-Peak Detector #: 911
Preamp LF#: NA Preselector #: N/A
Preamp HF# : 919 DCCF: 20

Peak	RBW: 1 MHz
Video Bandwidth 3 MHz	
Average = Peak- DCCF	
Average (NF)	RBW: 1 MHz
Video Bandwidth 10 Hz	

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
2400.0	61.0	61.5	P		1.0	61.5	63.2	74.0	-10.8	Pass	
2400.0	41.0	41.5	A		1.0	41.5	43.2	54.0	-10.8	Pass	
2483.5	57.6	58.1	P		1.0	58.1	59.8	74.0	-14.2	Pass	
2483.5	37.6	38.1	A		1.0	38.1	39.8	54.0	-14.2	Pass	
4824.0	51.3	51.9	P		1.0	51.9	64.1	74.0	-9.9	Pass	Noise Floor
4824.0	39.3	39.3	A		1.0	39.3	51.5	54.0	-2.5	Pass	Noise Floor
7236.0	40.3	40.1	P		1.0	40.3	61.2	74.0	-12.8	Pass	Noise Floor
7236.0	28.5	28.3	A		1.0	28.5	49.4	54.0	-4.6	Pass	Noise Floor
4874.0	51.2	52.6	P		1.0	52.6	64.8	74.0	-9.2	Pass	Noise Floor
4874.0	39.2	38.8	A		1.0	39.2	51.4	54.0	-2.6	Pass	Noise Floor
7311.0	38.5	38.4	P		1.0	38.5	59.4	74.0	-14.6	Pass	Noise Floor
7311.0	27.3	28.1	A		1.0	28.1	49.0	54.0	-5.0	Pass	Noise Floor
4924.0	50.4	51.3	P		1.0	51.3	63.6	74.0	-10.4	Pass	Noise Floor
4924.0	38.4	39.6	A		1.0	39.6	51.9	54.0	-2.1	Pass	Noise Floor
7386.0	38.6	39.3	P		1.0	39.3	60.2	74.0	-13.8	Pass	Noise Floor
7386.0	29.1	29.3	A		1.0	29.3	50.2	54.0	-3.8	Pass	Noise Floor

Above 1GHz Emissions Data ("b" mode)



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Radiated Emissions Data

Job # : 43699 Date : 5/4/2010
NEX # : 149324 Time : 8AM
 Staff : FSC

Page 1 of 1

Client Name : Clarity Design
EUT Name : WiFi SD Card
EUT Model # : 5006
EUT Serial # : N/A
EUT Config. : "g" mode @ mid channel

EUT Voltage : 3.3VDC
EUT Frequency : _____
Phase: _____
NOATS _____
SOATS _____
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : CFR47 Part 15, Subpart B, Class B
Loop Ant. # : NA
Bicon Ant.#: 114_3m Temp. (°C) : 16
Log Ant.#: 110_3m Humidity (%) : 82
DRG Ant. # : NA Spec Analyzer #: 898/899
Cable LF#: SOATS Analyzer Display #: N/A
Cable HF#: NA Quasi-Peak Detector #: 898/899
Preamp LF#: NA Preselector #: N/A
Preamp HF# : NA

Quasi-Peak	RBW: 120 kHz
	Video Bandwidth 300 kHz
Peak	RBW: 1 MHz
	Video Bandwidth 3 MHz
Average	RBW: 1 MHz
	Video Bandwidth 10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.
Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
110.8	12.3	8.2	Q		1.0	12.3	27.2	43.5	-16.3	Pass	
156.0	10.5	13.3	Q		1.0	13.3	29.0	43.5	-14.5	Pass	
760.6	7.9	9.9	Q		1.0	9.9	36.0	46.0	-10.1	Pass	

Below 1GHz Emissions Data ("g" mode)



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Radiated Emissions Data

Job # : 43699 Date : 5/4/2010 Page 1 of 1
 NEX# : 149324 Time : 10AM
 Staff : FSC

Client Name : Clarity Design EUT Voltage : 3.3VDC
 EUT Name : WiFi SD Card EUT Frequency : _____
 EUT Model # : 5006 Phase: _____
 EUT Serial # : N/A NOATS _____
 EUT Config. : "g" mode SOATS X
 Distance < 1000 MHz: 3 m
 Distance > 1000 MHz: 3 m

Specification : CFR47 Part 15, Subpart B, Class B

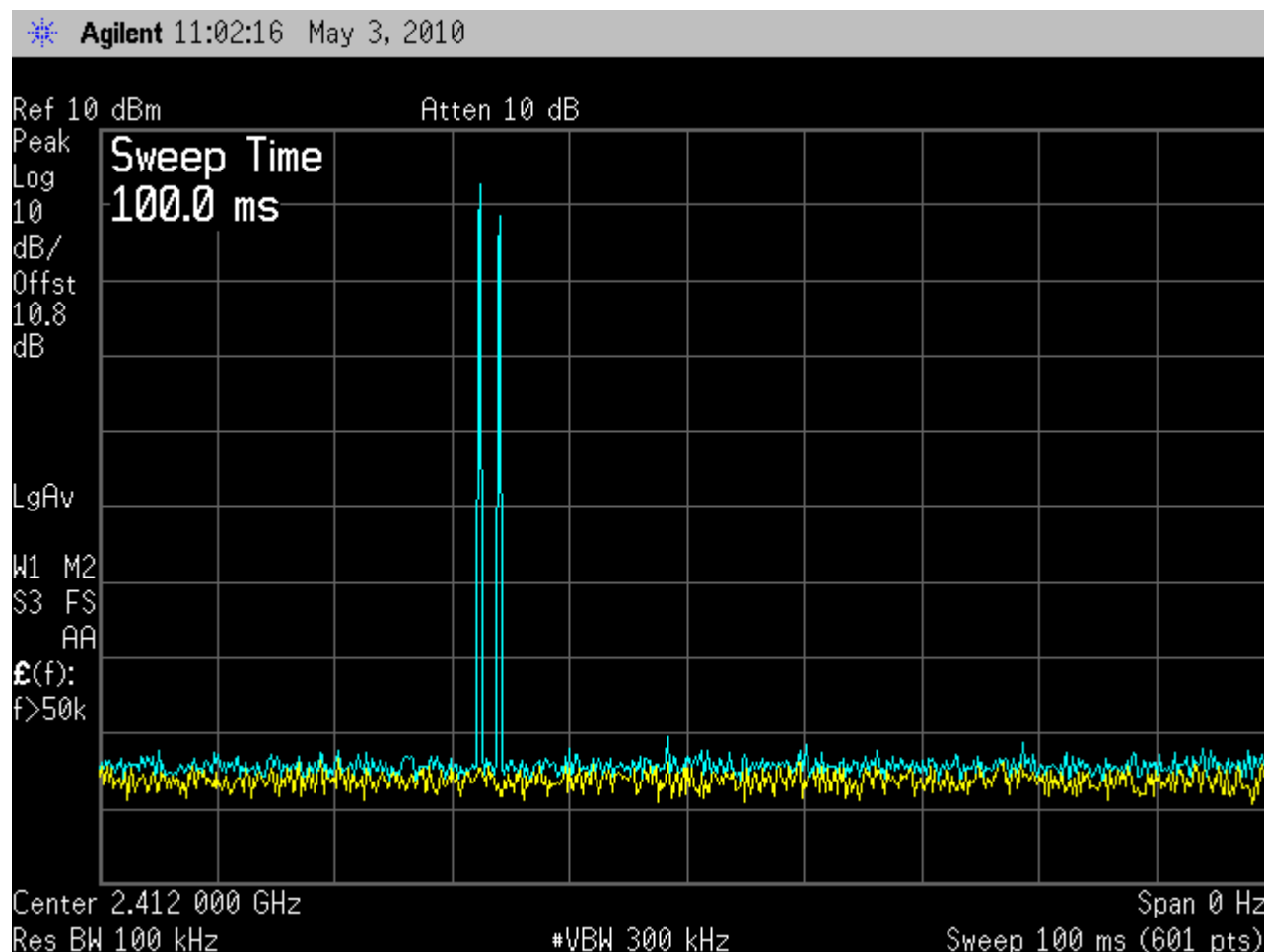
Loop Ant. # : NA
 Bicon Ant.# : NA Temp. (°C) : 17
 Log Ant.# : NA Humidity (%) : 77
 DRG Ant. # : 877 Spec Analyzer # : 911
 Cable LF# : NA Analyzer Display # : N/A
 Cable HF# : SOATS Quasi-Peak Detector # : 911
 Preamp LF# : NA Preselector # : N/A
 Preamp HF# : 919 DCCF : 20

Peak	RBW: 1 MHz
Video Bandwidth 3 MHz	
Average = Peak- DCCF	
Average (NF)	RBW: 1 MHz
Video Bandwidth 10 Hz	

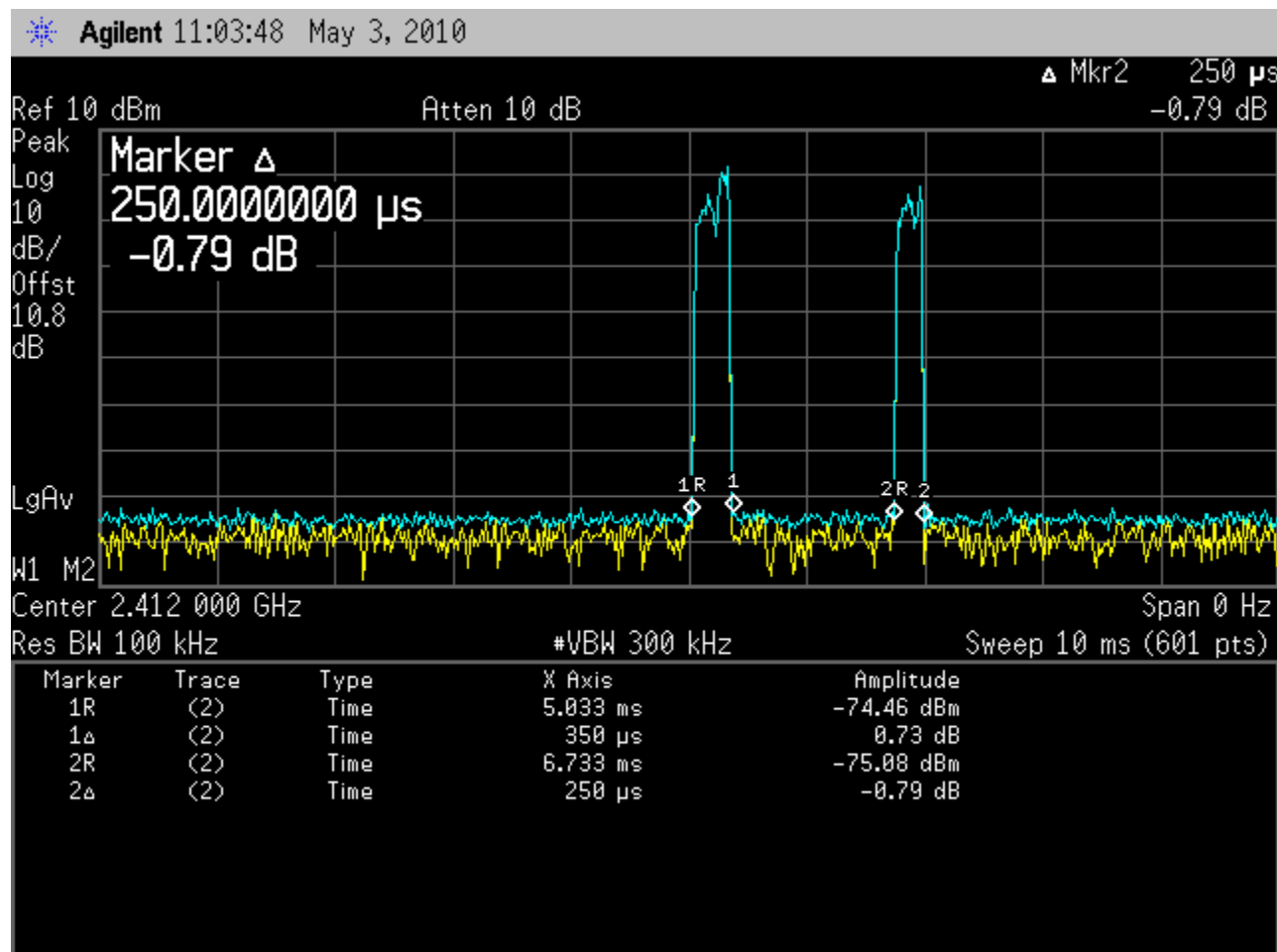
Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
2400.0	61.1	61.8	P		1.0	61.8	63.5	74.0	-10.5	Pass	
2400.0	41.1	41.8	A		1.0	41.8	43.5	54.0	-10.5	Pass	
2483.5	58.0	58.3	P		1.0	58.3	60.0	74.0	-14.0	Pass	
2483.5	38.0	38.3	A		1.0	38.3	40.0	54.0	-14.0	Pass	
4824.0	51.2	52.4	P		1.0	52.4	64.6	74.0	-9.4	Pass	Noise Floor
4824.0	39.4	39.5	A		1.0	39.5	51.7	54.0	-2.3	Pass	Noise Floor
7236.0	40.0	40.2	P		1.0	40.2	61.1	74.0	-12.9	Pass	Noise Floor
7236.0	29.5	29.6	A		1.0	29.6	50.5	54.0	-3.5	Pass	Noise Floor
4874.0	51.6	52.6	P		1.0	52.6	64.8	74.0	-9.2	Pass	Noise Floor
4874.0	39.3	39.7	A		1.0	39.7	51.9	54.0	-2.1	Pass	Noise Floor
7311.0	38.8	39.2	P		1.0	39.2	60.1	74.0	-13.9	Pass	Noise Floor
7311.0	28.5	28.3	A		1.0	28.5	49.4	54.0	-4.6	Pass	Noise Floor
4924.0	50.4	51.2	P		1.0	51.2	63.5	74.0	-10.5	Pass	Noise Floor
4924.0	38.6	39.0	A		1.0	39.0	51.3	54.0	-2.7	Pass	Noise Floor
7386.0	39.1	39.6	P		1.0	39.6	60.5	74.0	-13.5	Pass	Noise Floor
7386.0	29.7	29.4	A		1.0	29.7	50.6	54.0	-3.4	Pass	Noise Floor

Above 1GHz Emissions Data ("g" mode)

Duty Cycle Correction Factor Computation ("b" mode)



Two (2) Transmissions per 100 ms

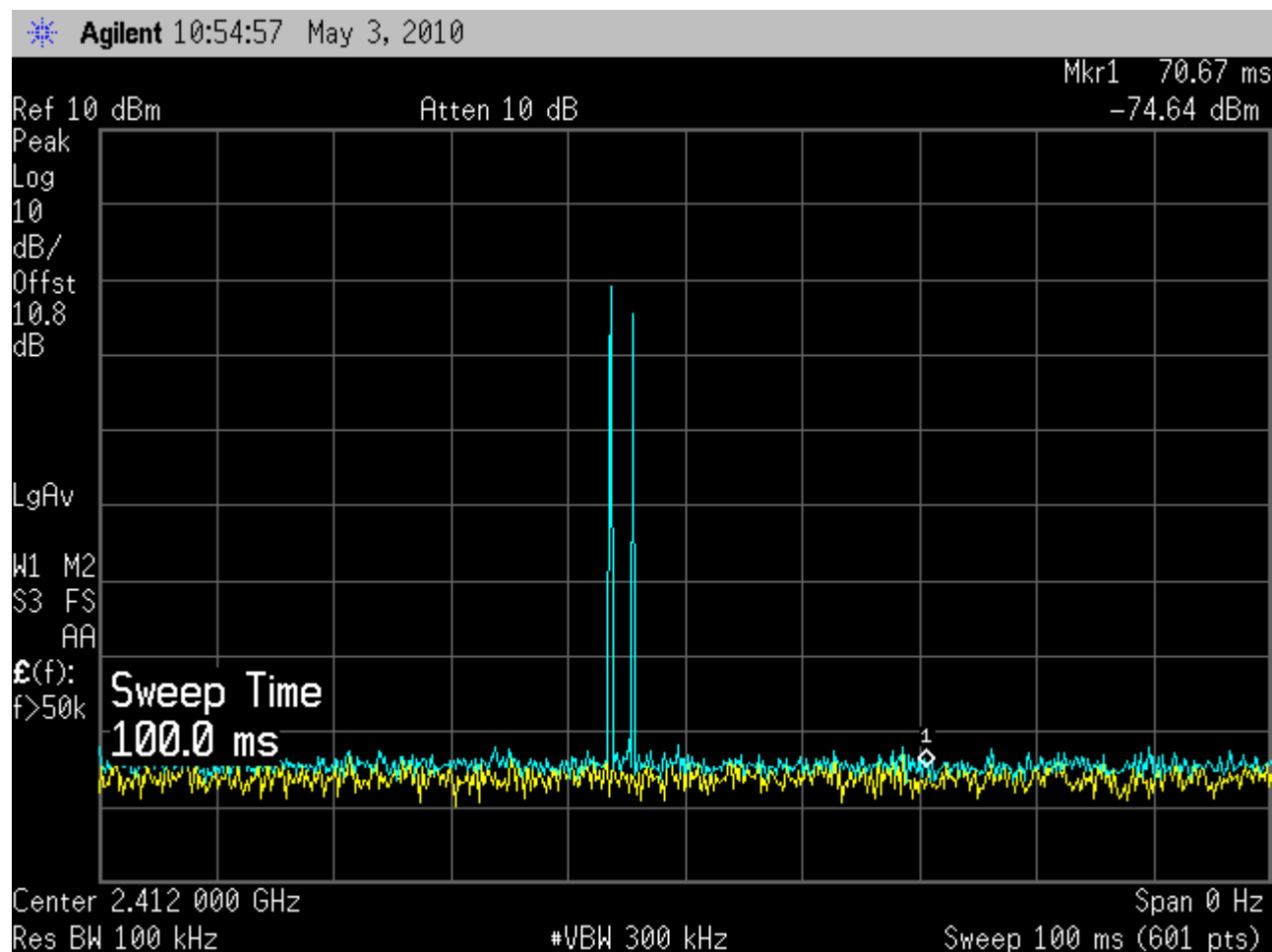


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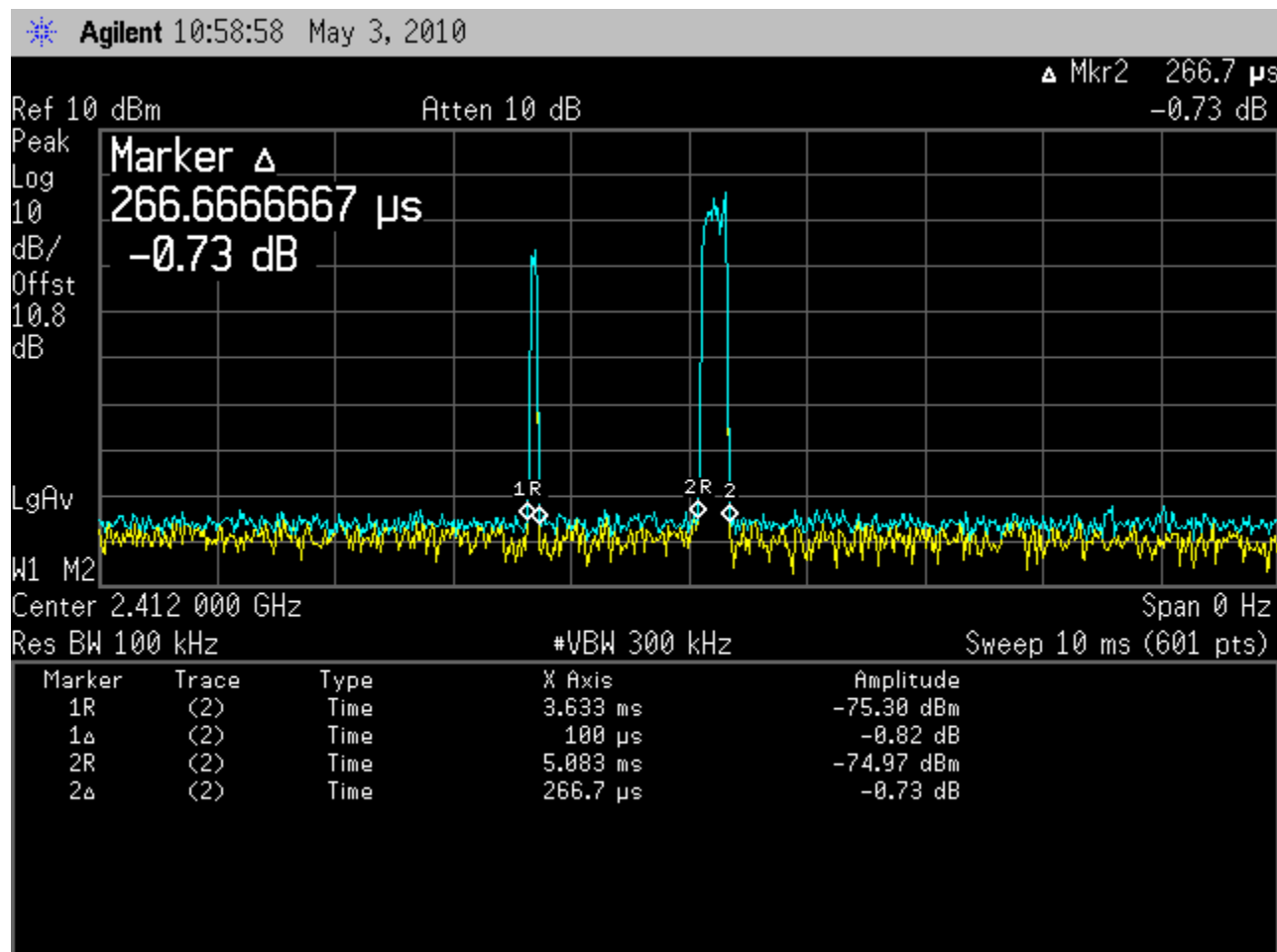
Duty Cycle = 0.35 ms + 0.25 ms
 = 0.6 ms/100 ms
 = 0.6%

DCCF = 20 log (0.040668)
 = -44.44; limited to -20

Duty Cycle Correction Factor Computation ("g" mode)



Two (2) Transmissions per 100 ms



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Duty Cycle = 0.10 ms + 0.2667 ms
 = 0.3667 ms/100 ms
 = 0.4%

DCCF = 20 log (0.040668)
 = -48.71; limited to -20

Section 15.247(e) – Power Spectral Density for Digitally Modulated Devices

(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

Test Conditions:

Sample Number:	5006	Temperature:	21°C
Date:	April 30, 2010	Humidity:	43 %
Modification State:	Low and High Channel (b and g mode)	Tester:	FSCustodio
		Laboratory:	Nemko

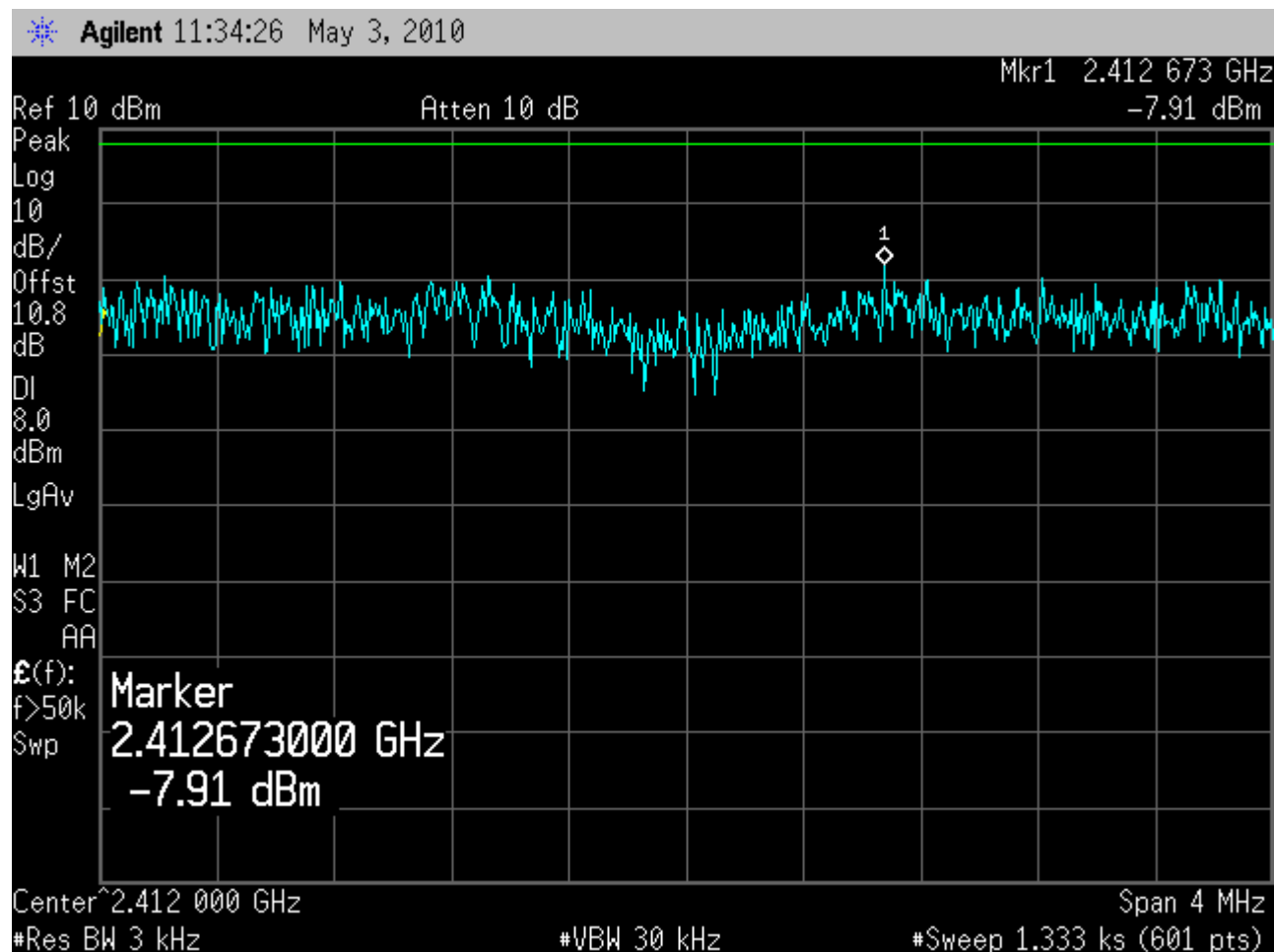
Test Results:

See attached plots.

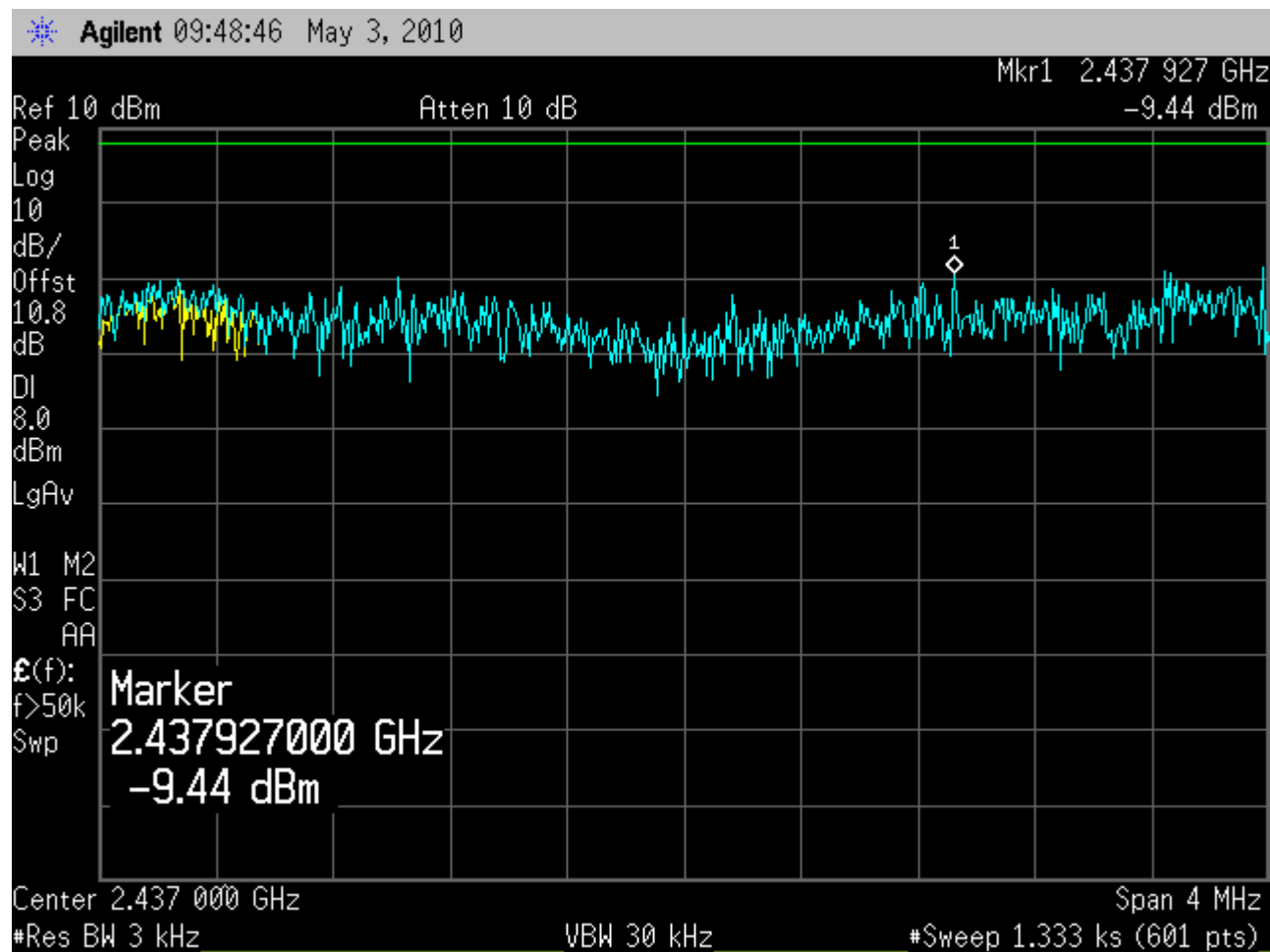
Additional Observations:

- This is a conducted test. The 10.8dB offset is from the attenuator and cable assembly used.
- Span is wide enough to capture the peak level of the emission. Each start of a measurement, a preliminary scan using a span capturing the 20dB bandwidth is performed to verify that the peak emissions is captured on the final span used during the actual measurement.
- 4 MHz was verified the absolute minimum span that would contain the peak emissions for both “b” and “g” mode.
- RBW is 3kHz
- VBW is > RBW
- Sweep is Span/RBW (4MHz/3kHz = 1333.3 seconds).
- Detector is Peak
- Trace is Max Hold

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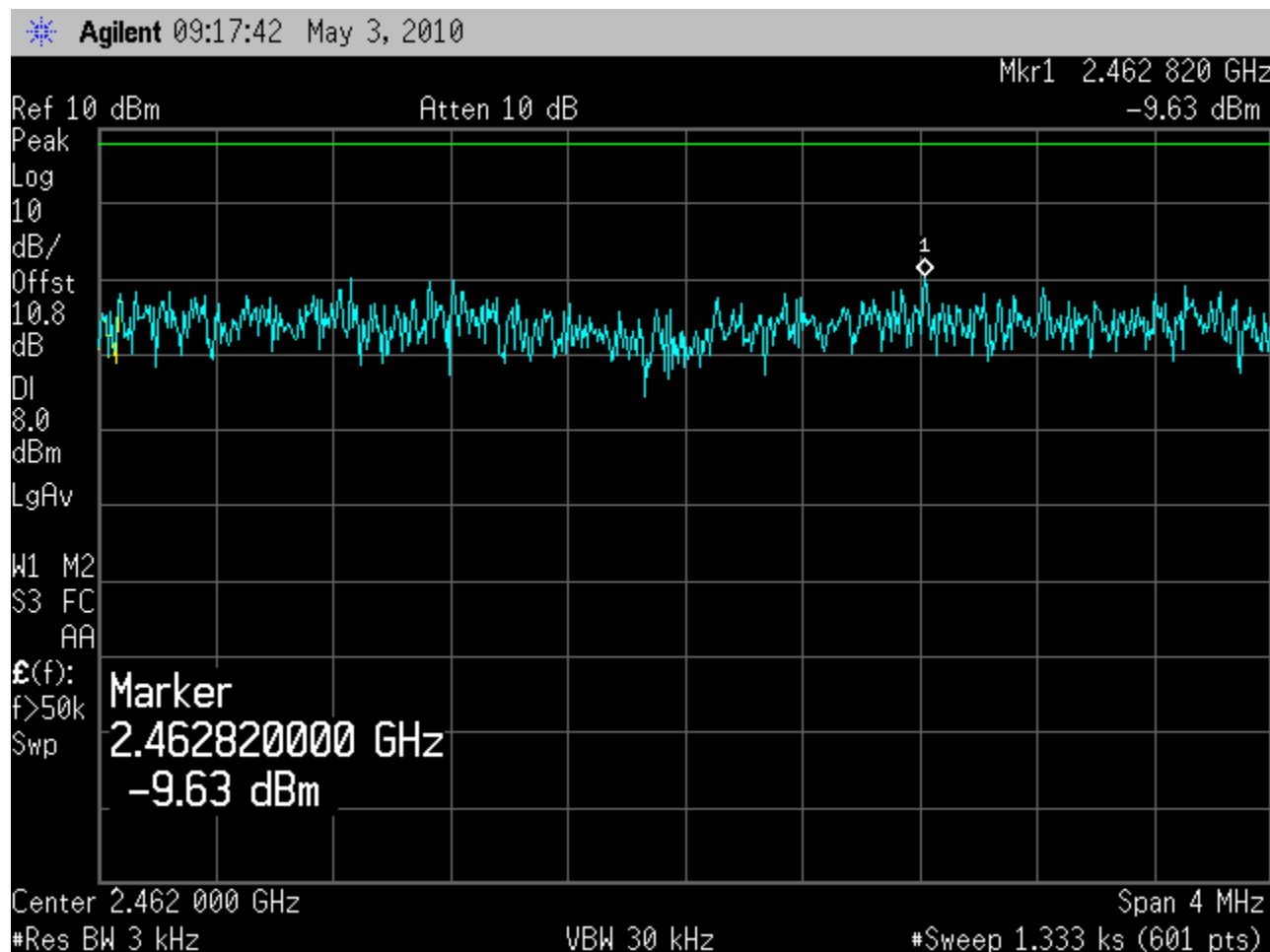


Low Channel ("b" mode) – Peak level is -7.91 dBm



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Mid Channel ("b" mode) – Peak level is -9.44 dBm



High Channel ("b" mode) – Peak level is -9.63 dBm



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Low Channel ("g" mode) – Peak level is -7.07 dBm



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Mid Channel ("g" mode) – Peak level is -8.53 dBm



High Channel ("g" mode) – Peak level is -12.14 dBm



Section 4.10 – Receiver Spurious Radiated Emissions

The following receiver spurious emission limits shall be complied with:
 (a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 metres)
30-88	100
88-216	150
216-960	200
Above 960	500

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Test Conditions:

Sample Number:	5006	Temperature:	16°C
Date:	May 4, 2010	Humidity:	82 %
Modification State:	Low and High Channel (b and g mode)	Tester:	FSCustodio
		Laboratory:	SOATS

Test Results:

There are no emissions found when the EUT is on “stand-by” mode (not pinging).

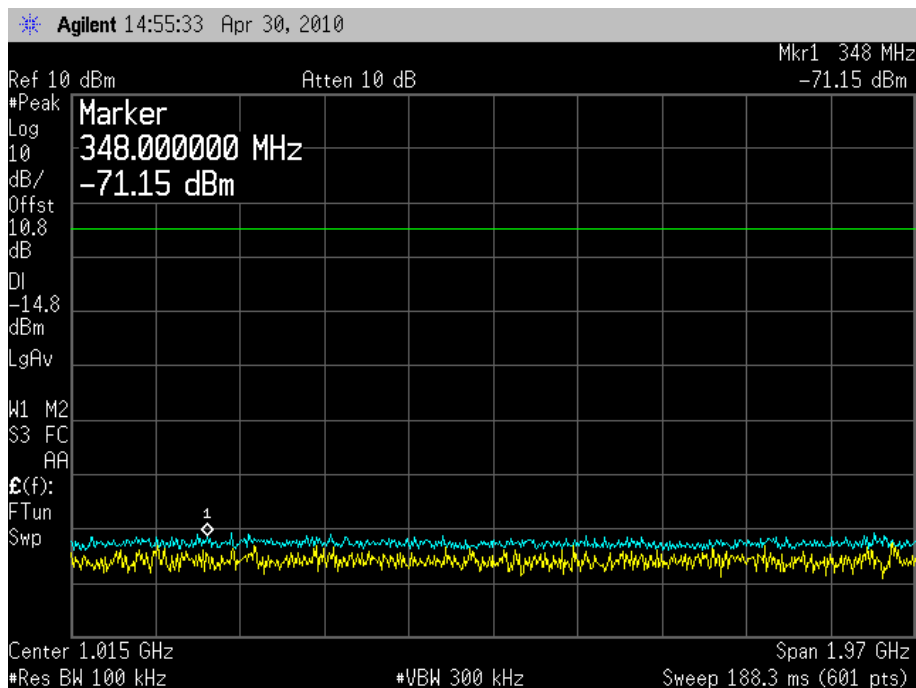
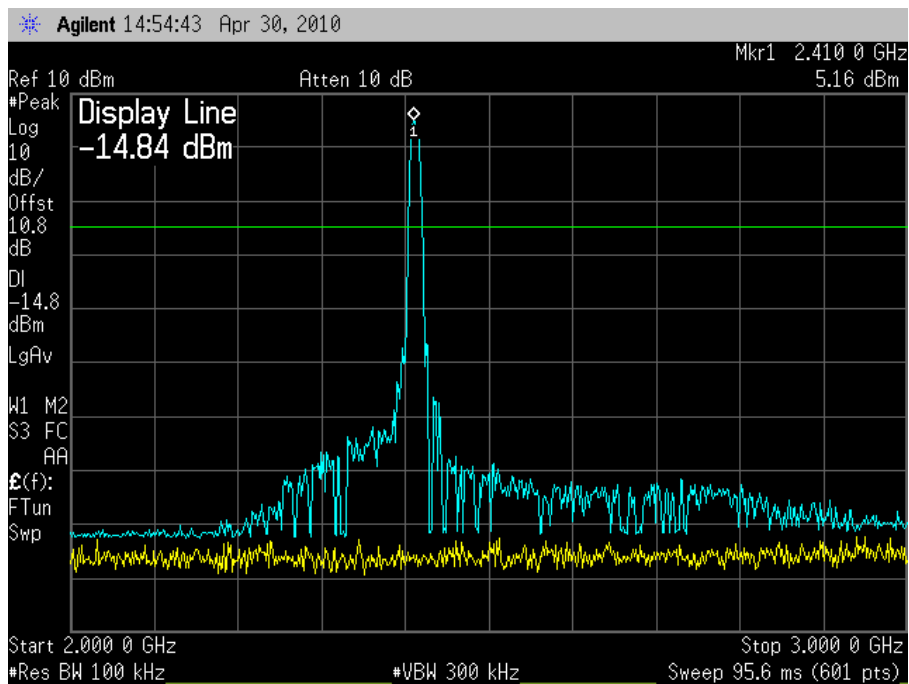
Additional Observations:

- The Spectrum was searched from 30MHz to 26500 MHz.



Appendix B: Section 15.247(d) – Spurious Emissions (RF Antenna Conducted Test) data for Low and Mid Channels

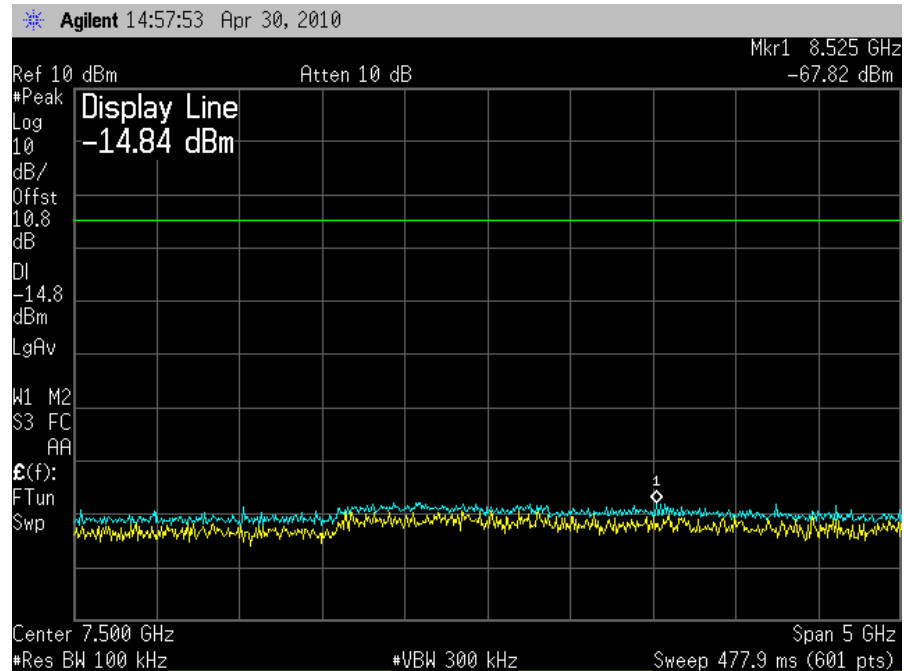
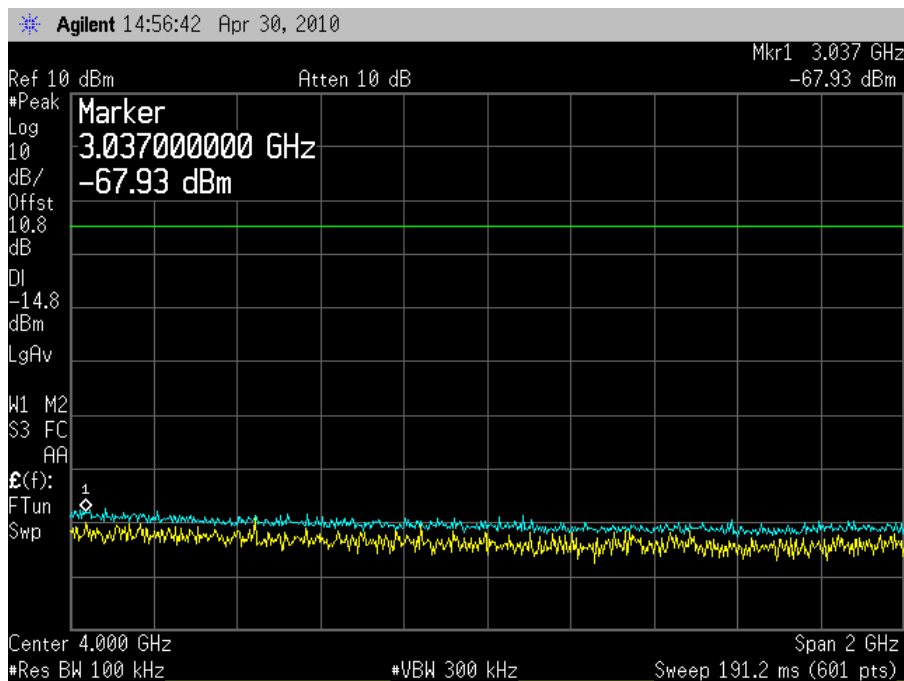
Low Channel ('b' mode)



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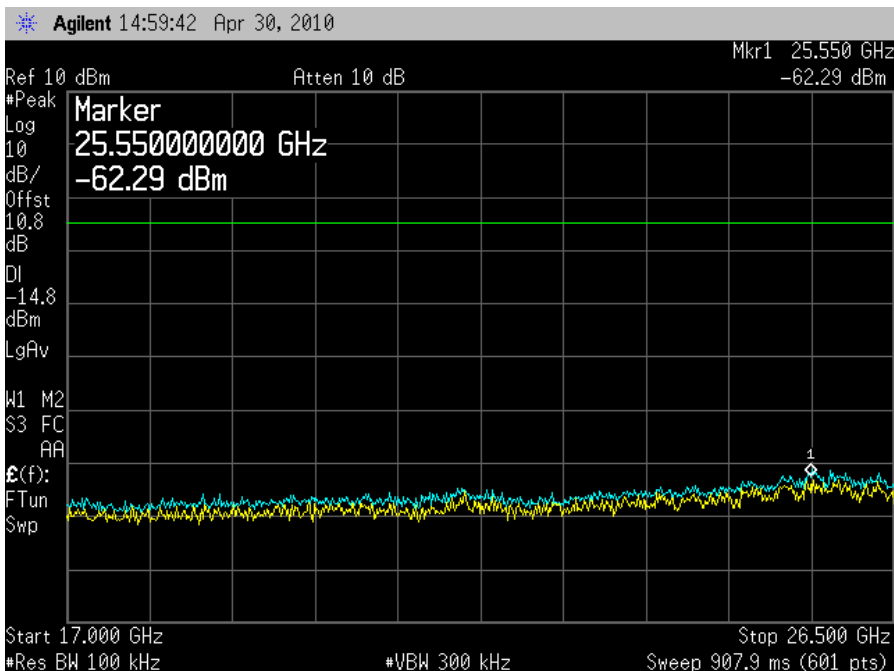
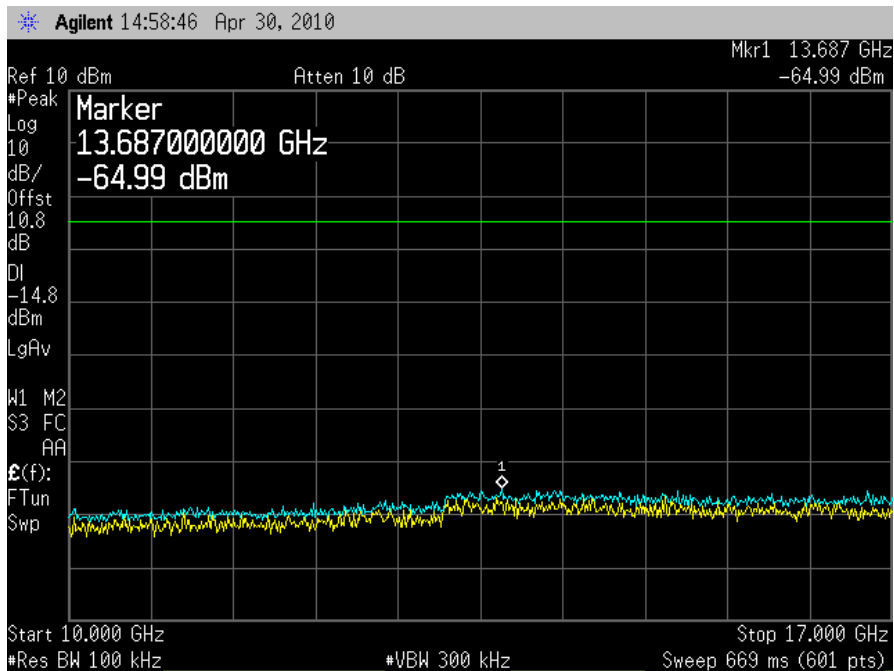


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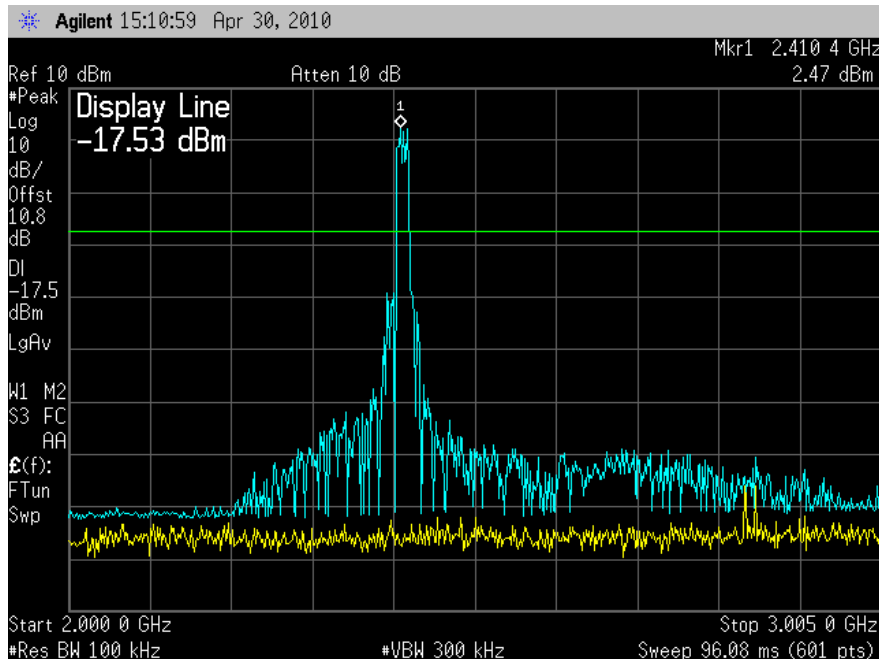


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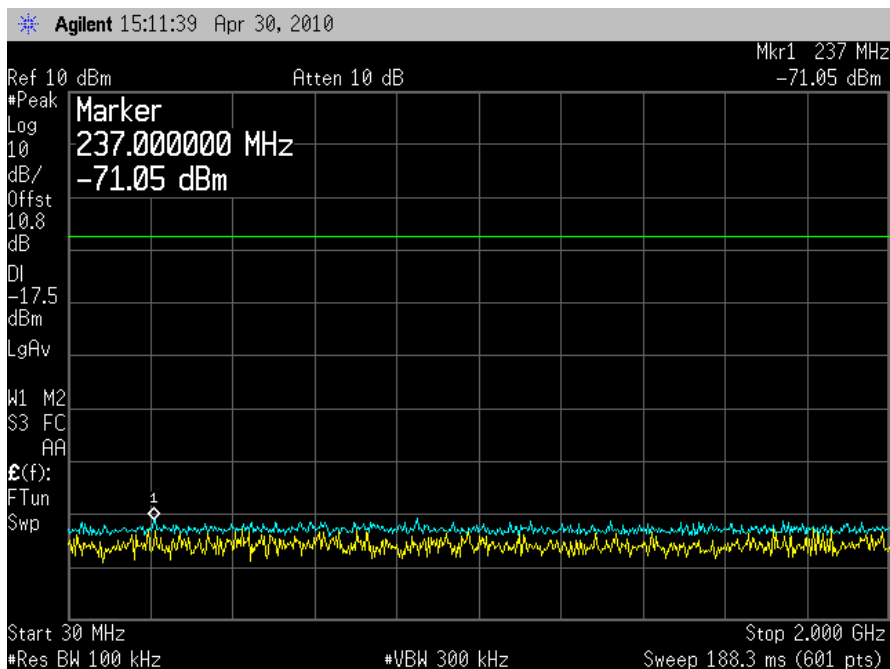




Low Channel ("g" mode)

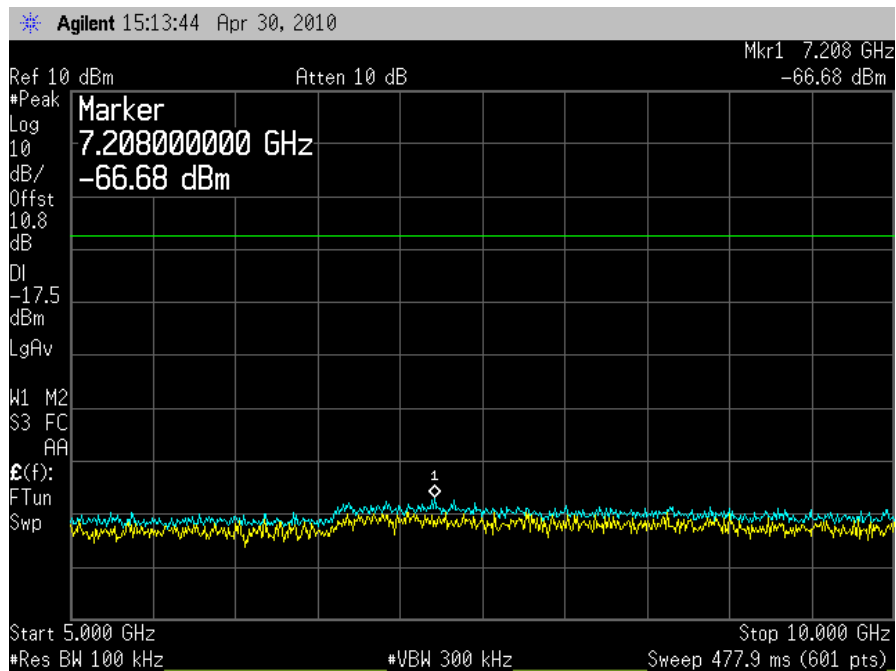
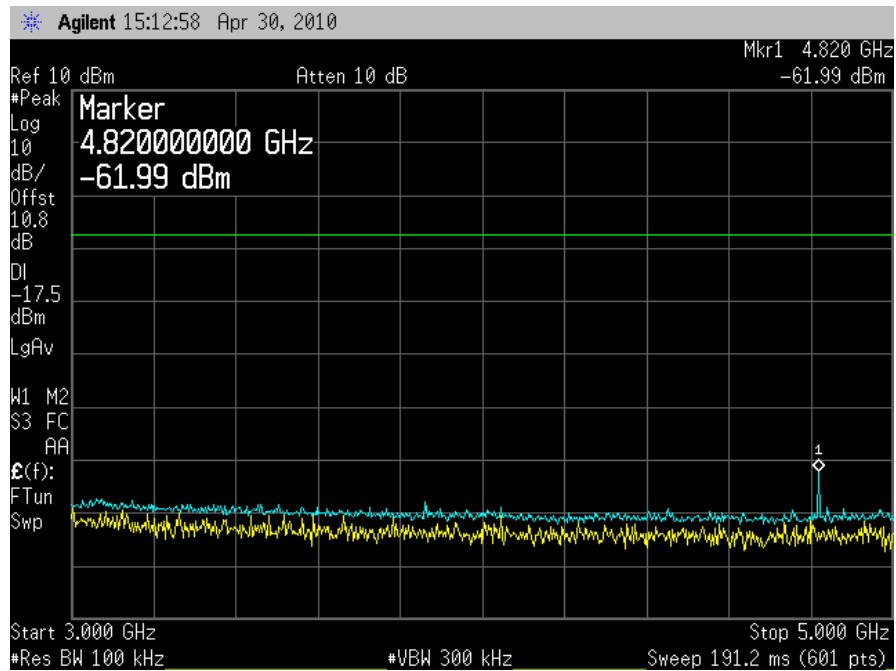


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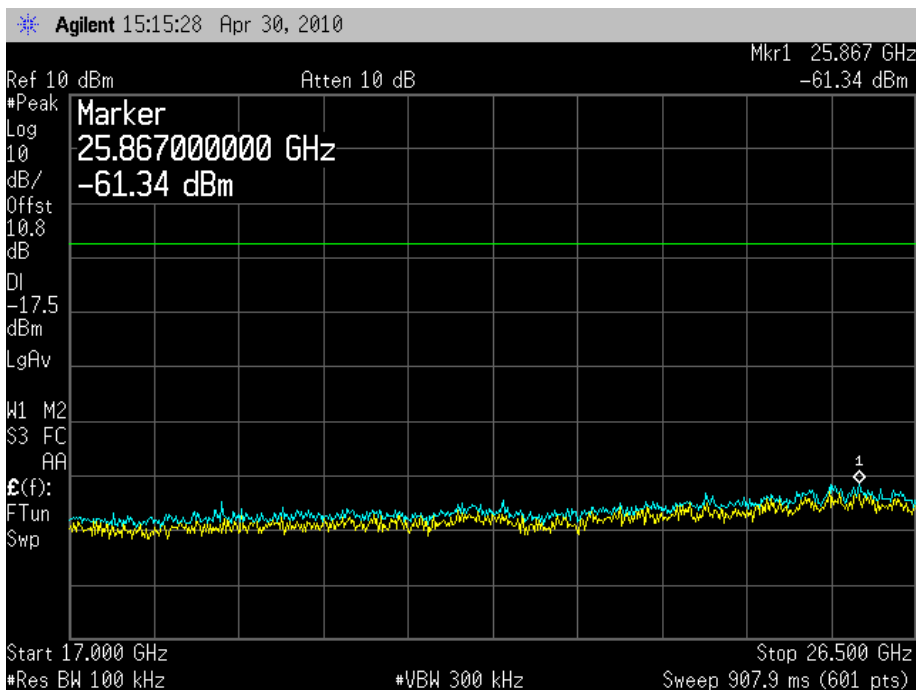
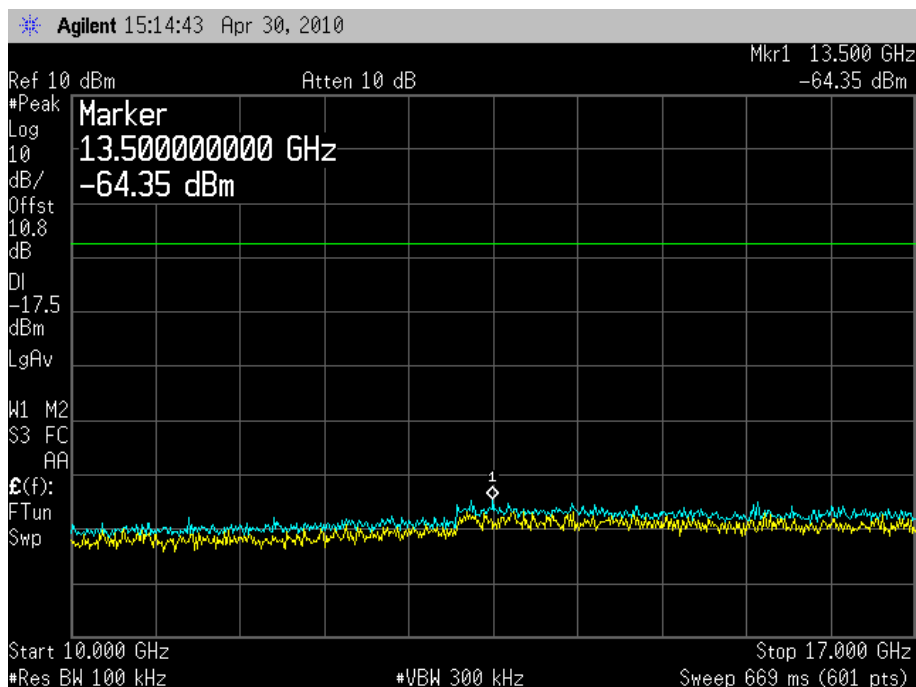


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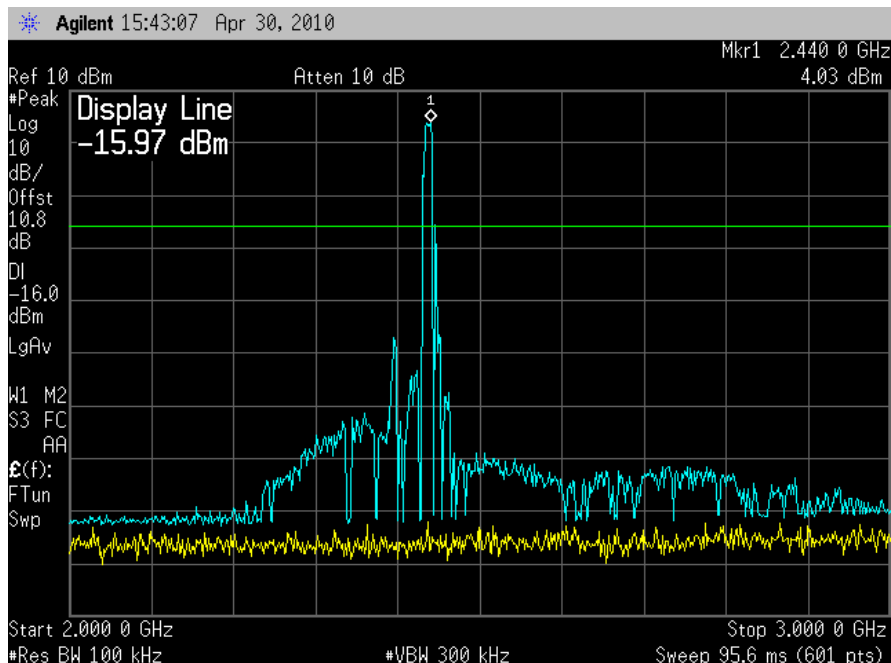


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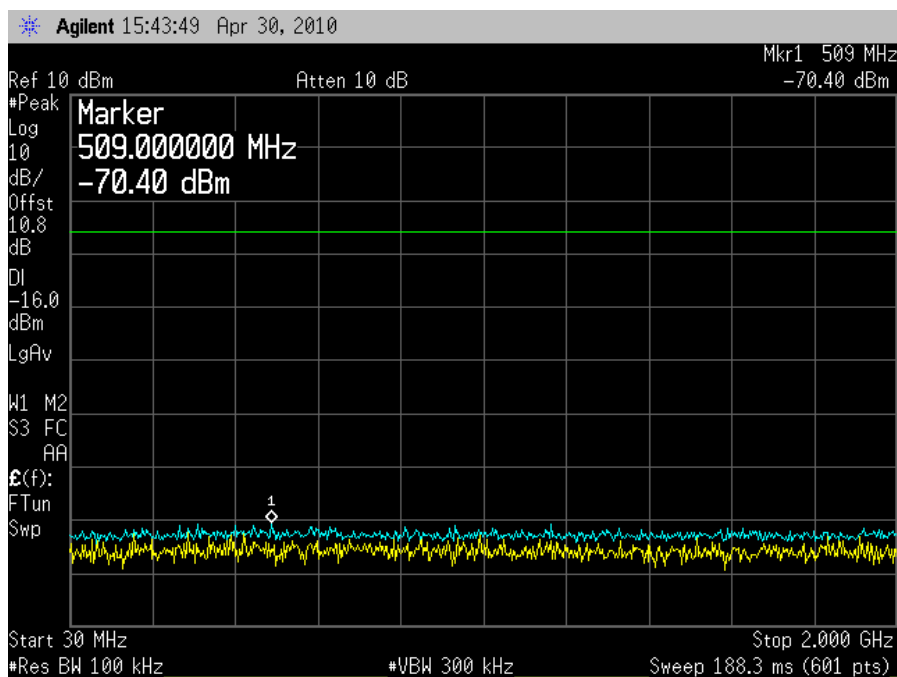




Mid Channel ("b" mode)

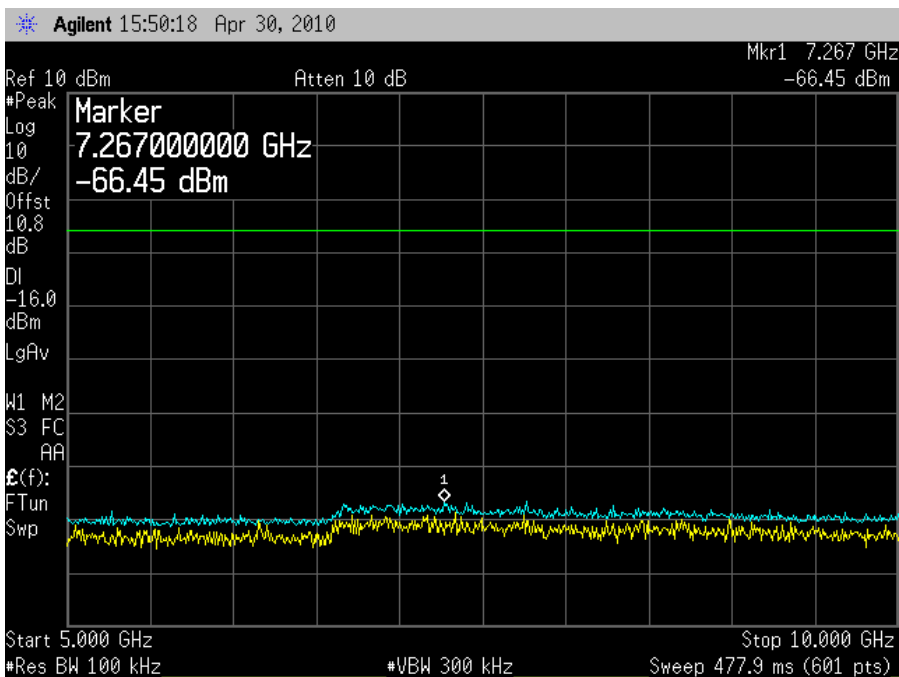
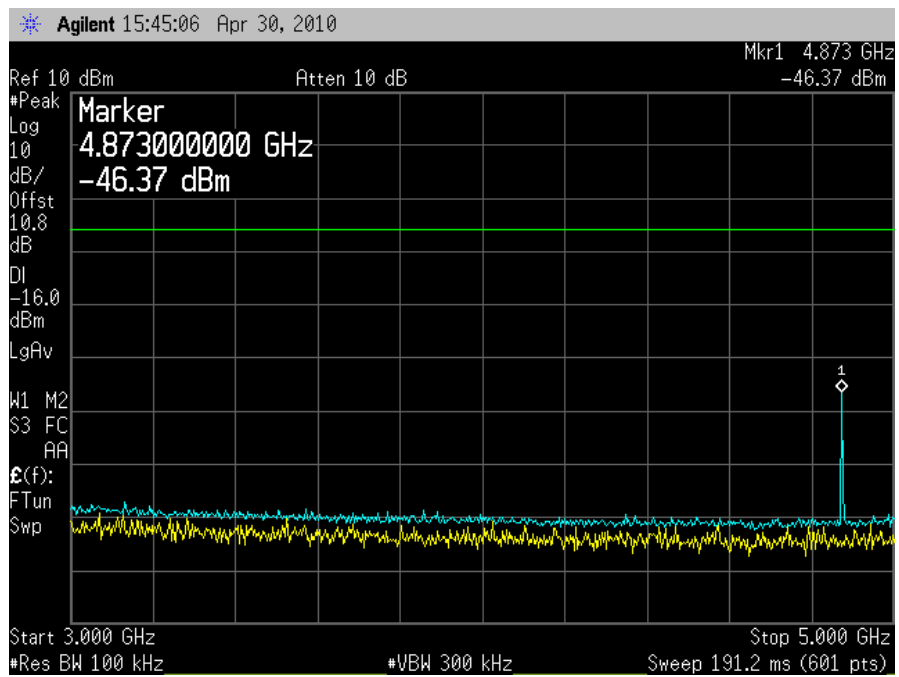


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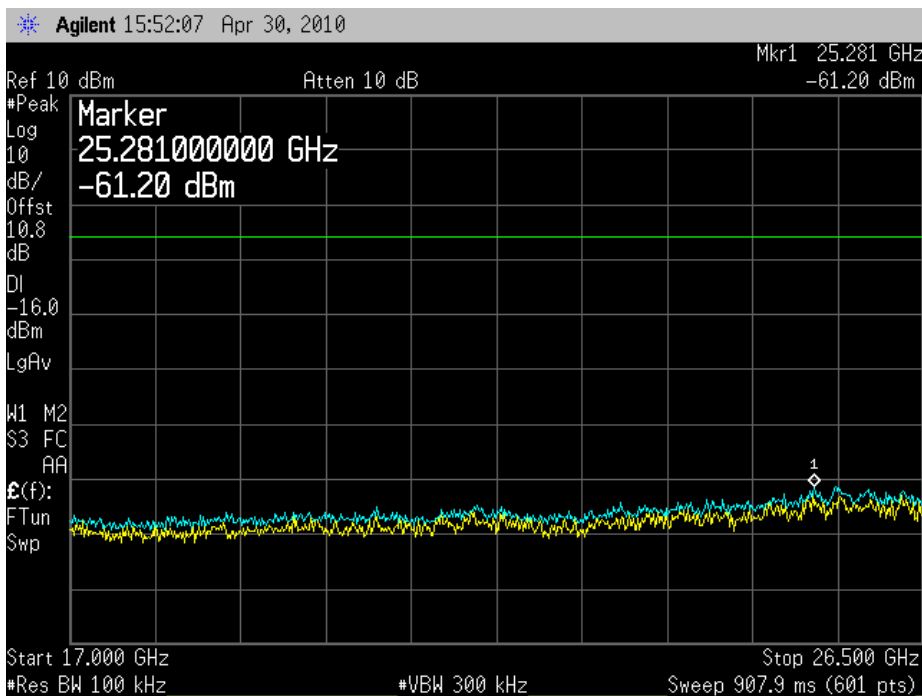
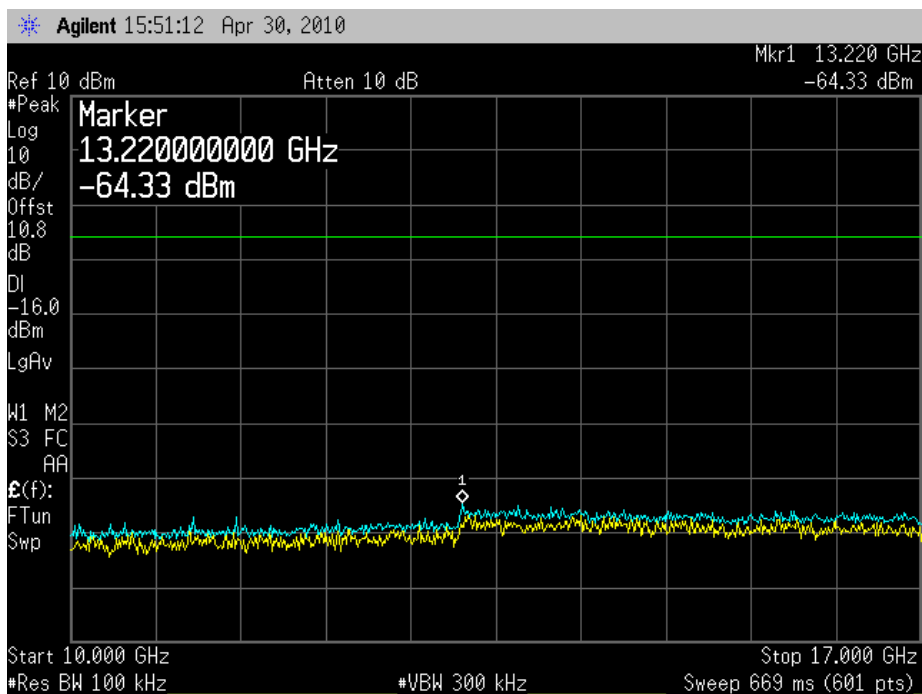


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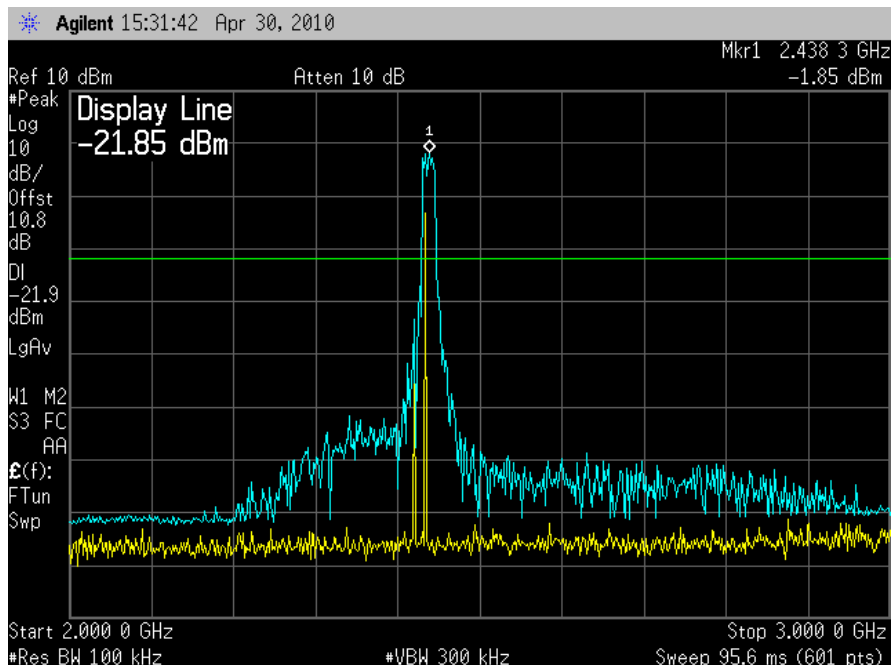


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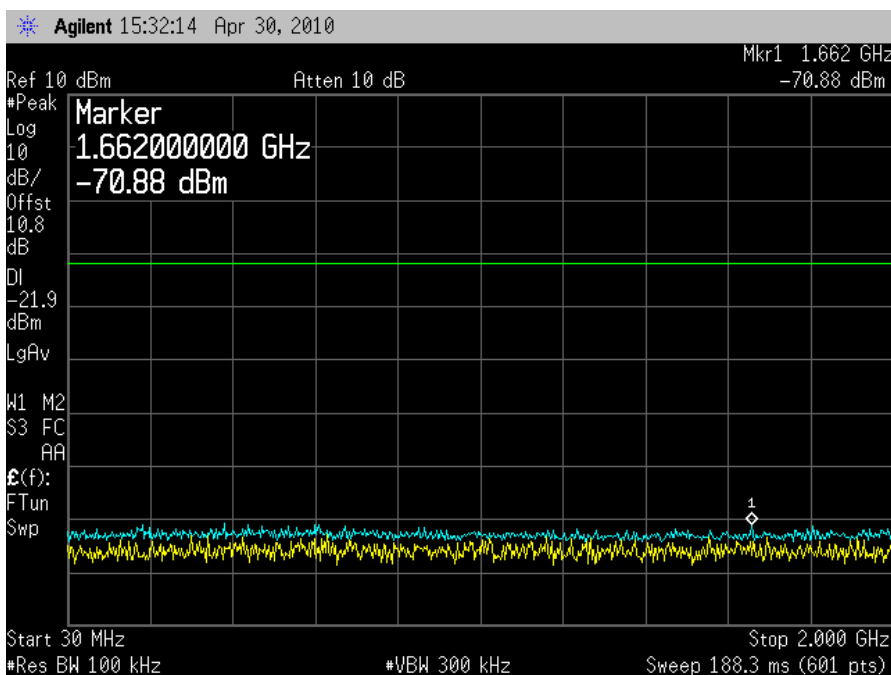




Mid Channel ("g" mode)

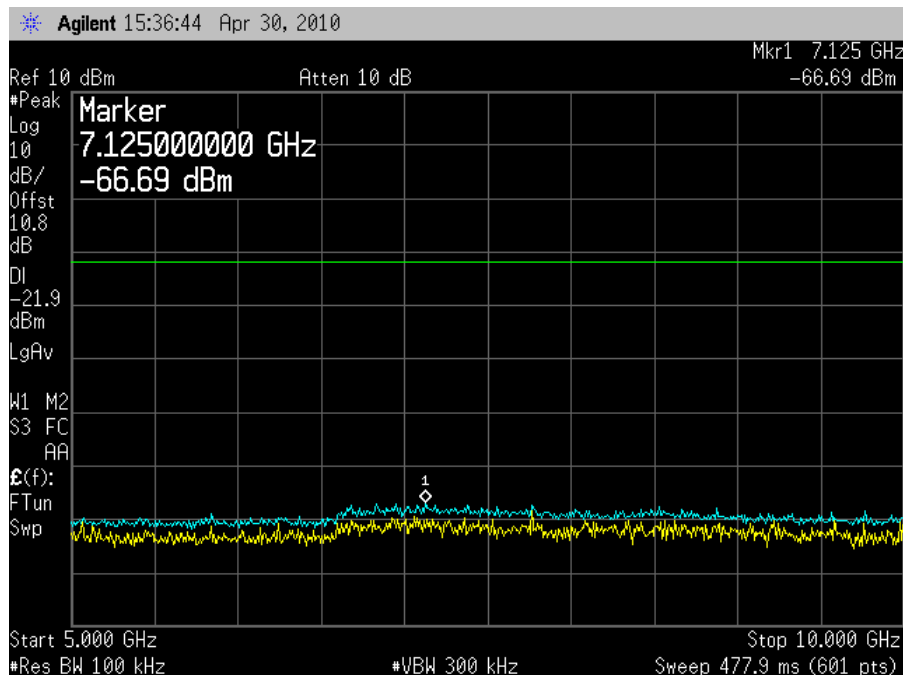
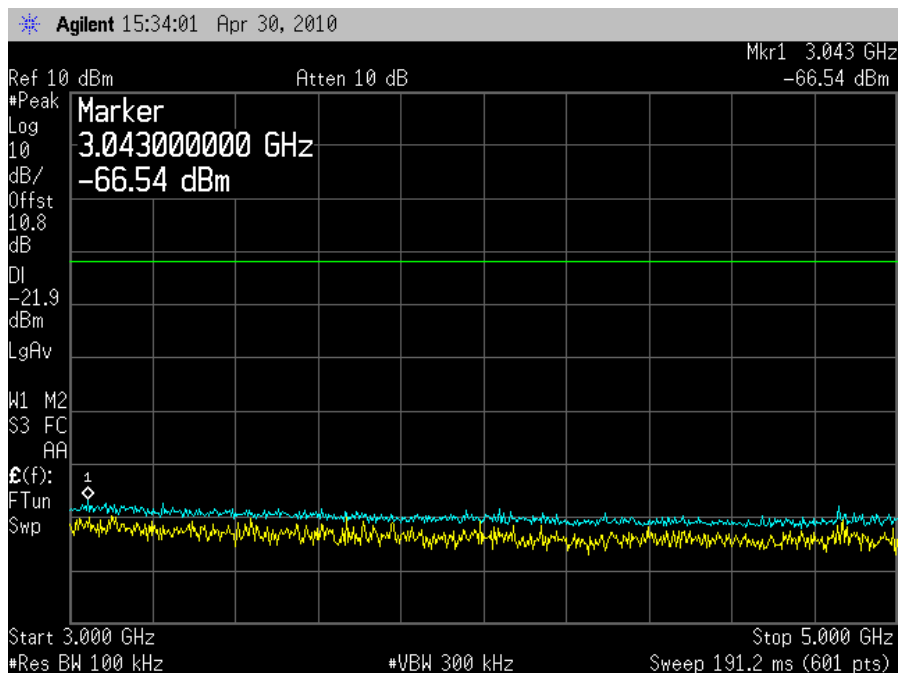


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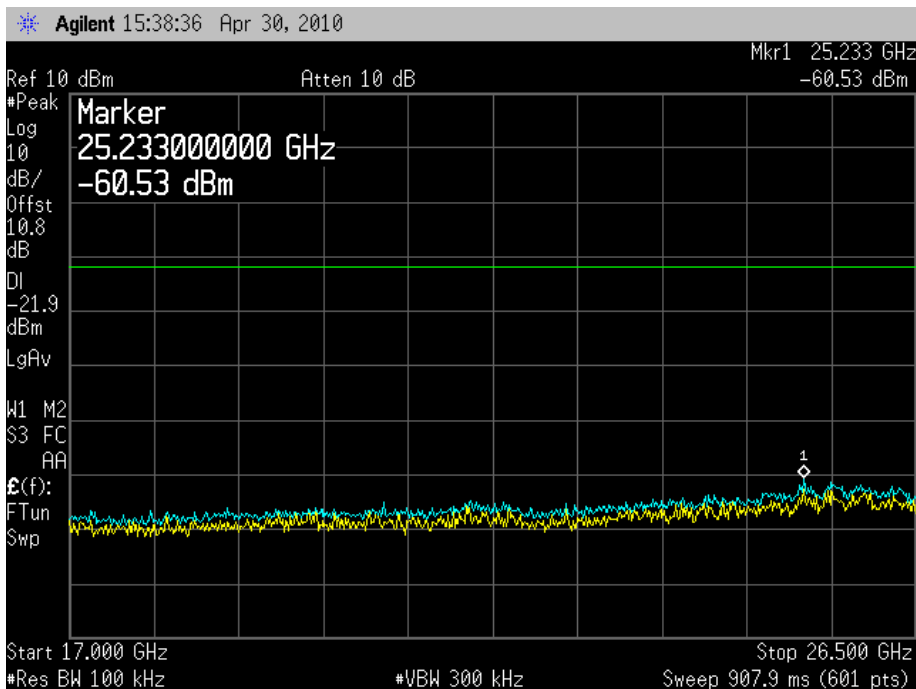
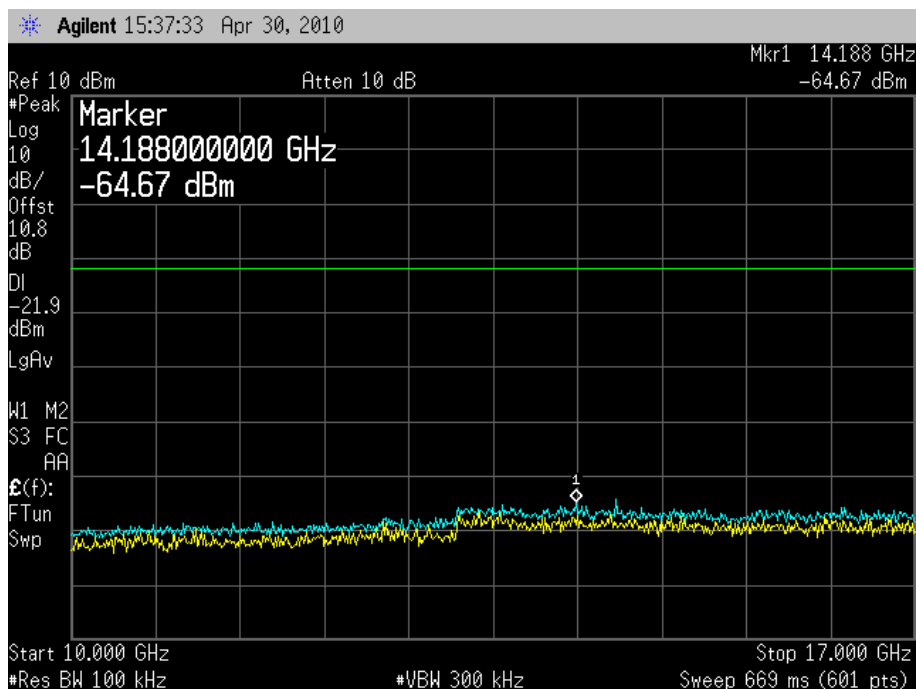


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Appendix C: Block Diagram of Test Setups

Test Site For Radiated Emissions

