Lab Code: 200167-0

FCC PART 15.247
TEST AND MEASUREMENT REPORT

For

Movea, Inc.

680 N. McCarthy Blvd. Suite 120

Milpitas, CA 95035, USA

FCC ID: JJ4-A800765
Model: GC15M

Report Type:	**Product Type:**
Class II Permissive Change Report	Wireless USB Mouse

Test Engineer:	Xiao Ming Hu
Report Number:	R0811072-247
Report Date:	2008-11-12
Reviewed By:	Boni Baniqued Sr. RF Engineer
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R0811072-247	Supplemental Report	2008-11-12

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Movea, Inc.* Product, *FCC ID: JJ4-A800765, model: GC15M* or the "EUT" as referred to this report is a wireless mouse, which uses DSSS and operates at 2.4 GHz band. It communicates with a USB transceiver connected to a computer. The mouse sends data to computer via the radio. The transceiver receives data and sends out acknowledgements for the data received and awaits further data from the mouse. The EUT is powered up by battery.

1.2 Mechanical Description

The EUT is a 2.4 GHz DSSSS Radio Transceiver of plastic construction that measures approximately 133 mm (L) x 58 mm (W) x 46 mm (H) and weighs 134 grams.

** The test data gathered are from typical production sample, serial number: AAAL0109928, provided by the manufacturer.*

1.3 EUT Photo

Please see additional photos in Exhibit C

1.4 Objective

This report is prepared on behalf of Movea, Inc. in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

Per customer's request, additional radiated tests are performed due to the change of Gyro Sensor on the Main PCB board inside the EUT.

The objective is to determine compliance with FCC standards, rules and limits for this device including:

- Radiated Spurious Emissions
- Restricted Band

1.5 Related Submittal(s)/ Grant(s)

The original DSSS Radio was tested in Compliance Certification Services with FCC ID: JJ4-A800765. Additional testing was performed.

Please refer to original report number 05U3657-1 which was prepared by Compliance Certification Services for other FCC 15.247 radio tests which include Channel Bandwidth, Channel Output Power, Channel Separation and Number of Channels.

1.6 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003.

1.7 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

1.8 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11, 1997 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003 & TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: R-2463 and C-2698. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is a National Institute of Standards and Technology (NIST) accredited laboratory under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm.

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

2.2 Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded.

2.3 Equipment Modifications

N/A

2.4 Power Supply and Line Filters

N/A

2.5 Internal Configuration

Manufacturer	Description	Part Number	Rev
Movea, Inc.	Main PCB	PC01720-001	E
Gyration, Inc.	Power circuit board	PC00271-001	1

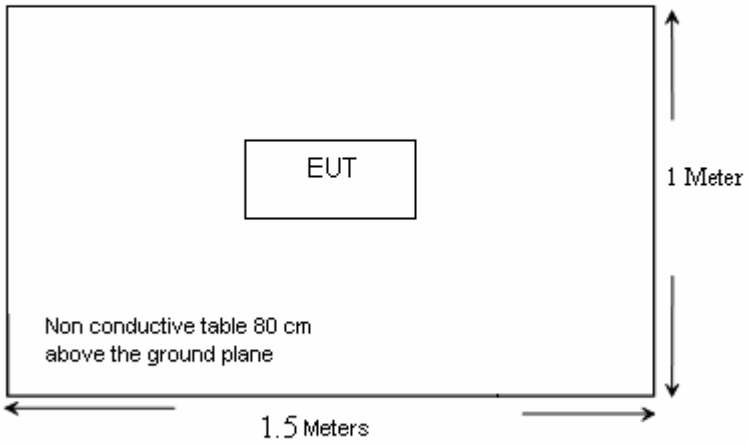
2.6 Local Support Equipment List and Details

N/A

2.7 Interface Ports and Cabling

N/A

2.8 Test Setup Block Diagram



3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§15.247(i),§2.1091	RF Exposure	Please refer to Original Report*
FCC §15.203	Antenna Requirement	Please refer to Original Report*
FCC §15.207	Conducted Emissions	Please refer to Original Report*
FCC § 15.247(d)	Spurious Emissions at Antenna Port	Please refer to Original Report*
FCC§15.205; §15.209 §15.247(d)	Spurious Radiated Emissions and Restriction Band	Compliant
FCC §15.247 (a)	6 dB & 99% Bandwidth	Please refer to Original Report*
FCC §15.247(a)(2)	Maximum Peak Output Power	Please refer to Original Report*
FCC §15.247(e)	Power Spectral Density	Please refer to Original Report*

*Original submission FCC ID: JJ4-A800765 filed 2005-09-13.

4 FCC §15.205, §15.209 & §15.247 - Spurious Radiated Emissions and Restriction Band

4.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.247(c)(1)(i): Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

As per FCC §15.247 (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)).

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

f (MHz)	f (MHz)	f (MHz)	f (GHz)
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410 608 – 614	960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3600 – 4400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

4.2 Test Setup

The radiated emissions tests were performed in the shielded room, using the setup in accordance with ANSI C63.4-2003. The specification used was the FCC 15 Subpart C limits.

During the test, EUT is powered up by battery.

4.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Dates
HP	Amplifier, Pre	A8447D	2944A10187	2007-12-18
Sunol Science	Antenna	JB3	A020106-2 / S009976	2008-05-14
HP	Amplifier, Pre	8449B	3147A00400	2008-10-22
MICRO-TRONICS	NOTCH FILTER 2.4-2.5GHz	-	388	-
Antenna Research Associates	Horn Antenna	DRG-1181A	1132	2008-07-28

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

4.4 Environmental Conditions

Temperature:	20° C
Relative Humidity:	40 %
ATM Pressure:	1012 mbar

**The testing was performed by Xiao Ming Hu on 2008-11-07.*

4.5 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emissions was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**QP**" in the data table.

4.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emissions are 7dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

4.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15 sections 15.205, 15.209 and Subpart C 15.247 standards' limits, and had the margin from the limits of:

Radiated spurious emissions under 1GHz

-25.29 dB at **30.976 MHz** in the **Vertical** polarization

Radiated spurious emissions above 1GHz

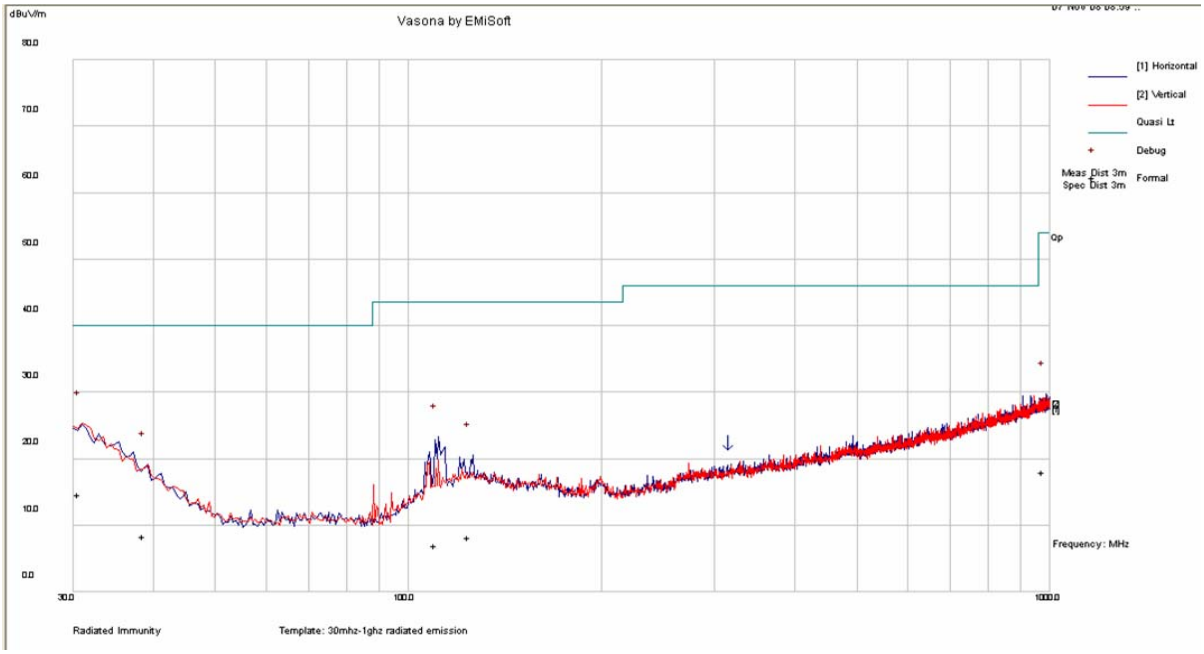
-17.24 dB at **4806 MHz** in the **Vertical** polarization, above 1 GHz, Low Channel

-19.29 dB at **4882 MHz** in the **Vertical** polarization, above 1 GHz, Middle Channel

-19.52 dB at **4958 MHz** in the **Horizontal** polarization, above 1 GHz, High Channel

4.8 Radiated Spurious Emissions Test Data

Worst case results under 1GHz



Frequency (MHz)	Reading (dBuV)	Cable Loss (dB)	Ant. Factor (dB/m)	Corrected Reading (dBuV/m)	Ant. Polarity (V/H)	Ant. Height (cm)	Azimuth (degree)	Limit (dBuV/m)	Margin (dB)
30.976	13.14	10.33	-8.76	14.71	V	245	284	40.0	-25.29
39.221	13.19	10.35	-15.12	8.42	V	288	294	40.0	-31.58
125.894	13.10	10.49	-15.42	8.18	H	280	319	43.5	-35.32
988.542	12.51	11.19	-5.65	18.05	H	111	82	54.0	-35.95
111.634	13.07	10.48	-16.60	6.95	H	102	174	43.5	-36.55

Above 1GHz results:

Low Channel @ 2403 MHz

Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Ant. Height (m)	Ant. Polarity (H / V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp Gain (dB)	Cord. Am. (dBµV/m)	FCC Part 15 C		Note
									Limit (dBµV/m)	Margin (dB)	
2403	90.53	271	1.00	V	28.2	5.65	36.68	87.70		87.70	Fund/Peak
2403	92.91	32	1.05	H	28.2	5.65	36.68	90.08		90.08	Fund/Peak
2403	42.04	271	1.00	V	28.2	5.65	36.68	39.21		39.21	Fund/Ave
2403	42.46	32	1.05	H	28.2	5.65	36.68	39.63		39.63	Fund/Ave
4806	51.78	70	1.00	V	33.1	8.22	36.34	56.76	74	-17.24	Peak
4806	50.69	276	1.86	H	33.1	8.22	36.34	55.67	74	-18.33	Peak
4806	30.03	70	1.00	V	33.1	8.22	36.34	35.01	54	-18.99	Ave
4806	29.92	276	1.86	H	33.1	8.22	36.34	34.90	54	-19.10	Ave

Middle Channel @ 2441 MHz

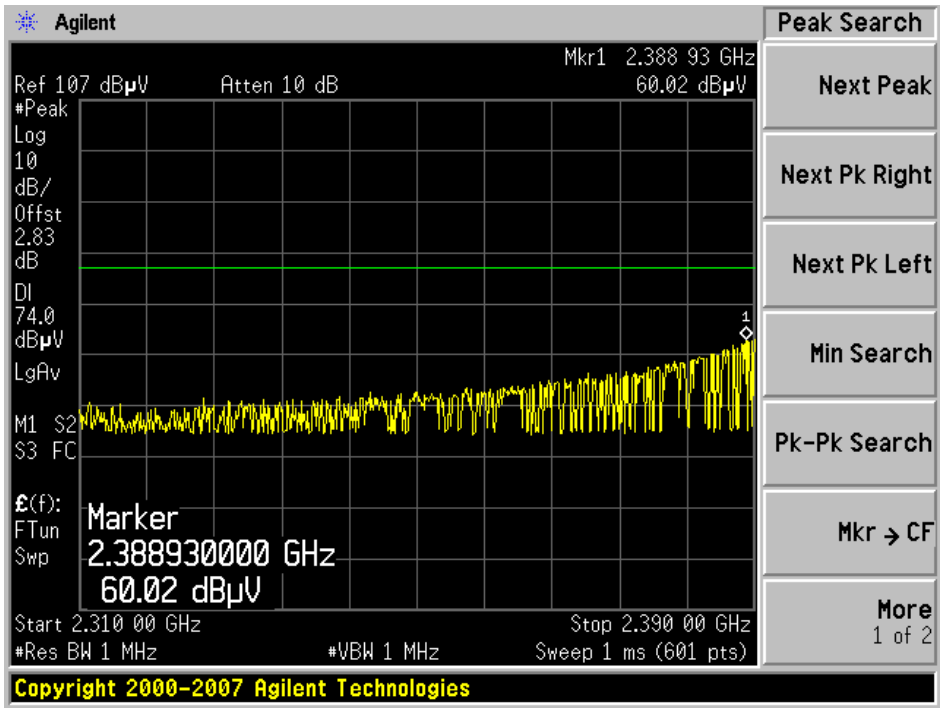
Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Ant. Height (m)	Ant. Polarity (H / V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp Gain (dB)	Cord. Am. (dBµV/m)	FCC Part 15 C		Note
									Limit (dBµV/m)	Margin (dB)	
2441	92.91	271	1.00	V	28.5	5.70	36.66	90.45		90.45	Fund/Peak
2441	94.74	32	1.06	H	28.5	5.70	36.66	92.28		92.28	Fund/Peak
2441	42.39	271	1.00	V	28.5	5.70	36.66	39.93		39.93	Fund/Ave
2441	42.78	32	1.06	H	28.5	5.70	36.66	40.32		40.32	Fund/Ave
4882	49.06	0	1.00	V	33.1	8.22	36.34	54.04	74	-19.96	Peak
4882	48.46	174	1.00	H	33.1	8.22	36.34	53.44	74	-20.56	Peak
4882	29.73	0	1.00	V	33.1	8.22	36.34	34.71	54	-19.29	Ave
4882	29.60	174	1.00	H	33.1	8.22	36.34	34.58	54	-19.42	Ave

High Channel @ 2479 MHz

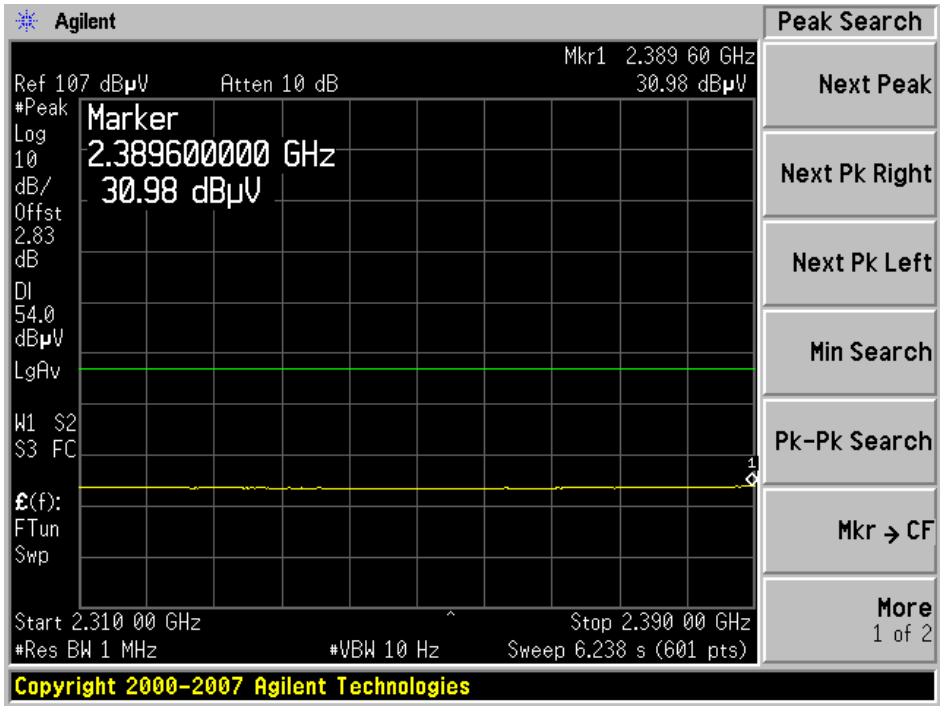
Frequency (MHz)	Reading (dBµV)	Azimuth (Degree)	Ant. Height (m)	Ant. Polarity (H / V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp Gain (dB)	Cord. Am. (dBµV/m)	FCC Part 15 C		Note
									Limit (dBµV/m)	Margin (dB)	
2479	93.23	269	1.00	V	28.8	5.78	36.63	91.18		91.18	Fund/Peak
2479	96.06	33	1.00	H	28.8	5.78	36.63	94.01		94.01	Fund/Peak
2479	42.09	269	1.00	V	28.8	5.78	36.63	40.04		40.04	Fund/Ave
2479	42.72	33	1.00	H	28.8	5.78	36.63	40.67		40.67	Fund/Ave
4958	46.58	36	1.00	V	33.1	8.31	36.26	51.73	74	-22.27	Peak
4958	46.04	156	1.00	H	33.1	8.31	36.26	51.19	74	-22.81	Peak
4958	28.60	36	1.00	V	33.1	8.31	36.26	33.75	54	-20.25	Ave
4958	29.33	156	1.00	H	33.1	8.31	36.26	34.48	54	-19.52	Ave

Restricted Band (Near Band edge):

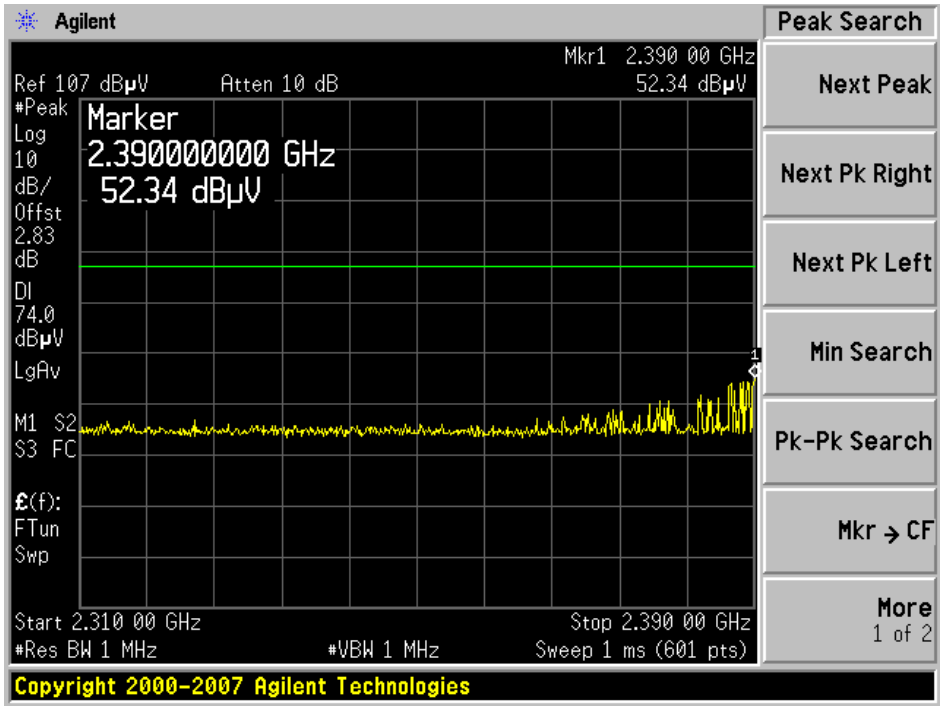
Low Channel Horizontal Peak



Low Channel Horizontal Average



Low Channel Vertical Peak



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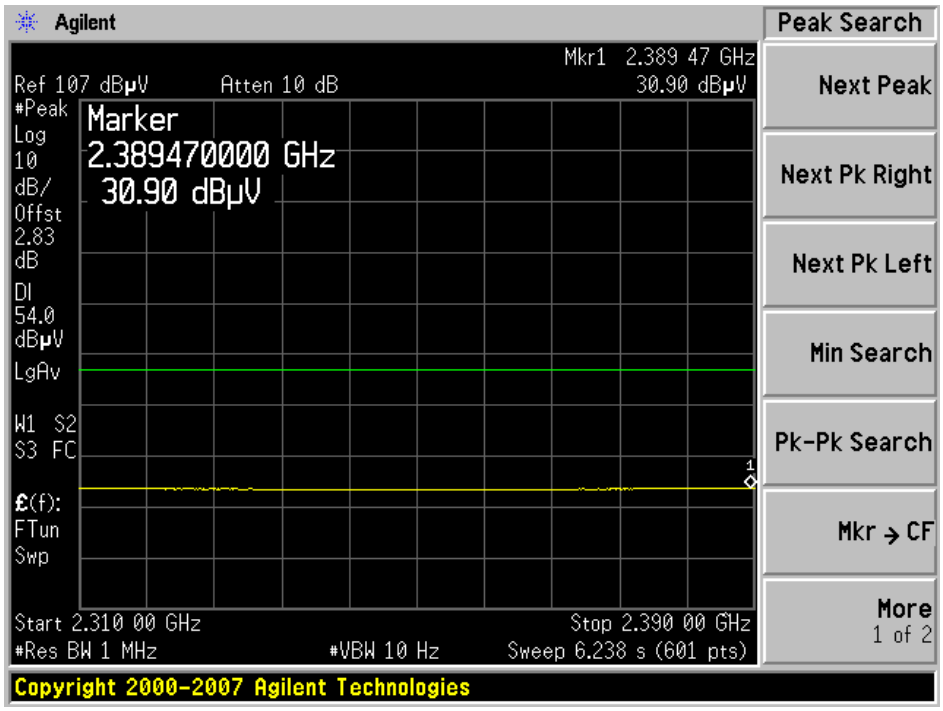

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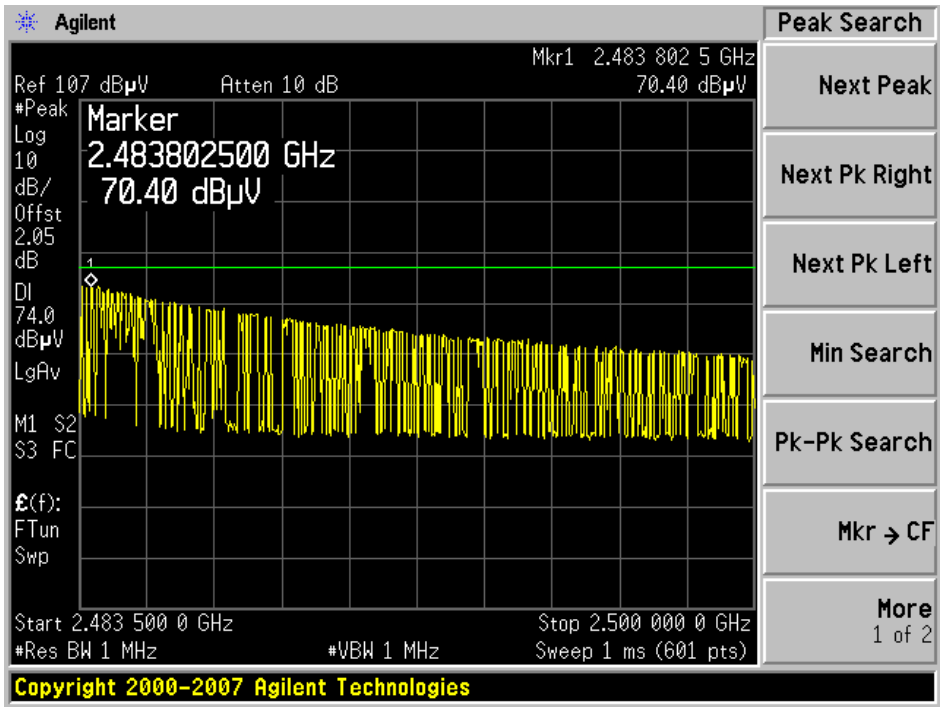

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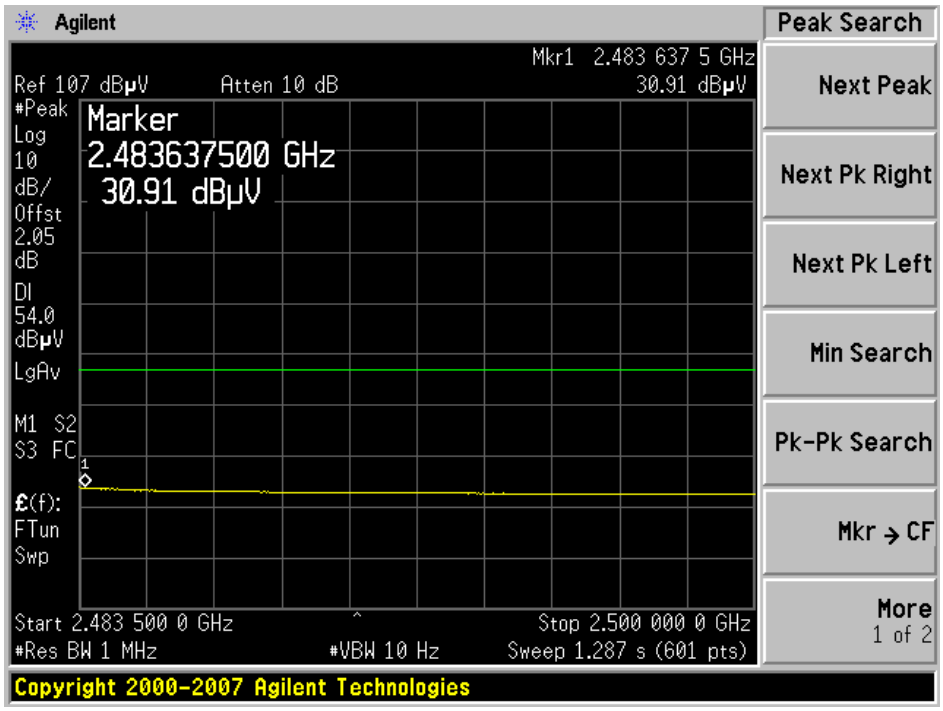
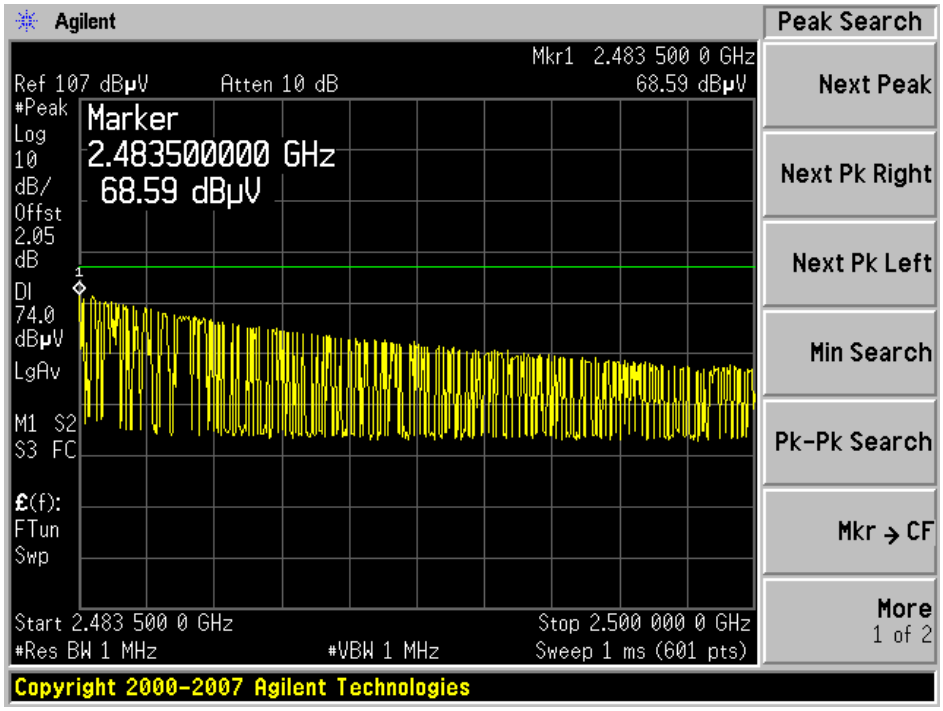


High Channel Vertical Peak



High Channel Vertical Average