

Radioframe Networks, Inc.

MCRB

July 19, 2006

Report No. RAFN0063.1 Rev 01

Report Prepared By



www.nwemc.com
1-888-EMI-CERT

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EMC Test Report



22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test
Issue Date: July 19, 2006
Radioframe Networks, Inc.
Model: MCRB

| Emissions | | | | |
|---------------------------------------|-------------------------|-----------------------|-------------------------------------|--------------------------|
| Test Description | Specification | Test Method | Pass | Fail |
| Radiated Emissions | FCC 15.109:2006 Class A | ANSI C63.4:2003 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Conducted Emissions | FCC 15.107:2006 Class A | ANSI C63.4:2003 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Frequency Stability | FCC 90.213:2005 | ANSI/TIA/EIA-603:2002 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Output Power | FCC 90.691:2005 | ANSI/TIA/EIA-603:2002 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Emission Mask | FCC 90.691:2005 | ANSI/TIA/EIA-603:2002 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Spurious Conducted Emissions-Receive | FCC 15.111:2006 | ANSI C63.4:2003 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Spurious Conducted Emissions-Transmit | FCC 90.691:2005 | ANSI/TIA/EIA-603:2002 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Spurious Radiated Emissions | FCC 90.691:2005 | ANSI/TIA/EIA-603:2002 | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

Modifications made to the product
See the Modifications section of this report

Test Facilities

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400; Hillsboro, OR 97124
Phone: (503) 844-4066
Fax: 844-3826

This site has been fully described in a report filed with and accepted by the FCC (Federal Communications Commission) and Industry Canada.

Additional antenna port direct connect measurements were made in-situ at the client's facility:

Radioframe Networks, Inc.
9461 Willows Road NE, Suite 100
Redmond, WA 98052

Approved By:

Greg Kiemel, Director of Engineering

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested, the specific description is noted in each of the individual sections of the test report supporting this certificate of test.

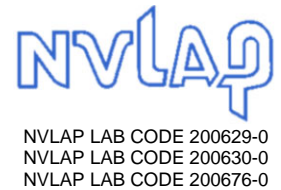
| Revision Number | Description | Date | Page Number |
|------------------------|--------------------|-------------|--------------------|
|------------------------|--------------------|-------------|--------------------|

| | | | |
|----|----------------------------|---------|----------|
| 01 | Added test equipment | 2/27/08 | 147 |
| 01 | Added Software Version | 2/27/08 | 50 |
| 01 | Removed test equipment | 2/27/08 | 59,75,88 |
| 01 | Added Class A to emissions | 2/27/08 | 2 |

FCC: Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.



NVLAP: Northwest EMC, Inc. is accredited under the United States Department of Commerce, National Institute of Standards and Technology, and National Voluntary Laboratory Accreditation Program for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 89/336/EEC, ANSI C63.4, MIL-STD 461E, DO-160D and SAE J1113. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.



Industry Canada: Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS 212, Issue 1 (Provisional) and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements.



CAB: Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.



TÜV Product Service: Included in TÜV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TÜV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TÜV's current Listing of CARAT Laboratories, available from TÜV. A certificate was issued to represent that this laboratory continues to meet TÜV's CARAT Program requirements. Certificate No. USA0401C.



TÜV Rheinland: Authorized to carryout EMC tests by order and under supervision of TÜV Rheinland. This authorization is based on "Conditions for EMC-Subcontractors" of November 1992.



NEMKO: Assessed and accredited by NEMKO (Norwegian testing and certification body) for European emissions and immunity testing. As a result of NEMKO's laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification (Authorization No. ELA 119).



Australia/New Zealand: The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).



VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (*Registration Numbers. - Hillsboro: C-1071, R-1025, and R-2318, Irvine: C-2094 and R-1943, Sultan: R-871, C-1784 and R-1761.*)



BSMI: Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement. License No.SL2-IN-E-1017.



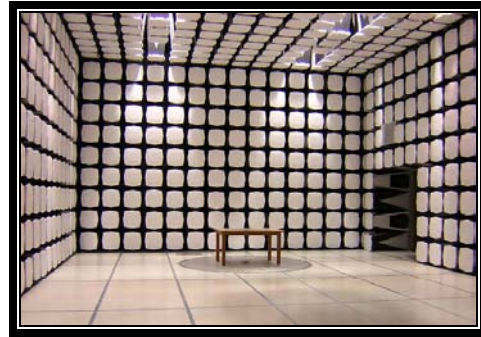
GOST: Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification



SCOPE

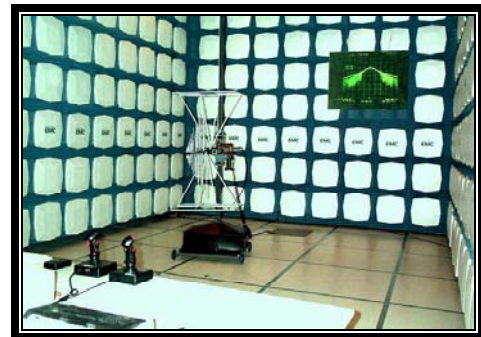
For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/scope.asp>



**California – Orange County Facility
Labs OC01 – OC13**

41 Tesla Ave. Irvine, CA 92618
(888) 364-2378 Fax: (503) 844-3826



**Oregon – Evergreen Facility
Labs EV01 – EV11**

22975 NW Evergreen Pkwy. Suite 400 Hillsboro, OR 97124
(503) 844-4066 Fax: (503) 844-3826



**Washington – Sultan Facility
Labs SU01 – SU07**

14128 339th Ave. SE Sultan, WA 98294
(888) 364-2378

Party Requesting the Test

| | |
|---------------------------------|---------------------------------|
| Company Name: | Radioframe Networks, Inc. |
| Address: | 9461 Willows Road NE, Suite 100 |
| City, State, Zip: | Redmond, WA 98052 |
| Test Requested By: | Dean Busch |
| Model: | MCRB |
| First Date of Test: | May 18, 2006 |
| Last Date of Test: | June 29, 2006 |
| Receipt Date of Samples: | May 18, 2006 |
| Equipment Design Stage: | Production |
| Equipment Condition: | No Damage |

Information Provided by the Party Requesting the Test**Functional Description of the EUT (Equipment Under Test):**

The Multi-Channel Radio Blade (MCRB) transceiver duplicates the RF functions of up to 6 simultaneously operational iDEN radio transceivers. The blades are installed in a standard 7-foot-tall, 19-inch-wide rack.

Testing Objective:

To meet the EMC requirements for certification under FCC Part 90.691

CONFIGURATION 1

| Software/Firmware Running during test | |
|---------------------------------------|--------------|
| Description | Version |
| VxWorks | RFN_14.0.225 |
| Software Script | idencric.gz |

| EUT | | | |
|--|---------------------------|-------------------|---------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| EUT- Multi-Channel RadioBlades (MCRB) | Radioframe Networks, Inc. | 176-0860-00 | Various |
| MC-15 SERIES DUAL BAND SYSTEM (3 SECTOR) | Radioframe Networks, Inc. | 176-7970-xx | Unknown |

| Remote Equipment Outside of Test Setup Boundary | | | |
|---|---------------------------|-------------------|---------------|
| Description | Manufacturer | Model/Part Number | Serial Number |
| Site Simulator | Radioframe Networks, Inc. | N/a | N/a |
| Site Controller | Motorola, Inc. | CCN1008N | CAF030LTC4 |
| GPS Antenna | Hewlett-Packard | 8532A | 901 |
| DC Power Supply | Sorensen | DCR 60-45B | 0144 |

| Cables | | | | | |
|------------|--------|------------|---------|-------------------------------|-----------------|
| Cable Type | Shield | Length (m) | Ferrite | Connection 1 | Connection 2 |
| DC Power | No | 8.0 | No | MC-15 SERIES DUAL BAND SYSTEM | DC Supply |
| BNC | Yes | 30.0 | No | ERTM | Site Simulator |
| BNC | Yes | 30.0 | No | Site Controller | Site Simulator |
| BNC | Yes | 3.0 | No | GPS Antenna | Site Controller |
| Ethernet | No | 3.0 | No | Site Controller | ERTM |

PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.

| Equipment modifications | | | | | |
|--------------------------------|-------------|---|--------------------------------------|---|---|
| Item | Date | Test | Modification | Note | Disposition of EUT |
| 1 | 5/18/2006 | Spurious Conducted Limits Xmit Mode | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 2 | 5/19/2006 | Spurious Emissions at Antenna Terminals | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 3 | 5/19/2006 | Field Strength of Spurious radiation | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 4 | 5/19/2006 | Radiated Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 5 | 5/23/2006 | RF Power Output | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 6 | 5/23/2006 | Emission Mask | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 7 | 5/23/2006 | Spurious Conducted Limits Receive Mode | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 8 | 6/29/2006 | Conducted Emissions | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | EUT remained at Northwest EMC following the test. |
| 9 | 6/29/2006 | 3 Tone Inter Mod | Tested as delivered to Test Station. | No EMI suppression devices were added or modified during this test. | Scheduled testing was completed. |

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|--------------|--------|-----|-----------|----------|
| Spectrum Analyzer | Agilent | E4446A | AAT | 4/4/2006 | 12 |

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

Configuration: The peak measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The occupied bandwidth / emission mask was measured with the EUT set to low; medium, and high transmit frequencies. At each channel, measurements were made at the highest output settings

FCC Interpretation Regarding Emission Mask and 90.691

-----Original Message-----

From: Andrew Leimer [mailto:ALEIMER@fcc.gov] Sent: Wednesday, May 14, 2003 12:21 PM
To: rwacs@att.net
Subject: Re: Part 90 rules

Hello Dean,

How are you doing? I have not heard from you in a while! The following explanation is from the archives. The basic question was if emissions mask G would ever be used. I hope it answers your question:

I found that footnote 3 was added to Section 90.210 as a result of the First R&O, Eighth R&O and 2nd FNPRM in PR Docket 93-144 (FCC 95-501), adopted 12/15/95. Footnote 3 initially said "Equipment in this band licensed to EA systems shall comply with the emission mask provisions of Section 90.691." Note here that this R&O dealt principally with the upper 200 MHz SMR channels which were auctioned in contiguous segments/blocks. Consequently, providing more flexibility in the emission mask that required protection of the "outer" channels in those blocks and to any interior channels in those blocks used by incumbents made sense.

When the Commission subsequently dealt with auctioning the lower 80 channels (non-contiguous channels in each block) and the General Category channels (contiguously allocated channels by block for auction purposes but originally allocated on a single channel basis for site-specific licensing purposes), the consideration of emission mask caused footnote 3 to be modified as it exists today. Specifically, the Second R&O in PR Docket 93-144 (FCC 97-223), adopted 6/23/97 @ para 80 reasons that applying the same emission mask standards to the lower 230 channels (lower 80 channels and 150 General Category channels) as to the upper 200 channels facilitates the use of common equipment and the combining of all such channels. It further states that Section 90.691 (the emission mask) would apply to "outer" channels used by a licensee "that create out-of-band emissions that affect another licensee". The MO&O on reconsideration of the 800 MHz 1st R&O (FCC 97-224, adopted 6/23/97) at para 76 agreed with Ericsson's recommendation to expand the emission mask provision of Section 90.691 to "non-EA 800 MHz Part 90 CMRS systems". The decision was based ostensibly on extending the flexibility of the 90.691 emission mask to incumbent licensees (non-EA licensees or non-auction winners) and to those non-SMR channels used by CMRS operators. The paragraph closes by stating that neither Ericsson or Motorola believe that such relaxation will increase the amount of interference to adjacent channel licensees.

You'll note that there is some similarity between emission mask G (applicable to equipment without audio low pass filters) under Section 90.210 and the emission mask required by Section 90.691. It is my interpretation that footnote 3 under Section 90.210 (the applicability of the emission mask under Section 90.691) was intended principally for Part 90 CMRS systems in the 800 MHz band to provide flexibility and consistency to those operators. As Section 90.210 is written, however, I don't see how we could legally prevent any 800 MHz licensee from using the more flexible emission mask under Section 90.691.

Bottom line: As the rule is written, it is possible that the "G" mask would never be used by 800 MHz licensees.

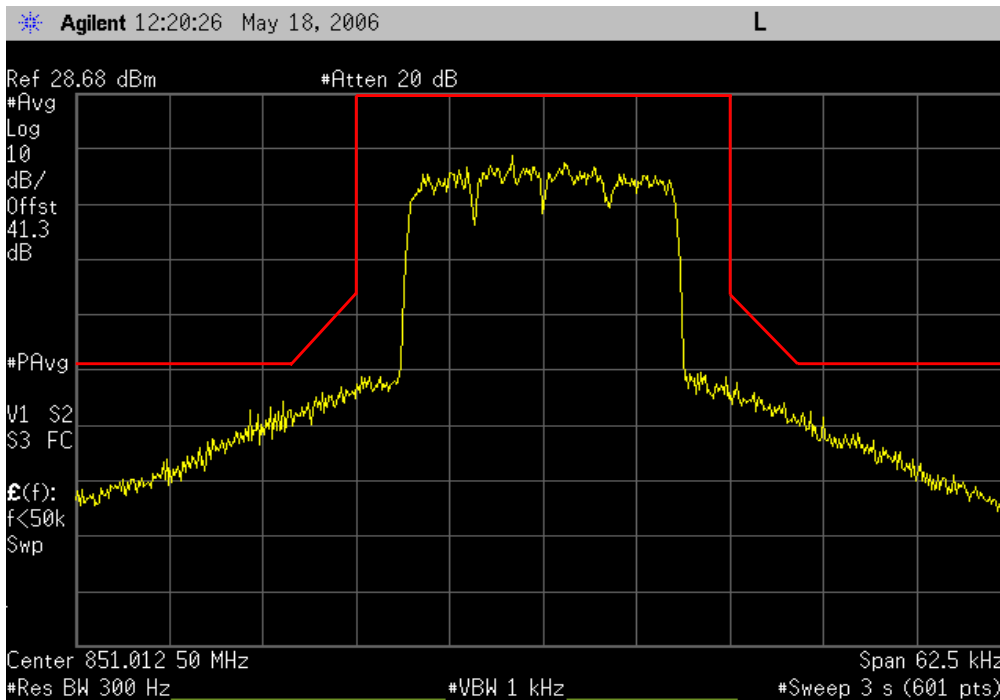
>>> Dean Busch 05/14/03 01:22PM >>>
Andy;

| | |
|--|--|
| EUT: MCRB | Work Order: RAFN0062 |
| Serial Number: Various | Date: 05/18/06 |
| Customer: Radioframe Networks, Inc. | Temperature: 23°C |
| Attendees: Dean Busch | Humidity: 34% |
| Project: None | Barometric Pres.: 29.99 |
| Tested by: Rod Peloquin | Power: -48Vdc |
| | Job Site: EV06 |
| TEST SPECIFICATIONS | |
| FCC 90.691:2005 | Test Method |
| | ANSI/TIA/EIA-603-B:2002 |
| COMMENTS | |
| 800MHz Band | |
| DEVIATIONS FROM TEST STANDARD | |
| | |
| Configuration # | 1 |
| | <i>Rodney L. Peloquin</i> Signature |

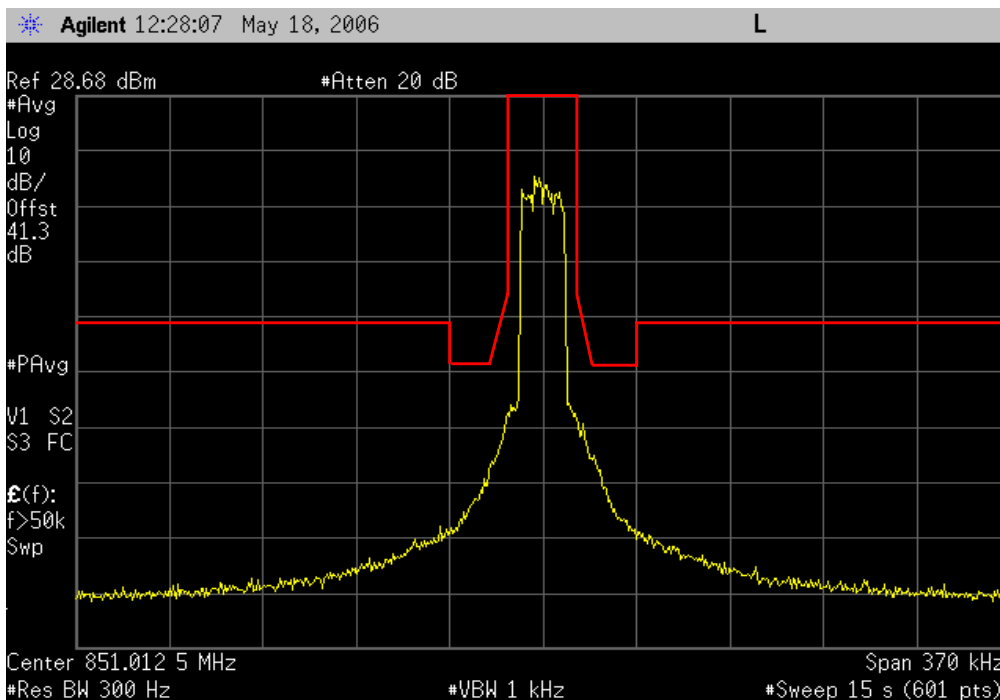
Modes of Operation and Test Conditions

| | Value | Limit | Result |
|---|--------------|--------------|---------------|
| Low Channel, High Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, High Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, Mid Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, Mid Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, Low Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, Low Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, High Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, High Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, Mid Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, Mid Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, Low Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, Low Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, High Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, High Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, Mid Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, Mid Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, Low Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, Low Power, > 37.5 kHz Fc | N/A | See Table | Pass |

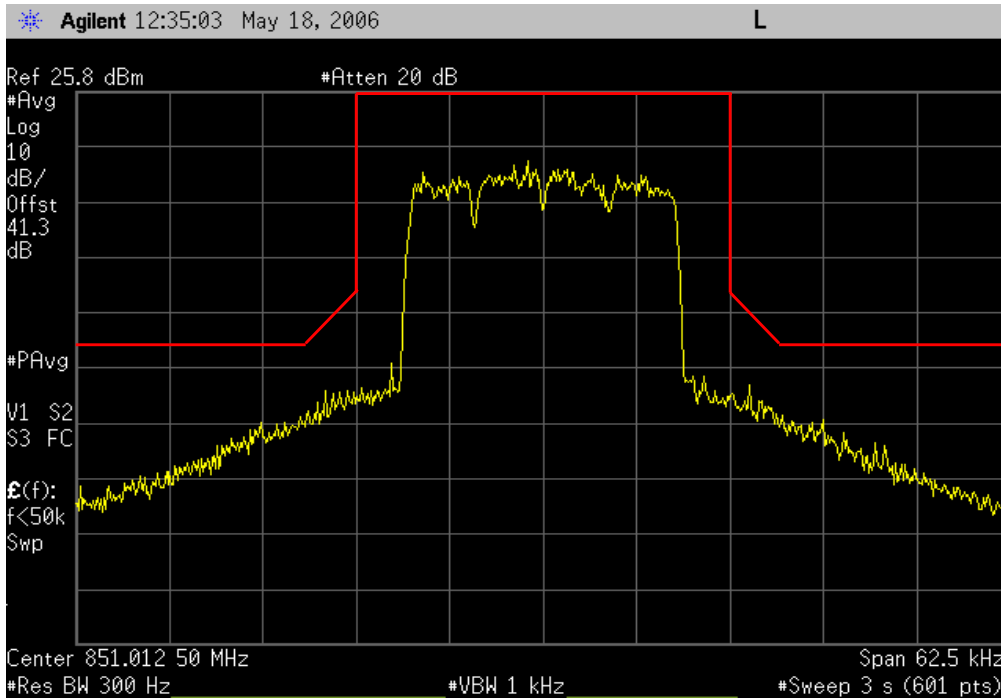
Low Channel, High Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



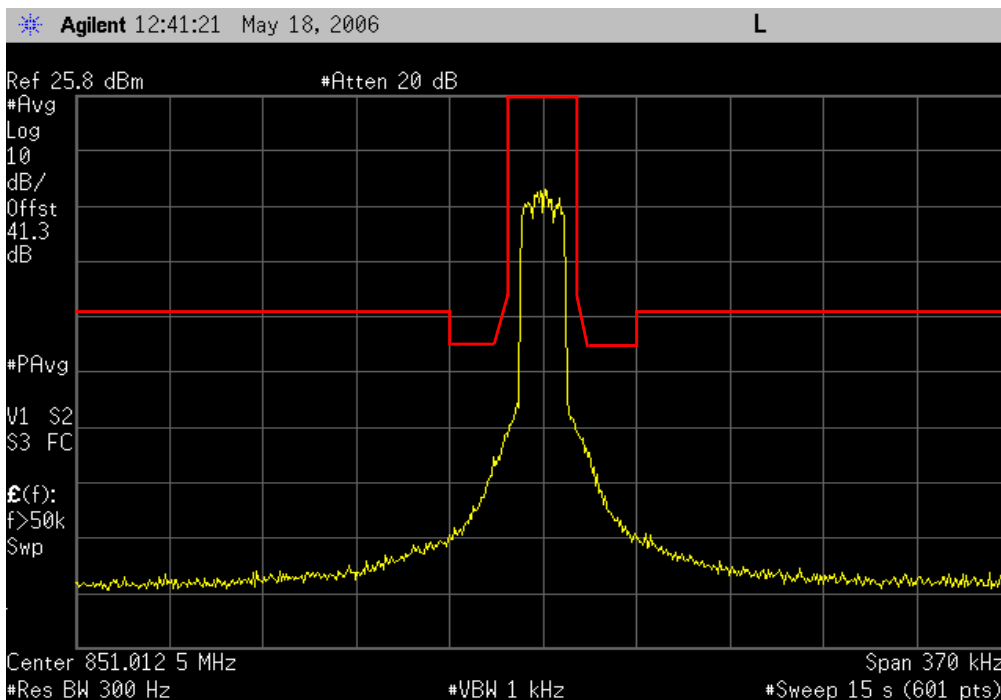
Low Channel, High Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



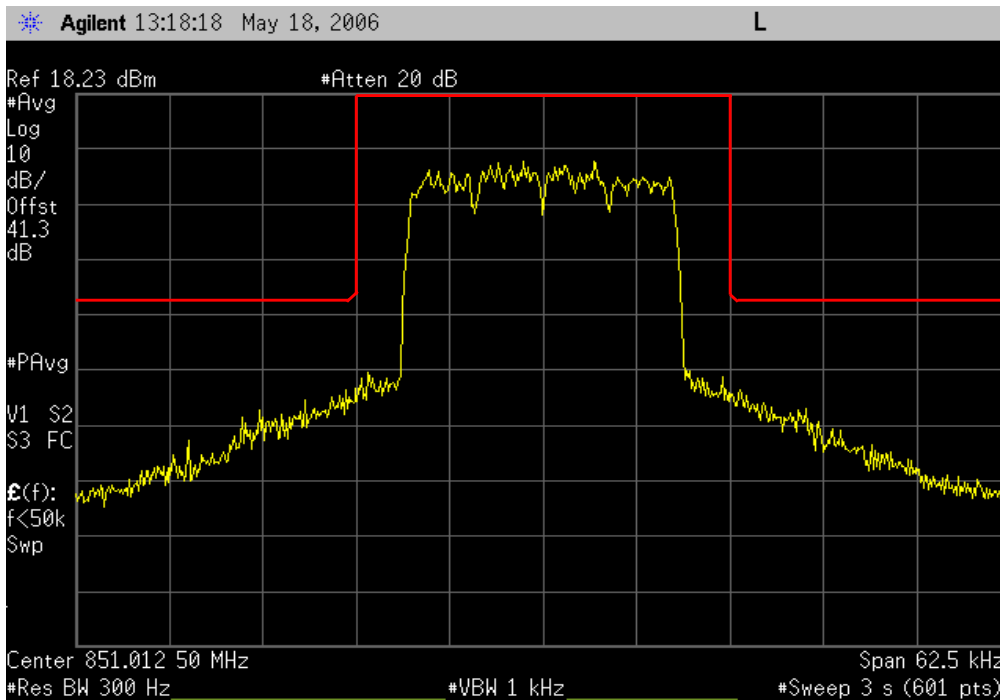
Low Channel, Mid Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



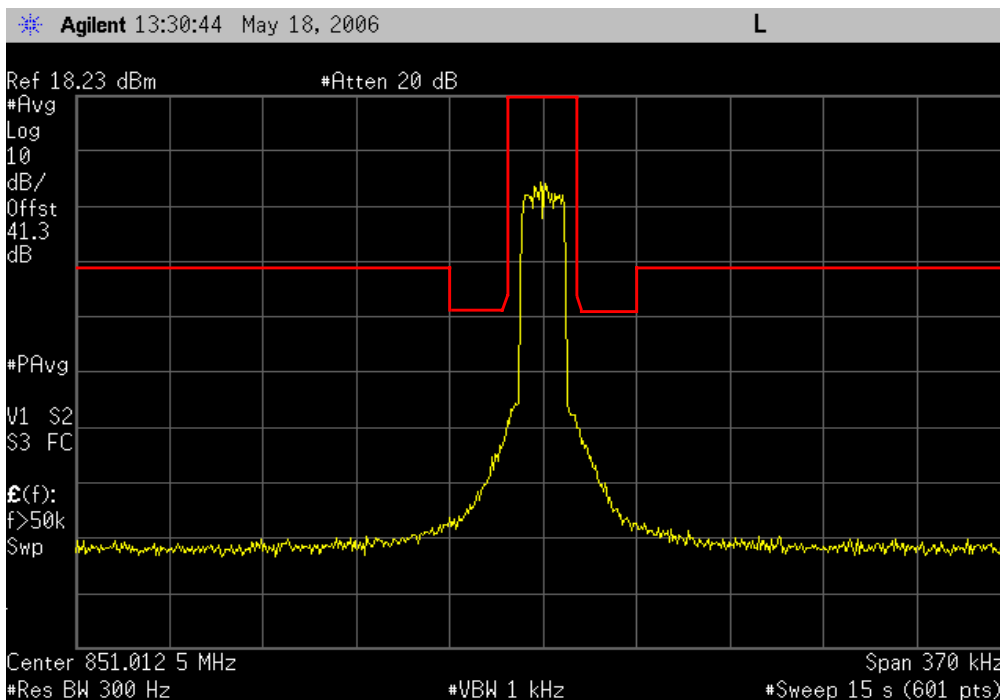
Low Channel, Mid Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



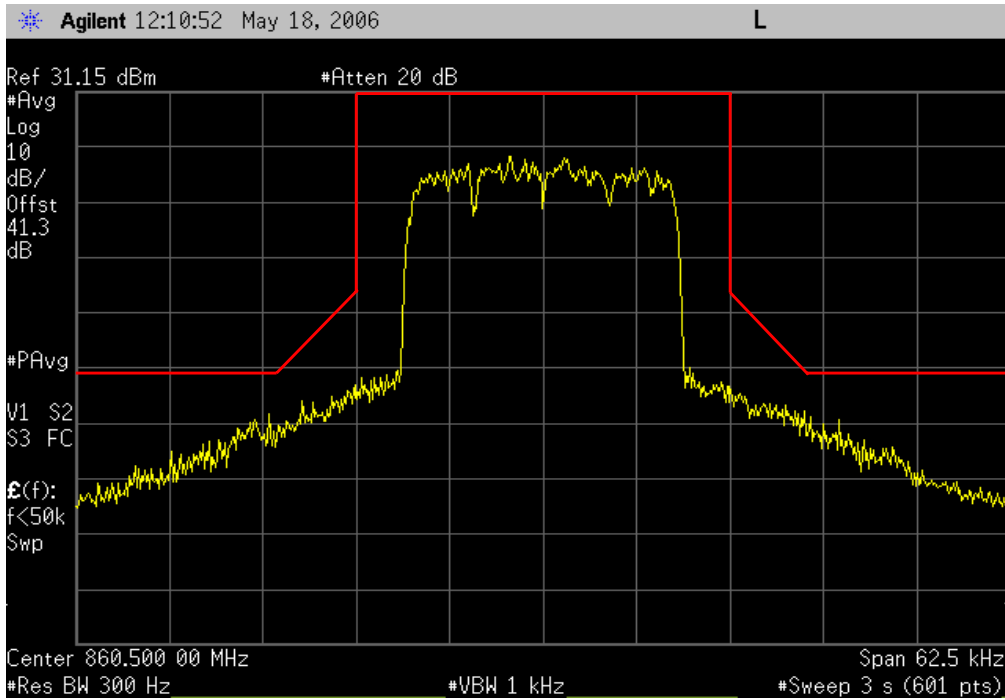
| | | | |
|---------------------------------------|-------------------|-------------------------|--|
| Low Channel, Low Power, < 37.5 kHz Fc | | | |
| Result: Pass | Value: N/A | Limit: See Table | |



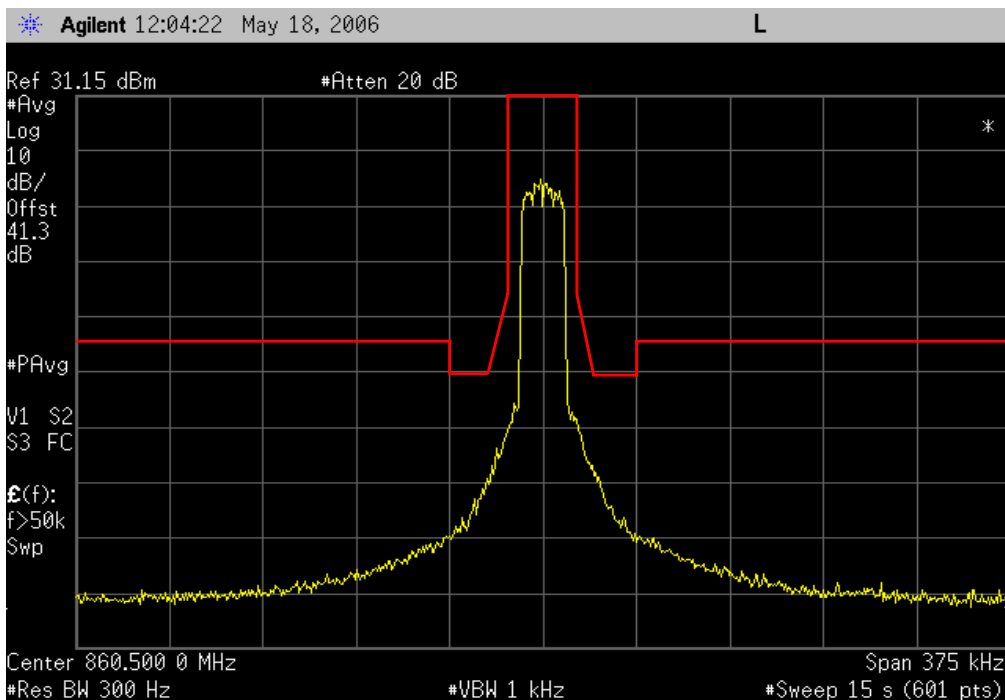
| | | | |
|---------------------------------------|-------------------|-------------------------|--|
| Low Channel, Low Power, > 37.5 kHz Fc | | | |
| Result: Pass | Value: N/A | Limit: See Table | |



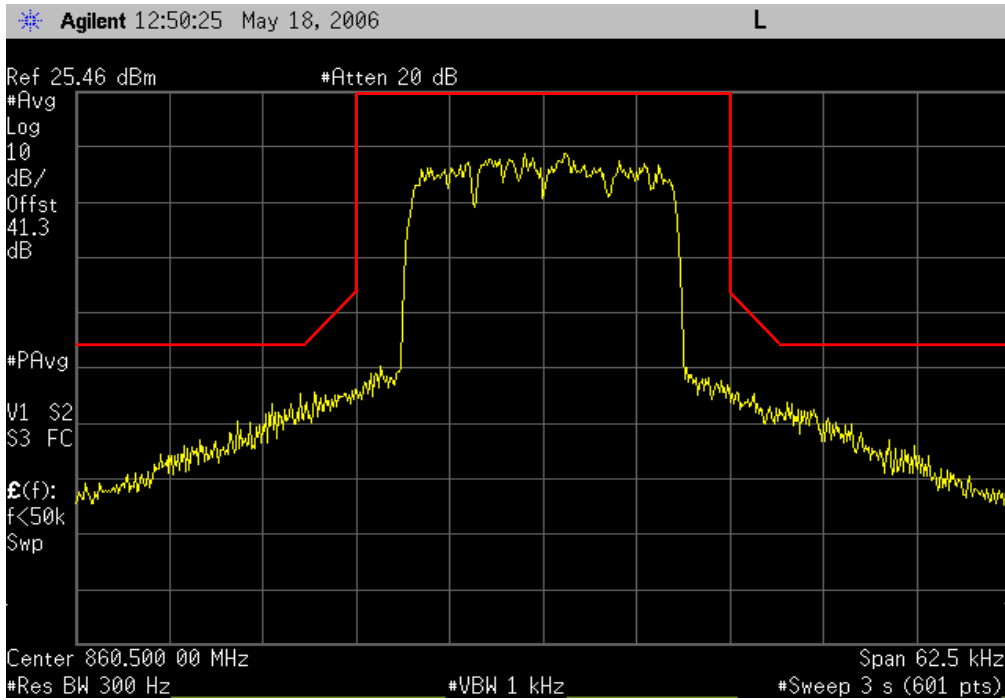
| | | |
|--|-------------------|-------------------------|
| Mid Channel, High Power, < 37.5 kHz Fc | | |
| Result: Pass | Value: N/A | Limit: See Table |



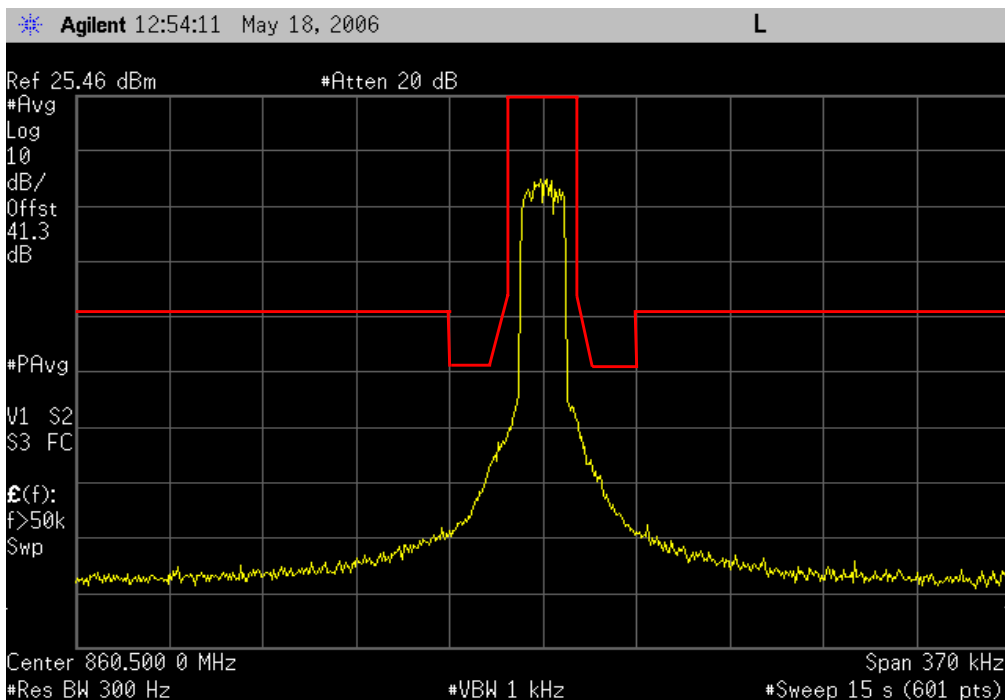
| | | |
|--|-------------------|-------------------------|
| Mid Channel, High Power, > 37.5 kHz Fc | | |
| Result: Pass | Value: N/A | Limit: See Table |



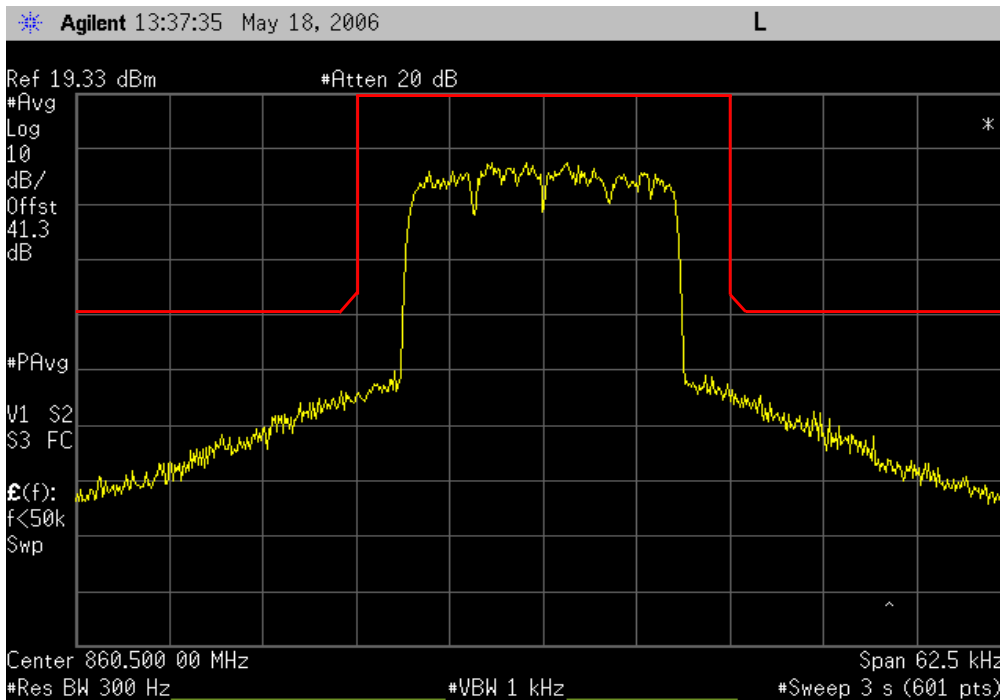
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|---------------------------------------|-------------------|-------------------------|
| Mid Channel, Mid Power, < 37.5 kHz Fc | | |
| Result: Pass | Value: N/A | Limit: See Table |



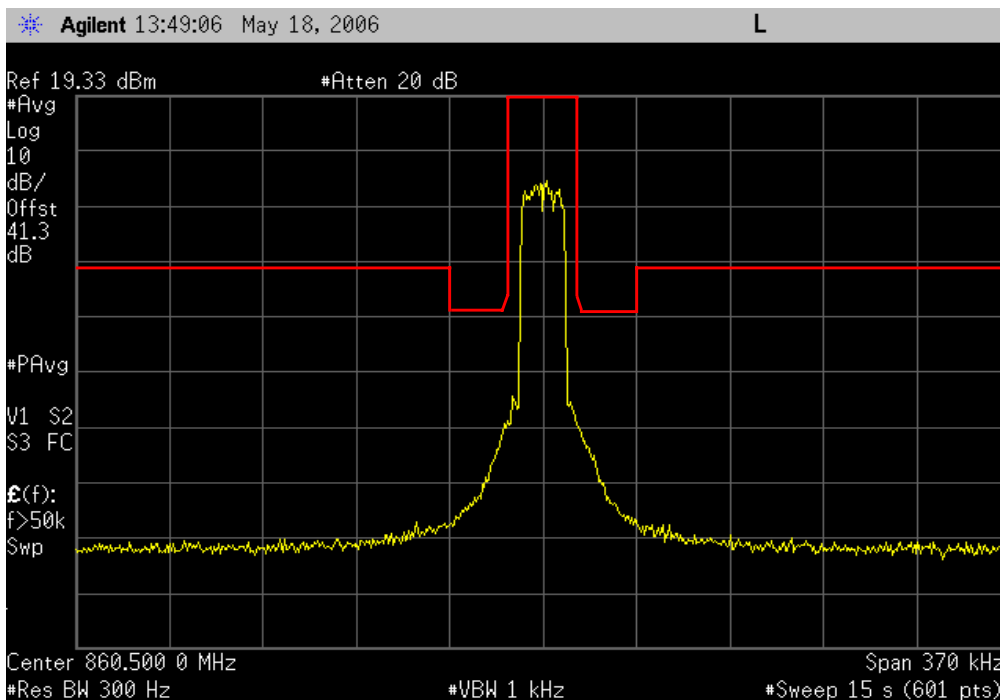
| | | |
|---------------------------------------|-------------------|-------------------------|
| Mid Channel, Mid Power, > 37.5 kHz Fc | | |
| Result: Pass | Value: N/A | Limit: See Table |



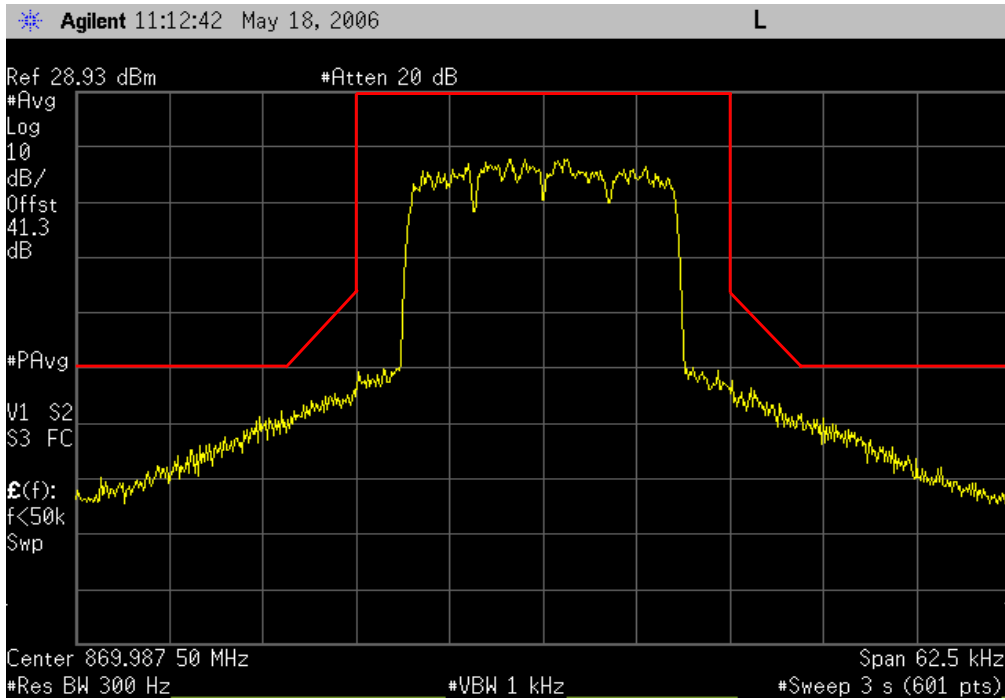
Mid Channel, Low Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



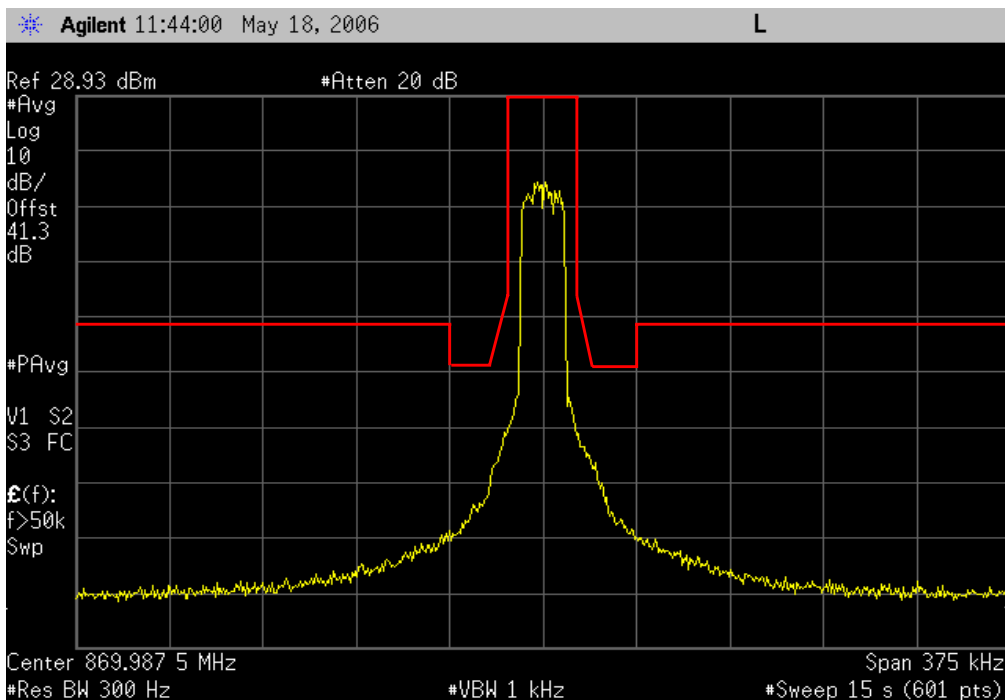
Mid Channel, Low Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



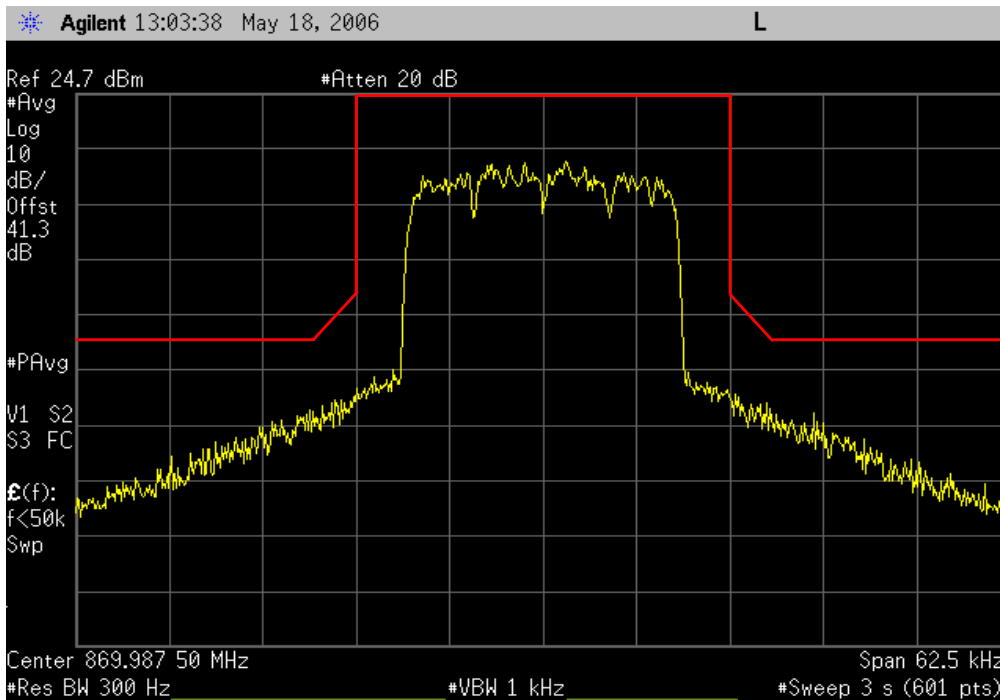
High Channel, High Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



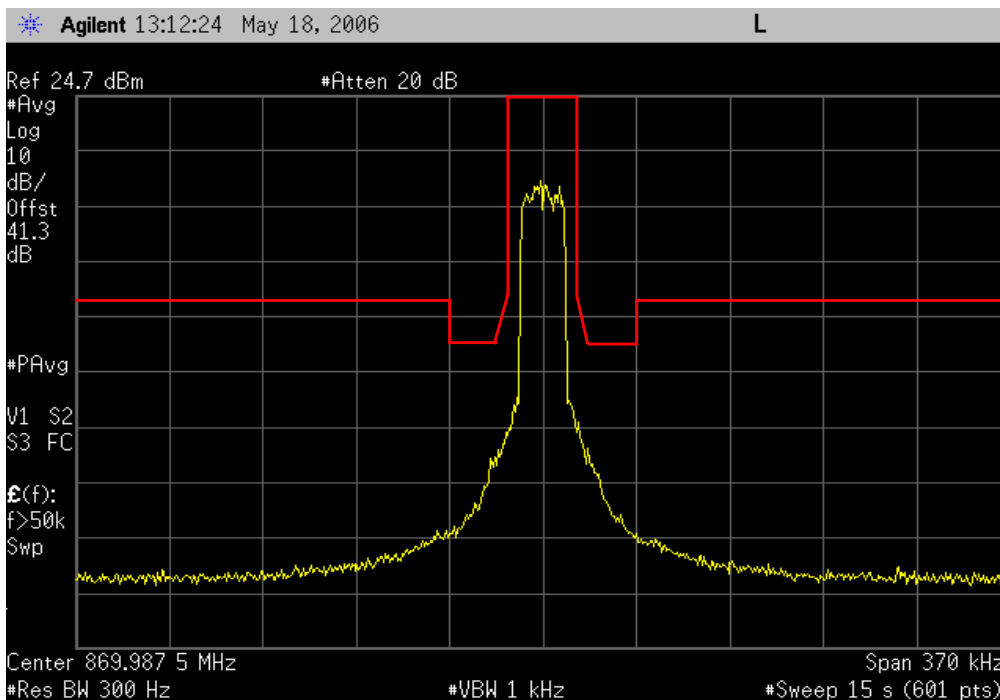
High Channel, High Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



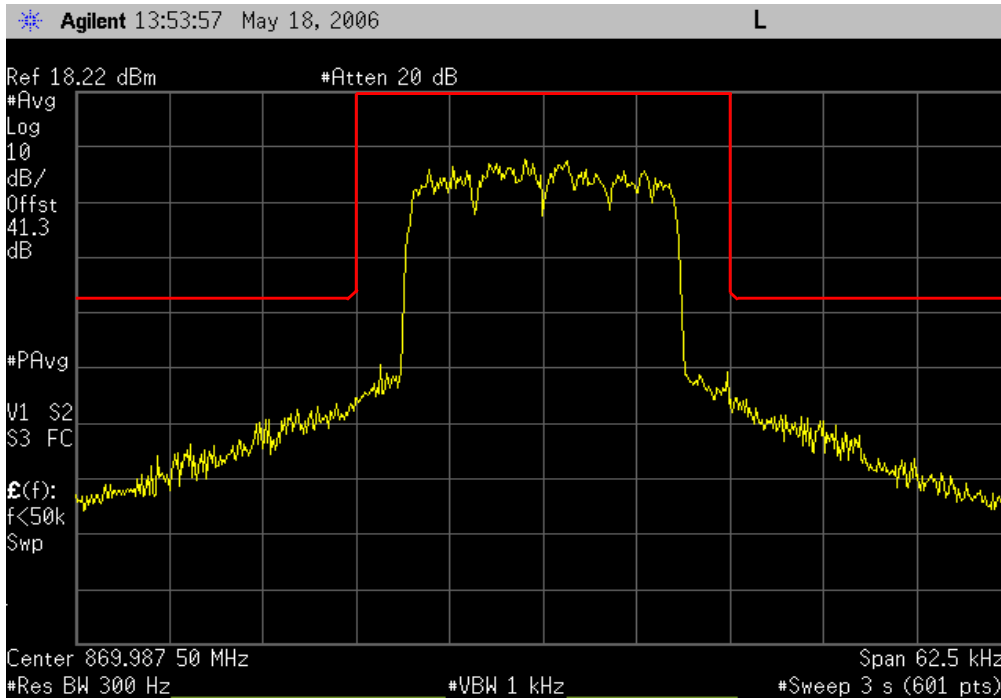
High Channel, Mid Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



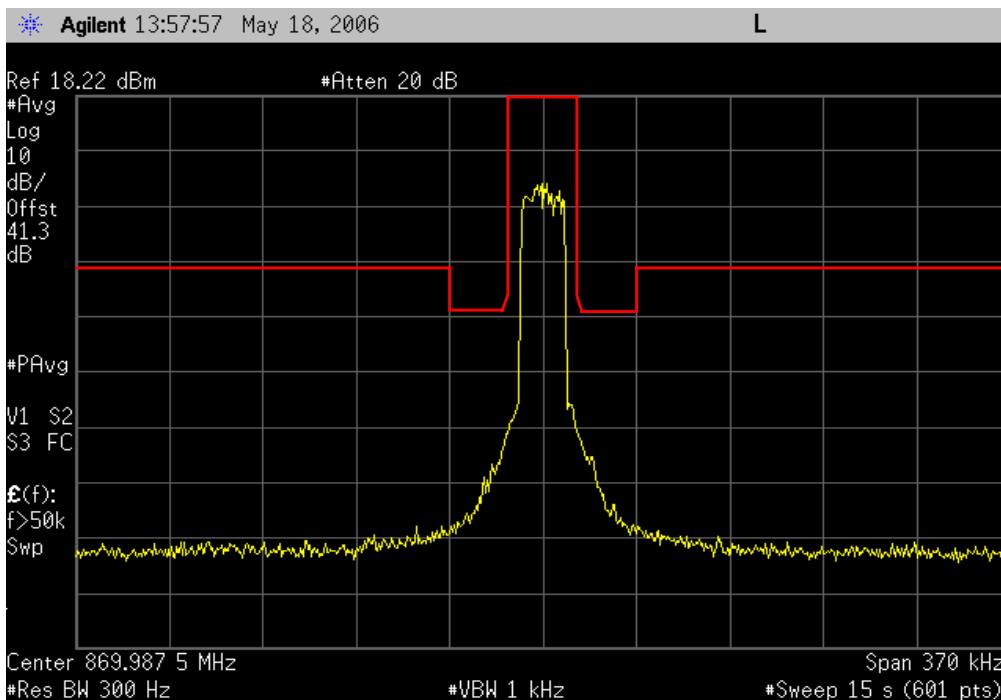
High Channel, Mid Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



High Channel, Low Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



High Channel, Low Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



| Frequency (MHz) | Output Power (dBm) | Power (P) Watts | Attenuation for the range 12.5 kHz to 37.5 kHz from fc (dBc) | | | | Attenuation >37.5 kHz from fc (dBc) | |
|--------------------|-----------------------|--------------------|---|----------------|--------------|----|--|----|
| | | | 50 + (10*log P) | 116*log(f/6.1) | | 80 | 43 + (10*log P) | 80 |
| | | | | f = 12.5 kHz | f = 37.5 kHz | | | |
| 851.0125 | 28.68 | 7.38E-01 | 48.7 | 36.14 | 91.49 | 80 | 41.7 | 80 |
| | 25.80 | 3.80E-01 | 45.8 | 36.14 | 91.49 | 80 | 38.8 | 80 |
| | 18.23 | 6.65E-02 | 38.2 | 36.14 | 91.49 | 80 | 31.2 | 80 |
| 860.5 | 31.15 | 1.30E+00 | 51.2 | 36.14 | 91.49 | 80 | 44.2 | 80 |
| | 25.46 | 3.52E-01 | 45.5 | 36.14 | 91.49 | 80 | 38.5 | 80 |
| | 19.33 | 8.57E-02 | 39.3 | 36.14 | 91.49 | 80 | 32.3 | 80 |
| 869.9875 | 28.93 | 7.82E-01 | 48.9 | 36.14 | 91.49 | 80 | 41.9 | 80 |
| | 24.70 | 2.95E-01 | 44.7 | 36.14 | 91.49 | 80 | 37.7 | 80 |
| | 18.22 | 6.64E-02 | 38.2 | 36.14 | 91.49 | 80 | 31.2 | 80 |

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|--------------|--------|-----|-----------|----------|
| Spectrum Analyzer | Agilent | E4446A | AAT | 4/4/2006 | 12 |

MEASUREMENT UNCERTAINTY

Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

Configuration: The peak measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The occupied bandwidth / emission mask was measured with the EUT set to low; medium, and high transmit frequencies. At each channel, measurements were made at the highest output settings

FCC Interpretation Regarding Emission Mask and 90.691

-----Original Message-----

From: Andrew Leimer [mailto:ALEIMER@fcc.gov] Sent: Wednesday, May 14, 2003 12:21 PM
To: rwacs@att.net
Subject: Re: Part 90 rules

Hello Dean,

How are you doing? I have not heard from you in a while! The following explanation is from the archives. The basic question was if emissions mask g would ever be used. I hope it answers your question:

I found that footnote 3 was added to Section 90.210 as a result of the First R&O, Eighth R&O and 2nd FNPRM in PR Docket 93-144 (FCC 95-501), adopted 12/15/95. Footnote 3 initially said "Equipment in this band licensed to EA systems shall comply with the emission mask provisions of Section 90.691." Note here that this R&O dealt principally with the upper 200 MHz SMR channels which were auctioned in contiguous segments/blocks. Consequently, providing more flexibility in the emission mask that required protection of the "outer" channels in those blocks and to any interior channels in those blocks used by incumbents made sense.

When the Commission subsequently dealt with auctioning the lower 80 channels (non-contiguous channels in each block) and the General Category channels (contiguously allocated channels by block for auction purposes but originally allocated on a single channel basis for site-specific licensing purposes), the consideration of emission mask caused footnote 3 to be modified as it exists today. Specifically, the Second R&O in PR Docket 93-144 (FCC 97-223), adopted 6/23/97 @ para 80 reasons that applying the same emission mask standards to the lower 230 channels (lower 80 channels and 150 General Category channels) as to the upper 200 channels facilitates the use of common equipment and the combining of all such channels. It further states that Section 90.691 (the emission mask) would apply to "outer" channels used by a licensee "that create out-of-band emissions that affect another licensee". The MO&O on reconsideration of the 800 MHz 1st R&O (FCC 97-224, adopted 6/23/97) at para 76 agreed with Ericsson's recommendation to expand the emission mask provision of Section 90.691 to "non-EA 800 MHz Part 90 CMRS systems". The decision was based ostensibly on extending the flexibility of the 90.691 emission mask to incumbent licensees (non-EA licensees or non-auction winners) and to those non-SMR channels used by CMRS operators. The paragraph closes by stating that neither Ericsson or Motorola believe that such relaxation will increase the amount of interference to adjacent channel licensees.

You'll note that there is some similarity between emission mask G (applicable to equipment without audio low pass filters) under Section 90.210 and the emission mask required by Section 90.691. It is my interpretation that footnote 3 under Section 90.210 (the applicability of the emission mask under Section 90.691) was intended principally for Part 90 CMRS systems in the 800 MHz band to provide flexibility and consistency to those operators. As Section 90.210 is written, however, I don't see how we could legally prevent any 800 MHz licensee from using the more flexible emission mask under Section 90.691.

Bottom line: As the rule is written, it is possible that the "G" mask would never be used by 800 MHz licensees.

>>> Dean Busch 05/14/03 01:22PM >>>
Andy;

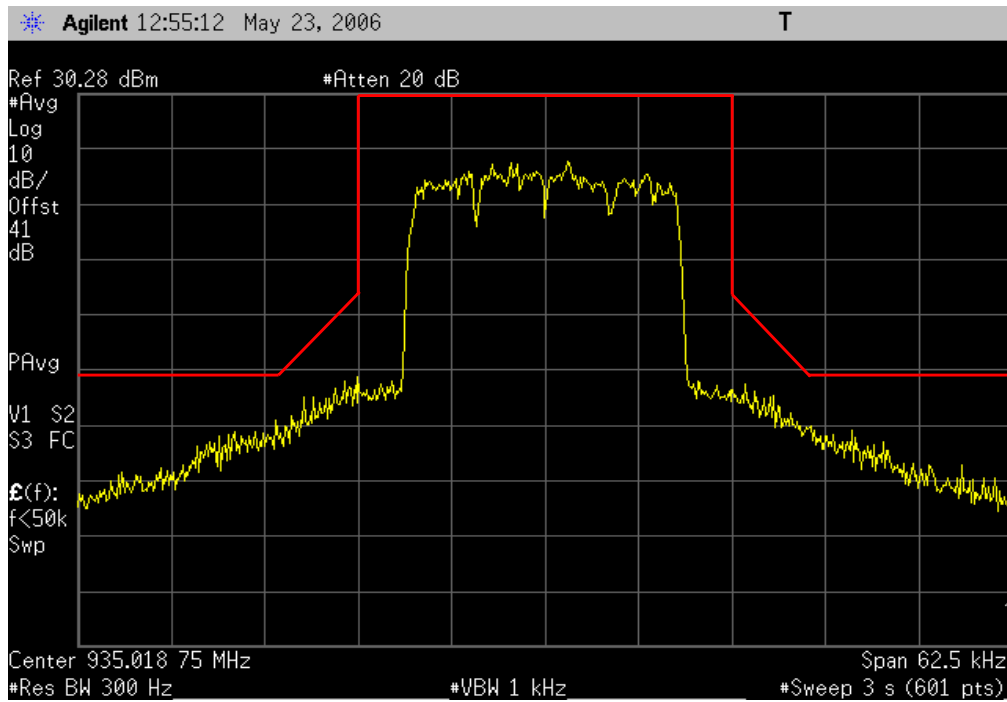
EMC**EMISSION MASK**

| | |
|--|--|
| EUT: MCRB | Work Order: RAFN0062 |
| Serial Number: Various | Date: 05/23/06 |
| Customer: Radioframe Networks, Inc. | Temperature: 22°C |
| Attendees: Dean Busch | Humidity: 43% |
| Project: None | Barometric Pres.: 29.93 |
| Tested by: Rod Peloquin | Power: -48Vdc |
| | Job Site: EV01 |
| TEST SPECIFICATIONS | |
| FCC 90.691:2005 | Test Method |
| | ANSI/TIA/EIA-603-B:2002 |
| COMMENTS | |
| 900MHz Band | |
| DEVIATIONS FROM TEST STANDARD | |
| | |
| Configuration # | 1 |
| | <i>Rodney L. Peloquin</i> Signature |

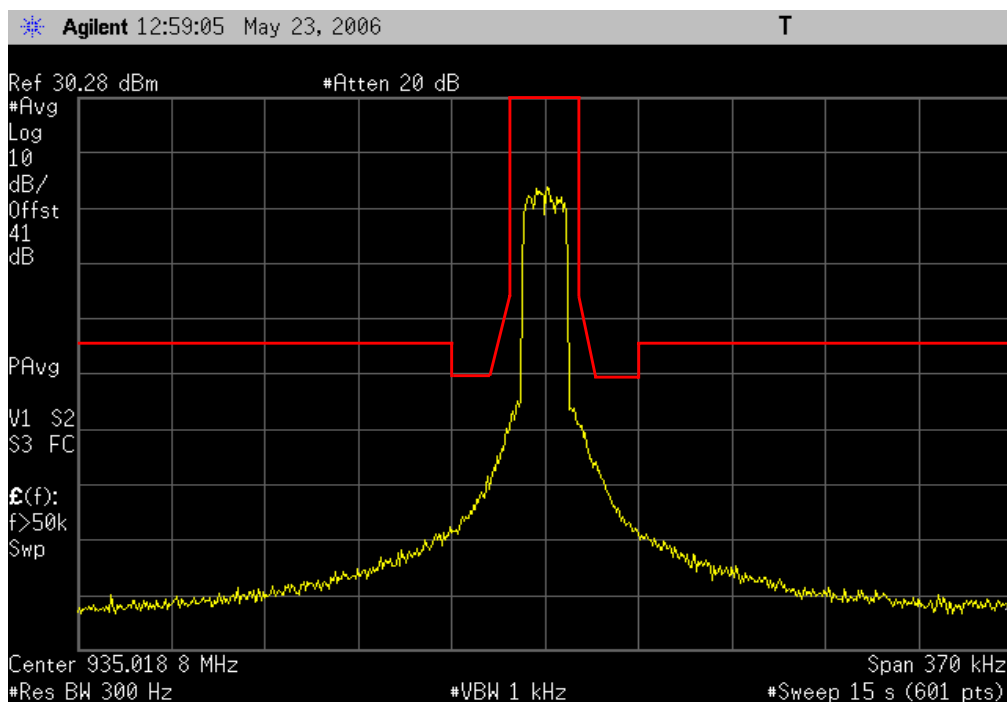
Modes of Operation and Test Conditions

| | Value | Limit | Result |
|---|--------------|--------------|---------------|
| Low Channel, High Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, High Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, Mid Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, Mid Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, Low Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Low Channel, Low Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, High Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, High Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, Mid Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, Mid Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, Low Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| Mid Channel, Low Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, High Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, High Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, Mid Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, Mid Power, > 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, Low Power, < 37.5 kHz Fc | N/A | See Table | Pass |
| High Channel, Low Power, > 37.5 kHz Fc | N/A | See Table | Pass |

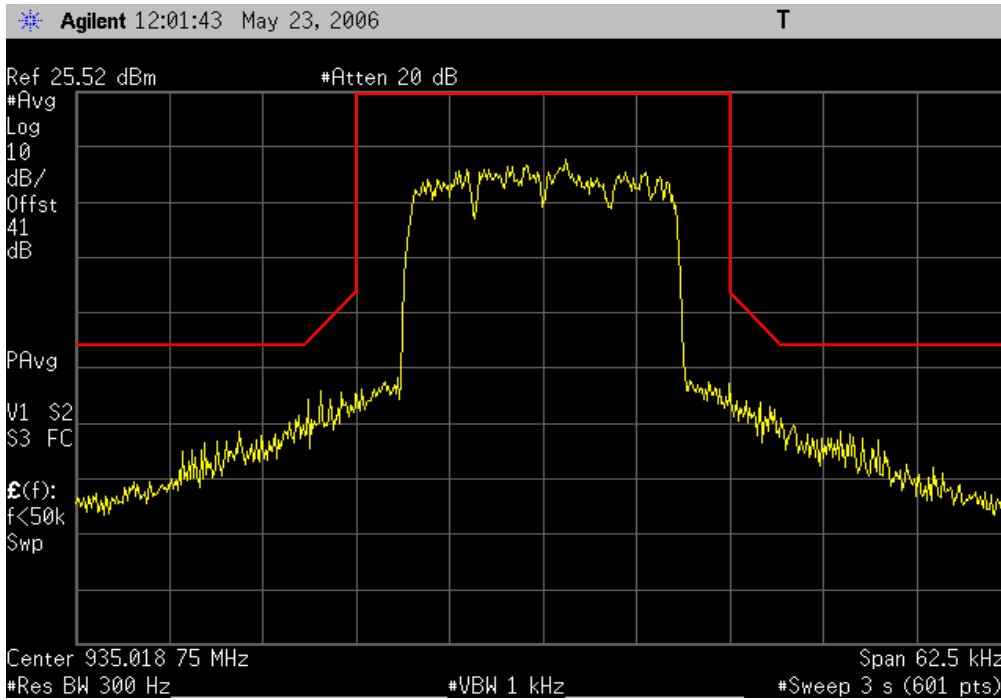
Low Channel, High Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



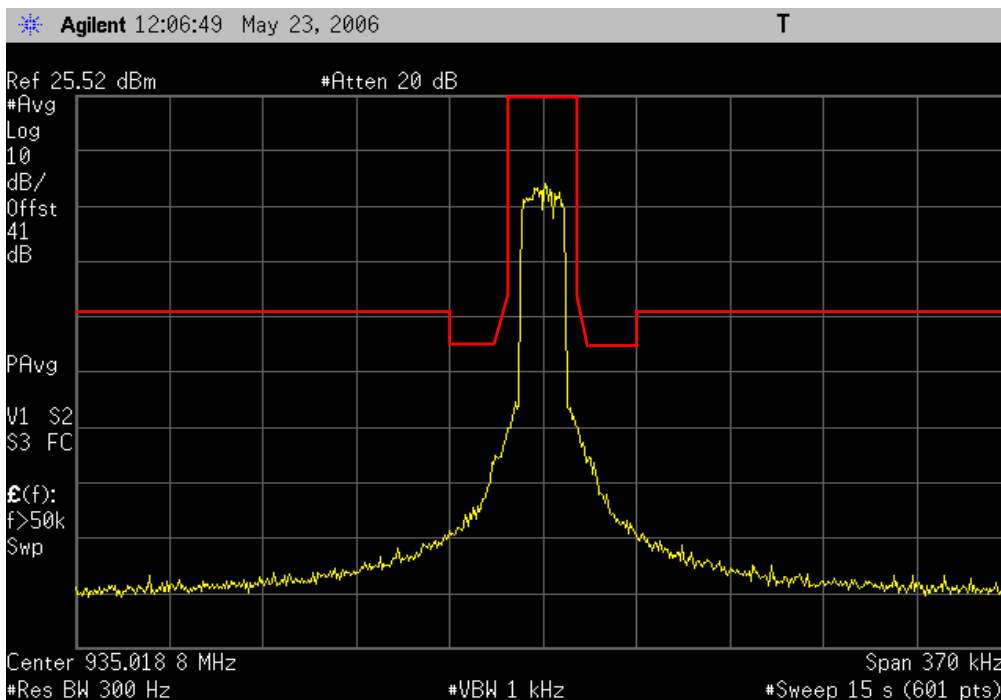
Low Channel, High Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



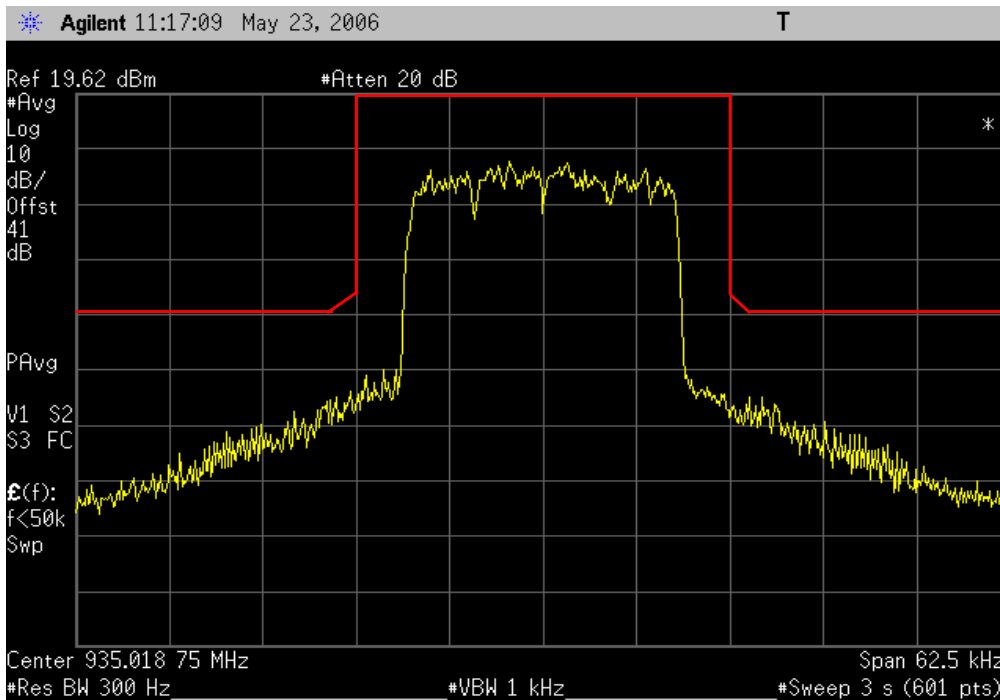
Low Channel, Mid Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



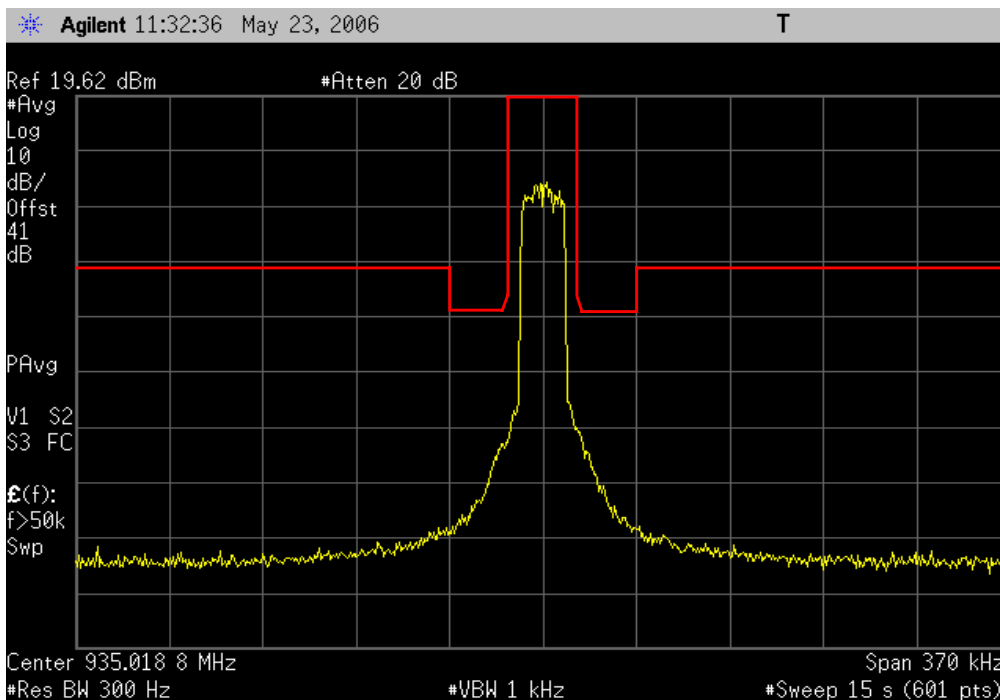
Low Channel, Mid Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



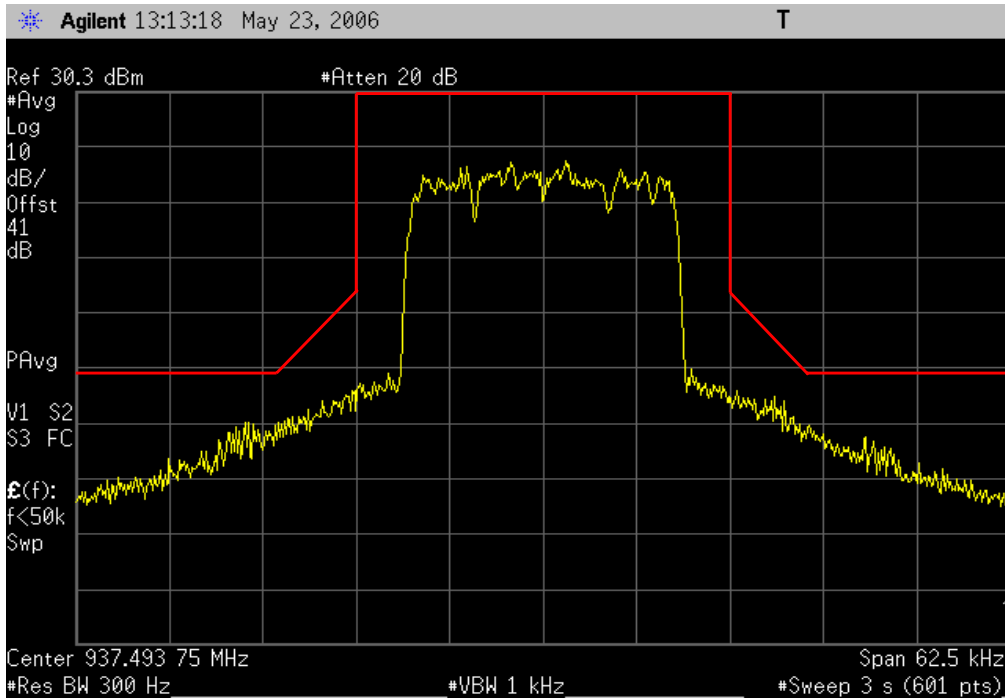
| | | | |
|---------------------------------------|-------------------|-------------------------|--|
| Low Channel, Low Power, < 37.5 kHz Fc | | | |
| Result: Pass | Value: N/A | Limit: See Table | |



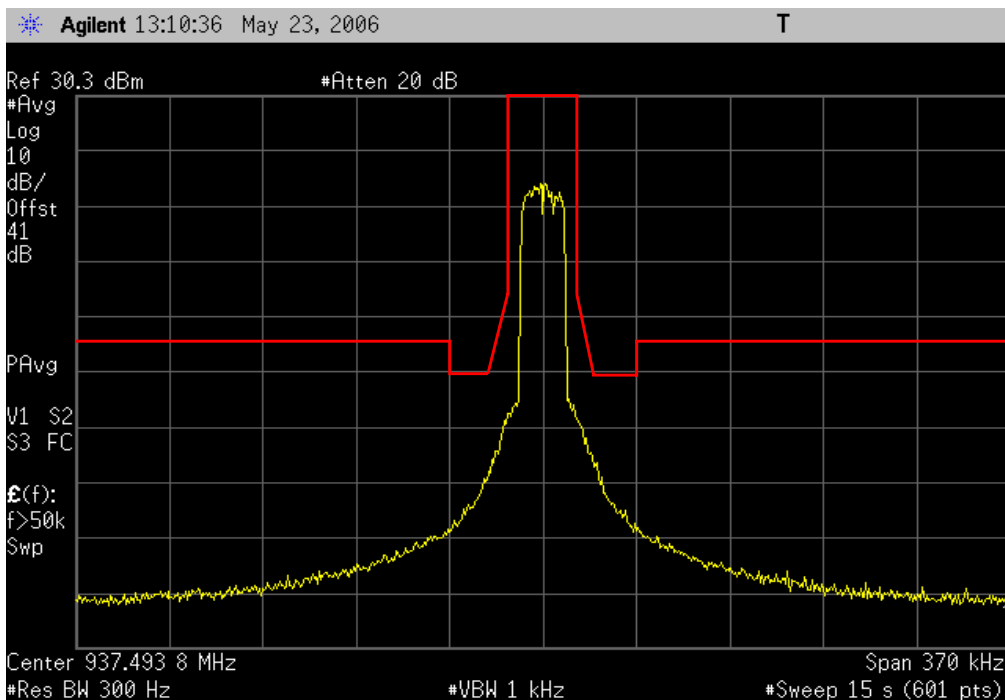
| | | | |
|---------------------------------------|-------------------|-------------------------|--|
| Low Channel, Low Power, > 37.5 kHz Fc | | | |
| Result: Pass | Value: N/A | Limit: See Table | |



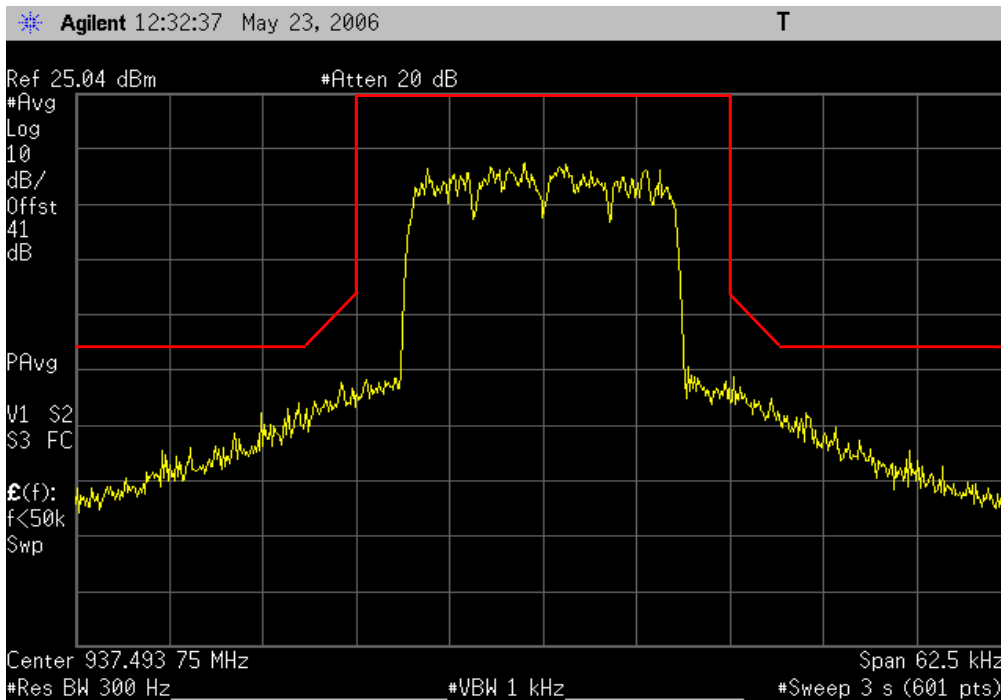
Mid Channel, High Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



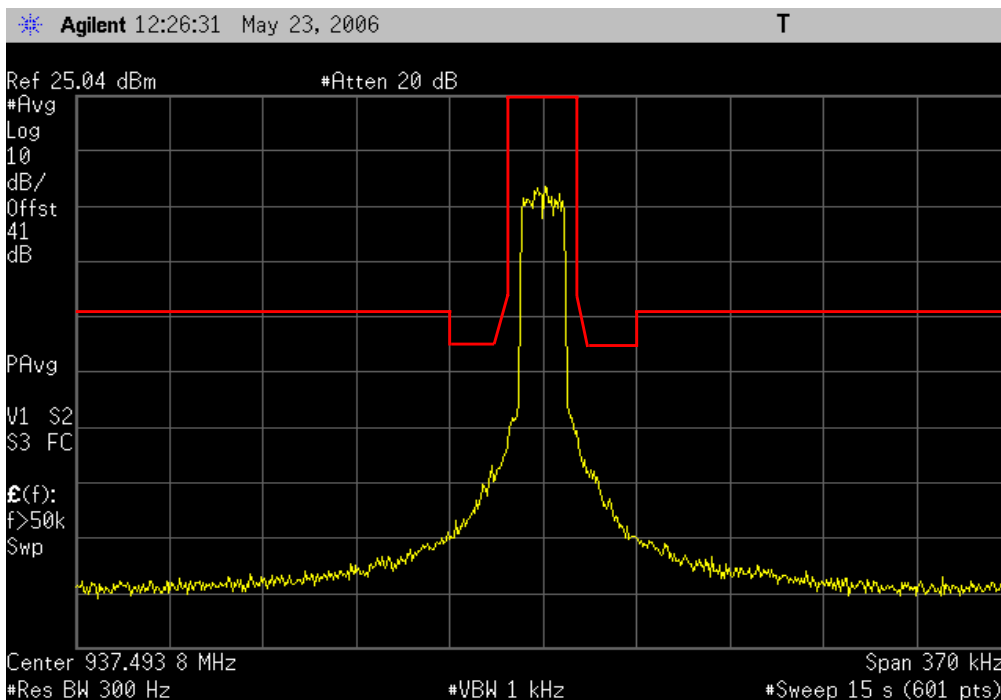
Mid Channel, High Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



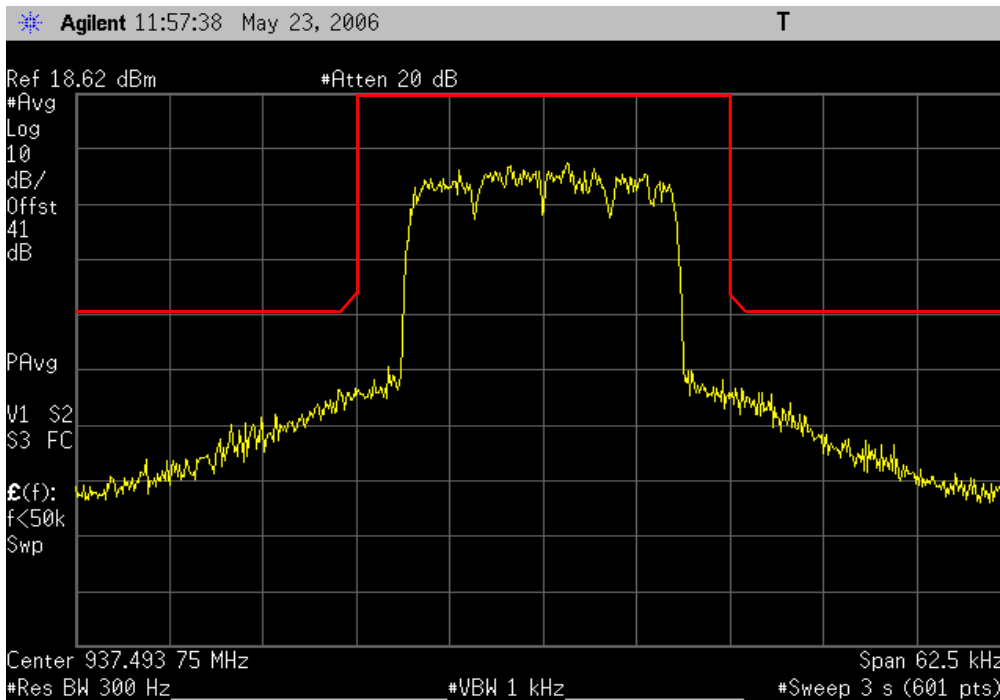
| | | |
|---------------------------------------|-------------------|-------------------------|
| Mid Channel, Mid Power, < 37.5 kHz Fc | | |
| Result: Pass | Value: N/A | Limit: See Table |



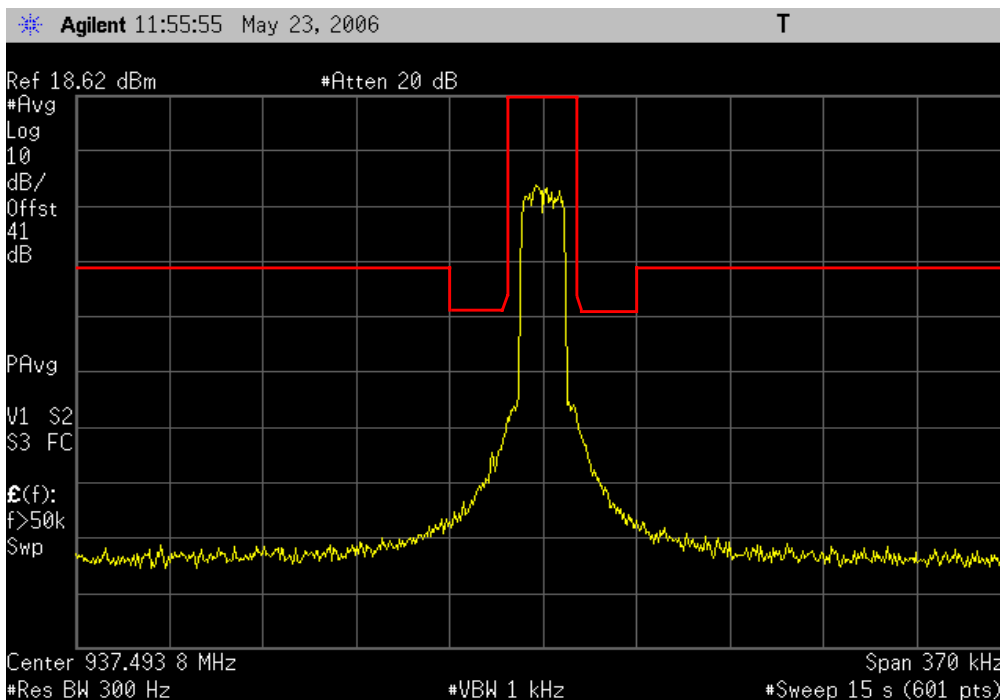
| | | |
|---------------------------------------|-------------------|-------------------------|
| Mid Channel, Mid Power, > 37.5 kHz Fc | | |
| Result: Pass | Value: N/A | Limit: See Table |



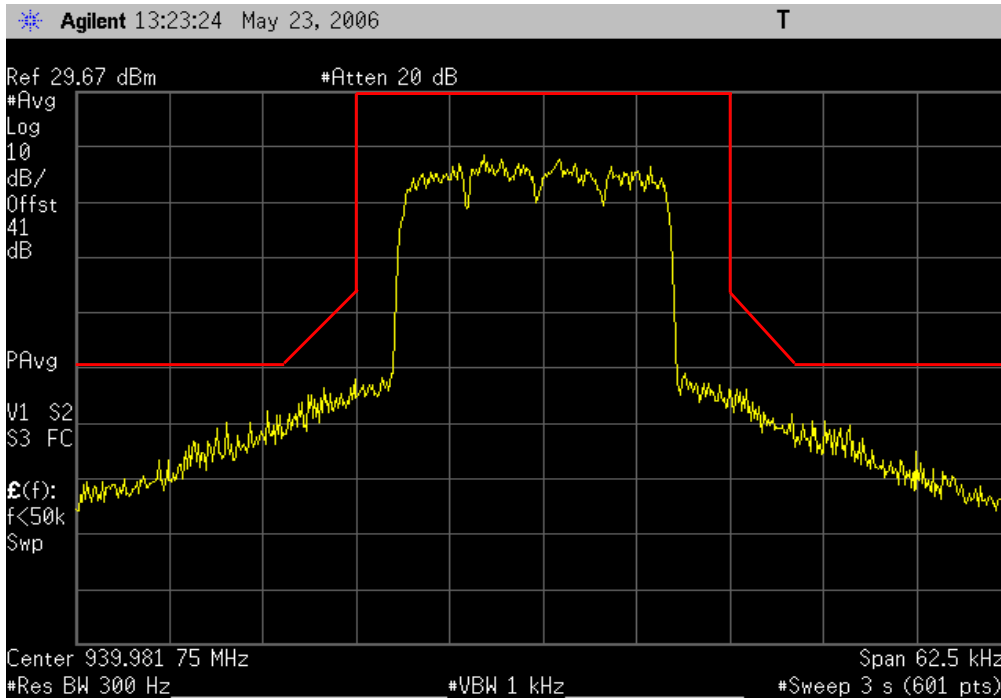
| | | | |
|---------------------------------------|-------------------|-------------------------|--|
| Mid Channel, Low Power, < 37.5 kHz Fc | | | |
| Result: Pass | Value: N/A | Limit: See Table | |



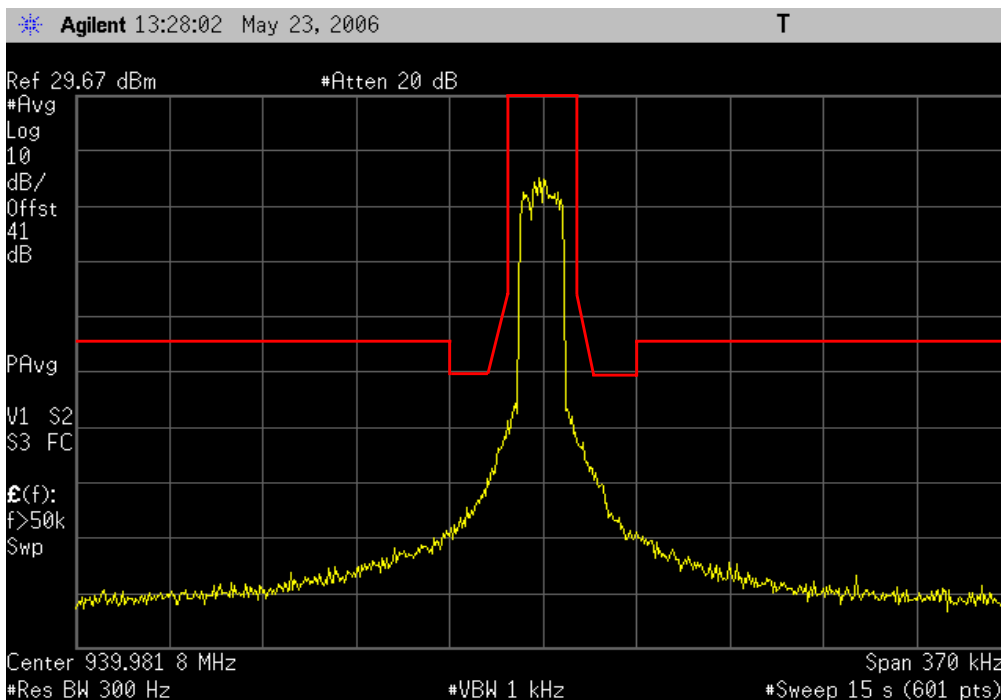
| | | | |
|---------------------------------------|-------------------|-------------------------|--|
| Mid Channel, Low Power, > 37.5 kHz Fc | | | |
| Result: Pass | Value: N/A | Limit: See Table | |



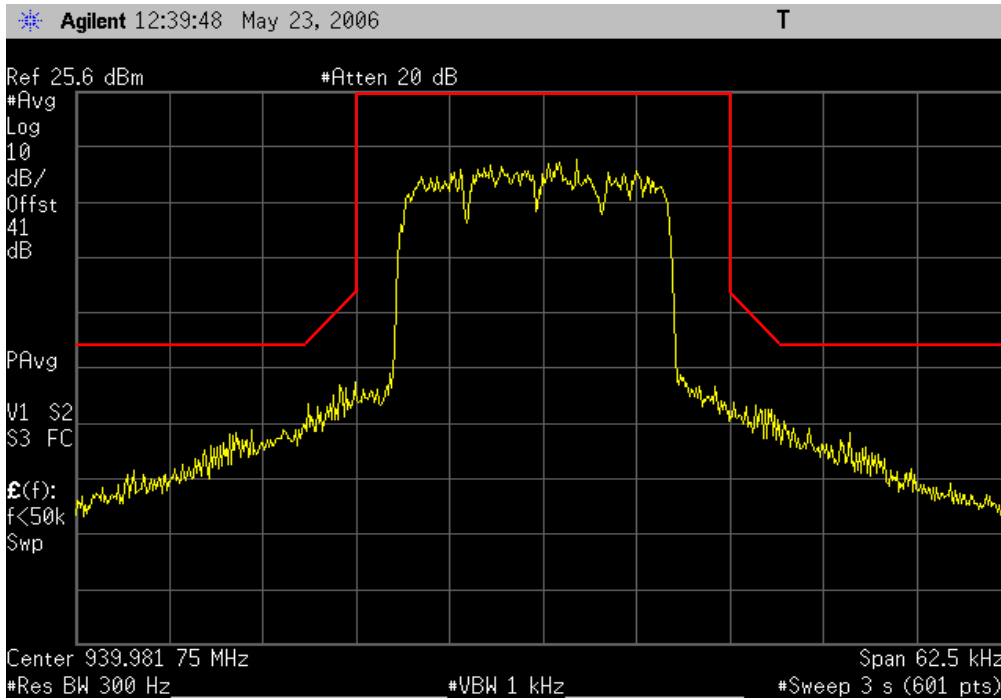
High Channel, High Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



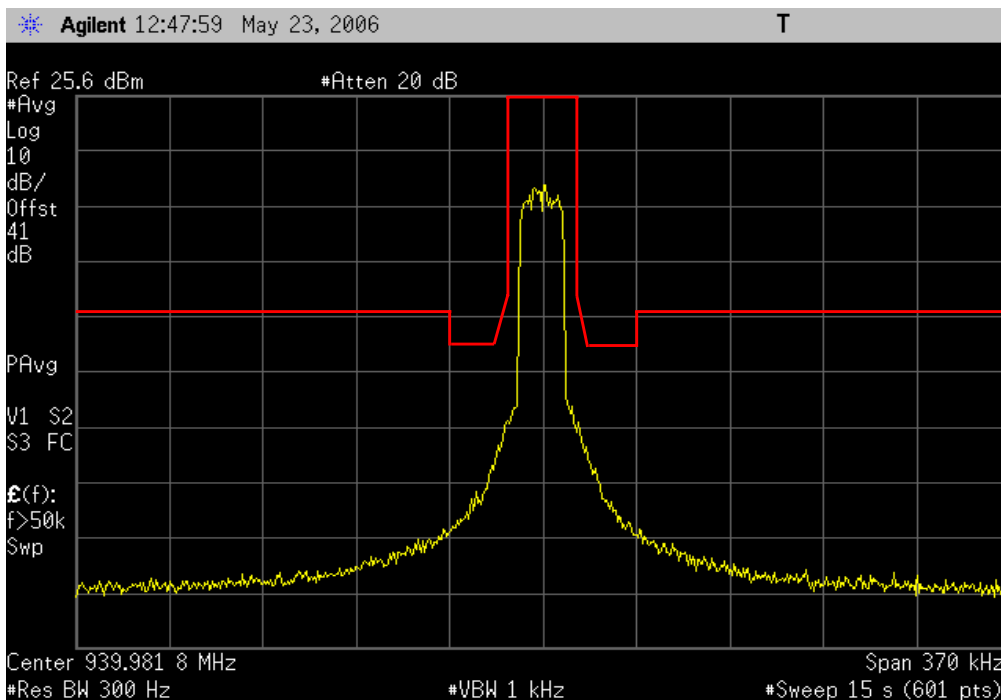
High Channel, High Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



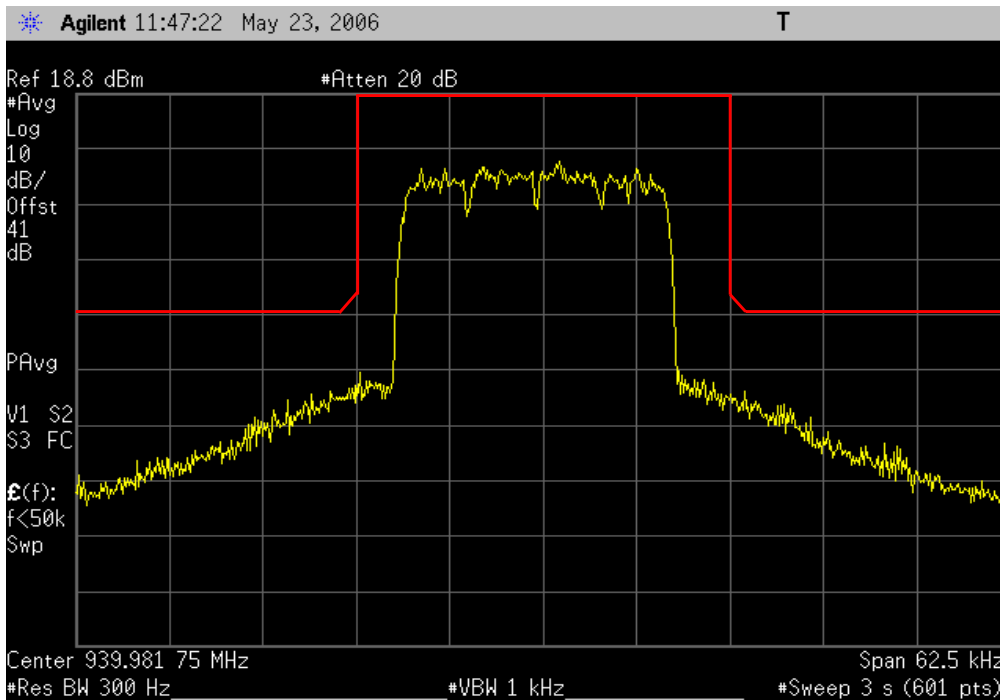
High Channel, Mid Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



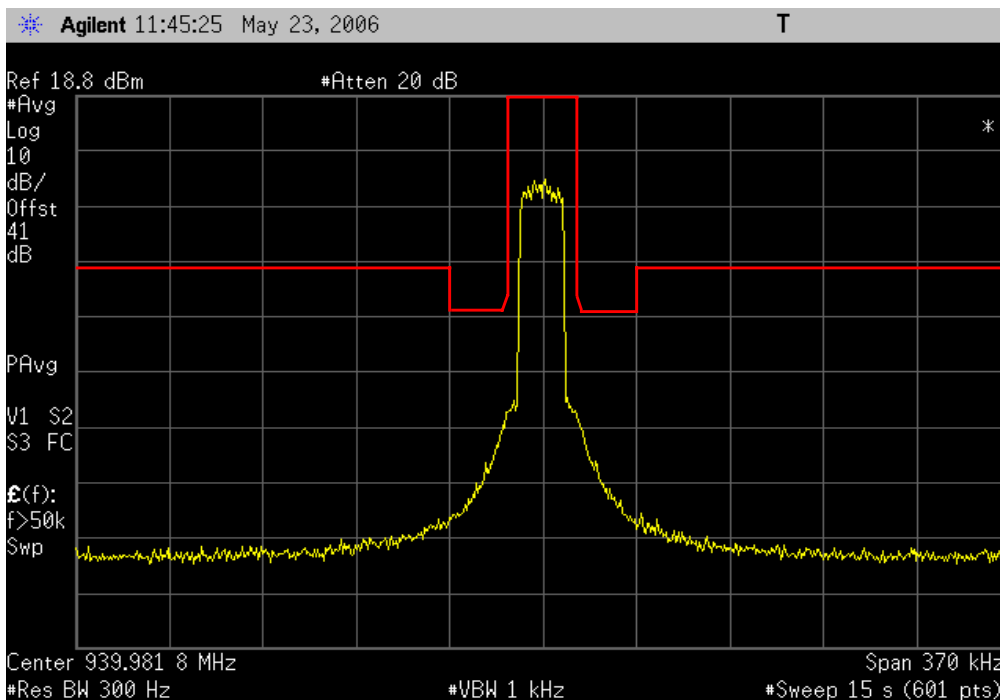
High Channel, Mid Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



High Channel, Low Power, < 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



High Channel, Low Power, > 37.5 kHz Fc
Result: Pass **Value:** N/A **Limit:** See Table



| Frequency (MHz) | Output Power (dBm) | Power (P) Watts | Attenuation for the range 12.5 kHz to 37.5 kHz from fc (dBc) | | | | Attenuation >37.5 kHz from fc (dBc) | |
|--------------------|--------------------------|--------------------|---|----------------|--------------|----|--|----|
| | | | 50 + (10*log P) | 116*log(f/6.1) | | 80 | 43 + (10*log P) | 80 |
| | | | | f = 12.5 kHz | f = 37.5 kHz | | | |
| 935.01875 | 30.28 | 1.07E+00 | 50.3 | 36.14 | 91.49 | 80 | 43.3 | 80 |
| | 25.52 | 3.56E-01 | 45.5 | 36.14 | 91.49 | 80 | 38.5 | 80 |
| | 19.62 | 9.16E-02 | 39.6 | 36.14 | 91.49 | 80 | 32.6 | 80 |
| 937.49375 | 30.30 | 1.07E+00 | 50.3 | 36.14 | 91.49 | 80 | 43.3 | 80 |
| | 25.04 | 3.19E-01 | 45.0 | 36.14 | 91.49 | 80 | 38.0 | 80 |
| | 18.62 | 7.28E-02 | 38.6 | 36.14 | 91.49 | 80 | 31.6 | 80 |
| 939.98175 | 29.67 | 9.27E-01 | 49.7 | 36.14 | 91.49 | 80 | 42.7 | 80 |
| | 25.60 | 3.63E-01 | 45.6 | 36.14 | 91.49 | 80 | 38.6 | 80 |
| | 18.80 | 7.59E-02 | 38.8 | 36.14 | 91.49 | 80 | 31.8 | 80 |

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|-----------------|--------|-----|-----------|----------|
| Spectrum Analyzer | Agilent | E4446A | AAT | 4/4/2006 | 12 |
| Signal Generator | Hewlett-Packard | 8648D | TGC | 1/27/2006 | 13 |
| Power Meter | Hewlett Packard | E4418A | SPA | 7/23/2004 | 24 |
| Power Sensor | Hewlett-Packard | 8481H | SPB | 7/23/2004 | 24 |

MEASUREMENT UNCERTAINTY


Measurement uncertainty is used to reflect the accuracy of the measured result as compared with its "true" or theoretically correct value. Our measurement data meets or exceeds the measurement uncertainty requirements of CISPR 16-4. In the case of transient tests our test equipment has been demonstrated by calibration to provide at least a 95% confidence that it complies with the test specification requirements. The measurement uncertainty for any test is available upon request.

TEST DESCRIPTION

The peak output power was measured with the EUT set to low, medium, and high transmit frequencies within the allowable band, and at all three power levels. The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer with an RMS average detector.

EMC

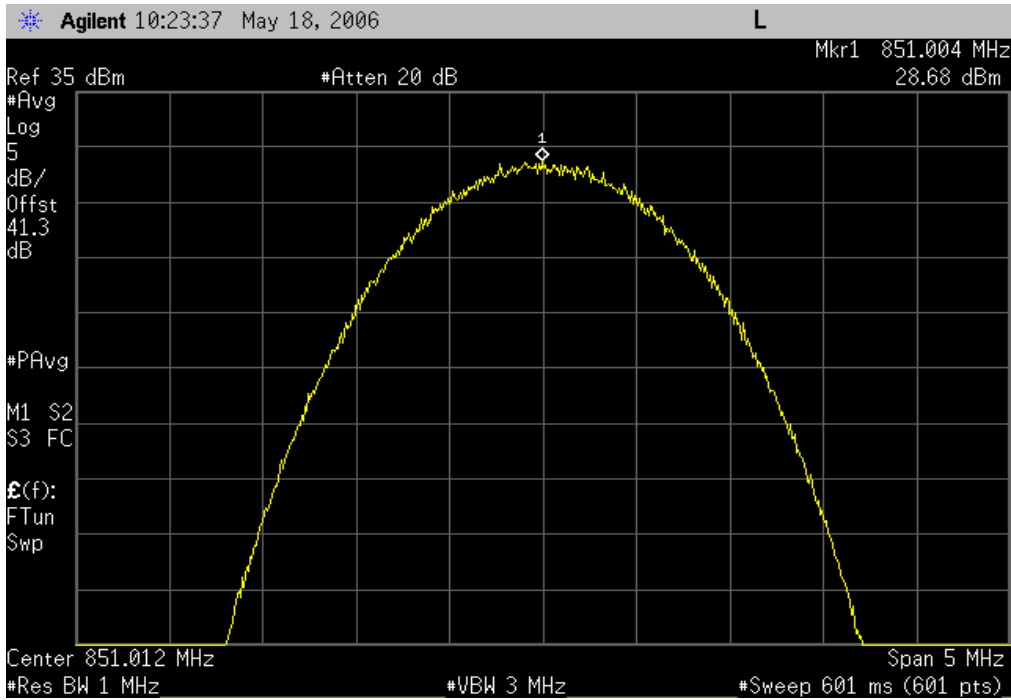
OUTPUT POWER

| | | | |
|--------------------------------------|---------------------------|--|----------|
| EUT: | MCRB | Work Order: | RAFN0062 |
| Serial Number: | Various | Date: | 05/18/06 |
| Customer: | Radioframe Networks, Inc. | Temperature: | 23°C |
| Attendees: | Dean Busch | Humidity: | 37% |
| Project: | None | Barometric Pres.: | 29.99 |
| Tested by: | Rod Peloquin | Power: | -48Vdc |
| | | Job Site: | EV06 |
| TEST SPECIFICATIONS | | Test Method | |
| FCC 90.691:2005 | | ANSI/TIA/EIA-603-B:2002 | |
| COMMENTS | | | |
| 800MHz Band | | | |
| DEVIATIONS FROM TEST STANDARD | | | |
| | | | |
| Configuration # | 1 |  Signature | |

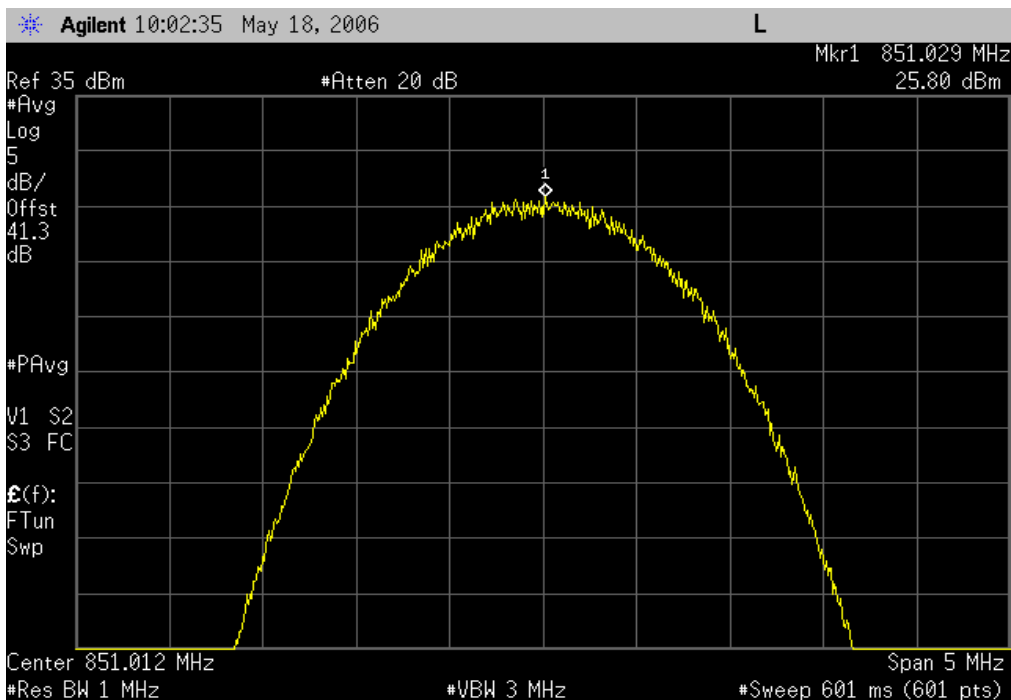
Modes of Operation and Test Conditions

| | Value | Limit | Result |
|--------------------------|-----------|-------|--------|
| Low Channel, High Power | 28.68 dBm | | Pass |
| Low Channel, Mid Power | 25.80 dBm | | Pass |
| Low Channel, Low Power | 18.23 dBm | | Pass |
| Mid Channel, High Power | 31.15 dBm | | Pass |
| Mid Channel, Mid Power | 25.46 dBm | | Pass |
| Mid Channel, Low Power | 19.33 dBm | | Pass |
| High Channel, High Power | 28.93 dBm | | Pass |
| High Channel, Mid Power | 24.70 dBm | | Pass |
| High Channel, Low Power | 18.22 dBm | | Pass |

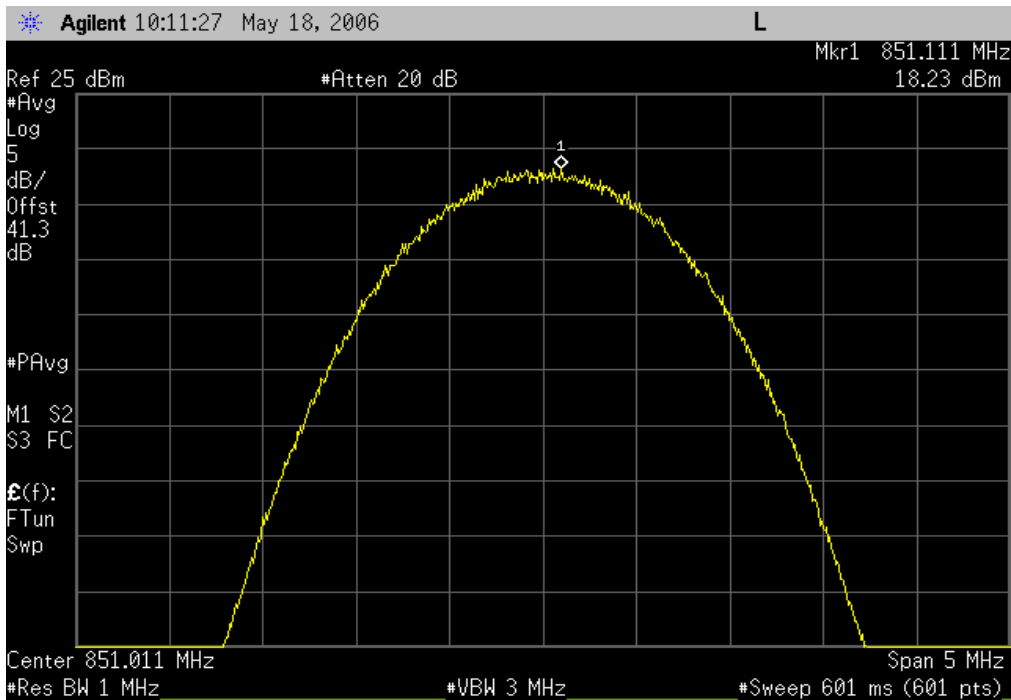
Result: Pass **Low Channel, High Power** **Value:** 28.68 dBm **Limit:**



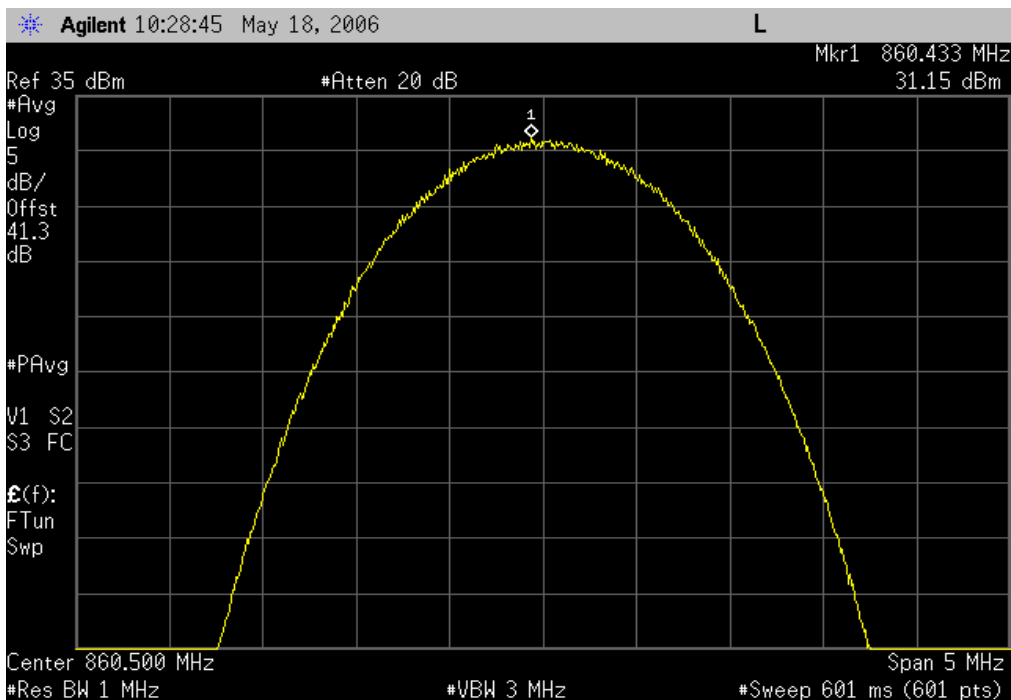
Result: Pass **Low Channel, Mid Power** **Value:** 25.80 dBm **Limit:**



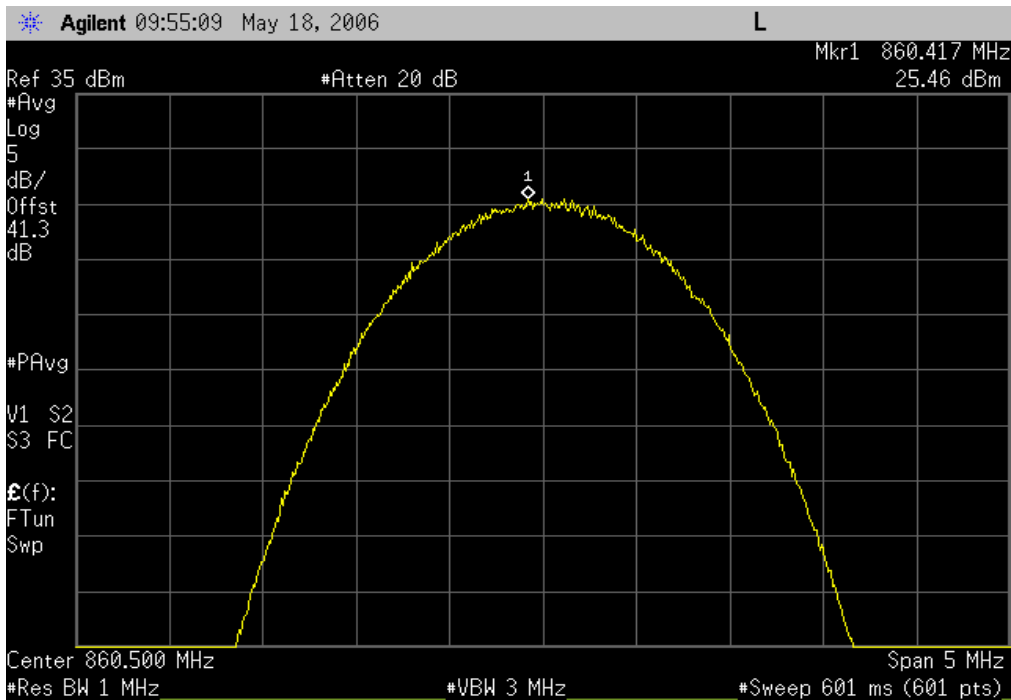
| | | |
|------------------------|-------------------------|---------------|
| Low Channel, Low Power | | |
| Result: Pass | Value: 18.23 dBm | Limit: |



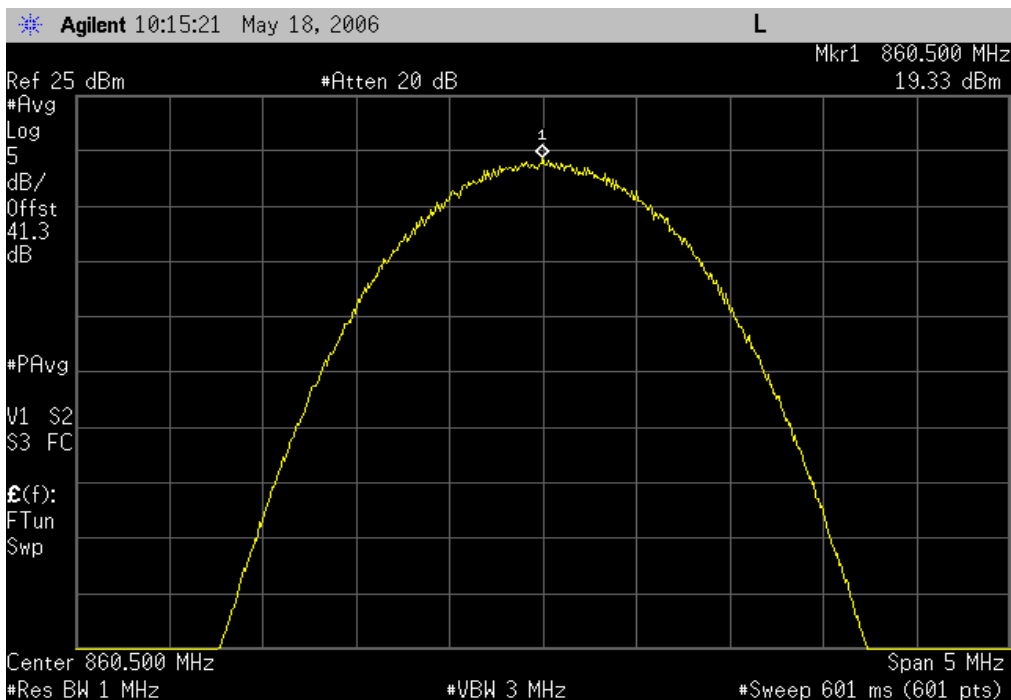
| | | |
|-------------------------|-------------------------|---------------|
| Mid Channel, High Power | | |
| Result: Pass | Value: 31.15 dBm | Limit: |



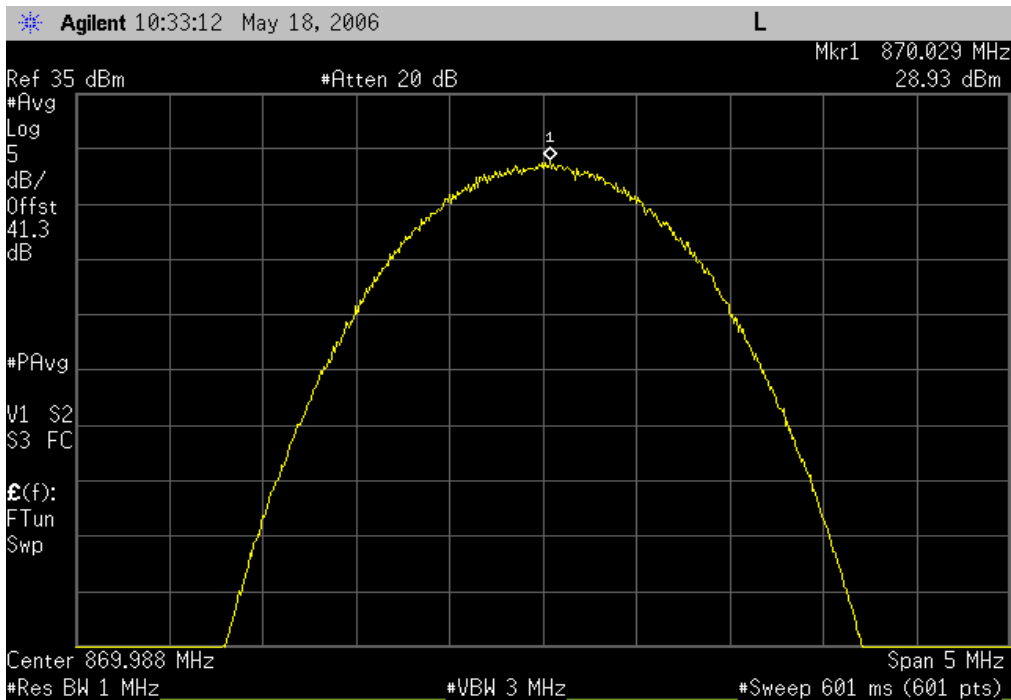
Result: Pass **Value:** 25.46 dBm **Limit:**



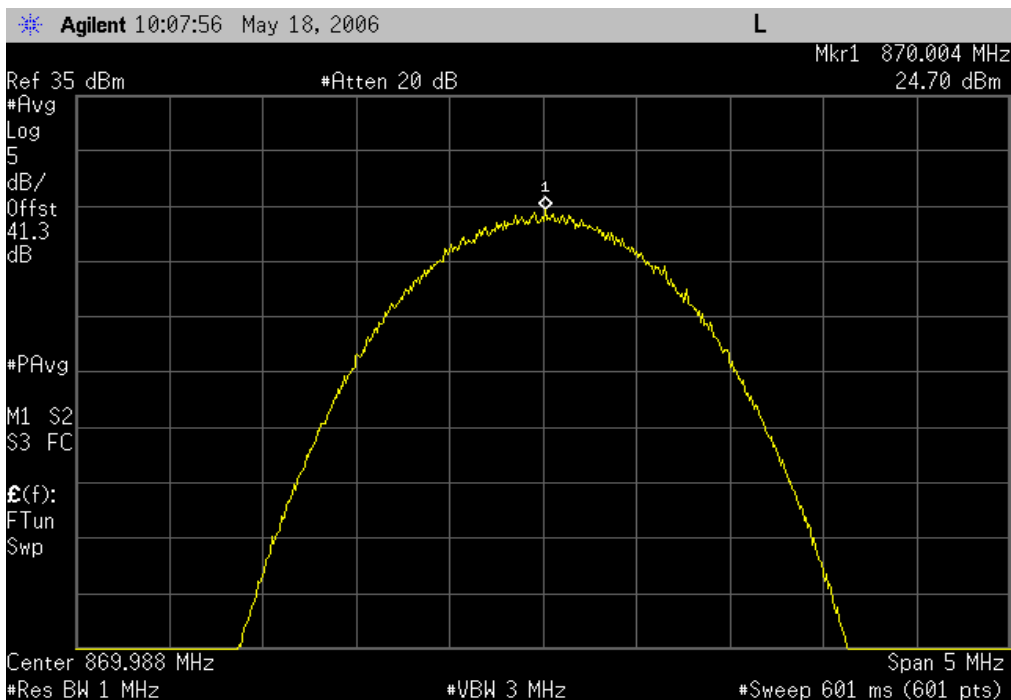
Result: Pass **Value:** 19.33 dBm **Limit:**



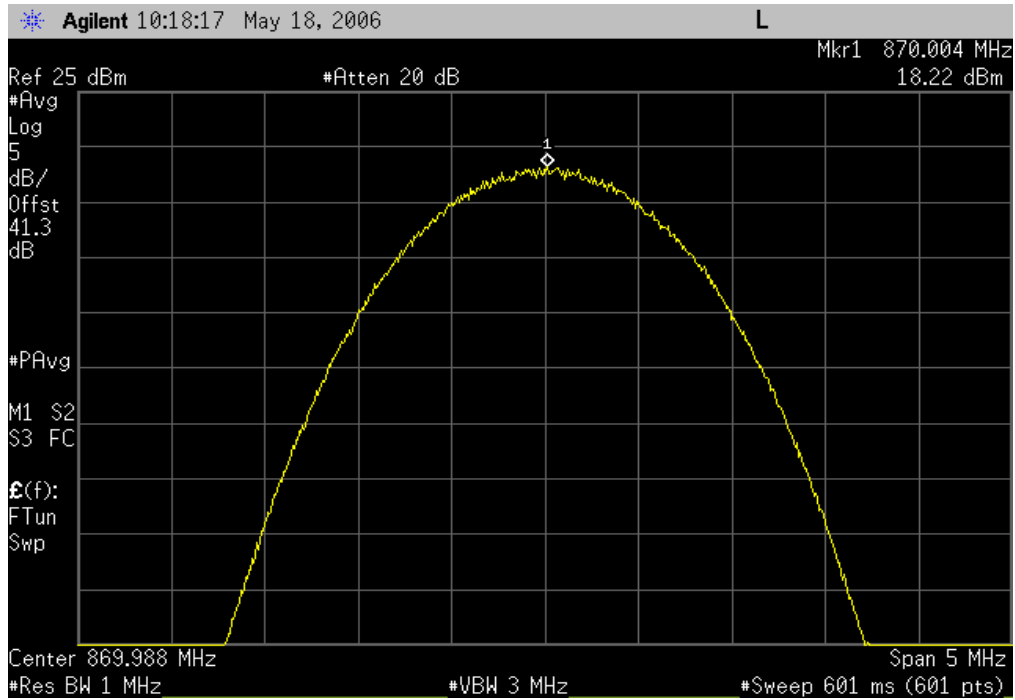
| | | |
|--------------------------|-------------------------|---------------|
| High Channel, High Power | | |
| Result: Pass | Value: 28.93 dBm | Limit: |



| | | |
|-------------------------|-------------------------|---------------|
| High Channel, Mid Power | | |
| Result: Pass | Value: 24.70 dBm | Limit: |



| | | |
|-------------------------|-------------------------|---------------|
| High Channel, Low Power | | |
| Result: Pass | Value: 18.22 dBm | Limit: |



Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

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| Description | Manufacturer | Model | ID | Last Cal. | Interval |
|-------------------|-----------------|--------|-----|-----------|----------|
| Spectrum Analyzer | Agilent | E4446A | AAT | 4/4/2006 | 12 |
| Attenuator | Weinschel Corp | 54A-10 | RBK | NCR | 13 |
| Power Meter | Hewlett Packard | E4418A | SPA | 7/23/2004 | 24 |
| Power Sensor | Hewlett-Packard | 8481H | SPB | 7/23/2004 | 24 |
| Signal Generator | Hewlett-Packard | 8648D | TGC | 1/27/2006 | 13 |

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EMC

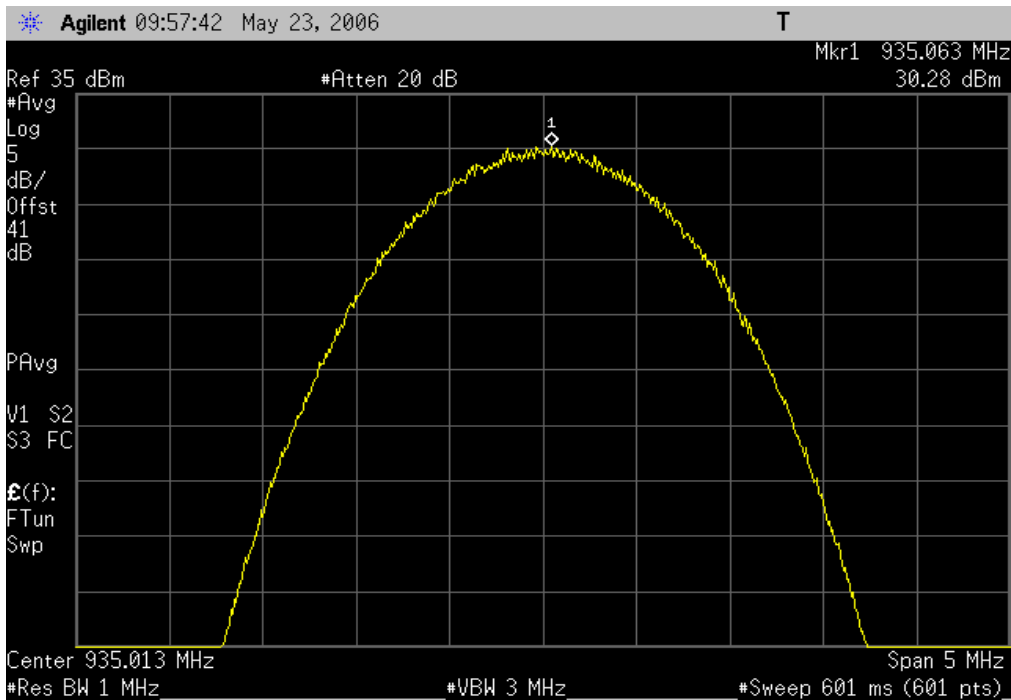
OUTPUT POWER

| | | | |
|--------------------------------------|---------------------------|--|----------|
| EUT: | MCRB | Work Order: | RAFN0062 |
| Serial Number: | Various | Date: | 05/23/06 |
| Customer: | Radioframe Networks, Inc. | Temperature: | 22°C |
| Attendees: | Dean Busch | Humidity: | 43% |
| Project: | None | Barometric Pres.: | 29.93 |
| Tested by: | Rod Peloquin | Power: | -48Vdc |
| | | Job Site: | EV01 |
| TEST SPECIFICATIONS | | Test Method | |
| FCC 90.691:2005 | | ANSI/TIA/EIA-603-B:2002 | |
| COMMENTS | | | |
| 900MHz Band | | | |
| DEVIATIONS FROM TEST STANDARD | | | |
| | | | |
| Configuration # | 1 |  Signature | |

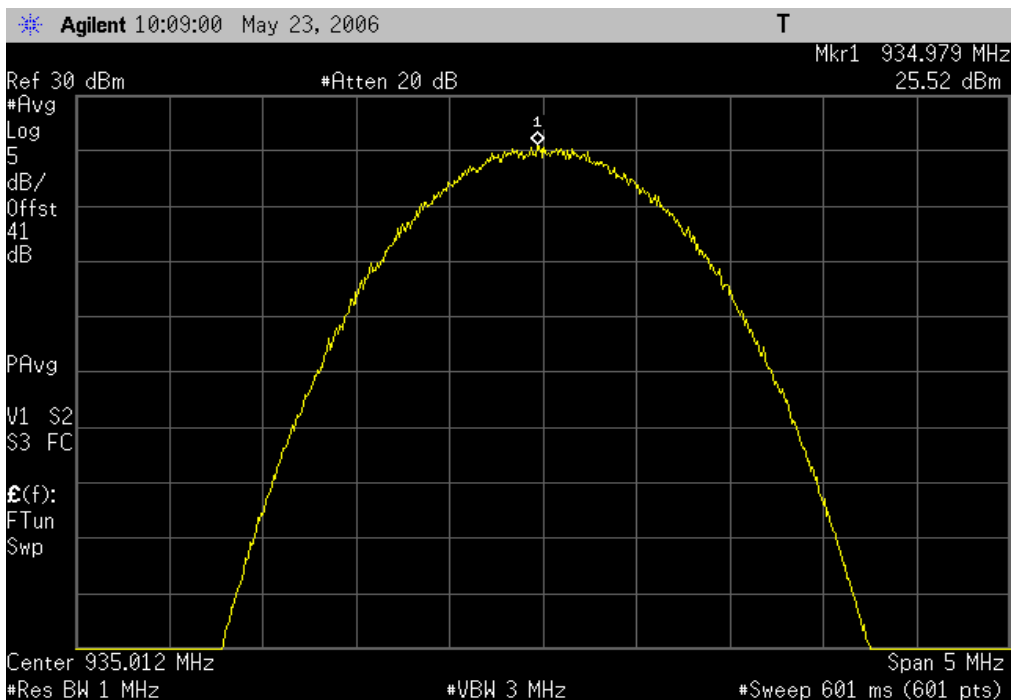
Modes of Operation and Test Conditions

| | Value | Limit | Result |
|--------------------------|-----------|-------|--------|
| Low Channel, High Power | 30.28 dBm | | Pass |
| Low Channel, Mid Power | 25.52 dBm | | Pass |
| Low Channel, Low Power | 19.62 dBm | | Pass |
| Mid Channel, High Power | 30.30 dBm | | Pass |
| Mid Channel, Mid Power | 25.04 dBm | | Pass |
| Mid Channel, Low Power | 18.62 dBm | | Pass |
| High Channel, High Power | 29.67 dBm | | Pass |
| High Channel, Mid Power | 25.60 dBm | | Pass |
| High Channel, Low Power | 18.80 dBm | | Pass |

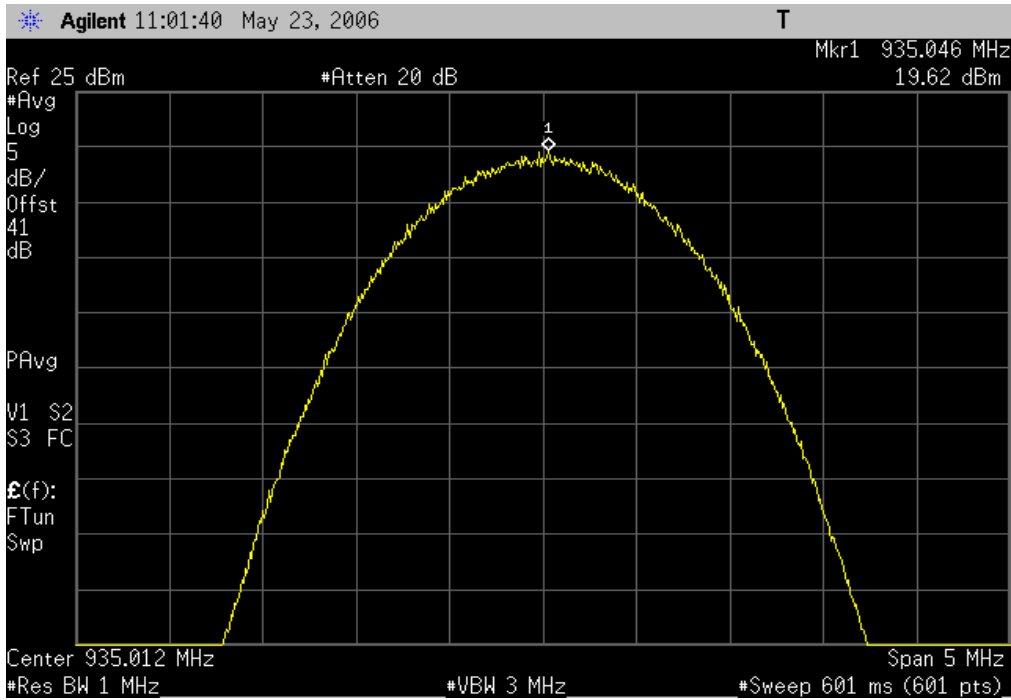
| | | |
|-------------------------|-------------------------|---------------|
| Low Channel, High Power | | |
| Result: Pass | Value: 30.28 dBm | Limit: |



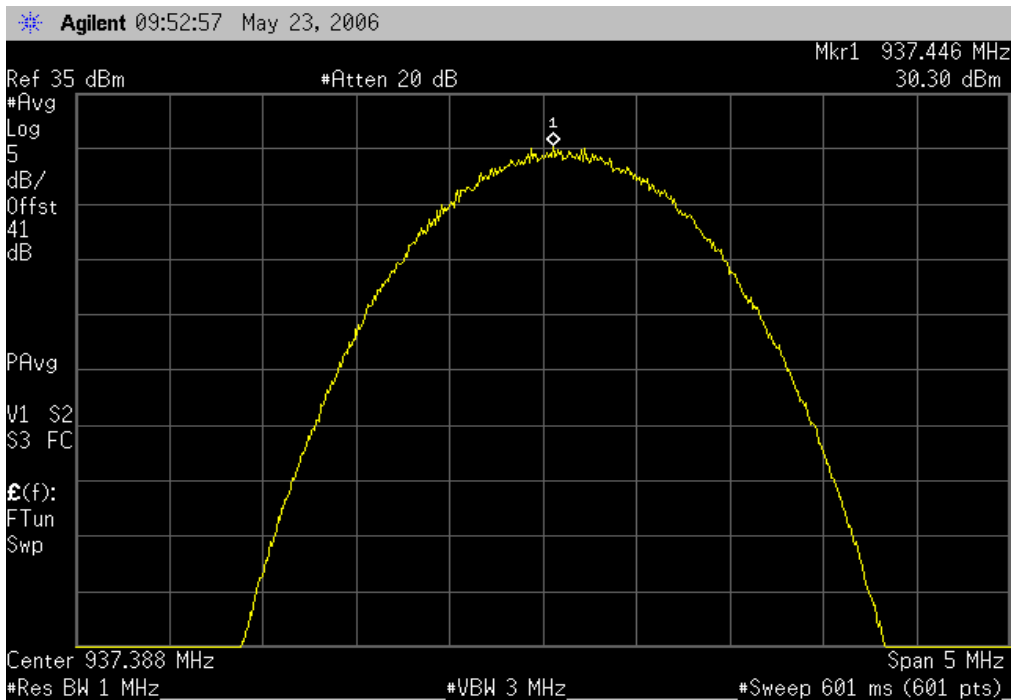
| | | |
|------------------------|-------------------------|---------------|
| Low Channel, Mid Power | | |
| Result: Pass | Value: 25.52 dBm | Limit: |



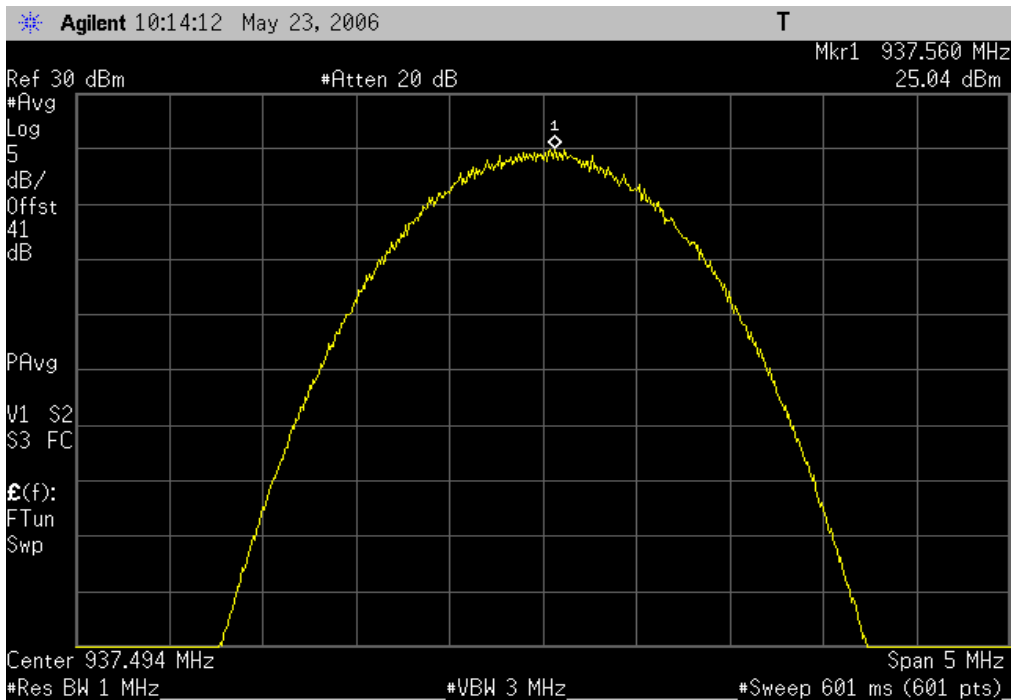
| | | |
|------------------------|-------------------------|---------------|
| Low Channel, Low Power | | |
| Result: Pass | Value: 19.62 dBm | Limit: |



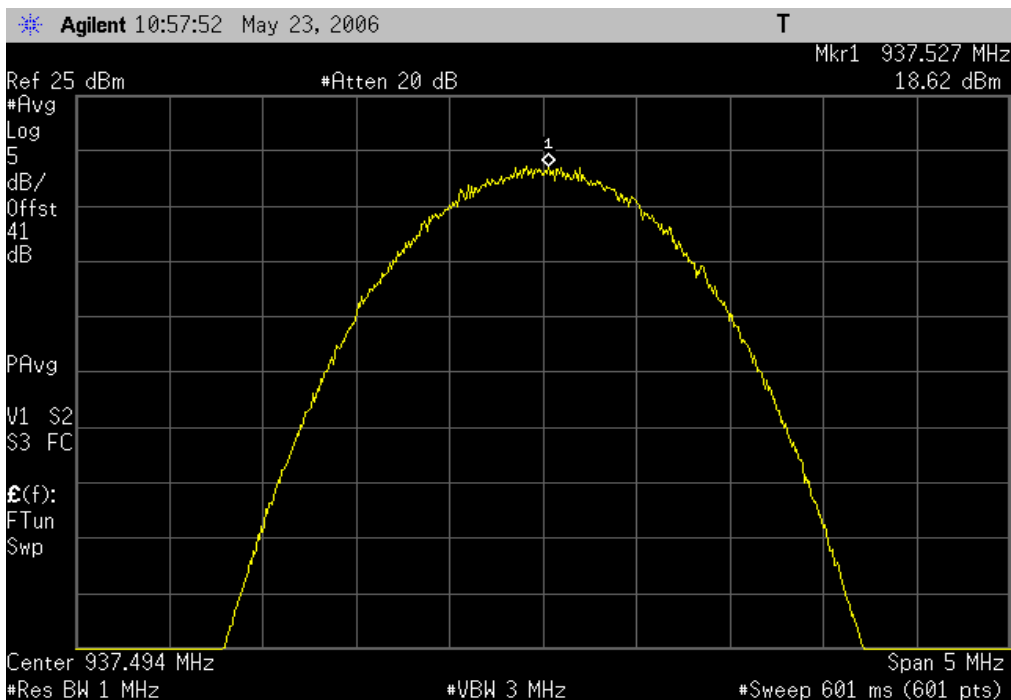
| | | |
|-------------------------|-------------------------|---------------|
| Mid Channel, High Power | | |
| Result: Pass | Value: 30.30 dBm | Limit: |



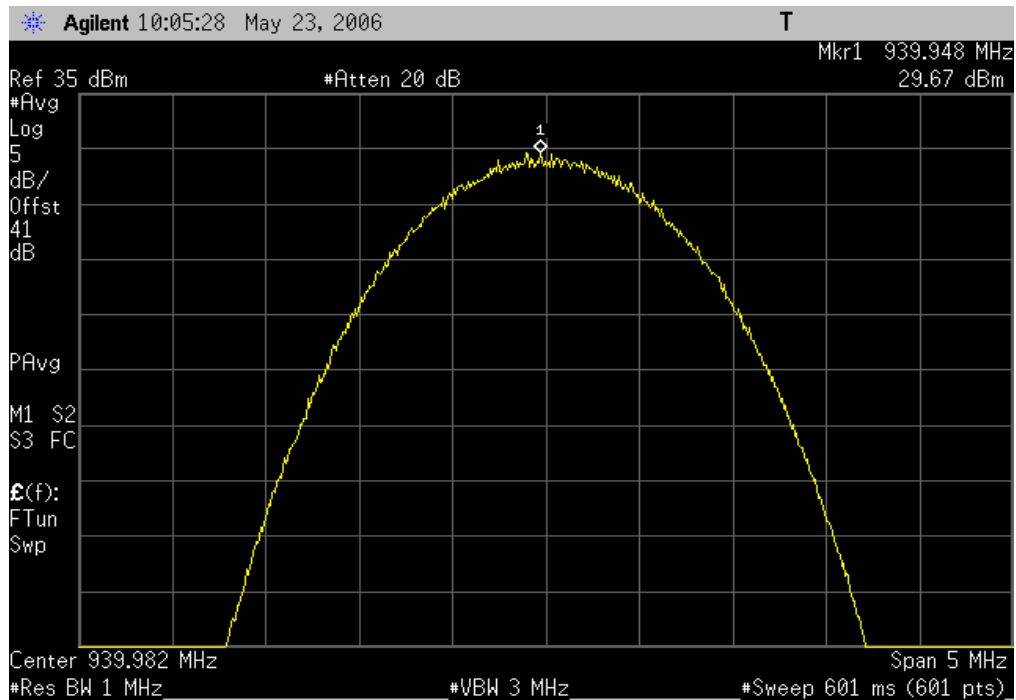
| | | |
|------------------------|-------------------------|---------------|
| Mid Channel, Mid Power | | |
| Result: Pass | Value: 25.04 dBm | Limit: |



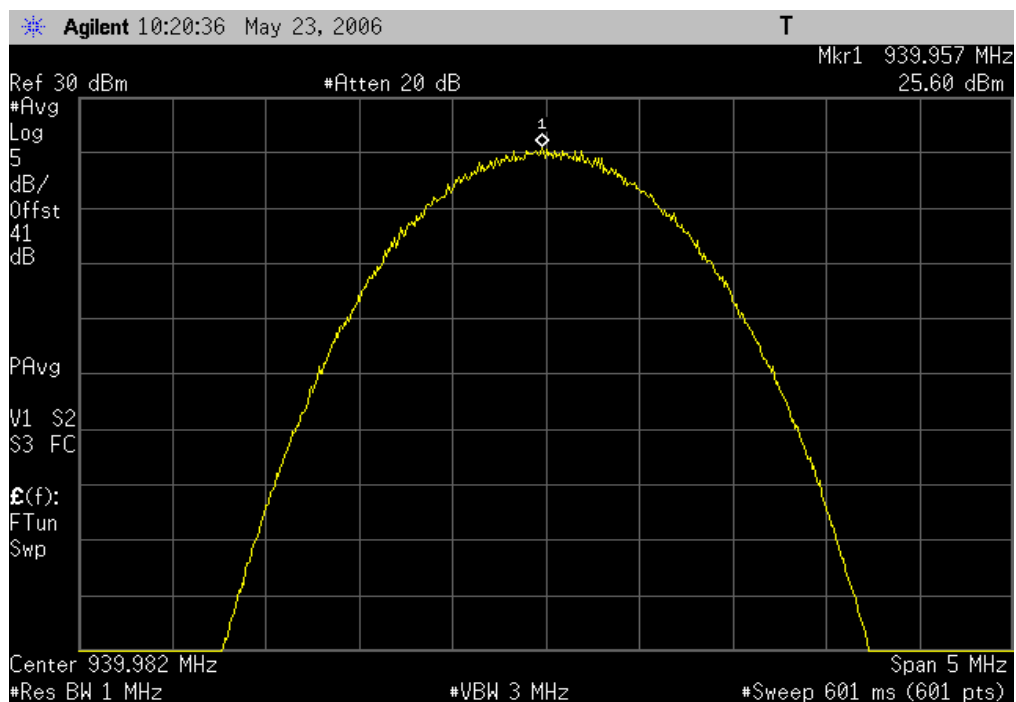
| | | |
|------------------------|-------------------------|---------------|
| Mid Channel, Low Power | | |
| Result: Pass | Value: 18.62 dBm | Limit: |



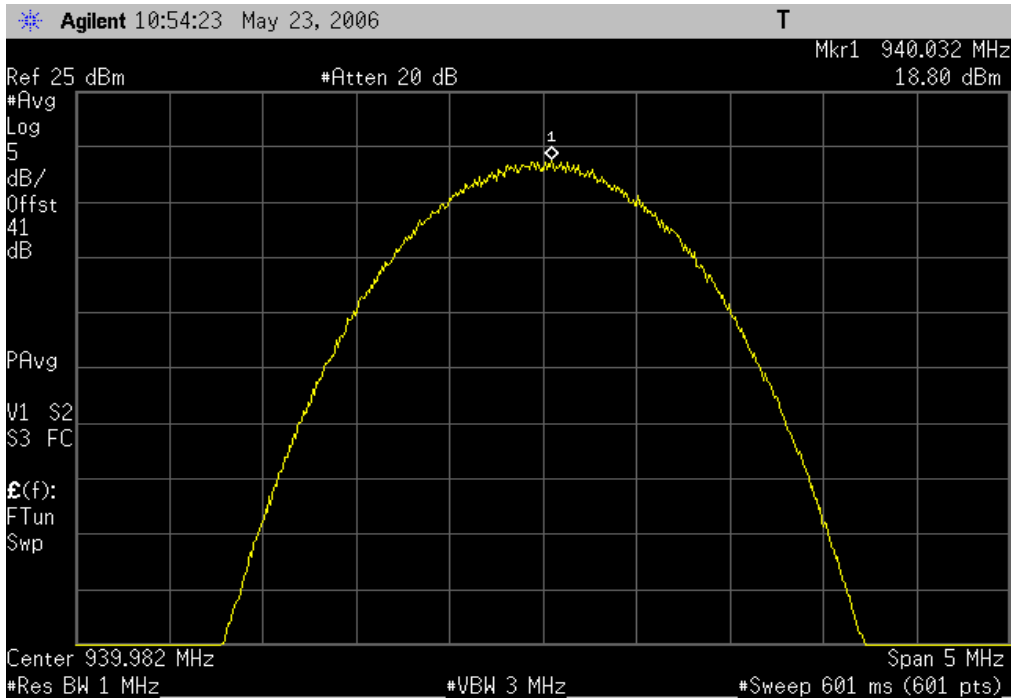
| High Channel, High Power | | |
|--------------------------|-------------------------|---------------|
| Result: Pass | Value: 29.67 dBm | Limit: |



| High Channel, Mid Power | | |
|-------------------------|-------------------------|---------------|
| Result: Pass | Value: 25.60 dBm | Limit: |



| | | |
|-------------------------|-------------------------|---------------|
| High Channel, Low Power | | |
| Result: Pass | Value: 18.80 dBm | Limit: |



Justification

The individuals and/or the organization requesting the test provided the modes, configurations and settings available to evaluate. While scanning the radiated emissions, all of the EUT parameters listed below were investigated. This includes, but may not be limited to, antennas, tuned transmit frequency ranges, operating modes, and data rates.

Channels in Specified Band Investigated:

Single channels within the center of the allowable 800MHz and 900MHz bands

Operating Modes Investigated:

Typical

Data Rates Investigated:

96 kbps at 64-QAM

Output Power Setting(s) Investigated:

Maximum ~ 14 dBm

Power Input Settings Investigated:

-48Vdc

Software\Firmware Applied During Test

| Exercise software | Vx Works | Version | RFN_14.0.225 |
|--|----------|---------|--------------|
| Description | | | |
| The system was tested using standard operating production software to exercise the functions of the device during the testing. | | | |

EUT and Peripherals

| Description | Manufacturer | Model/Part Number | Serial Number |
|--|---------------------------|-------------------|---------------|
| EUT- Multi-Channel RadioBlade (MCRB | Radioframe Networks, Inc. | 176-0860-00 | 14106110148 |
| EUT- Multi-Channel RadioBlade (MCRB | Radioframe Networks, Inc. | 176-0860-00 | 14106110160 |
| EUT- Multi-Channel RadioBlade (MCRB | Radioframe Networks, Inc. | 176-0860-00 | 14106110151 |
| EUT- Multi-Channel RadioBlade (MCRB | Radioframe Networks, Inc. | 176-0860-00 | 14106110146 |
| EUT- Multi-Channel RadioBlade (MCRB | Radioframe Networks, Inc. | 176-0860-00 | 14106110173 |
| EUT- Multi-Channel RadioBlade (MCRB | Radioframe Networks, Inc. | 176-0860-00 | 14106110174 |
| MC-15 SERIES DUAL BAND SYSTEM (3 SE | Radioframe Networks, Inc. | 176-7970-xx | 14106050325 |
| FRU, DUAL BAND RF SHELF | Radioframe Networks, Inc. | 176-0970-xx | 14105510109 |
| FRU, DUAL BAND RF SHELF | Radioframe Networks, Inc. | 176-0970-xx | 14105510110 |
| FRU, DUAL BAND RF SHELF | Radioframe Networks, Inc. | 176-0970-xx | 14105510113 |
| RadioBlade Shelf (RBS) | Radioframe Networks, Inc. | 176-0535-xx | 14106030127 |
| MC-15 BTS Interface Chassis (BIC) | Radioframe Networks, Inc. | 176-0900-xx | 14106050474 |
| MC Common RadioFrame Interface Card | Radioframe Networks, Inc. | 176-7540-xx | 041053919XV |
| MC Common RadioFrame Interface Card | Radioframe Networks, Inc. | 176-7540-xx | 041053919W3 |
| Base Processing Card (BPC) | Radioframe Networks, Inc. | 176-7570-xx | 04105411HGM |
| Base Processing Card (BPC) | Radioframe Networks, Inc. | 176-7570-xx | 04105401GP1 |
| Base Processing Card (BPC) | Radioframe Networks, Inc. | 176-7570-xx | 04105421JKZ |
| MC-15 Airlink Interface Chassis (AI | Radioframe Networks, Inc. | 176-0800-xx | 14106050522 |
| BPC W/ LC SPAM | Radioframe Networks, Inc. | 176-7565-xx | 04105411HC0 |
| SPAM | Radioframe Networks, Inc. | 176-7510-xx | Unknown |
| SPAM | Radioframe Networks, Inc. | 176-7510-xx | Unknown |
| BPC W/ LC SPAM | Radioframe Networks, Inc. | 176-7565-xx | 04105411HJX |
| SPAM | Radioframe Networks, Inc. | 176-7510-xx | Unknown |
| SPAM | Radioframe Networks, Inc. | 176-7510-xx | Unknown |
| BPC W/ LC SPAM | Radioframe Networks, Inc. | 176-7565-xx | 04105411HLH |
| SPAM | Radioframe Networks, Inc. | 176-7510-xx | Unknown |
| SPAM | Radioframe Networks, Inc. | 176-7510-xx | Unknown |
| Ethernet Rear Transition Module (ER | Radioframe Networks, Inc. | 176-7562-xx | 14105320204 |
| Ethernet Rear Transition Module (ER | Radioframe Networks, Inc. | 176-7562-xx | 14105320203 |
| Coaxial RMII Transceiver Card (CRTC | Radioframe Networks, Inc. | 176-0820-xx | 14105480250 |

Remote Equipment Outside of Test Setup Boundary

| Description | Manufacturer | Model/Part Number | Serial Number |
|-----------------|-------------------------------|-------------------|---------------|
| Site Simulator | Radioframe Networks, Inc. | N/a | N/a |
| Site Controller | Motorola, Inc. | CCN1008N | CAF030LTC4 |
| GPS Antenna | Hewlett-Packard | 8532A | 901 |
| DC Power Supply | Electronic Measurements, Inc. | EMS 60-33 | 20K11738 |

Equipment isolated from the EUT so as not to contribute to the measurement result is considered to be outside the test setup boundary

| Cables | | | | | |
|------------|--------|------------|---------|-------------------------------|-----------------|
| Cable Type | Shield | Length (m) | Ferrite | Connection 1 | Connection 2 |
| DC Power | No | 8.0 | No | MC-15 SERIES DUAL BAND SYSTEM | DC Supply |
| BNC | Yes | 30.0 | No | ERTM | Site Simulator |
| BNC | Yes | 30.0 | No | Site Controller | Site Simulator |
| BNC | Yes | 3.0 | No | GPS Antenna | Site Controller |
| Ethernet | No | 3.0 | No | Site Controller | ERTM |

| Measurement Equipment | | | | | |
|-------------------------------------|---------------------------|----------------|------------|------------|----------|
| Description | Manufacturer | Model | Identifier | Last Cal | Interval |
| Spectrum Analyzer | Hewlett-Packard | 8593E | AAN | 01/25/2006 | 13 mo |
| Multimeter | Tektronix | DMM912 | MMH | 12/08/2005 | 13 mo |
| DC Power Supply | Sorensen | DCR60-45B | TPB | NCR | NA |
| Chamber, Temp./Humidity Chamber | Cincinnati Sub Zero (CSZ) | ZH-32-2-2-H/AC | TBA | 08/24/2005 | 12 mo |
| Chamber Temp. & Humidity Controller | ESZ / Eurotherm | Dimension II | TBC | 08/24/2005 | 12 mo |

Test Description

Requirement: Per 47 CFR 15.255, the frequency stability shall be measured with variation of ambient temperature and primary supply voltage. A spectrum analyzer or frequency counter can be used to measure the frequency stability. If using a spectrum analyzer, it must have a precision frequency reference that exceeds the stability requirement of the transmitter. A temperature / humidity chamber is required.

Configuration:

Variation of Supply Voltage

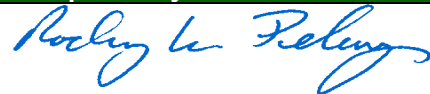
The primary supply voltage was varied from 85% to 115% of nominal. The EUT can only be operated from the public AC mains, so an DC lab supply was used to vary the supply voltage from 115% to 85% -48V DC.

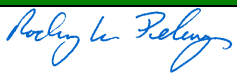
Variation of Ambient Temperature

Using a temperature chamber, the transmit frequency was recorded at the extremes of the specified temperature range (-20° to +50° C) and at 10°C intervals.

Measurements were made at the single transmit frequency. The antenna is integral to the EUT, so a radiated measurement was made using a spectrum analyzer and a near field probe. The spectrum analyzer is equipped with a precision frequency reference that exceeds the stability requirement of the EUT.

Completed by:



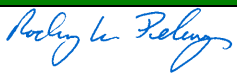
| | | | | |
|---|------------|------------------------------------|------------|----------------------|
| NORTHWEST EMC | | FREQUENCY STABILITY | | Rev BETA 01/30/01 |
| EUT: MCRB | | Work Order: RAFN0060 | | |
| Serial Number: Various | | Date: 03/21/06 | | |
| Customer: Radioframe Networks, Inc. | | Temperature: 21°C | | |
| Attendees: Dean Busch | | Tested by: Rod Pelquin | | Humidity: 32% |
| Customer Ref. No.: None | | Power: -48 Vdc | | Job Site: Off-site |
| TEST SPECIFICATIONS | | | | |
| Specification: 47 CFR 2.1055, 90.213 | Year: 2005 | Method: TIA/EIA - 603 | Year: 2002 | |
| SAMPLE CALCULATIONS | | | | |
| | | | | |
| COMMENTS | | | | |
| | | | | |
| EUT OPERATING MODES | | | | |
| Transmitting mid band | | | | |
| DEVIATIONS FROM TEST STANDARD | | | | |
| None | | | | |
| REQUIREMENTS | | | | |
| Minimum frequency stability of 1 part per million (ppm) for variations of temperature and supply voltage (DC) | | | | |
| RESULTS | | MINIMUM FREQUENCY STABILITY | | |
| Pass | | 0.3 ppm | | |
| SIGNATURE | | | | |
|  Tested By: _____ | | | | |
| DESCRIPTION OF TEST | | | | |
| Frequency Stability | | | | |

Frequency Stability with Variation of Ambient Temperature (Primary Supply = 48 Vdc)

| Temp (°C) | Assigned Frequency (MHz) | Measured Frequency (MHz) | Tolerance (ppm) | Specification (ppm) |
|-----------|--------------------------|--------------------------|-----------------|---------------------|
| 50 | 860.55000 | 860.550037 | 0.04 | 1 |
| 40 | 860.55000 | 860.550062 | 0.07 | 1 |
| 30 | 860.55000 | 860.550037 | 0.04 | 1 |
| 20 | 860.55000 | 860.550037 | 0.04 | 1 |
| 10 | 860.55000 | 860.550250 | 0.29 | 1 |
| 0 | 860.55000 | 860.550037 | 0.04 | 1 |
| -10 | 860.55000 | 860.550049 | 0.06 | 1 |
| -20 | 860.55000 | 860.550049 | 0.06 | 1 |
| -30 | 860.55000 | 860.550049 | 0.06 | 1 |

Frequency Stability with Variation of Primary Supply Voltage (Ambient Temperature = 20°C)

| Voltage (Vdc) | Assigned Frequency (MHz) | Measured Frequency (MHz) | Tolerance (ppm) | Specification (ppm) |
|---------------|--------------------------|--------------------------|-----------------|---------------------|
| 55.2 (115%) | 860.55000 | 860.550062 | 0.07 | 1 |
| 52.8 (110%) | 860.55000 | 860.550037 | 0.04 | 1 |
| 50.4 (105%) | 860.55000 | 860.550050 | 0.06 | 1 |
| 48 (100%) | 860.55000 | 860.550037 | 0.04 | 1 |
| 45.6 (95%) | 860.55000 | 860.550050 | 0.06 | 1 |
| 43.2 (90%) | 860.55000 | 860.550000 | 0.00 | 1 |
| 40.8 (85%) | 860.55000 | 860.550000 | 0.00 | 1 |

| NORTHWEST EMC | | FREQUENCY STABILITY | | Rev BETA 01/30/01 |
|---|---------------------------|------------------------------------|---------------|----------------------|
| EUT: | MCRB | Work Order: | RAFN0060 | |
| Serial Number: | Various | Date: | 03/21/06 | |
| Customer: | Radioframe Networks, Inc. | Temperature: | 21°C | |
| Attendees: | Dean Busch | Tested by: | Rod Pelquoin | Humidity: |
| Customer Ref. No.: | None | Power: | -48 Vdc | Job Site: |
| TEST SPECIFICATIONS | | | | |
| Specification: | 47 CFR 2.1055, 90.213 | Year: | 2005 | Method: |
| | | | TIA/EIA - 603 | Year: |
| | | | | 2002 |
| SAMPLE CALCULATIONS | | | | |
| | | | | |
| COMMENTS | | | | |
| | | | | |
| EUT OPERATING MODES | | | | |
| Transmitting mid 900MHz band | | | | |
| DEVIATIONS FROM TEST STANDARD | | | | |
| None | | | | |
| REQUIREMENTS | | | | |
| Minimum frequency stability of 1 part per million (ppm) for variations of temperature and supply voltage (DC) | | | | |
| RESULTS | | MINIMUM FREQUENCY STABILITY | | |
| Pass | | 0.05 ppm | | |
| SIGNATURE | | | | |
|  Tested By: _____ | | | | |
| DESCRIPTION OF TEST | | | | |
| Frequency Stability | | | | |

Frequency Stability with Variation of Ambient Temperature (Primary Supply = -48 Vdc)

| Temp (°C) | Assigned Frequency (MHz) | Measured Frequency (MHz) | Tolerance (ppm) | Specification (ppm) |
|-----------|--------------------------|--------------------------|-----------------|---------------------|
| 50 | 937.46875 | 937.468775 | 0.03 | 1 |
| 40 | 937.46875 | 937.468800 | 0.05 | 1 |
| 30 | 937.46875 | 937.468800 | 0.05 | 1 |
| 20 | 937.46875 | 937.468787 | 0.04 | 1 |
| 10 | 937.46875 | 937.468763 | 0.01 | 1 |
| 0 | 937.46875 | 937.468787 | 0.04 | 1 |
| -10 | 937.46875 | 937.468763 | 0.01 | 1 |
| -20 | 937.46875 | 937.468763 | 0.01 | 1 |
| -30 | 937.46875 | 937.468775 | 0.03 | 1 |

Frequency Stability with Variation of Primary Supply Voltage (Ambient Temperature = 20°C)

| Voltage (Vdc) | Assigned Frequency (MHz) | Measured Frequency (MHz) | Tolerance (ppm) | Specification (ppm) |
|---------------|--------------------------|--------------------------|-----------------|---------------------|
| 55.2 (115%) | 937.46875 | 937.468738 | 0.01 | 1 |
| 52.8 (110%) | 937.46875 | 937.468763 | 0.01 | 1 |
| 50.4 (105%) | 937.46875 | 937.468763 | 0.01 | 1 |
| 48 (100%) | 937.46875 | 937.468775 | 0.03 | 1 |
| 45.6 (95%) | 937.46875 | 937.468775 | 0.03 | 1 |
| 43.2 (90%) | 937.46875 | 937.468775 | 0.03 | 1 |
| 40.8 (85%) | 937.46875 | 937.468775 | 0.03 | N/A |