Radioframe Networks, Inc.

MC-series, Mid-power, Outdoor Pole-mount

August 07, 2007

Report No. RAFN0075

Report Prepared By

NORTHWEST EMC

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

EMC Test Report

NORTHWEST EMC

22975 NW Evergreen Parkway
Suite 400
Hillsboro, Oregon 97124

Certificate of Test

Issue Date: August 07, 2007
Radioframe Networks, Inc.
Model: MC-series, Mid-power, Outdoor Pole-mount

Emissions			
Test Description	**Specification**	**Test Method**	**Pass/Fail**
Output Power	FCC 90I:2006	ANSI/TIA/EIA-603-B-2002	**Pass**
Emission mask	FCC 90I:2006	ANSI/TIA/EIA-603-B-2002	**Pass**
Spurious Radiated Emissions	FCC 90I:2006	ANSI/TIA/EIA-603-B-2002	**Pass**
Radiated Emissions as a digital device / receiver (Verification)	FCC 15.109:2006 Class A	ANSI C63.4:2003	**Pass**
Spurious Conducted Emissions - Transmit Mode	FCC 90I:2006	ANSI/TIA/EIA-603-B-2002	**Pass**
Spurious Conducted Emissions - Receive Mode	FCC 15.111:2006	ANSI/TIA/EIA-603-B-2002	**Pass**
Frequency Stability	FCC 90.213:2005	ANSI/TIA/EIA-603:2002	**Pass**

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

Approved By:
Ethan Schoonover, Sultan Lab Manager

NVLAP Lab Code: 200630-0

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
00	None		

Accreditations and Authorizations

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 2004/108/EC, and ANSI C63.4. 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.

NVLAP LAB CODE 200629-0
NVLAP LAB CODE 200630-0
NVLAP LAB CODE 200676-0
NVLAP LAB CODE 200761-0

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 TUV Product Service Group's Listing of Recognized Laboratories. It qualifies in connection with the TUV Certification after Recognition of Agent's Testing Program for the product categories and/or standards shown in TUV's current Listing of CARAT Laboratories, available from TUV. A certificate was issued to represent that this laboratory continues to meet TUV's CARAT Program requirements. Certificate No. USA0604C.

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).

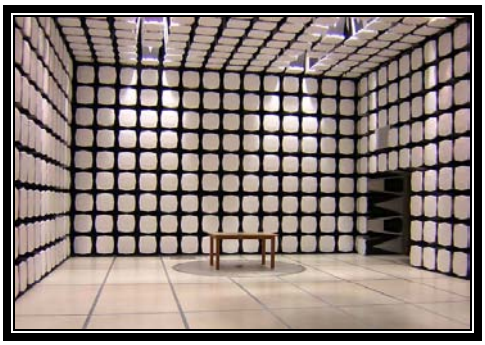
VCCI: Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. *(Registration Numbers. - Hillsboro: C-1071, R-1025, C-2687, T-289, and R-2318, Irvine: R-1943, C-2766, and T-298, Sultan: R-871, C-1784, and T-294).*

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

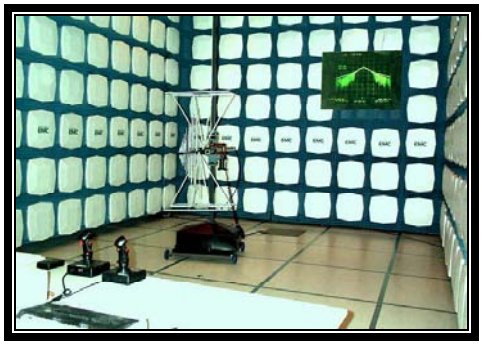
SCOPE

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:	Nha Tran
Model:	MC-series, Mid-power, Outdoor Pole-mount
First Date of Test:	March 21, 2006
Last Date of Test:	July 2, 2007
Receipt Date of Samples:	June 27, 2007
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):
Dual band operation: 851-854 MHz and 854-859 MHz. Cellular base station. Output power can be adjusted by user over a range. Digital modulation: TDMA(iDEN).

Testing Objective:
Demonstrate compliance with FCC 90I requirements for a cellular basestation.

CONFIGURATION 1 RAFN0075

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
OPM (Outdoor Pole Mount System)	Radioframe Networks	MC Series	Unknown

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
ISC (Integrated Site Controller)	Motorola	ISC3 X516	CAF0207XD1

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Remote PC	Dell	Latitude X300	Unknown

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power -48V	No	3m	No	EUT	DC Supply
Coaxial	Yes	5m	No	EUT	ISC
Serial	Yes	5m	No	EUT	Remote PC
Ethernet	No	5m	No	EUT	Remote PC
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	6/27/2007	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.
2	6/27/2007	Spurious Conducted Emissions - Transmit 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.
3	6/28/2007	Spurious Conducted Emissions - 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.
4	6/28/2007	Output Power	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	7/2/2007	Spurious 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.
6	7/2/2007	Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

RADIATED EMISSIONS

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.

MODES OF OPERATION

Transmitting typical sector config: Single Sector, 3 channels at full power.

MODE USED FOR FINAL DATA

Transmitting typical sector config: Single Sector, 3 channels at full power.

POWER SETTINGS INVESTIGATED

48 VDC

POWER SETTINGS USED FOR FINAL DATA

48 VDC

FREQUENCY RANGE INVESTIGATED

Start Frequency	30MHz	Stop Frequency	1000MHz

SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
EV11 cables a,b,c			EVL	5/1/2007	13
Antenna, Biconilog	EMCO	3142	AXB	12/28/2006	24
Pre-Amplifier	Miteq	AM-1551	AOY	5/1/2007	13
Spectrum Analyzer	Agilent	E4443A	AAS	12/7/2006	13

MEASUREMENT BANDWIDTHS

	Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
	0.01 - 0.15	1.0	0.2	0.2
	0.15 - 30.0	10.0	9.0	9.0
	30.0 - 1000	100.0	120.0	120.0
	Above 1000	1000.0	N/A	1000.0

Measurements were made using the bandwidths and detectors specified. No video filter was used.

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

Using the mode of operation and configuration noted within this report, a final radiated emissions test was performed. The frequency range investigated (scanned), is also noted in this report. Radiated emissions measurements were made at the EUT azimuth and antenna height such that the maximum radiated emissions level will be detected. This requires the use of a turntable and an antenna positioner. The preferred method of a continuous azimuth search is utilized for frequency scans of the EUT field strength with both polarities of the measuring antenna. A calibrated, linearly polarized antenna was positioned at the specified distance from the periphery of the EUT.

Tests were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Though specified in the report, the measurement distance shall be 3 meters or 10 meters. At any measurement distance, the antenna height was varied from 1 meter to 4 meters. These height scans apply for both horizontal and vertical polarization, except that for vertical polarization the minimum height of the center of the antenna shall be increased so that the lowest point of the bottom of the antenna clears the ground surface by at least 25 cm.

NORTHWEST EMC

RADIATED EMISSIONS DATA SHEET

PSA 2007.05.07
EMI 2006.12.20

EUT:	MC-series, Mid-power, Outdoor Pole-mount			Work Order:	RAFN0075
Serial Number:	None			Date:	07/02/07
Customer:	Radioframe Networks, Inc.			Temperature:	23
Attendees:	Dean Busch			Humidity:	36%
Project:	None			Barometric Pres.:	30.13
Tested by:	David Divergigelis	Power:	48 VDC	Job Site:	EV11

TEST SPECIFICATIONS	Test Method
FCC 15.109(g) (CISPR 22:1997):2006 Class A	ANSI C63.4:2003

TEST PARAMETERS			
Antenna Height(s) (m)	1 - 4	Test Distance (m)	10

COMMENTS

Antenna ports terminated.

EUT OPERATING MODES

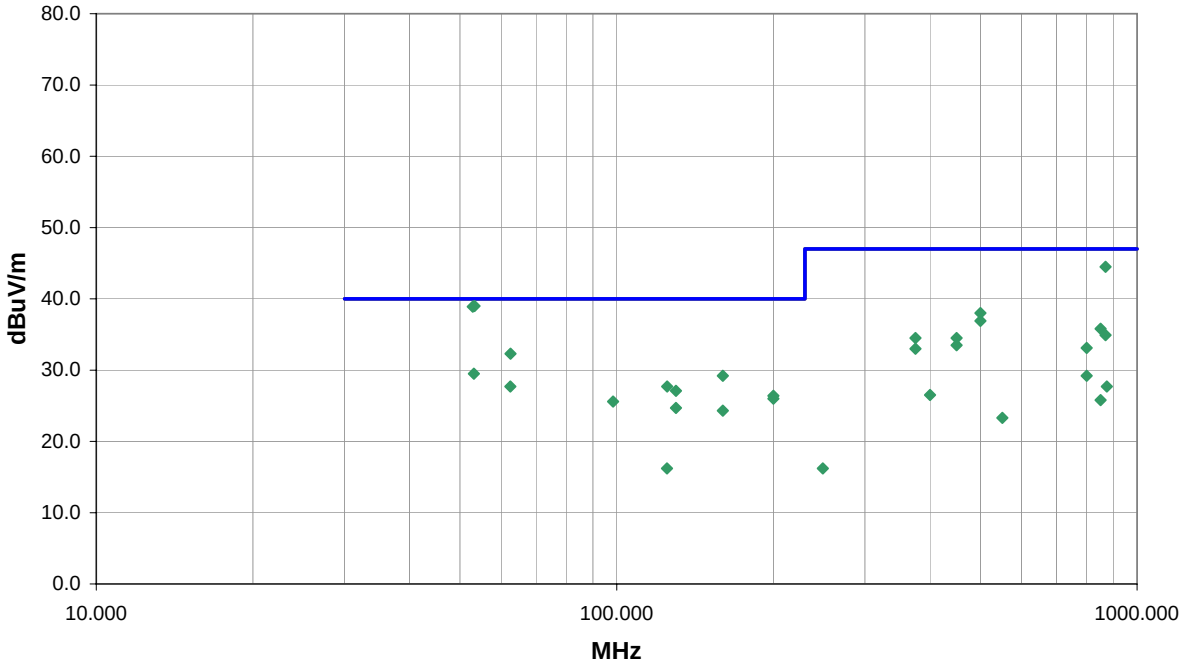
Transmitting typical sector config: Single Sector, 3 channels at full power.

DEVIATIONS FROM TEST STANDARD

No deviations.

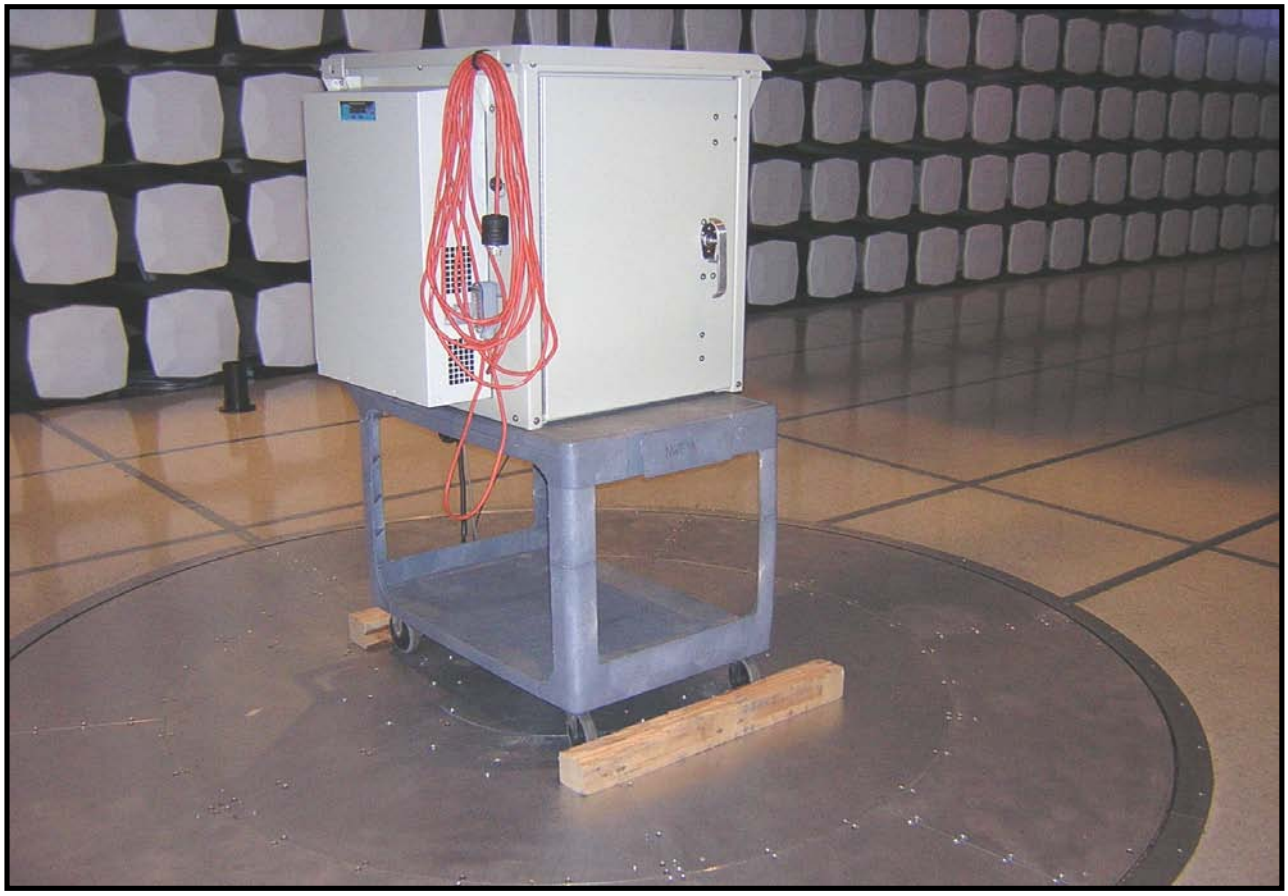
Run #	1
Configuration #	1
Results	Pass

Signature



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
53.325	64.1	-25.1	288.0	1.5	10.0	0.0	V-Bilog	QP	0.0	39.0	40.0	-1.0
52.900	63.9	-25.0	276.0	2.0	10.0	0.0	V-Bilog	QP	0.0	38.9	40.0	-1.1
869.994	53.8	-9.3	167.0	2.0	10.0	0.0	V-Bilog	QP	0.0	44.5	47.0	-2.5
62.506	59.1	-26.8	115.0	3.5	10.0	0.0	H-Bilog	QP	0.0	32.3	40.0	-7.7
499.999	52.5	-14.5	130.0	1.5	10.0	0.0	H-Bilog	QP	0.0	38.0	47.0	-9.0
500.002	51.4	-14.5	197.0	3.5	10.0	0.0	V-Bilog	QP	0.0	36.9	47.0	-10.1
53.146	54.6	-25.1	157.0	3.5	10.0	0.0	H-Bilog	QP	0.0	29.5	40.0	-10.5
160.009	53.9	-24.7	273.0	1.5	10.0	0.0	V-Bilog	QP	0.0	29.2	40.0	-10.8
851.019	45.6	-9.8	303.0	2.4	10.0	0.0	V-Bilog	QP	0.0	35.8	47.0	-11.2
869.996	44.2	-9.3	15.0	3.5	10.0	0.0	H-Bilog	QP	0.0	34.9	47.0	-12.1
62.459	54.5	-26.8	8.0	3.8	10.0	0.0	H-Bilog	QP	0.0	27.7	40.0	-12.3
125.006	54.5	-26.8	254.0	1.0	10.0	0.0	V-Bilog	QP	0.0	27.7	40.0	-12.3
375.000	51.3	-16.8	106.0	1.0	10.0	0.0	V-Bilog	QP	0.0	34.5	47.0	-12.5
450.001	50.1	-15.6	0.0	2.4	10.0	0.0	H-Bilog	QP	0.0	34.5	47.0	-12.5
130.004	53.9	-26.8	260.0	1.0	10.0	0.0	V-Bilog	QP	0.0	27.1	40.0	-12.9
450.004	49.1	-15.6	319.0	1.0	10.0	0.0	V-Bilog	QP	0.0	33.5	47.0	-13.5
200.006	49.7	-23.3	352.0	1.0	10.0	0.0	V-Bilog	QP	0.0	26.4	40.0	-13.6
799.987	43.6	-10.5	59.0	1.5	10.0	0.0	H-Bilog	QP	0.0	33.1	47.0	-13.9
200.003	49.3	-23.3	19.0	3.4	10.0	0.0	H-Bilog	QP	0.0	26.0	40.0	-14.0
375.001	49.8	-16.8	114.0	1.5	10.0	0.0	H-Bilog	QP	0.0	33.0	47.0	-14.0
98.418	52.5	-26.9	174.0	2.8	10.0	0.0	V-Bilog	QP	0.0	25.6	40.0	-14.4

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Azimuth (degrees)	Height (meters)	Distance (meters)	External Attenuation (dB)	Polarity	Detector	Distance Adjustment (dB)	Adjusted dBuV/m	Spec. Limit dBuV/m	Compared to Spec. (dB)
130.000	51.5	-26.8	16.0	3.6	10.0	0.0	H-Bilog	QP	0.0	24.7	40.0	-15.3
159.998	49.0	-24.7	119.0	3.3	10.0	0.0	H-Bilog	QP	0.0	24.3	40.0	-15.7
800.011	39.7	-10.5	297.0	2.0	10.0	0.0	V-Bilog	QP	0.0	29.2	47.0	-17.8
874.996	36.9	-9.2	287.0	1.5	10.0	0.0	H-Bilog	QP	0.0	27.7	47.0	-19.3
400.002	43.3	-16.8	360.0	2.1	10.0	0.0	H-Bilog	PK	0.0	26.5	47.0	-20.5
851.020	35.6	-9.8	126.0	3.2	10.0	0.0	H-Bilog	QP	0.0	25.8	47.0	-21.2
550.972	36.9	-13.6	91.0	1.5	10.0	0.0	H-Bilog	PK	0.0	23.3	47.0	-23.7
124.982	43.0	-26.8	21.0	1.0	10.0	0.0	H-Bilog	PK	0.0	16.2	40.0	-23.8
248.989	37.1	-20.9	342.0	1.0	10.0	0.0	H-Bilog	PK	0.0	16.2	47.0	-30.8



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	12/7/2006	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/7/2006	13

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 byincumbents 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 Erricson'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 flexbility 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 flexibile 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;

NORTHWEST EMC

EMISSION MASK

XMit 2006.03.01

EUT:	MC-series, Mid-power, Outdoor Pole-mount			**Work Order:**	RAFN0075
Serial Number:	Various			**Date:**	06/27/07
Customer:	Radioframe Networks, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	34%
Project:	None			**Barometric Pres.:**	29.99
Tested by:	Ethan Schoonover	**Power:**	-48Vdc	**Job Site:**	Offsite

TEST SPECIFICATIONS	Test Method
FCC 90I:2006	ANSI/TIA/EIA-603-B:2002

COMMENTS

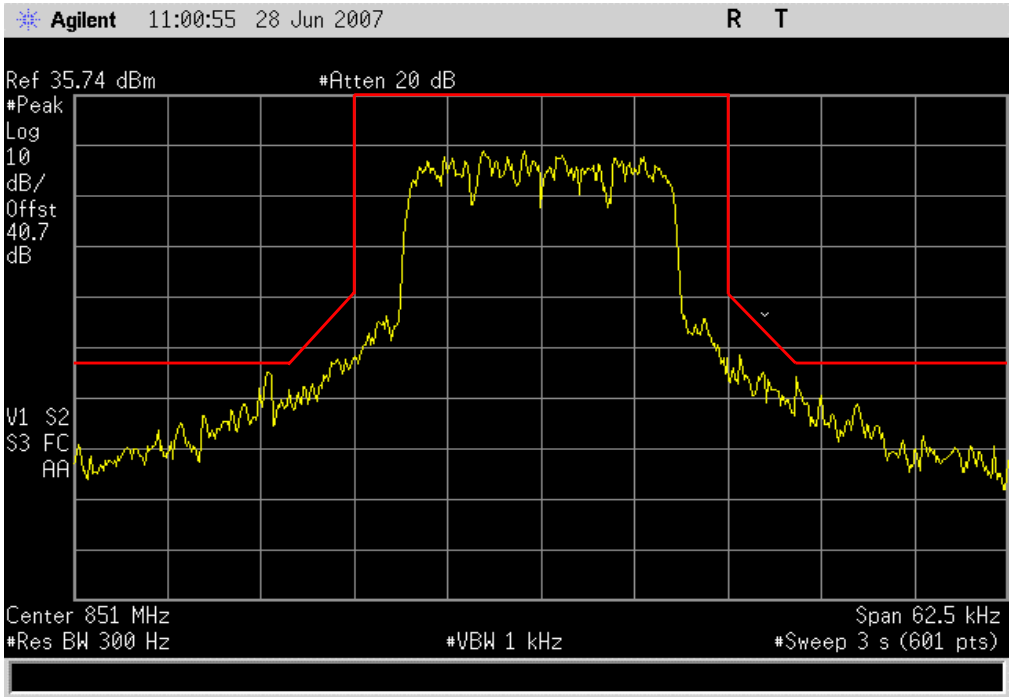
800MHz Band

DEVIATIONS FROM TEST STANDARD

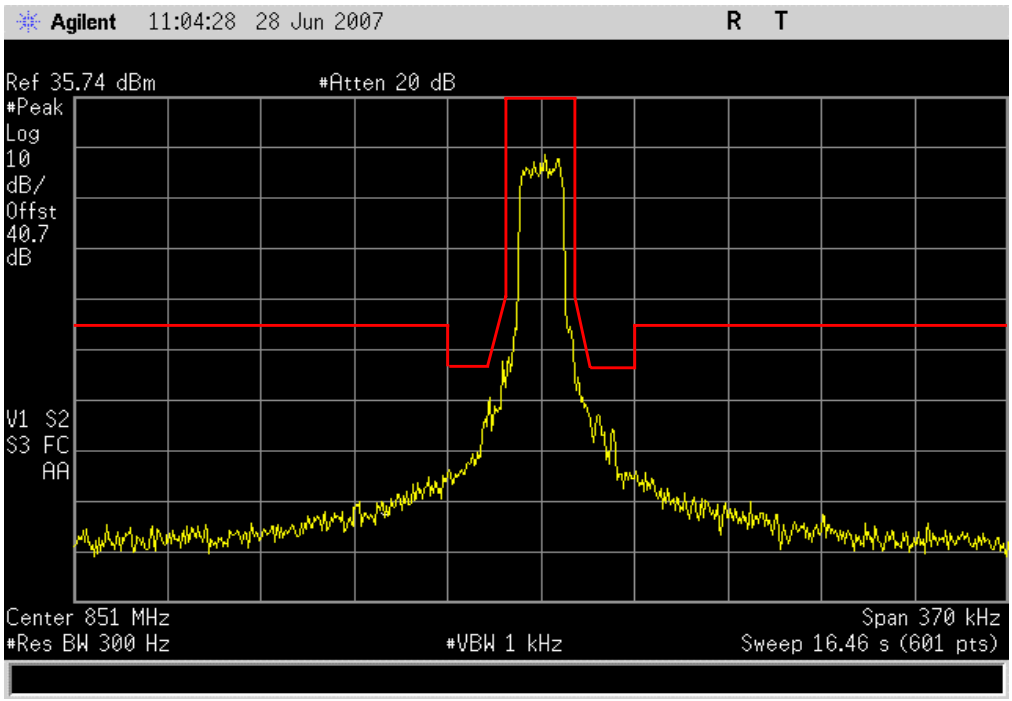
Configuration #	1	Signature 

Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel, High Power, < 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

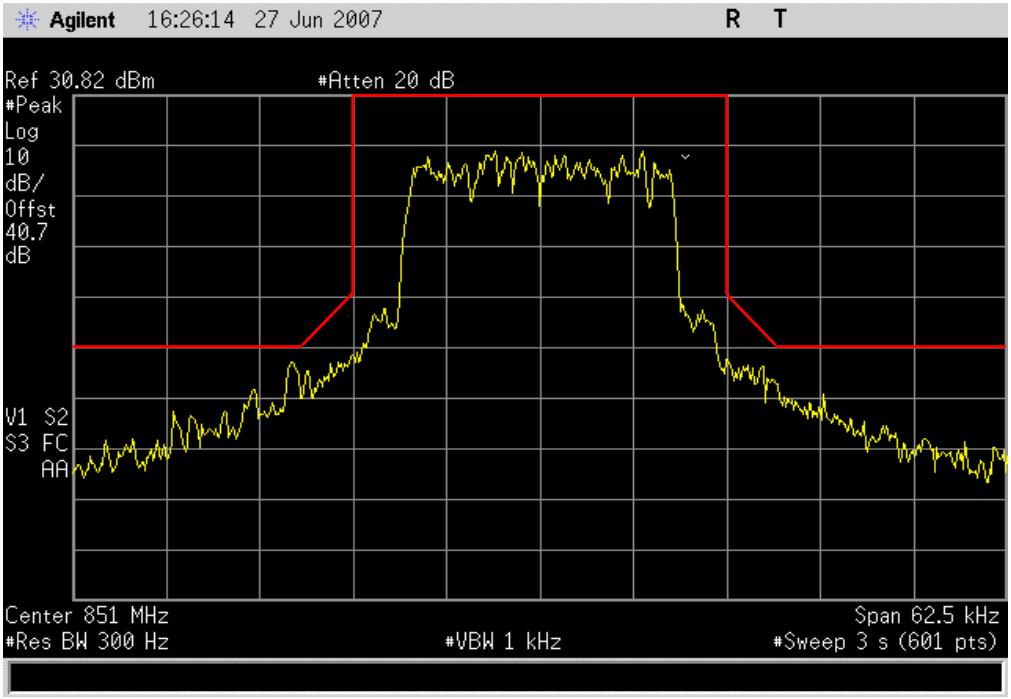
Low Channel, High Power, < 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



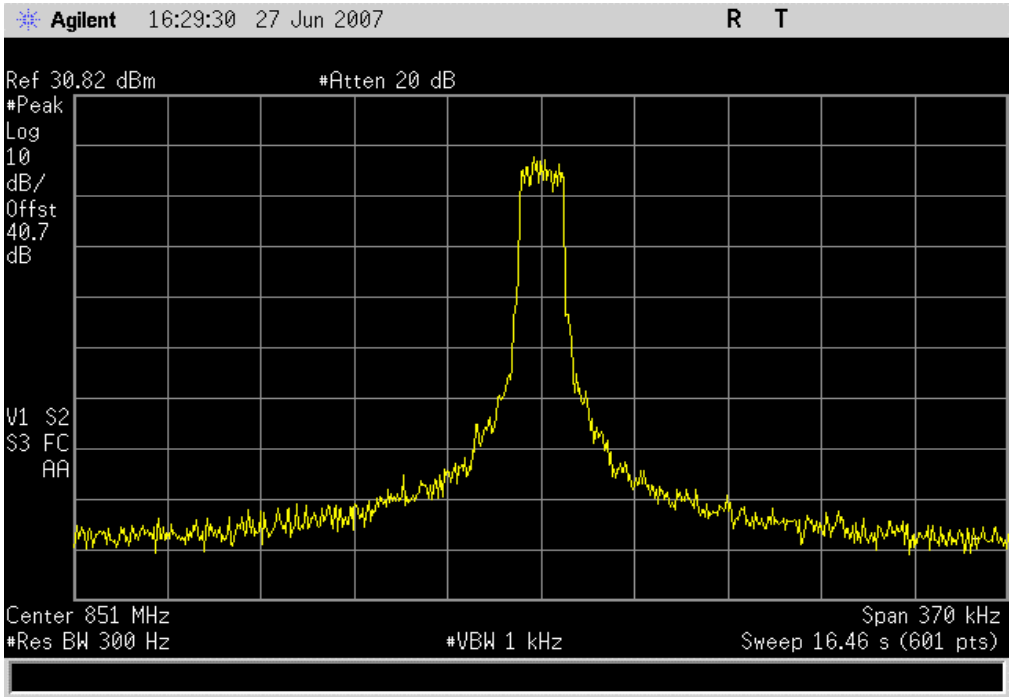
Low Channel, High Power, > 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



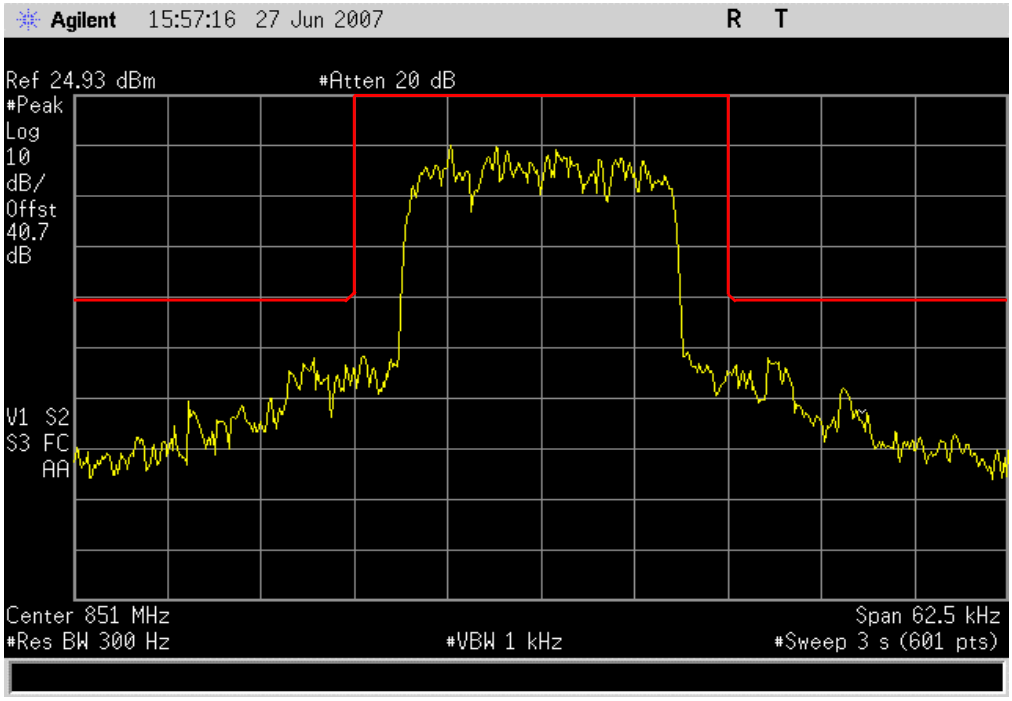
Low Channel, Mid Power, < 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



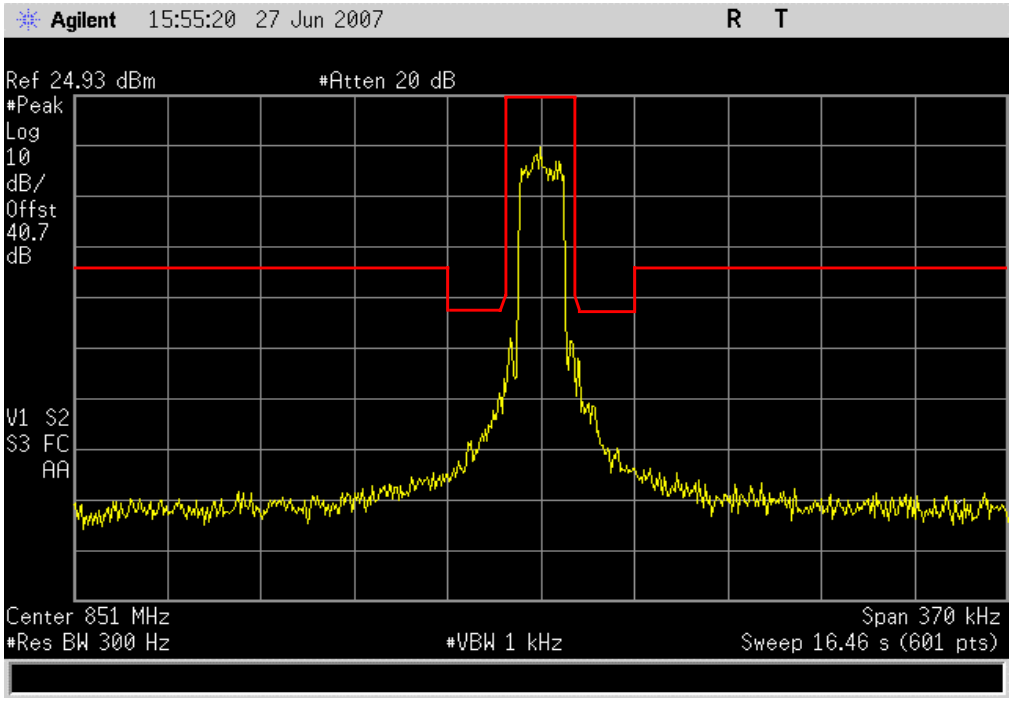
Low Channel, Mid Power, > 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



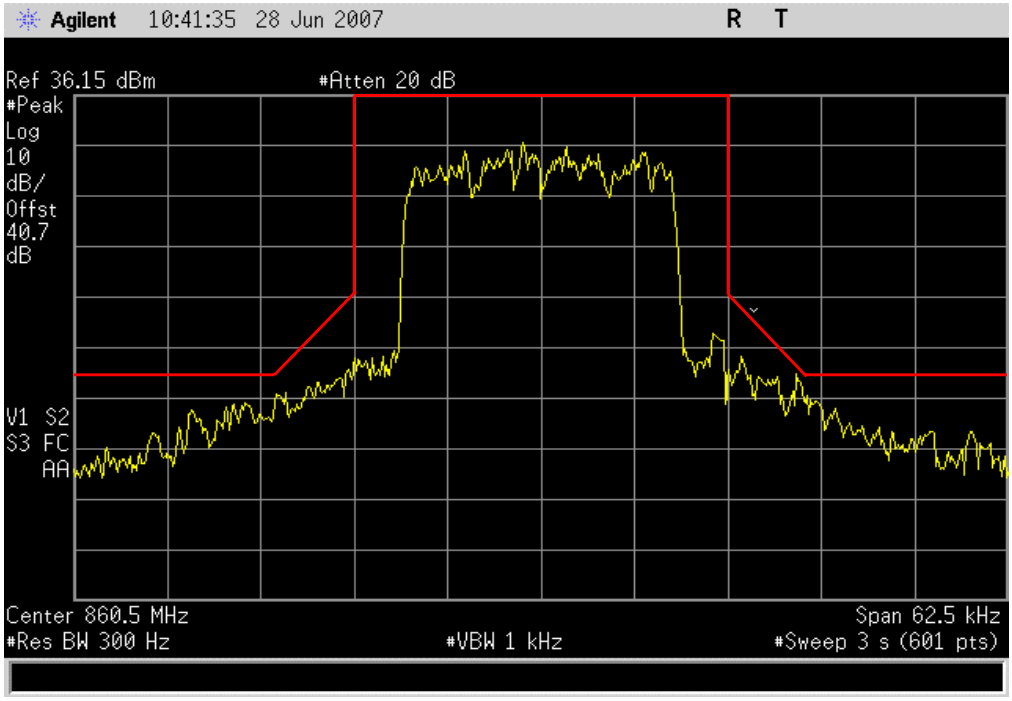
Low Channel, Low Power, < 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



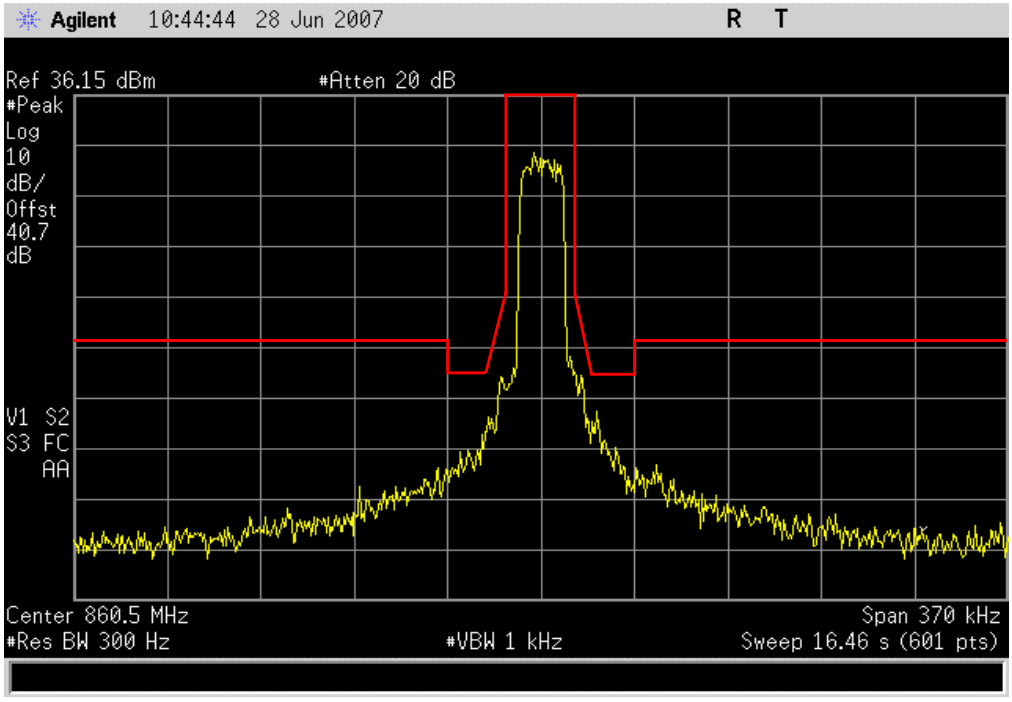
Low Channel, Low Power, > 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



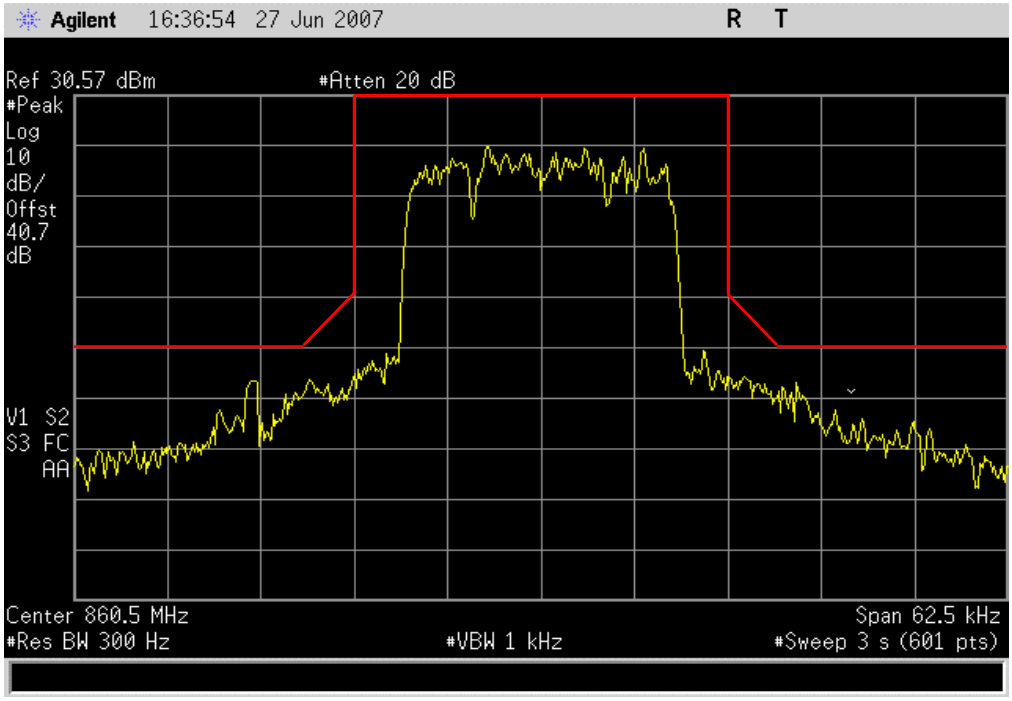
Mid Channel, High Power, < 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



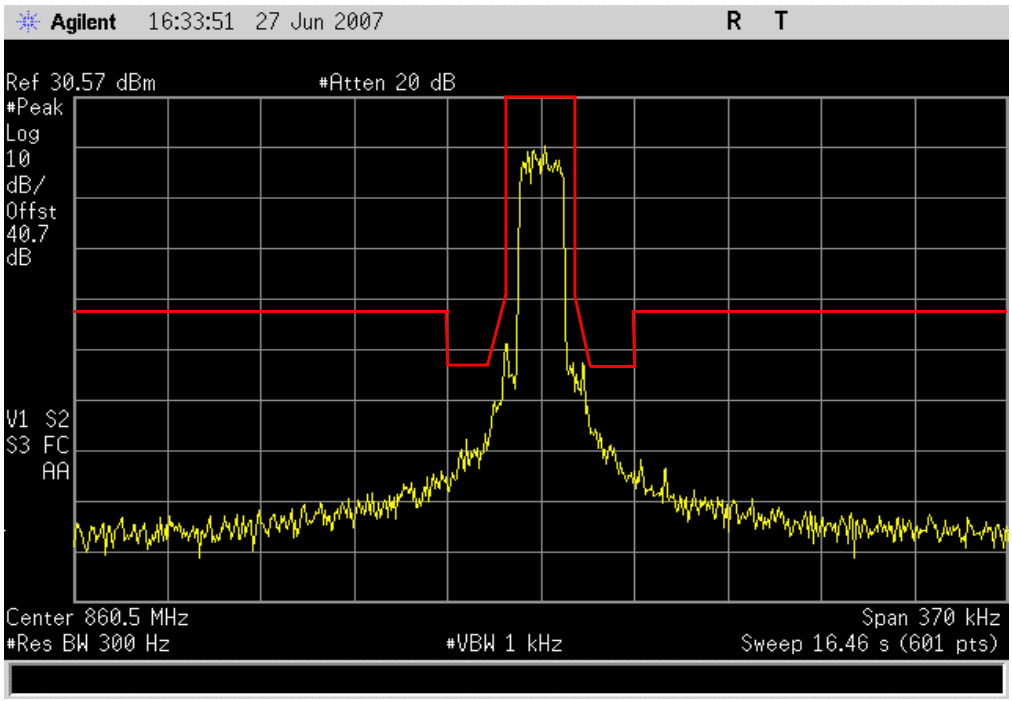
Mid Channel, High Power, > 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



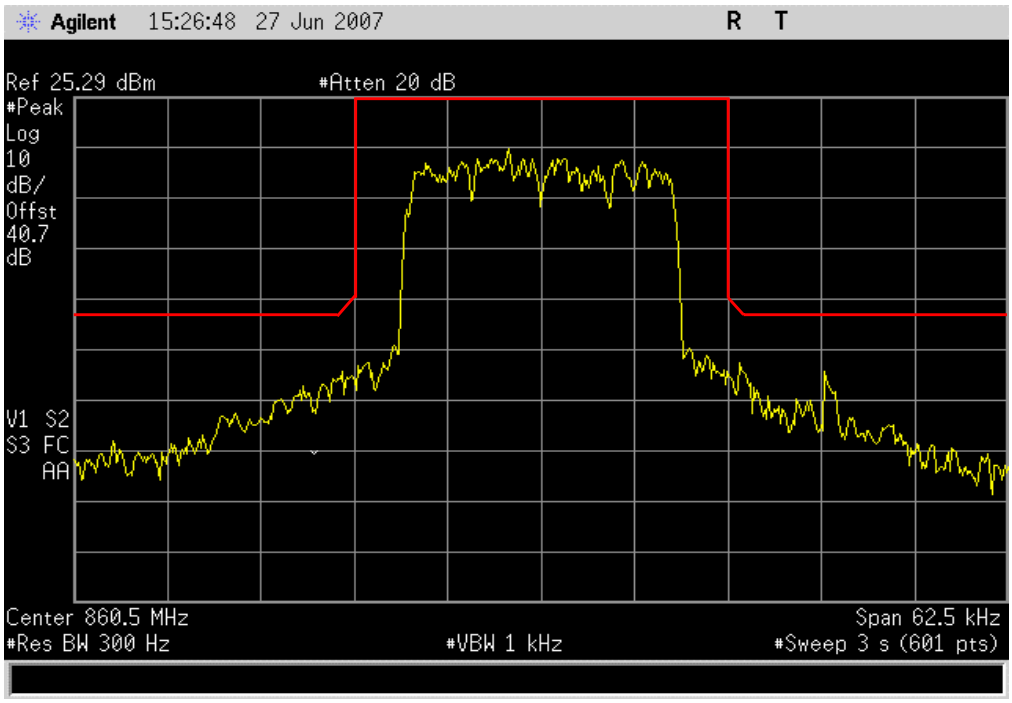
Mid Channel, Mid Power, < 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



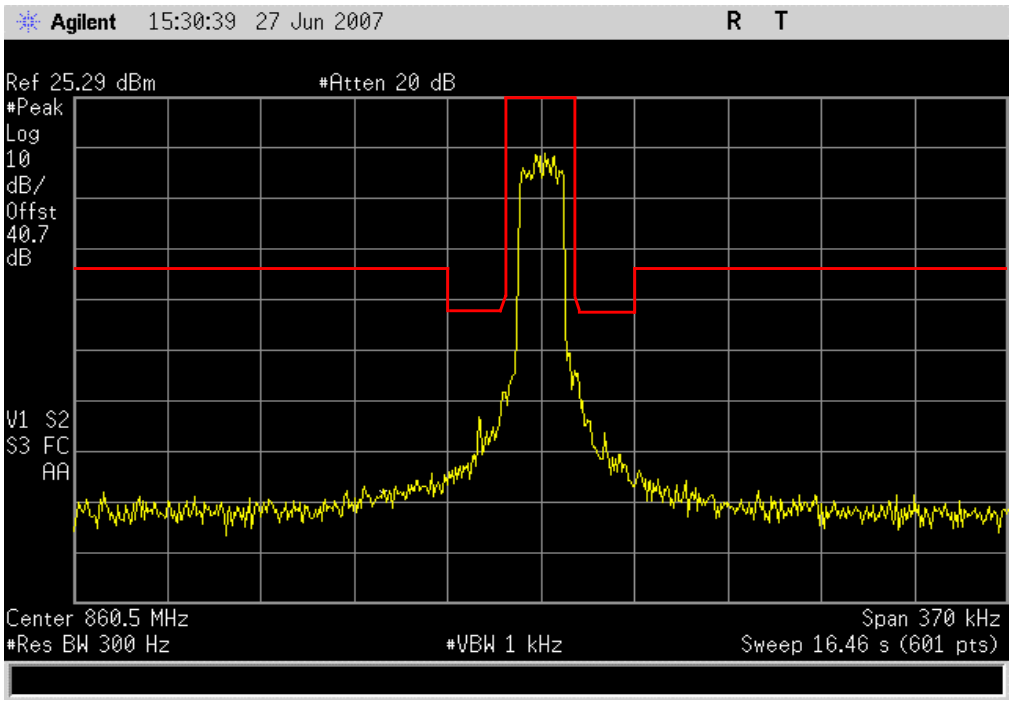
Mid Channel, Mid Power, > 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



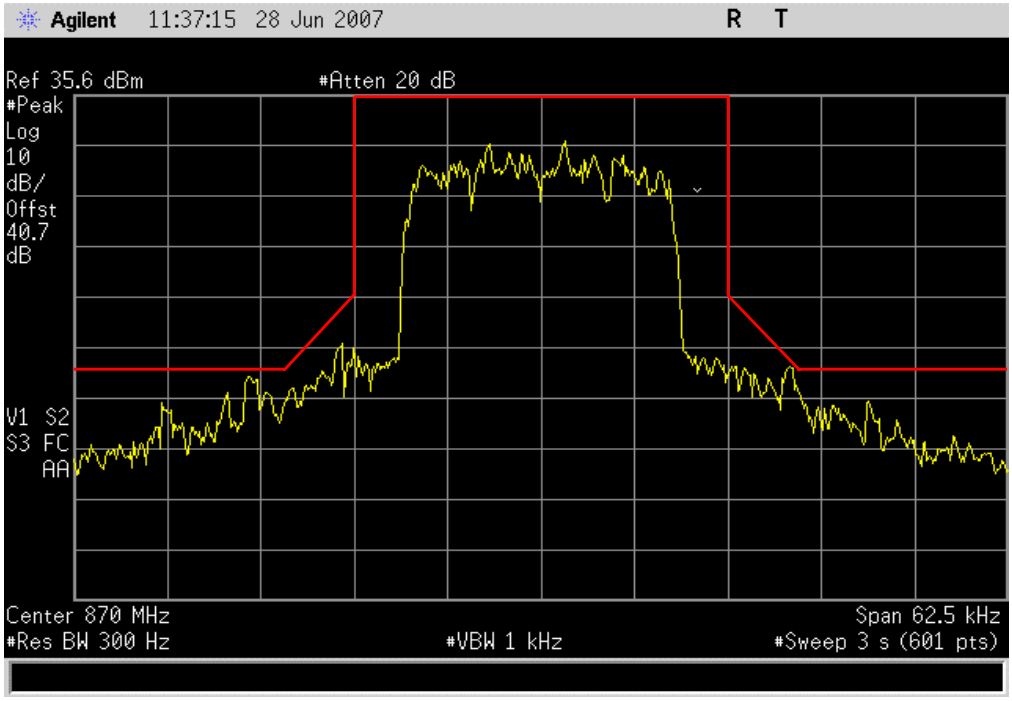
Mid Channel, Low Power, < 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



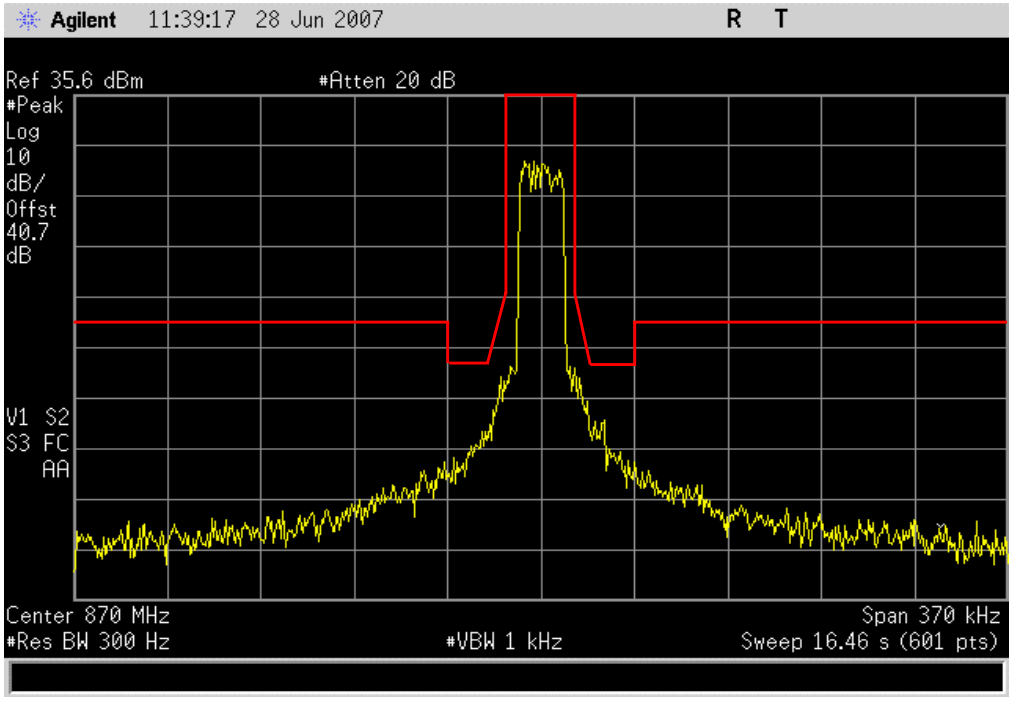
Mid Channel, Low Power, > 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



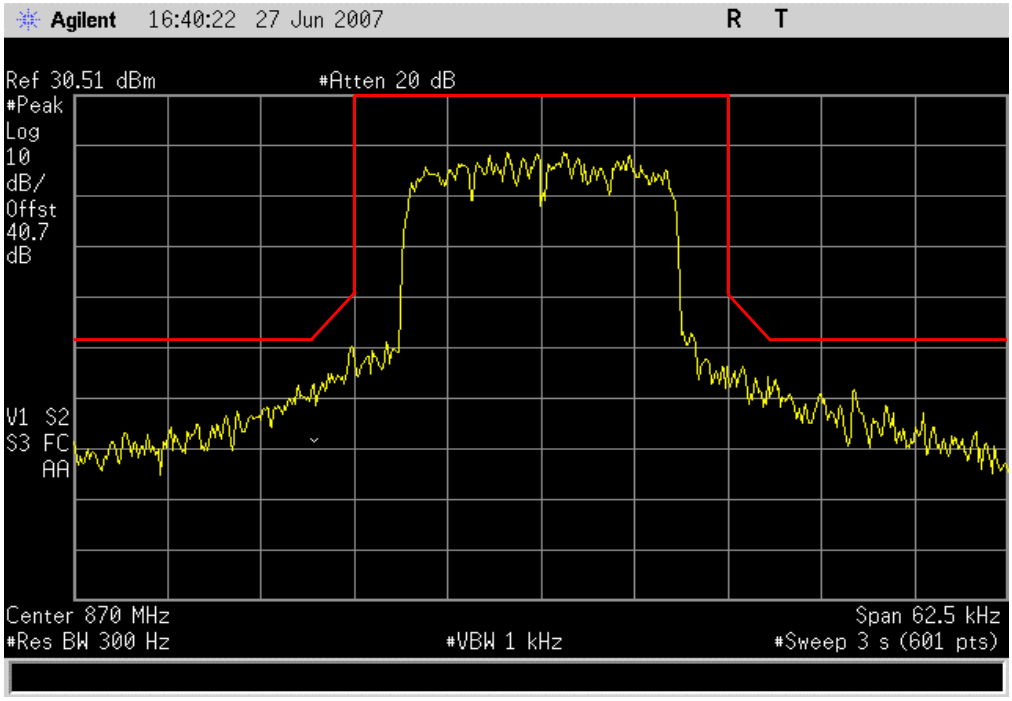
High Channel, High Power, < 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



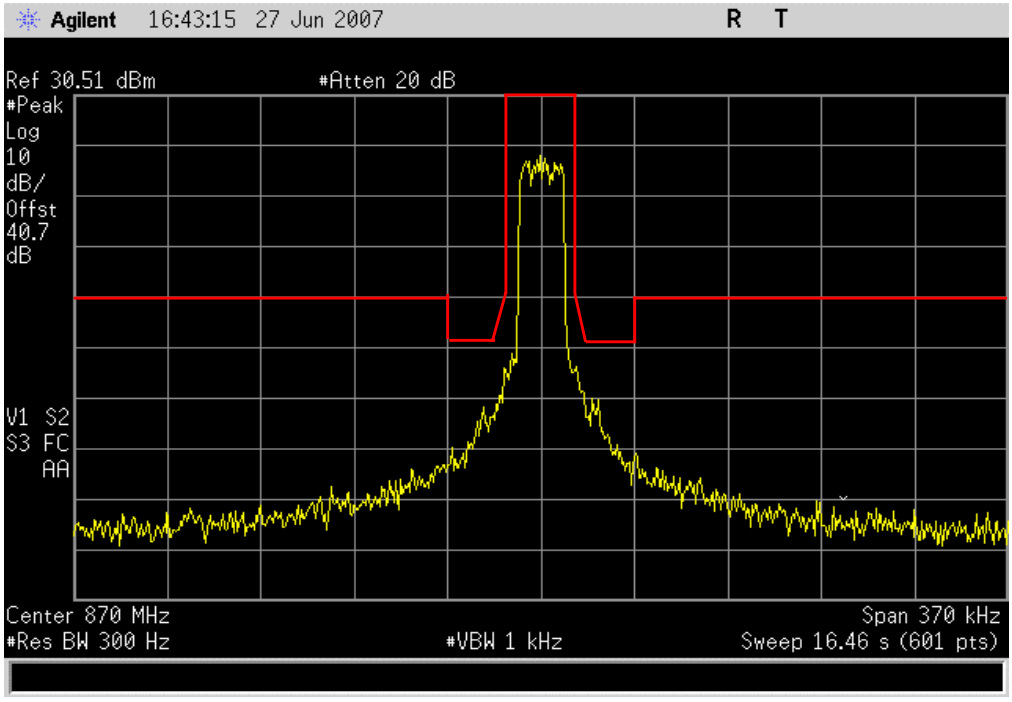
High Channel, High Power, > 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



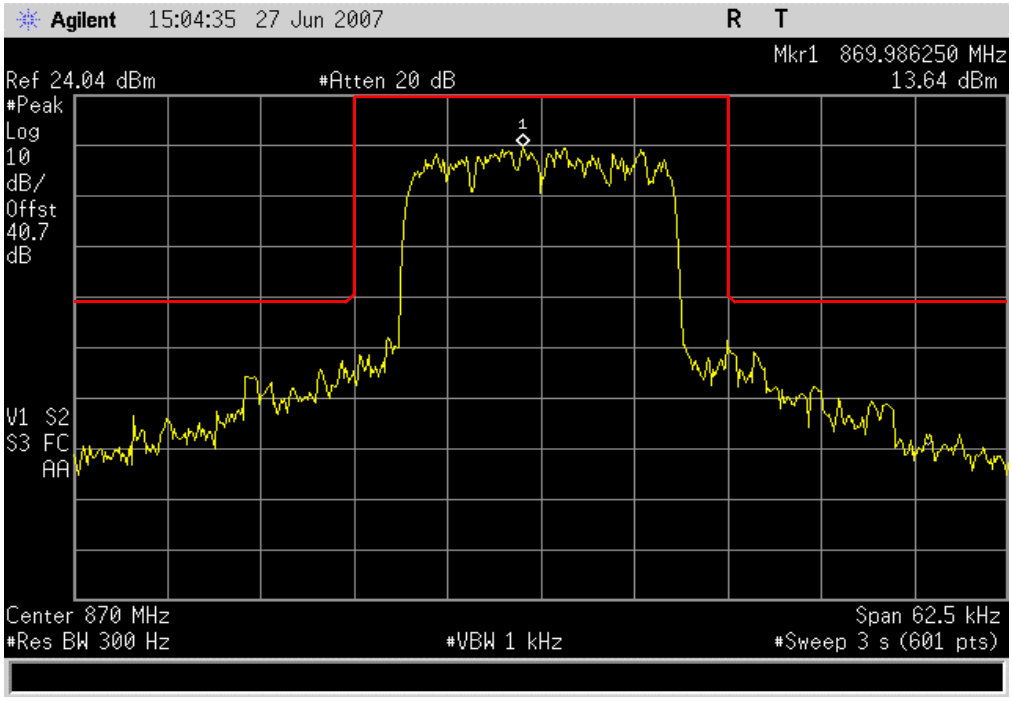
High Channel, Mid Power, < 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



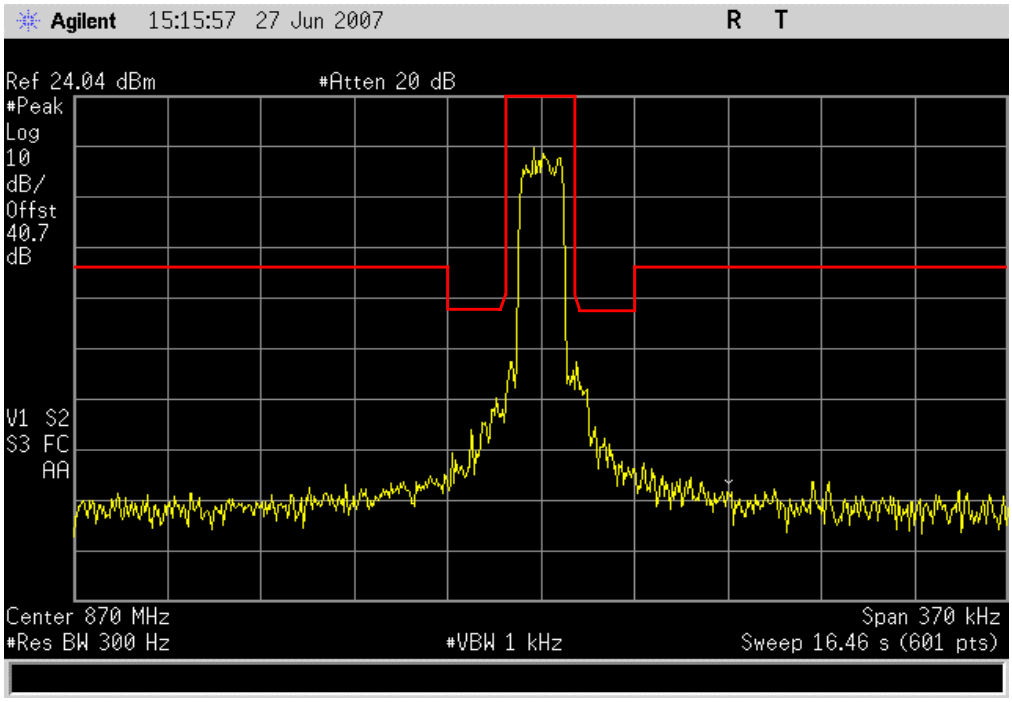
High Channel, Mid Power, > 37.5 kHz Fc					
Result:	Pass	**Value:**	N/A	**Limit:**	See Table



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



Emission Mask 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	35.74	3.75E+00	55.7	36.14	91.49	80	48.7	80
	30.82	1.21E+00	50.8	36.14	91.49	80	43.8	80
	24.93	3.11E-01	44.9	36.14	91.49	80	37.9	80
860.5	36.15	4.12E+00	56.2	36.14	91.49	80	49.2	80
	30.57	1.14E+00	50.6	36.14	91.49	80	43.6	80
	25.29	3.38E-01	45.3	36.14	91.49	80	38.3	80
869.9875	35.60	3.63E+00	55.6	36.14	91.49	80	48.6	80
	30.51	1.12E+00	50.5	36.14	91.49	80	43.5	80
	24.04	2.54E-01	44.0	36.14	91.49	80	37.0	80

OUTPUT POWER

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	12/7/2006	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/7/2006	13

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.

NORTHWEST EMC

OUTPUT POWER

XMit 2006.03.01

EUT:	MC-series, Mid-power, Outdoor Pole-mount			**Work Order:**	RAFN0075
Serial Number:	Various			**Date:**	06/28/07
Customer:	Radioframe Networks, Inc.			**Temperature:**	21°C
Attendees:	Dean Busch			**Humidity:**	37%
Project:	None			**Barometric Pres.:**	29.99
Tested by:	Ethan Schoonover	**Power:**	-48Vdc	**Job Site:**	Offsite

TEST SPECIFICATIONS	Test Method
FCC 90I:2006	ANSI/TIA/EIA-603-B:2002

COMMENTS

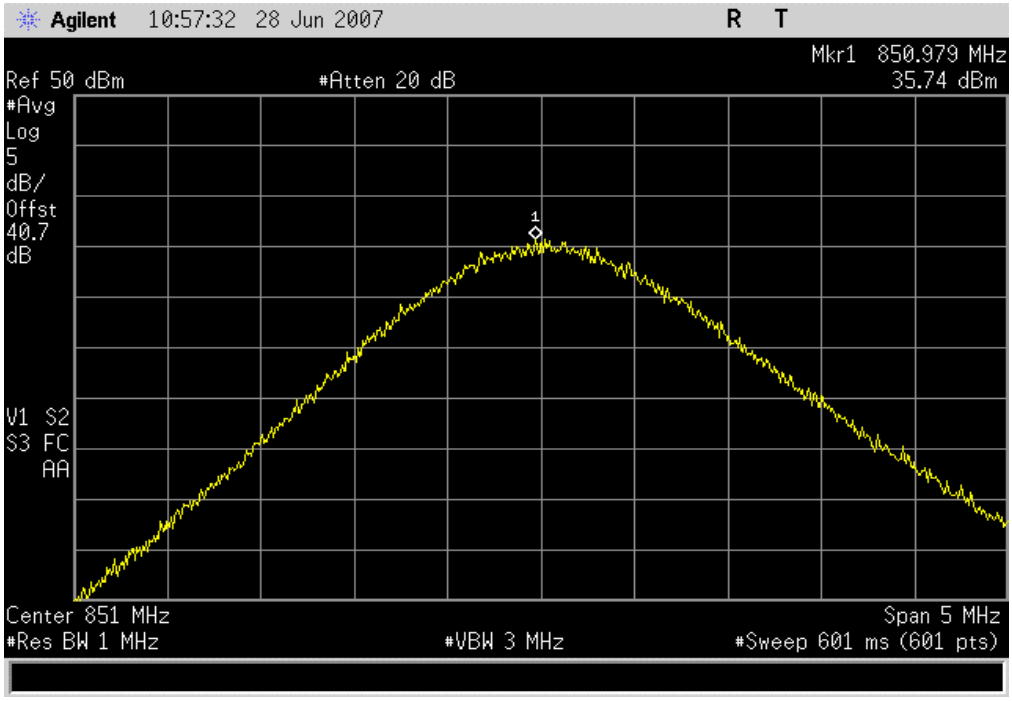
800MHz Band

DEVIATIONS FROM TEST STANDARD

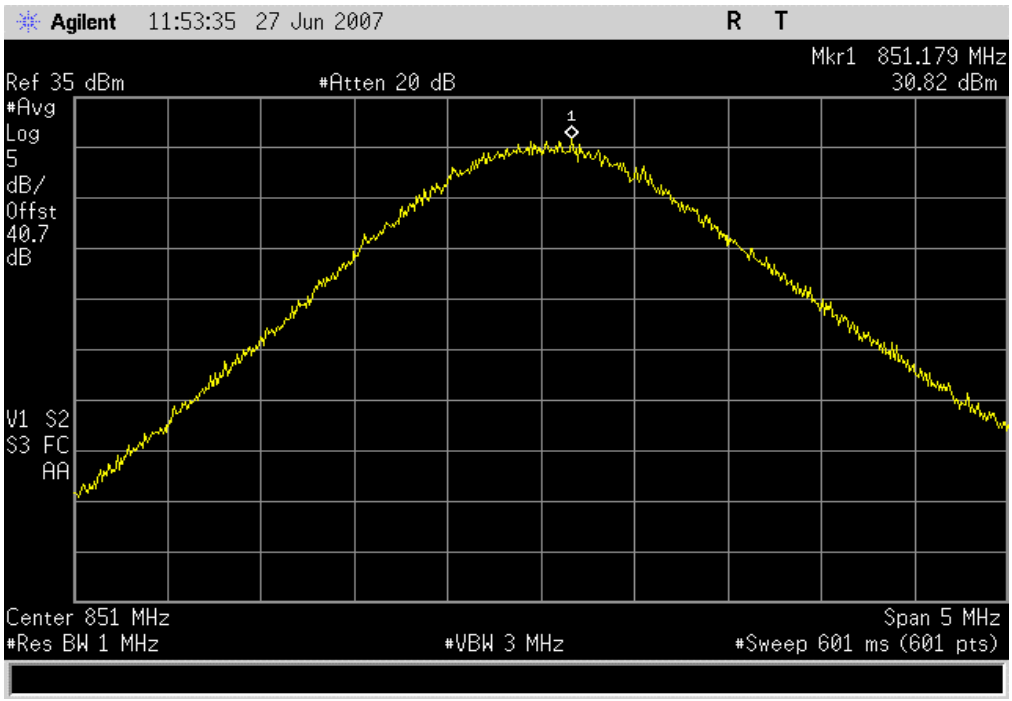
Configuration #	1	Signature 

Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel, High Power	35.74 dBm		Pass
Low Channel, Mid Power	30.82 dBm		Pass
Low Channel, Low Power	24.93 dBm		Pass
Mid Channel, High Power	36.15 dBm		Pass
Mid Channel, Mid Power	30.57 dBm		Pass
Mid Channel, Low Power	25.29 dBm		Pass
High Channel, High Power	35.6 dBm		Pass
High Channel, Mid Power	30.51 dBm		Pass
High Channel, Low Power	24.04 dBm		Pass

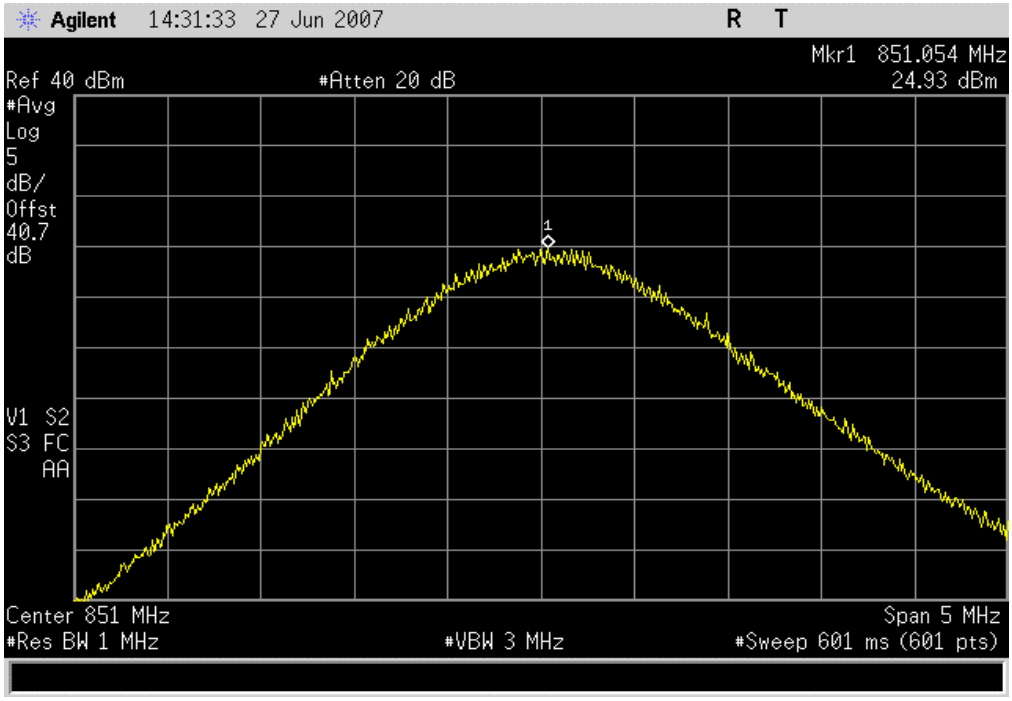
Low Channel, High Power					
Result:	Pass	**Value:**	35.74 dBm	**Limit:**	



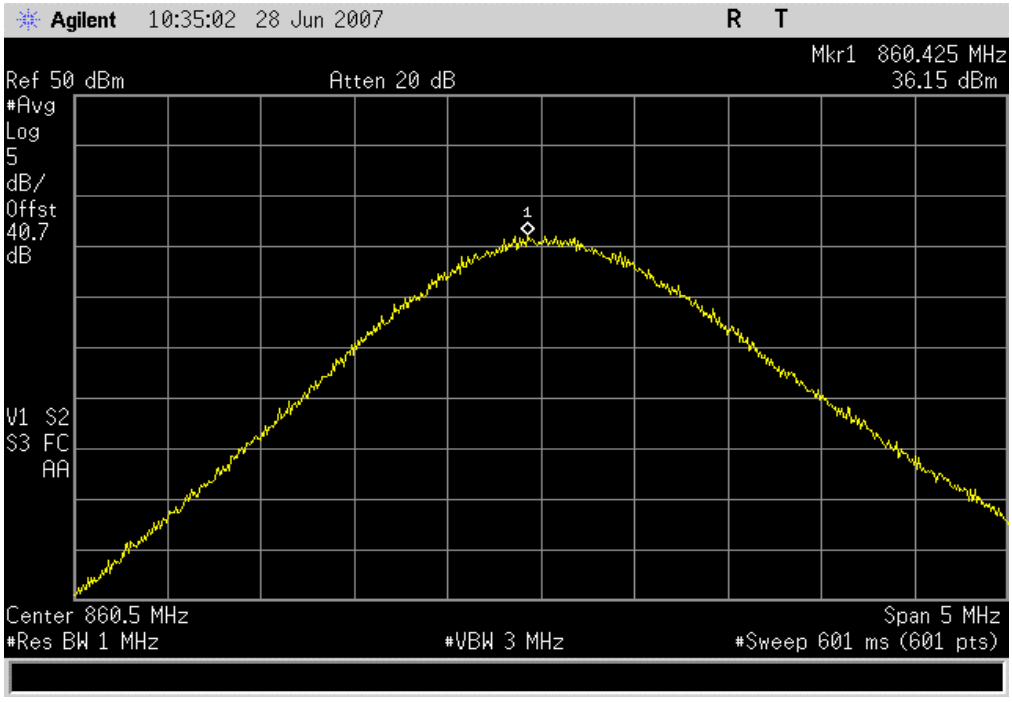
Low Channel, Mid Power					
Result:	Pass	**Value:**	30.82 dBm	**Limit:**	



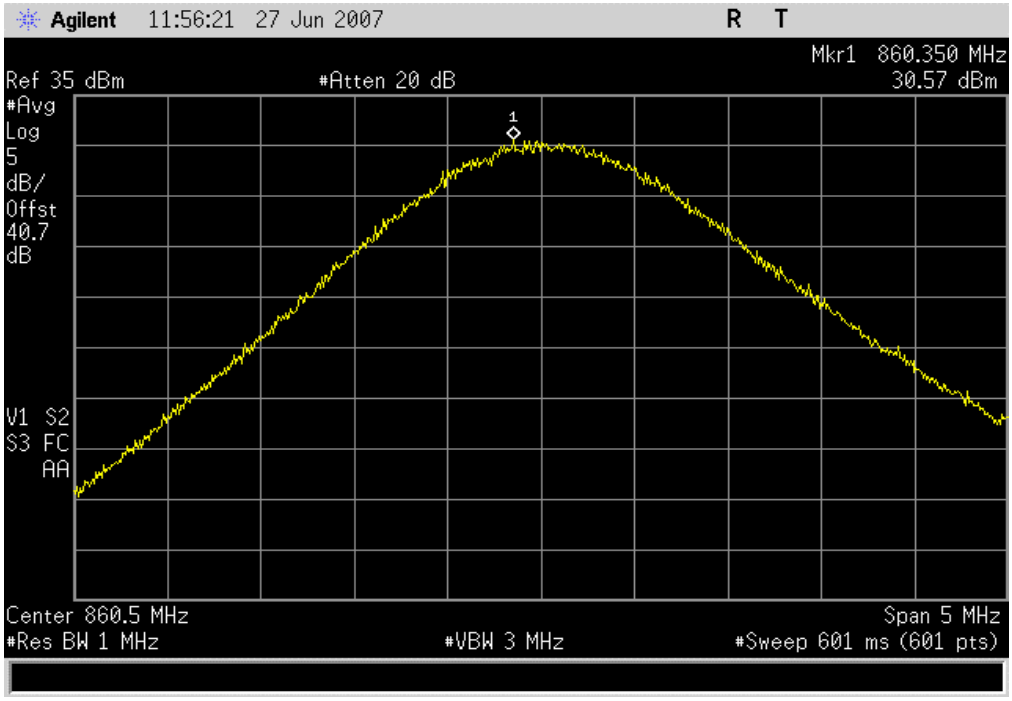
Low Channel, Low Power					
Result:	Pass	**Value:**	24.93 dBm	**Limit:**	



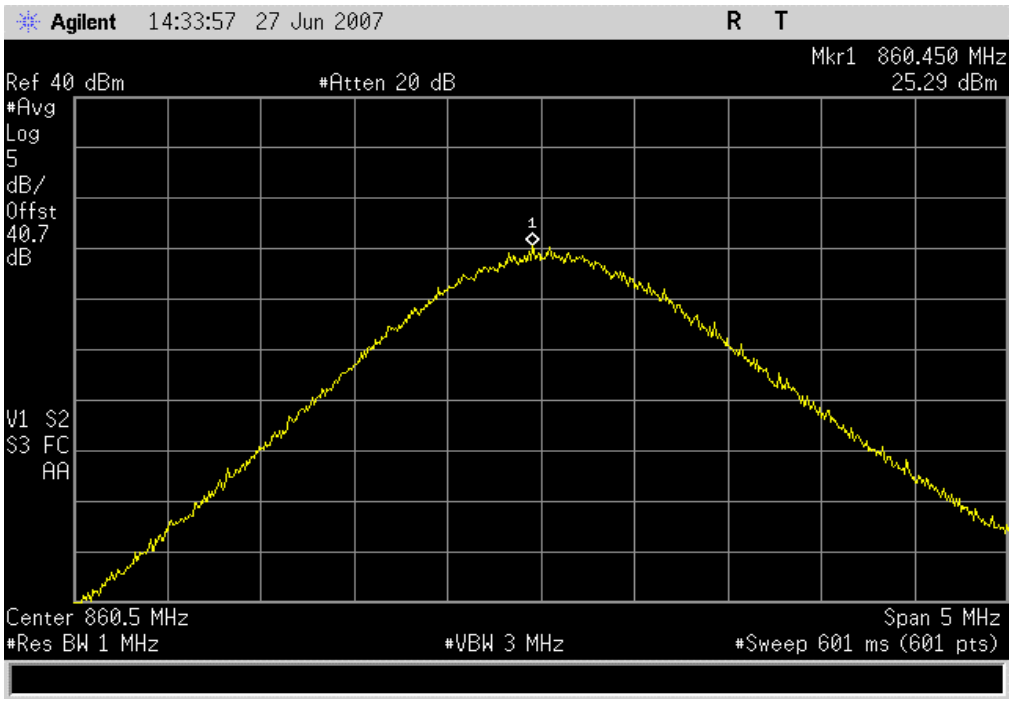
Mid Channel, High Power					
Result:	Pass	**Value:**	36.15 dBm	**Limit:**	



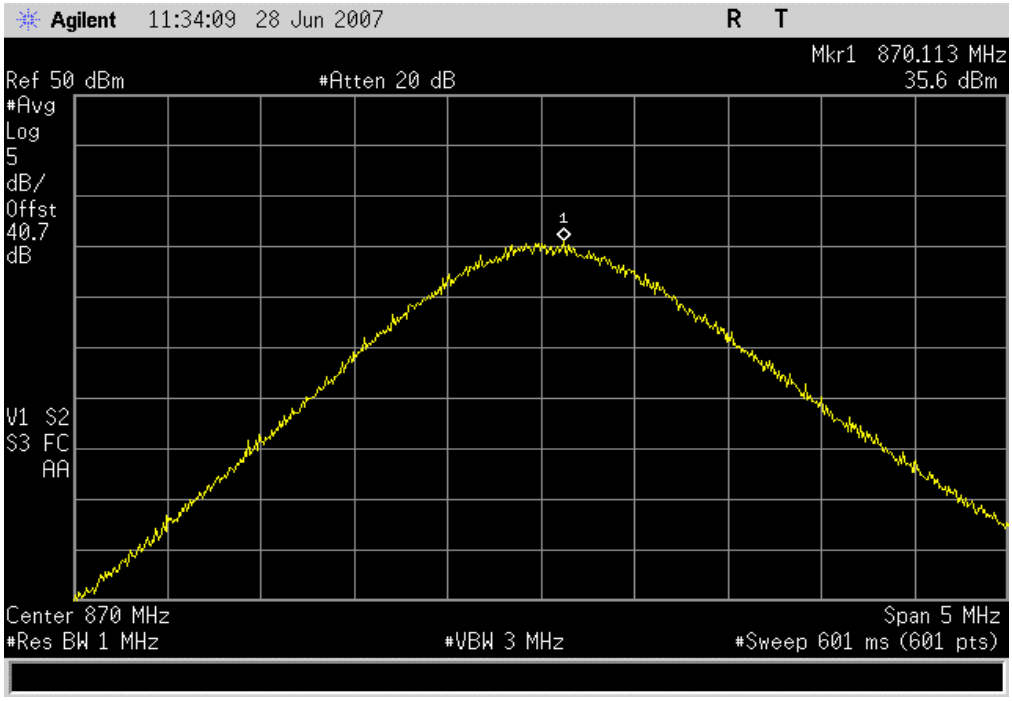
Mid Channel, Mid Power					
Result:	Pass	**Value:**	30.57 dBm	**Limit:**	



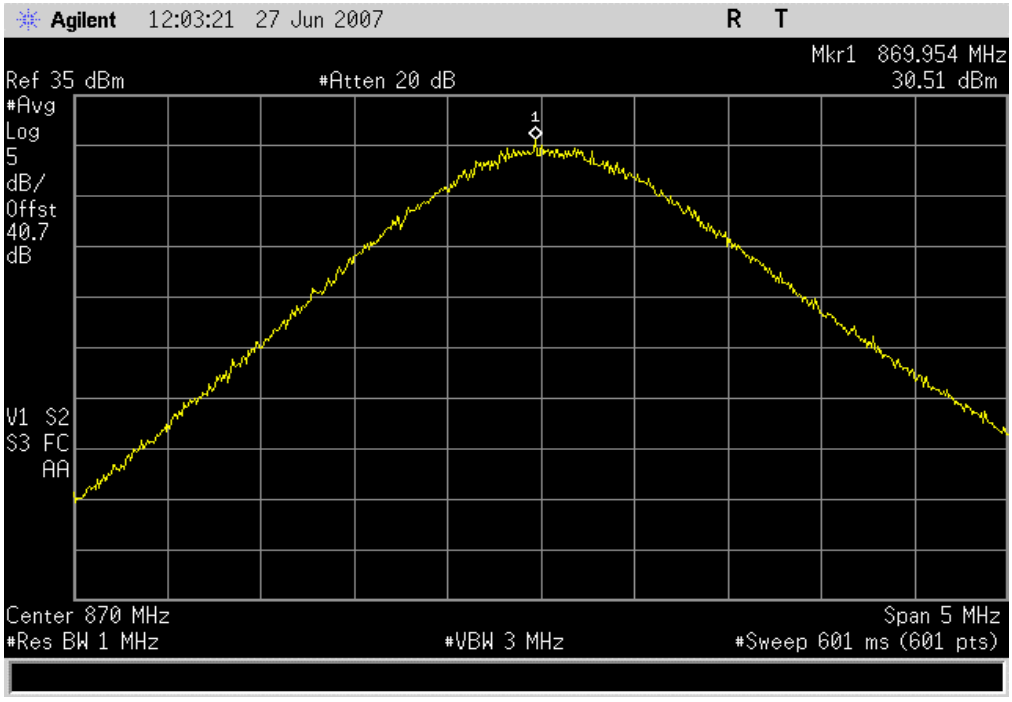
Mid Channel, Low Power					
Result:	Pass	**Value:**	25.29 dBm	**Limit:**	



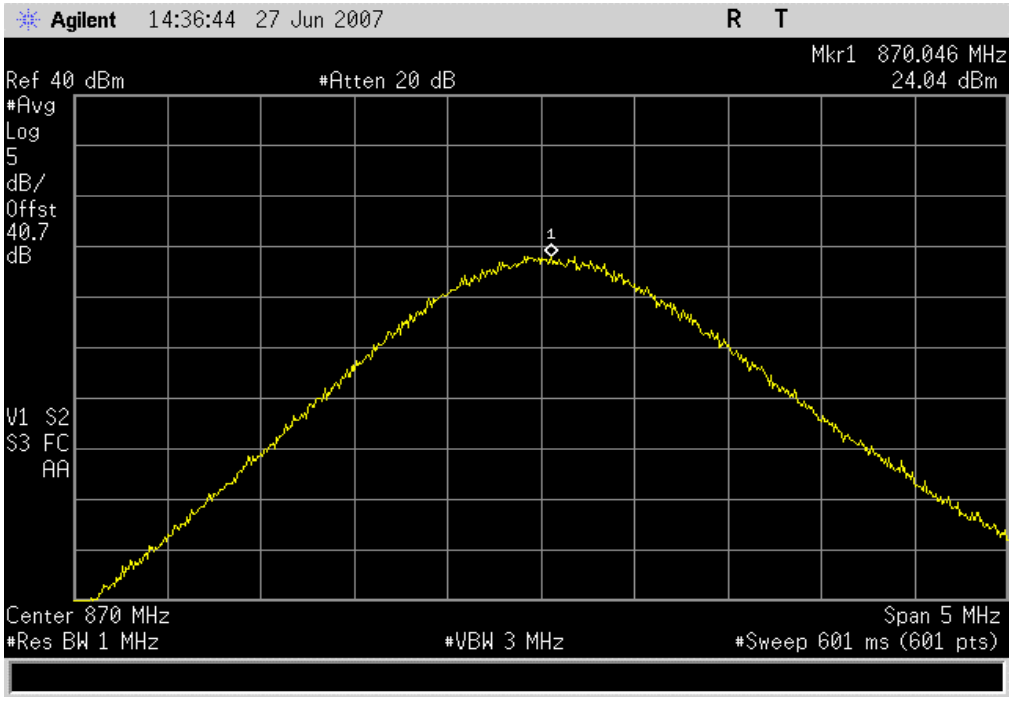
High Channel, High Power					
Result:	Pass	**Value:**	35.6 dBm	**Limit:**	



High Channel, Mid Power					
Result:	Pass	**Value:**	30.51 dBm	**Limit:**	



High Channel, Low Power					
Result:	Pass	**Value:**	24.04 dBm	**Limit:**	



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

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	12/7/2006	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/7/2006	13

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 antenna power conducted emissions were measured with the EUT set in receive mode. The measurements were made using a direct connection between each of the RF outputs of the EUT and the spectrum analyzer. The spectrum was scanned throughout the specified frequency range.

NORTHWEST EMC

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

XMit 2006.03.01

EUT:	MC-series, Mid-power, Outdoor Pole-mount			Work Order:	RAFN0062
Serial Number:	Various			Date:	06/28/07
Customer:	Radioframe Networks, Inc.			Temperature:	21°C
Attendees:	Dean Busch			Humidity:	41%
Project:	None			Barometric Pres.:	29.93
Tested by:	Ethan Schoonover	Power:	-48Vdc	Job Site:	Offsite

TEST SPECIFICATIONS	Test Method
FCC 15.111: 2006	ANSI C63.4 2003

COMMENTS

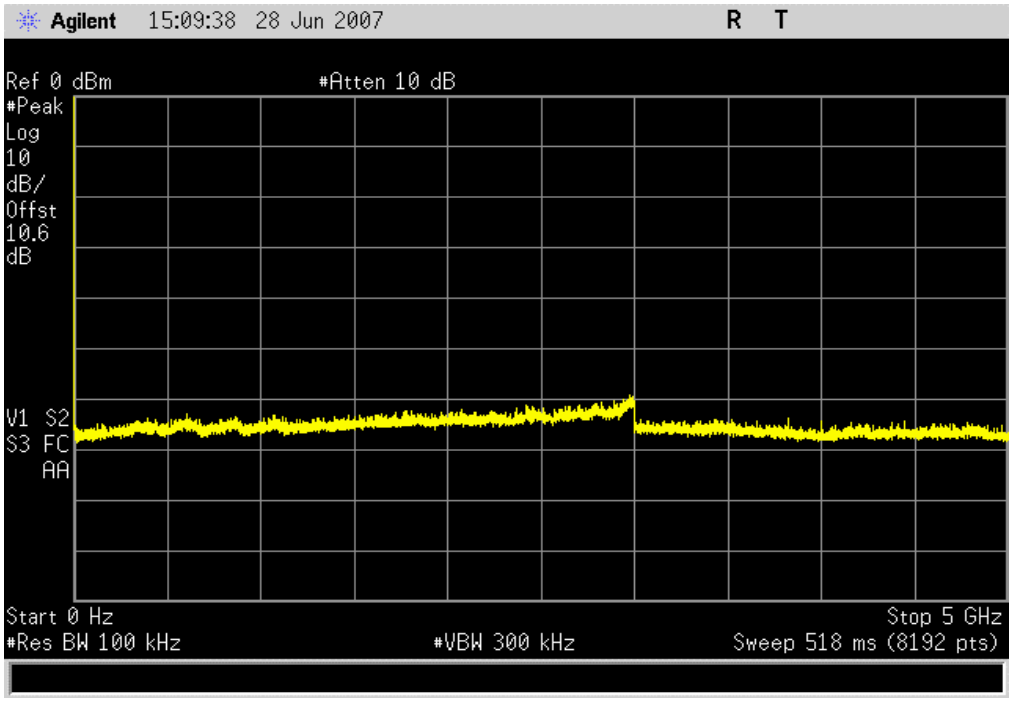
800MHz Band

DEVIATIONS FROM TEST STANDARD

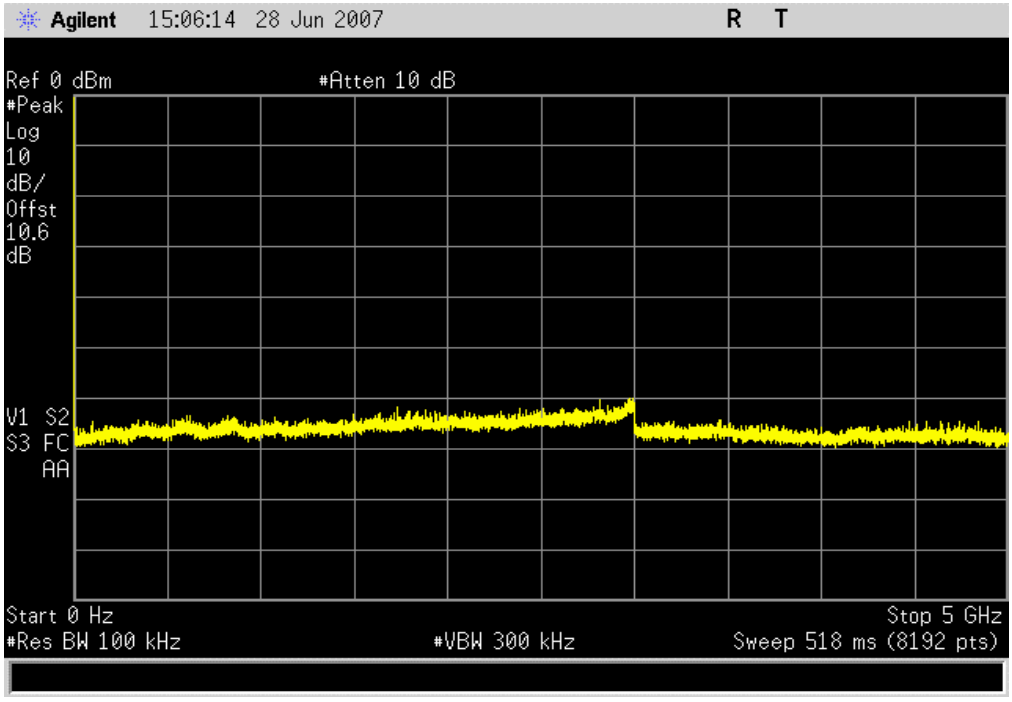
Configuration #	1	Signature

Modes of Operation and Test Conditions	Value	Limit	Result
RX1 port	< -60 dBm	≤ -57 dBm	Pass
RX2 port	< -60 dBm	≤ -57 dBm	Pass

RX1 port					
Result:	Pass	**Value:**	< -60 dBm	**Limit:**	≤ -57 dBm



RX2 port					
Result:	Pass	**Value:**	< -60 dBm	**Limit:**	≤ -57 dBm



SPURIOUS EMISSIONS AT ANTENNA TERMINALS

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	12/7/2006	13
Signal Generator	Hewlett-Packard	8648D	TGC	12/7/2006	13

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

A spectrum analyzer was used to scan from 0 to 9 GHz. A 100kHz resolution bandwidth was used. No video filtering was employed. A 30dB external attenuator was used on the RF input of the spectrum analyzer.

NORTHWEST EMC

SPURIOUS EMISSIONS AT ANTENNA TERMINALS

XMit 2006.03.01

EUT:	MC-series, Mid-power, Outdoor Pole-mount			Work Order:	RAFN0075
Serial Number:	Various			Date:	06/27/07
Customer:	Radioframe Networks, Inc.			Temperature:	21°C
Attendees:	Dean Busch			Humidity:	34%
Project:	None			Barometric Pres.:	29.99
Tested by:	Ethan Schoonover	Power:	-48Vdc	Job Site:	Offsite

TEST SPECIFICATIONS	Test Method
FCC 90I:2006	ANSI/TIA/EIA-603-B:2002

COMMENTS

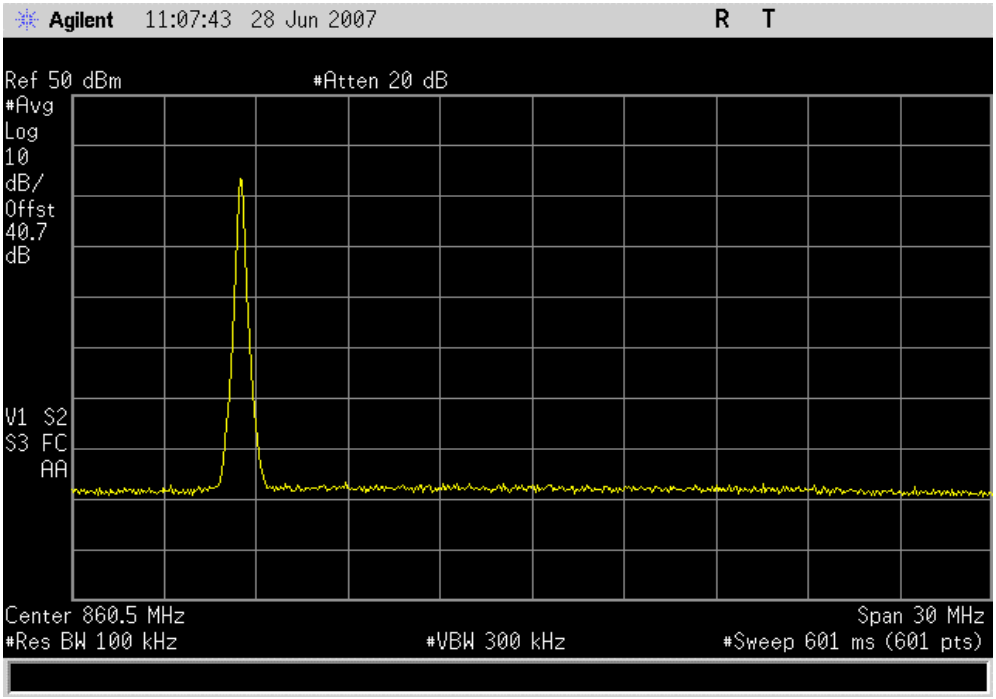
800MHz Band, High Power Level

DEVIATIONS FROM TEST STANDARD

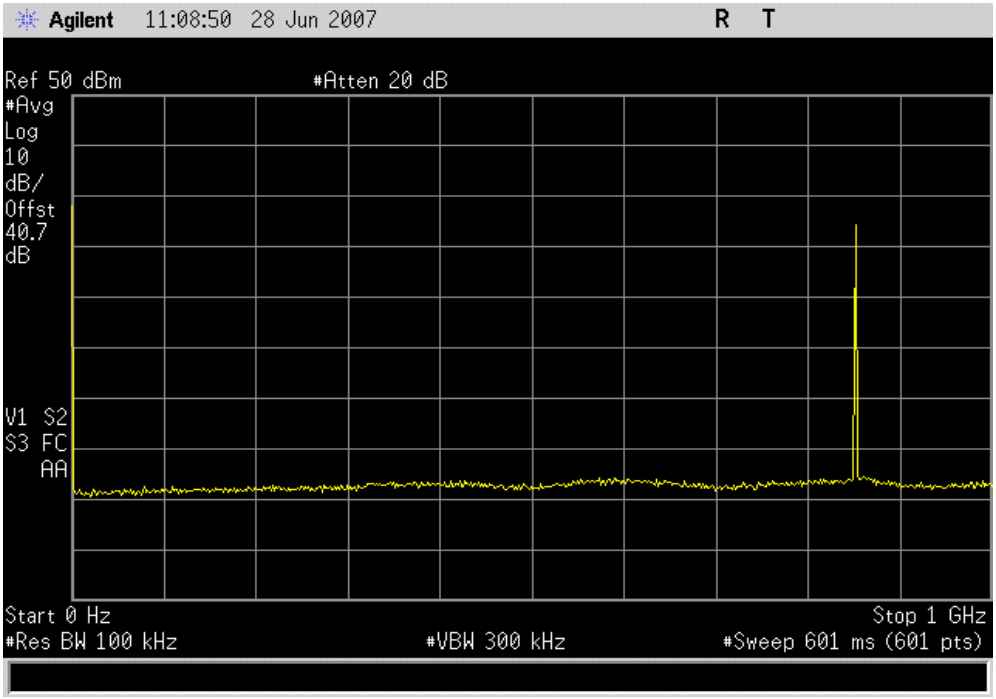
Configuration #	1	Signature

Modes of Operation and Test Conditions	Value	Limit	Result
Low Channel, In Band	< -30 dBm	≤ -13 dBm	Pass
Low Channel, 0-1GHz	< -30 dBm	≤ -13 dBm	Pass
Low Channel, 995MHz-2.8GHz	< -30 dBm	≤ -13 dBm	Pass
Low Channel, 2.795GHz-4.5GHz	< -30 dBm	≤ -13 dBm	Pass
Low Channel, 4.495GHz-6GHz	< -30 dBm	≤ -13 dBm	Pass
Low Channel, 5.995GHz-7.5GHz	< -30 dBm	≤ -13 dBm	Pass
Low Channel, 7.495GHz-9GHz	< -30 dBm	≤ -13 dBm	Pass
Mid Channel, In Band	< -30 dBm	≤ -13 dBm	Pass
Mid Channel, 0-1GHz	< -30 dBm	≤ -13 dBm	Pass
Mid Channel, 995MHz-2.8GHz	< -30 dBm	≤ -13 dBm	Pass
Mid Channel, 2.795GHz-4.5GHz	< -30 dBm	≤ -13 dBm	Pass
Mid Channel, 4.495GHz-6GHz	< -30 dBm	≤ -13 dBm	Pass
Mid Channel, 5.995GHz-7.5GHz	< -30 dBm	≤ -13 dBm	Pass
Mid Channel, 7.495GHz-9GHz	< -30 dBm	≤ -13 dBm	Pass
High Channel, In Band	< -30 dBm	≤ -13 dBm	Pass
High Channel, 0-1GHz	< -30 dBm	≤ -13 dBm	Pass
High Channel, 995MHz-2.8GHz	< -30 dBm	≤ -13 dBm	Pass
High Channel, 2.795GHz-4.5GHz	< -30 dBm	≤ -13 dBm	Pass
High Channel, 4.495GHz-6GHz	< -30 dBm	≤ -13 dBm	Pass
High Channel, 5.995GHz-7.5GHz	< -30 dBm	≤ -13 dBm	Pass
High Channel, 7.495GHz-9GHz	< -30 dBm	≤ -13 dBm	Pass
12 Channel Intermods, In Band	< -30 dBm	≤ -13 dBm	Pass
12 Channel Intermods, 0-1GHz	< -30 dBm	≤ -13 dBm	Pass
12 Channel Intermods, 995MHz-2.8GHz	< -30 dBm	≤ -13 dBm	Pass
12 Channel Intermods, 2.795GHz-4.5GHz	< -30 dBm	≤ -13 dBm	Pass
12 Channel Intermods, 4.495GHz-6GHz	< -30 dBm	≤ -13 dBm	Pass
12 Channel Intermods, 5.995GHz-7.5GHz	< -30 dBm	≤ -13 dBm	Pass
12 Channel Intermods, 7.495GHz-9GHz	< -30 dBm	≤ -13 dBm	Pass
12 Channel Intermods, In Band, Lower group			

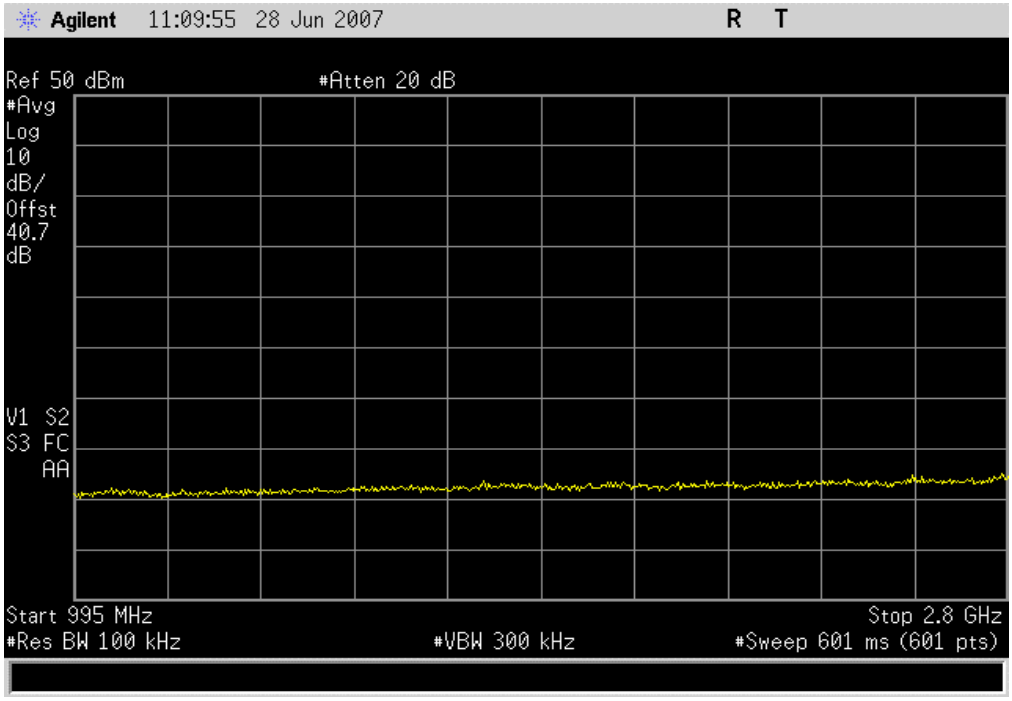
Low Channel, In Band					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



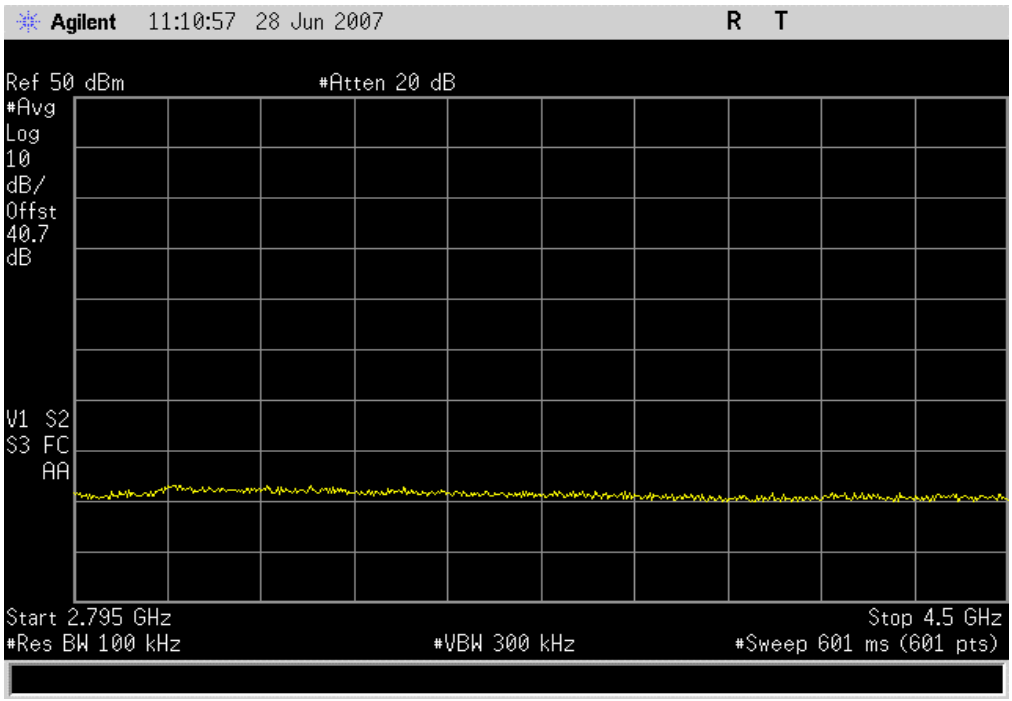
Low Channel, 0-1GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



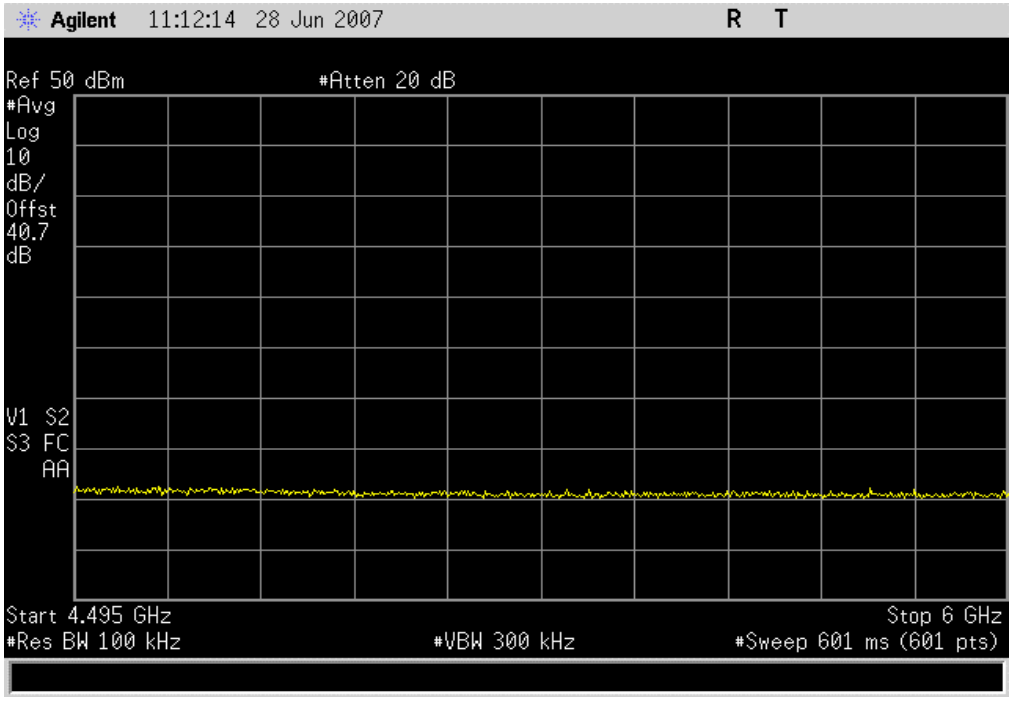
Low Channel, 995MHz-2.8GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



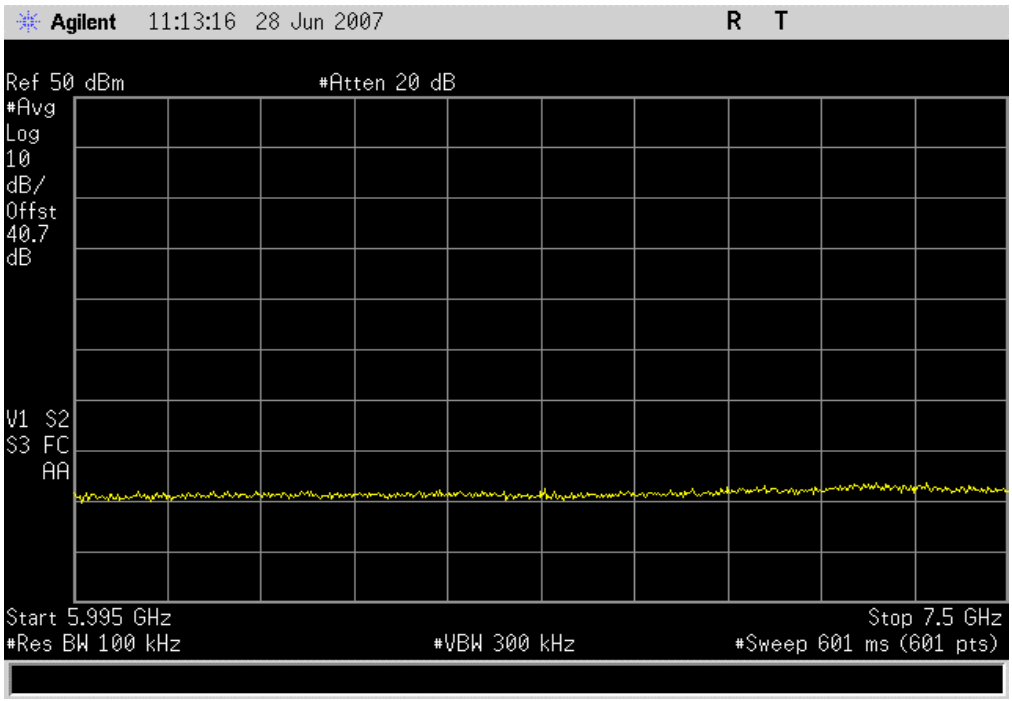
Low Channel, 2.795GHz-4.5GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



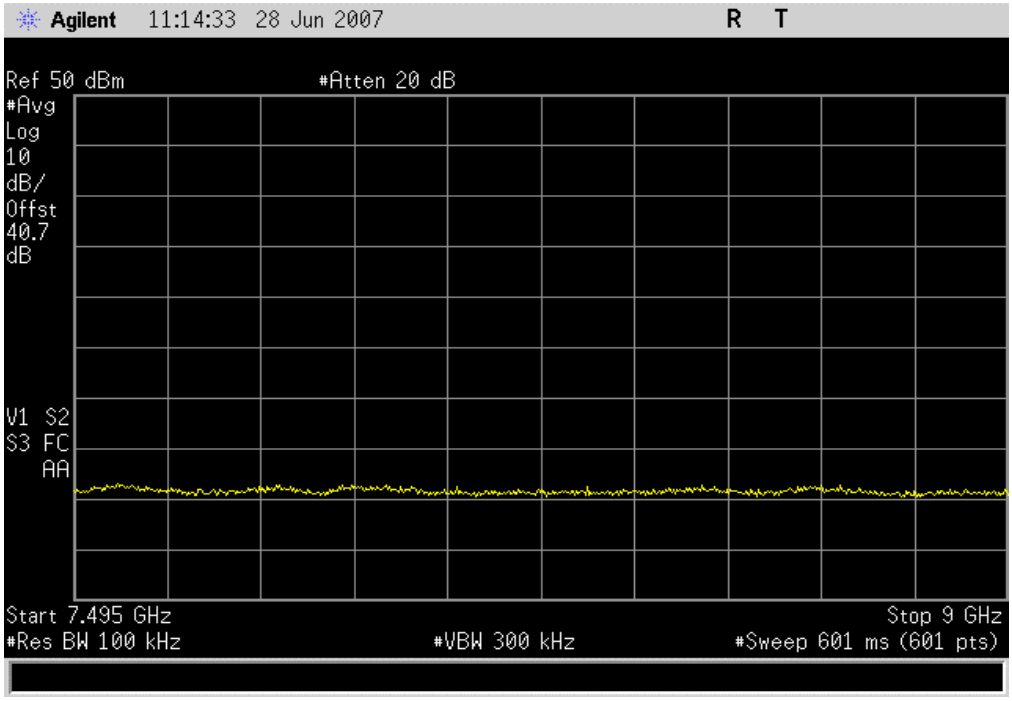
Low Channel, 4.495GHz-6GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



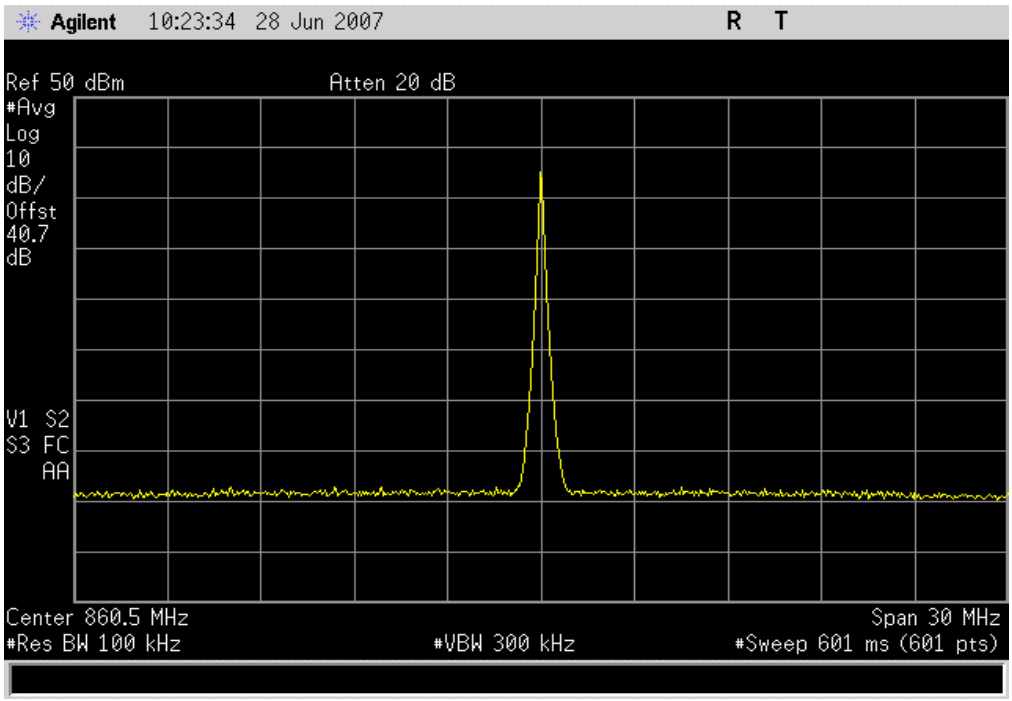
Low Channel, 5.995GHz-7.5GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



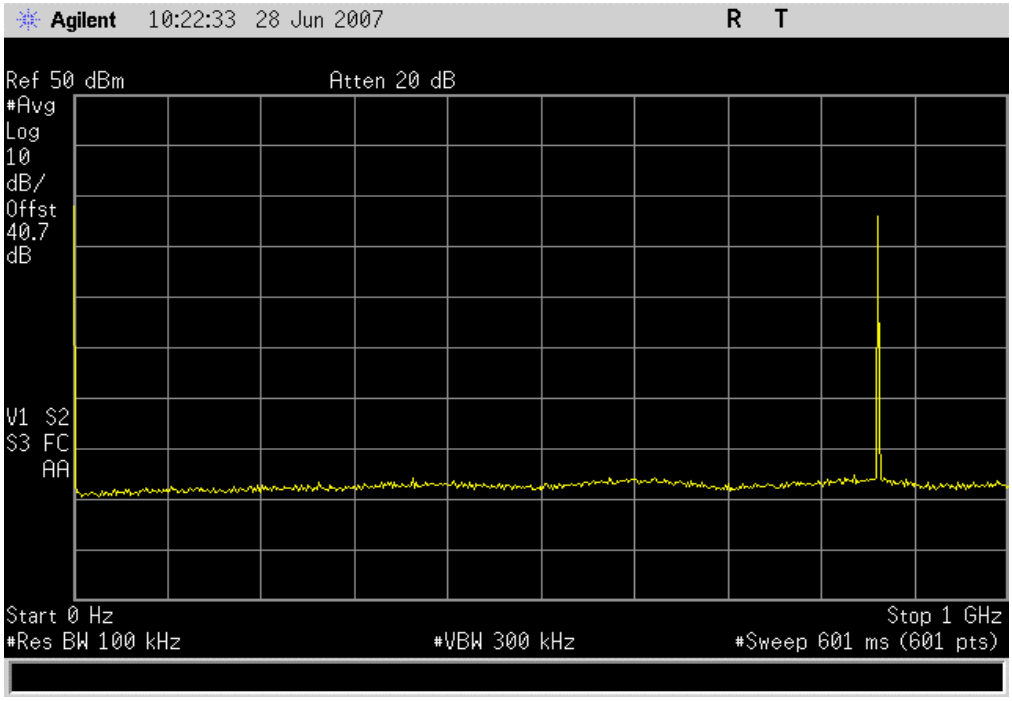
Low Channel, 7.495GHz-9GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



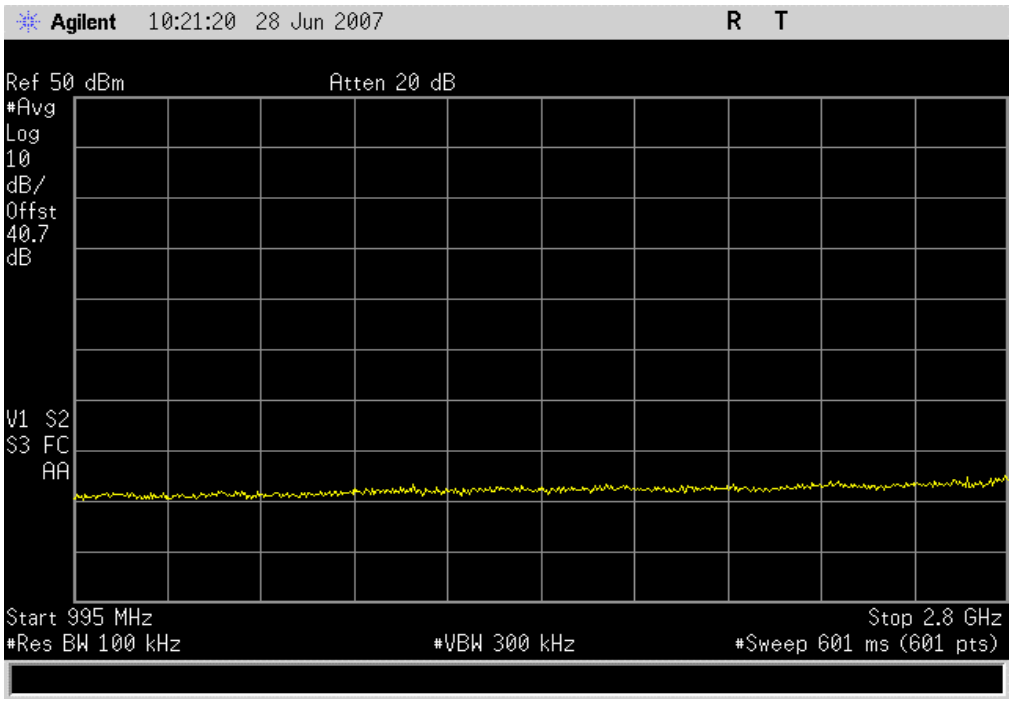
Mid Channel, In Band					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



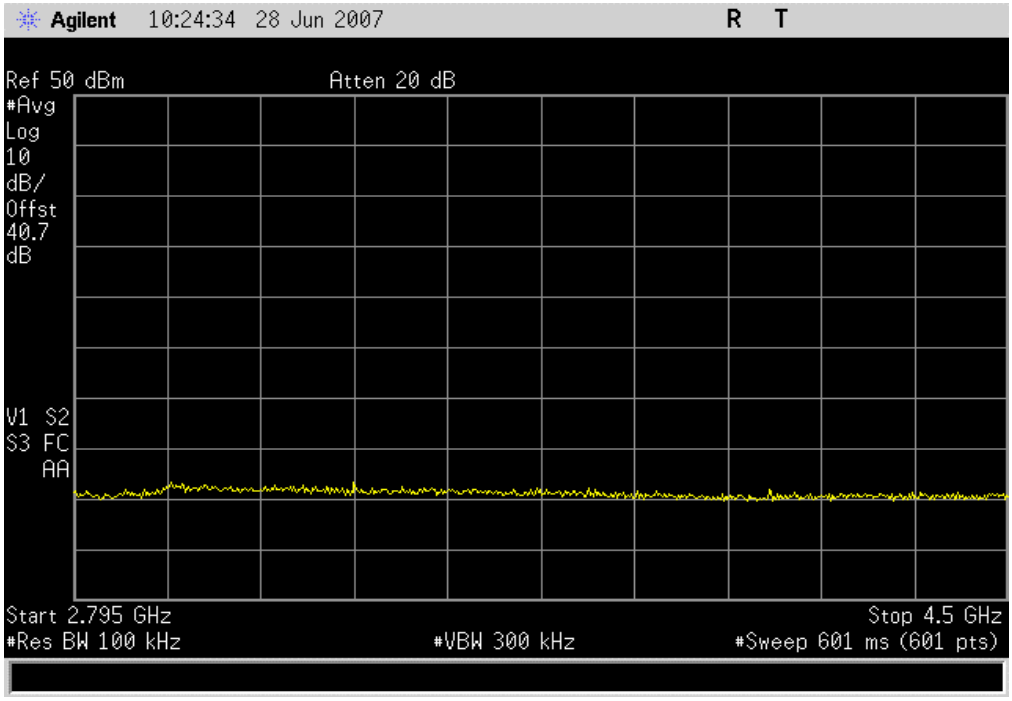
Mid Channel, 0-1GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



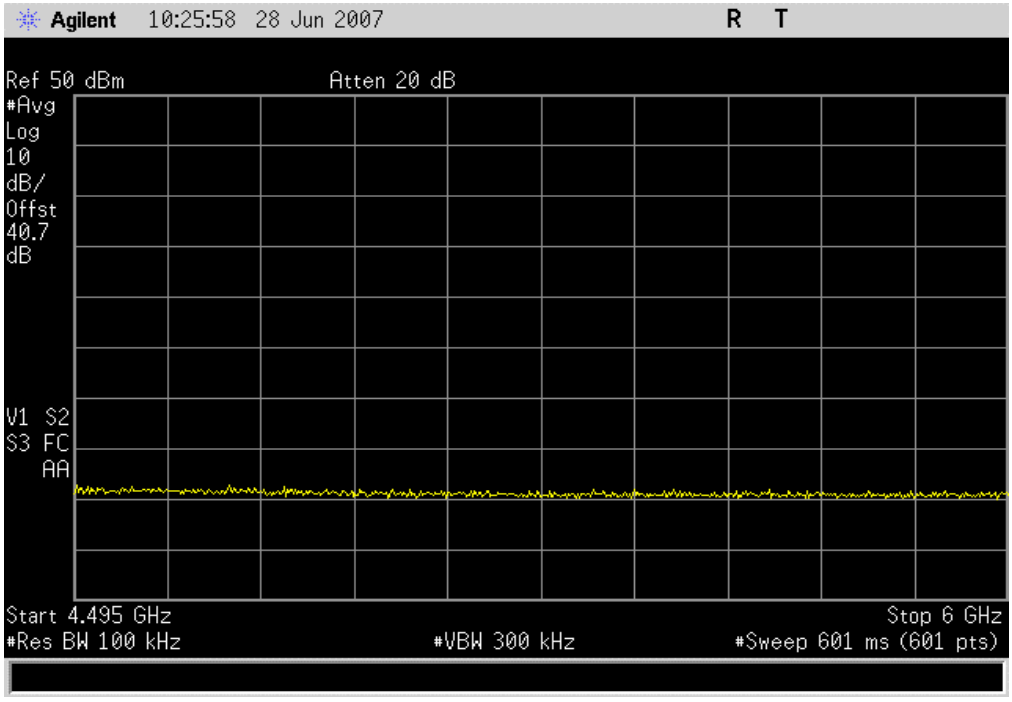
Mid Channel, 995MHz-2.8GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



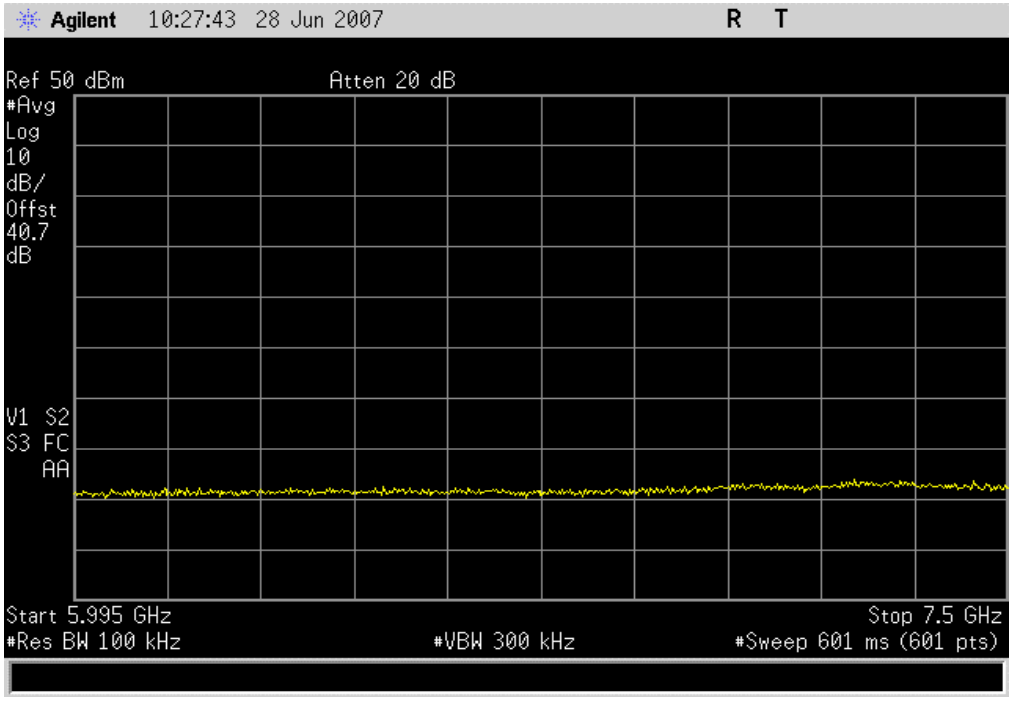
Mid Channel, 2.795GHz-4.5GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



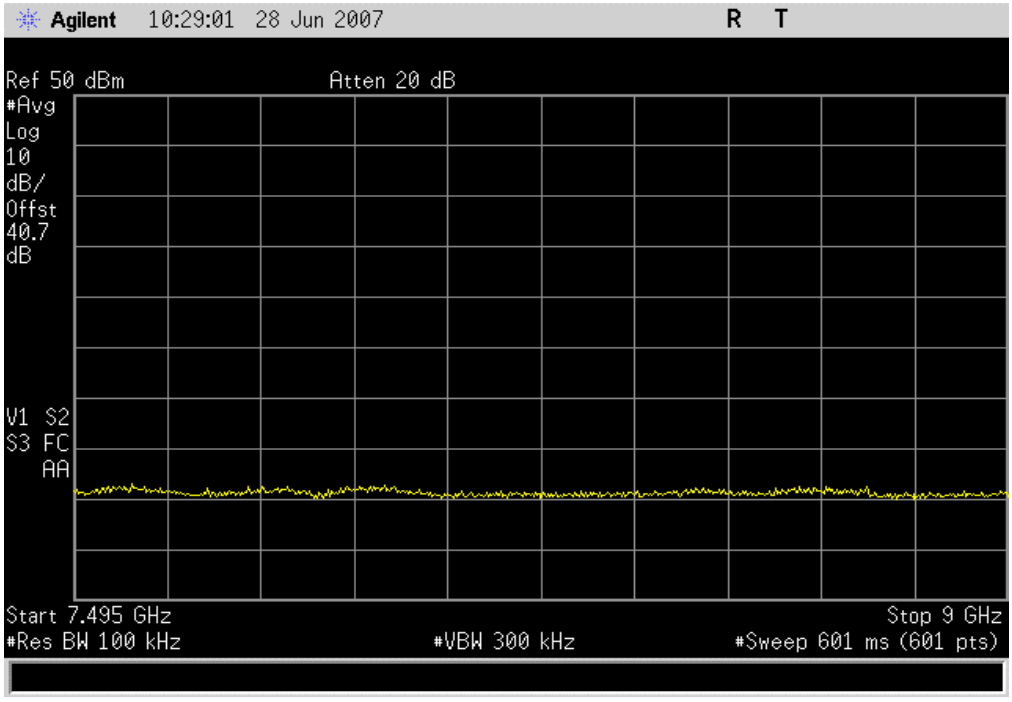
Mid Channel, 4.495GHz-6GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



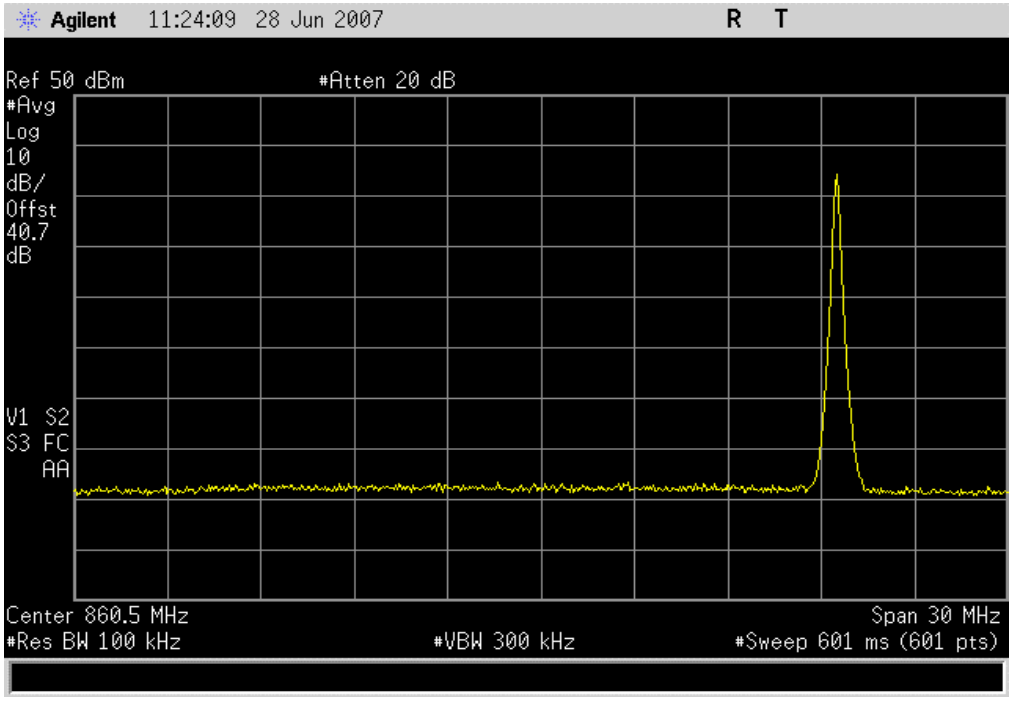
Mid Channel, 5.995GHz-7.5GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



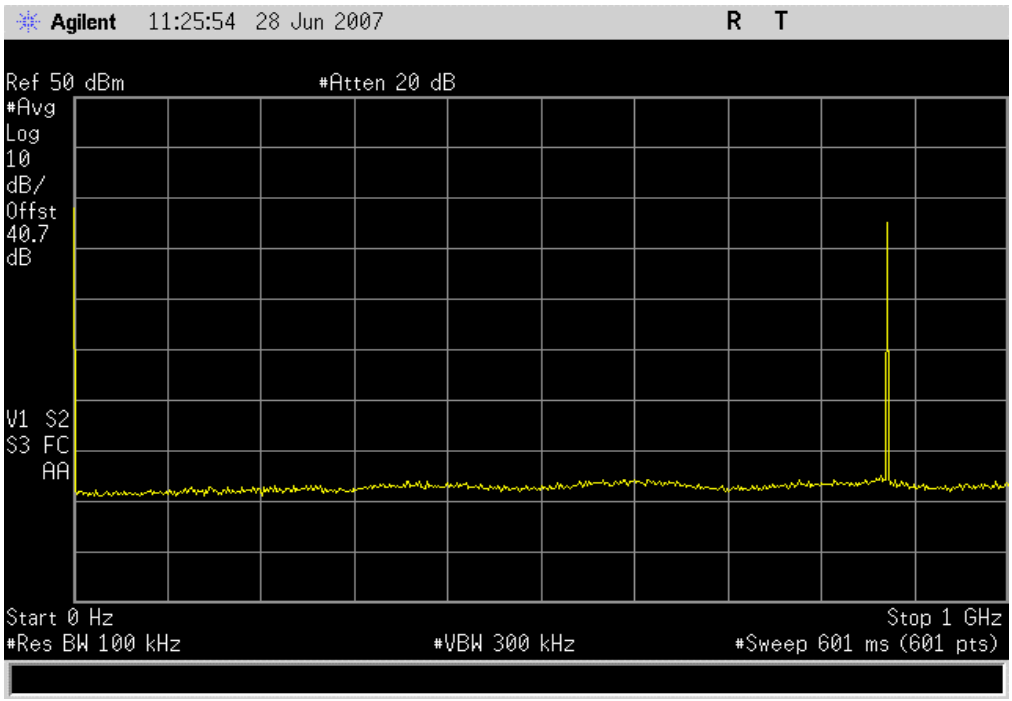
Mid Channel, 7.495GHz-9GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



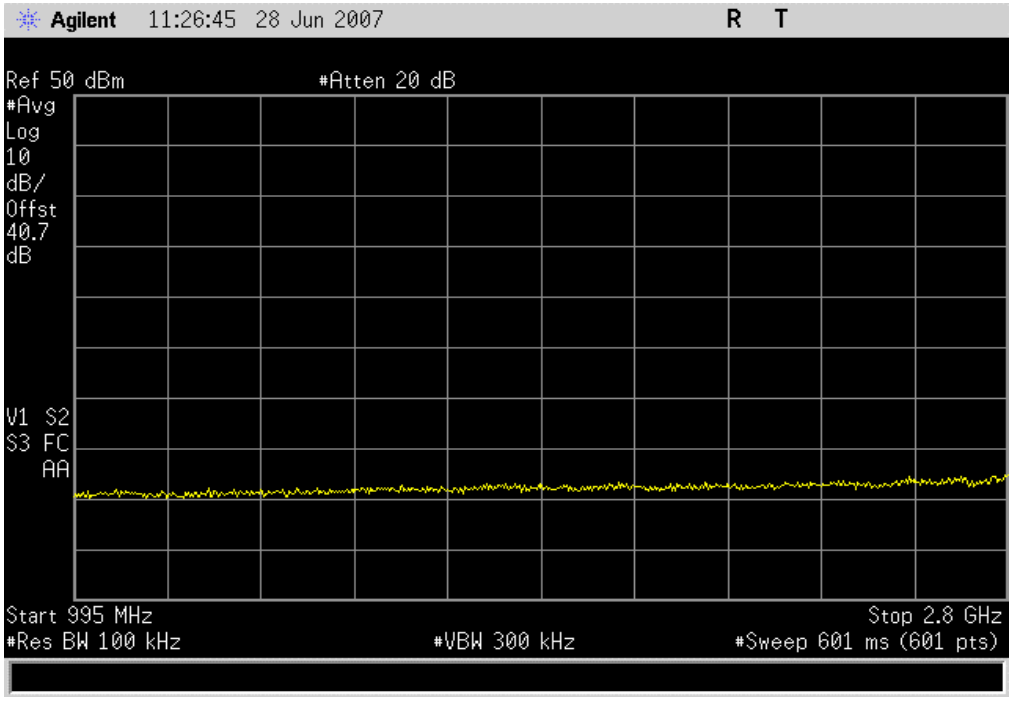
High Channel, In Band					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



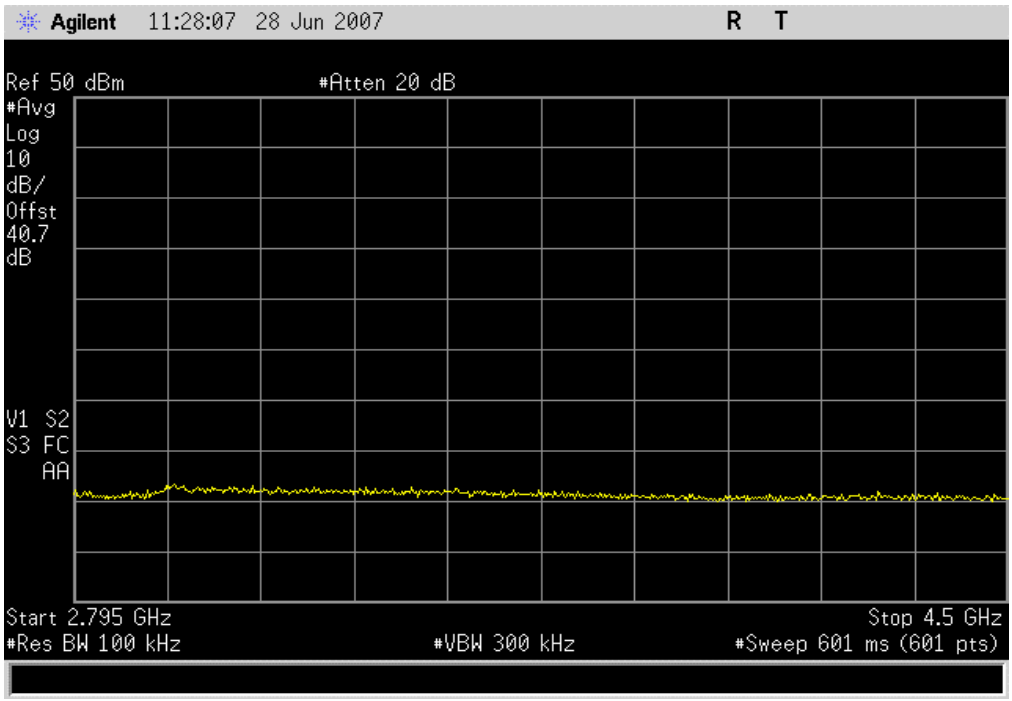
High Channel, 0-1GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



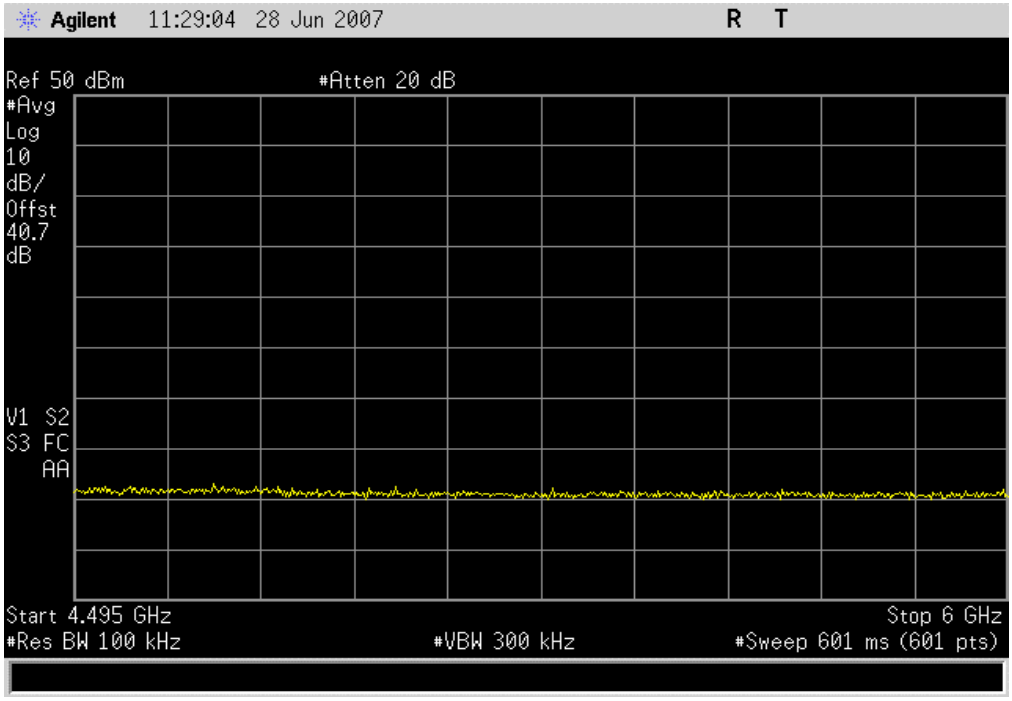
High Channel, 995MHz-2.8GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



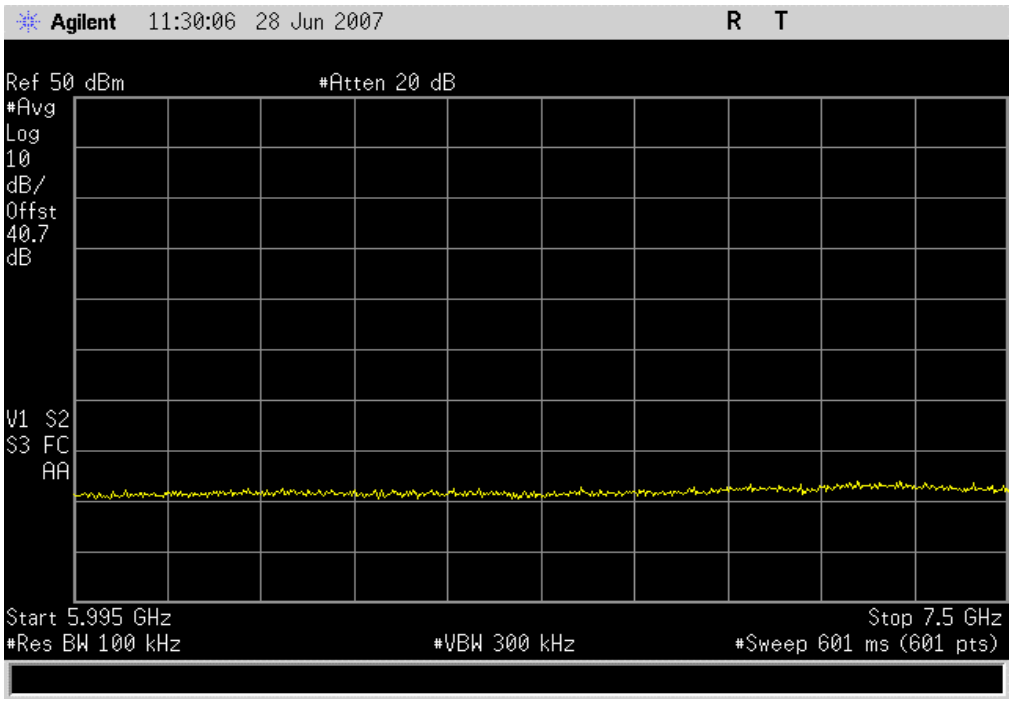
High Channel, 2.795GHz-4.5GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



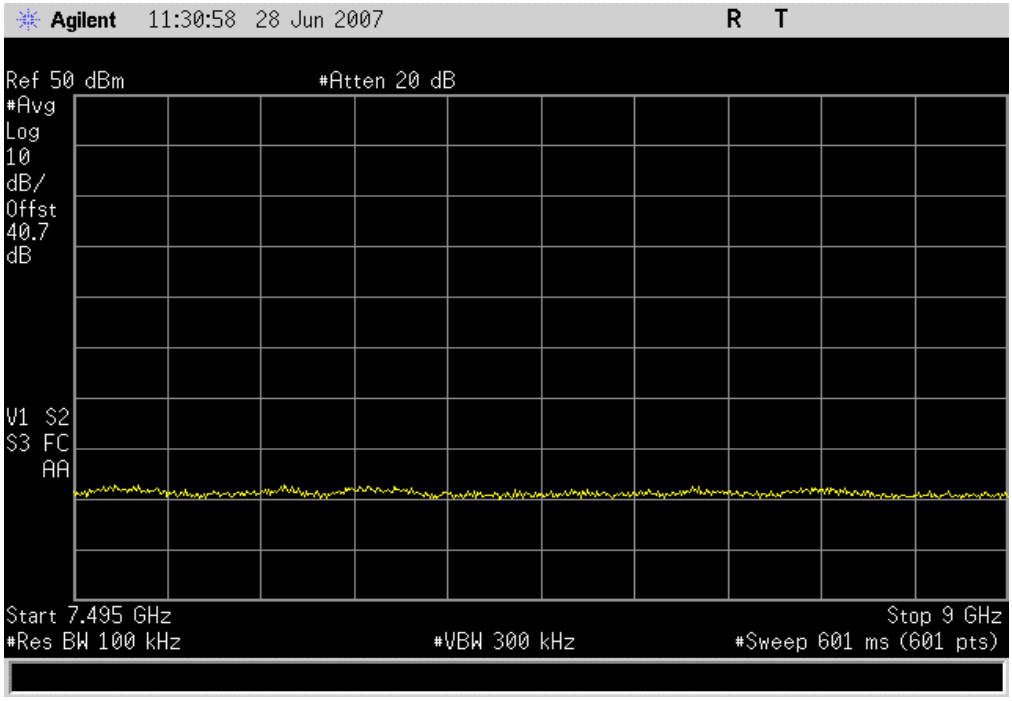
High Channel, 4.495GHz-6GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



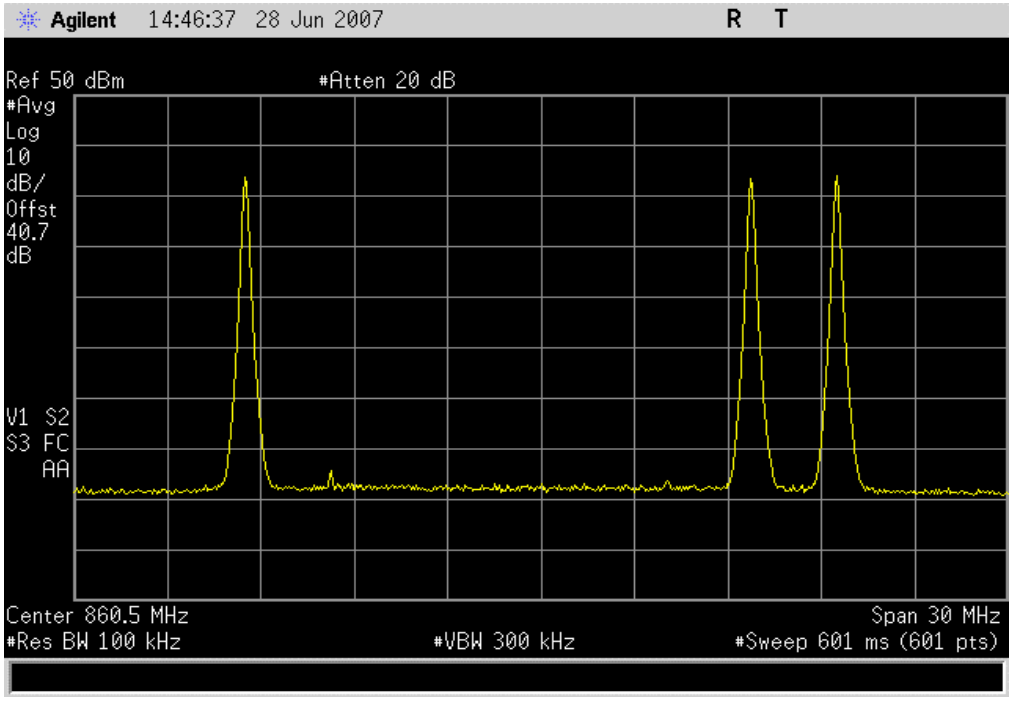
High Channel, 5.995GHz-7.5GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



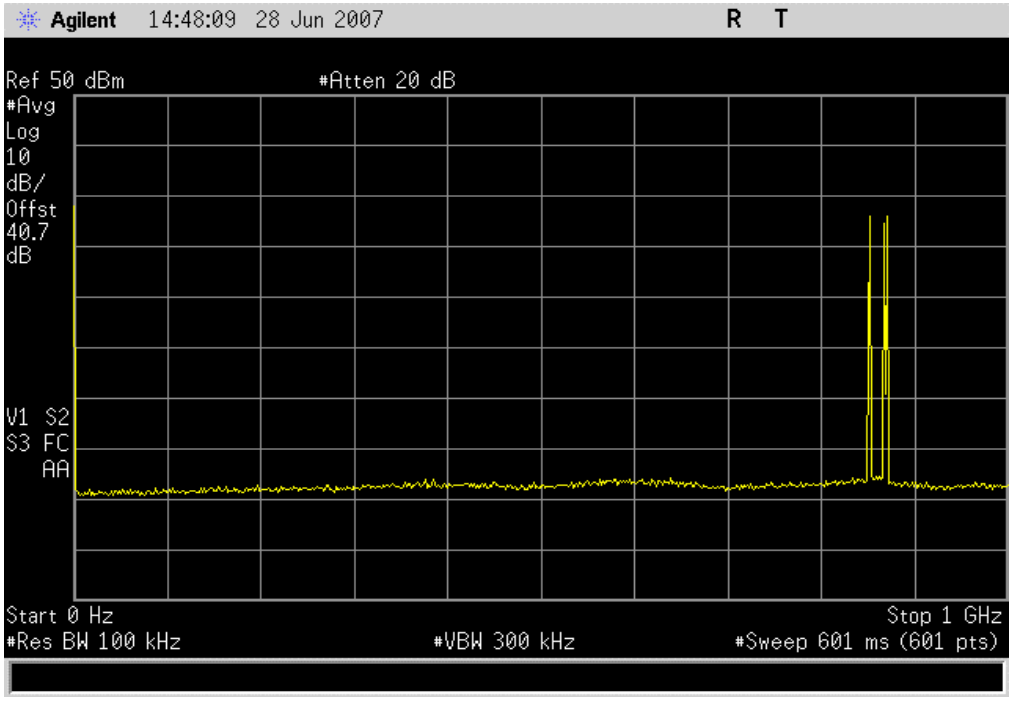
High Channel, 7.495GHz-9GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



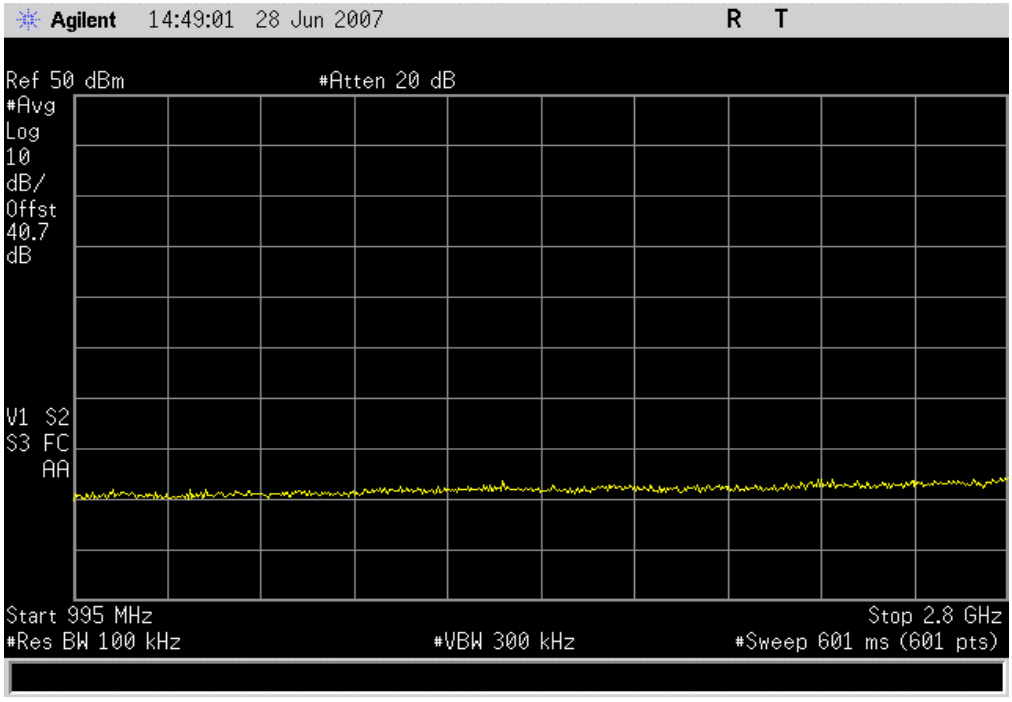
12 Channel Intermods, In Band					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



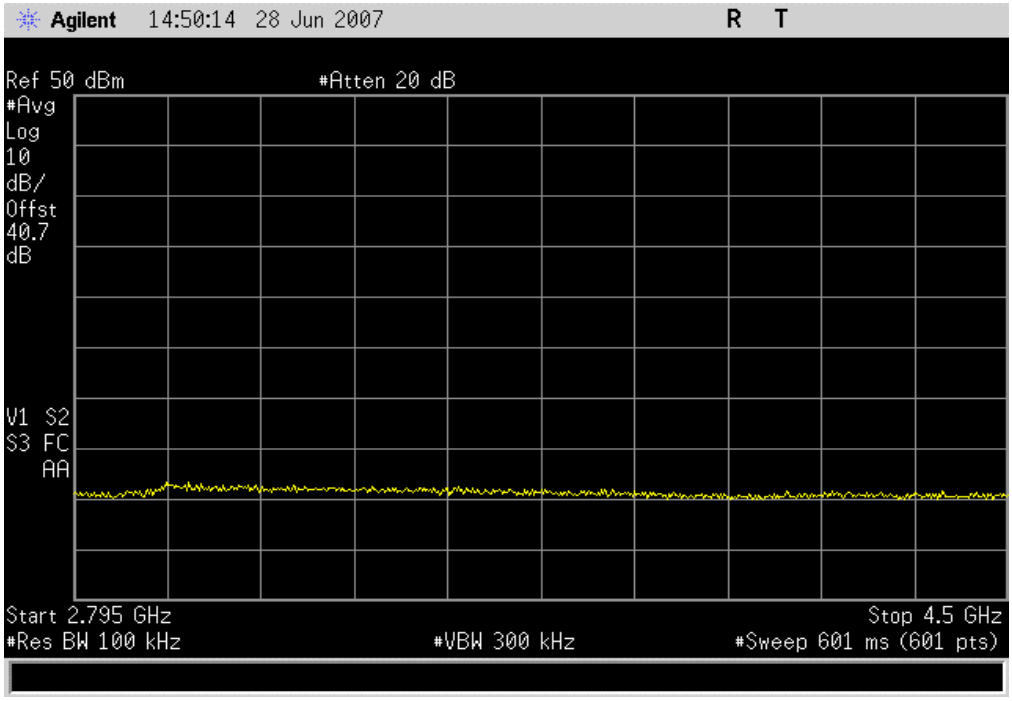
12 Channel Intermods, 0-1GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



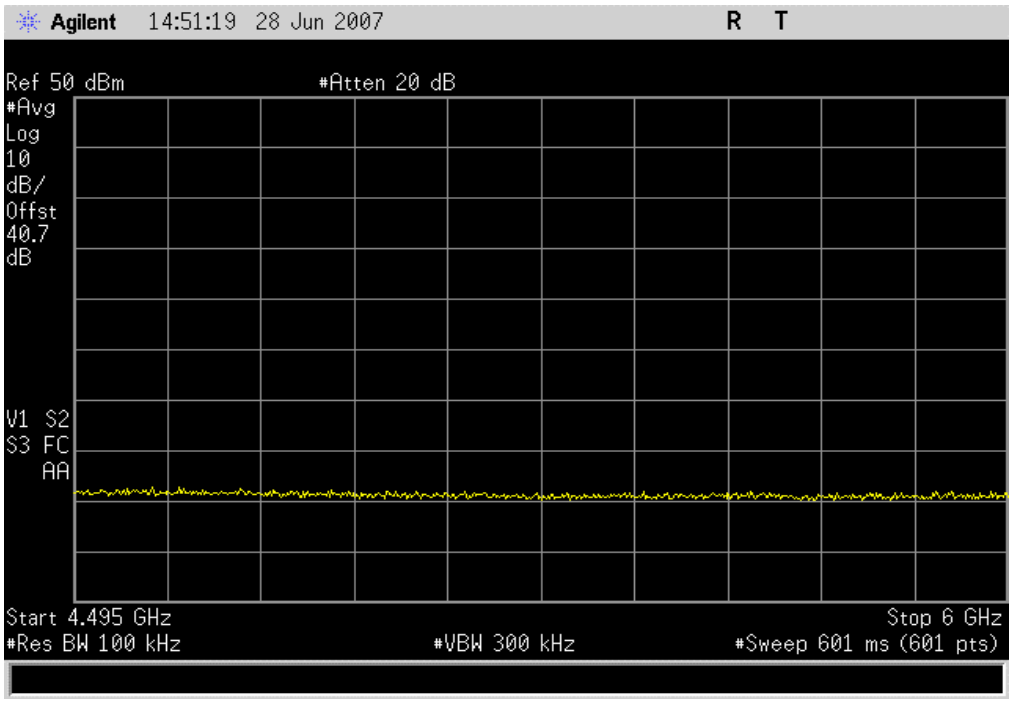
12 Channel Intermods, 995MHz-2.8GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



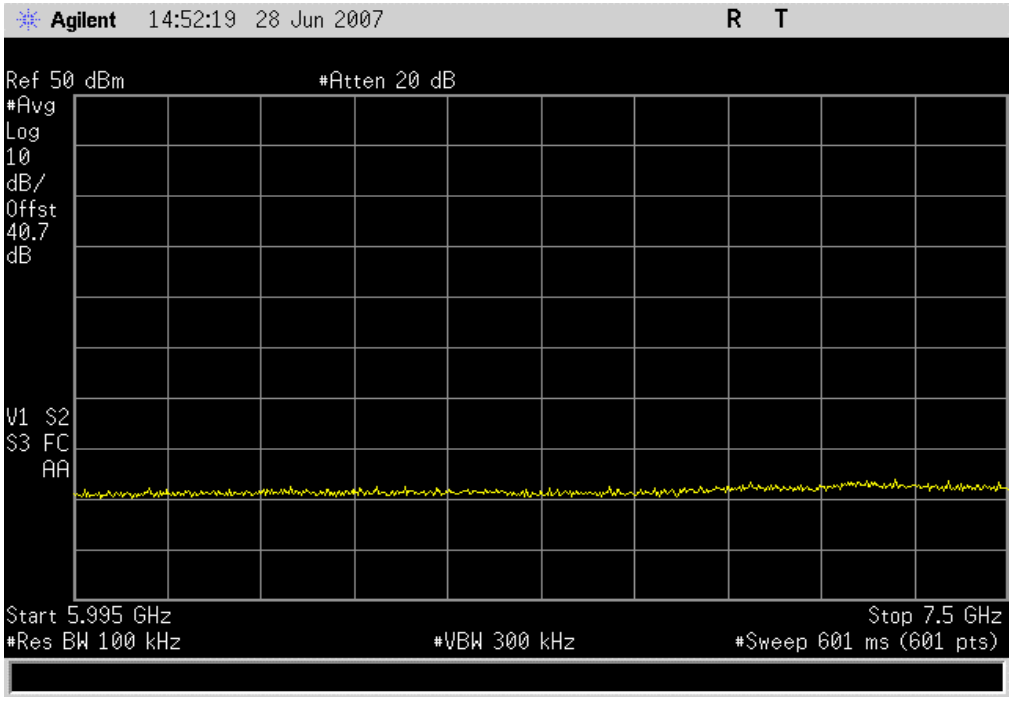
12 Channel Intermods, 2.795GHz-4.5GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



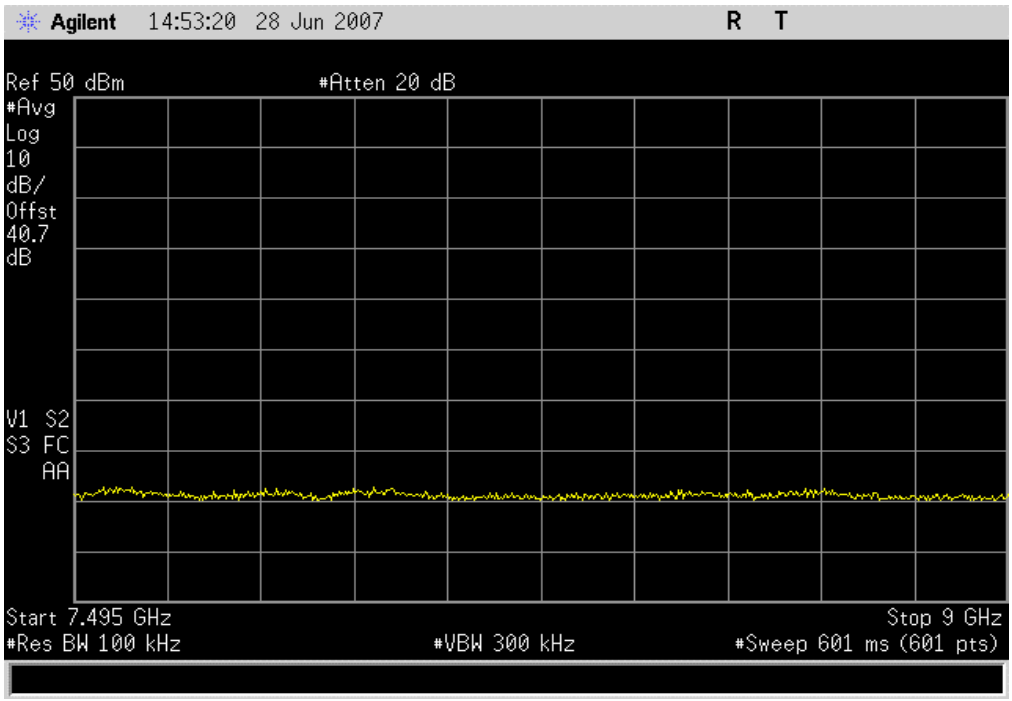
12 Channel Intermods, 4.495GHz-6GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



12 Channel Intermods, 5.995GHz-7.5GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



12 Channel Intermods, 7.495GHz-9GHz					
Result:	Pass	**Value:**	< -30 dBm	**Limit:**	≤ -13 dBm



Spurious Radiated Emissions

MODES OF OPERATION

Transmitting typical sector config: Single Sector, 3 channels at full power.

POWER SETTINGS INVESTIGATED

48 VDC

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Horn	EMCO	3160-08	AHK	NCR	0
Antenna, Dipole (ADAA included)	Roberts	Roberts	ADA	12/28/2006	24
Signal Generator	Agilent	E8257D	TGX	1/25/2007	13
Pre-Amplifier	Miteq	AMF-4D-010100-24-10P	APW	5/10/2007	13
Antenna, Horn	EMCO	3115	AHC	8/24/2006	12
Pre-Amplifier	Miteq	AM-1616-1000	AOL	12/29/2006	13
Antenna, Biconilog	EMCO	3141	AXE	12/28/2005	24
Spectrum Analyzer	Agilent	E4446A	AAT	12/7/2006	13

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

For licensed transmitters, the FCC references TIA/EIA-603 as the measurement procedure standard. TIA/EIA-603 Section 2.2.12 describes a method for measuring radiated spurious emissions that utilizes an antenna substitution method:

At an approved test site, the transmitter is place on a remotely controlled turntable, and the measurement antenna is placed 3 meters from the transmitter. The turntable azimuth is varied to maximize the level of spurious emissions. The height of the measurement antenna is also varied from 1 to 4 meters. The amplitude and frequency of the highest emissions are noted. The transmitter is then replaced with a ½ wave dipole that is successively tuned to each of the highest spurious emissions. A signal generator is connected to the dipole (horn antenna for frequencies above 1 GHz), and its output is adjusted to match the level previously noted for each frequency. The output of the signal generator is recorded, and by factoring in the cable loss to the dipole antenna and its gain; the power (dBm) into an ideal ½ wave dipole antenna is determined for each radiated spurious emission.

NORTHWEST EMC

Spurious Radiated Emissions

PSA 2007.05.07
EMI 2006.12.20

EUT:	MC-series, Mid-power, Outdoor Pole-mount			Work Order:	RAFN0075
Serial Number:	None			Date:	07/02/07
Customer:	Radioframe Networks, Inc.			Temperature:	23
Attendees:	None			Humidity:	36%
Project:	None			Barometric Pres.:	30.13
Tested by:	Greg Kiemel	Power:	48 VDC	Job Site:	EV01

TEST SPECIFICATIONS	Test Method
FCC 90I:2006	ANSI/TIA/EIA-603-B-2002

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	Test Distance (m)	0

COMMENTS

Antenna ports terminated.

EUT OPERATING MODES

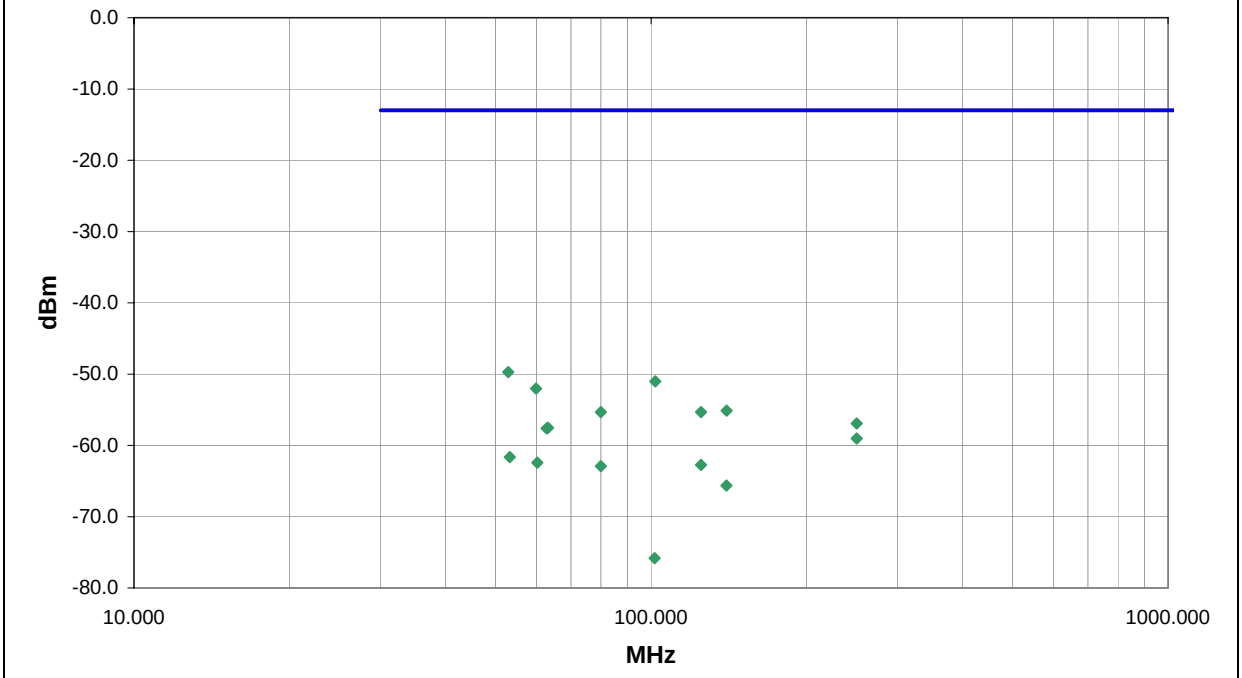
Transmitting typical sector config: Single Sector, 3 channels at full power.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	1
Configuration #	1
Results	Pass

Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
52.937			276.0	1.0			V-Bilog	PK	1.06E-08	-49.7	-13.0	-36.7
101.912			241.0	1.0			V-Bilog	PK	7.89E-09	-51.0	-13.0	-38.0
59.953			308.0	1.0			V-Bilog	PK	6.27E-09	-52.0	-13.0	-39.0
140.007			263.0	1.0			V-Bilog	PK	3.07E-09	-55.1	-13.0	-42.1
79.985			286.0	1.4			V-Bilog	PK	2.93E-09	-55.3	-13.0	-42.3
124.947			272.0	1.0			V-Bilog	PK	2.93E-09	-55.3	-13.0	-42.3
249.999			68.0	1.0			V-Bilog	PK	2.03E-09	-56.9	-13.0	-43.9
63.241			99.0	1.0			H-Bilog	PK	1.77E-09	-57.5	-13.0	-44.5
62.830			185.0	1.0			V-Bilog	PK	1.73E-09	-57.6	-13.0	-44.6
249.985			94.0	1.0			H-Bilog	PK	1.25E-09	-59.0	-13.0	-46.0
53.340			150.0	3.3			H-Bilog	PK	6.87E-10	-61.6	-13.0	-48.6
60.291			153.0	1.0			H-Bilog	PK	5.72E-10	-62.4	-13.0	-49.4
124.973			360.0	1.8			H-Bilog	PK	5.33E-10	-62.7	-13.0	-49.7
79.955			14.0	1.5			H-Bilog	PK	5.09E-10	-62.9	-13.0	-49.9
139.963			121.0	1.0			H-Bilog	PK	2.74E-10	-65.6	-13.0	-52.6
101.628			65.0	2.3			H-Bilog	PK	2.61E-11	-75.8	-13.0	-62.8

NORTHWEST EMC

Spurious Radiated Emissions

PSA 2007.05.07
EMI 2006.12.20

EUT:	MC-series, Mid-power, Outdoor Pole-mount			Work Order:	RAFN0075
Serial Number:	None			Date:	07/02/07
Customer:	Radioframe Networks, Inc.			Temperature:	23
Attendees:	None			Humidity:	36%
Project:	None			Barometric Pres.:	30.13
Tested by:	Greg Kiemel	Power:	48 VDC	Job Site:	EV01

TEST SPECIFICATIONS	Test Method
FCC 90I:2006	ANSI/TIA/EIA-603-B-2002

TEST PARAMETERS

Antenna Height(s) (m)	1 - 4	Test Distance (m)	0

COMMENTS

Antenna ports terminated.

EUT OPERATING MODES

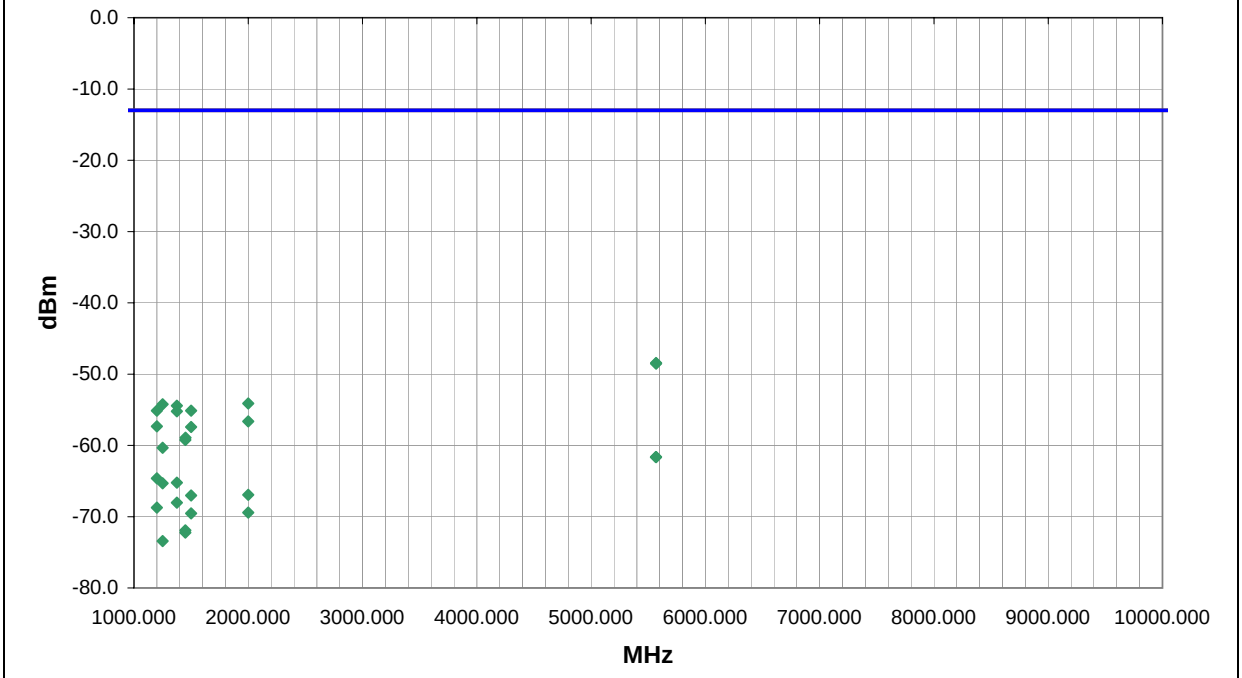
Transmitting typical sector config: Single Sector, 3 channels at full power.

DEVIATIONS FROM TEST STANDARD

No deviations.

Run #	2
Configuration #	1
Results	Pass

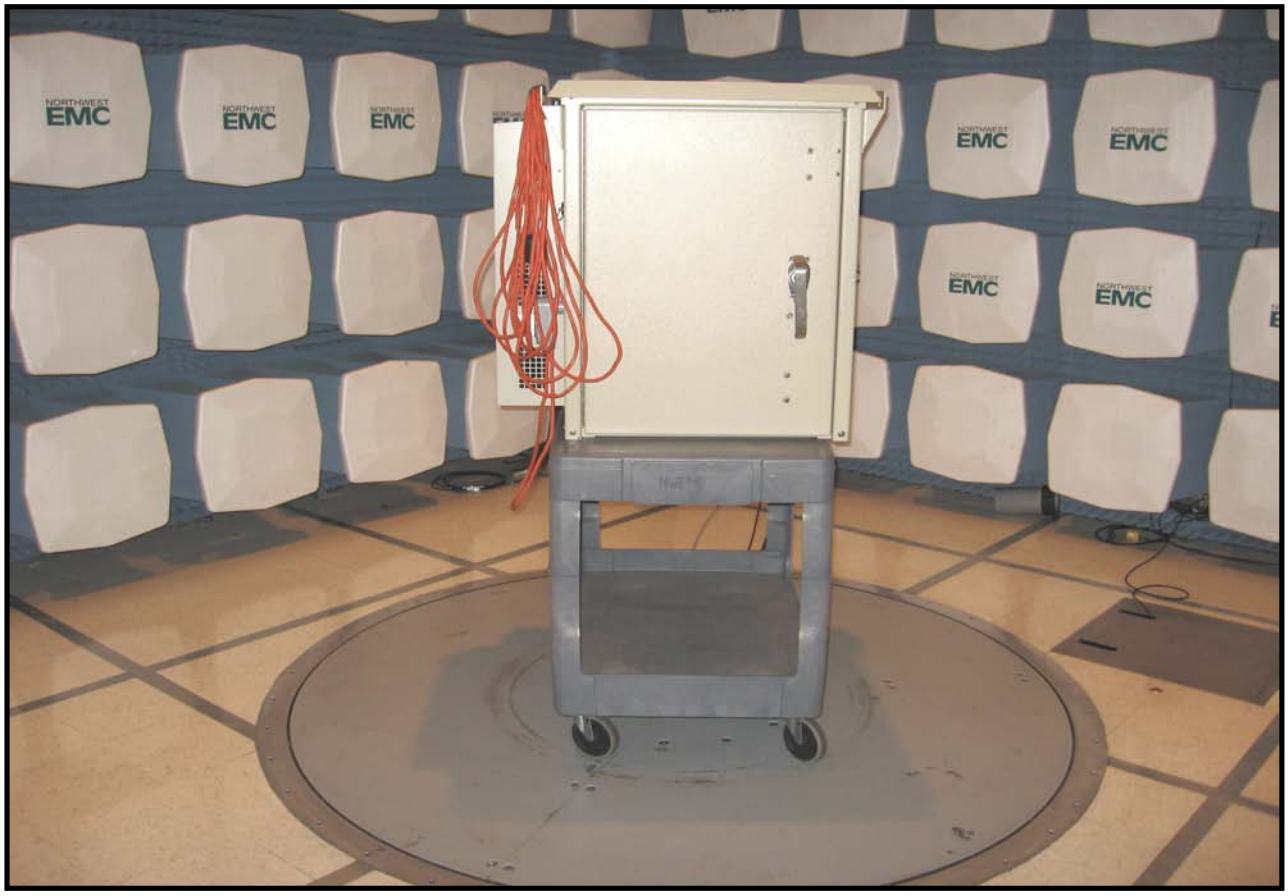
Signature



Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
5568.281			265.0	3.3			H-Horn	PK	1.44E-08	-48.4	-13.0	-35.4
5568.189			65.0	1.0			V-Horn	PK	1.40E-08	-48.5	-13.0	-35.5
1999.928			95.0	1.0			V-Horn	PK	3.86E-09	-54.1	-13.0	-41.1
1250.026			122.0	1.0			V-Horn	PK	3.78E-09	-54.2	-13.0	-41.2
1374.942			268.0	1.0			V-Horn	PK	3.61E-09	-54.4	-13.0	-41.4
1200.040			107.0	1.0			V-Horn	PK	3.07E-09	-55.1	-13.0	-42.1
1499.970			89.0	1.0			V-Horn	PK	3.07E-09	-55.1	-13.0	-42.1
1375.119			273.0	1.0			H-Horn	PK	3.00E-09	-55.2	-13.0	-42.2
1999.929			36.0	1.2			H-Horn	PK	2.17E-09	-56.6	-13.0	-43.6
1199.655			281.0	1.0			H-Horn	PK	1.85E-09	-57.3	-13.0	-44.3
1499.928			107.0	1.0			H-Horn	PK	1.81E-09	-57.4	-13.0	-44.4
1450.267			119.0	1.0			H-Horn	PK	1.28E-09	-58.9	-13.0	-45.9
1449.930			64.0	1.7			V-Horn	PK	1.19E-09	-59.2	-13.0	-46.2
1250.108			8.0	2.0			H-Horn	PK	9.27E-10	-60.3	-13.0	-47.3
5567.866			265.0	3.3			H-Horn	AV	6.87E-10	-61.6	-13.0	-48.6
5568.396			65.0	1.0			V-Horn	AV	6.87E-10	-61.6	-13.0	-48.6
1199.968			107.0	1.0			V-Horn	AV	3.44E-10	-64.6	-13.0	-51.6
1374.882			268.0	1.0			V-Horn	AV	3.00E-10	-65.2	-13.0	-52.2
1249.989			122.0	1.0			V-Horn	AV	2.93E-10	-65.3	-13.0	-52.3
1999.894			95.0	1.0			V-Horn	AV	2.03E-10	-66.9	-13.0	-53.9
1499.996			89.0	1.0			V-Horn	AV	1.98E-10	-67.0	-13.0	-54.0

Freq (MHz)			Azimuth (degrees)	Height (meters)			Polarity	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)
1374.979			273.0	1.0			H-Horn	AV	1.57E-10	-68.0	-13.0	-55.0
1200.063			281.0	1.0			H-Horn	AV	1.34E-10	-68.7	-13.0	-55.7
1999.918			36.0	1.2			H-Horn	AV	1.14E-10	-69.4	-13.0	-56.4
1500.006			107.0	1.0			H-Horn	AV	1.11E-10	-69.5	-13.0	-56.5
1449.964			119.0	1.0			H-Horn	AV	6.41E-11	-71.9	-13.0	-58.9
1449.937			64.0	1.7			V-Horn	AV	5.99E-11	-72.2	-13.0	-59.2
1250.033			8.0	2.0			H-Horn	AV	4.54E-11	-73.4	-13.0	-60.4


EMC


EMC

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 band

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**	N/A
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

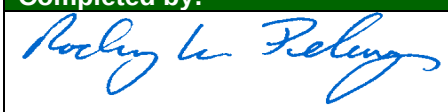
The primary supply voltage was varied from 85% to 115% of nominal. The EUT can only be operated from the public AC mains, so an DC lab supply was used to vary the supply voltage from 115% to 85% -48V DC.

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 Pelqouin	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	860.55000	0.00	1