



Nemko

Nemko USA, Inc.
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CERTIFICATION TEST REPORT

PART 15.247C
IC RSS-210

For The Wireless Internet Appliance
Model: CHY-A01-AA

FCC ID: VDCAA
IC: 7612A-AA

PREPARED FOR:

Chumby Industries, Inc.
12264 El Camino Real, Suite 203
San Diego, CA 92130

Prepared on: September 3, 2008

Project Number: 11194-1

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Total Pages: 60

Nemko USA, Inc.		11696 Sorrento Valley Road, Suite F, San Diego, CA 92121 Phone (858) 755-5525 Fax (858) 452-1810	
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DOCUMENT HISTORY

REVISION	DATE	COMMENTS	
-	September 3, 2008	Prepared By:	Dustin Chapin
-	September 3, 2008	Initial Release:	Alan Laudani

NOTE: Nemko USA, Inc. hereby makes the following statements so as to conform to Chapter 10 (Test Reports) Requirements of ANSI C63.4 (2003) "Methods and Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz":

- The unit described in this report was received at Nemko USA, Inc.'s facilities on February 29, 2008.
- Testing was performed on the unit described in this report on February 29, 2008 to September 2, 2008.
- The Test Results reported herein apply only to the Unit actually tested, and to substantially identical Units.
- This report does not imply the endorsement of the Federal Communications Commission (FCC), Industry Canada, NVLAP or any other government agency.

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CERTIFICATION

Nemko USA, Inc., an independent Electromagnetic Compatibility (EMC) Test Laboratory, produced this Test Report and performed the Radio Frequency Interference (RFI) testing and data evaluation contained herein.

Nemko USA, Inc.'s measurement facility is currently registered with the United States Federal Communications Commission (FCC) in accordance with the provisions of 47 United States Code (CFR) Part 2, Subpart I, Section 2.948(a). A current description of Nemko USA, Inc.'s measurement facility is on file with the FCC. Nemko USA Inc. has additionally satisfied the FCC that it complies with the requirements set forth in 47 CFR Part 2, Subpart I, Section 2.948(d) regarding the accreditation of EMC laboratories.

The RFI testing, test data collection and test data evaluation were accomplished in accordance with the ANSI C63.4-2003 Standard, and in accordance with the applicable sections of the FCC rules (47 CFR Parts 2 and 15). The testing was also accomplished in accordance with Industry Canada's ICES-003 standard for unintentional radiating device per EMCAB-3, Issue 3 (May 1998). The administrative summary of this test report provides a description of the test sample.

I hereby certify that the test data, test data evaluation, and equipment configurations used to compile this test report are a true and accurate representation of the test sample's radio frequency interference characteristics as of the test date(s), and, for the design of the test sample.



Alan Laudani
EMC Engineer

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1. ADMINISTRATIVE DATA AND TEST SUMMARY

1.1. Administrative Data

CLIENT:	Chumby Industries, Inc. 12264 El Camino Real, Suite 203 San Diego, CA 92130
CONTACT:	Mary Jungman mary@chumby.com
E-Mail:	
DATE (S) OF TEST:	February 29, 2008 to September 2, 2008
EQUIPMENT UNDER TEST (EUT):	Wireless Internet Appliance
MODEL:	CHY-A01-AA
CONDITION UPON RECEIPT:	Suitable for Test
TEST SPECIFICATION:	FCC, Part 15.247, Subpart C Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands and RSS 210 (Issue 7, June 2007) Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

1.2. Test Summary

<i>Specification</i>	<i>Frequency Range</i>	<i>Compliance Status</i>
FCC, CFR 47, Section 15.207	0.15 MHz - 30.00 MHz	PASS
FCC, CFR 47, Section 15.209	30 MHz – 10 th Harmonic	PASS
FCC CFR 47, §15.247 Plus Bandedge	2412– 2462 MHz	PASS
RSS-210 - Low Power License Exempt Radio-communication Devices (All Frequency Bands)	2412 – 2462 MHz	PASS

Testing was started at 30 MHz as there are no RF signals generated below this frequency.

Refer to the test results section for further details.

Alan Laudani
EMC Engineer

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2. SYSTEM CONFIGURATION

2.1. Description and Method of Exercising the EUT

The CHY-A01-AA is a Wireless Internet Appliance known as a Chumby. The Chumby is a device that displays information (flash based feeds or ‘widgets’) from the internet using your wireless Wi-Fi 802.11b/g internet router and connection. Log on to Chumby.com on your PC and select the custom (personalized) content you want it to display. When turned on it displays customized online matter to the user. Features include a 3.5" LCD color touch screen, two (2) external USB ports, stereo speakers, headphone jack, squeeze sensor, and accelerometer (motion sensor). The dimensions are 5 1/2" wide, 4 1/4" tall, 3 1/4" deep at the base, and 2 1/4" deep at the top. Two (2) power supplies were presented for evaluation. The chip antenna was set aside for conductive RF measurements. The antenna is not accessible by the user.

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2.2. System Components and Power Cables

DEVICE	MANUFACTURER MODEL # SERIAL #	POWER CABLE
EUT - Wireless Internet Appliance	Chumby Industries, Inc. Model: CHY-A01-AA Serial #: Not Applied	2 m, 18 AWG x 2, DC Power Plug from AC Wall Adaptor
EUT – AC Wall Adaptor	Chumby Model: MPB-12012500	Direct Plug In, 2 Prong
EUT – AC Wall Adaptor	Phihong Model: PSA 15R-120P	Direct Plug In, 2 Prong with Worldwide Adapters
Support – Wireless b/g Broadband Router	Cisco Systems – Linksys Model: WRT54GL v1.1 S/N: CL7B1G703827	2 m, 22 AWG x 2, DC Power Plug from AC Wall Adaptor
Support – Router Power Supply	Cisco Systems – Linksys Model:	Direct Plug In, 2 Prong
Support – Headphones	Denon Model: AH-D950	N/A
Support – USB thumb drive	No Name Model: Chumby Supplied	N/A
Support – Mouse	Microsoft Model: Basic Optical Mouse S/N: 69657-OEM-7374601-60445	N/A

2.3. Device Interconnection and I/O Cables

Connection	I/O Cable
Support Headphones to EUT	3.2 m, 1/8th inch stereo plug
Support USB drive to EUT	USB port direct plug-in
Support Mouse to EUT	1.8 m, USB

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2.4. Design Modifications for Compliance

The following design modifications were made to the EUT during testing.

No design modifications were made to the EUT during testing.

2.5. Theory of Operation

The CHY-A01-AA is a WI-FI part 15.247 radio. It communicates with any 802.11b/g wireless router to be connected to a computer with internet access. The user would subscribe to a site that will define the content to be sent to the Chumby wireless internet appliance. As the communication is made, it automatically sets the frequency channel and streams content via the wireless connection. The internal RF module was made by TP-Link who provided BOM, schematics, block diagram and technical description for this application. Chumby has modified this module by a custom antenna. The chumby made antenna connected to the final stage of the RF transmitter by cable. Its nominal output power is 25 dBm. Its nominal duty cycle is 18% digital modulation. Its nominal data rate is 9 Mbps, max data rate is 11 Mbps; being limited to this due to its USB 1.1 interface. The antenna gain is 0.6 dBi. It takes internet content as data.

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2.6. Technical Specifications of the EUT

Manufacturer: Chumby Industries, Inc.

Operating Frequency: 2412 MHz to 2462 MHz in the 2400-2483.5 MHz Band

Rated Power: 27.8 dBm

Modulation: DSSS and OFDM

Antenna Connector: Internal within enclosure – not accessible to user

Power Source: 120 VAC, 60 Hz

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3. DESCRIPTION OF TEST SITE AND ENVIRONMENT

3.1. Description of Test Site

The test site is located at 11696 Sorrento Valley Road, Suite F, San Diego, CA 92121. The site is physically located 18 miles Northwest of downtown San Diego. The general area is a valley 1.5 miles east of the Pacific Ocean. This particular part of the valley tends to minimize ambient levels, i.e. radio and TV broadcast stations and land mobile communications. The three and ten-meter Open Area Test Site (OATS) is located behind the office/lab building. It conforms to the normalized site attenuation limits and construction specifications as set in the EN 55022 (1987), CISPR 16 and 22 (1985) and ANSI C63.4-2001 documents. The OATS normalized site attenuation characteristics are verified for compliance every year, and registered with the Federal Communications Commission under Registration Number 90579 and Industry Canada under 2040B-1 and 2040B-2.

3.2. Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	17 – 22 °C
Humidity range	:	29 - 55%
Pressure range	:	87 - 105 kPa
Power supply range	:	120VAC 60Hz (±15%)

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4. DESCRIPTION OF TESTING METHODS

4.1. Introduction

As required in 47 CFR, Parts 2 and 15, the methods employed to test the radiated and conducted emissions (as applicable) of the EUT are those contained within the American National Standards Institute (ANSI) document ANSI C63.4-2003, titled "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz." All applicable FCC Rule Sections that provide further guidance for performance of such testing are also observed.

For General Test Configuration please refer to Figure 1 on the following page.

Digital devices sold in Canada are required to comply with the Interference Causing Equipment Standard for Digital Apparatus, ICES-003. These test methods and limits are specified in the Canadian Standards Association's (CSA) Standard C108.8-M1983 (1-1-94 version) and are "essentially equivalent" with FCC, Part 15 and CISPR 22 (EN55022) rules for unintentional radiators per EMCAB-3, Issue 3 (May 1998). No further testing is required for compliance to ICES-003.

4.2. Configuration and Methods of Measurements for Conducted Emissions

Section 7 of ANSI C63.4 determines the general configuration of the EUT and associated equipment, as well as the test platform for conducted emissions testing. Tabletop devices are placed on a non-conducting surface 80 centimeters above the ground plane floor and 40 centimeters from the ground plane wall. The EUT and associated system are configured to operate continuously, representing a "normally operating" mode. The EUT is powered via a Line Impedance Stabilization Network (LISN). The emissions are recorded using the required bandwidth of 9 kHz in the quasi-peak mode. The average amplitude is also observed employing a 10 kHz bandwidth to determine the presence of broadband RFI. When such interference is caused by broadband sources (as defined by the FCC and ANSI Rules), the deviation guidelines contained in Section 11.3.1 of ANSI C63.4 are employed, which allows a correction factor of 13 dB to be subtracted from the quasi-peak reading. The emission levels are then compared to the applicable FCC limits to determine compliance.

4.3. Configuration and Methods of Measurements for Frequency Identification

When performing all testing of equipment, the actual emissions of the EUT are segregated from ambient signals present within the laboratory or the open-field test range. Preliminary testing is performed to ensure that ambient signals are sufficiently low to allow for proper observation of the emissions from the EUT. Incoming power lines are filtered using a 120 dB, 30-ampere; 115/208-volt filter to assist in reducing ambient signals for tests of levels of conducted emissions. Ambients within the laboratory are compared to those noted at the nearby open-field site to discriminate between signals produced from the EUT and ambient signals. In the event that a significant emission is produced by the EUT at a frequency which is also demonstrating significant ambient signals, the spectrum analyzer is placed in the peak mode, the bandwidth is narrowed, the EUT's signal is centered on the analyzer, the scan width is expanded to 50 kHz while monitoring the audio to ensure that only the EUT signal is present, the analyzer is switched to quasi-peak mode, and the level of the EUT signal is recorded.

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4.4. Configuration and Methods of Measurements for Radiated Emissions

Section 8 of ANSI C63.4 determines the general configuration and procedures for measuring the radiated emissions of equipment under test. Initially, the primary emission frequencies are identified inside the test lab by positioning a broadband receive antenna one meter from the EUT to locate frequencies of significant radiation. Next, the EUT and associated system are placed on a turntable on a ten meter open area test site (registered with the FCC in accord with its Rules and ANSI C63.4) and the receive antenna is located at a distance of ten meters from the EUT.

The EUT and associated system are configured to operate continuously, representing a “normally operating” mode. All significant radiated emissions are recorded when maximum radiation on each frequency is observed, in accordance with part 8 of ANSI C63.4-2003 and Section 15.33 of the FCC Rules. To ensure that the maximum emission at each discrete frequency of interest is observed, the receive antenna is varied in height from one to four meters and rotated to horizontal and vertical polarities, and the turntable is also rotated to determine the worst emitting configuration. The numerical results of the test are included herein to demonstrate compliance.

The numerical results that are applied to the emissions limits are arrived at by the following method:

Example: $A = RR + CL + AF$

A = Amplitude $\text{dB}\mu\text{V}/\text{m}$

RR = Receiver Reading $\text{dB}\mu\text{V}$

CL = cable loss dB

AF = antenna factor dB/m

Example Frequency = 110MHz

18.5 $\text{dB}\mu\text{V}$ (spectrum analyzer reading)

+3.0 dB (cable loss @ frequency)

21.5 $\text{dB}\mu\text{V}$

+15.4 dB/m (antenna factor @ frequency)

36.9 $\text{dB}\mu\text{V}/\text{m}$ Final adjusted value

The final adjusted value is then compared to the appropriate emission limit to determine compliance.

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5. Test Results

5.1. Conducted Emissions – Transceive Mode

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

7.2.2 The purpose of this test is to measure unwanted radio frequency currents induced in any AC conductor external to the equipment which could conduct interference to other equipment via the AC electrical network. Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown below. The tighter limit applies at the frequency range boundaries. The conducted emissions shall be measured with a 50 ohm/50 microhenry line impedance stabilization network

Frequency Range (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

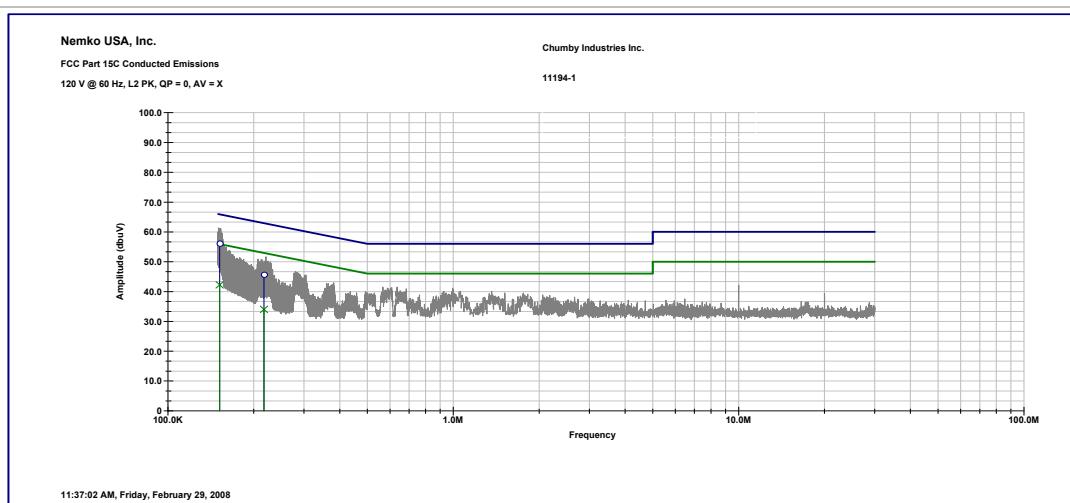
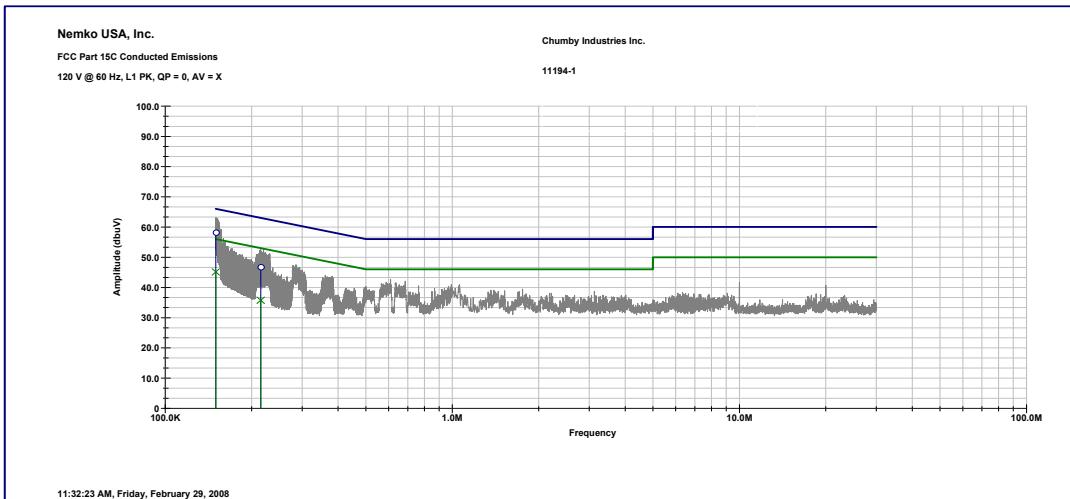
*Decreases with the logarithm of the frequency.

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5.2. Conducted Emissions Test Data – Transceive Mode

Chumby Power Supply MPB-12012500

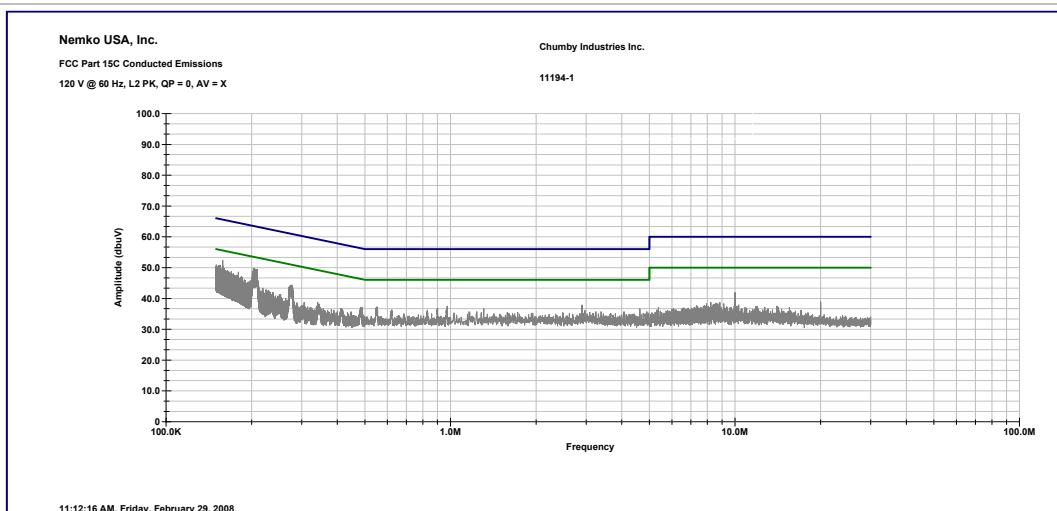
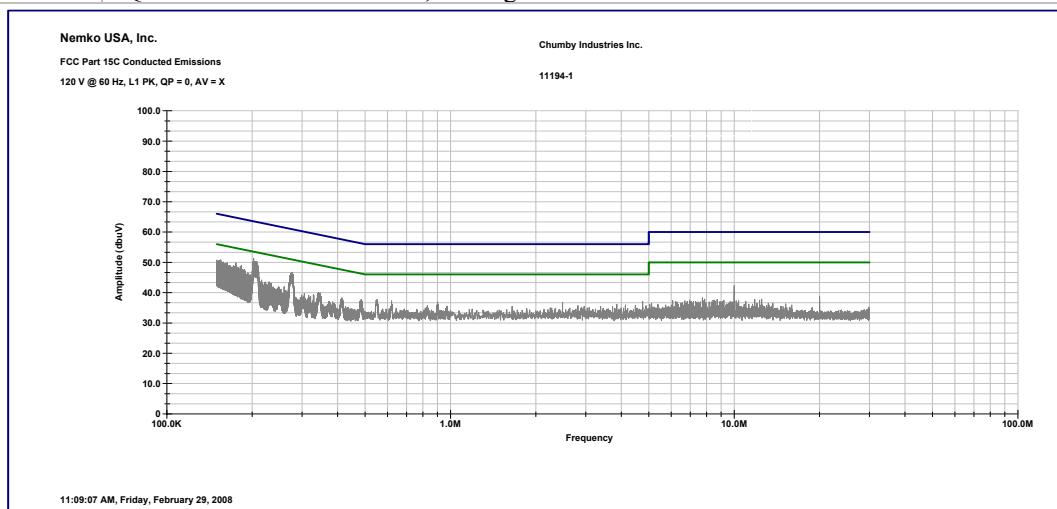
Client	Chumby Industries, Inc.	Temperature	73	°F
PAN #	11194-1	Relative Humidity	38	%
EUT Name	Wireless Internet Appliance	Barometric Pressure	30.24	Hg
EUT Model	CHY-A01-AA	Test Location	Enclosure 1	
Governing Doc	CFR 47, Part 15B	Test Engineer	Dustin Chapin	
Basic Standard	Sec. 15.207	Date	2/29/08	
Parameters	Peak RBW: 100kHz VBW: 100kHz Quasi-Peak: RBW 9kHz, VBW 30 kHz Average: RBW 9kHz, VBW 30 kHz Quasi-Peak Limit Blue Line, Average Limit Green Line			



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Phihong Power Supply PSA 15R-120P

Client	Chumby Industries, Inc.	Temperature	73	°F
PAN #	11194-1	Relative Humidity	38	%
EUT Name	Wireless Internet Appliance	Barometric Pressure	30.24	Hg
EUT Model	CHY-A01-AA	Test Location		Enclosure 1
Governing Doc	CFR 47, Part 15B	Test Engineer	Dustin Chapin	
Basic Standard	Sec. 15.107	Date		2/29/08
Parameters	Peak RBW: 100kHz VBW: 100kHz Quasi-Peak: RBW 9kHz, VBW 30 kHz Average: RBW 9kHz, VBW 30 kHz			
Legend	.Quasi-Peak Limit Blue Line, Average Limit Green Line			



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5.3. Bandwidth

RSS-Gen 4.6.1

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

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

Sample Number:	CHY-A01-AA	Temperature:	71°F
Date:	3/6/08 and 7/14/08	Humidity:	50%
Modification State:	Lo/Mid/High Channels	Tester:	Dustin Chapin
Laboratory:			NEMKO SR1

15.247(a)(1)

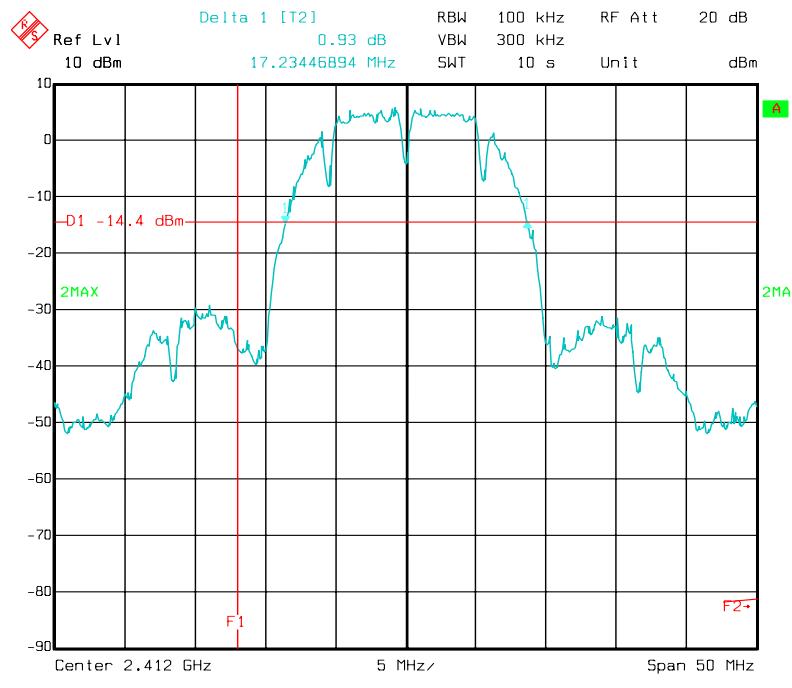
Measurements were made conductively. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level. The bandwidth was determined from where the channel output spectrum intersected the display line.

Test Results:

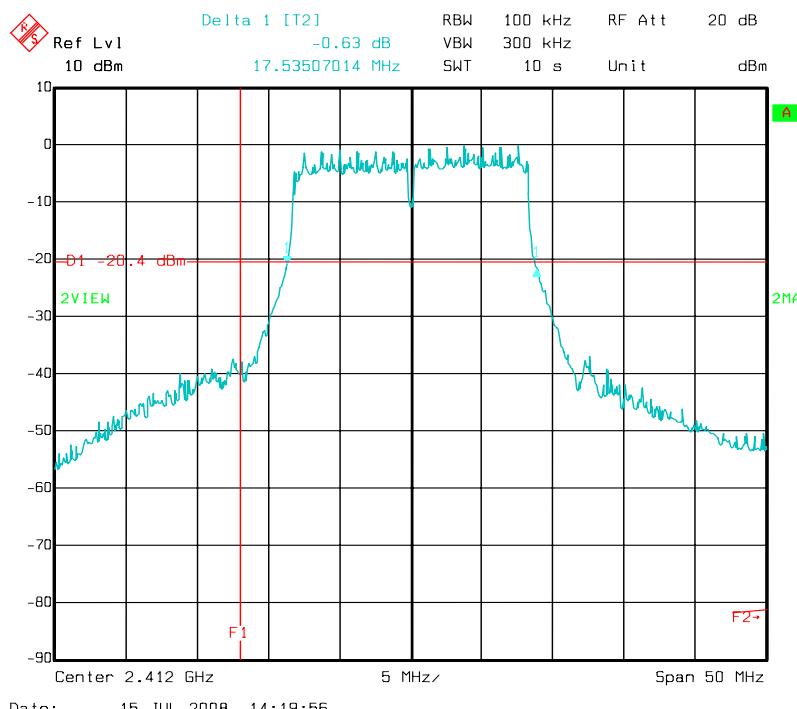
Mode	20 dB Bandwidth		
	Low Channel	Mid Channel	High Channel
“b”	17.2 MHz	17.2 MHz	17.3 MHz
“g”	17.5 MHz	17.5 MHz	17.5 MHz

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Low Channel b-Mode

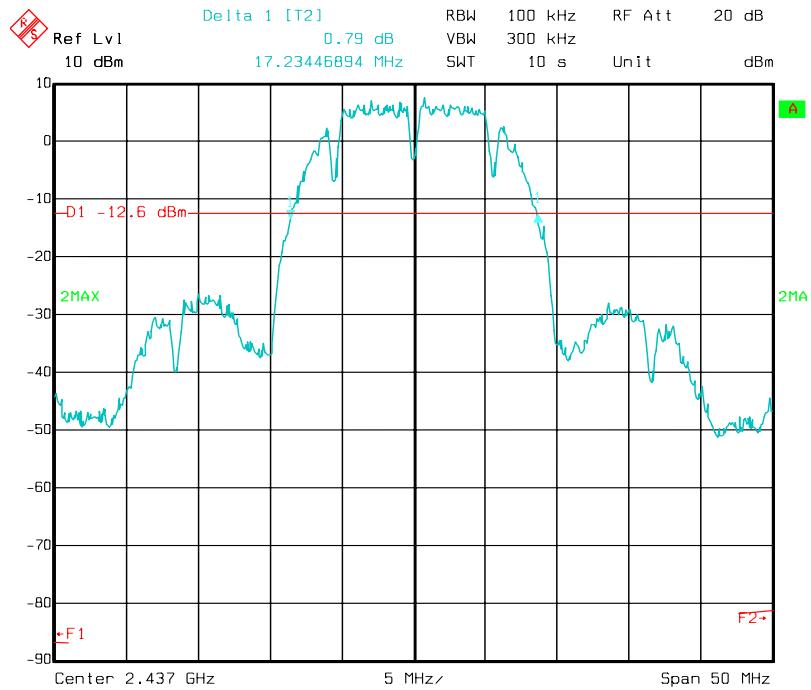


Low Channel g-Mode

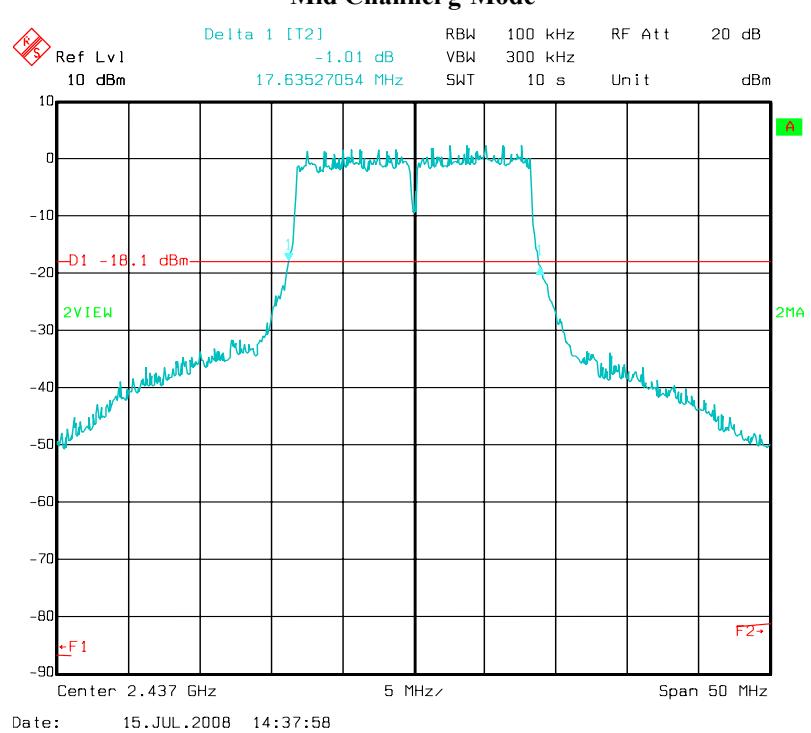


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Mid Channel b-Mode

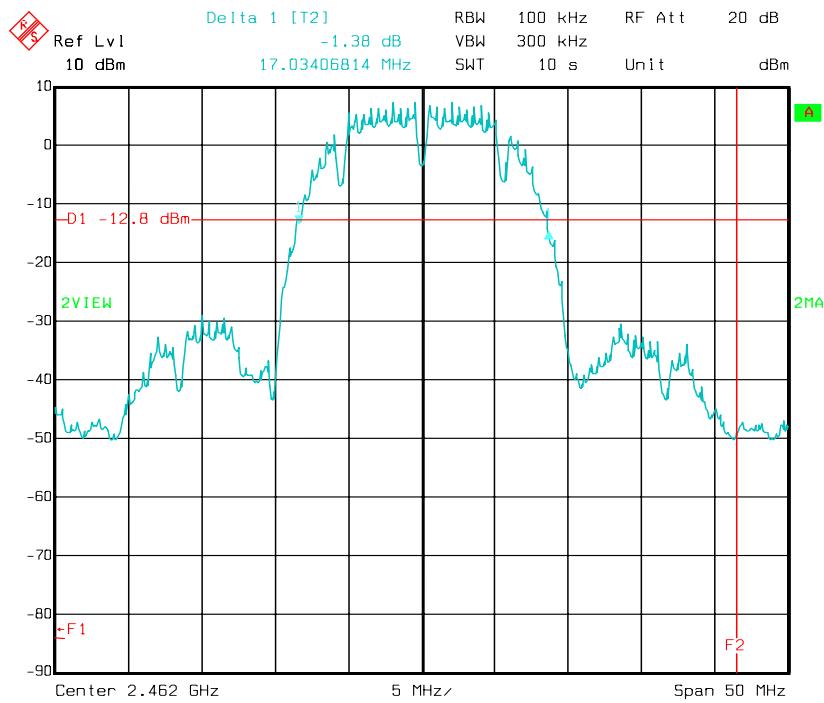


Mid Channel g-Mode



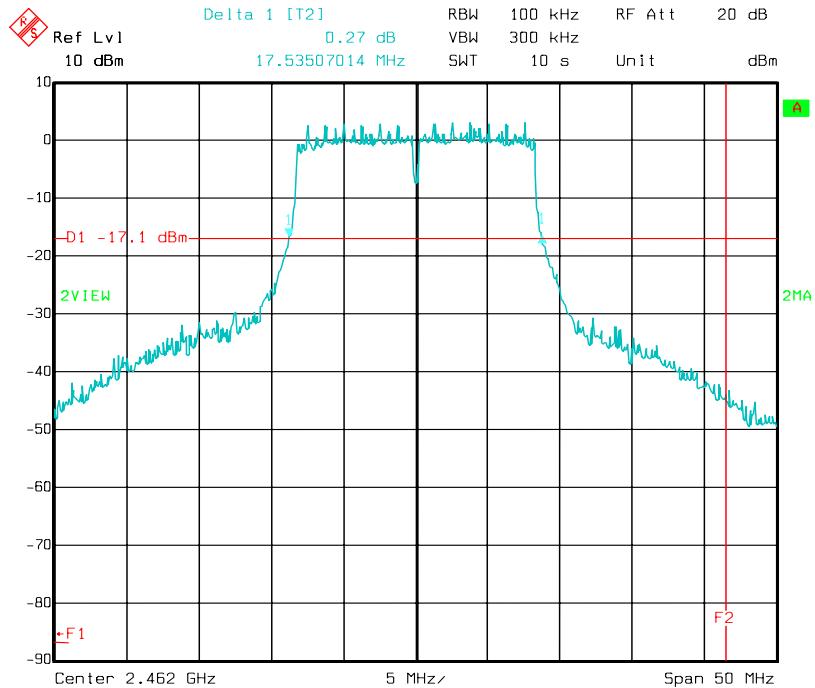
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High Channel b-Mode



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5.4. Out-of-band Conducted Emissions

A8.5 Out-of-band Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

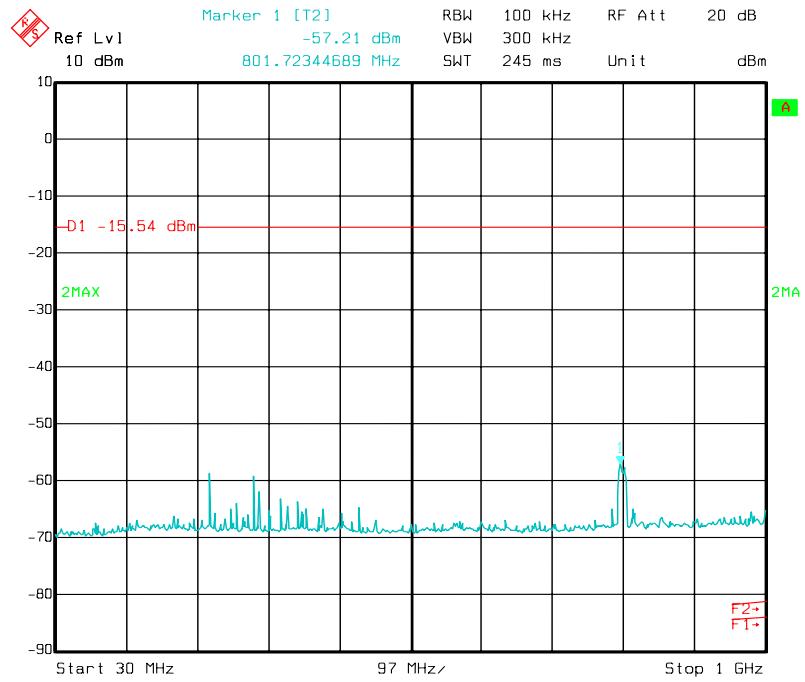
15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that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

Sample Number:	CHY-A01-AA	Temperature:	19°C
Date:	3/10/08 and 7/14/08	Humidity:	23%
Modification State:	Lo/Mid/High Channels	Tester:	Dustin Chapin
		Laboratory:	NOATS

Test Results: See plots below.

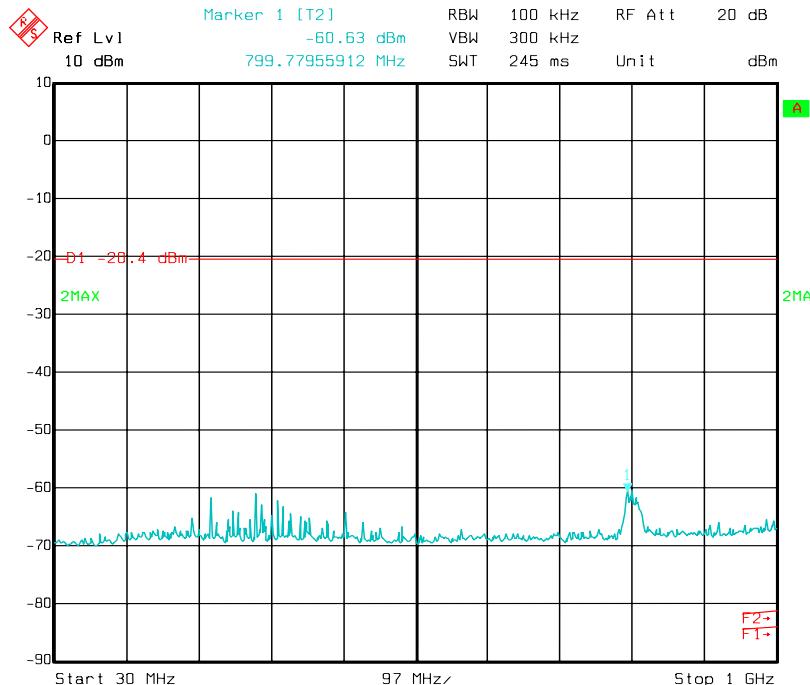
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Low Channel b-Mode 2412 MHz; Limit is 20 dBc



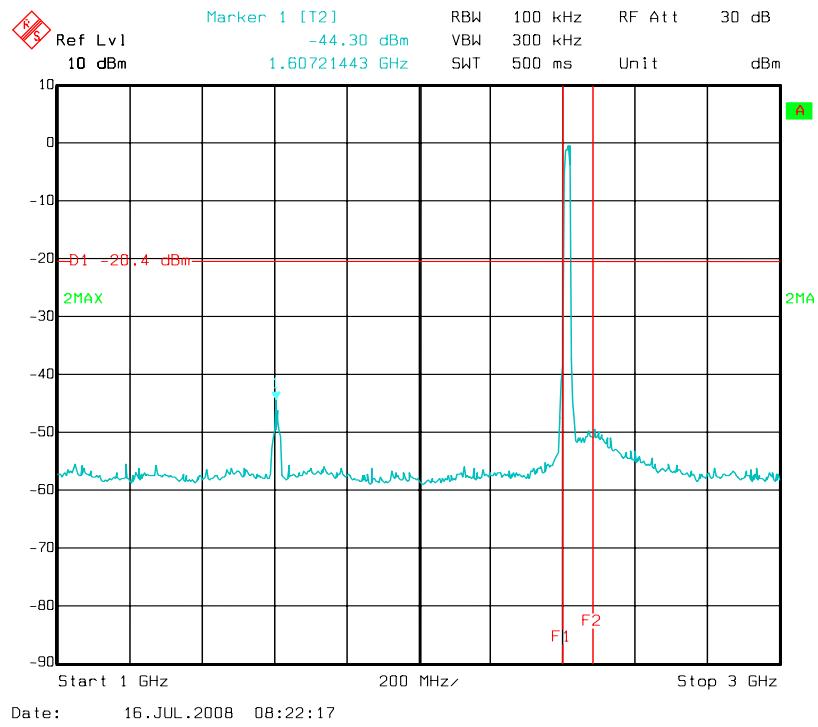
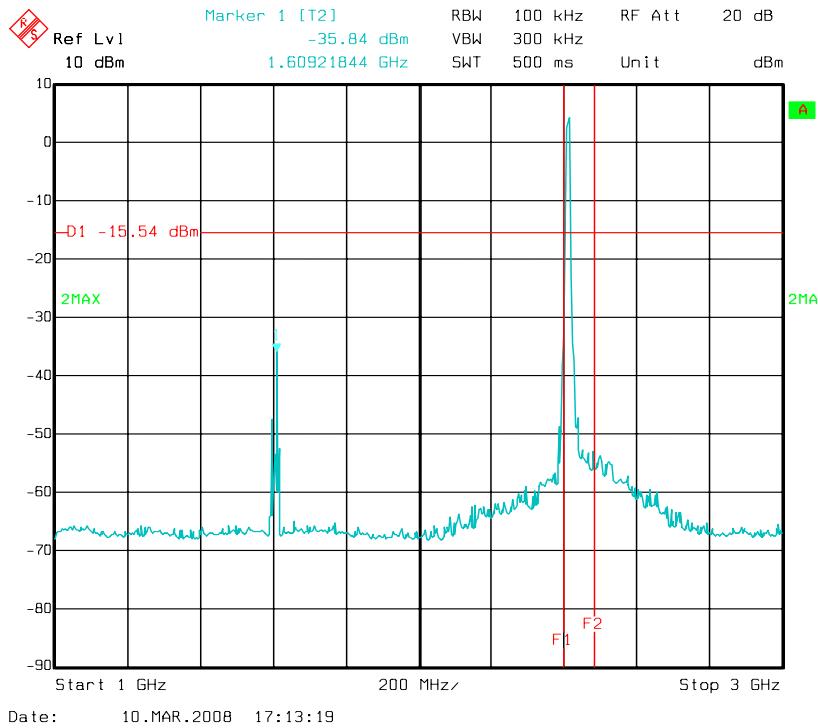
Date: 10.MAR.2008 17:11:01

Low Channel g-Mode 2412 MHz; Limit is 20 dBc

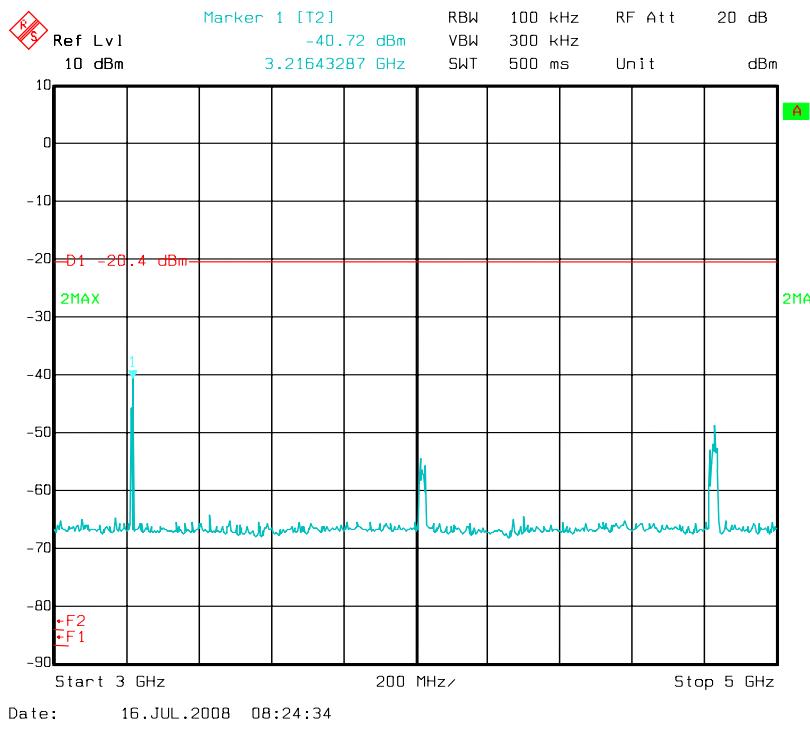
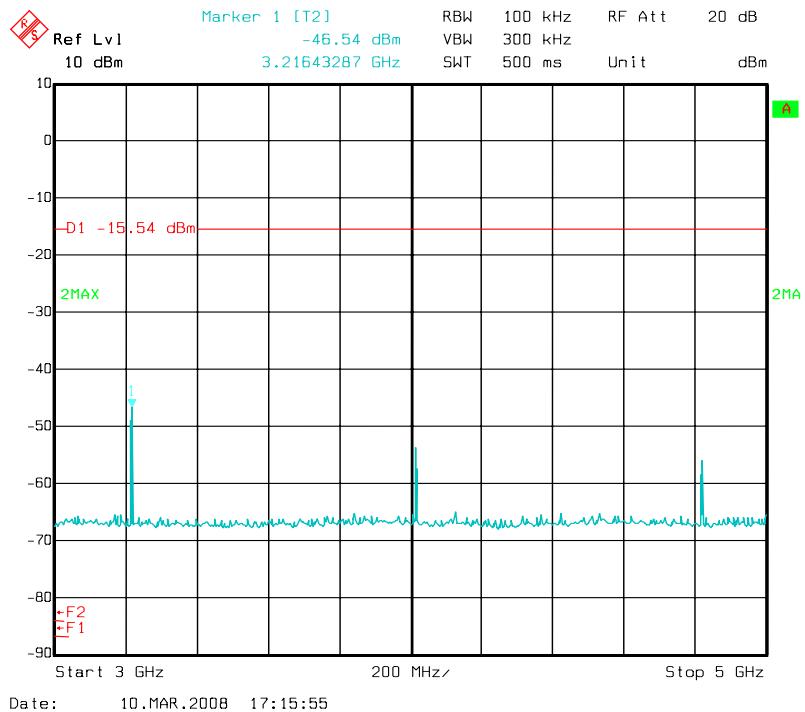


Date: 16.JUL.2008 08:23:25

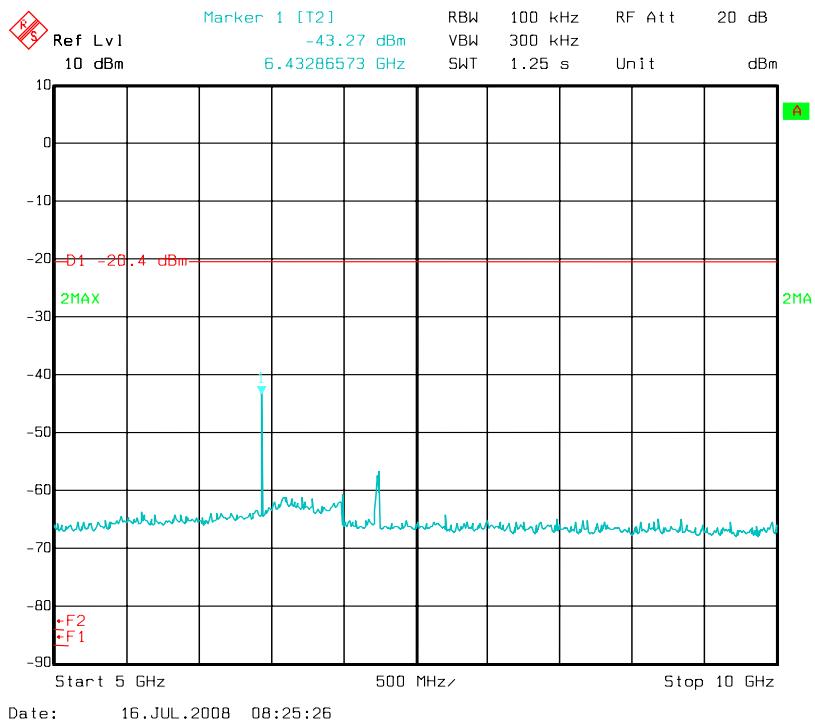
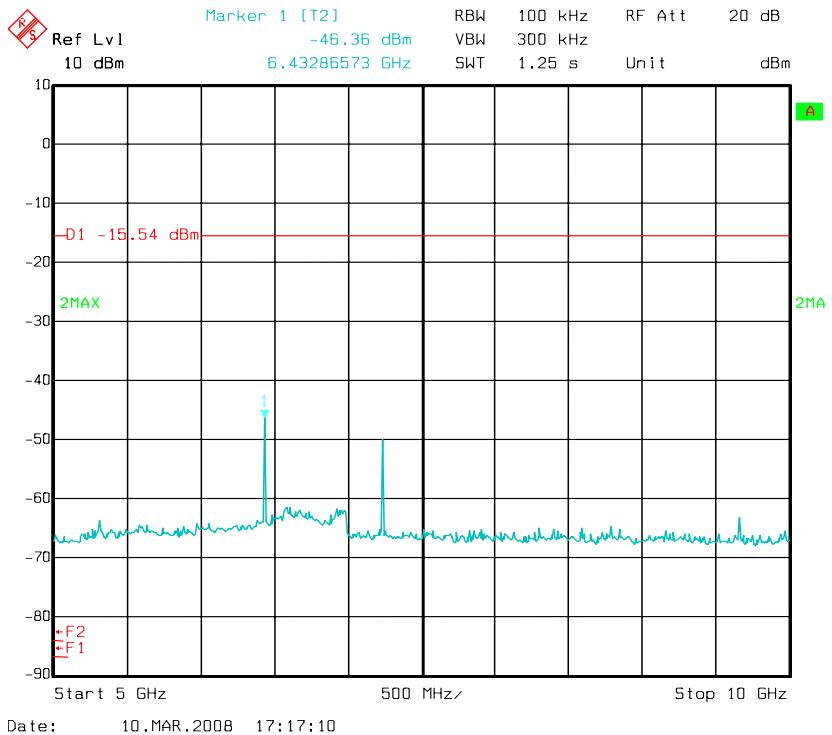
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DATE	DOCUMENT NAME	DOCUMENT #	PAGE
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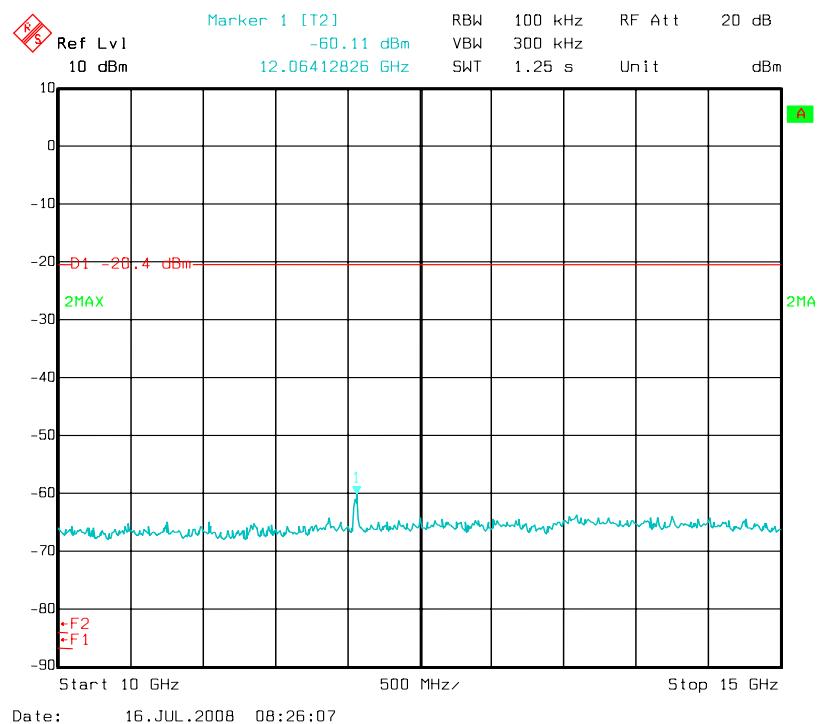
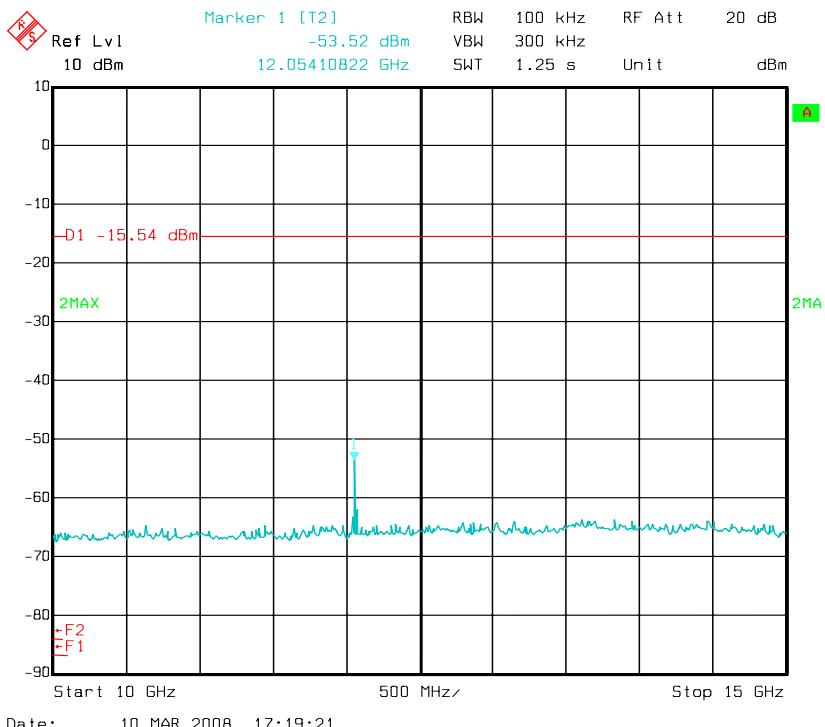


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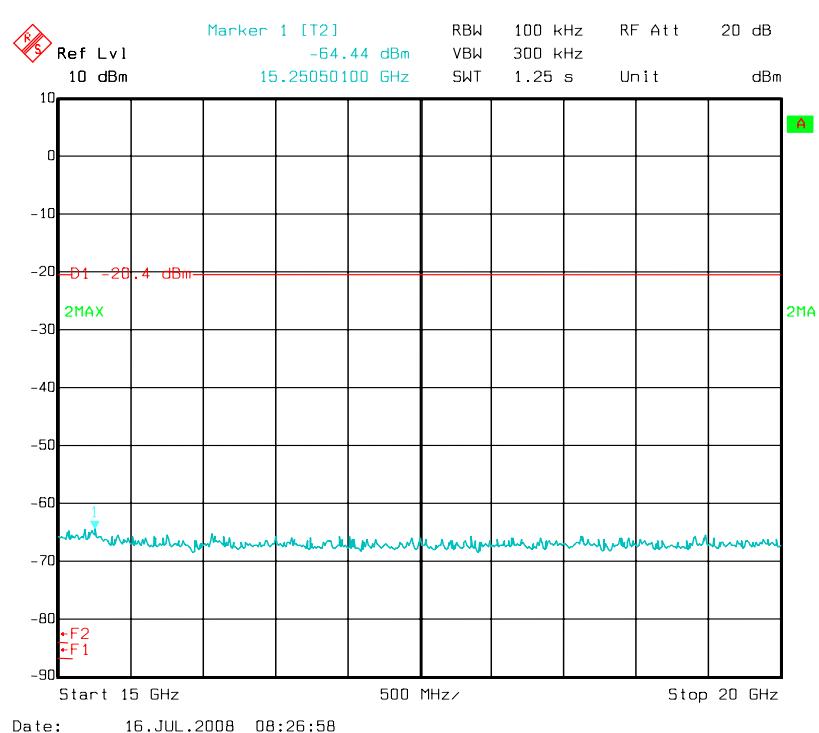
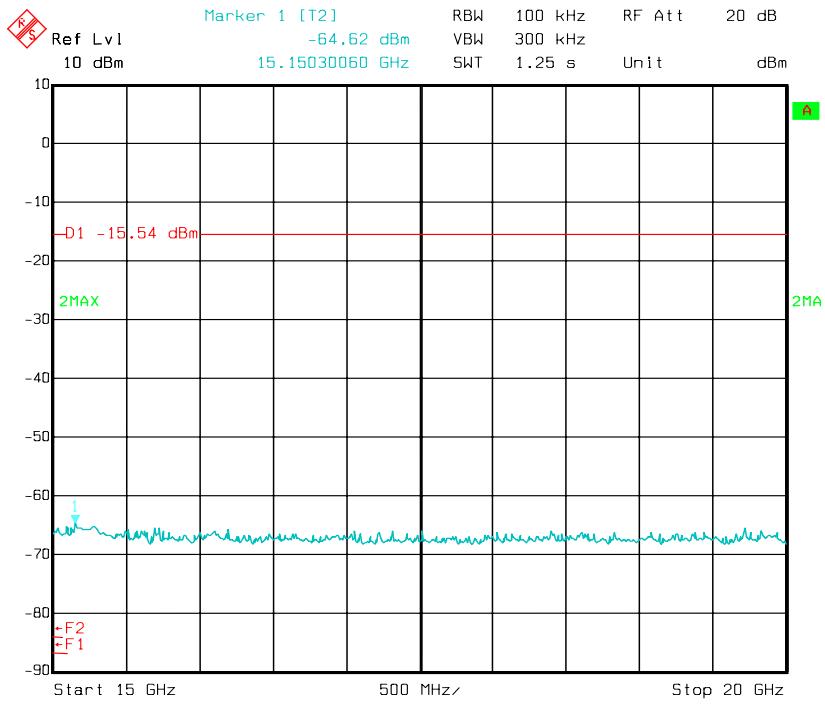
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Phone (858) 755-5525 Fax (858) 452-1810

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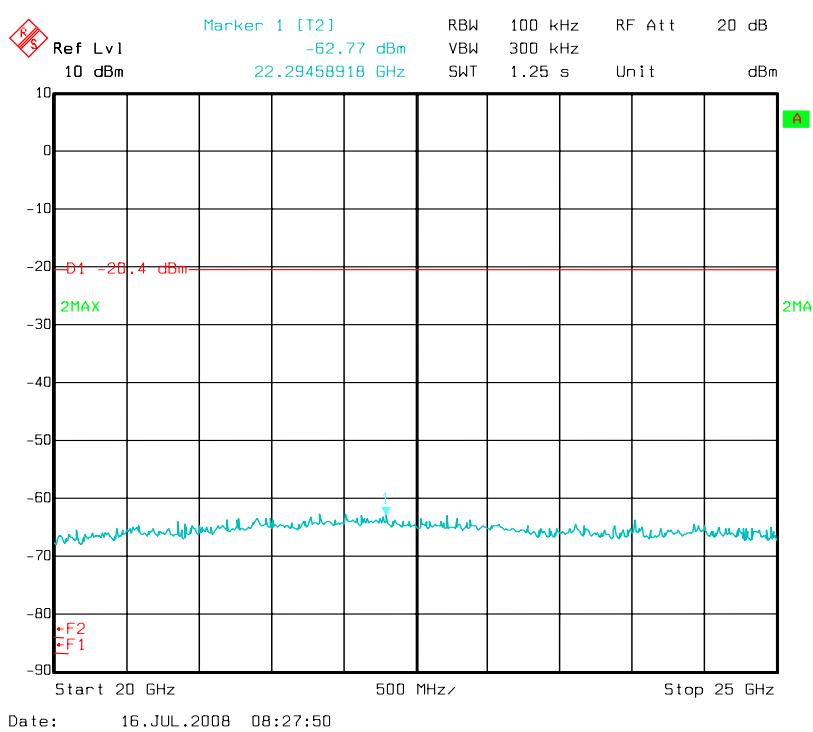
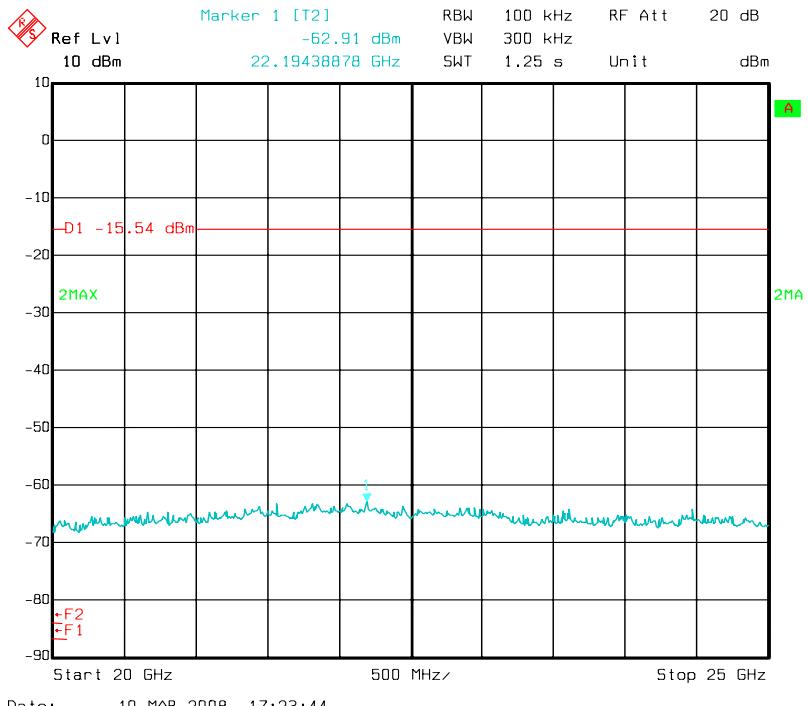


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*See Appendix for Mid and High Channel

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5.5. Out-of-band Emissions / Radiated Emissions within Restricted Bands

(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

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

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

A8.5 Out-of-band Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

Sample Number:	CHY-A01-AA	Temperature:	19°C
Date:	3/7/08	Humidity:	23%
Modification State:	Lo/Mid/High Channels	Tester:	Dustin Chapin
		Laboratory:	NOATS

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Test Results:

Emissions reported below, Emissions were searched over a range of 30 MHz to 1000MHz and in the restricted bands from 1000 to 25000 MHz.

Prescan investigations with both power supplies and both modes were preformed, the Chumby Power Supply (MPB-12012500) proved to be worst case and emissions shown below are presented. Emissions presented are digital emissions due to the computer, not RF spurious due to harmonics of the transmitter.

No emissions recorded within 20 dB of the limit other than the emissions recorded below.

Additional Observations:

The Spectrum was searched from 30MHz to the 10th Harmonic, 25000 MHz.

There are no emissions found that do not comply to the restricted bands defined in **FCC Part 15 Subpart C, 15.205 or Part 15.247(d)**.

The EUT was investigated on three orthogonal axes. Worst case emissions presented.

Radiated Measurements below 1GHz were performed at 3m with a Quasi-Peak detector (RBW 120kHz/VBW 300kHz) while Radiated Peak (RBW 1MHz/VBW 3MHz) and Average (RBW 1MHz/VBW 10Hz) measurements conducted above 1GHz. If RF spurious emissions were evident, the average would be evaluated from a peak hold measurement by applying duty cycle factor.

Example

Frequency = 78.70 MHz

60.2 dB μ V (spectrum analyzer reading)

+2.2 dB (cable loss @ frequency)

+6.9 dB/m (antenna factor @ frequency)

-32.2 dB (PreAmp Gain @ frequency)

37.1 dB μ V/m Final adjusted value

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Radiated Emissions Data

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Client Name :	Chumby Industries, Inc.	
EUT Name :	Wireless Internet Appliance	
EUT Model # :	CHY-A01-XXX-AA	Chumby PS
EUT Serial # :	NA	
EUT Config. :	Streaming Audio & Widgets with Headphones	
	Wi-Fi Transceiving Mode	

EUT Voltage :	120
EUT Frequency :	60
Phase:	Single
NOATS	X
SOATS	
Distance < 1000 MHz:	3 m
Distance > 1000 MHz:	3 m

Specification :	CFR47 Part 15, Subpart C, 15.209		
Loop Ant. #:	NA		
Bicon Ant. #:	114	Temp. (°C) :	19
Log Ant. #:	111	Humidity (%) :	23
DRG Ant. #	755	Spec An. #:	711
Cable LF#:	NOATS	Spec An. Display #:	404
Cable HF#:	60FT	QP #:	421
Preamp LF#:	902	PreSelect#:	NA
Preamp HF#	919		

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

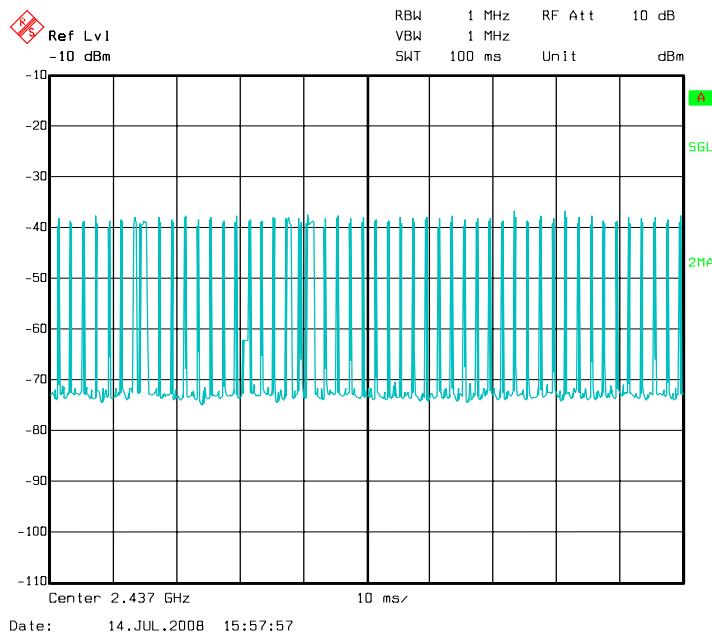
Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

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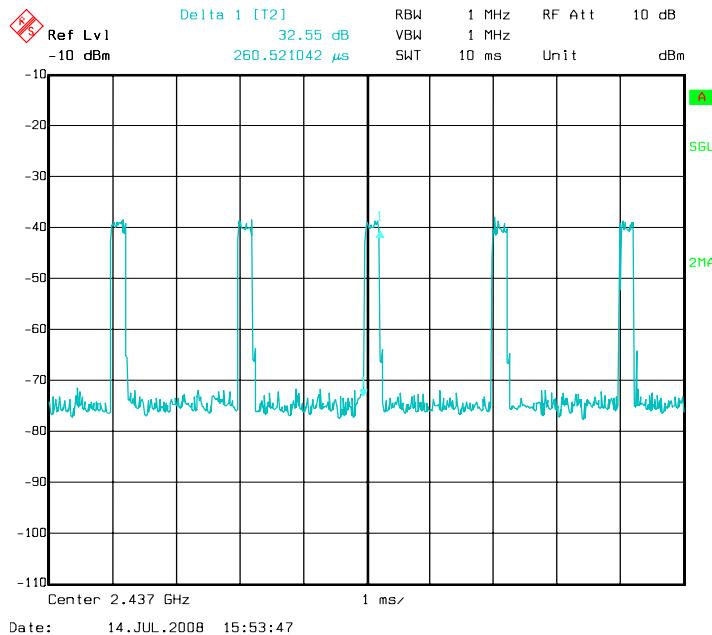
5.6. Duty Cycle Correction Factor

On Time in 100 ms



On time = 13.026 ms in 100 ms

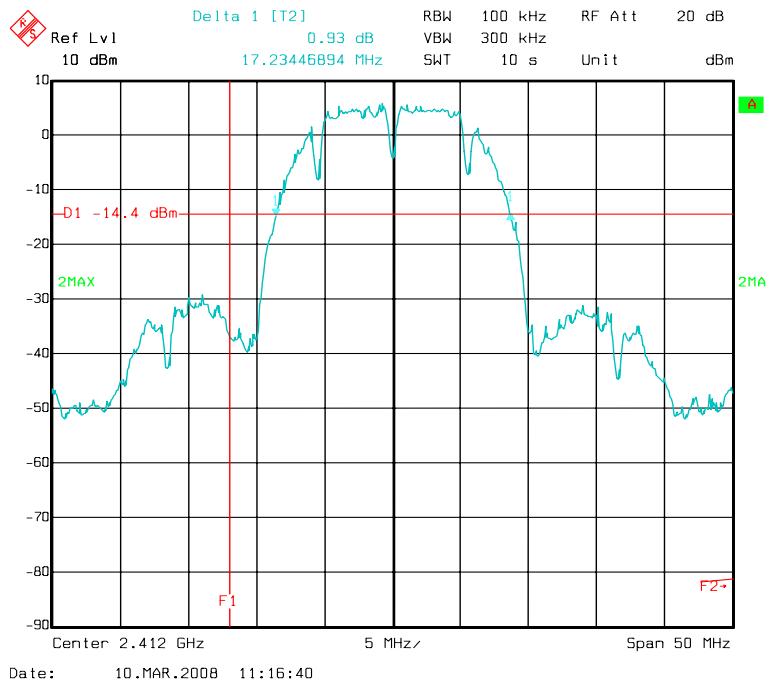
Duty Cycle Factor = $20 \times \log (13.03/100)$, Not < $20 \times \log (0.1)$
Therefore Duty Cycle Correction Factor (DCCF) = -17.7 dB



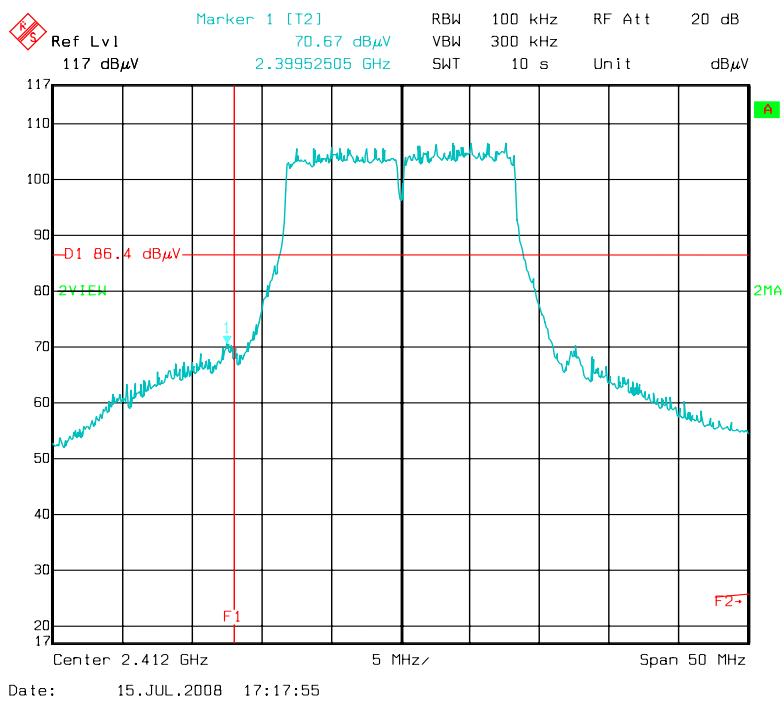
DATE	DOCUMENT NAME	DOCUMENT #	PAGE
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5.7. Bandedge Measurements

Low Channel (b-Mode) 2412 MHz (Peak Measurement)



Low Channel (g-Mode) 2412 MHz (Peak Measurement)

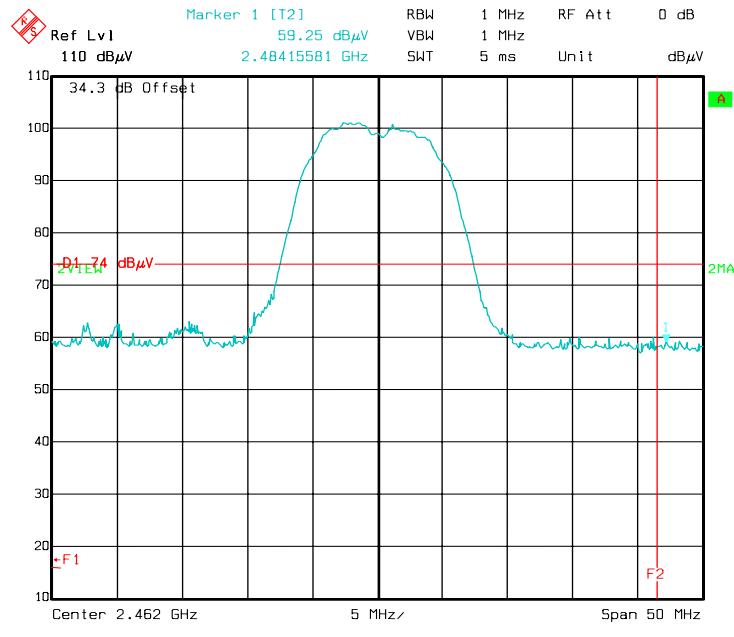


Frequency line is 2400MHz, Limit used is 20dB from emission peak

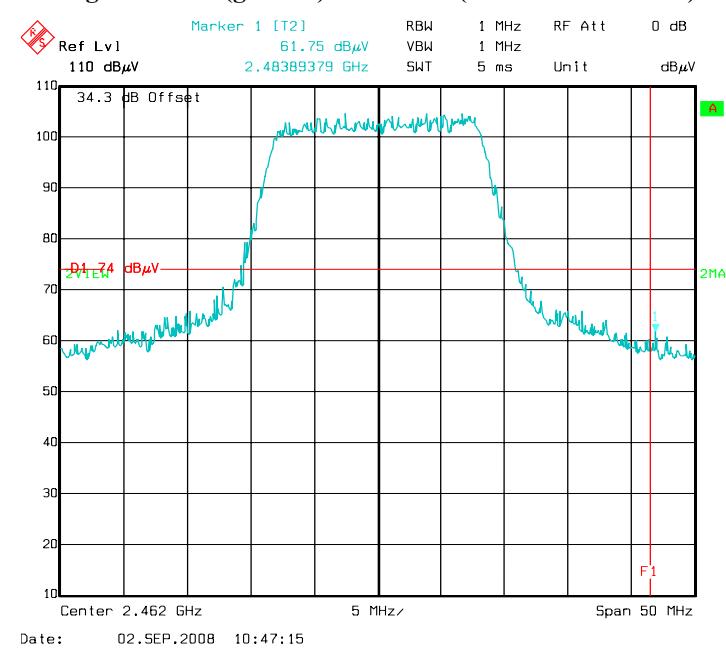
Low Channel 2412 MHz (Average Measurement), Average = Peak + DCCF

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High Channel (b-mode) 2462 MHz (Peak Measurement)



High Channel (g-mode) 2462 MHz (Peak Measurement)

Frequency line is 2483.5 MHz, Peak Limit used is 74 dB μ V/mAverage Limit = 54 dB μ V/m, Average = Peak + DCCFAverage Emission = Peak(b) -17.7 dB or 61.84 dB μ V/m -17.7 dB = 44.14 dB μ V/mAverage Emission = Peak(b) -17.7 dB or 61.75 dB μ V/m -17.7 dB = 44.05 dB μ V/m

Radiated Emission Offset includes Antenna Factor 28.4 dB/m + cable loss 5.9 dB

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5.8. Minimum 6dB RF Bandwidth

(a)(2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

A8.2 (a) The minimum 6 dB bandwidth shall be at least 500 kHz.

Sample Number:	CHY-A01-AA	Temperature:	71°F
Date:	3/10/08	Humidity:	51%
Modification State:	Lo/Mid/High Channels	Tester:	Dustin Chapin
		Laboratory:	NEMKO SR1

Test Results:

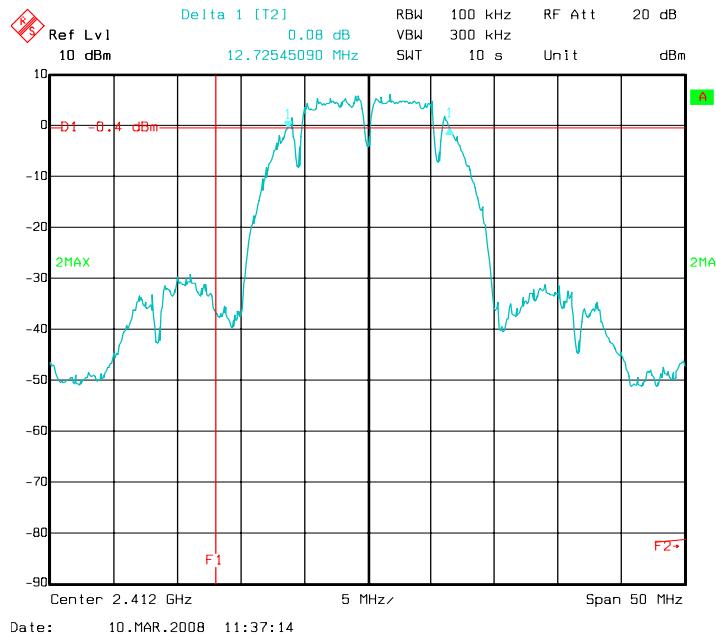
6dB Bandwidth:

Measurements were made conductively. Analyzer RES BW was set to 100 kHz. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6 dB bandwidth was determined from where the channel output spectrum intersected the display line.

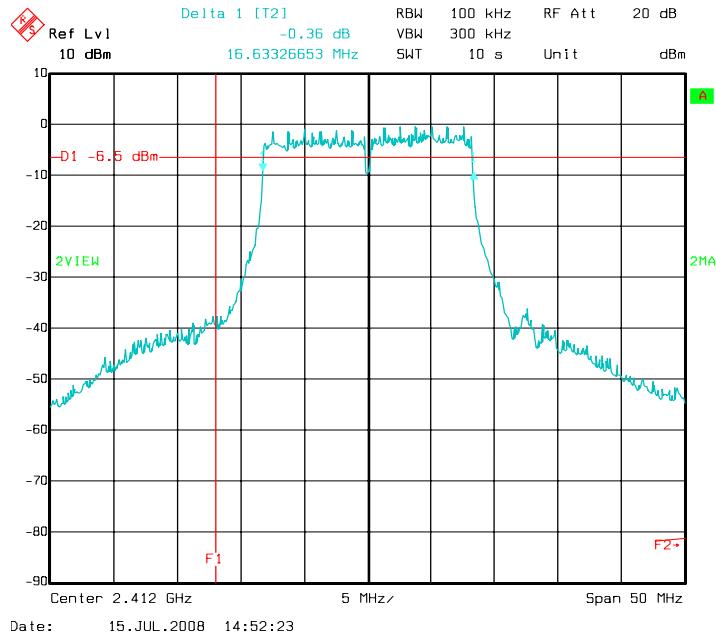
Channel Range	6 dB Bandwidth
Low (2462 MHz)	12.7 MHz
Mid (2440 MHz)	12.6 MHz
High (2462 MHz)	12.9 MHz
Low (2462 MHz)	16.6 MHz
Mid (2440 MHz)	16.6 MHz
High (2462 MHz)	16.6 MHz

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Low Channel (b-Mode) 2412 MHz

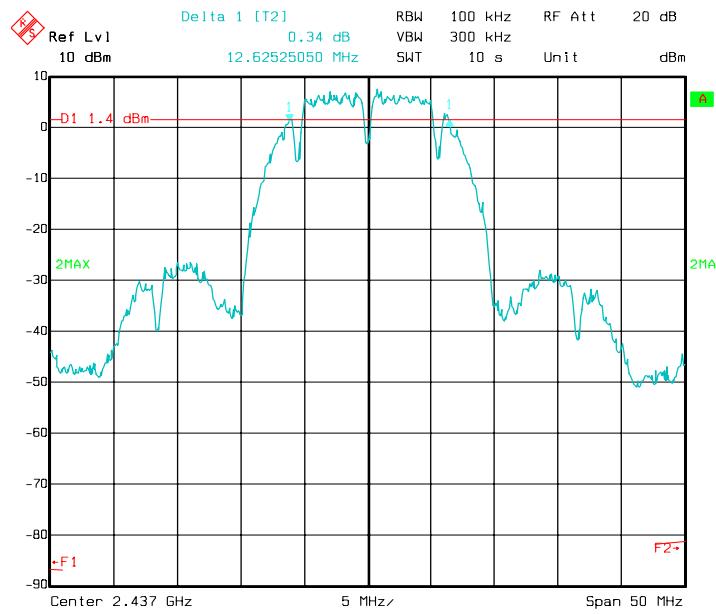


Low Channel (g-Mode) 2412 MHz



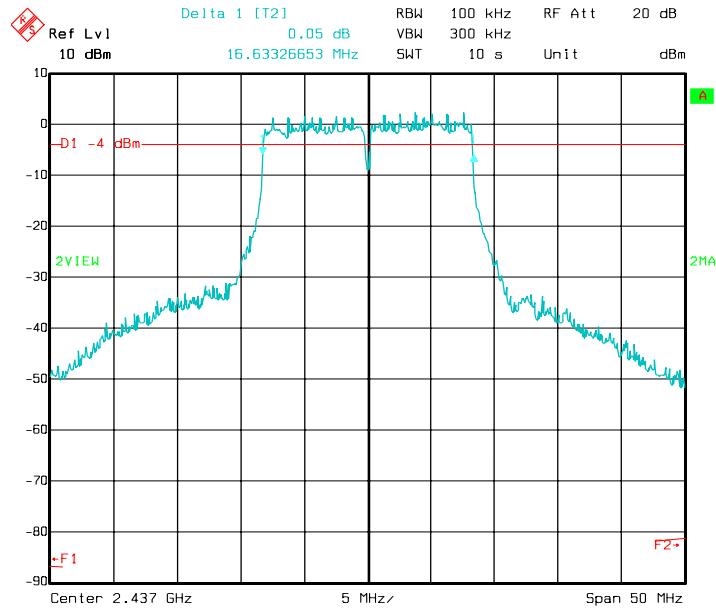
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Mid Channel (b-Mode) 2437 MHz



Date: 10.MAR.2008 13:28:43

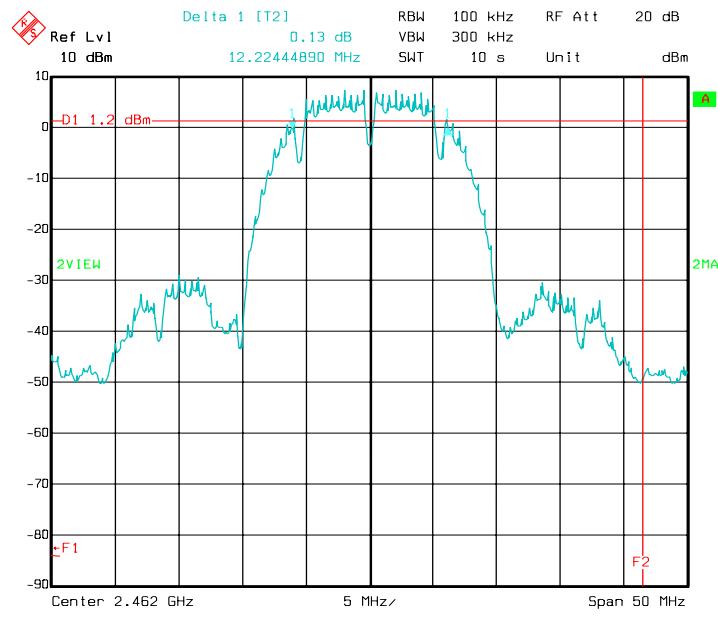
Mid Channel (g-Mode) 2437 MHz



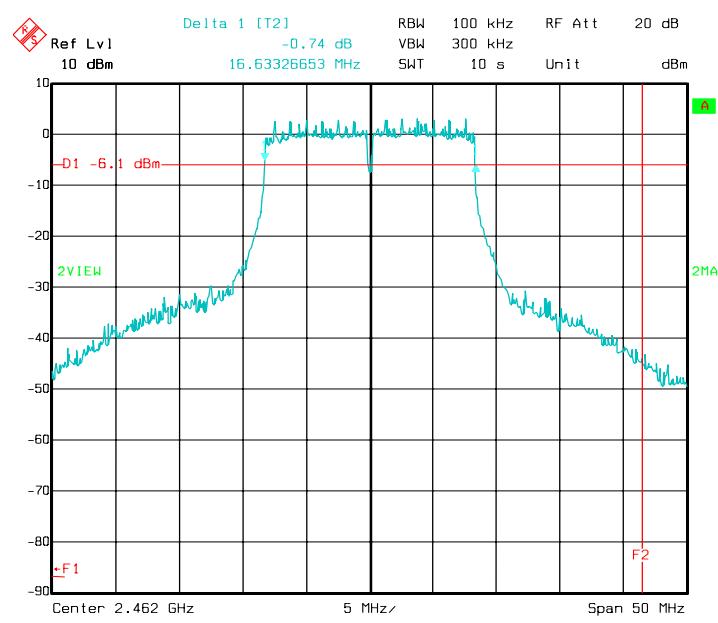
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High Channel (g-Mode) 2462 MHz



High Channel (g-Mode) 2462 MHz



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5.9. Maximum peak output power

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

A8.5

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under Section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

Sample Number:	CHY-A01-AA	Temperature:	71°F
Date:	3/10/08 & 7/15/08	Humidity:	51%
Modification State:	Lo/Mid/High Channels	Tester:	Dustin Chapin
			Laboratory: NEMKO SR1

Test Results:

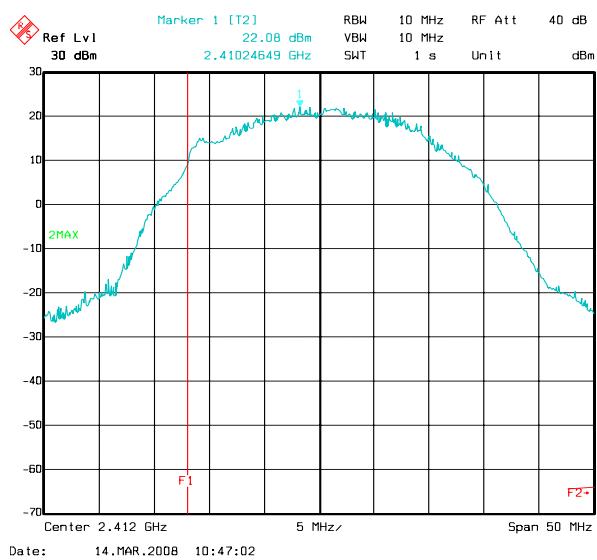
Channel Frequency (MHz)	Measured Output Power (dBm)	Bandwidth Correction $10 \times \log \frac{BW}{BW_m}$	Calculated Output Power dBm
2412 b	22.08	+2.35	24.43
2437 b	23.14	+2.35	25.49
2462 b	23.70	+2.38	26.08
2412 g	22.37	+2.43	24.80
2437 g	25.34	+2.43	27.77
2462 g	25.34	+2.43	27.77

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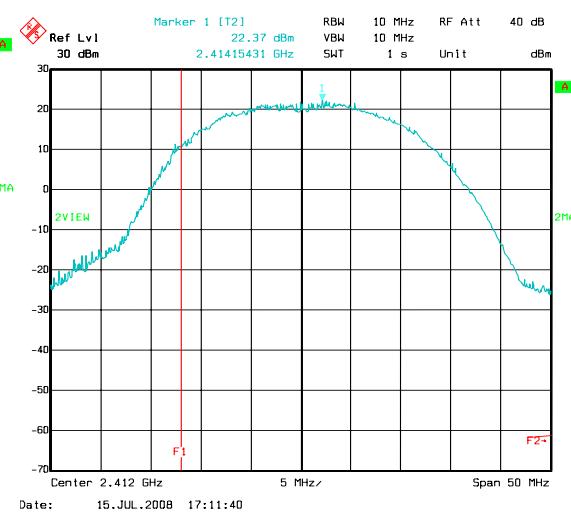
Additional Observations:

- Correction was added for 20 dB bandwidth vs measurement bandwidth .
- Measurements were made at 102VAC, 120VAC and 138VAC 60Hz, however no noticeable differences were observed.
- Measured at Max Hold, Peak detector.
- Antenna Gain = -1.8 dBi

Low Channel (b-Mode) 2412 MHz

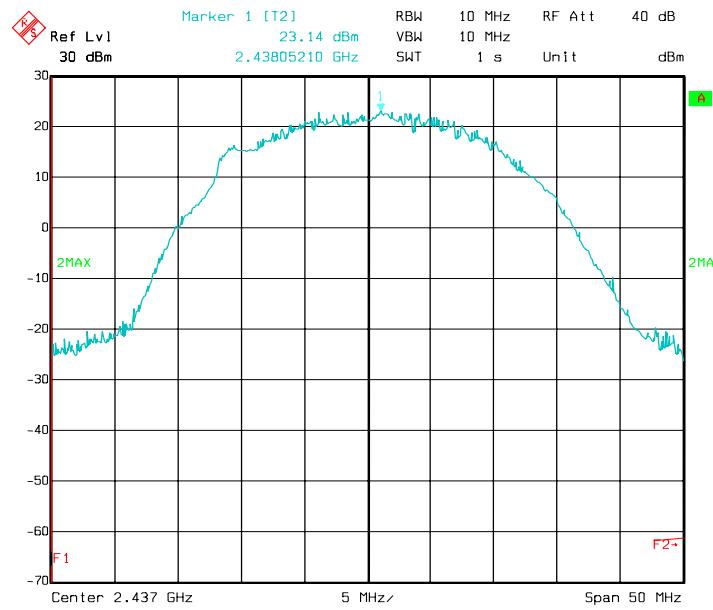


Low Channel (g-Mode) 2412 MHz

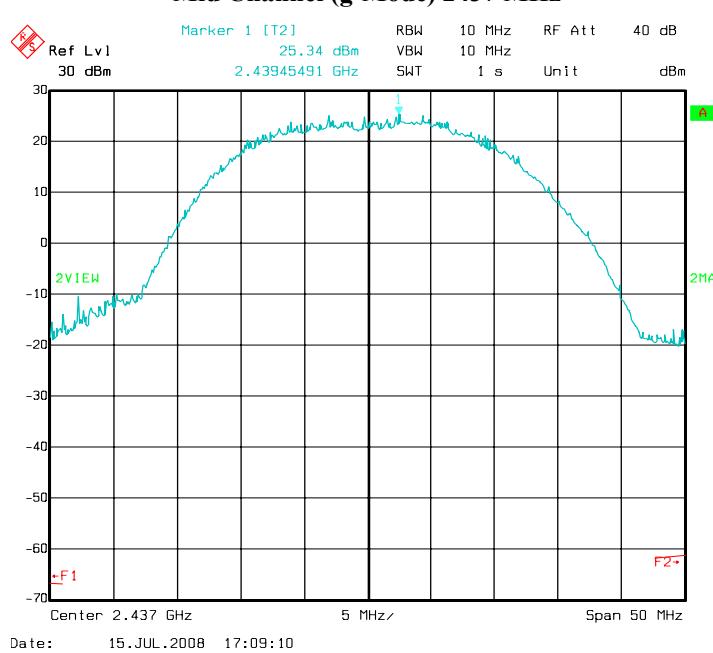


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Mid Channel (b-Mode) 2437 MHz

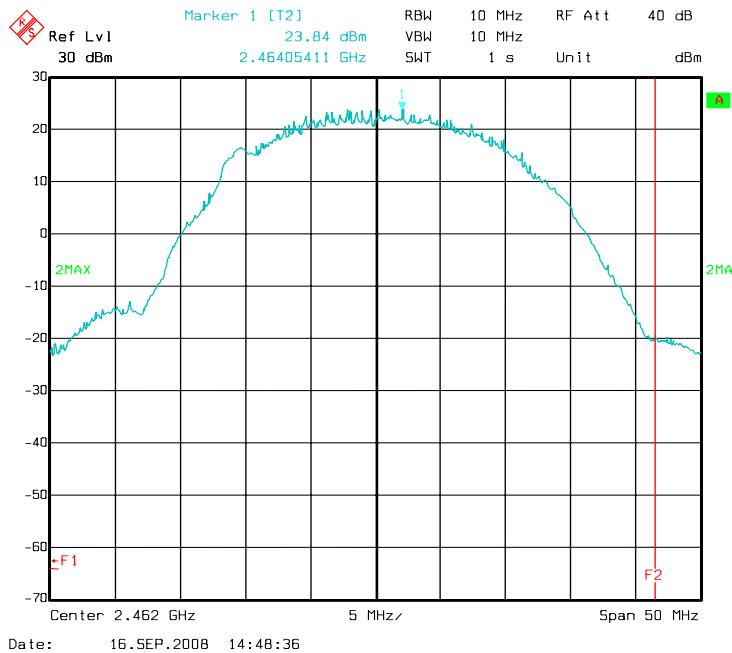


Mid Channel (g-Mode) 2437 MHz

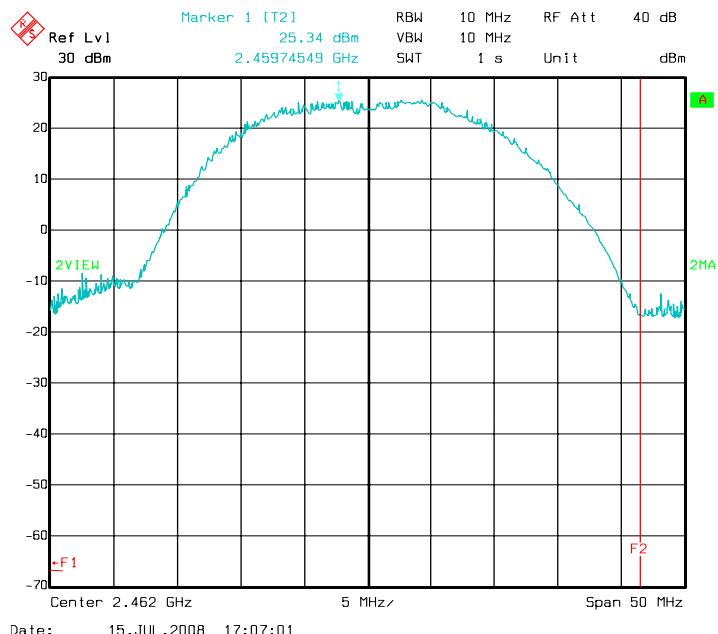


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High Channel (b-Mode) 2462 MHz



High Channel (g-Mode) 2462 MHz



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5.10. Power Spectral Density

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

A8.2(b) The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration. This power spectral density shall be determined in accordance with the provisions of Section A8.4(4); (i.e. the power spectral density shall be determined using the same method for determining the conducted output power).

Sample Number:	CHY-A01-AA	Temperature:	78°F
Date:	4-28-08	Humidity:	23%
Modification State:	Lo/Mid/High Channels	Tester:	Dustin Chapin
		Laboratory:	SOATS

Test Results:

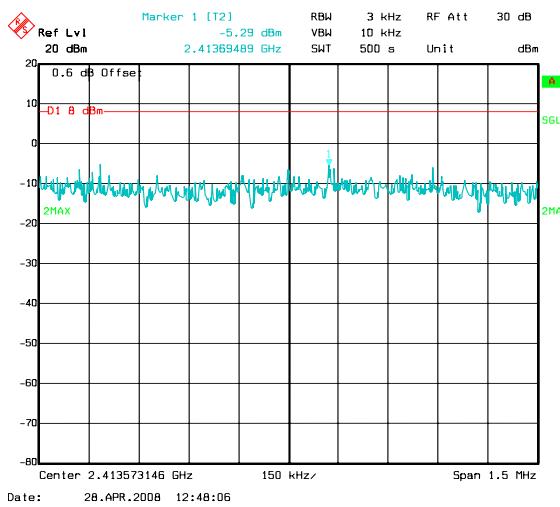
Channel	Channel Frequency (MHz)	RF Power Level in 3kHz BW (dBm)	Maximum Limit (dBm)	PASS/FAIL
LO	2412	-5.29	8	Pass
MID	2437	-6.65	8	Pass
HIGH	2462	-6.55	8	Pass
LO	2412	-10.1	8	Pass
MID	2437	-12.7	8	Pass
HIGH	2462	-11.3	8	Pass

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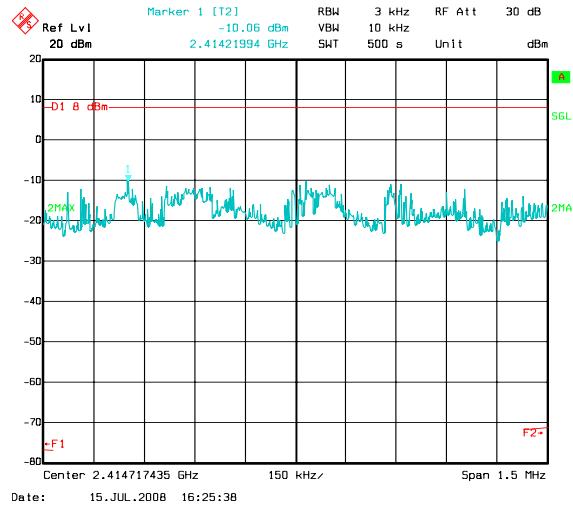
Additional Observations:

- Analyzer Span = 1.5 MHz, RES BW was set to 3 kHz, VBW to 10 kHz,
- Sweep time of 1.5 MHz/ 3kHz = 500 seconds.
- Conductive measurement, peak max hold.

Low Channel (b-Mode) 2412 MHz

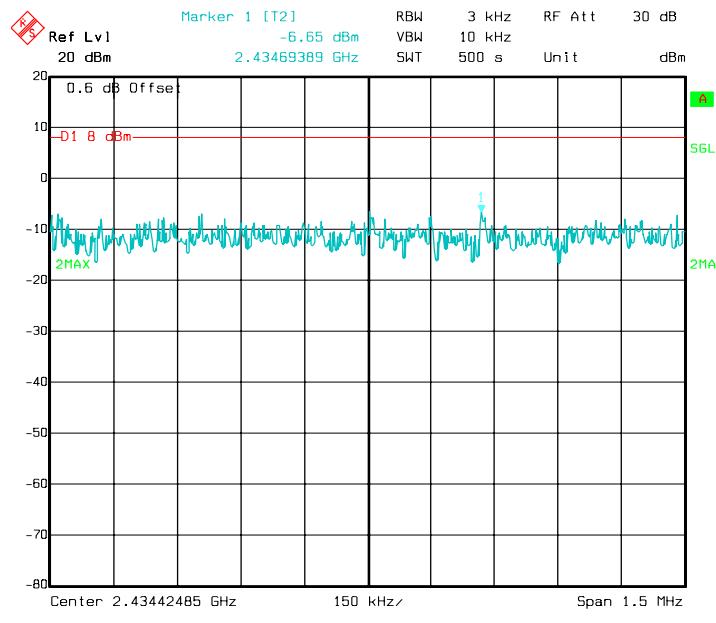


Low Channel (g-Mode) 2412 MHz

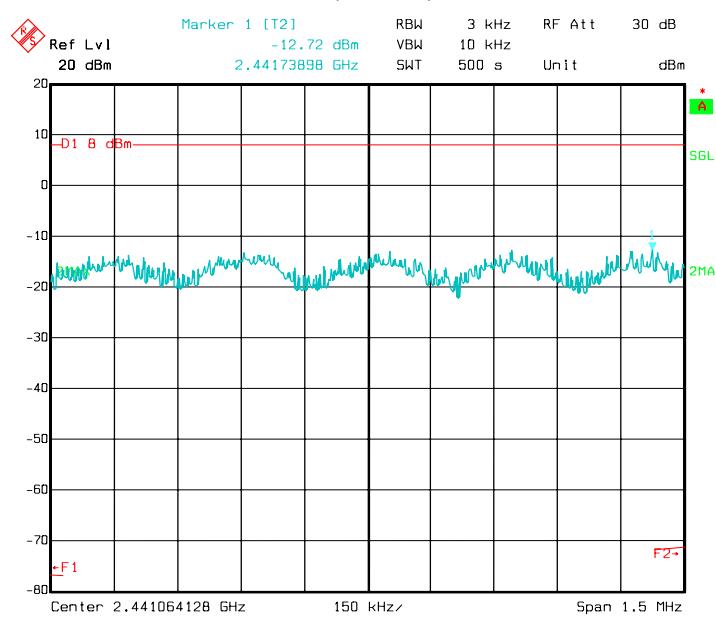


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Mid Channel (b-Mode) 2437 MHz

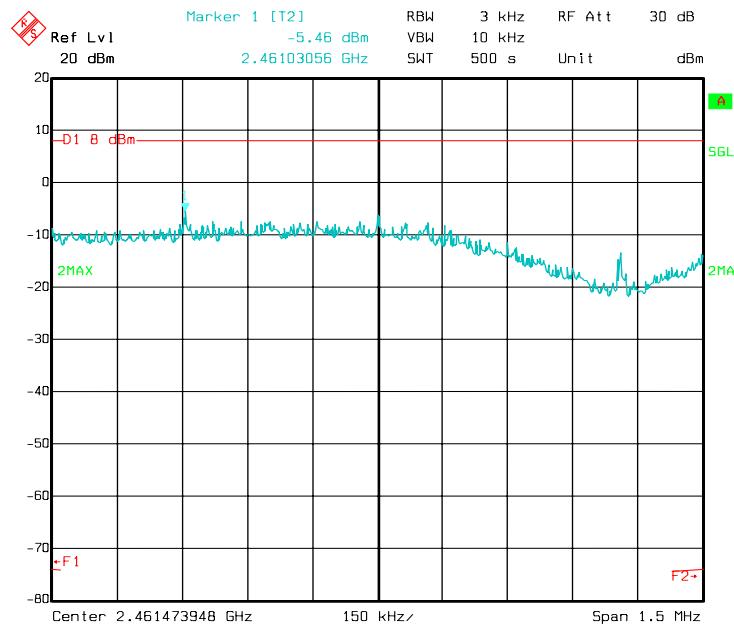


Mid Channel (b-Mode) 2437 MHz

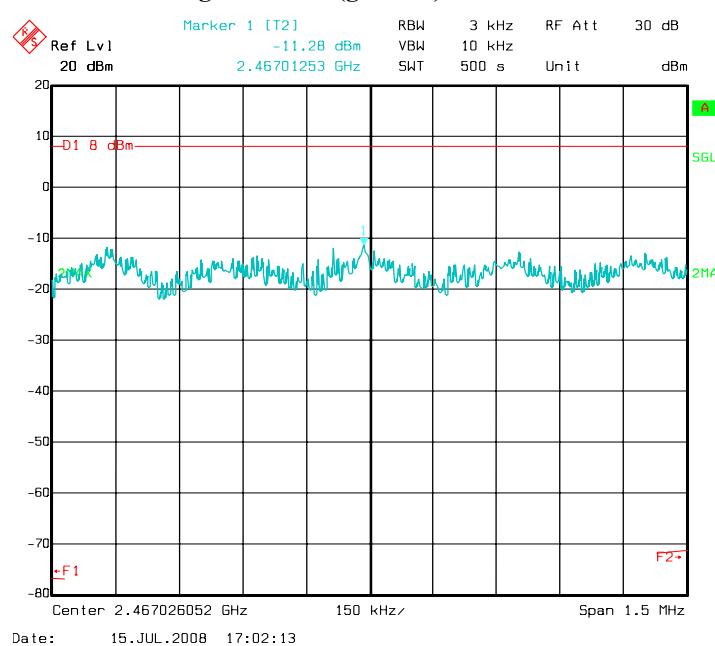


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High Channel (b-Mode) 2462 MHz



High Channel (g-Mode) 2462 MHz



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5.11. Test Equipment

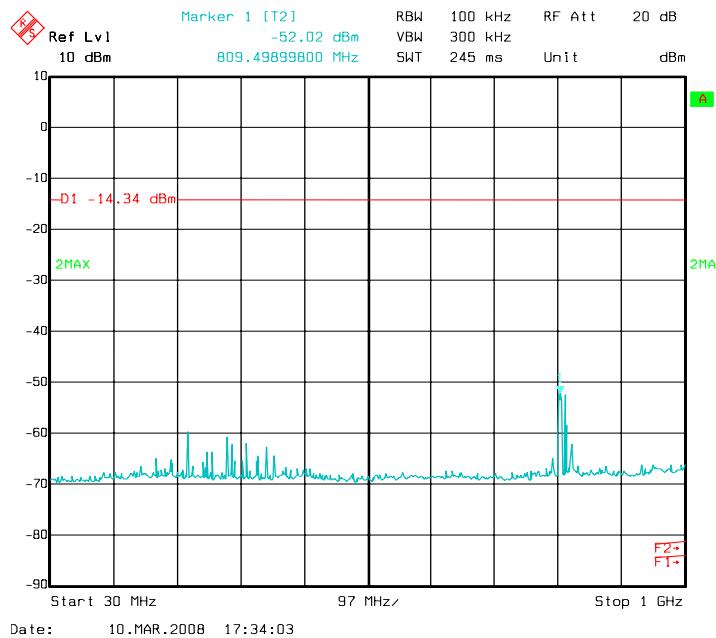
Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
111	Antenna, LPA	EMCO	3146	1382	03-Oct-07	03-Oct-08
114	Antenna, Bicon	EMCO	3104	2997	10-Jan-08	10-Jan-09
394	LISN	Solar	9348-50-R-24-BNC	941716	28-Aug-07	28-Aug-08
404	Spectrum Analyzer Display	HP	85662A	2648A15448	27-Jun-07	27-Jun-08
421	Quasi-Peak Adapter	HP	85650A	3145A01672	21-Feb-08	21-Feb-09
574	High Pass Filter	Solar	7801-5.0	853135	09-Jul-07	09-Jul-08
529	Antenna, DRWG	EMCO	3115	2505	27-Aug-07	27-Aug-08
625	Antenna, Dbl Ridge Horn	EMCO	3116	2325	01-Apr-08	01-Apr-09
685	Transient Limiter	HP	11974A	3107A02637	05-Sep-07	05-Sep-08
711	Spectrum Analyzer	HP	8566B	2747A04729	21-Feb-08	21-Aug-08
835	Spectrum Analyzer	Rohde & Schwarz	RHDFSEK	829058/005	20-Jun-07	20-Jun-08
755	Antenna, LPA	EMCO	3147	1246	10-Oct-07	10-Oct-09
902	pre amp	Sonoma	310 N	185803	10-Jul-07	10-Jul-08
919	Preamplifier	Spacek	100MHz to 40GHz	3M12,3M13 (SLKa-35-4)	12-Mar-08	12-Mar-10
815	Multimeter	Fluke	111	78130066	7/9/2007	07/09/08
NA	Regulating Transformer	TDGC	0-250 Vac	NA	NCR	NCR

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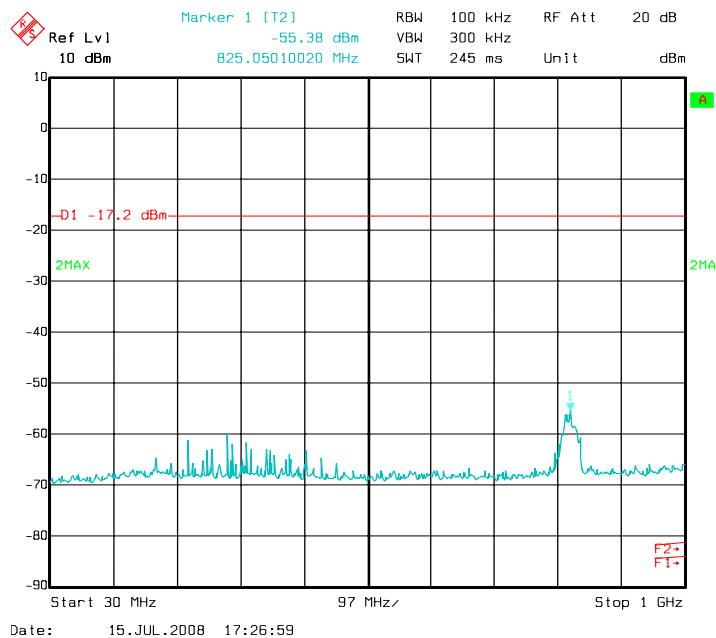
Appendix A

Conducted Spurious Continued

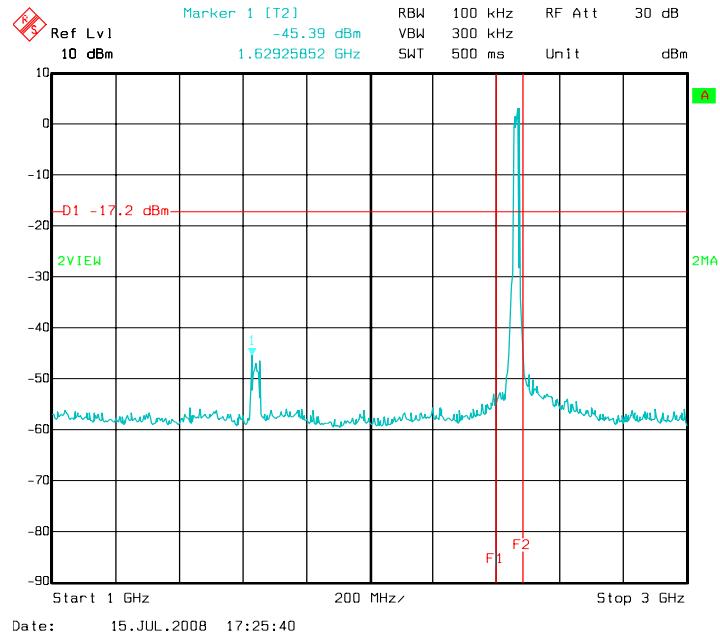
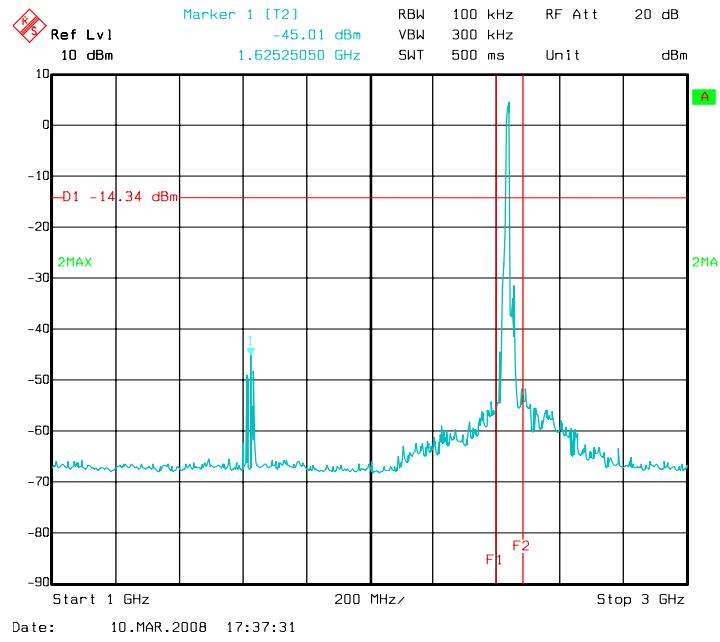
Mid Channel (b-Mode) 2437 MHz



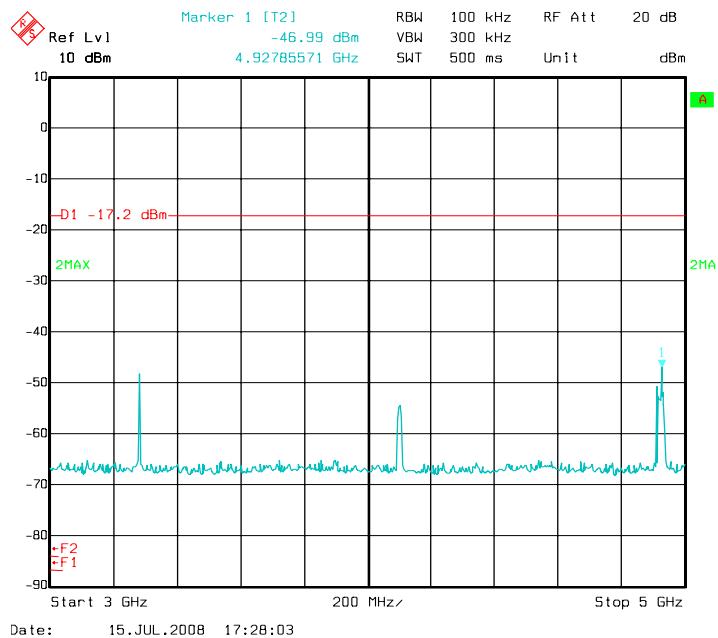
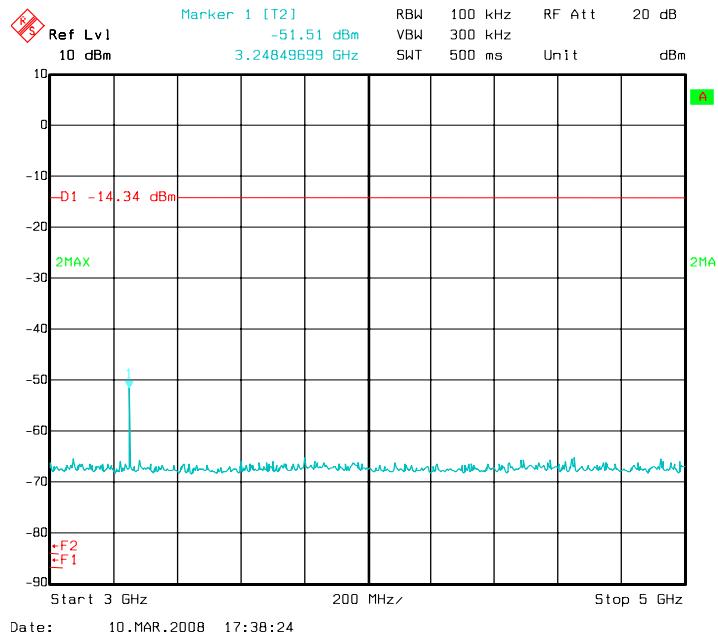
Mid Channel (g-Mode) 2437 MHz



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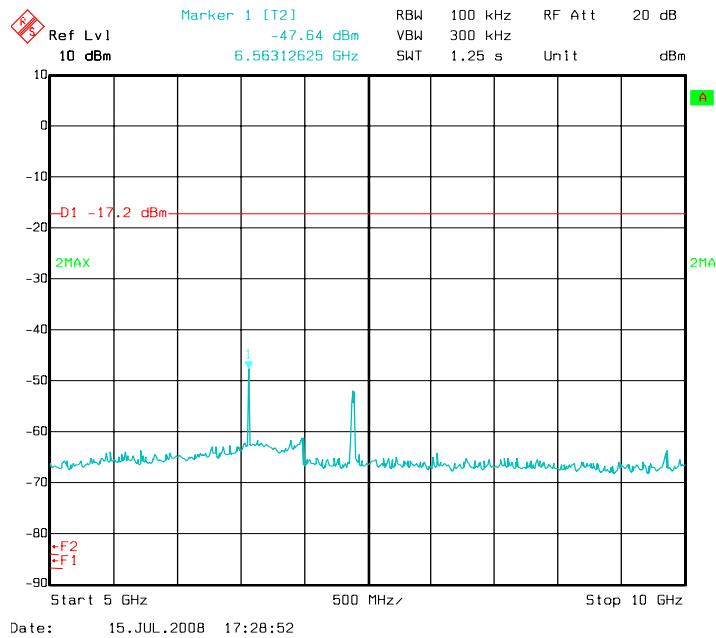
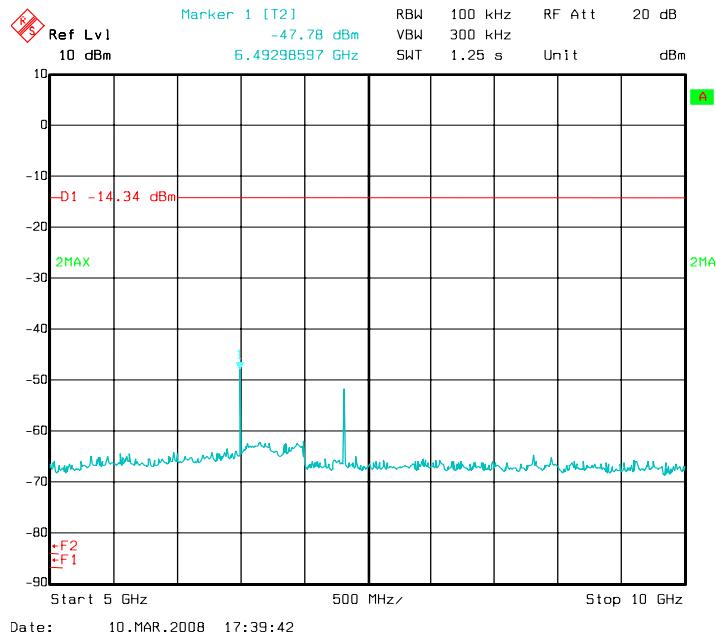


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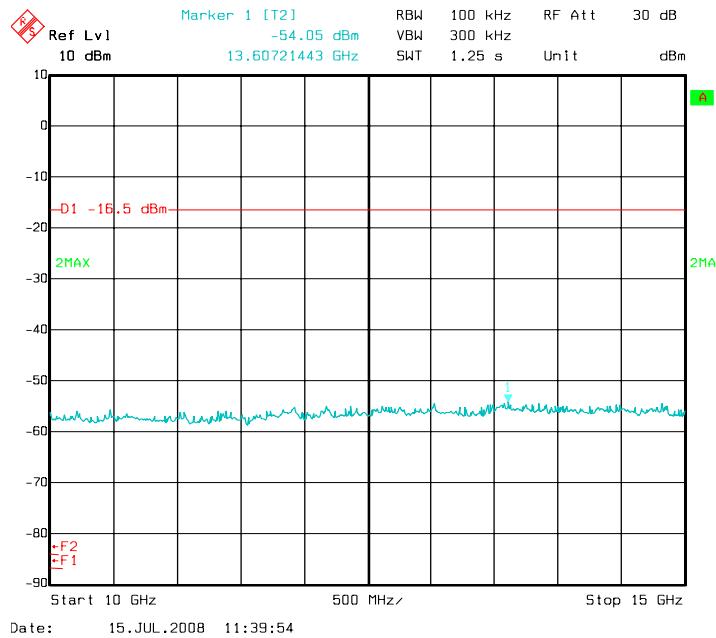
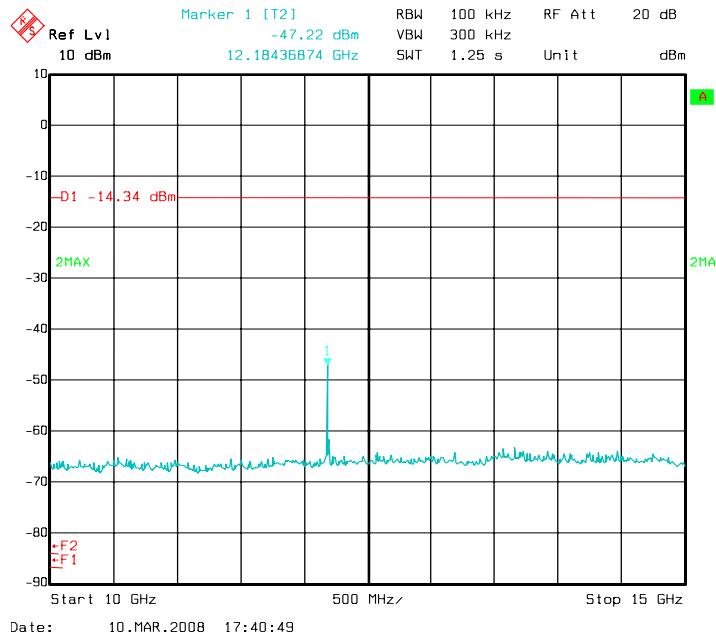
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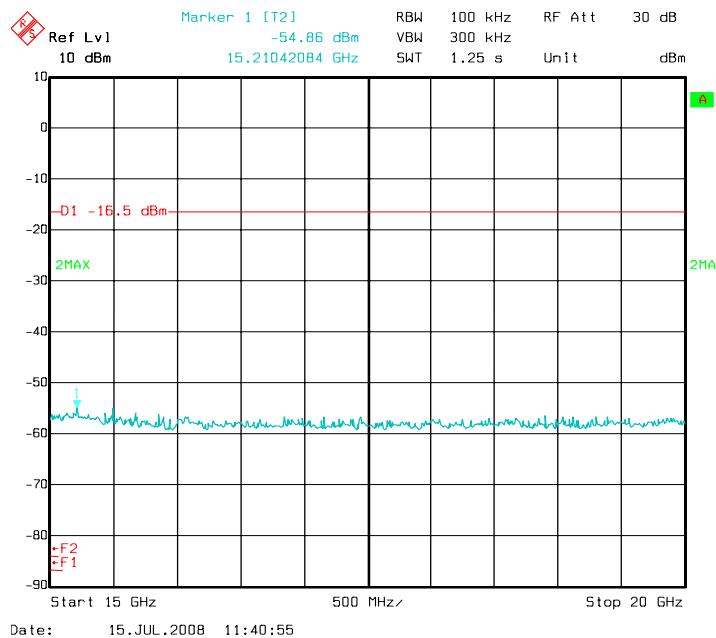
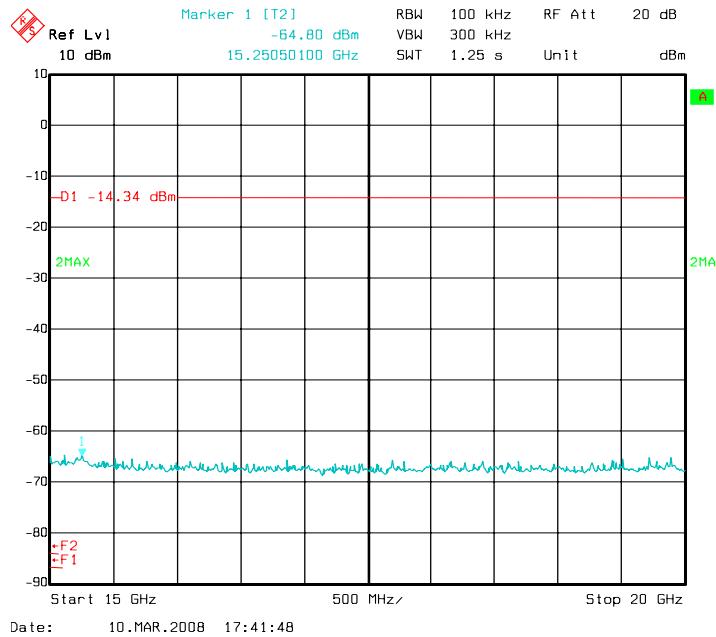
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September 3, 2008	CHY-A01-AA Certification Test Report FCC ID: VDCA IC: 7612A-A	20811194 FCC AA	51 of 60

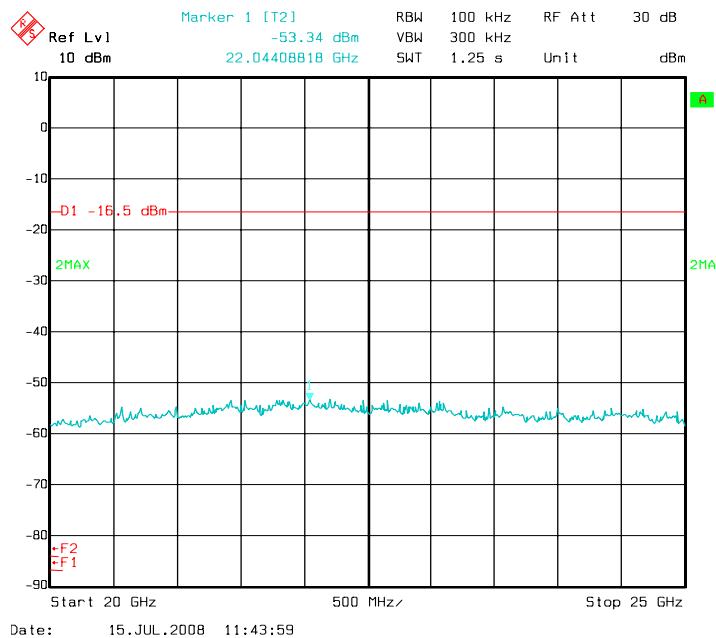
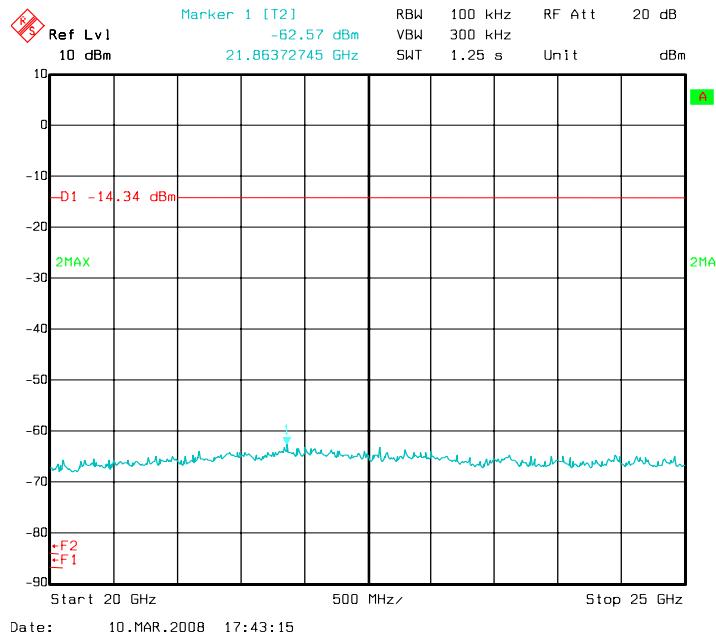


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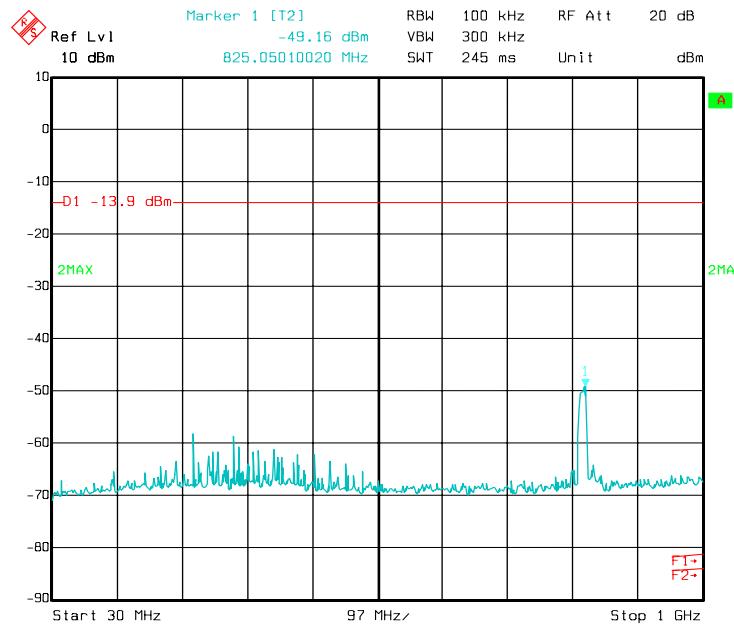


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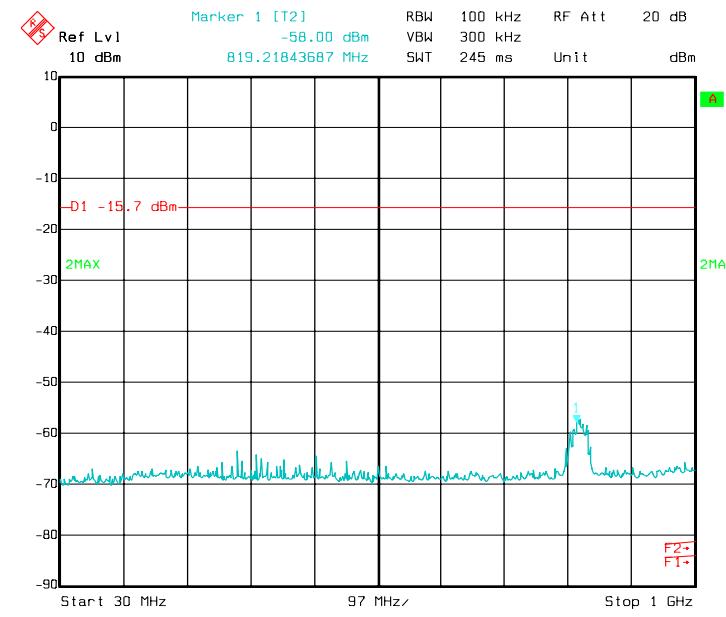


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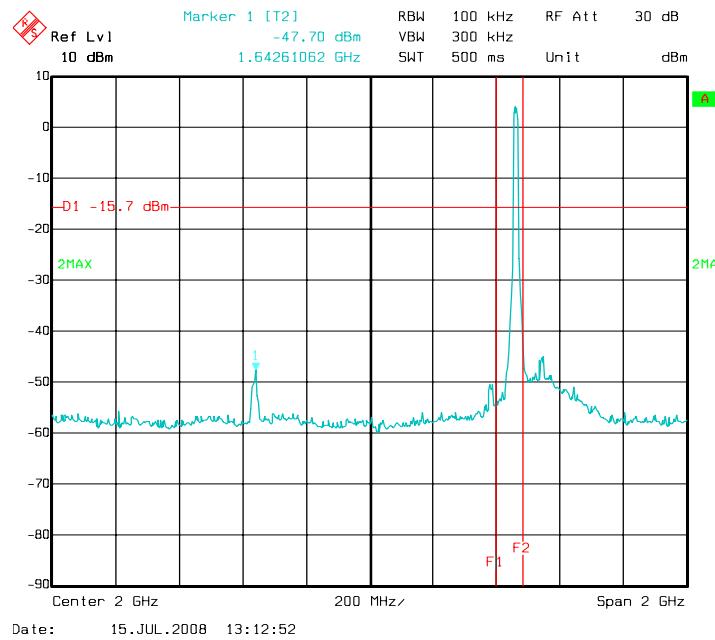
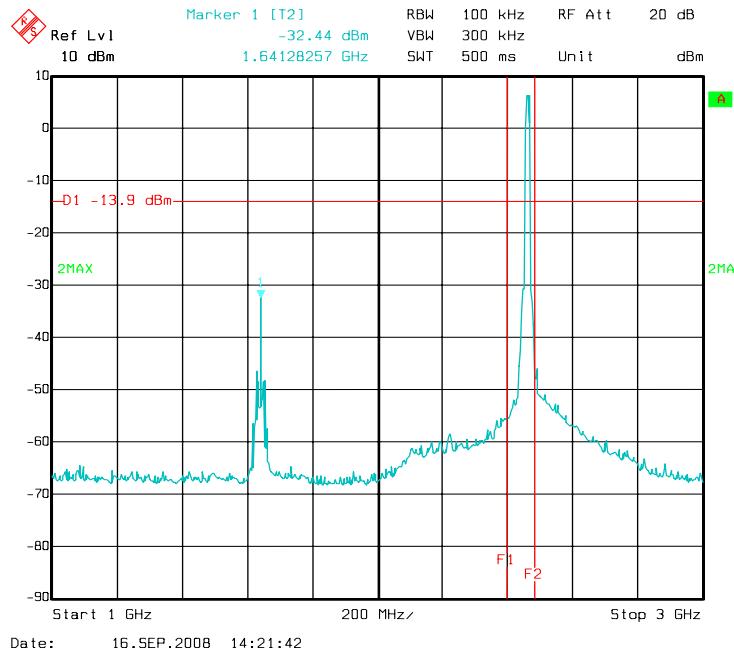
Conducted Spurious Continued**High Channel (b-Mode) 2462 MHz**

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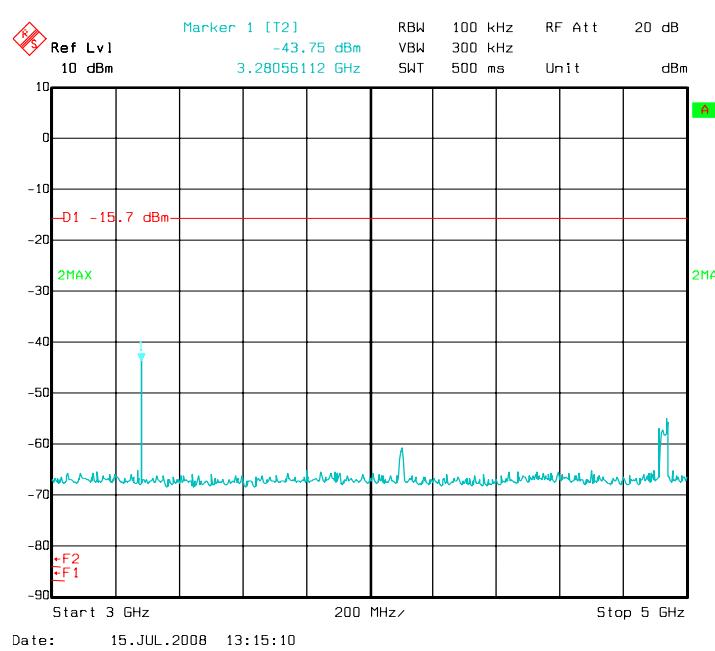
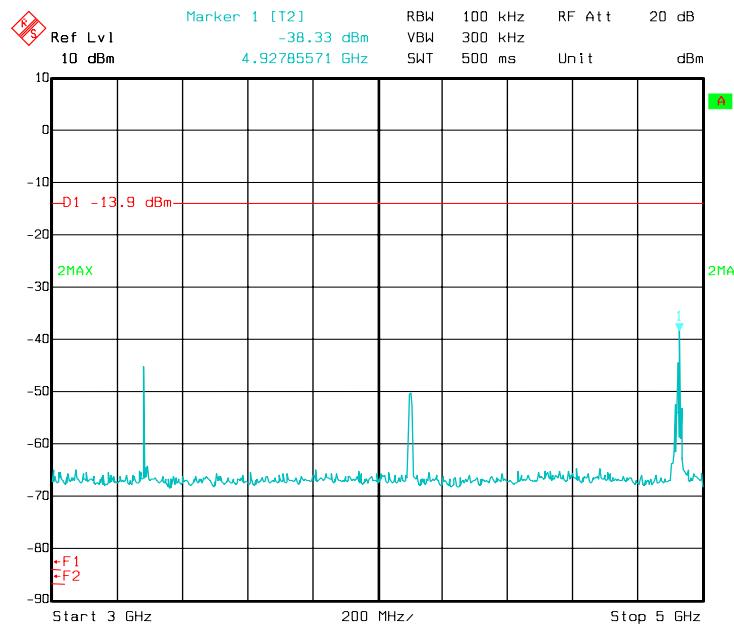
High Channel (g-Mode) 2462 MHz

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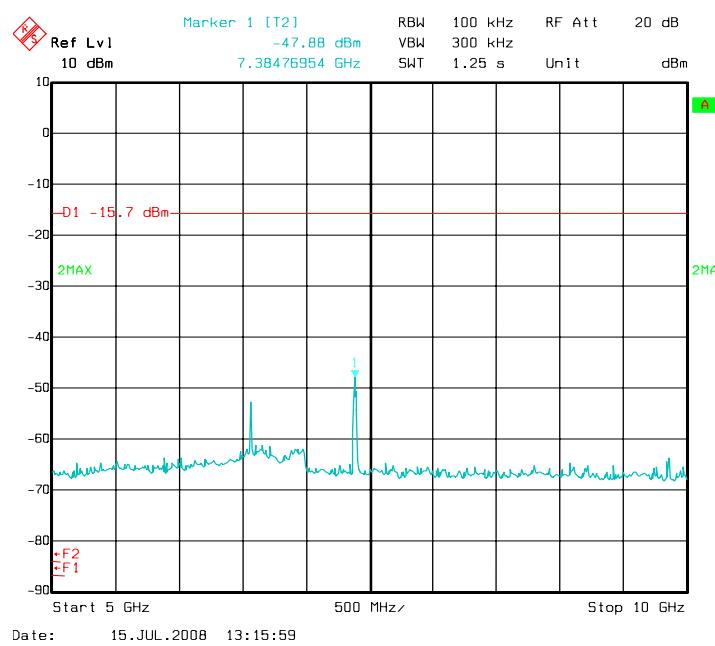
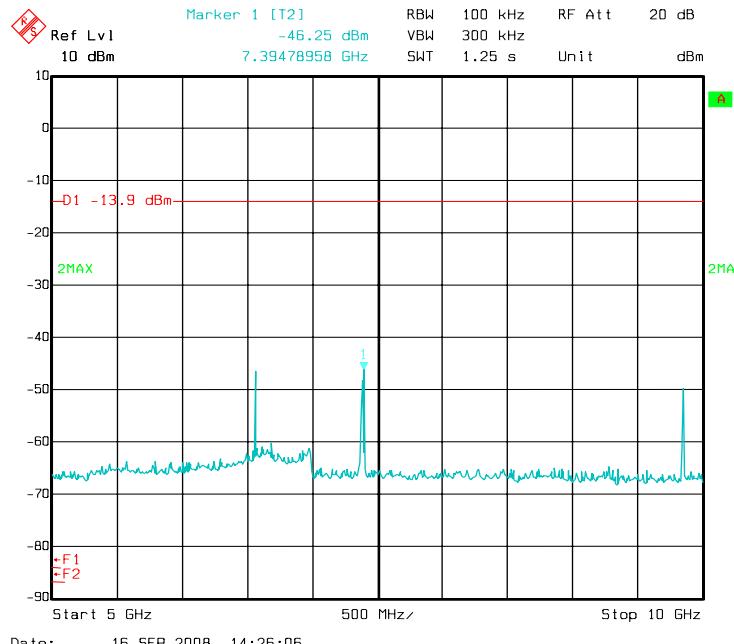


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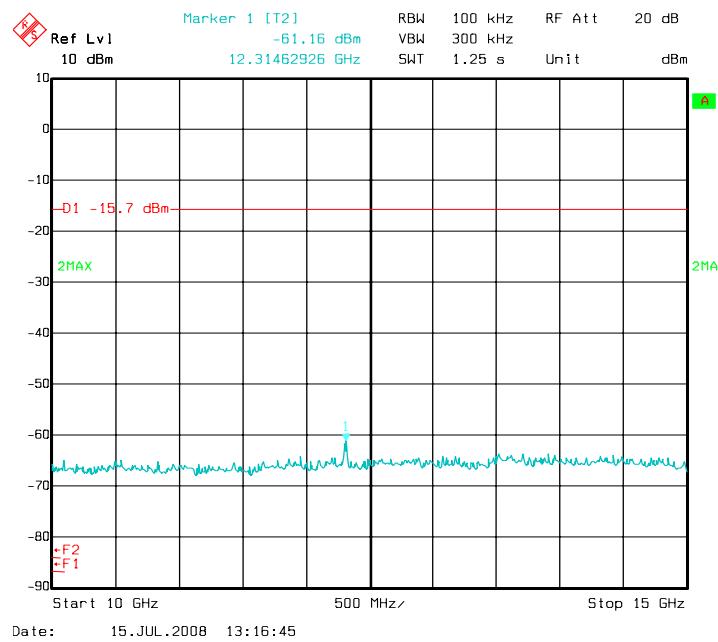
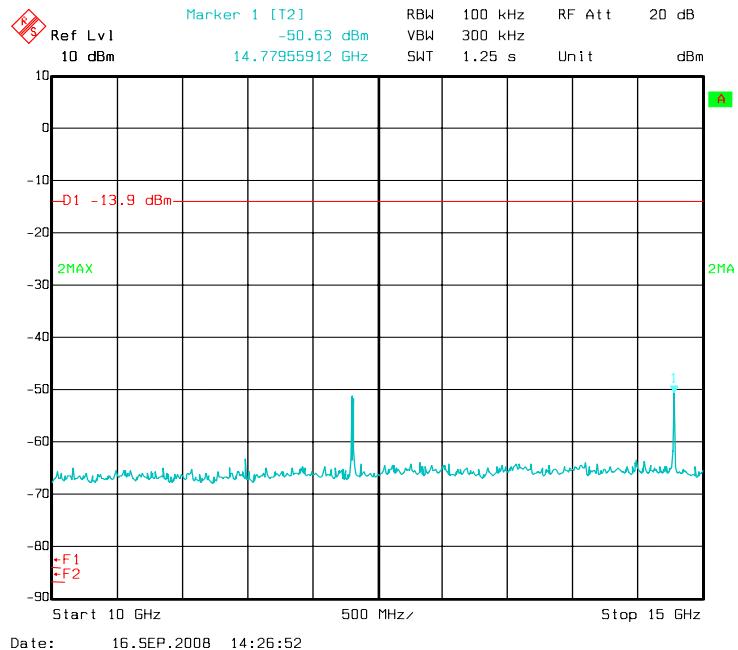
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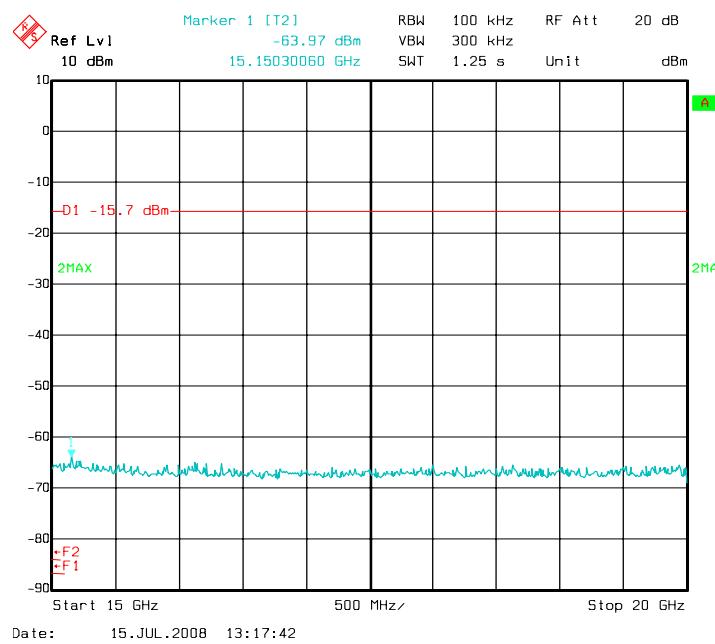
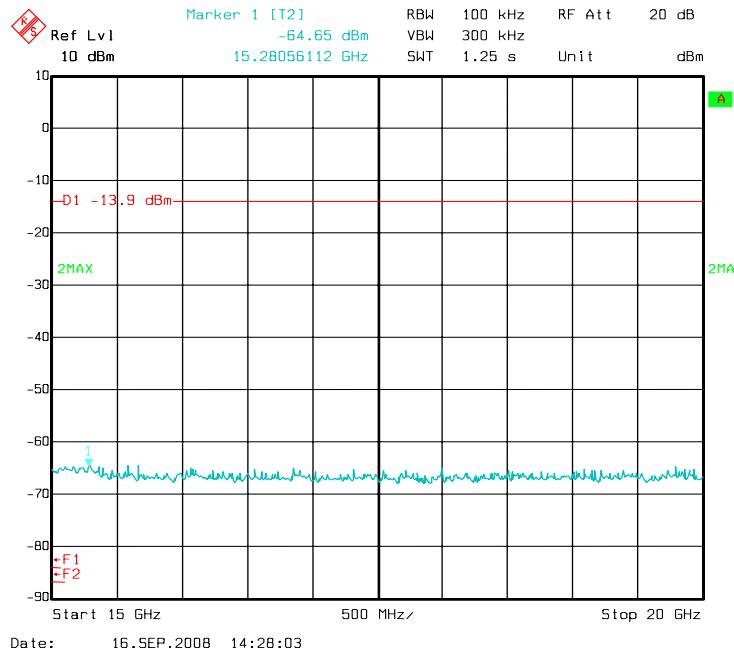
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