MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

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January 2, 2018

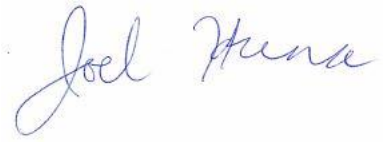
Muzik LLC
10 Woodbridge Center Dr., Suite 650
Woodbridge, New Jersey 07095

Dear Matthew DeZaio,

Enclosed is the EMC Wireless test report for compliance testing of the Muzik LLC, Muzik Live as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15 Subpart C for Intentional Radiators.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.



Joel Huna
Documentation Department

Reference: (\Muzik LLC\EMC94487-FCC247 Rev. 1)

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ACCREDITED
TESTING CERT #0591.01

Electromagnetic Compatibility Criteria
Test Report

for the

Muzik LLC
Muzik Live

Tested under
the FCC Certification Rules
contained in
15.247 Subpart C for Intentional Radiators

MET Report: EMC94487-FCC247 Rev. 1

January 2, 2018

Prepared For:

Muzik LLC
10 Woodbridge Center Dr., Suite 650
Woodbridge, New Jersey 07095

Prepared By:
MET Laboratories, Inc.
914 West Patapsco Avenue, Baltimore, MD 21230

Electromagnetic Compatibility Criteria
Test Report

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Muzik LLC
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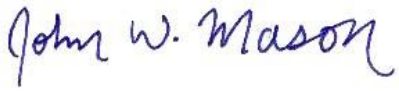
Tested under
the FCC Certification Rules
contained in
15.247 Subpart C for Intentional Radiators

Deepak Giri, Project Engineer
Electromagnetic Compatibility Lab

Joel Huna
Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules Part 15.247 under normal use and maintenance.



John Mason,
Director, Electromagnetic Compatibility Lab

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Report Status Sheet

Revision	Report Date	Reason for Revision
∅	December 4, 2017	Initial Issue.
1	January 2, 2018	Engineer corrections.

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List of Terms and Abbreviations

AC	**A**lternating **C**urrent
ACF	**A**ntenna **C**orrection **F**actor
Cal	**Cal**ibration
d	**M**easurement **D**istance
dB	**D**eci**b**els
dBµA	**D**eci**b**els above one **micro**amp
dBµV	**D**eci**b**els above one **micro**volt
dBµA/m	**D**eci**b**els above one **micro**amp **per m**eter
dBµV/m	**D**eci**b**els above one **micro**volt **per m**eter
DC	**D**irect **C**urrent
E	**E**lectric Field
DSL	**D**igital **S**ubscriber **L**ine
ESD	**E**lectro**s**tatic **D**ischarge
EUT	**E**quipment **U**nder **T**est
f	**F**requency
FCC	**F**ederal **C**ommunications **C**ommission
GRP	**G**round **R**eference **P**lane
H	Magnetic Field
HCP	**H**orizontal **C**oupling **P**lane
Hz	**H**ert**z**
IEC	**I**nternational **E**lectrotechnical **C**ommission
kHz	**k**ilo**h**ert**z**
kPa	**k**ilo**pa**scal
kV	**k**ilo**v**olt
LISN	**L**ine **I**mpedance **S**tabilization **N**etwork
MHz	**M**ega**h**ertz
µH	**microh**enry
µ	**microf**arad
µs	**micros**econds
NEBS	**N**etwork **E**quipment-**B**uilding **S**ystem
PRF	**P**ulse **R**epetition **F**requency
RF	**R**adio **F**requency
RMS	**R**oot-**M**ean-**S**quare
TWT	**T**raveling **W**ave **T**ube
V/m	**V**olts **per m**eter
VCP	**V**ertical **C**oupling **P**lane

I. Executive Summary

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A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Muzik LLC Muzik Live, with the requirements of Part 15, §15.247. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the Muzik Live. Muzik LLC should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Muzik Live, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.247, in accordance with Muzik LLC, purchase order number 1239. All tests were conducted using measurement procedure ANSI C63.4-2014.

FCC Reference 47 CFR Part 15.247:2005	Description	Compliance
Title 47 of the CFR, Part 15 §15.203	Antenna Requirement	Compliant
Title 47 of the CFR, Part 15 §15.207(a)	Conducted Emission Limits	Not Applicable
Title 47 of the CFR, Part 15 §15.247(a)(2)	6dB Occupied Bandwidth	Compliant
Title 47 of the CFR, Part 15 §15.247(b)	Peak Power Output	Compliant
Title 47 of the CFR, Part 15 §15.247(d); §15.209; §15.205	Radiated Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15 §15.247(d)	RF Conducted Spurious Emissions Requirements	Compliant
Title 47 of the CFR, Part 15 §15.247(d)	RF Conducted Band Edge	Compliant
Title 47 of the CFR, Part 15; §15.247(e)	Peak Power Spectral Density	Compliant
Title 47 of the CFR, Part 15 §15.247(i)	Maximum Permissible Exposure (MPE)	Not Applicable

Table 1. Executive Summary of EMC Part 15.247 ComplianceTesting

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II. Equipment Configuration

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A. Overview

MET Laboratories, Inc. was contracted by Muzik LLC to perform testing on the Muzik Live, under Muzik LLC's purchase order number 1239.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Muzik LLC, Muzik Live.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	Muzik Live	
Model(s) Covered:	Muzik Live	
EUT Specifications:	Primary Power: 3.7-4.2 (Battery) / 5 (USB Charger)	
	FCC ID: 2AASDMZHP2	
	Type of Modulations:	OFDM
	Equipment Code:	DTS
	Peak RF Output Power:	10.31 dBm
	EUT Frequency Ranges:	2412 - 2462 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35º C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Deepak Giri	
Report Date(s):	January 2, 2018	

Table 2. EUT Summary Table

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ISO/IEC 17025:2005	General Requirements for the Competence of Testing and Calibration Laboratories
ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices

Table 3. References

C. Test Site

All testing was performed at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, MD 21230. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

MET Laboratories is a ISO/IEC 17025 accredited site by A2LA. Baltimore #0591.01.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

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D. Description of Test Sample

The Muzik LLC Muzik Live, Equipment Under Test (EUT), is a smart connected headphone which contains a dual-mode Bluetooth radio for audio playback and control as well as an integrated smartphone chipset with 2.4 GHz WiFi connectivity to support image/video capture and live video streaming capability, as well as a live camera preview on the user's smartphone. The headset can operate in two modes for video streaming: as a WiFi access point to which the user's smartphone connects or in a home WiFi mode where the headset directly connects to a known WiFi network.

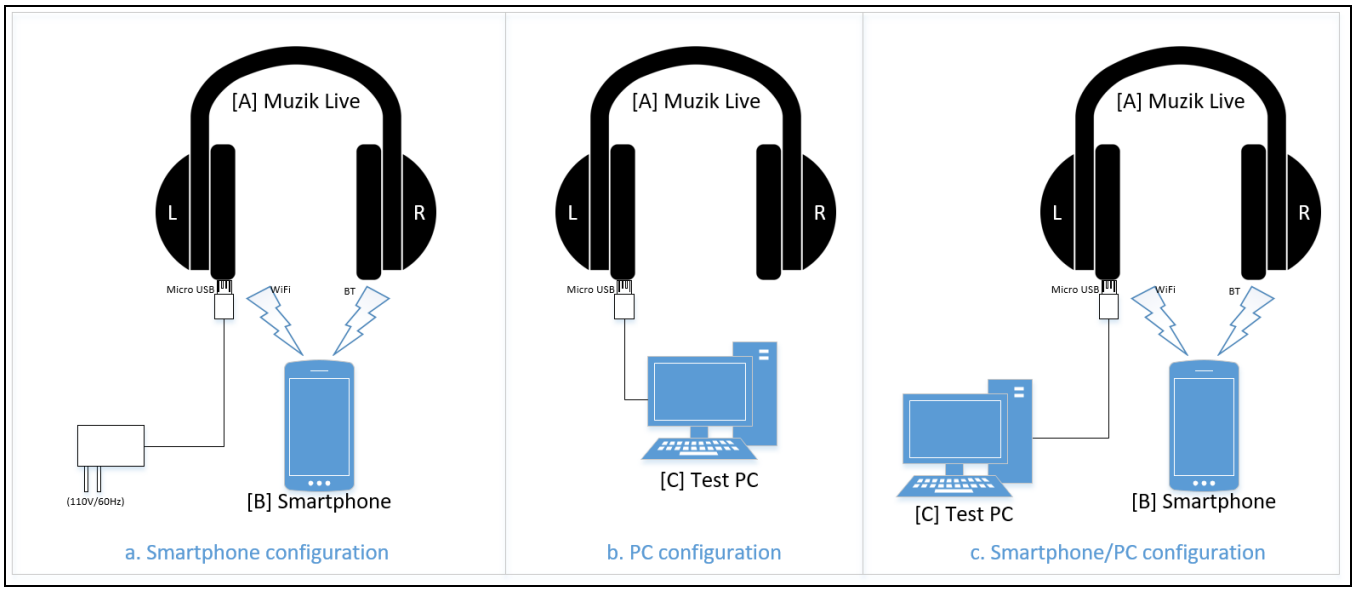

Figure 1. Block Diagram of Test Configuration

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E. Equipment Configuration

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

Ref. ID	Name / Description	Model Number	Part Number	Serial Number	Revision
A	Muzik Live Headphones	MZHP2			

Table 4. Equipment Configuration

F. Support Equipment

Support equipment necessary for the operation and testing of the EUT is included in the following list.

Ref. ID	Name / Description	Manufacturer	Model Number	*Customer Supplied Calibration Data
B	Smartphone	TBD	TBD	
C	Test PC	TBD	TBD	
The 'Customer Supplied Calibration Data' column will be marked as either not applicable, not available, or will contain the calibration date supplied by the customer.				

Table 5. Support Equipment

G. Ports and Cabling Information

Ref. ID	Port name on EUT	Cable Description or reason for no cable	Qty	Length as tested (m)	Max Length (m)	Shielded? (Y/N)	Termination Box ID & Port Name
1	N/A	USB Data Cable	1	0.82		N	N/A

Table 6. Ports and Cabling Information

H. Mode of Operation

Live Video Preview Mode – The EUT will be powered on and operating as a WiFi access point. A secondary device will connect to the access point. The headphones will be placed into the video mode of operation, using either the hardware user interface or connected device. The headphones will transmit a motion JPEG video preview to the connected device.

Access Point Video Streaming Mode – The EUT will be powered on and operating as a WiFi access point. A secondary device will connect to the access point. The headphones will be placed into the video streaming mode of operation. A live video stream will be initiated, using either the hardware user interface or connected device. The video stream will be sent to the smartphone via the WiFi connected and then to the endpoint via the smartphone's cellular connection.

Home WiFi Video Streaming Mode – The EUT will be powered on and then connected to a known WiFi network, which is configured by a secondary device. The headphones will be placed into the video streaming mode of operation and a live video stream will be initiated, using either the hardware user interface or connected device. The video stream will be sent to the endpoint via the WiFi connection.

Test Data Streaming Mode – The EUT will be powered on and operating as a WiFi access point. A secondary device (test PC or smartphone) will connect to the access point. The secondary device will be set up as an iperf server. The EUT will be set up as an iperf client and the data transfer will be initiated.

I. Method of Monitoring EUT Operation

Live Preview Video Mode

1. A solid blue LED on the right ear cup in any operation mode indicates that the EUT is streaming audio using the classic Bluetooth A2DP profile. Presence of the video preview on a connected device indicates that the live preview function is operating as defined.
2. Any combination of flashing colors on the LED on the right ear cup indicates that the EUT is not streaming Bluetooth audio. The live preview function is not operating as defined is the video stream is not observed on the connected device.

Access Point Video Streaming Mode / Home WiFi Video Streaming Mode

1. A solid blue LED on the right ear cup in any operation mode indicates that the EUT is streaming audio using the classic Bluetooth A2DP profile. A solid red LED on the left ear cup indicates that the streaming video is active.
2. Any combination of flashing colors on the LED on the right ear cup indicates that the EUT is not streaming Bluetooth audio. If the solid red LED is not illuminated on the left ear cup, the live video stream is not operating as defined.

Test Data Streaming Mode

1. A solid blue LED on the right ear cup in any operation mode indicates that the EUT is streaming audio using the classic Bluetooth A2DP profile. The reporting of data via the iperf process, i.e. in a terminal on the test PC, indicates that the test data stream is active and functioning as defined.
2. Any combination of flashing colors on the LED on the right ear cup indicates that the EUT is not streaming Bluetooth audio. A lack of reported data or a reported value of 0 bits per second from the iperf process indicates that the test data stream is not functioning as defined.

J. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

K. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Muzik LLC upon completion of testing.

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III. Electromagnetic Compatibility Criteria for Intentional Radiators

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Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.203 Antenna Requirement

Test Requirement: **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

Results: The EUT as tested is compliant the criteria of §15.203. Antennas are permanently attached.

Test Engineer(s): Deepak Giri

Test Date(s): June 20, 2017

Gain	Type
2.5 dBi	Trace

Table 7. Antenna List

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Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.207(a) Conducted Emissions Limits

Test Requirement(s): **§ 15.207 (a):** 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 30MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Σ line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency range (MHz)	§ 15.207(a), Conducted Limit (dBμV)	
	Quasi-Peak	Average
* 0.15- 0.45	66 - 56	56 - 46
0.45 - 0.5	56	46
0.5 - 30	60	50

Table 8. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)

Test Procedure: The EUT was placed on a 0.8 m-high wooden table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-2014 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. The measurements were performed over the frequency range of 0.15 MHz to 30 MHz using a 50 Ω/50 μH LISN as the input transducer to an EMC/field intensity meter. For the purpose of this testing, the transmitter was turned on. Scans were performed with the transmitter on.

Test Results: The EUT was not applicable with this requirement. EUT is DC powered.

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Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(a)(2) 6 dB Bandwidth

Test Requirements: **§ 15.247(a)(2):** Operation under the provisions of this section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

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

Test Procedure: The transmitter was on and transmitting at the highest output power. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately 1 -5 % of the total emission bandwidth, VBW > RBW. The 6 dB Bandwidth was measured and recorded. The measurements were performed on the low, mid and high channels.

Test Results The EUT was compliant with § 15.247 (a)(2). Only data for N mode 40 MHz channels is included but not the plots.

The 6 dB Bandwidth was determined from the plots on the following pages.

Test Engineer(s): Deepak Giri

Test Date(s): August 25, 2017

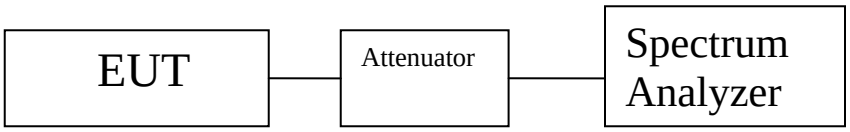

Figure 2. Block Diagram, Occupied Bandwidth Test Setup

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Occupied Bandwidth Test Results

Frequency MHz	Mode	Data Rate	Bandwidth MHz	6 dB	99 % OBw
2412	B	Long 1 Mbps	20	8.617	12.425
2437				8.599	12.357
2462				8.61	12.353
2412	G	6 Mbps	20	17.1	18.556
2437				17.041	18.654
2462				16.959	18.9928
2412	N	MCS 0	20	18.189	19.364
2437				18.168	19.3765
2462				17.806	19.253
2422			40	35.054	37.7227
2437				34.906	37.454
2452				34.768	38.338

Table 9. 6 dB Occupied Bandwidth, Test Results

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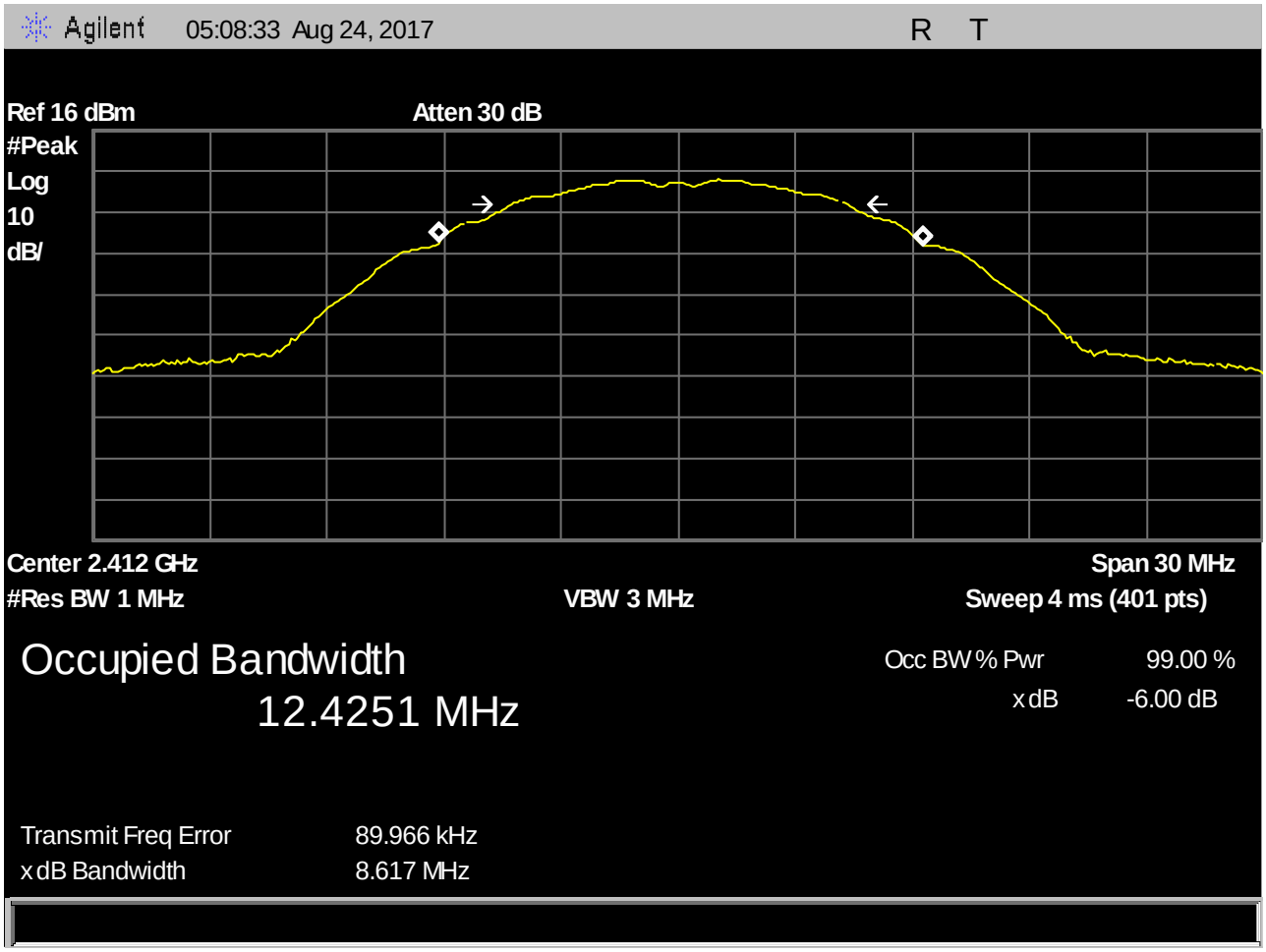
6 dB Occupied Bandwidth Test Results



Plot 1. 6 dB Occupied Bandwidth, 2412 MHz, 20 MHz, B mode

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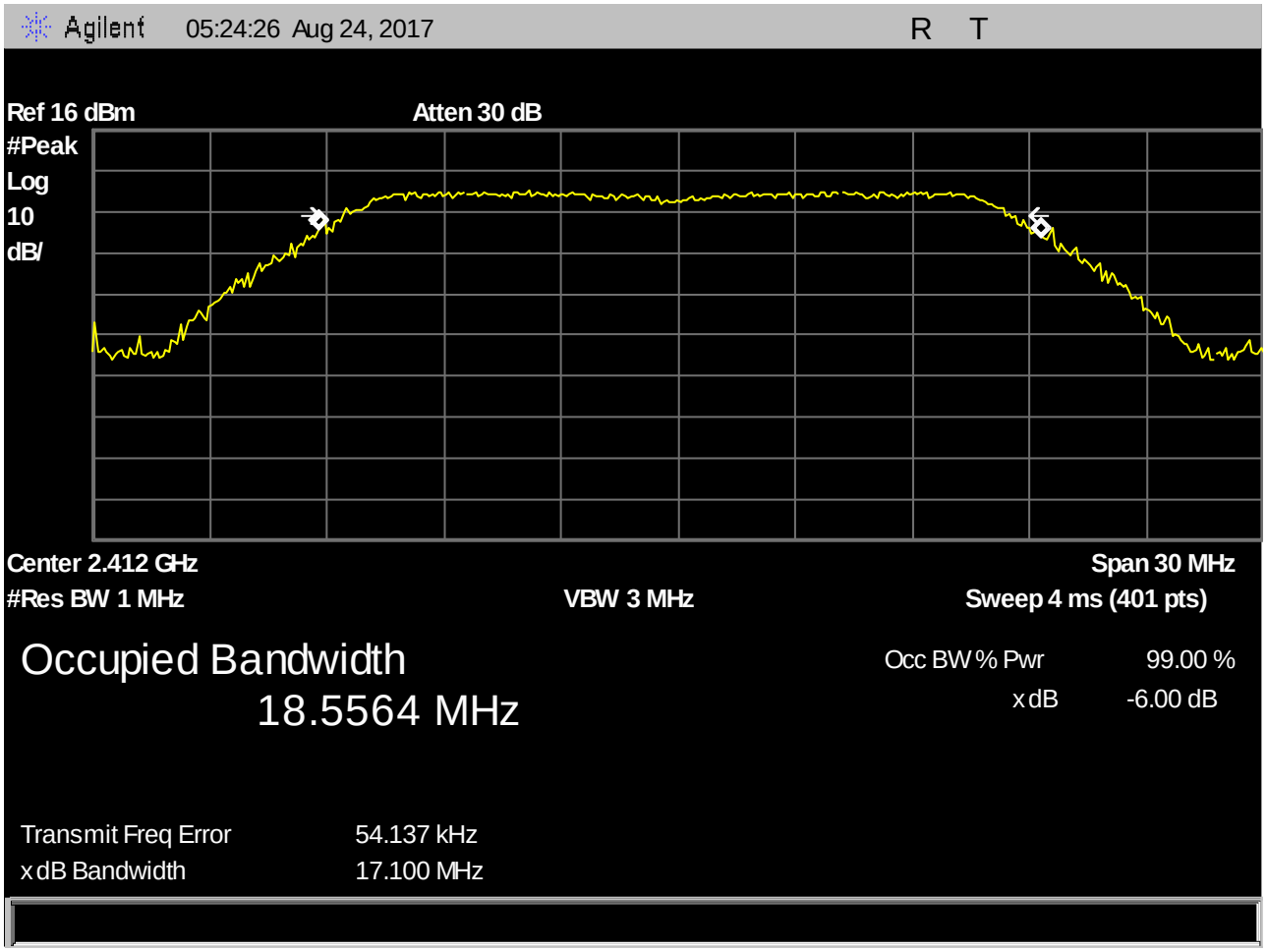

Plot 2. 6 dB Occupied Bandwidth, 2412 MHz, 20 MHz, G mode

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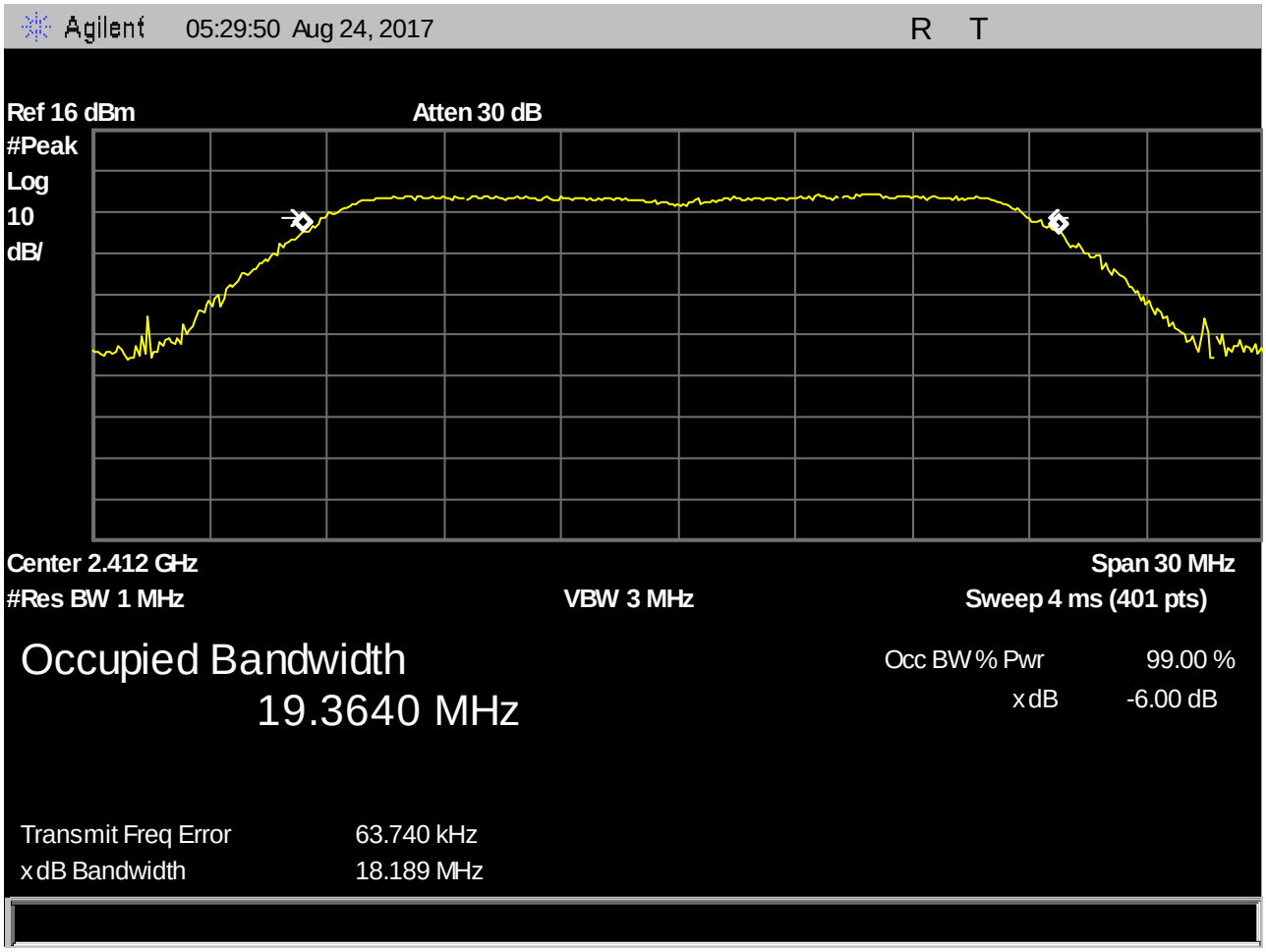

Plot 3. 6 dB Occupied Bandwidth, 2412 MHz, 20 MHz, N mode

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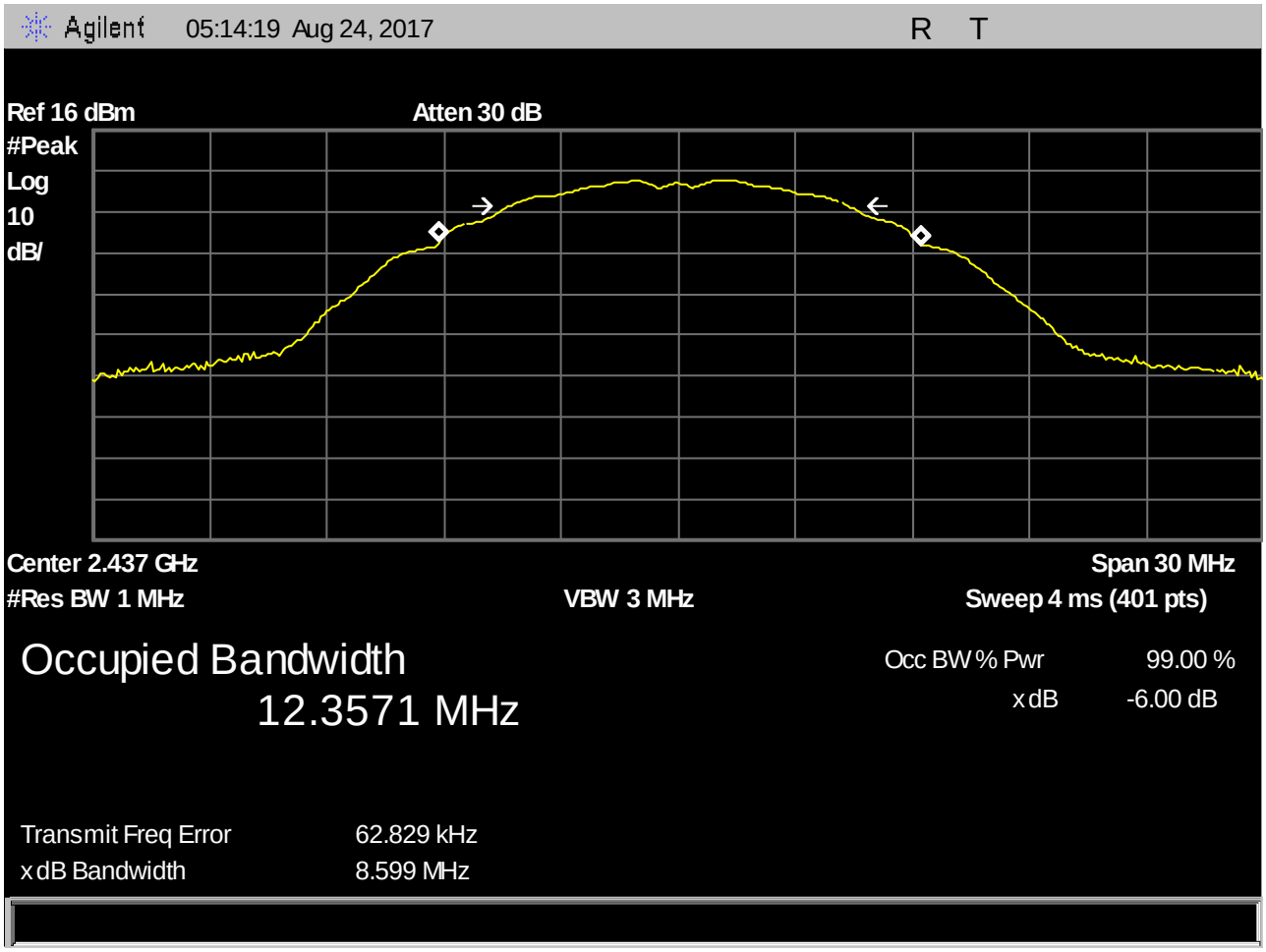
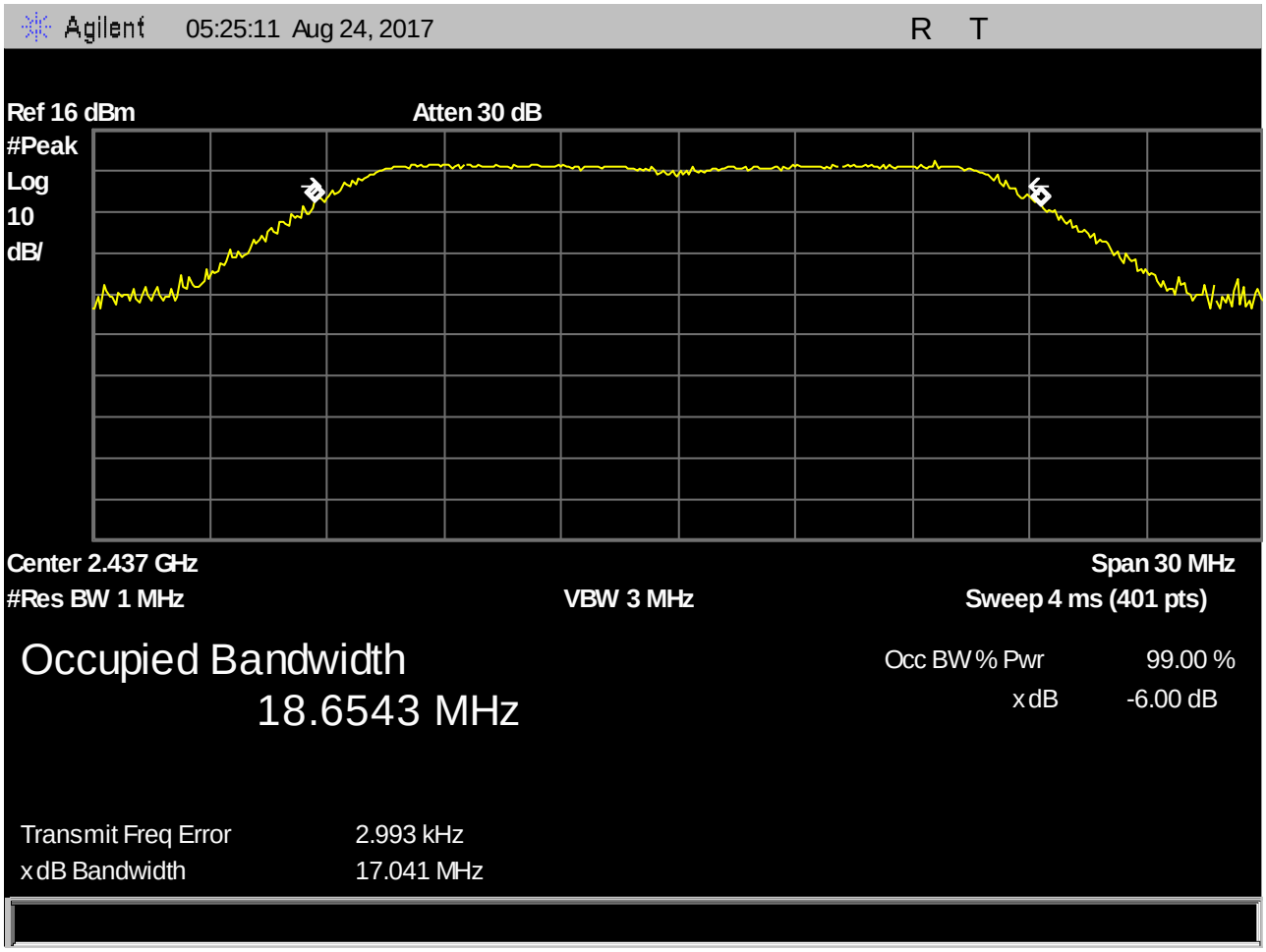


Plot 4. 6 dB Occupied Bandwidth, 2437 MHz, 20 MHz, B mode



Plot 5. 6 dB Occupied Bandwidth, 2437 MHz, 20 MHz, G mode

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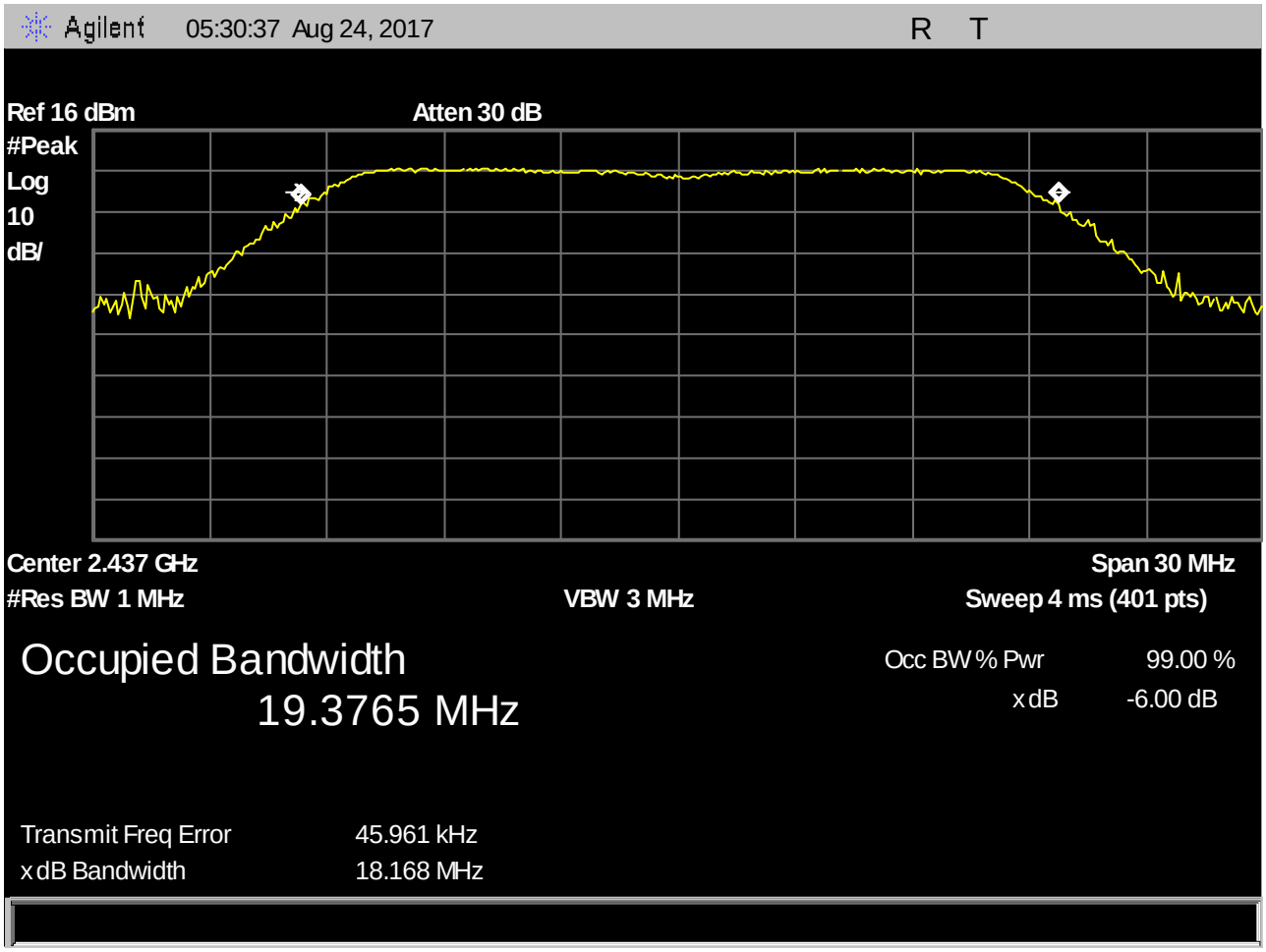

Plot 6. 6 dB Occupied Bandwidth, 2437 MHz, 20 MHz, N mode

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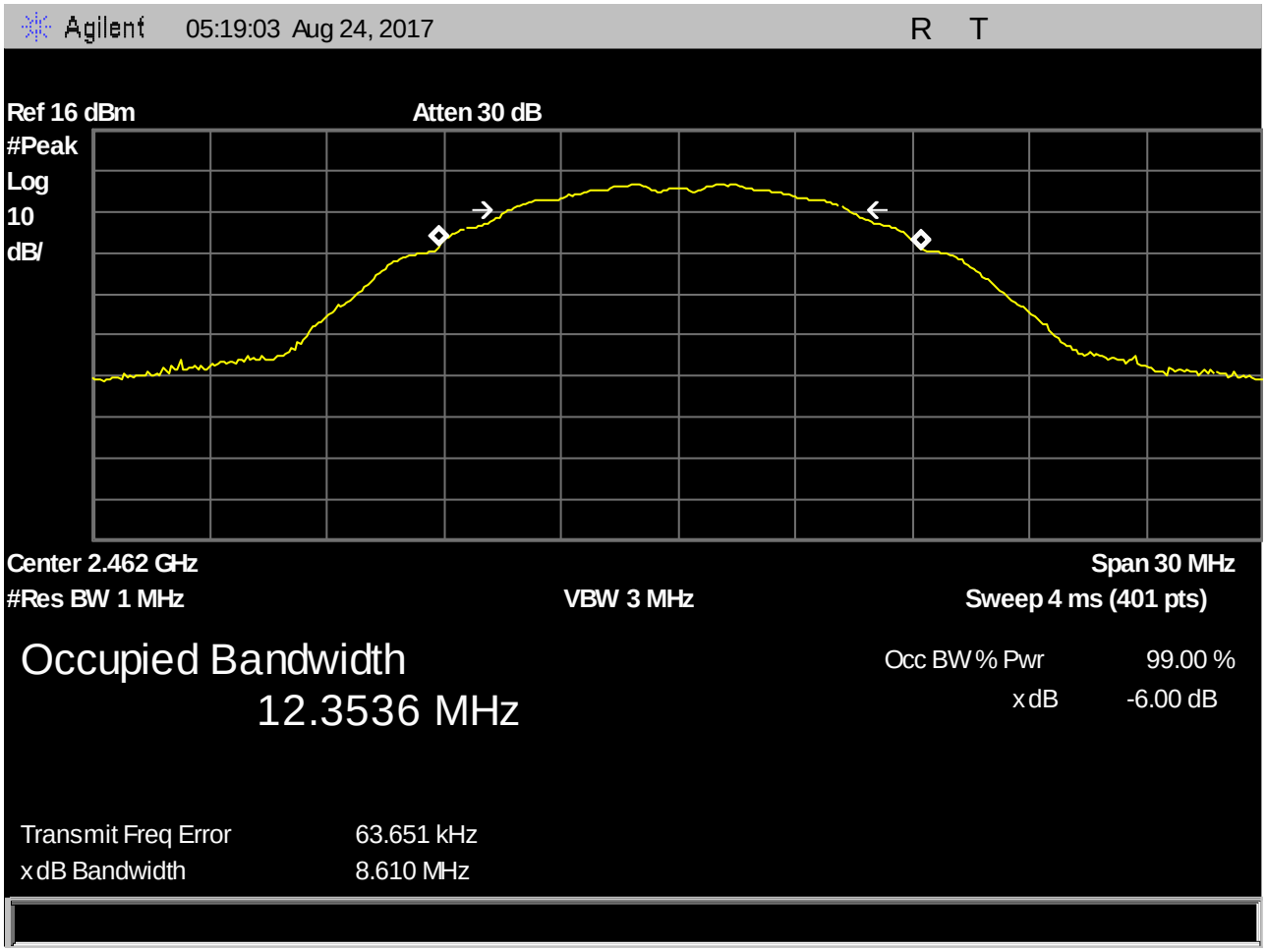

Plot 7. 6 dB Occupied Bandwidth, 2462 MHz, 20 MHz, B mode

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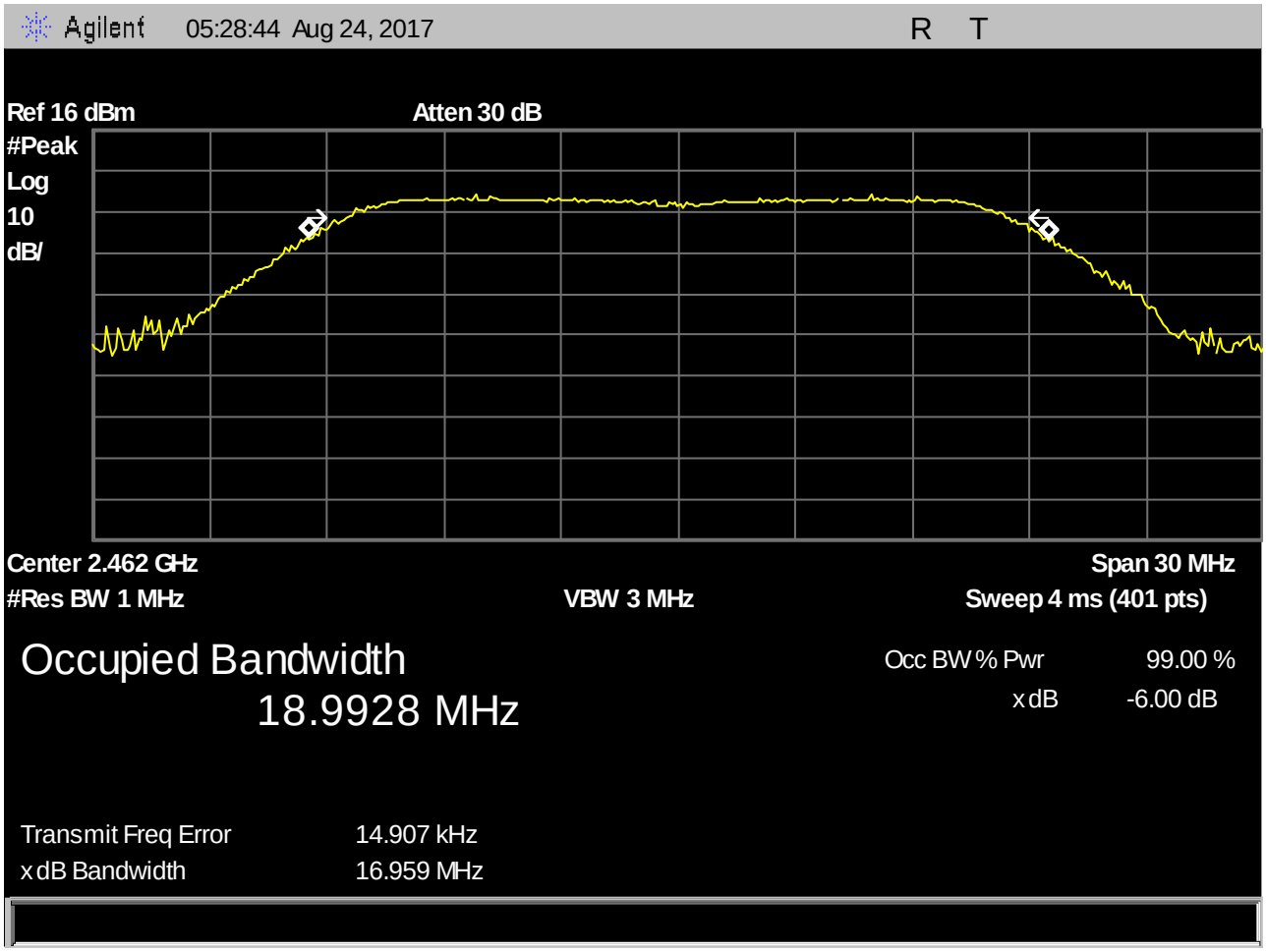

Plot 8. 6 dB Occupied Bandwidth, 2462 MHz, 20 MHz, G mode

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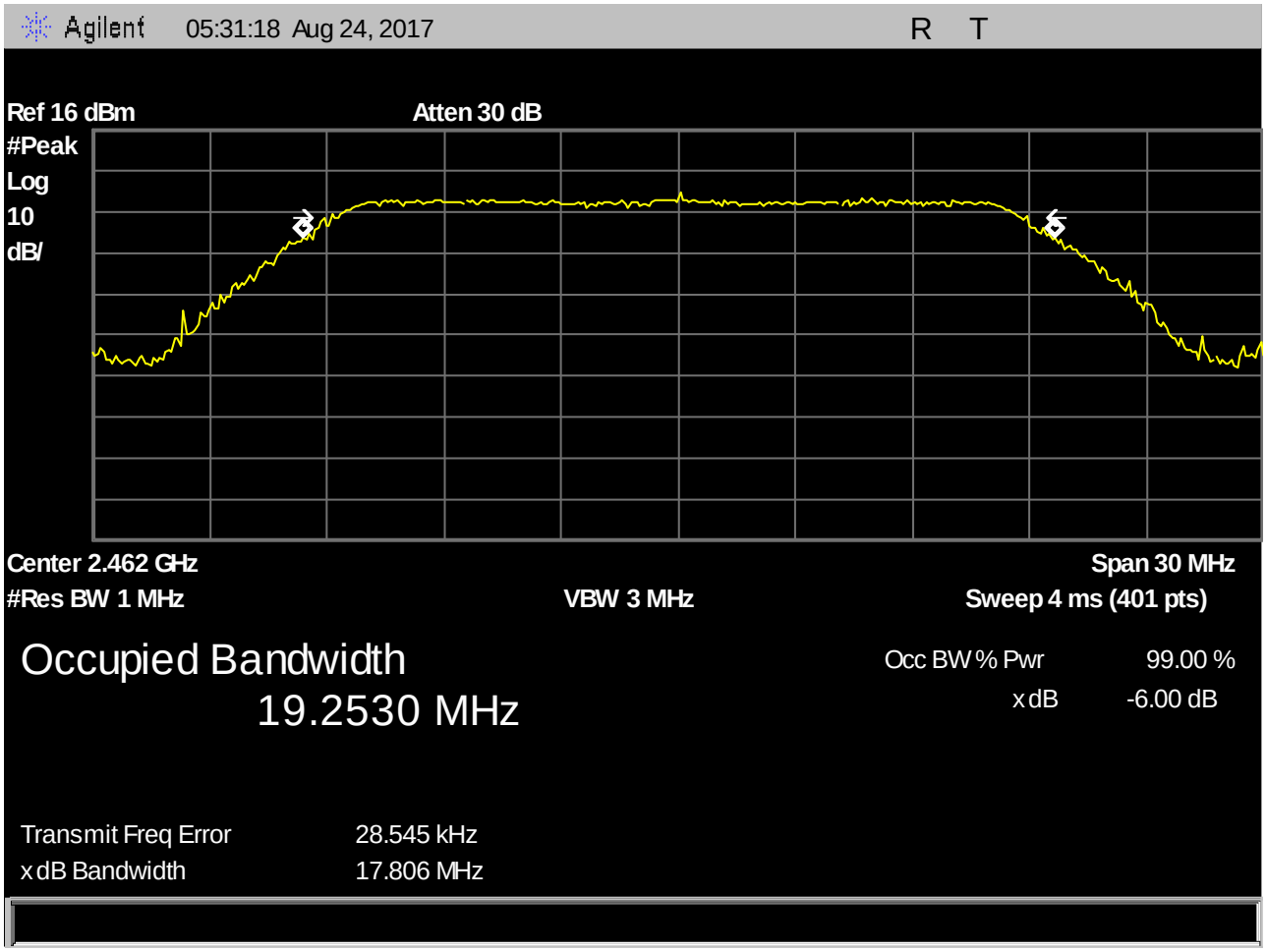

Plot 9. 6 dB Occupied Bandwidth, 2462 MHz, 20 MHz, N mode

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Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(b) Peak Power Output

Test Requirements: **§15.247(b):** The maximum peak output power of the intentional radiator shall not exceed the following:

Digital Transmission Systems (MHz)	Output Limit (Watts)
902-928	1.000
2400–2483.5	1.000
5725– 5850	1.000

Table 10. Output Power Requirements from §15.247(b)

§15.247(c): if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in the Table 10, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400 – 2483.5 MHz band and using a point to point application may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

Fixed, point-to-point operation excludes the use of point-to-multipoint systems, Omni-directional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

Test Procedure: The transmitter was connected to a calibrated spectrum analyzer. The EUT was measured at the low, mid and high channels of each band at the maximum power level.

Test Results: The EUT was compliant with the Peak Power Output limits of **§15.247(b)**. Only data for N mode 40 MHz Channels was included. The data rate used yielded the worst case.

Test Engineer(s): Deepak Giri

Test Date(s): August 25, 2017

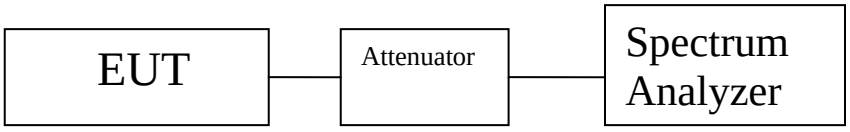

Figure 3. Peak Power Output Test Setup

Peak Power Output Test Results

Frequency MHz	Mode	Data Rate	Bandwidth MHz	Power dBm	Limit dBm
2412	B	Long 1 Mbps	20	9.1	30
2437				9.62	30
2462				8.03	30
2412	G	6 Mbps	20	4.52	30
2437				10.31	30
2462				2.23	30
2412	N	MCS 0	20	3.58	30
2437				10.12	30
2462				2.57	30
2422			40	7.62	30
2437				9.78	30
2452				7.15	30

Table 11. Peak Power Output, Test Results

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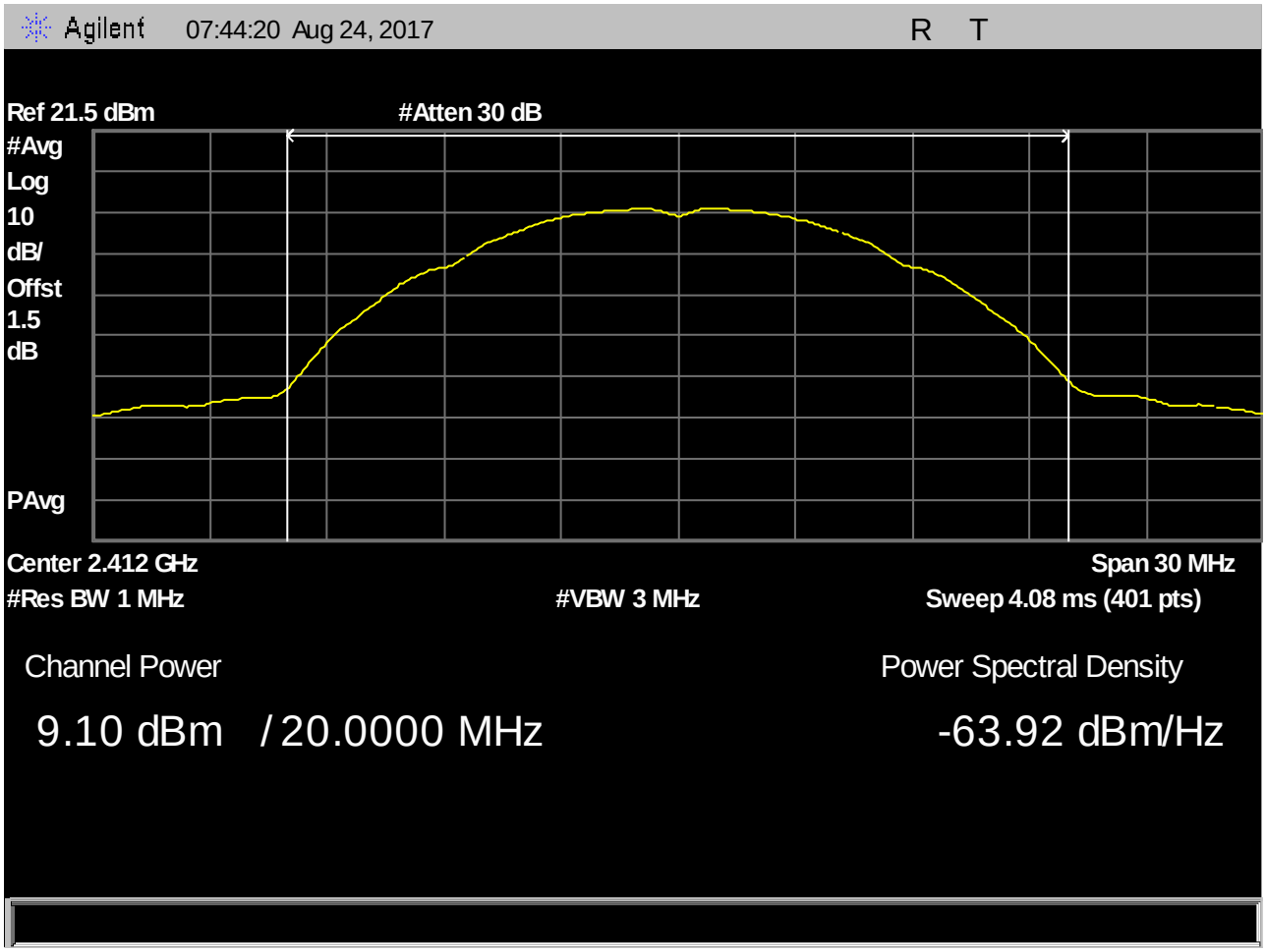
Peak Power Output Test Results



Plot 10. Peak Power Output, 2412 MHz, 20 MHz, B mode

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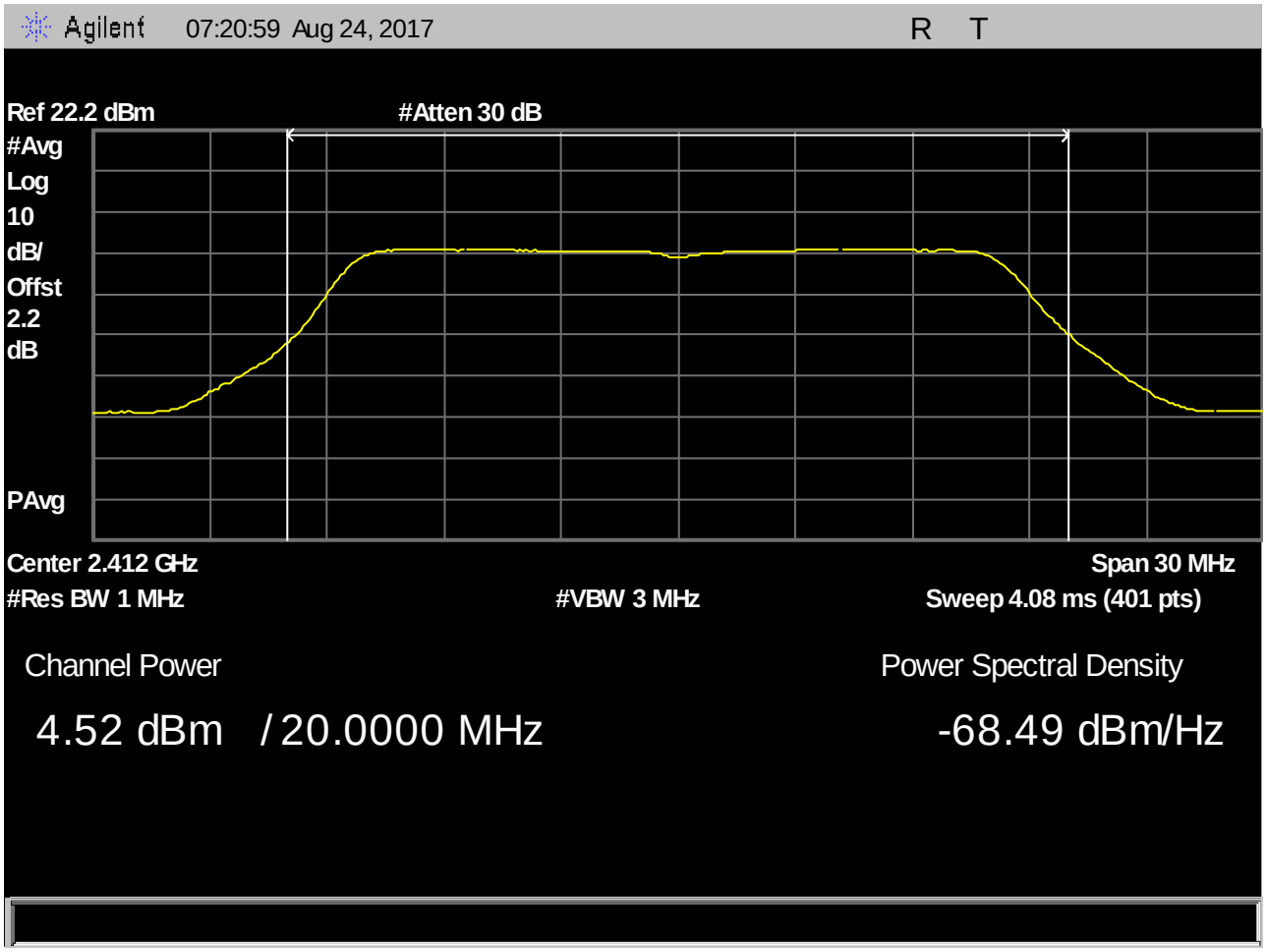
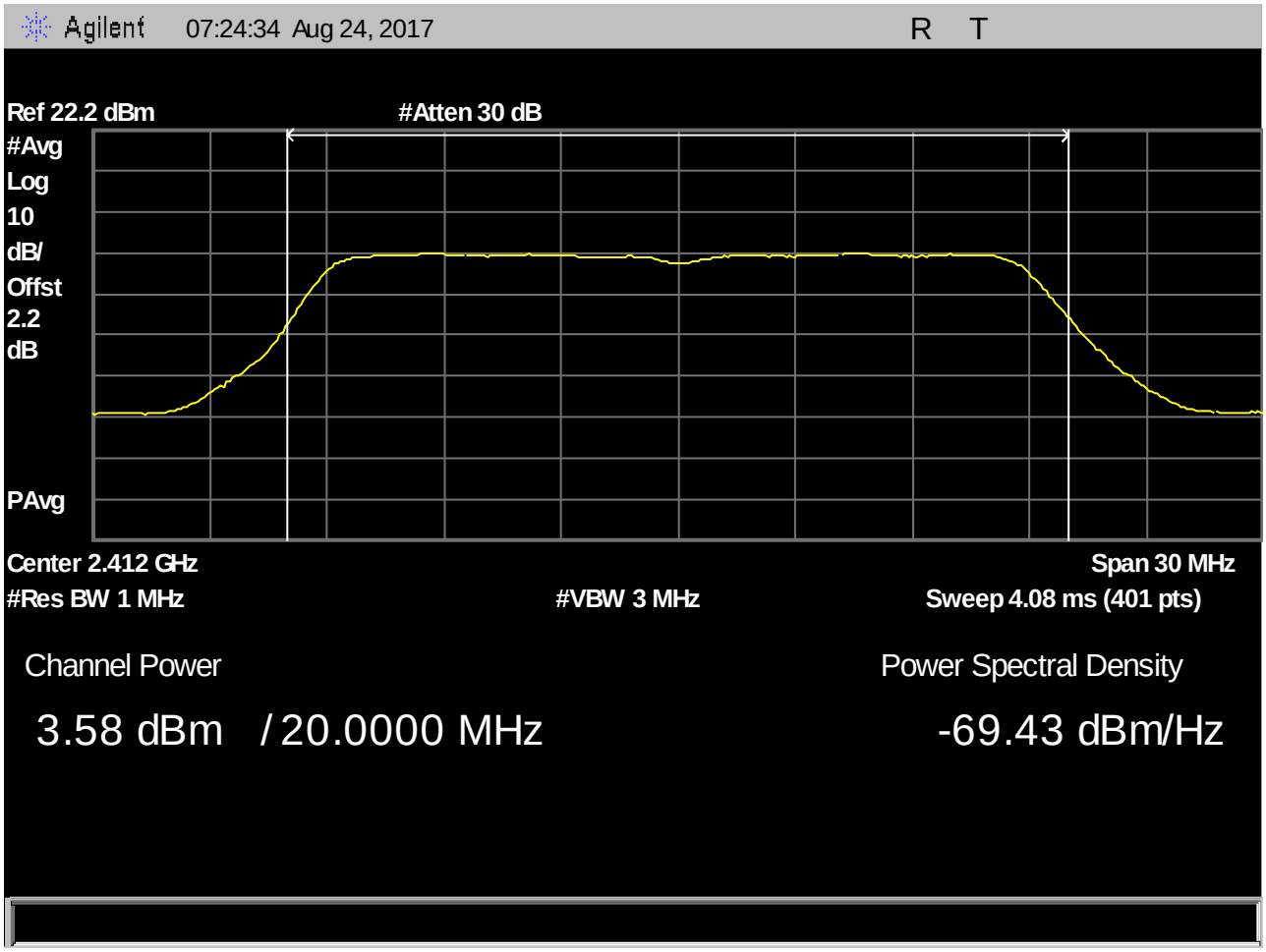
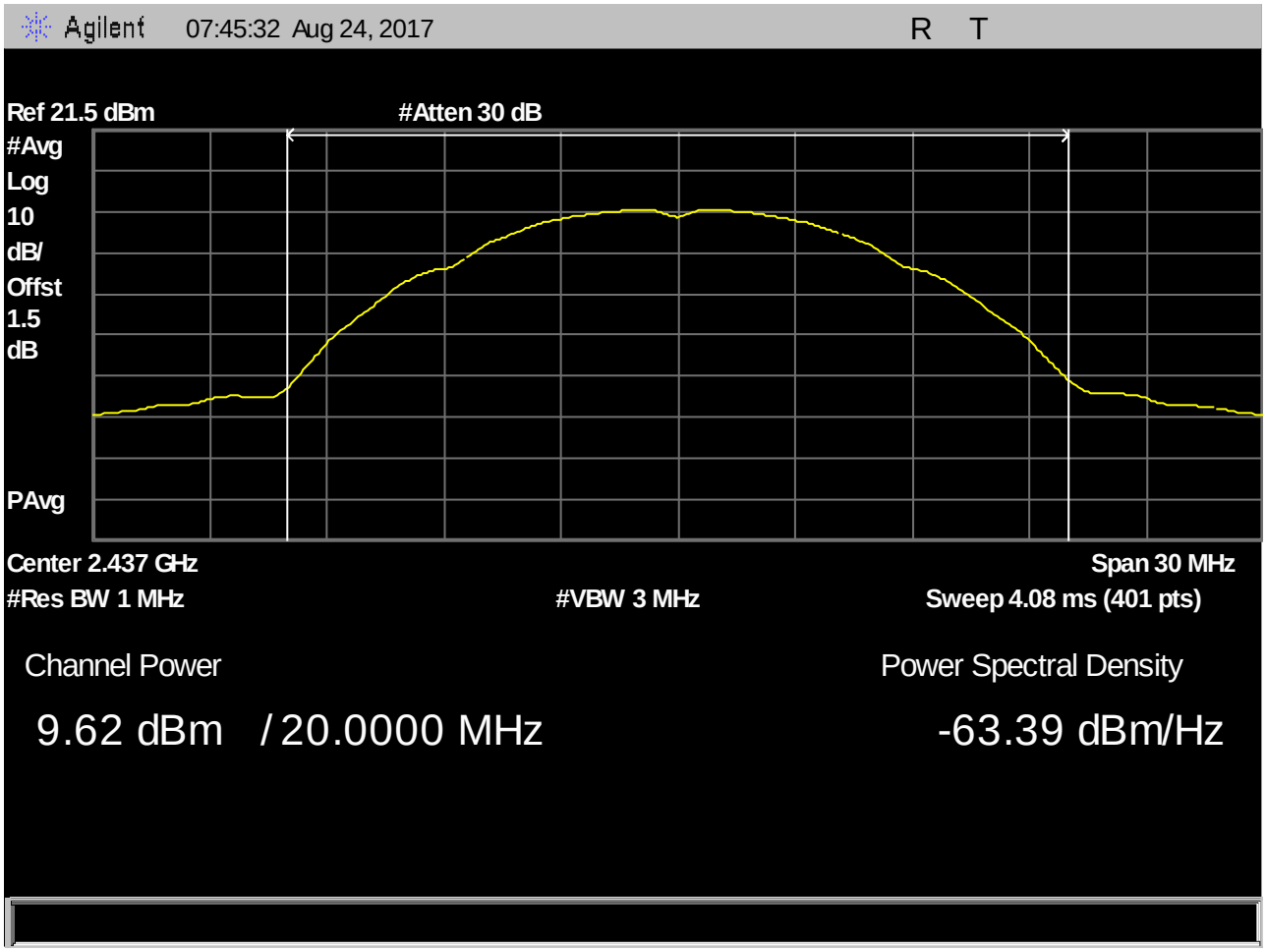


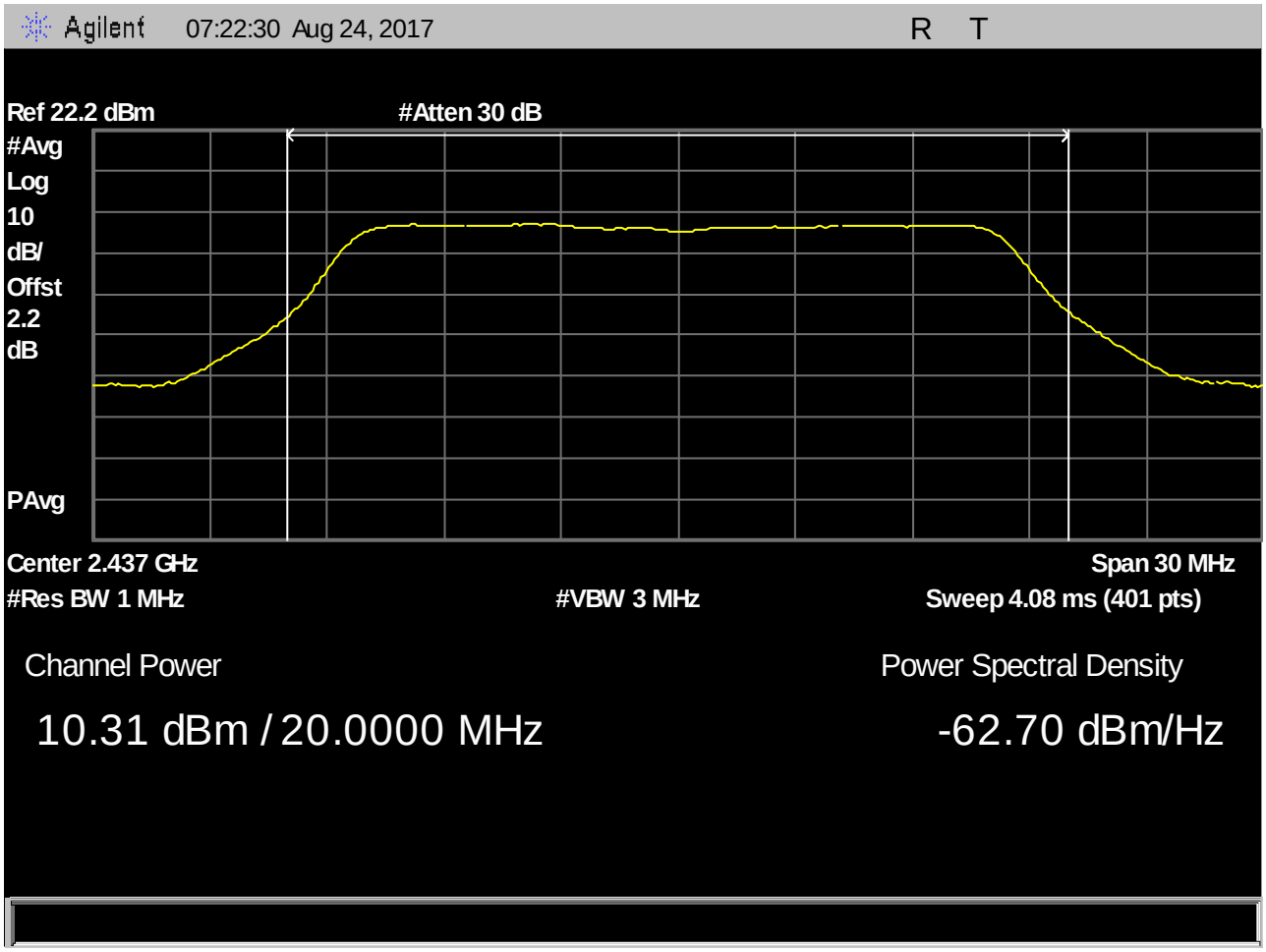
Plot 11. Peak Power Output, 2412 MHz, 20 MHz, G mode



Plot 12. Peak Power Output, 2412 MHz, 20 MHz, N mode



Plot 13. Peak Power Output, 2437 MHz, 20 MHz, B mode



Plot 14. Peak Power Output, 2437 MHz, 20 MHz, G mode

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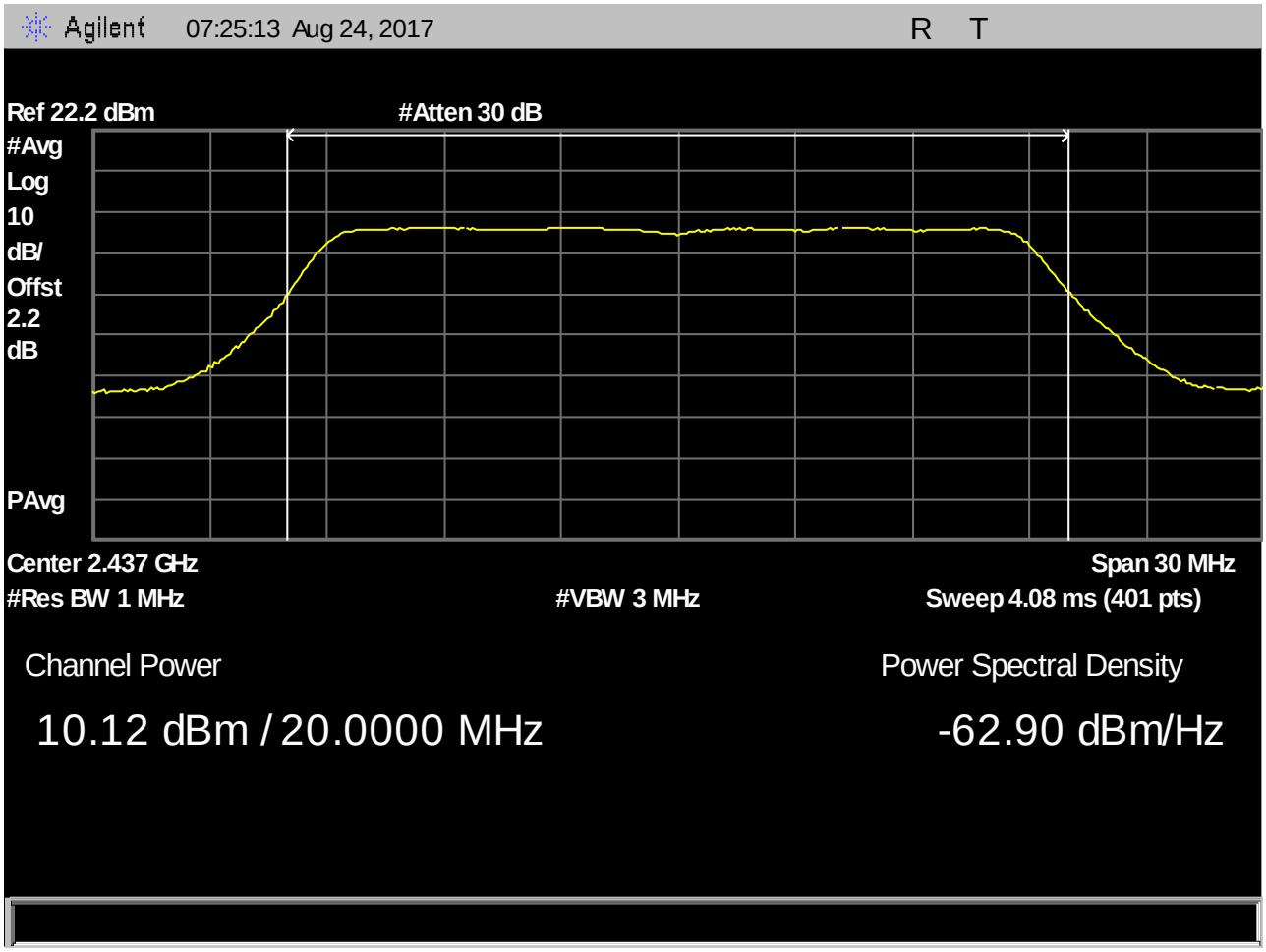
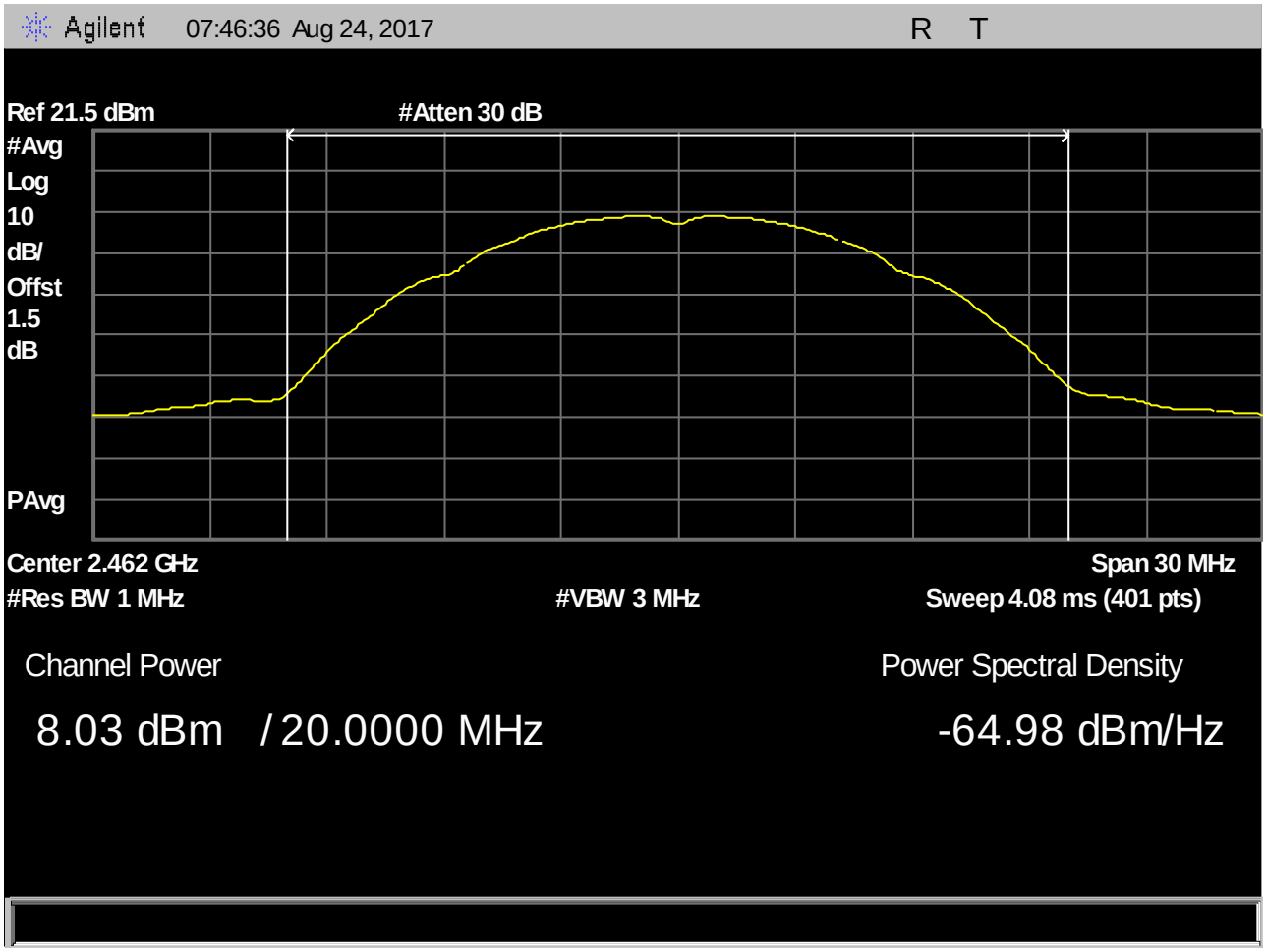
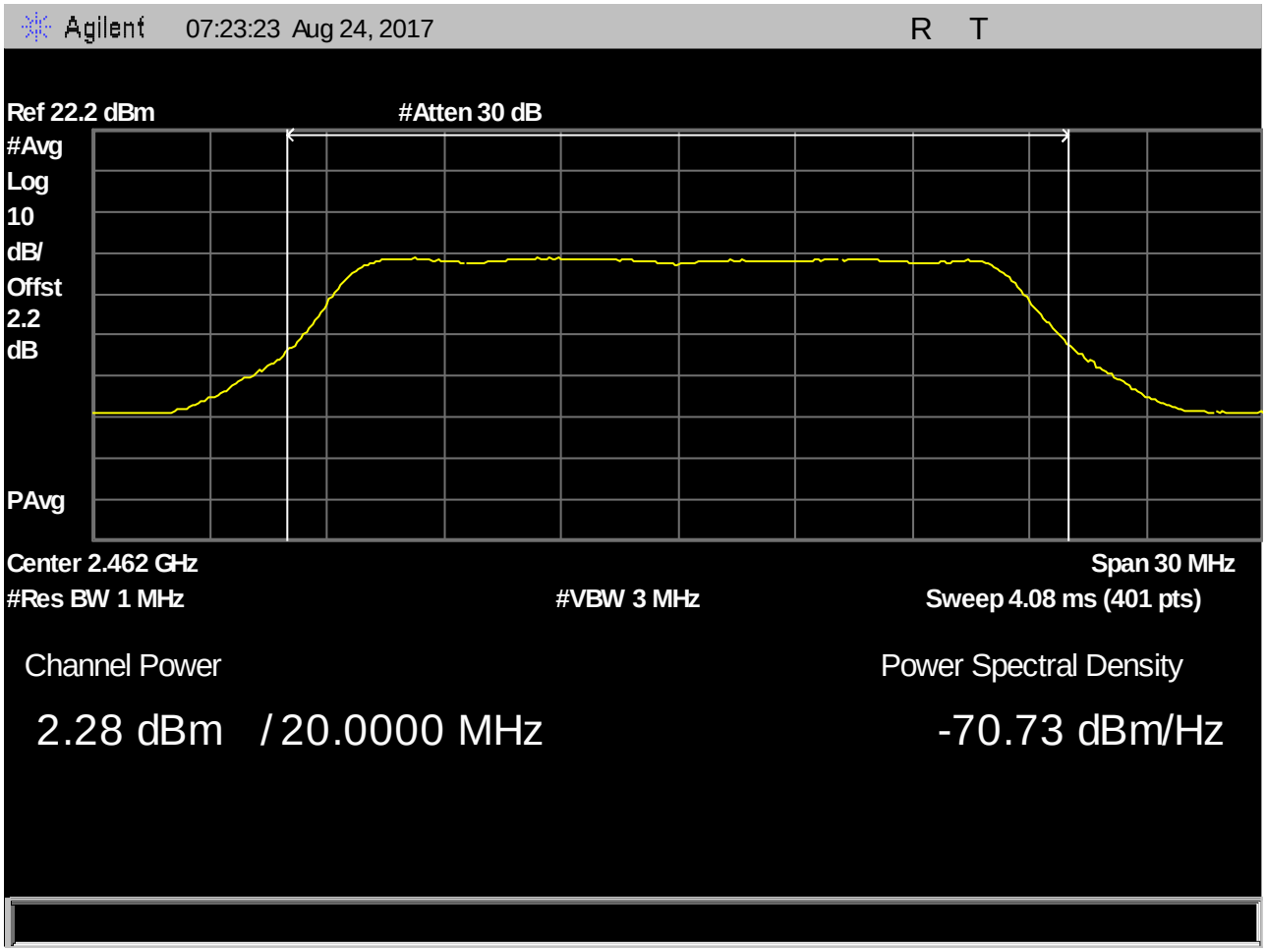


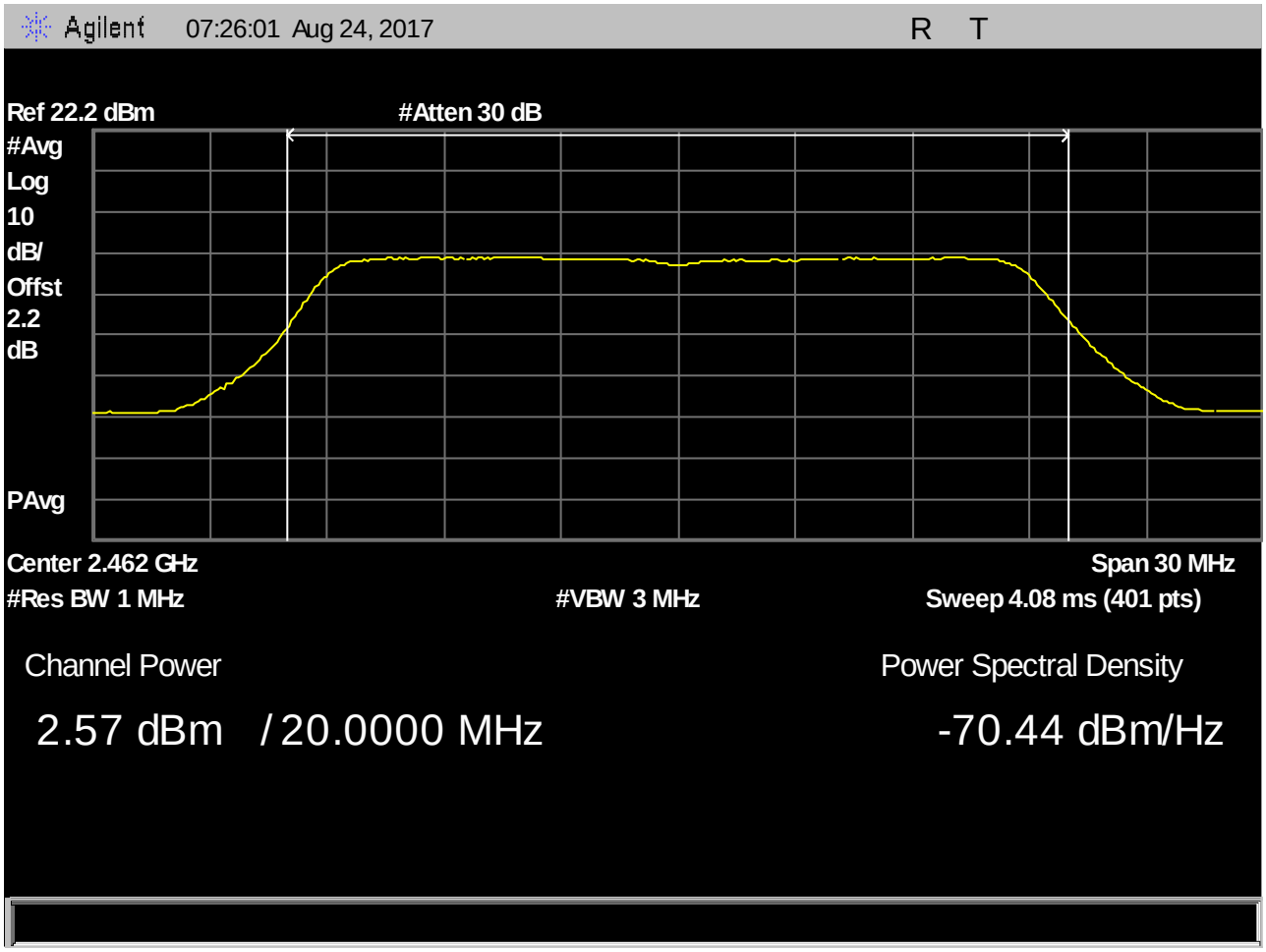
Plot 15. Peak Power Output, 2437 MHz, 20 MHz, N mode



Plot 16. Peak Power Output, 2462 MHz, 20 MHz, B mode



Plot 17. Peak Power Output, 2462 MHz, 20 MHz, G mode



Plot 18. Peak Power Output, 2462 MHz, 20 MHz, N mode

Duty Cycle:

Frequency MHz	Mode	ON Time ms	Period ms	Duty Cycle
2412	B	8.20	8.40	0.98
2412	G	1.36	1.58	0.86
2462	N	1.27	1.48	0.86

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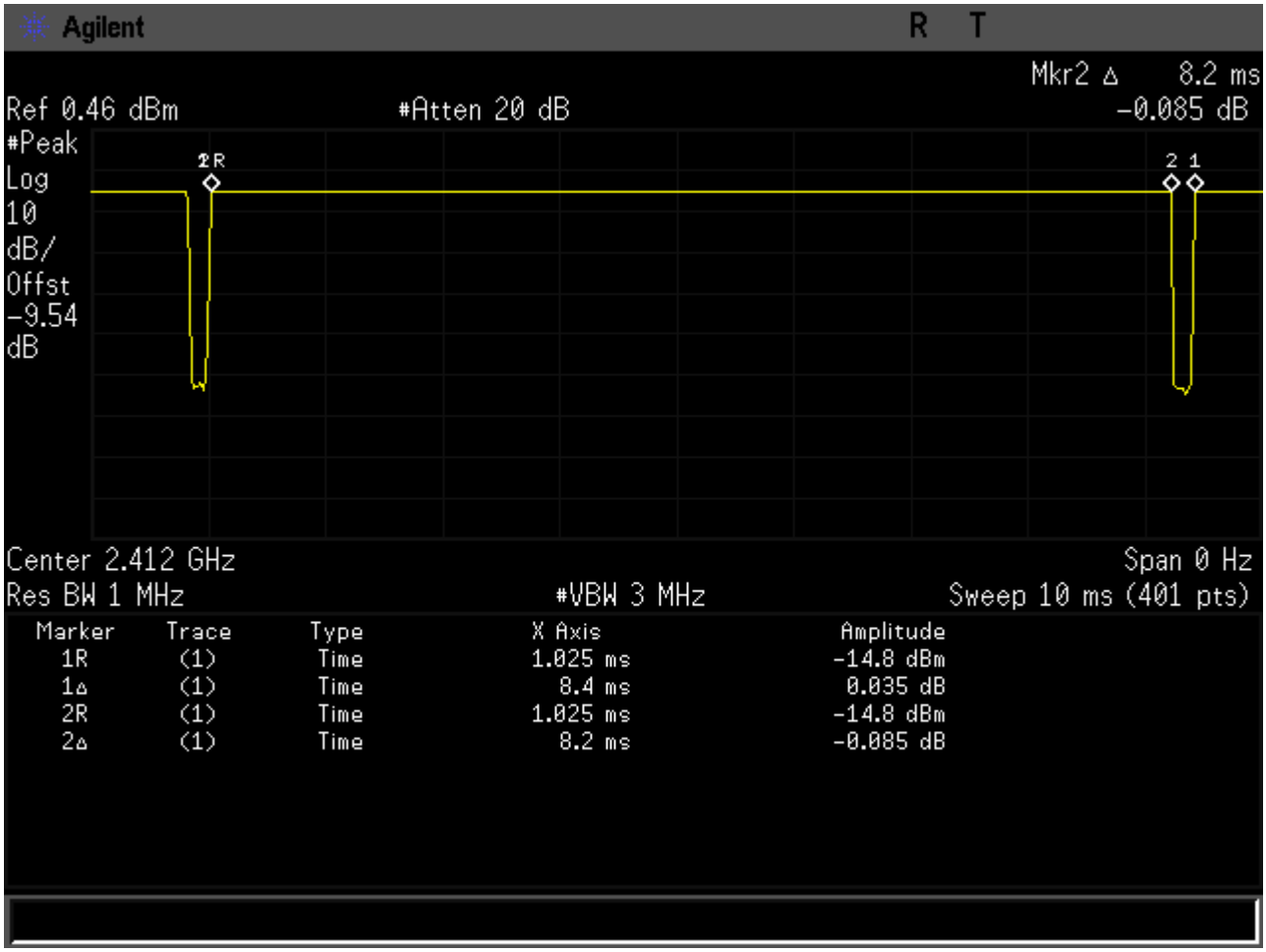

Plot 19. Duty Cycle B mode

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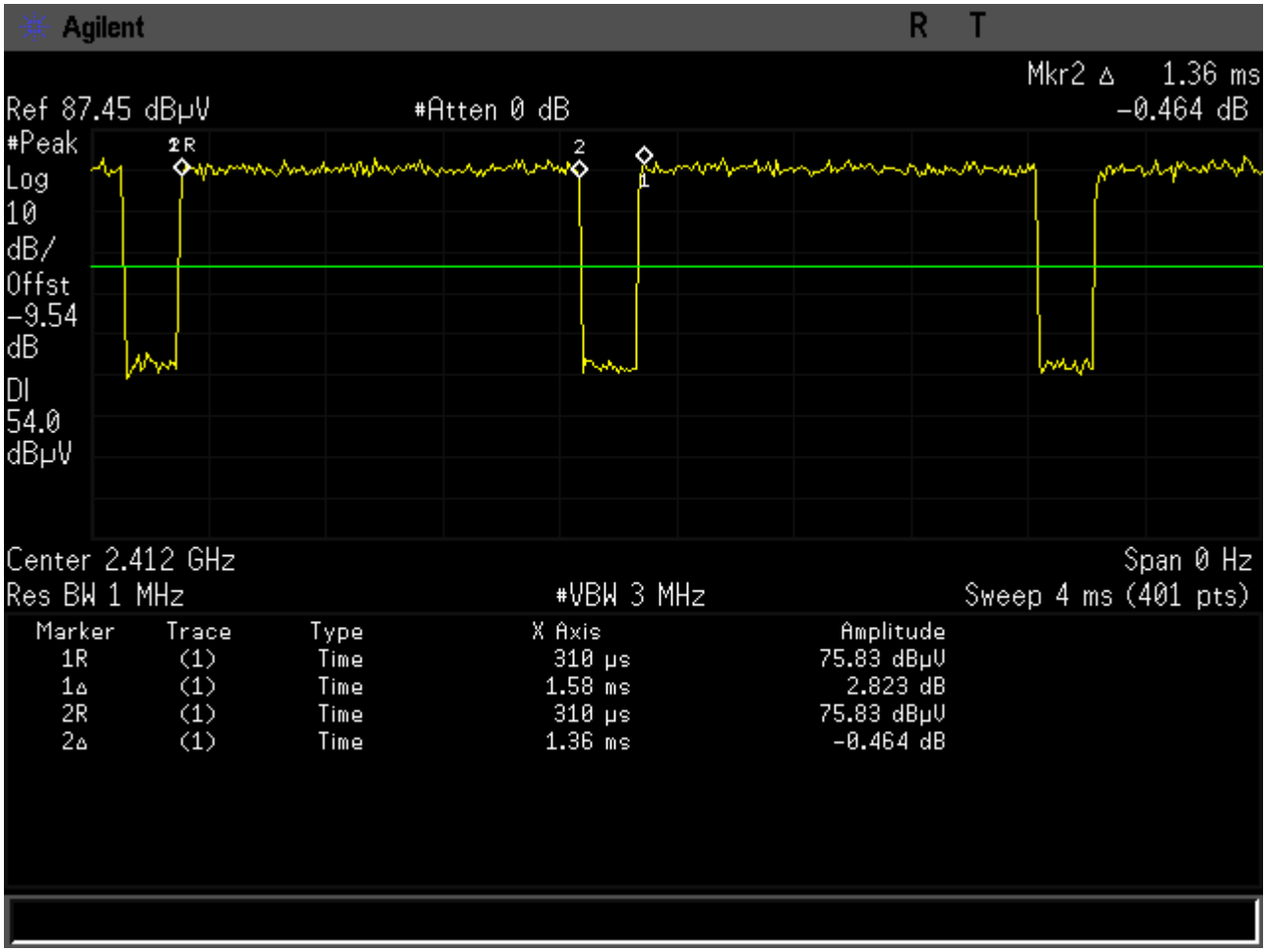

Plot 20. Duty Cycle G mode

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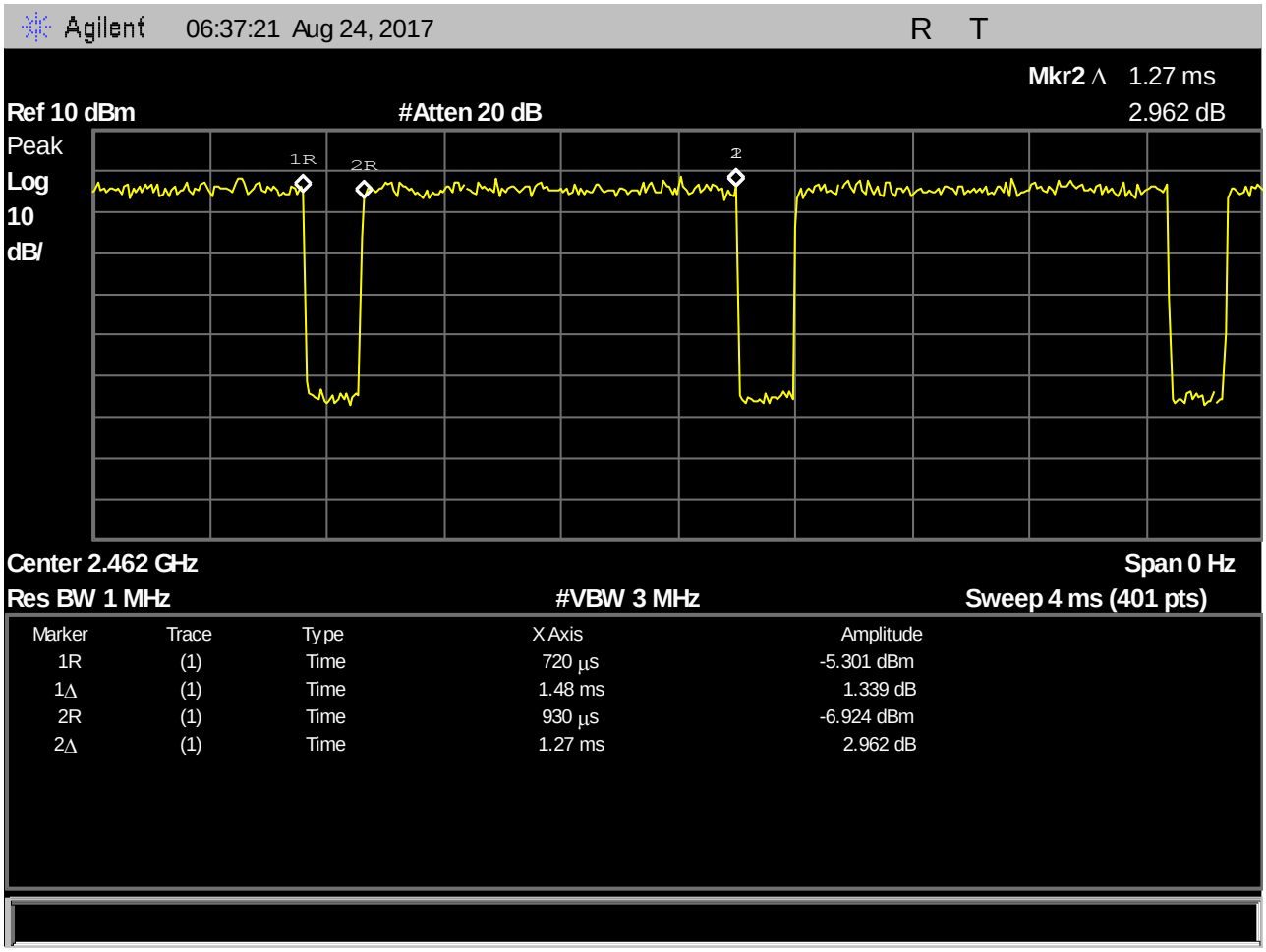

Plot 21. Duty Cycle N mode

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Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) Radiated Spurious Emissions Requirements and Band Edge

Test Requirements: **§15.247(d); §15.205:** Emissions outside the frequency band.

§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. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a).

§15.205(a): Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090–0.110----------	16.42–16.423	399.9–410	4.5–5.15
[1] 0.495–0.505----------	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905----------	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128----------	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775----------	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775----------	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218----------	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825----------	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225----------	123–138	2200–2300	14.47–14.5
8.291–8.294----------	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366----------	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675----------	156.7–156.9	2655–2900	22.01–23.12
8.41425–8.41475----------	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293----------	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025----------	240–285	3345.8–3358 36.	43–36.5
12.57675–12.57725----------	322–335.4	3600–4400	([2])

Table 12. Restricted Bands of Operation

[1] Until February 1, 1999, this restricted band shall be 0.490 – 0.510 MHz.
[2] Above 38.6

Test Requirement(s): **§ 15.209 (a):** Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in Table 13.

Frequency (MHz)	§ 15.209(a),Radiated Emission Limits (dBµV) @ 3m
30 - 88	40.00
88 - 216	43.50
216 - 960	46.00
Above 960	54.00

Table 13. Radiated Emissions Limits Calculated from FCC Part 15, § 15.209 (a)

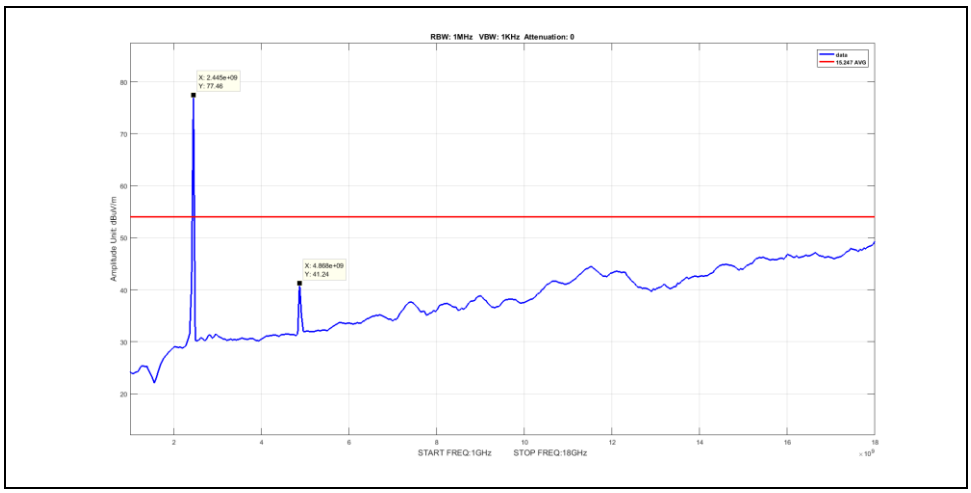
Test Procedures: The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line. Only noise floor was measured above 18 GHz and below 30 MHz.

Test Results: The EUT was compliant with the Radiated Spurious Emission limits of **§ 15.247(d)**. Only noise was observed above 18 GHz and below 30 Mhz. Emissions close to limit by 20dB were investigated with respective detectors. Data presented in this report only represents the worst case.

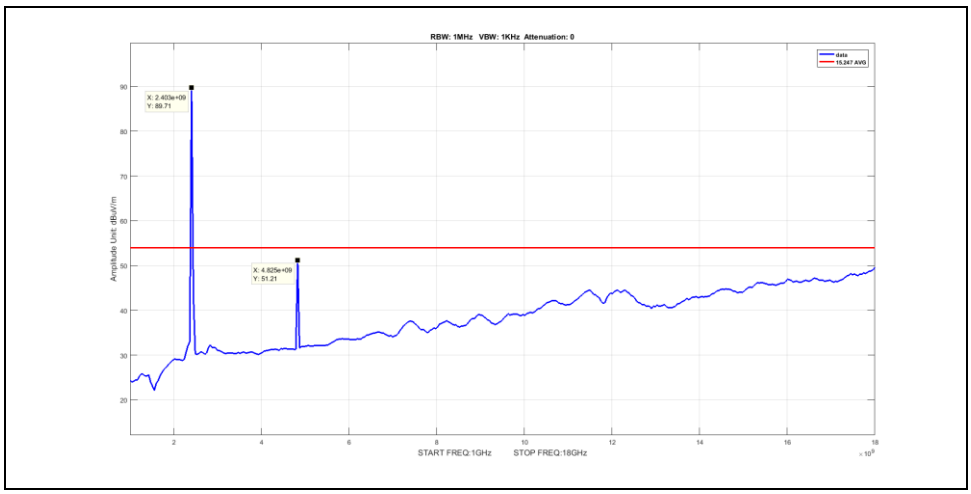
Test Engineer(s): Deepak Giri

Test Date(s): August 25, 2017

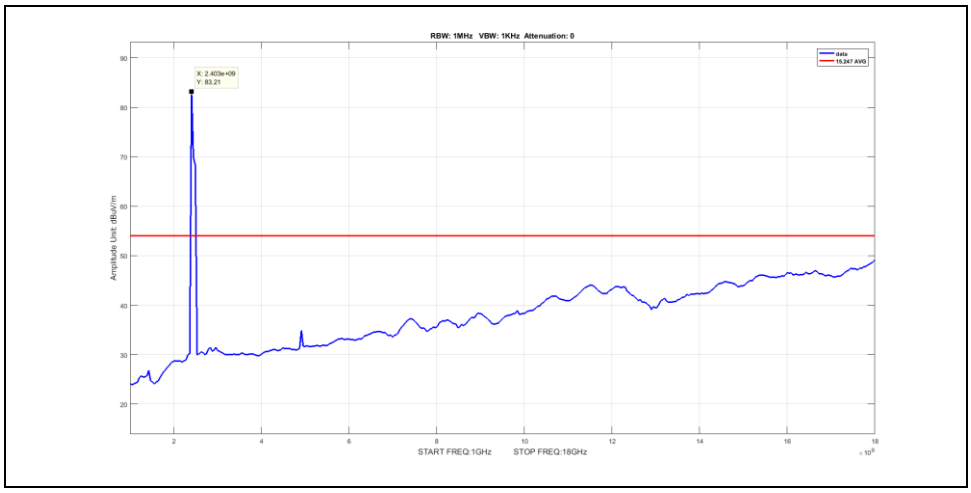
Radiated Spurious Emissions Test Results



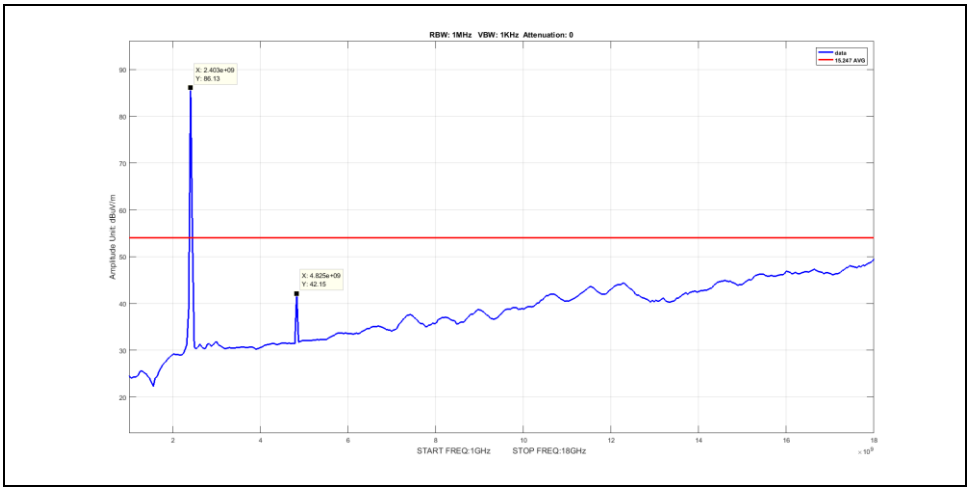
Plot 22. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2347M, N Mode



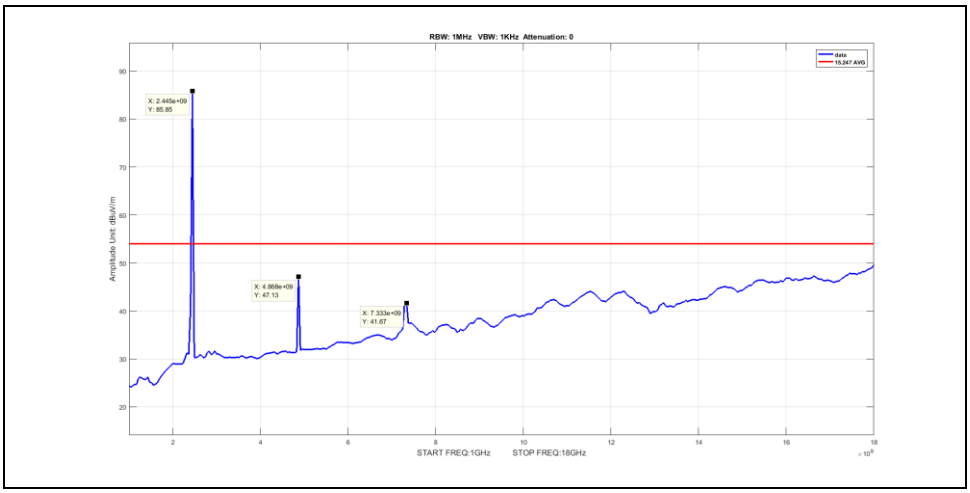
Plot 23. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2412M, B Mode



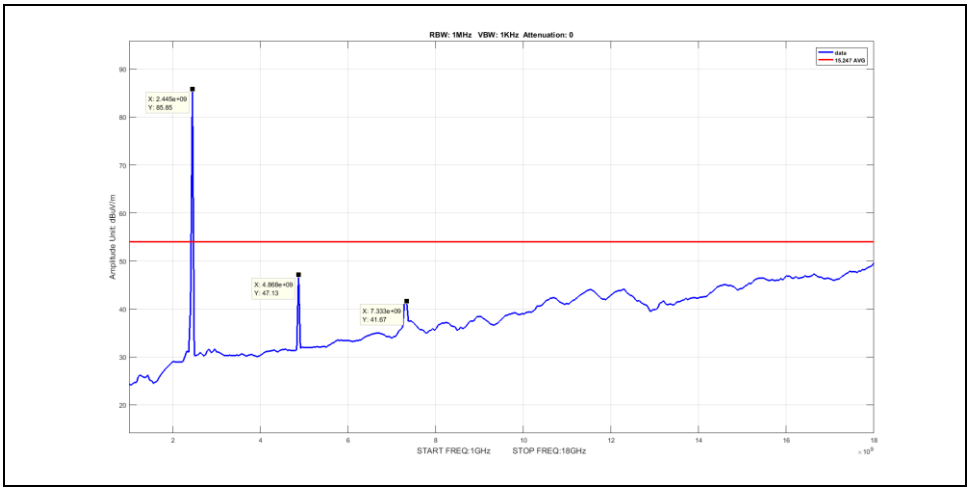
Plot 24. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2412M, G Mode



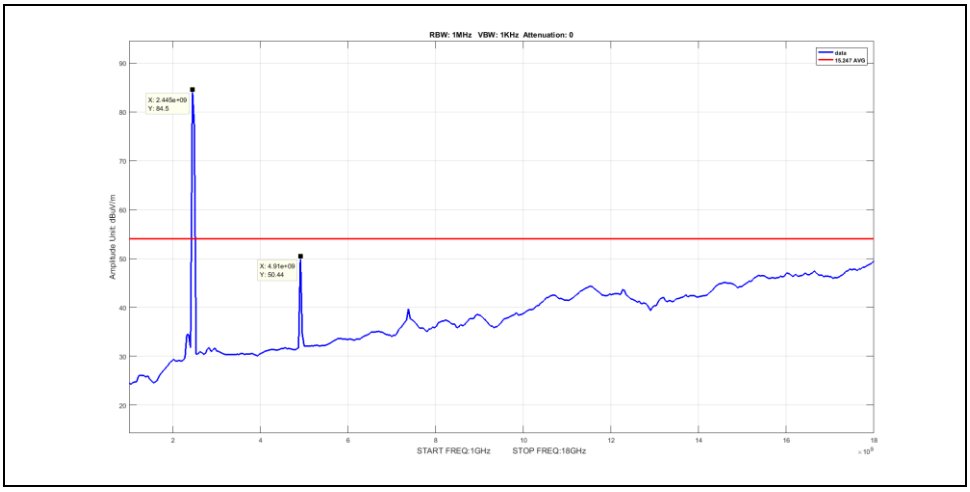
Plot 25. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2412M, N Mode



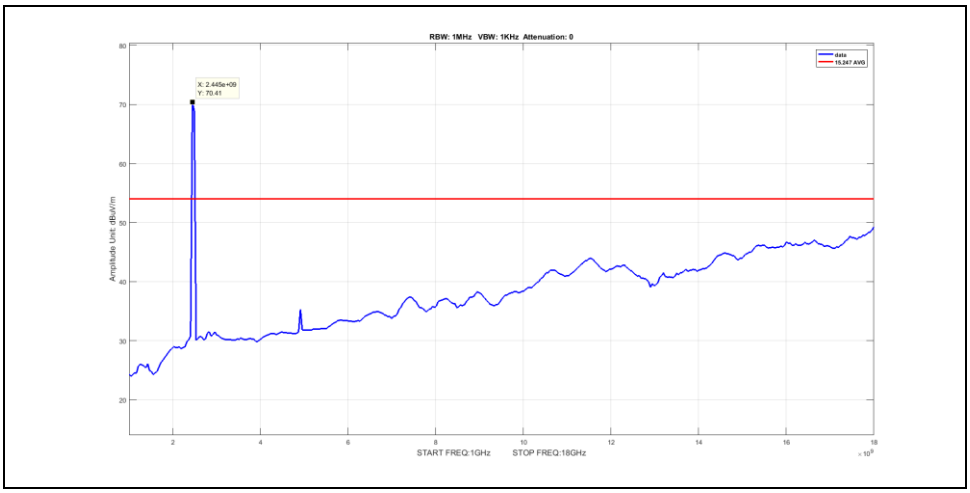
Plot 26. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2437M, B Mode



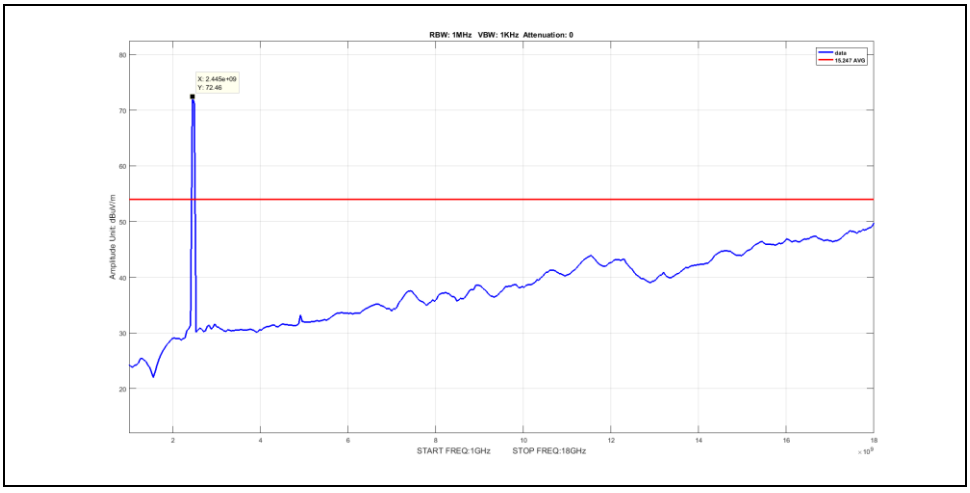
Plot 27. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2437M, G Mode



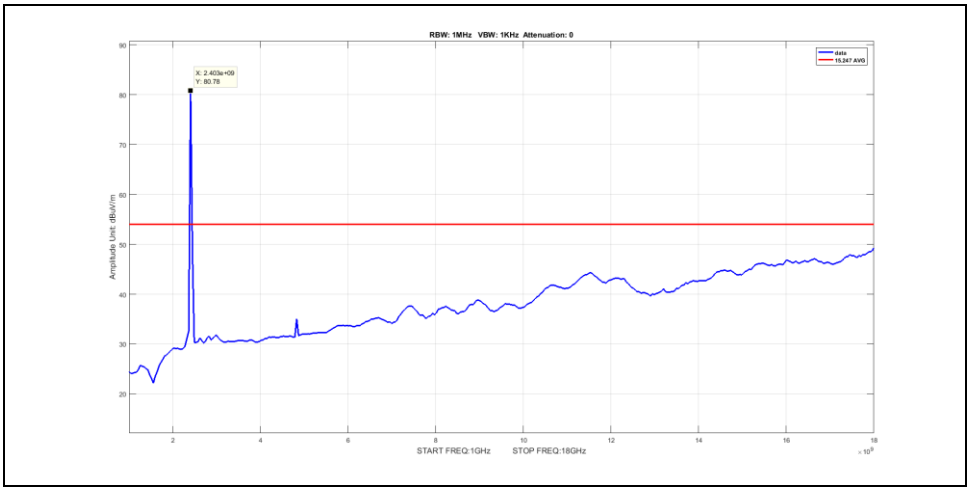
Plot 28. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2462M, B Mode



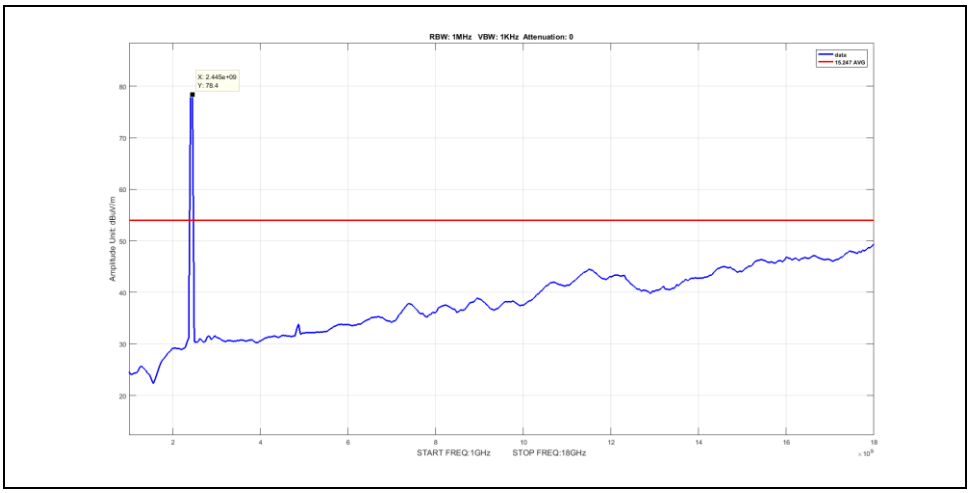
Plot 29. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2462M, G Mode



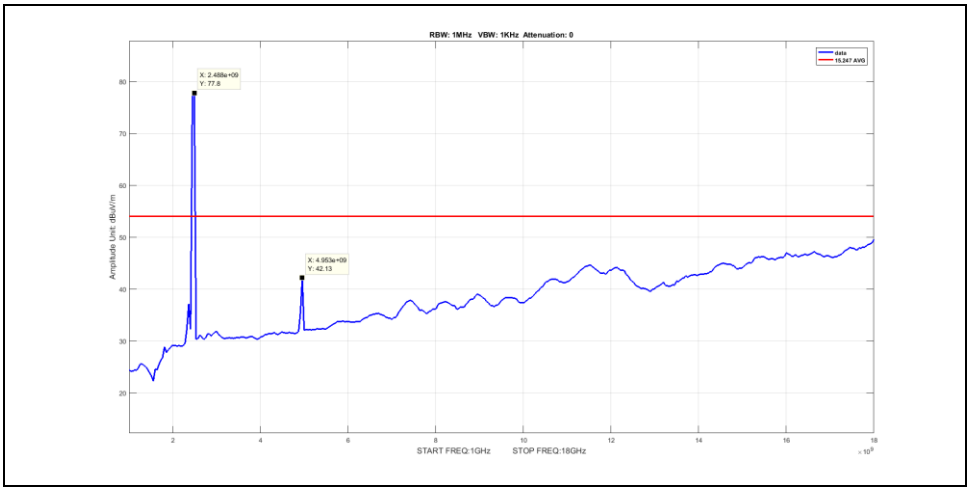
Plot 30. Average Spurious Emission, 1-18GHz, BW 20M, Ch. 2462M, N Mode



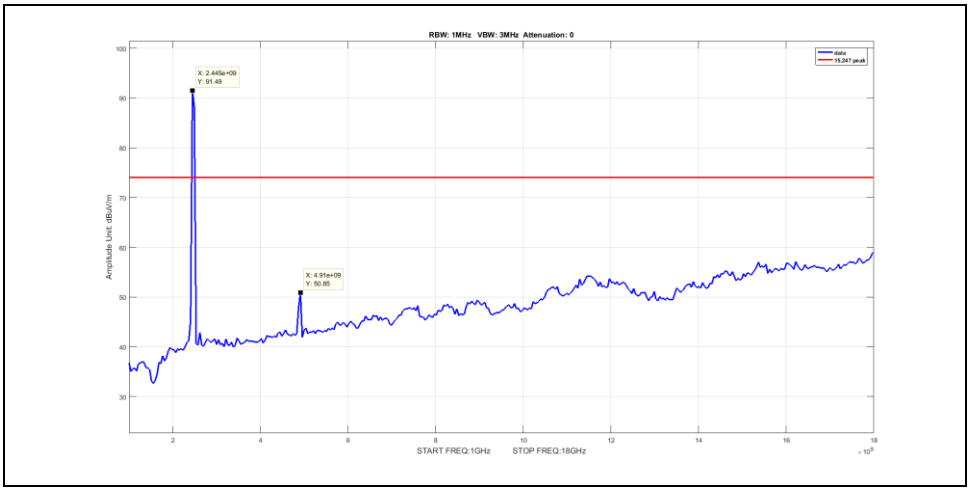
Plot 31. Average Spurious Emission, 1-18GHz, BW 40M, Ch. 2422M, N Mode



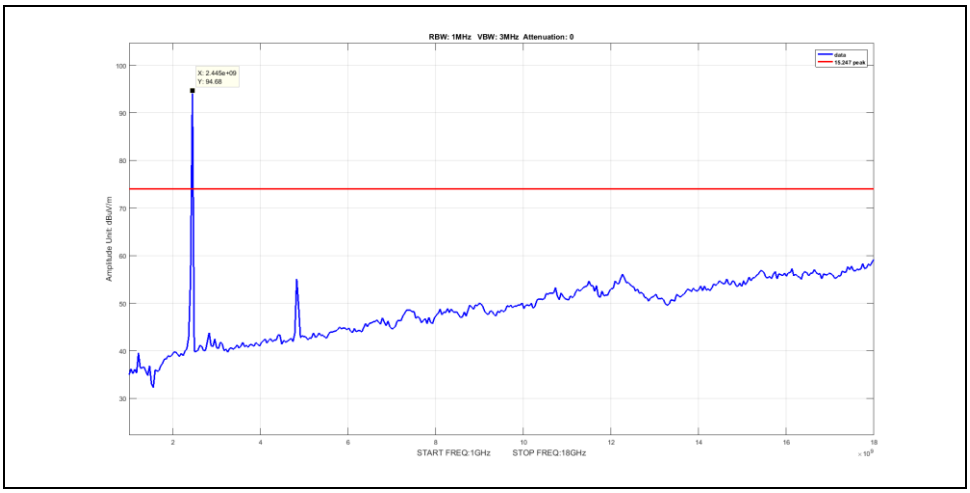
Plot 32. Average Spurious Emission, 1-18GHz, BW 40M, Ch. 2437M, N Mode



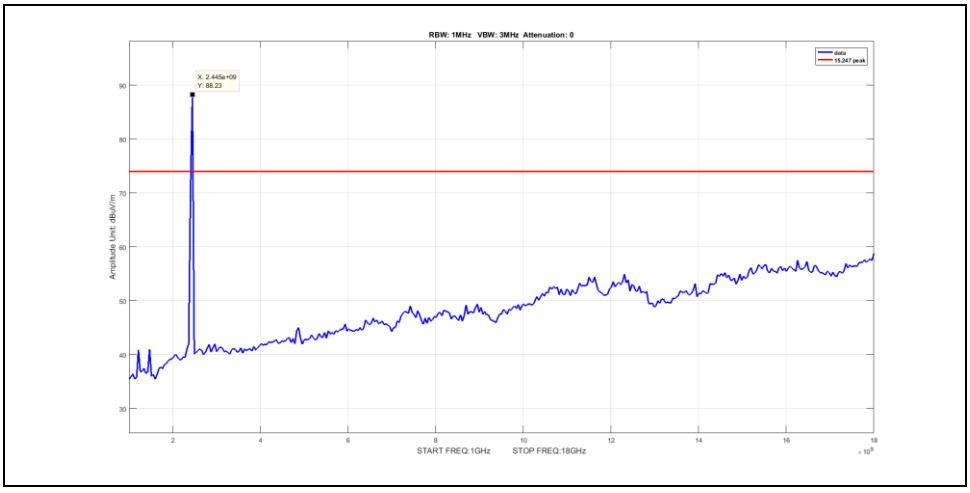
Plot 33. Average Spurious Emission, 1-18GHz, BW 40M, Ch. 2452M, N Mode



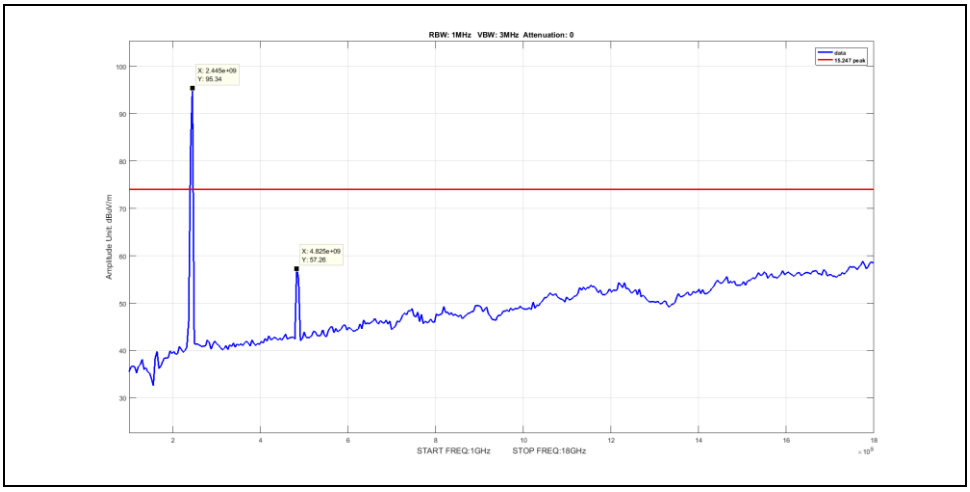
Plot 34. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2347M, N Mode



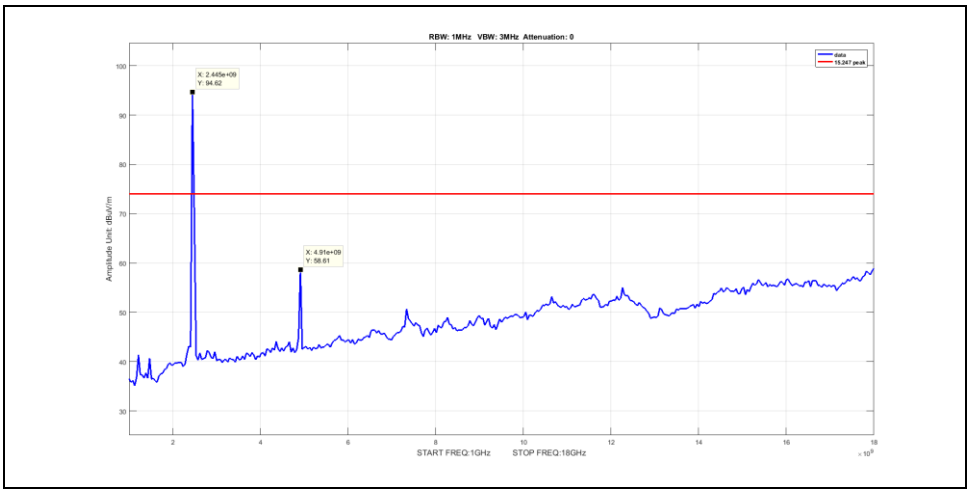
Plot 35. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2412M, B Mode



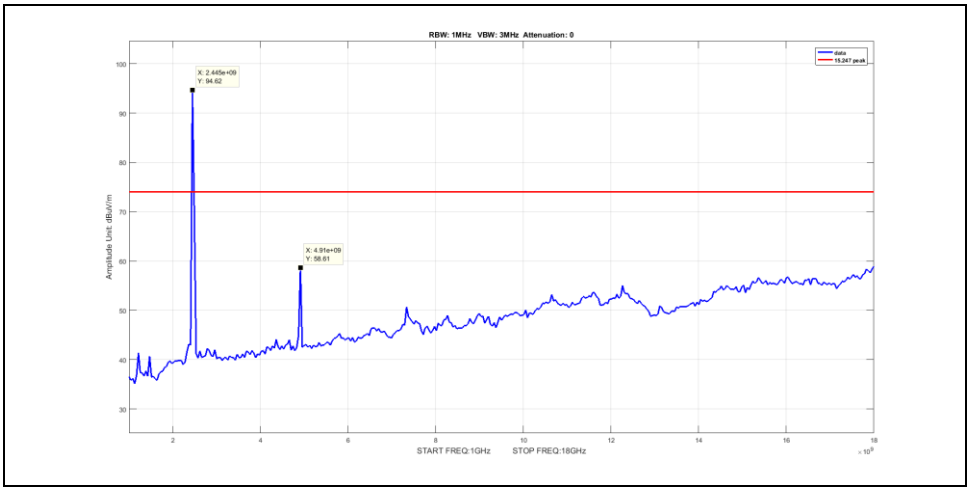
Plot 36. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2412M, G Mode



Plot 37. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2412M, N Mode



Plot 38. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2437M, B Mode



Plot 39. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2437M, G Mode

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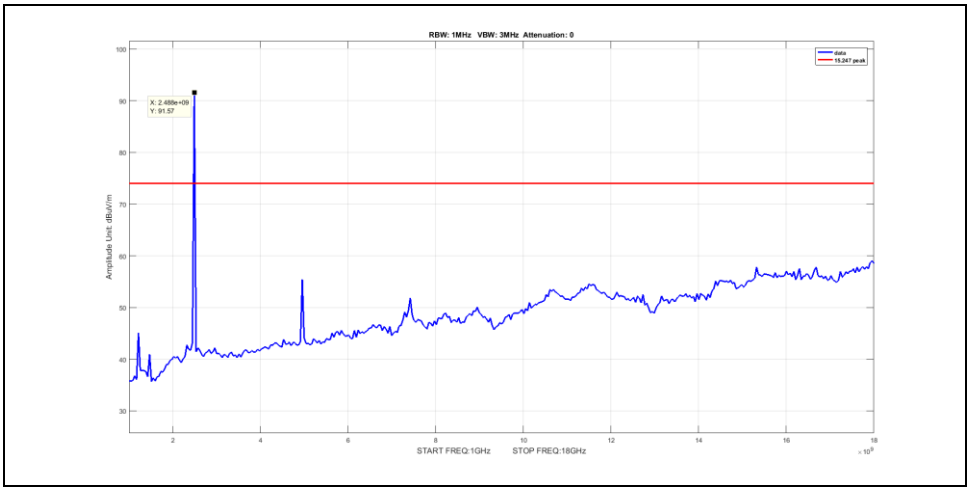
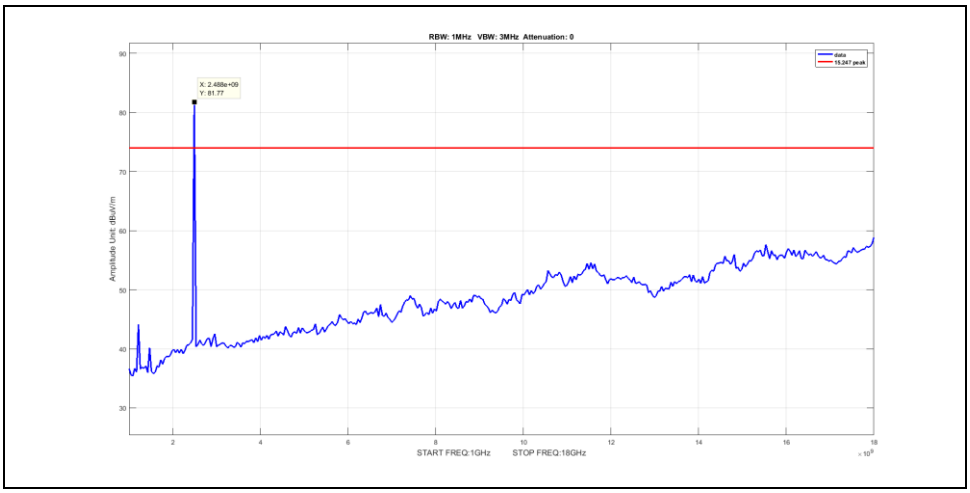
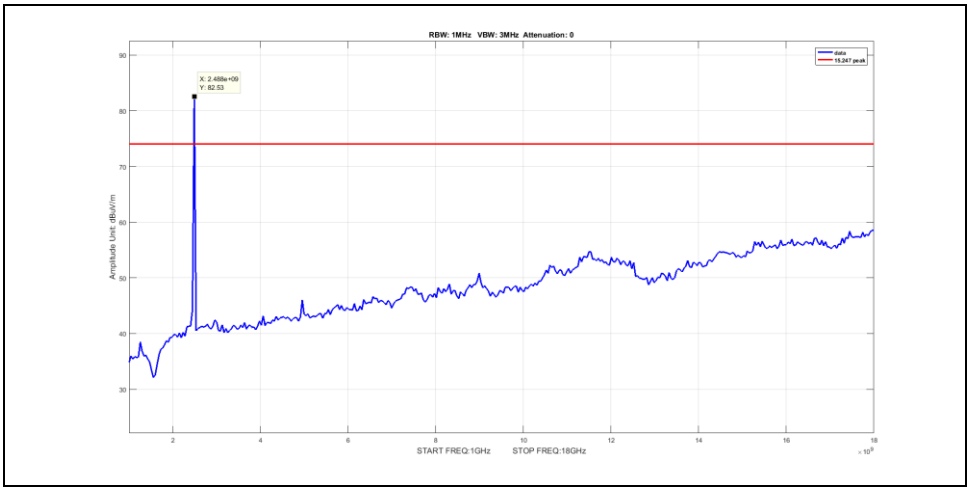


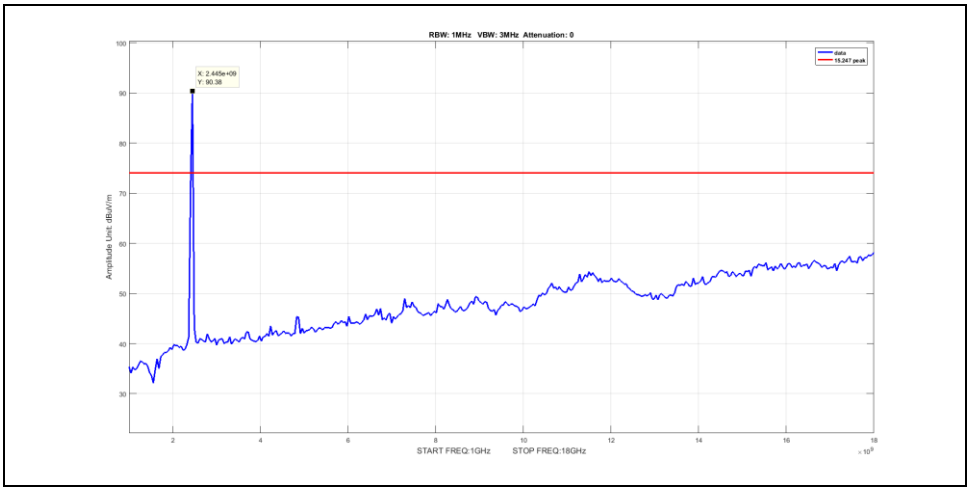
Plot 40. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2462M, B Mode



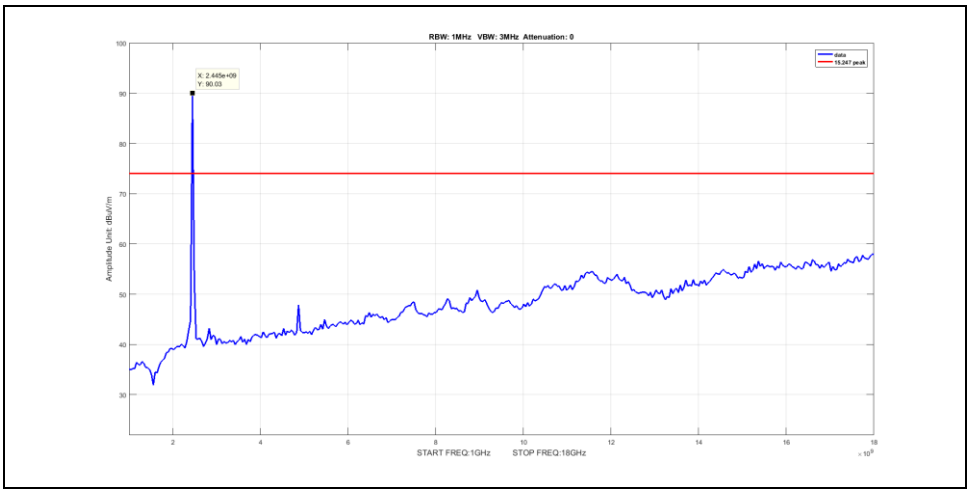
Plot 41. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2462M, G Mode



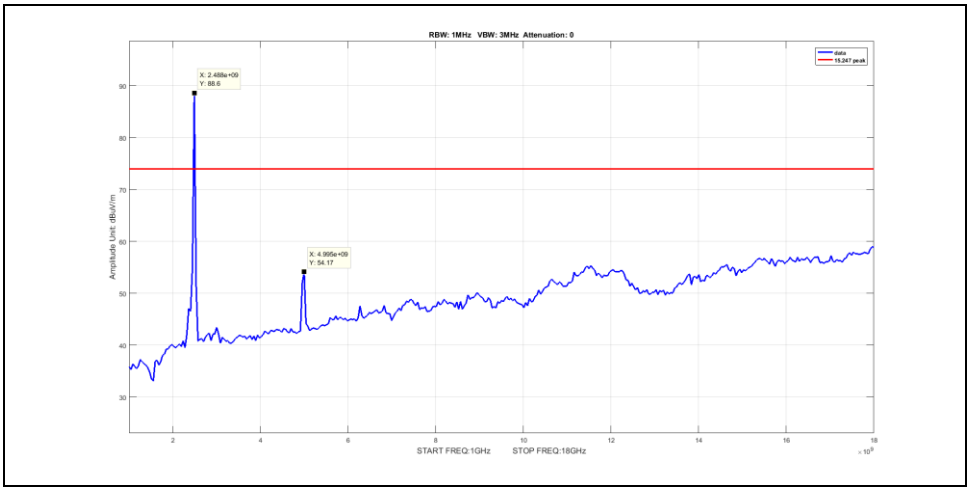
Plot 42. Peak Spurious Emission, 1-18GHz, BW 20M, Ch. 2462M, N Mode



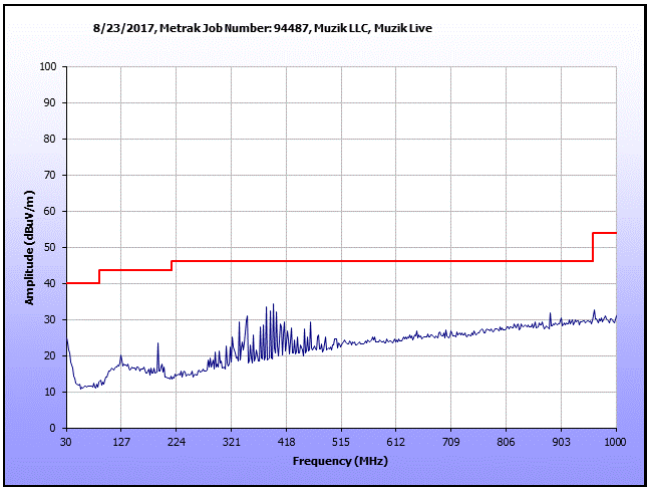
Plot 43. Peak Spurious Emission, 1-18GHz, BW 40M, Ch. 2422M, N Mode



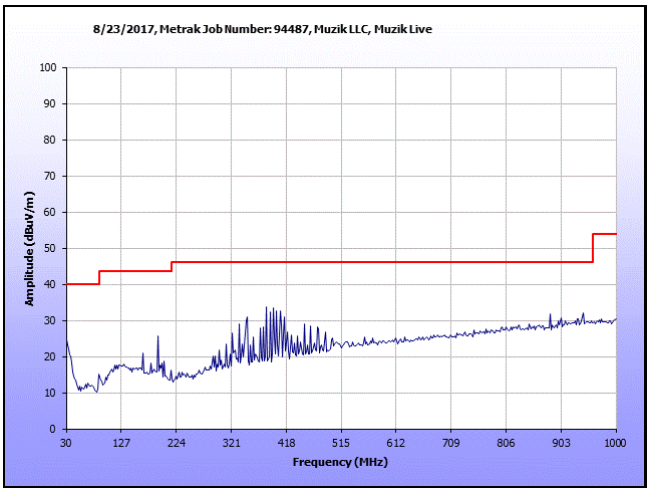
Plot 44. Peak Spurious Emission, 1-18GHz, BW 40M, Ch. 2437M, N Mode



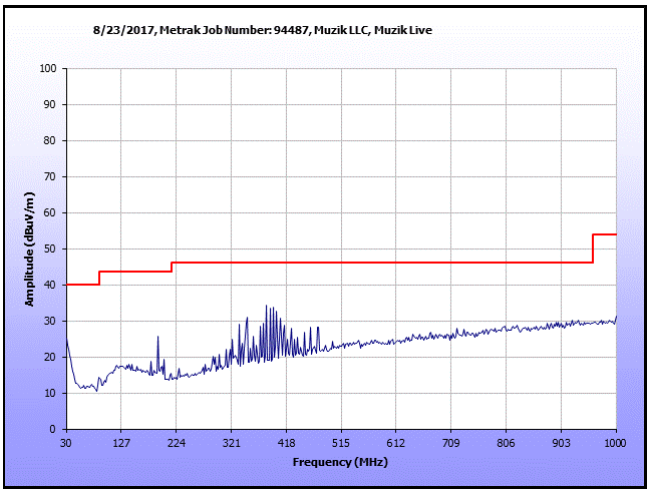
Plot 45. Peak Spurious Emission, 1-18GHz, BW 40M, Ch. 2452M, N Mode



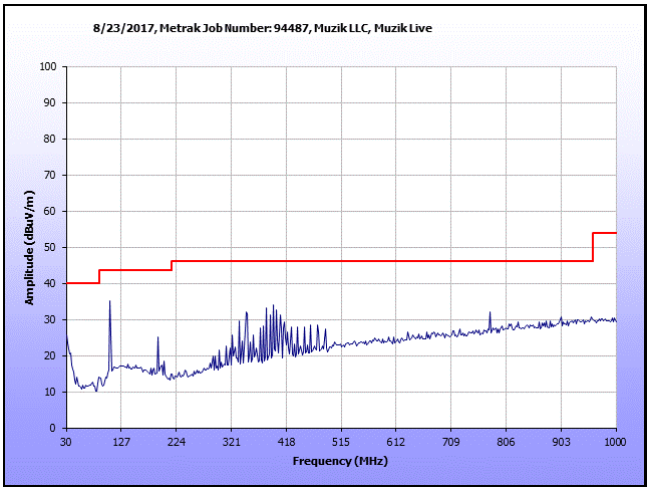
Plot 46. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2412M, B Mode



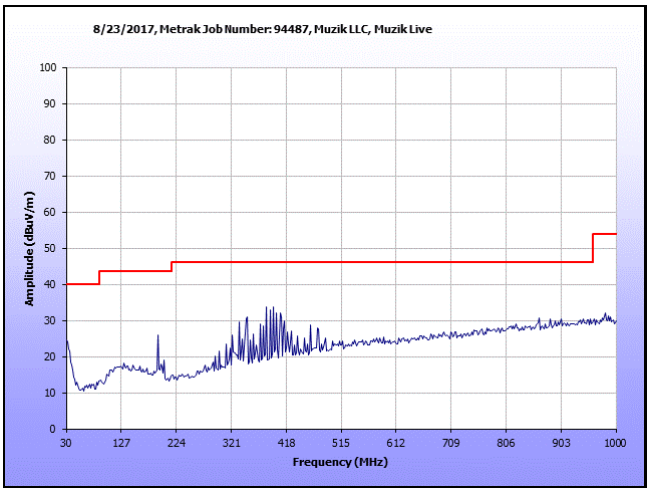
Plot 47. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2412M, G Mode



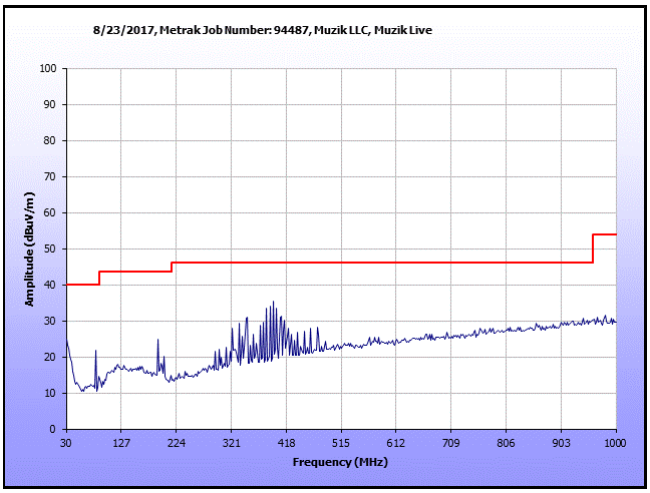
Plot 48. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2412M, N Mode



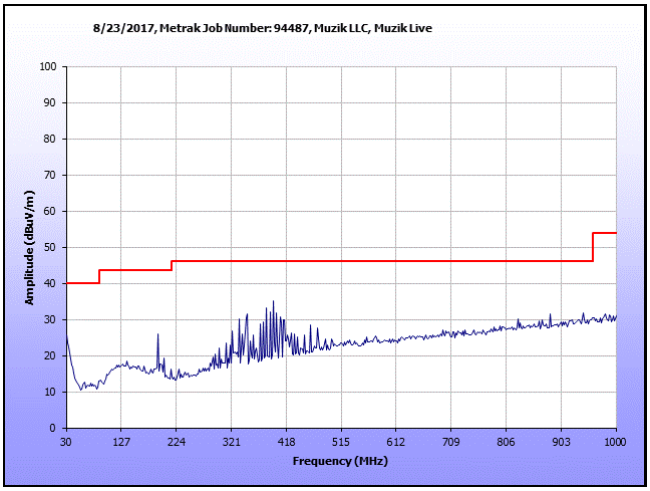
Plot 49. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2437M, B Mode



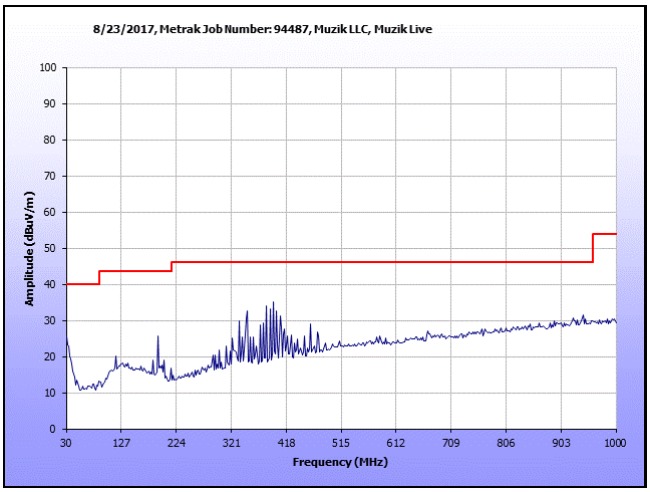
Plot 50. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2437M, G Mode



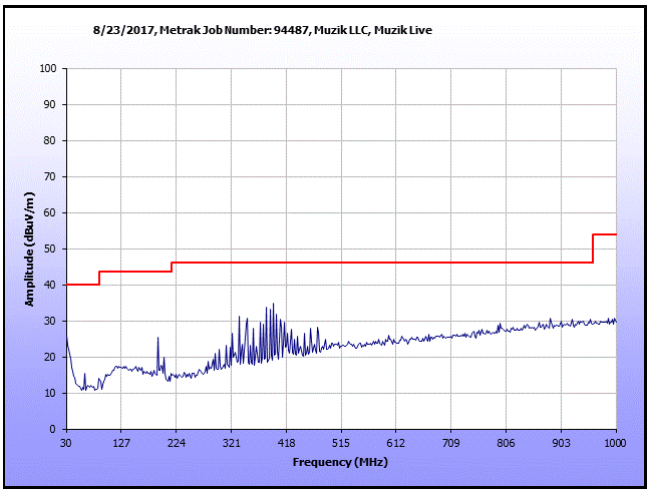
Plot 51. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2437M, N Mode



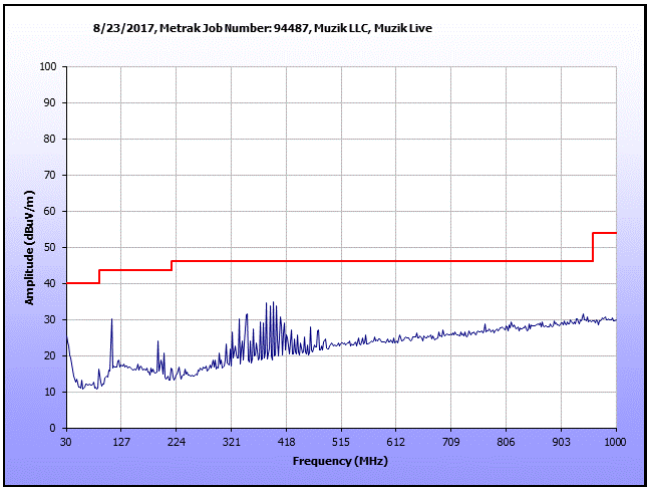
Plot 52. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2462M, B Mode



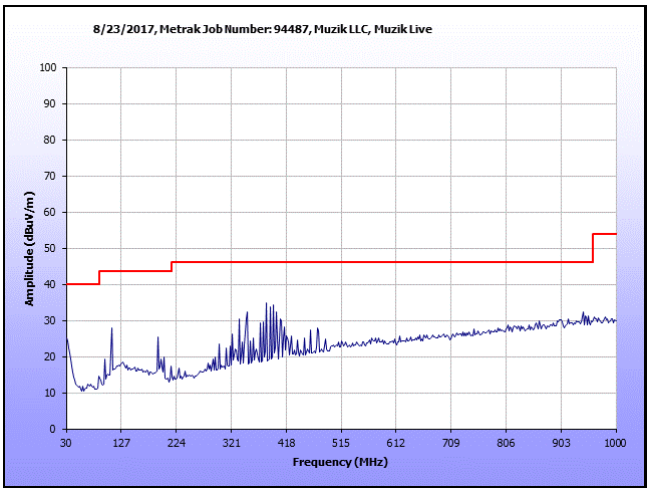
Plot 53. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2462M, G Mode



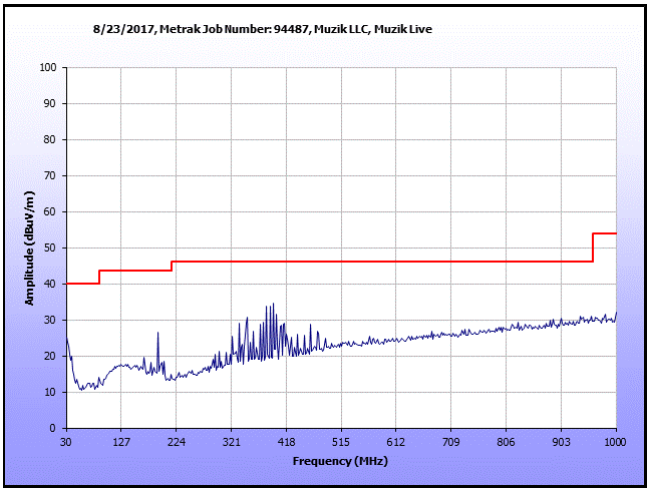
Plot 54. Spurious Emissions, 30MHz-1GHz, BW 20MHz, Ch. 2462M, N Mode



Plot 55. Spurious Emissions, 30MHz-1GHz, BW 40MHz, Ch. 2422M, N Mode



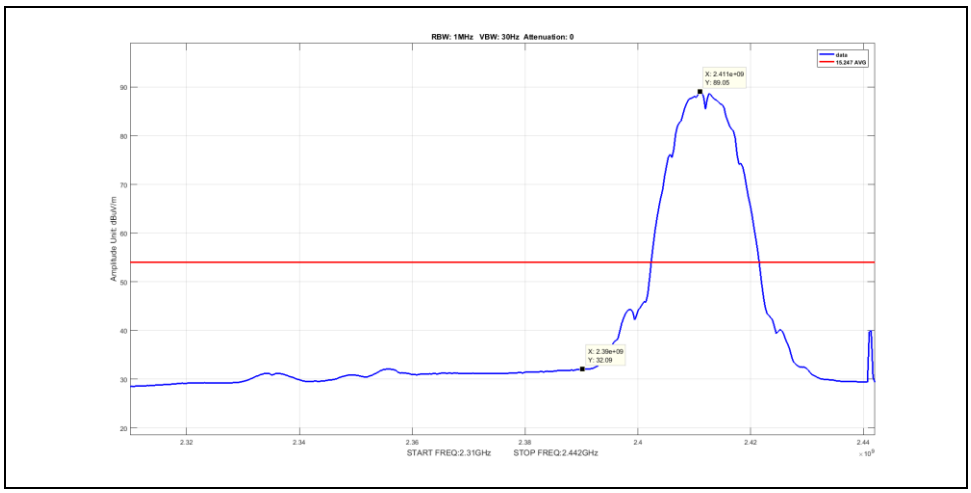
Plot 56. Spurious Emissions, 30MHz-1GHz, BW 40MHz, Ch. 2437M, N Mode



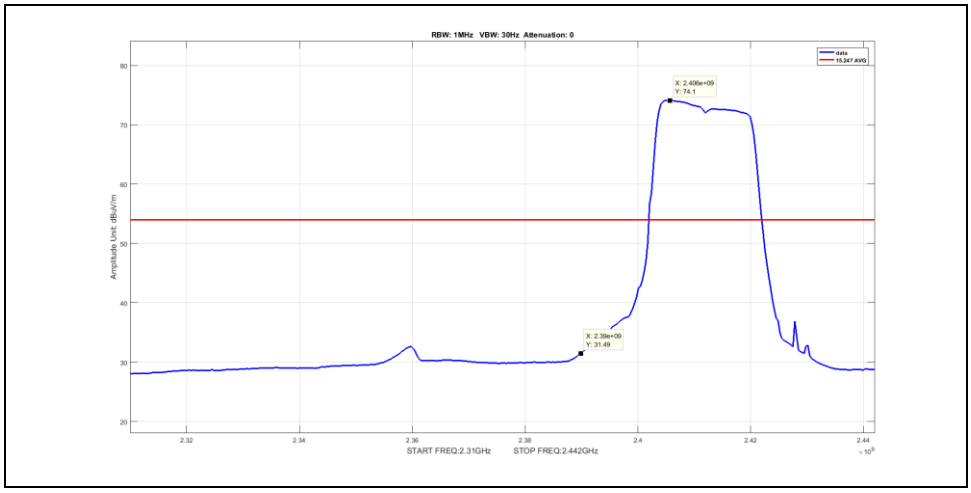
Plot 57. Spurious Emissions, 30MHz-1GHz, BW 40MHz, Ch. 2452M, N Mode

Radiated Band Edge Measurements

Test Procedures: The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line.



Plot 58. Radiated Average Band Edge Spurious, BW 20M, Ch. 2412M, B Mode



Plot 59. Radiated Average Band Edge Spurious, BW 20M, Ch. 2412M, G Mode

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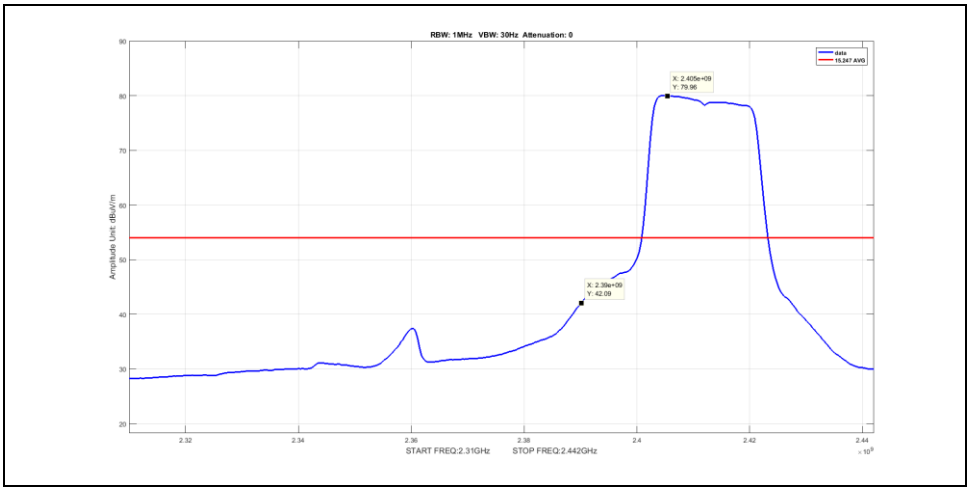
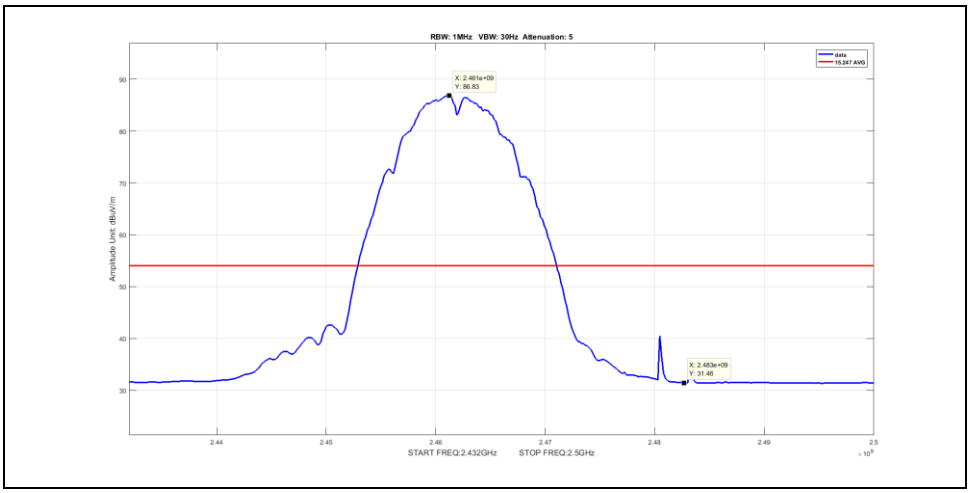
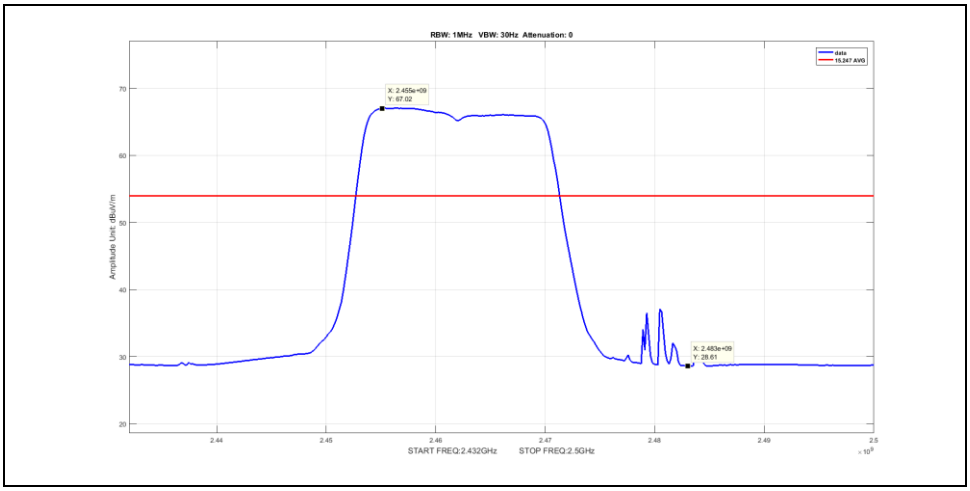


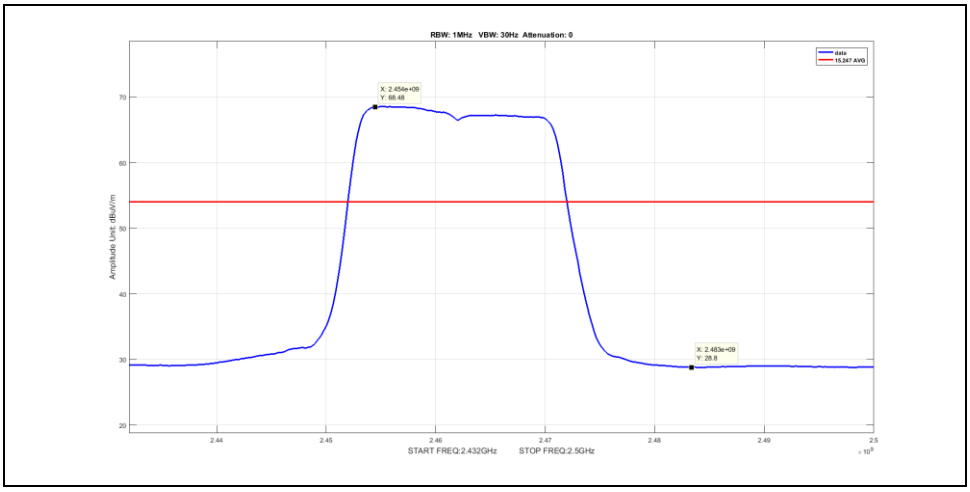
Plot 60. Radiated Average Band Edge Spurious, BW 20M, Ch. 2412M, N Mode



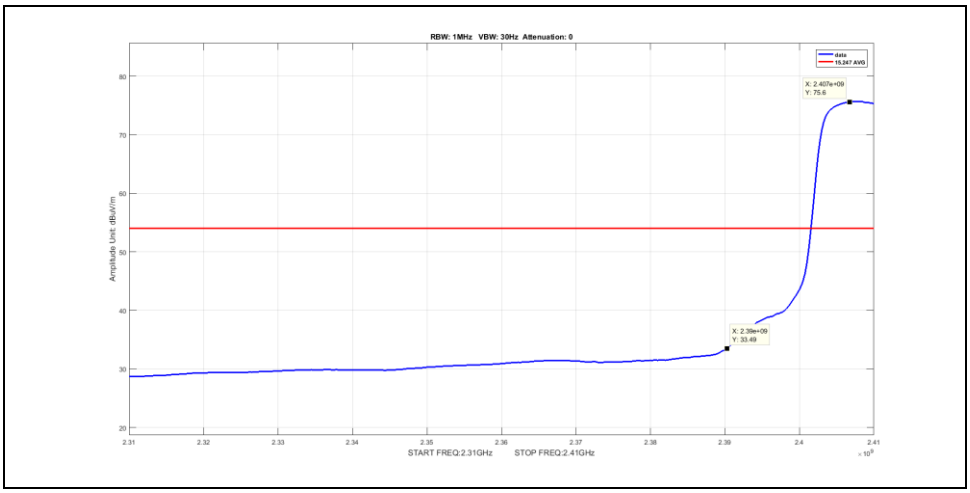
Plot 61. Radiated Average Band Edge Spurious, BW 20M, Ch. 2462M, B Mode



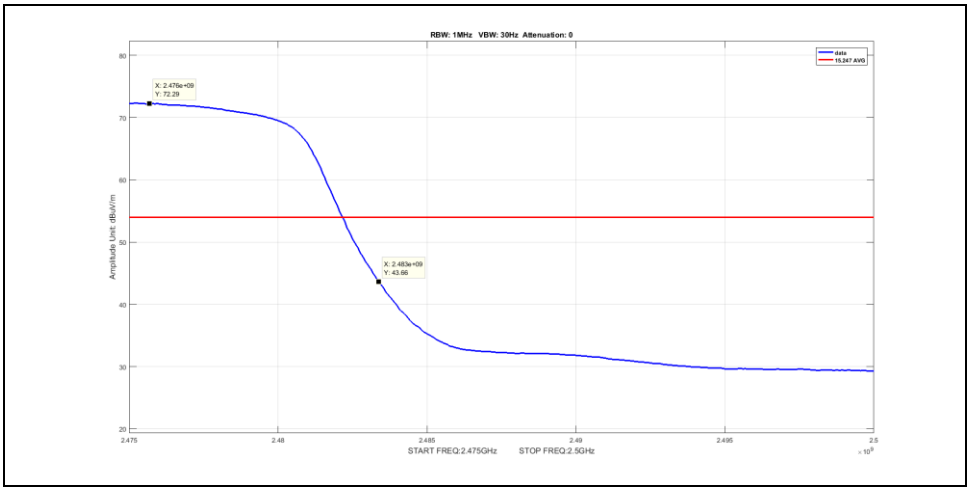
Plot 62. Radiated Average Band Edge Spurious, BW 20M, Ch. 2462M, G Mode



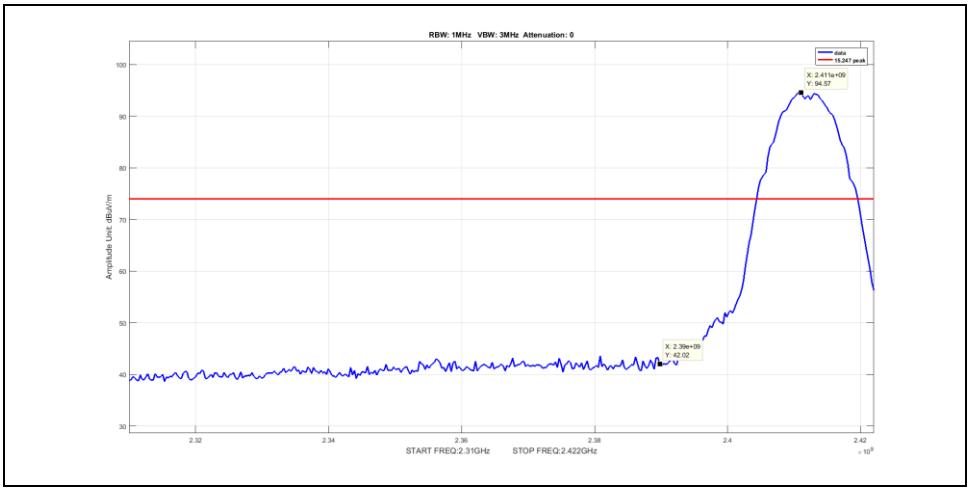
Plot 63. Radiated Average Band Edge Spurious, BW 20M, Ch. 2462M, N Mode



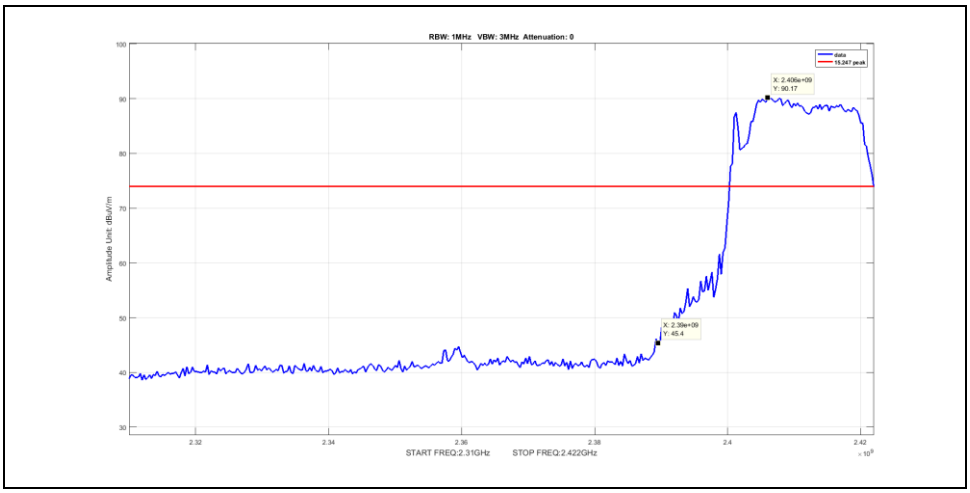
Plot 64. Radiated Average Band Edge Spurious, BW 40M, Ch. 2422M, N Mode



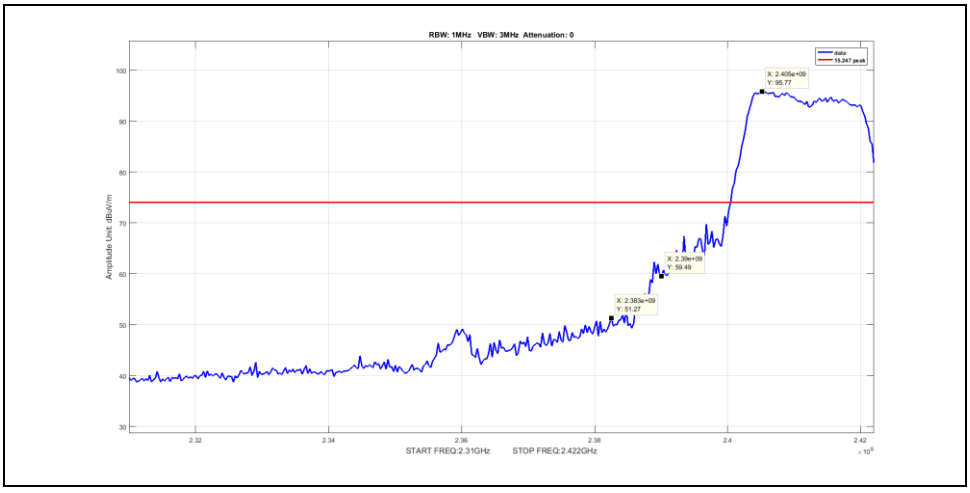
Plot 65. Radiated Average Band Edge Spurious, BW 40M, Ch. 2452M, N Mode



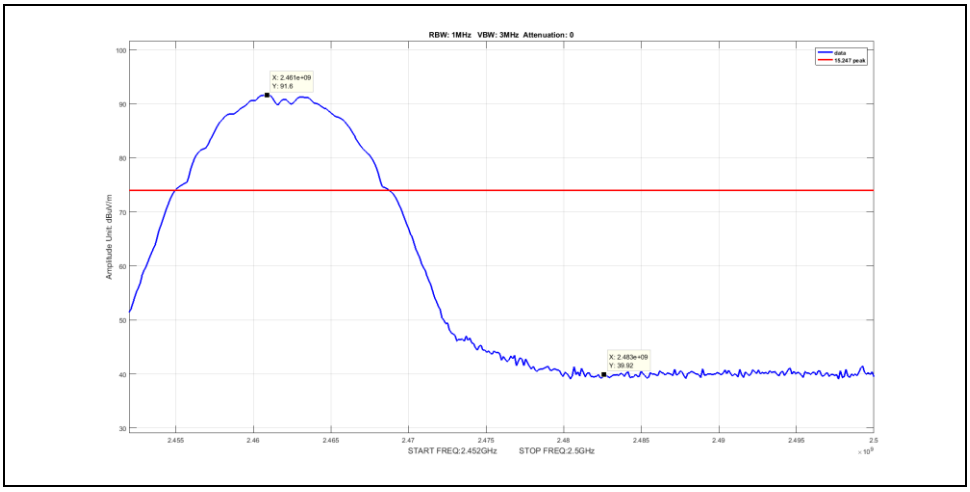
Plot 66. Radiated Peak Band Edge Spurious, BW 20M, Ch. 2412M, B Mode



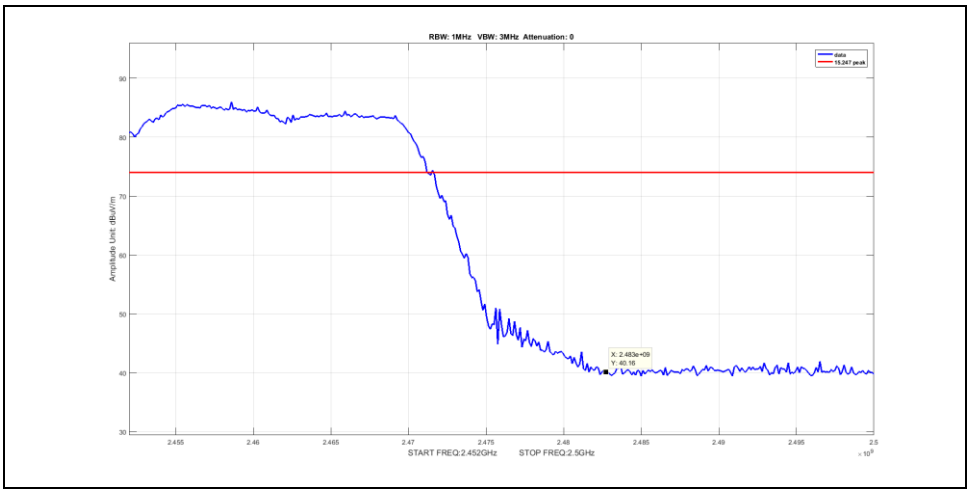
Plot 67. Radiated Peak Band Edge Spurious, BW 20M, Ch. 2412M, G Mode



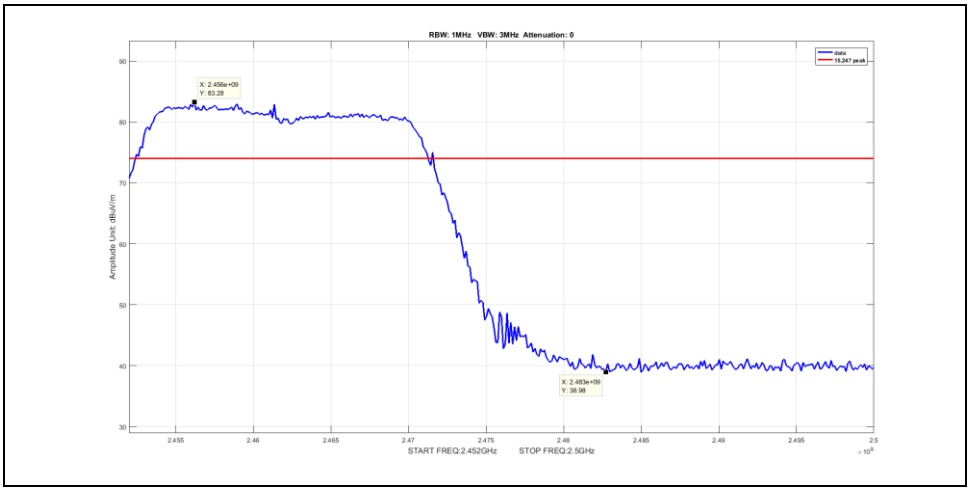
Plot 68. Radiated Peak Band Edge Spurious, BW 20M, Ch. 2412M, N Mode



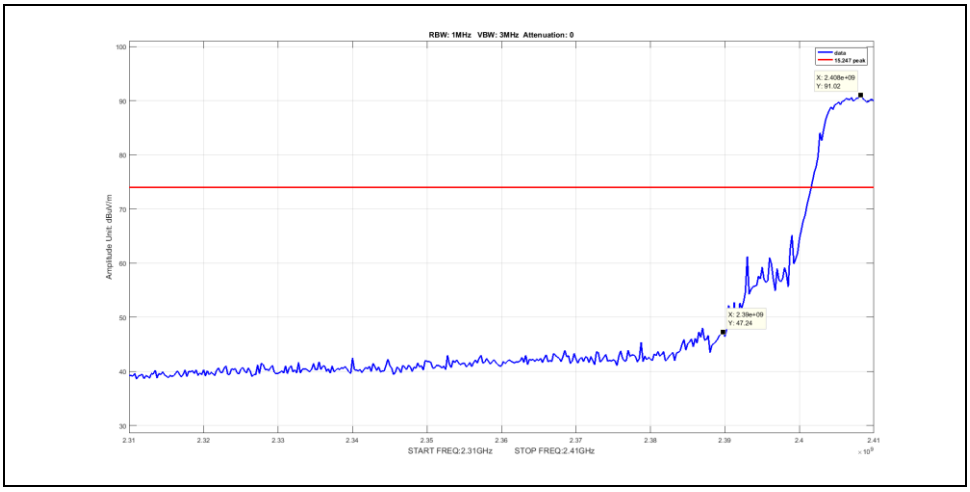
Plot 69. Radiated Peak Band Edge Spurious, BW 20M, Ch. 2462M, B Mode



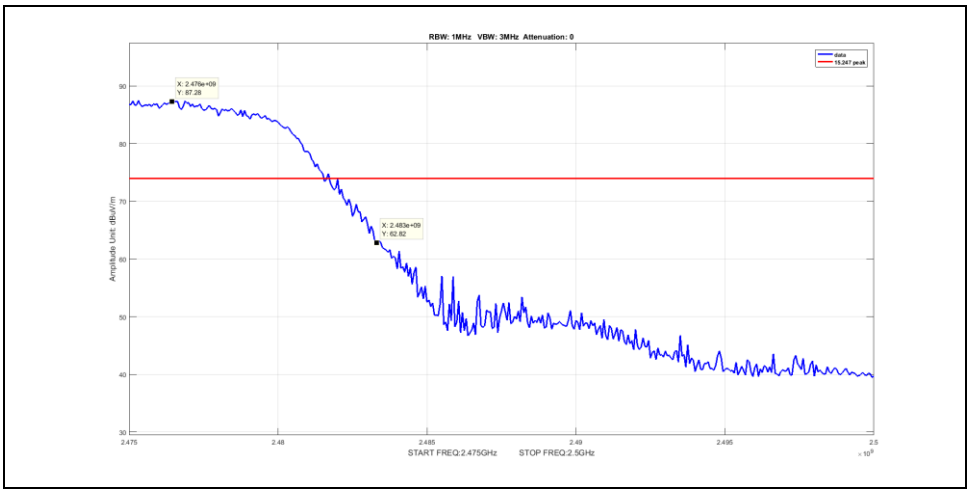
Plot 70. Radiated Peak Band Edge Spurious, BW 20M, Ch. 2462M, G Mode



Plot 71. Radiated Peak Band Edge Spurious, BW 20M, Ch. 2462M, N Mode



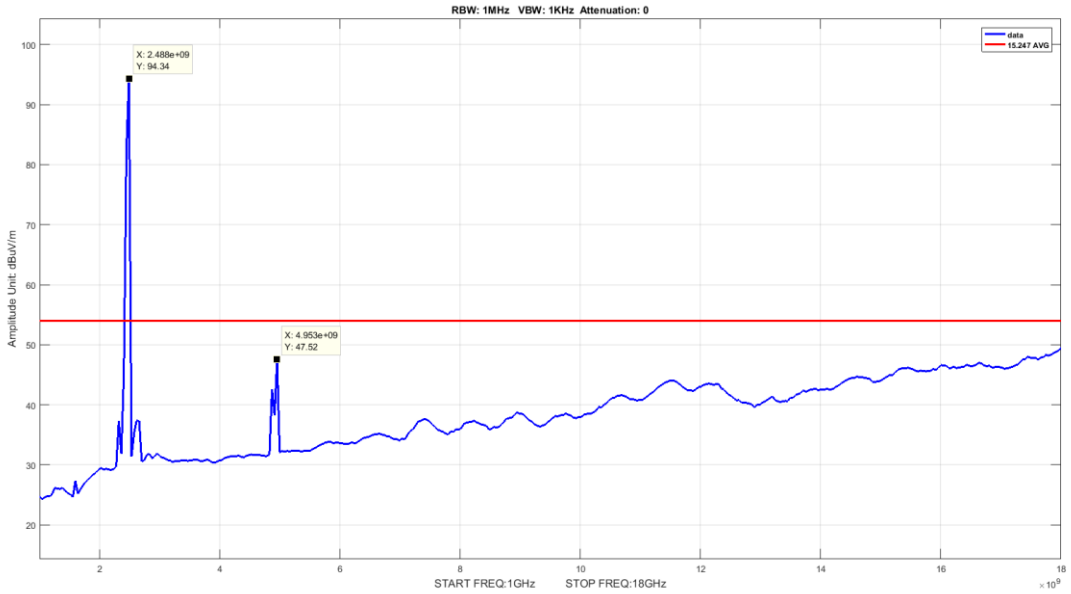
Plot 72. Radiated Peak Band Edge Spurious, BW 40M, Ch. 2422M, N Mode



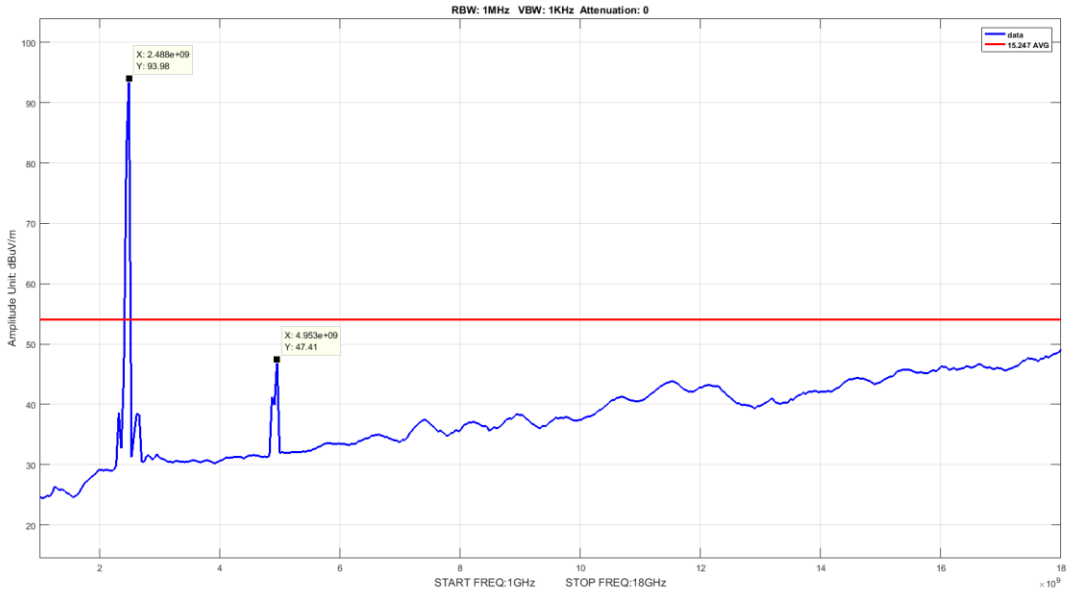
Plot 73. Radiated Peak Band Edge Spurious, BW 40M, Ch. 2452M, N Mode

Simultaneous Emission for Bluetooth and Wifi

Emission close to the limit line by 20dB were investigated using respective detectors. Only noise was observed below 1 GHz and above 18 GHz.. Data included represents the worst case.



Plot 74. Simultaneous Average Spurious Emission, 1 – 18 GHz, BW 20 MHz, Ch. 2437 MHz, G mode, BT high channel



Plot 75. Simultaneous Average Spurious Emission, 1 – 18 GHz, BW 20 MHz, Ch. 2437 MHz, N mode, BT high channel

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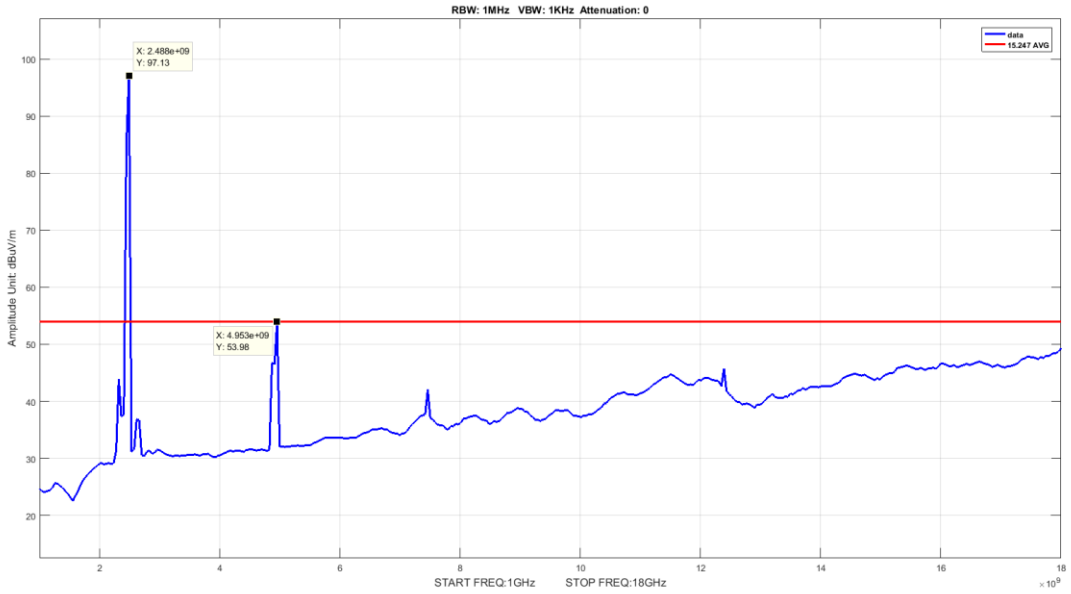
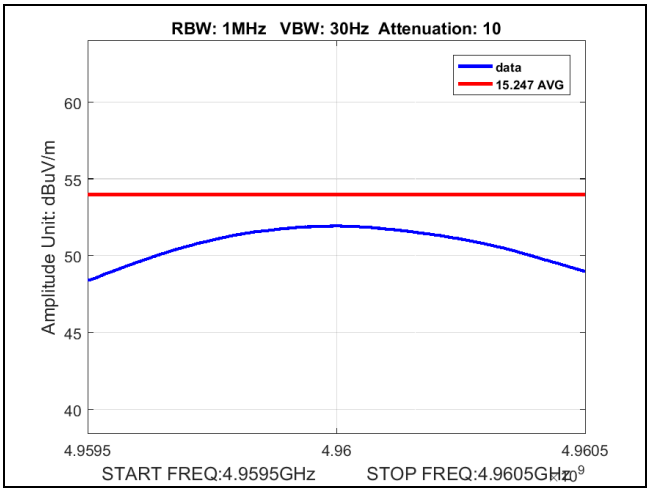


Plot 76. Simultaneous Average Spurious Emission, 1 – 18 GHz, BW 40 MHz, CH. 2437 MHz, B mode, BT high channel



Plot 77. Simultaneous Average Spurious Emission, 4593 MHz, Harmonics and Intermodulation Emission B mode, BT high channel

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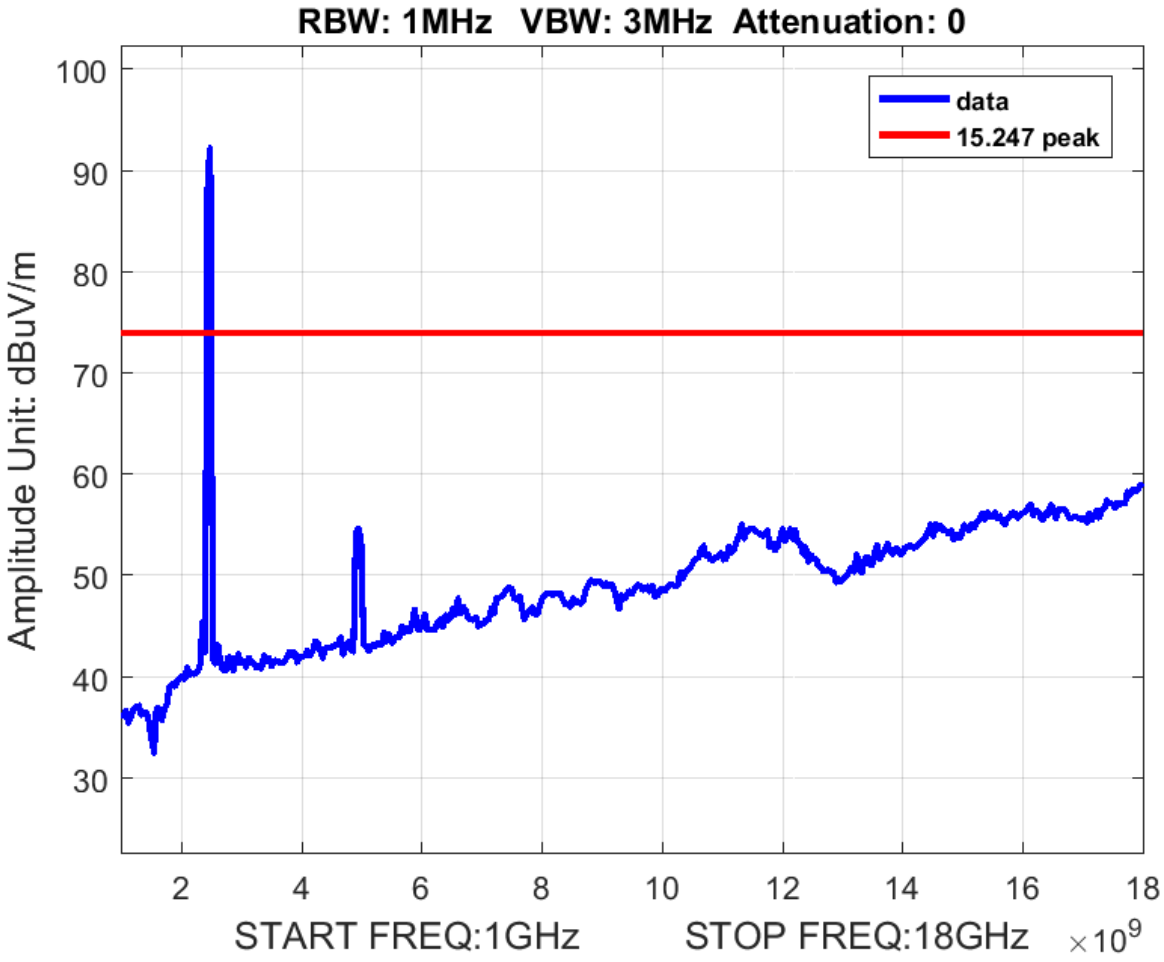

Plot 78. Simultaneous Peak Spurious Emission, 1 – 18 GHz, BW 20 MHz, Ch. 2437 MHz, B mode, BT high channel

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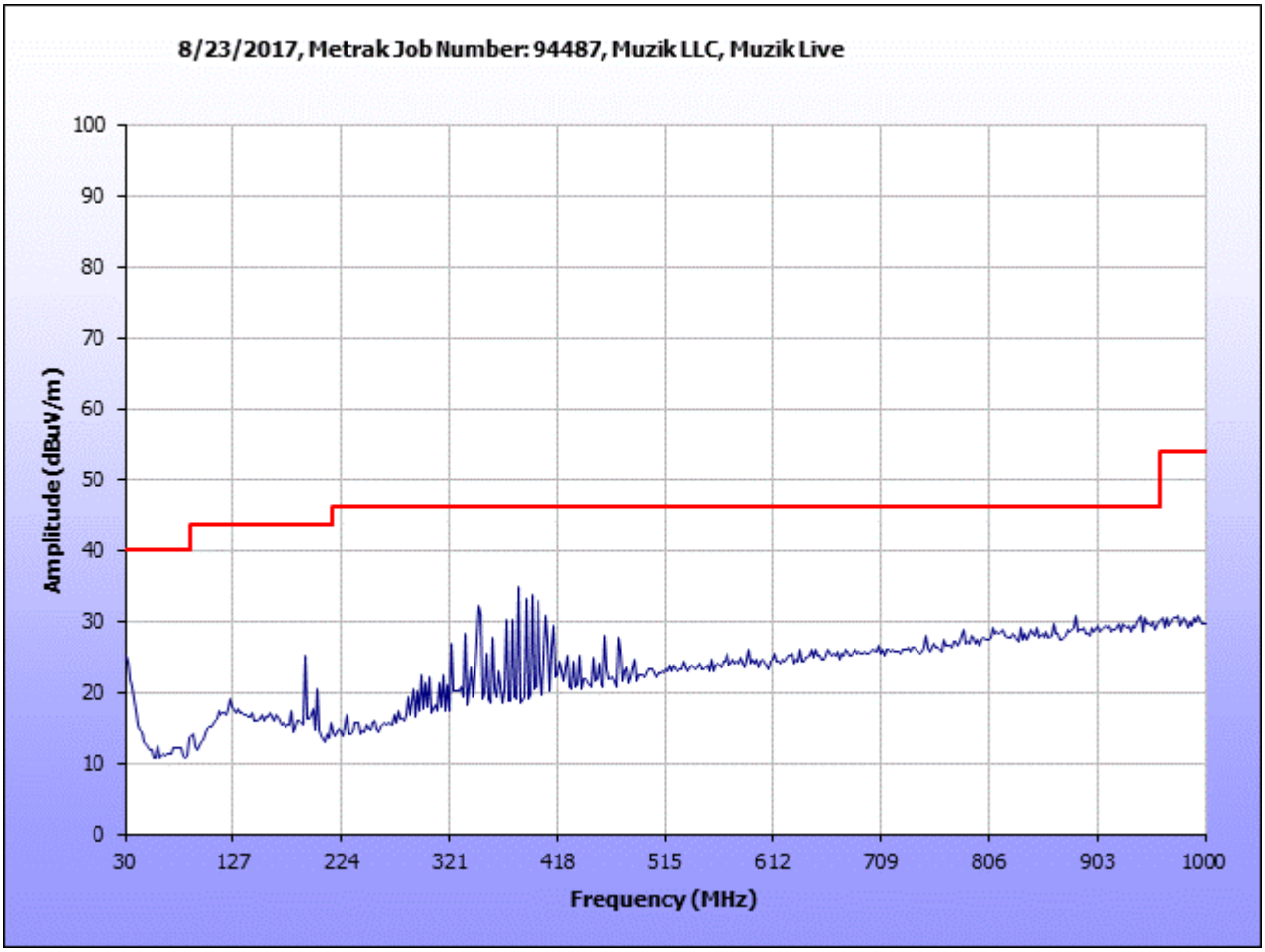

Plot 79. Simultaneous Spurious Emission, 30 MHz – 1 GHz, BW 20 MHz, Ch. 2437 MHz, B mode, BT mode high channel

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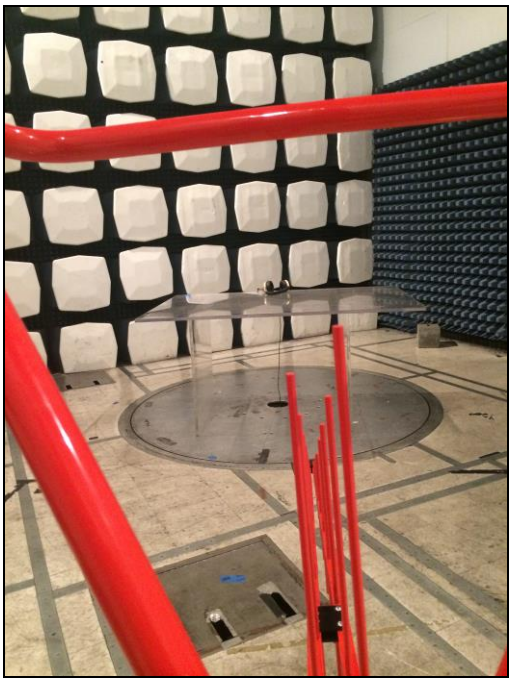
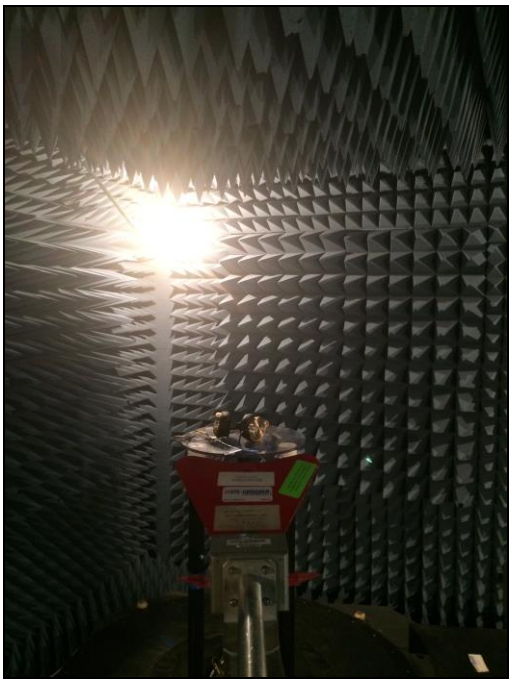
Radiated Spurious Emissions Test Setup



Photograph 1. Radiated Emission Set up, 30 MHz - 1 GHz



Photograph 2. Radiated Emission Set up, 1 GHz - 18 GHz

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Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(d) RF Conducted Spurious Emissions Requirements and Band Edge

Test Requirement: **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.

Test Procedure: For intentional radiators with a digital device portion which operates below 10 GHz, the spectrum was investigated as per §15.33(a)(1) and §15.33(a)(4); i.e., the lowest RF signal generated or used in the device up to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Measurement was performed conducted using calibrated spectrum analyzer. EUT was connected to the spectrum analyzer directly and measurement was performed at three different frequencies. .

See following pages for detailed test results with RF Conducted Spurious Emissions.

Test Results: The EUT was compliant with the Conducted Spurious Emission limits of **§15.247(d)**.

Test Engineer(s): Deepak Giri

Test Date(s): August 25, 2017

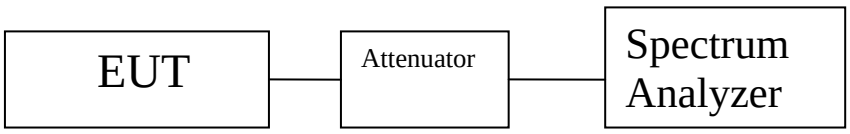
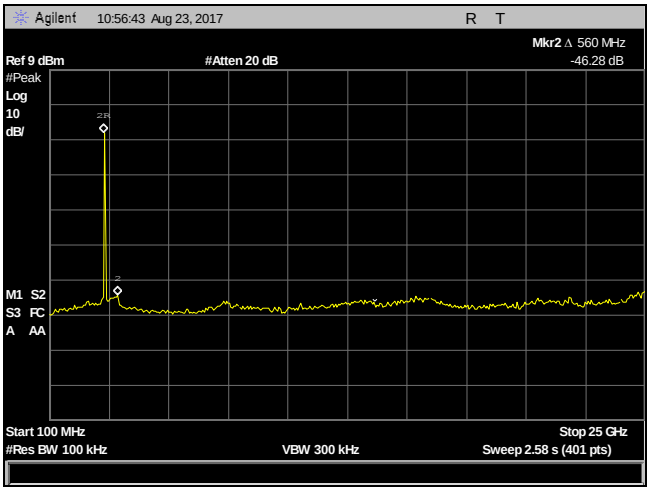
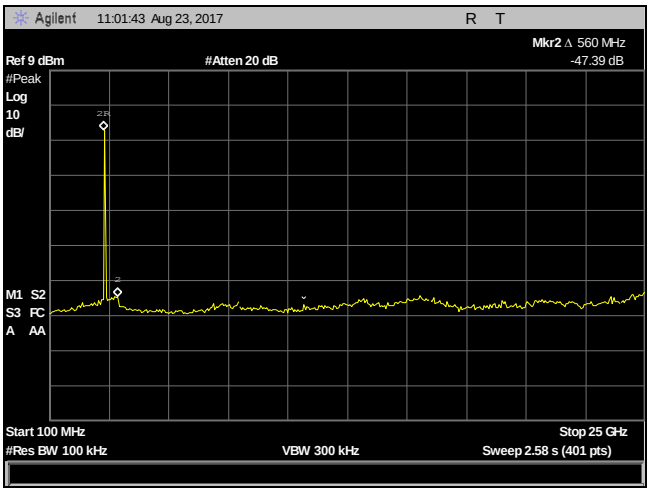


Figure 4. Block Diagram, Conducted Spurious Emissions Test Setup

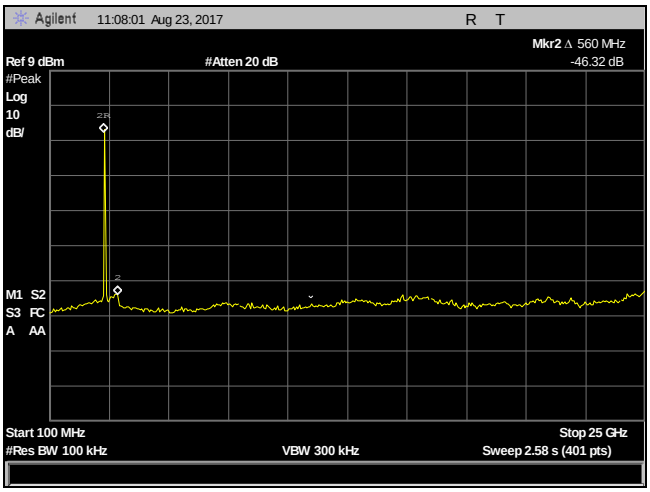
Conducted Spurious Emissions Test Results



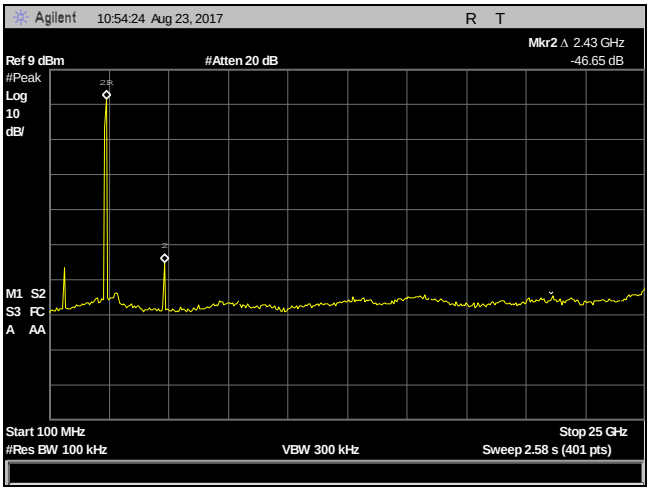
Plot 80. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2412M, B Mode



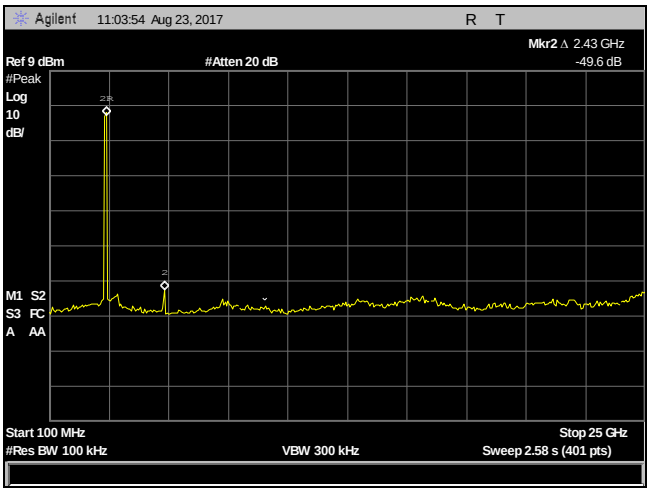
Plot 81. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2412M, G Mode



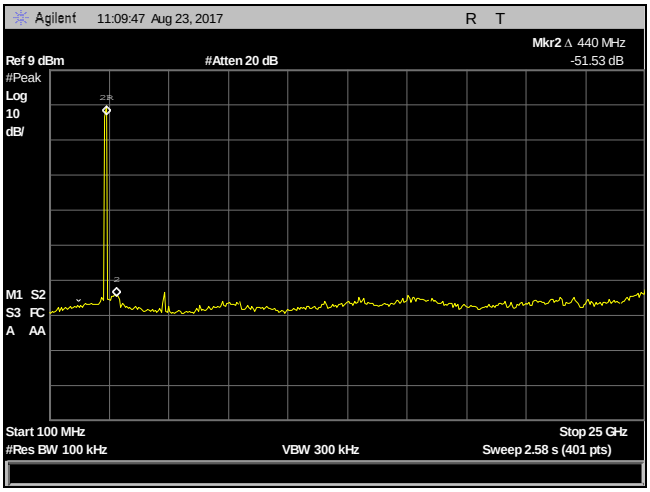
Plot 82. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2412M, N Mode



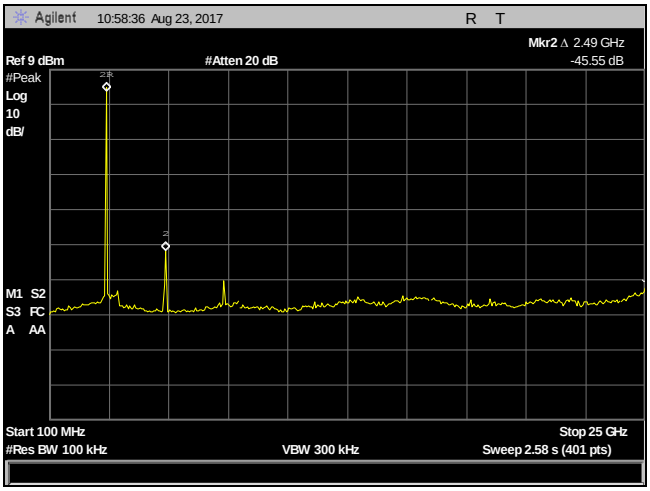
Plot 83. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2437M, B Mode



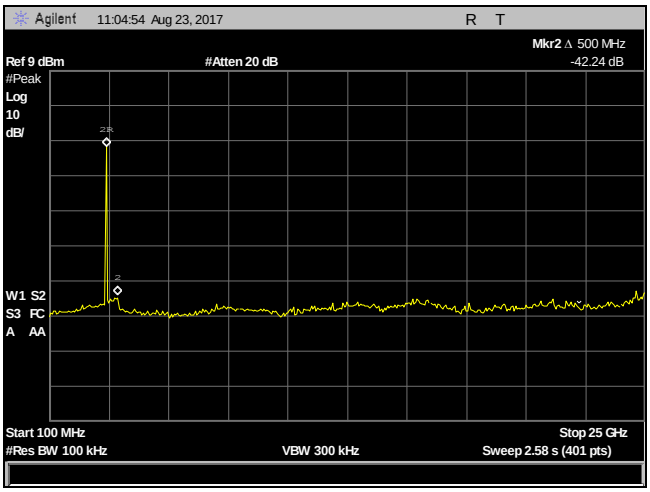
Plot 84. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2437M, G Mode



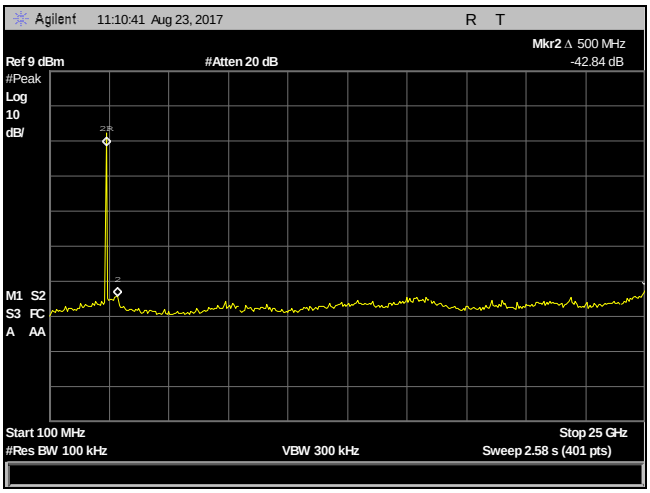
Plot 85. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2437M, N Mode



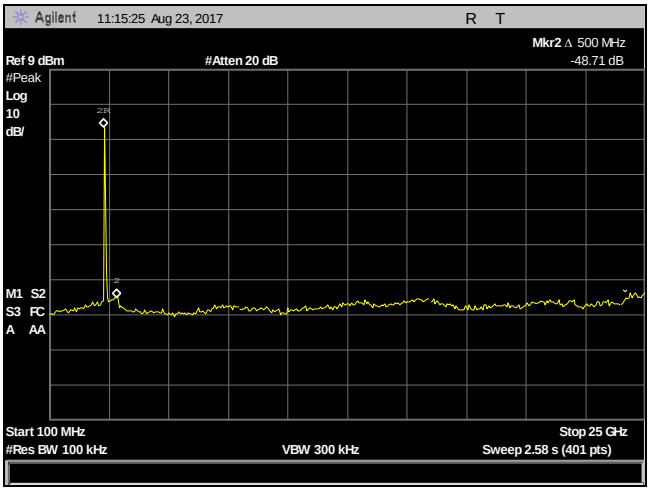
Plot 86. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2462M, B Mode



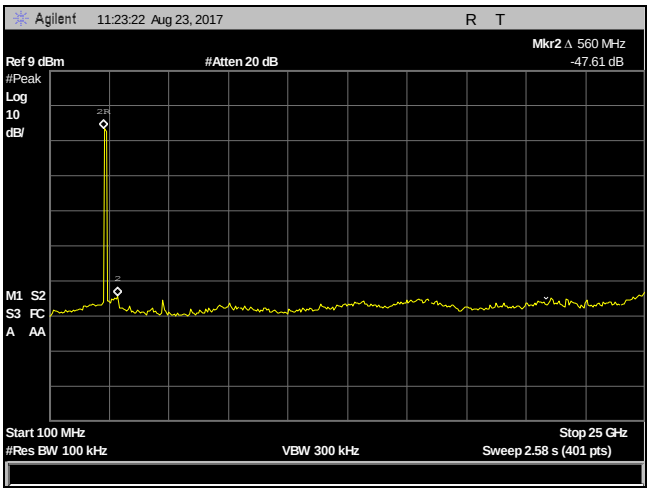
Plot 87. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2462M, G Mode



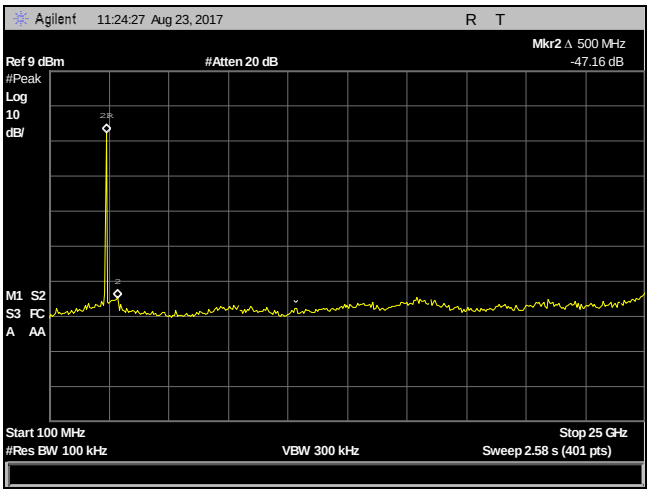
Plot 88. Conducted Emission, 30MHz-25GHz, BW 20M, Ch 2462M, N Mode



Plot 89. Conducted Emission, 30MHz-25GHz, BW 40M, Ch 2422M, N Mode

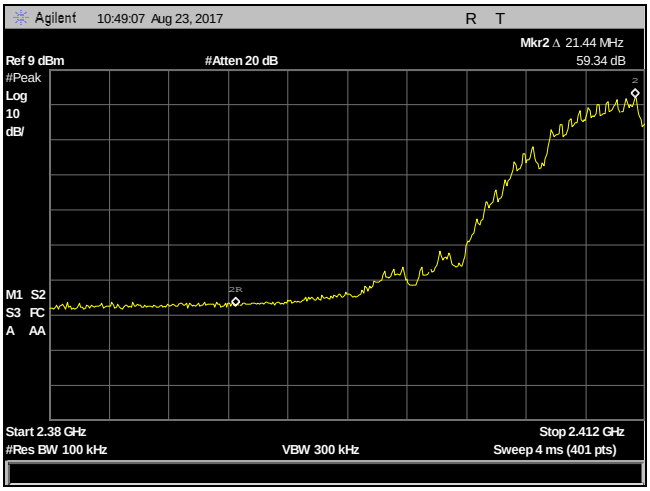


Plot 90. Conducted Emission, 30MHz-25GHz, BW 40M, Ch 2437M, N Mode

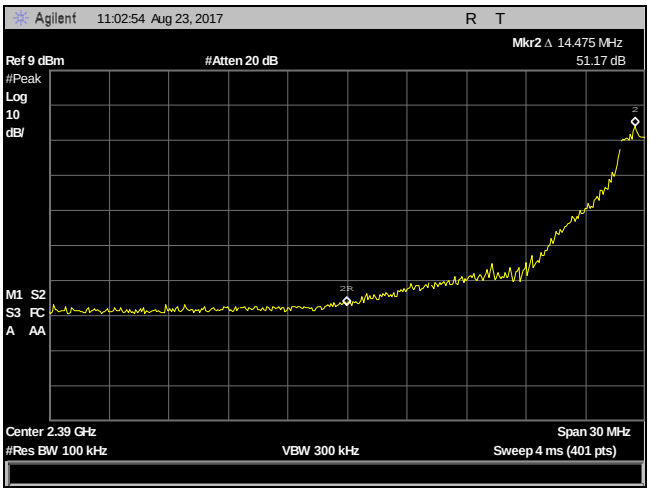


Plot 91. Conducted Emission, 30MHz-25GHz, BW 40M, Ch 2452M, N Mode

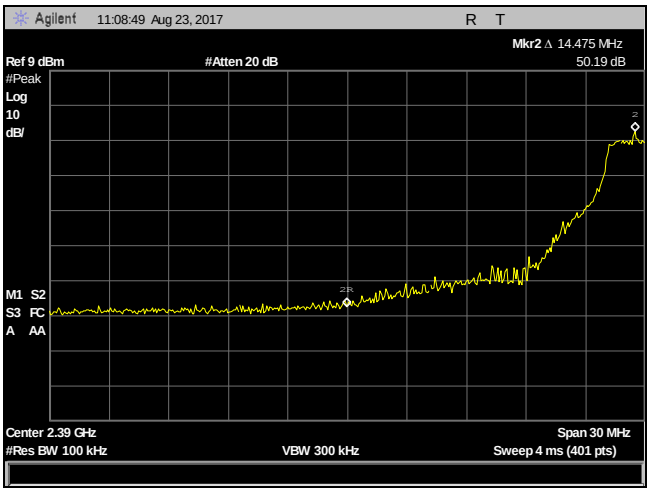
Conducted Band Edge Test Results



Plot 92. Conducted Band Edge, BW 20MHz, 2412M, B Mode



Plot 93. Conducted Band Edge, BW 20MHz, 2412M, G Mode



Plot 94. Conducted Band Edge, BW 20MHz, 2412M, N Mode

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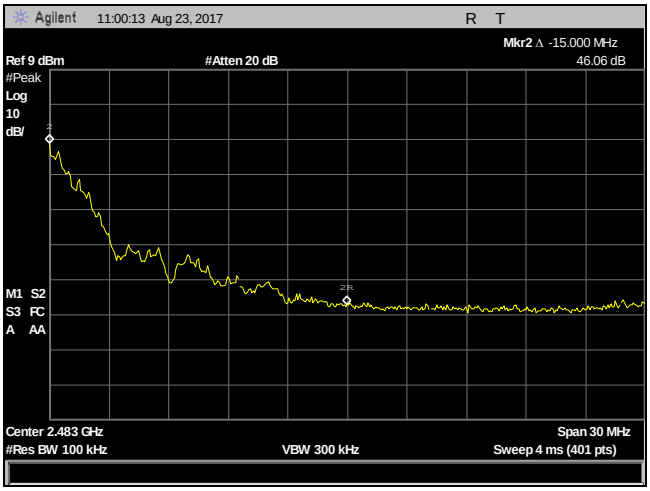
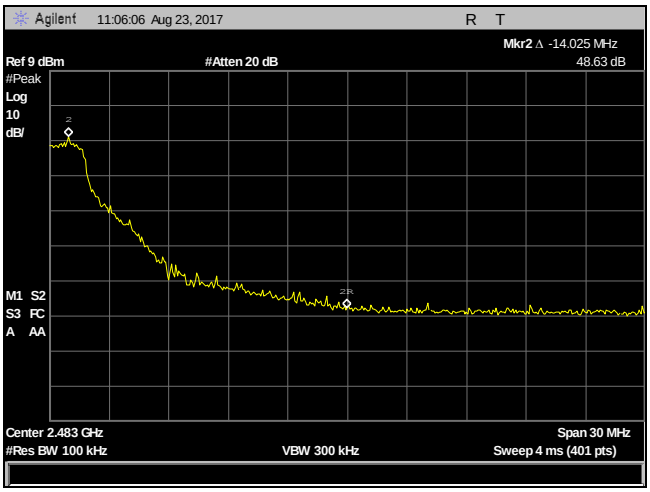
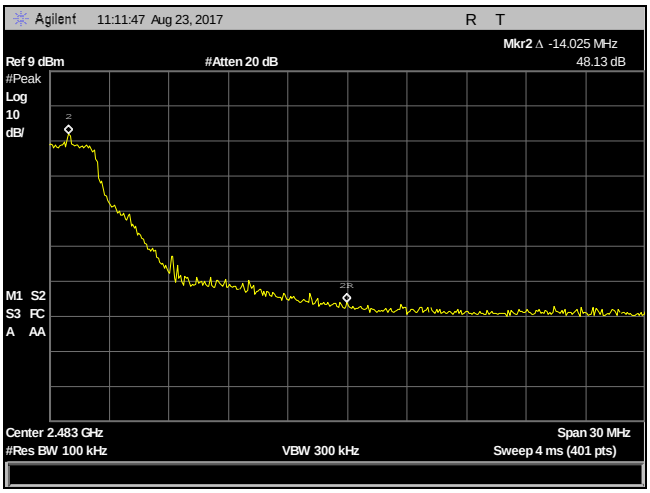


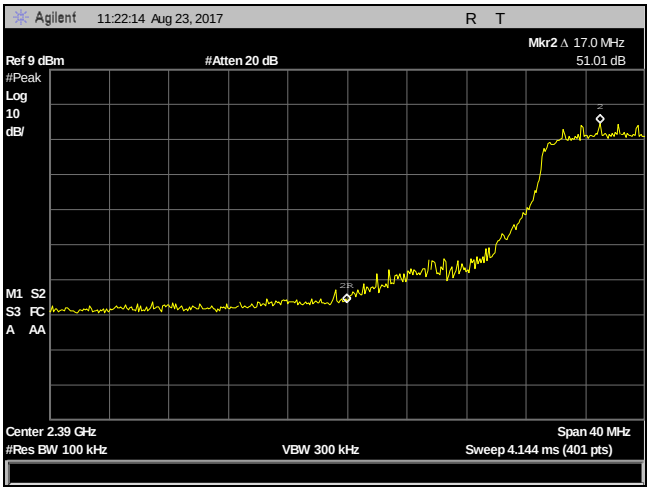
Plot 95. Conducted Band Edge, BW 20MHz, 2462M, B Mode



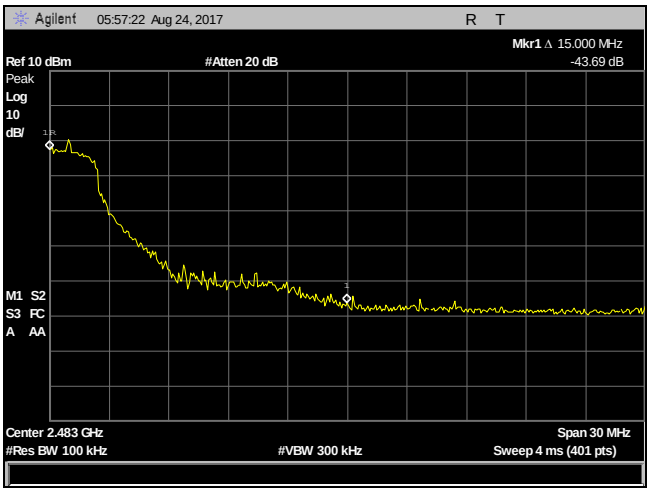
Plot 96. Conducted Band Edge, BW 20MHz, 2462M, G Mode



Plot 97. Conducted Band Edge, BW 20MHz, 2462M, N Mode



Plot 98. Conducted Band Edge, BW 40MHz, 2422M, N Mode



Plot 99. Conducted Band Edge, BW 40MHz, 2452M, N Mode

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(e) Peak Power Spectral Density

Test Requirements: **§15.247(e):** For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure: The transmitter was connected directly to a Spectrum Analyzer through an attenuator. The power level was set to the maximum level throughout each of the 100 sweeps of power averaging. The RBW was set no less than 3 kHz and a VBW set to three times equivalent or greater than RBW. . Measurements were carried out at the low, mid and high channels.

Test Results: The EUT was compliant with the power spectral density limits of **§ 15.247 (e)**. The data type used yielded the worst case. Only data for N mode 40 MHz channel is included.

The peak power spectral density was determined from plots on the following page(s).

Test Engineer: Deepak Giri

Test Date: August 25, 2017

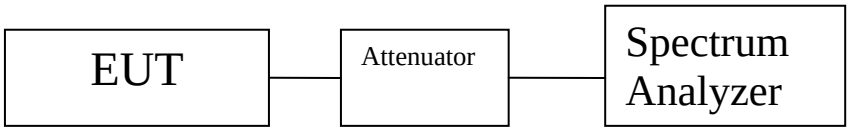


Figure 5. Block Diagram, Peak Power Spectral Density Test Setup

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Peak Power Spectral Density Test Results

Frequency MHz	Mode	Data Type	Bandwidth MHz	PSD dBm	Limit dBm
2412	B	Long 1 Mbps	20	-14.79	8
2437				-15.55	8
2462				-18.26	8
2412	G	6 Mbps	20	-23.8	8
2437				-17.73	8
2462				-26.31	8
2412	N	MCS 0	20	-26.89	8
2437				-19.08	8
2462				-26.99	8
2422			40	-21.71	8
2437				-19.45	8
2452				-22.75	8

Table 14. Peak Power Spectral Density, Test Results

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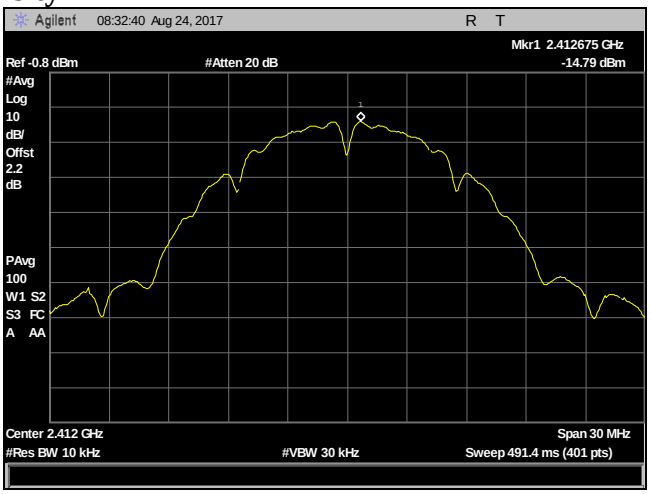
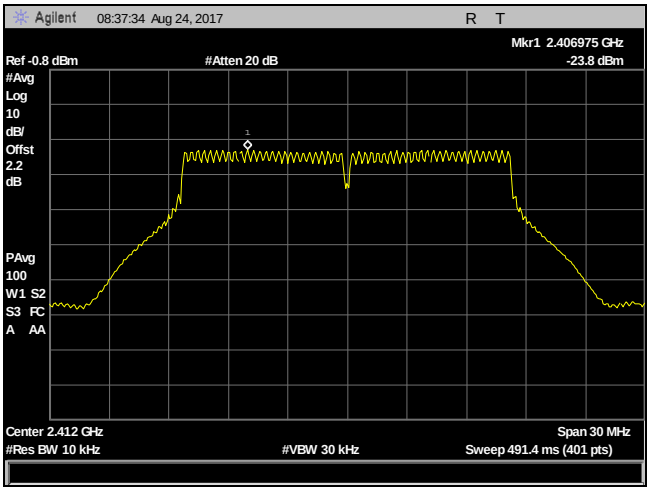
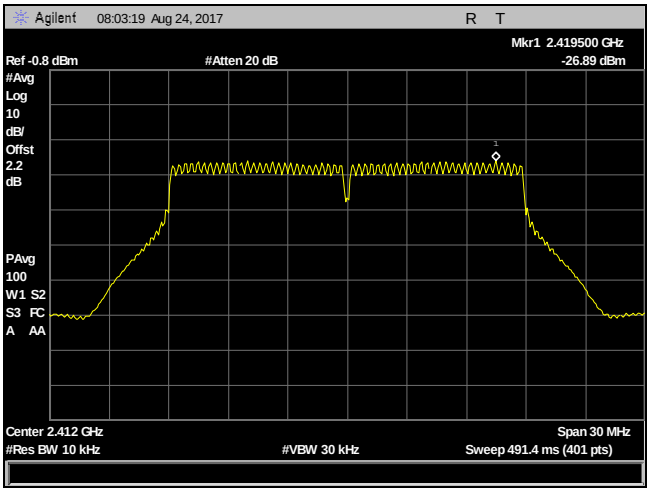
Peak Power Spectral Density



Plot 100. Power Spectral Density, 2412 MHz, 20 MHz B Mode



Plot 101. Power Spectral Density, 2412, MHz, 20 MHz G Mode



Plot 102. Power Spectral Density, 2412 MHz, 20 MHz N Mode

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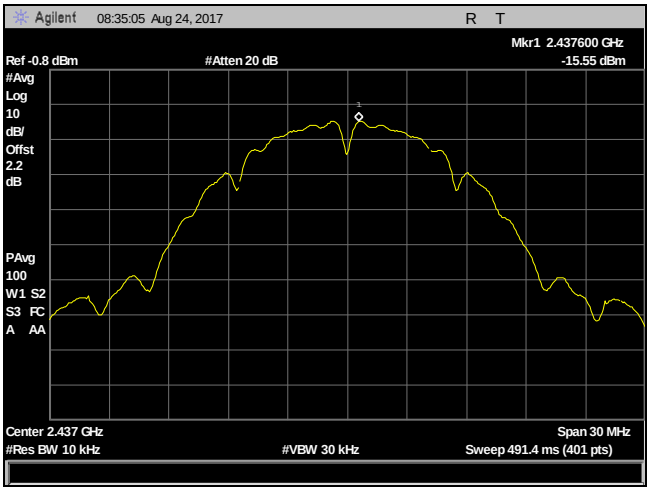
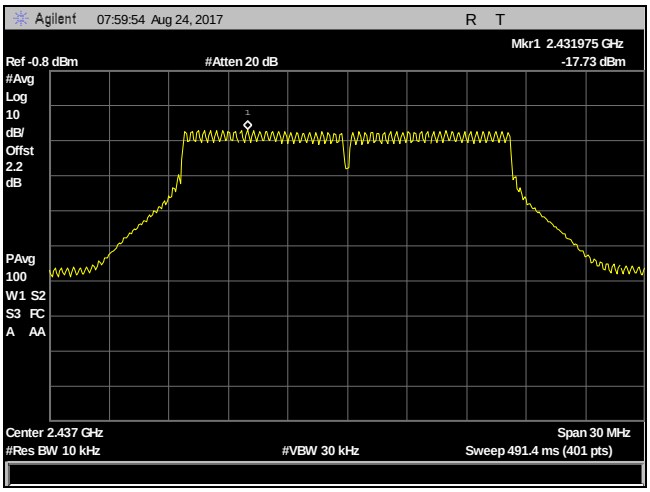
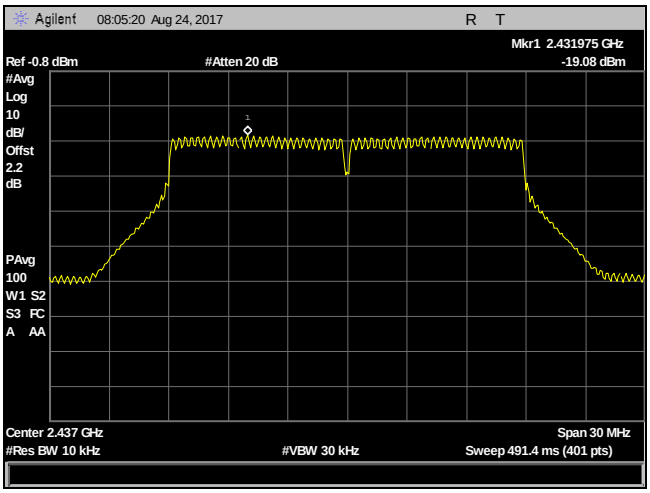


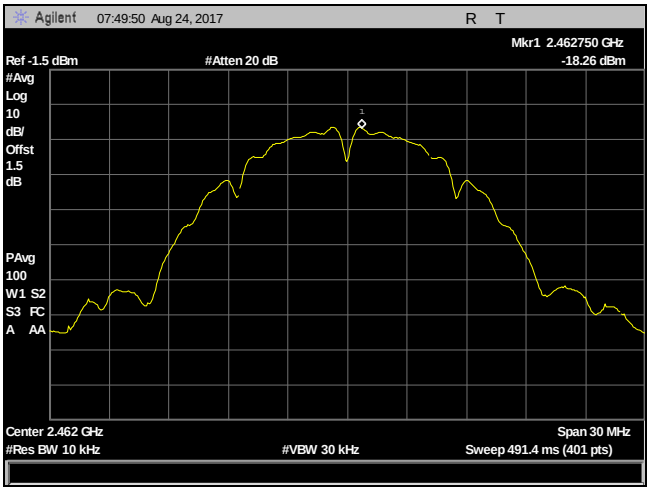
Plot 103. Power Spectral Density, 2437 MHz, 20 MHz B Mode



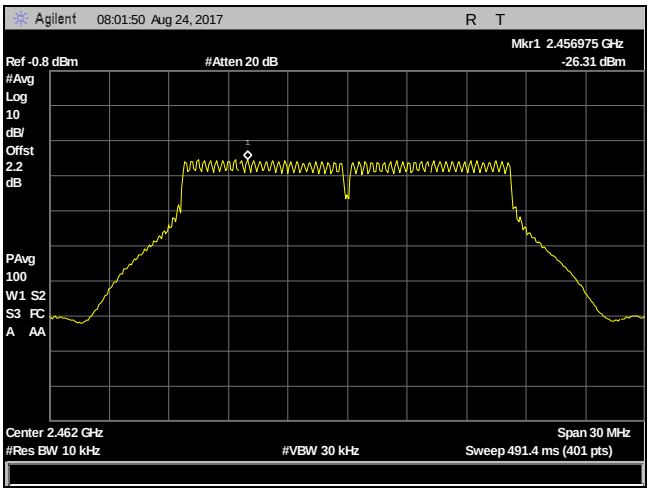
Plot 104. Power Spectral Density, 2437 MHz, 20 MHz G Mode



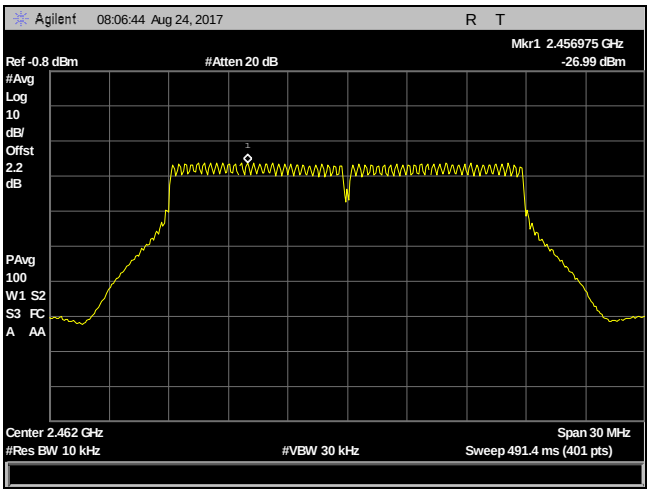
Plot 105. Power Spectral Density, 2437 MHz, 20 MHz N Mode



Plot 106. Power Spectral Density, 2462 MHz, 20 MHz B Mode



Plot 107. Power Spectral Density, 2462 MHz, 20 MHz G Mode



Plot 108. Power Spectral Density, 2462 MHz, 20 MHz N Mode

Electromagnetic Compatibility Criteria for Intentional Radiators

§ 15.247(i) Maximum Permissible Exposure

RF Exposure Requirements: **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit: EUT's operating frequencies @ 2400-2483.5 MHz; **Limit for Uncontrolled exposure: 1 mW/cm^2 or 10 W/m^2**

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{(PG / 4\pi S)}$$

where, S = Power Density (mW/cm^2)
P = Power Input to antenna (mW)
G = Antenna Gain (numeric value)
R = Distance (cm)

Test Results: This test is not applicable. Device is head worn ear-phone. SAR is evaluated. See SAR exhibit.

IV. Test Equipment

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Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4483	ANTENNA; HORN	ETS-LINDGREN	3117	4/19/2017	10/19/2018
1T4753	ANTENNA - BILOG	SUNOL SCIENCES	JB6	10/24/2016	4/24/2018
1T4503	SHIELDED ROOM	UNIVERSAL SHIELDING CORP	N/A	NOT REQUIRED	
1T4859	DIGITAL BAROMETER, HYGROMETER, THERMOMETER	CONTROL COMPANY	15-078-198, FB70423, 245CD	2/10/2016	2/10/2018
1T4442	PRE-AMPLIFIER, MICROWAVE	MITEQ	AFS42-01001800-30-10P	SEE NOTE	
1T4409	EMI RECEIVER	ROHDE & SCHWARZ	ESIB7	12/7/2016	12/7/2018
1T4771	PSA SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4446A	8/10/2016	2/10/2018
1T4300	SEMI-ANECHOIC CHAMBER # 1 (NSA)	EMC TEST SYSTEMS	NONE	2/6/2015	2/6/2018
1T4612	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	E4407B	3/30/2017	9/30/2018

Table 15. Test Equipment List

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

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V. Certification & User's Manual Information

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Certification & User's Manual Information

A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

§ 2.801 Radio-frequency device defined.

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

§ 2.803 Marketing of radio frequency devices prior to equipment authorization.

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

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(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

(i) Compliance testing;

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

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Certification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:

§ 2.901 Basis and Purpose

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.[1] *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer*, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

§ 2.907 Certification.

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

[1] In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

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Certification & User's Manual Information

§ 2.948 Description of measurement facilities.

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

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Certification & User's Manual Information

1. Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

§ 15.19 Labeling requirements.

(a) In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

§ 15.21 Information to user.

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

§ 15.105 Information to the user.

(a) For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

(b) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

– Reorient or relocate the receiving antenna.

– Increase the separation between the equipment and receiver.

– Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

– Consult the dealer or an experienced radio/TV technician for help.

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End of Report

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