Excellence in Compliance Testing

Certification Test Report

FCC ID: AZ489FT7061
IC: 109U-89FT7061

FCC Rule Part: 15.247
IC Radio Standards Specification: RSS-210

ACS Report Number: 14-2134.W06.1D

Applicant: Motorola Solutions
Model(s): H91TGD9PW7AN

Test Begin Date: **December 17, 2014**
Test End Date: **February 13, 2015**

Report Issue Date: May 28, 2015

ACCREDITED TESTING

FOR THE SCOPE OF ACCREDITATION UNDER CERTIFICATE NUMBER AT-1533

This report must not be used by the client to claim product certification, approval, or endorsement by ACLASS, ANSI, or any agency of the Federal Government.

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This report contains 68 pages

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1 GENERAL

1.1 Purpose

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations and Industry Canada's Radio Standards Specification RSS-210.

1.2 Applicant Information

Motorola Solutions
8000 West Sunrise Blvd.
Fort Lauderdale, FL 33322

1.3 Product Description

The EUT is a P25 Portable Public Safety Radio

Technical Details

Mode of Operation:	WLAN 802.11b/g/n
Frequency Range:	2412 MHz - 2462 MHz
Number of Channels:	11
Channel Separation:	5 MHz
Modulations:	802.11b: DSSS
	802.11g/n: OFDM
Antenna Type/Gain:	PIFA, 2.58 dBi
Input Power:	7.4 VDC Lithium Ion Battery

Model Number: H91TGD9PW7AN

Test Sample Serial Number(s): KT000006A01MK4KA127X (Radiated & Power Line Conducted Emissions), KT000006A01MK4KA12N2 (RF Conducted)

Test Sample Condition: The equipment was provided in good condition without any physical damage.

1.4 Test Methodology and Considerations

The EUT was evaluated for radiated, power line and RF conducted emissions for the 2.4 GHz IEEE 802.11b/g/n radio. Preliminary power measurements were carried out for all available data rates. The configurations leading to the highest output power per mode of operation were used for the remaining measurements.

The RF conducted measurements were performed on a sample with the back cover removed for access to the RF port.

The radiated emission evaluation was performed for the EUT set in multiple configurations. The unit was investigated stand-alone in three orthogonal orientations, when installed in a charger and when communicating with a remote computer. The final measurements were executed using the worst case configuration which consists of the EUT with the charger.

The unit was also investigated for inter-modulation products between the co-located Wi-Fi and the land mobile radio. The measurements were performed for two antenna configurations of the land mobile radio. The first antenna covers the VHF, UHF, 7/800 MHz and GPS bands while the second antenna covers the 7/800 MHz and GPS band. All inter-modulation products between the co-located radios were found to be compliant to the FCC limits of 15.209 and Industry Canada RSS-GEN.

The EUT was evaluated for power line conducted emissions when installed in the charger for the radio mode of operation leading to the worst case emissions.

Table 1.4-1: 802.1b/g/n Radio Test Configuration

Mode of Operation	Frequency (MHz)	Channel	Test Software Power Setting	Data Rate Setting)
802.11b	2412	1	18	1 Mbps
	2437	6		
	2462	11		
802.11g	2412	1	13	6 Mbps
	2437	6		
	2462	11		
802.11n 20 MHz	2412	1	13	6.5 Mbps
	2437	6		
	2462	11		

The EUT was also evaluated for unintentional emissions. The results are documented separately in a Declaration of Conformity/Verification test report.

2 TEST FACILITIES

2.1 Location

The radiated and conducted emissions test sites are located at the following address:

Advanced Compliance Solutions, Inc.
3998 FAU Blvd, Suite 310
Boca Raton, Florida 33431
Phone: (561) 961-5585
Fax: (561) 961-5587
www.acstestlab.com

FCC Test Firm Registration #: 475089
Industry Canada Lab Code: 4175C

2.2 Laboratory Accreditations/Recognitions/Certifications

ACS is accredited to ISO/IEC 17025 by ANSI-ASQ National Accreditation Board under their ACLASS program and has been issued certificate number AT-1533 in recognition of this accreditation. Unless otherwise specified, all test methods described within this report are covered under the ISO/IEC 17025 scope of accreditation.

2.3 Radiated & Conducted Emissions Test Site Description

2.3.1 Semi-Anechoic Chamber Test Site

The EMC radiated test facility consists of an RF-shielded enclosure. The interior dimensions of the indoor semi-anechoic chamber are approximately 48 feet (14.6 m) long by 36 feet (10.8 m) wide by 24 feet (7.3 m) high and consist of rigid, 1/8 inch (0.32 cm) steel-clad, wood core modular panels with steel framing. In the shielded enclosure, the faces of the panels are galvanized and the chamber is self-supporting. 8-foot RF absorbing cones are installed on 4 walls and the ceiling. The steel-clad ground plane is covered with vinyl floor.

The turntable is driven by pneumatic motor, which is capable of supporting a 2000 lb. load. The turntable is flushed with the chamber floor which it is connected to, around its circumference, with a continuous metallic loaded spring. An EMCO Model 1050 Multi-device Controller controls the turntable position.

A pneumatic motor is used to control antenna polarizations and height relative to the ground. The height information is displayed on the control unit EMCO Model 1050.

The control room is an RF shielded enclosure attached to the semi-anechoic chamber with two bulkhead panels for connecting RF, and control cables. The dimension of the room is 7.3 m x 4.9 m x 3 m high and the entrance doors of both control and conducted rooms are 3 feet (0.91 m) by 7 feet (2.13 m).

A diagram of the Semi-Anechoic Chamber Test Site is shown in Figure 2.3.1-1 below:

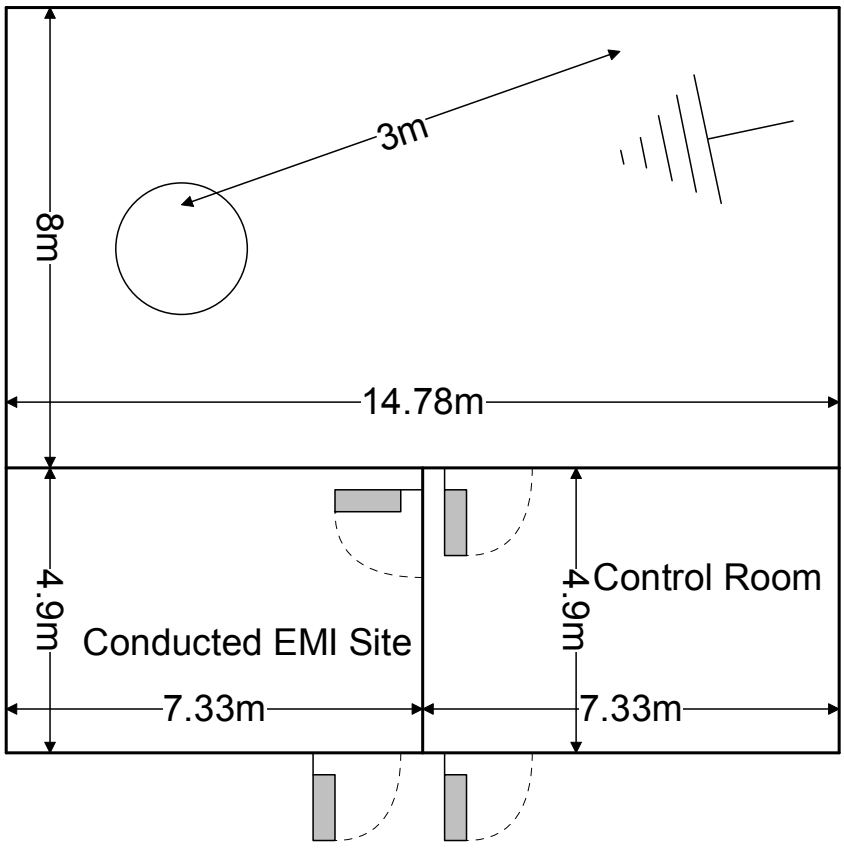


Figure 2.3.1-1: Semi-Anechoic Chamber Test Site

2.3.2 Conducted Emissions Test Site Description

The dimensions of the shielded conducted room are 7.3 x 4.9 x 3 m^3. As per ANSI C63.4 2009 requirements, the data were taken using two LISNs; a Solar Model 8028-50 50 Ω/50 µH and an EMCO Model 3825, which are installed as shown in Photograph 3. For evaluations requiring 220 V, 50 Hz, a Polarad LISN (S/N 879341/048) is used in conjunction with a 1 kVA, 50 Hz/220 V EDGAR variable frequency generator, Model 1001B, to filter conducted noise from the generator.

A diagram of the room is shown below in figure 2.3.2-1:

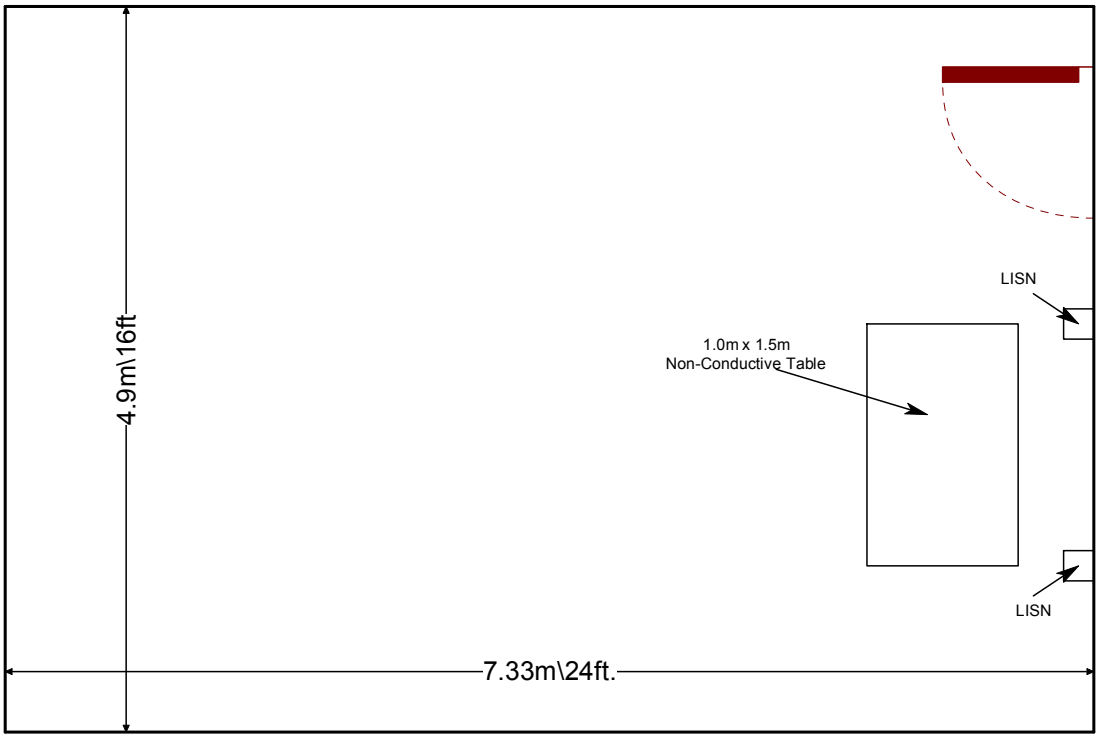


Figure 2.3.2-1: AC Mains Conducted EMI Site

3 APPLICABLE STANDARD REFERENCES

The following standards were used:

- ANSI C63.4-2009: Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9 kHz to 40 GHz.
- ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices.
- US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2015.
- US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2015
- KDB Publication No. 558074 D01 DTS Meas Guidance v03r02 – Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247, June 4, 2014.
- Industry Canada Radio Standards Specification: RSS-210 - Low-power License-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Issue 8 December 2010.
- Industry Canada Radio Standards Specification: RSS-GEN – General Requirements for Compliance of Radio Apparatus, Issue 4, November 2014.

4 LIST OF TEST EQUIPMENT

The calibration interval of test equipment is annually or the manufacturer's recommendations. Where the calibration interval deviates from the annual cycle based on the instrument manufacturer's recommendations, it shall be stated below.

Table 4-1: Test Equipment

AssetID	Manufacturer	Model #	Equipment Type	Serial #	Last Calibration Date	Calibration Due Date
2111	Aeroflex Inmet	40AH2W-20	Attenuator	2111	7/25/2014	7/25/2015
283	Rohde & Schwarz	FSP40	Spectrum Analyzers	1000033	9/18/2013	9/18/2015
523	Agilent	E7405	Spectrum Analyzers	MY45103293	1/8/2013	1/8/2015
523	Agilent	E7405	Spectrum Analyzers	MY45103293	12/26/2014	12/26/2016
2002	EMCO	3108	Antennas	2147	11/22/2013	11/22/2015
2004	EMCO	3146	Antennas	1385	11/22/2013	11/22/2015
2006	EMCO	3115	Antennas	2573	4/24/2013	4/24/2015
2008	COM-Power	AH-826	Antennas	81009	NCR	NCR
2011	Hewlett-Packard	HP 8447D	Amplifiers	2443A03952	12/31/2013	12/31/2014
2011	Hewlett-Packard	HP 8447D	Amplifiers	2443A03952	12/31/2014	12/31/2015
2022	EMCO	LISN3825/2R	LISN	1095	9/9/2013	9/9/2015
2037	ACS Boca	Chamber EMI Cable Set	Cable Set	2037	2/27/2014	2/27/2015
2044	QMI	N/A	Cables	2044	12/31/2013	12/31/2014
2044	QMI	N/A	Cables	2044	12/31/2014	12/31/2015
2045	ACS Boca	Conducted Cable Set	Cable Set	2045	1/1/2014	1/1/2015
2045	ACS Boca	Conducted Cable Set	Cable Set	2045	1/1/2015	1/1/2016
2070	Mini Circuits	VHF-8400+	Filter	2070	12/31/2014	12/31/2015
2070	Mini Circuits	VHF-8400+	Filter	2070	1/1/2014	1/1/2015
2072	Mini Circuits	VHF-3100+	Filter	30737	1/1/2014	1/1/2015
2072	Mini Circuits	VHF-3100+	Filter	30737	12/31/2014	12/31/2015
2082	Teledyne Storm Products	90-010-048	Cables	2082	5/8/2014	5/8/2015
2086	Merrimac	FAN-6-10K	Attenuators	23148-83-1	12/21/2013	12/31/2014
2086	Merrimac	FAN-6-10K	Attenuators	23148-83-1	12/31/2014	12/31/2015
2089	Agilent Technologies, Inc.	83017A	Amplifiers	3123A00214	12/12/2014	12/12/2015
2095	ETS Lindgren	TILE4! - Version 4.2.A	Software	85242	NCR	NCR
3004	Teseq	CFL 9206A	Attenuators	34720	10/21/2013	10/21/2015

Notes:

- **NCR=No Calibration Required**
- **The asset calibration information is provided to cover the entire test period.**

5 SUPPORT EQUIPMENT

Table 5-1: EUT and Support Equipment

Item #	Type Device	Manufacturer	Model/Part #	Serial #
1	EUT	Motorola Solutions	H91TGD9PW7AN	KT00006A01MK4KA127X
2	Dock Charger	Motorola Solutions	NNTN7079A (V3.90)	N/A
3	Power Supply	Motorola Solutions	NU20-C140150-I3	1209

Table 5-2: Cable Description

Cable #	Cable Type	Length	Shield	Termination
A	Power	1.90 m	No	Charger to power Supply
B	Power	1.23 m	No	Power Supply to Extension Cord
C	Extension Cord	1.82 m	No	Power Cord to AC Mains

6 EQUIPMENT UNDER TEST SETUP BLOCK DIAGRAM

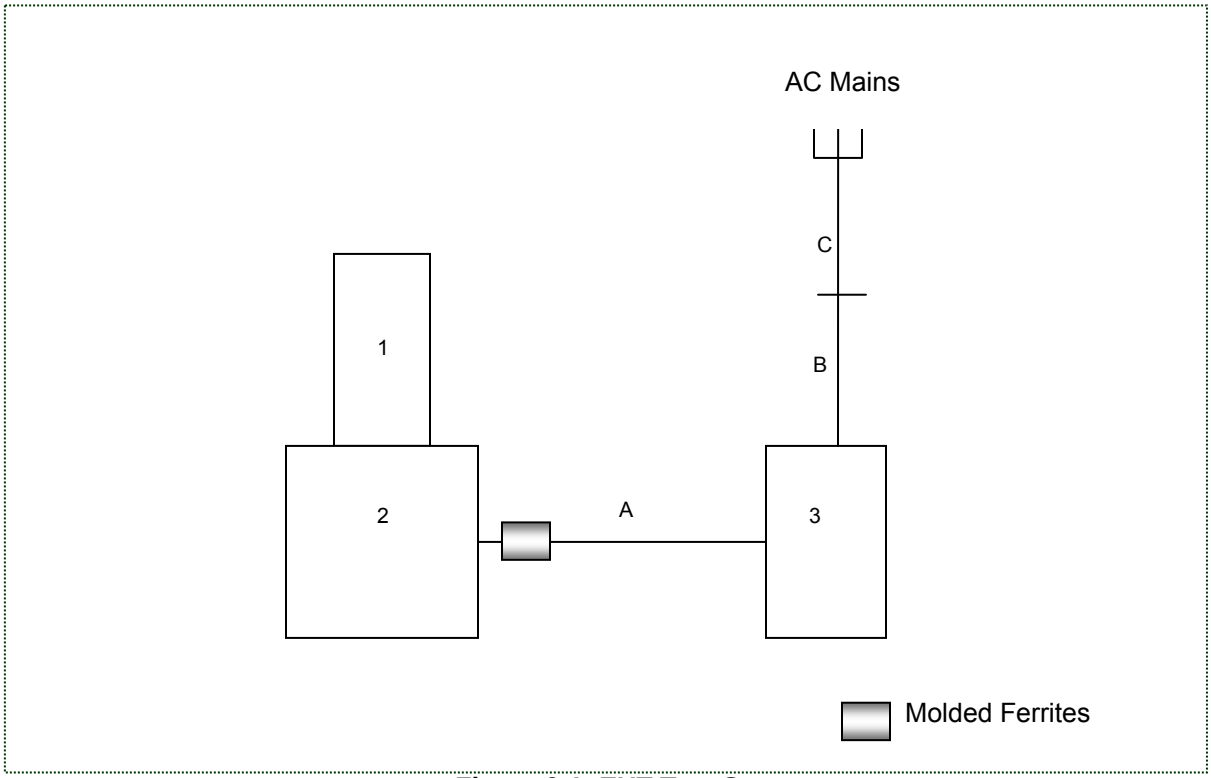


Figure 6-1: EUT Test Setup

7 SUMMARY OF TESTS

Along with the tabular data shown below, plots were taken of all signals deemed important enough to document.

7.1 Antenna Requirement – FCC: Section 15.203

The EUT uses a 2.58 dBi internal PIFA which connects to the RF port via a spring contact. The EUT meets the requirements of FCC 15.203.

7.2 6 dB Bandwidth - FCC: Section 15.247(a)(2) 99% Bandwidth IC: RSS-210 A8.2(a)

7.2.1 Measurement Procedure

The 6dB bandwidth was measured in accordance with the FCC KDB Publication No. 558074 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (47 CFR 15.247)” DTS 6-dB Signal Bandwidth Option 1. The RBW of the spectrum analyzer was set to 100 kHz and VBW 300 kHz. Span was set large enough to capture the entire emissions and >> RBW.

The 99% occupied bandwidth was measured with the spectrum analyzer span set to fully display the emission. The RBW was set to 1% to 5% of the approximated bandwidth. . The occupied 99% bandwidth was measured by using a delta marker at the lower and upper frequencies leading to 0.5% of the total power.

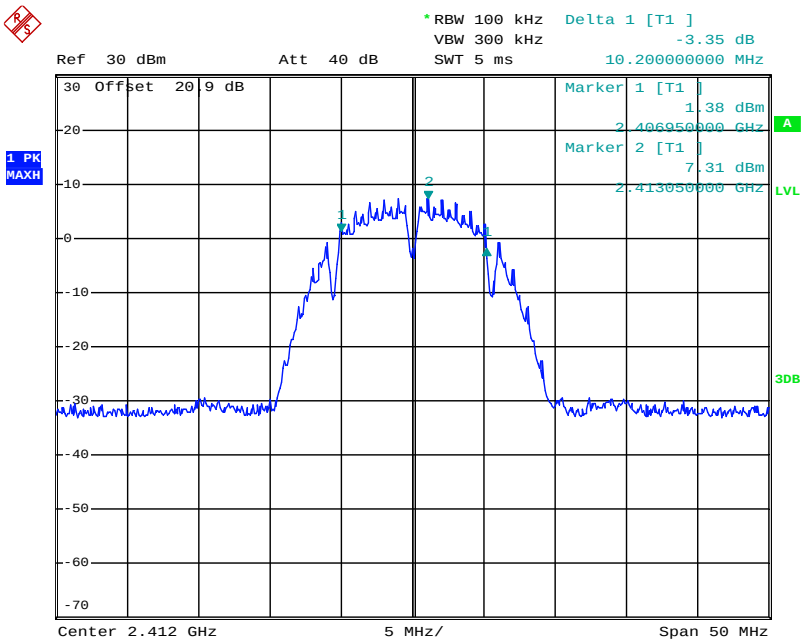
7.2.2 Measurement Results

Results are shown below.

802.11b

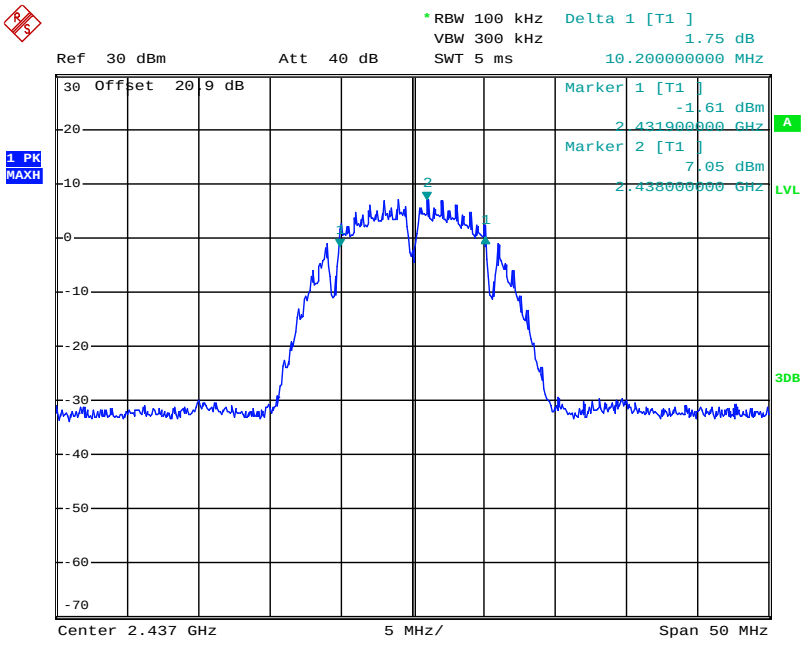
Table 7.2.2-1: 6dB / 20dB / 99% Bandwidth

Frequency [MHz]	6dB Bandwidth [MHz]	20dB Bandwidth [MHz]	99% Bandwidth (MHz)
2412	10.2000	16.1188	13.7000
2437	10.2000	16.2700	13.7000
2462	10.2000	16.2313	13.7000



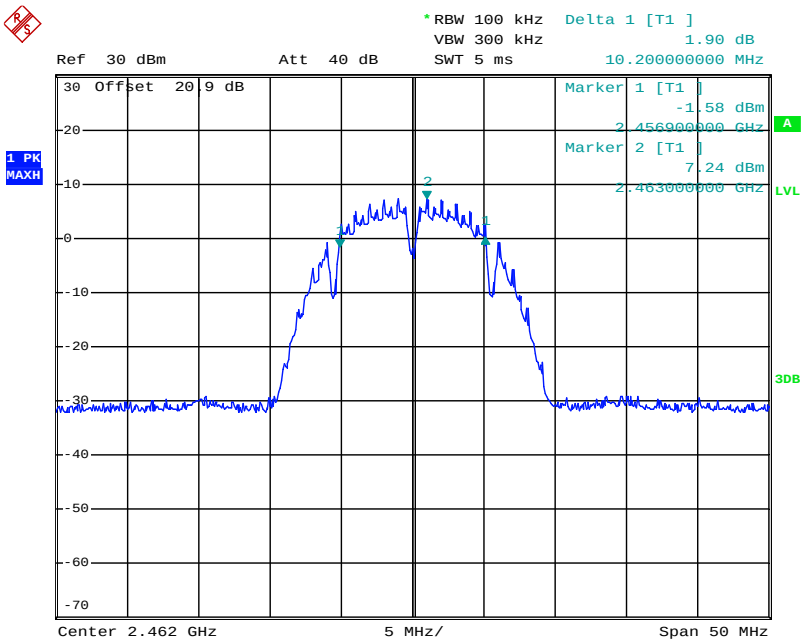
Date: 2.JAN.2015 19:59:20

Figure 7.2.2-1: 6dB BW - Low Channel



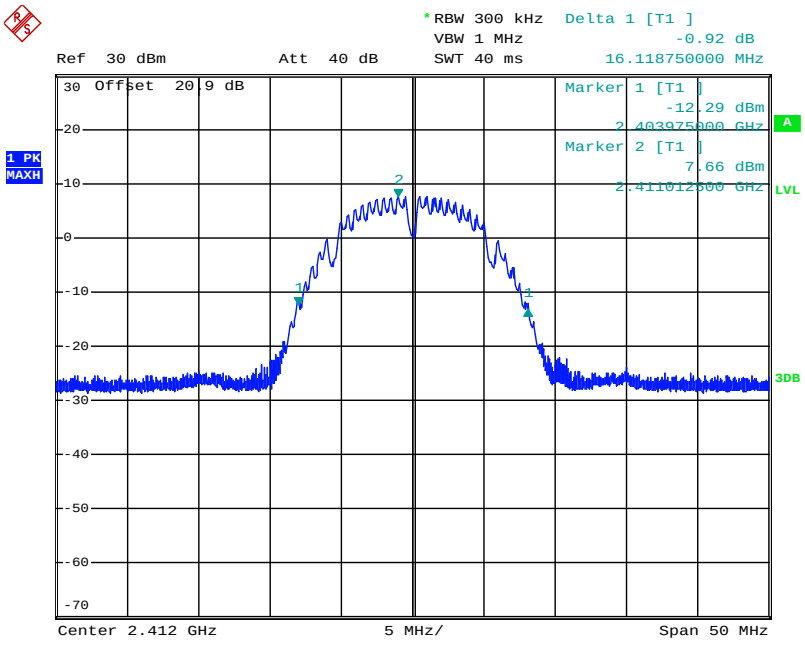
Date: 2.JAN.2015 19:54:03

Figure 7.2.2-2: 6dB BW - Middle Channel



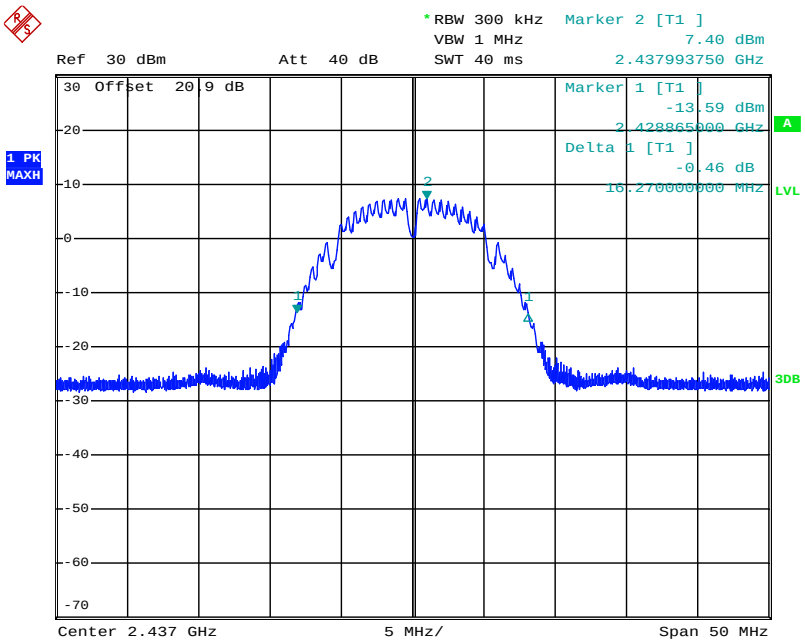
Date: 2.JAN.2015 18:44:12

Figure 7.2.2-3: 6dB BW - High Channel



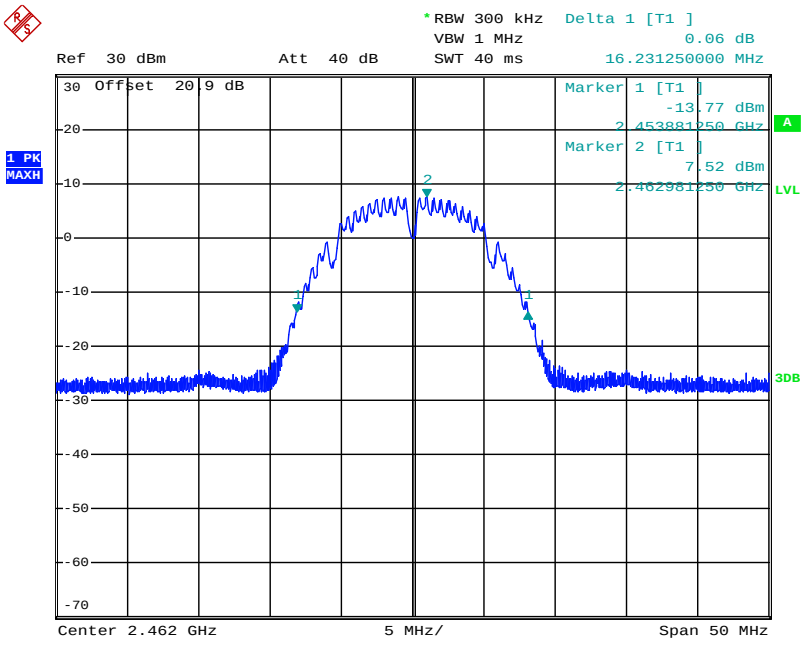
Date: 2.JAN.2015 16:38:02

Figure 7.2.2-4: 20dB BW - Low Channel



Date: 19.DEC.2014 17:44:27

Figure 7.2.2-5: 20dB BW - Middle Channel



Date: 2.JAN.2015 16:49:44

Figure 7.2.2-6: 20dB BW - High Channel

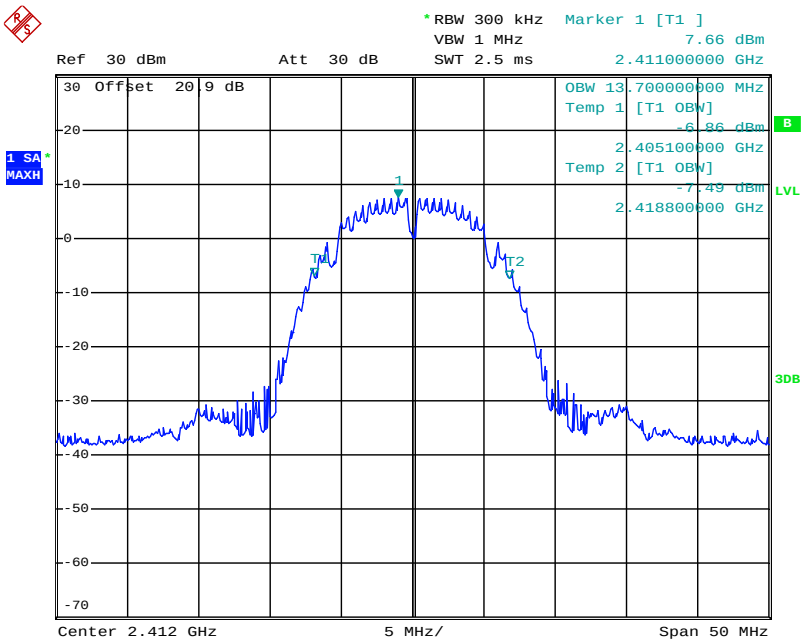


Figure 7.2.2-7: 99% OBW - Low Channel

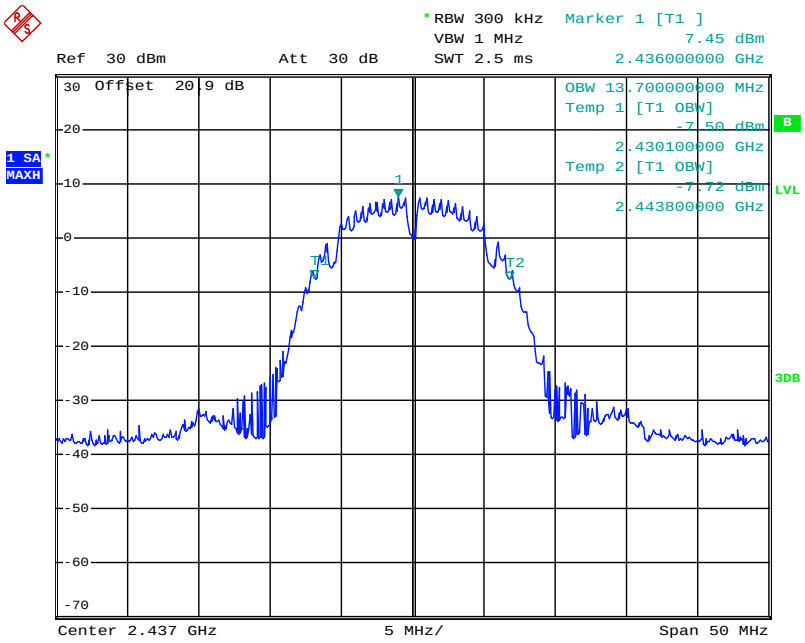
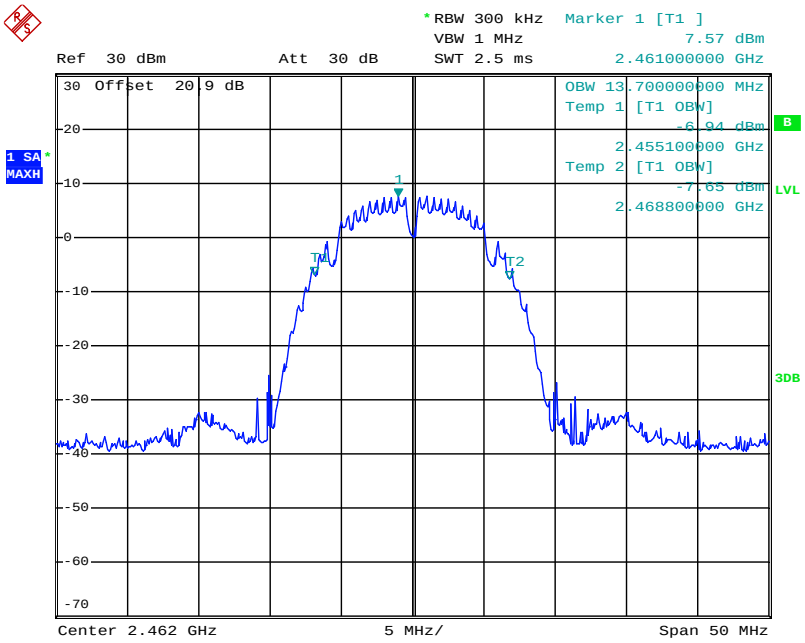


Figure 7.2.2-8: 99% OBW - Middle Channel



Date: 2.JAN.2015 19:46:11

Figure 7.2.2-9: 99% OBW - High Channel

802.11g

Table 7.2.2-2: 6dB / 20dB / 99% Bandwidth

Frequency [MHz]	6dB Bandwidth [MHz]	20dB Bandwidth [MHz]	99% Bandwidth (MHz)
2412	16.5000	19.4625	17.0000
2437	16.4500	19.5250	16.9000
2462	16.4500	19.6000	16.9000

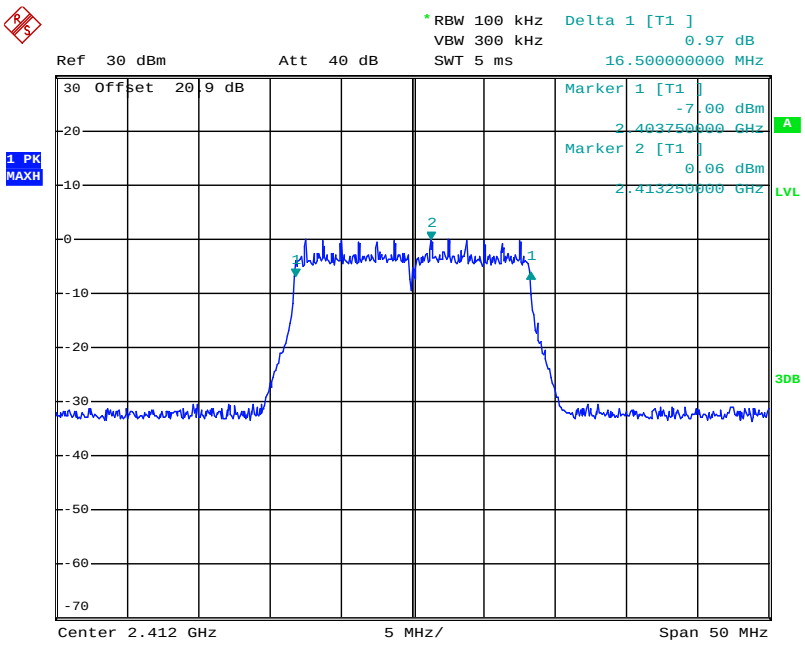
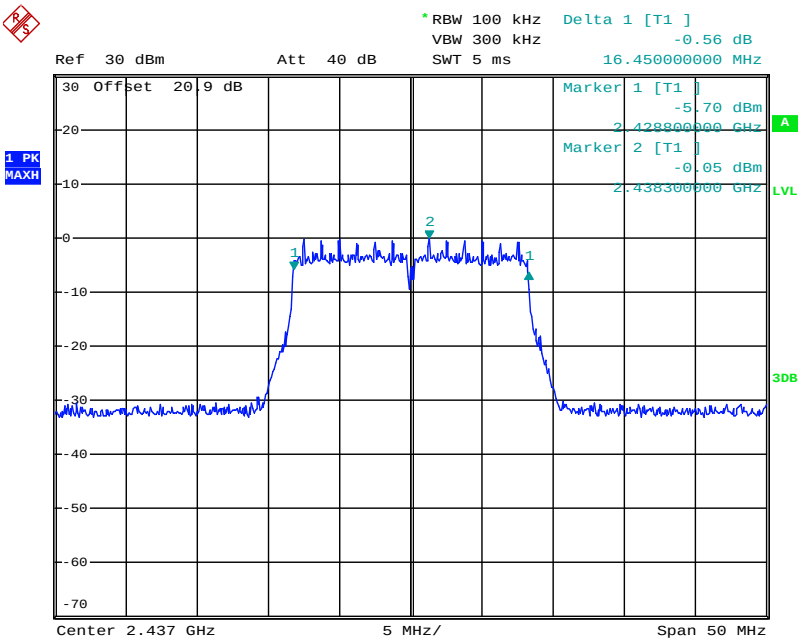
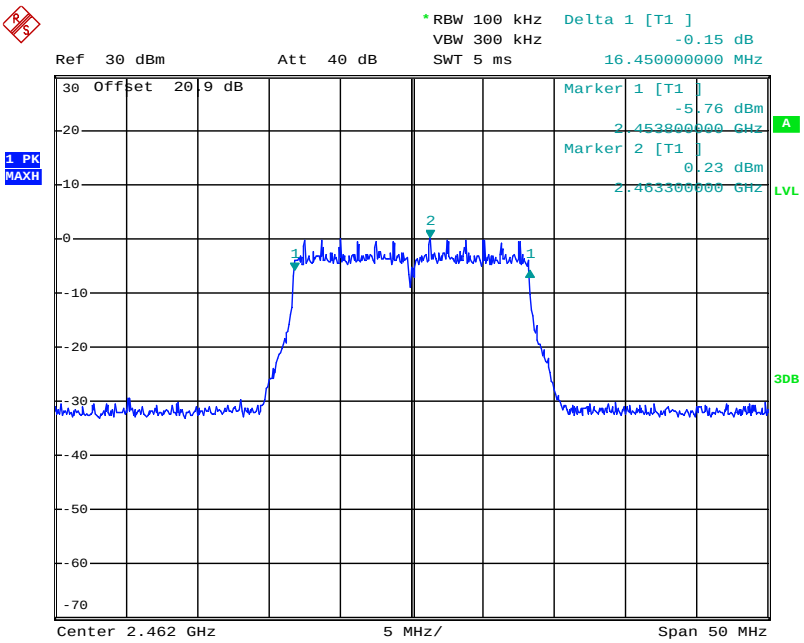


Figure 7.2.2-10: 6dB BW - Low Channel



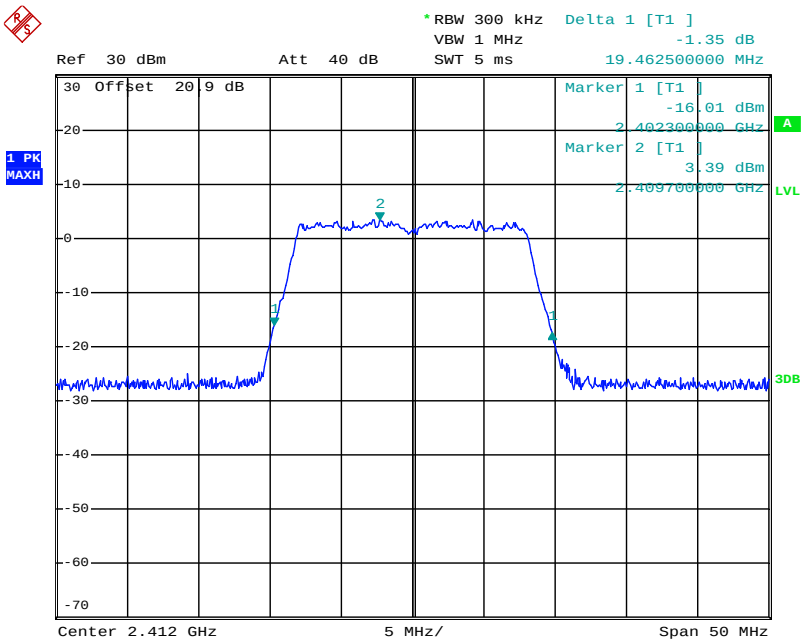
Date: 2.JAN.2015 18:12:07

Figure 7.2.2-11: 6dB BW - Middle Channel



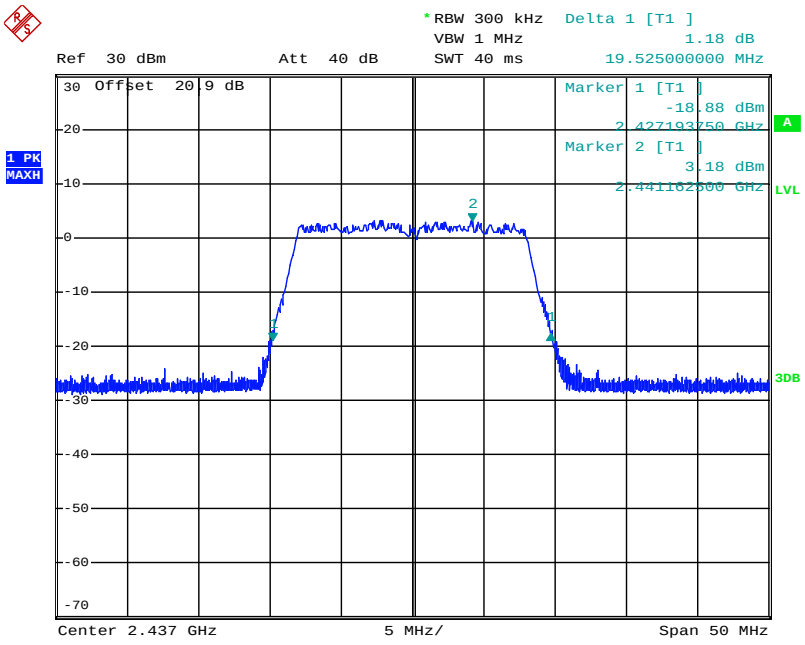
Date: 2.JAN.2015 18:23:18

Figure 7.2.2-12: 6dB BW - High Channel



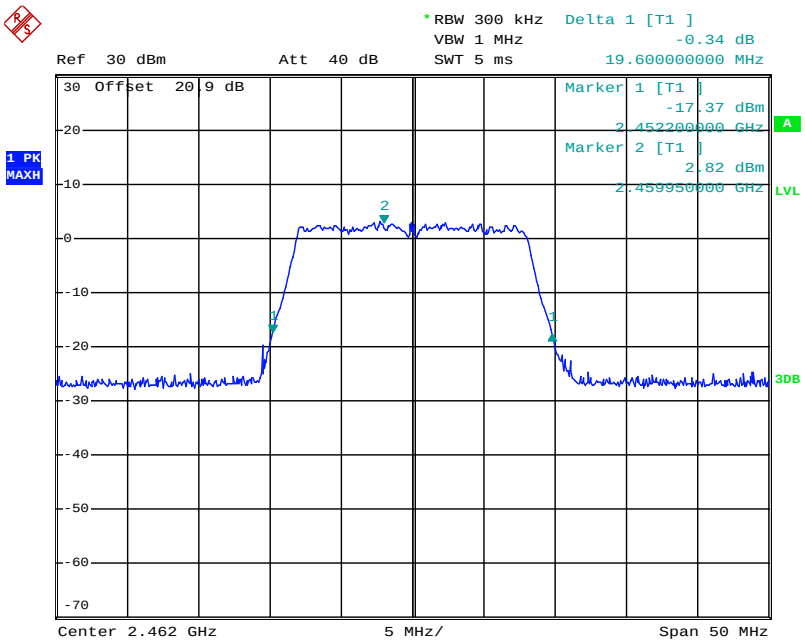
Date: 2.JAN.2015 16:57:36

Figure 7.2.2-13: 20dB BW - Low Channel



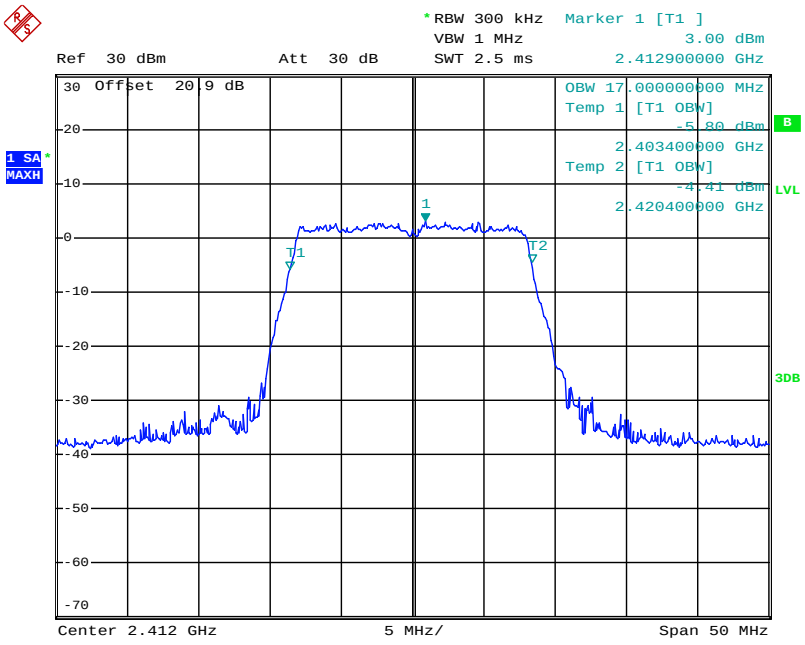
Date: 19.DEC.2014 18:38:31

Figure 7.2.2-14: 20dB BW - Middle Channel



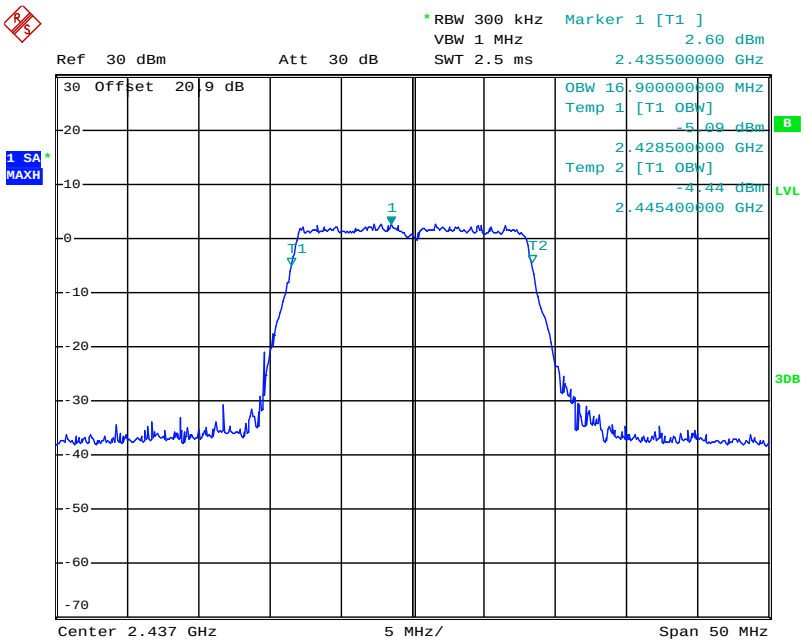
Date: 2.JAN.2015 17:05:31

Figure 7.2.2-15: 20dB BW - High Channel



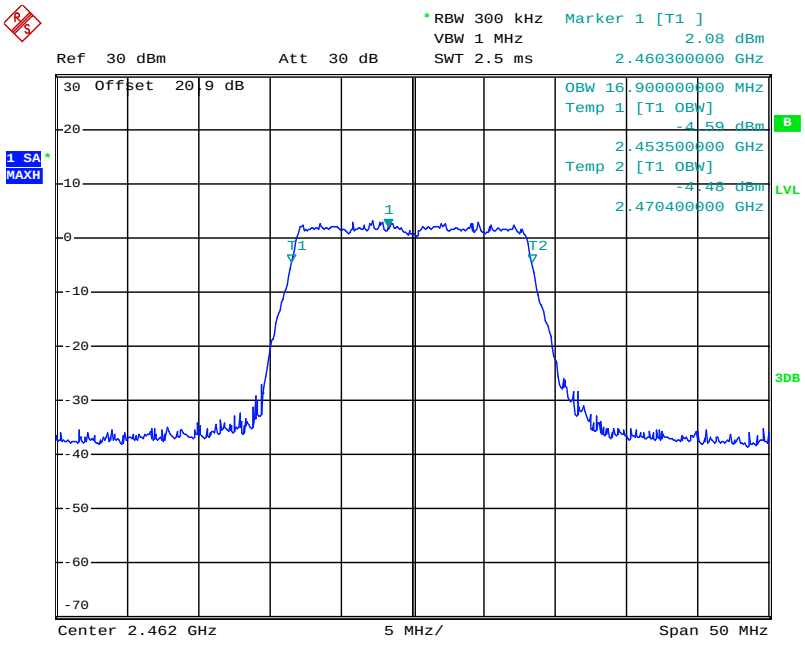
Date: 2.JAN.2015 18:05:22

Figure 7.2.2-16: 99% OBW - Low Channel



Date: 2.JAN.2015 18:14:47

Figure 7.2.2-17: 99% OBW - Middle Channel



Date: 2.JAN.2015 18:17:57

Figure 7.2.2-18: 99% OBW - High Channel

802.11n 20 MHz

Table 7.2.2-3: 6dB / 20dB / 99% Bandwidth

Frequency [MHz]	6dB Bandwidth [MHz]	20dB Bandwidth [MHz]	99% Bandwidth (MHz)
2412	17.8000	20.2000	18.1000
2437	17.8000	20.4000	18.1000
2462	17.8000	20.3500	18.0000

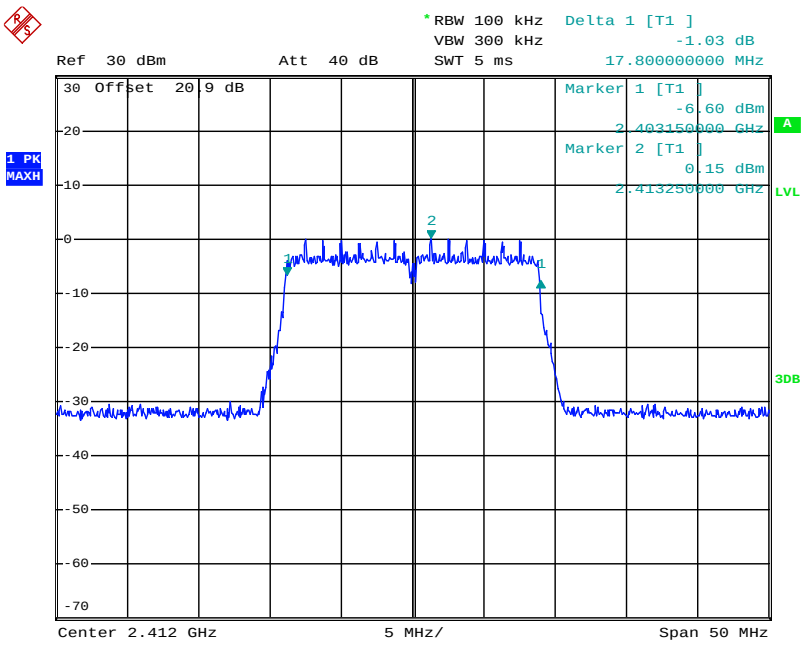
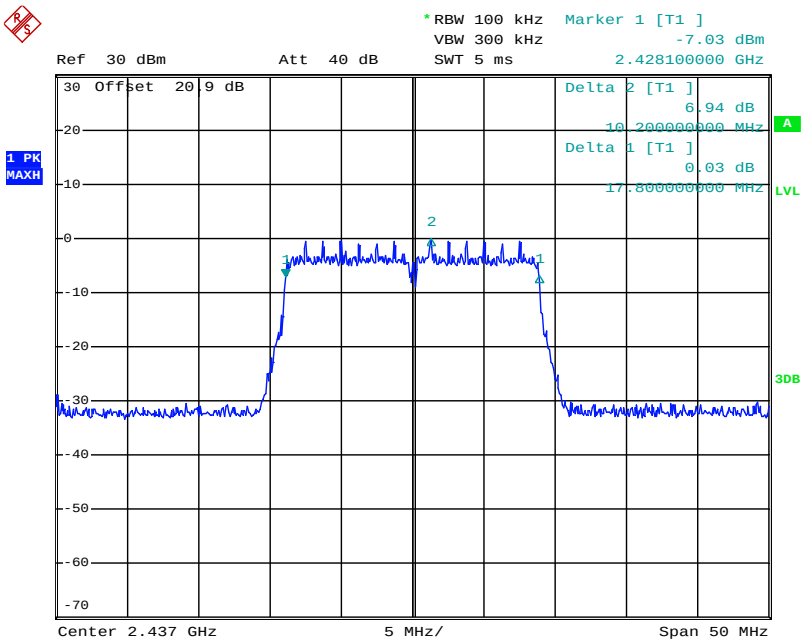
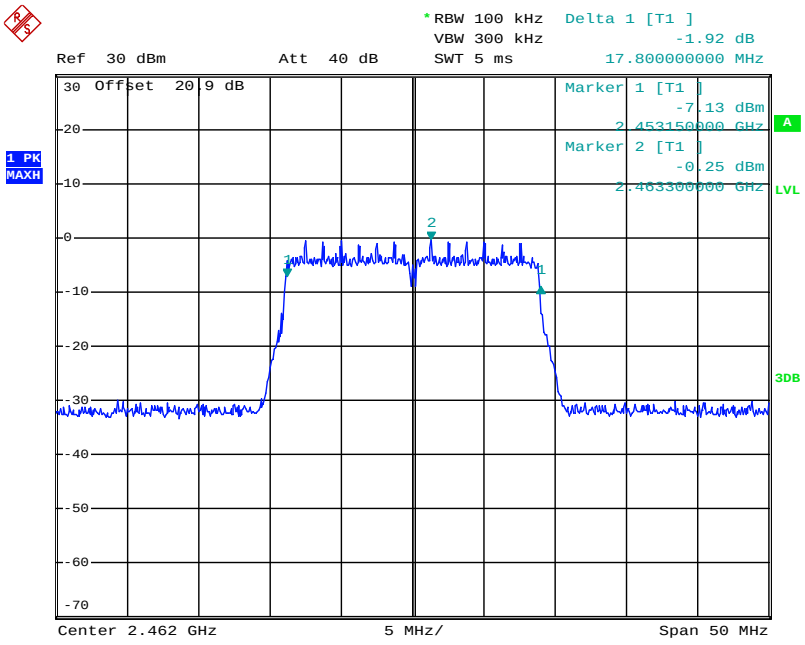


Figure 7.2.2-19: 6dB BW - Low Channel



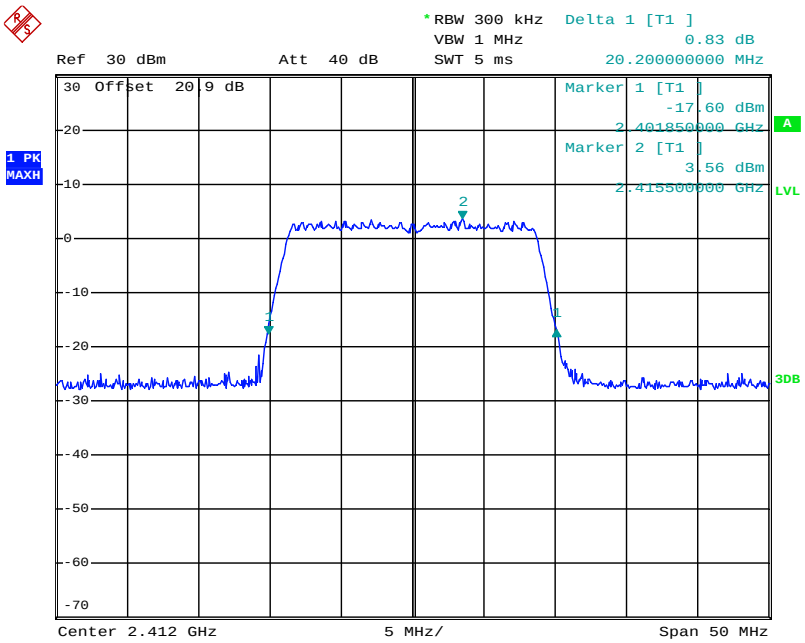
Date: 2.JAN.2015 17:55:35

Figure 7.2.2-20: 6dB BW - Middle Channel



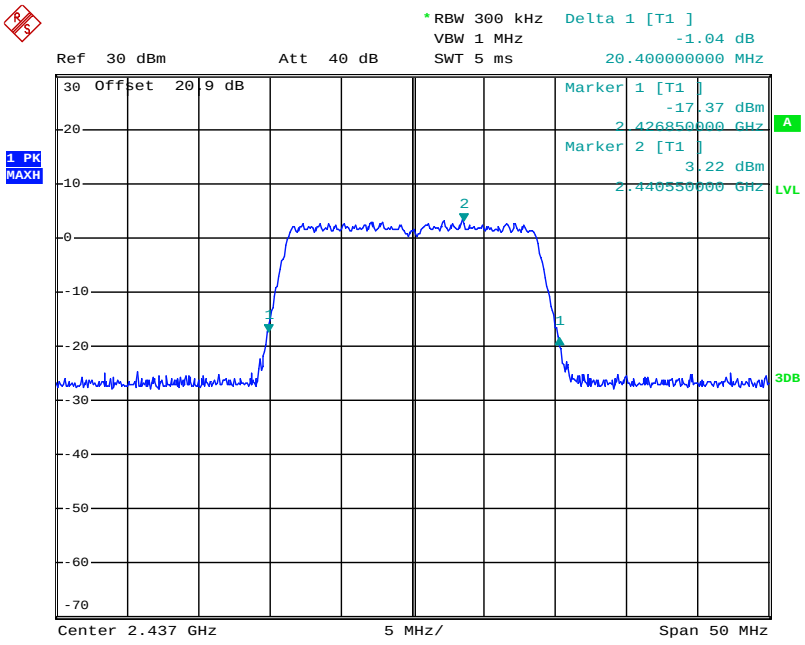
Date: 2.JAN.2015 17:42:48

Figure 7.2.2-21: 6dB BW - High Channel



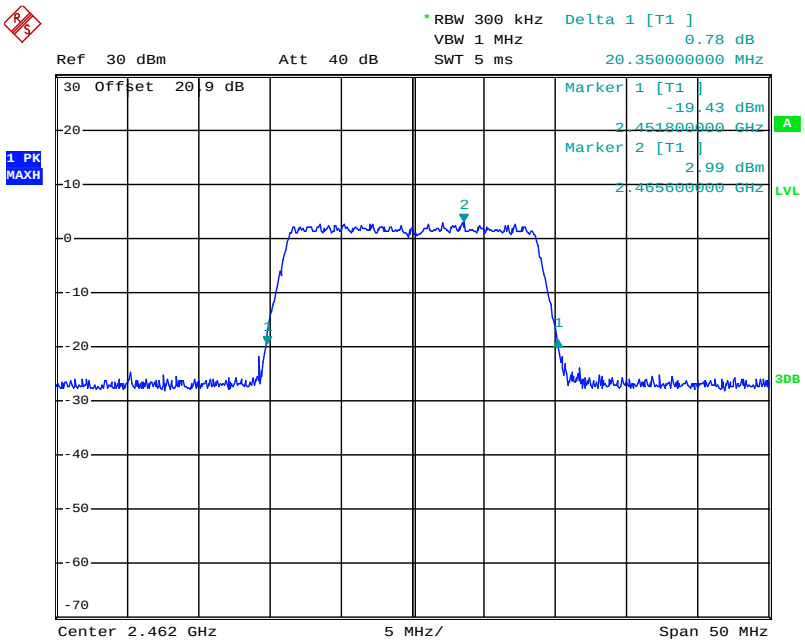
Date: 2.JAN.2015 17:12:17

Figure 7.2.2-22: 20dB BW - Low Channel



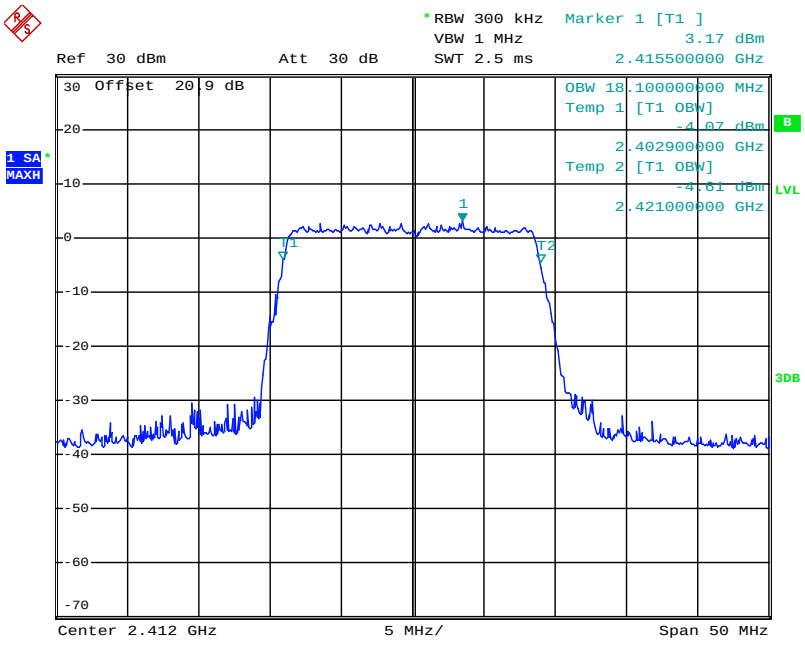
Date: 19.DEC.2014 23:07:32

Figure 7.2.2-23: 20dB BW - Middle Channel



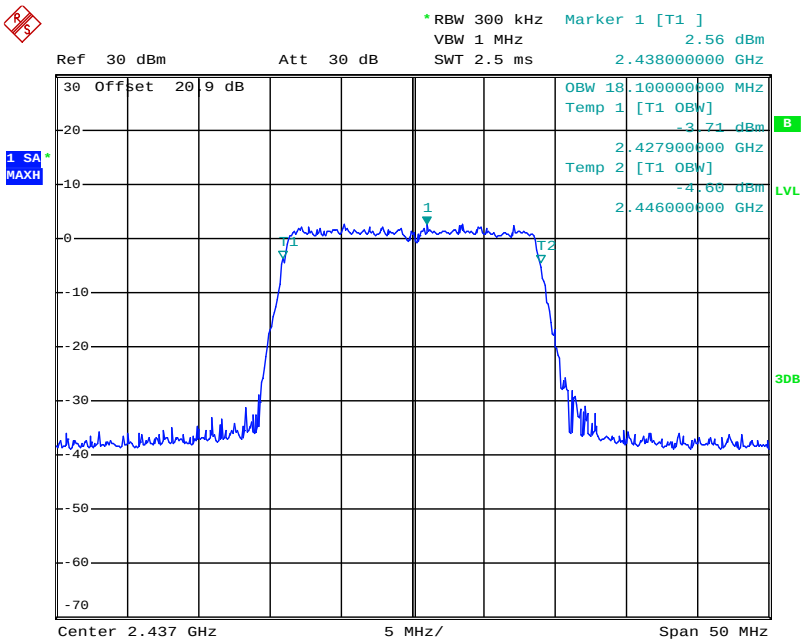
Date: 2.JAN.2015 17:16:34

Figure 7.2.2-24: 20dB BW - High Channel



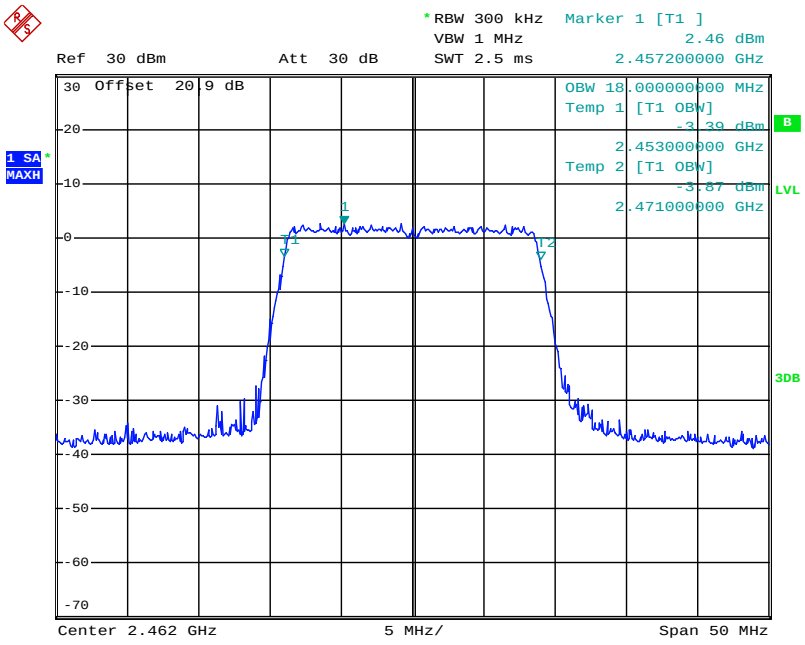
Date: 2.JAN.2015 18:02:26

Figure 7.2.2-25: 99% OBW - Low Channel



Date: 2.JAN.2015 17:52:16

Figure 7.2.2-26: 99% OBW - Middle Channel



Date: 2.JAN.2015 17:49:49

Figure 7.2.2-27: 99% OBW - High Channel

7.3 Peak Output Power - FCC Section 15.247(b)(3) IC: RSS-210 A8.4(4)

7.3.1 Measurement Procedure (Conducted Method)

The Peak Output Power was measured in accordance with the FCC KDB Publication No. 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (47 CFR 15.247)" Section 9.2.2.2 Method AVGSA-1 (trace averaging with the EUT transmitting at full power throughout each sweep). The RF output of the equipment under test was directly connected to the input of the spectrum analyzer through suitable attenuation.

7.3.2 Measurement Results

Results are shown below.

802.11b

Table 7.3.2-1: RF Output Power

Frequency [MHz]	Level [dBm]
2412	15.99
2437	15.90
2462	15.93

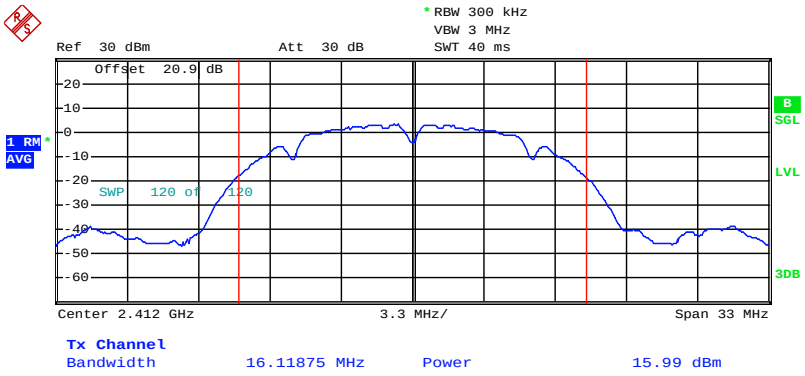
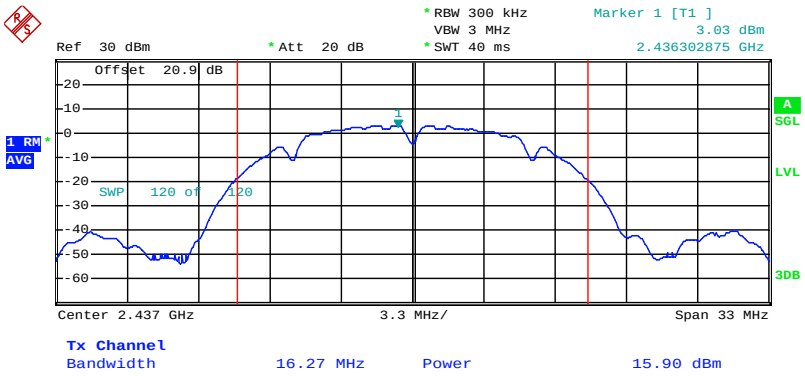
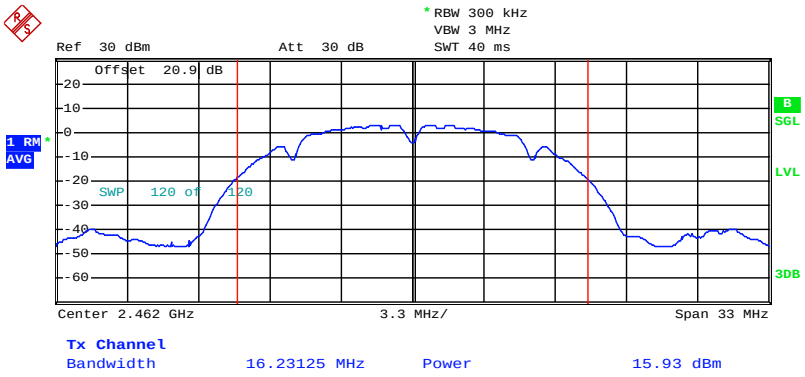


Figure 7.3.2-1: RF Output Power - Low Channel



Date: 20.DEC.2014 13:10:47

Figure 7.3.2-2: RF Output Power - Middle Channel



Date: 2.JAN.2015 16:51:24

Figure 7.3.2-3: RF Output Power - High Channel

802.11g

Table 7.3.2-2: RF Output Power

Frequency [MHz]	Level [dBm]
2412	11.57
2437	10.95
2462	11.04

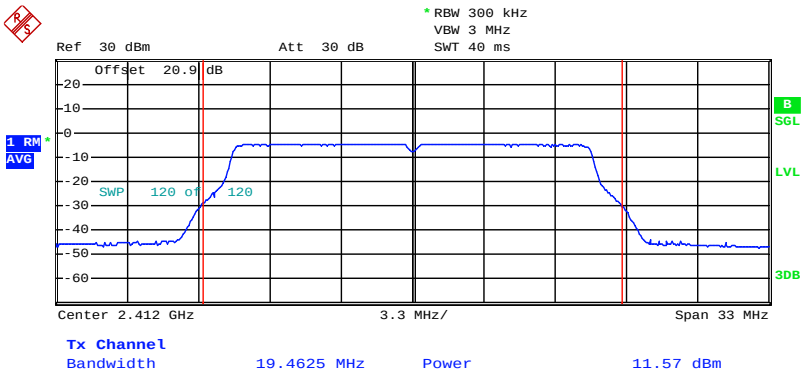
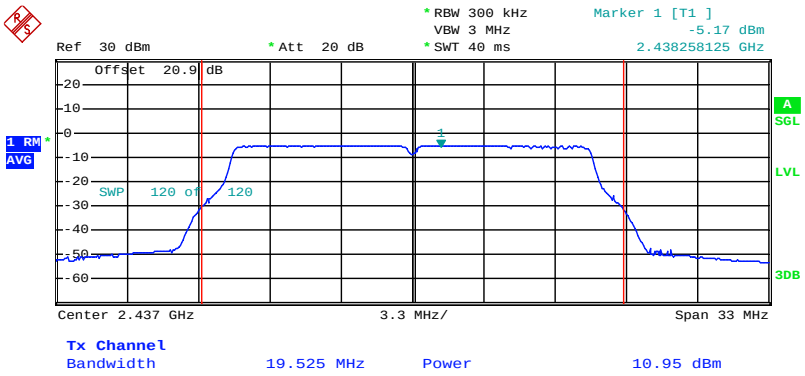
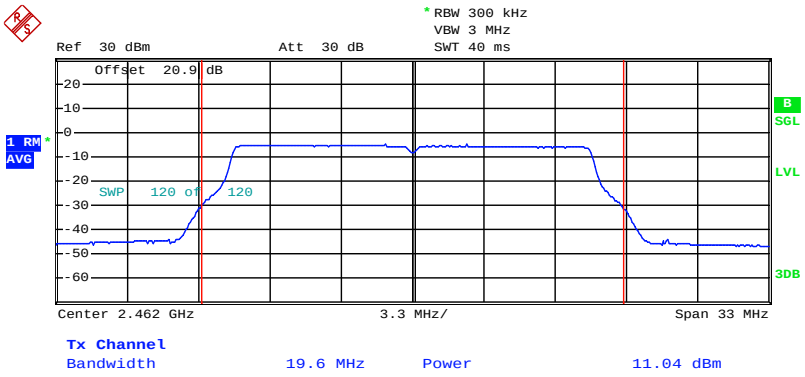


Figure 7.3.2-4: RF Output Power - Low Channel



Date: 20.DEC.2014 13:22:08

Figure 7.3.2-5: RF Output Power - Middle Channel



Date: 2.JAN.2015 17:06:48

Figure 7.3.2-6: RF Output Power - High Channel

802.11n 20 MHz

Table 7.3.2-3: RF Output Power

Frequency [MHz]	Level [dBm]
2412	11.56
2437	10.84
2462	11.05

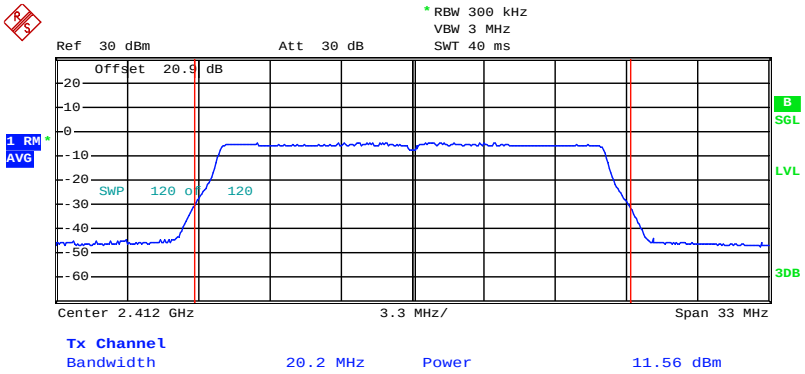
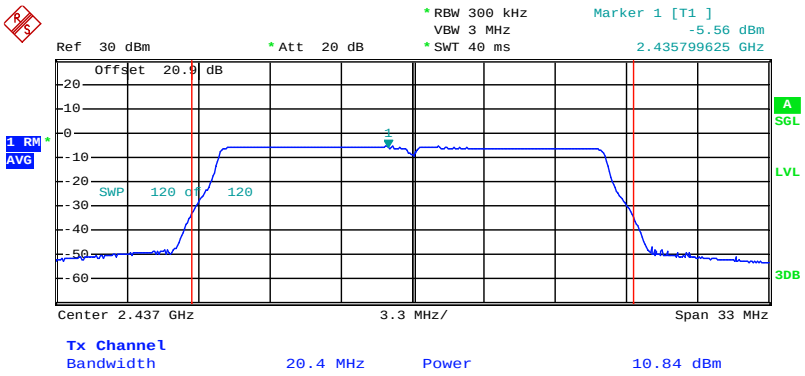
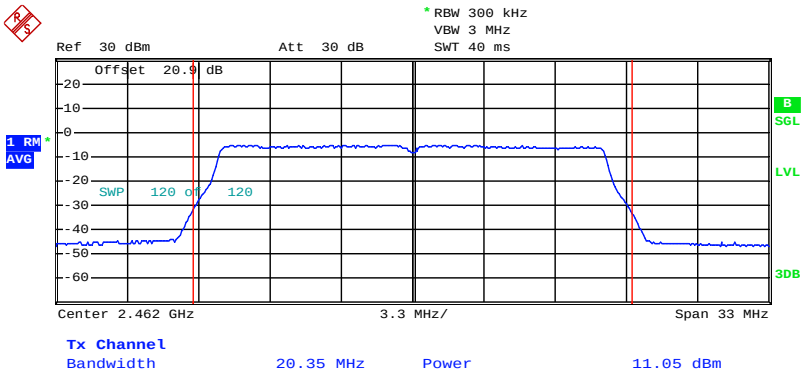


Figure 7.3.2-7: RF Output Power - Low Channel



Date: 20.DEC.2014 13:46:02

Figure 7.3.2-8: RF Output Power - Middle Channel



Date: 2.JAN.2015 17:21:22

Figure 7.3.2-9: RF Output Power - High Channel

7.4 Band-Edge Compliance and Spurious Emissions-FCC 15.247(d) IC: RSS-210 A8.5

7.4.1 Band-Edge Compliance of RF Conducted Emissions

7.4.1.1 Measurement Procedure

The RF output port of the EUT was directly connected to the input of the spectrum analyzer via suitable attenuation. The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. For each measurement the spectrum analyzer's RBW was set to 100 kHz, and the VBW was set to 300 kHz.

7.4.1.2 Measurement Results

Results are shown below.

802.11b

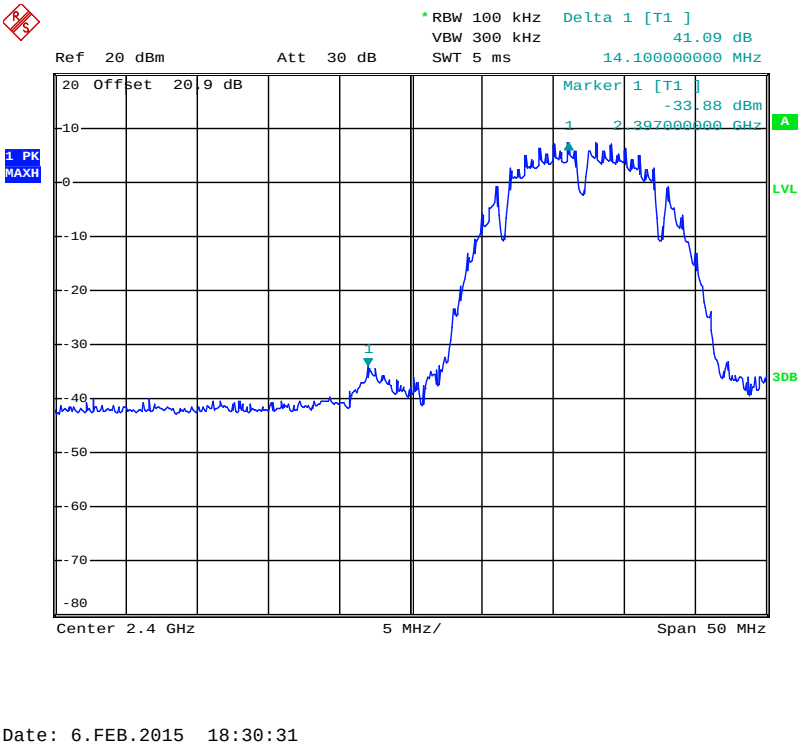


Figure 7.4.1.2-1: Lower Band-edge

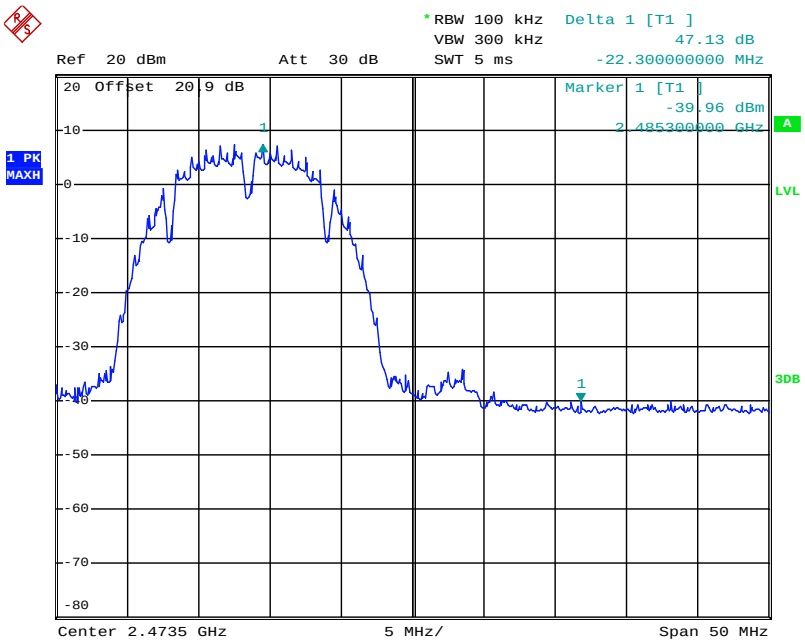
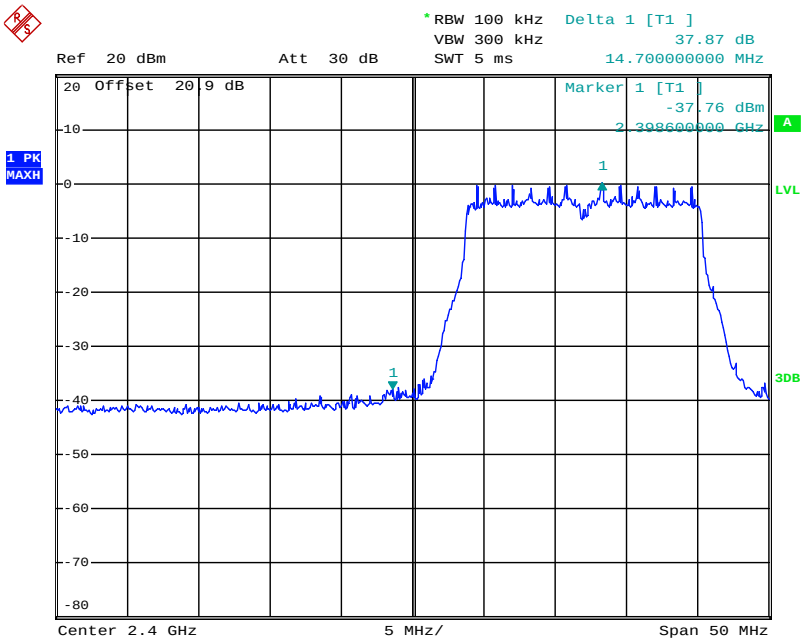


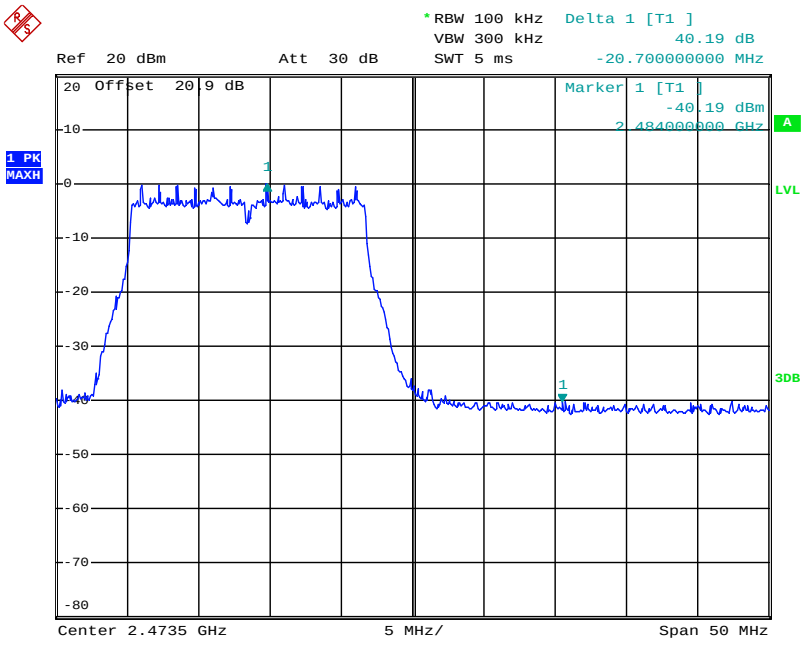
Figure 7.4.1.2-2: Upper Band-edge

802.11g



Date: 6.FEB.2015 18:09:24

Figure 7.4.1.2-3: Lower Band-edge



Date: 6.FEB.2015 18:20:14

Figure 7.4.1.2-4: Upper Band-edge

802.11n 20 MHz

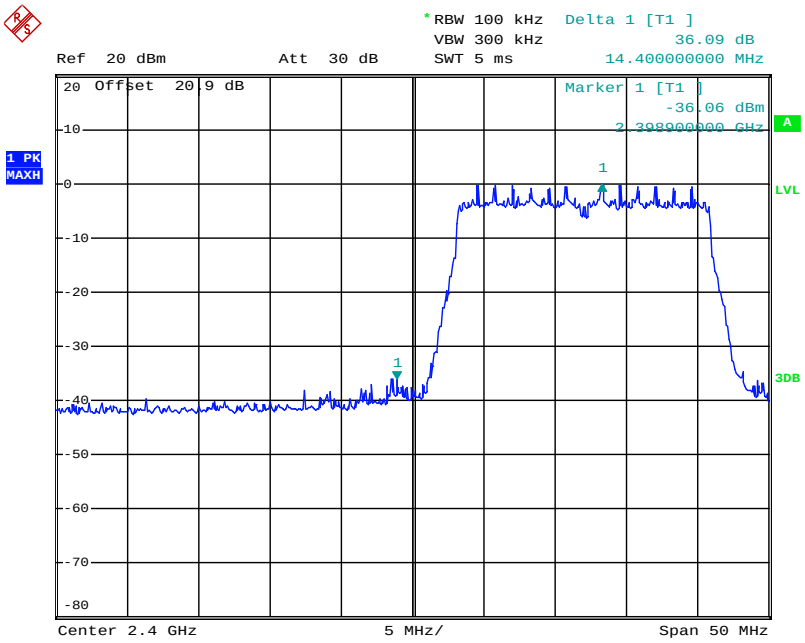


Figure 7.4.1.2-5: Lower Band-edge

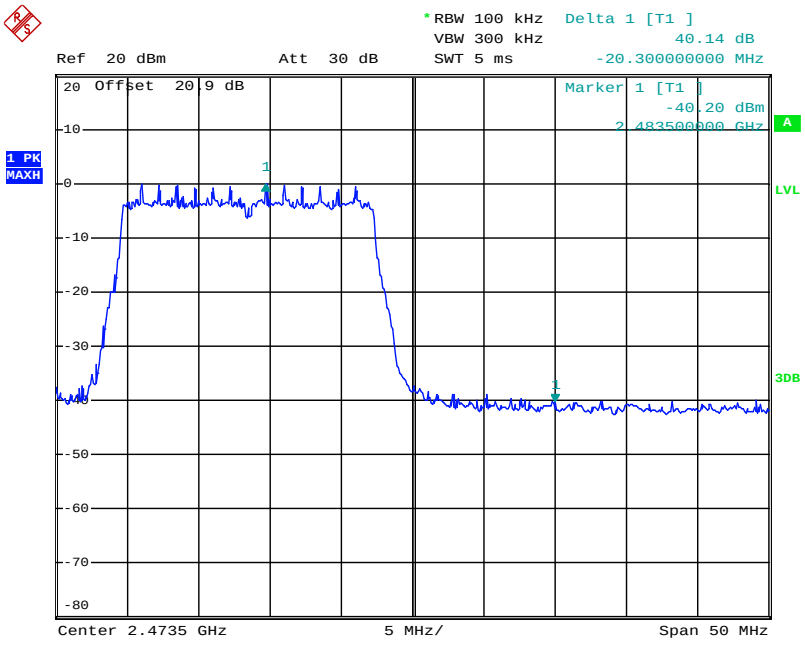


Figure 7.4.1.2-6: Upper Band-edge

7.4.2 RF Conducted Spurious Emissions

7.4.2.1 Measurement Procedure

The RF Conducted Spurious Emissions were measured in accordance with the FCC KDB Publication No. 558074 “Guidance for Performing Compliance Measurements on Digital Transmission Systems (47 CFR 15.247)”. The RF output port of the equipment under test was directly connected to the input of the spectrum analyzer. The EUT was investigated for conducted spurious emissions from 30MHz to 26 GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center and high channels of the EUT. For each measurement, the spectrum analyzer’s RBW was set to 100 kHz and the VBW was set to 300 kHz. The peak Max Hold function of the analyzer was utilized. The reference level was determined by measuring the Peak PSD level in any 100 kHz bandwidth within the DTS channel bandwidth.

7.4.2.2 Measurement Results

Results are shown below.

802.11b

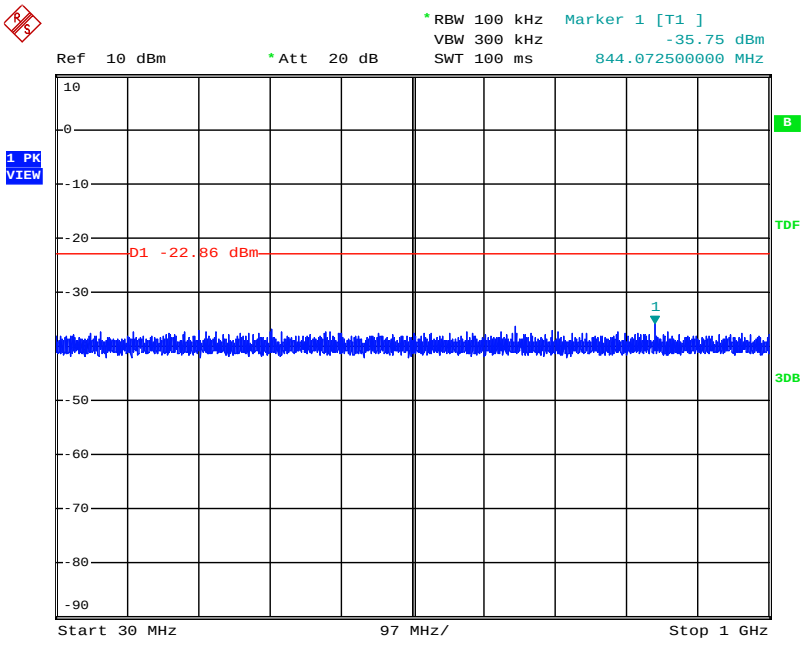
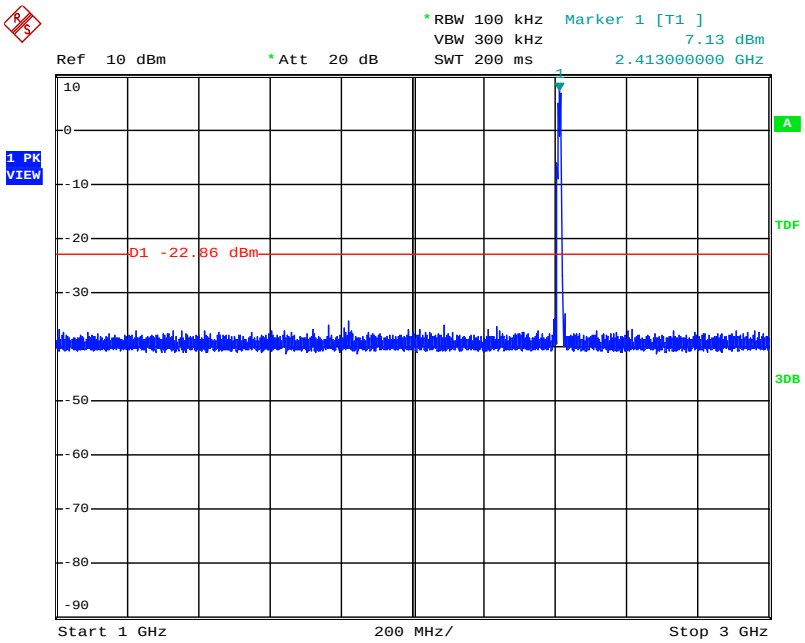
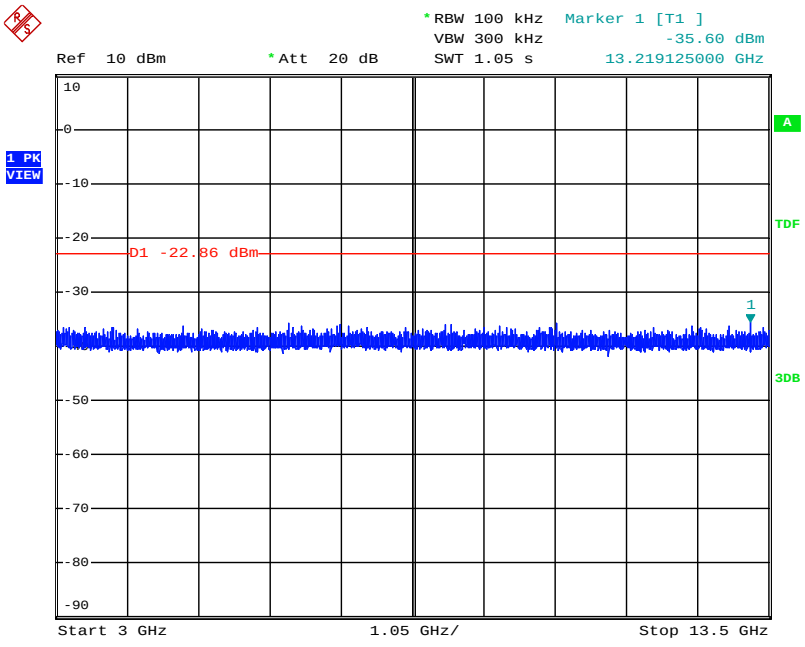


Figure 7.4.2.2-1: 30 MHz – 1 GHz – Low Channel



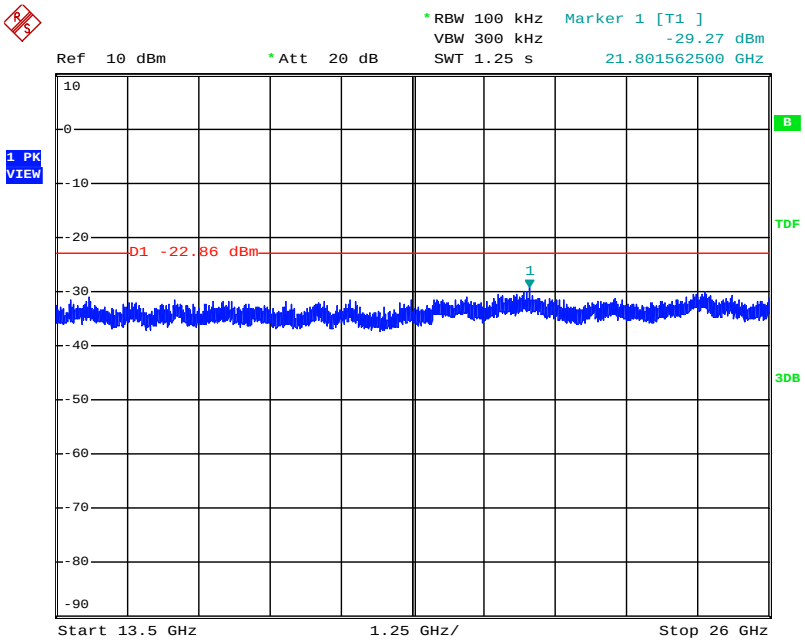
Date: 6.FEB.2015 18:44:09

Figure 7.4.2.2-2: 1 GHz –3 GHz – Low Channel



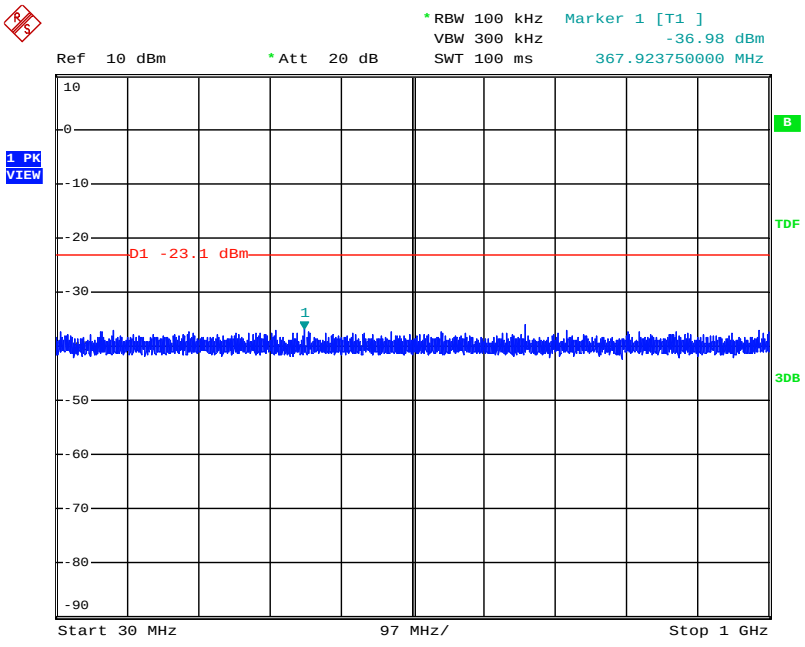
Date: 6.FEB.2015 18:48:10

Figure 7.4.2.2-3: 3 GHz –13.5 GHz – Low Channel



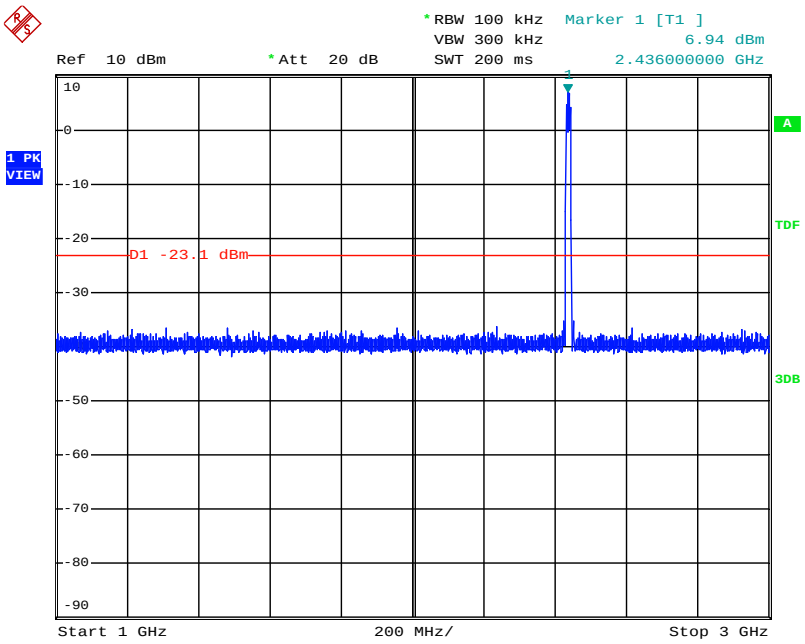
Date: 6.FEB.2015 18:47:41

Figure 7.4.2.2-4: 13.5 GHz – 26 GHz – Low Channel



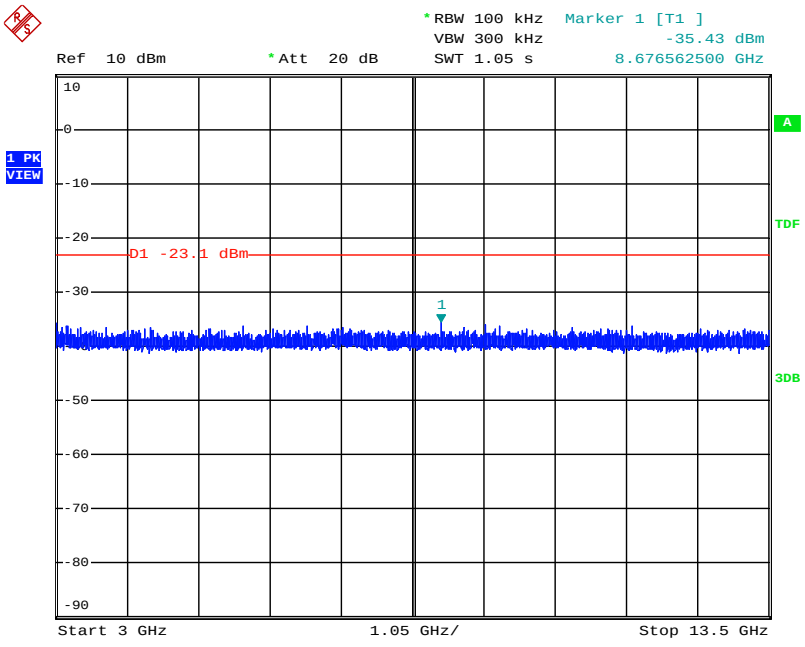
Date: 6.FEB.2015 18:56:50

Figure 7.4.2.2-5: 30 MHz – 1 GHz –Middle Channel



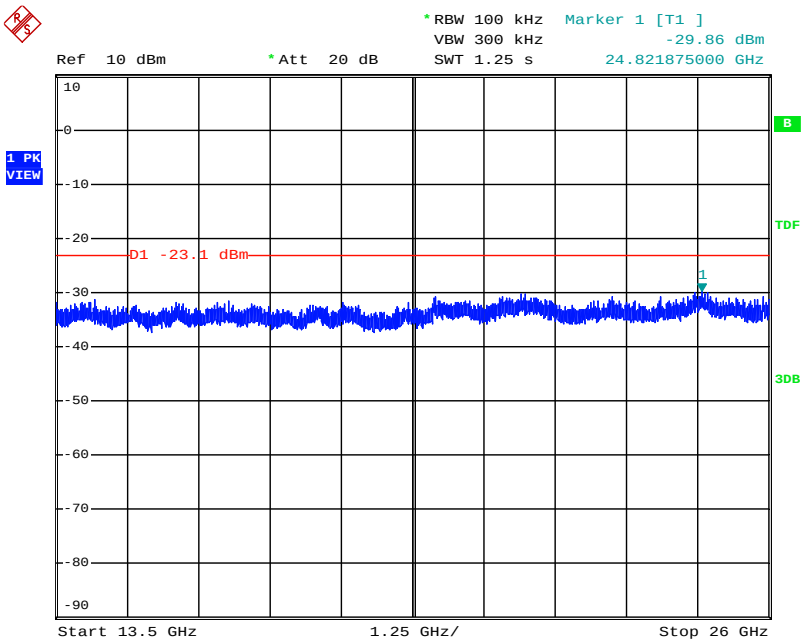
Date: 6.FEB.2015 18:57:09

Figure 7.4.2.2-6: 1 GHz –3 GHz – Middle Channel



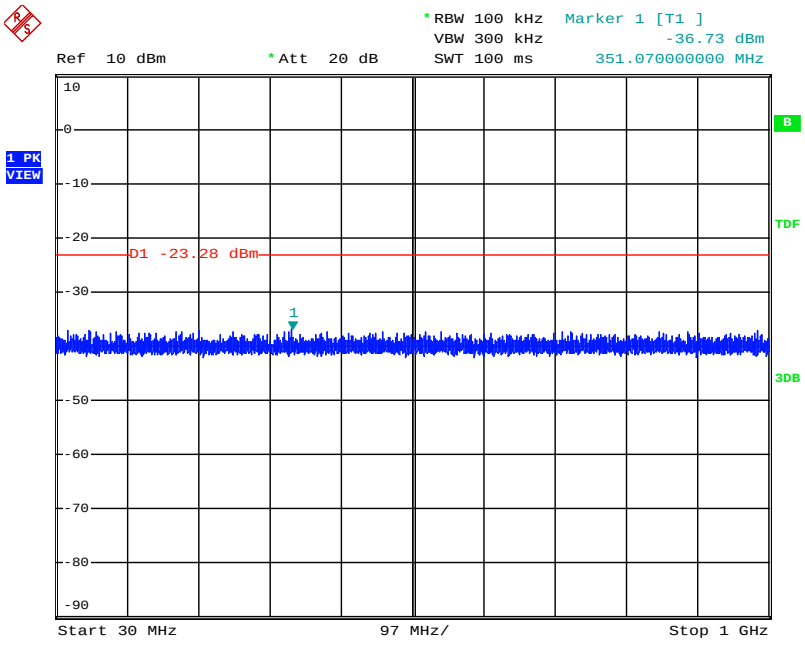
Date: 6.FEB.2015 18:52:44

Figure 7.4.2.2-7: 3 GHz –13.5 GHz – Middle Channel



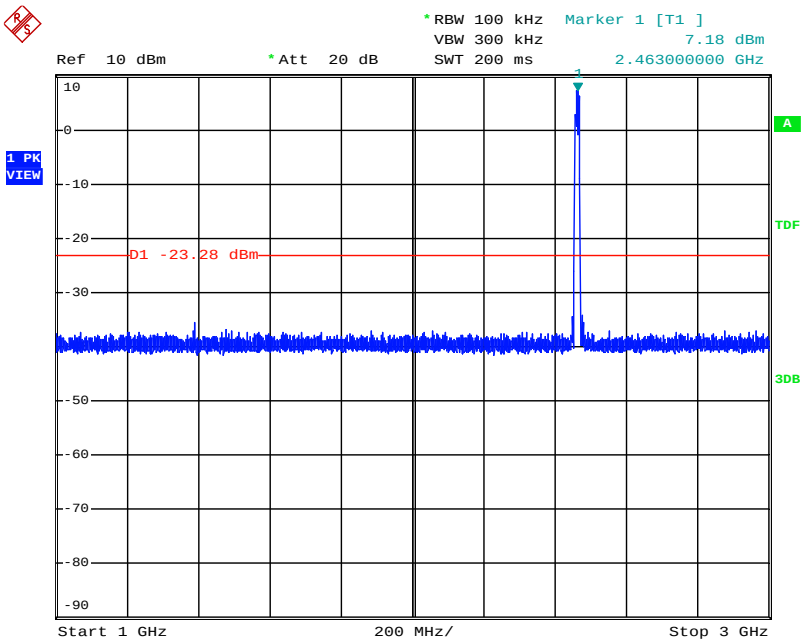
Date: 6.FEB.2015 18:53:04

Figure 7.4.2.2-8: 13.5 GHz – 26 GHz – Middle Channel



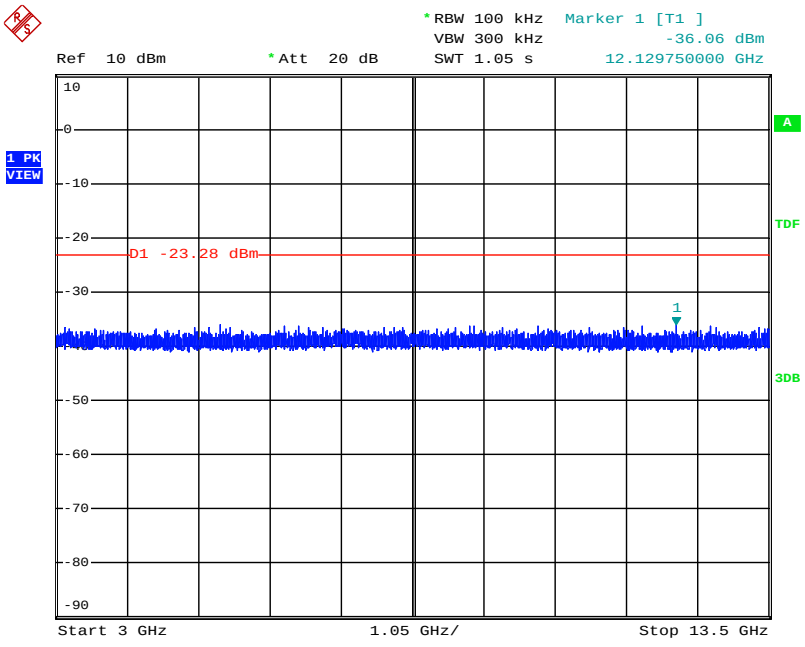
Date: 6.FEB.2015 19:02:24

Figure 7.4.2.2-9: 30 MHz – 1 GHz – High Channel



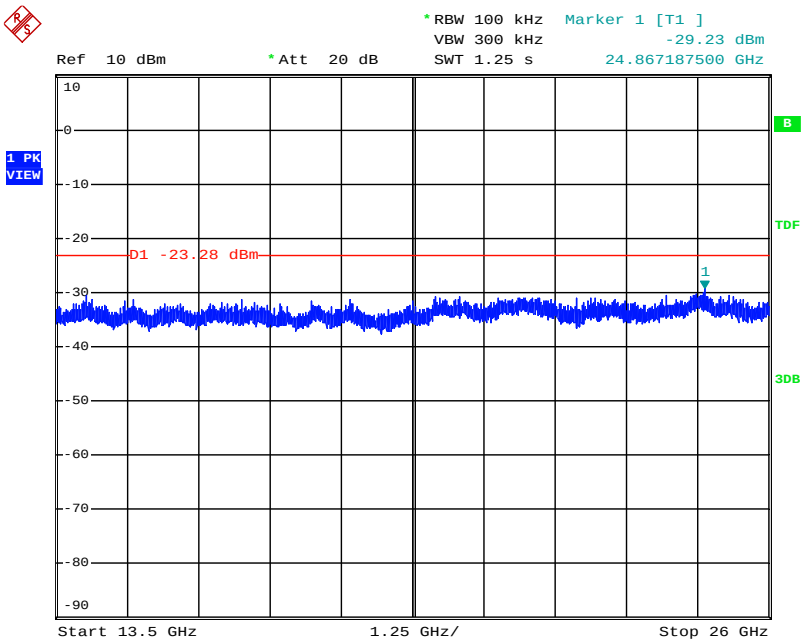
Date: 6.FEB.2015 19:02:47

Figure 7.4.2.2-10: 1 GHz –3 GHz –High Channel



Date: 6.FEB.2015 19:06:24

Figure 7.4.2.2-11: 3 GHz – 13.5 GHz –High Channel



Date: 6.FEB.2015 19:06:44

Figure 7.4.2.2-12: 13.5 GHz – 26 GHz –High Channel

802.11g

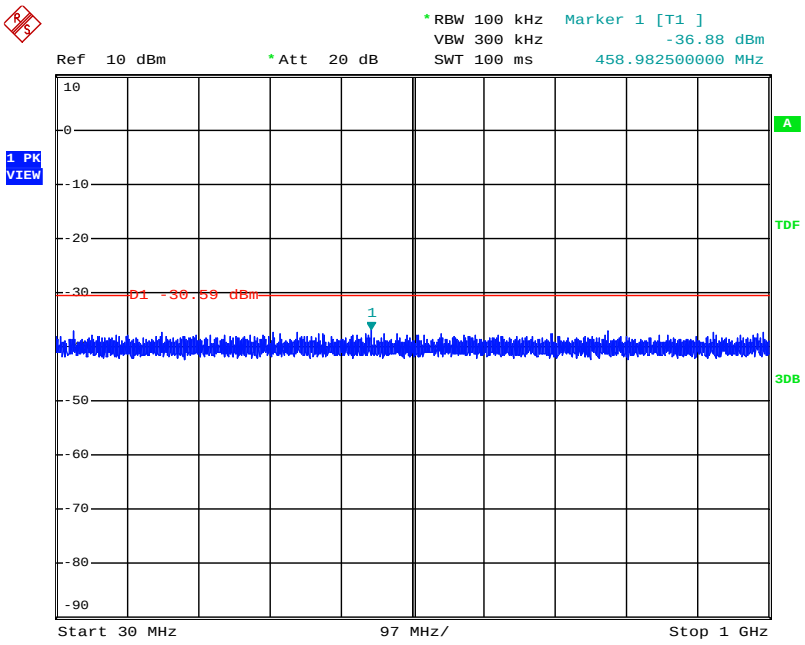


Figure 7.4.2.2-13: 30 MHz – 1 GHz – Low Channel

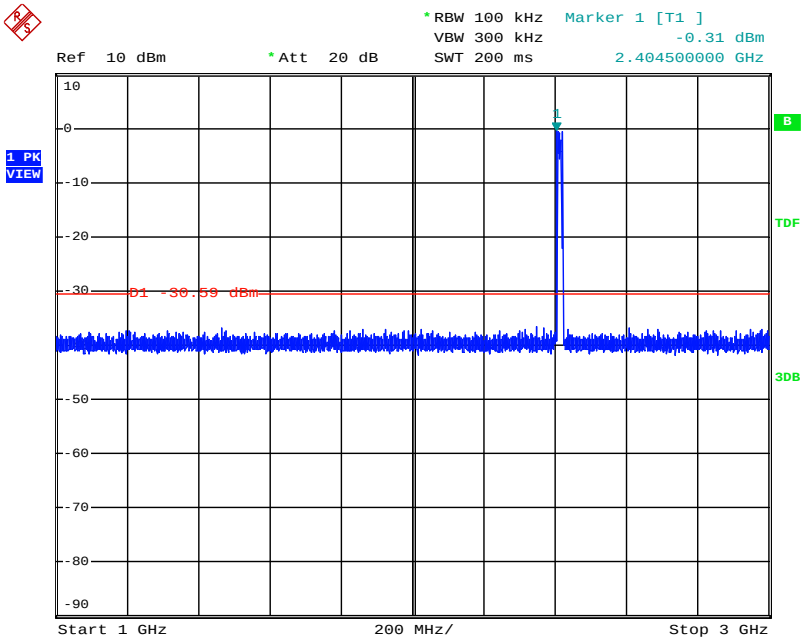
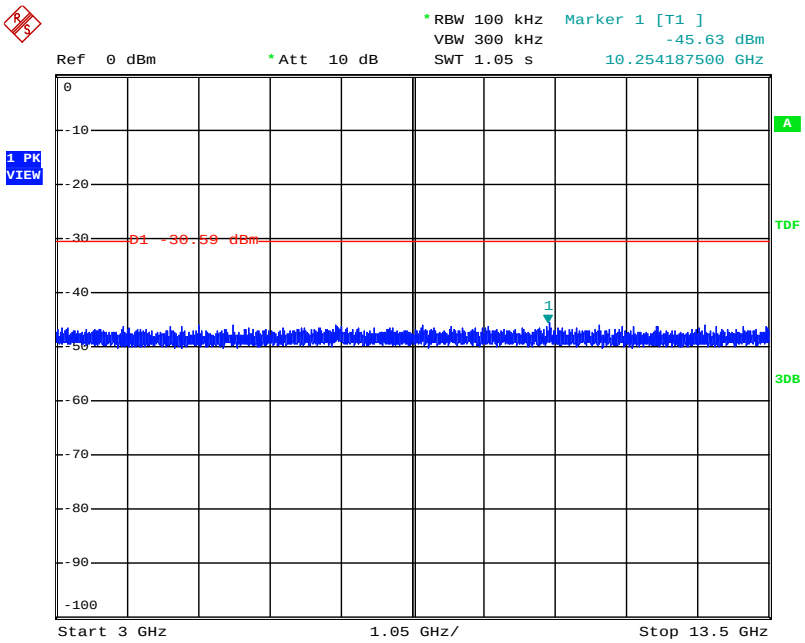
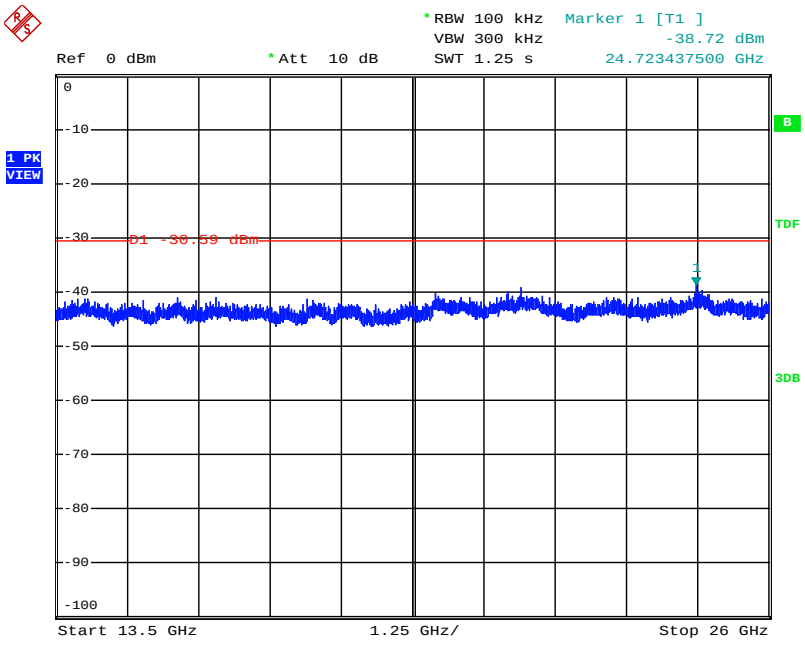


Figure 7.4.2.2-14: 1 GHz –3 GHz – Low Channel



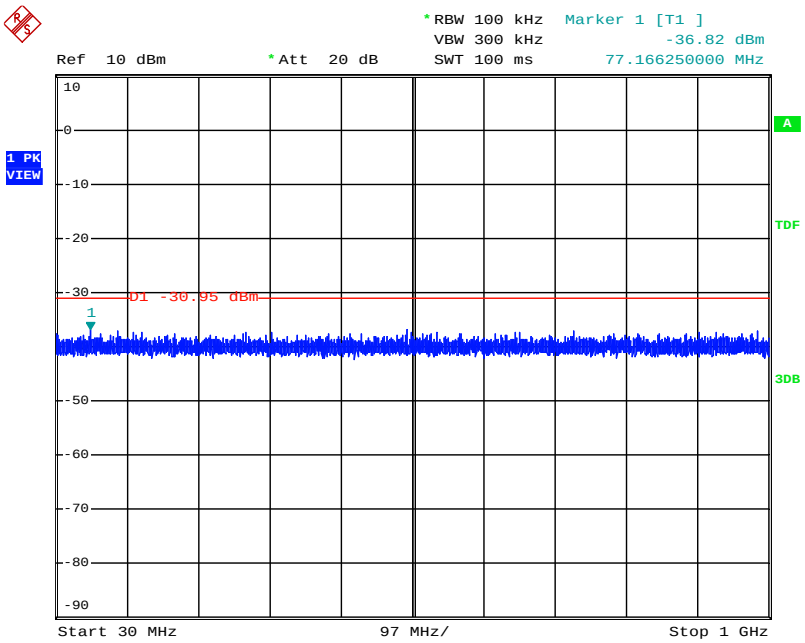
Date: 6.FEB.2015 19:23:31

Figure 7.4.2.2-15: 3 GHz –13.5 GHz – Low Channel



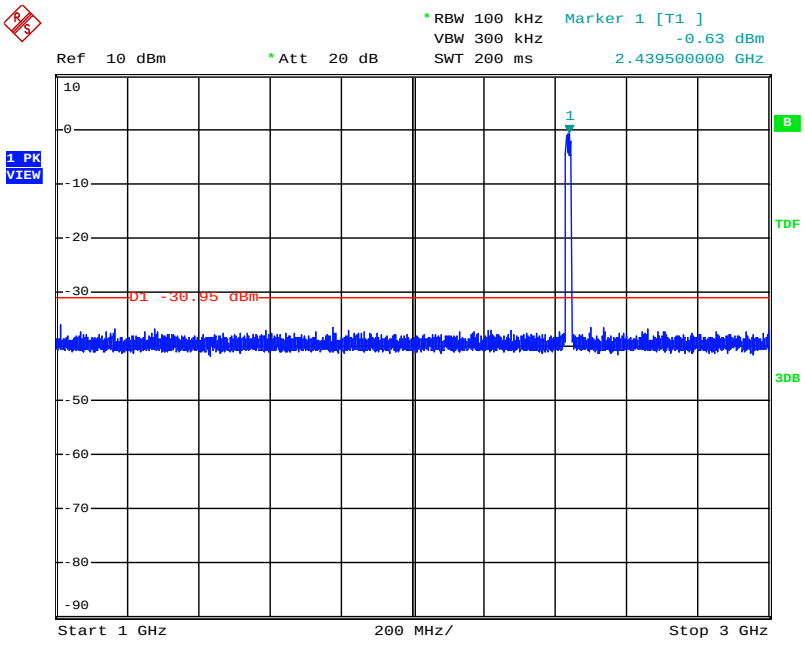
Date: 6.FEB.2015 19:23:04

Figure 7.4.2.2-16: 13.5 GHz – 26 GHz – Low Channel



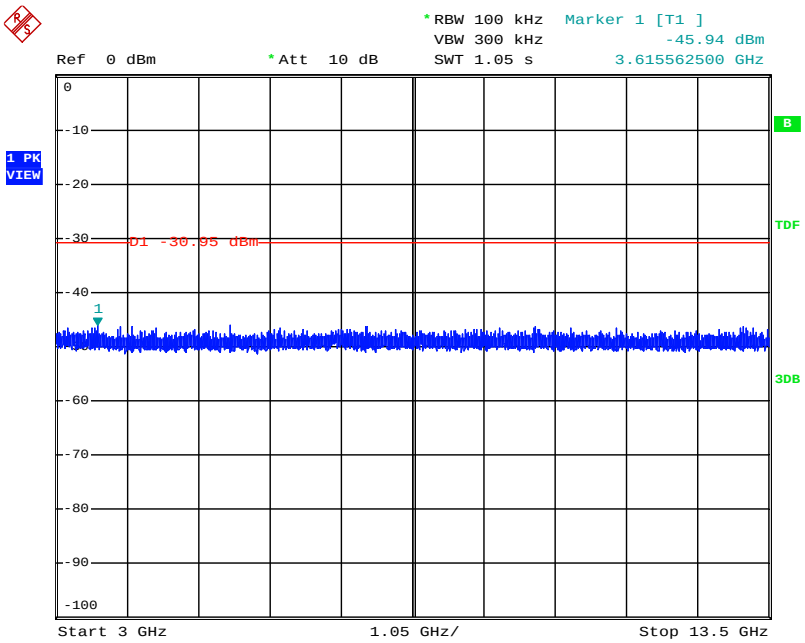
Date: 6.FEB.2015 19:34:18

Figure 7.4.2.2-17: 30 MHz – 1 GHz –Middle Channel



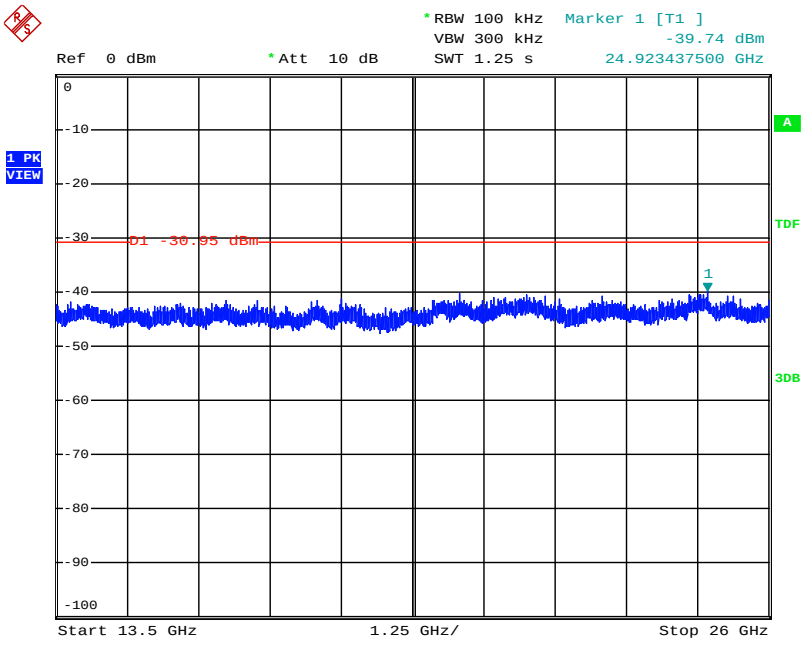
Date: 6.FEB.2015 19:33:46

Figure 7.4.2.2-18: 1 GHz – 3 GHz – Middle Channel



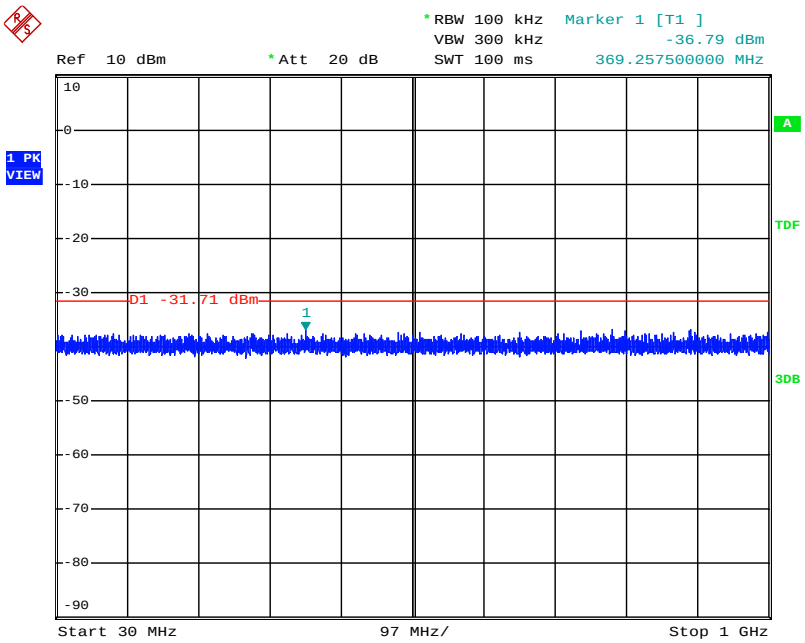
Date: 6.FEB.2015 19:37:56

Figure 7.4.2.2-19: 3 GHz – 13.5 GHz – Middle Channel



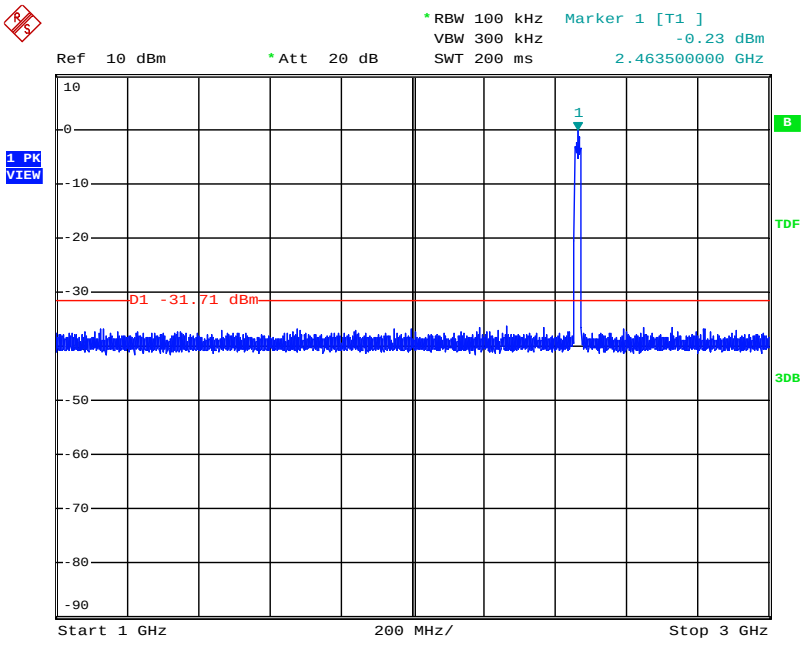
Date: 6.FEB.2015 19:37:36

Figure 7.4.2.2-20: 13.5 GHz – 26 GHz – Middle Channel



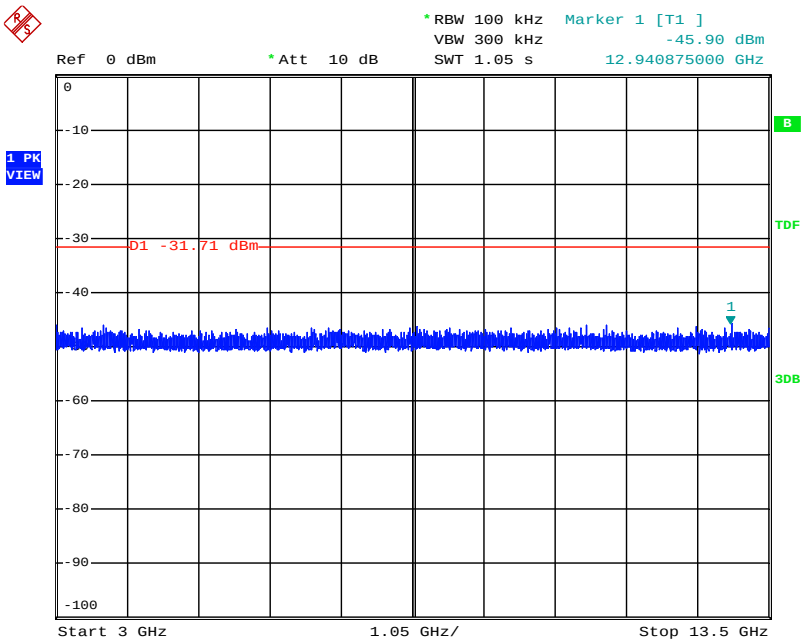
Date: 6.FEB.2015 23:34:37

Figure 7.4.2.2-21: 30 MHz – 1 GHz – High Channel



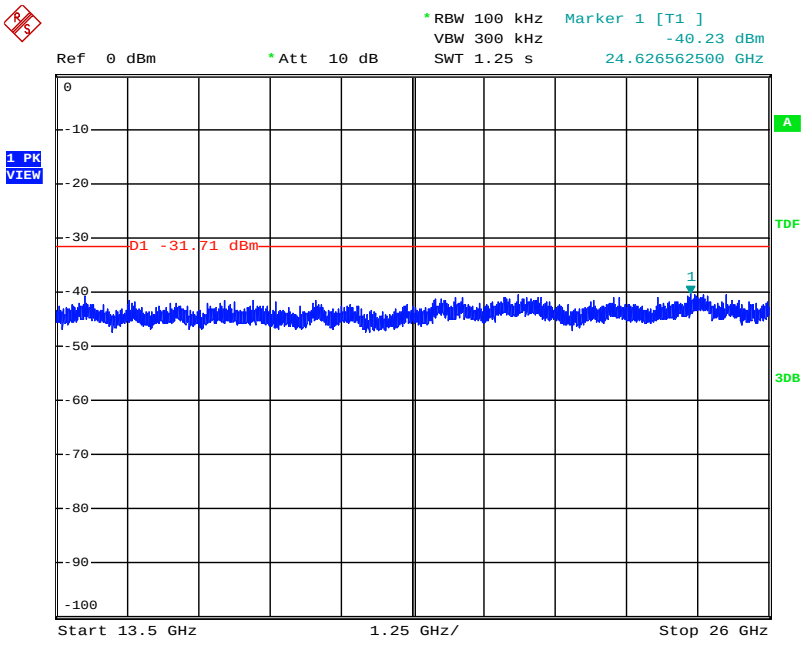
Date: 6.FEB.2015 19:47:05

Figure 7.4.2.2-22: 1 GHz – 3 GHz –High Channel



Date: 6.FEB.2015 19:42:32

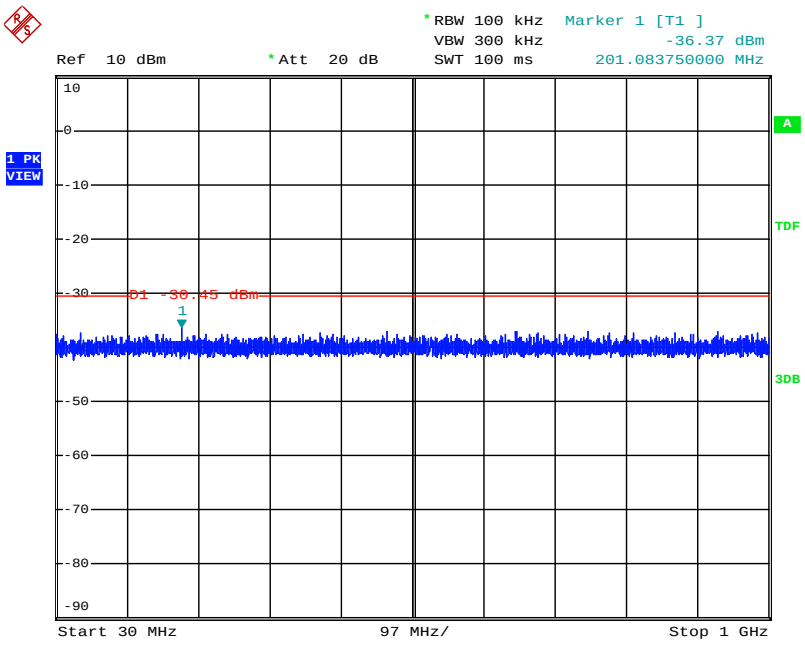
Figure 7.4.2.2-23: 3 GHz – 13.5 GHz –High Channel



Date: 6.FEB.2015 19:42:51

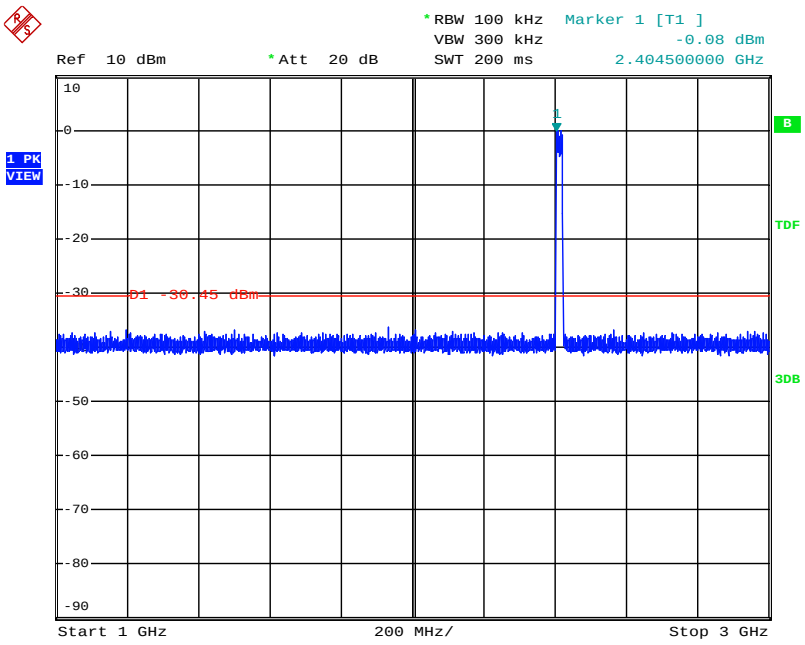
Figure 7.4.2.2-24: 13.5 GHz – 26 GHz –High Channel

802.11n 20 MHz



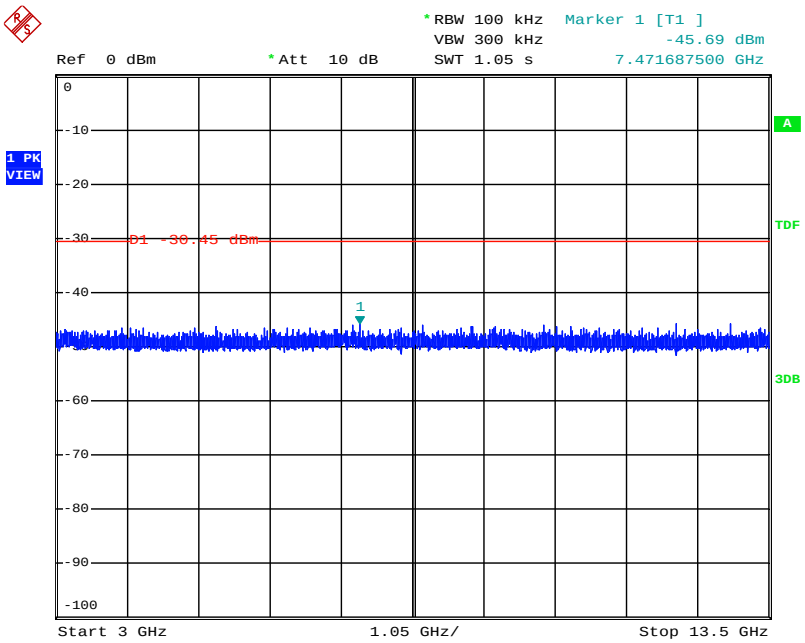
Date: 6.FEB.2015 22:26:10

Figure 7.4.2.2-25: 30 MHz – 1 GHz – Low Channel



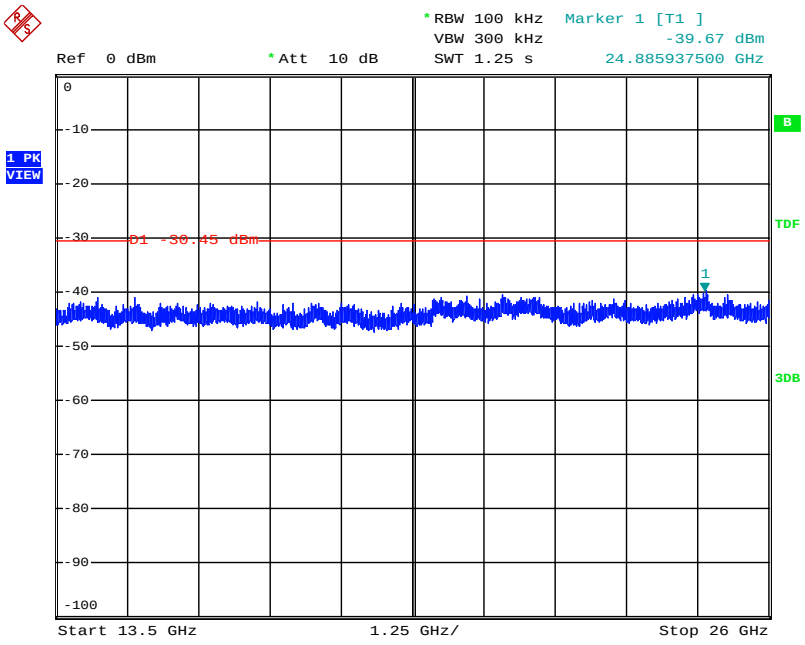
Date: 6.FEB.2015 22:25:51

Figure 7.4.2.2-26: 1 GHz –3 GHz – Low Channel



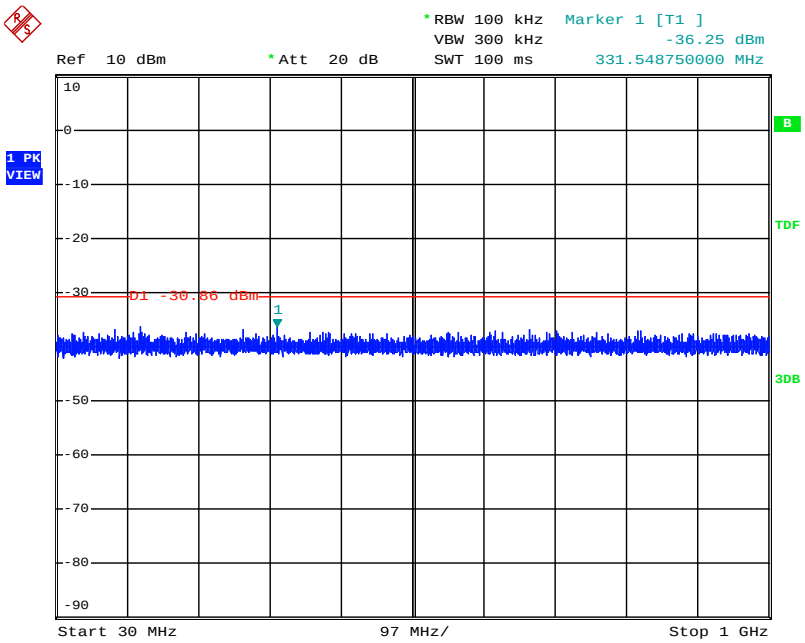
Date: 6.FEB.2015 22:29:26

Figure 7.4.2.2-27: 3 GHz – 13.5 GHz – Low Channel



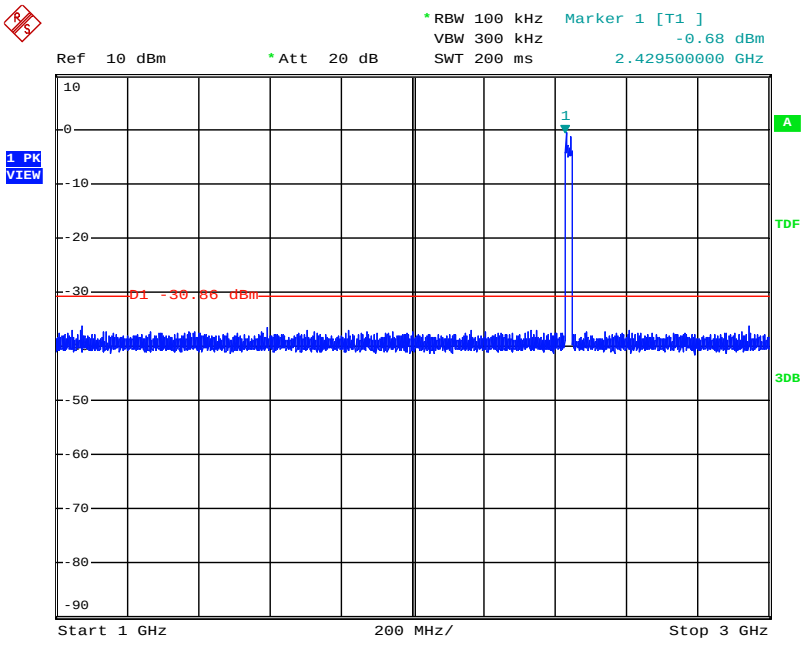
Date: 6.FEB.2015 22:29:50

Figure 7.4.2.2-28: 13.5 GHz – 26 GHz – Low Channel



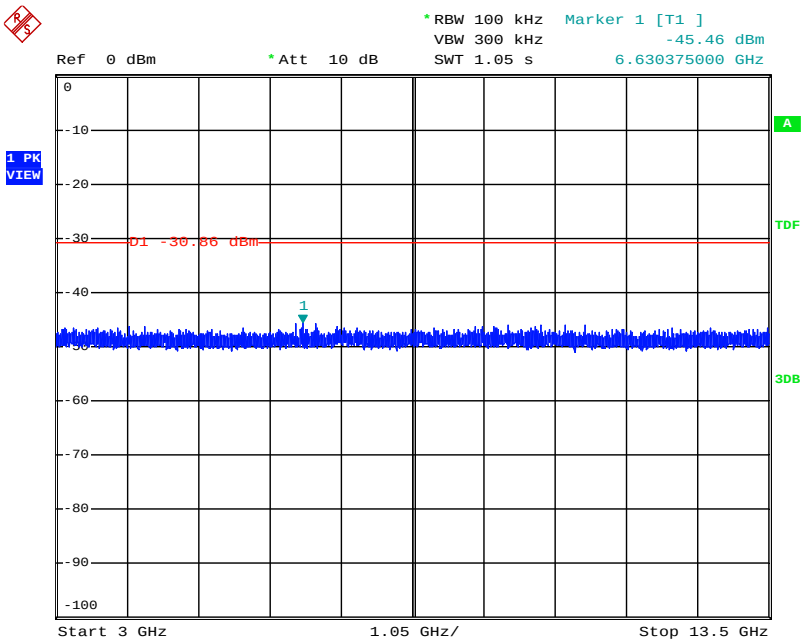
Date: 6.FEB.2015 22:43:31

Figure 7.4.2.2-29: 30 MHz – 1 GHz –Middle Channel



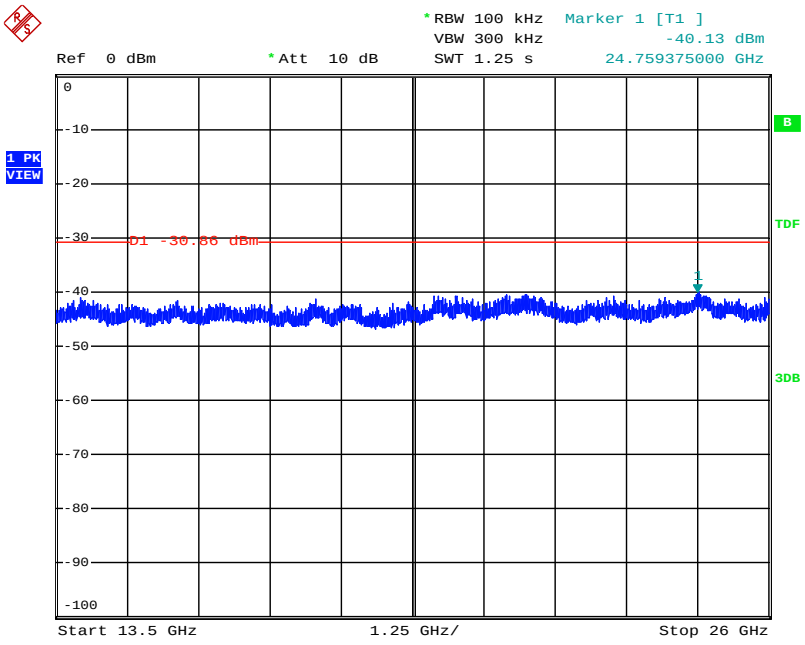
Date: 6.FEB.2015 22:42:48

Figure 7.4.2.2-30: 1 GHz – 3 GHz – Middle Channel



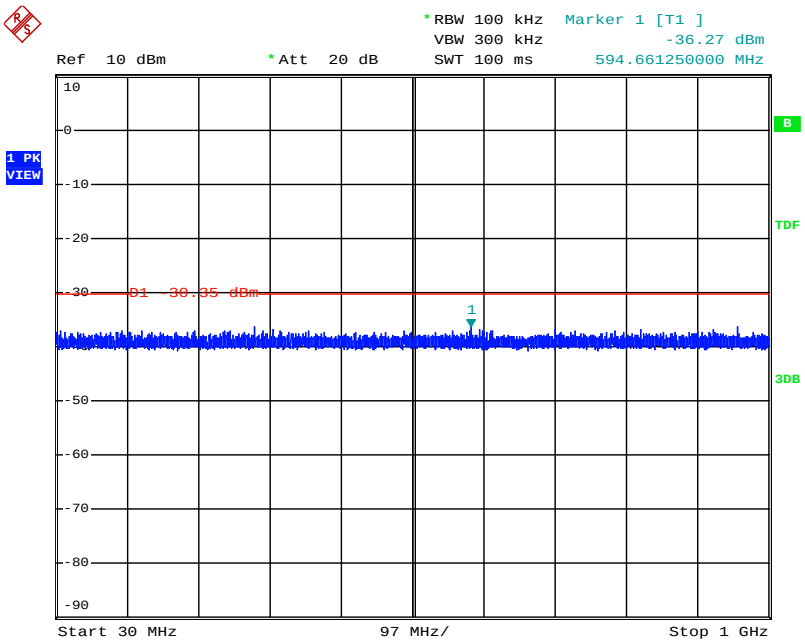
Date: 6.FEB.2015 22:35:48

Figure 7.4.2.2-31: 3 GHz – 13.5 GHz – Middle Channel



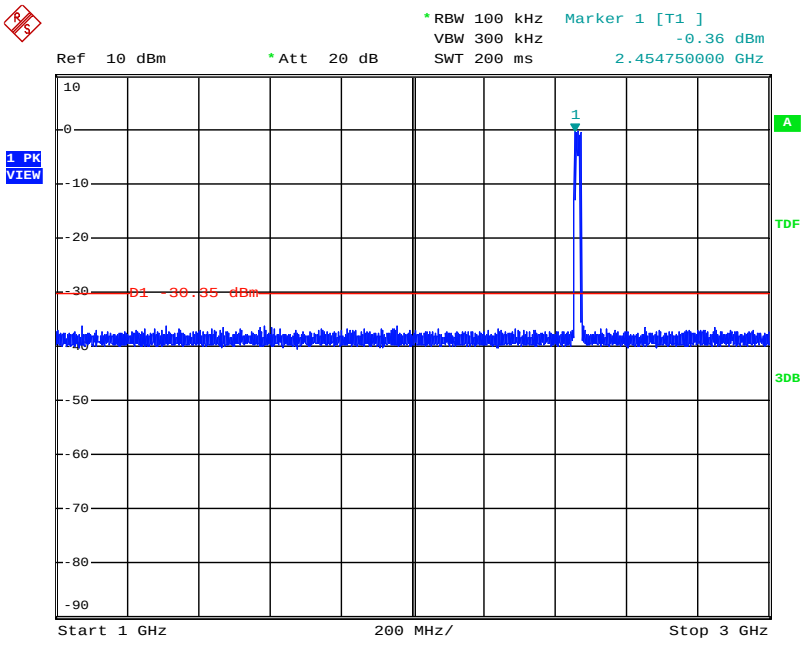
Date: 6.FEB.2015 22:35:26

Figure 7.4.2.2-32: 13.5 GHz – 26 GHz – Middle Channel



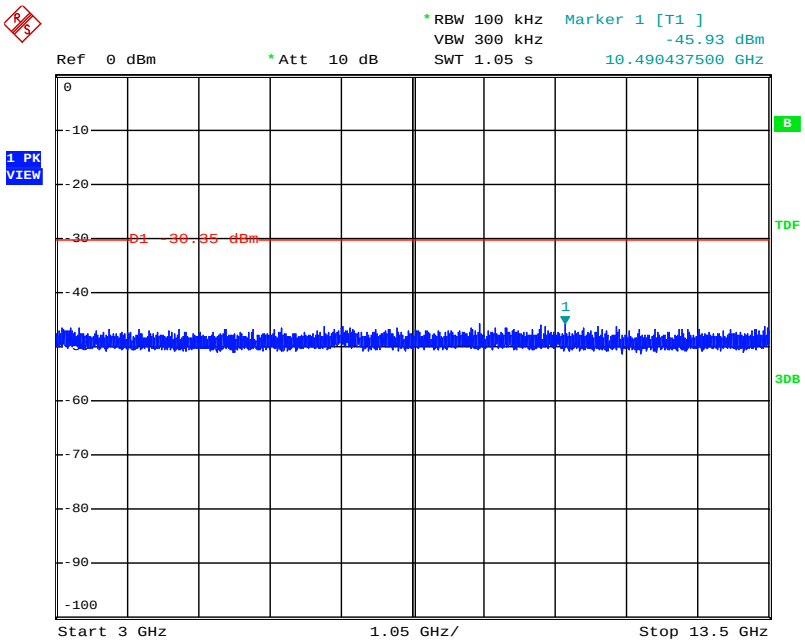
Date: 6.FEB.2015 22:57:31

Figure 7.4.2.2-33: 30 MHz – 1 GHz – High Channel



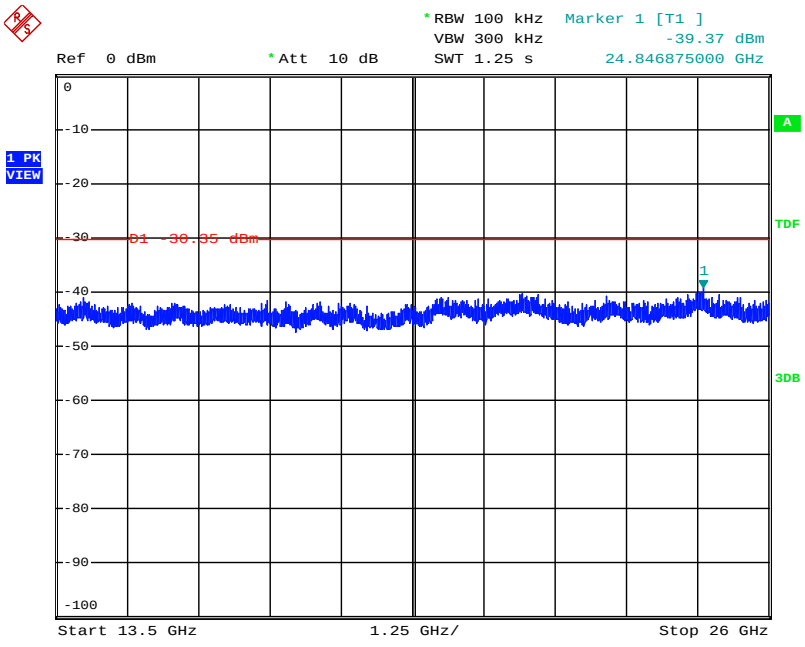
Date: 6.FEB.2015 23:01:39

Figure 7.4.2.2-34: 1 GHz – 3 GHz –High Channel



Date: 6.FEB.2015 23:05:29

Figure 7.4.2.2-35: 3 GHz – 13.5 GHz –High Channel



Date: 6.FEB.2015 23:05:52

Figure 7.4.2.2-36: 13.5 GHz – 26 GHz –High Channel

7.4.3 Radiated Spurious Emissions into Restricted Frequency Bands - FCC 15.205, 15.209; IC: RSS-210 2.2, RSS-Gen 8.9, 8.10

7.4.3.1 Measurement Procedure

Radiated emissions tests were made over the frequency range of 9 kHz to 26 GHz, 10 times the highest fundamental frequency. Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in section 15.209.

For measurements below 30 MHz, the receive antenna height was set to 1m and the EUT was rotated through 360 degrees. The resolution bandwidth was set to 200 Hz below 150 kHz and to 9 kHz above 150 kHz.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak measurements are made with RBW of 1 MHz and VBW of 3 MHz. Average measurements are performed in the linear scale using VBW of 30 Hz over a 5 second sweep.

7.4.3.2 Measurement Results

Radiated band-edge and spurious emissions found in the restricted frequency bands of 9 kHz to 26 GHz are reported in the tables below.

802.11b

Table 7.4.3.2-1: Radiated Spurious Emissions Tabulated Data

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel = 2412 MHz										
2390	62.54	50.78	V	-7.86	54.68	42.92	74.0	54.0	19.3	11.1
Middle Channel = 2437 MHz										
7311	48.00	37.03	H	5.28	53.28	42.31	74.0	54.0	20.7	11.7
7311	47.74	36.38	V	5.28	53.02	41.66	74.0	54.0	21.0	12.3
High Channel = 2462 MHz										
2483.5	62.77	47.68	V	-7.47	55.30	40.21	74.0	54.0	18.7	13.8
7386	49.05	38.29	H	5.50	54.55	43.79	74.0	54.0	19.4	10.2
7386	48.57	37.43	V	5.50	54.07	42.93	74.0	54.0	19.9	11.1

Note: All the emissions above 7.386 GHz were attenuated below the limits and the noise floor of the measurement equipment.

802.11g

Table 7.4.3.2-2: Radiated Spurious Emissions Tabulated Data

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel = 2412 MHz										
2390	65.76	47.59	H	-7.86	57.90	39.73	74.0	54.0	16.1	14.3
2390	74.50	54.55	V	-7.86	66.64	46.69	74.0	54.0	7.4	7.3
Middle Channel = 2437 MHz										
All the restricted bands were attenuated below the limits and the noise floor										
High Channel = 2462 MHz										
2483.5	62.13	45.53	H	-7.47	54.66	38.06	74.0	54.0	19.3	15.9
2483.5	68.46	49.12	V	-7.47	60.99	41.65	74.0	54.0	13.0	12.3
7386	58.35	44.53	H	5.50	63.85	50.03	74.0	54.0	10.1	4.0

Note: All the emissions above 7.386 GHz were attenuated below the limits and the noise floor of the measurement equipment.

802.11n 20 MHz

Table 7.4.3.2-3: Radiated Spurious Emissions Tabulated Data

Frequency (MHz)	Level (dBuV)		Antenna Polarity	Correction Factors	Corrected Level (dBuV/m)		Limit (dBuV/m)		Margin (dB)	
	pk	Qpk/Avg	(H/V)	(dB)	pk	Qpk/Avg	pk	Qpk/Avg	pk	Qpk/Avg
Low Channel = 2412 MHz										
2390	69.00	48.34	H	-7.86	61.14	40.48	74.0	54.0	12.9	13.5
2390	79.44	55.69	V	-7.86	71.58	47.83	74.0	54.0	2.4	6.2
Middle Channel = 2437 MHz										
All the restricted bands were attenuated below the limits and the noise floor										
High Channel = 2462 MHz										
2483.5	61.47	46.25	H	-7.47	54.00	38.78	74.0	54.0	20.0	15.2
2483.5	73.19	52.11	V	-7.47	65.72	44.64	74.0	54.0	8.3	9.4

Note: All the emissions above 2.4835 GHz were attenuated below the limits and the noise floor of the measurement equipment.

7.4.3.3 Sample Calculation:

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Peak
Corrected Level: 62.54+ (-7.86) = 54.68dBµV/m
Margin: 74 dBµV/m – 54.68 dBµV/m = 19.3 dB

Example Calculation: Average
Corrected Level: 50.78 + (-7.86) = 42.92 dBµV/m
Margin: 54 dBµV/m – 42.92 dBµV/m = 11.1dB

7.5 Power Spectral Density - FCC Section 15.247(e) IC: RSS-210 A8.2(b)

7.5.1 PSD Measurement Procedure (Conducted Method)

The power spectral density was measured in accordance with the FCC KDB Publication No. 558074 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (47 CFR 15.247)" Section 10.2 Method PKPSD (peak PSD). The RF output port of the EUT was directly connected to the input of the spectrum analyzer. Offset values were input for cable and external attenuation. The spectrum analyzer RBW was set to 100 kHz and VBW 300 kHz. Span was adjusted to 1.5 times the 6 dB bandwidth and the sweep time was set to auto.

7.5.2 Measurement Results

Results are shown below.

802.11b

Table 7.5.2-1: Power Spectral Density

Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
2412	-7.69	8.0	15.69
2437	-7.90	8.0	15.90
2462	-8.00	8.0	16.00

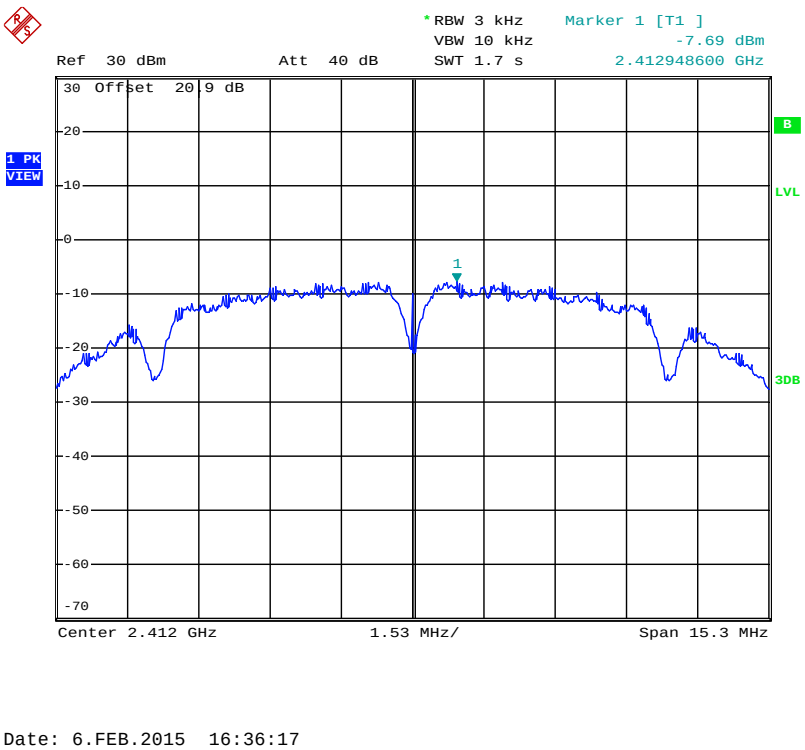
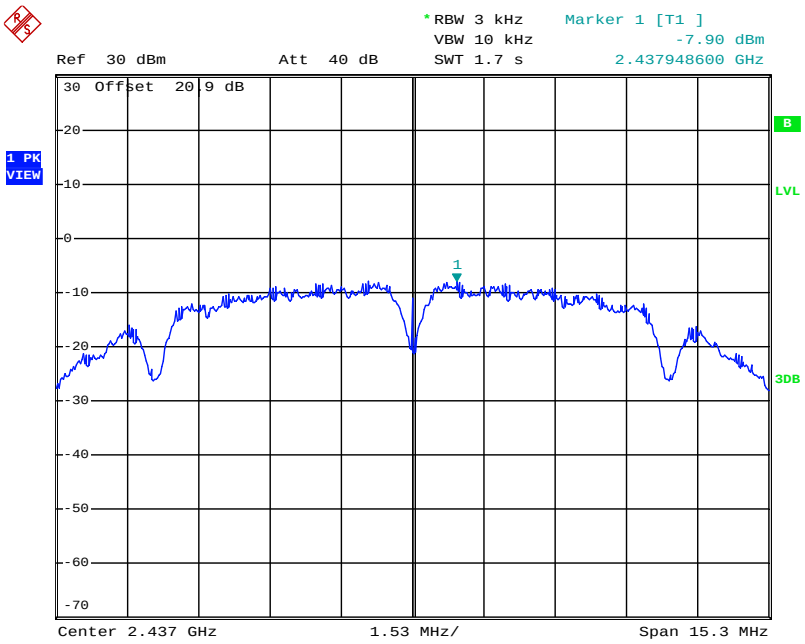
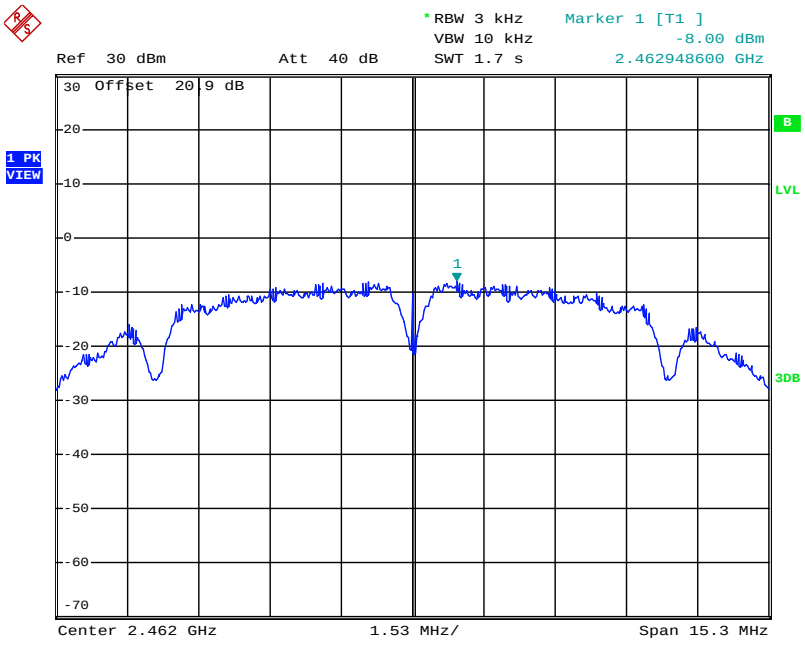


Figure 7.5.2-1: Power Spectral Density - Low Channel



Date: 6.FEB.2015 16:42:43

Figure 7.5.2-2: Power Spectral Density - Middle Channel



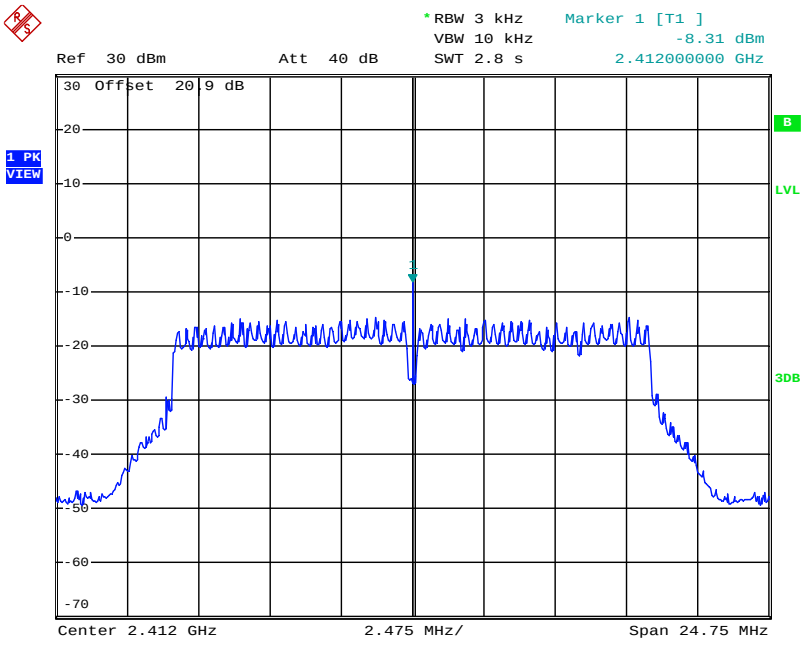
Date: 6.FEB.2015 16:48:13

Figure 7.5.2-3: Power Spectral Density – High Channel

802.11g

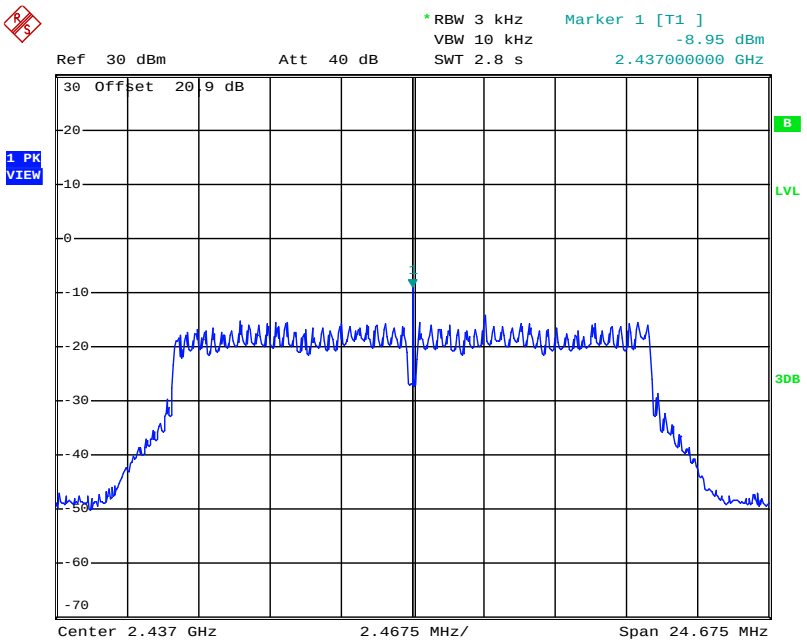
Table 7.5.2-2: Power Spectral Density

Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
2412	-8.31	8.0	16.31
2437	-8.95	8.0	16.95
2462	-9.48	8.0	17.48



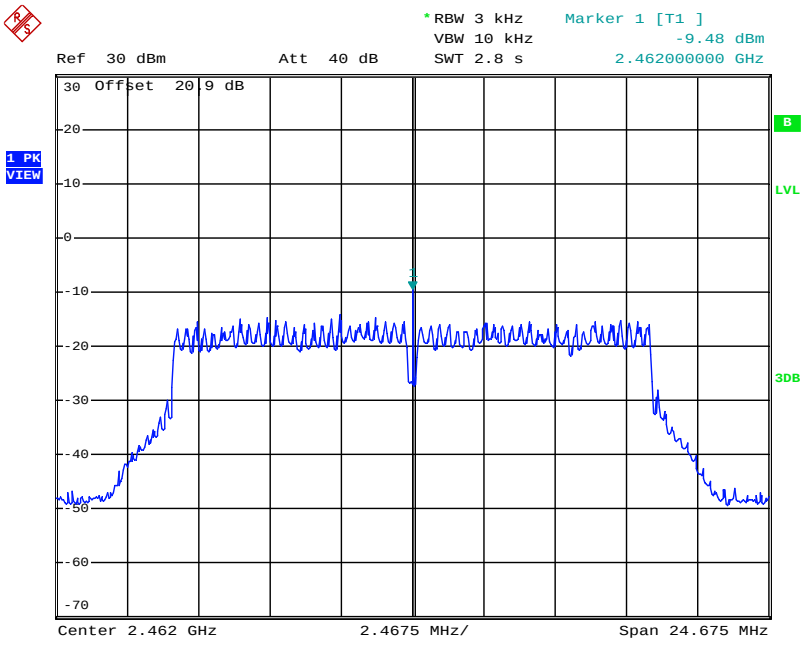
Date: 6.FEB.2015 17:03:38

Figure 7.5.2-4: Power Spectral Density - Low Channel



Date: 6.FEB.2015 17:08:50

Figure 7.5.2-5: Power Spectral Density - Middle Channel



Date: 6.FEB.2015 17:15:05

Figure 7.5.2-6: Power Spectral Density – High Channel

802.11n 20 MHz

Table 7.5.2-3: Power Spectral Density

Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
2412	-8.62	8.0	16.62
2437	-9.23	8.0	17.23
2462	-9.55	8.0	17.55

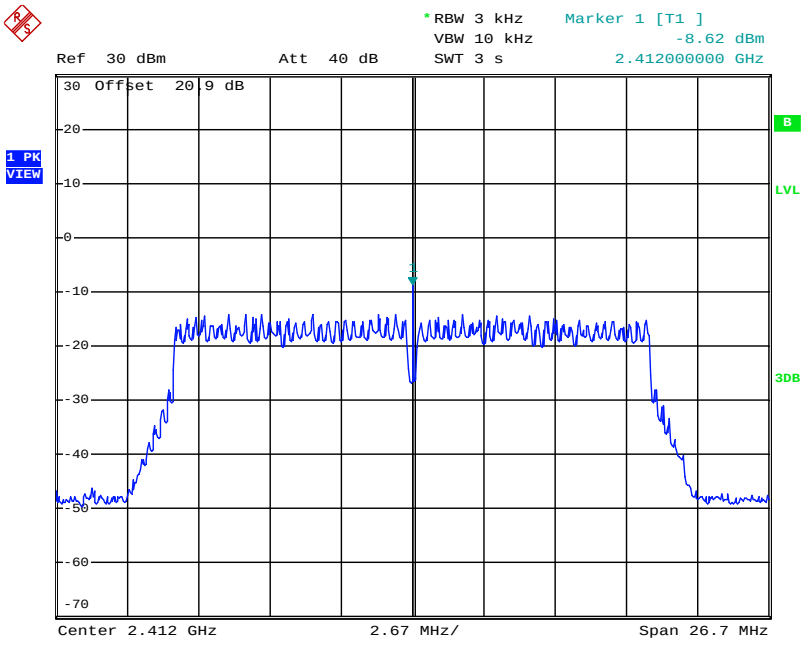
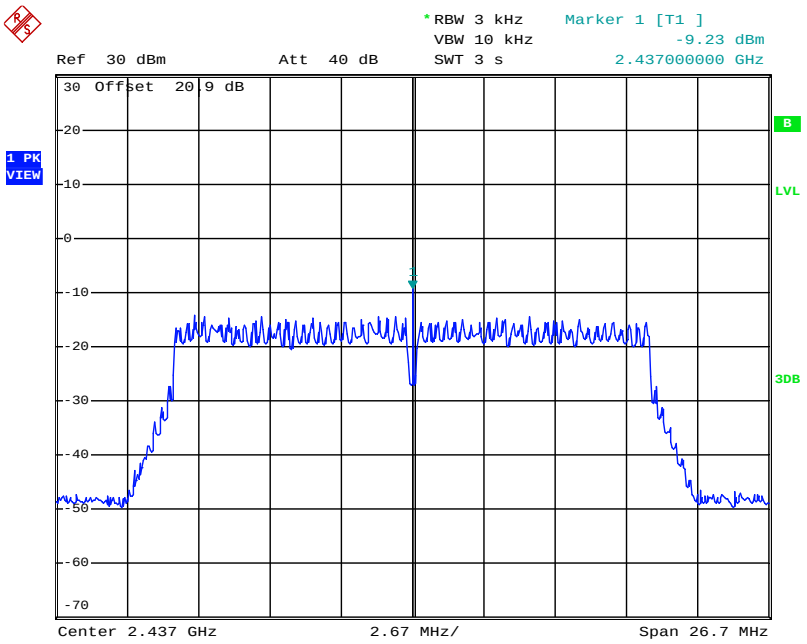
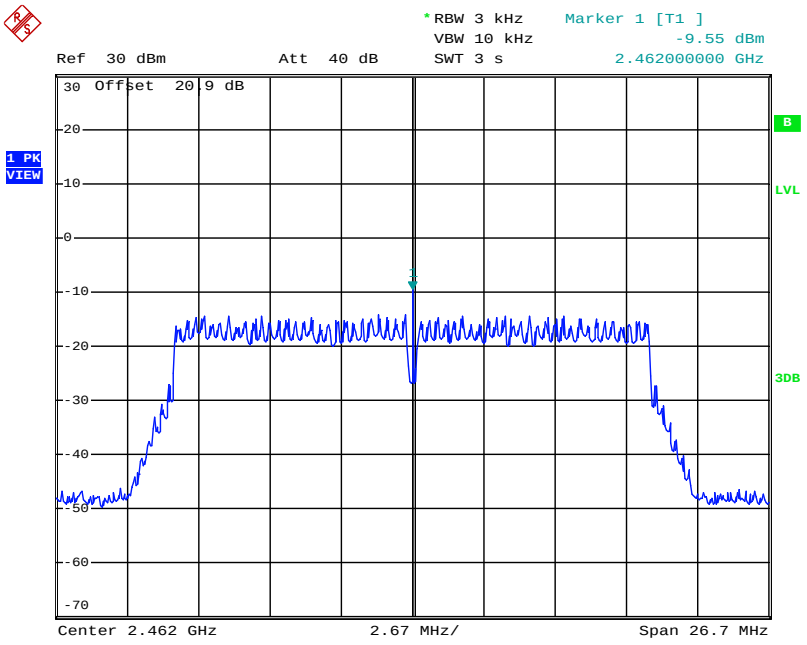


Figure 7.5.2-7: Power Spectral Density - Low Channel



Date: 6.FEB.2015 17:31:24

Figure 7.5.2-8: Power Spectral Density - Middle Channel



Date: 6.FEB.2015 17:47:01

Figure 7.5.2-9: Power Spectral Density – High Channel

7.6 Power Line Conducted Emissions – FCC: Section 15.207 IC: RSS-Gen 8.8

7.6.1 Measurement Procedure

ANSI C63.4 sections 6 and 7 were the guiding documents for this evaluation. Conducted emissions were performed from 150 kHz to 30 MHz with the spectrum analyzer's resolution bandwidth set to 9 kHz and the video bandwidth set to 30 kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Applicable Limit - Corrected Reading

7.6.2 Measurement Results

Results are shown below.

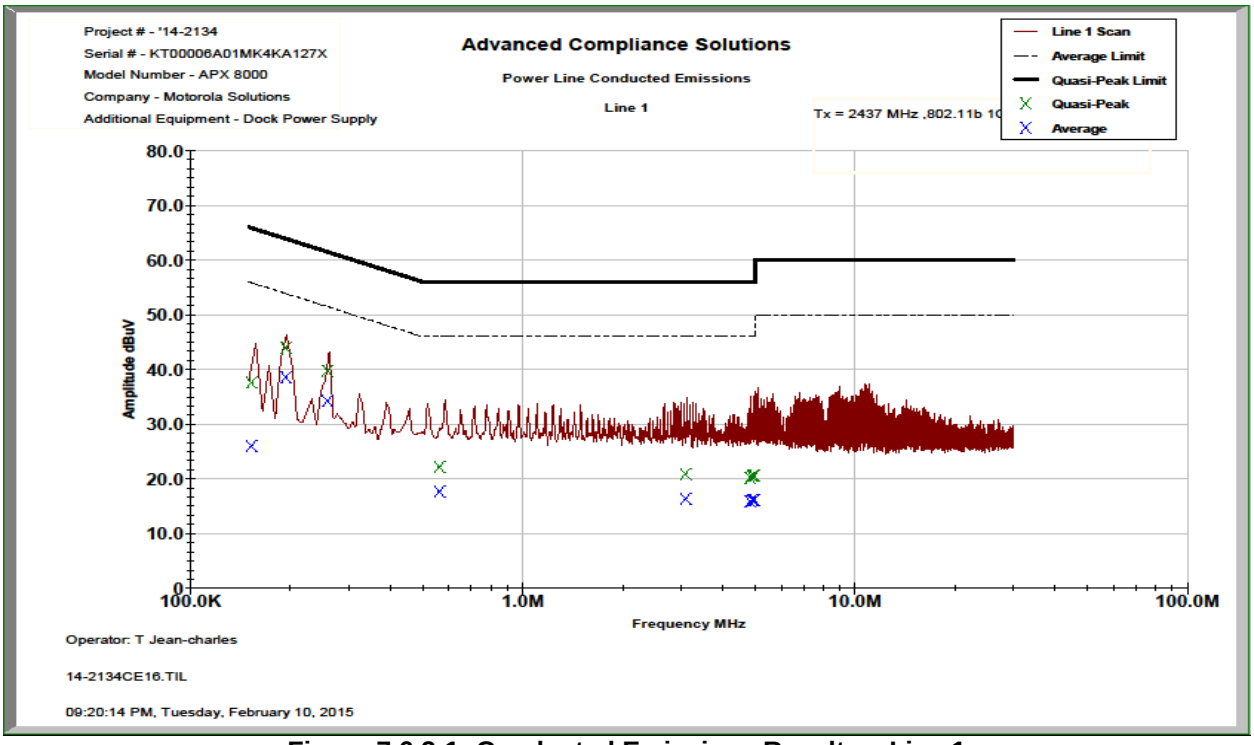


Figure 7.6.2-1: Conducted Emissions Results – Line 1

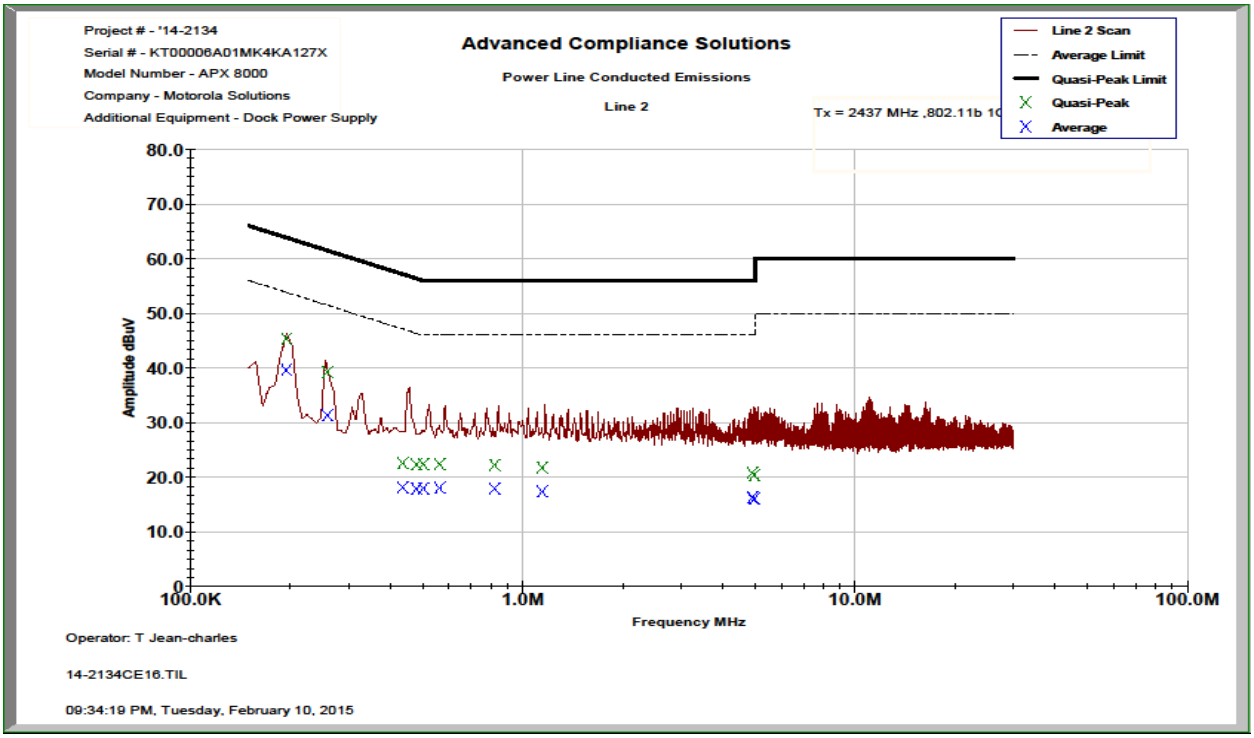


Figure 7.6.2-2: Conducted Emissions Results – Line 2

Table 7.6.2-1: Conducted EMI Results

☒ Line 1 ☒ Line 2 ☐ Line 3
☐ Line 4
☐ To Ground ☒ Floating
☐ Telecom Port _____
☒ dBµV ☐ dBµA

Plot Number: 14-2134CE16
Power Supply Description: 14 VDC

Frequency (MHz)	Uncorrected Reading		Total Correction Factor (dB)	Corrected Level		Limit		Margin (dB)	
	Quasi-Peak	Average		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
Line 1									
0.152748	27.5	15.957	10.05	37.55	26.00	65.85	55.85	28.3	29.8
0.194024	33.927	28.539	10.04	43.96	38.58	63.86	53.86	19.9	15.3
0.258988	29.754	24.226	10.03	39.78	34.25	61.46	51.46	21.7	17.2
0.562824	12.15	7.694	10.03	22.18	17.72	56.00	46.00	33.8	28.3
3.09261	10.699	6.172	10.20	20.90	16.38	56.00	46.00	35.1	29.6
4.8463	9.956	5.62	10.24	20.20	15.86	56.00	46.00	35.8	30.1
4.91346	10.212	5.871	10.24	20.45	16.11	56.00	46.00	35.5	29.9
4.97316	10.199	5.719	10.24	20.44	15.96	56.00	46.00	35.6	30.0
4.98	10.219	5.906	10.24	20.46	16.15	56.00	46.00	35.5	29.9
4.9801	10.291	5.866	10.24	20.53	16.11	56.00	46.00	35.5	29.9
Line 2									
0.194775	35.322	29.579	10.05	45.38	39.63	63.83	53.83	18.5	14.2
0.258975	29.191	21.257	10.05	39.24	31.31	61.46	51.46	22.2	20.2
0.435963	12.491	8.07	10.03	22.53	18.10	57.14	47.14	34.6	29.0
0.479999	12.268	7.877	10.04	22.30	17.91	56.34	46.34	34.0	28.4
0.503125	12.292	7.961	10.04	22.33	18.00	56.00	46.00	33.7	28.0
0.562825	12.291	7.98	10.04	22.33	18.02	56.00	46.00	33.7	28.0
0.824013	12.206	7.86	10.06	22.27	17.92	56.00	46.00	33.7	28.1
1.1449	11.714	7.286	10.06	21.77	17.34	56.00	46.00	34.2	28.7
4.906	10.42	5.912	10.26	20.68	16.17	56.00	46.00	35.3	29.8
4.97316	9.982	5.66	10.26	20.24	15.92	56.00	46.00	35.8	30.1

8 CONCLUSION

In the opinion of ACS, Inc., the model H91TGD9PW7AN manufactured by Motorola Solutions meets the requirements of FCC Part 15 subpart C and Industry Canada's Radio Standards Specification RSS-210 for the test procedures documented in the test report.

END REPORT