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Report On

FCC Testing of the Vertex Telecom, Inc. DB1016US DamaiBox1.0+ in accordance with FCC CFR 47 Part 15, Subpart C

COMMERCIAL-IN-CONFIDENCE

FCC ID: 2AE7M-DB1016

Document 57015091 Report 02 Issue 1

August 2015



Product Service

REPORT ON

FCC Testing of the
Vertex Telecom, Inc.
DB1016US DamaiBox1.0+

Document 57015091 Report 02 Issue 1

August 2015

PREPARED FOR

Vertex Telecom, Inc.
980 Corporate Center Dr, Pomona, CA 91768, USA

PREPARED BY

G Zhao
Engineer

APPROVED BY

C Zhang
Manager

DATED

04 August 2015

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on two sample equipments to demonstrate limited compliance with FCC CFR 47 Part 15, Subpart C. These samples tested were found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Zhao



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SECTION 1

REPORT SUMMARY

FCC Testing of the Vertex Telecom, Inc. DB1016US DamaiBox1.0+
in accordance with FCC CFR 47 Part 15, Subpart C



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Vertex Telecom, Inc. DB1016US DamaiBox1.0+ to the requirements of FCC CFR 47 Part 15 Subpart C.

Objective	To perform FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Vertex Telecom, Inc.
Product Name	DamaiBox1.0+
Product Type	DB1016US
Serial Number(s)	DMA30905140900082 DMA30905140900022
Software Version	VT.40.04.01
Hardware Version	24230511
Number of Samples Tested	2
Test Specification/Issue/Date	FCC CFR 47 Part 15, Subpart C: 2014
Start of Test	20 July 2015
Finish of Test	22 July 2015
Name of Engineer(s)	G Zhao

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 15, Subpart C.

Test	Spec Clause	Test Description	Result
2.1	15.207	Conducted Emission AC Power Port	Pass
2.2	15.247(a)(2)	6dB Bandwidth	Pass
2.3	15.247(b)(3)	Maximum Conducted Output Power - Peak	Pass
2.4	15.247(e)	Power Spectral Density	Pass
2.5	15.205, 15.209,15.247(d)	Band Edge Emissions	Pass
		Conducted Spurious Emissions	Pass
2.6	15.205, 15.209,15.247(d)	Radiated Emissions	Pass



1.3 DECLARATION OF BUILD STATUS

MAIN EUT		
Manufacture	Vertex Telecom, Inc.	
Product Name	DamaiBox1.0+	
Product Type	DB1016US	
Serial Number	DMA30905140900082	
Radio Access Technology	WLAN	
Hardware Version	24230511	
Software Version	VT.40.04.01	
Operating Frequency	2400MHz to 2483.5MHz	
Transfer Rate	802.11b: 1Mbps, 2Mbps, 5.5Mbps, 11Mbps 802.11g: 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps 802.11n HT20 and HT40: MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7	
Number of channel	802.11b/g/n HT20: 11 802.11n HT40: 9	
Modulation Type	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n HT20 and HT40: OFDM (64QAM, 16QAM, QPSK, BPSK)	
Maximum Output Power (dBm)	20dBm	
Antenna Gain (dBi)	5	
FCC ID	2AE7M-DB1016	
Environment temperature range(s)	Minimum -20 °C	Maximum +45 °C
DC Power source	5.0V	
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	This is a DamaiBox1.0+ could communication with indoor access point by wireless mode, which operates on the frequency band 2400MHz to 2483.5MHz. Also, it can be connected to TV through HDMI cable, and to indoor access point by network cable.	

No responsibility will be accepted by TÜV SÜD Certification and Testing (China) Co., Ltd. Beijing Branch as to the accuracy of the information declared in this document by the manufacturer.



Product Service

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) DB1016US is DamaiBox1.0+ from Vertex Telecom, Inc.

There is only one model with DamaiBox1.0+ for approval, which is DB1016US. This is a DamaiBox1.0+ could communication with indoor access point by wireless mode, which operates on the frequency band 2400MHz to 2483.5MHz. Also, it can be connected to TV through HDMI cable, and to indoor access point by network cable. A full technical description is held by Vertex Telecom, Inc.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturers documentation.



Equipment Under Test



1.4.2 Test Configuration

Configuration: 2.4GHz WLAN Module

The worst configurations were representative for all traffic scenarios after different data rates for each operating mode were measured. The settings below were used for all measurements if not otherwise noted.

Operating Mode	Data Rate
802. 11b	1Mbps
802. 11g	36Mbps
802. 11n(HT20)	MCS6
802. 11n(HT40)	MCS0

The EUT was powered by a 5.0VDC power supply.

1.4.3 Modes of Operation

Modes of operation of the EUT during testing were shown as follows:

Test Mode 1 – 2412 MHz (TX)
 Test Mode 2 – 2437 MHz (TX)
 Test Mode 3 – 2462 MHz (TX)
 Test Mode 4 – 2422 MHz (TX)
 Test Mode 5 – 2452 MHz (TX)

Information on the specific test modes utilised are detailed in the test procedure for each individual test.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure, test laboratories or an open test area as appropriate.

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

1.8 ALTERNATIVE TEST SITE

The testing was conducted at following site registrations:

FCC Accreditation 910917:

The State Radio Monitoring Center, No.80 Beilishi Road Xicheng District Beijing, China.



Product Service

SECTION 2

TEST DETAILS

FCC Testing of the Vertex Telecom, Inc. DB1016US DamaiBox1.0+
in accordance with FCC CFR 47 Part 15 Subpart C



2.1 CONDUCTED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.207

2.1.2 Equipment Under Test

DB1016US, S/N: DMA30905140900082

2.1.3 Date of Test and Modification State

21 July 2015 – Modification State 0

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements in clause 15.207 of FCC CFR 47 Part 15, Subpart C.

The test was performed in a shield room, and EUT was placed on a table, which was 0.8m above ground plane. The power line of the EUT was connected to the AC mains through a line Impedance Stabilization Network (LISN). The EUT was control to operate at traffic mode with maximum output power.

A EMI test receiver was used to test the emissions from both sides of AC line. The conducted emission is scanned over the frequency from 150KHz to 30MHz with peak detector. A final measurement is performed with quasi-peak detector and average detector.

2.1.6 Environmental Conditions

Ambient Temperature 24.5°C

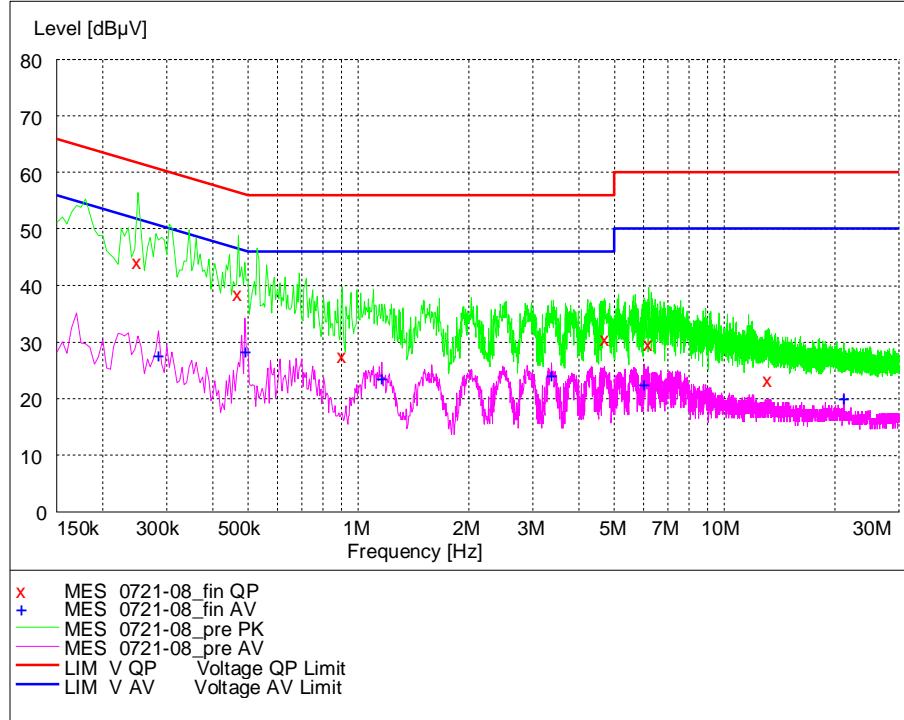
Relative Humidity 53.0%



2.1.7 Test Results

The test results are shown below.

L Line:

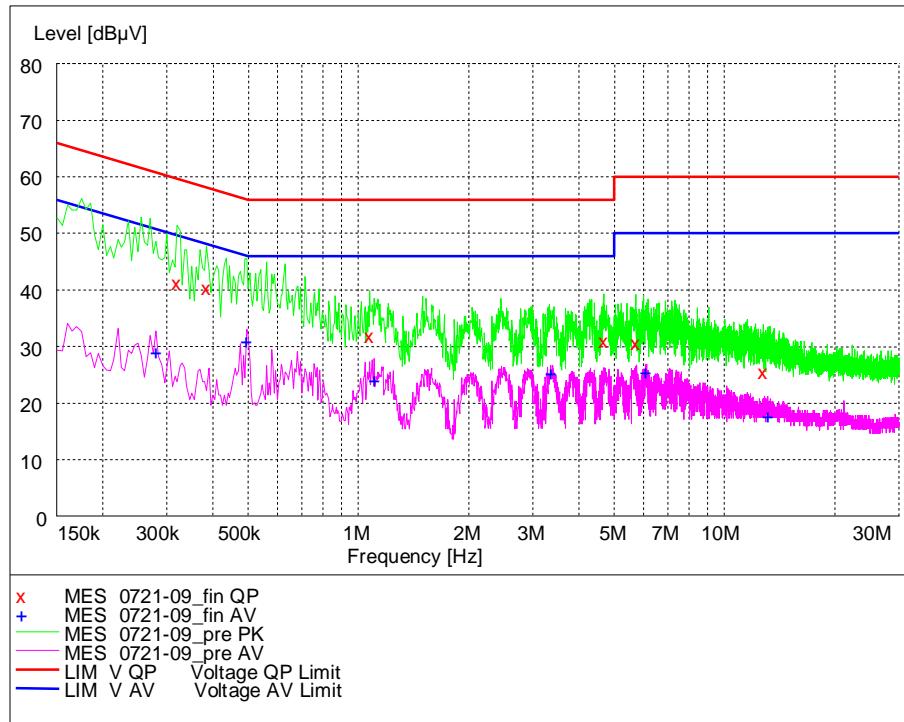


MEASUREMENT RESULT: "0721-08_fin QP"

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB
0.250000	44.60	20.1	62	17.1
0.470000	38.70	20.1	57	17.9
0.905000	28.00	20.2	56	28.0
4.710000	31.00	20.3	56	25.0
6.220000	30.10	20.4	60	29.9
13.160000	23.80	20.7	60	36.2

MEASUREMENT RESULT: "0721-08_fin AV"

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB
0.285000	28.20	20.1	51	22.4
0.490000	28.90	20.2	46	17.3
1.160000	24.00	20.1	46	22.0
3.370000	24.50	20.3	46	21.5
6.040000	22.90	20.4	50	27.1
21.195000	20.30	20.9	50	29.7

N Line:**MEASUREMENT RESULT: "0721-09_fin QP"**

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB
0.320000	41.60	20.1	60	18.1
0.385000	40.70	20.1	58	17.5
1.075000	32.30	20.2	56	23.7
4.670000	31.50	20.3	56	24.5
5.715000	30.90	20.4	60	29.1
12.780000	25.80	20.7	60	34.2

MEASUREMENT RESULT: "0721-09_fin AV"

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB
0.280000	29.60	20.1	51	21.2
0.495000	31.40	20.2	46	14.7
1.105000	24.60	20.2	46	21.4
3.355000	25.60	20.3	46	20.4
6.090000	25.70	20.4	50	24.3
13.145000	18.20	20.7	50	31.8



Product Service

Frequency (MHz)	QP Limit (dB μ V)	AV Limit (dB μ V)
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency

Remarks

The result of test did not exceed the limits at the measured frequencies.



2.2 6DB BANDWIDTH

2.2.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.247(a)(2)

2.2.2 Equipment Under Test

DB1016US, S/N: DMA30905140900082

2.2.3 Date of Test and Modification State

20 July 2015 – Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Method and Operating Modes

The test was applied in accordance with the test method requirements in clause 15.247 of FCC CFR 47 Part 15 Subpart C.

The EUT was connected to the spectrum analyzer, and transmitting on its maximum output power.

Test procedures refer to KDB 558074 D01.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1

- Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5

2.2.6 Environmental Conditions

20 July 2015

Ambient Temperature 25.0°C

Relative Humidity 50.0%



2.2.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15 for Occupied Bandwidth.

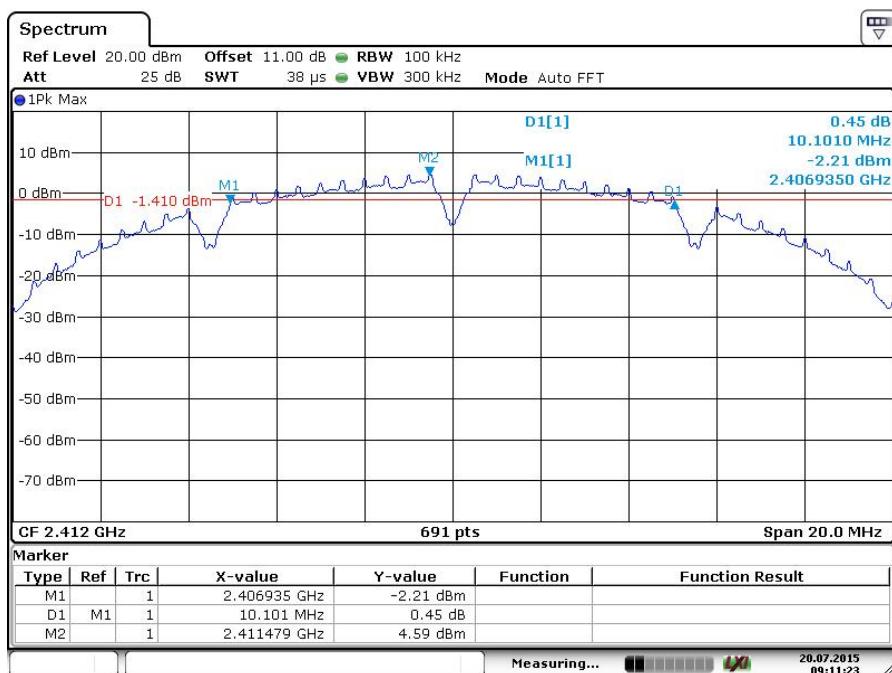
The test results are shown below.

Operating Mode	Data Rate	Channel	Frequency (MHz)	Test Result (MHz)
11b	1Mbps	1	2412	10.101
11b	1Mbps	6	2437	10.101
11b	1Mbps	11	2462	10.101
11g	36Mbps	1	2412	16.606
11g	36Mbps	6	2437	16.606
11g	36Mbps	11	2462	16.606
11n (HT20)	MCS6	1	2412	17.836
11n (HT20)	MCS6	6	2437	17.836
11n (HT20)	MCS6	11	2462	17.800
11n (HT40)	MCS0	3	2422	36.469
11n (HT40)	MCS0	6	2437	36.541
11n (HT40)	MCS0	9	2452	36.614

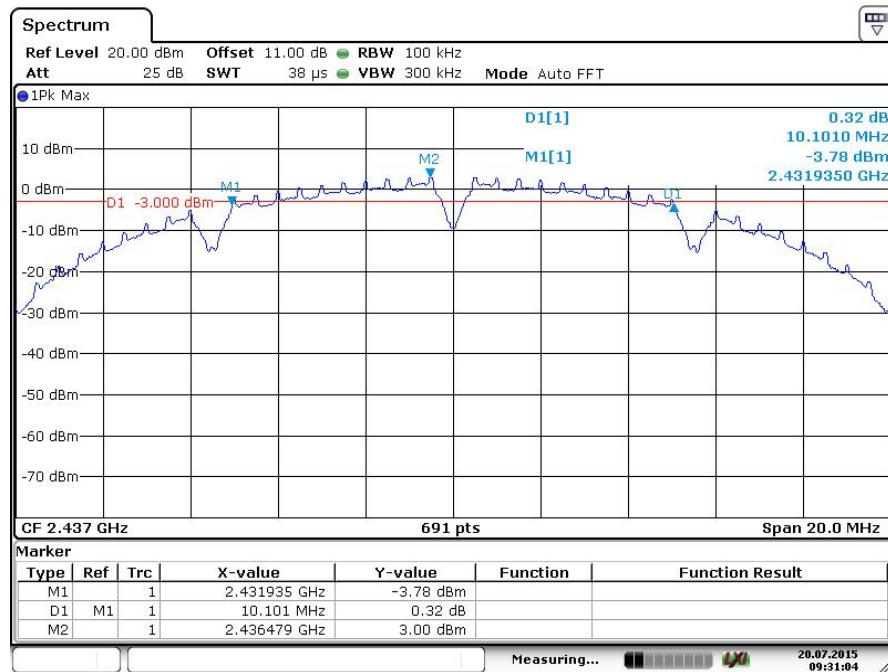
Test Plots are shown below

802. 11b

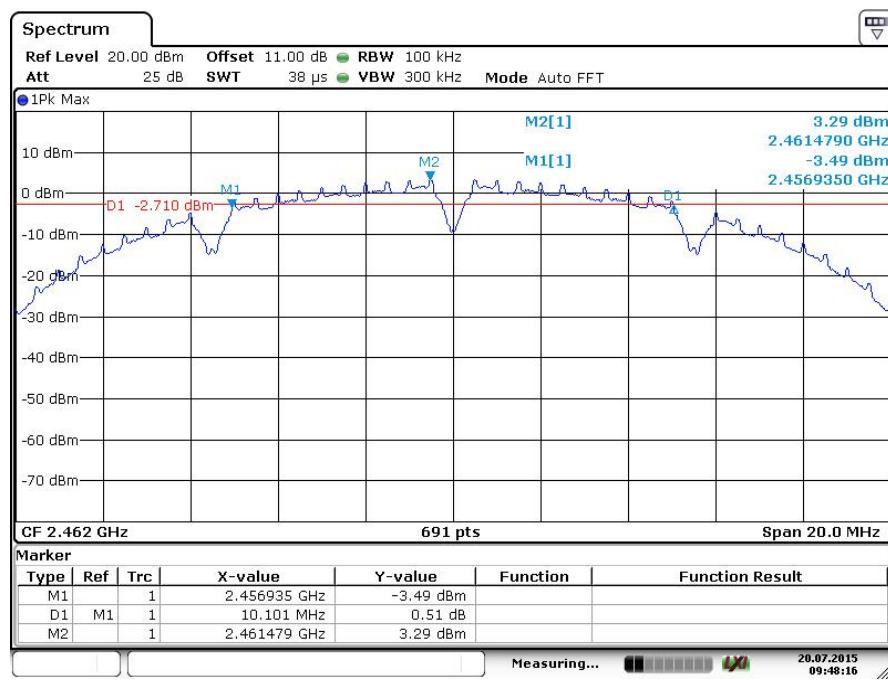
Configuration 1 - Mode 1, 2 & 3



Date: 20 JUL 2015 09:11:23



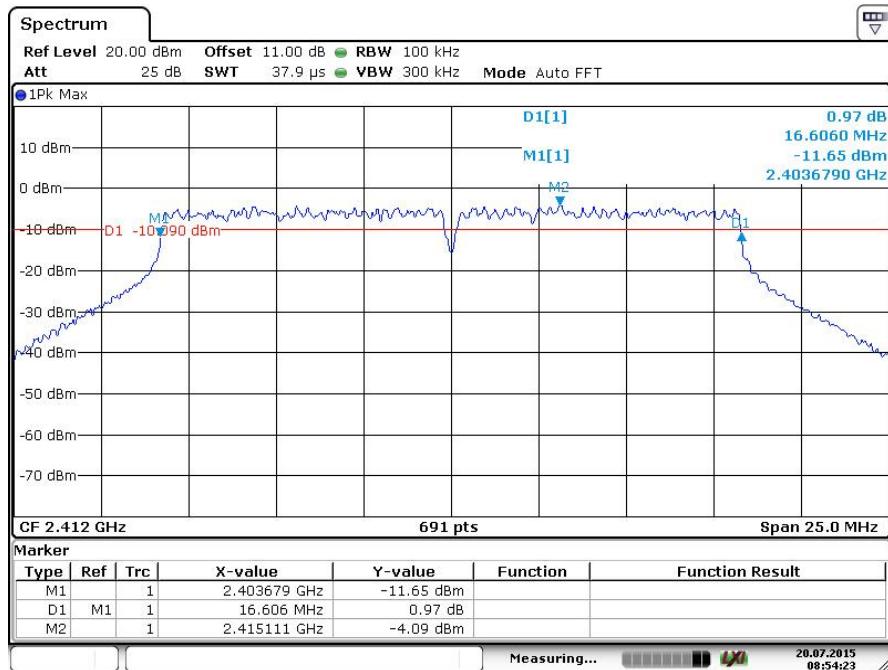
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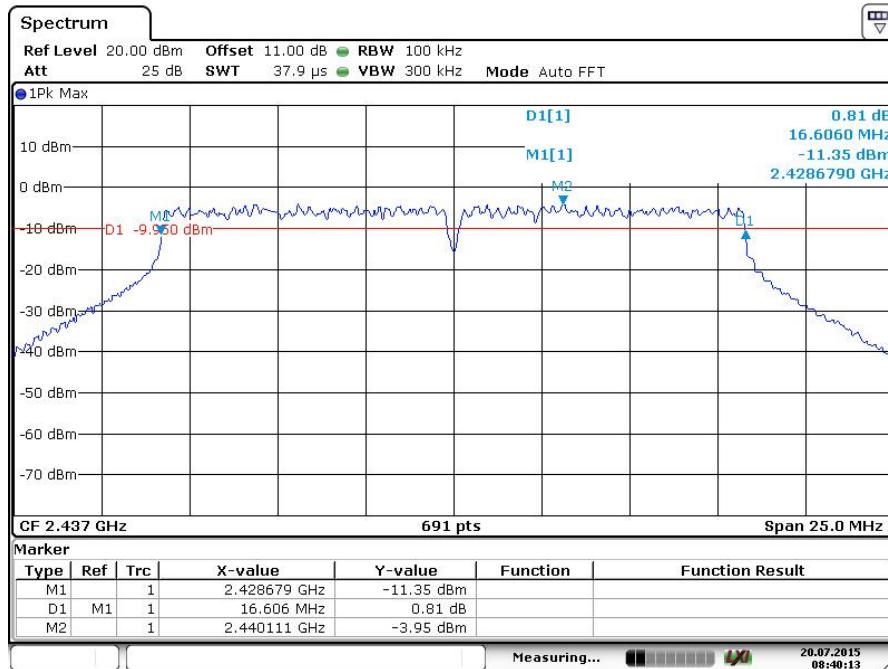
Date: 20 JUL 2015 09:48:16

802. 11g

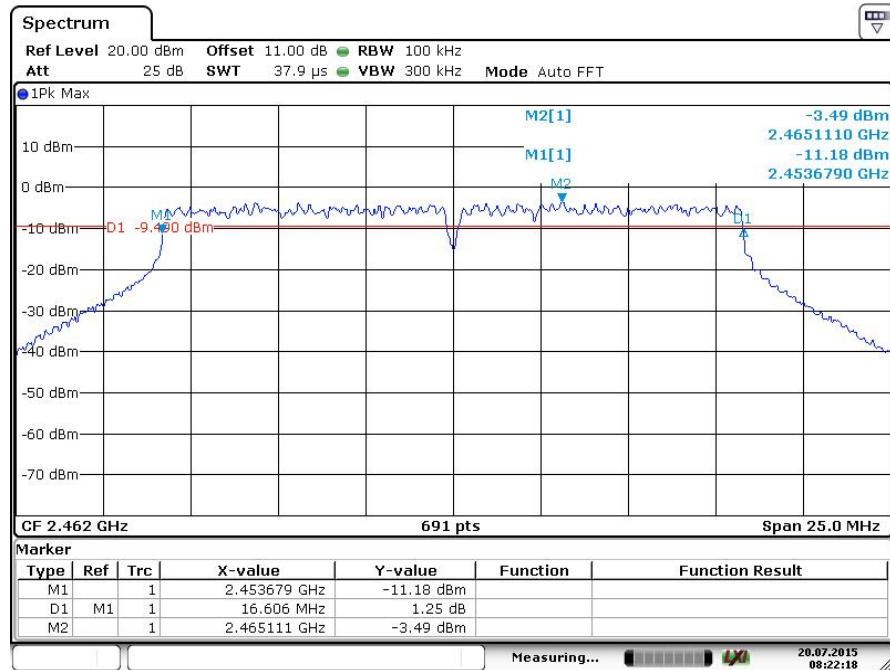
Configuration 1 - Mode 1, 2 & 3



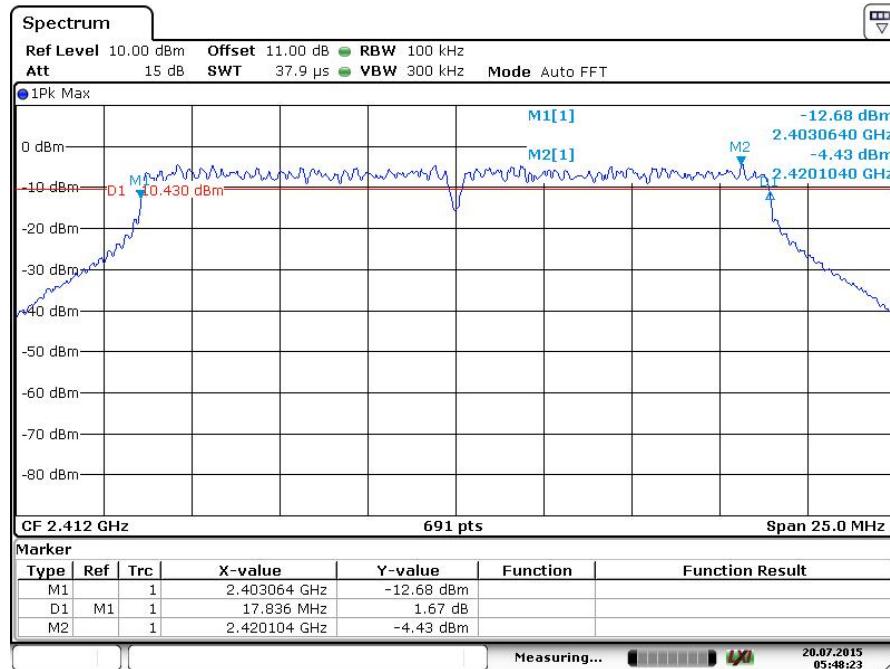
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Date: 20 JUL 2015 08:40:13



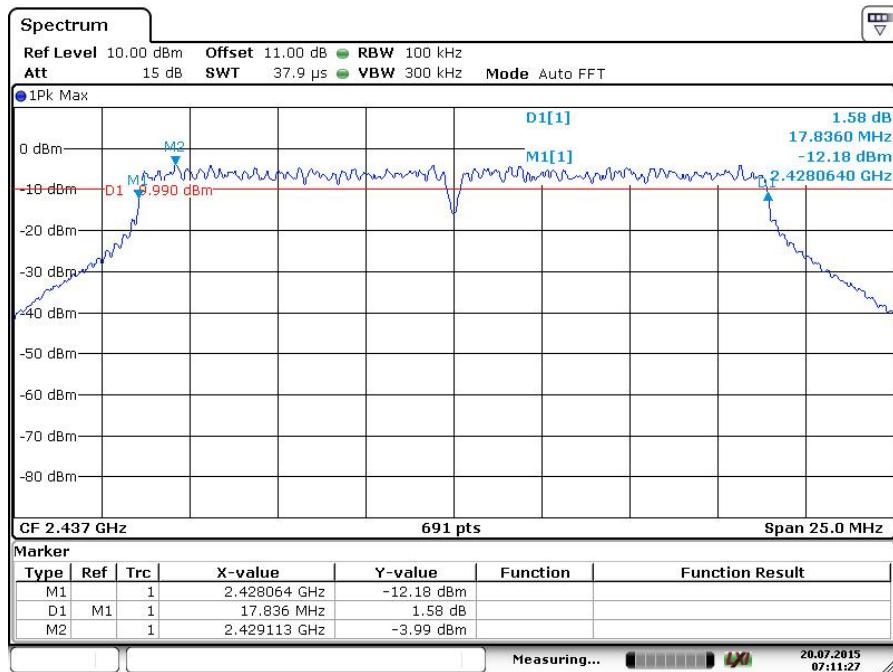
Date: 20 JUL 2015 08:22:18

802.11n(HT20)Configuration 1 - Mode 1, 2 & 3

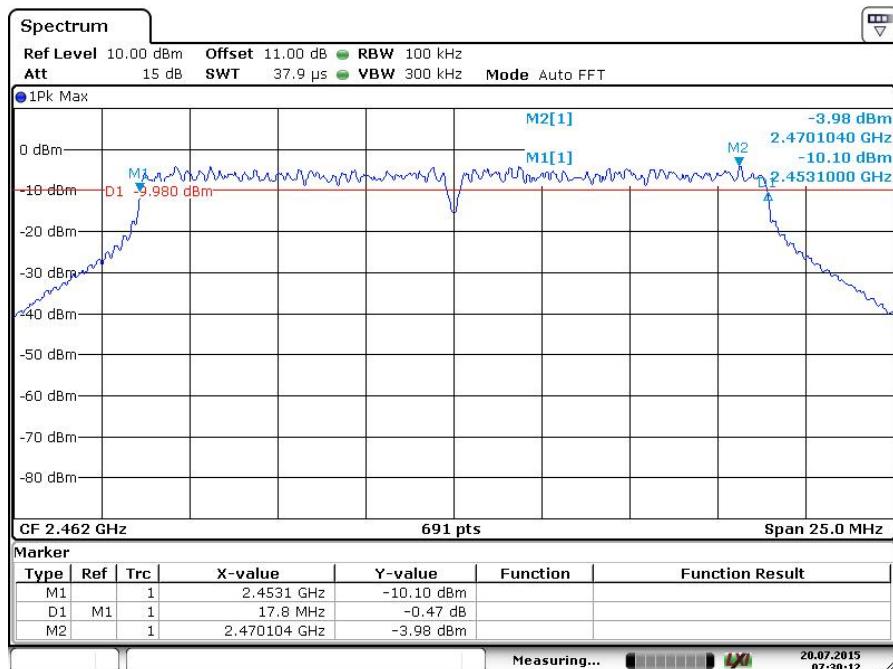
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Product Service



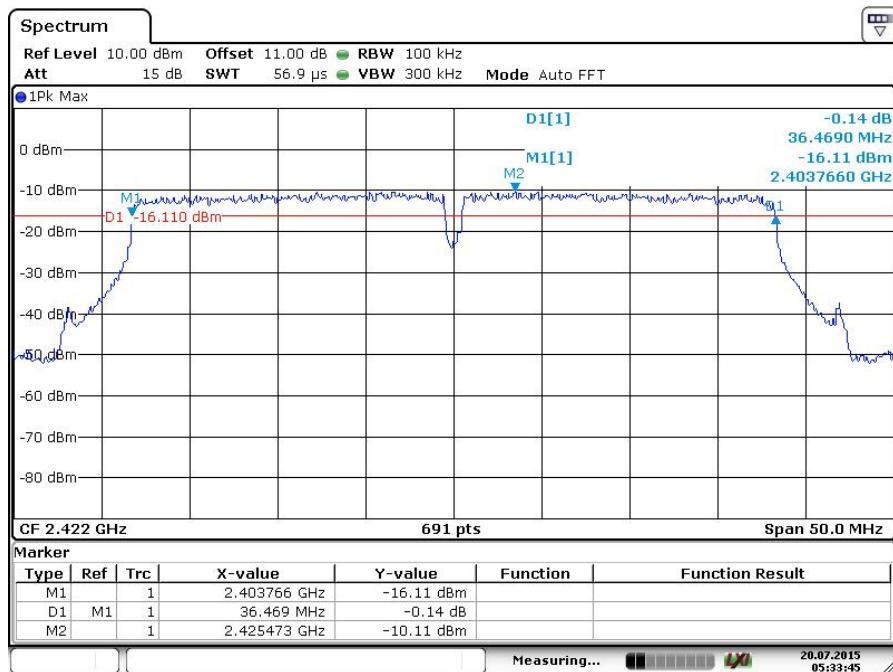
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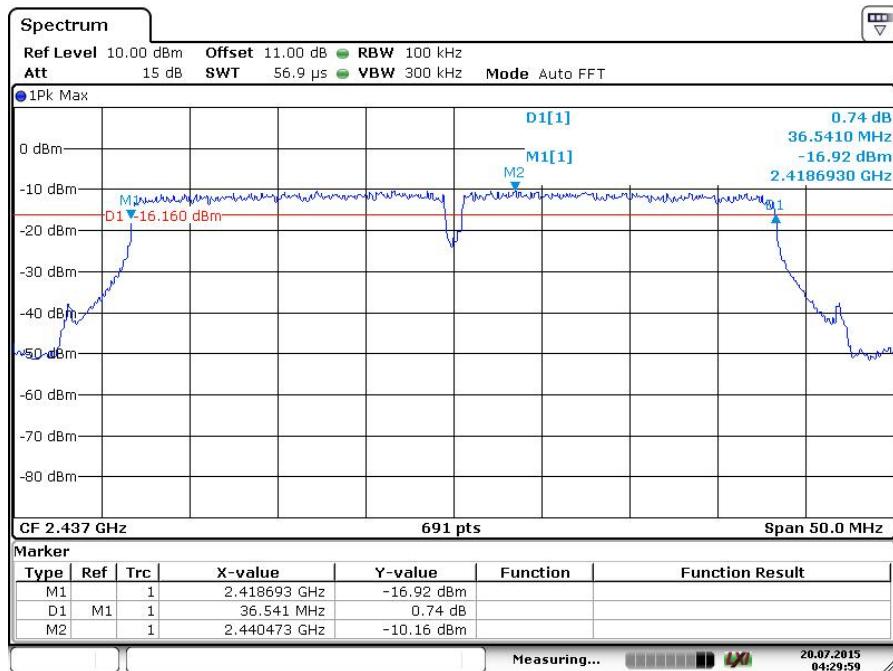
Date: 20 JUL 2015 07:30:12

802.11n(HT40)

Configuration 1 - Mode 2, 4 & 5



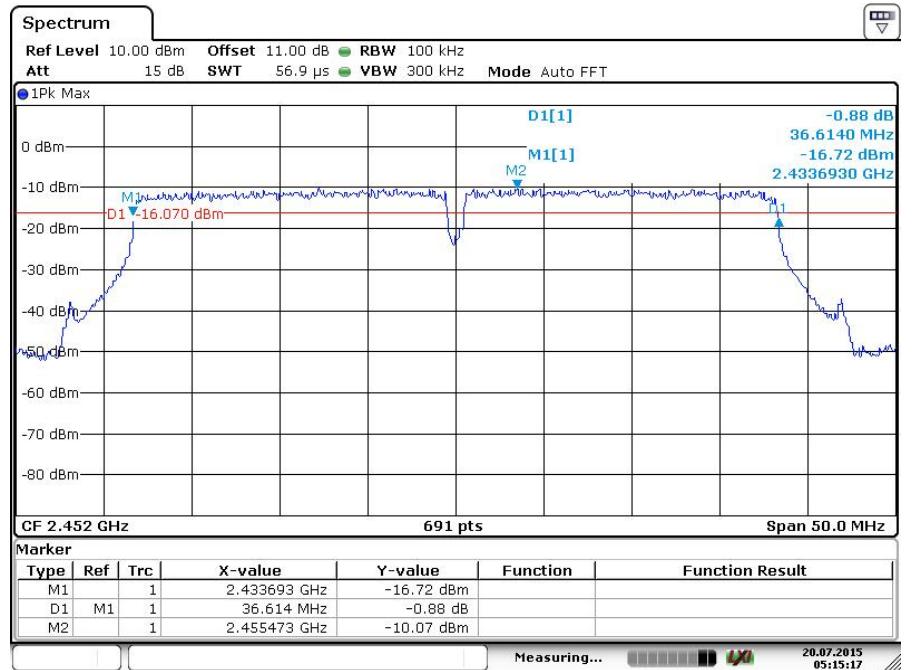
Date: 20 JUL 2015 05:33:45



Date: 20 JUL 2015 04:29:59



Product Service



Date: 20 JUL 2015 05:15:17

Limit	$\geq 500\text{kHz}$
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Remarks

The results of test did not exceed the limits at the measured frequencies



2.3 MAXIMUM CONDUCTED OUTPUT POWER - PEAK

2.3.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.247(b)(3)

2.3.2 Equipment Under Test

DB1016US, S/N: DMA30905140900082

2.3.3 Date of Test and Modification State

20 July 2015 – Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Method and Operating Modes

The test was applied in accordance with the requirements in clause 15.247 of FCC CFR 47 Part 15 Subpart C.

The EUT was connected to the power meter via an RF cable. The path loss of the cable was measured and entered as an offset. The peak level was recorded and compared with the test limits. Test procedures refer to KDB 558074 D01.

The path loss was measured and entered as a reference level offset.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration1

- Mode 1
- Mode 2
- Mode 3
- Mode 4
- Mode 5

2.3.6 Environmental Conditions

20 July 2015

Ambient Temperature 25.0°C

Relative Humidity 50.0%



2.3.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15 for Maximum Peak Output Power

The test results are shown below.

Configuration 1 - Mode 1, 2, 3, 4 & 5

Operating Mode	Data Rate	Channel	Frequency (MHz)	Peak Output Power(dBm)	Peak Output Power(mW)
11b	1Mbps	1	2412	16.63	46.03
11b	1Mbps	6	2437	16.38	43.45
11b	1Mbps	11	2462	16.43	43.95
11g	36Mbps	1	2412	19.26	84.33
11g	36Mbps	6	2437	19.38	86.70
11g	36Mbps	11	2462	19.50	89.13
11n (HT20)	MCS6	1	2412	18.32	67.92
11n (HT20)	MCS6	6	2437	18.71	74.30
11n (HT20)	MCS6	11	2462	18.71	74.30
11n (HT40)	MCS0	3	2422	15.16	32.81
11n (HT40)	MCS0	6	2437	15.12	32.51
11n (HT40)	MCS0	9	2452	15.41	34.75

Operating Mode	Data Rate	Channel	Frequency (MHz)	Average Output Power(dBm)	Average Output Power(mW)
11b	1Mbps	1	2412	14.22	26.42
11b	1Mbps	6	2437	14.05	25.41
11b	1Mbps	11	2462	14.12	25.82
11g	36Mbps	1	2412	10.09	10.21
11g	36Mbps	6	2437	10.15	10.35
11g	36Mbps	11	2462	10.29	10.69
11n (HT20)	MCS6	1	2412	9.07	8.07
11n (HT20)	MCS6	6	2437	9.28	8.47
11n (HT20)	MCS6	11	2462	9.46	8.83
11n (HT40)	MCS0	3	2422	8.06	6.40
11n (HT40)	MCS0	6	2437	8.03	6.35
11n (HT40)	MCS0	9	2452	8.32	6.79

Limit	≤30dBm or ≤1000mW
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Remarks

The maximum peak output power of EUT did not exceed 1000mW or 30dBm at the measured frequencies.



2.4 POWER SPECTRAL DENSITY

2.4.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.247(e)

2.4.2 Equipment Under Test

DB1016US, S/N: DMA30905140900082

2.4.3 Date of Test and Modification State

20 July 2015 – Modification State 0

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Method and Operating Modes

The test was applied in accordance with the requirements in clause 15.247 of FCC CFR 47 Part 15, Subpart C.

The EUT was connected to the spectrum analyzer via an RF cable, and controlled to transmit on its maximum output power. The path loss of the cable was measured and entered as an offset. The peak level was recorded and compared with the test limits.

Test procedures refer to KDB 558074 D01, and the test span was set to 1.5*DTS bandwidth (6dB Bandwidth).

The path loss was measured and entered as a reference level offset.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration1 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 4
 - Mode 5

2.4.6 Environmental Conditions

20 July 2015

Ambient Temperature 25.0°C

Relative Humidity 50.0%



2.4.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15 for Maximum Peak Output Power

The test results are shown below.

Configuration 1 - Mode 1, 2, 3, 4 & 5

Operating Mode	Data Rate	Channel	Frequency (MHz)	Peak Power Spectral Density (dBm/3kHz)
11b	1Mbps	1	2412	-15.91
11b	1Mbps	6	2437	-17.45
11b	1Mbps	11	2462	-17.20
11g	36Mbps	1	2412	-17.00
11g	36Mbps	6	2437	-16.93
11g	36Mbps	11	2462	-16.58
11n (HT20)	MCS6	1	2412	-17.20
11n (HT20)	MCS6	6	2437	-17.14
11n (HT20)	MCS6	11	2462	-16.76
11n (HT40)	MCS0	3	2422	-21.33
11n (HT40)	MCS0	6	2437	-21.56
11n (HT40)	MCS0	9	2452	-21.27

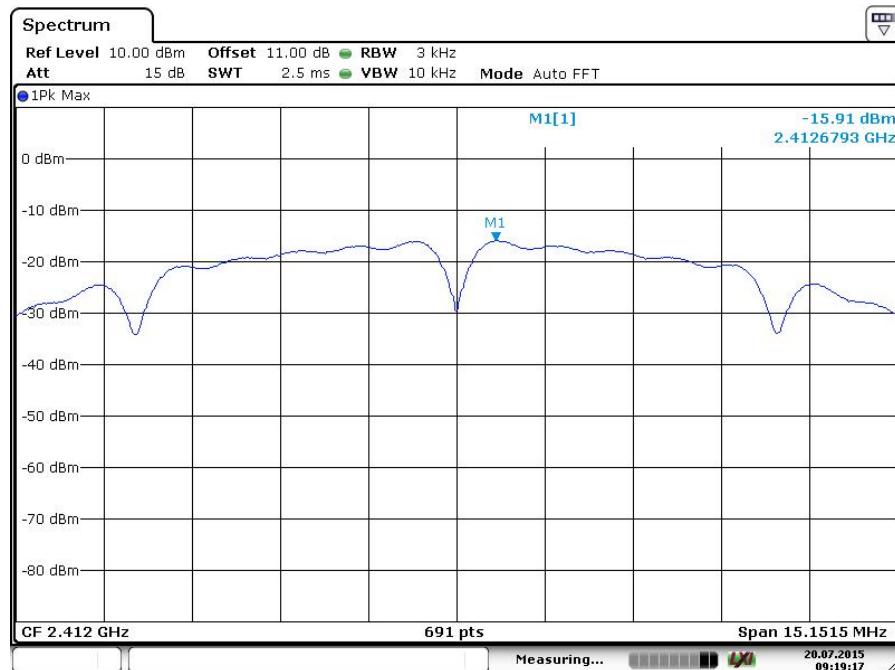


Product Service

Test Plots are shown below.

802.11b

Configuration 1 - Mode 1, 2 & 3



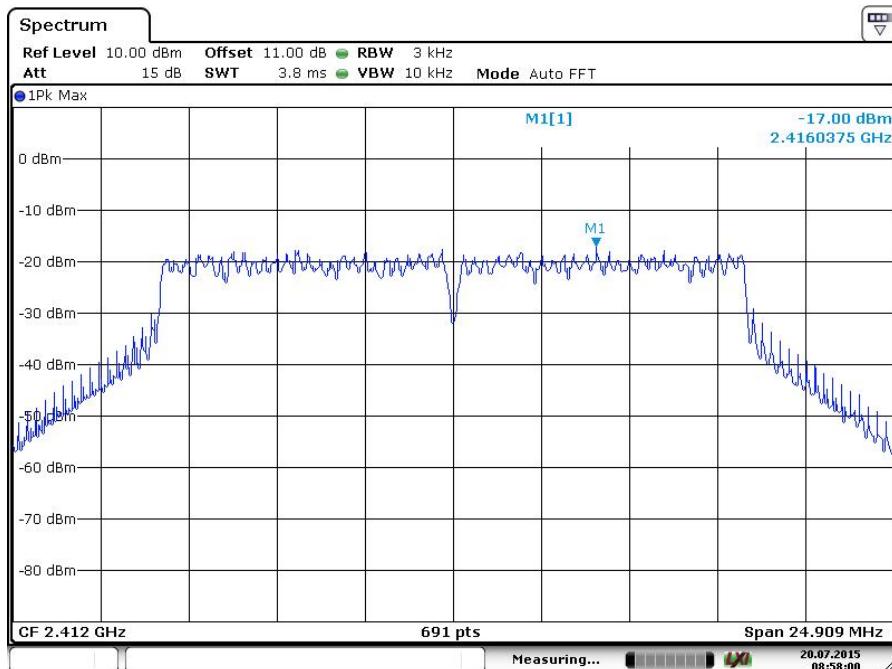
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Date: 20 JUL 2015 09:40:36



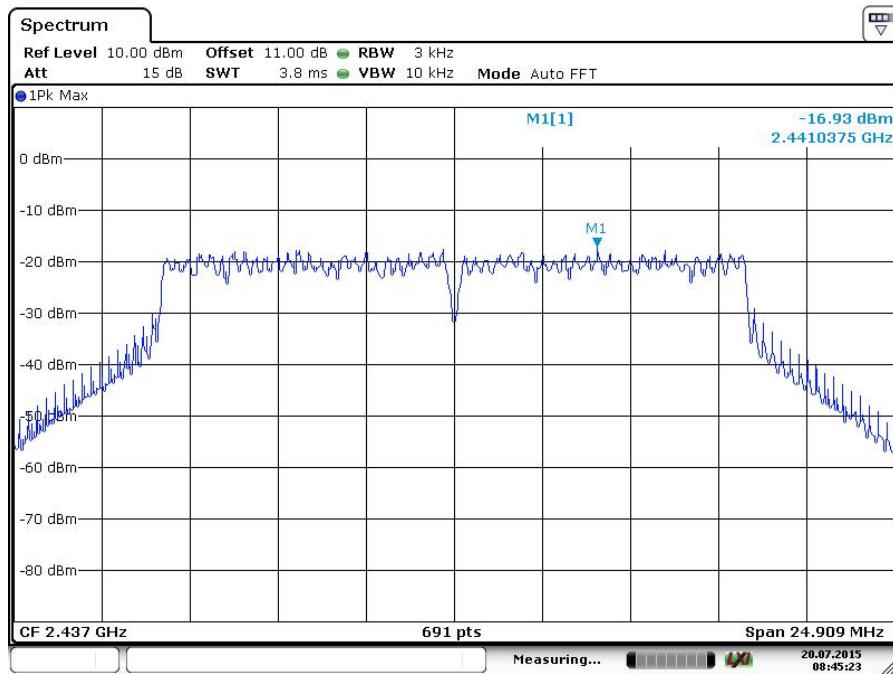
Date: 20 JUL 2015 09:57:46

802.11gConfiguration 1 - Mode 1, 2 & 3

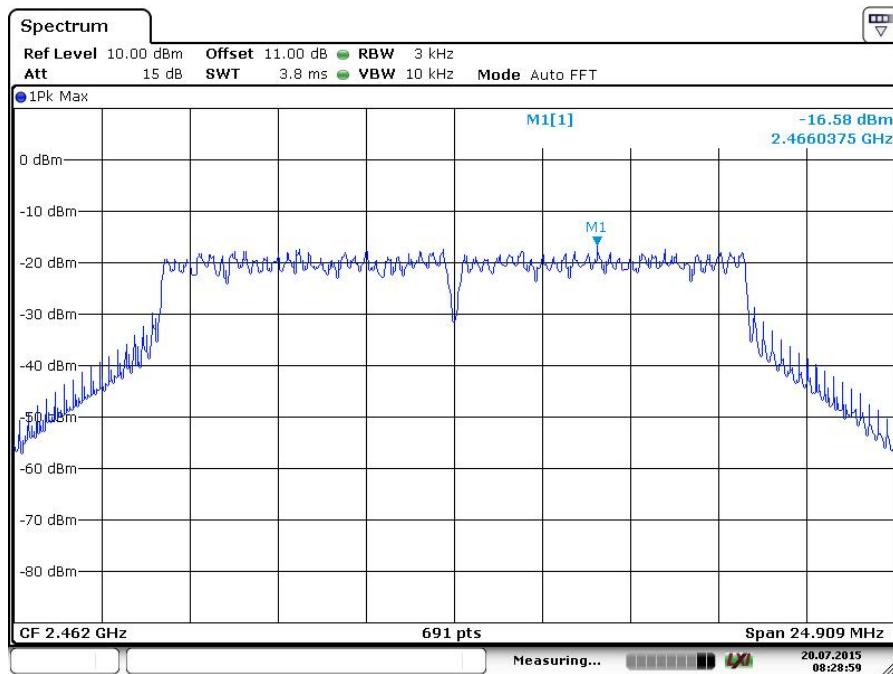
Date: 20 JUL 2015 08:58:00



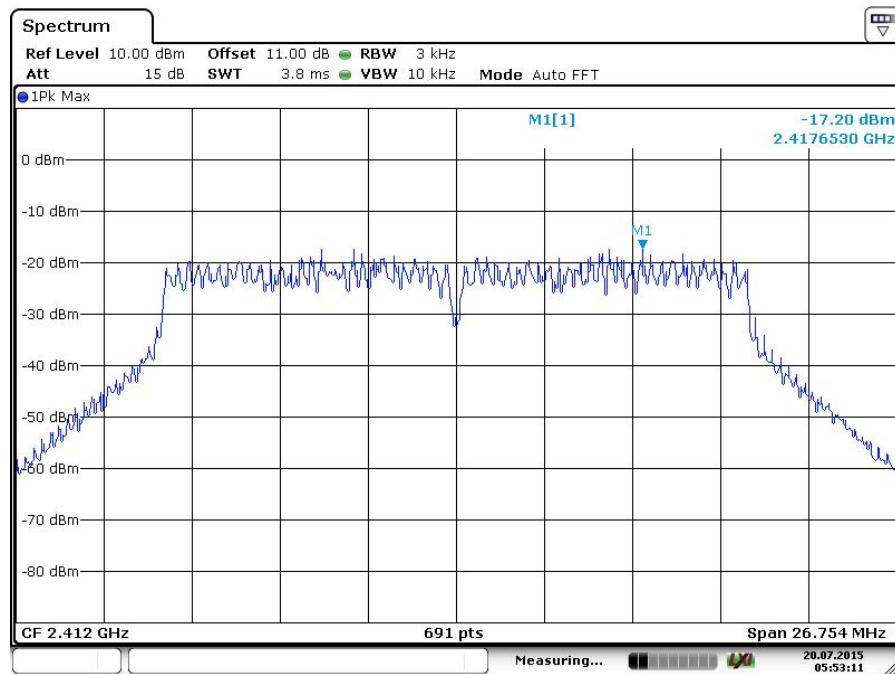
Product Service



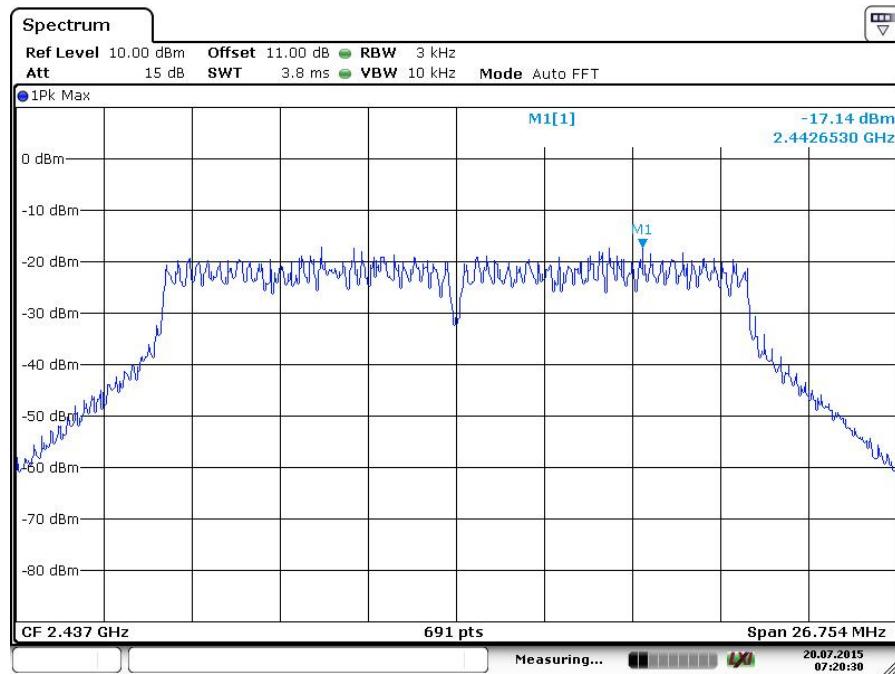
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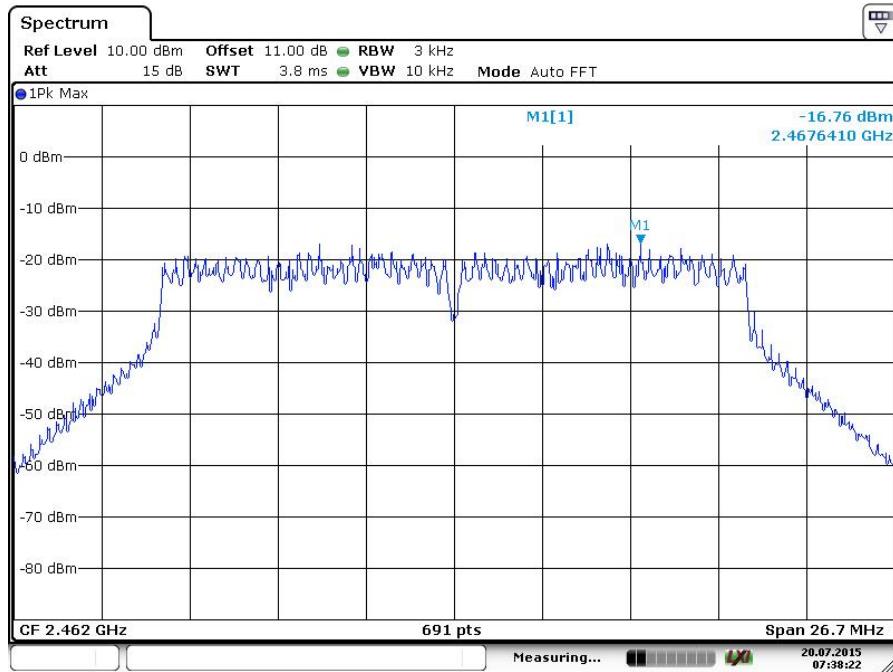
Date: 20 JUL 2015 08:28:58

802.11n(HT20)Configuration 1 - Mode 1, 2 & 3

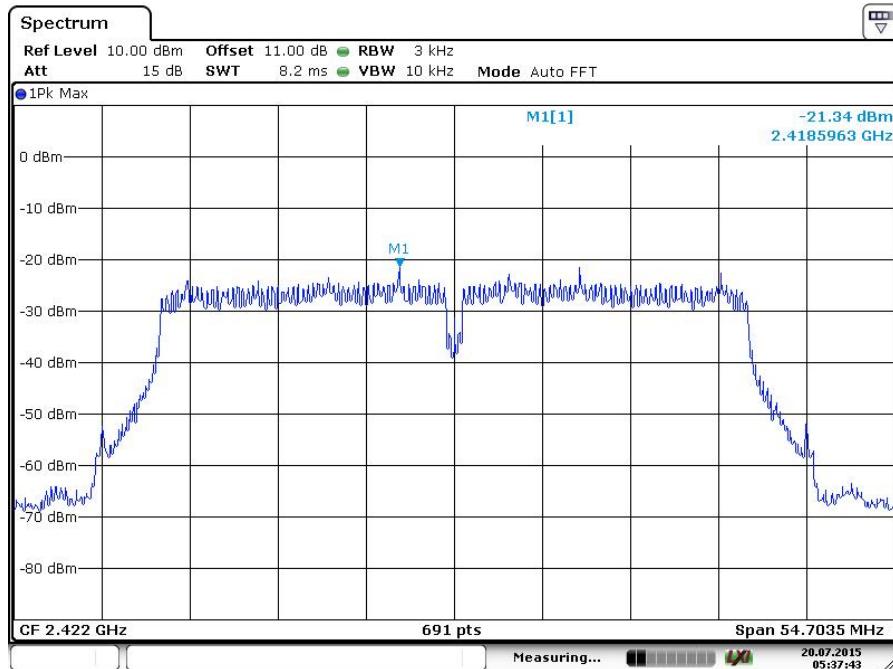
Date: 20 JUL 2015 05:53:12



Date: 20 JUL 2015 07:20:30



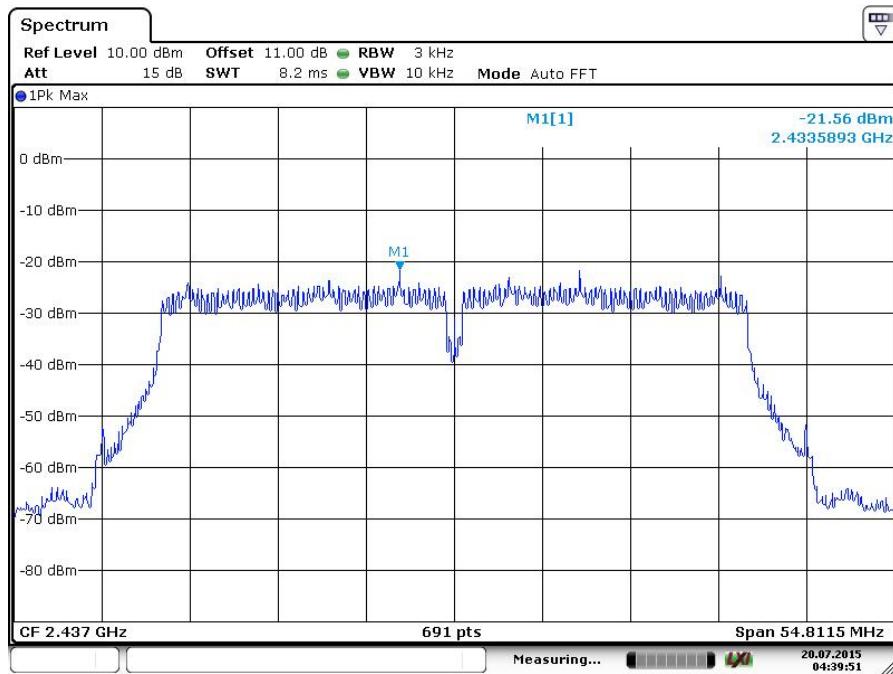
Date: 20 JUL 2015 07:38:22

802.11n(HT40)Configuration 1 - Mode 2, 4 & 5

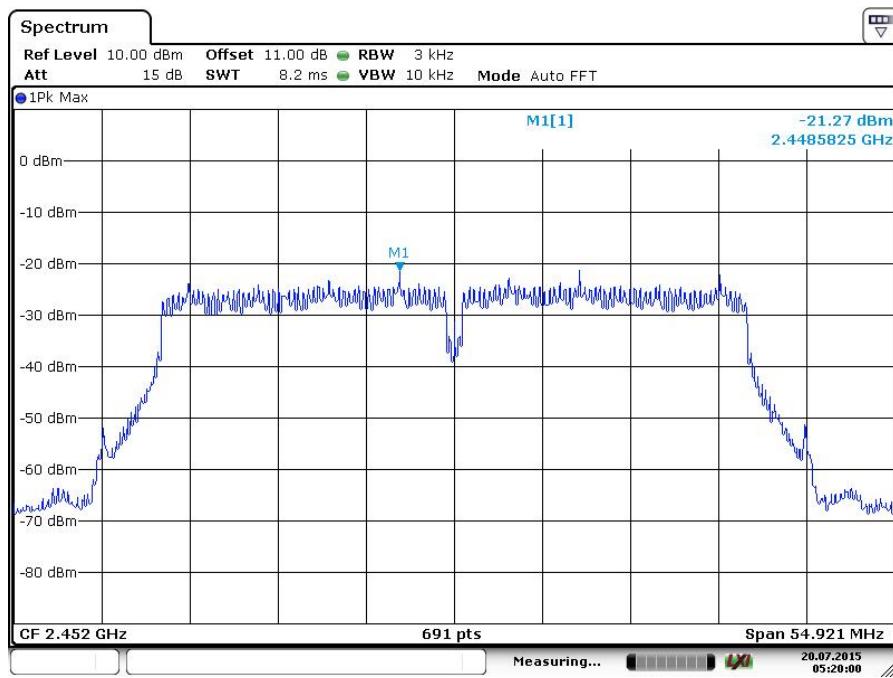
Date: 20 JUL 2015 05:37:43



Product Service



Date: 20 JUL 2015 04:39:51



Date: 20 JUL 2015 05:20:00

Limit	≤8dBm/3kHz
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Remarks

The test results of EUT did not exceed the limit at all measured frequencies.



2.5 BAND EDGE AND CONDUCTED SPURIOUS EMISSIONS

2.5.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.205, 15.209, 15.247(d)

2.5.2 Equipment Under Test

DB1016US, S/N: DMA30905140900082

2.5.3 Date of Test and Modification State

20 July 2015 – Modification State 0

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Method and Operating Modes

The test was applied in accordance with the test requirements in clause 15.247 of FCC CFR 47 Part 15, Subpart C.

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.

The Spurious Conducted Emissions from the antenna terminal were measured. The frequency spectrum investigated from 30MHz to 25 GHz. The EUT was transmitted at maximum power to the Spectrum Analyser. The test span was set to 1.5*DTS bandwidth (6dB bandwidth). The detector and trace of spectrum analyser were set to Peak and Max Hold respectively. The peak point of the trace was measured and the markers positioned to give the -20dBc points of the displayed spectrum.

The test was performed with the EUT in the following configurations and modes of operation:

- Configuration 1
 - Mode 1
 - Mode 2 (for Conducted Spurious Emissions test only)
 - Mode 3
 - Mode 4
 - Mode 5

2.5.6 Environmental Conditions

20 July 2015

Ambient Temperature 25.0°C

Relative Humidity 50.0%



2.5.7 Test Results

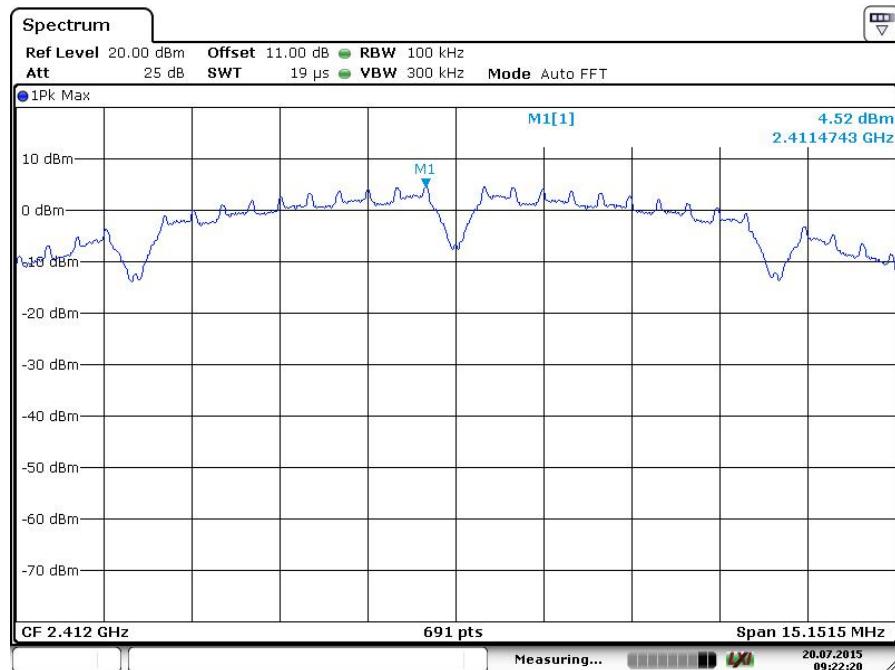
For the period of test the EUT met the requirements of FCC CFR 47 Part 15 for Band Edge Compliance.

The test results are shown below.

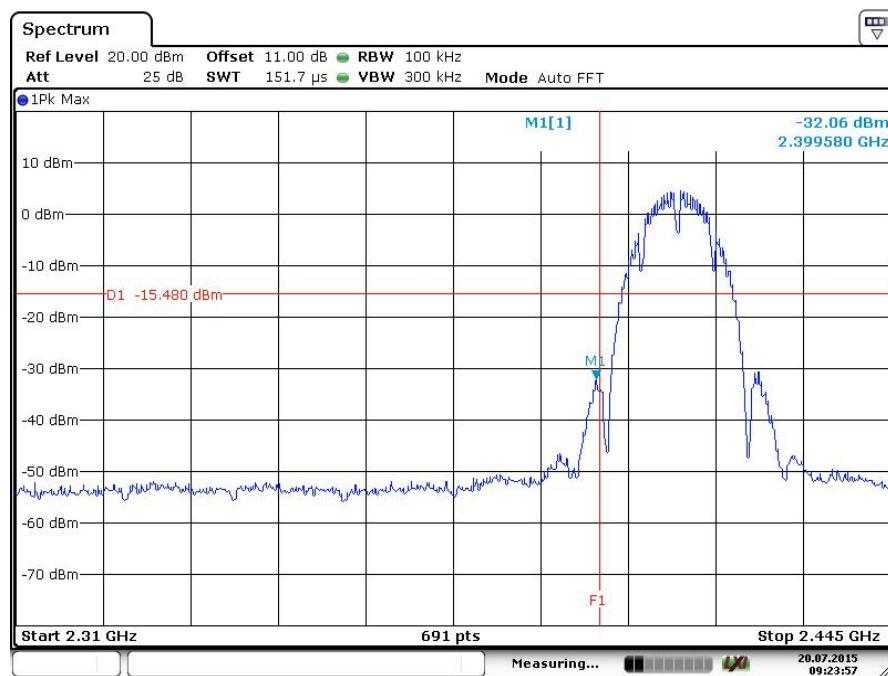
Operating Mode	Data Rate	Channel	Frequency (MHz)	Peak Power Spectral Density (dBm/100kHz)	Limits for Unwanted Emissions (dBm/100kHz)
11b	1Mbps	1	2412	4.52	-15.48
11b	1Mbps	6	2437	2.99	-17.01
11b	1Mbps	11	2462	3.28	-16.72
11g	36Mbps	1	2412	-4.08	-24.08
11g	36Mbps	6	2437	-4.00	-24.00
11g	36Mbps	11	2462	-3.64	-23.64
11n (HT20)	MCS6	1	2412	-4.49	-24.49
11n (HT20)	MCS6	6	2437	-4.32	-24.32
11n (HT20)	MCS6	11	2462	-4.04	-24.04
11n (HT40)	MCS0	3	2422	-10.13	-30.13
11n (HT40)	MCS0	6	2437	-10.55	-30.55
11n (HT40)	MCS0	9	2452	-10.04	-30.04



Product Service

Test Plots are shown below.802.11bConfiguration 1 - Mode 1

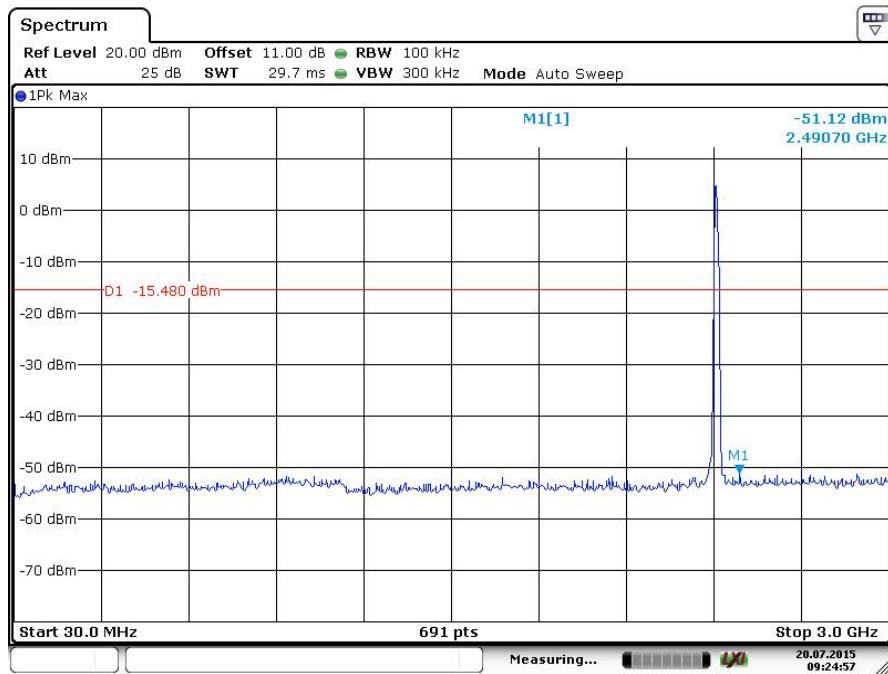
Date: 20 JUL 2015 09:22:20



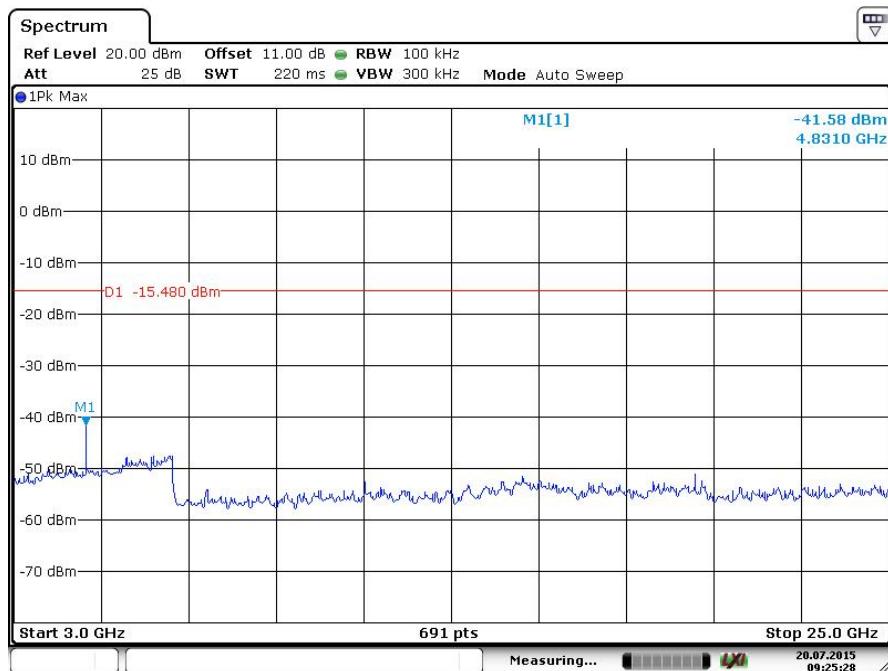
Date: 20 JUL 2015 09:23:57



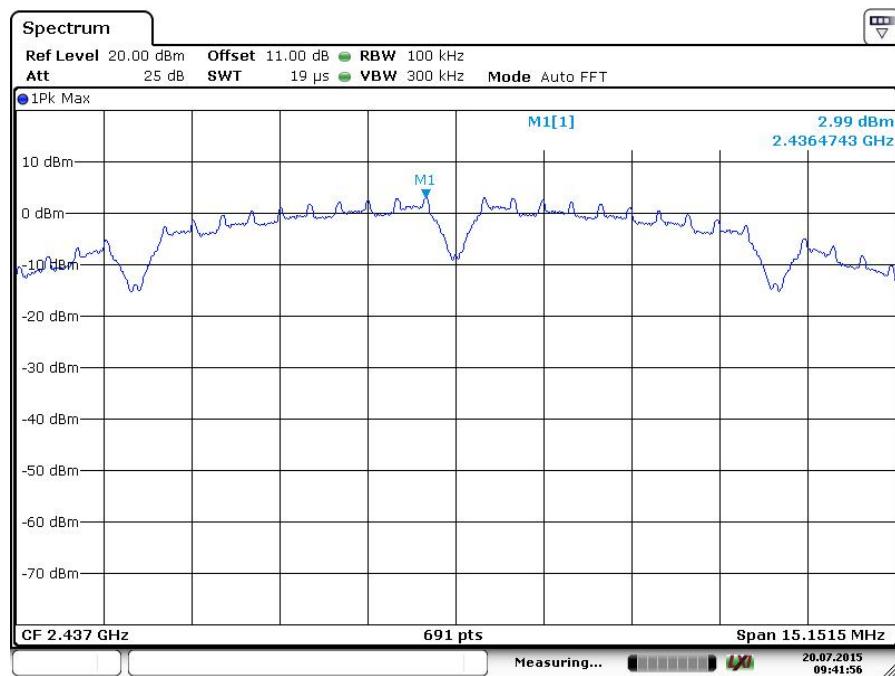
Product Service



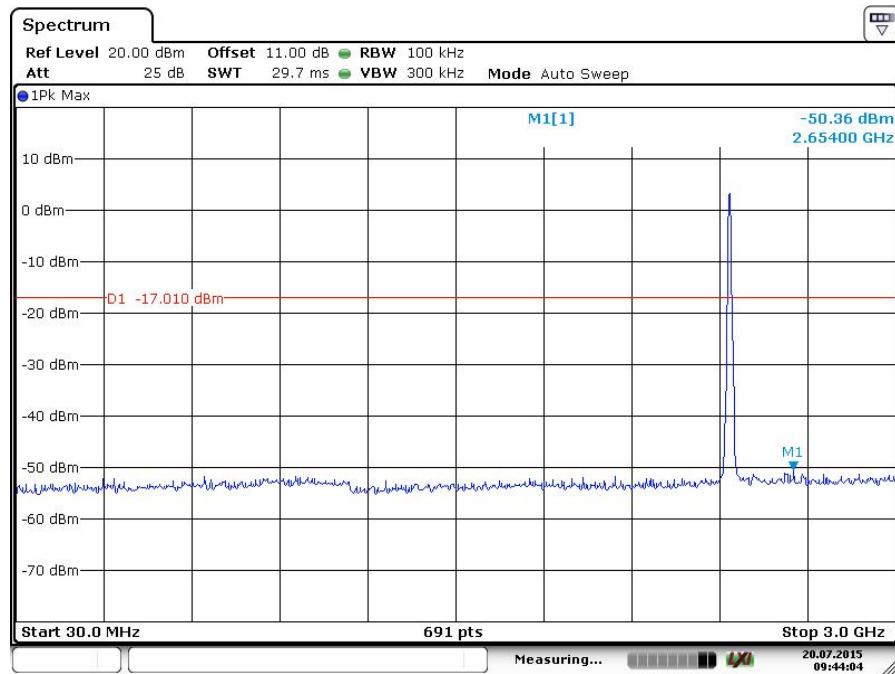
Date: 20 JUL 2015 09:24:57



Date: 20 JUL 2015 09:25:29

802.11bConfiguration 1 - Mode 2

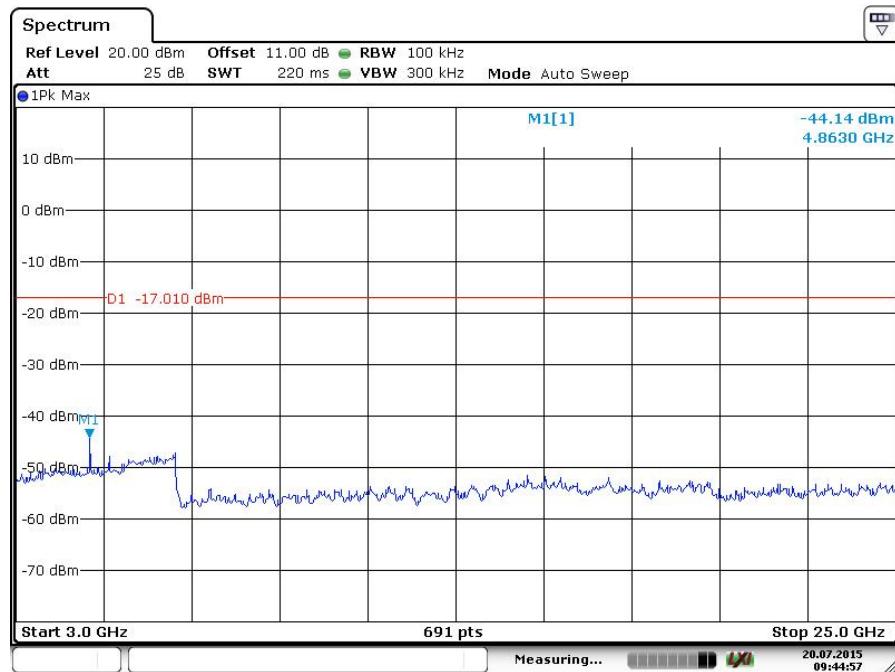
Date: 20 JUL 2015 09:41:56



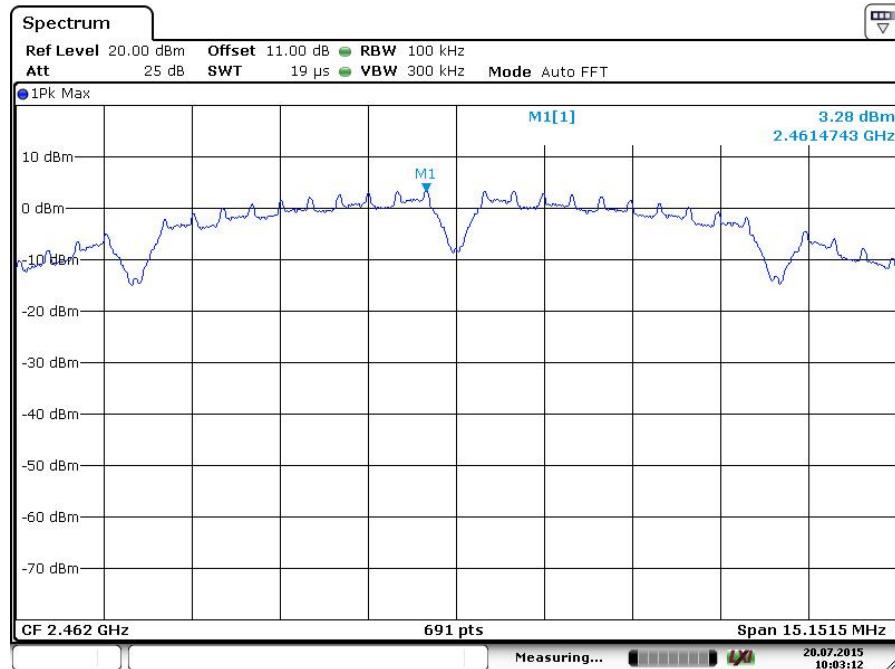
Date: 20 JUL 2015 09:44:04



Product Service



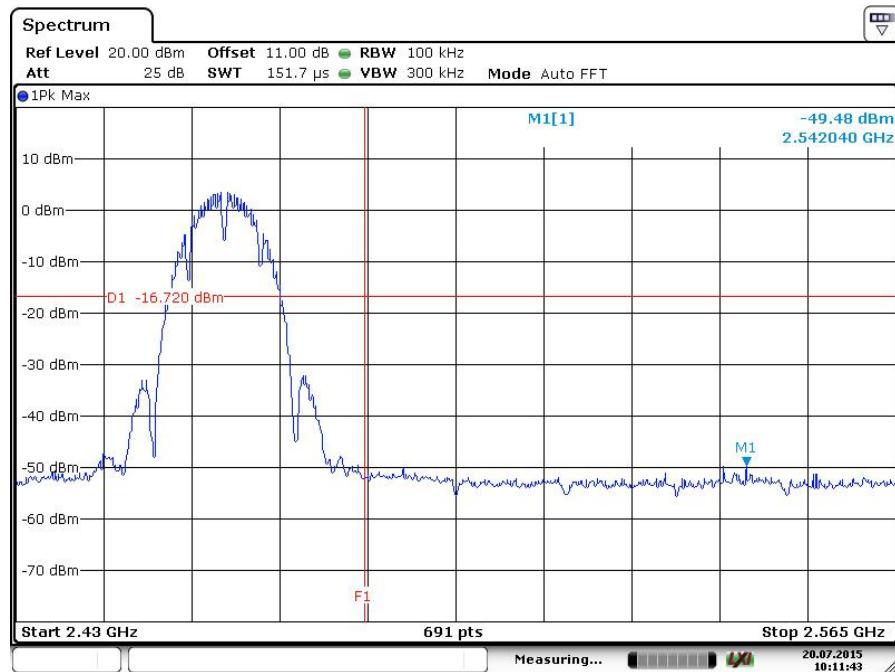
Date: 20 JUL 2015 09:44:56

802. 11bConfiguration 1 - Mode 3

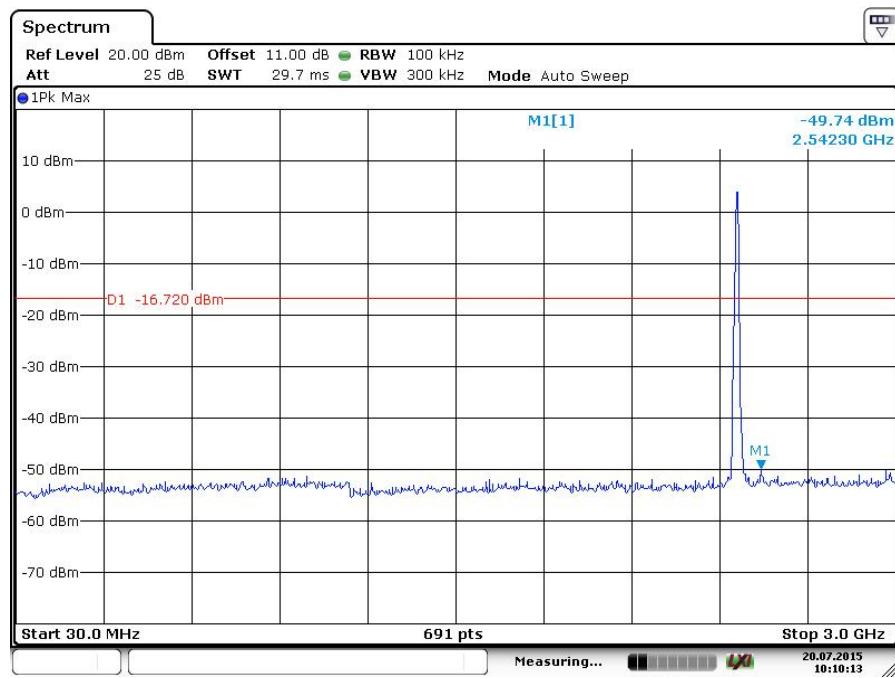
Date: 20 JUL 2015 10:03:12



Product Service



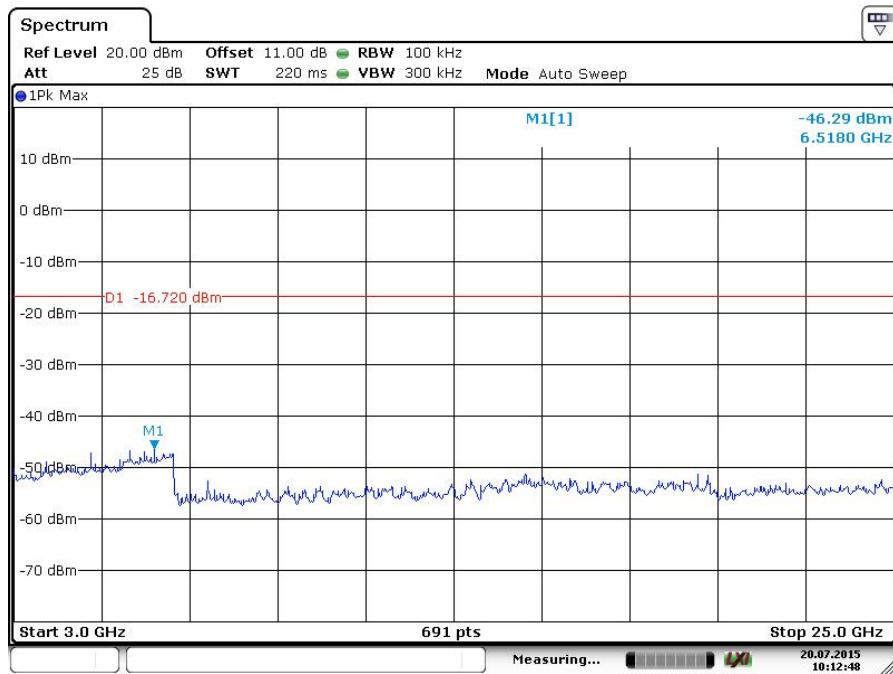
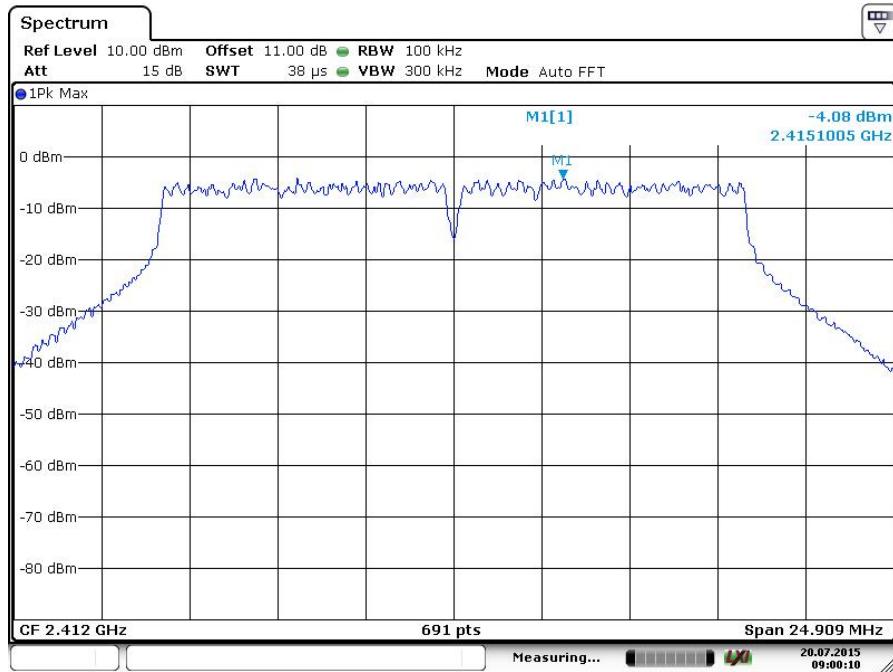
Date: 20 JUL 2015 10:11:43



Date: 20 JUL 2015 10:10:13

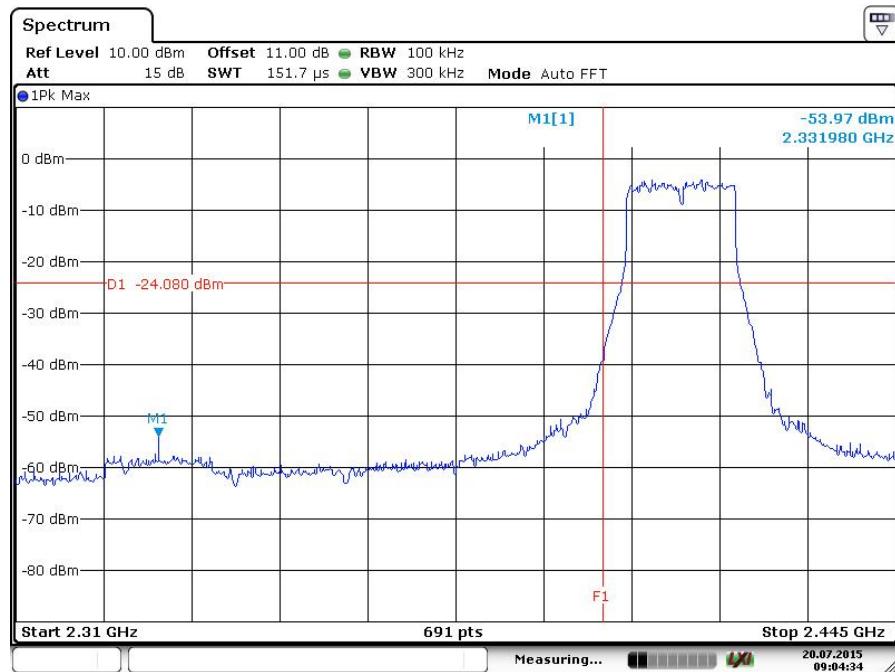


Product Service

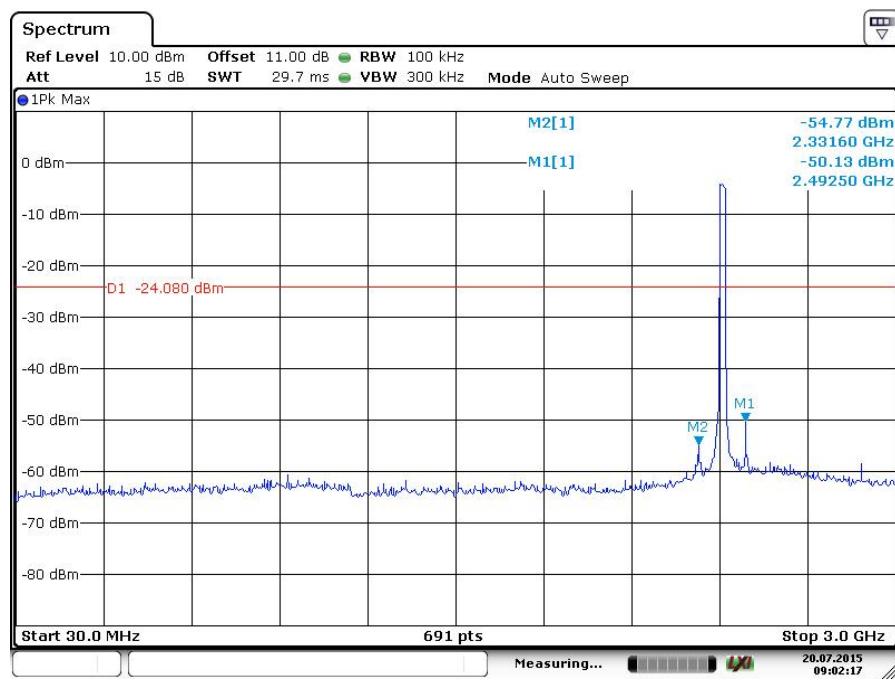
802.11gConfiguration 1 - Mode 1



Product Service



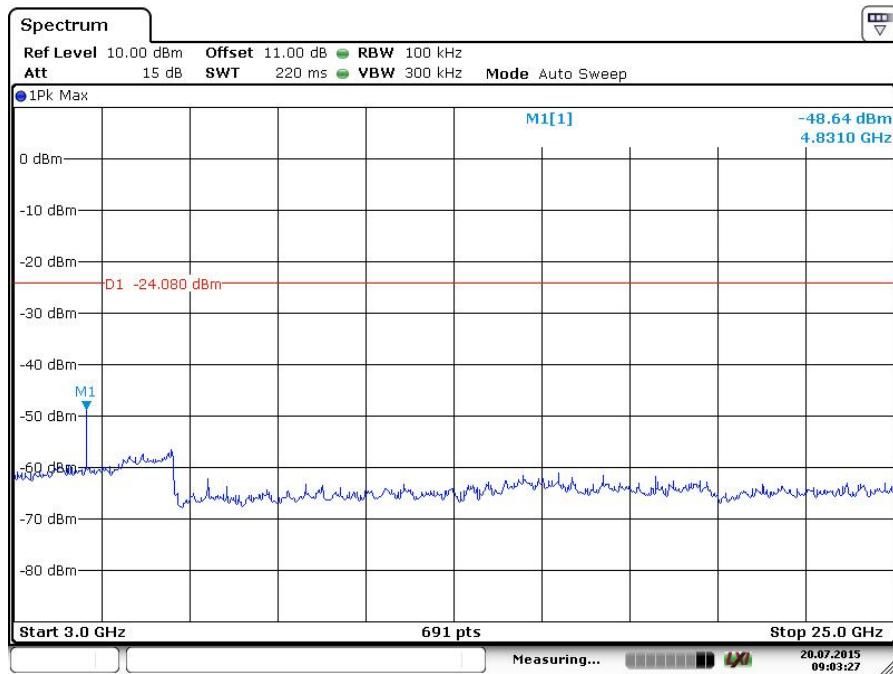
Date: 20 JUL 2015 09:04:34



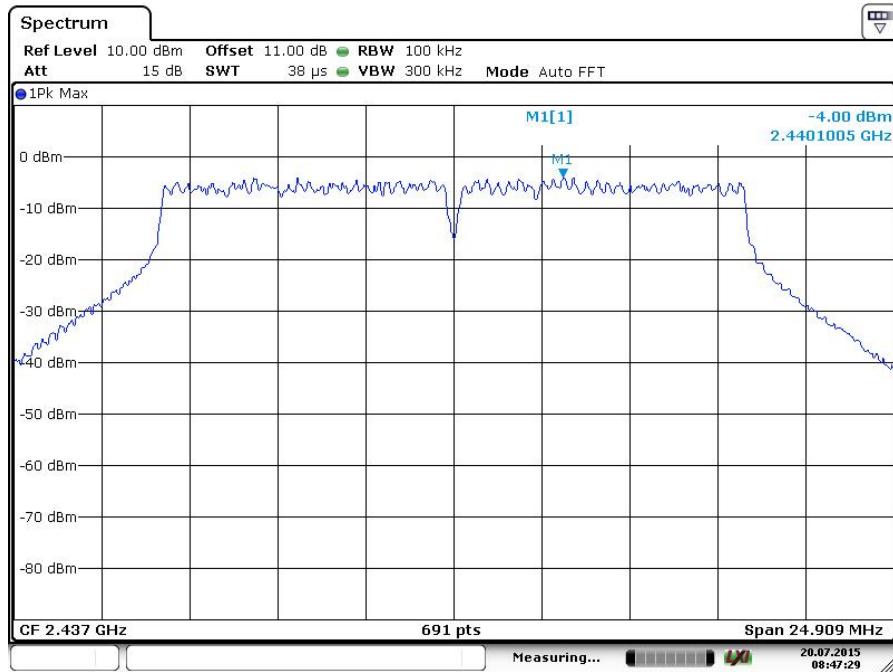
Date: 20 JUL 2015 09:02:17



Product Service



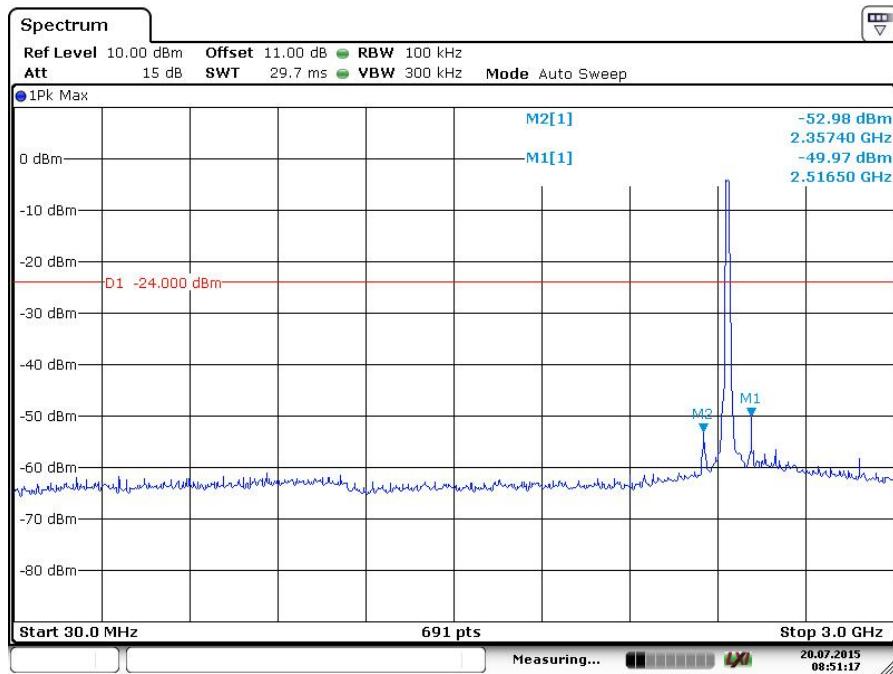
Date: 20 JUL 2015 09:03:27

802.11gConfiguration 1 - Mode 2

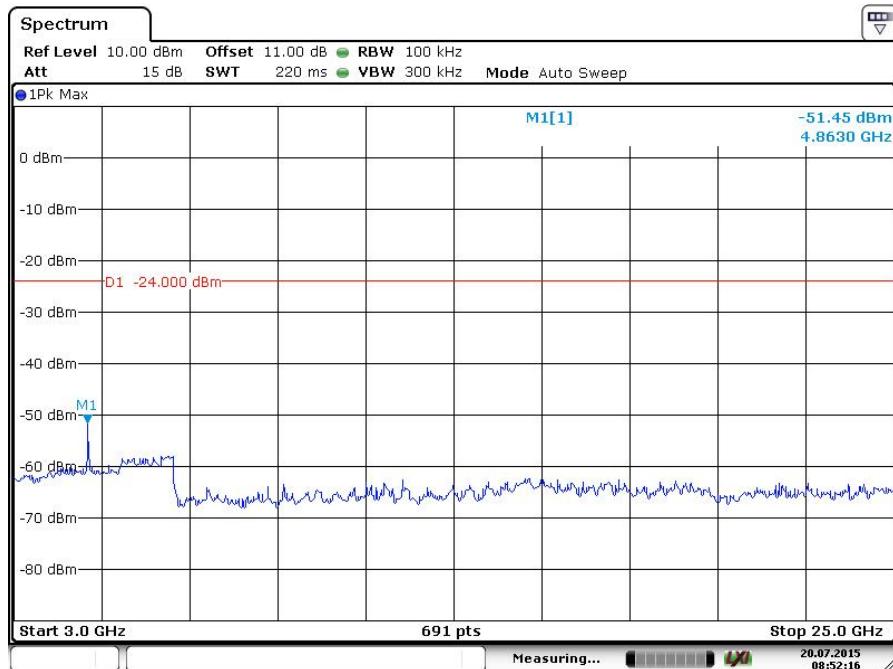
Date: 20 JUL 2015 08:47:29



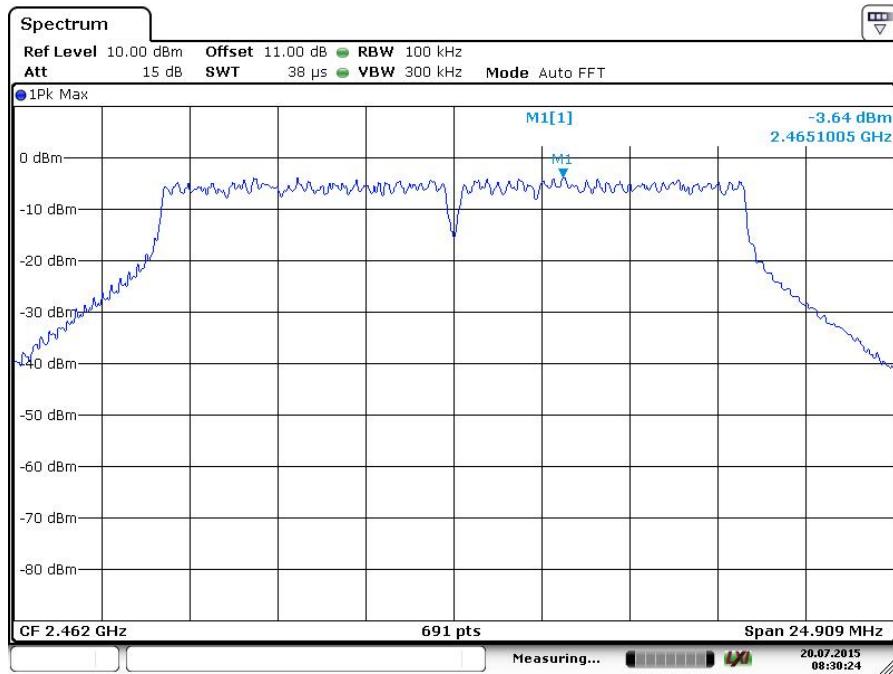
Product Service



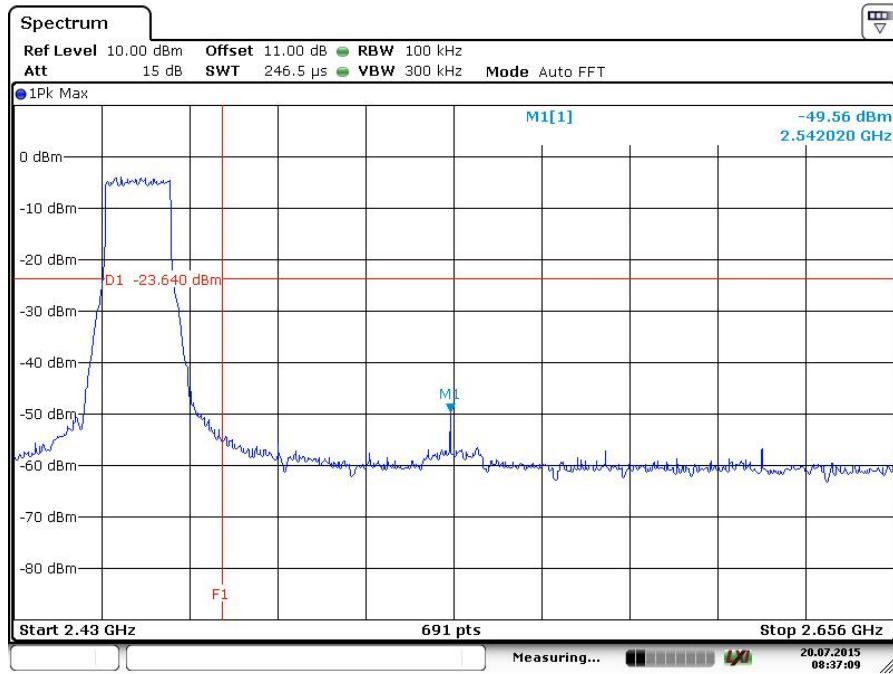
Date: 20 JUL 2015 08:51:17



Date: 20 JUL 2015 08:52:17

802. 11gConfiguration 1 - Mode 3

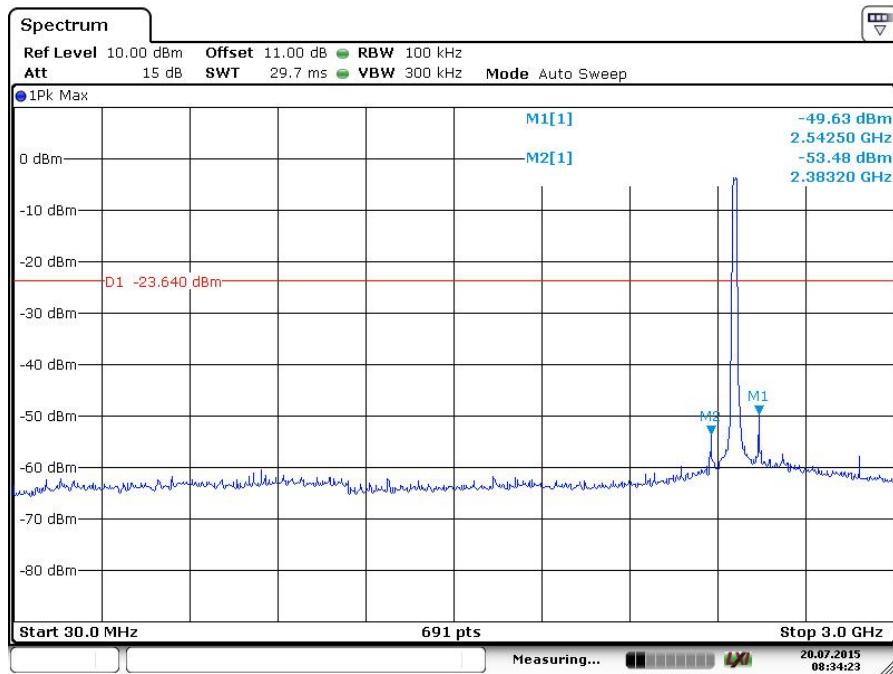
Date: 20.JUL.2015 08:30:24



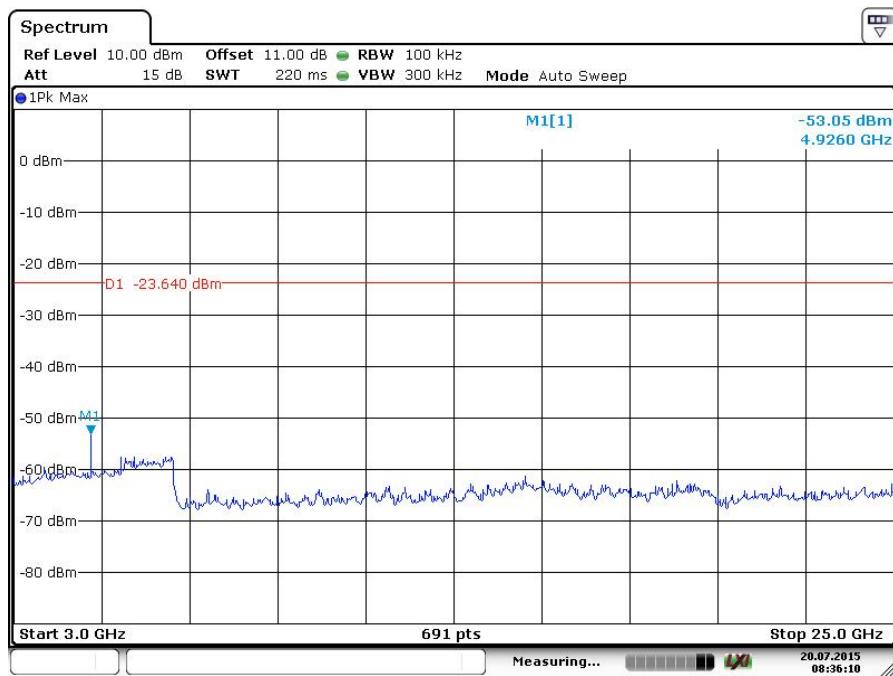
Date: 20.JUL.2015 08:37:09



Product Service



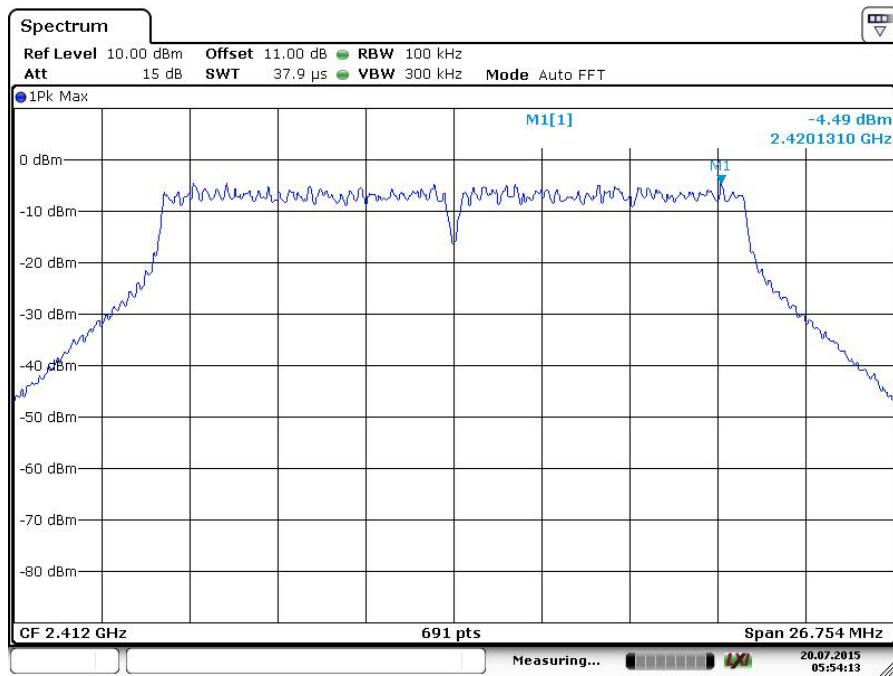
Date: 20 JUL 2015 08:34:24



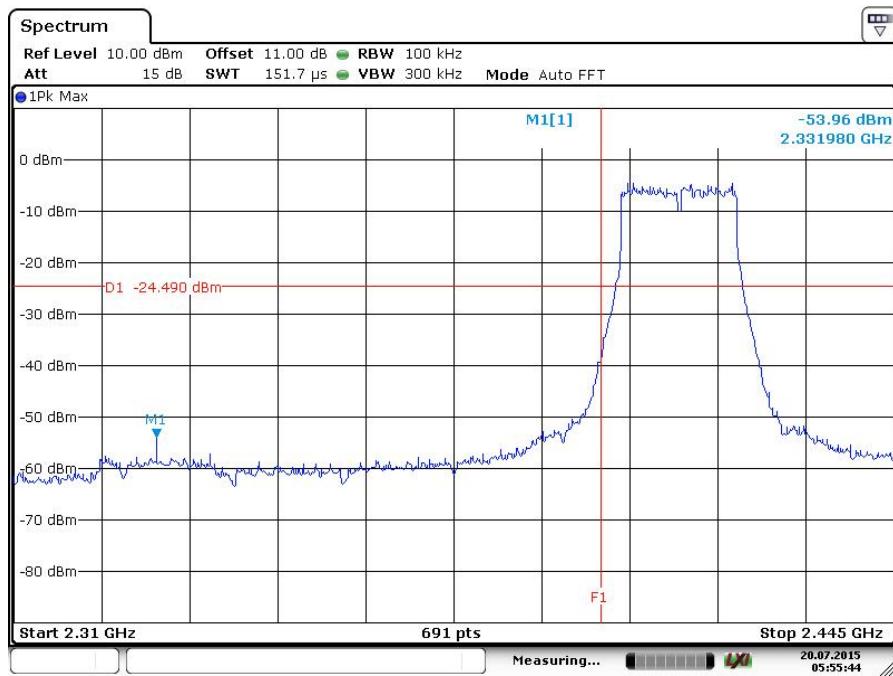
Date: 20 JUL 2015 08:36:10



Product Service

802.11n(HT20)Configuration 1 - Mode 1

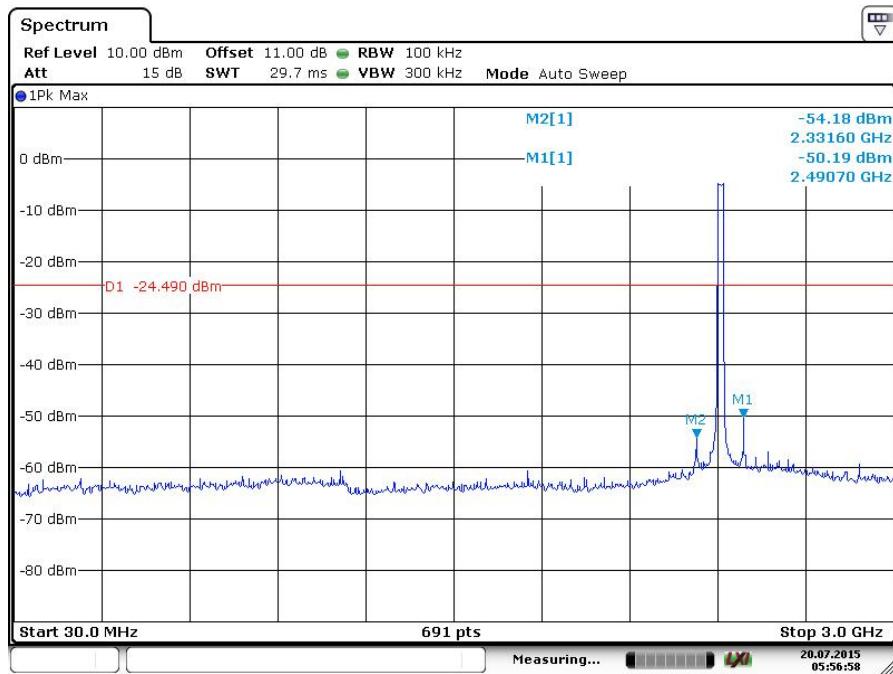
Date: 20 JUL 2015 05:54:14



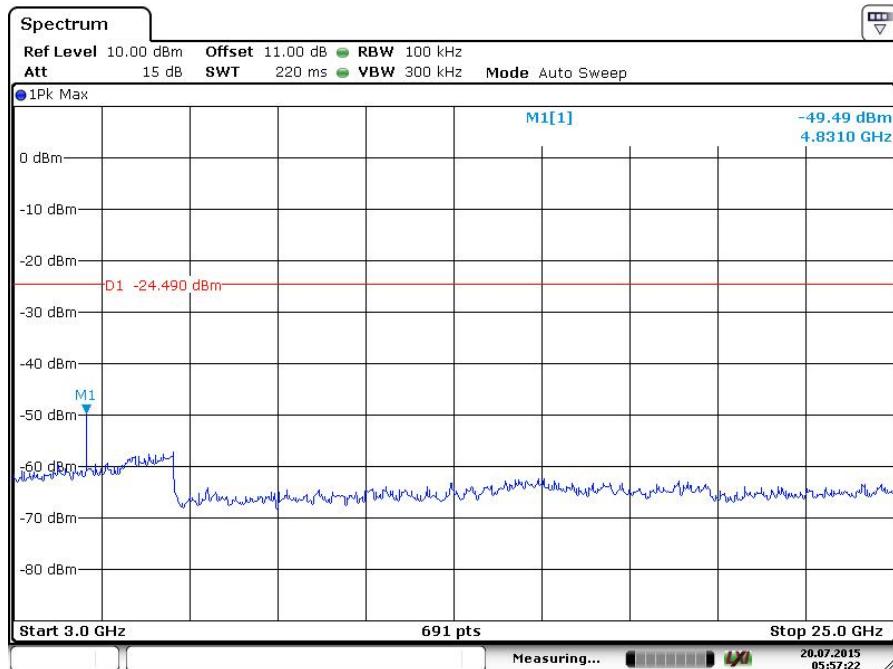
Date: 20 JUL 2015 05:55:44



Product Service



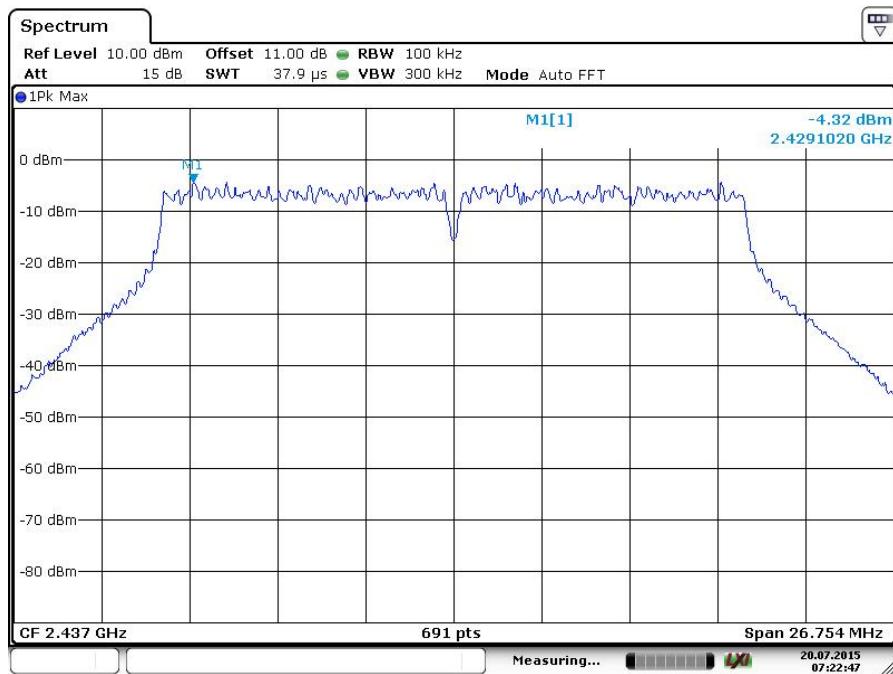
Date: 20 JUL 2015 05:56:57



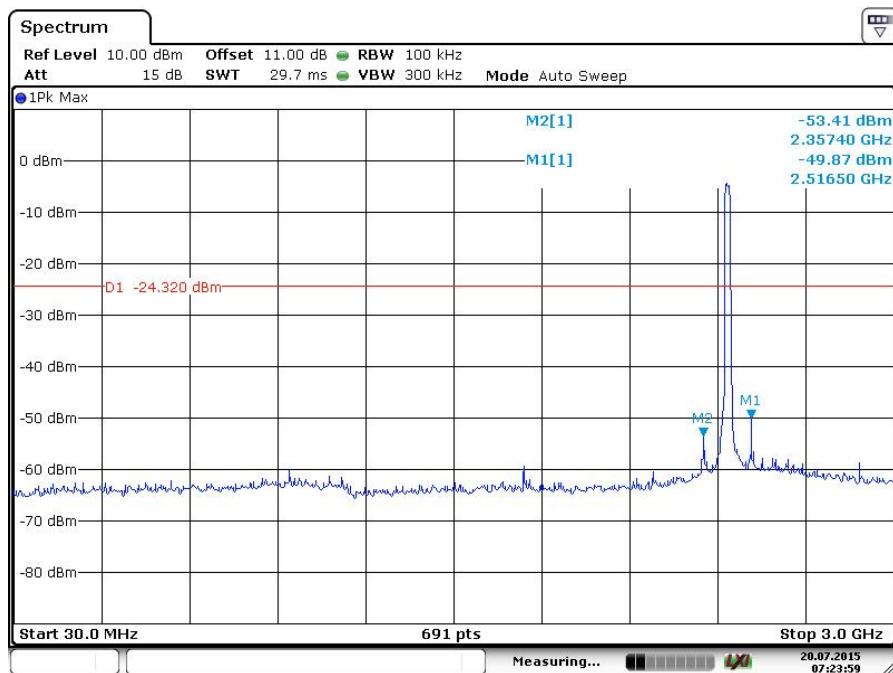
Date: 20 JUL 2015 05:57:22



Product Service

802.11n(HT20)Configuration 1 - Mode 2

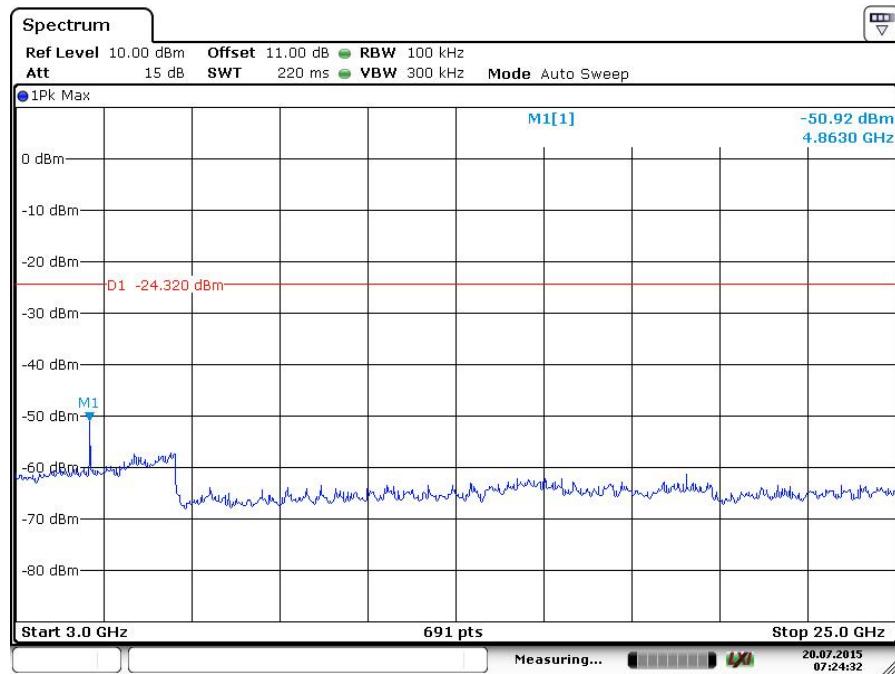
Date: 20 JUL 2015 07:22:47



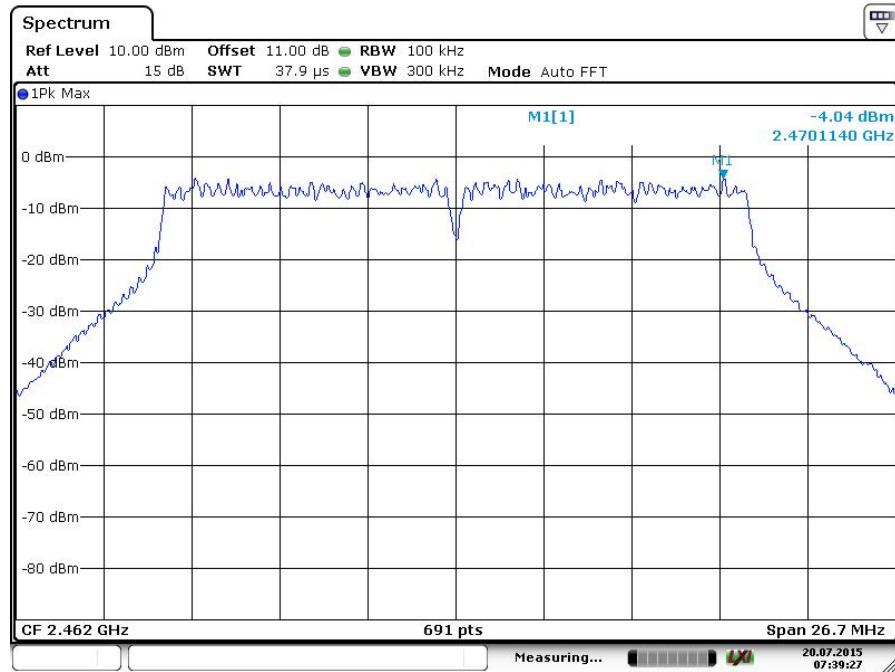
Date: 20 JUL 2015 07:23:59



Product Service



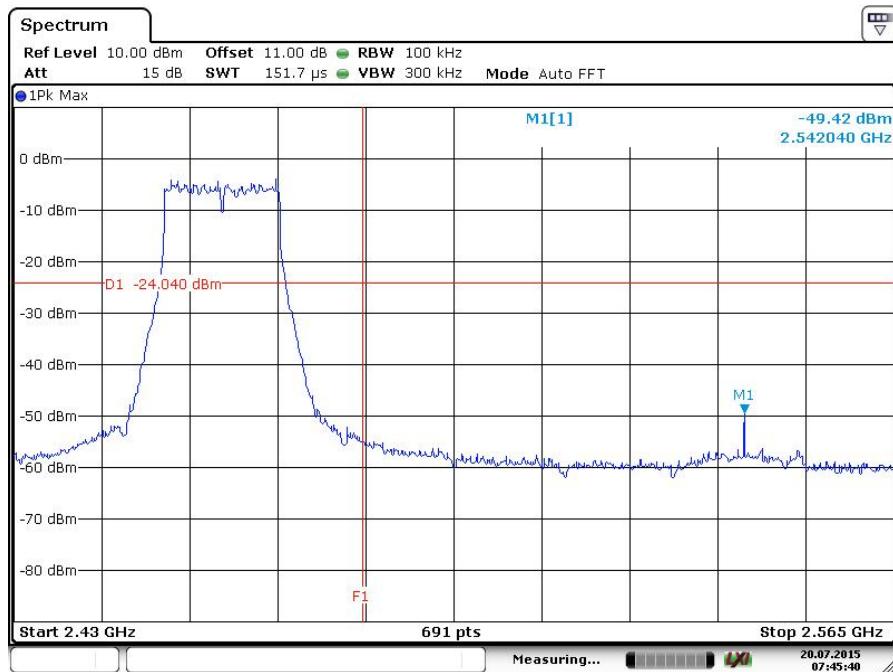
Date: 20 JUL 2015 07:24:32

802.11n(HT20)Configuration 1 - Mode 3

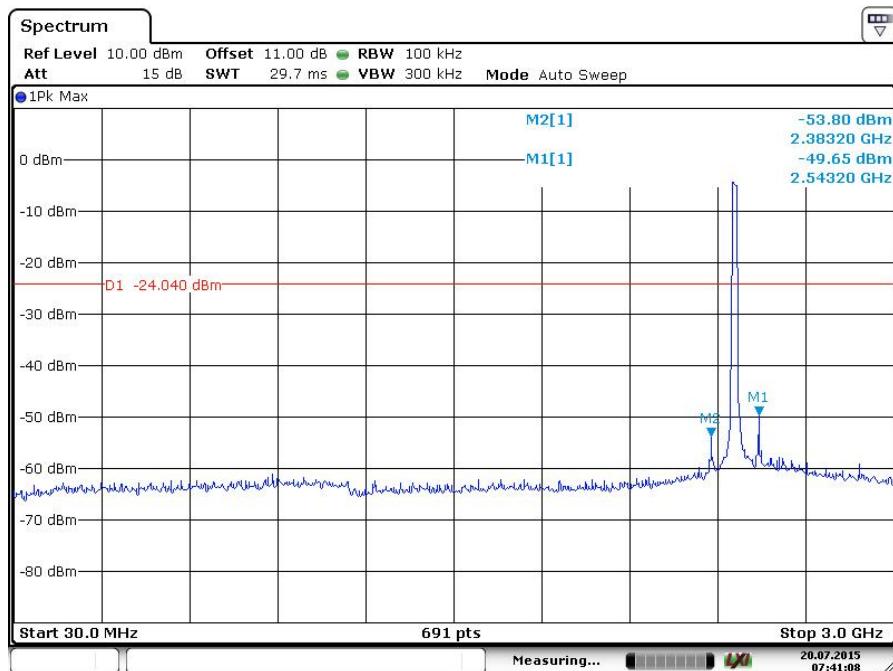
Date: 20 JUL 2015 07:39:26



Product Service



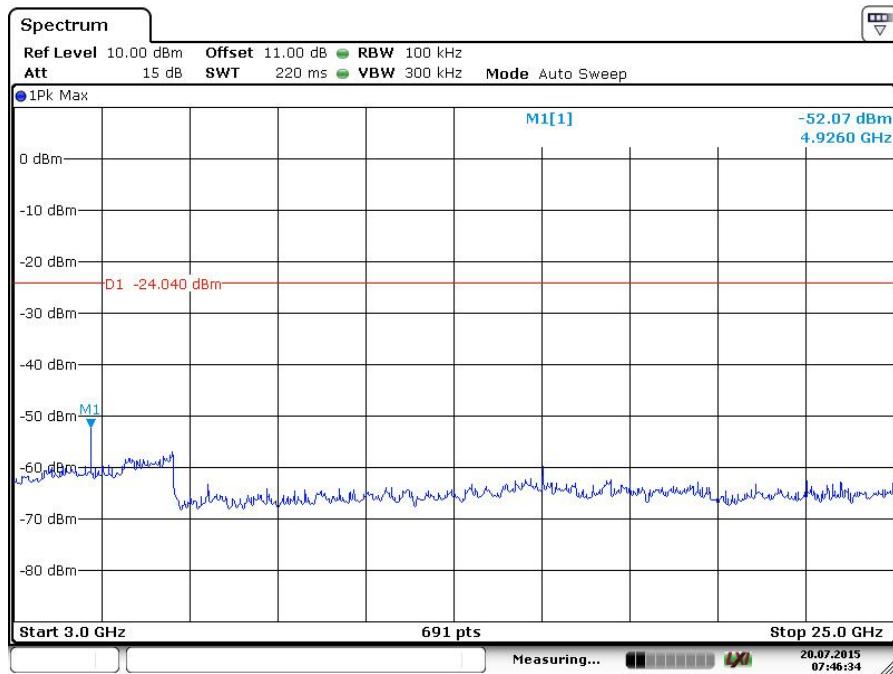
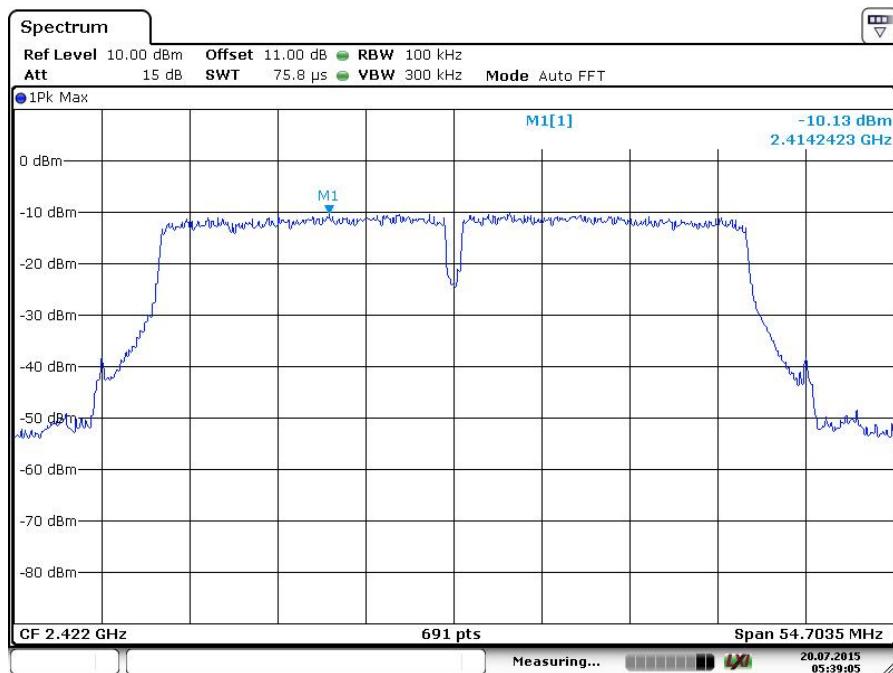
Date: 20 JUL 2015 07:45:40



Date: 20 JUL 2015 07:41:08

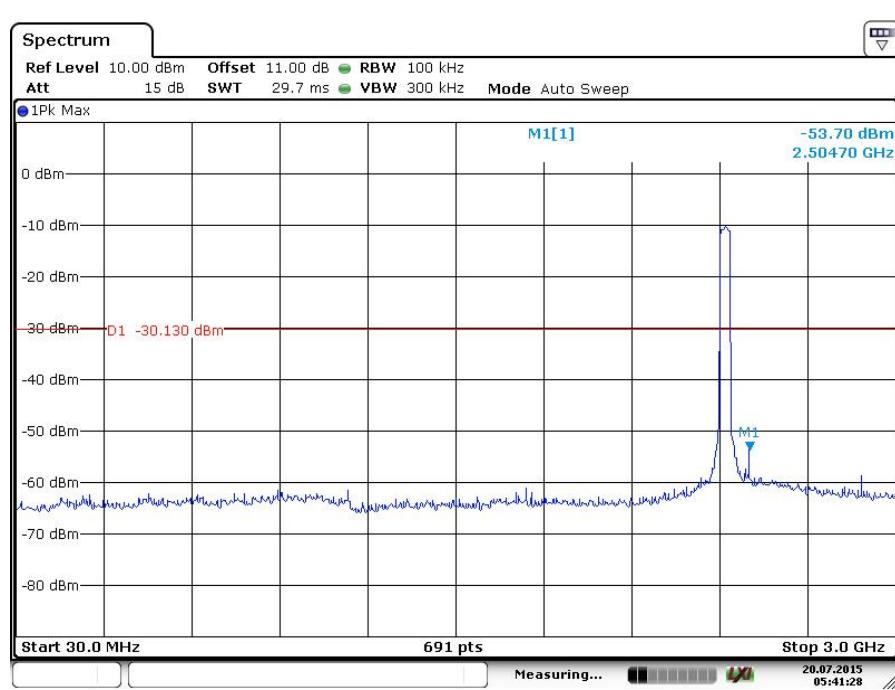
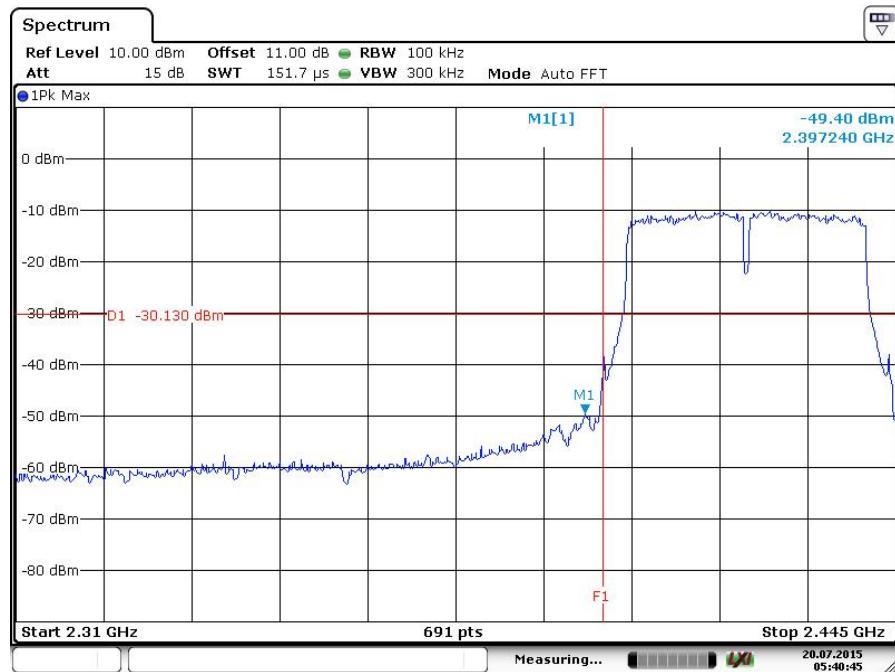


Product Service

802.11n(HT40)Configuration 1 - Mode 4

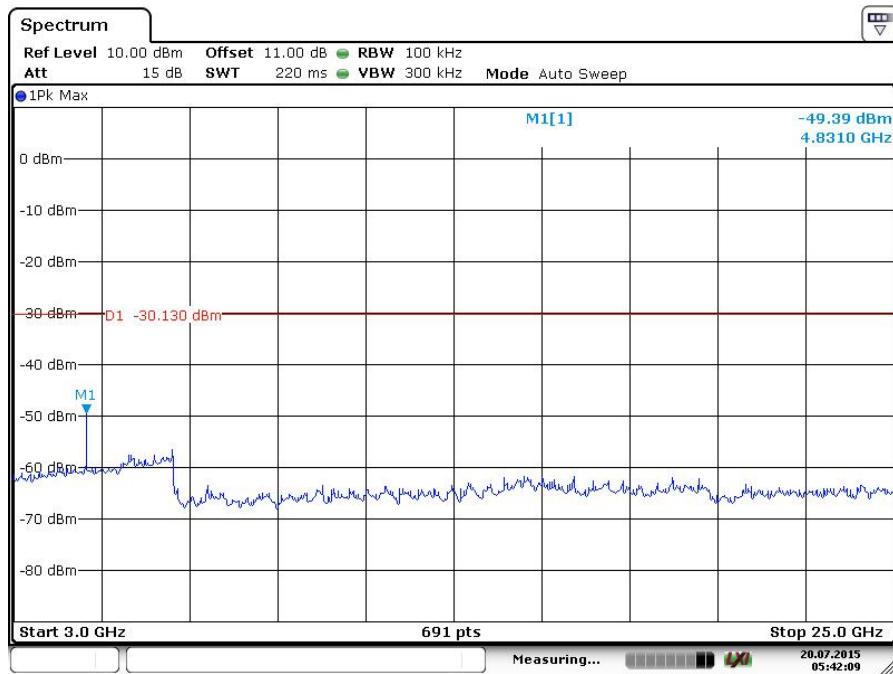


Product Service

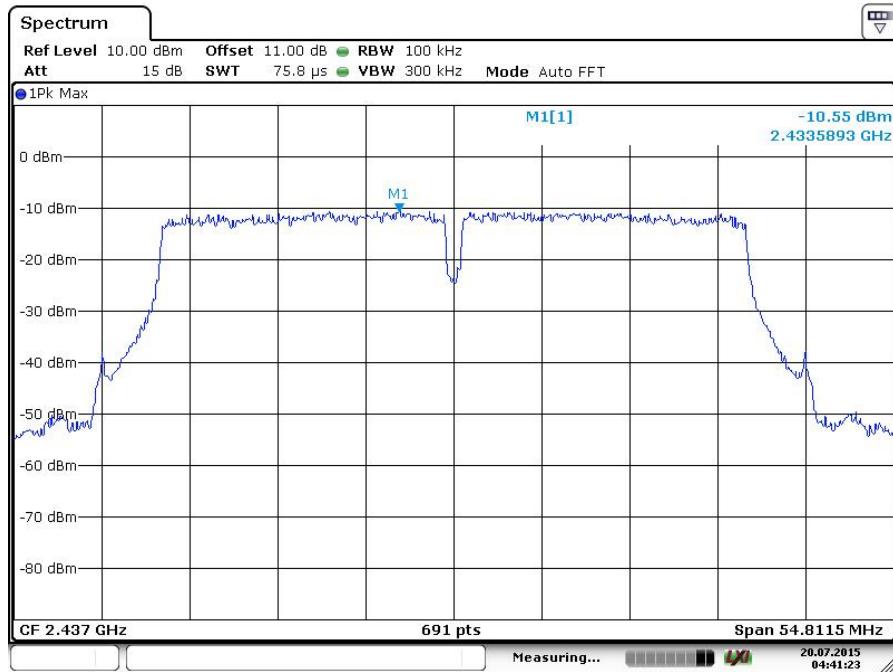




Product Service



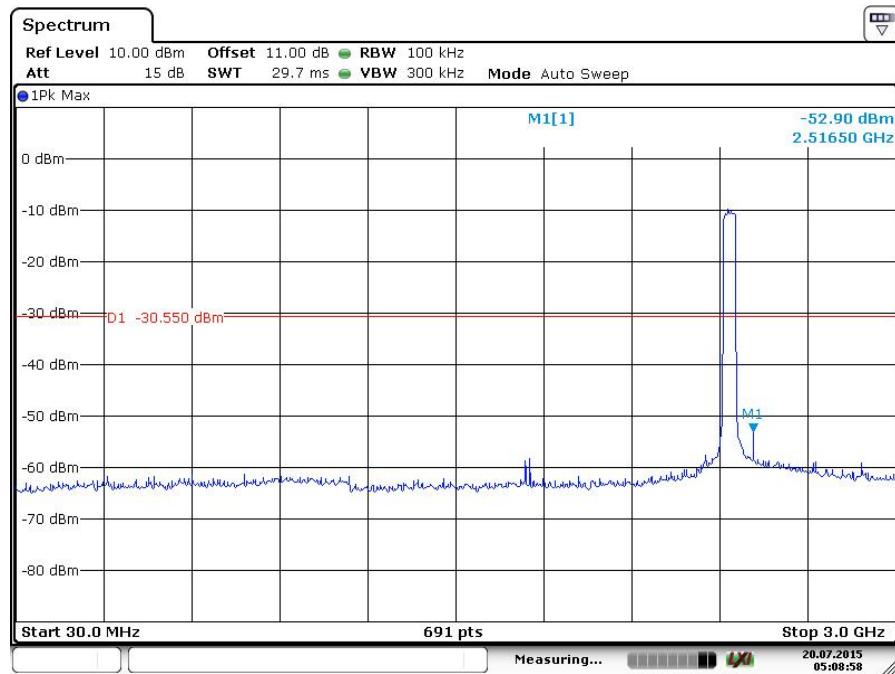
Date: 20 JUL 2015 05:42:09

802.11n(HT40)Configuration 1 - Mode 2

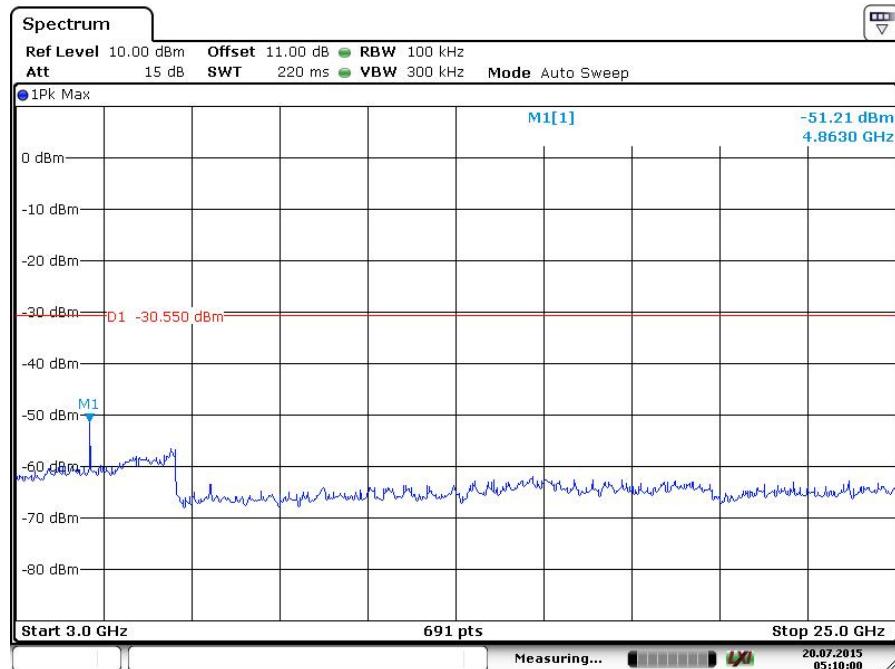
Date: 20 JUL 2015 04:41:23



Product Service



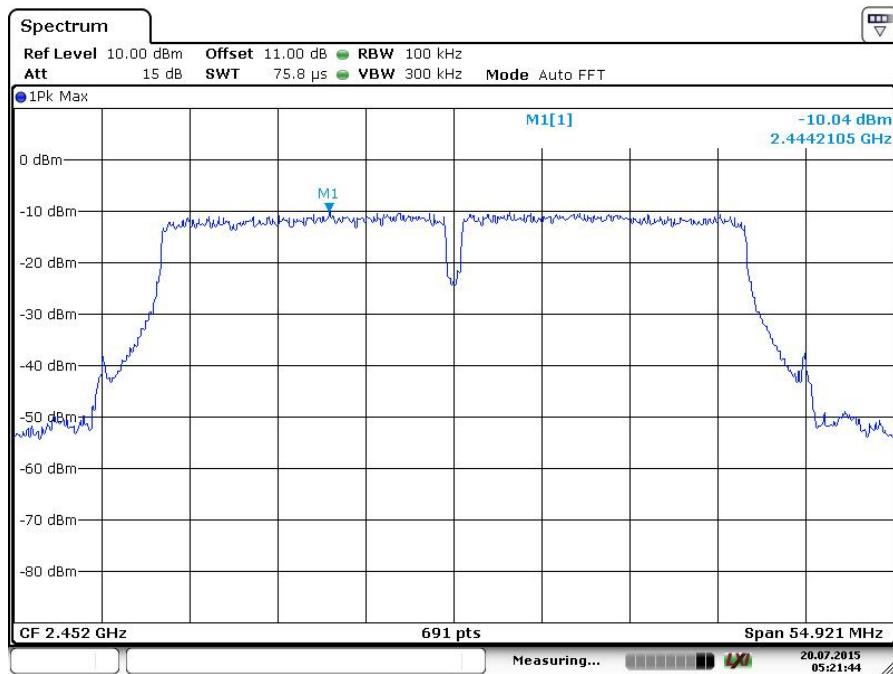
Date: 20 JUL 2015 05:08:58



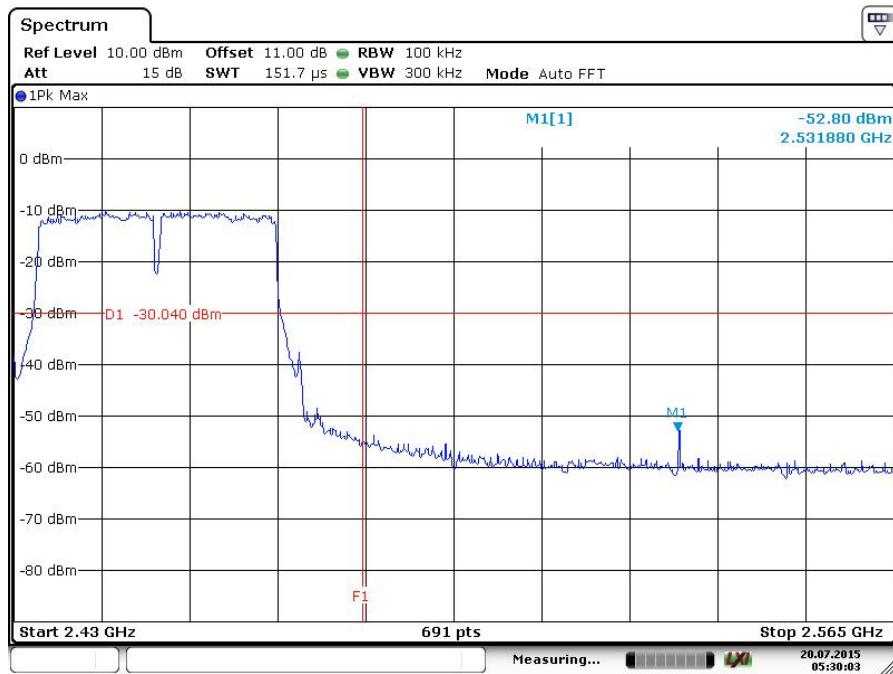
Date: 20 JUL 2015 05:10:00



Product Service

802.11n(HT40)Configuration 1 - Mode 5

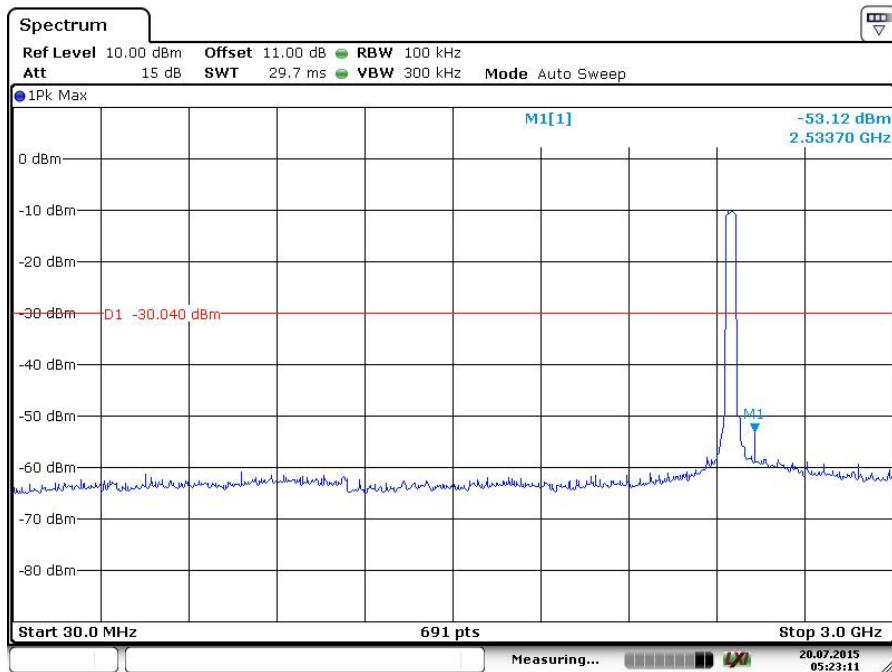
Date: 20.JUL.2015 05:21:45



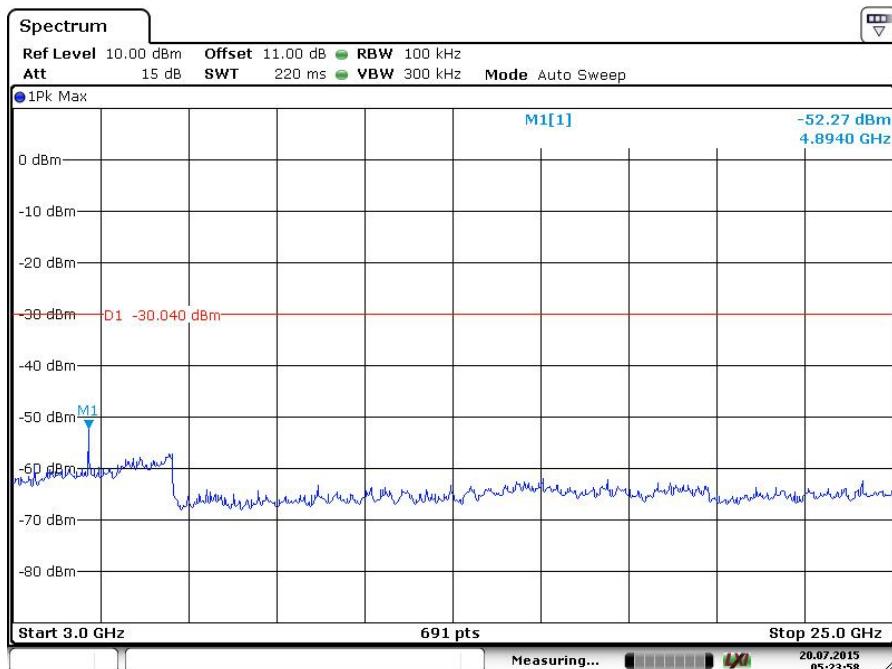
Date: 20.JUL.2015 05:30:04



Product Service



Date: 20 JUL 2015 05:23:11



Date: 20 JUL 2015 05:23:58

Remarks

The test results of EUT did not exceed the limit at all measured frequencies.



2.6 RADIATED EMISSIONS

2.6.1 Specification Reference

FCC CFR 47 Part 15, Clause 15.205, 15.209, 15.247(d)

2.6.2 Equipment Under Test

DB1016US, S/N: DMA30905140900022

2.6.3 Date of Test and Modification State

21 and 22 July 2015 – Modification State 0

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Method and Operating Modes

The test was applied in accordance with the requirements in clause 15.247 of FCC CFR 47 Part 15 Subpart C.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the EUT on a remotely controlled turntable within the chamber. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations.

Emissions identified within the range 30MHz – 25GHz were then formally measured using a Peak detector as the worst case.

In the frequency Range 30MHz – 25GHz, the measurement was performed with a resolution bandwidth of 1MHz.

The measurements were performed at a 3m distance unless otherwise stated.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1
 - Mode 2
 - Mode 3
 - Mode 4
 - Mode 5

2.6.6 Environmental Conditions

	21 July 2015	22 July 2015
Ambient Temperature	24.5°C	23.9°C
Relative Humidity	53.0%	56.0%



2.6.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15 Radiated Spurious Emissions.

Note: Only the worst test results plots have been included as all of the emissions are greater than 20dB below the limit. A set of plots have been included to show the measurement system noise floor.

The test results are shown below.

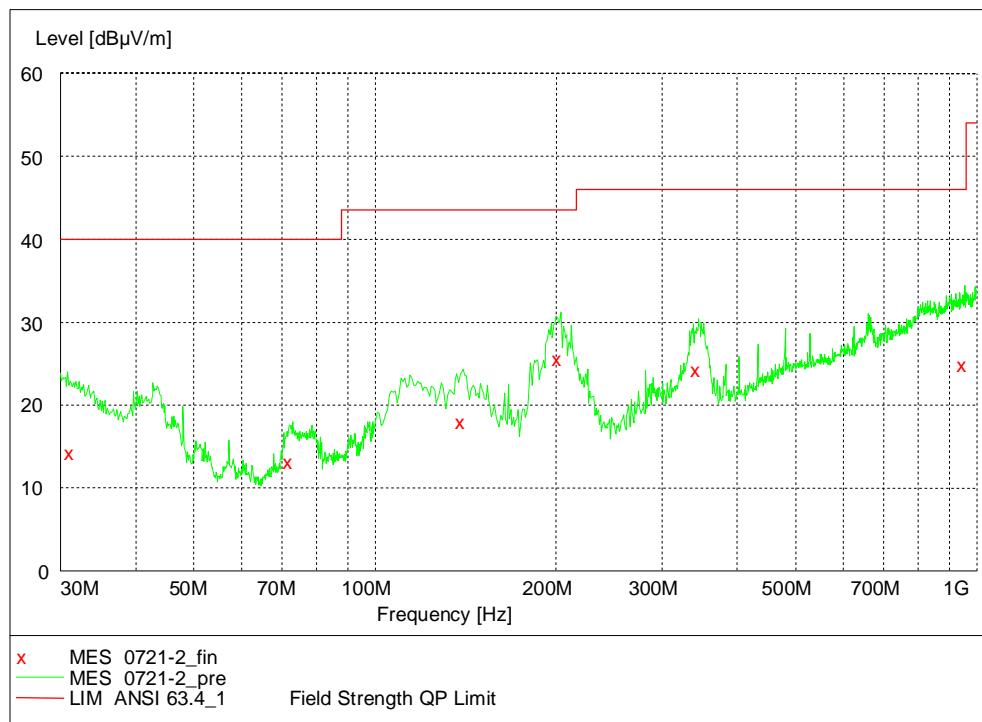
802. 11b

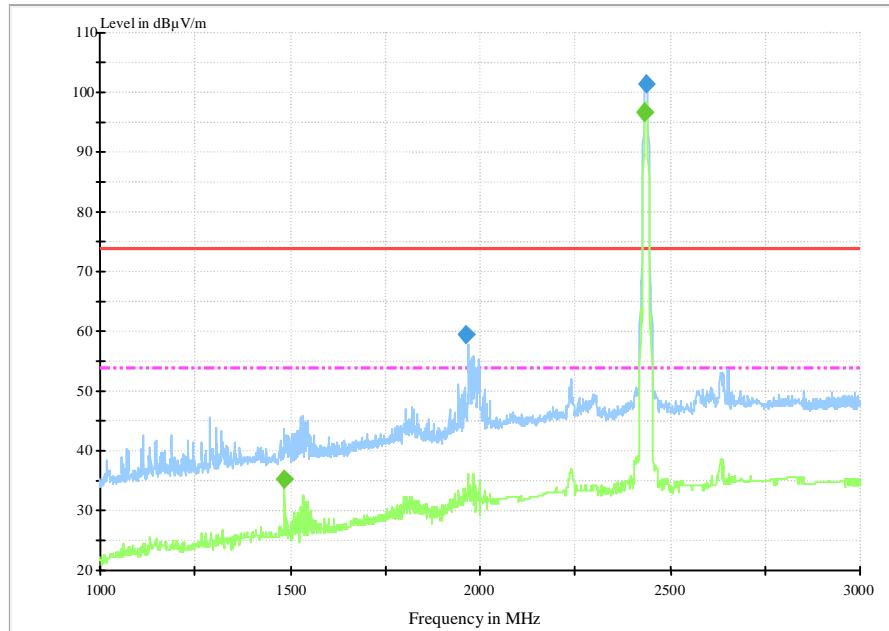
Configuration 1 - Mode 1

No emissions were detected within 20dB of the limit.

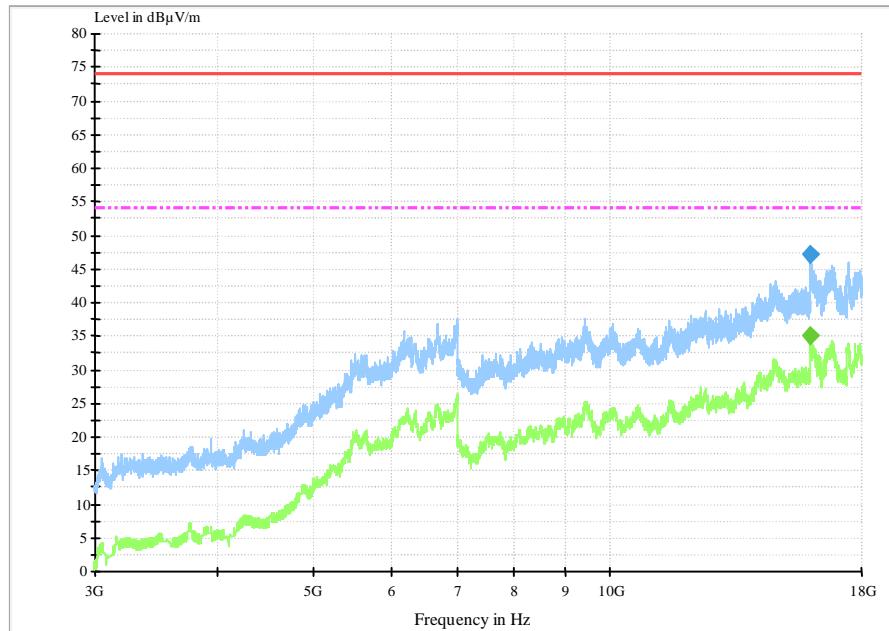
Configuration 1 - Mode 2

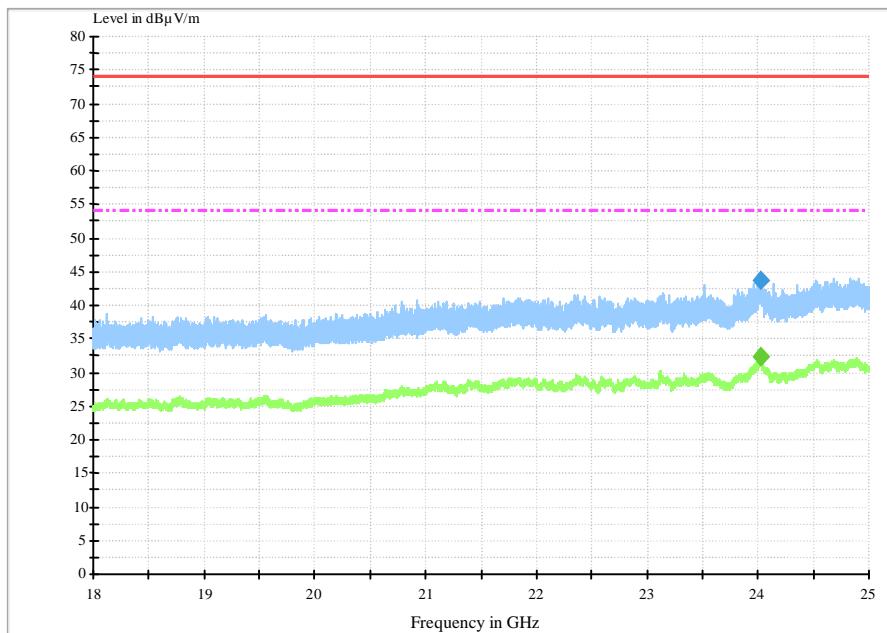
30MHz – 1GHz



1GHz – 3GHz

Note: The emission beyond the limit is the operating frequency.

3GHz – 18GHz

18GHz – 25GHz

No emissions were detected within 20dB of the limit.

Configuration 1 - Mode 3802.11g/n(HT20)Configuration 1 - Mode 1, 2 & 3

No emissions were detected within 20dB of the limit.

802.11n(HT40)Configuration 1 - Mode 4, 5 & 6

No emissions were detected within 20dB of the limit.

Frequency range	Limit
30 MHz to 88 MHz	40dB μ V/m
88 MHz to 216 MHz	43.5dB μ V/m
216 MHz to 960 MHz	46dB μ V/m
>960MHz	Average:54dB μ V/m, Peak:74dB μ V/m

Remarks

The test result of EUT did not exceed the limit during the test.



Product Service

SECTION 3

TEST EQUIPMENT USED



3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	Serial No.	Calibration Period (months)	Calibration Due
Section 2.1 Conducted Emission					
EMI Receiver	Rohde & Schwarz	ESIB7	100280	12	15-Aug-2015
LISN	AFJ	LS16C	16011306281	12	01-Apr-2016
Digital Multimeter	FLUKE	179	91820401	12	14-Dec-2015
Thermo-hygrometer	AZ Instruments	8705	9151665	12	10-Dec-2015
Section 2.2, 2.3 2.4 and 2.5 – 6dB Bandwidth, Maximum Conducted Output Power-Peak, Band Edge Emissions and Conducted Spurious Emissions.					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101065	12	19-Aug-2015
Power Meter	Agilent	E9327A	MY52420006	12	29-Feb-2016
Power Sensor	Agilent	E4416A	MY52370013	12	29-Feb-2016
Digital Multimeter	FLUKE	179	91820401	12	14-Dec-2015
Thermo-hygrometer	AZ Instruments	8705	9151665	12	10-Dec-2015
Section 2.5 – Radiated Spurious Emissions					
EMI Receiver	Rohde & Schwarz	ESI 40	100015	12	19-Aug-2015
Ultra log test antenna	Rohde & Schwarz	HL562	100167	12	19-Aug-2015
Double-Ridged Wave-guide Horn Antenna	Rohde & Schwarz	HF 906	100029	12	19-Aug-2015
Pyramidal Horn Antenna	EMCO	3160-09	-	-	-
Antenna master	Frankonia	MA 260	-	12	19-Aug-2015
Relay Switch Unit	Rohde & Schwarz	331.1601.31	338965002	-	TU
Semi Anechoic Chamber	Frankonia	23.18mx16.88 mx 9.60m	-	12	19-Aug-2015
Digital Multimeter	FLUKE	179	91820401	12	14-Dec-2015
Thermo-hygrometer	AZ Instruments	8705	9151665	12	10-Dec-2015

TU - Traceability Unscheduled.



3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	Frequency / Parameter	MU
Conducted RF Output Power	30MHz to 10GHz Amplitude	0.5dB*
Conducted Emissions	QP detector AV detector	3.34 dB 3.39 dB
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.1dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Worst case error for both Time and Frequency measurement 12 parts in 10^6		

* In accordance with CISPR 16-4



Product Service

SECTION 4

DISCLAIMERS AND COPYRIGHT



Product Service

4.1 DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

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