

Report on the Radio Testing
For
SmarDTV (UK) Limited
on
Project N63
Report no. TRA-029575-02-45-03B
2nd December 2016

RFXXX



Report Number: TRA-029575-02-45-03B
Issue: B

REPORT ON THE RADIO TESTING OF A
SmarDTV (UK) Limited
Project N63
WITH RESPECT TO SPECIFICATION
FCC 47CFR Subpart E

TEST DATE: 25th Apr - 26th Sep 2016

Tested by: A Longley

A Longley - A Tosif – A Wong
Radio Test Engineers

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Date: 2nd December 2016

Disclaimers:

- [1] THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE
[2] THE RESULTS CONTAINED IN THIS DOCUMENT RELATE ONLY TO THE ITEM(S) TESTED

1 Revision Record

<i>Issue Number</i>	<i>Issue Date</i>	<i>Revision History</i>
A	18 th October 2016	Original
B	2 nd December 2016	EUT name change

2 Summary

TEST REPORT NUMBER:	TRA-029575-02-45-03B
WORKS ORDER NUMBER:	TRA-029575-02
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	47CFR15 Subpart E
EQUIPMENT UNDER TEST (EUT):	Project N63
FCC IDENTIFIER:	DKN-AVBX1
EUT SERIAL NUMBER:	1604210679 & 14604210698
MANUFACTURER/AGENT:	SmarDTV (UK) Limited
ADDRESS:	Beckside Design Centre Millennium Business Park Station Rd Steeton Keighley West Yorkshire BD20 6QW United Kingdom
CLIENT CONTACT:	Chris Wordley ☎ 01535 659000 ✉ chris.wordley@smardtv.com
ORDER NUMBER:	POR01251
TEST DATE:	25th Apr - 26th Sep 2016
TESTED BY:	A Longley - A Tosif – A Wong Element

2.1 Test Summary

Test Method and Description		Requirement Clause	Applicable to this equipment	Result / Note
		47CFR15		
Out-of-band emissions		15.407(b)	☒	Pass
AC power line conducted emissions		15.207	☐	Note 1
Occupied bandwidth		15.407(e)	☒	Pass
Output power	Conducted	15.407(a)	☒	Pass
	PSD		☒	
	RPE		☐	
TPC and DFS		15.407(h)	☐	Note 2

Notes:

1. See Test report TRA-029575-02-45-05A
2. See Test report TRA-029575-02-45-06A

The results contained in this report relate only to the items tested, in the condition at time of test, and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set-up and exercised using the configurations, modes of operation and arrangements defined in this report only. Any modifications made are identified in Section 8 of this report.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 5.2 of this test report (Deviations from Test Standards).

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4 Introduction

This report TRA-029575-02-45-03B presents the results of the Radio testing on a SmarDTV (UK) Limited, Project N63 to specification 47CFR15 Radio Frequency Devices and RSS-247 Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices.

The testing was carried out for SmarDTV (UK) Limited by Element, at the address(es) detailed below.

☒	Element Hull Unit E South Orbital Trading Park Hedon Road Hull HU9 1NJ UK	☐	Element Skelmersdale Unit 1 Pendle Place Skelmersdale West Lancashire WN8 9PN UK
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This report details the configuration of the equipment, the test methods used and any relevant modifications where appropriate.

FCC Site Listing:

The test laboratory is accredited for the above sites under the US-EU MRA, Designation number UK0009.

IC Registration Number(s):

Element Skelmersdale	3930B
Element Hull	3483A

The test site requirements of ANSI C63.4-2014 are met up to 1GHz.

The test site SVSWR requirements of CISPR 16-1-4:2010 are met over the frequency range 1 GHz to 18 GHz.

5 Test Specifications

5.1 Normative References

- FCC 47 CFR Ch. I – Part 15 – Radio Frequency Devices.
- FCC KDB Publication 905462 D02 v01r02 – Compliance measurement procedures for unlicensed-national information infrastructure devices operating in the 5250-5350 MHz and 5470-5725 MHz bands incorporating dynamic frequency selection.
- ANSI C63.10-2013 – American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
- ANSI C63.4-2014 – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

5.2 Deviations from Test Standards

There were no deviations from the test standard.

6 Glossary of Terms

§	denotes a section reference from the standard, not this document
AC	Alternating Current
ANSI	American National Standards Institute
BW	bandwidth
C	Celsius
CAC	Channel Availability Check
CFR	Code of Federal Regulations
CW	Continuous Wave
dB	decibel
dBm	dB relative to 1 milliwatt
DC	Direct Current
DFS	Dynamic Frequency Selection
DSSS	Direct Sequence Spread Spectrum
EIRP	Equivalent Isotropically Radiated Power
ERP	Effective Radiated Power
EUT	Equipment Under Test
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
Hz	hertz
IC	Industry Canada
ITU	International Telecommunication Union
LBT	Listen Before Talk
LE-LAN	Licence-Exempt Local Area Network
m	metre
max	maximum
MIMO	Multiple Input and Multiple Output
min	minimum
MRA	Mutual Recognition Agreement
N/A	Not Applicable
PCB	Printed Circuit Board
PDF	Portable Document Format
Pt-mpt	Point-to-multipoint
Pt-pt	Point-to-point
PSD	Power Spectral Density
RF	Radio Frequency
RH	Relative Humidity
RMS	Root Mean Square
Rx	receiver
s	second
SVSWR	Site Voltage Standing Wave Ratio
TPC	Transmitter Power Control
Tx	transmitter
UKAS	United Kingdom Accreditation Service
U-NII	Unlicensed-National Information Infrastructure
V	volt
W	watt
Ω	ohm

7 Equipment under Test

7.1 EUT Identification

- Name: Project N63
- Serial Number: 1604210679 & 14604210698
- Model Number: S60
- Software Revision: Not Applicable
- Build Level / Revision Number: Not Applicable

7.2 System Equipment

Equipment listed below forms part of the overall test setup and is required for equipment functionality and/or monitoring during testing. The compliance levels achieved in this report relate only to the EUT and not items given in the following list.

Sample No.	Description	Model No.	Serial No.
S08	EUT 12 Vdc Power Adapter	EADP-40MB A	HBBD45F00A7
S11	Lenovo ThinkPad	E560	34546
S14	Thurlby Thandar Audio Generator	TF215	045441
S15	LG TV	M227WDL	002MAAK4P824
S17	Channel Master DVR	CM-7500TB1	R5YFKZ00228D
S27	Dlink USB to Ethernet adapter	DUB-E100	Q8041AA002873

7.3 EUT Mode of Operation

7.3.1 Transmission

The mode of operation for Tx tests was as follows.

Wi-Fi transmitter control was via commands sent through MTool v2.0.3.2 software. The commands provided by the manufacturer setup the device into a permanent transmit mode. For each type of test, lowest and highest data rates were investigated to find the worst case data rate. Only the worst case results are reported. The commands allowed adjustment of the following parameters of significant interest.

Modulation Scheme / Mode	Channel	Data rate	Power setting
802.11a / CDD	36	OFDM6	44
		OFDM54	44
	52	OFDM6	62
		OFDM54	56
	64	OFDM6	58
		OFDM54	56
	100	OFDM6	58
		OFDM54	56
	116	OFDM6	62
		OFDM54	56
	144	OFDM6	62
		OFDM54	56
	149	OFDM6	62
		OFDM54	56
	157	OFDM6	62
		OFDM54	56
	165	OFDM6	62
		OFDM54	56

Modulation Scheme	Channel	Data rate	Power setting
802.11n/ac 20 MHz / CDD	36	mcs0	44
		mcs8	44
	52	mcs0	62
		mcs8	56
	64	mcs0	58
		mcs8	52
	100	mcs0	62
		mcs8	56
	116	mcs0	62
		mcs8	56
	144	mcs0	62
		mcs8	56
	149	mcs0	62
		mcs8	56
	157	mcs0	62
		mcs8	56
	165	mcs0	62
		mcs8	56

Modulation Scheme	Channel	Data rate	Power setting
802.11n/ac 40 MHz / CDD	38	mcs0	44
		mcs9	44
	54	mcs0	62
		mcs9	56
	62	mcs0	54
		mcs9	52
	102	mcs0	48
		mcs9	40
	110	mcs0	62
		mcs9	56
	142	mcs0	62
		mcs9	56
	151	mcs0	62
		mcs9	56
	159	mcs0	62
		mcs9	56

Modulation Scheme	Channel	Data rate	Power setting
802.11ac 80 MHz / CDD	42	mcs0	46
		mcs9	46
	58	mcs0	52
		mcs9	44
	106	mcs0	48
		mcs9	42
	122	mcs0	58
		mcs9	42
	138	mcs0	58
		mcs9	42
	155	mcs0	58
		mcs9	42

7.3.2 Reception

This report covers transmitter operation only. Results for unintentional emissions can be found in test report TRA-029575-44-00B.

7.4 EUT Radio Frequency Parameters

7.4.1 General

Frequency of operation:	5.15 GHz – 5.35 GHz; 5.47 GHz – 5.725 GHz; 5.725GHz – 5.85 GHz
Occupied channel bandwidth(s):	20 MHz / 40 MHz / 80 MHz
Nominal Supply Voltage:	110 Vac
Location of notice for license exempt use:	Label / user manual / both.

7.4.2 Antennas

Type:	Integral
Frequency range:	5.15 GHz – 5.35 GHz; 5.47 GHz – 5.725 GHz; 5.725GHz – 5.85 GHz
Impedance:	50 Ohms
Gain:	See table below
Connector type:	U-FL
Mounting:	Case Mounted

Antenna Gain		
Frequency (MHz)	Antenna 1	Antenna 0
4900	4.3	3.1
4950	4.9	2.9
5000	5.2	2.6
5050	4.4	3.0
5100	4.3	3.0
5150	4.2	3.1
5200	4.0	4.0
5250	3.6	4.0
5300	3.5	3.8
5350	3.5	3.7
5400	3.4	3.6
5450	3.6	4.0
5500	3.7	4.3
5550	3.8	4.3
5600	3.9	3.7
5650	4.0	3.5
5700	3.9	3.6
5750	4.1	4.0
5800	4.4	4.6
5850	4.9	4.8
5900	4.9	4.7

7.4.3 Product specific declarations

Multiple antenna configuration(s), e.g. MIMO:	MIMO
Simultaneous tx (yes/no):	Yes

7.5 EUT Description

The EUT is a dual band Wi-Fi router with Bluetooth. The radios are contained on two separate modules. One module contains a 5 GHz Wi-Fi Access Point, and the other module contains a dual-band Wi-Fi Client and a dual-mode Bluetooth radio. All radios within the device are capable of simultaneous transmission. It is intended for both indoor and outdoor use (mobile, not portable).

This report only covers 5 GHz Wi-Fi Client. This radio is a DFS Slave device without radar detect. It uses the following operating schemes (beamformig is not supported):

- SISO (single antenna transmission)
- SM-MIMO (multiple antenna transmission, uncorrelated)
- STBC (multiple antenna transmission, uncorrelated)
- CDD (multiple antenna transmission, correlated)

Testing is only performed in CDD mode with both antennas' active.

It uses 6 modulation schemes in the 5 GHz band:

- 802.11a (20 MHz)
- 802.11n (20 MHz)
- 802.11n (40 MHz)
- 802.11ac (20 MHz)
- 802.11ac (40 MHz)
- 802.11ac (80 MHz)

And can transmit in the following bands:

- U-NII-1
- U-NII-2A
- U-NII-2C
- U-NII-3

There are 2 antennas of known gain

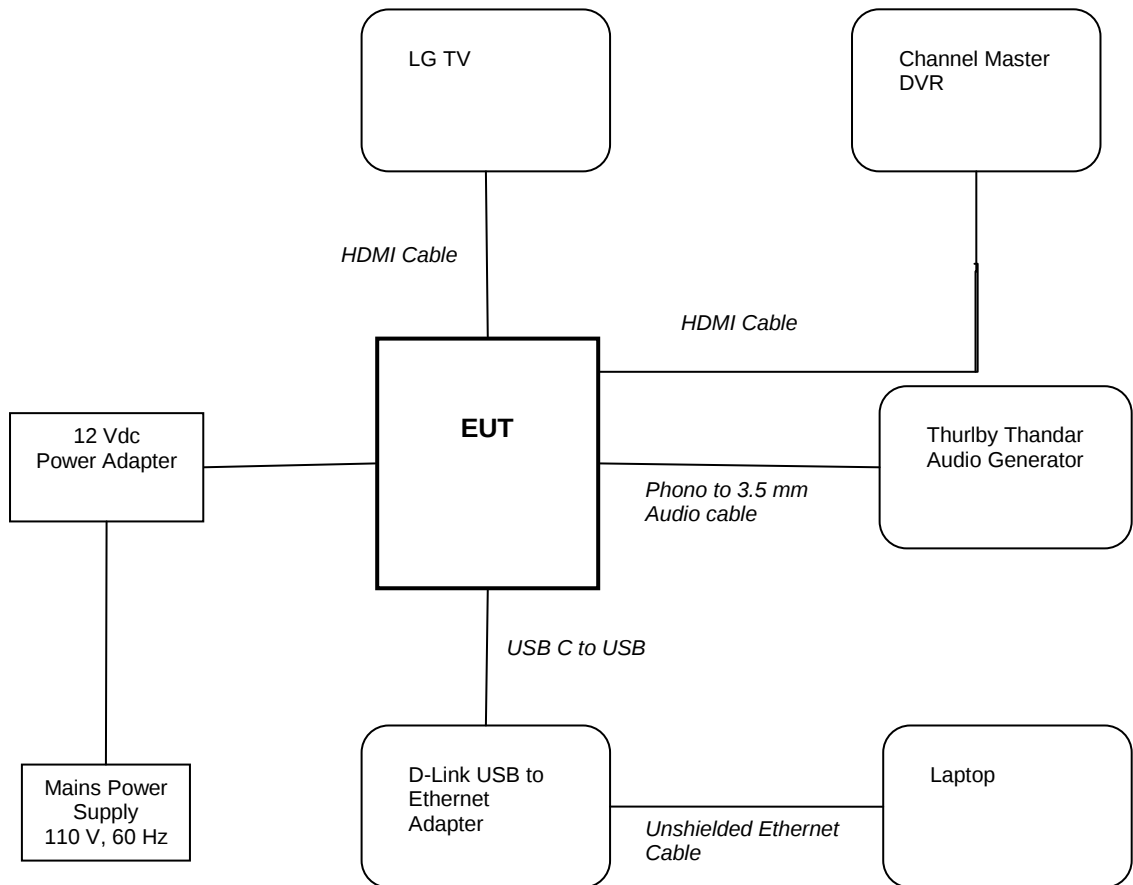
8 Modifications

No modifications were performed during this assessment.

9 EUT Test Setup

9.1 Block Diagram

The following diagram shows basic EUT interconnections with cable type and cable lengths identified:



10 General Technical Parameters

10.1 Normal Conditions

The EUT was tested under the normal environmental conditions of the test laboratory, except where otherwise stated. The normal power source applied was approx. 12 V dc from the adaptor.

10.2 Varying Test Conditions

Variation of supply voltage is required to ensure stability of the declared output power and frequency. During carrier power testing the following variations was made:

	<i>Category</i>	<i>Nominal</i>	<i>Variation</i>
☒	Mains	110V ac +/-2%	85% and 115%
☐	Battery	New battery	N/A

11 Out-of-band spurious emissions

11.1 Definition

Spurious emissions

Emissions on a frequency or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

Restricted bands

A frequency band in which intentional radiators are permitted to radiate only spurious emissions but not fundamental signals.

11.2 Test Parameters

Test Location:	Element Hull
Test Chamber:	REF886
Test Standard and Clause:	ANSI C63.10-2013, Clause 12.7
EUT Channels / Frequencies Measured:	36, 38, 42, 52, 54, 58, 62, 64, 100, 102, 106, 110, 116, 122, 138, 142, 144, 149, 151, 155, 157, 159, 165
EUT Channel Bandwidths:	20 MHz / 40 MHz / 80 MHz
Deviations From Standard:	None
Measurement BW:	30 MHz to 1 GHz: 120 kHz Above 1 GHz: 1 MHz
Measurement Detector:	Up to 1 GHz: quasi-peak Above 1 GHz: RMS average and Peak

Environmental Conditions (Normal Environment)

Temperature:	25 °C	+15 °C to +35 °C (as declared)
Humidity:	45 %RH	20%RH to 75%RH (as declared)
Supply:	110 Vac	

Test Limits

For transmitters operating in the 5.15–5.25 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

For transmitters operating in the 5.725–5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of -27 dBm/MHz.

Where regulatory limits are defined as EIRP in dBm/MHz limits are converted to field strength values as per ANSI C63.10

Operating Band (GHz)	EIRP Limit (dBm / MHz)	Field Strength Limit (dBμV/m@ 3m)
5.15–5.35 GHz	-27 dBm/MHz	68.2 dBμV/m
5.47–5.725 GHz	-27 dBm/MHz	68.2 dBμV/m
5.725–5.825 GHz	-17 dBm/MHz	78.2 dBμV/m
	-27 dBm/MHz	68.2 dBμV/m

Unwanted emissions that fall within the restricted frequency bands shall comply with the limits specified below:

General Field Strength Limits for License-Exempt Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength (μV/m at 3m)
30-88	100
88-216	150
216-960	200
Above 960	500

11.3 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure i, the emissions from the EUT were measured on a spectrum analyzer / EMI receiver.

Radiated electromagnetic emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked, using a peak detector and where applicable worst-case determined for function, operation, orientation, etc. for both vertical and horizontal polarisations. Pre-scan plots are shown with a peak detector and 100kHz RBW.

If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.10 are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed, (see EUT setup photographs for more detail).

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. Emissions above 1 GHz are characterized using standard gain horn antennas. Pre-amplifiers and filters are used where required. Care is taken to ensure that test receiver resolution bandwidth, video bandwidth and detector type(s) meet the regulatory requirements.

For both horizontal and vertical polarizations, the EUT is then rotated through 360 degrees in azimuth until the highest emission is detected. At the previously determined azimuth the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected, this maximum value is recorded.

Power values measured on the test receiver / analyzer are converted to field strength, FS, in dBμV/m at the regulatory distance, using:

$$FS = PR + CL + AF - PA + DC - CF$$

Where,

PR is the power recorded on the receiver / spectrum analyzer in dBμV;

CL is the cable loss in dB;

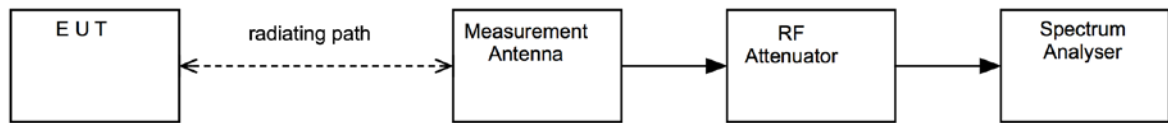
AF is the test antenna factor in dB/m;

PA is the pre-amplifier gain in dB (where used);

DC is the duty correction factor in dB (where used, e.g. where average detector on pulsed harmonic understates the power);

CF is the distance factor in dB (where measurement distances different to limit distance);

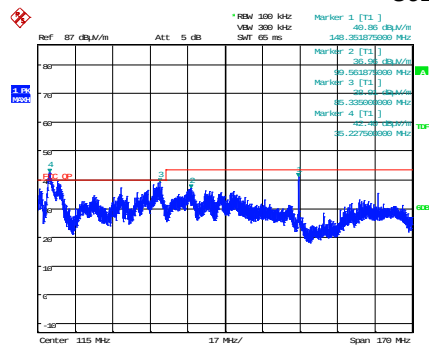
This field strength value is then compared with the regulatory limit.

Figure i Test Setup**11.4 Test Equipment**

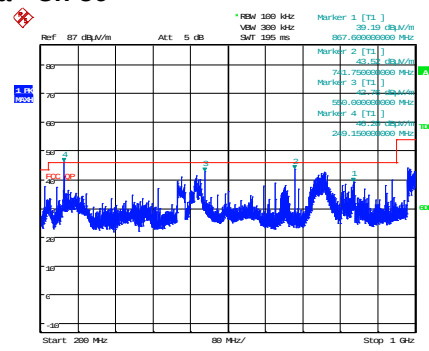
<i>Equipment Description</i>	<i>Manufacturer</i>	<i>Equipment Type</i>	<i>Element No</i>	<i>Last Cal Calibration</i>	<i>Calibration Period</i>	<i>Due For Calibration</i>
Ferrite Lined Chamber	Rainford	ATS	REF886	21/07/14	36	21/07/17
Biconical Antenna	EMCO	3109	RFG095	17/05/16	36	17/05/19
Log Periodic Antenna	EMCO	3146	RFG191	17/05/16	36	17/05/19
Horn Antenna	EMCO	3115	RFG129	09/02/16	24	09/02/18
Horn Antenna	Q-Par	-	RFG629	30/09/15	24	30/09/17
Standard Gain Horn Antenna	FM	2240-25	REF820	19/07/16	12	19/07/18
Pre-Amp (9kHz – 1GHz)	Sonoma	310	REF927	30/06/16	24	30/06/18
Pre-Amp (1 – 26.5GHz)	Agilent	8449B	REF913	02/02/16	24	02/02/18
EMI Test Receiver	R&S	ESVS20	RFG126	23/05/16	12	23/05/17
Spectrum Analyser	R&S	FSU46	REF910	05/07/16	12	05/07/17
Receiver	R&S	ESU40	RFG701	29/12/15	12	29/12/16

11.5 Test Results

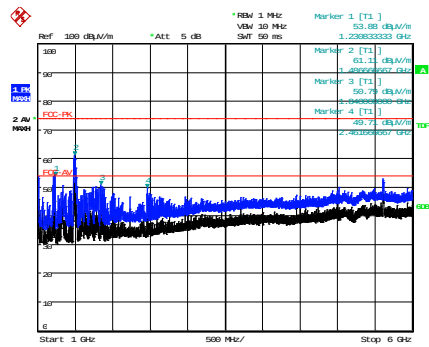
Emissions not related to the transmit Frequency			
Frequency (MHz)	Quasi Peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
25.700000	33.75	40.00	6.25
37.800000	34.64	40.00	5.36
42.950000	36.39	40.00	3.62
44.550000	37.49	40.00	2.51
46.150000	33.00	40.00	7.00
54.200000	34.12	40.00	5.88
62.250000	32.58	40.00	7.42
66.350000	36.33	40.00	3.67
81.200000	38.88	40.00	1.12
112.250000	32.95	43.52	10.57
140.600000	28.54	43.52	14.98
208.920000	37.26	43.52	6.26
233.480000	37.87	46.02	8.15
258.080000	31.18	46.02	14.84
289.600000	34.00	46.02	12.02
331.800000	30.52	46.02	15.50
434.280000	27.69	46.02	18.33
506.720000	36.87	46.02	9.15
530.440000	34.18	46.02	11.84
550.000000	41.82	46.02	4.20
577.560000	35.18	46.02	10.84
626.680000	35.98	46.02	10.04
651.280000	35.49	46.02	10.53
675.840000	34.90	46.02	11.12
680.720000	23.27	46.02	22.75
741.800000	38.55	46.02	7.47
793.680000	39.05	46.02	6.97
850.040000	38.23	46.02	7.79
950.000000	37.19	46.02	8.83
983.160000	36.18	53.98	17.79

802.11a - Ch 36

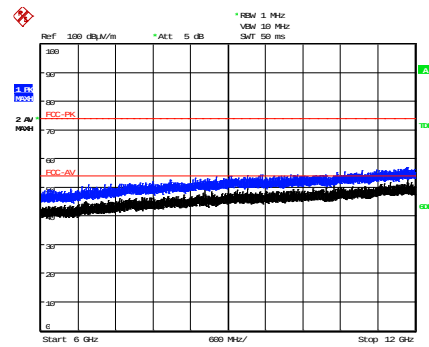
Date: 1.JUL.2016 17:29:19

30 MHz – 200 MHz

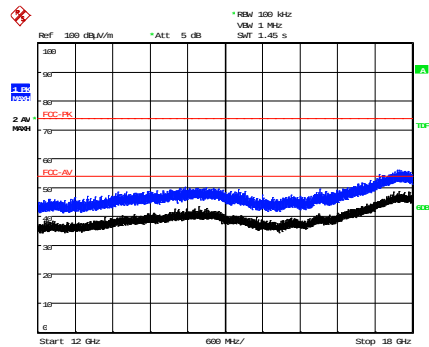
Date: 4.JUL.2016 17:12:19

200 MHz – 1 GHz

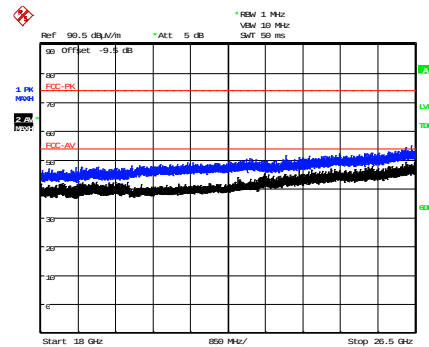
Date: 6.JUL.2016 14:02:02

1 GHz – 6 GHz

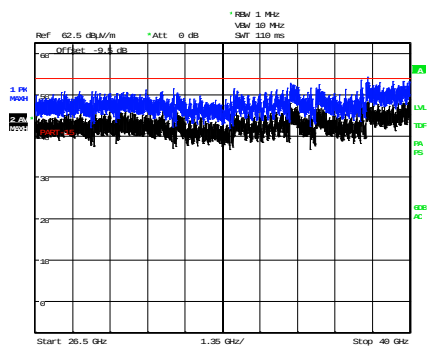
Date: 6.JUL.2016 14:03:27

6 GHz – 12 GHz

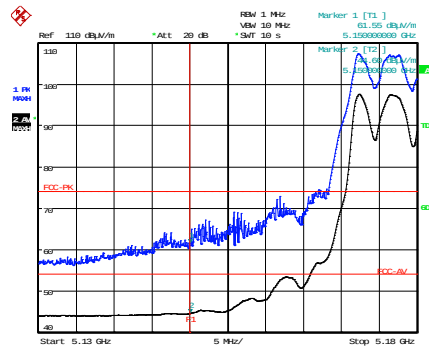
Date: 6.JUL.2016 14:04:34

12 GHz – 18 GHz

Date: 6.JUL.2016 16:41:09

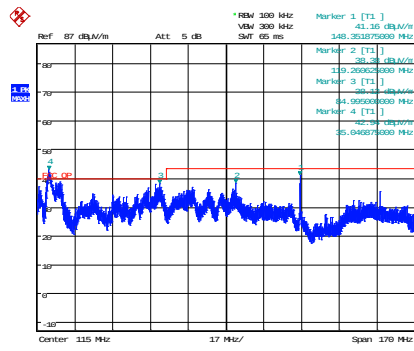
18 GHz – 26.5 GHz

Date: 24.JUL.2003 06:10:35

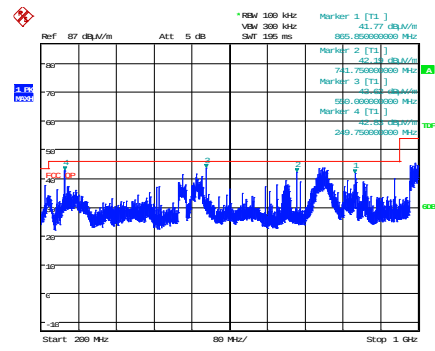
26.5 GHz – 40 GHz

Date: 24.MAY.2016 11:12:04

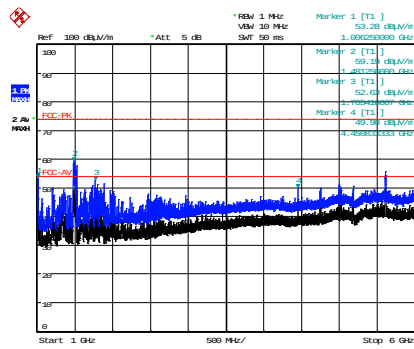
Bandedge

802.11a - Ch 52

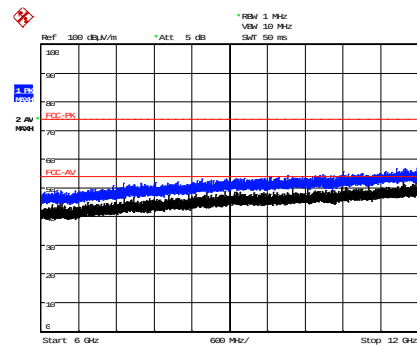
Date: 1 JUL 2016 17:33:52



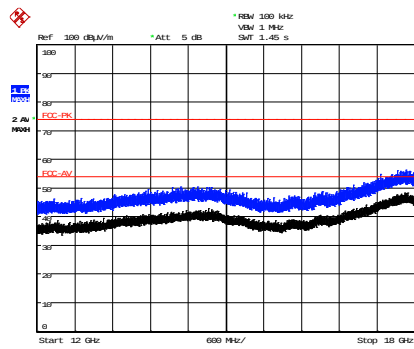
Date: 4 JUL 2016 17:16:28

30 MHz – 200 MHz

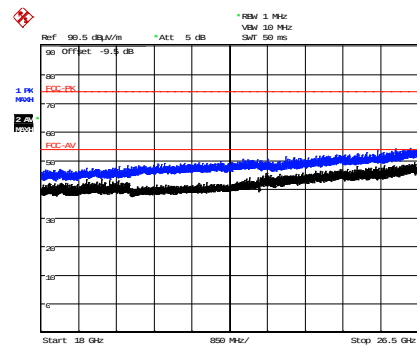
Date: 6 JUL 2016 14:09:26

200 MHz – 1 GHz

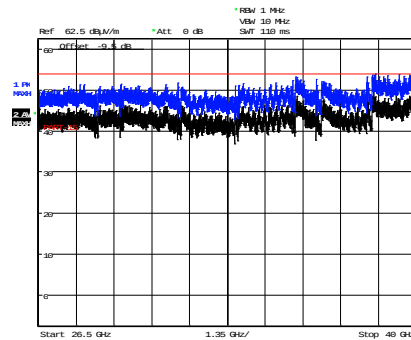
Date: 6 JUL 2016 14:06:53

1 GHz – 6 GHz

Date: 6 JUL 2016 14:09:37

6 GHz – 12 GHz

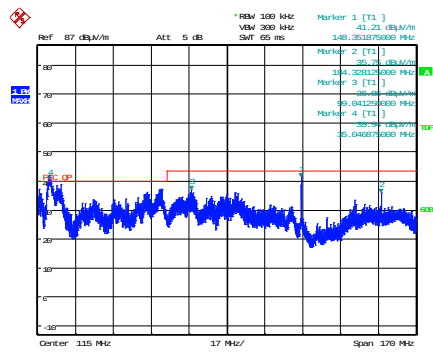
Date: 6 JUL 2016 16:38:46

12 GHz – 18 GHz

Date: 24 JUL 2003 06:19:44

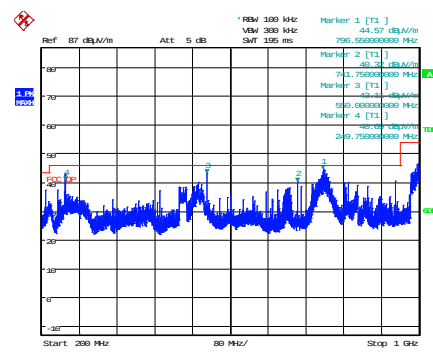
18 GHz – 26.5 GHz**26.5 GHz – 40 GHz**

802.11a - Ch 64



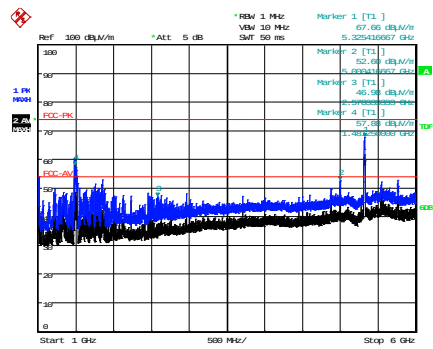
Date: 1 JUL 2016 17:37:21

30 MHz – 200 MHz



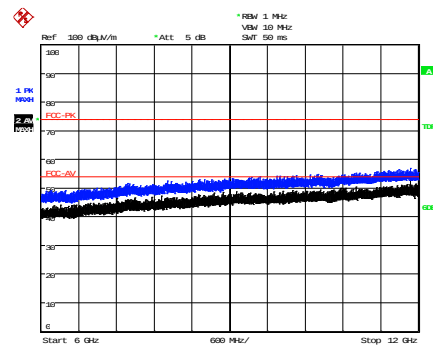
Date: 4 JUL 2016 17:28:08

200 MHz – 1 GHz



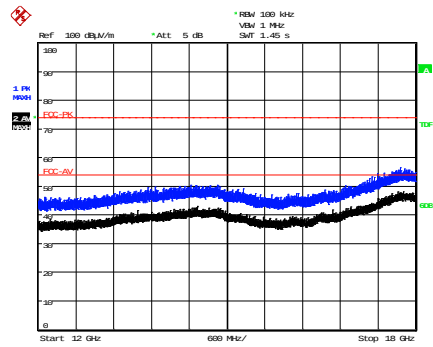
Date: 6 JUL 2016 14:49:53

1 GHz – 6 GHz



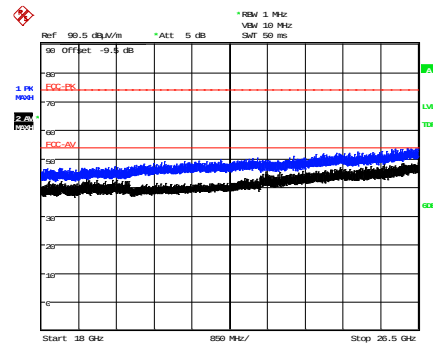
Date: 6 JUL 2016 14:47:39

6 GHz – 12 GHz



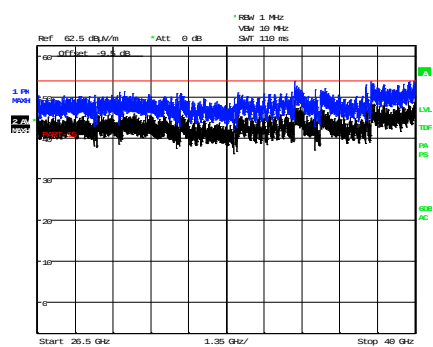
Date: 6 JUL 2016 14:45:49

12 GHz – 18 GHz



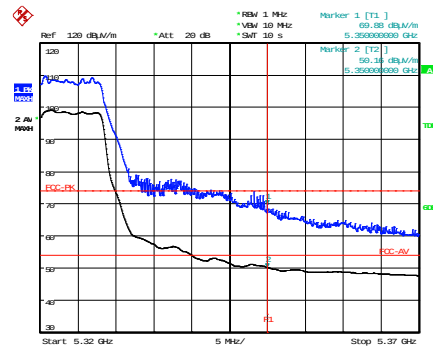
Date: 6 JUL 2016 16:36:42

18 GHz – 26.5 GHz



Date: 24 JUL 2003 06:21:56

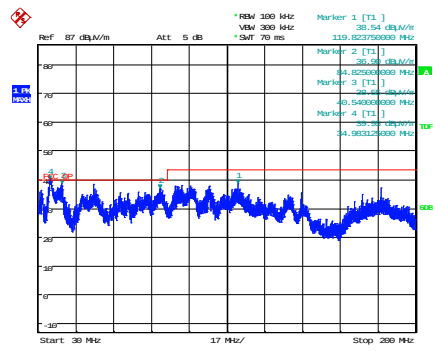
26.5 GHz – 40 GHz



Date: 25 MAY 2016 11:34:43

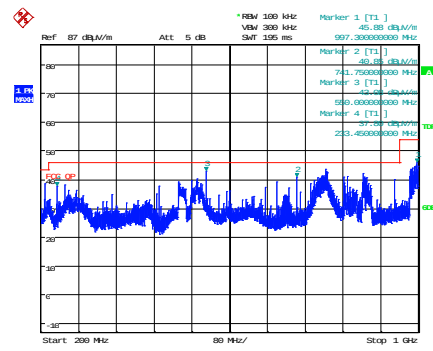
Bandedge

802.11a - Ch 100



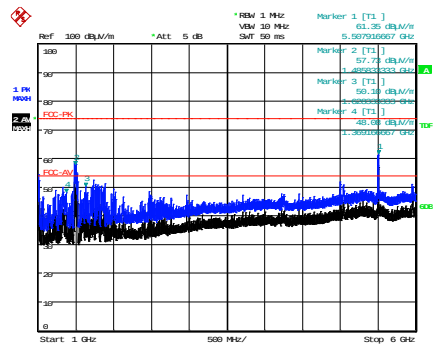
Date: 4.JUL.2016 10:30:17

30 MHz – 200 MHz



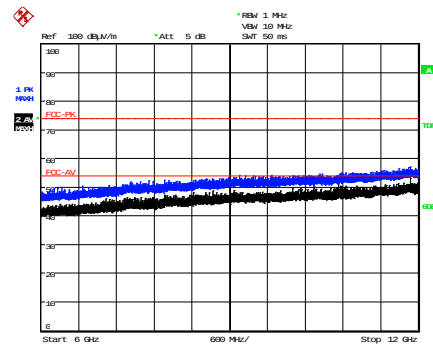
Date: 5.JUL.2016 09:46:56

200 MHz – 1 GHz



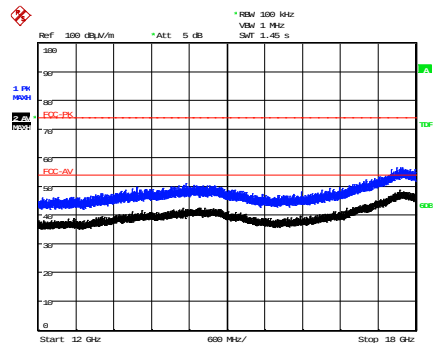
Date: 5.JUL.2016 17:51:23

1 GHz – 6 GHz



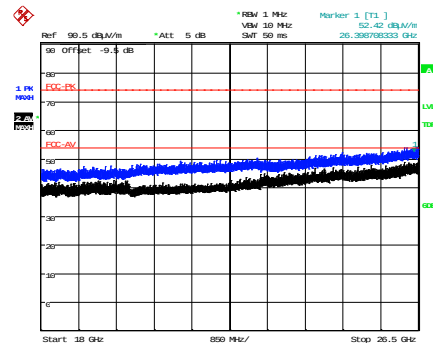
Date: 5.JUL.2016 17:47:22

6 GHz – 12 GHz



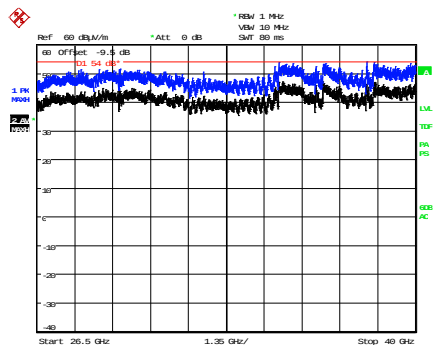
Date: 5.JUL.2016 17:44:23

12 GHz – 18 GHz



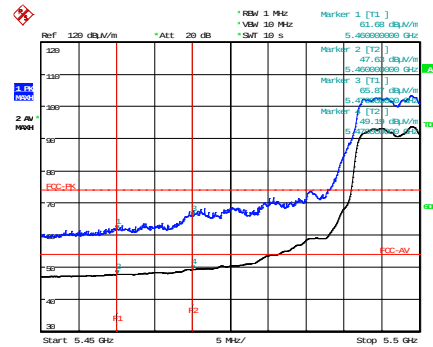
Date: 6.JUL.2016 16:58:44

18 GHz – 26.5 GHz



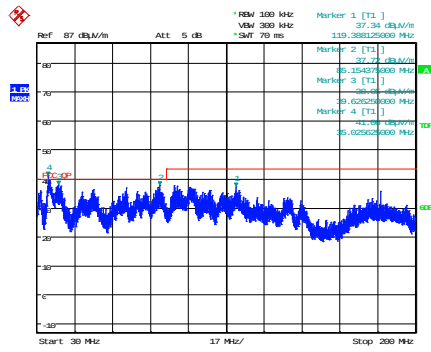
Date: 13.SEP.2016 16:57:51

26.5 GHz – 40 GHz

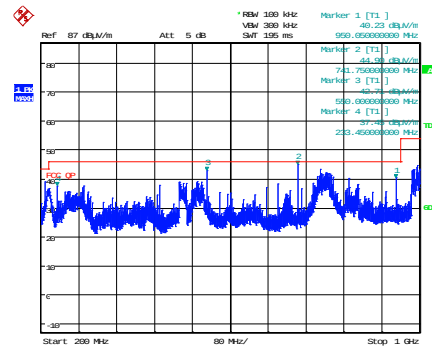


Date: 26.MAY.2016 09:22:23

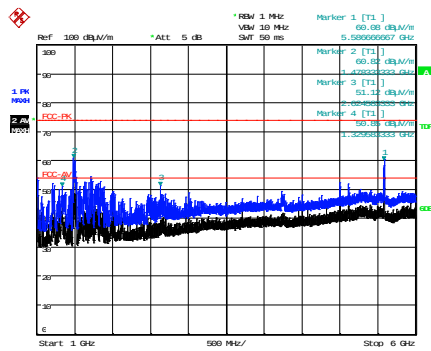
Bandedge

802.11a - Ch 116

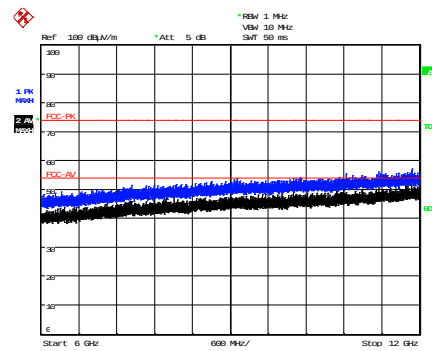
Date: 4.JUL.2016 10:34:06

30 MHz – 200 MHz

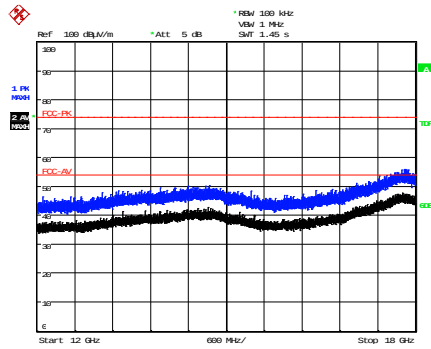
Date: 5.JUL.2016 09:51:42

200 MHz – 1 GHz

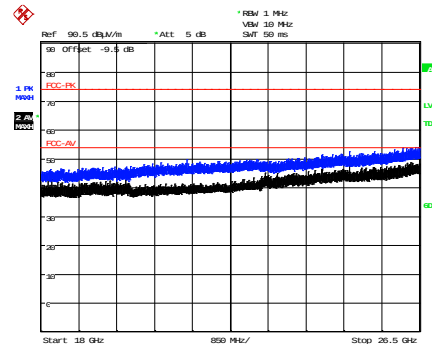
Date: 5.JUL.2016 17:48:11

1 GHz – 6 GHz

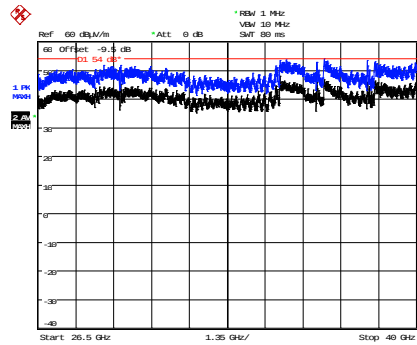
Date: 5.JUL.2016 17:48:59

6 GHz – 12 GHz

Date: 5.JUL.2016 17:41:33

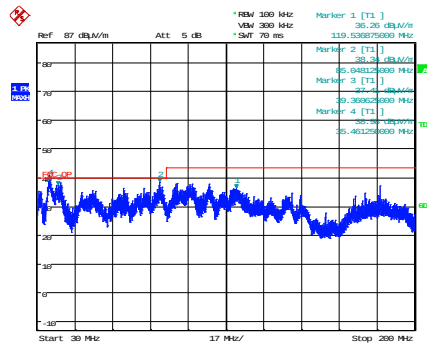
12 GHz – 18 GHz

Date: 6.JUL.2016 16:52:54

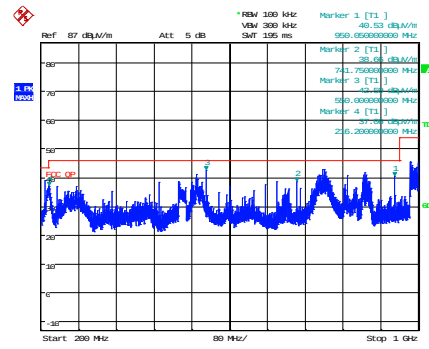
18 GHz – 26.5 GHz

Date: 13.SEP.2016 16:58:39

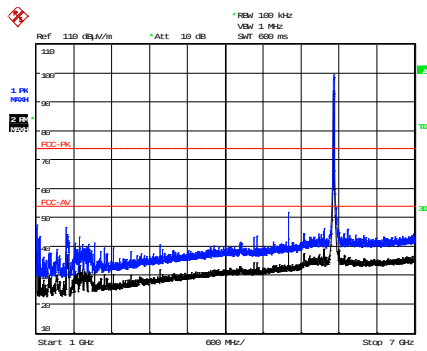
26.5 GHz – 40 GHz

802.11a - Ch 144

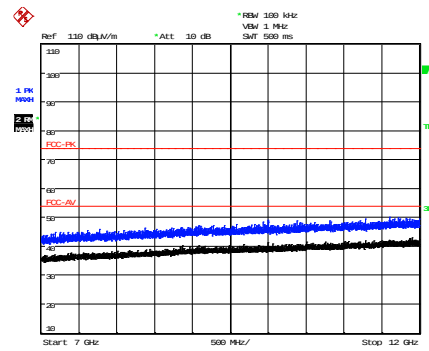
Date: 4.JUL.2016 10:37:29

30 MHz – 200 MHz

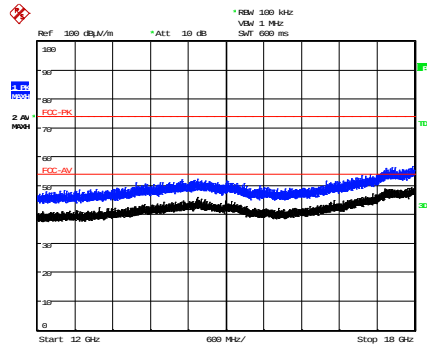
Date: 5.JUL.2016 09:53:57

200 MHz – 1 GHz

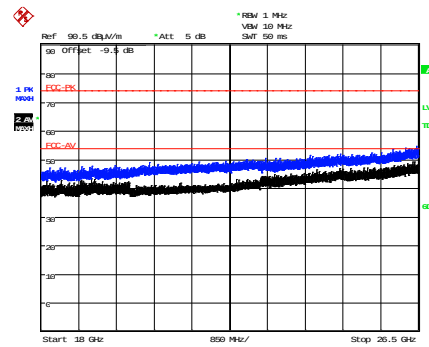
Date: 8.SEP.2016 13:43:07

1 GHz – 7 GHz

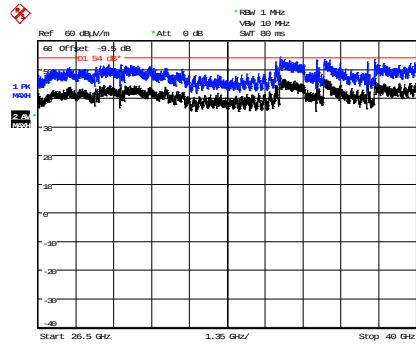
Date: 8.SEP.2016 13:33:33

7 GHz – 12 GHz

Date: 9.SEP.2016 12:52:43

12 GHz – 18 GHz

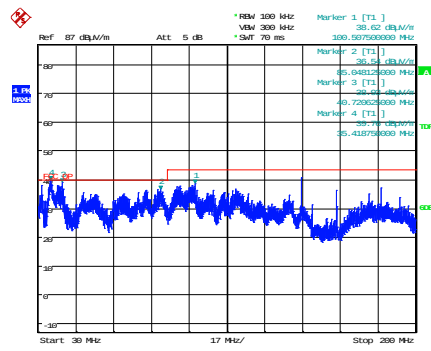
Date: 6.JUL.2016 16:55:14

18 GHz – 26.5 GHz

Date: 13.SEP.2016 17:00:40

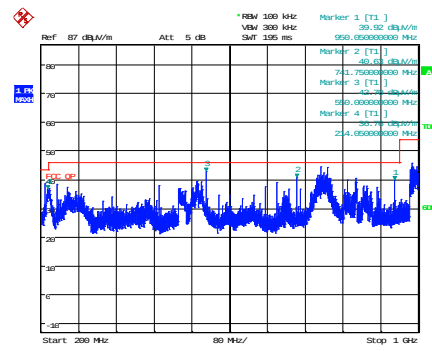
26.5 GHz – 40 GHz

802.11a - Ch 149



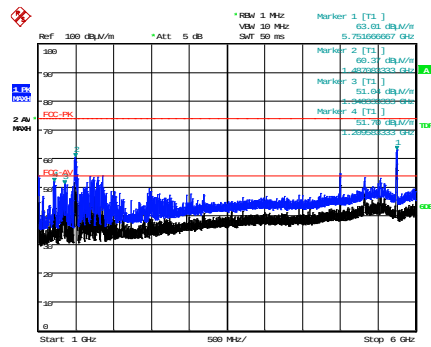
Date: 4.JUL.2016 10:41:41

30 MHz – 200 MHz



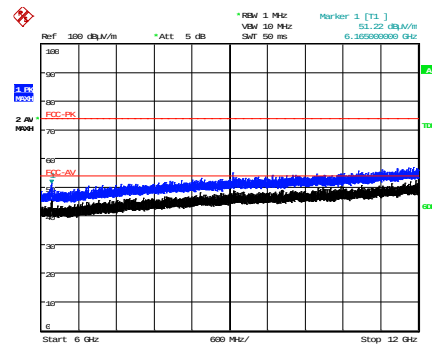
Date: 5.JUL.2016 09:55:59

200 MHz – 1 GHz



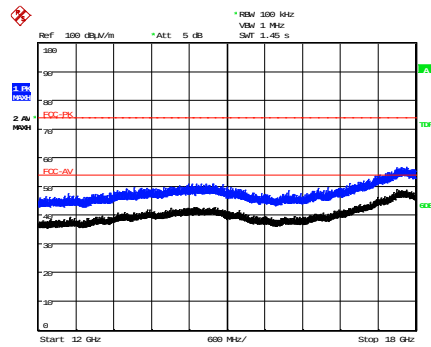
Date: 5.JUL.2016 15:44:14

1 GHz – 6 GHz



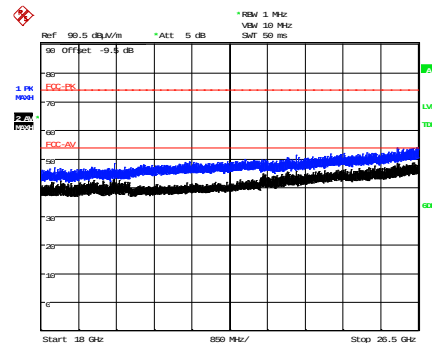
Date: 5.JUL.2016 15:48:36

6 GHz – 12 GHz



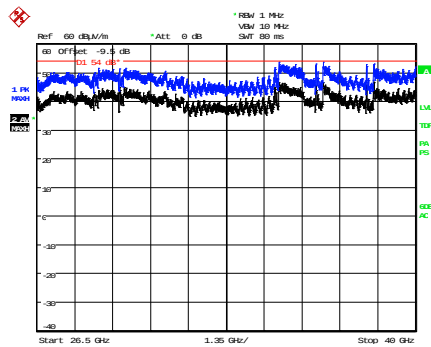
Date: 5.JUL.2016 15:38:53

12 GHz – 18 GHz



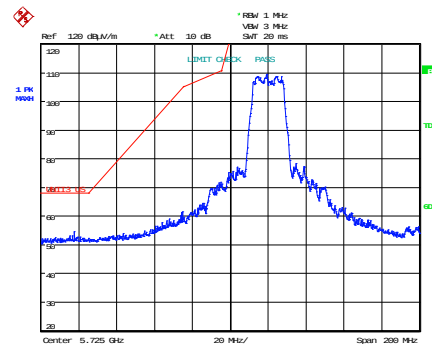
Date: 6.JUL.2016 16:57:03

18 GHz – 26.5 GHz



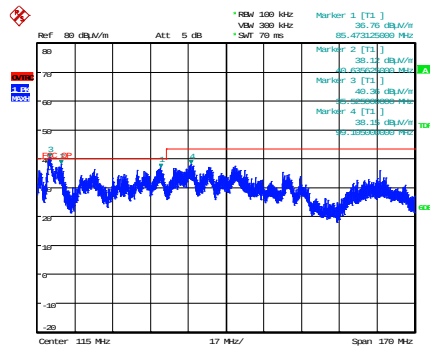
Date: 13.SEP.2016 17:03:38

26.5 GHz – 40 GHz

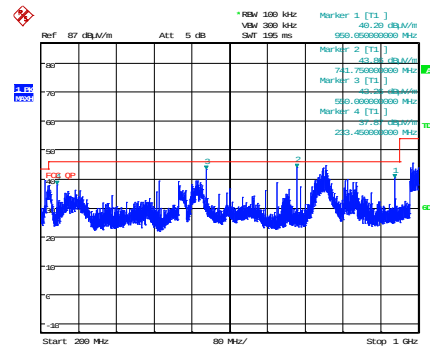


Date: 13.SEP.2016 11:02:03

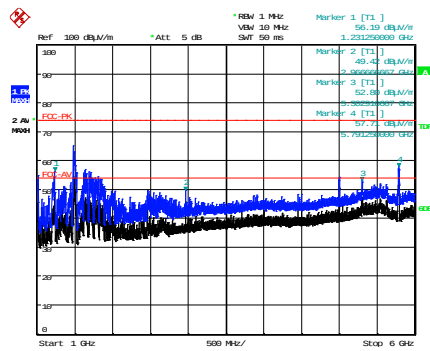
Bandedge

802.11a - Ch 157

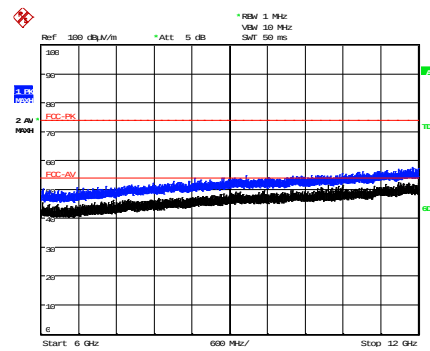
Date: 4 JUL 2016 10:52:01

30 MHz – 200 MHz

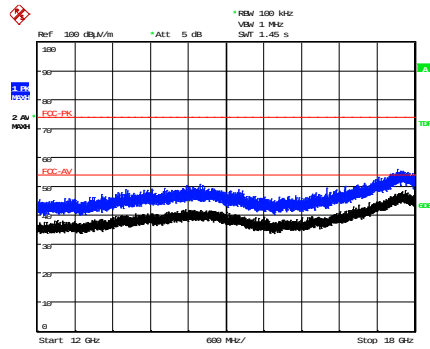
Date: 5 JUL 2016 09:59:54

200 MHz – 1 GHz

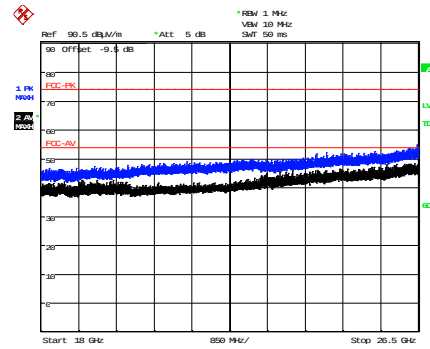
Date: 5 JUL 2016 15:29:25

1 GHz – 6 GHz

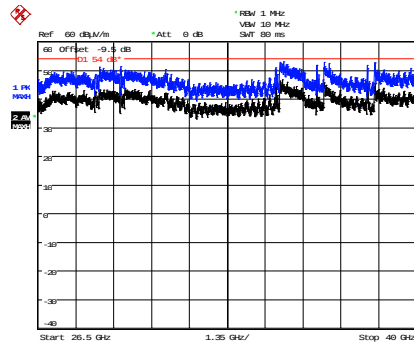
Date: 5 JUL 2016 15:33:08

6 GHz – 12 GHz

Date: 5 JUL 2016 15:35:07

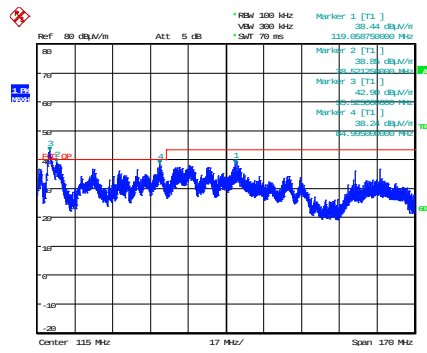
12 GHz – 18 GHz

Date: 6 JUL 2016 16:58:35

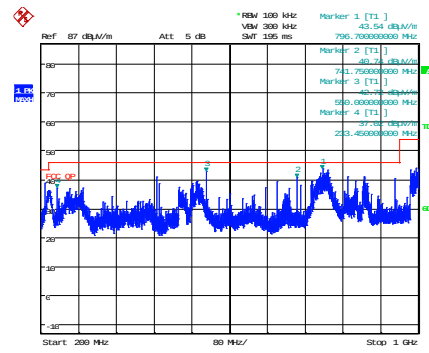
18 GHz – 26.5 GHz

Date: 13 SEP 2016 17:04:22

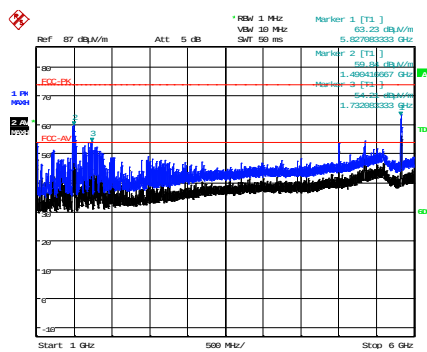
26.5 GHz – 40 GHz

802.11a - Ch 165

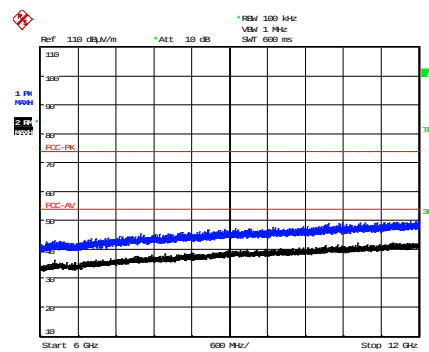
Date: 4.JUL.2016 10:56:39

30 MHz – 200 MHz

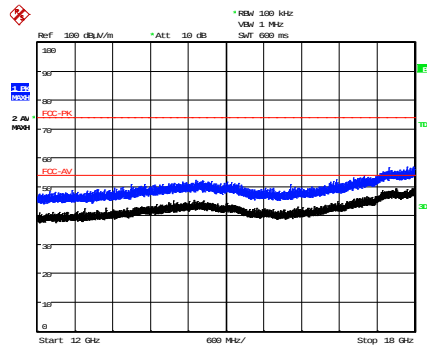
Date: 5.JUL.2016 10:02:41

200 MHz – 1 GHz

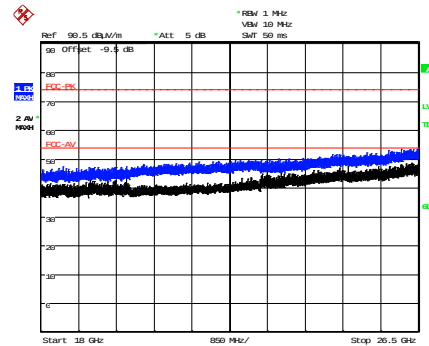
Date: 5.JUL.2016 12:52:53

1 GHz – 6 GHz

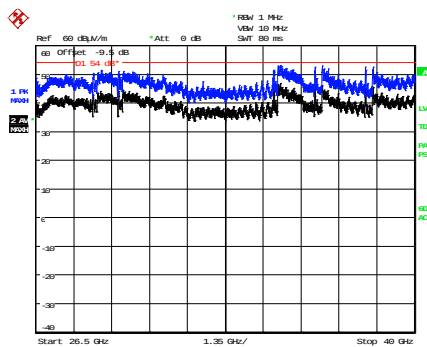
Date: 8.SEP.2016 12:56:55

6 GHz – 12 GHz

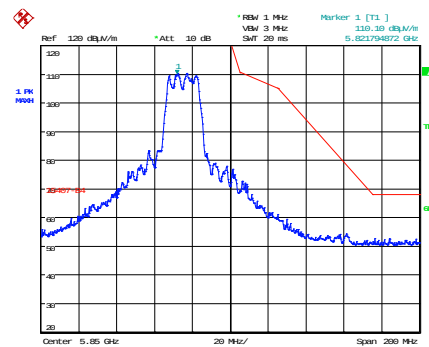
Date: 9.SEP.2016 12:55:11

12 GHz – 18 GHz

Date: 6.JUL.2016 17:00:08

18 GHz – 26.5 GHz

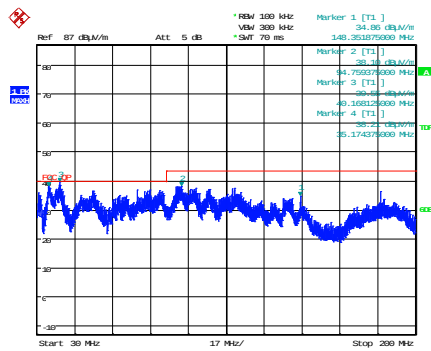
Date: 13.SEP.2016 17:06:38

26.5 GHz – 40 GHz

Date: 8.SEP.2016 15:35:49

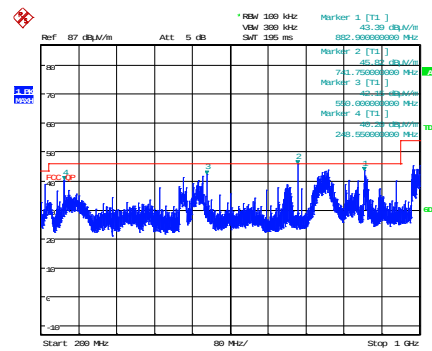
Bandedge

802.11n HT20 - Ch 36



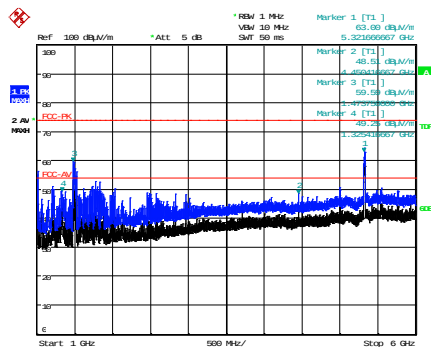
Date: 4.JUL.2016 09:59:27

30 MHz – 200 MHz



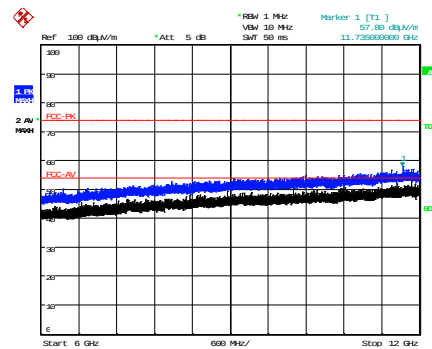
Date: 4.JUL.2016 17:23:23

200 MHz – 1 GHz



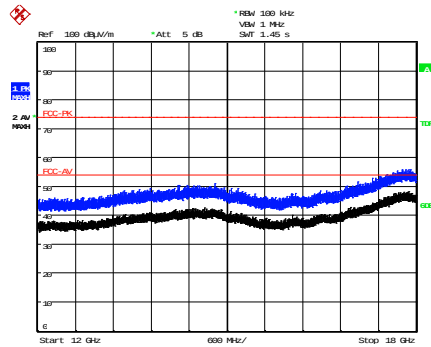
Date: 6.JUL.2016 14:28:16

1 GHz – 6 GHz



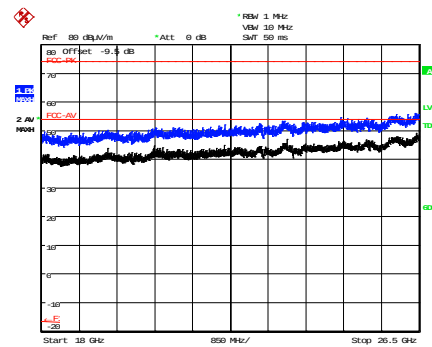
Date: 6.JUL.2016 14:22:19

6 GHz – 12 GHz



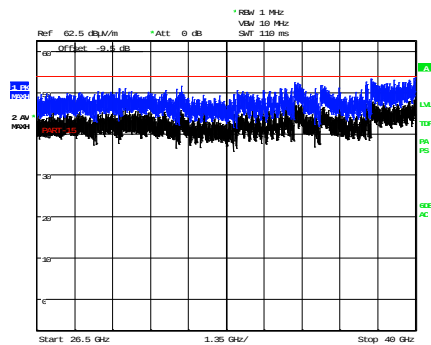
Date: 6.JUL.2016 14:23:25

12 GHz – 18 GHz



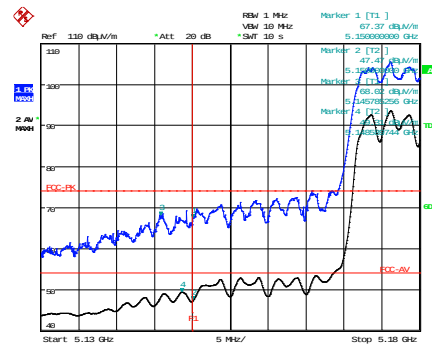
Date: 13.SEP.2016 18:45:08

18 GHz – 26.5 GHz



Date: 24.JUL.2003 05:53:12

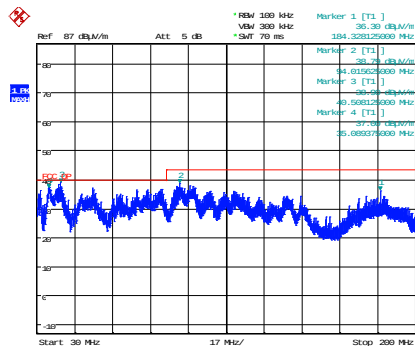
26.5 GHz – 40 GHz



Date: 24.MAY.2016 11:45:34

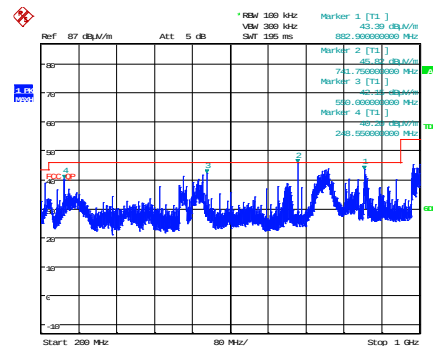
Bandedge

802.11n HT20 - Ch 52



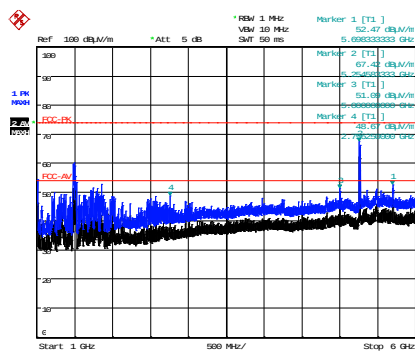
Date: 4.JUL.2016 09:56:33

30 MHz – 200 MHz



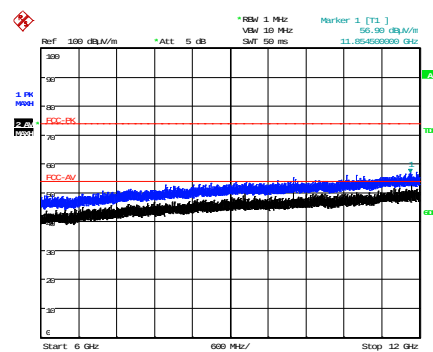
Date: 4.JUL.2016 17:25:45

200 MHz – 1 GHz



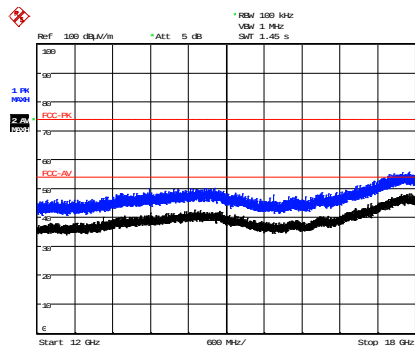
Date: 6.JUL.2016 14:42:07

1 GHz – 6 GHz



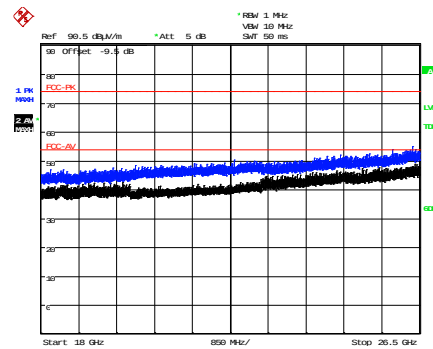
Date: 6.JUL.2016 14:43:29

6 GHz – 12 GHz



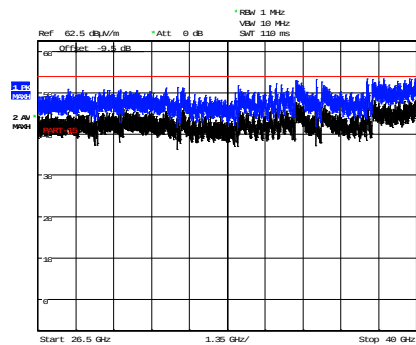
Date: 6.JUL.2016 14:44:29

12 GHz – 18 GHz



Date: 6.JUL.2016 16:33:38

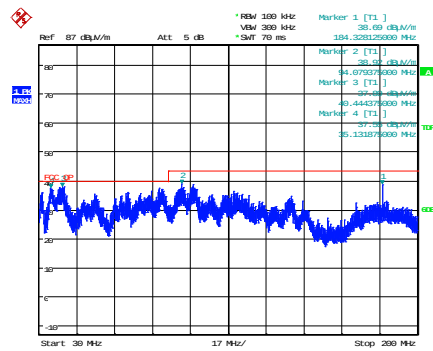
18 GHz – 26.5 GHz



Date: 24.JUL.2003 05:51:03

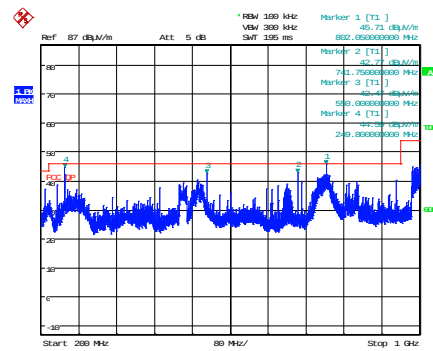
26.5 GHz – 40 GHz

802.11n HT20 - Ch 64



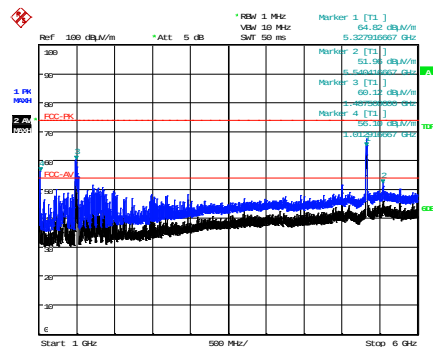
Date: 4.JUL.2016 09:59:49

30 MHz – 200 MHz



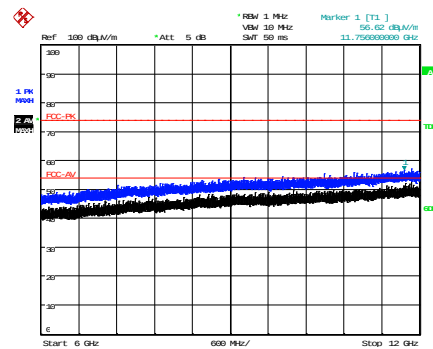
Date: 4.JUL.2016 17:39:31

200 MHz – 1 GHz



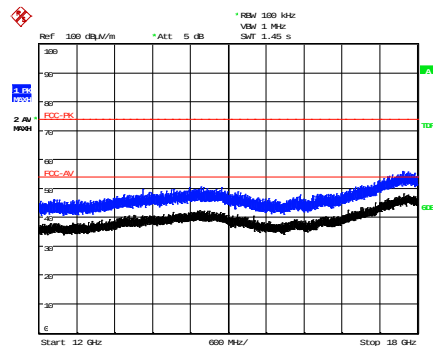
Date: 6.JUL.2016 14:35:58

1 GHz – 6 GHz



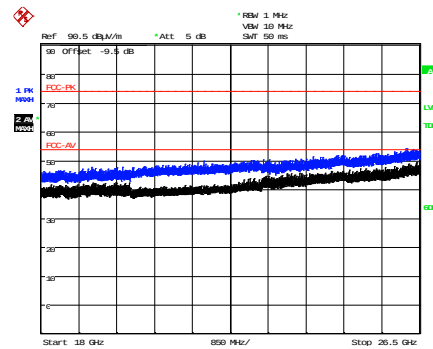
Date: 6.JUL.2016 14:31:14

6 GHz – 12 GHz



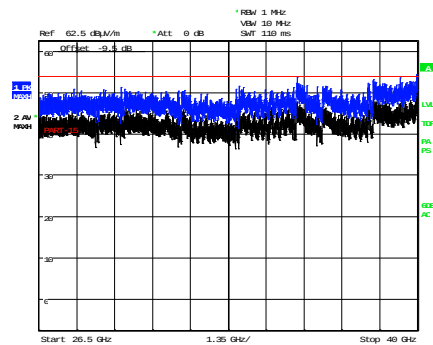
Date: 6.JUL.2016 14:15:28

12 GHz – 18 GHz



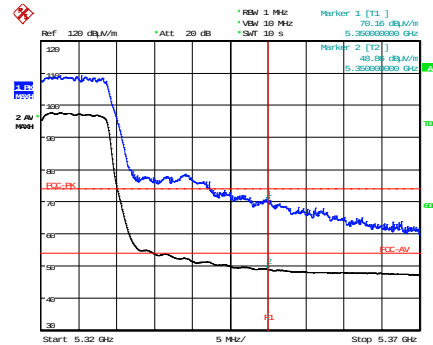
Date: 6.JUL.2016 16:31:41

18 GHz – 26.5 GHz



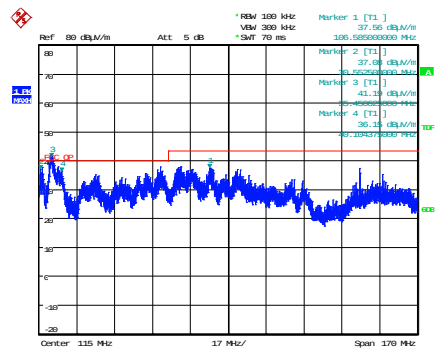
Date: 24.JUL.2003 05:52:06

26.5 GHz – 40 GHz

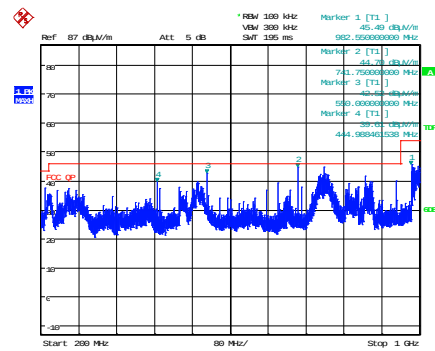


Date: 25.MAY.2016 11:52:18

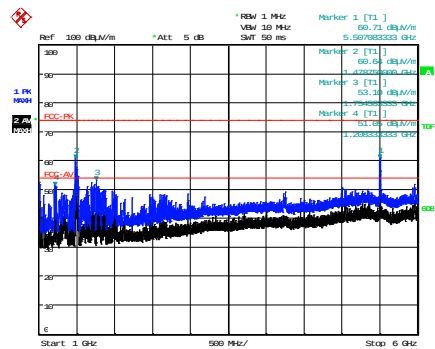
Bandedge

802.11n HT20 - Ch 100

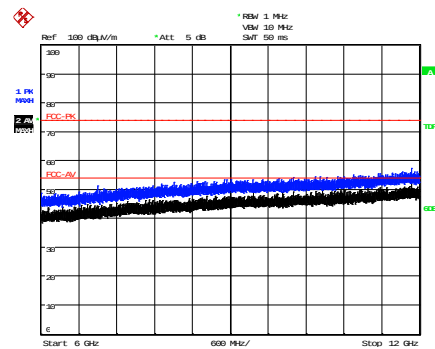
Date: 4.JUL.2016 11:23:02

30 MHz – 200 MHz

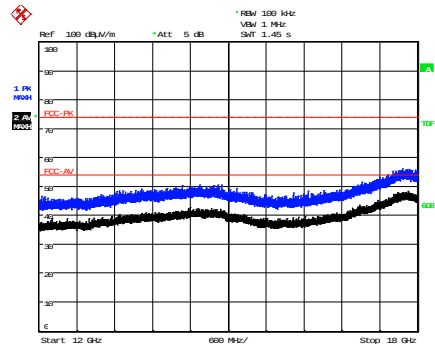
Date: 5.JUL.2016 10:05:28

200 MHz – 1 GHz

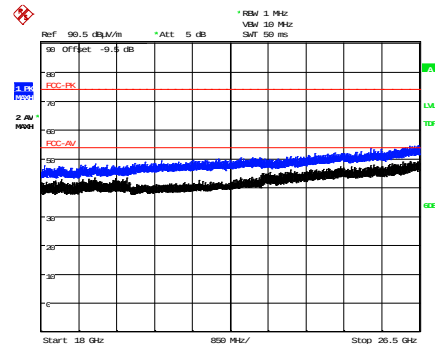
Date: 5.JUL.2016 17:15:29

1 GHz – 6 GHz

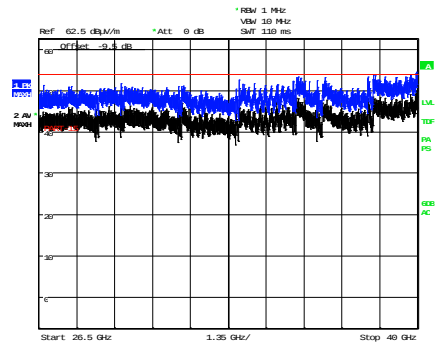
Date: 5.JUL.2016 17:13:21

6 GHz – 12 GHz

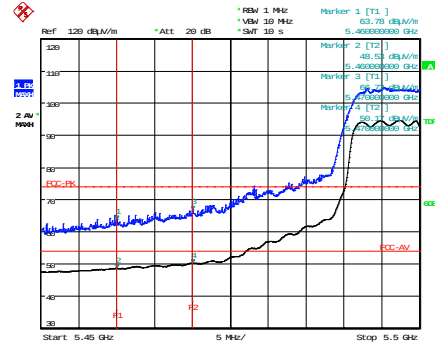
Date: 5.JUL.2016 17:11:58

12 GHz – 18 GHz

Date: 6.JUL.2016 17:11:29

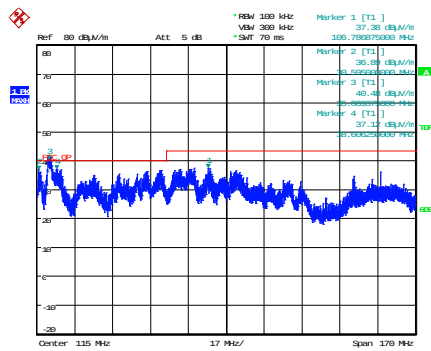
18 GHz – 26.5 GHz

Date: 24.JUL.2003 05:49:43

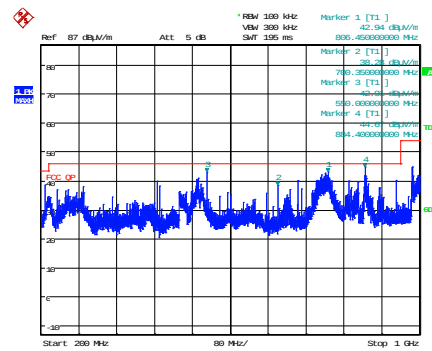
26.5 GHz – 40 GHz

Date: 26.MAY.2016 09:26:30

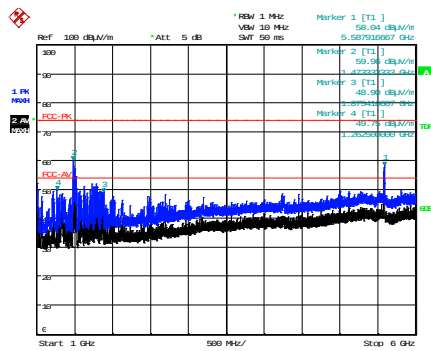
Bandedge

802.11n HT20 - Ch 116

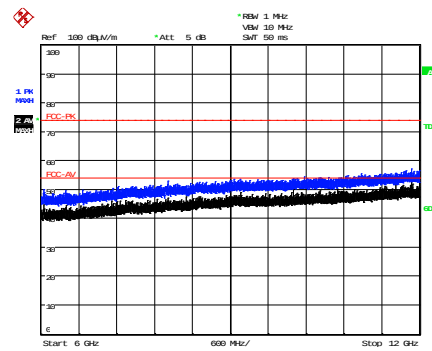
Date: 4.JUL.2016 11:20:35

30 MHz – 200 MHz

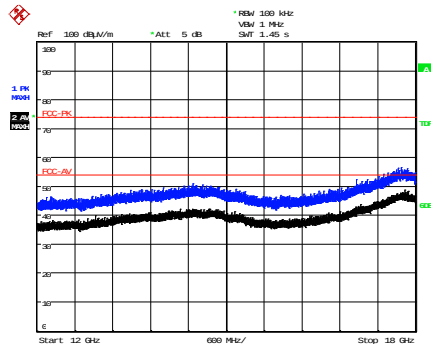
Date: 5.JUL.2016 10:10:23

200 MHz – 1 GHz

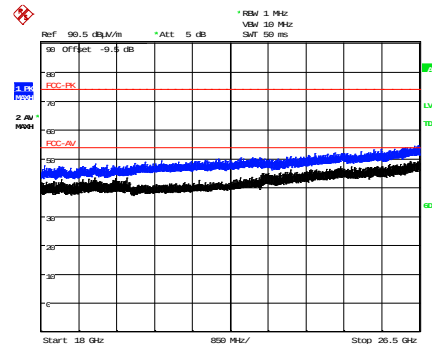
Date: 5.JUL.2016 17:19:08

1 GHz – 6 GHz

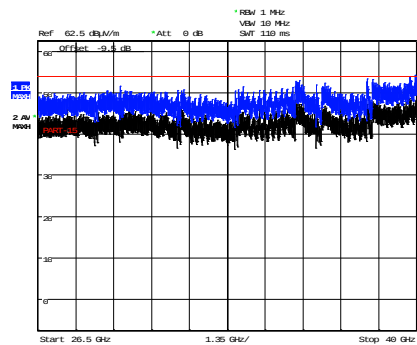
Date: 5.JUL.2016 17:20:20

6 GHz – 12 GHz

Date: 5.JUL.2016 17:21:46

12 GHz – 18 GHz

Date: 6.JUL.2016 17:18:29

18 GHz – 26.5 GHz

Date: 24.JUL.2003 05:46:41

26.5 GHz – 40 GHz