

Report on the Radio Testing

For

Pace plc

on

Xi5

Report no. TRA-029286-02-45-02A

20th May 2016

Report Number: TRA-029286-02-45-02A
Issue: A

REPORT ON THE RADIO TESTING OF A
Pace plc
Xi5
WITH RESPECT TO SPECIFICATION
FCC 47CFR Subpart E

TEST DATE: 01st March - 13th May 2016

Written by: A Tosif

A Tosif
Radio Test Engineer

Approved by: **John Charters**
Date: 20th May 2016

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J Charters
Department Manager- Radio

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	20th May 2016	Original

2 Summary

TEST REPORT NUMBER:	TRA-029286-02-45-02A
WORKS ORDER NUMBER:	TRA-029286-02
PURPOSE OF TEST:	Certification
TEST SPECIFICATION:	47CFR15 Subpart E
EQUIPMENT UNDER TEST (EUT):	Xi5
FCC IDENTIFIER:	NQ8PX051AEI
EUT SERIAL NUMBER:	PAW400000759 & PAW400000782
MANUFACTURER/AGENT:	Pace plc
ADDRESS:	Victoria Road Saltaire Shipley West Yorkshire BD18 3LF United Kingdom
CLIENT CONTACT:	James Humphrey ☎ 01274 537259 ✉ James.Humphrey1@pace.com
ORDER NUMBER:	5185322
TEST DATE:	01st March - 13th May 2016
TESTED BY:	A Tosif Element

2.1 Test Summary

<i>Test Method and Description</i>	<i>Requirement Clause 47CFR15</i>	<i>Applicable to this equipment</i>	<i>Result / Note</i>
Radiated spurious emissions Bandedge Emissions	15.407(b)	☒	Pass
AC power line conducted emissions	15.207	☐	Note 1
Emission / Occupied bandwidth	15.407(e)	☒	Pass
Transmit carrier power	15.407(a)	☒	Pass
Power spectral density, conducted	15.407(a)	☒	Pass
TPC and DFS	15.407(h)	☐	Note 2

Notes:

1. See Test report TRA-029286-02-45-03A. AC Power line Conducted emissions were recorded with all radio devices active simultaneously
2. See Test report See Test report TRA-029286-02-45-04A

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-029286-02-45-02A presents the results of the Radio testing on a Pace plc, Xi5 to specification 47CFR15 Radio Frequency Devices.

The testing was carried out for Pace plc 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: Xi5
- Serial Number: PAW400000759 & PAW400000782
- Model Number: PX051AEI
- Software Revision: Not Applicable
- Build Level / Revision Number: DV

Incorporating the following external interconnecting cables, ports or terminals:

<i>Description</i>		<i>Cable Type</i>	<i>Test Length</i>	<i>Max. Length</i>
1	DC input	2 core unscreened	1.5m	1.5m
2	Ethernet	CAT5e UTP	10m	>3m
3	HDMI in	HDMI unscreened	1m	1m
4	HDMI out	HDMI unscreened	1m	1m
5	Micro USB*	None	N/A	N/A

*The micro USB port is not used in normal operation, so it wasn't terminated during the testing.

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.

EPS-2 (AC Adapter)
Pace HDMI Input Load
Sharp Television
Dell Latitude Laptop
Dell AC/DC Adapter

7.3 EUT Mode of Operation

7.3.1 Transmission

Wi-Fi transmitter control was via commands sent through Tera Term. The commands provided by the manufacturer setup the device into a permanent transmit mode. The commands allowed adjustment of the following parameters of significant interest.

Modulation Scheme	Channel	Power setting	Worst Case Data Rate
802.11a	5180	12	54
	5260	12	54
	5320	12	54
	5500	12	54
	5620	12	54
	5720	12	54
	5745	73	54
	5785	73	54
	5825	69	54
802.11n HT20	5180	13	MCS31
	5260	13	MCS31
	5320	13	MCS31
	5500	13	MCS31
	5620	13	MCS31
	5720	13	MCS31
	5745	71	MCS31
	5785	73	MCS31
	5825	69	MCS31
802.11n HT40	5190	14	MCS31
	5270	14	MCS31
	5310	14	MCS31
	5510	14	MCS31
	5630	14	MCS31
	5710	14	MCS31
	5755	65	MCS31
	5795	74	MCS31
802.11ac VHT20	5180	13	MCS8
	5260	13	MCS8
	5320	13	MCS8
	5500	12	MCS8
	5620	12	MCS8
	5720	12	MCS8
	5745	74	MCS8
	5785	73	MCS8
	5825	69	MCS8
802.11ac VHT40	5190	14	MCS9
	5270	14	MCS9
	5310	14	MCS9
	5510	13	MCS9
	5630	13	MCS9
	5710	13	MCS9
	5755	65	MCS9
	5795	74	MCS9
802.11ac VHT80	5210	14	MCS9
	5290	14	MCS9
	5530	14	MCS9
	5610	14	MCS9
	5690	14	MCS9
	5775	61	MCS9

7.3.2 Reception

This report covers transmitter operation only, results for unintentional emissions can be found in test report TRA-029286-44-00A.

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
Modulation type(s):	OFDM
Occupied channel bandwidth(s):	20 MHz / 40 MHz / 80 MHz
Declared output power(s):	+25dBm
Warning against use of alternative antennas in user manual (yes/no):	Not Applicable
Nominal Supply Voltage:	110 Vac
Location of notice for license exempt use:	Label / user manual / both.

7.4.2 Antennas

Type:	Omni directional/polarity Antennas
Frequency range:	5.15 GHz – 5.35 GHz; 5.47 GHz – 5.725 GHz; 5.725GHz – 5.85 GHz
Impedance:	50 Ohms
Gain:	See charts on page 29
Polarisation:	Omni
Connector type:	U-FL
Mounting:	Case Mounted

7.4.3 Product specific declarations

Multiple antenna configuration(s), e.g. MIMO:	MIMO
Fixed pt-pt operations (yes/no):	No
Installation manual advice on pt-pt operational restrictions (yes/no):	Not Applicable
Fixed pt-mpt operations (yes/no):	Not Applicable
Simultaneous tx (yes/no):	Yes

7.5 EUT Description

The EUT is a set top box with one HDMI output for connection to a television. The EUT can accept inputs from Wi-Fi, HDMI and Ethernet. The EUT is controlled by remote control over RF4CE and/or Bluetooth.

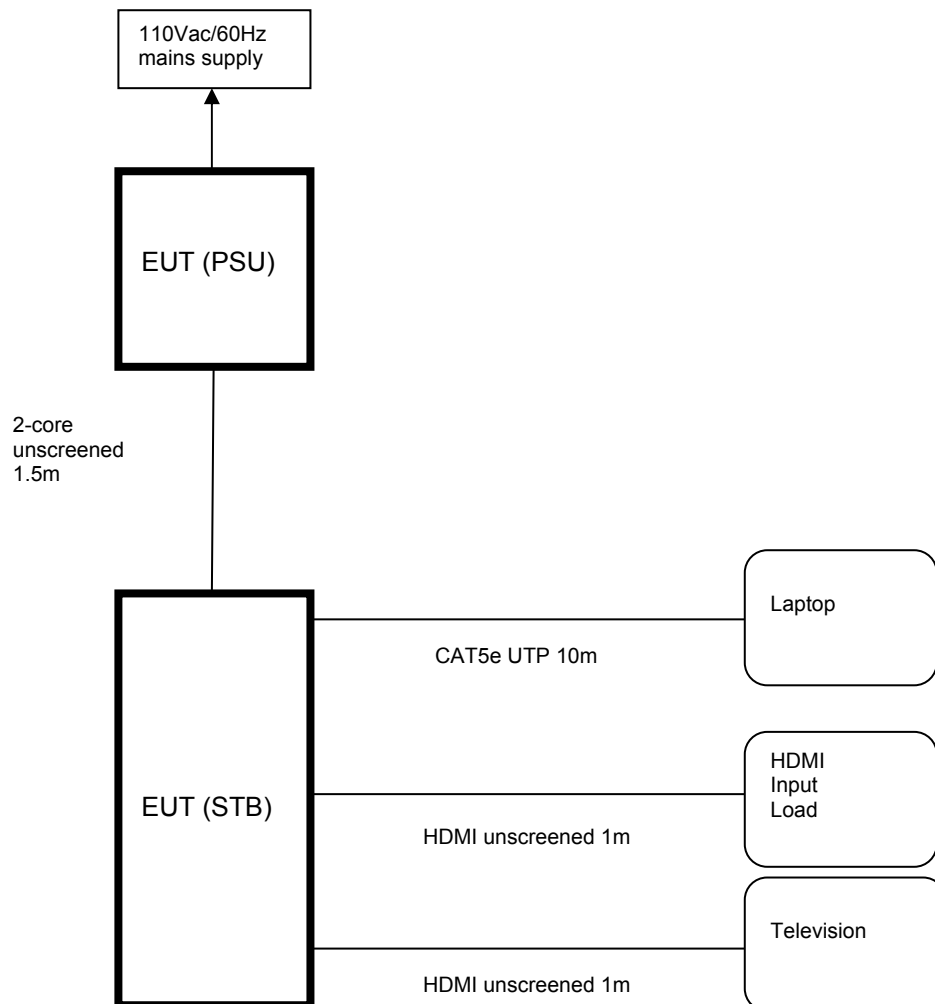
8 Modifications

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. 110 Vac from the mains.

11 Occupied Bandwidth

11.1 Definition

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal.

11.2 Test Parameters

Test Location:	Element Hull
Test Chamber:	Wireless Lab 1
Test Standard and Clause:	ANSI C63.10-2013, Clause 6.9, KDB 789033 D02
EUT Channels / Frequencies Measured:	36, 38, 42, 52, 54, 58, 100, 102, 106, 122, 124, 126, 138, 142, 144, 149, 151, 155, 159, 165
EUT Channel Bandwidths:	20 MHz / 40 MHz / 80 MHz
EUT Test Modulations:	802.11a, 802.11n HT20/40, 802.11ac VHT20/40/80
Deviations From Standard:	None
Measurement BW:	1% of the emission bandwidth for 26 dB BW, 100 kHz for 6 dB BW
Spectrum Analyzer Video BW:	> RBW for 26 dB BW, $\geq 3 \times$ RBW for 6 dB BW
Measurement Detector:	Peak

Environmental Conditions (Normal Environment)

Temperature: 20 °C	+15 °C to +35 °C (as declared)
Humidity: 36 %RH	20%RH to 75%RH (as declared)
Supply: 110 Vac	110Vac +/-10% (as declared)

Test Limits

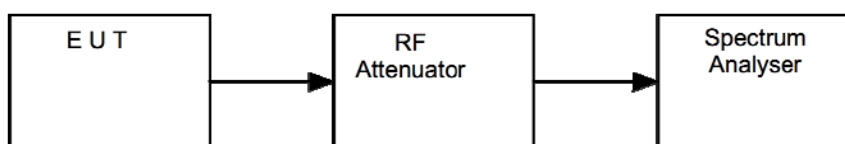
Within the 5.725–5.85 GHz band, the minimum 6 dB bandwidth of U–NII devices shall be at least 500 kHz.

11.3 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure iii, the bandwidth of the EUT was measured on a spectrum analyser.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst-case configuration in each bandwidth.

Figure iii Test Setup



11.4 Test Equipment

Equipment Description	Manufacturer	Equipment Type	Element No	Last Cal Calibration	Calibration Period	Due For Calibration
Spectrum Analyser	R&S	FSU26	U405	11/05/2015	12	11/05/2016

11.5 Test Results

Modulation: 802.11a;					
Channel Frequency (MHz)	Power setting	F_L (MHz)	F_H (MHz)	26dB Bandwidth (MHz)	Result
5180	12	5169.615385	5190.576923	20.962	PASS
5260	12	5249.567308	5270.528846	20.962	PASS
5320	12	5309.567308	5330.528846	20.962	PASS
5500	12	5489.663462	5510.528846	20.865	PASS
5620	12	5609.615385	5630.576923	20.962	PASS
5720	12	5709.615385	5730.576923	20.962	PASS
5745	73	5734.615385	5755.625000	21.010	PASS
5785	73	5774.663462	5795.737179	21.074	PASS
5825	69	5814.663462	5835.657051	20.994	PASS

Modulation: 802.11n-HT20					
Channel Frequency (MHz)	Power setting	F_L (MHz)	F_H (MHz)	26dB Bandwidth (MHz)	Result
5180	13	5169.262821	5190.897436	21.635	PASS
5260	13	5249.182692	5270.897436	21.715	PASS
5320	13	5309.182692	5330.897436	21.715	PASS
5500	13	5489.262821	5510.977564	21.715	PASS
5620	13	5609.262821	5630.977564	21.715	PASS
5720	13	5709.262821	5730.977564	21.715	PASS
5745	71	5734.342949	5755.977564	21.635	PASS
5785	73	5774.262821	5795.977564	21.715	PASS
5825	69	5814.262821	5835.977564	21.715	PASS

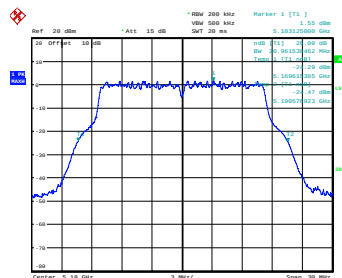
Modulation: 802.11n-HT40					
Channel Frequency (MHz)	Power setting	F_L (MHz)	F_H (MHz)	26dB Bandwidth (MHz)	Result
5190	14	5169.967949	5210.352564	40.385	PASS
5270	14	5249.967949	5290.352564	40.385	PASS
5310	14	5289.967949	5330.192308	40.224	PASS
5510	14	5489.967949	5530.352564	40.385	PASS
5630	14	5609.967949	5650.352564	40.385	PASS
5710	14	5689.967949	5730.192308	40.224	PASS
5755	65	5734.967949	5775.352564	40.385	PASS
5795	74	5774.967949	5815.352564	40.385	PASS

Modulation: 802.11ac-VHT20					
Channel Frequency (MHz)	Power setting	F_L (MHz)	F_H (MHz)	26dB Bandwidth (MHz)	Result
5180	13	5168.301282	5191.858974	23.558	PASS
5260	13	5248.301282	5271.858974	23.558	PASS
5320	13	5308.381410	5331.858974	23.478	PASS
5500	12	5488.381410	5511.858974	23.478	PASS
5620	12	5608.301282	5631.858974	23.558	PASS
5720	12	5708.301282	5731.858974	23.558	PASS
5745	74	5733.221154	5756.858974	23.638	PASS
5785	73	5773.301282	5796.858974	23.558	PASS
5825	69	5813.301282	5836.858974	23.558	PASS

Modulation: 802.11ac-VHT40					
Channel Frequency (MHz)	Power setting	F_L (MHz)	F_H (MHz)	26dB Bandwidth (MHz)	Result
5190	14	5169.967949	5210.192308	40.224	PASS
5270	14	5249.967949	5290.192308	40.224	PASS
5310	14	5289.967949	5330.192308	40.224	PASS
5510	13	5489.967949	5530.192308	40.224	PASS
5630	13	5609.967949	5650.192308	40.224	PASS
5710	13	5689.967949	5730.192308	40.224	PASS
5755	65	5734.967949	5775.192308	40.224	PASS
5795	74	5774.871795	5815.128205	40.256	PASS

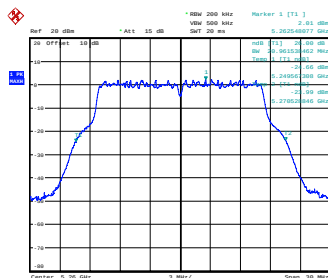
Modulation: 802.11ac-VHT80					
Channel Frequency (MHz)	Power setting	F_L (MHz)	F_H (MHz)	26dB Bandwidth (MHz)	Result
5210	14	5489.375000	5571.346154	81.971	PASS
5290	14	5569.375000	5651.346154	81.971	PASS
5530	14	5649.134615	5731.346154	82.212	PASS
5610	14	5734.134615	5816.346154	82.212	PASS
5690	14	5169.375000	5251.105769	81.731	PASS
5775	61	5249.134615	5331.346154	82.212	PASS

802.11a



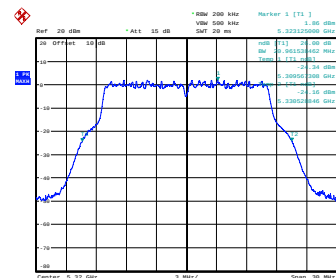
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5180 MHz



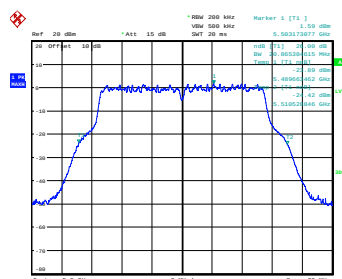
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5260 MHz



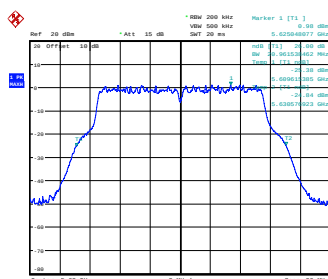
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5320 MHz



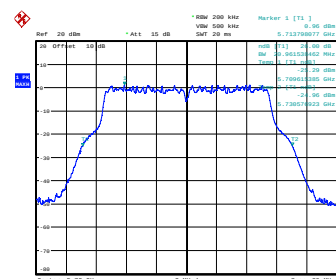
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5500 MHz



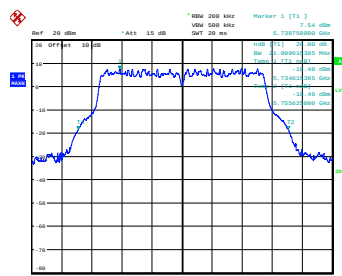
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5620 MHz



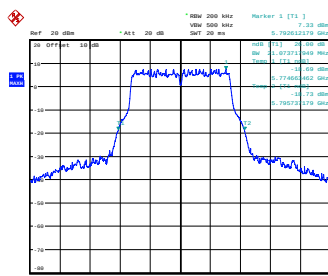
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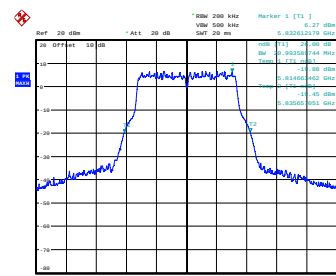
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5745 MHz



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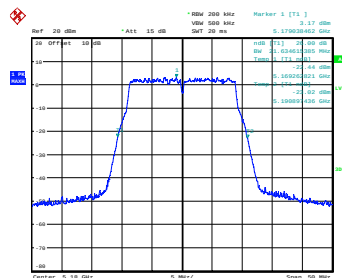
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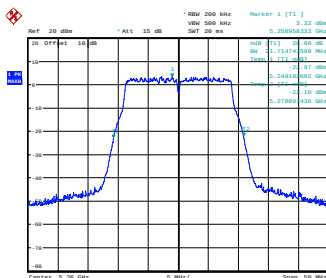
5825 MHz

802.11n HT20



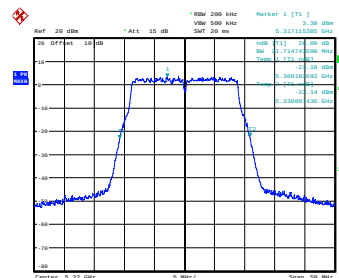
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5180 MHz



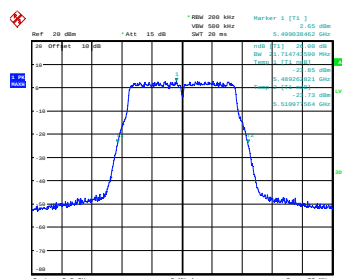
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5260 MHz



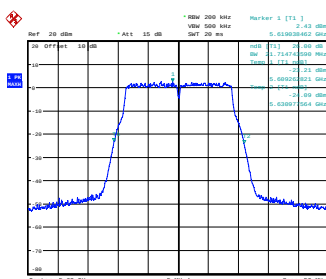
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5320 MHz



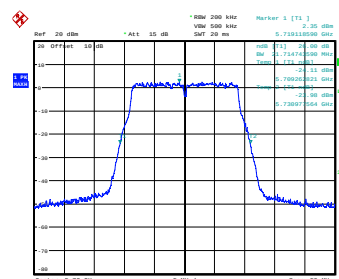
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5500 MHz



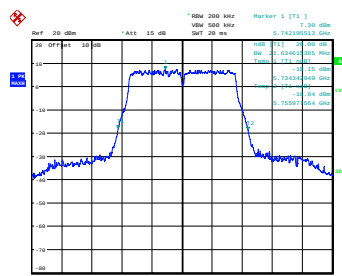
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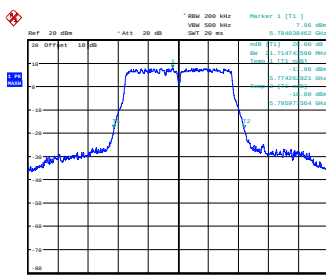
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5720 MHz



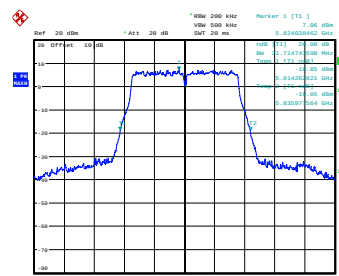
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5745 MHz



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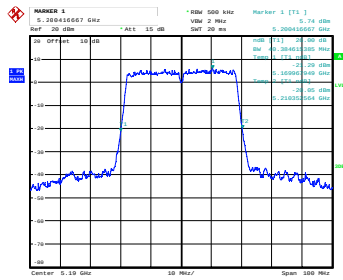
5785 MHz



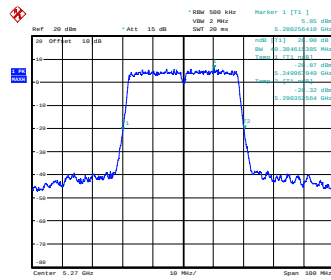
Date: 28-MAY-2016 12:51:13

5825 MHz

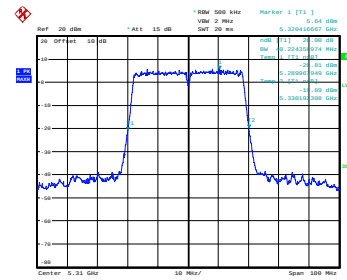
802.11n HT40



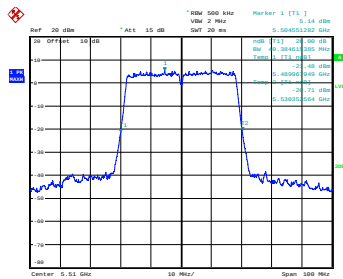
5190 MHz



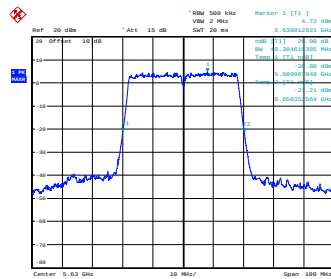
5270 MHz



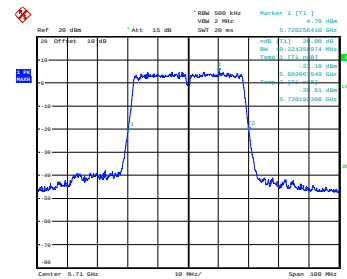
5310 MHz



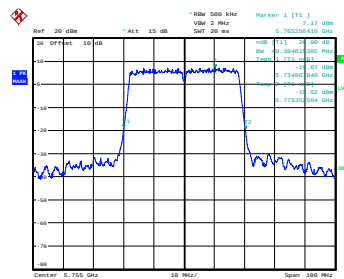
5510 MHz



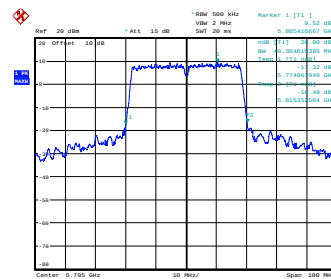
5630 MHz



5710 MHz

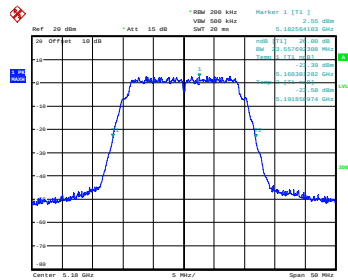


5755 MHz



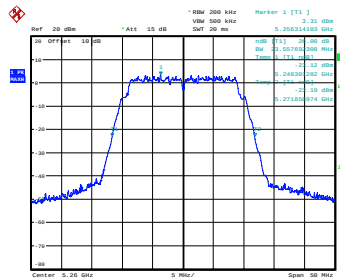
5795 MHz

802.11ac VHT20



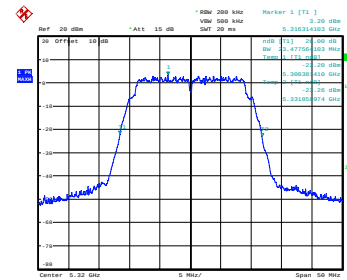
Date: 28.APR.2016 12:55:56

5180 MHz



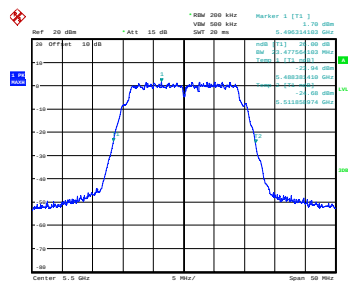
Date: 28.APR.2016 12:55:13

5260 MHz



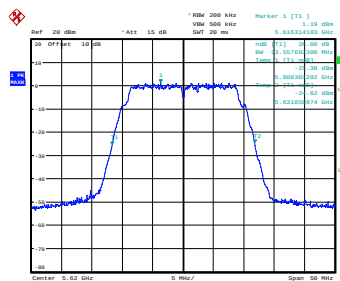
Date: 28.APR.2016 12:54:19

5320 MHz



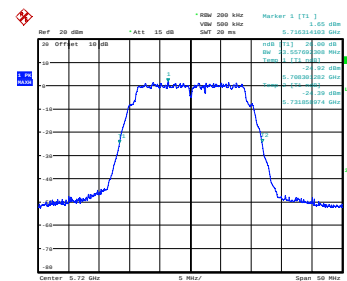
Date: 28.APR.2016 12:21:01

5500 MHz



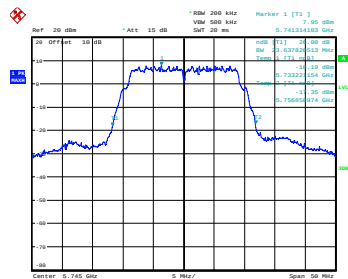
Date: 28.APR.2016 12:20:13

5620 MHz



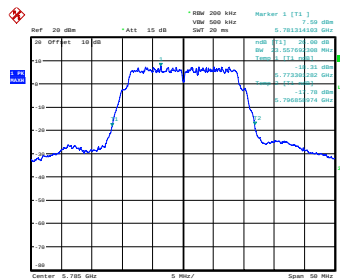
Date: 28.APR.2016 12:18:17

5720 MHz



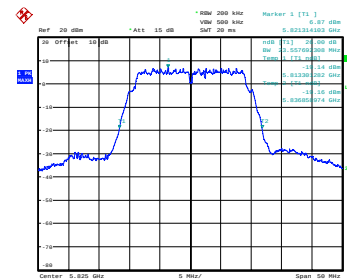
Date: 28.APR.2016 12:57:57

5745 MHz



Date: 28.MAY.2016 13:04:53

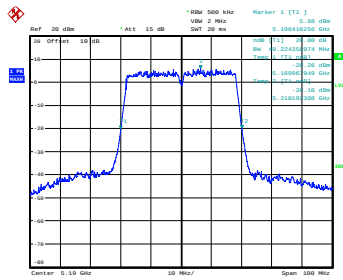
5785 MHz



Date: 28.MAY.2016 13:06:45

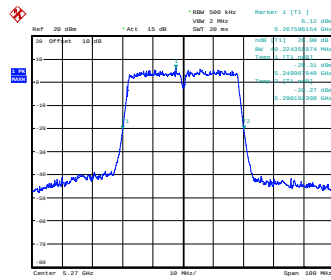
5825 MHz

802.1ac VHT40



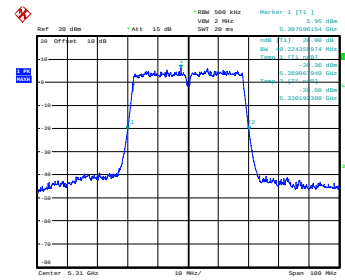
Date: 28.APR.2016 13:57:05

5190 MHz



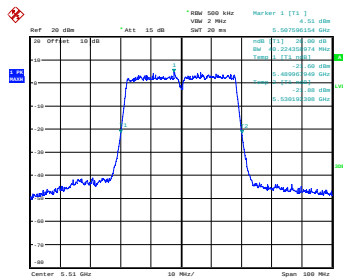
Date: 28.APR.2016 13:58:33

5270 MHz



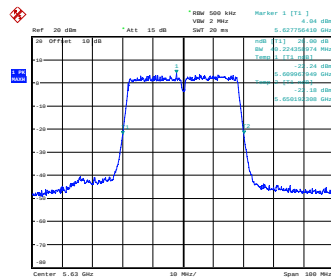
Date: 28.APR.2016 14:00:10

5310 MHz



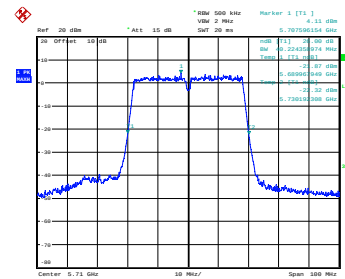
Date: 28.APR.2016 14:10:30

5510 MHz



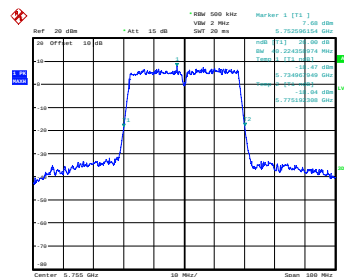
Date: 28.APR.2016 14:11:21

5630 MHz



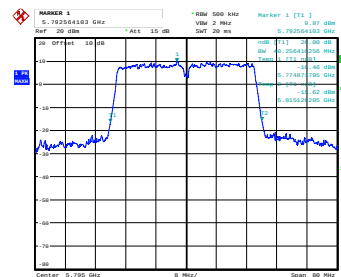
Date: 28.APR.2016 14:13:38

5710 MHz



Date: 28.APR.2016 14:15:42

5755 MHz



Date: 18.MAY.2016 13:09:53

5795 MHz

Modulation: 802.11a					
Channel Frequency	Power setting	F_L (MHz)	F_H (MHz)	6dB Bandwidth (kHz)	Result
5745	73	5736.746795	5753.269231	16522.4	PASS
5785	73	5776.746795	5793.333333	16586.5	PASS
5825	69	5816.842948	5833.333333	16490.4	PASS

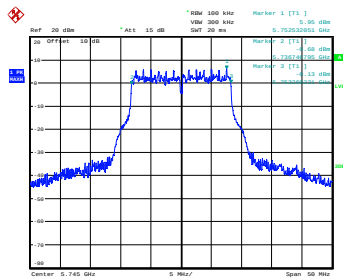
Modulation: 802.11nHT20					
Channel Frequency	Power setting	F_L (MHz)	F_H (MHz)	6dB Bandwidth (kHz)	Result
5745	71	5736.025641	5753.990385	17964.7	PASS
5785	73	5776.121794	5793.974358	17852.6	PASS
5825	69	5816.105769	5833.974358	17868.6	PASS

Modulation: 802.11nHT40					
Channel Frequency	Power setting	F_L (MHz)	F_H (MHz)	6dB Bandwidth (kHz)	Result
5755	65	5736.878205	5773.419872	36541.7	PASS
5795	74	5776.798077	5813.381410	36583.3	PASS

Modulation: 802.11acVHT20					
Channel Frequency	Power setting	F_L (MHz)	F_H (MHz)	6dB Bandwidth (kHz)	Result
5745	74	5736.025641	5753.990385	17964.7	PASS
5785	73	5776.105769	5793.974359	17868.6	PASS
5825	69	5816.121794	5834.054487	17932.7	PASS

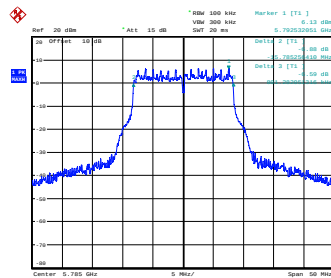
Modulation: 802.11acVHT40					
Channel Frequency	Power setting	F_L (MHz)	F_H (MHz)	6dB Bandwidth (kHz)	Result
5755	65	5736.878205	5773.307692	36429.5	PASS
5795	74	5776.798077	5813.269230	36471.2	PASS

Modulation: 802.11acVHT80					
Channel Frequency	Power setting	F_L (MHz)	F_H (MHz)	6dB Bandwidth	Result
5775	61	5737.333334	5813.173077	75839.7	PASS

802.11a

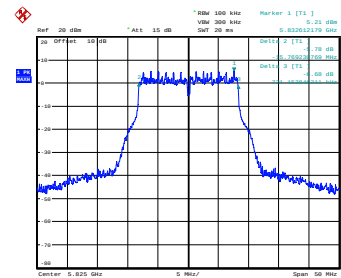
Date: 29.APR.2016 07:48:10

5745 MHz



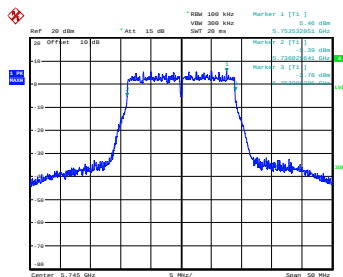
Date: 18.MAY.2016 13:39:10

5785 MHz



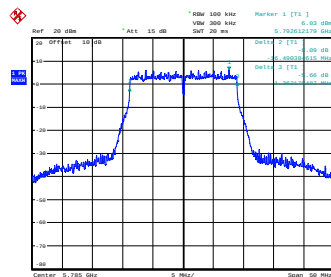
Date: 18.MAY.2016 13:41:38

5825 MHz

802.11n HT20

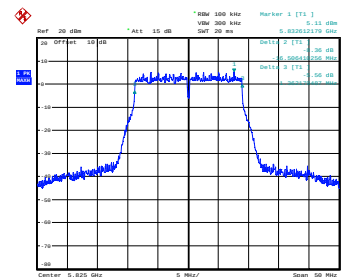
Date: 29.APR.2016 07:50:14

5745 MHz



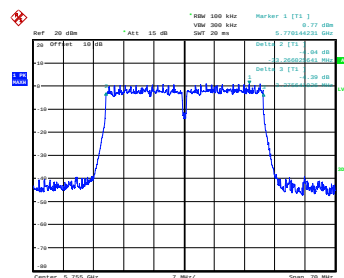
Date: 18.MAY.2016 13:45:32

5785 MHz



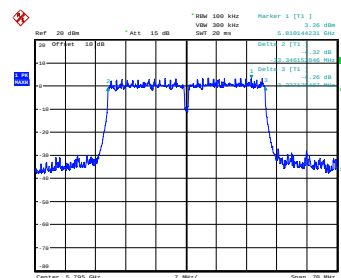
Date: 18.MAY.2016 13:47:31

5825 MHz

802.11n HT40

Date: 29.APR.2016 08:29:54

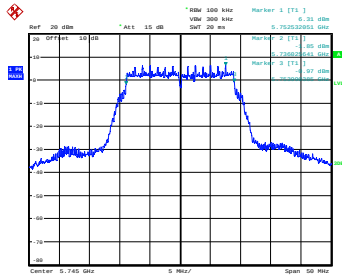
5755 MHz



Date: 18.MAY.2016 14:05:06

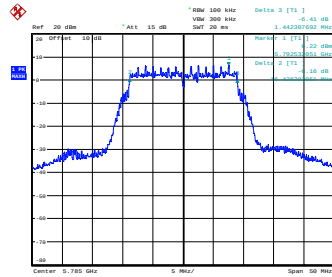
5795 MHz

802.11ac VHT20



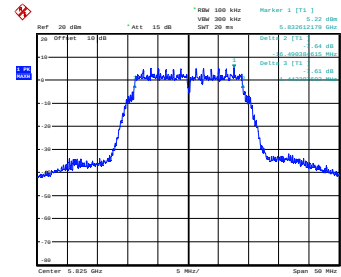
Date: 29.APR.2016 07:54:45

5745 MHz



Date: 18.MAY.2016 14:20:57

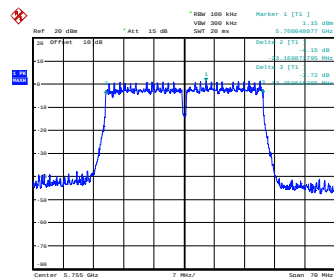
5785 MHz



Date: 18.MAY.2016 14:31:40

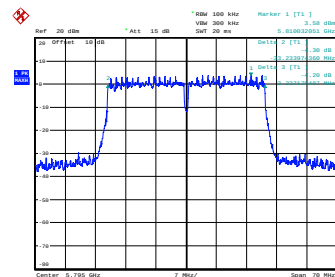
5825 MHz

802.11ac VHT40



Date: 29.APR.2016 08:31:33

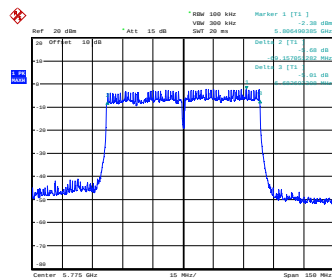
5755 MHz



Date: 18.MAY.2016 14:11:26

5795 MHz

802.11ac VHT80



Date: 29.APR.2016 08:43:15

5775 MHz

12 Maximum conducted output power

12.1 Definition

The maximum conducted output power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level.

12.2 Test Parameters

Test Location:	Element Hull
Test Chamber:	Wireless Lab 1
Test Standard and Clause:	ANSI C63.10-2013, Clause 12.3, KDB 789033 D02, KDB 662911 D01
EUT Channels / Frequencies Measured:	36, 38, 42, 52, 54, 58, 100, 102, 106, 122, 124, 126, 138, 142, 144, 149, 151, 155, 159, 165
EUT Channel Bandwidths:	20 MHz / 40 MHz / 80 MHz
Deviations From Standard:	None
Measurement Detector:	RMS
Voltage Extreme Environment Test Range:	Mains Power = 85% and 115% of Nominal (FCC only requirement);

Environmental Conditions (Normal Environment)

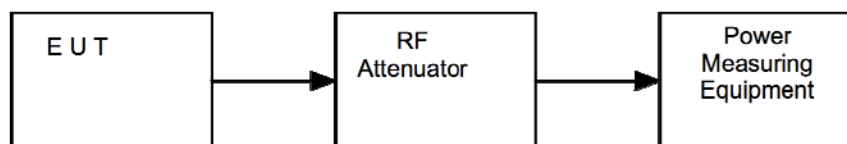
Temperature: 22 °C	+15 °C to +35 °C (as declared)
Humidity: 38%RH	20%RH to 75%RH (as declared)

12.3 Test Method

The EUT was setup as per section 9 of this report and, as per Figure iv, the power meter was used to measure each antenna output in turn, having taken account of all path losses. The results were summed as in the tables below.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

Figure iv Test Setup



12.4 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>
Power Meter	Dare	RPR3006W	REF2111	09/03/2016	12	09/03/2017

Test Limits

For client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

802.11a/n/ac 20 MHz									
Frequency (MHz)	5180	5260	5320	5500	5620	5720	5745	5785	5825
Direction Gain of Antenna*	9.4	9.5	9.8	9.9	10.2	10.0	10.0	9.8	9.8
Exceeds 6 dBi ?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exceeds 6 dBi by	3.4	3.5	3.8	3.9	4.2	4.0	4.0	3.8	3.8
Spec limit (dBm/MHz)	24.0	24.0	24.0	24.0	24.0	24.0	30.0	30.0	30.0
Number Of Antennas	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Correlated Signals	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Limit (dBm)	20.6	20.5	20.2	20.1	19.8	20.0	26.0	26.2	26.2

802.11n/ac 40 MHz								
Frequency (MHz)	5190	5270	5310	5510	5630	5710	5755	5795
Direction Gain of Antenna*	9.6	9.5	9.8	10.2	10.2	10.2	10.0	9.8
Exceeds 6 dBi?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exceeds 6 dBi by	3.6	3.5	3.8	4.2	4.2	4.2	4.0	3.8
Spec limit (dBm/MHz)	24.0	24.0	24.0	24.0	24.0	24.0	30.0	30.0
Number Of Antennas	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Correlated Signals	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Limit (dBm)	20.4	20.5	20.2	19.8	19.8	19.8	26.0	26.2

802.11ac 80 MHz						
Frequency (MHz)	5210	5290	5530	5610	5690	5775
Direction Gain of Antenna*	9.6	9.8	10.3	10.2	10.3	10.0
Exceeds 6 dBi?	Yes	Yes	Yes	Yes	Yes	Yes
Exceeds 6 dBi by	3.6	3.8	4.3	4.2	4.3	4.0
Spec limit (dBm/MHz)	24.0	24.0	24.0	24.0	24.0	30.0
Number Of Antennas	4.0	4.0	4.0	4.0	4.0	4.0
Correlated Signals	Yes	Yes	Yes	Yes	Yes	Yes
Limit (dBm)	20.4	20.2	19.7	19.8	19.7	26.0

* Directional Gain of antenna Calculated as per KDB 662911 D01 Multiple Transmitter Output v02r01
 Directional gain = $10 \log [(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi

12.5 Test Results

Modulation: 802.11a							
Channel (MHz)	Power setting	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Power Chain 2 (dBm)	Power Chain 3 (dBm)	Total Power (dBm)	Total Power (mW)
5180	12	11.7	11.9	11.8	11.4	17.7	59.2
5260	12	11.2	11.1	11.5	11.2	17.3	53.4
5320	12	11.2	11.5	11.2	10.8	17.2	52.5
5500	12	11.2	11.1	11.5	11.2	17.3	53.4
5620	12	11.2	11.1	11.2	11.2	17.2	52.4
5720	12	11.2	11.5	11.2	10.8	17.2	52.5
5745	73	17.8	17.7	17.7	17.1	23.6	229.3
5785	73	18.3	18	17.8	17.2	23.9	243.4
5825	69	16.8	16.9	16.6	15.8	22.6	180.6

Modulation: 802.11n HT20							
Channel (MHz)	Power setting	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Power Chain 2 (dBm)	Power Chain 3 (dBm)	Total Power (dBm)	Total Power (mW)
5180	13	13.2	13.3	12.9	12.6	19.0	80.0
5260	13	12.5	12.8	13	13	18.9	76.7
5320	13	12.5	12.7	12.9	13	18.8	75.9
5500	13	12.2	12.3	12.3	12.3	18.3	67.5
5620	13	12	12	12.3	12.3	18.2	65.7
5720	13	12.2	12.2	12.4	12.3	18.3	67.6
5745	71	17.5	17.3	17.1	16.6	23.2	206.9
5785	73	18.3	18.1	17.9	17.4	24.0	248.8
5825	69	17.2	17	16.8	16	22.8	190.3

Modulation: 802.11n HT40							
Channel (MHz)	Power setting	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Power Chain 2 (dBm)	Power Chain 3 (dBm)	Total Power (dBm)	Total Power (mW)
5190	14	14.2	14.2	14.1	13.7	20.1	101.8
5270	14	14.2	14	13.8	13.8	20.0	99.4
5310	14	14.3	14.2	13.7	13.6	20.0	99.6
5510	14	13.7	13.9	13.5	13.3	19.6	91.8
5630	14	13.5	13.9	13.5	13.2	19.6	90.2
5710	14	13.5	13.8	13.5	13.1	19.5	89.2
5755	65	15.8	15.6	15.5	15.3	21.6	143.7
5795	74	18.1	17.9	17.9	17.5	23.9	244.1

Modulation: 802.11ac VHT20							
Channel (MHz)	Power setting	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Power Chain 2 (dBm)	Power Chain 3 (dBm)	Total Power (dBm)	Total Power (mW)
5180	13	12.8	13.1	12.9	12.5	18.9	76.8
5260	13	13.1	13.2	13.2	12.7	19.1	80.8
5320	13	13.1	13.2	13.1	12.8	19.1	80.8
5500	12	11.3	11.3	11.6	11.2	17.4	54.6
5620	12	11.5	11.5	11.6	11.4	17.5	56.5
5720	12	11.5	11.7	11.8	11.3	17.6	57.5
5745	74	17.8	17.9	17.7	17.4	23.7	235.8
5785	73	17.8	17.9	17.6	17.1	23.6	230.7
5825	69	16.7	16.9	16.8	16.1	22.7	184.4

Modulation: 802.11ac VHT40							
Channel (MHz)	Power setting	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Power Chain 2 (dBm)	Power Chain 3 (dBm)	Total Power (dBm)	Total Power (mW)
5190	14	14.3	14.4	14.3	13.9	20.2	105.9
5270	14	14.3	14.2	13.8	13.7	20.0	100.6
5310	14	14.2	14.2	13.8	13.7	20.0	100.0
5510	13	13	13.3	12.8	12.5	18.9	78.2
5630	13	12.9	13.1	12.8	12.5	18.9	76.8
5710	13	12.9	13.2	12.8	12.4	18.9	76.8
5755	65	16	15.9	15.7	15.6	21.8	152.2
5795	74	18.3	18.4	18.3	17.9	24.2	266.1

Modulation: 802.11ac VHT80							
Channel (MHz)	Power setting	Power Chain 0 (dBm)	Power Chain 1 (dBm)	Power Chain 2 (dBm)	Power Chain 3 (dBm)	Total Power (dBm)	Total Power (mW)
5210	14	14	13.9	13.7	13.7	19.8	96.6
5290	14	13.9	13.8	13.9	13.5	19.8	95.5
5530	14	13.7	13.8	13.6	13.3	19.6	91.7
5610	14	13.6	13.7	13.6	13.3	19.6	90.6
5690	14	13.6	13.9	13.6	13.3	19.6	91.7
5775	61	14.8	14.4	14.2	14.6	20.5	112.9

13 Power spectral density

13.1 Definition

The power spectral density is the total energy output per unit bandwidth from a pulse or sequence of pulses for which the transmit power is at its maximum level, divided by the total duration of the pulses.

13.2 Test Parameters

Test Location:	Element Hull
Test Chamber:	Wireless Lab 1
Test Standard and Clause:	ANSI C63.10-2013, Clause 12.5, KDB 789033 D02, KDB 662911 D01
EUT Channels / Frequencies Measured:	36, 38, 42, 52, 54, 58, 100, 102, 106, 122, 124, 126, 138, 142, 144, 149, 151, 155, 159, 165
EUT Channel Bandwidths:	20 MHz / 40 MHz / 80 MHz
Deviations From Standard:	None
Measurement BW:	1 MHz, 500 kHz
Spectrum Analyzer Video BW: (requirement at least 3x RBW)	10 MHz, 5 MHz
Measurement Detector:	RMS

Environmental Conditions (Normal Environment)

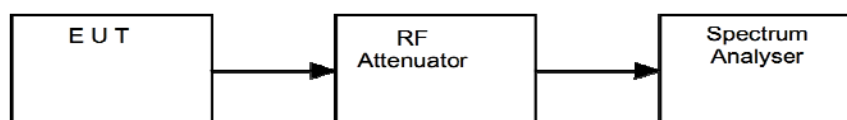
Temperature: 21 °C	+15 °C to +35 °C (as declared)
Humidity: 41%RH	20%RH to 75%RH (as declared)
Supply: 110 Vac	110 Vac +/-10% (as declared)

13.3 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure v, the peak emission of the EUT was measured on a spectrum analyser, with path losses taken into account. The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

Measurements were performed as per KDB KDB 662911 D01 Multiple Transmitter Output v02r012) In-Band Power Spectral Density (PSD) Measurements b) Measure and sum spectral maxima across the outputs.

Figure v Test Setup



13.4 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>
Spectrum Analyser	R&S	FSU26	U405	11/05/2015	12	11/05/2016

Test Limits

For client devices in the 5.15–5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

802.11a/n/ac 20 MHz									
Frequency (MHz)	5180	5260	5320	5500	5620	5720	5745	5785	5825
Direction Gain of Antenna*	9.4	9.5	9.8	9.9	10.2	10.0	10.0	9.8	9.8
Exceeds 6 dBi ?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exceeds 6 dBi by	3.4	3.5	3.8	3.9	4.2	4.0	4.0	3.8	3.8
Spec limit (dBm/MHz)	11.0	11.0	11.0	11.0	11.0	11.0	30.0	30.0	30.0
Number Of Antennas	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Correlated Signals	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Limit (dBm)	7.6	7.5	7.2	7.1	6.8	7.0	26.0	26.2	26.2

802.11n/ac 40 MHz								
Frequency (MHz)	5190	5270	5310	5510	5630	5710	5755	5795
Direction Gain of Antenna*	9.6	9.5	9.8	10.2	10.2	10.2	10.0	9.8
Exceeds 6 dBi ?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exceeds 6 dBi by	3.6	3.5	3.8	4.2	4.2	4.2	4.0	3.8
Spec limit (dBm/MHz)	11.0	11.0	11.0	11.0	11.0	11.0	30.0	30.0
Number Of Antennas	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Correlated Signals	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Limit (dBm)	7.4	7.5	7.2	6.8	6.8	6.8	26.0	26.2

802.11ac 80 MHz						
Frequency (MHz)	5210	5290	5530	5610	5690	5775
Direction Gain of Antenna*	9.6	9.8	10.3	10.2	10.3	10.0
Exceeds 6 dBi ?	Yes	Yes	Yes	Yes	Yes	Yes
Exceeds 6 dBi by	3.6	3.8	4.3	4.2	4.3	4.0
Spec limit (dBm/MHz)	11.0	11.0	11.0	11.0	11.0	30.0
Number Of Antennas	4.0	4.0	4.0	4.0	4.0	4.0
Correlated Signals	Yes	Yes	Yes	Yes	Yes	Yes
Limit (dBm)	7.4	7.2	6.7	6.8	6.7	26.0

* Directional Gain of antenna Calculated as per KDB 662911 D01 Multiple Transmitter Output v02r01
 Directional gain = $10 \log [(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi

13.5 Test Results

Modulation: 802.11a						
Channel (MHz)	Power setting	PSD Chain 0 (dBm)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	PSD Chain 3 (dBm)	Total PSD (dBm)
5180	12	0.70	0.77	0.62	0.41	6.65
5260	12	1.09	0.53	1.07	0.93	6.93
5320	12	0.62	0.13	0.69	0.49	6.51
5500	12	0.41	0.19	0.52	0.37	6.39
5620	12	0.13	-0.03	0.51	0.29	6.25
5720	12	0.23	0.12	0.70	0.41	6.39
5745	73	3.86	4.08	3.64	3.06	9.70
5785	73	3.63	3.73	3.55	3.10	9.53
5825	69	2.93	2.83	2.95	2.59	8.85

Modulation: 802.11n HT20						
Channel (MHz)	Power setting	PSD Chain 0 (dBm)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	PSD Chain 3 (dBm)	Total PSD (dBm)
5180	13	1.23	1.32	1.11	0.85	7.15
5260	13	1.42	0.91	1.39	1.33	7.29
5320	13	1.31	0.76	1.4	1.16	7.18
5500	13	0.92	0.75	0.94	0.83	6.88
5620	13	0.23	0.33	0.8	0.84	6.58
5720	13	0.51	0.5	1.13	0.84	6.77
5745	71	3.58	3.79	3.33	2.79	9.41
5785	73	3.94	3.58	3.89	3.5	9.75
5825	69	3.01	2.85	2.81	2.48	8.81

Modulation: 802.11n HT40						
Channel (MHz)	Power setting	PSD Chain 0 (dBm)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	PSD Chain 3 (dBm)	Total PSD (dBm)
5190	14	0.19	0.26	0.00	-0.44	6.03
5270	14	0.13	0.04	-0.25	-0.37	5.91
5310	14	-0.15	-0.15	-0.22	-0.69	5.72
5510	14	-0.37	-0.46	-0.58	-0.83	5.46
5630	14	-0.75	-0.46	-0.91	-1.37	5.16
5710	14	-0.66	-0.31	-0.92	-1.50	5.19
5755	65	-0.71	-1.03	-0.96	-1.19	5.05
5795	74	2.00	1.92	1.61	1.76	7.85

Modulation: 802.11ac VHT20						
Channel (MHz)	Power setting	PSD Chain 0 (dBm)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	PSD Chain 3 (dBm)	Total PSD (dBm)
5180	13	0.67	1.33	0.94	0.63	6.92
5260	13	1.12	0.62	1.12	0.87	6.96
5320	13	0.94	0.70	1.64	1.15	7.14
5500	12	0.48	0.15	0.25	0.31	6.32
5620	12	-0.08	-0.15	0.36	-0.16	6.02
5720	12	0.27	-0.24	0.41	-0.45	6.03
5745	74	3.75	3.43	3.34	3.21	9.46
5785	73	3.65	3.96	3.61	3.78	9.77
5825	69	2.96	2.90	2.49	2.85	8.82

Modulation: 802.11ac VHT40						
Channel (MHz)	Power setting	PSD Chain 0 (dBm)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	PSD Chain 3 (dBm)	Total PSD (dBm)
5190	14	0.45	0.45	0.26	-0.24	6.26
5270	14	0.44	0.18	-0.07	-0.45	6.06
5310	14	0.07	0.21	-0.26	-0.69	5.87
5510	13	-1.36	-1.12	-1.54	-1.71	4.59
5630	13	-1.39	-1.35	-1.97	-2.13	4.32
5710	13	-1.69	-1.46	-2.03	-2.24	4.18
5755	65	-0.24	-1.03	-1.17	-1.32	5.10
5795	74	1.83	1.76	1.81	1.98	7.87

Modulation: 802.11ac VHT80						
Channel (MHz)	Power setting	PSD Chain 0 (dBm)	PSD Chain 1 (dBm)	PSD Chain 2 (dBm)	PSD Chain 3 (dBm)	Total PSD (dBm)
5210	14	-1.52	-1.40	-1.69	-1.83	4.41
5290	14	-2.58	-2.99	-3.02	-3.00	3.13
5530	14	-2.70	-3.04	-3.49	-3.28	2.90
5610	14	-3.21	-3.09	-3.52	-3.65	2.66
5690	14	-3.29	-3.12	-3.34	-3.96	2.60
5775	61	-4.10	3.97	-4.39	-4.77	5.54

14 Radiated emissions

14.1 Definitions

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.

14.2 Test Parameters

Test Location:	Element Hull
Test Chamber:	REF886
Test Standard and Clause:	ANSI C63.10-2013, Clause 6.5 and 6.6, Clause 12.7.3
EUT Channels / Frequencies Measured:	36, 38, 42, 52, 54, 58, 100, 102, 106, 122, 124, 126, 138, 142, 144, 149, 151, 155, 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:	23 °C	+15 °C to +35 °C (as declared)
Humidity:	42 %RH	20%RH to 75%RH (as declared)
Supply:	110 Vac	110Vac +/-10% (as declared)

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 (dB μ V/m@ 3m)
5.15–5.35 GHz	-27 dBm/MHz	68.2 dB μ V/m
5.47–5.725 GHz	-27 dBm/MHz	68.2 dB μ V/m
5.725–5.825 GHz	-17 dBm/MHz	78.2 dB μ V/m
	-27 dBm/MHz	68.2 dB μ V/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 (μ V/m at 3m)
30-88	100
88-216	150
216-960	200
Above 960	500

14.3 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 dB μ V/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 dB μ V;

CL is the cable loss in dB;

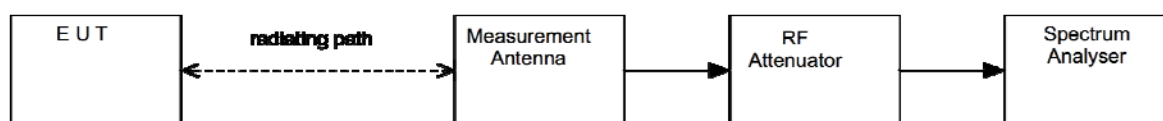
AF is the test antenna factor in dB/m;

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**Beam forming**

For 802.11ac mode, the beamforming procedure of C63.10 Section 13 was performed to establish the worst case beam orientation. The combination $(\theta, \Phi) = (0^\circ, 30^\circ)$ was determined as the worst case, and all bandedge and spurious emission testing was performed using this combination.

14.4 Test Equipment

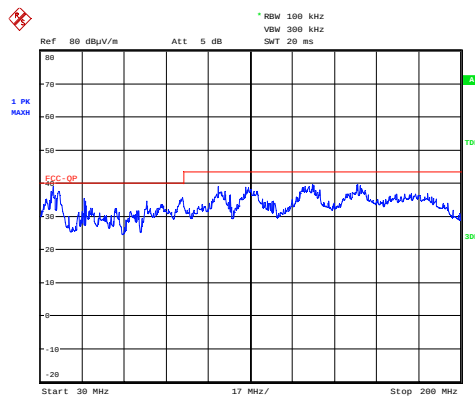
<i>Equipment Description</i>	<i>Manufacturer</i>	<i>Equipment Type</i>	<i>Element No</i>	<i>Last Cal Calibration</i>	<i>Calibration Period</i>	<i>Due For Calibration</i>
Ferrite Lined Chamber	Rainford	ATS	REF886	21/07/2014	24	21/07/2016
Biconical Antenna	EMCO	3109	RFG095	09/05/2013	36	09/05/2016
Log Periodic Antenna	EMCO	3146	RFG191	09/05/2013	36	09/05/2016
Horn Antenna	EMCO	3115	RFG129	09/02/2016	24	09/02/2018
Horn Antenna	Q-Par	0	RFG629	30/09/2015	24	30/09/2017
Horn Antenna	Flan	0	REF821	Note1		
Pre-Amp (9kHz – 1GHz)	Sonoma	310	REF927	01/07/2014	24	01/07/2016
Pre-Amp (1 – 26.5GHz)	Agilent	8449B	REF913	02/02/2016	24	02/02/2018
EMI Test Receiver	R&S	ESVS20	RFG126	17/04/2015	12	17/04/2016
Spectrum Analyser	R&S	FSU46	REF910	28/05/2015	12	28/05/2016
Band Stop Filter (5.15 - 5.35 GHz)	BSC	SN4832	REF841	Cal before use		
Band Stop Filter (5.47 - 5.725 GHz)	BSC	SN 4833	REF842	Cal before use		
Band Stop Filter (5.725 - 5.85 GHz)	BSC	SN 4834	REF843	Cal before use		

Note1: ANSI C63.10 - 4.4.3 a) Antenna calibration

Standard gain horns need not be periodically recalibrated, unless damage or deterioration is suspected or known to have occurred. If a standard gain horn is not periodically recalibrated, then its critical dimensions (see IEEE Std 1309-2005) shall be verified and documented on an annual basis.

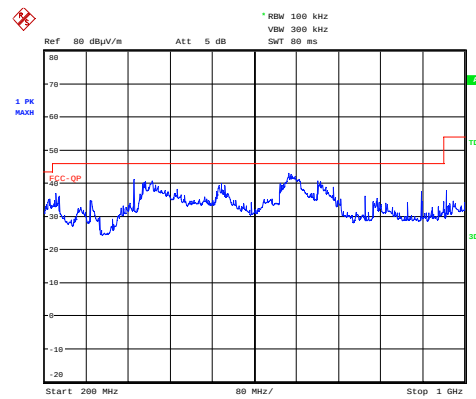
14.5 Test Results

Modulation: 802.11a – 5180 MHz									
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
PK	5755.6	53.7	9.7	34.1	34.5	-9.5	53.5	473.2	2582.3
PK	6906.7	52.6	10.9	35.8	34.7	-9.5	55.1	568.9	2582.3



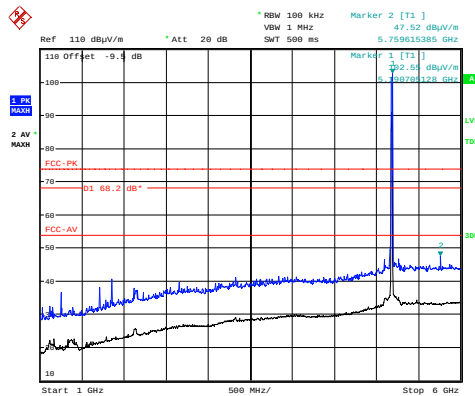
Date: 11.MAY.2016 08:42:32

30 MHz – 200 MHz



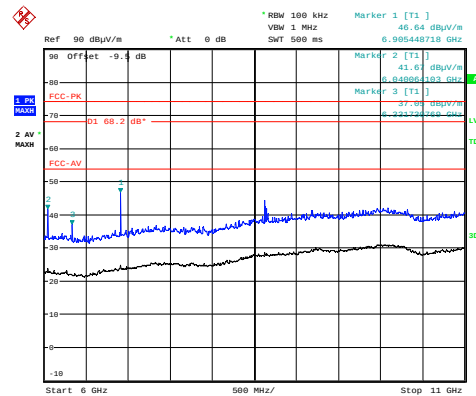
Date: 10.MAY.2016 13:56:17

200 MHz – 1 GHz



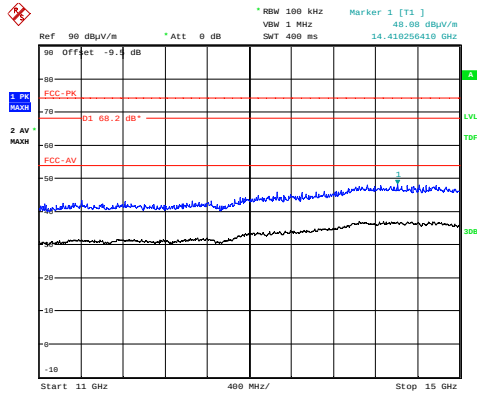
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1 GHz – 6 GHz



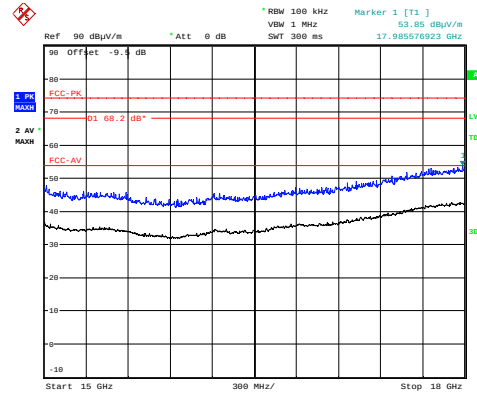
Date: 1.MAY.2016 17:18:33

6 GHz – 11 GHz



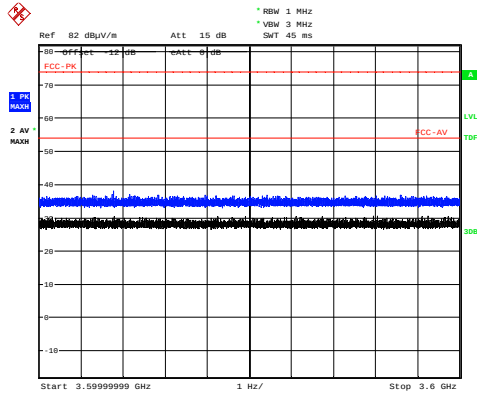
Date: 1.MAY.2016 17:13:31

11 GHz – 15 GHz



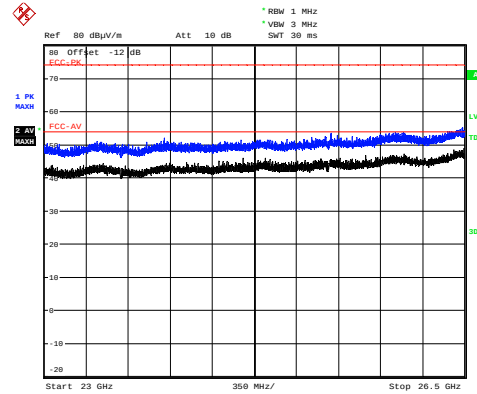
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15 GHz – 18 GHz



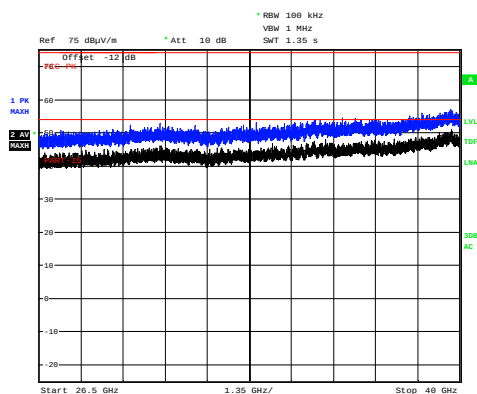
Date: 9.MAY.2016 11:52:51

18 GHz – 23 GHz



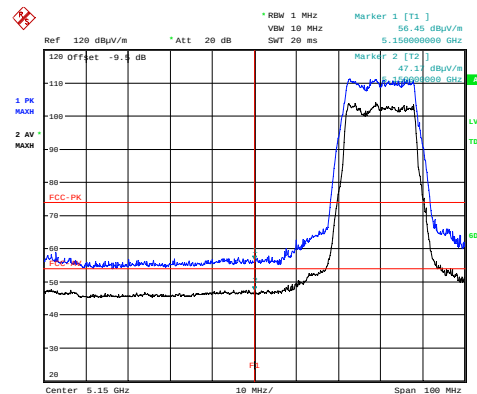
Date: 9.MAY.2016 12:37:51

23 GHz – 26.5 GHz



Date: 26.MAY.2003 09:47:14

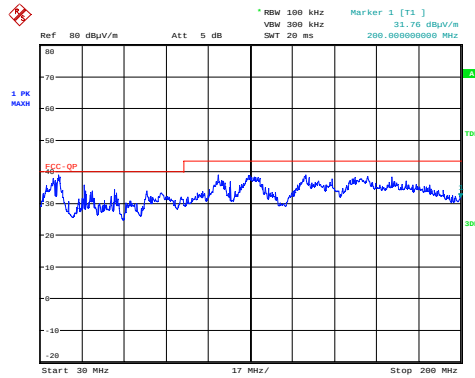
26.5 GHz – 40 GHz



Date: 29.APR.2016 11:10:19

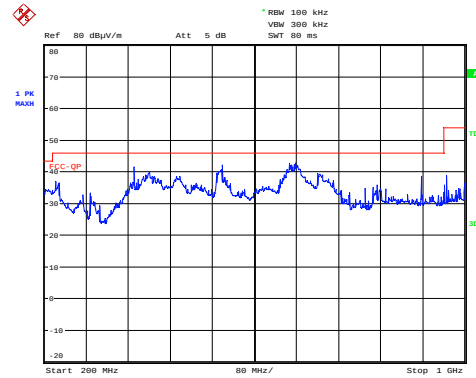
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Modulation: 802.11a – 5260 MHz									
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
PK	5844.4	52.3	9.8	34.1	34.5	-9.5	52.2	407.4	2582.3
PK	7013.4	52.9	11.1	36.0	34.7	-9.5	55.7	609.5	2582.3



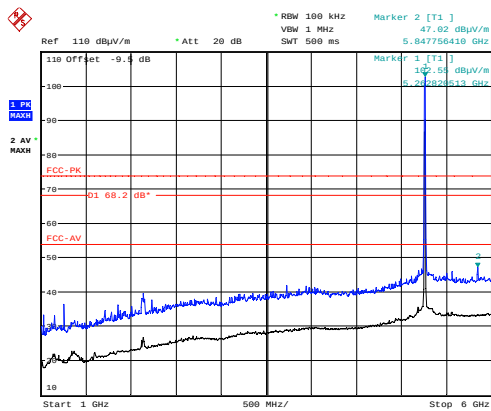
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30 MHz – 200 MHz



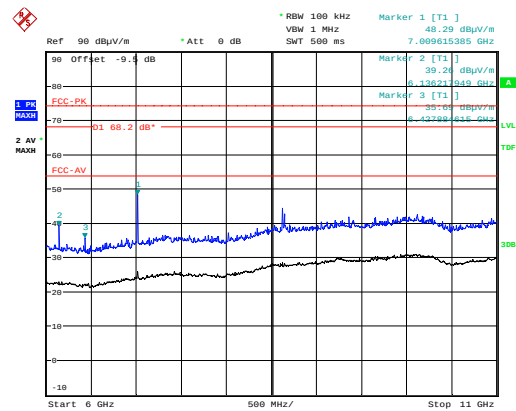
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200 MHz – 1 GHz



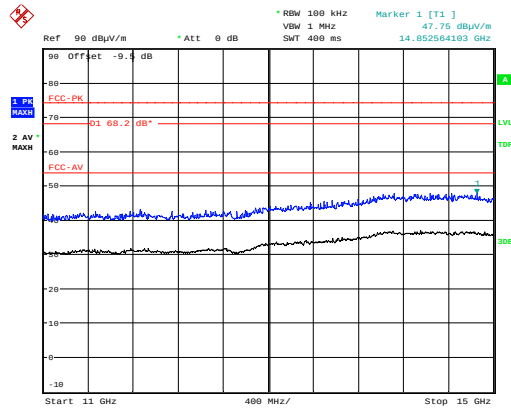
Date: 1.MAY.2016 13:58:17

1 GHz – 6 GHz



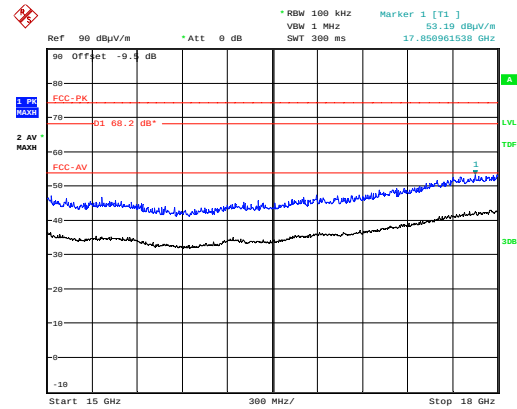
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6 GHz – 11 GHz



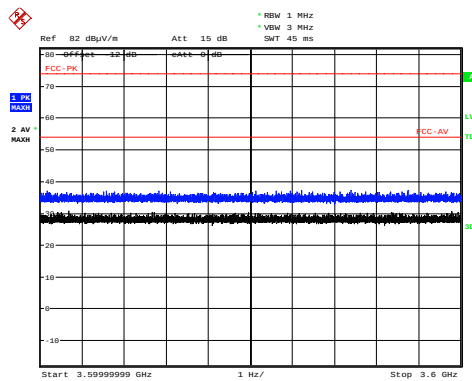
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11 GHz – 15 GHz



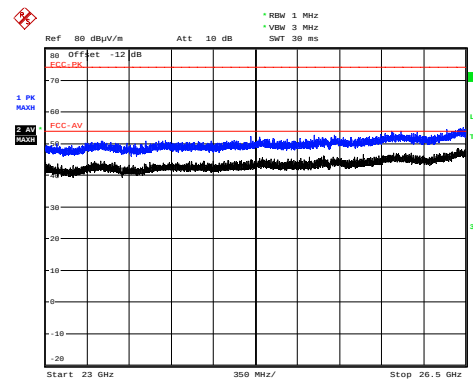
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15 GHz – 18 GHz



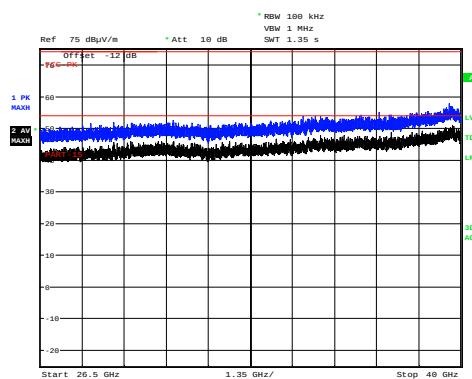
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18 GHz – 23 GHz



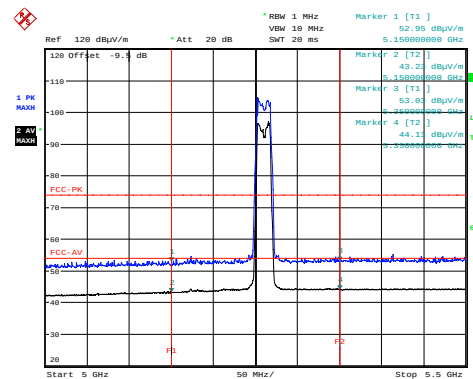
Date: 9.MAY.2016 12:35:20

23 GHz – 26.5 GHz



Date: 26.MAY.2003 09:51:01

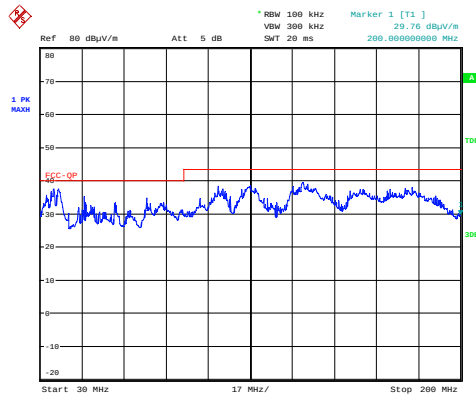
26.5 GHz – 40 GHz



Date: 16.APR.2016 17:10:38

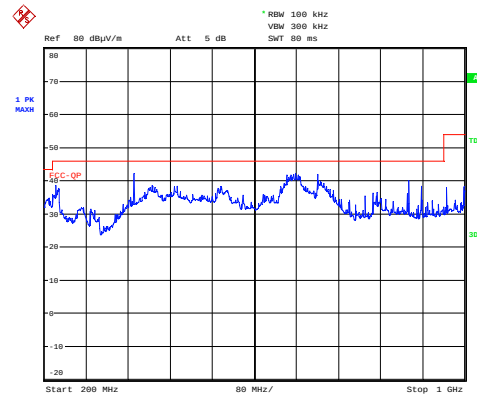
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Modulation: 802.11a – 5320 MHz									
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
PK	5911.2	53.2	9.8	34.2	34.5	-9.5	53.1	451.9	2582.3
PK	7093.3	52.5	11.0	36.1	34.8	-9.5	55.3	582.1	2582.3



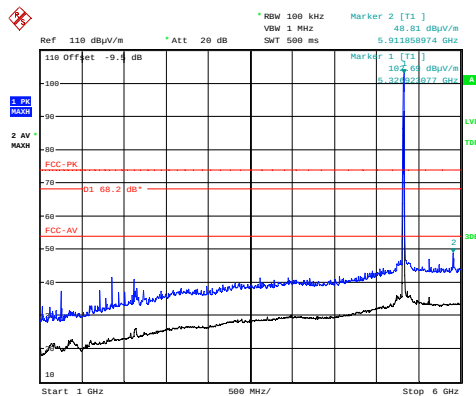
Date: 11.MAY.2016 08:50:13

30 MHz – 200 MHz



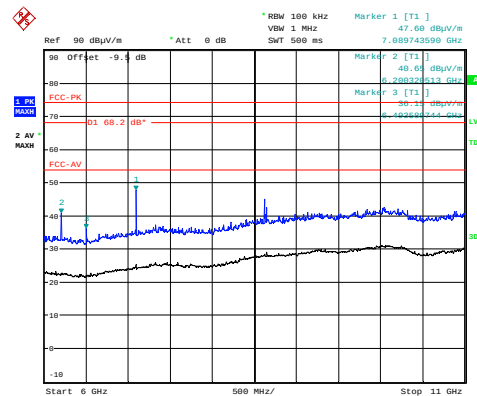
Date: 10.MAY.2016 14:02:31

200 MHz – 1 GHz



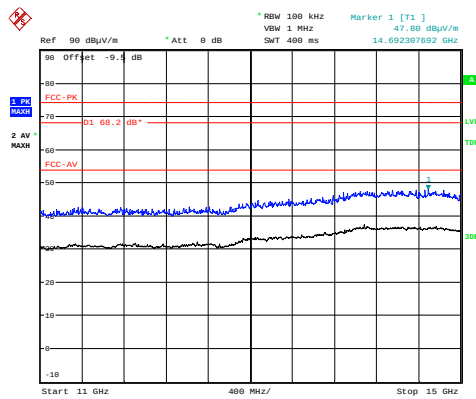
Date: 1.MAY.2016 14:00:02

1 GHz – 6 GHz



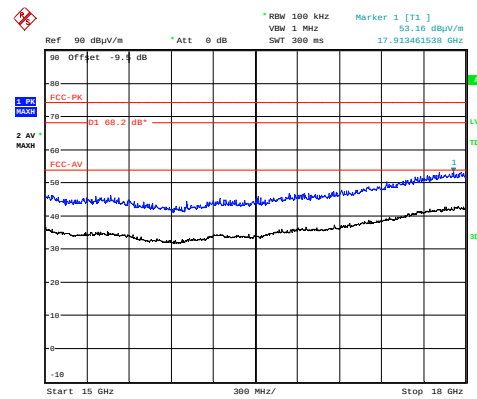
Date: 1.MAY.2016 17:25:02

6 GHz – 11 GHz



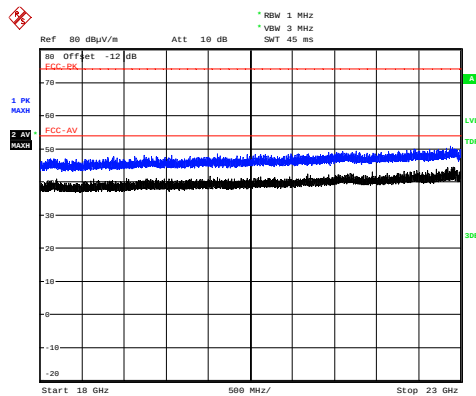
Date: 1.MAY.2016 17:09:11

11 GHz – 15 GHz



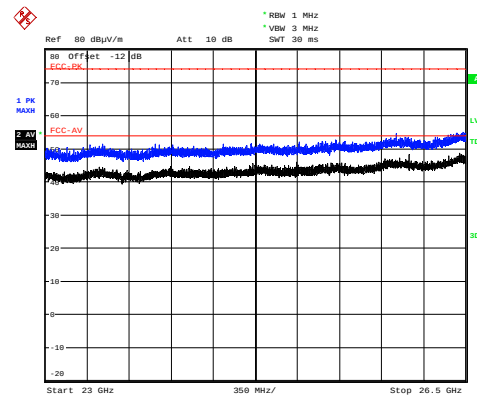
Date: 1.MAY.2016 16:33:51

15 GHz – 18 GHz



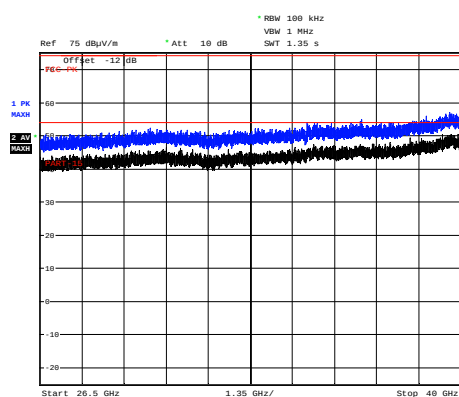
Date: 9.MAY.2016 12:01:28

18 GHz – 23 GHz



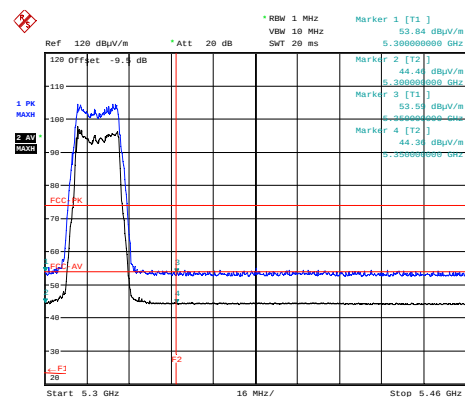
Date: 9.MAY.2016 12:33:28

23 GHz – 26.5 GHz



Date: 26.MAY.2003 09:54:36

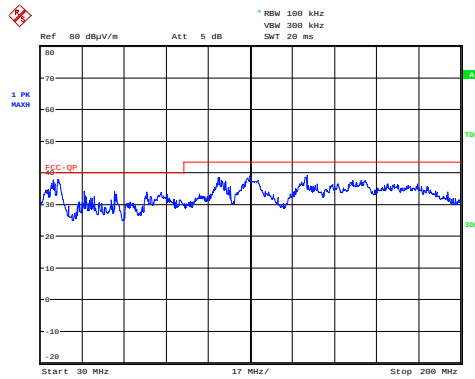
26.5 GHz – 40 GHz



Date: 16.APR.2016 17:21:44

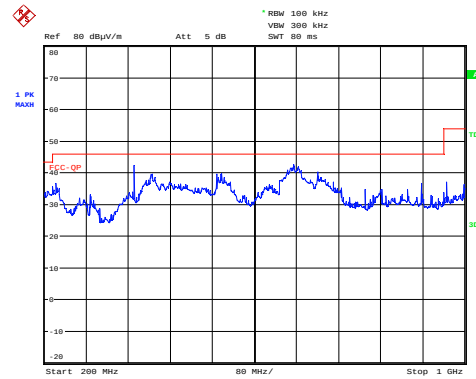
Bandedge

Modulation: 802.11a – 5500 MHz									
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
PK	6187.5	50.1	10.2	34.8	34.5	-9.5	51.1	358.9	2582.3
PK	7333.5	50.5	11.3	37.0	34.8	-9.5	54.5	530.9	5000.0
AV	7333.5	46.6	11.3	37.0	34.8	-9.5	50.6	338.8	500.0



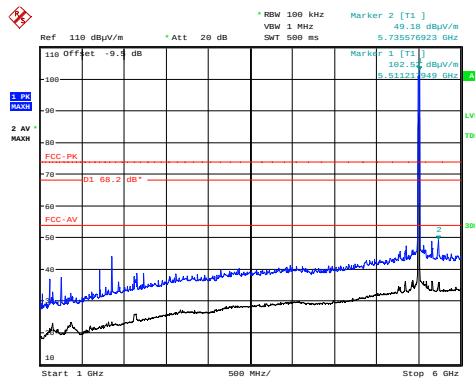
Date: 11.MAY.2016 08:52:20

30 MHz – 200 MHz



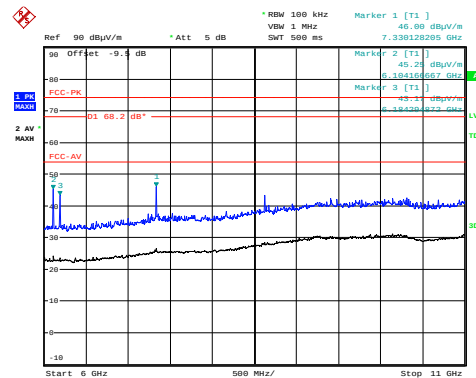
Date: 10.MAY.2016 14:14:33

200 MHz – 1 GHz



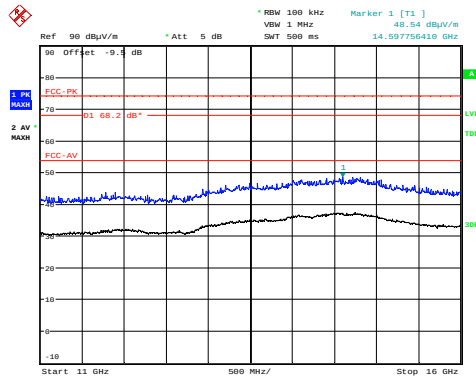
Date: 1.MAY.2016 14:02:05

1 GHz – 6 GHz



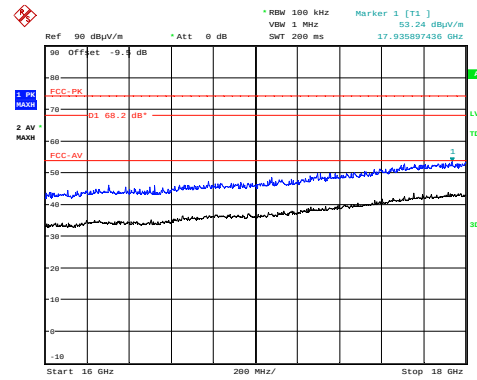
Date: 1.MAY.2016 15:04:09

6 GHz – 11 GHz



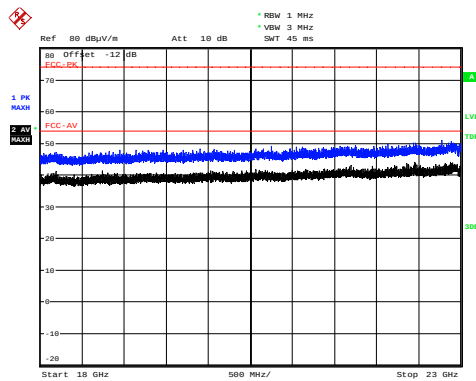
Date: 1.MAY.2016 15:21:20

11 GHz – 16 GHz



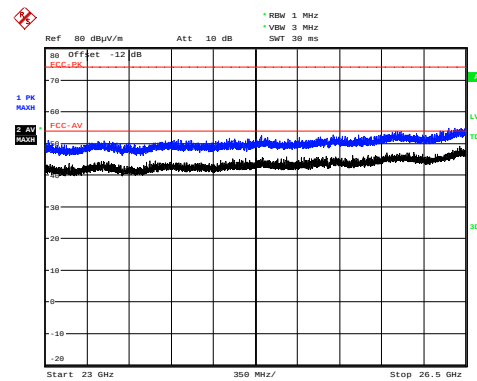
Date: 1.MAY.2016 16:28:57

16 GHz – 18 GHz



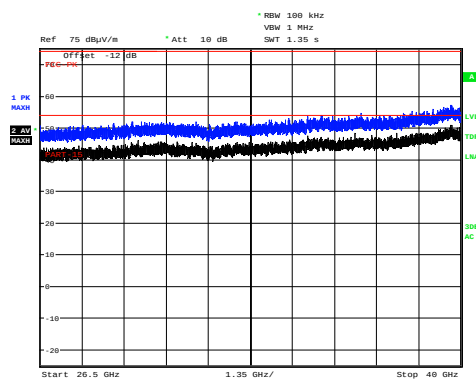
Date: 9.MAY.2016 12:06:53

18 GHz – 23 GHz



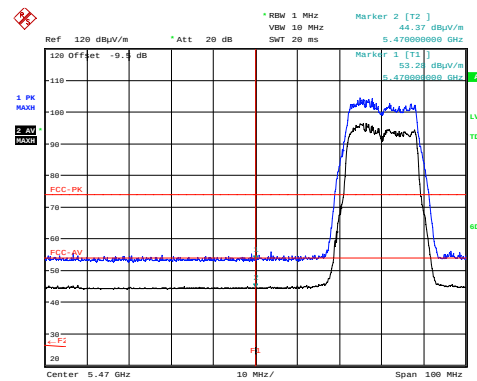
Date: 9.MAY.2016 12:31:39

23 GHz – 26.5 GHz



Date: 26.MAY.2003 09:58:43

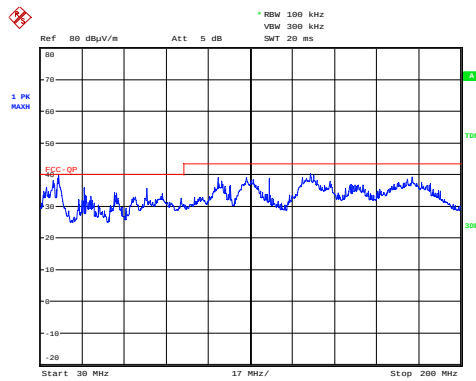
26.5 GHz – 40 GHz



Date: 16.APR.2016 17:31:36

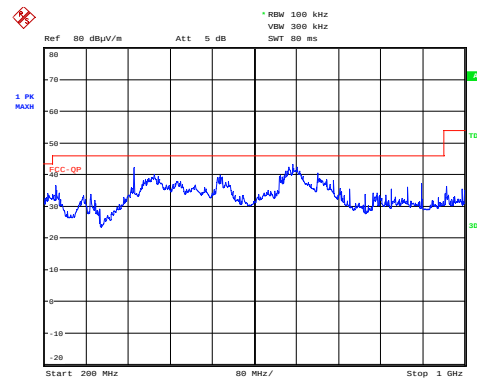
Bandedge

Modulation: 802.11a – 5620 MHz									
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
PK	5856.3	53.2	9.6	34.1	34.5	-9.5	52.9	441.6	2582.3
PK	6085.9	49.0	10.2	34.7	34.5	-9.5	49.8	309.0	2582.3
PK	7493.4	51.3	11.5	37.0	34.9	-9.5	55.4	588.8	5000.0
AV	7493.4	47.7	11.5	37.0	34.9	-9.5	51.9	393.6	500.0



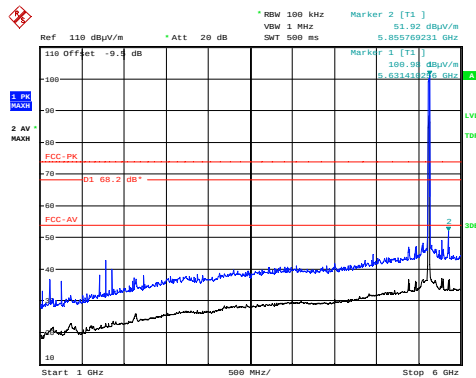
Date: 11.MAY.2016 08:54:19

30 MHz – 200 MHz



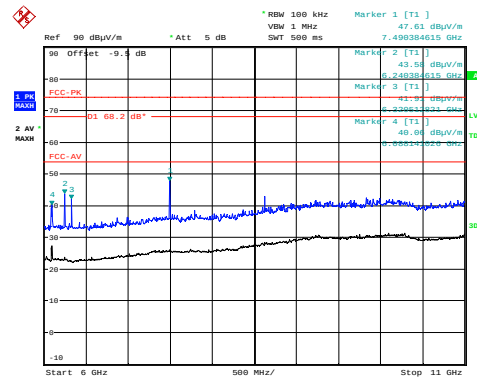
Date: 10.MAY.2016 14:17:09

200 MHz – 1 GHz



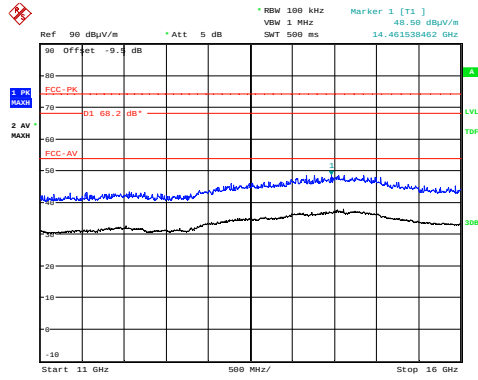
Date: 1.MAY.2016 14:03:43

1 GHz – 6 GHz



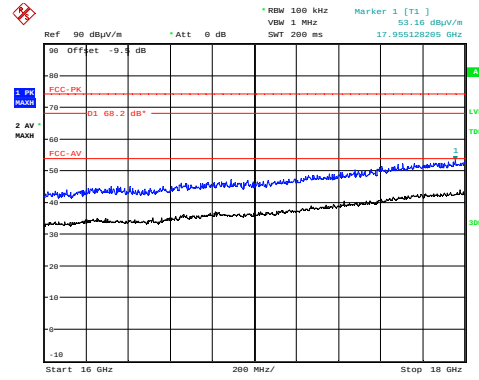
Date: 1.MAY.2016 14:59:52

6 GHz – 11 GHz



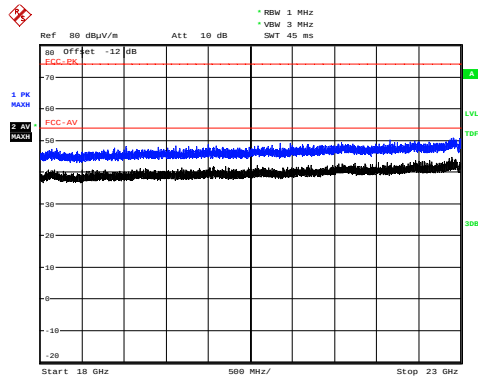
Date: 1.MAY.2016 15:23:00

11 GHz – 16 GHz



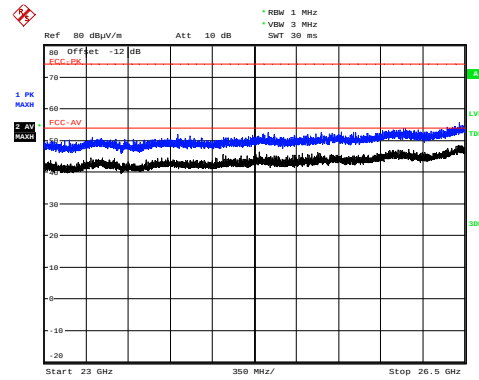
Date: 1.MAY.2016 16:18:17

16 GHz – 18 GHz



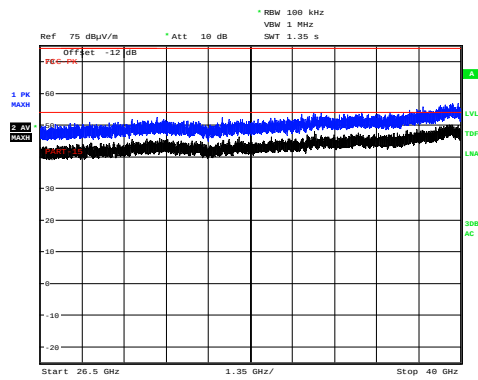
Date: 9.MAY.2016 12:09:04

18 GHz – 23 GHz



Date: 9.MAY.2016 12:29:38

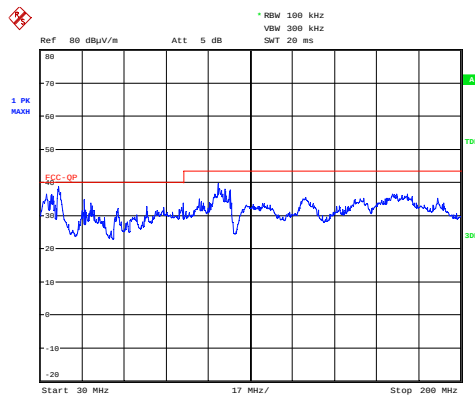
23 GHz – 26.5 GHz



Date: 26.MAY.2003 10:01:31

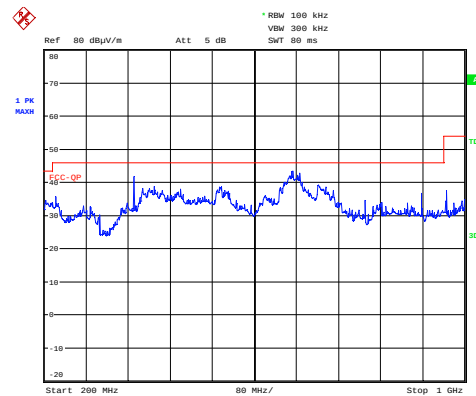
26.5 GHz – 40 GHz

Modulation: 802.11a – 5720 MHz									
Detector	Freq. (MHz)	Meas'd Emission (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Pre-amp Gain (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBμV/m)	Field Strength (μV/m)	Limit (μV/m)
PK	5875.4	54.6	9.6	34.1	34.5	-9.5	54.3	518.8	2582.3
PK	5964.6	54.3	9.9	34.4	34.5	-9.5	54.6	537.0	2582.3
PK	7626.8	50.8	11.7	36.9	34.9	-9.5	55.0	562.3	5000.0
AV	7626.8	47.3	11.7	36.9	34.9	-9.5	51.5	375.8	500.0



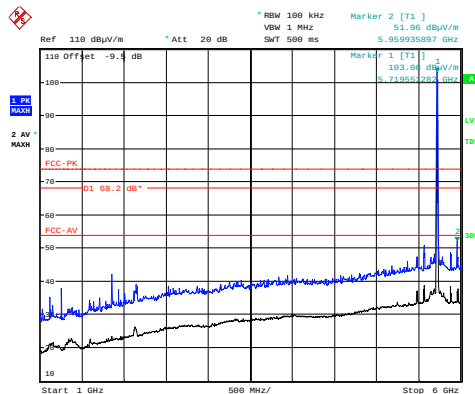
Date: 11.MAY.2016 09:19:49

30 MHz – 200 MHz



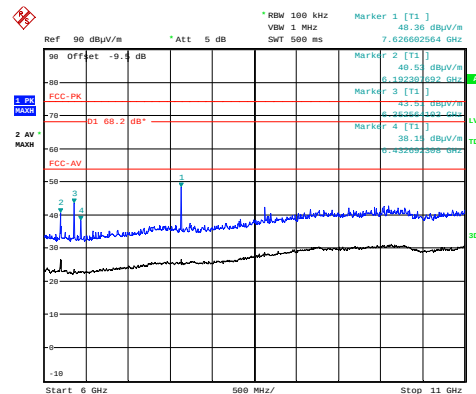
Date: 10.MAY.2016 14:19:32

200 MHz – 1 GHz



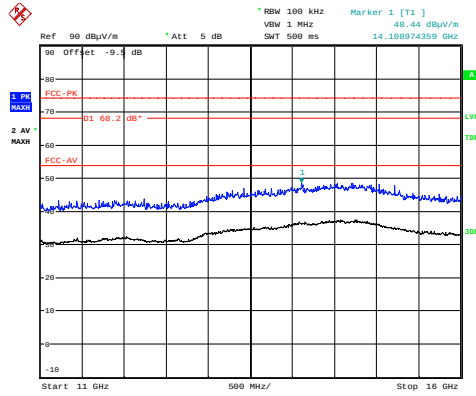
Date: 1.MAY.2016 14:05:31

1 GHz – 6 GHz



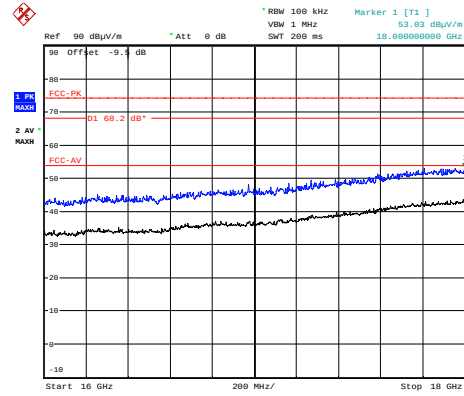
Date: 1.MAY.2016 14:57:42

6 GHz – 11 GHz



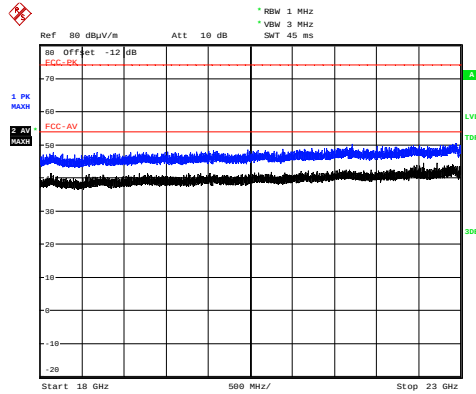
Date: 1.MAY.2016 15:24:38

11 GHz – 15 GHz



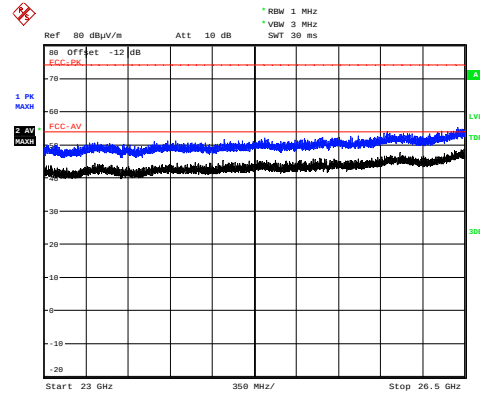
Date: 1.MAY.2016 16:16:56

15 GHz – 18 GHz



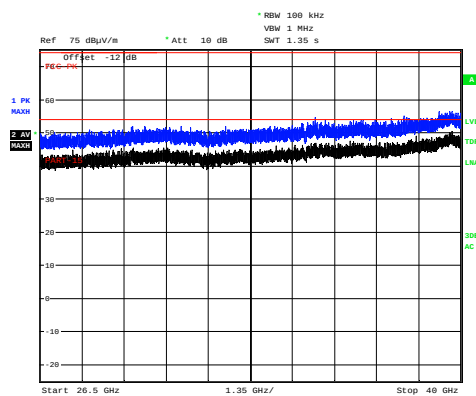
Date: 9.MAY.2016 12:11:19

18 GHz – 23 GHz



Date: 9.MAY.2016 12:27:41

23 GHz – 26.5 GHz



Date: 26.MAY.2003 10:03:36

26.5 GHz – 40 GHz