

InterLab®

FCC Measurement/Technical Report on

WLAN transceiver
Wireless remote control
SKYCONTROLLER

FCC ID: RKXSKYCONTROLLER
IC: 5119A-SKYCONTROLLER

Report Reference: MDE_PARRO_1423_FCCb_rev3

Test Laboratory:

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40880 Ratingen
Germany



Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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0 Applied Standards and Test Summary

0.1 Applied Standards

Type of Authorization

Certification for an Intentional Radiator (Digital Device / Spread Spectrum).

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 (10-1-13 Edition) and 15 (10-1-13 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.201 Equipment authorization requirement

§ 15.207 Conducted limits

§ 15.209 Radiated emission limits; general requirements

Part 15, Subpart E – Unlicensed National Information Infrastructure Devices

§ 15.403 Definitions

§ 15.407 General technical requirements

Note:

The tests were selected and performed with reference to the FCC Public Notice "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, 789033 D02 General UNII Test Procedures New Rules v01, 2014-6-06"

Instead of applying ANSI C63.4–1992 which is referenced in the FCC Public Note, the newer ANSI C63.4–2009 is applied.

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 0.3 Measurement Summary / Signatures.

0.2 FCC-IC Correlation Table

Correlation of measurement requirements for UNII / LE-LAN (e.g. WLAN 5 GHz) equipment

UNII equipment ^{*)}

Measurement	FCC reference	IC reference
Conducted emissions on AC Mains	§ 15.207	RSS-Gen Issue 4: 8.8
Occupied bandwidth	§ 15.403 (i) (26 dB) / § 15.407 (e) (6 dB)	RSS-210 Issue 8: A9.2, 9.4 (99%)
Maximum conducted output power	§ 15.407 (a) (1),(2),(3),(4)	RSS-210 Issue 8: A9.2, 9.4
Maximum power spectral density	§ 15.407 (a) (1),(2),(3),(5)	RSS-210 Issue 8: A9.2, 9.4
Transmitter undesirable emissions; General Field Strength Limits, Restricted Bands	15.407 (b) § 15.209 (a)	RSS-Gen Issue 4: 6.13/8.9/8.10; RSS-210 Issue 8: A9.2, 9.4
Frequency stability	§ 15.407 (g)	RSS-Gen Issue 4: 6.11/8.11
Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS)	§ 15.407 (h)	RSS-210 Issue 8: A9.2, 9.4
Antenna requirement	§ 15.203 / 15.204	RSS-Gen Issue 4: 8.3
Receiver spurious emissions	–	RSS-210 Issue 8: 2.3; RSS Gen Issue 4: 5/7 ^{*)}

^{*)} Receivers are exempted from certification besides if operating in stand-alone mode in the frequency range 30–960 MHz or if these are scanner receivers.

0.3 Measurement Summary / Signatures

FCC Part 15, Subpart C

§ 15.207

Conducted emissions (AC power line)

The measurement was performed according to ANSI C63.4

OP-Mode	Setup	Port	Final Result
–	–	AC Port (power line)	N/A ¹⁾

FCC Part 15, Subpart E

§ 15.403 (i), 15.407 (e)

26 / 6 dB Emission bandwidth / 99 % occupied bandwidth

The measurement was performed according to FCC § 15.31

OP-Mode	Setup	Port	Final Result
a-Mode, CH 36, 20 MHz	Setup_01	Temp.ant.connector	performed
a-Mode, CH 44, 20 MHz	Setup_01	Temp.ant.connector	performed
a-Mode, CH 48, 20 MHz	Setup_01	Temp.ant.connector	performed
a-Mode, CH 149, 20 MHz	Setup_01	Temp.ant.connector	passed
a-Mode, CH 157, 20 MHz	Setup_01	Temp.ant.connector	passed
a-Mode, CH 161, 20 MHz	Setup_01	Temp.ant.connector	passed
n-Mode, CH 36, 20 MHz	Setup_01	Temp.ant.connector	performed
n-Mode, CH 44, 20 MHz	Setup_01	Temp.ant.connector	performed
n-Mode, CH 48, 20 MHz	Setup_01	Temp.ant.connector	performed
n-Mode, CH 149, 20 MHz	Setup_01	Temp.ant.connector	passed
n-Mode, CH 157, 20 MHz	Setup_01	Temp.ant.connector	passed
n-Mode, CH 161, 20 MHz	Setup_01	Temp.ant.connector	passed
n-Mode, CH 38, 40 MHz	Setup_01	Temp.ant.connector	performed
n-Mode, CH 46, 40 MHz	Setup_01	Temp.ant.connector	performed
n-Mode, CH 151, 40 MHz	Setup_01	Temp.ant.connector	passed
n-Mode, CH 159, 40 MHz	Setup_01	Temp.ant.connector	passed

FCC Part 15, Subpart E

§ 15.407 (a) (1,2,3,4)

Maximum Conducted Output Power

The measurement was performed according to FCC § 15.31

OP-Mode	Setup	Port	Final Result	
			FCC	IC
a-Mode, CH 36, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 44, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 48, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 149, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 157, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 161, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 36, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 44, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 48, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 149, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 157, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 161, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 38, 40 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 46, 40 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 151, 40 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 159, 40 MHz	Setup_01	Temp.ant.connector	passed	passed

FCC Part 15, Subpart E

§ 15.407 (a)(1,2,3,5)

Maximum Power Spectral Density

The measurement was performed according to FCC § 15.31

OP-Mode	Setup	Port	Final Result	
			FCC	IC
a-Mode, CH 36, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 44, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 48, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 149, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 157, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
a-Mode, CH 161, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 36, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 44, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 48, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 149, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 157, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 161, 20 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 38, 40 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 46, 40 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 151, 40 MHz	Setup_01	Temp.ant.connector	passed	passed
n-Mode, CH 159, 40 MHz	Setup_01	Temp.ant.connector	passed	passed

FCC Part 15, Subpart E

§ 15.407 (g)

Frequency Stability

The measurement was performed according to FCC § 15.31

OP-Mode	Setup	Port	Final Result	
-	-	Temp.ant.connector	N/P	

FCC Part 15, Subpart C & E

§ 15.205, § 15.209

§ 15.407 (b)(5,6) (1,2,3,4,5,6)

Undesirable Emissions, General Field Strength Limits;

Restricted Bands and Radiated Emission Limits

The measurement was performed according to ANSI C63.4

OP-Mode	Setup	Port	Final Result	
			FCC	IC
a-Mode, CH 36, 20 MHz	Setup_02	Enclosure	passed	passed
a-Mode, CH 44, 20 MHz	Setup_02	Enclosure	passed	passed
a-Mode, CH 48, 20 MHz	Setup_02	Enclosure	passed	passed
a-Mode, CH 149, 20 MHz	Setup_02	Enclosure	passed	passed
a-Mode, CH 157, 20 MHz	Setup_02	Enclosure	passed	passed
a-Mode, CH 161, 20 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 36, 20 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 44, 20 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 48, 20 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 149, 20 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 157, 20 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 161, 20 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 38, 40 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 46, 40 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 151, 40 MHz	Setup_02	Enclosure	passed	passed
n-Mode, CH 159, 40 MHz	Setup_02	Enclosure	passed	passed

FCC Part 15, Subpart E

§ 15.407 (h)

Dynamic Frequency selection

The measurement was performed according to FCC § 15.31

Final Result

OP-Mode

Setup

Port

FCC

IC

–

–

–

N/A ²⁾

N/A ²⁾

N/A Not applicable:

1) the EUT is powered by Battery, the battery is loaded by external charger

2) the EUT operates only in bands where DFS is not required.

N/P Not performed

Performed: Test was performed but no verdict was assigned, for details please refer to sub-clause 3.1.2.

Responsible for
Accreditation Scope: _____

Responsible
for Test Report: _____

0.4 Revision History

Report version control			
Version	Release date	Change Description	Version validity
initial	2014-10-27	--	invalid
rev1	2014-11-26	Added description and for bandwidth measurement subband 3, modified the previously existing one, corrected values and added plot for WLAN 40 MHz bandwidth 26 dB bandwidth measurement, changed the plot for WLAN 20 MHz. Corrected used KDB references. Added worst case plot power spectral density subband 3	invalid
rev2	2014-12-03	product does not support channel 165: exchanged all results of channel 165 against channel 161 (new results); updated IC correlation table ch. 0.2 to new issue 4 of RSS-Gen; corrected range to 5825 MHz at "Specific product description for the EUT"; Undesirable Emissions results: correction of AV duty cycle correction factor was not correctly applied to all measured values, insertion of results below 1 GHz.	invalid
rev3	2014-12-04	related to the change of channel 165 to 161 the frequency values were not also changed, done now (5805 instead of 5825 MHz)	valid

1 Administrative Data

1.1 Testing Laboratory

Company Name: 7Layers AG
Address Borsigstr. 11
40880 Ratingen
Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716 .

The test facility is also accredited by the following accreditation organisation:
Laboratory accreditation no.: DAKKS D-PL-12140-01-01

Responsible for Accreditation Scope: Dipl.-Ing. Bernhard Retka
Dipl.-Ing. Robert Machulec
Dipl.-Ing. Thomas Hoell
Dipl.-Ing. Andreas Petz
Dipl.-Ing. Marco Kullik

Report Template Version: 2014-08-22

1.2 Project Data

Responsible for testing and report: Dipl.-Ing. Andreas Petz
Date of Test(s): 2014-08-22 to 2014-12-03
Date of Report: 2014-12-04

1.3 Applicant Data

Company Name: Parrot S.A.
Address: 174 quai de Jemmapes
75010 Paris
France
Contact Person: Mr. Yoann Bardet

1.4 Manufacturer Data

Company Name: Please see applicant data
Address:

Contact Person:

2 Test object Data

2.1 General EUT Description

Equipment under Test:	IEEE 802.11a/b/g/n WLAN transceiver
Type Designation:	Wireless remote control
Kind of Device:	SKYCONTROLLER
(optional)	
Voltage Type:	DC
Voltage Level:	12V
Tested Modulation Type:	OFDM:BPSK; OFDM:64-QAM

General product description:

The Parrot Skycontroller is a wireless remote control which significantly extends the Wifi range for your Bebop Drone. Equipped by an amplified Wi-Fi radio and 4 antennas, the Parrot Skycontroller is able to work at 2.4 GHz and 5 GHz. A smartphone or tablet can be fixed on a shelf that is compatible with the vast majority of the tablets available in the market. The pilot takes the helm of the drone via 2 joysticks. The pilot can view the video of the drone directly on his device or plug FPV glasses to get a real immersion experience.

Specific product description for the EUT:

The EUT contains two dual band WLAN (802.11 2.4 GHz b/g/n and 5 GHz a/n) modules with two antenna connectors each for WLAN. The "short range" module has one antenna for the 2.4 GHz band and one antenna for the 5 GHz band supporting only SISO, the "long range" module has two dual band antennas for the 2.4 and 5 GHz bands, supporting SISO and MIMO.

In IEEE 802.11n mode it supports 20 MHz and 40 MHz bandwidth channels (both with MCS7), providing 72.2 Mbit/s, and 150 Mbit/s transfer data rates respectively in SISO mode, twice that in MIMO for the "long range".

The object of this test report is the WLAN transceiver "short range", consequently switched on the IEEE 802.11 a/n modes. In IEEE 802.11n mode, it was tested with 20 MHz and 40 MHz channel bandwidth.

The WLAN (Wireless Local Area Network) transceiver is operating in the 5 GHz band in the range 5.15 – 5.25 GHz and 5.725 – 5.825 GHz.

The EUT provides the following ports:

Ports

Enclosure
HDMI port
USB port

The main components of the EUT are listed and described in chapter 2.2

2.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status
EUT A (Code: DE1018006aa01)	WLAN transceiver	SKYCONTROLL ER	PF725000D10 00017	DV1	Linux - adb
Remark: EUT A is equipped with a temporary antenna connector.					
EUT B (Code: DE1018006aa02)	WLAN transceiver	SKYCONTROLL ER	PI040322D14 G000112	DV1	Linux - adb
Remark: Module "short range" of EUT B is equipped with an integral antenna for the 5 GHz band with an antenna gain of 1.73 dBi.					

NOTE: The short description is used to simplify the identification of the EUT in this test report.

2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status
-	-	-	-	-	-

2.4 Auxiliary Equipment

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Auxiliary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status
-	-	-	-	-	-

2.5 EUT Setups

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

Setup	Combination of EUTs	Description and Rationale
Setup_01	EUT A	setup for conducted radio measurements
Setup_02	EUT B	setup for radiated measurements

2.6 Operating Modes

This chapter describes the operating modes of the EUTs used for testing.

2.6.1 Test Channels

20 MHz Test Channels:	UNII-Subband 1 5150 - 5250 MHz			UNII-Subband 3 5725 - 5850 MHz		
	Bottom	Middle	Top	Bottom	Middle	Top
	36	44	48	149	157	161
Frequency [MHz]	5180	5220	5240	5745	5785	5805

40 MHz Test Channels:	Bottom	Middle	Top	Bottom	Middle	Top
	38	-	46	151	-	159
	5190	-	5230	5755	-	5795
Frequency [MHz]	5190	-	5230	5755	-	5795

2.6.2 Datarates

SISO:

WLAN a-Mode; 20 MHz; 6 Mbit/s
WLAN n-Mode; 20 MHz; 6.5 Mbit/s
WLAN n-Mode; 40 MHz; 13.5 Mbit/s

2.7 Special software used for testing

The ADB android tool was used to set the testmode.

2.8 Product labelling

2.8.1 FCC ID label

Please refer to the documentation of the applicant.

2.8.2 Location of the label on the EUT

Please refer to the documentation of the applicant.

3 Test Results

3.1 26 / 6 dB Emission bandwidth / 99 % occupied bandwidth

Standard FCC Part 15, Subpart E

The test was performed according to: FCC §15.31

3.1.1 Test Description

The Equipment Under Test (EUT) was setup in a shielded room to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produce the worst-case (widest) emission bandwidth (26 / 6 dB and 99%).

The EUT was connected to spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- Resolution Bandwidth (RBW): approx. 1 % of emission bandwidth
- Video Bandwidth (VBW): > RBW
- Detector: Peak
- Trace: Maxhold
- Sweeps: ≥ 200
- Sweep time: at least coupled

Analyzer settings band 5.725-5.85:

- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz ≥ 3 times the RBW
- Detector: Peak
- Trace: Maxhold
- Sweeps: until trace stabilizes
- Sweep time: coupled

3.1.2 Test Requirements / Limits

FCC Part 15, Subpart E, §15.403 (i)

There exists no applicable limits for the U-NII subbands 1, 2A and 2C. The test was performed to determine the limits for the "Maximum Conducted Output Power" test case. Therefore no verdict was assigned.

FCC Part 15, Subpart E, §15.407 (e)

Within the 5.725-5.850 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

3.1.3 Test Protocol

Temperature: 22 – 25 °C
Air Pressure: 1010 – 1014 hPa
Humidity: 32 – 40 %

1) 26 dB bandwidth

WLAN a-Mode; 20 MHz; 6 Mbit/s			
UNII-Subband	Channel No.	Frequency [MHz]	26 dB Bandwidth [MHz]
1	36	5180	34.904
	44	5220	34.848
	48	5240	35.456
3	149	5745	36.411
	157	5785	36.122
	161	5805	34.327

WLAN n-Mode; 20 MHz; 6,5 Mbit/s			
UNII-Subband	Channel No.	Frequency [MHz]	26 dB Bandwidth [MHz]
1	36	5180	31.780
	44	5220	32.706
	48	5240	33.517
3	149	5745	34.558
	157	5785	34.269
	161	5805	33.864

WLAN n-Mode; 40 MHz; 13.5 Mbit/s			
1	38	5190	78.58
	46	5230	77.51
3	151	5755	86.4
	159	5795	66.94

2) 6 dB bandwidth

WLAN a-Mode; 20 MHz; 6 Mbit/s					
UNII-Subband	Channel No.	Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]	Margin [MHz]
3	149	5745	15.630	0.500	15.130
	157	5785	15.543	0.500	15.043
	161	5805	15.326	0.500	14.826

WLAN n-Mode; 20 MHz; 6,5 Mbit/s					
UNII-Subband	Channel No.	Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]	Margin [MHz]
3	149	5745	15.673	0.500	15.173
	157	5785	15.369	0.500	14.869
	161	5805	15.326	0.500	14.826

WLAN n-Mode; 40 MHz; 13.5 Mbit/s					
UNII-Subband	Channel No.	Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]	Margin [MHz]
3	151	5755	35.341	0.500	34.841
	159	5795	35.369	0.500	34.869

3) 99% bandwidth

WLAN a-Mode; 20 MHz; 6 Mbit/s			
UNII-Subband	Channel No.	Frequency [MHz]	99 % Bandwidth [MHz]
1	36	5180	20.188
	44	5220	20.984
	48	5240	20.984
3	149	5745	21.924
	157	5785	21.345
	161	5805	21.491

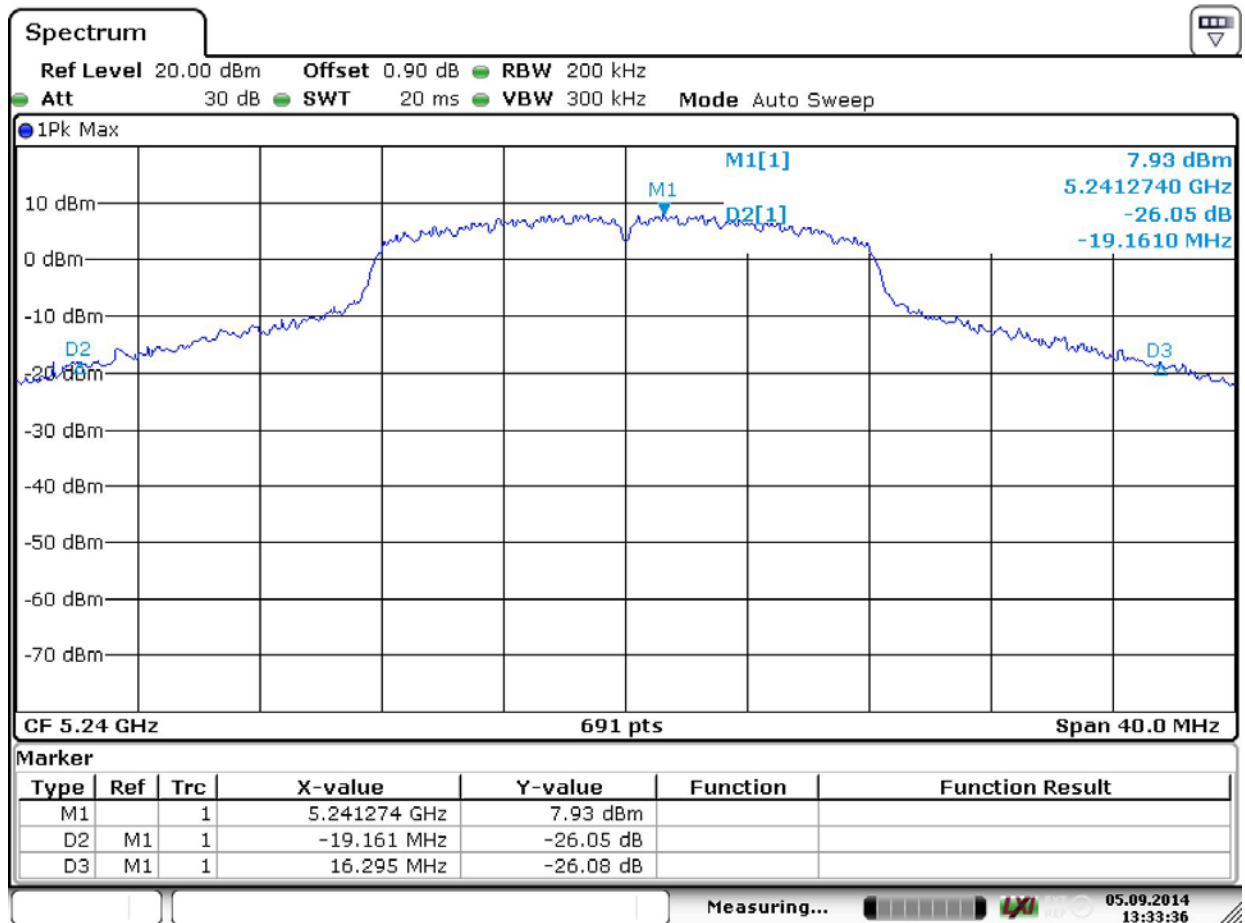
WLAN n-Mode; 20 MHz; 6,5 Mbit/s			
UNII-Subband	Channel No.	Frequency [MHz]	99 % Bandwidth [MHz]
1	36	5180	19.319
	44	5220	19.971
	48	5240	19.826
3	149	5745	20.549
	157	5785	20.188
	161	5805	19.826

WLAN n-Mode; 40 MHz; 13.5 Mbit/s			
1	38	5190	36.251
	46	5230	36.251
3	151	5755	36.324
	159	5795	36.324

NOTE: None.

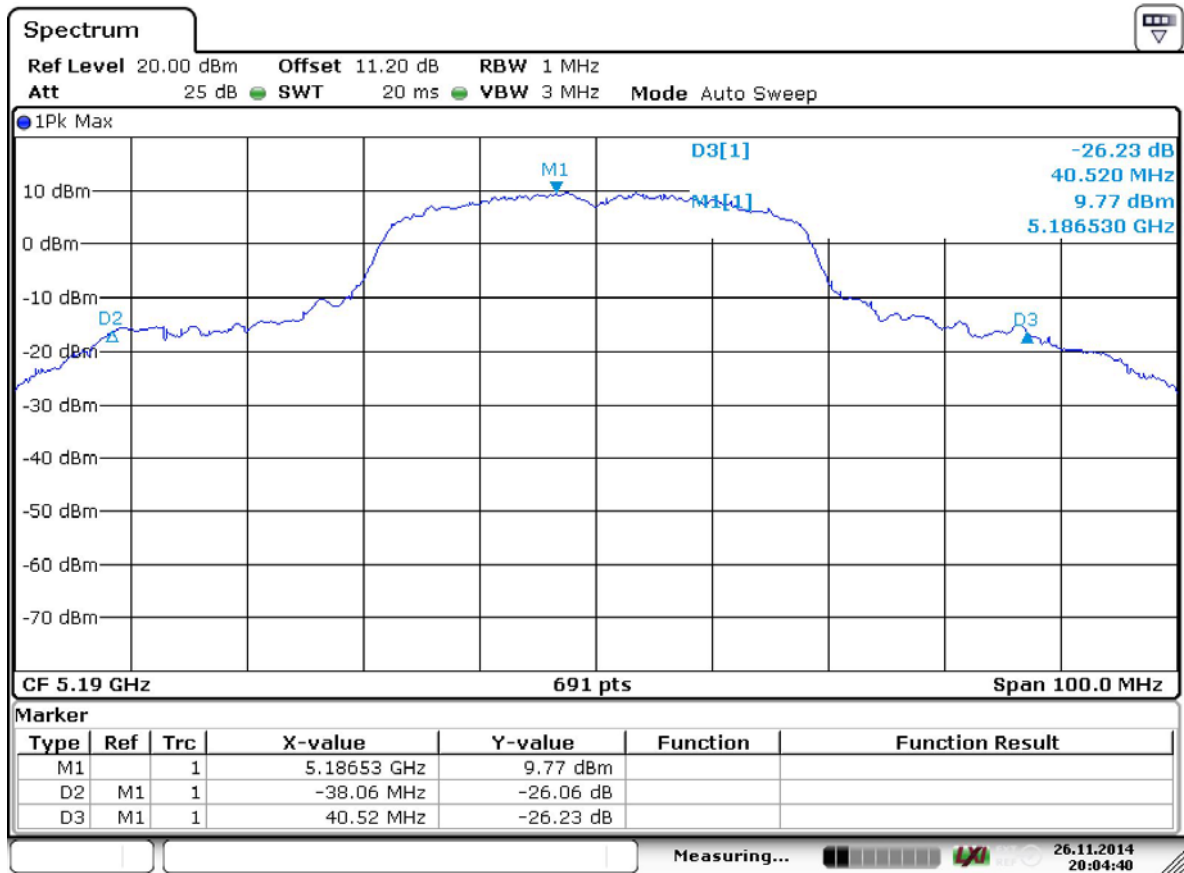
3.1.4 Measurement Plot (showing the highest value, “worst case”)

1) 26 dB bandwidth



Date: 5.SEP.2014 13:33:36

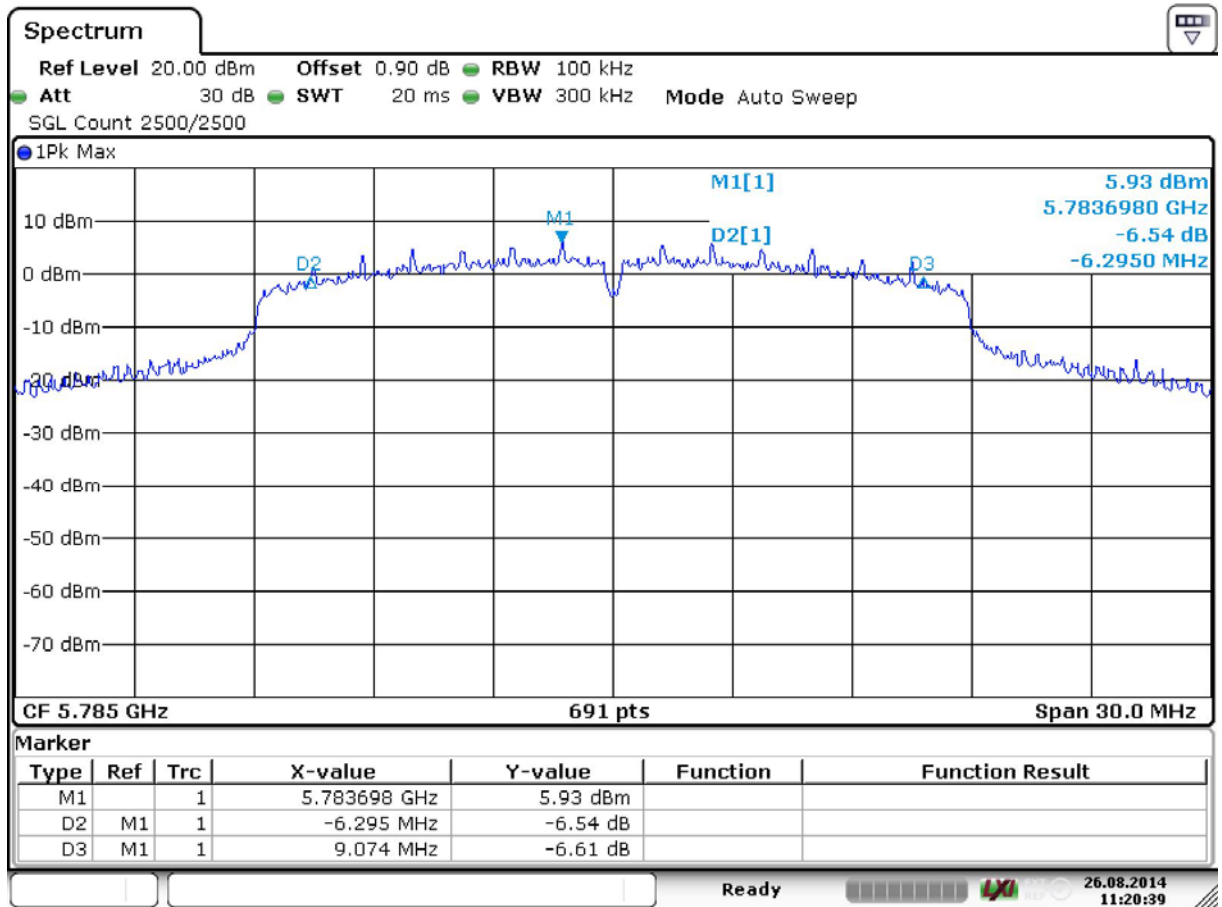
WLAN mode a 20 MHz highest channel subband 1



Date: 26.NOV.2014 20:04:40

WLAN mode n 40 MHz low channel subband 1

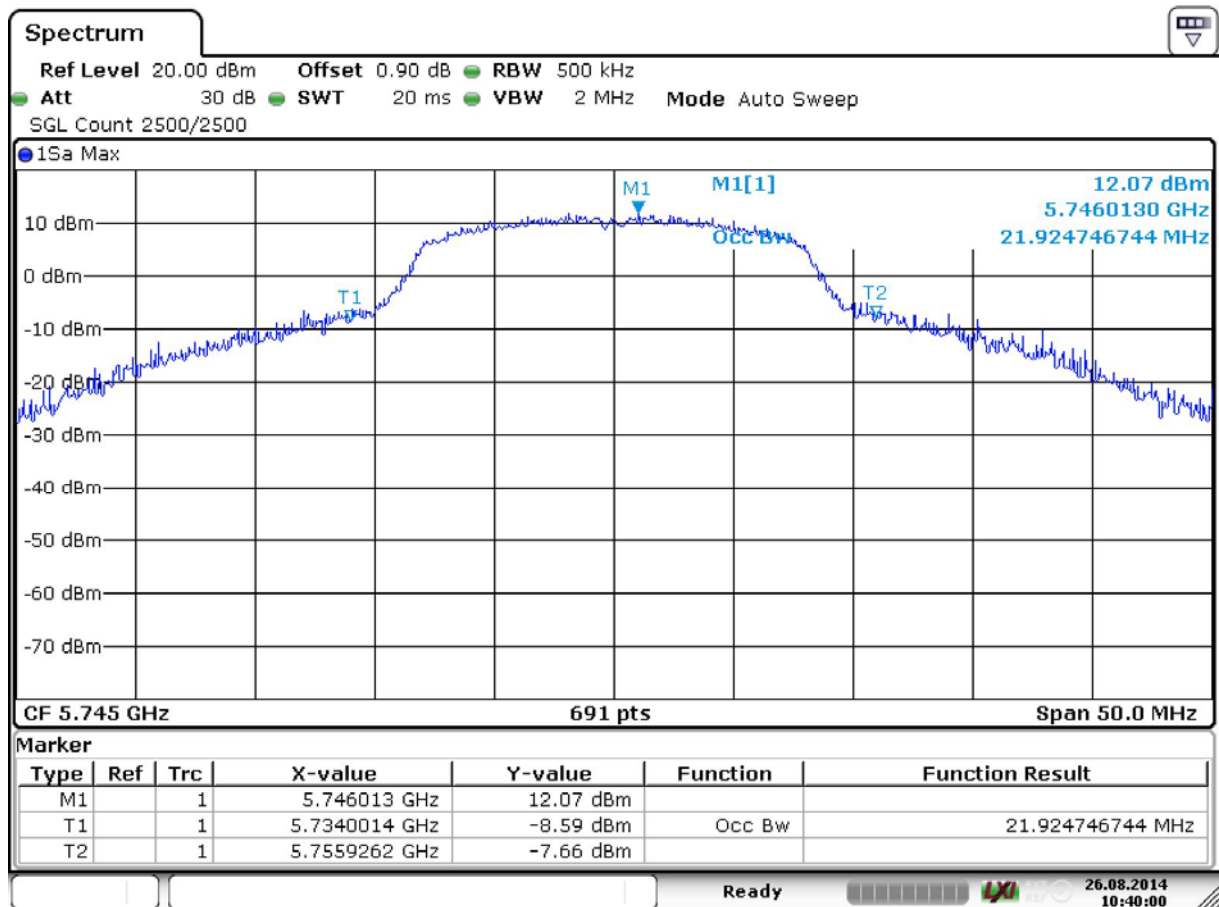
2) 6 dB bandwidth



Date: 26.AUG.2014 11:20:39

WLAN mode n 20 MHz mid channel

3) 99% bandwidth



Date: 26.AUG.2014 10:40:00

WLAN mode a lowest channel

3.2 Maximum conducted output power

Standard FCC Part 15, Subpart E

The test was performed according to: FCC §15.31

3.2.1 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the output power measurements. The results recorded were measured with the modulation which produces the worst-case (highest) output power. The EUT was connected to spectrum analyser via a short coax cable with a known loss.

Analyser settings:

- Resolution Bandwidth (RBW): 1 MHz
- Video Bandwidth (VBW): 3 MHz
- Detector: RMS
- Trace: Average
- Sweeps: 100
- Sweep time: coupled

Note:

The analyser settings are according FCC Public Note "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, 789033 D02 General UNII Test Procedures New Rules v01, 2014-6-06", method **SA-1**.

3.2.2 Test Requirements / Limits

A) FCC

For systems using digital modulation techniques in the 5.15 – 5.25 GHz bands:

§15.407 (a) (1)

Limit: 50 mW (17 dBm) or 4 dBm + 10 log (26 dB bandwidth/MHz) whatever is the lesser.

FCC ET Docket No. 13-49, FIRST REPORT AND ORDER, April 1, 2014 ("new rules"):

§15.407 (a) (1) (i): Outdoor access point:

Limit: 1 W (30 dBm) provided the maximum antenna gain does not exceed 6 dBi.

The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

§15.407 (a) (1) (ii): Indoor access point:

Limit: 1 W (30 dBm) provided the maximum antenna gain does not exceed 6 dBi.

§15.407 (a) (1) (iv): Mobile and portable client devices:

Limit: 250 mW (24 dBm) provided the maximum antenna gain does not exceed 6 dBi.

For systems using digital modulation techniques in the 5.25 – 5.35 GHz and 5.47 – 5.725 GHz bands:

§15.407 (a) (2)

Limit: 250 mW (24 dBm) or 11 dBm + 10 log (26 dB bandwidth/MHz) whatever is the lesser.

For systems using digital modulation techniques in the 5.725 – 5.825 5.850 GHz bands:

§15.407 (a) (3)

Limit: 1 W (30 dBm) or 17 dBm + 10 log (26 dB bandwidth/MHz) whatever is the lesser.

FCC ET Docket No. 13-49, FIRST REPORT AND ORDER, April 1, 2014 ("new rules"):
§15.407 (a) (3):
Limit: 1 W (30 dBm).

§15.407 (a) (4):

The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.

B) IC

Different frequency bands and limits apply, as compared to the FCC requirements.

RSS-210, A9.2 (1), Band 5150-5250 MHz, indoor operation only:

Limit (e.i.r.p.): 200 mW (23 dBm) or $10 + 10 \log_{10} B$ [dBm], whichever power is less.
B is the 99% emission bandwidth in MHz.

RSS-210, A9.2 (2), Band 5250-5350 MHz:

Limits:

Maximum conducted Power: 250 mW (24 dBm) or $11 + 10 \log_{10} B$ [dBm], whichever power is less.

e.i.r.p.: 1.0 W (30 dBm) or $17 + 10 \log_{10} B$ [dBm], whichever power is less.

Note: For EUTs operating at a higher e.i.r.p. than 200 mW (23 dBm), compliance with the e.i.r.p. elevation mask is required.

RSS-210, A9.2 (3), Bands 5470-5600 MHz and 5650-5725 MHz:

Limits:

Maximum conducted Power: 250 mW (24 dBm) or $11 + 10 \log_{10} B$ [dBm], whichever power is less.

e.i.r.p.: 1.0 W (30 dBm) or $17 + 10 \log_{10} B$ [dBm], whichever power is less.

RSS-210, A9.2 (4), Band 5725-5825 MHz:

Limits:

Maximum conducted Power: 1W (30 dBm) or $17 + 10 \log_{10} B$ [dBm], whichever power is less.

e.i.r.p.: 4.0 W (36 dBm) or $23 + 10 \log_{10} B$ [dBm], whichever power is less.

All frequency bands: B is the 99% emission bandwidth in MHz.

3.2.3 Test Protocol

Temperature: 22 – 25 °C
 Air Pressure: 1010 – 1014 hPa
 Humidity: 32 – 40 %

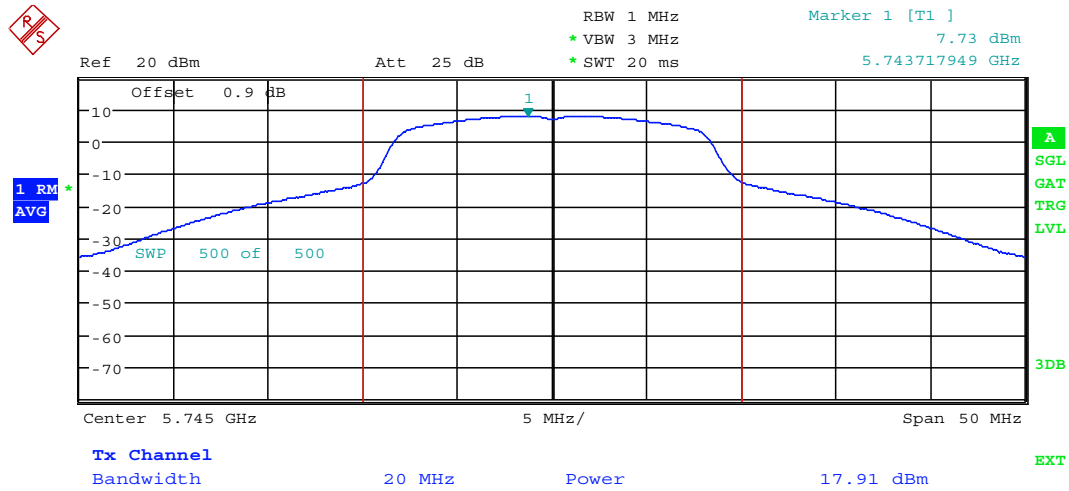
The antenna gain is excluded in the given conducted power level.

WLAN a-Mode; 20 MHz; 6 Mbit/s					FCC		IC			
UNII-Sub-band	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	Cond. Limit [dBm]	Margin [dB]	Cond. Limit [dBm]	Margin [dB]	EIRP Limit [dBm]	Margin [dB]
1	36	5180	16.9	18.6	30.0	13.1	N/A		23.0	4.4
	44	5220	17.2	19.0	30.0	12.8	N/A		23.0	4.1
	48	5240	17.1	18.9	30.0	12.9	N/A		23.0	4.1
3	149	5745	17.9	19.6	30.0	12.1	30.0	12.1	36.0	16.4
	157	5785	17.4	19.2	30.0	12.6	30.0	12.6	36.0	16.8
	161	5805	16.8	18.5	30.0	13.2	30.0	13.2	36.0	17.5

WLAN n-Mode; 20 MHz; 6,5 Mbit/s					FCC		IC			
UNII-Sub-band	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	Cond. Limit [dBm]	Margin [dB]	Cond. Limit [dBm]	Margin [dB]	EIRP Limit [dBm]	Margin [dB]
1	36	5180	15.8	17.5	30.0	14.2	N/A		22.9	5.4
	44	5220	16.2	17.9	30.0	13.8	N/A		23.0	5.1
	48	5240	16.2	17.9	30.0	13.8	N/A		23.0	5.1
3	149	5745	17.0	18.7	30.0	13.0	30.0	13.0	36.0	17.3
	157	5785	16.5	18.2	30.0	13.5	30.0	13.5	36.0	17.8
	161	5805	16.2	17.9	30.0	13.8	30.0	13.8	36.0	18.0

WLAN n-Mode; 40 MHz; 13.5 Mbit/s					FCC		IC			
UNII-Sub-band	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	Cond. Limit [dBm]	Margin [dB]	Cond. Limit [dBm]	Margin [dB]	EIRP Limit [dBm]	Margin [dB]
1	38	5190	14.8	16.5	30.0	15.2	N/A		23.0	6.5
	46	5230	14.8	16.5	30.0	15.2	N/A		23.0	6.5
3	151	5755	15.3	17.1	30.0	14.7	30.0	14.7	36.0	19.0
	159	5795	14.8	16.6	30.0	15.2	30.0	15.2	36.0	19.5

3.2.4 Measurement Plot (showing the highest value, “worst case”)



Date: 22.AUG.2014 07:58:04

WLAN mode a lowest frequency.

3.3 Maximum Power Spectral Density

Standard FCC Part 15, Subpart E

The test was performed according to: FCC §15.31

3.3.1 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the Peak Maximum Power Spectral Density measurements.

The results recorded were measured with the modulation which produces the worst-case (highest) output power.

The EUT was connected to spectrum analyser via a short coax cable with a known loss.

Analyser settings:

- Resolution Bandwidth (RBW): 1 MHz
- Video Bandwidth (VBW): 3 MHz
- Detector: RMS
- Trace: Average
- Sweeps: 100
- Sweep time: coupled
- Marker: Peak

Note:

The analyser settings are according FCC Public Note "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, 789033 D02 General UNII Test Procedures New Rules v01, 2014-6-06", method **SA-1**.

3.3.2 Test Requirements / Limits

A) FCC

FCC Part 15, Subpart E, §15.407 (a) (1)

For systems using digital modulation techniques in the 5.15 – 5.25 GHz bands:

Limit: 4 dBm/MHz

(i) and (ii), outdoor and indoor access points: Limit: 17 dBm/MHz.

(iv), mobile and portable client devices: Limit: 11 dBm/MHz.

FCC Part 15, Subpart E, §15.407 (a) (2)

For systems using digital modulation techniques in the 5.25 – 5.35 GHz and 5.47 – 5.725 GHz bands:

Limit: 11 dBm/MHz.

FCC Part 15, Subpart E, §15.407 (a) (3)

For systems using digital modulation techniques in the 5.725 – 5.82550 GHz bands:

Limit: 17 dBm/MHz

Limit: 30 dBm/500 kHz.

Note: The limit will be also fulfilled when measuring at any bandwidth greater than 500 kHz. This applies to signals where the maximum conducted output power was measured at a bandwidth exceeding 500 kHz and which fulfil that limit of 30 dBm.

B) IC

Different frequency bands and limits apply, as compared to the FCC requirements.

RSS-210, A9.2 (1), Band 5150-5250 MHz, indoor operation only:
Limit (e.i.r.p.): 10 dBm/MHz.

RSS-210, A9.2 (2), Band 5250-5350 MHz:
Limit: 11 dBm/MHz.

RSS-210, A9.2 (3), Bands 5470-5600 MHz and 5650-5725 MHz:
Limit: 11 dBm/MHz.

RSS-210, A9.2 (4), Band 5725-5825 MHz:
Limit: 17 dBm/MHz.

3.3.3 Test Protocol

Temperature: 22 – 25 °C
 Air Pressure: 1010 – 1014 hPa
 Humidity: 32 – 40 %

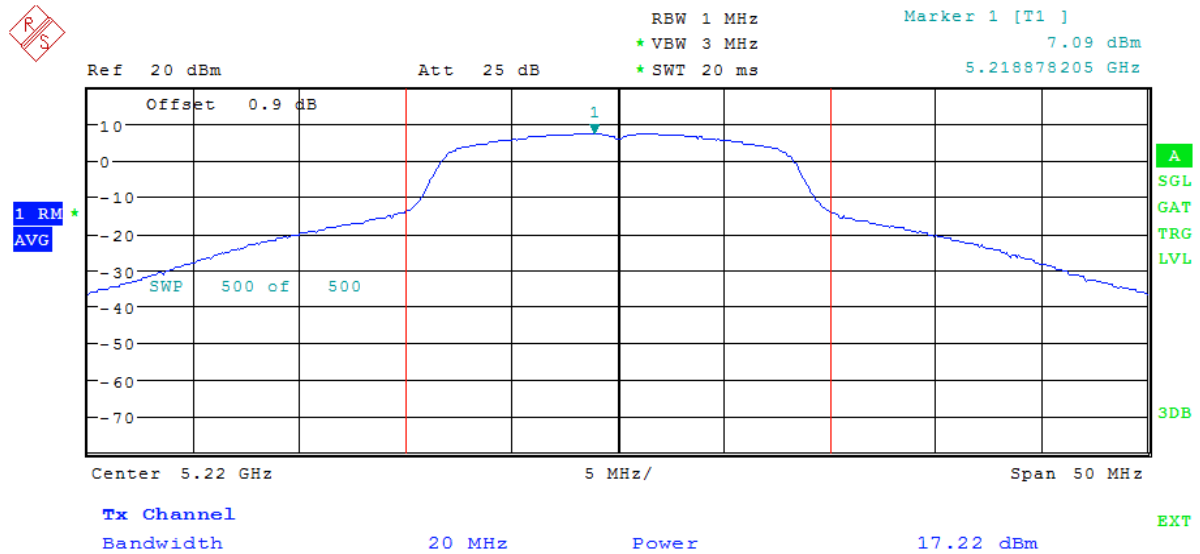
WLAN a-Mode; 20 MHz; 6 Mbit/s								
UNII-Sub-band	Ch. No.	Freq. [MHz]	MPSD [dBm/MHz]	FCC Limit [dBm/MHz]	Margin [dB]	IC Limit [dBm/MHz]	Margin [dB]	IC EIRP MPD Limit [dBm / MHz]
1	36	5180	6.7	17.0	10.3	10.0	1.6	8.5
	44	5220	7.1	17.0	9.9	10.0	1.2	8.8
	48	5240	7.0	17.0	10.0	10.0	1.3	8.8
3	149	5745	7.7	30.0	22.3	17.0	9.3	
	157	5785	7.3	30.0	22.7	17.0	9.7	
	161	5805	6.6	30.0	23.4	17.0	10.4	

WLAN n-Mode; 20 MHz; 6,5 Mbit/s								
UNII-Sub-band	Ch. No.	Freq. [MHz]	MPSD [dBm/MHz]	FCC Limit [dBm/MHz]	Margin [dB]	IC Limit [dBm/MHz]	Margin [dB]	IC EIRP MPD Limit [dBm / MHz]
1	36	5180	5.6	17.0	11.4	10.0	2.7	7.4
	44	5220	5.9	17.0	11.1	10.0	2.3	7.7
	48	5240	5.9	17.0	11.1	10.0	2.3	7.7
3	149	5745	6.7	30.0	23.3	17.0	10.3	
	157	5785	6.2	30.0	23.8	17.0	10.8	
	161	5805	6.3	30.0	23.7	17.0	10.7	

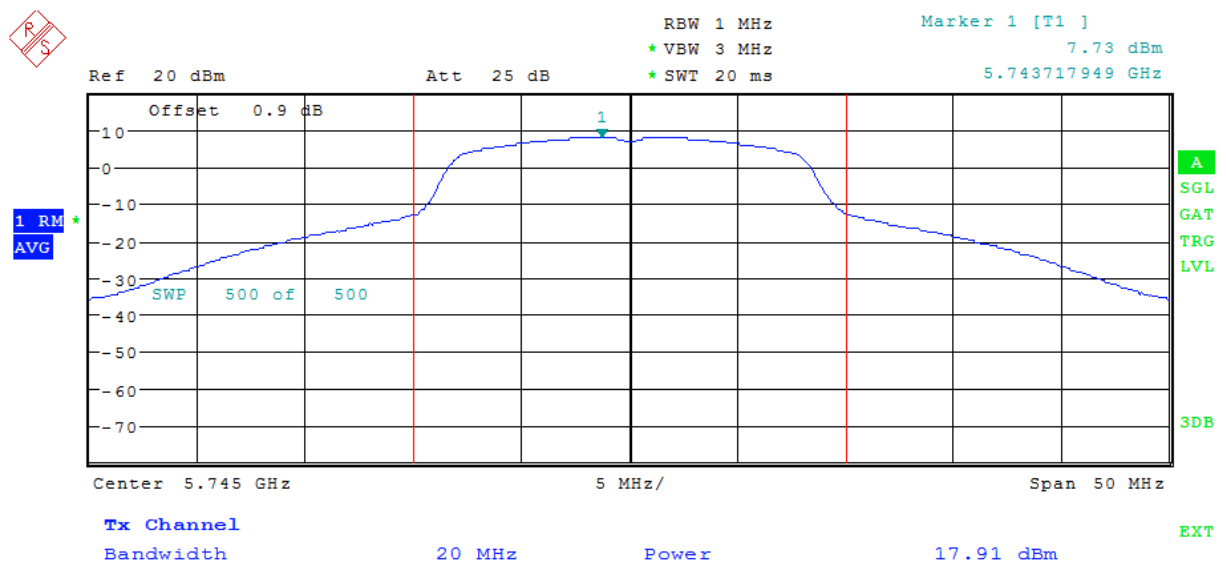
WLAN n-Mode; 40 MHz; 13.5 Mbit/s								
UNII-Sub-band	Ch. No.	Freq. [MHz]	MPSD [dBm/MHz]	FCC Limit [dBm/MHz]	Margin [dB]	IC Limit [dBm/MHz]	Margin [dB]	IC EIRP MPD Limit [dBm / MHz]
1	38	5190	0.6	17.0	16.4	10.0	7.7	2.3
	46	5230	1.5	17.0	15.5	10.0	6.7	3.3
3	151	5755	1.9	30.0	28.1	17.0	15.1	
	159	5795	1.4	30.0	28.7	17.0	15.7	

Note: MPSD for subband 3 is measured at 1 MHz bandwidth.

3.3.4 Measurement Plot (showing the highest value, “worst case”)



WLAN mode a mid frequency subband 1.



WLAN mode a low frequency subband 3

3.4 Undesirable Emissions / General Field Strength Limits; Restricted Band and Radiated Emission Limits, Band Edge

Standard FCC Part 15, Subpart C & E

The test was performed according to: ANSI C 63.4

3.4.1 Test Description

The radiated emissions measurements were made in a typical installation configuration. The measurement procedure is implemented into the EMI test software ES-K1 from R&S.

1. Measurement up to 30 MHz

The Equipment Under Test (EUT) was set up on a non-conductive table in the anechoic chamber.

The Loop antenna HFH2-Z2 is used.

Step 1: pre measurement

- Anechoic chamber
- Antenna distance: 10 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 and 0.15 – 30 MHz
- Frequency steps: 0.1 kHz and 5 kHz
- IF-Bandwidth: 0.2 kHz and 10 kHz
- Measuring time / Frequency step: 100 ms

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: final measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Open area test side
- Antenna distance: according to the Standard
- Detector: Quasi-Peak
- Frequency range: 0.009 – 30 MHz
- Frequency steps: measurement at frequencies detected in step 1
- IF-Bandwidth: 200 Hz - 10 kHz
- Measuring time / Frequency step: 100 ms

2. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan

Preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Antenna distance: 3 m
- Detector: Peak-Maxhold
- Frequency range: 30 – 1000 MHz
- Frequency steps: 60 kHz
- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 μ s
- Turntable angle range: -180 to 180°
- Turntable step size: 90°
- Height variation range: 1 – 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: second measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is, to find out the approximate turntable angle and antenna height for each frequency.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: -180 to 180°
- Turntable step size: 45°
- Height variation range: 1 – 4 m
- Height variation step size: 0.5 m
- Polarisation: horizontal + vertical

After this step the EMI test system has determined the following values for each frequency (of step 1):

- Frequency
- Azimuth value (of turntable)
- Antenna height

The last two values have now the following accuracy:

- Azimuth value (of turntable): 45°
- Antenna height: 0.5 m

Step 3: final measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will be slowly varied by $\pm 22.5^\circ$ around this value. During this action the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position the antenna height is also slowly varied by ± 25 cm around the antenna height determined. During this action the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: -22.5° to $+22.5^\circ$ around the determined value
- Height variation range: -0.25 m to $+0.25$ m around the determined value

Step 4: final measurement with QP detector

With the settings determined in step 3, the final measurement will be performed:

EMI receiver settings for step 4:

- Detector: Quasi-Peak
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

Measurement above 1 GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz:

The Equipment Under Test (EUT) was set up on a non-conductive support at 1.4 m height in the fully-anechoic chamber. The measurement distance was reduced to 1 m. The results were extrapolated by the extrapolation factor of 20 dB/decade (inverse linear distance for field strength measurements, inverse linear-distance squared for the power reference level measurements). Due to the fact that in this frequency range a double ridged wave guided horn antenna (up to 15 GHz) and a horn antenna (15-26 GHz) are used, the steps 2-4 are omitted. Step 1 was performed with one height of the receiving antenna only.

EMI receiver settings:

- Detector: Peak, Average
- IF Bandwidth = 1 MHz

For the data rate in mode n the test is performed as worst-case-check in order to verify that emissions have a comparable level as found at modes b and g. Typically, the measurement is performed in the frequency range 1 to 15 GHz but it depends on the emissions found during the test for the modes b and g. Please refer to the results for the used frequency range.

In the frequency range 26 – 40 GHz the measurement was performed conducted.

3.4.2 Test Requirements / Limits

A) FCC

FCC Part 15 Subpart E , §15.407 (b)(1)

For transmitters operating in the 5150–5250 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5150–5350 MHz.

FCC Part 15 Subpart E , §15.407 (b)(2)

For transmitters operating in the 5250–5350 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5150–5350 MHz.

FCC Part 15 Subpart E , §15.407 (b)(3)

For transmitters operating in the 5470–5725 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5470–5725 MHz.

FCC Part 15 Subpart E , §15.407 (b)(4)

For transmitters operating in the 5725–5850 MHz band:

Limit: –27 dBm/MHz EIRP outside of the band 5715–5860 MHz and additionally

Limit: –17 dBm/MHz EIRP within the frequency ranges 5715–5725 and 5850–5860 MHz.

B) IC

Different frequency bands and limits apply, as compared to the FCC requirements.

RSS-210, A9.2 (1), Emissions outside the band 5150-5250 MHz, indoor operation only:
Limit: -27 dBm/MHz EIRP outside of the band 5150-5250 MHz.

RSS-210, A9.2 (2), Emissions outside the band 5250-5350 MHz:
Limit: -27 dBm/MHz EIRP outside of the band 5250-5350 MHz.

RSS-210, A9.2 (3), Emissions outside the bands 5470-5600 MHz and 5650-5725 MHz:
Limit: -27 dBm/MHz EIRP outside of the band 5470-5725 MHz.
Note: No operation is permitted for the frequency range 5600-5650 MHz.

RSS-210, A9.2 (4), Emissions outside the band 5725-5825 MHz:
Limit: -27 dBm/MHz EIRP outside of the band 5715-5835 MHz and additionally
Limit: -17 dBm/MHz EIRP within the frequency ranges 5715-5725 and 5825-5835 MHz.

C) FCC & IC

FCC Part 15 Subpart E, §15.405 and §15.407 (b)(1.2.3.46,7)
FCC Part 15, Subpart C, §15.247 (b)(5,6)

... In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209. The provisions of §§ 15.203 and 15.205 are included.

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Calculated Limits(dBµV/m @10m)	Limits(dBµV/m @10m)
0.009 – 0.49	2400/F(kHz)	300 → 10	(48.5 – 13.8) + 59.1 dB	107.6 – 72.9
0.49 – 1.705	24000/F(kHz)	30 → 10	(48.9 – 23.0) + 19.1 dB	60.0 – 42.1
1.705 – 30	30	30 → 10	29.5 + 19.1 dB	48.6

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit (dBµV/m)
30 – 88	100	3	40.0
88 – 216	150	3	43.5
216 – 960	200	3	46.0
above 960	500	3	54.0

§15.35(b)

..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)
 Limit (dBµV/m) = EIRP [dBm] – 20 log (d [m]) + 104.8
 where d is the measurement distance

3.4.3 Test Protocol

Limit types:

RB – Emissions falls into a “Restricted Band” according FCC §§15.205 and/or 15.209

UE – “Undesirable Emission Limit” according FCC §15.407

BE – Band Edge Limit

BE-RB – Band Edge Limit basing on “Restricted Band Limits”

BE-UE – Band Edge Limit basing on “Undesirable Emission Limit”

Temperature: 22 – 27 °C

Air Pressure: 1010 – 1018 hPa

Humidity: 33 – 42 %

3.4.3.1 Radiated spurious and undesired emissions

WLAN a-Mode; 20 MHz; 6 Mbit/s				Applied duty cycle correction (AV) [dB]: 1.4					
Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type	Plot No.
36	5180	1411.0	39.6	PEAK	1000	74.0	34.4	RB	031
36	5180	1411.0	36.3	AV	1000	54.0	17.7	RB	031
36	5180	5075.0	49.1	PEAK	1000	74.0	24.9	RB	031
36	5180	5075.0	39.8	AV	1000	54.0	14.2	RB	031
36	5180	6906.5	54.3	PEAK	1000	68.0	13.7	UE	031
44	5220	144.2	33.2	QP	120	43.5	10.3	RB	010
44	5220	144.9	36.6	QP	120	43.5	6.9	RB	010
44	5220	146.3	37.4	QP	120	43.5	6.1	RB	010
44	5220	146.8	38.9	QP	120	43.5	4.6	RB	010
44	5220	148.1	38.2	QP	120	43.5	5.3	RB	010
44	5220	149.9	37.9	QP	120	43.5	5.6	RB	010
44	5220	151.8	34.5	QP	120	43.5	9.0	RB	010
44	5220	152.0	38.0	QP	120	43.5	5.5	RB	010
44	5220	153.4	36.0	QP	120	43.5	7.5	RB	010
44	5220	155.3	30.6	QP	120	43.5	12.9	RB	010
44	5220	1411.0	39.4	PEAK	1000	74.0	34.6	RB	032
44	5220	1411.0	35.9	AV	1000	54.0	18.1	RB	032
44	5220	5114.0	46.9	PEAK	1000	74.0	27.1	RB	032
44	5220	5114.0	36.8	AV	1000	54.0	17.2	RB	032
44	5220	6960.0	57.8	PEAK	1000	68.0	10.2	UE	032
48	5240	1411.0	41.2	PEAK	1000	74.0	32.8	RB	033
48	5240	1411.0	38.9	AV	1000	54.0	15.1	RB	033
48	5240	5135.0	50.1	PEAK	1000	74.0	23.9	RB	033
48	5240	5135.0	40.3	AV	1000	54.0	13.7	RB	033
48	5240	5350.0	48.6	PEAK	1000	74.0	25.4	RB	033
48	5240	5350.0	39.0	AV	1000	54.0	15.0	RB	033
48	5240	6986.5	56.3	PEAK	1000	68.0	11.7	UE	033

(Table continues on next page)

149	5745	1411.0	39.9	PEAK	1000	74.0	34.1	RB
149	5745	1411.0	37.4	AV	1000	54.0	16.6	RB
149	5745	3830.0	47.6	PEAK	1000	74.0	26.4	RB
149	5745	3830.0	43.7	AV	1000	54.0	10.3	RB
149	5745	5642.5	55.2	PEAK	1000	68.0	12.8	UE
149	5745	5725.0	77.0	PEAK	1000	78.0	1.0	BE
149	5745	5851.5	54.6	PEAK	1000	68.0	13.4	UE
149	5745	7660.0	42.7	PEAK	1000	74.0	31.3	RB
149	5745	7660.0	37.3	AV	1000	54.0	16.7	RB
149	5745	11490.0	49.3	PEAK	1000	74.0	24.7	RB
149	5745	11490.0	44.8	AV	1000	54.0	9.2	RB
157	5785	147.4	41.5	QP	120	43.5	2.0	RB
157	5785	174.8	34.0	QP	120	43.5	9.5	RB
157	5785	194.4	38.4	QP	120	43.5	5.1	RB
157	5785	245.8	40.6	QP	120	46.0	5.4	RB
157	5785	257.5	41.9	QP	120	46.0	4.1	RB
157	5785	326.3	43.0	QP	120	46.0	3.0	RB
157	5785	360.0	35.6	QP	120	46.0	10.4	RB
157	5785	404.2	45.2	QP	120	46.0	0.8	RB
157	5785	420.0	42.7	QP	120	46.0	3.3	RB
157	5785	851.5	22.9	QP	120	46.0	23.1	RB
157	5785	1411.0	40.6	PEAK	1000	74.0	33.4	RB
157	5785	1411.0	37.5	AV	1000	54.0	16.5	RB
157	5785	3856.5	48.6	PEAK	1000	74.0	25.4	RB
157	5785	3856.5	44.7	AV	1000	54.0	9.3	RB
157	5785	4821.0	46.1	PEAK	1000	74.0	27.9	RB
157	5785	4821.0	37.6	AV	1000	54.0	16.4	RB
157	5785	5681.0	55.4	PEAK	1000	68.0	12.6	UE
157	5785	5825.0	58.4	PEAK	1000	78.0	19.6	BE
157	5785	5888.0	55.2	PEAK	1000	68.0	12.8	UE
157	5785	7713.5	44.9	PEAK	1000	74.0	29.1	RB
157	5785	7713.5	37.3	AV	1000	54.0	16.7	RB
157	5785	11570.0	45.8	PEAK	1000	74.0	28.2	RB
157	5785	11570.0	41.3	AV	1000	54.0	12.7	RB
161	5805	1411.0	39.6	PEAK	1000	74.0	34.4	RB
161	5805	1411.0	35.9	AV	1000	54.0	18.1	RB
161	5805	1559.0	40.0	PEAK	1000	74.0	34.0	RB
161	5805	1559.0	36.7	AV	1000	54.0	17.3	RB
161	5805	3870.0	48.8	PEAK	1000	74.0	25.2	RB
161	5805	3870.0	45.8	AV	1000	54.0	8.2	RB
161	5805	5702.0	54.4	PEAK	1000	68.0	13.6	UE
161	5805	5825.0	75.4	PEAK	1000	78.0	2.6	BE
161	5805	5910.0	57.7	PEAK	1000	68.0	10.3	UE
161	5805	7740.0	44.9	PEAK	1000	74.0	29.1	RB
161	5805	7740.0	37.4	AV	1000	54.0	16.6	RB
161	5805	11610.0	45.6	PEAK	1000	74.0	28.4	RB
161	5805	11610.0	42.0	AV	1000	54.0	12.0	RB

Note: No (further) spurious emissions in the range 20 dB below the limit found.

WLAN n-Mode; 20 MHz; 6.5 Mbit/s				Applied duty cycle correction (AV) [dB]: 1.5				
Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detec-tor	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type
36	5180	1411.0	39.7	PEAK	1000	74.0	34.3	RB
36	5180	1411.0	36.7	AV	1000	54.0	17.3	RB
36	5180	5075.0	47.4	PEAK	1000	74.0	26.6	RB
36	5180	5075.0	37.4	AV	1000	54.0	16.6	RB
36	5180	6906.5	57.4	PEAK	1000	68.0	10.6	UE
44	5220	1411.0	40.2	PEAK	1000	74.0	33.8	RB
44	5220	1411.0	36.9	AV	1000	54.0	17.1	RB
44	5220	5117.0	46.6	PEAK	1000	74.0	27.4	RB
44	5220	5117.0	36.7	AV	1000	54.0	17.3	RB
44	5220	5251.5	51.5	PEAK	1000	68.0	16.5	UE
44	5220	5325.0	48.5	PEAK	1000	68.0	19.5	UE
44	5220	6960.0	58.6	PEAK	1000	68.0	9.4	UE
48	5240	1411.0	39.8	PEAK	1000	74.0	34.2	RB
48	5240	1411.0	36.8	AV	1000	54.0	17.2	RB
48	5240	5135.0	46.7	PEAK	1000	74.0	27.3	RB
48	5240	5135.0	36.2	AV	1000	54.0	17.8	RB
48	5240	5350.0	45.9	PEAK	1000	74.0	28.1	RB
48	5240	5350.0	36.2	AV	1000	54.0	17.8	RB
48	5240	6986.5	54.8	PEAK	1000	68.0	13.2	UE
149	5745	1411.0	40.5	PEAK	1000	74.0	33.5	RB
149	5745	1411.0	38.3	AV	1000	54.0	15.7	RB
149	5745	3830.0	48.4	PEAK	1000	74.0	25.6	RB
149	5745	3830.0	45.4	AV	1000	54.0	8.6	RB
149	5745	5642.0	52.4	PEAK	1000	68.0	15.6	UE
157	5785	1411.0	41.0	PEAK	1000	74.0	33.0	RB
157	5785	1411.0	38.4	AV	1000	54.0	15.6	RB
157	5785	3856.5	49.0	PEAK	1000	74.0	25.0	RB
157	5785	3856.5	45.8	AV	1000	54.0	8.2	RB
157	5785	5679.5	52.6	PEAK	1000	68.0	15.4	UE
157	5785	5891.5	51.5	PEAK	1000	68.0	16.5	UE

Note: No (further) spurious emissions in the range 20 dB below the limit found.
The measurement was performed from 1 GHz up to 7 GHz because at pre-measurements no significant spurious emissions have been found outside this frequency range.

WLAN n-Mode; 40 MHz; 13.5 Mbit/s				Applied duty cycle correction (AV) [dB]: 2.8				
Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type
38	5190	1411.0	40.5	PEAK	1000	74.0	33.5	RB
38	5190	1411.0	39.2	AV	1000	54.0	14.8	RB
38	5190	5085.0	50.4	PEAK	1000	74.0	23.6	RB
38	5190	5085.0	42.3	AV	1000	54.0	11.7	RB
38	5190	5296.0	48.3	PEAK	1000	68.0	19.7	UE
38	5190	6920.0	58.1	PEAK	1000	68.0	9.9	UE
46	5230	1411.0	42.1	PEAK	1000	74.0	31.9	RB
46	5230	1411.0	41.3	AV	1000	54.0	12.7	RB
46	5230	5125.0	47.9	PEAK	1000	74.0	26.1	RB
46	5230	5125.0	39.7	AV	1000	54.0	14.3	RB
46	5230	6973.5	57.6	PEAK	1000	68.0	10.4	UE
151	5755	1411.0	42.5	PEAK	1000	74.0	31.5	RB
151	5755	1411.0	41.7	AV	1000	54.0	12.3	RB
151	5755	3836.5	46.8	PEAK	1000	74.0	27.2	RB
151	5755	5125.0	44.0	AV	1000	54.0	10.0	RB
151	5755	5650.0	52.7	PEAK	1000	68.0	15.3	UE
151	5755	5724.5	55.6	PEAK	1000	68.0	12.4	UE
151	5755	5861.5	53.7	PEAK	1000	68.0	14.3	UE
151	5755	7673.5	47.7	PEAK	1000	74.0	26.3	RB
151	5755	7673.5	45.9	AV	1000	54.0	8.1	RB
151	5755	11510.0	44.9	PEAK	1000	74.0	29.1	RB
151	5755	11510.0	40.0	AV	1000	54.0	14.0	RB
159	5795	1411.0	39.4	PEAK	1000	74.0	34.6	RB
159	5795	1411.0	37.3	AV	1000	54.0	16.7	RB
159	5795	1559.5	40.4	PEAK	1000	74.0	33.6	RB
159	5795	1559.5	38.5	AV	1000	54.0	15.5	RB
159	5795	3863.5	50.9	PEAK	1000	74.0	23.1	RB
159	5795	3863.5	50.1	AV	1000	54.0	3.9	RB
159	5795	5690.0	51.8	PEAK	1000	68.0	16.2	UE
159	5795	5901.0	50.2	PEAK	1000	68.0	17.8	UE
159	5795	7726.5	45.6	PEAK	1000	74.0	28.4	RB
159	5795	7726.5	41.2	AV	1000	54.0	12.8	RB
159	5795	11590.0	43.2	PEAK	1000	74.0	30.8	RB
159	5795	11590.0	40.2	AV	1000	54.0	13.8	RB

Note: No (further) spurious emissions in the range 20 dB below the limit found.
The measurement was performed from 30 MHz up to 15 GHz because at pre-measurements no significant spurious emissions have been found outside this frequency range.
The results of the pre-test with peak detector have been similar to the results at a mode in the frequency range 30–1000 MHz and independent from the transmit frequency. Therefore the final test applying the QP-(quasi-peak-)detector was performed only for a mode.

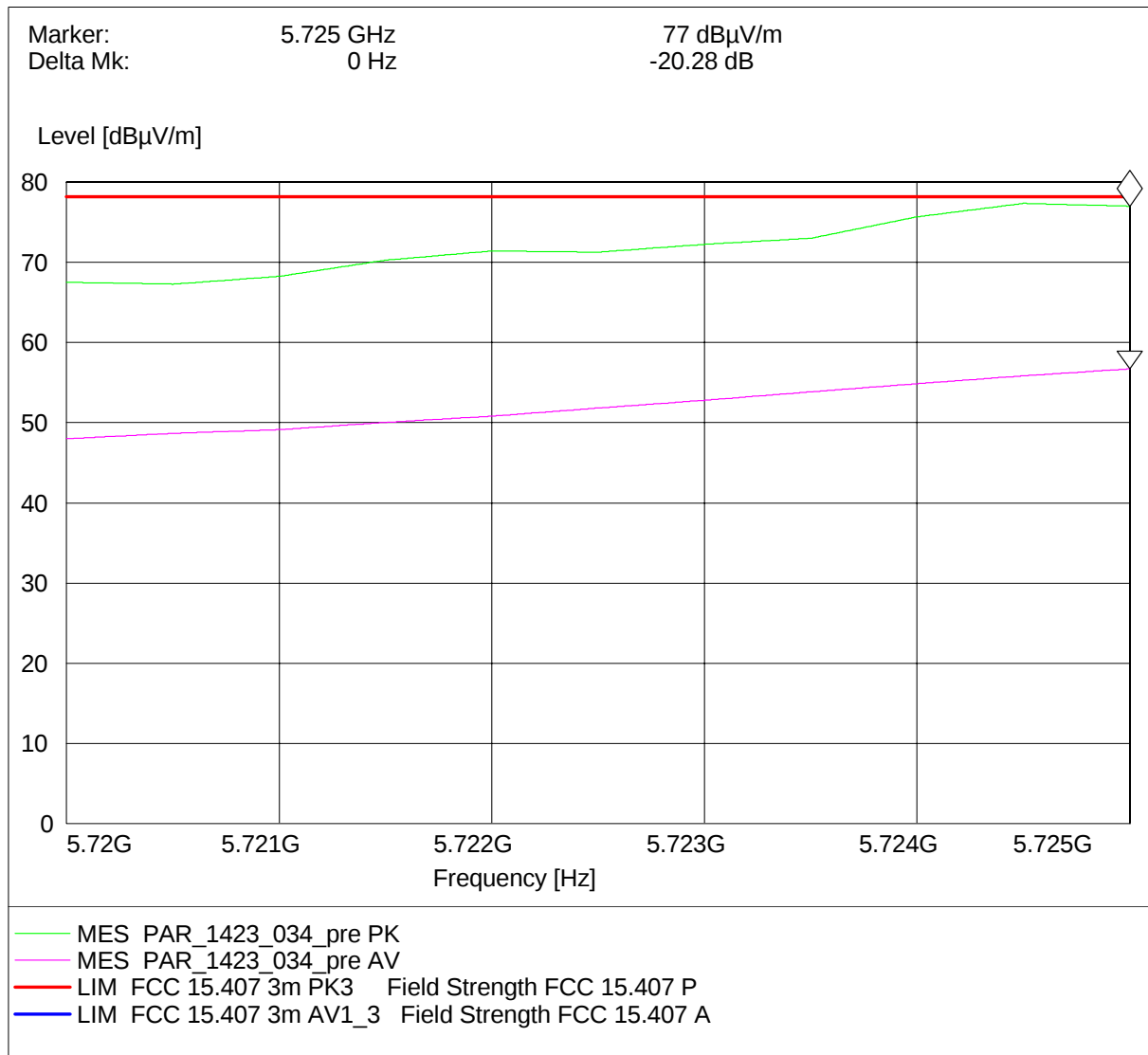
3.4.3.2 Band Edge

WLAN a-Mode; 20 MHz; 6 Mbit/s					Applied duty cycle correction (AV) [dB]: 1.4					
UNII-Sub-band	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	44.6	PEAK	1000	74.0	29.4	BE-RB	FCC&IC
	36	5180	5150.0	33.4	AV	1000	54.0	20.6	BE-RB	FCC&IC
3	149	5745	5725.0	77.0	PEAK	1000	78.0	1.0	BE-UE	FCC&IC
	161	5805	5825.0	74.1	PEAK	1000	78.0	4.0	BE-UE	FCC&IC

WLAN n-Mode; 20 MHz; 6.5 Mbit/s					Applied duty cycle correction (AV) [dB]: 1.5					
UNII-Sub-band	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	45.6	PEAK	1000	74.0	28.4	BE-RB	FCC&IC
	36	5180	5150.0	33.5	AV	1000	54.0	20.5	BE-RB	FCC&IC
3	149	5745	5725.0	67.9	PEAK	1000	78.0	10.1	BE-UE	FCC&IC
	161	5805	5825.0	65.9	PEAK	1000	78.0	12.1	BE-UE	FCC&IC

WLAN n-Mode; 40 MHz; 13.5 Mbit/s					Applied duty cycle correction (AV) [dB]: 2.8					
UNII-Sub-band	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBμV/m]	Detector	RBW [kHz]	Limit [dBμV/m]	Margin [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	44.2	PEAK	1000	74.0	29.8	BE-RB	FCC&IC
	38	5190	5150.0	35.1	AV	1000	54.0	18.9	BE-RB	FCC&IC
3	151	5755	5725.0	55.6	PEAK	1000	78.0	22.4	BE-UE	FCC&IC
	159	5795	5850.0	48.0	PEAK	1000	78.0	30.0	BE-UE	FCC&IC

3.4.4 Measurement Plot Band Edge (showing the highest value, “worst case”)



WLAN mode a lowest channel

4 Test Equipment

The calibration, hardware and software states are shown for the testing period.

Test Equipment Anechoic Chamber

Lab ID:	Lab 3	
Manufacturer:	Frankonia	
Description:	Anechoic Chamber for radiated testing	
Type:	10.58x6.38x6.00 m ³ NSA (FCC)	2014/01/09

Single Devices for Anechoic Chamber

Single Device Name	Type	Serial Number	Manufacturer
Air compressor	none	-	Atlas Copco
Anechoic Chamber	10.58 x 6.38 x 6.00 m ³ FCC listing 96716 3m Part15/18	none	Frankonia 2014/01/09
Controller Maturo	MCU	961208	Maturo GmbH
EMC camera	CE-CAM/1	-	CE-SYS
EMC camera Nr.2	CCD-400E	0005033	Mitsubishi
Filter ISDN	B84312-C110-E1		Siemens&Matsushita
Filter Universal 1A	BB4312-C30-H3	-	Siemens&Matsushita

Test Equipment Auxiliary Equipment for Radiated emissions

Lab ID:	Lab 3
Description:	Equipment for emission measurements
Serial Number:	see single devices

Single Devices for Auxiliary Equipment for Radiated emissions

Single Device Name	Type	Serial Number	Manufacturer
Antenna mast	AM 4.0	AM4.0/180/11920513	Maturo GmbH
Antenna mast	AS 620 P	620/37	HD GmbH
Biconical Broadband Antenna	SBA 9119	9119-005	Schwarzbeck
Biconical dipole	VUBA 9117	9117-108	Schwarzbeck
	Calibration Details		Last Execution
	Standard Calibration		2012/01/18
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P	849785	Miteq
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4	-	Miteq
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P	896037	Miteq
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2+W38.01-2	Kabel Kusch
Cable "ESI to Horn Antenna"	UFB311A+UFB293C	W18.02-2+W38.02-2	Rosenberger Micro-Coax
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution

Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	Type	Serial Number	Manufacturer
	Standard Calibration		2012/05/18
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i>
	Standard Calibration		2012/06/26
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic
High Pass Filter	WHKX 7.0/18G-8SS	09	Wainwright
Horn Antenna Schwarzbeck 15-26 GHz BBHA 9170	BBHA 9170		
Log.-per. Antenna	HL 562 Ultralog	100609	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i>
	Standard Calibration		2012/12/18
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i>
	Standard calibration		2011/10/27
Pyramidal Horn Antenna 26,5 GHz	3160-09	00083069	EMCO Elektronik GmbH
Pyramidal Horn Antenna 40 GHz	3160-10	00086675	EMCO Elektronik GmbH
Tilt device Maturo (Rohacell)	Antrieb TD1.5-10kg	TD1.5- 10kg/024/3790709	Maturo GmbH

Test Equipment Auxiliary Test Equipment

Lab ID: Lab 3, Lab 4
Manufacturer: see single devices
Description: Single Devices for various Test Equipment
Type: various
Serial Number: none

Single Devices for Auxiliary Test Equipment

Single Device Name	Type	Serial Number	Manufacturer
Broadband Power Divider1506A / 93459 N (Aux)		LM390	Weinschel Associates
Broadband Power DividerWA1515 SMA		A855	Weinschel Associates
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.
	<i>Calibration Details</i>		<i>Last Execution</i>
	Customized calibration		2013/12/04
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	Pontis
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	Pontis
Isolating Transformer	LTS 604	1888	Thalheimer Transformatorenwerke GmbH
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	Wainwright
Signal Analyzer	FSV30	103005	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i>
	Standard		2014/02/10
Spectrum Analyser	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i>
	Standard		2012/06/13
Spectrum Analyser	FSU26	200418	Rohde & Schwarz GmbH & Co.KG
	Standard calibration		2014/07/29
Vector Signal Generator	SMIQ 03B	832492/061	Rohde & Schwarz GmbH & Co.KG

Test Equipment Digital Signalling Devices

Lab ID: Lab 3, Lab 4

Description: Signalling equipment for various wireless technologies.

Single Devices for Digital Signalling Devices

Single Device Name	Type	Serial Number	Manufacturer
Bluetooth Signalling Unit CBT CBT		100589	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i>
	Standard calibration		2011/11/24
CMW500	CMW500	107500	Rohde & Schwarz GmbH & Co. KG
	Standard calibration		2014/01/27
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i>
	Standard calibration		2011/11/28
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz GmbH & Co. KG
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	Hardware: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B56V14, B68 3v04, PCMCIA, U65V04 Software: K21 4v21, K22 4v21, K23 4v21, K24 4v21, K42 4v21, K43 4v21, K53 4v21, K56 4v22, K57 4v22, K58 4v22, K59 4v22, K61 4v22, K62 4v22, K63 4v22, K64 4v22, K65 4v22, K66 4v22, K67 4v22, K68 4v22, K69 4v22 Firmware: µP1 8v50 02.05.06 ---		2007/07/16
Universal Radio Communication Tester	CMU 200	837983/052	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i>
	Standard calibration		2011/12/07
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	HW options: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B54V14, B56V14, B68 3v04, B95, PCMCIA, U65V02 SW options: K21 4v11, K22 4v11, K23 4v11, K24 4v11, K27 4v10, K28 4v10, K42 4v11, K43 4v11, K53 4v10, K65 4v10, K66 4v10, K68 4v10, Firmware: µP1 8v40 01.12.05 ---		2007/01/02
	SW: K62, K69		2008/11/03
Vector Signal Generator	SMU200A	100912	Rohde & Schwarz GmbH & Co. KG

Test Equipment Emission measurement devices

Lab ID: Lab 3
Description: Equipment for emission measurements
Serial Number: see single devices

Single Devices for Emission measurement devices

Single Device Name	Type	Serial Number	Manufacturer
Personal Computer	Dell	30304832059	Dell
Power Meter	NRVD	828110/016	Rohde & Schwarz GmbH & Co.KG
	Standard calibration		2014/05/13
Sensor Head A	NRV-Z1	827753/005	Rohde & Schwarz GmbH & Co.KG
	Standard calibration		2014/05/13
Signal Generator	SMR 20	846834/008	Rohde & Schwarz GmbH & Co. KG
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG
	Standard Calibration		2014/01/07
	HW/SW Status		Date of Start Date of End
	Firmware-Update 4.34.4 from 3.45 during calibration		2009/12/03

Test Equipment Multimeter 12

Lab ID: Lab 6
Description: Ex-Tech 520
Serial Number: 05157876

Single Devices for Multimeter 12

Single Device Name	Type	Serial Number	Manufacturer
Digital Multimeter 12 (Multimeter)	EX520	05157876	Extech Instruments Corp.
	Calibration Details		Last Execution
	Customized calibration		2013/12/04

Test Equipment Radio Lab Test Equipment

Lab ID: Lab 4
Description: Radio Lab Test Equipment

Single Devices for Radio Lab Test Equipment

Single Device Name	Type	Serial Number	Manufacturer
Broadband Power DividerWA1515 SMA		A856	Weinschel Associates
Coax Attenuator 10dB SMA 2W	4T-10	F9401	Weinschel Associates
Coax Attenuator 10dB SMA 2W	56-10	W3702	Weinschel Associates
Coax Attenuator 10dB SMA 2W	56-10	W3711	Weinschel Associates
Coax Cable Huber&Suhner	Sucotest 2,0m		Huber&Suhner
Coax Cable Rosenberger Micro Coax FA210A0010003030 SMA/SMA 1,0m	FA210A0010003030	54491-2	Rosenberger Micro-Coax
Power Meter	NRVD Standard calibration	828110/016	Rohde & Schwarz GmbH & Co.KG 2014/05/13
RF Step Attenuator RSP	RSP	833695/001	Rohde & Schwarz GmbH & Co.KG
Rubidium Frequency Standard	Datum, Model: MFS Standard calibration	5489/001	Datum-Beverly 2014/07/03
Sensor Head A	NRV-Z1 Standard calibration	827753/005	Rohde & Schwarz GmbH & Co.KG 2014/05/13
Signal Generator SME	SME03 Calibration Details Standard calibration	827460/016	Rohde & Schwarz GmbH & Co.KG Last Execution 2011/11/25
Signal Generator SMP	SMP02 Calibration Details Standard calibration	836402/008	Rohde & Schwarz GmbH & Co. KG Last Execution 2013/05/06
Spectrum Analyser	FSIQ26 Calibration Details Standard Calibration	840061/005	Rohde & Schwarz GmbH & Co. KG Last Execution 2013/02/12

Test Equipment Shielded Room 07

Lab ID: Lab 6
Description: Shielded Room 4m x 6m

Test Equipment T / A Logger 13

Lab ID: Lab 3, Lab 4
Description: Lufft Opus10 TPR
Type: Opus10 TPR
Serial Number: 13936

Single Devices for T / A Logger 13

Single Device Name	Type	Serial Number	Manufacturer
ThermoAirpressure Datalogger 13 (Environ)	Opus10 TPR (8253.00)	13936	Lufft Mess- und Regeltechnik GmbH
Calibration Details			Last Execution
Customized calibration			2013/02/07

Test Equipment T / H Logger 03

Lab ID: Lab 4
Description: Lufft Opus10
Serial Number: 7482

Single Devices for T / H Logger 03

Single Device Name	Type	Serial Number	Manufacturer
ThermoHygro DataloggerOpus10 THI (8152.00) 03 (Environ)	Opus10 THI (8152.00)	7482	Lufft Mess- und Regeltechnik GmbH
Calibration Details			Last Execution
Customized calibration			2013/02/07

Test Equipment T / H Logger 12

Lab ID: Lab 3
Description: Lufft Opus10
Serial Number: 12482

Single Devices for T / H Logger 12

Single Device Name	Type	Serial Number	Manufacturer
ThermoHygro DataloggerOpus10 THI (8152.00) 12 (Environ)	Opus10 THI (8152.00)	12482	Lufft Mess- und Regeltechnik GmbH
Calibration Details			Last Execution
Customized calibration			2013/01/07

Test Equipment T / H Logger 15

Lab ID: Lab 6
Description: Lufft Opus10
Serial Number: 13985

Single Devices for T / H Logger 15

Single Device Name	Type	Serial Number	Manufacturer
ThermoHygro DataloggerOpus10 THI (8152.00) 15 (Environ)	Opus10 THI (8152.00)	13985	Lufft Mess- und Regeltechnik GmbH
Calibration Details			Last Execution
Customized calibration			2013/01/07

Test Equipment Temperature Chamber 01

Lab ID: Lab 6
Manufacturer: see single devices
Description: Temperature Chamber KWP 120/70
Type: Weiss
Serial Number: see single devices

Single Devices for Temperature Chamber 01

Single Device Name	Type	Serial Number	Manufacturer
Temperature Chamber Weiss 01	KWP 120/70	59226012190010	Weiss Umwelttechnik GmbH
	Customized calibration		2014/03/12

Test Equipment Temperature Chamber 05

Lab ID: Lab 4
Manufacturer: see single devices
Description: Temperature Chamber VT4002
Type: Vötsch
Serial Number: see single devices

Single Devices for Temperature Chamber 05

Single Device Name	Type	Serial Number	Manufacturer
Temperature Chamber Vötsch 05	VT 4002	58566080550010	Vötsch
	Customized calibration		2014/03/11

Test Equipment WLAN RF Test Solution

Lab ID: Lab 6
Manufacturer: 7 layers AG
Description: Regulatory WLAN RF Tests
Type: WLAN RF
Serial Number: 001

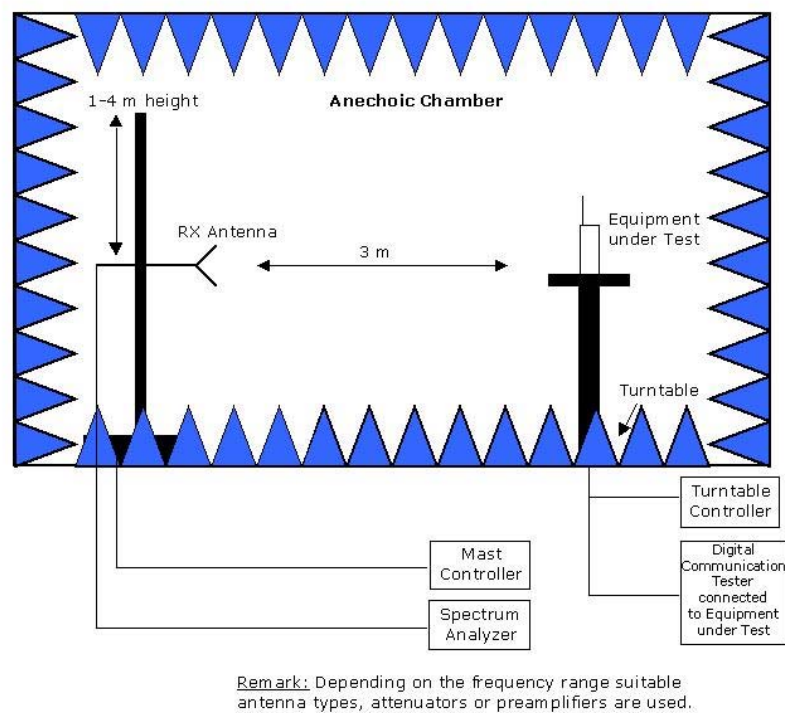
Single Devices for WLAN RF Test Solution

Single Device Name	Type	Serial Number	Manufacturer
Arbitrary Waveform Generator	TGA12101	284482	
Power Meter NRVD	NRVD Standard calibration Standard calibration	832025/059	2013/08/26 2014/08/29
Power Sensor NRV Z1 A	PROBE Standard calibration Standard calibration	832279/013	2013/08/28 2014/08/28
Power Supply	NGSM 32/10 Standard calibration	2725	2013/06/20
Rubidium Frequency Normal MFS	Datum MFS Standard calibration	002	Datum GmbH 2013/08/27
Signal Analyser FSIQ26	1119.6001.26	832695/007	Rohde & Schwarz GmbH & Co.KG
Spectrum Analyser	FSU26 Standard Calibration HW/SW Status	100136	Rohde & Schwarz GmbH & Co.KG 2014/01/06 Date of Start Date of End
	FSU FW Update to v4.61 SP3, K5 v4.60 and K73 v4.61		2011/12/05
Spectrum Analyser	FSU3 Standard calibration HW/SW Status	200046	Rohde & Schwarz GmbH & Co.KG 2014/07/01 Date of Start Date of End
	Firmware Version 4.51 SP1 Option FS-K72 4.50 SP1 Option FS-K73 4.50 SP1		2011/12/07
TOCT Switching Unit	Switching Unit	040107	7 layers, Inc.
Vector Signal Generator SMIQ03B	SMIQ03B Standard calibration	832870/017	2013/06/21

5 Photo Report

Please refer to external report.

6 Setup Drawings



Drawing 1: Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting groundplane.