FCC Measurement/Technical Report on

Radio Navigation System

AIVIP33A0

FCC ID: 2AUXS-AIVIP33A0
IC: 25847-AIVIP33A0

Test Report Reference: MDE_BOSCH_1925_FCC_03_rev01

Test Laboratory:
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40880 Ratingen
Germany

Deutsche Akkreditierungsstelle
D-PL-12140-01-01
D-PL-12140-01-02
D-PL-12140-01-03

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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1 APPLIED STANDARDS AND TEST SUMMARY

1.1 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 (10-1-17 Edition) and 15 (10-1-17 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 U-NII Test Procedures New Rules v02r01, 2017-12-14".

ANSI C63.10-2013 is applied.

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

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 1.3 Measurement Summary.

1.2 FCC-IC CORRELATION TABLE

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

UNII equipment

Measurement	FCC reference	IC reference
Conducted emissions on AC Mains	§ 15.207	RSS-Gen Issue 5: 8.8
Occupied bandwidth	§ 15.403 (i) (26 dB) / § 15.407 (e) (6 dB)	RSS-247 Issue 2: 6.2.1.1, 6.2.2.1, 6.2.3.1 (99%) RSS-247 Issue 2: 6.2.4.1 (6 dB)
Maximum conducted output power	§ 15.407 (a) (1),(2),(3),(4)	RSS-247 Issue 2: 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.1
Maximum power spectral density	§ 15.407 (a) (1),(2),(3),(5)	RSS-247 Issue 2: 6.2.1.1, 6.2.2.1, 6.2.3.1, 6.2.4.1
Transmitter undesirable emissions; General Field Strength Limits, Restricted Bands	§ 15.407 (b) § 15.209 (a)	RSS-Gen Issue 5: 6.13/8.9/8.10; RSS-247 Issue 2: 3.3/6.2 6.2.1.2, 6.2.2.2, 6.2.3.2, 6.2.4.2
Frequency stability	§ 15.407 (g)	RSS-Gen Issue 5: 6.11/8.11
Transmit Power Control (TPC) and Dynamic Frequency Selection (DFS)	§ 15.407 (h)	RSS-247 Issue 2: 6.2.2.1, 6.2.3.1, 6.3
Antenna requirement	§ 15.203 / 15.204	RSS-Gen Issue 5: 8.3
Receiver spurious emissions	–	-

1.3 MEASUREMENT SUMMARY

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.403 (i)**

26 dB Bandwidth

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-1	S01_AA01	2020-02-06	Performed	N/A
WLAN a, high, U-NII-2A	S01_AA01	2020-02-06	Performed	N/A
WLAN a, high, U-NII-2C	S01_AA01	2020-02-06	Performed	N/A
WLAN a, high, U-NII-3	S01_AA01	2020-02-06	Performed	N/A
WLAN a, low, U-NII-1	S01_AA01	2020-02-06	Performed	N/A
WLAN a, low, U-NII-2A	S01_AA01	2020-02-06	Performed	N/A
WLAN a, low, U-NII-2C	S01_AA01	2020-02-06	Performed	N/A
WLAN a, low, U-NII-3	S01_AA01	2020-02-06	Performed	N/A
WLAN a, mid, U-NII-1	S01_AA01	2020-02-06	Performed	N/A
WLAN a, mid, U-NII-2A	S01_AA01	2020-02-06	Performed	N/A
WLAN a, mid, U-NII-2C	S01_AA01	2020-02-06	Performed	N/A
WLAN a, mid, U-NII-3	S01_AA01	2020-02-06	Performed	N/A
WLAN ac 20 MHz, high, U-NII-1	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, high, U-NII-2A	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, high, U-NII-2C	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, high, U-NII-3	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, low, U-NII-1	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, low, U-NII-2A	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, low, U-NII-2C	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, low, U-NII-3	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, mid, U-NII-1	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, mid, U-NII-2A	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, mid, U-NII-2C	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 20 MHz, mid, U-NII-3	S01_AA01	2020-02-07	Performed	N/A
WLAN ac 40 MHz, high, U-NII-1	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 40 MHz, high, U-NII-2A	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 40 MHz, high, U-NII-2C	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 40 MHz, low, U-NII-1	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 40 MHz, low, U-NII-2A	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 40 MHz, low, U-NII-2C	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 40 MHz, mid, U-NII-2C	S01_AA01	2020-02-10	Performed	N/A
WLAN ac 80 MHz, high, U-NII-2C	S01_AA01	2020-02-12	Performed	N/A
WLAN ac 80 MHz, low, U-NII-2C	S01_AA01	2020-02-12	Performed	N/A
WLAN ac 80 MHz, mid, U-NII-1	S01_AA01	2020-02-12	Performed	N/A
WLAN ac 80 MHz, mid, U-NII-2A	S01_AA01	2020-02-12	Performed	N/A
WLAN ac 80 MHz, mid, U-NII-3	S01_AA01	2020-02-12	Performed	N/A

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.403 (i)**

26 dB Bandwidth

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN n 20 MHz, high, U-NII-1	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, high, U-NII-2A	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, high, U-NII-2C	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, high, U-NII-3	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, low, U-NII-1	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, low, U-NII-2A	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, low, U-NII-2C	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, low, U-NII-3	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, mid, U-NII-1	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, mid, U-NII-2A	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, mid, U-NII-2C	S01_AA01	2020-02-06	Performed	N/A
WLAN n 20 MHz, mid, U-NII-3	S01_AA01	2020-02-06	Performed	N/A
WLAN n 40 MHz, high, U-NII-1	S01_AA01	2020-02-10	Performed	N/A
WLAN n 40 MHz, high, U-NII-2A	S01_AA01	2020-02-10	Performed	N/A
WLAN n 40 MHz, high, U-NII-2C	S01_AA01	2020-02-10	Performed	N/A
WLAN n 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	Performed	N/A
WLAN n 40 MHz, low, U-NII-1	S01_AA01	2020-02-10	Performed	N/A
WLAN n 40 MHz, low, U-NII-2A	S01_AA01	2020-02-10	Performed	N/A
WLAN n 40 MHz, low, U-NII-2C	S01_AA01	2020-02-10	Performed	N/A
WLAN n 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	Performed	N/A
WLAN n 40 MHz, mid, U-NII-2C	S01_AA01	2020-02-10	Performed	N/A

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.407 (e)**

6 dB Bandwidth

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN ac 20 MHz, high, U-NII-3	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-3	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-3	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-3	S01_AA01	2020-02-12	Passed	Passed
WLAN n 20 MHz, high, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-3	S01_AA01	2020-02-06	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.407 (e)**

6 dB Bandwidth

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN n 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, IC RSS 247 Ch. 6.2.x**

99 % Bandwidth

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-1	S01_AA01	2020-02-06	N/A	Performed
WLAN a, high, U-NII-2A	S01_AA01	2020-02-06	N/A	Performed
WLAN a, high, U-NII-2C	S01_AA01	2020-02-06	N/A	Performed
WLAN a, high, U-NII-3	S01_AA01	2020-02-06	N/A	Performed
WLAN a, low, U-NII-1	S01_AA01	2020-02-06	N/A	Performed
WLAN a, low, U-NII-2A	S01_AA01	2020-02-06	N/A	Performed
WLAN a, low, U-NII-2C	S01_AA01	2020-02-06	N/A	Performed
WLAN a, low, U-NII-3	S01_AA01	2020-02-06	N/A	Performed
WLAN a, mid, U-NII-1	S01_AA01	2020-02-06	N/A	Performed
WLAN a, mid, U-NII-2A	S01_AA01	2020-02-06	N/A	Performed
WLAN a, mid, U-NII-2C	S01_AA01	2020-02-06	N/A	Performed
WLAN a, mid, U-NII-3	S01_AA01	2020-02-06	N/A	Performed
WLAN ac 20 MHz, high, U-NII-1	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, high, U-NII-2A	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, high, U-NII-2C	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, high, U-NII-3	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, low, U-NII-1	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, low, U-NII-2A	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, low, U-NII-2C	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, low, U-NII-3	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, mid, U-NII-1	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, mid, U-NII-2A	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, mid, U-NII-2C	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 20 MHz, mid, U-NII-3	S01_AA01	2020-02-07	N/A	Performed
WLAN ac 40 MHz, high, U-NII-1	S01_AA01	2020-02-10	N/A	Performed
WLAN ac 40 MHz, high, U-NII-2A	S01_AA01	2020-02-10	N/A	Performed
WLAN ac 40 MHz, high, U-NII-2C	S01_AA01	2020-02-10	N/A	Performed
WLAN ac 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	N/A	Performed
WLAN ac 40 MHz, low, U-NII-1	S01_AA01	2020-02-10	N/A	Performed
WLAN ac 40 MHz, low, U-NII-2A	S01_AA01	2020-02-10	N/A	Performed
WLAN ac 40 MHz, low, U-NII-2C	S01_AA01	2020-02-10	N/A	Performed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, IC RSS 247 Ch. 6.2.x**

99 % Bandwidth

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN ac 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	N/A	Performed
WLAN ac 40 MHz, mid, U-NII-2C	S01_AA01	2020-02-10	N/A	Performed
WLAN ac 80 MHz, high, U-NII-2C	S01_AA01	2020-02-12	N/A	Performed
WLAN ac 80 MHz, low, U-NII-2C	S01_AA01	2020-02-12	N/A	Performed
WLAN ac 80 MHz, mid, U-NII-1	S01_AA01	2020-02-12	N/A	Performed
WLAN ac 80 MHz, mid, U-NII-2A	S01_AA01	2020-02-12	N/A	Performed
WLAN ac 80 MHz, mid, U-NII-3	S01_AA01	2020-02-12	N/A	Performed
WLAN n 20 MHz, high, U-NII-1	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, high, U-NII-2A	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, high, U-NII-2C	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, high, U-NII-3	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, low, U-NII-1	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, low, U-NII-2A	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, low, U-NII-2C	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, low, U-NII-3	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, mid, U-NII-1	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, mid, U-NII-2A	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, mid, U-NII-2C	S01_AA01	2020-02-06	N/A	Performed
WLAN n 20 MHz, mid, U-NII-3	S01_AA01	2020-02-06	N/A	Performed
WLAN n 40 MHz, high, U-NII-1	S01_AA01	2020-02-10	N/A	Performed
WLAN n 40 MHz, high, U-NII-2A	S01_AA01	2020-02-10	N/A	Performed
WLAN n 40 MHz, high, U-NII-2C	S01_AA01	2020-02-10	N/A	Performed
WLAN n 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	N/A	Performed
WLAN n 40 MHz, low, U-NII-1	S01_AA01	2020-02-10	N/A	Performed
WLAN n 40 MHz, low, U-NII-2A	S01_AA01	2020-02-10	N/A	Performed
WLAN n 40 MHz, low, U-NII-2C	S01_AA01	2020-02-10	N/A	Performed
WLAN n 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	N/A	Performed
WLAN n 40 MHz, mid, U-NII-2C	S01_AA01	2020-02-10	N/A	Performed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.407 (a)(1)**

Maximum Conducted Output Power

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN a, high, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN a, high, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN a, high, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-1	S01_AA01	2020-02-06	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.407 (a)(1)**

Maximum Conducted Output Power
The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, low, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN ac 20 MHz, high, U-NII-1	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, high, U-NII-2A	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, high, U-NII-2C	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, high, U-NII-3	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-1	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-2A	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-2C	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-3	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-1	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-2A	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-2C	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-3	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 40 MHz, high, U-NII-1	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, high, U-NII-2A	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, high, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-1	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-2A	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, mid, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 80 MHz, low, U-NII-2C	S01_AA01	2020-02-12	Passed	Passed
WLAN ac 80 MHz, high, U-NII-2C	S01_AA01	2020-02-12	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-1	S01_AA01	2020-02-12	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-2A	S01_AA01	2020-02-12	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-3	S01_AA01	2020-02-12	Passed	Passed
WLAN n 20 MHz, high, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, high, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, high, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, high, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_AA01	2020-02-06	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.407 (a)(1)**

Maximum Conducted Output Power
The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN n 20 MHz, mid, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN n 40 MHz, high, U-NII-1	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, high, U-NII-2A	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, high, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-1	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-2A	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, mid, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.407 (a) (1),(5)**

Peak Power Spectral Density
The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN a, high, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN a, high, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN a, high, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN a, mid, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN ac 20 MHz, high, U-NII-1	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, high, U-NII-2A	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, high, U-NII-2C	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, high, U-NII-3	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-1	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-2A	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-2C	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, low, U-NII-3	S01_AA01	2020-02-07	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.407 (a) (1),(5)**

Peak Power Spectral Density
The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN ac 20 MHz, mid, U-NII-1	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-2A	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-2C	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 20 MHz, mid, U-NII-3	S01_AA01	2020-02-07	Passed	Passed
WLAN ac 40 MHz, high, U-NII-1	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, high, U-NII-2A	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, high, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-1	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-2A	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 40 MHz, mid, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN ac 80 MHz, low, U-NII-2C	S01_AA01	2020-02-12	Passed	Passed
WLAN ac 80 MHz, high, U-NII-2C	S01_AA01	2020-02-12	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-1	S01_AA01	2020-02-12	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-2A	S01_AA01	2020-02-12	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-3	S01_AA01	2020-02-12	Passed	Passed
WLAN n 20 MHz, high, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, high, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, high, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, high, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-1	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-2A	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-2C	S01_AA01	2020-02-06	Passed	Passed
WLAN n 20 MHz, mid, U-NII-3	S01_AA01	2020-02-06	Passed	Passed
WLAN n 40 MHz, high, U-NII-1	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, high, U-NII-2A	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, high, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, high, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-1	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-2A	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_AA01	2020-02-10	Passed	Passed
WLAN n 40 MHz, mid, U-NII-2C	S01_AA01	2020-02-10	Passed	Passed

Undesirable Emissions; General Field Strength Limits
The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Measurement range, Subband	**Setup**	**Date**	**FCC**	**IC**
WLAN a, high, 1GHz - 26GHz, U-NII-1	S01_AC01	2020-02-07	Passed	Passed
WLAN a, high, 1GHz - 26GHz, U-NII-2A	S01_AC01	2020-02-07	Passed	Passed
WLAN a, high, 1GHz - 26GHz, U-NII-2C	S01_AC01	2020-02-08	Passed	Passed
WLAN a, high, 1GHz - 26GHz, U-NII-3	S01_AC01	2020-02-09	Passed	Passed
WLAN a, high, 9kHz - 30MHz, U-NII-2C	S01_AC01	2020-02-12	Passed	Passed
WLAN a, low, 1GHz - 26GHz, U-NII-1	S01_AC01	2020-02-07	Passed	Passed
WLAN a, low, 1GHz - 26GHz, U-NII-2A	S01_AC01	2020-02-07	Passed	Passed
WLAN a, low, 1GHz - 26GHz, U-NII-2C	S01_AC01	2020-02-08	Passed	Passed
WLAN a, low, 1GHz - 26GHz, U-NII-3	S01_AC01	2020-02-09	Passed	Passed
WLAN a, low, 9kHz - 30MHz, U-NII-1	S01_AC01	2020-02-12	Passed	Passed
WLAN a, mid, 1GHz - 26GHz, U-NII-1	S01_AC01	2020-02-07	Passed	Passed
WLAN a, mid, 1GHz - 26GHz, U-NII-2A	S01_AC01	2020-02-07	Passed	Passed
WLAN a, mid, 1GHz - 26GHz, U-NII-2C	S01_AC01	2020-02-08	Passed	Passed
WLAN a, mid, 1GHz - 26GHz, U-NII-3	S01_AC01	2020-02-09	Passed	Passed
WLAN a, mid, 26GHz - 40GHz, U-NII-1	S01_AC01	2020-03-01	Passed	Passed
WLAN a, mid, 26GHz - 40GHz, U-NII-2A	S01_AC01	2020-03-01	Passed	Passed
WLAN a, mid, 26GHz - 40GHz, U-NII-2C	S01_AC01	2020-03-01	Passed	Passed
WLAN a, mid, 26GHz - 40GHz, U-NII-3	S01_AC01	2020-03-01	Passed	Passed
WLAN a, mid, 30MHz - 1GHz, U-NII-1	S01_AC01	2020-02-14	Passed	Passed
WLAN a, mid, 30MHz - 1GHz, U-NII-2A	S01_AC01	2020-02-14	Passed	Passed
WLAN a, mid, 30MHz - 1GHz, U-NII-2C	S01_AC01	2020-02-14	Passed	Passed
WLAN a, mid, 30MHz - 1GHz, U-NII-3	S01_AC01	2020-02-14	Passed	Passed
WLAN n 20 MHz, high, 1GHz - 26GHz, U-NII-1	S01_AC01	2020-02-09	Passed	Passed
WLAN n 20 MHz, high, 1GHz - 18GHz, U-NII-2A	S01_AC01	2020-02-17	Passed	Passed
WLAN n 20 MHz, high, 1GHz - 18GHz, U-NII-2C	S01_AC01	2020-02-13	Passed	Passed
WLAN n 20 MHz, high, 1GHz - 18GHz, U-NII-3	S01_AC01	2020-02-17	Passed	Passed
WLAN n 20 MHz, low, 1GHz - 18GHz, U-NII-1	S01_AC01	2020-02-09	Passed	Passed
WLAN n 20 MHz, low, 1GHz - 18GHz, U-NII-2A	S01_AC01	2020-02-09	Passed	Passed
WLAN n 20 MHz, low, 1GHz - 18GHz, U-NII-2C	S01_AC01	2020-02-13	Passed	Passed
WLAN n 20 MHz, low, 1GHz - 18GHz, U-NII-3	S01_AC01	2020-02-14	Passed	Passed
WLAN n 20 MHz, mid, 1GHz - 18GHz, U-NII-1	S01_AC01	2020-02-09	Passed	Passed
WLAN n 20 MHz, mid, 1GHz - 18GHz, U-NII-2A	S01_AC01	2020-02-10	Passed	Passed
WLAN n 20 MHz, mid, 1GHz - 18GHz, U-NII-2C	S01_AC01	2020-02-13	Passed	Passed
WLAN n 20 MHz, mid, 1GHz - 18GHz, U-NII-3	S01_AC01	2020-02-18	Passed	Passed
WLAN n 40 MHz, high, 1GHz - 26GHz, U-NII-2A	S01_AC01	2020-02-16	Passed	Passed
WLAN n 40 MHz, high, 1GHz - 26GHz, U-NII-2C	S01_AC01	2020-02-17	Passed	Passed
WLAN n 40 MHz, high, 1GHz - 26GHz, U-NII-3	S01_AC01	2020-02-17	Passed	Passed
WLAN n 40 MHz, high, 30MHz - 1GHz, U-NII-1	S01_AC01	2020-02-14	Passed	Passed
WLAN n 40 MHz, high, 30MHz - 1GHz, U-NII-2A	S01_AC01	2020-02-14	Passed	Passed
WLAN n 40 MHz, high, 30MHz - 1GHz, U-NII-3	S01_AC01	2020-02-14	Passed	Passed
WLAN n 40 MHz, low, 1GHz - 26GHz, U-NII-1	S01_AC01	2020-02-09	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407	FCC §15.407 (b), (1),(2),(3),(4); FCC §15.205, §15.209, §15.407 (b) (5),(6)

Undesirable Emissions; General Field Strength Limits
The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Measurement range, Subband	Setup	Date	FCC	IC
WLAN n 40 MHz, low, 1GHz - 26GHz, U-NII-2C	S01_AC01	2020-02-16	Passed	Passed
WLAN n 40 MHz, low, 1GHz - 26GHz, U-NII-3	S01_AC01	2020-02-17	Passed	Passed
WLAN n 40 MHz, low, 30MHz - 1GHz, U-NII-1	S01_AC01	2020-02-14	Passed	Passed
WLAN n 40 MHz, mid, 1GHz - 26GHz, U-NII-2C	S01_AC01	2020-02-16	Passed	Passed
WLAN n 40 MHz, mid, 30MHz - 1GHz, U-NII-2C	S01_AC01	2020-02-14	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407	FCC §15.407 (b), (1),(2),(3),(4)

Band Edge
The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN a, high, U-NII-2A	S01_AC01	2020-02-07	Passed	Passed
WLAN a, high, U-NII-2C	S01_AC01	2020-02-08	Passed	Passed
WLAN a, high, U-NII-3	S01_AC01	2020-02-09	Passed	Passed
WLAN a, low, U-NII-1	S01_AC01	2020-02-06	Passed	Passed
WLAN a, low, U-NII-2C	S01_AC01	2020-02-08	Passed	Passed
WLAN a, low, U-NII-3	S01_AC01	2020-02-09	Passed	Passed
WLAN ac 20 MHz, high, U-NII-2A	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 20 MHz, high, U-NII-2C	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 20 MHz, high, U-NII-3	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 20 MHz, low, U-NII-1	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 20 MHz, low, U-NII-2C	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 20 MHz, low, U-NII-3	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 40 MHz, high, U-NII-2A	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 40 MHz, high, U-NII-2C	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 40 MHz, high, U-NII-3	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 40 MHz, low, U-NII-1	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 40 MHz, low, U-NII-2C	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 40 MHz, low, U-NII-3	S01_AC01	2020-02-18	Passed	Passed
WLAN ac 80 MHz, low, U-NII-2C	S01_AC01	2020-02-17	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-1	S01_AC01	2020-02-17	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-2A	S01_AC01	2020-02-17	Passed	Passed
WLAN ac 80 MHz, mid, U-NII-3	S01_AC01	2020-02-17	Passed	Passed
WLAN n 20 MHz, high, U-NII-2A	S01_AC01	2020-02-17	Passed	Passed
WLAN n 20 MHz, high, U-NII-2C	S01_AC01	2020-02-17	Passed	Passed
WLAN n 20 MHz, high, U-NII-3	S01_AC01	2020-02-17	Passed	Passed
WLAN n 20 MHz, low, U-NII-1	S01_AC01	2020-02-09	Passed	Passed
WLAN n 20 MHz, low, U-NII-2C	S01_AC01	2020-02-17	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_AC01	2020-02-17	Passed	Passed
WLAN n 40 MHz, high, U-NII-2A	S01_AC01	2020-02-16	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.407 (b), (1),(2),(3),(4)**

Band Edge

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode Radio Technology, Operating Frequency, Subband	Setup	Date	FCC	IC
WLAN n 40 MHz, high, U-NII-2C	S01_AC01	2020-02-17	Passed	Passed
WLAN n 40 MHz, high, U-NII-3	S01_AC01	2020-02-17	Passed	Passed
WLAN n 40 MHz, low, U-NII-1	S01_AC01	2020-02-16	Passed	Passed
WLAN n 40 MHz, low, U-NII-2C	S01_AC01	2020-02-16	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_AC01	2020-02-17	Passed	Passed

47 CFR CHAPTER I FCC PART 15 Subpart E §15.407 **FCC §15.31, §15.407 (h)**

Dynamic Frequency Selection

The measurement was performed according to ANSI C63.10 **Final Result**

OP-Mode	Setup	FCC	IC
WLAN ac 80 MHz normal connection	S01_AH01	2020-03-19	Passed	Passed

N/A: Not applicable
N/P: Not performed

2 REVISION HISTORY / SIGNATURES

Report version control			
Version	**Release date**	**Change Description**	**Version validity**
initial	2020-05-11	--	invalid
Rev 01	2020-05-29	- Center frequencies of tested channel in section 4.6 changed	valid
--	--	--	--

COMMENT: -

(responsible for accreditation scope)
Dipl.-Ing. Andreas Petz

(responsible for testing and report)
Dipl.-Ing. Daniel Gall

7 layers GmbH, Borsigstr. 11
40880 Ratingen, Germany
Phone +49 (0)2102 749 0

3 ADMINISTRATIVE DATA

3.1 TESTING LABORATORY

Company Name:	7layers GmbH
Address:	Borsigstr. 11 40880 Ratingen Germany

The test facility is accredited by the following accreditation organisation:

Laboratory accreditation no:	DAkkS D-PL-12140-01-01| D-PL-12140-01-02 | D-PL-12140-01-03
FCC Designation Number:	DE0015
FCC Test Firm Registration:	929146
ISED CAB Identifier	DE0007; ISED#: 3699A
Responsible for accreditation scope:	Dipl.-Ing. Andreas Petz
Report Template Version:	2020-02-10

3.2 PROJECT DATA

Responsible for testing and report:	Dipl.-Ing. Daniel Gall
Employees who performed the tests:	documented internally at 7Layers
Date of Report:	2020-05-11
Testing Period:	2020-02-06 to 2020-03-18

3.3 APPLICANT DATA

Company Name:	Robert Bosch GmbH; Business Unit CM
Address:	Robert-Bosch-Platz 1 70839 Gerlingen Germany
Contact Person:	Mr. Thomas Dargel

3.4 MANUFACTURER DATA

Company Name:	please see Applicant Data
Address:	
Contact Person:	

4 TEST OBJECT DATA

4.1 GENERAL EUT DESCRIPTION

Kind of Device product description	The EUT is an automotive infotainment head unit. It is supporting Bluetooth and WLAN radio technology in the 2.4 GHz and 5 GHz ISM Band.
Product name	Radio Navigation System
Type	AIVIP33A0
Declared EUT data by the supplier	
General product description	The EUT is an automotive infotainment head unit. It is supporting Bluetooth and WLAN radio technology in the 2.4 GHz and 5 GHz ISM Band.
Ports of the device	- TH18 - TH40 (incl. DC) - USB (1m) - USB (1m) - Display HSD (3m) - RVC HSD (3m) - GNSS (3m) - FM (3m) - AM (3m) - SXM
Special software used for testing	Labtool
Specific product description	WLAN mode a, n20/40 and ac20/40/80 MHz are supported in the 5 GHz band by the device.
Antenna Type / Gain	Integral: - Subb.1 : 7.7 dBi - Subb. 2A : 7.4 dBi - Subb. 2C : 5.9 dBi - Subb. 3 : 5.7 dBi
Tested Datarates	WLAN a: 6 Mbps WLAN n/ac: MCS0
Tested Modulation Type	WLAN: Mode a: OFDM Modulation, 6 Mbps Mode n: OFDM Modulation, MCS 0 (20/40 MHz) Mode ac: OFDM Modulation, MCS 0 (20/40/80 MHz)
Voltage Level	13.5 VDC
Voltage Type	DC (vehicular battery)
DFS capability	Only in station Mode (STA). In Access Point Mode (AP) DFS channels are not used.

4.2 EUT MAIN COMPONENTS

Sample Name	Sample Code	Description
EUT A	DE1050019aa01	conducted sample
Sample Parameter	**Value**	
Serial No.	0000128	
HW Version	001	
SW Version	3213_191123	
Integral Antenna	Replaced by a temporary SMA Connector	

Sample Name	Sample Code	Description
EUT C	DE1050019ac01	radiated sample
Sample Parameter	**Value**	
Serial No.	0000089	
HW Version	001	
SW Version	3213_191123	
Integral Antenna	Yes	

Sample Name	Sample Code	Description
EUT H	DE1050019ah01	conducted sample
Sample Parameter	**Value**	
Serial No.	0000039	
HW Version	001	
SW Version	3213_191123	
Integral Antenna	Replaced by a temporary SMA Connector	

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

4.3 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.

Device	Details (Manufacturer, Type Model, OUT Code)	Description
-	-	-

4.4 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.

Device	Details (Manufacturer, Type Model, HW, SW, S/N)	Description
AUX1	Schärfer electronic, FPD-Link III, -, -, 716 1 9428 0005	A-IVI Video-Generator connected to Display HSD Port
AUX2	-, -, , -, -,	Ethernet Termination-Box connected to RVC HSD port
AUX3	-, -, , -, -,	Load Box A-IVI (Scope 2) #1.8

4.5 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
S01_AA01	EUT A,	Setup for conducted measurement
S01_AC01	EUT C, AUX1, AUX2, AUX3	Setup for radiated measurement
S01_AH01	EUT H,	Setup for DFS Testing

4.6 OPERATING MODES / TEST CHANNELS

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

U-NII-Subband 1 5150 - 5250 MHz			U-NII-Subband 2A 5250 - 5350 MHz			U-NII-Subband 2C 5470 - 5725 MHz			U-NII-Subband 3 5725 - 5850 MHz			Nom. BW
low	mid	high	low	mid	high	low	mid	high	low	mid	high	20 MHz
36	44	48	52	56	64	100	116	140	149	157	165	Ch.-No.
5180	5220	5240	5260	5280	5320	5500	5580	5700	5745	5785	5825	MHz

low	mid	high	low	mid	high	low	mid	high	low	mid	high	40 MHz
38	-	46	54	-	62	102	110	134	151	-	159	Ch.-No.
5190	-	5230	5270	-	5310	5510	5550	5670	5755	-	5795	MHz
low	mid	high	low	mid	high	low	mid	high	low	mid	high	80 MHz
-	42	-	-	58	-	106	-	122	-	155	-	Ch.-No.
-	5210	-	-	5290	-	5530	-	5610	-	5775	-	MHz

4.7 PRODUCT LABELLING

4.7.1 FCC ID LABEL

Please refer to the documentation of the applicant.

4.7.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.

5 TEST RESULTS

5.1 26 DB BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.1.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up 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.

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

Analyzer settings:

- Please see measurement plots

5.1.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart E, §15.403 (i)
There exist 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 result was applied.

5.1.3 TEST PROTOCOL

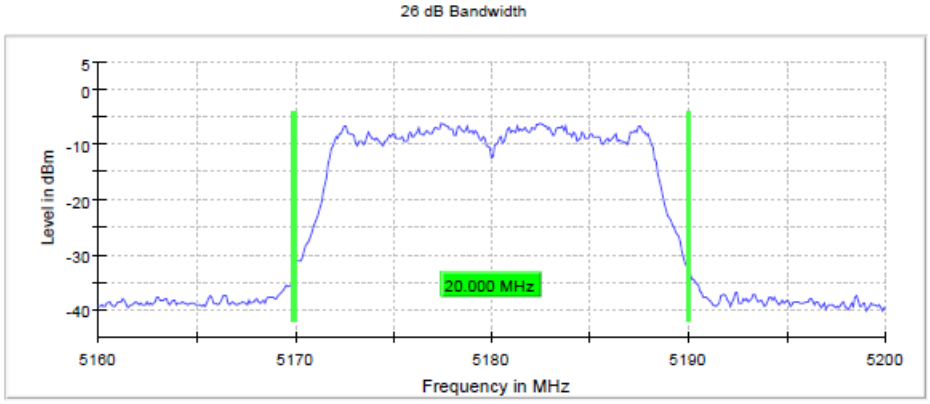
Ambient temperature: 25 °C
Air Pressure: 31 hPa
Humidity: 1025 %

Radio Technology	Operating Frequency	Subband	26 dB Bandwidth [MHz]
WLAN a	low	U-NII-1	20.0
WLAN a	mid	U-NII-1	19.9
WLAN a	high	U-NII-1	19.7
WLAN a	low	U-NII-2A	19.8
WLAN a	mid	U-NII-2A	19.7
WLAN a	high	U-NII-2A	19.9
WLAN a	low	U-NII-2C	19.9
WLAN a	mid	U-NII-2C	19.8
WLAN a	high	U-NII-2C	19.6
WLAN a	low	U-NII-3	19.8
WLAN a	mid	U-NII-3	19.7
WLAN a	high	U-NII-3	19.7
WLAN n 20 MHz	low	U-NII-1	20.4
WLAN n 20 MHz	mid	U-NII-1	20.2
WLAN n 20 MHz	high	U-NII-1	20.3
WLAN n 20 MHz	low	U-NII-2A	19.9
WLAN n 20 MHz	mid	U-NII-2A	20.3
WLAN n 20 MHz	high	U-NII-2A	20.1
WLAN n 20 MHz	low	U-NII-2C	20.2
WLAN n 20 MHz	mid	U-NII-2C	20.2
WLAN n 20 MHz	high	U-NII-2C	20.2
WLAN n 20 MHz	low	U-NII-3	20.2
WLAN n 20 MHz	mid	U-NII-3	20.2
WLAN n 20 MHz	high	U-NII-3	20.2
WLAN n 40 MHz	low	U-NII-1	40.5
WLAN n 40 MHz	high	U-NII-1	40.7
WLAN n 40 MHz	low	U-NII-2A	40.8
WLAN n 40 MHz	high	U-NII-2A	40.4
WLAN n 40 MHz	low	U-NII-2C	40.8
WLAN n 40 MHz	mid	U-NII-2C	40.2
WLAN n 40 MHz	high	U-NII-2C	40.7
WLAN n 40 MHz	low	U-NII-3	40.5
WLAN n 40 MHz	high	U-NII-3	40.5
WLAN ac 20 MHz	low	U-NII-1	20.5
WLAN ac 20 MHz	mid	U-NII-1	20.1
WLAN ac 20 MHz	high	U-NII-1	20.2
WLAN ac 20 MHz	low	U-NII-2A	20.3
WLAN ac 20 MHz	mid	U-NII-2A	20.3
WLAN ac 20 MHz	high	U-NII-2A	20.3
WLAN ac 20 MHz	low	U-NII-2C	20.3
WLAN ac 20 MHz	mid	U-NII-2C	20.2
WLAN ac 20 MHz	high	U-NII-2C	20.3
WLAN ac 20 MHz	low	U-NII-3	20.2
WLAN ac 20 MHz	mid	U-NII-3	20.1
WLAN ac 20 MHz	high	U-NII-3	20.2
WLAN ac 40 MHz	low	U-NII-1	40.7
WLAN ac 40 MHz	high	U-NII-1	40.2
WLAN ac 40 MHz	low	U-NII-2A	40.4
WLAN ac 40 MHz	high	U-NII-2A	40.2
WLAN ac 40 MHz	low	U-NII-2C	39.9
WLAN ac 40 MHz	mid	U-NII-2C	40.1
WLAN ac 40 MHz	high	U-NII-2C	40.5
WLAN ac 40 MHz	low	U-NII-3	40.2
WLAN ac 40 MHz	high	U-NII-3	40.8
WLAN ac 80 MHz	mid	U-NII-1	82.5
WLAN ac 80 MHz	mid	U-NII-2A	83.0
WLAN ac 80 MHz	low	U-NII-2C	83.5
WLAN ac 80 MHz	high	U-NII-2C	83.0
WLAN ac 80 MHz	mid	U-NII-3	83.0

Remark: Please see next sub-clause for the measurement plot.

5.1.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

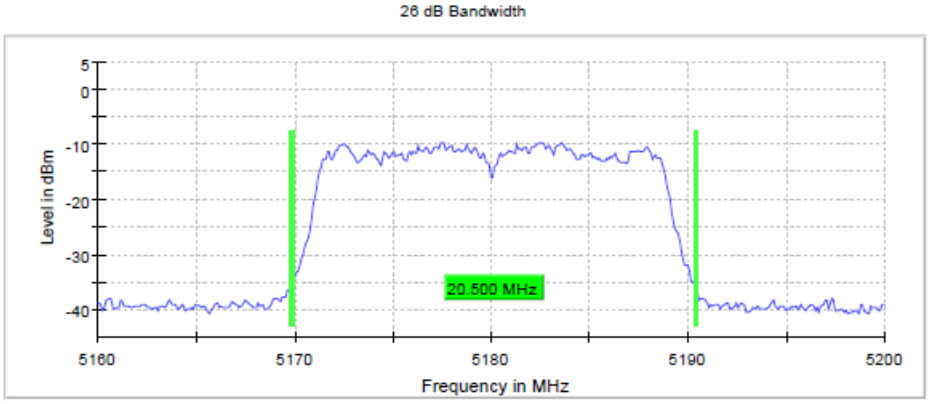
Radio Technology = WLAN a mode, Frequency = low, Subband U-NIII-1 (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.16000 GHz
Stop Frequency	5.20000 GHz
Span	40.000 MHz
RBW	200.000 kHz
VBW	1.000 MHz
SweepPoints	400
Sweeptime	28.477 µs
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	50 / max. 150
Stable	5 / 5
Max Stable Difference	0.21 dB

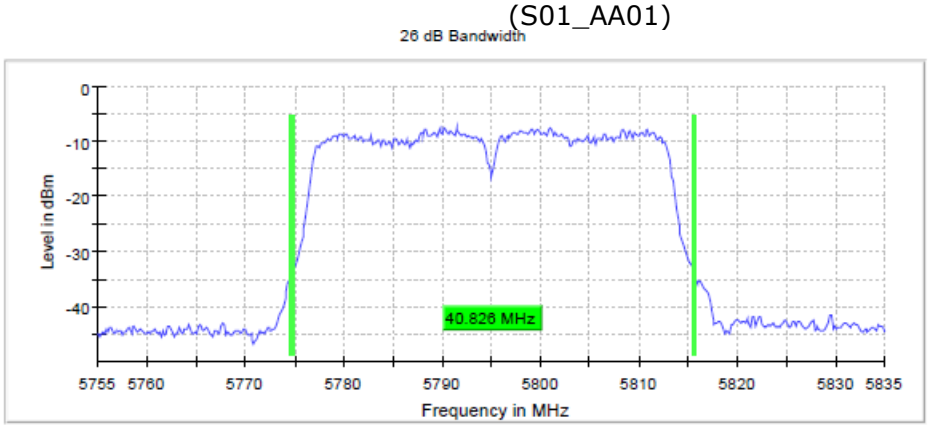
Radio Technology = WLAN ac 20 MHz, Frequency = low, Subband U-NIII-1 (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.16000 GHz
Stop Frequency	5.20000 GHz
Span	40.000 MHz
RBW	200.000 kHz
VBW	1.000 MHz
SweepPoints	400
Sweeptime	28.477 µs
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	37 / max. 150
Stable	5 / 5
Max Stable Difference	0.09 dB

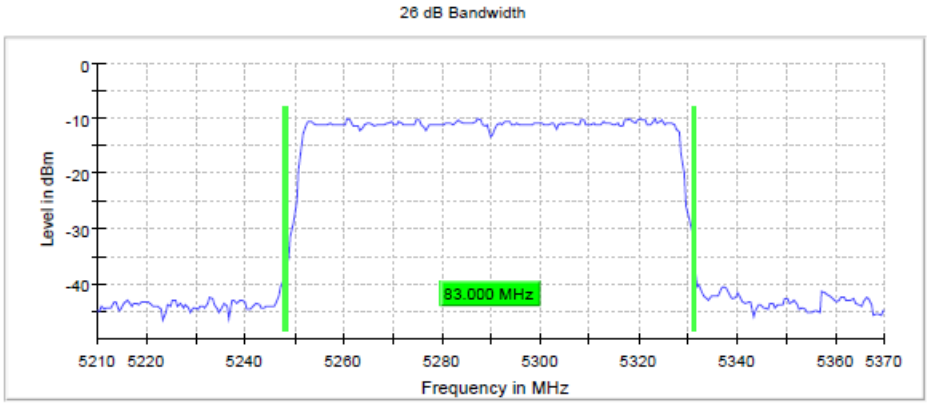
Radio Technology = WLAN ac 40 MHz, Frequency = high, Subband U-NIII-3 (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.75500 GHz
Stop Frequency	5.83500 GHz
Span	80.000 MHz
RBW	300.000 kHz
VBW	1.000 MHz
SweepPoints	533
Sweeptime	31.621 µs
Reference Level	-10.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	94 / max. 150
Stable	5 / 5
Max Stable Difference	0.24 dB

Radio Technology = WLAN ac 80 MHz, Frequency = low, Subband U-NIII-2C (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.21000 GHz
Stop Frequency	5.37000 GHz
Span	160.000 MHz
RBW	1.000 MHz
VBW	3.000 MHz
SweepPoints	320
Sweeptime	22.875 µs
Reference Level	-20.000 dBm
Attenuation	0.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	76 / max. 150
Stable	5 / 5
Max Stable Difference	0.00 dB

5.1.5 TEST EQUIPMENT USED

- R&S TS8997

5.2 6 DB BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.2.1 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 (smallest) emission bandwidth.

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

Analyzer settings:

- See measurement plots

5.2.2 TEST REQUIREMENTS / LIMITS

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.

5.2.3 TEST PROTOCOL

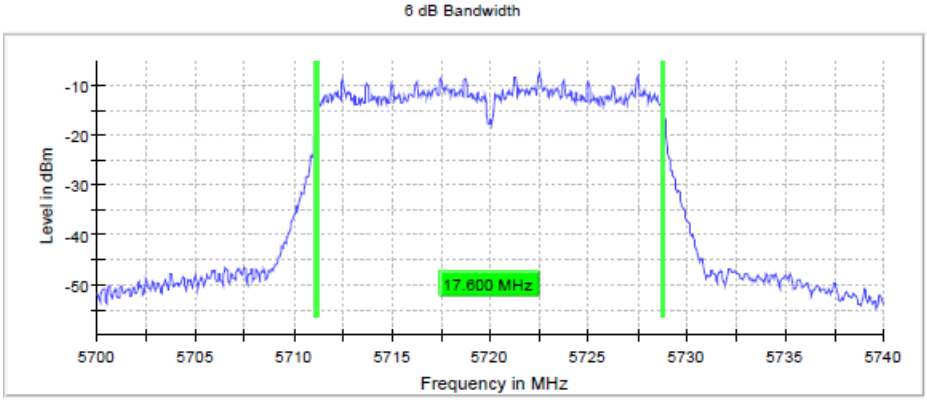
Ambient temperature:	25 °C
Air Pressure:	31 hPa
Humidity:	1025 %

Radio Technology	Operating Frequency	6 dB Bandwidth [MHz]	Limit [MHz]	Margin [MHz]	Min. 6 dB Frequency [MHz]	Max. 6 dB Frequency [MHz]
WLAN a	low	16.40	0.5	11489.46	5736.78	5753.18
WLAN a	mid	16.40	0.5	11569.46	5776.78	5793.18
WLAN a	high	16.40	0.5	11649.46	5816.78	5833.18
WLAN n 20 MHz	low	17.40	0.5	11489.66	5736.38	5753.78
WLAN n 20 MHz	mid	17.40	0.5	11569.66	5776.38	5793.78
WLAN n 20 MHz	high	17.40	0.5	11649.66	5816.38	5833.78
WLAN n 40 MHz	low	35.75	0.5	11509.61	5737.18	5772.93
WLAN n 40 MHz	high	35.76	0.5	11589.60	5777.17	5812.93
WLAN ac 20 MHz	low	17.60	0.5	11489.46	5736.18	5753.78
WLAN ac 20 MHz	mid	17.60	0.5	11569.46	5776.18	5793.78
WLAN ac 20 MHz	high	17.60	0.5	11649.46	5816.18	5833.78
WLAN ac 40 MHz	low	35.75	0.5	11509.61	5737.18	5772.93
WLAN ac 40 MHz	high	35.75	0.5	11589.61	5777.18	5812.93
WLAN ac 80 MHz	mid	76.40	0.5	11549.46	5736.78	5813.18

Remark: Please see next sub-clause for the measurement plot.

5.2.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

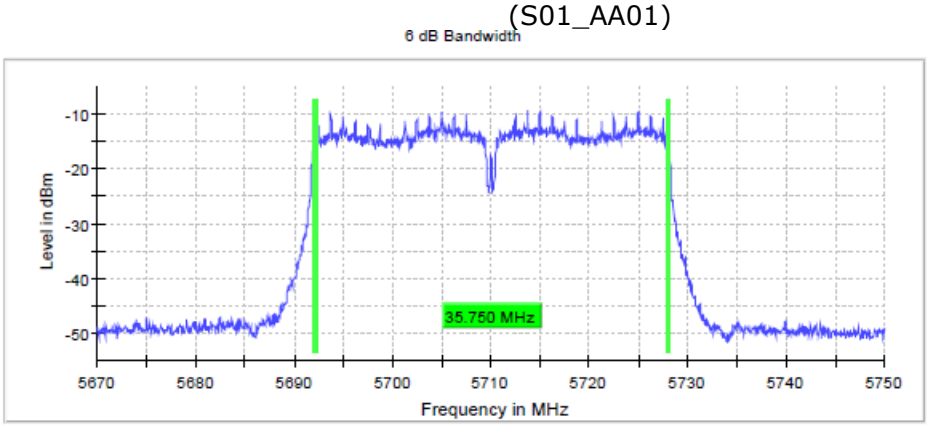
Radio Technology = WLAN ac 20, Operating Frequency = low, Subband U-NII-3 (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.70000 GHz
Stop Frequency	5.74000 GHz
Span	40.000 MHz
RBW	100.000 kHz
VBW	300.000 kHz
SweepPoints	800
Sweeptime	56.836 µs
Reference Level	-20.000 dBm
Attenuation	0.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	84 / max. 150
Stable	5 / 5
Max Stable Difference	0.01 dB

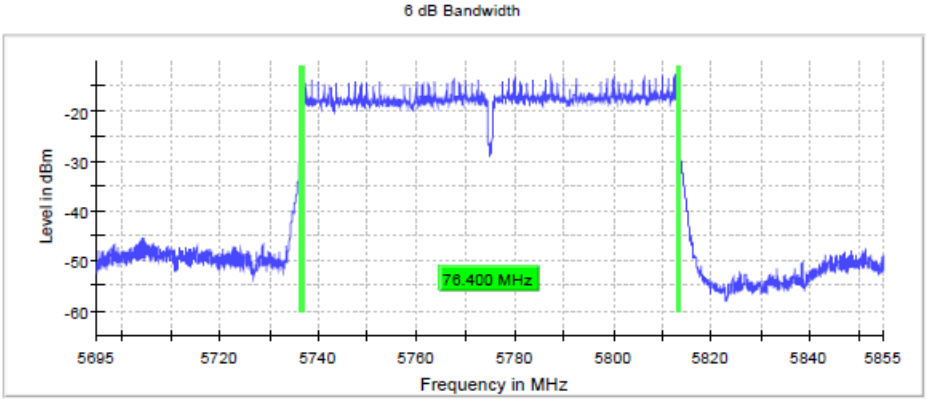
Radio Technology = WLAN ac 40, Operating Frequency = low, Subband U-NII-3 (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.67000 GHz
Stop Frequency	5.75000 GHz
Span	80.000 MHz
RBW	100.000 kHz
VBW	300.000 kHz
SweepPoints	1600
Sweeptime	94.727 µs
Reference Level	-10.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	53 / max. 150
Stable	5 / 5
Max Stable Difference	0.29 dB

Radio Technology = WLAN ac 80, Operating Frequency = low, Subband U-NII-3 (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.69500 GHz
Stop Frequency	5.85500 GHz
Span	160.000 MHz
RBW	100.000 kHz
VBW	300.000 kHz
SweepPoints	3200
Sweeptime	189.453 µs
Reference Level	-20.000 dBm
Attenuation	0.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	78 / max. 150
Stable	5 / 5
Max Stable Difference	0.26 dB

5.2.5 TEST EQUIPMENT USED

- R&S TS8997

5.3 99 % BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.3.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up 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.

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

Analyzer settings:

Please see measurement plots

The 99 % measurement function of the spectrum analyser function was used to determine the 99 % bandwidth.

5.3.2 TEST REQUIREMENTS / LIMITS

No applicable limit:

5.3.3 TEST PROTOCOL

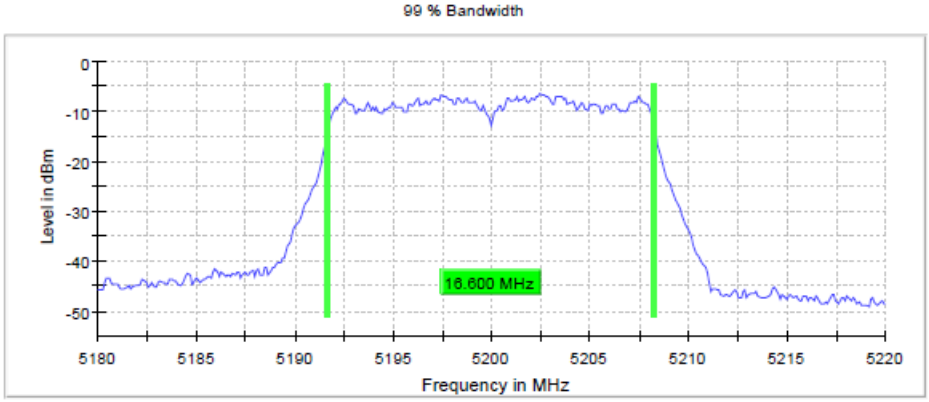
Ambient temperature: 25 °C
Air Pressure: 31 hPa
Humidity: 1025 %

Radio Technology	Operating Frequency	Subband	99% Bandwidth [MHz]
WLAN a	low	U-NII-1	16.6
WLAN a	mid	U-NII-1	16.5
WLAN a	high	U-NII-1	16.7
WLAN a	low	U-NII-2A	16.5
WLAN a	mid	U-NII-2A	16.7
WLAN a	high	U-NII-2A	16.6
WLAN a	low	U-NII-2C	16.7
WLAN a	mid	U-NII-2C	16.7
WLAN a	high	U-NII-2C	16.6
WLAN a	low	U-NII-3	16.6
WLAN a	mid	U-NII-3	16.6
WLAN a	high	U-NII-3	16.6
WLAN n 20 MHz	low	U-NII-1	17.6
WLAN n 20 MHz	mid	U-NII-1	17.7
WLAN n 20 MHz	high	U-NII-1	17.7
WLAN n 20 MHz	low	U-NII-2A	17.7
WLAN n 20 MHz	mid	U-NII-2A	17.7
WLAN n 20 MHz	high	U-NII-2A	17.6
WLAN n 20 MHz	low	U-NII-2C	17.7
WLAN n 20 MHz	mid	U-NII-2C	17.7
WLAN n 20 MHz	high	U-NII-2C	17.7
WLAN n 20 MHz	low	U-NII-3	17.6
WLAN n 20 MHz	mid	U-NII-3	17.6
WLAN n 20 MHz	high	U-NII-3	17.6
WLAN n 40 MHz	low	U-NII-1	36.3
WLAN n 40 MHz	high	U-NII-1	36.3
WLAN n 40 MHz	low	U-NII-2A	36.3
WLAN n 40 MHz	high	U-NII-2A	36.3
WLAN n 40 MHz	low	U-NII-2C	36.3
WLAN n 40 MHz	mid	U-NII-2C	36.3
WLAN n 40 MHz	high	U-NII-2C	36.3
WLAN n 40 MHz	low	U-NII-3	36.3
WLAN n 40 MHz	high	U-NII-3	36.3
WLAN ac 20 MHz	low	U-NII-1	17.7
WLAN ac 20 MHz	mid	U-NII-1	17.7
WLAN ac 20 MHz	high	U-NII-1	17.7
WLAN ac 20 MHz	low	U-NII-2A	17.7
WLAN ac 20 MHz	mid	U-NII-2A	17.7
WLAN ac 20 MHz	high	U-NII-2A	17.7
WLAN ac 20 MHz	low	U-NII-2C	17.6
WLAN ac 20 MHz	mid	U-NII-2C	17.6
WLAN ac 20 MHz	high	U-NII-2C	17.6
WLAN ac 20 MHz	low	U-NII-3	17.7
WLAN ac 20 MHz	mid	U-NII-3	17.7
WLAN ac 20 MHz	high	U-NII-3	17.6
WLAN ac 40 MHz	low	U-NII-1	36.3
WLAN ac 40 MHz	high	U-NII-1	36.3
WLAN ac 40 MHz	low	U-NII-2A	36.3
WLAN ac 40 MHz	high	U-NII-2A	36.3
WLAN ac 40 MHz	low	U-NII-2C	36.3
WLAN ac 40 MHz	mid	U-NII-2C	36.3
WLAN ac 40 MHz	high	U-NII-2C	36.3
WLAN ac 40 MHz	low	U-NII-3	36.3
WLAN ac 40 MHz	high	U-NII-3	36.3
WLAN ac 80 MHz	mid	U-NII-1	76.5
WLAN ac 80 MHz	mid	U-NII-2A	76.5
WLAN ac 80 MHz	low	U-NII-2C	76.5
WLAN ac 80 MHz	high	U-NII-2C	76.5

WLAN ac 80 MHz	mid	U-NII-3	77.0

5.3.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

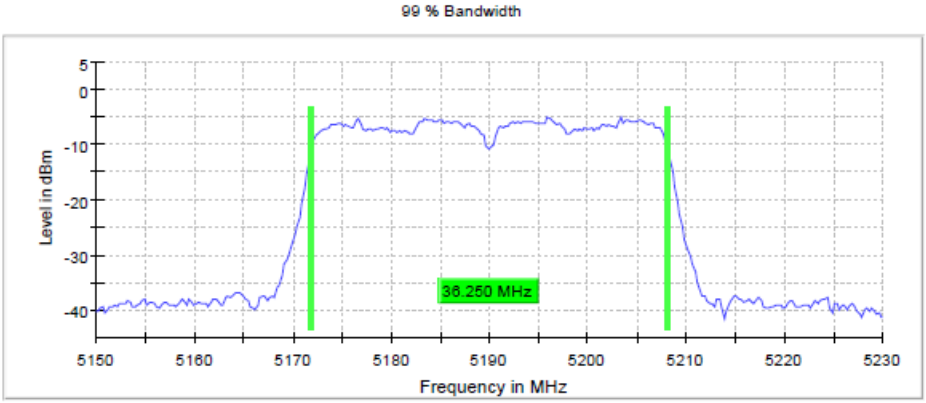
Radio Technology = WLAN n 20, Operating Frequency = mid, Subband U-NII-I (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.18000 GHz
Stop Frequency	5.22000 GHz
Span	40.000 MHz
RBW	200.000 kHz
VBW	1.000 MHz
SweepPoints	400
Sweeptime	28.477 µs
Reference Level	-10.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	62 / max. 150
Stable	5 / 5
Max Stable Difference	0.00 dB

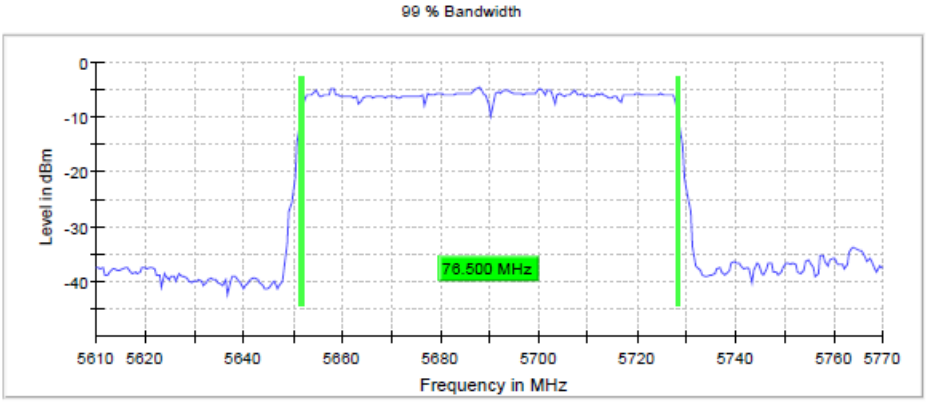
Radio Technology = WLAN n 40, Operating Frequency = low, Subband U-NII-I (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.15000 GHz
Stop Frequency	5.23000 GHz
Span	80.000 MHz
RBW	500.000 kHz
VBW	2.000 MHz
SweepPoints	320
Sweeptime	18.906 µs
Reference Level	-10.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	78 / max. 150
Stable	5 / 5
Max Stable Difference	0.00 dB

Radio Technology = WLAN ac 80, Operating Frequency = mid, Subband U-NII-3 (S01_AA01)



Measurement

Setting	Instrument Value
Start Frequency	5.61000 GHz
Stop Frequency	5.77000 GHz
Span	160.000 MHz
RBW	1.000 MHz
VBW	3.000 MHz
SweepPoints	320
Sweeptime	22.875 µs
Reference Level	-10.000 dBm
Attenuation	10.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	38 / max. 150
Stable	5 / 5
Max Stable Difference	0.01 dB

5.3.5 TEST EQUIPMENT USED

- R&S TS8997

5.4 MAXIMUM CONDUCTED OUTPUT POWER

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.4.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the output power measurements. The results recorded were measured with the modulation which produces the worst-case (highest) output power. The reference level of the spectrum analyzer was set higher than the output power of the EUT.

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

Analyzer settings:
- Resolution Bandwidth (RBW): 1 MHz
- Video Bandwidth (VBW): 3 MHz
- Trace: Average, RMS power averaging mode
- Sweeps: 100
- Sweeptime: 5 ms
- Detector: RMS
- Trigger: gated mode

The channel power function of the spectrum analyser was used (Used channel bandwidth = nominal bandwidth)

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", method **SA-1**.

5.4.2 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 – 5.850 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-247, 6.2.1 (1), Band 5150-5250 MHz, indoor operation only:
Limit (e.i.r.p.): 200 mW (23 dBm) or 10 + 10 log10 B [dBm], whichever power is less.
B is the 99% emission bandwidth in MHz.

RSS-247, 6.2.2 (1), Band 5250-5350 MHz:
Limits:
Maximum conducted Power: 250 mW (24 dBm) or 11 + 10 log10 B [dBm], whichever power is less.
e.i.r.p.: 1.0 W (30 dBm) or 17 + 10 log10 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-247, 6.2.3 (1), Bands 5470-5600 MHz and 5650-5725 MHz:
Limits:
Maximum conducted Power: 250 mW (24 dBm) or 11 + 10 log10 B [dBm], whichever power is less.
e.i.r.p.: 1.0 W (30 dBm) or 17 + 10 log10 B [dBm], whichever power is less.

RSS-247, 6.2.4 (1), Band 5725-5825 MHz:
Limits:
Maximum conducted Power: 1W (30 dBm) or 17 + 10 log10 B [dBm], whichever power is less.
e.i.r.p.: 4.0 W (36 dBm) or 23 + 10 log10 B [dBm], whichever power is less.

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

5.4.3 TEST PROTOCOL

Ambient temperature: 23 - 26 °C
Air Pressure: 1002 – 1014 hPa
Humidity: 32 - 43 %

WLAN a-Mode; 20 MHz; 6 Mbit/s					FCC				ISED			
U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	FCC EIRP Limit [dBm]	Margin [dB]	ISED Cond. Limit [dBm]	Margin [dB]	ISED EIRP Limit [dBm]	Margin [dB]
1	36	5180	3.7	11.4	22.3	18.6	21.0	9.6	N/A	-	11.8	0.4
	44	5220	3.5	11.2	22.3	18.8	21.0	9.8	N/A	-	11.8	0.6
	48	5240	3.1	10.8	22.3	19.2	21.0	10.2	N/A	-	11.8	1.0
2A	52	5260	3.2	10.6	22.6	19.4	27.0	16.4	N/A	-	11.8	1.2
	56	5280	3.5	10.9	22.6	19.0	27.0	16.1	N/A	-	11.8	0.9
	64	5320	3.4	10.8	22.6	19.2	27.0	16.2	N/A	-	11.8	1.0
2C	100	5500	5.4	11.3	24.0	18.6	27.0	15.7	23.2	17.8	27.0	15.7
	116	5580	6.9	12.8	24.0	17.1	27.0	14.2	23.2	16.3	27.0	14.2
	140	5700	7.6	13.5	23.9	16.3	27.0	13.5	23.2	15.6	27.0	13.5
3	149	5745	7.5	13.2	30.0	22.5	36.0	22.8	30.0	22.5	36.0	22.8
	157	5785	7.6	13.3	30.0	22.4	36.0	22.7	30.0	22.4	36.0	22.7
	165	5825	7.2	12.9	30.0	22.8	36.0	23.1	30.0	22.8	36.0	23.1

WLAN n-Mode; 20 MHz; MCS 0					FCC				ISED			
U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	FCC EIRP Limit [dBm]	Margin [dB]	ISED Cond. Limit [dBm]	Margin [dB]	ISED EIRP Limit [dBm]	Margin [dB]
1	36	5180	3.5	11.2	22.3	18.8	21.0	9.8	N/A	-	11.8	0.6
	44	5220	3.7	11.4	22.3	18.6	21.0	9.6	N/A	-	11.8	0.4
	48	5240	3.3	11.0	22.3	19.0	21.0	10.0	N/A	-	11.8	0.8
2A	52	5260	3.0	10.4	22.6	19.6	27.0	16.6	N/A	-	11.8	1.4
	56	5280	3.4	10.8	22.6	19.2	27.0	16.2	N/A	-	11.8	1.0
	64	5320	3.4	10.8	22.6	19.2	27.0	16.2	N/A	-	11.8	1.0
2C	100	5500	5.6	11.5	24.0	18.4	27.0	15.5	23.5	17.9	27.0	15.5
	116	5580	6.9	12.8	24.0	17.1	27.0	14.2	23.5	16.6	27.0	14.2
	140	5700	7.5	13.4	24.0	16.5	27.0	13.6	23.5	16.0	27.0	13.6
3	149	5745	7.5	13.2	30.0	22.5	36.0	22.8	30.0	22.5	36.0	22.8
	157	5785	7.6	13.3	30.0	22.4	36.0	22.7	30.0	22.4	36.0	22.7
	165	5825	7.1	12.8	30.0	22.9	36.0	23.2	30.0	22.9	36.0	23.2

WLAN n-Mode; 40 MHz; MCS 0					FCC				ISED			
U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	FCC EIRP Limit [dBm]	Margin [dB]	ISED Cond. Limit [dBm]	Margin [dB]	ISED EIRP Limit [dBm]	Margin [dB]
1	38	5190	3.8	11.5	22.3	18.5	21.0	9.5	N/A	-	11.8	0.3
	46	5230	3.9	11.6	22.3	18.4	21.0	9.4	N/A	-	11.8	0.2
2A	54	5270	3.7	11.1	22.6	18.9	27.0	15.9	N/A	-	11.8	0.7
	62	5310	3.6	11.0	22.6	19.0	27.0	16.0	N/A	-	11.8	0.8
2C	102	5510	6.3	12.2	24.0	17.7	27.0	14.8	24.0	17.7	27.0	14.8
	110	5550	7.3	13.2	24.0	16.7	27.0	13.8	24.0	16.7	27.0	13.8
	134	5670	8.2	14.1	24.0	15.8	27.0	12.9	24.0	15.8	27.0	12.9
3	151	5755	8.0	13.7	30.0	22.0	36.0	22.3	30.0	22.0	36.0	22.3
	159	5795	7.9	13.6	30.0	22.1	36.0	22.4	30.0	22.1	36.0	22.4
												23

WLAN ac-Mode; 20 MHz; MCS 0					FCC				ISED			
U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	FCC EIRP Limit [dBm]	Margin [dB]	ISED Cond. Limit [dBm]	Margin [dB]	ISED EIRP Limit [dBm]	Margin [dB]
1	36	5180	0.7	8.4	22.3	21.6	21.0	12.6	N/A	-	11.8	3.4
	44	5220	-0.2	7.5	22.3	22.5	21.0	13.5	N/A	-	11.8	4.3
	48	5240	-1.1	6.6	22.3	23.4	21.0	14.4	N/A	-	11.8	5.2
2A	52	5260	-1.4	6.0	22.6	24.0	27.0	21.0	N/A	-	11.8	5.8
	56	5280	-1.4	6.0	22.6	24.0	27.0	21.0	N/A	-	11.8	5.8
	64	5320	-0.7	6.7	22.6	23.3	27.0	20.3	N/A	-	11.8	5.1
2C	100	5500	1.7	7.6	24.0	22.3	27.0	19.4	23.5	21.8	27.0	19.4
	116	5580	3.0	8.9	24.0	21.0	27.0	18.1	23.5	20.5	27.0	18.1
	140	5700	3.8	9.7	24.0	20.2	27.0	17.3	23.5	19.7	27.0	17.3
3	149	5745	3.6	9.3	30.0	26.4	36.0	26.7	30.0	26.4	36.0	26.7
	157	5785	3.6	9.3	30.0	26.4	36.0	26.7	30.0	26.4	36.0	26.7
	165	5825	3.4	9.1	30.0	26.6	36.0	26.9	30.0	26.6	36.0	26.9

WLAN ac-Mode; 40 MHz; MCS 0					FCC				ISED			
U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	FCC EIRP Limit [dBm]	Margin [dB]	ISED Cond. Limit [dBm]	Margin [dB]	ISED EIRP Limit [dBm]	Margin [dB]
1	38	5190	0.2	7.9	22.3	22.1	21.0	13.1	N/A	-	11.8	3.9
	46	5230	-0.3	7.4	22.3	22.6	21.0	13.6	N/A	-	11.8	4.4
2A	54	5270	-0.2	7.2	22.6	22.8	27.0	19.8	N/A	-	11.8	4.6
	62	5310	-0.4	7.0	22.6	23.0	27.0	20.0	N/A	-	11.8	4.8
2C	102	5510	2.4	8.3	24.0	21.6	27.0	18.7	24.0	21.6	27.0	18.7
	110	5550	3.1	9.0	24.0	20.9	27.0	18.0	24.0	20.9	27.0	18.0
	134	5670	4.2	10.1	24.0	19.8	27.0	16.9	24.0	19.8	27.0	16.9
3	151	5755	3.9	9.6	30.0	26.1	36.0	26.4	30.0	26.1	36.0	26.4
	159	5795	3.7	9.4	30.0	26.3	36.0	26.6	30.0	26.3	36.0	26.6

WLAN ac-Mode; 80 MHz; MCS 0					FCC				ISED			
U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	FCC EIRP Limit [dBm]	Margin [dB]	ISED Cond. Limit [dBm]	Margin [dB]	ISED EIRP Limit [dBm]	Margin [dB]
1	42	5210	-0.1	7.6	22.3	22.4	21.0	13.4	N/A	-	11.8	4.2
2A	58	5290	-0.7	6.7	22.6	23.3	27.0	20.3	N/A	-	11.8	5.1
2C	106	5530	3.1	9.0	24.0	20.9	27.0	18.0	24.0	20.9	27.0	18.0
	122	5610	4.0	9.9	24.0	20.0	27.0	17.1	24.0	20.0	27.0	17.1
3	155	5775	4.1	9.8	30.0	25.9	36.0	26.2	30.0	25.9	36.0	26.2

Remark: Please see next sub-clause for the measurement plot.

5.4.4 TEST EQUIPMENT USED

- R&S TS8997

5.5 PEAK POWER SPECTRAL DENSITY

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.5.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up in a shielded room to perform the 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 the spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:
- Resolution Bandwidth (RBW): 1 MHz
- Video Bandwidth (VBW): 3 MHz
- Trace: Average, RMS power averaging mode
- Sweeps: 100
- Sweeptime: 5 ms
- Detector: RMS
- Trigger: gated mode

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", method **SA-1**.

5.5.2 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:
(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 – 5.850 GHz bands:
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-247, 6.2.1 (1), Band 5150-5250 MHz, indoor operation only:
Limit (e.i.r.p.): 10 dBm/MHz.

RSS-247, 6.2.2 (1), Band 5250-5350 MHz:
Limit: 11 dBm/MHz.

RSS-247, 6.2.3 (1), Bands 5470-5600 MHz and 5650-5725 MHz:
Limit: 11 dBm/MHz.

RSS-247, 6.2.4 (1), Band 5725-5850 MHz:
Limit: 30 dBm/500 kHz.

5.5.3 TEST PROTOCOL

Ambient temperature: 23 - 26 °C
Air Pressure: 1002 – 1014 hPa
Humidity: 32 - 43 %

WLAN a-Mode; 20 MHz; 6 Mbit/s

U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm / MHz]	E.I.R.P MPSD [dBm / MHz]	FCC Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED E.I.R.P limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]
1	36	5180	-7.4	0.3	9.3	16.7	N/A	-	10.0	9.7
	44	5220	-7.9	-0.2	9.3	17.2	N/A	-	10.0	10.2
	48	5240	-7.9	-0.2	9.3	17.2	N/A	-	10.0	10.2
2A	52	5260	-8.1	-0.7	9.6	17.7	11.0	19.1	N/A	-
	56	5280	-7.9	-0.5	9.6	17.5	11.0	18.9	N/A	-
	64	5320	-7.6	-0.2	9.6	17.2	11.0	18.6	N/A	-
2C	100	5500	-5.8	0.1	11.0	16.8	11.0	16.8	N/A	-
	116	5580	-4.2	1.7	11.0	15.2	11.0	15.2	N/A	-
	140	5700	-3.6	2.3	11.0	14.6	11.0	14.6	N/A	-
3	149	5745	-6.8	-1.1	30.0	36.8	30.0	36.8	36.0	37.1
	157	5785	-6.8	-1.1	30.0	36.8	30.0	36.8	36.0	37.1
	165	5825	-7.1	-1.4	30.0	37.1	30.0	37.1	36.0	37.4

WLAN n-Mode; 20 MHz; MCS0

U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm / MHz]	E.I.R.P MPSD [dBm / MHz]	FCC Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED E.I.R.P limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]
1	36	5180	-7.6	0.1	9.3	16.9	N/A	-	10.0	9.9
	44	5220	-7.7	0.0	9.3	17.0	N/A	-	10.0	10.0
	48	5240	-8.4	-0.7	9.3	17.7	N/A	-	10.0	10.7
2A	52	5260	-8.2	-0.8	9.6	17.8	11.0	19.2	N/A	-
	56	5280	-8.2	-0.8	9.6	17.8	11.0	19.2	N/A	-
	64	5320	-8.1	-0.7	9.6	17.7	11.0	19.1	N/A	-
2C	100	5500	-5.9	0.0	11.0	16.9	11.0	16.9	N/A	-
	116	5580	-4.3	1.6	11.0	15.3	11.0	15.3	N/A	-
	140	5700	-3.7	2.2	11.0	14.7	11.0	14.7	N/A	-
3	149	5745	-7.0	-1.3	30.0	37.0	30.0	37.0	36.0	37.3
	157	5785	-6.9	-1.2	30.0	36.9	30.0	36.9	36.0	37.2
	165	5825	-7.4	-1.7	30.0	37.4	30.0	37.4	36.0	37.7

WLAN n-Mode; 40 MHz; MCS0										
U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm / MHz]	E.I.R.P MPSD [dBm / MHz]	FCC Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED E.I.R.P limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]
1	38	5190	-6.8	0.9	9.3	16.1	N/A	-	10.0	9.1
	46	5230	-10.6	-2.9	9.3	19.9	N/A	-	10.0	12.9
2A	54	5270	-10.7	-3.3	9.6	20.3	11.0	21.7	N/A	-
	62	5310	-10.7	-3.3	9.6	20.3	11.0	21.7	N/A	-
2C	102	5510	-7.8	-1.9	11.0	18.8	11.0	18.8	N/A	-
	110	5550	-6.9	-1.0	11.0	17.9	11.0	17.9	N/A	-
	134	5670	-6.4	-0.5	11.0	17.4	11.0	17.4	N/A	-
3	151	5755	-9.5	-3.8	30.0	39.5	30.0	39.5	36.0	39.8
	159	5795	-9.5	-3.8	30.0	39.5	30.0	39.5	36.0	39.8

WLAN ac-Mode; 20 MHz; MCS0										
U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm / MHz]	E.I.R.P MPSD [dBm / MHz]	FCC Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED E.I.R.P limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]
1	36	5180	-10.4	-2.7	9.3	19.7	N/A	-	10.0	12.7
	44	5220	-11.3	-3.6	9.3	20.6	N/A	-	10.0	13.6
	48	5240	-12.2	-4.5	9.3	21.5	N/A	-	10.0	14.5
2A	52	5260	-12.5	-5.1	9.6	22.1	11.0	23.5	N/A	-
	56	5280	-12.1	-4.7	9.6	21.7	11.0	23.1	N/A	-
	64	5320	-12.2	-4.8	9.6	21.8	11.0	23.2	N/A	-
2C	100	5500	-9.4	-3.5	11.0	20.4	11.0	20.4	N/A	-
	116	5580	-8.7	-2.8	11.0	19.7	11.0	19.7	N/A	-
	140	5700	-7.8	-1.9	11.0	18.8	11.0	18.8	N/A	-
3	149	5745	-11.0	-5.3	30.0	41.0	30.0	41.0	36.0	41.3
	157	5785	-11.0	-5.3	30.0	41.0	30.0	41.0	36.0	41.3
	165	5825	-11.2	-5.5	30.0	41.2	30.0	41.2	36.0	41.5

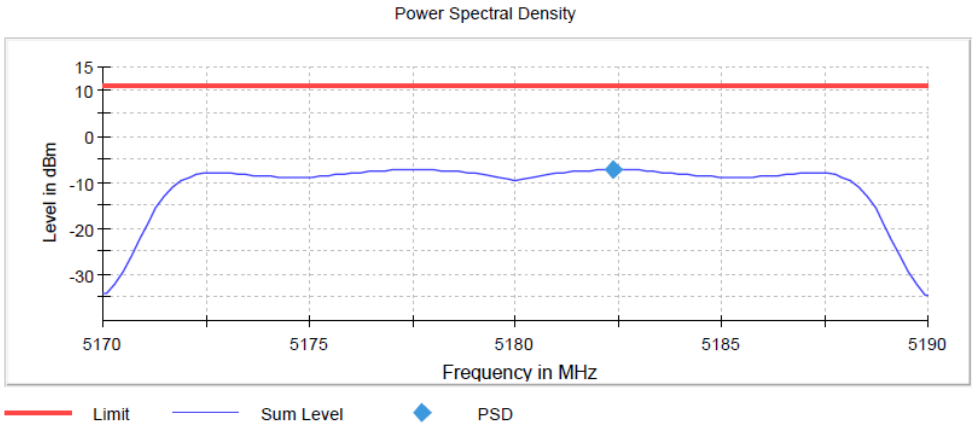
WLAN ac-Mode; 40 MHz; MCS0										
U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm / MHz]	E.I.R.P MPSD [dBm / MHz]	FCC Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]	ISED E.I.R.P limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)	Margin [dB]
1	38	5190	-14.1	-6.4	9.3	23.4	N/A	-	10.0	16.4
	46	5230	-14.8	-7.1	9.3	24.1	N/A	-	10.0	17.1
2A	54	5270	-14.6	-7.2	9.6	24.2	11.0	25.6	N/A	-
	62	5310	-14.6	-7.2	9.6	24.2	11.0	25.6	N/A	-
2C	102	5510	-11.3	-5.4	11.0	22.3	11.0	22.3	N/A	-
	110	5550	-10.7	-4.8	11.0	21.7	11.0	21.7	N/A	-
	134	5670	-10.3	-4.4	11.0	21.3	11.0	21.3	N/A	-
3	151	5755	-13.2	-7.5	30.0	43.2	30.0	43.2	36.0	43.5
	159	5795	-13.2	-7.5	30.0	43.2	30.0	43.2	36.0	43.5

WLAN ac-Mode; 80 MHz; MCS0										
U-NII-Subband	**Ch. No.**	**Freq. [MHz]**	**MPSD [dBm / MHz]**	**E.I.R.P MPSD [dBm / MHz]**	**FCC Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)**	**Margin [dB]**	**ISED Limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)**	**Margin [dB]**	**ISED E.I.R.P limit [dBm/MHz] or [dBm/500kHz] (U-NII-3)**	**Margin [dB]**
1	42	5210	-17.9	-10.2	9.3	27.2	N/A	-	10.0	20.2
2A	58	5290	-18.9	-11.5	9.6	28.5	11.0	29.9	N/A	-
2C	106	5530	-13.8	-7.9	11.0	24.8	11.0	24.8	N/A	-
	122	5610	-13.6	-7.7	11.0	24.6	11.0	24.6	N/A	-
3	155	5775	-16.6	-10.9	30.0	46.6	30.0	46.6	36.0	46.9

Remark: Please see next sub-clause for the measurement plot.

5.5.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Radio Technology = WLAN a 20MHz, Operating Frequency = , Subband = U-NII-1 (S01_AA01)



5.5.5 TEST EQUIPMENT USED

- R&S TS8997

5.6 UNDESIRABLE EMISSIONS; GENERAL FIELD STRENGTH LIMITS

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.6.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m² in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.
The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered from a DC power source.

1. Measurement up to 30 MHz
The Loop antenna HFH2-Z2 is used.

Step 1: pre measurement
- Anechoic chamber
- Antenna distance: 3 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 MHz and 0.15 – 30 MHz
- Frequency steps: 0.05 kHz and 2.25 kHz
- IF–Bandwidth: 0.2 kHz and 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)

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: 0.2 - 10 kHz
- Measuring time / Frequency step: 1 s

2. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan
This is a preliminary test to identify the highest amplitudes relative to the limit.
Settings for step 1:
- Antenna distance: 3 m
- Detector: Peak-Maxhold / Quasipeak (FFT-based)
- Frequency range: 30 – 1000 MHz

- Frequency steps: 30 kHz
- IF–Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range: –180° to 90°
- 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: Adjustment 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 slowly vary by ± 45° 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 will also slowly vary by ± 100 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: ± 45 ° around the determined value
- Height variation range: ± 100 cm around the determined value
- Antenna Polarisation: max. value determined in step 1

Step 3: 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 (< 1 GHz)
- 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.

3. Measurement above 1 GHz

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

Step 1:

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.

All steps were performed with one height (1.5 m) of the receiving antenna only.

The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.

The turn table step size (azimuth angle) for the preliminary measurement is 45 °.

Above 26 GHz the measurement distance is reduced to 1 m.

Step 2:

Due to the fact, that in this frequency range the test is performed in a fully anechoic room, the height scan of the receiving antenna instep 2 is omitted. Instead of this, a maximum search with a step size ± 45° for the elevation axis is performed.
The turn table azimuth will slowly vary by ± 22.5°.
The elevation angle will slowly vary by ± 45°
EMI receiver settings (for all steps):
- Detector: Peak, Average
- IF Bandwidth = 1 MHz

Step 3:
Spectrum analyser settings for step 3:
- Detector: Peak / Average
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 1 MHz
- Measuring time: 1 s

5.6.2 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-247, 6.2.1 (2), Emissions outside the band 5150-5250 MHz, indoor operation only:
Limit: –27 dBm/MHz EIRP outside of the band 5150–5250 MHz.

RSS-247, 6.2.2 (2), Emissions outside the band 5250-5350 MHz:
Limit: –27 dBm/MHz EIRP outside of the band 5250–5350 MHz.

RSS-247, 6.2.3 (2), 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-247, 6.2.4 (2), 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
The provisions of §§ 15.203 and 15.205 are included.

§15.407 (b)(6)
Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.

§15.407 (b)(7)
The provisions of §15.205 apply to intentional radiators operating under this section

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

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
0.009 – 0.49	2400/F(kHz)@300m	3	(48.5 – 13.8)@300m
0.49 – 1.705	24000/F(kHz)@30m	3	(33.8 – 23.0)@30m
1.705 – 30	30@30m	3	29.5@30m

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (2).

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
30 – 88	100@3m	3	40.0@3m
88 – 216	150@3m	3	43.5@3m
216 – 960	200@3m	3	46.0@3m
960 - 26000	500@3m	3	54.0@3m
26000 - 40000	500@3m	1	54.0@3m

The measured values above 26 GHz are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§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

Limit types (in result tables on next page):
RB – Emissions falls into a "Restricted Band" according FCC §§15.205 and 15.209 *)
UE – "Undesirable Emission Limit" according FCC §15.407
BE-RB – Band Edge Limit basing on "Restricted Band Limits"
BE-UE – Band Edge Limit basing on "Undesirable Emission Limit"
*) Below 1 GHz the limits of §15.209 are applied for all frequencies.

5.6.3 TEST PROTOCOL

Ambient temperature: 23 - 26 °C
Air Pressure: 1002 – 1014 hPa
Humidity: 32 - 43 %
WLAN a-Mode; 20 MHz; 6 Mbit/s
Applied duty cycle correction (AV): 0.1 dB

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	2717.9	37.3	AV	1000	54.0	16.7	RB
36	5180	2718.1	50.0	PEAK	1000	74.0	24.0	RB
44	5220	45.7	30.0	PEAK	120	40.0	10.0	RB
44	5220	47.8	30.6	PEAK	120	40.0	9.4	RB
44	5220	101.9	33.1	PEAK	120	43.5	10.4	RB
44	5220	234.0	38.8	PEAK	120	46.0	7.2	RB
44	5220	876.4	41.6	PEAK	120	46.0	4.4	RB
44	5220	939.0	33.8	PEAK	120	46.0	12.2	RB
56	5280	55.3	32.9	PEAK	120	40.0	7.1	RB
56	5280	56.0	33.6	PEAK	120	40.0	6.4	RB
56	5280	101.9	28.7	PEAK	120	43.5	14.8	RB
56	5280	234.4	37.5	PEAK	120	46.0	8.6	RB
56	5280	876.4	40.9	PEAK	120	46.0	5.1	RB
56	5280	939.0	32.7	PEAK	120	46.0	13.3	RB
100	5500	5469.1	58.3	PEAK	1000	74.0	15.7	RB
116	5580	240.0	20.8	QP	120	46.0	25.2	RB
116	5580	876.4	40.8	QP	120	46.0	5.2	RB
116	5580	939.0	33.0	QP	120	46.0	13.0	RB
116	5580	56.0	33.2	PEAK	120	40.0	6.8	RB
116	5580	101.9	28.6	PEAK	120	43.5	14.9	RB
116	5580	234.7	34.7	PEAK	120	46.0	11.3	RB
116	5580	876.4	40.9	PEAK	120	46.0	5.1	RB
116	5580	939.0	32.2	PEAK	120	46.0	13.8	RB
140	5700	5725.4	60.9	PEAK	1000	74.0	13.1	RB
149	5745	5725.0	65.8	PEAK	1000	122.2	56.4	RB
157	5785	245.1	26.1	PEAK	120	46.0	19.9	RB
157	5785	876.4	40.9	AV	120	46.0	5.2	RB
157	5785	939.0	33.6	PEAK	120	46.0	12.4	RB
157	5785	55.3	31.3	PEAK	120	40.0	8.8	RB
157	5785	56.0	31.4	PEAK	120	40.0	8.6	RB
157	5785	235.6	37.0	PEAK	120	46.0	9.0	RB
157	5785	876.4	40.8	PEAK	120	46.0	5.2	RB
157	5785	939.0	32.5	PEAK	120	46.0	13.5	RB
165	5825	2645.3	57.5	PEAK	1000	68.2	10.7	UE
165	5825	5851.0	58.9	PEAK	1000	118.7	59.8	RB

WLAN n-Mode; 20 MHz; MCS0
Applied duty cycle correction (AV): 0.1 dB

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	5149.4	56.6	PEAK	1000	74.0	17.4	RB
56	5280	1115.1	43.9	PEAK	1000	68.2	24.3	RE
56	5280	1131.0	43.2	PEAK	1000	74.0	30.8	RB
64	5320	2639.5	49.7	PEAK	1000	68.2	18.5	RB
64	5320	2708.3	37.3	AV	1000	54.0	16.7	UE
149	5745	5724.2	75.6	PEAK	1000	120.4	44.8	RB
157	5785	1223.3	30.3	AV	1000	54.0	23.7	RB
157	5785	1223.3	43.2	PEAK	1000	68.2	25.0	UE
165	5825	5851.3	63.3	PEAK	1000	119.2	55.9	UE

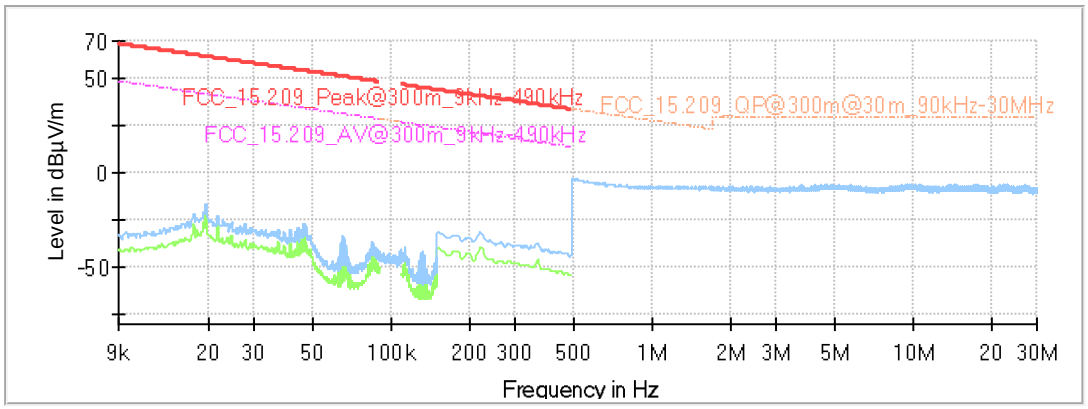
WLAN n-Mode; 40 MHz; MCS0
Applied duty cycle correction (AV): 0.1 dB

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type
38	5190	45.7	25.7	QP	100	46.0	14.29	RB
38	5190	55.8	31.1	QP	100	46.0	8.91	RB
38	5190	234.0	37.3	QP	100	46.0	8.66	RB
38	5190	876.3	40.1	QP	100	46.0	5.04	RB
38	5190	939.0	32.8	QP	100	46.0	13.24	RB
62	5310	876.4	40.7	QP	100	46.0	5.3	RB
62	5310	939.0	33.1	QP	100	46.0	12.9	RB
159	5795	240.0	21.4	QP	100	46.0	24.6	RB
159	5795	876.4	40.7	QP	100	46.0	5.3	RB
159	5795	939.0	33.7	QP	100	46.0	12.3	RB

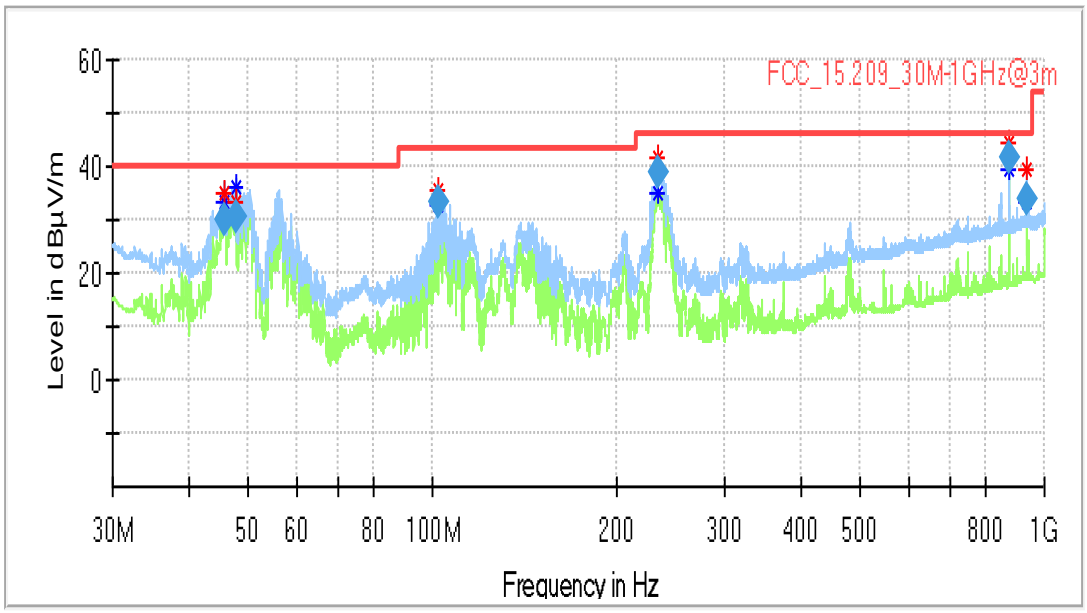
Remark: Please see next sub-clause for the measurement plot.

5.6.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

9 kHz – 30 MHz, WLAN a 6 Mbps, Ch 36



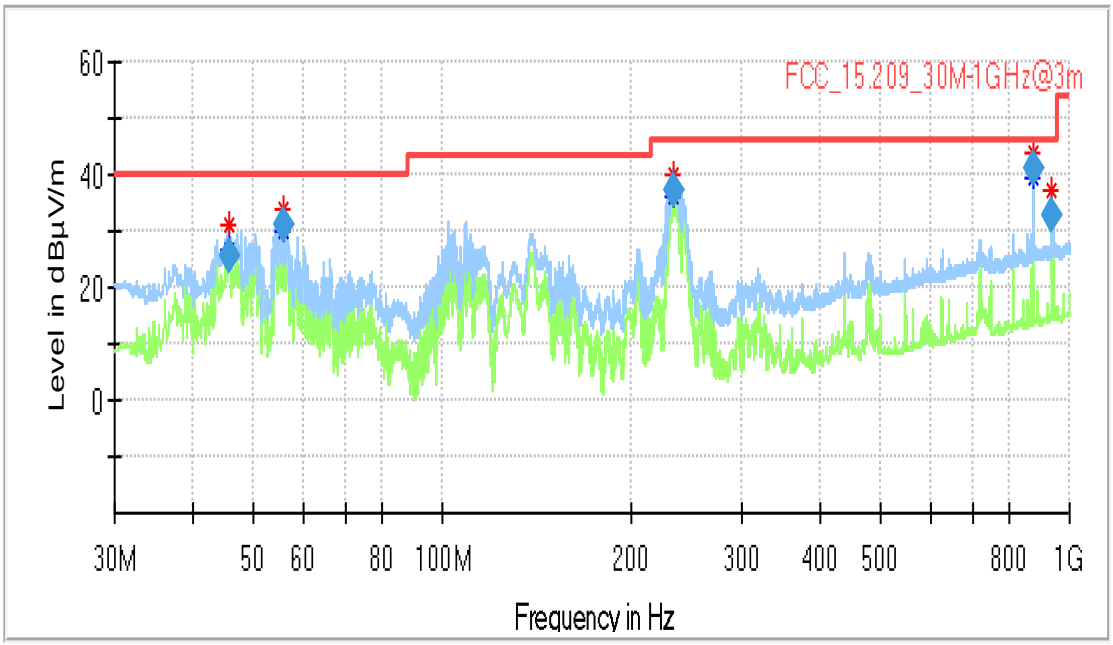
30 MHz – 1 GHz, WLAN a 6 Mbps, Ch 44



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB/m)	Comment
45.720000	30.01	40.00	9.99	1000.0	120.000	103.0	V	-198.0	9.9	
47.790000	30.60	40.00	9.40	1000.0	120.000	105.0	V	-180.0	8.4	
101.880000	33.10	43.50	10.40	1000.0	120.000	117.0	V	-135.0	10.9	
234.000000	38.81	46.00	7.19	1000.0	120.000	108.0	V	-199.0	10.6	
876.390000	41.56	46.00	4.44	1000.0	120.000	115.0	V	11.0	23.9	
939.000000	33.76	46.00	12.24	1000.0	120.000	103.0	V	-3.0	24.7	

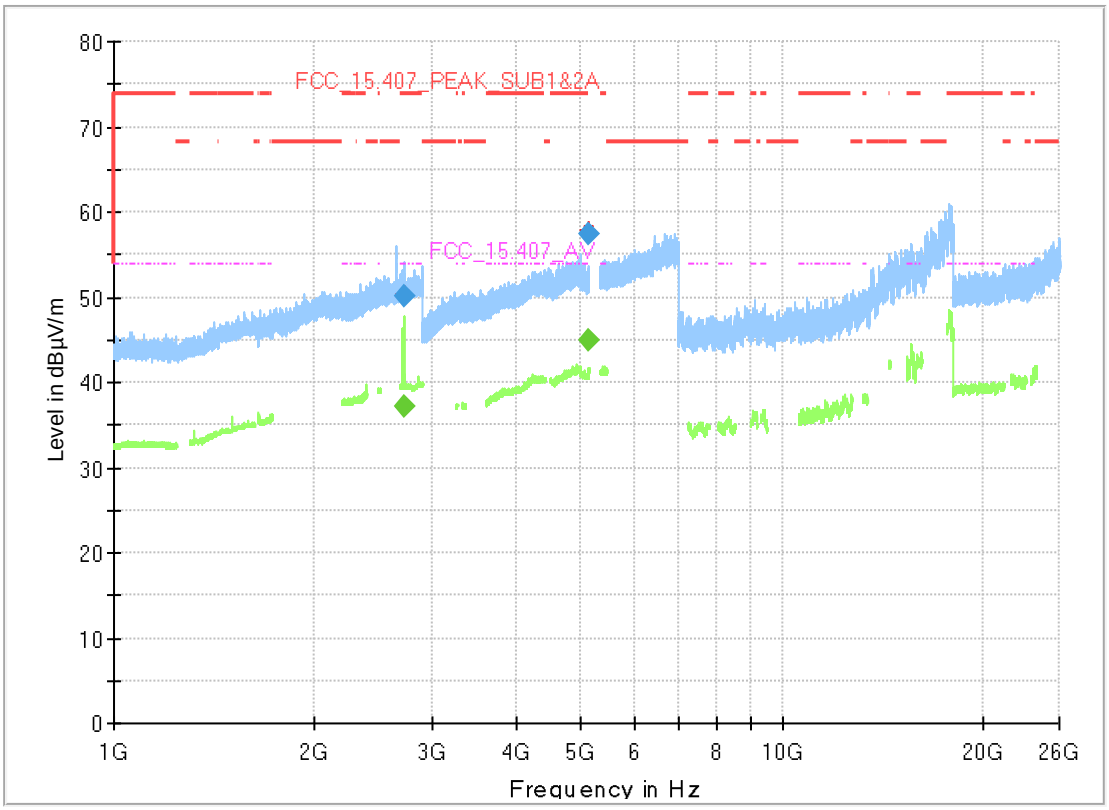
30 MHz – 1 GHz, WLAN n20 MHz MCS0,



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB/m)	Comment
45.720000	25.71	40.00	14.29	1000.0	120.000	116.0	V	130.0	9.8	
55.860000	31.09	40.00	8.91	1000.0	120.000	124.0	V	111.0	3.5	
234.000000	37.34	46.00	8.66	1000.0	120.000	102.0	V	123.0	10.5	
876.390000	40.96	46.00	5.04	1000.0	120.000	110.0	V	6.0	23.7	
939.000000	32.76	46.00	13.24	1000.0	120.000	103.0	V	-7.0	24.5	

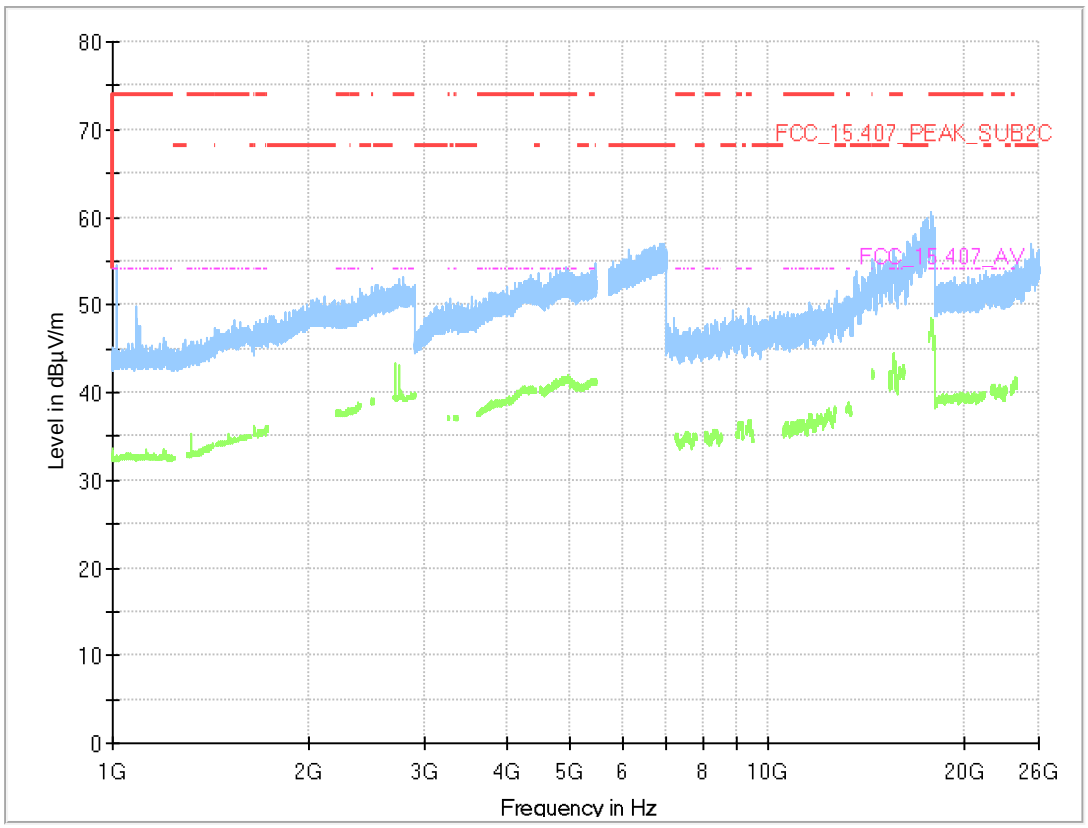
1 GHz – 26 GHz, WLAN a-mode, Ch 36



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation
2717.930	---	37.2	54.00	16.82	1000.0	1000.000	150.0	H	-97.0	75.0
2718.140	50.0	---	74.00	23.98	1000.0	1000.000	150.0	H	-79.0	105.0
5149.025	---	45.0	54.00	9.04	1000.0	1000.000	150.0	H	-136.0	105.0
5149.025	57.5	---	74.00	16.49	1000.0	1000.000	150.0	H	-135.0	83.0

1 GHz – 26 GHz, WLAN n 40MHz, Ch 134



26 GHz – 40 GHz, WLAN n 40MHz, Ch 116

5.6.5 TEST EQUIPMENT USED

- Radiated Emissions

5.7 BAND EDGE

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.7.1 TEST DESCRIPTION

Please see test description for the test case "Spurious Radiated Emissions"

5.7.2 TEST REQUIREMENTS / LIMITS

For band edges connected to a restricted band, the limits are specified in Section 15.209(a)

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

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
0.009 – 0.49	2400/F(kHz)@300m	3	(48.5 – 13.8)@300m
0.49 – 1.705	24000/F(kHz)@30m	3	(33.8 – 23.0)@30m
1.705 – 30	30@30m	3	29.5@30m

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (2).

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limits (dBµV/m)
30 – 88	100@3m	3	40.0@3m
88 – 216	150@3m	3	43.5@3m
216 – 960	200@3m	3	46.0@3m
960 - 26000	500@3m	3	54.0@3m
26000 - 40000	500@3m	1	54.0@3m

The measured values above 26 GHz are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§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)

5.7.3 TEST PROTOCOL

Ambient temperature: 23 25 °C
Air Pressure: 1009 - 1013 hPa
Humidity: 30 - 33 %
WLAN a-Mode; 20 MHz; 6 Mbit/s
Applied duty cycle correction (AV): 0.1 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	57.5	PEAK	1000	74.0	16.5	BE-RB	FCC&IC
	36	5180	5150.0	45.1	AV	1000	54.0	8.9	BE-RB	FCC&IC
2A	64	5320	5350.0	59.3	PEAK	1000	74.0	14.7	BE-RB	FCC&IC
	64	5320	5350.0	45.1	AV	1000	54.0	8.9	BE-RB	FCC&IC
2C	100	5500	5460.0	57.2	PEAK	1000	74.0	16.8	BE-RB	FCC&IC
	100	5500	5460.0	44.4	AV	1000	54.0	9.6	BE-RB	FCC&IC
	100	5500	5470.0	58.3	PEAK	1000	68.2	9.9	BE-UE	FCC&IC
	140	5700	5725.0	60.9	PEAK	1000	68.2	7.3	BE-UE	FCC&IC
3	149	5745	5725.0	65.8	PEAK	1000	119.0	53.2	BE-UE	FCC&IC
	165	5825	5850.0	58.6	PEAK	1000	119.0	60.4	BE-UE	FCC&IC

WLAN n-Mode; 20 MHz; MCS0;
Applied duty cycle correction (AV): 0.1 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	56.6	PEAK	1000	74.0	17.4	BE-RB	FCC&IC
	36	5180	5150.0	44.9	AV	1000	54.0	9.1	BE-RB	FCC&IC
2A	64	5320	5350.0	58.1	PEAK	1000	74.0	15.9	BE-RB	FCC&IC
	64	5320	5350.0	44.9	AV	1000	54.0	9.1	BE-RB	FCC&IC
2C	100	5500	5460.0	56.7	PEAK	1000	74.0	17.3	BE-RB	FCC&IC
	100	5500	5460.0	44.2	AV	1000	54.0	9.8	BE-RB	FCC&IC
	100	5500	5470.0	60.3	PEAK	1000	68.2	7.9	BE-UE	FCC&IC
	140	5700	5725.0	61.4	PEAK	1000	68.2	6.8	BE-UE	FCC&IC
3	149	5745	5725.0	75.6	PEAK	1000	119.0	43.4	BE-UE	FCC&IC
	165	5825	5850.0	63.3	PEAK	1000	119.0	55.7	BE-UE	FCC&IC

WLAN n-Mode; 40 MHz; MCS 0
Applied duty cycle correction (AV): 0.1 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	56.6	PEAK	1000	74.0	17.4	BE-RB	FCC&IC
	38	5190	5150.0	43.8	AV	1000	54.0	10.2	BE-RB	FCC&IC
2A	62	5310	5350.0	65.0	PEAK	1000	74.0	9.0	BE-RB	FCC&IC
	62	5310	5350.0	50.1	AV	1000	54.0	3.9	BE-RB	FCC&IC
2C	102	5510	5460.0	63.0	PEAK	1000	74.0	11.0	BE-RB	FCC&IC
	102	5510	5460.0	46.9	AV	1000	54.0	7.1	BE-RB	FCC&IC
	102	5510	5470.0	67.4	PEAK	1000	68.2	0.8	BE-UE	FCC&IC
	134	5670	5725.0	58.8	PEAK	1000	68.2	9.4	BE-UE	FCC&IC
3	151	5755	5725.0	68.6	PEAK	1000	119.0	50.4	BE-UE	FCC&IC
	159	5795	5850.0	58.5	PEAK	1000	119.0	60.5	BE-UE	FCC&IC

WLAN ac-Mode; 20 MHz; MCS 0; SISO
Applied duty cycle correction (AV): 0.1 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type	FCC /IC?
1	36	5180	5150.0	57.2	PEAK	1000	74.0	16.8	BE-RB	FCC&IC
	36	5180	5150.0	43.9	AV	1000	54.0	10.1	BE-RB	FCC&IC
2A	64	5320	5350.0	57.4	PEAK	1000	74.0	16.6	BE-RB	FCC&IC
	64	5320	5350.0	44.4	AV	1000	54.0	9.6	BE-RB	FCC&IC
2C	100	5500	5460.0	57.6	PEAK	1000	74.0	16.4	BE-RB	FCC&IC
	100	5500	5460.0	44.3	AV	1000	54.0	9.7	BE-RB	FCC&IC
	100	5500	5470.0	57.2	PEAK	1000	68.2	11.0	BE-UE	FCC&IC
	140	5700	5725.0	57.2	PEAK	1000	68.2	11.0	BE-UE	FCC&IC
3	149	5745	5725.0	62.8	PEAK	1000	119.0	56.2	BE-UE	FCC&IC
	165	5825	5850.0	58.0	PEAK	1000	119.0	61.0	BE-UE	FCC&IC

WLAN ac-Mode; 40 MHz; MCS 0;
Applied duty cycle correction (AV): 0.1 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type	FCC /IC?
1	38	5190	5150.0	58.0	PEAK	1000	74.0	16.0	BE-RB	FCC&IC
	38	5190	5150.0	46.5	AV	1000	54.0	7.5	BE-RB	FCC&IC
2A	62	5310	5350.0	57.6	PEAK	1000	74.0	16.4	BE-RB	FCC&IC
	62	5310	5350.0	44.7	AV	1000	54.0	9.3	BE-RB	FCC&IC
2C	102	5510	5460.0	56.8	PEAK	1000	74.0	17.2	BE-RB	FCC&IC
	102	5510	5460.0	44.2	AV	1000	54.0	9.8	BE-RB	FCC&IC
	102	5510	5470.0	59.6	PEAK	1000	68.2	8.6	BE-UE	FCC&IC
	134	5670	5725.0	57.1	PEAK	1000	68.2	11.1	BE-UE	FCC&IC
3	151	5755	5725.0	62.3	PEAK	1000	119.0	56.7	BE-UE	FCC&IC
	159	5795	5850.0	57.8	PEAK	1000	120.2	62.4	BE-UE	FCC&IC

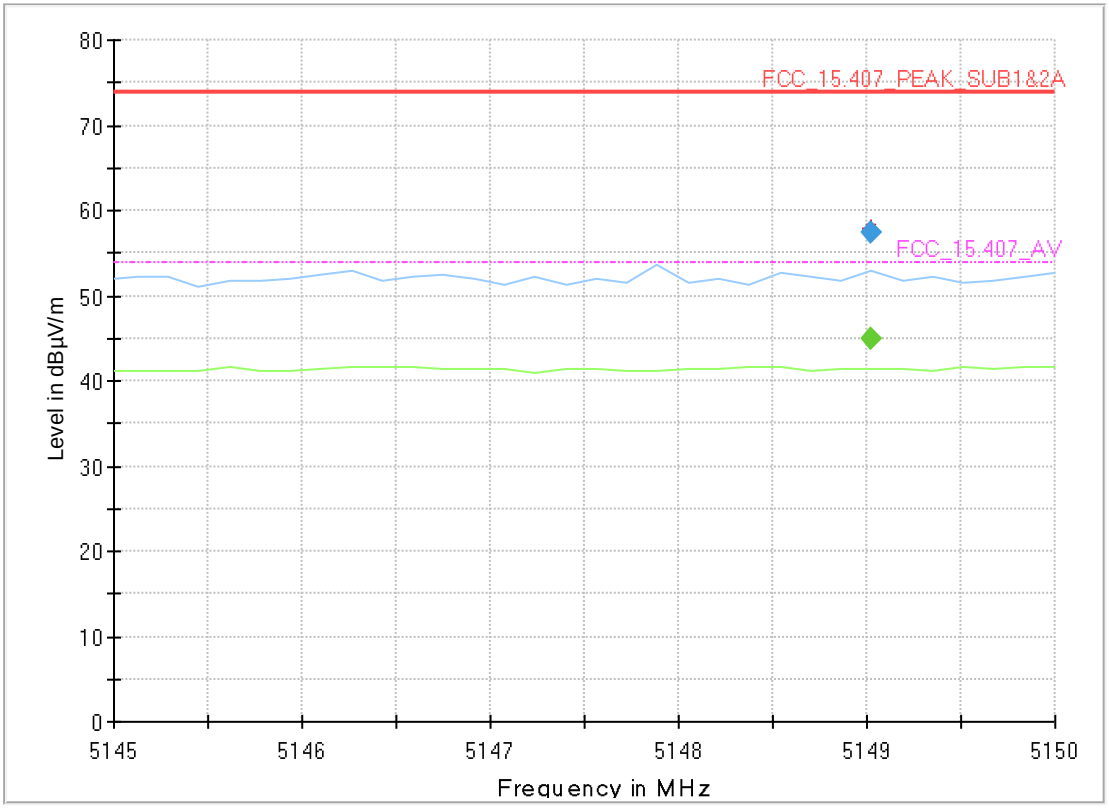
WLAN ac-Mode; 80 MHz; MCS0;
Applied duty cycle correction (AV): 0.1 dB

U-NII-Subband	Ch. No.	Ch. Center Freq. [MHz]	Band Edge Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type	FCC /IC?
1	42	5210	5150.0	58.2	PEAK	1000	74.0	15.8	BE-RB	FCC&IC
	42	5210	5150.0	45.7	AV	1000	54.0	8.3	BE-RB	FCC&IC
2A	58	5290	5350.0	59.9	PEAK	1000	74.0	14.1	BE-RB	FCC&IC
	58	5290	5350.0	46.2	AV	1000	54.0	7.8	BE-RB	FCC&IC
2C	106	5530	5460.0	64.5	PEAK	1000	74.0	9.5	BE-RB	FCC&IC
	106	5530	5460.0	47.9	AV	1000	54.0	6.1	BE-RB	FCC&IC
	106	5530	5470.0	64.4	PEAK	1000	68.2	3.8	BE-UE	FCC&IC
3	155	5775	5725.0	62.3	PEAK	1000	121.9	59.7	BE-UE	FCC&IC
	155	5775	5850.0	65.8	PEAK	1000	120.3	54.5	BE-UE	FCC&IC

Remark: Please see next sub-clause for the measurement plot.

5.7.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

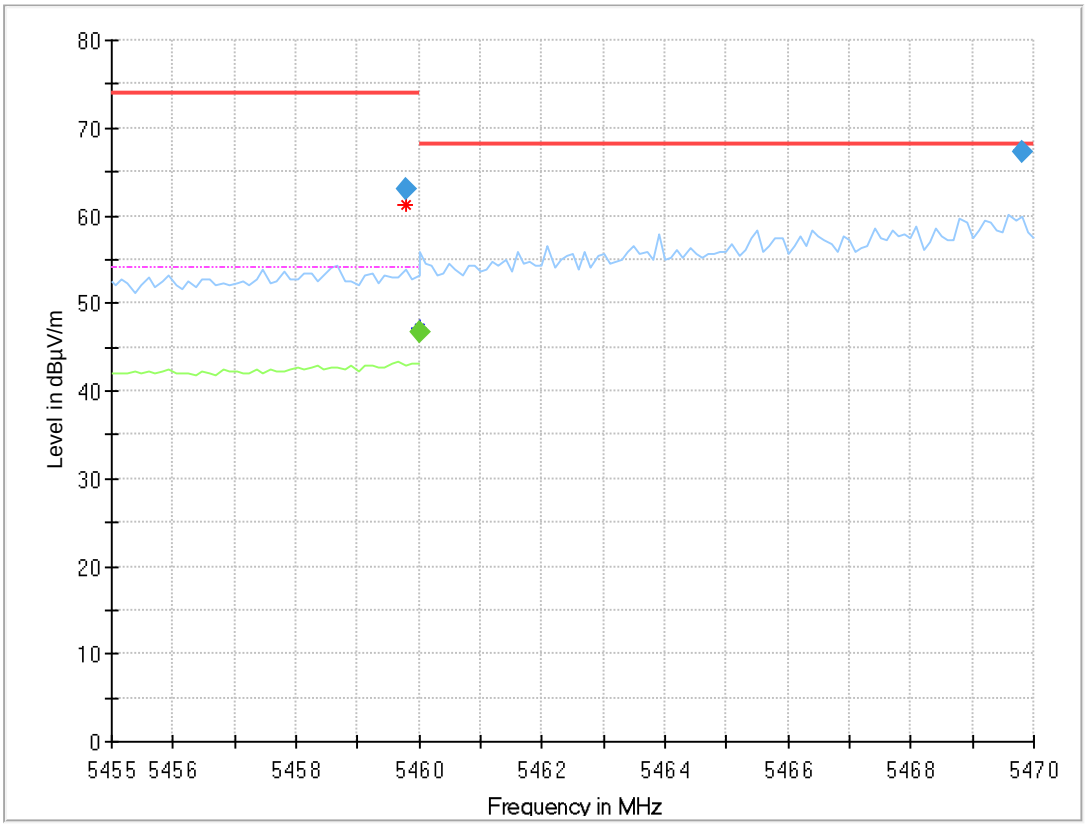
Radio Technology = WLAN a, Channel 36



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation
2717.930	---	37.2	54.00	16.82	1000.0	1000.000	150.0	H	-97.0	75.0
2718.140	50.0	---	74.00	23.98	1000.0	1000.000	150.0	H	-79.0	105.0
5149.025	---	45.0	54.00	9.04	1000.0	1000.000	150.0	H	-136.0	105.0
5149.025	57.5	---	74.00	16.49	1000.0	1000.000	150.0	H	-135.0	83.0

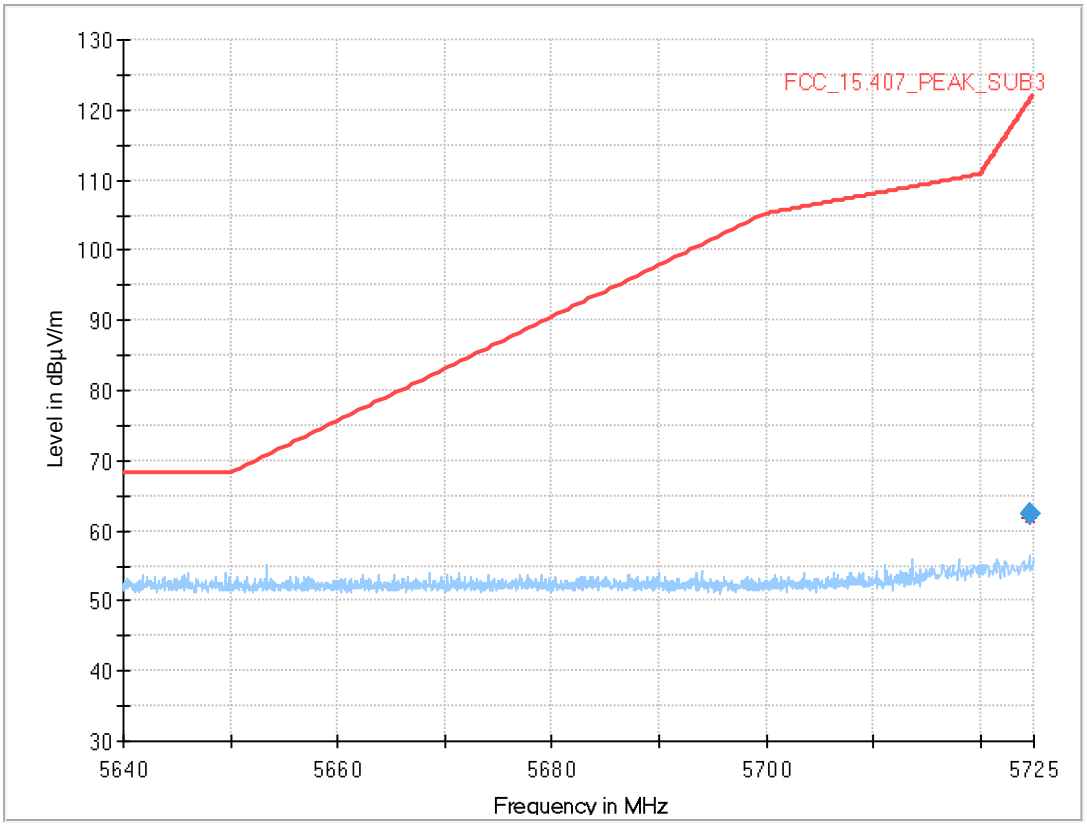
Radio Technology = WLAN n 40MHz, Channel 102



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation
5459.780	63.0	---	74.00	11.01	1000.0	1000.000	150.0	H	-130.0	88.0
5460.000	---	46.8	54.00	7.23	1000.0	1000.000	150.0	H	-136.0	88.0
5469.800	67.4	---	68.20	0.83	1000.0	1000.000	150.0	H	-135.0	105.0

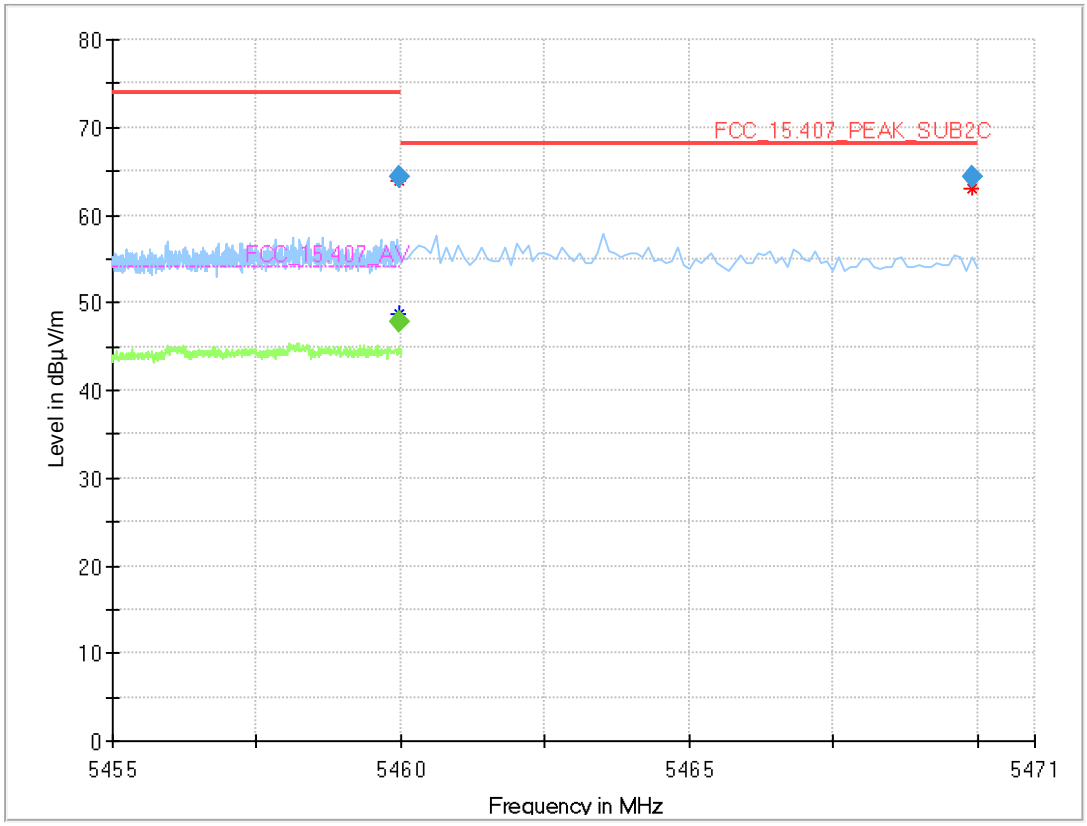
Radio Technology = WLAN ac 40MHz, Channel 151



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation
5724.600	62.3	---	121.29	58.94	1000.0	1000.000	150.0	H	-141.0	105.0

Radio Technology = WLAN ac 80MHz, Channel 106



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Elevation
5459.975	64.5	---	74.00	9.55	1000.0	1000.000	150.0	V	-39.0	4.0
5459.980	---	47.8	54.00	6.22	1000.0	1000.000	150.0	H	-132.0	78.0
5469.900	64.4	---	68.20	3.82	1000.0	1000.000	150.0	V	-39.0	2.0

5.7.5 TEST EQUIPMENT USED

- Radiated Emissions

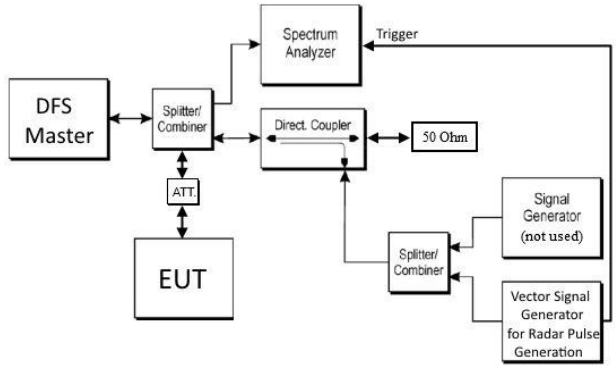
5.8 DYNAMIC FREQUENCY SELECTION

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.8.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up in a shielded room for the DFS measurements. Since the EUT is a slave device without radar detection, it was connected to another device acting as master with radar detection.



After setting up a connection to the Master using the maximum supported bandwidth of the EUT, a radar pulse of type 0 was send from the vector signal generator.

At the same time the spectrum analyser is triggered by the vector signal generator and a trace is recorded:

Analyzer settings:

- Resolution Bandwidth (RBW): 3 MHz
- Video Bandwidth (VBW): 3 MHz
- Trace: Clear/Write
- Sweeps: Single Sweep
- Sweeptime: 20 s
- Detector: Peak
- Trigger: External

In addition to the plot also the trace data is recorded to calculate the Channel Closing Time.

Afterwards the test is repeated with a sweep time of 32 minutes to monitor the Non-occupancy period.

5.8.2 TEST REQUIREMENTS / LIMITS

Limits according KDB 905462 D02 UNII DFS Compliance Procedures New Rules

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
Note 1: *Channel Move Time* and the *Channel Closing Transmission Time* should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst. **Note 2:** The *Channel Closing Transmission Time* is comprised of 200 milliseconds starting at the beginning of the *Channel Move Time* plus any additional intermittent control signals required to facilitate a *Channel* move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.	

5.8.3 TEST PROTOCOL

Ambient temperature: **24 °C**
Air Pressure: **1002 hPa**
Humidity: **30 %**

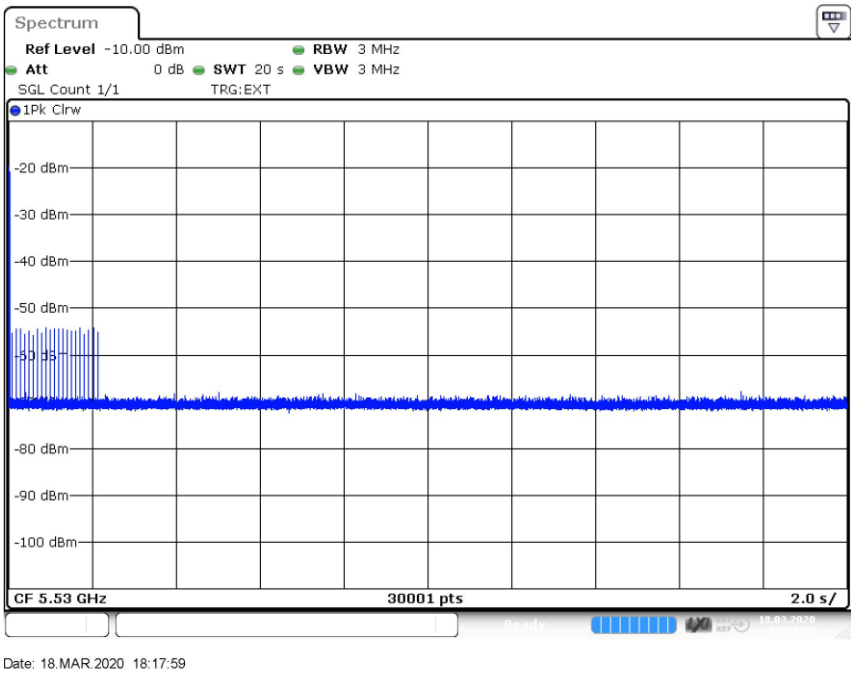
WLAN ac-Mode; 80 MHz

Ch. No.	Ch. Center Freq. [MHz]	Aggregate Transmission Time from 200 ms to 10 s after end of radar pulse [ms]	Limit [ms]	Margin [ms]	Channel move time within 10 s	Transmissions within Non-occupancy period
106	5530	0.096	60.0	59.9	yes	none

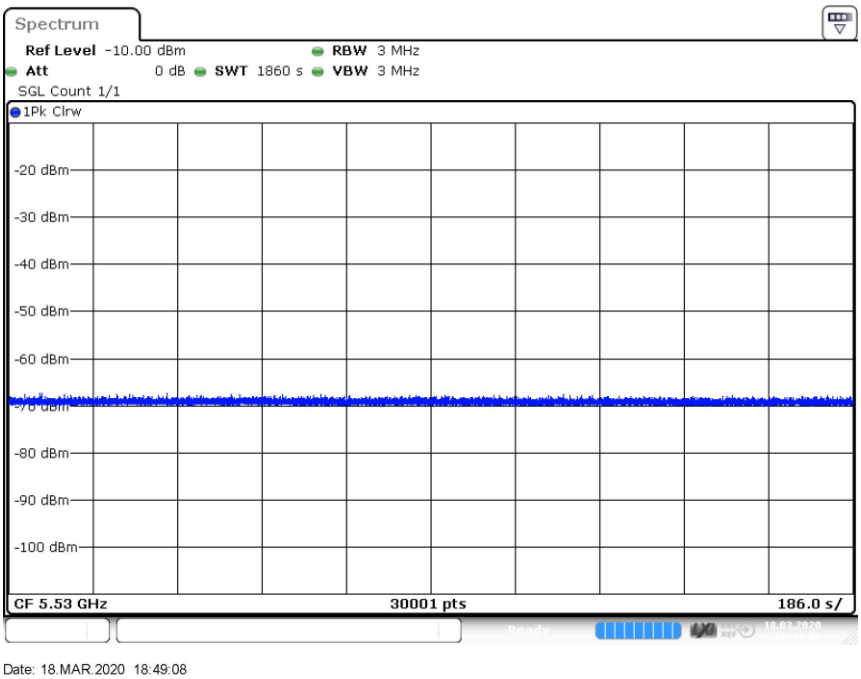
Remark: Please see next sub-clause for the measurement plot.

5.8.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

(S01__AH01)



Channel Closing Time



Non Occupancy Period

5.8.5 TEST EQUIPMENT USED

- R&S TS8997

6 TEST EQUIPMENT

1 R&S TS8997
EN300328/301893 Test Lab

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
1.1	SMB100A	Signal Generator 9 kHz - 6 GHz	Rohde & Schwarz	107695	2017-07	2020-07
1.2	FSV30	Signal Analyzer 10 Hz - 30 GHz	Rohde & Schwarz	103005	2018-04	2020-04
1.3	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2018-04	2020-04
1.4	Temperature Chamber VT 4002	Temperature Chamber Vötsch 03	Vötsch	58566002150010	2018-04	2020-04
1.5	A8455-4	4 Way Power Divider (SMA)		-		
1.6	Opus10 THI (8152.00)	T/H Logger 03	Lufft Mess- und Regeltechnik GmbH	7482	2019-06	2021-06
1.7	UNI-T UT195E	True RMS Digital Multimeter	UNI-T UNI-TREND TECHNOLOGY (CHINA) CO., LTD.	C190729561		
1.8	SMBV100A	Vector Signal Generator 9 kHz - 6 GHz	Rohde & Schwarz	259291	2019-11	2022-11
1.9	OSP120	Switching Unit with integrated power meter	Rohde & Schwarz	101158	2018-05	2021-05
1.10	Temperature Chamber VT 4002	Temperature Chamber Vötsch 05	Vötsch	58566080550010	2018-04	2020-04

2 Radiated Emissions
Lab to perform radiated emission tests

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.1	MFS	Rubidium Frequency Normal MFS	Datum GmbH	002	2019-10	2020-10
2.2	N5000/NP	Filter for EUT, 2 Lines, 250 V, 16 A	ETS-LINDGREN	241515		
2.3	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2019-05	2021-05
2.4	ESW44	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	101603	2019-12	2021-12
2.5	Anechoic Chamber 01	SAC/FAR, 10.58 m x 6.38 m x 6.00 m	Frankonia	none	2018-06	2020-06
2.6	FS-Z60	Harmonic Mixer 40 - 60 GHz	Rohde & Schwarz Messgerätebau GmbH	100178		

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.7	FS-Z220	Harmonic Mixer 140 - 220 GHz	Rohde & Schwarz Messgerätebau GmbH	101005	2017-03	2020-03
2.8	SGH-05	Standard Gain / Pyramidal Horn Antenna (140 - 220 GHz)	RPG-Radiometer Physics GmbH	075		
2.9	HL 562 ULTRALOG	Biconical-log-per antenna (30 MHz - 3 GHz) with HL 562E biconicals	Rohde & Schwarz GmbH & Co. KG	830547/003	2018-07	2021-07
2.10	AMF-7D00101800-30-10P-R	Broadband Amplifier 100 MHz - 18 GHz	Miteq			
2.11	5HC2700/12750-1.5-KK	High Pass Filter	Trilithic	9942012		
2.12	ASP 1.2/1.8-10 kg	Antenna Mast	Maturo GmbH	-		
2.13	Anechoic Chamber 03	FAR, 8.80m x 4.60m x 4.05m (l x w x h)	Albatross Projects	P26971-647-001-PRB	2018-06	2020-06
2.14	SMBV100A	Vector Signal Generator 9 kHz - 3.2 GHz (GNSS / Broadcast Signalling Unit)	Rohde & Schwarz GmbH & Co. KG	260001	2018-01	2021-01
2.15	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2018-04	2020-04
2.16	WRD1920/1980-5/22-5EESD	Tunable Band Reject Filter	Wainwright Instruments GmbH	11		
2.17	TDS 784C	Digital Oscilloscope [SA2] (Aux)	Tektronix	B021311		
2.18	foRS232 Unit 2	Fibre optic link RS232	PONTIS Messtechnik GmbH	4031516037		
2.19	PONTIS Con4101	PONTIS Camera Controller		6061510370		
2.20	NRVD	Power Meter	Rohde & Schwarz GmbH & Co. KG	828110/016	2019-08	2020-08
2.21	OLS-1 R	Fibre optic link USB 1.1	Ingenieurbüro Scheiba	018		
2.22	HF 906	Double-ridged horn	Rohde & Schwarz	357357/002	2018-09	2021-09
2.23	JS4-18002600-32-5P	Broadband Amplifier 18 GHz - 26 GHz	Miteq	849785		
2.24	FSW 43	Spectrum Analyzer	Rohde & Schwarz	103779	2019-02	2021-02

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.25	3160-09	Standard Gain / Pyramidal Horn Antenna 26.5 GHz	EMCO Elektronic GmbH	00083069		
2.26	foRS232 Unit 1	Fibre optic link RS232	PONTIS Messtechnik GmbH	4021516036		
2.27	FSP3	Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	836722/011		
2.28	SGH-19	Standard Gain / Pyramidal Horn Antenna (40 - 60 GHz)	RPG-Radiometer Physics GmbH	093		
2.29	WHKX 7.0/18G-8SS	High Pass Filter	Wainwright Instruments GmbH	09		
2.30	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99		
2.31	4HC1600/12750-1.5-KK	High Pass Filter	Trilithic	9942011		
2.32	foUSB-M Converter 2	Fibre optic link USB 2.0	PONTIS Messtechnik GmbH	4471520061		
2.33	WRCD1879.8-0.2/40-10EE	Notch Filter Ultra Stable	Wainwright Instruments GmbH	16		
2.34	SMB100A	Signal Generator 100 kHz - 40 GHz	Rohde & Schwarz Vertriebs-GmbH	181486	2019-11	2021-11
2.35	JS4-00102600-42-5A	Broadband Amplifier 30 MHz - 26 GHz	Miteq	619368		
2.36	TT 1.5 WI	Turn Table	Maturo GmbH	-		
2.37	HL 562 ULTRALOG	Biconical-log-per Antenna (30 MHz - 3 GHz)	Rohde & Schwarz GmbH & Co. KG	100609	2019-05	2022-05
2.38	HF 906	Double-ridged horn	Rohde & Schwarz	357357/001	2018-03	2021-03
2.39	foCAN (v 4.0)	Fibre optic link CAN	Audivo GmbH (PONTIS EMC)	492 1607 014		
2.40	FS-Z325	Harmonic Mixer 220 - 325 GHz	Rohde & Schwarz Messgerätebau GmbH	101006	2017-03	2020-03
2.41	CMW 500	CMW 500 Flex 2	Rohde & Schwarz GmbH & Co. KG	155999-Ei	2019-09	2022-09
2.42	CMU 200	"CMU1" Universal Radio Communicatio n Tester	Rohde & Schwarz GmbH & Co. KG	102366	2017-12	2020-12
2.43	3160-10	Standard Gain / Pyramidal Horn Antenna 40 GHz	EMCO Elektronic GmbH	00086675		
2.44	MA4985-XP-ET	Bore Sight Antenna Mast	innco systems GmbH	none		
2.45	SGH-08	Standard Gain / Pyramidal Horn Antenna (90 - 140 GHz)	RPG-Radiometer Physics GmbH	064		

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.46	CBT	Bluetooth Tester "CBT-02" incl. BLE-Option	Rohde & Schwarz	100302	2018-03	2021-03
2.47	CMW 500	callbox with SUA, BT, 2G, 3G, LTE, AUDIO, UL/DL fading	Rohde & Schwarz GmbH & Co. KG	163529-bw	2017-07	2020-07
2.48	A8455-4	4 Way Power Divider (SMA)		-		
2.49	SGH-12	Standard Gain / Pyramidal HornAntenna (60 - 90 GHz)	RPG-Radiometer Physics GmbH	326		
2.50	JUN-AIR Mod. 6-15	Air Compressor	JUN-AIR Deutschland GmbH	612582		
2.51	foEthernet_M	Fibre optic link Ethernet / Gb-LAN	PONTIS Messtechnik GmbH	4841516023		
2.52	5HC3500/18000-1.2-KK	High Pass Filter	Trilithic	200035008		
2.53	FS-Z140	Harmonic Mixer 90 -140 GHz	Rohde & Schwarz Messgerätebau GmbH	101007	2017-02	2020-02
2.54	OLS-1 M	Fibre optic link USB 1.1	Ingenieurbüro Scheiba	018		
2.55	HFH2-Z2	Loop Antenna	Rohde & Schwarz	829324/006	2018-01	2021-01
2.56	Voltcraft M-3860M	Digital Multimeter 01 (Multimeter)	Conrad	IJ096055		
2.57	CMW 500	callbox, 2G, 3G, LTE, WLAN, BT, Audio	Rohde & Schwarz GmbH & Co. KG	149268-Qf	2018-04	2021-04
2.58	Opus10 THI (8152.00)	T/H Logger 12	Lufft Mess- und Regeltechnik GmbH	12482	2019-06	2021-06
2.59	ESR 7	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz	101424	2019-01	2021-01
2.60	UNI-T UT195E	True RMS Digital Multimeter	UNI-T UNI-TREND TECHNOLOGY (CHINA) CO., LTD.	C190729561		
2.61	foEthernet_M	Fibre optic link Ethernet / Gb-LAN	PONTIS Messtechnik GmbH	4841516022		
2.62	JS4-00101800-35-5P	Broadband Amplifier 30 MHz - 18 GHz	Miteq	896037		
2.63	AS 620 P	Antenna Mast (pneumatic polarisation)	HD GmbH	620/37		
2.64	6005D (30 V / 5 A)	Laboratory Power Supply 120 V 60 Hz	Peaktech	81062045		
2.65	TD1.5-10kg	EUT Tilt Device (Rohacell)	Maturo GmbH	TD1.5-10kg/024/3790709		

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.66	SGH-03	Standard Gain / Pyramidal Horn Antenna (220 - 325 GHz)	RPG-Radiometer Physics GmbH	060		
2.67	FS-Z90	Harmonic Mixer 60 - 90 GHz	Rohde & Schwarz Messgerätebau GmbH	101686	2017-03	2020-03
2.68	ESIB 26	Spectrum Analyzer	Rohde & Schwarz	830482/004		
2.69	Innco Systems CO3000	Controller for bore sight mast SAC	innco systems GmbH	CO3000/967/39371016/L		
2.70	NRV-Z1	Sensor Head B	Rohde & Schwarz GmbH & Co. KG	827753/006	2019-08	2020-08
2.71	HF 907-2	Double-ridged horn	Rohde & Schwarz	102817	2019-04	2022-04
2.72	foCAN (v 4.0)	Fibre optic link CAN	Audivo GmbH (PONTIS EMC)	492 1607 013		
2.73	PAS 2.5 - 10 kg	Antenna Mast	Maturo GmbH	-		
2.74	AFS42-00101800-25-S-42	Broadband Amplifier 25 MHz - 18 GHz	Miteq	2035324		
2.75	WRCA800/960-0.2/40-6EEK	Tunable Notch Filter	Wainwright Instruments GmbH	20		
2.76	AM 4.0	Antenna Mast 4 m	Maturo GmbH	AM4.0/180/11920513		
2.77	HF 907	Double-ridged horn	Rohde & Schwarz	102444	2018-07	2021-07
2.78	E4408B	Spectrum Analyser (9 kHz to 26.5 GHz)	Agilent Technologies Deutschland GmbH	MY45103714		

The calibration interval is the time interval between “Last Calibration” and “Calibration Due”

7 ANTENNA FACTORS, CABLE LOSS AND SAMPLE CALCULATIONS

This chapter contains the antenna factors with their corresponding path loss of the used measurement path for all antennas as well as the insertion loss of the LISN.

7.1 LISN R&S ESH3-Z5 (150 KHZ – 30 MHZ)

Frequency		Corr.	LISN insertion loss ESH3-Z5	cable loss (incl. 10 dB atten-uator)
MHz		dB	dB	dB
0.15		10.1	0.1	10.0
5		10.3	0.1	10.2
7		10.5	0.2	10.3
10		10.5	0.2	10.3
12		10.7	0.3	10.4
14		10.7	0.3	10.4
16		10.8	0.4	10.4
18		10.9	0.4	10.5
20		10.9	0.4	10.5
22		11.1	0.5	10.6
24		11.1	0.5	10.6
26		11.2	0.5	10.7
28		11.2	0.5	10.7
30		11.3	0.5	10.8

Sample calculation

U_{LISN} (dB µV) = U (dB µV) + Corr. (dB)
U = Receiver reading
LISN Insertion loss = Voltage Division Factor of LISN
Corr. = sum of single correction factors of used LISN, cables, switch units (if used)
Linear interpolation will be used for frequencies in between the values in the table.

7.2 ANTENNA R&S HFH2-Z2 (9 KHZ – 30 MHZ)

Frequency	AF HFH-Z2)	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-40 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
0.009	20.50	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.01	20.45	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.015	20.37	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.02	20.36	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.025	20.38	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.03	20.32	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.05	20.35	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.08	20.30	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.1	20.20	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.2	20.17	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.3	20.14	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.49	20.12	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.490001	20.12	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.5	20.11	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.8	20.10	-39.6	0.1	0.1	0.1	0.1	-40	30	3
1	20.09	-39.6	0.1	0.1	0.1	0.1	-40	30	3
2	20.08	-39.6	0.1	0.1	0.1	0.1	-40	30	3
3	20.06	-39.6	0.1	0.1	0.1	0.1	-40	30	3
4	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
5	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
6	20.02	-39.5	0.2	0.1	0.1	0.1	-40	30	3
8	19.95	-39.5	0.2	0.1	0.1	0.1	-40	30	3
10	19.83	-39.4	0.2	0.1	0.2	0.1	-40	30	3
12	19.71	-39.4	0.2	0.1	0.2	0.1	-40	30	3
14	19.54	-39.4	0.2	0.1	0.2	0.1	-40	30	3
16	19.53	-39.3	0.3	0.1	0.2	0.1	-40	30	3
18	19.50	-39.3	0.3	0.1	0.2	0.1	-40	30	3
20	19.57	-39.3	0.3	0.1	0.2	0.1	-40	30	3
22	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
24	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
26	19.54	-39.3	0.3	0.1	0.2	0.1	-40	30	3
28	19.46	-39.2	0.3	0.1	0.3	0.1	-40	30	3
30	19.73	-39.1	0.4	0.1	0.3	0.1	-40	30	3

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
distance correction = -40 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values

7.3 ANTENNA R&S HL562 (30 MHZ – 1 GHZ)

(d_{Limit} = 3 m)

Frequency	AF R&S HL562	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-20 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
30	18.6	0.6	0.29	0.04	0.23	0.02	0.0	3	3
50	6.0	0.9	0.39	0.09	0.32	0.08	0.0	3	3
100	9.7	1.2	0.56	0.14	0.47	0.08	0.0	3	3
150	7.9	1.6	0.73	0.20	0.59	0.12	0.0	3	3
200	7.6	1.9	0.84	0.21	0.70	0.11	0.0	3	3
250	9.5	2.1	0.98	0.24	0.80	0.13	0.0	3	3
300	11.0	2.3	1.04	0.26	0.89	0.15	0.0	3	3
350	12.4	2.6	1.18	0.31	0.96	0.13	0.0	3	3
400	13.6	2.9	1.28	0.35	1.03	0.19	0.0	3	3
450	14.7	3.1	1.39	0.38	1.11	0.22	0.0	3	3
500	15.6	3.2	1.44	0.39	1.20	0.19	0.0	3	3
550	16.3	3.5	1.55	0.46	1.24	0.23	0.0	3	3
600	17.2	3.5	1.59	0.43	1.29	0.23	0.0	3	3
650	18.1	3.6	1.67	0.34	1.35	0.22	0.0	3	3
700	18.5	3.6	1.67	0.42	1.41	0.15	0.0	3	3
750	19.1	4.1	1.87	0.54	1.46	0.25	0.0	3	3
800	19.6	4.1	1.90	0.46	1.51	0.25	0.0	3	3
850	20.1	4.4	1.99	0.60	1.56	0.27	0.0	3	3
900	20.8	4.7	2.14	0.60	1.63	0.29	0.0	3	3
950	21.1	4.8	2.22	0.60	1.66	0.33	0.0	3	3
1000	21.6	4.9	2.23	0.61	1.71	0.30	0.0	3	3

(d_{Limit} = 10 m)

30	18.6	-9.9	0.29	0.04	0.23	0.02	-10.5	10	3
50	6.0	-9.6	0.39	0.09	0.32	0.08	-10.5	10	3
100	9.7	-9.2	0.56	0.14	0.47	0.08	-10.5	10	3
150	7.9	-8.8	0.73	0.20	0.59	0.12	-10.5	10	3
200	7.6	-8.6	0.84	0.21	0.70	0.11	-10.5	10	3
250	9.5	-8.3	0.98	0.24	0.80	0.13	-10.5	10	3
300	11.0	-8.1	1.04	0.26	0.89	0.15	-10.5	10	3
350	12.4	-7.9	1.18	0.31	0.96	0.13	-10.5	10	3
400	13.6	-7.6	1.28	0.35	1.03	0.19	-10.5	10	3
450	14.7	-7.4	1.39	0.38	1.11	0.22	-10.5	10	3
500	15.6	-7.2	1.44	0.39	1.20	0.19	-10.5	10	3
550	16.3	-7.0	1.55	0.46	1.24	0.23	-10.5	10	3
600	17.2	-6.9	1.59	0.43	1.29	0.23	-10.5	10	3
650	18.1	-6.9	1.67	0.34	1.35	0.22	-10.5	10	3
700	18.5	-6.8	1.67	0.42	1.41	0.15	-10.5	10	3
750	19.1	-6.3	1.87	0.54	1.46	0.25	-10.5	10	3
800	19.6	-6.3	1.90	0.46	1.51	0.25	-10.5	10	3
850	20.1	-6.0	1.99	0.60	1.56	0.27	-10.5	10	3
900	20.8	-5.8	2.14	0.60	1.63	0.29	-10.5	10	3
950	21.1	-5.6	2.22	0.60	1.66	0.33	-10.5	10	3
1000	21.6	-5.6	2.23	0.61	1.71	0.30	-10.5	10	3

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
distance correction = -20 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Tables show an extract of values.

7.4 ANTENNA R&S HF907 (1 GHZ – 18 GHZ)

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay + cable inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit, atten-uator & pre-amp)	cable loss 4 (to receiver)		
MHz	dB (1/m)	dB	dB	dB	dB	dB		
1000	24.4	-19.4	0.99	0.31	-21.51	0.79		
2000	28.5	-17.4	1.44	0.44	-20.63	1.38		
3000	31.0	-16.1	1.87	0.53	-19.85	1.33		
4000	33.1	-14.7	2.41	0.67	-19.13	1.31		
5000	34.4	-13.7	2.78	0.86	-18.71	1.40		
6000	34.7	-12.7	2.74	0.90	-17.83	1.47		
7000	35.6	-11.0	2.82	0.86	-16.19	1.46		

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay inside chamber)	cable loss 2 (inside chamber)	cable loss 3 (outside chamber)	cable loss 4 (switch unit, atten-uator & pre-amp)	cable loss 5 (to receiver)	used for FCC 15.247
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	
3000	31.0	-23.4	0.47	1.87	0.53	-27.58	1.33	
4000	33.1	-23.3	0.56	2.41	0.67	-28.23	1.31	
5000	34.4	-21.7	0.61	2.78	0.86	-27.35	1.40	
6000	34.7	-21.2	0.58	2.74	0.90	-26.89	1.47	
7000	35.6	-19.8	0.66	2.82	0.86	-25.58	1.46	

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay inside chamber)	cable loss 2 (High Pass)	cable loss 3 (pre-amp)	cable loss 4 (inside chamber)	cable loss 5 (outside chamber)	cable loss 6 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	dB
7000	35.6	-57.3	0.56	1.28	-62.72	2.66	0.94	1.46
8000	36.3	-56.3	0.69	0.71	-61.49	2.84	1.00	1.53
9000	37.1	-55.3	0.68	0.65	-60.80	3.06	1.09	1.60
10000	37.5	-56.2	0.70	0.54	-61.91	3.28	1.20	1.67
11000	37.5	-55.3	0.80	0.61	-61.40	3.43	1.27	1.70
12000	37.6	-53.7	0.84	0.42	-59.70	3.53	1.26	1.73
13000	38.2	-53.5	0.83	0.44	-59.81	3.75	1.32	1.83
14000	39.9	-56.3	0.91	0.53	-63.03	3.91	1.40	1.77
15000	40.9	-54.1	0.98	0.54	-61.05	4.02	1.44	1.83
16000	41.3	-54.1	1.23	0.49	-61.51	4.17	1.51	1.85
17000	42.8	-54.4	1.36	0.76	-62.36	4.34	1.53	2.00
18000	44.2	-54.7	1.70	0.53	-62.88	4.41	1.55	1.91

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
Tables show an extract of values.

7.5 ANTENNA EMCO 3160-09 (18 GHZ – 26.5 GHZ)

Frequency	AF EMCO 3160-09	Corr.	cable loss 1 (inside chamber)	cable loss 2 (pre-amp)	cable loss 3 (inside chamber)	cable loss 4 (switch unit)	cable loss 5 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB
18000	40.2	-23.5	0.72	-35.85	6.20	2.81	2.65
18500	40.2	-23.2	0.69	-35.71	6.46	2.76	2.59
19000	40.2	-22.0	0.76	-35.44	6.69	3.15	2.79
19500	40.3	-21.3	0.74	-35.07	7.04	3.11	2.91
20000	40.3	-20.3	0.72	-34.49	7.30	3.07	3.05
20500	40.3	-19.9	0.78	-34.46	7.48	3.12	3.15
21000	40.3	-19.1	0.87	-34.07	7.61	3.20	3.33
21500	40.3	-19.1	0.90	-33.96	7.47	3.28	3.19
22000	40.3	-18.7	0.89	-33.57	7.34	3.35	3.28
22500	40.4	-19.0	0.87	-33.66	7.06	3.75	2.94
23000	40.4	-19.5	0.88	-33.75	6.92	3.77	2.70
23500	40.4	-19.3	0.90	-33.35	6.99	3.52	2.66
24000	40.4	-19.8	0.88	-33.99	6.88	3.88	2.58
24500	40.4	-19.5	0.91	-33.89	7.01	3.93	2.51
25000	40.4	-19.3	0.88	-33.00	6.72	3.96	2.14
25500	40.5	-20.4	0.89	-34.07	6.90	3.66	2.22
26000	40.5	-21.3	0.86	-35.11	7.02	3.69	2.28
26500	40.5	-21.1	0.90	-35.20	7.15	3.91	2.36

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values.

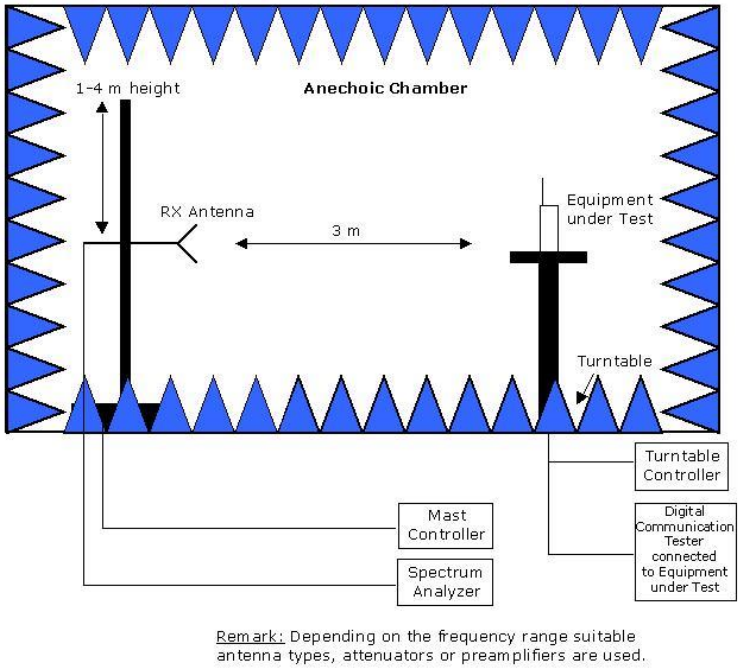
7.6 ANTENNA EMCO 3160-10 (26.5 GHZ – 40 GHZ)

Frequency	AF EMCO 3160-10	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-20 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
GHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
26.5	43.4	-11.2	4.4				-9.5	3	1.0
27.0	43.4	-11.2	4.4				-9.5	3	1.0
28.0	43.4	-11.1	4.5				-9.5	3	1.0
29.0	43.5	-11.0	4.6				-9.5	3	1.0
30.0	43.5	-10.9	4.7				-9.5	3	1.0
31.0	43.5	-10.8	4.7				-9.5	3	1.0
32.0	43.5	-10.7	4.8				-9.5	3	1.0
33.0	43.6	-10.7	4.9				-9.5	3	1.0
34.0	43.6	-10.6	5.0				-9.5	3	1.0
35.0	43.6	-10.5	5.1				-9.5	3	1.0
36.0	43.6	-10.4	5.1				-9.5	3	1.0
37.0	43.7	-10.3	5.2				-9.5	3	1.0
38.0	43.7	-10.2	5.3				-9.5	3	1.0
39.0	43.7	-10.2	5.4				-9.5	3	1.0
40.0	43.8	-10.1	5.5				-9.5	3	1.0

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
distance correction = -20 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values.

8 SETUP DRAWINGS

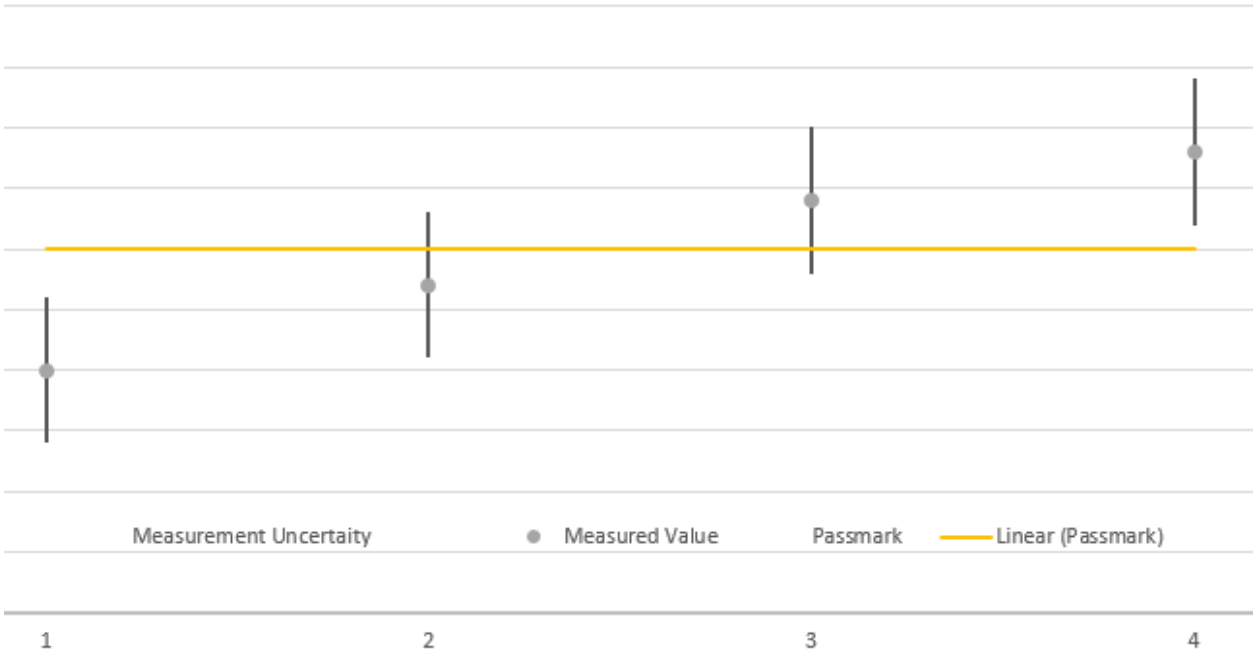


Drawing 1: Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting groundplane.

9 MEASUREMENT UNCERTAINTIES

Test Case	Parameter	Uncertainty
AC Power Line	Power	± 3.4 dB
Field Strength of spurious radiation	Power	± 5.5 dB
6 dB / 26 dB / 99% Bandwidth	Power Frequency	± 2.9 dB ± 11.2 kHz
Conducted Output Power	Power	± 2.2 dB
Band Edge Compliance	Power Frequency	± 2.2 dB ± 11.2 kHz
Frequency Stability	Frequency	± 25 Hz
Power Spectral Density	Power	± 2.2 dB

The measurement uncertainties for all parameters are calculated with an expansion factor (coverage factor) k = 1.96. This means, that the true value is in the corresponding interval with a probability of 95 %.



The verdicts in this test report are given according the above diagram:

Case	Measured Value	Uncertainty Range	Verdict
1	below pass mark	below pass mark	Passed
2	below pass mark	within pass mark	Passed
3	above pass mark	within pass mark	Failed
4	above pass mark	above pass mark	Failed

That means, the laboratory applies, as decision rule (see ISO/IEC 17025:2017), the so called shared risk principle.

10 PHOTO REPORT

Please see separate photo report.