FCC Measurement/Technical Report on

Wireless HD-Video-Transceiver Q1049

FCC ID: 2ABQT-Q1049
IC: 23072-Q1049

Test Report Reference: MDE_TQSYS_2003_FCC_02

Test Laboratory:
7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

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

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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 (10-1-19 Edition) and 15 (10-1-19 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.

Some tests were performed according to older versions of the rules. However the tests inside of this document also comply with the current version.

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 §15.207**

AC Conducted Emissions

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

OP-Mode	Setup	Date	FCC	IC
Operating mode				
worst case	S02_0AB01TX	2015-03-18	Passed	Passed

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_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, high, U-NII-2A	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, high, U-NII-2C	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, high, U-NII-3	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, low, U-NII-1	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, low, U-NII-2A	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, low, U-NII-2C	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, low, U-NII-3	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, mid, U-NII-1	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, mid, U-NII-2A	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, mid, U-NII-2C	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 20 MHz, mid, U-NII-3	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, high, U-NII-1	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, high, U-NII-2A	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, high, U-NII-2C	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, high, U-NII-3	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, low, U-NII-1	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, low, U-NII-2A	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, low, U-NII-2C	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, low, U-NII-3	S01_0AB01TX	2014-08-28	Performed	N/A
WLAN n 40 MHz, mid, U-NII-2C	S01_0AB01TX	2014-08-28	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 n 20 MHz, high, U-NII-3	S01_0AB01TX	2015-03-17	Passed	Passed
WLAN n 20 MHz, low, U-NII-3	S01_0AB01TX	2015-03-17	Passed	Passed
WLAN n 20 MHz, mid, U-NII-3	S01_0AB01TX	2015-03-17	Passed	Passed
WLAN n 40 MHz, high, U-NII-3	S01_0AB01TX	2015-03-18	Passed	Passed
WLAN n 40 MHz, low, U-NII-3	S01_0AB01TX	2015-03-18	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 n 20 MHz, high, U-NII-1	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, high, U-NII-2A	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, high, U-NII-2C	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, high, U-NII-3	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, low, U-NII-1	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, low, U-NII-2A	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, low, U-NII-2C	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, low, U-NII-3	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, mid, U-NII-1	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, mid, U-NII-2A	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, mid, U-NII-2C	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 20 MHz, mid, U-NII-3	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, high, U-NII-1	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, high, U-NII-2A	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, high, U-NII-2C	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, high, U-NII-3	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, low, U-NII-1	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, low, U-NII-2A	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, low, U-NII-2C	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, low, U-NII-3	S01_AA01TX	2021-02-25	Performed	Performed
WLAN n 40 MHz, mid, U-NII-2C	S01_AA01TX	2021-02-25	Performed	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 n 20 MHz MIMO, high, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, mid, U-NII-2C	S01_0AB01TX	2014-10-24	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 n 20 MHz MIMO, high, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 20 MHz MIMO, mid, U-NII-3	S01_0AB01TX	2014-10-24	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 n 40 MHz MIMO, high, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-1	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-2A	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-2C	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-3	S01_0AB01TX	2014-10-24	Passed	Passed
WLAN n 40 MHz MIMO, mid, U-NII-2C	S01_0AB01TX	2014-10-24	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 MIMO, high, 1GHz - 26GHz, U-NII-1	S01_0AB01TX	2014-08-31	Passed	Passed
WLAN n 40 MHz MIMO, high, 1GHz - 26GHz, U-NII-2A	S01_0AB01TX	2014-11-09	Passed	Passed
WLAN n 40 MHz MIMO, high, 1GHz - 26GHz, U-NII-2C	S01_0AB01TX	2014-10-22	Passed	Passed
WLAN n 40 MHz MIMO, high, 1GHz - 26GHz, U-NII-3	S01_0AB01TX	2014-10-22	Passed	Passed
WLAN n 40 MHz MIMO, high, 26GHz - 40GHz, U-NII-2A	S01_0AB01TX	2015-03-19	Passed	Passed
WLAN n 40 MHz MIMO, high, 26GHz - 40GHz, U-NII-3	S01_0AB01TX	2015-03-19	Passed	Passed
WLAN n 40 MHz MIMO, high, 30MHz - 1GHz, U-NII-2A	S01_AB01TX	2021-03-19	Passed	Passed
WLAN n 40 MHz MIMO, high, 30MHz - 1GHz, U-NII-3	S01_AB01TX	2021-03-21	Passed	Passed
WLAN n 40 MHz MIMO, high, 9kHz - 30MHz, U-NII-2C	S01_AB01TX	2021-03-19	Passed	Passed
WLAN n 40 MHz MIMO, low, 1GHz - 26GHz, U-NII-1	S01_0AB01TX	2014-08-31	Passed	Passed
WLAN n 40 MHz MIMO, low, 1GHz - 26GHz, U-NII-2A	S01_0AB01TX	2014-11-09	Passed	Passed
WLAN n 40 MHz MIMO, low, 1GHz - 26GHz, U-NII-2C	S01_0AB01TX	2014-11-09	Passed	Passed
WLAN n 40 MHz MIMO, low, 1GHz - 26GHz, U-NII-3	S01_0AB01TX	2014-11-09	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 MIMO, low, 26GHz - 40GHz, U-NII-1	S01_0AB01TX	2015-03-19	Passed	Passed
WLAN n 40 MHz MIMO, low, 30MHz - 1GHz, U-NII-1	S01_AB01TX	2021-03-19	Passed	Passed
WLAN n 40 MHz MIMO, low, 9kHz - 30MHz, U-NII-1	S01_AB01TX	2021-03-19	Passed	Passed
WLAN n 40 MHz MIMO, mid, 1GHz - 26GHz, U-NII-2C	S01_0AB01TX	2014-10-22	Passed	Passed
WLAN n 40 MHz MIMO, mid, 26GHz - 40GHz, U-NII-2C	S01_0AB01TX	2015-03-19	Passed	Passed
WLAN n 40 MHz MIMO, mid, 30MHz - 1GHz, U-NII-2C	S01_AB01TX	2021-03-21	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 20 MHz MIMO, high, U-NII-1	S01_AB01TX	2021-02-22	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-2A	S01_0AB01TX	2014-08-31	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-2C	S01_AB01TX	2021-02-22	Passed	Passed
WLAN n 20 MHz MIMO, high, U-NII-3	S01_0AB01TX	2014-08-31	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-1	S01_0AB01TX	2014-08-31	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-2C	S01_0AB01TX	2014-08-31	Passed	Passed
WLAN n 20 MHz MIMO, low, U-NII-3	S01_AB01TX	2021-02-22	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-1	S01_AB01TX	2021-02-22	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-2A	S01_0AB01TX	2014-11-09	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-2C	S01_0AB01TX	2014-11-09	Passed	Passed
WLAN n 40 MHz MIMO, high, U-NII-3	S01_AB01TX	2021-03-19	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-1	S01_0AB01TX	2014-08-31	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-2C	S01_AB01TX	2021-03-19	Passed	Passed
WLAN n 40 MHz MIMO, low, U-NII-3	S01_0AB01TX	2014-04-29	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	2021-03-25	--	valid
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COMMENT: For results of the applicable DFS tests see report MDE_TQSYS_2001_FCC_01.

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

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

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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| -02 | -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:	2021-01-13

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:	2021-03-25
Testing Period:	2014-04-29 to 2021-03-21

3.3 APPLICANT DATA

Company Name:	TQ-Systems Durach GmbH
Address:	Johann-Georg-Halske-Strasse 1 87471 Durach Germany
Contact Person:	Mr. Bernd Wein

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	Wireless HD-Video-Transceiver
Product name	Wireless HD-Video-Transceiver TX
Type	Q1049
Declared EUT data by the supplier	
Voltage Type	DC
Voltage Level	5 V
Tested Modulation Type	OFDM
General product description	The Transceiver is operating in the 5 GHz band using Orthogonal Frequency Division Multiplexing (OFDM).
Specific product description	The EUT is a module which enables video transmission in the 5 GHz bands. It is using bidirectional communication with a proprietary modulation scheme and supports 20 MHz and 40 MHz bandwidth channels. The transceiver is operating in the 5 GHz band in the ranges 5.15 – 5.25 GHz , 5.25 –5.35 GHz, 5.470 – 5.725 GHz and 5.725 – 5.850 GHz. In transmit direction for the video signal, 2 TX transmit chains are operating with symmetrical power distribution (MIMO), while the receiver operates with 1 RX receive chain in order to receive control commands. The EUT is supplied with power via a standard USB port. The object of this test report is the video transceiver, it was tested at 20 and 40 MHz channel bandwidth. For the tests a synthetic video signal (OFDM) is provided as test mode.
Ports of the device	Enclosure Data / DC port (system connector to ANC1) 5 GHz Antennas (5x UFL connector) DC power (at ANC1)
Antennas	All antennas are integral antennas with a gain of 2 dBi.
Special software used for testing	A tool which is called "AppCom" is used to set the EUT into the desired test modes. From the software, PRBS script files provided by the applicant, are used to control directly the EUT via a RS-232 port. A software tool "Debug View" is used to check the correct execution of the commands (at the software layer).

4.2 EUT MAIN COMPONENTS

Sample Name	Sample Code	Description
EUT 0ab01TX	DE1059000ab01	
Sample Parameter	**Value**	
Serial No.	SRI14242337 12	
HW Version	Q1049-X100-3	
SW Version	3.x.28.1	
Comment		

Sample Name	Sample Code	Description
EUT aa01 TX	DE1059003aa01	Conducted Sample
Sample Parameter	**Value**	
Serial No.	SRI2033028483	
HW Version	270315.0100 - SRI Q1049-X100-2-KN REV.0100	
SW Version	4.2.28.141	
Comment		

Sample Name	Sample Code	Description
EUT ab01 TX	DE1059003ab01	Radiated Sample
Sample Parameter	**Value**	
Serial No.		
HW Version	270315.0100 - SRI Q1049-X100-2-KN REV.0100	
SW Version	4.2.28.141	
Comment		

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**
AUX_A_TX	TQ-Systems, Q1048-M-2, -, - , SRI1424233639	TX Board with HDMI connector for Video transmission
AUX_B_TX	TQ-Systems, Q1048-M-4, -, - , SRI2029028100	TX Board with HDMI connector for Video transmission
AUX_C_TX	TQ-Systems, Q1048-M-4, -, -, SRI2029028099	TX Board with HDMI connector for Video transmission
AUX_D_TX	Conrad Electronics, Conrad PS 303 A, -, - , -	Laboratory Power Supply
AUX_E_TX	Goobay, 43749, -, - , -	AC/DC adapter USB, 100-240VAC, 5VDC
AUX_F_TX	Goobay, 43749, -, - , -	AC/DC adapter USB, 100-240VAC, 5VDC
AUX_G_TX	Schwaiger, HDMIV15031 high end, -, - , -	HDMI cable
AUX_H_TX	AMIMON, AMN043PCB, Rev 1.0, - , -	Debug Board

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_0AB01TX	EUT 0ab01TX, AUX_G_TX, AUX_A_TX, AUX_E_TX, AUX_H_TX,	Standalone test setup
S01_AA01TX	EUT aa01 TX, AUX_B_TX, AUX_F_TX, AUX_H_TX,	Standalone test setup
S01_AB01TX	EUT ab01 TX, AUX_C_TX, AUX_F_TX, AUX_H_TX,	Standalone test setup
S02_0AB01TX	EUT 0ab01TX, AUX_D_TX, AUX_G_TX, AUX_H_TX,	Standalone test setup

4.6 OPERATING MODES / TEST CHANNELS

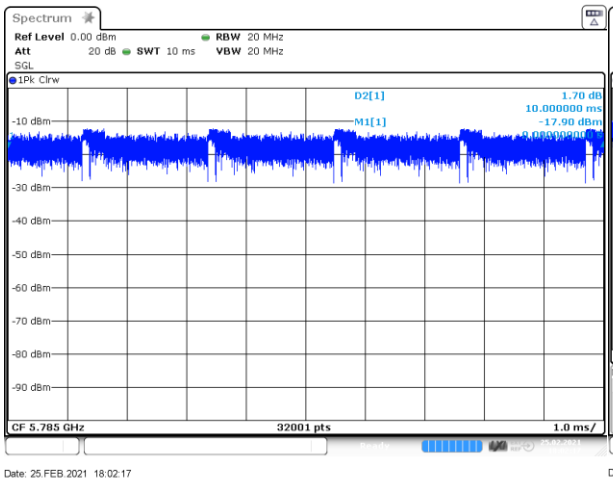
This chapter describes the operating modes of the EUTs used for testing.

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	40/44 [1)]	48	52	56/60 [1)]	64	100	116/120 [2)]	140	149	157	165	Ch.-No.
5180	5200/5220	5240	5260	5280/5300	5320	5500	5580/5600	5700	5745	5785	5825	MHz

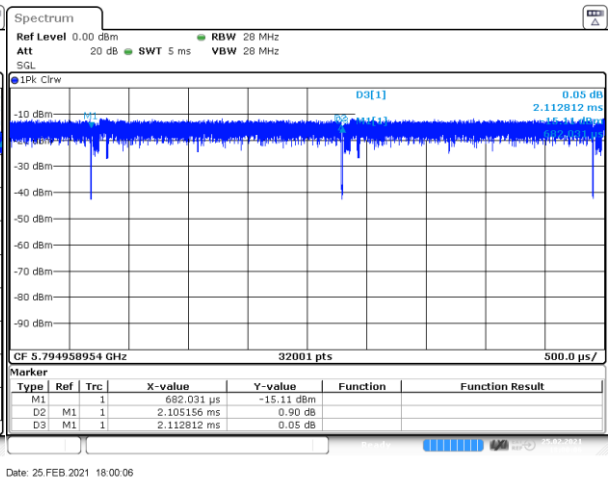
low	mid	high	low	mid	high	low	Mid	high	low	mid	high	40 MHz
38	-	46	54	-	62	102	110/118 [2)]	138	151	-	159	Ch.-No.
5190	-	5230	5270	-	5310	5510	5550/5590	5690	5755	-	5795	MHz

1) Used channel for 99 % bandwidth: 5200 MHz + 5300 MHz. For all other test cases: 5220 MHz / 5280 MHz.
2) Used channel for 99 % bandwidth and spurious emissions 30 MHz – 1 GHz and 15- 26 GHz: 5500 MHz. For all other test cases: 5590 MHz.

Duty Cycle Plots



20 MHz BW (100 %)



40 MHz BW (99.6 %)

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

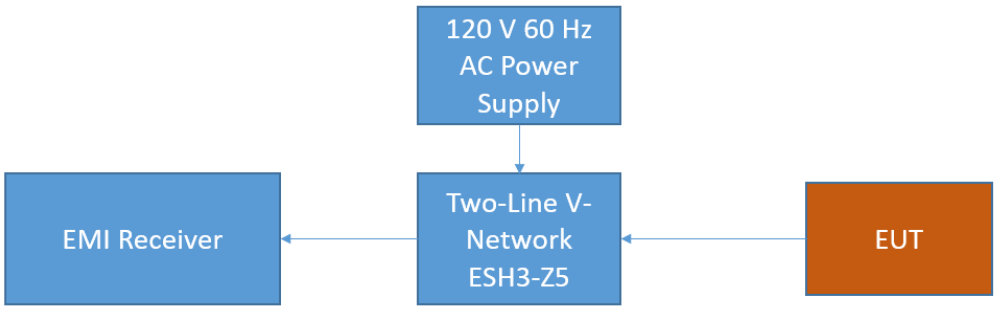
5.1 AC CONDUCTED EMISSIONS

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.1.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C 63.10
The Equipment Under Test (EUT) was setup in a shielded room to perform the conducted emissions measurements in a typical installation configuration. The EUT was powered from 50µH || 50 Ohm Line Impedance Stabilization Network (LISN). The LISN's unused connections were terminated with 50 Ohm loads.



FCC Conducted Emissions on AC

The measurement procedure consists of two steps. It is implemented into the EMI test software EMC-32 from R&S.

Step 1: Preliminary scan
Intention of this step is, to determine the conducted EMI-profile of the EUT.
EMI receiver settings:
- Detector: Peak – Maxhold & Average
- Frequency range: 150 kHz – 30 MHz
- Frequency steps: 2.5 kHz
- IF–Bandwidth: 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)
- Measurement on phase + neutral lines of the power cords

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

Step 2: Final measurement
Intention of this step is, to determine the highest emissions with the settings defined in the test specification for the frequencies identified in step 1.
EMI receiver settings:
- Detector: Quasi-Peak & (CISPR) Average

- IF Bandwidth: 9 kHz
- Measuring time: 1 s / frequency

At each frequency determined in step 1, four measurements are performed in the following combinations:
1) Neutral lead - reference ground (PE grounded)
2) Phase lead - reference ground (PE grounded)
3) Neutral lead - reference ground (PE floating)
4) Phase lead - reference ground (PE floating)

The highest value is reported.

5.1.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.207

Frequency (MHz)	QP Limits (dBµV)	AV Limits (dBµV)
0.15 – 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

5.1.3 TEST PROTOCOL

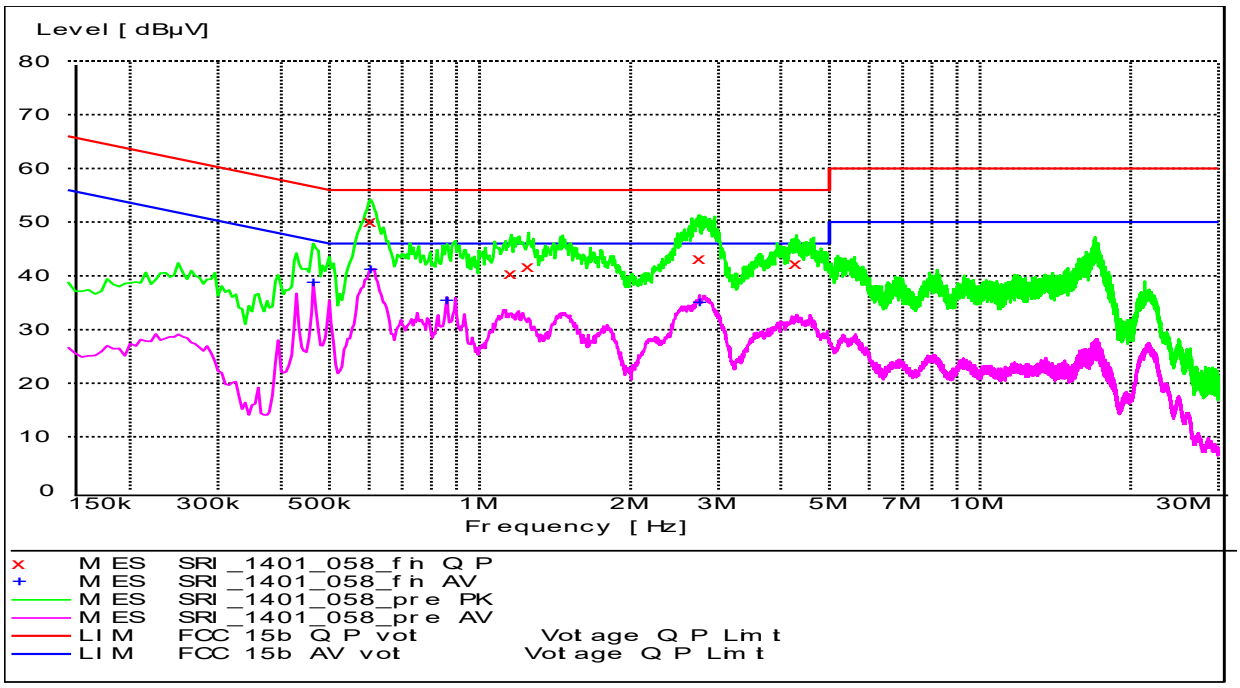
Temperature: 26 °C
Air Pressure: 1010 hPa
Humidity: 31 %

Power line	**PE**	**Frequency [MHz]**	**Measured value QP [dBµV]**	**Measured value AV [dBµV]**	**Limit [dBµV]**	**Margin [dB]**
L	Grounded	0.47	-	38.6	47.0	8.1
N	Floating	0.61	50.0	-	56.0	6.0
L	Grounded	0.61	-	41.2	46.0	4.8

Remark: Please see next sub-clause for the measurement plot.
The EUT is operated at 5 V DC while supplied by AUX_E_TX which is connected to AC Mains at 120 V / 60 Hz.

5.1.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Operating mode = worst case
(S02_0AB01TX)



MEASUREMENT RESULT: "SRI_1401_058_fin QP"

18.03.2015 16:13

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.605000	50.00	10.1	56	6.0	N	FLO
1.155000	40.40	10.1	56	15.6	L1	FLO
1.250000	41.80	10.1	56	14.2	N	GND
2.750000	43.20	10.2	56	12.8	L1	GND
4.295000	42.20	10.3	56	13.8	N	GND

MEASUREMENT RESULT: "SRI_1401_058_fin AV"

18.03.2015 16:13

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.465000	38.60	10.1	47	8.1	L1	GND
0.605000	41.20	10.1	46	4.8	L1	GND
0.860000	35.40	10.1	46	10.6	L1	FLO
2.750000	35.00	10.2	46	11.0	N	GND

5.1.5 TEST EQUIPMENT USED

- Conducted Emissions

5.2 26 DB BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

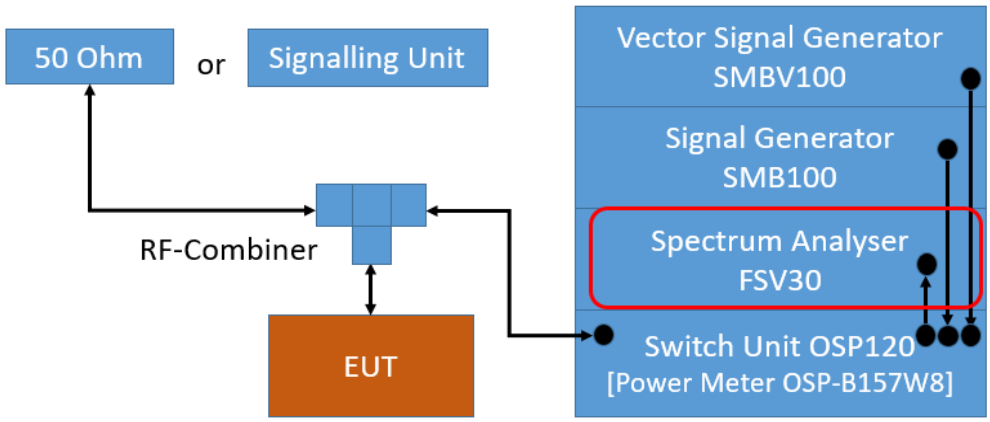
5.2.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was 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 the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyzer settings:

- Resolution Bandwidth (RBW): initially approx. 1 % of nominal emission bandwidth
- Video Bandwidth (VBW): > RBW
- Span: 40 / 60 / 160 / 320 MHz (for 20 / 40 / 80 / 160 MHz nominal bandwidth)
- Trace: Maxhold
- Sweeps: Until the trace is stable
- Sweeptime: Auto
- Detector: Peak



TS8997; Occupied Channel Bandwidth 6 dB / 26 dB / 99 %

Note: Deviant from the above picture, the EUT was directly connected to the spectrum analyser for the tests in this report.

5.2.2 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.

5.2.3 TEST PROTOCOL

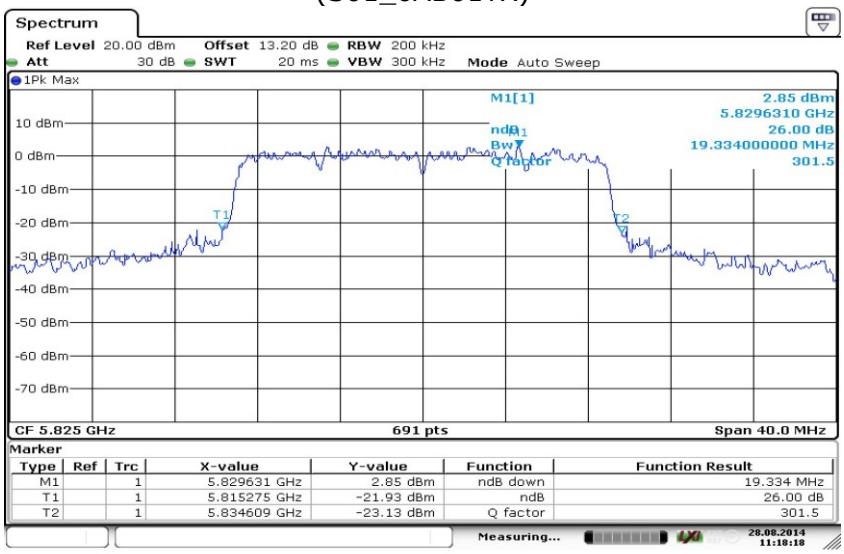
Ambient temperature: 25 °C
Air Pressure: 1018 hPa
Humidity: 46 %

Radio Technology	Operating Frequency	Subband	26 dB Bandwidth [MHz]
WLAN n 20 MHz	low	U-NII-1	19.2
WLAN n 20 MHz	mid	U-NII-1	19.0
WLAN n 20 MHz	high	U-NII-1	19.1
WLAN n 20 MHz	low	U-NII-2A	19.0
WLAN n 20 MHz	mid	U-NII-2A	19.1
WLAN n 20 MHz	high	U-NII-2A	19.2
WLAN n 20 MHz	low	U-NII-2C	19.0
WLAN n 20 MHz	mid	U-NII-2C	19.0
WLAN n 20 MHz	high	U-NII-2C	19.1
WLAN n 20 MHz	low	U-NII-3	19.2
WLAN n 20 MHz	mid	U-NII-3	19.2
WLAN n 20 MHz	high	U-NII-3	19.3
WLAN n 40 MHz	low	U-NII-1	38.9
WLAN n 40 MHz	high	U-NII-1	38.9
WLAN n 40 MHz	low	U-NII-2A	38.9
WLAN n 40 MHz	high	U-NII-2A	38.9
WLAN n 40 MHz	low	U-NII-2C	38.9
WLAN n 40 MHz	mid	U-NII-2C	38.9
WLAN n 40 MHz	high	U-NII-2C	38.9
WLAN n 40 MHz	low	U-NII-3	40.6
WLAN n 40 MHz	high	U-NII-3	39.8

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

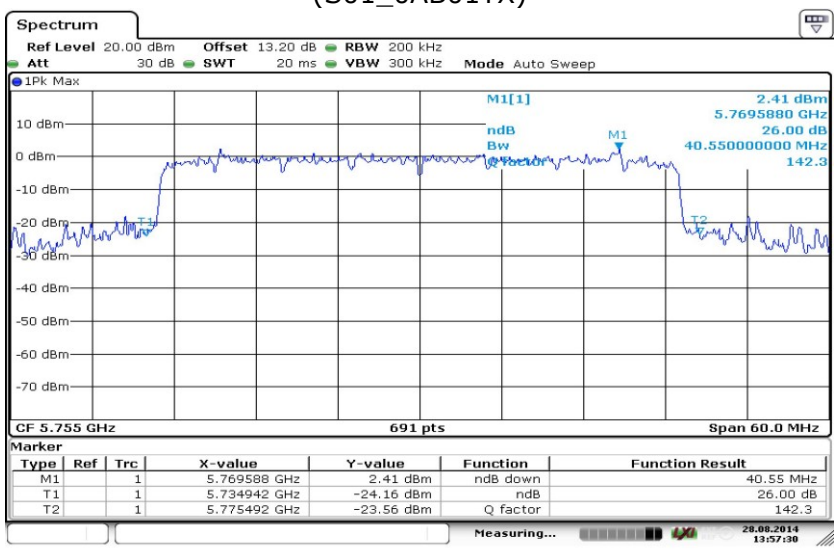
5.2.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Radio Technology = WLAN n 20 MHz, Operating Frequency = high, Subband = U-NII-3 (S01_0AB01TX)



Date: 28.AUG.2014 11:18:18

Radio Technology = WLAN n 40 MHz, Operating Frequency = low, Subband = U-NII-3 (S01_0AB01TX)



Date: 28.AUG.2014 13:57:30

5.2.5 TEST EQUIPMENT USED

- Radio Lab

5.3 6 DB BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

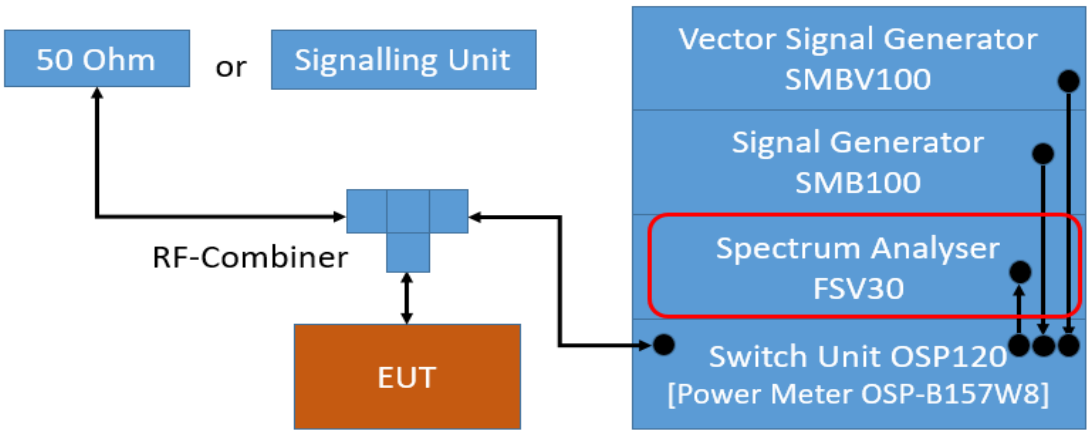
5.3.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was 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 the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyzer settings:

- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz
- Span: 30 / 60 / 160 / 320 MHz (for 20 / 40 / 80 / 160 MHz nominal bandwidth))
- Trace: Maxhold
- Sweeps: Until the trace is stable
- Sweeptime: Auto
- Detector: Peak



TS8997; Occupied Channel Bandwidth 6 dB / 26 dB / 99 %

Note: Deviant from the above picture, the EUT was directly connected to the spectrum analyser for the tests in this report.

5.3.2 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.

5.3.3 TEST PROTOCOL

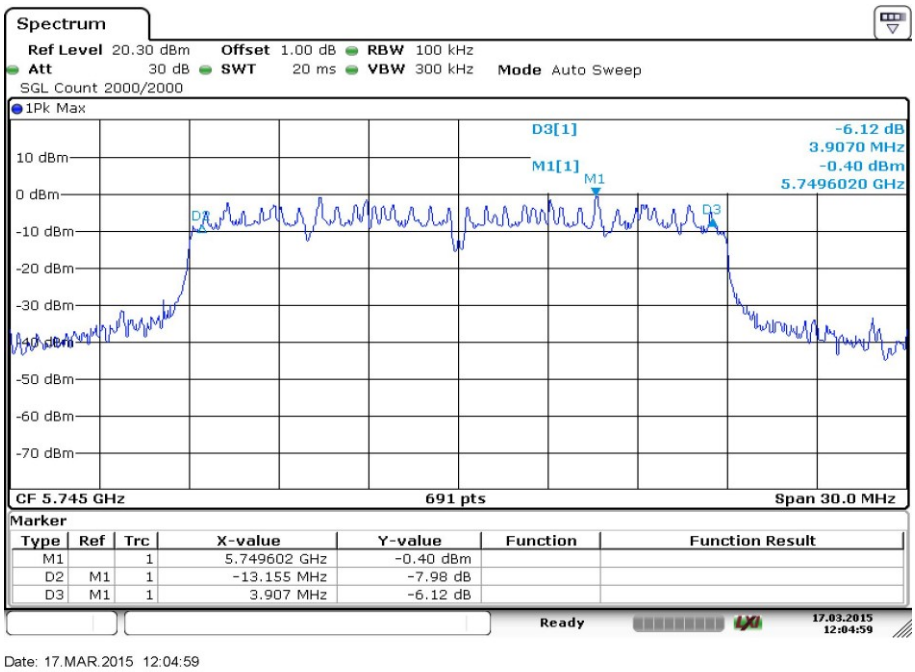
Ambient temperature:	25 °C
Air Pressure:	1018 hPa
Humidity:	46 %

Radio Technology	Operating Frequency	6 dB Bandwidth [MHz]	Limit [MHz]	Margin [MHz]	Min. 6 dB Frequency [MHz]	Max. 6 dB Frequency [MHz]
WLAN n 20 MHz	low	17.07	0.5	16.57	3.91	13.16
WLAN n 20 MHz	mid	17.07	0.5	16.57	3.91	13.16
WLAN n 20 MHz	high	17.37	0.5	16.87	4.21	13.16
WLAN n 40 MHz	low	36.82	0.5	36.32	33.00	3.82
WLAN n 40 MHz	high	36.93	0.5	36.43	33.08	3.85

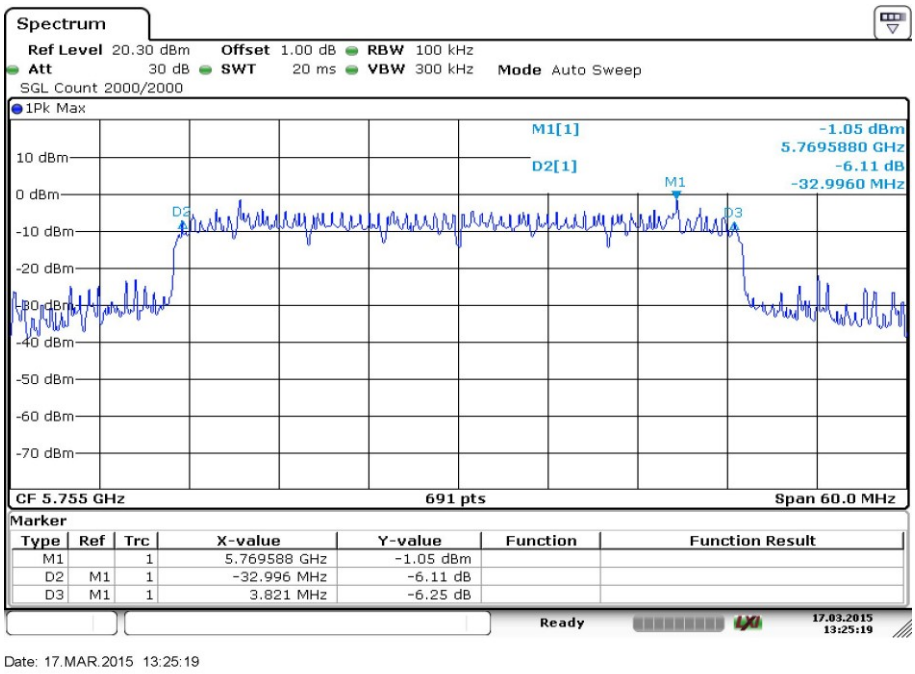
Remark: Please see next sub-clause for the measurement plot.

5.3.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Radio Technology = WLAN n 20 MHz, Operating Frequency = low, Subband = U-NII-3 (S01_0AB01TX)



Radio Technology = WLAN n 40 MHz, Operating Frequency = low, Subband = U-NII-3 (S01_0AB01TX)



5.3.5 TEST EQUIPMENT USED

- Radio Lab

5.4 99 % BANDWIDTH

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.4.1 TEST DESCRIPTION

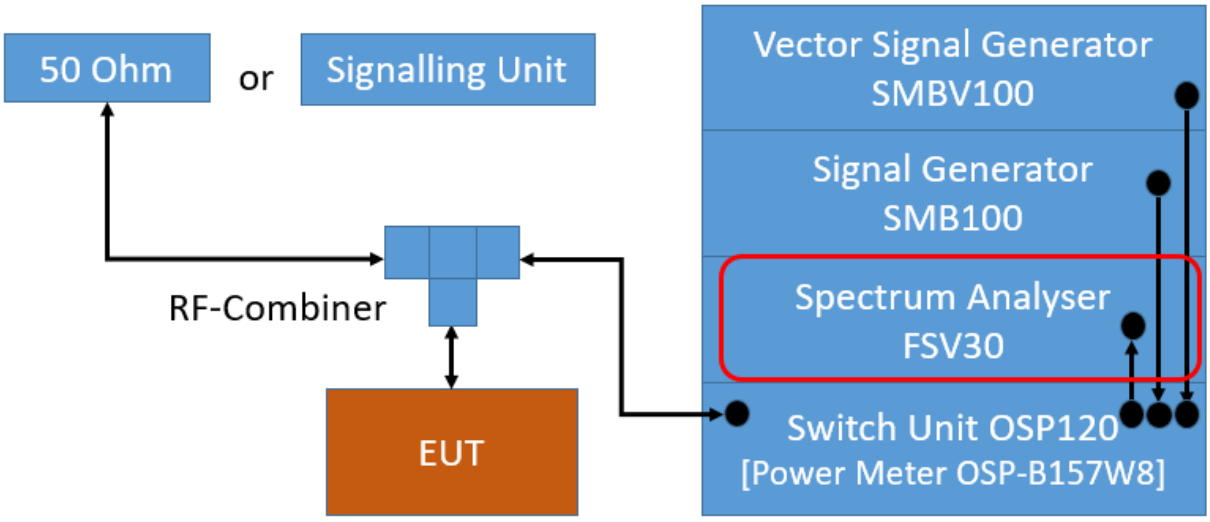
The Equipment Under Test (EUT) was set up to perform the occupied bandwidth measurements.
The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including 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 the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyzer settings:

- Resolution Bandwidth (RBW): approx. ≥ 1 % of the span, but not below
- Video Bandwidth (VBW): ≥ 3 times the RBW
- Span: 40 / 80 / 160 / 320 MHz (for 20 / 40 / 80 / 160 MHz nominal bandwidth)
- Trace: Maxhold
- Sweeps: Until the trace is stable
- Sweeptime: Auto
- Detector: Peak

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



TS8997; Occupied Channel Bandwidth 6 dB / 26 dB / 99 %

5.4.2 TEST REQUIREMENTS / LIMITS

No applicable limit:

5.4.3 TEST PROTOCOL

Ambient temperature: 25 °C
Air Pressure: 997 hPa
Humidity: 32 %

Radio Technology	Operating Frequency	Subband	99% Bandwidth [MHz]
WLAN n 20 MHz	low	U-NII-1	17.7
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	17.7
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	17.9
WLAN n 20 MHz	mid	U-NII-3	17.8
WLAN n 20 MHz	high	U-NII-3	17.8
WLAN n 40 MHz	low	U-NII-1	37.5
WLAN n 40 MHz	high	U-NII-1	37.8
WLAN n 40 MHz	low	U-NII-2A	37.8
WLAN n 40 MHz	high	U-NII-2A	37.8
WLAN n 40 MHz	low	U-NII-2C	37.8
WLAN n 40 MHz	mid	U-NII-2C	37.8
WLAN n 40 MHz	high	U-NII-2C	37.8
WLAN n 40 MHz	low	U-NII-3	38.3
WLAN n 40 MHz	high	U-NII-3	38.3

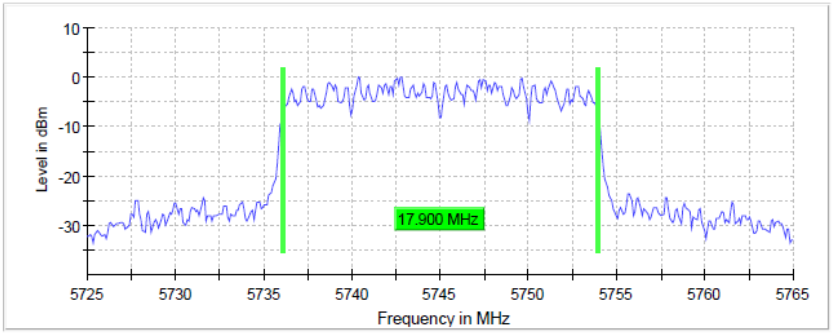
Remark: Please see next sub-clause for the measurement plot.

5.4.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Radio Technology = WLAN n 20 MHz, Operating Frequency = low, Subband = U-NII-3 (S01_AA01TX)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
5745.000000	17.900000	---	---	5736.050000	5753.950000	PASS

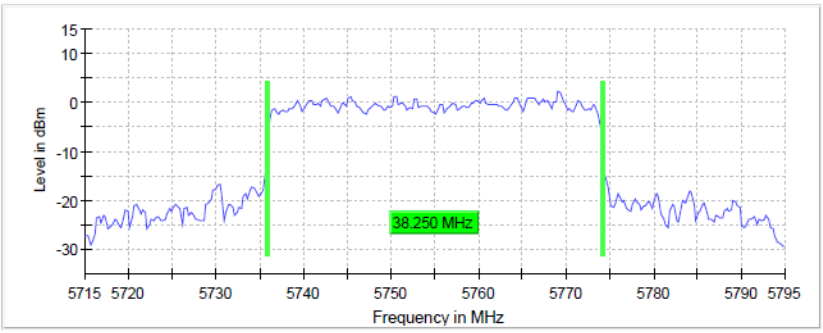


Setting	Instrument Value
Start Frequency	5.72500 GHz
Stop Frequency	5.76500 GHz
Span	40.000 MHz
RBW	200.000 kHz
VBW	1.000 MHz
SweepPoints	400
Sweeptime	28.477 µs
Reference Level	0.000 dBm
Attenuation	20.000 dB
Detector	MaxPeak
SweepCount	200
Filter	3 dB
Trace Mode	Max Hold
Sweeptype	FFT
Preamp	off
Stablemode	Trace
Stablevalue	0.30 dB
Run	34 / max. 150
Stable	5 / 5
Max Stable Difference	0.09 dB

Radio Technology = WLAN n 40 MHz, Operating Frequency = low, Subband = U-NII-3 (S01_AA01TX)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)	Result
5755.000000	38.250000	---	---	5735.875000	5774.125000	PASS



Setting	Instrument Value
Start Frequency	5.71500 GHz
Stop Frequency	5.79500 GHz
Span	80.000 MHz
RBW	500.000 kHz
VBW	2.000 MHz
SweepPoints	320
Sweeptime	18.906 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	65 / max. 150
Stable	5 / 5
Max Stable Difference	0.00 dB

5.4.5 TEST EQUIPMENT USED

- R&S TS8997

5.5 MAXIMUM CONDUCTED OUTPUT POWER

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

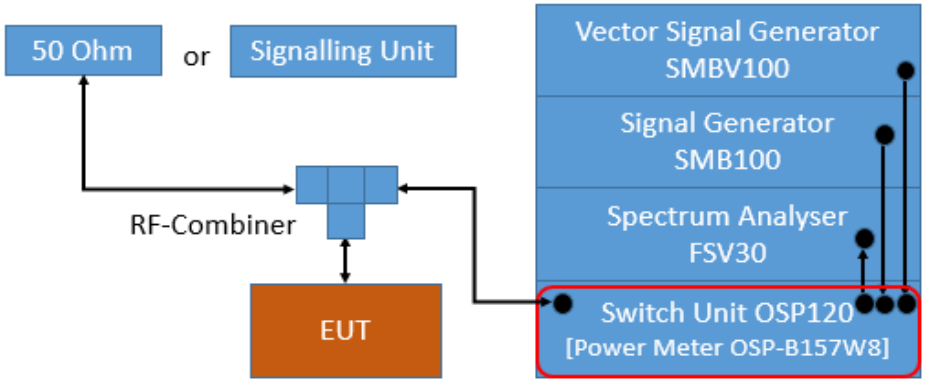
5.5.1 TEST DESCRIPTION

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

The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

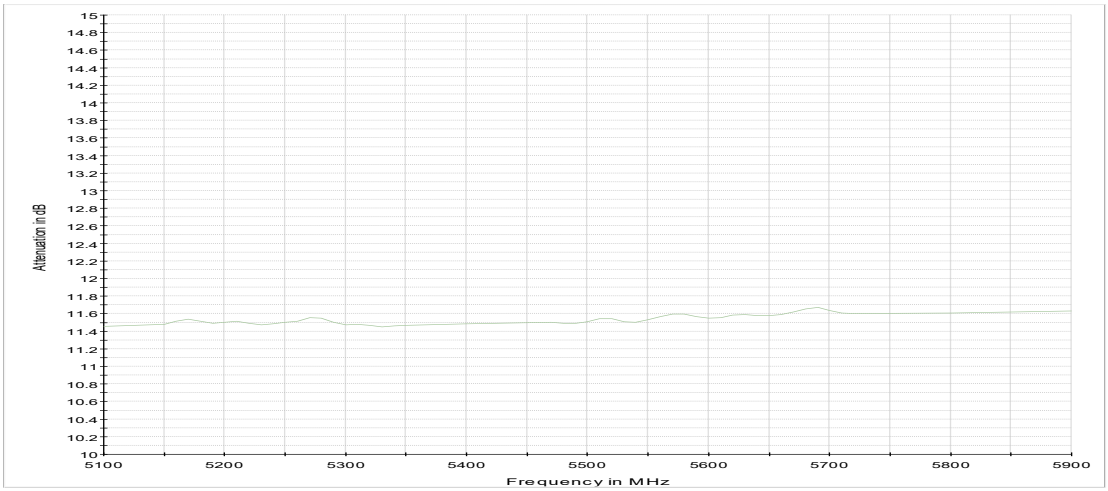
The OSP-B157W is a gated RF average power meter with a signal bandwidth > 300 MHz.

Note:
The measurement was performed according FCC Public Note "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E, 789033 D02", method **PM-G**.



TS8997; Maximum Conducted Output Power

Note: Deviant from the above picture, the EUT was directly connected to the spectrum analyser for the tests in this report. The channel power function was used to determine the output power. See example plots for the respective Analyser settings.



Attenuation of measurement path

5.5.2 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.

5.5.3 TEST PROTOCOL

Ambient temperature: 25 °C
Air Pressure: 1019 hPa
Humidity: 44 %
Video 20 MHz

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	ANT1 [dBm]	ANT2 [dBm]	N/A	N/A	
1	36	5180	9.3	11.3	30.0	20.7	6.3	6.2	-99.0	-99.0	1)
	44	5220	9.4	11.4	30.0	20.6	6.5	6.2	-99.0	-99.0	1)
	48	5240	9.4	11.4	30.0	20.6	6.5	6.3	-99.0	-99.0	1)
2A	52	5260	9.4	11.4	23.8	14.4	6.4	6.5	-99.0	-99.0	
	56	5280	9.5	11.5	23.8	14.3	6.3	6.7	-99.0	-99.0	
	64	5320	9.9	11.9	23.8	14.0	6.9	6.8	-99.0	-99.0	
2C	100	5500	10.1	12.1	23.8	13.7	7.1	7.0	-99.0	-99.0	
	120	5600	9.9	11.9	23.8	13.9	6.8	7.1	-99.0	-99.0	
	140	5700	10.1	12.1	23.8	13.7	6.9	7.3	-99.0	-99.0	
3	149	5745	10.0	12.0	30.0	20.0	6.9	7.1	-99.0	-99.0	
	157	5785	10.3	12.3	30.0	19.7	7.5	7.0	-99.0	-99.0	
	165	5825	10.1	12.1	30.0	19.9	7.5	6.6	-99.0	-99.0	

table continued

U-NII-Subband	Ch. No.	Freq. [MHz]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]	
1	36	5180	N/A		22.5	11.2	
	44	5220	N/A		22.5	11.1	
	48	5240	N/A		22.5	11.1	
2A	52	5260	23.5	14.0	29.5	18.1	1)
	56	5280	23.5	14.0	29.5	18.0	1)
	64	5320	23.5	13.6	29.5	17.6	1)
2C	100	5500	23.5	13.4	29.5	17.4	
	120	5600	23.5	13.5	29.5	17.6	
	140	5700	23.5	13.4	29.5	17.4	
3	149	5745	30.0	20.0	36.0	24.0	
	157	5785	30.0	19.7	36.0	23.7	
	165	5825	30.0	19.9	36.0	23.9	

Video 40 MHz

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	ANT1 [dBm]	ANT2 [dBm]	N/A	N/A	
1	38	5190	13.2	15.2	30.0	16.8	10.3	10.0	-99.0	-99.0	1)
	46	5230	13.0	15.0	30.0	17.0	10.2	9.7	-99.0	-99.0	1)
2A	54	5270	13.1	15.1	24.0	10.9	10.1	10.0	-99.0	-99.0	
	62	5310	13.5	15.5	24.0	10.5	10.9	10.1	-99.0	-99.0	
2C	102	5510	13.3	15.3	24.0	10.7	10.5	10.1	-99.0	-99.0	
	118	5590	13.0	15.0	24.0	11.0	10.2	9.8	-99.0	-99.0	
	134	5670	13.0	15.0	24.0	11.0	10.2	9.6	-99.0	-99.0	
3	151	5755	13.6	15.6	30.0	16.4	10.9	10.2	-99.0	-99.0	
	159	5795	13.3	15.3	30.0	16.7	10.7	9.9	-99.0	-99.0	

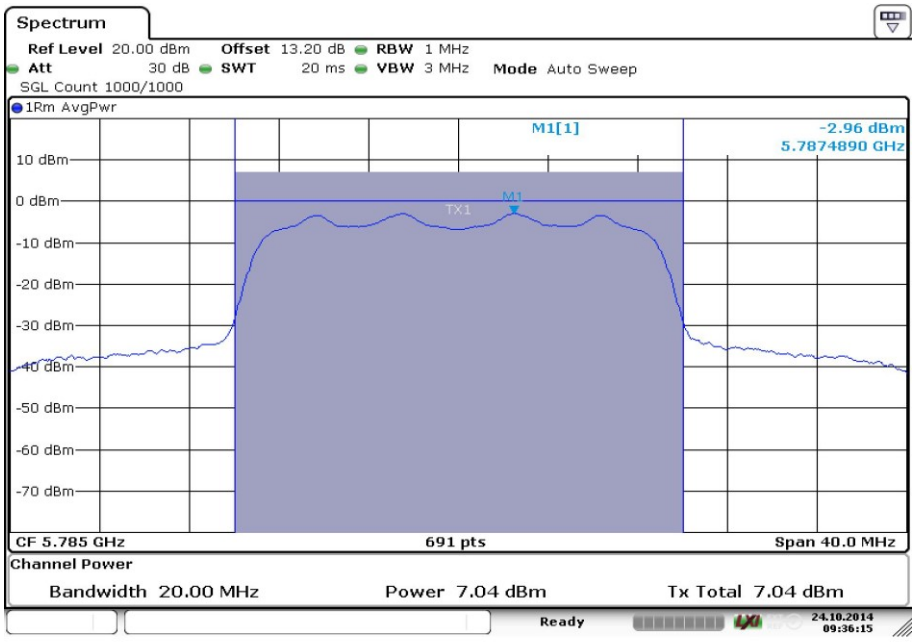
table continued

U-NII-Subband	Ch. No.	Freq. [MHz]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]	
1	38	5190	N/A		23.0	7.8	
	46	5230	N/A		23.0	8.0	
2A	54	5270	24.0	10.8	30.0	14.9	1)
	62	5310	24.0	10.9	30.0	14.5	1)
2C	102	5510	24.0	10.5	30.0	14.7	
	118	5590	24.0	10.7	30.0	15.0	
	134	5670	24.0	11.0	30.0	15.0	
3	151	5755	30.0	17.0	36.0	20.4	
	159	5795	30.0	16.4	36.0	20.7	

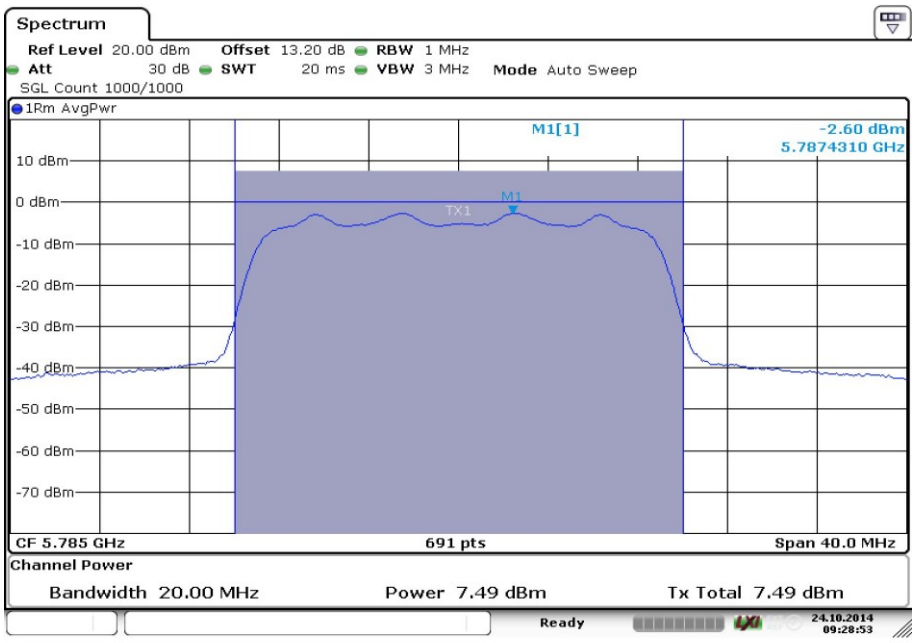
Remark: Please see next sub-clause for the measurement plot.
1) = no additional limit applies related to the elevation.

5.5.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = mid, Subband = U-NII-3 (S01_0AB01TX)

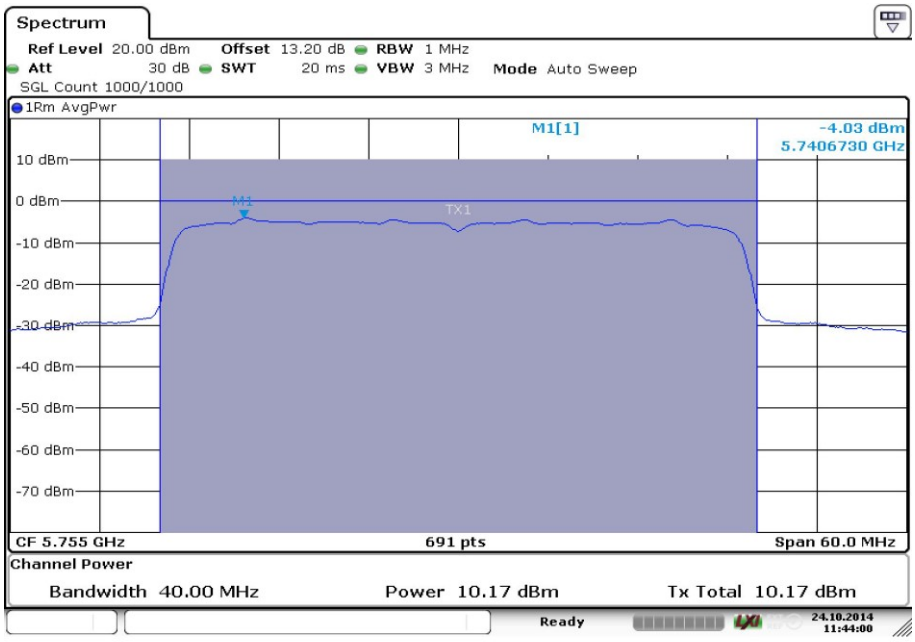


Date: 24.OCT.2014 09:36:15

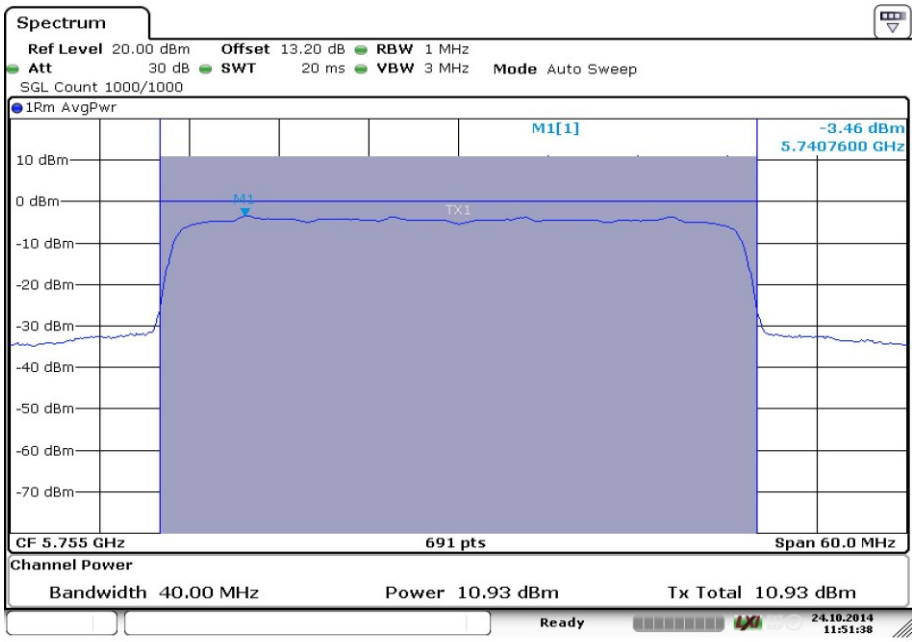


Date: 24.OCT.2014 09:28:54

Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = low, Subband = U-NII-3 (S01_0AB01TX)



Date: 24.OCT.2014 11:44:00



Date: 24.OCT.2014 11:51:38

5.5.5 TEST EQUIPMENT USED

- Radio Lab

5.6 PEAK POWER SPECTRAL DENSITY

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.6.1 TEST DESCRIPTION

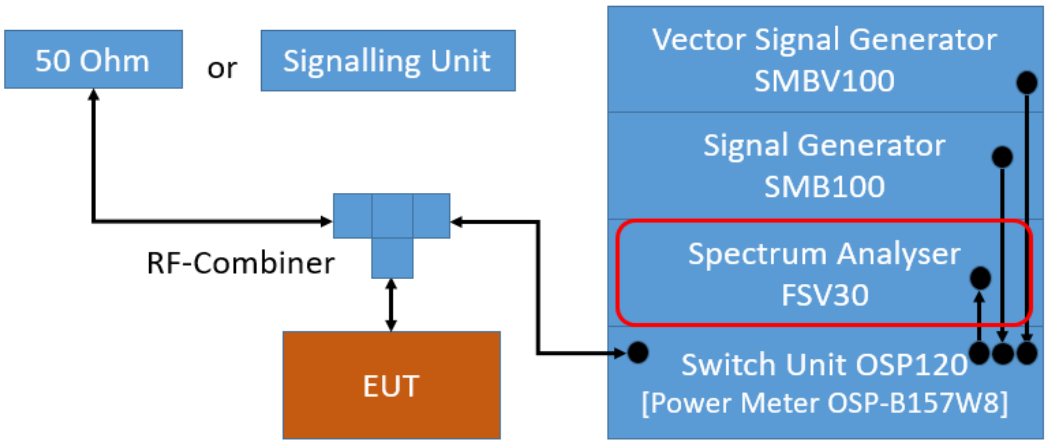
The Equipment Under Test (EUT) was set up in a shielded room to perform the Maximum Power Spectral Density measurements.
The results recorded were measured with the modulation which produces the worst-case (highest) output power.

The EUT was connected to the test system as described in the block diagram below. The complete attenuation of the measurement path is known and considered.

Analyzer settings:

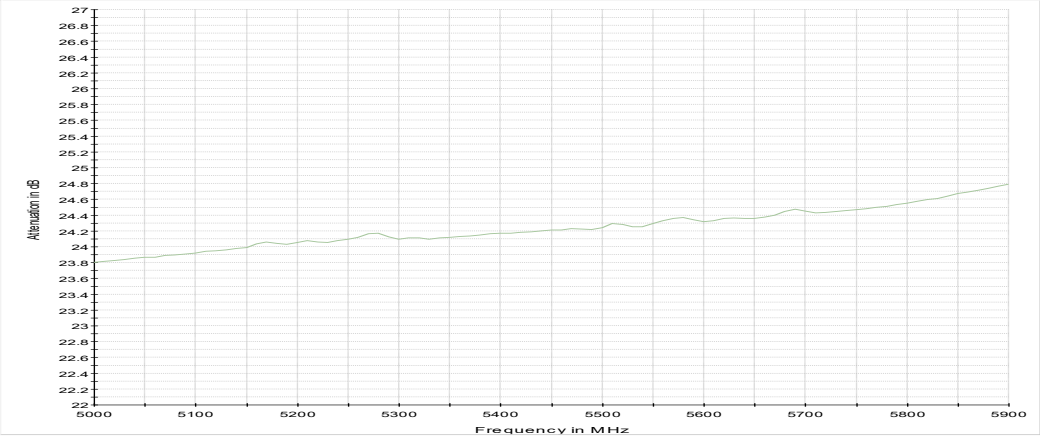
- Resolution Bandwidth (RBW): 1 MHz
- Video Bandwidth (VBW): 3 MHz
- Trace: Average, RMS power averaging mode
- Sweeps: 100
- Sweeptime: 5 ms
- Detector: RMS
- Trigger: gated mode

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-3**.



TS8997; Maximum Power Spectral Density

Note: Deviant from the above picture, the EUT was directly connected to the spectrum analyser for the tests in this report.



Attenuation of the measurement path

5.6.2 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.

5.6.3 TEST PROTOCOL

Ambient temperature: 25 °C
Air Pressure: 1019 hPa
Humidity: 44 %
Video 20 MHz

U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm/MHz]	FCC Limit [dBm/MHz]	Margin [dB]	ANT1 [dBm/MHz]	ANT2 [dBm/MHz]	N/A	N/A
1	36	5180	-0.8	17.0	17.8	-3.8	-3.8	-99.0	-99.0
	44	5220	-0.7	17.0	17.7	-3.6	-3.8	-99.0	-99.0
	48	5240	-0.7	17.0	17.7	-3.7	-3.7	-99.0	-99.0
2A	52	5260	-0.6	11.0	11.6	-3.7	-3.6	-99.0	-99.0
	56	5280	-0.6	11.0	11.6	-3.9	-3.3	-99.0	-99.0
	64	5320	-0.2	11.0	11.2	-3.2	-3.2	-99.0	-99.0
2C	100	5500	0.0	11.0	11.0	-3.0	-3.0	-99.0	-99.0
	120	5600	-0.1	11.0	11.1	-3.3	-2.9	-99.0	-99.0
	140	5700	0.0	11.0	11.0	-3.2	-2.9	-99.0	-99.0
3	149	5745	0.0	30.0	30.0	-3.2	-2.9	-99.0	-99.0
	157	5785	0.2	30.0	29.8	-2.6	-3.0	-99.0	-99.0
	165	5825	0.1	30.0	29.9	-2.5	-3.4	-99.0	-99.0

table continued

U-NII-Subband	Ch. No.	Freq. [MHz]	IC EIRP MPSD	IC Limit [dBm/MHz]	Margin [dB]
1	36	5180	1.2	10.0	8.8
	44	5220	1.3	10.0	8.7
	48	5240	1.3	10.0	8.7
2A	52	5260	unit:	11.0	11.6
	56	5280	dBm/	11.0	11.6
	64	5320	MHz	11.0	11.2
2C	100	5500		11.0	11.0
	120	5600		11.0	11.1
	140	5700		11.0	11.0
3	149	5745		30.0	30.0
	157	5785		30.0	29.8
	165	5825		30.0	29.9

Video 40 MHz

U-NII-Subband	Ch. No.	Freq. [MHz]	MPSD [dBm/MHz]	FCC Limit [dBm/MHz]	Margin [dB]	ANT1 [dBm/MHz]	ANT2 [dBm/MHz]	N/A	N/A
1	38	5190	-1.2	17.0	18.2	-4.2	-4.3	-99.0	-99.0
	46	5230	-1.4	17.0	18.4	-4.3	-4.6	-99.0	-99.0
2A	54	5270	-1.3	11.0	12.3	-4.3	-4.3	-99.0	-99.0
	62	5310	-0.8	11.0	11.8	-3.5	-4.3	-99.0	-99.0
2C	102	5510	-1.1	11.0	12.1	-3.9	-4.3	-99.0	-99.0
	118	5590	-1.4	11.0	12.4	-4.3	-4.5	-99.0	-99.0
	134	5670	-1.4	11.0	12.4	-4.2	-4.6	-99.0	-99.0
3	151	5755	-0.7	30.0	30.7	-3.5	-4.0	-99.0	-99.0
	159	5795	-1.1	30.0	31.1	-3.8	-4.5	-99.0	-99.0

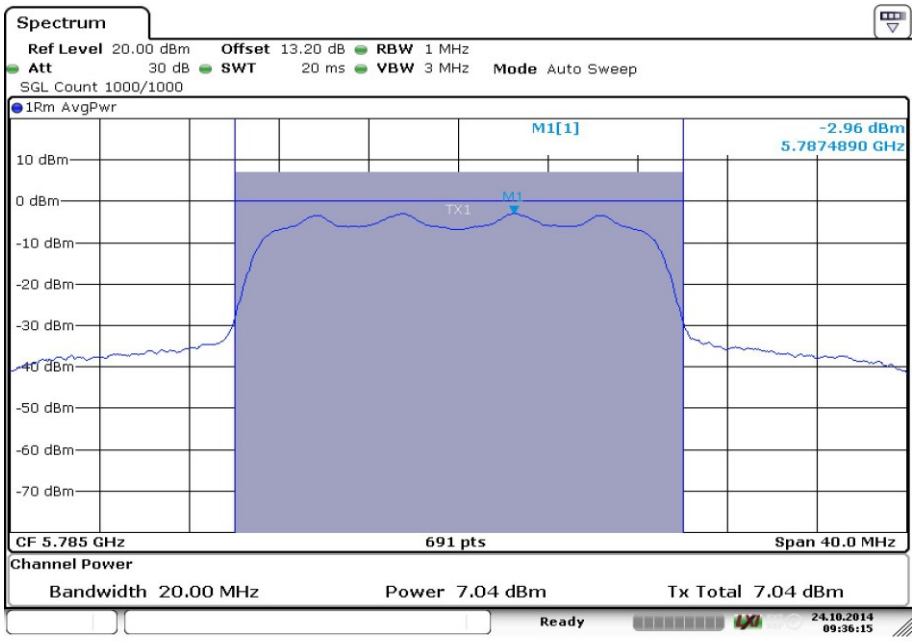
table continued

U-NII-Subband	Ch. No.	Freq. [MHz]	IC EIRP MPSD	IC Limit [dBm/MHz]	Margin [dB]
1	38	5190	0.8	10.0	9.2
	46	5230	0.6	10.0	9.4
2A	54	5270	unit:	11.0	12.3
	62	5310	dBm/	11.0	11.8
2C	102	5510	MHz	11.0	12.1
	118	5590		11.0	12.4
	134	5670		11.0	12.4
3	151	5755		30.0	30.7
	159	5795		30.0	31.1

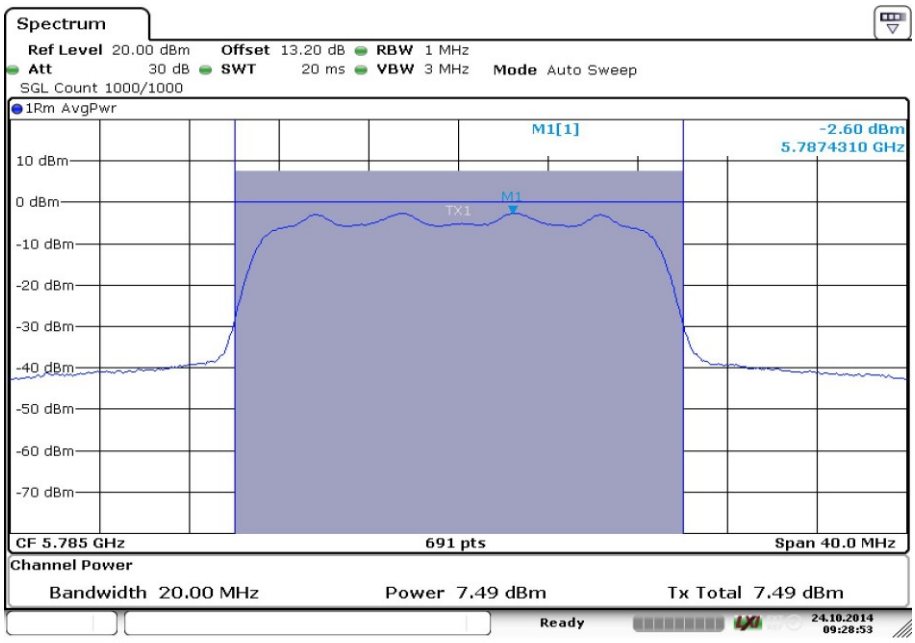
Remark: Please see next sub-clause for the measurement plot.

5.6.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = mid, Subband = U-NII-3 (S01_0AB01TX)

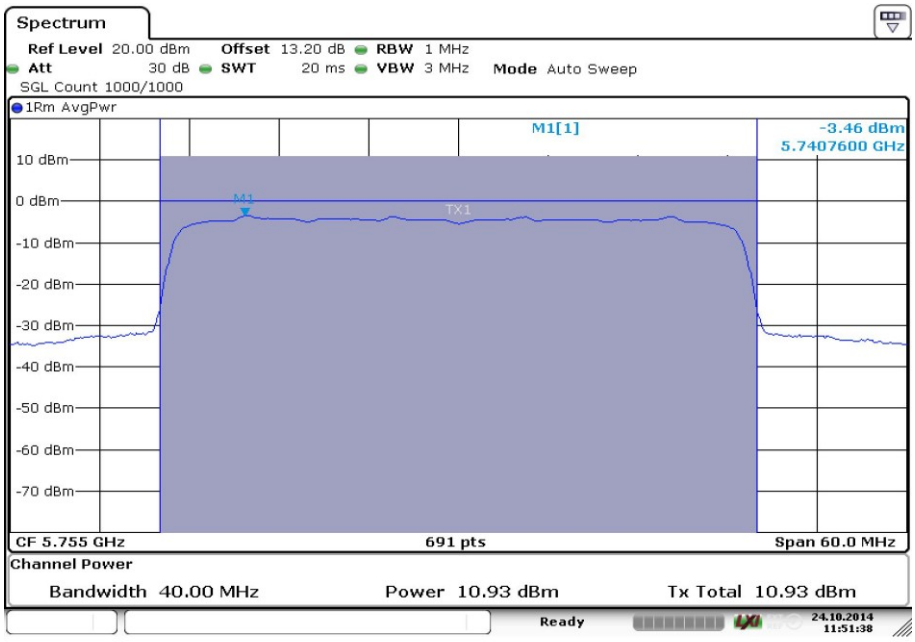


Date: 24.OCT.2014 09:36:15

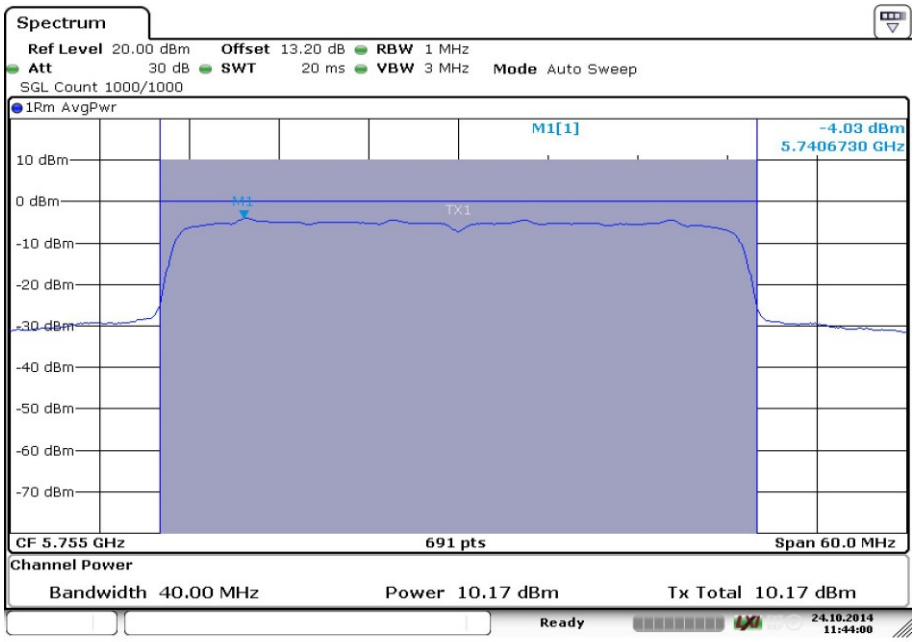


Date: 24.OCT.2014 09:28:54

Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = low, Subband = U-NII-3 (S01_0AB01TX)



Date: 24.OCT.2014 11:51:38



Date: 24.OCT.2014 11:44:00

5.6.5 TEST EQUIPMENT USED

- Radio Lab

5.7 UNDESIRABLE EMISSIONS; GENERAL FIELD STRENGTH LIMITS

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

5.7.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The measurements were performed according the following sub-chapters of ANSI C63.10:

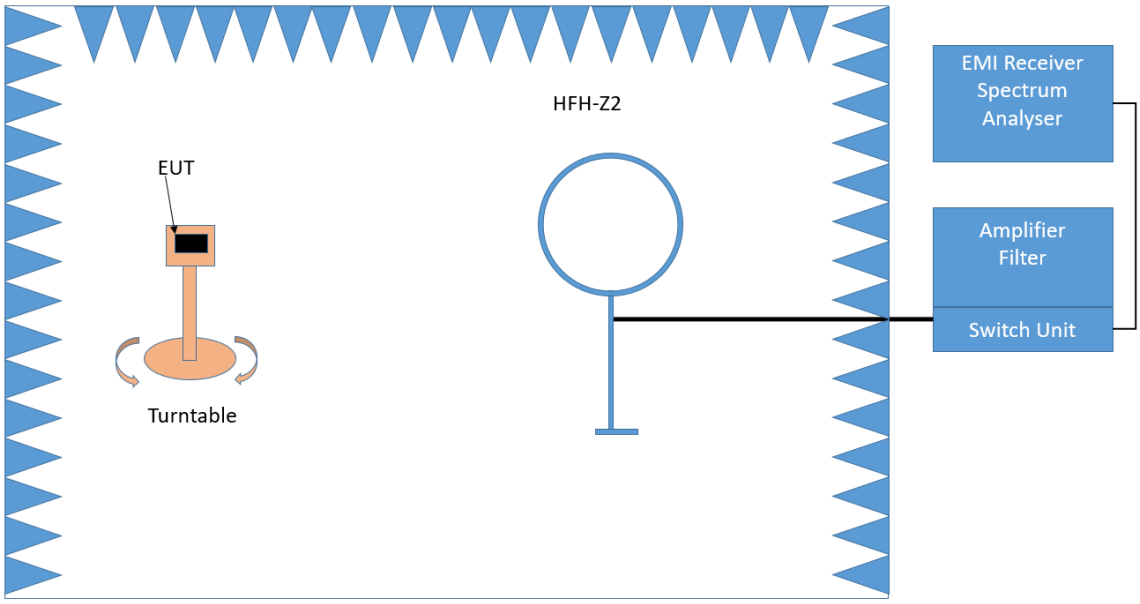
- < 30 MHz: Chapter 6.4
- 30 MHz – 1 GHz: Chapter 6.5
- > 1 GHZ: Chapter 6.6 (procedure according 6.6.5 used)

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.

Below 1 GHz:

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.

1. Measurement up to 30 MHz



Test Setup; Spurious Emission Radiated (SAC), 9 kHz – 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)

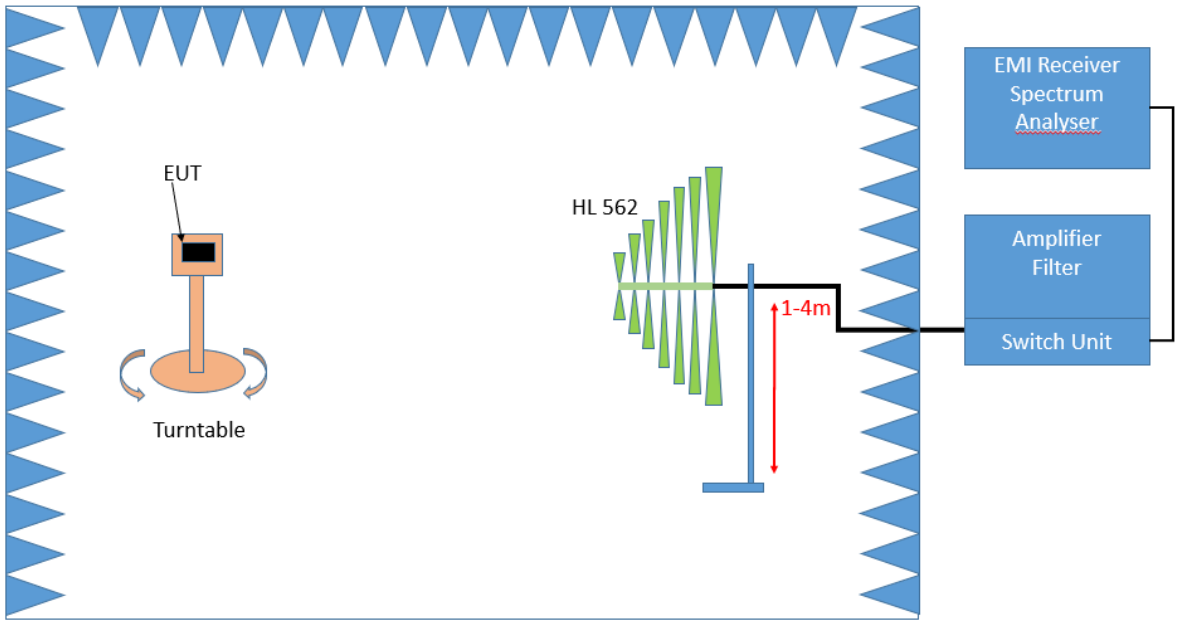
Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

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



Test Setup; Spurious Emission Radiated (SAC), 30 MHz- 1GHz

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 – 4 m

- Height variation step size: 1.5 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: 360 °
- Height variation range:1 – 4 m
- Antenna Polarisation: max. value determined in step 1

Step 3: Final measurement with QP detector

With the settings determined in step 2, the final measurement will be performed:

EMI receiver settings for step 3:

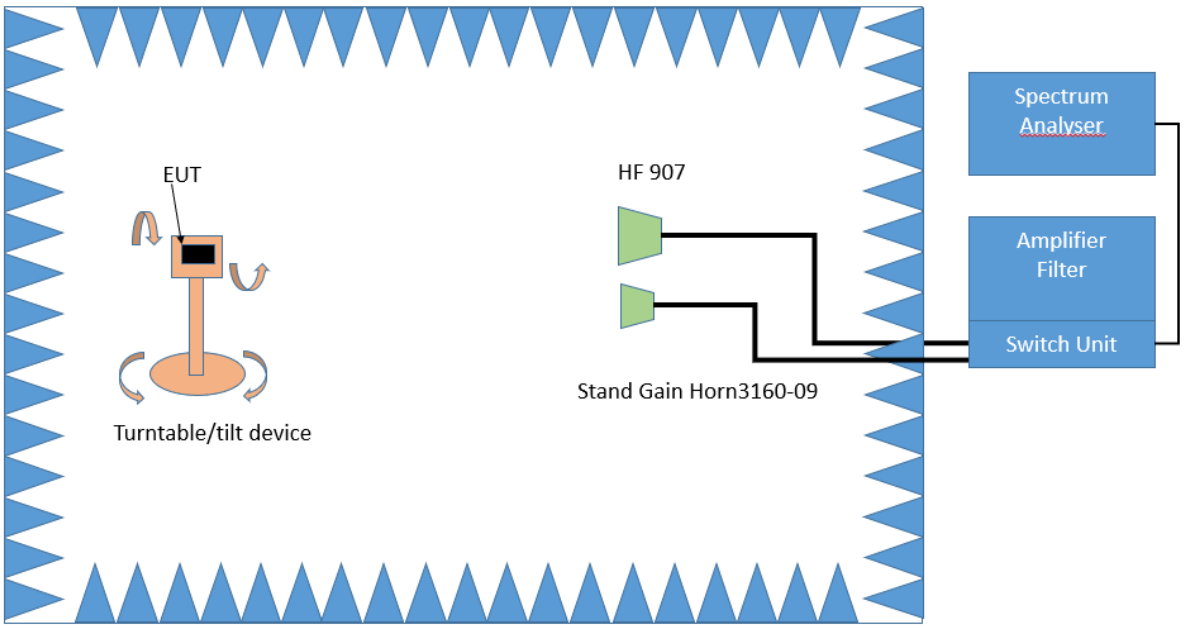
- Detector: Quasi-Peak (< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

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.

Above 1 GHz:

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.

3. Measurement 1 GHz up to 26.5 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

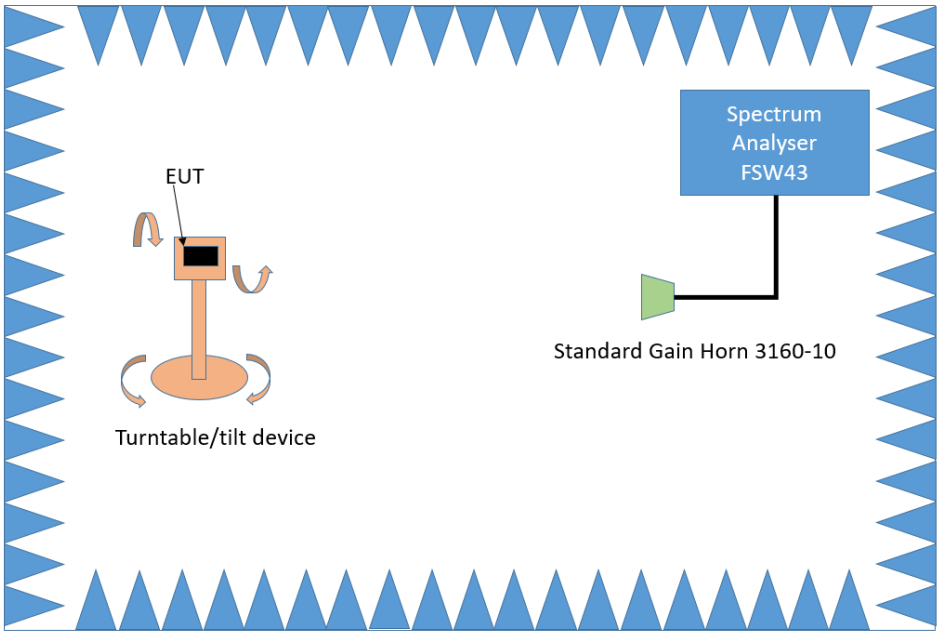
Step 1:
The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.
All steps were performed with one height (1.5 m) of the receiving antenna only.
The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.
The turn table step size (azimuth angle) for the preliminary measurement is 45 °.

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

4. Measurement above 26.5 GHz up to 40 GHz
The following modifications, compared to the frequency range 1 GHz – 26.5 GHz, apply to the measurement procedure for the frequency range above 26.5 GHz:

- Measurement distance: 1m



Test Setup; Spurious Emission Radiated (FAC), 26.5 – 40 GHz

5.7.2 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 at 75 MHz or more above or below the band edge
increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge
increasing linearly to 15.6 dBm/MHz at 5 MHz above or below the band edge
increasing linearly to 27 dBm/MHz at the band edge.

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.
However, devices with bandwidth overlapping the band edge of 5725 MHz can meet the emission limit of -27 dBm/MHz e.i.r.p.at 5850 MHz instead of 5725 MHz.
Note: No operation is permitted for the frequency range 5600–5650 MHz.

RSS-247, 6.2.4.2, Emissions outside the band 5725-5850 MHz:

a. 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 Bm/MHz at 5 MHz above or below the band edges;
b. 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
c. 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
d. -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.

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.

5.7.3 TEST PROTOCOL

Ambient temperature: 23–26 °C
Air Pressure: 1000–1021 hPa
Humidity: 36–47 %
Video 40 MHz
Applied duty cycle correction (AV): 0 dB

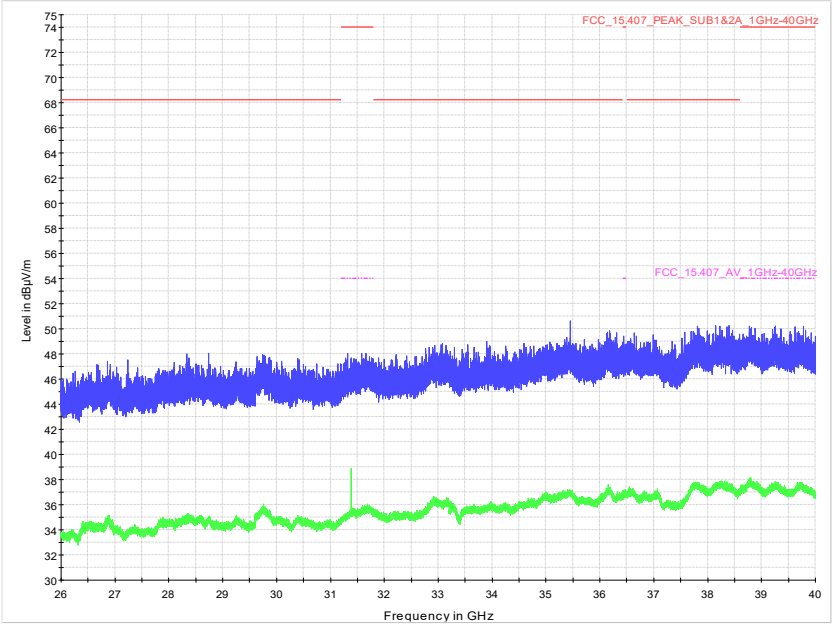
Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type
38	5190	59.3	30.1	QP	100	40.0	9.9	RB
38	5190	65.0	34.2	QP	100	40.0	5.8	RB
38	5190	70.8	26.1	QP	100	40.0	14.0	RB
38	5190	106.6	26.2	QP	100	43.5	17.3	RB
38	5190	125.5	3.2	QP	100	43.5	40.3	RB
38	5190	178.3	18.5	QP	100	43.5	25.1	RB
38	5190	10400.0	62.9	PEAK	1000	68.2	5.3	UE
38	5190	15553.5	66.0	PEAK	1000	74.0	8.0	RB
38	5190	15562.5	45.9	AV	1000	54.0	8.1	RB
38	5190	20760.5	44.2	PEAK	1000	74.0	29.8	RB
38	5190	20760.5	38.4	AV	1000	54.0	15.6	RB
46	5230	10449.0	61.4	PEAK	1000	68.2	6.8	UE
46	5230	15669.0	57.7	PEAK	1000	74.0	16.3	RB
46	5230	15691.5	35.8	AV	1000	54.0	18.2	RB
46	5230	20920.5	45.1	PEAK	1000	74.0	28.9	RB
46	5230	20920.5	40.8	AV	1000	54.0	13.2	RB
54	5270	10539.5	67.4	PEAK	1000	68.2	0.8	UE
54	5270	15808.5	66.9	PEAK	1000	74.0	7.1	RB
54	5270	15808.5	49.2	AV	1000	54.0	4.8	RB
62	5310	30.0	27.1	QP	100	54.0	26.9	RB
62	5310	69.0	33.8	QP	100	40.0	6.2	RB
62	5310	178.2	23.3	QP	100	43.5	20.2	RB
62	5310	902.1	18.3	QP	100	46.0	27.7	RB
62	5310	10619.5	58.7	PEAK	1000	74.0	15.3	RB
62	5310	10619.5	40.9	AV	1000	54.0	13.1	RB
62	5310	15903.0	70.5	PEAK	1000	74.0	3.5	RB
62	5310	15925.0	48.4	AV	1000	54.0	5.6	RB
102	5510	5469.5	64.4	PEAK	1000	68.2	3.8	UE
102	5510	11020.0	61.0	PEAK	1000	68.2	7.2	UE
102	5510	11020.0	44.6	AV	1000	54.0	9.4	RB
102	5510	16512.0	63.2	PEAK	1000	68.2	5.0	UE
102	5510	22040.0	42.3	AV	1000	54.0	11.7	RB
110	5550	58.9	33.4	QP	100	40.0	6.7	RB
110	5550	65.6	23.2	QP	100	40.0	16.8	RB
110	5550	104.3	33.2	QP	100	43.5	10.3	RB
110	5550	178.1	26.0	QP	100	43.5	17.5	RB
110	5550	16624.0	61.2	PEAK	1000	68.2	7.0	UE
110	5550	22200.0	40.5	AV	1000	54.0	13.5	RB
118	5590	11163.5	57.9	PEAK	1000	74.0	16.1	RB
118	5590	11180.0	42.9	AV	1000	54.0	11.1	RB
134	5670	5729.0	52.6	PEAK	1000	68.2	15.7	UE
134	5670	11343.0	55.1	PEAK	1000	74.0	18.9	RB
134	5670	11340.0	45.8	AV	1000	54.0	8.2	RB
134	5670	16986.0	60.2	PEAK	1000	68.2	8.0	UE
134	5670	22680.0	43.1	AV	1000	54.0	10.9	RB
151	5755	5710.0	68.0	PEAK	1000	68.2	0.2	UE
151	5755	5721.0	72.0	PEAK	1000	78.0	6.0	BE
151	5755	11508.0	57.1	PEAK	1000	74.0	16.9	RB
151	5755	11510.0	47.7	AV	1000	54.0	6.3	RB
151	5755	17237.0	59.8	PEAK	1000	68.2	8.4	UE
151	5755	23024.0	52.5	PEAK	1000	74.0	21.6	RB
151	5755	23020.0	40.3	AV	1000	54.0	13.7	RB
159	5795	57.9	25.0	QP	100	40.0	15.0	RB

Ch. No.	Ch. Center Freq. [MHz]	Spurious Freq. [MHz]	Spurious Level [dBµV/m]	Detec-tor	RBW [kHz]	Limit [dBµV/m]	Margin [dB]	Limit Type
159	5795	65.3	31.1	QP	100	40.0	8.9	RB
159	5795	76.2	32.8	QP	100	40.0	7.2	RB
159	5795	104.3	32.4	QP	100	43.5	11.1	RB
159	5795	178.7	26.6	QP	100	43.5	16.9	RB
159	5795	11569.6	59.5	PEAK	1000	74.0	14.5	RB
159	5795	11590.0	46.3	AV	1000	54.0	7.7	RB
159	5795	17421.0	58.9	PEAK	1000	68.2	9.3	UE
159	5795	23226.0	51.0	PEAK	1000	74.0	23.0	RB
159	5795	23180.5	37.8	AV	1000	54.0	16.2	RB

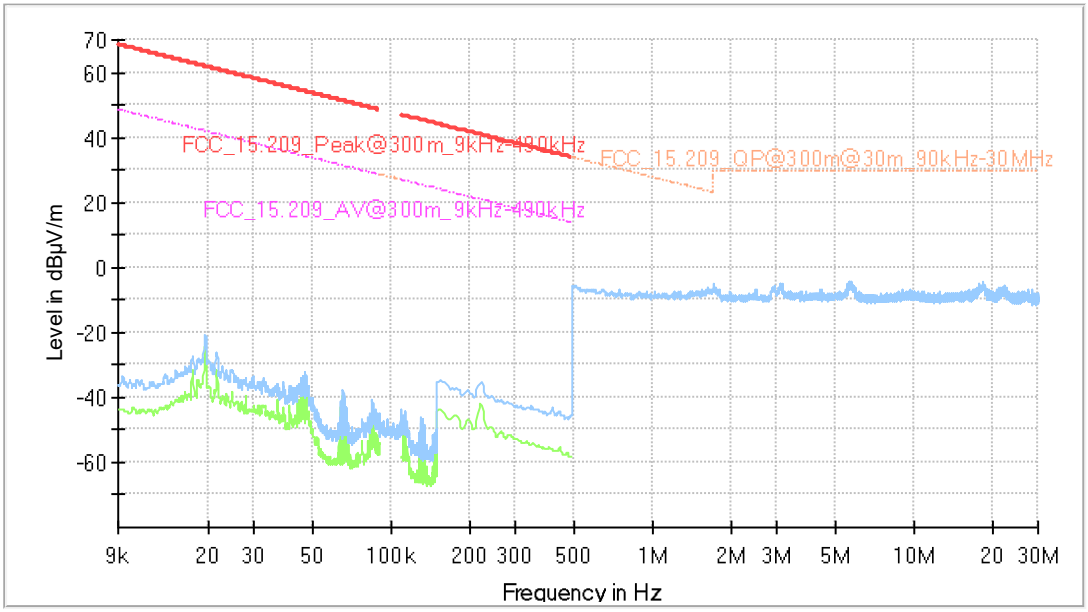
Remark: Please see next sub-clause for the measurement plot.

5.7.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = low, Measurement range = 26GHz - 40GHz, Subband = U-NII-1
(S01_0AB01TX)



Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = high, Measurement range = 9kHz - 30MHz, Subband = U-NII-2C
(S01_AB01TX)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Azimuth (deg)	Corr. (dB/m)
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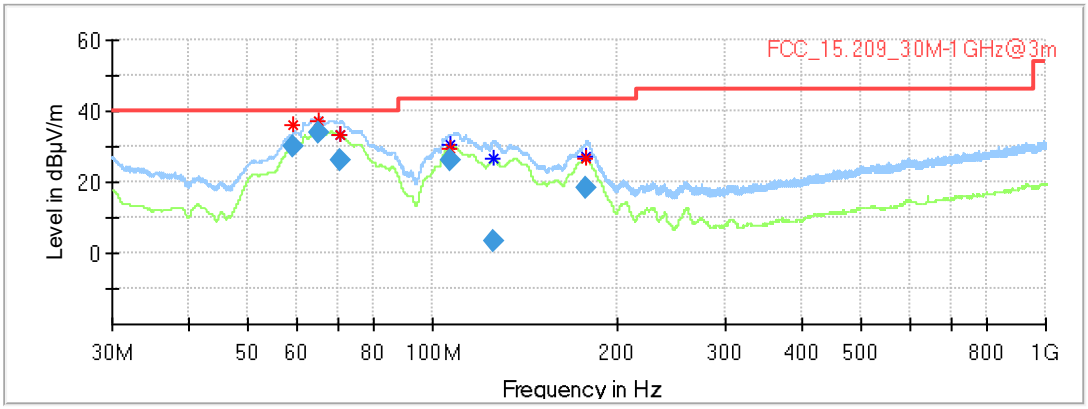
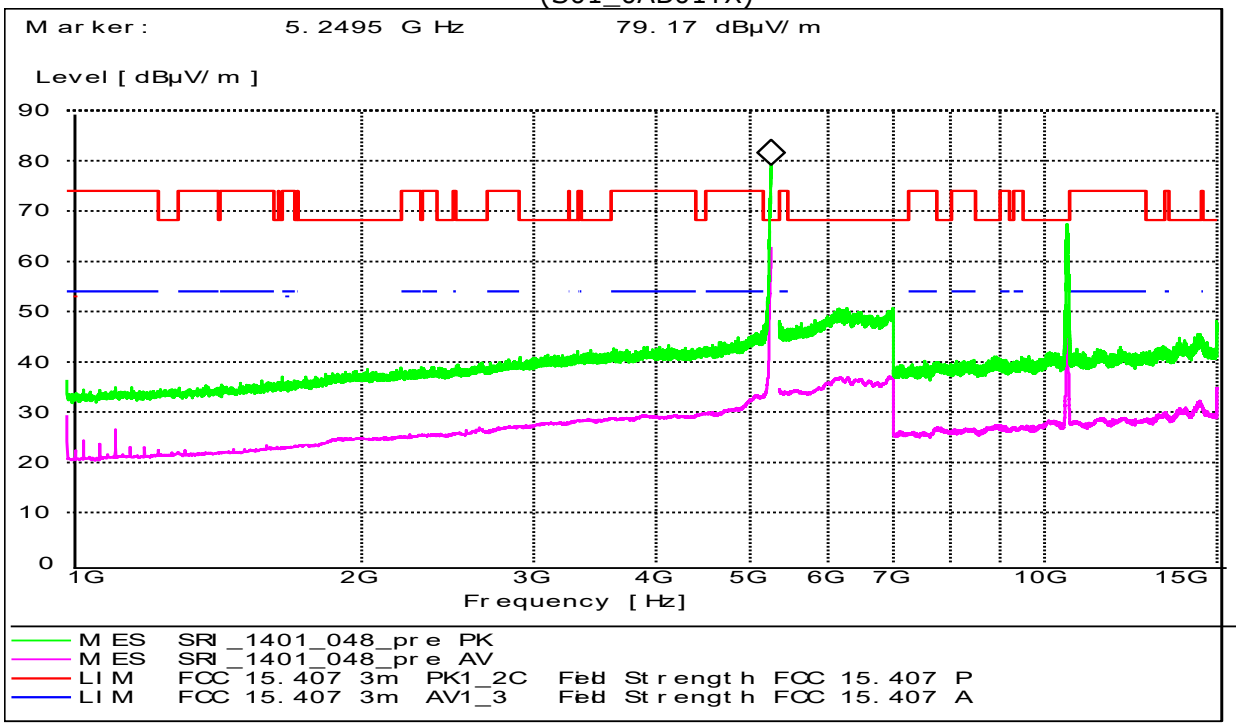
Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = low, Measurement range = 30MHz - 1GHz, Subband = U-NII-1
(S01_AB01TX)

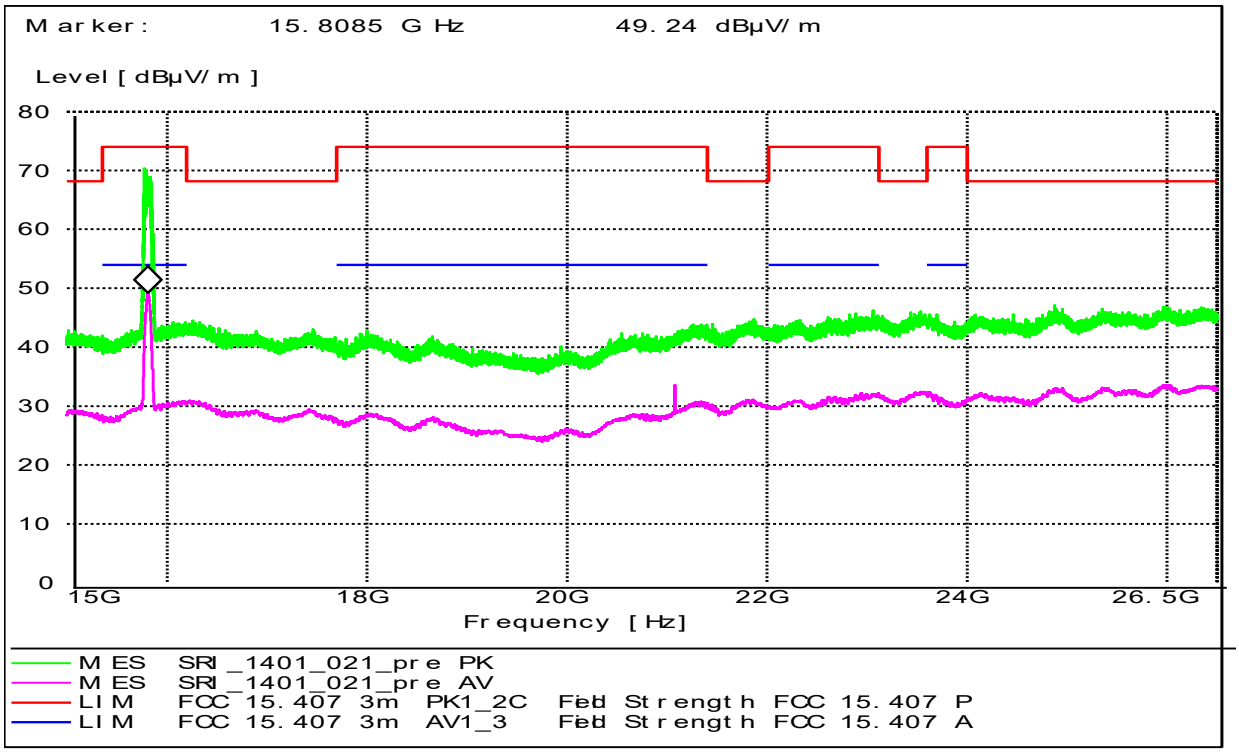


Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin	Meas. Time (ms)	Bandwidth	Height	Pol	Azimuth	Corr. (dB/m)	Comment
59.340000	30.09	40.00	9.91	1000.0	120.000	175.0	V	-186.0	4.1	
65.010000	34.16	40.00	5.84	1000.0	120.000	125.0	V	64.0	6.7	
70.770000	26.05	40.00	13.95	1000.0	120.000	131.0	V	-28.0	8.6	
106.620000	26.23	43.50	17.27	1000.0	120.000	122.0	V	-85.0	10.9	
125.490000	3.20	43.50	40.30	1000.0	120.000	267.0	V	-114.0	10.9	
178.260000	18.45	43.50	25.05	1000.0	120.000	103.0	V	-160.0	9.8	

Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = low, Measurement range = 1GHz - 26GHz, Subband = U-NII-2A
(S01_0AB01TX)





5.7.5 TEST EQUIPMENT USED

- Radiated Emissions

5.8 BAND EDGE

Standard **FCC Part 15 Subpart E**

The test was performed according to:
ANSI C63.10

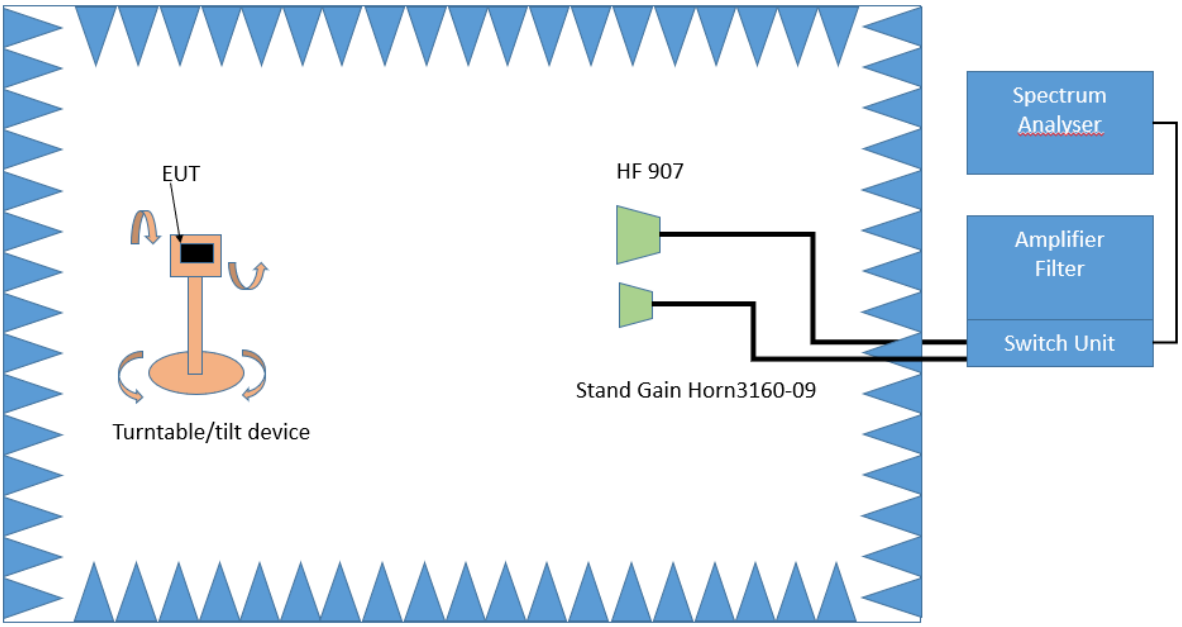
5.8.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The measurements were performed according the following sub-chapter of ANSI C63.10:

- Chapter 6.10.5

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 (procedure according ANSI C63.10, chapter 6.6.5.

3. Measurement above 1 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

Step 1:
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 °.
Spectrum analyser settings:
- Detector: Peak, Average
- RBW = 1 MHz
- VBW = 3 MHz

Step 2:
The turn table azimuth will slowly vary by ± 22.5°.
The elevation angle will slowly vary by ± 45°

Spectrum analyser settings:
- Detector: Peak

Step 3:
Spectrum analyser settings for step 3:
- Detector: Peak / CISPR Average
- Measured frequencies: in step 1 determined frequencies
- RBW = 1 MHz
- VBW = 3 MHz
- Measuring time: 1 s

5.8.2 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)

5.8.3 TEST PROTOCOL

Ambient temperature: 23–26 °C
Air Pressure: 1000–1021 hPa
Humidity: 36–47 %
Video 20 MHz
Applied duty cycle correction (AV): 0 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	45.9	PEAK	1000	74.0	28.1	BE-RB	FCC&IC
	36	5180	5150.0	31.5	AV	1000	54.0	22.5	BE-RB	FCC&IC
2A	64	5320	5350.0	46.1	PEAK	1000	74.0	27.9	BE-RB	FCC&IC
	64	5320	5350.0	32.9	AV	1000	54.0	21.1	BE-RB	FCC&IC
2C	100	5500	5460.0	45.1	PEAK	1000	74.0	28.9	BE-RB	FCC&IC
	100	5500	5460.0	33.1	AV	1000	54.0	20.9	BE-RB	FCC&IC
	140	5700	5725.0	59.7	PEAK	1000	68.2	8.5	BE-UE	FCC&IC
3	149	5745	5725.0	69.1	PEAK	1000	119.6	50.5	BE-UE	FCC&IC
	165	5825	5850.0	64.3	PEAK	1000	122.2	57.9	BE-UE	FCC&IC

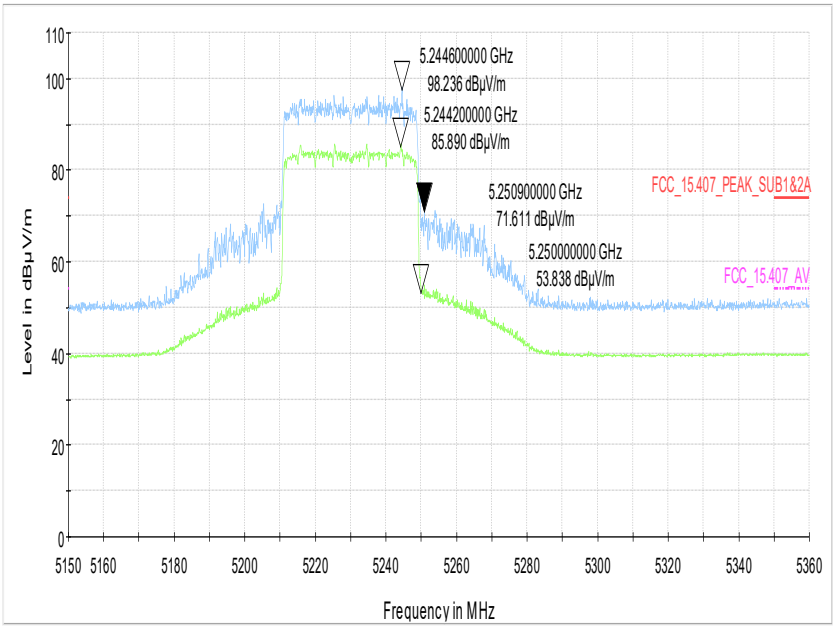
Video 40 MHz
Applied duty cycle correction (AV): 0 dB

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	60.9	PEAK	1000	74.0	13.1	BE-RB	FCC&IC
	38	5190	5150.0	45.1	AV	1000	54.0	8.9	BE-RB	FCC&IC
2A	62	5310	5350.0	63.9	PEAK	1000	74.0	10.1	BE-RB	FCC&IC
	62	5310	5350.0	49.9	AV	1000	54.0	4.1	BE-RB	FCC&IC
2C	102	5510	5460.0	58.9	PEAK	1000	74.0	15.1	BE-RB	FCC&IC
	102	5510	5460.0	43.6	AV	1000	54.0	10.4	BE-RB	FCC&IC
	102	5510	5470.0	67.1	PEAK	1000	68.2	1.1	BE-UE	FCC&IC
	134	5670	5725.0	51.6	PEAK	1000	68.2	16.6	BE-UE	FCC&IC
3	151	5755	5725.0	70.4	PEAK	1000	122.2	51.8	BE-UE	FCC&IC
	159	5795	5850.0	57.7	PEAK	1000	122.2	64.5	BE-UE	FCC&IC

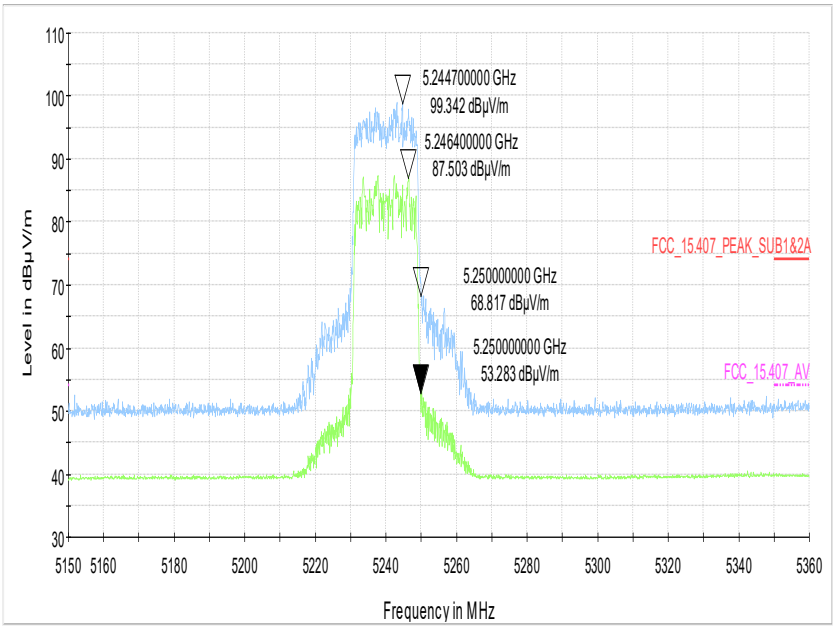
Remark: Please see next sub-clause for the measurement plot.

5.8.4 MEASUREMENT PLOT (EXAMPLE PLOT, SHOWING WORST CASE, IF APPLICABLE)

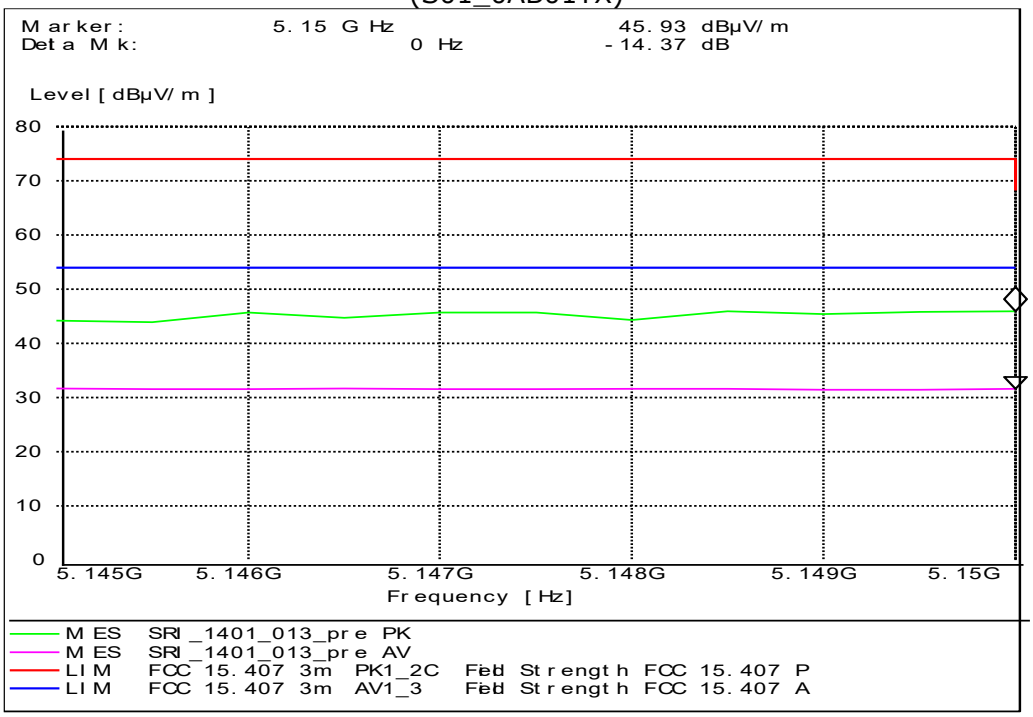
Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = high, Subband = U-NII-1 (S01_AB01TX)



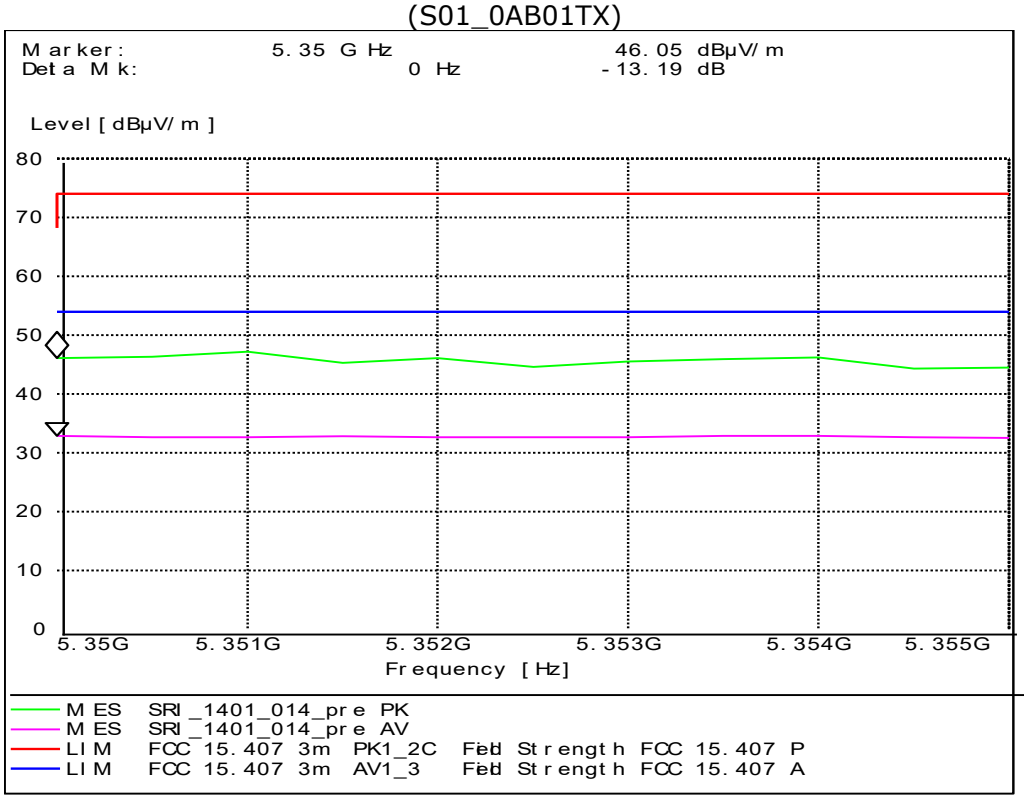
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = high, Subband = U-NII-1 (S01_AB01TX)



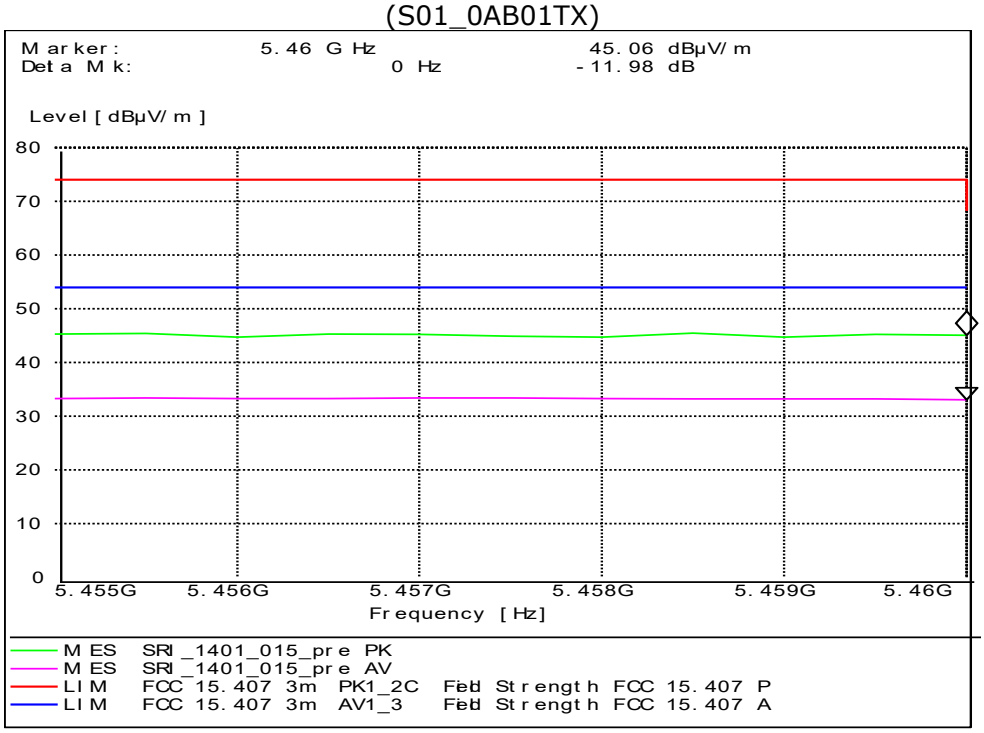
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = low, Subband = U-NII-1 (S01_0AB01TX)



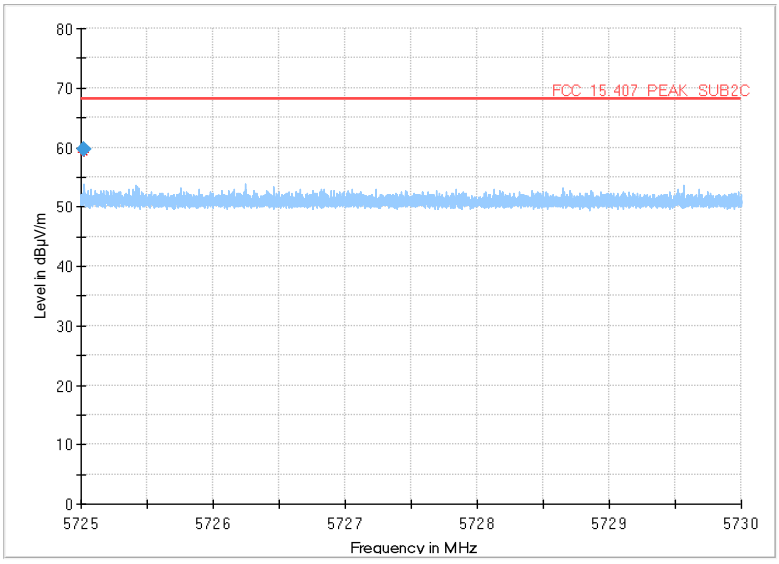
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = high, Subband = U-NII-2A (S01_0AB01TX)



Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = low, Subband = U-NII-2C (S01_0AB01TX)



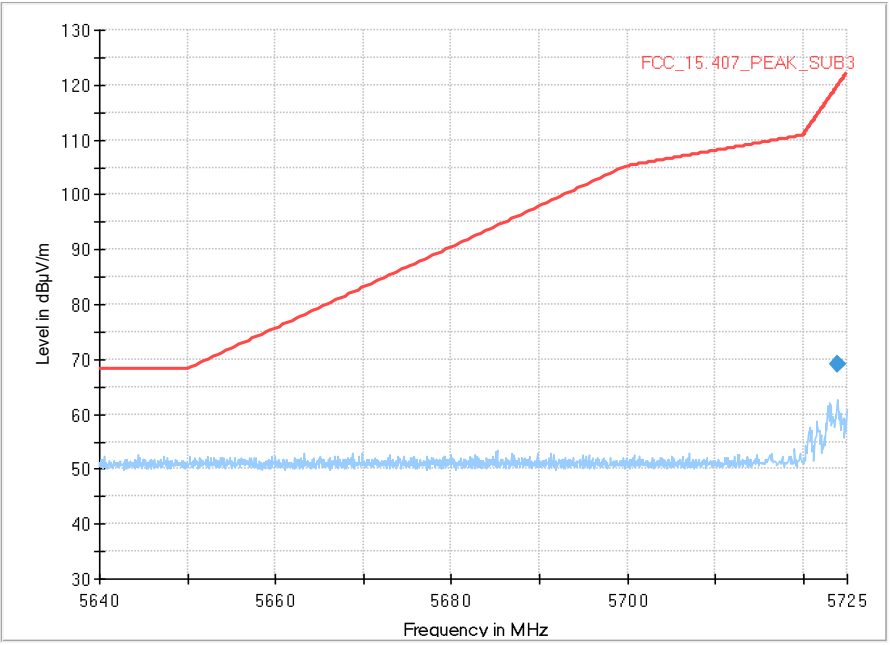
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = high, Subband = U-NII-2C (S01_AB01TX)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/
5725.027	59.7	---	68.20	8.48	1000.0	1000.000	150.0	H	53.0	-15.0	14.1

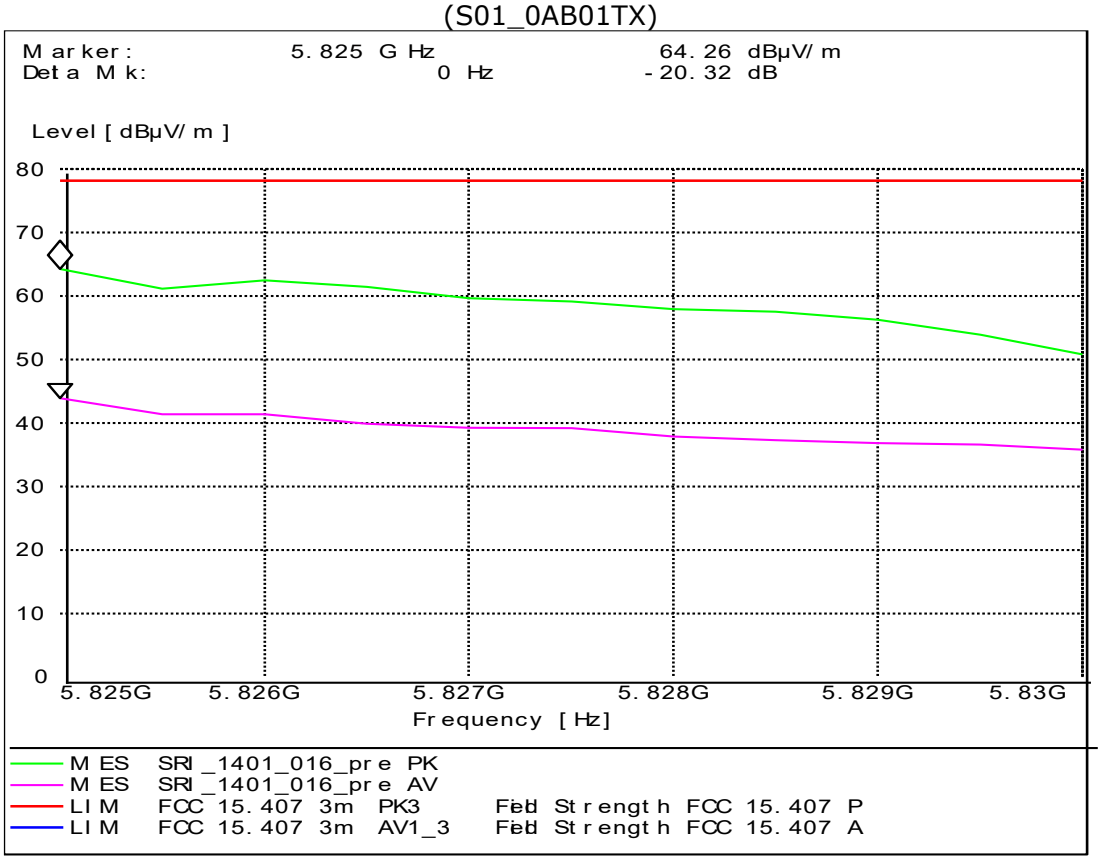
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = low, Subband = U-NII-3 (S01_AB01TX)



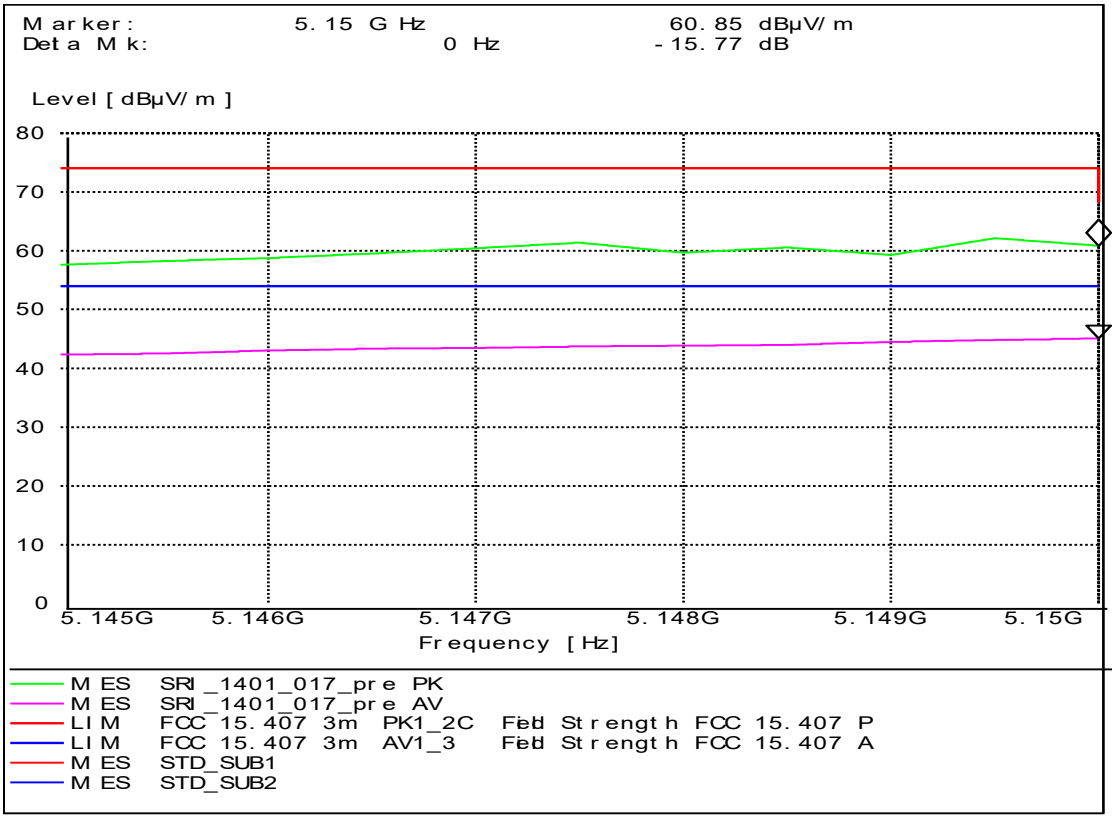
Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/
5723.900	69.1	---	119.6	50.64	1000.0	1000.000	150.0	H	50.0	-10.0	14.1

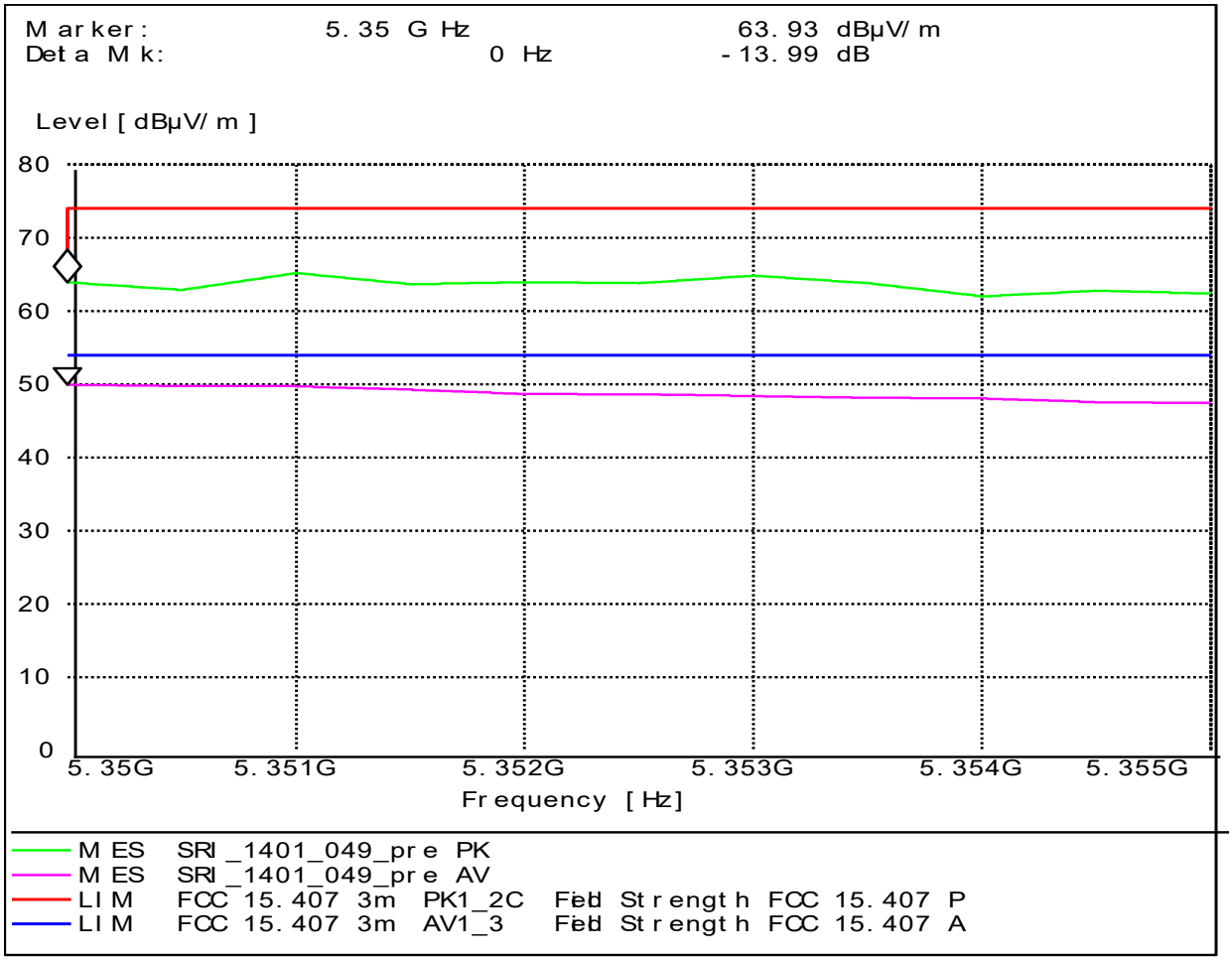
Radio Technology = WLAN n 20 MHz MIMO, Operating Frequency = high, Subband = U-NII-3 (S01_0AB01TX)



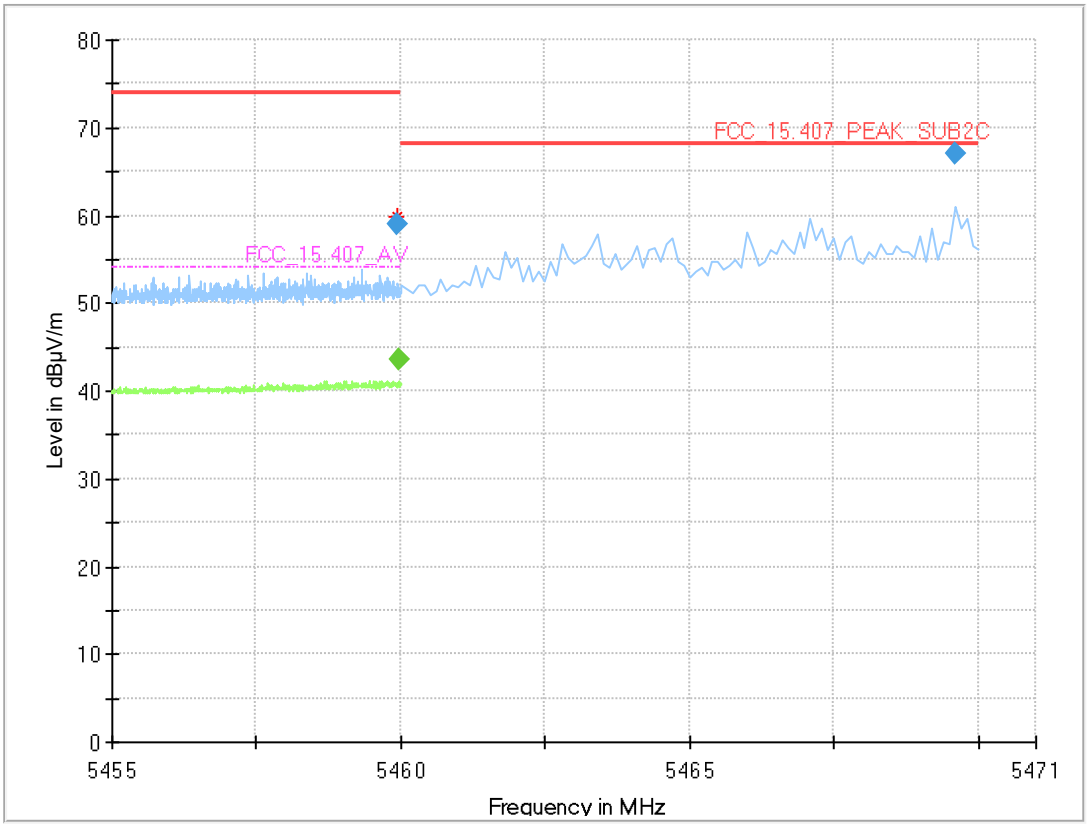
Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = low, Subband = U-NII-1 (S01_0AB01TX)



Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = high, Subband = U-NII-2A (S01_0AB01TX)



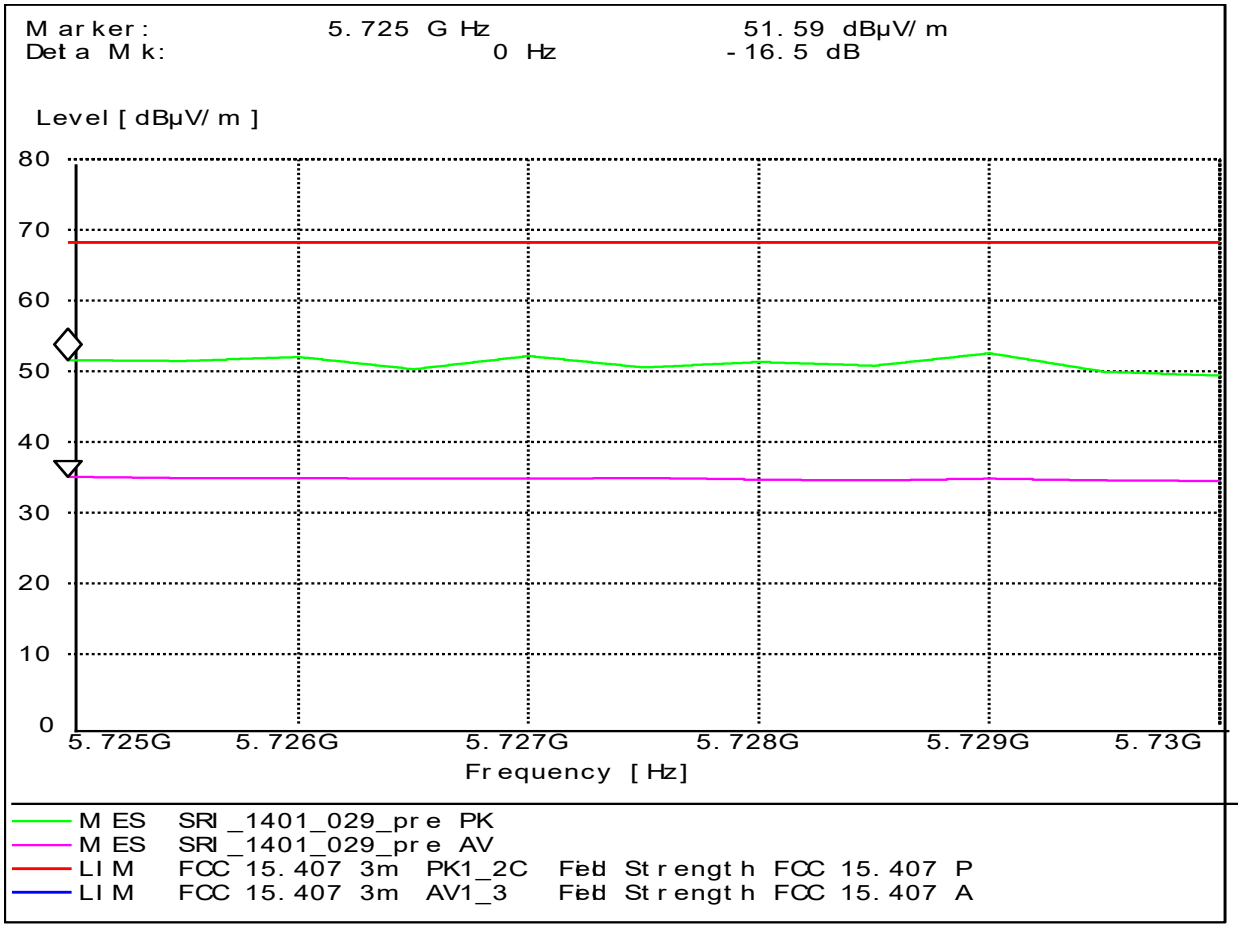
Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = low, Subband = U-NII-2C (S01_AB01TX)



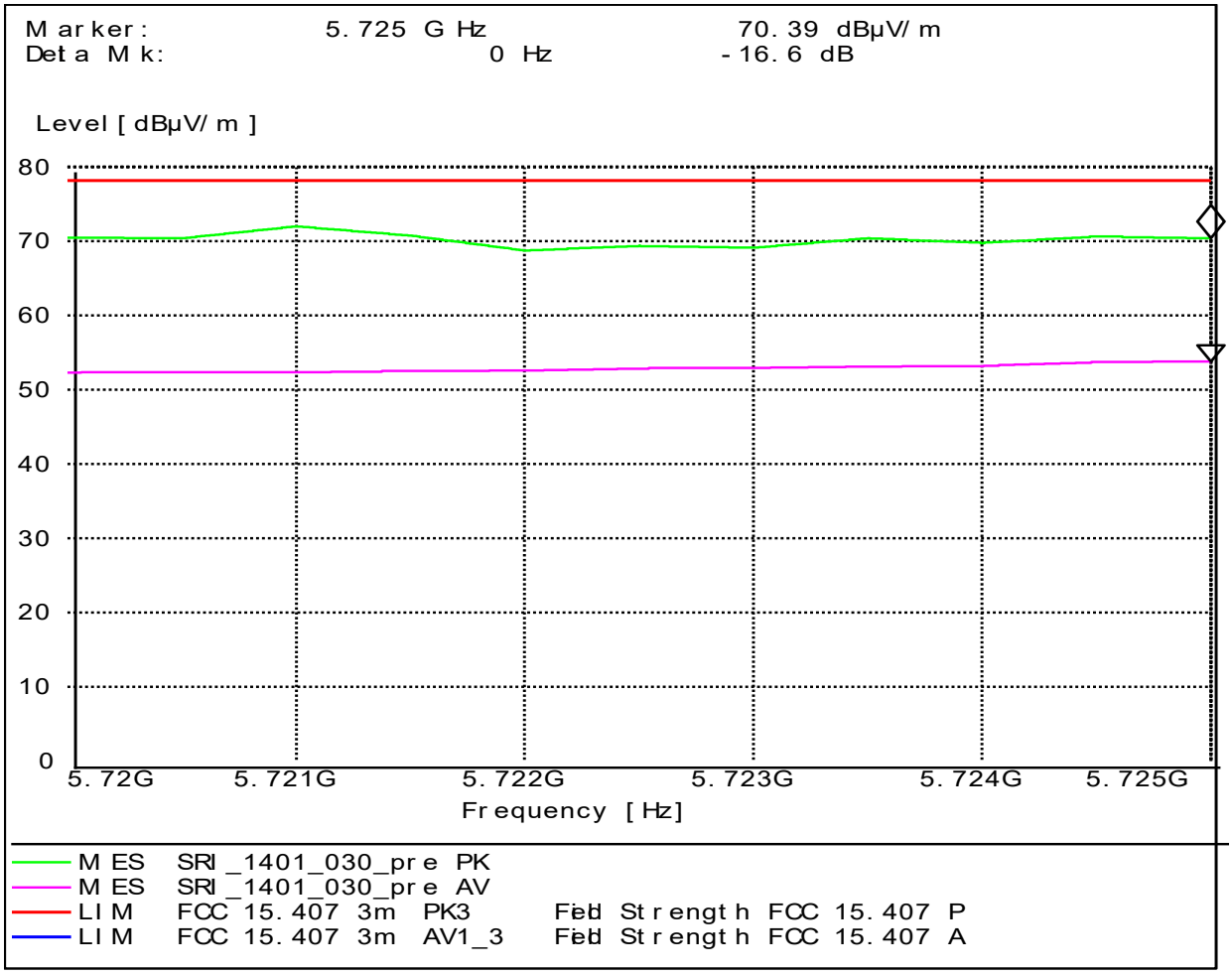
Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5459.950	58.9	---	74.00	15.11	1000.0	1000.000	150.0	H	-34.0	-12.0	14.1
5459.980	---	43.6	54.00	10.41	1000.0	1000.000	150.0	H	-6.0	85.0	14.1
5469.600	67.1	---	68.20	1.11	1000.0	1000.000	150.0	H	-34.0	-10.0	14.0

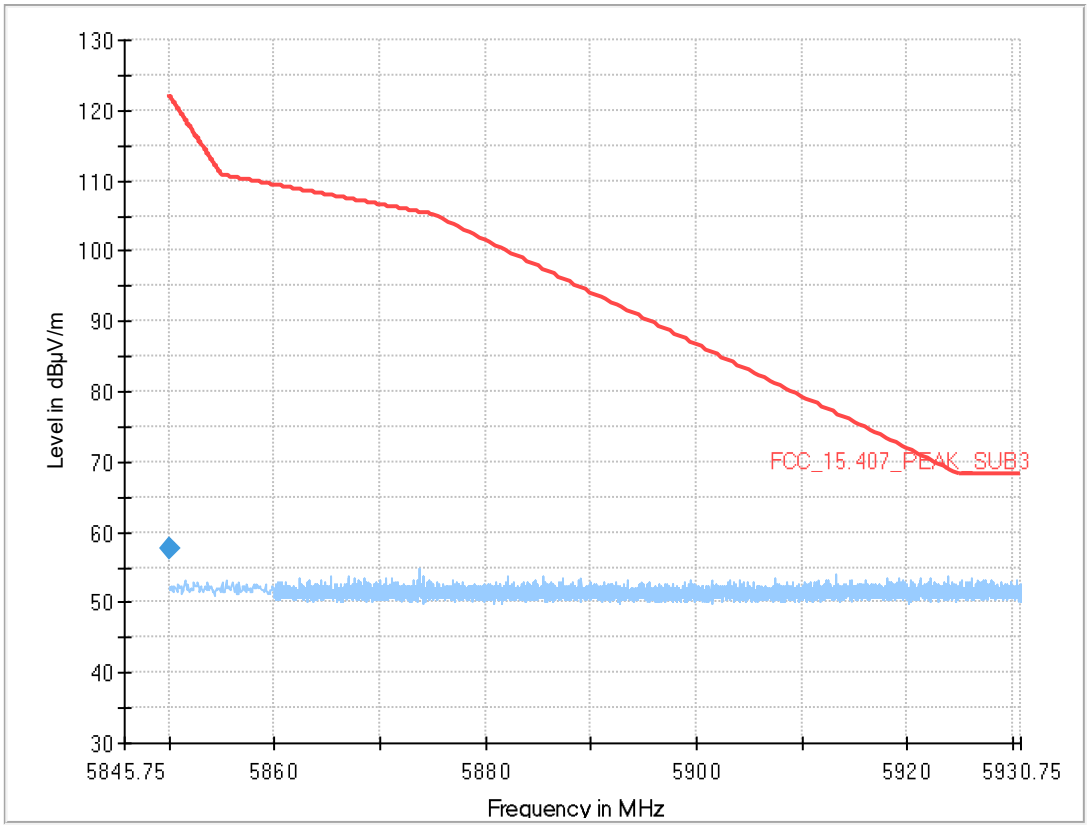
Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = high, Subband = U-NII-2C (S01_0AB01TX)



Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = low, Subband = U-NII-3 (S01_0AB01TX)



Radio Technology = WLAN n 40 MHz MIMO, Operating Frequency = high, Subband = U-NII-3 (S01_AB01TX)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
5850.000	57.7	---	122.2	64.48	1000.0	1000.000	150.0	H	56.0	96.0	14.7

5.8.5 TEST EQUIPMENT USED

- Radiated Emissions

6 TEST EQUIPMENT

Test Equipment of tests performed in 2021

1 R&S TS8997
2.4 and 5 GHz Bands Conducted Test Lab

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
1.1	MFS	Rubidium Frequency Standard	Datum-Beverly	5489/001	2020-09	2021-09
1.2	FSV30	Signal Analyzer 10 Hz - 30 GHz	Rohde & Schwarz	103005	2020-05	2022-05
1.3	Opus10 THI (8152.00)	T/H Logger 15	Lufft Mess- und Regeltechnik GmbH	13985	2019-06	2021-06
1.4	Opus10 THI (8152.00)	T/H Logger 14	Lufft Mess- und Regeltechnik GmbH	13993	2019-06	2021-06
1.5	Opus10 THI (8152.00)	T/H Logger 03	Lufft Mess- und Regeltechnik GmbH	7482	2019-06	2021-06
1.6	OSP120	Contains Power Meter and Switching Unit OSP-B157W8	Rohde & Schwarz	101158	2018-05	2021-05

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	2020-11	2021-11
2.2	Opus10 TPR (8253.00)	T/P Logger 13	Lufft Mess- und Regeltechnik GmbH	13936	2019-05	2021-05
2.3	ESW44	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	101603	2019-12	2021-12
2.4	Anechoic Chamber 01	SAC/FAR, 10.58 m x 6.38 m x 6.00 m	Frankonia	none	2018-06	2021-06
2.5	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
2.6	AFS4-01000400-1Q-10P-4	Broadband Amplifier 1 GHz - 4 GHz	Miteq			
2.7	AMF-7D00101800-30-10P-R	Broadband Amplifier 100 MHz - 18 GHz	Miteq			
2.8	ASP 1.2/1.8-10 kg	Antenna Mast	Maturo GmbH	-		

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.9	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
2.10	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2019-06	2021-06
2.11	JS4-18002600-32-5P	Broadband Amplifier 18 GHz - 26 GHz	Miteq	849785		
2.12	FSW 43	Spectrum Analyzer	Rohde & Schwarz	103779	2019-02	2021-08
2.13	3160-09	Standard Gain / Pyramidal Horn Antenna 26.5 GHz	EMCO Elektronic GmbH	00083069		
2.14	WHKX 7.0/18G-8SS	High Pass Filter	Wainwright Instruments GmbH	09		
2.15	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99		
2.16	3160-09	Standard Gain / Pyramidal Horn Antenna 26.5 GHz	EMCO Elektronic GmbH	9910-1184		
2.17	JS4-00102600-42-5A	Broadband Amplifier 30 MHz - 26 GHz	Miteq	619368		
2.18	TT 1.5 WI	Turn Table	Maturo GmbH	-		
2.19	HL 562 ULTRALOG	Biconical-log-per Antenna (30 MHz - 3 GHz)	Rohde & Schwarz GmbH & Co. KG	100609	2019-05	2022-05
2.20	3160-10	Standard Gain / Pyramidal Horn Antenna 40 GHz	EMCO Elektronic GmbH	00086675		
2.21	MA4985-XP-ET	Bore Sight Antenna Mast	innco systems GmbH	none		
2.22	JUN-AIR Mod. 6-15	Air Compressor	JUN-AIR Deutschland GmbH	612582		
2.23	HFH2-Z2	Loop Antenna + 3 Axis Tripod	Rohde & Schwarz GmbH & Co. KG	829324/006	2021-01	2024-01
2.24	Opus10 THI (8152.00)	T/H Logger 12	Lufft Mess- und Regeltechnik GmbH	12482	2019-06	2021-06
2.25	SB4-100.OLD20-3T/10 Airwin 2 x 1.5 kW	Air compressor (oil-free)	airWin Kompressoren UG	901/00503		
2.26	JS4-00101800-35-5P	Broadband Amplifier 30 MHz - 18 GHz	Miteq	896037		
2.27	AS 620 P	Antenna Mast (pneumatic polarisation)	HD GmbH	620/37		
2.28	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
2.29	HF 907-2	Double-ridged horn	Rohde & Schwarz	102817	2019-04	2022-04
2.30	PAS 2.5 - 10 kg	Antenna Mast	Maturo GmbH	-		
2.31	AFS42-00101800-25-S-42	Broadband Amplifier 25 MHz - 18 GHz	Miteq	2035324		
2.32	AM 4.0	Antenna Mast 4 m	Maturo GmbH	AM4.0/180/1192 0513		
2.33	HF 907	Double-ridged horn	Rohde & Schwarz	102444	2018-07	2021-07

The calibration interval is the time interval between "Last Calibration" and "Calibration Due"

Test Equipment of tests performed before 2021

Test Equipment Anechoic Chamber

Lab ID:	**Lab 2**		
Manufacturer:	Frankonia		
Description:	Anechoic Chamber for radiated testing		
Type:	10.58x6.38x6.00 m³		
	NSA (FCC)	2014/01/09	2017/01/09

Single Devices for Anechoic Chamber

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Air compressor	none	-	Atlas Copco	
Anechoic Chamber	10.58 x 6.38 x 6.00 m³ FCC listing 96716 3m Part15/18	none	Frankonia 2014/01/09	2017/01/08
Controller Maturo	MCU	961208	Maturo GmbH	
EMC camera	CE-CAM/1	-	CE-SYS	
EMC camera Nr.2	CCD-400E	0005033	Mitsubishi	
Filter ISDN	B84312-C110-E1		Siemens&Matsushita	
Filter Universal 1A	BB4312-C30-H3	-	Siemens&Matsushita	

Test Equipment Auxiliary Equipment for Conducted emissions

Lab ID:	**Lab 1**
Manufacturer:	Rohde & Schwarz GmbH & Co.KG
Description:	EMI Conducted Auxiliary Equipment

Single Devices for Auxiliary Equipment for Conducted emissions

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber&Suhner	
Impedance Stabilization Network	ISN T800	36159	Teseq GmbH	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2014/02/06	2016/02/28
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN ENY41	100002	Rohde & Schwarz GmbH & Co. KG	
	Standard calibration		2013/03/01	2015/03/31
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN ST08	36292	Teseq GmbH	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard calibration		2014/01/10	2016/01/31
Impedance Stabilization Network, Coupling Decoupling Network	ISN/CDN T8-Cat6	32187	Teseq GmbH	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2014/01/08	2016/01/31

Single Devices for Auxiliary Equipment for Conducted emissions (continued)

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
One-Line V-Network	ESH 3-Z6	100489	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	standard calibration		2014/06/18	2017/11/30
One-Line V-Network	ESH 3-Z6	100570	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2013/11/25	2016/11/24
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standart Calibration		2013/03/01	2015/02/28
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2013/03/01	2015/02/28

Test Equipment Auxiliary Equipment for Radiated emissions

Lab ID: **Lab 2**
Description: Equipment for emission measurements
Serial Number: see single devices

Single Devices for Auxiliary Equipment for Radiated emissions

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Antenna mast	AM 4.0	AM4.0/180/11920513	Maturo GmbH	
Antenna mast	AS 620 P	620/37	HD GmbH	
Biconical Broadband Antenna	SBA 9119	9119-005	Schwarzbeck	
Biconical dipole	VUBA 9117 Standard Calibration	9117-108	Schwarzbeck 2012/01/18	 2015/01/17
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P	849785	Miteq	
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4	-	Miteq	
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P	896037	Miteq	
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2+W38.01-2	Kabel Kusch	
Cable "ESI to Horn Antenna"	UFB311A+UFB293C	W18.02-2+W38.02-2	Rosenberger Micro-Coax	
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG	
	Standard Calibration		2012/05/18	2015/05/17
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG	
	Standard Calibration		2012/06/26	2015/06/25
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic	
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic	
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic	
High Pass Filter	WHKX 7.0/18G-8SS	09	Wainwright	
Horn Antenna Schwarzbeck 15-26 GHz BBHA 9170	BBHA 9170	BBHA9170262		
Log.-per. Antenna	HL 562 Ultralog	100609	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2012/12/18	2015/12/17
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG	
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	DKD Calibration Standard calibration		2014/11/27 2011/10/27	2017/11/27 2014/10/26
Standard Gain / Pyramidal Horn Antenna 26,5 GHz	3160-09	00083069	EMCO Elektronik GmbH	

Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
Standard Gain / Pyramidal Horn Antenna 40 GHz	3160-10	00086675	EMCO Elektronik GmbH
Tilt device Maturo (Rohacell)	Antrieb TD1.5-10kg	TD1.5-10kg/024/3790709	Maturo GmbH

Test Equipment Auxiliary Test Equipment

Lab ID:	**Lab 2, Lab 3**
Manufacturer:	see single devices
Description:	Single Devices for various Test Equipment
Type:	various
Serial Number:	none

Single Devices for Auxiliary Test Equipment

Single Device Name	*Type*	*Serial Number*	*Manufacturer*	
Broadband Power Divider N (Aux)	1506A / 93459	LM390	Weinschel Associates	
Broadband Power Divider SMA	WA1515	A855	Weinschel Associates	
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.	
	Calibration Details		*Last Execution*	*Next Exec.*
	Customized calibration		2013/12/04	2015/12/03
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	Pontis	
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	Pontis	
Isolating Transformer	LTS 604	1888	Thalheimer Transformatorenwerke GmbH	
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	Wainwright	
Signal Analyzer	FSV30	103005	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard		2014/02/10	2016/02/09
Spectrum Analyser	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard		2012/06/13	2015/06/12
Spectrum Analyser	FSU26	200418	Rohde & Schwarz GmbH & Co.KG	
	Standard calibration		2014/07/29	2015/07/28
Vector Signal Generator	SMIQ 03B	832492/061	Rohde & Schwarz GmbH & Co.KG	

Test Equipment Emission measurement devices

Lab ID:	**Lab 1, Lab 2**
Description:	Equipment for emission measurements
Serial Number:	see single devices

Single Devices for Emission measurement devices

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
EMI Receiver / Spectrum Analyser	ESR 7	101424	Rohde & Schwarz
	Calibration Details		*Last Execution* *Next Exec.*
	Initial Factory Calibration		2014/11/13 2016/11/12
Personal Computer	Dell	30304832059	Dell
Power Meter	NRVD	828110/016	Rohde & Schwarz GmbH & Co.KG
	Standard calibration		2014/05/13 2015/05/12
Sensor Head A	NRV-Z1	827753/005	Rohde & Schwarz GmbH & Co.KG
	Standard calibration		2014/05/13 2015/05/12
Signal Generator	SMR 20	846834/008	Rohde & Schwarz GmbH & Co. KG
	Standard Calibration		2014/06/24 2017/06/23
Spectrum Analyser	FSW 43	103779	Rohde & Schwarz
	Calibration Details		*Last Execution* *Next Exec.*
	Initial Factory Calibration		2014/11/17 2016/11/16
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG
	Standard Calibration		2014/01/07 2016/01/31
	HW/SW Status		*Date of Start* *Date of End*
	Firmware-Update 4.34.4 from 3.45 during calibration		2009/12/03

Test Equipment Radio Lab Test Equipment

Lab ID:	**Lab 3**
Description:	Radio Lab Test Equipment

Single Devices for Radio Lab Test Equipment

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
Broadband Power Divider SMA	WA1515	A856	Weinschel Associates
Coax Attenuator 10dB SMA 2W	4T-10	F9401	Weinschel Associates
Coax Attenuator 10dB SMA 2W	56-10	W3702	Weinschel Associates
Coax Attenuator 10dB SMA 2W	56-10	W3711	Weinschel Associates
Coax Cable Huber&Suhner	Sucotest 2,0m		Huber&Suhner
Coax Cable Rosenberger Micro Coax FA210A0010003030 SMA/SMA 1,0m	FA210A0010003030	54491-2	Rosenberger Micro-Coax
Power Meter	NRVD	828110/016	Rohde & Schwarz GmbH & Co.KG
	Standard calibration		2014/05/13 2015/05/12
RF Step Attenuator RSP	RSP	833695/001	Rohde & Schwarz GmbH & Co.KG
Rubidium Frequency Standard	Datum, Model: MFS	5489/001	Datum-Beverly
	Standard calibration		2014/07/03 2015/07/02
Sensor Head A	NRV-Z1	827753/005	Rohde & Schwarz GmbH & Co.KG
	Standard calibration		2014/05/13 2015/05/12
Signal Generator SME	SME03	827460/016	Rohde & Schwarz GmbH & Co.KG
	Calibration Details		*Last Execution* *Next Exec.*
	Standard calibration		2014/12/02 2017/12/01
	Standard calibration		2011/11/25 2014/11/24
Signal Generator SMP	SMP02	836402/008	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	Standard calibration		2013/05/06 2016/05/05
Spectrum Analyser	FSIQ26	840061/005	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	Standard Calibration		2013/02/12 2015/02/11

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.
MHz	dB (1/m)	dB
18000	40.2	-23.5
18500	40.2	-23.2
19000	40.2	-22.0
19500	40.3	-21.3
20000	40.3	-20.3
20500	40.3	-19.9
21000	40.3	-19.1
21500	40.3	-19.1
22000	40.3	-18.7
22500	40.4	-19.0
23000	40.4	-19.5
23500	40.4	-19.3
24000	40.4	-19.8
24500	40.4	-19.5
25000	40.4	-19.3
25500	40.5	-20.4
26000	40.5	-21.3
26500	40.5	-21.1

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)
dB	dB	dB	dB	dB
0.72	-35.85	6.20	2.81	2.65
0.69	-35.71	6.46	2.76	2.59
0.76	-35.44	6.69	3.15	2.79
0.74	-35.07	7.04	3.11	2.91
0.72	-34.49	7.30	3.07	3.05
0.78	-34.46	7.48	3.12	3.15
0.87	-34.07	7.61	3.20	3.33
0.90	-33.96	7.47	3.28	3.19
0.89	-33.57	7.34	3.35	3.28
0.87	-33.66	7.06	3.75	2.94
0.88	-33.75	6.92	3.77	2.70
0.90	-33.35	6.99	3.52	2.66
0.88	-33.99	6.88	3.88	2.58
0.91	-33.89	7.01	3.93	2.51
0.88	-33.00	6.72	3.96	2.14
0.89	-34.07	6.90	3.66	2.22
0.86	-35.11	7.02	3.69	2.28
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

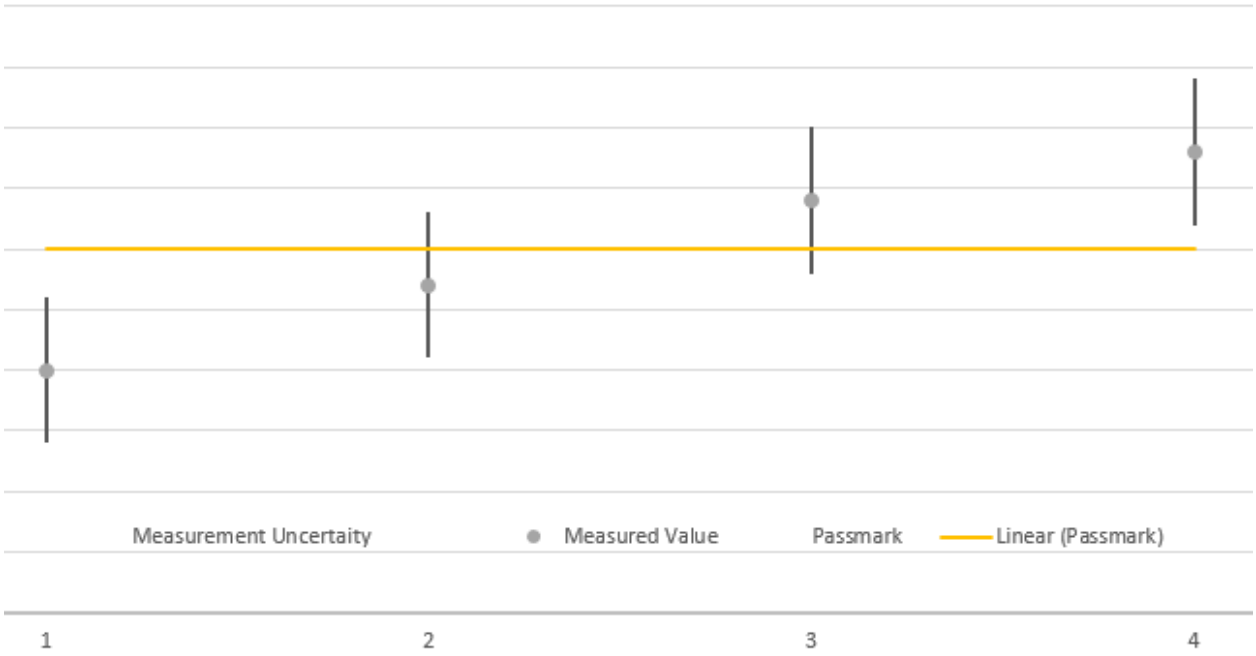
Sample calculation

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 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.

9 PHOTO REPORT

Please see separate photo report.