EMI – TEST REPORT

- FCC Part 15.407, 5725-5850 MHz, RSS 247 -

Type / Model Name	:	Xirium Pro (NXP2TX, NXP2TX-C)
Product Description	:	Digital Wireless Audio Network
Applicant	:	Neutrik AG
Address	:	Im alten Riet 143
		9494 SCHAAN, LIECHTENSTEIN
Manufacturer	:	Neutrik AG
Address	:	Im alten Riet 143
		9494 SCHAAN, LIECHTENSTEIN
Licence holder	:	Neutrik AG
Address	:	Im alten Riet 143
		9494 SCHAAN, LIECHTENSTEIN

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

Test Report No. : T41996-01-01HS	06. March 2017 Date of issue

Deutsche Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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ATTACHMENT A as separate supplement

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September, 2016)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September, 2016)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
Part 15, Subpart C, Section 15.212	Modular transmitters

FCC Rules and Regulations Part 15, Subpart E – Unlicensed National Information Infrastructure Devices (December, 2016)

Part 15, Subpart E, Section 15.407	Operation within the bands 5.15 - 5.25 GHz, 5.25 - 5.35 GHz, 5.47 - 5.725 GHz and 5.725 - 5.85 GHz
ANSI C63.10: 2013	Testing Unlicensed Wireless Devices
ETSI TR 100 028 V1.3.1: 2001-03	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the Measurement of Mobile Radio Equipment Characteristics—Part 1 and Part 2
KDB 789033 D02 v01r03	Guidance for compliance Testing of U-NII devices, August 22, 2016.

2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

2.2 General remarks:

The motherboard is manufactured by another manufacturer, the PCB material has changed. Additional a new type of antenna, SOA-2456/360/1/0/V, 2.0 dBi gain (radiation pattern omni), will be used. The intention of this test report is to demonstrate the further compliance to the FCC Part 15.407 and RSS 247.
Therefore the radiated output power and spurious emissions f > 1 GHz and conducted emissions are re-measured.

2.3 Equipment category

WLAN - AP

2.4 Short description of the equipment under test (EUT)

The EUT is part of a digital wireless audio network. The product represents a TX base station. The audio stream is transmitted in the band 5725 MHz to 5850 MHz. The EUT is controlled via 2.4 GHz WLAN interface. The 2.4 GHz functionality is not part of this test report.

Number of tested samples: 1 TX
Serial number: Host module 620007, TX module 515547
Firmware version: 3.0

EUT configuration:
(The CDF filled by the applicant can be viewed at the test laboratory.)

2.5 Variants of the EUT

Xirium Pro (NXP2TX) US-Version
Xirium Pro (NXP2TX-C) Canada-Version

2.6 Operation frequency and channel plan

The operating frequency is 5725 MHz to 5850 MHz.

Channel plan:
Channel plan WLAN Standard 802.11a:

Channel	Frequency
149	5745
153	5765
157	5785
161	5805
165	5825

Note: The marked frequencies are determined for final testing.

2.7 Transmit operating modes

The module use OFDM modulation and is capable to provide following data rates:
- 802.11a 24, 6 Mbps

2.8 Antenna

The following antennas shall be used with the EUT:

Number	Manufacturer Number	Characteristic	Model number	Connector	Frequency (GHz)	Gain 5 GHz	Cable loss (dB)	effective Gain 5 GHz (dBi)
1	ECO9-5500 Series	Omni	ECO9-5500-BLK-RN	N-male	5 GHz	9.0	0	9.0
2	WiFi Antenna 1399.17.0225	Omni	SOA-2456/360/1/0/V	N-male	5 GHz	2.0	0	2.0

2.9 Power supply system utilised

Power supply voltage, V_{nom} : 5 VDC Li-ion battery
Power supply voltage (alternative) : Input: 100-240 V, 50-60 Hz, 1ϕ Power supply,
Output: +5 VDC (charging and operation)

2.10 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- - _____ Model : - _____
- _____ Model : _____
- _____ Model : _____

2.11 Determination of worst case conditions for final measurement

Measurements are made in all three orthogonal axes and the settings of the EUT are changed to locate at which position and at what setting of the EUT produce the maximum of the emissions.
The tests are carried out in the following frequency band:

5725 - 5850 MHz

Preliminary tests are performed to find the worst-case mode from all possible combinations between available modulations and data rates. The maximum output power depends on used data rate.
Following channels and test modes are selected for the final test as listed below:

WLAN	Available channel	Tested channels	Power setting	Modulation	Modulation type	Data rate
802.11a	149 to 165	149, 157, 165	Pmax	OFDM	BPSK	6 Mbps

- TX continuous mode, 802.11a

2.11.1 Test jig

No test jig is used.

2.11.2 Test software

The test software for the EUT provides the special test mode TX continuous mode, modulated, after switch on. The switch “XROC” is used for switch the channels 149, 157, 165. No other settings are available.

3 TEST RESULT SUMMARY

WLAN device using digital modulation:

Operating in the 5725 MHz – 5850 MHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.407(b)(6)	RSS Gen, 8.8	AC power line conducted emissions	passed
15.407(e)	RSS247, 6.2.4 (1)	6 dB EBW	Not tested
15.407(a)(3)	RSS247, 6.2.4 (1)	Maximum conducted output power	passed
15.407(b)(4)	RSS247, 6.2.4 (2)	Unwanted emission	Not tested
15.407(b)(7)	RSS-Gen, 8.10	Unwanted emissions in restricted bands	passed
15.407(a)(3)	RSS247, 6.2.4 (1)	Maximum power spectral density	Not tested
15.35(c)	RSS-Gen, 6.10	Pulsed operation	Not tested
15.203	-	Antenna requirement	passed
15.407(g)	RSS-Gen, 6.11	Transmitter frequency stability	Not tested
KDB 789033	RSS-Gen, 6.6	99 % Bandwidth	Not tested

3.1 Final assessment

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 01 February 2017

Testing concluded on : 07 February 2017

Checked by:

Klaus Gegenfurtner
I confirm the correctness and Integrity of this document
2017.03.07 09:48:40 +01'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

Hermann Smetana
I am the author of this document.
2017.03.06 11:52:21 +01'00'

Hermann Smetana
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Ohmstrasse 1-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 °C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners gmbh, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
AC power line conducted emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
EBW and OBW	2400 MHz to 3000 MHz	95%	± 2.5 x 10^{-7}
Maximum peak conducted output power	2400 MHz to 3000 MHz	95%	± 0.62 dB
Power spectral density	2400 MHz to 3000 MHz	95%	± 0.62 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB
Conducted Spurious Emissions	10000 MHz to 40000 MHz	95%	± 3.47 dB
Radiated Spurious Emissions	9 kHz to 30 MHz	95%	± 3.53 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	± 3.71 dB
Radiated Spurious Emissions	1000 MHz to 10000 MHz	95%	± 2.34 dB
Field strength of the fundamental	100 kHz to 100 MHz	95%	± 3.53 dB

4.4 Measurement protocol for FCC and ISED

4.4.1 General information

4.4.1.1 Test methodology

The Open Area test site is a listed Open Site under the Canadian Test-Sites File-No:

IC 3009A-1

The Anechoic chamber is a listed test site under the Canadian Test-Sites File-No:

IC 3009A-2

In compliance with RSS-247 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

4.4.1.2 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.1.3 General Standard information

In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

4.4.1.3.1 Radiated emission (electrical field 30 MHz - 1 GHz)

Description of measurement

Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.10.The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees.
The final level in dBµV/m is calculated by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (dB). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	-	CISPR Limit (dBµV/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

4.4.1.3.2 Radiated emission (electrical field 1 GHz - 40 GHz)

Description of measurement

Radiated emissions from the EUT are measured in the frequency range 1 GHz up to the maximum frequency as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table, 1.5 metre above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is following set out in ANSI C63.10. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyzer set to max peak detector function and a resolution 1 MHz and video bandwidth 3 MHz for peak measurement. The conditions determined as worst case will then be used for the final measurements. When the EUT is larger than the beam width of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty and are calculated at the specified test distance.

5 TEST CONDITIONS AND RESULTS

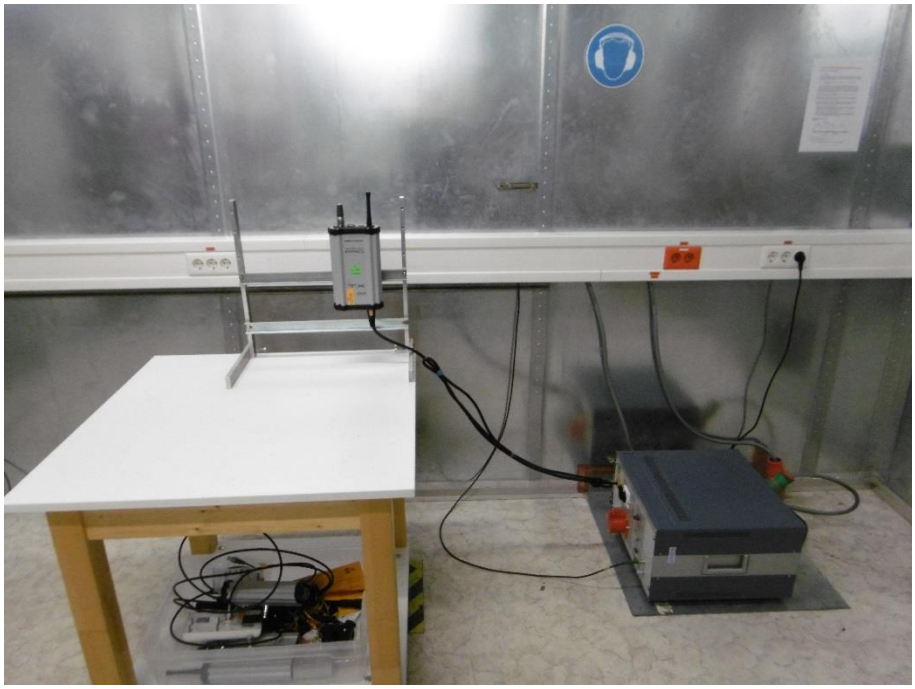
5.1 AC power line conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location: Shielded Room S2

5.1.2 Photo documentation of the test set-up



5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):
Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10 described under item 4.4.3. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 12.4 dB at 0.208 MHz

FCC ID: 2ABA7XPT IC ID: 11536A-XPT

Limit according to FCC Part 15, Section 15.207(a):

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

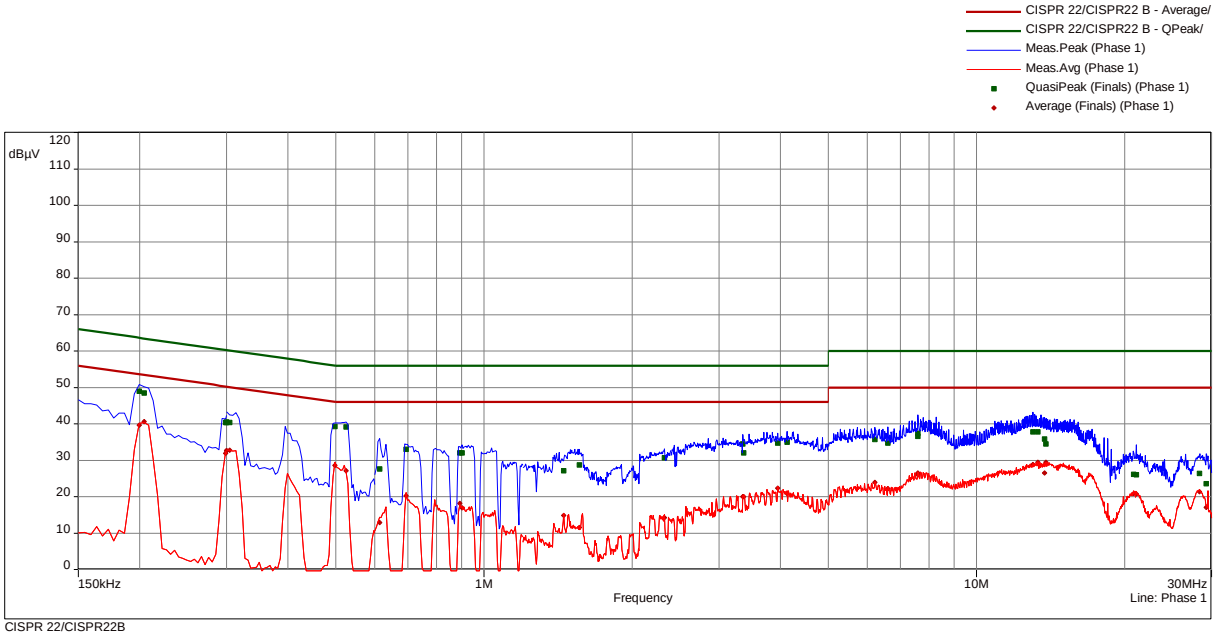
* Decreases with the logarithm of the frequency

The requirements are **FULFILLED.**

Remarks: For detailed test result please refer to following test protocols

5.1.6 Test protocol

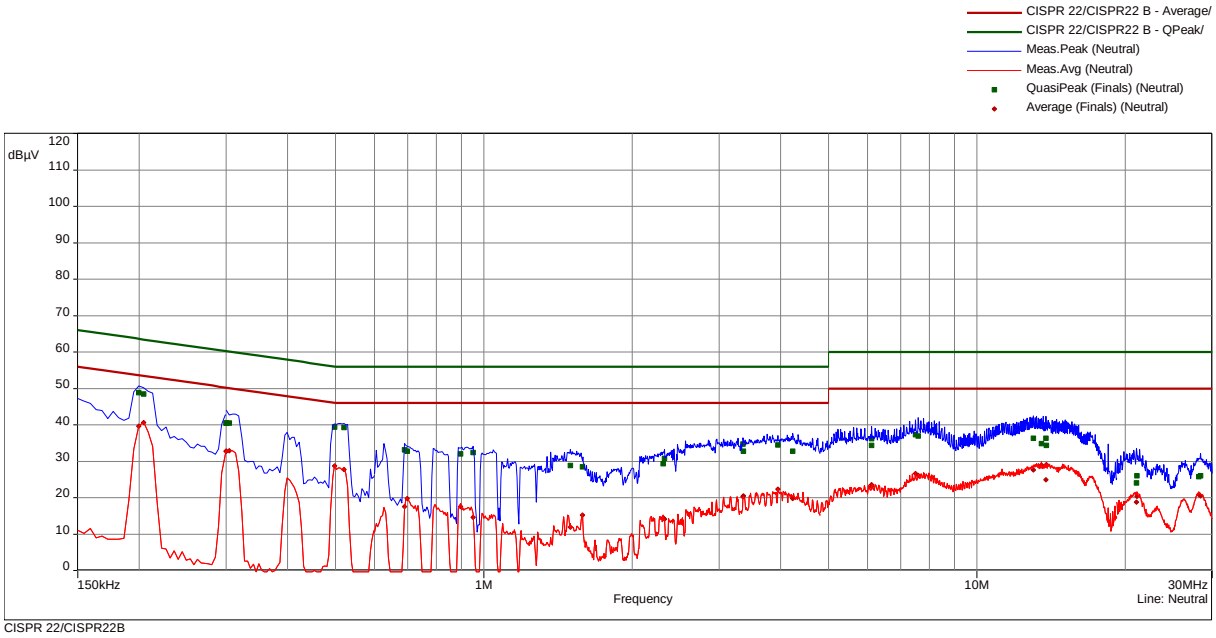
Test point L1 Result: passed
Operation mode: TX continuous mode 5 GHz
Remarks:



FCC ID: 2ABA7XPT IC ID: 11536A-XPT

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.200	1	48.9	14.7	63.6	39.6	14.0	53.6	Phase 1	9.8
0.204	1	48.5	15.0	63.5	40.6	12.8	53.5	Phase 1	9.8
0.299	1	40.4	19.9	60.3	32.0	18.3	50.3	Phase 1	9.8
0.300	1	40.5	19.8	60.2	32.6	17.6	50.2	Phase 1	9.8
0.300	2	40.4	19.8	60.2	32.6	17.6	50.2	Phase 1	9.8
0.305	2	40.4	19.7	60.1	32.8	17.3	50.1	Phase 1	9.8
0.498	2	39.3	16.7	56.0	28.7	17.4	46.0	Phase 1	9.8
0.525	2	39.2	16.8	56.0	27.1	18.9	46.0	Phase 1	9.8
0.614	3	27.6	28.4	56.0	12.9	33.1	46.0	Phase 1	9.8
0.695	3	33.0	23.0	56.0	20.3	25.7	46.0	Phase 1	9.8
0.893	3	32.0	24.0	56.0	18.1	27.9	46.0	Phase 1	9.8
0.902	3	32.0	24.0	56.0	17.0	29.0	46.0	Phase 1	9.8
1.452	4	27.2	28.8	56.0	14.9	31.1	46.0	Phase 1	9.8
1.560	4	28.8	27.2	56.0	11.6	34.4	46.0	Phase 1	9.8
2.325	4	30.7	25.3	56.0	14.2	31.8	46.0	Phase 1	9.8
3.354	5	34.5	21.5	56.0	20.0	26.0	46.0	Phase 1	9.8
3.363	5	32.0	24.0	56.0	20.1	26.0	46.0	Phase 1	9.8
3.948	5	34.8	21.2	56.0	22.4	23.6	46.0	Phase 1	9.8
4.124	5	34.9	21.1	56.0	20.9	25.1	46.0	Phase 1	9.8
6.218	6	35.7	24.3	60.0	23.9	26.1	50.0	Phase 1	9.8
6.609	6	34.7	25.3	60.0	22.3	27.7	50.0	Phase 1	9.8
7.595	6	36.6	23.4	60.0	26.0	24.0	50.0	Phase 1	9.9
7.599	6	37.4	22.6	60.0	26.5	23.5	50.0	Phase 1	9.9
13.025	7	37.8	22.2	60.0	28.9	21.2	50.0	Phase 1	10.0
13.322	7	37.8	22.2	60.0	29.5	20.5	50.0	Phase 1	10.0
13.745	7	35.8	24.2	60.0	26.5	23.5	50.0	Phase 1	10.1
13.826	7	34.5	25.5	60.0	29.4	20.6	50.0	Phase 1	10.1
20.847	8	26.2	33.8	60.0	20.9	29.1	50.0	Phase 1	10.3
21.095	8	26.0	34.0	60.0	20.7	29.3	50.0	Phase 1	10.3
28.371	8	26.4	33.6	60.0	21.3	28.7	50.0	Phase 1	10.3
29.267	8	23.6	36.4	60.0	17.1	32.9	50.0	Phase 1	10.3

Test point N Result: passed
Operation mode: TX continuous mode 5 GHz
Remarks:



FCC ID: 2ABA7XPT IC ID: 11536A-XPT

freq	SR	QP	margin	limit	AV	margin	limit	line	corr
MHz		dB(µV)	dB	dB	dB(µV)	dB	dB		dB
0.200	9	48.9	14.8	63.6	39.6	14.0	53.6	Neutral	9.8
0.204	9	48.4	15.0	63.5	40.6	12.9	53.5	Neutral	9.8
0.300	9	40.5	19.8	60.2	32.7	17.5	50.2	Neutral	9.8
0.300	10	40.5	19.8	60.2	32.7	17.5	50.2	Neutral	9.8
0.305	10	40.5	19.6	60.1	32.9	17.2	50.1	Neutral	9.8
0.498	10	39.3	16.7	56.0	28.7	17.3	46.0	Neutral	9.8
0.521	10	39.3	16.7	56.0	27.8	18.2	46.0	Neutral	9.8
0.690	11	33.2	22.8	56.0	17.6	28.5	46.0	Neutral	9.8
0.699	11	32.7	23.3	56.0	19.7	26.3	46.0	Neutral	9.8
0.897	11	32.0	24.0	56.0	17.6	28.4	46.0	Neutral	9.8
0.951	11	32.4	23.6	56.0	14.6	31.4	46.0	Neutral	9.8
1.497	12	28.9	27.1	56.0	11.9	34.1	46.0	Neutral	9.8
1.583	12	28.5	27.5	56.0	15.3	30.7	46.0	Neutral	9.8
2.312	12	29.3	26.7	56.0	14.5	31.6	46.0	Neutral	9.8
2.325	12	30.8	25.3	56.0	14.1	31.9	46.0	Neutral	9.8
3.354	13	34.7	21.3	56.0	20.3	25.8	46.0	Neutral	9.8
3.359	13	32.8	23.2	56.0	20.5	25.5	46.0	Neutral	9.8
3.948	13	34.5	21.5	56.0	22.4	23.6	46.0	Neutral	9.8
4.232	13	32.8	23.2	56.0	19.8	26.2	46.0	Neutral	9.8
6.114	14	34.4	25.7	60.0	23.1	26.9	50.0	Neutral	9.8
6.119	14	36.2	23.8	60.0	23.6	26.4	50.0	Neutral	9.8
7.500	14	37.3	22.7	60.0	26.7	23.3	50.0	Neutral	9.8
7.595	14	37.0	23.0	60.0	26.2	23.8	50.0	Neutral	9.8
13.007	15	36.3	23.7	60.0	27.6	22.4	50.0	Neutral	9.9
13.524	15	34.9	25.2	60.0	29.0	21.0	50.0	Neutral	9.9
13.812	15	36.3	23.7	60.0	24.9	25.1	50.0	Neutral	9.9
13.826	15	34.4	25.7	60.0	29.1	20.9	50.0	Neutral	9.9
21.077	16	24.1	35.9	60.0	18.7	31.3	50.0	Neutral	10.1
21.090	16	26.0	34.0	60.0	20.4	29.6	50.0	Neutral	10.1
28.160	16	25.8	34.2	60.0	20.8	29.2	50.0	Neutral	9.8
28.407	16	26.0	34.0	60.0	20.5	29.6	50.0	Neutral	9.8

5.2 Emission bandwidth and occupied bandwidth

For test instruments and accessories used see section 6 Part **MB**.

5.2.1 Description of the test location

Test location: NONE

Remarks: Not tested.

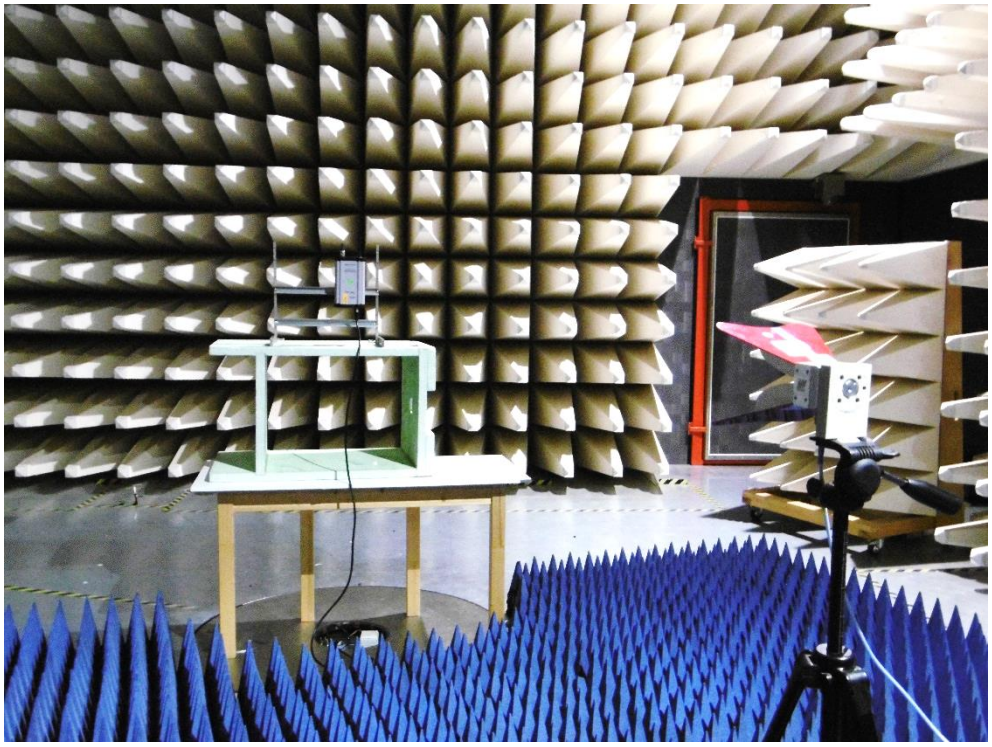
5.3 Maximum conducted output power

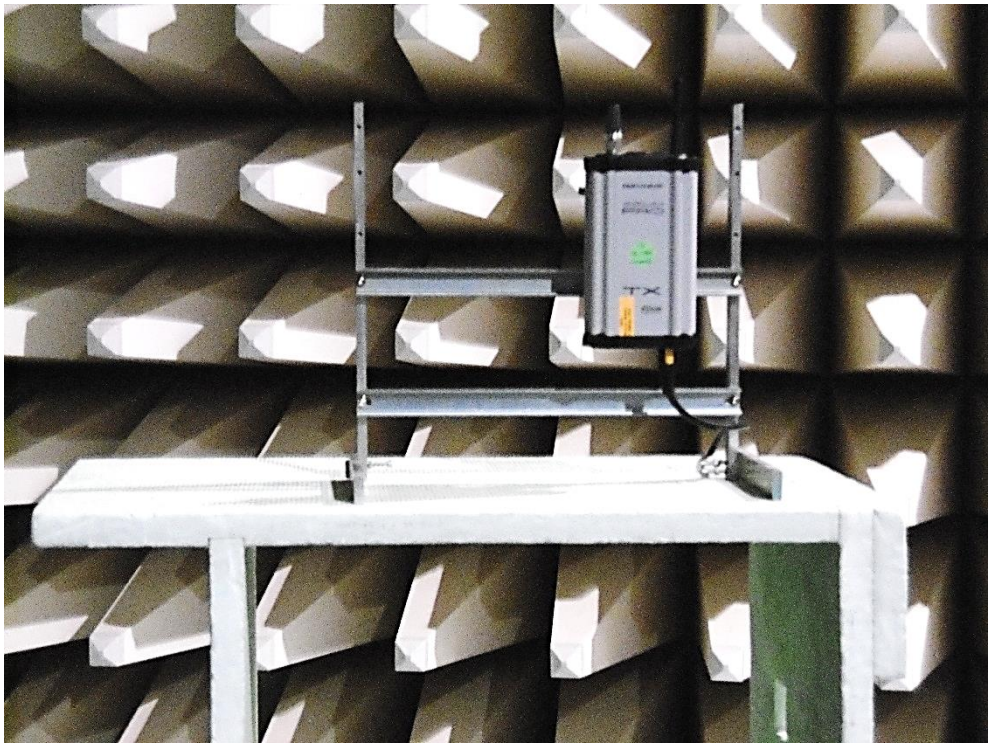
For test instruments and accessories used see section 6 Part **CPR 3**.

5.3.1 Description of the test location

Test location: Anechoic chamber 1
Test distance: 3 m

5.3.2 Photo documentation of the test set-up





5.3.3 Applicable standard

According to FCC Part 15, Section 15.407(a)(3):
For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

5.3.4 Description of Measurement

The maximum conducted output power is measured using a spectrum analyser with the function “integrated band power measurement” following the procedure set out in KDB 789033 D02, item E b) Method SA-1. The EUT is set in TX continuous mode while measuring. The resulting values are listed in the following tables.

Spectrum analyser settings:
RBW: 1 MHz, VBW: 3 MHz, Detector: RMS (power averaging), Number of points: 10000,
Sweep time: 500 µs, Band power function;

5.3.5 Test result

802.11a, 6 Mbps, 1TX		Test results conducted				
Port 1		P [max] (dBm)	Gain (dBi)	A [max] (dBm)	Limit (dBm)	Min Margin (dB)
Lowest						
T_{nom}	V_{nom}	24.1	2.0	22.1	30.0	-7.9
Middle						
T_{nom}	V_{nom}	24.5	2.0	22.5	30.0	-7.5
Highest						
T_{nom}	V_{nom}	24.0	2.0	22.0	30.0	-8.0

Note: Pmax in EIRP.

FCC ID: 2ABA7XPT IC ID: 11536A-XPT

Maximum conducted output power limit according to FCC Part 15, Section 15.407(a)(3):

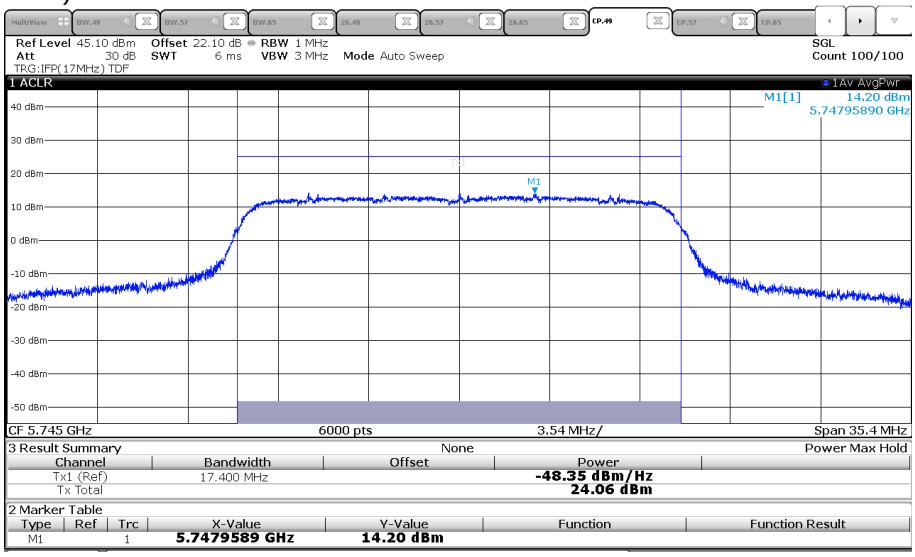
Frequency (MHz)	Maximum conducred power limit	
	(dBm)	(Watt)
5725 - 5850	30	1.0

The requirements are **FULFILLED.**

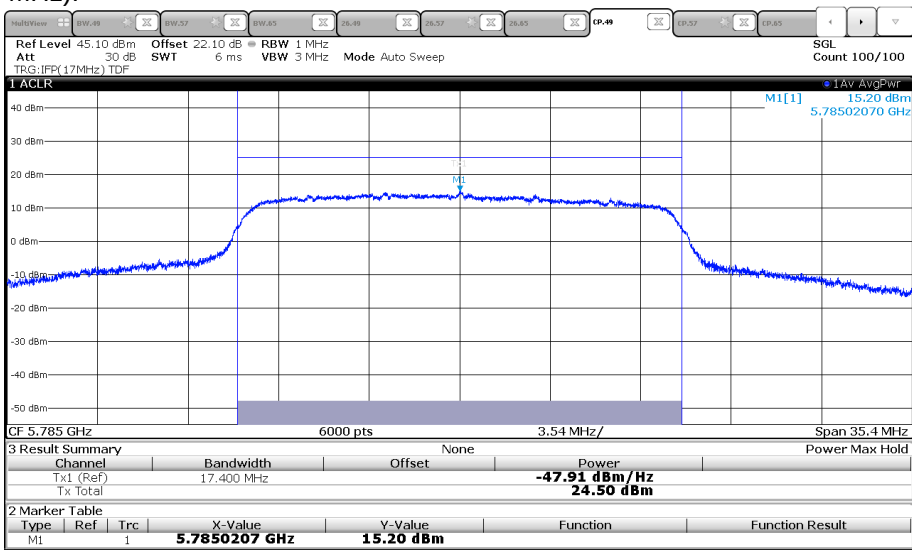
Remarks: For detailed test results please see the following test protocols.

5.3.6 Test protocols

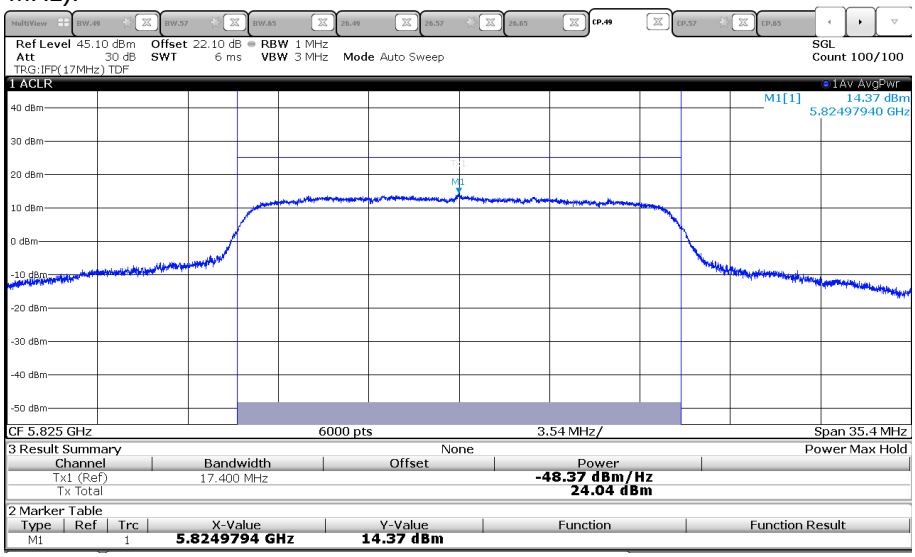
Channel 149 (5745 MHz):



Channel 157 (5785 MHz):



Channel 165 (5825 MHz):



5.4 Maximum power spectral density

For test instruments and accessories used see section 6 Part **CPC 3**.

5.4.1 Description of the test location

Test location: NONE

Remarks: Not tested.

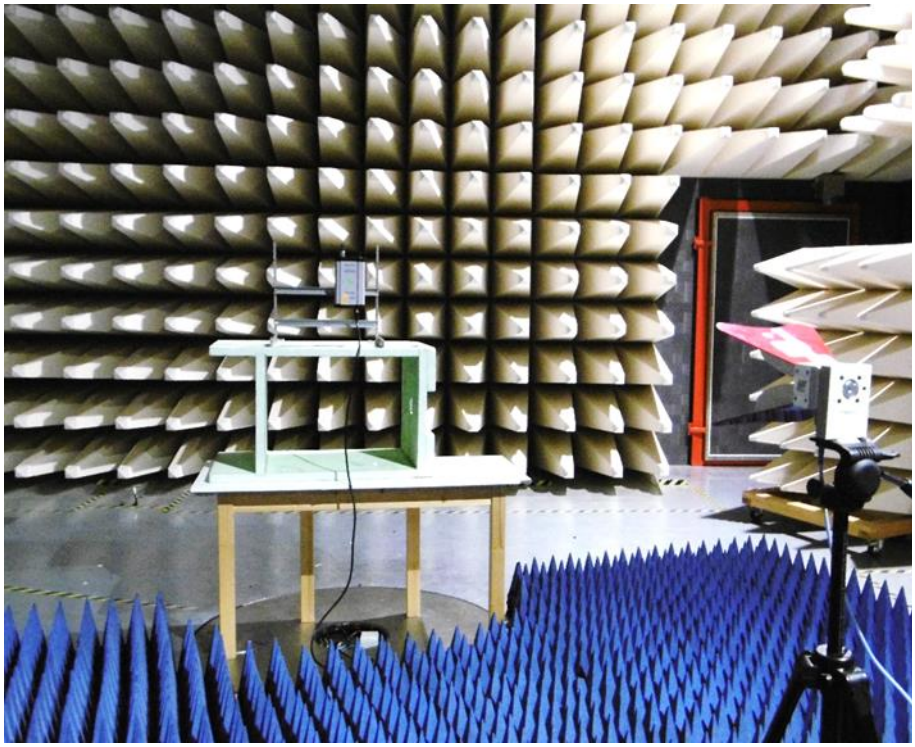
5.5 Defacto limit

For test instruments and accessories used see section 6 Part **CPR 3**.

5.5.1 Description of the test location

Test location: Anechoic chamber 1
Test distance: 3 m

5.5.2 Photo documentation of the test set-up



5.5.3 Applicable standard

According to FCC Part 15, Section 15.407(a)(3):
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.5.4 Test result

The amount of reduction is calculated using the following formula: Pout = 30 – (Gx – 6);
Where
Pout = maximum conducted output power
Gx = antenna gain of the applied antenna

Output power:

Antenna	Gx	Cond. limit	G	Amax	Limit P_{out}	Reduction	P set
	(dBi)	(dBm)	(dBi)	(dBm)	(dBm)	(dB)	5 GHz
SOA-2456/360/1/0/V	2.0	30.0	6.0	22.5	34.0	0.0	Pmax

Defacto limit according to FCC Part 15, Section 15.407(a)(3):
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Frequency (MHz)	Maximum EIRP limit	
	(dBm)	(Watt)
5725 - 5850	36	4.0

The requirements are **FULFILLED.**

Remarks: The used antennas requires no reduction of the output power.

5.6 Unwanted emissions

For test instruments and accessories used see section 6 Part **SER 2 and SER 3**.

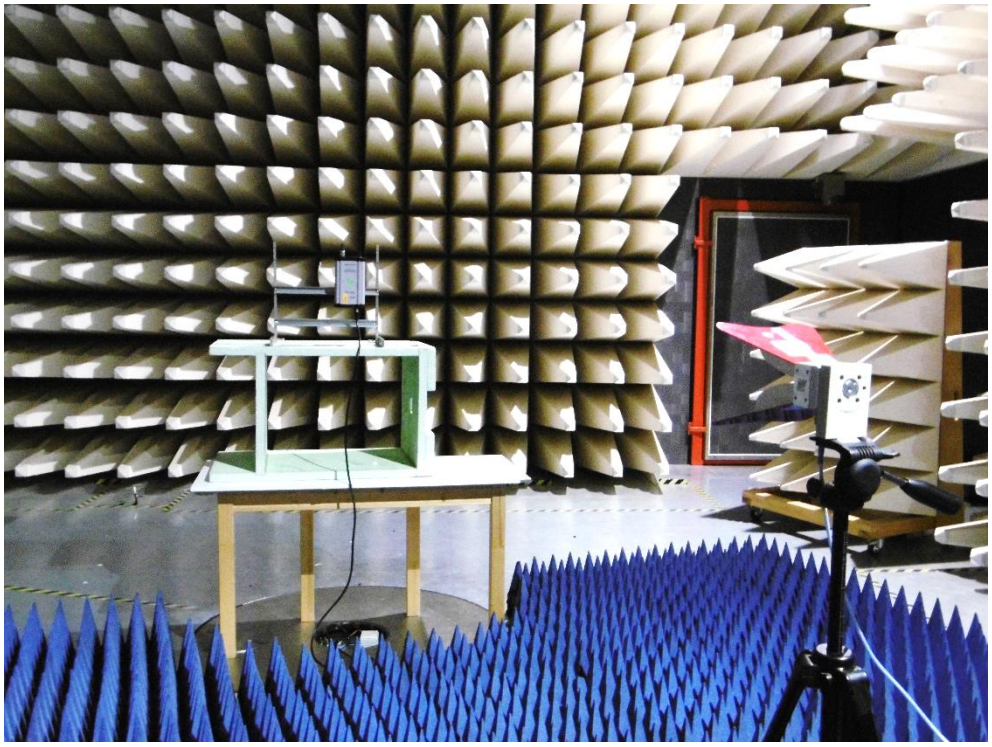
5.6.1 Description of the test location

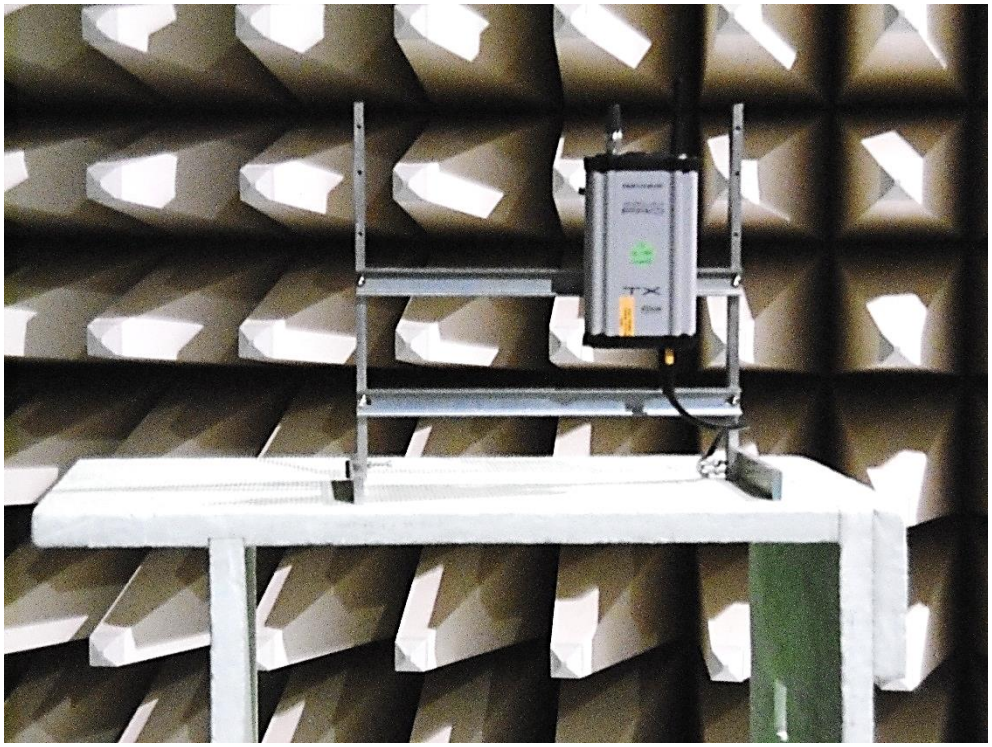
Test location: OATS 1
Test location: Anechoic chamber 1
Test distance: 3 m

5.6.2 Photo documentation of the test set-up

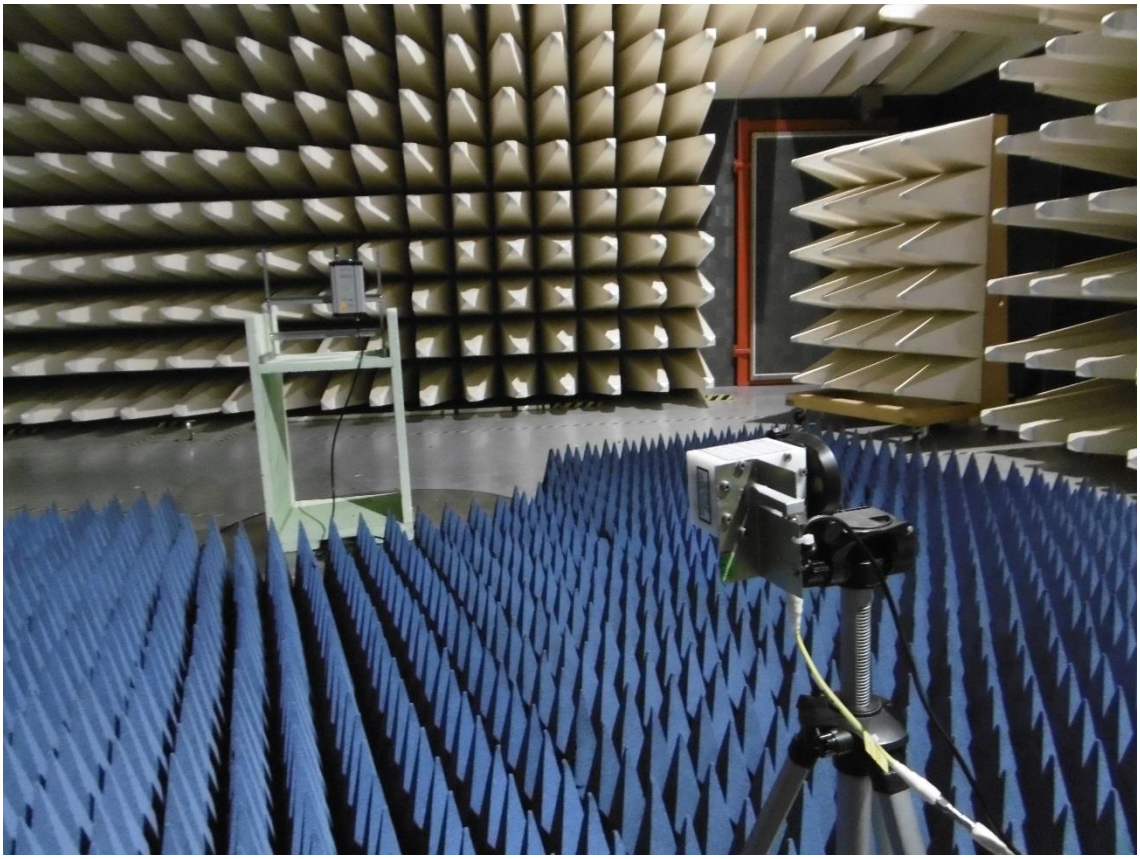
30 MHz – 1 GHz

1 GHz – 18 GHz





18 GHz – 40 GHz



5.6.3 Applicable standard

According to FCC Part 15E, Section 15.407(b):
For transmitters operating in the defined bands shall not exceed the appropriate emission limit outside of the operating bands.
In addition, radiated emissions which fall in the restricted bands, as defined in Section15.205(a), must also comply with the radiated emission limit specified in Section15.209(a) (see Section15.205(c)).

Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII- band 5725-5850 MHz. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz. However, an out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

5.6.4 Description of Measurement

Undesirable emissions are measured using a spectrum analyser and following the procedures according the OET 789033, item G. Up from 4-8 GHz a 3 HP filter is used. . If the emission level of the EUT in peak mode complies with the average limit then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured in average mode again and reported.

Spectrum analyser settings for peak values 1 GHz – 40 GHz:
RBW: 1 MHz, VBW: 3 MHz, Detector: max peak, Sweep: 100 ms, Trace mode: max hold;

Spectrum analyser settings for average values 1 GHz – 40 GHz:
RBW: 1 MHz VBW: 3 MHz Detector: RMS, Sweep: 100 ms, Trace mode: max hold;

5.6.5 Test result

f < 1 GHz

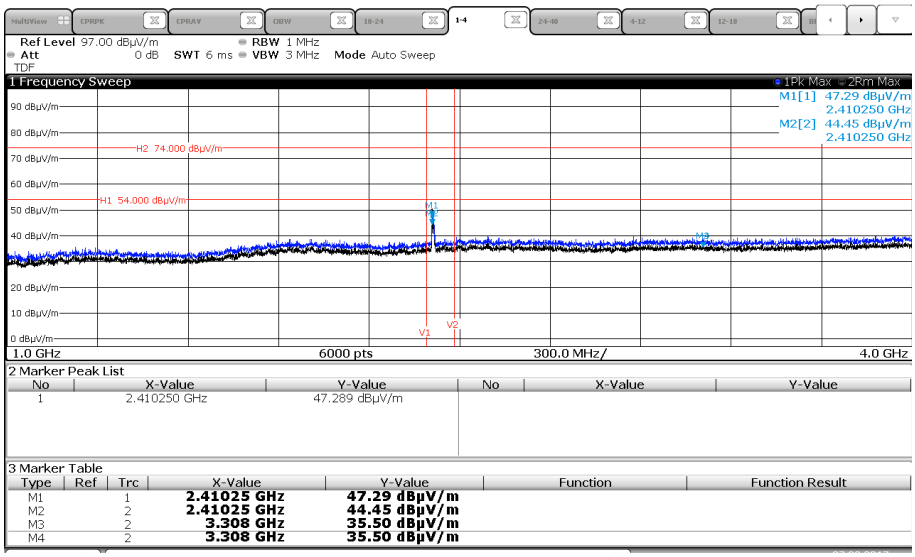
Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
39.11	9.7	-1.6	14.5	13.3	24.2	11.7	40.0	-15.8
49.20	9.4	-0.6	15.2	14.1	24.6	13.5	40.0	-15.4
114.88	23.6	20.6	11.5	12.2	35.1	32.8	43.5	-8.4
117.79	21.1	18.8	12.0	12.6	33.1	31.4	43.5	-10.4
250.00	27.3	23.6	13.8	14.0	41.1	37.6	46.0	-4.9
350.00	10.0	10.5	18.4	18.0	28.4	28.5	46.0	-17.5

f > 1 GHz

801.11a:

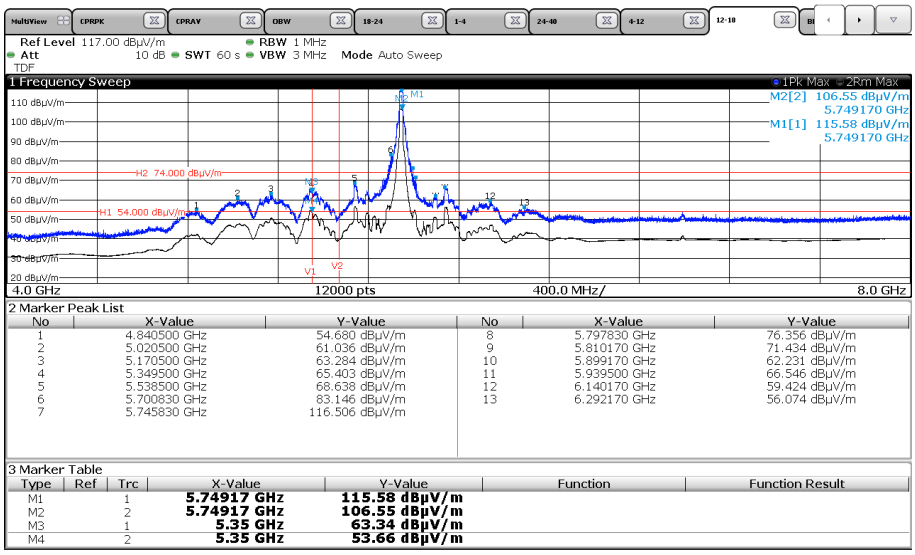
Channel149 (5745 MHz):

1-4-GHz



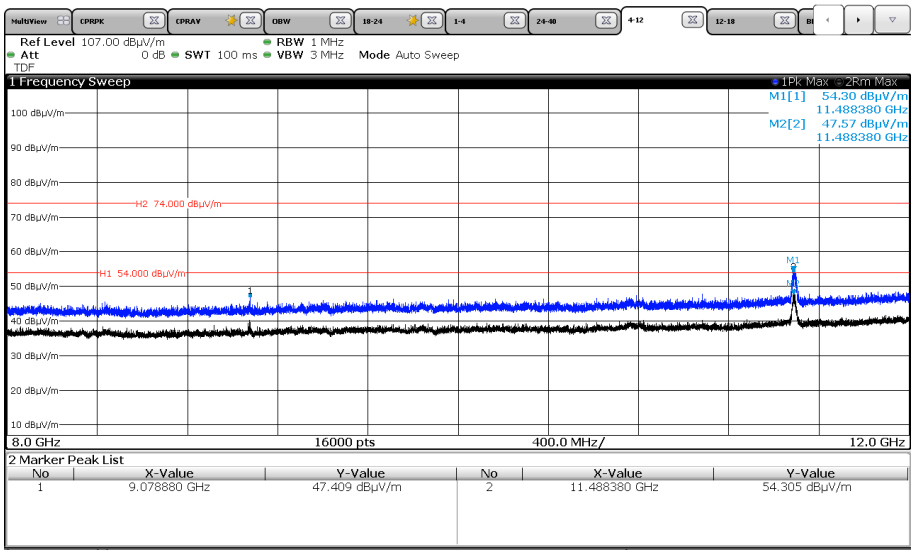
Note: WLAN antenna output connector with 50 Ohms terminated.

4-8 GHz

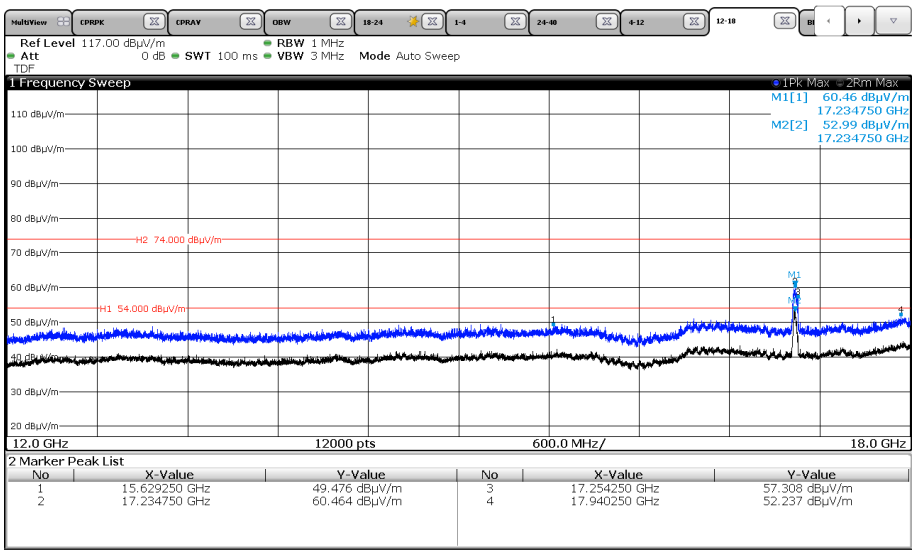


FCC ID: 2ABA7XPT IC ID: 11536A-XPT

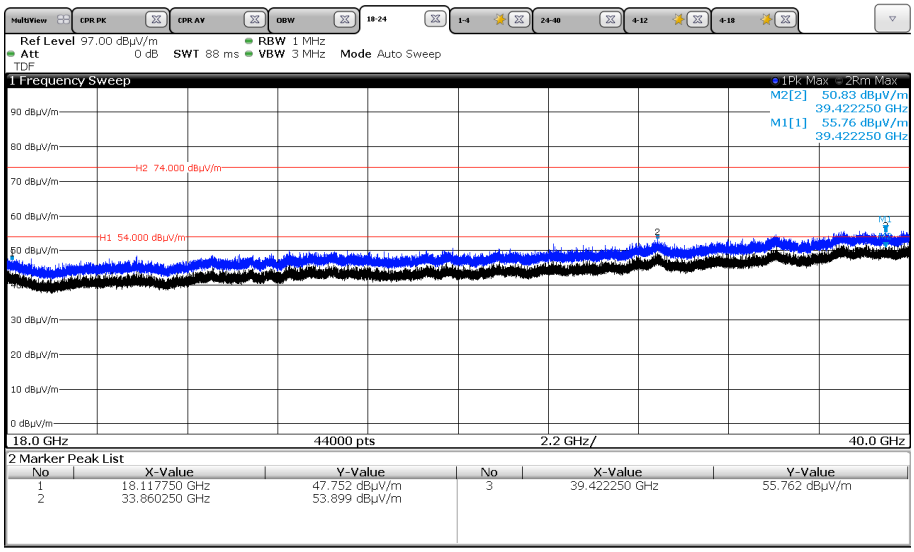
8-12 GHz



12-18 GHz



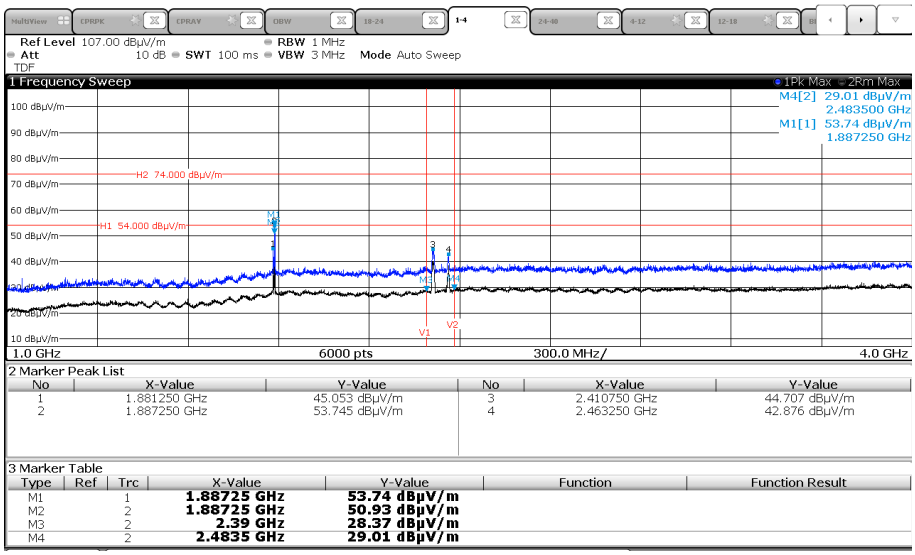
18-40 GHz



FCC ID: 2ABA7XPT IC ID: 11536A-XPT

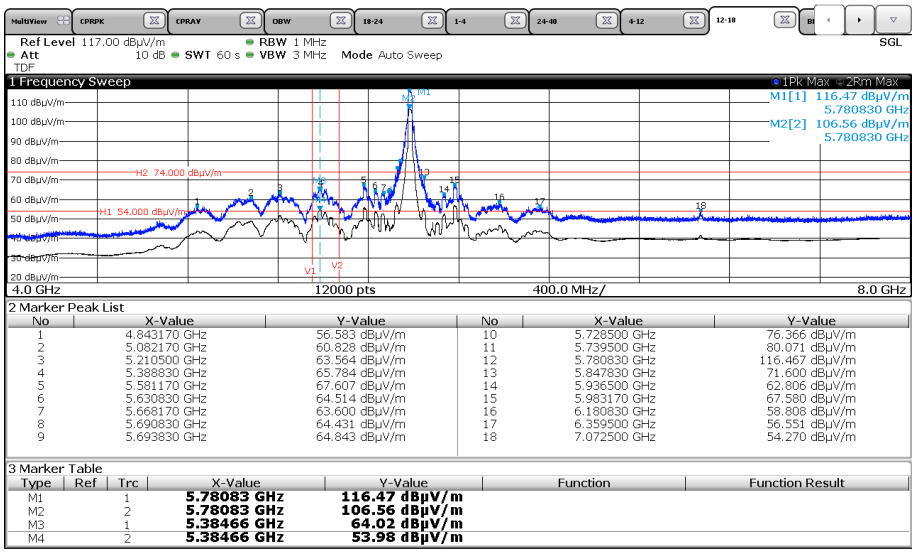
Channel 157 (5785 MHz)

1-4 GHz

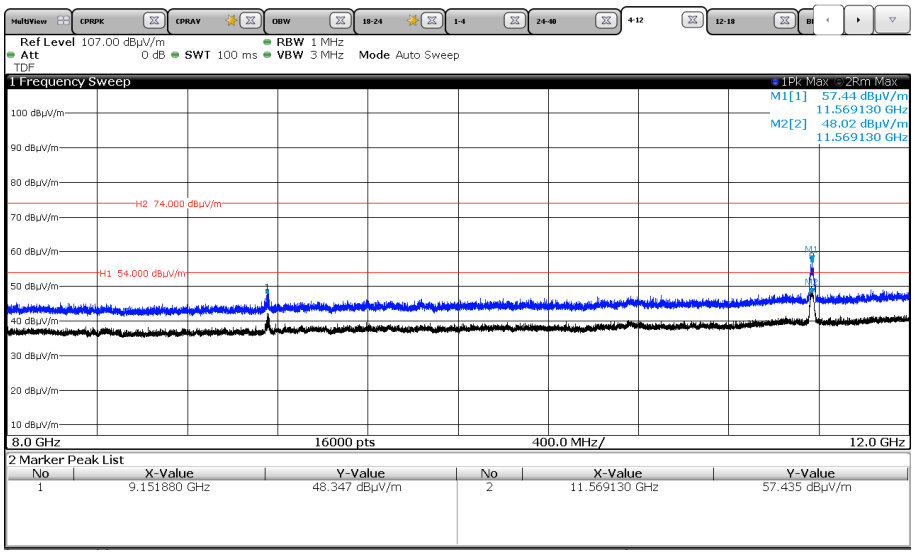


Note: WLAN antenna output connector with 50 Ohms terminated.

4-8 GHz

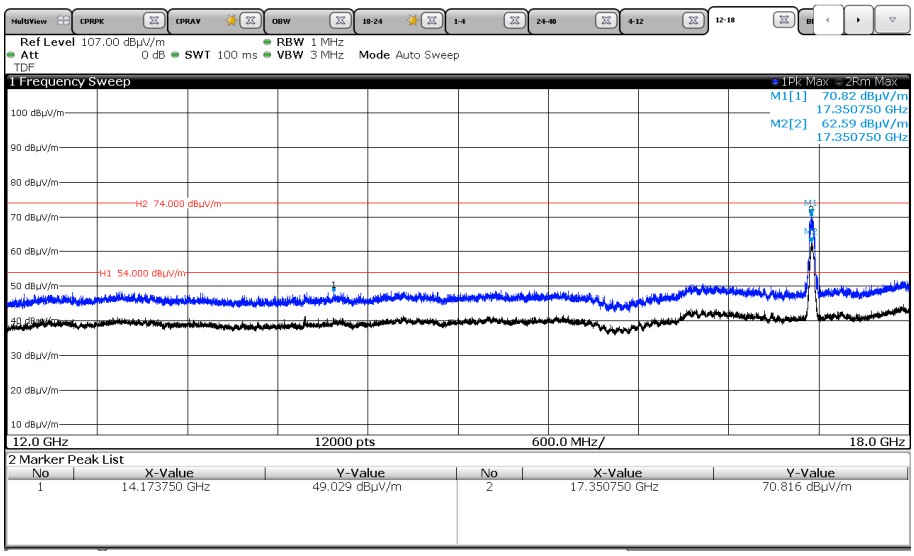


8-12 GHz

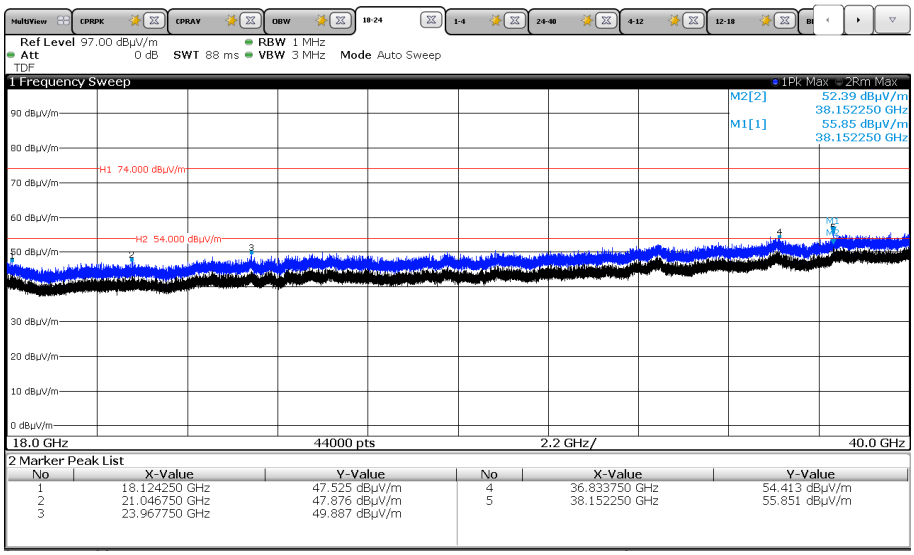


FCC ID: 2ABA7XPT IC ID: 11536A-XPT

12-18 GHz

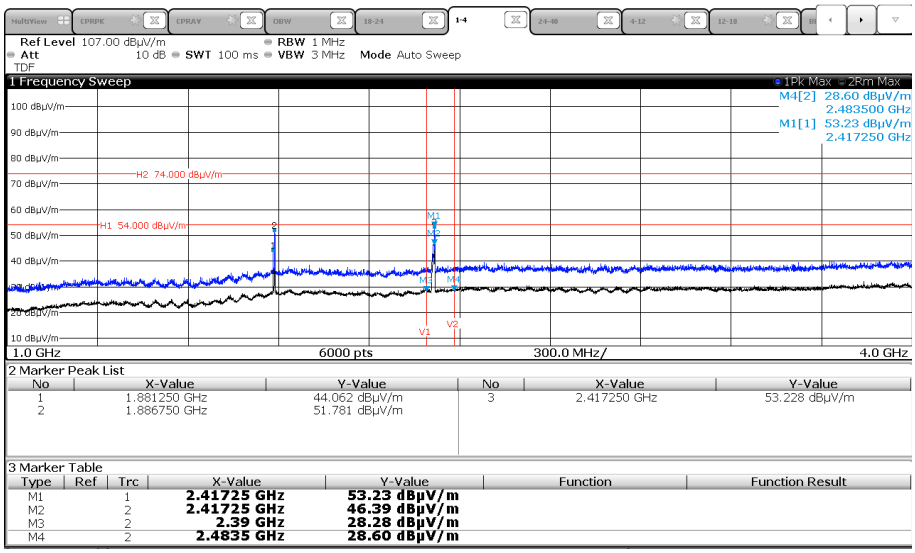


18-40 GHz



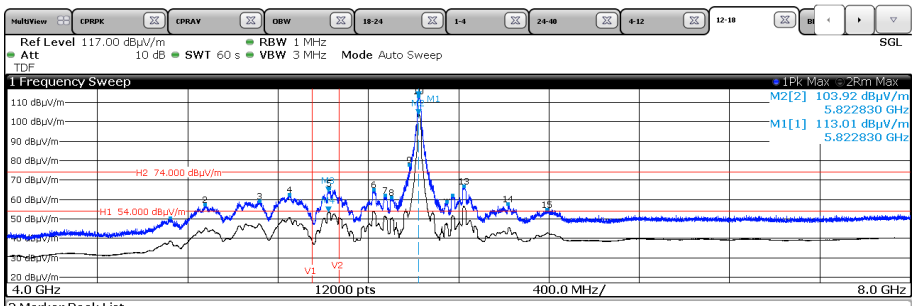
Channel 165 (5825 MHz)

1-4-GHz



FCC ID: 2ABA7XPT IC ID: 11536A-XPT

4-8 GHz



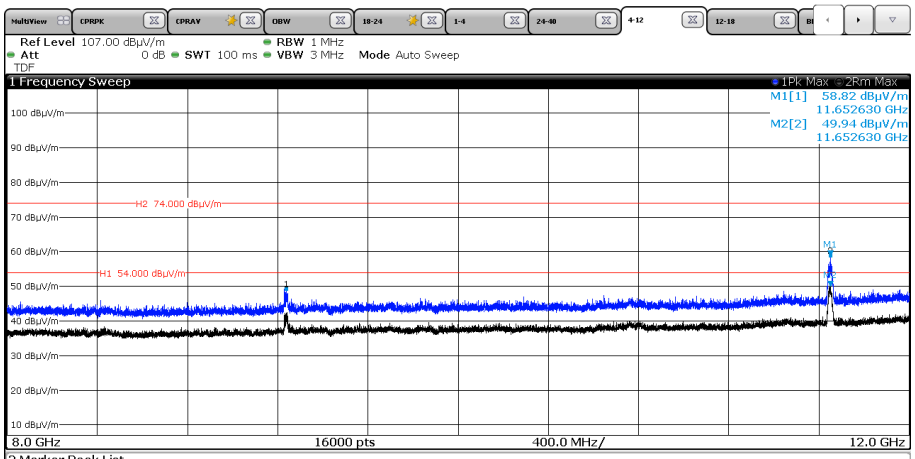
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	4.723170 GHz	50.670 dBµV/m	9	5.781500 GHz	77.629 dBµV/m
2	4.876830 GHz	57.153 dBµV/m	10	5.822170 GHz	113.443 dBµV/m
3	5.117170 GHz	59.133 dBµV/m	11	5.947830 GHz	58.801 dBµV/m
4	5.251500 GHz	62.494 dBµV/m	12	5.972170 GHz	61.987 dBµV/m
5	5.425170 GHz	65.603 dBµV/m	13	6.022830 GHz	66.840 dBµV/m
6	5.623170 GHz	64.915 dBµV/m	14	6.219500 GHz	57.721 dBµV/m
7	5.674500 GHz	62.177 dBµV/m	15	6.391830 GHz	54.725 dBµV/m
8	5.703830 GHz	60.851 dBµV/m			

3 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**5.82283 GHz**	**113.01 dBµV/m**		
M2		2	**5.82283 GHz**	**103.92 dBµV/m**		
M3		1	**5.42433 GHz**	**63.98 dBµV/m**		
M4		2	**5.42433 GHz**	**53.62 dBµV/m**		

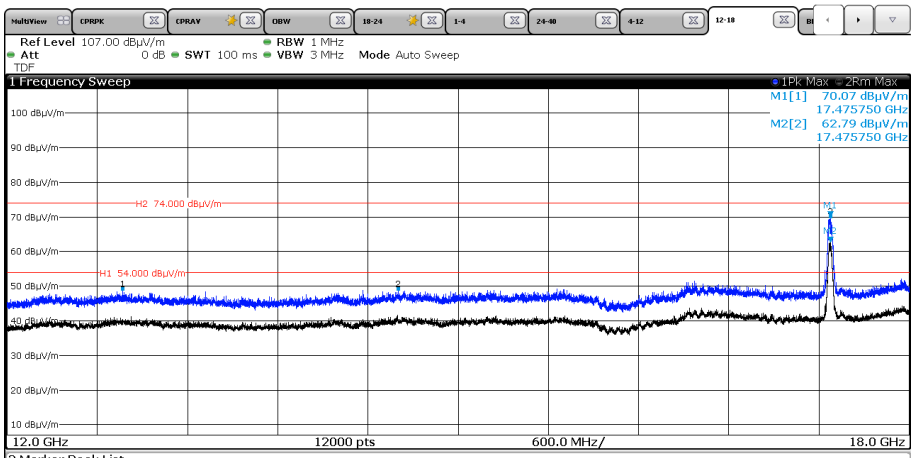
8-12 GHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	9.238880 GHz	49.316 dBµV/m	2	11.652630 GHz	58.825 dBµV/m

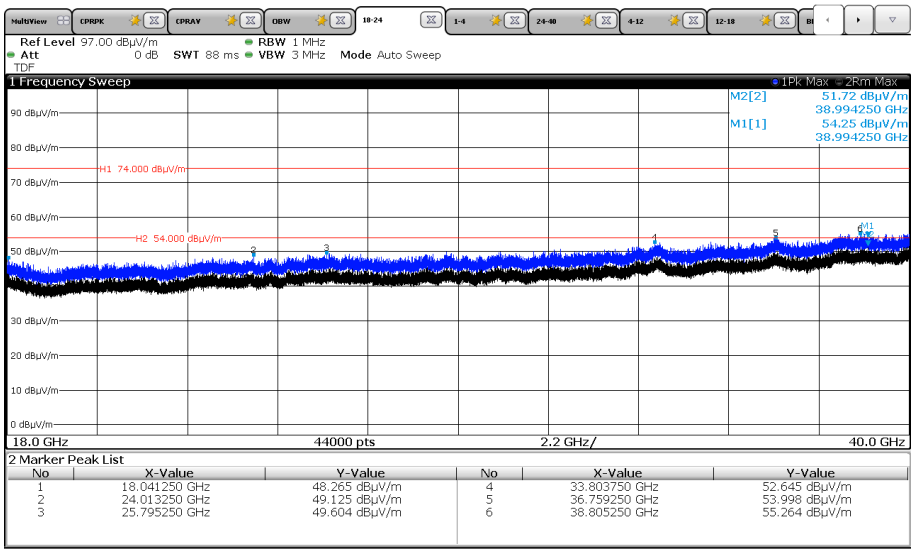
12-18 GHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	12.769750 GHz	49.124 dBµV/m	3	17.475750 GHz	70.068 dBµV/m
2	14.600750 GHz	49.239 dBµV/m			

18-40 GHz



Limit according to FCC Part 15E, Section 15.407(b)(4) for undesirable emissions:

All emissions shall be limited to a level of −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, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

The requirements are **FULFILLED.**

Remarks: The EUT holds the general limits of Part 15.209, therefore the emission limits part 15.407(b)(4) are, fulfilled, too.

5.7 Antenna application

5.7.1 Applicable standard

According to FCC Part 15C, Section 15.203:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

The equipment connector for the 5 GHz Audio application is a N(f) connector for professional use.
The WLAN antenna connector is a SMA-R connector.

Remarks:

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Next Verif.
A 4	ESCI	02-02/03-15-001	23/05/2017	23/05/2016		
	ESH 2 - Z 5	02-02/20-05-004	26/10/2017	26/10/2015	24/05/2017	24/11/2016
	N-4000-BNC	02-02/50-05-138				
	N-1500-N	02-02/50-05-140				
	ESH 3 - Z 2	02-02/50-05-155	18/11/2019	18/11/2016	18/05/2017	18/11/2016
CPR 3	AFS5-12001800-18-10P-6	02-02/17-06-002				
	AFS4-01000400-10-10P-4	02-02/17-13-002				
	AMF-4F-04001200-15-10P	02-02/17-13-003				
	BBHA 9120 E 251	02-02/24-05-006	19/04/2017	19/04/2016	23/06/2017	23/12/2016
	WBH2-18NHG	02-02/24-08-002	19/04/2017	19/04/2016	23/06/2017	23/12/2016
	Sucoflex N-2000-SMA	02-02/50-05-075				
	SF104/11N/11N/1500MM	02-02/50-13-015				
	SF104/11SMA/11N/1500MM	02-02/50-13-016				
	SF104/11SMA/11N/1500MM	02-02/50-13-017				
SER 2	ESVS 30	02-02/03-05-003	08/07/2017	08/07/2016		
	VULB 9168	02-02/24-05-005	20/04/2017	20/04/2016	01/03/2017	01/09/2016
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
	KK-SD_7/8-2X21N-33,0M	02-02/50-15-028				
SER 3	FSW43	02-02/11-15-001	25/07/2017	25/07/2016		
	JS4-18004000-30-5A	02-02/17-05-017				
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	AFS4-01000400-10-10P-4	02-02/17-13-002				
	AMF-4F-04001200-15-10P	02-02/17-13-003				
	3117	02-02/24-05-009	24/05/2017	24/05/2016		
	BBHA 9170	02-02/24-05-014	02/06/2018	02/06/2015	09/12/2017	09/12/2016
	Sucoflex N-2000-SMA	02-02/50-05-075				
	WHK 3.0/18G-10EF	02-02/50-05-180				
	WHKX 7.5/18G-8SS	02-02/50-07-010				
	KMS102-0.2 m	02-02/50-11-020				
	SF104/11N/11N/1500MM	02-02/50-13-015				