7.5. 99% Power Bandwidth

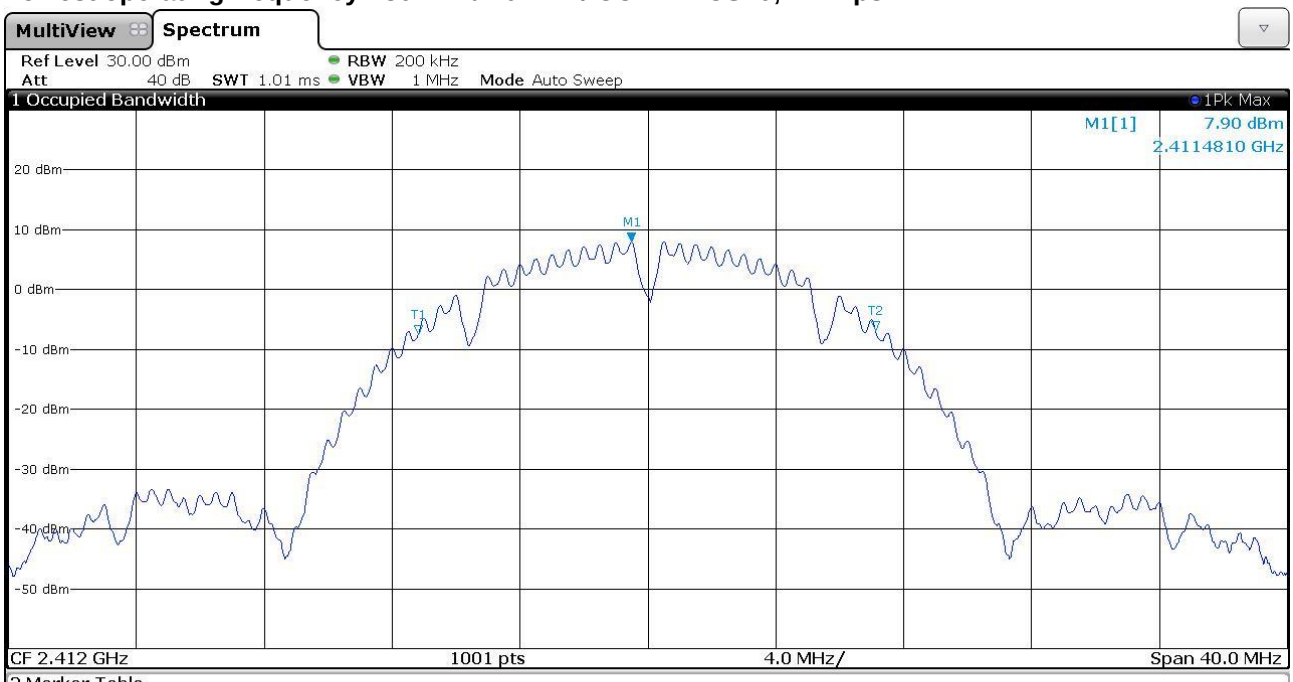
Applied standards
-RSS-Gen issue 5 Section 6.7

Test equipment and test set up
Test equipment used for conducted measurements as given in clause Test equipment of this report.
Test setup used for conducted measurements as given in clause Test setups of this report.

Description
The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.
The 99% power bandwidth function of the instrument was used for the measurement.

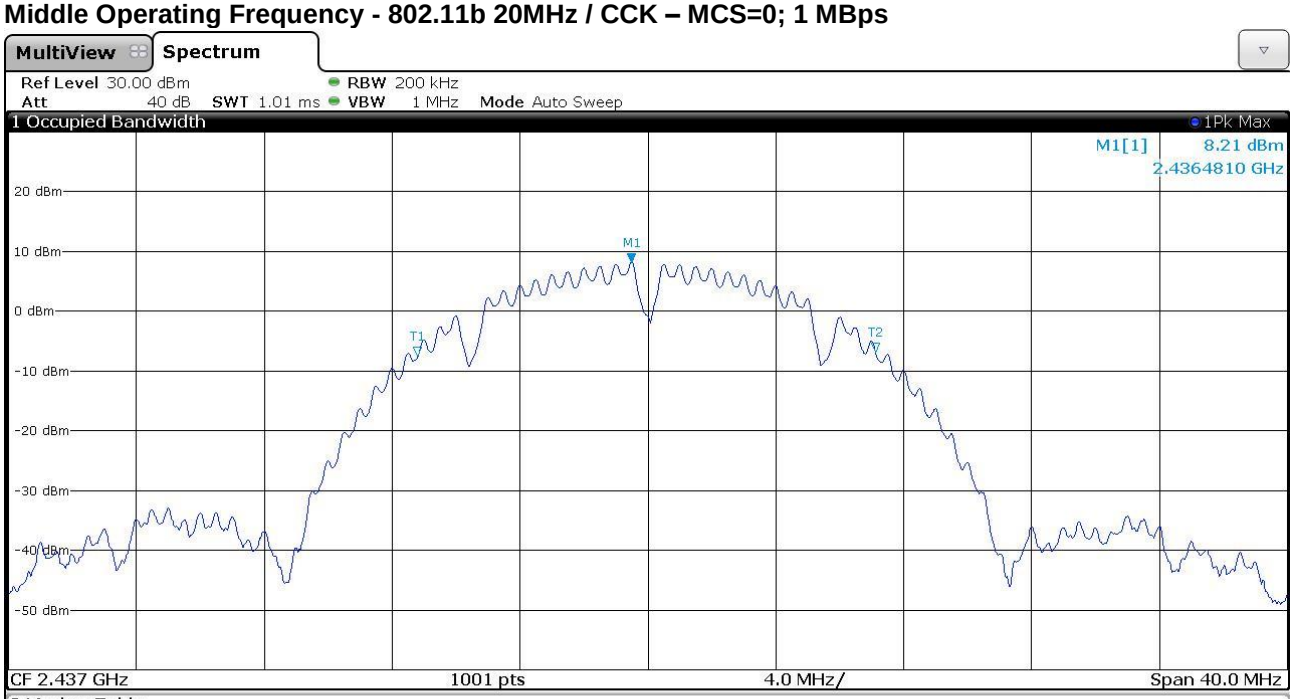
Measurement
The Measurement was performed on: 03.02.2020 and 14.04.2020

Lowest operating frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps



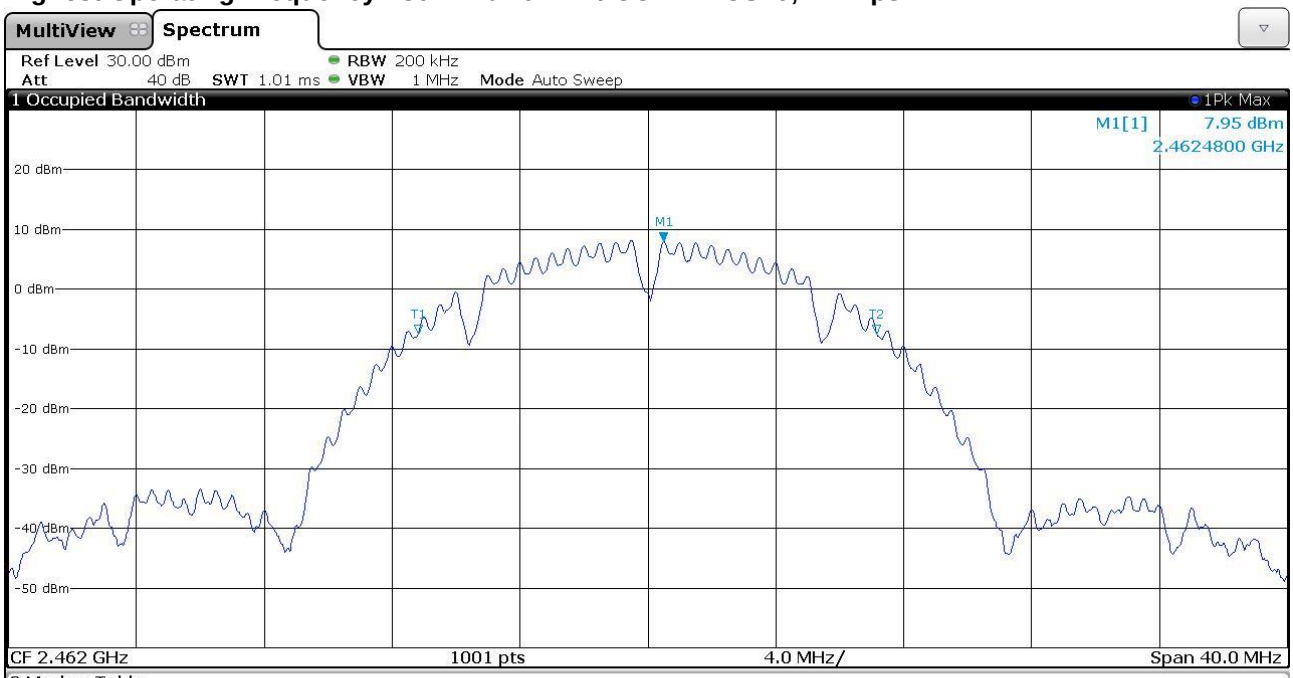
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
1	2412	14.308	-/-	Pass

Middle Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps



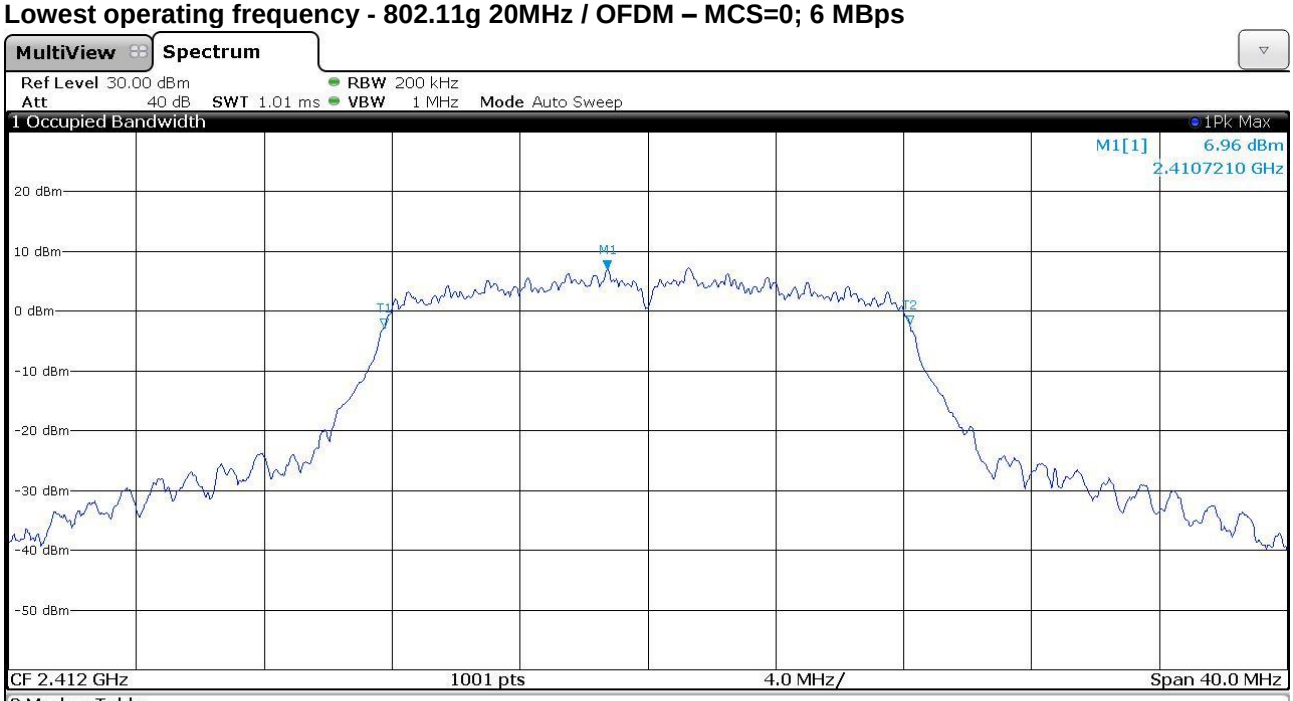
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
6	2437	14.318	-/-	Pass

Highest Operating Frequency - 802.11b 20MHz / CCK – MCS=0; 1 MBps



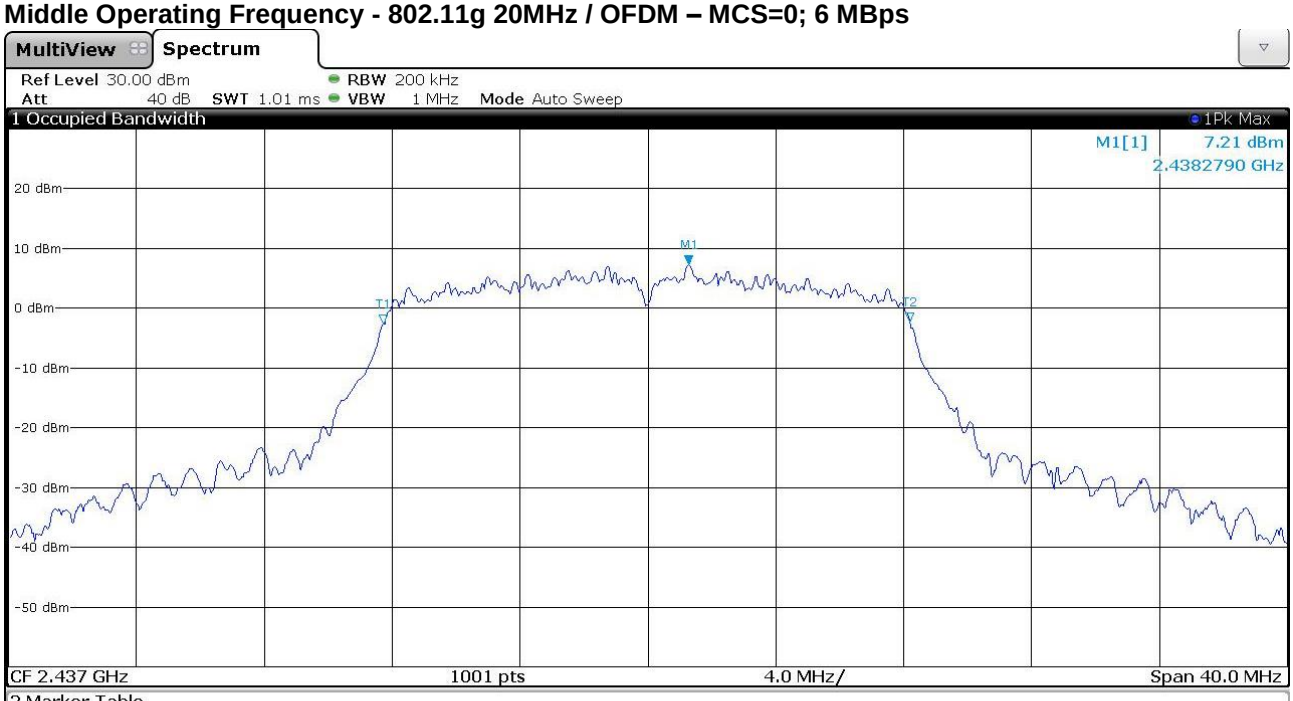
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
11	2462	14.333	-/-	Pass

Lowest operating frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps



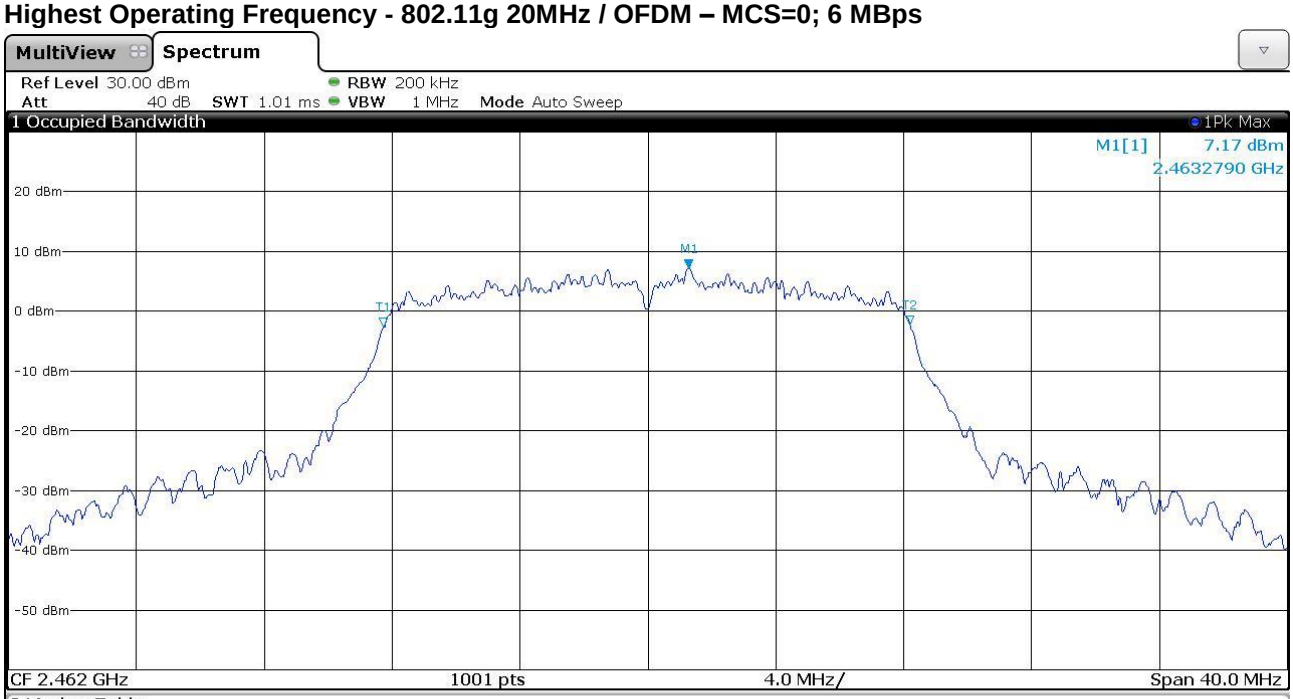
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
1	2412	16.448	-/-	Pass

Middle Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps



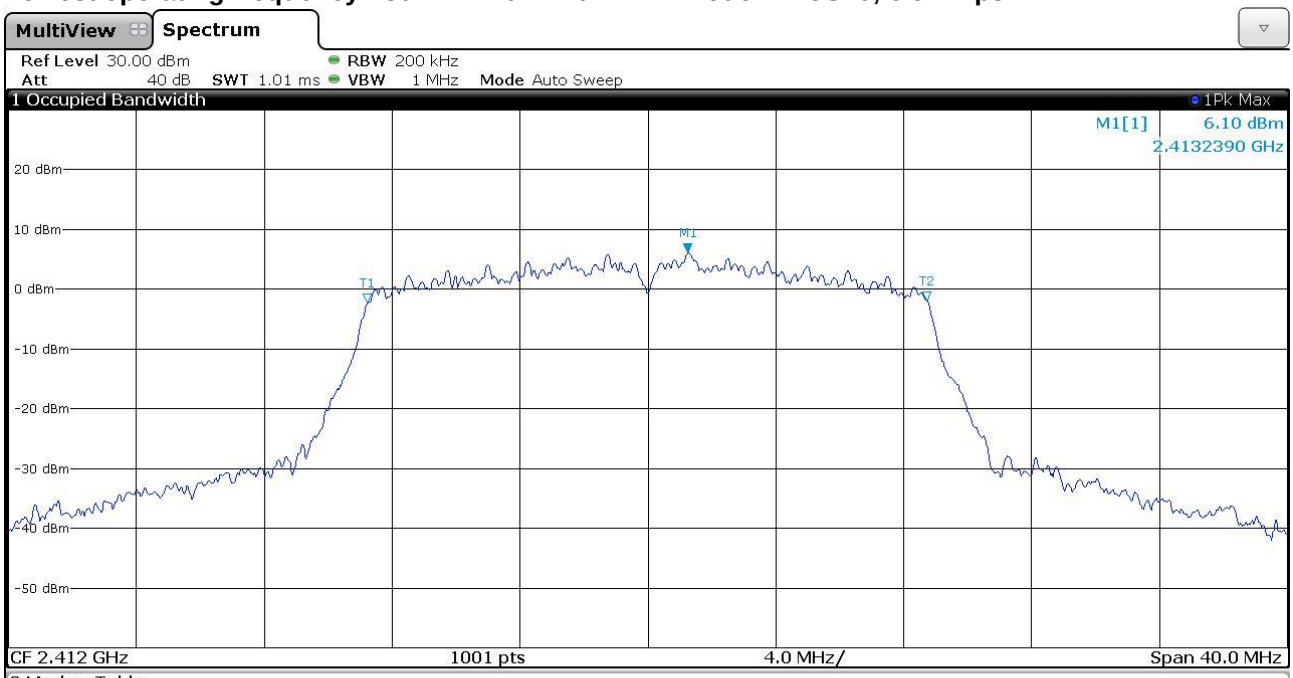
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
6	2437	16.453	-/-	Pass

Highest Operating Frequency - 802.11g 20MHz / OFDM – MCS=0; 6 MBps



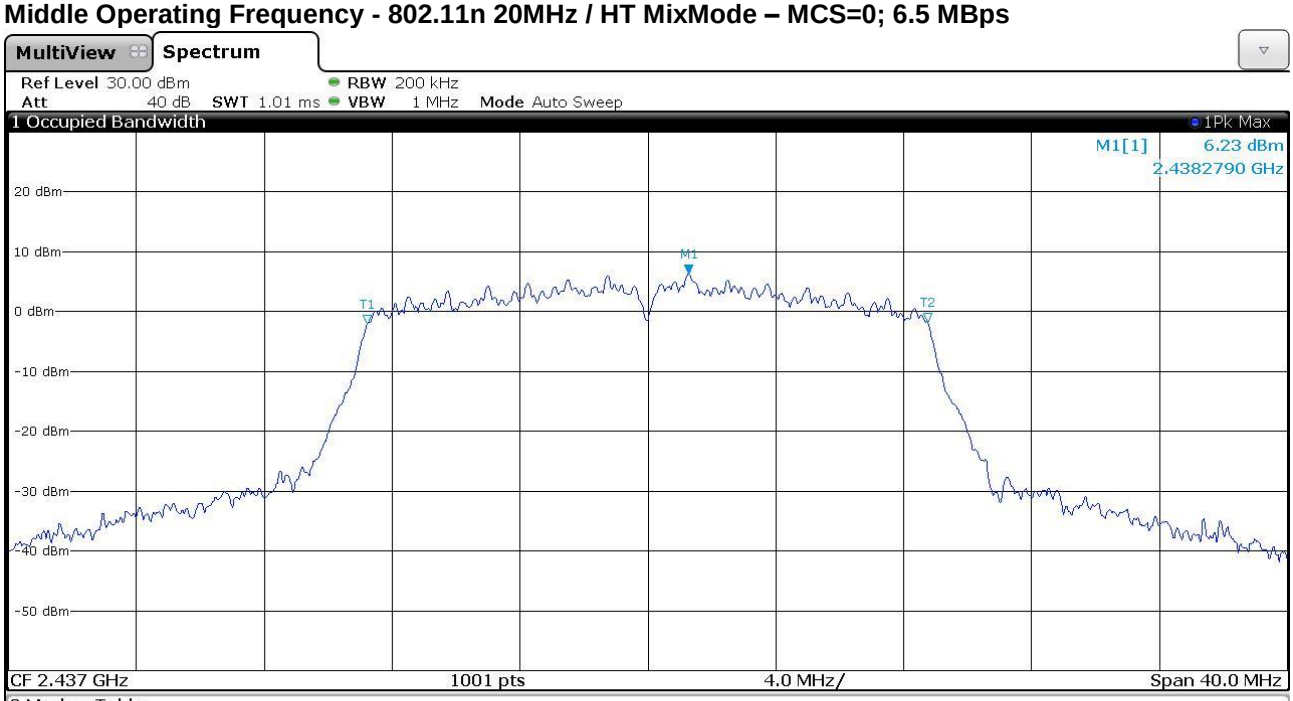
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
11	2462	16.455	-/-	Pass

Lowest operating frequency - 802.11n 20MHz / HT MixMode – MCS=0; 6.5 MBps



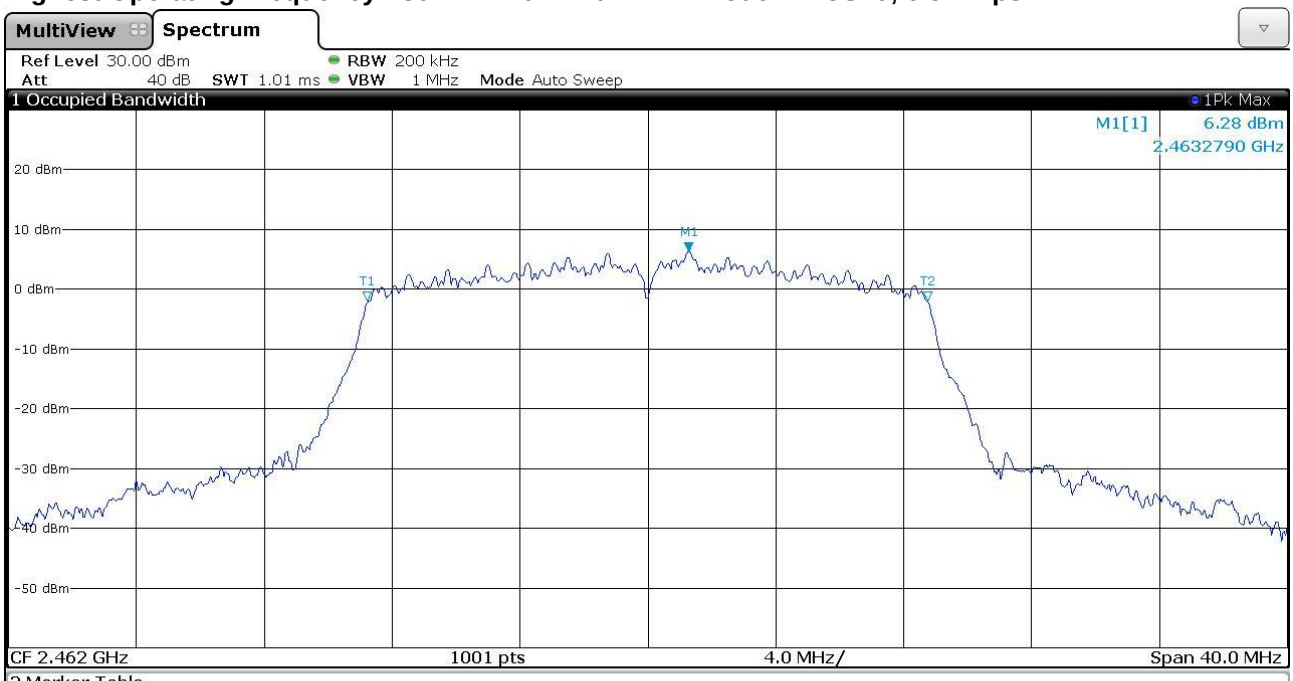
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
1	2412	17.505	-/-	Pass

Middle Operating Frequency - 802.11n 20MHz / HT MixMode – MCS=0; 6.5 MBps



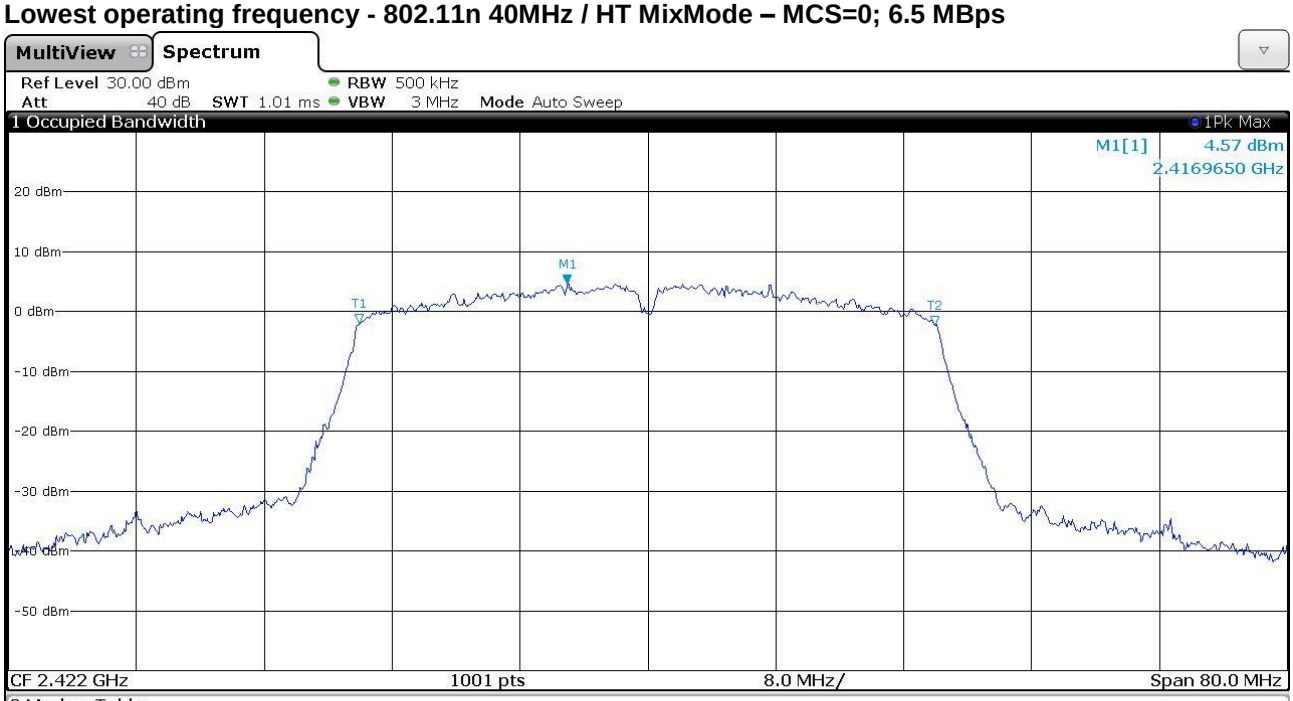
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
6	2437	17.521	-/-	Pass

Highest Operating Frequency - 802.11n 20MHz / HT MixMode – MCS=0; 6.5 MBps



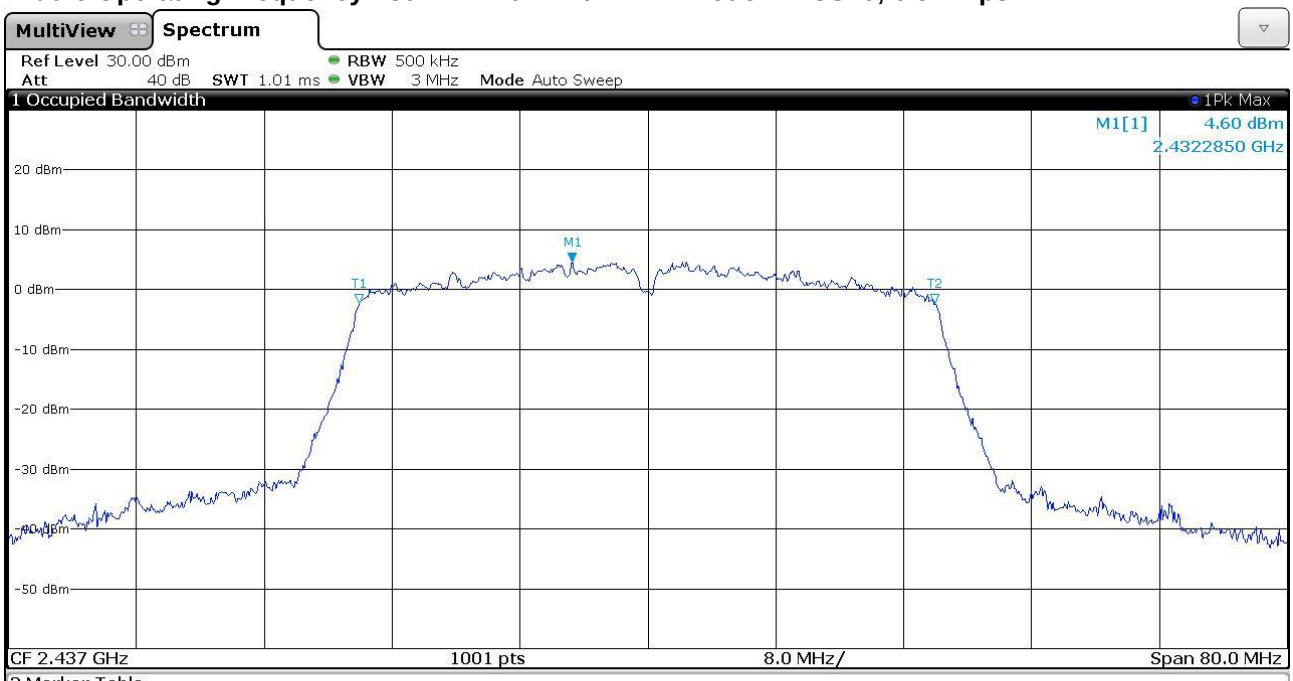
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
11	2462	17.504	-/-	Pass

Lowest operating frequency - 802.11n 40MHz / HT MixMode – MCS=0; 6.5 MBps



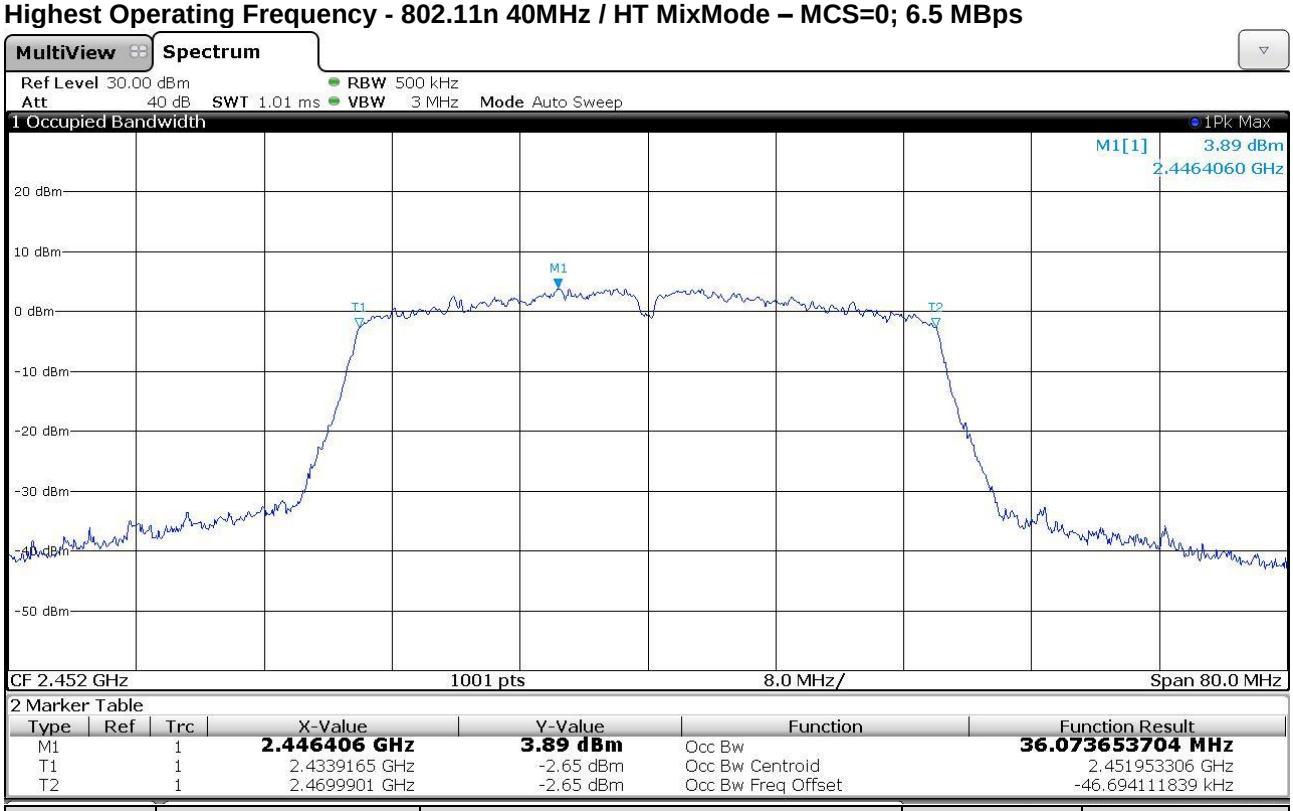
Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
3	2422	36.045	-/-	Pass

Middle Operating Frequency - 802.11n 40MHz / HT MixMode – MCS=0; 6.5 MBps



Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
6	2437	36.018	-/-	Pass

Highest Operating Frequency - 802.11n 40MHz / HT MixMode – MCS=0; 6.5 MBps



Channel	Frequency [MHz]	99% Power Bandwidth [MHz]	Limit [MHz]	Result
9	2452	36.074	-/-	Pass

Results

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the **99% Power Bandwidth**.

8. Test equipment

Test equipment used for Conducted Mains emissions:

Kind of equipment	Manufacturer	Type	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
Test-Receiver	Rohde & Schwarz	ESHS30	10571	842053/008	2016 – Mar.	3 years
					2019 – Mar.	3 years
Software	PKM	PKM U5/6	-/-	V1.01.03	-/-	-/-
Line impedance stabilisation network (LISN)	Rohde & Schwarz	ESH2-Z5	10139	879675/028	2017 – Okt.	3 years
					2019 – Jan.	3 years
Shielded room	Siemens	(6,2 x 4,7 x 3,3) m (l x w x h) DC – 10 GHz	10113	1	-/-	-/-

Test equipment used for radiated Measurements:

Kind of equipment	Manufacturer	Type	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
Signal Spectrum Analyzer 2Hz – 26.5 GHz	Rohde & Schwarz	FSW 26 Instrument FW 2.60	11571	102047	2019-Jan.	3 years
ESR7 EMI Testreceiver 7GHz	Rohde & Schwarz	ESR7	11676	101694	2018-March	3 years
Test-Receiver	Rohde & Schwarz	ESVS30	10572	833825/010	2017-Mar.	3 years
					2020-April	3 years
Antenna 9 kHz – 30 MHz	EMCO	6502	10546	2018	2017-Nov.	3 years
Antenna 30 MHz – 1 GHz	Chase	CBL6111C	10022	1064	2017-Jan.	2 years
					2019-Dec.	3 years
Antenna 1GHz – 18 GHz	Electro Metric	RGA50/60	10273	2753	2017-Nov.	3 years
Broadband-Hornantenne 15 - 26,5 (40) GHz	Schwarzbeck	BBHA 9170	11580	BBHA9170621	2017-Jan.	2 years
					2019-Dec.	3 years
Broadband-Preamplifier 1-18 GHz	Schwarzbeck	BBV9718	11231	9718-002	2017-Okt.	3 years
Preamplifier 18 - 40 GHz	CERNEX	CBM18403523	11679	29711	2017 - May	3 years
					2019 - July	3 years
Cable	el-spec GmbH	FlexCore-SMA11-SMA11-8000-ARM	11625	-/-	2017-Dec.	3 years
Shielded room/Chamber	Frankonia	SAC3 "SEMI-ANECHOIC-CHAMBER"	11609	004/16	2016-March	3 years
					2019-March	3 years
Band Reject Filter	Telemeter	BRF-2450-150-7-N (0441)	11243	-/-	-/-	-/-

Test equipment used for Band Edge Measurements:

Kind of equipment	Manufacturer	Type	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
ESR7 EMI Testreceiver 7GHz	Rohde & Schwarz	ESR7	11676	101694	2018-March	3 years
Antenna 1GHz – 18 GHz	Electro Metric	RGA50/60	10273	2753	2017-Nov.	3 years
Cable	el-spec GmbH	FlexCore-SMA11-SMA11-8000-ARM	11625	-/-	2017-Dec.	3 years
Shielded room/Chamber	Frankonia	SAC3 "SEMI-ANECHOIC-CHAMBER"	11609	004/16	2016-March	3 years
					2019-March	3 years

Test equipment used for conducted measurements:

Kind of equipment	Manufacturer	Type	Ident no.	Serial no.	Calibrated on (y-m)	Calibration interval
Signal Spectrum Analyzer 2Hz – 26.5 GHz	Rohde & Schwarz	FSW 26 Instrument FW 2.60	11571	102047	2019-Jan.	3 years
EMI-Test-Receiver	Rohde & Schwarz	ESR7 Instrument FW 3.36	11505	101103	2017 - Nov.	3 years
Automatisation unit RF switch and power meter	Rohde & Schwarz	OSP120 and OSP B157	11573	101282	2017 - Dec.	3 years
Cable	el-spec GmbH	FlexCore-SMA11-SMA11-8000-ARM	11625	-/-	2017 - Dec.	3 years

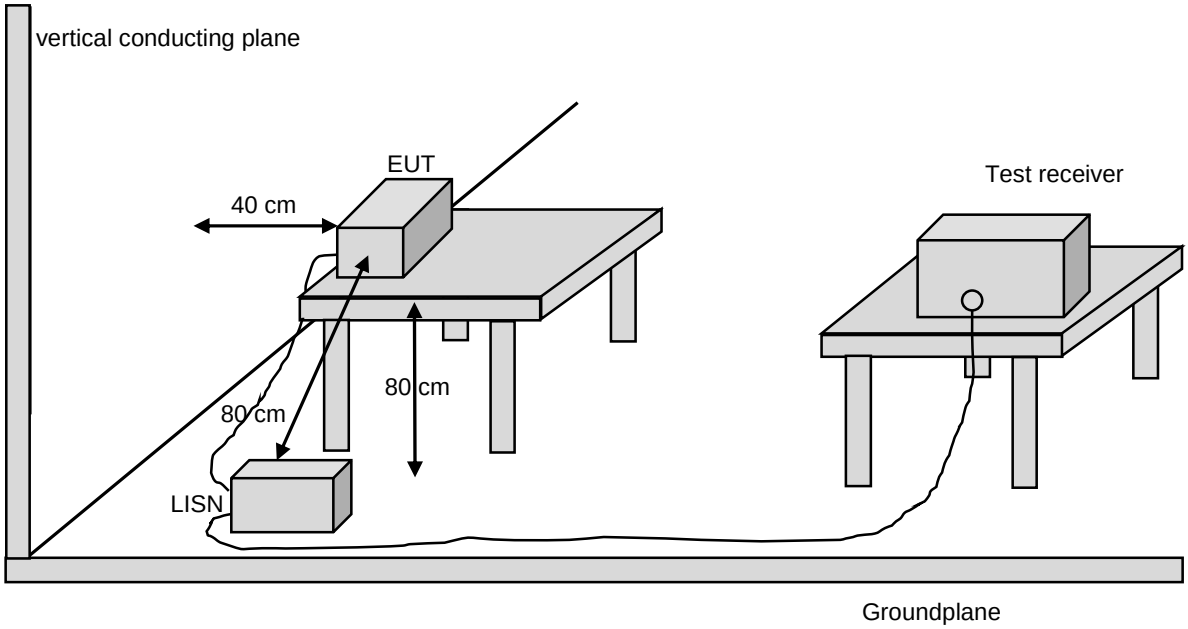
All measurements were made with measuring instruments, including any accessories that may affect test results, calibrated according to the requests of ISO/IEC 17025 according to which the test site is accredited from DAkkS. Measurement of conducted mains emissions was made with instruments conforming to American National Standard Specification, ANSI C63.4-2014.

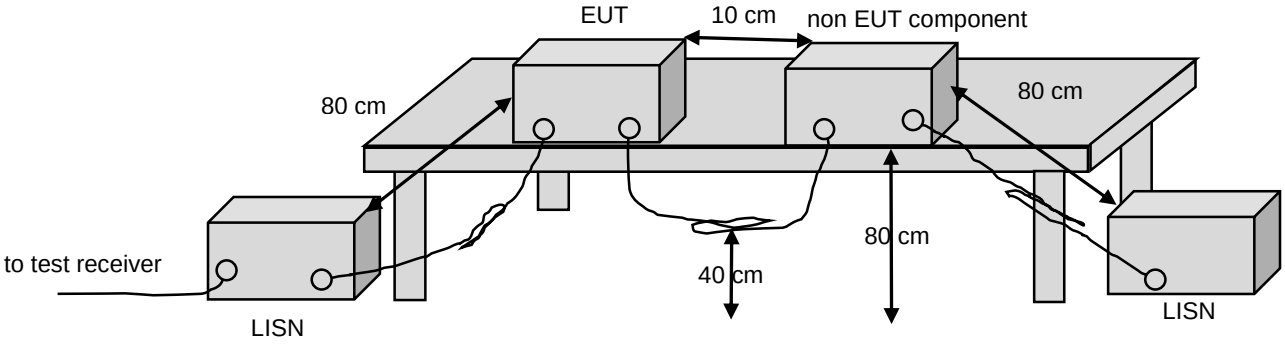
Test equipment to support EUT functions:

Kind of equipment	Manufacturer	Type	Ident no.
Laptop	HP	EliteBook	11742
AC-Adaptor 120 V ~ / 24 V⎓	-/-	AC1200200	-/-
Router	AVM	Fritz!Box 4020	Client
ZigBee Stick	-/-	ZM3588S-USB-LR	Client

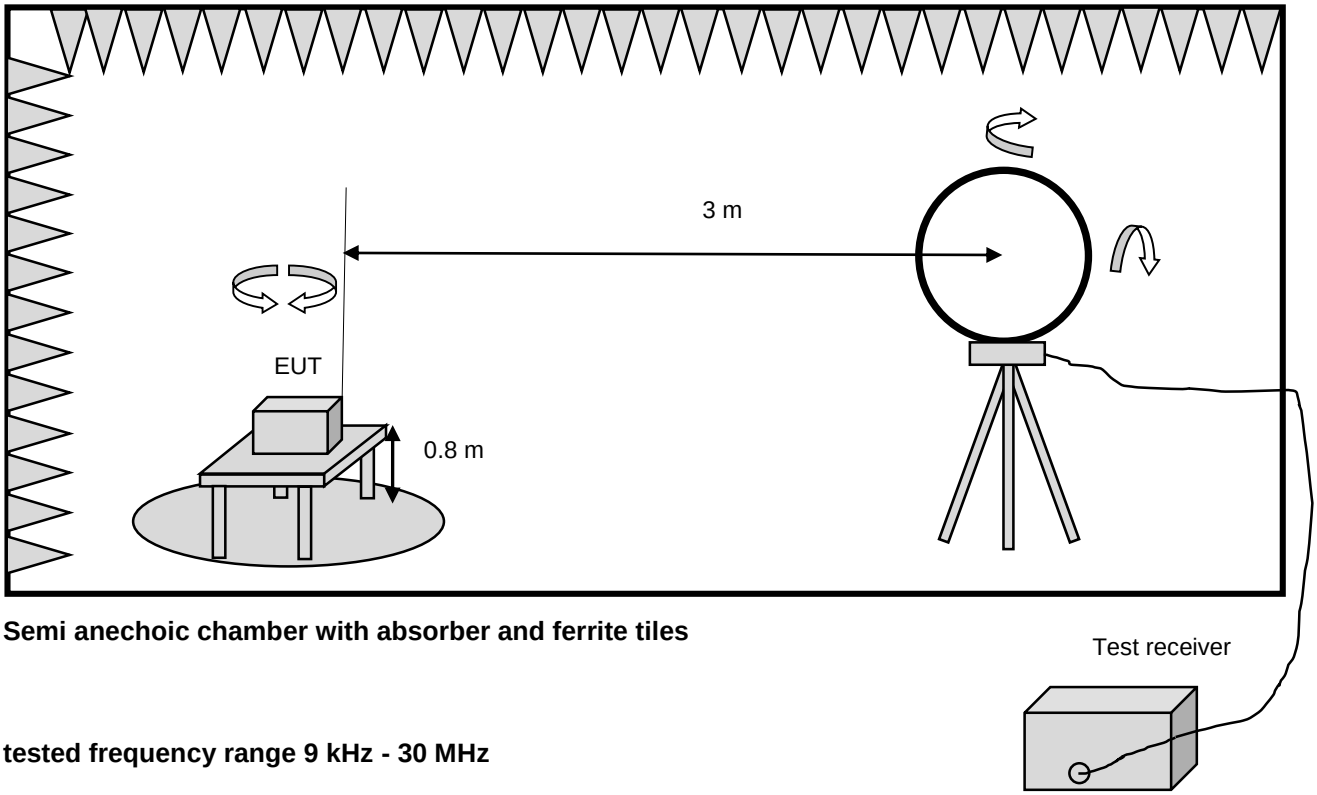
9. Test Setups

Block diagram Conducted Mains emissions





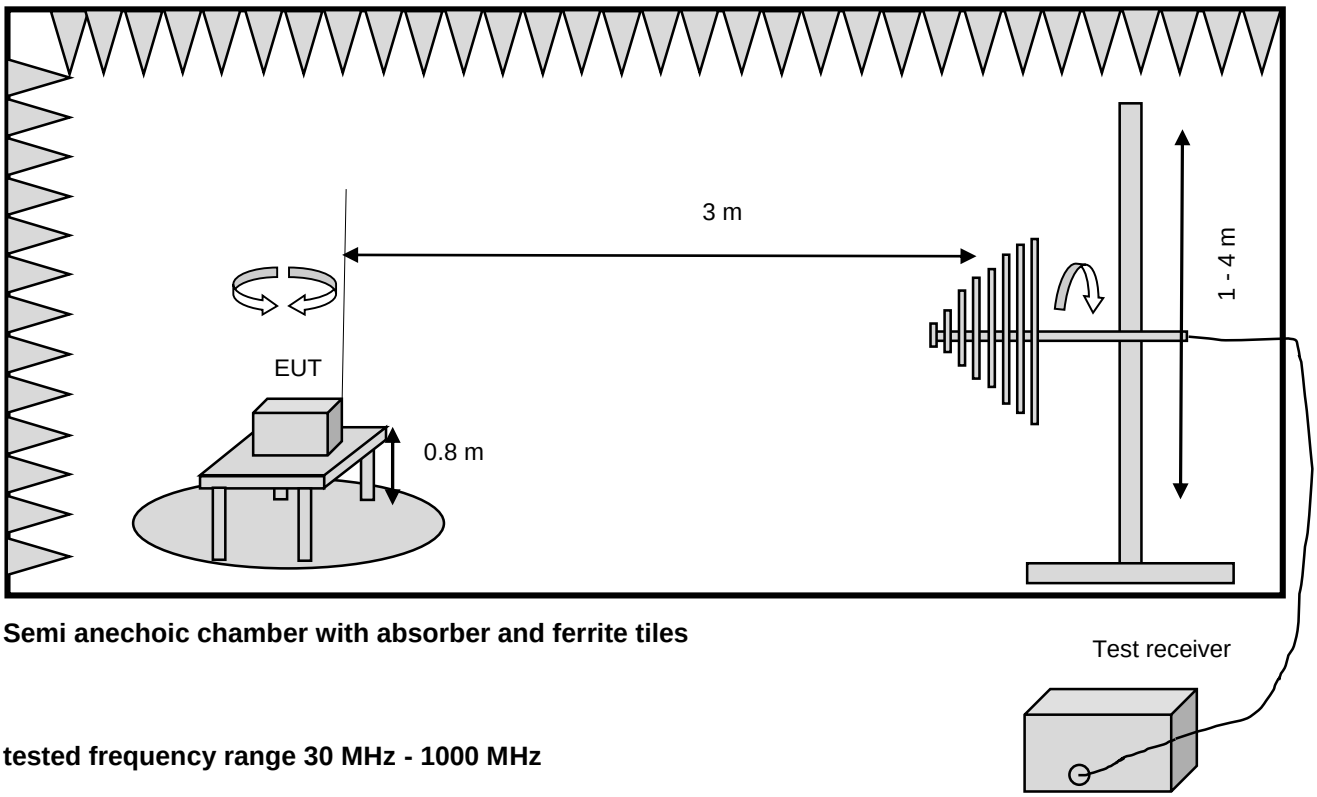
Block diagram Radiated emissions



Semi anechoic chamber with absorber and ferrite tiles

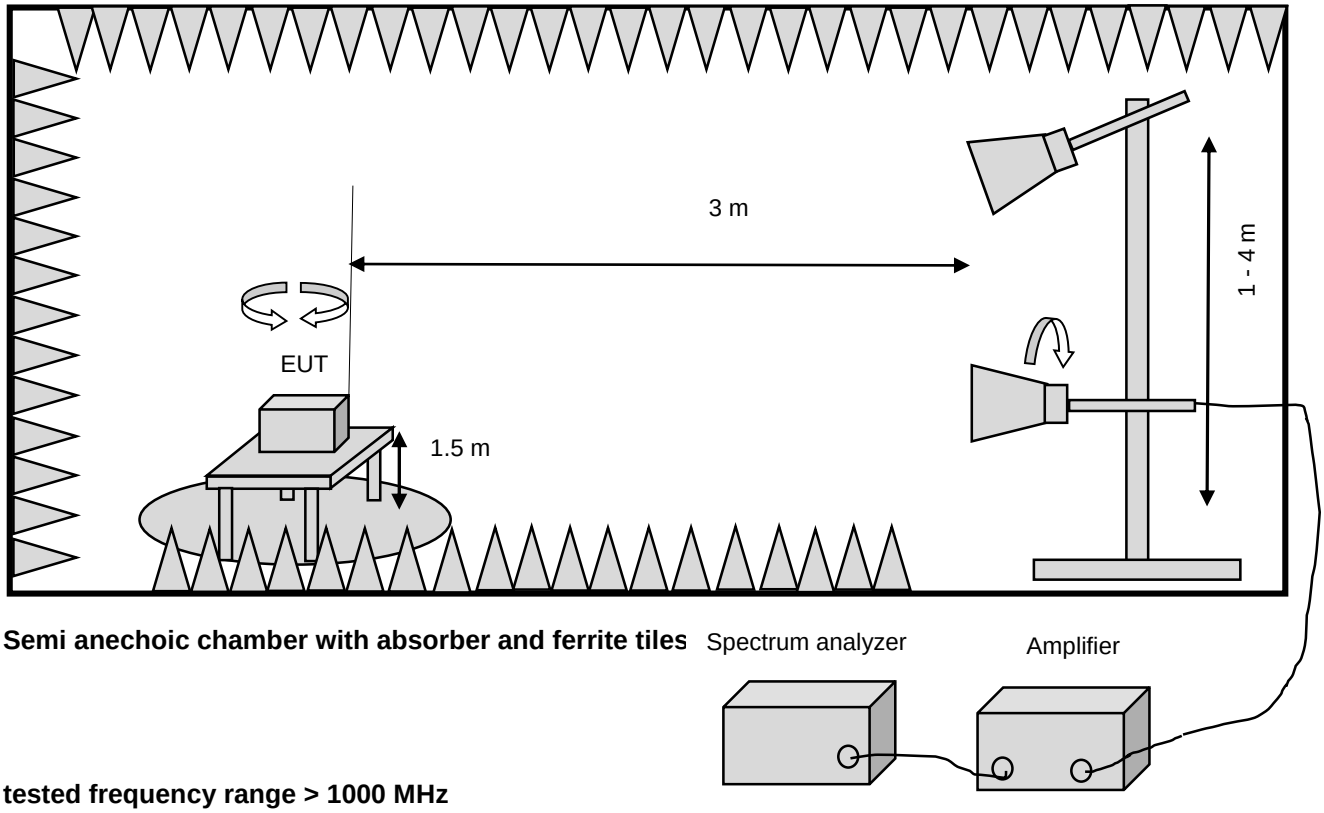
tested frequency range 9 kHz - 30 MHz

Block diagram Radiated emissions



Semi anechoic chamber with absorber and ferrite tiles

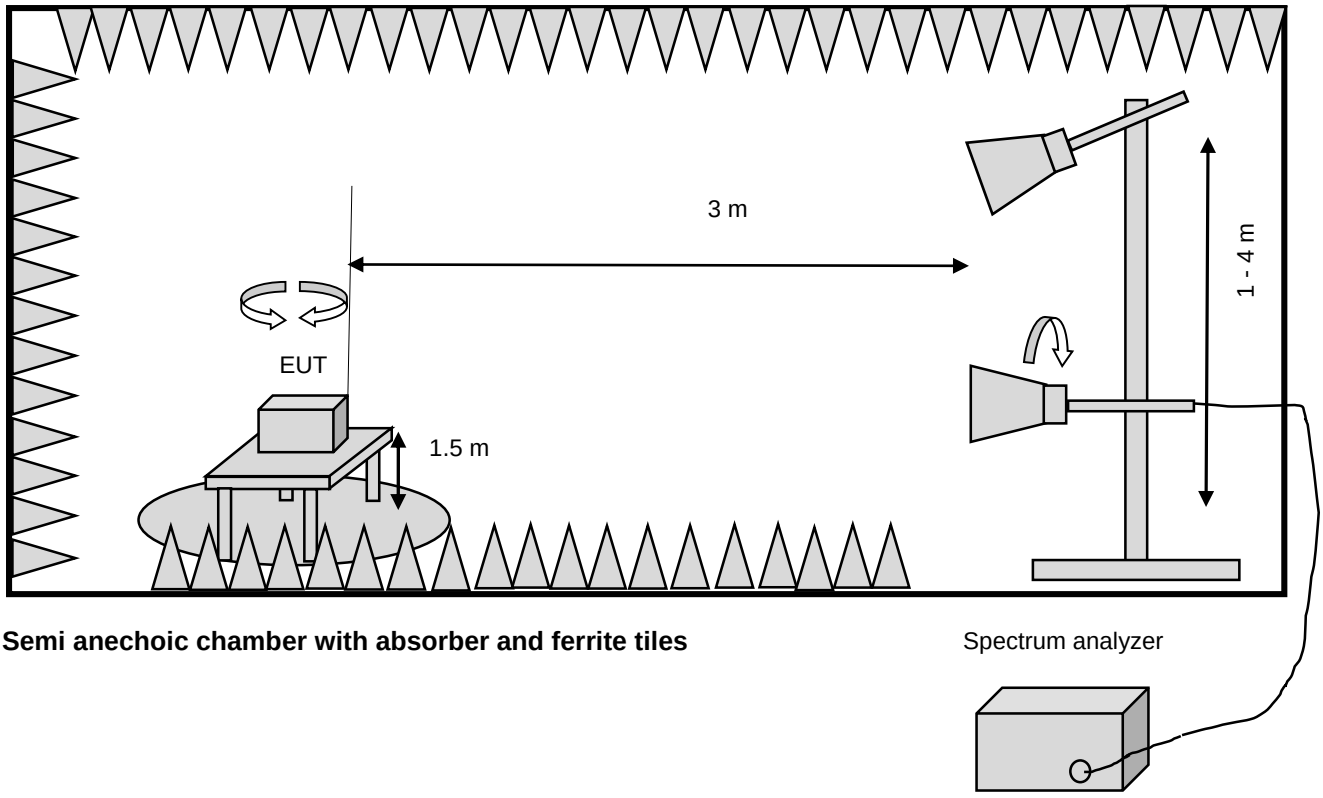
tested frequency range 30 MHz - 1000 MHz



Semi anechoic chamber with absorber and ferrite tiles

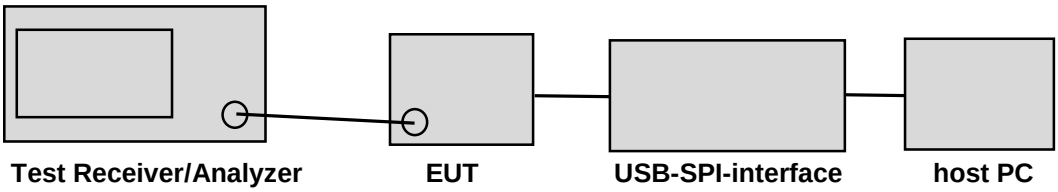
tested frequency range > 1000 MHz

Block diagram Band Edge emissions



Semi anechoic chamber with absorber and ferrite tiles

Block diagram for conducted measurements



10. Measurement uncertainty

according to *CISPR 16-4-2 Edition 2.0 2011-06*

Measurement	**calculated uncertainty U_{lab}**	**Specified CISPR uncertainty according CISPR 16-4-2 Edition 2.0 2011-06, table 1 U_{CISPR}**
Conducted disturbance at mains port using AMN 9 kHz – 150 kHz	3.6 dB	3.8 dB
Conducted disturbance at mains port using AMN 150 kHz – 30 MHz	3.2 dB	3.4 dB
Magn. fieldstrength 9kHz - 30MHz	3.4 dB	-/-
Radiated disturbance (electric field strength in the SAC) 30 MHz to 1 000 MHz	4.7 dB	6.3 dB
Radiated disturbance (electric field strength in the SAC) 1 GHz to 26.5 GHz	4.1 dB	-/-

Measurement	**calculated uncertainty Ulab**	**Maximum measurement uncertainty**
Channel Bandwidth	1.17 %	±5 %
RF output power, conducted	±1.36 dB	±1.5 dB
Power Spectral Density, conducted	±1.99 dB	±3 dB
Unwanted Emissions, conducted	±1.71 dB	±3 dB
All emissions, radiated	±4.8 dB	±6 dB
Temperature	±0.72 °C	±3 °C
Supply voltages	±0.76 % (DC up to 40V) ±1.74 % (AC 50Hz up to 400V)	±3 %
Time	±0.012 %	±5 %

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above mentioned way.

The measurements uncertainty was calculated in accordance with CISPR 16-4-2 Edition 2.0 2011-06.

The measurement uncertainty was given with a confidence of 95 % (k = 2).

11. Photos setup

Refer to “0061-fcc-ised-photos test setup.pdf” file

12. Conclusions

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the relevant §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

From the measurement data obtained, the tested sample was considered to have **COMPLIED** with the requirements for the relevant RSS-247 issue 02 Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.

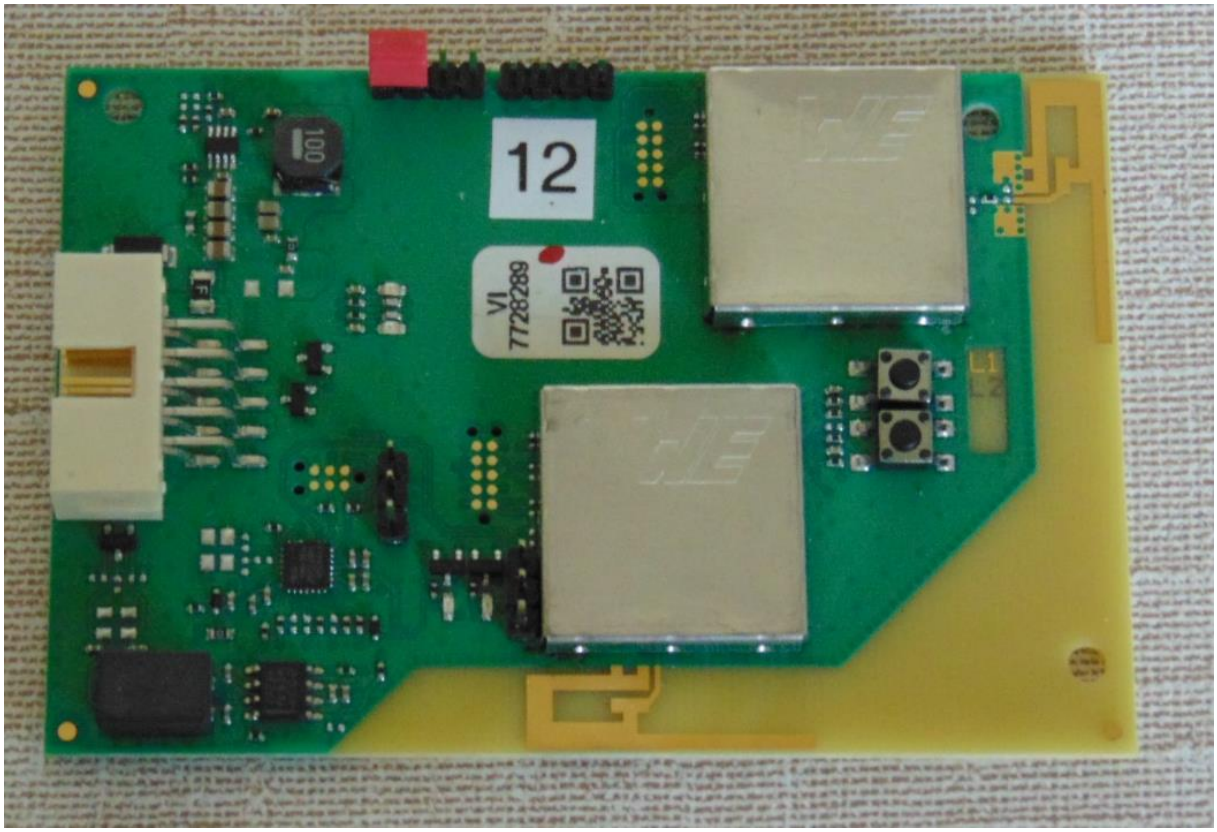
Following specific modifications and/or special attributes are necessary to pass the above mentioned requirements:

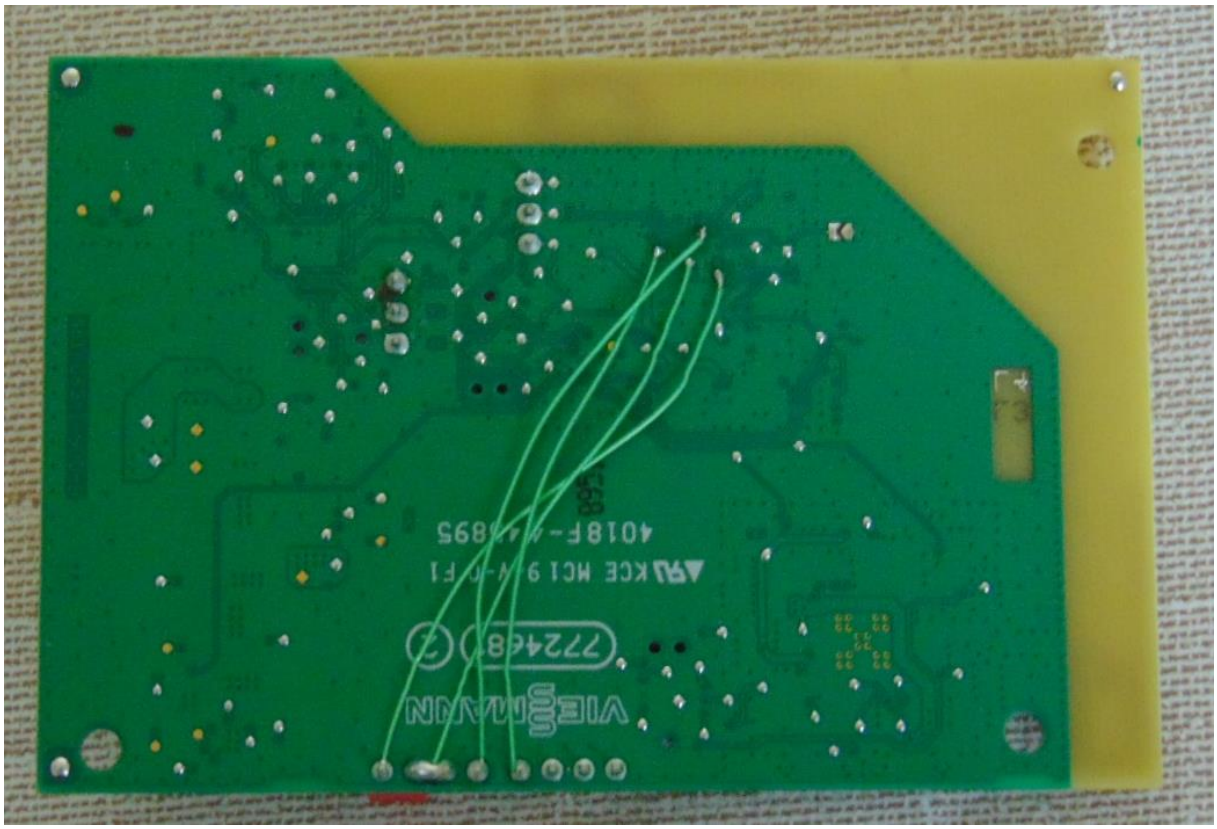
none

24.06.2020	M. Beindl, Laboratory Engineer	
Erstellt am/*prepared on*	**(Name***/name* / **Stellung***/position***)**	**(Unterschrift/***signature***)**

24.06.2020	A. Tropmann, Head of Laboratory	
Freigabe am/released *on*	**(Name***/name* / **Stellung***/position***)**	**(Unterschrift/***signature***)**

13. Photos of tested sample





End of test report