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Test Report

Report Number: F151496E6

Applicant:

u-blox Malmö AB

Manufacturer:

u-blox Malmö AB

Equipment under Test (EUT):

ODIN-W2

Laboratory accredited by
Deutsche Akkreditierungsstelle GmbH (DAkkS)
in compliance with DIN EN ISO/IEC 17025
under the Reg. No. D-PL-17186-01-02,
FCC Test site registration number 90877 and
Industry Canada Test site registration IC3469A-1

REFERENCES

[1] **ANSI C63.10-2013** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

[2] **FCC CFR 47 Part 15 (June 2015)** Radio Frequency Devices

[3] **RSS-247 (May 2015)** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

[4] **RSS-Gen Issue 4 (November 2014)** General Requirements for Compliance of Radio Apparatus

TEST RESULT

The requirements of the tests performed as shown in the overview (clause 4) were fulfilled by the equipment under test.
The complete test results are presented in the following.

	Name	Signature	Date
Test engineer:	Paul NEUFELD		16 October 2015
Authorized reviewer:	Bernd STEINER		16 October 2015

RESERVATION

This test report is only valid in its original form.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

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1 IDENTIFICATION

1.1 Applicant

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Country:	Sweden
Name for contact purposes:	Mr. Mats Andersson
Phone:	+ 46 40 63 07 100
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eMail Address:	mats.andersson@u-blox.com
Applicant represented during the test by the following person:	None

1.2 Manufacturer

Name:	u-blox Malmö AB
Address:	Östra varvsgatan 4, SE-211 75 Malmö
Country:	Sweden
Name for contact purposes:	Mr. Mats Andersson
Phone:	+ 46 40 63 07 100
Fax:	+ 46 40 23 71 37
eMail Address:	mats.andersson@u-blox.com
Manufacturer represented during the test by the following person:	None

1.3 Test laboratory

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
32825 Blomberg
Germany

accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under the Reg. No. D-PL-17186-01-02, FCC Test site registration number 90877 and Industry Canada Test site registration IC3469A-1.

1.4 EUT (Equipment Under Test)

Test object: *	WLAN / Bluetooth module
Model / PMN: *	ODIN-W2
FCC ID: *	PVH0965
IC Company number / UPN: *	5325A-0965
HVIN: *	ODIN-W260 ODIN-W262
Serial number: *	#15, #3
PCB identifier: *	0965-02
Hardware version: *	2.1
Software version / FVIN: *	0.11

Used WLAN channels:

Channel 36	RX:	5180 MHz	TX:	5180 MHz
Channel 40	RX:	5200 MHz	TX:	5200 MHz
Channel 44	RX:	5220 MHz	TX:	5220 MHz
Channel 48	RX:	5240 MHz	TX:	5240 MHz

Channel 52	RX:	5260 MHz	TX:	5260 MHz
Channel 56	RX:	5280 MHz	TX:	5280 MHz
Channel 60	RX:	5300 MHz	TX:	5300 MHz
Channel 64	RX:	5320 MHz	TX:	5320 MHz

Channel 100	RX:	5500 MHz	TX:	5500 MHz
Channel 104	RX:	5520 MHz	TX:	5520 MHz
Channel 108	RX:	5540 MHz	TX:	5540 MHz
Channel 112	RX:	5560 MHz	TX:	5560 MHz
Channel 116	RX:	5580 MHz	TX:	5580 MHz

Channel 132	RX:	5660 MHz	TX:	5660 MHz
Channel 136	RX:	5680 MHz	TX:	5680 MHz
Channel 140	RX:	5700 MHz	TX:	5700 MHz

Channel 149	RX:	5745 MHz	TX:	5745 MHz
Channel 153	RX:	5765 MHz	TX:	5765 MHz
Channel 157	RX:	5785 MHz	TX:	5785 MHz
Channel 161	RX:	5805 MHz	TX:	5805 MHz
Channel 165	RX:	5825 MHz	TX:	5825 MHz

Fulfills WLAN specification: *	IEEE, 802.11b, 802.11g, 802.11n, 802.11a		
Antenna type: *	See Table 1		
Antenna gain: *	See Table 1		
Antenna connector: *	See Table 1		
Power supply - EUT	3.3 V DC		
Power supply Host	U_{nom}= 3.3 V DC	U_{min}= 3.0 V DC	U_{max}= 3.6 V DC
Type of modulation: *	802.11a:OFDM 802.11n: OFDM		
Operating frequency range:*	2412 MHz to 2462 MHz, 5180 MHz to 5240 MHz, 5260 MHz to 5320 MHz, 5500 MHz to 5700 MHz, 5745 to 5825 MHz		
Number of channels: *	21		
Temperature range: *	-40 °C to +85 °C		
Lowest / highest Internal clock frequency: *	24.000 MHz / 26.000 MHz		

* declared by the applicant.

Table 1 Antenna specifications

Antenna name	Manufacturer	Type	Comment	Gain [dBi]
InSide-WLAN	ProAnt	Patch	dual band 10 cm flying lead U.FL	3 dBi @ 2.4 GHz 3 dBi @ 5 GHz
Ex-IT WLAN - RP-SMA -MHF	ProAnt	Monopole	dual band RSMA 10cm flying lead U.FL	3 dBi @ 2.4 GHz 3 dBi @ 5 GHz
InSide Fold-WLAN	ProAnt	Patch	10 cm flying lead U.FL	2.5 dBi @ 2.4 GHz' 3 dBi @ 5 GHz
InSide-WLAN Square	ProAnt	Patch	Dual band; 10 cm flying lead U.FL	3 dBi @ 2.4 GHz 3 dBi @ 5 GHz
OnBoard SMD 2400	ProAnt	Patch	SMD PIFA antenna on ODIN-W262	3 dBi @ 2.4 GHz <3 dBi @ 5 GHz

The following external I/O cables were used:

Identification	Connector		Length
	EUT	Ancillary	
DC in (carrier board)		-	2 m *
USB interface (carrier board)	USB plug	Laptop PC	-

*: Length during the test if not other specified.

Dates

Date of receipt of test sample:	10 March 2015
Start of test:	16 March 2015
End of test:	16 June 2015

2 OPERATIONAL STATES

The equipment under test (EUT) is a WLAN dual band and Bluetooth dual mode module soldered onto a carrier board. The WLAN / Bluetooth module is equipped with an U.FL. antenna connector (Model ODIN-W260) or an integral antenna (Model ODIN-W262). The module version with the U.FL antenna connectors is able to operate in MIMO mode. The MIMO mode is only possible for 2.4 GHz operation with 802.11n modulation with 20MHz. The EUT with internal antenna has no MIMO. MIMO is also not possible in 5 GHz mode for both versions of the EUT nor for Bluetooth operation.

Because the ODIN-W2 is a module, which will be implemented in a final application, it was mounted on a carrier board (EVB-W2) to connect it to a Laptop with the test software. All tests were carried out with an unmodified sample.

With test software which was provided by the applicant the EUT could be set to a continuous transmit mode with a certain modulation scheme and data rate on a certain frequency. Furthermore the equipment could be set to receive mode on a certain frequency. This software was installed on a laptop PC, which was connected to the Equipment under test via the carrier board.

For this test report the EUT was tested as a WLAN device in the 5 GHz band which was able to operate according to the specification 802.11 a/n20. The table below shows the worst case modulation and data rate for appropriate test cases.

In the 5 GHz just antenna connector 1 is used. The antenna connector 2 is disabled by software.

The following operation modes were identified as worst case condition and used during the tests:

Operation mode	Description of the operation mode	WLAN mode	WLAN channel	Modulation	Data rate / Mbps
1	Continuous transmitting on 5180 MHz	a	36	OFDM	6 MBit/s
2	Continuous transmitting on 5200 MHz	a	40	OFDM	6 MBit/s
3	Continuous transmitting on 5240 MHz	a	48	OFDM	6 MBit/s
4	Continuous transmitting on 5260 MHz	a	52	OFDM	6 MBit/s
5	Continuous transmitting on 5300 MHz	a	60	OFDM	6 MBit/s
6	Continuous transmitting on 5320 MHz	a	64	OFDM	6 MBit/s
7	Continuous transmitting on 5500 MHz	a	100	OFDM	6 MBit/s
8	Continuous transmitting on 5580 MHz	a	116	OFDM	6 MBit/s
9	Continuous transmitting on 5700 MHz	a	140	OFDM	6 MBit/s
10	Continuous transmitting on 5745 MHz	a	149	OFDM	6 MBit/s
11	Continuous transmitting on 5785 MHz	a	157	OFDM	6 MBit/s
12	Continuous transmitting on 5825 MHz	a	165	OFDM	6 MBit/s
13	Continuous transmitting on 5180 MHz	n20	36	OFDM	6.5 MBit/s
14	Continuous transmitting on 5200 MHz	n20	40	OFDM	6.5 MBit/s
15	Continuous transmitting on 5240 MHz	n20	48	OFDM	6.5 MBit/s
16	Continuous transmitting on 5260 MHz	n20	52	OFDM	6.5 MBit/s
17	Continuous transmitting on 5300 MHz	n20	60	OFDM	6.5 MBit/s
18	Continuous transmitting on 5320 MHz	n20	64	OFDM	6.5 MBit/s
19	Continuous transmitting on 5500 MHz	n20	100	OFDM	6.5 MBit/s
20	Continuous transmitting on 5580 MHz	n20	116	OFDM	6.5 MBit/s
21	Continuous transmitting on 5700 MHz	n20	140	OFDM	6.5 MBit/s
22	Continuous transmitting on 5745 MHz	n20	149	OFDM	6.5 MBit/s
23	Continuous transmitting on 5785 MHz	n20	157	OFDM	6.5 MBit/s
24	Continuous transmitting on 5825 MHz	n20	165	OFDM	6.5 MBit/s

Each test case was performed in the following operation modes:

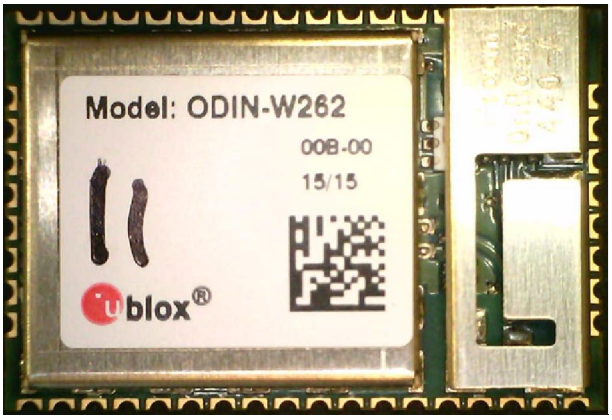
Test case	Operation mode
Maximum Peak Output Power	1 - 24
DTS Bandwidth	1 - 24
Peak Power Spectral Density	1 - 24
Band Edge Compliance	1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 24
Maximum Unwanted Emissions	1 - 12

3 ADDITIONAL INFORMATION

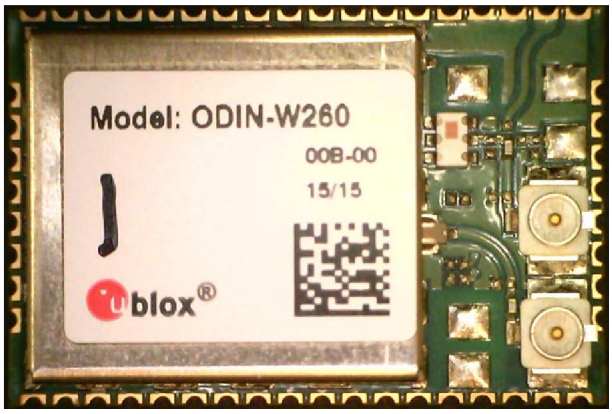
The power was set to the values shown in the table below.

Channel	36 - 48	52 - 64	100	104 - 136	140	149	153 - 165
Power a/n20 modes (for 5 GHz)	17.0	17.0	17.0	17.0	17.0	15.0	17.0

This report contains the results of the EUT operating in the 5 GHz UNII band only.



ODIN-W262 as marketed



ODIN-W260 as marketed

4 OVERVIEW

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS 247 [4] or RSS-Gen, Issue 3 [5]	Status	Refer page
Maximum Peak Output Power	5150 – 5250 5250 – 5350 5470 - 5725 5725 - 5850	15.407 (a)	6.2.1 (1)[3] 6.2.2 (1)[3] 6.2.3 (1)[3] 6.2.4 (1)[3]	Passed	15 et seq
UNII Bandwidth	5150 – 5250 5250 – 5350 5470 - 5725 5725 - 5850	15.403 (i)	- - - 6.2.4 (1) [3]	Passed	17 et seq
Peak Power Spectral Density	5150 – 5250 5250 – 5350 5470 - 5725 5725 - 5850	15.407 (a)(5)	6.2.1 (1)[3] 6.2.2 (1)[3] 6.2.3 (1)[3] 6.2.4 (1)[3]	Passed	19 et seq
Frequency Stability	5150 – 5250	15.407 (g)	-	Passed	22 et seq
Band edge compliance	5150 – 5250 5250 – 5350 5470 - 5725 5725 - 5850	15.407 (b)	6.2.1 (2)[3] 6.2.2 (2)[3] 6.2.3 (2)[3] 6.2.4 (2)[3]	Passed	24 et seq.
Radiated emissions (transmitter)	0.009 - 40,000	15.407 (b) 15.205 (a) 15.209 (a)	7.2.2 [4], 6.2.1 (2)[3] 6.2.2 (2)[3] 6.2.3 (2)[3] 6.2.4 (2)[3]	Passed	29 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2.4 [4]	Passed	74 et seq.

5 TEST RESULTS

5.1 Duty cycle

5.1.1 Method of measurement

The measurement was performed as a conducted measurement.

Acceptable measurement configurations

The measurement procedures described herein are based on the use of radiated measurements.

The method described in chapter 12.2 b) 2) of document [1] was used to perform the following test.

The measurement was only performed on only one frequency, because the timing behaviour was found to be independent of the selected channel.

The following measurement technique was used:

The zero-span mode on a spectrum analyzer or EMI receiver, if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal.

- Set the center frequency of the instrument to the center frequency of the transmission.
- Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value.
- Set VBW ≥ RBW.
- Set detector = peak or average.
- The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

5.1.2 Test results

Ambient temperature	22 °C

Relative humidity	40 %

The following calculations for the settings are only submitted for the worst case, therefore the other results can be assumed to be passed as well.

$$T_{TX} = 1.688ms \quad (1)$$

$$\frac{50}{T_{TX}} = \frac{50}{1.688ms} = 29.620kHz \le RBW \le VBW \quad (2)$$

Measurement Points 5000 for 1.8 ms → 1.688 ms = 4688 measurement points → Signal has 4688 measurement points (and fulfils the requirement of at least 100 Points resolution for the signal)

$$T_{TX\_On} = 1.477ms \quad (3)$$

$$T_{TX\_Period} = 1.688ms \quad (4)$$

If power averaging (RMS) mode was used in step f), then the applicable correction factor is 10 log(1/x), where x is the duty cycle.

$$x = \frac{1.477ms}{1.688ms} = 0.875 = 87.5\% \quad (5)$$

Correction factor: $10 \cdot \log\left(\frac{1}{x}\right) = 10 \cdot \log\left(\frac{1}{0.875}\right) = 10 \cdot \log\left(\frac{1}{0.875}\right) = 0.6dB$ (6)

Therefore, for average measurements a correction factor of 0.6 dB is use in all tests with n20 modulation. The results for the other modulation are submitted without calculation below:

802.11a with 6 Mbps: 0.3 dB correction factor
802.11n20 with 6.5 Mbps: 0.6 dB correction factor

TEST EQUIPMENT USED FOR THE TEST:

7

5.2 Maximum conducted output power

5.2.1 Method of measurement

The EUT has to be connected to the power meter via a low loss cable.

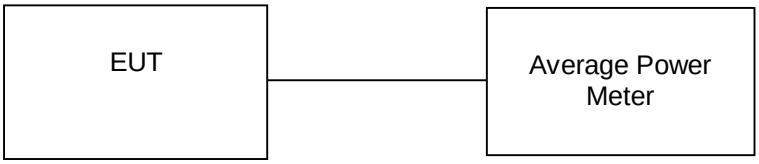
Acceptable measurement configurations

The measurement procedures described herein are based on the use of an antenna-port conducted test configuration.

“Measurement using a power meter (PM)” was used for this test. The procedure is described in chapter 12.3.3.1 of document [1].

The measurement will be performed at the upper and lower end and the middle of the assigned frequency band.

Test set-up:



Since the EUT is not transmitting continuously, the results are corrected by the duty cycle obtained in 5.1.2.

5.2.2 Test results

Ambient temperature	22 °C

Relative humidity	62 %

The highest antenna gain is 3 dBi. Therefore no reduction of the power limit is necessary.

Operation Mode	Nominal Channel frequency	Antenna gain combined [dBi]	Average output power [dBm]	Duty Cycle correction (dB)	Maximum output power [dBm]	Margin [dB]	Power limit [dBm]	Power limit [dBm] calculated from 26 dB Bandwidth
1	5180 MHz	3	12.3	0.3	12.6	11.4	24	-
2	5200 MHz	3	11.9	0.3	12.2	11.8	24	-
3	5240 MHz	3	11.9	0.3	12.2	11.8	24	-
4	5260 MHz	3	11.6	0.3	11.9	12.1	24	26.5
5	5300 MHz	3	11.9	0.3	12.2	11.8	24	26.5
6	5320 MHz	3	12.0	0.3	12.3	11.7	24	25.7
7	5500 MHz	3	12.8	0.3	13.1	10.9	24	25.5
8	5580 MHz	3	13.2	0.3	13.5	10.5	24	25.1
9	5700 MHz	3	13.0	0.3	13.3	10.7	24	24.8
10	5745 MHz	3	11.4	0.3	11.7	18.3	30	-
11	5785 MHz	3	12.8	0.3	13.1	16.9	30	-
12	5825 MHz	3	12.7	0.3	13.0	17.0	30	-
13	5180 MHz	3	12.2	0.6	12.8	11.2	24	-
14	5200 MHz	3	12.1	0.6	12.7	11.3	24	-
15	5240 MHz	3	12.0	0.6	12.6	11.4	24	-
16	5260 MHz	3	11.7	0.6	12.3	11.7	24	26.7
17	5300 MHz	3	11.9	0.6	12.5	11.5	24	26.6
18	5320 MHz	3	12.0	0.6	12.6	11.4	24	25.9
19	5500 MHz	3	12.8	0.6	13.4	10.6	24	25.7
20	5580 MHz	3	12.8	0.6	13.4	10.6	24	25.4
21	5700 MHz	3	13.0	0.6	13.6	10.4	24	25.0
22	5745 MHz	3	13.1	0.6	13.7	16.3	30	-
23	5785 MHz	3	12.9	0.6	13.5	16.5	30	-
24	5825 MHz	3	12.7	0.6	13.3	16.7	30	-
Measurement uncertainty		+0.66 dB / -0.72 dB						

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

26, 27

5.3 UNII Bandwidth

5.3.1 Method of measurement

The relating measurements were carried out in a conducting manner. Therefore, the antenna connector was directly connected to a spectrum analyser. The measurement procedure refers to part 12.4.1 of document [1].

- Set RBW = approximately 1% of the emission bandwidth.
- Set the VBW > RBW.
- Detector = Peak.
- Trace mode = max hold.
- Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyser. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

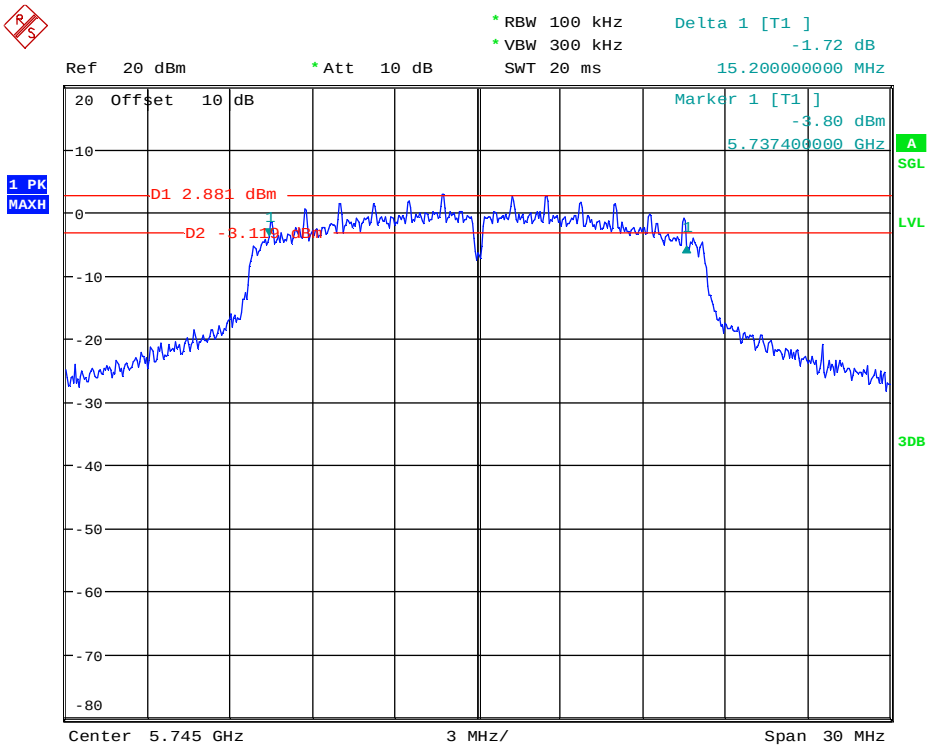
The measurements were carried out at each antenna port separately.

5.3.2 Test result

Ambient temperature	22 °C	Relative humidity	59 %

The following results were measured at the antenna port of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

Odin_6dB-BW_a_149.wmf: 6-dB Bandwidth (operation mode 10):



Operation Mode	Nominal Channel frequency [MHz]	99% Bandwidth [MHz]	26 dB Bandwidth [MHz]
1	5180 MHz	18.375	26.000
2	5200 MHz	18.375	26.200
3	5240 MHz	18.375	26.000
4	5260 MHz	18.500	25.700
5	5300 MHz	18.500	26.200
6	5320 MHz	18.500	27.200
7	5500 MHz	19.625	26.600
8	5580 MHz	18.375	26.400
9	5700 MHz	18.625	27.300
13	5180 MHz	19.500	27.100
14	5200 MHz	19.500	27.600
15	5240 MHz	19.375	28.500
16	5260 MHz	19.625	28.500
17	5300 MHz	19.500	28.300
18	5320 MHz	19.625	27.900
19	5500 MHz	19.625	29.100
20	5580 MHz	19.625	28.500
21	5700 MHz	19.750	29.000
Measurement uncertainty		+0.66 dB / -0.72 dB	

Operation Mode	Nominal Channel frequency [MHz]	99% Bandwidth [MHz]	6 dB Bandwidth [MHz]	Limit 6 dB Bandwidth [MHz]	Result
10	5745 MHz	20.250	15.200	0.5	Passed
11	5785 MHz	19.750	15.200	0.5	Passed
12	5825 MHz	19.250	15.200	0.5	Passed
22	5745 MHz	21.625	15.200	0.5	Passed
23	5785 MHz	21.000	15.200	0.5	Passed
24	5825 MHz	20.375	15.200	0.5	Passed
Measurement uncertainty		+0.66 dB / -0.72 dB			

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

7

5.4 Peak Power Spectral Density

5.4.1 Method of measurement

The relating measurements were carried out in a conducting manner. Therefore, the antenna connector was directly connected to a spectrum analyser. The measurement procedure refers to part 12.5 of document [1].

Method SA-2 was used for this measurement.

- Measure the duty cycle D of the transmitter output signal as described in 12.2.
- Set span to encompass the entire 26 dB EBW or 99% OBW of the signal.
- Set RBW = 1 MHz.
- Set VBW ≥ 3 MHz.
- Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.)
- Sweep time = auto.
- Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.Do not use sweep triggering. Allow the sweep to “free run.”
- Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the ON and OFF periods of the transmitter.
- Use the peak search function on the instrument to find the peak of the spectrum.
- add [10 log (1 / D)], where D is the duty cycle, to the peak of the spectrum.
- The result is the PPSD.

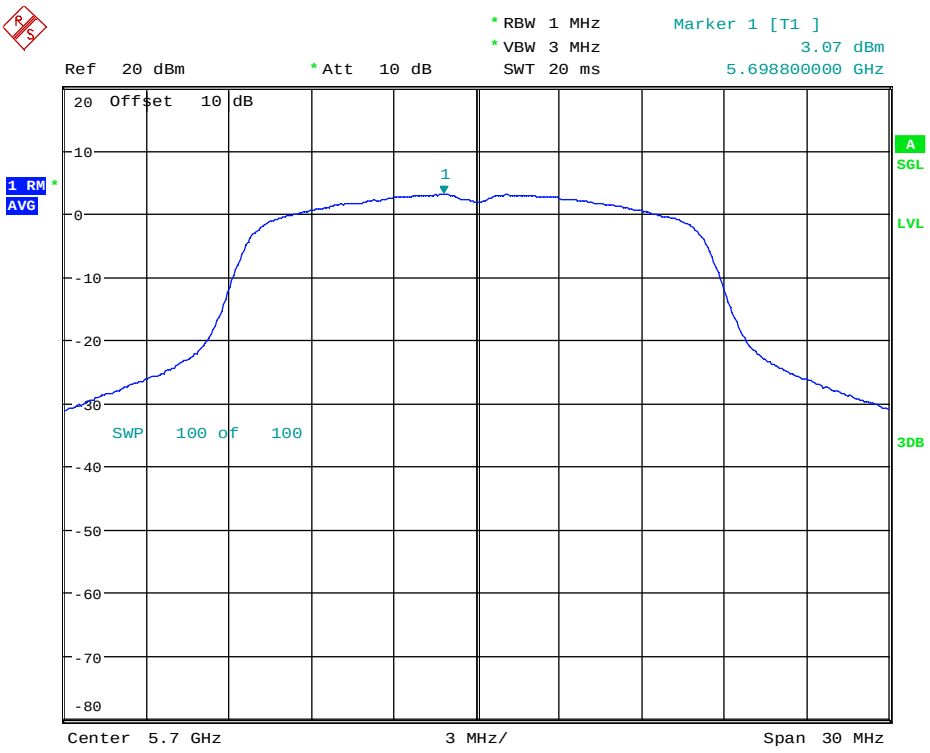
The measurements were carried out at each antenna port separately.

5.4.2 Test result

Ambient temperature	22 °C	Relative humidity	59 %

The following results were measured at the antenna port of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

Odin_PeakPwrSpecDens_a_140.wmf: Power Spectral Density (operation mode 9):



Operation Mode	Nominal Channel frequency [MHz]	Peak Frequency [MHz]	Power Spectral Density Limit [dBm / MHz]	Peak Power Spectral Density Reading [dBm]	Array Gain [dB]	Peak Power Spectral Density Level [dBm / MHz]	Margin	Result
1	5180 MHz	5178.725	11.0	0.8	0.0	1.1	9.9	Passed
2	5200 MHz	5198.800	11.0	1.8	0.0	2.1	8.9	Passed
3	5240 MHz	5238.650	11.0	1.8	0.0	2.1	8.9	Passed
4	5260 MHz	5258.800	11.0	1.5	0.0	1.8	9.2	Passed
5	5300 MHz	5298.575	11.0	1.3	0.0	1.6	9.4	Passed
6	5320 MHz	5318.650	11.0	1.4	0.0	1.7	9.3	Passed
7	5500 MHz	5501.500	11.0	2.1	0.0	2.4	8.6	Passed
8	5580 MHz	5598.950	11.0	2.2	0.0	2.5	8.5	Passed
9	5700 MHz	5698.800	11.0	3.1	0.0	3.4	7.6	Passed
13	5180 MHz	5178.800	11.0	1.4	0.0	1.7	9.3	Passed
14	5200 MHz	5201.400	11.0	1.9	0.0	2.2	8.8	Passed
15	5240 MHz	5238.700	11.0	1.8	0.0	2.1	8.9	Passed
16	5260 MHz	5258.700	11.0	1.5	0.0	1.8	9.2	Passed
17	5300 MHz	5301.400	11.0	1.3	0.0	1.6	9.4	Passed
18	5320 MHz	5318.900	11.0	1.3	0.0	1.6	9.4	Passed
19	5500 MHz	5501.700	11.0	2.0	0.0	2.3	8.7	Passed
20	5580 MHz	5598.500	11.0	2.0	0.0	2.3	8.7	Passed
21	5700 MHz	5698.700	11.0	2.9	0.0	3.2	7.8	Passed
Operation Mode	Nominal Channel frequency [MHz]	Peak Frequency [MHz]	Power Spectral Density Limit [dBm / 500 kHz]	Peak Power Spectral Density Reading [dBm]	Array Gain [dB]	Peak Power Spectral Density Level [dBm / 500 kHz]	Margin	Result
10	5745 MHz	5744.025	30.0	-0.3	0.0	0.0	30.0	Passed
11	5785 MHz	5783.875	30.0	-0.4	0.0	-0.1	30.1	Passed
12	5825 MHz	5823.800	30.0	-0.7	0.0	-0.4	30.4	Passed
22	5745 MHz	5743.800	30.0	-0.2	0.0	0.4	29.6	Passed
23	5785 MHz	5783.700	30.0	-0.2	0.0	0.4	29.6	Passed
24	5825 MHz	5823.900	30.0	-0.6	0.0	0.0	30.0	Passed
Measurement uncertainty				+0.66 dB / -0.72 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

7

5.5 Frequency Stability

5.5.1 Method of measurement

The EUT is placed in a climatic chamber, which is able to adjust the temperature over the desired temperature range.

After reaching the desired temperature and an after an appropriate acclimatisation time, the EUT is turned on.

The nominal channel frequency is the measurement result with nominal supply power at 20 °C.

Spectrum analyzer settings:

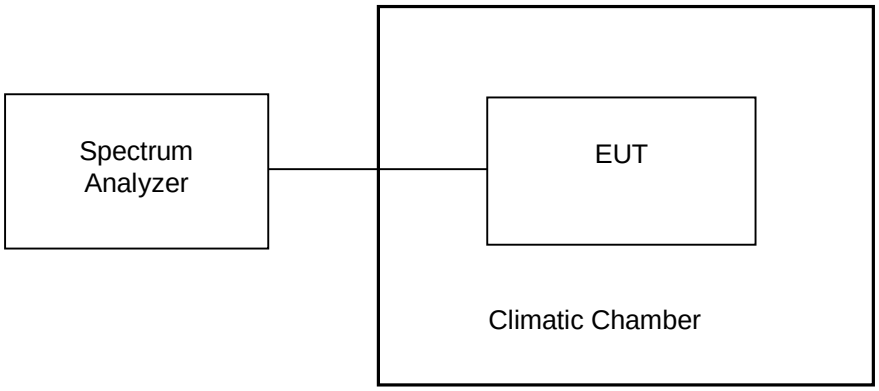
- Attenuation: Auto
- Center Frequency: channel frequency
- Span: 2 MHz
- RWB=VBW: 10 kHz
- Sweep Time: Auto

The frequency stability is testet at the minimum and maximum voltage, which is permitted by the manufacturer.

The frequency stability is testet at the minimum and maximum temperature, which is permitted by the manufacturer. But at least a temperature span from -30 °C – + 50 °C shall be covered.

The temperature is measured in 10 °C steps.

Test set-up:



5.5.2 Test result

The changes made from the original device (as described in the previous report) are not such, that the frequency stability is altered (It only would get better). The host device which handles the power supply is also the same. Therefore the tests are not repeated and the previous results are submitted below.

The EUT was set to transmit continuously in operation mode 4. The frequency was derived by observing a characteristic dip in the centre of the OFDM signal.

Voltage [V]	Measurement Frequency [MHz]	Frequency Deviation |d| [ppm]	Limit [ppm]	Result
3 V	5200.009	1.2	20	Passed
3.3 V	5200.003	Reference	20	-
3.6 V	5199.095	-1.5	20	Passed
Measurement uncertainty		+0.66 dB / -0.72 dB		

Temperature [°C]	Measurement Frequency [MHz]	Frequency Deviation [ppm]	Limit [ppm]	Result
-40 °C	5200.015	2.5	20	Passed
-30 °C	5199.999	-0.6	20	Passed
-20 °C	5200.005	0.6	20	Passed
-10 °C	5200.002	0.0	20	Passed
0 °C	5199.997	1.0	20	Passed
10 °C	5199.995	1.0	20	Passed
20 °C	5200.002	Reference	-	-
30 °C	5200.002	0.0	20	Passed
40 °C	5200.003	0.2	20	Passed
50 °C	5199.999	-0.6	20	Passed
60 °C	5200.002	0.0	20	Passed
70 °C	5199.998	-0.8	20	Passed
80 °C	5200.011	1.7	20	Passed
85 °C	5200.011	1.7	20	Passed
Measurement uncertainty		+0.66 dB / -0.72 dB		

TEST EQUIPMENT USED FOR THE TEST:
7, 31, 32

5.6 Band-edge compliance

5.6.1 Method of measurement (band edges next to unrestricted bands (conducted))

The relating measurements were carried out in a conducting manner. Therefore, the antenna connector was directly connected to a spectrum analyser. The measurement procedure refers to part 12.7.6 of document [1].

Measurement Procedure – Unwanted Emissions

- Set the center frequency and span to encompass the frequency range to be measured.
- RBW = 1 MHz. (100 kHz for frequencies below 1 GHz)
- VBW ≥ 3 MHz. (300 kHz for frequencies below 1 GHz)
- Detector = Peak.
- Sweep time = auto couple.
- Trace Mode = max hold.
- Use the peak marker function to determine the maximum amplitude level. Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, then the time required for the trace to stabilize will increase by a factor of approximately 1/D, where D is the duty cycle. For example, at 50% duty cycle, the measurement time will increase by a factor of two, relative to measurement time for continuous transmission.

The measurements were performed at the lower and upper end of the applicable 5 GHz bands.

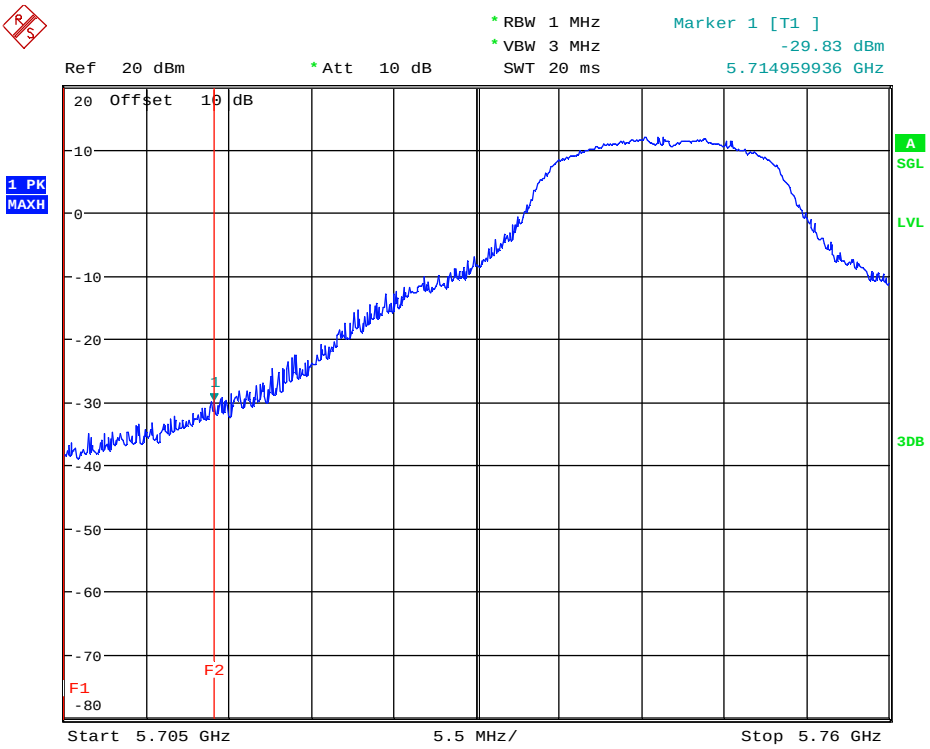
The measurements that were failed during the conducted measurements were repeated as radiated tests.

5.6.2 Test result (band edges next to unrestricted bands (conducted))

Ambient temperature	22 °C	Relative humidity	59 %

The following results were measured at antenna port 1 of the EUT. The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

Odin_BandEdgeUnrestr_2_a_149.wmf: conducted band-edge compliance (operation mode 10):



Operation Mode	WLAN channel	WLAN mode	Band-Edge	Unwanted Emission Frequency MHz	Limit [dBm]	Unwanted Emission Value [dBm]	Margin dB	Result
7	100	a	low	5.469.615	-27	-33.9	6.9	Passed
16	100	n20	low	5.470.000	-27	-32.9	5.9	Passed
10	149	a	low	5.714.960	-27	-29.8	2.8	Passed
12	165	a	high	5.851.346	-17	-25.6	8.6	Passed
12	165	a	high	5.861.450	-27	-31.3	4.3	Passed
24	165	n20	high	5.850.769	-17	-23.4	6.4	Passed
24	165	n20	high	5.860.481	-27	-30.9	3.9	Passed
Measurement uncertainty				+0.66 dB / -0.72 dB				

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
7

5.6.3 Method of measurement (band edges next to restricted bands (conducted))

The same test set-up as used for the final conducted emission measurement shall be used (refer also subclause 5.7.1 of this test report).

After trace stabilisation the marker shall be set on the signal peak. The frequency line shall be set on the edge of the assigned frequency band. Now set the second marker on the emission at the band-edge, or on the highest modulation product outside of the band, if this level is higher than that at the band-edge. The level of the measured field strength shall be compared to the the general limits specified in § 15.205.

The measurement was performed at the lower end of the 5.15 – 5.25 GHz band and the upper end of the 5.25 – 5.35 GHz band.

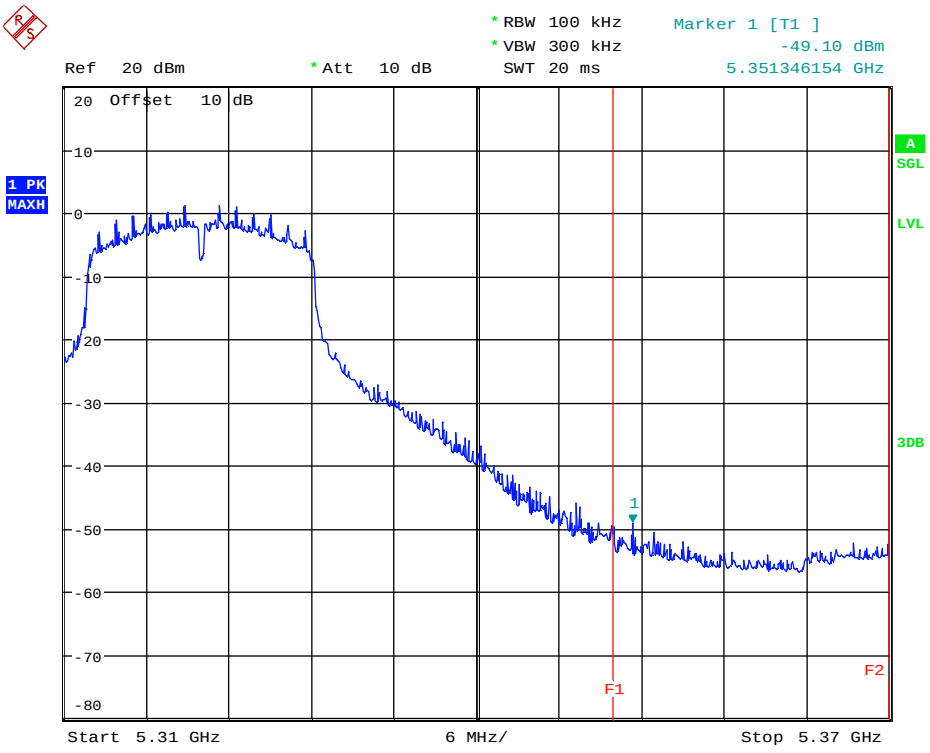
If an emission fails the conducted test, the measurement will be repeated in a radiated manner.

5.6.4 Test result (band edges next to restricted bands (conducted))

Ambient temperature	22 °C	Relative humidity	59 %

The plot shows an exemplary measurement result for the worst documented case. The other results are listed in the following table.

Odin_BandEdgeRestr_a_64.wmf: conducted band-edge compliance (operation mode 6):



Band Edge Compliance, a-mode, channel 36 (Operation mode 1)									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	36	5149.992	65.9	74.0	8.1	-32.4	3.0	Passed	Y
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	36	5149.992	44.2	54.0	9.8	-54.4	3.0	Passed	Y
Measurement uncertainty				+0.66 dB / -0.72 dB					

Band Edge Compliance, n20-mode, channel 36 (Operation mode 13)									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	36	5149.863	65.8	74.0	8.2	-32.5	3.0	Passed	Y
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	36	5149.788	45.3	54.0	8.7	-53.6	3.0	Passed	Y
Measurement uncertainty				+0.66 dB / -0.72 dB					

Band Edge Compliance, a-mode, channel 64 (Operation mode 6)									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	5350.446	66.3	74.0	7.7	-32.0	3.0	Passed	Y
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	5349.996	44.5	54.0	9.5	-54.1	3.0	Passed	Y
Measurement uncertainty				+0.66 dB / -0.72 dB					

Band Edge Compliance, n20-mode, channel 64 (Operation mode 18)									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	5350.085	67.0	74.0	7.0	-31.3	3.0	Passed	Y
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	5350.235	45.9	54.0	8.1	-53.0	3.0	Passed	Y
Measurement uncertainty				+0.66 dB / -0.72 dB					

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
7

5.7 Maximum unwanted emissions

5.7.1 Method of measurement (conducted emissions in the restricted bands)

The relating measurements were carried out in a conducting manner. Therefore, the antenna connector was directly mounted to a spectrum analyser. The measurement procedure refers to parts 12.7.5, 12.7.6 and 12.7.7.2 in [1].

If emissions were detected during the preliminary measurements, they were measured using the following measurement procedures:

Peak measurement procedure:

- Set the analyzer span to encompass the entire unwanted emission bandwidth.
- Set the RBW = specified in Table 2.
- Set the VBW ≥ [3 x RBW].
- Set sweep time = auto.
- Detector = peak.
- Trace mode = max hold.
- Allow the trace to stabilize.
- Use the peak marker function to determine the peak power over the emission bandwidth.

Average measurement procedure:

- RBW = 1 MHz.
- VBW ≥ [3 × RBW].
- Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.
- Averaging type = power (i.e., rms)
- Sweep time = auto.
- Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)
- Add the correction factor [10 log (1 / D)], where D is the duty cycle to the measured value (if the EUT transmitting at a duty cycle less than 98%)

Table 2 RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

The measurements were carried out at each antenna port.

If an emission fails the conducted test, the measurement will be repeated in a radiated manner.

5.7.1.1 Limit calculations

The following general procedure is described in chapter 12.7.2 of [1].

a) Measure the conducted output power (in dBm) using the procedures described in 5.7.1.
b) Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level
c) Add the appropriate maximum ground reflections factor to the EIRP level (6 dB for frequencies ≤, 30 MHz, 4.7 for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies > 1000 MHz)
d) For devices with multiple antenna ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW)
e) Convert the resultant level to an equivalent electric field strength using the following relationships:

$$E. = EIRP - 20\log(d) + 104.8 \quad (1)$$

Where:

E. = electric field strength, in dBμV/m
EIRP = equivalent isotropic radiated power, in dBm
d = specified measurement distance, in meters

f) Compare the resultant electric field strength to the applicable limit

Document [1] states in chapter14, that for transmitters with multiple outputs in the same band, summing of emissions and accounting for array gain have to be considered.

For combining emissions from multiple outputs, the spurious emissions at each output have to be measured and 10 log (N) has to be added to the resulting value, whereby N refers to the number of outputs.

To account for directional gain which might occur in case of N transmit antennas, the directional gain has to be calculated as

$$G_{Dir} = G_{Ant} + 10\log(N)dBi ,$$

whereby N is the number of antennas.

The actual EUT only has one antenna port active in 5 GHz mode. Therefore only the antenna gain is added to the values which were measured conducted.

5.7.2 Method of measurement (conducted emissions in the unrestricted bands)

The measurement was performed as described in H)2) in document [3].

5.7.2.1 Emission level measurement

Measurement Procedure – Unwanted Emissions

- Set the center frequency and span to encompass the frequency range to be measured.
- RBW = 1 MHz. (100 kHz for frequencies below 1 GHz)
- VBW ≥ 3 MHz. (300 kHz for frequencies below 1 GHz)
- Detector = Peak.
- Sweep time = auto couple.
- Trace Mode = max hold.
- Use the peak marker function to determine the maximum amplitude level. Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, then the time required for the trace to stabilize will increase by a factor of approximately 1/D, where D is the duty cycle. For example, at 50% duty cycle, the measurement time will increase by a factor of two, relative to measurement time for continuous transmission.

The limit of -27 dBm/MHz was specified in 15.407 (b) (1).
For transmitters operating in the frequency band 5.725 – 5.85 the spurious emissions shall not be greater than – 17 dBm/MHz at frequencies greater than 10 MHz from the band edges.

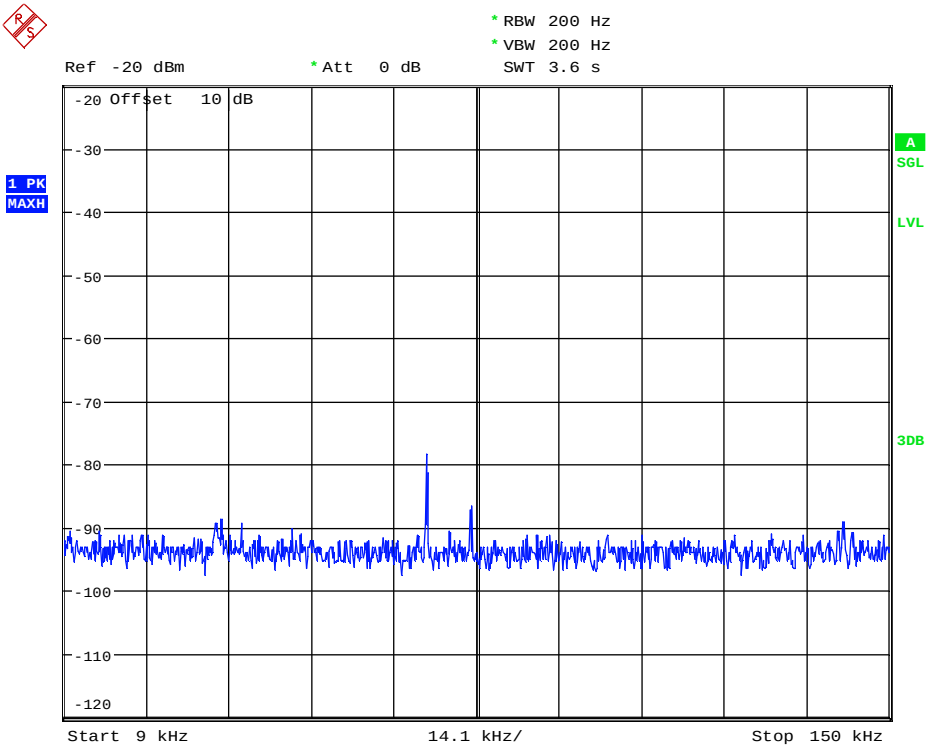
5.7.3 Test results (conducted emissions)

5.7.3.1 Emissions below 1 GHz

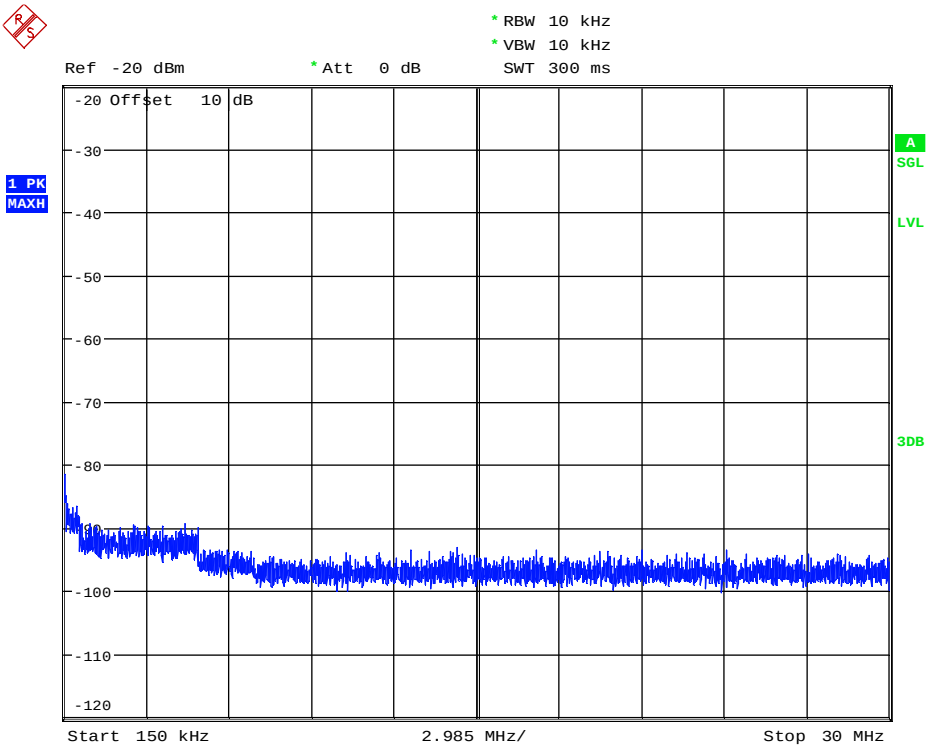
Ambient temperature	22 °C	Relative humidity	59 %

The Emissions below 1 GHz were equal for all channels, modulations and data rates. Therefore only the results of an exemplary test case are submitted below.

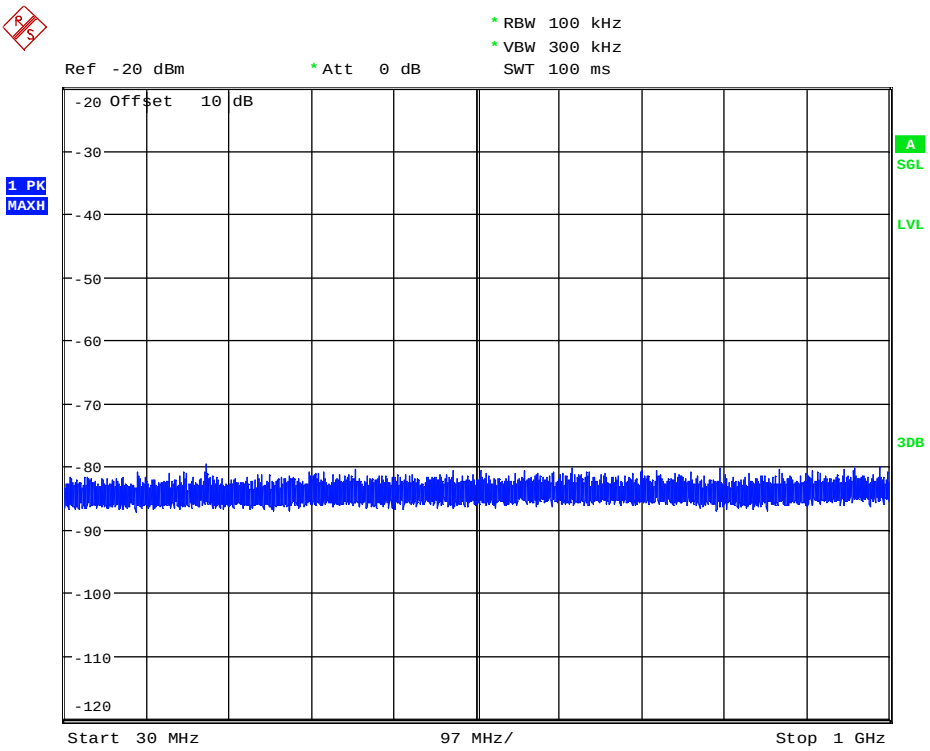
136117_9-150k_allModesWLAN.wmf: conducted spurious emissions (all operation modes):



136117_150k-30M_allModesWLAN.wmf: conducted spurious emissions (all operation modes):



136117_30M-1G_allModesWLAN.wmf: conducted spurious emissions (all operation modes):



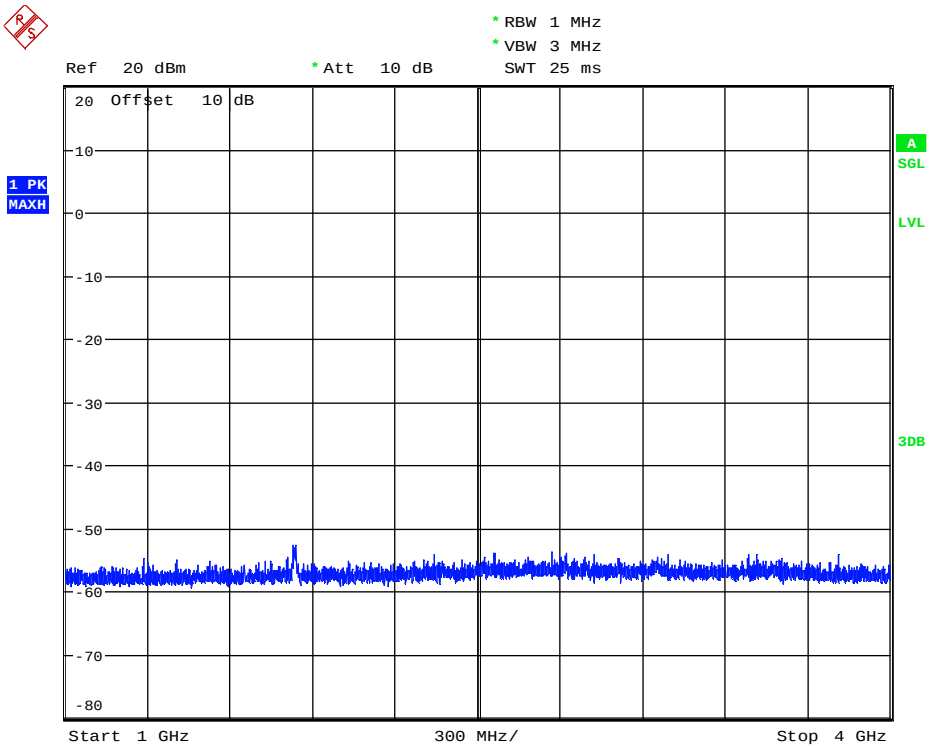
Spurious Emissions f < 1 GHz						
Peak Emission – Restricted Band						
Frequency [MHz]	Meas. Result [dBµV/m]	Max Peak Limit [dBµV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result
0.071	-13.7	30.6	44.3	-78.0	3.0	Passed
0.079	-20.7	29.7	50.4	-84.9	3.0	Passed
0.142	-22.4	24.6	47.0	-86.7	3.0	Passed

5.7.3.2 Emissions above 1 GHz

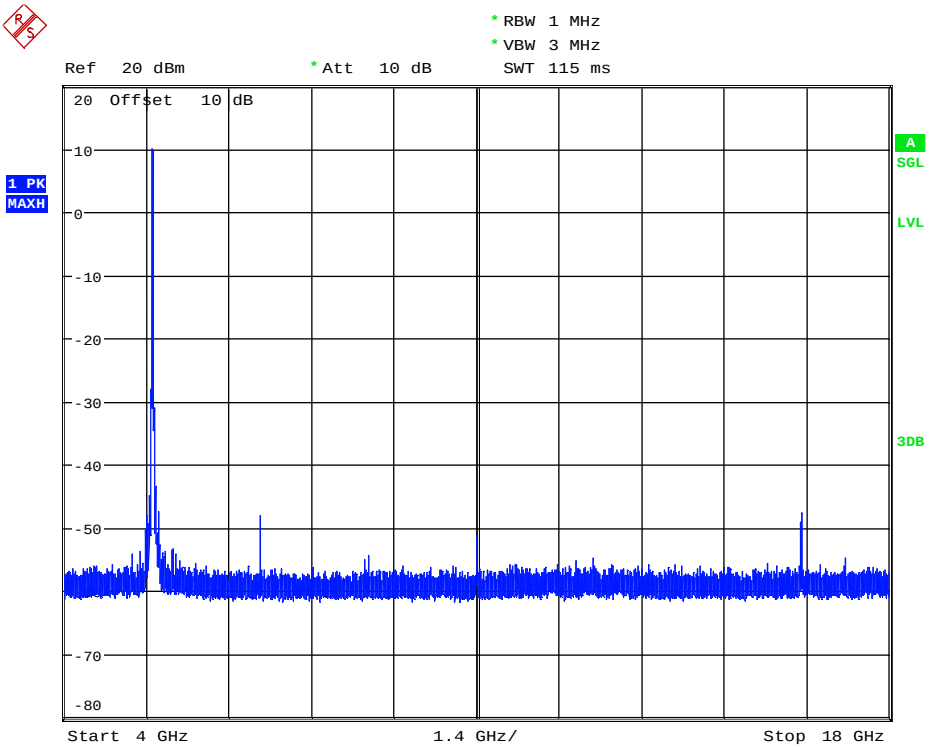
Ambient temperature	22 °C	Relative humidity	59 %

The following results were measured at antenna port of the EUT. The plots show exemplary measurement results for the worst documented case. The other results are listed in the following tables.

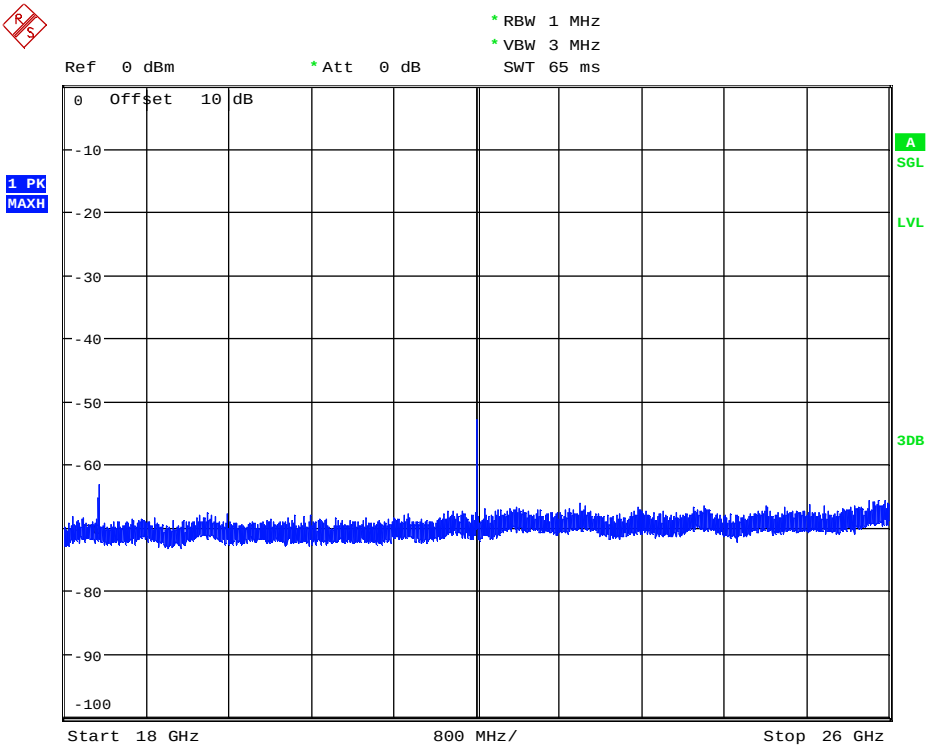
Odin_SpurEmiss1-4G_n20_100.wmf: conducted spurious emissions (operation mode 19):



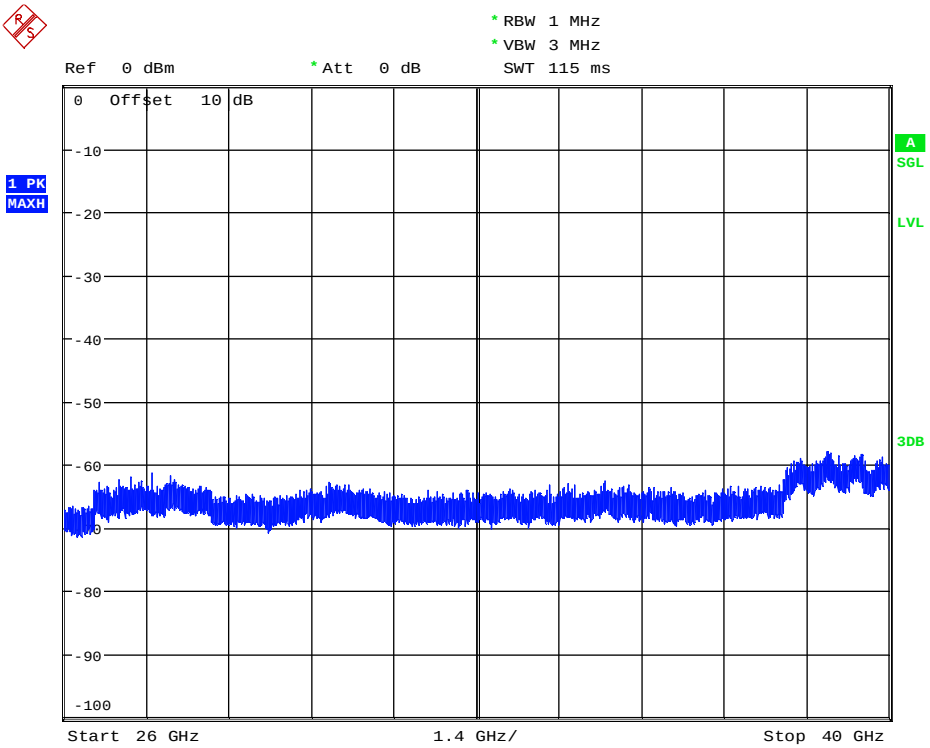
Odin_SpurEmiss4-18G_n20_100.wmf: conducted spurious emissions (operation mode 19):



Odin_SpurEmiss18-26G_n20_100.wmf: conducted spurious emissions (operation mode 19):



Odin_SpurEmiss26-40G_n20_100.wmf: conducted spurious emissions (operation mode 19):



Spurious Emissions, a-mode, channel 36 (Operation mode 1)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	36	15532.400	55.0	74.0	19.0	-43.3	3.0	Passed	Y
a	36	20720.075	43.6	74.0	30.4	-54.7	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	36	15534.400	35.7	54.0	18.3	-62.9	3.0	Passed	Y
a	36	20720.125	41.3	54.0	12.7	-57.3	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
a	36	6.906.675	-40.7	-27	13.7	Passed	No		
a	36	10.359.625	-42.8	-27	15.8	Passed	No		
a	36	25.900.050	-57.9	-27	30.9	Passed	No		
No emissions were found									

Spurious Emissions, a-mode, channel 40 (Operation mode 2)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
		15592.350	56.6	74.0	17.4	-41.7	3.0	Passed	Y
		20799.875	43.9	74.0	30.1	-54.4	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	40	15596.475	36.8	54.0	17.2	-61.8	3.0	Passed	Y
a	40	20800.025	42.1	54.0	11.9	-56.5	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
a	40	6933.200	-40.5	-27	13.5	Passed	No		
a	40	10400.350	-43.5	-27	16.5	Passed	No		

Spurious Emissions, a-mode, channel 48 (Operation mode 3)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	48	15712.900	55.3	74.0	18.7	-43.0	3.0	Passed	Y
a	48	20960.175	45.8	74.0	28.2	-52.5	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	48	15719.950	37.1	54.0	16.9	-61.5	3.0	Passed	Y
a	48	20960.025	44.1	54.0	9.9	-54.5	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
a	48	6986.600	-41.2	-27.0	14.2	Passed	No		
a	48	10479.650	-46.7	-27.0	19.7	Passed	No		
a	48	26200.100	-56.3	-27.0	29.3	Passed	No		

Spurious Emissions, a-mode, channel 52 (Operation mode 4)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	52	15772.800	54.9	74.0	19.1	-43.4	3.0	Passed	Y
a	52	21040.025	45.9	74.0	28.1	-52.4	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	52	15780.000	36.9	54.0	17.1	-61.7	3.0	Passed	Y
a	52	21040.025	44.4	54.0	9.6	-54.2	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
a	52	7013.350	-42.1	-27.0	15.1	Passed	No
a	52	10523.150	-48.9	-27.0	21.9	Passed	No
a	52	26299.875	-57.5	-27.0	30.5	Passed	No

Spurious Emissions, a-mode, channel 60 (Operation mode 5)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	60	15893.950	55.5	74.0	18.5	-42.8	3.0	Passed	Y
a	60	21199.950	45.7	74.0	28.3	-52.6	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	60	15900.150	37.7	54.0	16.3	-60.9	3.0	Passed	Y
a	60	21200.000	44.0	54.0	10.0	-54.6	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
a	60	7066.600	-42.4	-27.0	15.4	Passed	No
a	60	10601.050	-50.4	-27.0	23.4	Passed	No

Spurious Emissions, a-mode, channel 64 (Operation mode 6)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	10639.950	47.2	74.0	26.8	-51.1	3.0	Passed	Y
a	64	15959.500	57.5	74.0	16.5	-40.8	3.0	Passed	Y
a	64	21280.075	45.4	74.0	28.6	-52.9	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	10639.950	37.4	54.0	16.6	-61.2	3.0	Passed	Y
a	64	15960.200	38.3	54.0	15.7	-60.3	3.0	Passed	Y
a	64	21279.975	43.5	54.0	10.5	-55.1	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
a	64	7093.300	-43.3	-27.0	16.3	Passed	No		

Spurious Emissions, a-mode, channel 100 (Operation mode 7)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	7333.300	53.0	74.0	21.0	-45.3	3.0	Passed	Y
a	64	10999.800	49.0	74.0	25.0	-49.3	3.0	Passed	Y
a	64	18333.450	36.2	74.0	37.8	-62.1	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	7333.350	48.7	54.0	5.3	-49.9	3.0	Passed	Y
a	64	11000.000	38.1	54.0	15.9	-60.5	3.0	Passed	Y
a	64	18333.250	31.1	54.0	22.9	-67.5	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
a	100	16503.350	-43.5	-27.0	16.5	Passed	No		
a	100	22000.000	-52.2	-27.0	25.2	Passed	No		

Spurious Emissions, a-mode, channel 116 (Operation mode 8)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	7466.700	52.0	74.0	22.0	-46.3	3.0	Passed	Y
a	64	22399.925	44.3	74.0	29.7	-54.0	3.0	Passed	Y
a	64	18666.550	36.8	74.0	37.2	-61.5	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	7466.750	47.7	54.0	6.3	-50.9	3.0	Passed	Y
a	64	22400.075	42.0	54.0	12.0	-56.6	3.0	Passed	Y
a	64	18666.575	32.2	54.0	21.8	-66.4	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
a	116	16801.950	-40.4	-27.0	13.4	Passed	No		

Spurious Emissions, a-mode, channel 140 (Operation mode 9)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	7599.900	48.9	74.0	25.1	-49.4	3.0	Passed	Y
a	64	22800.100	41.7	74.0	32.3	-56.6	3.0	Passed	Y
a	64	19000.075	35.9	74.0	38.1	-62.4	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	64	7599.950	43.1	54.0	10.9	-55.5	3.0	Passed	Y
a	64	22800.075	38.5	54.0	15.5	-60.1	3.0	Passed	Y
a	64	18999.950	31.2	54.0	22.8	-67.4	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
a	140	17100.500	-38.8	-27.0	11.8	Passed	No		
a	140	1898.500	-45.7	-27.0	18.7	Passed	No		
a	140	28499.750	-58.1	-27.0	31.1	Passed	No		

Spurious Emissions, a-mode, channel 149 (Operation mode 10)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	149	4787.300	50.3	74.0	23.7	-48.0	3.0	Passed	Y
a	149	22980.200	41.6	74.0	32.4	-56.7	3.0	Passed	Y
a	149	19150.000	35.3	74.0	38.7	-63.0	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	149	4787.500	41.4	54.0	12.6	-57.2	3.0	Passed	Y
a	149	22980.050	38.7	54.0	15.3	-59.9	3.0	Passed	Y
a	149	19149.950	30.2	54.0	23.8	-68.4	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
a	149	1912.950	-47.2	-27.0	20.2	Passed	No		
a	149	9575.200	-49.4	-27.0	22.4	Passed	No		
a	149	17236.150	-41.0	-27.0	14.0	Passed	No		
a	149	28725.225	-58.9	-27.0	31.9	Passed	No		

Spurious Emissions, a-mode, channel 157 (Operation mode 11)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	157	4821.375	47.9	74.0	26.1	-50.4	3.0	Passed	Y
a	157	11572.350	47.6	74.0	26.4	-50.7	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	157	4820.775	38.6	54.0	15.4	-60.0	3.0	Passed	Y
a	157	11569.950	36.7	54.0	17.3	-61.9	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
a	157	1927.600	-46.0	-27.0	19.0	Passed	No
a	157	9640.900	-49.6	-27.0	22.6	Passed	No
a	157	17356.350	-40.0	-27.0	13.0	Passed	No
a	157	23139.950	-60.8	-27.0	33.8	Passed	No
a	157	28925.150	-58.1	-27.0	31.1	Passed	No

Spurious Emissions, a-mode, channel 165 (Operation mode 12)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	165	3883.500	49.1	74.0	24.9	-49.2	3.0	Passed	Y
a	165	4854.650	50.2	74.0	23.8	-48.1	3.0	Passed	Y
a	165	11649.700	50.1	74.0	23.9	-48.2	3.0	Passed	Y
a	165	19416.700	35.4	74.0	38.6	-62.9	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
a	165	3883.300	43.0	54.0	11.0	-55.6	3.0	Passed	Y
a	165	4854.150	42.0	54.0	12.0	-56.6	3.0	Passed	Y
a	165	11650.100	39.4	54.0	14.6	-59.2	3.0	Passed	Y
a	165	19416.625	29.2	54.0	24.8	-69.4	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
a	165	1939.300	-45.1	-27.0	18.1	Passed	No
a	165	6109.750	-48.0	-27.0	21.0	Passed	No
a	165	17479.750	-39.6	-27.0	12.6	Passed	No
a	165	23300.025	-61.6	-27.0	34.6	Passed	No
a	165	29124.875	-58.9	-27.0	31.9	Passed	No

Spurious Emissions, n20-mode, channel 36 (Operation mode 13)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	36	15543.400	54.6	74.0	19.4	-43.7	3.0	Passed	Y
n20	36	20720.050	43.7	74.0	30.3	-54.6	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	36	15543.050	36.5	54.0	17.5	-62.4	3.0	Passed	Y
n20	36	20720.025	41.6	54.0	12.4	-57.3	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
n20	36	6906.600	-40.6	-27.0	13.6	Passed	No		
n20	36	10360.250	-43.0	-27.0	16.0	Passed	No		
n20	36	25900.375	-58.2	-27.0	31.2	Passed	No		
n20									

Spurious Emissions, n20-mode, channel 40 (Operation mode 14)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	40	15595.750	57.0	74.0	17.0	-41.3	3.0	Passed	Y
n20	40	20800.050	44.0	74.0	30.0	-54.3	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	40	15599.950	37.2	54.0	16.8	-61.3	3.0	Passed	Y
n20	40	20800.025	42.2	54.0	11.8	-56.6	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
n20	40	6933.300	-40.6	-27.0	13.6	Passed	No		
n20	40	10400.000	-44.4	-27.0	17.4	Passed	No		

Spurious Emissions, n20-mode, channel 48 (Operation mode 15)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	48	15719.600	56.1	74.0	17.9	-42.2	3.0	Passed	Y
n20	48	20960.025	46.0	74.0	28.0	-52.3	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	48	15720.000	37.4	54.0	16.6	-61.5	3.0	Passed	Y
n20	48	20960.025	44.7	54.0	9.3	-54.2	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
n20	48	6986.750	-41.2	-27.0	14.2	Passed	No
n20	48	10480.350	-46.9	-27.0	19.9	Passed	No
n20	48	26200.175	-56.1	-27.0	29.1	Passed	No

Spurious Emissions, n20-mode, channel 52 (Operation mode 16)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	52	15776.000	54.4	74.0	19.6	-43.9	3.0	Passed	Y
n20	52	21040.050	46.2	74.0	27.8	-52.1	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	52	15780.150	37.2	54.0	16.8	-61.7	3.0	Passed	Y
n20	52	21040.000	45.0	54.0	9.0	-53.9	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
n20	52	7013.300	-42.1	-27.0	15.1	Passed	No
n20	52	10519.700	-48.5	-27.0	21.5	Passed	No
n20	52	26300.050	-57.3	-27.0	30.3	Passed	No

Spurious Emissions, n20-mode, channel 60 (Operation mode 17)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	60	15895.100	55.3	74.0	18.7	-43.0	3.0	Passed	Y
n20	60	21200.025	46.1	74.0	27.9	-52.2	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	60	15900.000	37.9	54.0	16.1	-61.0	3.0	Passed	Y
n20	60	21200.025	44.6	54.0	9.4	-54.3	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
n20	60	7066.700	-42.1	-27.0	15.1	Passed	No
n20	60	10600.350	-50.4	-27.0	23.4	Passed	No

Spurious Emissions, n20-mode, channel 64 (Operation mode 18)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	10639.950	47.2	74.0	26.8	-51.1	3.0	Passed	Y
n20	64	15959.500	57.5	74.0	16.5	-40.8	3.0	Passed	Y
n20	64	21280.075	45.4	74.0	28.6	-52.9	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	10639.950	37.7	54.0	16.3	-61.2	3.0	Passed	Y
n20	64	15960.200	38.6	54.0	15.4	-60.3	3.0	Passed	Y
n20	64	21279.975	43.8	54.0	10.2	-55.1	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
n20	64	7093.400	-42.6	-27.0	15.6	Passed	No
n20	64	26500.050	-59.5	-27.0	32.5	Passed	No

Spurious Emissions, n20-mode, channel 100 (Operation mode 19)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	7333.400	52.6	74.0	21.4	-45.7	3.0	Passed	Y
n20	64	10999.500	49.0	74.0	25.0	-49.3	3.0	Passed	Y
n20	64	18333.250	36.1	74.0	37.9	-62.2	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	7333.300	48.8	54.0	5.2	-50.1	3.0	Passed	Y
n20	64	10999.950	38.7	54.0	15.3	-60.2	3.0	Passed	Y
n20	64	18333.300	31.5	54.0	22.5	-67.4	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
n20	100	1831.400	-50.3	-27.0	23.3	Passed	No		
n20	100	16501.800	-42.5	-27.0	15.5	Passed	No		
n20	100	22000.025	-52.4	-27.0	25.4	Passed	No		

Spurious Emissions, n20-mode, channel 116 (Operation mode 20)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	7466.800	51.6	74.0	22.4	-46.7	3.0	Passed	Y
n20	64	22400.075	44.1	74.0	29.9	-54.2	3.0	Passed	Y
n20	64	18666.850	36.7	74.0	37.3	-61.6	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	7466.700	47.8	54.0	6.2	-51.1	3.0	Passed	Y
n20	64	22400.050	42.3	54.0	11.7	-56.6	3.0	Passed	Y
n20	64	18666.625	32.4	54.0	21.6	-66.5	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
n20	116	1866.800	-49.2	-27.0	22.2	Passed	No		
n20	116	16801.550	-39.9	-27.0	12.9	Passed	No		

Spurious Emissions, n20-mode, channel 140 (Operation mode 21)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	7599.900	48.9	74.0	25.1	-49.4	3.0	Passed	Y
n20	64	22800.100	41.7	74.0	32.3	-56.6	3.0	Passed	Y
n20	64	19000.075	35.9	74.0	38.1	-62.4	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	64	7599.950	43.4	54.0	10.6	-55.5	3.0	Passed	Y
n20	64	22800.075	38.8	54.0	15.2	-60.1	3.0	Passed	Y
n20	64	18999.950	31.5	54.0	22.5	-67.4	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
n20	140	1898.450	-44.2	-27.0	17.2	Passed	No		
n20	140	9501.250	-47.7	-27.0	20.7	Passed	No		
n20	140	17098.300	-38.8	-27.0	11.8	Passed	No		
n20	140	28499.950	-58.3	-27.0	31.3	Passed	No		

Spurious Emissions, n20-mode, channel 149 (Operation mode 22)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	149	4787.300	50.3	74.0	23.7	-48.0	3.0	Passed	Y
n20	149	22980.150	41.6	74.0	32.4	-56.7	3.0	Passed	Y
n20	149	19150.075	35.6	74.0	38.4	-62.7	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	149	4787.500	41.7	54.0	12.3	-57.2	3.0	Passed	Y
n20	149	22980.075	38.9	54.0	15.1	-60.0	3.0	Passed	Y
n20	149	19149.975	30.6	54.0	23.4	-68.3	3.0	Passed	Y
Emissions in the non-restricted Bands									
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?		
n20	149	1914.400	-44.1	-27.0	17.1	Passed	No		
n20	149	9577.575	-47.8	-27.0	20.8	Passed	No		
n20	149	17236.400	-39.7	-27.0	12.7	Passed	No		

Spurious Emissions, n20-mode, channel 157 (Operation mode 23)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	157	4821.375	47.9	74.0	26.1	-50.4	3.0	Passed	Y
n20	157	11572.350	47.6	74.0	26.4	-50.7	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	157	4820.775	38.9	54.0	15.1	-60.0	3.0	Passed	Y
n20	157	11569.950	37.0	54.0	17.0	-61.9	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
n20	157	1928.500	-46.2	-27.0	19.2	Passed	No
n20	157	9638.150	-50.2	-27.0	23.2	Passed	No
n20	157	17356.400	-39.0	-27.0	12.0	Passed	No
n20	157	23140.025	-60.9	-27.0	33.9	Passed	No
n20	157	28925.075	-58.2	-27.0	31.2	Passed	No

Spurious Emissions, n20-mode, channel 165 (Operation mode 24)									
Peak Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Max Peak Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	165	3883.275	48.2	74.0	25.8	-50.1	3.0	Passed	Y
n20	165	4854.100	50.2	74.0	23.8	-48.1	3.0	Passed	Y
n20	165	11651.925	49.5	74.0	24.5	-48.8	3.0	Passed	Y
n20	165	19416.475	35.3	74.0	38.7	-63.0	3.0	Passed	Y
Average Emission – Restricted Band									
WLAN Mode	Channel	Frequency [MHz]	Field Strength [dBuV/m]	Average Limit [dBuV/m]	Margin [dB]	Reading [dBm]	Antenna Gain + Array Gain [dBi]	Result	Restricted Band?
n20	165	3883.350	43.1	54.0	10.9	-55.8	3.0	Passed	Y
n20	165	4854.225	42.0	54.0	12.0	-56.9	3.0	Passed	Y
n20	165	11650.025	39.0	54.0	15.0	-59.9	3.0	Passed	Y
n20	165	19416.600	29.5	54.0	24.5	-69.4	3.0	Passed	Y

Emissions in the non-restricted Bands							
WLAN Mode	Channel	Frequency [MHz]	Reading [dBm]	Limit [dBm]	Margin [dB]	Result	Restricted Band?
n20	165	1941.825	-44.9	-27.0	17.9	Passed	No
n20	165	6110.325	-48.5	-27.0	21.5	Passed	No
n20	165	9706.900	-50.5	-27.0	23.5	Passed	No
n20	165	17476.350	-38.5	-27.0	11.5	Passed	No
n20	165	23300.125	-61.2	-27.0	34.2	Passed	No
n20	165	29124.875	-58.4	-27.0	31.4	Passed	No

TEST EQUIPMENT USED FOR THE TEST:
7, 30,

5.7.4 Method of measurement (radiated emissions)

The radiated emission measurement is subdivided into five stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
- A final measurement carried out on an outdoor test side without reflecting ground plane and a fixed antenna height in the frequency range 9 kHz to 30 MHz.
- A final measurement carried out on an open area test side with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range above 1 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range above 1 GHz.

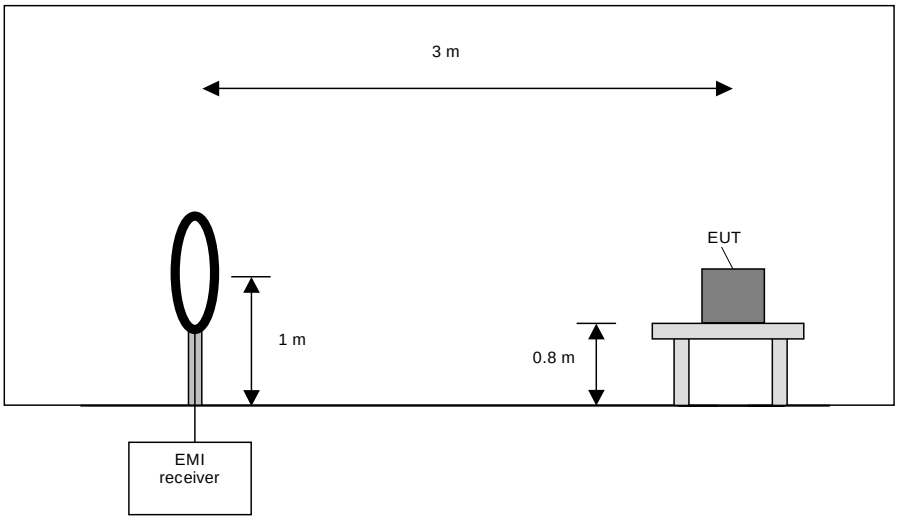
Preliminary measurement (9 kHz to 30 MHz):

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set-up of the Equipment under test will be in accordance to [1].

The frequency range 9 kHz to 30 MHz will be monitored with a spectrum analyser while the system and its cables will be manipulated to find out the configuration with the maximum emission levels if applicable. The EMI Receiver will be set to MAX Hold mode. The EUT and the measuring antenna will be rotated around their vertical axis to found the maximum emissions.

The resolution bandwidth of the spectrum analyser will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	10 kHz



Preliminary measurement procedure:

Prescans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

The following procedure will be used:

1) Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2) Manipulate the system cables within the range to produce the maximum level of emission.
3) Rotate the EUT by 360 ° to maximize the detected signals.
4) Make a hardcopy of the spectrum.
5) Measure the frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6) Repeat steps 1) to 5) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
7) Rotate the measuring antenna and repeat steps 1) to 5).

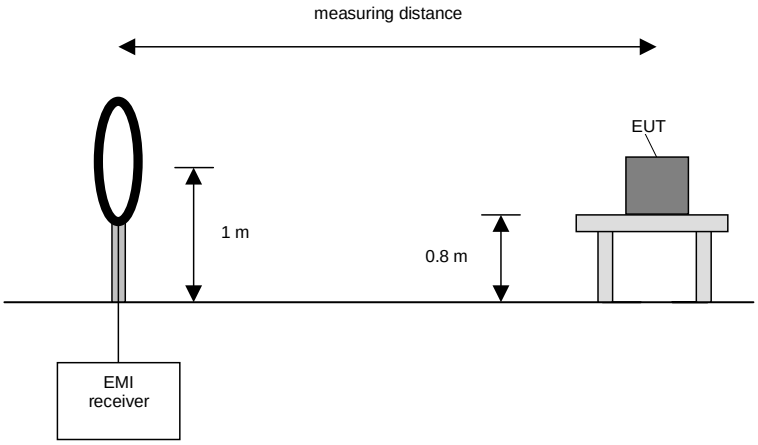
Final measurement (9 kHz to 30 MHz):

In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m. In the case where larger measuring distances are required the results will be extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with a EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an average detector will be used according Section 15.209 (d) [2].

On the frequencies, which were detected during the preliminary measurements, the final measurement will be performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum value is found.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Final measurement procedure:

The following procedure will be used:

1) Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
2) Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
3) Rotate the measuring antenna to find the maximum and note the value.
4) Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
5) Repeat steps 1) to 4) with the other orthogonal axes of the EUT (if the EUT is a module and might be used in a handheld equipment application).

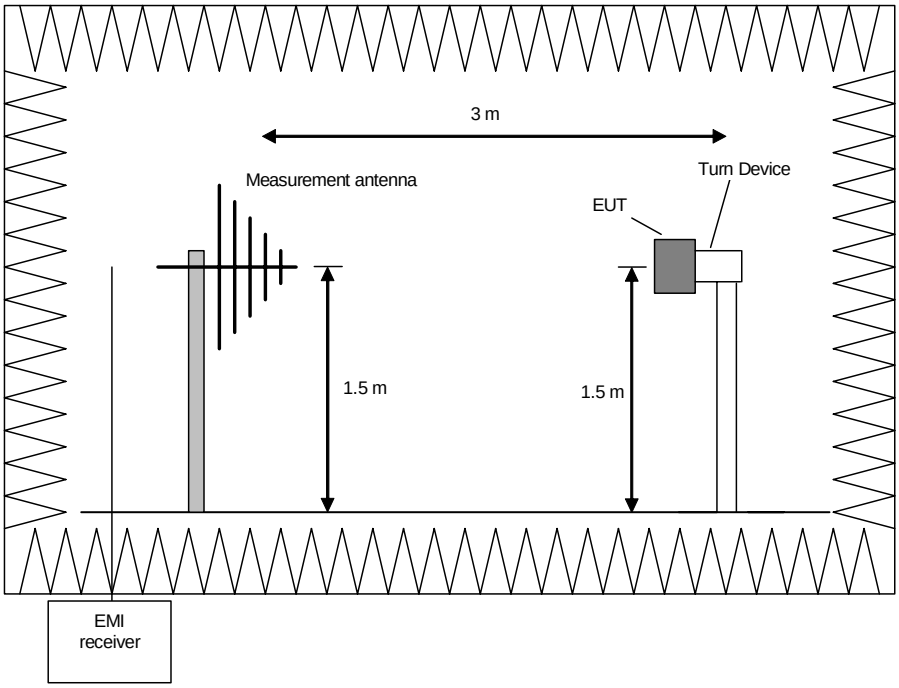
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Table top devices will set up on a non-conducting turn device on the height of 1.5m. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °. This measurement is repeated after raising the EUT in 30° steps according 6.6.5.4 in [1].

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.
The following procedure will be used:

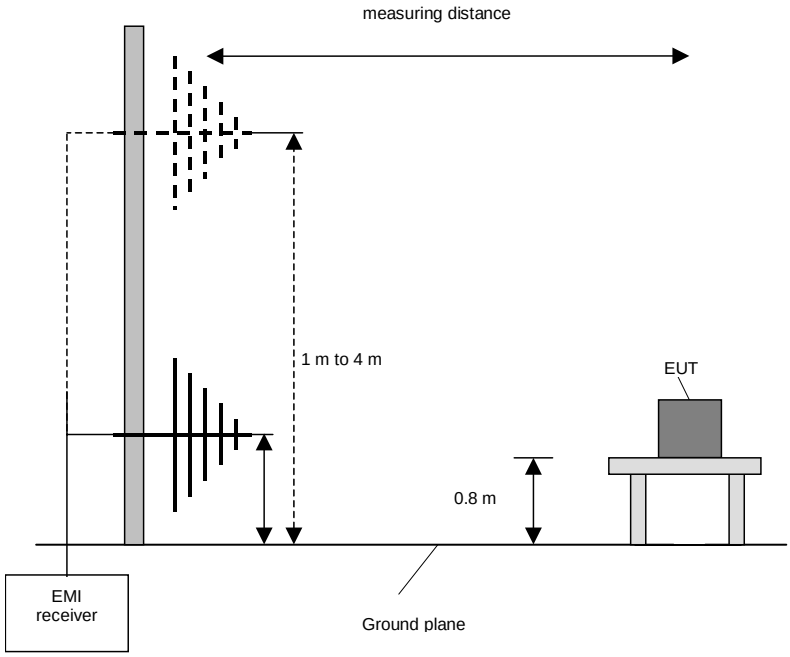
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Repeat 1) to 3) with the vertical polarisation of the measuring antenna.
5. Make a hardcopy of the spectrum.
6. Repeat 1) to 5) with the EUT raised by an angle of 30° (60°, 90°, 120° and 150°) according to 6.6.5.4 in [1].
7. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

1) Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.
4) Repeat 1) to 3) for the other orthogonal antenna polarization.
5) Move the antenna and the turntable to the position where the maximum value is detected.
6) Measure while moving the antenna slowly +/- 1 m.
7) Set the antenna to the position where the maximum value is found.
8) Measure while moving the turntable +/- 45 °.
9) Set the turntable to the azimuth where the maximum value is found.
10) Measure with Final detector (QP and AV) and note the value.
11) Repeat 5) to 10) for each frequency.
12) Repeat 1) to 11) for each orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

Preliminary and final measurement (1 GHz to 40 GHz)

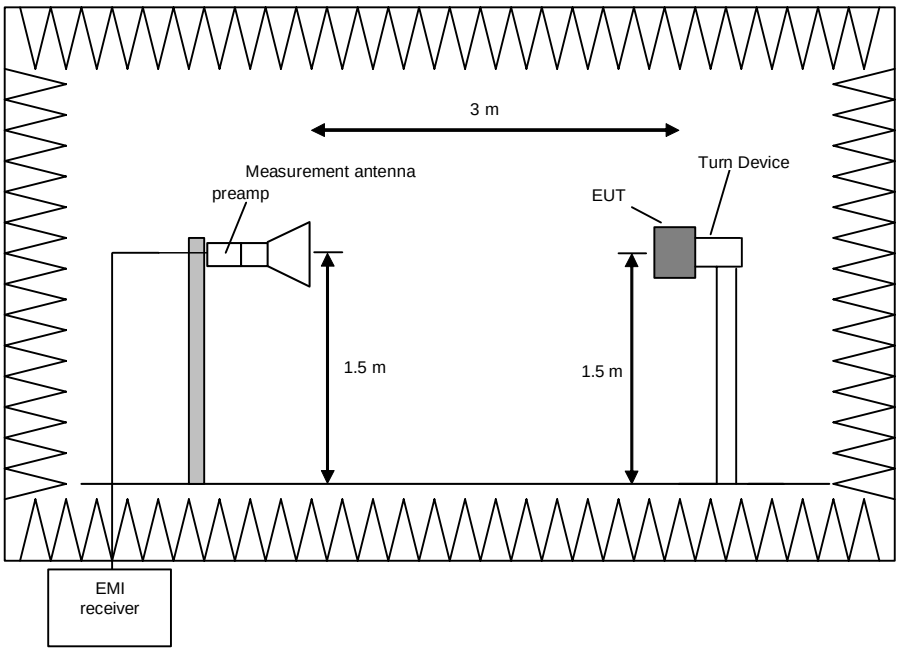
This measurement will be performed in a fully anechoic chamber. Table top devices will set up on a non-conducting turn device on the height of 1.5m. The set-up of the Equipment under test will be in accordance to [1].

Preliminary measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °. This measurement is repeated after raising the EUT in 30° steps according 6.6.5.4 in [1].

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 25 / 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 1 to 40 GHz.
The following procedure will be used:

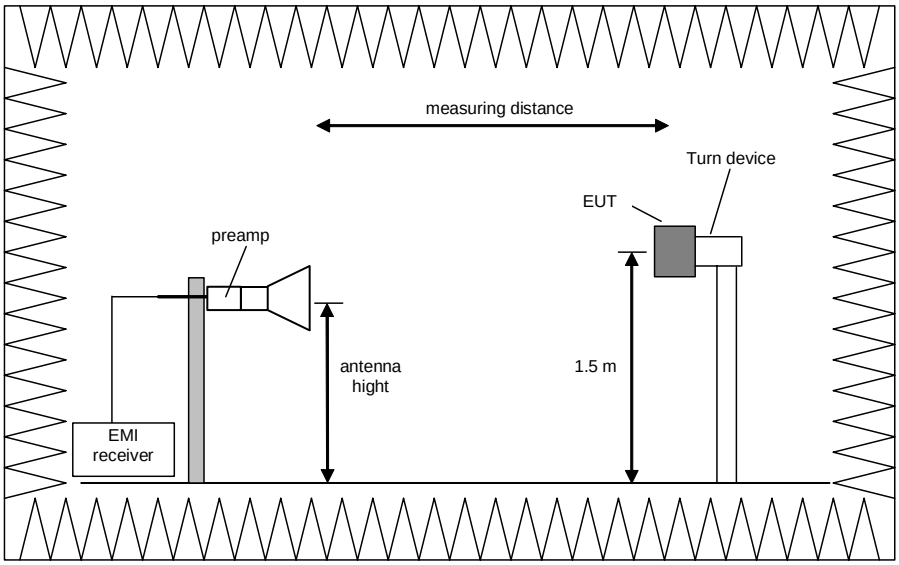
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Rotate the EUT by 360° to maximize the detected signals.
3. Repeat 1) to 2) with the vertical polarisation of the measuring antenna.
4. Make a hardcopy of the spectrum.
5. Repeat 1) to 4) with the EUT raised by an angle of 30° (60°, 90°, 120° and 150°) according to 6.6.5.4 in [1].
6. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
7. The measurement antenna polarisation, with the according EUT position (Turntable and Turn device) which produces the highest emission for each frequency will be used for the final measurement. The six closest values to the applicable limit will be used for the final measurement.

Final measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed by rotating the turntable through 0 to 360° in the worst-case EUT orientation which was obtained during the preliminary measurements.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 25 / 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency ranges 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 25 /26.5 GHz and 26.5 GHz to 40 GHz.
The following procedure will be used:

1) Set the turntable and the turn device to obtain the worst-case emission for the first frequency identified in the preliminary measurements.
2) Set the measurement antenna polarisation to the orientation with the highest emission for the first frequency identified in the preliminary measurements.
3) Set the spectrum analyser to EMI mode with peak and average detector activated.
4) Rotate the turntable from 0° to 360° to find the EUT angle that produces the highest emissions.
5) Note the highest displayed peak and average values
6) Repeat the steps 1) to 5) for each frequency detected during the preliminary measurements.

5.7.5 Test results (radiated emissions) – antenna emissions with each antenna type

5.7.5.1 Preliminary radiated emission measurement

The preliminary tests were performed during the conducted testing. In this test case only the final tests for the frequencies identified as failed during the conducted measurements are repeated as radiated tests. Since no emissions below 1 GHz were failed during the conducted measurement, no radiated retests for frequencies below 1 GHz were necessary.

5.7.5.2 Final radiated emission measurement (1 GHz to 25 GHz)

Ambient temperature	22 °C	Relative humidity	55 %

Position of EUT: The EUT was set-up on an EUT turn device of a height of 1.5 m. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in test setup photos.

Test record: All results are shown in the following.

Supply voltage: During all measurements the host of the EUT was powered with 3.3 V via an laboratory power supply. Because the external filters of the anechoic chamber prevented the start and operation of the EUT, an electrolytic capacitor [100 µF] was implemented between the power supply lines.

Remark: The following measurements were failed during the conducted measurements and are repeated with each antenna type incorporating the highest gain for its type.

The results for cabinet emission are submitted in 5.7.6.

If the measured value is an unrestricted band the limits are -17 dBm which is 78.2 dBµV/m as radiated value and -27 dBm which is 68.2 dBµV/m as radiated value.

If the test according to the restricted values is failed, the results are compared against unrestricted limits (if applicable).

5.7.5.2.1 Results for monopole antenna

Used antenna: Ex-IT WLAN SMA with 3 dBi gain

Transmitter operates at the upper end of the assigned frequency band (operation mode 9)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725.2	69.3	74.0	4.7	54.8	33.8	25.2	5.9	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725.2	46.4	54.0	7.6	31.6	33.8	25.2	5.9	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the upper of the assigned frequency band (operation mode 21)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725.2	69.6	74.0	4.4	55.1	33.8	25.2	5.9	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725.2	70.2	74.0	3.8	55.1	33.8	25.2	5.9	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower end of the assigned frequency band (operation mode 10)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725	73.4	78.7	5.3	58.9	33.8	25.2	5.9	150	Hor.	150°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower end of the assigned frequency band (operation mode 22)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725	77.7	78.7	1.0	63.0	33.8	25.2	5.9	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower end of the assigned frequency band (operation mode 22)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5150	45.9	74.0	28.1	32.1	33.8	25.6	5.6	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5150	32.8	54.0	21.2	18.5	33.8	25.6	5.6	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

5.7.5.2.2 Results for patch antenna

Used antenna: InSide 2400 ProAnt Patch 10 cm cable/U.FL with 3 dBi gain

Transmitter operates at the lower end of the assigned frequency band (operation mode 9)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725	66.8	74.0	7.2	52.3	33.8	25.2	5.9	150	Hor.	0°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725	48.6	54.0	5.4	33.9	33.8	25.2	5.9	150	Hor.	0°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the middle of the assigned frequency band (operation mode 21)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725	69.1	74.0	5.0	54.6	33.8	25.2	5.9	150	Hor.	0°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725	51.0	54.0	3.0	35.9	33.8	25.2	5.9	150	Hor.	0°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower end of the assigned frequency band (operation mode 10)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725	74.2	78.7	4.5	59.7	33.8	25.2	5.9	150	Hor.	150°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower end of the assigned frequency band (operation mode 22)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5725	75.7	78.7	3.0	60.9	33.8	25.2	5.9	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower end of the assigned frequency band (operation mode 22)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5715	60.6	74.0	13.4	46.1	33.8	25.2	5.9	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
5715	39.3	54.0	14.7	24.2	33.8	25.2	5.9	150	Hor.	90°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
5, 6, 8 - 15, 17-19, 25, 29, 33

5.7.6 Test results (radiated emissions) –emissions with internal antenna (OnBoard SMD 2400)

5.7.6.1 Preliminary radiated emission measurement

Ambient temperature	21 °C	Relative humidity	51 %

Position of EUT: The EUT was set-up on a non-conducting table of a height of 1.5 m. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in the annexes.

Test record: All results are shown in the following.

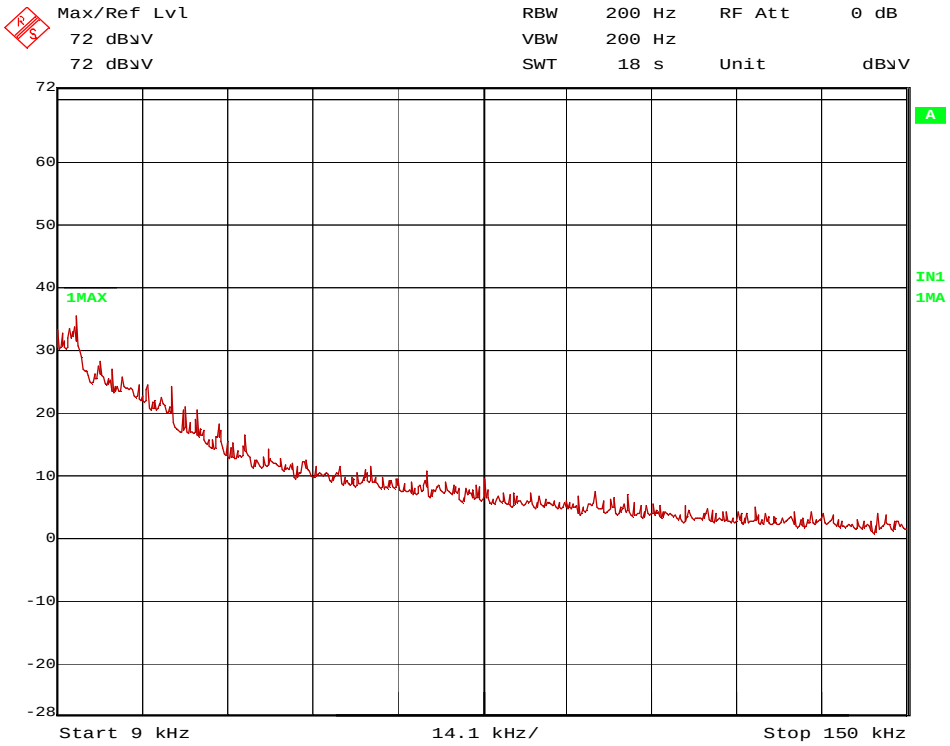
Supply voltage: During all measurements the host of the EUT was powered with 3.3 V via an laboratory power supply. Because the external filters of the anechoic chamber prevented the start and operation of the EUT, an electrolytic capacitor [100 µF] was implemented between the power supply lines.

Remark: Document [1] states in 12.7.4.2, that in case of conducted measurements, additional radiated cabinet emission measurements must be performed. The measurements were performed at the worst case modulation, namely 802.11a mode at channel 36, 40, 48, 52, 60, 64, 100, 116, 140, 149, 157 and 165.

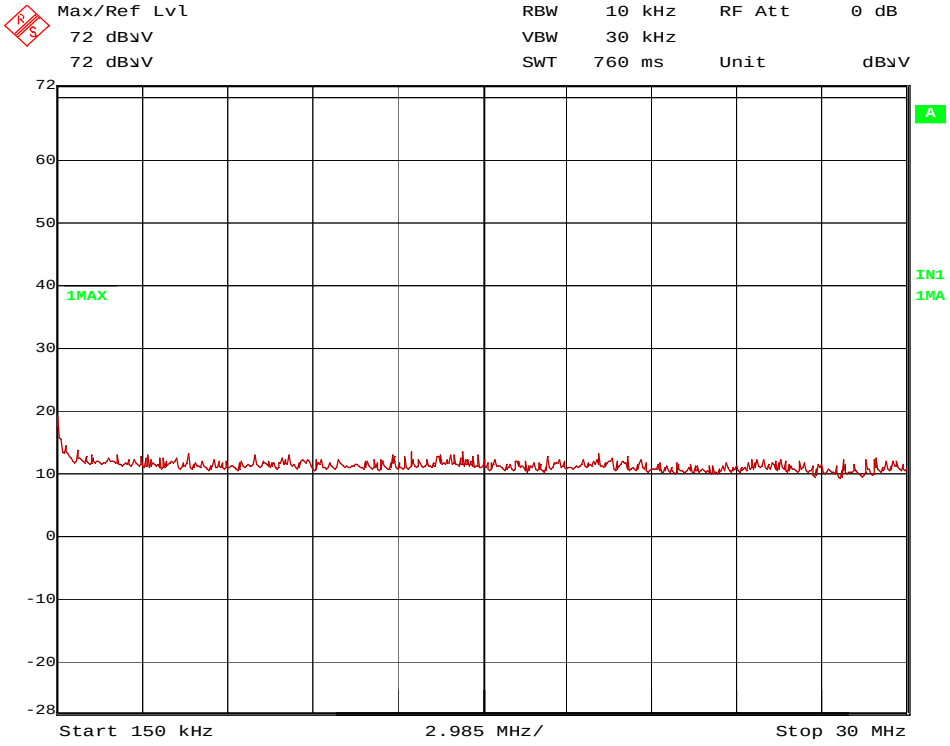
Only the plots of the worst case emissions are submitted for every frequency range above 1 GHz in the preliminary results.

The Emissions below 1 GHz were equal for all antenna ports, transmit frequencies, modulation schemes and data rates. Therefore only the results of an exemplary test case are submitted below.

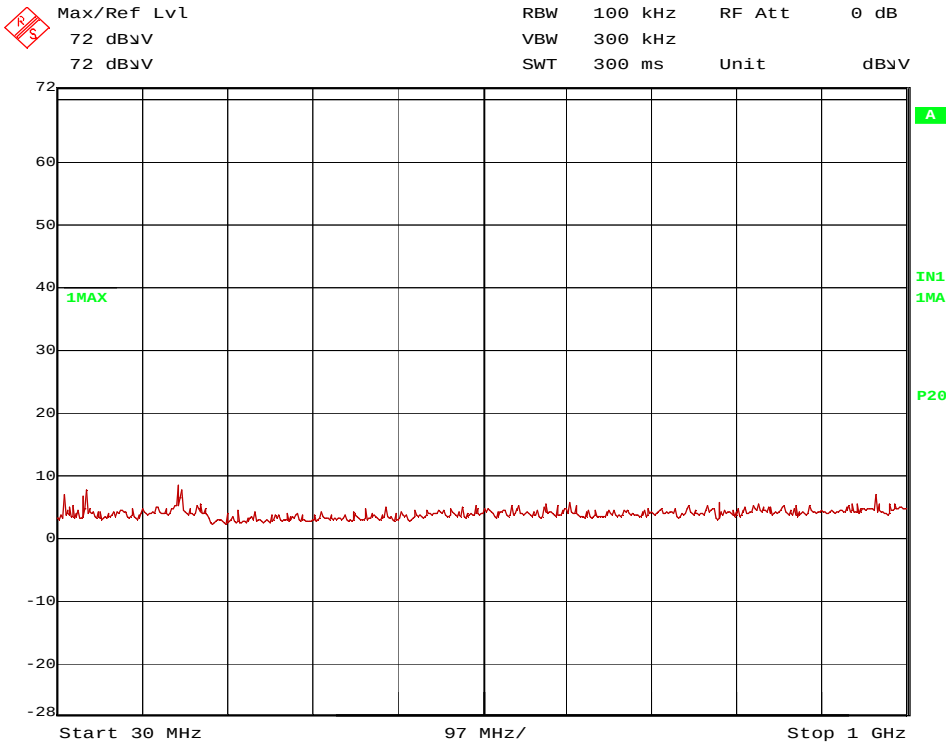
117_W26.wmf: Spurious emissions from 9 kHz to 150 kHz:



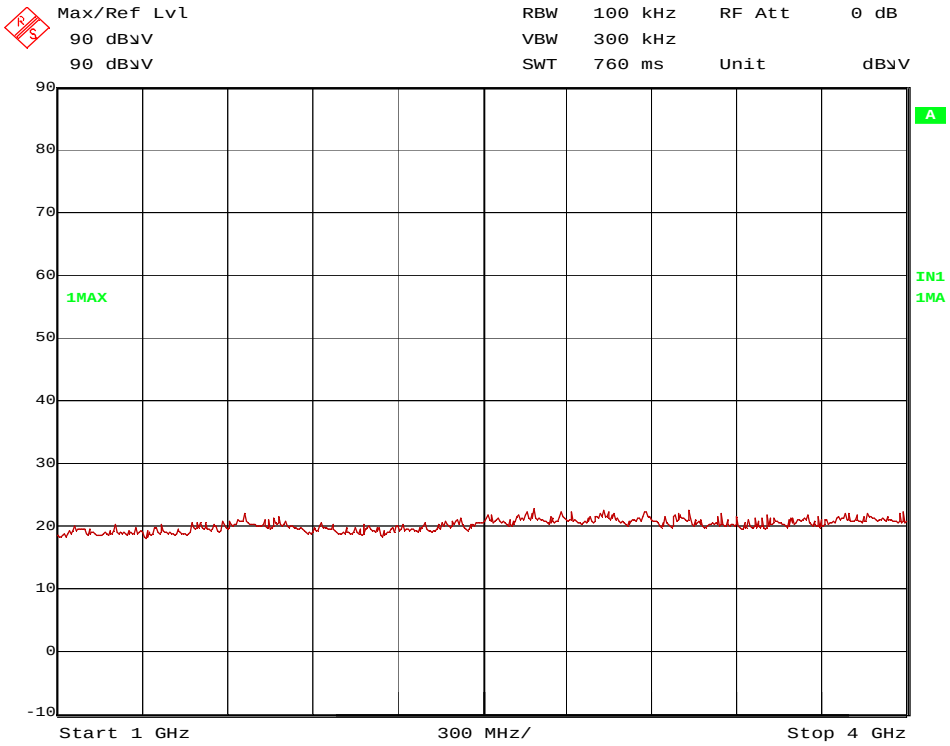
117_W27.wmf: Spurious emissions from 150 kHz to 30 MHz:



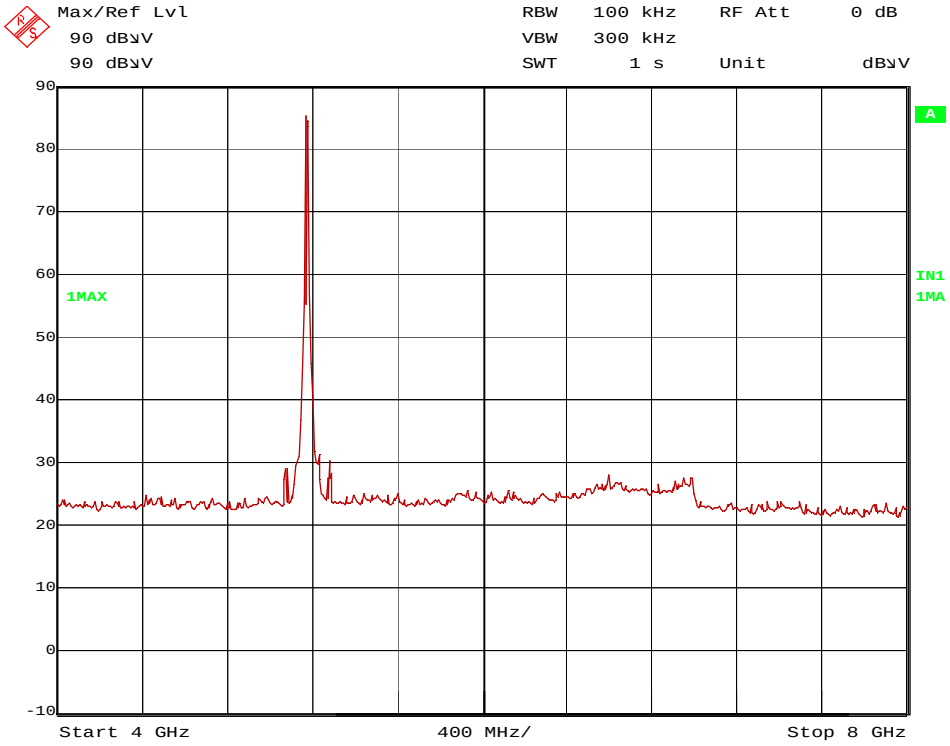
136117_all-modes_pos2_30M-1G_1.wmf: Spurious emissions from 30 MHz to 1 GHz:



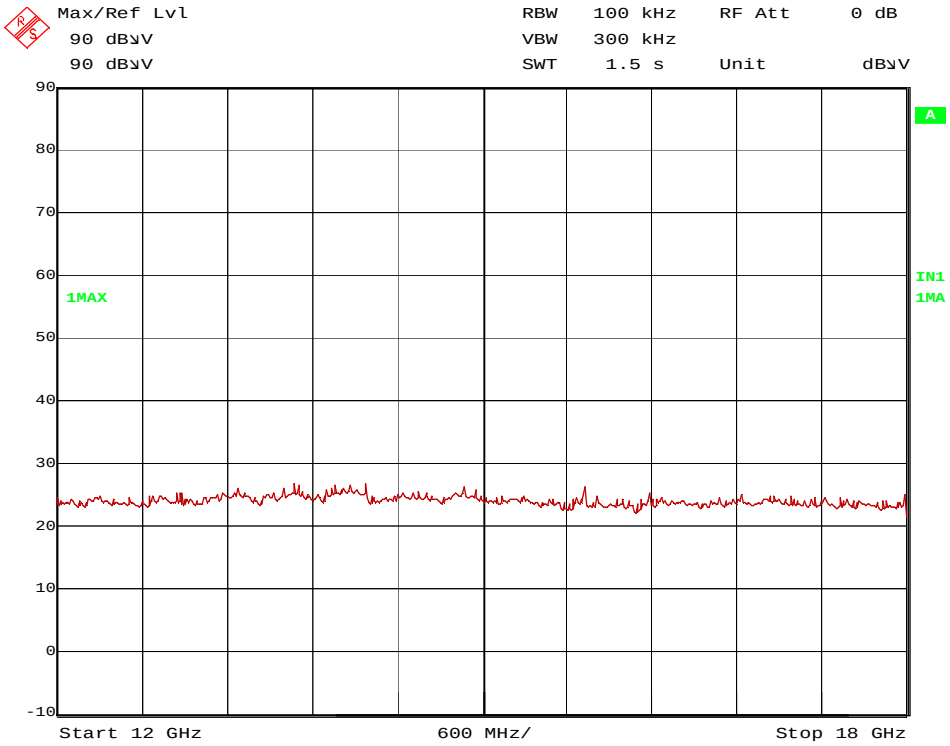
151496_6M_1-4G_ch48_0°.wmf: Spurious emissions from 1 GHz to 4 GHz (operation mode 3):



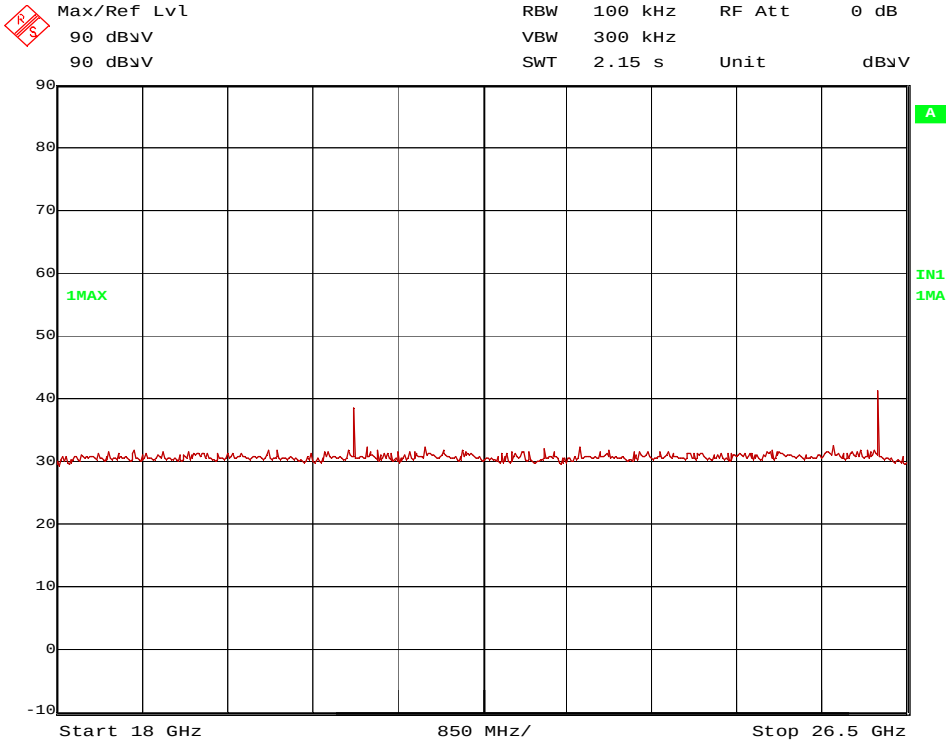
151496_6M_ch36_4-8G__90°.wmf: Spurious emissions from 4 GHz to 12 GHz (operation mode 3):



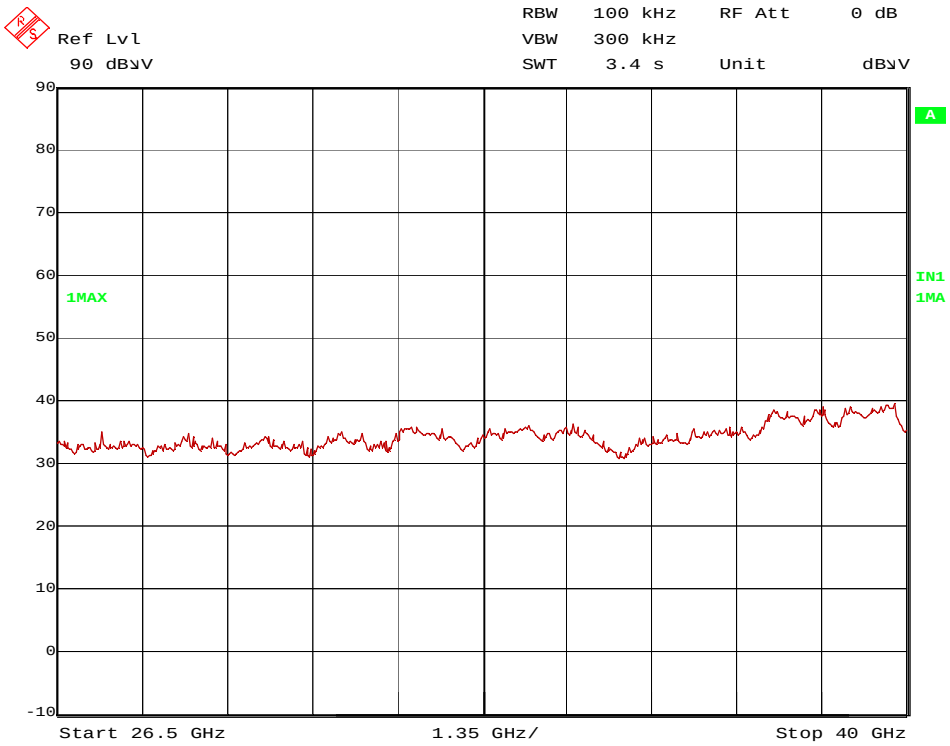
Odin_6M_ch48_Hor_90°_12-18G.wmf: Spurious emissions from 12 to 18 GHz (operation mode 3):



Odin_6M_ch48_Hor_120°_18-26.5G.wmf: Spurious emissions from 18 – 26.5 GHz (operation mode 3):



151496_6M_ch48_Hor_120°_26.5-40G.wmf: Spurious emissions from 26.5 – 40 GHz (operation mode 3):



The following frequencies were found inside the restricted bands during the preliminary radiated emission test:

- 15720 MHz and 20960 MHz.

The following frequencies were found outside the restricted bands during the preliminary radiated emission test:

- 10480 MHz and 26200 MHz.

These frequencies have to be measured in a final measurement. The results are presented in the following.

TEST EQUIPMENT USED FOR THE TEST:
6, 8 – 25, 28 - 30

5.7.6.2 Final radiated emission measurement (9 kHz to 1 GHz)

No significant emissions could be found during the preliminary measurements; therefore no final measurements were performed for this frequency range.

5.7.6.3 Final radiated emission measurement (1 GHz to 40 GHz)

Ambient temperature	22 °C	Relative humidity	55 %

Position of EUT: The EUT was set-up on a non-conducting table of a height of 1.5 m. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Supply voltage: During all measurements the host of the EUT was powered with 3.3 V via an laboratory power supply. Because the external filters of the anechoic chamber prevented the start and operation of the EUT, an electrolytic capacitor [100 µF] was implemented between the power supply lines.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Additional information: For simplification, all values were compared to the restricted band limits.

Above 26.5 GHz the limit was raised by 10 dB to account for the 1 m measurement distance (instead of 3 m as indicated in the standard).

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10360	56.1	74.0	17.9	35.5	37.6	23.6	6.6	150	Vert.	90°
15540	45.0	74.0	29.0	37.1	33.7	27.8	2.0	150	Hor.	90°
20720	50.0	74.0	24.0	48.2	37.1	37.7	2.4	150	Vert.	30°
25900	47.0	74.0	27.0	46.2	37.2	38.9	2.5	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10360.00	44.9	54.0	9.1	24.0	37.6	23.6	6.6	150	Vert.	90°
15540.00	32.3	54.0	21.7	24.1	33.7	27.8	2.0	150	Hor.	90°
20720.00	46.3	54.0	7.7	44.2	37.1	37.7	2.4	150	Vert.	30°
25900.00	40.4	54.0	13.6	39.3	37.2	38.9	2.5	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the middle of the assigned frequency band (operation mode 2)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10400	57.5	74.0	16.5	36.8	37.6	23.6	6.7	150	Vert.	90°
15600	44.3	74.0	29.7	36.5	33.7	27.9	2.0	150	Hor.	90°
20800	49.9	74.0	24.1	48.2	37.1	37.7	2.3	150	Vert.	30°
26000	55.6	74.0	18.4	46.4	37.2	30.7	2.7	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10400.00	45.4	54.0	8.6	24.4	37.6	23.6	6.7	150	Vert.	90°
15600.00	32.4	54.0	21.6	24.3	33.7	27.9	2.0	150	Hor.	90°
20800.00	46.4	54.0	7.6	44.4	37.1	37.7	2.3	150	Vert.	30°
26000.00	49.3	54.0	4.7	39.8	37.2	30.7	2.7	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the upper end of the assigned frequency band (operation mode 3)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10480	56.6	74.0	17.4	36.2	37.5	23.7	6.6	150	Vert.	90°
15720	43.5	74.0	30.5	35.7	33.7	27.8	1.9	150	Hor.	90°
20960	49.5	74.0	24.5	47.8	37.1	37.8	2.4	150	Vert.	30°
26200	55.7	74.0	18.3	46.8	37.2	30.9	2.6	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10480.00	44.7	54.0	9.3	24.0	37.5	23.7	6.6	150	Vert.	90°
15720.00	32.4	54.0	21.6	24.3	33.7	27.8	1.9	150	Hor.	90°
20960.00	45.5	54.0	8.5	43.5	37.1	37.8	2.4	150	Vert.	30°
26200.00	49.6	54.0	4.4	40.4	37.2	30.9	2.6	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower end of the assigned frequency band (operation mode 4)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10520	57.0	74.0	17.0	36.2	37.6	23.5	6.7	150	Vert.	90°
15780	45.2	74.0	28.8	37.1	33.8	27.7	2.0	150	Hor.	90°
21040	49.0	74.0	25.0	47.5	37.1	37.9	2.3	150	Vert.	30°
26300	55.4	74.0	18.6	46.3	37.3	30.9	2.7	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10520.00	44.9	54.0	9.1	23.8	37.6	23.5	6.7	150	Vert.	90°
15780.00	32.9	54.0	21.1	24.5	33.8	27.7	2.0	150	Hor.	90°
21040.00	45.0	54.0	9.0	43.2	37.1	37.9	2.3	150	Vert.	30°
26300.00	49.4	54.0	4.6	40.0	37.3	30.9	2.7	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the middle of the assigned frequency band (operation mode 5)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10600	56.8	74.0	17.2	35.8	37.9	23.6	6.7	150	Vert.	90°
15900	46.1	74.0	27.9	37.9	33.8	27.6	2.0	150	Hor.	90°
21200	48.8	74.0	25.2	47.2	37.1	37.8	2.3	150	Vert.	
26500	58.5	84.0	25.5	45.9	40.6	30.8	2.8	150	Hor.	
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10600.00	45.0	54.0	9.0	23.7	37.9	23.6	6.7	150	Vert.	90°
15900.00	33.4	54.0	20.6	24.9	33.8	27.6	2.0	150	Hor.	90°
21200.00	44.6	54.0	9.4	42.7	37.1	37.8	2.3	150	Vert.	30°
26500.00	52.3	64.0	11.7	39.4	40.6	30.8	2.8	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the upper end of the assigned frequency band (operation mode 6)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10640	56.7	74.0	17.3	35.7	38.0	23.7	6.7	150	Vert.	90°
15960	45.5	74.0	28.5	37.4	33.8	27.7	2.0	150	Hor.	90°
21280	48.4	74.0	25.6	46.7	37.2	37.8	2.3	150	Vert.	30°
26600	60.0	84.0	24.0	47.5	40.6	30.7	2.6	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
10640.00	44.1	54.0	9.9	22.8	38.0	23.7	6.7	150	Vert.	90°
15960.00	33.4	54.0	20.6	25.0	33.8	27.7	2.0	150	Hor.	90°
21280.00	44.1	54.0	9.9	42.1	37.2	37.8	2.3	150	Vert.	30°
26600.00	52.0	64.0	12.0	39.2	40.6	30.7	2.6	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower end of the assigned frequency band (operation mode 7)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
16500	54.2	74.0	19.8	40.1	33.8	28.1	8.4	150	Hor.	60°
22000	49.0	74.0	25.0	47.2	37.2	37.8	2.4	150	Hor.	90°
27500	58.2	84.0	25.8	45.4	40.7	30.3	2.4	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
16500.00	43.5	54.0	10.5	29.1	33.8	28.1	8.4	150	Hor.	60°
22000.00	44.1	54.0	9.9	42.0	37.2	37.8	2.4	150	Hor.	90°
27500.00	48.8	64.0	15.2	35.7	40.7	30.3	2.4	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the middle of the assigned frequency band (operation mode 8)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9334	53.8	74.0	20.2	34.0	37.3	23.7	6.2	150	Vert.	90°
16800	47.8	74.0	26.2	40.2	33.8	28.2	2.0	150	Hor.	60°
22400	48.3	74.0	25.7	46.4	37.2	37.7	2.4	150	Hor.	90°
26133.3	51.8	74.0	22.2	42.7	37.2	30.9	2.8	150	Hor.	90°
28000	60.3	84.0	23.7	46.8	40.6	29.9	2.8	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9334.00	41.4	54.0	12.6	21.3	37.3	23.7	6.2	150	Vert.	90°
16800.00	37.4	54.0	16.6	29.5	33.8	28.2	2.0	150	Hor.	60°
22400.00	44.3	54.0	9.7	42.1	37.2	37.7	2.4	150	Hor.	90°
26133.30	43.1	54.0	10.9	33.7	37.2	30.9	2.8	150	Hor.	90°
28000.00	52.1	64.0	11.9	38.3	40.6	29.9	2.8	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the upper end of the assigned frequency band (operation mode 9)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9498.8	54.7	74.0	19.3	34.4	37.4	23.4	6.3	150	Vert.	90°
17100	48.9	74.0	25.1	41.3	33.8	28.3	2.1	150	Hor.	60°
22800	48.8	74.0	25.2	47.0	37.2	37.8	2.4	150	Hor.	90°
28500	62.3	84.0	21.7	49.2	40.6	30.3	2.8	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9498.80	43.1	54.0	10.9	22.5	37.4	23.4	6.3	150	Vert.	90°
17100.00	38.8	54.0	15.2	30.9	33.8	28.3	2.1	150	Hor.	60°
22800.00	44.1	54.0	9.9	42.0	37.2	37.8	2.4	150	Hor.	90°
28500.00	54.2	64.0	9.8	40.8	40.6	30.3	2.8	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the lower of the assigned frequency band (operation mode 10)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9573.7	56.7	74.0	17.3	36.3	37.3	23.2	6.3	150	Vert.	120°
17235	46.4	74.0	27.6	39.1	33.8	28.6	2.1	150	Vert.	0°
22980	49.4	74.0	24.6	47.9	37.2	38.1	2.4	150	Hor.	90°
28725	62.1	84.0	22.0	49.1	40.6	30.2	2.6	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9573.70	45.3	54.0	8.7	24.6	37.3	23.2	6.3	150	Vert.	120°
17235.00	35.9	54.0	18.1	28.3	33.8	28.6	2.1	150	Vert.	0°
22980.00	45.6	54.0	8.5	43.8	37.2	38.1	2.4	150	Hor.	90°
28725.00	54.8	64.0	9.2	41.5	40.6	30.2	2.6	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the middle of the assigned frequency band (operation mode 11)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9640.4	55.7	74.0	18.3	35.4	37.3	23.3	6.3	150	Vert.	120°
17355	48.3	74.0	25.7	40.6	33.9	28.4	2.2	150	Vert.	0°
23140	50.1	74.0	23.9	48.3	37.2	37.8	2.4	150	Hor.	90°
28925	62.1	84.0	21.9	48.8	40.6	30.3	3.0	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9640.40	44.0	54.0	10.0	23.4	37.3	23.3	6.3	150	Vert.	120°
17355.00	37.2	54.0	16.8	29.2	33.9	28.4	2.2	150	Vert.	0°
23140.00	46.6	54.0	7.4	44.5	37.2	37.8	2.4	150	Hor.	90°
28925.00	55.1	64.0	8.9	41.5	40.6	30.3	3.0	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Transmitter operates at the upper end of the assigned frequency band (operation mode 12)

Result measured with the peak detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9709.6	56.1	74.0	17.9	36.2	37.3	23.7	6.3	150	Vert.	120°
17475	48.0	74.0	26.0	40.1	33.9	28.0	2.0	150	Vert.	0°
23300	50.5	74.0	23.6	48.6	37.2	37.9	2.6	150	Hor.	90°
29125	61.4	84.0	22.6	48.4	40.6	30.3	2.7	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Result measured with the average detector:

Frequency MHz	Meas. Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	EUT angle
9709.60	44.9	54.0	9.1	24.7	37.3	23.7	6.3	150	Vert.	120°
17475.00	37.0	54.0	17.0	28.8	33.9	28.0	2.0	150	Vert.	0°
23300.00	46.9	54.0	7.1	44.7	37.2	37.9	2.6	150	Hor.	90°
29125.00	54.8	64.0	9.2	41.5	40.6	30.3	2.7	150	Hor.	120°
+2.2 dB / -3.6 dB				+2.2 dB / -3.6 dB						

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
5, 6, 8 - 29

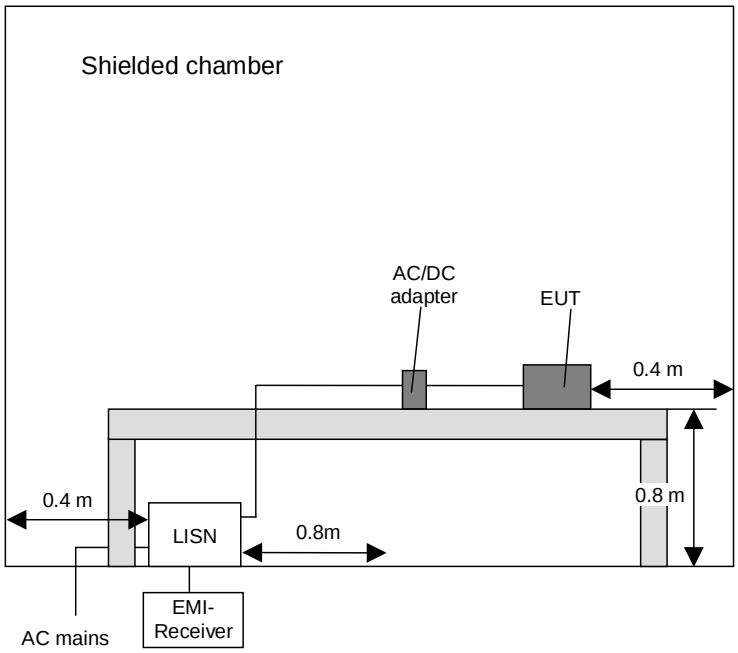
5.8 Conducted emissions on power supply lines (150 kHz to 30 MHz)

5.8.1 Method of measurement

This test will be carried out in a shielded chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The setup of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriable limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz



5.8.2 Test results (conducted emissions on power supply lines)

Ambient temperature	20 °C	Relative humidity	52 %

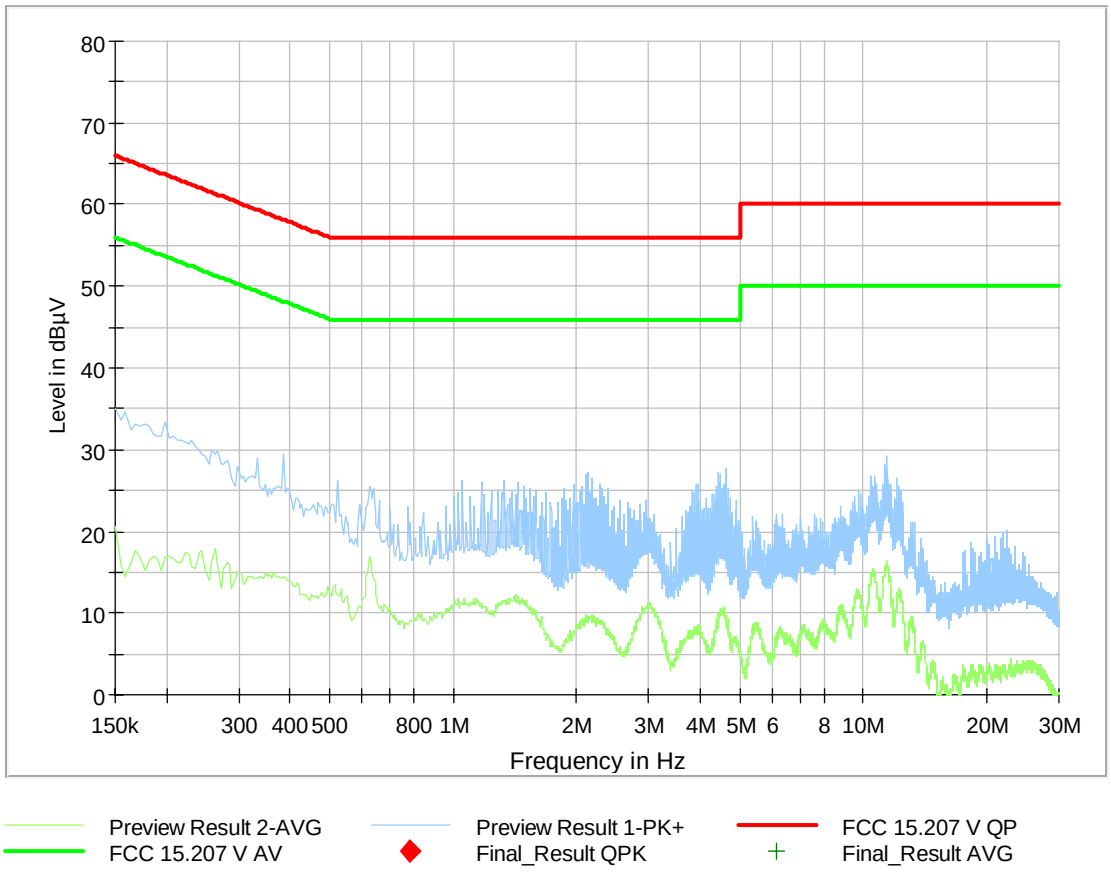
Position of EUT: For the test the EUT was powered by an typical AC/DC power supply. The EUT was set to continuous retransmitting fping frames on channel 36 (Plot 1) and 165 (Plot 2) sent from the laptop PC. The frames with 1400 Byte payload were sent every 10 ms.
The laptop PC with the inserted EUT was set-up on a non-conducting table of a height of 0.8 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Supply voltage: Measurement performed with US 120V/60Hz. For the test a power supply type 273-316 from enercell was used.

The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by "◊" and the average measured points by "+".



Data record name: 151496_FCC_WLAN5G_AC.Rtf

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
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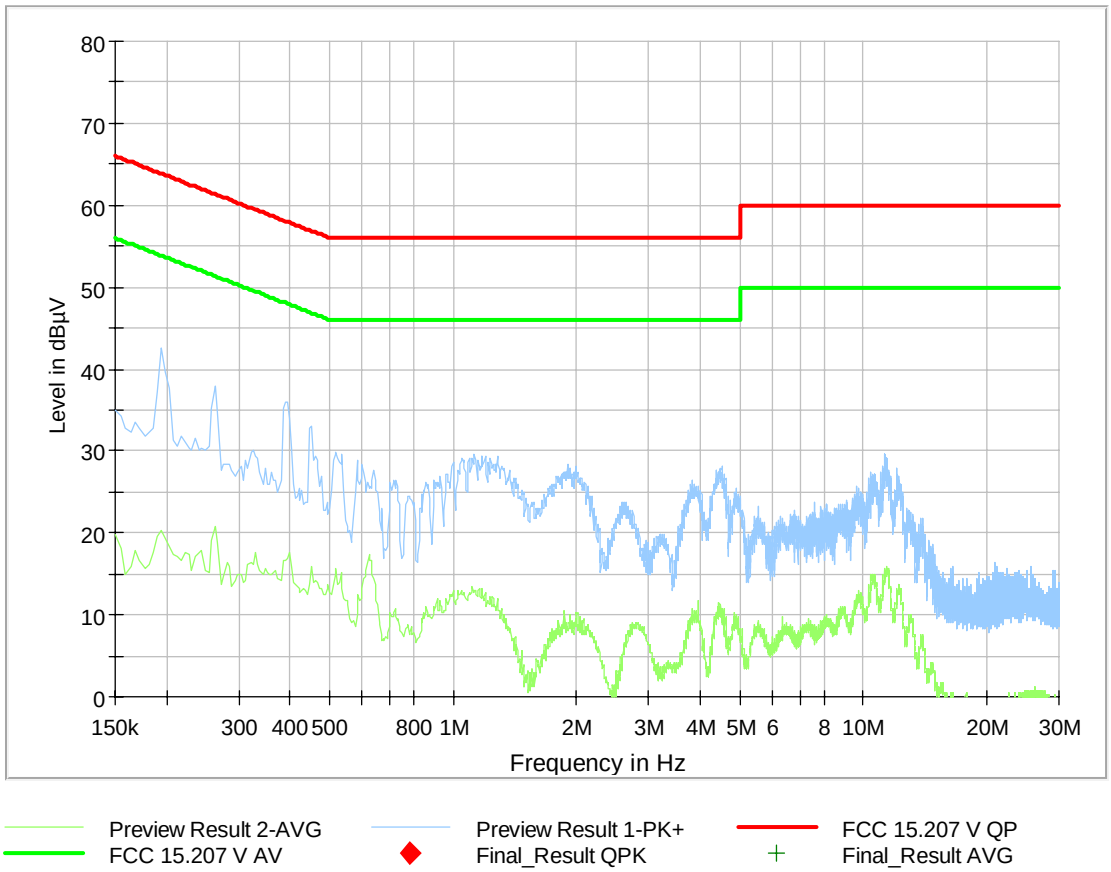

Data record name: 151496 5.8G FCC.Rtf

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
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Test: Passed

TEST EQUIPMENT USED FOR THE TEST:
1 – 5

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. Due
1	Shielded chamber M47	-	Albatross Projects	B83117-C6439-T262 -	480662	Weekly verification (system cal.)	
2	EMI Receiver	ESIB 26	Rohde & Schwarz	1088.7490	481182	03/21/2014	03/2016
3	LISN	NSLK8128	Schwarzbeck	8128155	480058	05/08/2014	08/2016
4	High pass filter	HR 0.13-5ENN	FSY Microwave Inc.	DC 0109 SN 002	480340	Weekly verification (system cal.)	
5	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	-
6	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
7	Spectrum analyser	FSU	Rohde & Schwarz	200125	480956	07/15/2013	07/2015
8	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	02/26/2014	02/2016
9	Controller	MCU	Maturo	MCU/043/971107	480832	-	-
10	Turntable	DS420HE	Deisel	420/620/80	480315	-	-
11	Antenna support	AS615P	Deisel	615/310	480187	-	-
12	Antenna	CBL6112 B	Chase	2688	480328	04/14/2014	04/2017
13	Antenna	3115 A	EMCO	9609-4918	480183	10/11/2014	11/2017
14	Standard Gain Horn 11.9 GHz – 18 GHz	18240-20	Flann Microwave	483	480294	Six month verification (system cal.)	
15	Standard Gain Horn 17.9 GHz – 26.7 GHz	20240-20	Flann Microwave	411	480297	Six month verification (system cal.)	
16	Standard Gain Horn Antenne 26.4 – 40.1 GHz	22240-20	Flann Microwave	469	480229	Six month verification (system cal.)	
17	RF-cable No. 3	Sucoflex 106B	Huber&Suhner	0563/6B / Kabel 3	480670	Weekly verification (system cal.)	
18	RF-cable No. 40	Sucoflex 106B	Huber&Suhner	0708/6B / Kabel 40	481330	Weekly verification (system cal.)	
19	RF-cable No. 36	Sucoflex 106B	Huber&Suhner	500003/6B / Kabel 36-	481680	Weekly verification (system cal.)	
20	RF-cable 1 m	KPS-1533-400-KPS	Insulated Wire	-	480300	Six month verification (system cal.)	
21	RF-cable 2 m	KPS-1533-800-KPS	Insulated Wire		480302	Six month verification (system cal.)	
22	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337	Six month verification (system cal.)	
23	Preamplifier	JS3-12001800-16-5A	Miteq	571667	480343	Six month verification (system cal.)	
24	Preamplifier	JS3-18002600-20-5A	Miteq	658697	480342	Six month verification (system cal.)	
25	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	02/2014	02/2016
26	Power Meter	NRVD	Rohde & Schwarz	833697/030	480589	07/2013	07/2015
27	Thermal Power Sensor	NRV-Z51	Rohde & Schwarz	825948/003	480248	03/2014	03/2016
28	4 GHz High Pass Filter	WHKX4.0/18G-8SS	Wainwright Instruments	1	480587	Weekly verification (system cal.)	

29	Single Control Unit	SCU	Maturo GmbH	SCU/006/971107	480831	Calibration not necessary	
30	High-pass Filter	H26G40G1	Microwave Circuits, Inc.	33471	480593	Six month verification (system cal.)	
31	Temperature Test Chamber	MK 240	Binder	05-79022	480462	02/18/2014	08/2015
32	Dual - Output DC Power Supply	TOE8952	Toellner Electronic Inst.	80456	480616	Calibration not necessary	

7 REPORT HISTORY

Report Number	Date	Comment
F151496E6	16 October 2015	Document created

8 LIST OF ANNEXES

ANNEX A TEST SET-UP PHOTOS 5 pages

151496_19: Test setup - Radiated emission. Antennas terminated (fully anechoic chamber)
151496_16: Test setup - Radiated emission. Antennas terminated (fully anechoic chamber)
151496_17: Test setup - Radiated emission. Antennas terminated (fully anechoic chamber)
151496_18: Test setup - Radiated emission. Antennas terminated (fully anechoic chamber)
151496_20: Test setup – conducted emissions on power supply lines

ANNEX B EXTERNAL PHOTOGRAPHS 6 pages

151496_01.jpg: Carrier Board + EUT – Top View (Odin-W260)
151496_02.jpg: Carrier Board – Bottom View (Odin-W260)
151496_07.jpg: EUT – Top View (Odin-W260)
151496_06:jpg: Carrier Board + EUT – Top View (Odin-W262)
151496_02.jpg: Carrier Board – Bottom View (Odin-W262)
151496_08.jpg: EUT – Top View (Odin-W262)

ANNEX C INTERNAL PHOTOGRAPHS 4 pages

151496_03.jpg: EUT – Top View –Shielding removed (Odin-W260)
151496_04.jpg: EUT – Bottom View (Odin-W260)
151496_05.jpg: EUT – Top View –Shielding removed (Odin-W262)
151496_04.jpg: EUT – Bottom View (Odin-W262)