EUROFINS ETS PRODUCT SERVICE GMBH

TEST - REPORT

FCC RULES PARTS 15.E
IC RADIO STANDARDS RSS-210 Annex 9

FCC ID: V98-BWLC-V1

Model Name: BWLC

Test report no.:G0M20804-1727-C-2

ACCREDITED
Certificate #1983.01

Eurofins ETS Product Service GmbH
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1 General information

1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.
The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.
Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.
Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.
The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that is performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.
The test report may only be reproduced or published in full.
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Operator:

20.05.2008		W. Treffke	i.A.
Date	Eurofins -Lab.	Name	Signature

Technical responsibility for area of testing:

20.05.2008		K. Damm	
Date	Eurofins	Name	Signature

1.2 Testing laboratory

1.2.1 Location

EUROFINS ETS PRODUCT SERVICE GMBH
Storkower Straße 38c
D-15526 Reichenwalde b. Berlin
Germany
Telephone : +49 33631 888 00
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1.2.2 Details of accreditation status

DAR ACCREDITED TESTING LABORATORY
DAR-REGISTRATION NUMBER: DAT-P-268/08

RECOGNIZED NOTIFIED BODY EMC
REGISTRATION NUMBER: BNetzA-bS EMV-07/61

RECOGNIZED NOTIFIED BODY R&TTE
REGISTRATION NUMBER: BNetzA-bS-02/51-53

FCC FILED TEST LABORATORY
REG.-NO. 96970

A2LA ACCREDITED TESTING LABORATORY
CERTIFICATE NO. 1983.01

BLUETOOTH QUALIFICATION TEST FACILITY (BQTF)
ACCREDITED BY BLUETOOTH QUALIFICATION REVIEW BOARD

INDUSTRY CANADA FILED TEST LABORATORY
REG. NO. IC 3470

1.3 Details of approval holder

Name	: modas GmbH
Street	: Belziger Str. 69-71
Town	: 10823 Berlin
Country	: Germany
Telephone	: +49 30 230973 37
Fax	: +49 30 230973 37
Contact	: Herr Günter Rohgengel
E-Mail	: gr@modas.de

1.4 Application details

Date of receipt of application	: 11.04.2008
Date of receipt of test item	: 11.04.2008
Date of test	: 11.04.2008 – 19.05.2008

1.5 Test item

Description of test item	: WLAN Client
Type identification	: BWLC
Hardware version	: 1.0
Software version	: 1.0
Serial number	: Test sample without serial number
Photos	: See Annex A.

Technical data

Frequency band	:	5150 - 5250 MHz	5250 -5350 MHz	5470-5725 MHz	5725 – 5825 MHz
Frequency (ch A)	:	5180 MHz	5260 MHz	5500 MHz	5745 MHz
Frequency (ch B)	:	5220 MHz	5280 MHz	5600 MHz	5765 MHz
Frequency (ch C)	:	5240 MHz	5320 MHz	5700 MHz	5802 MHz
Number of channels	:	4	4	11	4

Antenna Type 1	:2 x IF Panel antenna
Antenna Gain 1	: 0 dBi
Power supply	: 5 V DC
Operating mode	: duplex
Type of modulation	: IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)

Manufacturer:
(if applicable)

Name	: modas GmbH
Street	: Belziger Str. 69-71
Town	: 10823 Berlin
Country	: Germany

1.6 Test standards

Technical standard :	FCC Parts:	15E
	IC Standards:	RSS 210 Issue 7 Annex 9

2 Technical test

2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed. ☒

or

The deviations as specified in 2.5 were ascertained in the course of the tests performed. ☐

2.2 Test environment

Temperature	: 25 °C
Relative humidity content	: 20 ... 75 %
Air pressure	: 86 ... 103 kPa

Canada: Applicants info for the User Manual

The user manual of local area network devices shall contain clear instructions on the restrictions mentioned above, namely that:

(i) the device for the band 5150-5250 MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems;

(ii) the maximum antenna gain permitted (for devices in the bands 5250-5350 MHz and 5470-5725 MHz) to comply with the e.i.r.p. limit; and

(iii) the maximum antenna gain permitted (for devices in the band 5725-5825 MHz) to comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate, as stated in section A9.2(3).

In addition, users should also be cautioned to take note that high-power radars are allocated as primary users (meaning they have priority) of the bands 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices.

2.3 Test equipment utilized

No.	Test equipment	Type	Manufacturer
ETS 0014	Log Periodical Antenna	HL 025	R & S
ETS 0253	Spectrum Analyzer	FSIQ 26	R & S
ETS 0271	Spectrum Analyzer	FSEK 30	R & S
ETS 0288	Artificial mains	ESH2-Z5	R & S
ETS 0294	Biconical antenna	HK 116	R & S
ETS 0295	LPD antenna	HL 223	R & S
ETS 0310	Anechoic chamber	AC 3	Frankonia
ETS 0311	Anechoic chamber	AC 4	Frankonia
ETS 0416	Power Supply	EX752M	TTi
ETS 0474	EMI Test Receiver	ESCS 30	R&S
ETS 0484	Radio Communication Tester	CMU 200	R&S

2.4 General test procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2003 5.2 using a 50µH LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 6.4 using a spectrum analyzer. The resolution bandwidth of the spectrum analyzer was 100 kHz for measurements below 1 GHz and RBW 1 MHz was used above 1 GHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

FORMULA OF CONVERSION FACTORS for Field strength: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBµV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:
Freq. (MHz) METER READING + ACF + CABLE LOSS (to the receiver) = FS
20 dBµV + 10.36 dB + 6 dB = 36.36 dBµV/m @3m

ANSI STANDARD C63.4-2003 6.2.1 MEASUREMENT PROCEDURES: The UUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m (non metallic table). The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to at least 10^{th} harmonic of the fundamental.
Peak readings were taken in three (3) orthogonal planes and the highest readings.
Measurements were made by Eurofins at the registered open field test site located at Storkower Str. 38c, 15526 Reichenwalde, Germany.
When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.
RF Exposure Compliance Requirements
According to FCC OET Bulletin 65 Edition 97-01 Supplement C and RSS-102 §2.5, this spread spectrum transmitter is categorically excluded from routine environmental evaluation because of the low power level, where there is a high likelihood of compliance with RF exposure standards.
The antenna used for this transceiver must not be co-located or operating in conjunction with any other antenna or transmitter.

ANTENNA & GROUND:
This unit use 2 x IF Panel Antenna.

2.5 Test results

☒ 1st test ☐ test after modification ☐ production test

SECT.	TEST CASE	FCC 47CFR PART	IC RSS-	Required	Test passed	Test failed
3	*TRANSMITTER PARAMETERS*					
3.1	RF power output conducted	15.407 (a)	210 A9.2	☒	☒	☐
3.2	RF power output radiated (EIRP)	15.407 (a)	210 A9.2	☐	☐	☐
3.3	Emission bandwidth/ occupied bandwidth	15.407 (a)	210 A9.2	☒ ☒	☒ ☒	☐ ☐
3.4	Peak power spectral density	15.407 (a)	210 A9.2	☒	☒	☐
3.5	Peak excursion of the modulation	15.407 (a)(6)	210 A9.2	☒	☒	☐
3.6	Channel Move Time / Channel Closing Transmission Time	15.407 (a)	210 A9.4	☒	☒	☐
3.7	Undesirable emission radiated	15.407(b)(1-3)	210 A9.3	☐	☐	☐
3.8	Spurious emission radiated	15.407 (b)(6)	210 A2.2	☒	☒	☐
3.9	AC power line conducted emissions	15.207	Gen 7.2.2	☒	☒	☐
3.10	Frequency stability	15.407 (g)	210 A2.1 A9.5(5)	☒	☒	☐
4	*RECEIVER PARAMETERS*					
4.1	Radiated emissions	-	Gen 7.2.3	☒	☒	☐

3. Transmitter parameters

3.1 RF power output, conducted,

Reference

FCC	CFR part 15.407 (a)(1-4)
IC	RSS-210 A8.4

Method of measurement

This measurement applies to equipment with an integral antenna and to equipment with an antenna connector and equipped with an antenna as declared by the applicant.

The power was measured with modulation (declared by the applicant).

Limits

FCC	5150-5250 MHz ≤ 50 mW or 4 dBm + 10log B 5250-5350 MHz ≤ 250 mW or 11 dBm + 10log B 5470-5725 MHz ≤ 250 mW or 11 dBm + 10log B 5725-5825 MHz ≤ 1 W or 17 dBm + 10log B B is the 26-dB emission bandwidth in MHz The maximum conducted output power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement conforming to the above definitions for the emission in question.
IC	5150-5250 MHz ≤ Limit from item 3.2 - 6 dbi 5250-5350 MHz ≤ 250 mW or 11 dBm + 10log B, whichever power is less. 5470-5725 MHz ≤ 250 mW or 11 dBm + 10log B, whichever power is less. 5725-5825 MHz ≤ 1 W or 17 dBm + 10log B, whichever power is less. B is the 99% emission bandwidth in MHz.

Test results

Test conditions	**Frequency** MHz	[mW]
T_{nom}= 25°C; V_{nom} = 5.0 V	5180	15.657
T_{nom}= 25°C; V_{nom} = 5.0 V	5220	14.445
T_{nom}= 25°C; V_{nom} = 5.0 V	5240	15.741
T_{nom}= 25°C; V_{nom} = 5.0 V	5260	10.445
T_{nom}= 25°C; V_{nom} = 5.0 V	5280	10.049
T_{nom}= 25°C; V_{nom} = 5.0 V	5320	23.710
T_{nom}= 25°C; V_{nom} = 5.0 V	5500	24.500
T_{nom}= 25°C; V_{nom} = 5.0 V	5600	17.235
T_{nom}= 25°C; V_{nom} = 5.0 V	5700	14.070
T_{nom}= 25°C; V_{nom} = 5.0 V	5745	13.762
T_{nom}= 25°C; V_{nom} = 5.0 V	5765	12.970
T_{nom}= 25°C; V_{nom} = 5.0 V	5805	15.179
Measurement uncertainty	< 3 dB	

See attached diagrams in Annex B.

Test equipment: ETS 0253, ETS 0271

3.2 RF power output, radiated,

Reference

FCC	CFR part 15.407 (a)(3)
IC	RSS-210 A8.4

Method of measurement
This measurement applies to equipment with an integral antenna and to equipment with an antenna connector and equipped with an antenna as declared by the applicant.

The power was measured with modulation (declared by the applicant).

Limits

FCC	5150-5250 MHz ≤ Limit from item 3.1 + 6 dbi 5250-5350 MHz ≤ Limit from item 3.1 + 6 dbi 5470-5725 MHz ≤ Limit from item 3.1 + 6 dbi 5725-5825 MHz ≤ Limit from item 3.1 + 6 dbi If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. If the measured transmit power is already below the limit a reduction may not be necessary
IC	5150-5250 MHz ≤ 200 mW or 10 + 10 log10 B , whichever power is less. 5250-5350 MHz ≤ 1.0 W or 17 + 10 log10 B , whichever power is less. In addition to the above requirements, devices operating in the band 5250-5350 MHz with maximum e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. elevation mask where θ is the angle above the local horizontal plane (of the earth) as shown below: (i) -13 dB(W/MHz) for $0^o \le \theta < 8^o$ (ii) -13 – 0.716 (θ-8) dB(W/MHz) for $8^o \le \theta < 40^o$ (iii) -35.9 – 1.22 (θ-40) dB(W/MHz) for $40^o \le \theta \le 45^o$ (iv) -42 dB(W/MHz) for $\theta > 45^o$ 5470-5725 MHz ≤ 1.0 W or 17 + 10 log10 B , whichever power is less. 5250-5350 MHz ≤ 4.0 W or 23 + 10 log10 B , whichever power is less. Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4 W e.i.r.p, under the same conditions as for point-to-point systems.

Test Results

Test conditions	**Frequency**	EIRP [dBm]
T_{nom}= 25°C; V_{nom} = 5.0 V	--	--
Measurement uncertainty	< 3 dB	

Comment: not required.

Test equipment: --

3.3 Emission Bandwidth / Occupied Bandwidth (99%)

Reference

FCC	CFR part 15.407 (a)
IC	RSS-210 A9.2

Method of measurement

Spectrum analyser:
RBW: 100 kHz
Span: > RBW

Limits

FCC	Emission bandwidth: For purpose of this subpart the emission bandwidth shall be determined by measuring the width of the signal between teo points, one below the carrier center frequency and one above the carrier center frequency., That are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emission bandwidth is based on the use of measurement instrumentation employing a peak detector function with aninstrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.
IC	99% Occupied Bandwidth Measurement No restriction limits. But resolutuion banwidth within band edge measurement is 1% of the 99 % occupied bandwidth.

Test results 26 dB Bandwidth

Test conditions	**Frequency** (MHz)	**[MHz]**
T_{nom}= 25°C; V_{nom} = 5.0 V	5180	26.49
T_{nom}= 25°C; V_{nom} = 5.0 V	5220	27.69
T_{nom}= 25°C; V_{nom} = 5.0 V	5240	29.60
T_{nom}= 25°C; V_{nom} = 5.0 V	5260	29.62
T_{nom}= 25°C; V_{nom} = 5.0 V	5280	24.84
T_{nom}= 25°C; V_{nom} = 5.0 V	5320	27.51
T_{nom}= 25°C; V_{nom} = 5.0 V	5500	25.49
T_{nom}= 25°C; V_{nom} = 5.0 V	5600	23.99
T_{nom}= 25°C; V_{nom} = 5.0 V	5700	23.85
T_{nom}= 25°C; V_{nom} = 5.0 V	5745	23.79
T_{nom}= 25°C; V_{nom} = 5.0 V	5765	23.71
T_{nom}= 25°C; V_{nom} = 5.0 V	5805	25.49
Measurement uncertainty	< 3 dB	

Test results occupied Bandwidth 99%

Test conditions	**Frequency** (MHz)	**(MHz]**
T_{nom}= 25°C; V_{nom} = 5.0 V	5180	18.43
T_{nom}= 25°C; V_{nom} = 5.0 V	5220	19.63
T_{nom}= 25°C; V_{nom} = 5.0 V	5240	19.83
T_{nom}= 25°C; V_{nom} = 5.0 V	5260	18.83
T_{nom}= 25°C; V_{nom} = 5.0 V	5280	19.43
T_{nom}= 25°C; V_{nom} = 5.0 V	5320	19.03
T_{nom}= 25°C; V_{nom} = 5.0 V	5500	19.43
T_{nom}= 25°C; V_{nom} = 5.0 V	5600	19.23
T_{nom}= 25°C; V_{nom} = 5.0 V	5700	19.43
T_{nom}= 25°C; V_{nom} = 5.0 V	5745	19.03
T_{nom}= 25°C; V_{nom} = 5.0 V	5765	19.03
T_{nom}= 25°C; V_{nom} = 5.0 V	5805	18.83
Measurement uncertainty	< 3 dB	

See attached diagrams in Annex C.

System receiver input bandwidth: The manufacturer declares that the receiver input bandwidth matches to the bandwidth of the transmitter signal.

Test equipment: ETS 0271

3.4 Peak power spectral density

Reference

FCC	CFR part 15.407 (a)
IC	RSS-210 A9.2

Method of measurement

The same method of determine the conducted output power shall be used to determine the power spectral density. The ratio of peak modulation envelope excursion to peak transmit power meet the 13 dB/MHz limit. The comparison between the two measured levels is made within the same 1 MHz segment.

Limits

FCC	5150-5250 MHz ≤ 4 dBm in any 1 MHz band 5250-5350 MHz ≤ 11 dBm in any 1 MHz band 5470-5725 MHz ≤ 11 dBm in any 1 MHz band 5725-5825 MHz ≤ 17 dBm in any 1 MHz band
IC	5150-5250 MHz ≤ 10 dBm EIRP in any 1 MHz band 5250-5350 MHz ≤ 11 dBm in any 1 MHz band 5470-5725 MHz ≤ 11 dBm in any 1 MHz band 5725-5825 MHz ≤ 17 dBm in any 1 MHz band

Test results

Test conditions	**Frequency** MHz	[dBm]
T_{nom}= 25°C; V_{nom} = 5.0 V	5180	-17.72
T_{nom}= 25°C; V_{nom} = 5.0 V	5220	-19.65
T_{nom}= 25°C; V_{nom} = 5.0 V	5240	-21.66
T_{nom}= 25°C; V_{nom} = 5.0 V	5260	-19.99
T_{nom}= 25°C; V_{nom} = 5.0 V	5280	-19.74
T_{nom}= 25°C; V_{nom} = 5.0 V	5320	-18.24
T_{nom}= 25°C; V_{nom} = 5.0 V	5500	-18.21
T_{nom}= 25°C; V_{nom} = 5.0 V	5600	-20.25
T_{nom}= 25°C; V_{nom} = 5.0 V	5700	-18.00
T_{nom}= 25°C; V_{nom} = 5.0 V	5745	-18.19
T_{nom}= 25°C; V_{nom} = 5.0 V	5765	-20.66
T_{nom}= 25°C; V_{nom} = 5.0 V	5805	-20.52
Measurement uncertainty	< 3 dB	

See attached diagrams in Annex D.

Test equipment: ETS 0271

3.5 Peak Excursion of the Modulation

Reference

FCC	CFR part 15.407 (a)(6)
IC	RSS-210 A9.2

Method of measurement

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specific above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test results

Test conditions	**Frequency** MHz	[dB]
T_{nom}= 25°C; V_{nom} = 5.0 V	5180	12.28
T_{nom}= 25°C; V_{nom} = 5.0 V	5220	11.43
T_{nom}= 25°C; V_{nom} = 5.0 V	5240	11.76
T_{nom}= 25°C; V_{nom} = 5.0 V	5260	11.13
T_{nom}= 25°C; V_{nom} = 5.0 V	5280	11.52
T_{nom}= 25°C; V_{nom} = 5.0 V	5320	11.64
T_{nom}= 25°C; V_{nom} = 5.0 V	5500	11.89
T_{nom}= 25°C; V_{nom} = 5.0 V	5600	11.81
T_{nom}= 25°C; V_{nom} = 5.0 V	5700	11.62
T_{nom}= 25°C; V_{nom} = 5.0 V	5765	11.80
T_{nom}= 25°C; V_{nom} = 5.0 V	5745	11.74
T_{nom}= 25°C; V_{nom} = 5.0 V	5805	11.46
Measurement uncertainty	< 3 dB	

See attached diagrams in Annex E.

Test equipment: ETS 0271

3.6 Channel closing Transmission Time and Channel Move Time

The UUT is a U-NII Device operating in Client mode without radar detection. Radar detection is provided by the master device.

Agency	Channel Move Time (sec)	Limit (sec)
FCC/IC	0.544 ms	10

	Channel Closing Transmission Time (sec)	Limit (msec)
before 200 ms	18 ms	10
after 200 ms	8 ms	

See attached diagrams in Annex F.

Test equipment: ETS 0271

3.7 Undesirable emission radiated

Reference

FCC	CFR part 15.407(b) (1-3)
IC	RSS-210 A9.3

Method of measurement

The EUT is connected to the spectrum analyzer via a low loss cable.

The analyzer setting was as following:

Frequency range	RES bandwidth		Video bandwidth	
	Pk	Avg	Pk	Avg
		-		-
40 >f > 1GHz	1 MHz	1 MHz	> 1 MHz	> 1 MHz

Undesirable emission limits: Except as shown in paragraph 15.407(b)(6), the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits. These limits are on the Effective Isotropic Radiated Transmit Power. The same measurement settings used to measure the transmit power of the fundamental emission may be used here. Within the passband of the antenna an RF conducted measurement may be made. This level, added to the stated antenna gain for each proposed antenna, must comply with the limit.

The ratio of peak modulation envelope excursion to peak transmit power meet the 13 dB/MHz limit. The comparison between the two measured levels is made within the same 1 MHz segment..

Limits

FCC	5150-5250 MHz	an EIRP ≤ -27 dBm/MHz band
	5250-5350 MHz	an EIRP ≤ -27 dBm/MHz band
	5470-5725 MHz	an EIRP ≤ -27 dBm/MHz band
	5725-5825 MHz	an EIRP ≤ -17 dBm/MHz band from band edge to 10 MHz above or below the band edge
		an EIRP ≤ -27 dBm/MHz band for all other out of band emissions
IC	5150-5250 MHz	an EIRP ≤ -27 dBm/MHz band
	5250-5350 MHz	an EIRP ≤ -27 dBm/MHz band
	5470-5725 MHz	an EIRP ≤ -27 dBm/MHz band
	5725-5825 MHz	an EIRP ≤ -17 dBm/MHz band from band edge to 10 MHz above or below the band edge
		an EIRP ≤ -27 dBm/MHz band for all other out of band emissions

Test results

Transmitter operates				
Frequency	**Result [dBm]**	**Limit [dBm]**	**Margin [dB]**	**Reference level [dBm]**
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--

Test equipment: --

3.8 Spurious emission radiated

Reference

FCC	CFR part 15.407(b)(5), 15.205. 15.209, 15.35
IC	RSS-210 A8.5

Method of measurement

Spurious emission was measured with modulation (declared by manufacturer).

According to 47 CFR 15, Part 15.247 (d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.
If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.
In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Sample Calculation of Limit:
All results are updated by an automatic measuring system in accordance to point 2.3

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results.

The peak and average spurious emission plots was measured with the average limits.
In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

If in the column‘s correction factor states a value then the max. Field strength in the same row is corrected by a value gained from the “Marker-Delta-Method“ or the „Duty-Cycle Correction Factor“.

15.35 (c) average value
When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed o.1 seconds.

Duty cycle correction = 20 log (dwell time / pulse-train time of 100 ms or less)

The radiated emission measurements were performed from 30 MHz to 40 GHz.
The analyzer setting was as following:

Frequency range	RES bandwidth		Video bandwidth	
	Pk	Avg	Pk	Avg
f < 1GHz	100 kHz	-	100 kHz	-
f > 1GHz	1 MHz	1 MHz	1 MHz	1MHz

Limits

FCC	20 dB below peak output power, emissions which fall in the restricted bands (15.205(a)) must comply the following limits: Frequencies below 1GHz: Frequency of emission [MHz] / Field strength [µV / m] / Field strength [dBµV / m] 30 – 88 / 100 / 40.0 88 – 216 / 150 / 43.5 216 – 960 / 200 / 46.0 Above 960 / 500 / 54.0 For frequencies above 1 GHz (Avg measurements): 54.0 dBµV / m For frequencies above 1 GHz (Pk measurements): Limit + 20 dB = 54.0 dBµV / m + 20 dB = 74 dBµV / m
IC	20 dB below peak output power, emissions which fall in the restricted bands of table 1 (RSS-210 §2.7)must also comply with limits specified in tables 2 and 3

Test results

Summary table with radiated data of the test plots Antenna 1

Freq.	Used Ch.	Frequency Marker [GHz]	Polari-zation	Δ corrections dB	Max. Field Strength [dBµV/m]	Compliance Limit [dBµV/m]	Detec-tor	BW [MHz]	Margin [dB]
4	36	5.148	V		59.62	74	P	1	-14.38
4	36	5.148	V		39.59	54	AV	1	-14.41
4	36	5.148	H		59.34	74	P	1	-14.66
4	36	5.148	H		40.63	54	AV	1	-13.37
6	44	15.667	V		55.39	74	P	1	-18.61
6	44	15.657	V		38.41	54	AV	1	-15.59
6	48	15.717	V		57.18	74	P	1	-16.82
6	48	15.717	V		38.39	54	AV	1	-15.61
6	52	15.778	H		57.09	74	P	1	-16.91
6	52	15.788	H		37.98	54	AV	1	-16.02
6	52	15.778	V		58.42	74	P	1	-15.58
6	52	15.788	V		39.10	54	AV	1	-14.90
6	56	15.848	V		60.74	74	P	1	-13.26
6	56	15.838	V		41.39	54	AV	1	-12.61
6	56	15.848	H		55.37	74	P	1	-18.63
6	56	15.838	H		37.85	54	AV	1	-16.15
4	64	5.350	H		63.17	74	P	1	-10.83
4	64	5.350	H		43.16	54	AV	1	-10.-84
4	64	5.350	V		64.41	74	P	1	-9.59
4	64	5.350	V		44.28	54	AV	1	-9.72
6	64	15.958	V		58.91	74	P	1	-15.09
6	64	15.968	V		41.88	54	AV	1	-12.12
4	100	5.458	V		59.42	74	P	1	-14.58
4	100	7.334	V		56.82	74	P	1	-17.18
4	100	5.458	V		36.75	54	AV	1	-17.25
4	100	7.334	V		42.07	54	AV	1	-11.93
5	100	10.998	V		58.46	74	P	1	-15.54

Freq.	Used Ch.	Frequency Marker [GHz]	Polari-zation	Δ corrections dB	Max. Field Strength [dBµV/m]	Compliance Limit [dBµV/m]	Detec-tor	BW [MHz]	Margin [dB]
5	100	11.006	V		38.47	54	AV	1	-15.53
4	100	5.458	H		55.96	74	P	1	-18.04
4	100	7.334	H		55.13	74	P	1	-18.87
4	100	5.458	H		37.13	54	AV	1	-16.87
4	100	7.334	H		41.30	54	AV	1	-12.70
5	120	11:198	V		71.75	74	P	1	-2.25
5	120	11.198	V		51.93	54	AV	1	-2.07
5	120	11.206	H		65.73	74	P	1	-8.27
5	120	11.198	H		46.79	54	AV	1	-7.21
5	120	11.206	V		69.79	74	P	1	-4.21
5	120	11.206	V		48.98	54	AV	1	-5.02
5	120	11.198	H		65.19	74	P	1	-8.81
5	120	11.198	H		46.25	54	AV	1	-7.75

See attached diagrams in Annex G.

Freq. – Frequency Range:

1: 30 – 200 MHz
2: 200 – 1000 MHz
3: 1 – 4 GHz
4: 4 – 8 GHz
5: 8 – 12 GHz
6: 12 – 17 GHz
7: 17 – 40 GHz

All other not noted test plots do not contain significant test results in relation to the limits.

Test equipment: ETS 0012, ETS 0013, ETS 0015, ETS 0018, ETS 0271, ETS 0253, ETS 0311

3.9 AC power line conducted emissions

Reference

FCC	CFR part 15.207
IC	RSS-Gen 7.2.2

Method of measurement

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

Limits

	Frequency of emission	Conducted limit field strength [dBµV]	
	[MHz]	Quasi Peak	Avg
FCC & IC	0.15 - 0.5	66 to 56	56 - 46
	0.5 - 5	56	46
	5 - 30	60	50

Test results

Frequency	Level	
	Quasi-peak	Average
150 kHz	Lower limit line	Lower limit line

See attached diagrams in Annex H.

Test equipment: ETS 0288, ETS 0474

3.10 Frequency Stability

Reference

FCC	CFR part 15.407(b)(5) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.
IC	RSS-210 I7 A2.1 The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. When the carrier frequency stability is not specified, it need not be tested, provided that the carrier frequency is chosen such that the fundamental modulation products (meaning the nominal bandwidth) lie totally within the bands listed in Tables 2 and do not fall into any restricted band listed in Table 1. Due account shall be taken of carrier frequency drift as a result of aging, temperature, humidity, and supply voltage variations when using frequencies near the band edges.

Limits:

UNII lower band	5150 MHz ≤ f ≤ 5250 MHz
UNII middle band	5250 MHz ≤ f ≤ 5350 MHz
	5470 MHz ≤ f ≤ 5725 MHZ
UNII Upper band	5725 MHz ≤ f ≤ 5825 MHz

Test results:

Technical characteristics		5180 MHz	5220 MHz	5240 MHz
25 °C	V_{min}	5179.988	5219.983	5239.990
	V_{max}	5180.01	5219.978	5240.005
-10 °C	V_{nom}	5180.066	--	5240.058
60 °C	V_{nom}	5179.99	--	5239.985

Technical characteristics		5260 MHz	5280 MHz	5320 MHz
25°C	V_{min}	5259.983	5279.975	5319.97
	V_{max}	5259.978	5279.975	5319.966
-10°C	V_{nom}	5260.052	--	5320.058
60°C	V_{nom}	5259.984	--	5319.965

Technical characteristics		5500 MHz	5600 MHz	5700 MHz
25°C	V_{min}	5499.982	5599.963	5699.969
	V_{max}	5499.977	5599.964	5699.981
-10°C	V_{nom}	5500.068	--	5700.059
60°C	V_{nom}	5499.975	--	5699.978

Technical characteristics		5745 MHz	5765 MHz	5805 MHz
25°C	V_{min}	5744.990	5764.985	5804.969
	V_{max}	5744.994	5764.974	5804.981
-10°C	V_{nom}	5745.059	--	5805.054
60°C	V_{nom}	5744.979	--	5804.961

Test equipment: ETS 0288, ETS 0474

4 Receiver parameters

4.1 Radiated emissions

Reference

FCC	-
IC	RSS-Gen 7.2.3

Method of measurement

The compliance of the EUT Receiver with the Limits of spurious emissions was performed according to the radiated measurement method.

The spectrum analyser RBW was set to 100 kHz for measurements below 100 kHz and 1.0 MHz above 1.0 GHz. The measurement results are evaluated according to the procedure described in section 2.5 of this test report.

Limits

	Spurious frequency MHz	Field strength microvolt/m at 3 metre
IC	30 – 88 88 – 216 216 – 960 above 960	100 150 200 500

Test Results

Frequency MHz	Frequency marker indication [MHz]	Antenna polarization	Worst case emission level [µV/m]	Compliance limit [µV/M]	Results
5220	33,778	V	46,34	100	-53,66
5280	33,780	V	47,70	100	-52,30
5600	33,778	V	47,97	100	-52,03
5765	33,778	V	45,92	100	-54,08
5220	1246,000	V	295,80	500	-204,20

See attached diagrams in Annex I.

Test equipment: ETS 0014, ETS 0294, ETS 0295, ETS 0310, ETS 0416, ETS 0484

Annex

A	Pictures	9 pages
B	RF power output conducted	12 pages
C	Emission bandwidth / Occupied bandwidth	24 pages
D	Peak power spectral density	12 pages
E	Peak Excursion of the modulation	12 pages
F	Channel Move Time and Channel Closing Transmission Time	1 pages
G	Spurious emission radiated	177 pages
H	AC power line conducted emissions	2 page
I	Receiver radiated emissions	56 pages