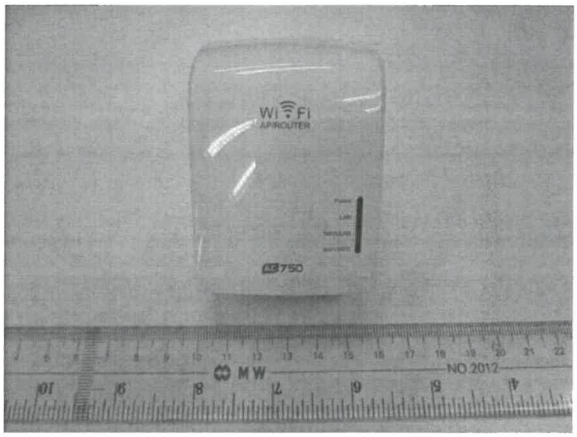
Produkte
Products

Prüfbericht *Test report*		**Auftragsnr.** / *order no.:* **144099556** **Berichtsnr.** / *report no.:* **14043594 001A**	
Auftraggeber *client:*	**Supra Foto Elektronik Vertriebs GmbH** Denisstraße 28A D-67663 Kaiserslautern Germany	**Auftragsdatum** / *date of order:* **AG-Referenz-Nr.** / *client reference no.:*	**01.02.2016** **Contract No.: IB-2016-1454**
Inhalt des Auftrags *content of order:*	**FCC PART 15**		
Prüfgrundlagen *test specifications:*	**FCC Part 15 Subpart C** **ANSI C63.10-2013**		
Prüfgegenstand *test item:*	**WLAN Repeater**	**EAN-Nr.** / *no.:* **N/A**	

Bezeichnung *identification:*	**Maginon WLR-755 AC**
Eingang Prüfgegenstand *receipt of test item:*	**20.04.2016**
Prüfgegenstands-Nr. *test item no.:*	**A000348257-001**
Prüfzeitraum und –ort *period of test and location:*	**20.04.2016 – 27.05.2016** **Hong Kong**
Prüflaboratorium *testing laboratory:*	**TÜV Rheinland (Hong Kong) Ltd.**
Prüfergebnis *test result* *):	***Pass***



Sonstiges / *Other aspects:*

geprüft/ *tested by:*			**kontrolliert**/ *reviewed by:*		
13.06.2016	Benny Lau / Senior Project Manager		13.06.2016	Thomas Berns / Certifier	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

*) Legende möglicher Prüfergebnisse: „1=sehr gut, 2=gut, 3=befriedigend, 4=ausreichend, 5=mangelhaft, p=passed, f=failed“ / *Legend of various test results: „1=very good, 2=good, 3=satisfactory, 4=sufficient, 5=poor*, p=passed, f=failed

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Prüfbericht - Nr.: *Test Report No.:*	**14043594 001**	**Seite 1 von 21** *Page 1 of 21*

Auftraggeber: *Client:*	**Supra Foto-Elektronik-Vertriebs-GmbH** **Denisstraße 28A** **D-67663 Kaiserslautern** **Germany**
Gegenstand der Prüfung: *Test Item:*	**WLAN Repeater**
Bezeichnung: *Identification:*	**Maginon WLR-755 AC**
Serien-Nr.: *Serial No.:*	**Engineering sample**
Wareneingangs-Nr.: *Receipt No.:*	**A000348257-001**
Eingangsdatum: *Date of Receipt:*	**20.04.2015**
Prüfort: *Testing Location:*	**TÜV Rheinland Hong Kong Ltd.** 8/F, First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong **Hong Kong Productivity Council** HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of test item at delivery:*	Test samples are not damaged and suitable for testing.
Prüfgrundlage: *Test Specification:*	**FCC Part 15 Subpart C** **ANSI C63.10-2013**
Prüfergebnis: *Test Results:*	**Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.** The above mentioned product was tested and **passed**.
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Hong Kong Ltd.** 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong

geprüft/ *tested by:*			**kontrolliert/** *reviewed by:*		
13.06.2016	Benny Lau Senior Project Manager		13.06.2016	Sharon Li Department Manager	
Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*

Sonstiges:
Other Aspects

FCC ID: Z5CWLR-755

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

Table of Content

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Product information

Manufacturers declarations

	WIFI Transceiver
Operating frequency range	2412 - 2462 MHz
Type of modulation	802.11b: DSSS (DBPSK/DQPSK/CCK) 802.11n: OFDM (BPSK/QPSK/16QAM/64QAM)
Number of channels	11 (20MHz Bandwidth) 9 (40MHz Bandwidth)
Channel separation	5 MHz
Type of antenna	Integral PIFA Antenna
Antenna 0 gain	3 dBi
Antenna 1 gain	3 dBi
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	Yes
Nominal voltage	V_{nor}: 100 to 240 VAC
Independent Operation Modes	Transmitting mode

Product function and intended use

The Equipment Under Test (EUT) is a wireless LAN repeater which is powered by 100 to 240VAC. It supports IEEE 802.11 b/g/n (2.4GHz) and IEEE 802.11a/n (5GHz) wireless LAN communication function.

FCC ID: Z5CWLR-755

Models	Product description
Maginon WLR-755 AC	WLAN Repeater

Submitted documents

Circuit Diagram
Block Diagram
User manual
Label

Independent Operation Modes

The basic operation modes are:

- Transmitting mode.

For further information refer to User Manual

Related Submittal(s) Grants

This is a single application for certification of the 2.4GHz WIFI transmitter.
The 5GHz WIFI portion is authorized under the certification procedure and refer to test report 50045765 001 issued by TÜV Rheinland Taiwan Ltd on 01.06.2016.
The other digital device portion is authorized under the verifcation procedrue and refer to the test report 14044065 001 issued by TÜV Rheinland HK Ltd on 26.05.2016.

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- Special software is provided by the grantee to set the device to operate in a fixed frequency channel and maximum RF output power level. The RF output power was selected according to the instruction given by the manufacturer. The setting of the RF output power and channel shall be fixed on the firmware of the final end product.

- Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate. Simultaneous transmission was investigated, no additional spurious emission was found from 9kHz to 25GHz.

Special Accessories and Auxiliary Equipment

- none

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

The investigation is performed with the EUT rotated 360°, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

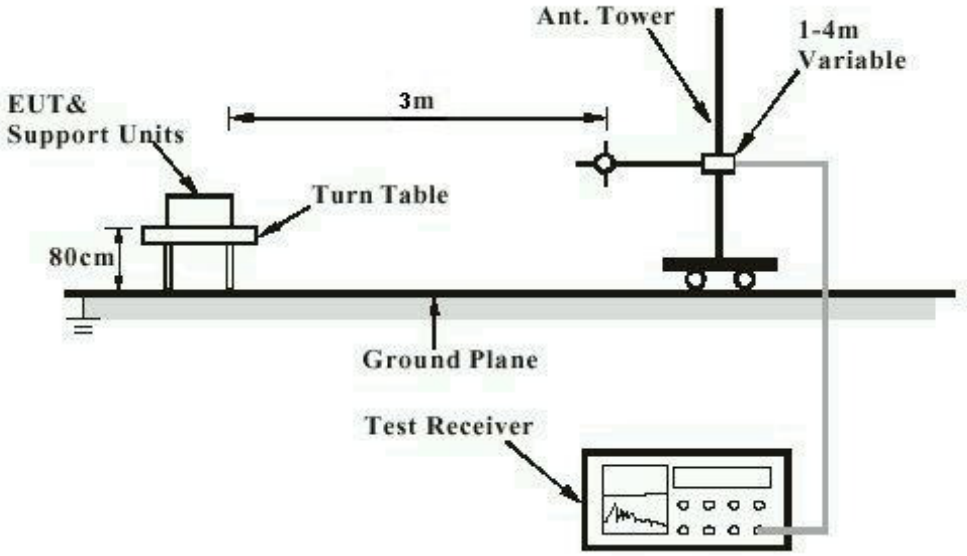
FS = R + AF + CF + FA – PA

Where FS = Field Strength in dBuV/m at 3 meters.
R = Reading of Spectrum Analyzer in dBuV.
AF = Antenna Factor in dB.
CF = Cable Attenuation Factor in dB.
FA = Filter Attenuation Factor in dB.
PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

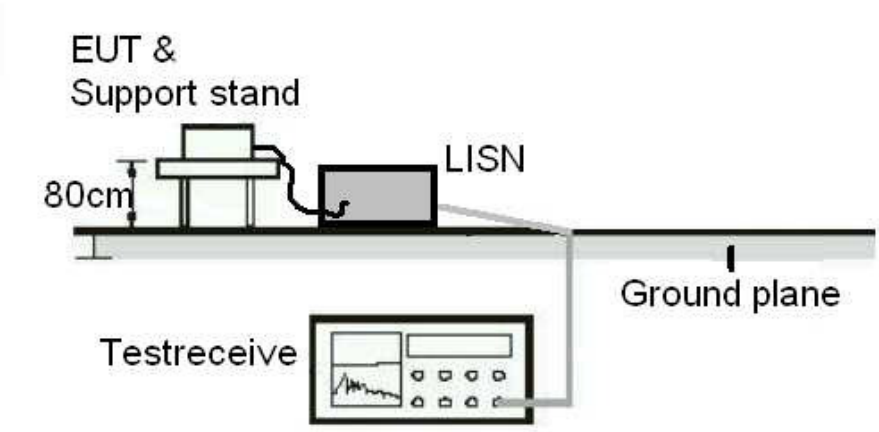
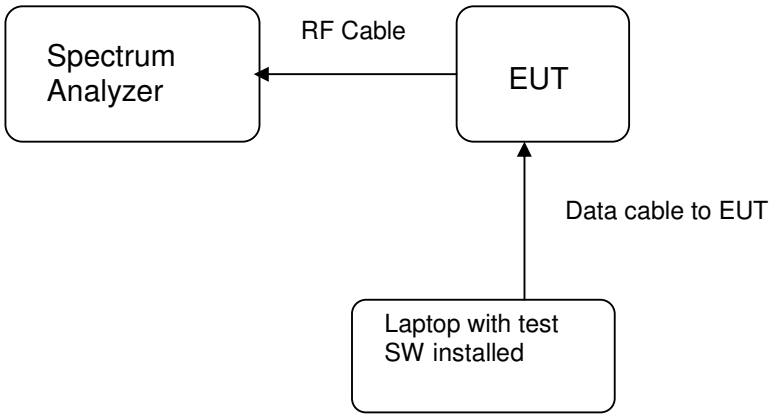


Diagram of Equipment Configuration for Antenna-port Conducted Measurement (if applicable)



List of Test and Measurement Instruments

Hong Kong Productivity Council (FCC Registration number: 90656)

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	25-Apr-16	25-Apr-17
New Fully Ancheonic Chamber	TDK	N/A	19-Apr-16	19-Apr-17
Cable	Hubersuhner	SUCOFLEX 104	31-Mar-16	31-Mar-18
Test Receiver	R & S	ESU26	07-Dec-15	07-Dec-16
Bi-conical Antenna	R & S	HK116	01-Sep-15	01-Sep-17
Log Periodic Antenna	R & S	HL223	01-Sep-15	01-Sep-17
Coaxial cable	Harbour	LL335	10-Jun-14	10-Oct-16
Microwave amplifer 0.5-26.5GHz, 25dB gain	HP	83017A	17-Jul-14	17-Jul-16
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	28-Oct-15	28-Oct-17
Horn Antenna	EMCO	3115	26-Aug-15	26-Aug-17
Active Loop Antenna	EMCO	6502	15-Aug-15	15-Aug-16

AC Mains Conducted Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Test Receiver	R & S	ESU40	07-Dec-15	07-Dec-16
RF Voltage Probe	Schwarzbeck	TK9416	10-Feb-16	10-Feb-17
LISN	R&S	ESH3-Z5	15-Jun-15	15-Jun-16
Double Shield Cable	Radiall	RG142	14-Sep-15	14-Sep-17
Pulse Limiter	R&S	ESH3-Z2	04-Jun-14	04-Jun-16

TÜV Rheinland Hong Kong Ltd

Radio Test

Equipment	Manufacturer	Type	Cal. Date	Due Date
Spectrum Analyzer	R & S	FSP30	19-Jan-16	19-Jan-17
Power meter	Dijkstra Advice, Research & EMC Instruments B.V.	RPR3006W	08-Jul-15	08-Jul-16

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is ±3.43dB.

The estimated combined standard uncertainty for radiated emissions measurements is ±5.10dB (30MHz to 200MHz) and ±5.08dB (200MHz to 1000MHz) and is ±5.10dB (30MHz to 200MHz) and ±5.08dB (above 1GHz).

The estimated combined standard uncertainty for antenna conducted emission is ±1.56dB

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart C

FCC 15.203 – Antenna Requirement 1		**Pass**
FCC Requirement:	No antenna other than that furnished by the responsible party shall be used with the device	
Results:	a) Antenna type:	Integral PIFA antenna
	b) Manufacturer and model no:	N/A
	c) Peak Gain:	Ant 0 = 3 dBi; Ant 1 =3dBi
	d) Directional gain:	3 + 10log(2) =6.01dBi
Verdict:	Pass	

FCC 15.204 – Antenna Requirement 2	**N/A**
FCC Requirement:	An intentional radiator may be operated only with the antenna with which it is authorized. If an antenna is marketed with the intentional radiator, it shall be of a type which is authorized with the intentional radiator.
Results:	Only the integral antennas can be used, they are fixed.
Verdict:	N/A

FCC 15.207 – Conducted Emission on AC Mains **Pass**

Test Specification : ANSI C63.10 – 2013
Mode of operation : TX mode
Port of testing : AC Mains input port of power supply
Detector : Quasi-peak and Average
RBW : 9 kHz
Supply voltage : 120Vac 60Hz
Temperature : 23ºC
Humidity : 50%

Requirement: 15.207(a)

Results: Pass

802.11b - Live measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.181	41.3	25.3	66 - 56	56 - 46	Pass
> 0,5 – 5	1.050	41.0	27.8	56	46	Pass
> 5 – 30	No peak found	---	---	60	50	Pass

802.11b - Neutral measurement

Frequency range (MHz)	Frequency (MHz)	Quasi-peak dBµV	Average dBµV	Limit QP (dBµV)	Limit AV (dBµV)	Verdict
0,15 – 0,5	0.424	39.0	28.4	66 - 56	56 - 46	Pass
> 0,5 – 5	1.047	37.7	26.1	56	46	Pass
> 5 – 30	No peak found	---	---	60	50	Pass

802.11g - Live measurement						
Frequency range (MHz)	**Frequency (MHz)**	**Quasi-peak dBµV**	**Average dBµV**	**Limit QP (dBµV)**	**Limit AV (dBµV)**	**Verdict**
0,15 – 0,5	0.171	44.3	26.4	66 - 56	56 - 46	Pass
> 0,5 – 5	1.050	40.4	27.0	56	46	Pass
> 5 – 30	No peak found	---	---	60	50	Pass
802.11g - Neutral measurement						
Frequency range (MHz)	**Frequency (MHz)**	**Quasi-peak dBµV**	**Average dBµV**	**Limit QP (dBµV)**	**Limit AV (dBµV)**	**Verdict**
0,15 – 0,5	0.177	41.1	31.4	66 - 56	56 - 46	Pass
> 0,5 – 5	1.047	38.5	26.4	56	46	Pass
> 5 – 30	No peak found	---	---	60	50	Pass
802.11n20 - Live measurement						
Frequency range (MHz)	**Frequency (MHz)**	**Quasi-peak dBµV**	**Average dBµV**	**Limit QP (dBµV)**	**Limit AV (dBµV)**	**Verdict**
0,15 – 0,5	0.190	42.1	24.9	66 - 56	56 - 46	Pass
> 0,5 – 5	1.047	40.8	26.9	56	46	Pass
> 5 – 30	No peak found	---	---	60	50	Pass
802.11n20 - Neutral measurement						
Frequency range (MHz)	**Frequency (MHz)**	**Quasi-peak dBµV**	**Average dBµV**	**Limit QP (dBµV)**	**Limit AV (dBµV)**	**Verdict**
0,15 – 0,5	0.192	41.6	25.2	66 - 56	56 - 46	Pass
> 0,5 – 5	1.047	40.9	28.0	56	46	Pass
> 5 – 30	No peak found	---	---	60	50	Pass
802.11n40 - Live measurement						
Frequency range (MHz)	**Frequency (MHz)**	**Quasi-peak dBµV**	**Average dBµV**	**Limit QP (dBµV)**	**Limit AV (dBµV)**	**Verdict**
0,15 – 0,5	0.460	38.9	24.4	66 - 56	56 - 46	Pass
> 0,5 – 5	1.047	40.3	25.7	56	46	Pass
> 5 – 30	No peak found	---	---	60	50	Pass
802.11n40 - Neutral measurement						
Frequency range (MHz)	**Frequency (MHz)**	**Quasi-peak dBµV**	**Average dBµV**	**Limit QP (dBµV)**	**Limit AV (dBµV)**	**Verdict**
0,15 – 0,5	0.464	39.0	29.8	66 - 56	56 - 46	Pass
> 0,5 – 5	1.050	39.4	26.3	56	46	Pass
> 5 – 30	No peak found	---	---	60	50	Pass

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.

The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150kHz to 30MHz does not exceed the limits. For test Results plots refer to Appendix 1.

FCC 15.247 (a)(2) – 6dB Bandwidth Measurement	Pass

FCC Requirement: Systems using digital modulation techniques may operate in the 902 – 928 MHz, 2400 – 2483.5 MHz, and 5725 – 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500kHz.

Test Specification : ANSI C63.10 – 2013
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100KHz/ 300KHz
Supply voltage : 3.7 Vdc
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1

Limit: At least 500 kHz

802.11b

Channel frequency (MHz)	Antenna 0 6dB bandwidth (kHz)	Antenna 1 6dB bandwidth (kHz)	Verdict
2412	9040	N/A*	Pass
2437	9360	N/A*	Pass
2462	9400	N/A*	Pass

802.11g

Channel frequency (MHz)	Antenna 0 6dB bandwidth (kHz)	Antenna 1 6dB bandwidth (kHz)	Verdict
2412	1520	N/A*	Pass
2437	1520	N/A*	Pass
2462	1520	N/A*	Pass

802.11n20

Channel frequency (MHz)	Antenna 0 6dB bandwidth (kHz)	Antenna 1 6dB bandwidth (kHz)	Verdict
2412	1520	1520	Pass
2437	1516	1505	Pass
2462	1516	1520	Pass

802.11n40

Channel frequency (MHz)	Antenna 0 6dB bandwidth (kHz)	Antenna 1 6dB bandwidth (kHz)	Verdict
2422	3550	3520	Pass
2437	3540	3533	Pass
2452	3550	3530	Pass

Remark *) Manufacturer declare that only antenna 0 will transmit at 802.11b and 802.11g mode

FCC 15.247(b)(3) – Maximum Peak Couducted Output Power **Pass**

FCC Requirement: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt (30dBm)

Test Specification : ANSI C63.10 – 2013
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
Supply voltage : 3.7 Vdc
Temperature : 23ºC
Humidity : 50%

802.11b

Frequency (MHz)	Antenna 0 Conducted Output Power (dBm)	Antenna 1 Conducted Output Power (dBm)	Cable loss (dB)	Resultant Output power (dBm)	Limit (dBm)	Verdict
2412	20.59	N/A*	1.25	21.84	30.0	Pass
2437	20.15	N/A*	1.25	21.40	30.0	Pass
2462	20.73	N/A*	1.25	21.98	30.0	Pass

802.11g

Frequency (MHz)	Antenna 0 Conducted Output Power (dBm)	Antenna 1 Conducted Output Power (dBm)	Cable loss (dB)	Resultant Output power (dBm)	Limit (dBm)	Verdict
2412	24.31	N/A*	1.25	25.56	30.0	Pass
2437	24.00	N/A*	1.25	25.25	30.0	Pass
2462	23.75	N/A*	1.25	25.00	30.0	Pass

802.11n20

Frequency (MHz)	Antenna 0 Conducted Output Power (dBm)	Antenna 1 Conducted Output Power (dBm)	Cable loss (dB)	Resultant Output power (dBm)	Limit (dBm)	Verdict
2412	24.26	25.91	1.25	29.42	29.99	Pass
2437	23.91	25.21	1.25	28.87	29.99	Pass
2462	23.88	24.80	1.25	28.62	29.99	Pass

802.11n40

Frequency (MHz)	Antenna 0 Conducted Output Power (dBm)	Antenna 1 Conducted Output Power (dBm)	Cable loss (dB)	Resultant Output power (dBm)	Limit (dBm)	Verdict
2422	22.30	24.10	1.25	27.55	29.99	Pass
2437	21.92	23.52	1.25	27.05	29.99	Pass
2452	21.76	23.44	1.25	26.94	29.99	Pass

Remark *) Manufacturer declare that only antenna 0 will transmit at 802.11b and 802.11g mode

FCC 15.247(e) – Power Spectral Density	Pass

FCC Requirement: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Specification : ANSI C63.10 – 2013
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : ≥3 kHz / ≥3xRBW
span : ≥1.5 x DTS BW
Supply voltage : 3.7 Vdc
Temperature : 23ºC
Humidity : 50%

Results: For test protocols please refer to Appendix 1.

802.11b

Operating frequency (MHz)	Ant 0 Power density (dBm)	Ant 1 Power density (dBm)	Cable loss (dB)	Resultant Power density (dBm)	Limit (dBm)	Verdict
2412	5.18	N/A*	1.25	6.43	8.0	Pass
2437	5.74	N/A*	1.25	6.99	8.0	Pass
2462	5.43	N/A*	1.25	6.68	8.0	Pass

802.11g

Operating frequency (MHz)	Ant 0 Power density (dBm)	Ant 1 Power density (dBm)	Cable loss (dB)	Resultant Power density (dBm)	Limit (dBm)	Verdict
2412	1.72	N/A*	1.25	2.97	8.0	Pass
2437	1.83	N/A*	1.25	3.08	8.0	Pass
2462	1.24	N/A*	1.25	2.49	8.0	Pass

802.11n20

Operating frequency (MHz)	Ant 0 Power density (dBm)	Ant 1 Power density (dBm)	Cable loss (dB)	Resultant Power density (dBm)	Limit (dBm)	Verdict
2412	2.03	3.49	1.25	7.75	8.0	Pass
2437	1.95	2.77	1.25	7.03	8.0	Pass
2462	1.47	2.44	1.25	6.70	8.0	Pass

802.11n40

Operating frequency (MHz)	Ant 0 Power density (dBm)	Ant 1 Power density (dBm)	Cable loss (dB)	Resultant Power density (dBm)	Limit (dBm)	Verdict
2422	1.37	3.05	1.25	7.31	8.0	Pass
2437	0.92	2.46	1.25	6.72	8.0	Pass
2452	0.58	2.36	1.25	6.62	8.0	Pass

Remark *) Manufacturer declare that only antenna 0 will transmit at 802.11b and 802.11g mode

FCC 15.247(d) – Spurious Conducted Emissions **Pass**

Test Specification : ANSI C63.10 – 2013
Mode of operation : TX mode
Port of testing : Temporary antenna port
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz
Supply voltage : 3.7 Vdc
Temperature : 23 ºC
Humidity : 50 %

FCC Requirement: 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.

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.

Only the worst cases is shown below. For test protocols refer to Appendix 1

802.11b

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2412	2397.500	-23.70	7.64	-31.34	Pass
2437	4890.000	-40.55	7.71	-48.26	Pass
2462	24592.000	-32.23	7.16	-39.39	Pass

802.11g

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2412	2399.900	-20.28	7.14	-27.42	Pass
2437	9260.000	-42.47	6.73	-49.20	Pass
2462	2483.600	-38.00	6.68	-44.68	Pass

802.11n20 Ant 0

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2412	2399.880	-19.15	6.80	-25.95	Pass
2437	7440.000	-42.35	6.69	-49.04	Pass
2462	2483.500	-36.49	6.71	-43.20	Pass

802.11n20 Ant 1

Operating frequency (MHz)	Spurious frequency (MHz)	Spurious Level (dBm)	Reference value (dBm)	Delta (dB)	Verdict
2412	2399.990	-14.18	8.52	-22.70	Pass
2437	9240.000	-42.38	7.21	-49.59	Pass
2462	2483.600	-29.53	6.86	-36.39	Pass

802.11n40 Ant 0					
Operating frequency (MHz)	**Spurious frequency (MHz)**	**Spurious Level (dBm)**	**Reference value (dBm)**	**Delta (dB)**	**Verdict**
2422	2399.480	-37.00	1.37	-38.37	Pass
2437	9960.000	-31.72	0.92	-32.64	Pass
2452	2485.800	-33.21	0.58	-33.79	Pass
802.11n40 Ant 1					
Operating frequency (MHz)	**Spurious frequency (MHz)**	**Spurious Level (dBm)**	**Reference value (dBm)**	**Delta (dB)**	**Verdict**
2422	2399.500	-32.09	3.05	-35.14	Pass
2437	2400.000	-36.38	2.46	-38.84	Pass
2452	2484.900	-36.40	2.36	-38.76	Pass

FCC 15.205 – Radiated Emissions in Restricted Frequency Bands **Pass**

Test Specification : ANSI C63.10 – 2013
Mode of operation : TX mode
Port of testing : Enclosure
Detector : Peak
RBW/VBW : 100 kHz / 300 kHz for f < 1 GHz
1 MHz / 3 MHz for f > 1 GHz
Supply voltage : 3.7 Vdc
Temperature : 23ºC
Humidity : 50%

FCC Requirement: In any 100kHz bandwidth outside the frequency band at least 20dB below the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in section15.205(a), must also comply with the radiated emission limits specified in section 15.205(c).

Results: Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.

All three transmit frequency modes comply with the field strength within the restricted bands. There is no spurious found below 30MHz.

Mode: 802.11b 2412MHz TX Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
60.225	33.60	40.0 / QP
2390.000	51.30	74.0 / PK
2390.000	38.68	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Mode: 802.11b 2412MHz TX Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
2390.000	51.68	74.0 / PK
2390.000	39.96	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Mode: 802.11b 2437 MHz TX Vertical Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
54.149	33.5	40.0 / QP
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Mode: 802.11b 2437 MHz TX Horizontal Polarization

Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Mode: 802.11b 2462 MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	53.08	74.0 / PK
2483.500	41.50	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11b 2462 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
55.890	30.9	40.0 / QP
2483.500	52.92	74.0 / PK
2483.500	41.30	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11g 2412MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
55.982	31.1	40.0 / QP
2390.000	67.62	74.0 / PK
2390.000	48.21	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11g 2412MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2390.000	67.93	74.0 / PK
2390.000	47.48	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11b 2437 MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
81.17	30.9	40.0/ QP
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11g 2437 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11g 2462 MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
55.981	33.9	40.0 / QP
2483.500	63.15	74.0 / PK
2483.500	44.93	54.0 / AV
No peak found	---	74.0 / PK

No peak found	---	54.0 / AV
Mode: 802.11g 2462 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	66.42	74.0 / PK
2483.500	46.11	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n20 2412MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
54.149	32.7	40.0 / QP
2390.000	51.92	74.0 / PK
2390.000	39.30	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n20 2412MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2390.000	53.42	74.0 / PK
2390.000	40.99	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n20 2437 MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
55.982	31.2	40.0 / QP
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n20 2437 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n20 2462 MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	57.61	74.0 / PK
2483.500	40.96	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n20 2462 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	60.08	74.0 / PK
2483.500	44.30	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV

Mode: 802.11n40 2422MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
55.890	32.3	40.0 / QP
2390.000	51.58	74.0 / PK
2390.000	39.03	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n40 2422MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2390.000	51.88	74.0 / PK
2390.000	39.20	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n40 2437 MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
56.012	32.0	40.0 / QP
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n40 2437 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n40 2452 MHz TX	Vertical Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
60.225	34.20	40.0 / QP
2483.500	55.85	74.0 / PK
2483.500	40.59	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV
Mode: 802.11n40 2452 MHz TX	Horizontal Polarization	
Freq MHz	**Level dBuV/m**	**Limit/ Detector dBuV/m**
2483.500	59.01	74.0 / PK
2483.500	41.72	54.0 / AV
No peak found	---	74.0 / PK
No peak found	---	54.0 / AV