

Ningbo Litesun Electronics Co., Ltd. RF TEST REPORT

Report Type:

FCC Part 15.247 & ISED RSS-247 RF report

Model: LTS-6A-W5

REPORT NUMBER: 190500329SHA-001

ISSUE DATE: May 22, 2019

DOCUMENT CONTROL NUMBER: TTRF15.247-03_V1 © 2018 Intertek



Total Quality. Assured.

Intertek Testing Services Shanghai Building No.86, 1198 Qinzhou Road (North) Caohejing Development Zone Shanghai 200233, China

> Telephone: 86 21 6127 8200 www.intertek.com

Report no.: 190500329SHA-001

Applicant:	Ningbo Litesun Electronics Co., Ltd.
	Simen Town, Yuyao City, Zhejiang, 315472, China
Manufacturer:	Ningbo Litesun Electronics Co., Ltd.
	Simen Town, Yuyao City, Zhejiang, 315472, China
Manufacturing site:	Ningbo Litesun Electronics Co., Ltd.
	Simen Town, Yuyao City, Zhejiang, 315472, China

FCC ID:	2AMQ8-WIFI-011
IC:	23878-WIFI011

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2017): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

RSS-247 Issue 2 (February 2017): Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

RSS-Gen Issue 5 (April 2018): General Requirements for Compliance of Radio Apparatus

PREPARED BY:

Teddy yin

Project Engineer Teddy Yin

REVIEWED BY:

Damiel 2hao

Reviewer Daniel Zhao

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.



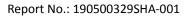
Content

RE	EVISION HISTORY		
M	EASU	REMENT RESULT SUMMARY	. 6
1	G	ENERAL INFORMATION	. 7
	1.1	DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	7
	1.2	TECHNICAL SPECIFICATION	
	1.3	DESCRIPTION OF TEST FACILITY	9
2	Т	EST SPECIFICATIONS	10
	2.1	Standards or specification	10
	2.2	MODE OF OPERATION DURING THE TEST	10
	2.3	TEST SOFTWARE LIST	
	2.4	TEST PERIPHERALS LIST	
	2.5	TEST ENVIRONMENT CONDITION:	
	2.6		
	2.7	MEASUREMENT UNCERTAINTY	
3	Μ	IINIMUM 6DB BANDWIDTH	14
	3.1	Liмit	
	3.2	Measurement Procedure	
	3.3	TEST CONFIGURATION	
	3.4	Test Results of Minimum 6dB bandwidth	
4	Μ	IAXIMUM CONDUCTED OUTPUT POWER AND E.I.R.P	15
	4.1	LIMIT	15
	4.2	Measurement Procedure	15
	4.3	TEST CONFIGURATION	
	4.4	TEST RESULTS OF MAXIMUM CONDUCTED OUTPUT POWER	15
5	P	OWER SPECTRUM DENSITY	16
	5.1	Liмit	16
	5.2	Measurement Procedure	16
	5.3	Test Configuration	17
	5.4	Test Results of Power spectrum density	17
6	Eľ	MISSION OUTSIDE THE FREQUENCY BAND	18
	6.1	Liмit	18
	6.2	Measurement Procedure	18
	6.3	Test Configuration	19
	6.4	The results of Emission outside the frequency band	19
7	R	ADIATED EMISSIONS IN RESTRICTED FREQUENCY BANDS	20
	7.1	Limit	20
	7.2	Measurement Procedure	
	7.3	TEST CONFIGURATION	
	7.4	Test Results of Radiated Emissions	
8	P	OWER LINE CONDUCTED EMISSION	28
	8.1	LIMIT	28
	8.2	TEST CONFIGURATION	28
	8.3	Measurement Procedure	29

intertek Total Quality. Assured.

TEST REPORT

8	.4	TEST RESULTS OF POWER LINE CONDUCTED EMISSION	
9	0	CCUPIED BANDWIDTH	32
9	.1	Liмit	
9	.2	Measurement Procedure	32
9	.3	Test Configuration	32
9	.4	The results of Occupied Bandwidth	32
10	A	NTENNA REQUIREMENT	
APP	ENC	DIX A: TEST RESULTS	





Revision History

Report No.	Version	Description	Issued Date
190500329SHA-001	Rev. 01	Initial issue of report	May 22, 2019



Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	RSS-247 Issue 2 Clause 5.2	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	RSS-247 Issue 2 Clause 5.4	Pass
Power spectrum density	15.247(e)	RSS-247 Issue 2 Clause 5.2	Pass
Emission outside the frequency band	15.247(d)	RSS-247 Issue 2 Clause 5.5	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	RSS-Gen Issue 5 Clause 8.9&8.10	Pass
Power line conducted emission	15.207(a)	RSS-Gen Issue 5 Clause 8.8	Pass
Occupied bandwidth	-	RSS-Gen Issue 5 Clause 6.6	Tested
Antenna requirement	15.203	-	Pass

Notes: 1: NA =Not Applicable

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

Intertek Total Quality. Assured. TEST REPORT

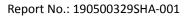
1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Relocatable Power Taps with Surge Protector
Type/Model:	LTS-6A-W5
Description of EUT:	The EUT is a Relocatable Power Taps with Surge Protector, it supports WIFI 2.4G band. The worst data is listed in this report.
Rating:	125VAC 60Hz 15A 1875W
EUT type:	🔀 Table top 🔲 Floor standing
Software Version:	V1.0.7
Hardware Version:	V1.0.2
Sample received date:	Jan 17, 2018
Date of test:	Jan 18, 2018~Apr 23, 2019

1.2 Technical Specification

Frequency Range:	2412MHz ~ 2462MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20
	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
	IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Type of Modulation:	IEEE 802.11n-HT20: OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20)
	IEEE 802.11b: Up to 11 Mbps
	IEEE 802.11g: Up to 54 Mbps
Data Rate:	IEEE 802.11n-HT20: Up to MCS7
Channel Separation:	5 MHz





1.3 Antenna information

Antenna No.	Model	Antenna type	Antenna Gain	Note
1	/	РСВ	3.0dBi	

Mode	Tx/Rx Function	Beamforming function	CDD function
802.11b	1Tx/1Rx	NO	NO
802.11g	1Tx/1Rx	NO	NO
802.11n(HT20)	1Tx/1Rx	NO	NO



1.4 Description of Test Facility

Name:	Intertek Testing Services Shanghai
Name.	
Address:	Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone:	86 21 61278200
Telefax:	86 21 54262353

The test facility is recognized,	CNAS Accreditation Lab Registration No. CNAS L0139
certified, or accredited by these organizations:	FCC Accredited Lab Designation Number: CN1175
organizations.	IC Registration Lab CAB identifier.: CN0051
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

Total Quality. Assured.

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2017) ANSI C63.10 (2013) RSS-247 Issue 2 (February 2017) RSS-Gen Issue 5 (April 2018) KDB 558074 D01(v05r01)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the continuously transmission was applied by following software.

Software name	Manufacturer	Version	Supplied by
ESP Series Modules FCC & CE Test Tool	TUYA	V2.2.2	Manufacturer

The EUT is a small unlicensed wireless device, so three axes (X, Y, Z) were observed while the test receiver worked as "max hold" continuously and the highest reading (X axis) among the whole test procedure was recorded.

The lowest, middle and highest channel were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
	802.11b	2412	2437	2462
2400 2492 E	802.11g	2412	2437	2462
2400-2483.5	802.11n(HT20)	2412	2437	2462
	/	/	/	/

Data rate VS Power:

The pre-scan for the conducted power with all rates in each modulation and bands was used, and the worst case was found and used in all test cases. After this pre-scan, we choose the following table of the data rata as the worst case.

Frequency Band (MHz)	Mode	Worst case data rate
	802.11b	1Mbps
2400 2482 5	802.11g	6Mbps
2400-2483.5	802.11n(HT20)	MCS0
	/	/

The EUT will use two types antenna, and there have the following test mode: Radiated test mode:

Mode 1: EUT transmitted signal with internal antenna;

Conducted test mode:

Mode 2: EUT transmitted signal from PCBA RF port connected to SPA directly;

We have verified all test modes, and choose the worst mode 1 for radiated test and mode 2 for conducted test as representatively to list the results in this report.



2.3 Test software list

Test Items	Software	Manufacturer	Version	
Conducted emission	ESxS-K1	R&S	V2.1.0	
Radiated emission	ES-K1	R&S	V1.71	

2.4 Test peripherals list

Item No.	Name	Band and Model	Description	
1	Laptop computer	HP ProBook 6470b	100-240V AC, 50/60Hz	
2	Lamp	/	200W	

2.5 Test environment condition:

Test items	Temperature	Humidity	
Minimum 6dB Bandwidth			
Maximum conducted output power and e.i.r.p.			
Power spectrum density	26°C	55% RH	
Emission outside the frequency band			
Occupied bandwidth			
Radiated Emissions in restricted frequency bands	26°C	54% RH	
Power line conducted emission	26°C	55% RH	



2.6 Instrument list

<mark>Cond</mark>	ucted Emission				
<mark>Used</mark>	Equipment	Manufacturer	Туре	Internal no.	Due date
	Test Receiver	R&S	ESCS 30	EC 2107	2019-07-15
	A.M.N.	R&S	ESH2-Z5	EC 3119	2019-11-30
۲	Shielded room	Zhongyu	-	EC 2838	2020-01-14
Radia	ted Emission				
<mark>Used</mark>	Equipment	Manufacturer	Туре	Internal no.	Due date
	Test Receiver	R&S	ESIB 26	EC 3045	2019-09-12
	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2019-06-10
\checkmark	Horn antenna	R&S	HF 906	EC 3049	2019-11-17
۲	Horn antenna	ΤΟΥΟ	HAP18-26W	EC 4792-3	2020-07-09
	Pre-amplifier	R&S	AFS42-00101800 -25-S-42	EC5262	2019-06-10
~	Semi-anechoic chamber	Albatross project	-	EC 3048	2019-07-31
RF te	st				
<mark>Used</mark>	Equipment	Manufacturer	Туре	Internal no.	Due date
	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2020-03-04
\checkmark	Power meter	Agilent	N1911A/N1921A	EC4318	2019-05-12
<mark>Addit</mark>	ional instrument				
<mark>Used</mark>	Equipment	Manufacturer	Туре	Internal no.	Due date
	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2020-03-20
	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 2323	2019-06-07
	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 5198	2020-02-20



2.7 Measurement uncertainty

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Measurement uncertainty
Maximum peak output power	± 0.74dB
Radiated Emissions in restricted frequency bands below 1GHz	± 4.90dB
Radiated Emissions in restricted frequency bands above 1GHz	± 5.02dB
Emission outside the frequency band	± 2.89dB
Power line conducted emission	± 3.19dB

Total Quality. Assured.

3 Minimum 6dB bandwidth

Test result: Pass

3.1 Limit

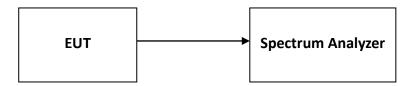
For systems using digital modulation techniques that may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz bands, the minimum 6 dB bandwidth shall be at least 500 kHz.

3.2 Measurement Procedure

The minimum 6dB bandwidth is measured using the Spectrum Analyzer according to DTS test procedure of "KDB558074 D01v05r01 DTS Meas Guidance" (clause 8.2) for compliance requirements.

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) \geq 3 × RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

3.3 Test Configuration



3.4 Test Results of Minimum 6dB bandwidth

Please refer to Appendix A

Total Quality. Assured.

4 Maximum conducted output power and e.i.r.p.

Test result: Pass

4.1 Limit

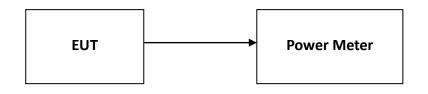
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 30dBm and 30+ (6 –antenna gain-beam forming gain).

4.2 Measurement Procedure

The EUT was tested according to DTS test procedure of "KDB558074 D01v05r01 DTS Meas Guidance" (clause 8.3.2.2) for compliance requirements.

4.3 Test Configuration



4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

Conclusion: The maximum EIRP = 15.94dBm+3.0dBi = 18.94dBm = 0.078W which is lower than the limit of 4W listed in RSS-247.

5 Power spectrum density

Test result: Pass

5.1 Limit

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

If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and 8+ (6 –antenna gain-beam forming gain).

5.2 Measurement Procedure

The power output was tested according to DTS test procedure of "KDB558074 D01v05r01 DTS Meas Guidance" (clause 8.4) for compliance requirements.

This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98 %), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level, and when the transmission duty cycle is constant (i.e., duty cycle variations are less than ± 2 %):

a) Measure the duty cycle (x) of the transmitter output signal as described in Section 6.0.

b) Set instrument center frequency to DTS channel center frequency.

c) Set span to at least 1.5 x OBW.

d) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.

e) Set VBW \geq 3 x RBW.

f) Detector = power averaging (RMS) or sample detector (when RMS not available).

g) Ensure that the number of measurement points in the sweep $\ge 2 \times \text{span/RBW}$.

h) Sweep time = auto couple.

i) Do not use sweep triggering. Allow sweep to "free run".

j) Employ trace averaging (RMS) mode over a minimum of 100 traces.

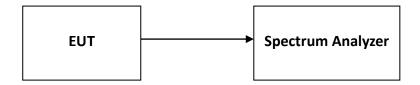
k) Use the peak marker function to determine the maximum amplitude level.

I) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

m) If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).



5.3 Test Configuration



5.4 Test Results of Power spectrum density

Please refer to Appendix A

Intertek Total Quality. Assured. TEST REPORT

6 Emission outside the frequency band

Test result: Pass

6.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

6.2 Measurement Procedure

The EUT was tested according to DTS test procedure of "KDB558074 D01v05r01 DTS Meas Guidance" (clause 8.5) for compliance requirements.

Reference level measurement

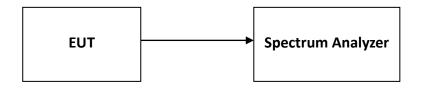
Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to \geq 1.5 times the DTS bandwidth.
- c) Set the RBW = 100 kHz.
- d) Set the VBW \geq 3 x RBW.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.
- **Emission level measurement**
- a) Set the center frequency and span to encompass frequency range to be measured.
- b) Set the RBW = 100 kHz.
- c) Set the VBW \geq 3 x RBW.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in 11.1 a) or 11.1 b). Report the three highest emissions relative to the limit.



6.3 Test Configuration



6.4 The results of Emission outside the frequency band

Please refer to Appendix A

Total Quality. Assured.

7 Radiated Emissions in restricted frequency bands

Test result: Pass

7.1 Limit

The radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified showed as below:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

7.2 Measurement Procedure

For Radiated emission below 30MHz:

- a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) Both X and Y axes of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.



For Radiated emission above 30MHz:

- a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

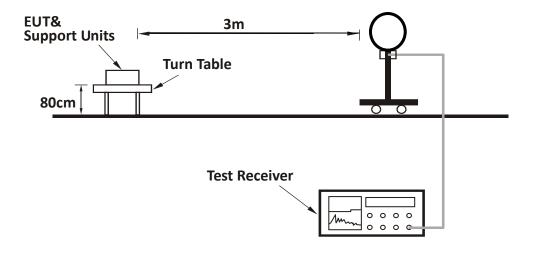
- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
- 4. All modes of operation were investigated and the worst-case emissions are reported

Report No.: 190500329SHA-001

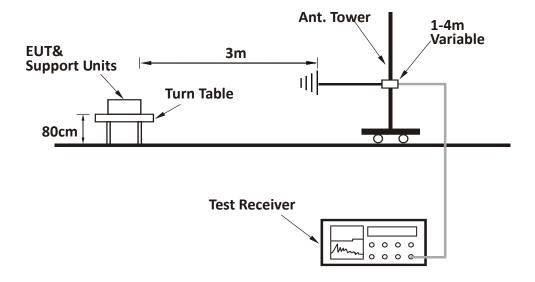
Intertek Total Quality. Assured. TEST REPORT

7.3 Test Configuration

For Radiated emission below 30MHz:

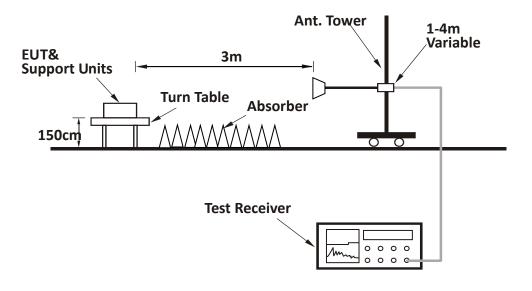


For Radiated emission 30MHz to 1GHz:





For Radiated emission above 1GHz:

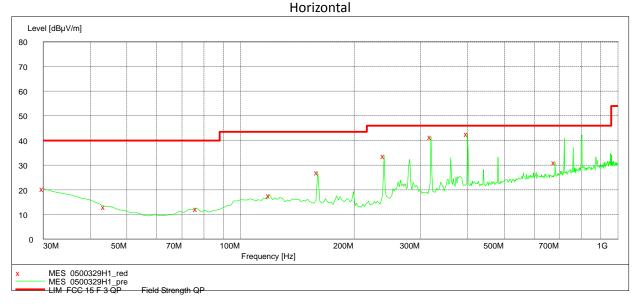


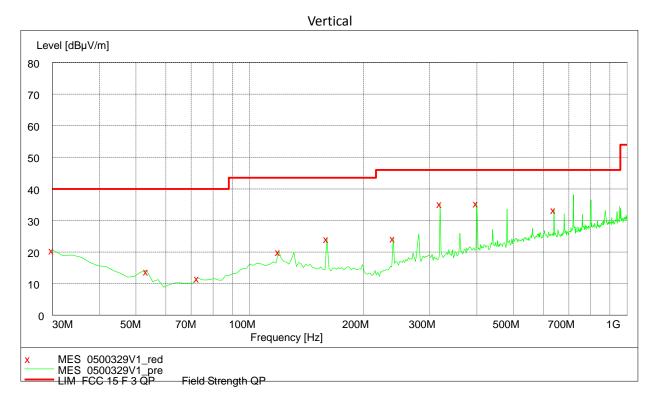


7.4 Test Results of Radiated Emissions

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst waveform from 30MHz to 1000MHz is listed as below:





TTRF15.247-03_V1 © 2018 Intertek

Intertek Total Quality. Assured. TEST REPORT

Test data below 1GHz

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
н	30.00	20.50	19.20	40.00	19.50	РК
н	160.24	27.20	11.50	43.50	16.30	РК
н	239.94	34.00	13.30	46.00	12.00	РК
н	319.64	41.50	15.90	46.00	4.50	РК
н	399.34	42.90	18.20	46.00	3.10	РК
н	681.20	31.20	22.00	46.00	14.80	РК
V	30.00	20.70	19.20	40.00	19.30	РК
V	160.24	24.40	11.50	43.50	19.10	РК
V	239.94	24.50	13.30	46.00	21.50	РК
V	319.64	35.40	15.90	46.00	10.60	РК
V	399.34	35.70	18.20	46.00	10.30	РК
V	640.38	33.50	21.80	46.00	12.50	РК

Note: The worst test result (30MHz to 1GHz) of 802.11g channel L (2412MHz) was chosen to list in the report as representative.

intertek Total Quality. Assured.

TEST REPORT

Test result above 1GHz:

The emission was conducted from 1GHz to 25GHz

802.11b

СН	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
	Н	2390.00	46.36	31.20	74.00	27.64	PK
L	Н	2390.00	37.54	31.20	54.00	16.46	AV
	V	4824.00	40.36	2.70	74.00	33.64	РК
	V	4824.00	33.67	2.70	54.00	20.33	AV
м	Н	4874.00	38.27	2.67	74.00	35.73	РК
IVI	Н	4874.00	31.75	2.67	54.00	22.25	AV
	Н	2483.50	44.77	31.19	74.00	29.23	РК
	Н	2483.50	37.84	31.19	54.00	16.16	AV
Н	V	4924.00	47.22	2.77	74.00	26.78	РК
	V	4924.00	40.36	2.77	54.00	13.64	AV

802.11g

СН	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
	Н	2390.00	47.95	31.20	74.00	26.05	РК
L	Н	2390.00	40.48	31.20	54.00	13.52	AV
L	V	4824.00	41.83	2.70	74.00	32.17	РК
	V	4824.00	35.99	2.70	54.00	18.01	AV
5.4	Н	4874.00	36.63	2.67	74.00	37.37	РК
М	Н	4874.00	31.18	2.67	54.00	22.82	AV
	Н	2483.50	45.29	31.19	74.00	28.71	РК
	Н	2483.50	37.84	31.19	54.00	16.16	AV
Н	V	4924.00	44.24	2.77	74.00	29.76	РК
	V	4924.00	36.47	2.77	54.00	17.53	AV

intertek

TEST REPORT

802.11n(HT20)

СН	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
	Н	2390.00	47.39	31.20	74.00	26.61	РК
	Н	2390.00	39.26	31.20	54.00	14.74	AV
L	V	4824.00	43.77	2.70	74.00	30.23	РК
	V	4824.00	37.85	2.70	54.00	16.15	AV
N/I	Н	4874.00	41.38	2.67	74.00	32.62	РК
M	Н	4874.00	35.72	2.67	54.00	18.28	AV
	Н	2483.50	44.59	31.19	74.00	29.41	РК
н	Н	2483.50	38.04	31.19	54.00	15.96	AV
	V	4924.00	44.87	2.77	74.00	29.13	РК
	V	4924.00	38.25	2.77	54.00	15.75	AV

- Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
 - 2. Corrected Reading = Original Receiver Reading + Correct Factor
 - 3. Margin = Limit Corrected Reading
 - 4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,

Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV, Limit = 40.00dBuV/m. Then Correct Factor = 30.20 + 2.00 - 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;

Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

Intertek Total Quality. Assured. TEST REPORT

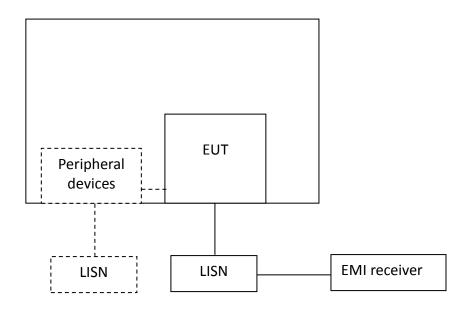
8 Power line conducted emission

Test result: Pass

8.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)			
	QP	AV		
0.15-0.5	66 to 56*	56 to 46 *		
0.5-5	56	46		
5-30	60	50		
* Decreases with the logarithm of the frequency.				

8.2 Test Configuration





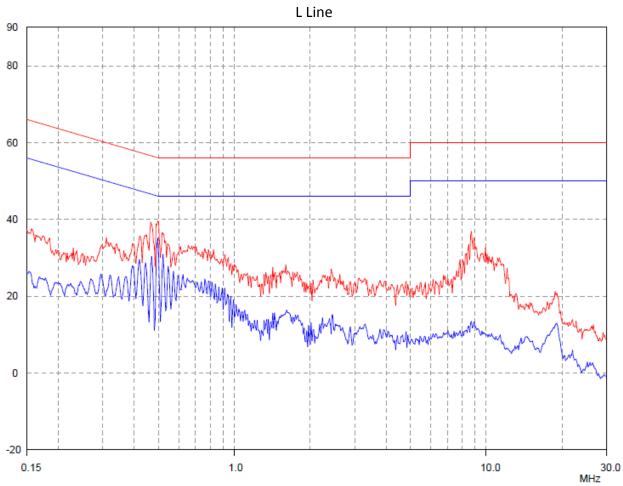
8.3 Measurement Procedure

Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

Intertek Total Quality. Assured. TEST REPORT



8.4 Test Results of Power line conducted emission

Test Curve:

Test	Data:

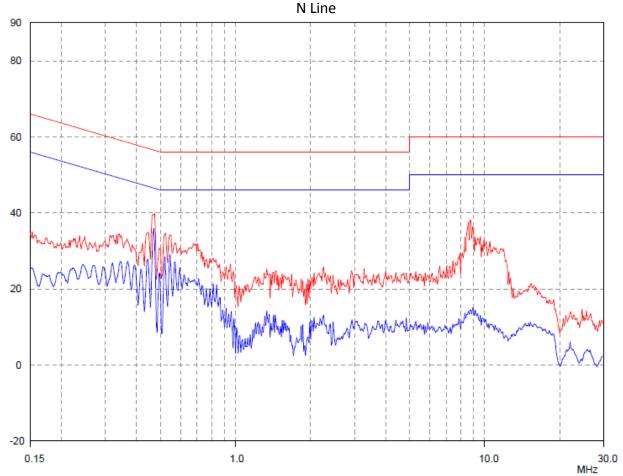
Frequency	Quasi-peak			Average		
(MHz)	level dB(μV)	Limit dB(µV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.17	*	65.3	*	*	55.3	*
0.22	*	62.7	*	*	52.7	*
0.39	*	57.9	*	*	47.9	*
4.29	*	56.0	*	*	46.0	*
10.45	*	60.0	*	*	50.0	*
19.40	*	60.0	*	*	50.0	*

Note: *means margin is more than 10dB.

Intertek Total Quality. Assured.

TEST REPORT

Test Curve:



Test Data:

Frequency	Quasi-peak			Average		
(MHz)	level dB(μV)	Limit dB(µV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.17	*	65.3	*	*	55.3	*
0.22	*	62.7	*	*	52.7	*
0.39	*	57.9	*	*	47.9	*
4.29	*	56.0	*	*	46.0	*
10.45	*	60.0	*	*	50.0	*
19.40	*	60.0	*	*	50.0	*

Note: *means margin is more than 10dB.

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

- 2. Corrected Reading = Original Receiver Reading + Correct Factor
- 3. Margin = Limit Corrected Reading
- 4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

9 Occupied Bandwidth

Test result: Tested

9.1 Limit

None

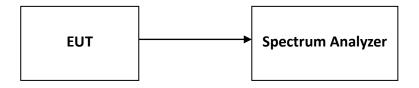
9.2 Measurement Procedure

The occupied bandwidth per RSS-Gen Issue 5 Clause 6.6 was measured using the Spectrum Analyzer.

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

9.3 Test Configuration



9.4 The results of Occupied Bandwidth

Please refer to Appendix A



10 Antenna requirement

Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Result:

EUT uses PCB antenna to the intentional radiator, so it can comply with the provisions of this section.

Total Quality. Assured.

Appendix A: Test results

1. Duty cycle

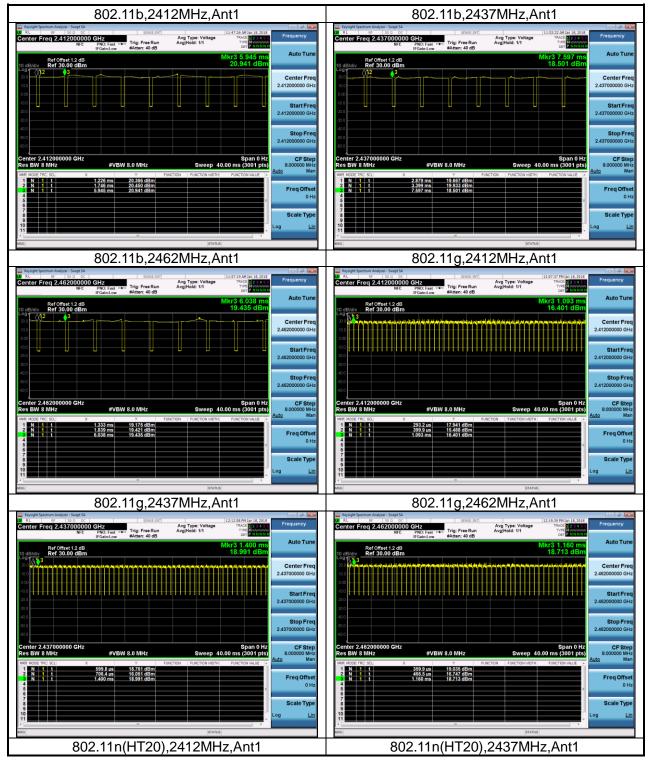
1.1 Test Result and Data

WLAN Duty Cycle					
Mode	Test Frequency(MHz)	Ant	Duty Cycle(%)	Duty Cycle Factor (dB)	
802.11b	2412	Ant1	88.98	0.51	
802.11b	2437	Ant1	88.98	0.51	
802.11b	2462	Ant1	89.24	0.49	
802.11g	2412	Ant1	86.67	0.62	
802.11g	2437	Ant1	86.67	0.62	
802.11g	2462	Ant1	86.67	0.62	
802.11n(HT20)	2412	Ant1	87.72	0.57	
802.11n(HT20)	2437	Ant1	85.96	0.66	
802.11n(HT20)	2462	Ant1	85.96	0.66	

intertek Total Quality. Assured.

1.2 Test Plots

TEST REPORT



intertek Total Quality. Assured.

TEST REPORT

Kongelst Spectra Motions Motions Sampt Sc. Section 7 (1997) Section 7 (1997)	Coll 3 (mode Registration Advances - Seet 50 Coll 3 (mode
IFGeinLow #Atten: 40 dB Or reaction Ref Offset 12 dB Mkr3 839.7 µs Mkr3 839.7 µs 10 dB/div Ref 30.00 dBm 16.399 dBm	Auto Tune Ref Offset 12 dB Mkr3 1.506 ms 10 dB/dl Ref 00ffset 12 dB Mkr3 1.506 ms 10 dB/dl Ref 00dBm 19.080 dBm
	Center Freq 2.412000000 GHz 2.412000000 GHz 2.41200000 GHz 2.412000000 GHz 2.412000000 GHz 2.412000000 GHz 2.41200000000000000000000000000000000000
	StartFreq 2.41200000 GHz 2.0
	Stop Freq 4:0 Stop Freq 2:41200000 GHz 2:43700000 GHz 2:43700000 GHz
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE A	CF Step 8.000000 MHz Center 2.437000000 GHz Span 0 Hz Span 0 Hz CF Step 8.00000 MHz Sweep 40.00 ms (300 1pt) CF Step 8.00000 MHz Man
1 N 1 t 7297 ua 16.113 dBm N 1 t 173.3 ua 16.113 dBm N 1 t 839.7 ua 16.399 dBm	Freq Offset 2 N 1 t 7/46 4 µs 10 0/17 dBm 2 N 1 t 7/46 4 µs 10 0/17 dBm Freq Offset 2 N 1 t 10 0/17 dBm Freq Offset Freq Offset 0 Hz 6 1 10 0/17 dBm Freq Offset Freq Offset
	Scale Type
una]	860
802.11n(HT20),2462MHz,Ant1	- S 100
M NO DO CONTO 122544 PRAIN 16,2013 Center Freq.2.4562000000 Hz PRO: Rat →+ Trig: Free Run Astart.40 db Arg Type: Voltes Trig: Free Run Arguitold: 11	Frequency Auto Tune
10 dBidiv Ref 30.00 dBm 17.481 dBm 10 stativ 17.481 dBm 17.481 dBm	
	Center Freq 2.462000000 GHz
	Start Freq 2.45200000 GHz
	Stop Freq 2.46200000 GH:
Center 2.462000000 GHz Span 0 Hz Res BW 8 MHz SWeep 40.00 ms (3001 pts) 104 Moder Rol X Y FUNCTION FUNCTION MOTH FUNCTION	CF Step 8.00000 MH-2 Man
I I	Freq Offset 0 Hz
	Scale Type
MIG ETATUS	

TEST REPORT

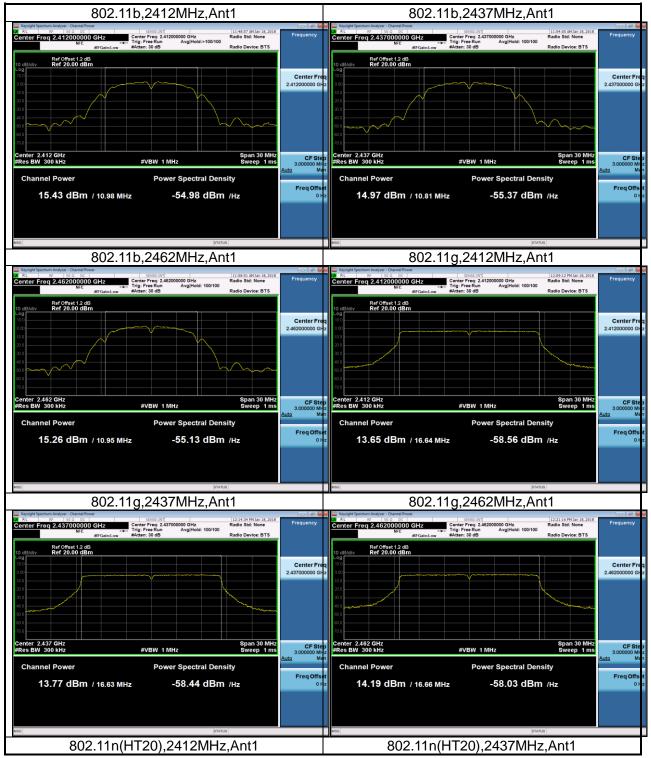
2. RF Output Power

WLAN AVGSA Output Power									
Mode	Test Frequency(MHz)	Ant	Duty Cycle Factor (dB)	Max Power (dBm)	Limit (dBm)	Result			
802.11b	2412	Ant1	0.51	15.94	30	Pass			
802.11b	2437	Ant1	0.51	15.48	30	Pass			
802.11b	2462	Ant1	0.49	15.75	30	Pass			
802.11g	2412	Ant1	0.62	14.27	30	Pass			
802.11g	2437	Ant1	0.62	14.39	30	Pass			
802.11g	2462	Ant1	0.62	14.81	30	Pass			
802.11n(HT20)	2412	Ant1	0.57	13.97	30	Pass			
802.11n(HT20)	2437	Ant1	0.66	14.25	30	Pass			
802.11n(HT20)	2462	Ant1	0.66	14.74	30	Pass			

intertek

2.2 Test Plots

Total Quality. Assured.



Keysight Spectrum Analyzer - Channel Power RL RF 50 Ω DC Center Freq 2.412000000 GHz	SENSE:1NT Center Freq: 2.412000000 GHz → Trig: Free Run Avg Hold: 100/100	12:27:00 PM Jan 18, 2018 Radio Std: None	Frequency	Keysight Spectrum Analyzer - Channel Power RL RF 50 Q DC Center Freq 2.43770000 GHz	SENSE:INT Center Freq: 2.437000000 GHz Trig: Freq Run Avg Hold: 100/100	12:33:12 PM Jan 18, 2018 Radio Std: None	Frequency
Ref Offset 1.2 dB Ref 20.00 dBm dB/dtv ref 20.00 dBm ref 20.00 dBm	sAtten: 30 dB	Radio Device: BTS	Center Free 2.41200000 GHz	#FGaint.on	#Atten: 30 dB	Radio Device: BTS	Center Fre 2.437000000 GH
200 30.0 40.0 40.0 70.0				200			
Center 2.412 GHz #Res BW 300 kHz	#VBW 1 MHz	Span 30 MHz Sweep 1 ms	CF Step 3.000000 MHz	Center 2.437 GHz #Res BW 300 kHz	#VBW 1 MHz	Span 30 MHz Sweep 1 ms	CF Ste 3.000000 Mi
Channel Power	Power Spectral Den	sity	<u>Auto</u> Mar	Channel Power	Power Spectral Den	sity	<u>Auto</u> Ma
13.40 dBm / 17.81	мнz -59.11 dBm	1 /Hz	Freq Offse 0 Hz	13.59 dBm / 17.8 M	нz -58.92 dBn	1 /Hz	Freq Offs 0 F
MSG 000 44.				MSG	STAT	TUS	
Keysight Spectrum Analyzer - Channel Power	n(HT20),2462MHz	z,Ant'i	0 2				
00 RL RF 50Ω DC Center Freq 2.462000000 GHz NFE #IFGain:L	SENSEINTI Center Freq: 2.46200000 GHz →→ Tig: Free Run Avg Hold:>100/100 #Atten: 30 dB	12:38:32 PM Jan 18, 2018 Radio Std: None Radio Device: BTS	Frequency				
Ref Offset 1.2 dB 10 dB/div Ref 20.00 dBm							
			Center Free 2.462000000 GHz				
-10.0							
-40.0							
-60.0							
Center 2.462 GHz #Res BW 300 kHz	#VBW 1 MHz	Span 30 MHz Sweep 1 ms	CF Step 3.000000 MHz				
Channel Power	Power Spectral Den		Auto Mar				
14.08 dBm / 17.83			Freq Offse 0 Hz				
MSG	STATI	rus					



3. Minimum 6dB bandwidth

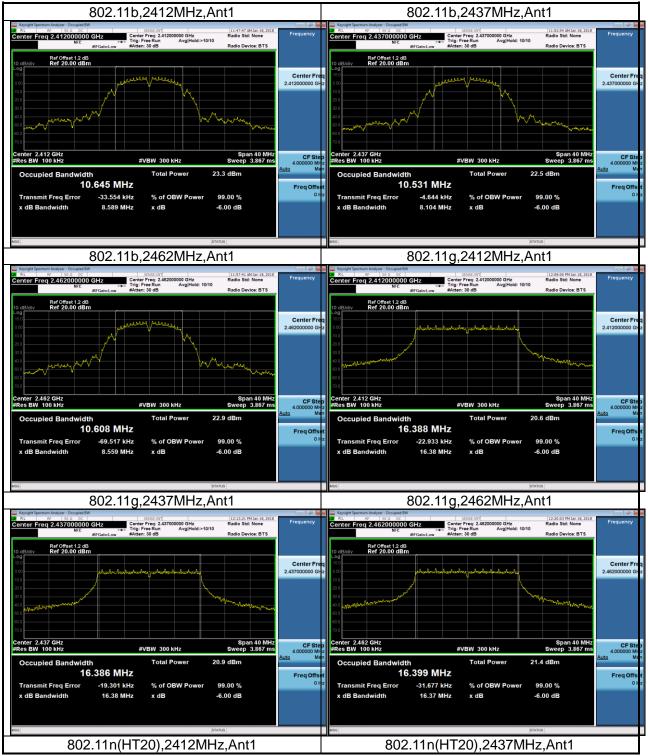
WLAN Occupied 6dB Bandwidth							
Mode	Test Frequency(MHz)		Occupied Bandwidth(MHz)	Result			
802.11b	2412	Ant1	8.59	Pass			
802.11b	2437	Ant1	8.10	Pass			
802.11b	2462	Ant1	8.56	Pass			
802.11g	2412	Ant1	16.38	Pass			
802.11g	2437	Ant1	16.38	Pass			
802.11g	2462	Ant1	16.37	Pass			
802.11n(HT20)	2412	Ant1	17.56	Pass			
802.11n(HT20)	2437	Ant1	17.56	Pass			
802.11n(HT20)	2462	Ant1	17.56	Pass			

intertek

TEST REPORT

Total Quality. Assured.

3.2 Test Plots



Keysight Spectrum Analyzer - Occupied BW				Keysight Spectrum Analyzer - Occupied BW			
RL RF S0.0 DC Center Freq 2.412000000 GHz NFE #IFGain:Low	SENSE:INT Center Freq: 2.412000000 GHz Trig: Free Run Avg Hold: 10/1 #Atten: 30 dB	12:25:45 PM Jan 18, 2018 Radio Std: None 10 Radio Device: BTS	Frequency	Center Freq 2.43700000 GHz	SENSE:BVT Center Freq: 2.437000000 GHz Trig: Free Run Avg Hold: #Atten: 30 dB	12:31:56 PM Jan 18, 2018 Radio Std: None 10/10 Radio Device: BTS	Frequen
Ref Offset 12 dB 0 dB/div 00 00 00 00 00 00 00 00 00 0	and and have been a stand and and and and and and		Center Freq 2.412000000 GHz	Ref Offset 12 dB Construction Construct	havbeelvery askardrahartartart		Center 2.43700000
		Mad Martin		300 400 500 500 500 500 500 500 5		www.madulawataha	
enter 2.412 GHz Res BW 100 kHz	#VBW 300 kHz	Span 40 MHz Sweep 3.867 ms	4.000000 MHz	Center 2.437 GHz #Res BW 100 kHz	#VBW 300 kHz	Span 40 MHz Sweep 3.867 ms	CF 4.00000
Occupied Bandwidth	Total Power	20.7 dBm	<u>Auto</u> Man	Occupied Bandwidth	Total Power	20.9 dBm	<u>Auto</u>
17.581 M			Freq Offset	17.578 M			Freq
Transmit Freq Error -15.563 x dB Bandwidth 17.56 l		99.00 % -6.00 dB	012	Transmit Freq Error -11.814 x dB Bandwidth 17.56 M		er 99.00 % -6.00 dB	
		STATUS		MSG		STATUS	
802 11n(HT20),2462M	Hz Ant1					
Keysight Spectrum Analyzer - Occupied BW	11120),2402101						
enter Freq 2.462000000 GHz	Center Freq: 2.462000000 GHz Trig: Free Run Avg Hold: 10/ #Atten: 30 dB	12:37:13 PM Jan 18, 2018 Radio Std: None 10 Radio Device: BTS	Frequency				
Ref Offset 1.2 dB dB/div Ref 20.00 dBm							
			Center Freq 2.46200000 GHz				
00 widhodhada	and and and and have been been a second and and and and and and and and and a		2.462000000 GHz				
1.0		Mun and a					
within math		mana mana					
1.0							
enter 2.462 GHz							
Res BW 100 kHz	#VBW 300 kHz	Span 40 MHz Sweep 3.867 ms	4.000000 MHz				
Occupied Bandwidth	Total Power	21.4 dBm	<u>Auto</u> Man				
17.585 M		00 00 %	Freq Offset				
Transmit Freq Error -23.252 x dB Bandwidth 17.56 I		99.00 % -6.00 dB					
G		STATUS					

TEST REPORT

4. Occupied Bandwidth

WLAN 99% Occupied Bandwidth								
Mode	Test Ant Frequency(MHz)		99% Occupied Bandwidth(MHz)	Result				
802.11b	2412	Ant1	10.976	Pass				
802.11b	2437	Ant1	10.810	Pass				
802.11b	2462	Ant1	10.948	Pass				
802.11g	2412	Ant1	16.641	Pass				
802.11g	2437	Ant1	16.632	Pass				
802.11g	2462	Ant1	16.662	Pass				
802.11n(HT20)	2412	Ant1	17.807	Pass				
802.11n(HT20)	2437	Ant1	17.799	Pass				
802.11n(HT20)	2462	Ant1	17.829	Pass				

4.2 Test Plots



enter Freq 2.412000000 GHz MFE #FGain1.ow dB/div Ref Offset 12 dB Ref 20.00 dBm	Center Freq: 2.41200000 GHz Trig: Free Run Avg Hold:>11 #Atten: 30 dB	Radio Std: None #10 Radio Device: BTS	Frequency	Center Freq 2.437000000 GHz NFE #FGait 10 dB/div Log	Center Freq: 2.437000000 GHz	Radio Std: None H10 Radio Device: BTS	Frequenc
			Center Freq 2.412000000 GH2				Center 2.43700000
orter 2,412 GHz Res BW 300 kHz	#VBW 1 MHz	Span 40 MHz Sweep 1 ms	4.000000 MHz	Center 2.437 GHz #Res BW 300 kHz	#VBW 1 MHz	Span 40 MHz Sweep 1 ms	CF 4.00000
Occupied Bandwidth	Total Power	20.9 dBm	<u>Auto</u> Man	Occupied Bandwidth	Total Power	21.0 dBm	Auto
17.807 N			Freq Offset 0 Hz		9 MHz		Freq
Transmit Freq Error -25.411 x dB Bandwidth 21.08		99.00 % -26.00 dB			0.456 kHz % of OBW Power 0.97 MHz x dB	99.00 % -26.00 dB	
		STATUS		Meg		STATUS	
802 11n	(HT20),2462M			mou		31/103	
Keysight Spectrum Analyzer - Occupied BW RL RF 50 Ω DC			0 0				
Ref Offset 1.2 dB Ref Offset 1.2 dB Ref 20.00 dBm Ref 20.00 dBm	Center Freq: 2.462000000 GHz Trig: Free Run Avg Hold:>1 #Atten: 30 dB	12:37:49 PM Jan 18, 2018 Radio Std: None M10 Radio Device: BTS					
enter Freq 2.462000000 GHz NFE #IFGain:Low	Trig: Free Run Avg Hold:>1	Radio Std: None					
enter Freq 2.462000000 GHz WE #FairLow ArGaleCow ArGaleLow ArGaleLow ArGaleLow ArGaleLow ArGaleLow Ar	Trig: Free Run Avg Hold:>1	Radio Std: None Radio Device: BTS	Frequency Center Freq 2.46200000 GHz				
Here Preq 2.462000000 GHz WE Ref Offset 12 dB dB/dw Ref 076set 12 dB dB/dw Ref 076set 12 dB dB/dw Ref 076set 12 dB	Trig: Free Run Avg Hold:>1	Radio Device: BTS	Center Fro 2.46200000 GHz 4.000000 MHz				
All of the second secon	#VBW 1 MHz Total Power	Radio Std: None Radio Device: BTS	Center Freq 2.46200000 GH 2.46200000 GH 2.46200000 MH Auto Mar				
Ref offset 12 dB Ref offset 1	#VBW 1 MHz Total Power HHZ	Radio Std: None Radio Device: BTS Span 40 MHz Sweep 1 ms 21.5 dBm	Center Fro 2.46200000 GHz 4.000000 MHz				
All of the second secon	#VBW 1 MHz #VBW 1 MHz Total Power AHZ 2 kHz % of OBW Power	Radio Std: None Radio Device: BTS	CF Sto 4000000 MH Auto Freq Offset				



5. Power Spectral Density

WLAN AVGSA Power Spectral Density										
Mode	Test Frequency (MHz)	Ant	Duty Cycle Factor(dB)	PSD(dBm)	RBW(kHz)	Limit(dBm)	Result			
802.11b	2412	Ant1	0.51	-15.422	3	8	Pass			
802.11b	2437	Ant1	0.51	-15.645	3	8	Pass			
802.11b	2462	Ant1	0.49	-15.894	3	8	Pass			
802.11g	2412	Ant1	0.62	-19.151	3	8	Pass			
802.11g	2437	Ant1	0.62	-19.239	3	8	Pass			
802.11g	2462	Ant1	0.62	-18.678	3	8	Pass			
802.11n(HT20)	2412	Ant1	0.57	-19.705	3	8	Pass			
802.11n(HT20)	2437	Ant1	0.66	-19.359	3	8	Pass			
802.11n(HT20)	2462	Ant1	0.66	-19.327	3	8	Pass			

5.2 Test Plots

