Qingdao Intelligent&Precise Electronics Co., Ltd

C2PC RF TEST REPORT

Report Type:
FCC Part 15.247 & ISED RSS-247 RF report

Model:
ZDGF7668AU-F

REPORT NUMBER:
190900303SHA-001

ISSUE DATE:
September 25, 2019

DOCUMENT CONTROL NUMBER:
TTRF15.247-01_V1 © 2018 Intertek

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TEST REPORT

Report no.: 190900303SHA-001

Applicant:	Qingdao Intelligent&Precise Electronics Co., Ltd No.218, Qianwangang Road, Qingdao Economic&Technological Development Zone, Shandong, China.
Manufacturer:	Qingdao Intelligent&Precise Electronics Co., Ltd No.218, Qianwangang Road, Qingdao Economic&Technological Development Zone, Shandong, China.
Factory:	Qingdao Intelligent&Precise Electronics Co., Ltd No.218, Qianwangang Road, Qingdao Economic&Technological Development Zone, Shandong, China.
FCC ID:	2AJVQ-ZDGF7668AU
IC:	22470-ZDGF7668AU

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:
47CFR Part 15 (2018): 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 (March 2019):** General Requirements for Compliance of Radio Apparatus

PREPARED BY:	**REVIEWED BY:**
	
Project Engineer Nemo Li	Reviewer Daniel Zhao

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Content

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Revision History

Report No.	Version	Description	Issued Date
190900303SHA-001	Rev. 01	Initial issue of report	September 25, 2019

Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	RSS-247 Issue 2 Clause 5.4	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	RSS-Gen Issue 5 Clause 8.8	Pass

Notes: 1: NA =Not Applicable

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Wireless Module
Type/Model:	ZDGF7668AU-F
Description of EUT:	Add a new model ZDGF7668AU-F. For the new model, the connector of the module is changed from HX1.25-10P-W-K to F05049-16P. Component R1046 is changed from 0 Ω to 0.6nH, Component L1006 is changed from NC to 0.2pF, in order to improve the spurious emission. By technical analysis and evaluation, only the conducted output power, Emission outside the frequency band, Radiated Emissions in restricted frequency bands and Power line conducted emission on the worst mode 802.11n(HT40) was retested.
Rating:	DC 5V
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	September 9, 2019
Date of test:	September 9, 2019 ~ September 20, 2019

1.2 Technical Specification

Frequency Range:	2400MHz ~ 2483.5MHz
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n(HT20), IEEE 802.11n(HT40)
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n(HT20): OFDM (64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n(HT40): OFDM (64-QAM, 16-QAM, QPSK, BPSK)
Channel Number:	11 Channels for 802.11b, 802.11g and 802.11n(HT20) 7 Channels for 802.11n(HT40)
Channel Separation:	5 MHz

1.3 Antenna information

Antenna No.	Model	Antenna type	Antenna Gain	Note
0	-	PIFA	2.89dBi	-
1	-	PIFA	3.14dBi	-

Mode	Tx/Rx Function	Beamforming function	CDD function	Directional gain (dBi)
802.11b	1Tx/1Rx	NO	NO	-
802.11g	1Tx/1Rx	NO	NO	-
802.11n(HT20)	2Tx/2Rx	NO	NO	3.02
802.11n(HT40)	2Tx/2Rx	NO	NO	3.02

Note: For 802.11b and 802.11g mode, it only supports 1TX.
For 802.11n modes, it can support 2TX, all the two transmit signals are completely uncorrelated with each other, so the directional gain = 10 log $((10^{G1/10} + 10^{G2/10} + \ldots + 10^{Gn/10}) / N_{ANT})$

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1.4 Description of Test Facility

Name:	Intertek Testing Services Shanghai
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, certified, or accredited by these organizations:	CNAS Accreditation Lab Registration No. CNAS L0139
	FCC Accredited Lab Designation Number: CN1175
	IC Registration Lab Registration code No.: 2042B-1
	VCCI Registration Lab Registration No.: R-4243, G-845, C-4723, T-2252
	NVLAP Accreditation Lab NVLAP LAB CODE: 200849-0
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2018)
ANSI C63.10 (2013)
KDB 662911 D01 (v02r01)
KDB 558074 (v05r02)
RSS-247 Issue 2 (February 2017)
RSS-Gen Issue 5 (March 2019)

2.2 Mode of operation during the test

While testing the transmitter mode of the EUT, the internal modulation is applied.

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	DELL 5480	-

2.5 Test environment condition:

Test items	Temperature	Humidity
Maximum conducted output power and e.i.r.p.	24°C	56% RH
Emission outside the frequency band	24°C	56% RH
Radiated Emissions in restricted frequency bands	24°C	56% RH
Power line conducted emission	24°C	56% RH

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2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2020-07-14
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2019-11-29
☐	A.M.N.	R&S	ENV 216	EC 3393	2020-07-14
☐	A.M.N.	R&S	ENV4200	EC 3558	2020-06-11
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2020-09-12
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2019-12-10
☒	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2020-06-11
☒	Horn antenna	R&S	HF 906	EC 3049	2019-11-16
☐	Horn antenna	ETS	3117	EC 4792-1	2020-02-25
☐	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2020-07-09
☐	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2020-03-14
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☐	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2020-03-04
☐	Power sensor	Agilent	U2021XA	EC 5338-1	2020-03-04
☐	Vector Signal Generator	Agilent	N5182B	EC 5175	2020-03-04
☐	Universal Radio Communication Tester	R&S	CMW500	EC5944	2019-12-22
☐	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2020-03-04
☐	Mobile Test System	Litepoint	Iqxel	EC 5176	2020-01-08
☐	Test Receiver	R&S	ESCI 7	EC 4501	2020-09-12
☐	Climate chamber	GWS	MT3065	EC 6021	2020-07-04
☒	Spectrum Analyzer	Keysight	N9030B	EC 6078	2020-06-11
Tet Site					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Shielded room	Zhongyu	-	EC 2838	2020-01-13

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☐	Shielded room	Zhongyu	-	EC 2839	2020-01-13
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2020-07-31
☐	Fully-anechoic chamber	Albatross project	-	EC 3047	2020-07-31
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2020-03-10
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3481	2019-12-23
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 5198	2020-02-27
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3325	2020-04-07

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

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

Test result: **Pass**

3.1 Limit

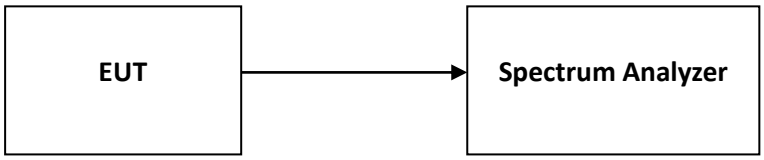
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

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).

3.2 Measurement Procedure

a) Measure the duty cycle, x, of the transmitter output signal as described in Section 6.0.
b) Set span to at least 1.5 x OBW.
c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
d) Set VBW ≥ 3 x RBW.
e) Number of points in sweep ≥ 2 x span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
f) Sweep time = auto.
g) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
h) Do not use sweep triggering. Allow the sweep to “free run”.
i) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
j) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
k) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add 10 log (1/0.25) = 6 dB if the duty cycle is 25 %.

3.3 Test Configuration



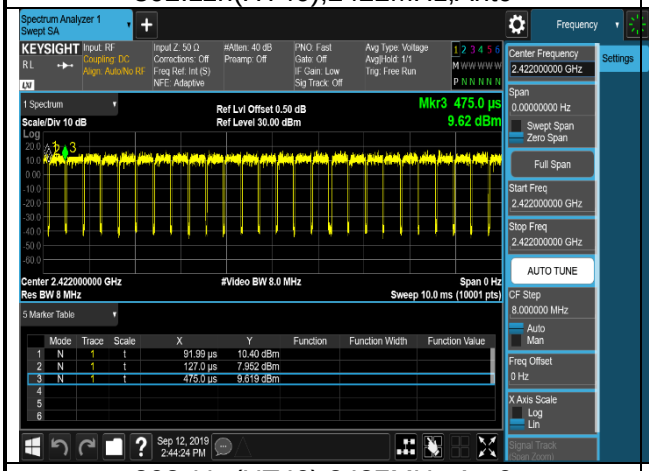
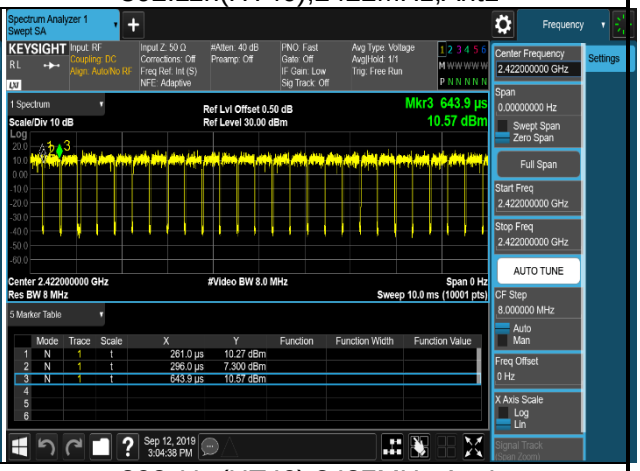
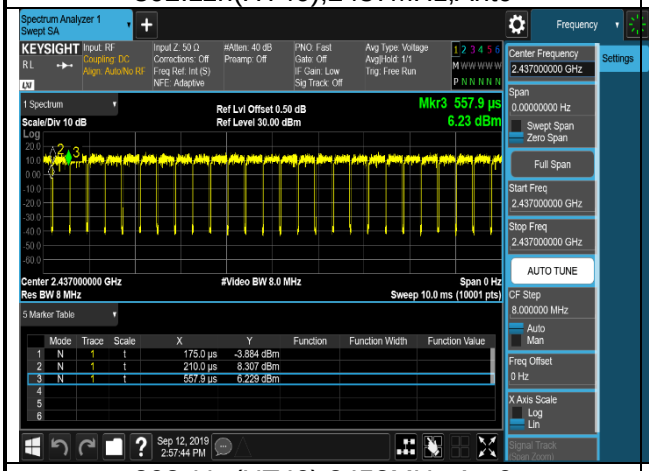
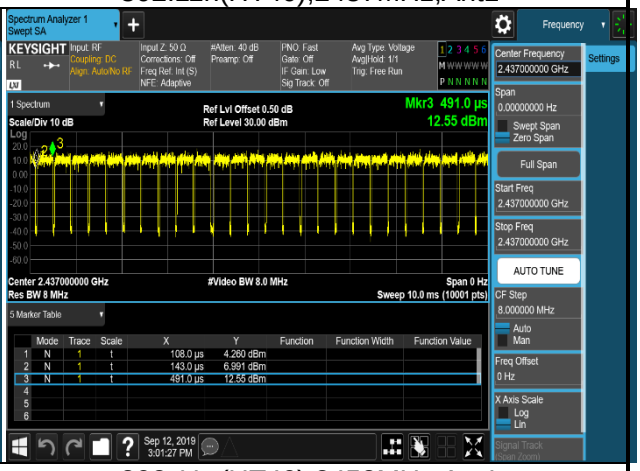
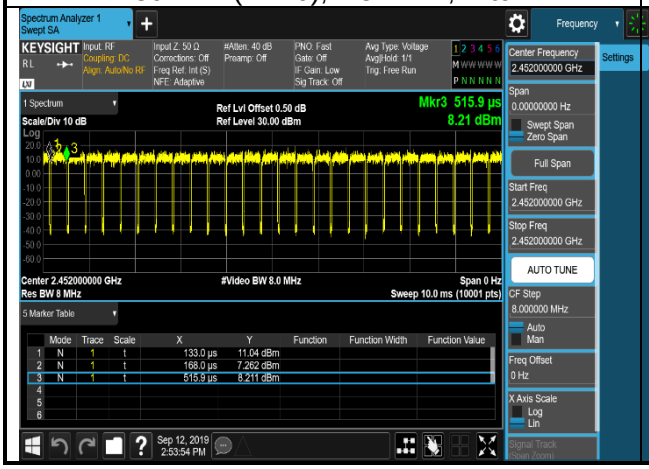
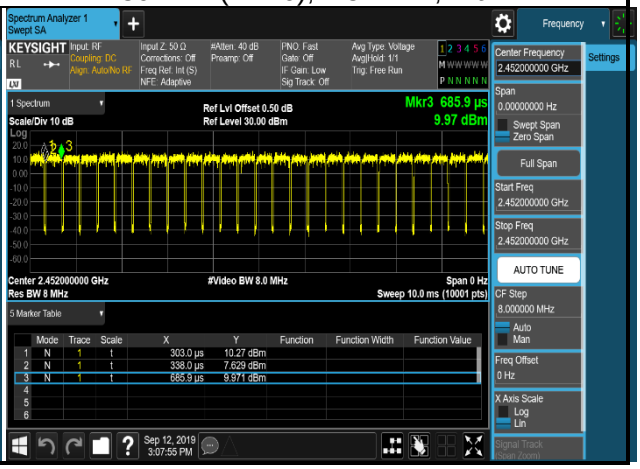
3.4 Test Results of Maximum conducted output power

1. Duty Cycle

1.1 Test Data

WLAN Duty Cycle				
Mode	Test Frequency (MHz)	Ant	Duty Cycle (%)	Duty Cycle Factor (dB)
802.11n (HT40)	2422	Ant0	90.86	0.42
802.11n (HT40)	2422	Ant1	90.86	0.42
802.11n (HT40)	2437	Ant0	90.86	0.42
802.11n (HT40)	2437	Ant1	90.86	0.42
802.11n (HT40)	2452	Ant0	90.86	0.42
802.11n (HT40)	2452	Ant1	90.86	0.42

1.2 Test Plots

802.11n(HT40),2422MHz,Ant0	802.11n(HT40),2422MHz,Ant1
	
802.11n(HT40),2437MHz,Ant0	802.11n(HT40),2437MHz,Ant1
	
802.11n(HT40),2452MHz,Ant0	802.11n(HT40),2452MHz,Ant1
	

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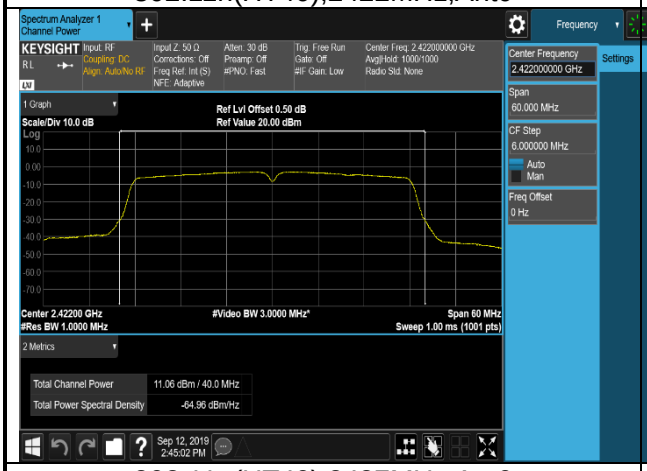
2. Maximum conducted output power and e.i.r.p

2.1 Test Data

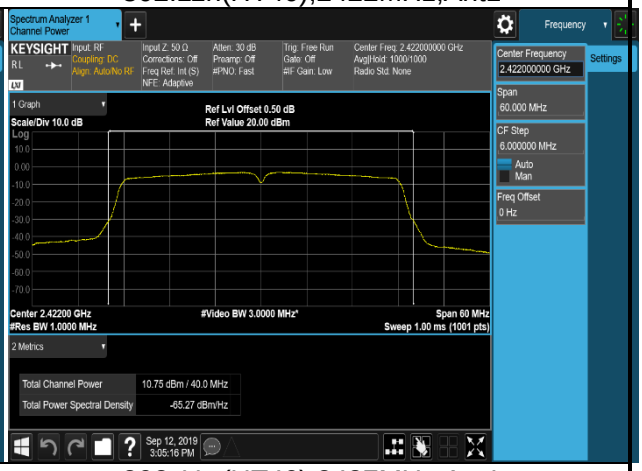
WLAN AVGSA Output Power								
Mode	Test Frequency (MHz)	Ant	Duty Cycle Factor (dB)	Max Power (dBm)	Total or max Power (dBm)	Limit (dBm)	EIRP (dBm)	Result
802.11n (HT40)	2422	Ant0	0.42	11.48	14.34	30	17.36	Pass
802.11n (HT40)	2422	Ant1	0.42	11.17				
802.11n (HT40)	2437	Ant0	0.42	11.74	14.52	30	17.54	Pass
802.11n (HT40)	2437	Ant1	0.42	11.27				
802.11n (HT40)	2452	Ant0	0.42	11.72	14.54	30	17.56	Pass
802.11n (HT40)	2452	Ant1	0.42	11.33				

2.2 Test Plots

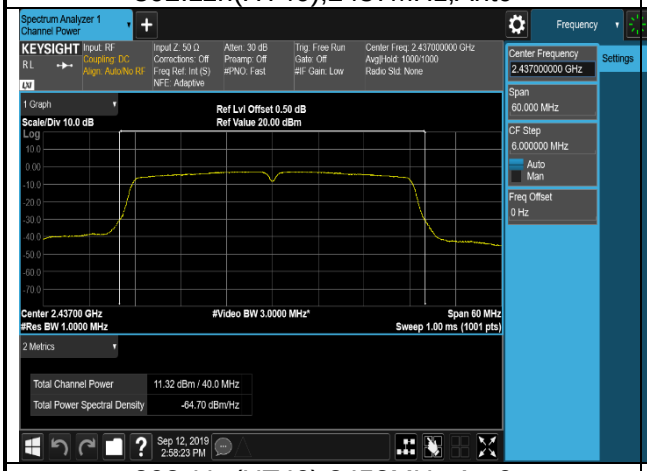
802.11n(HT40),2422MHz,Ant0



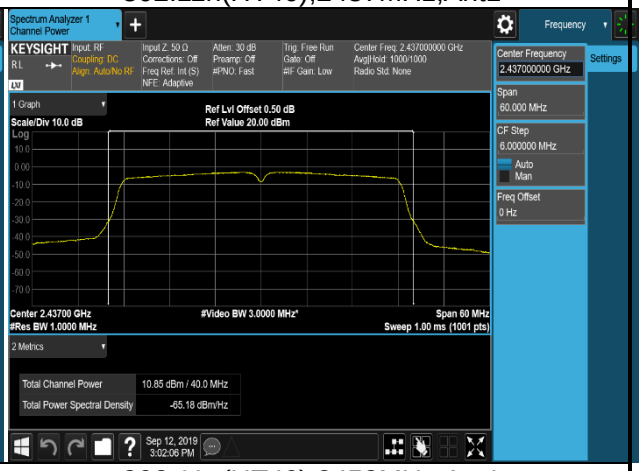
802.11n(HT40),2422MHz,Ant1



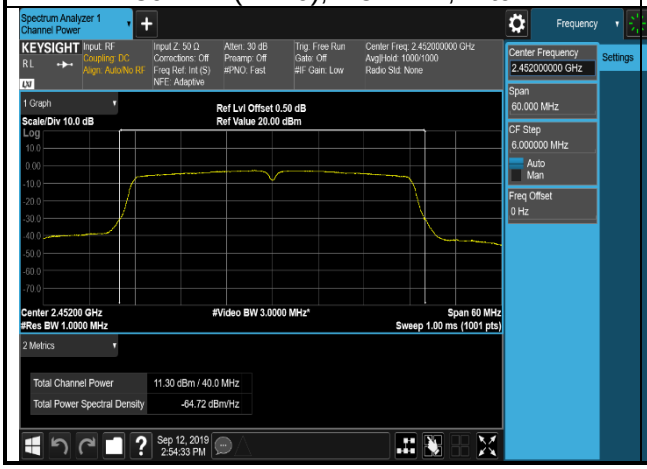
802.11n(HT40),2437MHz,Ant0



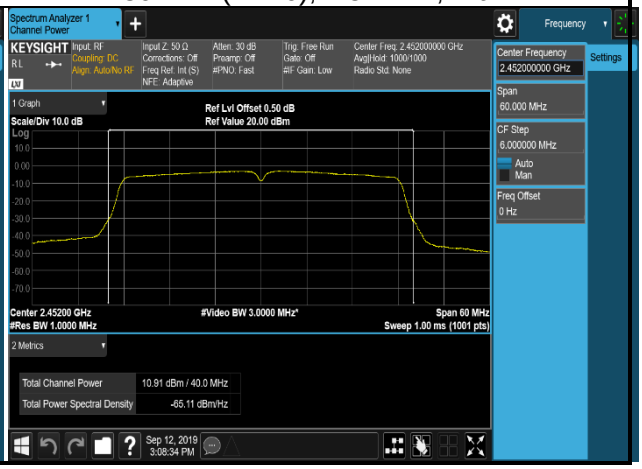
802.11n(HT40),2437MHz,Ant1



802.11n(HT40),2452MHz,Ant0



802.11n(HT40),2452MHz,Ant1



4 Emission outside the frequency band

Test result: **Pass**

4.1 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 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

4.2 Measurement Procedure

Reference level measurement

Establish a reference level by using the following procedure:

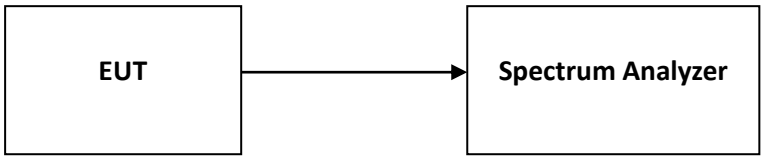
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker 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 ≥ 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.

4.3 Test Configuration



4.4 The results of Emission outside the frequency band

1. Emission outside the frequency band

1.1 Test Data

WLAN Transmitter Spurious Emission						
Mode	Test Frequency (MHz)	Ant	Plot No.	Frequency Range	Emission (dBm)	Result
802.11n (HT40)	2422	Ant0	1	Reference Level	-1.70	Pass
802.11n (HT40)	2422	Ant0	2	Band Edge	-36.02	Pass
802.11n (HT40)	2422	Ant0	3	30MHz~2310MHz	-56.66	Pass
802.11n (HT40)	2422	Ant0	4	2500MHz~5000MHz	-54.84	Pass
802.11n (HT40)	2422	Ant0	5	5000MHz~25000MHz	-41.76	Pass
802.11n (HT40)	2422	Ant1	1	Reference Level	-2.11	Pass
802.11n (HT40)	2422	Ant1	2	Band Edge	-38.39	Pass
802.11n (HT40)	2422	Ant1	3	30MHz~2310MHz	-57.99	Pass
802.11n (HT40)	2422	Ant1	4	2500MHz~5000MHz	-54.64	Pass
802.11n (HT40)	2422	Ant1	5	5000MHz~25000MHz	-41.56	Pass
802.11n (HT40)	2437	Ant0	1	Reference Level	-1.46	Pass
802.11n (HT40)	2437	Ant0	2	Band Edge	-40.03	Pass
802.11n (HT40)	2437	Ant0	3	30MHz~2310MHz	-54.82	Pass
802.11n (HT40)	2437	Ant0	4	2500MHz~5000MHz	-54.73	Pass
802.11n (HT40)	2437	Ant0	5	5000MHz~25000MHz	-41.82	Pass

802.11n (HT40)	2437	Ant1	1	Reference Level	-2.01	Pass
802.11n (HT40)	2437	Ant1	2	Band Edge	-43.06	Pass
802.11n (HT40)	2437	Ant1	3	30MHz~2310MHz	-57.90	Pass
802.11n (HT40)	2437	Ant1	4	2500MHz~5000MHz	-54.69	Pass
802.11n (HT40)	2437	Ant1	5	5000MHz~25000MHz	-41.46	Pass
802.11n (HT40)	2452	Ant0	1	Reference Level	-1.42	Pass
802.11n (HT40)	2452	Ant0	2	Band Edge	-43.53	Pass
802.11n (HT40)	2452	Ant0	3	30MHz~2310MHz	-57.67	Pass
802.11n (HT40)	2452	Ant0	4	2500MHz~5000MHz	-55.49	Pass
802.11n (HT40)	2452	Ant0	5	5000MHz~25000MHz	-41.92	Pass
802.11n (HT40)	2452	Ant1	1	Reference Level	-1.90	Pass
802.11n (HT40)	2452	Ant1	2	Band Edge	-45.98	Pass
802.11n (HT40)	2452	Ant1	3	30MHz~2310MHz	-58.48	Pass
802.11n (HT40)	2452	Ant1	4	2500MHz~5000MHz	-54.41	Pass
802.11n (HT40)	2452	Ant1	5	5000MHz~25000MHz	-41.08	Pass

9.2 Test Plots

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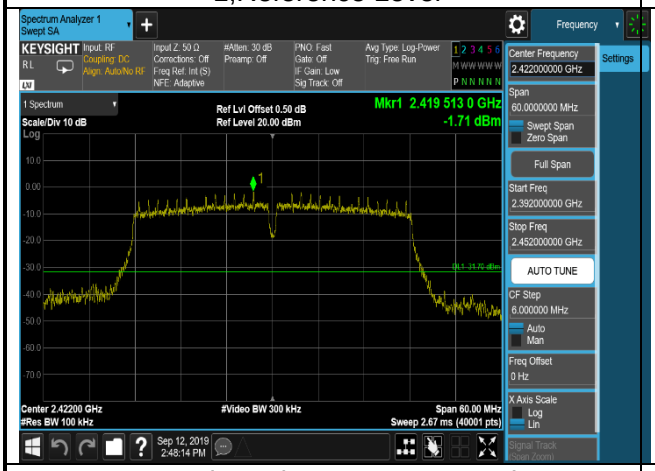
802.11n(HT40),2422MHz,Ant0,Plot 1,Reference Level	802.11n(HT40),2422MHz,Ant0,Plot 2,Band Edge
	
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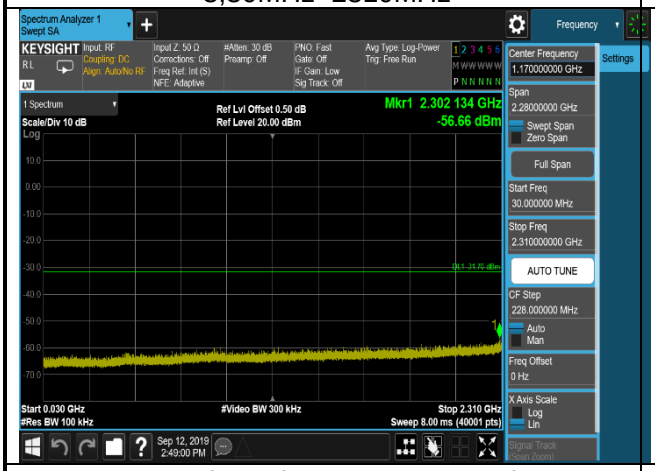
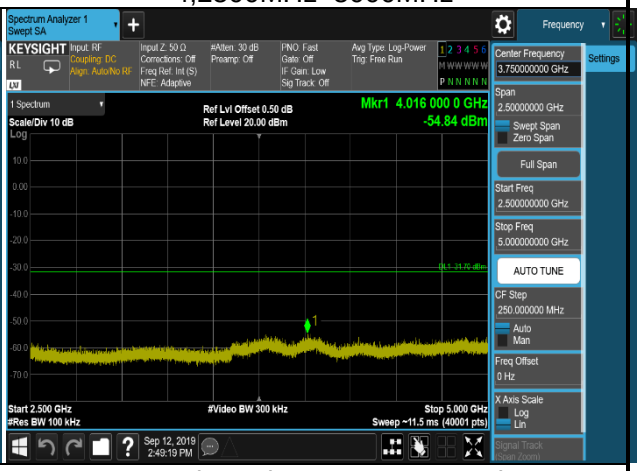
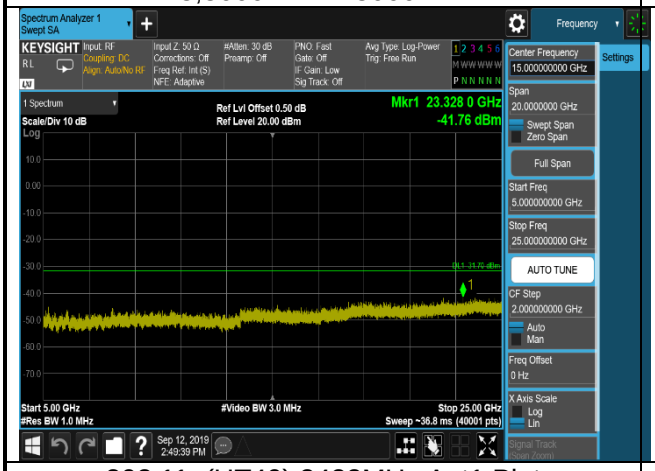
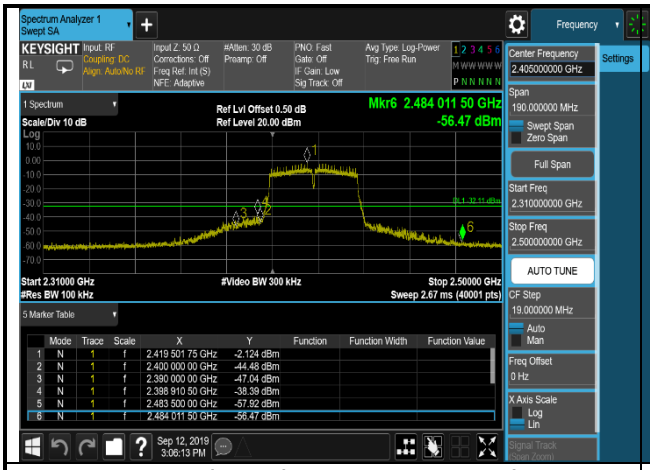
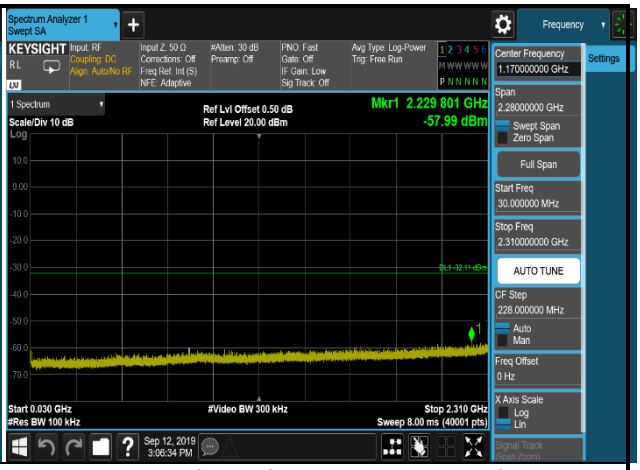
	
802.11n(HT40),2422MHz,Ant0,Plot 5,5000MHz~25000MHz	802.11n(HT40),2422MHz,Ant1,Plot 1,Reference Level
	
802.11n(HT40),2422MHz,Ant1,Plot 2,Band Edge	802.11n(HT40),2422MHz,Ant1,Plot 3,30MHz~2310MHz

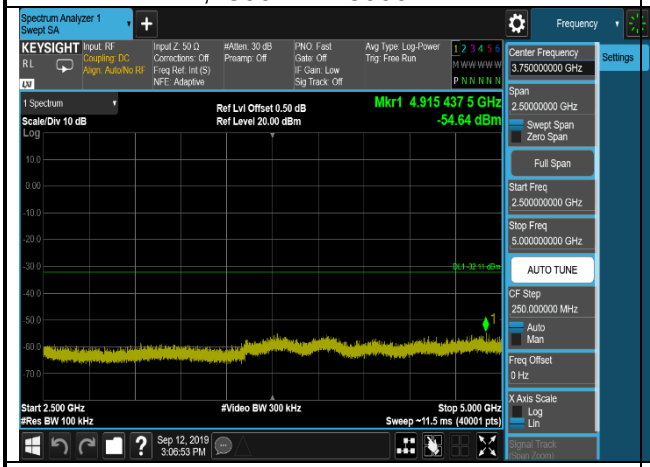
TEST REPORT



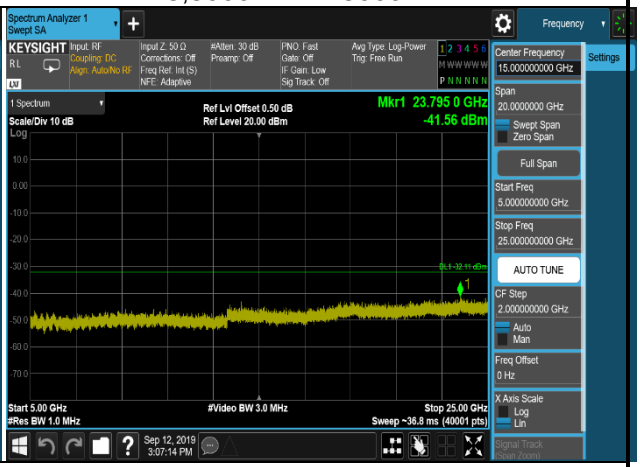
802.11n(HT40),2422MHz,Ant1,Plot 4,2500MHz~5000MHz



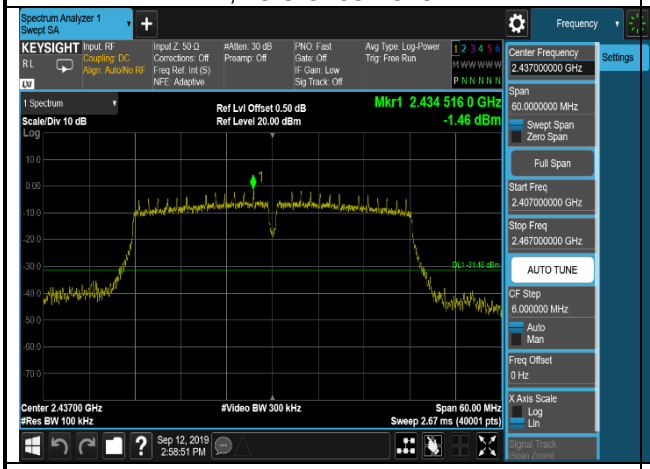
802.11n(HT40),2422MHz,Ant1,Plot 5,5000MHz~25000MHz



802.11n(HT40),2437MHz,Ant0,Plot 1,Reference Level



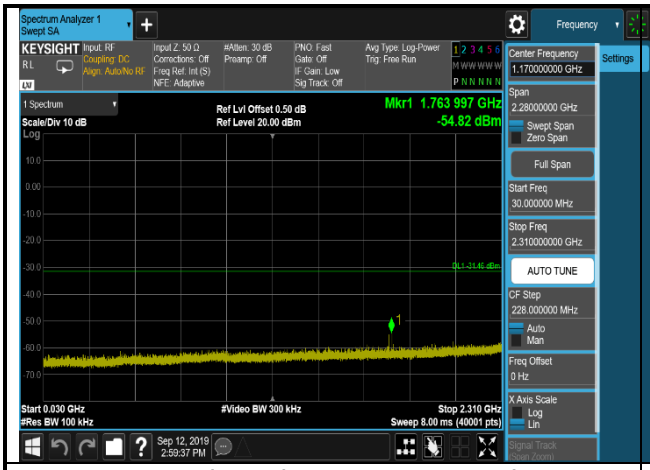
802.11n(HT40),2437MHz,Ant0,Plot 2,Band Edge



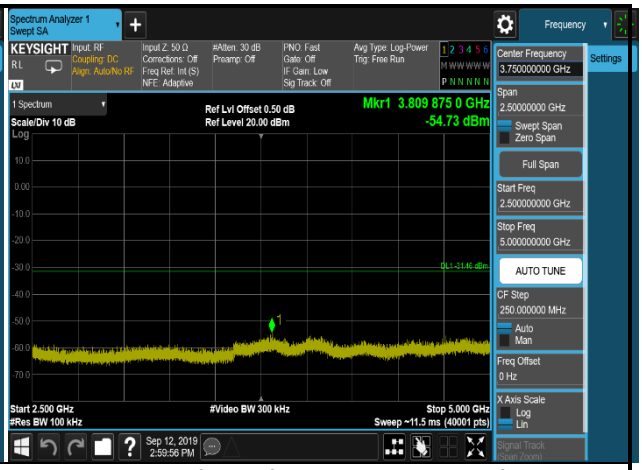
802.11n(HT40),2437MHz,Ant0,Plot 3,30MHz~2310MHz

802.11n(HT40),2437MHz,Ant0,Plot 4,2500MHz~5000MHz

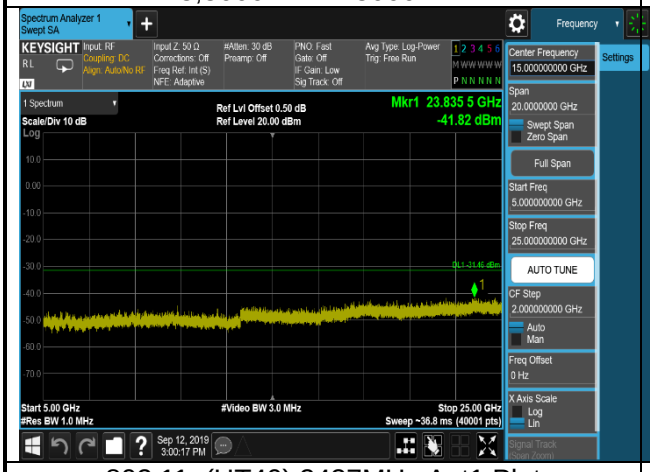
TEST REPORT



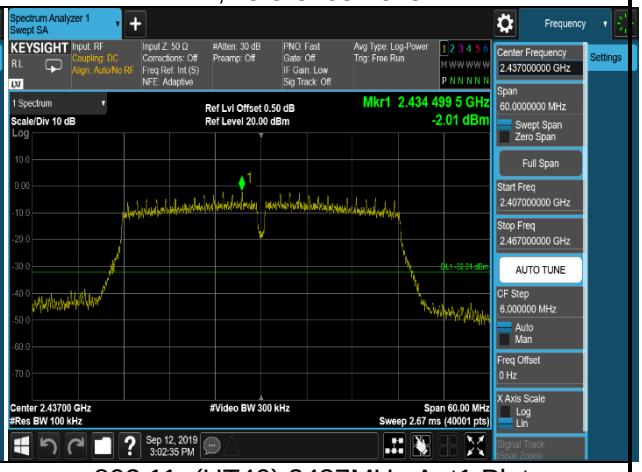
802.11n(HT40),2437MHz,Ant0,Plot 5,5000MHz~25000MHz



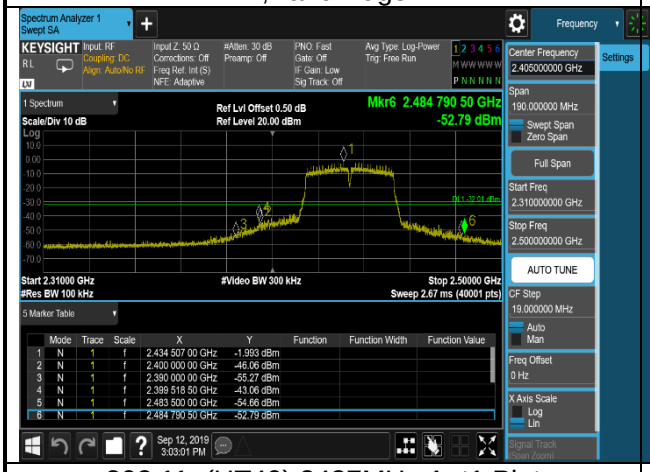
802.11n(HT40),2437MHz,Ant1,Plot 1,Reference Level



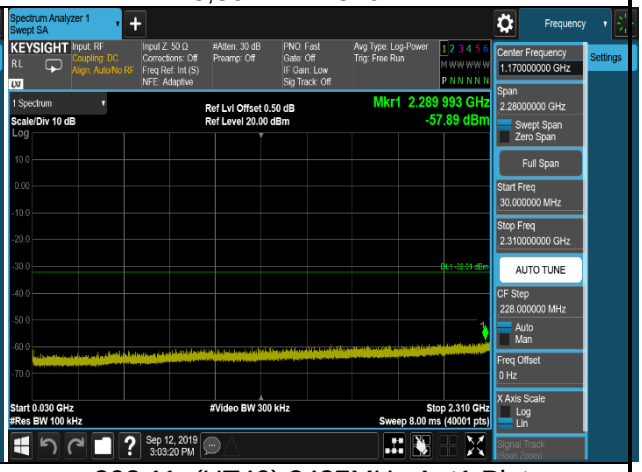
802.11n(HT40),2437MHz,Ant1,Plot 2,Band Edge



802.11n(HT40),2437MHz,Ant1,Plot 3,30MHz~2310MHz

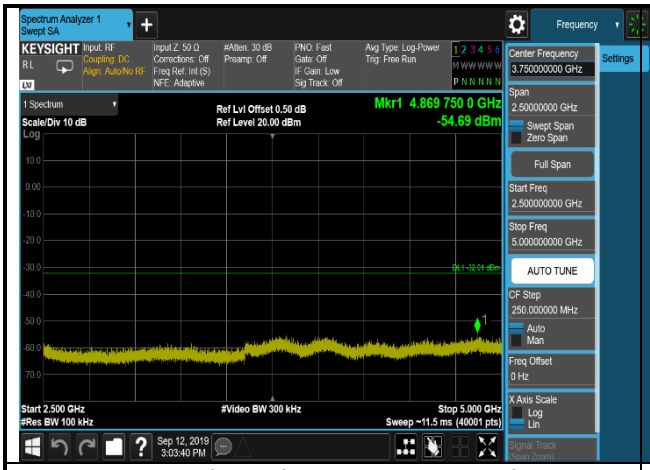


802.11n(HT40),2437MHz,Ant1,Plot 4,2500MHz~5000MHz

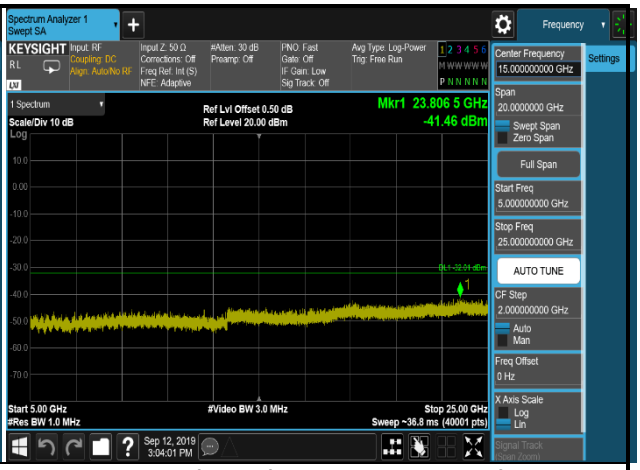


802.11n(HT40),2437MHz,Ant1,Plot 5,5000MHz~25000MHz

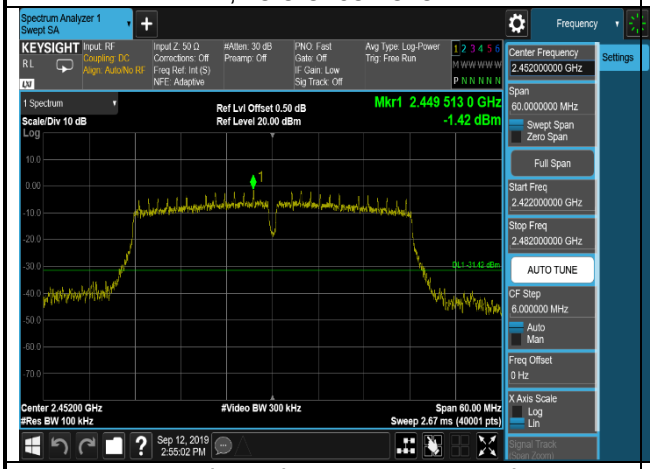
TEST REPORT



802.11n(HT40),2452MHz,Ant0,Plot 1,Reference Level

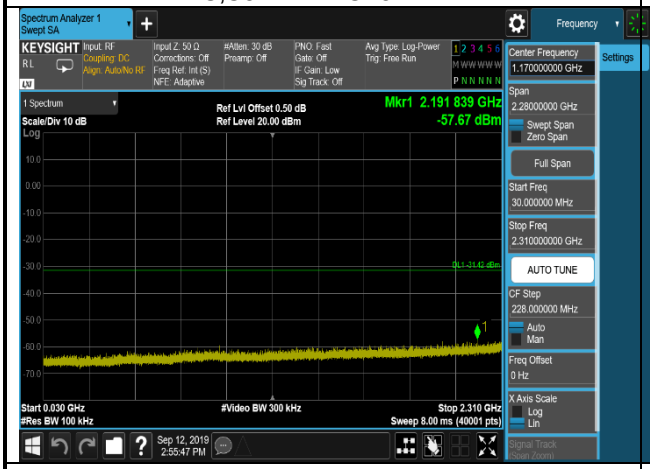


802.11n(HT40),2452MHz,Ant0,Plot 2,Band Edge

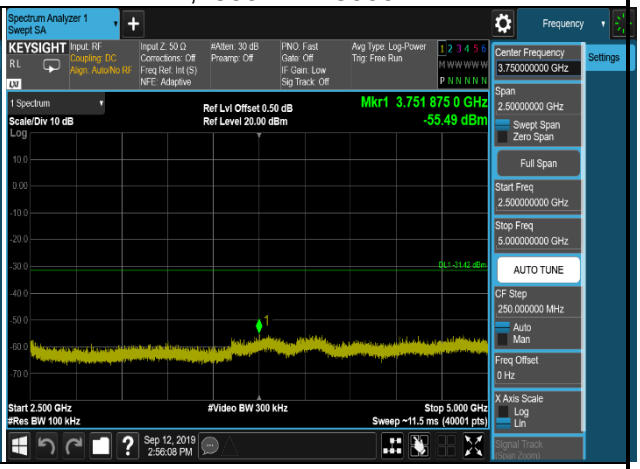


802.11n(HT40),2452MHz,Ant0,Plot 3,30MHz~2310MHz

802.11n(HT40),2452MHz,Ant0,Plot 4,2500MHz~5000MHz

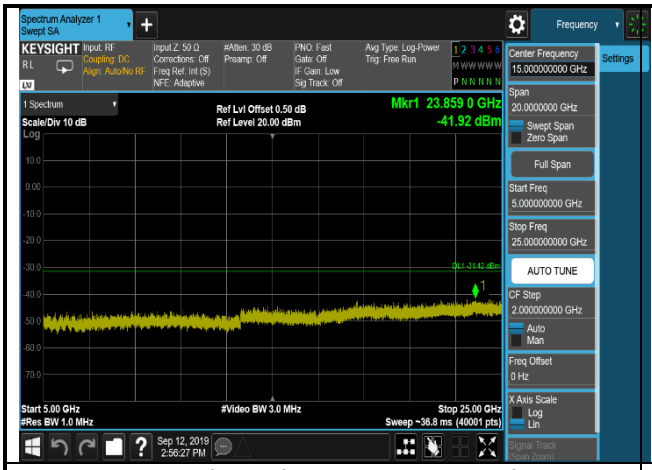


802.11n(HT40),2452MHz,Ant0,Plot 5,5000MHz~25000MHz

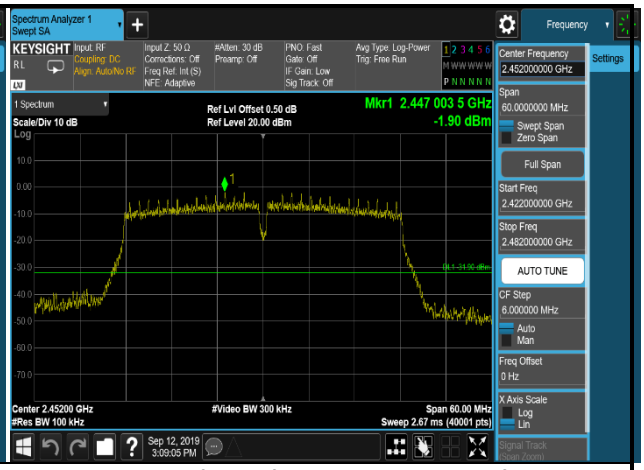


802.11n(HT40),2452MHz,Ant1,Plot 1,Reference Level

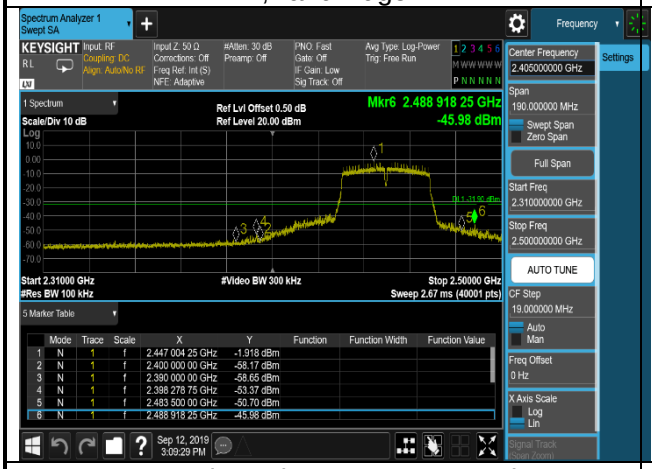
TEST REPORT



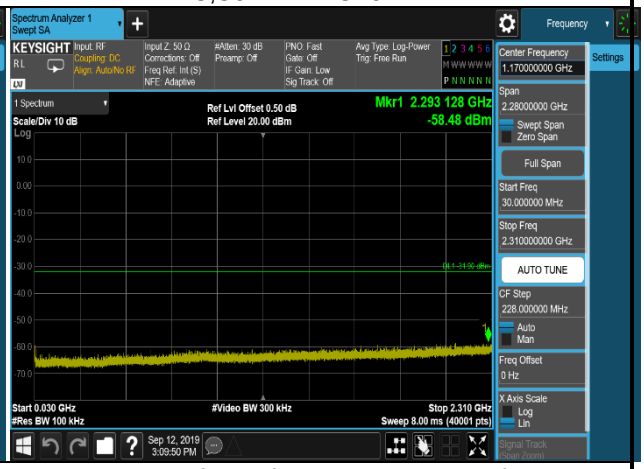
802.11n(HT40),2452MHz,Ant1,Plot 2,Band Edge



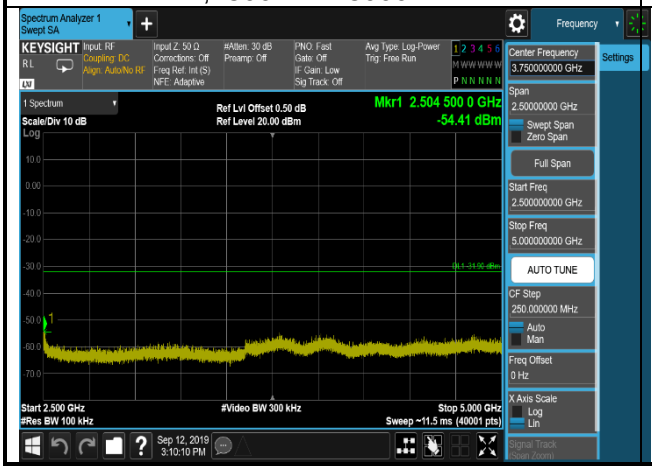
802.11n(HT40),2452MHz,Ant1,Plot 3,30MHz~2310MHz

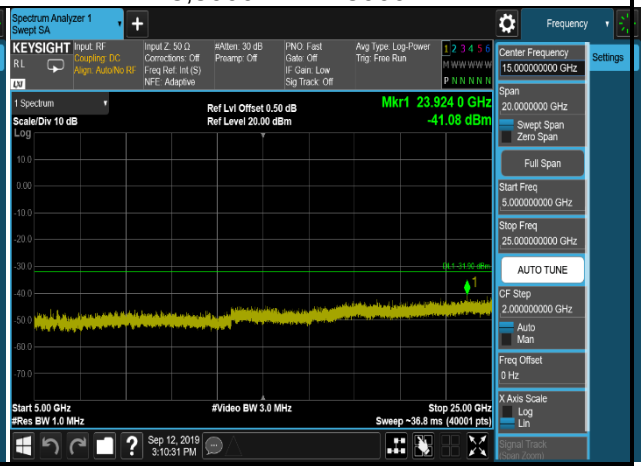


802.11n(HT40),2452MHz,Ant1,Plot 4,2500MHz~5000MHz



802.11n(HT40),2452MHz,Ant1,Plot 5,5000MHz~25000MHz





5 Radiated Emissions

Test result: **Pass**

5.1 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

5.2 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 meters 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.

TEST REPORT

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 meters 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.

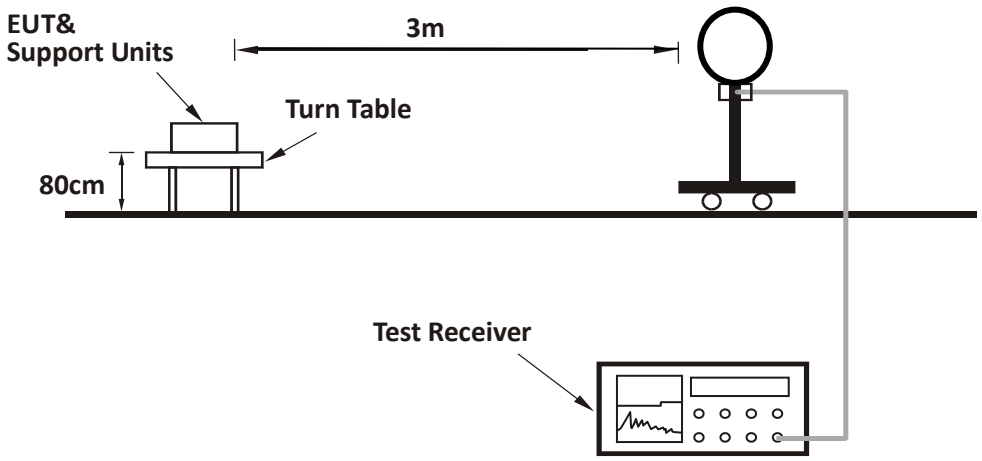
f) The test-receiver system was set to peak and average detector function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

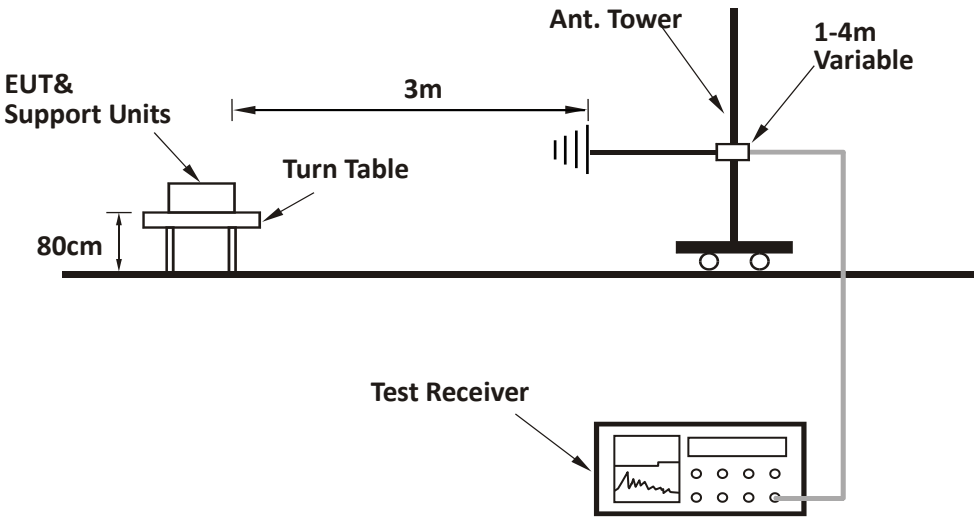
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. 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 evaluated and the worst-case emissions were reported

5.3 Test Configuration

For Radiated emission below 30MHz:

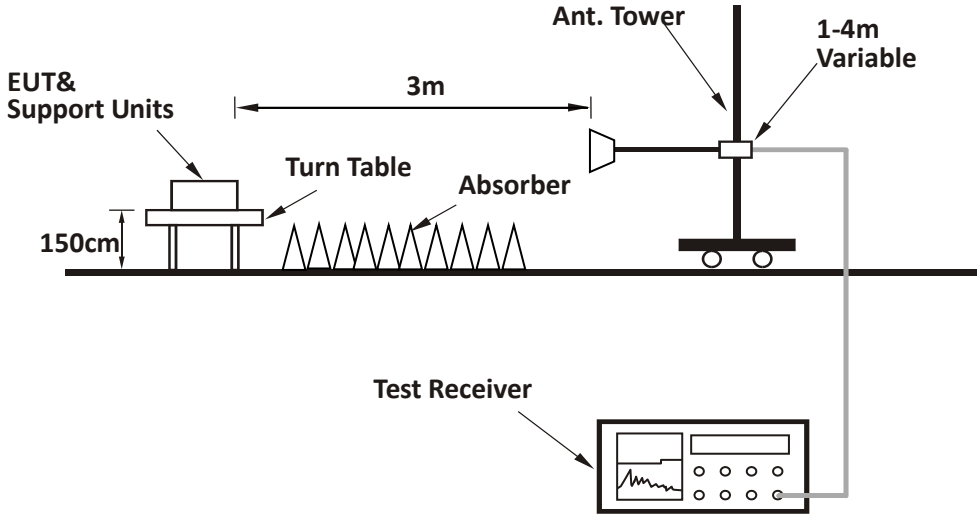


For Radiated emission 30MHz to 1GHz:



TEST REPORT

For Radiated emission above 1GHz:



5.4 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.

EUT was tested with WiFi on and off, and the worst data was listed in the report.

Test data below 1GHz:

Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	24.60	21.30	40	15.40	PK
H	55.27	19.70	6.00	40	20.30	PK
H	156.35	30.70	10.10	43.5	12.80	PK
H	239.94	38.60	12.80	46	7.40	PK
H	341.02	36.80	15.80	46	9.20	PK
H	935.85	32.90	25.40	46	13.10	PK
V	30.00	24.30	21.30	40	15.70	PK
V	84.43	18.90	10.00	40	21.10	PK
V	123.31	21.80	11.80	43.5	21.70	PK
V	199.12	29.30	11.20	43.5	14.20	PK
V	533.47	29.00	19.80	46	17.00	PK
V	922.24	33.40	25.40	46	12.60	PK

Test result above 1GHz:

The emission was conducted from 1GHz to 25GHz

802.11n(HT40)

CH	Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H/V	2422	103.70	34.10	Fundamental	/	PK
	H/V	2387.76	69.00	34.20	74.00	5.00	PK
	H/V	2387.76	52.50	34.20	54.00	1.50	AV
M	H/V	2437	104.50	34.20	Fundamental	/	PK
H	H/V	2452	105.10	34.40	Fundamental	/	PK

	H/V	2484.03	67.00	34.80	74.00	7.00	PK
	H/V	2484.03	52.50	34.80	54.00	1.50	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.

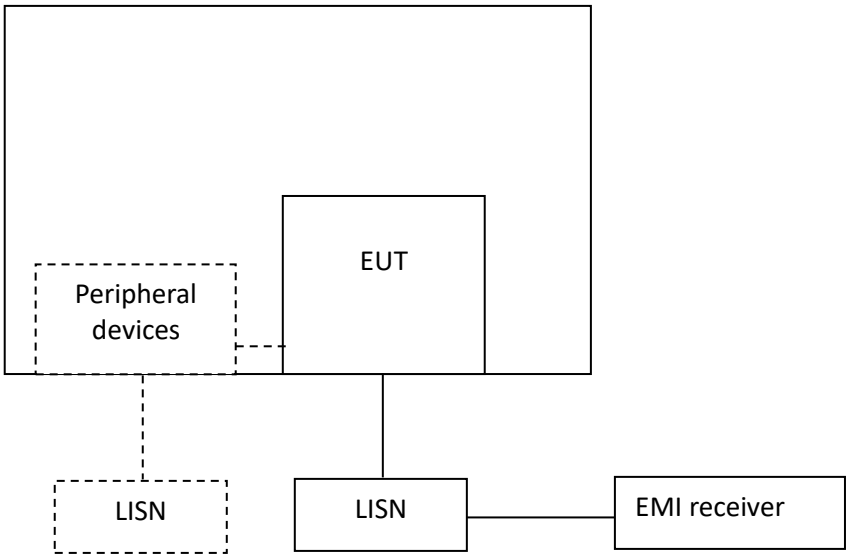
6 Power line conducted emission

Test result: **Pass**

6.1 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.		

6.2 Test Configuration



6.3 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.

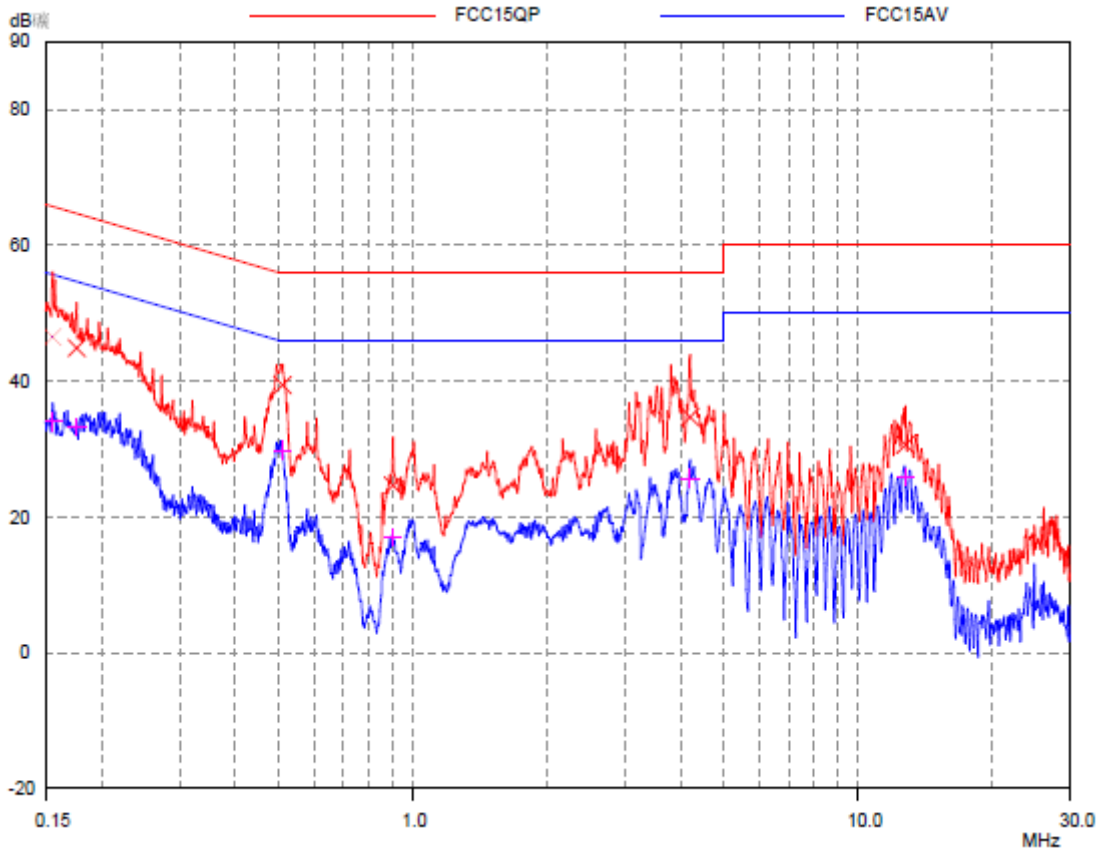
The bandwidth of the test receiver is set at 9 kHz.

TEST REPORT

6.4 Test Results of Power line conducted emission

Test Curve:

L Line



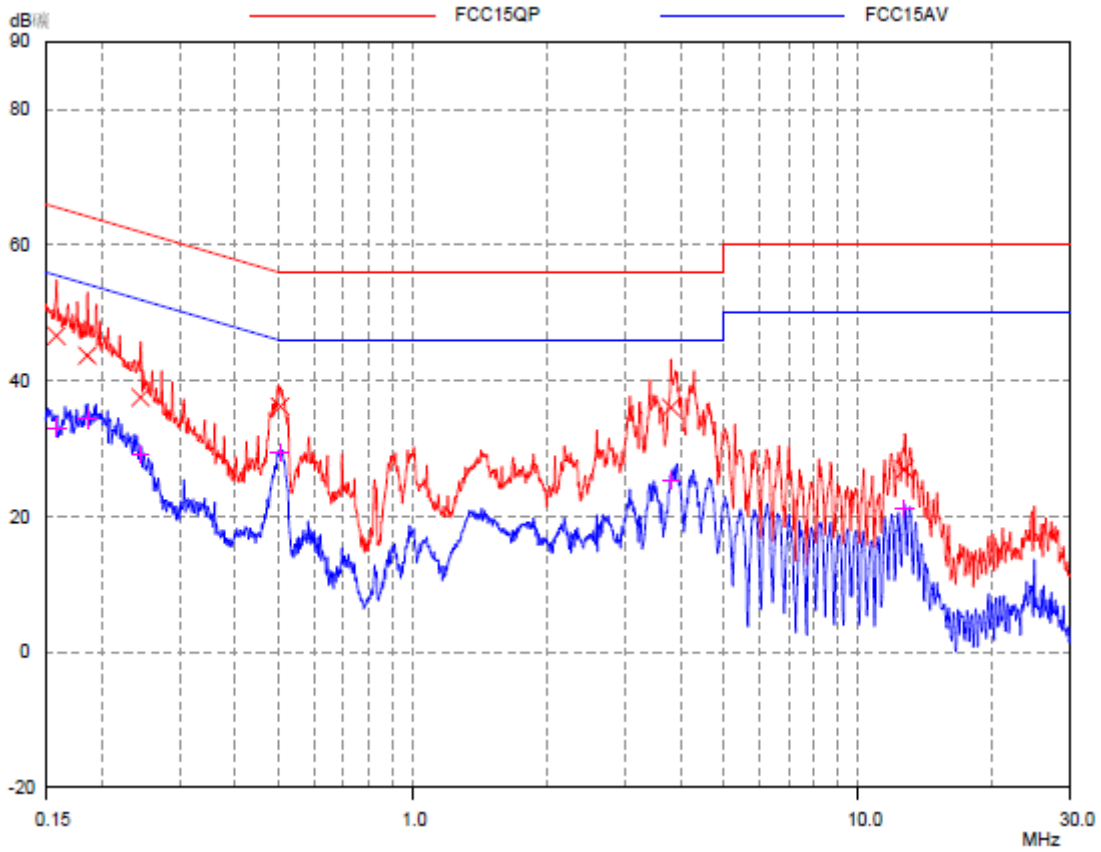
Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.16	46.49	65.70	19.21	34.04	55.70	21.66
0.18	44.87	64.67	19.80	33.24	54.67	21.43
0.51	39.43	56.00	16.57	29.84	46.00	16.16
0.90	24.63	56.00	31.37	17.04	46.00	28.96
4.20	34.71	56.00	21.29	25.70	46.00	20.30
12.81	30.63	60.00	29.37	25.82	50.00	24.18

TEST REPORT

Test Curve:

N Line



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(µV)	Limit dB(µV)	Margin (dB)	level dB(µV)	limit dB(µV)	Margin (dB)
0.16	46.61	65.54	18.93	33.09	55.54	22.45
0.19	43.71	64.21	20.50	34.35	54.21	19.86
0.25	37.51	61.92	24.41	29.08	51.92	22.84
0.50	36.19	56.00	19.81	29.47	46.00	16.53
3.81	36.04	56.00	19.96	25.32	46.00	20.68
12.76	26.92	60.00	33.08	21.20	50.00	28.80

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.

********** END **********