Bestway Inflatables & Material Corp.

RF TEST REPORT

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

Model:
54185E

REPORT NUMBER:
190402507SHA-001

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Report no.: 190402507SHA-001

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Applicant:	Bestway Inflatables & Material Corp. No. 3065 Cao An Road, Shanghai, China
Manufacturer:	Bestway Inflatables & Material Corp. No. 3065 Cao An Road, Shanghai, China
Manufacturing site:	Bestway (Nantong) Recreation Corp. No.8 West Huimin Road, Rugao Economic Development Zone, Jiangsu, China
Product Name:	SPA
Type/Model:	54185E
FCC ID:	2ACGN-BW54185

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

PREPARED BY:	REVIEWED BY:
Project Engineer	Reviewer
Wade Zhang	Daniel Zhao

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Revision History

Report No.	Version	Description	Issued Date
190402507SHA-001	Rev. 01	Initial issue of report	July 1, 2019

Measurement result summary

TEST ITEM	FCC REFERANCE	RESULT
Minimum 6dB Bandwidth	15.247(a)(2)	Pass
Maximum conducted output power and e.i.r.p.	15.247(b)(3)	Pass
Power spectrum density	15.247(e)	Pass
Emission outside the frequency band	15.247(d)	Pass
Radiated Emissions in restricted frequency bands	15.247(d), 15.205&15.209	Pass
Power line conducted emission	15.207(a)	Pass
Occupied bandwidth	-	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.

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	SPA
Type/Model:	54185E
Description of EUT:	The EUT is a SPA which was install a WIFI module.
Rating:	110~120VAC 60Hz, 12A
Software Version:	/
Hardware Version:	/
Sample received date:	May 20, 2019
Date of test:	May 20, 2019 ~ June 28, 2019

1.2 Technical Specification

Frequency Range:	2412MHz ~ 2462MHz
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)
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS7 IEEE 802.11n-HT40: Up to MCS7
Channel Separation:	5 MHz
Antenna:	Internal PCB antenna, 2.0dBi Peak gain

1.3 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 CAB identifier.: CN0051
	VCCI Registration Lab Registration No.: R-14243, G-10845, C-14723, T-12252
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2017)
ANSI C63.10 (2013)

2.2 Mode of operation during the test

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.

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

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
2400-2483.5	802.11b	2412	2437	2462
	802.11g	2412	2437	2462
	802.11n(HT20)	2412	2437	2462
	802.11n(HT40)	2422	2437	2452

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
2400-2483.5	802.11b	1Mbps
	802.11g	6Mbps
	802.11n(HT20)	MCS0
	802.11n(HT40)	MCS0

There have the following test modes:

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

2.5 Test environment condition:

Test items	Temperature	Humidity
Minimum 6dB Bandwidth	23°C	52% RH
Maximum conducted output power and e.i.r.p.		
Power spectrum density		
Emission outside the frequency band		
Occupied bandwidth		
Radiated Emissions in restricted frequency bands	22°C	55% RH
Power line conducted emission	21°C	52% RH

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESCS 30	EC 2107	2019-07-15
☑	A.M.N.	R&S	ESH2-Z5	EC 3119	2019-11-29
☑	Shielded room	Zhongyu	-	EC 2838	2020-01-13
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Test Receiver	R&S	ESIB 26	EC 3045	2019-09-12
☑	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2019-12-10
☑	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
☑	Pre-amplifier	R&S	Pre-amp 18	EC5262	2020-06-11
☑	Semi-anechoic chamber	Albatross project	-	EC 3048	2019-07-31
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2020-03-04
☑	PXA Signal Analyzer	Keysight	N9030B	EC 6078	2020-6-11
☑	Power sensor	Agilent	U2021XA	EC 5338-1	2020-03-04
☑	Vector Signal Generator	Agilent	N5182B	EC 5175	2020-03-04
☑	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2020-03-04
☑	Test Receiver	R&S	ESCI 7	EC 4501	2019-09-12
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☑	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2020-03-10
☑	Pressure meter	YM3	Shanghai Mengde	EC 3320	2019-07-01

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 Minimum 6dB bandwidth

Test result: Pass

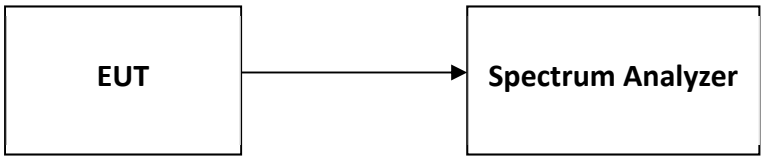
3.1 Limit

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

a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 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

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

Test result: Pass

4.1 Limit

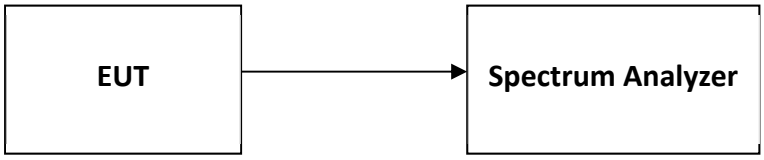
For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 W. (The e.i.r.p. shall not exceed 4 W)

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

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 %.

4.3 Test Configuration



4.4 Test Results of Maximum conducted output power

Please refer to Appendix A

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.

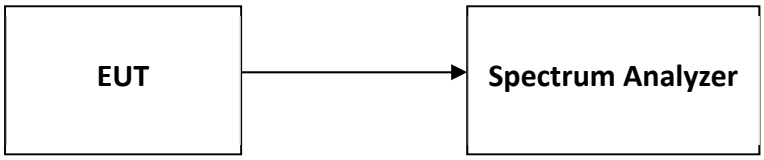
If the transmitting antenna of directional gain greater than 6dBi is used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. If there have a beam forming type, the limit should be the minimum of 8dBm/MHz and 8+ (6 –antenna gain-beam forming gain).

5.2 Measurement Procedure

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 kHz ≤ RBW ≤ 100 kHz.
e) Set VBW ≥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 ≥ 2 x 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.
l) 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

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

6.2 Measurement Procedure

Reference level measurement

Establish a reference level by using the following procedure:

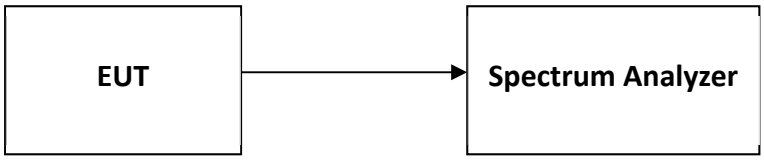
a) Set instrument center frequency to DTS channel center frequency.
b) Set the span to ≥ 1.5 times the DTS bandwidth.
c) Set the RBW = 100 kHz.
d) Set the VBW ≥ 3 x RBW.
e) Detector = peak.
f) Sweep time = auto couple.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker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

6.3 Test Configuration



6.4 The results of Emission outside the frequency band

Please refer to Appendix A

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 (0.1 meters for floor standing) 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 (0.1 meters for floor standing) (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.

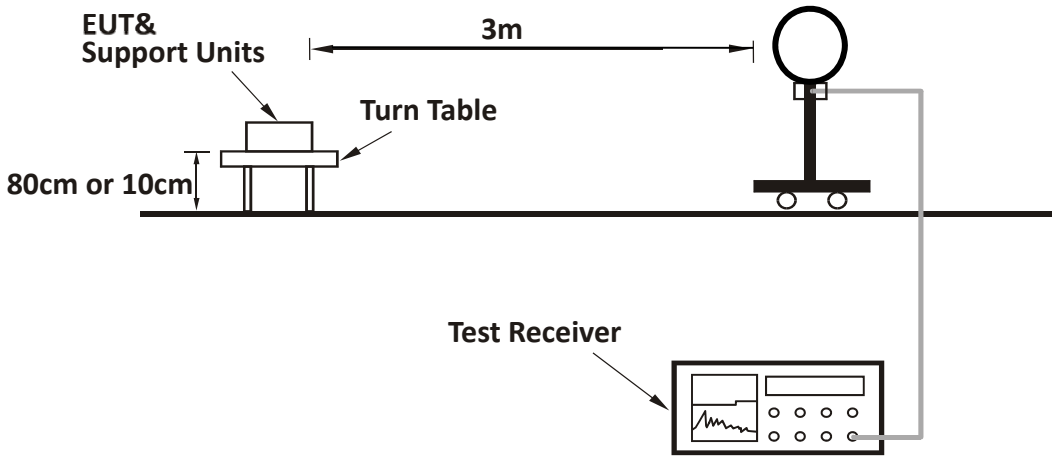
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

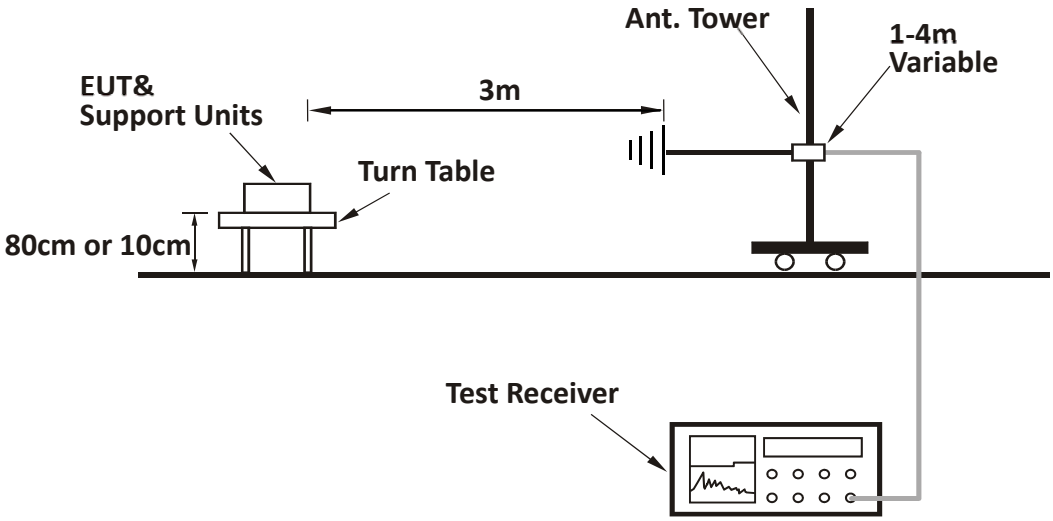
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

7.3 Test Configuration

For Radiated emission below 30MHz:

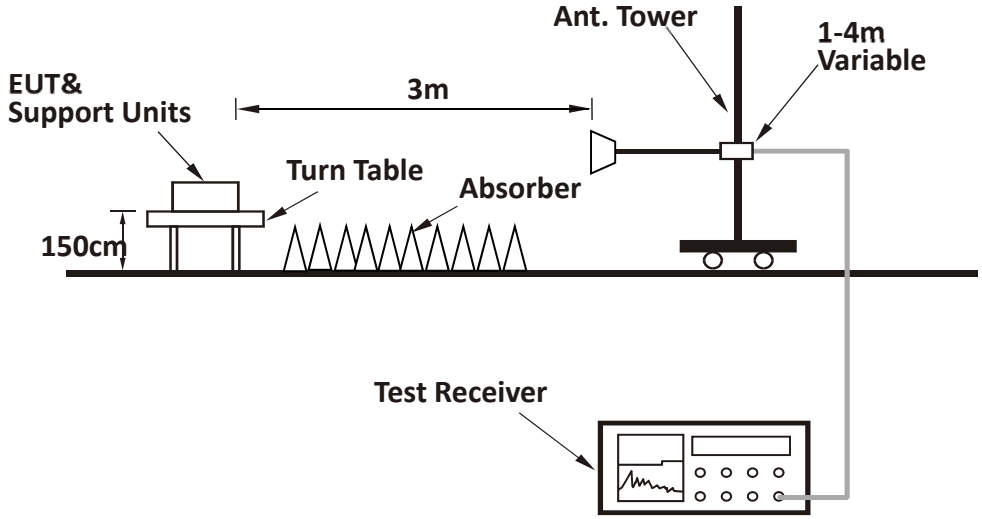


For Radiated emission 30MHz to 1GHz:



TEST REPORT

For Radiated emission above 1GHz:

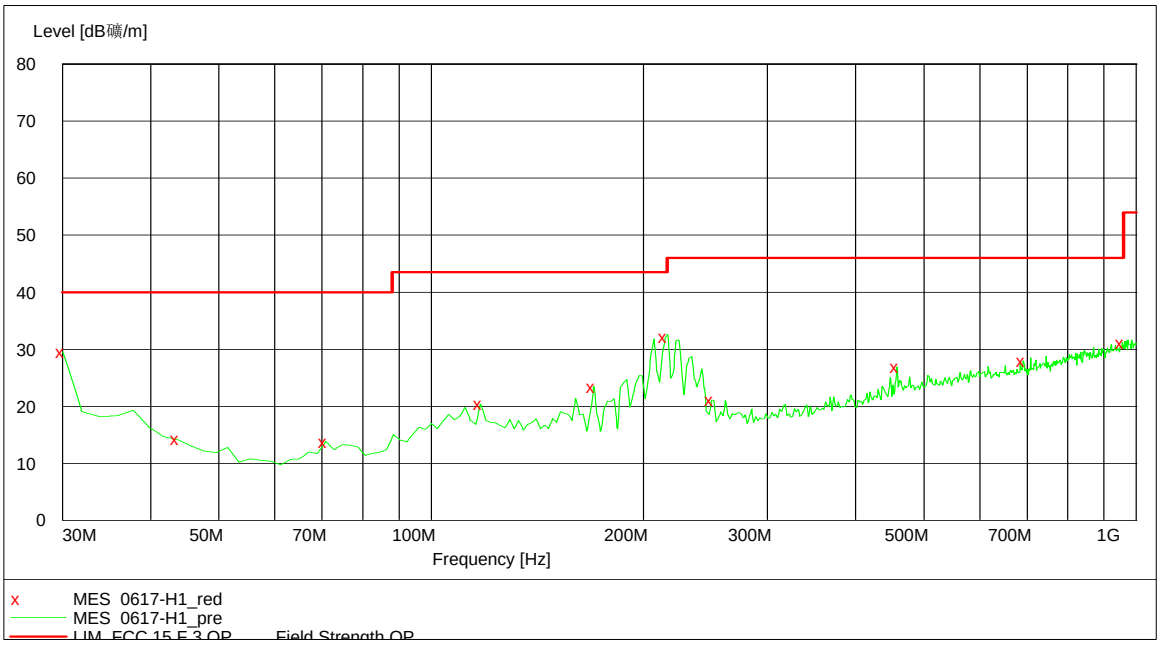


7.4 Test Results of Radiated Emissions

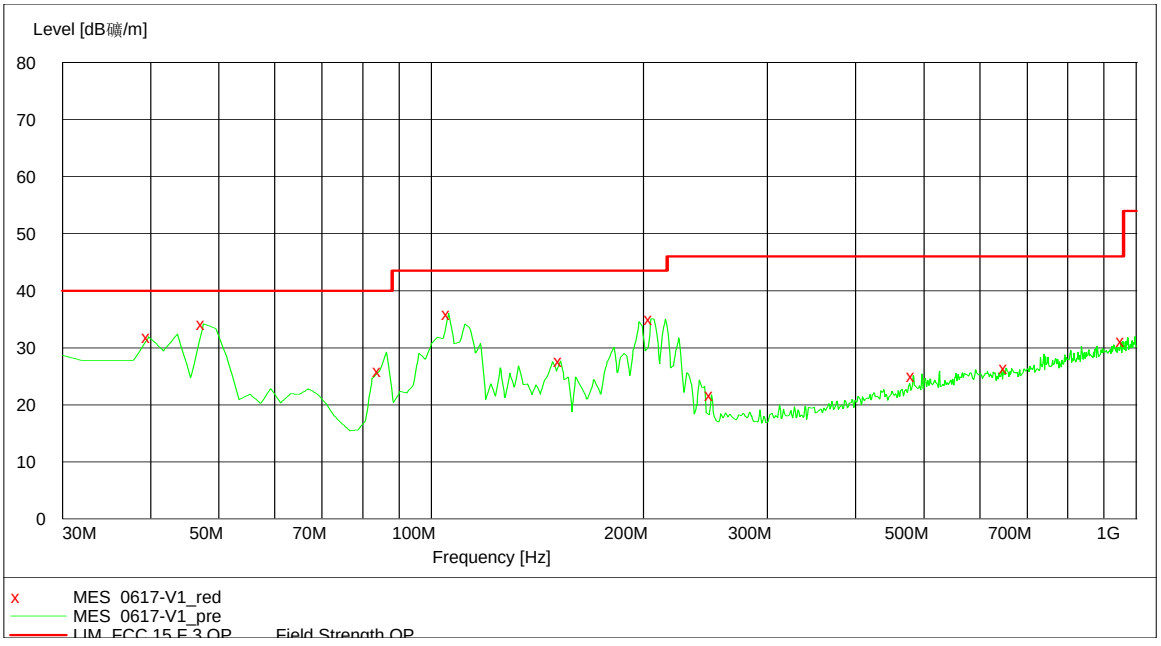
The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

The worst waveform (802.11b, 2462MHz) from 30MHz to 1000MHz is listed as below:

Horizontal



Vertical



TEST 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	29.60	18.90	40.00	10.40	PK
H	43.61	14.20	11.80	40.00	25.80	PK
H	70.82	13.80	7.30	40.00	26.20	PK
H	117.47	20.40	13.50	43.50	23.10	PK
H	169.96	23.40	11.20	43.50	20.10	PK
H	214.67	32.10	11.30	43.50	11.40	PK
H	249.66	21.10	14.50	46.00	24.90	PK
H	457.66	26.90	19.40	46.00	19.10	PK
H	690.92	27.90	22.10	46.00	18.10	PK
V	955.29	31.20	25.00	46.00	14.80	PK
V	39.72	31.90	13.80	40.00	8.10	PK
V	47.49	34.20	10.00	40.00	5.80	PK
V	84.43	25.90	8.90	40.00	14.10	PK
V	105.81	36.00	12.70	43.50	7.50	PK
V	152.46	27.70	12.00	43.50	15.80	PK
V	204.95	35.00	11.30	43.50	8.50	PK
V	249.66	21.70	14.50	46.00	24.30	PK
V	482.93	25.10	19.80	46.00	20.90	PK
V	653.99	26.40	21.90	46.00	19.60	PK
V	957.23	31.10	25.00	46.00	14.90	PK

TEST REPORT

Test result above 1GHz:
The emission was conducted from 1GHz to 25GHz

802.11b

CH	Antenna	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
L	H	2390.00	58.43	27.23	-15.57	74.00	31.20	PK
	H	2390.00	48.33	17.13	-5.67	54.00	31.20	AV
	H	4824.00	45.70	43.00	-28.30	74.00	2.70	PK
	V	4824.00	44.75	42.05	-29.25	74.00	2.70	PK
M	H	4874.00	45.64	42.96	-28.36	74.00	2.68	PK
	V	4874.00	44.66	41.98	-29.34	74.00	2.68	PK
H	H	2483.50	56.85	25.66	-17.15	74.00	31.19	PK
	H	2483.50	46.67	15.48	-7.33	54.00	31.19	AV
	H	4924.00	46.55	43.78	-27.45	74.00	2.77	PK
	V	4924.00	44.43	41.66	-29.57	74.00	2.77	PK

802.11g

CH	Antenna	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
L	H	2390.00	55.56	24.36	-18.44	74.00	31.20	PK
	H	2390.00	46.44	15.24	-7.56	54.00	31.20	AV
	H	4824.00	45.67	42.97	-28.33	74.00	2.70	PK
	V	4824.00	44.46	41.76	-29.54	74.00	2.70	PK
M	H	4874.00	46.66	43.98	-27.34	74.00	2.68	PK
	V	4874.00	45.64	42.96	-28.36	74.00	2.68	PK
	H	7311.00	45.87	37.88	-28.13	74.00	7.99	PK
	V	7311.00	45.54	37.55	-28.46	74.00	7.99	PK
H	H	2483.50	55.57	24.38	-18.43	74.00	31.19	PK
	H	2483.50	45.66	14.47	-8.34	54.00	31.19	AV

	H	4924.00	46.65	43.88	-27.35	74.00	2.77	PK
	V	4924.00	44.54	41.77	-29.46	74.00	2.77	PK

802.11n(HT20)

CH	Antenna	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
L	H	2390.00	56.67	25.47	-17.33	74.00	31.20	PK
	H	2390.00	47.65	16.45	-6.35	54.00	31.20	AV
	H	4824.00	46.64	43.94	-27.36	74.00	2.70	PK
	V	4824.00	45.63	42.93	-28.37	74.00	2.70	PK
M	H	4874.00	46.68	44.01	-27.32	74.00	2.67	PK
	V	4874.00	47.53	44.86	-26.47	74.00	2.67	PK
H	H	2483.50	56.64	25.45	-17.36	74.00	31.19	PK
	H	2483.50	46.63	15.44	-7.37	54.00	31.19	AV
	H	4924.00	46.64	43.88	-27.36	74.00	2.76	PK
	V	4924.00	45.56	42.80	-28.44	74.00	2.76	PK

802.11n (HT40):

CH	Antenna	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor (dB)	Type
L	H	2390.00	57.46	26.26	-16.54	74.00	31.20	PK
	H	2390.00	47.62	16.42	-6.38	54.00	31.20	AV
	H	4844.00	46.43	43.75	-27.57	74.00	2.68	PK
	V	4844.00	44.77	42.09	-29.23	74.00	2.68	PK
M	H	4874.00	45.63	42.96	-28.37	74.00	2.67	PK
	V	4874.00	45.87	43.20	-28.13	74.00	2.67	PK
H	H	2483.50	56.85	25.66	-17.15	74.00	31.19	PK
	H	2483.50	46.64	15.45	-7.36	54.00	31.19	AV
	H	4904.00	45.55	42.90	-28.45	74.00	2.65	PK
	V	4904.00	46.43	43.78	-27.57	74.00	2.65	PK

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.

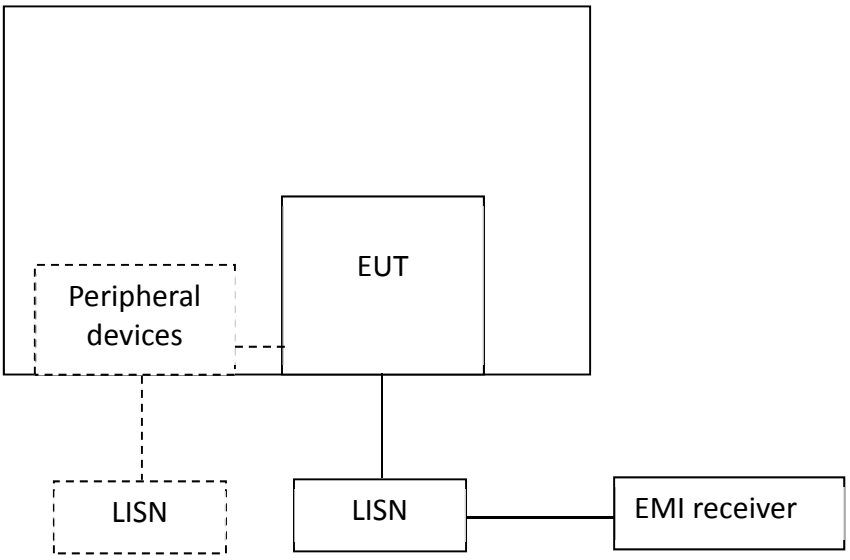
8 Power line conducted emission

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.

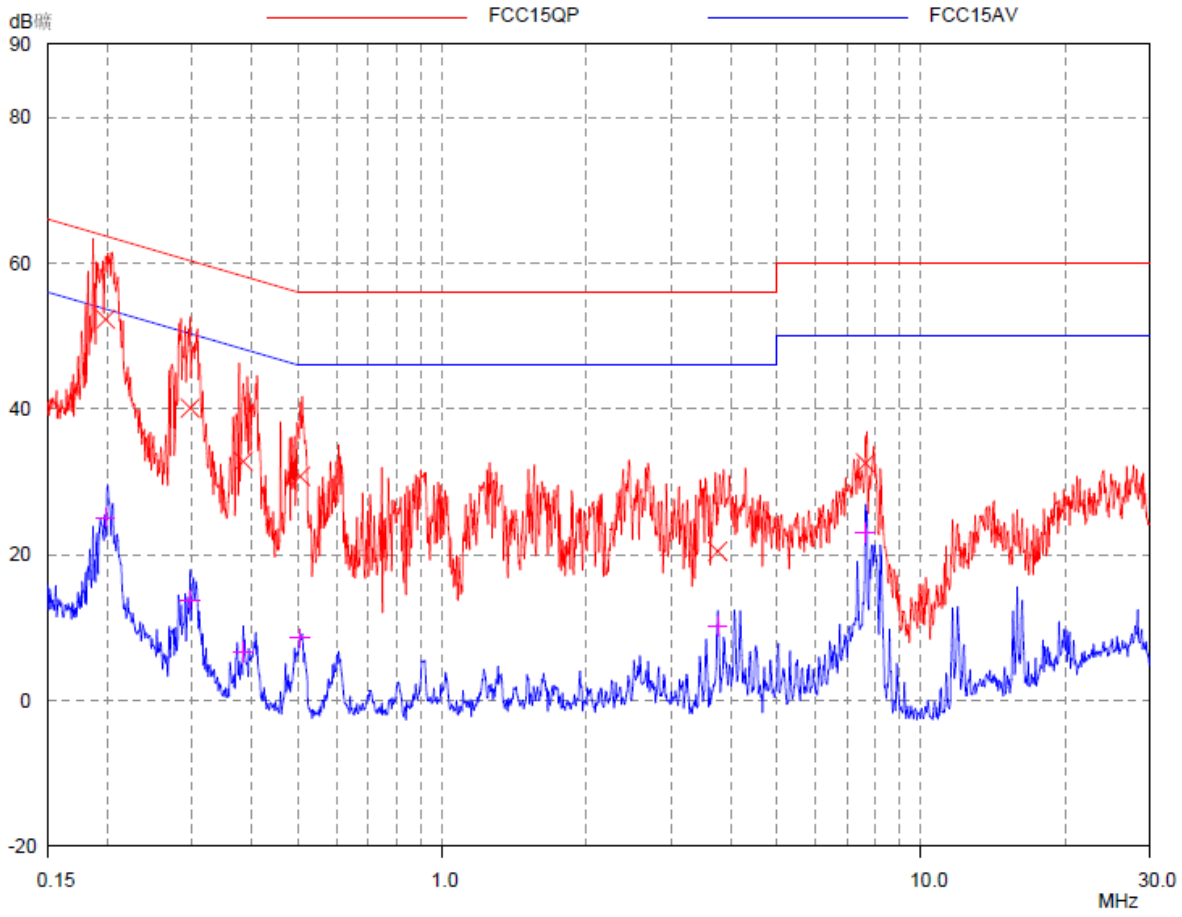
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on 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.

8.4 Test Results of Power line conducted emission

Test Curve:

L Line

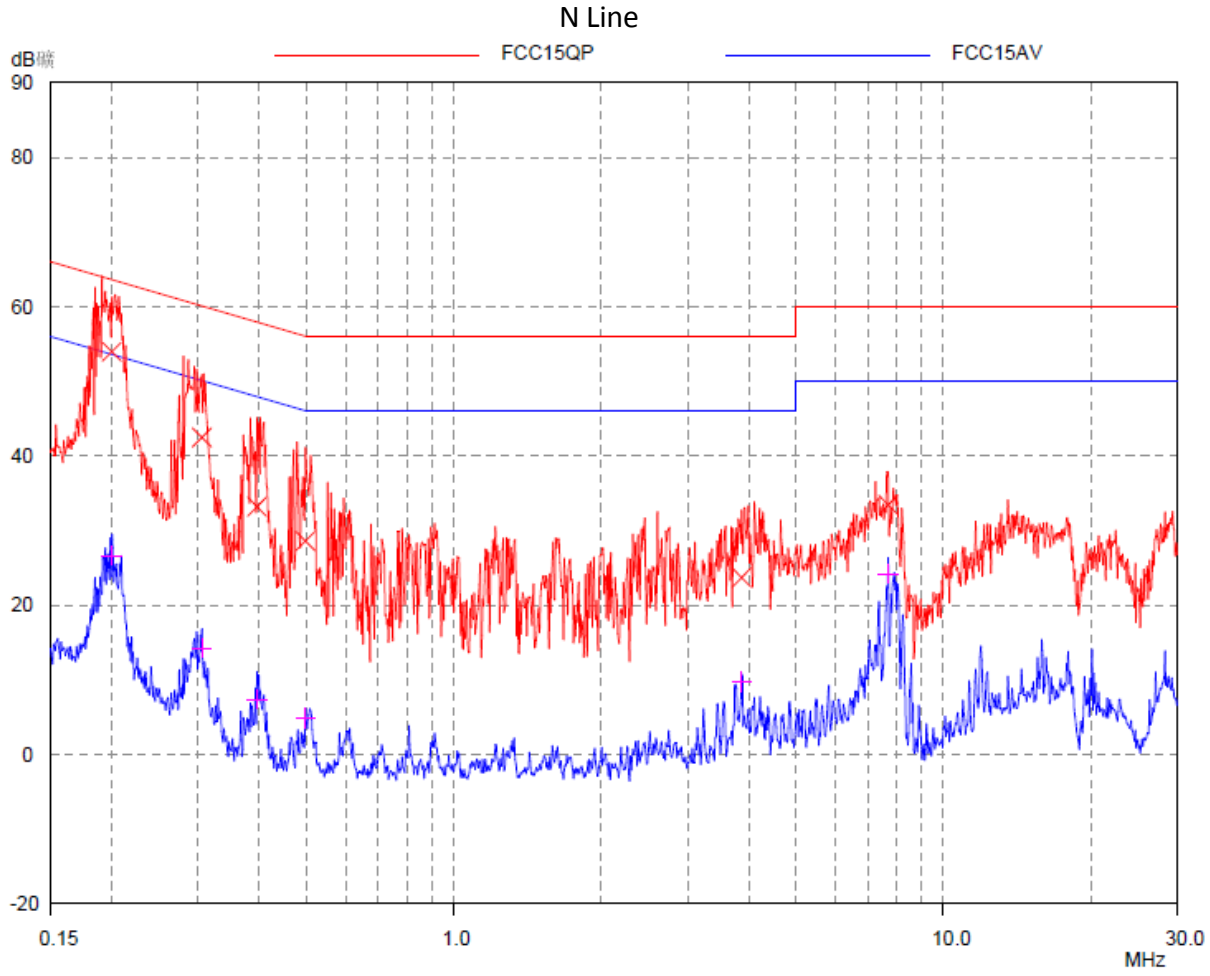


Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.198	52.27	63.71	11.44	25.08	53.71	28.63
0.297	40.12	60.33	20.21	13.79	50.33	36.54
0.383	32.81	58.21	25.40	6.66	48.21	41.55
0.505	30.75	56.00	25.25	8.56	46.00	37.44
3.760	20.48	56.00	35.52	10.18	46.00	35.82
7.652	32.56	60.00	27.44	23.04	50.00	26.96

TEST REPORT

Test Curve:



Test Data:

Frequency (MHz)	Quasi-peak			Average		
	level dB(μV)	Limit dB(μV)	Margin (dB)	level dB(μV)	limit dB(μV)	Margin (dB)
0.200	53.96	63.61	9.65	26.63	53.61	26.98
0.305	42.48	60.10	17.62	14.28	50.10	35.82
0.396	33.21	57.94	24.73	7.38	47.94	40.56
0.497	28.60	56.05	27.45	4.91	46.05	41.14
3.867	23.72	56.00	32.28	9.81	46.00	36.19
7.714	33.46	60.00	26.54	24.23	50.00	25.77

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

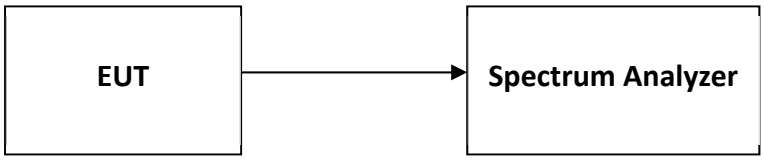
9.2 Measurement Procedure

The occupied bandwidth per RSS-Gen Issue 4 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 used a no-standard electrical connector antenna to the intentional radiator, so it can comply with the provisions of this section.

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

TEST REPORT

Appendix A: Test results

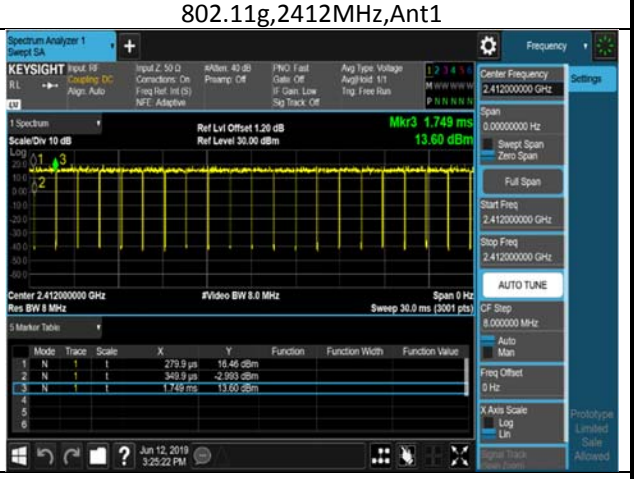
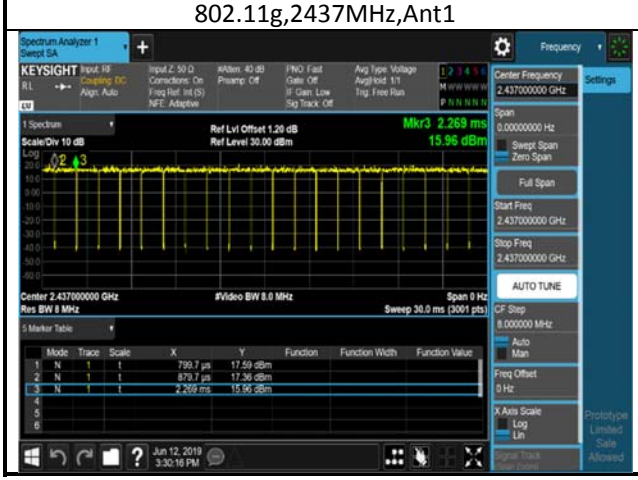
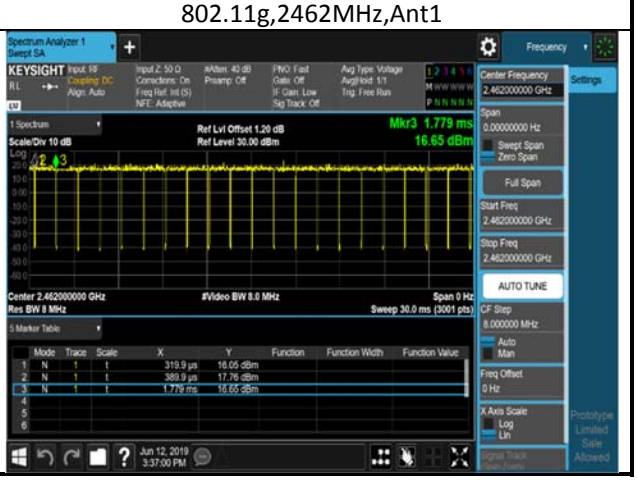
1. Duty Cycle

1.1 Test Data

WLAN Duty Cycle				
Mode	Test Frequency (MHz)	Ant	Duty Cycle (%)	Duty Cycle Factor (dB)
802.11b	2412	Ant1	97.11	0.13
802.11b	2437	Ant1	97.10	0.13
802.11b	2462	Ant1	97.22	0.12
802.11g	2412	Ant1	95.24	0.21
802.11g	2437	Ant1	94.56	0.24
802.11g	2462	Ant1	95.21	0.21
802.11n (HT20)	2412	Ant1	94.20	0.26
802.11n (HT20)	2437	Ant1	94.20	0.26
802.11n (HT20)	2462	Ant1	94.89	0.23
802.11n (HT40)	2422	Ant1	90.28	0.44
802.11n (HT40)	2437	Ant1	88.89	0.51
802.11n (HT40)	2452	Ant1	90.28	0.44

1.2 Test Plots

TEST REPORT

802.11b,2412MHz,Ant1	802.11b,2437MHz,Ant1
	
802.11b,2462MHz,Ant1	**802.11g,2412MHz,Ant1**
	
802.11g,2437MHz,Ant1	**802.11g,2462MHz,Ant1**
	

TEST REPORT

802.11n(HT20),2412MHz,Ant1	802.11n(HT20),2437MHz,Ant1
	
802.11n(HT20),2462MHz,Ant1	802.11n(HT40),2422MHz,Ant1
	
802.11n(HT40),2437MHz,Ant1	802.11n(HT40),2452MHz,Ant1
	

TEST REPORT

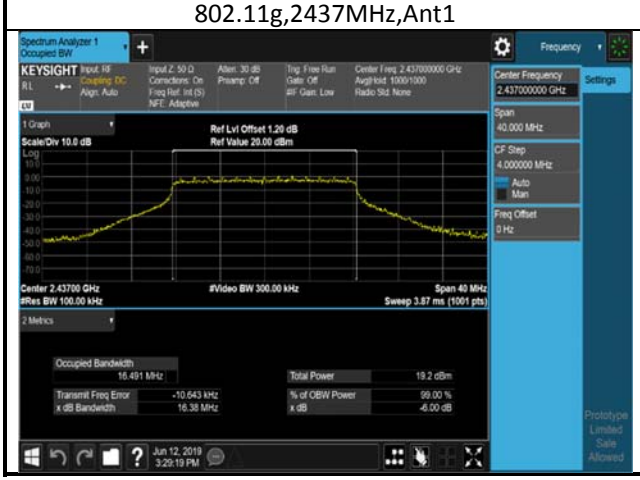
2. Minimum 6dB bandwidth

2.1 Test Data

WLAN Occupied 6dB Bandwidth				
Mode	Test Frequency (MHz)	Ant	Occupied Bandwidth (MHz)	Result
802.11b	2412	Ant1	10.07	Pass
802.11b	2437	Ant1	10.04	Pass
802.11b	2462	Ant1	10.06	Pass
802.11g	2412	Ant1	16.38	Pass
802.11g	2437	Ant1	16.38	Pass
802.11g	2462	Ant1	16.35	Pass
802.11n (HT20)	2412	Ant1	17.56	Pass
802.11n (HT20)	2437	Ant1	17.36	Pass
802.11n (HT20)	2462	Ant1	17.58	Pass
802.11n (HT40)	2422	Ant1	35.61	Pass
802.11n (HT40)	2437	Ant1	35.49	Pass
802.11n (HT40)	2452	Ant1	35.44	Pass

2.2 Test Plots

TEST REPORT

802.11b,2412MHz,Ant1	802.11b,2437MHz,Ant1
	
802.11b,2462MHz,Ant1	**802.11g,2412MHz,Ant1**
	
802.11g,2437MHz,Ant1	**802.11g,2462MHz,Ant1**
	

802.11n(HT20),2412MHz,Ant1



802.11n(HT20),2437MHz,Ant1



802.11n(HT20),2462MHz,Ant1



802.11n(HT40),2422MHz,Ant1



802.11n(HT40),2437MHz,Ant1



802.11n(HT40),2452MHz,Ant1



3. Occupied Bandwidth

3.1 Test Data

WLAN 99% Occupied Bandwidth				
Mode	Test Frequency (MHz)	Ant	99% Occupied Bandwidth (MHz)	Result
802.11b	2412	Ant1	12.996	Pass
802.11b	2437	Ant1	13.030	Pass
802.11b	2462	Ant1	13.118	Pass
802.11g	2412	Ant1	17.021	Pass
802.11g	2437	Ant1	17.037	Pass
802.11g	2462	Ant1	17.020	Pass
802.11n (HT20)	2412	Ant1	18.131	Pass
802.11n (HT20)	2437	Ant1	18.090	Pass
802.11n (HT20)	2462	Ant1	18.122	Pass
802.11n (HT40)	2422	Ant1	36.351	Pass
802.11n (HT40)	2437	Ant1	36.366	Pass
802.11n (HT40)	2452	Ant1	36.396	Pass

3.2 Test Plots

802.11b,2412MHz,Ant1



802.11b,2437MHz,Ant1



802.11b,2462MHz,Ant1



802.11g,2412MHz,Ant1



802.11g,2437MHz,Ant1



802.11g,2462MHz,Ant1



TEST REPORT

802.11n(HT20),2412MHz,Ant1	802.11n(HT20),2437MHz,Ant1
	
802.11n(HT20),2462MHz,Ant1	802.11n(HT40),2422MHz,Ant1
	
802.11n(HT40),2437MHz,Ant1	802.11n(HT40),2452MHz,Ant1
	

TEST REPORT

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

4.1 Test Data

WLAN AVGSA Output Power							
Mode	Test Frequency (MHz)	Ant	Duty Cycle Factor (dB)	Max Power (dBm)	Limit (dBm)	EIRP (dBm)	Result
802.11b	2412	Ant1	0.13	16.82	30	18.82	Pass
802.11b	2437	Ant1	0.13	17.81	30	19.81	Pass
802.11b	2462	Ant1	0.12	18.71	30	20.71	Pass
802.11g	2412	Ant1	0.21	10.96	30	12.96	Pass
802.11g	2437	Ant1	0.24	11.92	30	13.92	Pass
802.11g	2462	Ant1	0.21	12.93	30	14.93	Pass
802.11n (HT20)	2412	Ant1	0.26	10.86	30	12.86	Pass
802.11n (HT20)	2437	Ant1	0.26	11.79	30	13.79	Pass
802.11n (HT20)	2462	Ant1	0.23	12.66	30	14.66	Pass
802.11n (HT40)	2422	Ant1	0.44	10.55	30	12.55	Pass
802.11n (HT40)	2437	Ant1	0.51	11.22	30	13.22	Pass
802.11n (HT40)	2452	Ant1	0.44	11.70	30	13.70	Pass

4.2 Test Plots

802.11b,2412MHz,Ant1



802.11b,2437MHz,Ant1



802.11b,2462MHz,Ant1



802.11g,2412MHz,Ant1



802.11g,2437MHz,Ant1



802.11g,2462MHz,Ant1



TEST REPORT

802.11n(HT20),2412MHz,Ant1	802.11n(HT20),2437MHz,Ant1
	
802.11n(HT20),2462MHz,Ant1	802.11n(HT40),2422MHz,Ant1
	
802.11n(HT40),2437MHz,Ant1	802.11n(HT40),2452MHz,Ant1
	

TEST REPORT

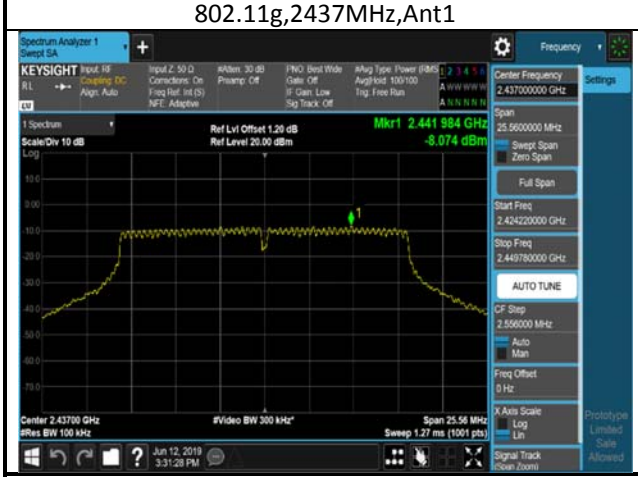
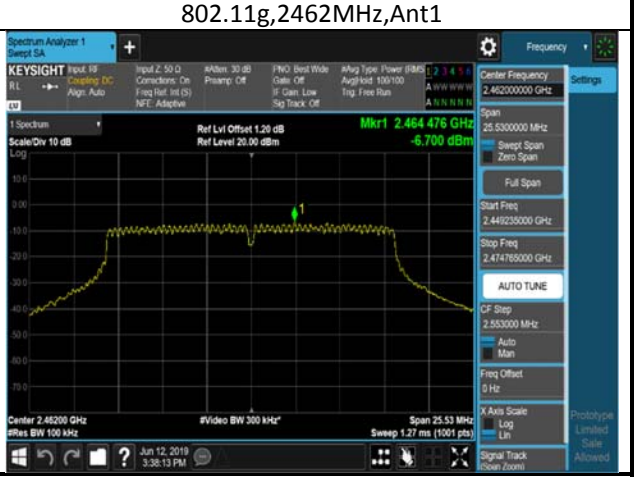
5. Power spectrum density

5.1 Test Data

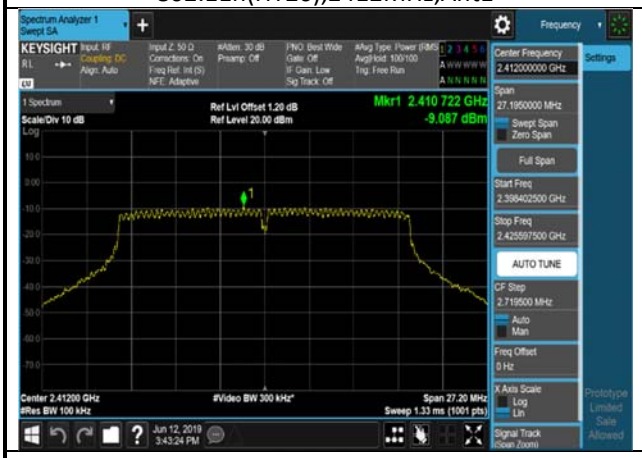
WLAN AVGSA Power Spectral Density							
Mode	Test Frequency (MHz)	Ant	Duty Cycle Factor (dB)	PSD (dBm)	RBW (kHz)	Limit (dBm)	Result
802.11b	2412	Ant1	0.13	0.439	100	8	Pass
802.11b	2437	Ant1	0.13	0.516	100	8	Pass
802.11b	2462	Ant1	0.12	1.414	100	8	Pass
802.11g	2412	Ant1	0.21	-8.960	100	8	Pass
802.11g	2437	Ant1	0.24	-7.834	100	8	Pass
802.11g	2462	Ant1	0.21	-6.490	100	8	Pass
802.11n (HT20)	2412	Ant1	0.26	-8.827	100	8	Pass
802.11n (HT20)	2437	Ant1	0.26	-8.504	100	8	Pass
802.11n (HT20)	2462	Ant1	0.23	-7.460	100	8	Pass
802.11n (HT40)	2422	Ant1	0.44	-12.394	100	8	Pass
802.11n (HT40)	2437	Ant1	0.51	-11.857	100	8	Pass
802.11n (HT40)	2452	Ant1	0.44	-10.956	100	8	Pass

5.2 Test Plots

TEST REPORT

802.11b,2412MHz,Ant1	802.11b,2437MHz,Ant1
	
802.11b,2462MHz,Ant1	**802.11g,2412MHz,Ant1**
	
802.11g,2437MHz,Ant1	**802.11g,2462MHz,Ant1**
	

TEST REPORT

802.11n(HT20),2412MHz,Ant1	802.11n(HT20),2437MHz,Ant1
	
802.11n(HT20),2462MHz,Ant1	802.11n(HT40),2422MHz,Ant1
	
802.11n(HT40),2437MHz,Ant1	802.11n(HT40),2452MHz,Ant1
	

TEST REPORT

6. Emission outside the frequency band

6.1 Test Data

WLAN Transmitter Spurious Emission						
Mode	Test Frequency (MHz)	Ant	Plot No.	Frequency Range	Emission (dBm)	Result
802.11b	2412	Ant1	1	Reference Level	7.96	Pass
802.11b	2412	Ant1	2	Band Edge	-41.11	Pass
802.11b	2412	Ant1	3	30MHz~2310MHz	-51.76	Pass
802.11b	2412	Ant1	4	2500MHz~5000MHz	-26.66	Pass
802.11b	2412	Ant1	5	5000MHz~25000MHz	-41.41	Pass
802.11b	2437	Ant1	1	Reference Level	8.65	Pass
802.11b	2437	Ant1	2	Band Edge	-49.70	Pass
802.11b	2437	Ant1	3	30MHz~2310MHz	-53.53	Pass
802.11b	2437	Ant1	4	2500MHz~5000MHz	-26.43	Pass
802.11b	2437	Ant1	5	5000MHz~25000MHz	-41.26	Pass
802.11b	2462	Ant1	1	Reference Level	9.79	Pass
802.11b	2462	Ant1	2	Band Edge	-46.85	Pass
802.11b	2462	Ant1	3	30MHz~2310MHz	-55.93	Pass
802.11b	2462	Ant1	4	2500MHz~5000MHz	-27.91	Pass
802.11b	2462	Ant1	5	5000MHz~25000MHz	-40.38	Pass
802.11g	2412	Ant1	1	Reference Level	-0.53	Pass
802.11g	2412	Ant1	2	Band Edge	-31.62	Pass
802.11g	2412	Ant1	3	30MHz~2310MHz	-51.03	Pass
802.11g	2412	Ant1	4	2500MHz~5000MHz	-41.50	Pass
802.11g	2412	Ant1	5	5000MHz~25000MHz	-41.09	Pass
802.11g	2437	Ant1	1	Reference Level	0.35	Pass
802.11g	2437	Ant1	2	Band Edge	-48.85	Pass
802.11g	2437	Ant1	3	30MHz~2310MHz	-47.60	Pass
802.11g	2437	Ant1	4	2500MHz~5000MHz	-41.68	Pass

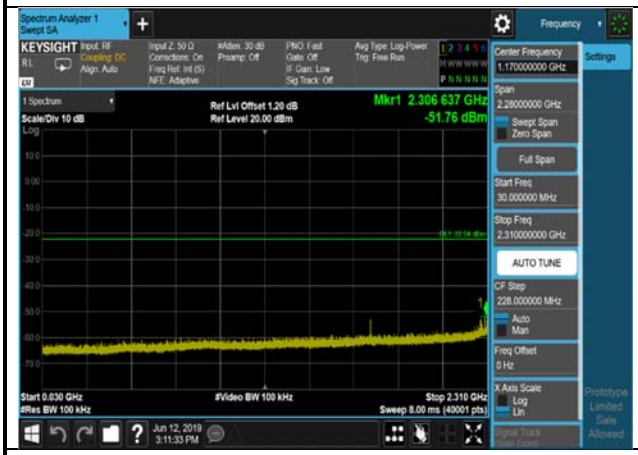
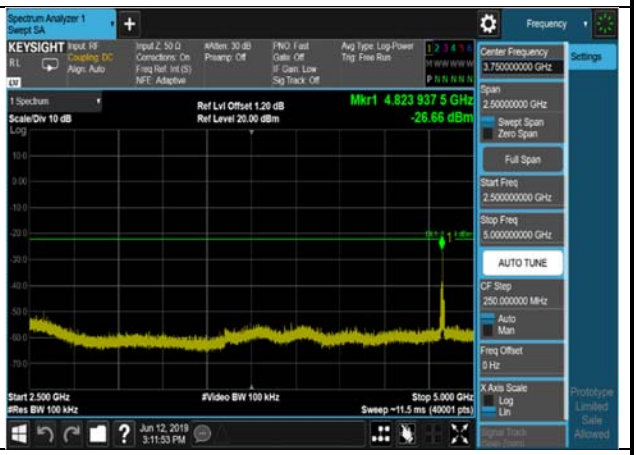
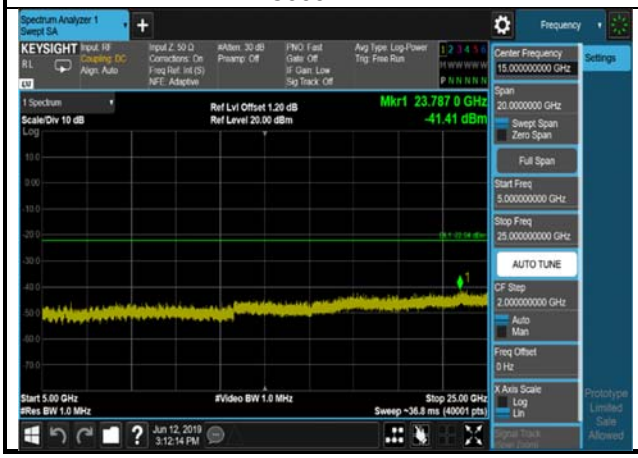
TEST REPORT

802.11g	2437	Ant1	5	5000MHz~25000MHz	-40.69	Pass
802.11g	2462	Ant1	1	Reference Level	1.41	Pass
802.11g	2462	Ant1	2	Band Edge	-45.57	Pass
802.11g	2462	Ant1	3	30MHz~2310MHz	-53.54	Pass
802.11g	2462	Ant1	4	2500MHz~5000MHz	-42.78	Pass
802.11g	2462	Ant1	5	5000MHz~25000MHz	-41.34	Pass
802.11n (HT20)	2412	Ant1	1	Reference Level	-0.67	Pass
802.11n (HT20)	2412	Ant1	2	Band Edge	-30.89	Pass
802.11n (HT20)	2412	Ant1	3	30MHz~2310MHz	-51.73	Pass
802.11n (HT20)	2412	Ant1	4	2500MHz~5000MHz	-42.24	Pass
802.11n (HT20)	2412	Ant1	5	5000MHz~25000MHz	-40.53	Pass
802.11n (HT20)	2437	Ant1	1	Reference Level	0.29	Pass
802.11n (HT20)	2437	Ant1	2	Band Edge	-49.29	Pass
802.11n (HT20)	2437	Ant1	3	30MHz~2310MHz	-52.45	Pass
802.11n (HT20)	2437	Ant1	4	2500MHz~5000MHz	-41.09	Pass
802.11n (HT20)	2437	Ant1	5	5000MHz~25000MHz	-41.16	Pass
802.11n (HT20)	2462	Ant1	1	Reference Level	1.10	Pass
802.11n (HT20)	2462	Ant1	2	Band Edge	-43.13	Pass
802.11n (HT20)	2462	Ant1	3	30MHz~2310MHz	-53.96	Pass
802.11n (HT20)	2462	Ant1	4	2500MHz~5000MHz	-42.20	Pass
802.11n (HT20)	2462	Ant1	5	5000MHz~25000MHz	-40.74	Pass
802.11n (HT40)	2422	Ant1	1	Reference Level	-3.68	Pass
802.11n (HT40)	2422	Ant1	2	Band Edge	-36.77	Pass
802.11n (HT40)	2422	Ant1	3	30MHz~2310MHz	-53.95	Pass
802.11n (HT40)	2422	Ant1	4	2500MHz~5000MHz	-43.86	Pass

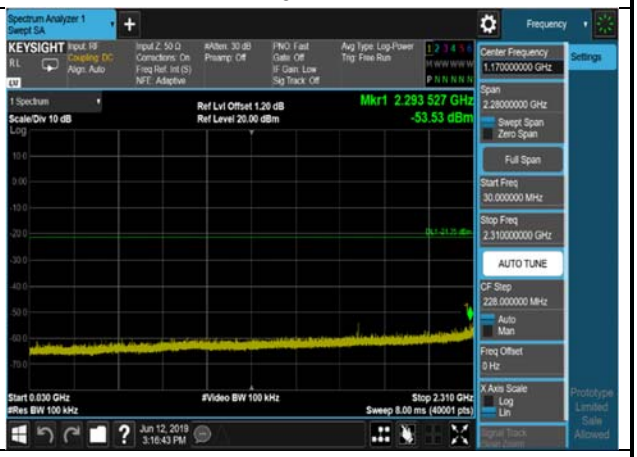
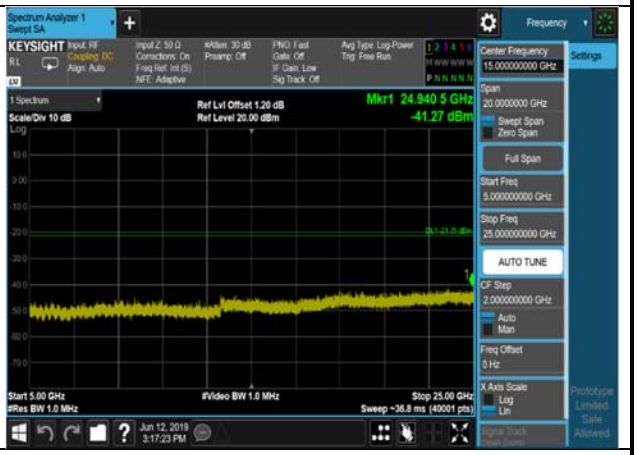
802.11n (HT40)	2422	Ant1	5	5000MHz~25000MHz	-41.67	Pass
802.11n (HT40)	2437	Ant1	1	Reference Level	-3.10	Pass
802.11n (HT40)	2437	Ant1	2	Band Edge	-45.87	Pass
802.11n (HT40)	2437	Ant1	3	30MHz~2310MHz	-54.27	Pass
802.11n (HT40)	2437	Ant1	4	2500MHz~5000MHz	-43.94	Pass
802.11n (HT40)	2437	Ant1	5	5000MHz~25000MHz	-40.72	Pass
802.11n (HT40)	2452	Ant1	1	Reference Level	-2.44	Pass
802.11n (HT40)	2452	Ant1	2	Band Edge	-36.65	Pass
802.11n (HT40)	2452	Ant1	3	30MHz~2310MHz	-54.44	Pass
802.11n (HT40)	2452	Ant1	4	2500MHz~5000MHz	-43.44	Pass
802.11n (HT40)	2452	Ant1	5	5000MHz~25000MHz	-41.88	Pass

9.2 Test Plots

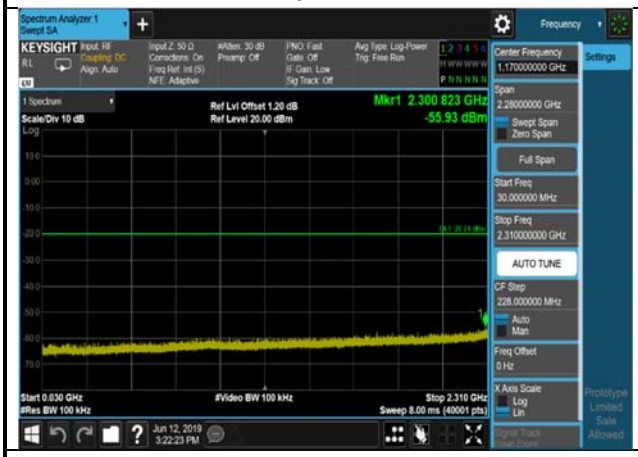
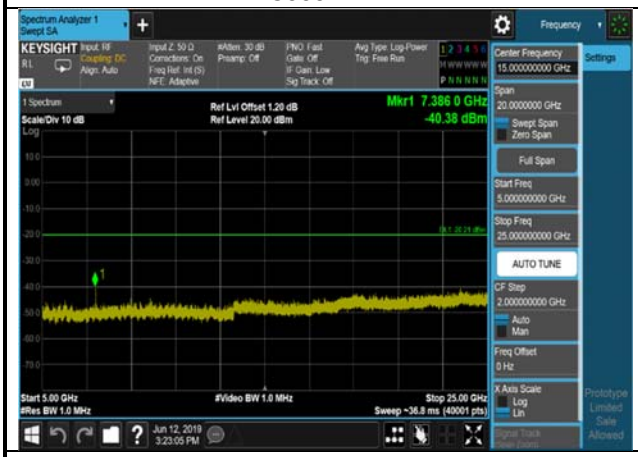
TEST REPORT

802.11b,2412MHz,Ant1,Plot 1,Reference Level	802.11b,2412MHz,Ant1,Plot 2,Band Edge
	
802.11b,2412MHz,Ant1,Plot 3,30MHz~2310MHz	802.11b,2412MHz,Ant1,Plot 4,2500MHz~5000MHz
	
802.11b,2412MHz,Ant1,Plot 5,5000MHz~25000MHz	802.11b,2437MHz,Ant1,Plot 1,Reference Level
	

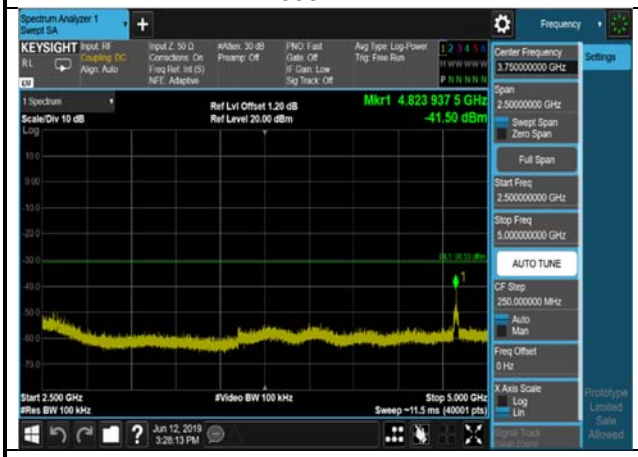
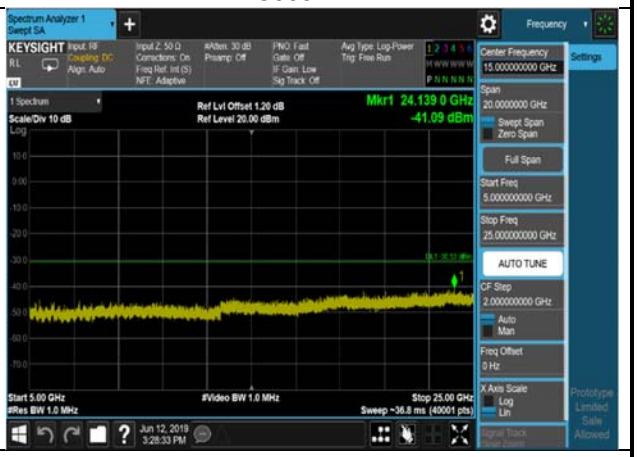
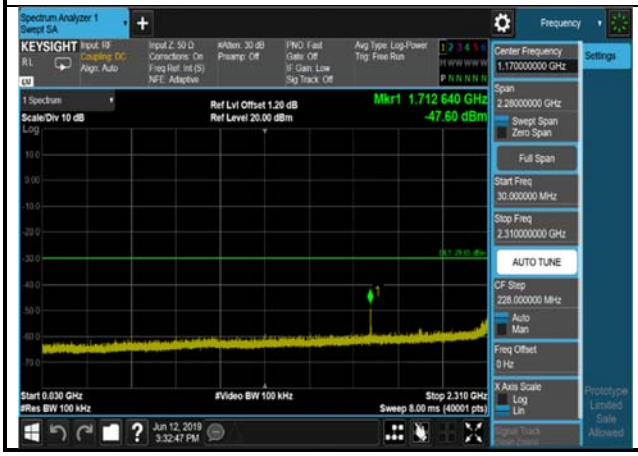
TEST REPORT

802.11b,2437MHz,Ant1,Plot 2,Band Edge	802.11b,2437MHz,Ant1,Plot 3,30MHz~2310MHz
	
802.11b,2437MHz,Ant1,Plot 4,2500MHz~5000MHz	802.11b,2437MHz,Ant1,Plot 5,5000MHz~25000MHz
	
802.11b,2462MHz,Ant1,Plot 1,Reference Level	802.11b,2462MHz,Ant1,Plot 2,Band Edge
	

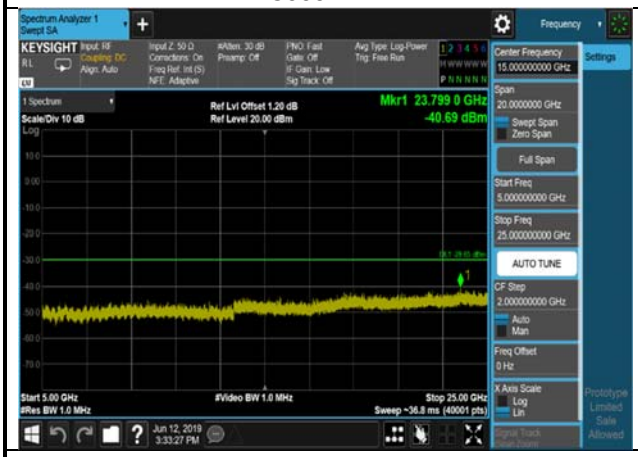
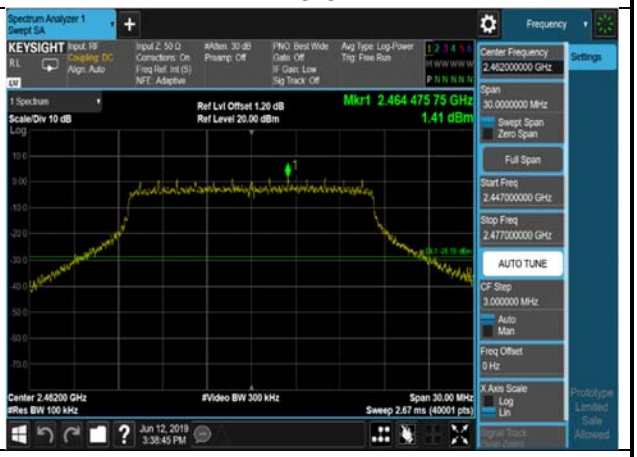
TEST REPORT

802.11b,2462MHz,Ant1,Plot 3,30MHz~2310MHz	802.11b,2462MHz,Ant1,Plot 4,2500MHz~5000MHz
	
802.11b,2462MHz,Ant1,Plot 5,5000MHz~25000MHz	802.11g,2412MHz,Ant1,Plot 1,Reference Level
	
802.11g,2412MHz,Ant1,Plot 2,Band Edge	802.11g,2412MHz,Ant1,Plot 3,30MHz~2310MHz
	

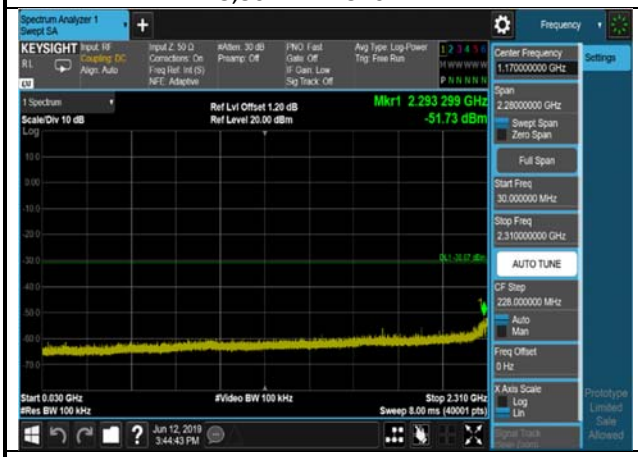
TEST REPORT

802.11g,2412MHz,Ant1,Plot 4,2500MHz~5000MHz	802.11g,2412MHz,Ant1,Plot 5,5000MHz~25000MHz
	
802.11g,2437MHz,Ant1,Plot 1,Reference Level	802.11g,2437MHz,Ant1,Plot 2,Band Edge
	
802.11g,2437MHz,Ant1,Plot 3,30MHz~2310MHz	802.11g,2437MHz,Ant1,Plot 4,2500MHz~5000MHz
	

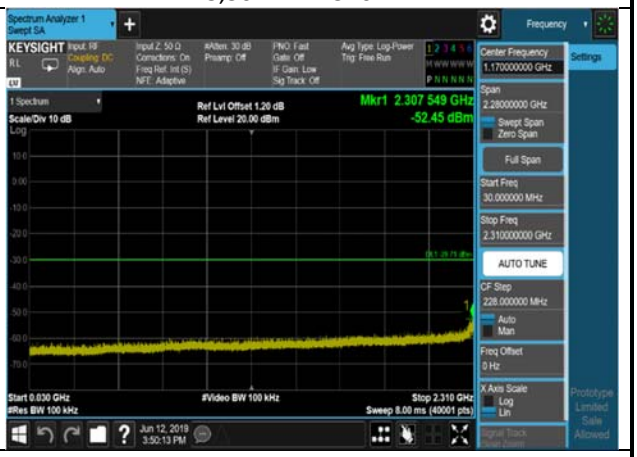
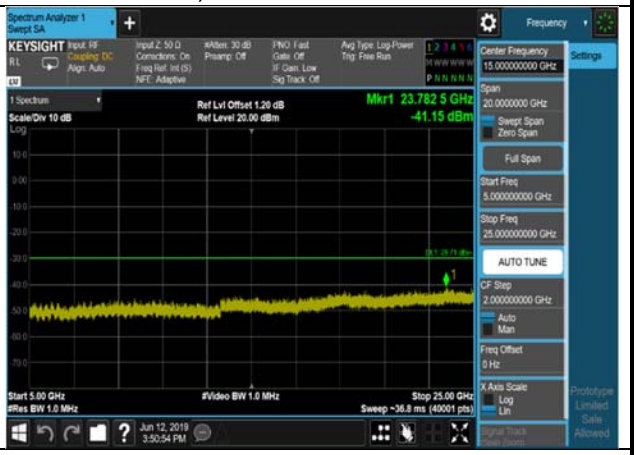
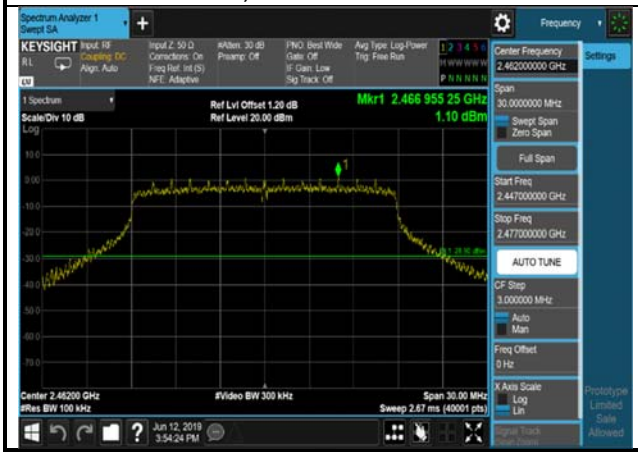
TEST REPORT

802.11g,2437MHz,Ant1,Plot 5,5000MHz~25000MHz	802.11g,2462MHz,Ant1,Plot 1,Reference Level
	
802.11g,2462MHz,Ant1,Plot 2,Band Edge	802.11g,2462MHz,Ant1,Plot 3,30MHz~2310MHz
	
802.11g,2462MHz,Ant1,Plot 4,2500MHz~5000MHz	802.11g,2462MHz,Ant1,Plot 5,5000MHz~25000MHz
	

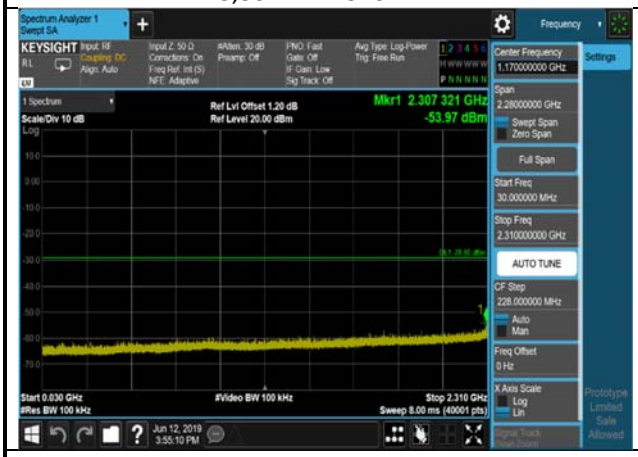
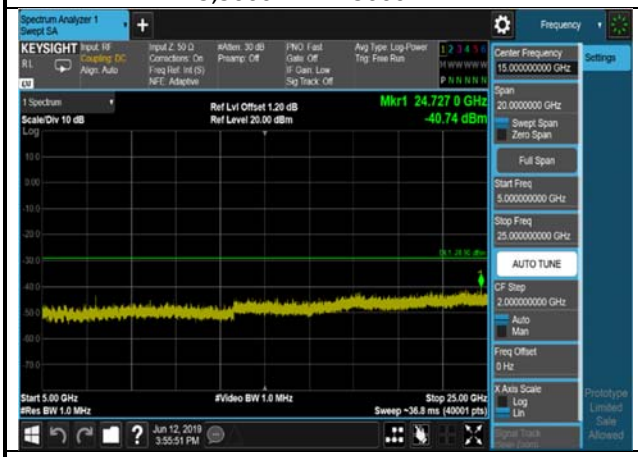
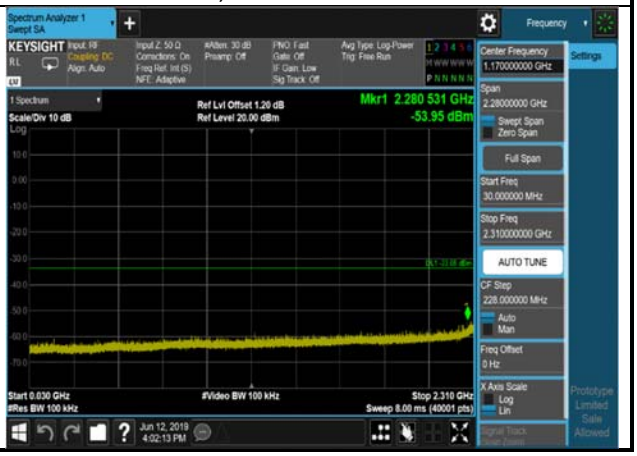
TEST REPORT

802.11n(HT20),2412MHz,Ant1,Plot 1,Reference Level	802.11n(HT20),2412MHz,Ant1,Plot 2,Band Edge
	
802.11n(HT20),2412MHz,Ant1,Plot 3,30MHz~2310MHz	802.11n(HT20),2412MHz,Ant1,Plot 4,2500MHz~5000MHz
	
802.11n(HT20),2412MHz,Ant1,Plot 5,5000MHz~25000MHz	802.11n(HT20),2437MHz,Ant1,Plot 1,Reference Level
	

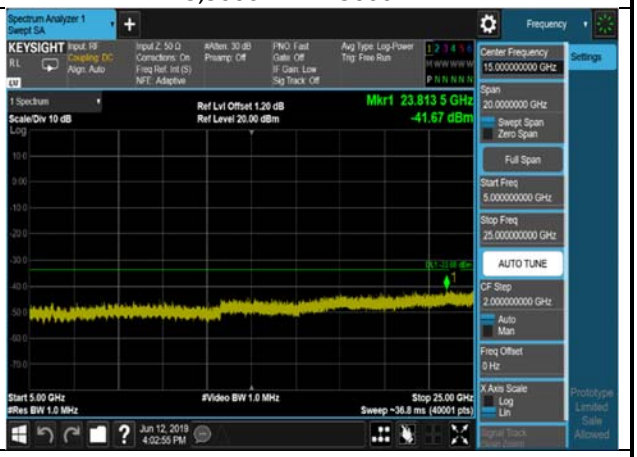
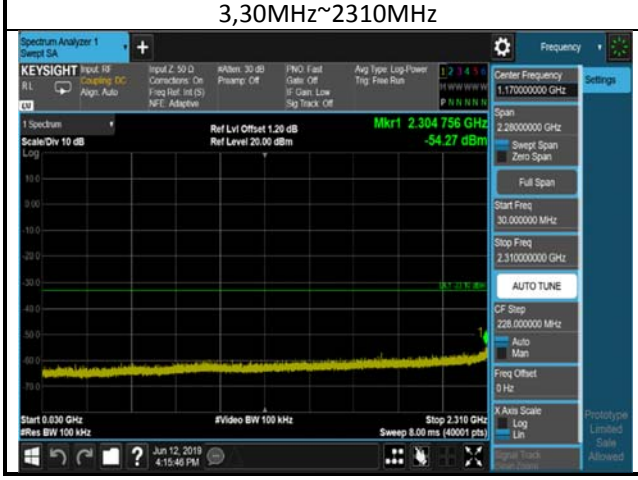
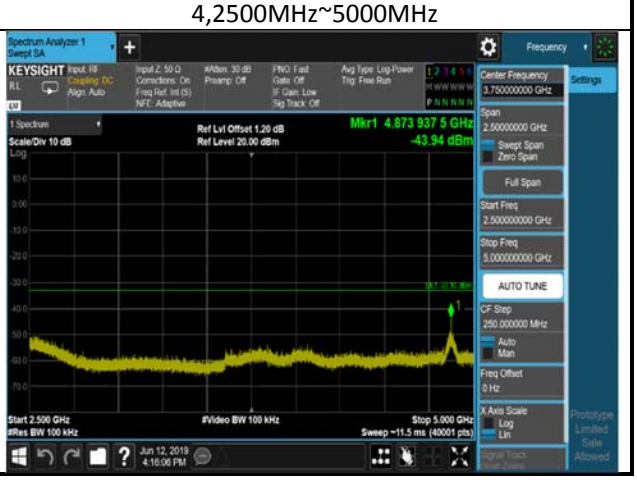
TEST REPORT

802.11n(HT20),2437MHz,Ant1,Plot 2,Band Edge	802.11n(HT20),2437MHz,Ant1,Plot 3,30MHz~2310MHz
	
802.11n(HT20),2437MHz,Ant1,Plot 4,2500MHz~5000MHz	802.11n(HT20),2437MHz,Ant1,Plot 5,5000MHz~25000MHz
	
802.11n(HT20),2462MHz,Ant1,Plot 1,Reference Level	802.11n(HT20),2462MHz,Ant1,Plot 2,Band Edge
	

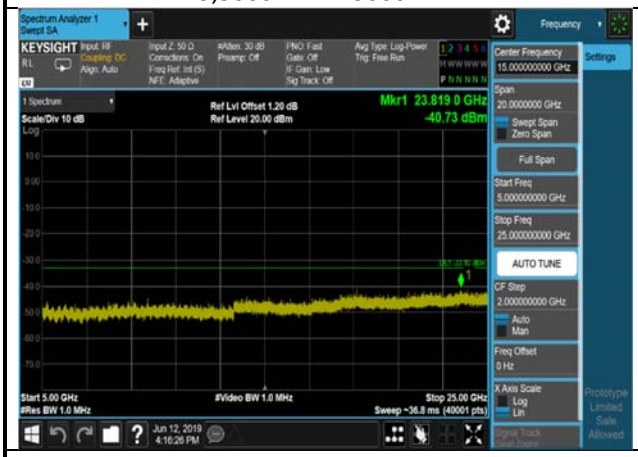
TEST REPORT

802.11n(HT20),2462MHz,Ant1,Plot 3,30MHz~2310MHz	802.11n(HT20),2462MHz,Ant1,Plot 4,2500MHz~5000MHz
	
802.11n(HT20),2462MHz,Ant1,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,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
	

TEST REPORT

802.11n(HT40),2437MHz,Ant1,Plot 5,5000MHz~25000MHz	802.11n(HT40),2452MHz,Ant1,Plot 1,Reference Level
	
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
	

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