Qingdao Intelligent&Precise Electronics Co., Ltd

RF TEST REPORT

Report Type:
FCC Part 15.407 & ISED RSS-247 RF report

Model:
ZDGF7618BU-CV

REPORT NUMBER:
210200462SHA-002

ISSUE DATE:
February 9, 2021

DOCUMENT CONTROL NUMBER:
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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

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TEST REPORT

Report no.: 210200462SHA-002

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 1:	Qingdao Intelligent&Precise Electronics Co., Ltd No.218, Qianwangang Road, Qingdao Economic&Technological Development Zone, Shandong, China.
FCC ID:	2AJVQ-7618BUC
IC:	22470-7618BUC

SUMMARY:

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

47CFR Part 15 (2019): 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) Amendment 1: General Requirements for Compliance of Radio Apparatus

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

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Revision History

Report No.	Version	Description	Issued Date
210200462SHA-002	Rev. 01	Initial issue of report	February 9, 2021

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Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Maximum Conducted Output Power	15.407(a)	RSS-247 Issue 2 Clause 6	Pass
Radiated emission	15.407(b) 15.205 15.209	RSS-247 Issue 2 Clause 6 RSS-Gen Issue 5 Clause 8.9&8.10	Pass

Notes: 1: NA =Not Applicable

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Wireless Module
Type/Model:	ZDGF7618BU-CV
PMN	ZDGF7618BU-CV
Description of EUT:	This product is based on the original FCC ID:2AJVQ-2AJVQ-7618BUC, IC: 22470-7618BUC. This time client adds another factory's WIFI antenna duplexer. By technical analysis and evaluation, only the worst case of Maximum conducted output power and Radiated Emissions in restricted frequency bands was retested.
Rating:	DC 3.3V
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	January 20, 2021
Date of test:	January 24,2021~ January 25, 2021

1.2 Technical Specification

Frequency Range:	5150 ~ 5250MHz 5250 ~ 5350MHz 5470 ~ 5725MHz 5725 ~ 5850MHz
Support Standards:	802.11a, 802.11n(HT20), 802.11n(HT40), 802.11ac(VHT20), 802.11ac(VHT40), 802.11ac(VHT80)
Type of Modulation:	OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Channel Number:	For 5150 ~ 5250MHz band: Channel 36 - 48 For 5250 ~ 5350MHz Band: Channel 52 - 64 For 5470 ~ 5725MHz Band: Channel 100 - 140 For 5725 ~ 5850MHz band: Channel 149 - 165

1.3 Antenna information

Antenna No.	Model	Antenna type	Antenna Gain	Note
0	-	PCB	3.44dBi	-
1	-	PCB	3.37dBi	-

Mode	Tx/Rx Function	Beamforming function	CDD function	Directional gain (dBi)
802.11a	1Tx/1Rx	NO	NO	-
802.11n(HT20) 802.11ac(VHT20)	2Tx/2Rx	NO	NO	3.41
802.11n(HT40) 802.11ac(VHT40)	2Tx/2Rx	NO	NO	3.41
802.11ac(VHT80)	2Tx/2Rx	NO	NO	3.41
Note: For 802.11a mode, it only supports 1TX. For 802.11n and 802.11ac modes, it can support 2TX, all the two transmit signals are completely uncorrelated with each other, so the directional gain = 10 log $((10^{G1/10} + 10^{G2/10} + \ldots + 10^{Gn/10}) / N_{ANT})$				

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 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 (2019)
ANSI C63.10 (2013)
RSS-247 Issue 2 (February 2017)
RSS-Gen Issue 5 (March 2019) Amendment 1
KDB 789033 D02 v02r01
KDB 662911 D01 (v02r01)

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
QA Tool	-	-	Client

The lowest, middle and highest channel for the following modes were tested as representatives.

Frequency Band (MHz)	Mode	Lowest (MHz)	Middle (MHz)	Highest (MHz)
5150 - 5250	802.11a	5180	5200	5240
	802.11n(HT20)	5180	5200	5240
	802.11n(HT40)	5190	/	5230
	802.11ac(VHT80)	5210	/	/
5250 - 5350	802.11a	5260	5300	5320
	802.11n(HT20)	5260	5300	5320
	802.11n(HT40)	5270	/	5310
	802.11ac(VHT80)	5290	/	/
5470 - 5725	802.11a	5500	5600	5700
	802.11n(HT20)	5500	5600	5700
	802.11n(HT40)	5510	5590	5670
	802.11ac(VHT80)	5530	/	5610
5725 - 5850	802.11a	5745	5785	5825
	802.11n(HT20)	5745	5785	5825
	802.11n(HT40)	5755	/	5795
	802.11ac(VHT80)	5775	/	/

Note: 802.11ac(VHT20) is similar as 802.11n(HT20), and 802.11n(HT20) is the worse after checked, so only 802.11n(HT20) was chosen to do the tests. It is the same to 802.11ac(VHT40) and 802.11n(HT40).

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Data rate and Power setting:

The pre-scan for the conducted power with all data rates in each modulation and band 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
5150 - 5250	802.11a	6Mbps
	802.11n(HT20)	MCS8
	802.11n(HT40)	MCS8
	802.11ac(VHT80)	MCS0NSS2
5250 - 5350	802.11a	6Mbps
	802.11n(HT20)	MCS8
	802.11n(HT40)	MCS8
	802.11ac(VHT80)	MCS0NSS2
5500 - 5725	802.11a	6Mbps
	802.11n(HT20)	MCS8
	802.11n(HT40)	MCS8
	802.11ac(VHT80)	MCS0NSS2
5725 - 5850	802.11a	6Mbps
	802.11n(HT20)	MCS8
	802.11n(HT40)	MCS8
	802.11ac(VHT80)	MCS0NSS2

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	23°C	53% RH
Radiated Emissions in restricted frequency bands	22°C	53% RH

2.6 Instrument list

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2021-09-15
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2021-09-24
☒	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2021-06-11
☒	Horn antenna	R&S	HF 906	EC 3049	2022-01-16
☐	Horn antenna	ETS	3117	EC 4792-1	2021-02-25
☐	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2021-07-09
☐	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2021-03-14
Tet Site					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☐	Shielded room	Zhongyu	-	EC 2838	2022-01-11
☐	Shielded room	Zhongyu	-	EC 2839	2022-01-11
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2021-07-14
☐	Fully-anechoic chamber	Albatross project	-	EC 3047	2021-07-14
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2021-03-03
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3481	2022-01-04
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3442	2022-01-04
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3324	2021-09-05
☐	Pressure meter	YM3	Shanghai Mengde	EC 3320	2021-07-14

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 an outdoor access point operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W provided the maximum antenna gain does not exceed 6dBi.
The maximum e.i.r.p. at any elevation angle above 30 degrees from the horizon must not exceed 125mW (21 dBm).

☐ For an indoor access point operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6dBi.

☐ For fixed point-to-point access points operating in the band 5.15-5.25GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W.

☒ For client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi.

☒ For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 10logB, where B is the 26dB emission bandwidth in megahertz.

☒ For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1W.

☒ For Frequency Band 5150-5250 MHz, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.

☒ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 99% emission bandwidth in megahertz.

☒ For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz.

☒ For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

3.2 Measurement Procedure

The EUT was tested according to test procedure of "KDB789033 D02 General UNII Test Procedures New Rules"

For 802.11a and 802.11n(HT20) mode:

(i) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied.
The EUT is configured to transmit continuously or to transmit with a constant duty cycle.
At all times when the EUT is transmitting, it must be transmitting at its maximum power control level.
The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

(ii) If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in II.B.

(iii) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.

(iv) Adjust the measurement in dBm by adding 10 log (1/x) where x is the duty cycle (e.g., 10 log (1/0.25) if the duty cycle is 25%).

For 802.11n(HT40) and 802.11ac(VHT80):

(i) Measure the duty cycle, x, of the transmitter output signal as described in II.B.

(ii) Set span to encompass the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(iii) Set RBW = 1 MHz.

(iv) Set VBW ≥ 3 MHz.

(v) Number of points in sweep ≥ 2 × span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(vi) Sweep time = auto.

(vii) Detector = power averaging (rms), if available. Otherwise, use sample detector mode.

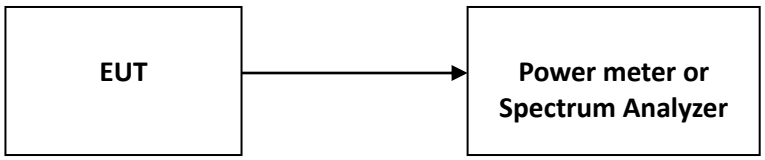
(viii) Do not use sweep triggering. Allow the sweep to "free run."

(ix) Trace average at least 100 traces in power averaging (rms) mode; however, the number of traces to be averaged shall be increased above 100 as needed to ensure that the average accurately represents the true average over the on and off periods of the transmitter.

(x) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(xi) Add 10 log (1/x), where x is the duty cycle, to the measured power 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 and e.i.r.p.

U-NII-1 band 802.11n (HT20)

U-NII-1 Duty Cycle				
Mode	Test Frequency (MHz)	Ant	Duty Cycle (%)	Duty Cycle Factor (dB)
802.11n (HT20)	5180	Ant0	94.81	0.23
802.11n (HT20)	5180	Ant1	94.81	0.23
802.11n (HT20)	5200	Ant0	94.81	0.23
802.11n (HT20)	5200	Ant1	94.81	0.23
802.11n (HT20)	5240	Ant0	94.81	0.23
802.11n (HT20)	5240	Ant1	94.81	0.23

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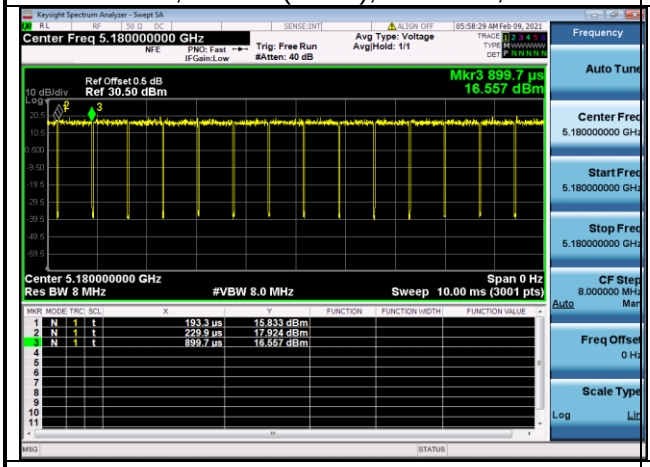
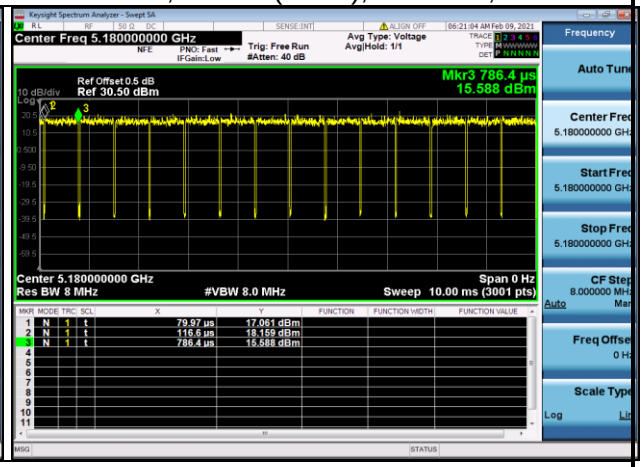
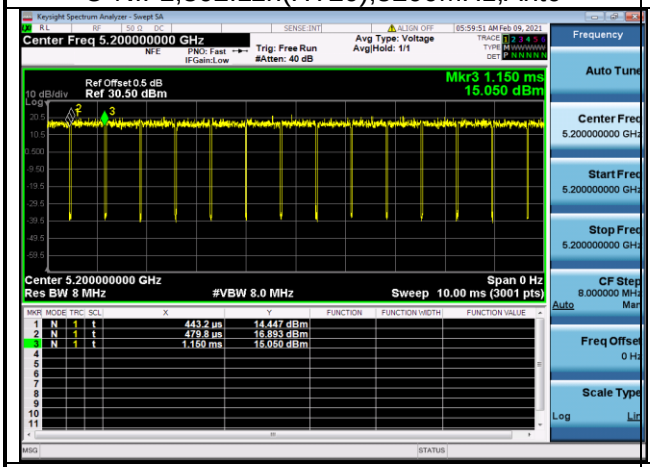
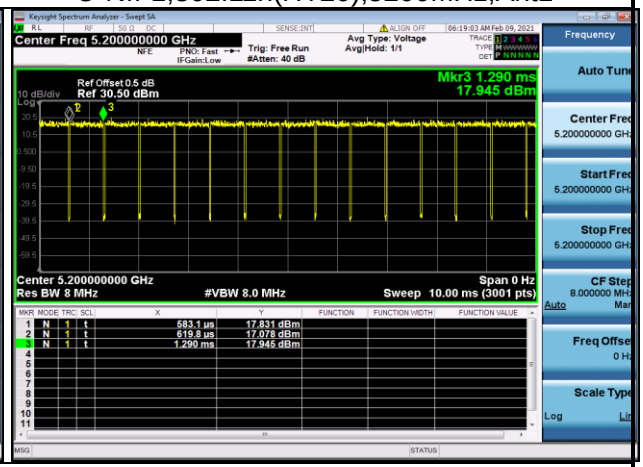
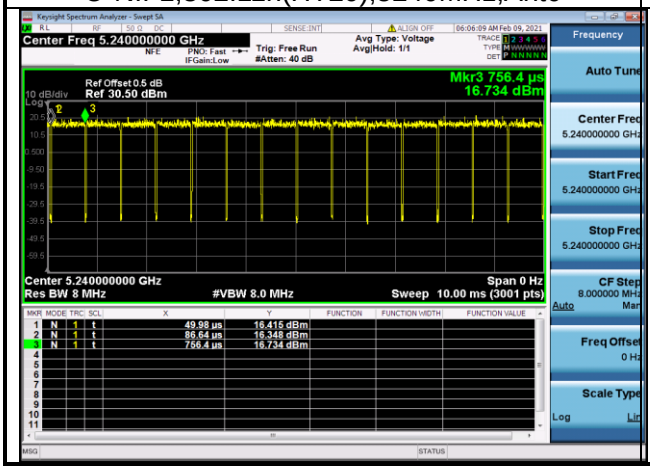
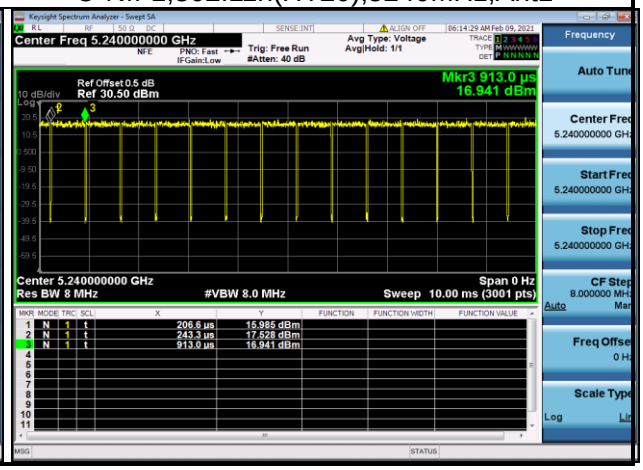
Test Plots

U-NII-1,802.11n(HT20),5180MHz,Ant0	U-NII-1,802.11n(HT20),5180MHz,Ant1
	
U-NII-1,802.11n(HT20),5200MHz,Ant0	U-NII-1,802.11n(HT20),5200MHz,Ant1
	
U-NII-1,802.11n(HT20),5240MHz,Ant0	U-NII-1,802.11n(HT20),5240MHz,Ant1
	

U-NII-1 AVGSA Output Power									
Mode	Test Frequency (MHz)	Ant	Duty Cycle Factor (dB)	Max Power (dBm)	Total Power (dBm)	FCC Limit (dBm)	EIRP (dBm)	IC EIRP Limit (dBm)	Result
802.11n (HT20)	5180	Ant0	0.23	13.51	16.72	24	20.13	22	Pass
802.11n (HT20)	5180	Ant1	0.23	13.90					
802.11n (HT20)	5200	Ant0	0.23	13.36	16.53	24	19.94	22	Pass
802.11n (HT20)	5200	Ant1	0.23	13.68					
802.11n (HT20)	5240	Ant0	0.23	13.49	16.63	24	20.04	22	Pass
802.11n (HT20)	5240	Ant1	0.23	13.75					

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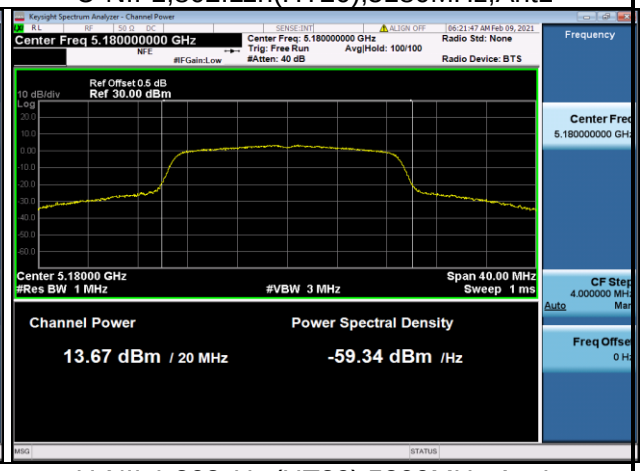
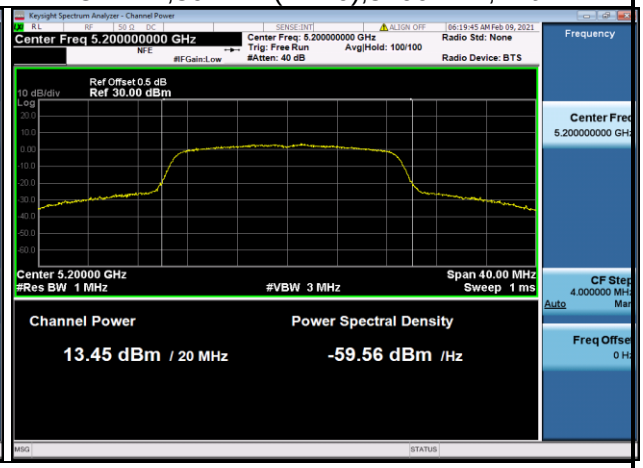
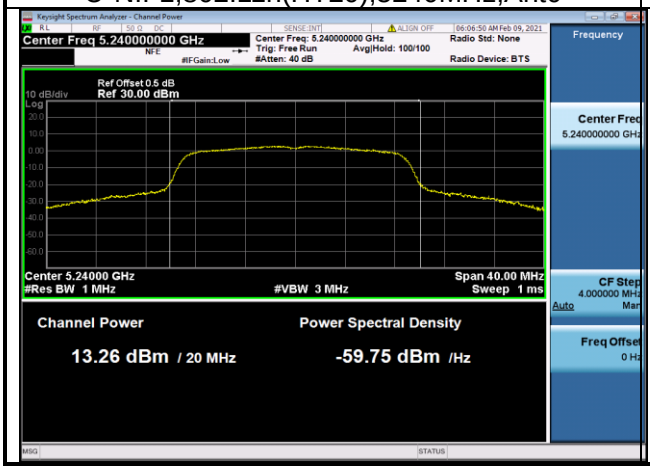
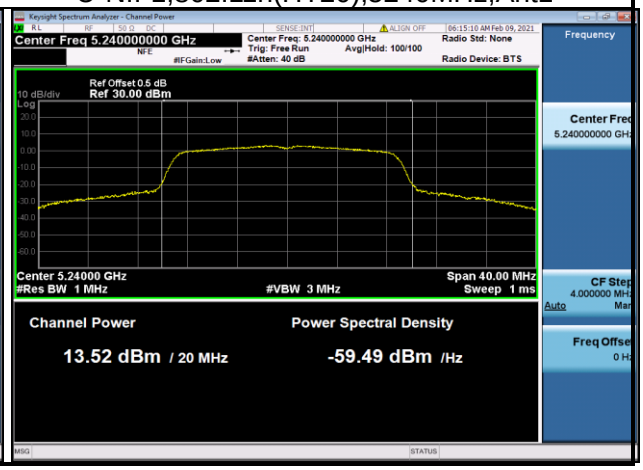
Test Plots

U-NII-1,802.11n(HT20),5180MHz,Ant0	U-NII-1,802.11n(HT20),5180MHz,Ant1
	
U-NII-1,802.11n(HT20),5200MHz,Ant0	U-NII-1,802.11n(HT20),5200MHz,Ant1
	
U-NII-1,802.11n(HT20),5240MHz,Ant0	U-NII-1,802.11n(HT20),5240MHz,Ant1
	

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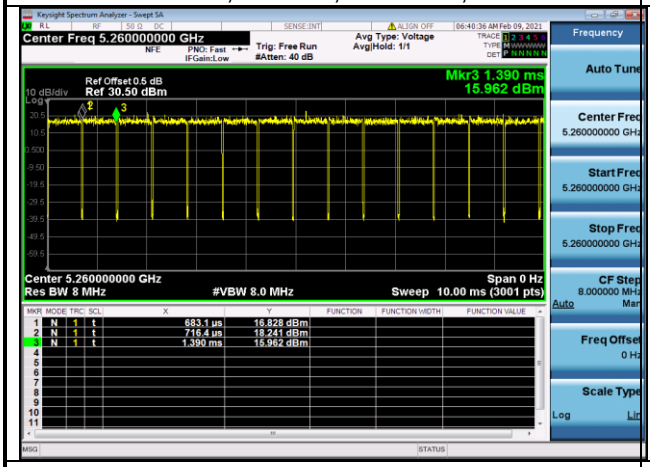
U-NII-2a band 802.11n (HT20)

U-NII-2a Duty Cycle				
Mode	Test Frequency (MHz)	Ant	Duty Cycle (%)	Duty Cycle Factor (dB)
802.11a	5260	Ant0	95.28	0.21
802.11a	5260	Ant1	94.84	0.23
802.11a	5300	Ant0	94.81	0.23
802.11a	5300	Ant1	95.28	0.21
802.11a	5320	Ant0	95.28	0.21
802.11a	5320	Ant1	95.28	0.21

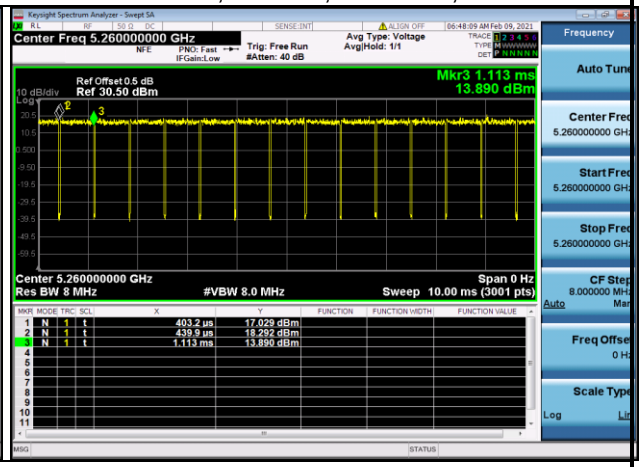
TEST REPORT

Test Plots

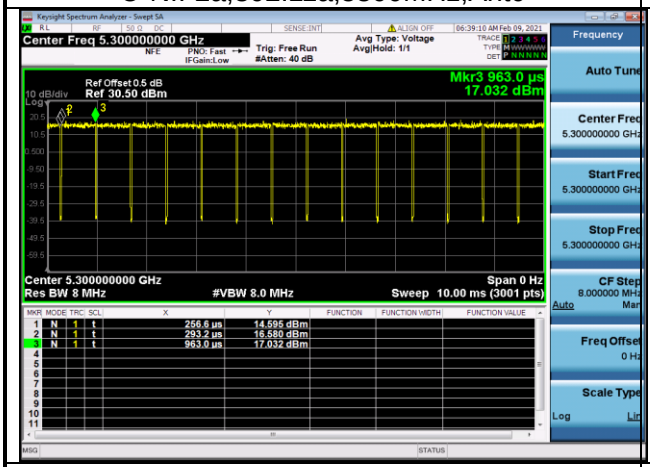
U-NII-2a,802.11a,5260MHz,Ant0



U-NII-2a,802.11a,5260MHz,Ant1



U-NII-2a,802.11a,5300MHz,Ant0



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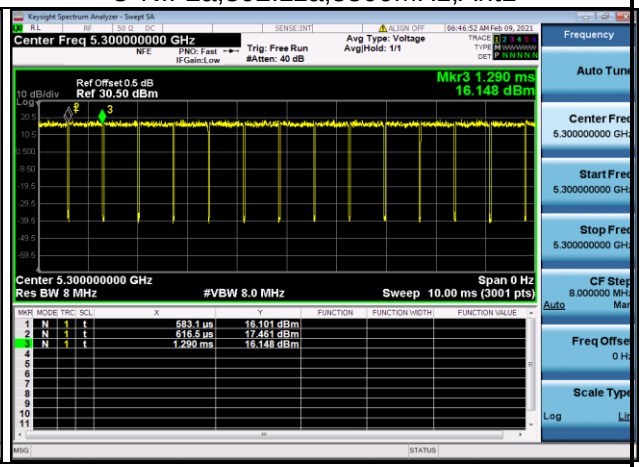
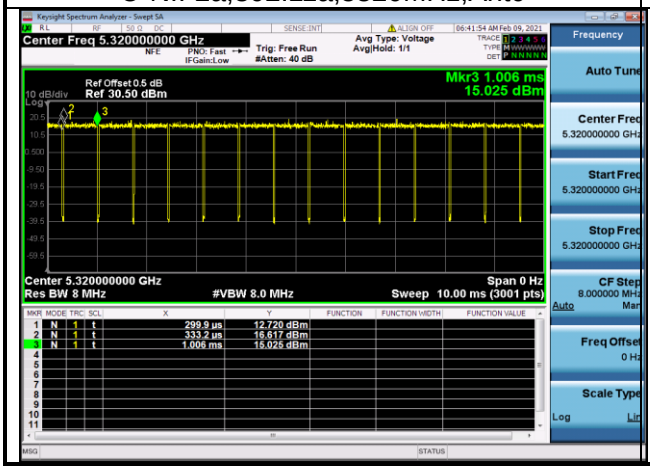
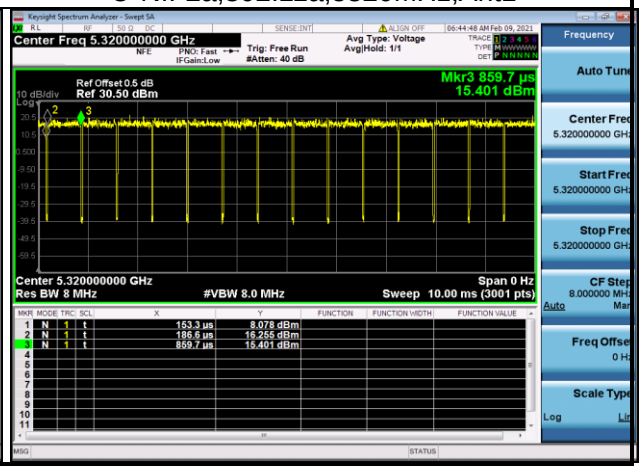


U-NII-2a,802.11a,5320MHz,Ant0



U-NII-2a,802.11a,5320MHz,Ant1

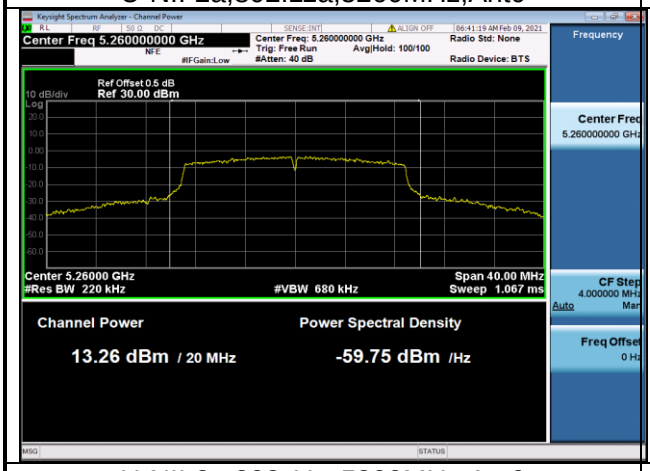


U-NII-2a AVGSA Output Power									
Mode	Test Frequency (MHz)	Ant	Duty Cycle Factor (dB)	Max Power (dBm)	Total Power (dBm)	FCC Limit (dBm)	EIRP (dBm)	IC EIRP Limit (dBm)	Result
802.11n (HT20)	5260	Ant0	0.21	13.47	16.56	24	19.97	22	Pass
802.11n (HT20)	5260	Ant1	0.23	13.62					
802.11n (HT20)	5300	Ant0	0.23	13.59	16.64	24	20.05	22	Pass
802.11n (HT20)	5300	Ant1	0.21	13.66					
802.11n (HT20)	5320	Ant0	0.21	13.58	16.57	24	19.98	22	Pass
802.11n (HT20)	5320	Ant1	0.21	13.54					

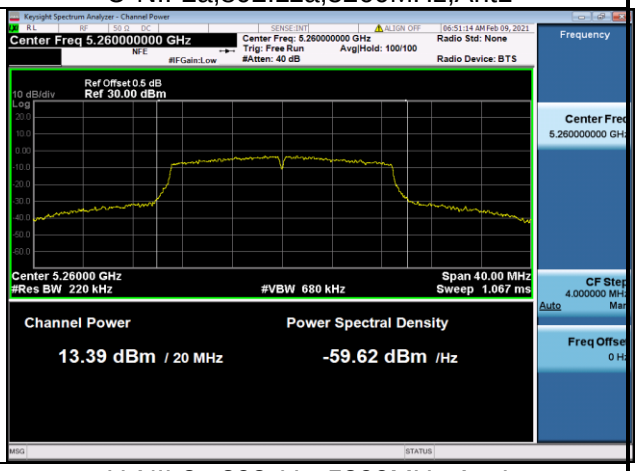
TEST REPORT

Test Plots

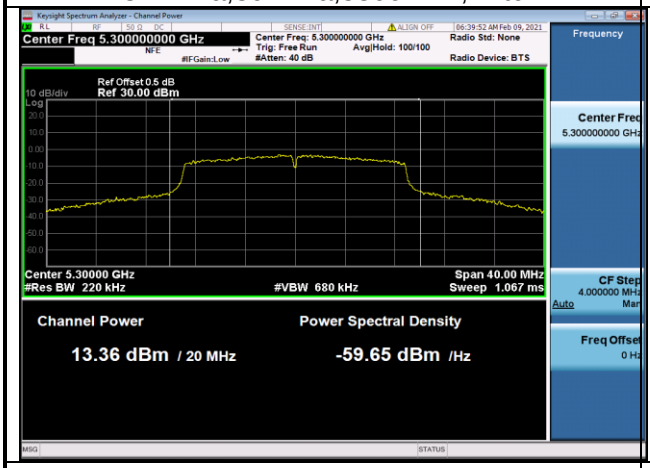
U-NII-2a,802.11a,5260MHz,Ant0



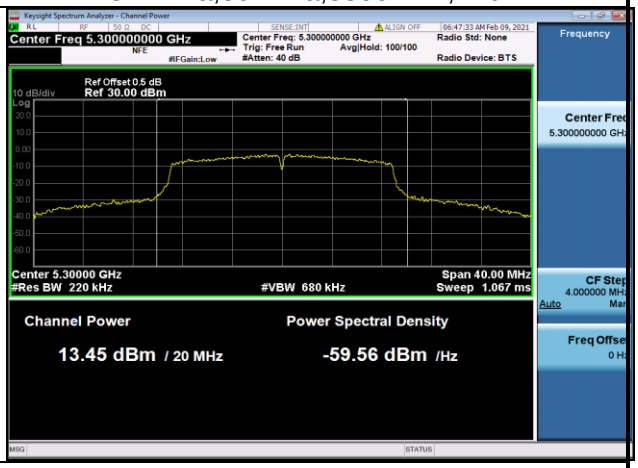
U-NII-2a,802.11a,5260MHz,Ant1



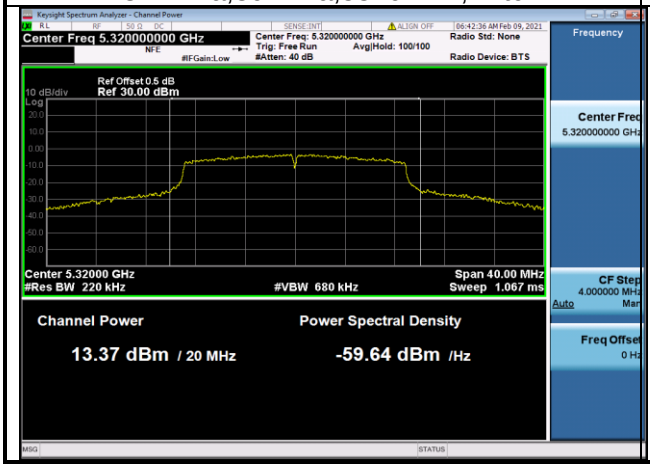
U-NII-2a,802.11a,5300MHz,Ant0



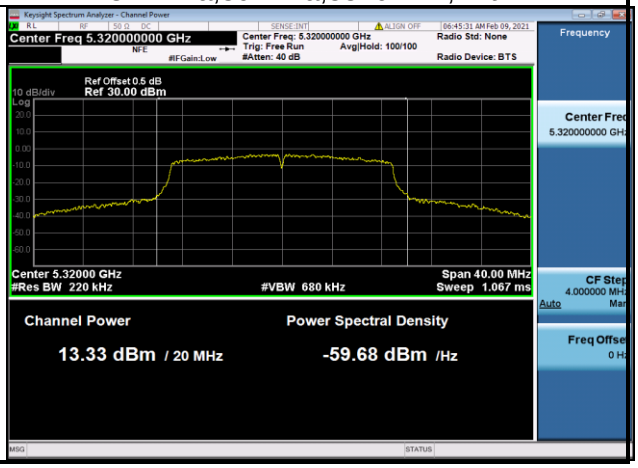
U-NII-2a,802.11a,5300MHz,Ant1



U-NII-2a,802.11a,5320MHz,Ant0



U-NII-2a,802.11a,5320MHz,Ant1



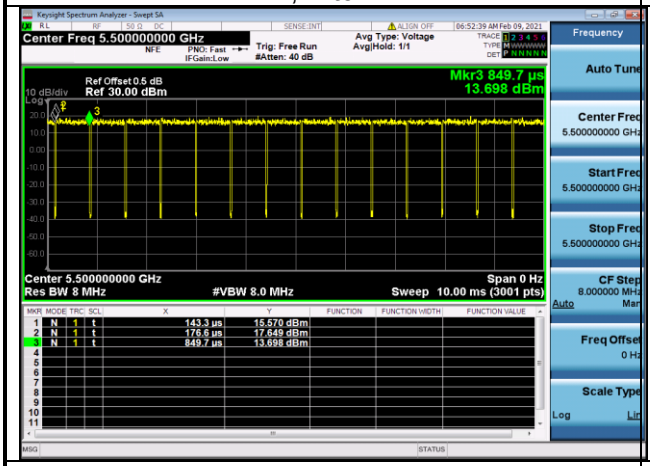
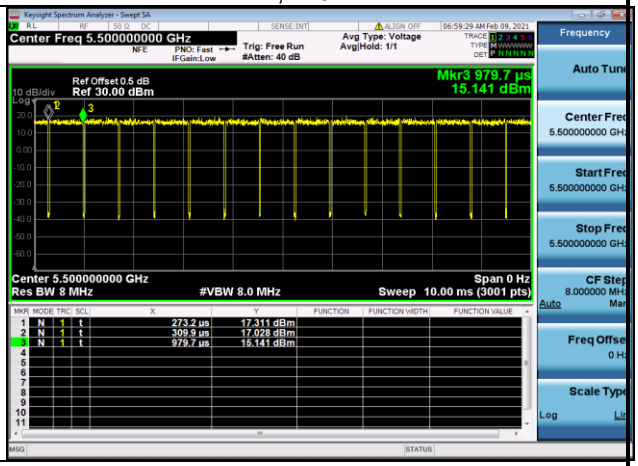
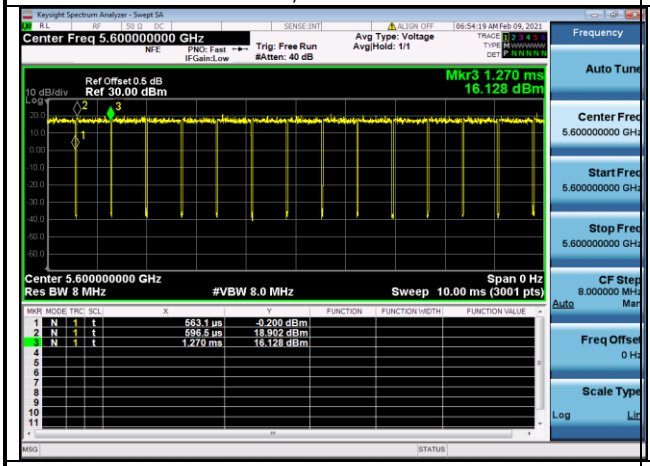
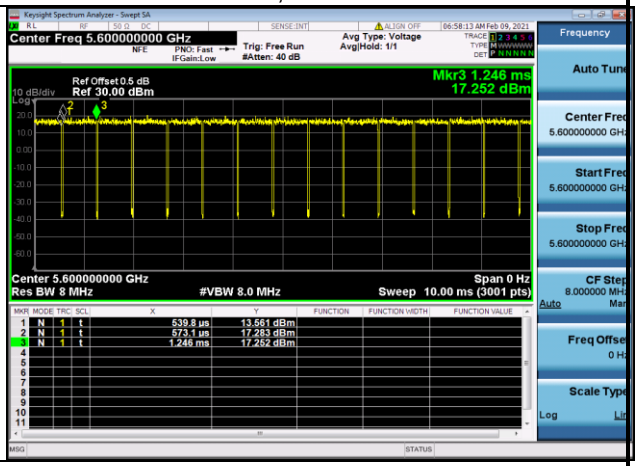
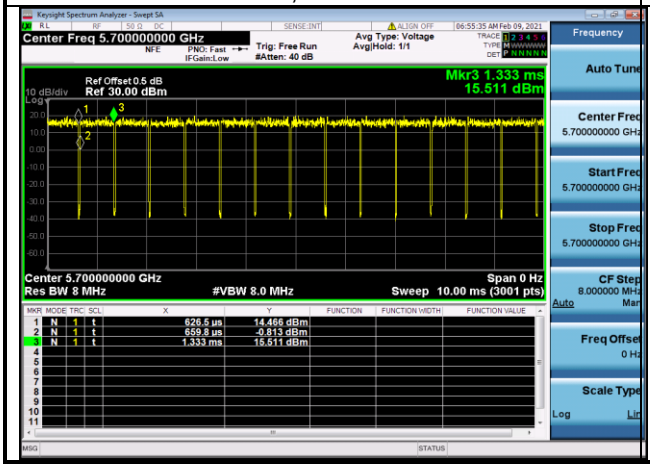
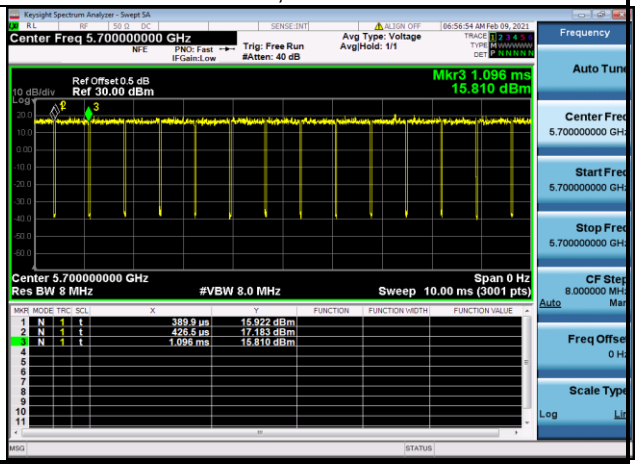
TEST REPORT

U-NII-2c band 802.11n (HT20)

U-NII-2c Duty Cycle				
Mode	Test Frequency (MHz)	Ant	Duty Cycle (%)	Duty Cycle Factor (dB)
802.11n (HT20)	5500	Ant0	95.28	0.21
802.11n (HT20)	5500	Ant1	94.81	0.23
802.11n (HT20)	5600	Ant0	95.28	0.21
802.11n (HT20)	5600	Ant1	95.28	0.21
802.11n (HT20)	5700	Ant0	95.28	0.21
802.11n (HT20)	5700	Ant1	94.81	0.23

TEST REPORT

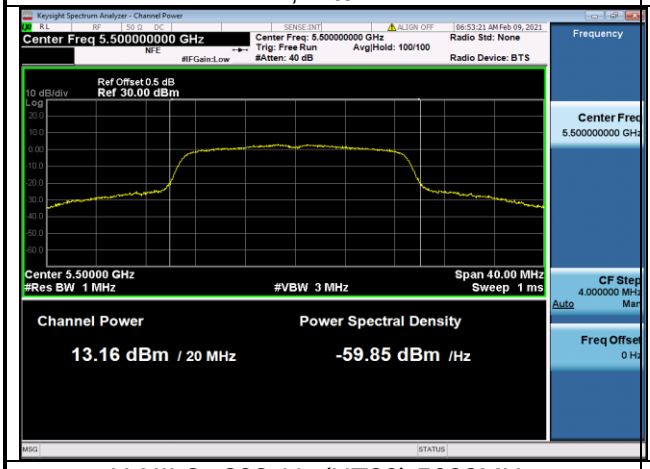
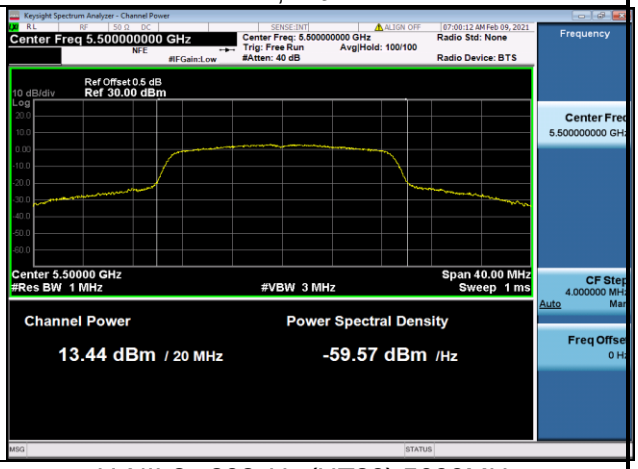
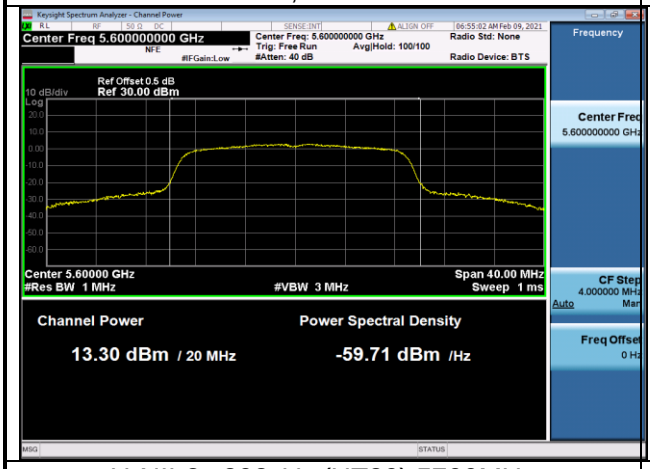
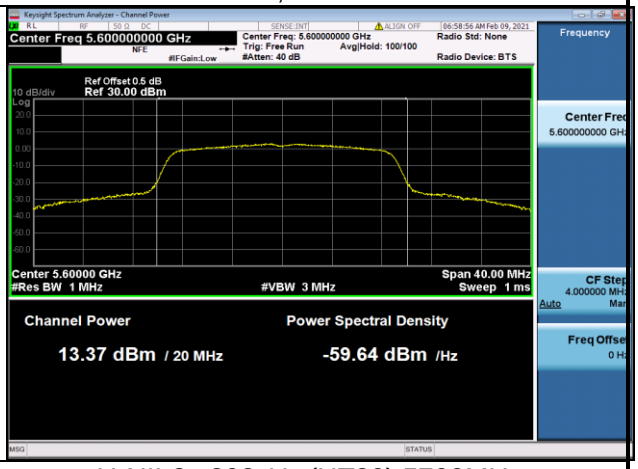
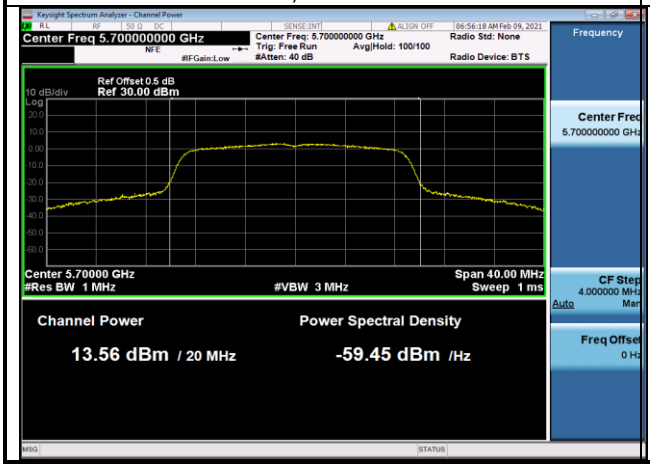
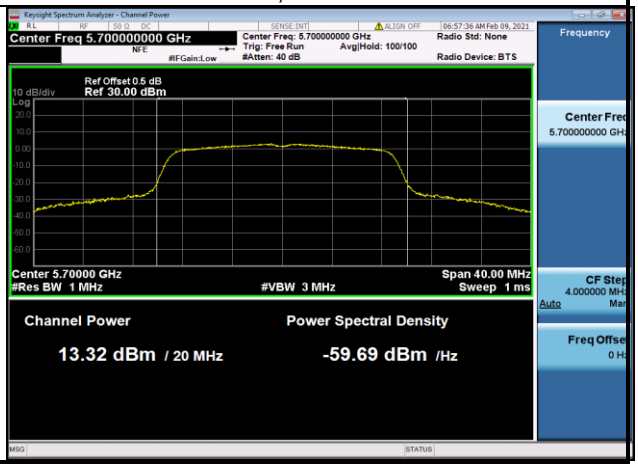
Test Plots

U-NII-2c,802.11n(HT20),5500MHz ,Ant0	U-NII-2c,802.11n(HT20),5500MHz ,Ant1
	
U-NII-2c,802.11n(HT20),5600MHz ,Ant0	U-NII-2c,802.11n(HT20),5600MHz ,Ant1
	
U-NII-2c,802.11n(HT20),5700MHz ,Ant0	U-NII-2c,802.11n(HT20),5700MHz ,Ant1
	

U-NII-2c AVGSA Output Power									
Mode	Test Frequency (MHz)	Ant	Duty Cycle Factor (dB)	Max Power (dBm)	Total Power (dBm)	FCC Limit (dBm)	EIRP (dBm)	IC EIRP Limit (dBm)	Result
802.11n (HT20)	5500	Ant0	0.21	13.37	16.53	24	19.94	22	Pass
802.11n (HT20)	5500	Ant1	0.23	13.67					
802.11n (HT20)	5600	Ant0	0.21	13.51	16.56	24	19.97	22	Pass
802.11n (HT20)	5600	Ant1	0.21	13.58					
802.11n (HT20)	5700	Ant0	0.21	13.77	16.67	24	20.08	22	Pass
802.11n (HT20)	5700	Ant1	0.23	13.55					

TEST REPORT

Test Plots

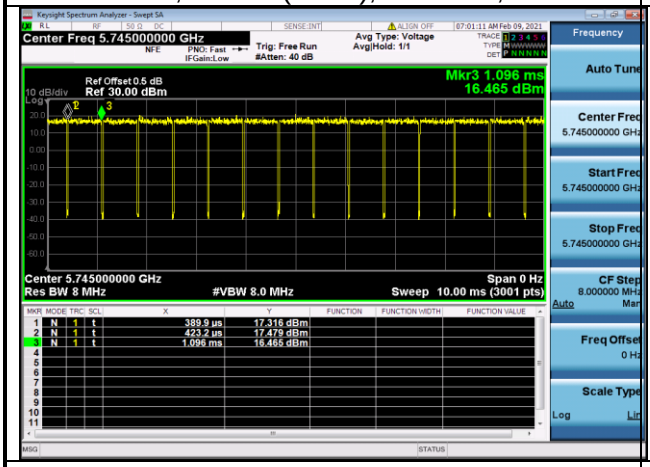
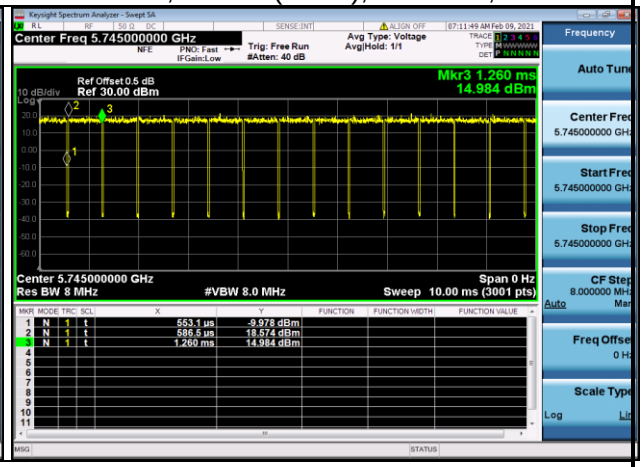
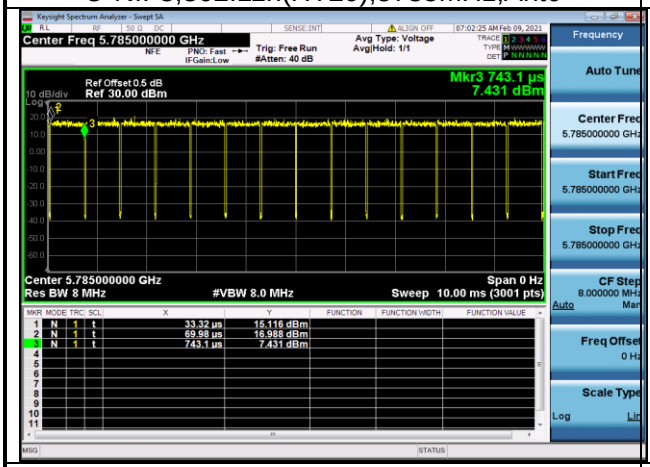
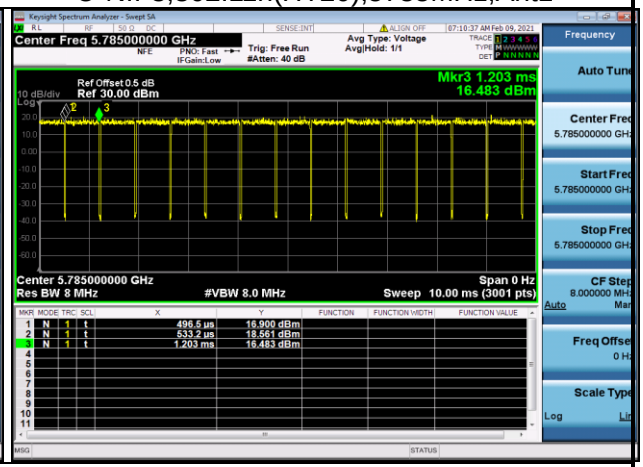
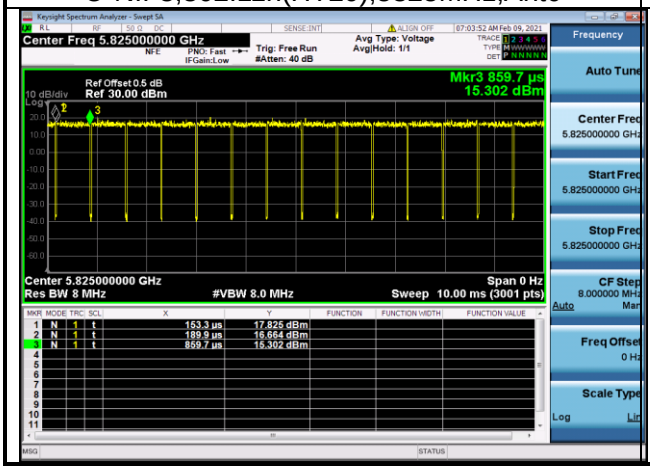
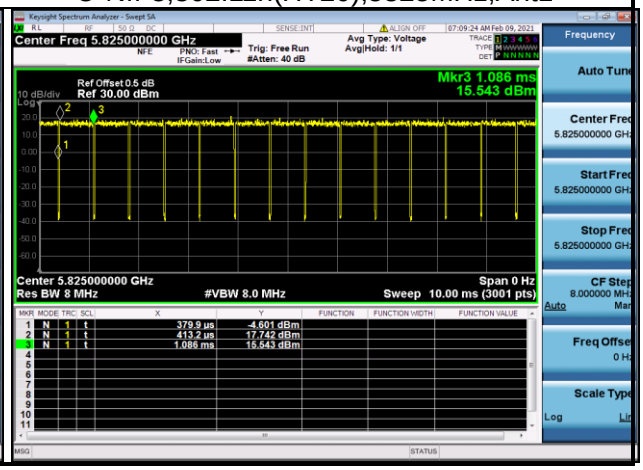
U-NII-2c,802.11n(HT20),5500MHz ,Ant0	U-NII-2c,802.11n(HT20),5500MHz ,Ant1
	
U-NII-2c,802.11n(HT20),5600MHz ,Ant0	U-NII-2c,802.11n(HT20),5600MHz ,Ant1
	
U-NII-2c,802.11n(HT20),5700MHz ,Ant0	U-NII-2c,802.11n(HT20),5700MHz ,Ant1
	

U-NII-3 band 802.11n (HT20)

U-NII-3 Duty Cycle				
Mode	Test Frequency (MHz)	Ant	Duty Cycle (%)	Duty Cycle Factor (dB)
802.11n (HT20)	5745	Ant0	95.28	0.21
802.11n (HT20)	5745	Ant1	95.28	0.21
802.11n (HT20)	5785	Ant0	94.84	0.23
802.11n (HT20)	5785	Ant1	94.81	0.23
802.11n (HT20)	5825	Ant0	94.81	0.23
802.11n (HT20)	5825	Ant1	95.28	0.21

TEST REPORT

Test Plots

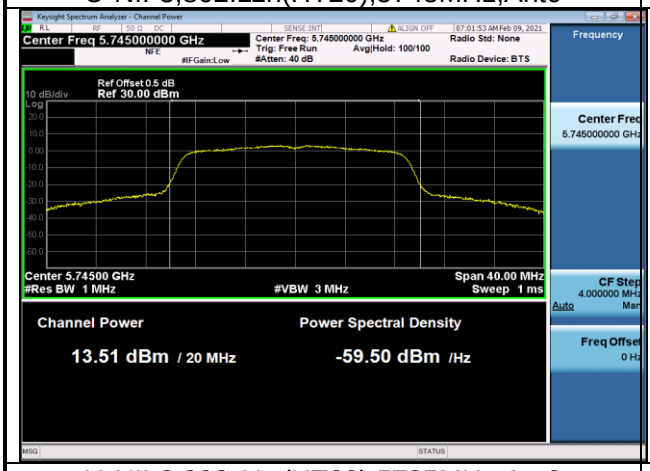
U-NII-3,802.11n(HT20),5745MHz,Ant0	U-NII-3,802.11n(HT20),5745MHz,Ant1
	
U-NII-3,802.11n(HT20),5785MHz,Ant0	U-NII-3,802.11n(HT20),5785MHz,Ant1
	
U-NII-3,802.11n(HT20),5825MHz,Ant0	U-NII-3,802.11n(HT20),5825MHz,Ant1
	

U-NII-3 AVGSA Output Power									
Mode	Test Frequency (MHz)	Ant	Duty Cycle Factor (dB)	Max Power (dBm)	Total Power (dBm)	FCC Limit (dBm)	EIRP (dBm)	IC EIRP Limit (dBm)	Result
802.11n (HT20)	5745	Ant0	0.21	13.72	16.74	24	20.15	22	Pass
802.11n (HT20)	5745	Ant1	0.21	13.74					
802.11n (HT20)	5785	Ant0	0.23	13.78	16.79	24	20.20	22	Pass
802.11n (HT20)	5785	Ant1	0.21	13.78					
802.11n (HT20)	5825	Ant0	0.23	13.72	16.75	24	20.16	22	Pass
802.11n (HT20)	5825	Ant1	0.21	13.76					

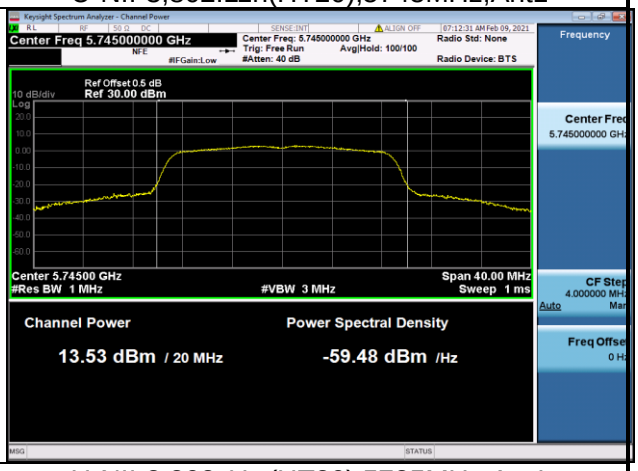
TEST REPORT

Test Plots

U-NII-3,802.11n(HT20),5745MHz,Ant0

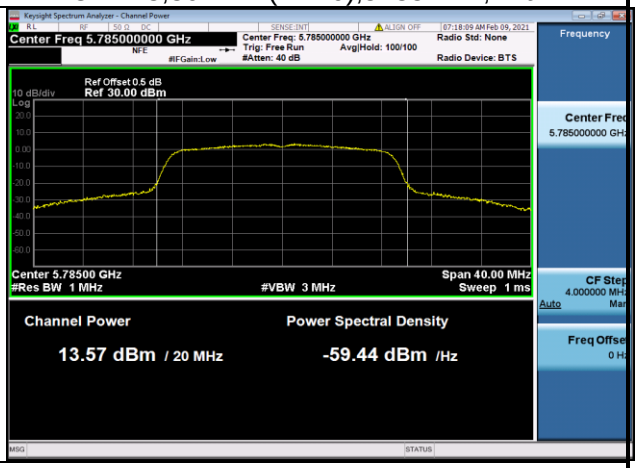


U-NII-3,802.11n(HT20),5745MHz,Ant1



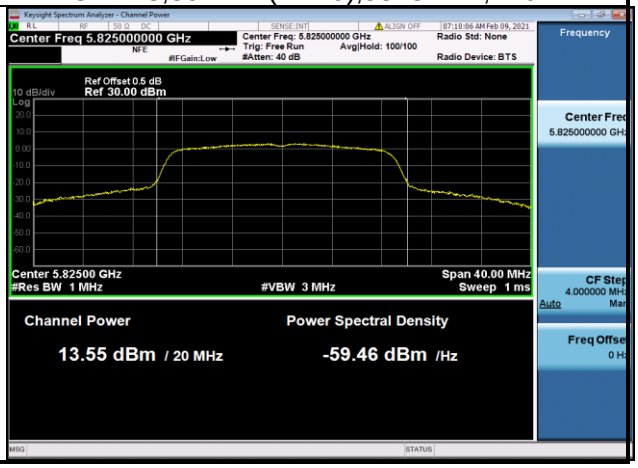
U-NII-3,802.11n(HT20),5785MHz,Ant0

U-NII-3,802.11n(HT20),5785MHz,Ant1



U-NII-3,802.11n(HT20),5825MHz,Ant0

U-NII-3,802.11n(HT20),5825MHz,Ant1



4 Radiated Emissions

Test result: **Pass**

4.1 Limit

The radiated emissions which fall in the restricted bands, and the radiated emissions below 1GHz, must 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

The radiated emissions which fall outside the restrict bands, should comply with the EIRP limit as below:

For transmitters operating in the 5.15 - 5.25 / 5.25 - 5.35 / 5.47 - 5.725GHz band:

Frequency (MHz)	EIRP Limit (dBm)	Equivalent Field Strength (3m) (dBµV/m)
<5150	-27	68.20
>5350		
<5470		
>5725		

For transmitters operating in the 5.725 - 5.85GHz band:

Frequency (MHz)	EIRP Limit (dBm/MHz)	Equivalent Field Strength (3m) (dBµV/m)
<5650	-27	68.20
5650 ~ 5700	-27 ~ 10	68.20 ~ 105.20
5700 ~ 5720	10 ~ 15.6	105.20 ~ 110.80
5720 ~ 5725	15.6 ~ 27	110.80 ~ 122.20
5850 ~ 5855	27 ~ 15.6	122.20 ~ 110.80
5855 ~ 5875	15.6 ~ 10	110.80 ~ 105.20
5875 ~ 5925	10 ~ -27	105.20 ~ 68.20
>5925	-27	68.20

4.2 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 peak or 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:

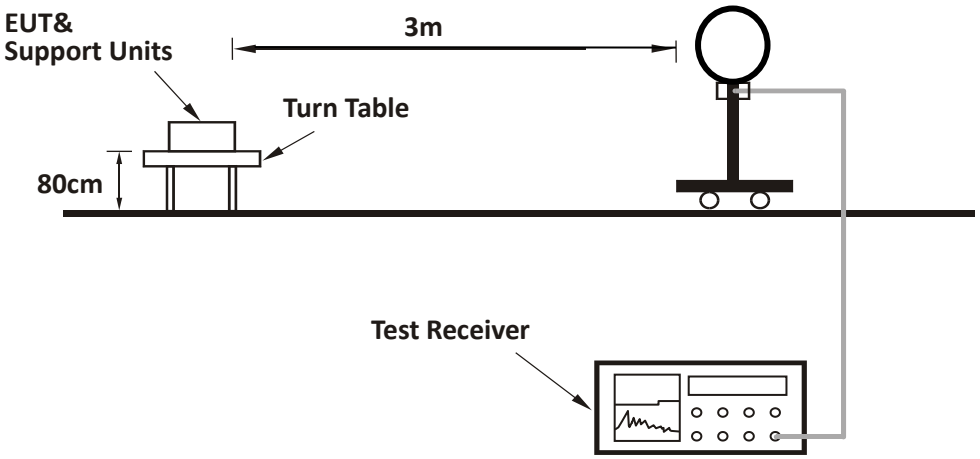
a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving 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 peak or 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:

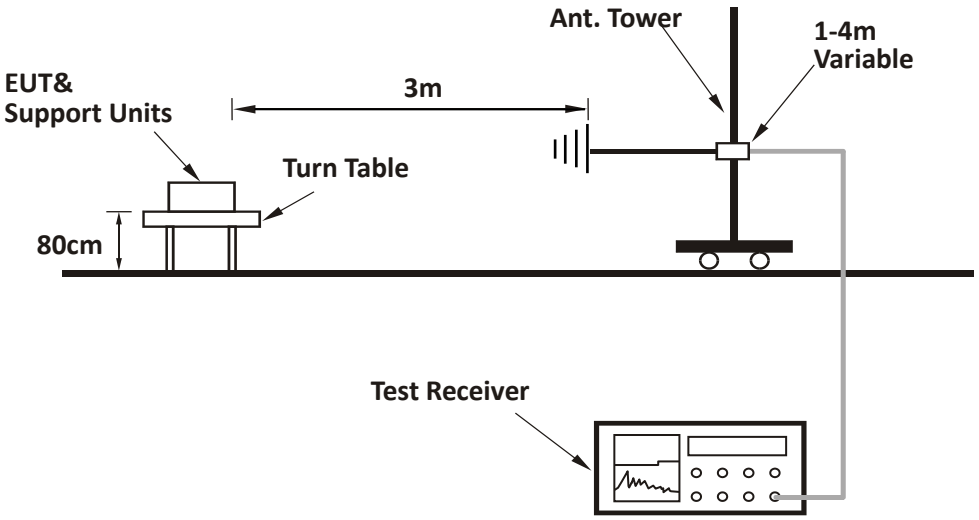
1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for peak or quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz at frequency above 1GHz for peak detection above 1GHz.
3. The resolution bandwidth of test receiver/spectrum 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.

4.3 Test Configuration

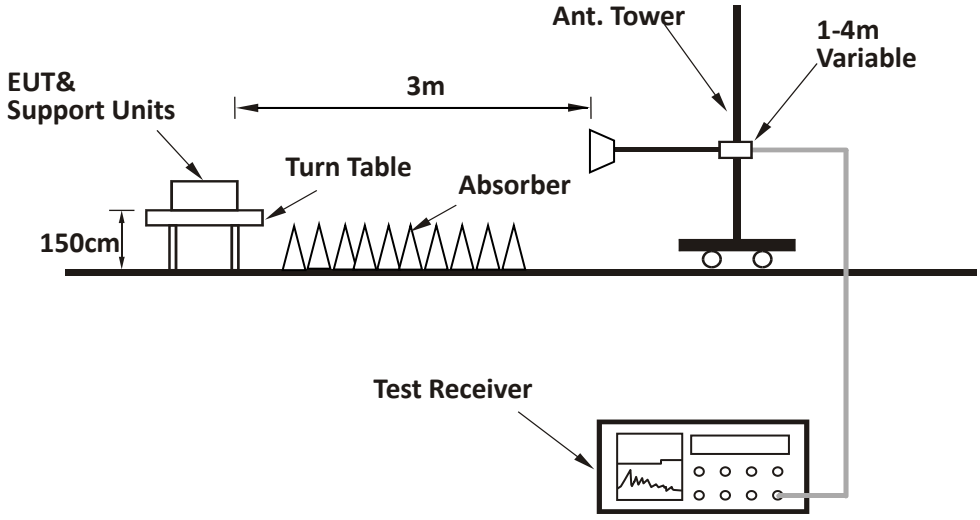
For Radiated emission below 30MHz:



For Radiated emission 30MHz to 1GHz:



For Radiated emission above 1GHz:



4.4 Test Results of Radiated Emissions

Test result above 1GHz:

The emission was conducted from 1GHz to 40GHz

U-NII-1 Band:

802.11n(HT40)

Channel	Polarity	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	5190	104.70	Fundamental	/	PK
	H	5150	71.20	74.00	2.80	PK
	H	5150	49.70	54.00	4.30	AV
H	H	5230	104.50	Fundamental	/	PK
	H	5350	61.30	74.00	12.70	PK
	H	5350	47.10	54.00	6.90	AV

U-NII-2a Band:

802.11ac(VHT80)

Channel	Polarity	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	5290	98.80	Fundamental	/	PK
	H	5350	64.70	74.00	9.30	PK
	H	5350	49.60	54.00	4.40	AV

TEST REPORT

U-NII-2c Band:

802.11n(HT40)

Channel	Polarity	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	5510	99.40	Fundamental	/	PK
	H	5469	65.20	68.20	3.00	PK
M	H	5600	99.50	Fundamental	/	PK
H	H	5700	99.40	Fundamental	/	PK
	H	5725	61.70	68.20	6.50	PK

U-NII-3 Band:

802.11ac(VHT80)

Channel	Polarity	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	H	5775	97.30	Fundamental	/	PK
	H	5647	60.90	68.20	7.30	PK
	H	5936	62.80	68.20	5.40	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.

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