TEST REPORT

Report Reference No. ..... :	**171208003RFC-1**	R/C.....: 68626
FCC ID ..... :	**2AEY7-S8A003**	
Applicant's name ..... :	**Bak USA Technologies Corp.**	
Address ..... :	425 Michigan Avenue,Buffalo,New York 14203,USA	
Manufacturer..... :	Bak USA Technologies Corp.	
Address..... :	425 Michigan Avenue,Buffalo,New York 14203,USA	
Test item description..... :	**Tablet PC**	
Trade Mark..... :	-	
Model/Type reference ..... :	Seal8Pro	
Listed Model(s) ..... :	-	
Standard..... :	**FCC CFR Title 47 Part 15 Subpart E Section 15.407**	
Date of receipt of test sample.....:	Dec.08, 2017	
Date of testing.....:	Dec.08, 2017- Dec.13, 2017	
Date of issue.....:	Dec.14, 2017	
Result .....:	**PASS**	
Tested by .....:	Senior Engineer : Kevin Liang	
Reviewed by.....:	RF Manager : Jim Long	
Approved by.....:	Technical Director : Billy Li	
Testing Laboratory Name..... :	**Shenzhen UnionTrust Quality and Technology Co., Ltd.**	
Address ..... :	16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China	

Contents

1. TEST STANDARDS AND REPORT VERSION

1.4 Test Standards

The tests were performed according to following standards:
FCC Rules Part 15.407: General technical requirements.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices

KDB789033 D02 v01r04: GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

2.4 Report Version

Version No.	Date of issue	Description
00	Dec.14, 2017	Original

2. TEST DESCRIPTION

Test Item	FCC Rule	Result	Test Engineer
Antenna Requirement	15.203	Pass	William Wang
Line Conducted Emissions (AC Main)	15.207	Pass	William Wang
Maximum Conducted Output Power	15.407 (a.1)(a.3)	Pass	Baozhu Hu
Maximum Power Spectral Density	15.407 (a.1)(a.3)	Pass	Baozhu Hu
6dB&26dB Bandwidth	15.407(a.5)	Pass	Baozhu Hu
Radiated Emissions & Band edge	15.407(b.6) &(b.1)(b.4)	Pass	Baozhu Hu

Remark: 1.The measurement uncertainty is not included in the test result.
2.The EUT is a client device without radar detection.a TPC mechanism is not required for systems with an e.i.r.p. of less than 500mW.

3. SUMMARY

1.4 Client Information

Applicant:	Bak USA Technologies Corp.
Address:	425 Michigan Avenue,Buffalo,New York 14203,USA
Manufacturer:	Bak USA Technologies Corp.
Address:	425 Michigan Avenue,Buffalo,New York 14203,USA

2.4 Product Description

Name of EUT	Tablet PC		
Trade Mark:	-		
Model No.:	Seal8Pro		
Listed Model(s):	-		
Power supply:	DC 3.7V From exchange battery		
Adapter information :	Input: 100-240Va.c., 50/60Hz, 0.6A Output: 5Vd.c.,5A		
5G WIFI			
Supported type:	☒ 802.11a	☒ 802.11n(HT20)	☒ 802.11n(HT40)
	☐ 802.11ac(HT20)	☐ 802.11ac(HT40)	☐ 802.11ac(HT80)
Function:	☐ Outdoor AP	☐ Indoor AP	☐ Fixed P2P
	☒ Client		
DFS type:	☐ master devices	☐ Slave devices with radar detection	☒ Slave devices without radar detection
Modulation:	BPSK, QPSK, 16QAM, 64QAM		
Operation frequency:	☒ Band I:	5150MHz~5250MHz	
	☒ Band II:	5250MHz~5350MHz	
	☒ Band III:	5470MHz~5725MHz	
	☒ Band IV:	5725MHz~5850MHz	
Supported Bandwidth	20MHz:	802.11a, 802.11n	
	40MHz:	802.11n	
Antenna type:	Integral antenna		
Antenna gain:	2.0dBi		

3.4 Operation state

◆ **Frequency list**

According to section 15.31(m), regards to the operating frequency range over 10 MHz, must select three channel which were tested. the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, please see the above gray bottom.

Band	Test Channel	20MHz		40MHz	
		Channel	Frequency (MHz)	Channel	Frequency (MHz)
I	CH_L	36	5180	38	5190
	CH_M	40	5200	-	-
	CH_H	48	5240	46	5230
II	CH_L	52	5260	54	5270
	CH_M	56	5280	-	-
	CH_H	64	5320	62	5310
III	CH_L	100	5500	102	5510
	CH_M	120	5600	118	5590
	CH_H	140	5700	134	5670
IV	CH_L	149	5745	151	5755
	CH_M	157	5785	-	-
	CH_H	165	5825	159	5795

◆ **Data Rated**

Preliminary tests were performed in different data rate, and found which the below bit rate is worst case mode, so only show data which it is a worst case mode.

Mode	Data rate (worst mode)
802.11a	6Mbps
802.11n(HT20)	MCS0
802.11n(HT40)	MCS0

◆ **Test mode**

For RF test items:

the engineering test program was provided and enabled to make EUT continuous transmit/receive. The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

For AC power line conducted emissions:

the EUT was set to connect with the WLAN AP under large package sizes transmission.

4.4 EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

- ● - supplied by the manufacturer
- ○ - supplied by the lab

○	N/A	Manufacturer :	N/A
		Model No. :	N/A
○	N/A	Manufacturer :	N/A
		Model No. :	N/A

5.4 Modifications

No modifications were implemented to meet testing criteria.

4. TEST ENVIRONMENT

1.4 Address of the test laboratory

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China 518109
Phone: +86 (0) 755 2823 0888 Fax: +86 (0) 755 2823 0886

2.4 Test Facility

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1
The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab
Designation Number: CN1194
Test Firm Registration Number: 25948

3.4 Equipments Used during the Test

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 20, 2015	Dec. 19, 2018
☑	Receiver	R&S	ESIB26	100114	Dec. 22, 2016	Dec. 22, 2017
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec. 22, 2016	Dec. 22, 2017
☑	Loop Antenna	ETS-LINDGREN	6502	00202525	Jun. 24, 2015	Jun. 23, 2018
☑	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Jul. 24, 2015	Jul. 23, 2018
☑	Preamplifier	HP	8447F	2805A02960	Dec. 22, 2016	Dec. 22, 2017
☑	Broadband Antenna (Pre-amplifier)	ETS-LINDGREN	3142E-PA	00201891	Dec. 30, 2016	Dec. 30, 2017
☐	Horn Antenna	ETS-LINDGREN	3117	00164202	Jul. 24, 2015	Jul. 23, 2018
☑	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	Dec. 30, 2016	Dec. 30, 2017
☐	Horn Antenna	ETS-LINDGREN	3116C	00200180	Jul. 28, 2015	Jul. 27, 2018
☑	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Jul. 29, 2015	Jul. 28, 2018
☑	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☐	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	Jun. 21, 2017	Jun. 20, 2018
☑	Band Rejection Filter (5150MHz~5880MHz)	Micro-Tronics	BRM50716	G1868	Jun. 15, 2017	Jun. 14, 2018
☑	Test Software	Audix	e3	Software Version: 9.160323		

Conducted RF test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date (mm dd, yyyy)**	**Cal. Due date (mm dd, yyyy)**
☑	EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY51440197	Dec. 22, 2016	Dec. 22, 2017
☑	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Dec. 22, 2016	Dec. 22, 2017
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430035	Dec. 22, 2016	Dec. 22, 2017
☑	USB Wideband Power Sensor	KEYSIGHT	U2021XA	MY55430023	Dec. 22, 2016	Dec. 22, 2017
☐	EXG-B RF Analog Signal Generator	KEYSIGHT	N5171B	MY53051777	Jan. 09, 2016	Jan. 08, 2018
☑	MXG X-Series RF Vector Signal Generator	KEYSIGHT	N5182B	MY51350267	Jan. 08, 2016	Jan. 07, 2018
☑	Temp & Humidity chamber	Votisch	VT4002	58566133290 020	Jun. 19, 2017	Jun. 18, 2018

Conducted Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☑	Receiver	R&S	ESR7	1316.3003K07 -101181-K3	Dec. 22, 2016	Dec. 22, 2017
☑	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	Dec. 22, 2016	Dec. 22, 2017
☑	LISN	R&S	ESH2-Z5	860014/024	Dec. 22, 2016	Dec. 22, 2017
☑	Test Software	Audix	e3	Software Version: 9.160323		

4.4 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15~35°C
Relative Humidity:	30~60 %
Air Pressure:	950~1050mba

5.4 Statement of the measurement uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

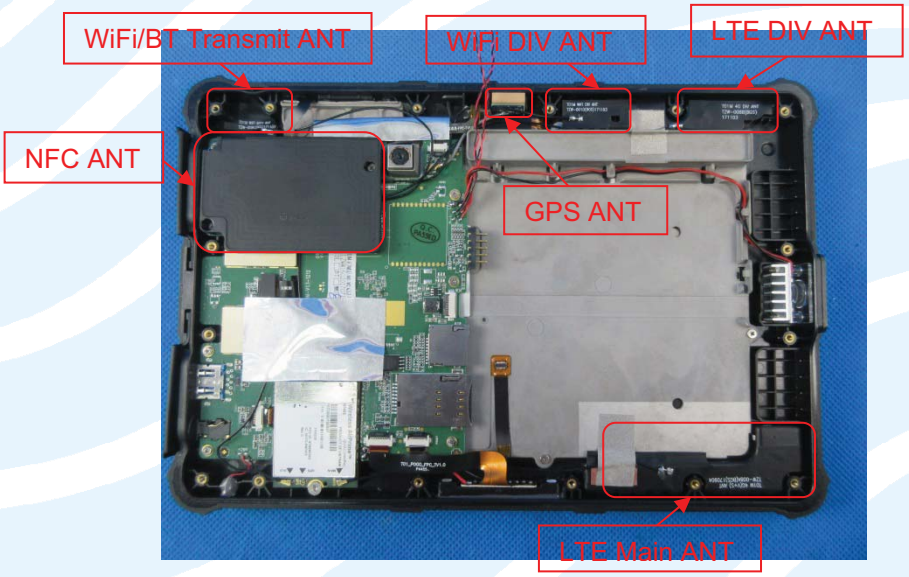
Requirement

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

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 anantenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Result:

The directional gain of the antenna less than 6 dBi, please refer to the below antenna photo.



5.2. Conducted Emissions (AC Main)

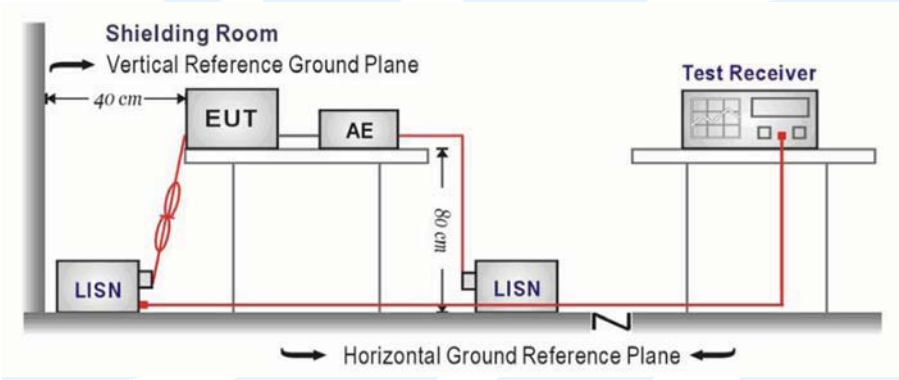
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
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.

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was setup according to ANSI C63.10:2013 requirements.
2. The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface.
3. The EUT and simulators are connected to the main power through a line impedances stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment.
4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
5. Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor,was individually connected through a LISN to the input power source.
6. The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
7. Conducted Emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

Please refer to the clause 3.3

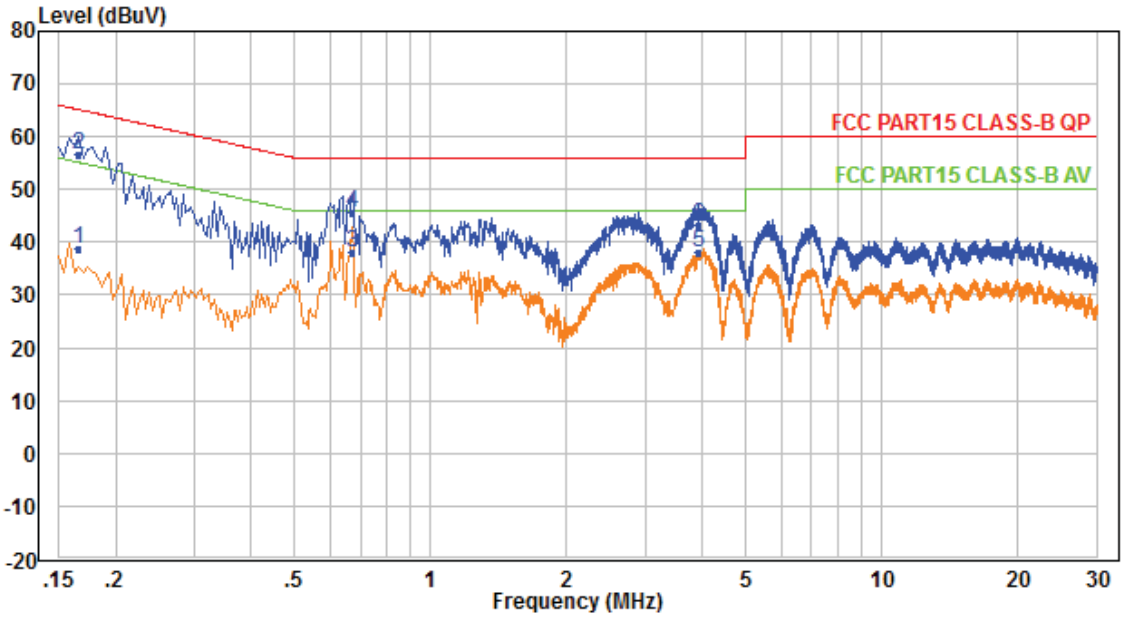
TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Note:

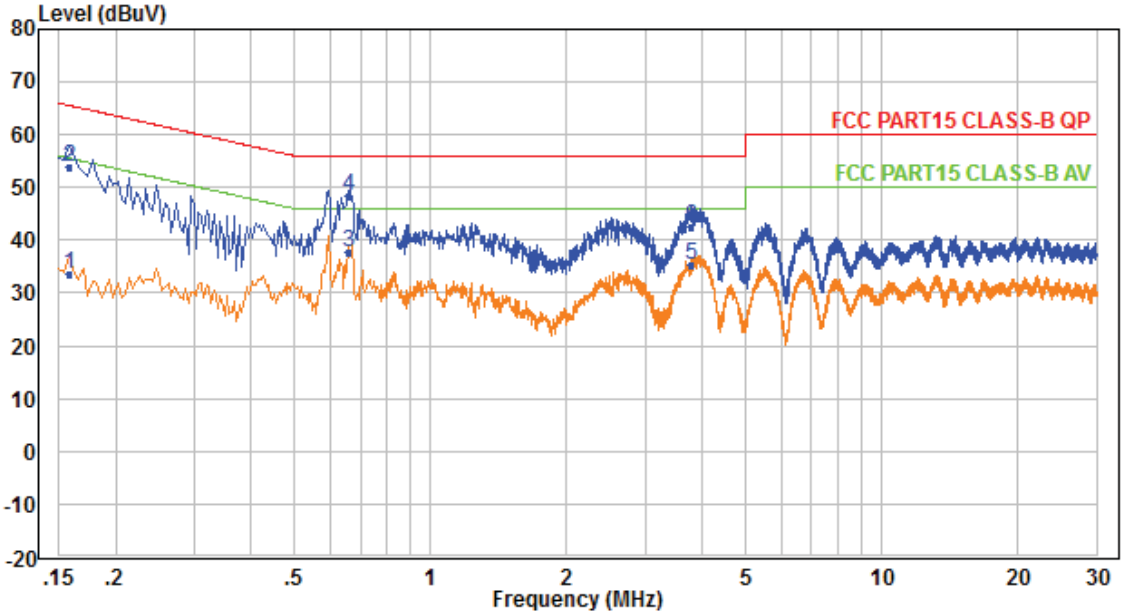
1) Transd=Cable lose+ Pulse Limiter Factor + Artificial Mains Factor
2) Margin= Limit -Level

Test Line:	L



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.198	9.00	10.20	19.20	53.70	34.50	Average
2	0.198	19.90	10.20	30.10	63.70	33.60	QP
3	0.530	21.00	10.20	31.20	46.00	14.80	Average
4	0.530	27.50	10.20	37.70	56.00	18.30	QP
5	16.169	7.60	12.10	19.70	50.00	30.30	Average
6	16.169	15.20	12.10	27.30	60.00	32.70	QP

Test Line:	N



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	0.158	23.50	10.20	33.70	55.60	21.90	Average
2	0.158	43.60	10.20	53.80	65.60	11.80	QP
3	0.658	27.40	10.20	37.60	46.00	8.40	Average
4*	0.658	38.10	10.20	48.30	56.00	7.70	QP
5	3.770	24.80	10.40	35.20	46.00	10.80	Average
6	3.770	32.30	10.40	42.70	56.00	13.30	QP

Remark:

1. Margin=Limit - Result

2. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

5.3. Maximum Conducted Output Power

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407(a):

For the 5.15~5.25GHz band:

- Outdoor AP
  The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).
  if G_{Tx}>6dBi, then P_{out} =30-(G_{Tx}-6). e.i.r.p. at any elevation angle above 30 degrees≤125mW (21dBm)
- Indoor AP
  The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).
  if G_{Tx}>6dBi, then Pout =30-(G_{Tx}-6).
- Point-to-point AP
  The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).
  if G_{Tx}>23dBi, then Pout =30-(G_{Tx}-23).
- Client devices
  The maximum conducted output power (P_{out}) shall not exceed the lesser of 250W (24dBm).
  if G_{Tx}>6dBi, then Pout =24-(G_{Tx}-6).

For the 5.25~5.35GHz band:

The maximum conducted output power (P_{out}) shall not exceed the lesser of 250mW (24dBm) or 11dBm+10 log B, where B is the 26dB emission bandwith in MHz.
if G_{Tx}>6dBi, then P_{out} =24-(G_{Tx}-6).

For the 5.47~5.725GHz band:

The maximum conducted output power (P_{out}) shall not exceed the lesser of 250mW (24dBm) or 11dBm+10 log B, where B is the 26dB emission bandwith in MHz.
if G_{Tx}>6dBi, then P_{out} =24-(G_{Tx}-6).

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)
  The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).
  if G_{Tx}>6dBi, then P_{out} =30-(G_{Tx}-6).
- Point-to-point systems (P2P)
  The maximum conducted output power (P_{out}) shall not exceed the lesser of 1W (30dBm).

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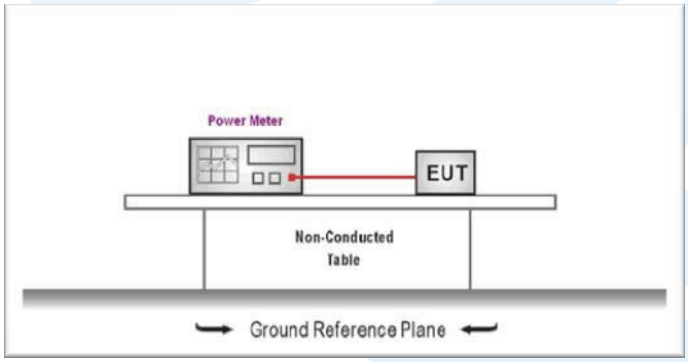
TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to KDB789033 requirements.
2. The maximum conducted output power may be measured using a broadband AVG RF power meter.
3. Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power
4. Record the measurement data.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Band	Bandwidth (MHz)	Type	Channel	Output power (dBm)	Limit (dBm)	Result
I	20	802.11n	CHL	14.21	24.00	Pass
			CHM	14.29		
			CHH	14.53		
		802.11a	CHL	15.11	24.00	Pass
			CHM	15.26		
			CHH	15.34		
	40	802.11n	CHL	13.60	24.00	Pass
			CHH	13.88		

Band	Bandwidth (MHz)	Type	Channel	Output power (dBm)	Limit (dBm)	Result
II	20	802.11n	CHL	14.51	24.00	Pass
			CHM	14.59		
			CHH	14.98		
		802.11a	CHL	14.60	24.00	Pass
			CHM	14.44		
			CHH	15.01		
	40	802.11n	CHL	13.37	24.00	Pass
			CHH	13.54		

Band	Bandwidth (MHz)	Type	Channel	Output power (dBm)	Limit (dBm)	Result
III	20	802.11n	CHL	14.75	24.00	Pass
			CHM	14.11		
			CHH	14.16		
		802.11a	CHL	14.81	24.00	Pass
			CHM	14.98		
			CHH	15.19		
	40	802.11n	CHL	12.55	24.00	Pass
			CHM	12.32		
			CHH	12.47		

Band	Bandwidth (MHz)	Type	Channel	Output power (dBm)	Limit (dBm)	Result
IV	20	802.11n	CHL	14.37	30.00	Pass
			CHM	14.76		
			CHH	14.76		
		802.11a	CHL	14.47	30.00	Pass
			CHM	14.85		
			CHH	14.67		

	40	802.11n	CHL	12.43	30.00	Pass
			CHH	12.53		

5.4. Maximum Power Spectral Density

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407:

For the 5.15~5.25GHz band:

- Outdoor AP
  The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
  if G_{Tx}>6dBi, then PSD =17-(G_{Tx}-6).
- Indoor AP
  The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
  if G_{Tx}>6dBi, then PSD =17-(G_{Tx}-6).
- Point-to-point AP
  The peak power spectral density (PSD) shall not exceed the lesser of 17dBm/MHz.
  if G_{Tx}>23dBi, then PSD =17-(G_{Tx}-23).
- Client devices
  The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
  if G_{Tx}>6dBi, then PSD =11-(G_{Tx}-6).

For the 5.25~5.35GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
if G_{Tx}>6dBi, then PSD =11-(G_{Tx}-6).

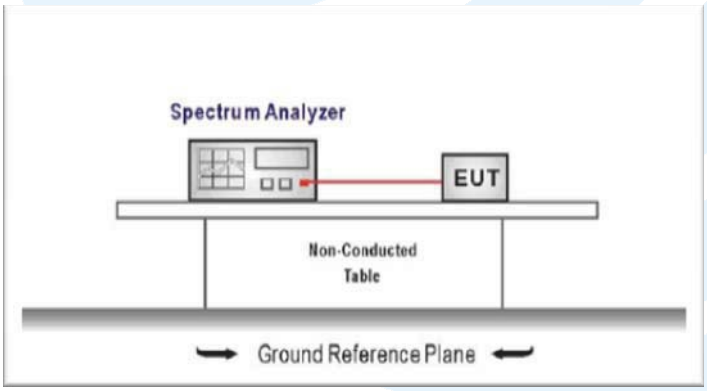
For the 5.47~5.725GHz band:

The peak power spectral density (PSD) shall not exceed the lesser of 11dBm/MHz.
if G_{Tx}>6dBi, then PSD =11-(G_{Tx}-6).

For the 5.725~5.85GHz band:

- Point-to-multipoint systems (P2M)
  The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.
  if G_{Tx}>6dBi, then PSD =30-(G_{Tx}-6).
- Point-to-point systems (P2P)
  The peak power spectral density (PSD) shall not exceed the lesser of 30dBm/500kHz.

TEST CONFIGURATION



TEST PROCEDURE

According KDB 789033 D02 – Section F
1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire emission bandwidth of the signal
3. For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth
   For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz.
4. Set VBW ≥ 3 RBW.Number of sweep points > 2 x (span/RBW)
5. Sweep time = auto
6. Detector = power averaging (RMS)

7. Trigger was set to free run for all modes
8. Trace was averaged over 100 sweeps
9. The peak search function of the spectrum analyzer was used to find the peak of the spectrum.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
I	20	802.11n	CHL	5.35	11.00	Pass
			CHM	6.04		
			CHH	6.69		
		802.11a	CHL	6.26	11.00	Pass
			CHM	6.14		
			CHH	6.36		
	40	802.11n	CHL	0.03	11.00	Pass
			CHH	0.29		

Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
II	20	802.11n	CHL	6.45	11.00	Pass
			CHM	6.48		
			CHH	7.54		
		802.11a	CHL	5.90	11.00	Pass
			CHM	5.48		
			CHH	6.41		
	40	802.11n	CHL	-0.17	11.00	Pass
			CHH	0.07		

Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
III	20	802.11n	CHL	6.16	11.00	Pass
			CHM	6.14		
			CHH	5.85		
		802.11a	CHL	6.29	11.00	Pass
			CHM	6.18		
			CHH	6.26		
	40	802.11n	CHL	-1.17	11.00	Pass
			CHM	-1.55		
			CHH	-1.02		

Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/500KHz)	Limit (dBm/500KHz)	Result
IV	20	802.11n	CHL	4.41	30.00	Pass
			CHM	5.00		
			CHH	3.94		
		802.11a	CHL	3.72	30.00	Pass
			CHM	3.35		
			CHH	3.87		
	40	802.11n	CHL	-2.64	30.00	Pass

			CHH	-2.86		

Band I			
802.11n (HT20)			
CH_L			
CH_M			
CH_H			

802.11a		
CH_L		
CH_M		
CH_H		

802.11n (HT40)			
CH_L			
CH_H			

Band II			
802.11n (HT20)			
CH_L			
CH_M			
CH_H			

802.11a		
CH_L		
CH_M		
CH_H		

802.11n (HT40)			
CH_L			
CH_H			

Band III			
802.11n (HT20)			
CH_L			
CH_M			
CH_H			

802.11a		
CH_L		
CH_M		
CH_H		

802.11n (HT40)			
CH_L			
CH_M			
CH_H			

Band IV			
802.11n (HT20)			
CH_L			
CH_M			
CH_H			

802.11a		
CH_L		
CH_M		
CH_H		

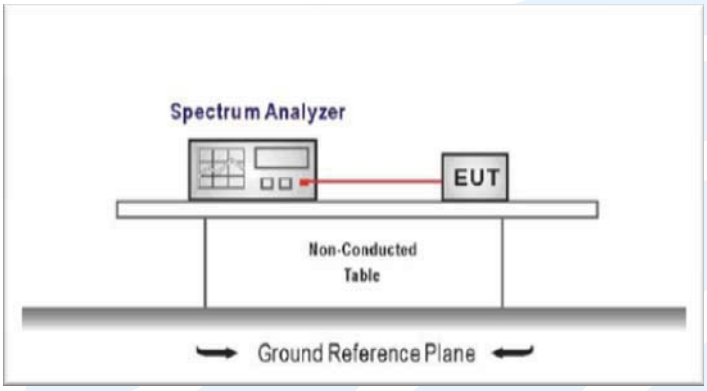
802.11n (HT40)			
CH_L			
CH_H			

5.5. 99% Occupy bandwidth & 26dB bandwidth

LIMIT

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in KDB 789033 D02 , and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

TEST CONFIGURATION



TEST PROCEDURE

According KDB 789033 D02 – Section C
1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth
3. VBW > 3 x RBW
4. Detector = Peak
5. Trace mode = max hold

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwith (MHz)	26dB bandwidth (MHz)	Result
I	20	802.11n	CH_L	16.51	20.71	Pass
			CH_M	17.80	21.29	
			CH_H	17.81	21.45	
		802.11a	CH_L	16.55	21.07	Pass
			CH_M	16.55	21.14	
			CH_H	16.55	21.15	
	40	802.11n	CH_L	36.12	40.62	Pass
			CH_H	36.08	40.55	

Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwith (MHz)	26dB bandwidth (MHz)	Result
II	20	802.11n	CH_L	17.78	21.30	Pass
			CH_M	17.79	21.32	
			CH_H	17.79	21.43	
		802.11a	CH_L	16.51	20.72	Pass
			CH_M	16.51	20.74	
			CH_H	16.50	20.68	
	40	802.11n	CH_L	36.14	40.44	Pass
			CH_H	36.07	40.49	

Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwith (MHz)	26dB bandwidth (MHz)	Result
III	20	802.11n	CH_L	17.81	21.42	Pass
			CH_M	17.78	21.29	
			CH_H	17.81	21.27	
		802.11a	CH_L	16.51	20.84	Pass
			CH_M	16.52	20.78	
			CH_H	16.53	20.82	
	40	802.11n	CH_L	36.06	40.01	Pass
			CH_M	36.15	40.59	
			CH_H	36.17	40.55	

Band I	
99% Occupy bandwith & 26dB bandwidth	802.11n (HT20)
CH_L	
CH_M	
CH_H	

99% Occupy bandwith & 26dB bandwidth	802.11a
CH_L	
CH_M	
CH_H	

99% Occupy bandwith & 26dB bandwidth	802.11n (HT40)
CH_L	
CH_H	

Band II	
99% Occupy bandwith & 26dB bandwidth	**802.11n (HT20)**
CH_L	
CH_M	

CH_H	

Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.320000000 GHz
Center Freq: 5.320000000 GHz
Trig: Free Run
Avg|Hold: 500/500
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 0.5 dB
10 dB/div
Ref 20.50 dBm
Mkr1 5.32129 GHz
-0.57744 dBm
Center Freq
5.320000000 GHz
Center 5.32 GHz
#Res BW 200 kHz
#VBW 1 MHz
Span 30 MHz
Sweep 1 ms
CF Step
3.000000 MHz
Auto
Man
Occupied Bandwidth
17.791 MHz
Total Power
17.1 dBm
Transmit Freq Error
55.100 kHz
OBW Power
99.00 %
x dB Bandwidth
21.43 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

99% Occupy bandwith & 26dB bandwidth	802.11a
CH_L	
CH_M	
CH_H	

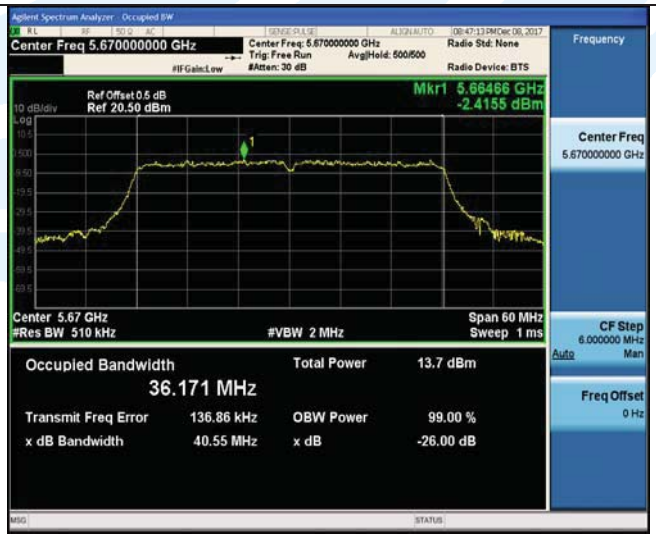
99% Occupy bandwith & 26dB bandwidth	802.11n (HT40)
CH_L	
CH_H	

Band III	
99% Occupy bandwith & 26dB bandwidth	**802.11n (HT20)**
CH_L	
CH_M	

CH_H	

Agilent Spectrum Analyzer - Occupied BW
Center Freq 5.700000000 GHz
Center Freq: 5.700000000 GHz
Trig: Free Run
Avg|Hold: 500/500
#Atten: 30 dB
Radio Std: None
Radio Device: BTS
Frequency
Ref Offset 0.5 dB
10 dB/div
Ref 20.50 dBm
Mkr1 5.69649 GHz
-1.1738 dBm
Center Freq
5.700000000 GHz
Center 5.7 GHz
#Res BW 200 kHz
#VBW 1 MHz
Span 30 MHz
Sweep 1 ms
CF Step
3.000000 MHz
Auto
Man
Occupied Bandwidth
17.807 MHz
Total Power
16.2 dBm
Transmit Freq Error
40.858 kHz
OBW Power
99.00 %
x dB Bandwidth
21.27 MHz
x dB
-26.00 dB
Freq Offset
0 Hz
MSG
STATUS

99% Occupy bandwith & 26dB bandwidth	802.11a
CH_L	
CH_M	
CH_H	

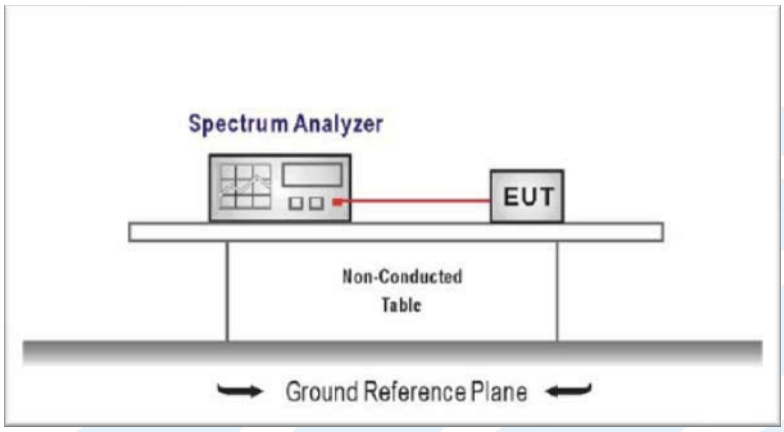
99% Occupy bandwith & 26dB bandwidth	802.11n (HT40)
CH_L	
CH_M	
CH_H	

5.6. 6dB Bandwidth

LIMIT

FCC CFR Title 47 Part 15 Subpart E Section 15.407(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

TEST CONFIGURATION



TEST PROCEDURE

1. Connect the antenna port(s) to the spectrum analyzer input.
2. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
   Center Frequency =DTS channel center frequency
   Span=2 x DTS bandwidth
   RBW = 100 kHz, VBW ≥ 3 × RBW
   Sweep time= auto couple
   Detector = Peak
   Trace mode = max hold
3. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
4. 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, and record the pertinent measurements.

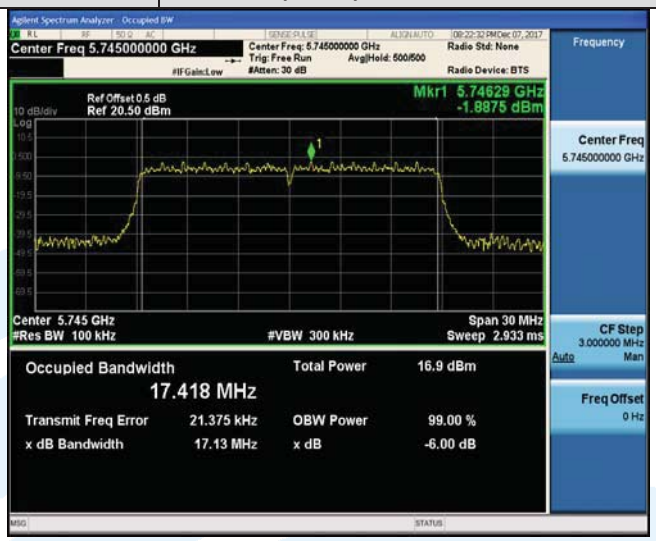
TEST MODE:

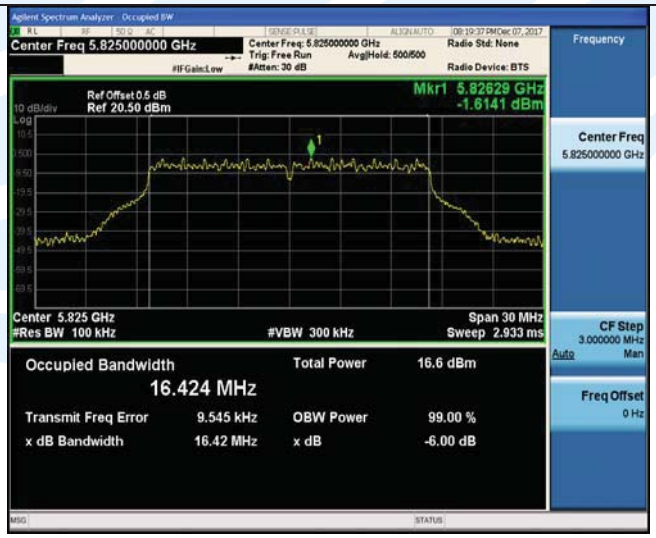
Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwith (MHz)	6dB bandwidth (MHz)	Result
IV	20	802.11n	CH_L	17.42	17.13	Pass
			CH_M	17.68	17.73	
			CH_H	17.69	17.73	
		802.11a	CH_L	16.36	16.42	Pass
			CH_M	16.42	16.43	
			CH_H	16.42	16.42	
	40	802.11n	CH_L	35.90	35.35	Pass
			CH_H	35.87	35.36	

Band IV	
6dB bandwith	**802.11n (HT20)**
CH_L	
CH_M	
CH_H	

6dB bandwith	802.11a
CH_L	
CH_M	
CH_H	

6dB bandwith	802.11n (HT40)
CH_L	
CH_H	

5.7. Radiated Emissions & Band edge

LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209

Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

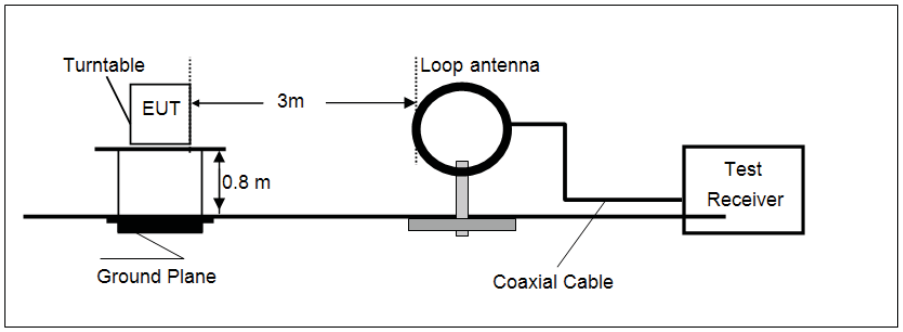
Operating Band	Frequency	EIRP Limit	Value
5150-5250MHz	Above 1GHz	-27dBm/MHz(68.2dBuV/m)@3m	Peak
5250-5350MHz	Above 1GHz	-27dBm/MHz(68.2dBuV/m)@3m	Peak
5470-5725MHz	Above 1GHz	-27dBm/MHz(68.2dBuV/m)@3m	Peak
5725-5850 MHz	1GHz-5.65GHz	-27 dBm/MHz(68.2dBuV/m)@3m	Peak
	5.65GHz-5.7GHz	-27*dBm/MHz to 10dBm/MHz (68.2* dBuV/m to 105.6dBuV/m)	Peak
	5.7GHz-5.72GHz	10*dBm/MHz to 15.6dBm/MHz (105.6*dBuV/m to 110.8dBuV/m)	Peak
	5.72GHz-5.725GHz	15.6*dBm/MHz to 27dBm/MHz (110.8dBuV/m to* 122.2dBuV/m)	Peak
	5.85GHz-5.855GHz	27dBm/MHz to 15.6*dBm/MHz (122.2dBuV/m to110.8* dBuV/m)	Peak
	5.855GHz-5.875GHz	15.6dBm/MHz to 10*dBm/MHz (110.8dBuV/m to 105.6* dBuV/m	Peak
	5.875GHz-5.925GHz	10dBm/MHz to -27*dBm/MHz (105.6dBuV/m to 68.2* dBuV/m)	Peak
	Above 5.925GHz	-27 dBm/MHz(68.2dBuV/m)@3m	Peak

* Increase/Decreases with the linearly of the frequency.

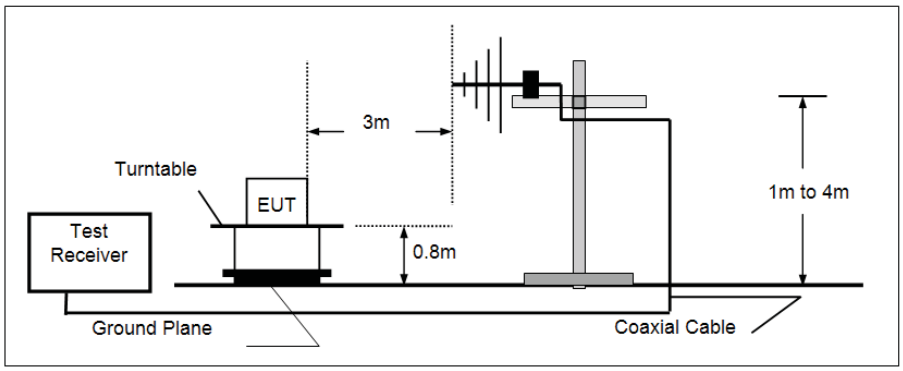
For emission above 1GHz and in restricted band, according to FCC KDB 789033 D02 General UNII Test Procedure, all emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit. E[dBμV/m] = EIRP[dBm] + 95.2, for d = 3 meters.

TEST CONFIGURATION

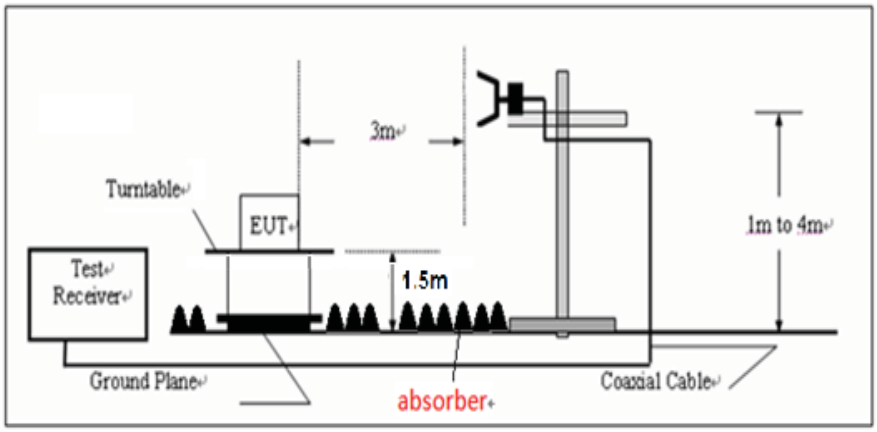
- 9KHz ~30MHz



- 30MHz ~ 1GHz



- Above 1GHz



TEST PROCEDURE

1. The EUT was tested according to ANSI C63.10:2013 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT is placed on a turn table which is 0.8/1.5 meter above ground plane. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. Thisis repeated for both horizontal and vertical polarization of the antenna.
5. Use the following spectrum analyzer settings
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Below 1GHz, RBW=120KHz, VBW=300KHz, Sweep=auto, Detector function=peak, Trace=max hold;
   If the emission level of the EUT measured by the peak detectoris 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
   (3) Above 1GHz, RBW=1MHz, VBW=3MHz Peak detetor for Peak value
   RBW=1MHz, VBW=3MHz RMS detetor for Average value.

Remark: “floor-standing equipment” Where possible, the antenna(s) of the EUT shall be located at a height of 1.5 m above the floor, and the intentional radiator circuitry shall be located within the system at a height of at least 0.8 m above the floor.

TEST RESULTS

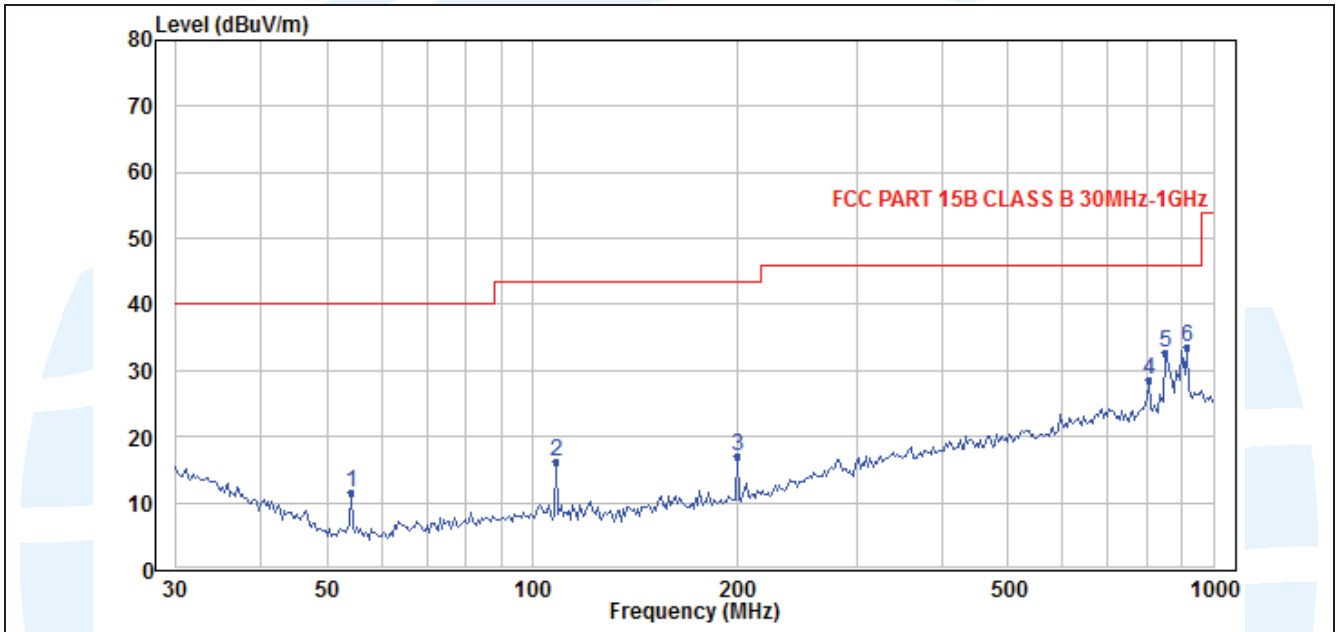
Measurement data:

■ **9kHz ~ 30MHz**

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.
Pre-scan all of the 802.11a/n(HT20) /n(HT40) mode at U-NII band I/II/III and IV. And found 802.11a mode was the worst case at this four bands. So only the worst data was shown on the report.

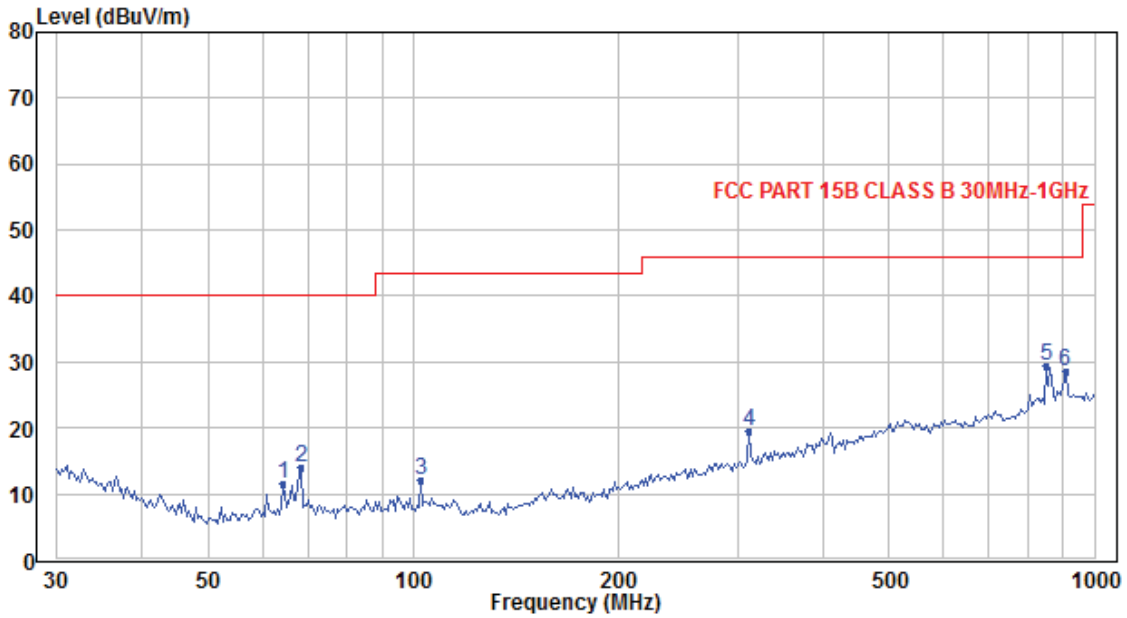
■ **30MHz ~ 1GHz**

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	54.135	31.95	-20.44	11.51	40.00	28.49	QP
2	108.546	34.15	-17.96	16.19	43.50	27.31	QP
3	200.043	32.47	-15.52	16.95	43.50	26.55	QP
4	804.252	29.96	-1.40	28.56	46.00	17.44	QP
5	850.760	34.41	-1.73	32.68	46.00	13.32	QP
6*	912.695	33.68	-0.02	33.66	46.00	12.34	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	64.532	31.32	-19.85	11.47	40.00	28.53	QP
2	68.264	33.88	-19.74	14.14	40.00	25.86	QP
3	102.612	30.85	-18.79	12.06	43.50	31.44	QP
4	311.452	30.63	-11.06	19.57	46.00	26.43	QP
5*	850.760	31.16	-1.84	29.32	46.00	16.68	QP
6	906.304	28.99	-0.31	28.68	46.00	17.32	QP

Remark:Result=Reading+ Correction factor; Margin=Limit –Result

■ **Above 1GHz**

Low channel for 802.11a Band I									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
4022.24	21.85	29.74	8.80	38.06	32.33	74.00	-41.67	Vertical	Peak
7738.21	19.30	36.10	13.09	35.04	43.45	74.00	-30.55	Vertical	Peak
10126.05	20.03	39.13	13.55	34.28	48.43	68.20	-19.77	Vertical	Peak
3065.24	22.00	28.73	7.56	38.22	30.07	68.20	-38.13	Horizontal	Peak
5502.17	19.50	31.90	10.20	36.32	35.28	68.20	-32.92	Horizontal	Peak
11345.12	19.23	40.30	13.43	33.95	49.01	74.00	-24.99	Horizontal	Peak

Middle channel for 802.11a Band I									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3869.11	21.64	29.67	8.60	38.19	31.72	74.00	-42.28	Vertical	Peak
7526.61	19.66	36.13	12.48	34.92	43.35	74.00	-30.65	Vertical	Peak
9686.67	20.37	39.10	13.70	35.39	47.78	68.20	-20.42	Vertical	Peak
3222.10	22.70	28.67	7.75	38.24	30.88	68.20	-37.32	Horizontal	Peak
6233.32	19.53	32.97	11.01	35.29	38.22	68.20	-29.98	Horizontal	Peak
9686.67	20.37	39.10	13.70	35.39	47.78	68.20	-20.42	Horizontal	Peak

High channel for 802.11a Band I									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3405.82	22.05	28.25	7.97	38.54	29.73	68.20	-38.47	Vertical	Peak
6945.12	19.10	34.97	11.78	34.84	41.01	68.20	-27.19	Vertical	Peak
9240.69	20.29	38.84	13.54	35.74	46.93	68.20	-21.27	Vertical	Peak
3763.30	20.84	29.49	8.46	38.24	30.55	74.00	-43.45	Horizontal	Peak
7402.44	19.50	36.30	12.08	34.82	43.06	74.00	-30.94	Horizontal	Peak
11065.53	19.09	40.35	13.54	33.73	49.25	74.00	-24.75	Horizontal	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Low channel for 802.11a Band II									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3550.45	21.09	29.15	8.19	38.34	30.09	68.20	-38.11	Vertical	Peak
6773.96	19.70	34.05	11.57	35.04	40.28	68.20	-27.92	Vertical	Peak
10614.76	18.82	39.94	13.59	33.32	49.03	74.00	-24.97	Vertical	Peak
4158.32	21.18	29.96	8.91	37.75	32.30	74.00	-41.70	Horizontal	Peak
6906.72	19.42	34.74	11.73	34.88	41.01	68.20	-27.19	Horizontal	Peak
11282.38	20.25	40.30	13.46	33.69	50.32	74.00	-23.68	Horizontal	Peak

Middle channel for 802.11a Band II									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3784.23	21.88	29.55	8.48	38.23	31.68	74.00	-42.32	Vertical	Peak
7022.57	19.31	35.37	11.85	34.82	41.71	68.20	-26.49	Vertical	Peak
11219.99	18.73	40.30	13.48	33.44	49.07	74.00	-24.93	Vertical	Peak
3890.62	21.02	29.69	8.63	38.18	31.16	74.00	-42.84	Horizontal	Peak
6736.50	20.19	34.13	11.52	35.11	40.73	68.20	-27.47	Horizontal	Peak
9266.34	19.96	39.00	13.56	35.67	46.85	68.20	-21.35	Horizontal	Peak

High channel for 802.11a Band II									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3377.60	21.52	28.20	7.93	38.51	29.14	68.20	-39.06	Vertical	Peak
6534.15	18.86	34.07	11.24	35.34	38.83	68.20	-29.37	Vertical	Peak
10673.79	20.16	39.91	13.59	33.74	49.92	74.00	-24.08	Vertical	Peak
3901.42	21.35	29.70	8.64	38.17	31.52	74.00	-42.48	Horizontal	Peak
7042.07	19.54	35.43	11.85	34.85	41.97	68.20	-26.23	Horizontal	Peak
10943.48	20.30	40.53	13.57	34.11	50.29	74.00	-23.71	Horizontal	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Low channel for 802.11a Band III									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3340.35	22.01	28.20	7.89	38.45	29.65	68.20	-38.55	Vertical	Peak
7160.20	19.77	35.96	11.86	35.02	42.57	68.20	-25.63	Vertical	Peak
11408.21	18.88	40.29	13.42	34.13	48.46	74.00	-25.54	Vertical	Peak
3491.87	21.63	28.94	8.10	38.42	30.25	68.20	-37.95	Horizontal	Peak
8742.22	21.12	37.82	13.04	34.35	47.63	68.20	-20.57	Horizontal	Peak
11096.25	18.28	40.31	13.53	33.65	48.47	74.00	-25.53	Horizontal	Peak

Middle channel for 802.11a Band III									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
4112.46	20.31	29.91	8.87	37.85	31.24	74.00	-42.76	Vertical	Peak
6680.70	19.96	34.20	11.46	35.21	40.41	68.20	-27.79	Vertical	Peak
10673.79	20.16	39.91	13.59	33.74	49.92	74.00	-24.08	Vertical	Peak
3434.26	21.41	28.48	8.01	38.50	29.40	68.20	-38.80	Horizontal	Peak
8156.78	20.91	36.83	12.67	34.55	45.86	74.00	-28.14	Horizontal	Peak
10182.36	18.74	39.18	13.56	34.79	46.69	68.20	-21.51	Horizontal	Peak

High channel for 802.11a Band III									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
4158.32	21.18	29.96	8.91	37.75	32.30	74.00	-41.70	Vertical	Peak
6925.89	19.65	34.86	11.76	34.86	41.41	68.20	-26.79	Vertical	Peak
10410.73	20.36	39.69	13.59	35.48	48.16	68.20	-20.04	Vertical	Peak
4506.48	20.91	30.71	9.31	37.38	33.55	74.00	-40.45	Horizontal	Peak
7120.61	18.93	35.72	11.86	34.96	41.55	68.20	-26.65	Horizontal	Peak
10792.82	18.69	40.23	13.58	34.58	47.92	74.00	-26.08	Horizontal	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Low channel for 802.11a Band IV									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3742.49	21.61	29.43	8.43	38.24	31.23	74.00	-42.77	Vertical	Peak
6736.50	20.19	34.13	11.52	35.11	40.73	68.20	-27.47	Vertical	Peak
10556.06	19.47	39.97	13.59	33.75	49.28	68.20	-18.92	Vertical	Peak
3721.80	22.19	29.37	8.41	38.25	31.72	74.00	-42.28	Horizontal	Peak
6906.72	19.42	34.74	11.73	34.88	41.01	68.20	-27.19	Horizontal	Peak
10210.63	18.76	39.21	13.56	34.99	46.54	68.20	-21.66	Horizontal	Peak

Middle channel for 802.11a Band IV									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
3966.87	20.49	29.70	8.73	38.13	30.79	74.00	-43.21	Vertical	Peak
6426.35	18.84	33.49	11.04	35.32	38.05	68.20	-30.15	Vertical	Peak
10070.06	19.78	39.10	13.55	33.78	48.65	68.20	-19.55	Vertical	Peak
3711.49	21.65	29.33	8.40	38.25	31.13	74.00	-42.87	Horizontal	Peak
6643.76	20.55	34.20	11.41	35.28	40.88	68.20	-27.32	Horizontal	Peak
10644.23	21.64	39.93	13.59	33.53	51.63	74.00	-22.37	Horizontal	Peak

High channel for 802.11a Band IV									
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Test value
4044.61	21.20	29.79	8.82	38.01	31.80	74.00	-42.20	Vertical	Peak
6588.73	19.93	34.18	11.34	35.36	40.09	68.20	-28.11	Vertical	Peak
11794.15	17.86	39.91	14.13	33.61	48.29	74.00	-25.71	Vertical	Peak
4022.24	21.85	29.74	8.80	38.06	32.33	74.00	-41.67	Horizontal	Peak
7003.13	21.57	35.31	11.85	34.79	43.94	68.20	-24.26	Horizontal	Peak
10973.87	20.39	40.49	13.57	34.00	50.45	74.00	-23.55	Horizontal	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Measuring frequencies from 1 GHz to 40GHz of highest fundamental frequency.*

Bandedge

Band I&II									
Bandwidth:	20MHz		Worst mode:		802.11a		Test channel:		CH_L
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5150.00	16.34	31.70	9.79	0.00	57.83	68.20	-10.37	Horizontal	Peak
5150.00	18.43	31.70	9.79	0.00	59.92	68.20	-8.28	Vertical	Peak
5150.00	8.01	31.70	9.79	0.00	49.50	54.00	-4.50	Horizontal	Average
5150.00	8.33	31.70	9.79	0.00	49.82	54.00	-4.18	Vertical	Average

Bandwidth:	20MHz		Worst mode:		802.11a		Test channel:		CH_H
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5350.00	14.31	31.40	10.06	0.00	55.77	68.20	-12.43	Horizontal	Peak
5350.00	15.99	31.40	10.06	0.00	57.45	68.20	-10.75	Vertical	Peak
5350.00	7.38	31.40	10.06	0.00	48.84	54.00	-5.16	Horizontal	Average
5350.00	7.69	31.40	10.06	0.00	49.15	54.00	-4.85	Vertical	Average

Bandwidth:	40MHz		Worst mode:		802.11n		Test channel:		CH_L
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5150.00	18.68	31.70	9.79	0.00	60.17	68.20	-8.03	Horizontal	Peak
5150.00	18.66	31.70	9.79	0.00	60.15	68.20	-8.05	Vertical	Peak
5150.00	7.02	31.70	9.79	0.00	48.51	54.00	-5.49	Horizontal	Average
5150.00	8.79	31.70	9.79	0.00	50.28	54.00	-3.72	Vertical	Average

Bandwidth:	40MHz	Worst mode:	802.11n	Test channel:	CH_H

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5350.00	19.29	31.40	10.06	0.00	60.75	68.20	-7.45	Horizontal	Peak
5350.00	18.27	31.40	10.06	0.00	59.73	68.20	-8.47	Vertical	Peak
5350.00	8.53	31.40	10.06	0.00	49.99	54.00	-4.01	Horizontal	Average
5350.00	8.44	31.40	10.06	0.00	49.90	54.00	-4.10	Vertical	Average

Band III									
Bandwidth:	20MHz		Worst mode:	802.11a		Test channel:	CH_L		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5460.00	14.34	31.74	10.17	0.00	56.25	68.20	-11.95	Horizontal	Peak
5460.00	15.25	31.74	10.17	0.00	57.16	68.20	-11.04	Vertical	Peak
5460.00	8.07	31.74	10.17	0.00	49.98	54.00	-4.02	Horizontal	Average
5460.00	7.88	31.74	10.17	0.00	49.79	54.00	-4.21	Vertical	Average

Bandwidth:	20MHz		Worst mode:	802.11a		Test channel:	CH_H		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5725.00	14.34	31.73	10.47	0.00	56.54	68.20	-11.66	Horizontal	Peak
5725.00	15.21	31.73	10.47	0.00	57.41	68.20	-10.79	Vertical	Peak
5725.00	7.13	31.73	10.47	0.00	49.33	54.00	-4.67	Horizontal	Average
5725.00	7.25	31.73	10.47	0.00	49.45	54.00	-4.55	Vertical	Average

Bandwidth:	40MHz		Worst mode:	802.11n		Test channel:	CH_L		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5460.00	15.94	31.74	10.17	0.00	57.85	68.20	-10.35	Horizontal	Peak
5460.00	16.88	31.74	10.17	0.00	58.79	68.20	-9.41	Vertical	Peak
5460.00	8.68	31.74	10.17	0.00	50.59	54.00	-3.41	Horizontal	Average
5460.00	8.42	31.74	10.17	0.00	50.33	54.00	-3.67	Vertical	Average

Bandwidth:	40MHz	Worst mode:	802.11n	Test channel:	CH_H

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5725.00	18.08	31.73	10.47	0.00	60.28	68.20	-7.92	Horizontal	Peak
5725.00	18.26	31.73	10.47	0.00	60.46	68.20	-7.74	Vertical	Peak
5725.00	6.87	31.73	10.47	0.00	49.07	54.00	-4.93	Horizontal	Average
5725.00	6.83	31.73	10.47	0.00	49.03	54.00	-4.97	Vertical	Average

Band IV									
Bandwidth:	20MHz		Worst mode:		802.11a		Test channel:	CH_L	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5725.00	17.33	31.73	10.47	0.00	59.53	68.20	-8.67	Horizontal	Peak
5725.00	17.17	31.73	10.47	0.00	59.37	68.20	-8.83	Vertical	Peak
5725.00	8.26	31.73	10.47	0.00	50.46	54.00	-3.54	Horizontal	Average
5725.00	8.05	31.73	10.47	0.00	50.25	54.00	-3.75	Vertical	Average

Bandwidth:	20MHz		Worst mode:		802.11a		Test channel:	CH_H	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5850.00	15.85	32.20	10.61	0.00	58.66	68.20	-9.54	Horizontal	Peak
5850.00	15.43	32.20	10.61	0.00	58.24	68.20	-9.96	Vertical	Peak
5850.00	6.48	32.20	10.61	0.00	49.29	54.00	-4.71	Horizontal	Average
5850.00	6.26	32.20	10.61	0.00	49.07	54.00	-4.93	Vertical	Average

Bandwidth:	40MHz		Worst mode:		802.11n		Test channel:	CH_L	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5725.00	17.68	31.73	10.47	0.00	59.88	68.20	-8.32	Horizontal	Peak
5725.00	17.41	31.73	10.47	0.00	59.61	68.20	-8.59	Vertical	Peak
5725.00	8.15	31.73	10.47	0.00	50.35	54.00	-3.65	Horizontal	Average
5725.00	8.34	31.73	10.47	0.00	50.54	54.00	-3.46	Vertical	Average

Bandwidth:	40MHz		Worst mode:		802.11n		Test channel:	CH_H	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Margin Limit (dB)	Polarization	Detector
5850.00	17.34	32.20	10.61	0.00	60.15	68.20	-8.05	Horizontal	Peak
5850.00	16.98	32.20	10.61	0.00	59.79	68.20	-8.41	Vertical	Peak
5850.00	6.37	32.20	10.61	0.00	49.18	54.00	-4.82	Horizontal	Average
5850.00	6.48	32.20	10.61	0.00	49.29	54.00	-4.71	Vertical	Average

5.8. Dynamic Frequency Selection(DFS)

Requirement

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	Master	Client Without Radar Detection	Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

LIMIT

1. DFS Detection Thresholds

Table 3: DFS Detection Thresholds for Master Devices and Client Devices With Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP ≥ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.
Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.
Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

2. DFS Response Requirements

Table 4: DFS Response Requirement Values

Paramenter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.
Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required facilitating a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.
Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

RADAR TEST WAVEFORMS

This section provides the parameters for required test waveforms, minimum percentage of successful detections, and the minimum number of trials that must be used for determining DFS conformance. Step intervals of 0.1 microsecond for Pulse Width, 1 microsecond for PRI, 1 MHz for chirp width and 1 for the number of pulses will be utilized for the random determination of specific test waveforms.

Table 5 Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{\text{PRI}_{\mu\text{sec}}}\right)\right\}$	60%	30

		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120
Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.					

A minimum of 30 unique waveforms are required for each of the Short Pulse Radar Types 2 through 4. If more than 30 waveforms are used for Short Pulse Radar Types 2 through 4, then each additional waveform must also be unique and not repeated from the previous waveforms. If more than 30 waveforms are used for Short Pulse Radar Type 1, then each additional waveform is generated with Test B and must also be unique and not repeated from the previous waveforms in Tests A or B.

For example if in Short Pulse Radar Type 1 Test B a PRI of 3066 μsec is selected, the number of pulses would be Round up $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{3066}\right)\right\}$ = Round up {17.2} = 18.

Table 5a - Pulse Repetition Intervals Values for Test A

Pulse Repetition Frequency Number	Pulse Repetition Frequency (Pulses Per Second)	Pulse Repetition Interval (Microseconds)
1	1930.5	518
2	1858.7	538
3	1792.1	558
4	1730.1	578
5	1672.2	598
6	1618.1	618
7	1567.4	638
8	1519.8	658
9	1474.9	678
10	1432.7	698
11	1392.8	718
12	1355	738
13	1319.3	758
14	1285.3	778
15	1253.1	798
16	1222.5	818
17	1193.3	838

18	1165.6	858
19	1139	878
20	1113.6	898
21	1089.3	918
22	1066.1	938
23	326.2	3066

Table 6 – Long Pulse Radar Test Waveform

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

The parameters for this waveforms are randomly chosen. Thirty unique waveforms are required for the Long Pulse Radar Type waveforms. If more than 30 waveforms are used for the Long Pulse Radar Type wave forms, then each additional waveform must also be unique and not repeated from the previous waveforms.

Table 7 – Frequency Hopping Radar Test Waveform

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

For the Frequency Hopping Radar Type, the same Burst parameters are used for each wave form. The hopping sequence is different for each wave form and a 100-length segment is selected from the hopping sequence defined by the following algorithm:

The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250–5724MHz.Next,the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until all 475 frequencies are chosen for the set. For selection of a random frequency, the frequencies remaining within the group are always treated as equally likely.

Calibration of Radar Waveform

Radar Waveform Calibration Procedure

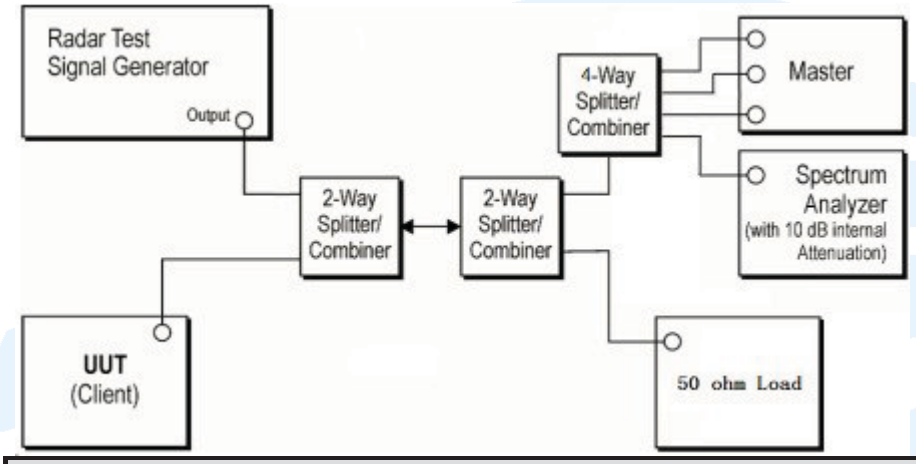
1) A 50 ohm load is connected in place of the spectrum analyzer, and the spectrum analyzer is connected to place of the master
2) The interference Radar Detection Threshold Level is -62dBm + 0dBi +1dB = -61dBm that had been taken into account the output power range and antenna gain.
3) The following equipment setup was used to calibrate the conducted radar waveform. A vector signal generator was utilized to establish the test signal level for radar type 0. During this process there were no transmissions by either the master or client device. The spectrum analyzer was switched to the zero spans (time domain) at the frequency of the radar waveform generator.

Peak detection was used. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) were set to 3

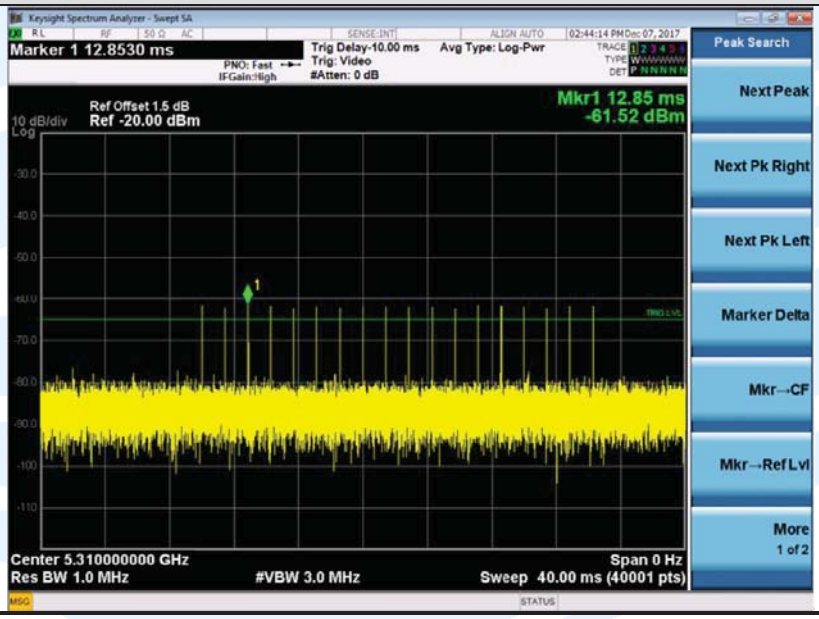
MHz. The spectrum analyzer had offset -1.0dB to compensate RF cable loss 1.0dB.

4) The vector signal generator amplitude was set so that the power level measured at the spectrum analyzer was - -62dBm + 0dBi +1dB = -61dBm. Capture the spectrum analyzer plots on short pulse radar waveform.

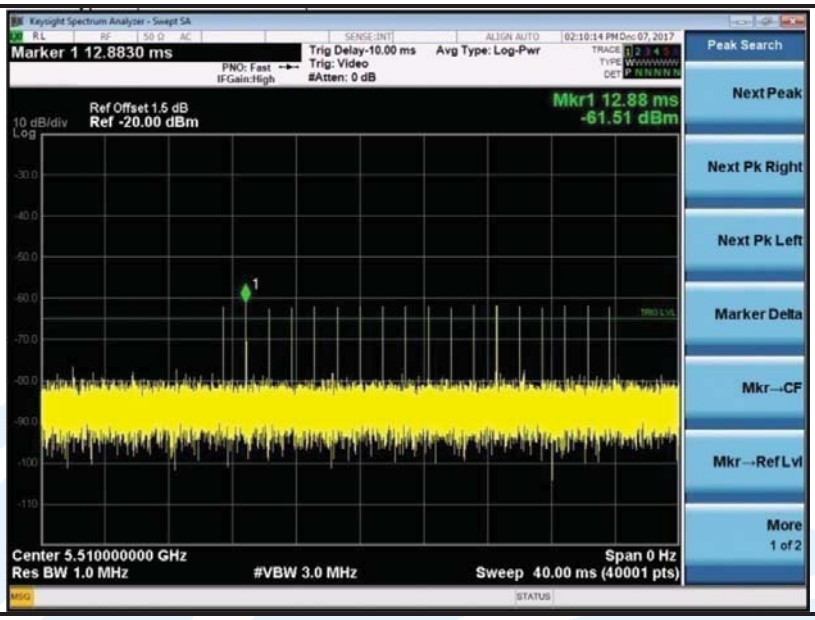
Conducted Calibration Setup



Radar Waveform Calibration Result

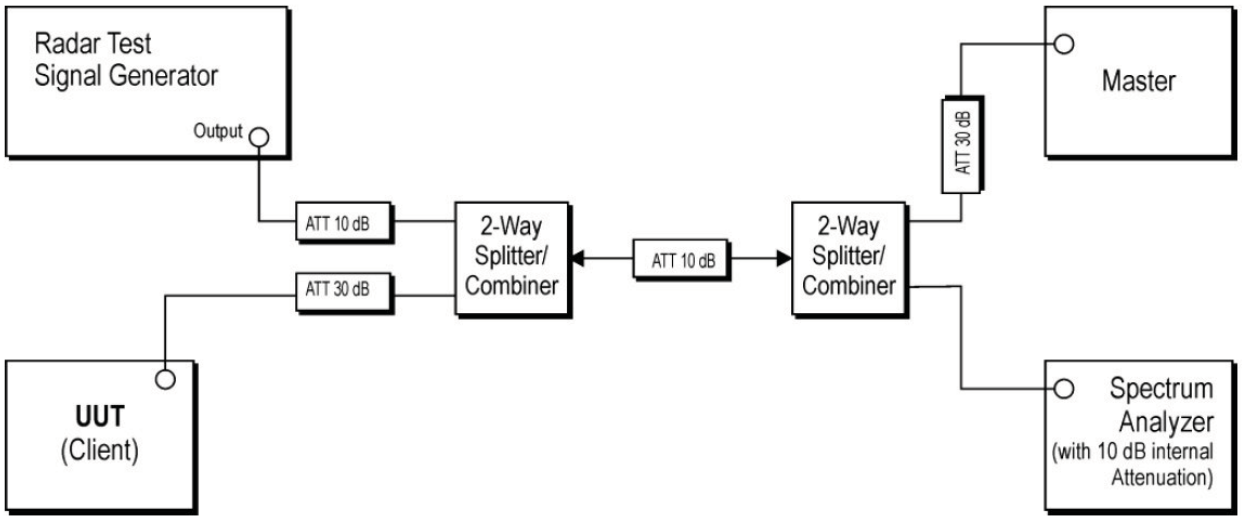
Reference DFS test signal
5310 MHz


5510 MHz


Keysight Spectrum Analyzer - Swept SA
Marker 1 12.8830 ms
PNO: Fast
IFGain:High
Trig Delay-10.00 ms
Trig: Video
#Atten: 0 dB
Avg Type: Log-Pwr
02:10:14 PM Dec 07, 2017
Ref Offset 1.5 dB
10 dB/div
Log
Ref -20.00 dBm
Mkr1 12.88 ms
-61.51 dBm
Center 5.510000000 GHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 40.00 ms (40001 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

TEST CONFIGURATION

Setup for Client with injection at the Master



TEST PROCEDURE

1. The radar pulse generator is setup to provide a pulse at frequency that the master and client are operating. A type 0 radar pulse with a 1us pulse width and a 1428us PRI is used for the testing.
2. The vector signal generator is adjusted to provide the radar burst (18 pulses) at the level of approximately -61dBm at the antenna port of the master device
3. A trigger is provided from the pulse generator to the DFS monitoring system in order to capture the traffic and the occurrence of the radar pulse.
4. EUT will associate with the master at channel. The file “iperf.exe” specified by the FCC is streamed from the PC 2 through the master and the client device to the PC 1 and played in full motion video using Media Player Classic Ver. 6.4.8.6 in order to properly load the network for the entire period of the test.
5. When radar burst with a level equal to the DFS Detection Threshold +1dB is generated on the operating channel of the U-NII device. At time T0 the radar waveform generator sends a burst of pulse of the radar waveform at Detection Threshold +1dB.
6. Observe the transmissions of the EUT at the end of the radar Burst on the Operating Channel Measure and record the transmissions from the UUT during the observation time (Channel Move Time). One 15 seconds plot is reported for the Short Pulse Radar Type 0. The plot for the Short Pulse Radar Types start at the end of the radar burst. The Channel Move Time will be calculated based on the zoom in 600ms plot of the Short Pulse Radar Type
7. Measurement of the aggregate duration of the Channel Closed Transmission Time method. With the spectrum analyzer set to zero span tuned to the center frequency of the EUT operating channel at the radar simulated frequency, peak detection, and max hold, the dwell time per bin is given by: Dwell (0.3ms) =S (12000ms) / B (4000); where Dwell is the dwell time per spectrum analyzer sampling bin, S is sweep time and B is the number of spectrum analyzer sampling bins. An upper bound of the

aggregate duration of the intermittent control signals of Channel Closing Transmission Time is calculated by: C (ms)= N X Dwell (0.3ms); where C is the Closing Time, N is the number of spectrum analyzer sampling bins (intermittent control signals) showing a U-NII transmission and Dwell is the dwell time per bin.

8. Measurement the EUT for more than 30 minutes following the channel move time to verify that no transmission or beacons occur on this channel.

TEST MODE:

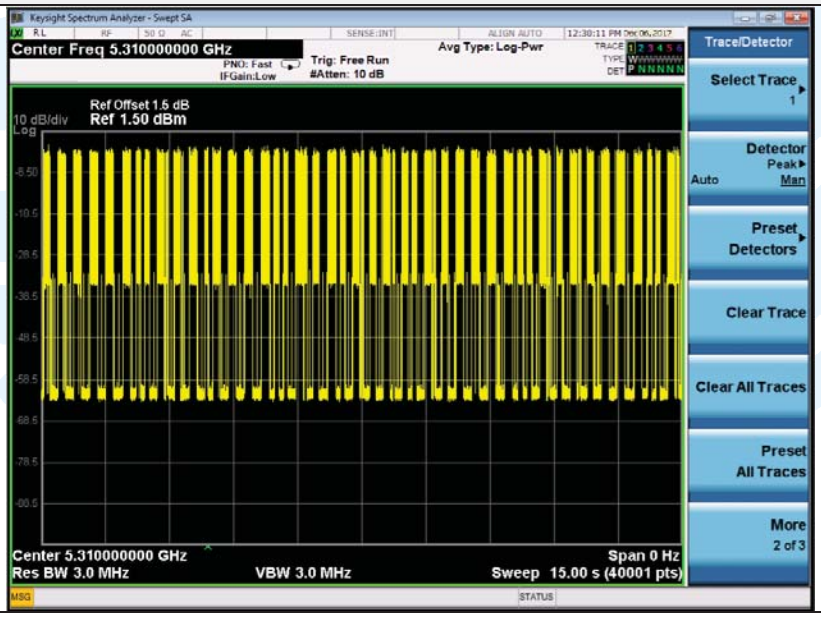
Please refer to the clause 3.3

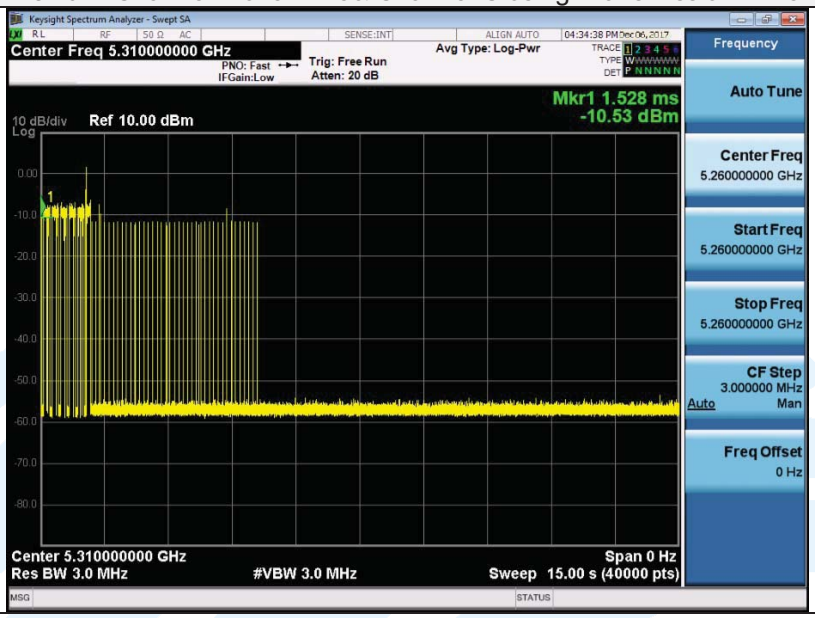
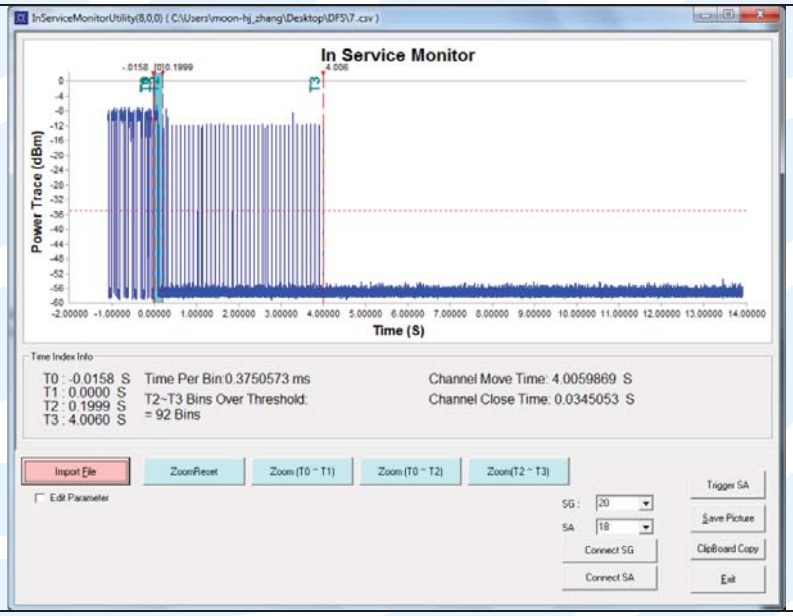
TEST RESULTS

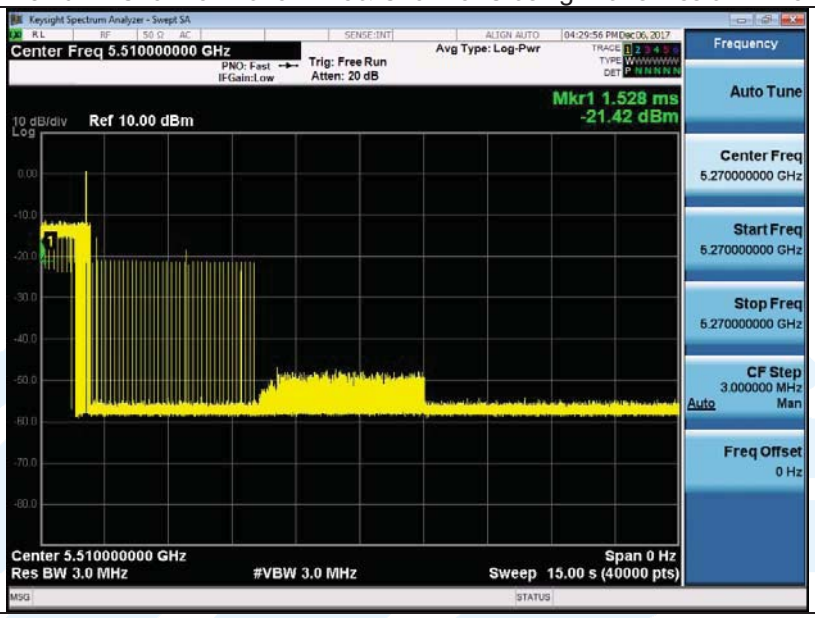
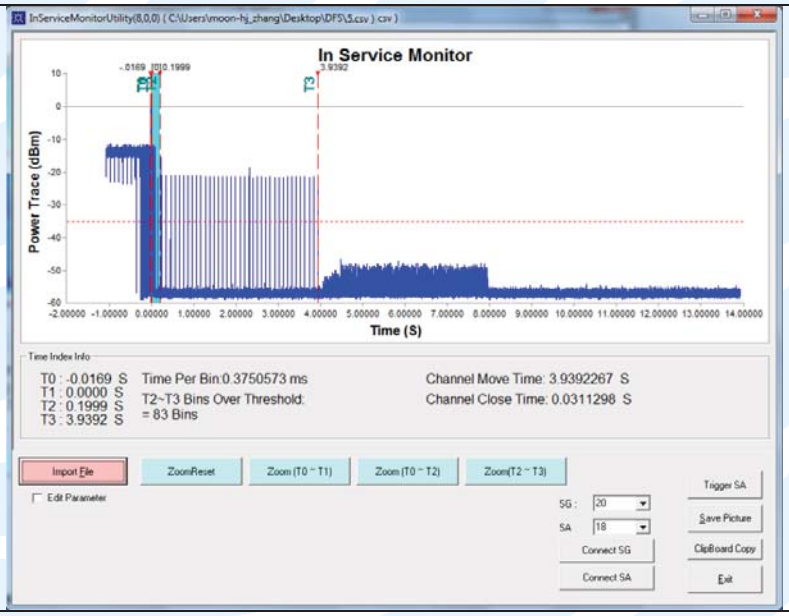
☒ **Passed** ☐ **Not Applicable**

BW/Channel	Test Item	Test Result	Limit	Result
40MHz/5310MHz	Channel Move Time	4.0059869s	＜10s	Pass
	Channel Closing Transmission Time	234.5053ms	＜200+60ms	Pass
40MHz/5510MHz	Channel Move Time	3.9392267S	＜10s	Pass
	Channel Closing Transmission Time	231.1298ms	＜200+60ms	Pass

Data Traffic Plot

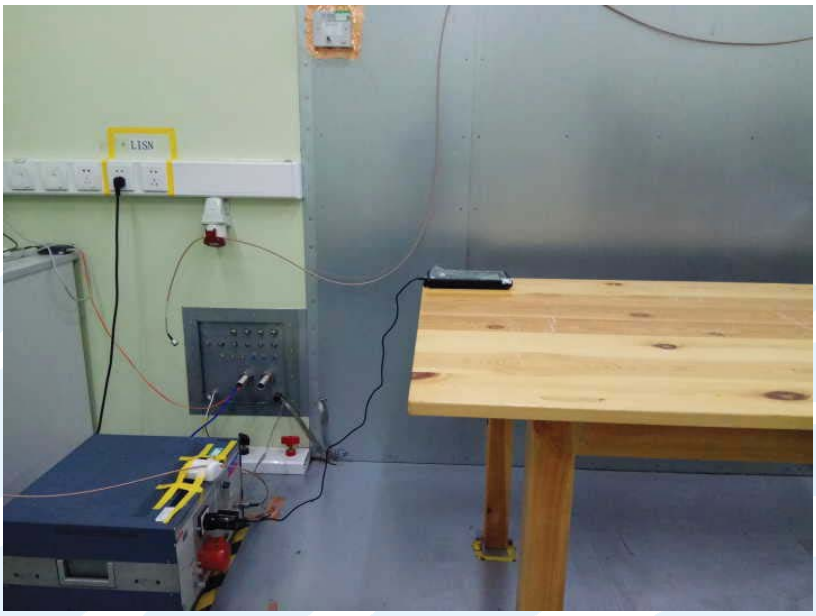


40MHz/5310MHz
Band II Channel Move Time& Channel Closing Transmission Time



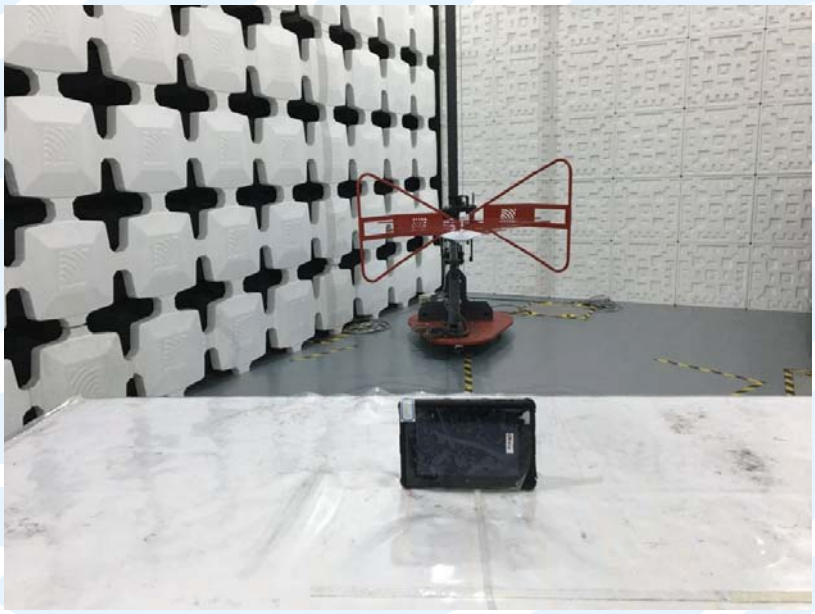
40MHz/5510MHz
Band III Channel Move Time& Channel Closing Transmission Time



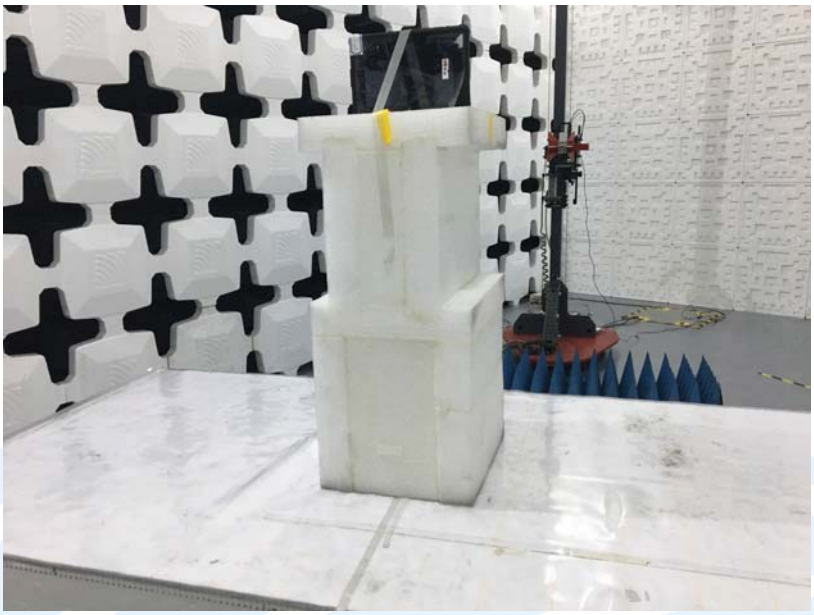
6. Test Setup Photos of the EUT

Conducted Emissions (AC Mains)



Radiated Emissions





7. External and Internal Photos of the EUT

Reference to Test Report No.: TRE1712001101.

----------End of Report----------