

Prüfbericht-Nr.: <i>Test Report No.:</i>	50241451 001	Auftrags-Nr.: <i>Order No.:</i>	238100183	Seite 1 von 140 <i>Page 1 of 140</i>	
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	14-Jan-2019		
Auftraggeber: <i>Client:</i>	Hon Hai Precision Industry Co., Ltd. No. 151, Sec. 1, Nankan Rd., Lujhu Dist., Taoyuan City 33859, Taiwan (R.O.C)				
Prüfgegenstand: <i>Test item:</i>	IEEE 802.11 a/b/g/n/ac 2x2 + BT combo module				
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	WBU042-IG5V, WBU042-IG				
Auftrags-Inhalt: <i>Order content:</i>	FCC Part 15E, FCC Part 2, IC RSS-247 Issue 2, IC RSS-102 Issue 5				
Prüfgrundlage: <i>Test specification:</i>	FCC 47CFR Part 15: Subpart E Section 15.407(UNII) FCC 47CFR Part 2: Subpart J Section 2.1091 RSS-247 Issue 2 Feb 2017 RSS-102 Issue 5 Mar 2015				
Wareneingangsdatum: <i>Date of receipt:</i>	14-Feb-2019				
Prüfmuster-Nr.: <i>Test sample No.:</i>	A000877050-008, 009				
Prüfzeitraum: <i>Testing period:</i>	14-Feb-2019 ~ 10-Jun-2019				
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Laboratory Taipei				
Prüflaboratorium: <i>Testing laboratory:</i>	TUV Rheinland Taiwan Ltd.				
Prüfergebnis*: <i>Test result*:</i>	Pass				
geprüft von / tested by:		kontrolliert von / reviewed by:			
2019-06-11	Mars Y.J. Lin / Project Engineer	2019-06-11	Arvin Ho / Vice General Manager		
Datum <i>Date(Report Date)</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name / Stellung <i>Name / Position</i>	Unterschrift <i>Signature</i>
Sonstiges / Other: WBU042-IG and WBU042-IG5V use the same RF chip and the same PCB layout, the difference between WBU042-IG5V and WBU042-IG is: WBU042-IG5V more WBU042-IG one Regulator.					
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet					
Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested					
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>					

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT

RESULT: *Passed*

5.1.2 DUTY CYCLE

RESULT: *Passed*

5.1.3 MAXIMUM CONDUCTED AVERAGE OUTPUT POWER

RESULT: *Passed*

5.1.4 26dB & 99% BANDWIDTH

RESULT: *Passed*

5.1.5 6dB BANDWIDTH

RESULT: *Passed*

5.1.6 POWER DENSITY

RESULT: *Passed*

5.1.7 FREQUENCY STABILITY MEASUREMENT

RESULT: *Passed*

5.1.8 SPURIOUS EMISSION

RESULT: *Passed*

5.1.9 DYNAMIC FREQUENCY SELECTION

RESULT: *Passed*

5.2.1 MAINS CONDUCTED EMISSIONS

RESULT: *Passed*

6.1.1 ELECTROMAGNETIC FIELDS

RESULT: *Passed*

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1. General Remarks

1.1 Complementary Materials

These attachments are integral parts of this test report:

Appendix P: Photo Documentation internal view
(File Name: 50241451 001APPENDIXP)

Appendix D: Test Result of Radiated Emissions
(File Name: 50241451 001APPENDIXD)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart E Section 15.407
FCC 47CFR Part 2: Subpart J Section 2.1091
ANSI C63.10:2013
KDB789033 D02 General UNII Test Procedures New Rules v02r01
KDB662911 D01 Multiple Transmitter Output v02r01
KDB662911 D02 MIMO with Cross Polarized Antenna v01
KDB447498 D01 General RF Exposure Guidance v06
RSS-247 Issue 2 Feb 2017
RSS-102 Issue 5 Mar 2015
RSS-Gen Issue 5 Apr 2018

1.2 Complementary Materials

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.
Taichung Branch Office

No.9, Lane 36, Minsheng Rd., Sec. 3, Daya District,
Taichung City 428
Taiwan (R.O.C.)

2.2 Test Facility

TUV Rheinland Taiwan Ltd.
Taipei Office

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC RegistrationNo.: 340738
IC Canada Registration No.: 9465A-1
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective periods: 2016-Jul-1st to 2019-Jun-30th



Testing Laboratory
0759

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manu-facturer	Type	S/N	Last Calibration	Next Calibration
Test Software	Farad	EZ_EMG	Ver. TUV3A1	N/A	N/A
Spectrum Analyzer	R&S	FSV 40	100921	2019/05/02	2020/05/02
EXA Signal Analyzer	KEYSIGHT	N9010A	MY52221334	2019/02/05	2020/02/04
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	2018/08/14	2019/08/14
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	2019/01/18	2020/01/18
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM01G18G	60558	2018/11/21	2019/11/21
Bilog Antenna	TESEQ	CBL6111D	29804	2018/08/18	2019/08/18
Horn Antenna	ETS-Lindgren	3117	201918	2018/08/18	2019/08/18
Horn Antenna (18GHz~40GHz)	COM-POWER	AH-840	101029	2018/11/28	2019/11/28
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2018/06/14	2019/06/14
EMI Test Receiver	R&S	ESR 7	101549	2018/11/10	2019/11/10
Spectrum Analyzer	R&S	FSL3	101943	2018/09/07	2019/09/07
LISN (1 phase)	R&S	ENV216	101243	2018/06/18	2019/06/17
LISN	R&S	ENV216	101262	2018/06/22	2019/06/21
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	2019/03/09	2021/03/09

Produkte

Products

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Kind of Equipment	Manu-facturer	Type	S/N	Last Calibration	Next Calibration
Spectrum Analyzer	Agilent	N9010A	MY53470241	2019/06/04	2020/06/03
Test Software	Agilent	301893 testsystem	V2.1.1	N/A	N/A
Power sensor	Agilent	U2021XA	MY54020001	2019/03/31	2020/03/31
Signal Generator	R&S	SMU200	104260	2018/09/06	2019/09/05
EXG-B RF Analog Signal Generator	Agilent	N5171B	MY53050377	2019/04/10	2020/04/09
MXG-B RF Vector Signal Generator	Agilent	N5182B	MY53050524	2019/04/10	2020/04/09
Embedded Attenuator	Keysight	AD211	TW5451121	N/A	N/A

2.4 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.5 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular schedule using in house standards or comparisons.

2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements .

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 0.1 ppm
RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
spurious emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	±3 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a WiFi 802.11 a/b/g/n/ac + Bluetooth 5.0 Combo module. It contains a WiFi 5G compatible module enabling the user to communicate data through a Wireless interface. For details refer to the User Guide, Data Sheet and Block Diagram.

3.2 System Details and Ratings

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	IEEE 802.11 a/b/g/n/ac 2x2 + BT combo module
Type Identification	WBU042-IG5V, WBU042-IG
FCC ID	RX3-WBU042IG
IC ID	2878F-WBU042IG
HVIN	WBU042-IG
Wireless Type	Slave without radar detection

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequencies	Band 1 : 5180 – 5240MHz Band 2 : 5260 – 5320MHz Band 3 : 5500 – 5720MHz Band 4 : 5745 – 5825MHz
Channel Spacing	10 MHz
Channel number	25 for 20MHz bandwidth ; 12 for 40MHz bandwidth ; 6 for 80MHz bandwidth ;
Operation Voltage	5Vdc for WBU042-IG5V 3.3Vdc for WBU042-IG
Modulation	802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM,
Antenna gain	Ant 1: 2.77 dBi Ant 2: 2.86 dBi
Product Type	802.11a: WLAN (2TX , 2RX) 802.11n: WLAN (2TX , 2RX) 802.11ac: WLAN (2TX , 2RX)

Table 6: Channel Frequency Table

Band	Channel	Frequency (MHz)	Bandwidth 20M	Bandwidth 40M	Bandwidth 80M
U-NII-1 (Band 1)	36	5180	V		
	38	5190		V	
	40	5200	V		
	42	5210			V
	44	5220	V		
	46	5230		V	
	48	5240	V		
U-NII-2A (Band 2)	52	5260	V		
	54	5270		V	
	56	5280	V		
	58	5290			V
	60	5300	V		
	62	5310		V	
	64	5320	V		
U-NII-2C (Band 3)	100	5500	V		
	102	5510		V	
	104	5520	V		
	106	5530			V
	108	5540	V		
	110	5550		V	
	112	5560	V		
	116	5580	V		
	118	5590		V	
	120	5600	V		
	122	5610			V
	124	5620	V		
	126	5630		V	
	128	5640	V		
	132	5660	V		
	134	5670		V	
	136	5680	V		
U-NII-2C Straddle Channel	138	5690			V
	142	5710		V	
	144	5720	V		
U-NII-3 (Band 4)	149	5745	V		
	151	5755		V	
	153	5765	V		
	155	5775			V
	157	5785	V		
	159	5795		V	
	161	5805	V		
	165	5825	V		

3.3 Independent Operation Modes

Basic operation modes are:

- A. Transmitting
- B. Normal Link

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Block Diagram.

3.5 Submitted Documents

- Block Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The test modes were adapted accordingly in reference to the instructions for use.

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Table 7: Table for Parameters of Test Software Setting

UNII Band	NCB: 20MHz			NCB: 40MHz		NCB: 80MHz	
	Channel	Mode		Channel	Mode	Channel	Mode
		802.11a Setting	802.11ac Setting		802.11ac Setting		802.11ac Setting
Band 1	36	12	16	38	1A	42	19
	40	11	14	46	1A		
	48	10	15				
Band 2	52	16	19	54	1A	58	1A
	60	15	1A	62	1B		
	64	15	1A				
Band 3	100	14	18	102	18	106	16
	116	14	18	110	17	132 (FCC Only)	17
	140	16	19	134	17		
Straddle CH	144	18	1C	142	1B	138	18
Band 4	149	16	19	151	19	155	18
	157	15	19	159	19		
	165	12	17				

4.2 Test Operation and Test Software

Setup for testing: Test samples are provided with USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software "MT7668 QATool" was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate

The samples were used as follows:
A000877050-008 for Conducted test
A000877050-009 for Radiated test

The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report.

Full test was applied on all test modes, but only worst case was shown

IEEE 802.11a mode:

Band 1 Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with 6Mbps data rate were chosen for full testing.

Band 2 Channel Low (5260MHz), Channel Mid (5300MHz) and Channel High (5320MHz) with 6Mbps data rate were chosen for full testing.

Band 3 Channel Low (5500MHz), Channel Mid (5580MHz) and Channel High (5700MHz) with 6Mbps data rate were chosen for full testing.

Band 4 Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with 6Mbps data rate were chosen for full testing.

Straddle Channel 5720MHz with 6Mbps data rate were chosen for full testing.

IEEE 802.11ac VHT20 mode:

Band 1 Channel Low (5180MHz), Channel Mid (5200MHz) and Channel High (5240MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 2 Channel Low (5260MHz), Channel Mid (5300MHz) and Channel High (5320MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 3 Channel Low (5500MHz), Channel Mid (5580MHz) and Channel High (5700MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 4 Channel Low (5745MHz), Channel Mid (5785MHz) and Channel High (5825MHz) with MCS0/NSS1 data rate were chosen for full testing.

Straddle Channel 5720MHz with MCS0/NSS1 data rate were chosen for full testing.

IEEE 802.11ac VHT40 mode:

Band 1 Channel Low (5190MHz) and Channel High (5230MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 2 Channel Low (5270MHz) and Channel High (5310MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 3 Channel Low (5510MHz), Channel Mid (5550MHz) and Channel High (5670MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 4 Channel Low (5755MHz) and Channel High (5795MHz) with MCS0/NSS1 data rate were chosen for full testing.

Straddle Channel 5710MHz with MCS0/NSS1 data rate were chosen for full testing.

IEEE 802.11ac VHT80 mode:

Band 1 Channel Low (5120MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 2 Channel Low (5290MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 3 Channel Low (5530MHz) and Channel High (5610MHz) with MCS0/NSS1 data rate were chosen for full testing.

Band 4 Channel Low (5775MHz) with MCS0/NSS1 data rate were chosen for full testing.

Straddle Channel 5690MHz with MCS0/NSS1 data rate were chosen for full testing.

For ISED test, the channel 5610MHz don't use.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

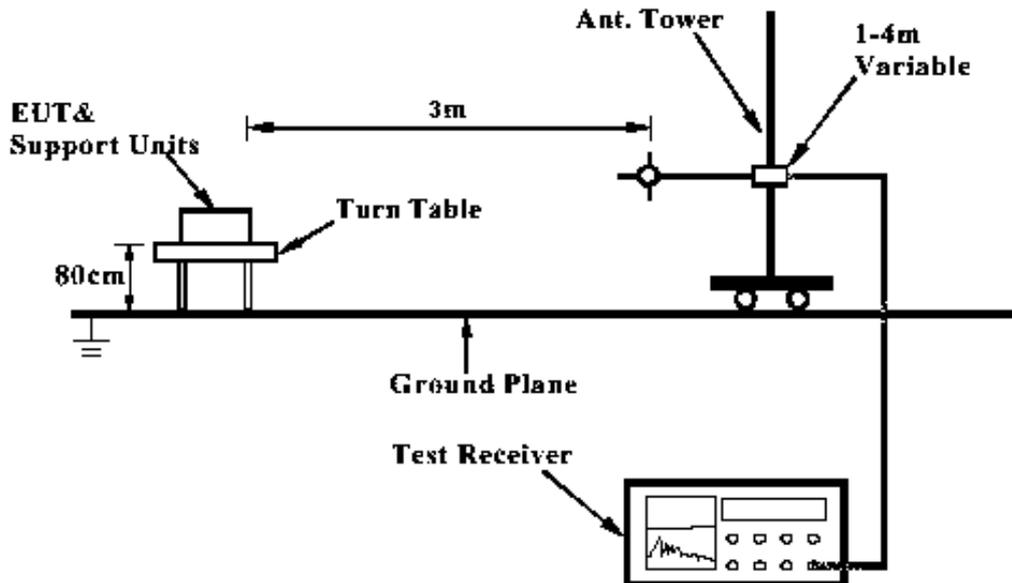
Kind of Equipment	Manufacturer	Model Name	S/N
Notebook(EMC-05)	Lenovo	TP00048A	PB-0F8B2
Smart WiFi Router	NETGEAR	AC2600	4H75745800509

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)

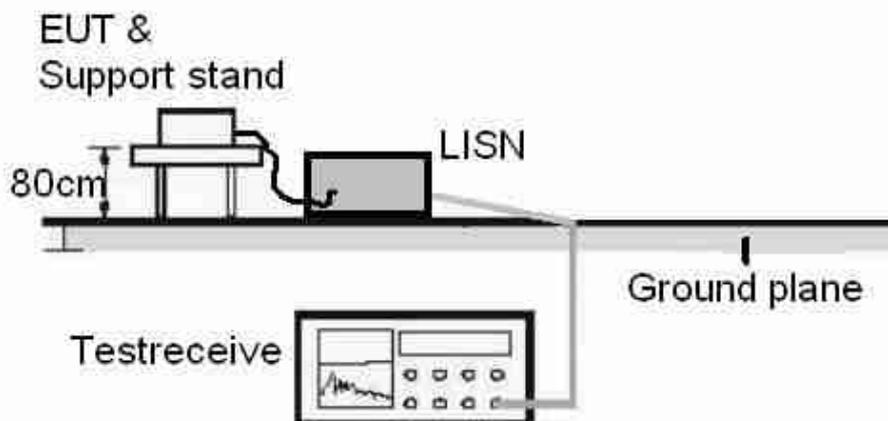
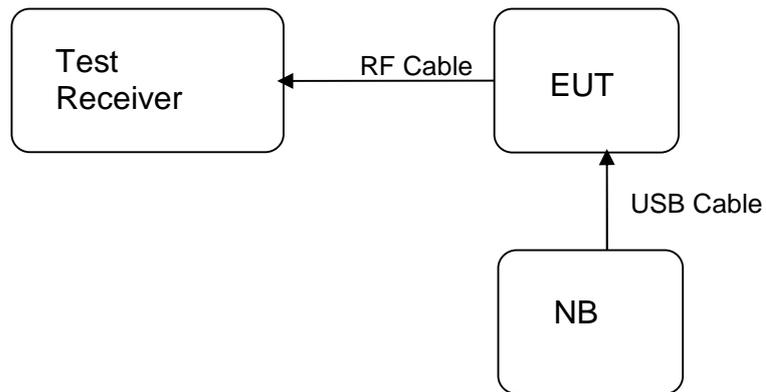
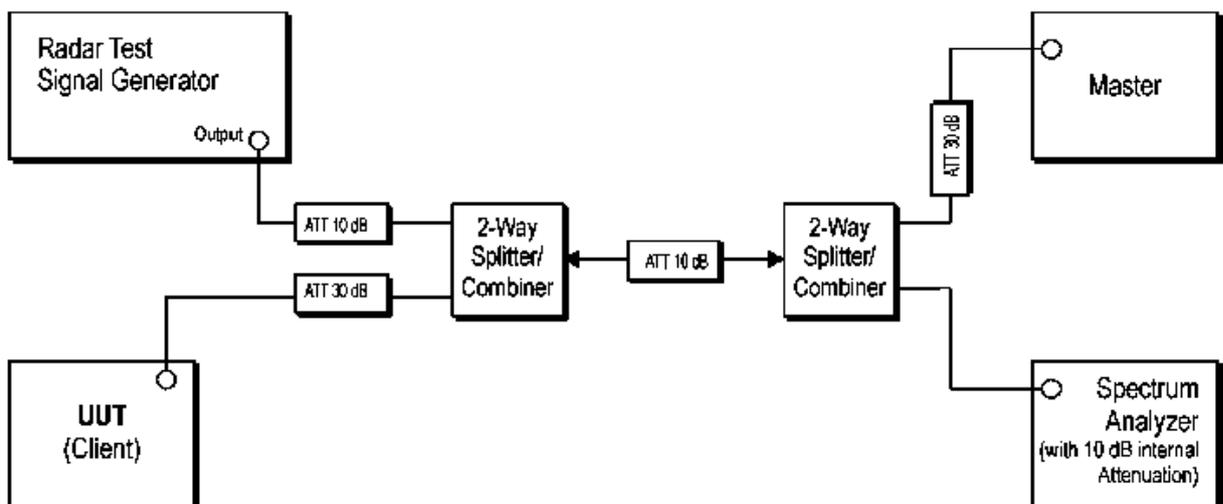


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement

Diagram of Measurement Configuration for DFS Test


5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Test standard : FCC Part 15.407(a), Part 15.203 and RSS-Gen
6.8

Requirement : use of approved antennas only with directional gains that
do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 5.83 dBi. The antenna is a Pifa Antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

5.1.2 Duty Cycle

RESULT:
Passed

Test standard : KDB 789033 Zero-Span Spectrum Analyzer Method
 Limit : None; for reporting purposes only
 Kind of test site : Shielded room / Conducted room

Test setup

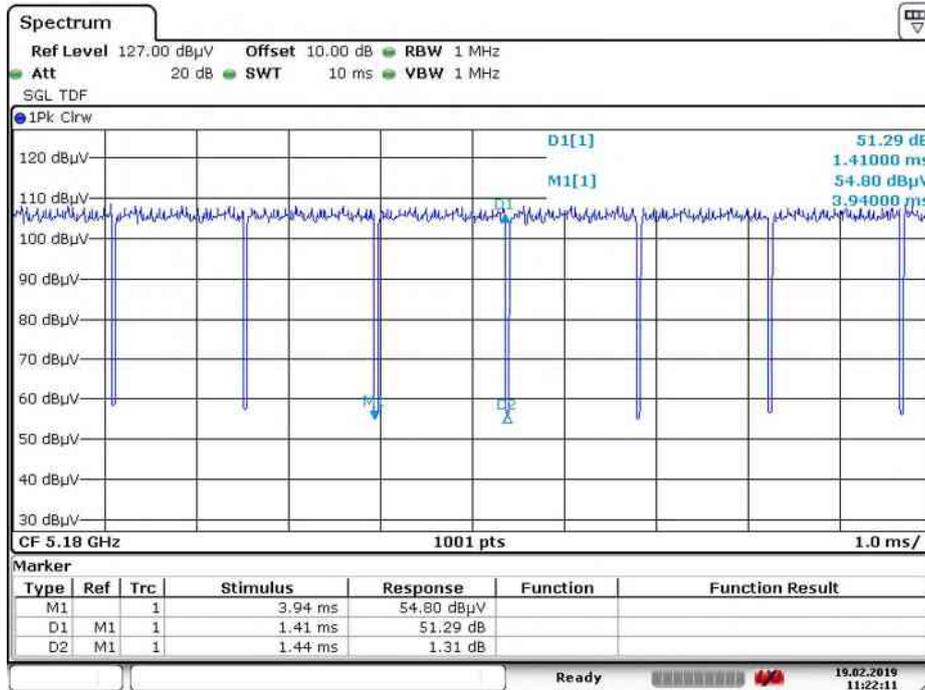
Operation Mode : A

Table 8: Test result of Duty Cycle

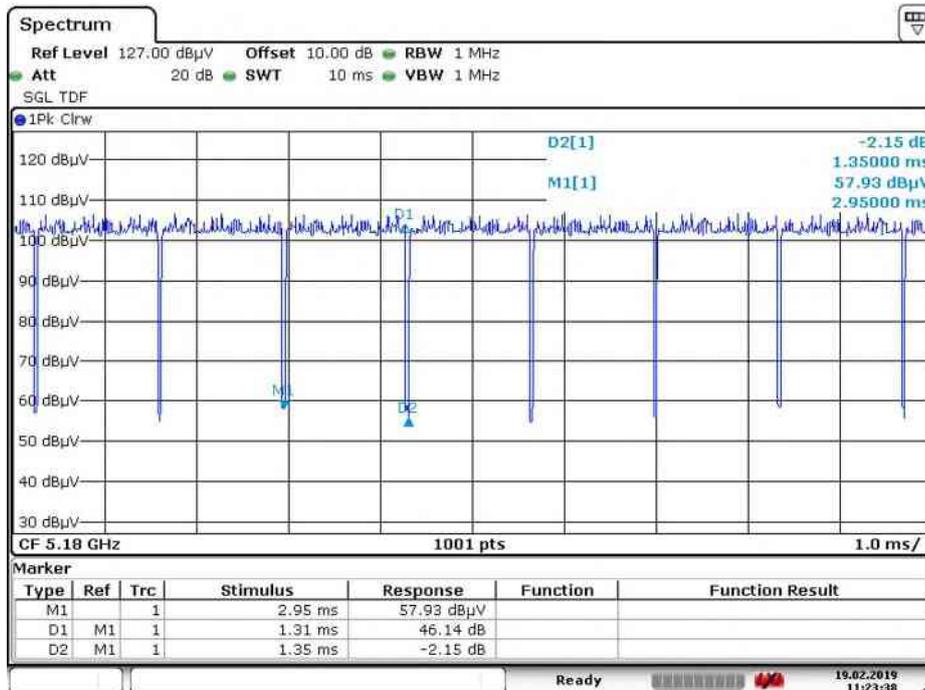
Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	1.410	1.440	97.92	0.09
802.11ac VHT20	1.310	1.350	97.04	0.13
802.11ac VHT40	0.660	0.690	95.65	0.19
802.11ac VHT80	0.330	0.370	89.19	0.50

The duty factor is $10\log(1 / (\text{Duty Cycle}(\%) / 100))$.

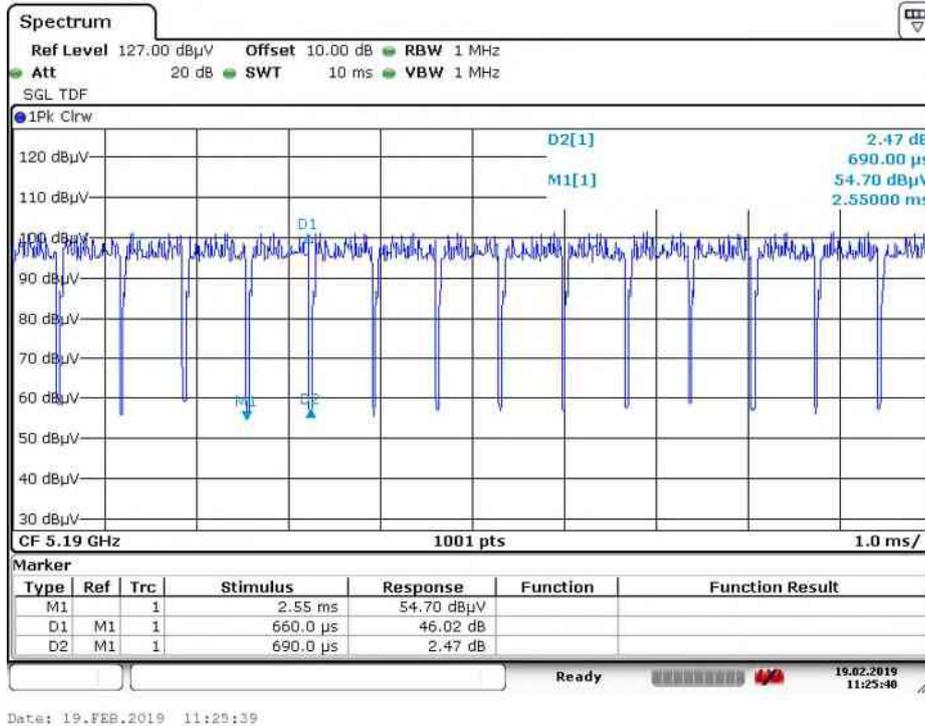
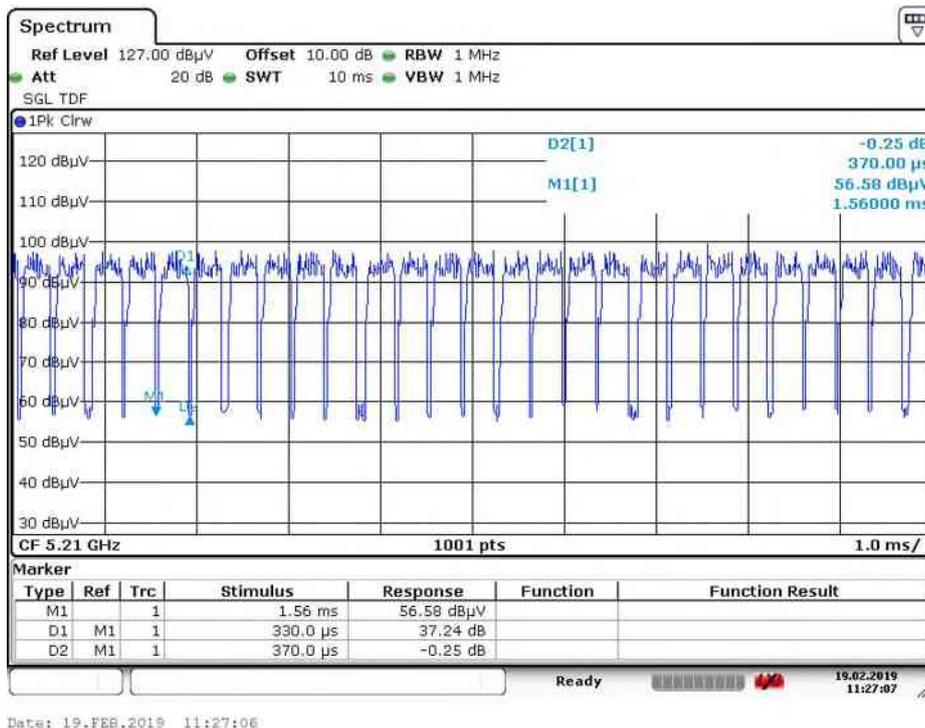
Test Plot of Duty Cycle

802.11a


Date: 19.FEB.2019 11:22:11

802.11ac VHT20


Date: 19.FEB.2019 11:23:38

802.11ac VHT40

802.11ac VHT80


5.1.3 Maximum Conducted Average Output Power

RESULT:**Passed**

Test standard : FCC Part 15.407(a), RSS-247 6.2
Basic standard : ANSI C63.10:2013
Kind of test site : Shielded room

Test setup

Test Channel : Refer to the Table 7
Operation Mode : A

Ambient temperature : 20-24 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

FCC Limit

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

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 26 dB 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.

ISED Limit

For the 5.15-5.25GHz, the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10}B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz.

For the 5.25-5.35 GHz, the maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10}B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz.

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10}B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

For the band 5.47-5.6GHz and 5.65-5.725GHz, the maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10}B$, dBm, whichever is less.

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10}B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

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

Table 9: FCC Test result of Average Output Power

Mode	Channel Frequency (MHz)	Average Output Power			Limit (dBm)
		Ant 1 (dBm)	Ant 2 (dBm)	Total (dBm)	
802.11a	5180	10.98	10.36	13.69	24.00
	5200	10.99	10.01	13.54	24.00
	5240	10.96	10.37	13.69	24.00
	5260	13.98	13.84	16.92	23.81
	5300	13.99	13.74	16.88	23.84
	5320	13.83	13.77	16.81	23.96
	5500	13.88	13.26	16.59	23.85
	5580	13.96	13.34	16.67	24.00
	5700	13.94	13.85	16.91	23.95
	5720 (U-NII-2C)	14.00	13.49	16.76	23.37
	5720 (U-NII-3)	5.96	5.59	8.79	30.00
	5745	13.98	13.78	16.89	30.00
	5785	13.98	13.62	16.81	30.00
	5825	13.94	13.24	16.61	30.00
802.11ac VHT20	5180	10.84	10.36	13.62	24.00
	5200	10.99	9.54	13.34	24.00
	5240	10.97	10.12	13.58	24.00
	5260	13.84	13.37	16.62	24.00
	5300	13.94	13.56	16.76	24.00
	5320	13.99	13.30	16.67	24.00
	5500	13.98	13.21	16.62	24.00
	5580	13.99	13.23	16.64	24.00
	5700	13.89	13.51	16.71	23.98
	5720 (U-NII-2C)	13.86	13.42	16.66	22.97
	5720 (U-NII-3)	6.40	6.18	9.30	30.00
	5745	13.85	13.38	16.63	30.00
	5785	13.86	13.29	16.59	30.00
	5825	13.98	13.54	16.78	30.00
802.11ac VHT40	5190	13.99	13.36	16.70	24.00
	5230	13.98	13.48	16.75	24.00
	5270	13.93	13.24	16.61	24.00
	5310	13.99	13.23	16.64	24.00
	5510	13.98	12.92	16.49	24.00
	5550	13.84	12.81	16.37	24.00
	5670	13.86	12.73	16.34	24.00
	5710 (U-NII-2C)	13.74	13.10	16.44	24.00
	5710 (U-NII-3)	1.48	0.93	4.22	30.00
	5755	13.98	13.26	16.65	30.00
5795	13.94	13.24	16.61	30.00	

Produkte
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Mode	Channel Frequency (MHz)	Conducted Average Output Power			Limit (dBm)
		Ant 1 (dBm)	Ant 2 (dBm)	Total (dBm)	
802.11ac VHT80	5210	12.98	12.84	15.92	24.00
	5290	12.96	12.15	15.58	24.00
	5530	12.93	11.68	15.36	24.00
	5610	12.84	11.52	15.24	24.00
	5690 (U-NII-2C)	12.79	11.24	16.44	24.00
	5690 (U-NII-3)	-3.20	-4.04	-0.59	30.00
	5775	12.98	12.39	15.71	30.00

For 802.11a 5260MHz, the power limit is using $11 \text{ dBm} + 10 \log B$, where B is the 19.09MHz, So, the limit equal $11+10\log(19.09)$, equal 23.81dBm.

For 802.11a 5300MHz, the power limit is using $11 \text{ dBm} + 10 \log B$, where B is the 19.23MHz, So, the limit equal $11+10\log(19.09)$, equal 23.84dBm.

For 802.11a 5320MHz, the power limit is using $11 \text{ dBm} + 10 \log B$, where B is the 19.76MHz, So, the limit equal $11+10\log(19.09)$, equal 23.96dBm.

For 802.11a 5500MHz, the power limit is using $11 \text{ dBm} + 10 \log B$, where B is the 19.27MHz, So, the limit equal $11+10\log(19.09)$, equal 23.85dBm.

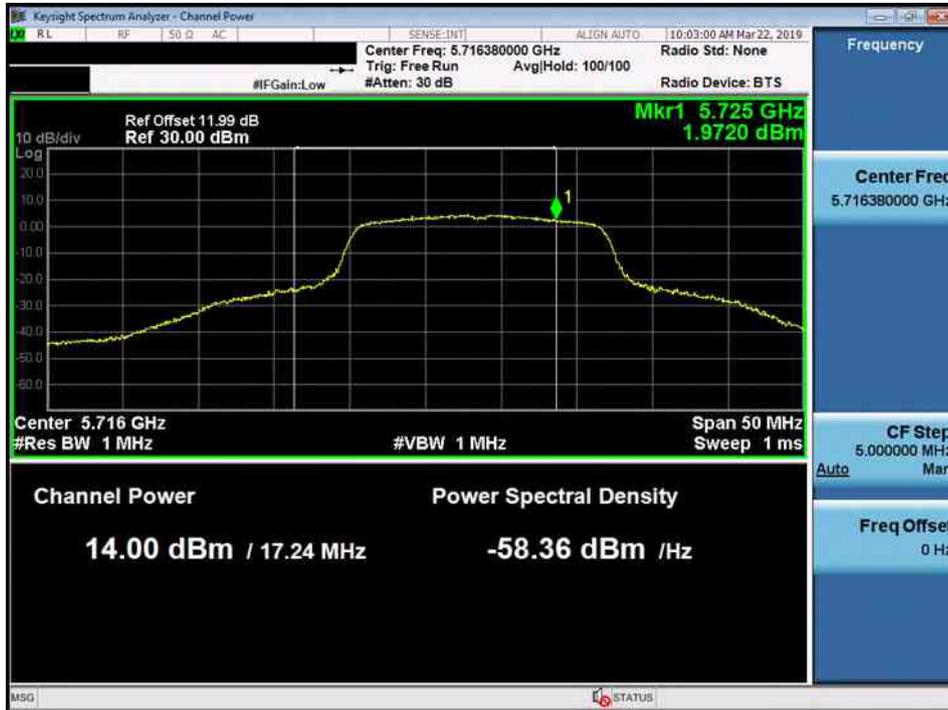
For 802.11a 5700MHz, the power limit is using $11 \text{ dBm} + 10 \log B$, where B is the 19.71MHz, So, the limit equal $11+10\log(19.09)$, equal 23.95dBm.

For 802.11a 5720MHz, the power limit is using $11 \text{ dBm} + 10 \log B$, where B is the 17.24MHz, So, the limit equal $11+10\log(19.09)$, equal 23.37dBm.

For 802.11ac VHT20 5700MHz, the power limit is using $11 \text{ dBm} + 10 \log B$, where B is the 19.86MHz, So, the limit equal $11+10\log(19.09)$, equal 23.98dBm.

For 802.11ac VHT20 5720MHz, the power limit is using $11 \text{ dBm} + 10 \log B$, where B is the 15.74MHz, So, the limit equal $11+10\log(19.09)$, equal 22.97dBm.

Test Plot of FCC Straddle Channel Power

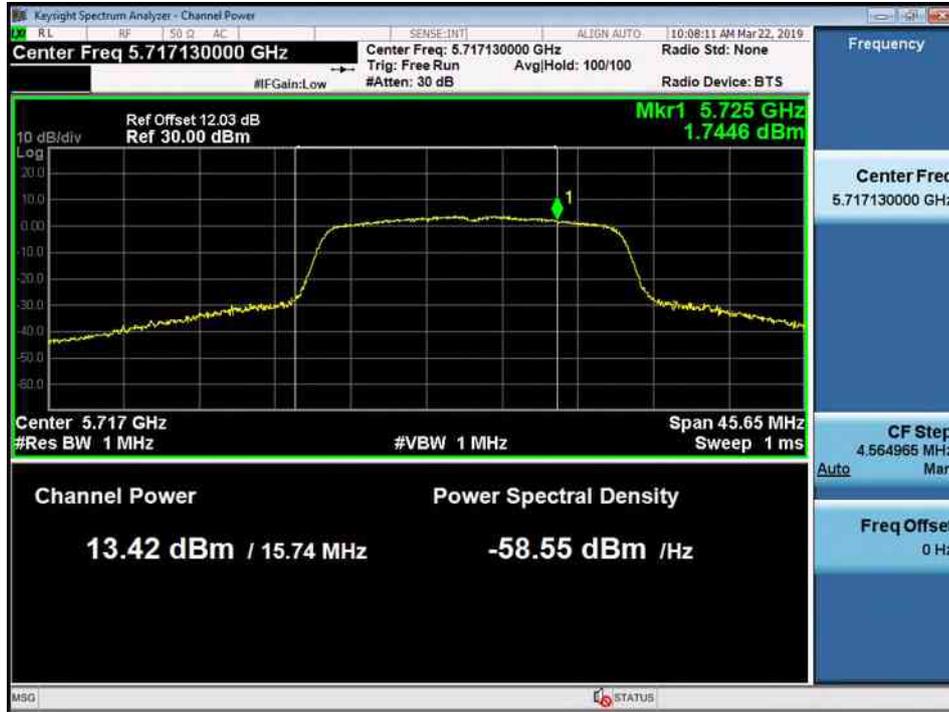
802.11a 5720MHz U-NII-2C Ant 1

802.11a 5720MHz U-NII-3 Ant1

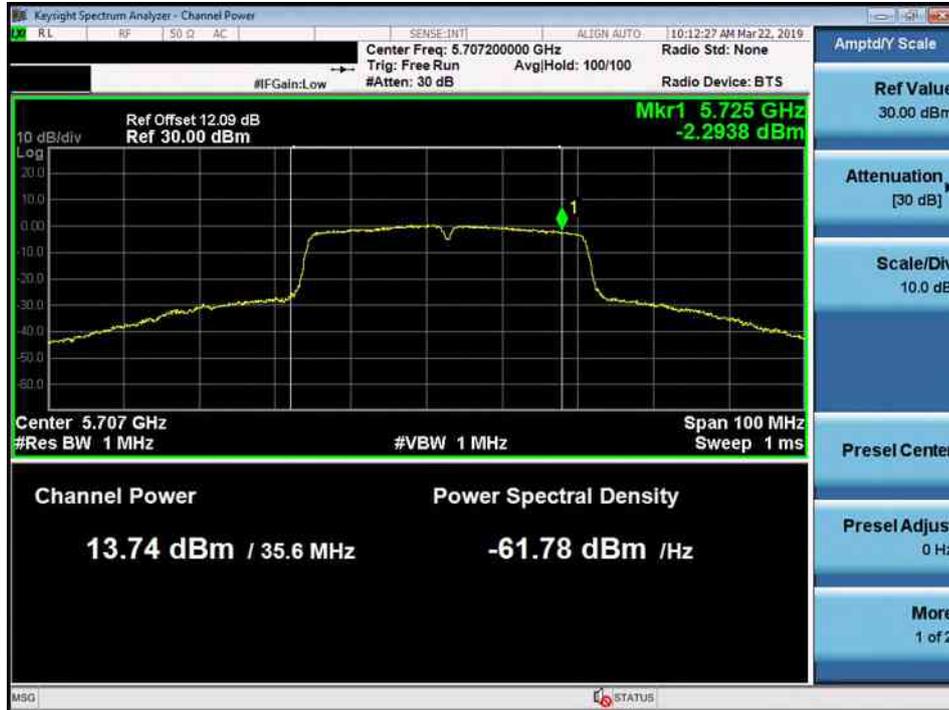

802.11a 5720MHz U-NII-2C Ant 2

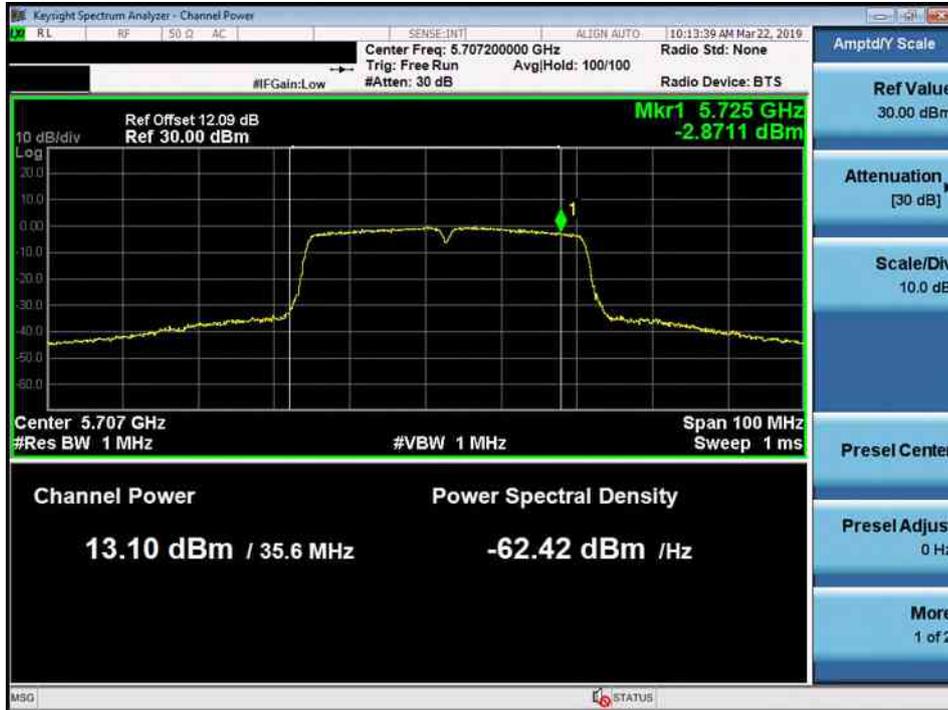
802.11a 5720MHz U-NII-3 Ant2

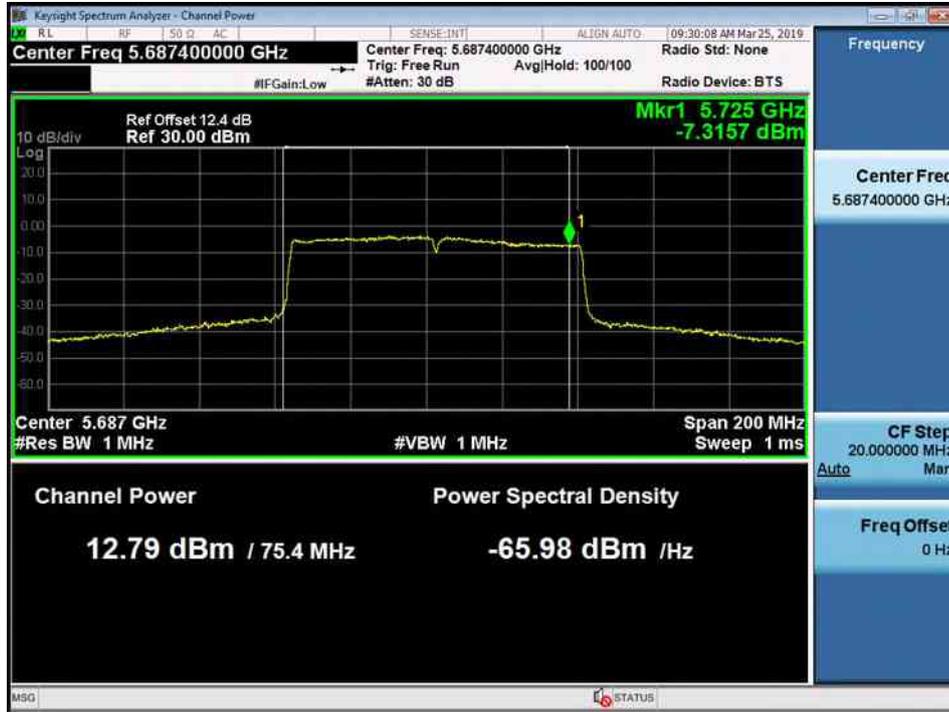
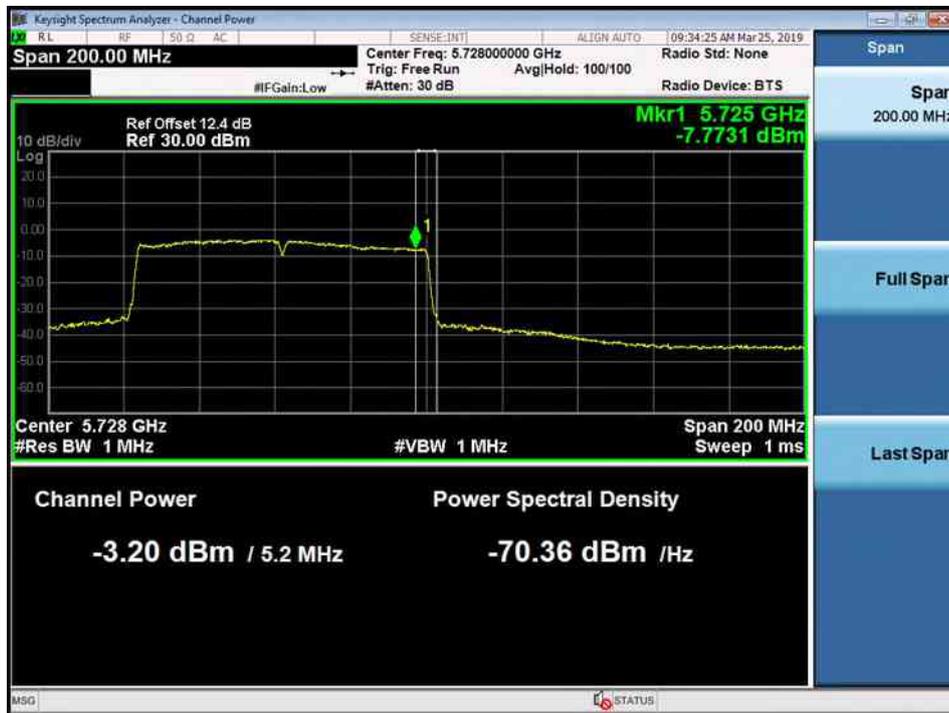

802.11ac VHT20 5720MHz U-NII-2C Ant 1

802.11ac VHT20 5720MHz U-NII-3 Ant1


802.11ac VHT20 5720MHz U-NII-2C Ant 2

802.11ac VHT20 5720MHz U-NII-3 Ant2


802.11ac VHT40 5710MHz U-NII-2C Ant 1

802.11ac VHT40 5710MHz U-NII-3 Ant1


802.11ac VHT40 5710MHz U-NII-2C Ant 2

802.11ac VHT40 5710MHz U-NII-3 Ant2


802.11ac VHT80 5690MHz U-NII-2C Ant 1

802.11ac VHT80 5690MHz U-NII-3 Ant1


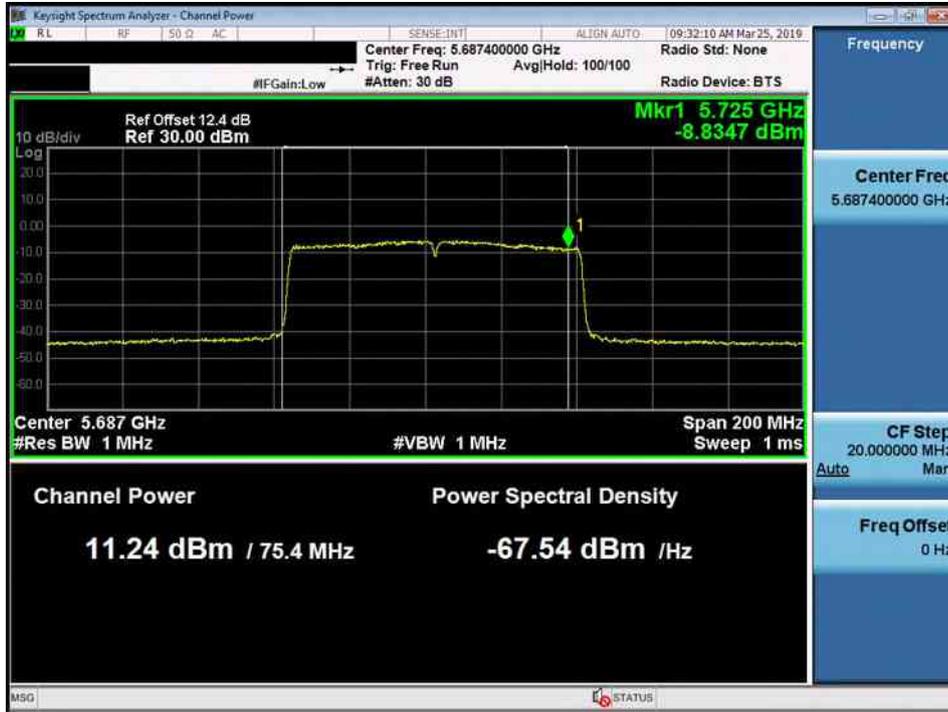
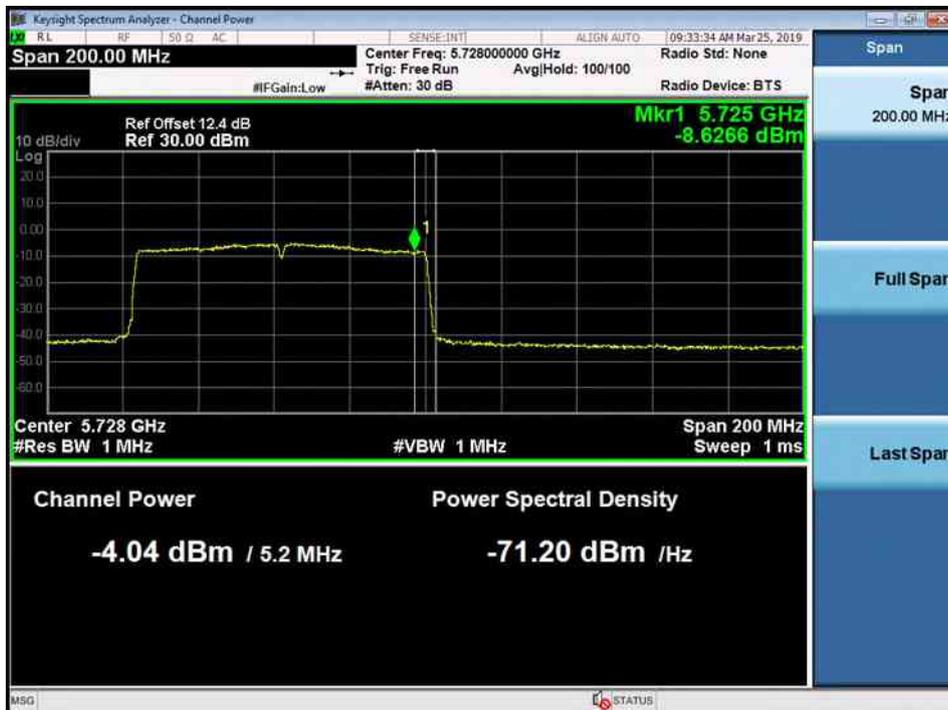
802.11ac VHT80 5690MHz U-NII-2C Ant 2

802.11ac 5690MHz U-NII-3 Ant2


Table 10: ISED Test result of Average Output Power

Mode	Channel Frequency (MHz)	Conducted Average Output Power			Conducted Limit (dBm)	EIRP Power (dBm)	EIRP Limit (dBm)
		Ant 1 (dBm)	Ant 2 (dBm)	Total (dBm)			
802.11a	5180	10.98	10.36	13.69	-	16.55	22.27
	5200	10.99	10.01	13.54	-	16.40	21.98
	5240	10.96	10.37	13.69	-	16.55	22.27
	5260	13.98	13.84	13.98	22.90	19.78	28.90
	5300	13.99	13.74	13.99	23.16	19.74	29.16
	5320	13.83	13.77	13.83	23.25	19.67	29.25
	5500	13.88	13.26	13.88	23.07	19.45	29.07
	5580	13.96	13.34	13.96	23.27	19.53	29.27
	5700	13.94	13.85	13.94	23.01	19.77	29.01
	5720 (U-NII-2C)	14.00	13.49	16.76	22.35	19.62	28.35
	5720 (U-NII-3)	5.96	5.59	8.79	30.00	-	-
	5745	13.98	13.78	16.89	30.00	-	-
	5785	13.98	13.62	16.81	30.00	-	-
	5825	13.94	13.24	16.61	30.00	-	-
802.11ac VHT20	5180	10.84	10.36	13.62	-	16.48	22.46
	5200	10.99	9.54	13.34	-	16.20	22.31
	5240	10.97	10.12	13.58	-	16.44	22.49
	5260	13.84	13.37	16.62	23.49	19.48	29.49
	5300	13.94	13.56	16.76	23.44	19.62	29.44
	5320	13.99	13.30	16.67	23.43	19.53	29.43
	5500	13.98	13.21	16.62	23.38	19.48	29.38
	5580	13.99	13.23	16.64	23.42	19.50	29.42
	5700	13.89	13.51	16.71	23.34	19.57	29.34
	5720 (U-NII-2C)	13.86	13.42	16.66	22.52	19.52	28.52
	5720 (U-NII-3)	6.40	6.18	9.30	30.00	-	-
	5745	13.85	13.38	16.63	30.00	-	-
	5785	13.86	13.29	16.59	30.00	-	-
	5825	13.98	13.54	16.78	30.00	-	-
802.11ac VHT40	5190	13.99	13.36	16.70	-	19.56	23.00
	5230	13.98	13.48	16.75	-	19.61	23.00
	5270	13.93	13.24	16.61	24.00	19.47	30.00
	5310	13.99	13.23	16.64	24.00	19.50	30.00
	5510	13.98	12.92	16.49	24.00	19.35	30.00
	5550	13.84	12.81	16.37	24.00	19.23	30.00
	5670	13.86	12.73	16.34	24.00	19.20	30.00
	5710 (U-NII-2C)	13.74	13.10	16.44	24.00	19.30	30.00
	5710 (U-NII-3)	1.48	0.93	3.90	30.00	-	-
	5755	13.98	13.26	16.65	30.00	-	-
	5795	13.94	13.24	16.61	30.00	-	-

Mode	Channel Frequency (MHz)	Conducted Average Output Power			Conducted Limit (dBm)	EIRP Power (dBm)	EIRP Limit (dBm)
		Ant 1 (dBm)	Ant 2 (dBm)	Total (dBm)			
802.11ac VHT80	5210	12.98	12.84	15.92	-	18.78	23.00
	5290	12.96	12.15	15.58	24.00	18.44	30.00
	5530	12.93	11.68	15.36	24.00	18.22	30.00
	5710 (U-NII-2C)	12.79	11.24	15.09	24.00	17.95	30.00
	5710 (U-NII-3)	-3.20	-4.04	-0.59	30.00	-	-
	5775	12.98	12.39	15.71	30.00	-	-

For 802.11a 5180MHz, the EIRP limit is using $10 \text{ dBm} + 10 \log(B)$, where B is the 16.87MHz, So, the EIRP limit equal 22.27dBm.

For 802.11a 5200MHz, the EIRP limit is using $10 \text{ dBm} + 10 \log(B)$, where B is the 15.78MHz, So, the EIRP limit equal 21.98dBm.

For 802.11a 5240MHz, the EIRP limit is using $10 \text{ dBm} + 10 \log(B)$, where B is the 16.85MHz, So, the EIRP limit equal 22.27dBm.

For 802.11a 5260MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 15.49MHz, So, the Conducted limit equal 22.90dBm and the EIRP limit equal 28.90dBm.

For 802.11a 5300MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 16.46MHz, So, the Conducted limit equal 23.16dBm and the EIRP limit equal 29.16dBm.

For 802.11a 5320MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 16.79MHz, So, the Conducted limit equal 23.25dBm and the EIRP limit equal 29.25dBm.

For 802.11a 5500MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 16.12MHz, So, the Conducted limit equal 23.07dBm and the EIRP limit equal 29.07dBm.

For 802.11a 5580MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 16.86MHz, So, the Conducted limit equal 23.27dBm and the EIRP limit equal 29.27dBm.

For 802.11a 5700MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 15.88MHz, So, the Conducted limit equal 23.01dBm and the EIRP limit equal 29.01dBm.

For 802.11a 5720MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 13.64MHz, So, the Conducted limit equal 22.35dBm and the EIRP limit equal 28.35dBm.

For 802.11ac VHT20 5180MHz, the EIRP limit is using $10 \text{ dBm} + 10 \log(B)$, where B is the 17.64MHz, So, the EIRP limit equal 22.46dBm.

For 802.11ac VHT20 5200MHz, the EIRP limit is using $10 \text{ dBm} + 10 \log(B)$, where B is the 17.02MHz, So, the EIRP limit equal 22.31dBm.

For 802.11ac VHT20 5240MHz, the EIRP limit is using $10 \text{ dBm} + 10 \log(B)$, where B is the 17.75MHz, So, the EIRP limit equal 22.49dBm.

For 802.11ac VHT20 5260MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 17.75MHz, So, the Conducted limit equal 23.49dBm and the EIRP limit equal 29.49dBm.

For 802.11ac VHT20 5300MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 17.53MHz, So, the Conducted limit equal 23.44dBm and the EIRP limit equal 29.44dBm.

For 802.11ac VHT20 5320MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 17.50MHz, So, the Conducted limit equal 23.43dBm and the EIRP limit equal 29.43dBm.

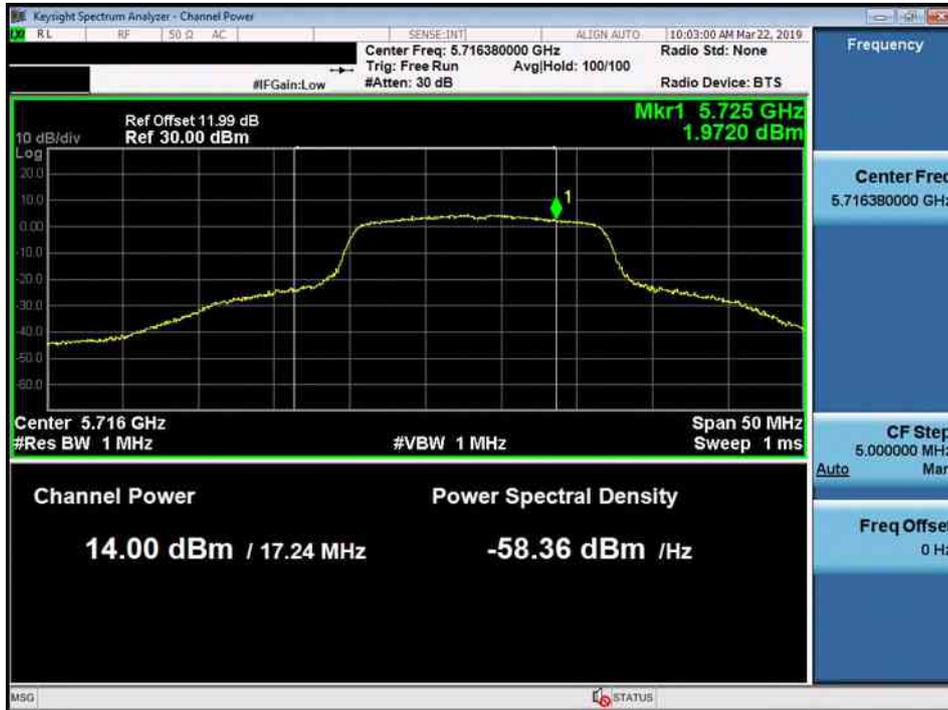
For 802.11ac VHT20 5500MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 17.30MHz, So, the Conducted limit equal 23.38dBm and the EIRP limit equal 23.38dBm.

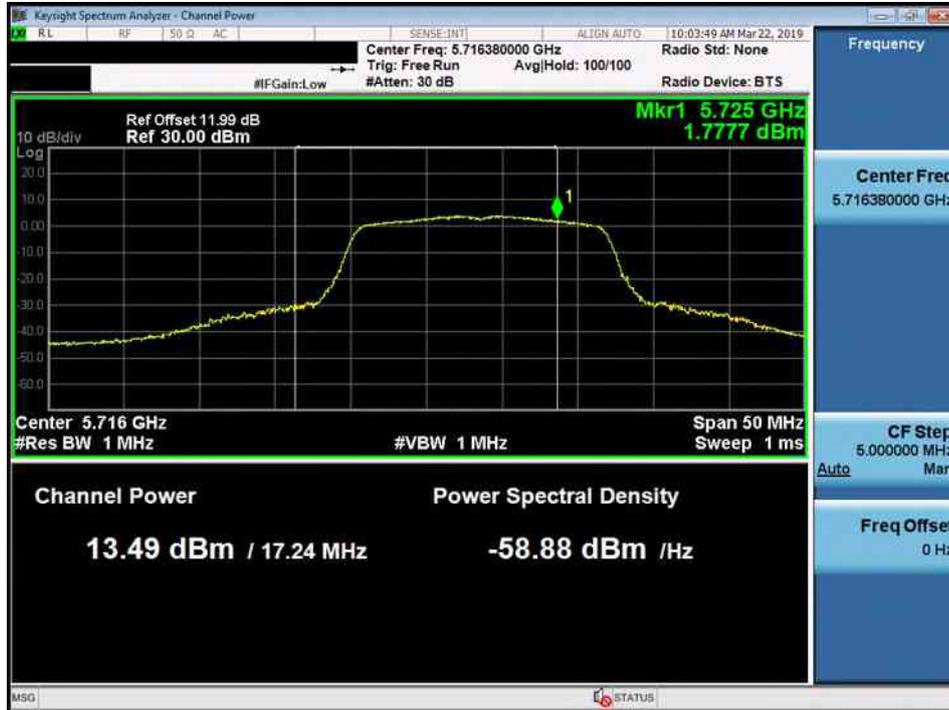
For 802.11ac VHT20 5580MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 17.47MHz, So, the Conducted limit equal 23.42dBm and the EIRP limit equal 29.42dBm.

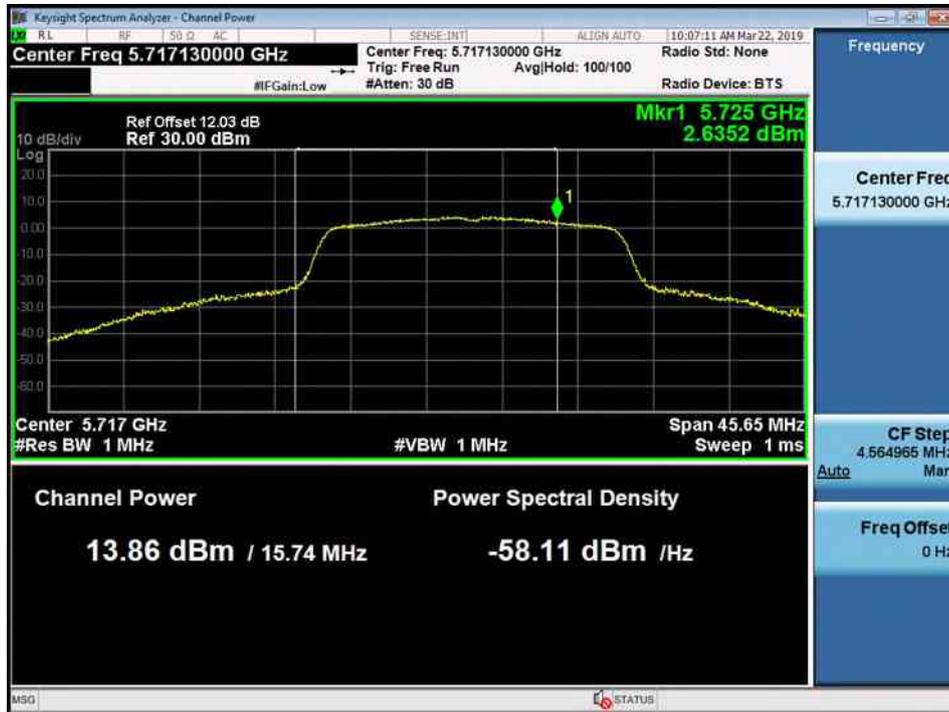
For 802.11ac VHT20 5700MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 17.14MHz, So, the Conducted limit equal 23.34dBm and the EIRP limit equal 23.34dBm.

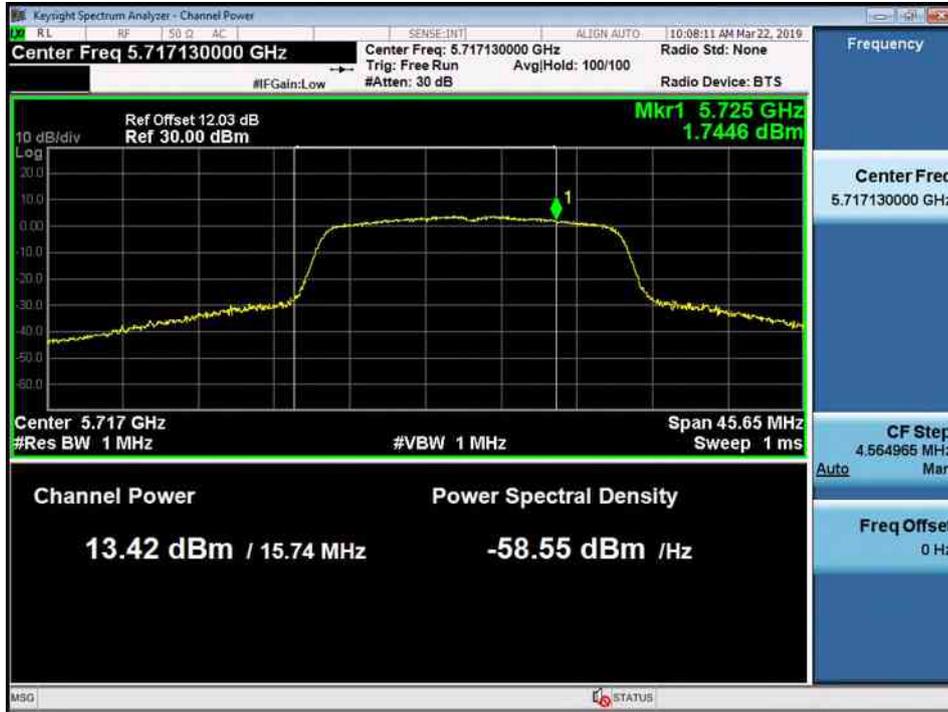
For 802.11ac VHT20 5720MHz, the Conducted power limit is $11 \text{ dBm} + 10 \log(B)$ and the EIRP limit is $17 \text{ dBm} + 10 \log(B)$, where B is the 14.18MHz, So, the Conducted limit equal 22.52dBm and the EIRP limit equal 28.52dBm.

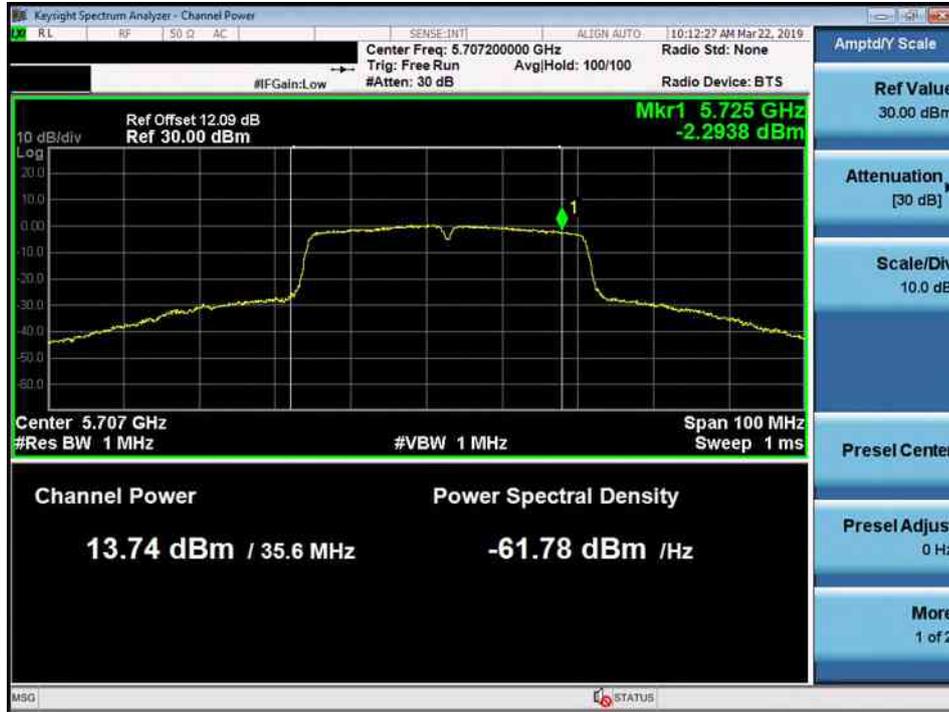
Test Plot of ISED Straddle Channel Power

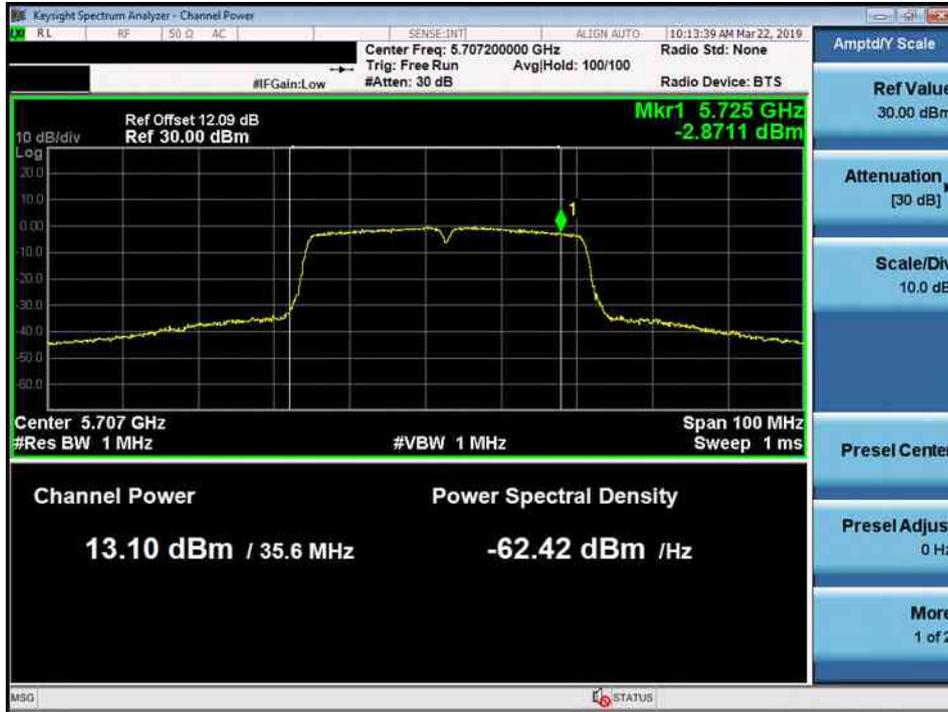
802.11a 5720MHz U-NII-2C Ant 1

802.11a 5720MHz U-NII-3 Ant1

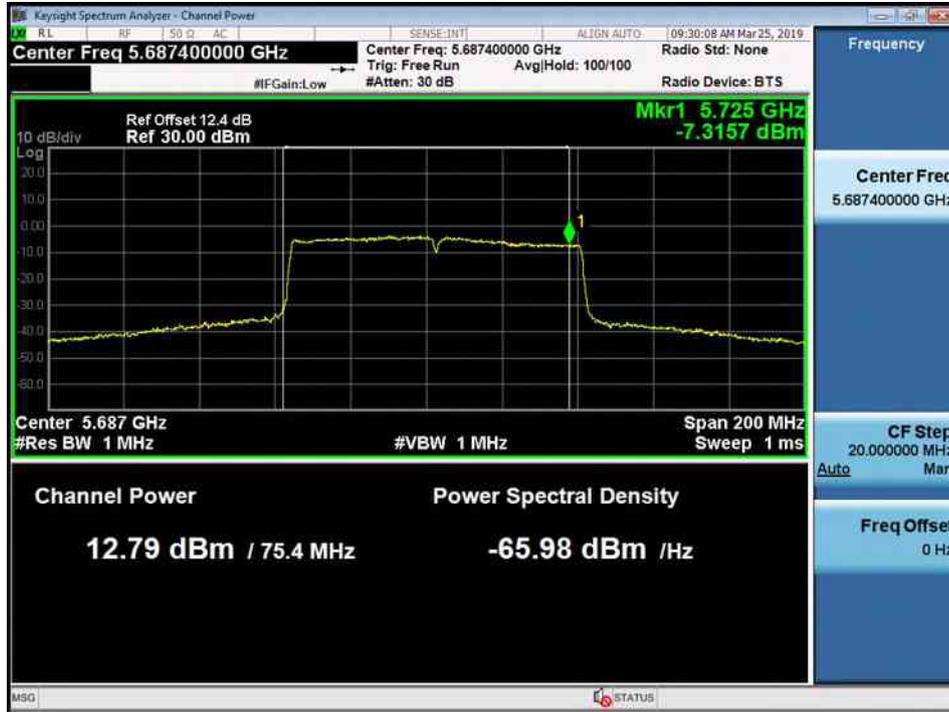
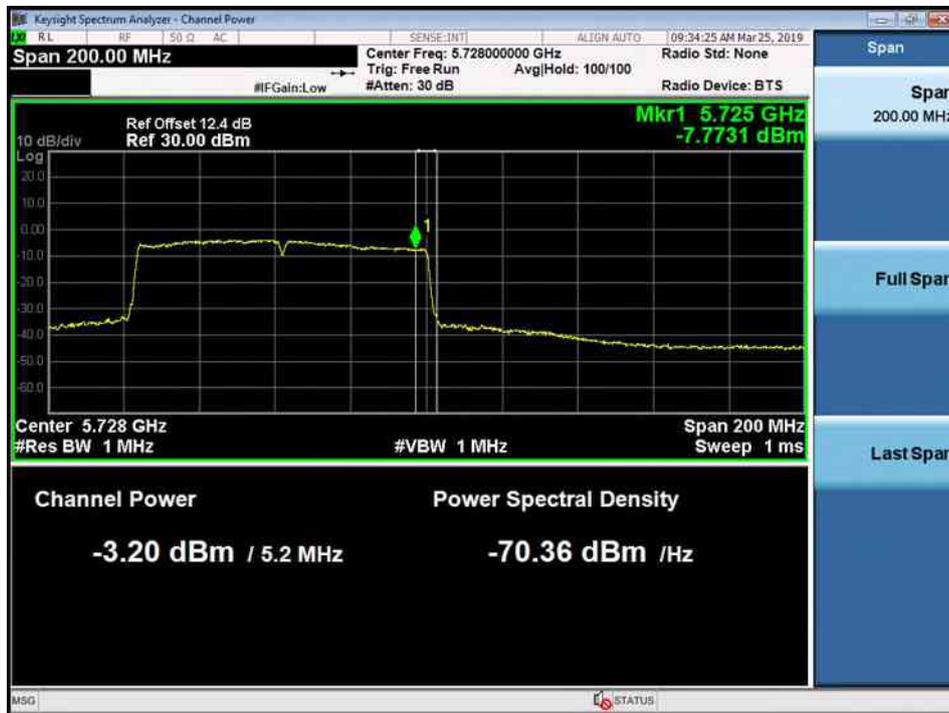

802.11a 5720MHz U-NII-2C Ant 2

802.11a 5720MHz U-NII-3 Ant2

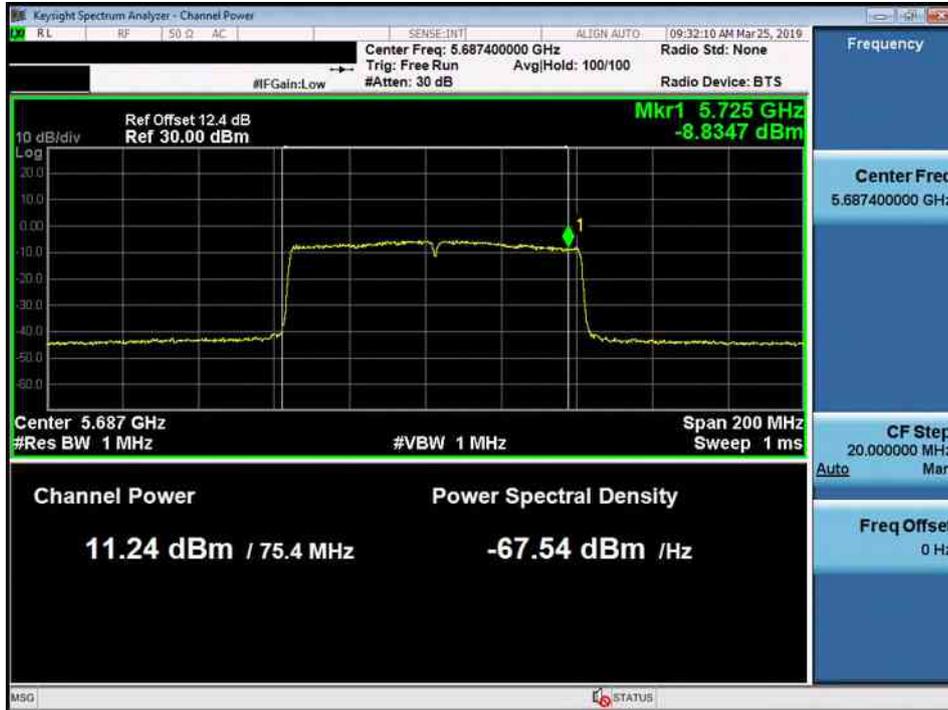
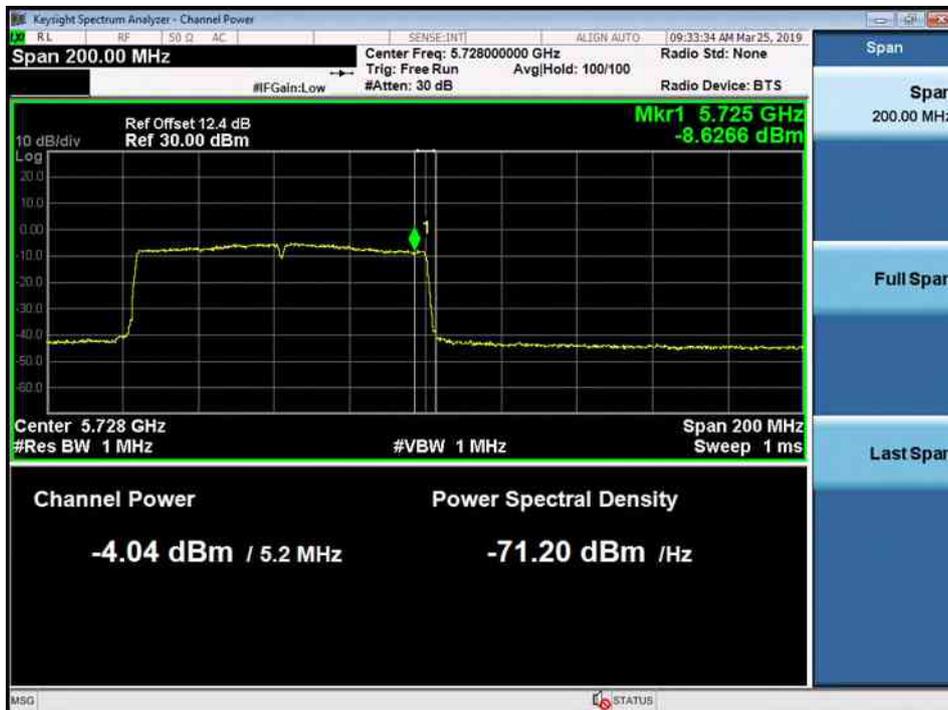

802.11ac VHT20 5720MHz U-NII-2C Ant 1

802.11ac VHT20 5720MHz U-NII-3 Ant1


802.11ac VHT20 5720MHz U-NII-2C Ant 2

802.11ac VHT20 5720MHz U-NII-3 Ant2


802.11ac VHT40 5710MHz U-NII-2C Ant 1

802.11ac VHT40 5710MHz U-NII-3 Ant1


802.11ac VHT40 5710MHz U-NII-2C Ant 2

802.11ac VHT40 5710MHz U-NII-3 Ant2


802.11ac VHT80 5690MHz U-NII-2C Ant 1

802.11ac VHT80 5690MHz U-NII-3 Ant1


802.11ac VHT80 5690MHz U-NII-2C Ant 2

802.11ac 5690MHz U-NII-3 Ant2


5.1.4 26dB & 99% Bandwidth

RESULT:
Passed

Test standard : FCC Part 15.407(a), RSS-247 6.2
 Basic standard : ANSI C63.10:2013
 Kind of test site : Conducted room

Test setup

Test Channel : Refer to the Table 7
 Operation Mode : A

Table 11: Test result of 26dB & 99% Bandwidth

Mode	Channel Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
802.11a	5180	19.91	16.87
	5200	19.03	15.78
	5240	20.05	16.85
	5260	19.09	15.49
	5300	19.23	16.46
	5320	19.76	16.79
	5500	19.27	16.12
	5580	20.03	16.86
	5700	19.71	15.88
	5720 U-NII-2C	17.24	13.64
	5720 U-NII-3	4.72	3.25
	5745	20.56	16.17
	5785	19.74	16.90
5825	24.92	16.88	
802.11ac VHT20	5180	20.03	17.64
	5200	19.93	17.02
	5240	20.12	17.75
	5260	20.07	17.75
	5300	20.66	17.53
	5320	20.54	17.50
	5500	20.01	17.30
	5580	20.15	17.47
	5700	19.86	17.14
	5720 U-NII-2C	15.74	14.18
	5720 U-NII-3	5.02	3.63

	5745	20.78	17.25
	5785	20.44	17.22
	5825	23.89	17.83
802.11ac VHT40	5190	41.33	37.01
	5230	41.25	36.31
	5270	41.03	36.01
	5310	42.69	36.59
	5510	41.10	35.90
	5550	41.23	36.81
	5670	41.33	37.06
	5710 U-NII-2C	35.60	33.28
	5710 U-NII-3	5.40	2.90
	5755	41.33	36.11
	5795	41.92	36.88
	802.11ac VHT80	5210	81.16
5290		81.69	75.32
5530		81.09	76.18
5610 (FCC Only)		81.30	75.19
5690 U-NII-2C		75.40	73.40
5690 U-NII-3		5.20	2.98
5775		81.21	76.19

Test Plot of 26dB & 99% Bandwidth

802.11a 5180MHz

802.11a 5200MHz


802.11a 5240MHz

802.11a 5260MHz


802.11a 5300MHz

802.11a 5320MHz


802.11a 5500MHz

802.11a 5580MHz


802.11a 5700MHz

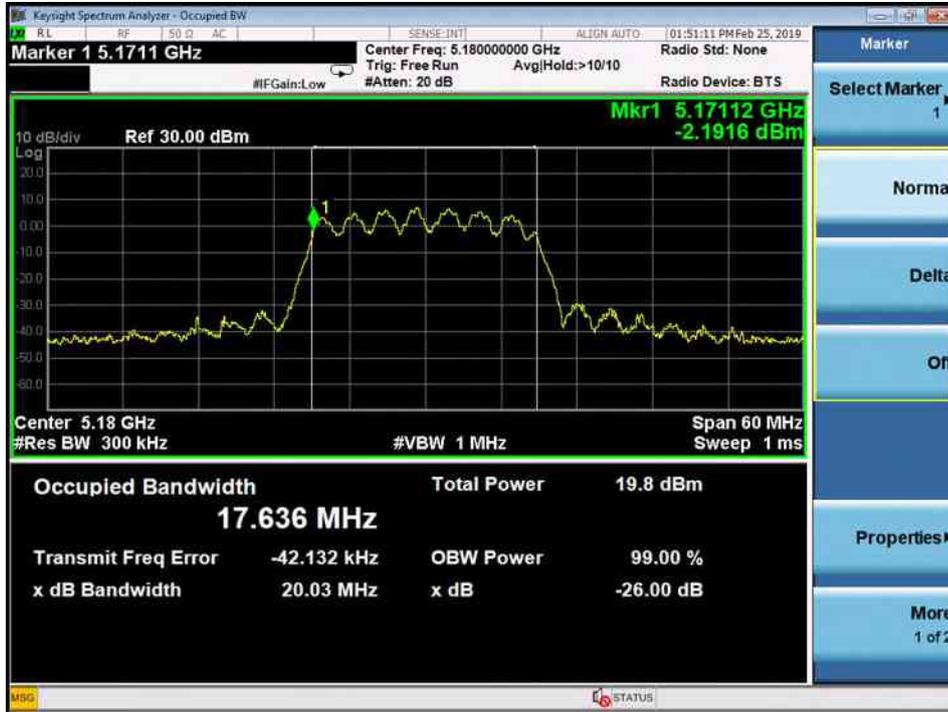
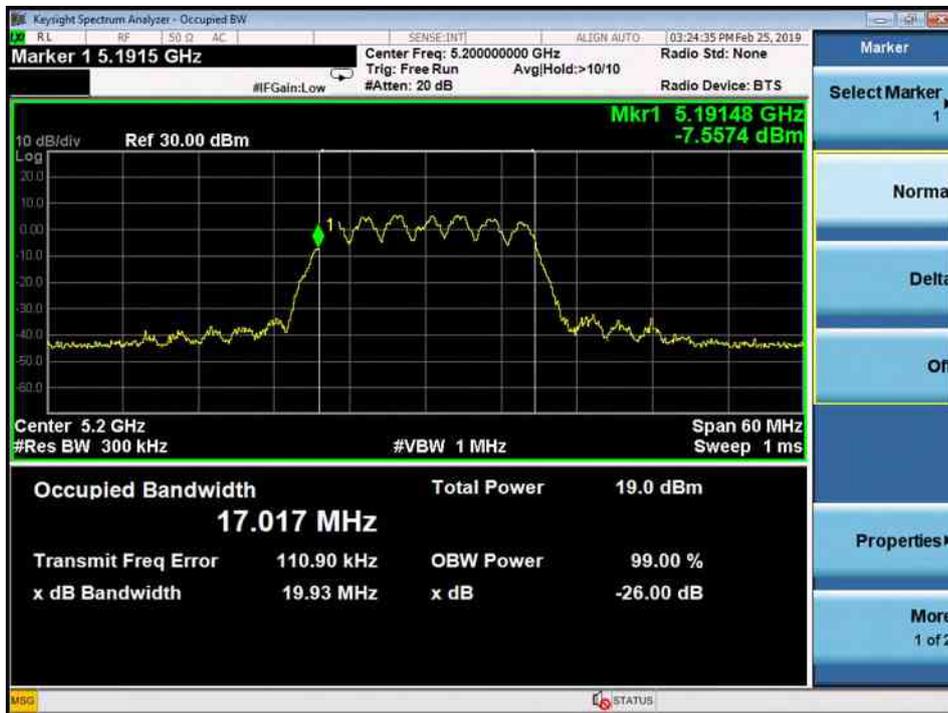
802.11a 5745MHz

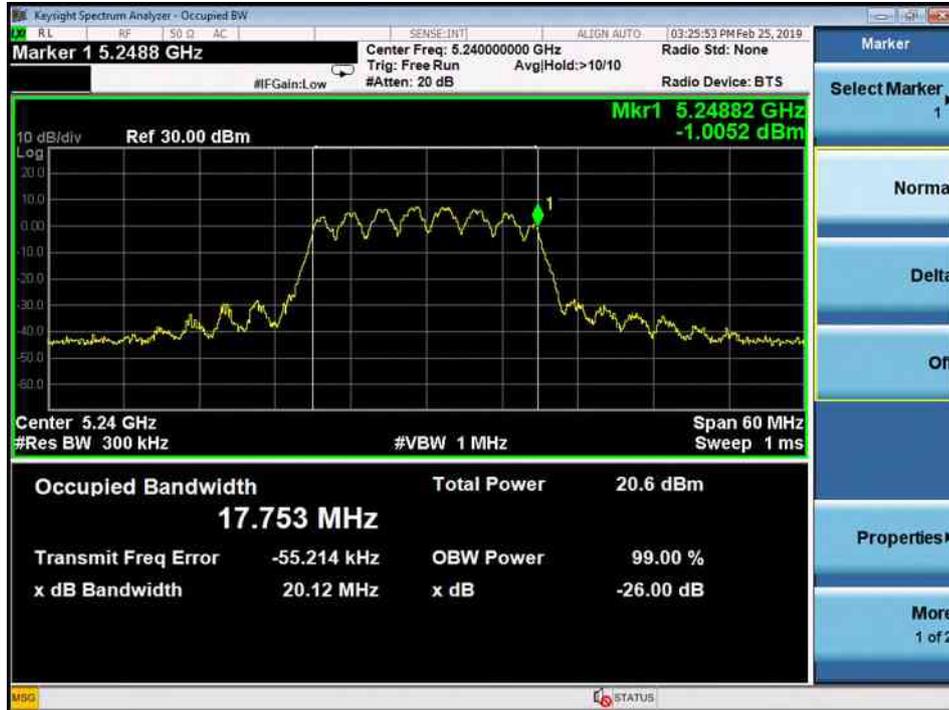

802.11a 5785MHz

802.11a 5825MHz


802.11a 5720MHz 26dB

802.11a 5720MHz 99%


802.11ac VHT20 5180MHz

802.11ac VHT20 5200MHz


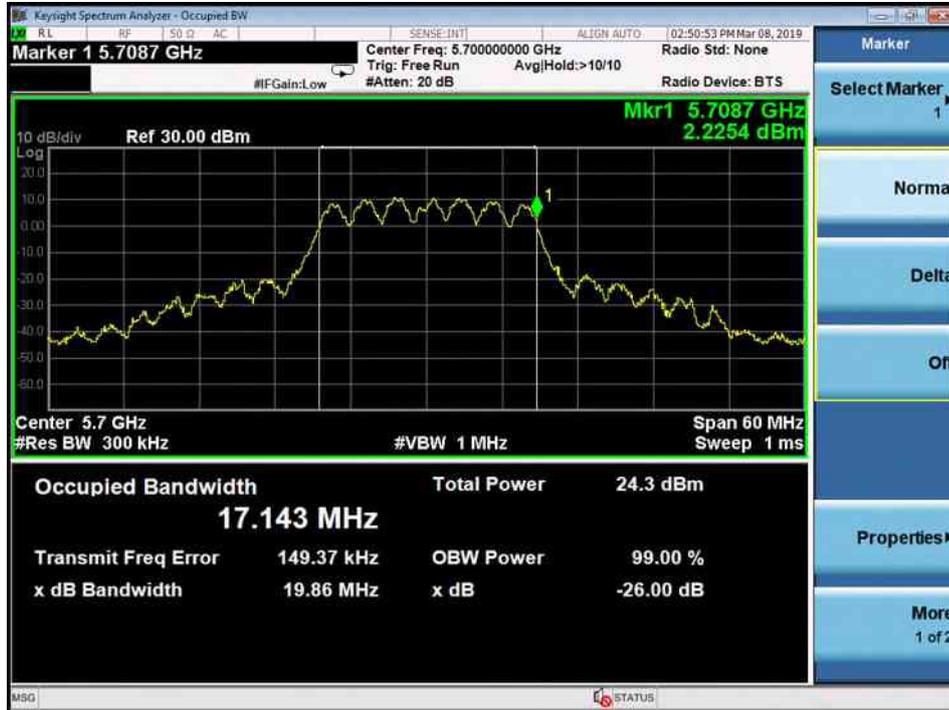
802.11ac VHT20 5240MHz

802.11ac VHT20 5260MHz


802.11ac VHT20 5300MHz

802.11ac VHT20 5320MHz


802.11ac VHT20 5500MHz

802.11ac VHT20 5580MHz

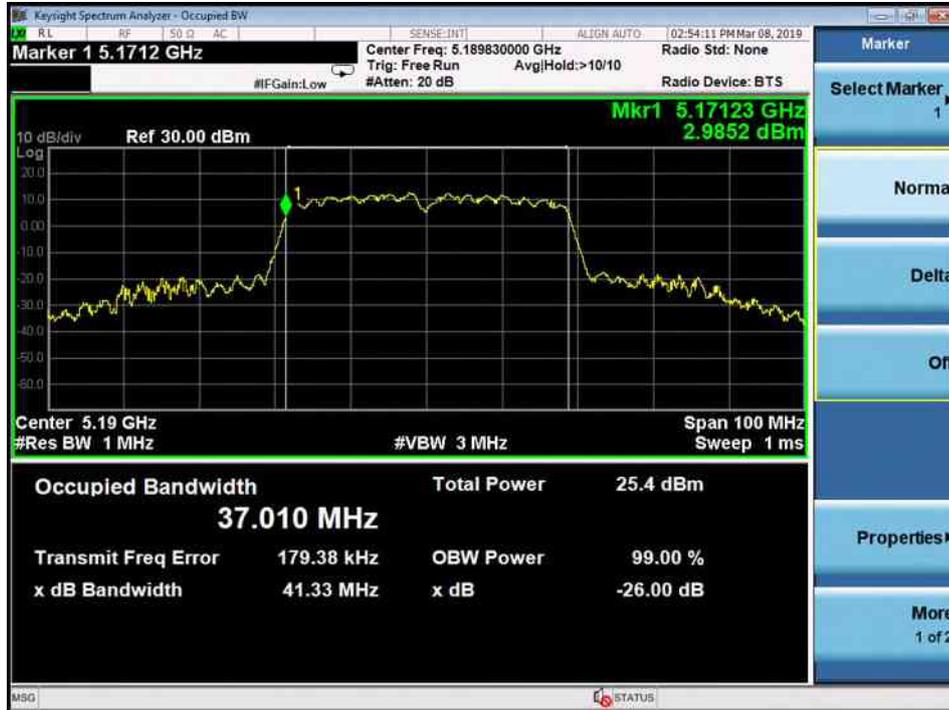
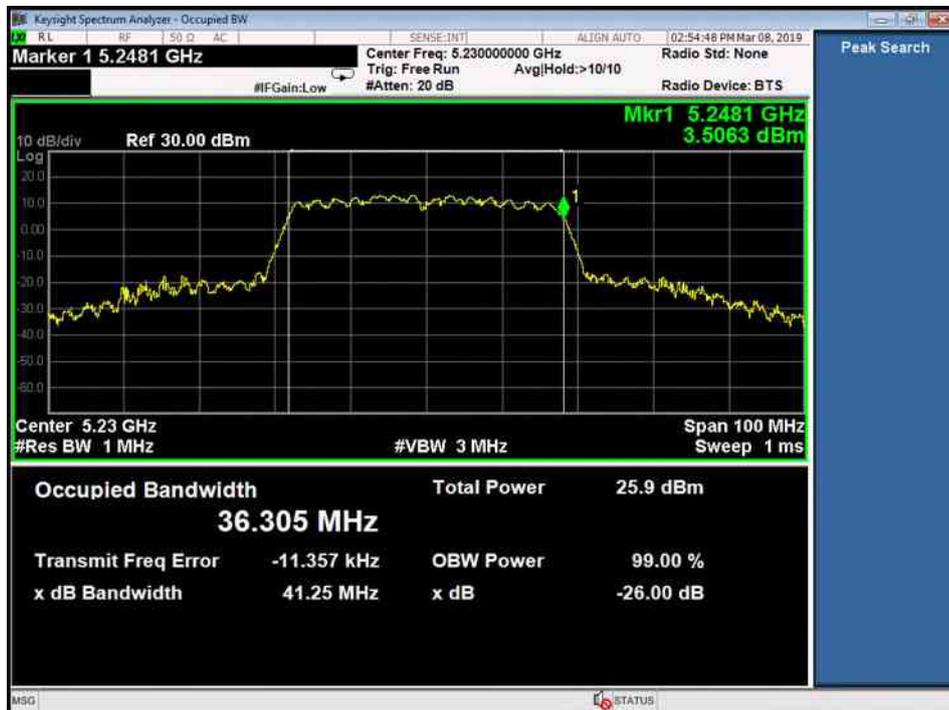

802.11ac VHT20 5700MHz

802.11ac VHT20 5745MHz

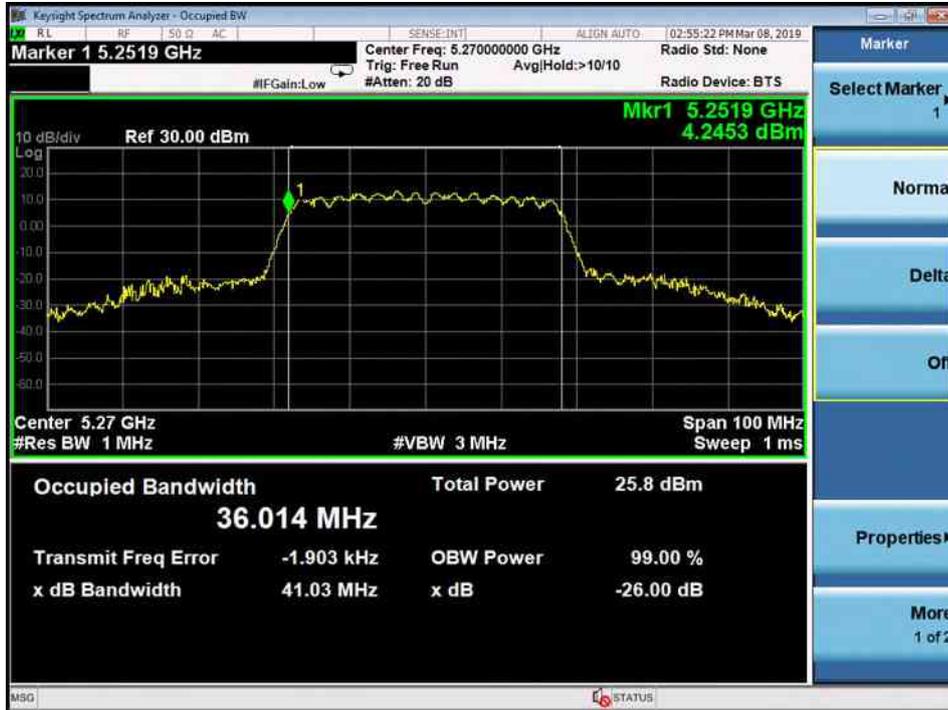

802.11ac VHT20 5785MHz

802.11ac VHT20 5825MHz


802.11ac VHT20 5720MHz 26dB

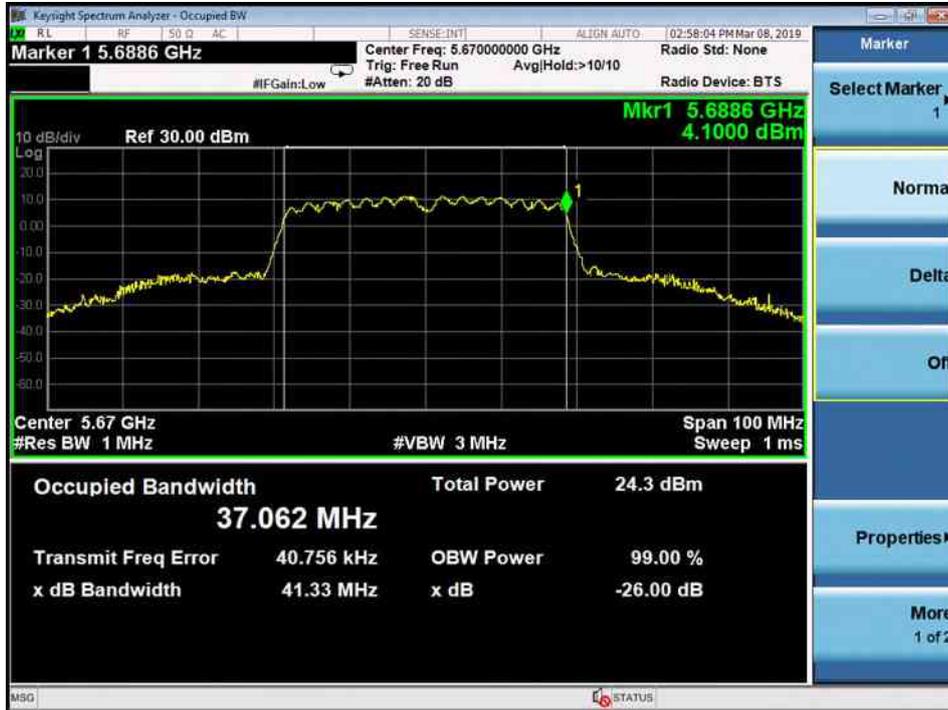
802.11ac VHT20 5720MHz 99%

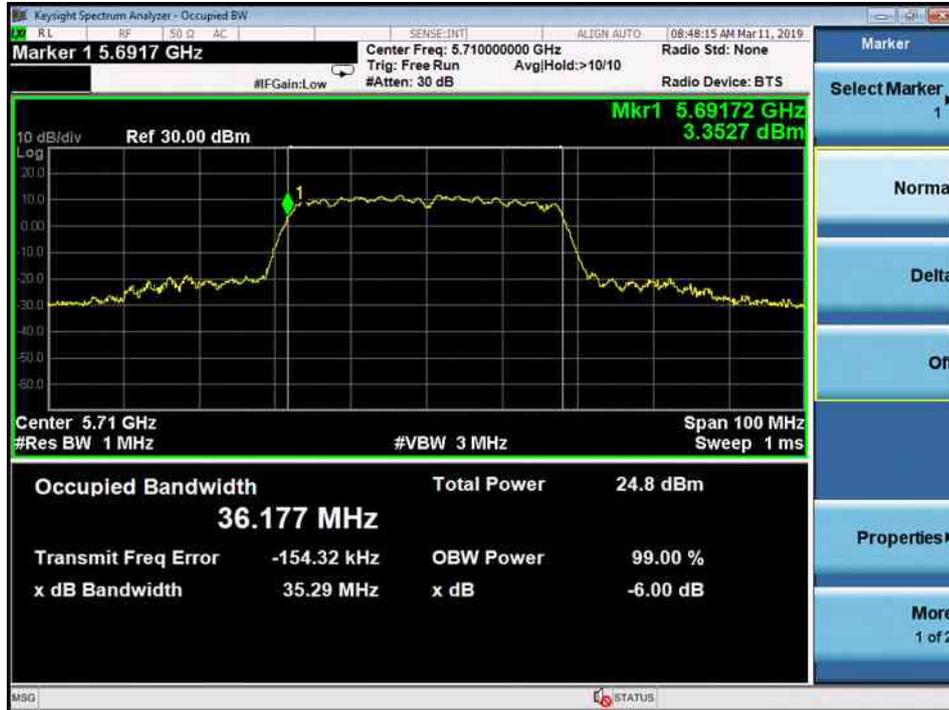
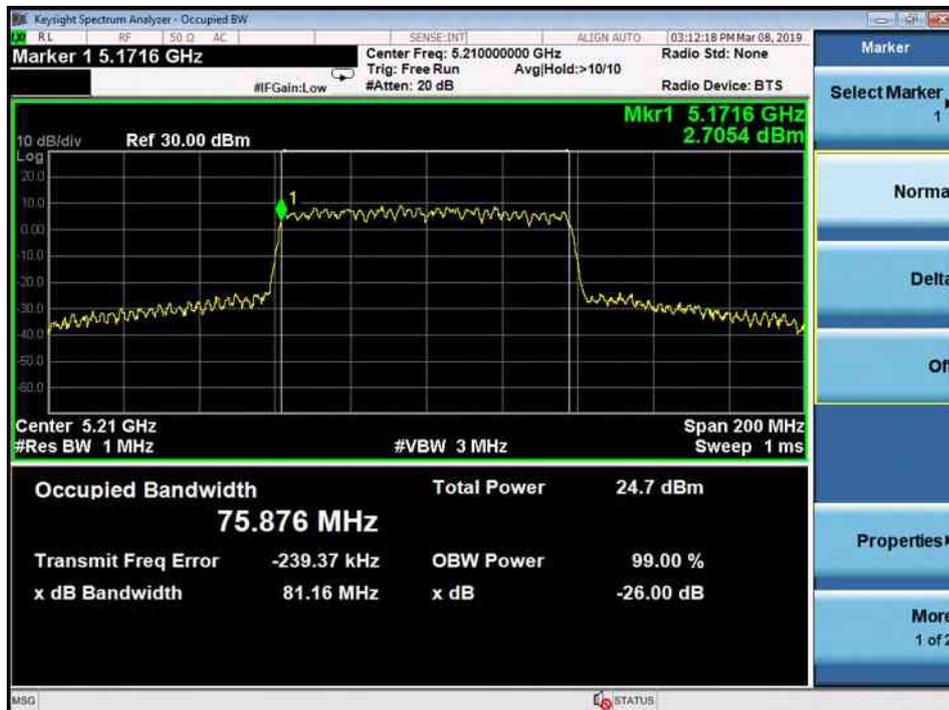

802.11ac VHT40 5190MHz

802.11ac VHT40 5230MHz


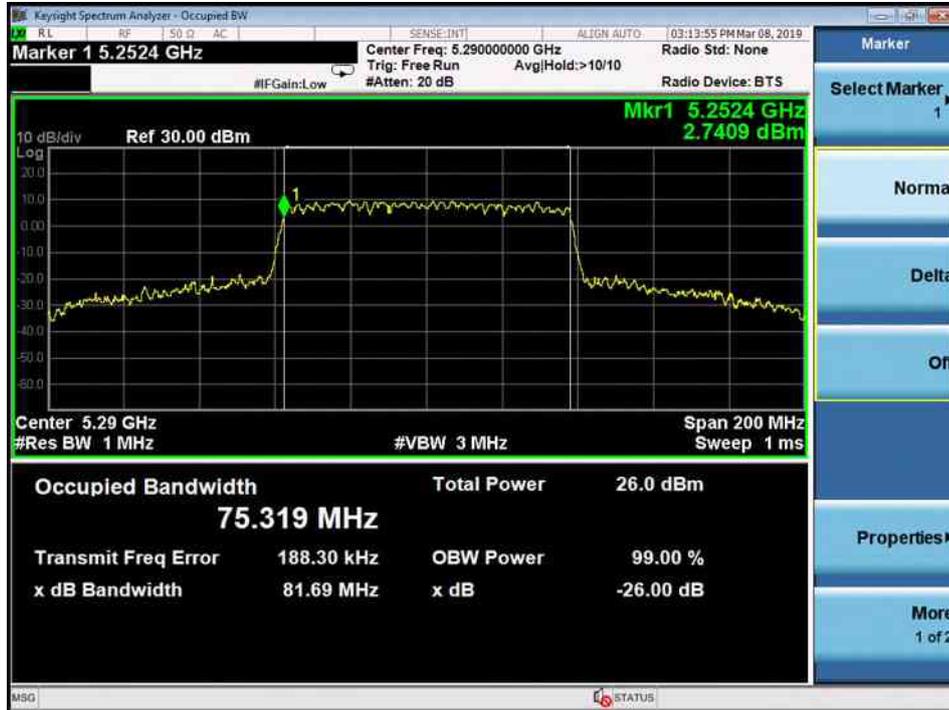
802.11ac VHT40 5270MHz

802.11ac VHT40 5310MHz

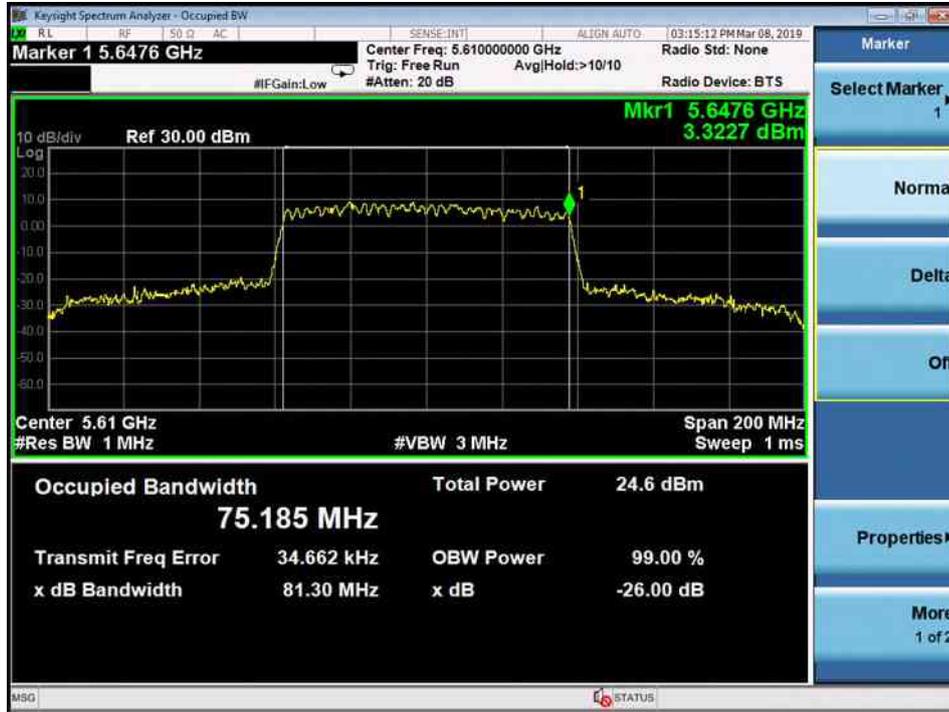
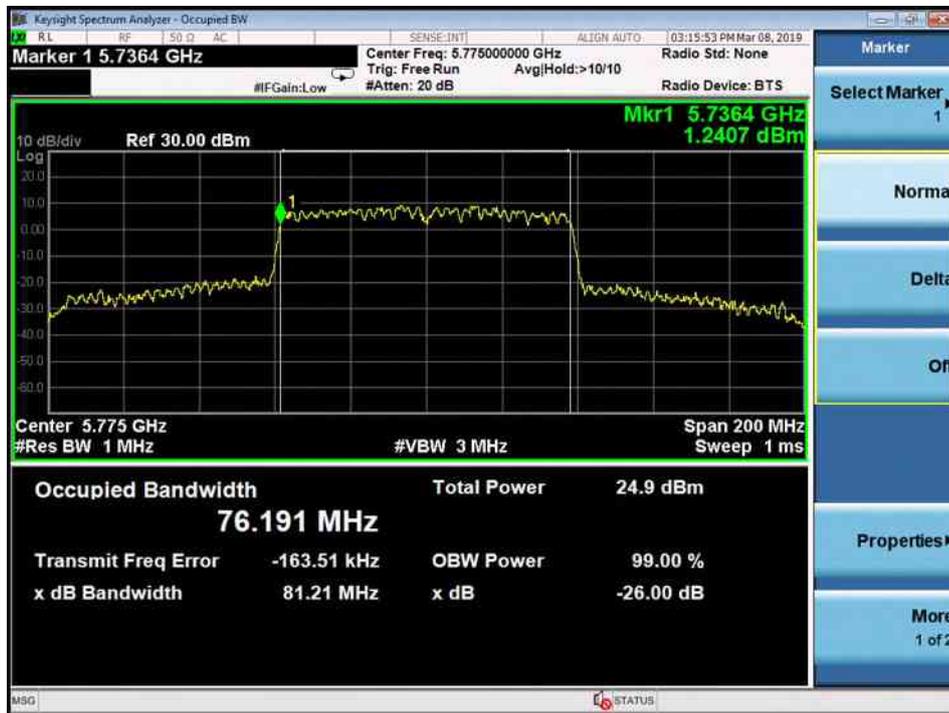

802.11ac VHT40 5510MHz

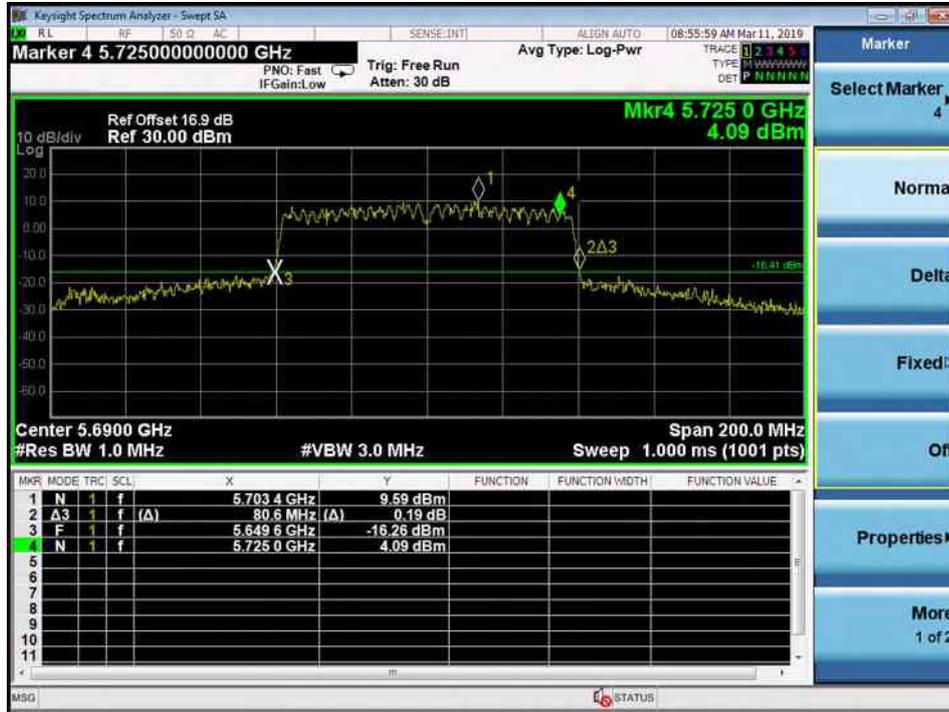
802.11ac VHT40 5550MHz


802.11ac VHT40 5670MHz

802.11ac VHT40 5755MHz


802.11ac VHT40 5710MHz 99%

802.11ac VHT80 5210MHz


802.11ac VHT80 5290MHz

802.11ac VHT80 5530MHz


802.11ac VHT80 5610MHz

802.11ac VHT80 5775MHz


802.11ac VHT80 5690MHz 26dB

802.11ac VHT80 5690MHz 99%


5.1.5 6dB Bandwidth

RESULT:
Passed

Test standard : FCC Part 15.407, RSS-247 6.2.4
 Limit : FCC Part 15.407, RSS-247 6.2.4
 Basic standard : ANSI C63.10:2013
 Kind of test site : Conducted room

Test setup

Test Channel : Refer to the Table 7
 Operation Mode : A

Table 12: Test result of 6dB Bandwidth

Mode	Channel Frequency (MHz)	6dB Bandwidth (MHz)	6dB Bandwidth Limit (kHz)	Result
802.11a	5720	2.52	>500	Pass
	5745	15.16	>500	Pass
	5785	12.29	>500	Pass
	5825	15.12	>500	Pass
802.11ac VHT20	5720	2.48	>500	Pass
	5745	13.27	>500	Pass
	5785	13.28	>500	Pass
	5825	13.27	>500	Pass
802.11ac VHT40	5710	2.48	>500	Pass
	5755	35.20	>500	Pass
	5795	33.99	>500	Pass
802.11ac VHT80	5690	2.60	>500	Pass
	5775	74.47	>500	Pass

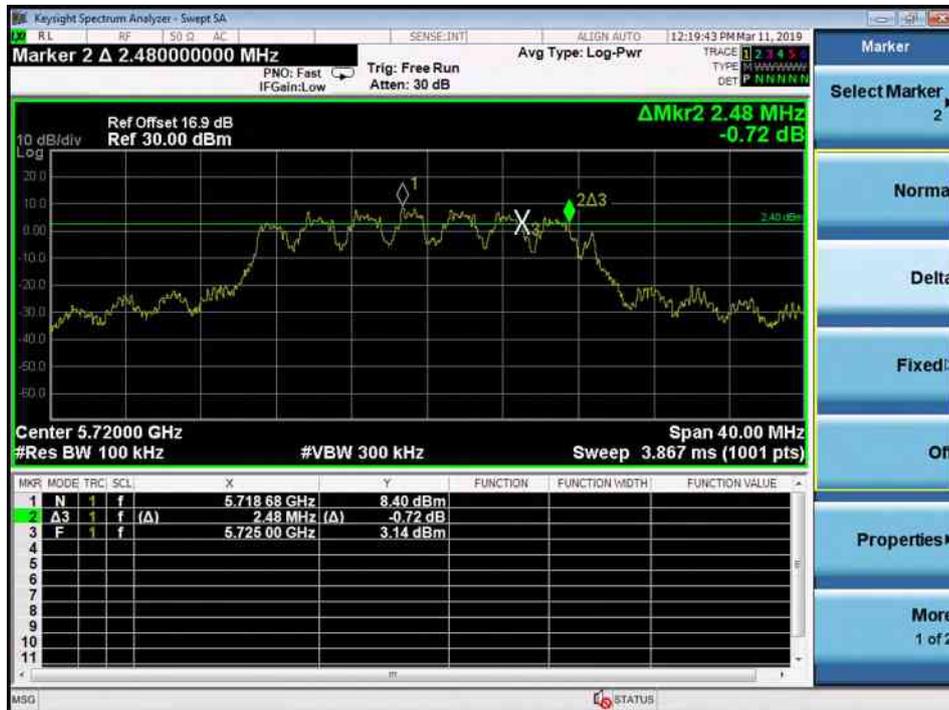
Test Plot of 6dB Bandwidth

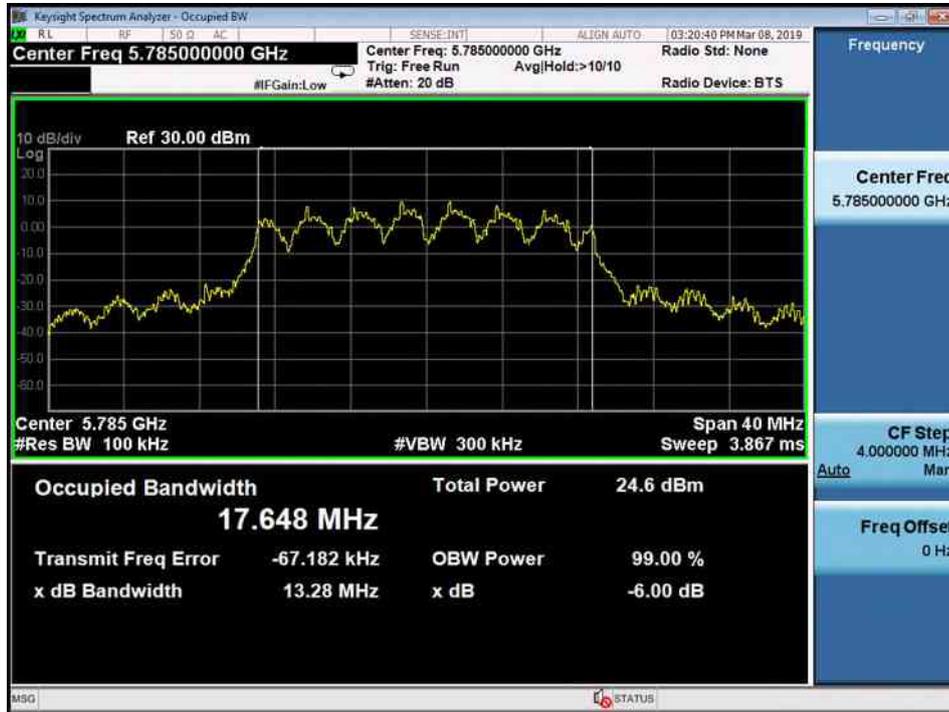
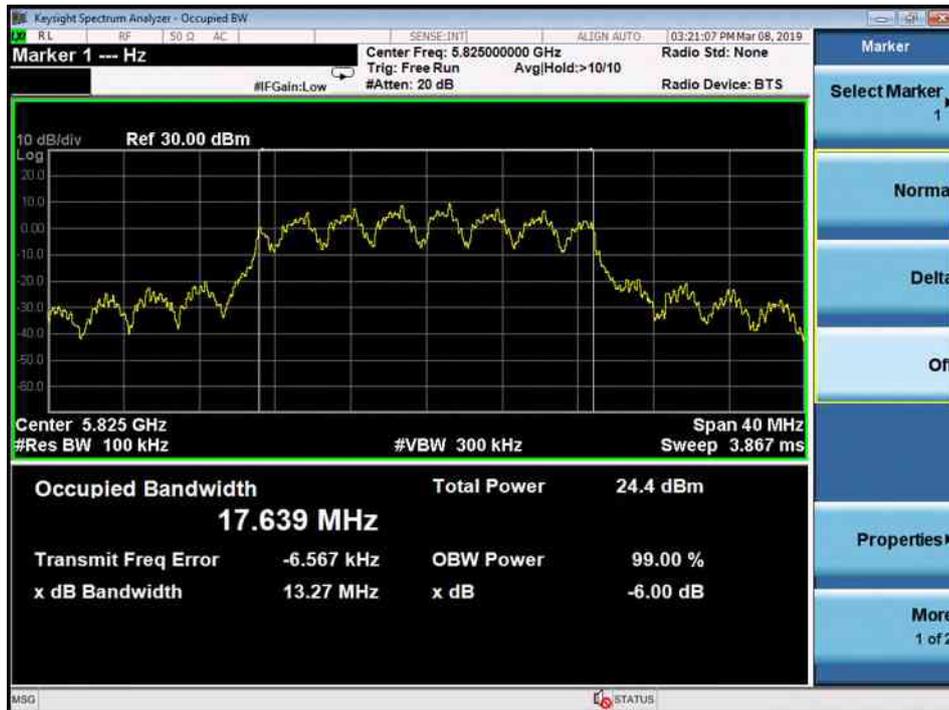
802.11a
5720MHz

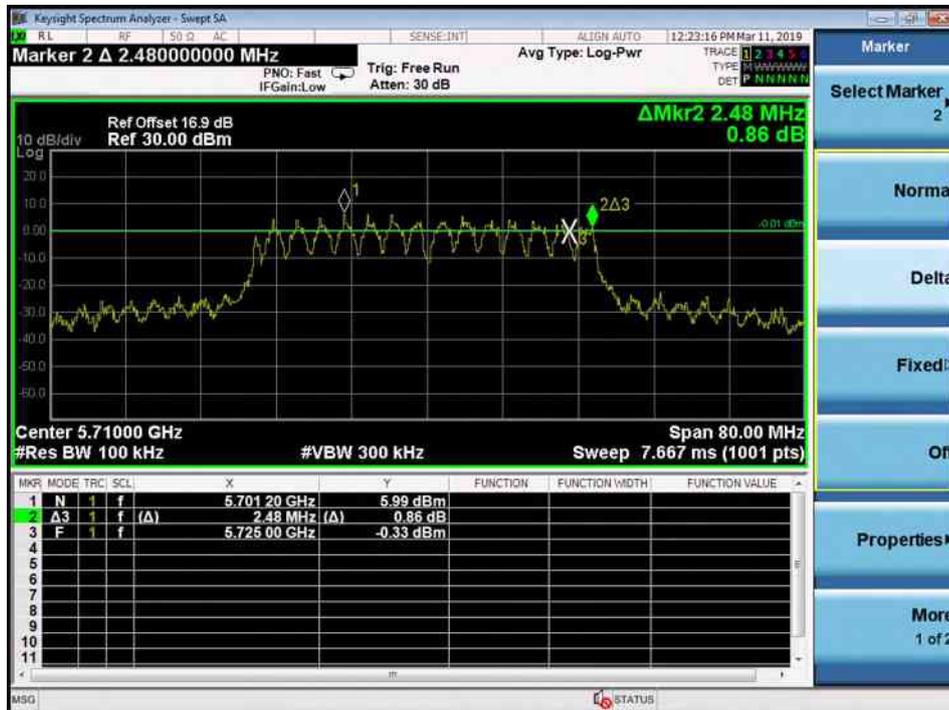
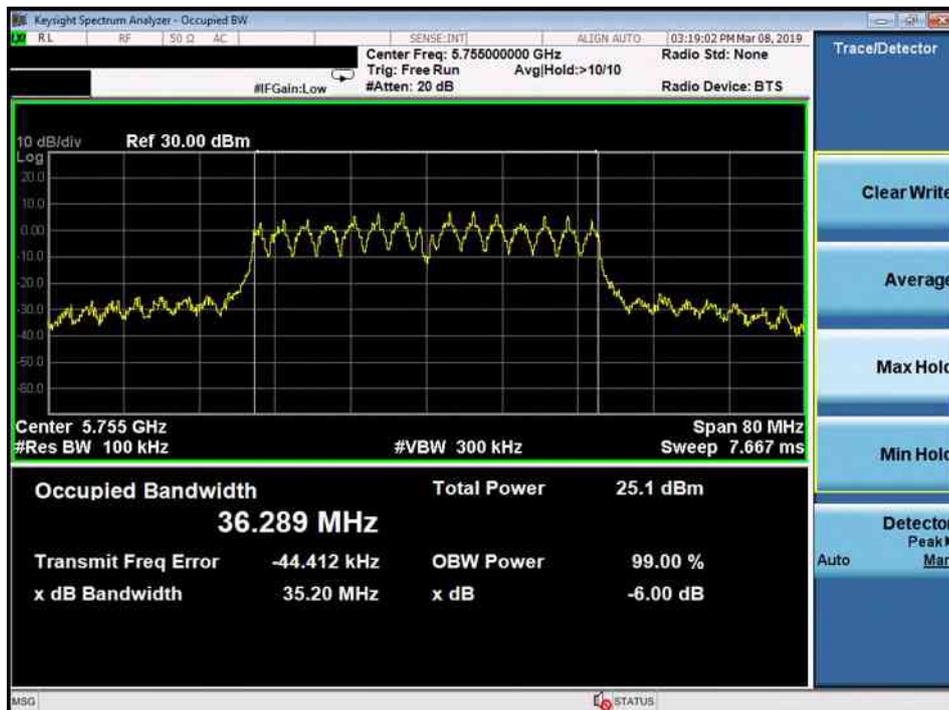
5745MHz


5785MHz

5825MHz


802.11ac VHT20
5720MHz

5745MHz


5785MHz

5825MHz


802.11ac VHT40
5710MHz

5755MHz


5755MHz


5.1.6 Power Density

RESULT:**Passed**

Test standard : FCC Part 15.407(a)(1),(3); RSS-247 6.2
Basic standard : ANSI C63.10:2013, KDB789033 D02
Kind of test site : Shielded room

Test setup

Test Channel : Refer to the table 7
Operation Mode : A

FCC Limit :

For client devices in the 5.15-5.25 GHz band, the maximum conducted power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725-5.85 GHz, the maximum conducted power spectral density shall not exceed 30 dBm in any 500-kHz band.

ISED Limit :

For client devices in the 5.15-5.25 GHz band, The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

For the 5.25-5.35 GHz band, the maximum conducted power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the 5.47-5.60 GHz and 5.65-5.725 GHz bands, the maximum conducted power spectral density shall not exceed 11 dBm in any 1 megahertz band.

For the band 5.725-5.85 GHz, the maximum conducted power spectral density shall not exceed 30 dBm in any 500-kHz band.

Table 13: Test result of FCC Power Density

Mode	Channel Frequency (MHz)	Conducted Power Density				Power Density Limit
		Ant 1 (dBm/MHz)	Ant 2 (dBm/MHz)	Total (dBm/MHz)	Total (dBm/500kHz)	B1-B3 (dBm/MHz) B4 (dBm/500kHz)
802.11a	5180	1.38	0.68	4.05	-	11.00
	5200	1.44	0.67	4.08	-	11.00
	5240	1.37	0.44	3.94	-	11.00
	5260	4.04	2.54	6.36	-	11.00
	5300	4.90	2.67	6.94	-	11.00
	5320	4.83	3.25	7.12	-	11.00
	5500	4.25	2.08	6.31	-	11.00
	5580	4.90	2.26	6.79	-	11.00
	5700	4.04	3.78	6.92	-	11.00
	5720 (U-NII-2C)	4.75	4.43	7.60	-	11.00
	5720 (U-NII-3)	2.81	1.77	5.33	2.32	30.00
	5745	3.94	3.60	6.79	3.78	30.00
	5785	3.71	3.09	6.42	3.41	30.00
	5825	3.75	4.67	7.25	4.24	30.00
802.11ac VHT20	5180	1.17	0.50	3.85	-	11.00
	5200	1.28	0.43	3.89	-	11.00
	5240	1.45	0.59	4.05	-	11.00
	5260	3.71	2.28	6.07	-	11.00
	5300	5.01	3.27	7.24	-	11.00
	5320	5.03	3.76	7.45	-	11.00
	5500	3.92	2.02	6.09	-	11.00
	5580	4.91	2.44	6.86	-	11.00
	5700	3.84	3.33	6.60	-	11.00
	5720 (U-NII-2C)	4.49	4.73	7.62	-	11.00
	5720 (U-NII-3)	2.88	2.63	5.77	2.76	30.00
	5745	3.72	3.41	6.58	3.57	30.00
	5785	3.26	3.11	6.19	3.18	30.00
	5825	3.46	3.36	6.42	3.41	30.00
802.11ac VHT40	5190	0.78	-0.77	3.08	-	11.00
	5230	0.21	-0.37	2.94	-	11.00
	5270	1.14	-0.69	3.33	-	11.00
	5310	1.94	0.16	4.15	-	11.00
	5510	0.23	-1.92	2.30	-	11.00
	5550	0.60	-1.75	2.59	-	11.00
	5670	0.24	-1.96	2.29	-	11.00
	5710 (U-NII-2C)	0.87	0.91	3.90	-	11.00
	5710 (U-NII-3)	-0.79	-1.70	1.79	-1.22	30.00
	5755	0.63	0.04	3.35	0.34	30.00
	5795	0.48	-0.04	3.24	0.23	30.00

Mode	Channel Frequency (MHz)	Conducted Power Density				Power Density Limit
		Ant 1 (dBm/MHz)	Ant 2 (dBm/MHz)	Total (dBm/MHz)	Total (dBm/500kHz)	B1-B3 (dBm/MHz) B4 (dBm/500kHz)
802.11ac VHT80	5210	-4.41	-4.52	-1.45	-	11.00
	5290	-3.05	-4.30	-0.62	-	11.00
	5530	-4.54	-5.97	-2.19	-	11.00
	5610	-3.36	-5.72	-1.37	-	11.00
	5690 (U-NII-2C)	-1.62	-3.71	0.47	-	11.00
	5690 (U-NII-3)	-2.68	-4.82	-0.61	-3.62	30.00
	5775	-4.53	-4.18	-1.34	-4.35	30.00

The formula dBm/MHz and dBm/500kHz is converted equal to Total (dBm/MHz)+10log(500kHz/1MHz).

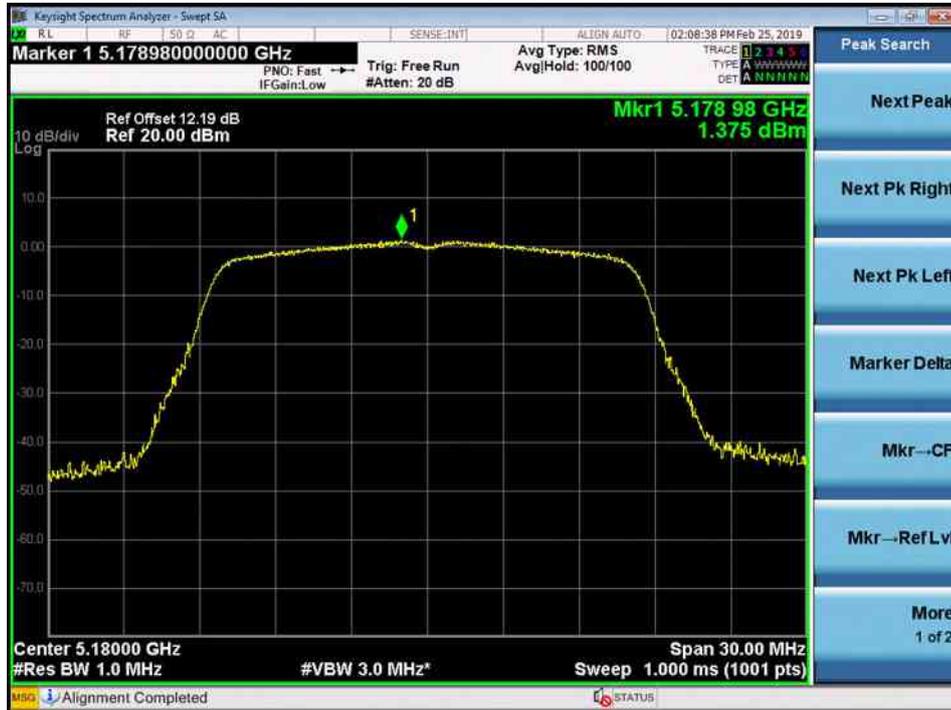
Table 14: Test result of ISED Power Density

Mode	Channel Frequency (MHz)	Conducted Power Density				EIRP Power Density Limit (dBm/MHz)
		Ant 1 (dBm/MHz)	Ant 2 (dBm/MHz)	Total (dBm/MHz)	Total EIRP (dBm/kHz)	
802.11a	5180	1.38	0.68	4.05	9.88	10.00
	5200	1.44	0.67	4.08	9.91	10.00
	5240	1.37	0.44	3.94	9.77	10.00
802.11ac VHT20	5180	1.17	0.50	3.85	9.68	10.00
	5200	1.28	0.43	3.89	9.72	10.00
	5240	1.45	0.59	4.05	9.88	10.00
802.11ac VHT40	5190	0.78	-0.77	3.08	8.91	10.00
	5230	0.21	-0.37	2.94	8.76	10.00
802.11ac VHT80	5210	-4.41	-4.52	-1.45	4.37	10.00

Mode	Channel Frequency (MHz)	Conducted Power Density				Power Density Limit B1-B3 (dBm/MHz) B4 (dBm/500kHz)
		Ant 1 (dBm/MHz)	Ant 2 (dBm/MHz)	Total (dBm/MHz)	Total (dBm/500kHz)	
802.11a	5260	4.04	2.54	6.36	-	11.00
	5300	4.90	2.67	6.94	-	11.00
	5320	4.83	3.25	7.12	-	11.00
	5500	4.25	2.08	6.31	-	11.00
	5580	4.90	2.26	6.79	-	11.00
	5700	4.04	3.78	6.92	-	11.00
	5720 (U-NII-2C)	4.75	4.43	7.60	-	11.00
	5720 (U-NII-3)	2.81	1.77	5.33	2.32	30.00
	5745	3.94	3.60	6.79	3.78	30.00
	5785	3.71	3.09	6.42	3.41	30.00
	5825	3.75	4.67	7.25	4.24	30.00
802.11ac VHT20	5260	3.71	2.28	6.07	-	11.00
	5300	5.01	3.27	7.24	-	11.00
	5320	5.03	3.76	7.45	-	11.00
	5500	3.92	2.02	6.09	-	11.00
	5580	4.91	2.44	6.86	-	11.00
	5700	3.84	3.33	6.60	-	11.00
	5720 (U-NII-2C)	4.49	4.73	7.62	-	11.00
	5720 (U-NII-3)	2.88	2.63	5.77	2.76	30.00
	5745	3.72	3.41	6.58	3.57	30.00
	5785	3.26	3.11	6.19	3.18	30.00
	5825	3.46	3.36	6.42	3.41	30.00

Mode	Channel Frequency (MHz)	Conducted Power Density				Power Density Limit
		Ant 1 (dBm/MHz)	Ant 2 (dBm/MHz)	Total (dBm/MHz)	Total (dBm/500kHz)	B1-B3 (dBm/MHz) B4 (dBm/500kHz)
802.11ac VHT40	5270	1.14	-0.69	3.33	-	11.00
	5310	1.94	0.16	4.15	-	11.00
	5510	0.23	-1.92	2.30	-	11.00
	5550	0.60	-1.75	2.59	-	11.00
	5670	0.24	-1.96	2.29	-	11.00
	5710 (U-NII-2C)	0.87	0.91	3.90	-	11.00
	5710 (U-NII-3)	-0.79	-1.70	1.79	-1.22	30.00
	5755	0.63	0.04	3.35	0.34	30.00
	5795	0.48	-0.04	3.24	0.23	30.00
802.11ac VHT80	5290	-3.05	-4.30	-0.62	-	11.00
	5530	-4.54	-5.97	-2.19	-	11.00
	5690 (U-NII-2C)	-1.62	-3.71	0.47	-	11.00
	5690 (U-NII-3)	-2.68	-4.82	-0.61	-3.62	30.00
	5775	-4.53	-4.18	-1.34	-4.35	30.00

The formula dBm/MHz and dBm/500kHz is converted equal to Total (dBm/MHz)+10log(500kHz/1MHz).

Test Plot of FCC / ISED Power Density Ant1
802.11a 5180MHz

802.11a 5200MHz


802.11a 5240MHz

802.11a 5260MHz


802.11a 5300MHz

802.11a 5320MHz

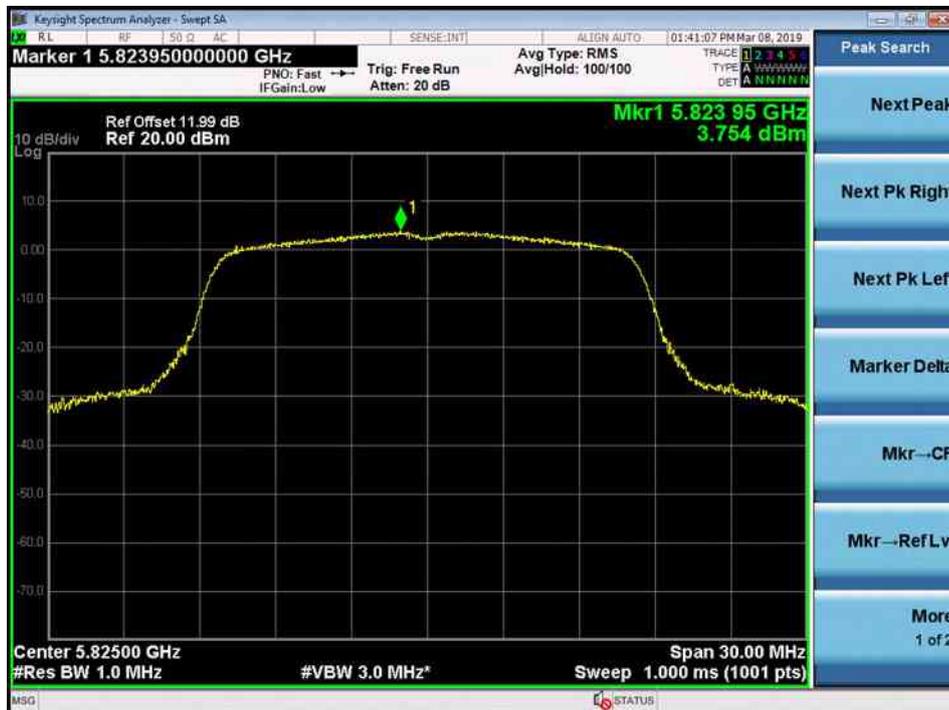

802.11a 5500MHz

802.11a 5580MHz


802.11a 5700MHz

802.11a 5745MHz


802.11a 5785MHz

802.11a 5825MHz


802.11a 5720MHz U-NII-2C

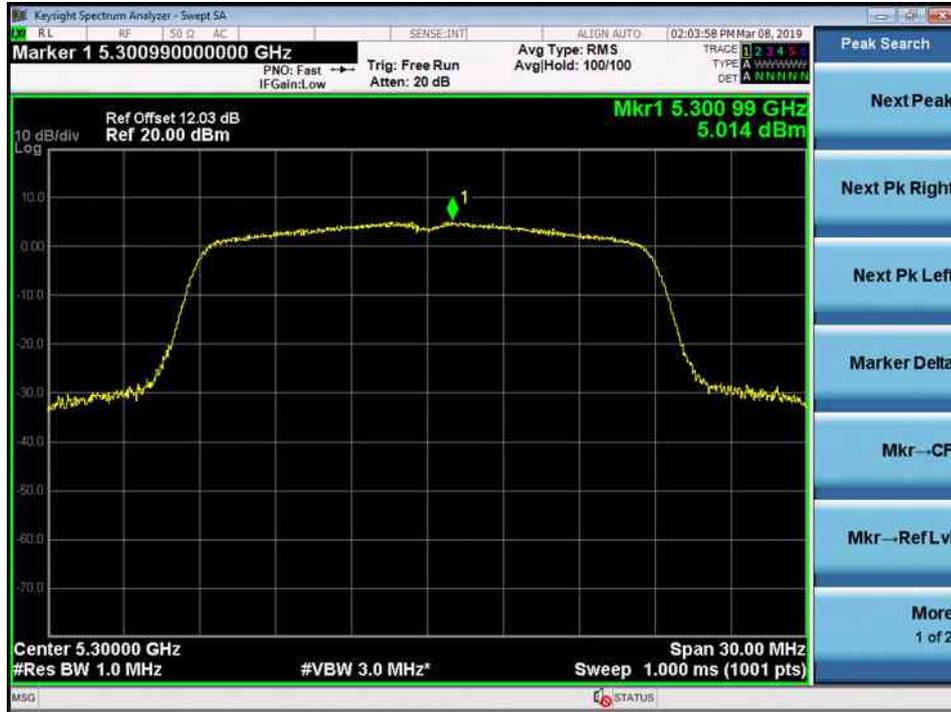
802.11a 5720MHz U-NII-3


802.11ac VHT20 5180MHz

802.11ac VHT20 5200MHz


802.11ac VHT20 5240MHz

802.11ac VHT20 5260MHz


802.11ac VHT20 5300MHz

802.11ac VHT20 5320MHz


802.11ac VHT20 5500MHz

802.11ac VHT20 5580MHz


802.11ac VHT20 5700MHz

802.11ac VHT20 5745MHz


802.11ac VHT20 5785MHz

802.11ac VHT20 5825MHz


802.11ac VHT20 5720MHz U-NII-2C

802.11ac VHT20 5720MHz U-NII-3


802.11ac VHT40 5190MHz

802.11ac VHT40 5230MHz

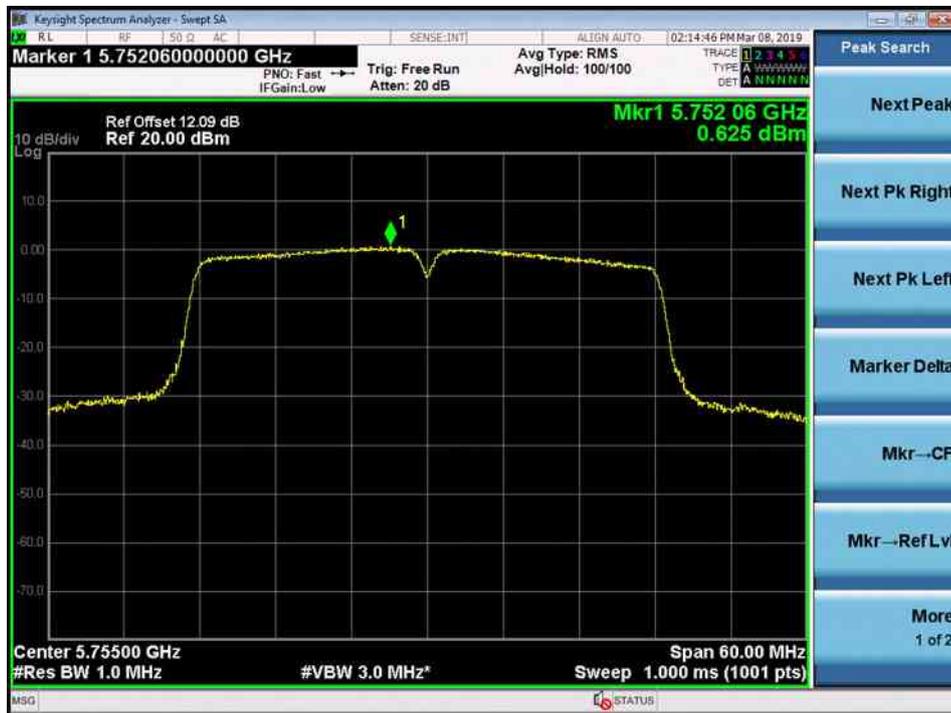

802.11ac VHT40 5270MHz

802.11ac VHT40 5310MHz


802.11ac VHT40 5510MHz

802.11ac VHT40 5550MHz

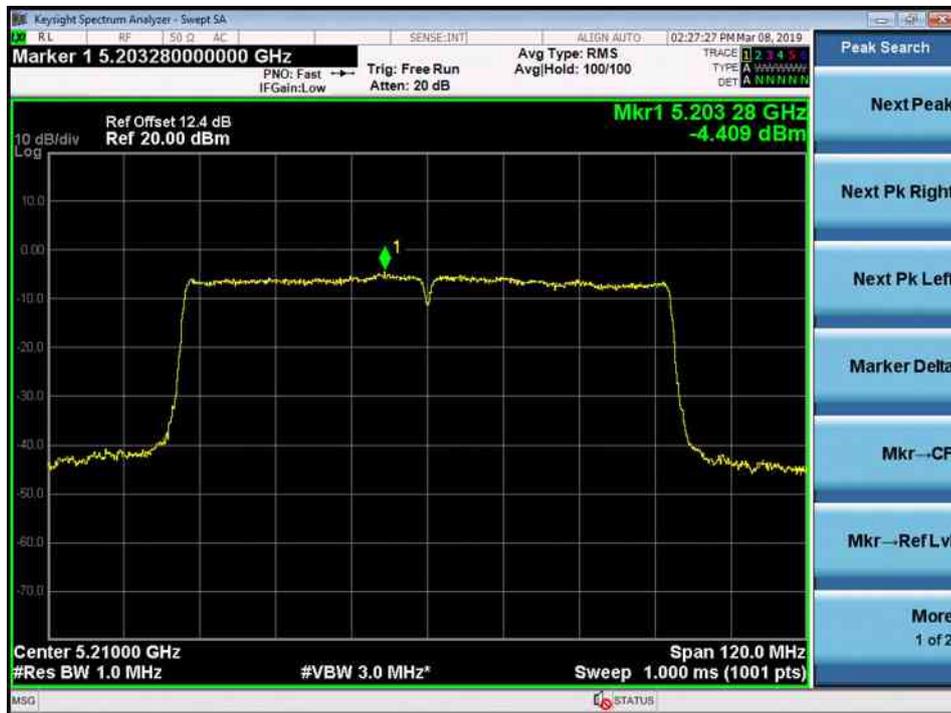

802.11ac VHT40 5670MHz

802.11ac VHT40 5755MHz


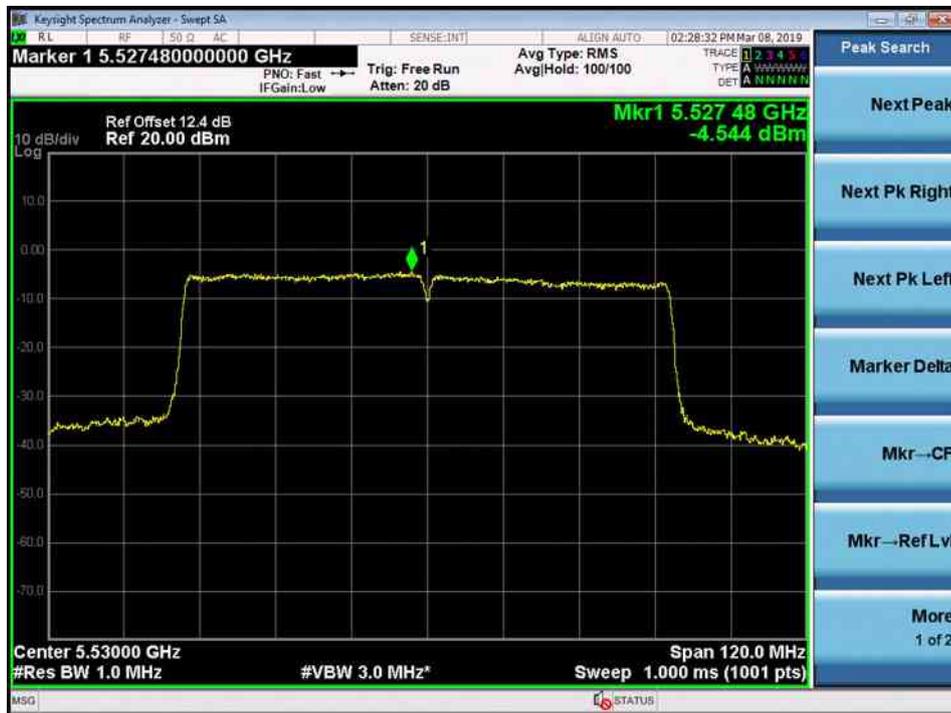
802.11ac VHT40 5795MHz

802.11ac VHT40 5710MHz U-NII-2C


802.11ac VHT40 5710MHz U-NII-3

802.11ac VHT80 5210MHz


802.11ac VHT80 5290MHz

802.11ac VHT80 5530MHz


802.11ac VHT80 5610MHz

802.11ac VHT80 5775MHz


802.11ac VHT80 5690MHz U-NII-2C

802.11ac VHT80 5690MHz U-NII-3

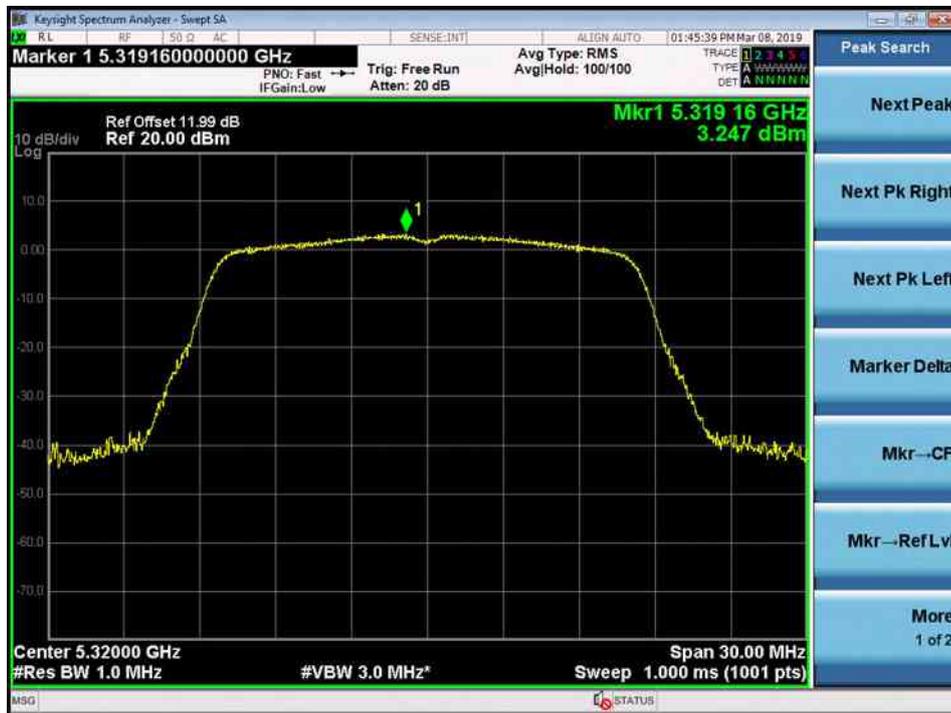

Test Plot of FCC / ISED Power Density Ant2
802.11a 5180MHz

802.11a 5200MHz


802.11a 5240MHz

802.11a 5260MHz


802.11a 5300MHz

802.11a 5320MHz


802.11a 5500MHz

802.11a 5580MHz


802.11a 5700MHz

802.11a 5745MHz


802.11a 5785MHz

802.11a 5825MHz


802.11a 5720MHz U-NII-2C

802.11a 5720MHz U-NII-3


802.11ac VHT20 5180MHz

802.11ac VHT20 5200MHz


802.11ac VHT20 5240MHz

802.11ac VHT20 5260MHz


802.11ac VHT20 5300MHz

802.11ac VHT20 5320MHz


802.11ac VHT20 5500MHz

802.11ac VHT20 5580MHz


802.11ac VHT20 5700MHz

802.11ac VHT20 5745MHz


802.11ac VHT20 5785MHz

802.11ac VHT20 5825MHz

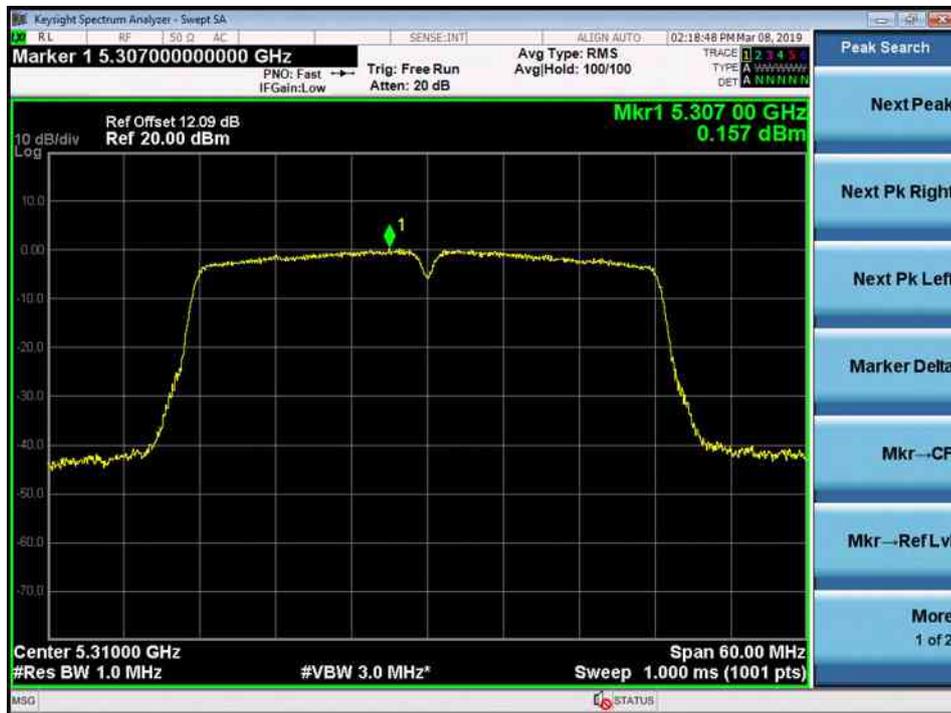

802.11ac VHT20 5720MHz U-NII-2C

802.11ac VHT20 5720MHz U-NII-3


802.11ac VHT40 5190MHz

802.11ac VHT40 5230MHz


802.11ac VHT40 5270MHz

802.11ac VHT40 5310MHz


802.11ac VHT40 5510MHz

802.11ac VHT40 5550MHz

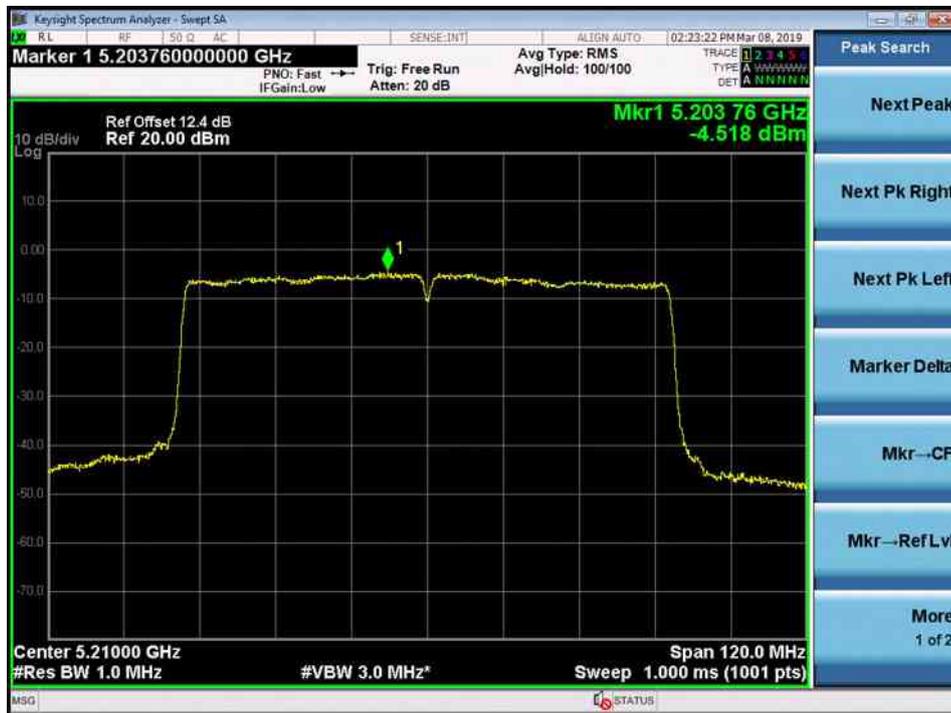

802.11ac VHT40 5670MHz

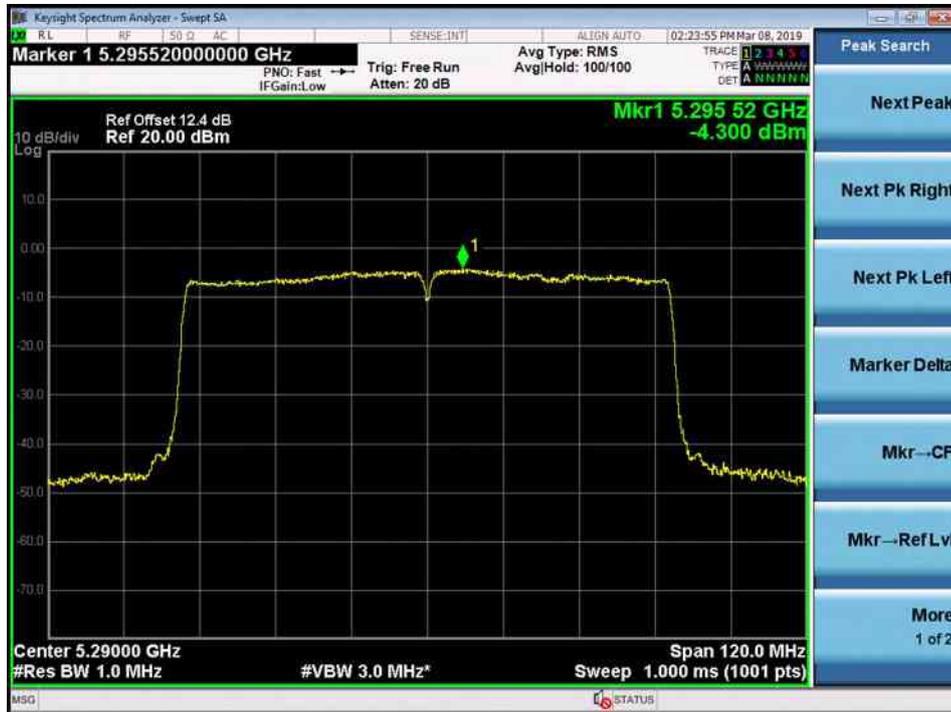
802.11ac VHT40 5755MHz


802.11ac VHT40 5795MHz

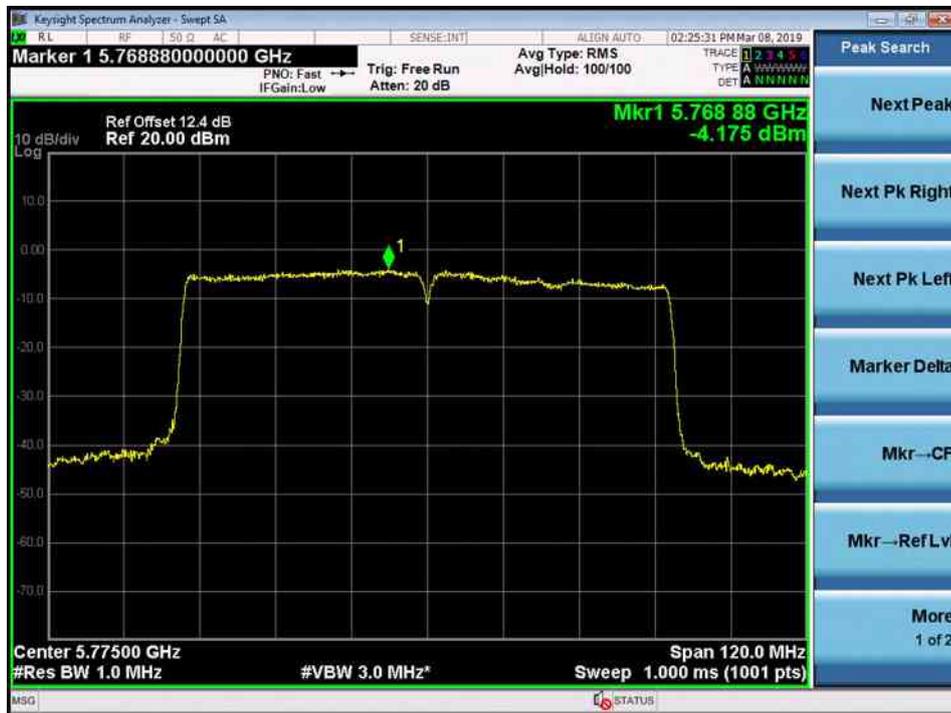
802.11ac VHT40 5710MHz U-NII-2C


802.11ac VHT40 5710MHz U-NII-3

802.11ac VHT80 5210MHz


802.11ac VHT80 5290MHz

802.11ac VHT80 5530MHz


802.11ac VHT80 5610MHz

802.11ac VHT80 5775MHz


802.11ac VHT80 5690MHz U-NII-2C

802.11ac VHT80 5690MHz U-NII-3


5.1.7 Frequency Stability Measurement

RESULT:
Passed

Test standard : FCC 15.407(g)
 Basic standard : ANSI C63.10: 2013
 Limits : ±20ppm
 Kind of test site : Shielded room

Test setup

Test Bandwidth : 20/40/80MHz
 Operation mode : A

Table 15: Test result of Frequency Stability

Bandwidth 20M

Voltage	Measurement Frequency (MHz)			
(V)	5200	5300	5580	5785
126.5	5199.9877	5299.9878	5579.9877	5784.9873
110	5199.9869	5299.9869	5579.9869	5784.9869
93.5	5199.9867	5299.9864	5579.9863	5784.9862
Max. Deviation (ppm)	2.56	2.57	2.46	2.39
Temperature	Measurement Frequency (MHz)			
(°C)	5200	5300	5580	5785
-20	5199.9804	5299.9828	5579.9822	5784.9844
-10	5199.9814	5299.9842	5579.9842	5784.9856
0	5199.9832	5299.9849	5579.9852	5784.9867
10	5199.9849	5299.9856	5579.9863	5784.9868
20	5199.9869	5299.9869	5579.9869	5784.9869
30	5199.9912	5299.9912	5579.9912	5784.9912
40	5199.9923	5299.9921	5579.9923	5784.9929
50	5199.9929	5299.9930	5579.9940	5784.9949
Max. Deviation (ppm)	3.77	3.25	3.19	2.70
Result	Pass			

Bandwidth 40M

Voltage	Measurement Frequency (MHz)			
(V)	5190	5310	5550	5755
126.5	5189.9870	5309.9873	5549.9872	5754.9873
110	5189.9869	5309.9869	5549.9869	5754.9869
93.5	5189.9862	5309.9868	5549.9860	5754.9866
Max. Deviation (ppm)	2.66	2.49	2.52	2.33
Temperature	Measurement Frequency (MHz)			
(°C)	5190	5310	5550	5755
-20	5189.9810	5309.9821	5549.9824	5754.9838
-10	5189.9824	5309.9829	5549.9842	5754.9847
0	5189.9841	5309.9844	5549.9843	5754.9854
10	5189.9861	5309.9860	5549.9850	5754.9860
20	5189.9869	5309.9869	5549.9869	5754.9869
30	5189.9912	5309.9912	5549.9912	5754.9912
40	5189.9929	5309.9915	5549.9922	5754.9931
50	5189.9947	5309.9934	5549.9928	5754.9937
Max. Deviation (ppm)	3.66	3.37	3.17	2.81
Result	Pass			

Bandwidth 80M

Voltage	Measurement Frequency (MHz)			
(V)	5210	5290	5530	5775
126.5	5209.9878	5289.9875	5529.9878	5774.9877
110	5209.9869	5289.9869	5529.9869	5774.9869
93.5	5209.9863	5289.9862	5529.9861	5774.9865
Max. Deviation (ppm)	2.63	2.61	2.51	2.34
Temperature	Measurement Frequency (MHz)			
(°C)	5210	5290	5530	5775
-20	5209.9834	5289.9836	5529.9809	5774.9826
-10	5209.9838	5289.9838	5529.9827	5774.9831
0	5209.9841	5289.9851	5529.9841	5774.9850
10	5209.9853	5289.9852	5529.9851	5774.9861
20	5209.9869	5289.9869	5529.9869	5774.9869
30	5209.9912	5289.9912	5529.9912	5774.9912
40	5209.9914	5289.9917	5529.9930	5774.9919
50	5209.9925	5289.9927	5529.9948	5774.9920
Max. Deviation (ppm)	3.19	3.10	3.45	3.01
Result	Pass			

5.1.8 Spurious Emission

RESULT:**Passed**

Test standard : FCC 15.205, FCC 15.209, FCC15.407, RSS-247 6.2 and RSS-Gen 8.10 , RSS-Gen 8.9
Basic standard : ANSI C63.10: 2013
Limits : Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-Gen i5, 8.10 (Table 7), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-Gen i5, 8.9 (Table 5 and 6).

Emission radiated outside the restricted and authorized frequency bands must either comply with the radiated emission limits specified for the restricted bands or in FCC15.407 and RSS-247 i2, 6.2

Kind of test site : 3m Semi-Anechoic Chamber

Test setup

Test Channel : Refer to Appendix D
Operation mode : A

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

Testing was carried out within frequency range 9kHz to the tenth harmonic. For details refer to Appendix D. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.

5.1.9 Dynamic Frequency Selection

RESULT:
Passed

Test standard : FCC Part 15.407(h)(2), RSS-247 6.3
 Basic standard : ANSI C63.10:2013, KDB905462 D02,
 KDB905462 D03
 Kind of test site : Shielded room

Test setup

Test Channel : 80M, 5290MHz, 5530MHz
 Operation Mode : B

Requirement :

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

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
<i>U-NII Detection Bandwidth and Statistical Performance Check</i>	All BW modes must be tested	Not required
<i>Channel Move Time and Channel Closing Transmission Time</i>	Test using widest BW mode available	Test using the widest BW mode available for the link
<i>All other tests</i>	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check (Section 7.B.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.

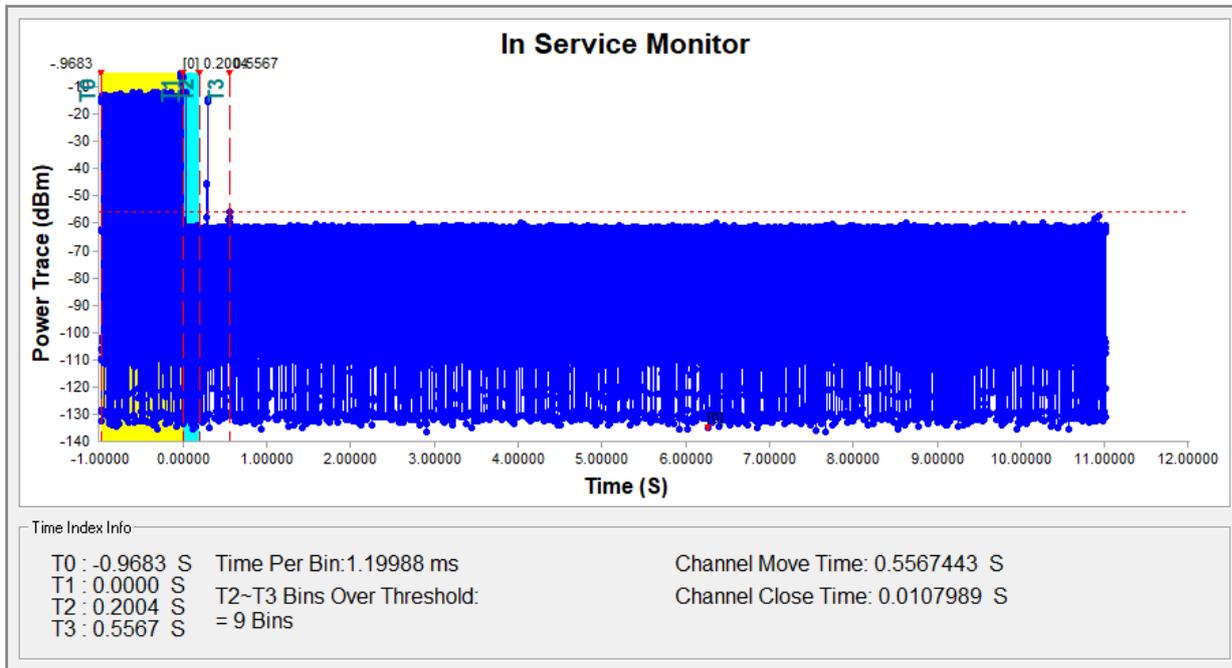
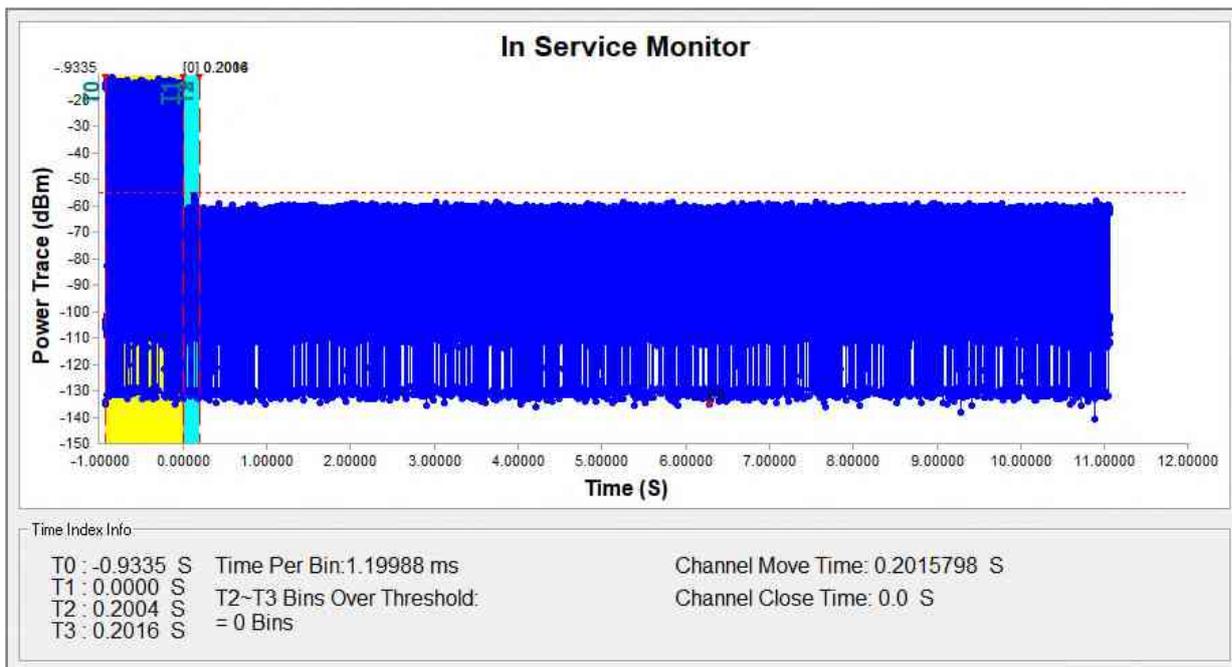
Limit :

Parameter	Value
<i>Non-occupancy period</i>	Minimum 30 minutes
<i>Channel Availability Check Time</i>	60 seconds
<i>Channel Move Time</i>	10 seconds See Note 1.
<i>Channel Closing Transmission Time</i>	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
<i>U-NII Detection Bandwidth</i>	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 to facilitate 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.

Test Plot of Bandwidth 80M 5290MHz DFS Result

Test Plot of Bandwidth 80M 5530MHz DFS Result


5.2 Mains Emissions

5.2.1 Mains Conducted Emissions

RESULT:**Passed**

Test standard : FCC Part 15.207
FCC Part 15.107
RSS-Gen 8.8

Limits : Mains Conducted emissions as defined in
above test standards must comply with the
mains conducted emission limits specified

Kind of test site : Shielded Room

Test setup

Test Channel : Refer to Appendix D
Operation mode : A

Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

Remark: For details refer to Appendix D.

6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:
Passed

Test standard : FCC CFR 47 Part 2 Subpart J Section 2.1091
 RSS-102 Issue 5, Table 4

Separation distance is more than 20 cm, thus mobile device exposure limits can be applied.

FCC Maximum Exposure:

Mode	Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Maximum Output Power (dBm)	Output Power (mW)	Power Density (S)(mW/cm ²)	Test Result
802.11ac VHT20	5260	2.86	1.9320	16.92	49.21	0.018925	Pass

Limit FCC: 1500-100,000 MHz 1.0 mW/cm²

IC Maximum Exposure:

Mode	Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Maximum Output Power (dBm)	Output Power (mW)	Power Density (S)(mW/cm ²)	Test Result
802.11ac VHT40	5190	2.86	1.9320	16.70	46.74	0.017973	Pass

Limit Canada: 0.537 mW/cm²

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/ f ^{1.2}

Note: f is frequency in MHz.

*Based on nerve stimulation (NS).

** Based on specific absorption rate (SAR).

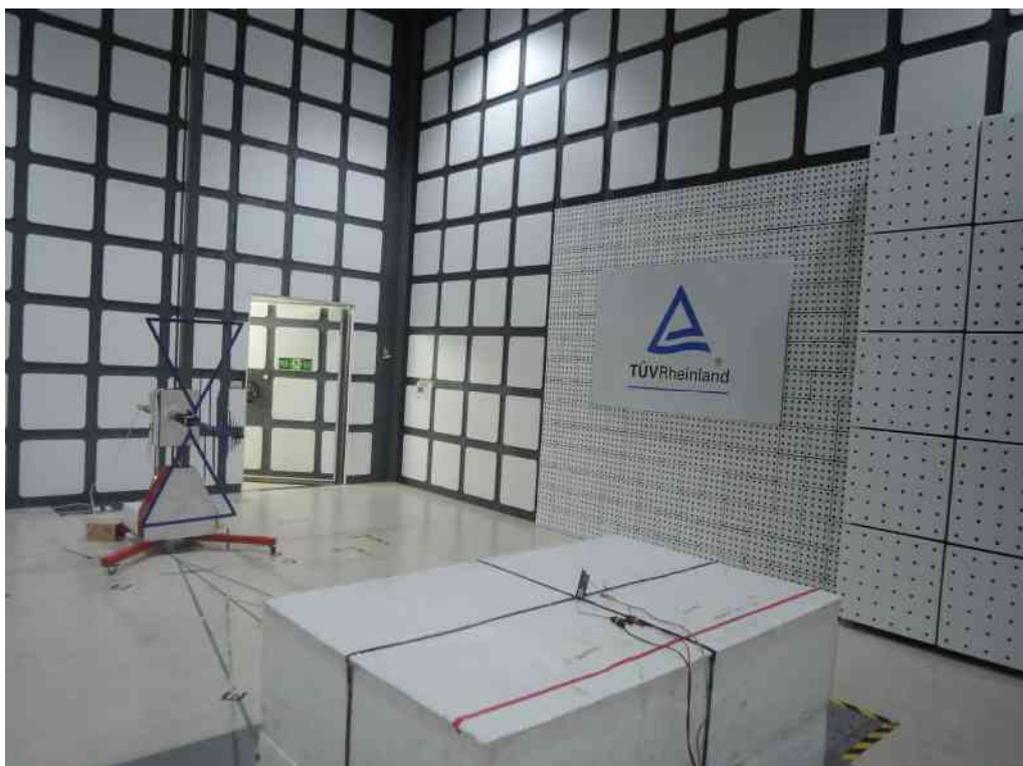
$$f = 5190, 0.02619f^{0.6834} = 0.905$$

7. Photographs of the Test Set-Up

Photograph 1: Set-up for Spurious Emissions (Front View)



Photograph 2: Set-up for Spurious Emissions (Back View 1)



Photograph 3: Set-up for Spurious Emissions (Back View 2)



Photograph 4: Set-up for Conducted testing



Photograph 5: Set-up for AC Mains (Front)



Photograph 6: Set-up for AC Mains (Back)



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