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TEST REPORT

Report No. ..... :	**CHTEW19070045** Report verification **:**
Project No. ..... :	**SHT1906060301EW**
FCC ID..... :	**2ATWR-WENC5719M**
Applicant's name..... :	**Beijing Aiterfeixiang Technologies Co., Ltd.**
Address.....:	1602 Building No.10, Changchunqiao Road No.5, Haidian District, Beijing, China
Manufacturer.....:	Beijing Aiterfeixiang Technologies Co., Ltd.
Address.....:	1602 Building No.10, Changchunqiao Road No.5, Haidian District, Beijing, China
Test item description ..... :	**Wireless Video & Audio Encoder/Extender**
Trade Mark .....:	-
Model/Type reference.....:	HEV-2KW
Listed Model(s) .....:	HEV-2KW,HEV-4KW,HEC-10,HEC-20,HEC-30,HEC-40,HEC-20B,HS-10,DD-2KW,DD-4KW,HDD-10,HDD-20,HDD-30,WHE-10,WHE-15,WHE-20
Standard ..... :	**FCC CFR Title 47 Part 15 Subpart E Section 15.407**
Date of receipt of test sample.....:	Jun.27, 2019
Date of testing.....:	Jun.27, 2019- Jul.12, 2019
Date of issue.....:	Jul.15, 2019
Result.....:	**PASS**

Compiled by (position+printedname+signature)...:	File administrators Echo Wei	Echo Wei
Supervised by (position+printedname+signature)....:	Project Engineer Jerry Zhao	Jerry zhao
Approved by (position+printedname+signature)....:	RF Manager Hans Hu	Hans Hu

Testing Laboratory Name ..... :	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address.....:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

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1. TEST STANDARDS AND REPORT VERSION

1.1. 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 v02r01: GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

1.2. Report Version

Revision No.	Date of issue	Description
N/A	2019-07-15	Original

2. TEST DESCRIPTION

Test Item	FCC Rule	Result	Test Engineer
Antenna Requirement	15.203	PASS	Bruce Wong
Line Conducted Emissions (AC Main)	15.207	PASS	Jiongsheng Feng
Maximum Conducted Output Power	15.407(a)	PASS	Bruce Wong
Maximum Power Spectral Density	15.407(a)	PASS	Bruce Wong
26dB Bandwidth and 99% Ocuppy bandwith	15.407(a)	PASS	Bruce Wong
6dB Bandwidth	15.407(a)	PASS	Bruce Wong
Band edge	15.407(b)	PASS	Jiongsheng Feng
Radiated Spurious Emissions	15.209	PASS	Jiongsheng Feng
Frequency Stability	15.407(g)	PASS	Bruce Wong
Dynamic Frequency Selection(DFS)	15.407(h)	PASS	Bruce Wong

Remark: The measurement uncertainty is not included in the test result.

3. SUMMARY

3.1. Client Information

Applicant:	Beijing Aiterfeixiang Technologies Co., Ltd.
Address:	1602 Building No.10, Changchunqiao Road No.5, Haidian District, Beijing, China
Manufacturer:	Beijing Aiterfeixiang Technologies Co., Ltd.
Address:	1602 Building No.10, Changchunqiao Road No.5, Haidian District, Beijing, China

3.2. Product Description

Name of EUT	Wireless Video & Audio Encoder/Extender		
Trade Mark:	-		
Model No.:	HEV-2KW		
Listed Model(s):	HEV-2KW,HEV-4KW,HEC-10,HEC-20,HEC-30,HEC-40,HEC-20B,HS-10,DD-2KW,DD-4KW,HDD-10,HDD-20,HDD-30,WHE-10,WHE-15,WHE-20		
Power supply:	DC 5V		
Adapter information:	-		
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:	802.11ac, 802.11n, 802.11a	
	40MHz:	802.11ac, 802.11n	
	80MHz:	802.11ac	
Antenna type:	1 Transmit, 1 Receive		
Antenna gain:	1 dBi		

3.3. 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		80MHz	
		Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
I	CH_L	36	5180	38	5190	-	-
	CH_M	44	5220	-	-	42	5210
	CH_H	48	5240	46	5230	-	-
II	CH_L	52	5260	54	5270	-	-
	CH_M	56	5280	-	-	58	5290
	CH_H	64	5320	62	5310	-	-
III	CH_L	100	5500	102	5510	106	5530
	CH_M	120	5600	118	5590	122	5610
	CH_H	140	5700	134	5670	138	5690
IV	CH_L	149	5745	151	5755	-	-
	CH_M	157	5785	-	-	155	5775
	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)/ 802.11ac(HT20)	MCS0
802.11n(HT40)/ 802.11ac(HT40)	MCS0
802.11ac(HT80)	MCS0

➢ **Test mode**

For RF test items
The engineering test program was provided and enabled to make EUT continuous transmit (duty cycle>98%).
For AC power line conducted emissions:
The EUT was set to connect with the WLAN AP under large package sizes transmission.
For Radiated suprious emissions test item:
The engineering test program was provided and enabled to make EUT continuous transmit(duty cycle>98%). The EUT in each of three orthogonal axis emissions had been tested ,but only the worst case (X axis) data Recorded in the report.

3.4. 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

3.5. Modifications

No modifications were implemented to meet testing criteria.

4. TEST ENVIRONMENT

4.1. Address of the test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China
Phone: 86-755-26748019 Fax: 86-755-26748089

4.2. Test Facility

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory 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-Registration No.: 762235

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files.

IC-Registration No.:5377B-1

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No.: 5377B-1.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

4.3. 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

4.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors in calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report according to TR-100028-01 “Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1” and TR-100028-02 “Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2” and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd. quality system according to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Here after the best measurement capability for Shenzhen Huatongwei International Inspection Co., Ltd. is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.51 dB	(1)
Conducted spurious emissions 9kHz~40GHz	0.51 dB	(1)
Conducted Disturbance 150kHz~30MHz	3.02 dB	(1)
Radiated Emissions below 1GHz	4.90 dB	(1)
Radiated Emissions above 1GHz	4.96 dB	(1)
Occupied Bandwidth	70 Hz	(1)
Frequency error	70 Hz	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

4.5. Equipments Used during the Test

●	Conducted Emission					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Shielded Room	Albatross projects	N/A	N/A	2018/09/28	2023/09/27
●	EMI Test Receiver	R&S	ESCI	101247	2018/10/27	2019/10/26
●	Artificial Mains	SCHWARZBECK	NNLK 8121	573	2018/10/27	2019/10/26
●	Pulse Limiter	R&S	ESH3-Z2	100499	2018/10/27	2019/10/26
●	RF Connection Cable	HUBER+SUHNER	EF400	N/A	2018/11/15	2019/11/14
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
○	Single Balanced Telecom Pair ISN	FCC	FCC-TLISN-T2-02	20371	2018/10/28	2019/10/27
○	Two Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T4-02	20373	2018/10/28	2019/10/27
○	Four Balanced Telecom Pairs ISN	FCC	FCC-TLISN-T8-02	20375	2018/10/28	2019/10/27
○	V-Network	R&S	ESH3-Z6	100211	2018/10/27	2019/10/26
○	V-Network	R&S	ESH3-Z6	100210	2018/10/27	2019/10/26
○	2-Line V-Network	R&S	ESH3-Z5	100049	2018/10/27	2019/10/26
●	Radiated Emission-6th test site					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-02	N/A	2018/09/30	2021/09/29
●	EMI Test Receiver	R&S	ESCI	100900	2018/10/28	2019/10/27
●	Loop Antenna	R&S	HFH2-Z2	100020	2017/11/20	2020/11/19
●	Ultra-Broadband Antenna	SCHWARZBECK	VULB9163	546	2017/04/05	2020/04/04
●	Pre-Amplifer	SCHWARZBECK	BBV 9742	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	N/A	N/A	2018/09/28	2019/09/27
●	RF Connection Cable	HUBER+SUHNER	SUCOFLEX104	501184/4	2018/09/28	2019/09/27
●	Test Software	R&S	ES-K1	N/A	N/A	N/A
●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A
●	Radiated emission-7th test site					
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Semi-Anechoic Chamber	Albatross projects	SAC-3m-01	N/A	2018/09/30	2021/09/29
●	Spectrum Analyzer	R&S	FSP40	100597	2018/10/27	2019/10/26
●	Horn Antenna	SCHWARZBECK	9120D	1011	2017/03/27	2020/03/26
●	Pre-amplifier	BONN	BLWA0160-2M	1811887	2018/11/14	2019/11/13
●	Pre-amplifier	CD	PAP-0102	12004	2018/11/14	2019/11/13
●	Broadband Pre-amplifier	SCHWARZBECK	BBV 9718	9718-248	2019/04/26	2020/04/25
●	RF Connection Cable	HUBER+SUHNER	RE-7-FH	N/A	2018/11/15	2019/11/14
●	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	2018/11/15	2019/11/14
●	Test Software	Audix	E3	N/A	N/A	N/A
●	Turntable	Maturo Germany	TT2.0-1T	N/A	N/A	N/A
●	Antenna Mast	Maturo Germany	CAM-4.0-P-12	N/A	N/A	N/A

● RF Conducted Method						
Used	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
●	Signal and spectrum Analyzer	R&S	FSV40	100048	2018/10/28	2019/10/27
●	Spectrum Analyzer	Agilent	N9020A	MY50510187	2018/09/29	2019/09/28
●	OSP	R&S	OSP120	101317	N/A	N/A
○	Radio communication tester	R&S	CMW500	137688-Lv	2018/09/29	2019/09/28
○	Test software	Tonscend	JS1120-1(LTE)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-2(WIFI)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-3(WCDMA)	N/A	N/A	N/A
○	Test software	Tonscend	JS1120-4(GSM)	N/A	N/A	N/A

5. TEST CONDITIONS AND RESULTS

5.1. Antenna requirement

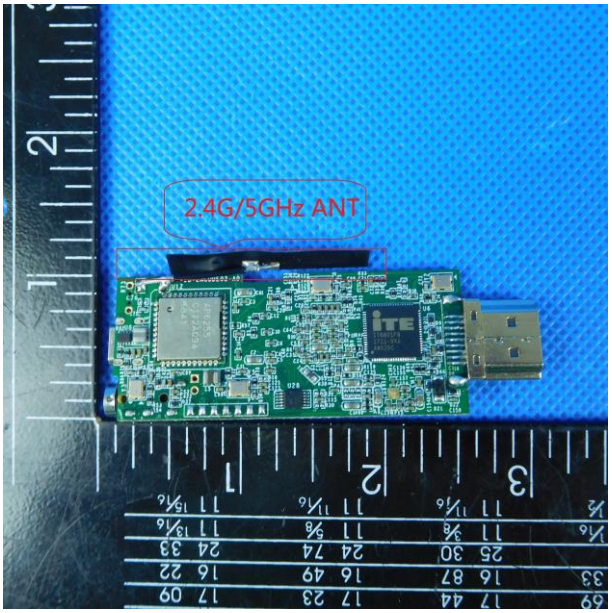
Requirement

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)

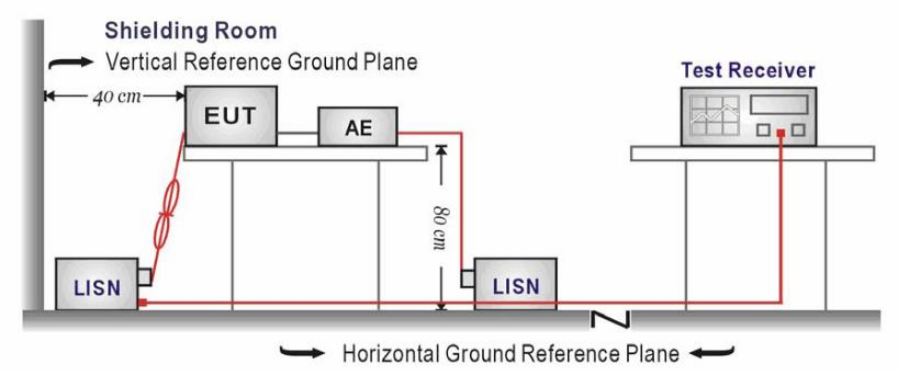
LIMIT

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:

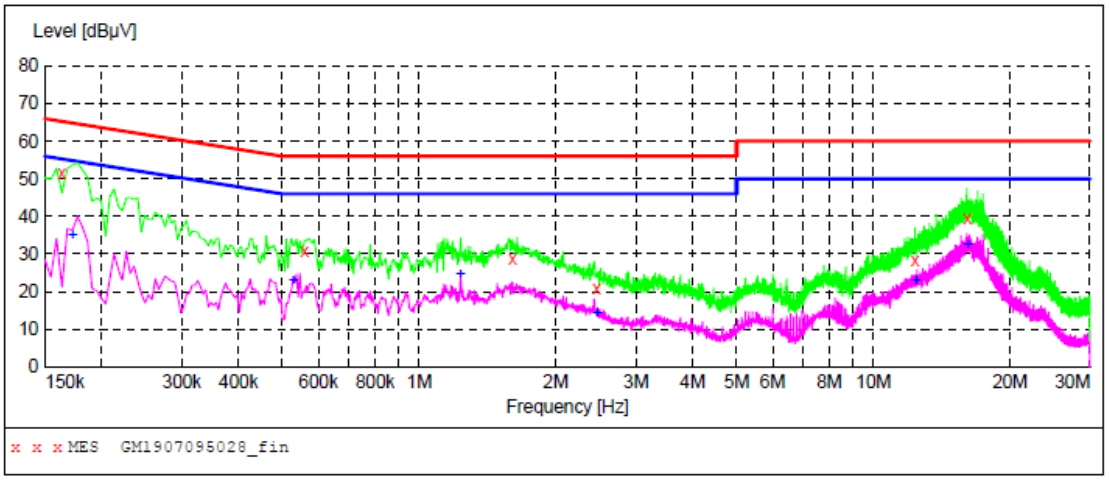
Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

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

Test Line:	L



MEASUREMENT RESULT: "GM1907095028_fin"

7/9/2019 5:12PM

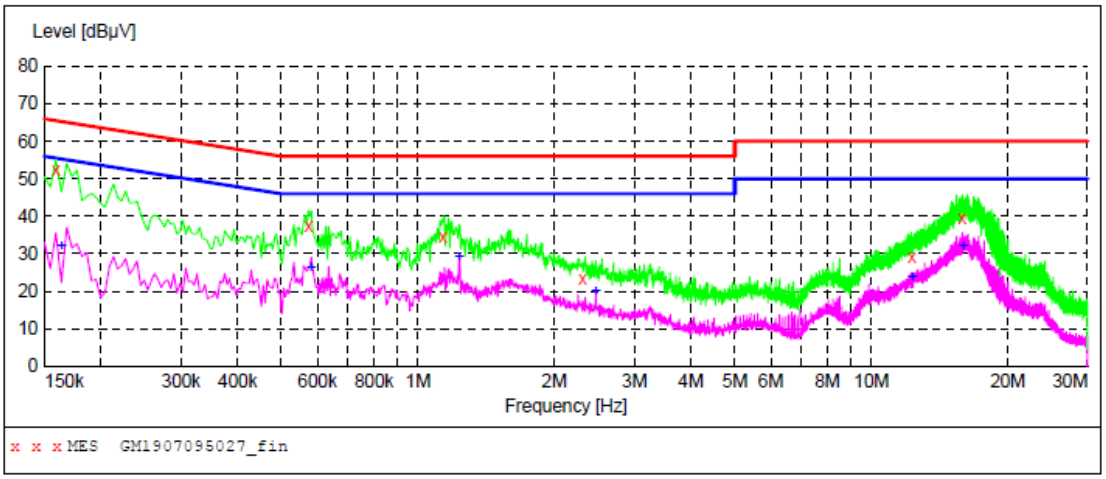
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.163500	51.40	9.9	65	13.9	QP	L1	GND
0.559500	30.70	9.9	56	25.3	QP	L1	GND
1.603500	28.70	9.9	56	27.3	QP	L1	GND
2.458500	20.90	9.9	56	35.1	QP	L1	GND
12.358500	28.50	10.1	60	31.5	QP	L1	GND
16.107000	39.40	10.2	60	20.6	QP	L1	GND

MEASUREMENT RESULT: "GM1907095028_fin2"

7/9/2019 5:12PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.172500	34.90	9.9	55	19.9	AV	L1	GND
0.528000	23.10	9.9	46	22.9	AV	L1	GND
1.234500	24.50	9.9	46	21.5	AV	L1	GND
2.463000	14.40	9.9	46	31.6	AV	L1	GND
12.430500	23.00	10.1	50	27.0	AV	L1	GND
16.116000	32.60	10.2	50	17.4	AV	L1	GND

Test Line:	N



MEASUREMENT RESULT: "GM1907095027_fin"

7/9/2019 5:10PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.159000	52.20	9.9	66	13.3	QP	N	GND
0.573000	37.40	9.9	56	18.6	QP	N	GND
1.135500	34.40	9.9	56	21.6	QP	N	GND
2.305500	23.30	9.9	56	32.7	QP	N	GND
12.286500	29.10	10.1	60	30.9	QP	N	GND
15.877500	39.40	10.2	60	20.6	QP	N	GND

MEASUREMENT RESULT: "GM1907095027_fin2"

7/9/2019 5:10PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.163500	32.00	9.9	55	23.3	AV	N	GND
0.582000	26.20	9.9	46	19.8	AV	N	GND
1.234500	29.00	9.9	46	17.0	AV	N	GND
2.467500	19.80	9.9	46	26.2	AV	N	GND
12.300000	23.80	10.1	50	26.2	AV	N	GND
15.913500	32.10	10.2	50	17.9	AV	N	GND

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).

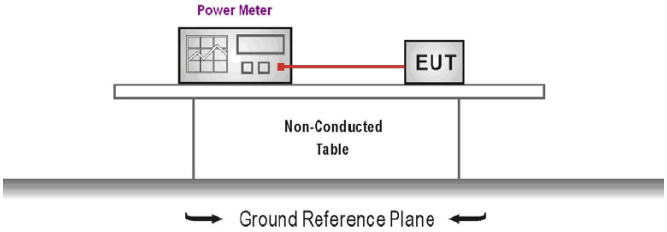
For the 5.47~5.725GHz band:

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).

TEST CONFIGURATION



TEST PROCEDURE

1. The EUT was tested according to KDB789033 Section E-3-b)
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.
4. 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.
5. Record the measurement data.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Band	Bandwidth (MHz)	Type	Channel	Conducted Output Power (dBm)	Limit (dBm)	Result
I	20	802.11ac	CH_L	8.33	24.00	Pass
			CH_M	10.01		
			CH_H	8.83		
		802.11n	CH_L	8.68	24.00	Pass
			CH_M	10.00		
			CH_H	8.86		
		802.11a	CH_L	8.58	24.00	Pass
			CH_M	10.14		
			CH_H	9.21		
	40	802.11ac	CH_L	8.29	24.00	Pass
			CH_H	8.41		
		802.11n	CH_L	8.37	24.00	Pass
			CH_H	8.49		
	80	802.11ac	CH_M	8.92	24.00	Pass
II	20	802.11ac	CH_L	8.13	24.00	Pass
			CH_M	9.64		
			CH_H	8.67		
		802.11n	CH_L	8.10	24.00	Pass
			CH_M	9.63		
			CH_H	8.77		
		802.11a	CH_L	8.01	24.00	Pass
			CH_M	7.84		
			CH_H	8.75		
	40	802.11ac	CH_L	8.06	24.00	Pass
			CH_H	8.91		
		802.11n	CH_L	7.93	24.00	Pass
			CH_H	8.83		
	80	802.11ac	CH_M	8.07	24.00	Pass

Band	Bandwidth (MHz)	Type	Channel	Conducted Output Power (dBm)	Limit (dBm)	Result
III	20	802.11ac	CH_L	8.09	24.00	Pass
			CH_M	8.02		
			CH_H	8.18		
		802.11n	CH_L	8.84	24.00	Pass
			CH_M	8.63		
			CH_H	7.34		
		802.11a	CH_L	8.44	24.00	Pass
			CH_M	8.80		
			CH_H	8.03		
	40	802.11ac	CH_L	8.87	24.00	Pass
			CH_M	8.48		
			CH_H	8.12		
		802.11n	CH_L	8.55	24.00	Pass
			CH_M	8.57		
			CH_H	7.93		
	80	802.11ac	CH_L	8.01	24.00	Pass
			CH_M	8.09		
			CH_H	8.02		
IV	20	802.11ac	CH_L	8.16	30.00	Pass
			CH_M	8.88		
			CH_H	8.83		
		802.11n	CH_L	8.33	30.00	Pass
			CH_M	8.85		
			CH_H	8.85		
		802.11a	CH_L	8.28	30.00	Pass
			CH_M	8.84		
			CH_H	8.86		
	40	802.11ac	CH_L	8.05	30.00	Pass
			CH_H	8.76		
		802.11n	CH_L	8.02	30.00	Pass
			CH_H	8.87		
	80	802.11ac	CH_M	8.43	30.00	Pass

5.4. Maximum Power Spectral Density

LIMIT

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

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).

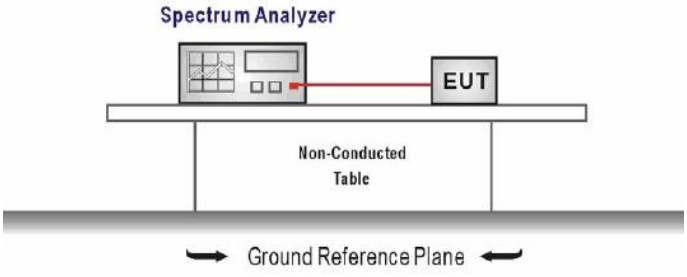
For the 5.47~5.725GHz band:

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

1. According KDB 789033 D02 – Section F
2. Analyzer was setting as follow:
   Center frequency: test channel
   Span was set to encompass the entire emission bandwidth of the signal
   RBW=1MHz for devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz
   RBW=500kHz for devices operating in the band 5.725-5.85 GHz
   VBW ≥ 3 RBW
   Number of sweep points > 2 x (span/RBW)
   Sweep time = auto
   Detector = Peak
   Trigger was set to free run for all modes, trace was averaged over 100 sweeps
3. 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

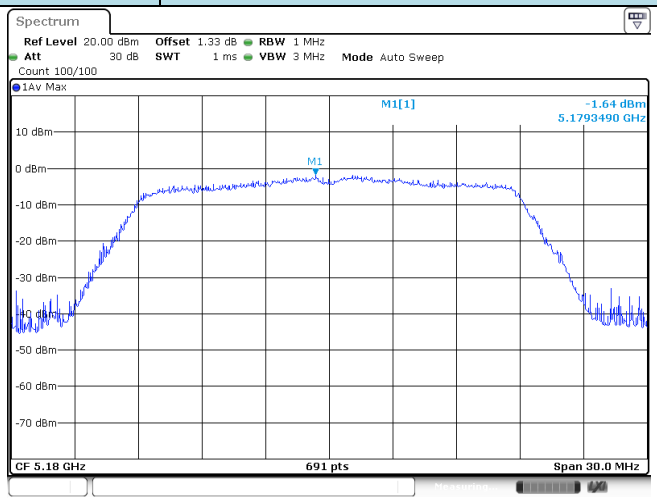
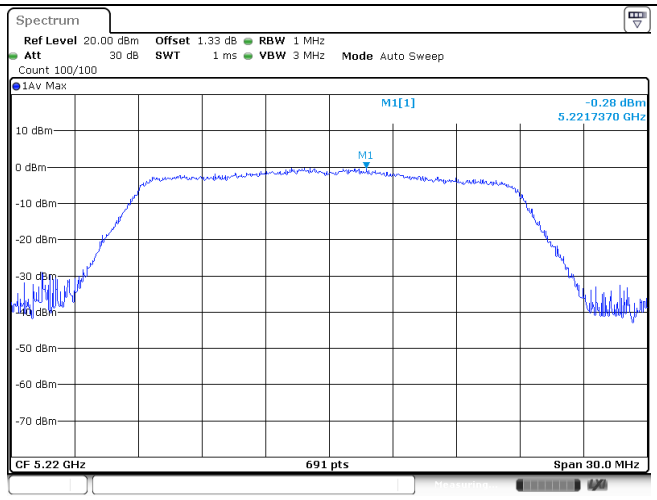
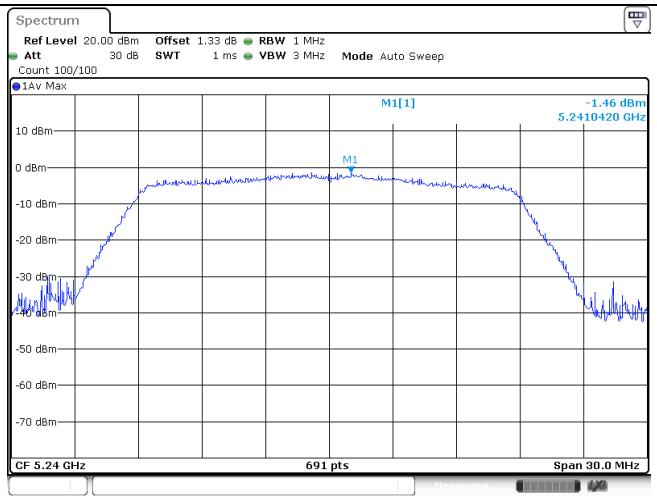
TEST RESULTS

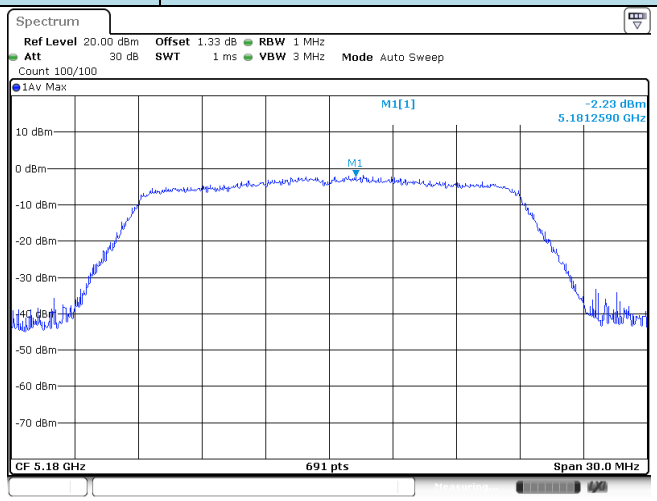
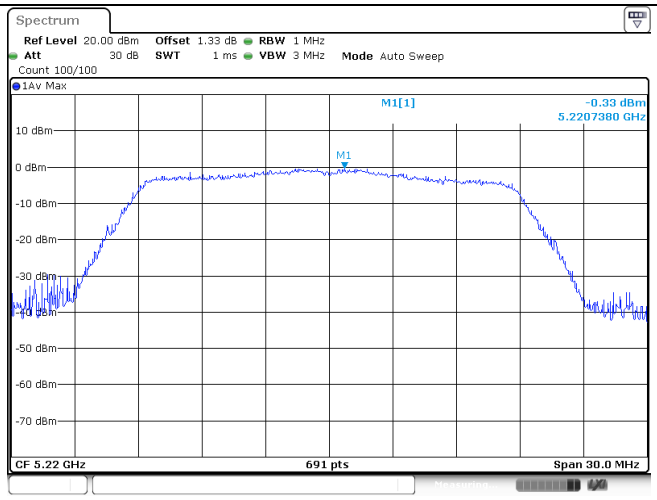
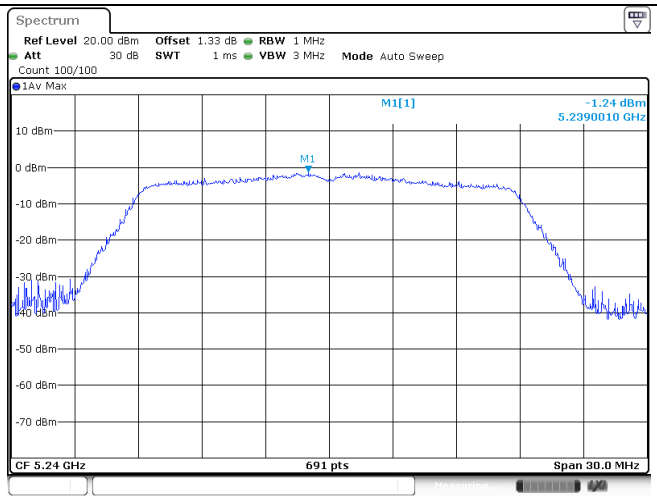
☒ **Passed** ☐ **Not Applicable**

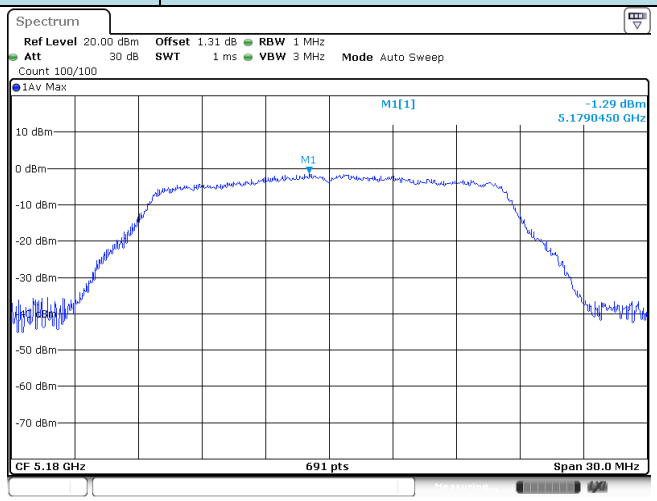
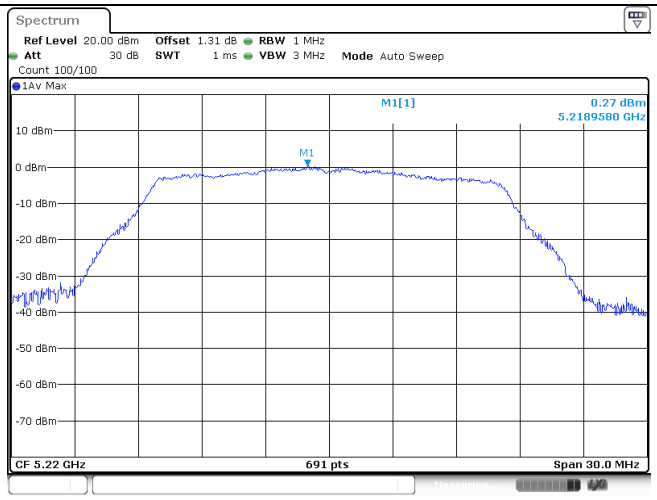
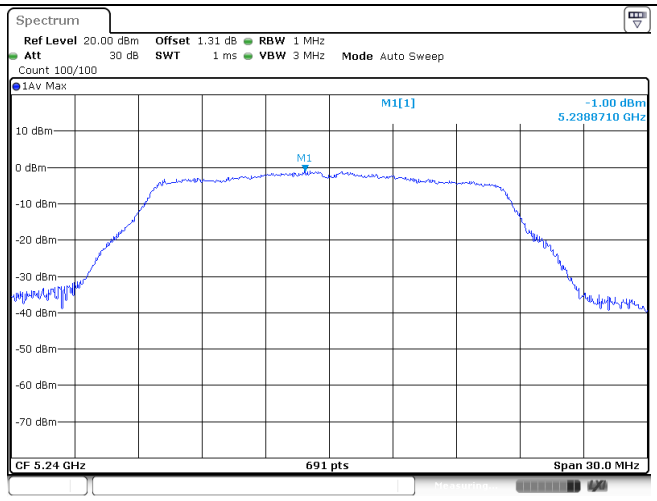
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
I	20	802.11ac	CH_L	-1.64	11.00	Pass
			CH_M	-0.28		
			CH_H	-1.46		
		802.11n	CH_L	-2.23	11.00	Pass
			CH_M	-0.33		
			CH_H	-1.24		
		802.11a	CH_L	-1.29	11.00	Pass
			CH_M	0.27		
			CH_H	-1.00		
	40	802.11ac	CH_L	-4.66	11.00	Pass
			CH_H	-4.82		
		802.11n	CH_L	-4.93	11.00	Pass
			CH_H	-4.82		
	80	802.11ac	CH_M	-5.54	11.00	Pass
II	20	802.11ac	CH_L	-2.42	11.00	Pass
			CH_M	-0.35		
			CH_H	-1.75		
		802.11n	CH_L	-2.33	11.00	Pass
			CH_M	-0.54		
			CH_H	-1.09		
		802.11a	CH_L	-2.09	11.00	Pass
			CH_M	-2.32		
			CH_H	-1.59		
	40	802.11ac	CH_L	-5.08	11.00	Pass
			CH_H	-4.26		
		802.11n	CH_L	-4.92	11.00	Pass
			CH_H	-4.10		
	80	802.11ac	CH_M	-7.40	11.00	Pass

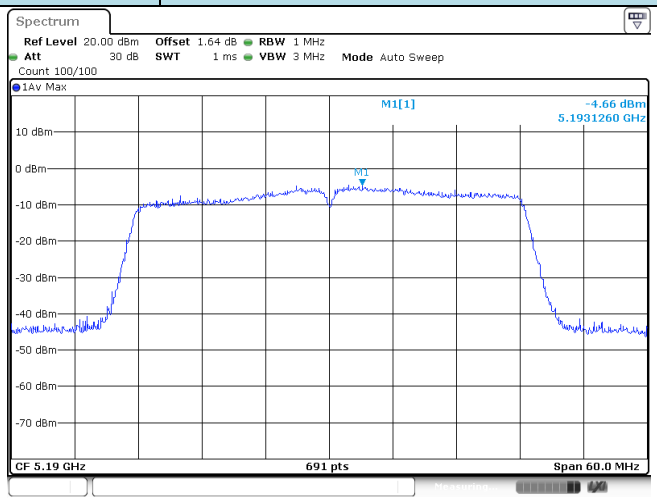
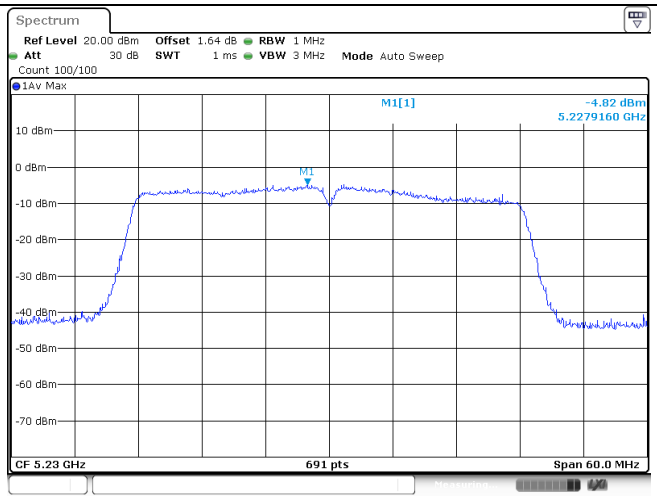
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/MHz)	Limit (dBm/MHz)	Result
III	20	802.11ac	CH_L	-2.16	11.00	Pass
			CH_M	-2.63		
			CH_H	-2.45		
		802.11n	CH_L	-1.15	11.00	Pass
			CH_M	-1.86		
			CH_H	-3.18		
		802.11a	CH_L	-1.51	11.00	Pass
			CH_M	-1.16		
			CH_H	-2.08		
	40	802.11ac	CH_L	-4.27	11.00	Pass
			CH_M	-4.77		
			CH_H	-5.20		
		802.11n	CH_L	-4.54	11.00	Pass
			CH_M	-4.00		
			CH_H	-4.78		
	80	802.11ac	CH_L	-8.74	11.00	Pass
			CH_M	-8.47		
			CH_H	-8.96		
Band	Bandwidth (MHz)	Type	Channel	Power Spectral Density (dBm/500kHz)	Limit (dBm/500KHz)	Result
IV	20	802.11ac	CH_L	-3.34	30.00	Pass
			CH_M	-2.90		
			CH_H	-2.77		
		802.11n	CH_L	-3.21	30.00	Pass
			CH_M	-2.29		
			CH_H	-2.11		
		802.11a	CH_L	-3.11	30.00	Pass
			CH_M	-2.71		
			CH_H	-2.38		
	40	802.11ac	CH_L	-6.59	30.00	Pass
			CH_H	-6.00		
		802.11n	CH_L	-6.35	30.00	Pass
			CH_H	-5.62		
	80	802.11ac	CH_M	-9.53	30.00	Pass

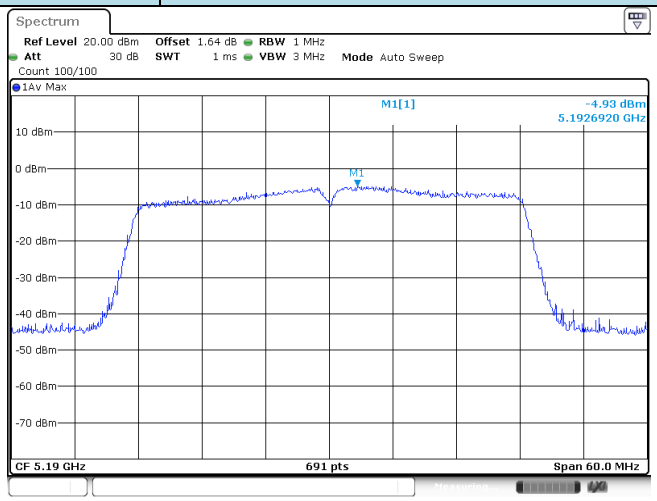
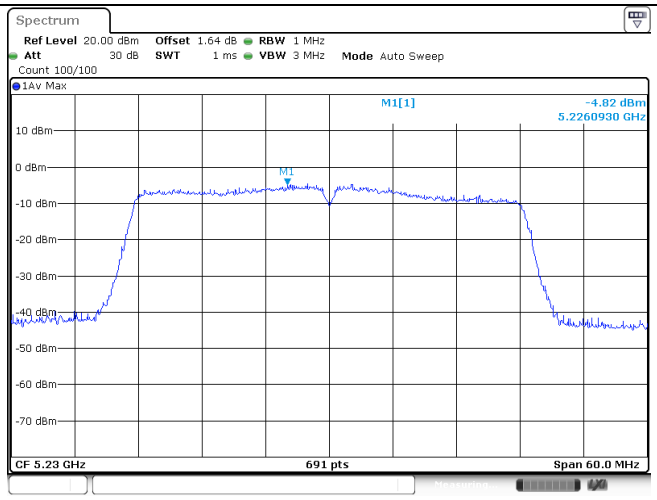
Test plot as follows:

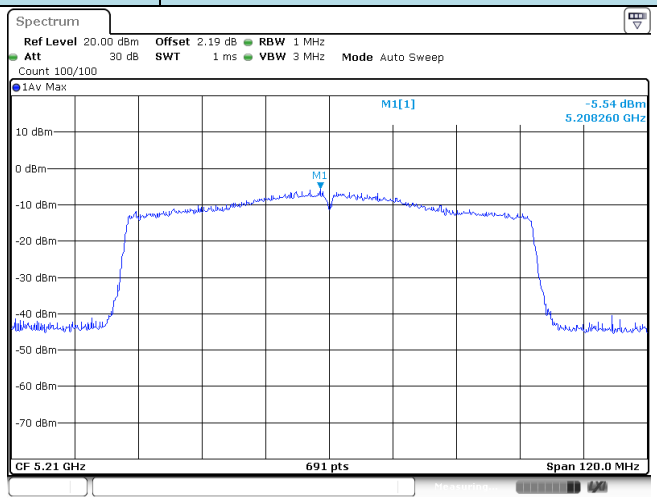
Band I	802.11ac (HT20)
CH_L	
CH_M	
CH_H	

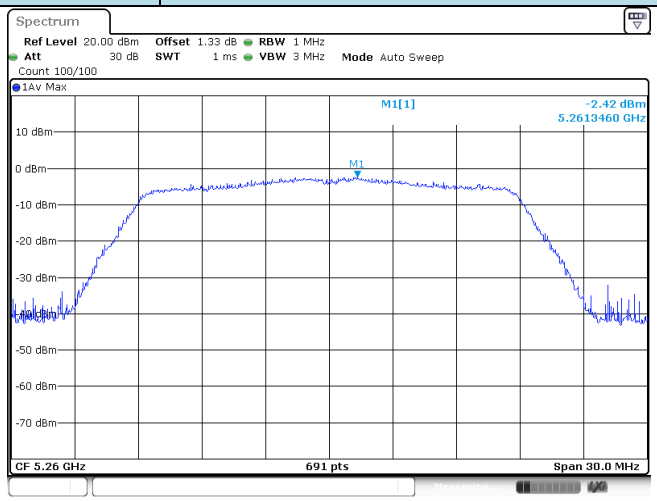
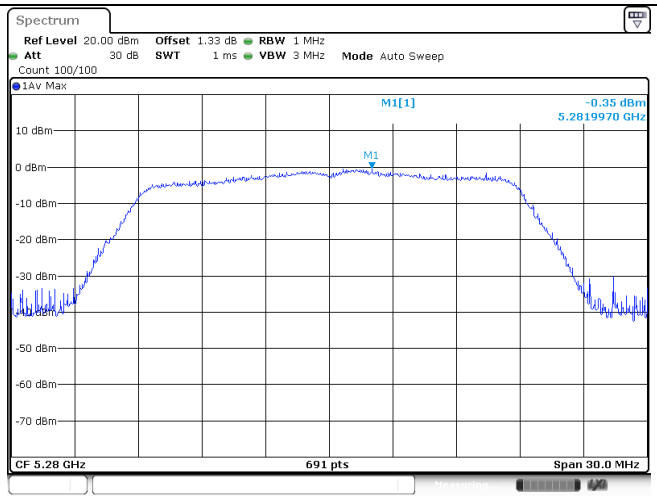
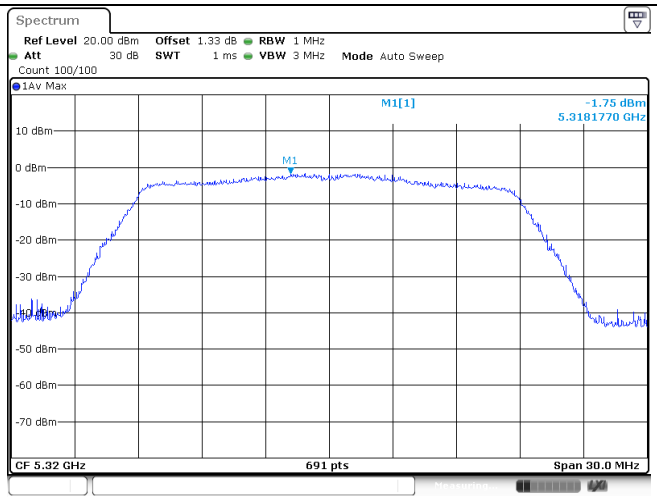
Band I	802.11n (HT20)
CH_L	
CH_M	
CH_H	

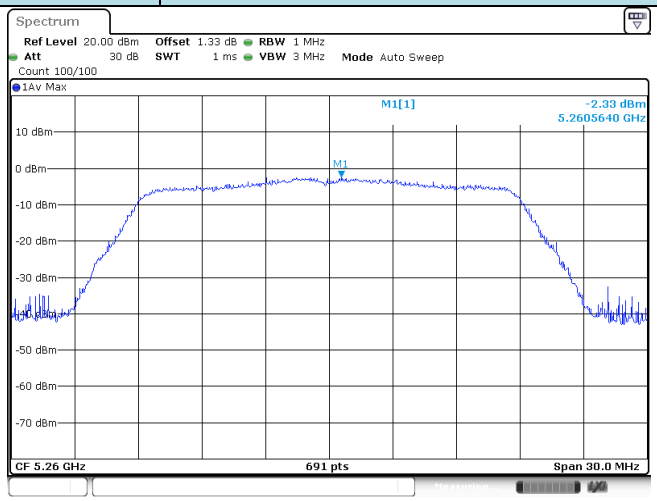
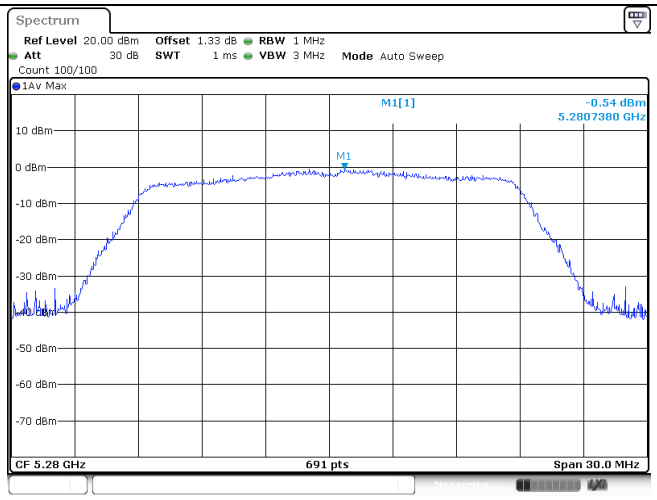
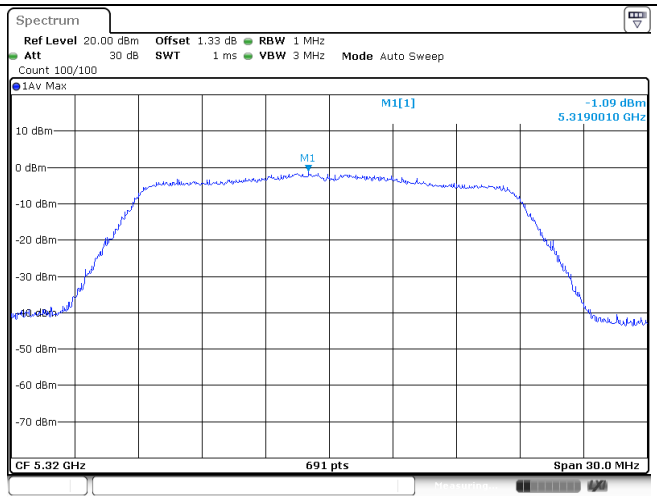
Band I	802.11a
CH_L	
CH_M	
CH_H	

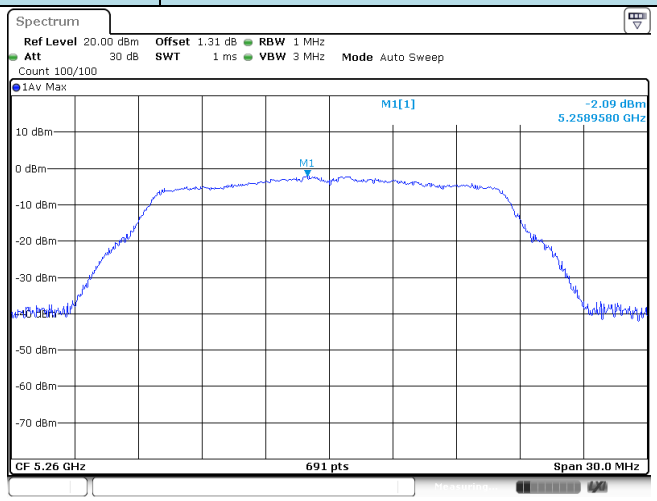
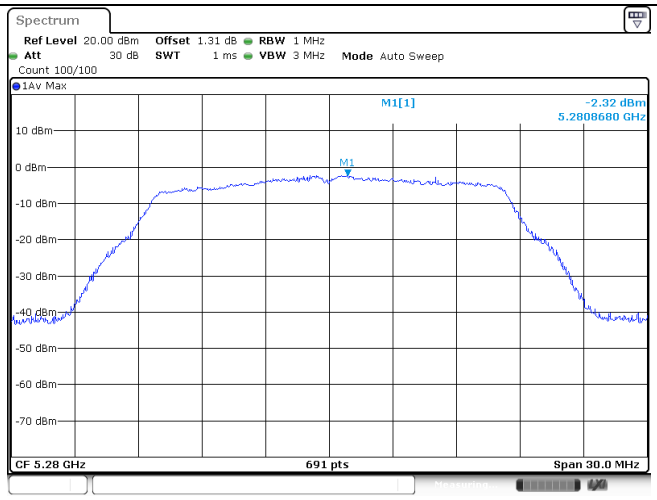
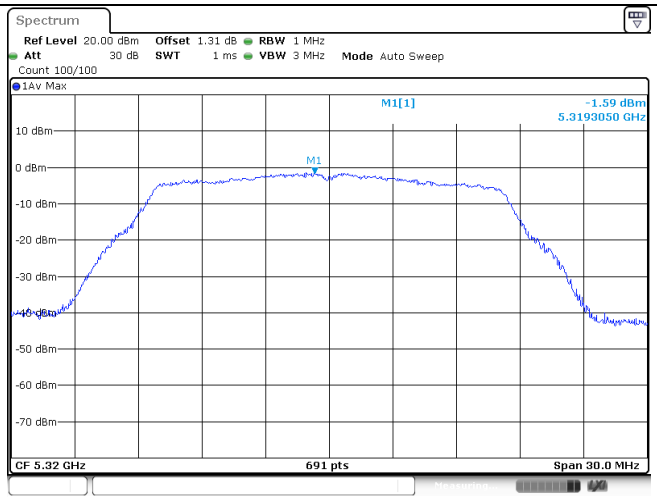
Band I	802.11ac (HT40)
CH_L	
CH_H	

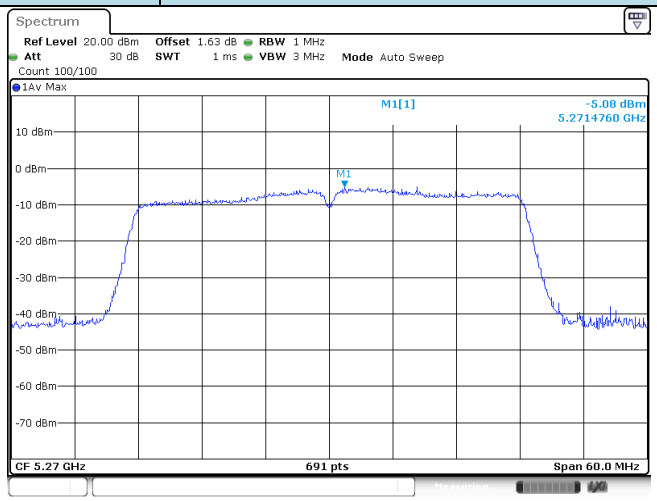
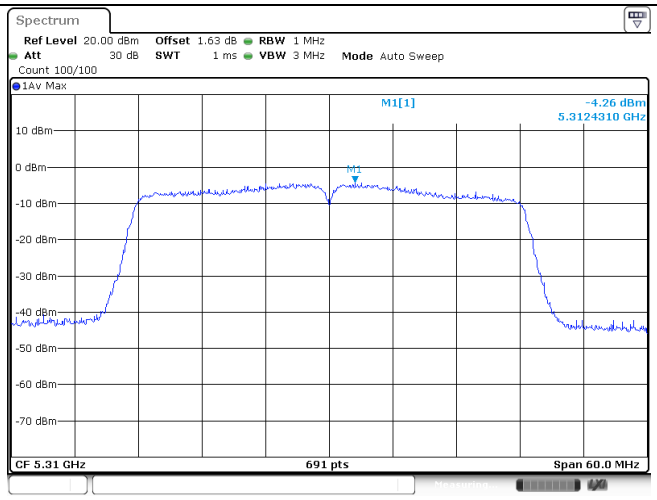
Band I	802.11n (HT40)
CH_L	
CH_H	

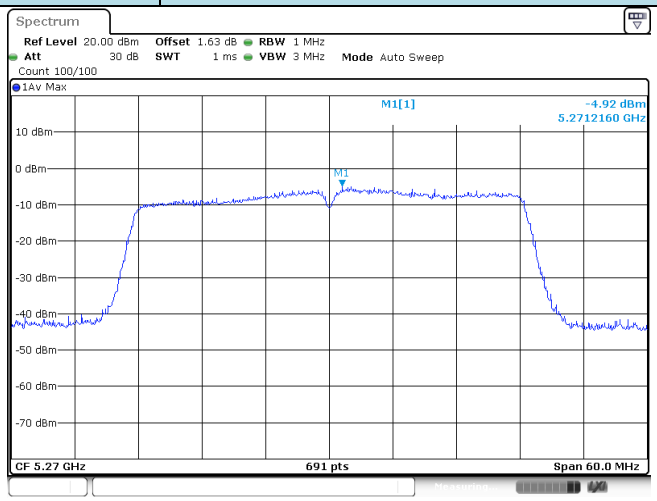
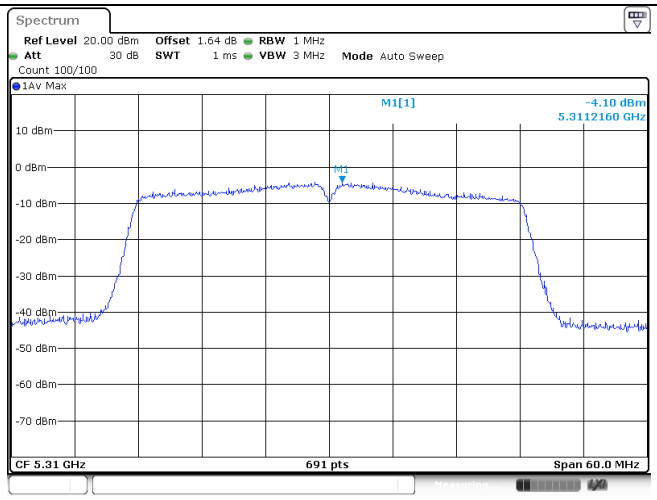
Band I	802.11ac (HT80)
CH_M	

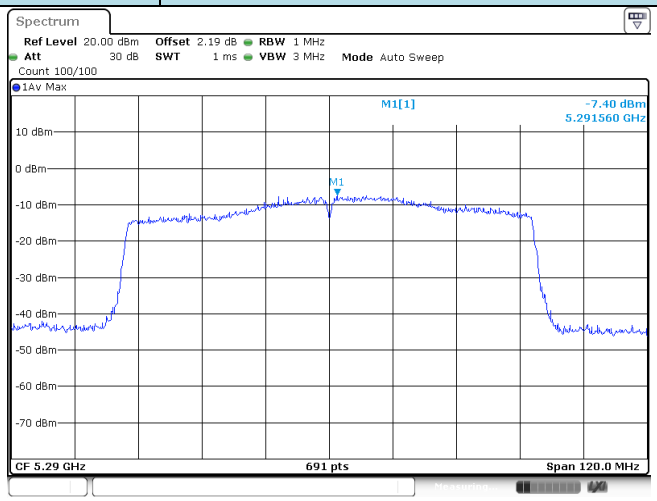
Band II	802.11ac (HT20)
CH_L	
CH_M	
CH_H	

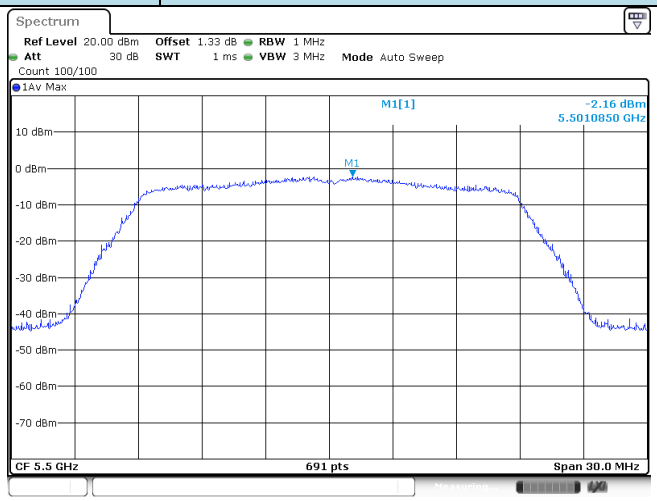
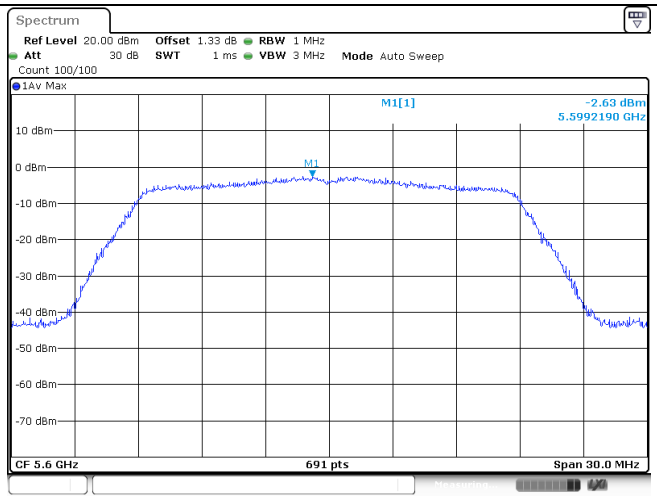
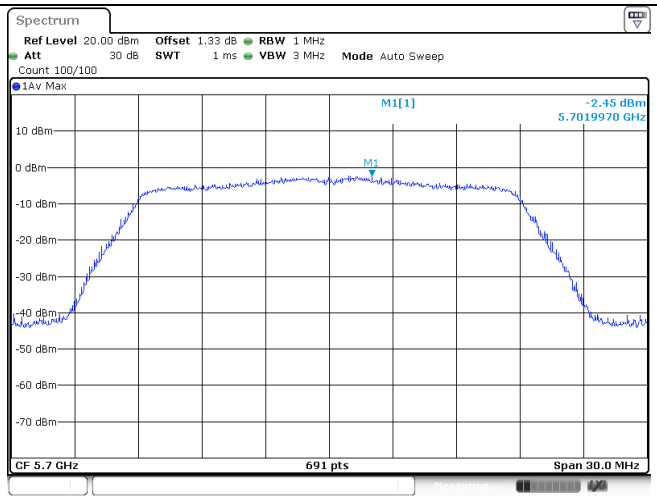
Band II	802.11n (HT20)
CH_L	
CH_M	
CH_H	

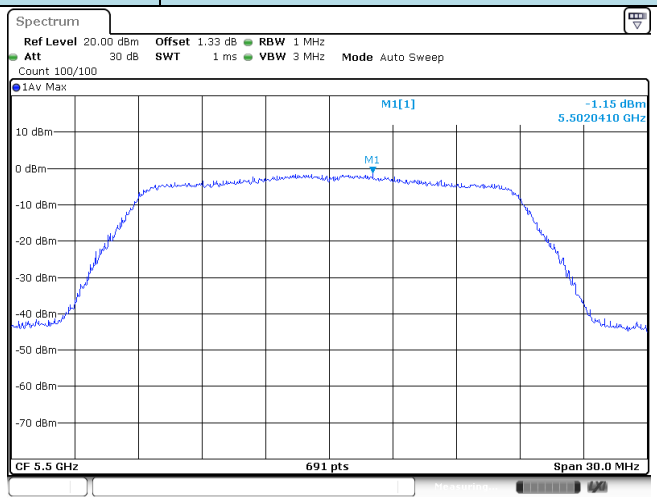
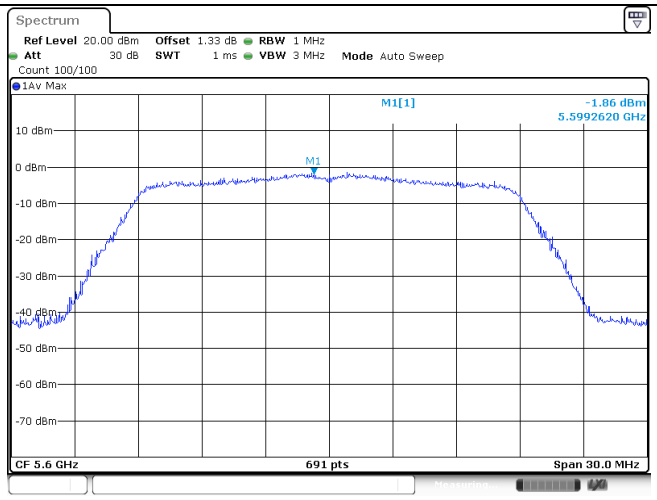
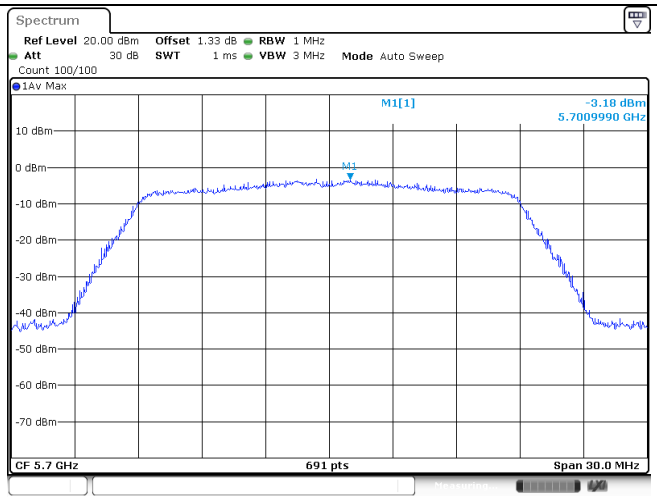
Band II	802.11a
CH_L	
CH_M	
CH_H	

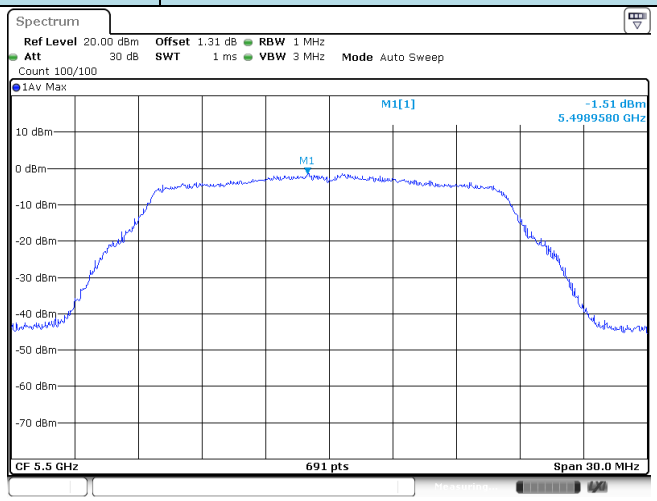
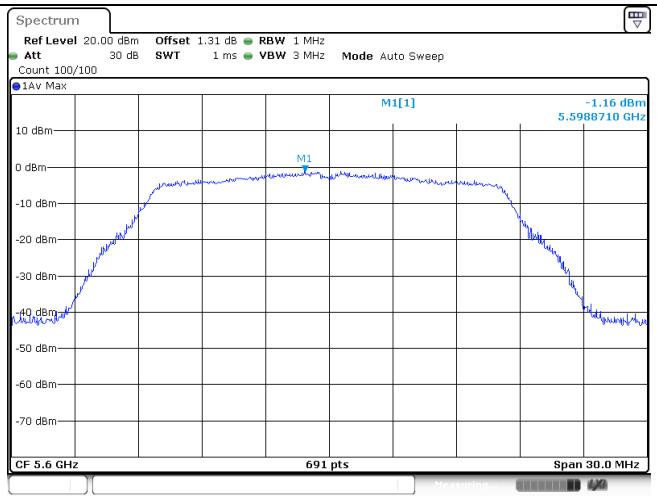
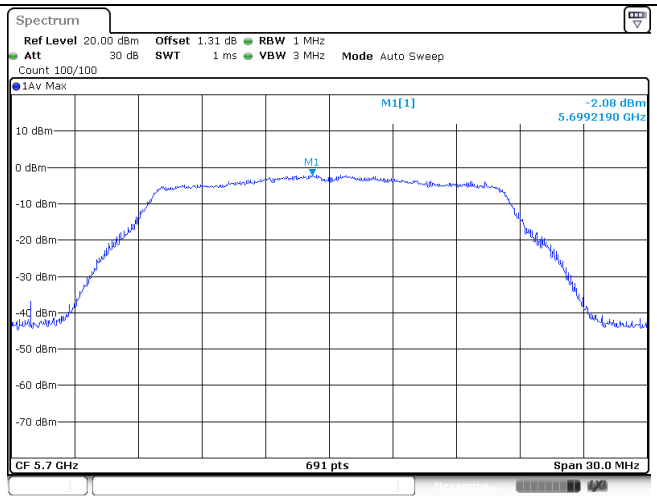
Band II	802.11ac (HT40)
CH_L	
CH_H	

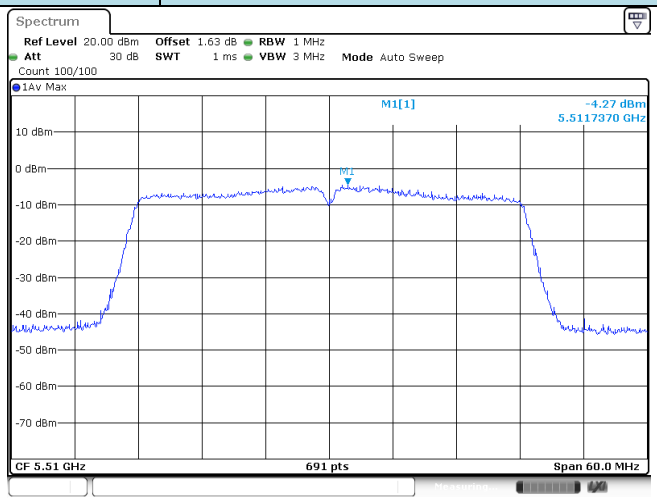
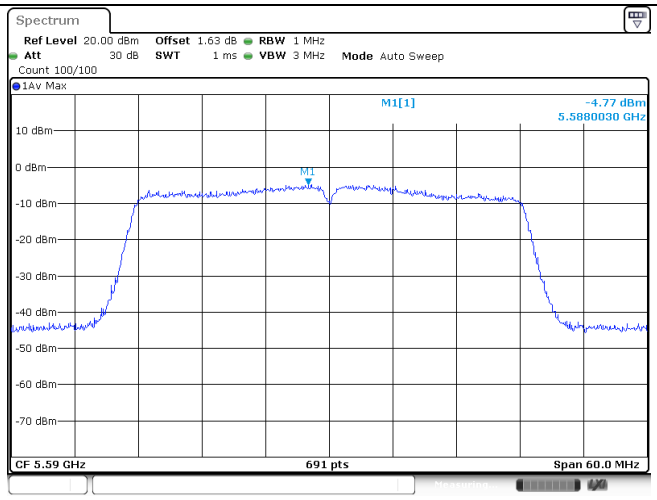
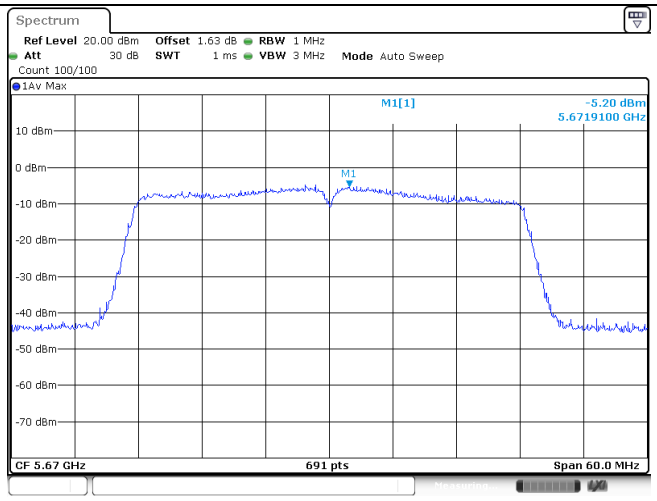
Band II	802.11n (HT40)
CH_L	
CH_H	

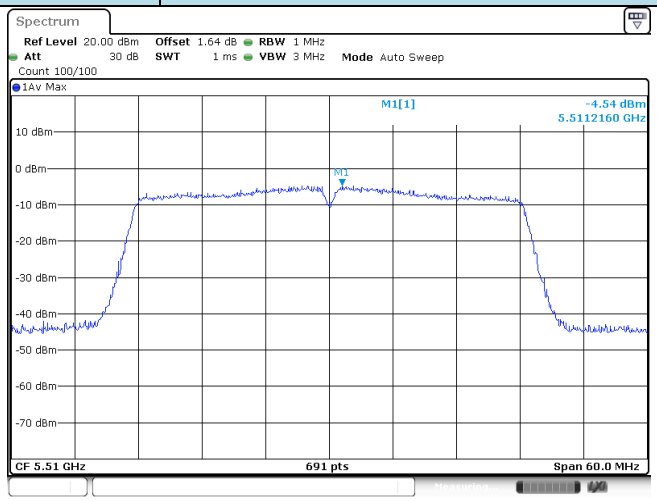
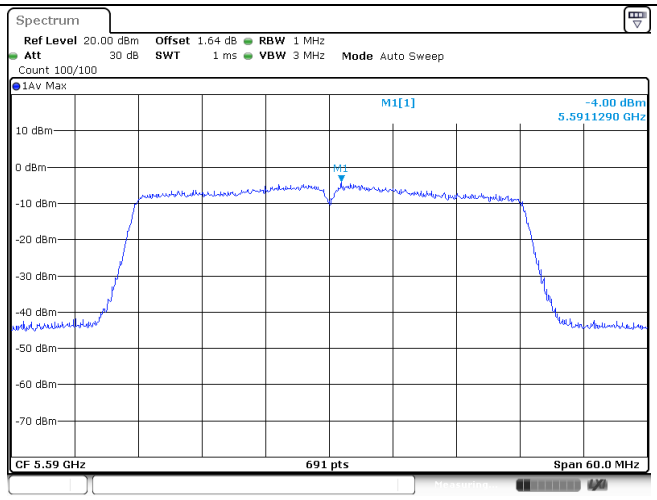
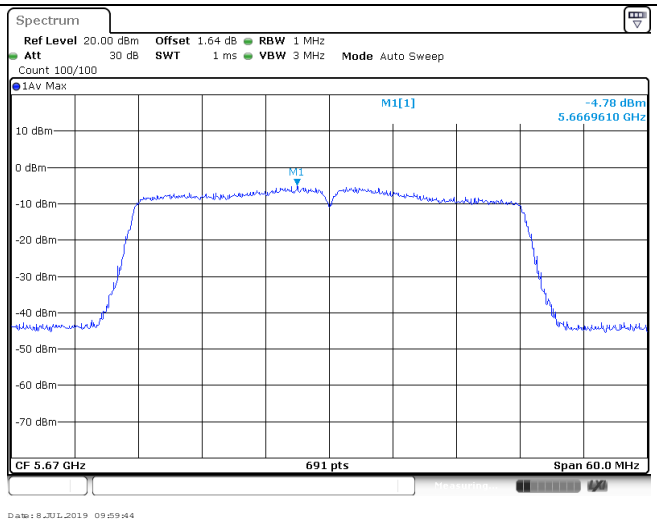
Band II	802.11ac (HT80)
CH_M	

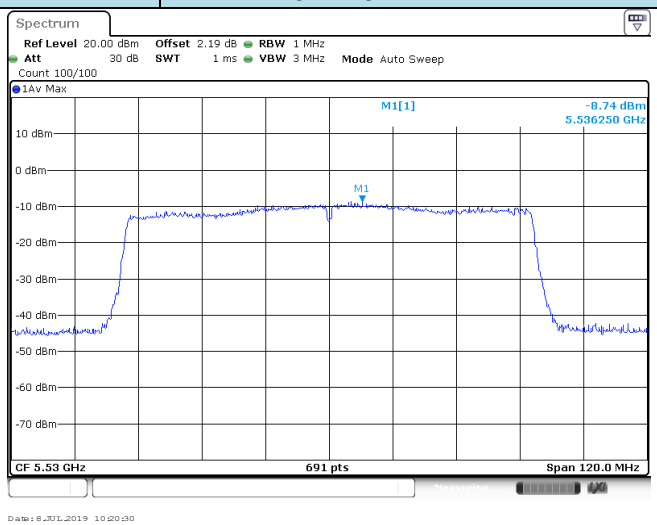
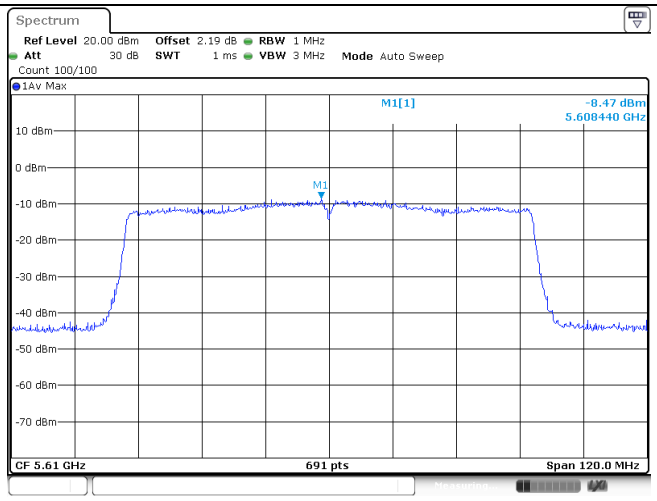
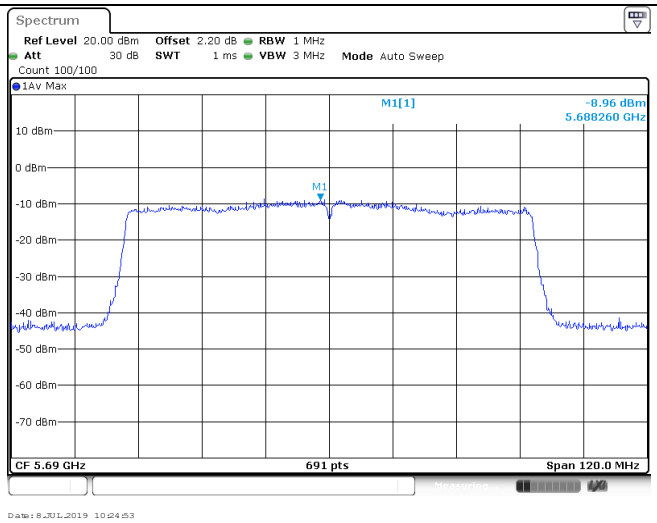
Band III	802.11ac (HT20)
CH_L	
CH_M	
CH_H	

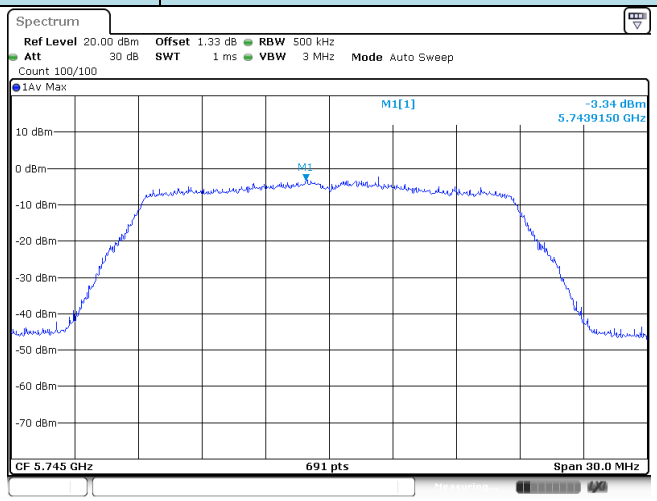
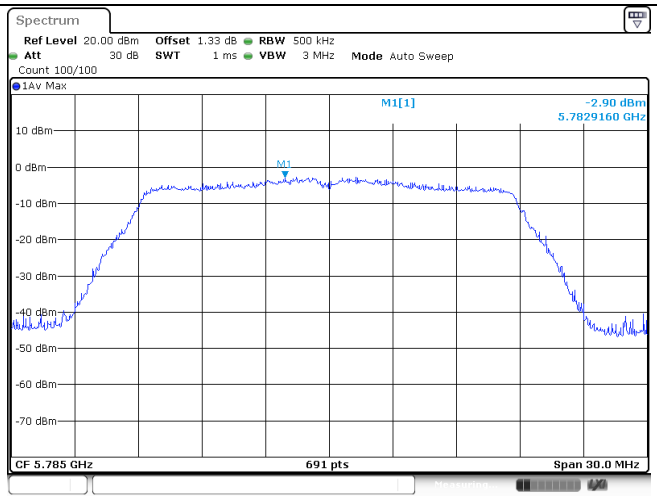
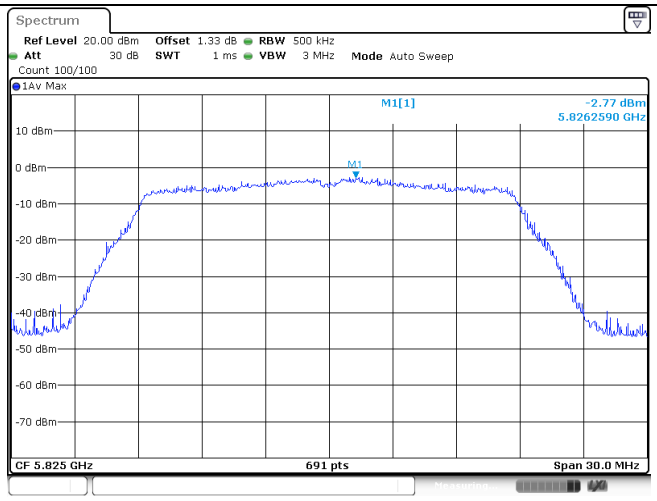
Band III	802.11n (HT20)
CH_L	
CH_M	
CH_H	

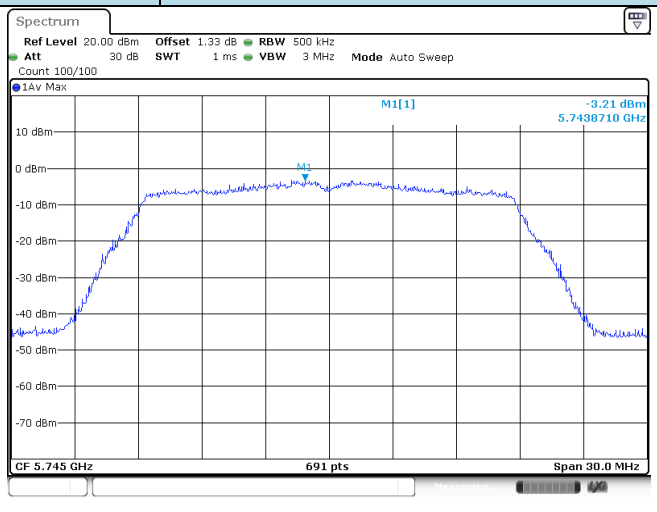
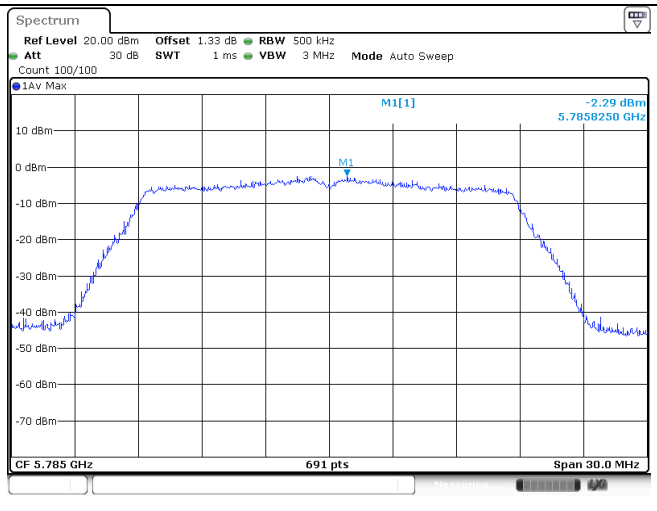
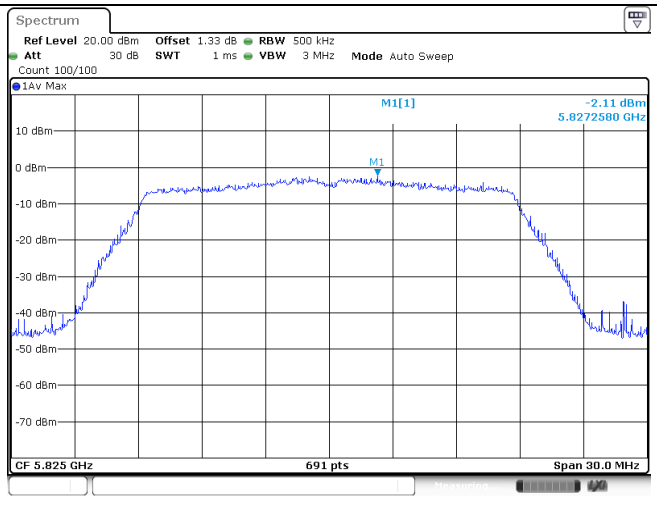
Band III	802.11a
CH_L	
CH_M	
CH_H	

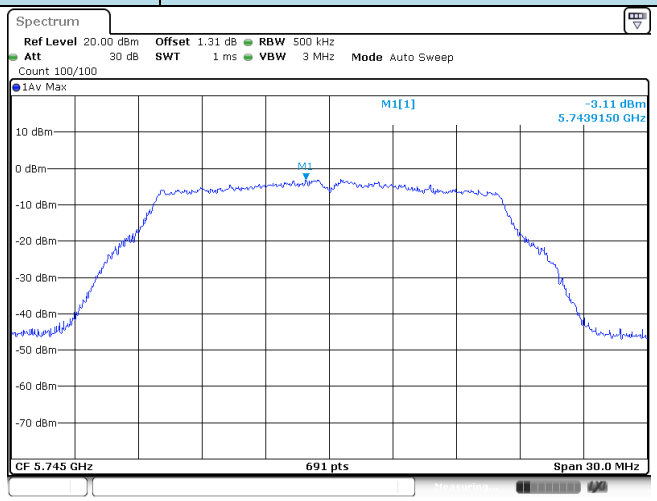
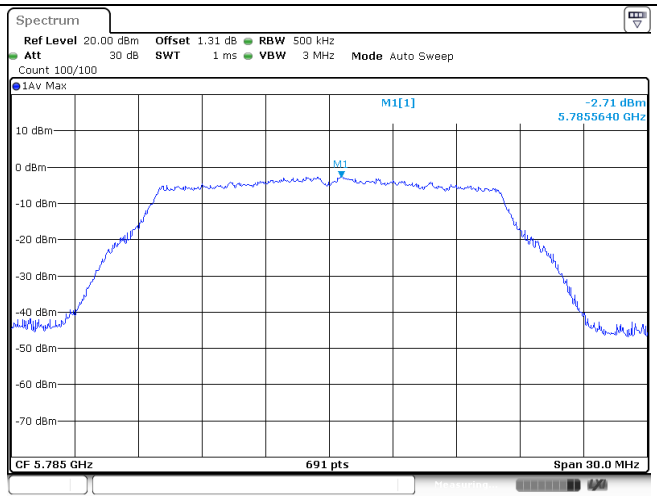
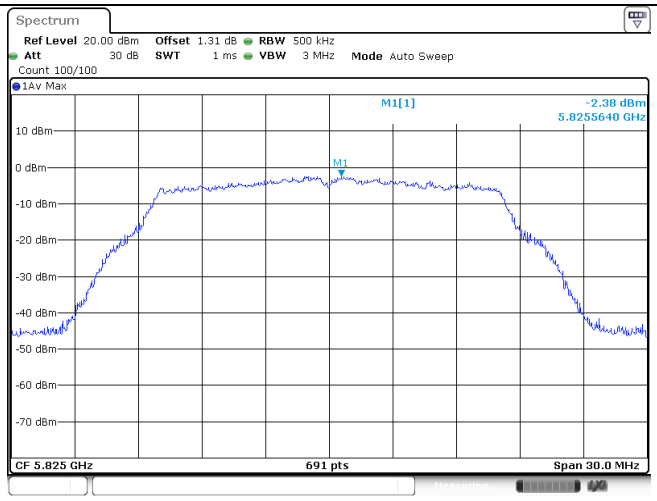
Band III	802.11ac (HT40)
CH_L	
CH_M	
CH_H	

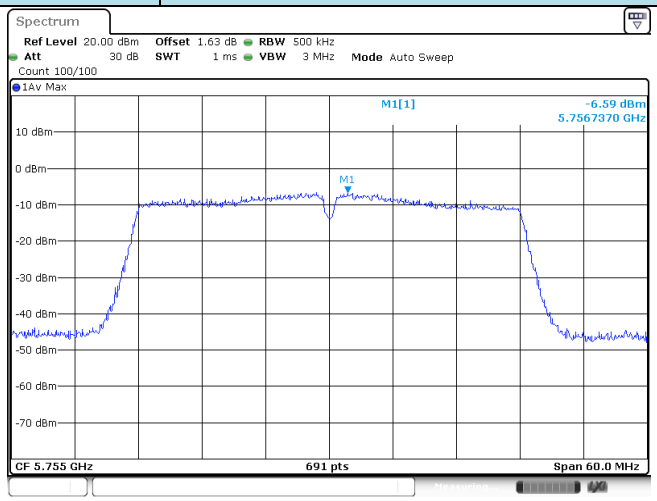
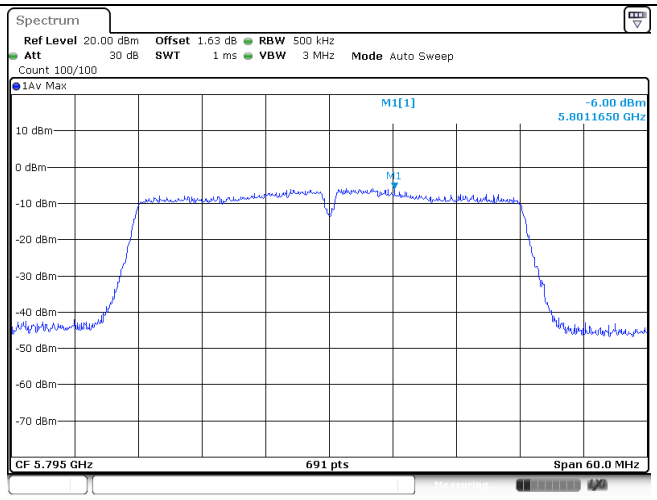
Band III	802.11n (HT40)
CH_L	
CH_M	
CH_H	

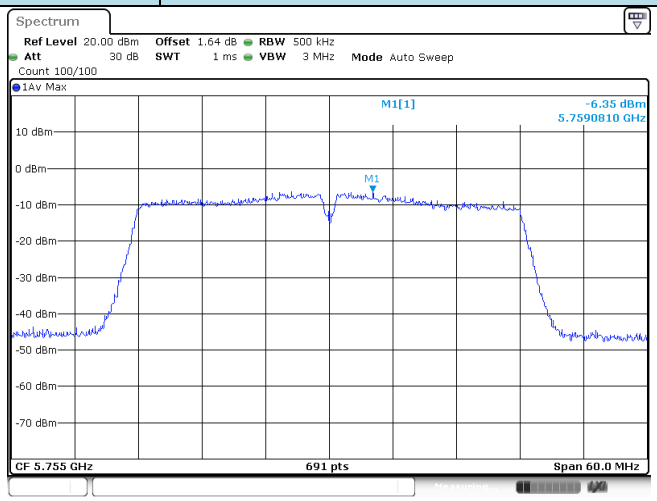
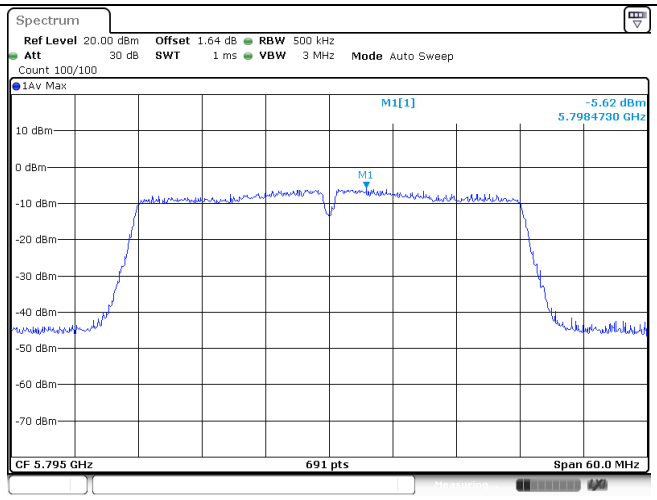
Band III	802.11ac (HT80)
CH_L	
CH_M	
CH_H	

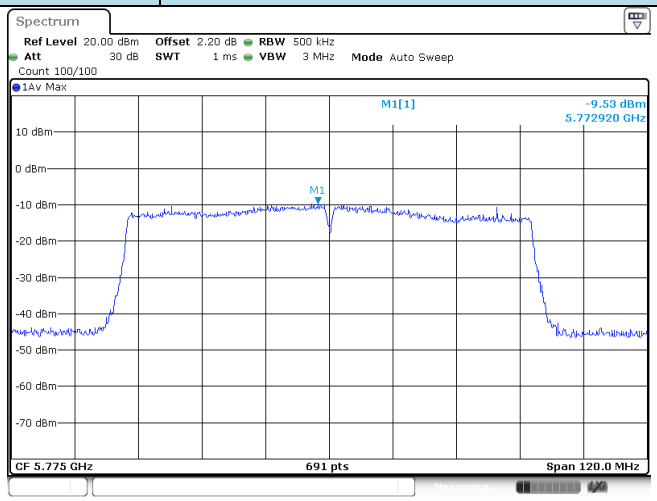
Band IV	802.11ac (HT20)
CH_L	
CH_M	
CH_H	

Band IV	802.11n (HT20)
CH_L	
CH_M	
CH_H	

Band IV	802.11a
CH_L	
CH_M	
CH_H	

Band IV	802.11ac (HT40)
CH_L	
CH_H	

Band IV	802.11n (HT40)
CH_L	
CH_H	

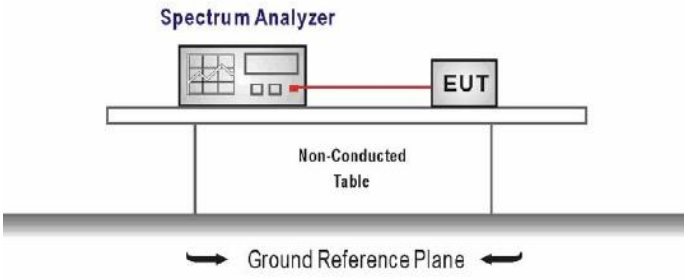
Band IV	802.11ac (HT80)
CH_M	

5.5. 26dB bandwidth and 99% Occupy 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

1. According KDB 789033 D02 – Section C
2. Connect the antenna port(s) to the spectrum analyzer input.
3. Configure the spectrum analyzer as shown below (enter all losses between the transmitter output and the spectrum analyzer).
   Center Frequency =Channel center frequency
   Span=2 x emission bandwidth
   RBW = 1% to 5% of the emission bandwidth
   VBW>3 x RBW
   Sweep time= auto couple
   Detector = Peak
   Trace mode = max hold
4. Place the radio in continuous transmit mode, allow the trace to stabilize, view the transmitter wave form on the spectrum analyzer.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission, and use the 99 % power bandwidth function of the instrument

TEST MODE:

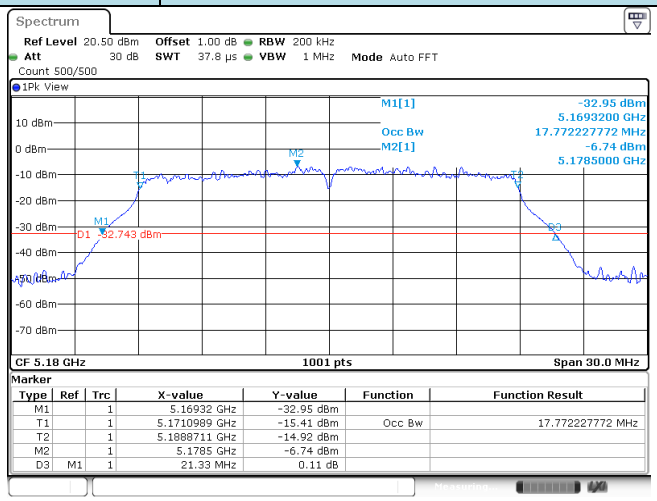
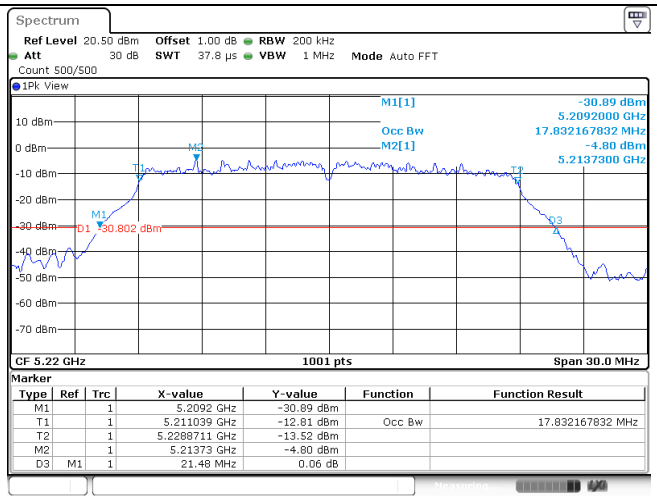
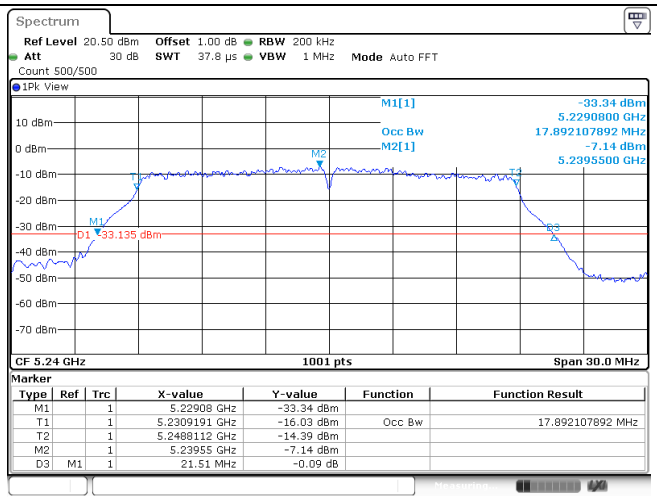
Please refer to the clause 3.3

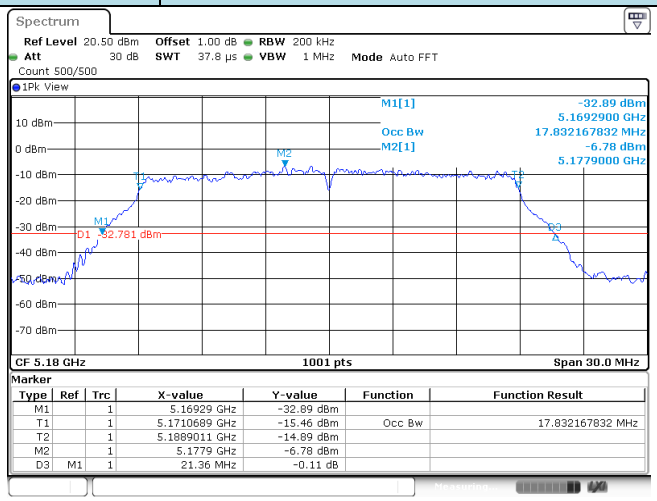
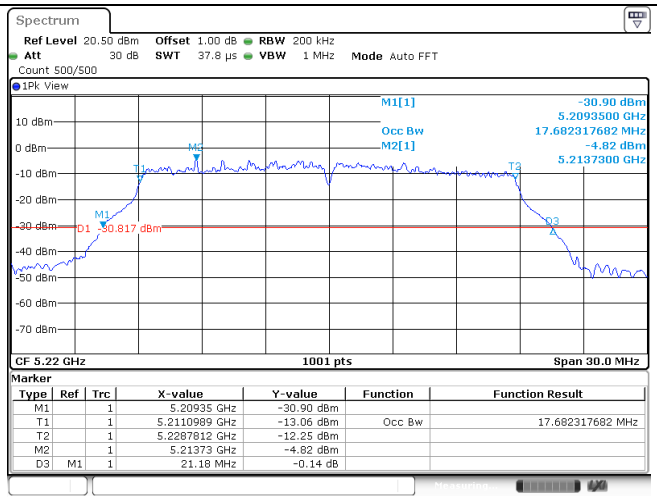
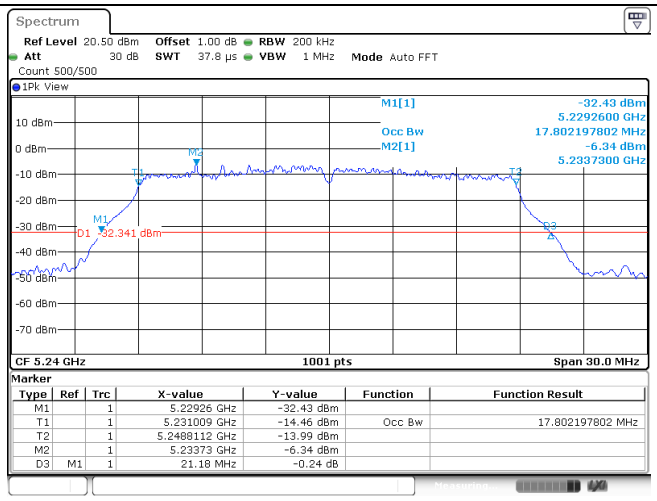
TEST RESULTS

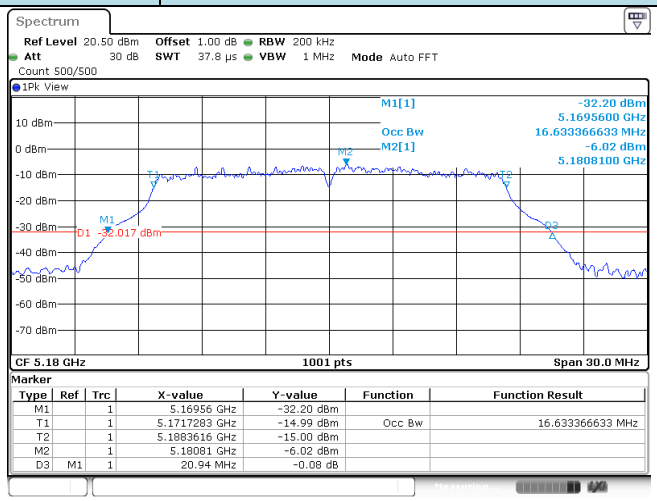
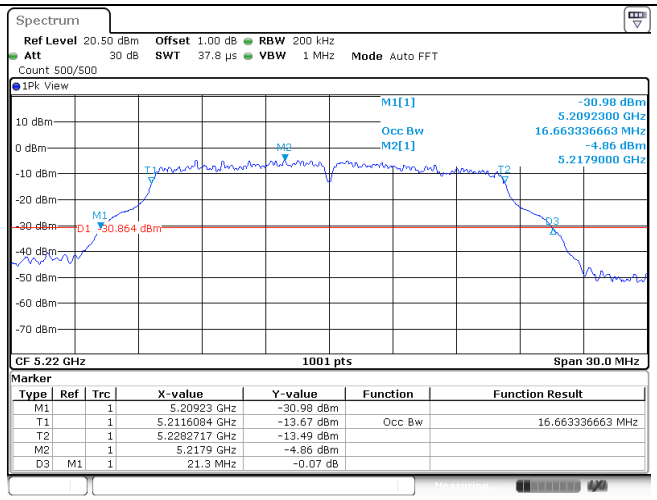
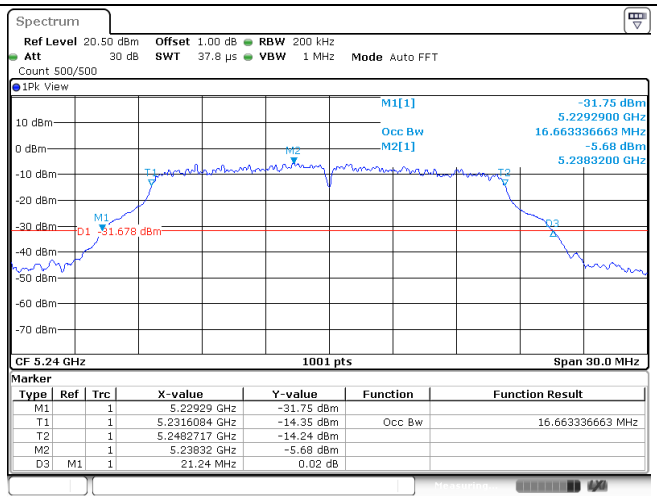
☒ **Passed** ☐ **Not Applicable**

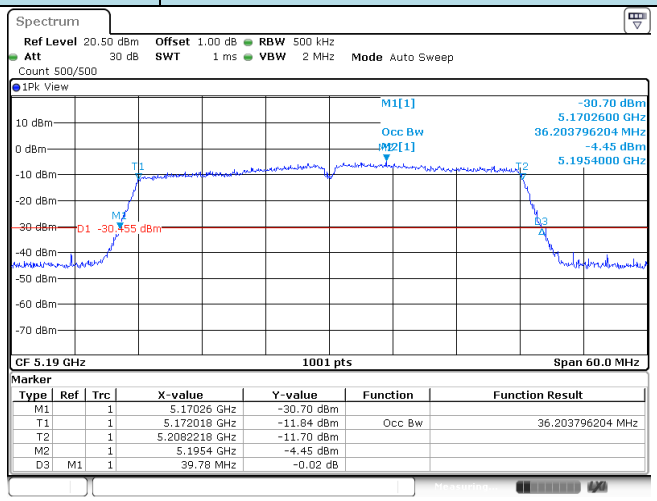
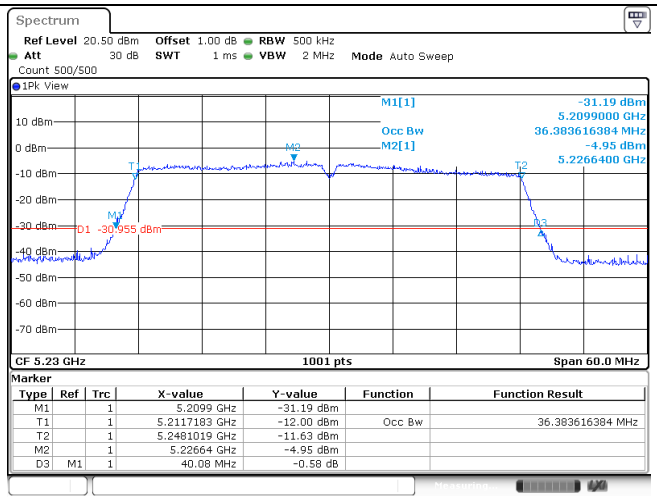
Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwith (MHz)	26dB bandwidth (MHz)	Result
I	20	802.11ac	CH_L	17.77	21.33	Pass
			CH_M	17.83	21.48	
			CH_H	17.89	21.51	
		802.11n	CH_L	17.83	21.36	Pass
			CH_M	17.68	21.18	
			CH_H	17.80	21.18	
		802.11a	CH_L	16.63	20.94	Pass
			CH_M	16.66	21.30	
			CH_H	16.66	21.24	
	40	802.11ac	CH_L	36.20	39.78	Pass
			CH_H	36.38	40.08	
		802.11n	CH_L	36.32	39.96	Pass
			CH_H	36.38	40.26	
	80	802.11ac	CH_M	74.81	80.76	Pass
II	20	802.11ac	CH_L	17.74	21.27	Pass
			CH_M	17.68	21.06	
			CH_H	17.71	21.36	
		802.11n	CH_L	17.80	21.18	Pass
			CH_M	17.71	21.21	
			CH_H	17.74	21.27	
		802.11a	CH_L	16.54	21.24	Pass
			CH_M	16.54	21.12	
			CH_H	16.63	21.33	
	40	802.11ac	CH_L	36.38	40.26	Pass
			CH_H	36.20	40.02	
		802.11n	CH_L	36.38	40.38	Pass
			CH_H	36.26	40.02	
	80	802.11ac	CH_M	75.17	81.36	Pass

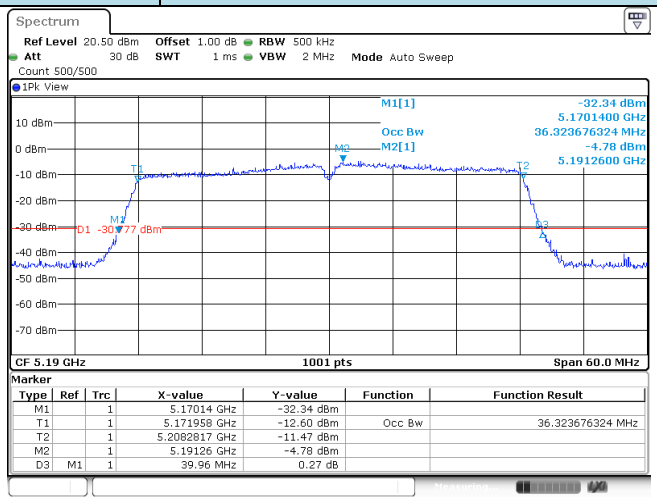
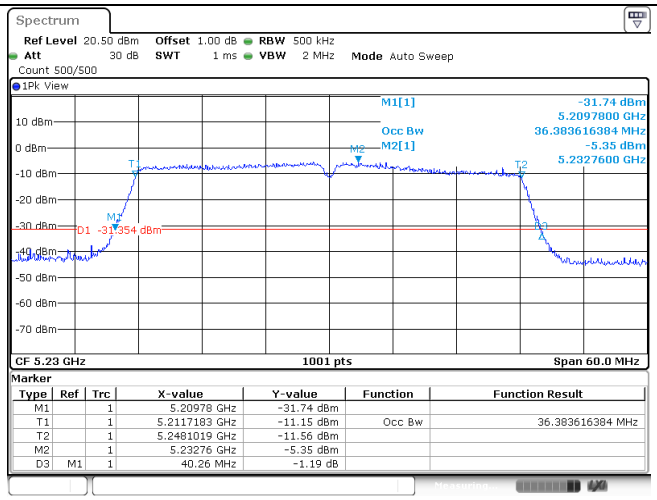
Band	Bandwidth (MHz)	Type	Channel	99% Occupy bandwith (MHz)	26dB bandwidth (MHz)	Result
III	20	802.11ac	CH_L	17.83	21.45	Pass
			CH_M	17.83	21.36	
			CH_H	17.71	21.21	
		802.11n	CH_L	17.74	21.21	Pass
			CH_M	17.74	21.48	
			CH_H	17.71	21.18	
		802.11a	CH_L	16.57	21.03	Pass
			CH_M	16.60	21.12	
			CH_H	16.57	21.18	
	40	802.11ac	CH_L	36.38	40.38	Pass
			CH_M	36.36	40.52	
			CH_H	36.26	40.02	
		802.11n	CH_L	36.32	40.44	Pass
			CH_M	36.32	40.08	
			CH_H	36.44	40.08	
	80	802.11ac	CH_L	75.88	82.20	Pass
			CH_M	75.88	82.68	
			CH_H	75.88	82.80	

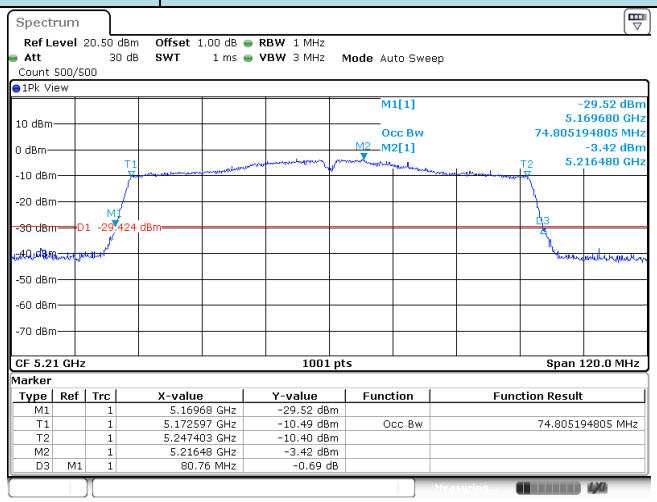
Band I	802.11ac (HT20)
CH_L	
CH_M	
CH_H	

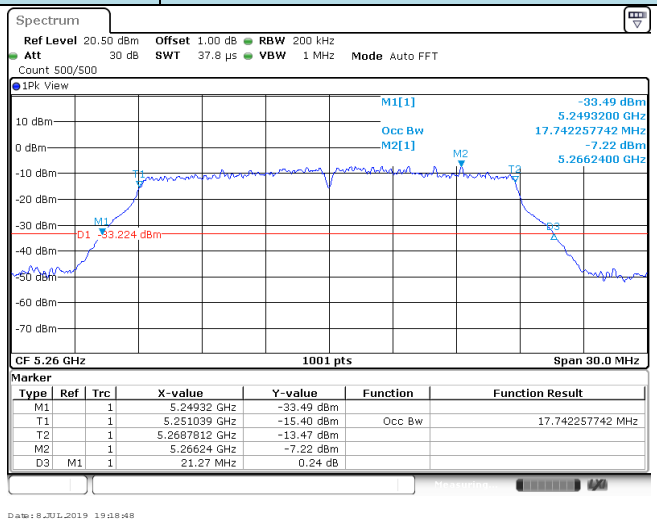
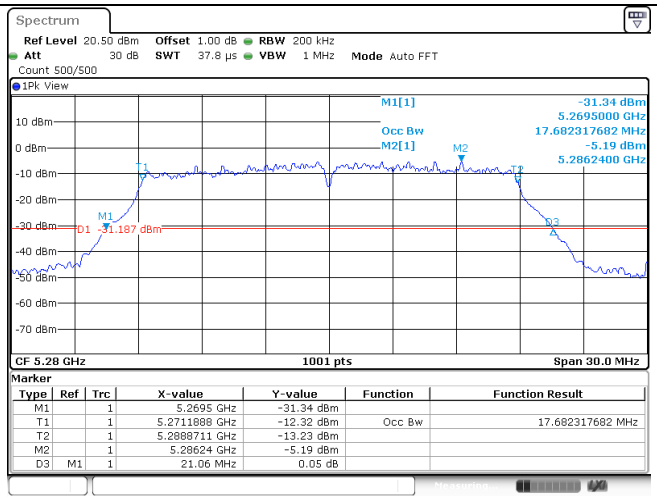
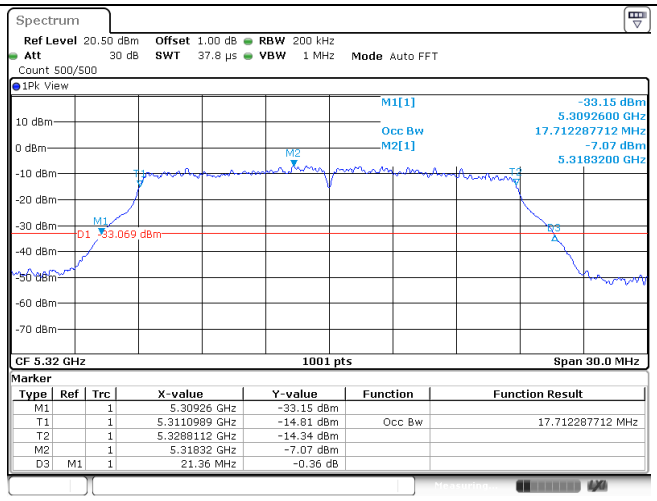
Band I	802.11n (HT20)
CH_L	
CH_M	
CH_H	

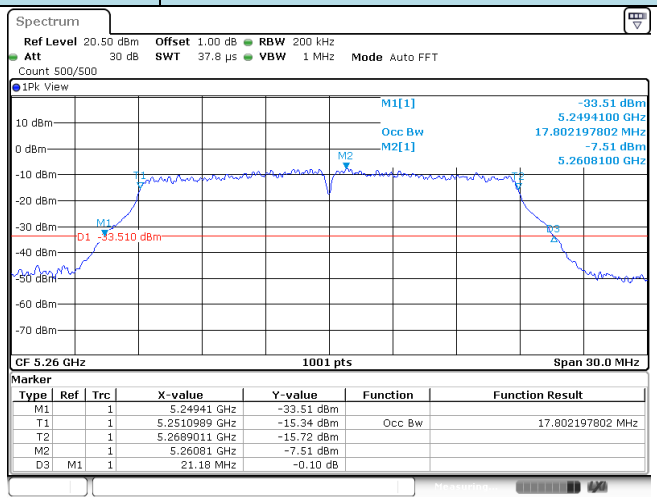
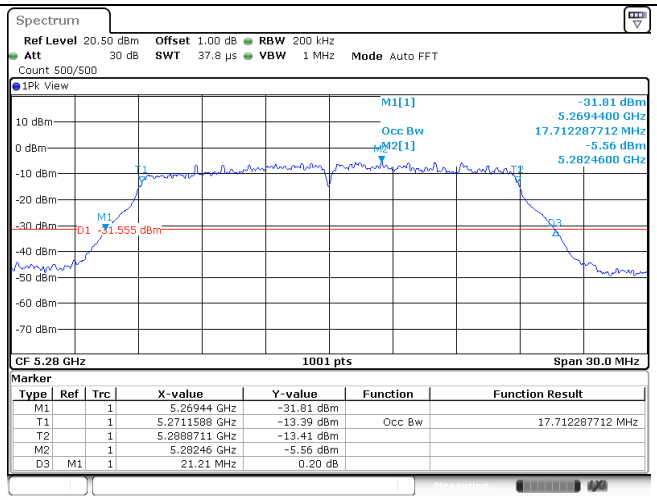
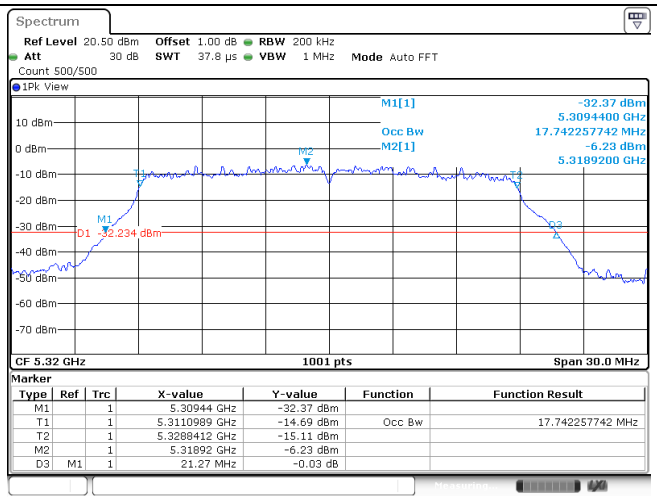
Band I	802.11a
CH_L	
CH_M	
CH_H	

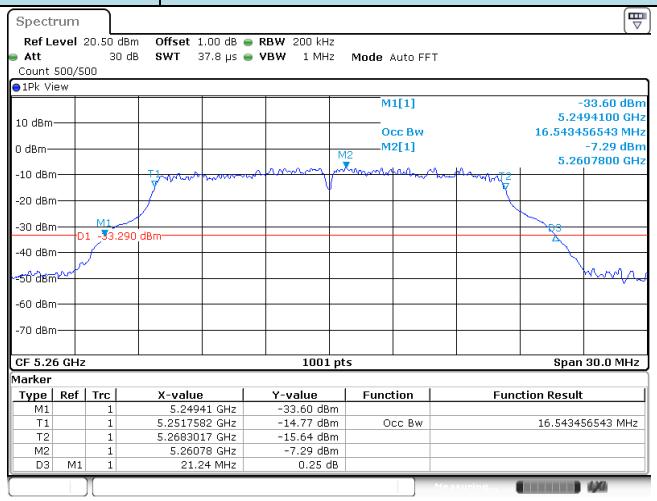
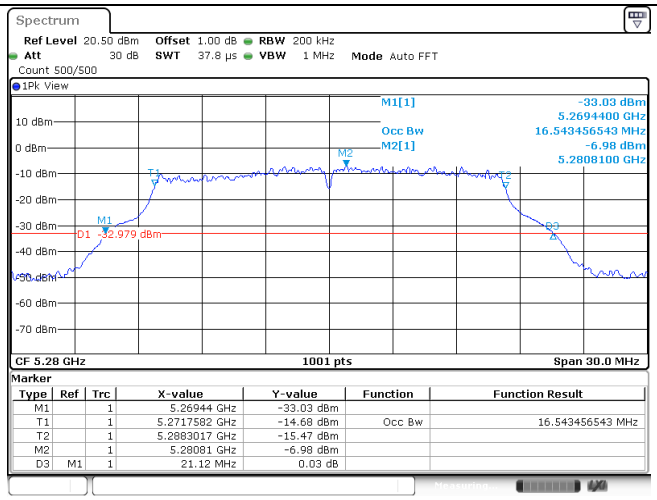
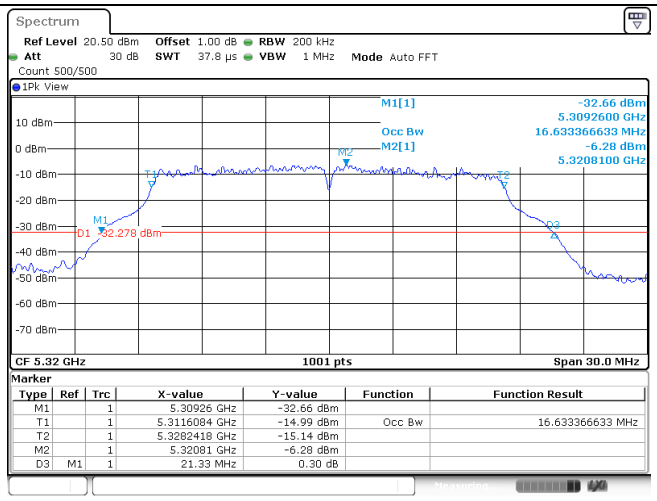
Band I	802.11ac (HT40)
CH_L	
CH_H	

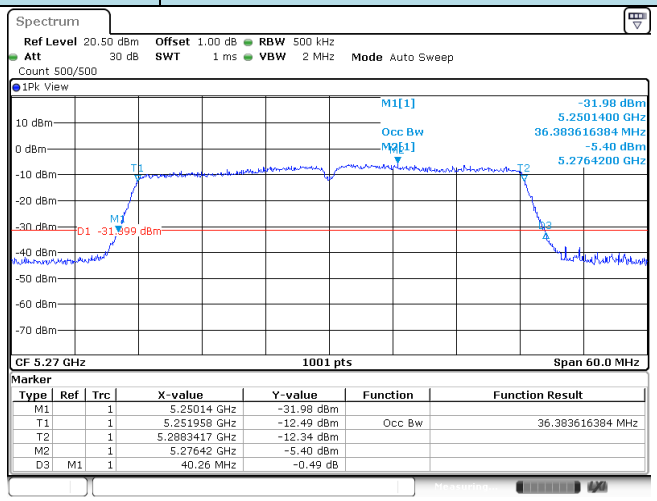
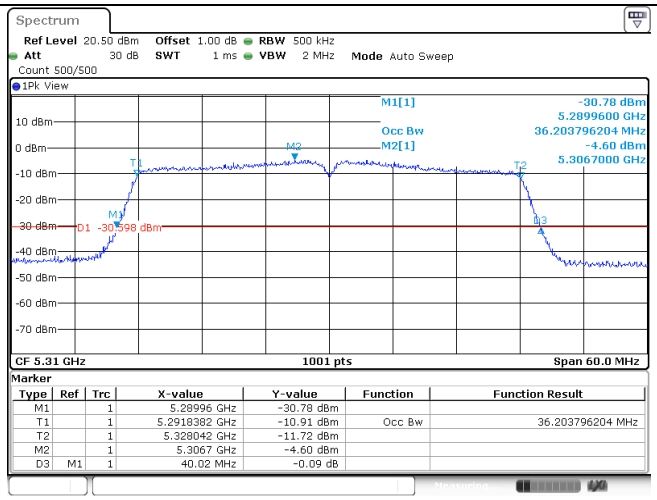
Band I	802.11n (HT40)
CH_L	
CH_H	

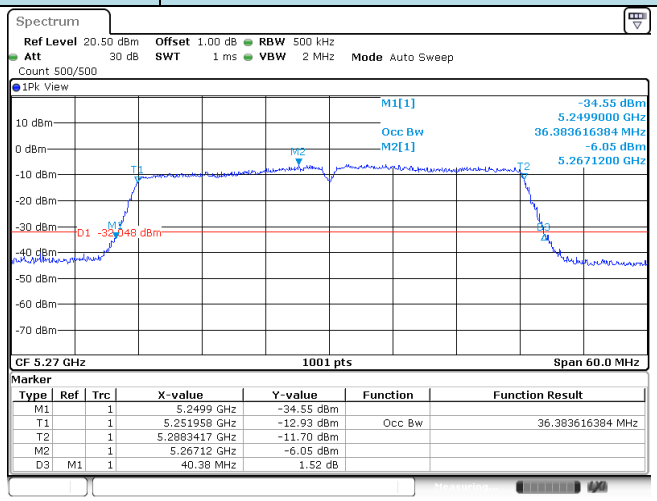
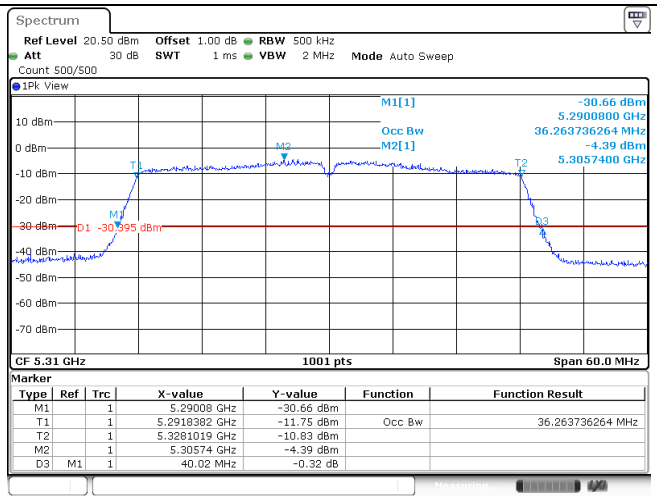
Band I	802.11ac (HT80)
CH_M	

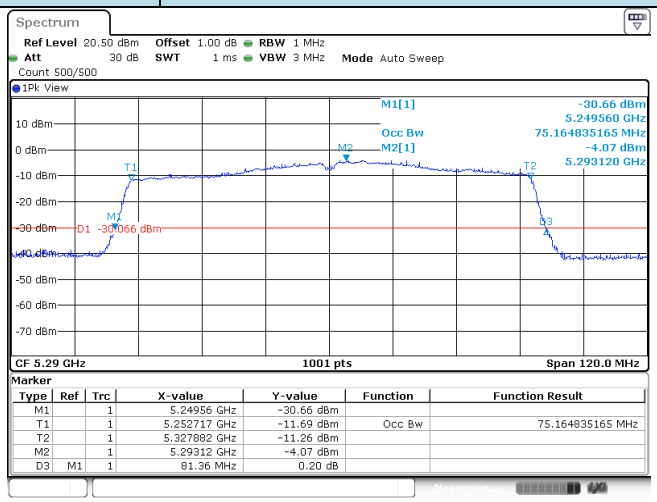
Band II	802.11ac (HT20)
CH_L	
CH_M	
CH_H	

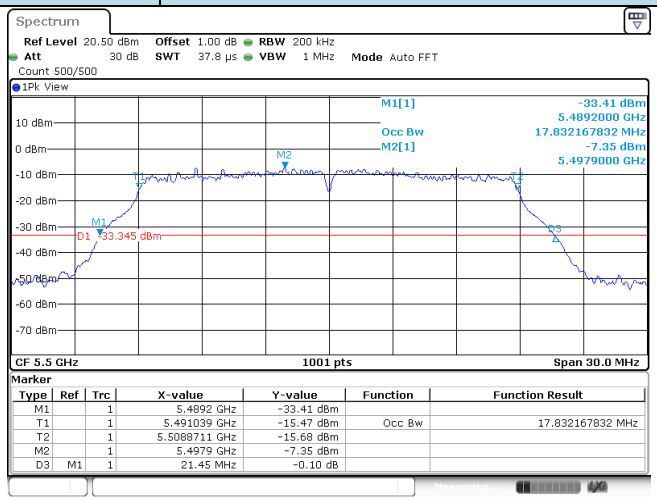
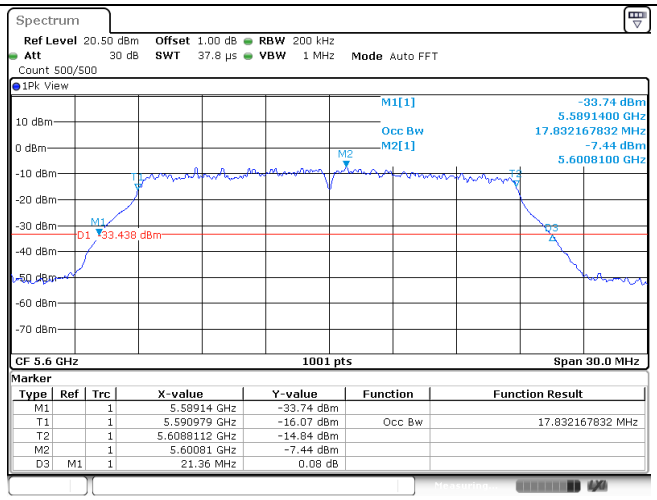
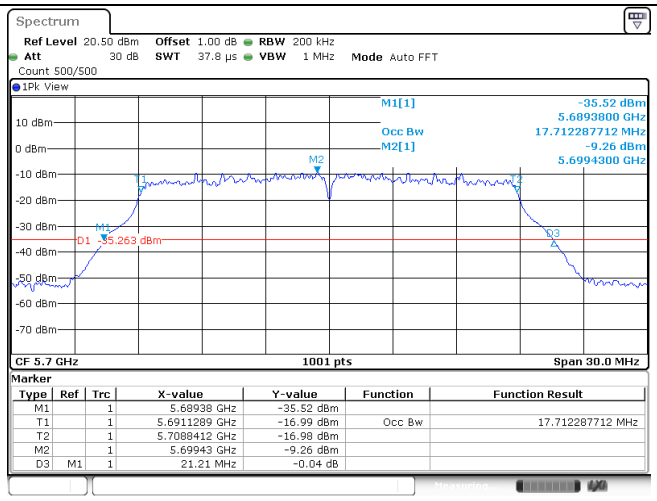
Band II	802.11n (HT20)
CH_L	
CH_M	
CH_H	

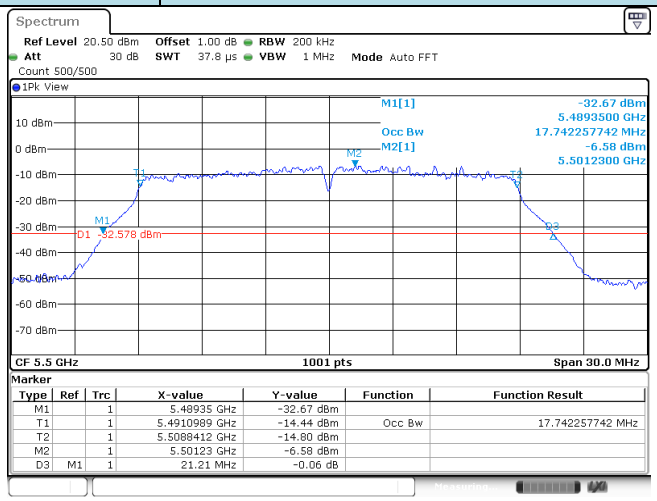
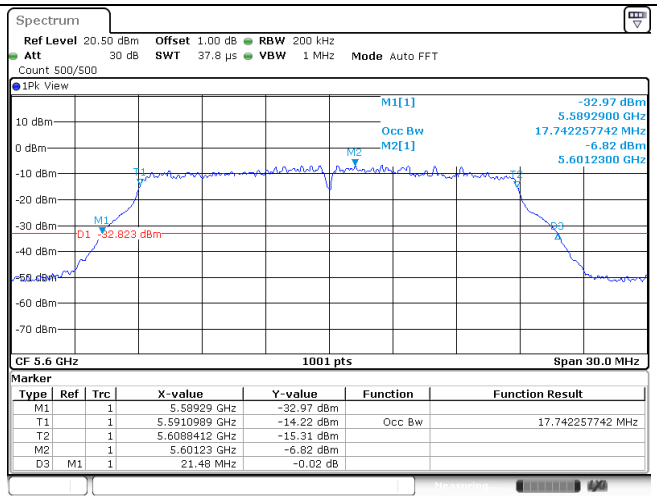
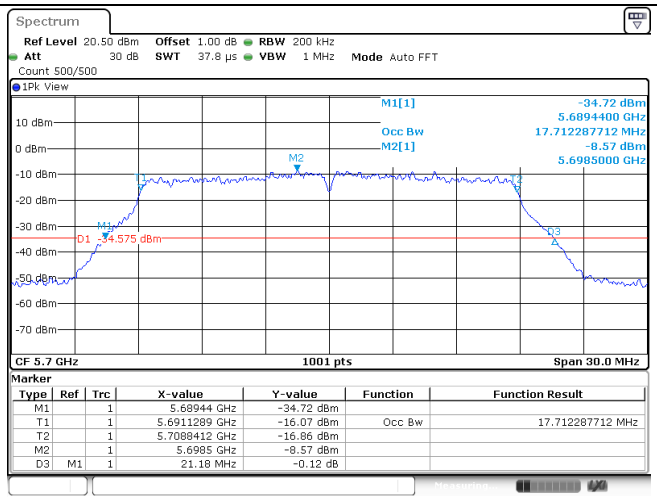
Band II	802.11a
CH_L	
CH_M	
CH_H	

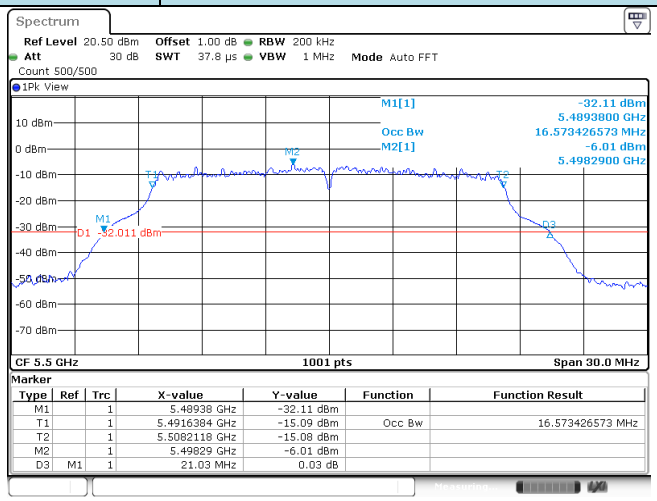
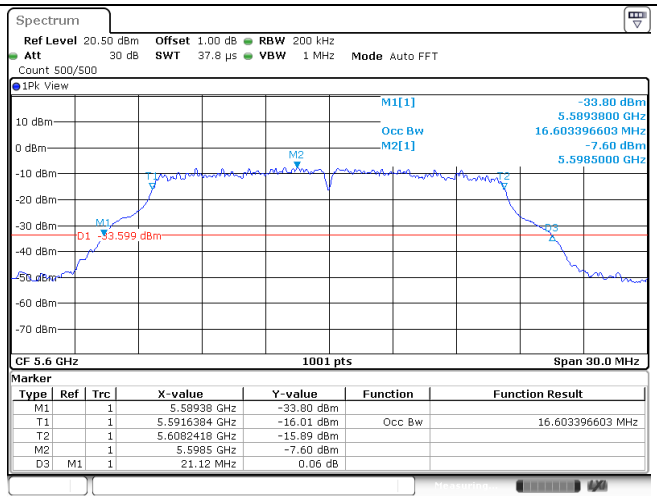
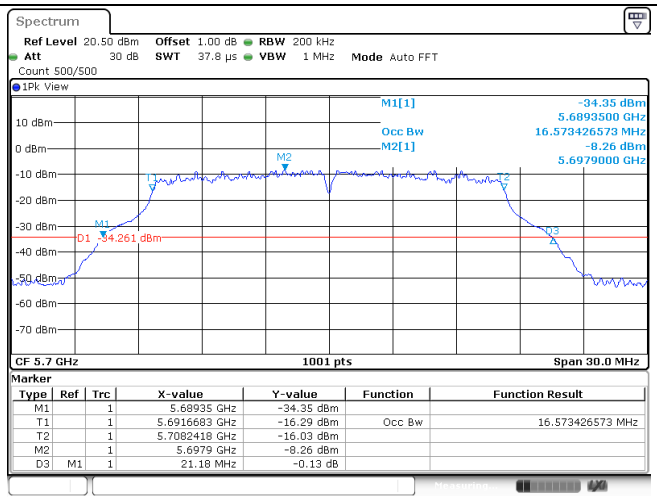
Band II	802.11ac (HT40)
CH_L	
CH_H	

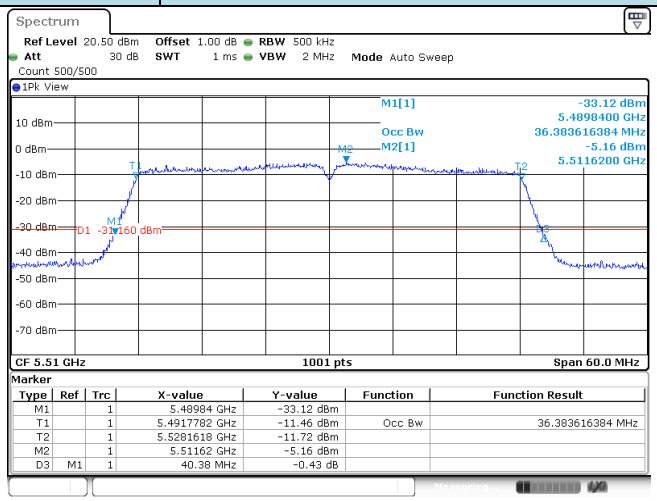
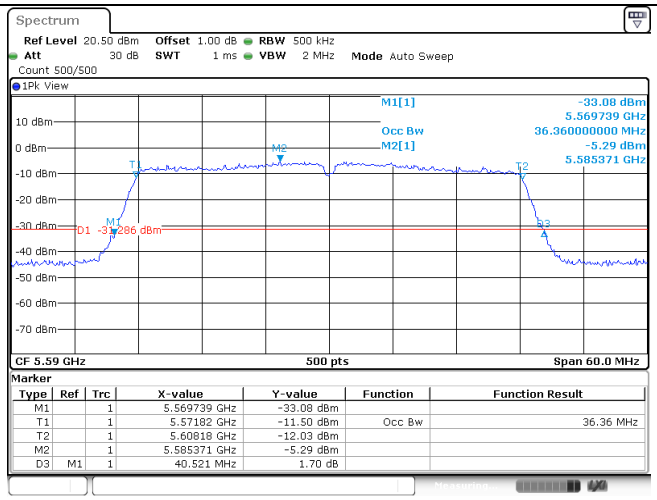
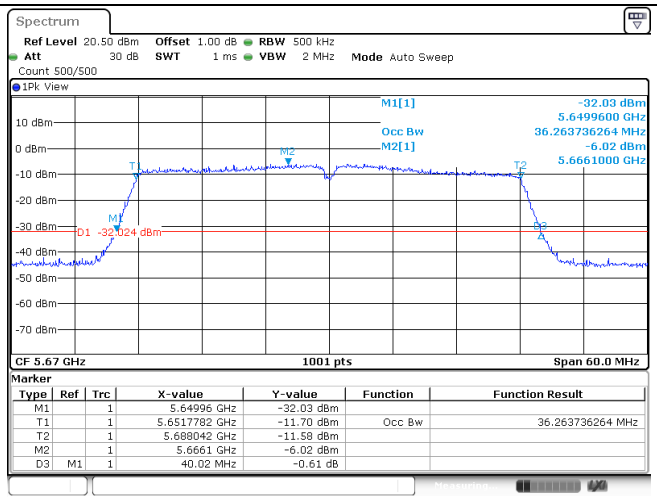
Band II	802.11n (HT40)
CH_L	
CH_H	

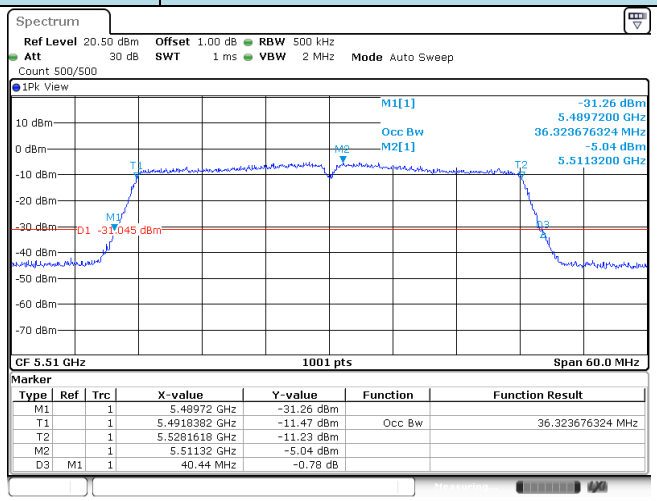
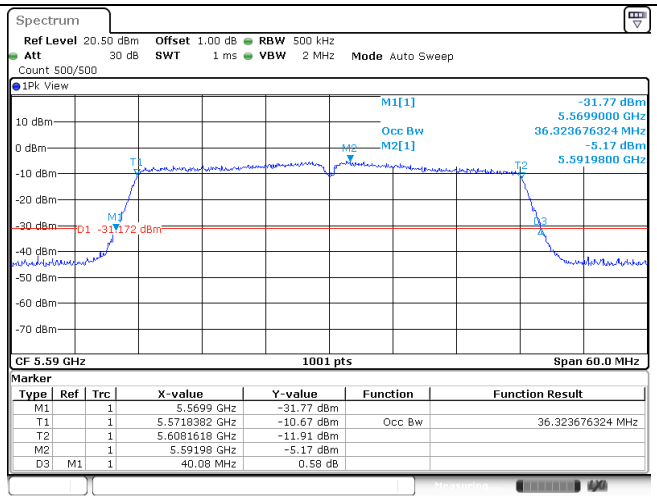
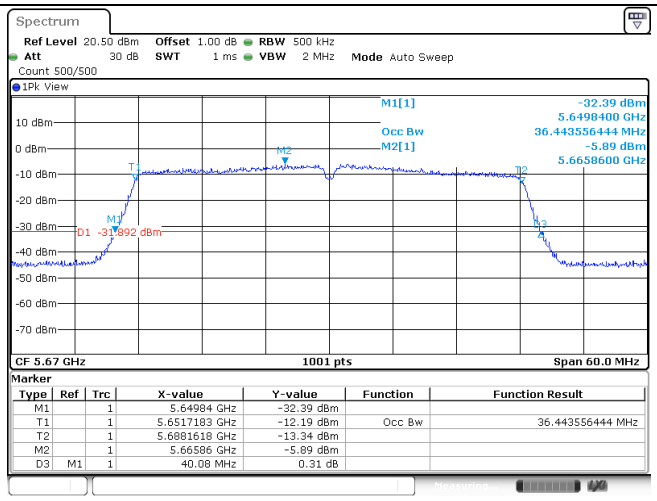
Band II	802.11ac (HT80)
CH_M	

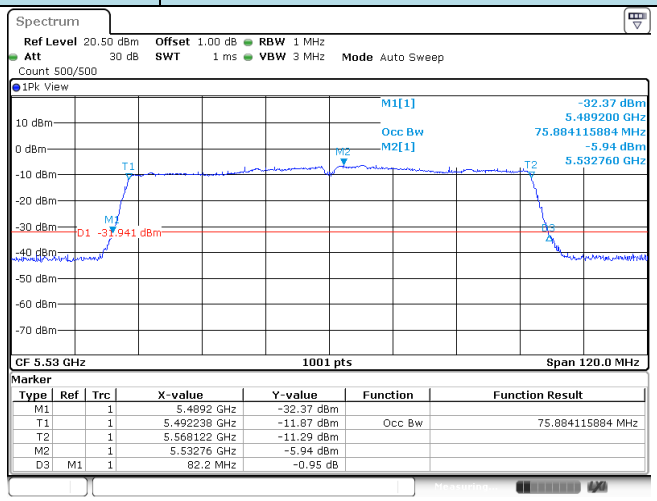
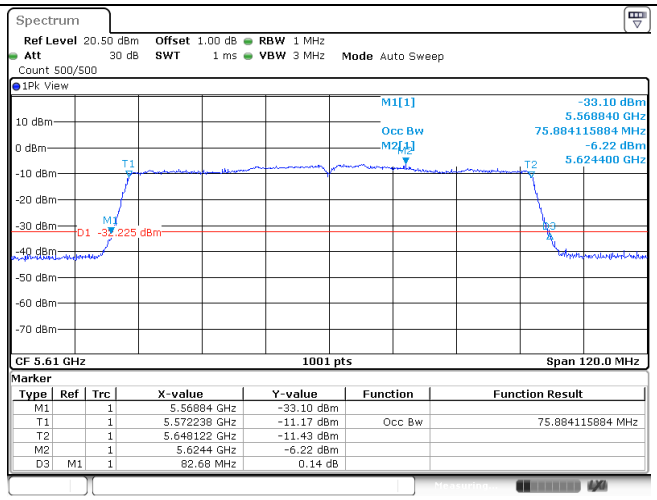
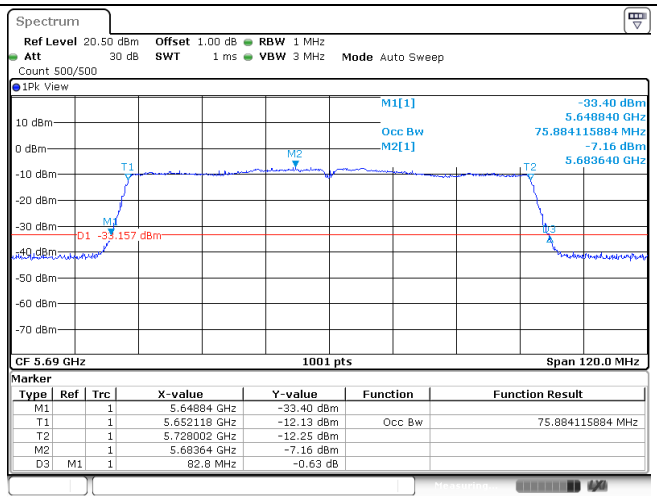
Band III	802.11ac (HT20)
CH_L	
CH_M	
CH_H	

Band III	802.11n (HT20)
CH_L	
CH_M	
CH_H	

Band III	802.11a
CH_L	
CH_M	
CH_H	

Band III	802.11ac (HT40)
CH_L	
CH_M	
CH_H	

Band III	802.11n (HT40)
CH_L	
CH_M	
CH_H	

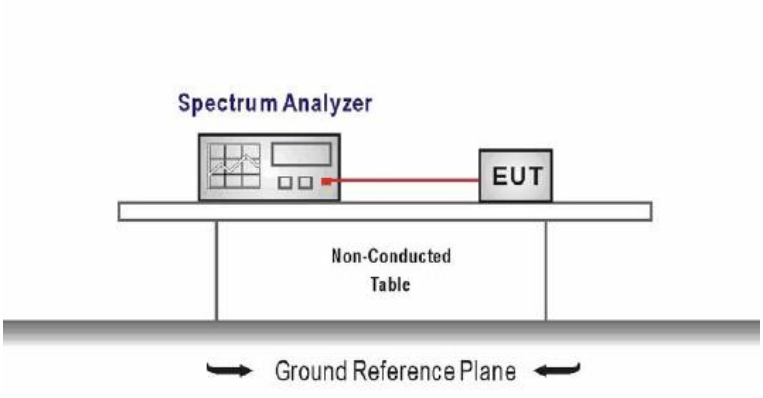
Band III	802.11ac (HT80)
CH_L	
CH_M	
CH_H	

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 =test channel center frequency
   Span=2 x emission 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.

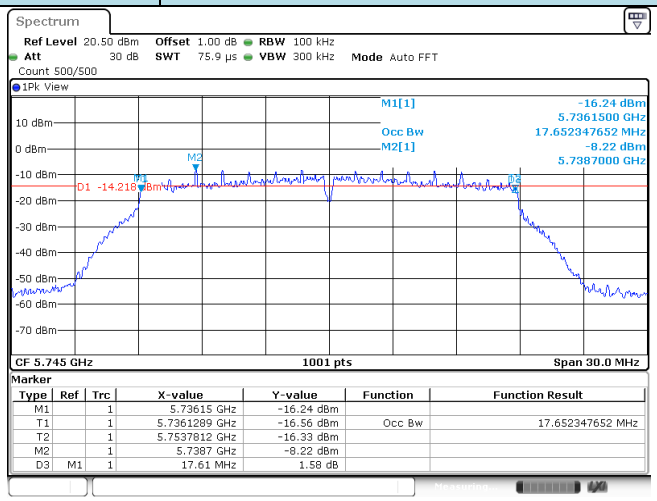
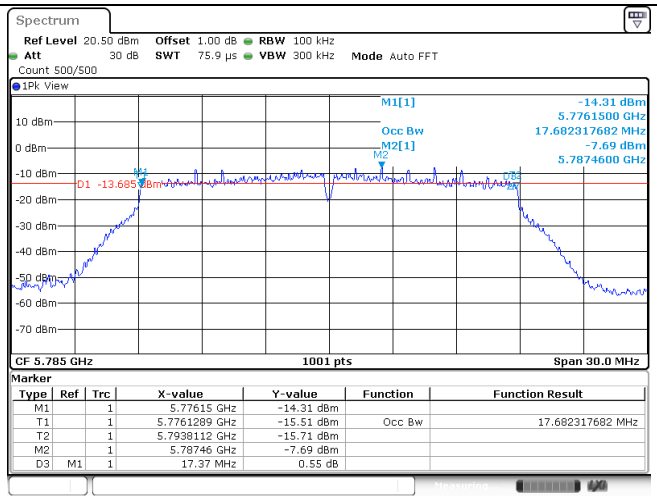
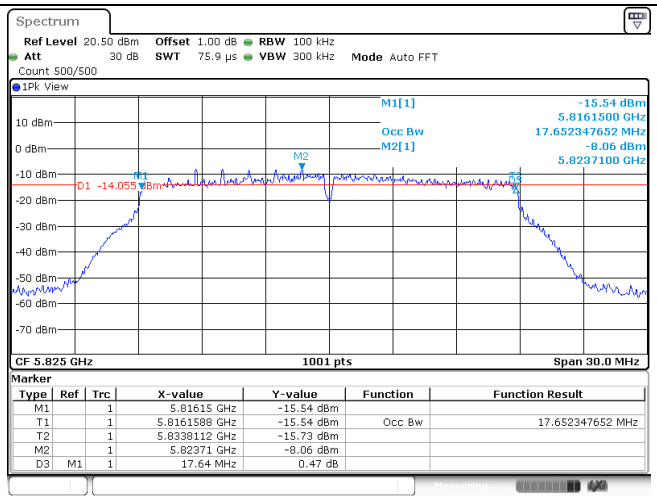
TEST MODE:

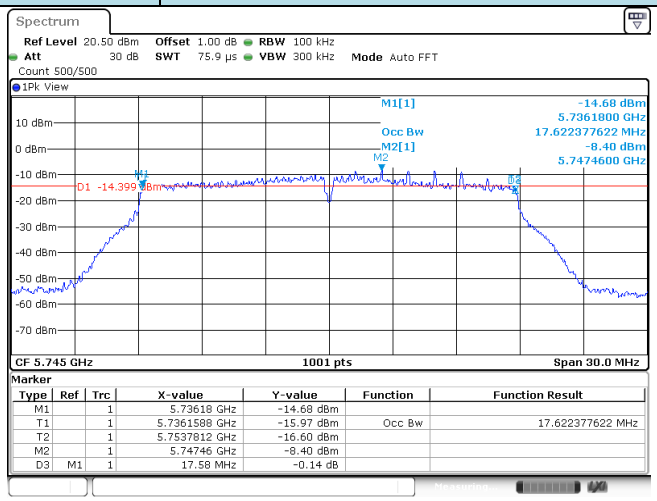
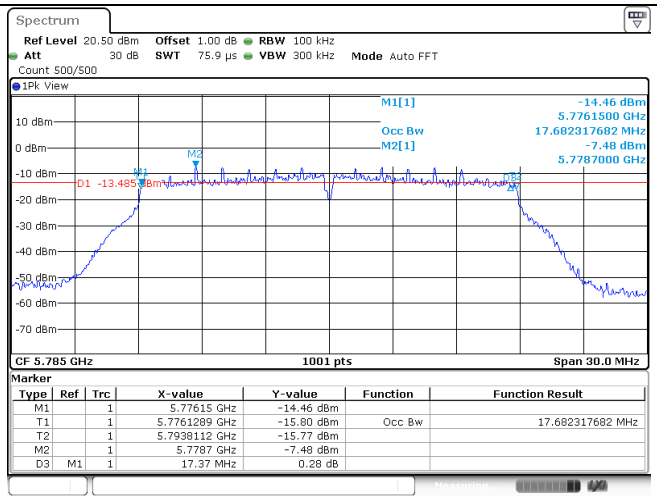
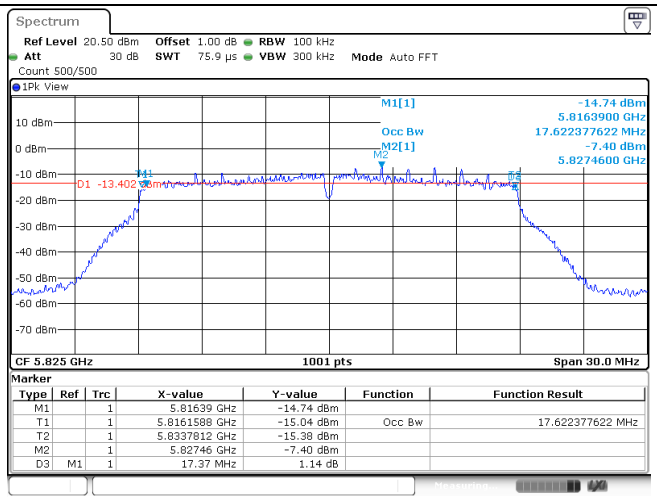
Please refer to the clause 3.3

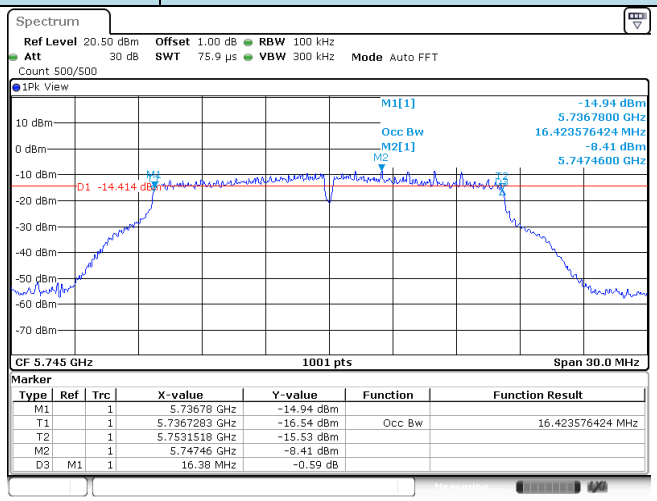
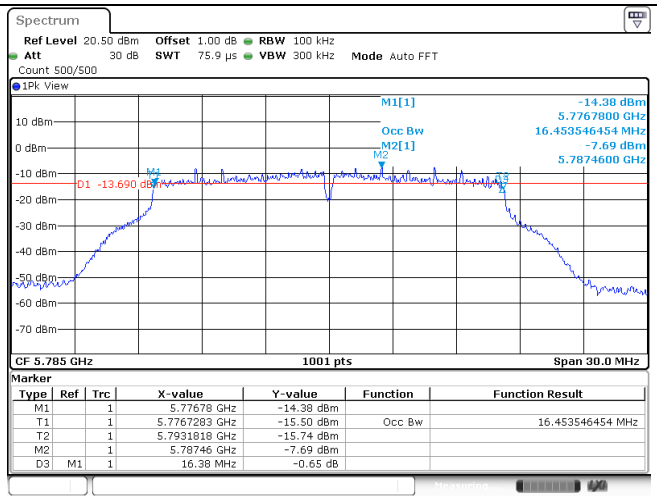
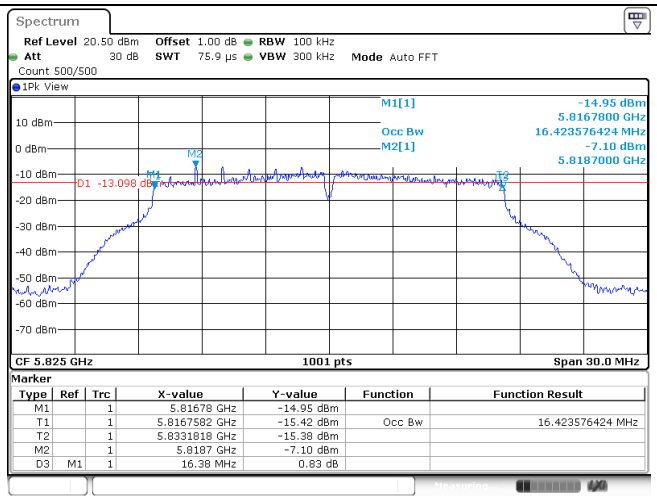
TEST RESULTS

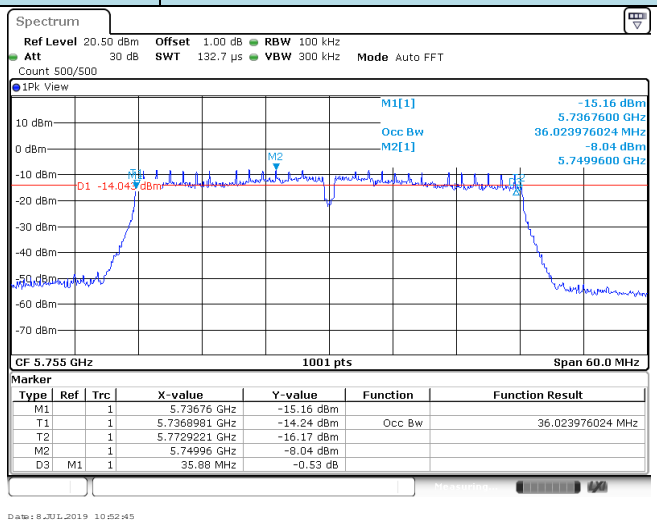
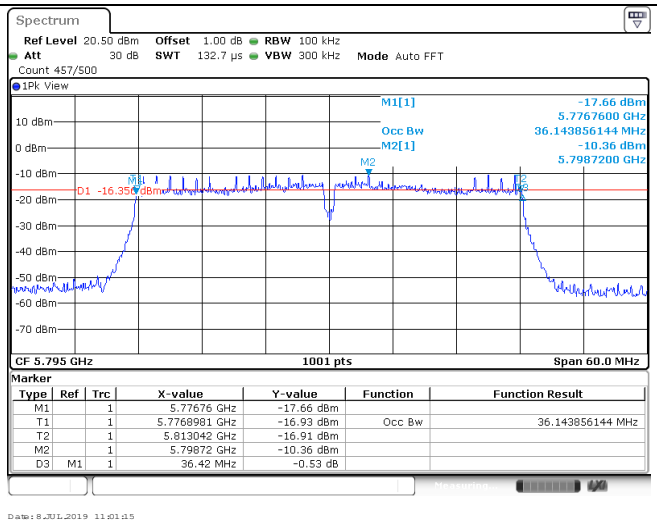
☒ **Passed** ☐ **Not Applicable**

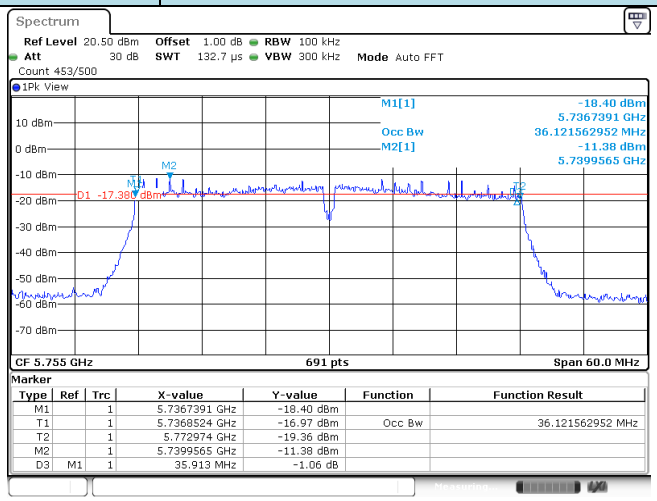
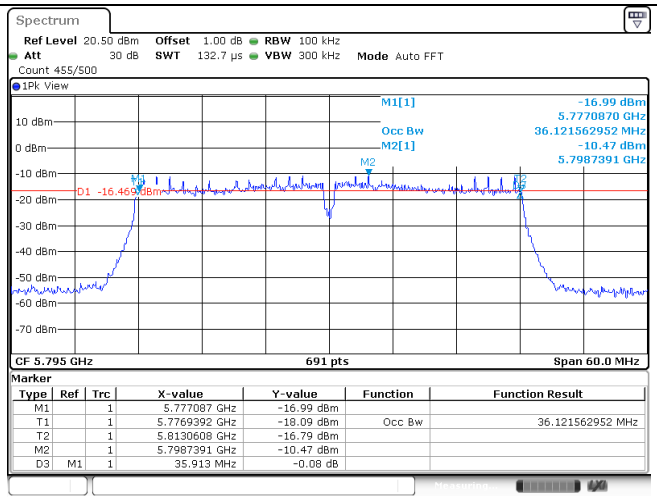
Band	Bandwidth (MHz)	Type	Channel	6dB bandwith (MHz)	99% Occupy bandwith (MHz)	Result
IV	20	802.11ac	CH_L	17.61	17.65	Pass
			CH_M	17.37	17.68	
			CH_H	17.64	17.65	
		802.11n	CH_L	17.58	17.62	Pass
			CH_M	17.37	17.68	
			CH_H	17.37	17.62	
		802.11a	CH_L	16.38	16.42	Pass
			CH_M	16.38	16.45	
			CH_H	16.38	16.42	
	40	802.11ac	CH_L	35.88	36.02	Pass
			CH_H	36.42	36.14	
		802.11n	CH_L	35.91	36.12	Pass
			CH_H	35.91	36.12	
	80	802.11ac	CH_M	75.48	75.41	Pass

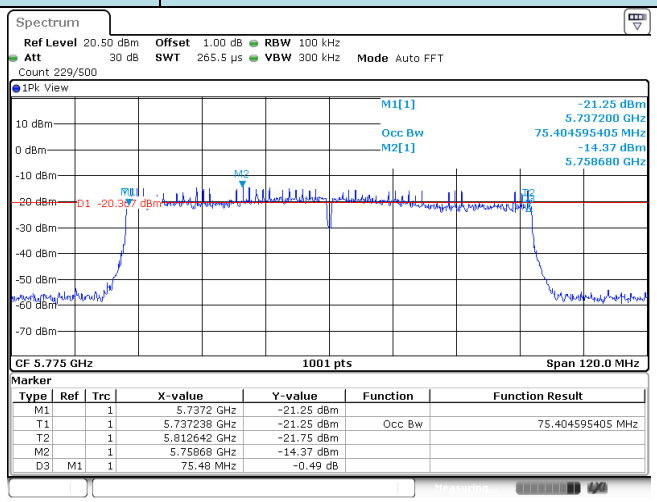
Band IV	802.11ac (HT20)
CH_L	
CH_M	
CH_H	

Band IV	802.11n (HT20)
CH_L	
CH_M	
CH_H	

Band IV	802.11a
CH_L	
CH_M	
CH_H	

Band IV	802.11ac (HT40)
CH_L	
CH_H	

Band IV	802.11n (HT40)
CH_L	
CH_H	

Band IV	802.11ac (HT80)
CH_M	

5.7. Band edge

LIMIT

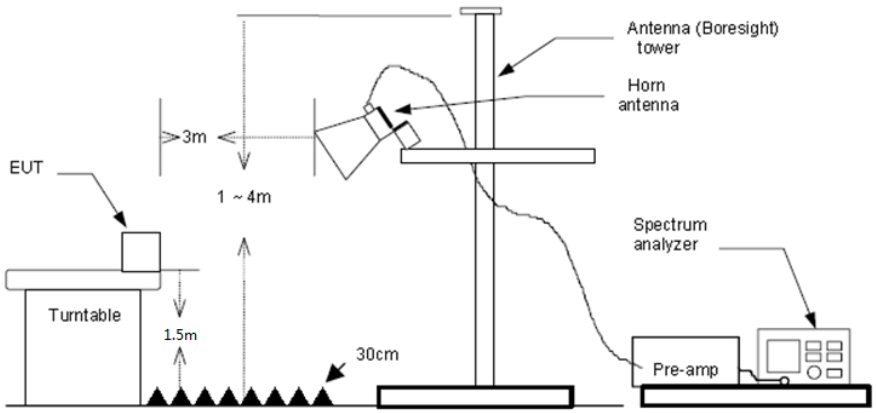
FCC CFR Title 47 Part 15 Subpart E Section 15.407(b)

Un-restricted band emissions above 1GHz			
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	-27dBm/MHz (68.2dBuV/m@3m)	Peak
	5.65GHz-5.7GHz	-27*dBm/MHz to 10dBm/MHz (68.2* dBuV/m to 105.6dBuV/m@3m)	Peak
	5.7GHz-5.72GHz	10*dBm/MHz to 15.6dBm/MHz (105.6*dBuV/m to 110.8dBuV/m@3m)	Peak
	5.72GHz-5.725GHz	15.6*dBm/MHz to 27dBm/MHz (110.8dBuV/m to* 122.2dBuV/m@3m)	Peak
	5.85GHz-5.855GHz	27dBm/MHz to 15.6*dBm/MHz (122.2dBuV/m to110.8* dBuV/m@3m)	Peak
	5.855GHz-5.875GHz	15.6dBm/MHz to 10*dBm/MHz (110.8dBuV/m to 105.6* dBuV/m@3m)	Peak
	5.875GHz-5.925GHz	10dBm/MHz to -27*dBm/MHz (105.6dBuV/m to 68.2* dBuV/m@3m)	Peak
	Above 5.925GHz	-27dBm/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



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013 requirements.
2. The EUT is placed on a turn table which is 1.5 meter above ground. 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. In order to find themaximum emission, all of the interface cables were manipulated according to ANSI C63.10:2013 on radiated measurement.
5. The receiver set as follow:
   RBW=1MHz, VBW=3MHz PEAK detector for Peak value.
   RBW=1MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Band: I&II				Worst mode: 802.11a			Test channel: CH_L		
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
5149.67	16.08	31.70	9.79	0.00	57.57	74.00	-16.43	Vertical	Peak
5149.67	14.85	31.70	9.79	0.00	56.34	74.00	-17.66	Horizontal	Peak
5149.67	7.79	31.70	9.79	0.00	49.28	54.00	-4.72	Vertical	Average
5149.67	8.09	31.70	9.79	0.00	49.58	54.00	-4.42	Horizontal	Average

Band: I&II				Worst mode: 802.11a			Test channel: CH_H		
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
5349.35	15.56	31.40	10.05	0.00	57.01	74.00	-16.99	Vertical	Peak
5349.35	14.72	31.40	10.05	0.00	56.17	74.00	-17.83	Horizontal	Peak
5349.35	8.93	31.40	10.05	0.00	50.38	54.00	-3.62	Vertical	Average
5349.35	8.09	31.40	10.05	0.00	49.54	54.00	-4.46	Horizontal	Average

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. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

Band: III				Worst mode: 802.11a			Test channel: CH_L		
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
5460.99	15.75	31.78	10.18	0.00	57.71	74.00	-16.29	Vertical	Peak
5460.99	14.27	31.78	10.18	0.00	56.23	74.00	-17.77	Horizontal	Peak
5460.99	6.59	31.78	10.18	0.00	48.55	54.00	-5.45	Vertical	Average
5460.99	11.00	31.78	10.18	0.00	52.96	54.00	-1.04	Horizontal	Average

Band: III				Worst mode: 802.11a			Test channel: CH_H		
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
5725.49	15.60	31.73	10.47	0.00	57.80	74.00	-16.20	Vertical	Peak
5725.49	14.65	31.73	10.47	0.00	56.85	74.00	-17.15	Horizontal	Peak
5725.49	8.97	31.73	10.47	0.00	51.17	54.00	-2.83	Vertical	Average
5725.49	8.73	31.73	10.47	0.00	50.93	54.00	-3.07	Horizontal	Average

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. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

Band: IV				Worst mode: 802.11a			Test channel: CH_L		
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
5725.49	15.76	31.73	10.47	0.00	57.96	74.00	-16.04	Vertical	Peak
5725.49	12.68	31.73	10.47	0.00	54.88	74.00	-19.12	Horizontal	Peak
5725.49	9.43	31.73	10.47	0.00	51.63	54.00	-2.37	Vertical	Average
5725.49	8.98	31.73	10.47	0.00	51.18	54.00	-2.82	Horizontal	Average

Band: IV				Worst mode: 802.11a			Test channel: CH_H		
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
5850.00	15.69	32.20	10.61	0.00	58.50	74.00	-15.50	Vertical	Peak
5850.00	11.79	32.20	10.61	0.00	54.60	74.00	-19.40	Horizontal	Peak
5850.00	8.71	32.20	10.61	0.00	51.52	54.00	-2.48	Vertical	Average
5850.00	8.46	32.20	10.61	0.00	51.27	54.00	-2.73	Horizontal	Average

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. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

5.8. Radiated Spurious Emissions

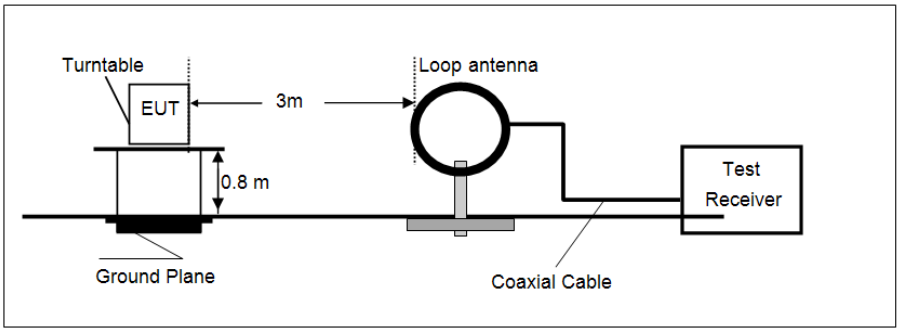
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.209 and Part 15 Subpart E Section 15.407

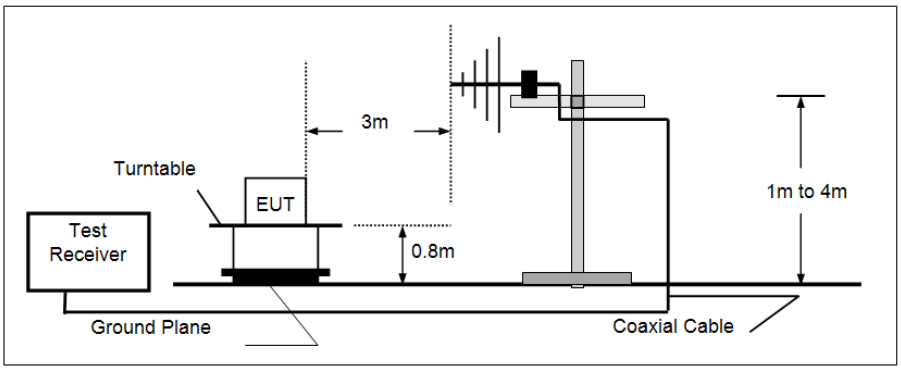
Unwanted emissions below 1GHz and Restricted band emissions above 1GHz		
Frequency	Limit (dBuV/m @3m)	Value
30MHz-88MHz	40.00	Quasi-peak
88MHz-216MHz	43.50	Quasi-peak
216MHz-960MHz	46.00	Quasi-peak
960MHz-1GHz	54.00	Quasi-peak
Above 1GHz	54.00	Average
	74.00	Peak

TEST CONFIGURATION

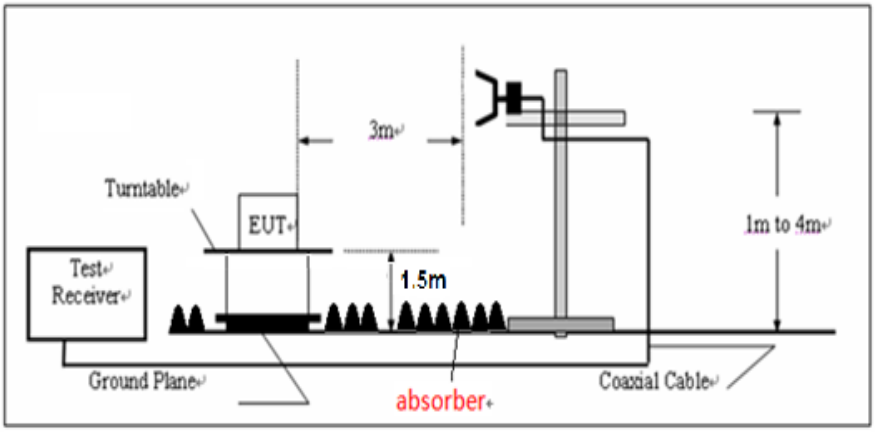
- 9KHz ~30MHz



- 30MHz ~ 1GHz



- Above 1GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10:2013
2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, and 1.5 m for above 1 GHz. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Below 1 GHz:
   RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold;
   If the emission level of the EUT measured by the peak detector is 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) From 1 GHz to 10^{th} harmonic:
   RBW=1MHz, VBW=3MHz Peak detector for Peak value.
   RBW=1MHz, VBW=3MHz RMS detector for Average value.

TEST MODE:

Please refer to the clause 3.3

TEST RESULTS

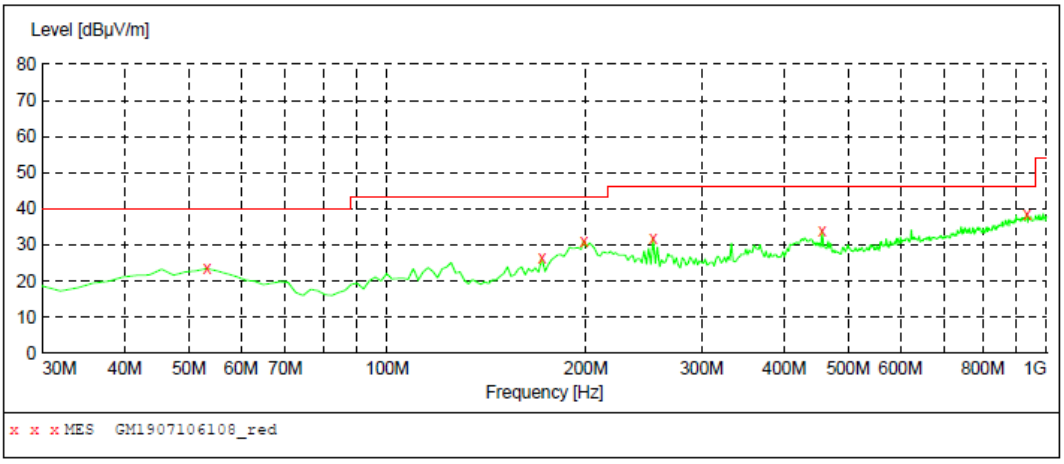
☒ **Passed** ☐ **Not Applicable**

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.

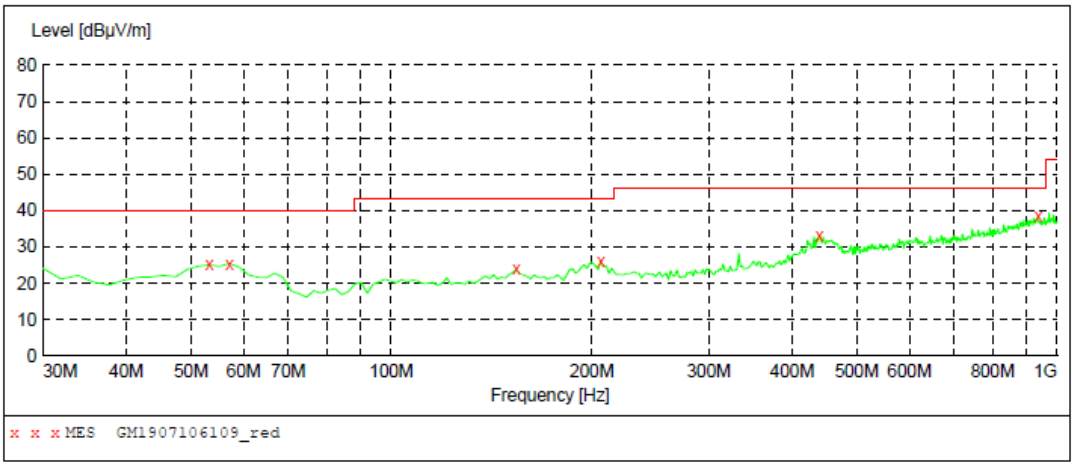
■ **30MHz ~ 1GHz**



MEASUREMENT RESULT: "GM1907106108_red"

7/10/2019 9:59AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
53.280000	23.50	-5.1	40.0	16.5	QP	300.0	274.00	HORIZONTAL
171.620000	26.30	-9.1	43.5	17.2	QP	100.0	93.00	HORIZONTAL
198.780000	31.10	-5.8	43.5	12.4	QP	100.0	93.00	HORIZONTAL
253.100000	31.90	-4.6	46.0	14.1	QP	100.0	161.00	HORIZONTAL
456.800000	34.00	0.6	46.0	12.0	QP	100.0	281.00	HORIZONTAL
934.040000	38.60	10.8	46.0	7.4	QP	300.0	31.00	HORIZONTAL



MEASUREMENT RESULT: "GM1907106109_red"

7/10/2019 10:01AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
53.280000	25.10	-5.1	40.0	14.9	QP	100.0	9.00	VERTICAL
57.160000	25.40	-5.5	40.0	14.6	QP	100.0	0.00	VERTICAL
154.160000	23.80	-9.9	43.5	19.7	QP	100.0	0.00	VERTICAL
206.540000	26.00	-6.6	43.5	17.5	QP	100.0	142.00	VERTICAL
439.340000	33.10	0.3	46.0	12.9	QP	100.0	52.00	VERTICAL
935.980000	38.30	10.8	46.0	7.7	QP	100.0	343.00	VERTICAL

Remark:

Transd=Cable lose+ Antenna factor- Pre-amplifier; Margin=Limit -Level

■ **Above 1GHz**

Band: I				Worst mode: 802.11a			Test channel: CH_L		
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
1805.01	32.29	25.39	5.97	37.41	26.24	74.00	-47.76	Horizontal	Peak
4234.72	30.73	30.07	8.97	36.53	33.24	74.00	-40.76	Horizontal	Peak
6511.12	28.49	34.02	11.20	33.63	40.08	74.00	-33.92	Horizontal	Peak
8814.77	30.43	37.71	13.12	32.99	48.27	74.00	-25.73	Horizontal	Peak
1773.13	32.81	25.35	5.91	37.38	26.69	74.00	-47.31	Vertical	Peak
7027.82	29.74	35.38	11.85	33.83	43.14	74.00	-30.86	Vertical	Peak
9538.54	30.63	39.05	13.72	33.87	49.53	74.00	-24.47	Vertical	Peak
11226.25	28.62	40.30	13.48	35.32	47.08	74.00	-26.92	Vertical	Peak

Band: I				Worst mode: 802.11a			Test channel: CH_M		
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
1904.12	31.24	25.34	6.12	37.51	25.19	74.00	-48.81	Horizontal	Peak
3135.99	33.05	28.80	7.64	37.45	32.04	74.00	-41.96	Horizontal	Peak
4946.07	30.70	31.45	9.63	35.47	36.31	74.00	-37.69	Horizontal	Peak
6511.12	28.49	34.02	11.20	33.63	40.08	74.00	-33.92	Horizontal	Peak
1814.22	32.53	25.39	5.98	37.42	26.48	74.00	-47.52	Vertical	Peak
4034.78	31.44	29.77	8.81	36.73	33.29	74.00	-40.71	Vertical	Peak
5022.19	29.05	31.59	9.69	35.34	34.99	74.00	-39.01	Vertical	Peak
10534.09	29.65	39.98	13.59	36.69	46.53	74.00	-27.47	Vertical	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.*
4. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

Band: I				Worst mode: 802.11a			Test channel: CH_H		
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
1938.35	31.38	25.69	6.17	37.54	25.70	74.00	-48.30	Horizontal	Peak
6140.85	29.34	32.66	10.91	34.00	38.91	74.00	-35.09	Horizontal	Peak
7981.72	29.43	37.03	12.39	33.07	45.78	74.00	-28.22	Horizontal	Peak
11341.14	29.40	40.30	13.43	35.00	48.13	74.00	-25.87	Horizontal	Peak
1795.84	32.27	25.39	5.95	37.40	26.21	74.00	-47.79	Vertical	Peak
4809.50	29.60	31.58	9.55	35.72	35.01	74.00	-38.99	Vertical	Peak
7081.70	29.53	35.55	11.85	33.74	43.19	74.00	-30.81	Vertical	Peak
9636.16	29.12	39.08	13.72	33.95	47.97	74.00	-26.03	Vertical	Peak

Band: II				Worst mode: 802.11a			Test channel: CH_L		
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
1585.25	32.45	25.03	5.53	37.17	25.84	74.00	-48.16	Horizontal	Peak
3933.37	30.26	29.70	8.69	36.81	31.84	74.00	-42.16	Horizontal	Peak
5462.30	31.97	31.75	10.17	34.49	39.40	74.00	-34.60	Horizontal	Peak
8208.37	28.38	36.67	12.77	33.00	44.82	74.00	-29.18	Horizontal	Peak
1732.97	34.17	25.27	5.83	37.34	27.93	74.00	-46.07	Vertical	Peak
3072.77	32.75	28.75	7.57	37.51	31.56	74.00	-42.44	Vertical	Peak
5099.49	30.63	31.90	9.75	35.18	37.10	74.00	-36.90	Vertical	Peak
7027.82	29.74	35.38	11.85	33.83	43.14	74.00	-30.86	Vertical	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.*
4. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

Band: II				Worst mode: 802.11a			Test channel: CH_M		
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
1617.86	33.48	24.95	5.60	37.21	26.82	74.00	-47.18	Horizontal	Peak
3342.04	32.76	28.20	7.89	37.27	31.58	74.00	-42.42	Horizontal	Peak
5448.41	29.25	31.69	10.16	34.51	36.59	74.00	-37.41	Horizontal	Peak
7800.94	28.30	36.11	13.26	33.05	44.62	74.00	-29.38	Horizontal	Peak
1851.54	32.25	25.35	6.04	37.46	26.18	74.00	-47.82	Vertical	Peak
4223.95	31.49	30.05	8.96	36.54	33.96	74.00	-40.04	Vertical	Peak
9298.80	30.14	39.19	13.59	33.52	49.40	74.00	-24.60	Vertical	Peak
10560.94	29.60	39.97	13.59	36.64	46.52	74.00	-27.48	Vertical	Peak

Band: II				Worst mode: 802.11a			Test channel: CH_H		
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
1795.84	34.93	25.39	5.95	37.40	28.87	74.00	-45.13	Horizontal	Peak
3384.85	33.33	28.20	7.94	37.24	32.23	74.00	-41.77	Horizontal	Peak
5546.36	28.63	31.85	10.23	34.39	36.32	74.00	-37.68	Horizontal	Peak
8792.37	28.48	37.72	13.09	32.98	46.31	74.00	-27.69	Horizontal	Peak
1621.99	33.19	24.97	5.61	37.21	26.56	74.00	-47.44	Vertical	Peak
3738.13	32.70	29.42	8.43	36.95	33.60	74.00	-40.40	Vertical	Peak
6886.15	29.72	34.60	11.71	33.82	42.21	74.00	-31.79	Vertical	Peak
8637.08	28.88	37.52	12.93	32.94	46.39	74.00	-27.61	Vertical	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.*
4. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

Band: III				Worst mode: 802.11a			Test channel: CH_L		
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
1483.73	31.84	25.82	5.24	37.08	25.82	74.00	-48.18	Horizontal	Peak
3419.49	32.57	28.36	7.99	37.21	31.71	74.00	-42.29	Horizontal	Peak
5546.36	28.63	31.85	10.23	34.39	36.32	74.00	-37.68	Horizontal	Peak
8725.48	29.05	37.85	13.02	32.96	46.96	74.00	-27.04	Horizontal	Peak
1894.45	31.40	25.31	6.11	37.50	25.32	74.00	-48.68	Vertical	Peak
4971.32	28.71	31.47	9.65	35.43	34.40	74.00	-39.60	Vertical	Peak
7900.86	29.18	36.70	12.78	33.06	45.60	74.00	-28.40	Vertical	Peak
11842.69	29.00	39.81	14.26	35.07	48.00	74.00	-26.00	Vertical	Peak

Band: III				Worst mode: 802.11a			Test channel: CH_M		
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
1786.72	31.96	25.37	5.93	37.39	25.87	74.00	-48.13	Horizontal	Peak
4433.26	30.43	30.57	9.18	36.35	33.83	74.00	-40.17	Horizontal	Peak
5164.81	30.87	31.64	9.80	35.05	37.26	74.00	-36.74	Horizontal	Peak
7820.82	28.71	36.23	13.16	33.05	45.05	74.00	-28.95	Horizontal	Peak
1786.72	32.75	25.37	5.93	37.39	26.66	74.00	-47.34	Vertical	Peak
3049.39	33.51	28.70	7.54	37.53	32.22	74.00	-41.78	Vertical	Peak
4629.32	30.95	30.99	9.47	36.05	35.36	74.00	-38.64	Vertical	Peak
6283.16	28.52	33.07	11.00	33.84	38.75	74.00	-35.25	Vertical	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.*
4. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

Band: III				Worst mode: 802.11a			Test channel: CH_H		
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
1973.20	30.23	26.04	6.23	37.58	24.92	74.00	-49.08	Horizontal	Peak
4107.32	31.68	29.91	8.87	36.65	33.81	74.00	-40.19	Horizontal	Peak
5047.83	29.08	31.69	9.71	35.28	35.20	74.00	-38.80	Horizontal	Peak
7470.56	29.02	36.16	12.30	33.07	44.41	74.00	-29.59	Horizontal	Peak
1502.73	32.24	25.77	5.29	37.07	26.23	74.00	-47.77	Vertical	Peak
3096.33	32.84	28.79	7.60	37.49	31.74	74.00	-42.26	Vertical	Peak
4736.60	29.05	31.35	9.51	35.85	34.06	74.00	-39.94	Vertical	Peak
6594.52	29.33	34.19	11.35	33.67	41.20	74.00	-32.80	Vertical	Peak

Band: IV				Worst mode: 802.11a			Test channel: CH_L		
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
2008.68	31.63	26.34	6.28	37.60	26.65	74.00	-47.35	Horizontal	Peak
3472.12	33.94	28.78	8.07	37.16	33.63	74.00	-40.37	Horizontal	Peak
4433.26	30.43	30.57	9.18	36.35	33.83	74.00	-40.17	Horizontal	Peak
6544.35	28.56	34.09	11.26	33.64	40.27	74.00	-33.73	Horizontal	Peak
2108.21	33.31	26.77	6.36	37.60	28.84	74.00	-45.16	Vertical	Peak
3266.35	32.73	28.40	7.80	37.34	31.59	74.00	-42.41	Vertical	Peak
4920.96	30.01	31.42	9.62	35.52	35.53	74.00	-38.47	Vertical	Peak
7190.69	29.29	36.14	11.86	33.54	43.75	74.00	-30.25	Vertical	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.*
4. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

Band: IV				Worst mode: 802.11a			Test channel: CH_M		
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
1786.72	31.96	25.37	5.93	37.39	25.87	74.00	-48.13	Horizontal	Peak
4170.53	31.11	29.97	8.92	36.59	33.41	74.00	-40.59	Horizontal	Peak
5910.80	30.24	32.32	10.63	34.20	38.99	74.00	-35.01	Horizontal	Peak
7470.56	29.02	36.16	12.30	33.07	44.41	74.00	-29.59	Horizontal	Peak
2195.85	32.40	27.47	6.44	37.60	28.71	74.00	-45.29	Vertical	Peak
3454.49	32.05	28.64	8.04	37.18	31.55	74.00	-42.45	Vertical	Peak
4846.37	30.38	31.51	9.57	35.65	35.81	74.00	-38.19	Vertical	Peak
6903.71	29.12	34.72	11.73	33.83	41.74	74.00	-32.26	Vertical	Peak

Band: IV				Worst mode: 802.11a			Test channel: CH_H		
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
1978.23	30.67	26.09	6.24	37.58	25.42	74.00	-48.58	Horizontal	Peak
4821.76	30.05	31.56	9.55	35.69	35.47	74.00	-38.53	Horizontal	Peak
6544.35	28.56	34.09	11.26	33.64	40.27	74.00	-33.73	Horizontal	Peak
10113.67	29.07	39.11	13.55	34.80	46.93	74.00	-27.07	Horizontal	Peak
1832.79	32.48	25.37	6.01	37.44	26.42	74.00	-47.58	Vertical	Peak
4366.07	30.29	30.40	9.10	36.41	33.38	74.00	-40.62	Vertical	Peak
6938.94	28.39	34.93	11.77	33.85	41.24	74.00	-32.76	Vertical	Peak
8355.94	28.59	36.51	12.83	32.96	44.97	74.00	-29.03	Vertical	Peak

Remark:

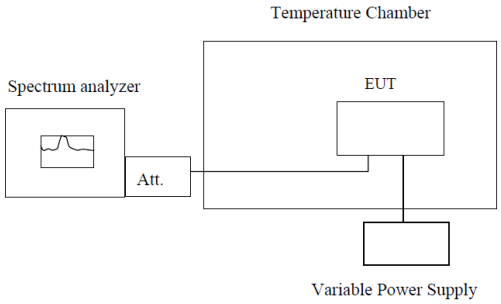
1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
3. *Measuring frequencies from 1 GHz to 40GHz.*
4. *Test 802.11a, 802.11n, 802.11ac mode,all modulations have been tested,only worst case is reported*

5.9. Frequency stability

LIMIT

Within Operation Band

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external power supply.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –20℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ reached.

TEST MODE:

Transmitting with unmodulation

TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

Voltage VS Frequency stability

Band: I			Test Frequency: 5180.00MHz	
Temperature (℃)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	3.3	-30000.00	-5.79151	PASS
25	3.7	-30000.00	-5.79151	PASS
25	4.2	-30000.00	-5.79151	PASS

Band: II			Test Frequency: 5260.00MHz	
Temperature (℃)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	3.3	-21000.00	-3.99240	PASS
25	3.7	-25000.00	-4.75285	PASS
25	4.2	-18000.00	-3.42205	PASS

Band: III			Test Frequency: 5500.00MHz	
Temperature (℃)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	3.3	7000.00	1.27273	PASS
25	3.7	5000.00	0.90909	PASS
25	4.2	8000.00	1.45455	PASS

Band: IV			Test Frequency: 5745.00MHz	
Temperature (℃)	Voltage (V)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
25	3.3	11000.00	1.91471	PASS
25	3.7	11000.00	1.91471	PASS
25	4.2	11000.00	1.91471	PASS

Temperature VS Frequency stability

Band: I			Test Frequency: 5180.00MHz	
Voltage (V)	Temperature (℃)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
3.7	-20	-29000.00	-5.59846	PASS
3.7	-10	-29000.00	-5.59846	PASS
3.7	0	-29000.00	-5.59846	PASS
3.7	10	-29000.00	-5.59846	PASS
3.7	20	-29000.00	-5.59846	PASS
3.7	30	-29000.00	-5.59846	PASS
3.7	40	-29000.00	-5.59846	PASS
3.7	50	-28000.00	-5.40541	PASS

Band: II			Test Frequency: 5260.00MHz	
Voltage (V)	Temperature (℃)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
3.7	-20	-11000.00	-2.09126	PASS
3.7	-10	-8000.00	-1.52091	PASS
3.7	0	-6000.00	-1.14068	PASS
3.7	10	-3000.00	-0.57034	PASS
3.7	20	-1000.00	-0.19011	PASS
3.7	30	1000.00	0.19011	PASS
3.7	40	2000.00	0.38023	PASS
3.7	50	3000.00	0.57034	PASS

Band: III			Test Frequency: 5500.00MHz	
Voltage (V)	Temperature (℃)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
3.7	-20	11000.00	2.00000	PASS
3.7	-10	11000.00	2.00000	PASS
3.7	0	12000.00	2.18182	PASS
3.7	10	12000.00	2.18182	PASS
3.7	20	11000.00	2.00000	PASS
3.7	30	12000.00	2.18182	PASS
3.7	40	12000.00	2.18182	PASS
3.7	50	11000.00	2.00000	PASS

Band: IV			Test Frequency: 5745.00MHz	
Voltage (V)	Temperature (℃)	Frequency Deviation (Hz)	Frequency Deviation (ppm)	Result
3.7	-20	11000.00	1.91471	PASS
3.7	-10	8000.00	1.39252	PASS
3.7	0	8000.00	1.39252	PASS
3.7	10	9000.00	1.56658	PASS
3.7	20	10000.00	1.74064	PASS
3.7	30	10000.00	1.74064	PASS
3.7	40	10000.00	1.74064	PASS
3.7	50	10000.00	1.74064	PASS

5.10. 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	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot 10^6}{PRI_{\mu sec}}\right)\right\}$	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 $\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^{6}}{3066}\right)\right\}$ = 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:

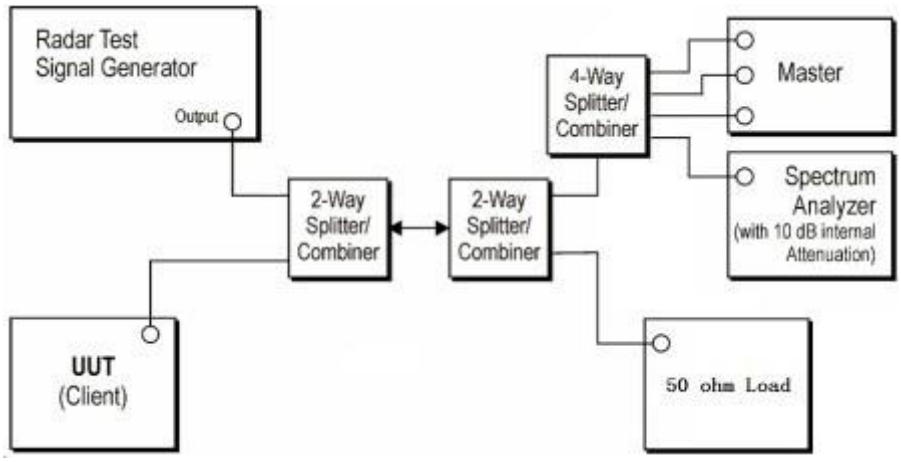
The first frequency in a hopping sequence is selected randomly from the group of 475 integer frequencies from 5250–5724MHz.Next,the frequency that was just chosen is removed from the group and a frequency is randomly selected from the remaining 474 frequencies in the group. This process continues until 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

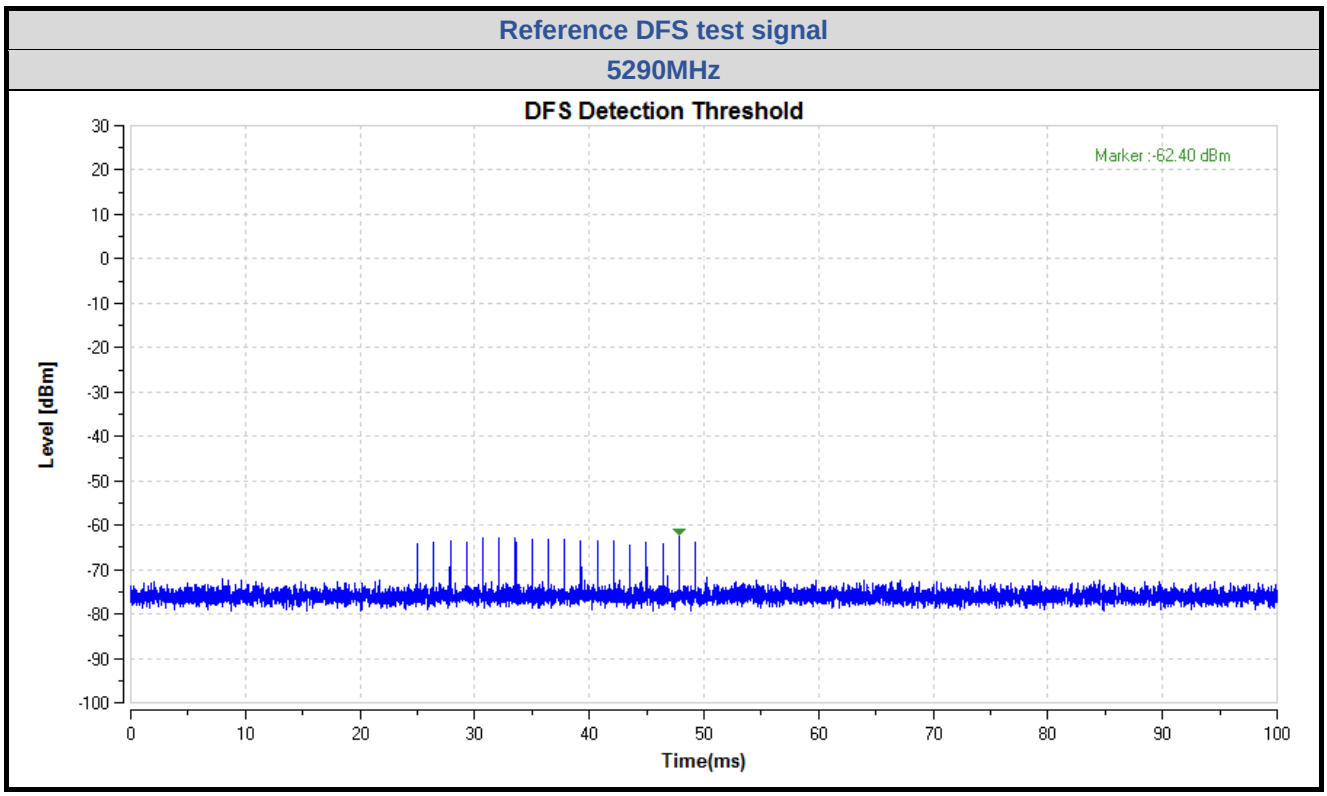
Radar Waveform Calibration Procedure

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

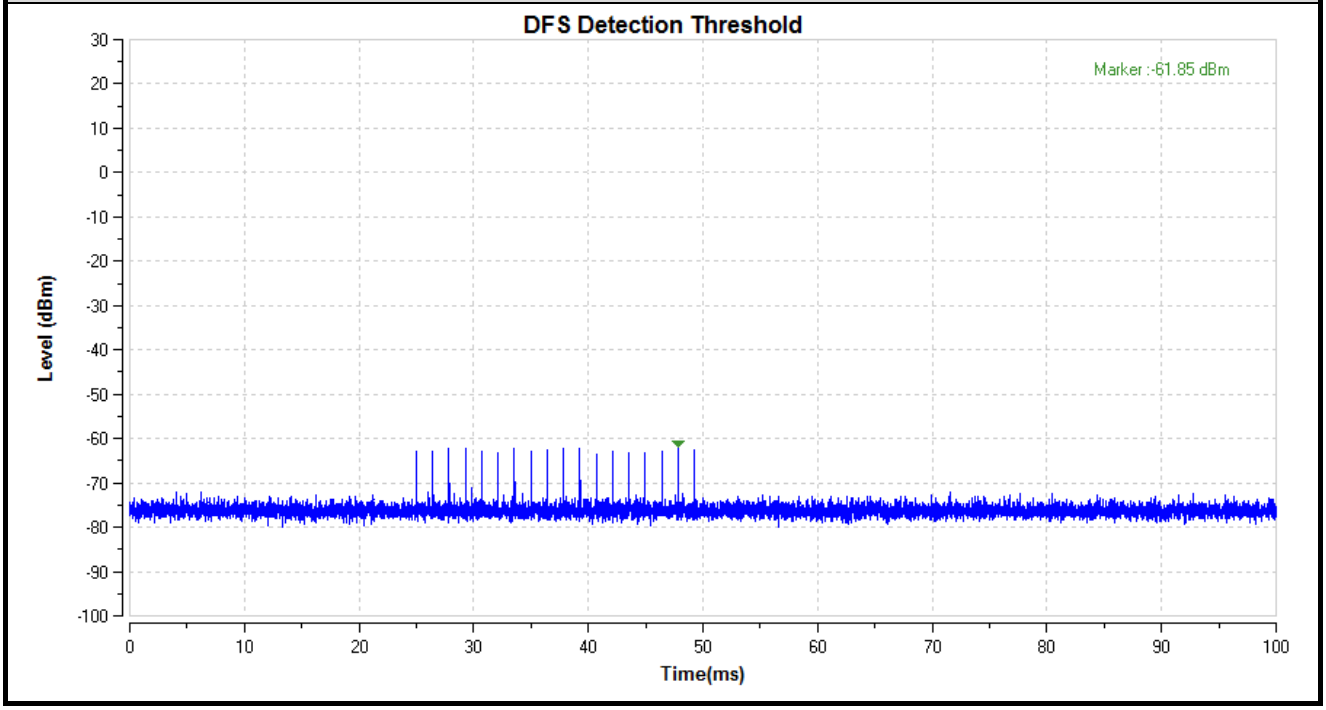


Radar Waveform Calibration Result

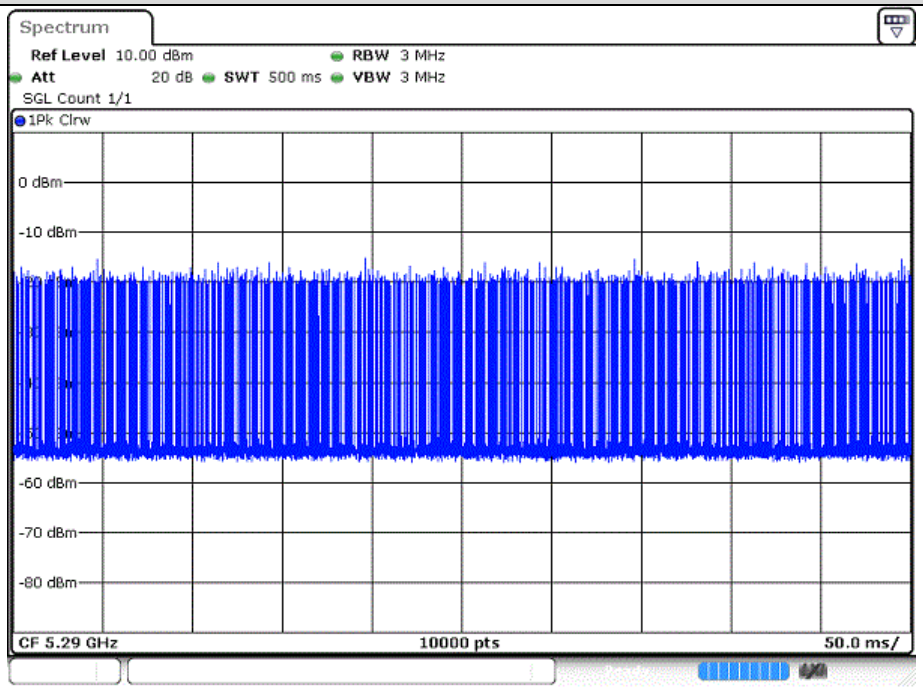


Reference DFS test signal

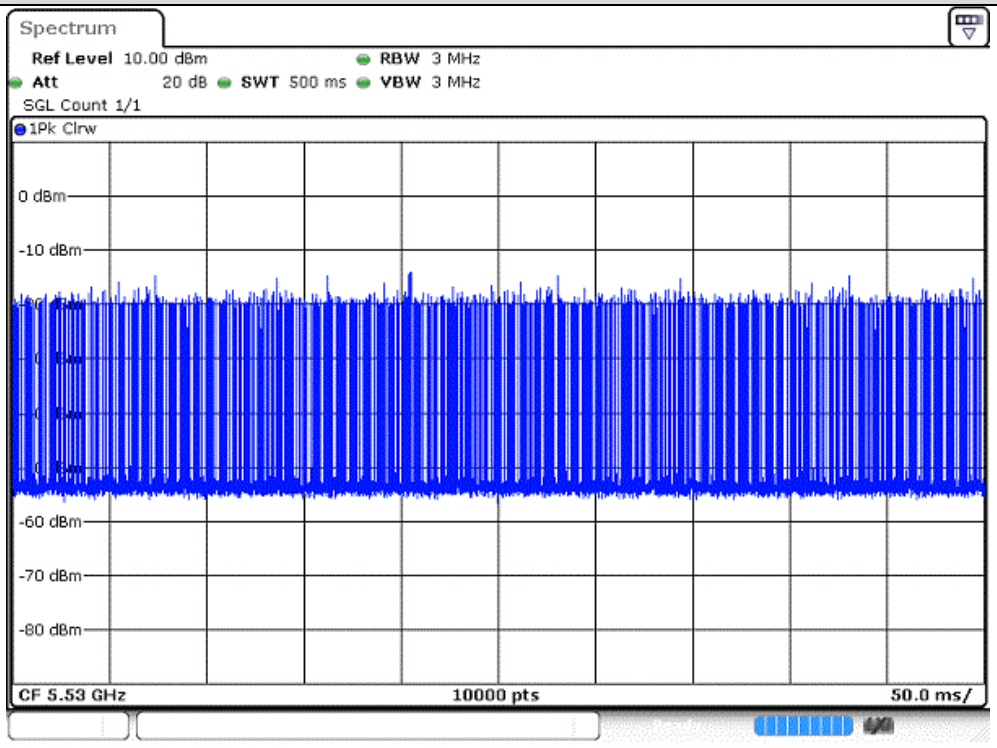
5530 MHz



EUT data traffic (Slave)
5290MHz

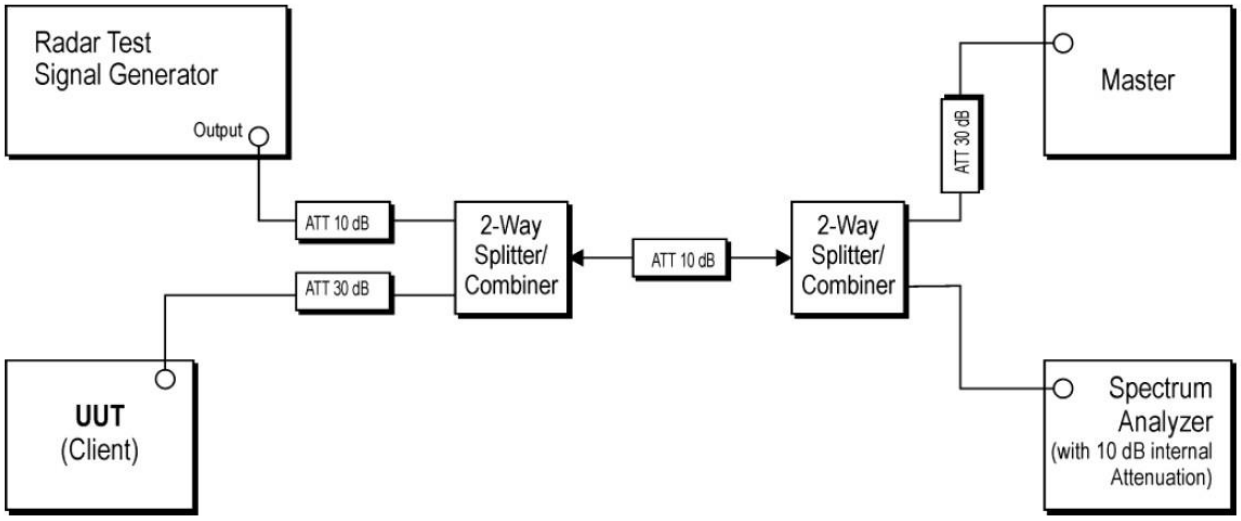


EUT data traffic (Slave)
5530MHz



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

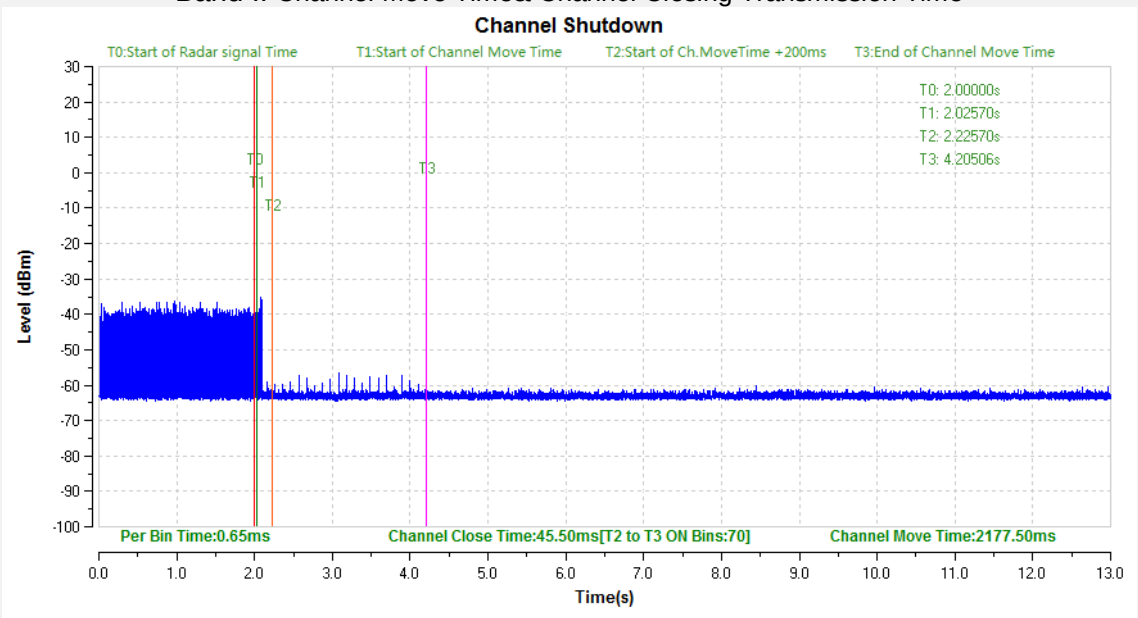
TEST RESULTS

☒ **Passed** ☐ **Not Applicable**

BW/ Channel	Maximum EIRP Power(dBm)	Test Item	Test Result	Limit	Result
80MHz/ 5290MHz	8.07	Channel Move Time	2.178s	<10s	Pass
		Channel Closing Transmission Time	45.50ms	<60ms	Pass
80MHz/ 5530MHz	8.09	Channel Move Time	2.144s	<10s	Pass
		Channel Closing Transmission Time	56.33ms	<60ms	Pass

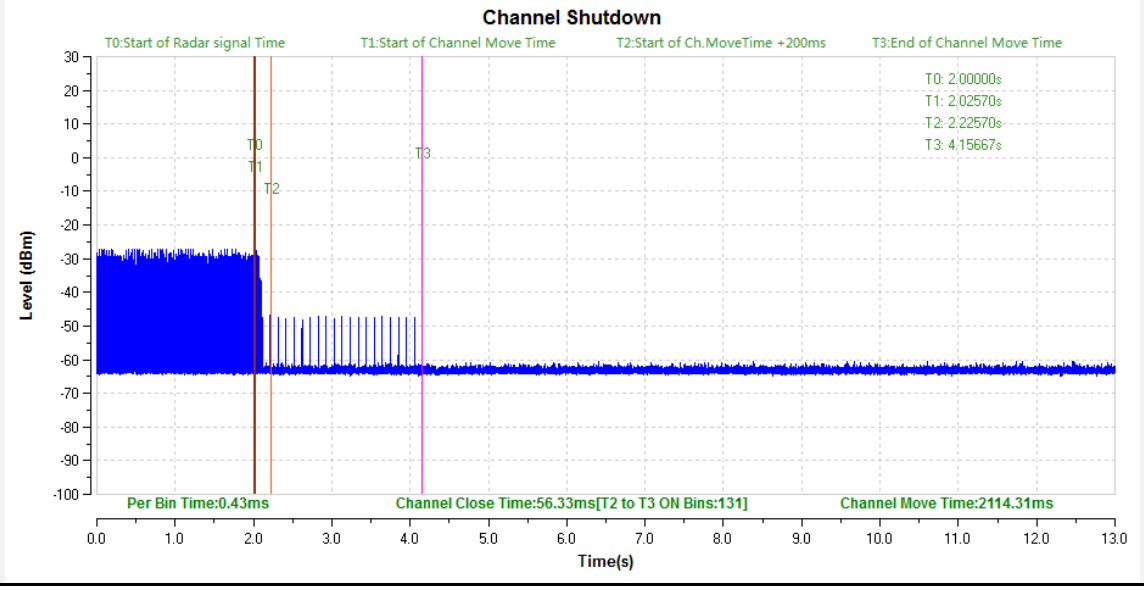
80MHz/5290MHz

Band II Channel Move Time& Channel Closing Transmission Time



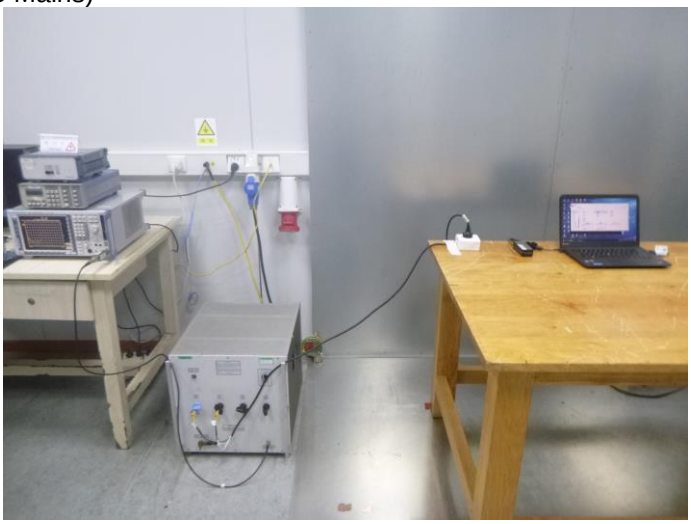
80MHz/5530MHz

Band III Channel Move Time& Channel Closing Transmission Time

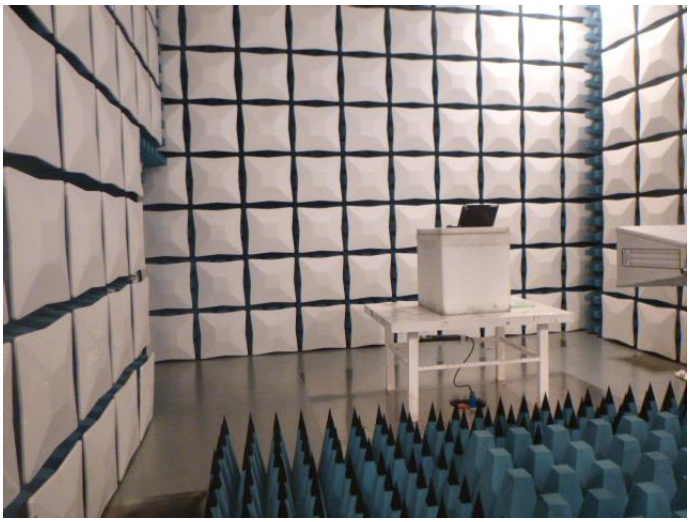


6. Test Setup Photos of the EUT

Conducted Emissions (AC Mains)



Radiated Emissions



DFS

7. External and Internal Photos of the EUT

Reference to the test report No.: CHTEW19070044

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