TEST REPORT

Reference No.	:	WTD24D03066052W002
FCC ID.....	:	ZLZ-ALXC29
Applicant	:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Address	:	Mindray Building, Keji 12th Road South, Hi-tech Ind, Shenzhen China
Manufacturer	:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Address	:	Mindray Building, Keji 12th Road South, Hi-tech Ind, Shenzhen China
Product Name	:	Wireless Flat Panel Wireless Module
Model No.	:	ALXC29
Standards.....	:	FCC 47CFR Part 15 Section 15.407
Date of Receipt sample.....	:	2024-03-28
Date of Test.....	:	2024-03-28 to 2024-04-12
Date of Issue	:	2024-08-27
Test Result	:	**Pass**

Remarks:
The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.
The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

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Approved by:

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3 Revision History

Test Report No.	Date of Receipt Sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD24D03066052W002	2024-03-28	2024-03-28 to 2024-04-12	2024-08-27	Original	-	Valid

4 General Information

4.1 General Description of E.U.T.

Product: Wireless Flat Panel Wireless Module

Model(s): ALXC29

Test Sample No.: 1-1/2

Model Description: N/A

Wi-Fi Specification: 802.11a/ n(HT20/40)/ac VHT(20/40/80)

Hardware Version: V1.0

Software Version: V1.0

4.2 Details of E.U.T.

Operation Frequency:
U-NII-1
802.11a/n (HT20) /ac (HT20), 5180-5240MHz 4CH
802.11n (HT40) /ac (HT40), 5190-5230MHz 2CH
802.11ac (HT80), 5210MHz 1CH
U-NII-3
802.11a/n (HT20)/ac (HT20), 5745-5825MHz 5CH
802.11n (HT40)/ ac (HT40), 5755-5795MHz 2CH
802.11ac (HT80), 5775MHz 1CH

Max. RF output power:
U-NII-1
Ant. 0: 15.87dBm, Ant. 1: 15.98 dBm, Total: 18.94 dBm
U-NII-3:
Ant. 0: 13.98dBm, Ant. 1: 13.95 dBm, Total: 17.10 dBm

Type of Modulation:
802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

Antenna installation: FPC antenna

Antenna Gain:

Ant.	Operation Frequencies (MHz) /Antenna Gain (dBi)	
	5150~5250	5725~5850
0	2.25	1.81
1	2.25	1.81

Note:
#: The antenna gain is provided by the applicant, and the applicant should be responsible for its authenticity, WALTEK lab has not verified the authenticity of its information.

Ratings: 3.3VDC

4.3 Channel List

U-NII-1 (5.15-5.25GHz)			
channel	**Frequency(MHz)**	**channel**	**Frequency(MHz)**
36	5180	38	5190
40	5200	42	5210
44	5220	46	5230
48	5240		

U-NII-3 (5.725-5.85GHz)			
channel	**Frequency(MHz)**	**channel**	**Frequency(MHz)**
149	5745	151	5755
153	5765	155	5775
157	5785	159	5795
161	5805	165	5825

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

For 802.11a/n (HT20):

channel	Frequency(MHz)	channel	Frequency(MHz)
36	5180	40	5200
48	5240		

channel	Frequency(MHz)	channel	Frequency(MHz)
149	5745	157	5785
165	5825		

For 802.11n (HT40):

channel	Frequency(MHz)	channel	Frequency(MHz)
38	5190	46	5230

channel	Frequency(MHz)	channel	Frequency(MHz)
151	5755	159	5795

4.4 Test Mode Description

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

The duty cycle of transmitting is maximum.

The software is SecureCRT.

Test Items	Mode	Data Rate	TX/RX
Radiated Emissions	802.11a (HT20)	6 Mbps	TX
	802.11n(HT20/40)	MCS0	TX
Duty Cycle	802.11a (HT20)	6 Mbps	TX
	802.11n(HT20/40)	MCS0	TX
Band Edge	802.11a (HT20)	6 Mbps	TX
	802.11n(HT20/40)	MCS0	TX
6dB Bandwidth	802.11a (HT20)	6 Mbps	TX
	802.11n(HT20/40)	MCS0	TX
26dB Bandwidth and 99% Occupied Bandwidth	802.11a (HT20)	6 Mbps	TX
	802.11n(HT20/40)	MCS0	TX
Conducted Output Power	802.11a (HT20)	6 Mbps	TX
	802.11n(HT20/40)	MCS0	TX
Power Spectral Density	802.11a (HT20)	6 Mbps	TX
	802.11n(HT20/40)	MCS0	TX
Frequency Stability	Un-modulation	/	TX

4.5 Test Facility

The test facility has a test site registered with the following organizations:

ISED CAB identifier: CN0013. Test Firm Registration No.: 7760A.

Waltek Testing Group Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration number 7760A, October 15, 2016.

FCC Designation No.: CN1201. Test Firm Registration No.: 523476.

Waltek Testing Group 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. Registration number 523476, September 10, 2019.

5 Equipment Used during Test

5.1 Equipments List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date	Calibration Due Date
3m Semi-anechoic Chamber for Radiation Emissions 1#						
1	Spectrum Analyzer	R&S	FSP30	100091	2023-04-24	2024-04-23
2	Amplifier	Agilent	8447D	2944A10178	2023-07-27	2024-07-26
3	Tri-log Broadband Antenna	SCHWARZBECK	VULB9163	336	2023-08-07	2024-08-06
4	Coaxial Cable	Top	TYPE16(13M)	-	2023-04-24	2024-04-23
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120D	667	2024-01-23	2025-01-22
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	2023-07-27	2024-07-26
7	Broadband Preamplifier	COMPLIANCE	PAP-1G18	2004	2023-08-07	2024-08-06
8	Coaxial Cable	Top	ZT26-NJ-NJ-8M/FA	-	2023-04-24	2024-04-23
9	Microwave Amplifier	SCHWARZBECK	BBV 9721	100472	2023-07-27	2024-07-26
10	Coaxial Cable	Top	ZT40-2.92J-2.92J-2.0M	17100919	2023-04-24	2024-04-23
3m Semi-anechoic Chamber for Radiation Emissions 2#						
1	Test Receiver	R&S	ESCI	101296	2023-04-24	2024-04-23
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2023-11-04	2024-11-03
3	Active Loop Antenna	Com-Power	AL-130R	10160007	2023-05-07	2024-05-06
4	Amplifier	ANRITSU	MH648A	M43381	2023-04-24	2024-04-23
5	Cable	HUBER+SUHNER	CBL2	525178	2023-04-24	2024-04-23
RF Conducting						
1	Spectrum Analyzer	R&S	FSP40	100501	2023-07-27	2024-07-26
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2023-07-27	2024-07-26

Test Software:

Test Item	Software name	Software version
Radiated Emission(3m)	EZ-EMC	EZ-EMC(RA-03A1-1)

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-6}
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

6 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207(a)	N/A*
Radiated Emissions	15.407(a) 15.205(a) 15.209(a)	PASS
Duty Cycle	KDB 789033	PASS
6dB Bandwidth	15.407(a)	PASS
26 dB Emission Bandwidth & 99% Occupied Bandwidth	15.407(a)	PASS
Maximum Conducted Output Power	15.407(a)	PASS
Power Spectral Density	15.407(a)	PASS
Restricted bands around fundamental frequency	15.407(a)	PASS
Antenna Requirement	15.203	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable *: The EUT is only powered by battery, no need to evaluate AC Power Conducted Emission.		

7 Duty cycle

Test Requirement:	FCC 47CFR Part 15 Section 15.407 KDB789033 D02 General U-NII Test Procedures New Rules v02r01, Section (B)
Test Method:	ANSI C63.10: 2013
Test Limit:	N/A
Test Result:	PASS
Remark:	Through Pre-scan, and found 802.11a at lowest channel is the worst case. Only the worst case is recorded in the report.

7.1 Summary of Test Results

Ant0

Type of Modulation	On time ms	Period ms	Duty Cycle linear	Duty Cycle %	Duty Cycle Factor(dB)	Average Factor(dB)
U-NII-1 802.11a	1.392	1.437	0.97	96.87	0.14	-0.28
U-NII-1 802.11n(HT20)	1.295	1.350	0.96	95.93	0.18	-0.36
U-NII-1 802.11n(HT40)	0.642	0.690	0.93	93.04	0.31	-0.63
U-NII-1 802.11ac (HT20)	1.300	1.360	0.96	95.59	0.20	-0.39
U-NII-1 802.11ac (HT40)	0.646	0.700	0.92	92.29	0.35	-0.70
U-NII-1 802.11ac (HT80)	0.321	0.364	0.88	88.19	0.55	-1.09
U-NII-3 802.11a	1.382	1.440	0.96	95.97	0.18	-0.36
U-NII-3 802.11n(HT20)	1.286	1.348	0.95	95.40	0.20	-0.41
U-NII-3 802.11n(HT40)	0.644	0.692	0.93	93.06	0.31	-0.62
U-NII-3 802.11ac (HT20)	1.306	1.356	0.96	96.31	0.16	-0.33
U-NII-3 802.11ac (HT40)	0.643	0.696	0.92	92.39	0.34	-0.69
U-NII-3 802.11ac (HT80)	0.320	0.364	0.88	87.91	0.56	-1.12

Ant1

Type of Modulation	On time ms	Period ms	Duty Cycle linear	Duty Cycle %	Duty Cycle Factor(dB)	Average Factor(dB)
U-NII-1 802.11a	1.383	1.437	0.96	96.24	0.17	-0.33
U-NII-1 802.11n(HT20)	1.290	1.350	0.96	95.56	0.20	-0.39
U-NII-1 802.11n(HT40)	0.638	0.690	0.92	92.46	0.34	-0.68
U-NII-1 802.11ac (HT20)	0.632	0.686	0.92	92.13	0.36	-0.71
U-NII-1 802.11ac (HT40)	0.652	0.700	0.93	93.14	0.31	-0.62
U-NII-1 802.11ac (HT80)	0.321	0.366	0.88	87.70	0.57	-1.14
U-NII-3 802.11a	1.378	1.440	0.96	95.69	0.19	-0.38
U-NII-3 802.11n(HT20)	1.290	1.348	0.96	95.70	0.19	-0.38
U-NII-3 802.11n(HT40)	0.638	0.690	0.92	92.46	0.34	-0.68
U-NII-3 802.11ac (HT20)	1.302	1.360	0.96	95.74	0.19	-0.38
U-NII-3 802.11ac (HT40)	0.652	0.701	0.93	93.01	0.31	-0.63
U-NII-3 802.11ac (HT80)	0.322	0.365	0.88	88.22	0.54	-1.09

Remark:

Duty cycle=On Time/period;

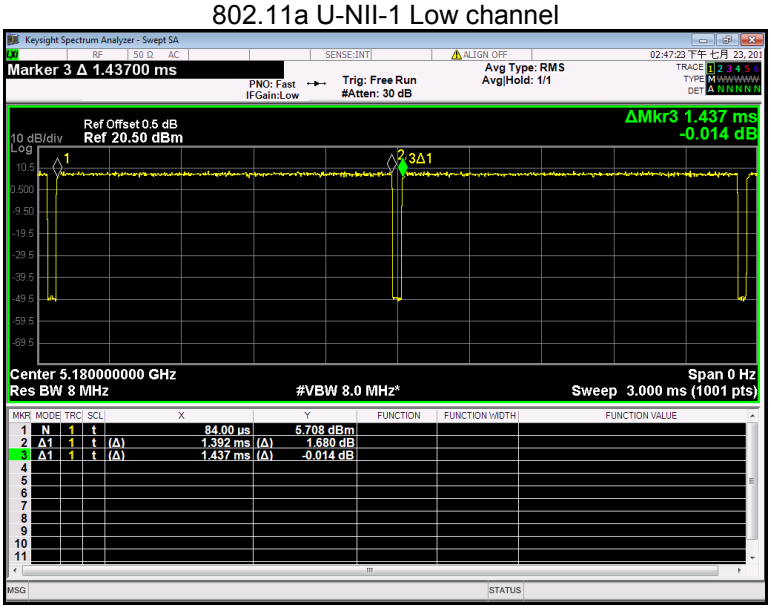
Duty cycle factor=10*log (1/Duty cycle);

Average factor=$20\log_{10}$Duty cycle

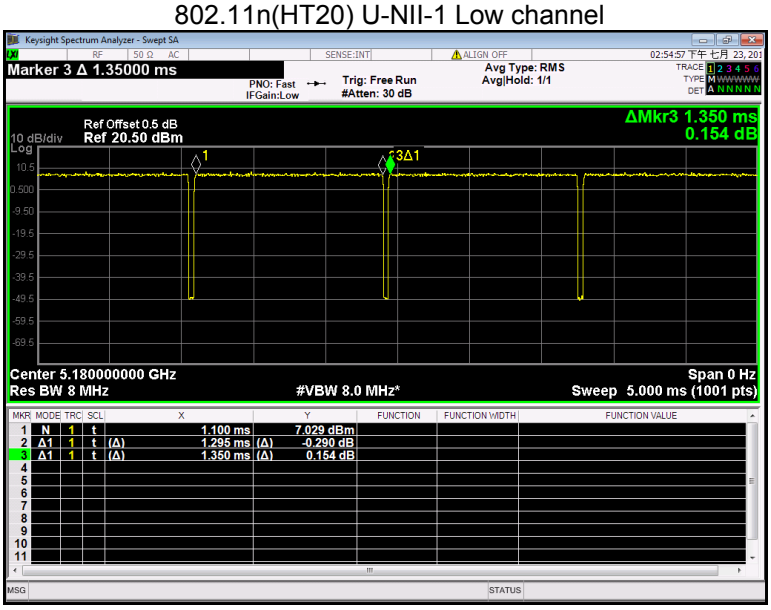
Test result plots shown as follows:

Ant0

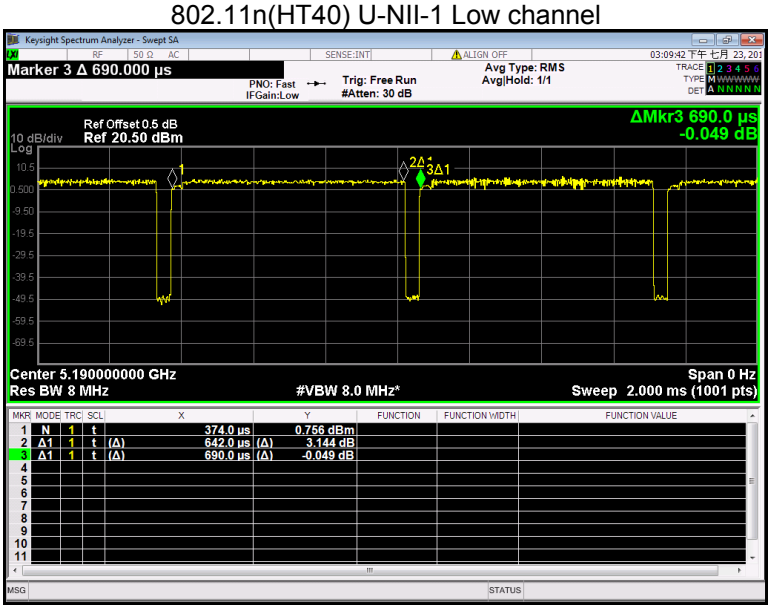
802.11a U-NII-1 Low channel



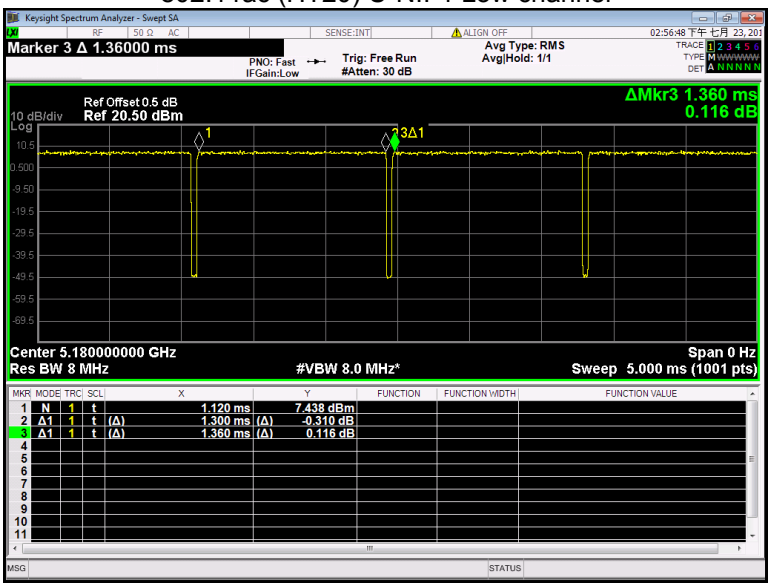
802.11n(HT20) U-NII-1 Low channel



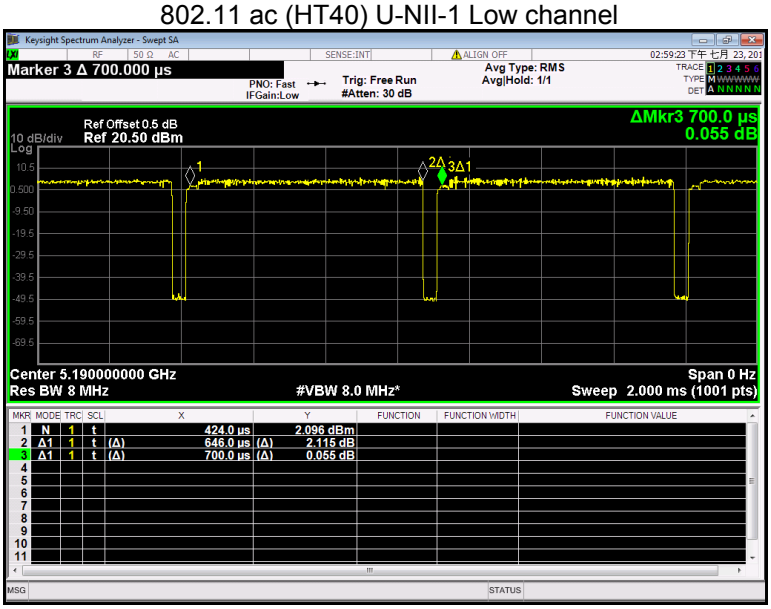
802.11n(HT40) U-NII-1 Low channel



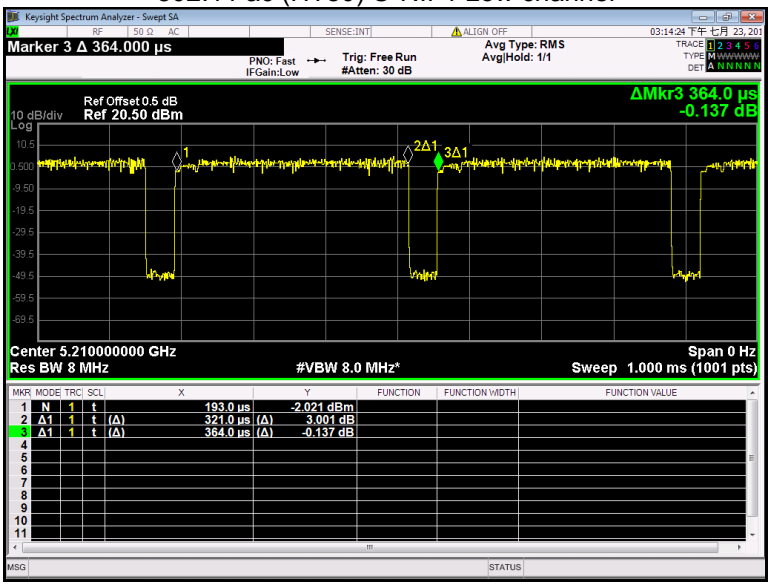
802.11ac (HT20) U-NII-1 Low channel



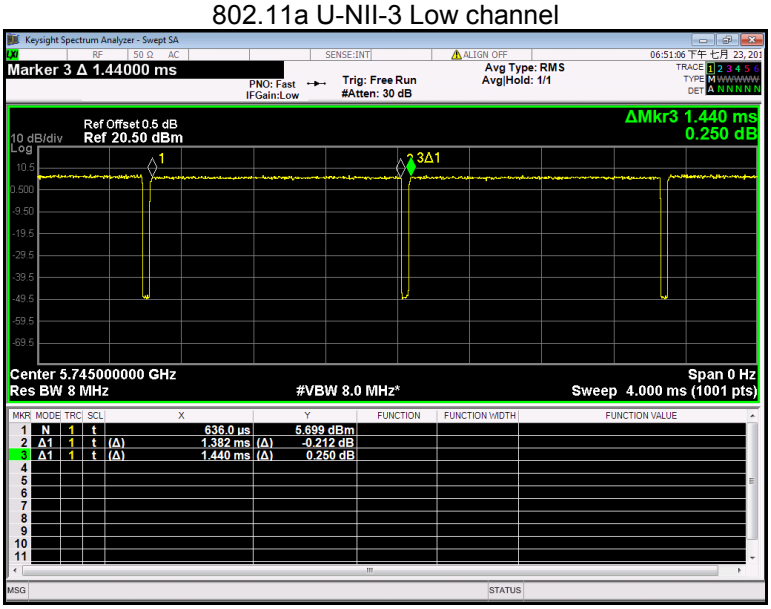
802.11 ac (HT40) U-NII-1 Low channel



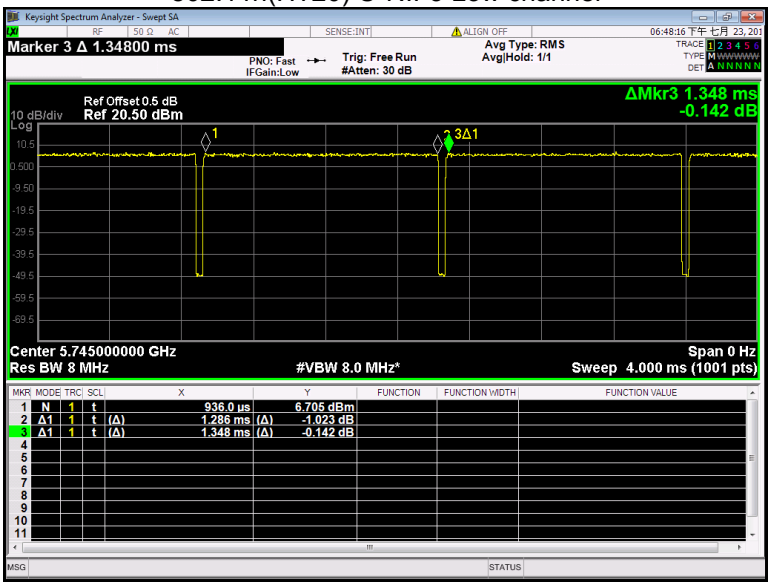
802.11 ac (HT80) U-NII-1 Low channel



802.11a U-NII-3 Low channel



802.11n(HT20) U-NII-3 Low channel



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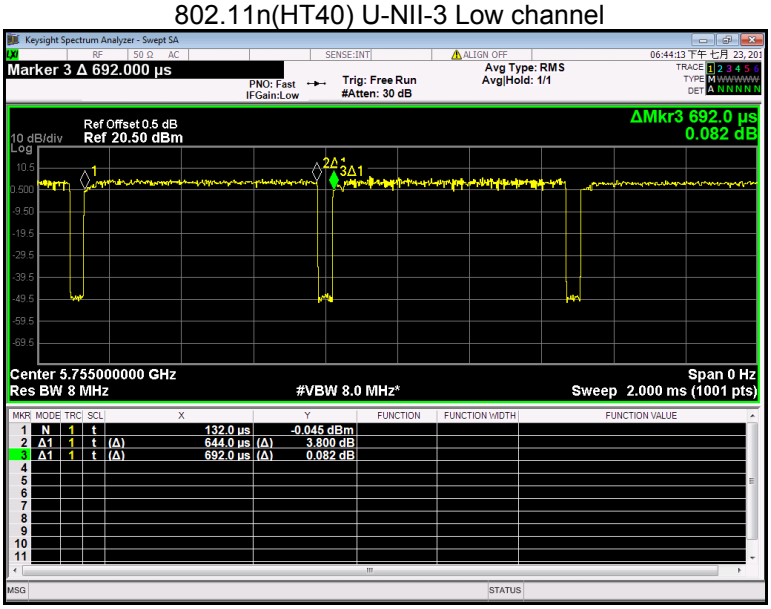
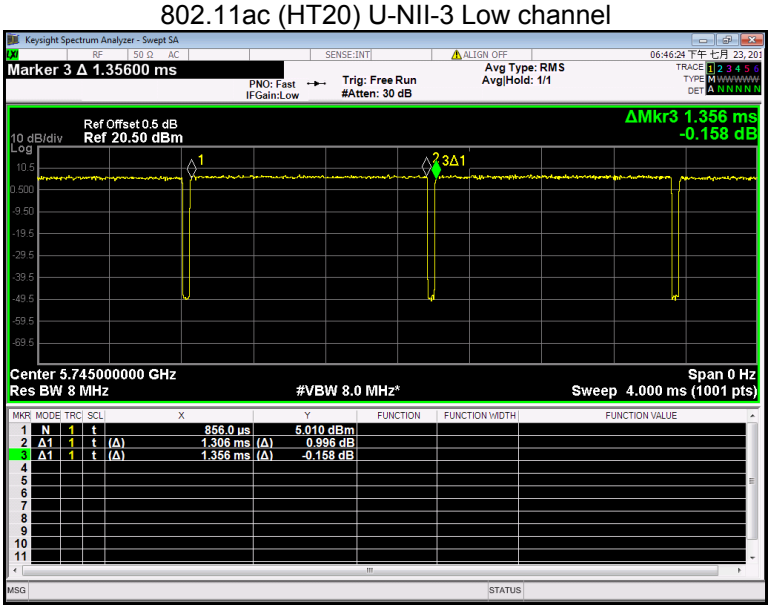
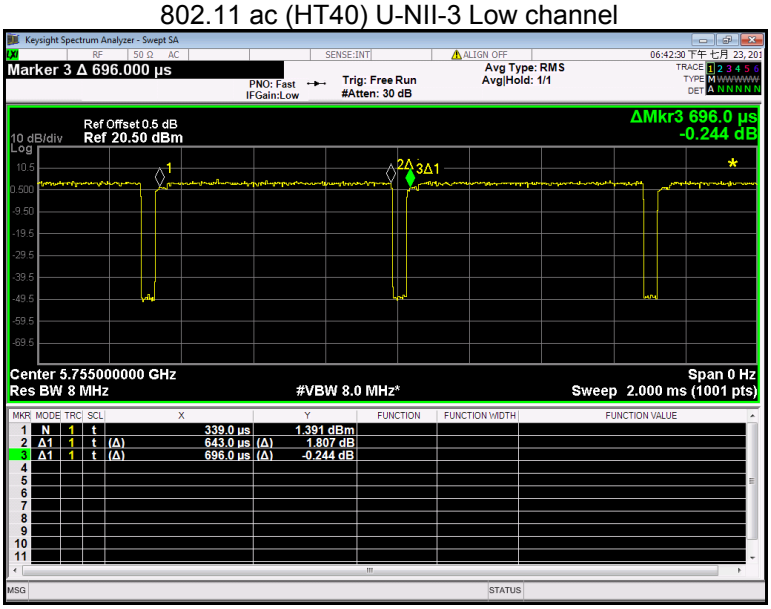


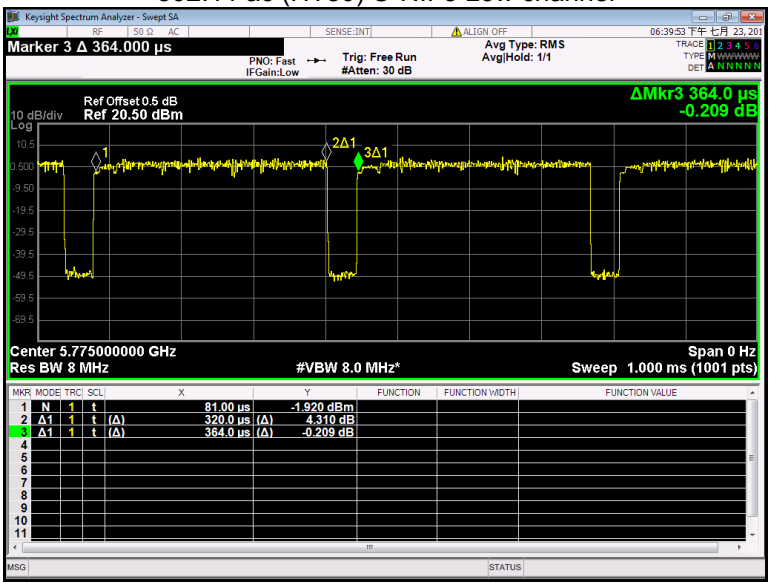
802.11ac (HT20) U-NII-3 Low channel



802.11 ac (HT40) U-NII-3 Low channel

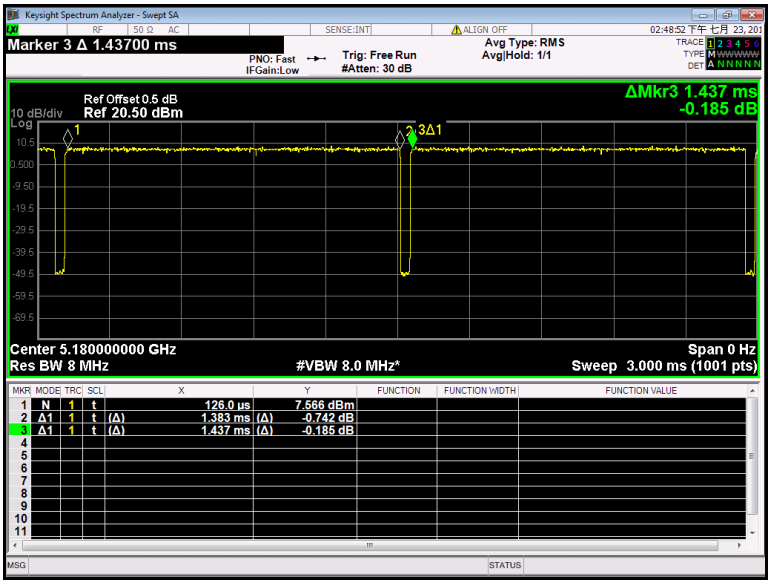


802.11 ac (HT80) U-NII-3 Low channel

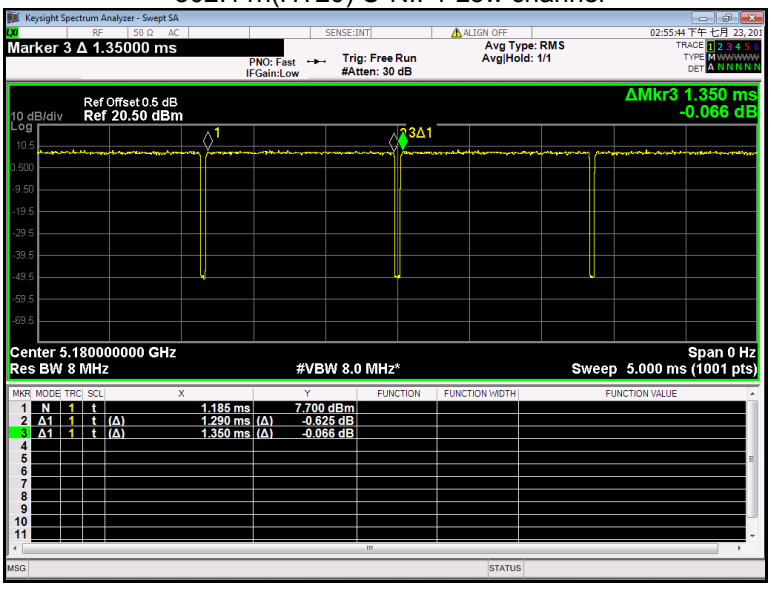


Ant1

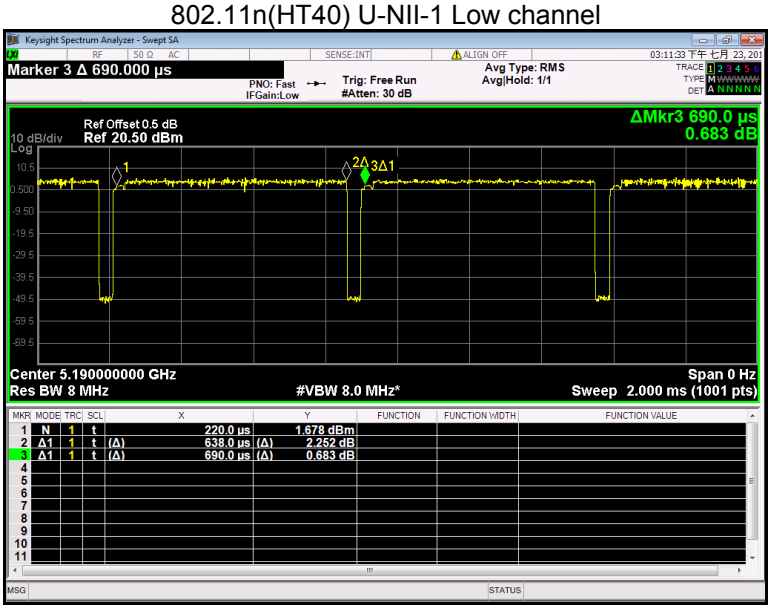
802.11a U-NII-1 Low channel



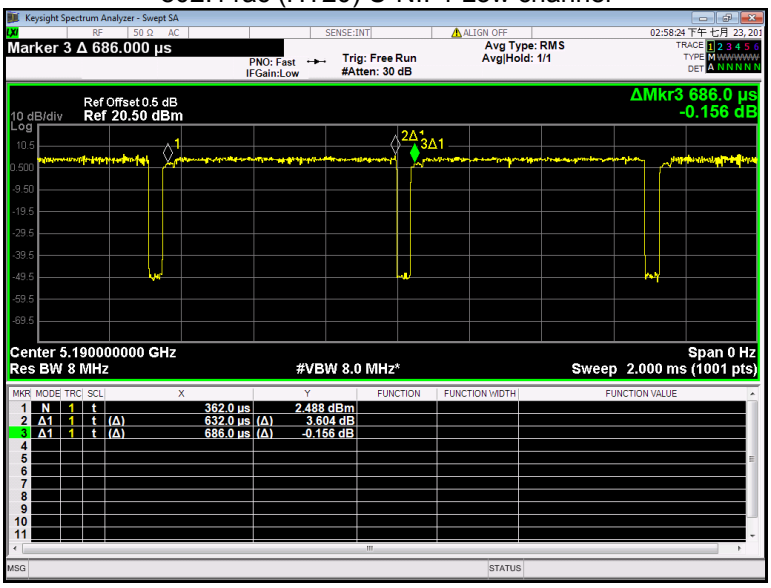
802.11n(HT20) U-NII-1 Low channel



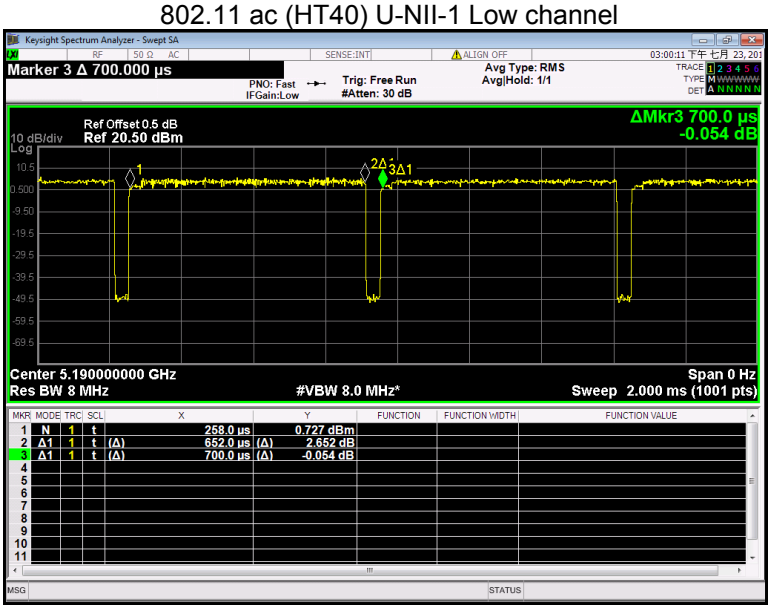
802.11n(HT40) U-NII-1 Low channel



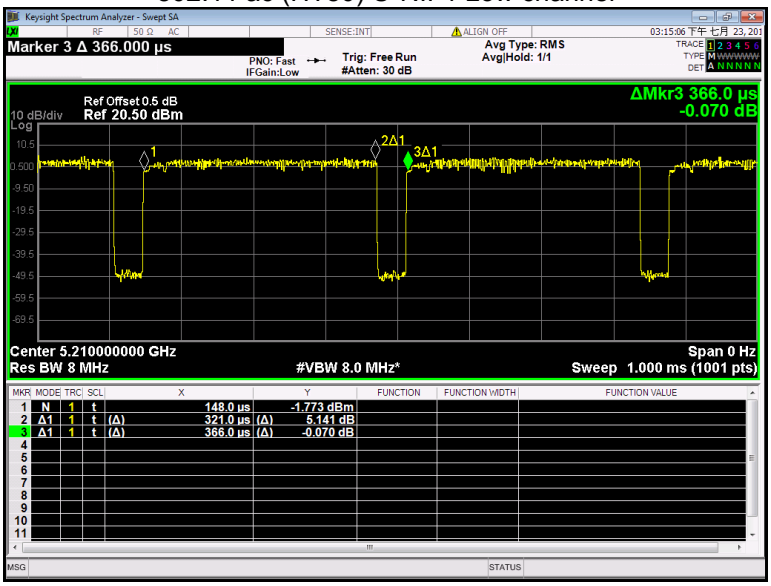
802.11ac (HT20) U-NII-1 Low channel



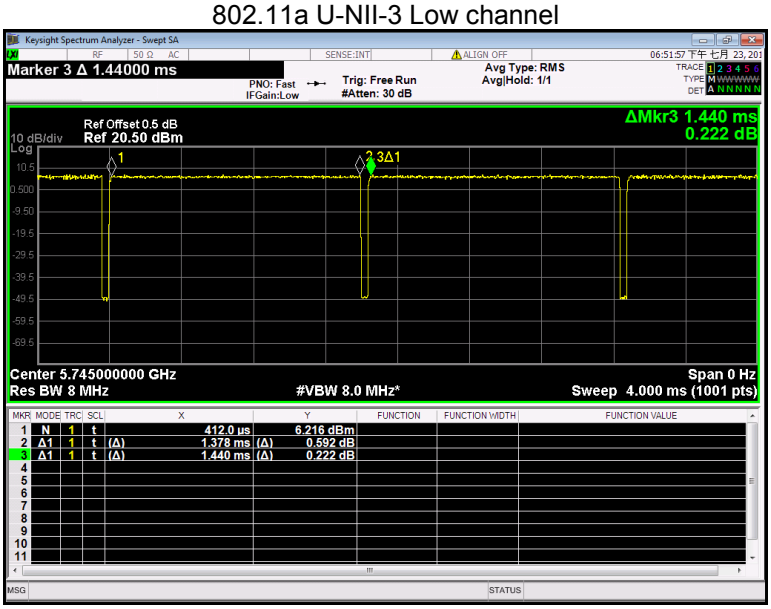
802.11 ac (HT40) U-NII-1 Low channel



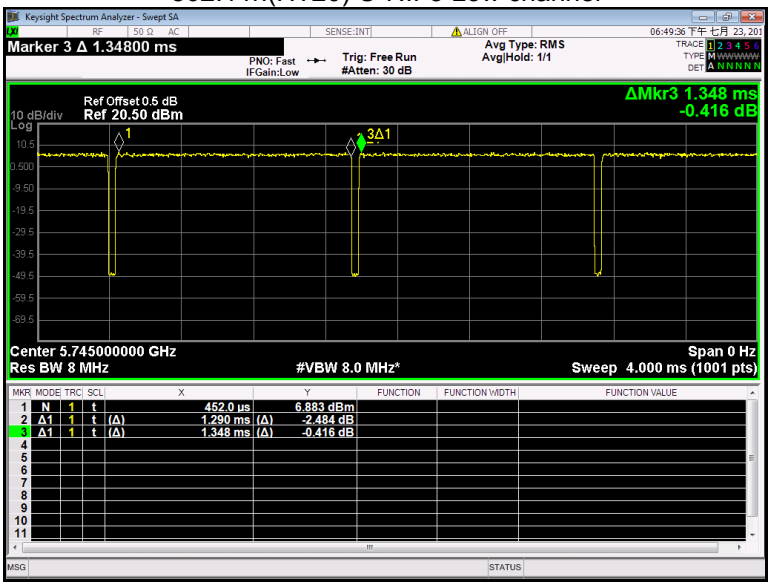
802.11 ac (HT80) U-NII-1 Low channel



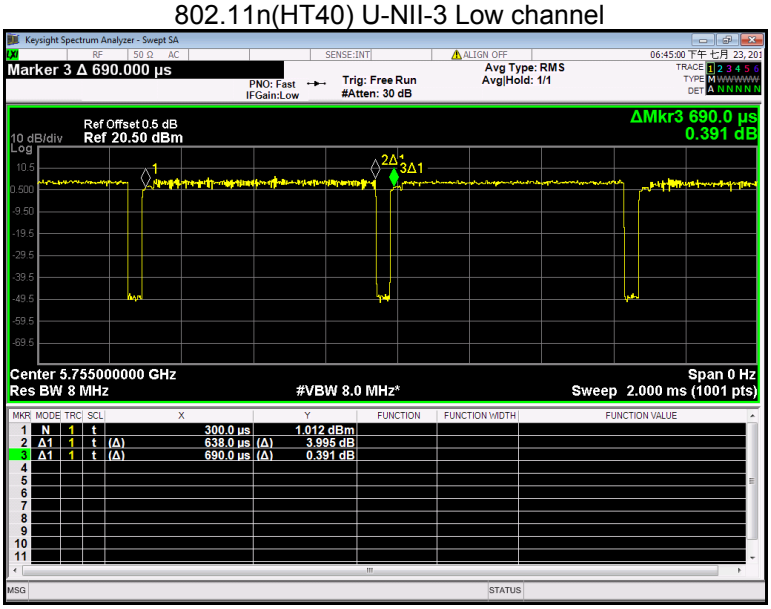
802.11a U-NII-3 Low channel



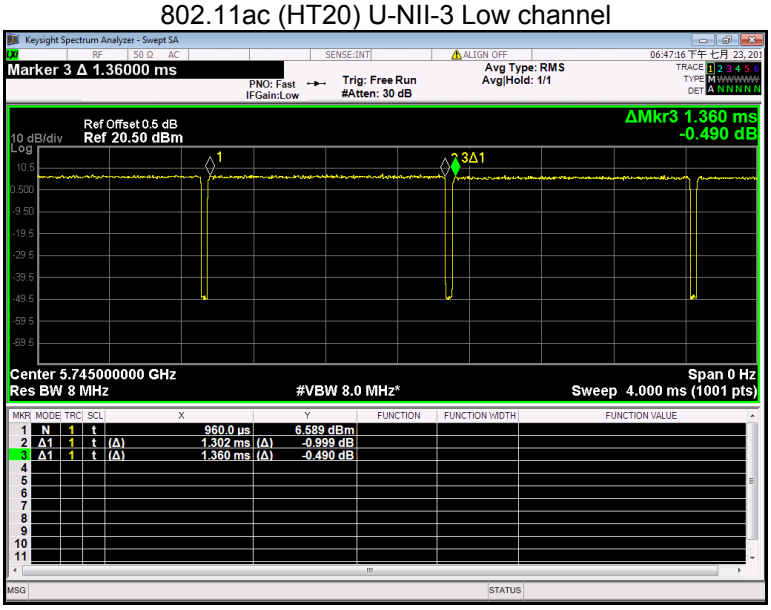
802.11n(HT20) U-NII-3 Low channel



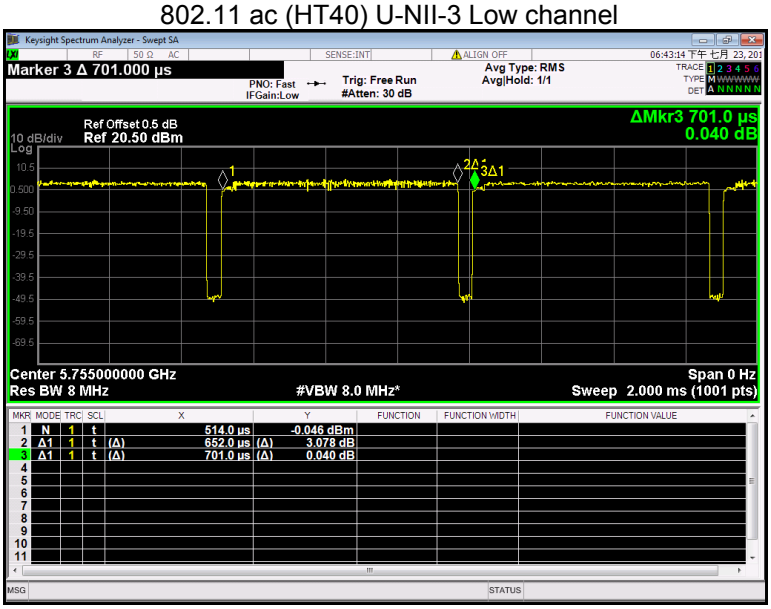
802.11n(HT40) U-NII-3 Low channel



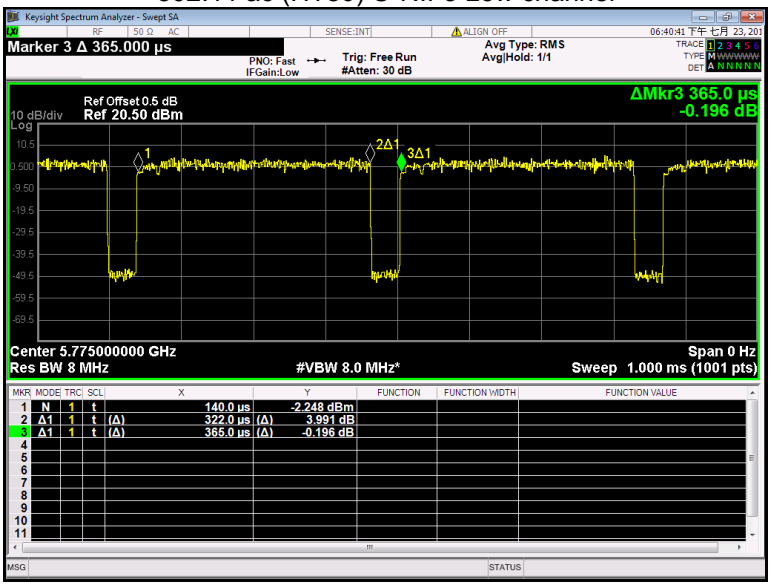
802.11ac (HT20) U-NII-3 Low channel



802.11 ac (HT40) U-NII-3 Low channel



802.11 ac (HT80) U-NII-3 Low channel



8 Radiated Emissions

Test Requirement: FCC 47CFR Part 15 Section 15.209 & 15.407

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Distance	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment **:**

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

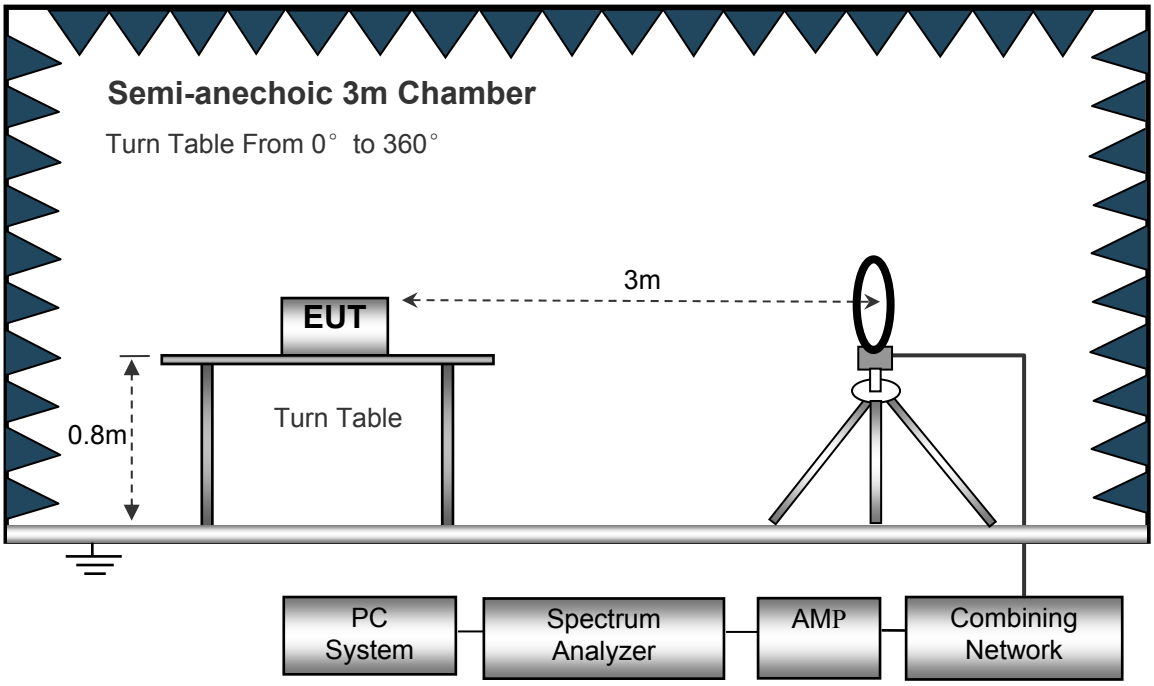
EUT Operation :

The test was performed in transmitting mode, the test data were shown in the report.

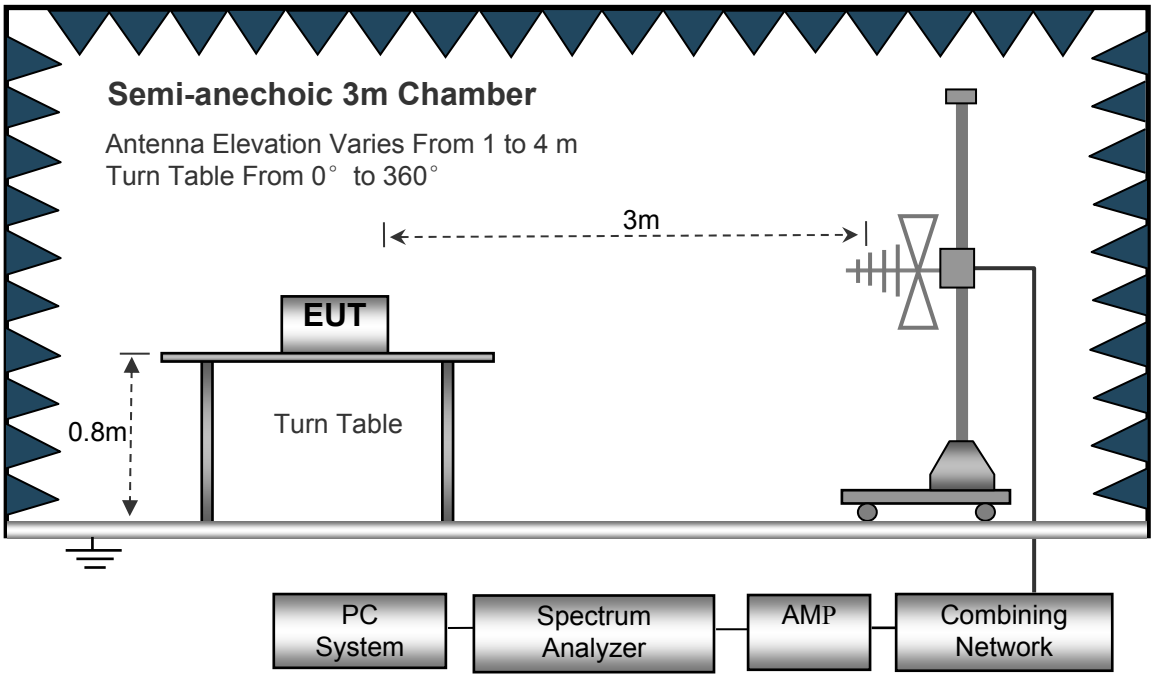
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10: 2013.

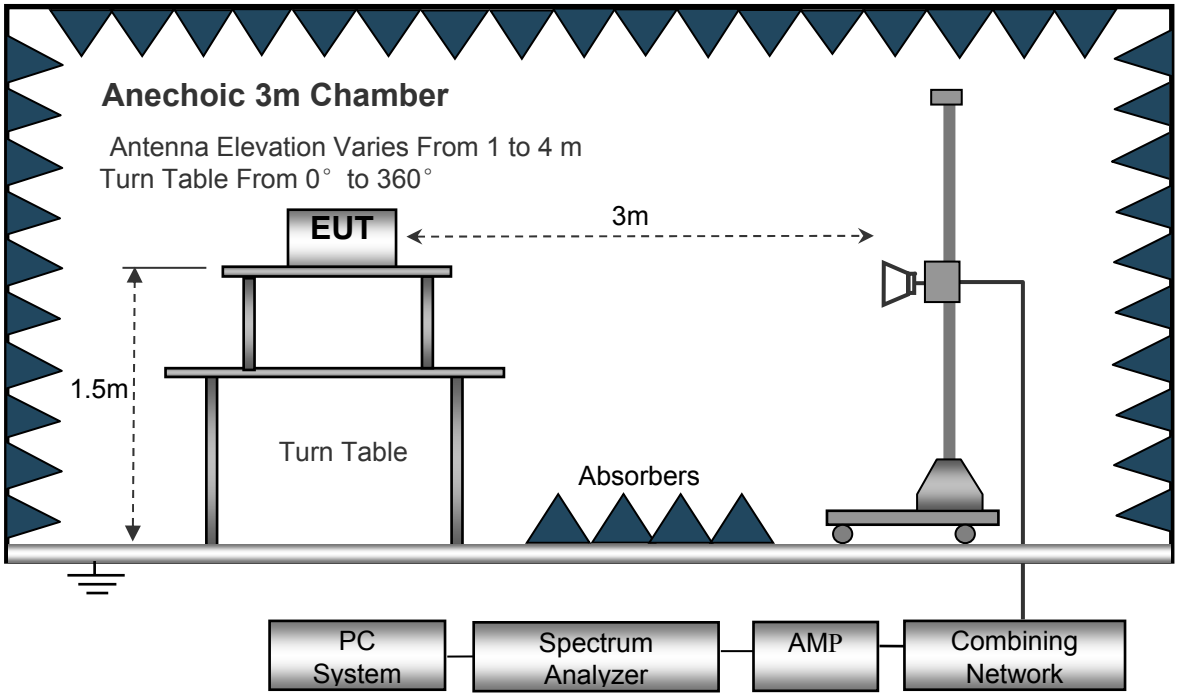
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

8.4 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane for below 1GHz and 1.5m for above 1GHz.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used druing radiated emissions above 1GHz measurement.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

8.6 Summary of Test Results

Note:
All test mode were tested, and only the worst-case were record in the report.

Test Mode: TX (Ant. 1+ Ant. 2)

Test Frequency: 9KHz~30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 18GHz

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-1 Low Channel 5180MHz									
263.25	40.32	QP	341	1.1	H	-11.62	28.70	46.00	-17.30
263.25	42.96	QP	198	1.9	V	-11.62	31.34	46.00	-14.66
4510.12	53.80	PK	71	2.0	H	-2.03	51.77	74.00	-22.23
4510.12	43.84	Ave	71	2.0	H	-2.03	41.81	54.00	-12.19
5140.71	53.56	PK	312	1.4	H	-1.02	52.54	74.00	-21.46
5140.71	44.77	Ave	312	1.4	H	-1.02	43.75	54.00	-10.25
10360.00	41.67	PK	98	1.0	H	5.33	47.00	74.00	-27.00
10360.00	37.18	Ave	98	1.0	H	5.33	42.51	54.00	-11.49
802.11a U-NII-1 Middle channel 5200MHz									
263.25	38.93	QP	169	1.7	H	-11.62	27.31	46.00	-18.69
263.25	43.26	QP	334	1.4	V	-11.62	31.64	46.00	-14.36
4503.93	55.27	PK	357	1.1	H	-1.94	53.33	74.00	-20.67
4503.93	43.37	Ave	357	1.1	H	-1.94	41.43	54.00	-12.57
5116.67	53.38	PK	170	1.7	H	-1.06	52.32	74.00	-21.68
5116.67	43.91	Ave	170	1.7	H	-1.06	42.85	54.00	-11.15
10400.00	42.33	PK	107	1.6	H	5.21	47.54	74.00	-26.46
10400.00	38.41	Ave	107	1.6	H	5.21	43.62	54.00	-10.38

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-1 High channel 5240MHz									
263.25	41.34	QP	49	1.0	H	-11.62	29.72	46.00	-16.28
263.25	42.01	QP	67	1.1	V	-11.62	30.39	46.00	-15.61
4524.98	55.71	PK	24	1.9	H	-2.24	53.47	74.00	-20.53
4524.98	44.29	Ave	24	1.9	H	-2.24	42.05	54.00	-11.95
5120.32	54.33	PK	268	1.0	H	-1.09	53.24	74.00	-20.76
5120.32	43.84	Ave	268	1.0	H	-1.09	42.75	54.00	-11.25
10480.00	40.81	PK	318	1.3	H	5.14	45.95	74.00	-28.05
10480.00	36.71	Ave	318	1.3	H	5.14	41.85	54.00	-12.15
802.11a U-NII-3 Low Channel 5745MHz									
263.25	37.87	QP	44	1.2	H	-11.62	26.25	46.00	-19.75
263.25	41.46	QP	37	1.3	V	-11.62	29.84	46.00	-16.16
4514.38	54.29	PK	151	1.2	H	-2.03	52.26	74.00	-21.74
4514.38	40.74	Ave	151	1.2	H	-2.03	38.71	54.00	-15.29
5118.96	53.37	PK	42	1.8	H	-1.02	52.35	74.00	-21.65
5118.96	38.84	Ave	42	1.8	H	-1.02	37.82	54.00	-16.18
10520.00	41.13	PK	235	1.3	H	5.33	46.46	74.00	-27.54
10520.00	33.13	Ave	235	1.3	H	5.33	38.46	54.00	-15.54

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11a U-NII-3 middle channel 5785MHz									
263.25	38.80	QP	198	1.4	H	-11.62	27.18	46.00	-18.82
263.25	40.33	QP	124	1.8	V	-11.62	28.71	46.00	-17.29
4532.94	54.87	PK	122	1.8	H	-1.94	52.93	74.00	-21.07
4532.94	42.20	Ave	122	1.8	H	-1.94	40.26	54.00	-13.74
5114.00	52.46	PK	223	1.7	H	-1.06	51.40	74.00	-22.60
5114.00	40.34	Ave	223	1.7	H	-1.06	39.28	54.00	-14.72
10560.00	41.65	PK	321	1.8	H	5.21	46.86	74.00	-27.14
10560.00	34.28	Ave	321	1.8	H	5.21	39.49	54.00	-14.51
802.11a U-NII-3 High channel 5825MHz									
263.25	37.75	QP	144	1.2	H	-11.62	26.13	46.00	-19.87
263.25	38.84	QP	284	1.9	V	-11.62	27.22	46.00	-18.78
4509.14	54.11	PK	58	1.8	H	-2.24	51.87	74.00	-22.13
4509.14	41.44	Ave	58	1.8	H	-2.24	39.20	54.00	-14.80
5113.84	51.49	PK	173	1.4	H	-1.09	50.40	74.00	-23.60
5113.84	40.98	Ave	173	1.4	H	-1.09	39.89	54.00	-14.11
10640.00	41.73	PK	16	1.9	H	5.14	46.87	74.00	-27.13
10640.00	32.91	Ave	16	1.9	H	5.14	38.05	54.00	-15.95

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT20) U-NII-1 Low Channel 5180MHz									
263.25	38.80	QP	241	1.8	H	-11.62	27.18	46.00	-18.82
263.25	39.42	QP	266	1.8	V	-11.62	27.80	46.00	-18.20
4507.51	52.78	PK	186	1.4	H	-2.03	50.75	74.00	-23.25
4507.51	40.02	Ave	186	1.4	H	-2.03	37.99	54.00	-16.01
5140.61	53.77	PK	79	1.5	H	-1.02	52.75	74.00	-21.25
5140.61	39.07	Ave	79	1.5	H	-1.02	38.05	54.00	-15.95
11000.00	41.57	PK	235	1.7	H	5.33	46.90	74.00	-27.10
11000.00	36.97	Ave	235	1.7	H	5.33	42.30	54.00	-11.70
802.11n(HT20) U-NII-1 Middle channel 5200MHz									
263.25	39.42	QP	226	1.7	H	-11.62	27.80	46.00	-18.20
263.25	39.04	QP	285	1.4	V	-11.62	27.42	46.00	-18.58
4530.05	51.65	PK	151	1.4	H	-1.94	49.71	74.00	-24.29
4530.05	41.27	Ave	151	1.4	H	-1.94	39.33	54.00	-14.67
5116.39	54.68	PK	314	1.1	H	-1.06	53.62	74.00	-20.38
5116.39	40.94	Ave	314	1.1	H	-1.06	39.88	54.00	-14.12
11200.00	42.47	PK	195	1.7	H	5.21	47.68	74.00	-26.32
11200.00	37.15	Ave	195	1.7	H	5.21	42.36	54.00	-11.64

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT20) U-NII-1 High channel 5240MHz									
263.25	38.38	QP	119	1.6	H	-11.62	26.76	46.00	-19.24
263.25	37.73	QP	52	1.9	V	-11.62	26.11	46.00	-19.89
4531.95	50.54	PK	158	2.0	H	-2.24	48.30	74.00	-25.70
4531.95	40.71	Ave	158	2.0	H	-2.24	38.47	54.00	-15.53
5120.63	54.99	PK	34	1.2	H	-1.09	53.90	74.00	-20.10
5120.63	40.33	Ave	34	1.2	H	-1.09	39.24	54.00	-14.76
11400.00	42.78	PK	81	1.4	H	5.14	47.92	74.00	-26.08
11400.00	37.94	Ave	81	1.4	H	5.14	43.08	54.00	-10.92
802.11n(HT20) U-NII-3 Low Channel 5745MHz									
263.25	41.98	QP	327	1.9	H	-11.62	30.36	46.00	-15.64
263.25	40.91	QP	209	1.4	V	-11.62	29.29	46.00	-16.71
4509.93	55.78	PK	155	1.5	H	-2.06	53.72	74.00	-20.28
4509.93	44.64	Ave	155	1.5	H	-2.06	42.58	54.00	-11.42
5369.98	42.55	PK	338	1.6	H	5.93	48.48	74.00	-25.52
5369.98	35.85	Ave	338	1.6	H	5.93	41.78	54.00	-12.22
11490.00	46.39	PK	70	1.8	H	-1.25	45.14	74.00	-28.86
11490.00	39.60	Ave	70	1.8	H	-1.25	38.35	54.00	-15.65

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT20) U-NII-3 middle channel 5785MHz									
263.25	42.49	QP	248	1.8	H	-11.62	30.87	46.00	-15.13
263.25	40.22	QP	281	1.2	V	-11.62	28.60	46.00	-17.40
4518.48	54.79	PK	218	1.0	H	-2.03	52.76	74.00	-21.24
4518.48	45.28	Ave	218	1.0	H	-2.03	43.25	54.00	-10.75
5363.43	41.57	PK	67	1.5	H	5.81	47.38	74.00	-26.62
5363.43	35.81	Ave	67	1.5	H	5.81	41.62	54.00	-12.38
11570.00	45.75	PK	162	1.4	H	-1.22	44.53	74.00	-29.47
11570.00	39.21	Ave	162	1.4	H	-1.22	37.99	54.00	-16.01
802.11n(HT20) U-NII-3 High channel 5825MHz									
263.25	40.81	QP	17	1.9	H	-11.62	29.19	46.00	-16.81
263.25	43.72	QP	132	2.0	V	-11.62	32.10	46.00	-13.90
4515.41	54.78	PK	189	1.9	H	-1.84	52.94	74.00	-21.06
4515.41	42.95	Ave	189	1.9	H	-1.84	41.11	54.00	-12.89
5368.08	41.66	PK	205	2.0	H	5.84	47.50	74.00	-26.50
5368.08	37.89	Ave	205	2.0	H	5.84	43.73	54.00	-10.27
11650.00	45.52	PK	196	1.4	H	-1.30	44.22	74.00	-29.78
11650.00	38.63	Ave	196	1.4	H	-1.30	37.33	54.00	-16.67

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT40) U-NII-1 Low Channel 5190MHz									
263.25	42.05	QP	202	1.2	H	-11.62	30.43	46.00	-15.57
263.25	43.71	QP	69	1.5	V	-11.62	32.09	46.00	-13.91
4509.28	56.20	PK	111	1.9	H	-2.14	54.06	74.00	-19.94
4509.28	44.11	Ave	111	1.9	H	-2.14	41.97	54.00	-12.03
5138.24	45.65	PK	320	1.6	H	-1.06	44.59	74.00	-29.41
5138.24	38.57	Ave	320	1.6	H	-1.06	37.51	54.00	-16.49
10360.00	42.51	PK	58	2.0	H	5.33	47.84	74.00	-26.16
10360.00	36.30	Ave	58	2.0	H	5.33	41.63	54.00	-12.37
802.11n(HT40) U-NII-1 High channel 5230MHz									
263.25	42.31	QP	95	1.4	H	-11.62	30.69	46.00	-15.31
263.25	43.33	QP	42	1.9	V	-11.62	31.71	46.00	-14.29
4522.98	56.44	PK	157	1.1	H	-2.12	54.32	74.00	-19.68
4522.98	44.41	Ave	157	1.1	H	-2.12	42.29	54.00	-11.71
5149.97	46.12	PK	141	1.7	H	-1.06	45.06	74.00	-28.94
5149.97	40.38	Ave	141	1.7	H	-1.06	39.32	54.00	-14.68
10400.00	42.13	PK	127	1.3	H	5.21	47.34	74.00	-26.66
10400.00	37.06	Ave	127	1.3	H	5.21	42.27	54.00	-11.73

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.407/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
802.11n(HT40) U-NII-3 Low Channel 5755MHz									
263.25	41.76	QP	233	1.1	H	-11.62	30.14	46.00	-15.86
263.25	43.16	QP	80	1.3	V	-11.62	31.54	46.00	-14.46
4523.22	55.23	PK	256	1.9	H	-1.96	53.27	74.00	-20.73
4523.22	43.97	Ave	256	1.9	H	-1.96	42.01	54.00	-11.99
5137.63	47.73	PK	130	1.9	H	-1.06	46.67	74.00	-27.33
5137.63	40.12	Ave	130	1.9	H	-1.06	39.06	54.00	-14.94
10480.00	41.16	PK	4	1.4	H	5.14	46.30	74.00	-27.70
10480.00	37.12	Ave	4	1.4	H	5.14	42.26	54.00	-11.74
802.11n(HT40) U-NII-3 High Channel 5795MHz									
263.25	42.93	QP	353	1.4	H	-11.62	31.31	46.00	-14.69
263.25	46.69	QP	129	1.6	V	-11.62	35.07	46.00	-10.93
4531.73	58.90	PK	125	1.0	H	-1.96	56.94	74.00	-17.06
4531.73	42.47	Ave	125	1.0	H	-1.96	40.51	54.00	-13.49
5114.23	49.47	PK	40	1.1	H	-1.06	48.41	74.00	-25.59
5114.23	41.34	Ave	40	1.1	H	-1.06	40.28	54.00	-13.72
10480.00	41.92	PK	2	1.4	H	5.14	47.06	74.00	-26.94
10480.00	38.08	Ave	2	1.4	H	5.14	43.22	54.00	-10.78

Test Frequency: 12GHz~40GHz

The measurements were more than 20 dB below the limit and not reported.

9 Band Edge

Test Requirement:	FCC 47CFR Part 15 Section 15.407
Test Method:	ANSI C63.10 2013
Test Limit:	For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27dBm/MHz. For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz. For transmitters operating in the 5.725-5.85 GHz band: (i) All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge. (ii) Devices certified before March 2, 2017 with antenna gain greater than 10 dBi may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease by March 2, 2018. Devices certified before March 2, 2018 with antenna gain of 10 dBi or less may demonstrate compliance with the emission limits in §15.247(d), but manufacturing, marketing and importing of devices certified under this alternative must cease before March 2, 2020.
Test Result:	PASS

9.1 Test Produce

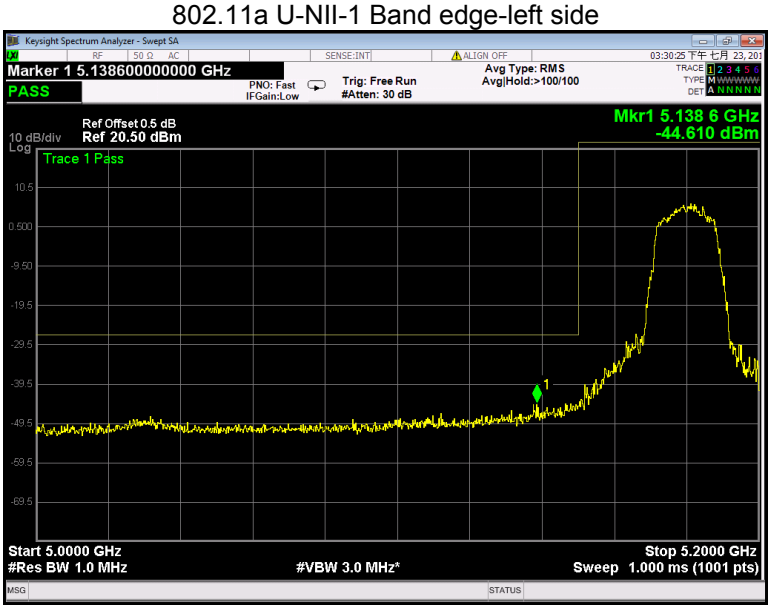
1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

9.2 Test Result

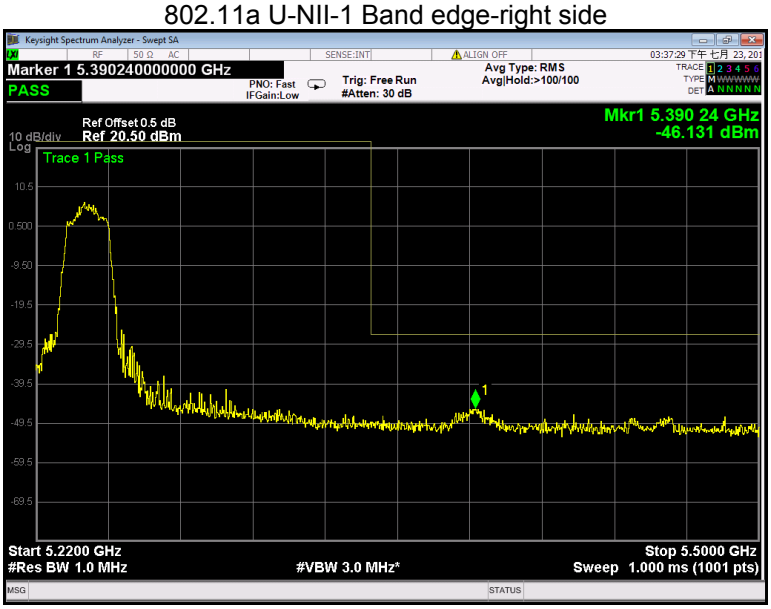
Test result plots shown as follows:

Ant0

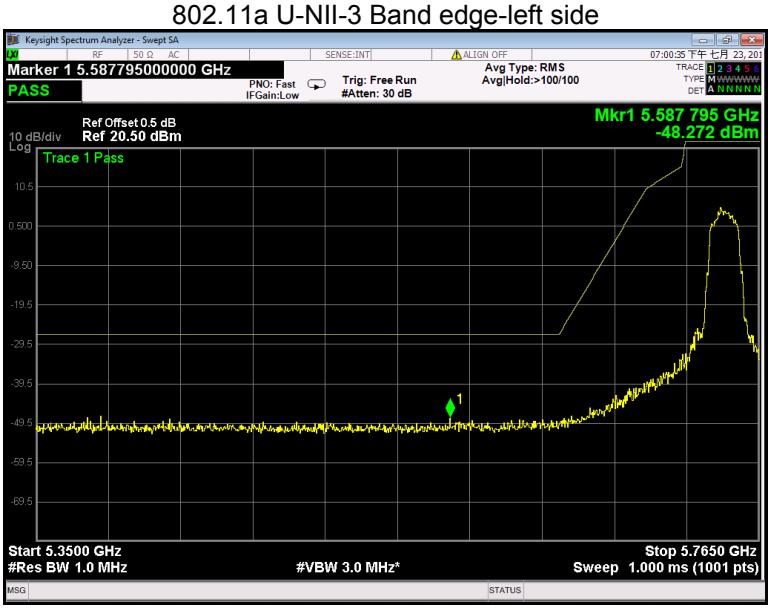
802.11a U-NII-1 Band edge-left side



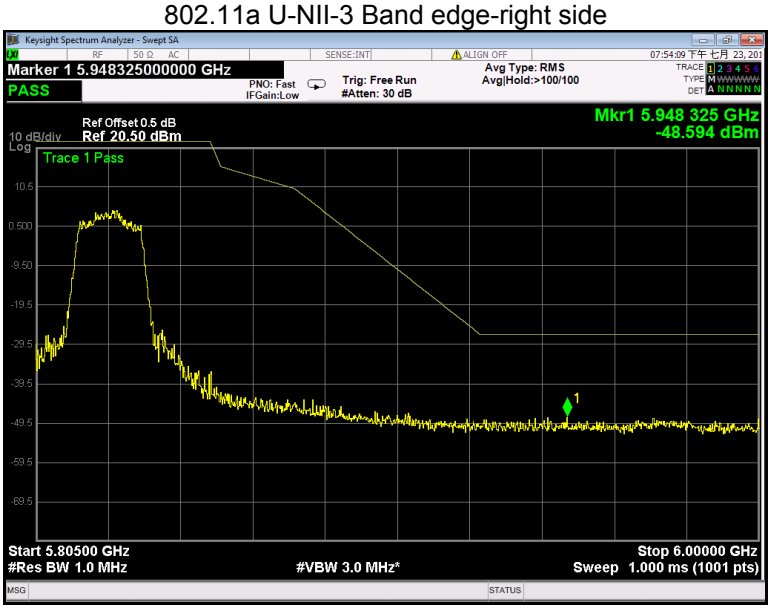
802.11a U-NII-1 Band edge-right side



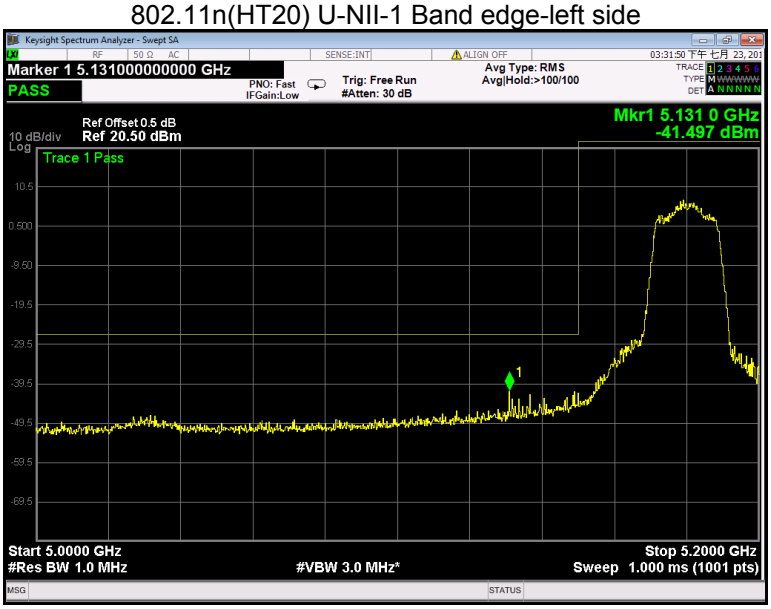
802.11a U-NII-3 Band edge-left side



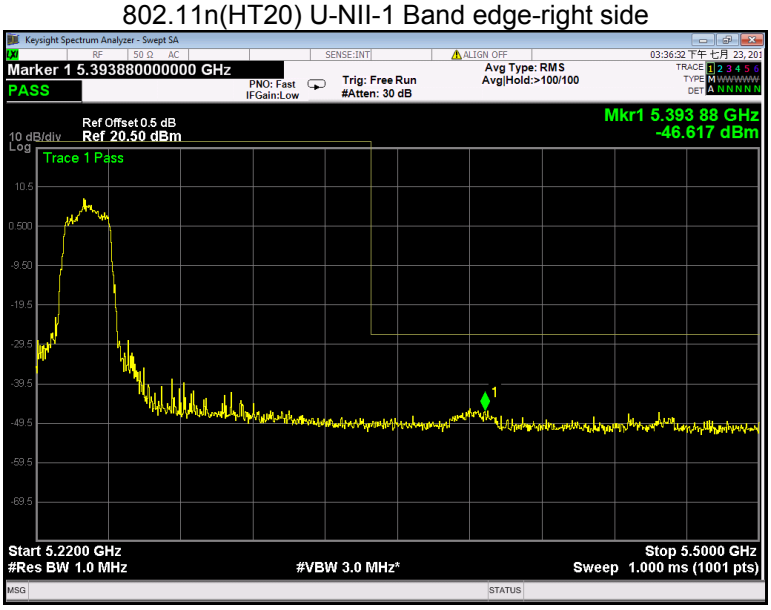
802.11a U-NII-3 Band edge-right side



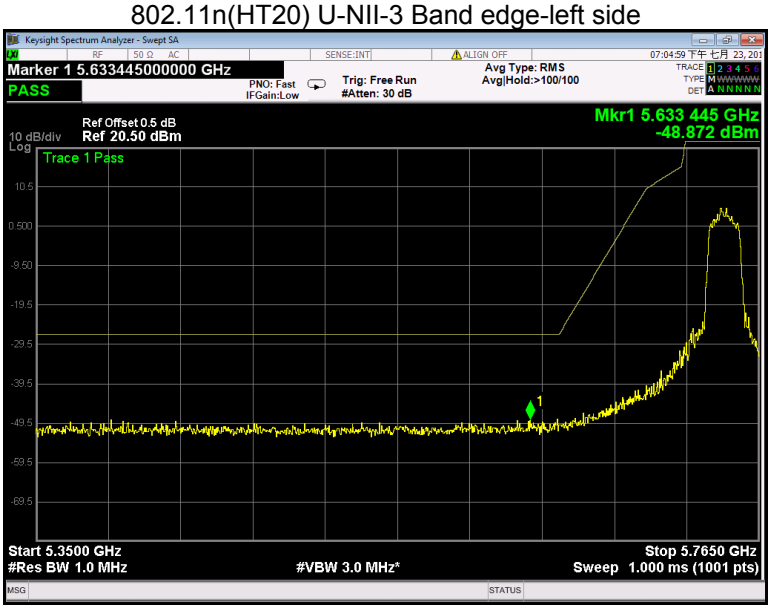
802.11n(HT20) U-NII-1 Band edge-left side



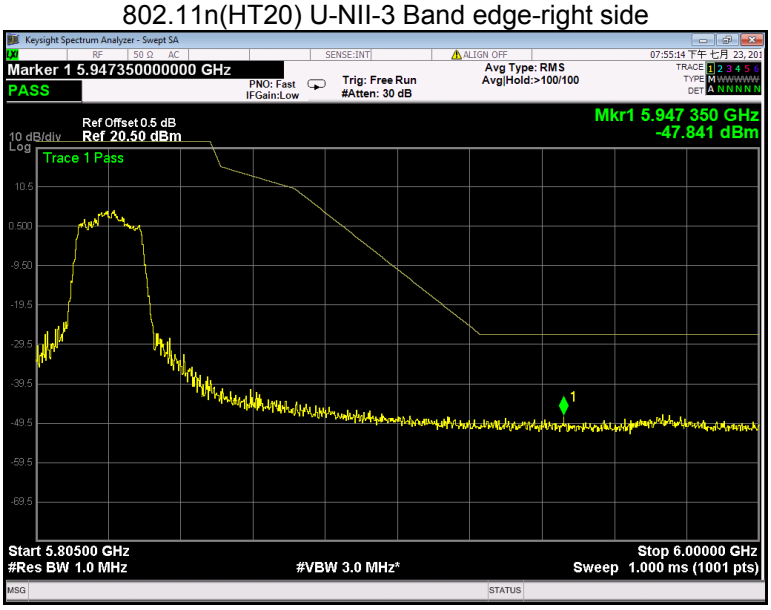
802.11n(HT20) U-NII-1 Band edge-right side



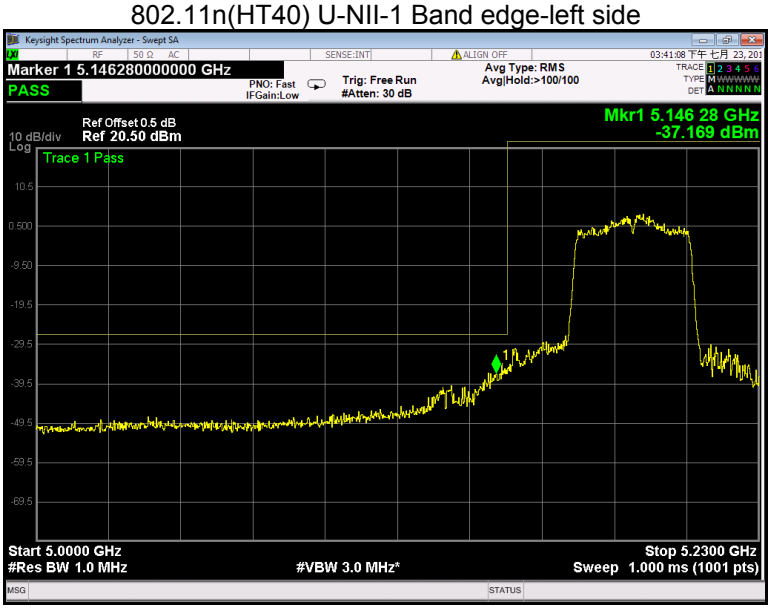
802.11n(HT20) U-NII-3 Band edge-left side



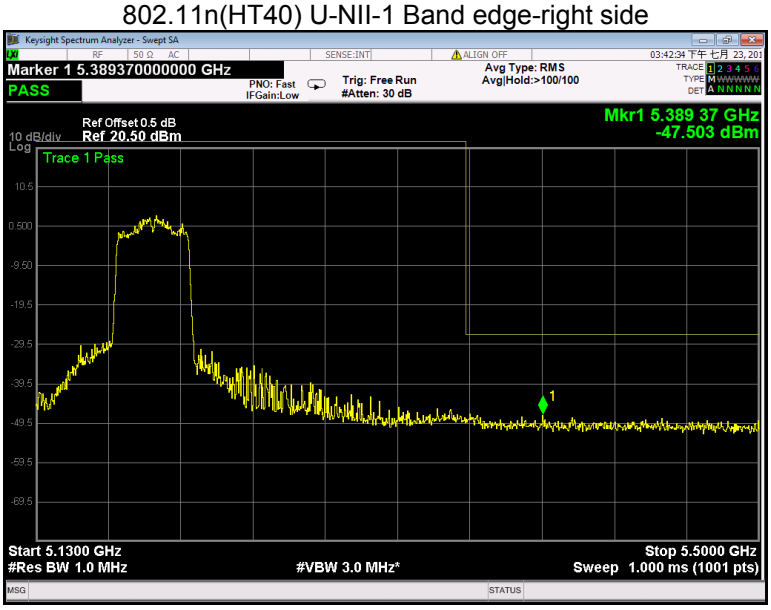
802.11n(HT20) U-NII-3 Band edge-right side



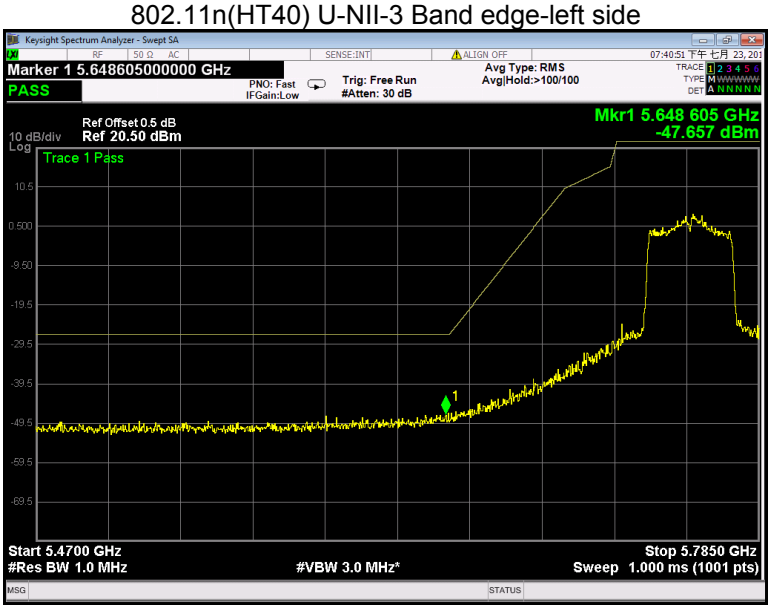
802.11n(HT40) U-NII-1 Band edge-left side



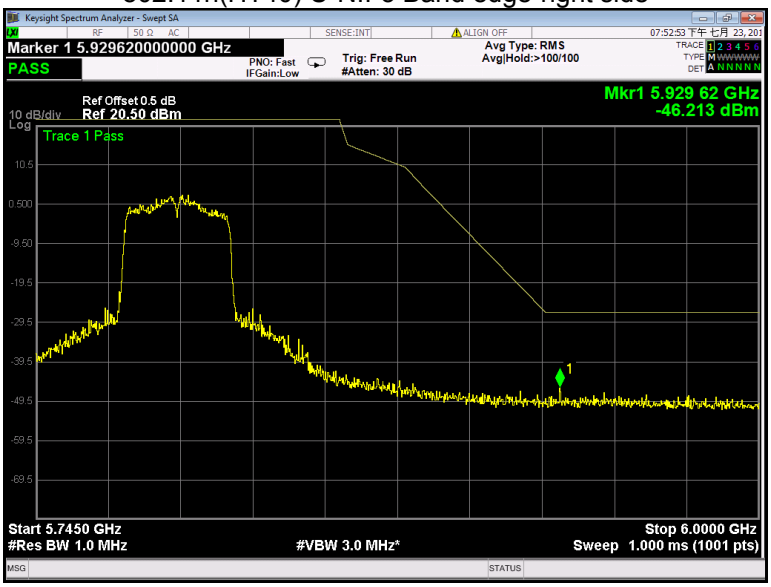
802.11n(HT40) U-NII-1 Band edge-right side



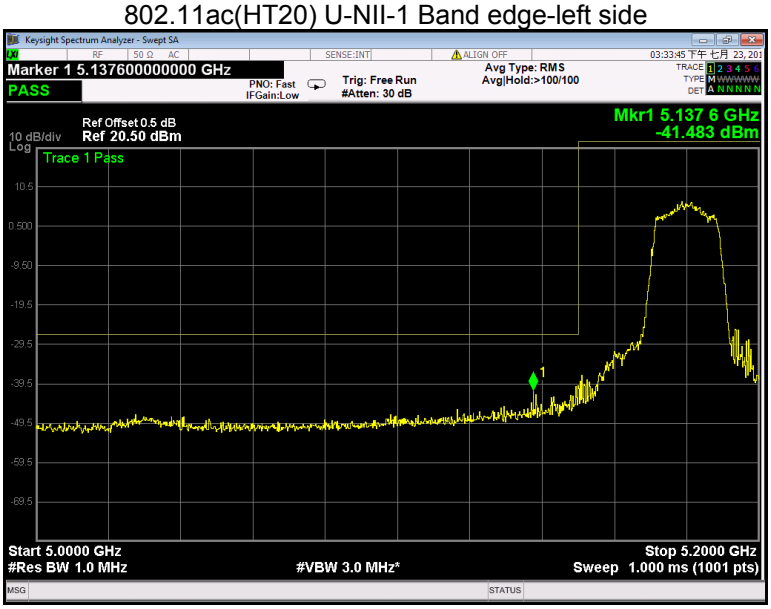
802.11n(HT40) U-NII-3 Band edge-left side



802.11n(HT40) U-NII-3 Band edge-right side

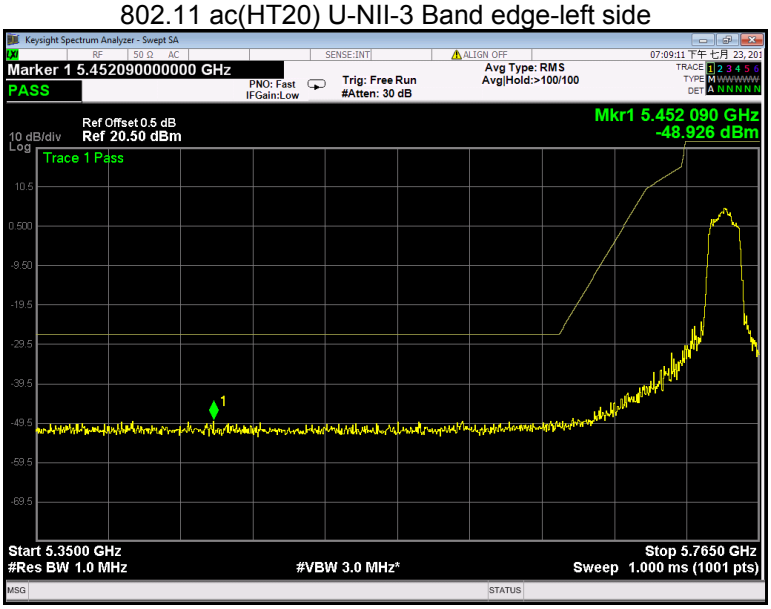


802.11ac(HT20) U-NII-1 Band edge-left side



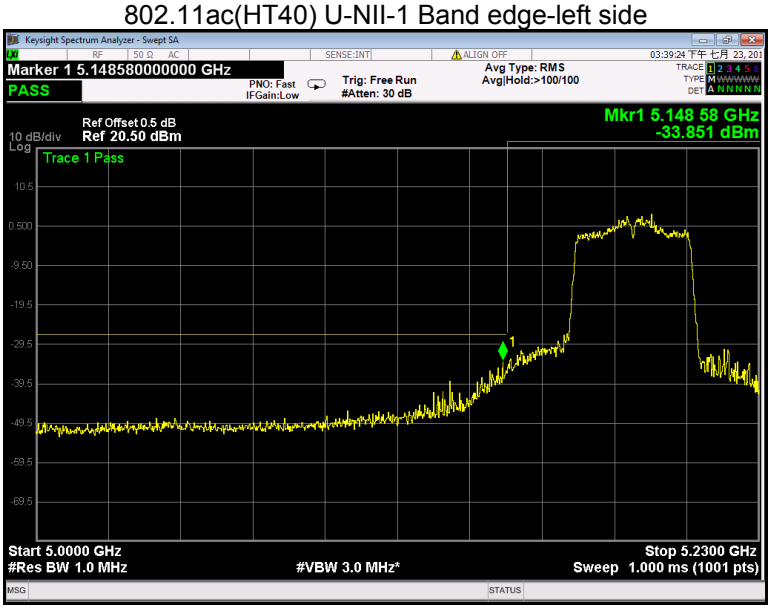
802.11 ac(HT20) U-NII-1 Band edge-right side

802.11 ac(HT20) U-NII-3 Band edge-left side

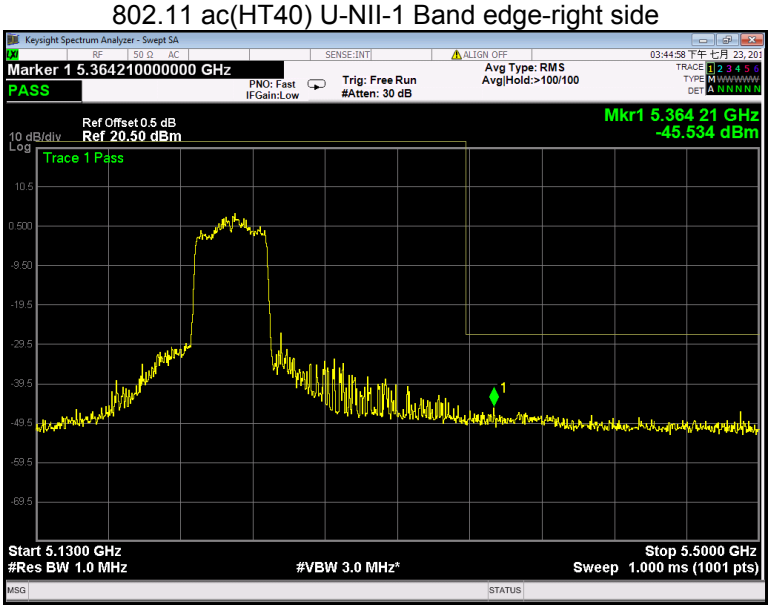


802.11 ac(HT20) U-NII-3 Band edge-right side

802.11ac(HT40) U-NII-1 Band edge-left side

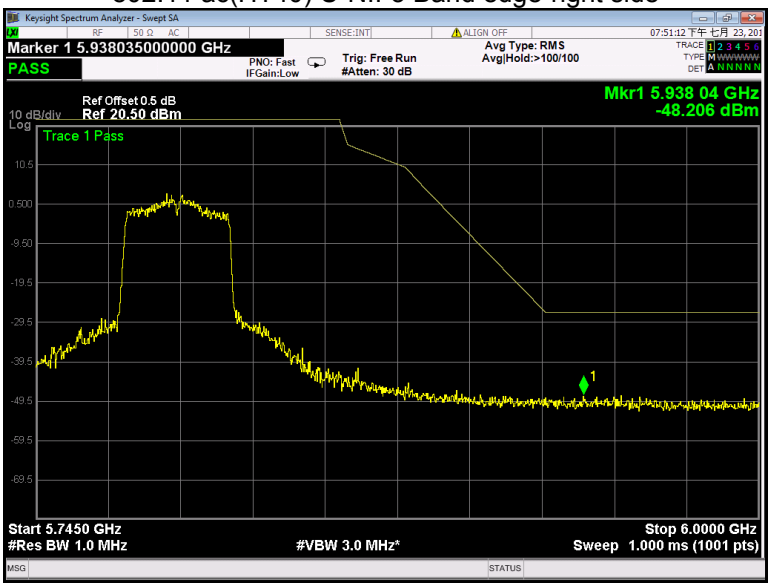


802.11 ac(HT40) U-NII-1 Band edge-right side

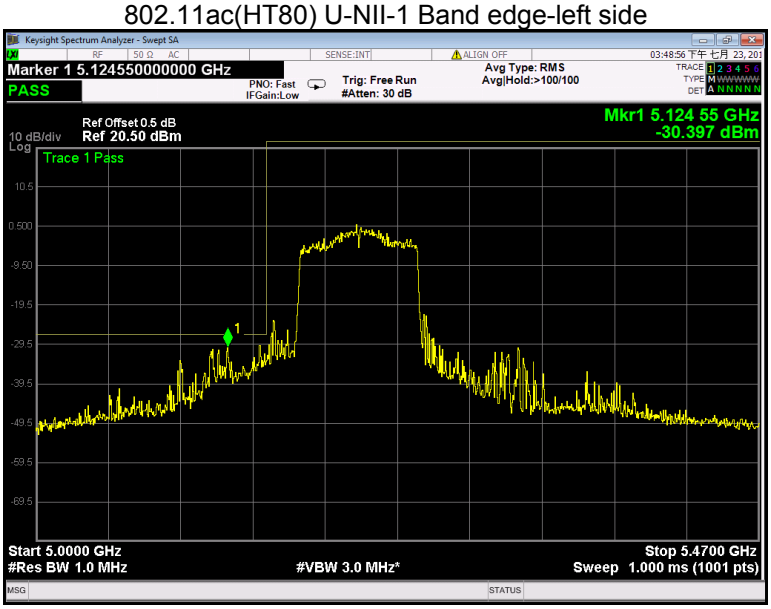


802.11 ac(HT40) U-NII-3 Band edge-left side

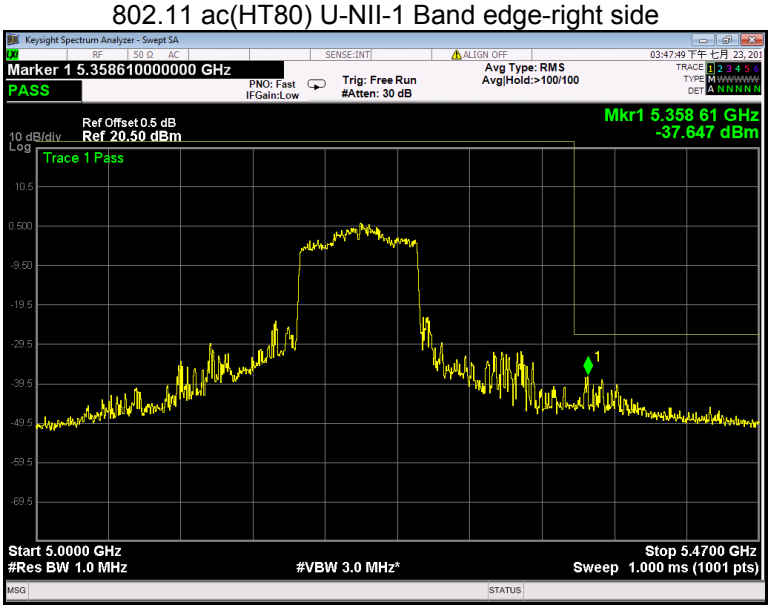
802.11 ac(HT40) U-NII-3 Band edge-right side



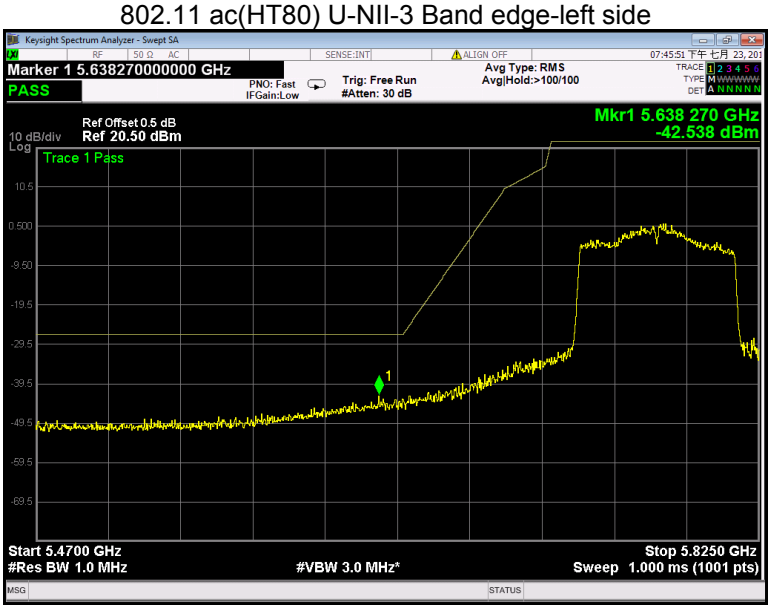
802.11ac(HT80) U-NII-1 Band edge-left side



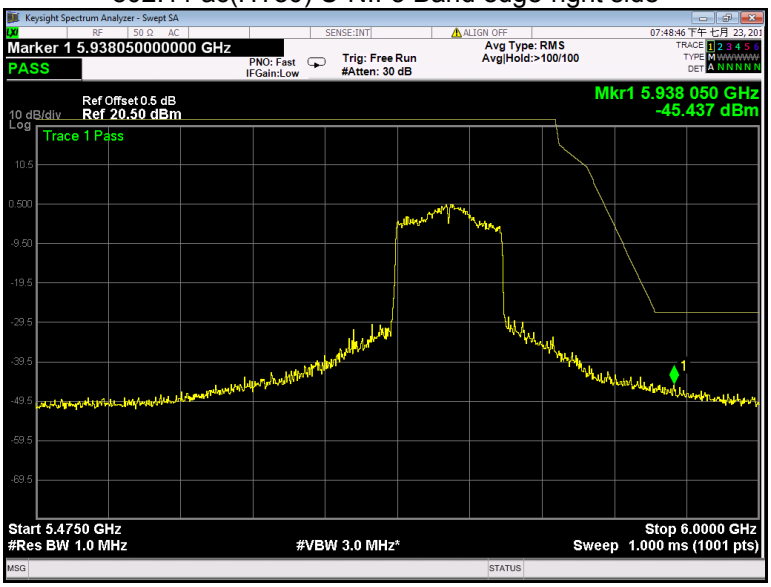
802.11 ac(HT80) U-NII-1 Band edge-right side



802.11 ac(HT80) U-NII-3 Band edge-left side

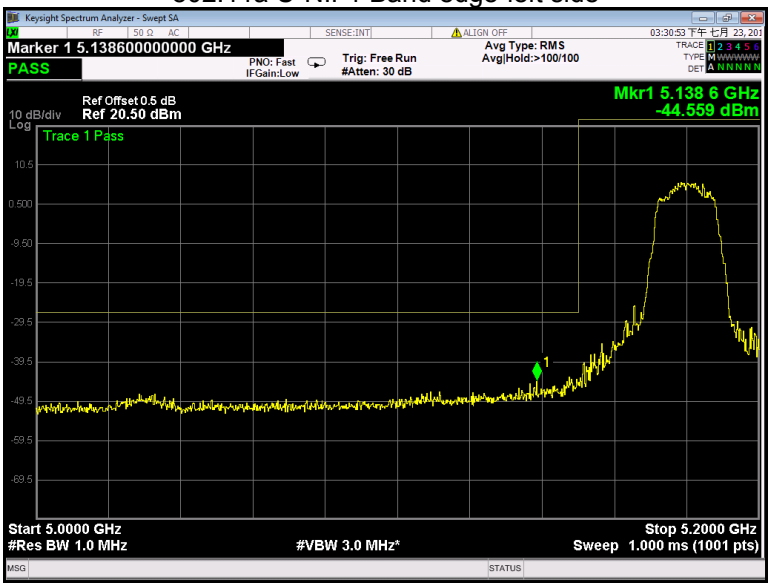


802.11 ac(HT80) U-NII-3 Band edge-right side

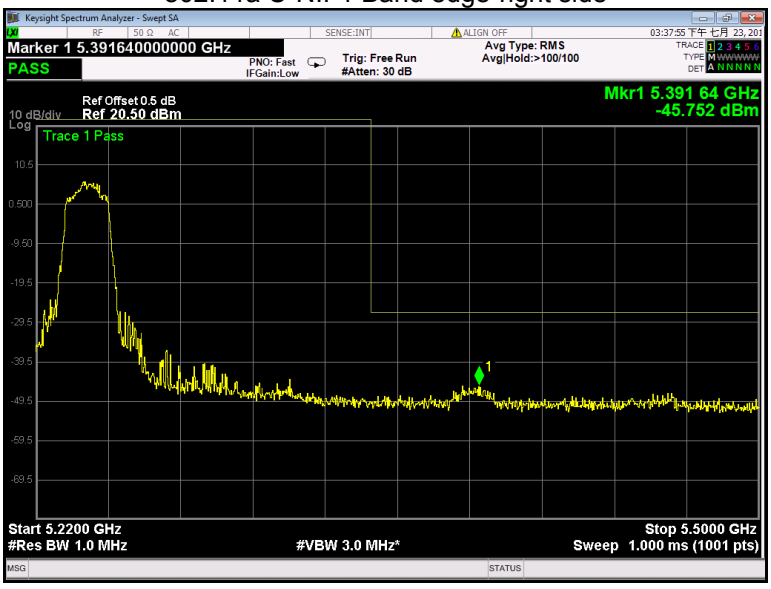


Ant1

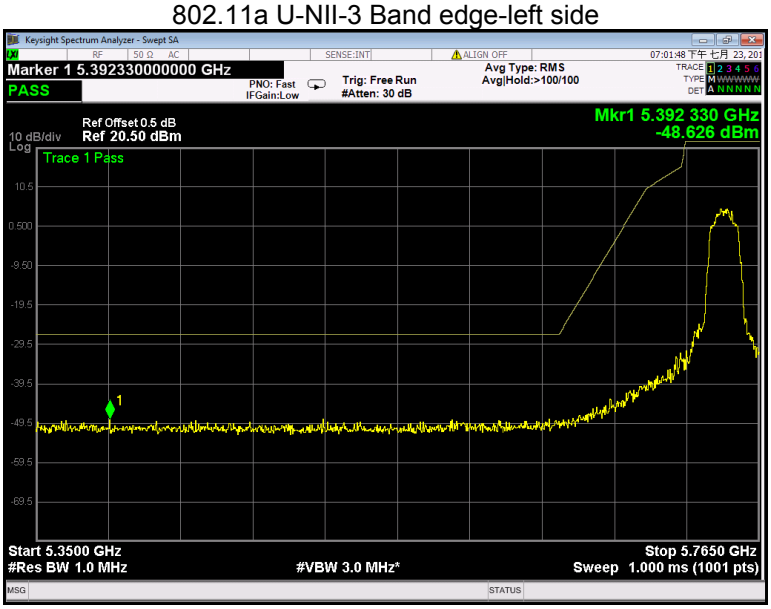
802.11a U-NII-1 Band edge-left side



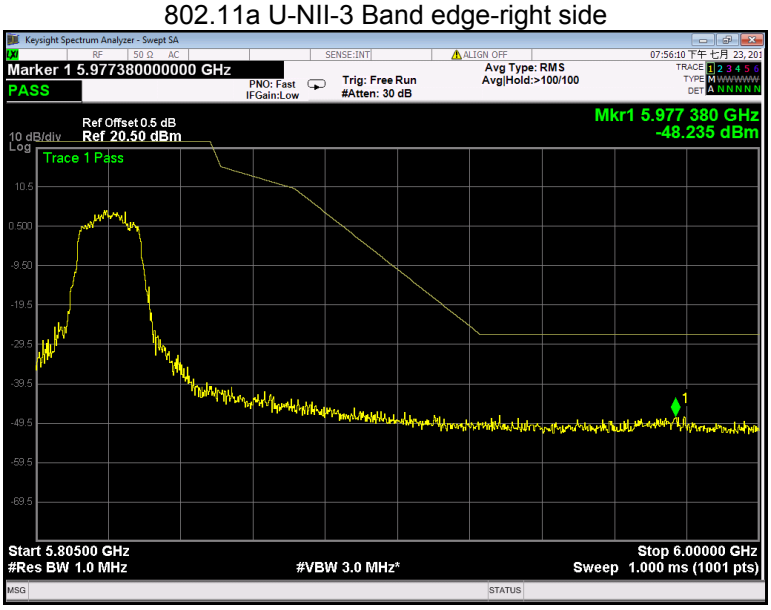
802.11a U-NII-1 Band edge-right side



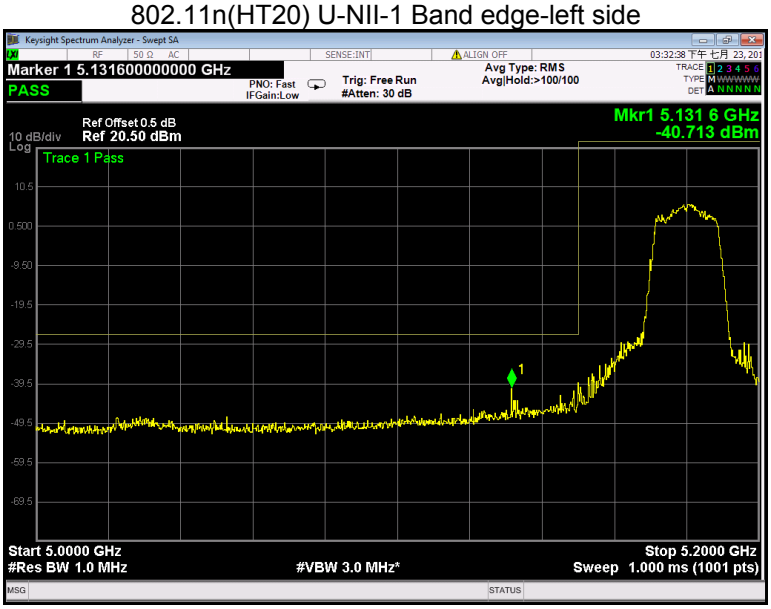
802.11a U-NII-3 Band edge-left side



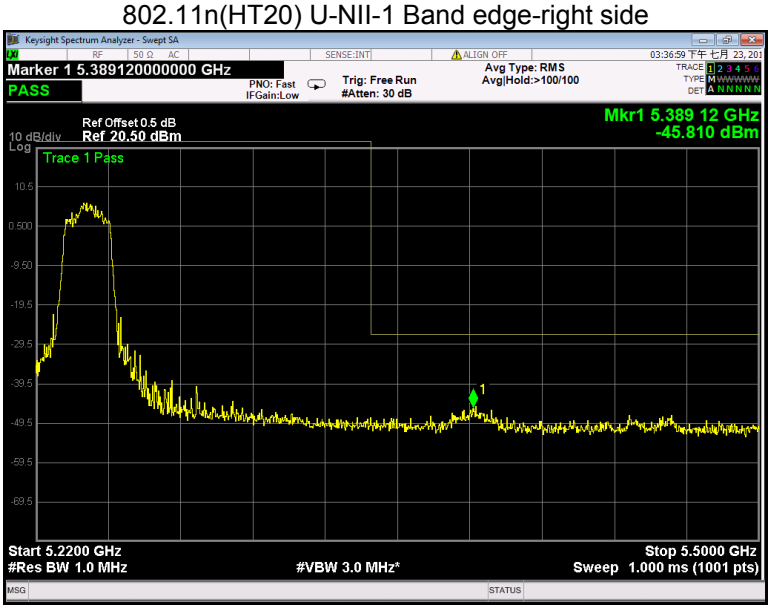
802.11a U-NII-3 Band edge-right side



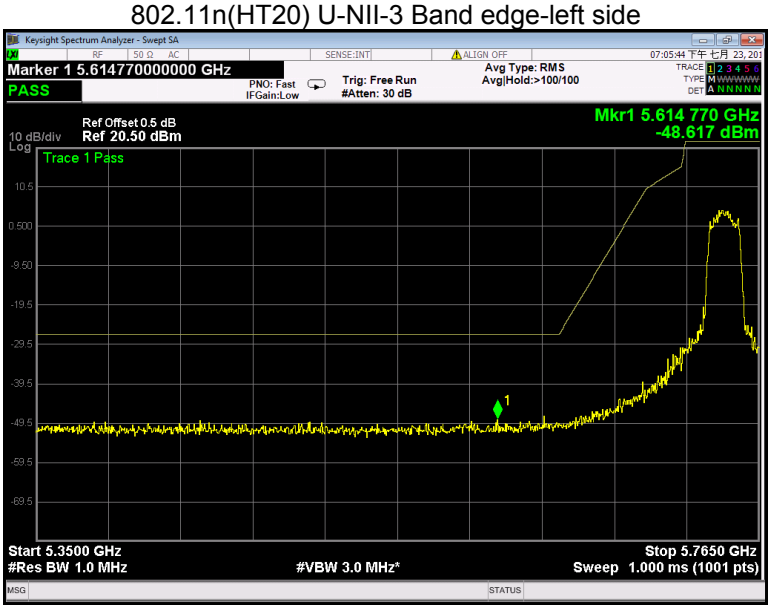
802.11n(HT20) U-NII-1 Band edge-left side



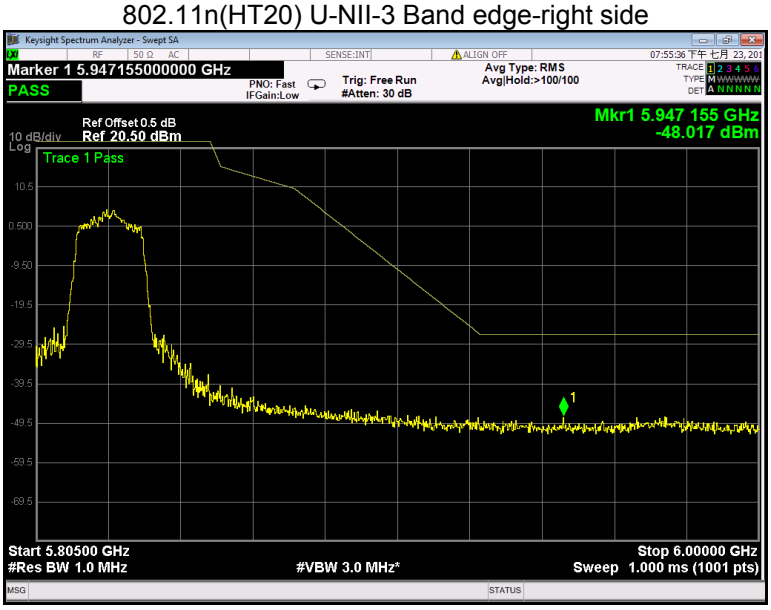
802.11n(HT20) U-NII-1 Band edge-right side



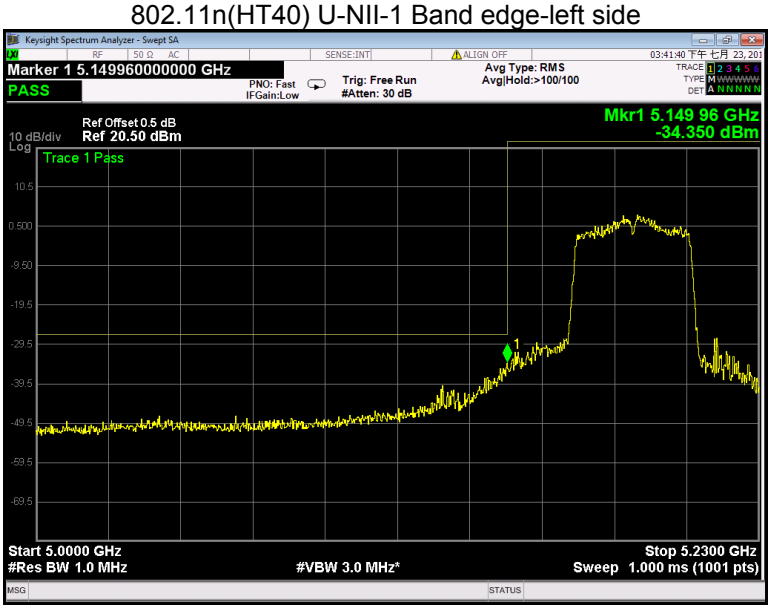
802.11n(HT20) U-NII-3 Band edge-left side



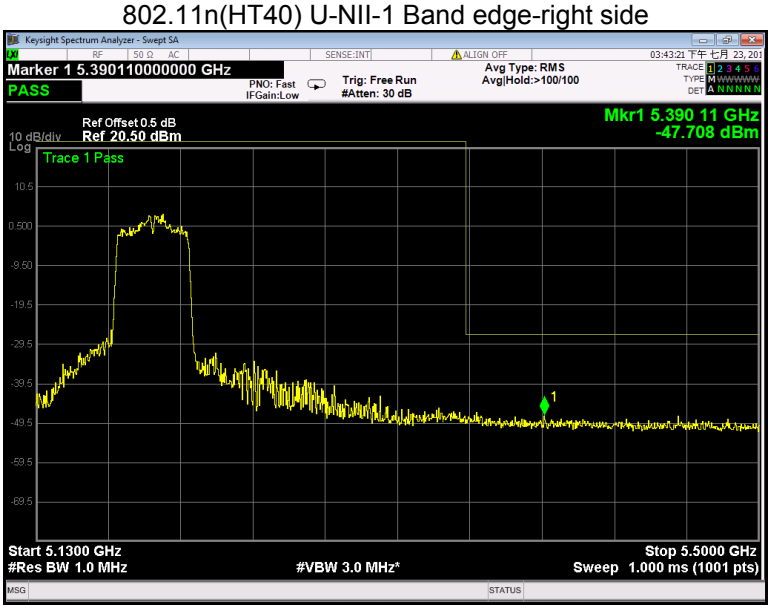
802.11n(HT20) U-NII-3 Band edge-right side



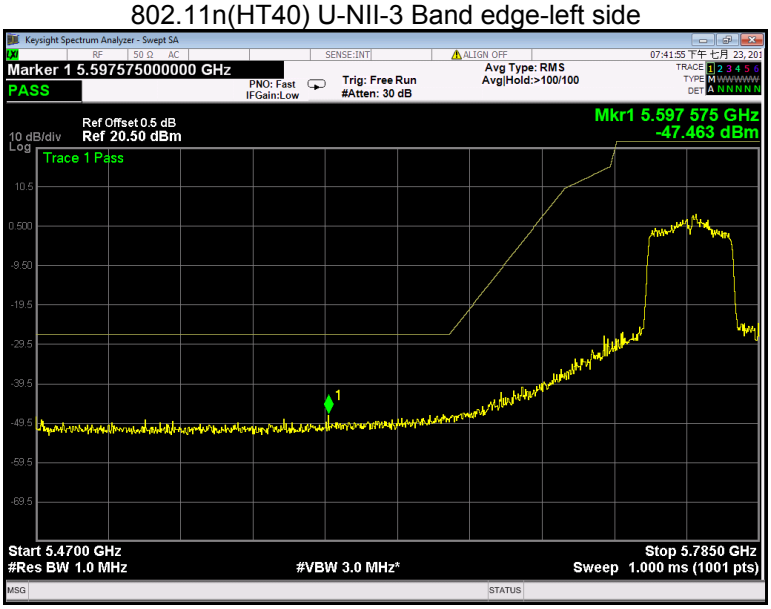
802.11n(HT40) U-NII-1 Band edge-left side



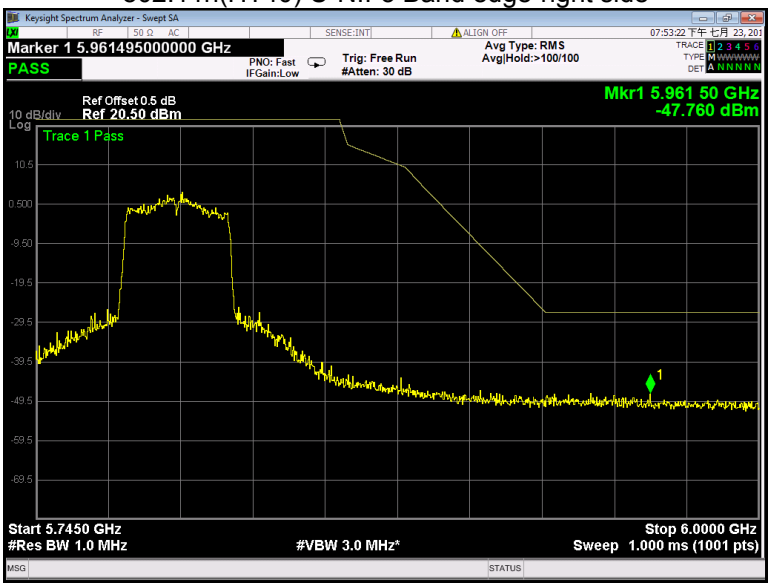
802.11n(HT40) U-NII-1 Band edge-right side



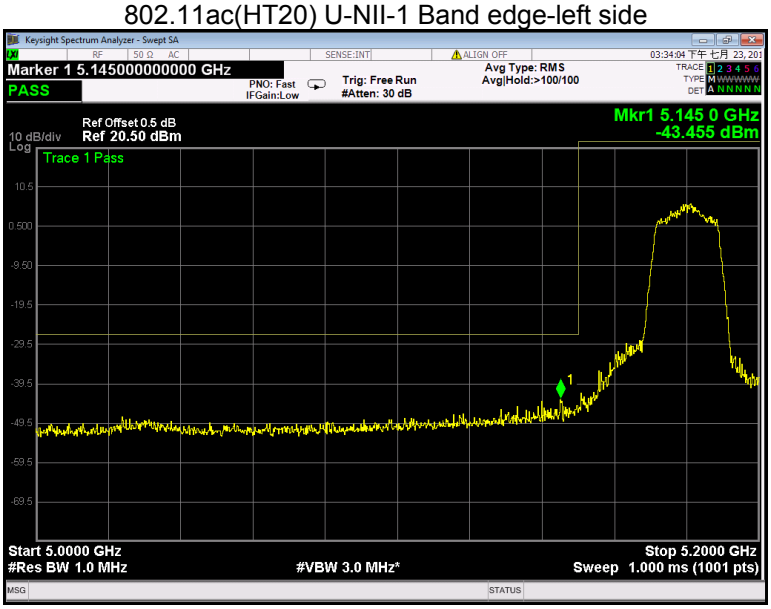
802.11n(HT40) U-NII-3 Band edge-left side



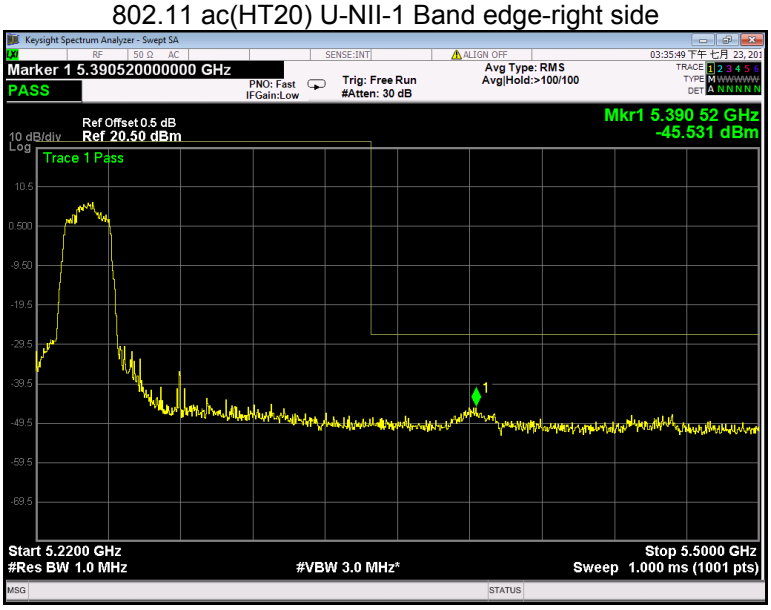
802.11n(HT40) U-NII-3 Band edge-right side



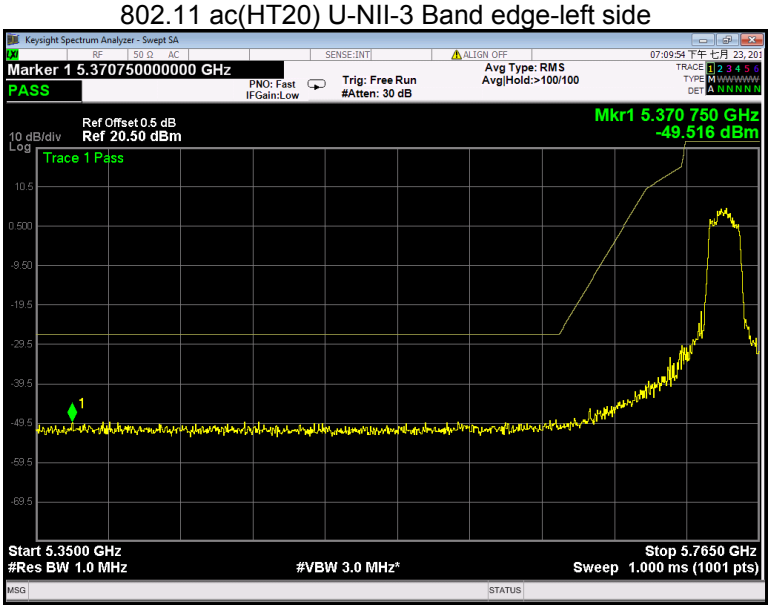
802.11ac(HT20) U-NII-1 Band edge-left side



802.11 ac(HT20) U-NII-1 Band edge-right side

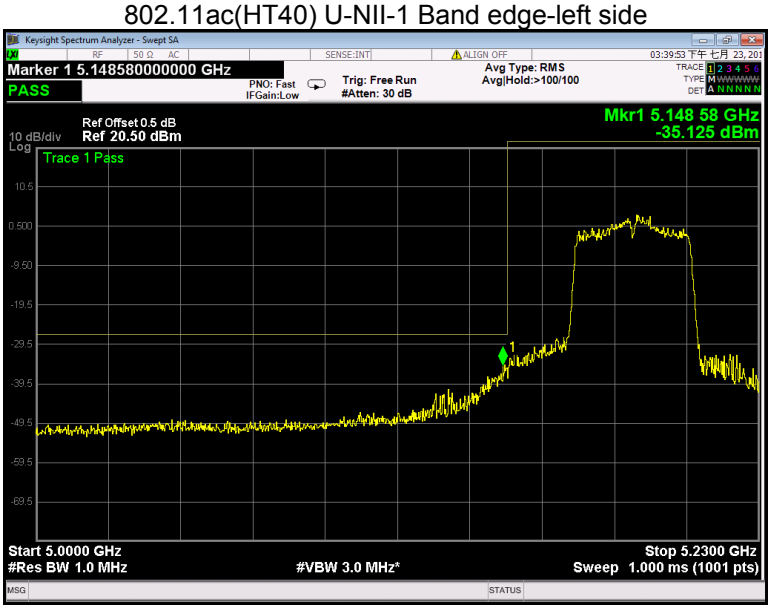


802.11 ac(HT20) U-NII-3 Band edge-left side

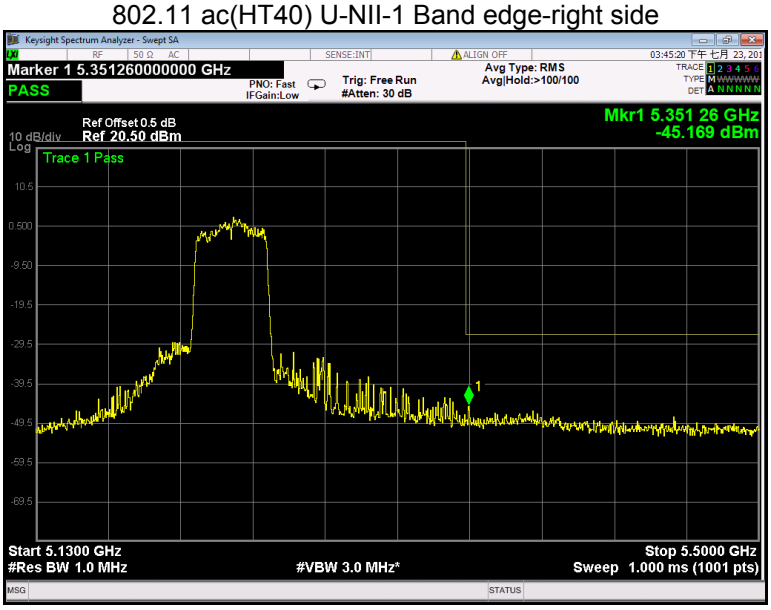


802.11 ac(HT20) U-NII-3 Band edge-right side

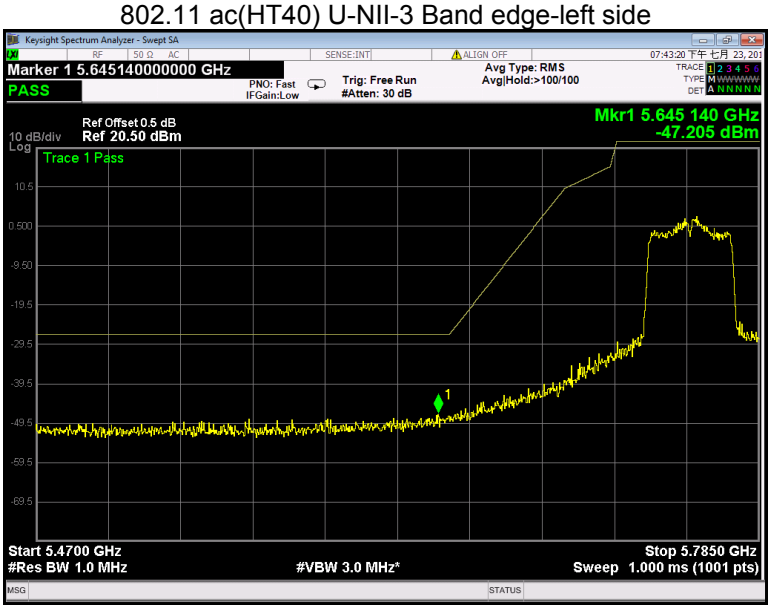
802.11ac(HT40) U-NII-1 Band edge-left side



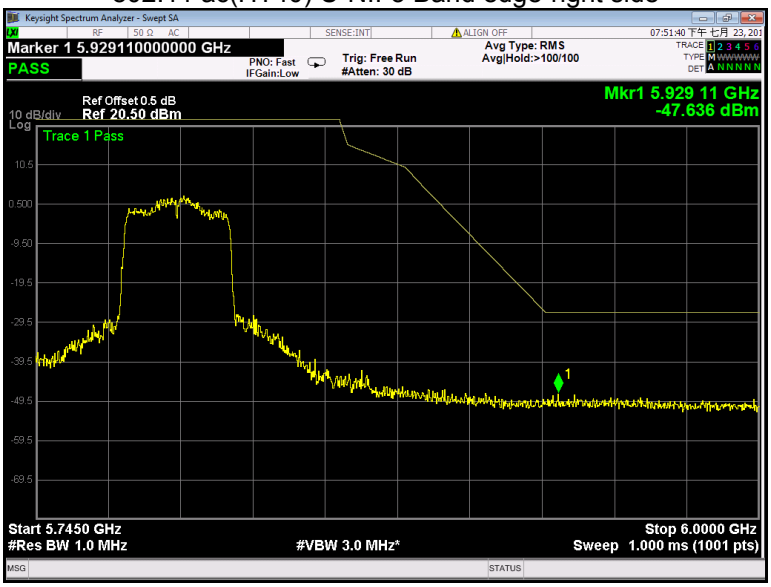
802.11 ac(HT40) U-NII-1 Band edge-right side



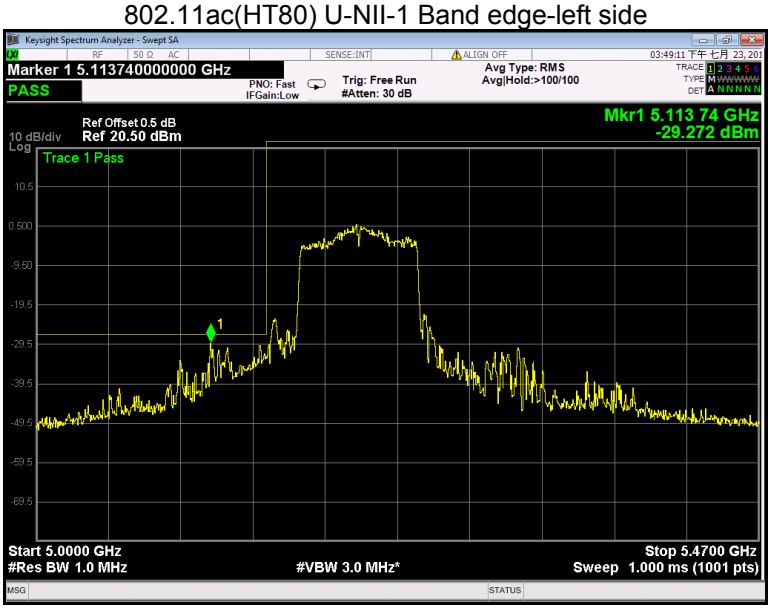
802.11 ac(HT40) U-NII-3 Band edge-left side



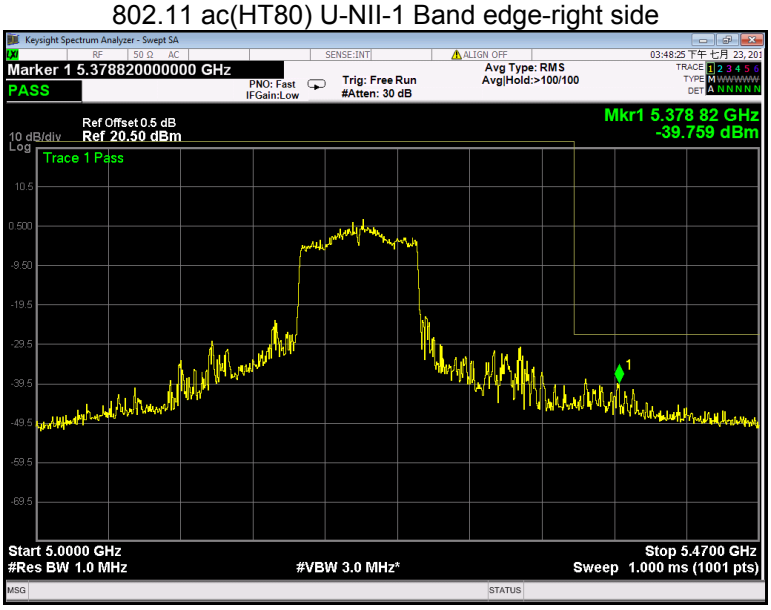
802.11 ac(HT40) U-NII-3 Band edge-right side



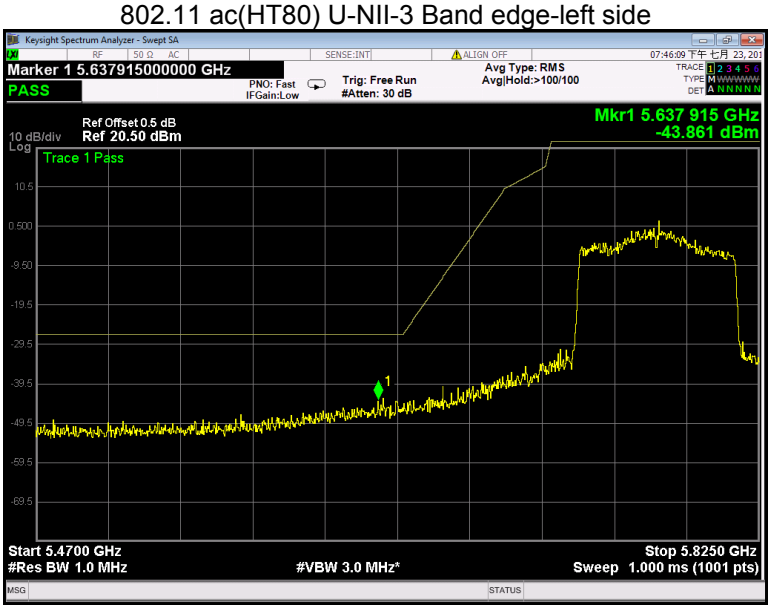
802.11ac(HT80) U-NII-1 Band edge-left side



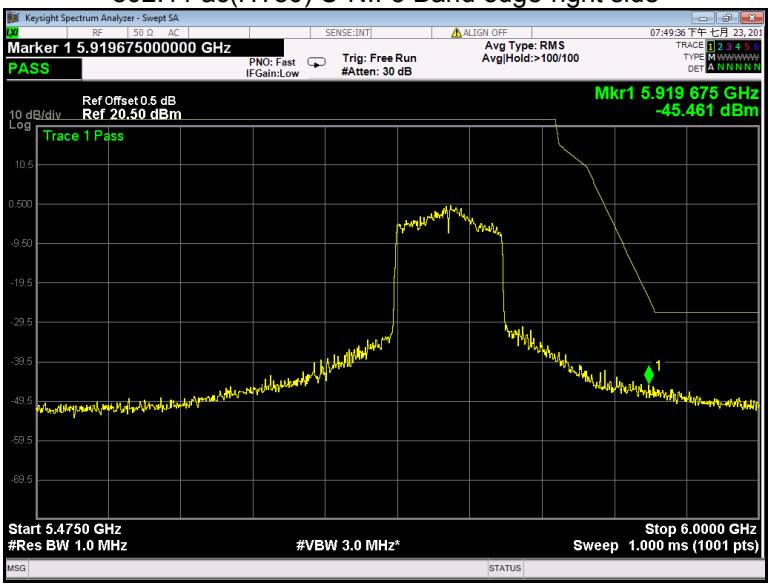
802.11 ac(HT80) U-NII-1 Band edge-right side



802.11 ac(HT80) U-NII-3 Band edge-left side



802.11 ac(HT80) U-NII-3 Band edge-right side



10 6 dB Bandwidth

Test Requirement:	FCC 47CFR Part 15 Section 15.407(e)
Test Method:	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Section C
Test Limit:	≥ 500 kHz
Test Result:	PASS

10.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 100kHz, VBW = 300kHz

10.2 Test Result

Ant0

Band	Operation mode	6 dB Bandwidth (MHz)		
		Low	Middle	High
U-NII-3	802.11a	16.31	16.04	16.31
	802.11n(HT20)	17.53	17.56	17.56
	802.11n(HT40)	36.29	/	36.32
	802.11ac(HT20)	17.26	17.18	16.67
	802.11ac(HT40)	36.26	/	35.69
	802.11ac(HT80)	/	75.26	/

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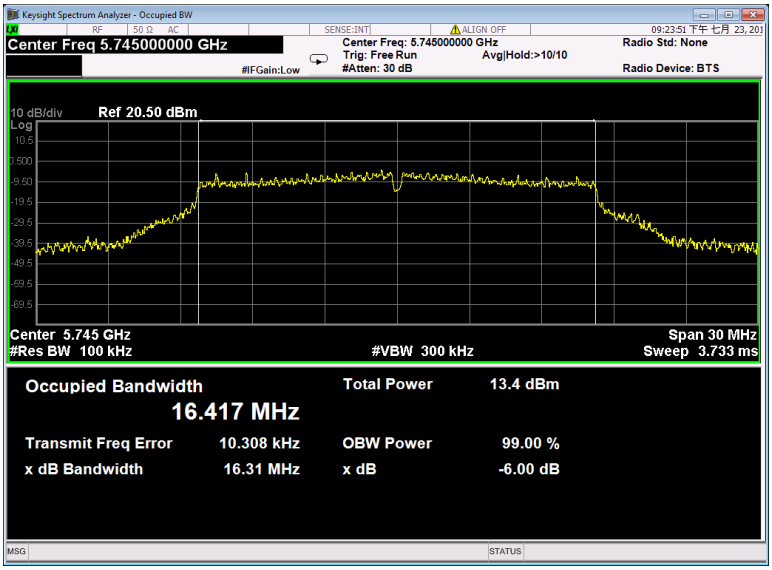
Band	Operation mode	6 dB Bandwidth (MHz)		
		Low	Middle	High
U-NII-3	802.11a	16.31	16.31	16.02
	802.11n(HT20)	17.58	16.93	17.57
	802.11n(HT40)	36.28	/	36.31
	802.11ac(HT20)	17.57	16.94	16.93
	802.11ac(HT40)	36.32	/	36.27
	802.11ac(HT80)	/	75.27	/

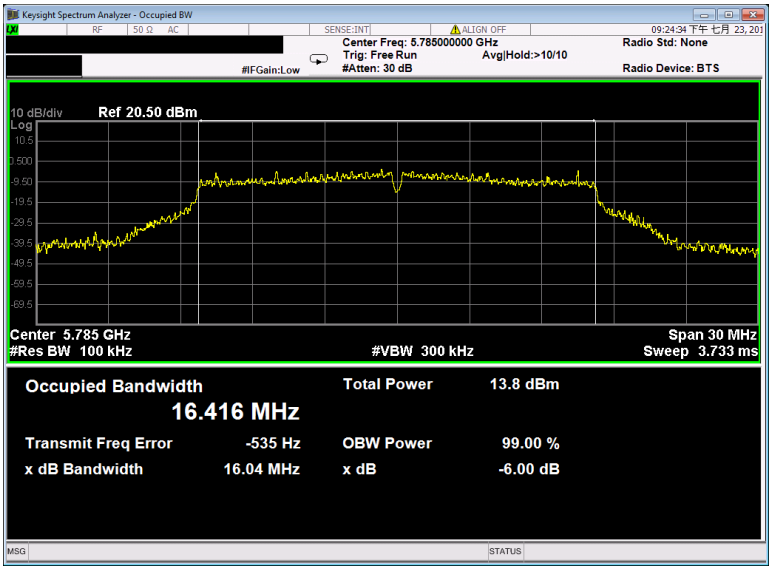
Test result plots shown as follows:

Ant0

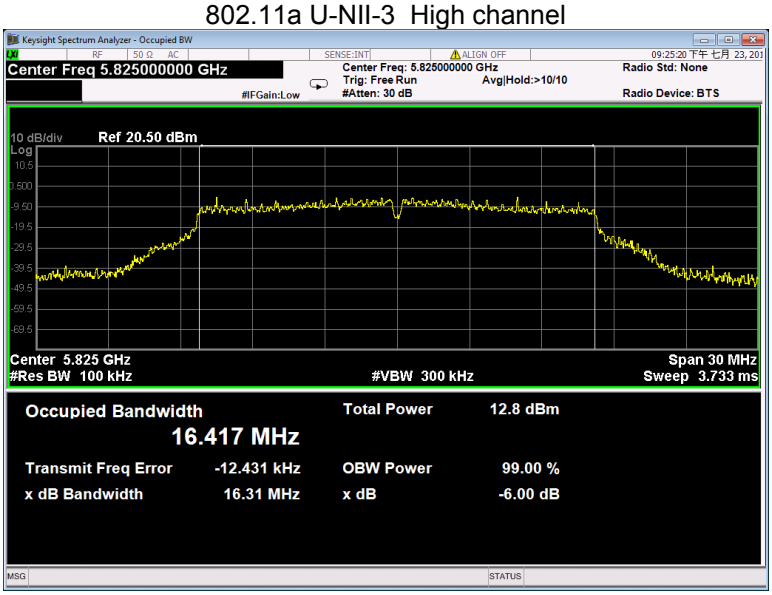
802.11a U-NII-3 Low channel



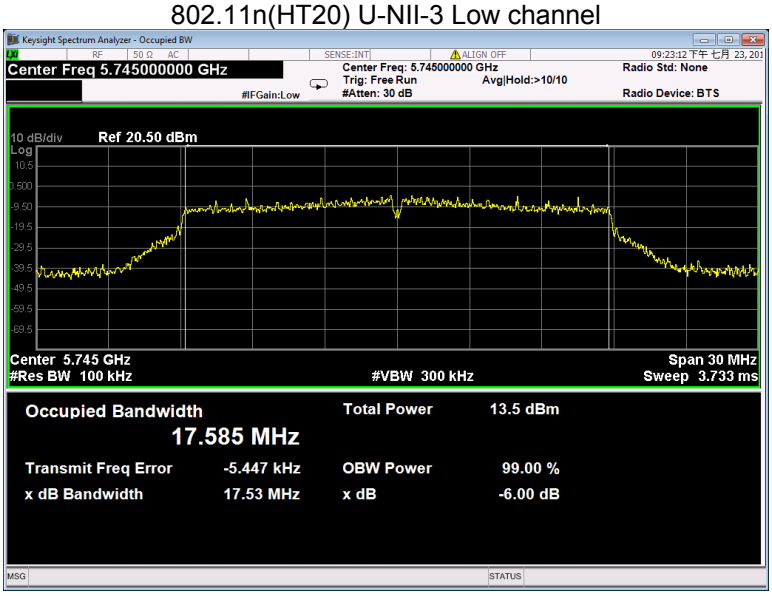
802.11a U-NII-3 Middle channel



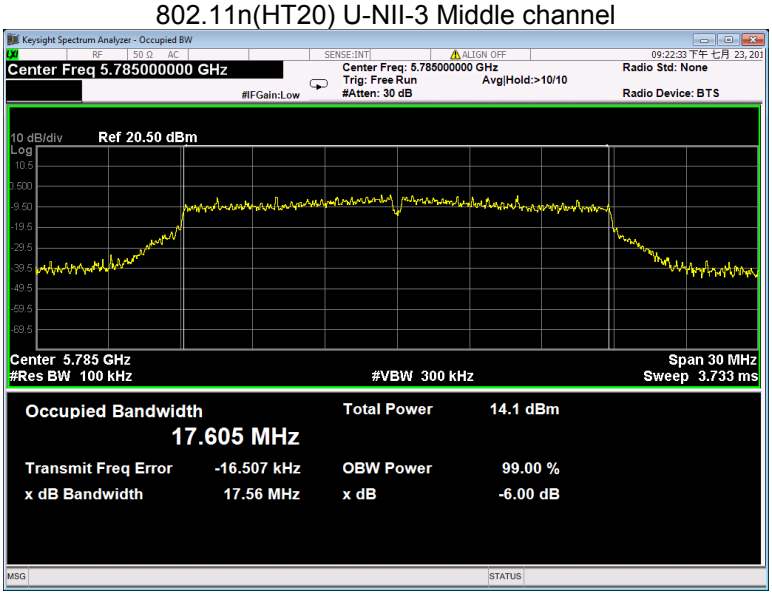
802.11a U-NII-3 High channel



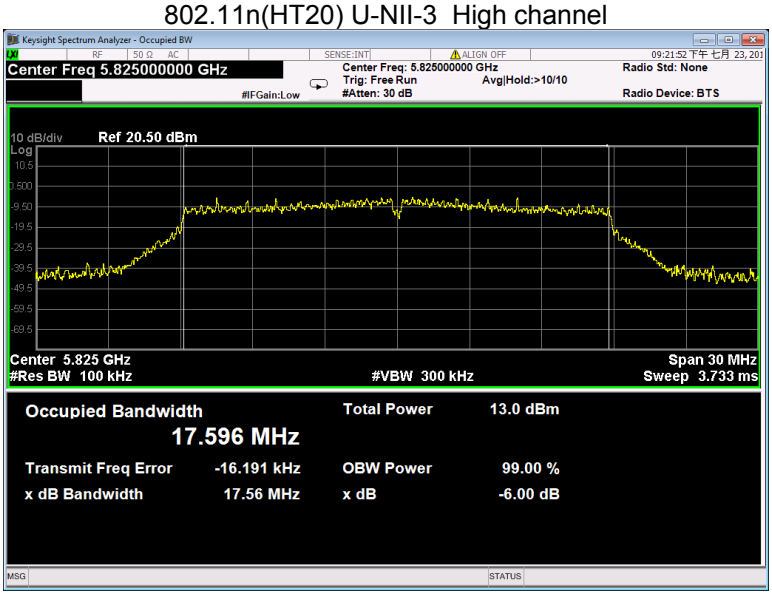
802.11n(HT20) U-NII-3 Low channel



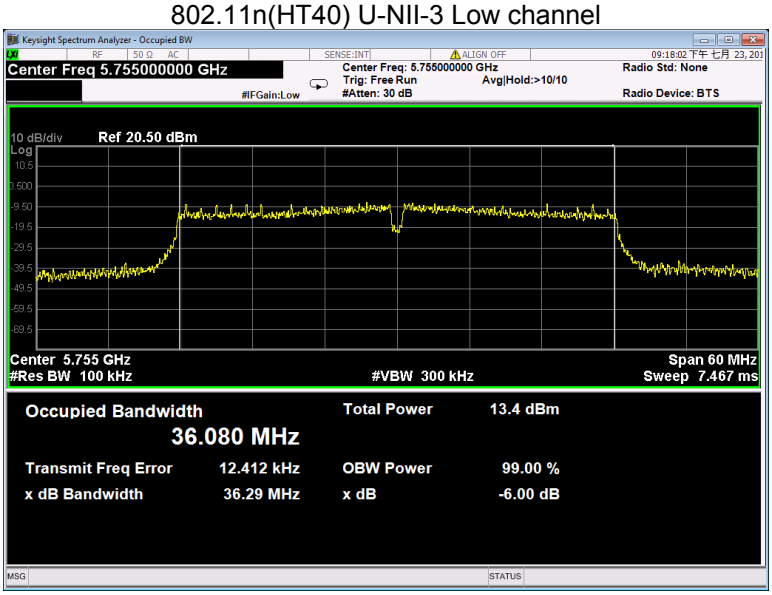
802.11n(HT20) U-NII-3 Middle channel



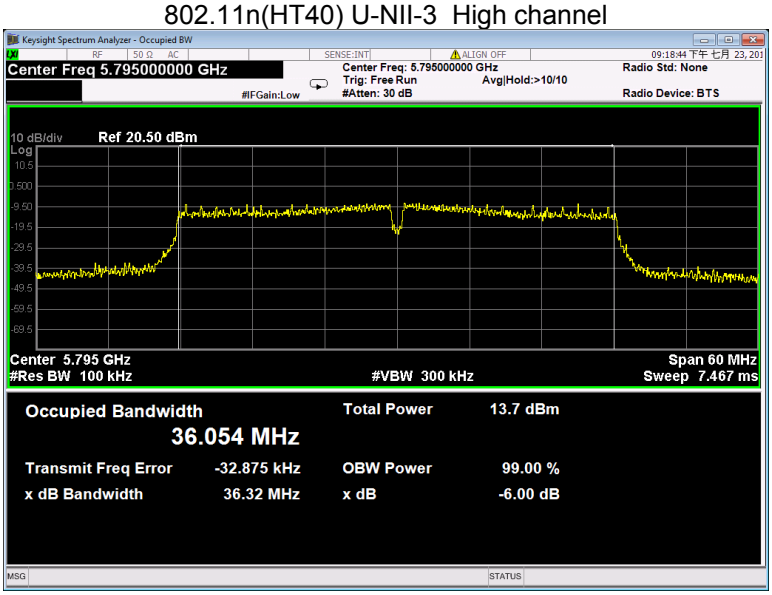
802.11n(HT20) U-NII-3 High channel



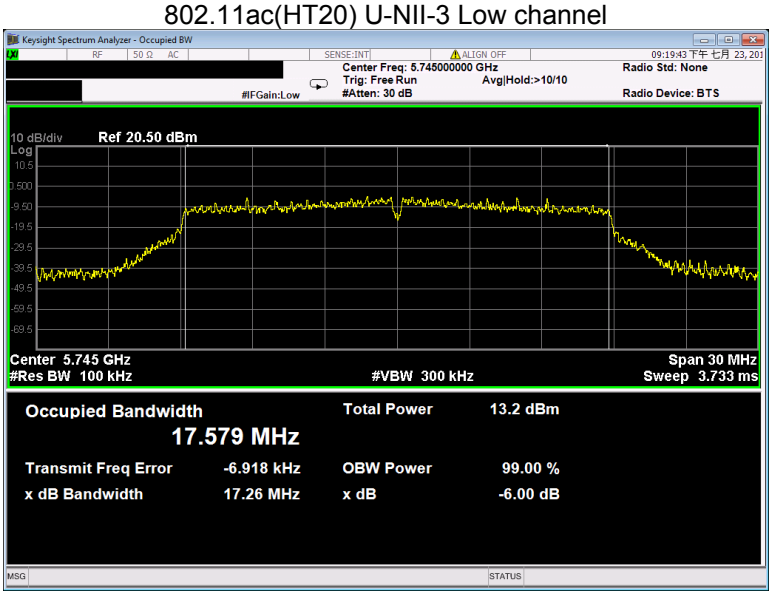
802.11n(HT40) U-NII-3 Low channel



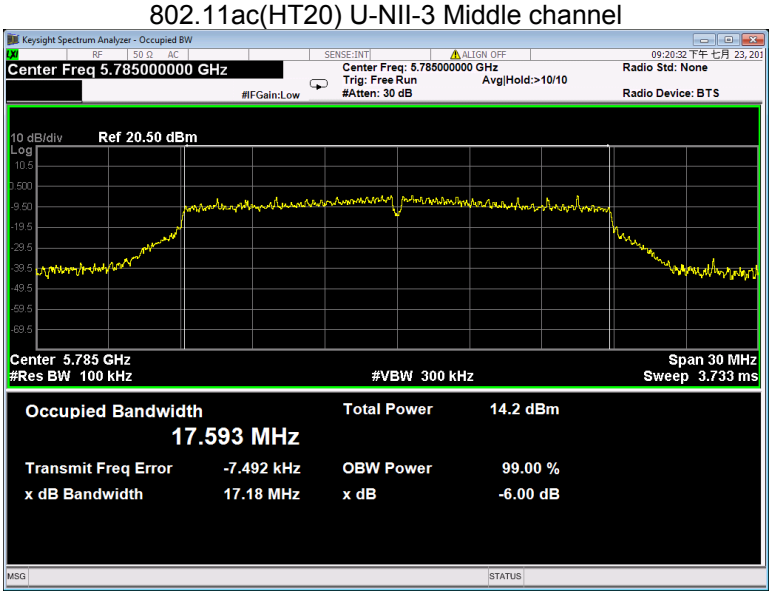
802.11n(HT40) U-NII-3 High channel



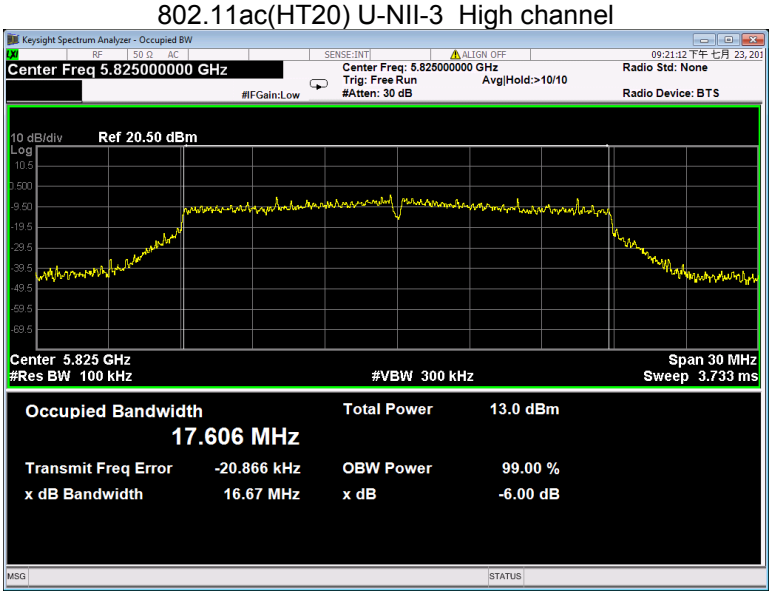
802.11ac(HT20) U-NII-3 Low channel



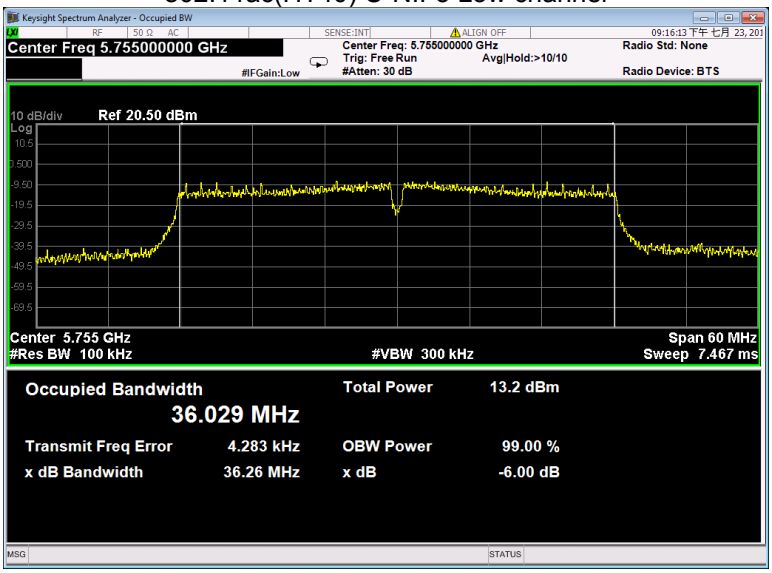
802.11ac(HT20) U-NII-3 Middle channel



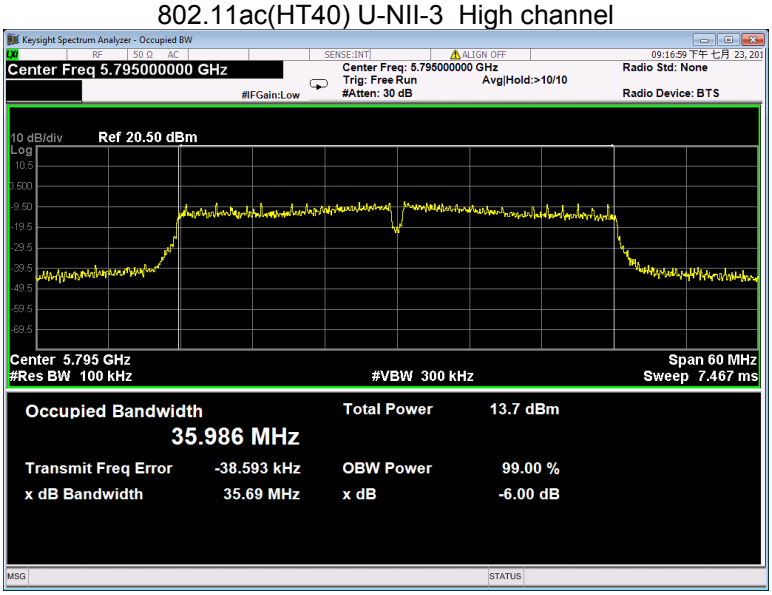
802.11ac(HT20) U-NII-3 High channel



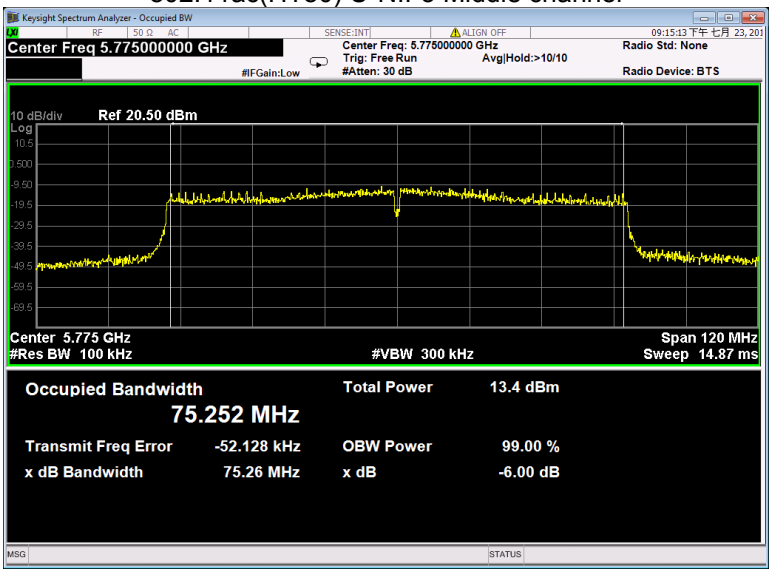
802.11ac(HT40) U-NII-3 Low channel



802.11ac(HT40) U-NII-3 High channel



802.11ac(HT80) U-NII-3 Middle channel



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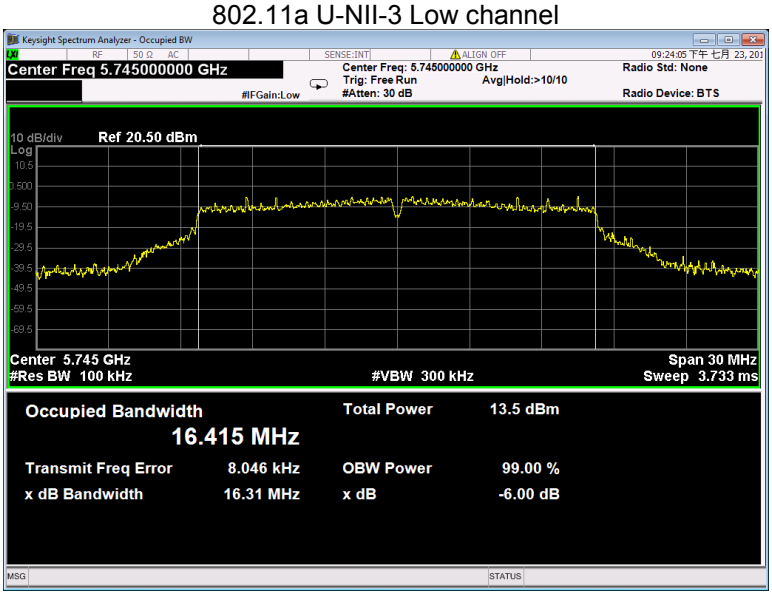
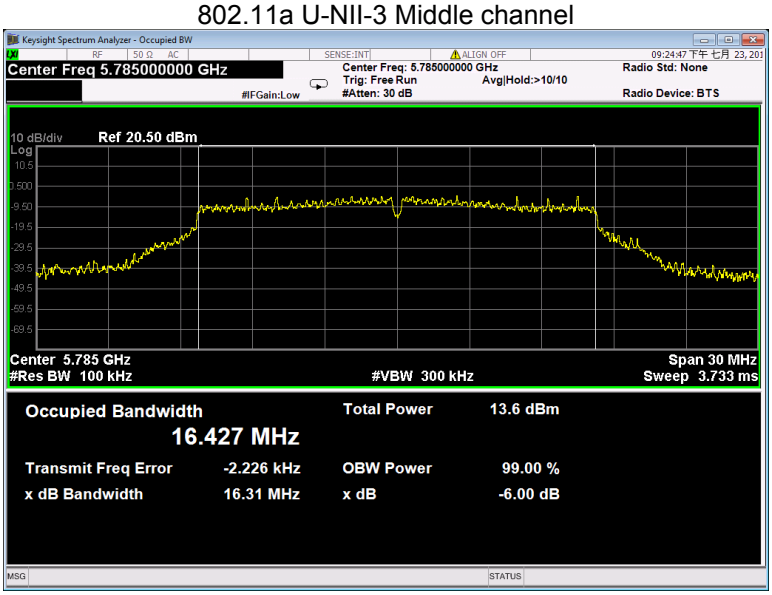
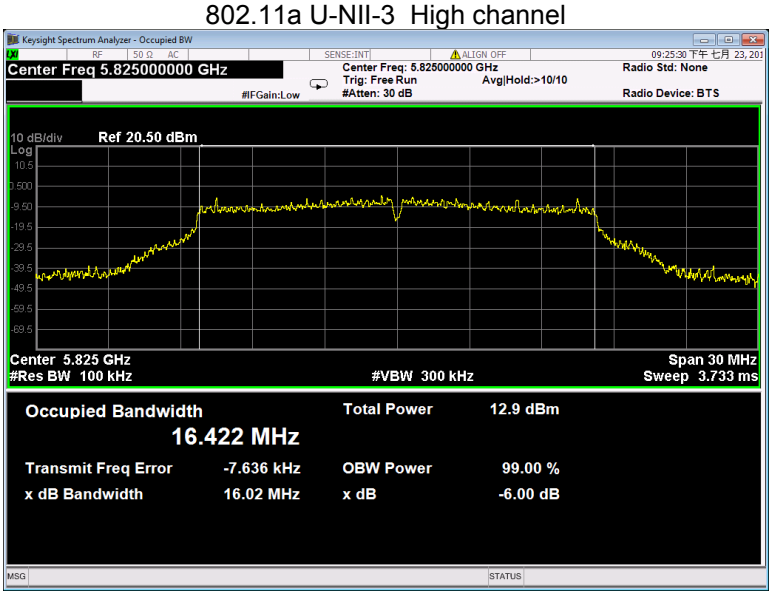
802.11a U-NII-3 Low channel



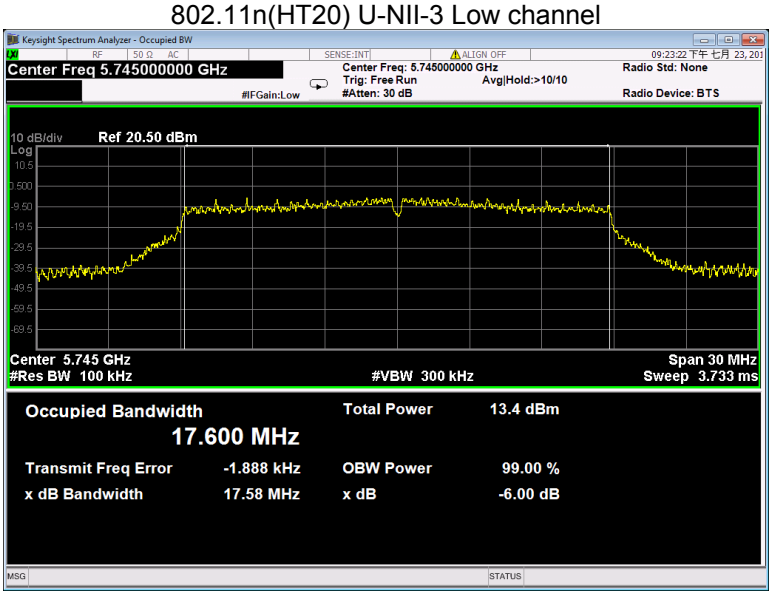
802.11a U-NII-3 Middle channel



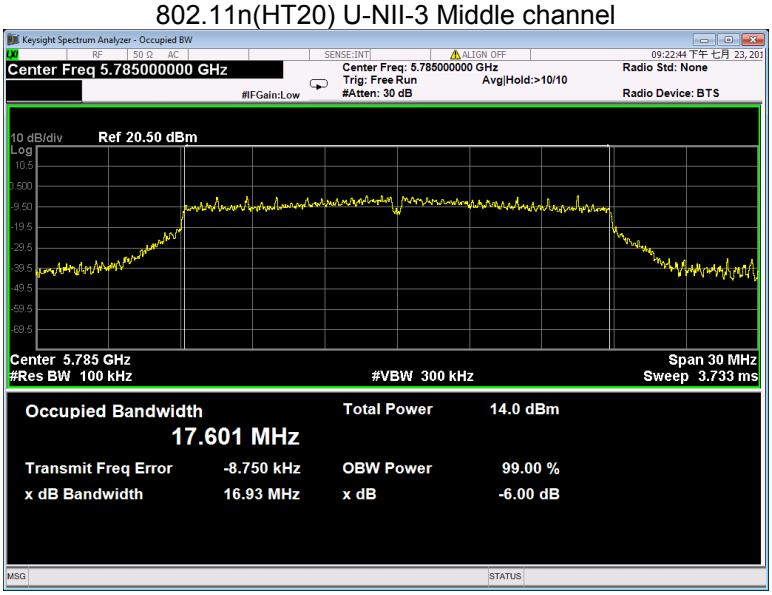
802.11a U-NII-3 High channel



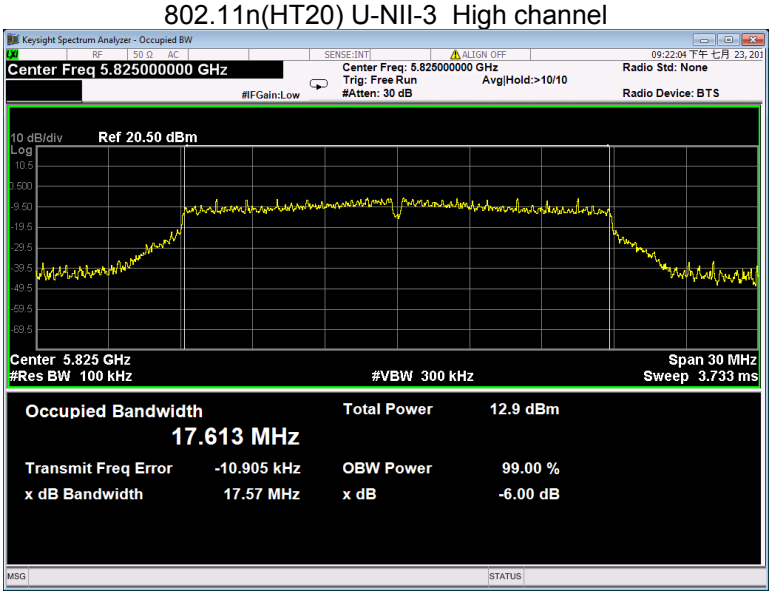
802.11n(HT20) U-NII-3 Low channel



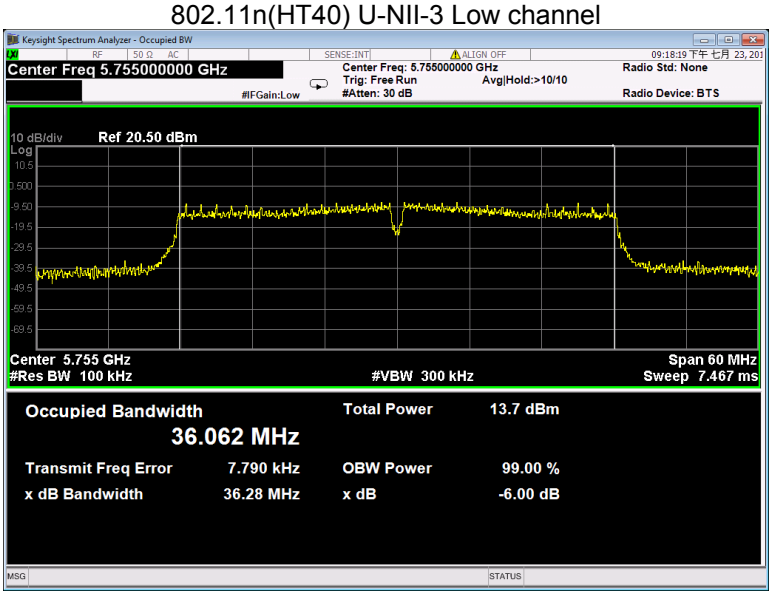
802.11n(HT20) U-NII-3 Middle channel



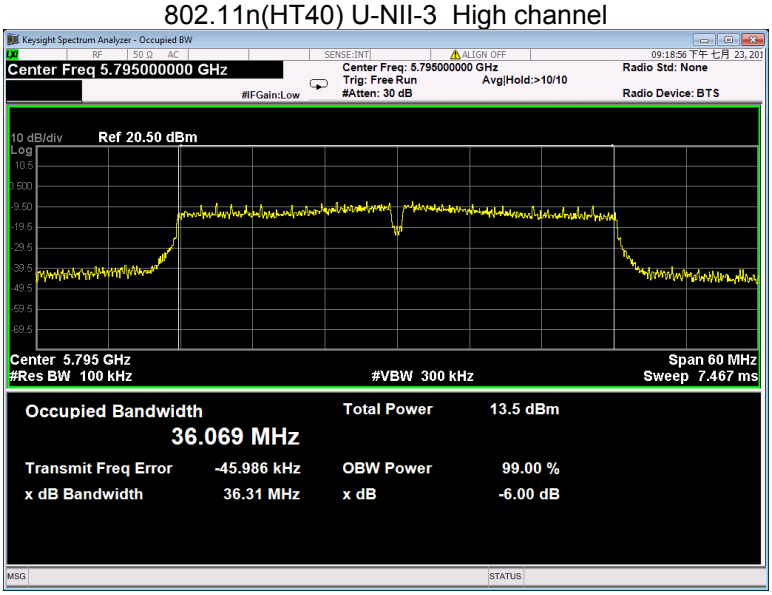
802.11n(HT20) U-NII-3 High channel



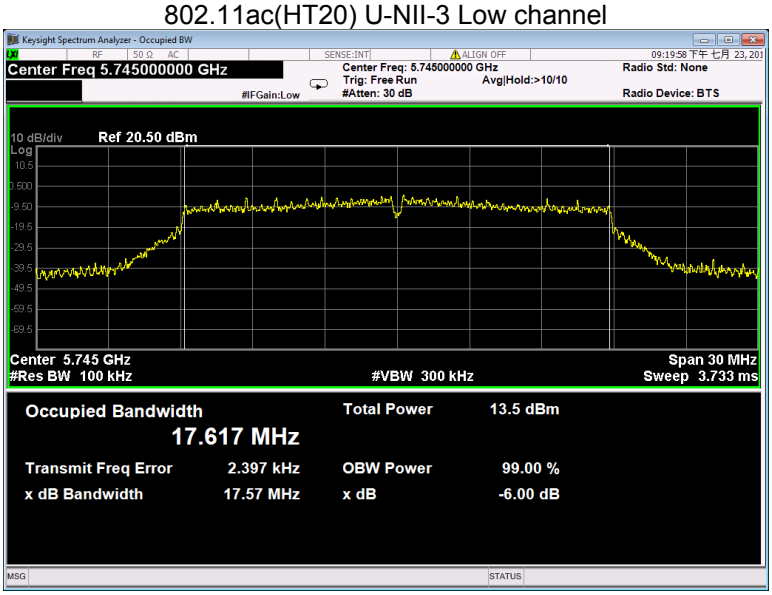
802.11n(HT40) U-NII-3 Low channel



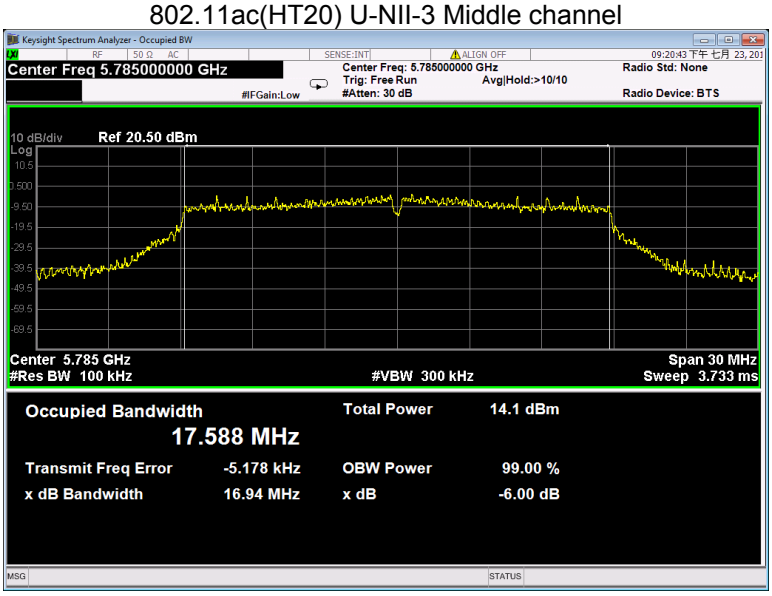
802.11n(HT40) U-NII-3 High channel



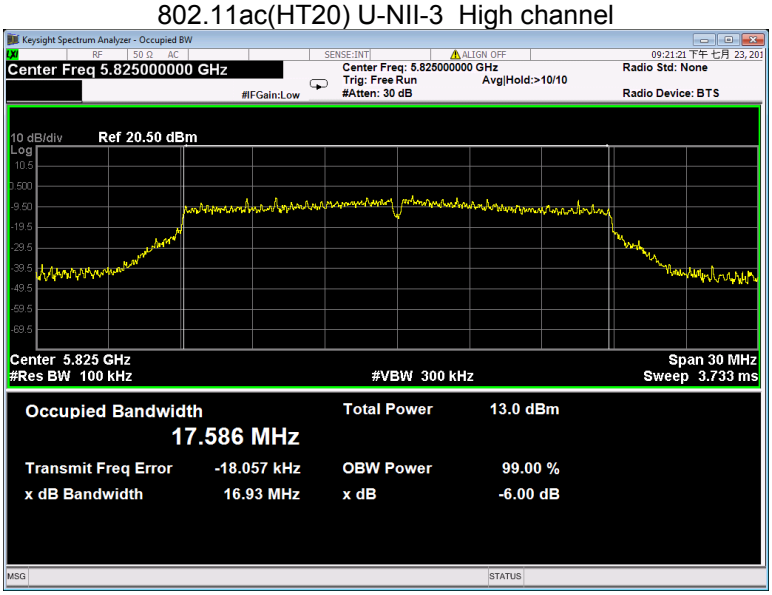
802.11ac(HT20) U-NII-3 Low channel



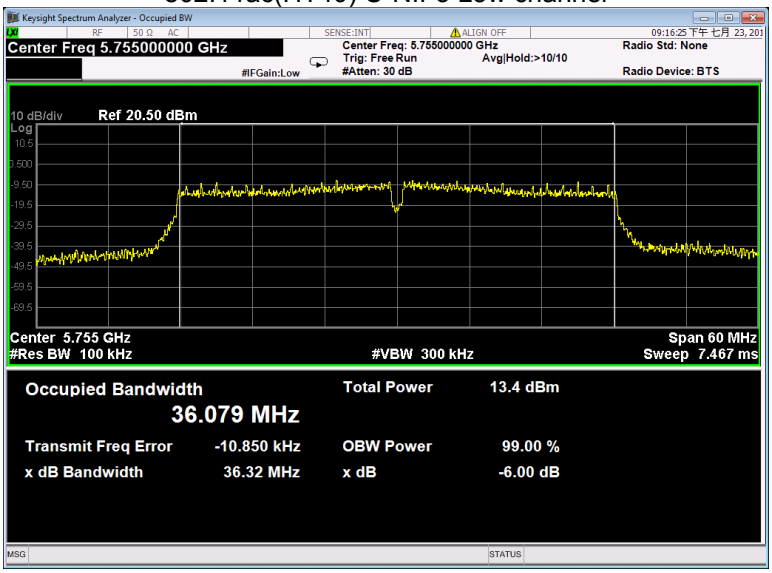
802.11ac(HT20) U-NII-3 Middle channel



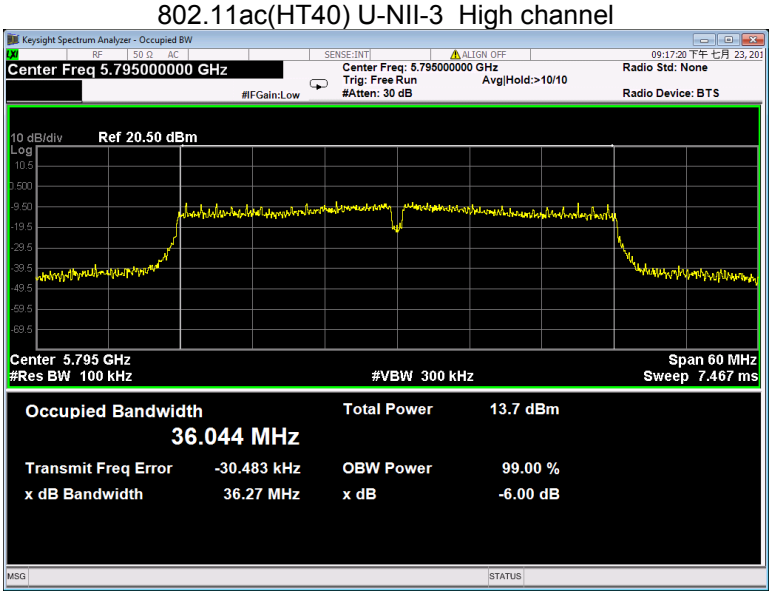
802.11ac(HT20) U-NII-3 High channel



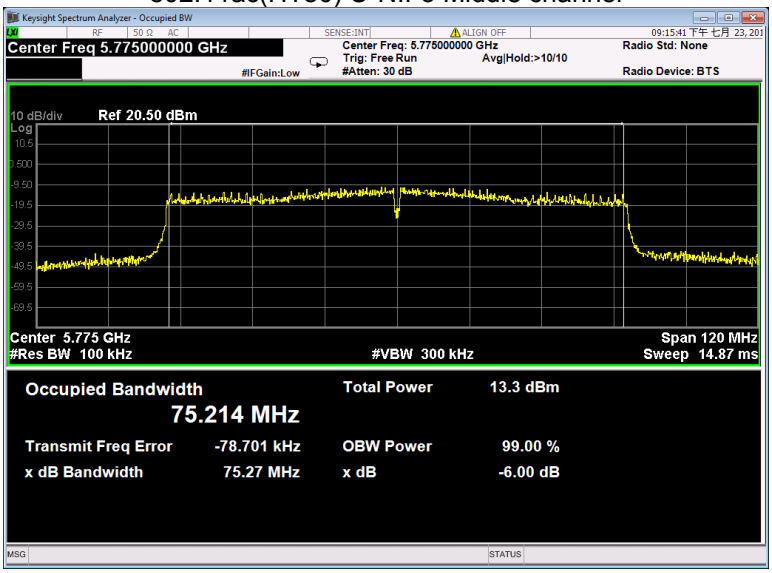
802.11ac(HT40) U-NII-3 Low channel



802.11ac(HT40) U-NII-3 High channel



802.11ac(HT80) U-NII-3 Middle channel



11 26 dB Bandwidth and 99% Occupied Bandwidth

Test Requirement:	FCC 47CFR Part 15 Section 15.407 (a)
Test Method:	KDB662911 D01 Multiple Transmitter Output v02r01 KDB789033 D02 General U-NII Test Procedures New Rules v02r01 Section D
Test Limit:	No restriction limits
Test Result:	PASS

11.1 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

2. Set the spectrum analyzer: RBW = 1% to 5% of the OBW, VBW = 3x RBW

11.2 Test Result

Ant0

Band	Operation mode	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
		Low	Middle	High	Low	Middle	High
U-NII-1	802.11a	21.51	21.36	21.31	16.566	16.523	16.643
	802.11n(HT20)	21.12	21.32	21.36	17.681	17.673	17.680
	802.11n(HT40)	38.98	/	39.18	36.088	/	36.111
	802.11ac(HT20)	21.21	21.23	21.37	17.673	17.668	17.692
	802.11ac(HT40)	39.25	/	38.86	36.157	/	36.095
	802.11ac(HT80)	/	84.49	/	/	75.515	/

Band	Operation mode	99% Bandwidth (MHz)		
		Low	Middle	High
U-NII-3	802.11a	16.743	16.574	16.565
	802.11n(HT20)	17.680	17.703	17.715
	802.11n(HT40)	36.172	/	36.112
	802.11ac(HT20)	17.708	17.684	17.704
	802.11ac(HT40)	36.146	/	36.133
	802.11ac(HT80)	/	75.371	/

Ant1

Band	Operation mode	26 dB Bandwidth (MHz)			99% Bandwidth (MHz)		
		Low	Middle	High	Low	Middle	High
U-NII-1	802.11a	21.54	21.18	21.35	16.587	16.534	16.535
	802.11n(HT20)	21.14	21.07	21.22	17.677	17.686	17.689
	802.11n(HT40)	39.19	/	38.79	36.137	/	36.143
	802.11ac(HT20)	21.09	21.27	21.19	17.674	17.704	17.666
	802.11ac(HT40)	39.09	/	38.89	36.161	/	36.096
	802.11ac(HT80)	/	84.87	/	/	75.404	/

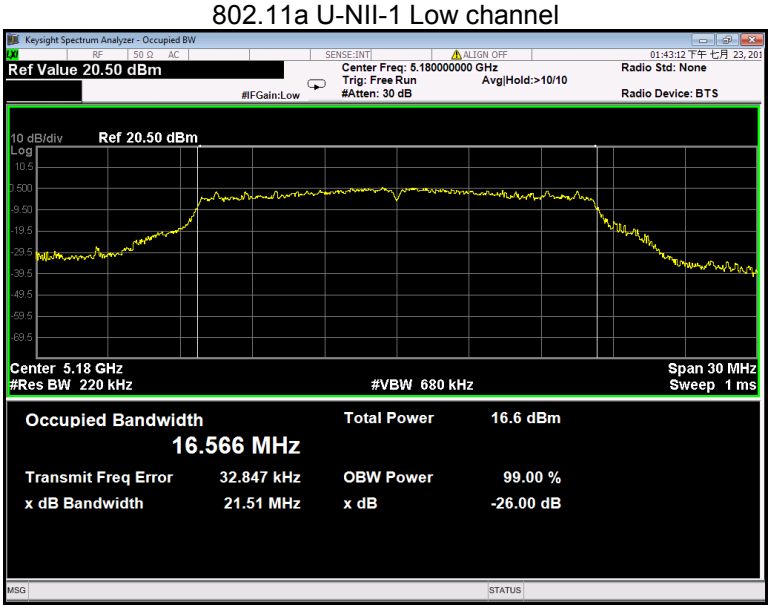
Band	Operation mode	99% Bandwidth (MHz)		
		Low	Middle	High
U-NII-3	802.11a	16.669	16.530	16.591
	802.11n(HT20)	17.712	17.688	17.684
	802.11n(HT40)	36.231	/	36.074
	802.11ac(HT20)	17.725	17.693	17.683
	802.11ac(HT40)	36.166	/	36.135
	802.11ac(HT80)	/	75.385	/

Test result plots shown as follows:

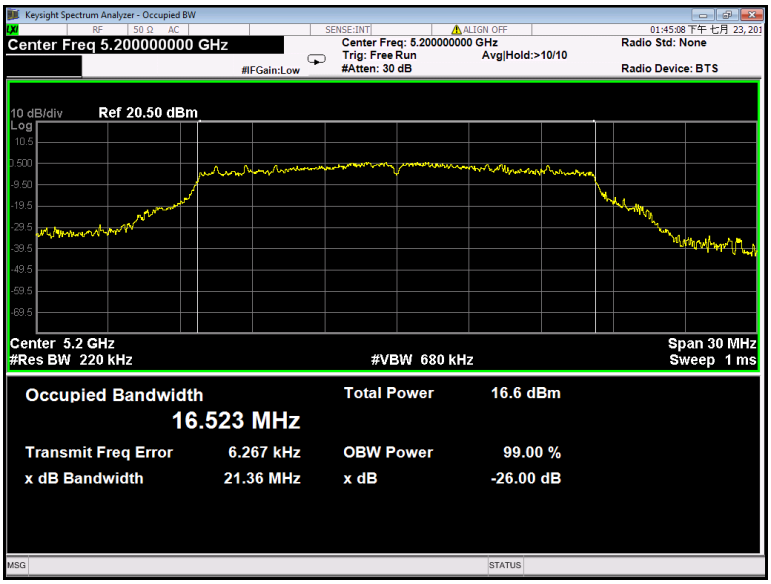
Ant0

26 dB Bandwidth and 99% Occupied Bandwidth

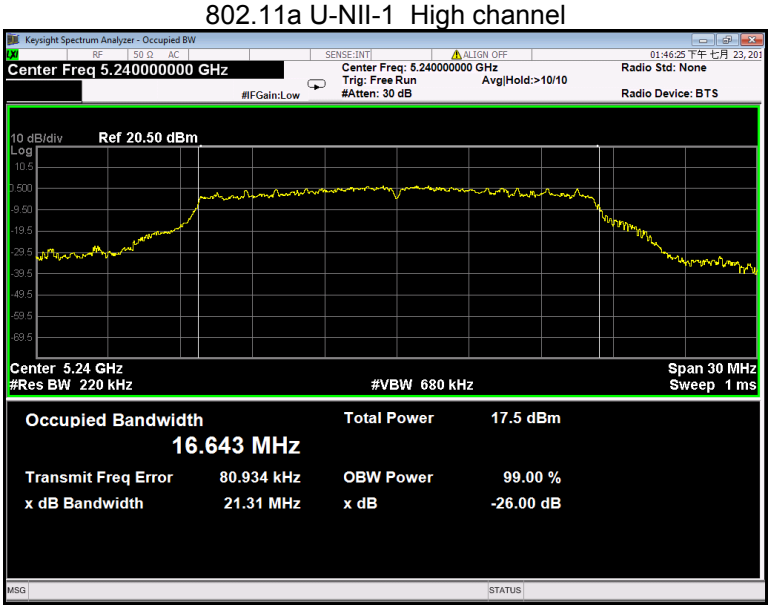
802.11a U-NII-1 Low channel



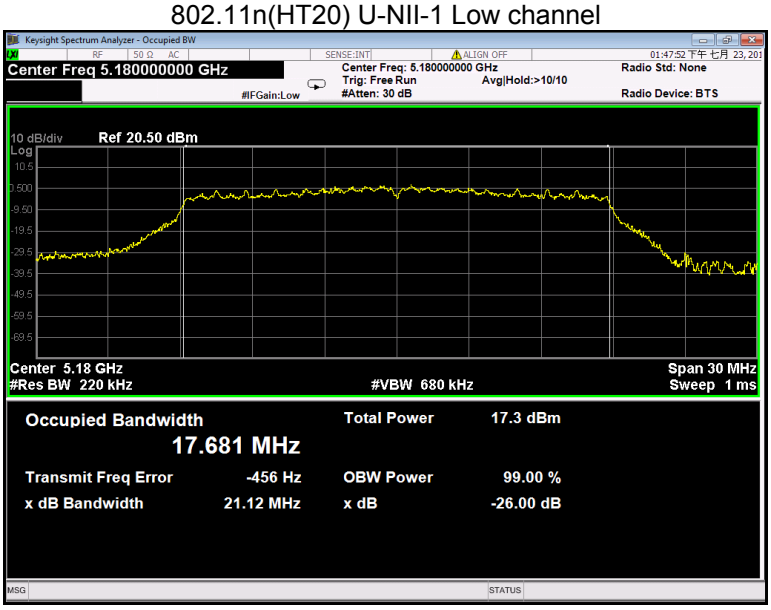
802.11a U-NII-1 Middle channel



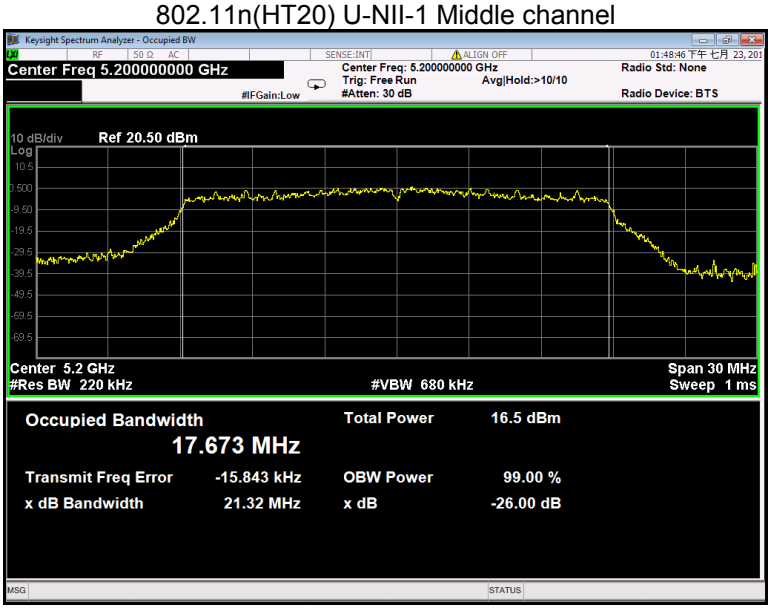
802.11a U-NII-1 High channel



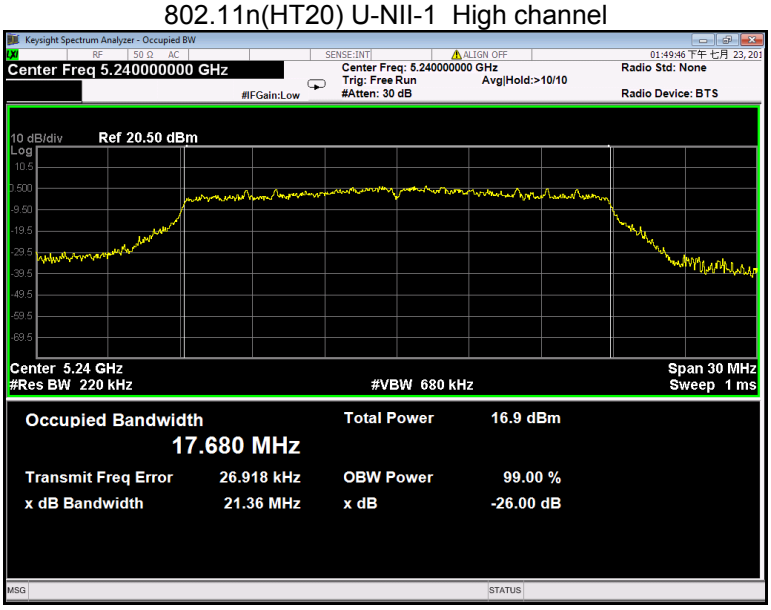
802.11n(HT20) U-NII-1 Low channel



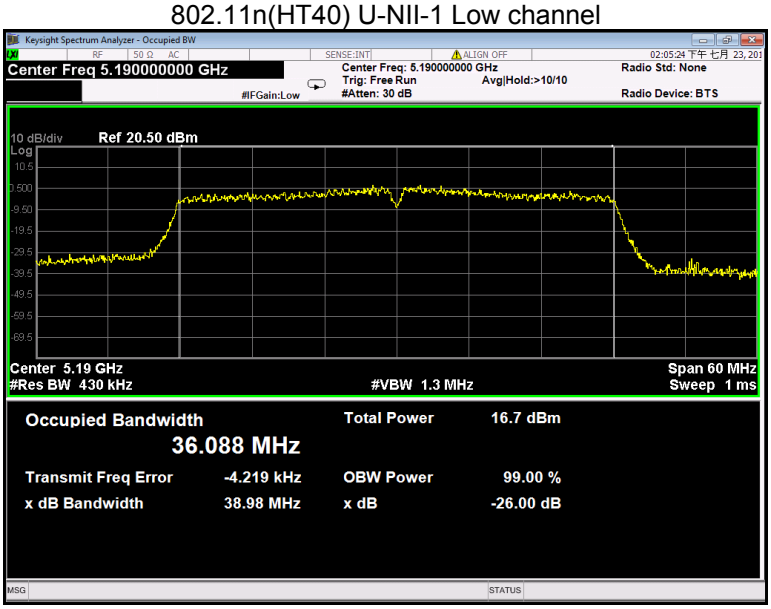
802.11n(HT20) U-NII-1 Middle channel



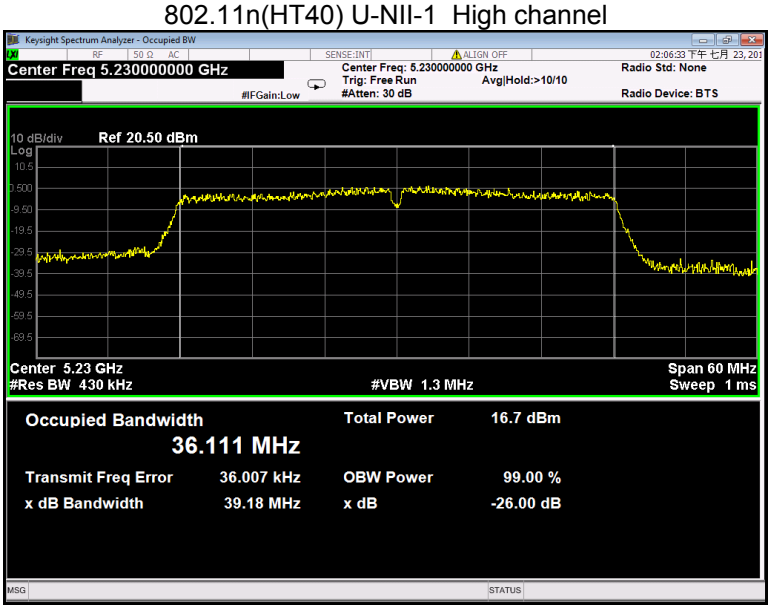
802.11n(HT20) U-NII-1 High channel



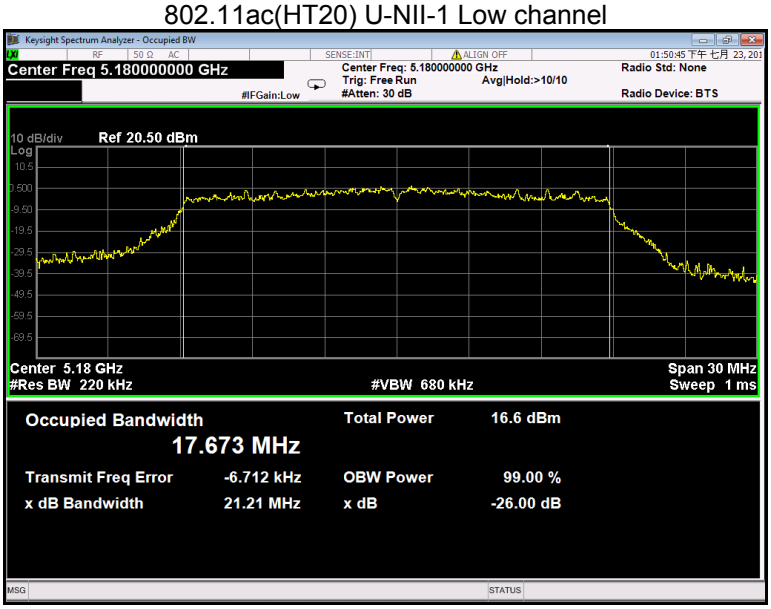
802.11n(HT40) U-NII-1 Low channel



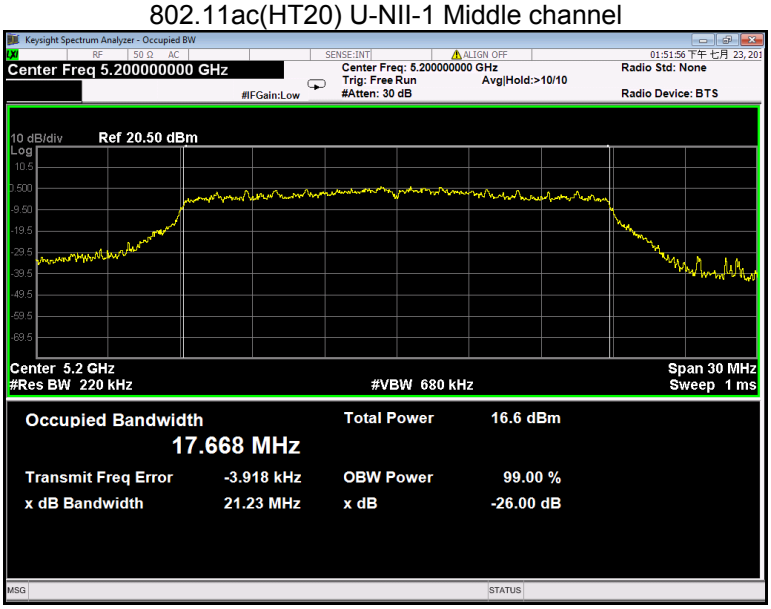
802.11n(HT40) U-NII-1 High channel



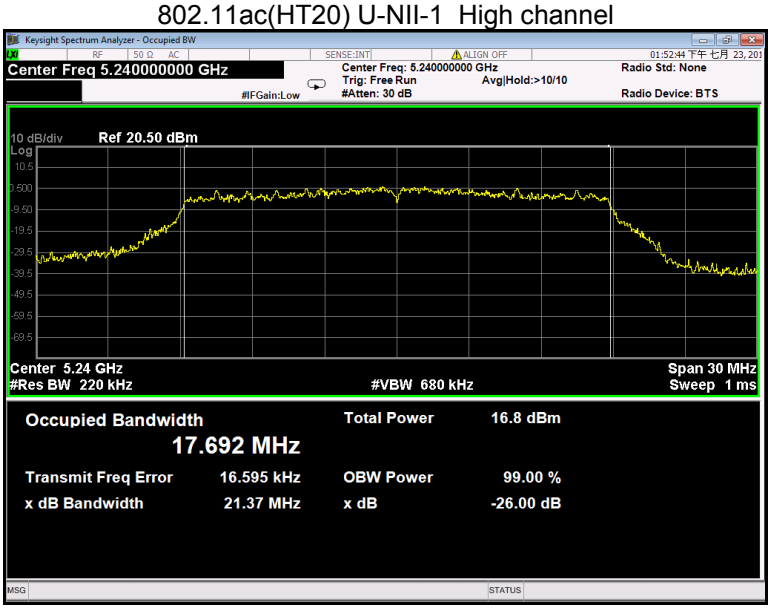
802.11ac(HT20) U-NII-1 Low channel



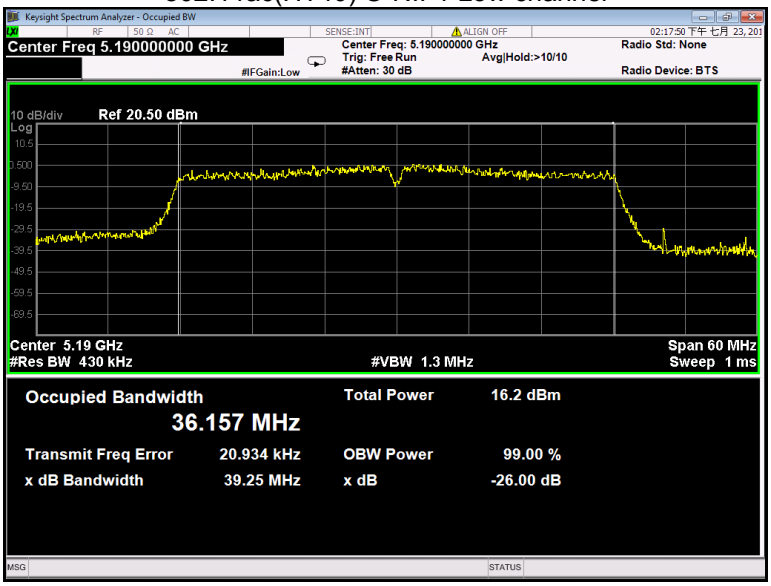
802.11ac(HT20) U-NII-1 Middle channel



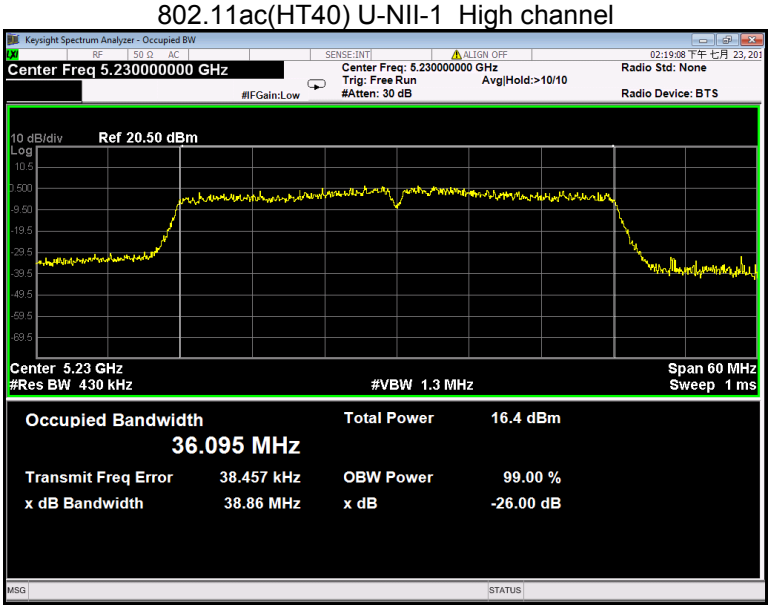
802.11ac(HT20) U-NII-1 High channel



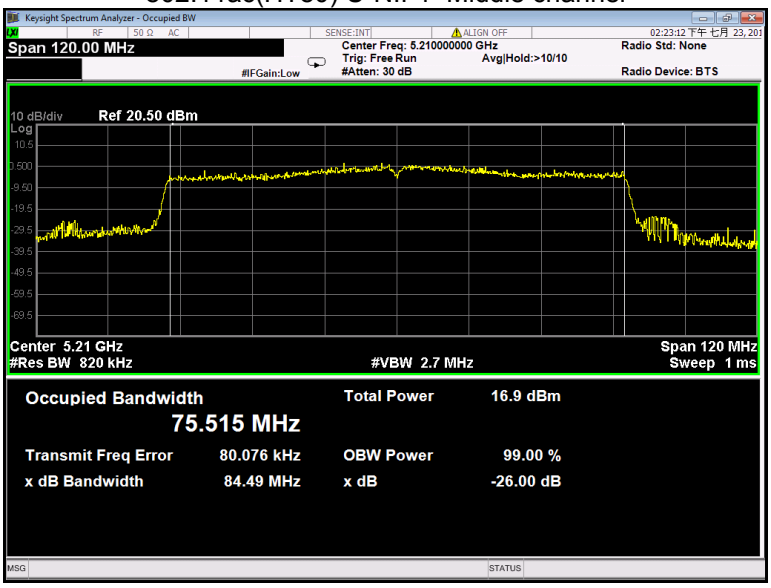
802.11ac(HT40) U-NII-1 Low channel



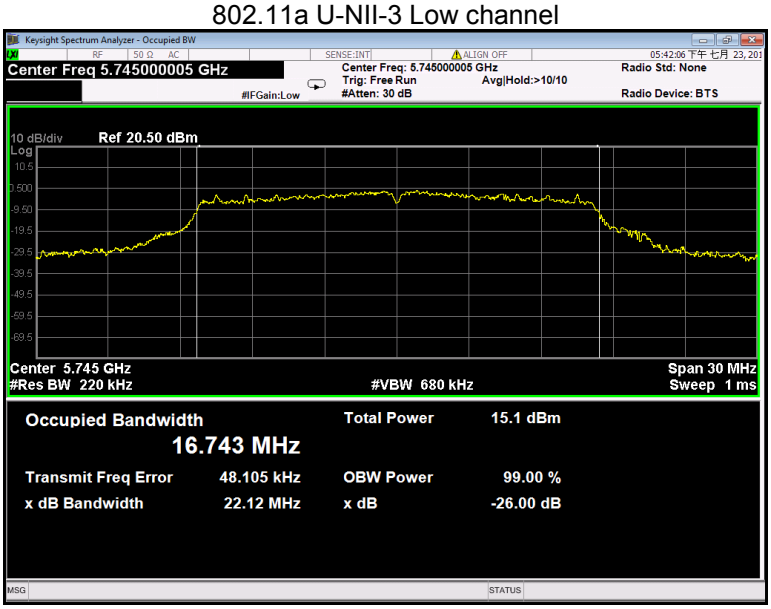
802.11ac(HT40) U-NII-1 High channel



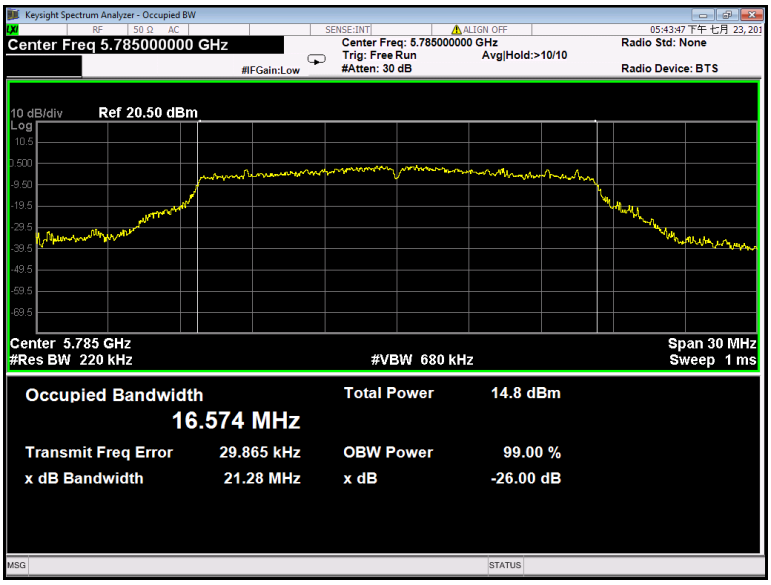
802.11ac(HT80) U-NII-1 Middle channel



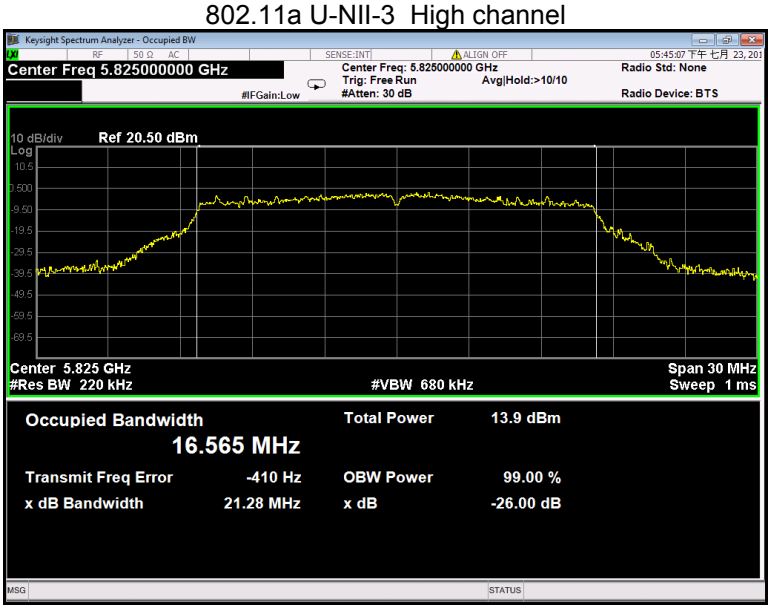
802.11a U-NII-3 Low channel



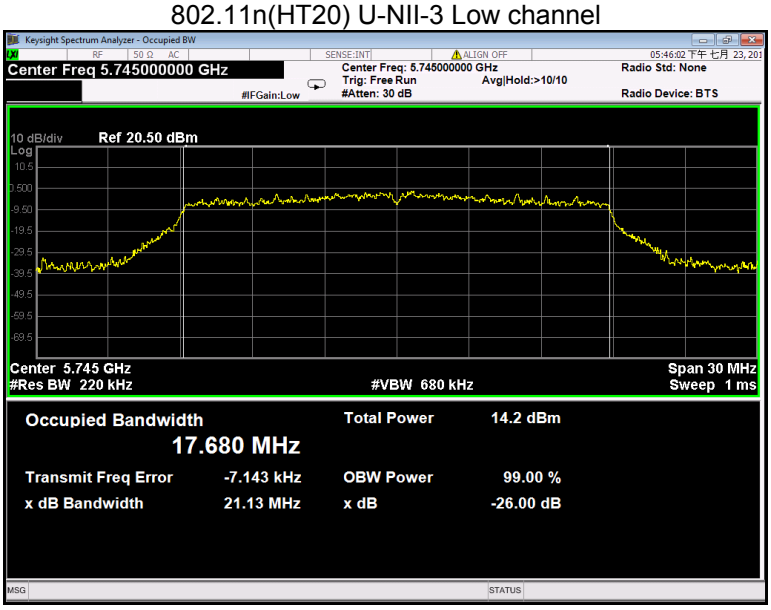
802.11a U-NII-3 Middle channel



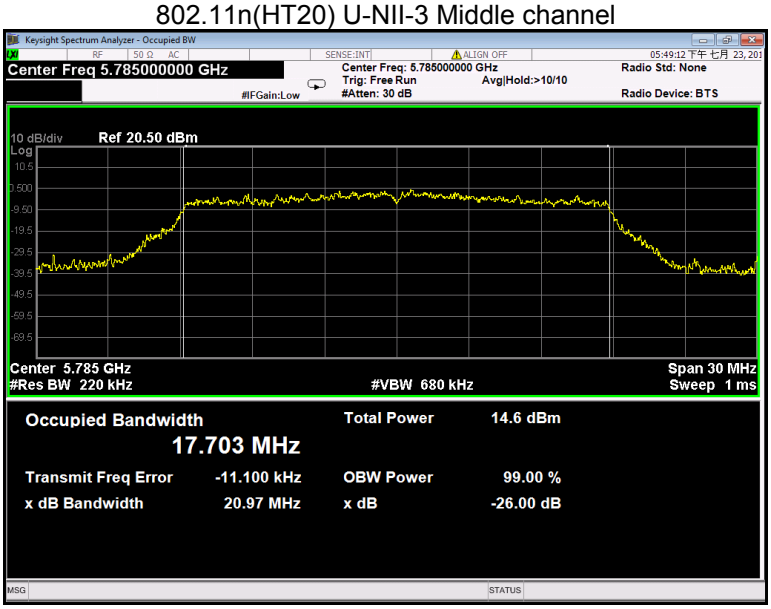
802.11a U-NII-3 High channel



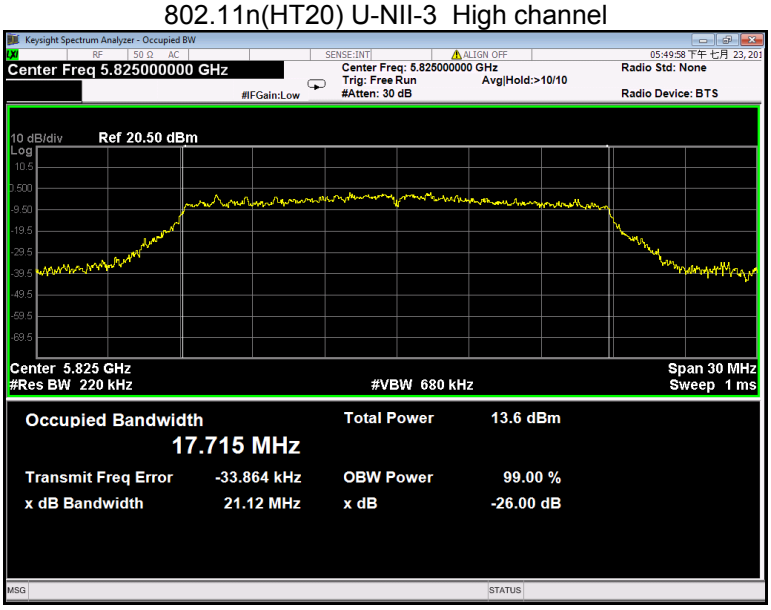
802.11n(HT20) U-NII-3 Low channel



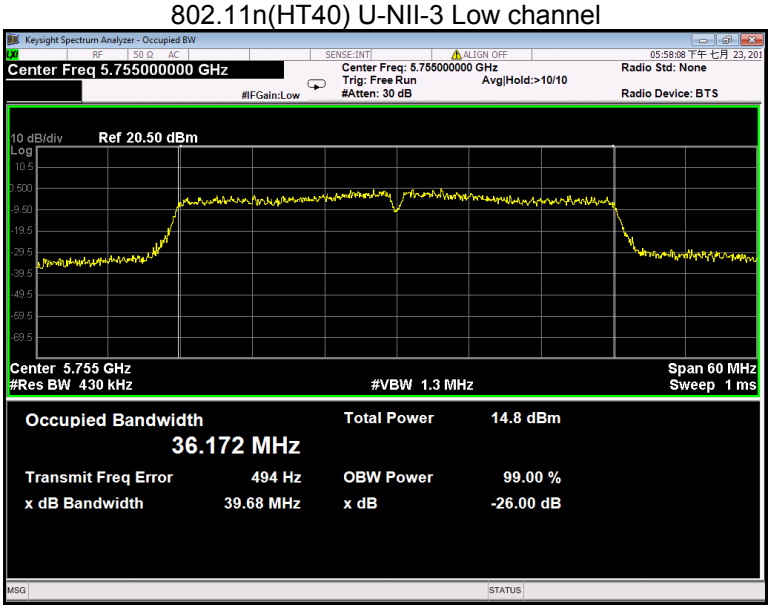
802.11n(HT20) U-NII-3 Middle channel



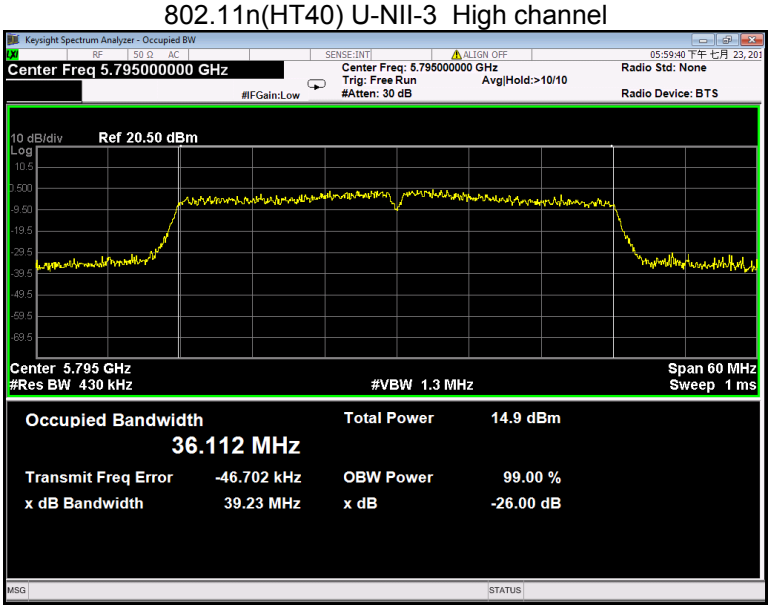
802.11n(HT20) U-NII-3 High channel



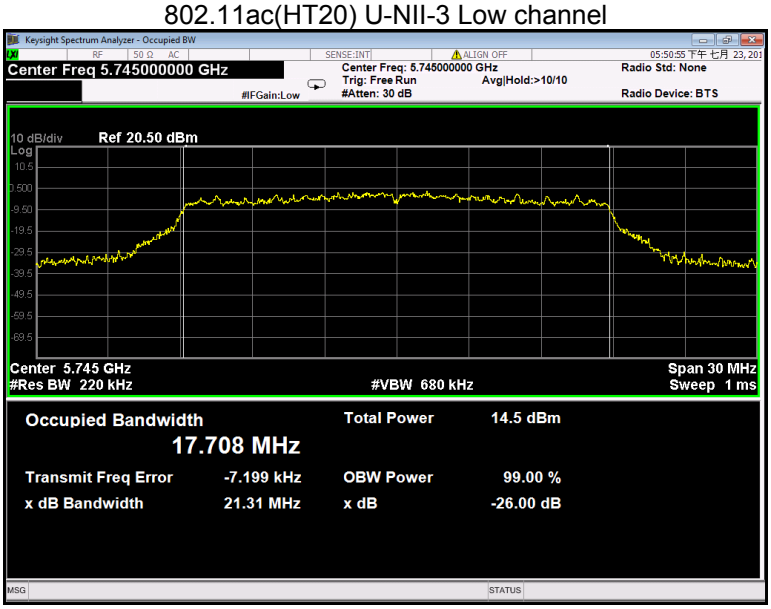
802.11n(HT40) U-NII-3 Low channel



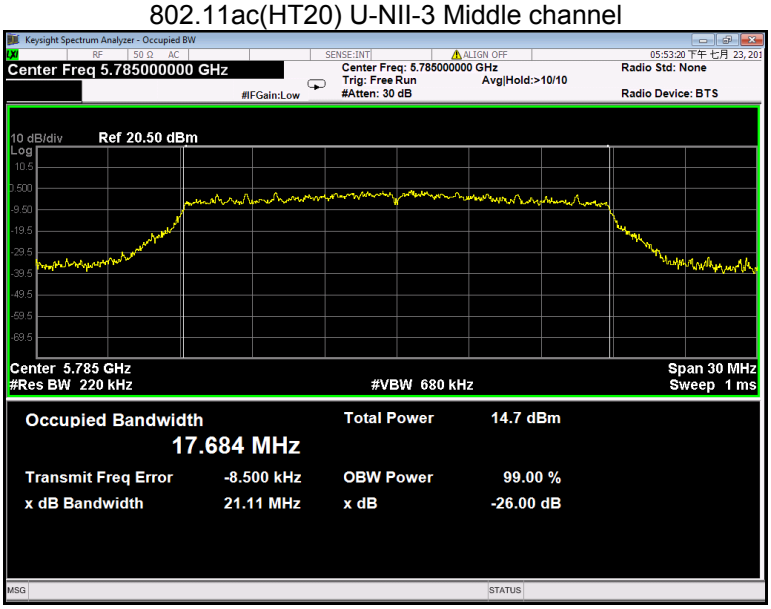
802.11n(HT40) U-NII-3 High channel



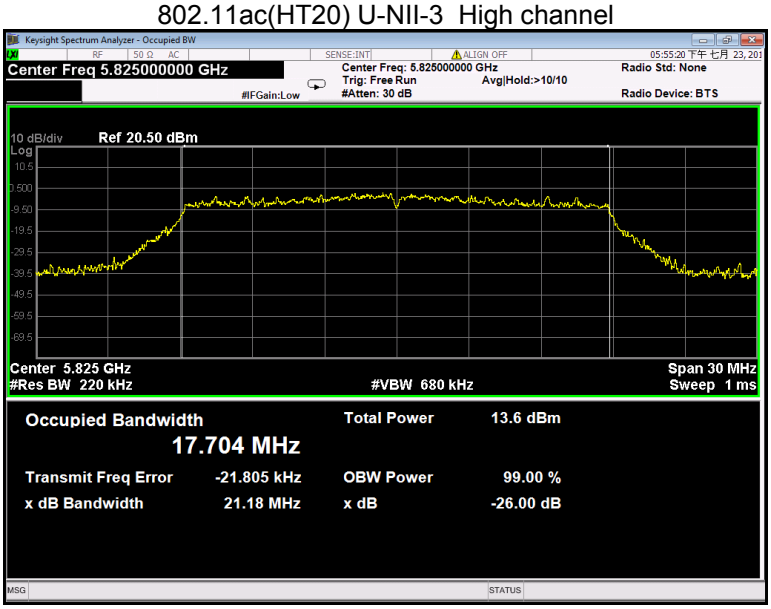
802.11ac(HT20) U-NII-3 Low channel



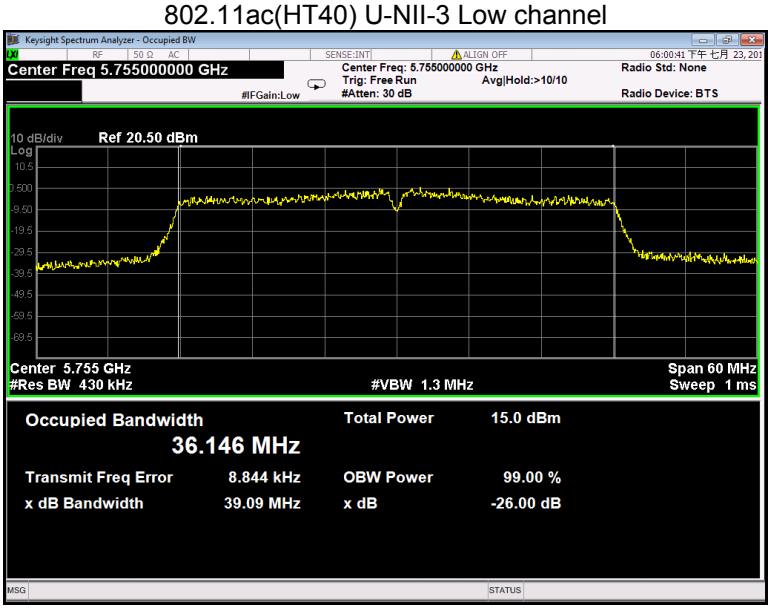
802.11ac(HT20) U-NII-3 Middle channel



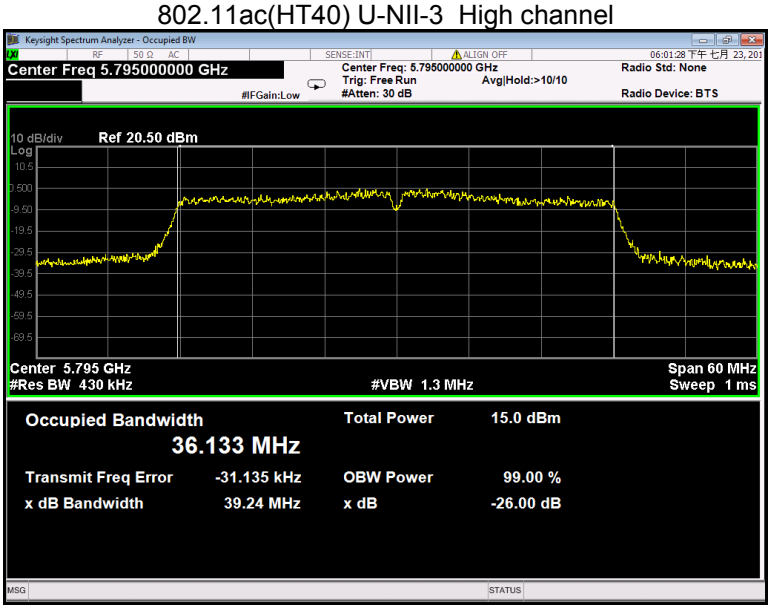
802.11ac(HT20) U-NII-3 High channel



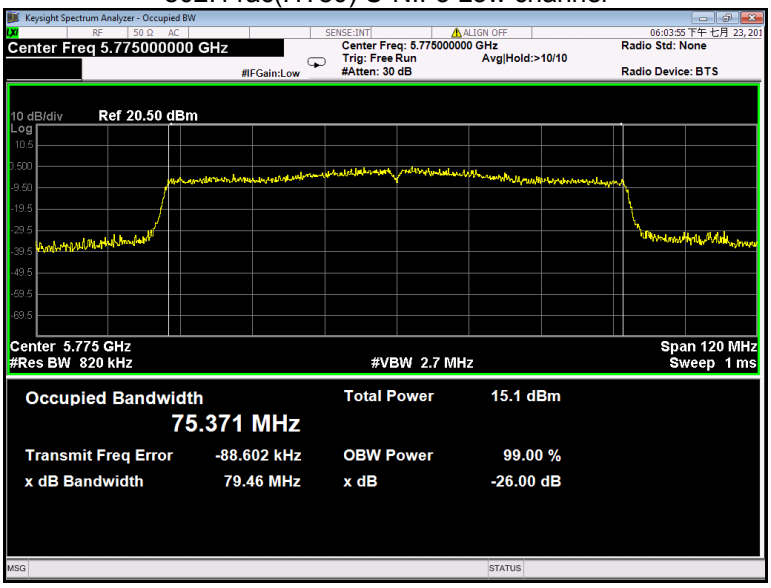
802.11ac(HT40) U-NII-3 Low channel



802.11ac(HT40) U-NII-3 High channel



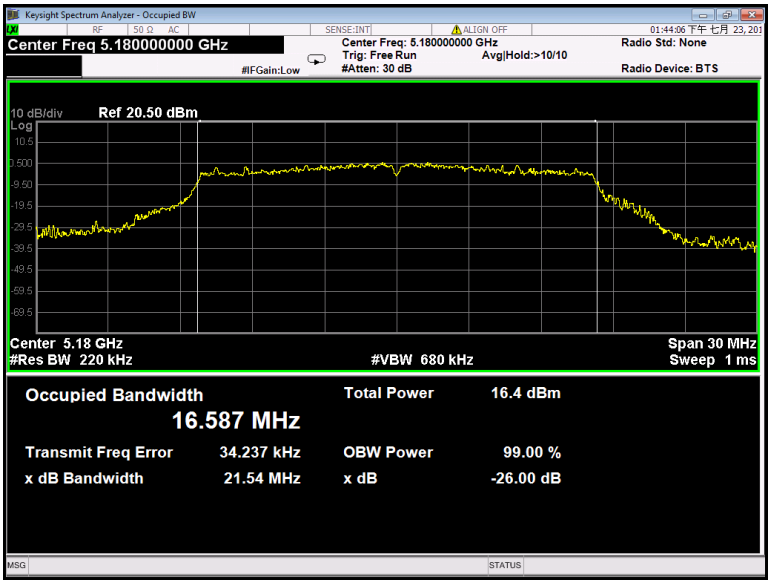
802.11ac(HT80) U-NII-3 Low channel



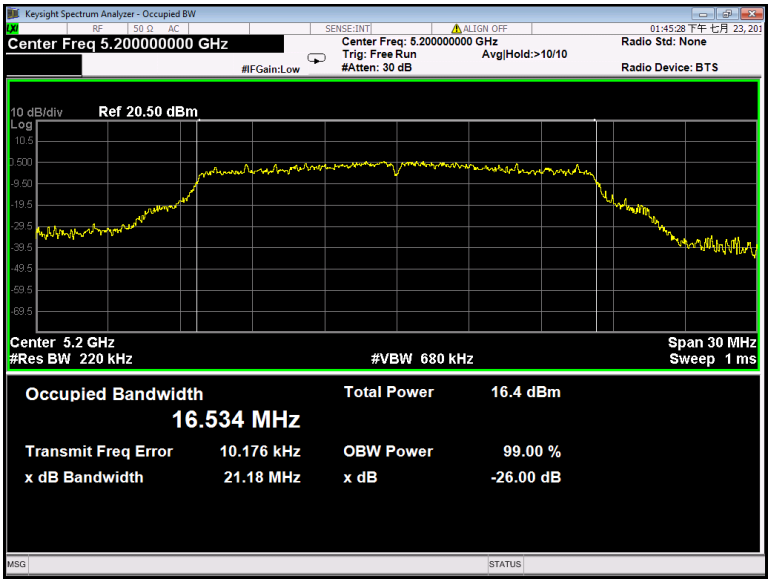
Ant1

26 dB Bandwidth and 99% Occupied Bandwidth

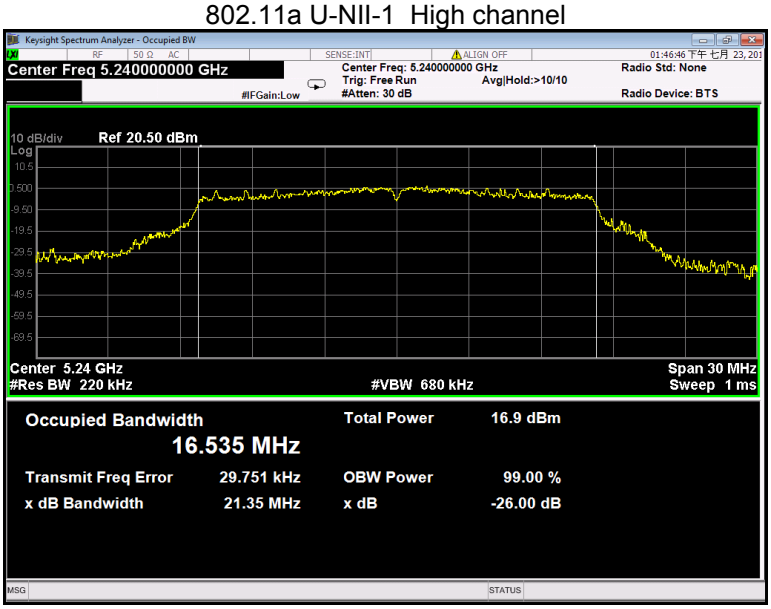
802.11a U-NII-1 Low channel



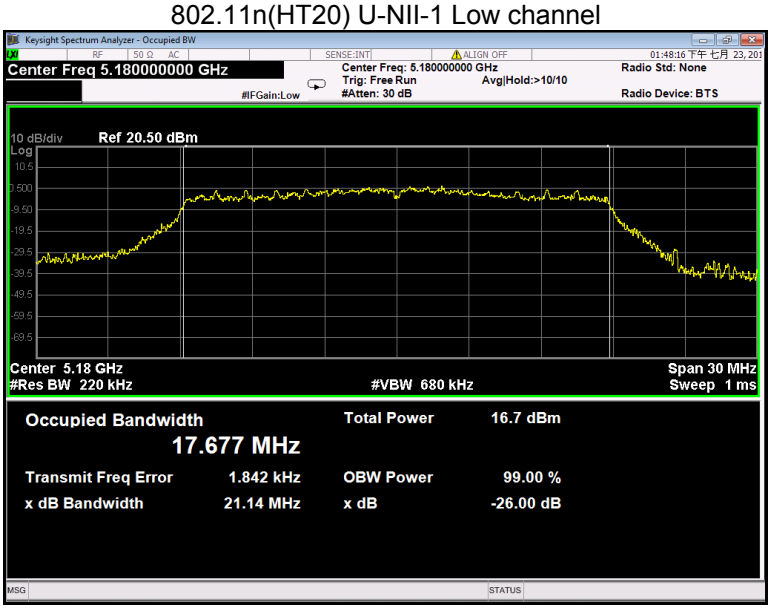
802.11a U-NII-1 Middle channel



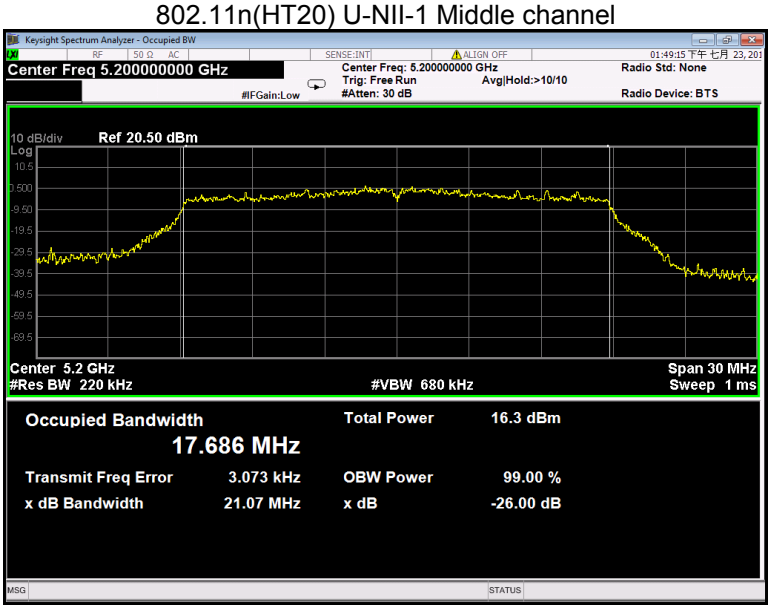
802.11a U-NII-1 High channel



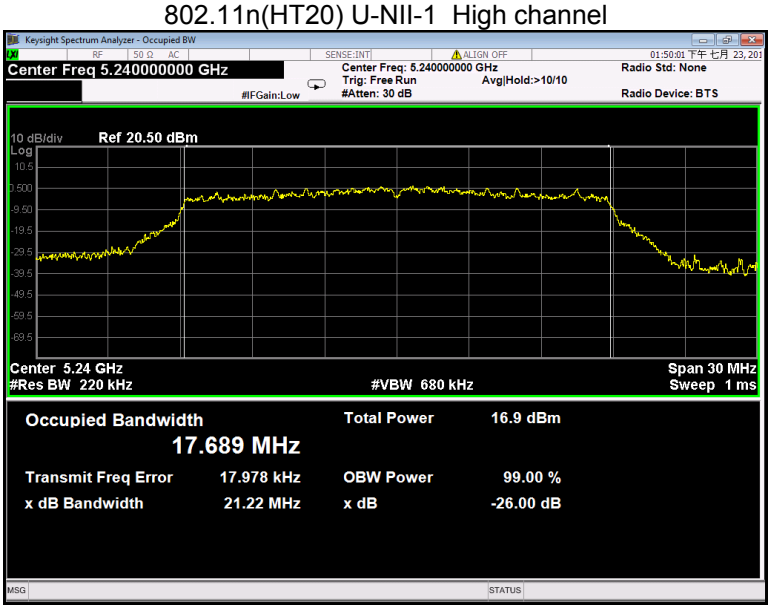
802.11n(HT20) U-NII-1 Low channel



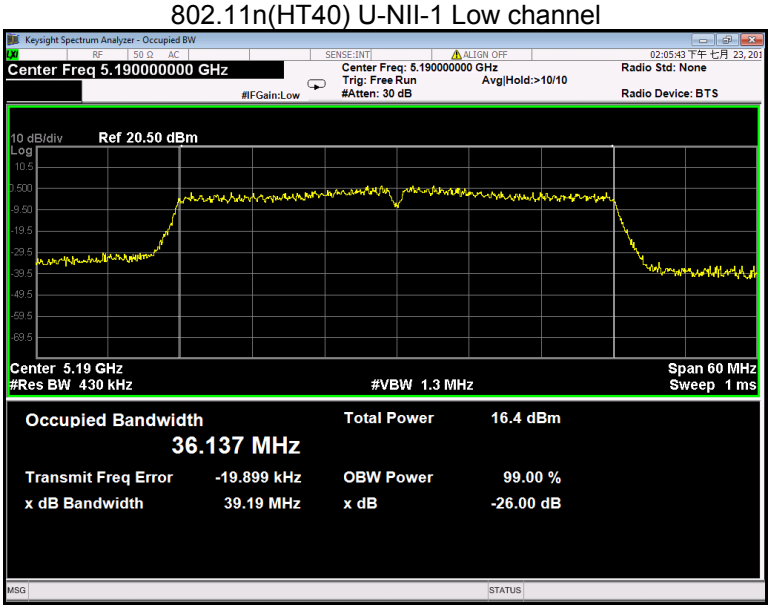
802.11n(HT20) U-NII-1 Middle channel



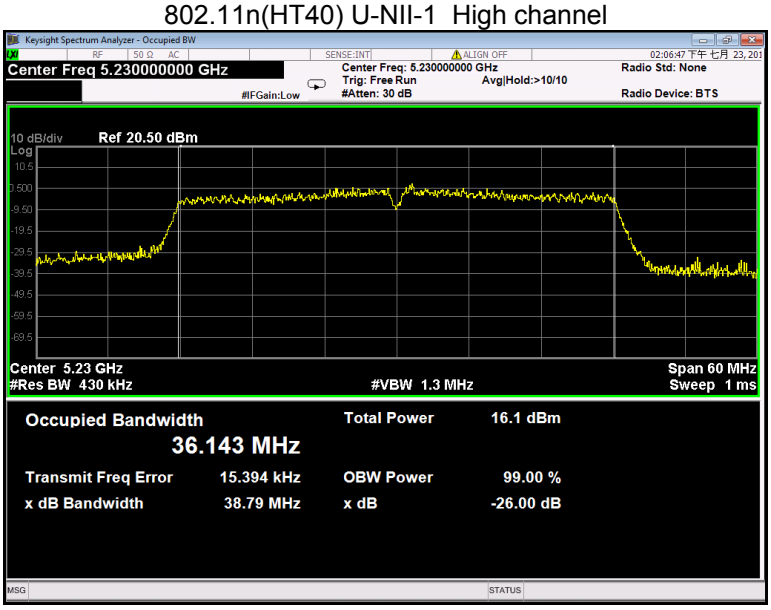
802.11n(HT20) U-NII-1 High channel



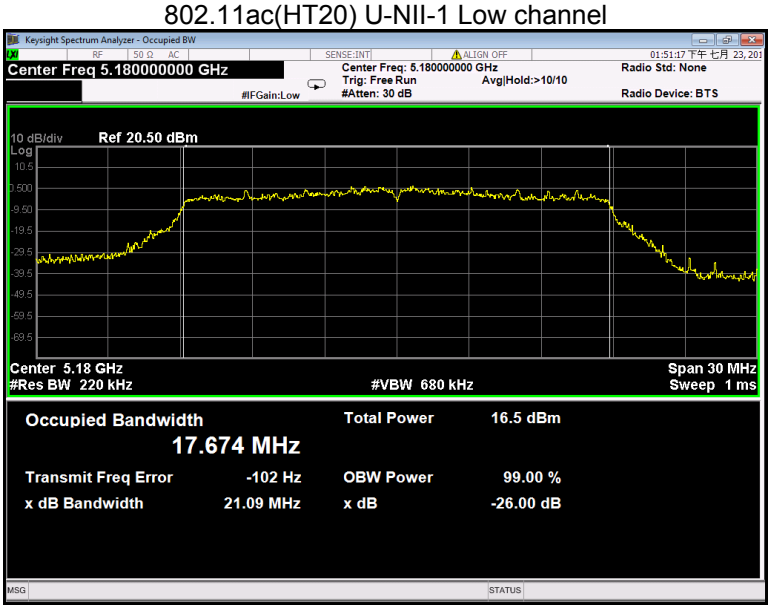
802.11n(HT40) U-NII-1 Low channel



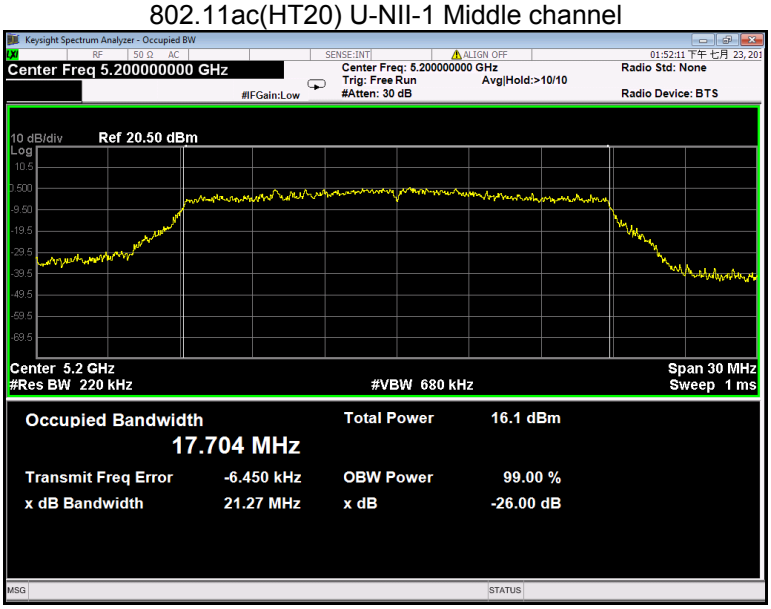
802.11n(HT40) U-NII-1 High channel



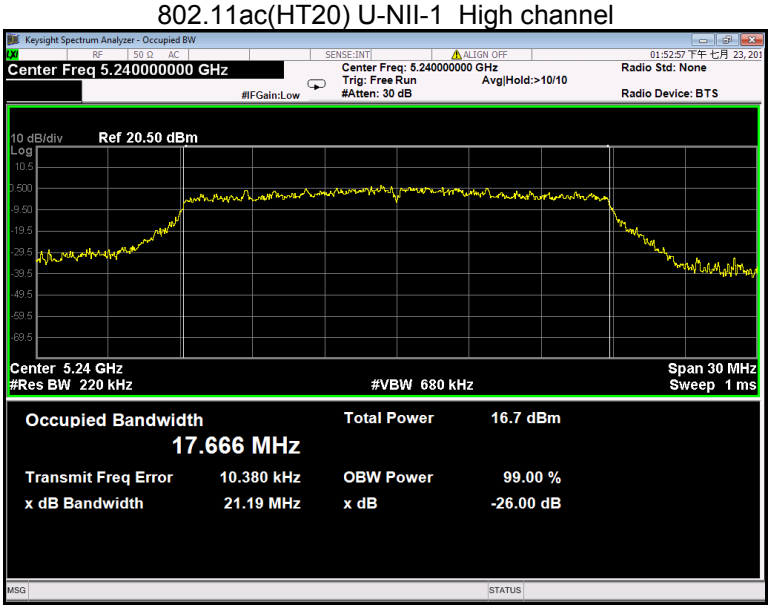
802.11ac(HT20) U-NII-1 Low channel



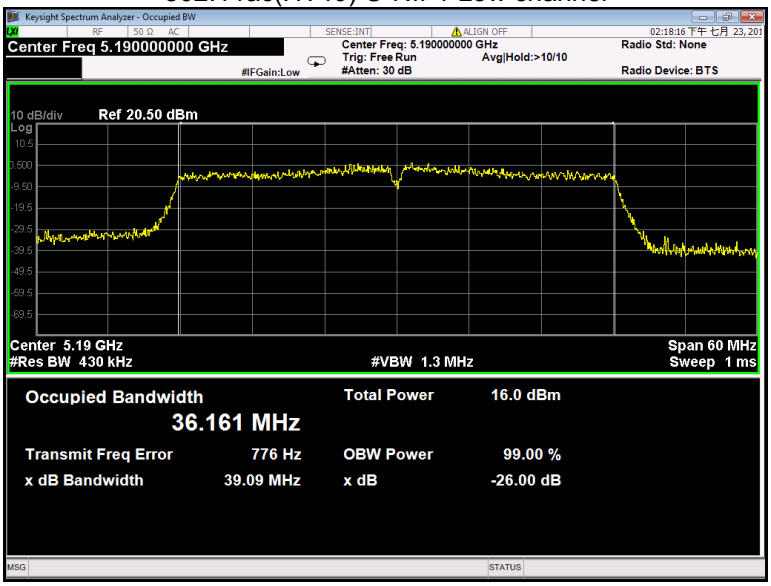
802.11ac(HT20) U-NII-1 Middle channel



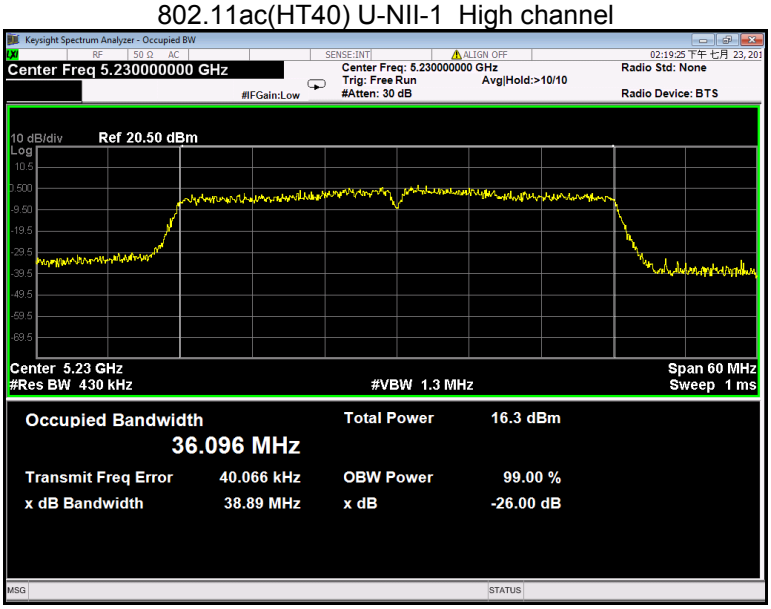
802.11ac(HT20) U-NII-1 High channel



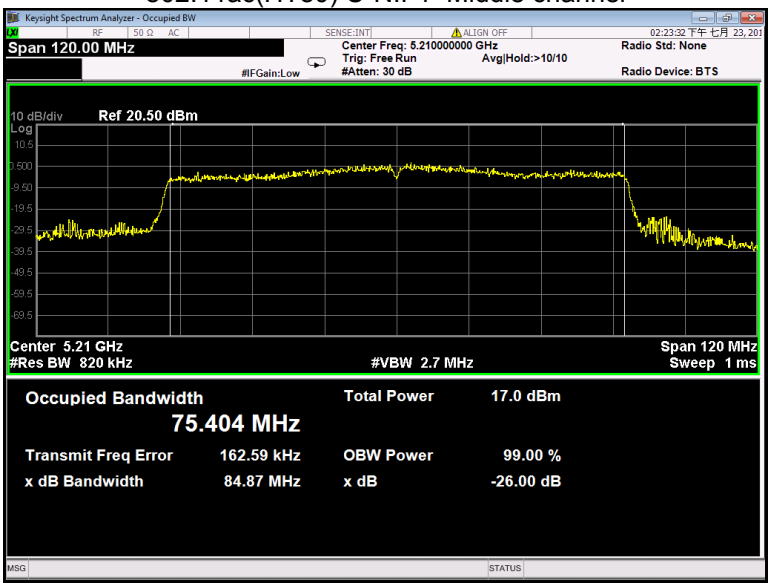
802.11ac(HT40) U-NII-1 Low channel



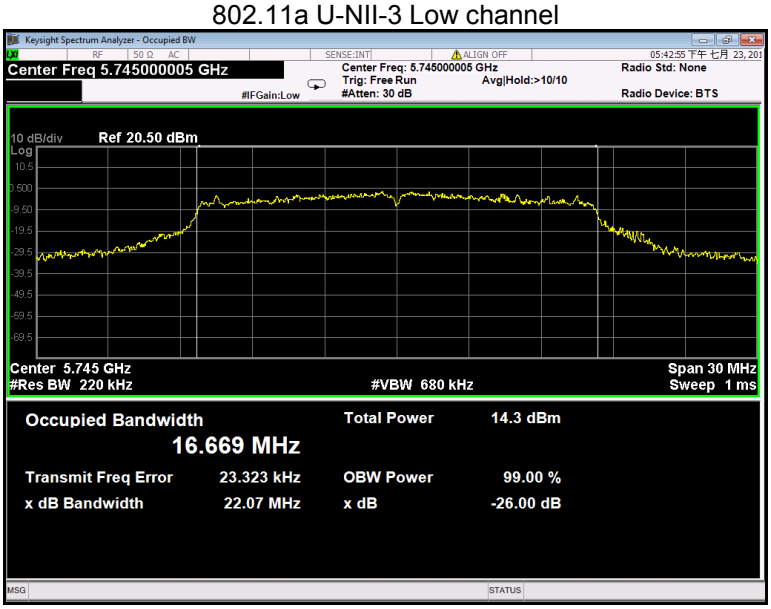
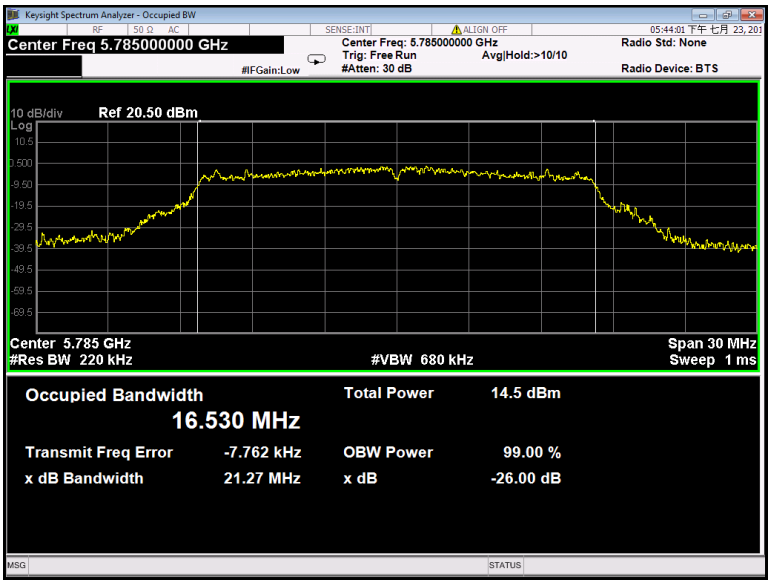
802.11ac(HT40) U-NII-1 High channel



802.11ac(HT80) U-NII-1 Middle channel



802.11a U-NII-3 Low channel



802.11a U-NII-3 Middle channel