



# CERTIFICATION TEST REPORT

**Report Number.** : 4789901731-FR3V2

**Applicant** : Kaonbroadband CO., LTD.  
884-3, Seongnam-daero, Bundang-gu, Seongnam-si  
Gyeonggi-do, South Korea

**Model** : AR1344P, AR1344, AR1344E, EVO6700AP

**FCC ID** : 2AXCW-AP6700

**EUT Description** : Wi-Fi Extender with DTS/UNII a/b/g/n/ac/ax

**Test Standard(s)** : FCC 47 CFR PART 15 SUBPART E

**Date Of Issue:**

August 11, 2021

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TL-637

0REPORT REVISION HISTORY

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	08/05/21	Initial issue	Robby Lee
V2	08/11/21	Updated to address about the TCB's comments	Robby Lee

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# 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Kaonbroadband CO., LTD.  
**EUT DESCRIPTION:** Wi-Fi Extender with DTS/UNII a/b/g/n/ac/ax  
**MODEL NUMBER:** AR1344P, AR1344, AR1344E, EVO6700AP  
**SERIAL NUMBER:** Proto type (CONDUCTED);  
Proto type (RADIATED);  
**DATE TESTED:** MAY 03, 2021 – AUG. 05, 2021;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart E	Complies

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For  
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Suwon Lab Engineer  
UL Korea, Ltd.

Tested By:



Robby Lee  
Suwon Lab Engineer  
UL Korea, Ltd.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 789033 D02 General UNII Test Procedures New Rules v02r01
4. KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02
5. KDB 905462 D03 UNII Clients Without Radar Detection New Rules v01r02
6. KDB 662911 D01 v02r01
7. ANSI C63.10-2013.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1
<input type="checkbox"/>	Chamber 2
<input checked="" type="checkbox"/>	Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

UL Korea, Ltd. is accredited by National Radio Research Agency, Designation Number KR0161, for all testing performed within the scope of this report.

ISED CABID	ISED Company Number	FCC Registration
KR0161	2324L	644529

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m} \end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.87 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.49 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.82 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.49 dB

Uncertainty figures are valid to a confidence level of 95%.

### 4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Accuracy Method specified in Procedure 2, Clause 4.4.3 in IEC Guide 115:2007.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a Wi-Fi Extender with DTS/UNII a/b/g/n/ac/ax. This test report addresses the NII (UNII 802.11a/n/ac) operational mode.

This report covers the models AR1344P and AR1344, AR1344E, EVO6700AP  
 The difference between these models is only the memory size.

Model	Memory size
AR1344P, EVO6700AP	256MB/512MB (FLASH MEMORY / SDRAM)
AR1344, AR1344E	128MB/256MB (FLASH MEMORY / SDRAM)

The model AR1344P was set for final test.

#### WiFi operating mode

Frequency range	Mode	ANT1	ANT2	ANT3	ANT4
5GHz (5180 MHz ~ 5825 MHz)	802.11a SISO	TX/RX	TX/RX	TX/RX	TX/RX
	802.11a MIMO	TX/RX	TX/RX	TX/RX	TX/RX
	802.11n SISO	TX/RX	TX/RX	TX/RX	TX/RX
	802.11n MIMO	TX/RX	TX/RX	TX/RX	TX/RX
	802.11ac SISO	TX/RX	TX/RX	TX/RX	TX/RX
	802.11ac MIMO	TX/RX	TX/RX	TX/RX	TX/RX

#### Simultaneous TX Condition

Simultaneous Tx Condition - RSDB

Mode	# of TX	5GHz WLAN				2.4GHz WLAN		Test Case
		ANT1	ANT2	ANT3	ANT4	ANT1	ANT2	
2.4GHz + 5GHz RSDB MIMO	6	○	○	○	○	○	○	○



**MAXIMUM OUTPUT POWER**

The transmitter has a maximum total conducted average output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]				Output Power [mW]			
		ANT1	ANT2	ANT3	ANT4	ANT1	ANT2	ANT3	ANT4
5180 - 5240	802.11a SISO	21.87	20.60	21.97	20.74	153.82	114.82	157.40	118.58
	802.11a MIMO	18.55				71.61			
	802.11n(HT20) SISO	21.60	20.66	21.59	20.61	144.54	116.41	144.21	115.08
	802.11n(HT20) MIMO	19.00				79.43			
5190 - 5230	802.11n(HT40) SISO	19.96	20.04	19.97	20.09	99.08	100.93	99.31	102.09
	802.11n(HT40) MIMO	20.95				124.45			
5210	802.11ac(VHT80) SISO	17.77	15.20	16.12	14.84	59.84	33.11	40.93	30.48
	802.11ac(VHT80) MIMO	19.87				97.05			
5250	802.11ac(VHT160) SISO	17.38	15.11	15.95	14.74	54.70	32.43	39.36	29.79
	802.11ac(VHT160) MIMO	19.85				96.61			
5260 - 5320	802.11a SISO	19.58	19.60	19.58	19.50	90.78	91.20	90.78	89.13
	802.11a MIMO	19.71				93.54			
	802.11n(HT20) SISO	20.02	20.12	20.05	20.09	100.46	102.80	101.16	102.09
	802.11n(HT20) MIMO	20.22				105.20			
5270 - 5310	802.11n(HT40) SISO	18.94	19.02	18.89	19.11	78.34	79.80	77.45	81.47
	802.11n(HT40) MIMO	22.19				165.58			
5290	802.11ac(VHT80) SISO	17.90	15.41	17.44	18.07	61.66	34.75	55.46	64.12
	802.11ac(VHT80) MIMO	20.14				103.28			
5500 - 5720	802.11a SISO	19.46	18.13	18.78	17.35	88.31	65.01	75.51	54.33
	802.11a MIMO	19.25				84.14			
	802.11n(HT20) SISO	18.75	18.03	18.78	16.97	74.99	63.53	75.51	49.77
	802.11n(HT20) MIMO	19.64				92.04			
5510 - 5710	802.11n(HT40) SISO	19.10	18.45	18.40	18.89	81.32	69.98	69.18	77.45
	802.11n(HT40) MIMO	21.95				156.68			
5530 - 5690	802.11ac(VHT80) SISO	18.86	18.66	17.61	19.18	76.95	73.45	57.68	82.81
	802.11ac(VHT80) MIMO	21.87				153.82			
5570	802.11ac(VHT160) SISO	15.75	15.19	15.56	14.70	37.58	33.04	35.97	29.51
	802.11ac(VHT160) MIMO	20.38				109.14			
5745 - 5825	802.11a SISO	20.21	20.18	18.23	20.72	104.95	104.23	66.53	118.03
	802.11a MIMO	23.70				234.42			
	802.11n(HT20) SISO	20.07	20.14	18.46	20.72	101.62	103.28	70.15	118.03
	802.11n(HT20) MIMO	24.59				287.74			
5755 - 5795	802.11n(HT40) SISO	20.30	19.82	18.71	20.55	107.15	95.94	74.30	113.50
	802.11n(HT40) MIMO	24.63				290.4			
5775	802.11ac(VHT80) SISO	19.93	19.35	17.73	20.41	98.40	86.10	59.29	109.90
	802.11ac(VHT80) MIMO	23.86				243.22			

## 5.2. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**The internal antenna was Permanently attached.  
 Therefore this E.U.T Complies with the requirement of §15.203.**

The radio utilizes a internal antenna, with a maximum gain of:

Frequency Band [MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]	ANT3 Gain [dBi]	ANT4 Gain [dBi]	Correlated Chains Directional Gain [dBi]
UNII 1 5150 - 5250	1.98	1.98	1.98	1.98	8.00
UNII 2A 5250 - 5350	1.97	1.97	1.97	1.97	7.99
UNII 2C 5470 - 5725	1.94	1.94	1.94	1.94	7.96
UNII 3 5725 - 5850	1.86	1.86	1.86	1.86	7.88

## 5.3. List of test reduction and modes covering other modes:

The output power on covered modes is equal to or less than one referenced.

Authorized Frequency Band			
Mode	Antenna Stream	Mode	Covered by
802.11a	SISO	802.11a 1TX	
	MIMO	802.11a 4TX	
802.11n HT20	SISO	802.11n HT20 1TX	
	MIMO	802.11n HT20 4TX	
802.11ac VHT20	SISO	802.11ac VHT20 1TX	802.11n HT20 1TX
	MIMO	802.11ac VHT20 4TX	802.11n HT20 4TX
802.11n HT40	SISO	802.11n HT40 1TX	
	MIMO	802.11n HT40 4TX	
802.11ac VHT40	SISO	802.11ac VHT40 1TX	802.11n HT40 1TX
	MIMO	802.11ac VHT40 4TX	802.11n HT40 4TX
802.11ac VHT80	SISO	802.11ac VHT80 1TX	
	MIMO	802.11ac VHT80 4TX	
802.11ac VHT160	SISO	802.11ac VHT160 1TX	
	MIMO	802.11ac VHT160 4TX	

#### 5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.

For UNII-1, Radiated emission tests were performed with higher power than reported power.

For SISO, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

For MIMO, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that X orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X orientation.

Worst-case selection criteria for test items :

- For the spurious emissions, all test mode were investigated, test result of 802.11a/n HT20 were worst case. so the test data for 802.11a/n HT20 mode were only reported in this test report.

Based on the baseline scan, the worst-case data rates were:

802.11a mode: 6 Mbps 1Tx / 2Tx  
802.11n HT20 mode: MCS0 1Tx / 2Tx  
802.11n HT40 mode: MCS0 1Tx / 2Tx  
802.11ac VHT80 mode: MCS0 1Tx / 2Tx  
802.11ac VHT160 mode: MCS0 1Tx / 2Tx

## 5.5. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Switching mode Power Adaptor	CHENZHOU FRECOM ELECTRONICS	F18L16-120150SPAU	N/A	N/A

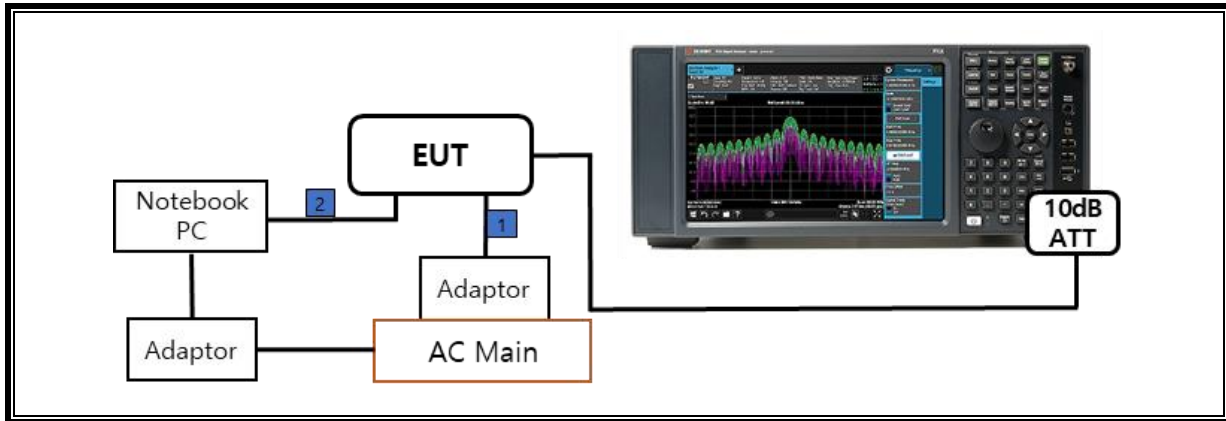
### I/O CABLE

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	Pin	Shielded	1.5m	N/A
2	LAN	2	RJ-45	Shielded	2.0m	N/A

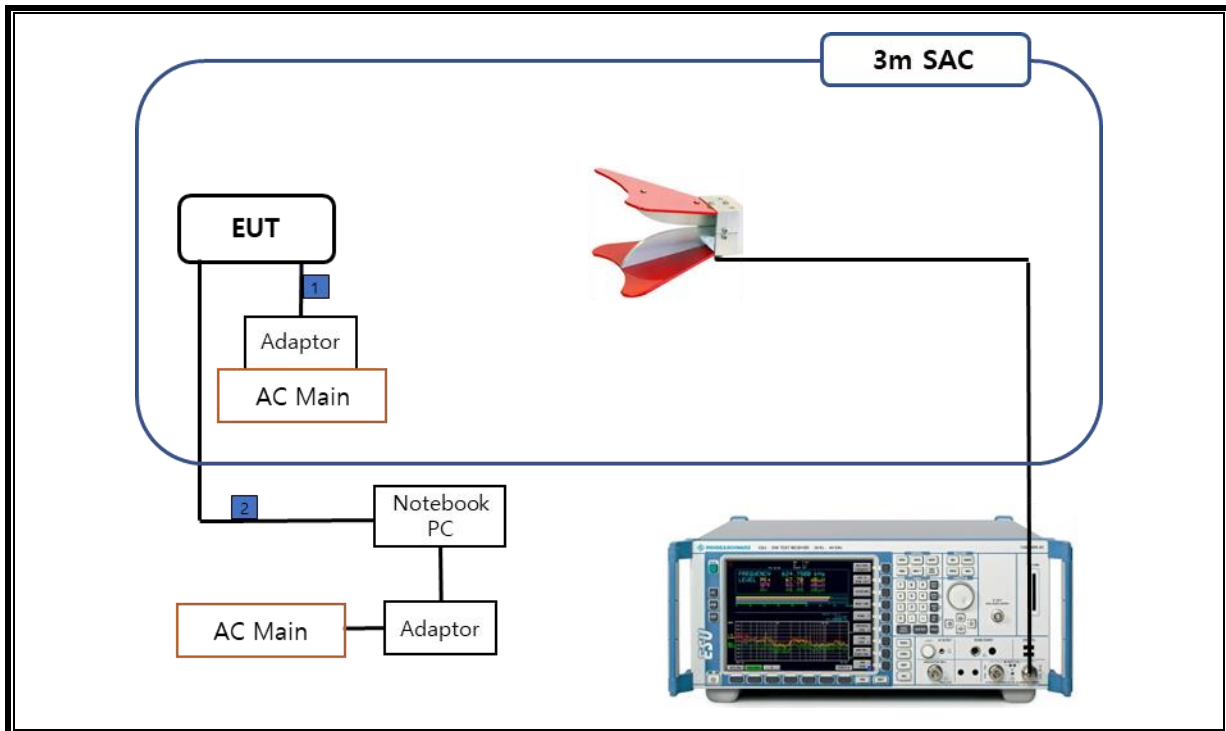
### TEST SETUP

The EUT is a stand-alone unit during the tests.  
 Test software exercised the EUT to enable NII mode.

**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**



**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2022-08-04
Antenna, Horn, 40 GHz	ETS	3116C	00168645	2021-10-02
Preamplifier	ETS	3116C-PA	00168841	2021-08-06
Preamplifier, 1000 MHz	Sonoma	310N	341282	2021-08-03
Preamplifier, 1000 MHz	Sonoma	310N	351741	2021-08-03
Preamplifier, 1000 MHz	Sonoma	310N	370599	2021-08-06
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2021-08-03
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2021-08-03
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	2021-08-04
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2021-09-15
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143717	2022-01-13
* Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY57143652	2022-01-13
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	2021-08-06
Average Power Sensor	Agilent / HP	U2000	MY54270007	2021-08-05
Power Sensor	R&S	NRP-Z91	102681	2021-08-05
Attenuator	PASTERNAK	PE7087-10	A001	2021-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2021-08-03
Attenuator	PASTERNAK	PE7004-10	2	2021-08-04
Attenuator	PASTERNAK	PE7087-10	A009	2021-08-03
* Attenuator	WEINSCHL	54A-10	74560	2021-08-07
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2021-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2021-08-03
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2021-08-03
EMI Test Receive, 3 GHz	R&S	ESR3	102592	2021-08-06
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2021-08-03
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2021-08-03
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	2021-08-04
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2021-08-03
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2021-08-03
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2021-08-04
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2021-08-03
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2021-08-03
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	2021-08-04
LISN	R&S	ENV-216	101837	2021-08-06
LISN	R&S	ENV216	102478	2021-08-07
OPEN SWITCH AND CONTROL	R&S	OSP220	101437	N/A
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2021-10-02
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	R&S	EMC32	Ver 10.60.10	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

Note: On August 5, only equipment marked with an asterisk(\*) was used.

## 7. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.407(e)	6dB Band width (5.8GHz)	500kHz	Condcuted	PASS
15.407 (a)(2)	TX Cond. Power 5.15-2.25, 5.25-5.35 & 5.47-5.725	< 24dBm or 11+10Log(26dB BW)		PASS
15.407 (a)(3)	TX Cond. Power 5.725-5.825	< 30dBm		PASS
15.407 (a)(5)	PSD (5.2,5.3,5.5GHz)	<11dBm		PASS
15.407 (a)(5)	PSD (5.8GHz)	30dBm per 500kHz		PASS
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line Condcuted	PASS
15.407 (b) & 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	PASS
15.407 (h)(2)	Dynamic Frequency Selection	N/A		Refer to the UNII WLAN DFS Test report (No.: 13785976-E1)

## 8. MEASUREMENT METHODS

On-Time and Duty Cycle : KDB 789033 D02 v02r01, Section II.B.

6dB Emission BW : KDB 789033 D02 v02r01, Section II.C.2.

26dB Emission BW : KDB 789033 D02 v02r01, Section II.C.1.

99% Occupied BW : KDB 789033 D02 v02r01, Section II.D.

Conducted Output Power : KDB 789033 D02 v02r01, Section II.E.3.b(Method PM-G)

Conducted Output Power for Straddle Channel (ch144/142/138 for 20/40/80MHz BW):

KDB 789033 D02 v02r01, Section II.E.2.b(Method SA-1)

Power Spectral Density : KDB 789033 D02 v02r01, Section II.F.

Unwanted emissions in restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

Unwanted emissions in non-restricted bands : KDB 789033 D02 v02r01, Section II.G.3 – II.G.6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.



## 9. REFERENCE MEASUREMENTS RESULTS

### 9.1. ON TIME AND DUTY CYCLE RESULTS

Mode	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor[dB]
802.11a MIMO	2.973	3.002	0.990	99.03	-
802.11n(HT20) MIMO	2.972	3.002	0.990	99.00	-
802.11n(HT40) MIMO	2.972	3.001	0.990	99.03	-
802.11ac(VHT80) MIMO	3.389	3.419	0.991	99.12	-
802.11ac(VHT160) MIMO	2.193	2.222	0.987	98.69	-

Note. If the duty cycle is over 98%, compensation is not included in average measurement.

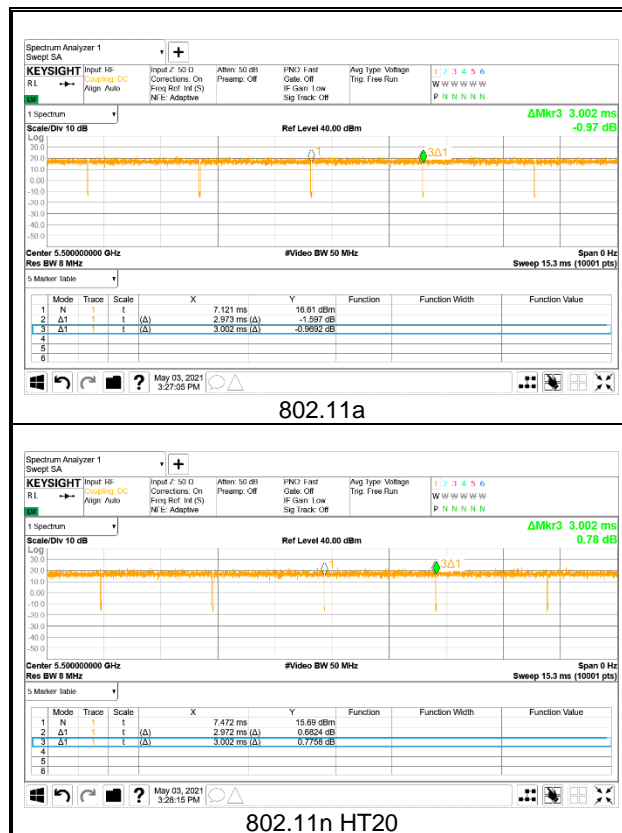
### LIMITS

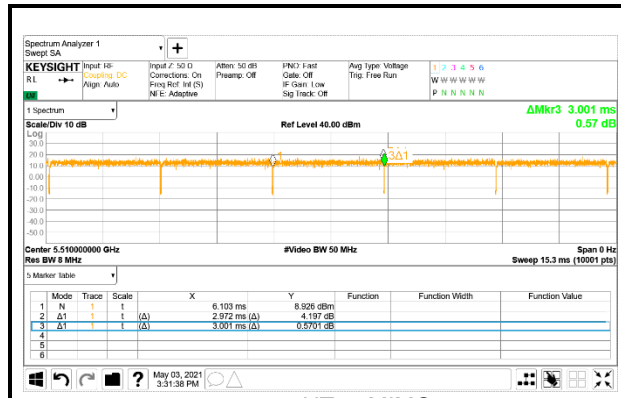
None; for reporting purposes only.

### PROCEDURE

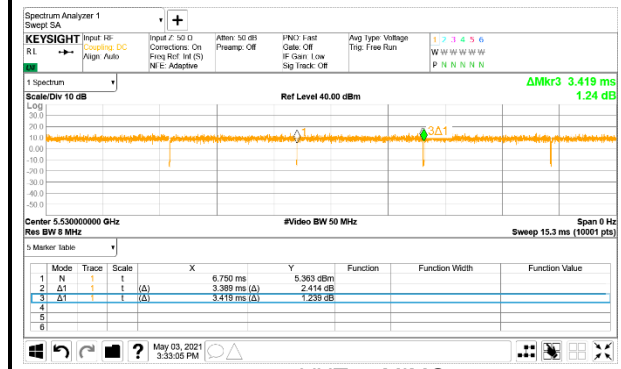
KDB 789033 D02 v02r01 Zero-Span Spectrum Analyzer Method.

### 9.2. DUTY CYCLE PLOTS

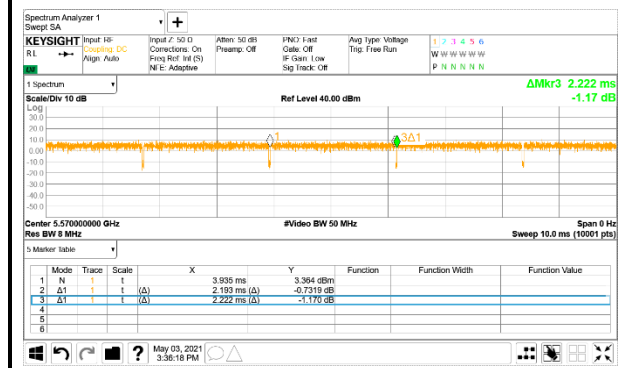




802.11n HT40 MIMO



802.11ac VHT80 MIMO



802.11ac VHT160 MIMO

### **9.3. 26 dB & 99% BANDWIDTH**

#### **LIMITS**

None; for reporting purposes only.

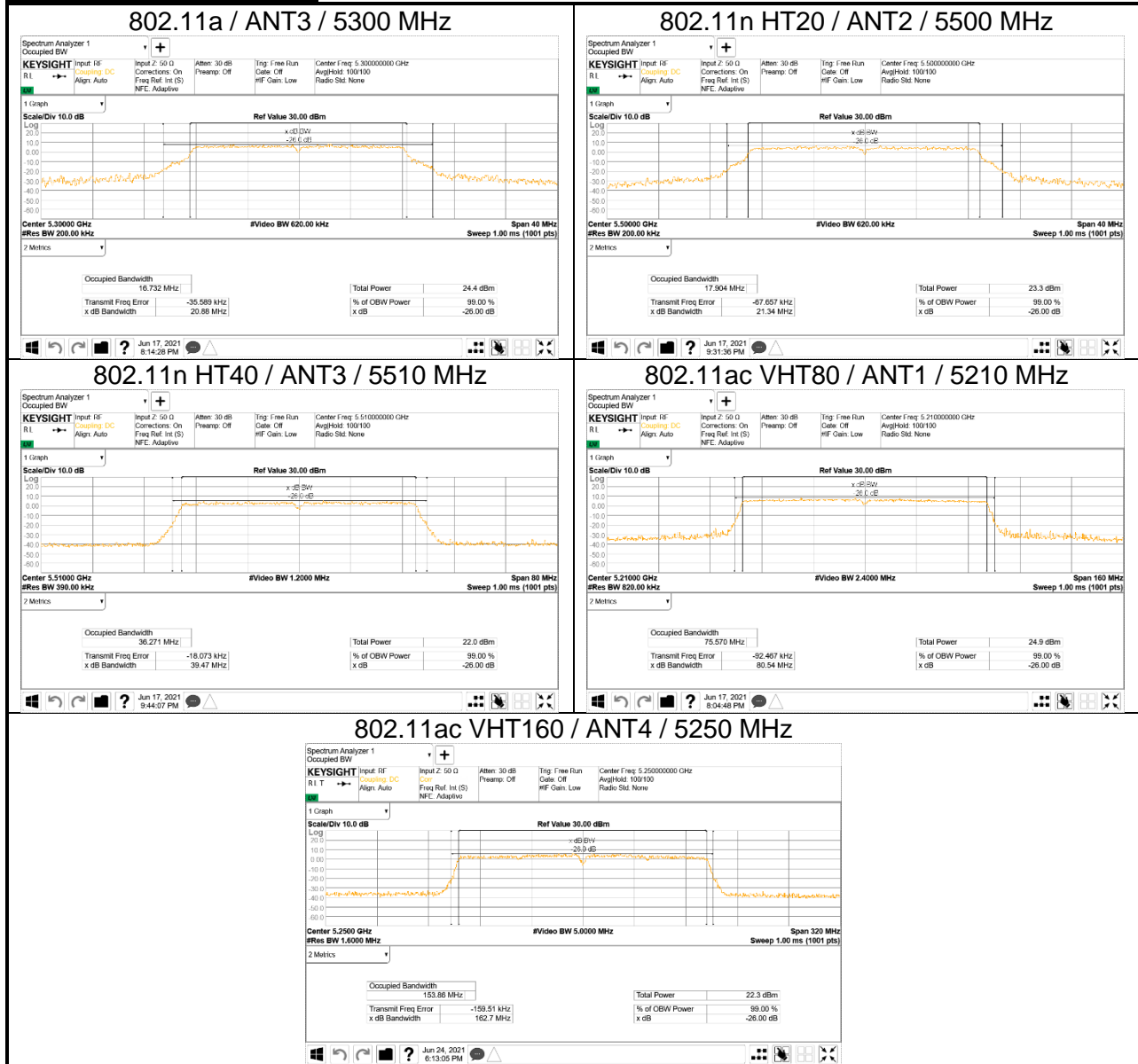
#### **TEST PROCEDURE**

Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to approximately 1% of EBW, the VBW > RBW, peak detector and max hold.

#### **RESULTS**

- Please refer to the next page

**WORST CASE TEST PLOTS**



**9.3.1. 5.2 GHz BAND**

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]				Worst [MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-1	802.11a	Low	5180	21.53	21.37	21.18	21.42	21.18
		Mid	5220	28.84	26.65	22.71	22.69	
		High	5220	27.58	21.47	25.44	21.54	
	802.11n HT20	Low	5180	23.03	21.52	21.52	21.49	21.49
		Mid	5220	25.58	23.65	21.73	22.00	
		High	5240	26.19	25.99	22.53	22.16	
	802.11n HT40	Low	5190	39.83	39.92	39.82	39.93	39.59
		High	5230	40.00	42.64	39.74	39.59	
	802.11ac VHT80	Mid	5210	<b>80.54</b>	81.09	81.18	80.99	80.54

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz](Note1)			
				ANT1	ANT2	ANT3	ANT4
UNII-1	802.11a	Low	5180	16.78	16.74	16.73	16.76
		Mid	5220	16.99	16.87	16.85	16.84
		High	5240	16.93	16.75	16.89	16.79
	802.11n HT20	Low	5180	17.89	17.85	17.89	17.89
		Mid	5220	18.05	18.01	17.93	17.97
		High	5240	18.07	17.94	17.92	17.95
	802.11n HT40	Low	5190	36.23	36.26	36.28	36.32
		High	5230	26.36	36.36	36.36	36.31
	802.11ac VHT80	Mid	5210	75.57	75.69	75.63	75.68

Note1. As a result of 99% bandwidth test, the bandwidth of UNII-1 does not interfere with UNII-2A.

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-1 & 2A	802.11ac VHT160	Mid	5250	163.60	164.40	163.80	<b>162.70</b>

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-1 & 2A	802.11ac VHT160	Mid	5250	153.79	153.92	154.22	153.86

**9.3.2. 5.3 GHz BAND**

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]				Worst [MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-2A	802.11a	Low	5260	21.02	21.28	21.02	21.05	20.88
		Mid	5300	21.40	21.33	<b>20.88</b>	21.23	
		High	5320	21.11	21.20	21.42	21.07	
	802.11n HT20	Low	5260	21.65	21.57	21.48	21.62	21.38
		Mid	5300	21.44	21.43	21.62	21.54	
		High	5320	21.54	21.63	21.38	21.67	
	802.11n HT40	Low	5270	39.65	39.88	39.85	39.75	39.55
		High	5310	39.89	39.76	39.84	39.55	
	802.11ac VHT80	Mid	5290	80.88	81.20	81.03	81.11	80.88

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz] <sup>(Note2)</sup>			
				ANT1	ANT2	ANT3	ANT4
UNII-2A	802.11a	Low	5260	16.75	17.80	16.68	16.76
		Mid	5300	16.72	16.71	16.73	16.68
		High	5320	16.72	16.68	16.70	16.74
	802.11n HT20	Low	5260	17.90	17.94	17.93	17.91
		Mid	5300	17.91	17.89	17.89	17.92
		High	5320	17.90	17.82	17.86	17.88
	802.11n HT40	Low	5270	36.26	36.34	36.40	36.38
		High	5310	36.29	36.24	36.36	36.30
	802.11ac VHT80	Mid	5290	75.76	75.65	75.67	75.65

Note2. As a result of 99% bandwidth test, the bandwidth of UNII-2A does not interfere with UNII-1.

**9.3.3. 5.5 GHz BAND**

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]				Worst [MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-2C	802.11a	Low	5500	21.28	21.43	21.04	21.26	20.96
		Mid	5600	23.45	21.09	21.12	21.02	
		High	5700	21.34	21.02	20.96	20.98	
	802.11n HT20	Low	5500	21.56	<b>21.34</b>	21.59	21.42	21.34
		Mid	5600	23.95	21.44	21.35	21.56	
		High	5700	21.37	21.41	21.50	21.39	
	802.11n HT40	Low	5510	39.80	39.88	<b>39.47</b>	39.80	39.47
		Mid	5590	40.15	42.54	39.88	39.66	
		High	5670	39.63	39.79	39.62	40.29	
	802.11ac VHT80	Low	5530	81.32	81.05	81.37	81.70	80.82
		High	5610	83.17	81.77	80.82	81.20	

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-2C	802.11a	Low	5500	16.74	16.68	16.69	16.73
		Mid	5600	16.87	16.73	16.70	16.72
		High	5700	16.68	16.74	16.70	16.65
	802.11n HT20	Low	5500	17.82	17.90	17.87	17.88
		Mid	5600	17.89	17.87	17.86	17.85
		High	5700	17.86	17.89	17.91	17.85
	802.11n HT40	Low	5510	36.33	36.31	36.27	36.34
		Mid	5590	36.34	36.33	36.28	36.23
		High	5670	36.31	36.34	36.33	36.29
	802.11ac VHT80	Low	5530	75.63	75.76	75.65	75.66
		High	5610	75.88	75.79	75.62	75.67

Band	Mode	Channel	Center Freq. [MHz]	26 dB BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-2C	802.11ac VHT160	Mid	5570	163.70	164.60	163.50	163.60

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz]			
				ANT1	ANT2	ANT3	ANT4
UNII-2C	802.11ac VHT160	Mid	5570	154.20	154.17	153.86	153.94

**9.3.4. STRADDLE CHANNEL**

Band	Mode	Center Freq. [MHz]	26 dB BW [MHz]							
			ANT1		ANT2		ANT3		ANT4	
			UNII-2C	UNII-3	UNII-2C	UNII-3	UNII-2C	UNII-3	UNII-2C	UNII-3
Straddle Channel	802.11a	5720	15.67	5.61	15.64	5.38	15.69	5.60	15.59	5.54
	802.11n HT20	5720	15.81	5.60	15.81	5.79	15.68	5.64	15.75	5.72
	802.11n HT40	5710	34.91	5.02	35.15	4.90	34.85	4.98	34.92	4.80
	802.11ac VHT80	5690	75.32	5.28	75.40	5.54	75.67	5.43	75.78	5.86



## 10. ANTENNA PORT TEST RESULTS

### 10.1. 6 dB & 99% BANDWIDTH

#### LIMITS

FCC §15.407

The minimum 6 dB bandwidth shall be at least 500 kHz.

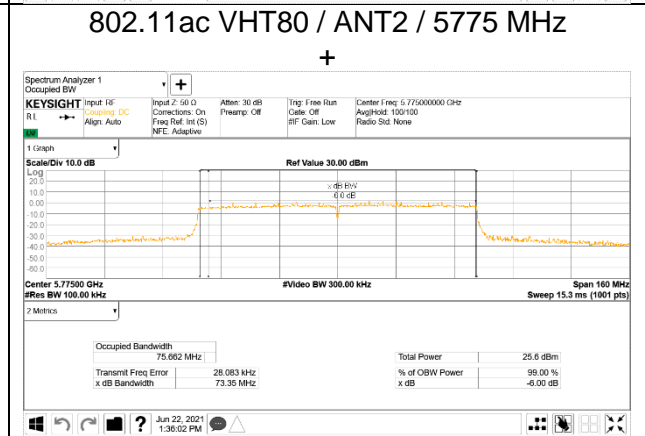
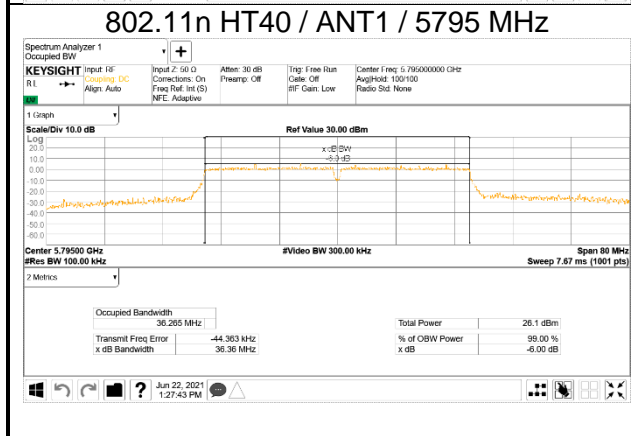
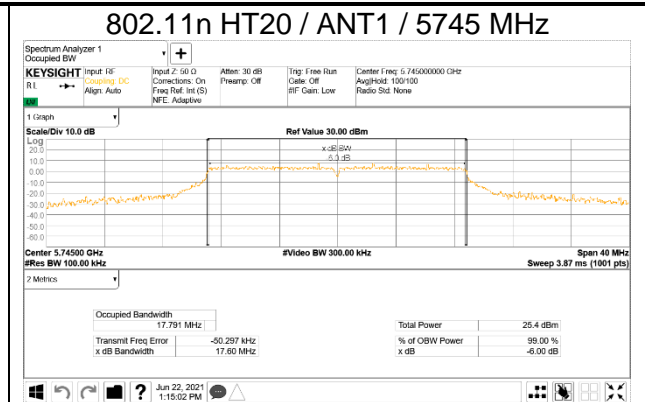
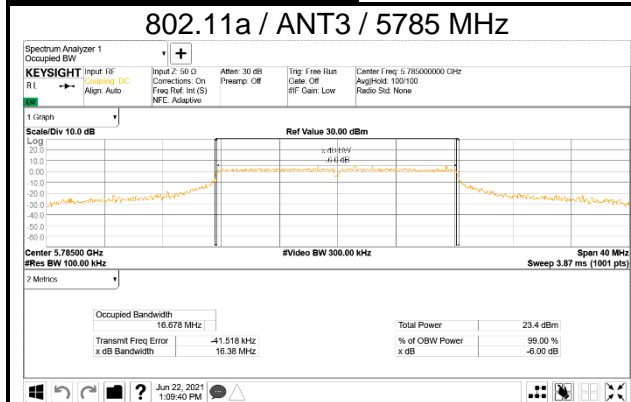
#### TEST PROCEDURE

Reference to 789033 D02 General UNII Test Procedures New Rules v02r01: The transmitter output is connected to a spectrum analyzer with the RBW set to 100KHz, the VBW  $\geq 3 \times$  RBW, peak detector and max hold.

#### RESULTS

- Please refer to the next page

**WORST CASE TEST PLOTS**



**10.1.1. 5.8 GHz BAND**

Band	Mode	Channel	Center Freq. [MHz]	6 dB BW [MHz]				Worst [MHz]	Minimum Limit [MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Low	5745	16.39	16.41	16.44	16.41	16.38	0.5
		Mid	5785	16.38	16.38	<b>16.38</b>	16.51		
		High	5825	16.41	16.39	16.42	16.38		
	802.11n HT20	Low	5745	<b>17.60</b>	17.62	17.62	17.63	17.60	
		Mid	5785	17.61	17.61	17.62	17.61		
		High	5825	17.61	17.61	17.64	17.65		
	802.11n HT40	Low	5755	36.43	36.39	36.40	36.43	36.36	
		High	5795	<b>36.36</b>	36.44	36.37	36.40		
	802.11ac VHT80	Mid	5775	76.38	<b>73.35</b>	76.08	75.85	73.35	

Band	Mode	Channel	Center Freq. [MHz]	99% BW [MHz]				Minimum Limit [MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-3	802.11a	Low	5745	16.55	16.57	16.56	16.56	-
		Mid	5785	16.53	16.56	16.68	16.55	
		High	5825	16.59	16.56	17.06	16.55	
	802.11n HT20	Low	5745	17.79	17.79	17.78	17.75	
		Mid	5785	17.72	17.76	17.86	17.76	
		High	5825	17.75	17.74	18.18	17.76	
	802.11n HT40	Low	5755	36.26	36.24	36.31	36.24	
		High	5795	36.27	36.25	36.43	36.24	
	802.11ac VHT80	Mid	5775	75.77	75.66	75.82	75.66	

## 10.2. OUTPUT POWER AND PPSD

### LIMITS

FCC §15.407 (a) (1) (2) (3)

### FCC

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

### TEST PROCEDURE

KDB 789033 Method PM is used for output power.

KDB 789033 Method SA-2 is used for only power of straddle Ch. and PPSD. RBW set to 1MHz(500kHz for the band 5.725-5.85 GHz, the VBW >= 3 x RBW, RMS detector and trace averaging). Band power function used for power and peak marker value of the spectrum is used for PSD.

### DIRECTIONAL ANTENNA GAIN

For OUTPUT POWER and PSD: The TX chains are correlated and the antenna gains are unequal among the chains. The directional gain is:

Frequency Band [MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]	ANT3 Gain [dBi]	ANT4 Gain [dBi]	Directional Gain for Output Power [dBi]	Directional Gain for PSD [dBi]
UNII 1 5150 - 5250	1.98	1.98	1.98	1.98	1.98	8.00
UNII 2A 5250 - 5350	1.97	1.97	1.97	1.97	1.97	7.99
UNII 2C 5470 - 5725	1.94	1.94	1.94	1.94	1.94	7.96
UNII 3 5725 - 5850	1.86	1.86	1.86	1.86	1.86	7.88

**10.2.1. 1Tx MODE IN THE 5.2 GHz BAND**

**Bandwidth and Antenna Gain, Limits**

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain		Power Limit [dBm]	PPSD Limit [dBm/MHz]
					For power	For PSD		
					[dBi]	[dBi]		
UNII-1	802.11a	Low	5180	21.18	1.98	1.98	24	11
		Mid	5220					
		High	5240					
	802.11n HT20	Low	5180	21.49				
		Mid	5220					
		High	5240					
	802.11n HT40	Low	5190	39.59				
		High	5230					
802.11ac VHT80	Mid	5210	80.54	24	11			
UNII-1 & 2A	802.11ac VHT160	Mid	5250	162.70	24	11		
<b>Included in Calculations of Corr'd Power &amp; PPSD</b>								
<b>Duty Cycle CF [dB]</b>				802.11a		0	dB	
				802.11n HT20		0	dB	
				802.11n HT40		0	dB	
				802.11ac VHT80		0	dB	
				802.11ac VHT160		0	dB	

**Output Power Results**

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4	
UNII-1	802.11a	Low	5180	20.99	19.37	20.48	18.07	23.98
		Mid	5220	21.87	20.60	21.97	20.74	
		High	5240	21.75	20.14	21.95	20.36	
	802.11n HT20	Low	5180	21.02	19.04	20.37	18.04	23.98
		Mid	5220	21.56	20.54	21.59	20.44	
		High	5240	21.60	20.66	21.42	20.61	
	802.11n HT40	Low	5190	18.19	15.47	17.34	14.95	23.98
		High	5230	19.96	20.04	19.97	20.09	
	802.11ac VHT80	Mid	5210	17.77	15.20	16.12	14.84	23.98
UNII-1 & 2A	802.11ac VHT160	Mid	5250	17.38	15.11	15.95	14.74	23.98

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

**PPSD Results**

Band	Mode	Channel	Center Freq. [MHz]	PPSD [dBm/MHz]				PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-1	802.11a	Low	5180	10.210	8.508	9.535	6.684	11
		Mid	5220	10.744	9.401	9.368	8.901	
		High	5240	10.794	8.708	9.308	8.980	
	802.11n HT20	Low	5180	9.769	7.935	9.329	6.757	11
		Mid	5220	9.947	8.935	8.640	8.507	
		High	5240	9.977	9.063	8.597	8.741	
	802.11n HT40	Low	5190	4.239	1.601	3.371	0.790	11
		High	5230	5.921	5.835	4.498	5.058	
	802.11ac VHT80	Mid	5210	0.838	-1.601	-0.860	-2.390	11
UNII-1 & 2A	802.11ac VHT160	Mid	5250	-3.180	-4.779	-4.813	-5.766	11

\* Calculation of PPSD result : PPSD = Meas PPSD + Duty CF [dB]

**10.2.2. 1Tx MODE IN THE 5.3 GHz BAND**

**Bandwidth and Antenna Gain, Limits**

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain		Power Limit [dBm]	PPSD Limit [dBm/MHz]
					For power [dBi]	For PSD [dBi]		
					UNII- 2A	802.11a		
Mid	5300							
High	5320							
802.11n HT20	Low	5260	21.49					
	Mid	5300						
	High	5320						
802.11n HT40	Low	5270	39.59					
	High	5310						
802.11ac VHT80	Mid	5290	80.54	24		11		
<b>Included in Calculations of Corr'd Power &amp; PPSD</b>								
<b>Duty Cycle CF [dB]</b>				802.11a		0	dB	
				802.11n HT20		0	dB	
				802.11n HT40		0	dB	
				802.11ac VHT80		0	dB	
				802.11ac VHT160		0	dB	

**Output Power Results**

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4	
UNII-2A	802.11a	Low	5260	19.49	19.59	19.58	19.46	23.98
		Mid	5300	19.58	19.60	19.44	19.50	
		High	5320	19.55	19.05	18.51	18.77	
	802.11n HT20	Low	5260	19.96	19.93	20.05	20.00	23.98
		Mid	5300	20.02	20.12	19.90	20.09	
		High	5320	19.51	19.05	18.56	18.70	
	802.11n HT40	Low	5270	18.94	19.02	18.89	19.11	23.98
		High	5310	18.53	15.94	17.65	18.45	
	802.11ac VHT80	Mid	5290	17.90	15.41	17.44	18.07	23.98

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

**PPSD Results**

Band	Mode	Channel	Center Freq. [MHz]	PPSD [dBm/MHz]				PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-2A	802.11a	Low	5260	8.400	8.384	8.524	8.275	11
		Mid	5300	8.194	8.220	8.265	8.348	
		High	5320	7.996	7.639	7.038	7.612	
	802.11n HT20	Low	5260	8.449	8.531	8.488	8.519	11
		Mid	5300	8.589	8.571	8.249	8.522	
		High	5320	8.120	7.039	6.875	7.197	
	802.11n HT40	Low	5270	4.575	4.661	3.893	4.504	11
		High	5310	4.019	1.318	3.022	3.775	
	802.11ac VHT80	Mid	5290	0.346	-2.018	-0.198	0.700	11

\* Calculation of PSD result : PSD = Meas PSD + Duty CF [dB]



**10.2.3. 1Tx MODE IN THE 5.5 GHz BAND**

**Bandwidth and Antenna Gain, Limits**

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain		Power Limit [dBm]	PPSD Limit [dBm/MHz]
					For power	For PSD		
					[dBi]	[dBi]		
UNII- 2C	802.11a	Low	5500	21.18	1.94	1.94	24	11
		Mid	5600					
		High	5700					
	802.11n HT20	Low	5500	21.49				
		Mid	5600					
		High	5700					
	802.11n	Low	5510	39.59				
		High	5590					
		High	5670					
	802.11ac VHT80	Low	5530	80.54				
High		5610						
UNII- 2C	802.11ac VHT160	Mid	5570	162.7			24	11
<b>Included in Calculations of Corr'd Power &amp; PSD</b>								
<b>Duty Cycle CF [dB]</b>				802.11a			0	dB
				802.11n HT20			0	dB
				802.11n HT40			0	dB
				802.11ac VHT80			0	dB
				802.11ac VHT160			0	dB

**Output Power Results**

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4	
UNII-2C	802.11a	Low	5500	18.38	18.13	18.78	16.67	23.98
		Mid	5600	19.46	17.68	18.14	15.24	
		High	5700	18.40	17.65	15.16	17.35	
	802.11n HT20	Low	5500	18.35	18.03	18.78	16.97	23.98
		Mid	5600	18.75	17.52	18.48	15.06	
		High	5700	17.52	17.12	14.63	16.30	
	802.11n HT40	Low	5510	16.73	15.71	16.21	16.45	23.98
		Mid	5590	18.49	18.45	18.40	16.39	
		High	5670	18.70	18.26	17.76	18.89	
	802.11ac VHT80	Low	5530	15.90	15.22	15.65	14.91	23.98
		High	5610	18.25	17.74	17.61	14.84	
	802.11ac VHT160	Mid	5570	15.75	15.19	15.56	14.70	23.98

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

**PPSD Results**

Band	Mode	Channel	Center Freq. [MHz]	PPSD [dBm/MHz]				PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-2C	802.11a	Low	5500	6.940	5.985	7.160	7.585	11
		Mid	5600	8.393	6.961	6.949	4.376	
		High	5700	7.495	6.643	4.204	6.668	
	802.11n HT20	Low	5500	6.714	5.537	6.837	5.305	11
		Mid	5600	7.899	6.192	7.199	3.728	
		High	5700	6.587	5.872	3.234	5.176	
	802.11n HT40	Low	5510	1.606	0.426	1.097	1.452	11
		Mid	5590	4.057	4.114	4.121	2.153	
		High	5670	4.745	4.093	3.549	4.589	
	802.11ac VHT80	Low	5530	-2.044	-2.742	-2.032	-2.666	11
		High	5610	0.822	1.085	1.954	-2.423	
	802.11ac VHT160	Mid	5570	-5.606	-5.828	-5.801	-6.944	11

\* Calculation of PPSD result : PPSD = Meas PPSD + Duty CF [dB]

### 10.2.4. 1Tx MODE IN THE 5.8 GHz BAND

#### Bandwidth and Antenna Gain, Limits

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	-	dB
	802.11n HT20	-	dB
	802.11n HT40	-	dB
	802.11ac VHT80	-	dB

#### Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4	
UNII-3	802.11a	Low	5745	18.51	19.46	18.03	20.72	30
		Mid	5785	19.32	20.18	18.23	20.61	
		High	5825	20.21	20.10	18.23	20.15	
	802.11n HT20	Low	5745	19.75	19.78	18.05	20.64	
		Mid	5785	19.27	20.14	18.17	20.72	
		High	5825	20.07	19.87	18.46	20.22	
	802.11n HT40	Low	5755	19.57	19.82	18.52	20.55	
		High	5795	20.30	19.70	18.71	20.34	
	802.11ac VHT80	Mid	5775	19.93	19.35	17.73	20.41	

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

#### PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	PPSD [dBm/MHz]				PPSD Limit [dBm/500kHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-3	802.11a	Low	5745	4.932	5.785	4.206	7.237	30
		Mid	5785	5.715	6.675	4.376	7.497	
		High	5825	6.654	6.060	4.399	7.345	
	802.11n HT20	Low	5745	6.310	6.139	4.090	7.353	
		Mid	5785	5.159	6.223	4.239	7.233	
		High	5825	6.331	6.364	4.620	7.248	
	802.11n HT40	Low	5755	3.073	3.302	1.948	4.109	
		High	5795	3.314	3.202	2.006	4.363	
	802.11ac VHT80	Mid	5775	0.392	-0.120	-1.688	1.367	

\* Calculation of PPSD result : PPSD = Meas PPSD + Duty CF [dB]

### 10.2.5. 1Tx Mode Straddle channel IN THE 5.5 GHz BAND

#### Bandwidth and Antenna Gain, Limits

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain		Power Limit [dBm]	PPSD Limit [dBm/MHz]
					For power	For PSD		
					[dBi]	[dBi]		
UNII- 2C	802.11a	Straddle	5720	21.18	1.94	1.94	24	11
	802.11n HT20	Straddle	5720	21.49			24	11
	802.11n	Straddle	5710	39.59			24	11
	802.11ac VHT80	Straddle	5690	80.54			24	11
<b>Included in Calculations of Corr'd Power &amp; PPSD</b>								
<b>Duty Cycle CF [dB]</b>				802.11a			0	dB
				802.11n HT20			0	dB
				802.11n HT40			0	dB
				802.11ac VHT80			0	dB

#### Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4	
UNII-2C	802.11a	Straddle	5720	17.21	16.59	16.04	16.34	23.98
	802.11n HT20	Straddle	5720	16.62	16.06	16.05	15.28	23.98
	802.11n HT40	Straddle	5710	19.10	18.23	17.66	18.47	23.98
	802.11ac VHT80	Straddle	5690	18.86	18.66	16.70	19.18	23.98

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

#### PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	PPSD [dBm/MHz]				PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-2C	802.11a	Straddle	5720	7.718	6.737	6.064	6.739	11
	802.11n HT20	Straddle	5720	6.688	6.268	6.234	5.531	
	802.11n HT40	Straddle	5710	5.520	4.774	3.827	4.677	
	802.11ac VHT80	Straddle	5690	2.454	2.299	0.109	2.835	

\* Calculation of PPSD result : PPSD = Meas PPSD + Duty CF

### 10.2.6. 1Tx Mode Straddle channel IN THE 5.8 GHZ BAND

#### Bandwidth and Antenna Gain, Limits

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	-	dB
	802.11n HT20	-	dB
	802.11n HT40	-	dB
	802.11ac VHT80	-	dB

#### Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4	
UNII-2C	802.11a	Straddle	5720	10.65	9.87	9.79	10.16	30
	802.11n HT20	Straddle	5720	10.53	10.14	10.38	9.63	
	802.11n HT40	Straddle	5710	8.62	7.32	7.41	8.13	
	802.11ac VHT80	Straddle	5690	4.73	3.95	2.09	5.08	

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

#### PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	PPSD [dBm/500kHz]				PPSD Limit [dBm/500kHz]
				ANT1	ANT2	ANT3	ANT4	
UNII-2C	802.11a	Straddle	5720	3.815	3.157	2.951	3.520	11
	802.11n HT20	Straddle	5720	2.847	2.612	2.813	2.218	
	802.11n HT40	Straddle	5710	0.766	0.275	-0.108	0.846	
	802.11ac VHT80	Straddle	5690	-3.480	-3.789	-5.573	-2.475	

\* Calculation of PPSD result : PPSD = Meas PPSD + Duty CF

**10.2.7. 4Tx MODE IN THE 5.2 GHz BAND**

**Bandwidth and Antenna Gain, Limits**

Band	Mode	Channel	Center Freq. [MHz]	Directional Gain		Power Limit [dBm]	PPSD Limit [dBm/MHz]						
				For power	For PSD								
				[dBi]	[dBi]								
UNII-1	802.11a	Low	5180	1.98	8.00	23.98	9						
		Mid	5220										
		High	5240										
	802.11n HT20	Low	5180			1.98	8.00	23.98	9				
		Mid	5220										
		High	5240										
	802.11n HT40	Low	5190					1.98	8.00	23.98	9		
		High	5230										
	802.11ac VHT80	Mid	5210							1.98	8.00	23.98	9
Mid		5250											
UNII-1 & 2A	802.11ac VHT160	Mid	5250	1.98	8.00							23.98	9
<b>Included in Calculations of Corr'd Power &amp; PPSD</b>													
<b>Duty Cycle CF [dB]</b>			802.11a			-	dB						
			802.11n HT20			-	dB						
			802.11n HT40			-	dB						
			802.11ac VHT80			-	dB						
			802.11ac VHT160			-	dB						

**Output Power Results**

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-1	802.11a	Low	5180	13.28	12.35	9.06	13.64	18.43	23.98
		Mid	5220	13.40	12.23	8.83	14.06	18.55	
		High	5240	13.41	12.31	9.15	13.89	18.55	
	802.11n HT20	Low	5180	13.56	13.26	9.41	13.97	18.90	23.98
		Mid	5220	13.71	12.68	9.43	14.37	18.93	
		High	5240	13.78	12.92	9.55	14.30	19.00	
	802.11n HT40	Low	5190	14.90	14.01	14.75	14.53	20.58	23.98
		High	5230	14.61	14.04	14.95	15.89	20.95	
	802.11ac VHT80	Mid	5210	13.80	13.11	14.05	14.35	19.87	23.98
UNII-1 & 2A	802.11ac VHT160	Mid	5250	13.97	13.68	12.90	14.60	19.85	23.98

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

Corr'd Power

= Ant1 Average Power + Ant2 Average Power + Ant3 Average Power + Ant4 Average Power

**PPSD Results**

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-1	802.11a	Low	5180	2.253	2.065	-1.239	3.550	8.000	9
		Mid	5220	2.732	1.350	-1.735	4.086	8.110	
		High	5240	2.685	1.672	-1.453	4.314	8.290	
	802.11n HT20	Low	5180	2.574	2.375	-0.714	3.305	8.150	9
		Mid	5220	2.425	1.888	-0.871	4.032	8.220	
		High	5240	2.708	2.086	-0.937	3.857	8.270	
	802.11n HT40	Low	5190	0.730	0.260	1.542	1.551	7.080	9
		High	5230	0.699	0.035	0.734	2.296	7.040	
	802.11ac VHT80	Mid	5210	-3.123	-3.752	-2.188	-1.801	3.370	9
UNII-1 & 2A	802.11ac VHT160	Mid	5250	-5.361	-5.223	-5.978	-4.499	0.790	9

\* Calculation of PPSD result :

Corr'd PPSD = Ant1 PPSD + Ant2 PPSD + Ant3 PPSD + Ant4 PPSD + Duty CF [dB]

**10.2.8. 4Tx MODE IN THE 5.3 GHz BAND**

**Bandwidth and Antenna Gain, Limits**

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain		Power Limit [dBm]	PPSD Limit [dBm/MHz]
					For power	For PSD		
					[dBi]	[dBi]		
UNII- 2A	802.11a	Low	5260	21.18	1.97	7.99	23.98	9.01
		Mid	5300					
		High	5320					
	802.11n HT20	Low	5260	21.49				
		Mid	5300					
		High	5320					
	802.11n HT40	Low	5270	39.59				
		High	5310					
	802.11ac VHT80	Mid	5290	80.54			23.98	9.01
	<b>Included in Calculations of Corr'd Power &amp; PSD</b>							
<b>Duty Cycle CF [dB]</b>				802.11a		-	dB	
				802.11n HT20		-	dB	
				802.11n HT40		-	dB	
				802.11ac VHT80		-	dB	
				802.11ac VHT160		-	dB	



**Output Power Results**

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-2A	802.11a	Low	5260	13.45	13.22	13.22	14.19	19.56	23.98
		Mid	5300	14.06	13.55	13.32	13.80	19.71	
		High	5320	13.52	13.08	12.71	13.04	19.12	
	802.11n HT20	Low	5260	14.31	13.89	13.78	14.76	20.22	23.98
		Mid	5300	14.45	13.94	13.58	14.26	20.09	
		High	5320	14.40	14.08	13.59	13.92	20.03	
	802.11n HT40	Low	5270	16.27	15.79	15.75	16.77	22.19	23.98
		High	5310	14.87	14.49	14.57	14.85	20.72	
	802.11ac VHT80	Mid	5290	14.54	13.86	13.69	14.34	20.14	23.98

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

Corr'd Power

= Ant1 Average Power + Ant2 Average Power + Ant3 Average Power + Ant4 Average Power

**PPSD Results**

Band	Mode	Channel	Center Freq. [MHz]	Meas PSD [dBm/MHz]				Total Corr'd PSD [dBm/MHz]	PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-2A	802.11a	Low	5260	2.720	2.121	2.657	3.760	8.88	9.01
		Mid	5300	2.670	2.505	2.886	3.337	8.88	
		High	5320	2.034	2.087	2.537	2.436	8.30	
	802.11n HT20	Low	5260	2.554	2.523	2.711	3.522	8.87	9.01
		Mid	5300	2.574	2.386	2.139	3.015	8.56	
		High	5320	2.921	2.790	2.452	2.991	8.81	
	802.11n HT40	Low	5270	1.716	1.739	1.674	2.910	8.06	9.01
		High	5310	0.406	0.500	0.292	1.039	6.59	
	802.11ac VHT80	Mid	5290	-3.255	-3.439	-3.303	-2.245	2.99	9.01

\* Calculation of PSD result :

Corr'd PSD = Ant1 PSD + Ant2 PSD + Ant3 PSD + Ant4 PSD + Duty CF [dB]

**10.2.9. 4Tx MODE IN THE 5.5 GHz BAND**

**Bandwidth and Antenna Gain, Limits**

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain		Power Limit [dBm]	PPSD Limit [dBm/MHz]
					For power	For PSD		
					[dBi]	[dBi]		
UNII- 2C	802.11a	Low	5500	21.18	1.94	7.96	23.98	9.04
		Mid	5600					
		High	5700					
	802.11n HT20	Low	5500	21.49				
		Mid	5600					
		High	5700					
	802.11n	Low	5510	39.59				
		High	5590					
		High	5670					
	802.11ac VHT80	Low	5530	80.54				
High		5610						
UNII- 2C	802.11ac VHT160	Mid	5570	162.7			23.98	9.04
<b>Included in Calculations of Corr'd Power &amp; PPSD</b>								
<b>Duty Cycle CF [dB]</b>				802.11a		-	dB	
				802.11n HT20		-	dB	
				802.11n HT40		-	dB	
				802.11ac VHT80		-	dB	
				802.11ac VHT160		-	dB	

**Output Power Results**

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-2C	802.11a	Low	5500	12.99	12.46	13.27	13.90	19.21	23.98
		Mid	5600	13.05	12.78	12.47	14.37	19.25	
		High	5700	12.86	12.61	10.18	14.05	18.66	
	802.11n HT20	Low	5500	13.43	13.07	13.67	14.22	19.64	23.98
		Mid	5600	13.03	13.20	13.25	14.01	19.41	
		High	5700	13.20	12.21	10.49	14.46	18.84	
	802.11n HT40	Low	5510	13.60	13.25	14.34	14.75	20.05	23.98
		Mid	5590	14.58	14.16	14.38	16.17	20.92	
		High	5670	15.96	15.88	13.30	16.97	21.74	
	802.11ac VHT80	Low	5530	13.80	13.82	14.75	15.08	20.42	23.98
		High	5610	15.66	15.77	15.14	16.67	21.87	23.98
	802.11ac VHT160	Mid	5570	13.98	13.93	14.03	15.32	20.38	23.98

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

Corr'd Power

= Ant1 Average Power + Ant2 Average Power + Ant3 Average Power + Ant4 Average Power

**PPSD Results**

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-2C	802.11a	Low	5500	1.829	1.785	2.356	3.355	8.40	9.04
		Mid	5600	1.909	1.708	3.052	3.846	8.74	
		High	5700	2.210	1.737	2.782	2.695	8.40	
	802.11n HT20	Low	5500	1.684	1.620	2.505	2.946	8.25	9.04
		Mid	5600	1.972	1.819	2.845	2.982	8.46	
		High	5700	2.299	1.922	2.700	3.009	8.52	
	802.11n HT40	Low	5510	1.557	1.308	2.611	3.329	8.30	9.04
		Mid	5590	1.672	1.798	2.438	3.597	8.47	
		High	5670	2.098	2.000	2.565	2.726	8.38	
	802.11ac VHT80	Low	5530	0.943	0.102	1.264	1.765	7.08	9.04
		High	5610	-1.221	-1.608	-1.000	-0.840	4.86	
	802.11ac VHT160	Mid	5570	-6.790	-6.626	-5.969	-5.269	-0.10	9.04

\* Calculation of PPSD result :

Corr'd PPSD = Ant1 PPSD + Ant2 PPSD + Ant3 PPSD + Ant4 PPSD + Duty CF [dB]

### 10.2.10. 4Tx MODE IN THE 5.8 GHz BAND

#### Bandwidth and Antenna Gain, Limits

Included in Calculations of Corr'd Power & PPSD				
Duty Cycle CF [dB]	802.11a		-	dB
	802.11n HT20		-	dB
	802.11n HT40		-	dB
	802.11ac VHT80		-	dB

#### Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Average Power [dBm]				Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Low	5745	17.71	17.07	17.84	18.04	23.70	30
		Mid	5785	18.01	17.65	14.87	18.86	23.60	
		High	5825	18.54	17.71	14.65	18.35	23.58	
	802.11n HT20	Low	5745	18.01	16.46	15.07	18.01	23.07	30
		Mid	5785	18.46	17.64	15.78	19.47	24.06	
		High	5825	18.96	18.34	16.19	19.96	24.59	
	802.11n HT40	Low	5755	19.47	18.81	16.38	19.17	24.63	30
		High	5795	18.76	18.61	15.97	18.94	24.24	
	802.11ac VHT80	Mid	5775	18.68	18.04	15.56	18.44	23.86	30

\* Calculation of Output Power : Average Power = Meas Power + Duty CF[dB]

Corr'd Power

= Ant1 Average Power + Ant2 Average Power + Ant3 Average Power + Ant4 Average Power

#### PPSD Results

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/500kHz]	PPSD Limit [dBm/500kHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Low	5745	5.163	4.602	2.249	6.158	10.78	30
		Mid	5785	5.204	4.552	1.834	6.365	10.80	
		High	5825	4.306	4.700	2.213	5.889	10.49	
	802.11n HT20	Low	5745	4.371	3.310	2.856	5.830	10.27	30
		Mid	5785	5.130	4.711	3.305	6.926	11.23	
		High	5825	5.863	5.272	3.260	6.853	11.52	
	802.11n HT40	Low	5755	2.891	2.822	1.111	4.564	9.04	30
		High	5795	3.025	2.780	0.927	4.370	8.96	
	802.11ac VHT80	Mid	5775	-0.153	-0.559	-3.002	1.102	5.60	30

\* Calculation of PPSD result :

Corr'd PPSD = Ant1 PPSD + Ant2 PPSD + Ant3 PPSD + Ant4 PPSD + Duty CF [dB]

**10.2.11. 4Tx Mode Straddle channel IN THE 5.5 GHz BAND**

**Bandwidth and Antenna Gain, Limits**

Band	Mode	Channel	Center Freq. [MHz]	Min 26 dB BW [MHz]	Directional Gain		Power Limit [dBm]	PPSD Limit [dBm/MHz]
					For power	For PSD		
					[dBi]	[dBi]		
UNII- 2C	802.11a	Straddle	5720	21.18	1.94	7.96	23.98	9.04
	802.11n HT20	Straddle	5720	21.49			23.98	9.04
	802.11n	Straddle	5710	39.59			23.98	9.04
	802.11ac VHT80	Straddle	5690	80.54			23.98	9.04
<b>Included in Calculations of Corr'd Power &amp; PPSD</b>								
<b>Duty Cycle CF [dB]</b>				802.11a			-	dB
				802.11n HT20			-	dB
				802.11n HT40			-	dB
				802.11ac VHT80			-	dB

**Output Power Results**

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]				Total Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII- 2C	802.11a	Straddle	5720	12.08	11.74	9.15	12.65	17.61	23.98
	802.11n HT20	Straddle	5720	12.57	11.38	9.84	13.31	17.98	23.98
	802.11n HT40	Straddle	5710	16.49	16.12	13.36	16.96	21.95	23.98
	802.11ac VHT80	Straddle	5690	14.62	14.74	12.01	15.52	20.42	23.98

\* Calculation of Output Power : Total Corr'd Power = Meas Power(ANT1 + ANT2 + ANT3 + ANT4) + Duty CF [dB]

**PPSD Results**

Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/MHz]	PPSD Limit [dBm/MHz]
				ANT1	ANT2	ANT3	ANT4		
UNII- 2C	802.11a	Straddle	5720	3.291	1.760	-0.955	3.468	8.23	11.00
	802.11n HT20	Straddle	5720	3.645	1.344	0.432	3.774	8.55	
	802.11n HT40	Straddle	5710	3.294	2.301	-0.229	3.209	8.37	
	802.11ac VHT80	Straddle	5690	-1.582	-1.538	-4.144	-0.772	4.18	

\* Calculation of PPSD result : Corr'd PPSD = Meas PPSD(ANT1 + ANT2 + ANT3 + ANT4) + Duty CF

### 10.2.12. 4Tx Mode Straddle channel IN THE 5.8 GHZ BAND

#### Bandwidth and Antenna Gain, Limits

Included in Calculations of Corr'd Power & PPSD			
Duty Cycle CF [dB]	802.11a	-	dB
	802.11n HT20	-	dB
	802.11n HT40	-	dB
	802.11ac VHT80	-	dB

#### Output Power Results

Band	Mode	Channel	Center Freq. [MHz]	Meas Power [dBm]				Total Corr'd Power [dBm]	Power Limit [dBm]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Straddle	5720	5.97	4.45	3.95	7.02	11.54	30
	802.11n HT20	Straddle	5720	6.49	5.45	4.15	7.73	12.17	
	802.11n HT40	Straddle	5710	5.92	5.00	2.75	6.73	11.36	
	802.11ac VHT80	Straddle	5690	0.44	-0.52	-3.32	1.18	5.76	

\* Calculation of Output Power : Total Corr'd Power = Meas Power(ANT1 + ANT2 + ANT3 + ANT4) + Duty CF [dB]

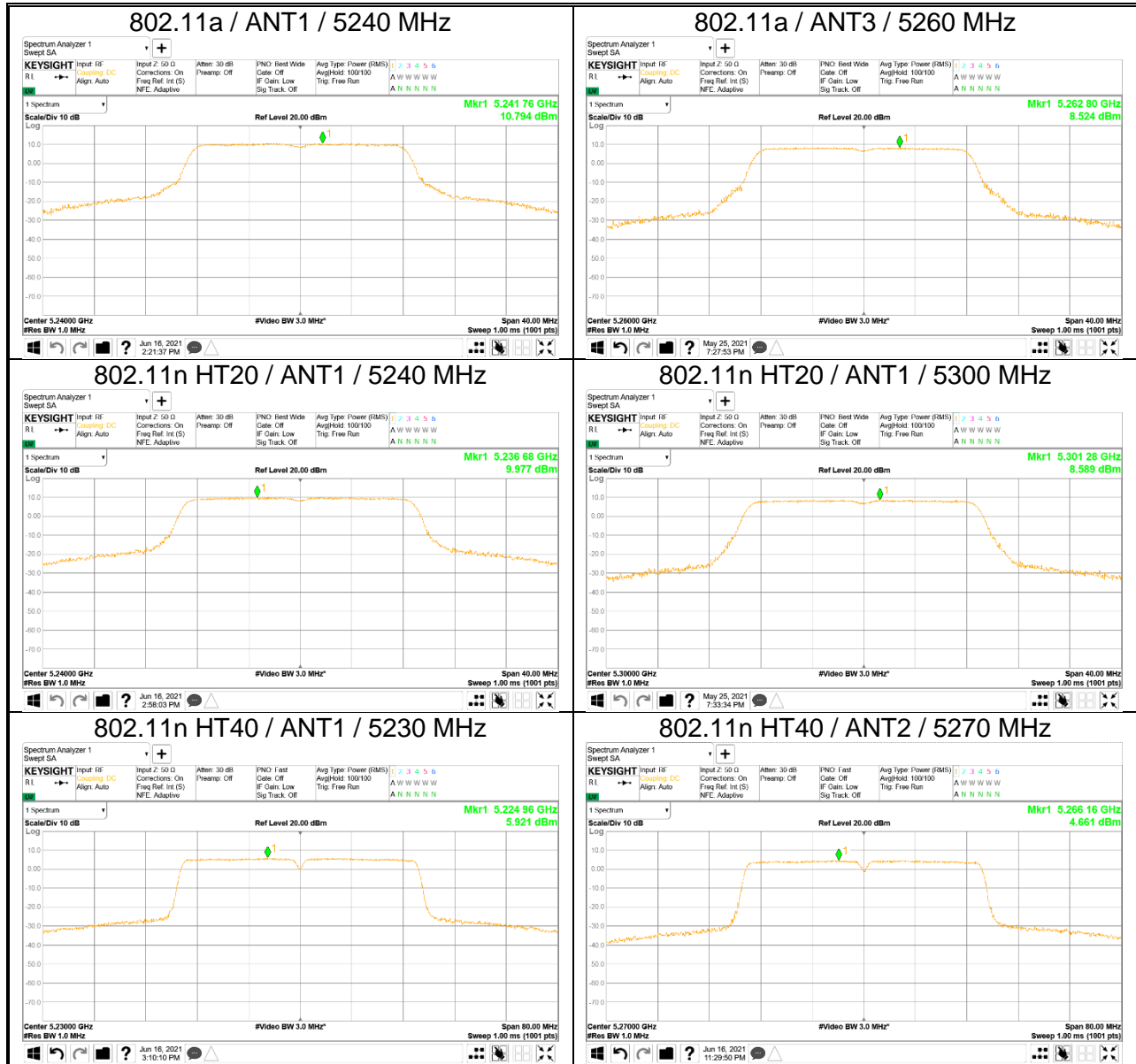
#### PPSD Results

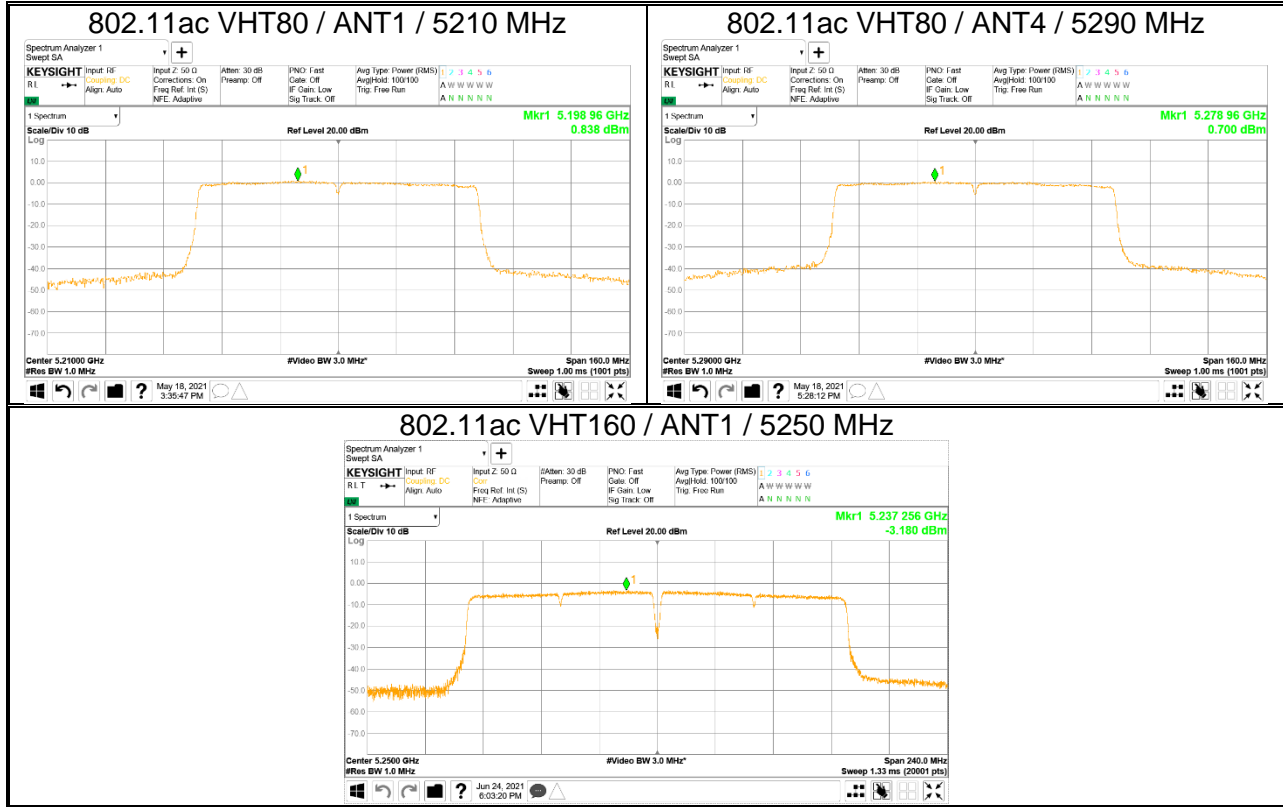
Band	Mode	Channel	Center Freq. [MHz]	Meas PPSD [dBm/MHz]				Total Corr'd PPSD [dBm/500kHz]	PPSD Limit [dBm/500kHz]
				ANT1	ANT2	ANT3	ANT4		
UNII-3	802.11a	Straddle	5720	-1.860	-2.185	-3.367	-0.057	4.32	30
	802.11n HT20	Straddle	5720	-0.451	-1.853	-3.632	0.878	5.07	
	802.11n HT40	Straddle	5710	-1.711	-2.196	-4.437	-0.397	4.07	
	802.11ac VHT80	Straddle	5690	-7.350	-8.075	-10.513	-5.643	-1.54	

\* Calculation of PPSD result : Corr'd PPSD = Meas PPSD(ANT1 + ANT2 + ANT3 + ANT4) + Duty CF

### 10.2.13. OUTPUT POWER AND PPSD PLOTS(WORST CASE)

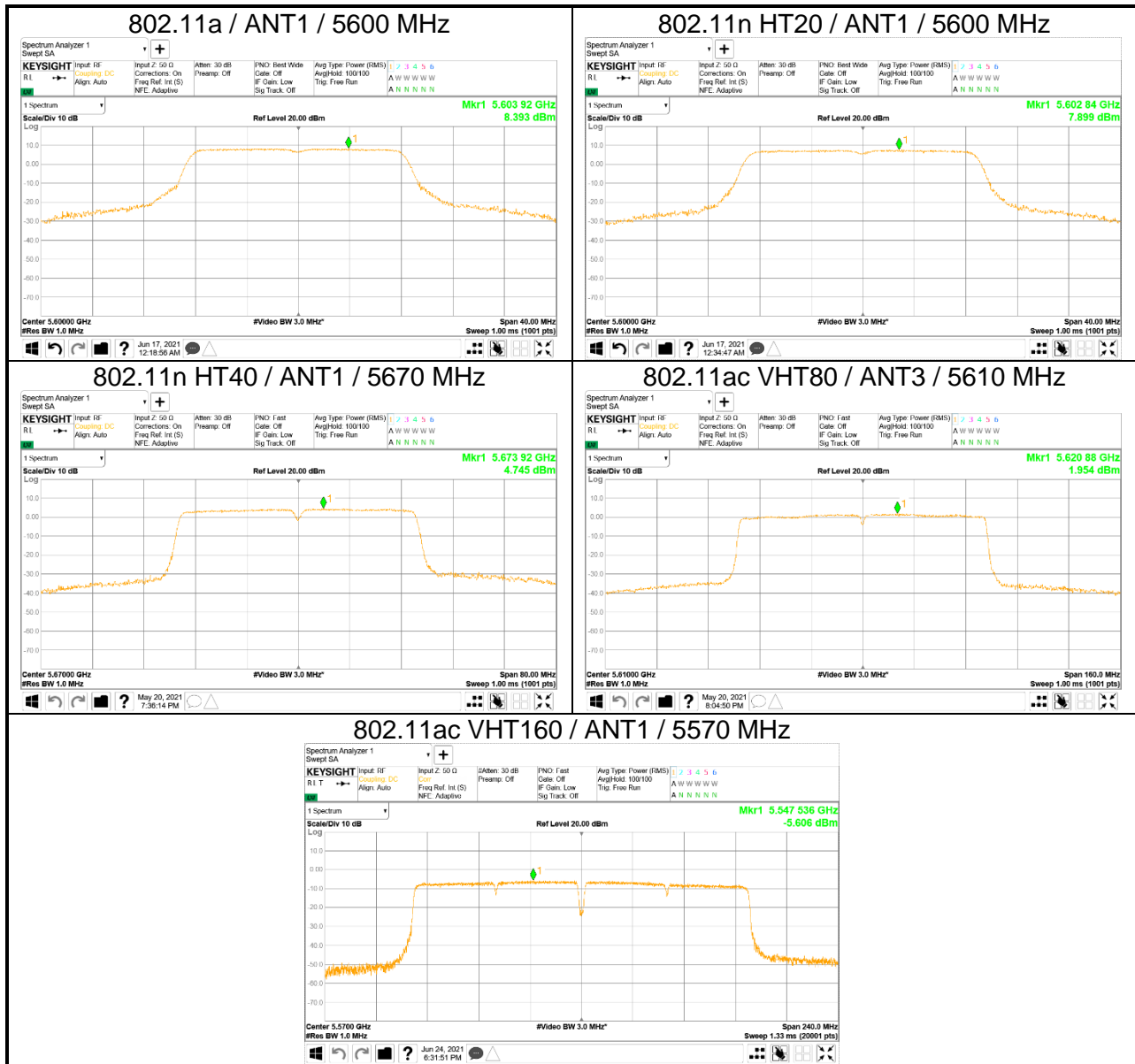
#### UNII-1 & 2A (1TX)



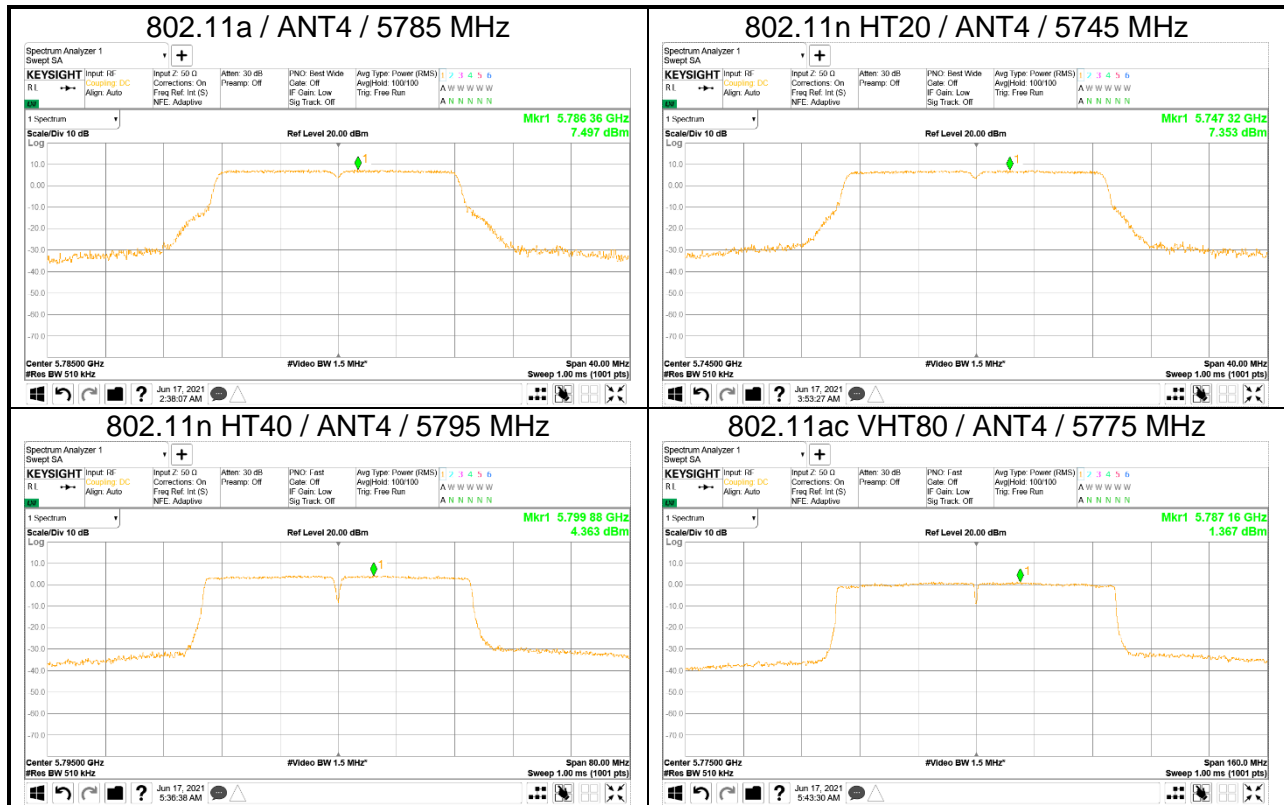




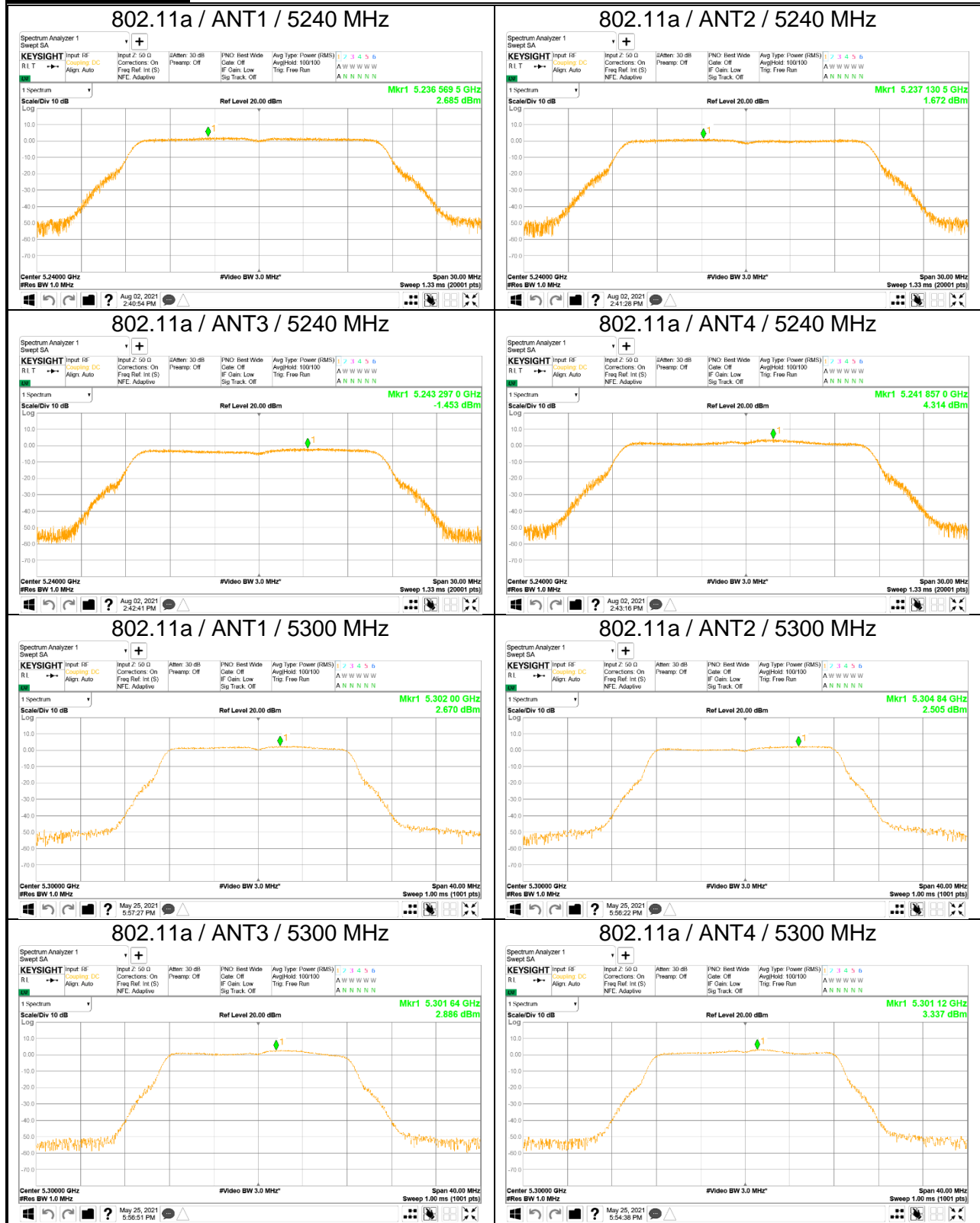
**UNII-2C (1TX)**

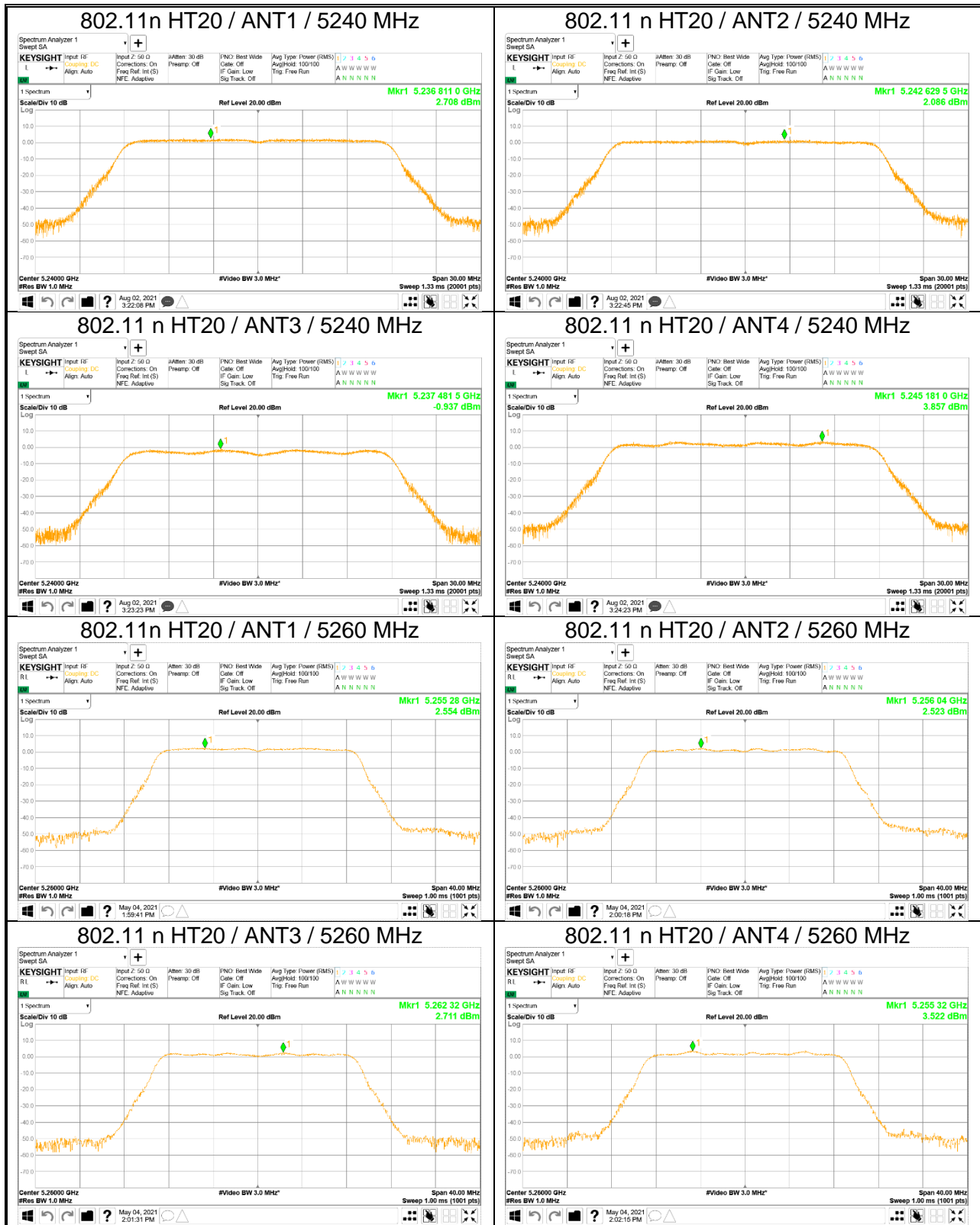


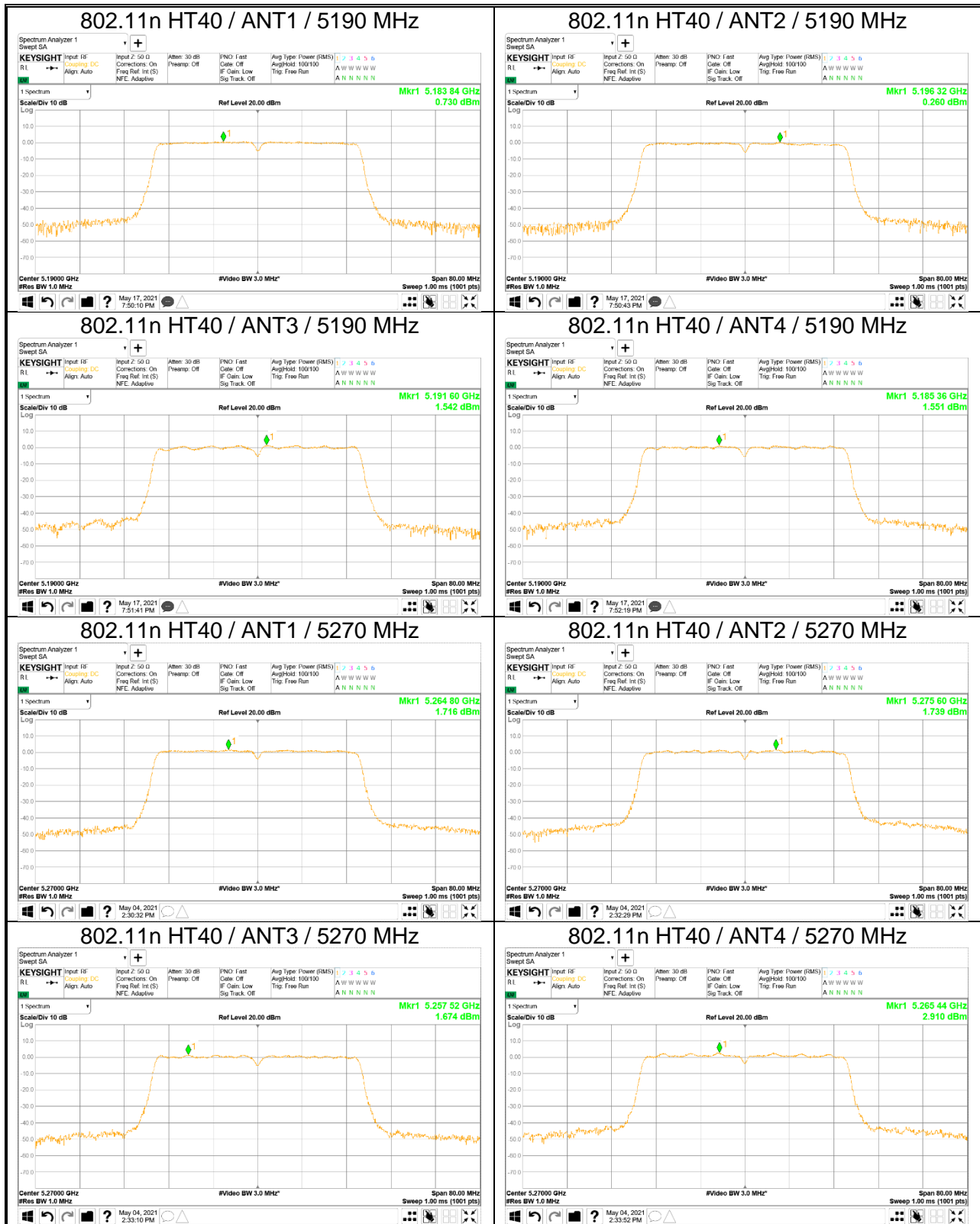
**UNII-3 (1TX)**

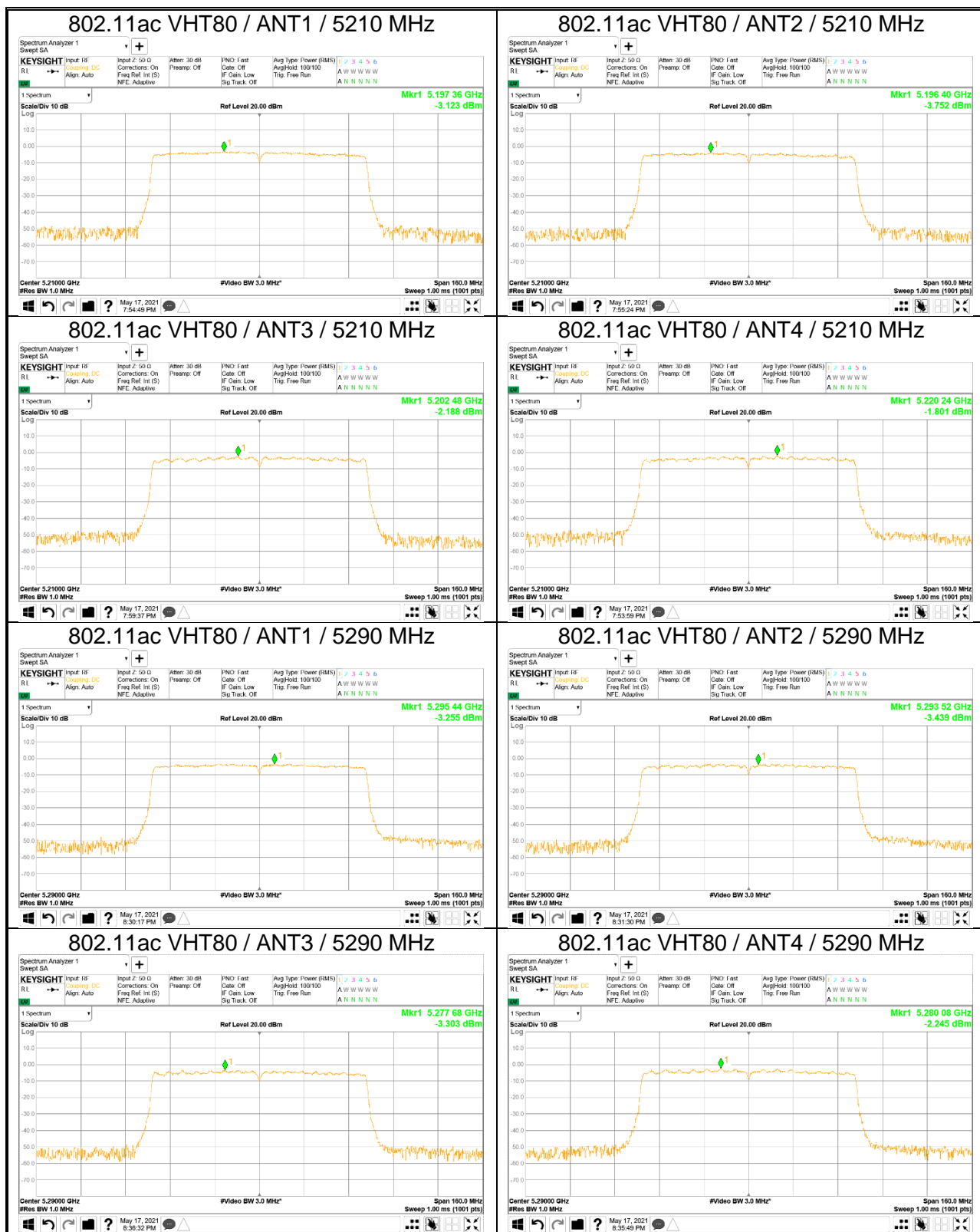


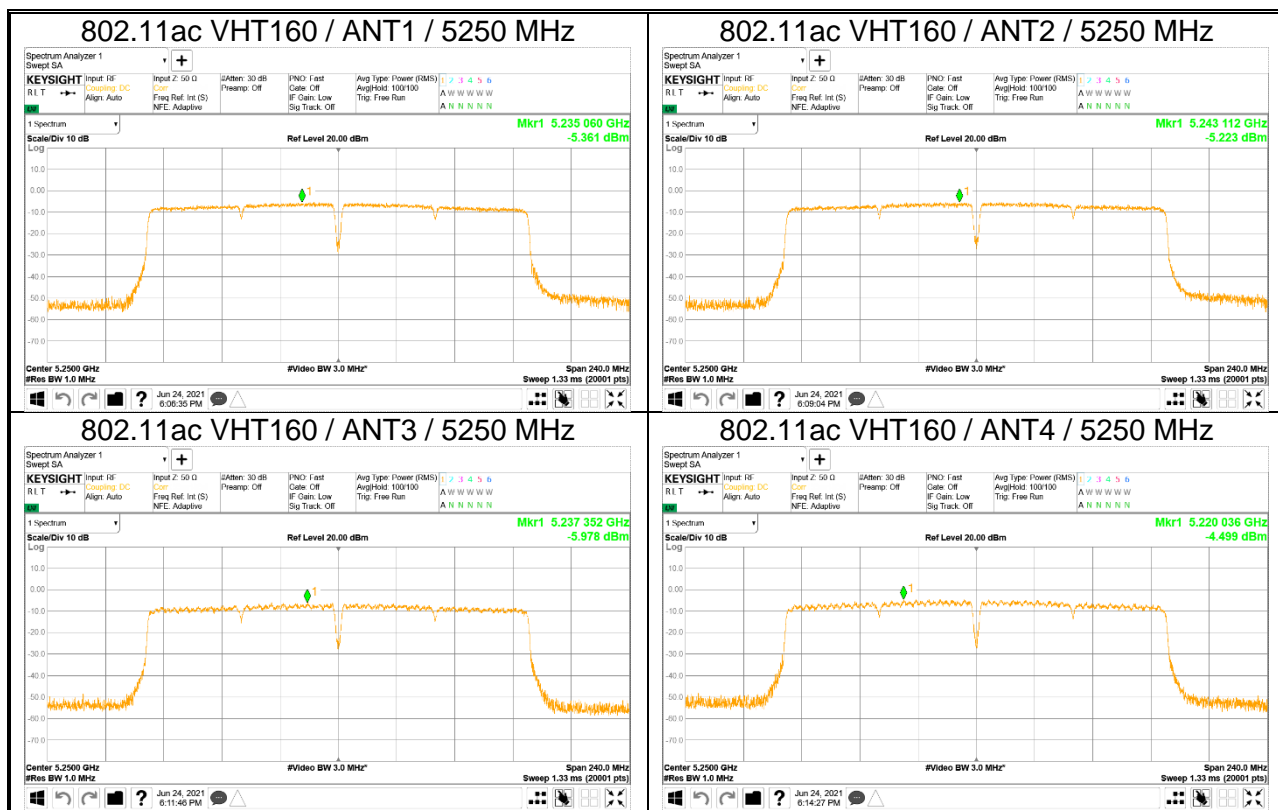
UNII-1 & 2A (4TX)



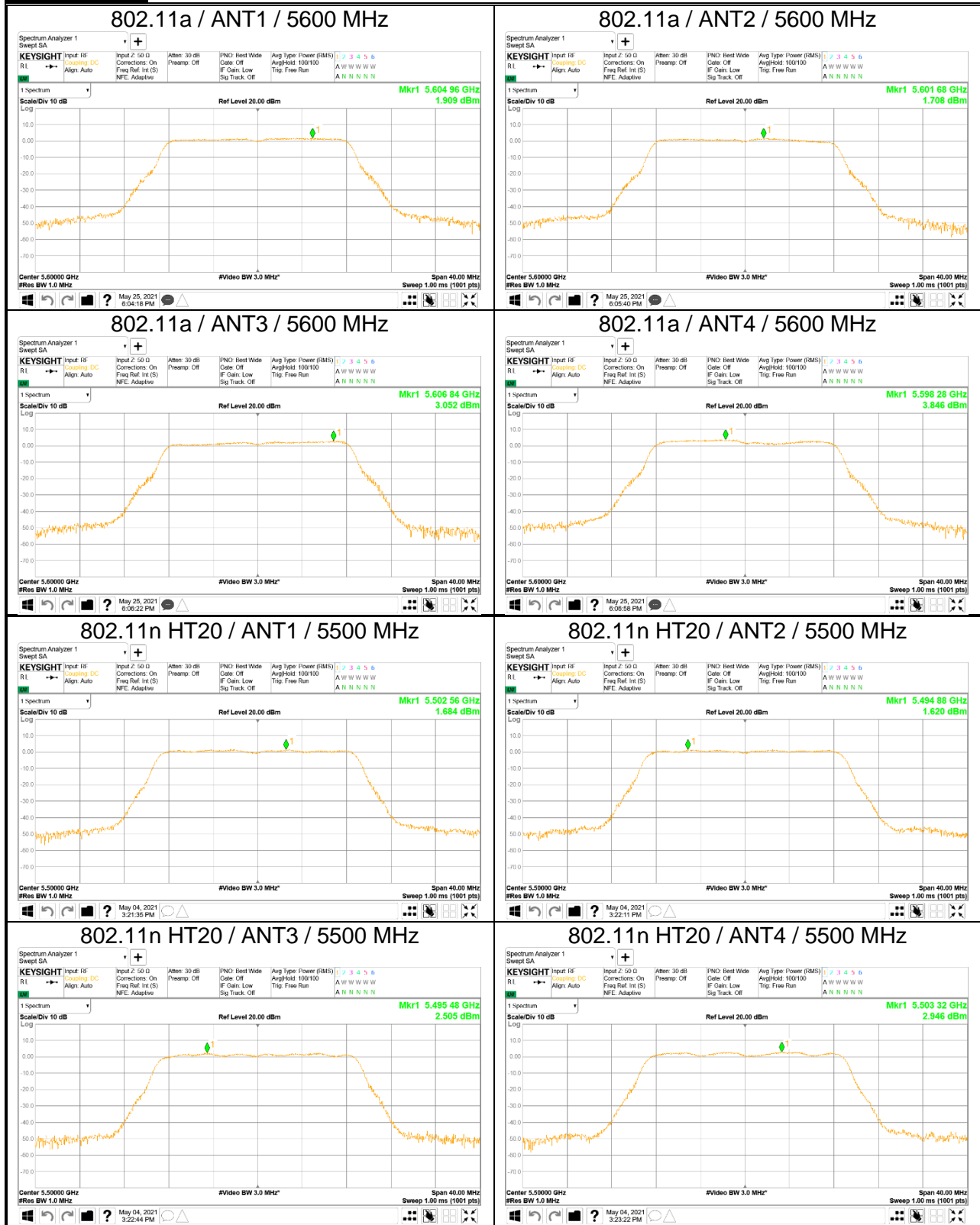




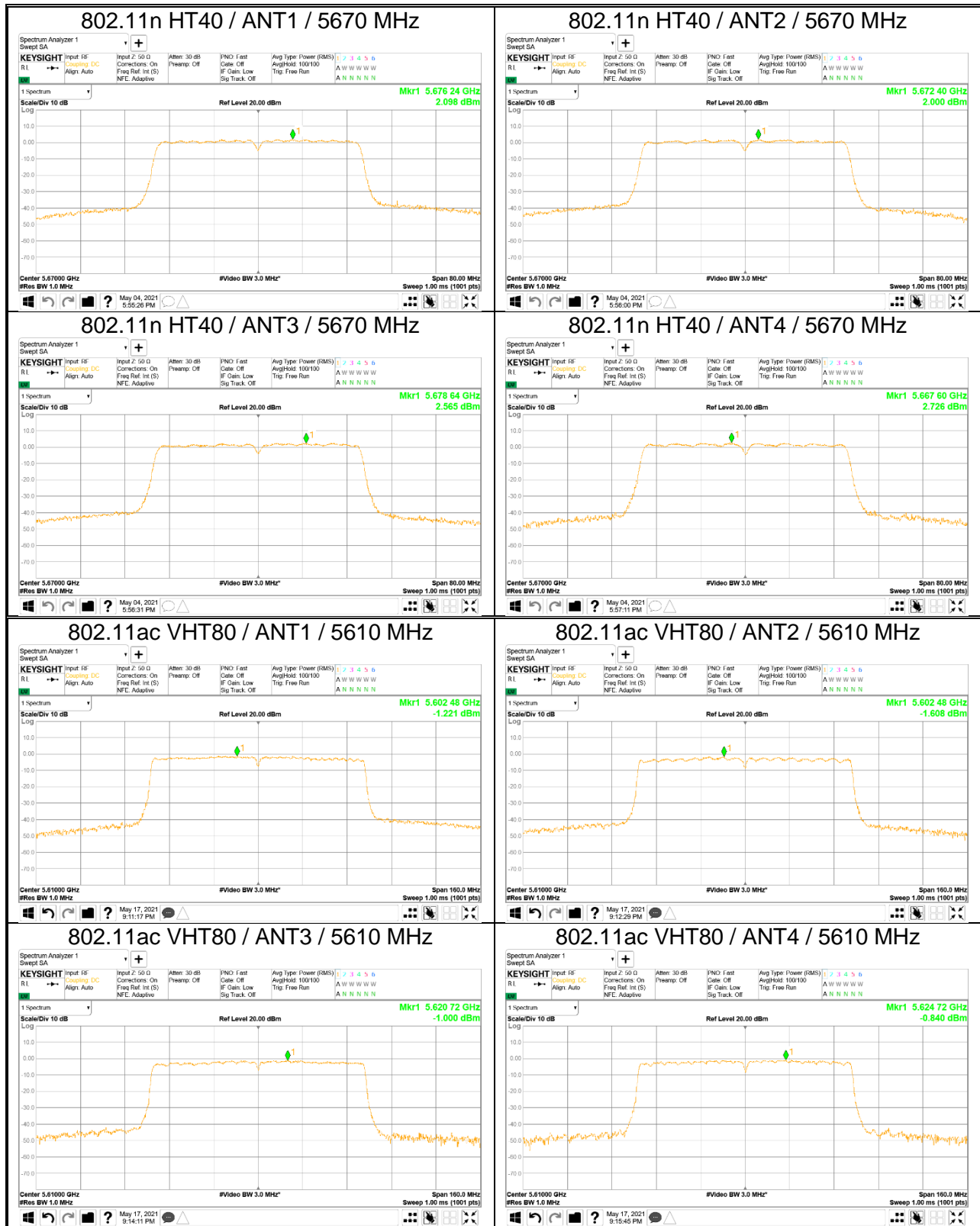


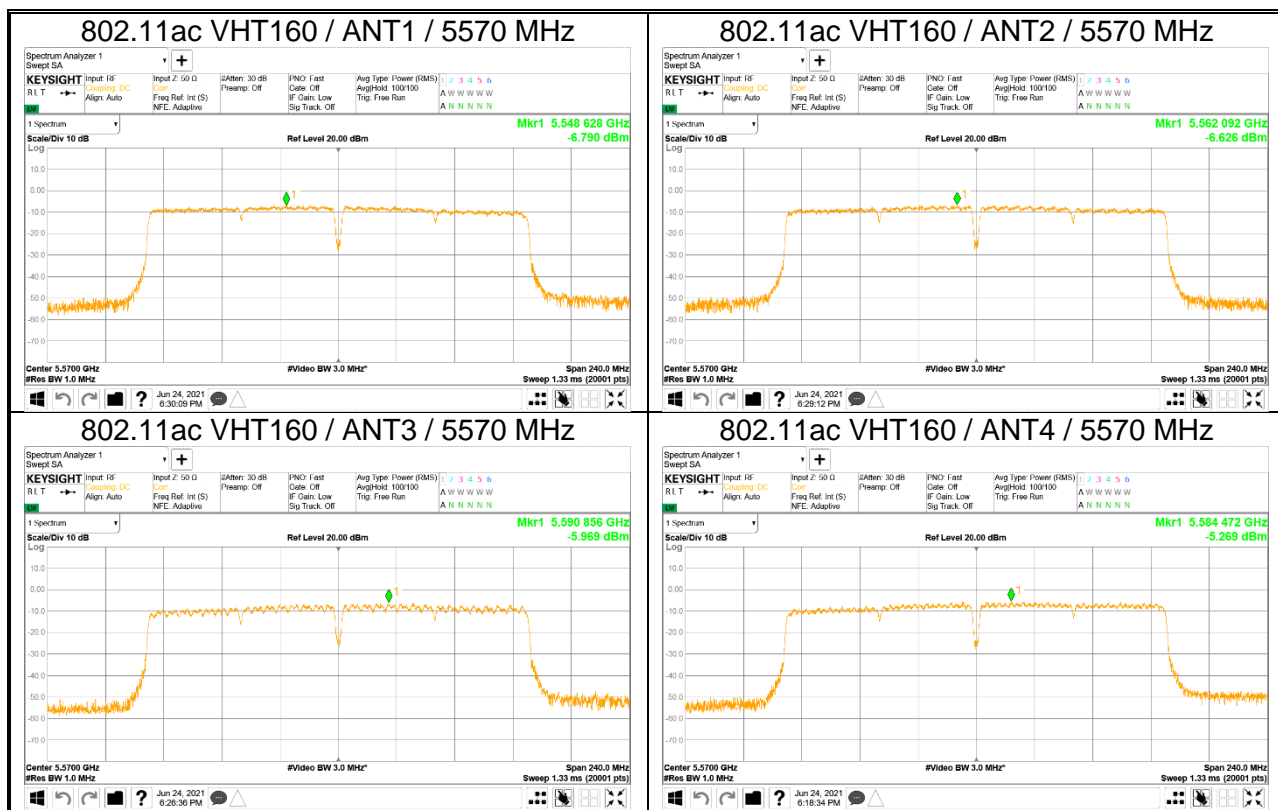


UNII-2C (4TX)









UNII-3 (4TX)

