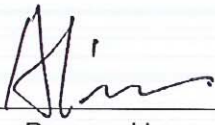


# FCC RADIO TEST REPORT

Applicant..... : HUNAN FN-LINK TECHNOLOGY LIMITED  
Address..... : Liuyang Economic Development Zone, Liuyang China  
Manufacturer..... : HUNAN FN-LINK TECHNOLOGY LIMITED  
Address..... : Liuyang Economic Development Zone, Liuyang China  
Factory..... : HUNAN FN-LINK TECHNOLOGY LIMITED  
Address..... : Liuyang Economic Development Zone, Liuyang China  
Product Name..... : WIFI+BT Module  
Brand Name..... : FN-LINK  
Model No. .... : 8274B-PR  
FCC ID..... : 2AATL-8274B-PR  
Measurement Standard..... : 47 CFR FCC PART 15 Subpart E (section 407)  
Receipt Date of Samples.... : August 06, 2021  
Date of Tested..... : August 10, 2021 to August 31, 2021  
Date of Report..... : September 02, 2021

This report shows that above equipment is technically compliant with the requirements of the standards above. All test results in this report apply only to the tested sample(s). Without prior written approval of Dongguan Nore Testing Center Co., Ltd, this report shall not be reproduced except in full.



Prepared by

Alina Guo / Project Engineer



Approved by

Iori Fan / Authorized Signatory

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## 1. Summary of Test Result

FCC Rules	Description of Test	Result	Remarks
§15.207 (a)	AC Power Conducted Emission	PASS	---
§15.407(a)	Max. Conducted Output Power	PASS	---
§15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	PASS	---
§15.407(e)	6dB Bandwidth	PASS	---
§15.407(a)	Power Spectral Density	PASS	---
§15.407(b) §15.205	Radiated Emissions	PASS	---
§15.407(b)	Band Edge Emissions	PASS	---
§15.407(g)	Frequency Stability	PASS	---
§15.203	Antenna Requirement	PASS	---

## 2. General Description of EUT

Product Information	
Product name:	WIFI+BT Module
Main Model Name:	8274B-PR
Additional Model Name:	N/A
Model Difference:	N/A
S/N:	2108-4306
Brand Name	FN-LINK
Hardware version:	V1.0
Software version:	V1.0
Rating:	DC 3.3V
Classification:	Class B
Typical arrangement:	Table-top
I/O Port:	N/A
Accessories Information	
Adapter:	N/A
Cable:	N/A
Other:	N/A
Additional Information	
Note:	N/A
Remark:	All the information above are provided by the manufacturer. More detailed feature of the EUT please refers to the user manual.

Technical Specification	
Frequency Range:	5180-5240MHz 5745-5825MHz
Modulation Technology:	DSSS, OFDM
Modulation Type:	CCK, DQPSK, DBPSK for 802.11a 64-QAM, 16-QAM, QPSK, BPSK for 802.11n
Number of Channel:	U-NII-1: 4 Channel for 802.11a/n(HT20) 2 Channel for 802.11n(HT40)/ac(VHT40) 1 Channel for 802.11ac(VHT80) U-NII-3: 5 Channel for 802.11a/n(HT20) 2 Channel for 802.11n(HT40)/ac(VHT40) 1 Channel for 802.11ac(VHT80)
Antenna Type:	Monopole antenna*2
Antenna Gain:	See Antenna Information

#### Antenna Information

Ant. (Chain)	Brand	Model name	Antenna Type	Connector	Gain (dBi)	Application range
1	TAOGLAS	GW.05.0153	Monopole	RP-SMA(M)	2.8	2.4G Band
					3.6	5G Band

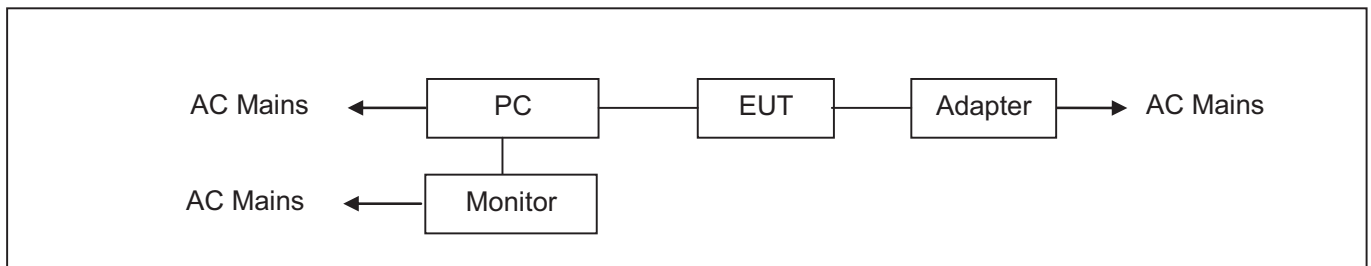
Channel List					
U-NII-1 Band 5180~5240MHz					
IEEE 802.11a/n(HT20)/ac(VHT20)		IEEE 802.11n(HT40)/ac(VHT40)		IEEE 802.11 ac (VHT80)	
Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz
36	5180	38	5190	42	5210
40	5200	46	5230	-	-
44	5220	-	-	-	-
48	5240	-	-	-	-
U-NII-3 Band 5745~5825MHz					
IEEE 802.11a/n(HT20)/ac(VHT20)		IEEE 802.11n(HT40)/ac(VHT40)		IEEE 802.11 ac (VHT80)	
Channel	Frequency MHz	Channel	Frequency MHz	Channel	Frequency MHz
149	5745	151	5755	155	5775
153	5765	159	5795	-	-
157	5785	-	-		
161	5805	-	-		
165	5825	-	-		

### 3. Test Channels and Modes Detail

No.	Mode	Channel	Frequency (MHz)	Remark
1	TX	36	5180	IEEE 802.11a/n(HT20)/ac(HT20)
		40	5200	IEEE 802.11a/n(HT20) /ac(HT20)
		48	5240	IEEE 802.11a/n(HT20) /ac(HT20)
		149	5745	IEEE 802.11a/n(HT20) /ac(HT20)
		157	5785	IEEE 802.11a/n(HT20) /ac(HT20)
		165	5825	IEEE 802.11a/n(HT20) /ac(HT20)
		38	5190	IEEE 802.11n(HT40) /ac(VHT40)
		46	5230	IEEE 802.11n(HT40) /ac(VHT40)
		151	5755	IEEE 802.11n(HT40) /ac(VHT40)
		159	5795	IEEE 802.11n(HT40) /ac(VHT40)
		42	5210	IEEE 802.11ac(VHT80)
		155	5775	IEEE 802.11ac(VHT80)
		2.	Normal Mode	---

Note: TX mode means that the EUT was programmed to be in continuously transmitting mode.

### 4. Configuration of EUT



### 5. Modification of EUT

No modifications are made to the EUT during all test items.



## 6. Description of Support Device

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Brand	M/N	S/N	Cable Specification	Remarks
1.	PC	DELL	---	---	---	Provided by manufacturer
2.	Monitor	DELL	S2240Tb	CN-0FP53 P-74261-3 AL-0CYU	---	Provided by Lab
3.	Test fixture	---	---	---	---	Provided by manufacturer
4.	Adapter	---	FJ-SW12 6050200 0DU	---	---	Input: AC 100-240V 50/60Hz 0.4A Output: DC 5V 2000mA

Software	Power Setting				
	---	Ant_1		Ant_2	
		U-NII-1	U-NII-3	U-NII-1	U-NII-3
QCARCT	IEEE 802.11a	4	5	4	4
	IEEE 802.11n(HT20)	3	4	4	4
	IEEE 802.11ac(HT20)	3	4	4	4
	IEEE 802.11n(HT40)	3	4	4	4
	IEEE 802.11ac(VHT40)	3	4	4	4
	IEEE 802.11ac(VHT80)	3	4	4	4
	IEEE 802.11ac(VHT80)	3	4	4	4

## 7. Test Facility and Location

Test Site	:	Dongguan Nore Testing Center Co., Ltd. (Dongguan NTC Co., Ltd.)
Accreditations and Authorizations	:	<p>The Laboratory has been assessed and proved to be in compliance with CNAS/CL01</p> <p>Listed by CNAS, August 13, 2018</p> <p>The Certificate Registration Number is L5795.</p> <p>The Certificate is valid until August 13, 2024</p> <p>The Laboratory has been assessed and proved to be in compliance with ISO17025</p> <p>Listed by A2LA, November 01, 2017</p> <p>The Certificate Registration Number is 4429.01</p> <p>The Certificate is valid until December 31, 2021</p> <p>Listed by FCC, November 06, 2017</p> <p>Test Firm Registration Number is 907417</p> <p>Listed by Industry Canada, June 08, 2017</p> <p>The Certificate Registration Number is 46405-9743A</p>
Test Site Location	:	Building D, Gaosheng Science and Technology Park, Hongtu Road, Nancheng District, Dongguan City, Guangdong Province, China

## 8. Applicable Standards and References

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

**Test Standards:**

47 CFR Part 15, Subpart E, 15.407

ANSI C63.10-2013

**References Test Guidance:**

KDB 789033 D02 v02r01

## 9. Deviations and Abnormalities from Standard Conditions

No additions, deviations and exclusions from the standard.

## 10. Test Conditions

No.	Test Item	Test Mode	Test Voltage	Tested by	Remarks
1.	AC Power Conducted Emission	2	DC 3.3V	Sean	See note 1
2.	Max. Conducted Output Power	1	DC 3.3V	Sean	See note 1
3.	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	1	DC 3.3V	Sean	See note 1
4.	6dB Bandwidth	1	DC 3.3V	Sean	See note 1
5.	Power Spectral Density	1	DC 3.3V	Sean	See note 1
6.	Radiated Emissions	1, 2	DC 3.3V	Sean	See note 1,3
7.	Band Edge Emissions	1	DC 3.3V	Sean	See note 1
8.	Frequency Stability	1	DC 3.3V	Sean	See note 1
9.	Antenna Requirement	---	---	---	See note 1

**Note:**

1. The testing climatic conditions for temperature, humidity, and atmospheric pressure are within: 15~35°C, 30~70%, 86~106kPa.

## 11. Measurement Uncertainty

No.	Test Item	Frequency	Uncertainty	Remarks
1.	Conducted Emission	150KHz ~ 30MHz	±2.52 dB	---
2.	Radiated Emission Test	9KHz ~ 30MHz	±2.60 dB	---
		30MHz ~ 1GHz	±4.68 dB	---
		1GHz ~ 18GHz	±5.14 dB	---
		18GHz ~ 40GHz	±5.14 dB	---
3.	RF Conducted Test	10Hz ~ 40GHz	±1.06 dB	---

**Note:**

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.
2. The measurement uncertainty levels above are estimated and calculated according to CISPR 16-4-2.
3. The conformity assessment statement in this report is based solely on the test results, measurement uncertainty is excluded.

## 12. Sample Calculations

Conducted Emission						
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB)	Measurement (dBuV)	Limit (dBuV)	Over (dB)	Detector
0.1900	30.10	10.60	40.70	79.00	-38.30	QP

Where,

Freq. = Emission frequency in MHz  
 Reading Level = Uncorrected Analyzer/Receiver reading  
 Corrector Factor = Insertion loss of LISN + Cable Loss + RF Switching Unit attenuation  
 Measurement = Reading + Corrector Factor  
 Limit = Limit stated in standard  
 Margin = Measurement - Limit  
 Detector = Reading for Quasi-Peak / Average / Peak

Radiated Spurious Emissions and Restricted Bands						
Freq. (MHz)	Reading Level (dBuV)	Correct Factor (dB/m)	Measurement (dBuV/m)	Limit (dBuV/m)	Over (dB)	Detector
60.0700	45.88	-18.38	27.50	49.00	-21.50	QP

Where,

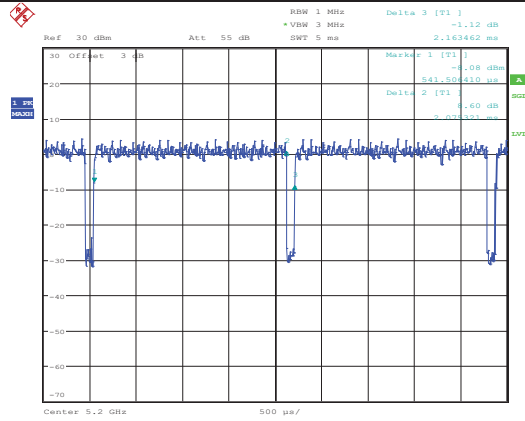
Freq. = Emission frequency in MHz  
 Reading Level = Uncorrected Analyzer/Receiver reading  
 Corrector Factor = Antenna Factor + Cable Loss - Pre-amplifier  
 Measurement = Reading + Corrector Factor  
 Limit = Limit stated in standard  
 Over = Margin, which calculated by Measurement - Limit  
 Detector = Reading for Quasi-Peak / Average / Peak

Note: For all conducted test items, the spectrum analyzer offset or transducer is derived from RF cable loss and attenuator factor. The offset or transducer is equal to the RF cable loss plus attenuator factor.

### 13. Duty cycle

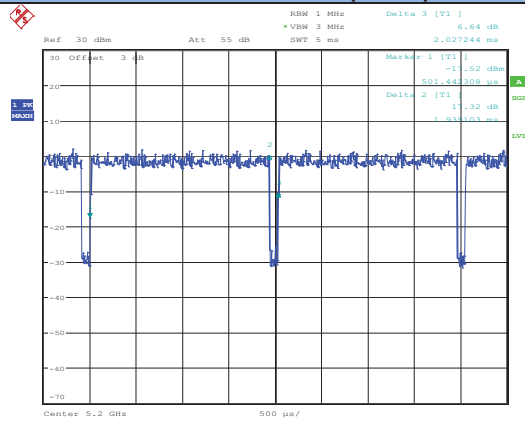
Operation Band (MHz)	Mode	Ton (ms)	Ton+off (ms)	Duty Cycle (%)	1/T minimum VBW (kHz)	Duty Cycle Factor (dB)
U-NII-1	802.11a	2.075	2.163	95.93%	0.48	0.18
	802.11n(HT20)	1.939	2.027	95.66%	0.52	0.19
	802.11n(HT40)	0.951	1.040	91.44%	1.05	0.39
	802.11ac(VHT20)	1.944	2.032	95.67%	0.51	0.19
	802.11ac(VHT40)	0.959	1.047	91.60%	1.04	0.38
	802.11ac(VHT80)	0.466	0.553	84.27%	2.15	0.74
U-NII-3	802.11a	2.067	2.155	95.92%	0.48	0.18
	802.11n(HT20)	1.931	2.019	95.64%	0.52	0.19
	802.11n(HT40)	0.957	1.043	91.75%	1.04	0.37
	802.11ac(VHT20)	1.939	2.027	95.66%	0.52	0.19
	802.11ac(VHT40)	0.952	1.048	90.84%	1.05	0.42
	802.11ac(VHT80)	0.465	0.554	83.94%	2.15	0.76
Remark: Duty Cycle= (Ton/ Ton+off)*100% Duty Cycle factor=10*log(1/ Duty cycle)						

### U-NII-1 Band IEEE 802.11a



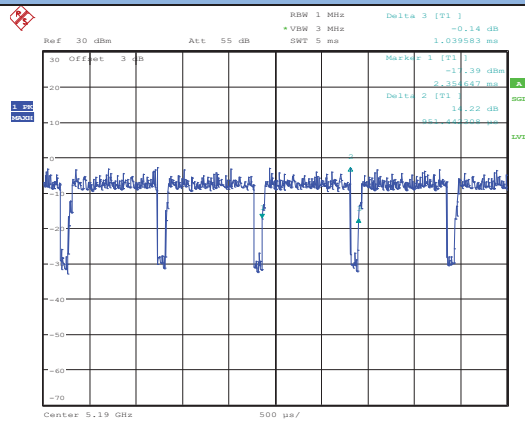
Date: 24.AUG.2021 21:38:38

### IEEE 802.11n(HT20)



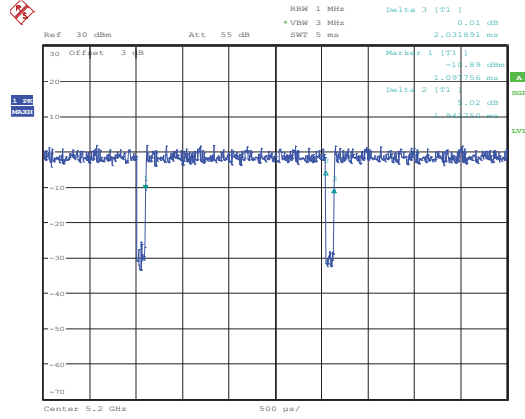
Date: 24.AUG.2021 21:40:11

### 802.11n(HT40)



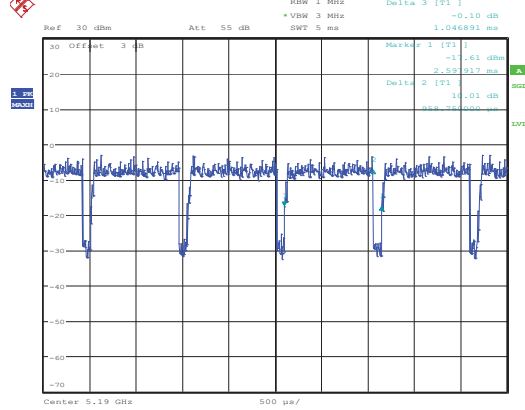
Date: 24.AUG.2021 21:44:51

### IEEE 802.11ac(VHT20)



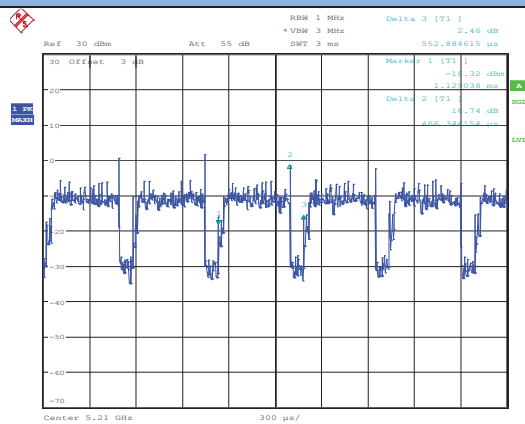
Date: 24.AUG.2021 21:41:20

### IEEE 802.11ac(VHT40)



Date: 24.AUG.2021 21:46:46

### IEEE 802.11ac(VHT80)

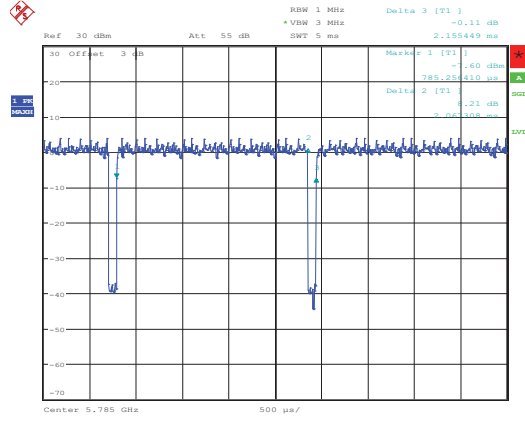


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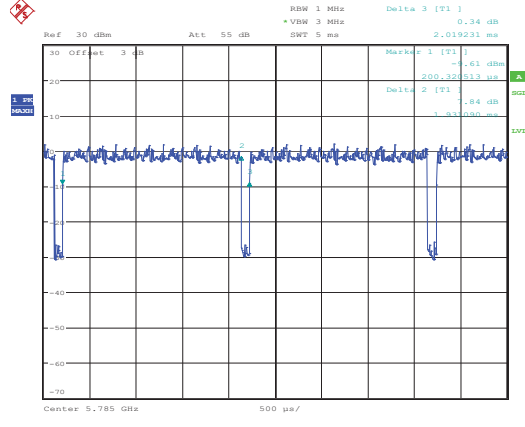
### U-NII-3 Band

### IEEE 802.11a



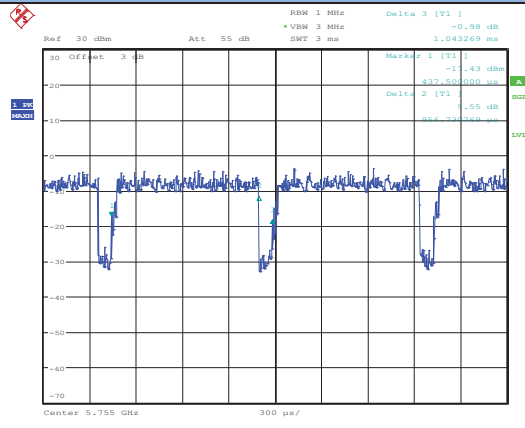
Date: 25.AUG.2021 00:05:14

### IEEE 802.11n(HT20)



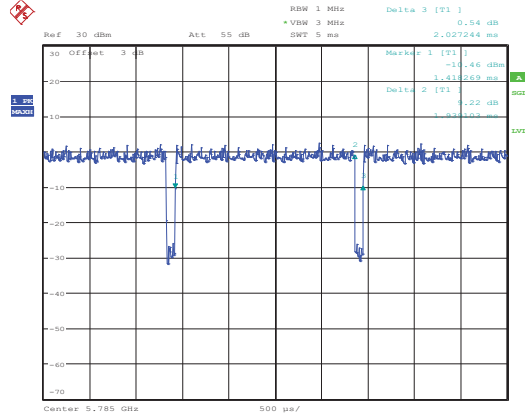
Date: 25.AUG.2021 00:07:07

### 802.11n(HT40)



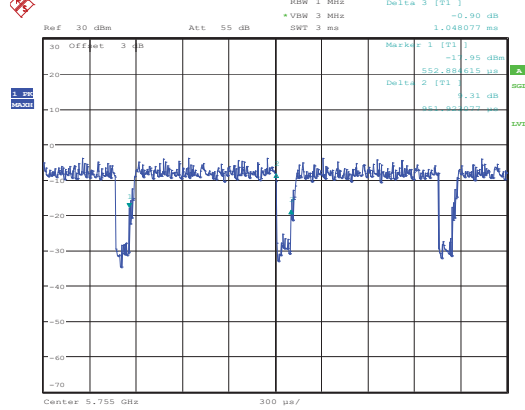
Date: 25.AUG.2021 00:09:30

### IEEE 802.11ac(VHT20)



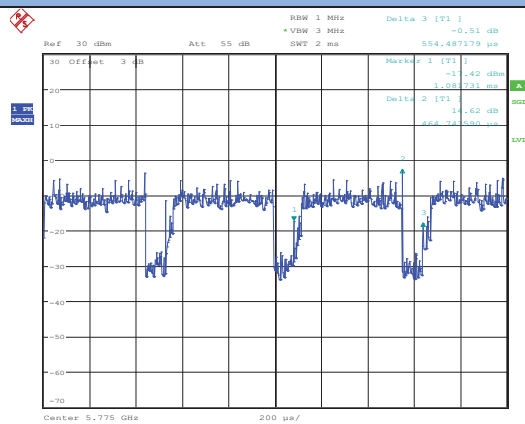
Date: 25.AUG.2021 00:07:53

### IEEE 802.11ac(VHT40)



Date: 25.AUG.2021 00:10:26

### IEEE 802.11ac(VHT80)



Date: 25.AUG.2021 00:11:33

## 14. Test Items and Results

### 14.1 Conducted Emissions Measurement

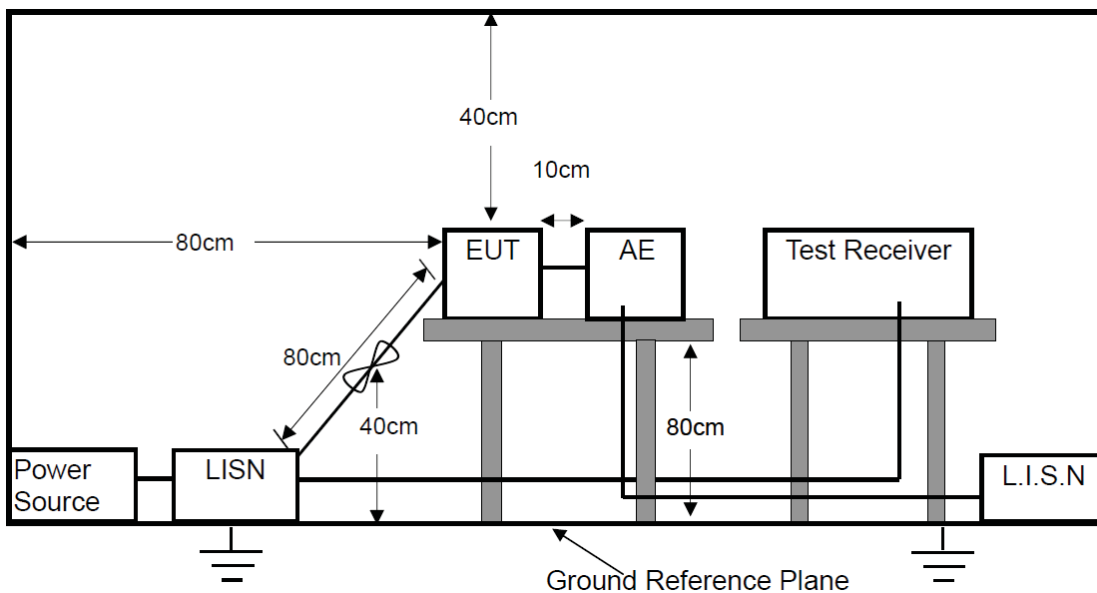
#### LIMITS

According to the requirements of FCC PART 15.207, the limits are as follows:

Frequency (MHz)	Quasi-peak	Average
0.15 to 0.5	66 to 56	56 to 46
0.5 to 5	56	46
5 to 30	60	50

- Note:
1. If the limits for the average detector are met when using the quasi-peak detector, then the limits for the measurements with the average detector are considered to be met.
  2. The lower limit shall apply at the transition frequencies.
  3. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5MHz.

#### BLOCK DIAGRAM OF TEST SETUP



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## TEST PROCEDURES

- a. The EUT was placed on a wooden table 0.8m height from the metal ground plan and 0.4m from the conducting wall of the shielding room and it was kept at 0.8m from any other grounded conducting surface.
- b. All I/O cables and support devices were positioned as per ANSI C63.10.
- c. Connect mains power port of the EUT to a line impedance stabilization network (LISN).
- d. Connect all support devices to the other LISN and AAN, if needed.
- e. Scan the frequency range from 150KHz to 30MHz at both sides of AC line for maximum conducted interference checking and record the test data.

## TEST RESULTS

PASS

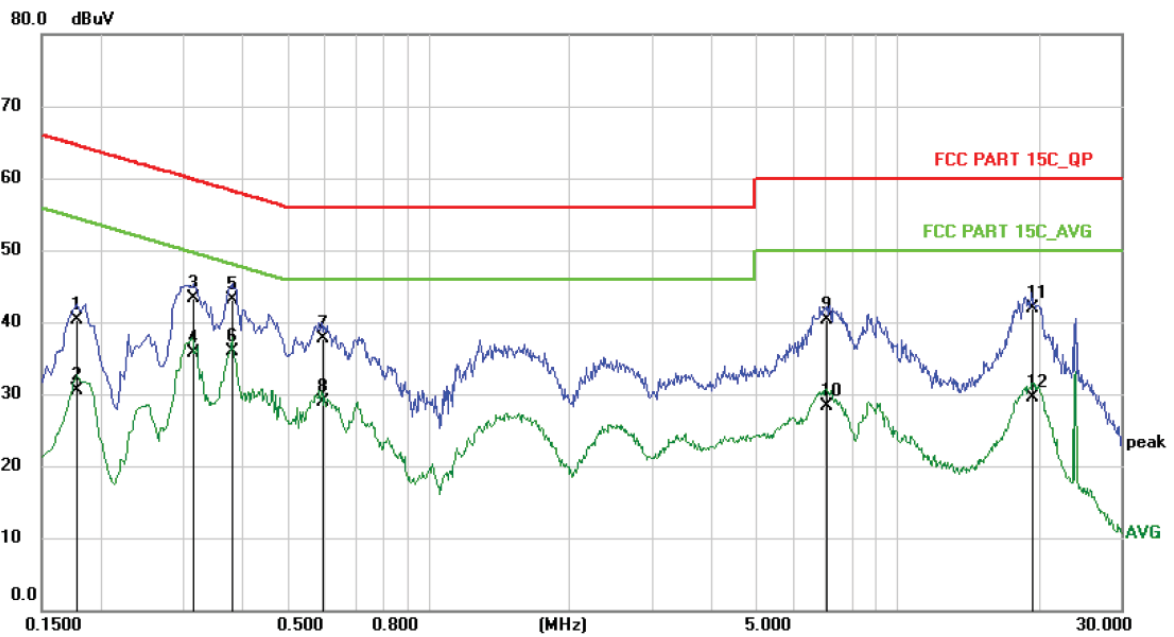
Please refer to the following pages.

M/N: 8274B-PR	Testing Voltage: DC 3.3V
Phase: L1	Detector: QP & AVG
Test Mode: 2 (U-NII-1)	

### Conducted Emission Measurement

Date: 2021/8/26

Time: 15:45:16



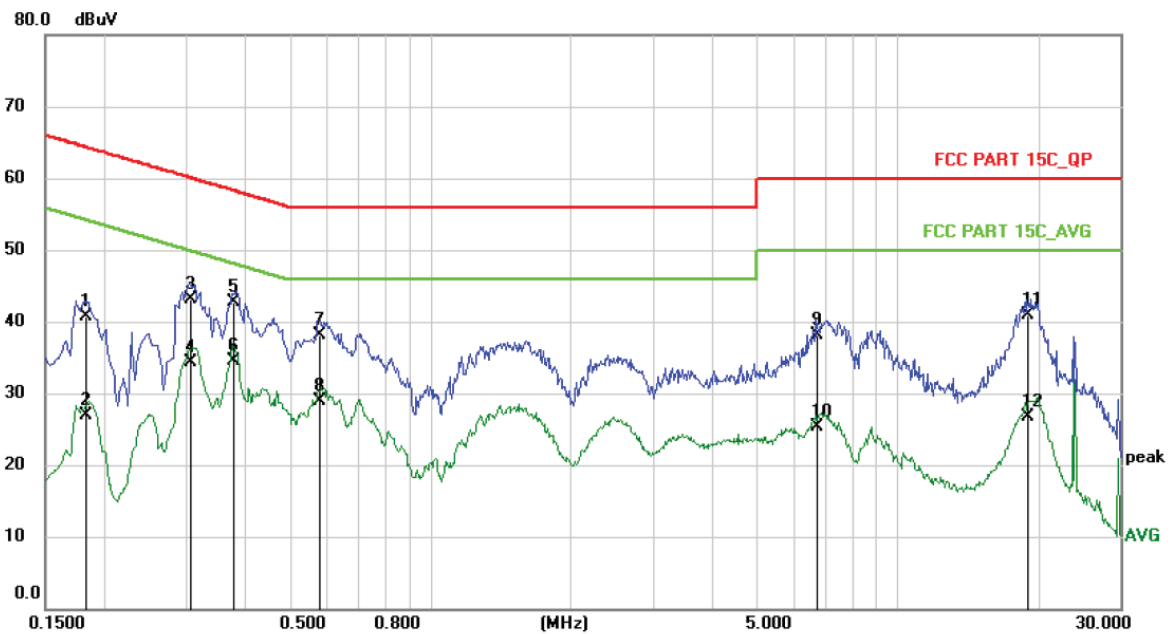
No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.1780	29.80	10.60	40.40	64.58	-24.18	QP	
2	0.1780	20.00	10.60	30.60	54.58	-23.98	AVG	
3	0.3140	32.70	10.60	43.30	59.86	-16.56	QP	
4	0.3140	25.20	10.60	35.80	49.86	-14.06	AVG	
5	0.3820	32.59	10.61	43.20	58.24	-15.04	QP	
6 *	0.3820	25.29	10.61	35.90	48.24	-12.34	AVG	
7	0.5940	27.16	10.64	37.80	56.00	-18.20	QP	
8	0.5940	18.26	10.64	28.90	46.00	-17.10	AVG	
9	7.0459	29.58	10.72	40.30	60.00	-19.70	QP	
10	7.0459	17.68	10.72	28.40	50.00	-21.60	AVG	
11	19.3659	31.24	10.76	42.00	60.00	-18.00	QP	
12	19.3659	18.74	10.76	29.50	50.00	-20.50	AVG	

M/N: 8274B-PR	Testing Voltage: DC 3.3V
Phase: N	Detector: QP & AVG
Test Mode: 2 (U-NII-1)	

### Conducted Emission Measurement

Date: 2021/8/26

Time: 15:52:56



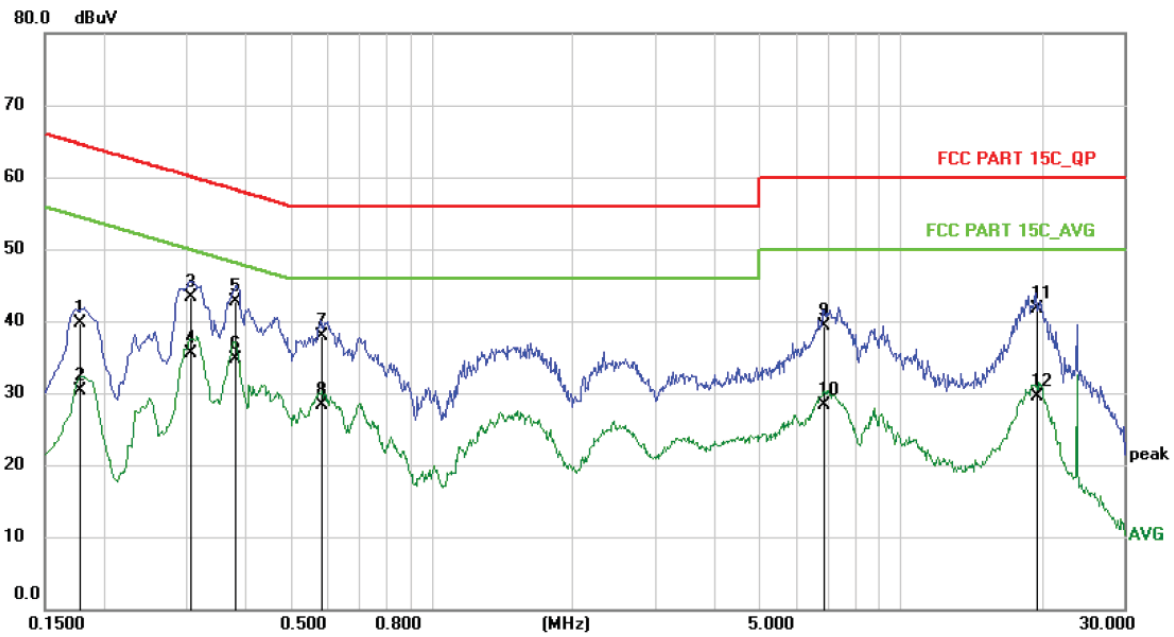
No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.1833	30.20	10.60	40.80	64.33	-23.53	QP	
2	0.1833	16.30	10.60	26.90	54.33	-27.43	AVG	
3	0.3060	32.60	10.60	43.20	60.08	-16.88	QP	
4	0.3060	23.70	10.60	34.30	50.08	-15.78	AVG	
5	0.3780	32.09	10.61	42.70	58.32	-15.62	QP	
6 *	0.3780	23.99	10.61	34.60	48.32	-13.72	AVG	
7	0.5780	27.56	10.64	38.20	56.00	-17.80	QP	
8	0.5780	18.26	10.64	28.90	46.00	-17.10	AVG	
9	6.7179	27.48	10.72	38.20	60.00	-21.80	QP	
10	6.7179	14.58	10.72	25.30	50.00	-24.70	AVG	
11	19.0059	30.24	10.76	41.00	60.00	-19.00	QP	
12	19.0059	15.94	10.76	26.70	50.00	-23.30	AVG	

M/N: 8274B-PR	Testing Voltage: DC 3.3V
Phase: L1	Detector: QP & AVG
Test Mode: 2 (U-NII-3)	

### Conducted Emission Measurement

Date: 2021/8/26

Time: 15:59:32



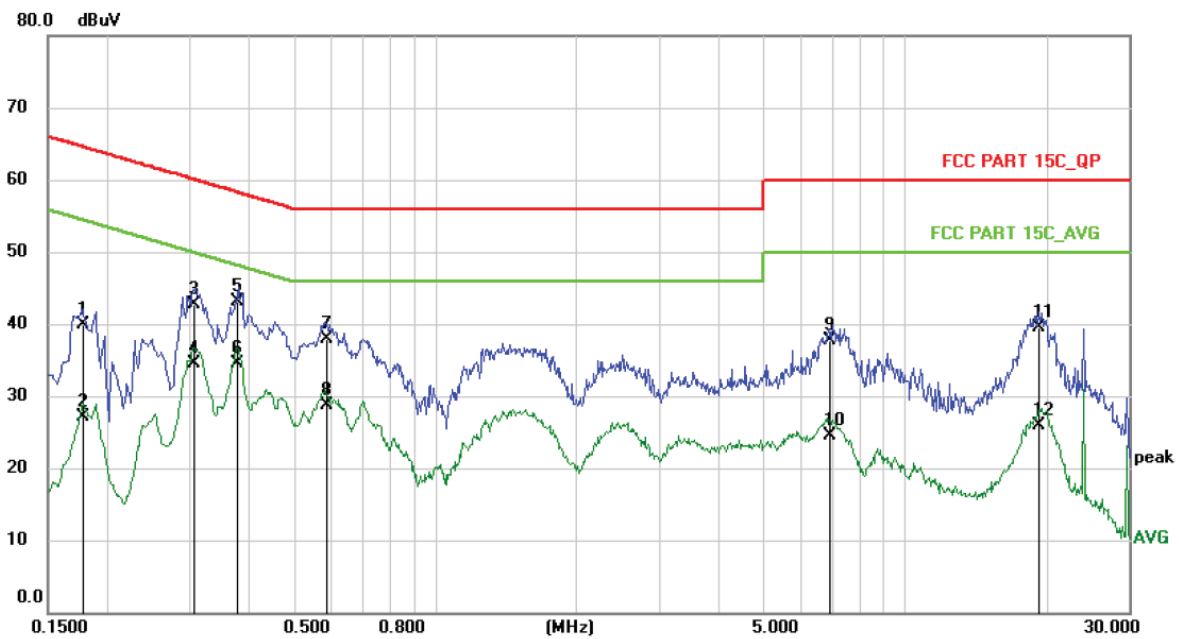
No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.1780	29.20	10.60	39.80	64.58	-24.78	QP	
2	0.1780	19.70	10.60	30.30	54.58	-24.28	AVG	
3	0.3060	32.80	10.60	43.40	60.08	-16.68	QP	
4	0.3060	24.90	10.60	35.50	50.08	-14.58	AVG	
5	0.3831	32.19	10.61	42.80	58.21	-15.41	QP	
6 *	0.3831	24.09	10.61	34.70	48.21	-13.51	AVG	
7	0.5820	27.36	10.64	38.00	56.00	-18.00	QP	
8	0.5820	17.66	10.64	28.30	46.00	-17.70	AVG	
9	6.8659	28.68	10.72	39.40	60.00	-20.60	QP	
10	6.8659	17.58	10.72	28.30	50.00	-21.70	AVG	
11	19.4779	31.04	10.76	41.80	60.00	-18.20	QP	
12	19.4779	18.74	10.76	29.50	50.00	-20.50	AVG	

M/N: 8274B-PR	Testing Voltage: DC 3.3V
Phase: N	Detector: QP & AVG
Test Mode: 2 (U-NII-3)	

### Conducted Emission Measurement

Date: 2021/8/26

Time: 16:05:09



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.1780	29.40	10.60	40.00	64.58	-24.58	QP	
2	0.1780	16.50	10.60	27.10	54.58	-27.48	AVG	
3	0.3060	32.20	10.60	42.80	60.08	-17.28	QP	
4	0.3060	24.00	10.60	34.60	50.08	-15.48	AVG	
5	0.3780	32.49	10.61	43.10	58.32	-15.22	QP	
6 *	0.3780	23.99	10.61	34.60	48.32	-13.72	AVG	
7	0.5860	27.36	10.64	38.00	56.00	-18.00	QP	
8	0.5860	18.06	10.64	28.70	46.00	-17.30	AVG	
9	6.8900	27.08	10.72	37.80	60.00	-22.20	QP	
10	6.8900	13.88	10.72	24.60	50.00	-25.40	AVG	
11	19.2419	28.84	10.76	39.60	60.00	-20.40	QP	
12	19.2419	15.24	10.76	26.00	50.00	-24.00	AVG	

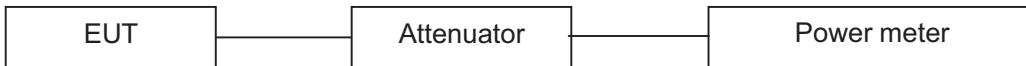


## 14.2 Maximum Conducted Output Power Measurement

### LIMITS

Operation Band	EUT category	Limit
<input checked="" type="checkbox"/> 5180~5240MHz	<input type="checkbox"/> Outdoor Access Point	1 Watt (30dBm) (Max. e.i.r.p ≤ 125mW( 21dBm) at any elevation angle above 30 degrees as measured from the horizon)
	<input type="checkbox"/> Fixed point-to-point Access Point	1 Watt (30dBm)
	<input type="checkbox"/> Indoor Access Point	1 Watt (30dBm)
	<input checked="" type="checkbox"/> Mobile and Portable client device	250mW (24dBm)
<input type="checkbox"/> 5260~5320MHz	-	250mW (24dBm)
<input type="checkbox"/> 5500~5700MHz	-	250mW (24dBm)
<input checked="" type="checkbox"/> 5745~5825MHz	-	1 Watt (30dBm)

### BLOCK DIAGRAM OF TEST SETUP



### TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 v02r01 for compliance testing of Unlicensed National Information Infrastructure (U-NII) Device -section (E) Maximum conducted output power.
3. Measurement using a power meter (PM) =b Method PM-G (Measurement using a gated RF average power meter).

### TEST RESULTS

PASS

Please refer to the following table.

U-NII-1					
Frequency MHz	Data Rate Mbps	Average Output Power dBm			Limit dBm
IEEE 802.11a Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5180	6	8.80			24
Channel: 5200	6	8.71			24
Channel: 5240	6	9.52			24
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5180	MCS0	ANT_1	ANT_2	Total	23.39
		6.92	5.79	9.40	
Channel: 5200	MCS0	6.58	6.32	9.46	23.39
Channel: 5240	MCS0	7.45	7.11	10.29	23.39
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5190	MCS0	6.59	5.87	9.25	23.39
Channel: 5230	MCS0	7.15	6.88	10.03	23.39
IEEE 802.11ac (VHT20) Mode (OFDM7.42, Antenna Gain=3.6dBi)					
Channel: 5180	MCS0	6.81	5.70	9.30	23.39
Channel: 5200	MCS0	6.57	6.29	9.44	23.39
Channel: 5240	MCS0	7.42	7.12	10.28	23.39
IEEE 802.11ac (VHT40) Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5190	MCS0	6.46	5.87	9.19	23.39
Channel: 5230	MCS0	7.11	6.88	10.01	23.39
IEEE 802.11ac (VHT80) Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5210	MCS0	6.86	6.54	9.71	23.39
Note: 1. As for IEEE 802.11a mode, both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded. 2. As for IEEE 802.11n/ac mode, EUT working in MIMO mode. Directional Gain for MIMO. 3. Directional Gain = 3.6dBi + 10log(2) = 6.61 dBi > 6 dBi, Therefore the limit drop of 0.61dBm.					

U-NII-3					
Frequency MHz	Data Rate Mbps	Average Output Power dBm			Limit dBm
IEEE 802.11a Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5745	6	8.11			30
Channel: 5785	6	8.29			30
Channel: 5825	6	7.20			30
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5745	MCS0	ANT_1	ANT_2	Total	29.39
		6.43	7.03	9.75	
Channel: 5785	MCS0	6.44	6.85	9.66	29.39
Channel: 5825	MCS0	5.29	6.03	8.69	29.39
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5755	MCS0	6.36	6.86	9.63	29.39
Channel: 5795	MCS0	6.03	6.41	9.24	29.39
IEEE 802.11ac (VHT20) Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5745	MCS0	6.43	6.82	9.64	29.39
Channel: 5785	MCS0	6.46	6.62	9.55	29.39
Channel: 5825	MCS0	5.27	5.94	8.63	29.39
IEEE 802.11ac (VHT40) Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5755	MCS0	6.38	6.84	9.63	29.39
Channel: 5795	MCS0	6.11	6.41	9.27	29.39
IEEE 802.11ac (VHT80) Mode (OFDM, Antenna Gain=3.6dBi)					
Channel: 5775	MCS0	6.48	7.03	9.78	29.39
Note: 4. As for IEEE 802.11a mode, both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded.					
5. As for IEEE 802.11n/ac mode, EUT working in MIMO mode. Directional Gain for MIMO.					
6. Directional Gain = 3.6dBi + 10log(2) = 6.61 dBi > 6 dBi, Therefore the limit drop of 0.61dBm.					

## 14.3 6dB Bandwidth Measurement

### LIMITS

The minimum 6dB bandwidth shall be at least 500 kHz

### BLOCK DIAGRAM OF TEST SETUP



### TEST PROCEDURES

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer was set as below according to ANSI C63.10 clause 11.8.1:

- a. Set the RBW = 100KHz.
- b. Set the VBW  $\geq 3 \times$  RBW
- c. Set the Detector = peak.
- d. Set the Sweep time = auto couple.
- e. Set the Trace mode = max hold.
- f. Allow trace to fully stabilize.
- g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

### TEST RESULTS

PASS

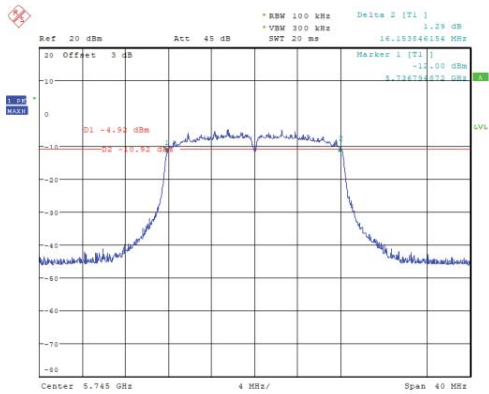
Please refer to the following tables.

U-NII-3 Band			
Frequency MHz	Data Rate Mbps	6dB Bandwidth MHz	Limit
IEEE 802.11a Mode (OFDM)			
Channel: 5745	6	16.154	>500KHz
Channel: 5785	6	16.218	>500KHz
Channel: 5825	6	16.154	>500KHz
IEEE 802.11n(HT20) Mode (OFDM)			
Channel: 5745	MCS0	17.115	>500KHz
Channel: 5785	MCS0	16.923	>500KHz
Channel: 5825	MCS0	17.115	>500KHz
IEEE 802.11n(HT40) Mode (OFDM)			
Channel: 5755	MCS0	35.897	>500KHz
Channel: 5795	MCS0	35.897	>500KHz
IEEE 802.11ac (VHT20) Mode (OFDM)			
Channel: 5745	MCS0	17.224	>500KHz
Channel: 5785	MCS0	16.923	>500KHz
Channel: 5825	MCS0	17.051	>500KHz
IEEE 802.11ac (VHT40) Mode (OFDM)			
Channel: 5755	MCS0	36.154	>500KHz
Channel: 5795	MCS0	35.769	>500KHz
IEEE 802.11ac (VHT80) Mode (OFDM)			
Channel: 5775	MCS0	75.641	>500KHz

Note: Both of antennas have considered during pre-test, but only the worst case (ANT\_1) was recorded.

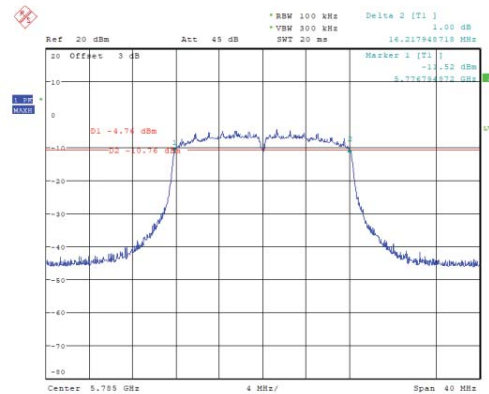
**U-NII-3**

**IEEE 802.11a Low Channel**



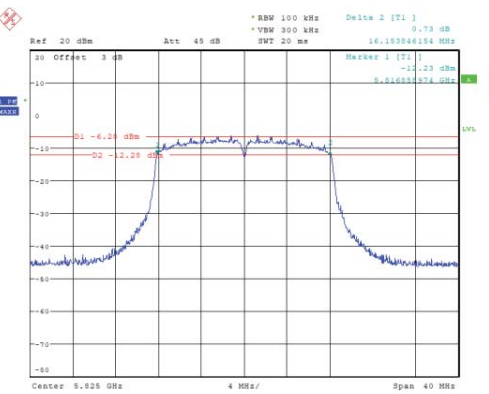
Date: 25.AUG.2021 01:17:40

**IEEE 802.11a Middle Channel**



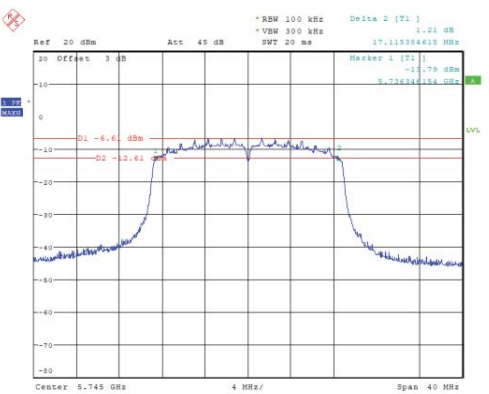
Date: 25.AUG.2021 01:19:15

**IEEE 802.11a High Channel**



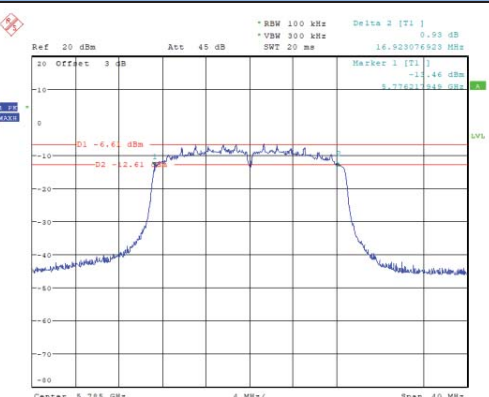
Date: 25.AUG.2021 01:21:30

**IEEE 802.11n(HT20) Low Channel**



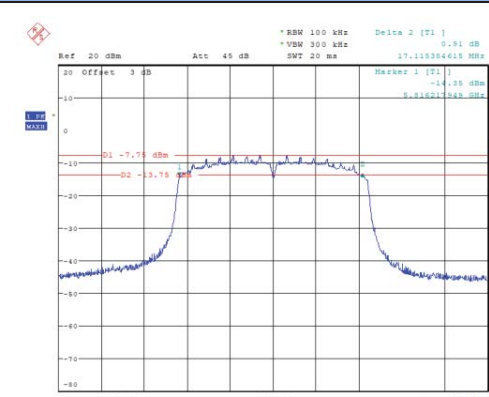
Date: 25.AUG.2021 01:24:58

**IEEE 802.11n(HT20) Middle Channel**



Date: 25.AUG.2021 01:29:51

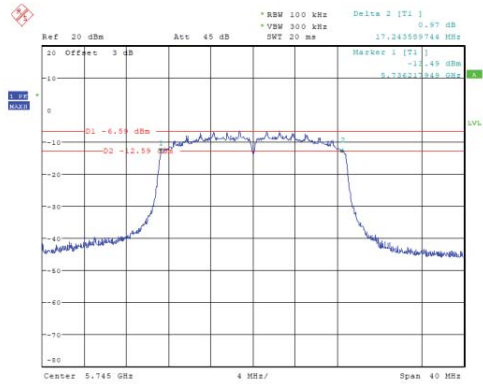
**IEEE 802.11n(HT20) High Channel**



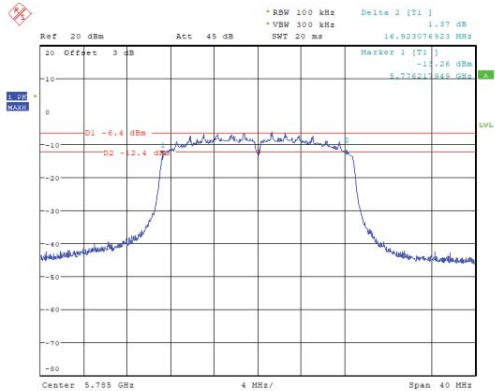
Date: 25.AUG.2021 01:31:59

U-NII-3

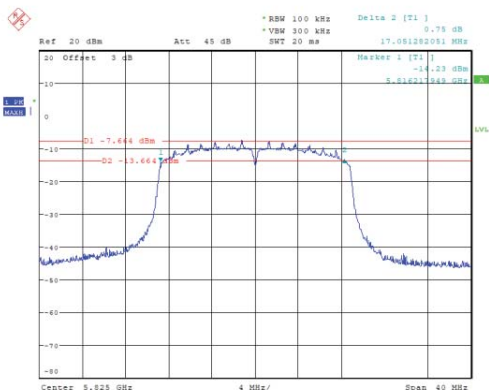
IEEE 802.11ac(VHT20) Low Channel



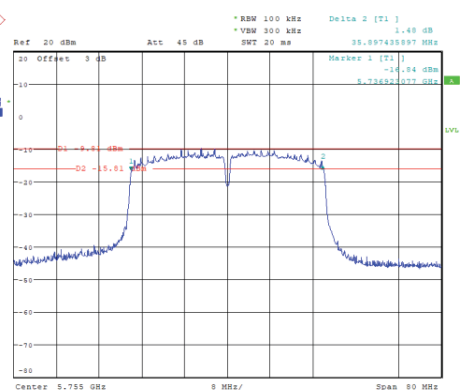
IEEE 802.11ac(VHT20) Middle Channel



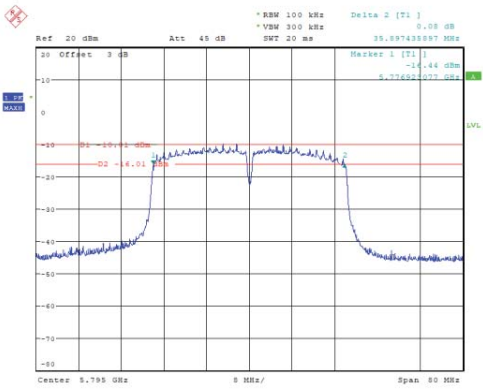
IEEE 802.11ac(VHT20) High Channel



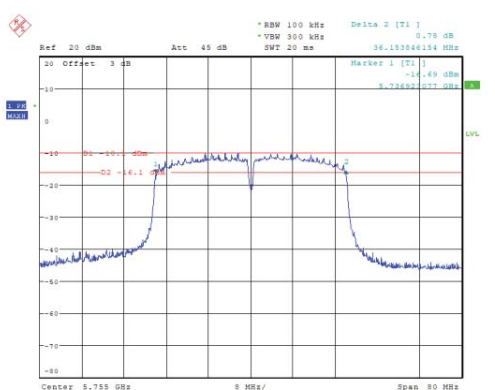
IEEE 802.11n(HT40) Low Channel



IEEE 802.11n(HT40) High Channel

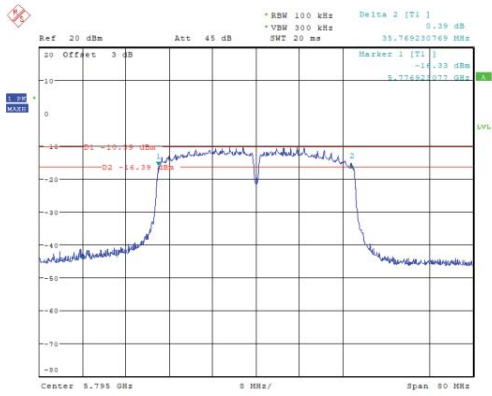


IEEE 802.11ac(VHT40) Low Channel



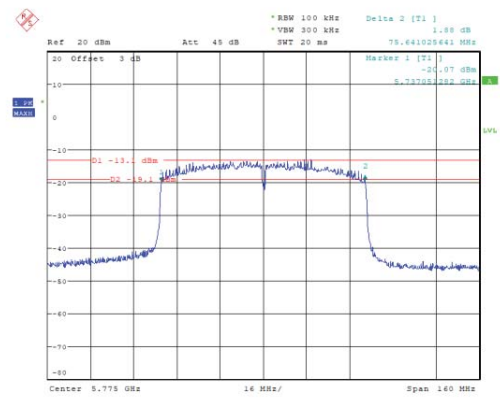
U-NII-3

IEEE 802.11ac(VHT40) High Channel



Date: 25.AUG.2021 01:45:51

IEEE 802.11ac(VHT80)



Date: 25.AUG.2021 01:50:07

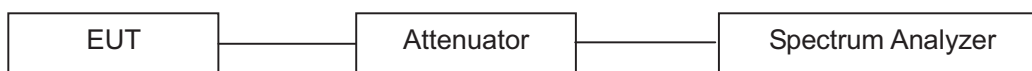


## 14.4 26dB Bandwidth & 99% Occupied Bandwidth

### LIMITS

No restriction limits.

### BLOCK DIAGRAM OF TEST SETUP



### TEST PROCEDURES

The antenna port of the EUT was connected to the input of a spectrum analyzer.

Analyzer was set as below according to FCC KDB789033(v02r01):

- a. For 26dB bandwidth, Set the RBW = Approximately 1% of the emission bandwidth
  - b. Set the VBW > RBW
  - c. Detector = peak.
  - d. Sweep time = auto couple.
  - e. Trace mode = max hold.
  - f. Allow trace to fully stabilize.
  - g. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 26 dB relative to the maximum level measured in the fundamental emission.
- 
1. For 99% occupied bandwidth, Set the RBW = 1% to 5% of the OBW
  2. Set the VBW  $\geq 3 \times$  RBW
  3. Detector = peak.
  4. Span = 1.5 times to 5.0 times the OBW
  5. Sweep time = auto couple.
  6. Trace mode = max hold. Allow trace to fully stabilize.
  7. Use the 99% power bandwidth function of the spectrum analyzer measure the occupied bandwidth.

**TEST RESULTS**

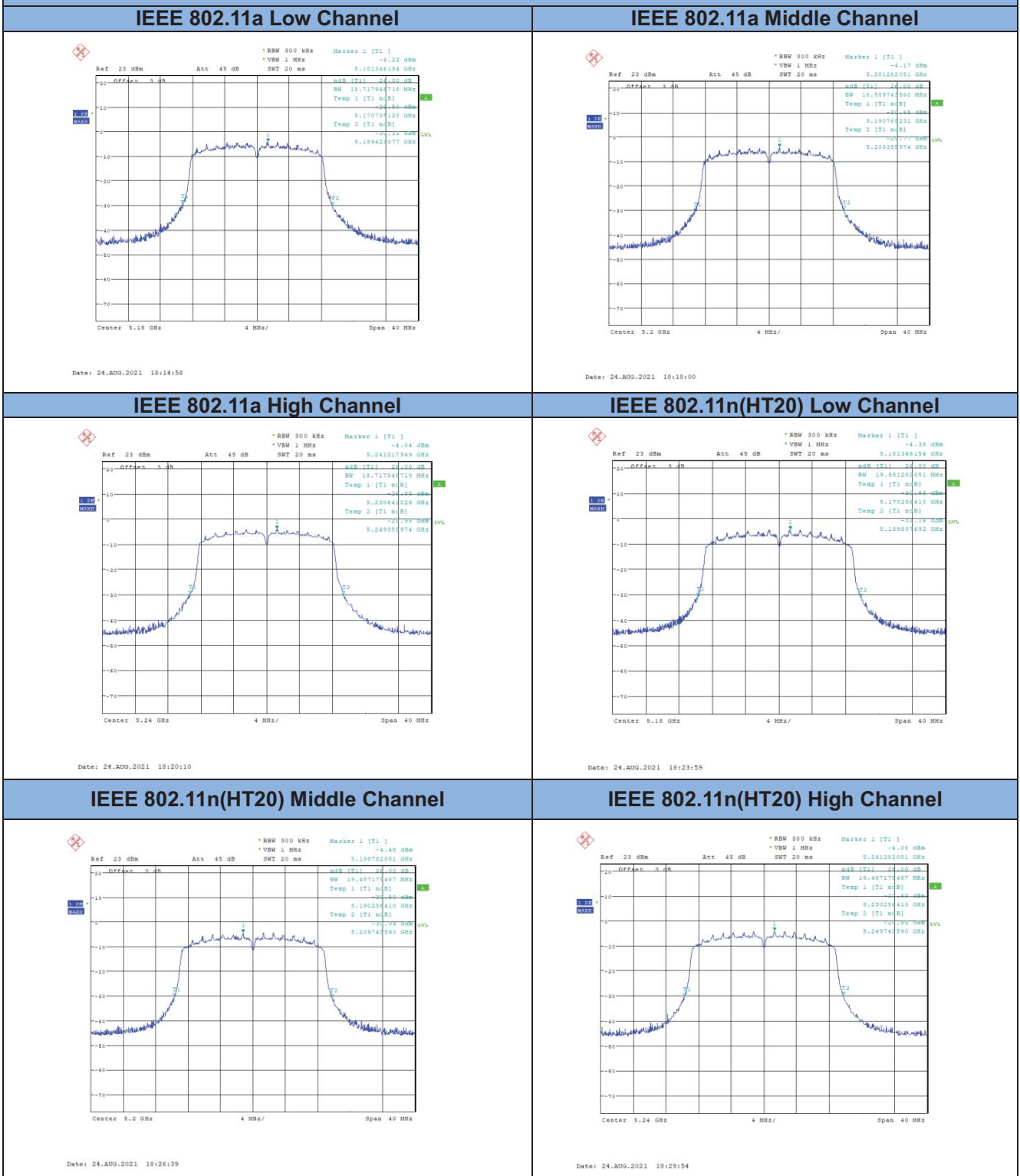
PASS

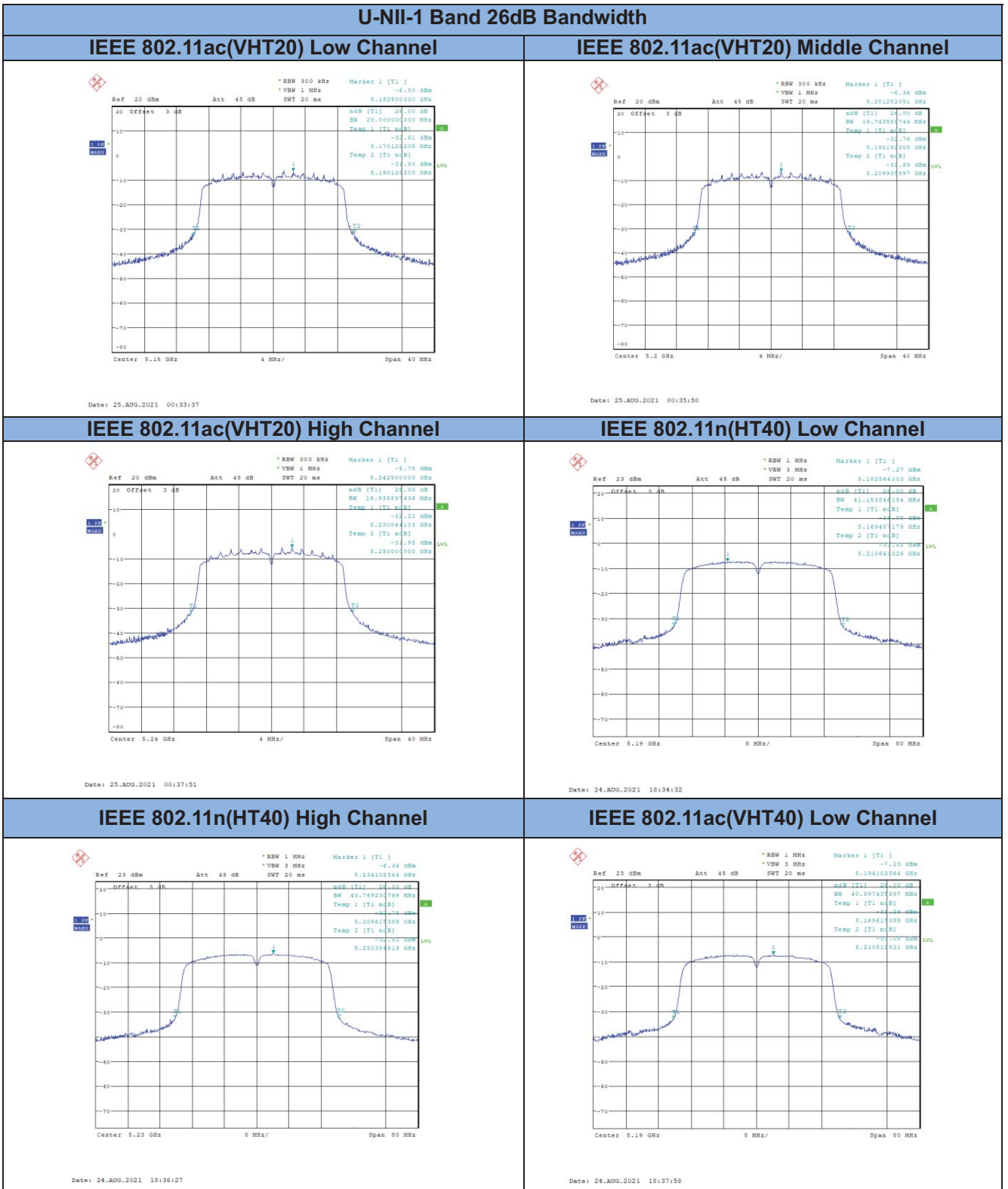
Please refer to the following table.

U-NII-1 Band			
Frequency MHz	Data Rate Mbps	26dB Bandwidth MHz	99% Occupied Bandwidth MHz
IEEE 802.11a Mode (OFDM)			
Channel: 5180	6	18.718	16.410
Channel: 5200	6	18.590	16.410
Channel: 5240	6	18.718	16.346
IEEE 802.11n(HT20) Mode (OFDM)			
Channel: 5180	MCS0	19.551	17.500
Channel: 5200	MCS0	19.487	17.500
Channel: 5240	MCS0	19.487	17.500
IEEE 802.11n(HT40) Mode (OFDM)			
Channel: 5190	MCS0	41.154	36.282
Channel: 5230	MCS0	40.769	36.154
IEEE 802.11ac (VHT20) Mode (OFDM)			
Channel: 5180	MCS0	20.000	17.564
Channel: 5200	MCS0	19.744	17.564
Channel: 5240	MCS0	19.936	17.500
IEEE 802.11ac (VHT40) Mode (OFDM)			
Channel: 5190	MCS0	40.897	36.282
Channel: 5230	MCS0	40.769	36.154
IEEE 802.11ac (VHT80) Mode (OFDM)			
Channel: 5210	MCS0	82.564	75.385
Note: Both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded.			

U-NII-3 Band			
Frequency MHz	Data Rate Mbps	26dB Bandwidth MHz	99% Occupied Bandwidth MHz
IEEE 802.11a Mode (OFDM)			
Channel: 5745	6	18.590	16.346
Channel: 5785	6	18.590	16.346
Channel: 5825	6	18.654	16.346
IEEE 802.11n(HT20) Mode (OFDM)			
Channel: 5745	MCS0	19.423	17.564
Channel: 5785	MCS0	19.487	17.500
Channel: 5825	MCS0	19.487	17.500
IEEE 802.11n(HT40) Mode (OFDM)			
Channel: 5755	MCS0	40.513	36.154
Channel: 5795	MCS0	40.513	36.154
IEEE 802.11ac (VHT20) Mode (OFDM)			
Channel: 5745	MCS0	19.423	17.564
Channel: 5785	MCS0	19.551	17.500
Channel: 5825	MCS0	19.551	17.500
IEEE 802.11ac (VHT40) Mode (OFDM)			
Channel: 5755	MCS0	40.385	36.154
Channel: 5795	MCS0	40.513	36.154
IEEE 802.11ac (VHT80) Mode (OFDM)			
Channel: 5775	MCS0	80.769	74.872
Note: Both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded.			

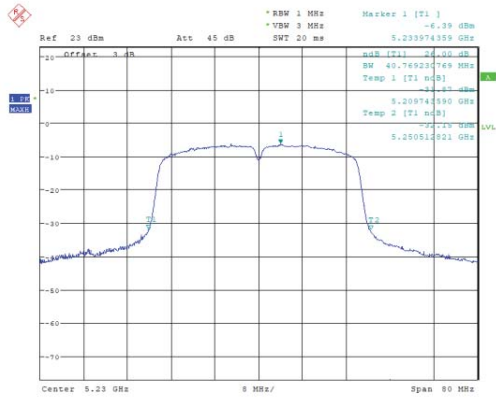
**U-NII-1 Band 26dB Bandwidth**





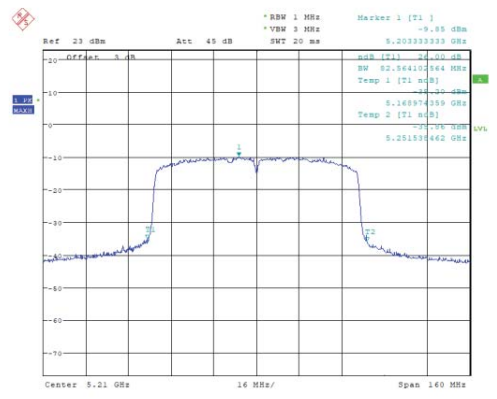
**U-NII-1 Band 26dB Bandwidth**

**IEEE 802.11ac(VHT40) High Channel**



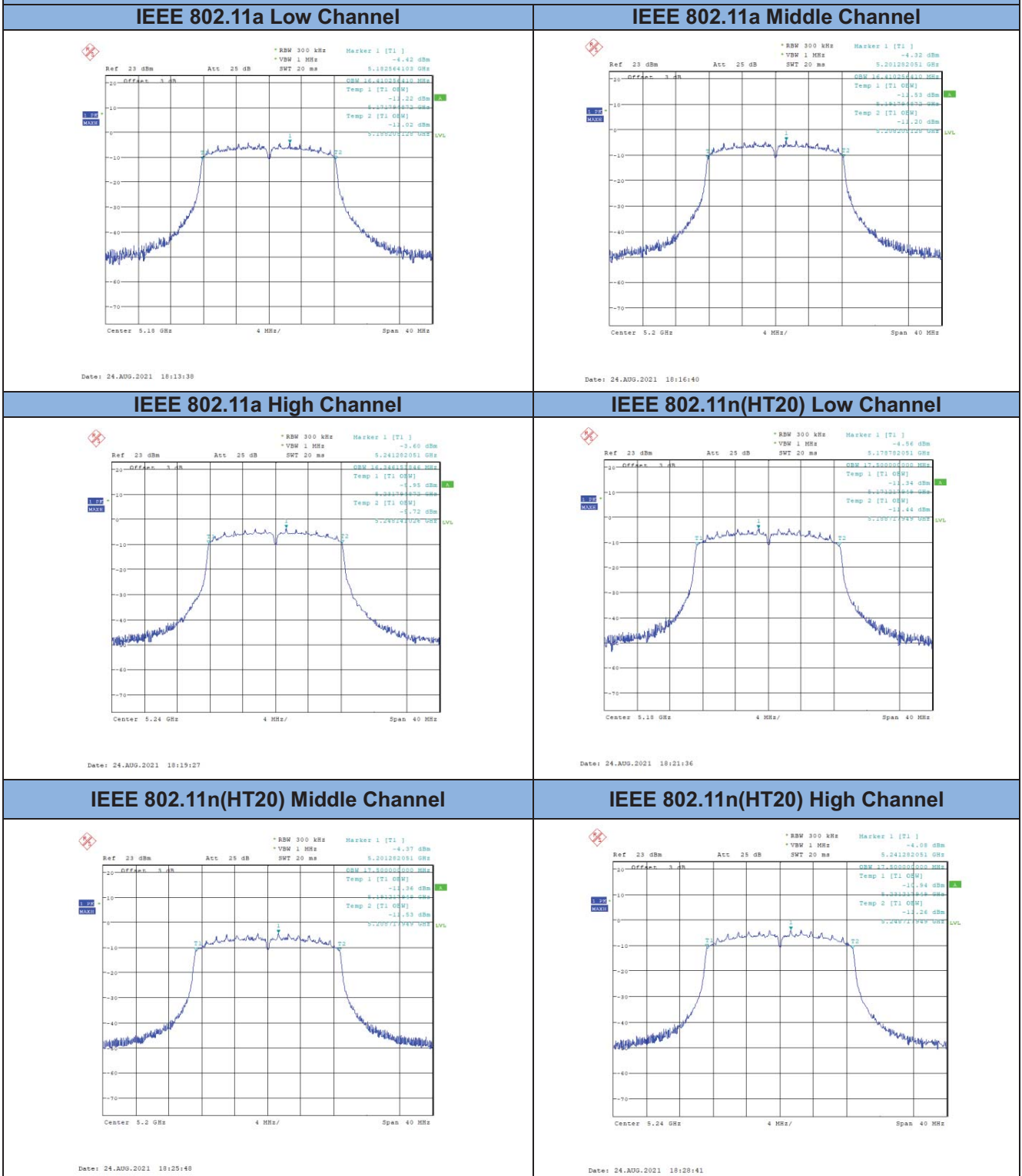
Date: 24.AUG.2021 18:39:59

**IEEE 802.11ac(VHT80)**



Date: 24.AUG.2021 18:41:26

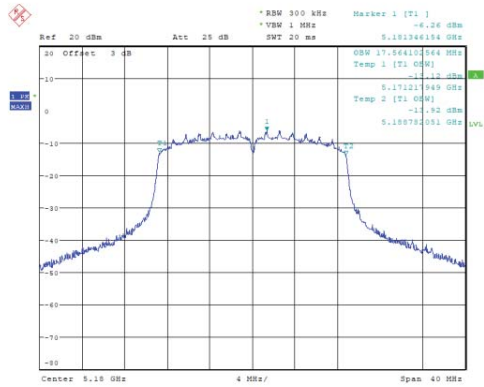
**U-NII-1 Band 99% Occupied Bandwidth**





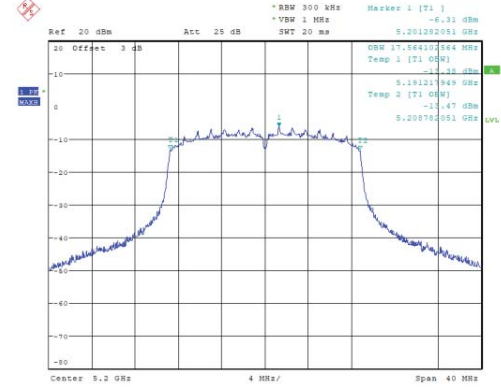
**U-NII-1 Band 99% Occupied Bandwidth**

**IEEE 802.11ac(VHT20) Low Channel**



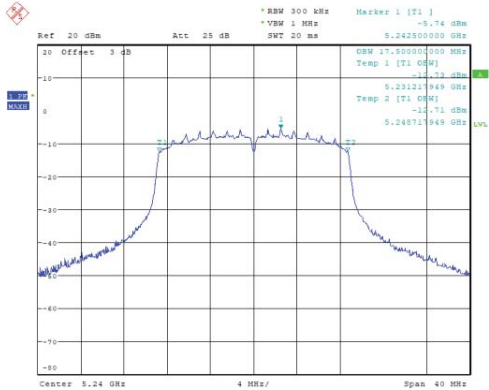
Date: 25.AUG.2021 00:33:19

**IEEE 802.11ac(VHT20) Middle Channel**



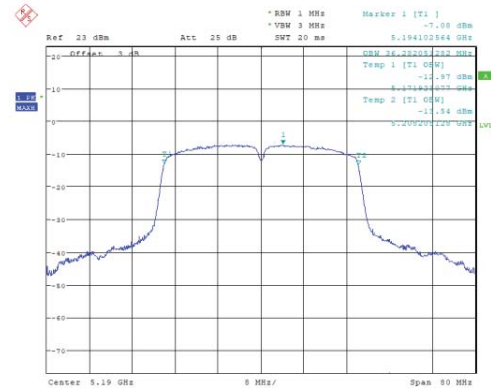
Date: 25.AUG.2021 00:34:57

**IEEE 802.11ac(VHT20) High Channel**



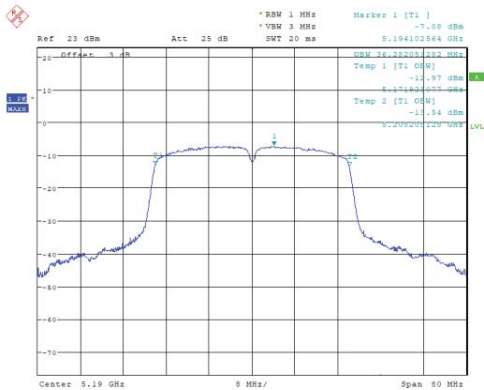
Date: 25.AUG.2021 00:36:43

**IEEE 802.11n(HT40) Low Channel**



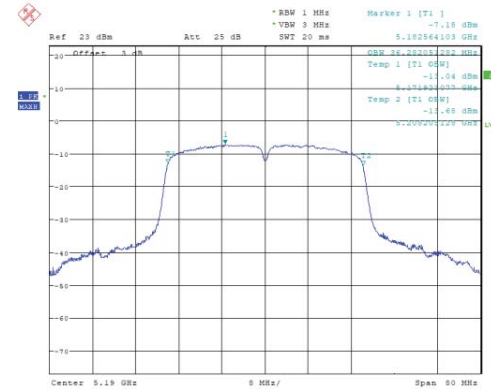
Date: 24.AUG.2021 18:34:14

**IEEE 802.11n(HT40) High Channel**



Date: 24.AUG.2021 18:34:14

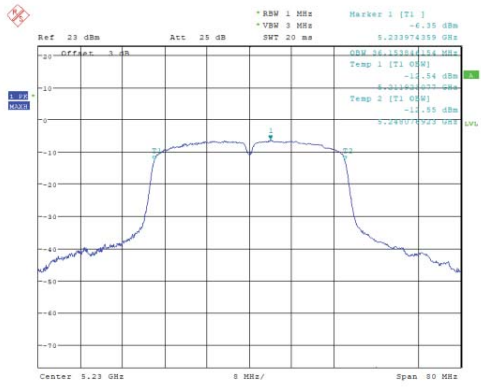
**IEEE 802.11ac(VHT40) Low Channel**



Date: 24.AUG.2021 18:37:40

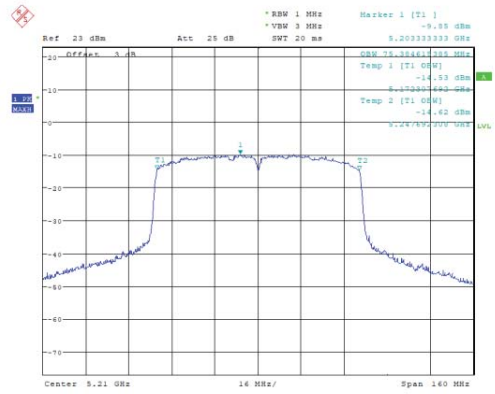
**U-NII-1 Band 99% Occupied Bandwidth**

**IEEE 802.11ac(VHT40) High Channel**



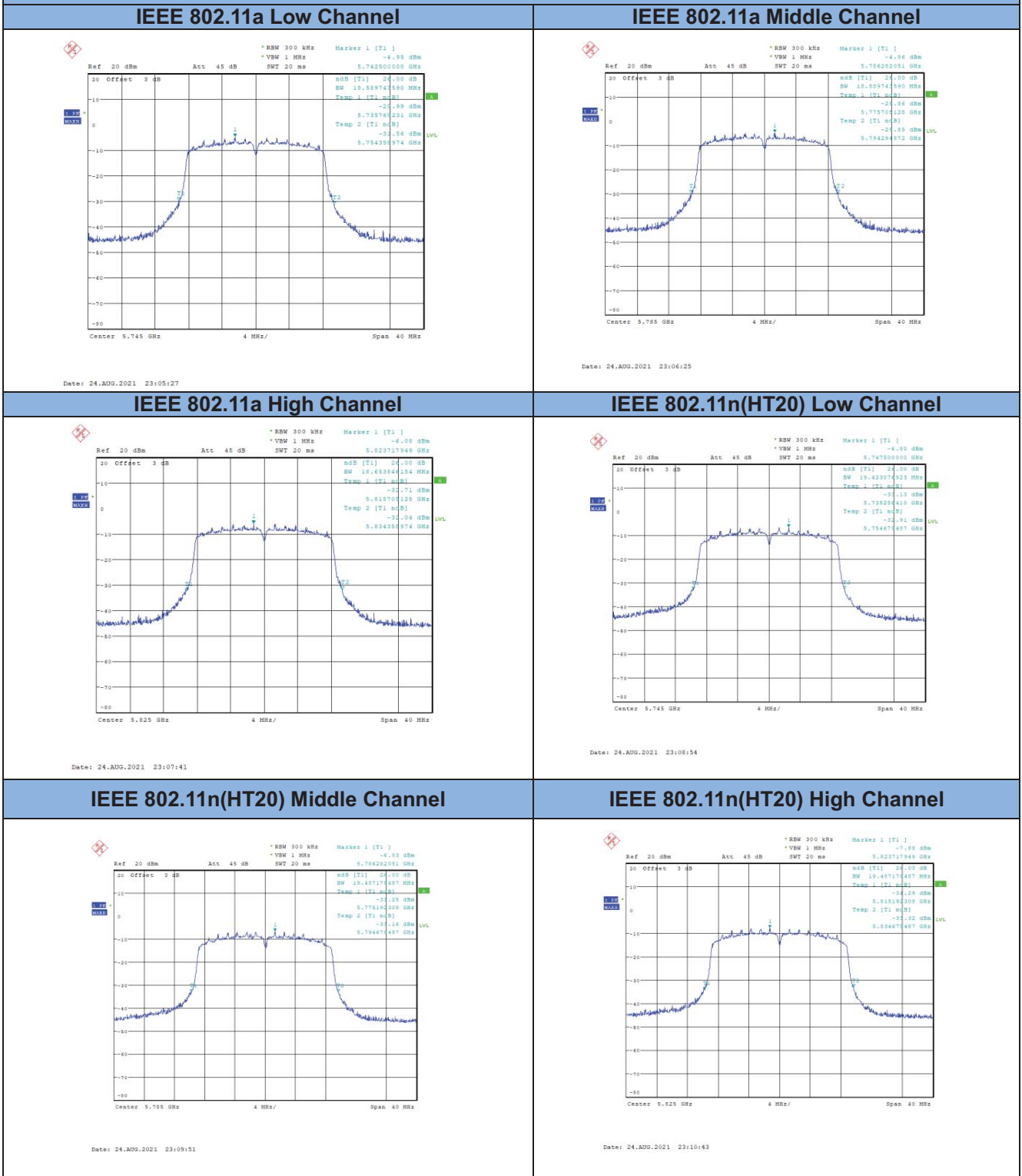
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**IEEE 802.11ac(VHT80)**



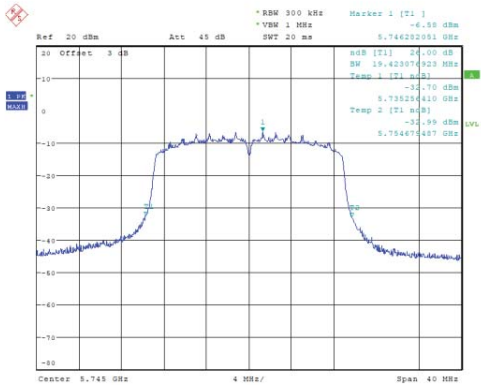
Date: 24.AUG.2021 18:40:59

**U-NII-3 Band 26dB Bandwidth**



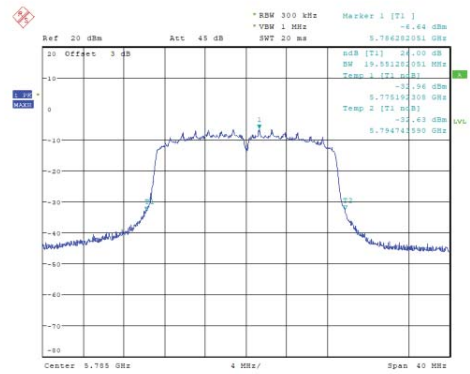
**U-NII-3 Band 26dB Bandwidth**

**IEEE 802.11ac(VHT20) Low Channel**



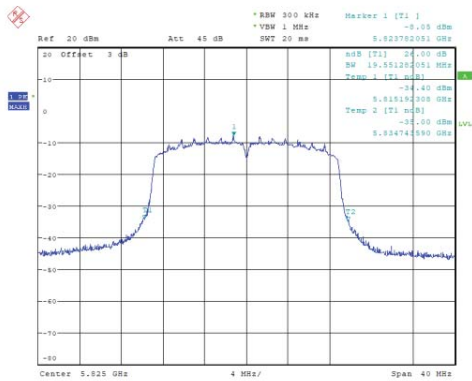
Date: 24.AUG.2021 23:11:50

**IEEE 802.11ac(VHT20) Middle Channel**



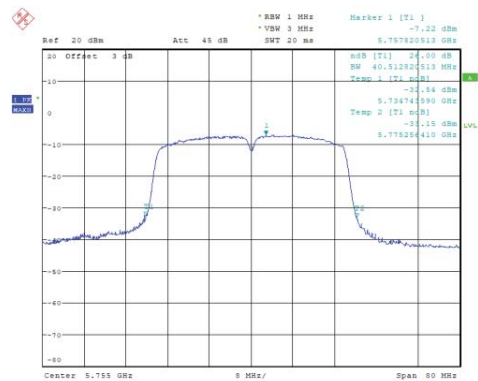
Date: 24.AUG.2021 23:13:01

**IEEE 802.11ac(VHT20) High Channel**



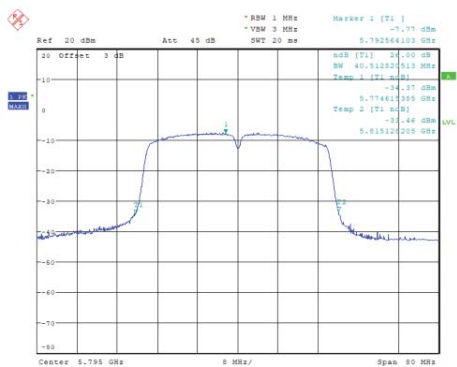
Date: 25.AUG.2021 00:24:34

**IEEE 802.11n(HT40) Low Channel**



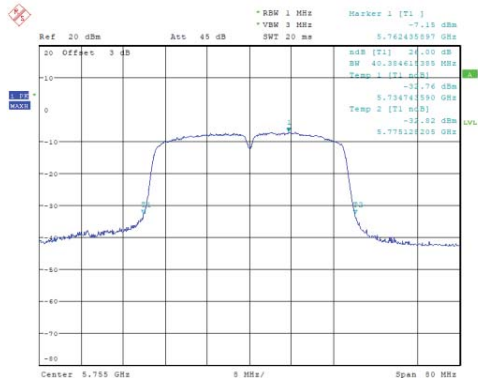
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**IEEE 802.11n(HT40) High Channel**



Date: 24.AUG.2021 23:17:13

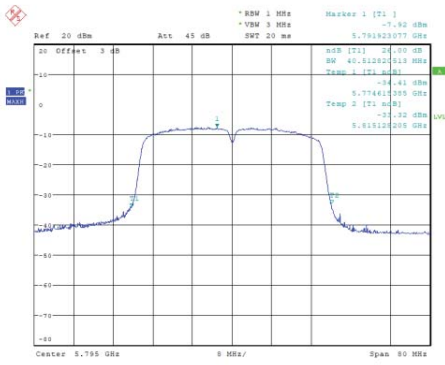
**IEEE 802.11ac(VHT40) Low Channel**



Date: 24.AUG.2021 23:18:40

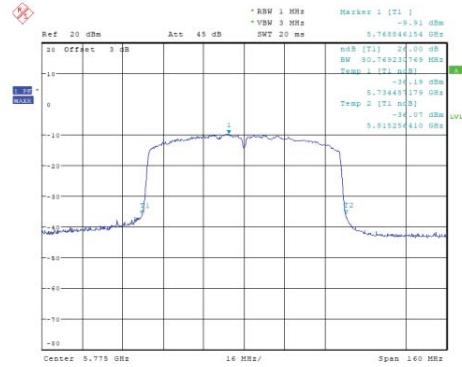
**U-NII-3 Band 26dB Bandwidth**

**IEEE 802.11ac(VHT40) High Channel**



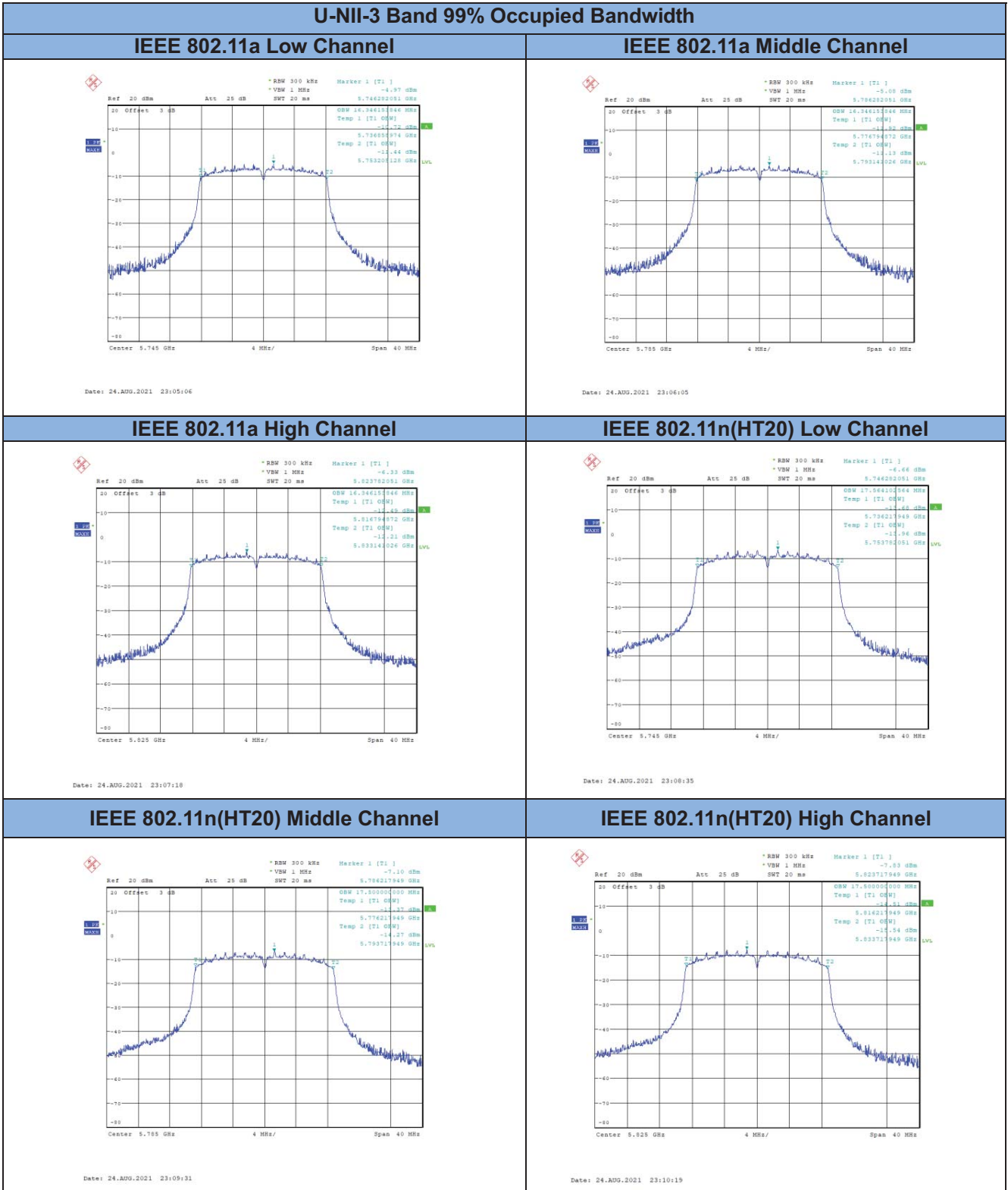
Date: 24.AUG.2021 23:19:27

**IEEE 802.11ac(VHT80)**



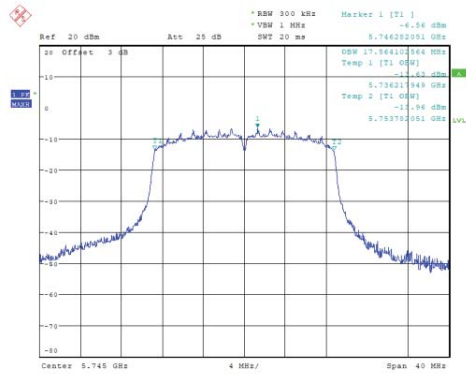
Date: 24.AUG.2021 23:20:28

**U-NII-3 Band 99% Occupied Bandwidth**



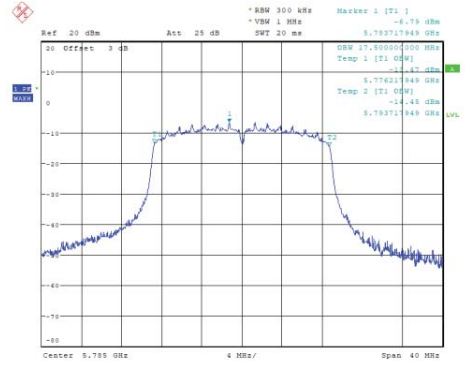
### U-NII-3 Band 99% Occupied Bandwidth

**IEEE 802.11ac(VHT20) Low Channel**



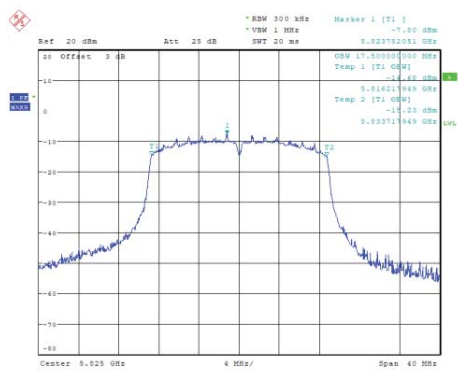
Date: 24.AUG.2021 23:11:32

**IEEE 802.11ac(VHT20) Middle Channel**



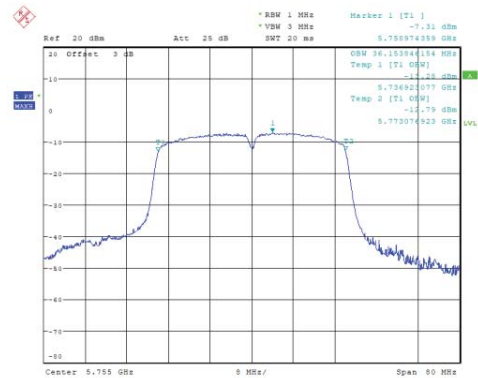
Date: 24.AUG.2021 23:12:26

**IEEE 802.11ac(VHT20) High Channel**



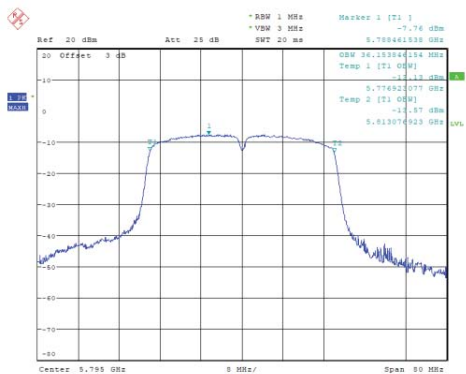
Date: 25.AUG.2021 00:26:14

**IEEE 802.11n(HT40) Low Channel**



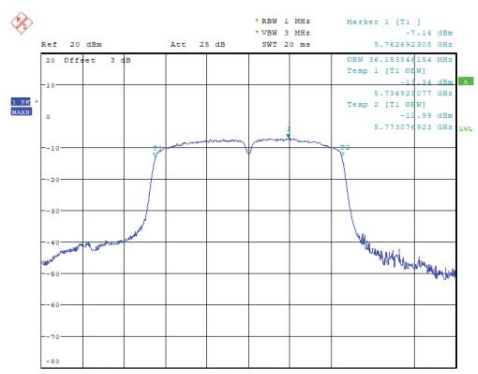
Date: 24.AUG.2021 23:14:04

**IEEE 802.11n(HT40) High Channel**



Date: 24.AUG.2021 23:16:44

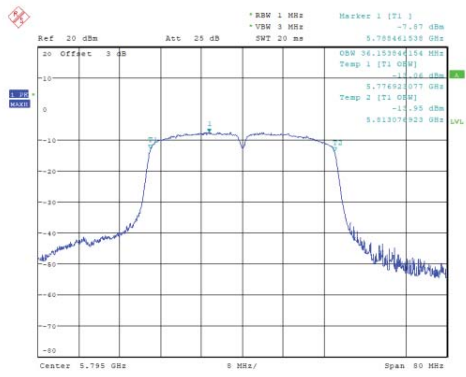
**IEEE 802.11ac(VHT40) Low Channel**



Date: 24.AUG.2021 23:18:08

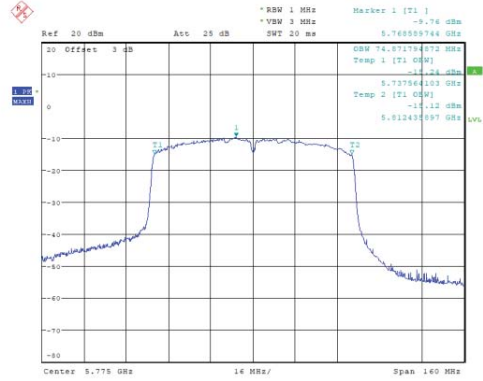
**U-NII-3 Band 99% Occupied Bandwidth**

**IEEE 802.11ac(VHT40) High Channel**



Date: 24.AUG.2021 23:19:07

**IEEE 802.11ac(VHT80)**



Date: 24.AUG.2021 23:20:13



## 14.5 Power Spectral Density

### LIMITS

Operation Band		Limit
<input checked="" type="checkbox"/> 5180~5240MHz	<input type="checkbox"/> Outdoor access point	17 dBm/MHz
	<input type="checkbox"/> Indoor access point	17 dBm/MHz
	<input type="checkbox"/> Fixed point-to-point access points	17 dBm/MHz
	<input checked="" type="checkbox"/> Client devices	11 dBm/MHz
<input type="checkbox"/> 5260~5320MHz	-	11 dBm/MHz
<input type="checkbox"/> 5500~5700MHz	-	11 dBm/MHz
<input checked="" type="checkbox"/> 5745~5825MHz	-	30 dBm/500kHz

### BLOCK DIAGRAM OF TEST SETUP



### TEST PROCEDURES

The antenna port of the EUT was connected to the input of a spectrum analyzer.

Analyzer was set as below according to FCC KDB789033 (v02r01):

- a. Set analyzer center frequency to center frequency
- b. Set the RBW to: 1MHz
- c. Set the VBW to: 3MHz
- d. Detector = RMS
- e. Sweep time = auto couple
- f. Trace Average = 100 times
- g. If measured bandwidth of Maximum PSD is specified in 500kHz, add  $10\log(500\text{kHz}/\text{RBW})$  to the measured result, whereas RBW (<500kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement. Allow trace to fully stabilize.

**TEST RESULTS**

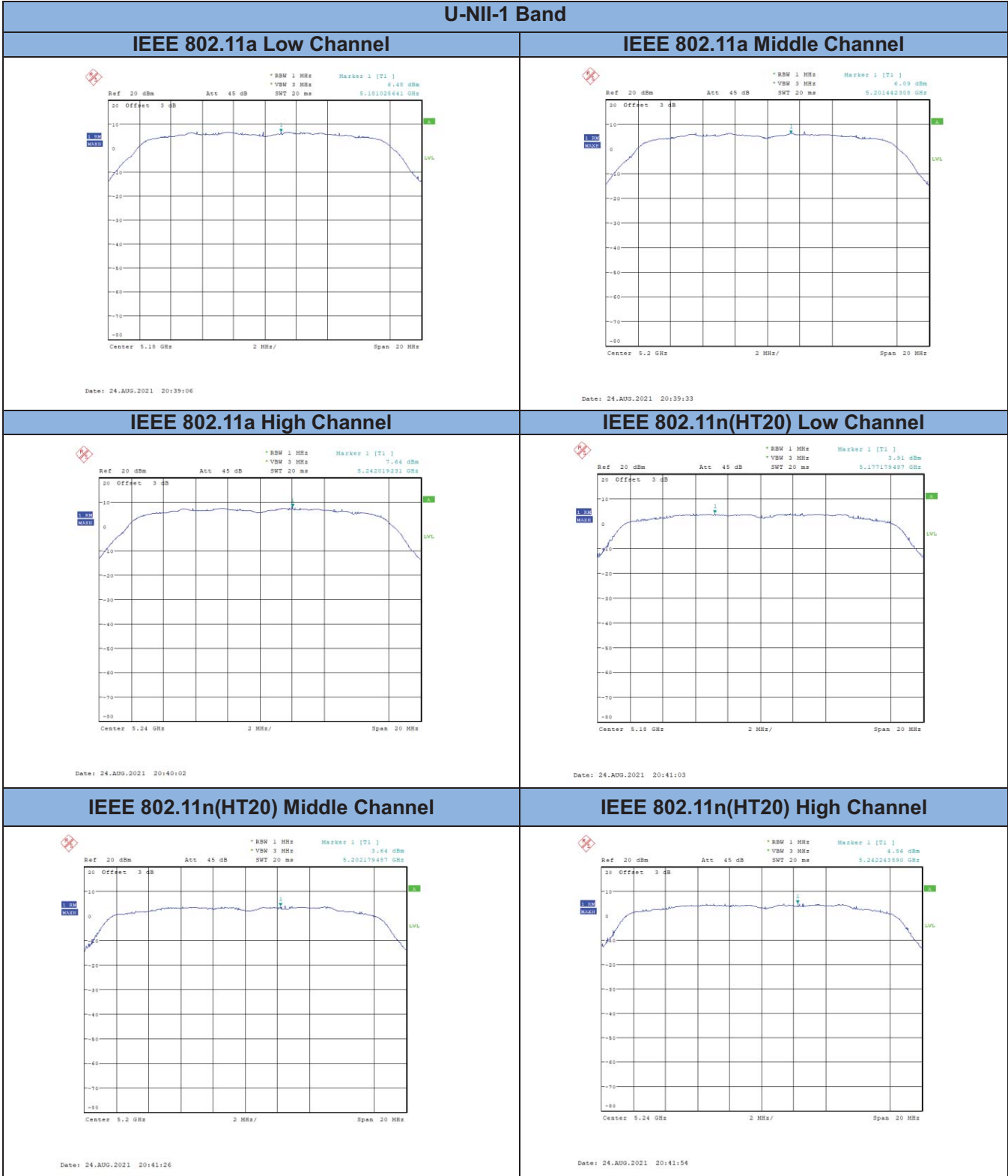
PASS

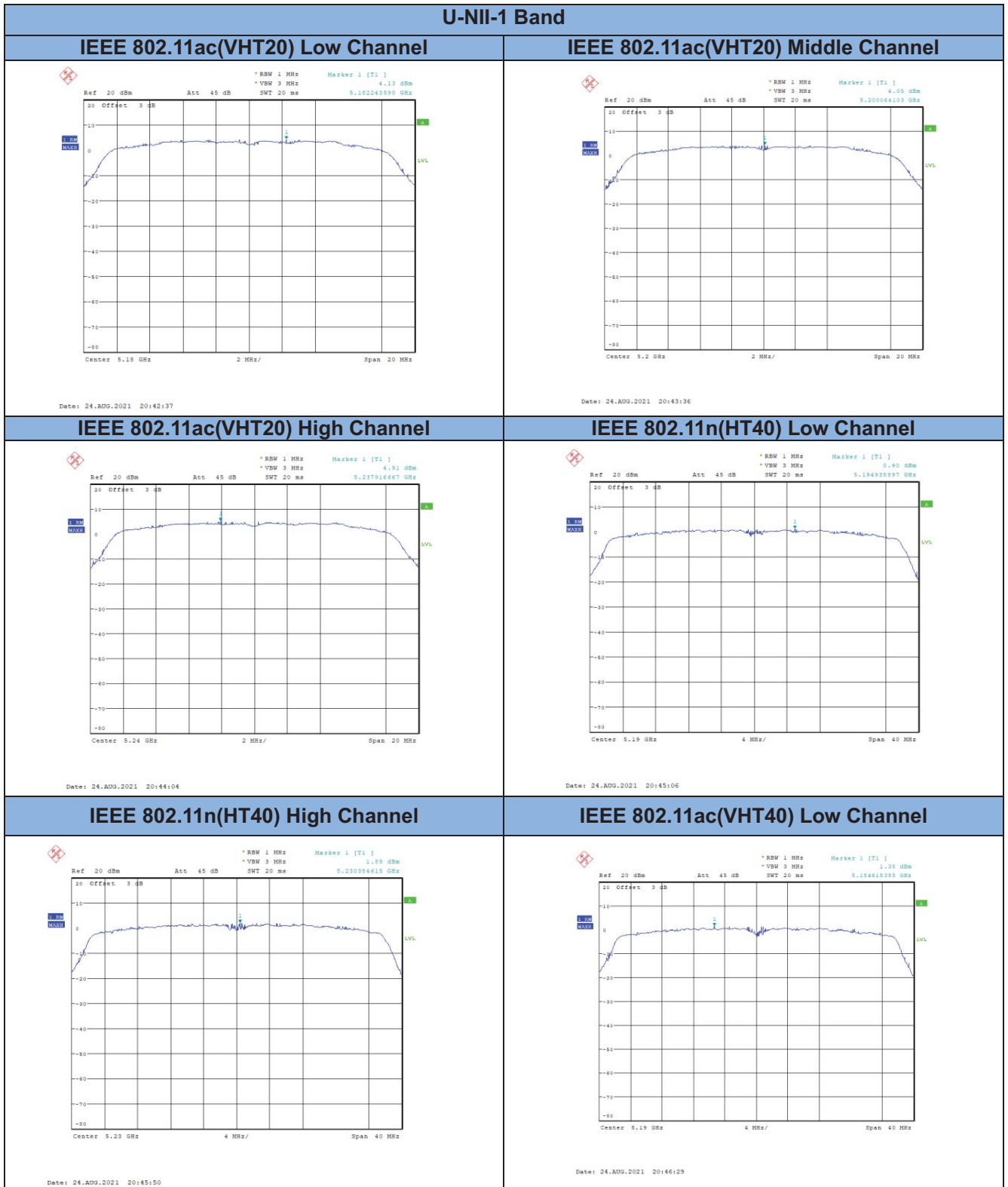
Please refer to the following test plots.

U-NII-1 Band						
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz		Total PSD with duty cycle factor	Limit dBm/ MHz
IEEE 802.11a Mode (OFDM, Antenna Gain=3.6dBi)						
Channel: 5180	6	0.18	6.48		6.66	11
Channel: 5200	6		6.09		6.27	11
Channel: 5240	6		7.64		7.82	11
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=3.6dBi)						
Channel: 5180	MCS0	0.19	ANT_1	ANT_2	-	-
			3.91	2.95	6.66	10.39
Channel: 5200	MCS0		3.64	3.52	6.79	10.39
Channel: 5240	MCS0		4.86	4.38	7.82	10.39
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=3.6Bi)						
Channel: 5190	MCS0	0.39	0.90	0.89	3.91	10.39
Channel: 5230	MCS0		1.85	2.01	5.33	10.39
IEEE 802.11ac (VHT20) Mode (OF4.91DM, Antenna Gain=3.6dBi)						
Channel: 5180	MCS0	0.19	4.13	3.19	6.88	10.39
Channel: 5200	MCS0		4.05	3.88	7.16	10.39
Channel: 5240	MCS0		4.91	4.43	7.88	10.39
IEEE 802.11ac (VHT40) Mode (OFDM, Antenna Gain=3.6dBi)						
Channel: 5190	MCS0	0.38	1.38	1.11	4.64	10.39
Channel: 5230	MCS0		2.88	2.52	6.10	10.39
IEEE 802.11ac (VHT80) Mode (OFDM, Antenna Gain=3.6dBi)						
Channel: 5210	MCS0	0.74	1.38	0.42	4.68	10.39
Note: 1. As for IEEE 802.11a mode, both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded. 2. As for IEEE 802.11n/ac mode, EUT working in MIMO mode. 3. Please refer to section 13 for duty cycle factor 4. Directional Gain = 3.6dBi + 10log(2) =6.61dBi >6 dBi, Therefore the limit drop of 0.61dBm.						

U-NII-3 Band								
Frequency MHz	Data Rate Mbps	Duty Cycle Factor (dB)	PSD dBm/MHz		PSD dBm/500kHz		Total PSD with duty cycle factor	Limit dBm/MHz
IEEE 802.11a Mode (OFDM, Antenna Gain=3.6dBi)								
Channel: 5745	6	0.18	5.78		2.77		2.95	30
Channel: 5785	6		5.75		2.74		2.92	30
Channel: 5825	6		4.86		1.85		2.03	30
IEEE 802.11n(HT20)Mode (OFDM, Antenna Gain=3.6dBi)								
Channel: 5745	MCS0	0.19	ANT_1	ANT_2	ANT_1	ANT_2	-	-
			3.61	4.39	0.60	1.38	4.10	29.39
Channel: 5785	MCS0		3.46	3.78	0.45	0.77	3.71	29.39
Channel: 5825	MCS0		2.09	3.18	-0.92	0.17	2.76	29.39
IEEE 802.11n(HT40) Mode (OFDM, Antenna Gain=3.6Bi)								
Channel: 5755	MCS0	0.37	0.92	1.71	-2.09	-1.30	1.70	29.39
Channel: 5795	MCS0		0.71	1.67	-2.30	-1.34	-1.58	29.39
IEEE 802.11ac (VHT20) Mode (OF4.91DM, Antenna Gain=3.6dBi)								
Channel: 5745	MCS0	0.19	4.24	4.56	1.23	1.55	4.59	29.39
Channel: 5785	MCS0		3.99	4.38	0.98	1.37	4.38	29.39
Channel: 5825	MCS0		2.64	3.17	-0.37	0.16	3.10	29.39
IEEE 802.11ac (VHT40) Mode (OFDM, Antenna Gain=3.6dBi)								
Channel: 5755	MCS0	0.42	1.83	2.11	-1.18	-0.90	2.41	29.39
Channel: 5795	MCS0		0.92	2.42	-2.09	-0.59	2.15	29.39
IEEE 802.11ac (VHT80) Mode (OFDM, Antenna Gain=3.6dBi)								
Channel: 5775	MCS0	0.76	1.83	1.64	-1.18	-1.37	2.50	29.39
Note:	<p>5. As for IEEE 802.11a mode, both of antennas have considered during pre-test, but only the worst case (ANT_1) was recorded.</p> <p>6. As for IEEE 802.11n/ac mode, EUT working in MIMO mode.</p> <p>7. Please refer to section 13 for duty cycle factor</p> <p>8. Directional Gain = 3.6dBi + 10log(2) =6.61dBi &gt;6 dBi, Therefore the limit drop of 0.61dBm.</p> <p>9. PSD dBm/500kHz= PSD dBm/MHz+Factor, Factor=10log(500kHz/RBW)=-3.01dB</p>							

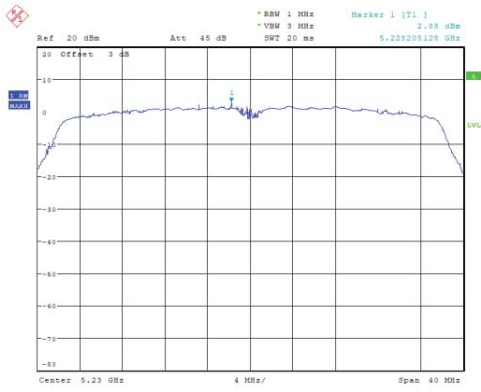
**U-NII-1 Band**



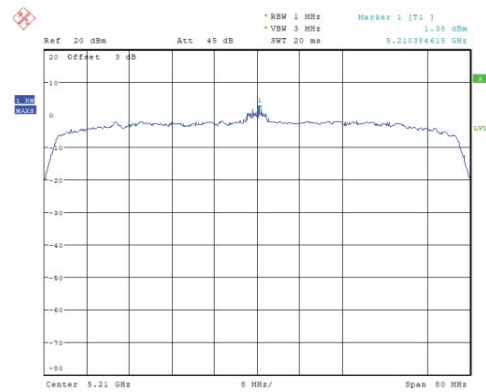


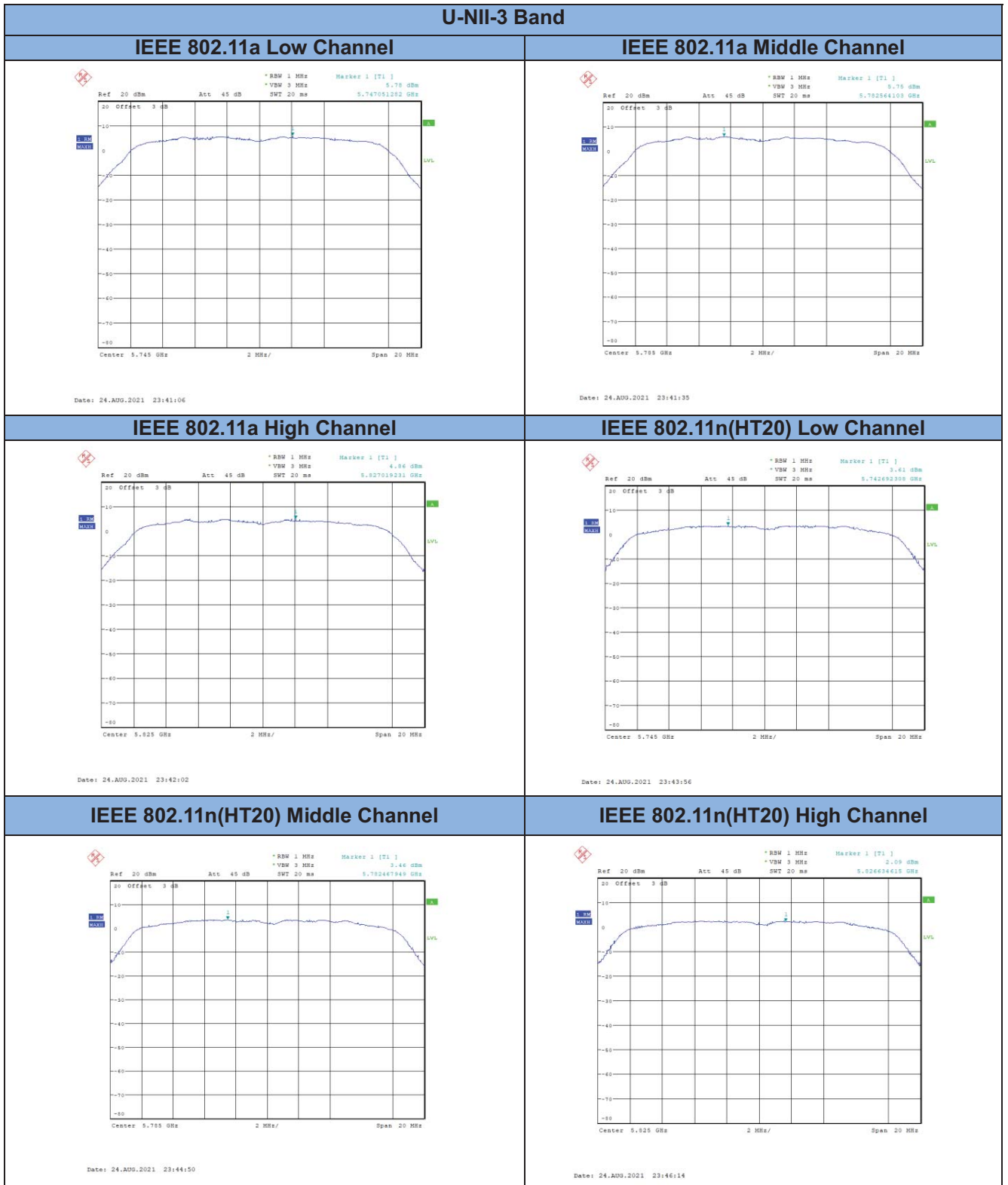
**U-NII-1 Band**

**IEEE 802.11ac(VHT40) High Channel**



**IEEE 802.11ac(VHT80)**

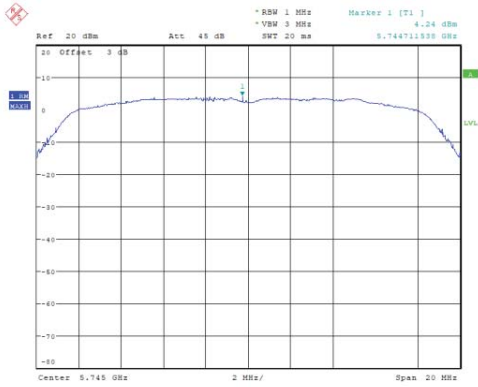




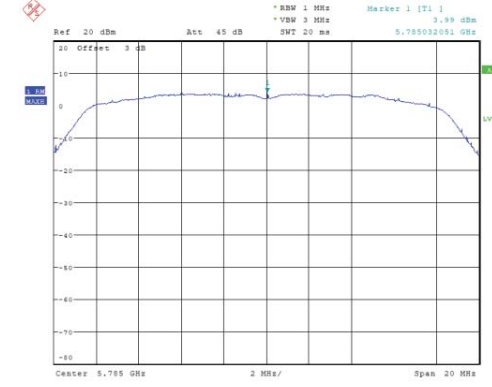


**U-NII-3 Band**

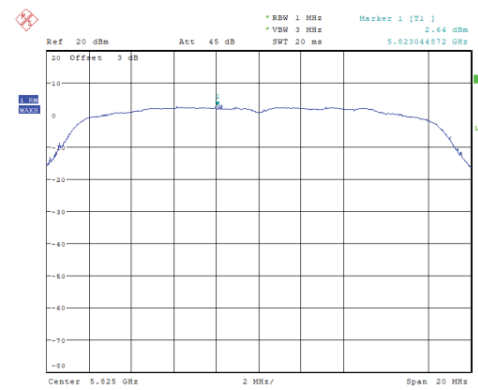
**IEEE 802.11ac(VHT20) Low Channel**



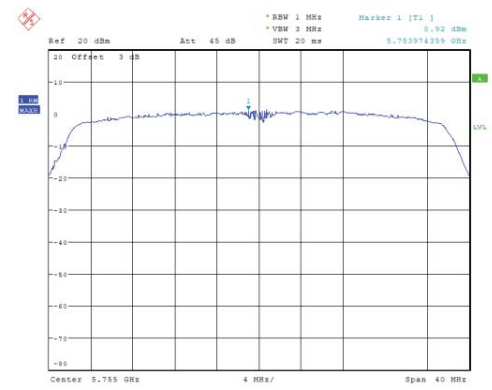
**IEEE 802.11ac(VHT20) Middle Channel**



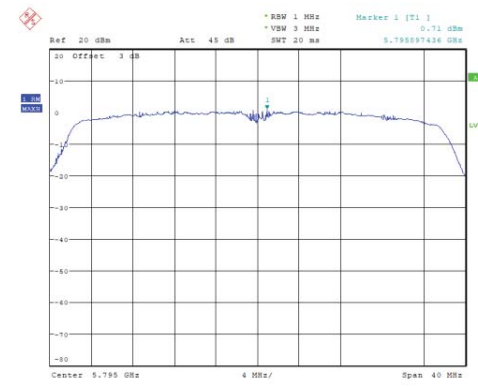
**IEEE 802.11ac(VHT20) High Channel**



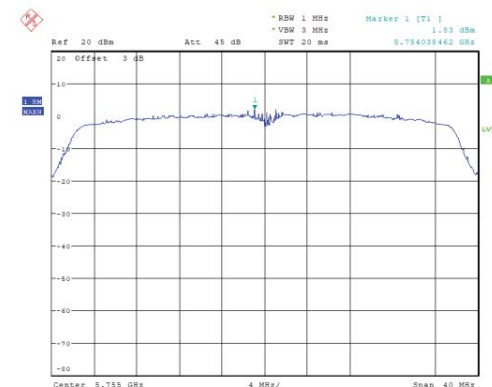
**IEEE 802.11n(HT40) Low Channel**



**IEEE 802.11n(HT40) High Channel**

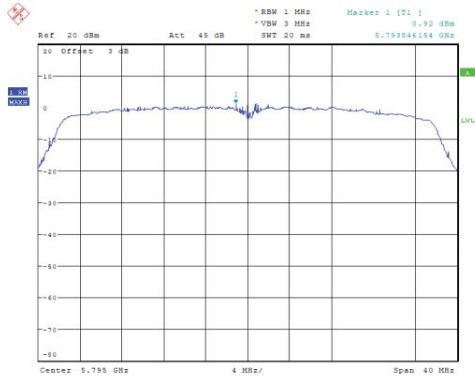


**IEEE 802.11ac(VHT40) Low Channel**

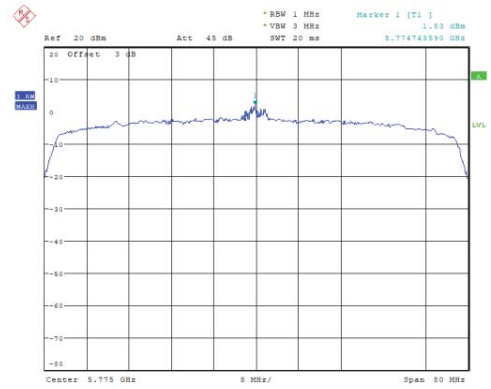


**U-NII-3 Band**

**IEEE 802.11ac(VHT40) High Channel**



**IEEE 802.11ac(VHT80)**



## 14.6 Band Edge

### LIMITS

For transmitters operating in the 5.15-5.25 GHz band:

All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

For transmitters operating in the 5.25-5.35 GHz band:

All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

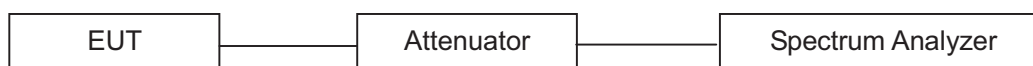
For transmitters operating in the 5.47-5.725 GHz band:

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:

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 25MHz 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 27dBm/MHz at the band edge.

### BLOCK DIAGRAM OF TEST SETUP



### TEST PROCEDURES

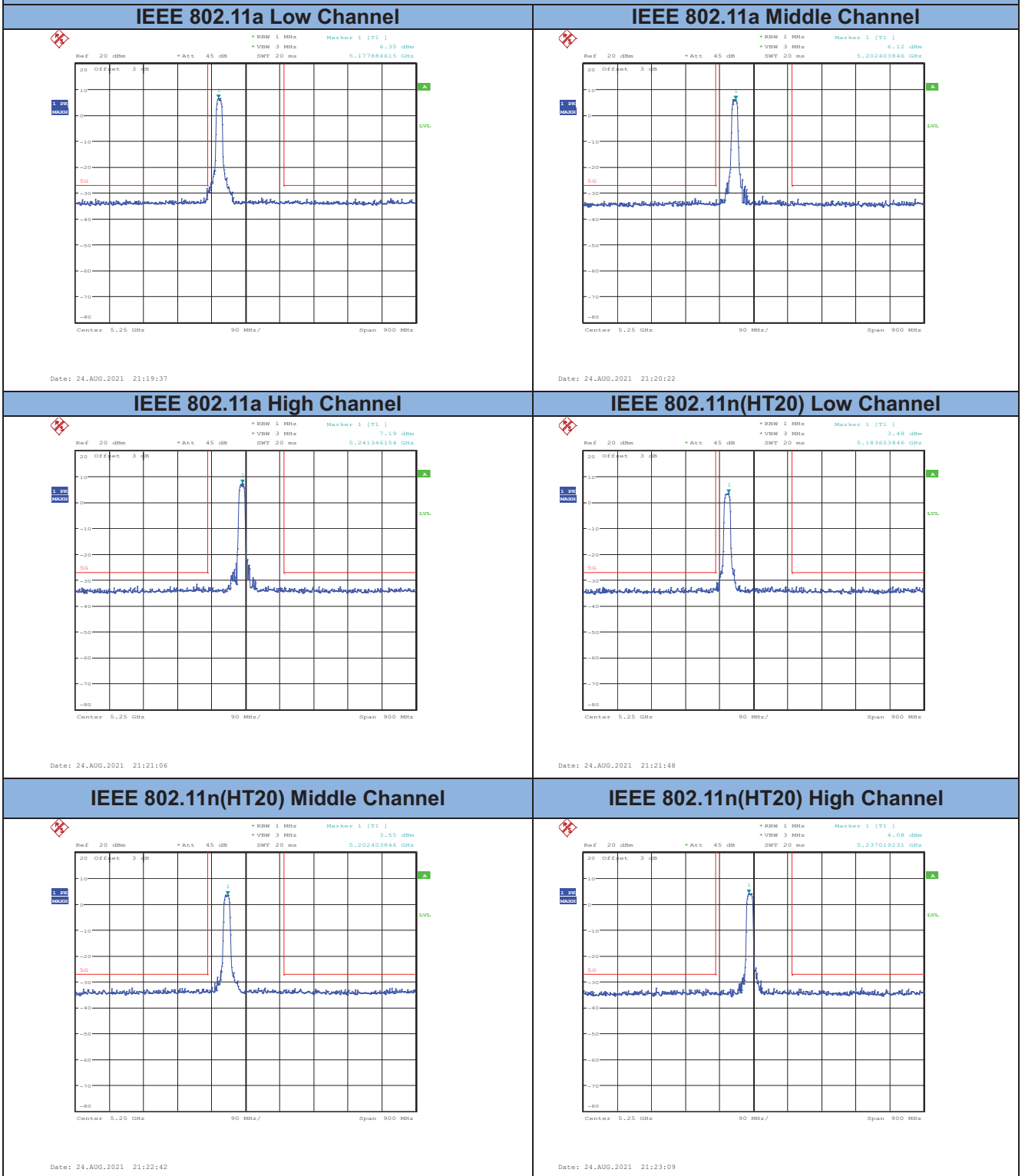
- Check the calibration of the measuring instrument using either an internal calibration or a known signal from an external generator.
- Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
- Set RBW to 1MHz and VBW to 3MHz of spectrum analyzer.
- 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.
- Repeat above procedures until all measured frequencies were complete.

**TEST RESULTS**

PASS

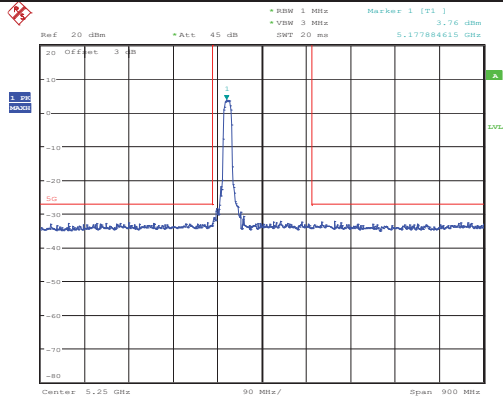
Please refer to the following pages of the worst case ANT\_1.

**U-NII-1 Band**



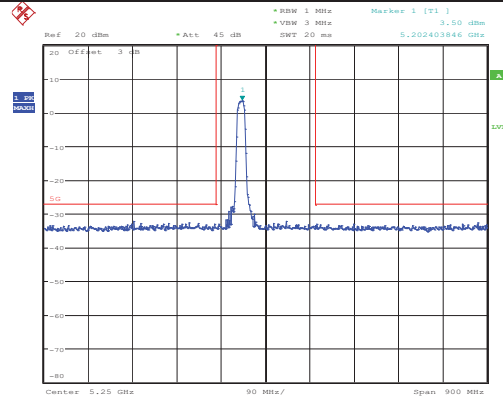
**U-NII-1 Band Band**

**IEEE 802.11ac(VHT20) Low Channel**



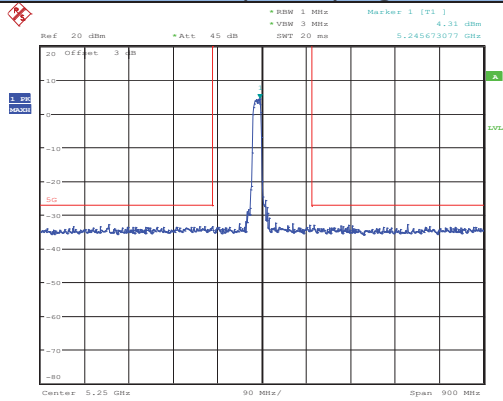
Date: 24.AUG.2021 21:24:17

**IEEE 802.11ac(VHT20) Middle Channel**



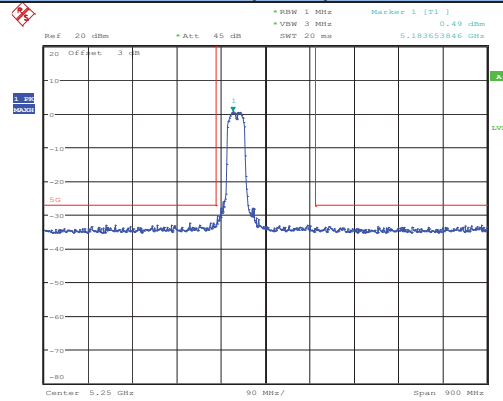
Date: 24.AUG.2021 21:24:55

**IEEE 802.11ac(VHT20) High Channel**



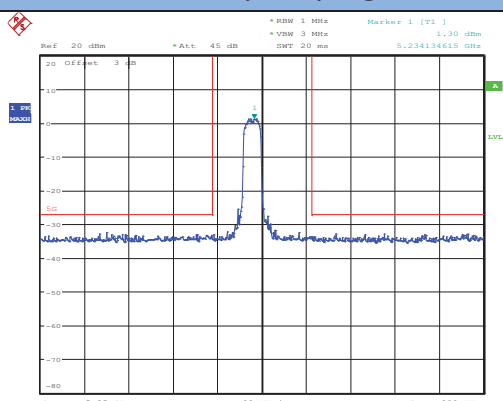
Date: 24.AUG.2021 21:25:15

**IEEE 802.11n(HT40) Low Channel**



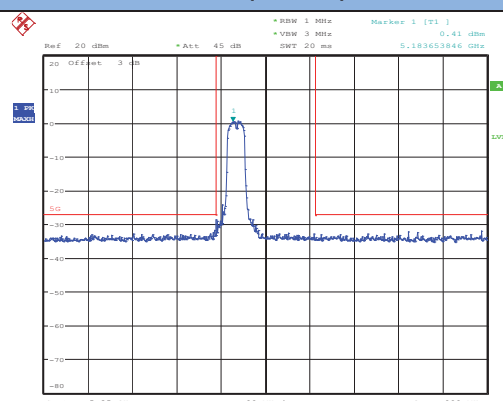
Date: 24.AUG.2021 21:25:45

**IEEE 802.11n(HT40) High Channel**

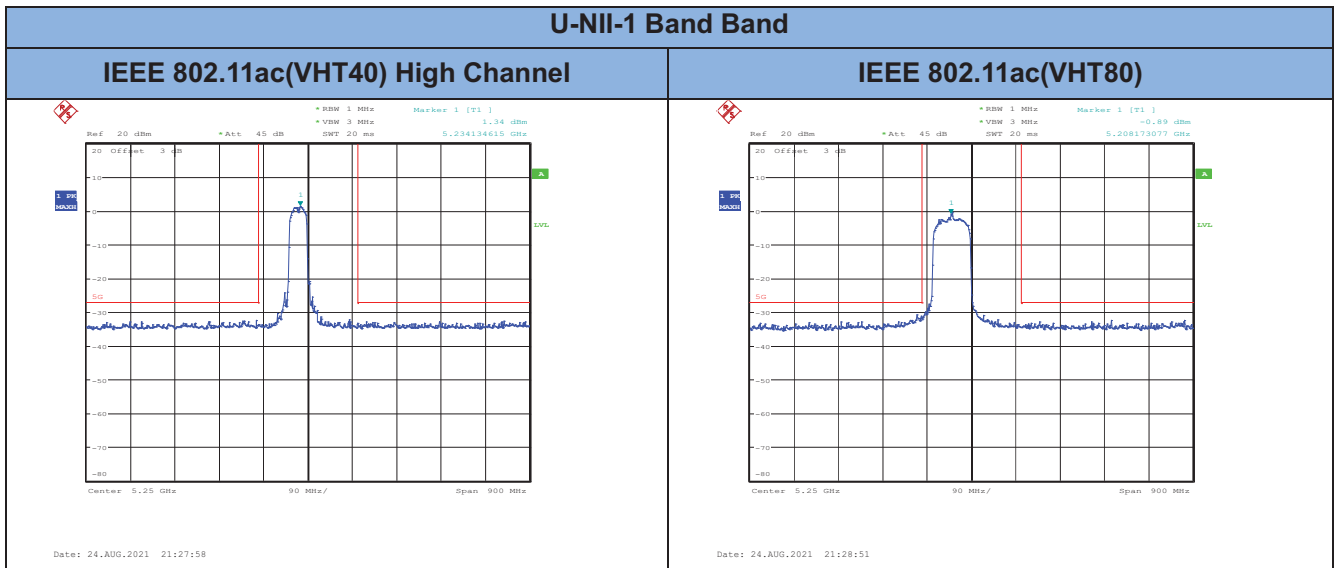


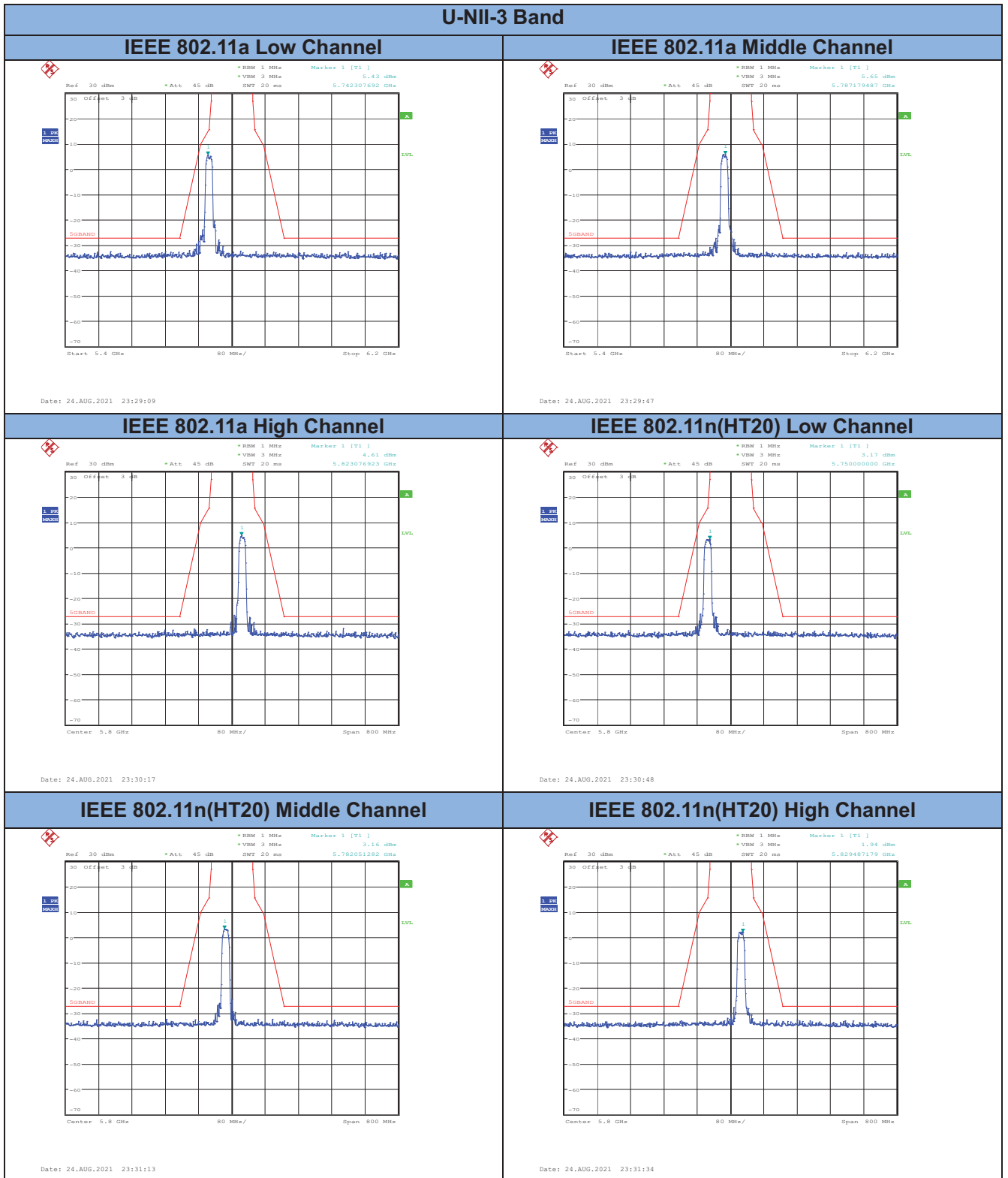
Date: 24.AUG.2021 21:26:11

**IEEE 802.11ac(VHT40) Low Channel**



Date: 24.AUG.2021 21:26:49

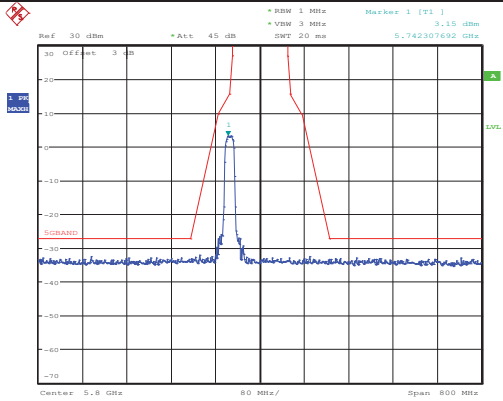






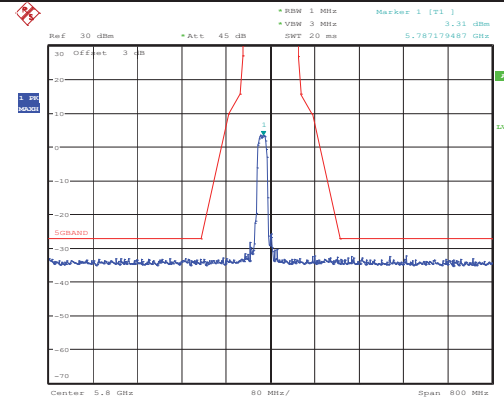
**U-NII-3 Band**

**IEEE 802.11ac(VHT20) Low Channel**



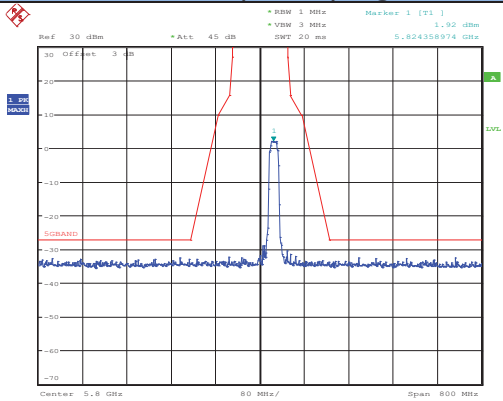
Date: 24.AUG.2021 23:32:14

**IEEE 802.11ac(VHT20) Middle Channel**



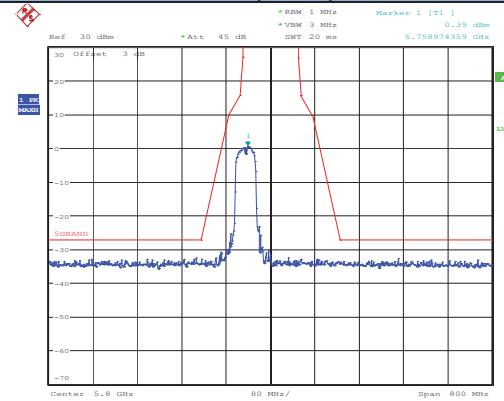
Date: 24.AUG.2021 23:32:46

**IEEE 802.11ac(VHT20) High Channel**



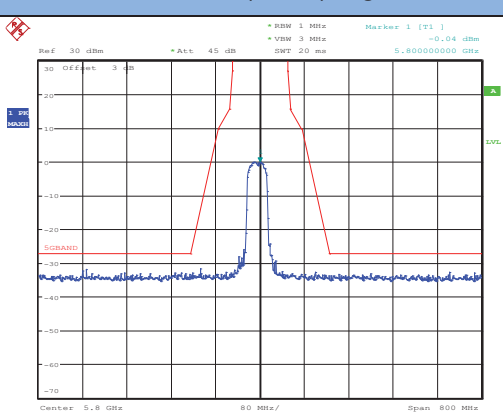
Date: 24.AUG.2021 23:33:12

**IEEE 802.11n(HT40) Low Channel**



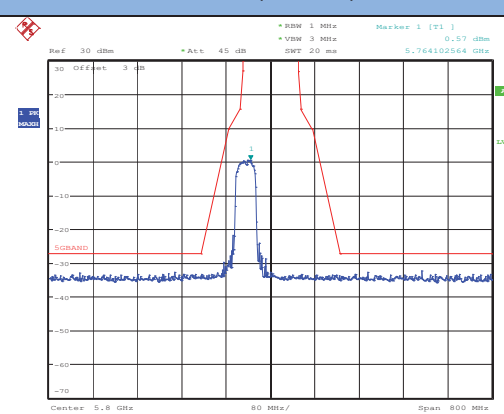
Date: 24.AUG.2021 23:33:46

**IEEE 802.11n(HT40) High Channel**

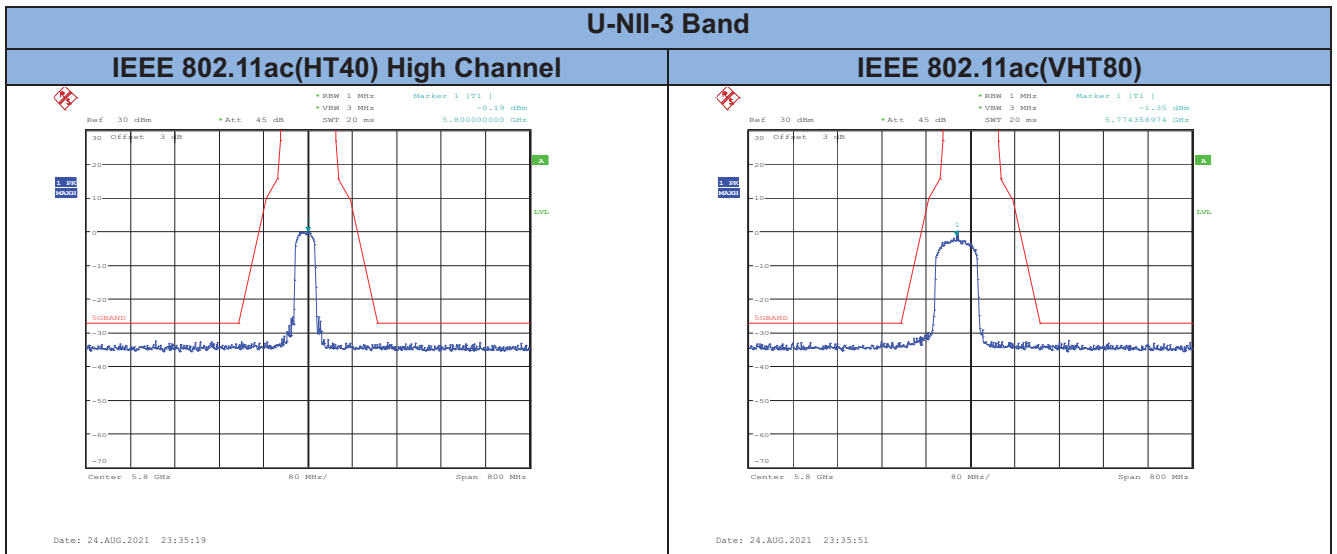


Date: 24.AUG.2021 23:34:13

**IEEE 802.11ac(VHT40) Low Channel**



Date: 24.AUG.2021 23:34:56



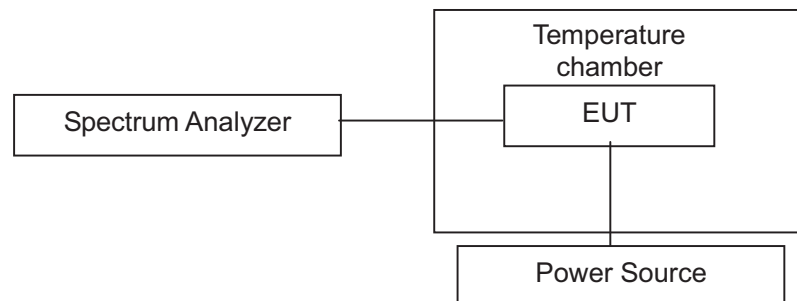
Note: The worst ANT\_1 data has more than 3dB margin below the limit, then the MIMO mode also passed.

## 14.7 Frequency Stability

### LIMITS

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### BLOCK DIAGRAM OF TEST SETUP



### TEST PROCEDURES

- The EUT was placed inside the environmental test chamber and powered by Power source.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

Note: The EUT set at un-modulation mode during frequency stability test.

### TEST RESULTS

PASS

Please refer to the following pages of the worst case ANT\_1.

5180~5240MHz Band						
Lowest channel 5180MHz						
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
-30	3.3	5180.0151	5180.0126	5180.0126	5180.0145	Pass
-10		5180.0113	5180.0159	5180.0151	5180.0146	Pass
0		5180.0136	5180.0167	5180.0121	5180.0158	Pass
20		5180.0158	5180.0123	5180.0137	5180.0162	Pass
40		5180.0173	5180.0131	5180.0147	5180.0148	Pass
60		5180.0165	5180.0152	5180.0146	5180.0145	Pass
85		5180.0184	5180.0168	5180.0125	5180.0166	Pass
20	2.97	5180.0164	5180.0151	5180.0143	5180.0142	Pass
20	3.63	5180.0182	5180.0167	5180.0124	5180.0161	Pass
Highest channel 5240MHz						
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
-30	3.3	5240.0131	5240.0217	5240.0171	5240.0125	Pass
-10		5240.0159	5240.0118	5240.0126	5240.0131	Pass
0		5240.0137	5240.0126	5240.0168	5240.0118	Pass
20		5240.0155	5240.0117	5240.0159	5240.0182	Pass
40		5240.0124	5240.0125	5240.0165	5240.0186	Pass
60		5240.0167	5240.0131	5240.0188	5240.0181	Pass
85		5240.0148	5240.0131	5240.0137	5240.0186	Pass
20	2.97	5240.0165	5240.0133	5240.0185	5240.0182	Pass
20	3.63	5240.0144	5240.0135	5240.0135	5240.0183	Pass

Note: EUT temperature working range is -30 to 85.

5745~5825MHz Band						
Lowest channel 5745MHz						
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
-30	3.3	5745.0152	5745.0122	5745.0135	5745.0134	Pass
-10		5745.0157	5745.0127	5745.0138	5745.0135	Pass
0		5745.0122	5745.0156	5745.0166	5745.0159	Pass
20		5745.0125	5745.0125	5745.0156	5745.0143	Pass
40		5745.0153	5745.0128	5745.0166	5745.0151	Pass
60		5745.0138	5745.0147	5745.0164	5745.0157	Pass
85		5745.0178	5745.0128	5745.0165	5745.0157	Pass
20	2.97					
20	3.63					
Highest channel 5825MHz						
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency (MHz)				Test Result
		0 Minute	2 Minute	5 Minute	10 Minute	
-30	3.3	5825.0123	5825.0141	5825.0164	5825.0155	Pass
-10		5825.0125	5825.0168	5825.0157	5825.0111	Pass
0		5825.0136	5825.0152	5825.0154	5825.0122	Pass
20		5825.0157	5825.0135	5825.0151	5825.0171	Pass
40		5825.0149	5825.0159	5825.0145	5825.0173	Pass
60		5825.0155	5825.0146	5825.0133	5825.0174	Pass
85		5825.0132	5825.0151	5825.0131	5825.0145	Pass
20	2.97	5825.0154	5825.0145	5825.0131	5825.0176	Pass
20	3.63	5825.0133	5825.0156	5825.0132	5825.0144	Pass

Note: EUT temperature working range is -30 to 85.

## 14.8 Radiated Spurious Emissions and Restricted Bands Measurement and Band Edge

### LIMITS

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209)
		μV/m
0.009 ~ 0.490	300	2400/F(kHz)
0.490 ~ 1.705	30	24000/F(kHz)
1.705 ~ 30	30	30
30 ~ 88	3	100
88 ~ 216	3	150
216 ~ 960	3	200
Above 960	3	500

Remark: (1) Emission level (dB) $\mu$ V = 20 log Emission level  $\mu$ V/m  
 (2) The smaller limit shall apply at the cross point between two frequency bands.  
 (3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.  
 (4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.  
 (5) §15.407 specifies that emissions which fall in the restricted bands, as defined in §15.205 comply with radiated emission limits specified in §15.209.

For transmitters operating in the 5.15-5.25 GHz band:

All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

For transmitters operating in the 5.25-5.35 GHz band:

All emissions outside of the 5.15-5.35GHz 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.

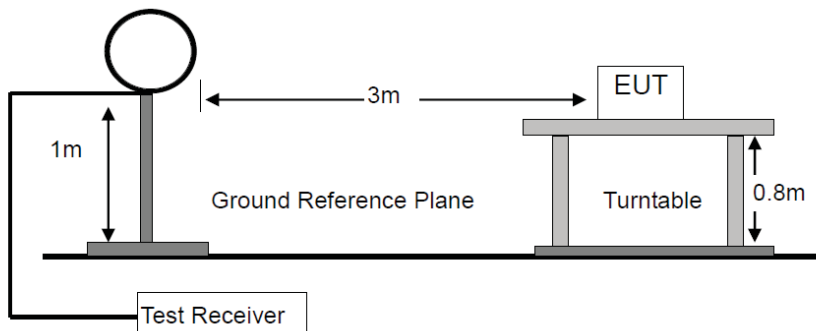
For transmitters operating in the 5.725-5.85 GHz band:

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 25MHz 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

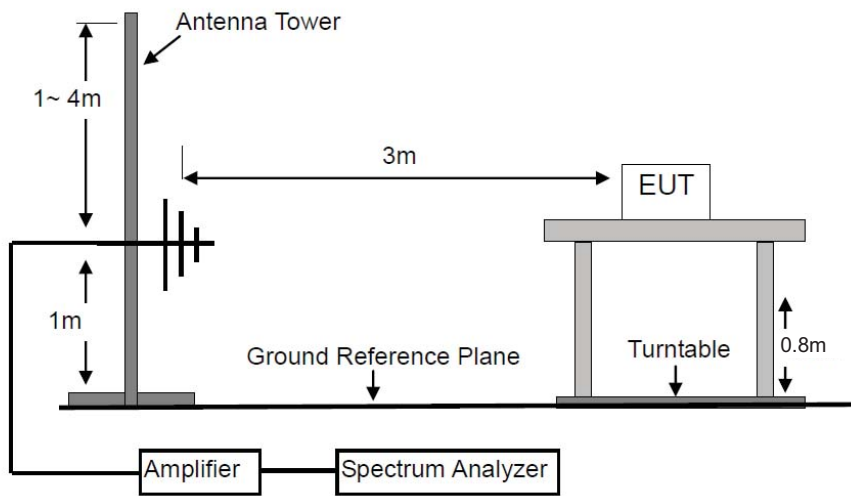
increasing linearly to a level of 27dBm/MHz at the band edge.

### BLOCK DIAGRAM OF TEST SETUP

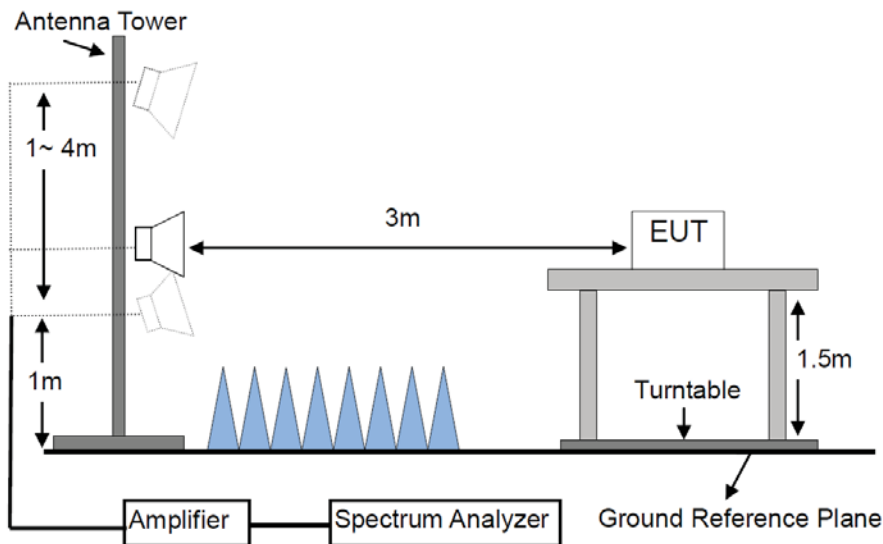
For Radiated Emission below 30MHz



For Radiated Emission 30-1000MHz



For Radiated Emission Above 1000MHz.





## TEST PROCEDURES

- a. Below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- b. For the radiated emission test above 1GHz:  
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- f. A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

**TEST RESULTS**

PASS

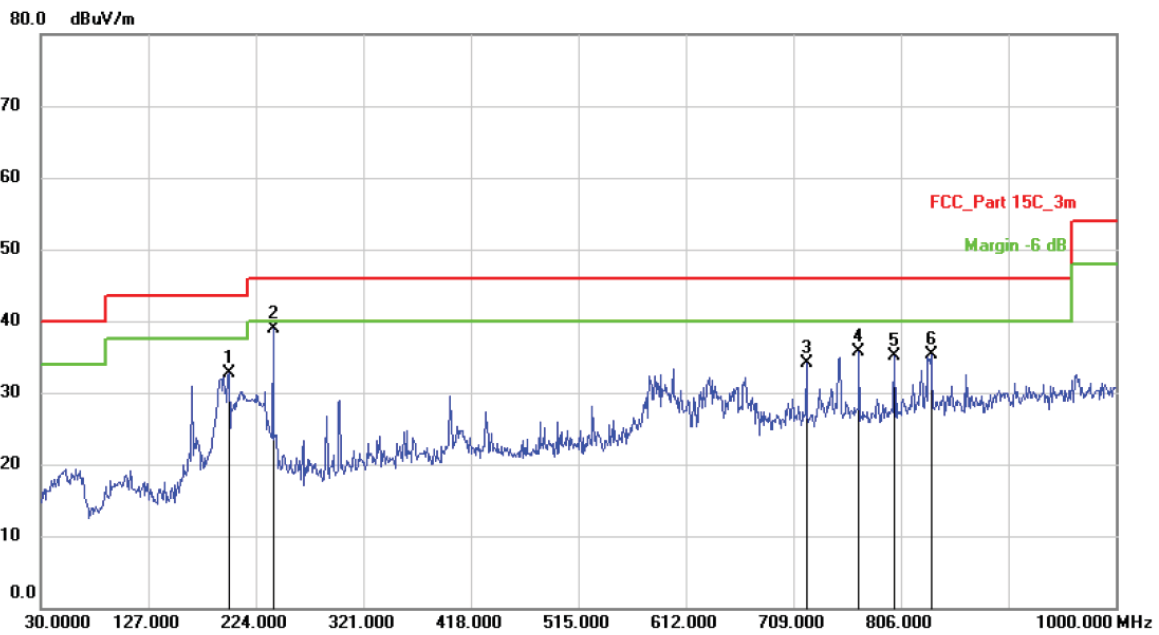
Please refer to the following pages of the worst case.

M/N: 8274B-PR	Testing Voltage: DC 3.3V
Polarization: Horizontal	Detector: QP
Test Mode: 1 (N-UII-1 IEEE 802.11n(HT20) Low channel)	Distance: 3m

## Radiated Emission Measurement

Date: 2021/8/25

Time: 10:43:24



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		199.7500	40.37	-7.72	32.65	43.50	-10.85	QP	
2	*	239.5200	45.50	-6.65	38.85	46.00	-7.15	QP	
3		720.6400	31.49	2.56	34.05	46.00	-11.95	QP	
4		768.1700	32.29	3.38	35.67	46.00	-10.33	QP	
5		800.1800	31.14	3.96	35.10	46.00	-10.90	QP	
6		833.1599	30.75	4.52	35.27	46.00	-10.73	QP	

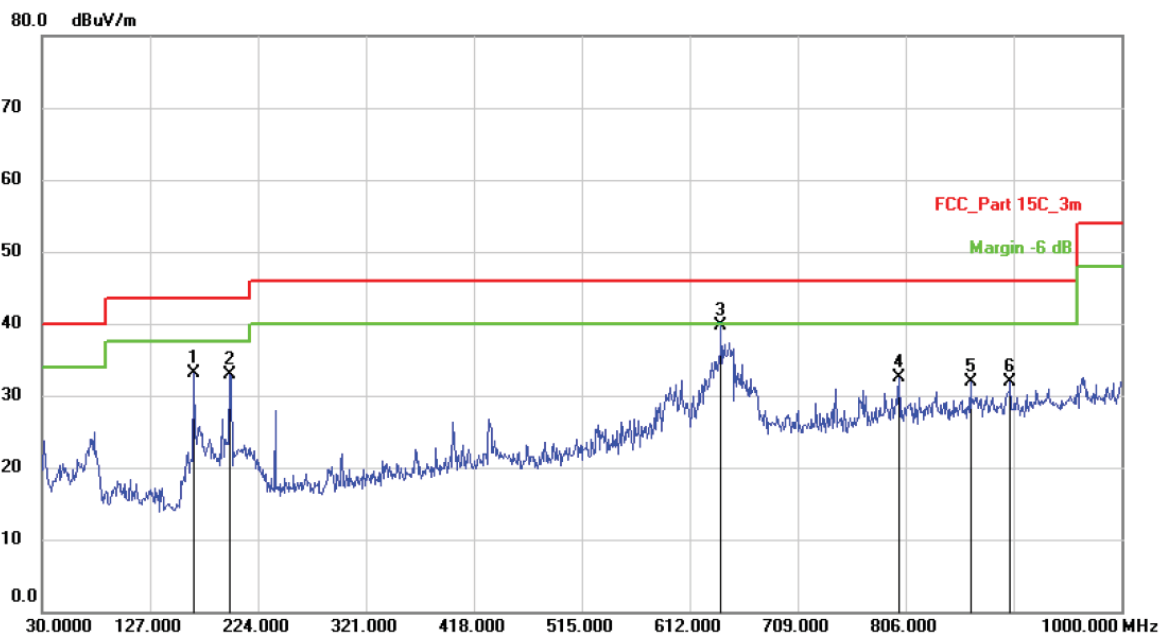
**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**

M/N: 8274B-PR	Testing Voltage: DC 3.3V
Polarization: Vertical	Detector: QP
Test Mode: 1 (N-U11-1 IEEE 802.11n(HT20) Low channel)	Distance: 3m

### Radiated Emission Measurement

Date: 2021/8/25

Time: 10:50:59



No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	166.7700	43.59	-10.45	33.14	43.50	-10.36	QP	
2	198.7800	41.64	-8.80	32.84	43.50	-10.66	QP	
3 *	640.1300	39.11	0.63	39.74	46.00	-6.26	QP	
4	800.1800	28.59	3.96	32.55	46.00	-13.45	QP	
5	864.2000	27.06	4.90	31.96	46.00	-14.04	QP	
6	900.0900	27.01	4.96	31.97	46.00	-14.03	QP	

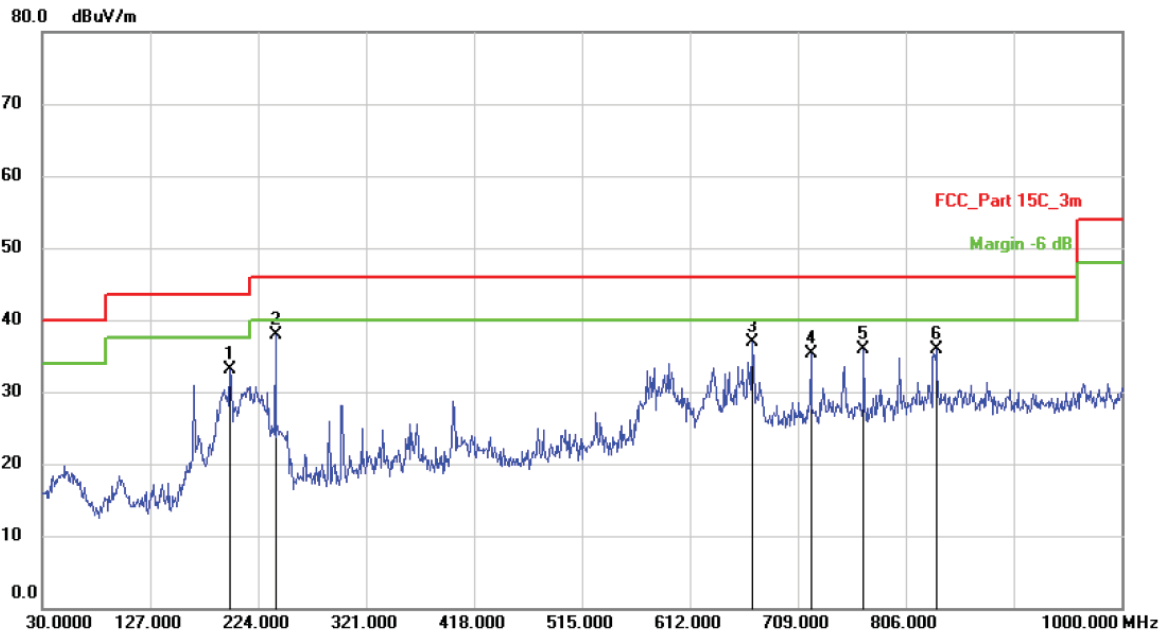
**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**

M/N: 8274B-PR	Testing Voltage: DC 3.3V
Polarization: Horizontal	Detector: QP
Test Mode: 1 (N-U11-3 IEEE 802.11ac(VHT80))	Distance: 3m

## Radiated Emission Measurement

Date: 2021/8/25

Time: 11:04:47



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1		198.7800	40.83	-7.76	33.07	43.50	-10.43	QP	
2	*	239.5200	44.50	-6.65	37.85	46.00	-8.15	QP	
3		668.2600	35.36	1.61	36.97	46.00	-9.03	QP	
4		720.6400	32.83	2.56	35.39	46.00	-10.61	QP	
5		768.1700	32.51	3.38	35.89	46.00	-10.11	QP	
6		833.1599	31.39	4.52	35.91	46.00	-10.09	QP	

**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**

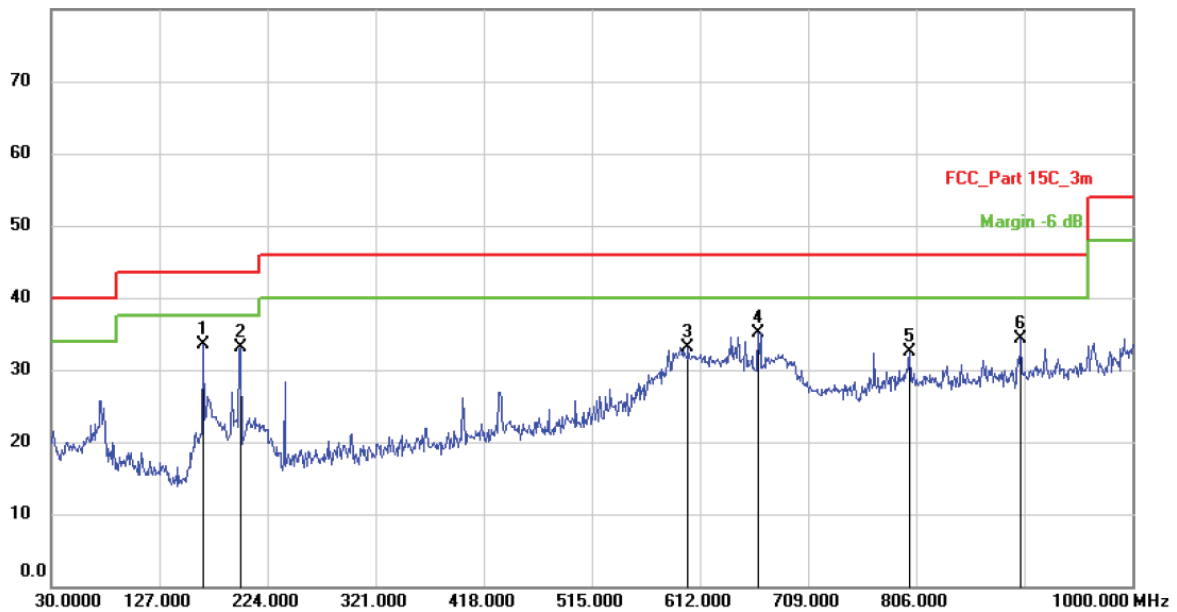
M/N: 8274B-PR	Testing Voltage: DC 3.3V
Polarization: Vertical	Detector: QP
Test Mode: 1 (N-U11-3 IEEE 802.11ac(VHT80))	Distance: 3m

## Radiated Emission Measurement

Date: 2021/8/25

Time: 10:57:56

80.0 dBuV/m



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	165.8000	43.96	-10.50	33.46	43.50	-10.04	QP	
2		199.7500	41.85	-8.75	33.10	43.50	-10.40	QP	
3		601.3300	33.43	-0.30	33.13	46.00	-12.87	QP	
4		664.3800	33.63	1.54	35.17	46.00	-10.83	QP	
5		800.1800	28.58	3.96	32.54	46.00	-13.46	QP	
6		900.0900	29.30	4.96	34.26	46.00	-11.74	QP	

**Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.**

Modulation: N-U11-1(5180-5240 MHz) TX (IEEE 802.11n(HT20) the worst case)				Test Result: PASS			Test frequency range: 1-40GHz			
Freq. (MHz)	Ant. Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV/m)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
<b>Operation Mode: TX Mode (Low)</b>										
10360	V	49.24	---	14.04	63.28	---	68.20	---	-4.92	---
15540	V	49.29	29.42	21.12	70.41	50.54	74.00	54.00	-3.59	-3.46
---										
10360	H	49.11	---	14.04	63.15	---	68.20	---	-5.05	---
15540	H	48.90	29.76	21.12	70.02	50.88	74.00	54.00	-3.98	-3.12
---										
<b>Operation Mode: TX Mode (Mid)</b>										
10400	V	48.35	---	14.12	62.47	---	68.20	---	-5.73	---
15600	V	49.04	29.39	20.82	69.86	50.21	74.00	54.00	-4.14	-3.79
---										
10400	H	48.36	---	14.12	62.48	---	68.20	---	-5.72	---
15600	H	49.04	29.61	20.82	69.86	50.43	74.00	54.00	-4.14	-3.57
---										
<b>Operation Mode: TX Mode (High)</b>										
10480	V	47.95	---	14.29	62.24	---	68.20	---	-5.96	---
15720	V	48.56	30.14	20.20	68.76	50.34	74.00	54.00	-5.24	-3.66
---										
10480	H	48.17	---	14.29	62.46	---	68.20	---	-5.74	---
15720	H	48.55	30.05	20.20	68.75	50.25	74.00	54.00	-5.25	-3.75
---										
<b>Spurious Emission in restricted band:</b>										
5150	V	50.17	38.34	6.80	56.97	45.14	74.00	54.00	-17.03	-8.86
5150	H	50.37	38.41	6.80	57.17	45.21	74.00	54.00	-16.83	-8.79
5350	V	51.24	35.38	7.20	56.97	45.14	74.00	54.00	-17.03	-8.86
5350	H	52.16	33.49	7.20	57.17	45.21	74.00	54.00	-16.83	-8.79

Remark: 1. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits.  
2. Others emissions are attenuated 20dB below the limits, so it does not record in report.

Modulation: N-Ull-3 (5745-5825 MHz) TX (IEEE 802.11n(HT20) the worst case)				Test Result: PASS			Test frequency range: 1-40GHz			
Freq. (MHz)	Ant. Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV/m)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
<b>Operation Mode: TX Mode (Low)</b>										
11490	V	45.29	33.55	16.86	62.15	50.41	74.00	54.00	-11.85	-3.59
17235	V	40.56	---	22.23	62.79	---	68.20	---	-5.41	---
---										
11490	H	45.64	33.46	16.81	62.45	50.27	74.00	54.00	-11.55	-3.73
17235	H	41.35	---	22.23	63.58	---	68.20	---	-4.62	---
---										
<b>Operation Mode: TX Mode (Mid)</b>										
11570	V	44.97	32.86	17.01	61.98	49.87	74.00	54.00	-12.02	-4.13
17355	V	39.86	---	22.62	62.48	---	68.20	---	-5.72	---
---										
11570	H	45.45	32.95	17.01	62.46	49.96	74.00	54.00	-11.54	-4.04
17355	H	40.15	---	22.62	62.77	---	68.20	---	-5.43	---
---										
<b>Operation Mode: TX Mode (High)</b>										
11650	V	43.95	32.93	17.16	61.11	50.09	74.00	54.00	-12.89	-3.91
17475	V	39.75	---	23.01	62.76	---	68.20	---	-5.44	---
---										
11650	H	43.63	32.35	17.16	60.79	49.51	74.00	54.00	-13.21	-4.49
17475	H	39.69	---	23.01	62.70	---	68.20	---	-5.50	---
---										
<b>Spurious Emission in restricted band:</b>										
5460	V	47.25	39.16	7.60	54.85	46.76	74.00	54.00	-19.15	-7.24
5460	H	49.35	37.56	7.60	56.95	45.16	74.00	54.00	-17.05	-8.84

Remark: 1. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits.  
2. Others emissions are attenuated 20dB below the limits, so it does not record in report.



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## **14.9 Antenna Requirement**

### **STANDARD APPLICABLE**

According to of FCC part 15C section 15.203:

furnished by the responsible party shall 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section 15.203 of the rules.

And according to 47 CFR section 15.407(a), if the transmitting antennas of directional gain greater than 6dBi are used, the transmit power and power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **ANTENNA CONNECTED CONSTRUCTION**

The EUT is a limited single-modular transmitter with external monopole antenna that no antenna other than furnished by the responsible party shall be used with the device, and the best case gain of the antenna is 3.6dBi, therefore, the antenna is consider meet the requirement.

## 15. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	Mar. 13, 2021	1 Year
2.	Antenna	Schwarzbeck	VULB9162	9162-010	Mar. 23, 2021	1 Year
3.	Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	Mar. 13, 2021	1 Year
4.	Spectrum Analyzer	Keysight	N9020A	MY54200831	Mar. 13, 2021	1 Year
5.	Spectrum Analyzer	Rohde & Schwarz	FSV40	101094	Mar. 13, 2021	1 Year
6.	Horn Antenna	Schwarzbeck	BBHA9170	9170-172	Mar. 23, 2021	2 Year
7.	Power Sensor	DARE	RPR3006W	15I00041SNO 64	Mar. 13, 2021	1 Year
8.	Horn Antenna	COM-Power	AH-118	071078	Mar. 23, 2021	1 Year
9.	Pre-Amplifier	HP	HP 8449B	3008A00964	Mar. 13, 2021	1 Year
10.	Pre-Amplifier	HP	HP 8447D	1145A00203	Mar. 13, 2021	1 Year
11.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	Mar. 23, 2021	1 Year
12.	Test Receiver	Rohde & Schwarz	ESCI	101152	Mar. 13, 2021	1 Year
13.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	Mar. 13, 2021	1 Year
14.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	Mar.13, 2021	1 Year
15.	Temporary antenna connector	TESCOM	SS402	N/A	N/A	N/A
16.	Test Software	EZ	EZ_EMG	N/A	N/A	N/A

Note: For photographs of EUT and measurement, please refer to appendix in separate documents.

---End---