FCC RF Test Report

APPLICANT	:	Qualcomm Technologies, Inc. 5775 Morehouse Drive, San Diego, CA 92121-1714
EQUIPMENT	:	Qualcomm WiFi 7/BT Combo module
BRAND NAME	:	Qualcomm
MODEL NAME	:	QCNCM825
FCC ID	:	J9C-QCNCM825
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure
TEST DATE(S)	:	Jul. 15, 2024 ~ Jul. 18, 2024

The product was inside of Lenovo Notebook Computer: (Brand Name: Lenovo, Model name: IdeaPad 5 2-in-1 14Q8X9) during the test, only Conducted power/RSE test items are verified in this report, all the other test results are leveraged from module RF report.

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR462112	Rev. 01	Initial issue of report	Jul. 30, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit for U-NII-1/2A/2C	Limit for U-NII-3	Result	Remark
-	2.1049 & 15.403(i)	6dB, 26dB & 99% Bandwidth	-	6dB Bandwidth > 500kHz	Pass	1
3.1	15.407(a)	Maximum Conducted Output Power	≤ 24 dBm	≤ 30 dBm	Pass	1
-	15.407(a)	Power Spectral Density	≤ 11 dBm/MHz	≤ 30 dBm/500kHz	Pass	1
3.2	15.407(b)	Unwanted Emissions	15.407(b) & 15.209(a)	15.407(b)(4)(i) &15.209(a)	Pass	Under limit 0.13 dB at 5435.460 MHz
-	15.207	AC Conducted Emission	15.207(a)	15.207(a)	Pass	1
3.3	15.203 & 15.407(a)	Antenna Requirement	15.203 & 15.407(a)	15.203 & 15.407(a)	Pass	1

Remark:

1. The test items were leveraged from module RF report which can refer to Report No. “RFBWIN-WTW-P23020421-1”, “RFBWIN-WTW-P23020421-6” and ” RFBWIN-WTW-P23020421-7”.

2. Based on KDB996369 D04, the host product manufacturer performed investigative measurements and confirmed that the final composite system met the limits, only the 5G WLAN 802.11be EHT80 996RU CH58 & 5G WLAN 802.11be EHT160 2*996RU CH114 channel need reduce power by software to meet the limit requirements.

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Qualcomm WiFi 7/BT Combo module
Brand Name	Qualcomm
Model Name	QCNCM825
FCC ID	J9C-QCNCM825

Host Product Feature	
Equipment	Notebook Computer
Brand Name	Lenovo
Model Name	IdeaPad 5 2-in-1 14Q8X9
Serial Model Name	IdeaPad 5 2-in-1 14Q8X9********(The"*"in model name can be 0 to 9,A to Z,a to z,"-", blank,or any symbol, for marketing use only, with no impact on RF compliance of the product)
EUT Stage	Identical Prototype

Note: There are three types of EUT, the sample 1 is 1st source with AWAN antenna, the sample 2 is 2nd source with INNOWAVE antenna and the sample 3 is 3rd source with AWAN antenna. According to the difference, we choose sample 1 with the max antenna gain to perform RSE test.

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	5180 MHz ~ 5240 MHz 5260 MHz ~ 5320 MHz 5500 MHz ~ 5720 MHz 5745 MHz ~ 5825 MHz
Resource Unit (RU)	Single RU: 26-tone, 52-tone, 106-tone, 242-tone, 484-tone, 996-tone, 2 * 996-tone Multi-RU(Small RU):52-tone + 26-tone, 106-tone + 26-tone Multi-RU (Large RU):484-tone + 242-tone, 996-tone +484-tone
Channel Puncturing (Large RU)	80 MHz punctured by 20 MHz; 160 MHz punctured by 20 MHz 160 MHz punctured by 40 MHz
Type of Modulation	802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) 802.11ax: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM) 802.11be: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM / 1024QAM / 4096QAM)

Antenna Function Description		

	Ant. 1	Ant. 2
802.11 a/n/ac/ax/be SISO	V	V
802.11 a/n/ac/ax/be MIMO	V	

Antenna Information			
Sample 1/3	**Manufacturer**	AWAN	
	Antenna Type	PIFA Antenna	PIFA Antenna
	Part Number	AYP6Y-100530	AYP6Y-100531
	Peak Gain(dBi)	Main Antenna:	Aux. Antenna:
		WLAN(U-NII-1): 2.34	WLAN(U-NII-1): 2.29
		WLAN(U-NII-2A): 1.79	WLAN(U-NII-2A): 2.46
		WLAN(U-NII-2C): 1.99	WLAN(U-NII-2C): 2.41
		WLAN(U-NII-3): 1.44	WLAN(U-NII-3): 2.00
Sample 2	**Manufacturer**	INNOWAVE	
	Antenna Type	PIFA Antenna	PIFA Antenna
	Part Number	F001E3513190001	F001E8613590001
	Peak Gain(dBi)	Main Antenna:	Aux. Antenna:
		WLAN(U-NII-1): 1.87	WLAN(U-NII-1): 2.62
		WLAN(U-NII-2A): 1.95	WLAN(U-NII-2A): 1.86
		WLAN(U-NII-2C): 2.33	WLAN(U-NII-2C): 2.31
		WLAN(U-NII-3): 2.17	WLAN(U-NII-3): 2.27

1.3 Modification of EUT

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

1.4 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH08-KS	CN1257	314309

1.5 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH08-KS	AUDIX	E3	210616

1.6 Applicable Standards

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

- 47 CFR Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5180-5240 MHz U-NII-1	36	5180	44	5220
	38*	5190	46*	5230
	40	5200	48	5240
	42#	5210	50##	5250

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5260-5320 MHz U-NII-2A	52	5260	60	5300
	54*	5270	62*	5310
	56	5280	64	5320
	58#	5290	-	-

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5500-5700MHz U-NII-2C	100	5500	112	5560
	102*	5510	116	5580
	104	5520	132	5660
	106#	5530	134*	5670
	108	5540	136	5680
	110*	5550	140	5700

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
5745-5825 MHz U-NII-3	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155#	5775	165	5825

Frequency Band	Channel	Freq.(MHz)	Channel	Freq. (MHz)
TDWR Channel	118*	5590	124	5620
	120	5600	126*	5630
	122#	5610	128	5640
	-	-	114##	5570

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
Straddle Channel	138#	5690	144	5720
	142*	5710	-	-

Note:

1. The above Frequency and Channel in "*" are 40MHz bandwidth.
2. The above Frequency and Channel in "#" are 80MHz bandwidth.
3. The above Frequency and Channel in "##" are 160MHz bandwidth.

2.2 Test Mode

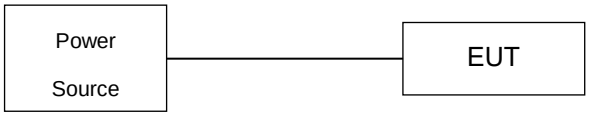
Final test modes are considering the modulation and worse data rates as below table.

MIMO Mode

Modulation	Data Rate
802.11be EHT80	MCS0
802.11be EHT160	MCS0

Ch. #		U-NII-2A	U-NII-2C
		80M BW	160M BW
M	Middle	58	114

2.3 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.4 EUT Operation Test Setup

For WLAN RF test items, an engineering test program was provided and enabled to make EUT continuously transmit.

3 Test Result

3.1 Maximum Conducted Output Power Measurement

3.1.1 Limit of Maximum Conducted Output Power

<FCC 14-30 CFR 15.407>

For mobile and portable client devices in the 5.15–5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW.

For the 5.25–5.725 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 $\log_{10}$ B, where B is the 26 dB emission bandwidth in megahertz.

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

For the 5.47–5.6 GHz and 5.65–5.725 GHz band, the maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$ B, dBm, whichever power is less. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$ B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note that U-NII-2 band, devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

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3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

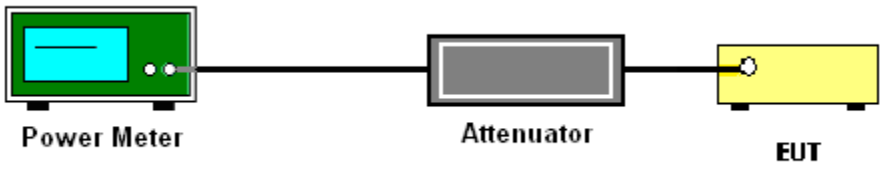
The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.
4. For MIMO mode, the measure-and-sum technique should be used for measuring the in-band transmit power of a device.

For Straddle Channel, According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01, If the power and PSD of the devices are uniform and comply with the lower limits specified for the U-NII-2 bands, a single measurement over the entire emission bandwidth can be performed to show compliance.

3.1.4 Test Setup



3.1.5 Test Result of Maximum Conducted Output Power

FCC U-NII-2A MIMO																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		Average Conducted Power with duty factor (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		EIRP Power Limit (dBm)	Pass/Fail
						Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2		
EHT80	MCS0	2	58	5290	996ru	0.11	0.08	11.81	11.41	14.62	23.98		2.46		30.00	Pass

FCC U-NII-2C MIMO																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		Average Conducted Power with duty factor (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		EIRP Power Limit (dBm)	Pass/Fail
						Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2		
EHT160	MCS0	2	114	5570	2*996RU	0.11	0.11	10.96	10.76	13.87	23.98		2.41		30.00	Pass

3.2 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

3.2.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

For transmitters operating in the 5250-5350 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5250-5350 MHz band that generate emissions in the 5150-5250 MHz band must meet all applicable technical requirements for operation in the 5150-5250 MHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5150-5250 MHz band.

For transmitters operating in the 5470-5600 MHz and 5650-5725MHz band: all emissions outside of the 5470-5600 MHz and 5650-5725MHz band shall not exceed an EIRP of -27 dBm/MHz.

(2) For transmitters operating in the 5.725-5.85 GHz band:
15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

(3) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

(4) EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.2

Note: The following formula is used to convert the EIRP to field strength.

$$EIRP = E_{Meas} + 20\log(d_{Meas}) - 104.7$$

where

EIRP is the equivalent isotropically radiated power, in dBm

E_{Meas} is the field strength of the emission at the measurement distance, in dBμV/m

d_{Meas} is the measurement distance, in m

(4) ANSI C63.10-2013 clause 12.7.3 note 97

As specified by regulatory requirements, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit. However, an out-of-band emission that complies with both the average and peak general regulatory limits is not required to satisfy the peak emission limit.

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

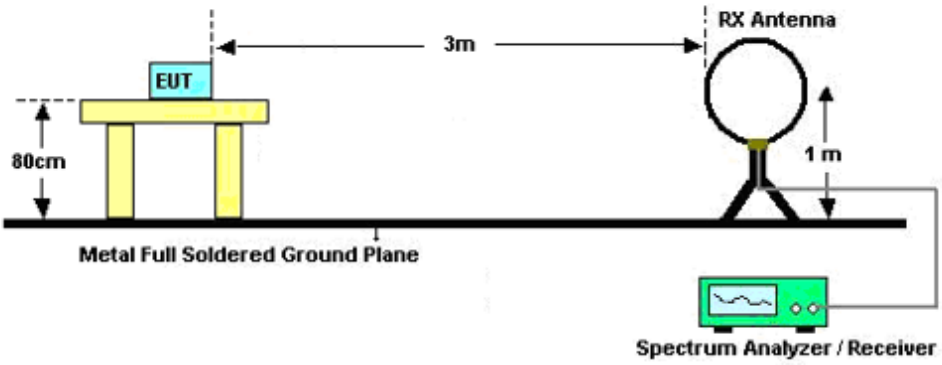
   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - RBW = 1 MHz
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on.

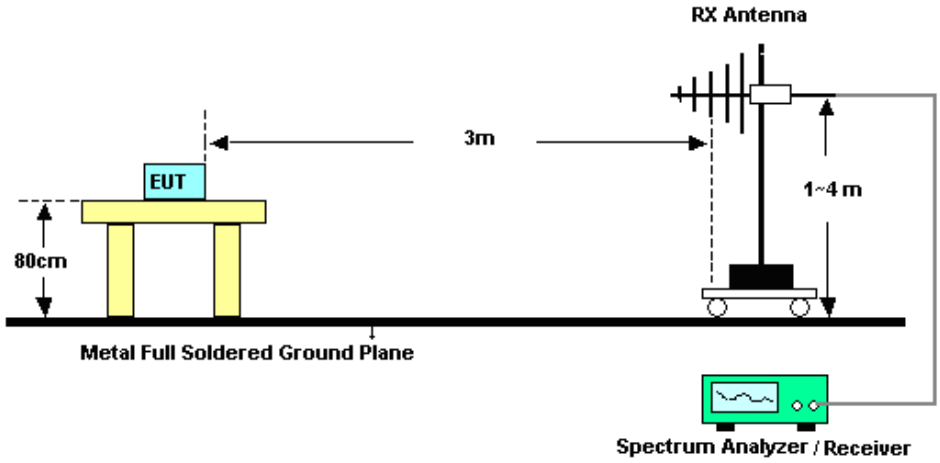
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.2.4 Test Setup

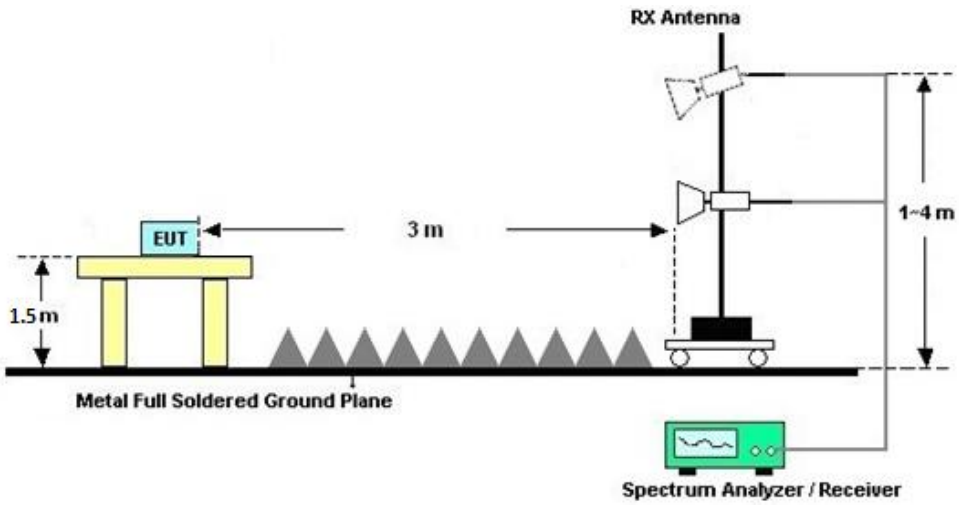
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

3.2.7 Duty Cycle

Please refer to Appendix B.

3.2.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix A.

3.3 Antenna Requirements

3.3.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.3.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = GANT + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(NANT/NSS=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with GANT set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

Sample 1/3

<CDD Modes>						
	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
UNII-1	2.34	2.29	2.34	5.33	0.00	0.00
UNII-2A	1.79	2.46	2.46	5.14	0.00	0.00
UNII-2C	1.99	2.41	2.41	5.21	0.00	0.00
UNII-3	1.44	2.00	2.00	4.73	0.00	0.00

Sample 2

<CDD Modes>						
	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
UNII-1	1.87	2.62	2.62	5.26	0.00	0.00
UNII-2A	1.95	1.86	1.95	4.92	0.00	0.00
UNII-2C	2.33	2.31	2.33	5.33	0.00	0.00
UNII-3	2.17	2.27	2.27	5.23	0.00	0.00

Power limit reduction = Composite gain – 6dBi, (min = 0)

PSD limit reduction = Composite gain + PSD Array gain – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	Keysight	N9038A	MY56400023	3Hz~8.5GHz;Max 30dBm	Jan. 04, 2024	Jul. 15, 2024	Jan. 03, 2025	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101932	10kHz~40GHz; Max 30dBm	Oct. 10, 2023	Jul. 15, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Oct. 10, 2023	Jul. 15, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Bilog Antenna	TESEQ& VGT	CBL 61110	59915	30MHz-1GHz	Aug. 12, 2023	Jul. 15, 2024	Aug. 11, 2024	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Mar. 01, 2024	Jul. 15, 2024	Feb. 28, 2025	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060845	1Ghz-18Ghz	Jan. 05, 2024	Jul. 15, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2024	Jul. 15, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2024	Jul. 15, 2024	Jan. 04, 2025	Radiation (03CH08-KS)
Amplifier	EM	EM01G18GA	060834	1Ghz-18Ghz	Oct. 10, 2023	Jul. 15, 2024	Oct. 09, 2024	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 04, 2024	Jul. 15, 2024	Jan. 03, 2025	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jul. 15, 2024	NCR	Radiation (03CH08-KS)
Turn Table	EM	EM 1000-T	N/A	0~360 degree	NCR	Jul. 15, 2024	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	Jul. 15, 2024	NCR	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Jul. 18, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 02, 2024	Jul. 18, 2024	Jan. 01, 2025	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 02, 2024	Jul. 18, 2024	Jan. 01, 2025	Conducted (TH01-KS)

NCR: No Calibration Required

5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.50 dB

Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.30 dB

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	6.04 dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.26 dB

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.40 dB

---------- THE END ----------

Appendix A. Radiated Spurious Emission Test Data

Test Engineer :	Koi Ji	Relative Humidity :	51 ~ 53%
		Temperature :	25.2 ~ 26.5℃

Radiated Spurious Emission Test Modes

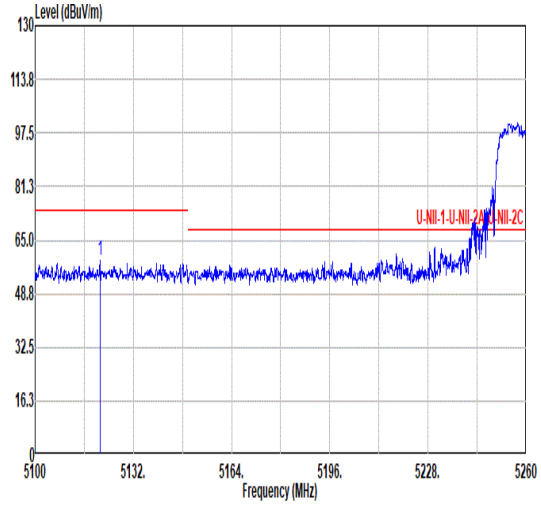
Mode	Band	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	U-NII-2A	5.25-5.35	1+2	802.11be EHT80	58	5290	MCS0	996	-
Mode 2	U-NII-2C	5.47-5.725	1+2	802.11be EHT160	114	5570	MCS0	1992	

Summary of each worse mode

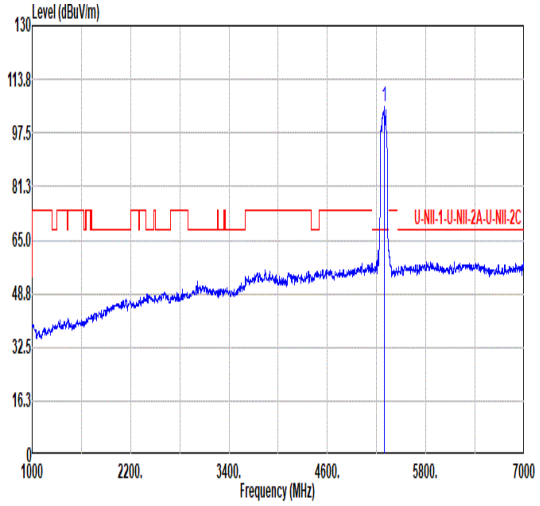
Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	802.11be EHT80	58	5354.15	52.53	54.00	-1.47	H	AVERAGE	Pass	Band Edge
1	802.11be EHT80	58	10580.00	44.70	68.20	-23.50	V	PEAK	Pass	Harmonic
2	802.11be EHT160	114	5435.46	53.87	54.00	-0.13	H	AVERAGE	Pass	Band Edge
2	802.11be EHT160	114	11140.00	44.43	74.00	-29.57	V	PEAK	Pass	Harmonic

Mode	1	
	Band Edge - L	
	U-NII-2A_5.25-5.35_802.11be EHT80_CH58_996_5290MHz	
ANT	1+2	
Pol.	Horizontal	Fundamental

Peak

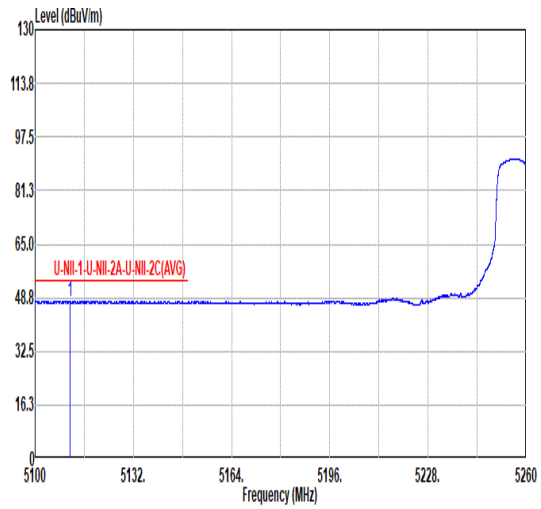


	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5121.21	58.87	74.00	-15.13	41.57	35.04	12.48	30.22	0.00	287	144	PEAK

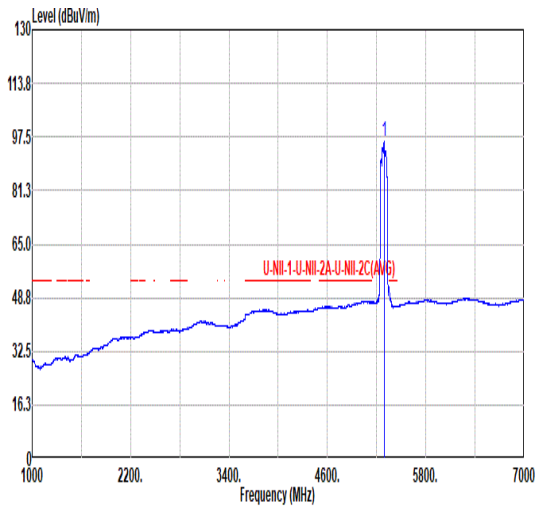


	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5290.00	105.31	------	------	87.94	34.73	12.78	30.14	0.00	287	144	PEAK

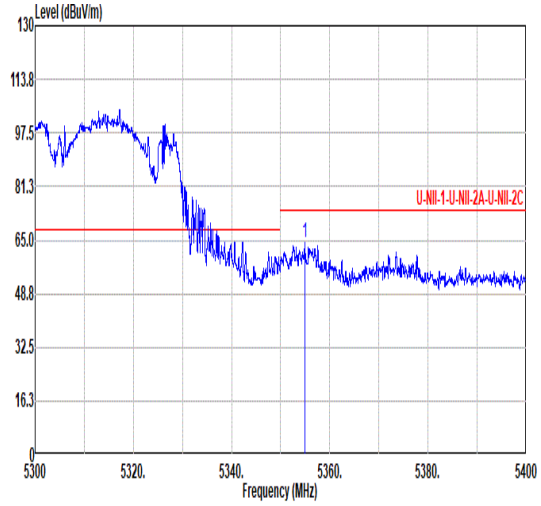
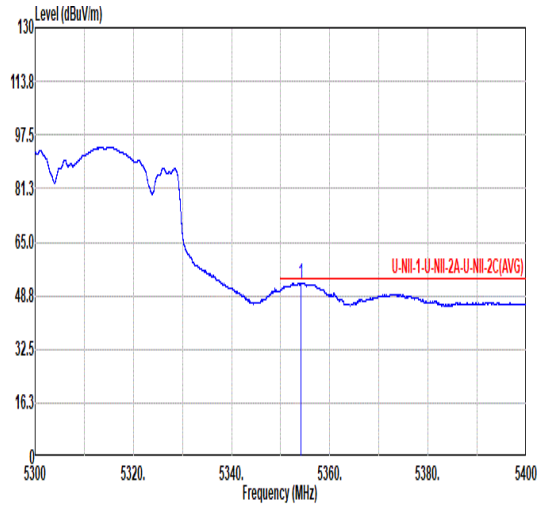
Avg

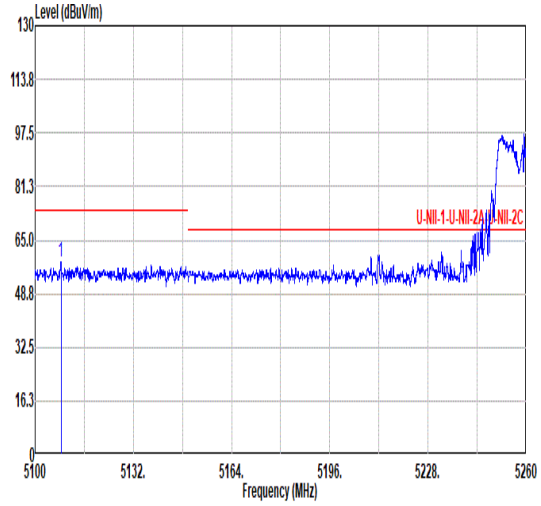
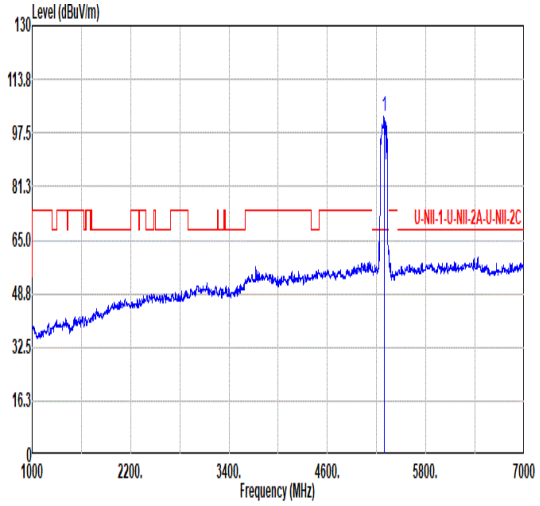
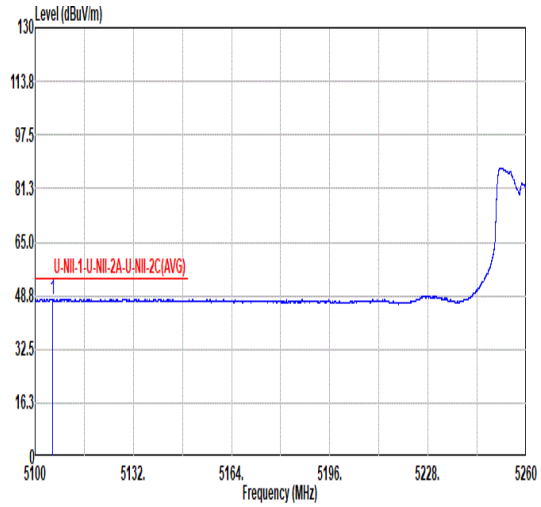
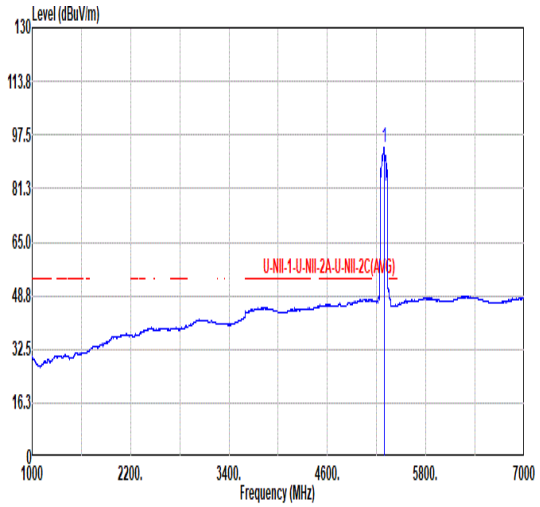


	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5111.29	47.74	54.00	-6.26	30.48	35.02	12.46	30.22	0.00	287	144	AVERAGE



	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5290.00	96.27	------	------	78.90	34.73	12.78	30.14	0.00	287	144	AVERAGE

Mode	1	
	Band Edge - R	
	U-NII-2A_5.25-5.35_802.11be EHT80_CH58_996_5290MHz	
ANT	1+2	
Pol.	Horizontal	Fundamental
Peak	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 5354.95 64.38 74.00 -9.62 46.87 34.69 12.93 30.11 0.00 287 144 PEAK	Blank
Avg	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 5354.15 52.53 54.00 -1.47 35.03 34.69 12.92 30.11 0.00 287 144 AVERAGE	Blank

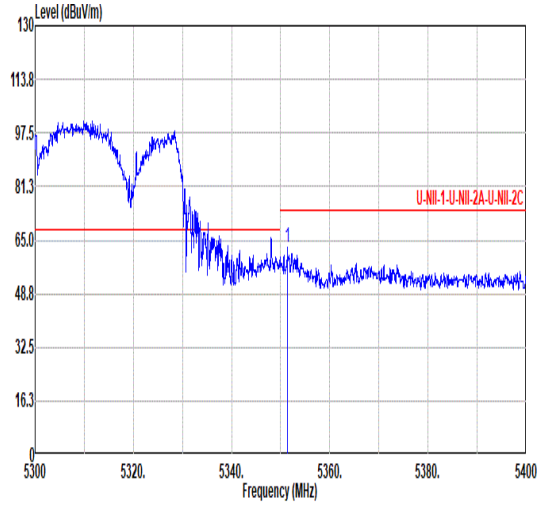
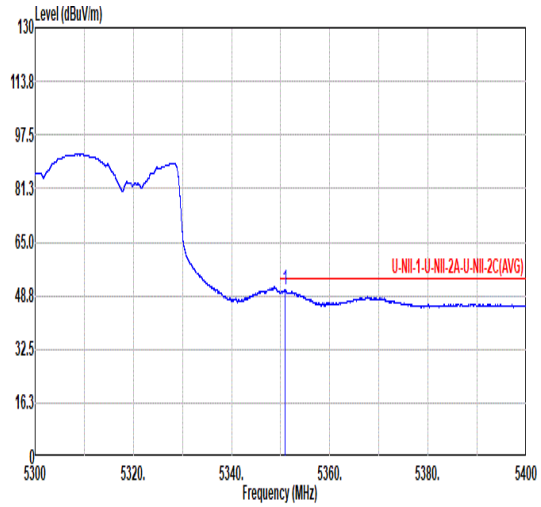
Mode	1	
	Band Edge - L	
	U-NII-2A_5.25-5.35_802.11be EHT80_CH58_996_5290MHz	
ANT	1+2	
Pol.	Vertical	Fundamental
Peak		
Avg		

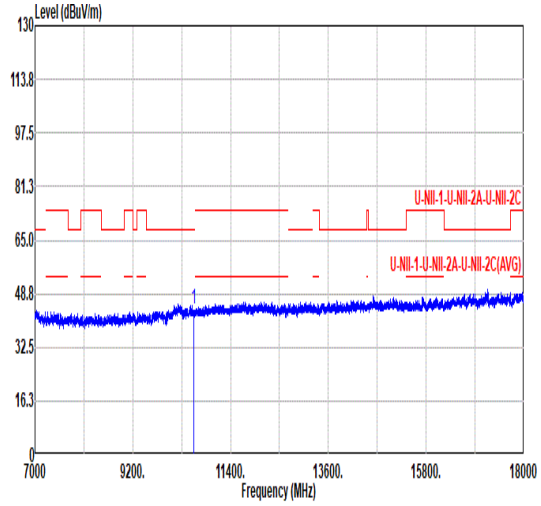
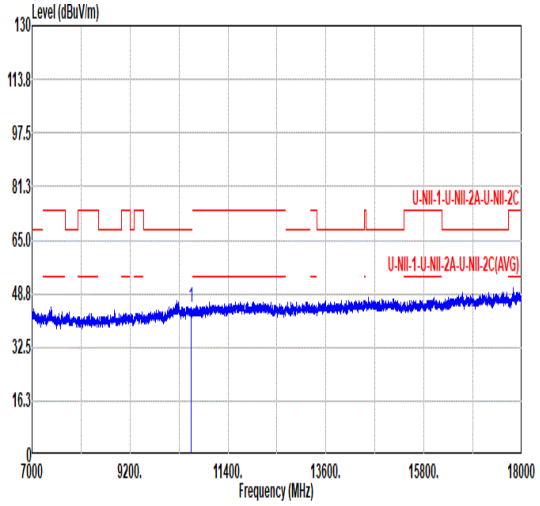
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5108.41	58.30	74.00	-15.70	41.04	35.02	12.46	30.22	0.00	289	214	PEAK

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5290.00	102.76	------	------	85.38	34.75	12.77	30.14	0.00	289	214	PEAK

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5105.69	47.78	54.00	-6.22	30.53	35.01	12.46	30.22	0.00	289	214	AVERAGE

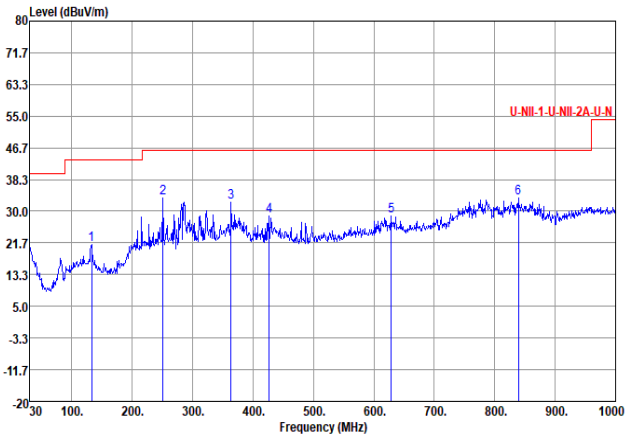
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5290.00	93.94	------	------	76.56	34.75	12.77	30.14	0.00	289	214	AVERAGE

Mode	1	
	Band Edge - R	
	U-NII-2A_5.25-5.35_802.11be EHT80_CH58_996_5290MHz	
ANT	1+2	
Pol.	Vertical	Fundamental
Peak	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 5351.35 62.68 74.00 -11.32 45.18 34.70 12.92 30.12 0.00 289 214 PEAK	Blank
Avg	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 5350.95 50.44 54.00 -3.56 32.94 34.70 12.92 30.12 0.00 289 214 AVERAGE	Blank

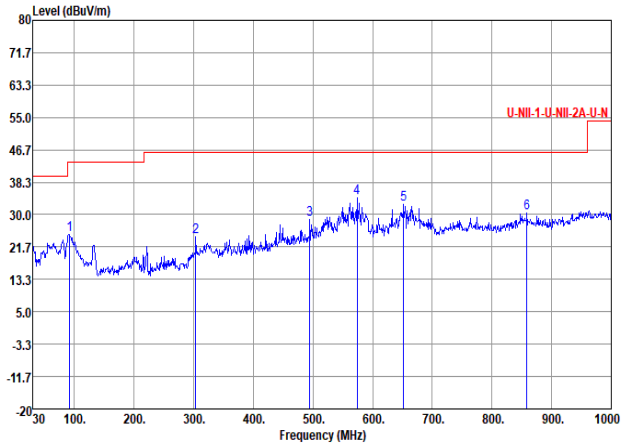
Mode	1	
	Harmonic	
	U-NII-2A_5.25-5.35_802.11be EHT80_CH58_996_5290MHz	
ANT	1+2	
Pol.	Horizontal	Vertical
Peak Avg	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 10580.00 44.00 74.00 -30.00 53.70 37.69 17.76 65.15 0.00 -- -- PEAK	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg 1 10580.00 44.70 68.20 -23.50 54.58 37.64 17.71 65.23 0.00 -- -- PEAK

Mode	1	
	LF	
	U-NII-2A_5.25-5.35_802.11be EHT80_CH58_996_5290MHz	
ANT	1+2	
Pol.	Horizontal	Vertical

Peak



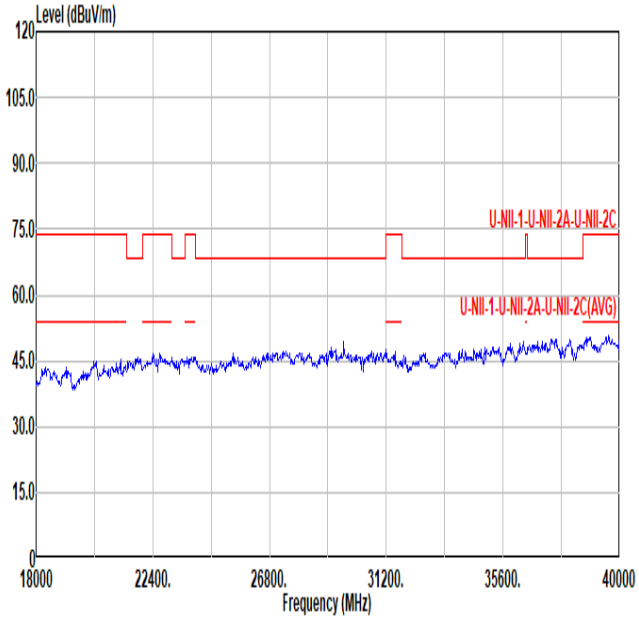
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	132.82	21.13	-22.37	43.50	35.32	16.89	1.75	32.83	---	---	Peak
2	251.16	33.60	-12.40	46.00	45.92	18.36	2.42	33.10	---	---	Peak
3	363.68	32.30	-13.70	46.00	41.32	20.95	2.90	32.87	---	---	Peak
4	426.73	28.74	-17.26	46.00	35.80	22.54	3.15	32.75	---	---	Peak
5	628.49	28.87	-17.13	46.00	31.31	26.34	3.83	32.61	---	---	Peak
6	838.98	33.43	-12.57	46.00	32.58	29.01	4.42	32.58	---	---	Peak

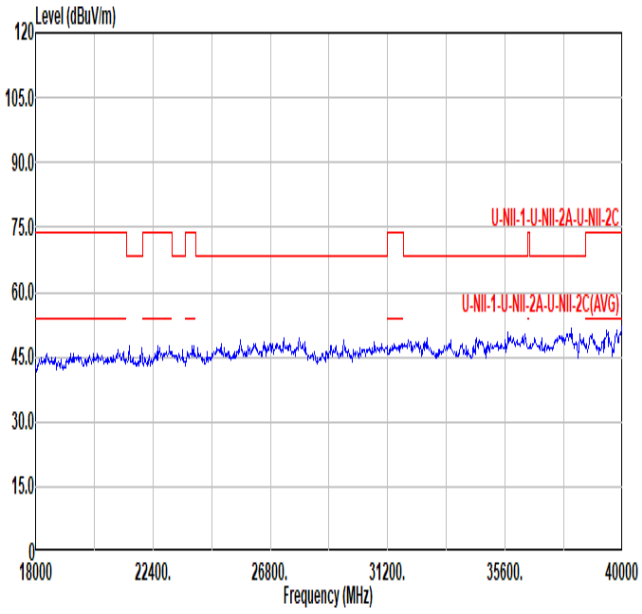


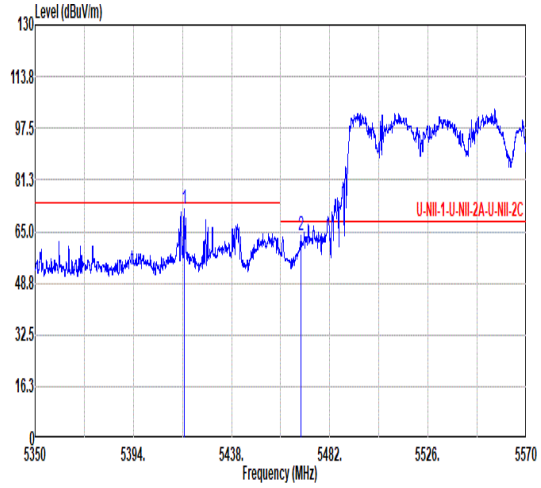
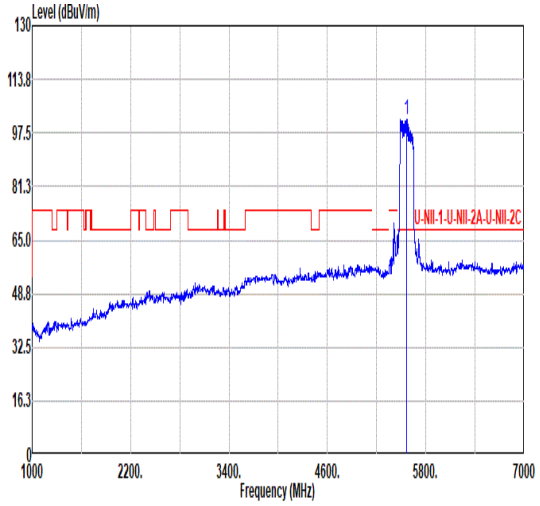
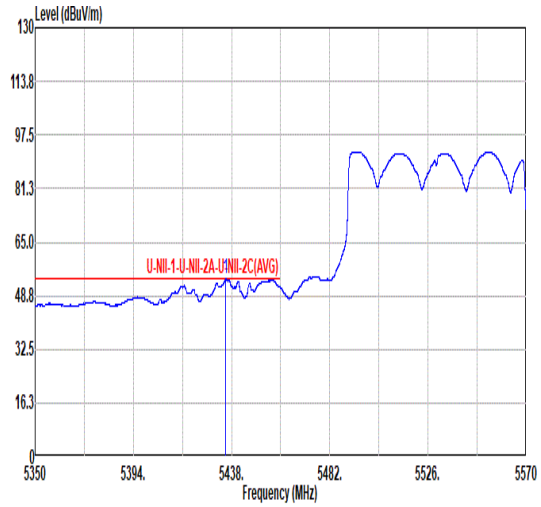
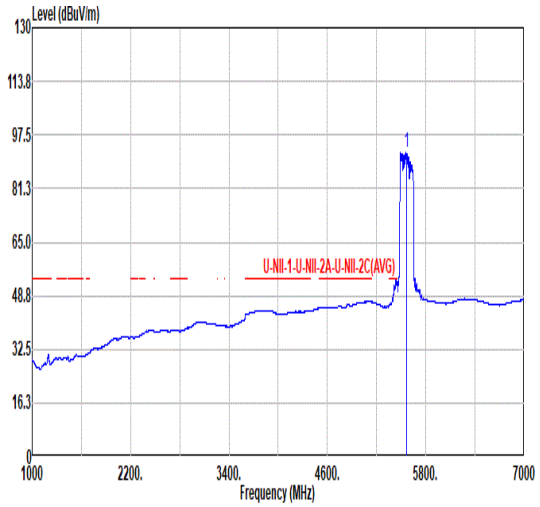
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	92.08	24.97	-18.53	43.50	41.02	15.14	1.45	32.64	---	---	Peak
2	303.54	24.30	-21.70	46.00	35.14	19.40	2.66	32.90	---	---	Peak
3	494.63	28.75	-17.25	46.00	34.15	23.99	3.40	32.79	---	---	Peak
4	574.17	34.40	-11.60	46.00	37.65	25.64	3.66	32.55	---	---	Peak
5	651.77	32.78	-13.22	46.00	34.98	26.60	3.90	32.70	---	---	Peak
6	858.38	30.31	-15.69	46.00	29.20	29.22	4.47	32.58	---	---	Peak

Emission above 18GHz

Peak





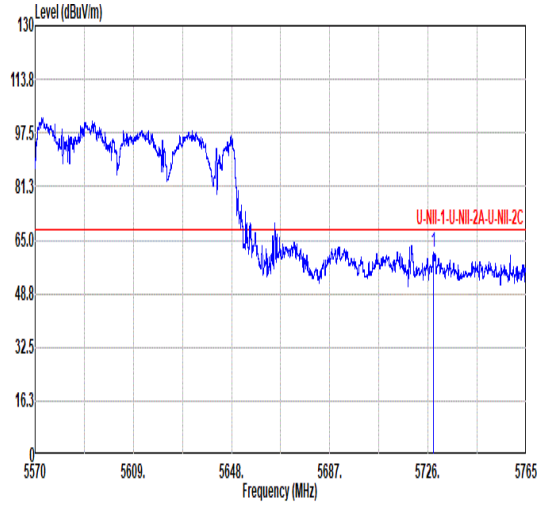
Mode	2	
	Band Edge - L	
	U-NII-2C_5.47-5.725_802.11be EHT160_CH114_1992_5570MHz	
ANT	1+2	
Pol.	Horizontal	Fundamental
Peak		
Avg		

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5416.78	71.95	74.00	-2.05	54.40	34.60	13.04	30.09	0.00	100	146	PEAK
2	5469.14	63.72	68.20	-4.48	46.11	34.60	13.07	30.06	0.00	100	146	PEAK

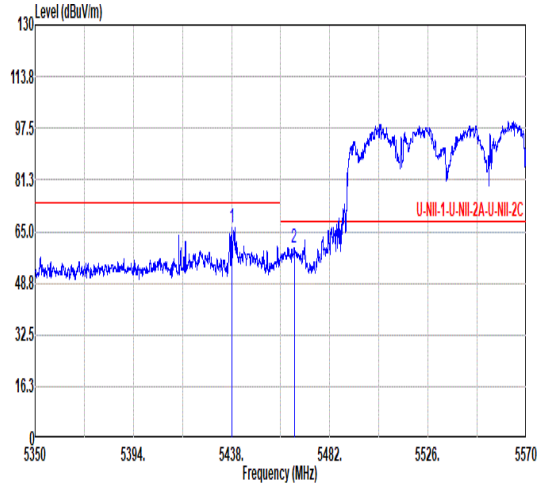
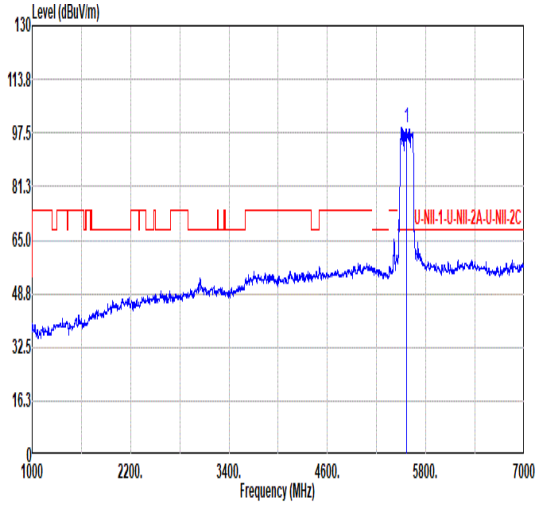
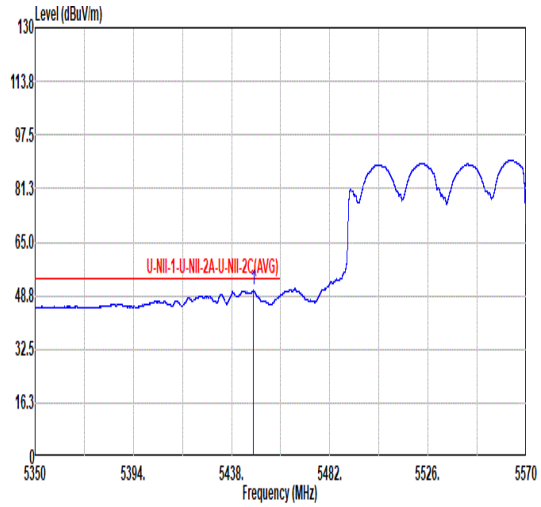
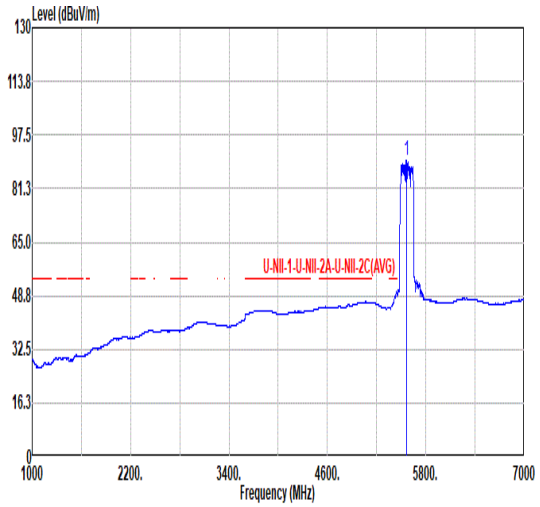
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5570.00	101.67	------	------	83.85	34.70	13.14	30.02	0.00	100	146	PEAK

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5435.46	53.87	54.00	-0.13	36.30	34.60	13.05	30.08	0.00	100	146	AVERAGE

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5570.00	92.16	------	------	74.53	34.60	13.08	30.05	0.00	100	146	AVERAGE

Mode	2	
	Band Edge - R	
	U-NII-2C_5.47-5.725_802.11be EHT160_CH114_1992_5570MHz	
ANT	1+2	
Pol.	Horizontal	Fundamental
Peak		Blank

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5728.25	61.14	68.20	-7.06	42.35	35.01	13.93	30.15	0.00	100	146	PEAK

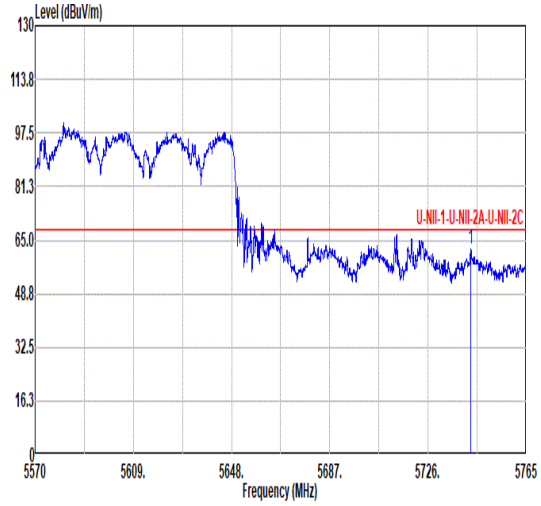
Mode	2	
	Band Edge - L	
	U-NII-2C_5.47-5.725_802.11be EHT160_CH114_1992_5570MHz	
ANT	1+2	
Pol.	Vertical	Fundamental
Peak		
Avg		

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5438.12	66.15	74.00	-7.85	48.58	34.60	13.05	30.08	0.00	189	224	PEAK
2	5466.06	60.02	68.20	-8.18	42.42	34.60	13.07	30.07	0.00	189	224	PEAK

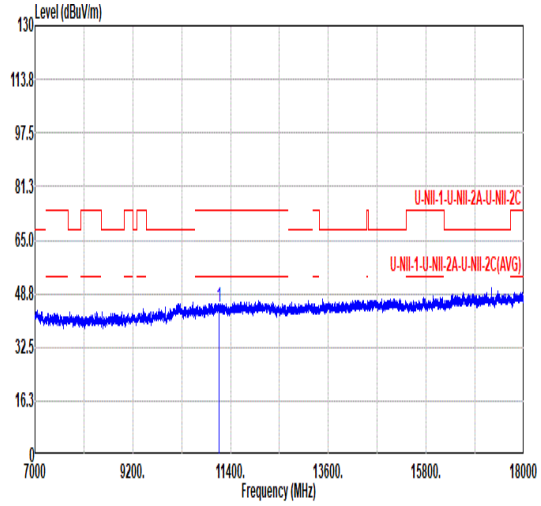
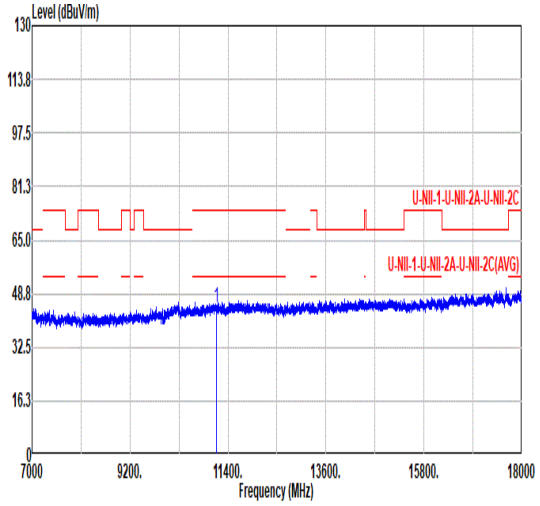
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5570.00	99.01	------	------	81.37	34.60	13.09	30.05	0.00	189	224	PEAK

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5447.58	50.30	54.00	-3.70	32.71	34.60	13.06	30.07	0.00	189	224	AVERAGE

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5570.00	89.75	------	------	72.00	34.64	13.13	30.02	0.00	189	224	AVERAGE

Mode	2	
	Band Edge - R	
	U-NII-2C_5.47-5.725_802.11be EHT160_CH114_1992_5570MHz	
ANT	1+2	
Pol.	Vertical	Fundamental
Peak		Blank

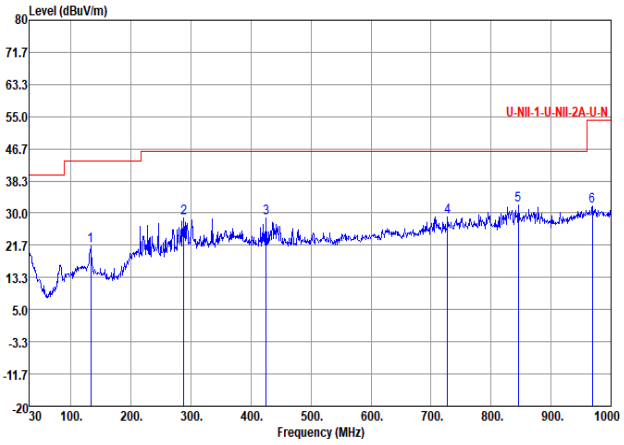
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	5742.87	62.26	68.20	-5.94	43.34	35.07	14.02	30.17	0.00	189	224	PEAK

Mode	2	
	Harmonic	
	U-NII-2C_5.47-5.725_802.11be EHT160_CH114_1992_5570MHz	
ANT	1+2	
Pol.	Horizontal	Vertical
Peak Avg		

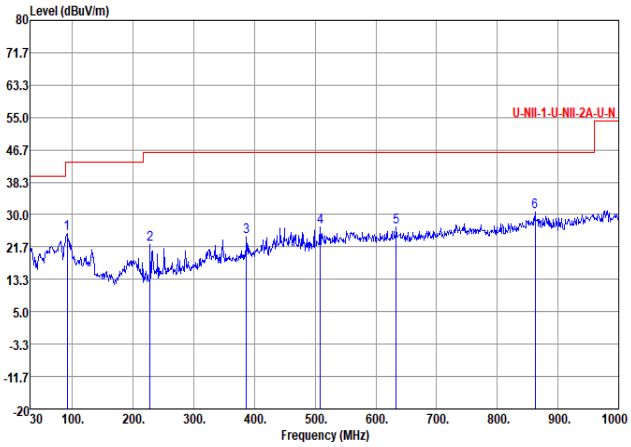
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	Aux Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	dB	cm	deg	
1	11140.00	44.43	74.00	-29.57	53.07	37.70	18.19	64.53	0.00	--	--	PEAK

Mode	2	
	LF	
	U-NII-2C_5.47-5.725_802.11be EHT160_CH114_1992_5570MHz	
ANT	1+2	
Pol.	Horizontal	Vertical

Peak



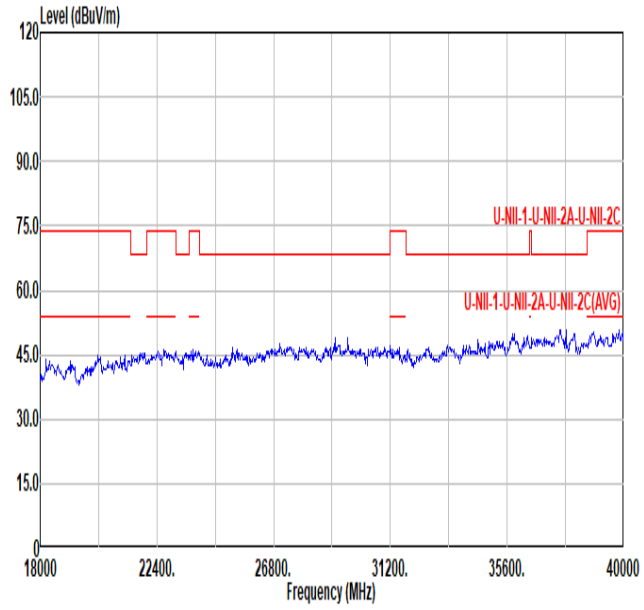
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	132.82	21.48	-22.02	43.50	35.67	16.89	1.75	32.83	---	---	Peak
2	288.02	28.65	-17.35	46.00	39.87	19.14	2.59	32.95	---	---	Peak
3	424.79	28.64	-17.36	46.00	35.75	22.50	3.14	32.75	---	---	Peak
4	727.43	29.07	-16.93	46.00	30.06	27.63	4.13	32.75	---	---	Peak
5	845.77	32.11	-13.89	46.00	31.13	29.13	4.44	32.59	---	---	Peak
6	968.96	31.77	-22.23	54.00	29.03	30.20	4.76	32.22	---	---	Peak

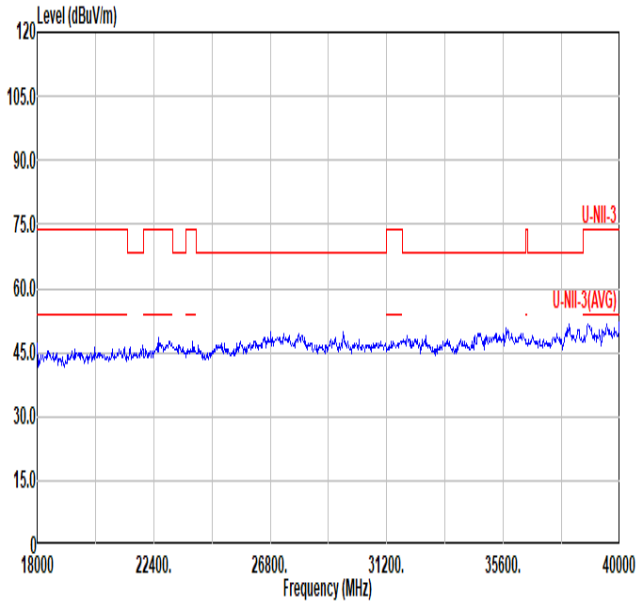


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	91.11	25.10	-18.40	43.50	41.25	15.02	1.45	32.62	---	---	Peak
2	227.88	22.42	-23.58	46.00	36.17	17.05	2.30	33.10	---	---	Peak
3	386.96	24.40	-21.60	46.00	32.66	21.57	3.00	32.83	---	---	Peak
4	508.21	26.93	-19.07	46.00	31.96	24.29	3.45	32.77	---	---	Peak
5	633.34	26.70	-19.30	46.00	29.09	26.40	3.84	32.63	---	---	Peak
6	862.26	30.73	-15.27	46.00	29.59	29.23	4.48	32.57	---	---	Peak

Emission above 18GHz

Peak

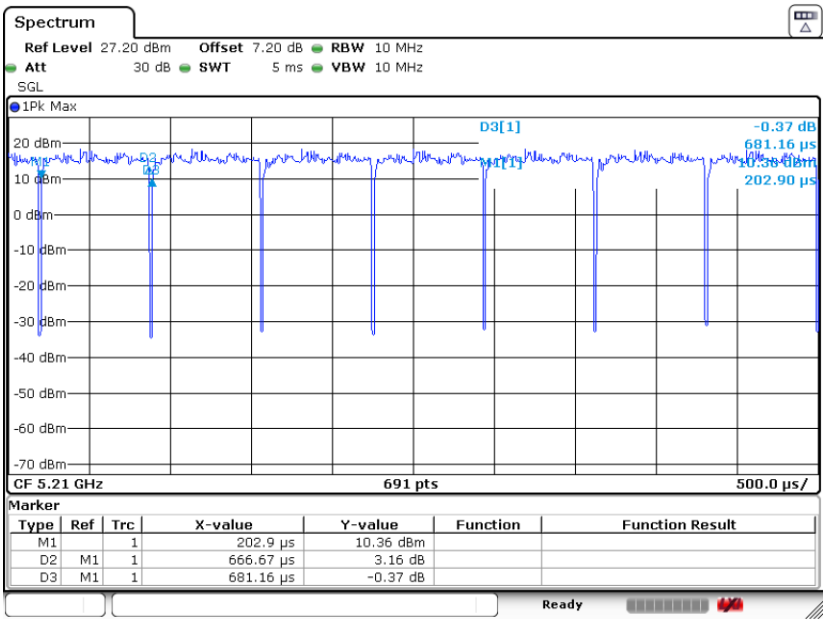




Appendix B. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1+2	802.11be EHT80 RU996	97.873	0.667	1.500	1.5KHz
1+2	802.11be EHT160 RU996+996	97.452	0.665	1.503	1.6KHz

802.11be EHT80 RU996



802.11be EHT160 RU996+996