



Test report No.: 2360570R-RFUSV03S-A

# TEST REPORT

Product Name	Wi-Fi 6/6E Sensor
Trademark	7SIGNAL, Inc.
Model and /or type reference	7S6300
FCC ID	YLF7S6300
Applicant's name / address	7signal 6155 Rockside Road, Suite 110, Independence, Ohio 44131, United States
Manufacturer's name	7signal
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 789033
Verdict Summary	IN COMPLIANCE
Documented By (Senior Project Specialist / Genie Chang)	<i>Genie Chang</i>
Tested By (Senior Engineer / Ivan Chuang)	<i>Ivan Chuang</i>
Tested By (Senior Engineer / Alan Chen)	<i>Alan Chen</i>
Date of Receipt	2023/06/17
Date of Issue	2023/09/05
Report Version	V1.0

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Appendix 1: EUT Test Photographs

Appendix 2: Product Photos-Please refer to the file: 2360570R-Product Photos

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## Competences and Guarantees

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DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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## General conditions

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1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

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## Revision History

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Report No.	Version	Description	Issued Date
2360570R-RFUSV03S-A	V1.0	Initial issue of report.	2023/09/05

## 1. Summary of Reference Test Data

### 1.1. Introduction

This application is intended to reuse the test data from FCC ID: A8J-ECW336, certified on 07/08/2022, due to the fact that this products is hardware-wise identical.

According to KDB 484596 D01v01, the FCC Part 15E (equipment class: NII) reuse UNII-2A and UNII-2C original test result of FCC ID: A8J-ECW336 and perform spot-check.

And it re-test UNII-1, UNII-3 and DFS slave mode.

UNII-1, 3		
Test Item	Data Reused	Remark
Conducted Emission	No	Re-test
Radiated Band Edge	No	Re-test
Radiated Spurious Emission	No	Re-test
6dB / Occupied Bandwidth	No	Re-test
Maximum Conducted Output Power	No	Re-test
Power Spectral Density	No	Re-test
Duty Cycle	No	Re-test

UNII-2A, 2C		
Test Item	Data Reused	Remark
Conducted Emission	Yes	N/A
Radiated Band Edge	Yes	Verify worst-case channel
Radiated Spurious Emission	Yes	Verify worst-case channel
Occupied Bandwidth	Yes	N/A
Maximum Conducted Output Power	Yes	Verify all output power
Power Spectral Density	Yes	N/A
Duty Cycle	Yes	N/A
DFS	No	Re-test slave mode

The applicant takes full responsibility that the test data as referenced in this report represent compliance for the FCC ID: YLF7S6300.

### 1.2. Difference Description

7S6300 (FCC ID: YLF7S6300), use the same MCU chipset (IPQ8072A), share the same chipset baseline, hardware design, support same bands, the difference is only on software version change from master mode to slave mode.

### 1.3. Spot Check Verification Data Section

The radiated emission and radiated band edge tests were performed according to the worst result of FCC ID: A8J-ECW336. After evaluation and verification, this change does not affect RF characteristic.

Therefore, re-use UNII-2A and UNII-2C test data which has been recorded in Test Report of FCC ID: A8J-ECW336 (DEKRA Report No.: 2230212R-RFUSWL2V01-A).

### 1.4. Reference Section

Rule Part	Operating Frequency (MHz)	Current FCC ID	Reference Original FCC ID	Reference Exhibit Type
15E (NII)	5260~5320 5500~5700	YLF7S6300	A8J-ECW336	RF Test Report_5G (Report No.: 2230212R-RFUSWL5V01-A)

Comparison Table (The worst result)				
Test Item	Band	Test Mode / Frequency (MHz)	Test Result	
			Original FCC ID	Current FCC ID
			Margin (dB)	Margin (dB)
Radiated Emission	UNII-2A	11ax80 / 5290	-0.07	-0.49
	UNII-2C	11ax20 / 5500	-0.48	-0.70
Radiated Band Edge	UNII-2A	11ax80 / 5290	-3.84	-5.06
	UNII-2C	11ax40 / 5510	-0.06	-1.26

## 2. General Information

### 2.1. EUT Description

Product Name	Wi-Fi 6/6E Sensor
Trademark	7SIGNAL, Inc.
Model and /or type reference	7S6300
EUT Rated Voltage	AC 100-240V / 50-60Hz
EUT Test Voltage	AC 120V / 60Hz
Frequency Range	802.11a/n/ac/ax-20MHz: 5180-5320MHz, 5500-5700MHz, 5720MHz, 5745-5825MHz 802.11n/ac/ax-40MHz: 5190-5310, 5510-5670MHz, 5710MHz, 5755-5795MHz 802.11ac/ax-80MHz: 5210-5290MHz, 5530-5690MHz, 5775MHz
Number of Channels	802.11a/n/ax-20MHz: 25 802.11n/ax-40MHz: 12 802.11ac/ax-80MHz: 6
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 800MHz 802.11ac: up to 1733.3MHz 802.11ax: up to 2402MHz
Type of Modulation	OFDM, OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Channel Control	Auto

#### Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Senao	7S6300	PIFA	4.87dBi for 5150~5250 MHz 4.87dBi for 5250~5350 MHz 4.73dBi for 5470~5725 MHz 5.09dBi for 5725~5850 MHz
2	Senao	7S6300	PIFA	4.01dBi for 5150~5250 MHz 4.01dBi for 5250~5350 MHz 2.55dBi for 5470~5725 MHz 3.04dBi for 5725~5850 MHz
3	Senao	7S6300	PIFA	4.36dBi for 5150~5250 MHz 4.36dBi for 5250~5350 MHz 4.39dBi for 5470~5725 MHz 4.56dBi for 5725~5850 MHz
4	Senao	7S6300	PIFA	3.59dBi for 5150~5250 MHz 3.59dBi for 5250~5350 MHz 3.18dBi for 5470~5725 MHz 4.01dBi for 5725~5850 MHz

For CDD power directional gain	For Beamforming power directional gain
4.87dBi for 5150~5250 MHz	10.89dBi for 5150~5250 MHz
4.87dBi for 5250~5350 MHz	10.89dBi for 5250~5350 MHz
4.73dBi for 5470~5725 MHz	10.75dBi for 5470~5725 MHz
5.09dBi for 5725~5850 MHz	11.11dBi for 5725~5850 MHz

**For CDD mode:**

5150MHz-5250MHz: Directional gain = 4.87 dBi

5250MHz-5350MHz: Directional gain = 4.87 dBi

5470MHz-5725MHz: Directional gain = 4.73 dBi

5725MHz-5850MHz: Directional gain = 5.09 dBi

(Directional gain = GANT MAX + Array Gain, Array Gain = 0 dB for NANT ≤ 4)

**For Beamforming mode:**

5150MHz-5250MHz: Directional gain = 10.89 dBi

5250MHz-5350MHz: Directional gain = 10.89 dBi

5470MHz-5725MHz: Directional gain = 10.75 dBi

5725MHz-5850MHz: Directional gain = 11.11 dBi

Directional gain = GANT MAX + Array Gain, Array Gain = 10\*log(4) = 6.02 dB)

For PSD directional gain
10.25dBi for 5150~5250 MHz
10.25dBi for 5250~5350 MHz
9.85dBi for 5470~5725 MHz
10.26dBi for 5725~5850 MHz

5150MHz-5250MHz: Directional gain = 10.25 dBi

5250MHz-5350MHz: Directional gain = 10.25 dBi

5470MHz-5725MHz: Directional gain = 9.85 dBi

5725MHz-5850MHz: Directional gain = 10.26 dBi

Directional gain = 10 log[(10G1/20 + 10G2/20 + 10G3/20 + 10G4/20)2 / NANT] dBi

802.11a/n/ac/ax-20 MHz Center Working Frequency of Each Channel:

Channel	Frequency (MHz)						
36	5180	40	5200	44	5220	48	5240
52	5260	56	5280	60	5300	64	5320
100	5500	104	5520	108	5540	112	5560
116	5580	120	5600	124	5620	128	5640
132	5660	136	5680	140	5700	144	5720
149	5745	153	5765	157	5785	161	5805
165	5825	--	--	--	--	--	--

802.11n/ac/ax-40 MHz Center Working Frequency of Each Channel:

Channel	Frequency (MHz)						
38	5190	46	5230	54	5270	62	5310
102	5510	110	5550	118	5590	126	5630
134	5670	142	5710	151	5755	159	5795

802.11ac/ax-80 MHz Center Working Frequency of Each Channel:

Channel	Frequency (MHz)						
42	5210	58	5290	106	5530	122	5610
138	5690	155	5775	--	--	--	--

Note:

- Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- Lowest data rates are tested in each mode. Only worst case is shown in the report.  
(802.11a is 6Mbps 、802.11ax-20 MHz/40 MHz/80 MHz is MCS0)
- The spectrum plot against conducted item only shows the worst case.
- The CDD mode and Beamforming mode are presented in the power output test item. For other test items, CDD mode is the worst case for the final test and shown in this report.

Test Mode	Transmit (802.11a)
	Transmit (802.11ax-20 MHz)
	Transmit (802.11ax-40 MHz)
	Transmit (802.11ax-80 MHz)
	Transmit (802.11ax-20 MHz)-Beamforming
	Transmit (802.11ax-40 MHz)-Beamforming
	Transmit (802.11ax-80 MHz)-Beamforming

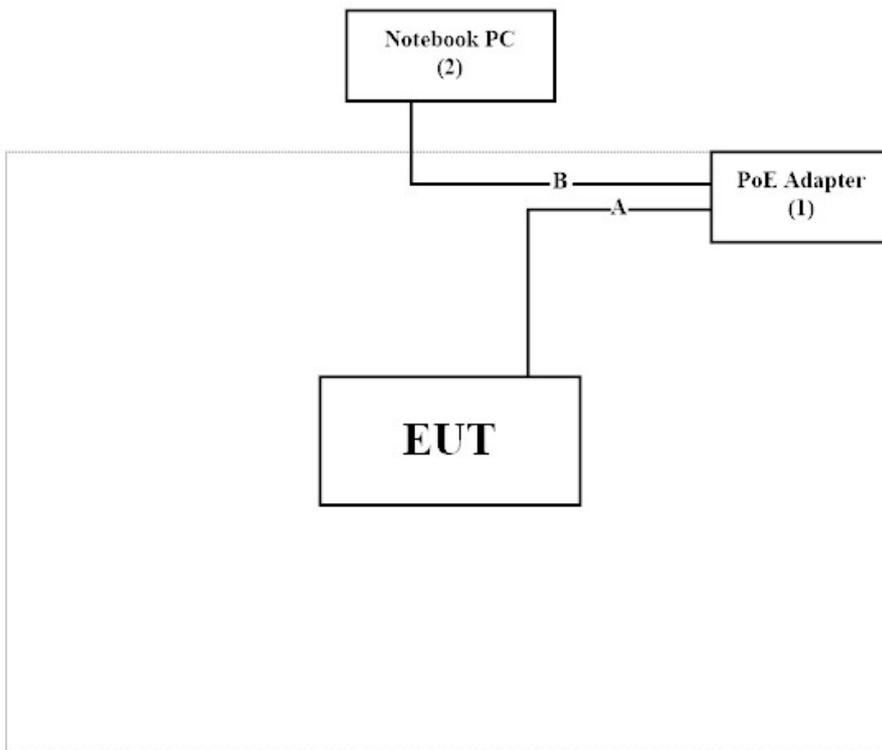
### 2.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1	PoE Adapter	EnGenius	EPA5006GP	N/A
2	Notebook PC	DELL	Latitude E6440	N/A

Cable Type	Cable Description
A	LAN Cable
B	LAN Cable

### 2.3. Configuration of tested System



### 2.4. EUT Exercise Software

1.	Setup the EUT as shown in Section 2.3.
2.	Execute software “QSPR Version V5.0-00197” on the Notebook PC.
3.	Configure the test mode, the test channel, and the data rate.
4.	Press “OK” to start the continuous Transmit.
5.	Verify that the EUT works properly.

## 2.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	22.9 °C
	Humidity (%RH)	10~90 %	59.3 %
Conductive	Temperature (°C)	10~40 °C	22.0 °C
	Humidity (%RH)	10~90 %	55.0 %

USA	FCC Registration Number: TW0033
Canada	CAB Identifier Number: TW3023 / Company Number: 26930

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
	Linkou Laboratory
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C.
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan, R.O.C.
Phone Number	+886-3-275-7255
Fax Number	+886-3-327-8031

## 2.6. List of Test Equipment

### For Conduction Measurements / HY-SR01

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	EMI Test Receiver	R&S	ESR7	101601	2023/06/20	2024/06/19
V	Two-Line V-Network	R&S	ENV216	101306	2023/03/16	2024/03/15
V	Coaxial Cable	SUHNER	RG400_BNC	RF001	2023/01/10	2024/01/09

Note:

1. All equipment are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version: E3 230303 dekra V9.

### For Conducted Measurements / HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Spectrum Analyzer	R&S	FSV30	103466	2022/12/22	2023/12/21
V	Peak Power Analyzer	KEYSIGHT	8990B	MY51000539	2023/05/15	2024/05/14
V	Power Sensor	KEYSIGHT	N1923A	MY59240002	2023/05/18	2024/05/17
V	Power Sensor	KEYSIGHT	N1923A	MY59240003	2023/05/18	2024/05/17

Note:

1. All equipment are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version: RF Conducted Test Tools R3 V3.0.0.14.

### For Radiated Measurements / HY-CB03

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Loop Antenna	AMETEK	HLA6121	49611	2023/02/21	2024/02/20
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021/08/11	2023/08/10
V	Horn Antenna	RF SPIN	DRH18-E	210507A18ES	2023/05/11	2024/05/10
V	Horn Antenna	Com-Power	AH-840	101100	2021/10/04	2023/10/03
V	Pre-Amplifier	SGH	0301	20211007-10	2023/01/10	2024/01/09
V	Pre-Amplifier	SGH	PRAMP118	20200701	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC05820SE	980310	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC184045SE	980369	2023/01/10	2024/01/09
	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
V	Filter	MICRO TRONICS	BRM50702	G269	2023/01/05	2024/01/04
V	Filter	MICRO TRONICS	BRM50716	G196	2023/01/05	2024/01/04
V	EMI Test Receiver	R&S	ESR	102793	2022/12/05	2023/12/04
V	Spectrum Analyzer	R&S	FSV3044	101113	2023/02/04	2024/02/03
V	Coaxial Cable	SGH	SGH18	2021005-1	2023/01/10	2024/01/09
	Coaxial Cable	SGH	SGH18	202108-4		
	Coaxial Cable	SGH	SGH18	GD20110223-1		
	Coaxial Cable	SGH	HA800	GD20110222-3		

Note:

1. Bi-Log Antenna and Horn Antenna (AH-840) is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version: E3 230303 dekra V9.

## 2.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

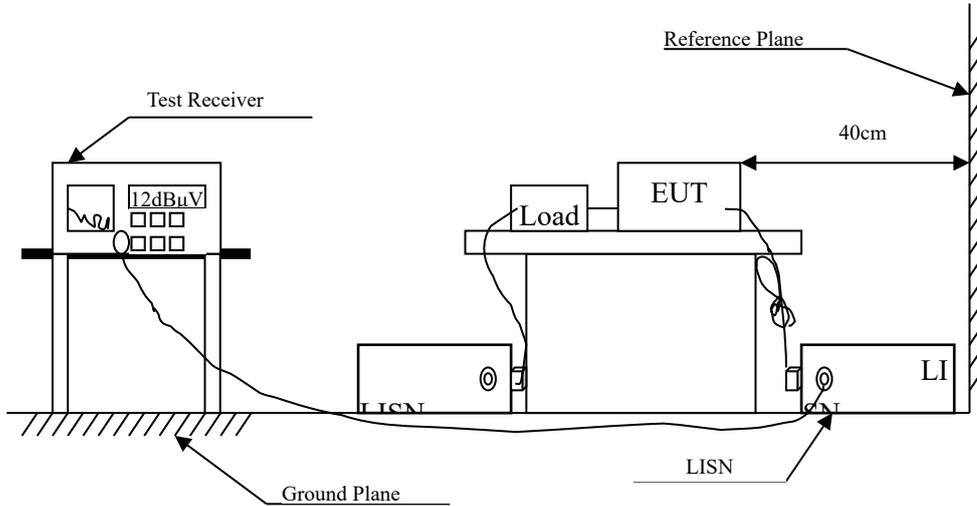
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Item	Uncertainty
Conducted Emission	$\pm 3.50$ dB
Maximum conducted output power	Power Meter: $\pm 1.05$ dB Spectrum Analyzer: $\pm 2.14$ dB
Peak Power Spectral Density	$\pm 2.14$ dB
Radiated Emission	9kHz~30MHz: $\pm 3.88$ dB 30MHz~1GHz: $\pm 4.42$ dB 1GHz~18GHz: $\pm 4.28$ dB 18GHz~40GHz: $\pm 3.90$ dB
Band Edge	$\pm 4.28$ dB
Occupied Bandwidth	$\pm 1580.61$ Hz
Duty Cycle	$\pm 0.53$ %

### 3. Conducted Emission

#### 3.1. Test Setup



#### 3.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

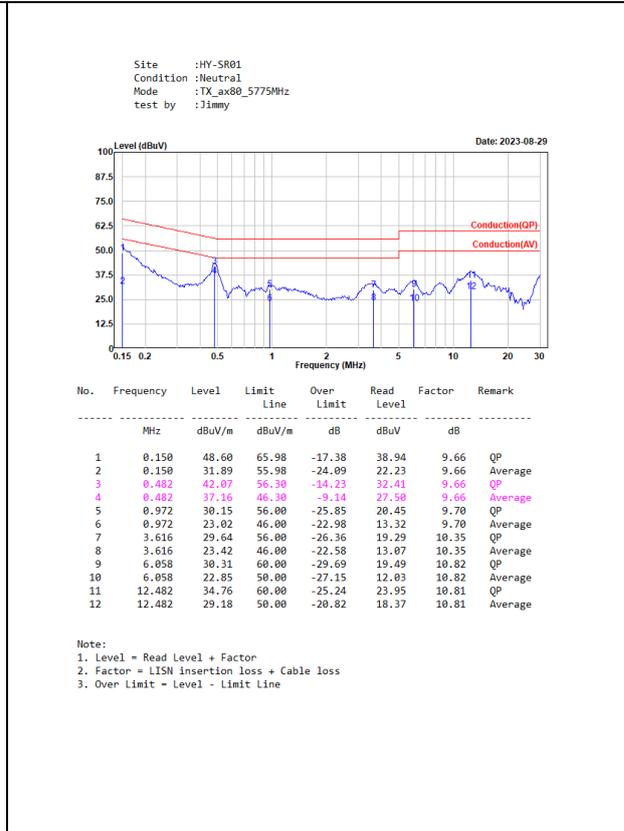
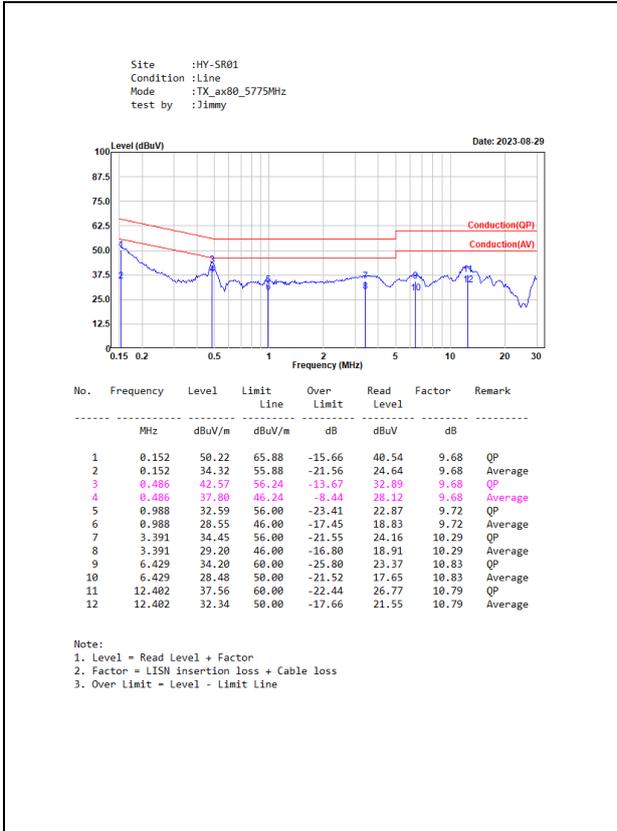
### 3.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:2014 on conducted measurement.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

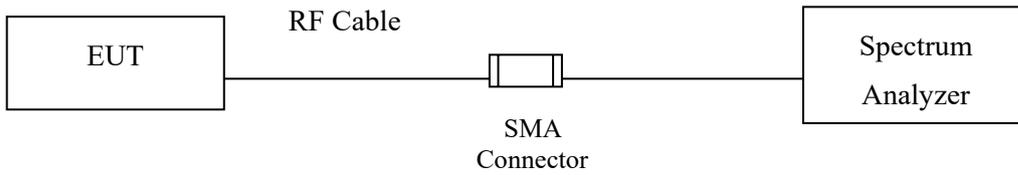
### 3.4. Test Result of Conducted Emission



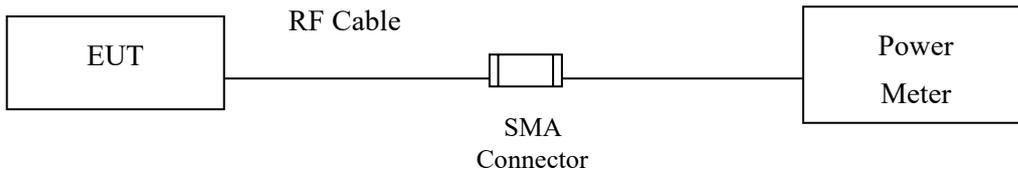
#### 4. Maximun conducted output power

##### 4.1. Test Setup

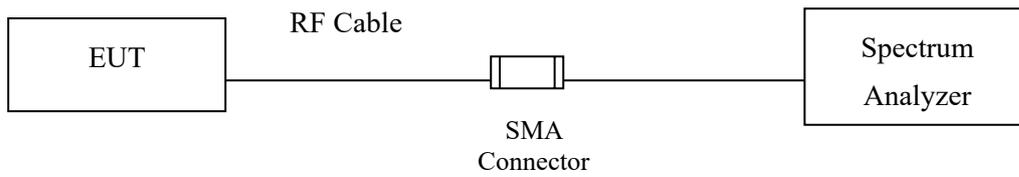
##### 26dB Occupied Bandwidth



##### Conducted Power Measurement



For straddle channel:



## 4.2. Limits

For the band 5.15-5.25 GHz,

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W, provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, if transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) 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 provided the maximum antenna gain does not exceed 6 dBi. In addition, if transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or  $11 \text{ dBm} + 10 \log B$ , where B is the 99% emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

The maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

**For CDD mode:**

5150MHz-5250MHz: Directional gain = 4.87 dBi, Limit= 24dBm

5250MHz-5350MHz: Directional gain = 4.87 dBi, Limit= 24dBm

5470MHz-5725MHz: Directional gain = 4.73 dBi, Limit= 24dBm

5725MHz-5850MHz: Directional gain = 5.09 dBi, Limit= 30dBm

(Directional gain =  $G_{ANT\ MAX} + \text{Array Gain}$ , Array Gain = 0 dB for  $N_{ANT} \leq 4$ )

**For Beamforming mode:**

5150MHz-5250MHz: Directional gain = 10.89 dBi, Limit= 19.11dBm

5250MHz-5350MHz: Directional gain = 10.89 dBi, Limit= 19.11dBm

5470MHz-5725MHz: Directional gain = 10.75 dBi, Limit= 19.25dBm

5725MHz-5850MHz: Directional gain = 11.11 dBi, Limit= 24.89dBm

(Directional gain =  $G_{ANT\ MAX} + \text{Array Gain}$ , Array Gain =  $10 \cdot \log(4) = 6.02$  dB)

#### 4.3. Test Procedure

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater than the 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

802.11an (BW  $\leq$  40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)

Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)

802.11ac (BW=80MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep).

When transmitted signals consist of two or more non-contiguous spectrum segments (e.g., 80+80 MHz mode) or when a single spectrum segment of a transmission crosses the boundary between two adjacent U-NII bands, KDB 644545 D03 section D) procedure is used for measurements.

## 4.4. Test Result of Maximum conducted output power

Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximum conducted output power  
 Test Mode : Transmit (802.11a)  
 Test Date : 2023/08/31

**Maximum conducted output power Measurement**

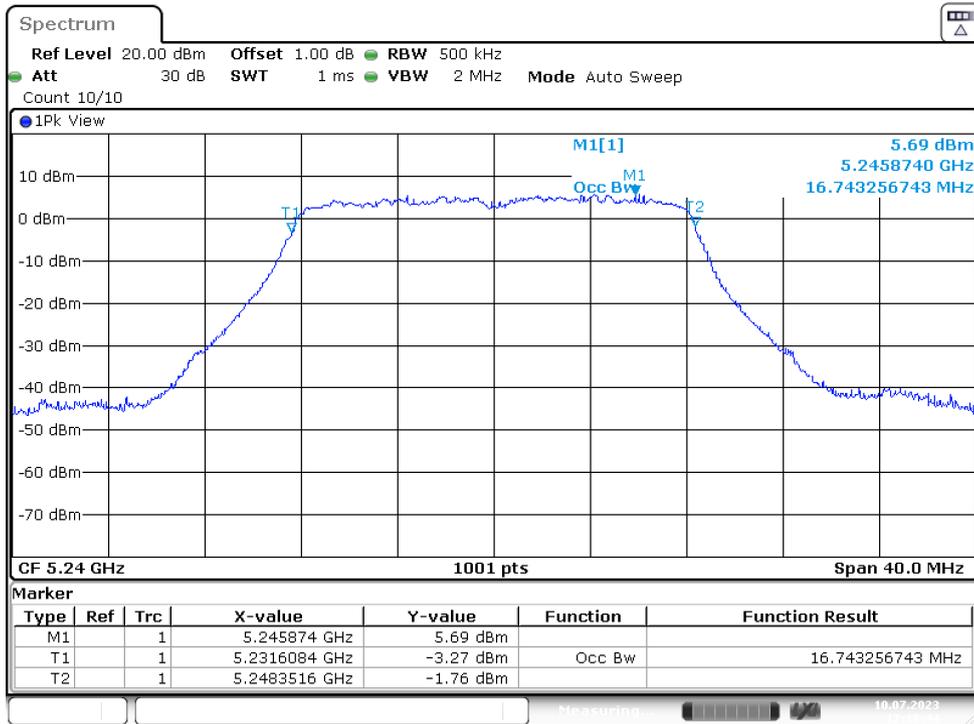
Channel No.	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Output Power Limit	
								(dBm)	dBm+10log(BW)
36	5180	--	12.08	12.45	12.38	11.90	18.23	24	--
44	5220	--	11.72	11.86	11.77	12.06	17.88	24	--
48	5240	--	11.58	11.87	12.06	11.72	17.83	24	--
52	5260	19.38	11.67	11.25	11.70	11.34	17.52	24	23.87
60	5300	19.54	11.90	11.28	11.72	11.63	17.66	24	23.91
64	5320	19.50	11.92	11.74	12.11	11.93	17.95	24	23.90
100	5500	19.46	12.45	13.01	12.72	12.83	18.78	24	23.89
116	5580	19.66	11.62	12.37	12.33	11.75	18.05	24	23.94
140	5700	19.50	12.17	12.56	12.32	12.35	18.37	24	23.90
149	5745	--	17.86	18.90	18.30	18.16	24.34	30	--
157	5785	--	17.55	18.17	17.44	17.89	23.79	30	--
165	5825	--	18.11	18.85	18.24	18.17	24.37	30	--

Note:

- Output Power Value (dBm) = 10\*LOG (Chain A(mW) + Chain B(mW) + Chain C(mW) + Chain D(mW))
- 26dB Bandwidth is the bandwidth of chain A or B or C or D whichever is less bandwidth, output power limitation is more stringent.

### Occupied Bandwidth for UNII-1

#### Channel 48 (Chain A)



Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximum conducted output power  
 Test Mode : Transmit (802.11ax-20 MHz)  
 Test Date : 2023/08/31

### Maximum conducted output power Measurement

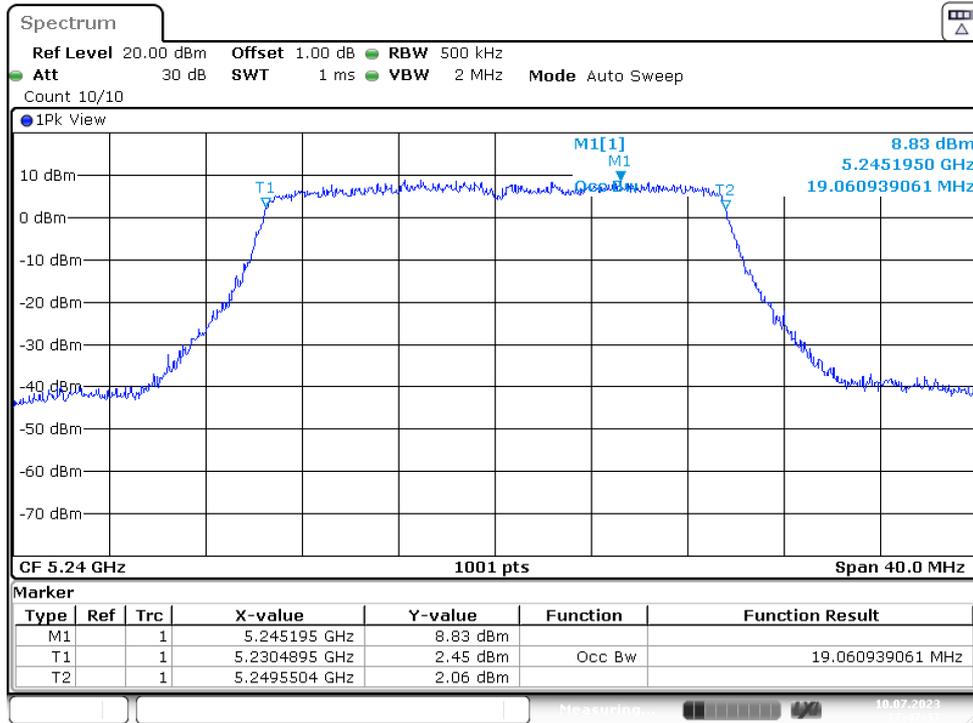
Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Duty factor (dBm)	Output Power Limit	
									(dBm)	dBm+10log(BW)
36	5180	--	11.89	12.06	12.37	12.25	18.17	--	24	--
44	5220	--	11.88	11.59	11.79	11.79	17.78	--	24	--
48	5240	--	11.17	11.55	11.57	11.72	17.53	--	24	--
52	5260	21.22	11.61	11.47	11.83	11.55	17.64	--	24	24.27
60	5300	21.34	12.22	12.16	12.22	12.25	18.23	--	24	24.29
64	5320	21.14	12.80	12.72	13.02	12.79	18.85	--	24	24.25
100	5500	20.98	13.14	13.68	13.44	13.21	19.39	--	24	24.22
116	5580	21.06	12.32	12.97	12.67	12.47	18.63	--	24	24.23
140	5700	21.06	12.51	13.40	12.96	13.00	19.00	--	24	24.23
144 (UNII-2C)	5720	15.67	10.74	11.30	11.52	10.97	18.10	0.94	24	22.95
144 (UNII-3)	5720	--	6.29	5.59	4.85	5.47	12.54	0.94	30	--
149	5745	--	16.98	17.22	17.27	16.89	23.11	--	30	--
157	5785	--	16.17	16.96	15.96	16.59	22.46	--	30	--
165	5825	--	17.46	18.13	17.44	17.10	23.57	--	30	--

Note:

- Output Power Value (dBm) = 10\*LOG (Chain A(mW) + Chain B(mW) + Chain C(mW) + Chain D(mW))
- 26dB Bandwidth is the bandwidth of chain A or B or C or D whichever is less bandwidth, output power limitation is more stringent.

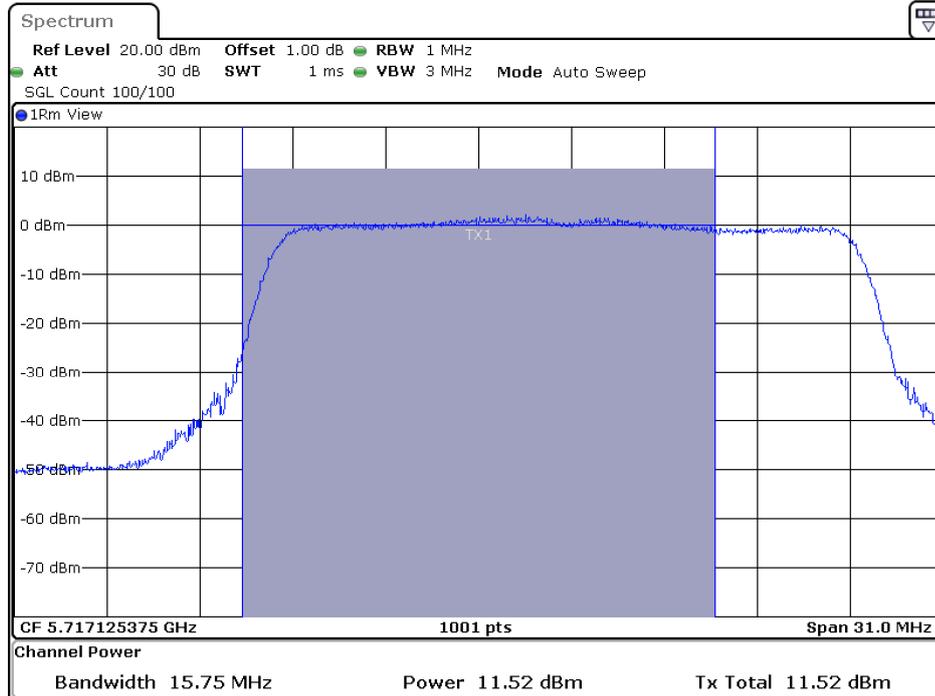
### Occupied Bandwidth for UNII-1

#### Channel 48 (Chain D)



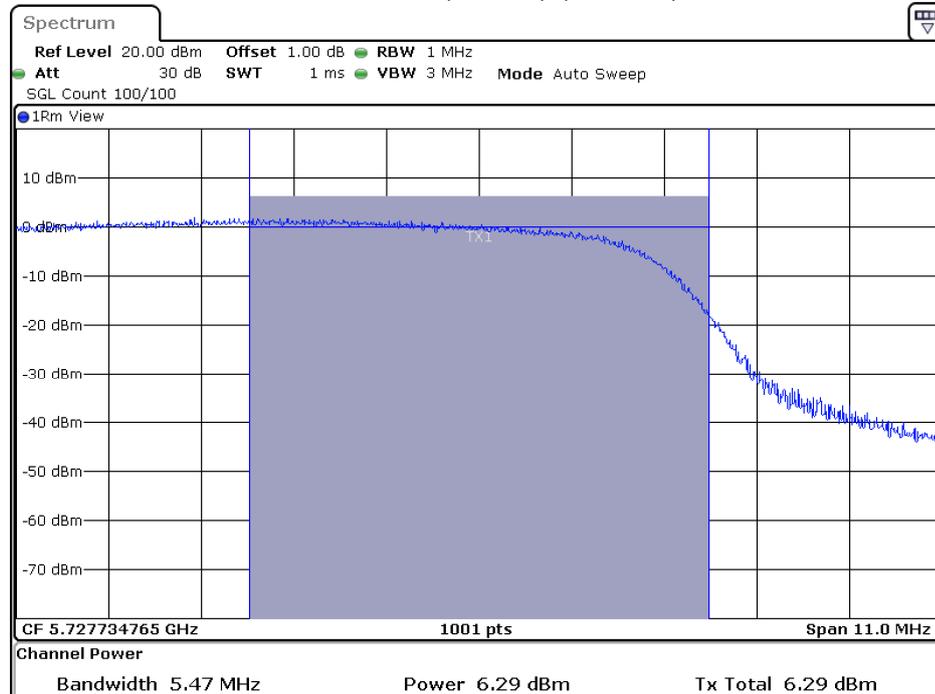
### Straddle channel maximum conducted output power

#### Channel 144 (UNII-2C) (Chain C)



Date: 31.AUG.2023 14:26:30

#### Channel 144 (UNII-3) (Chain A)



Date: 31.AUG.2023 14:23:46

Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximum conducted output power  
 Test Mode : Transmit (802.11ax-40 MHz)  
 Test Date : 2023/08/31

#### Maximum conducted output power Measurement

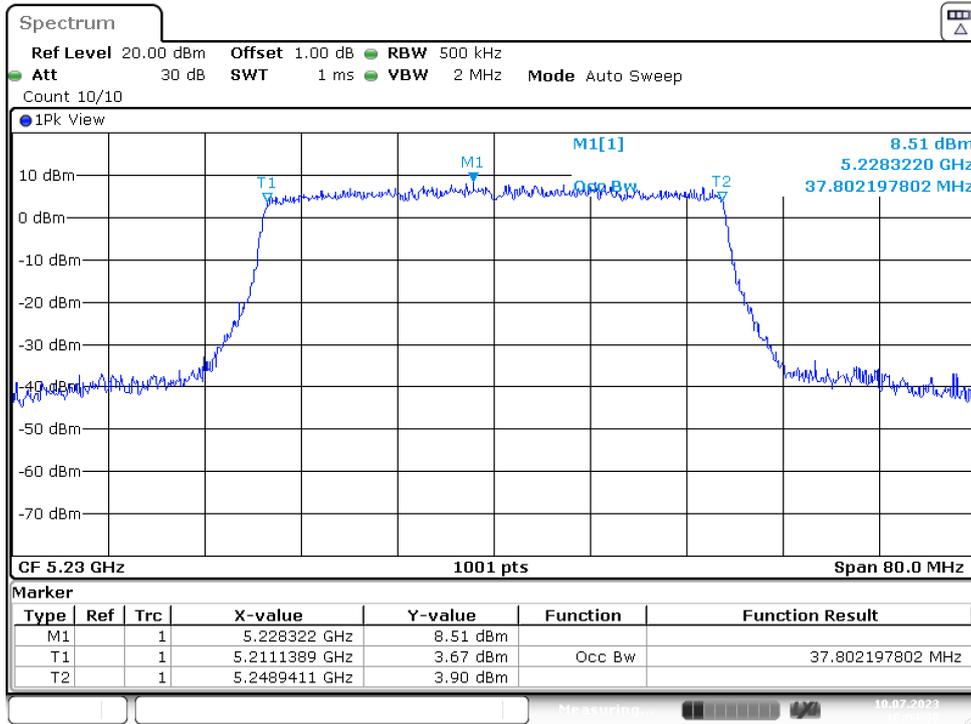
Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Duty factor (dBm)	Output Power Limit	
									(dBm)	dBm+10log(BW)
38	5190	--	14.78	14.83	14.88	14.79	20.84	--	24	--
46	5230	--	14.79	14.53	14.40	14.67	20.62	--	24	--
54	5270	40.52	14.42	14.46	14.35	14.34	20.41	--	24	27.08
62	5310	40.60	14.70	14.69	15.08	14.79	20.84	--	24	27.09
102	5510	40.68	15.51	16.10	15.79	15.76	21.82	--	24	27.09
110	5550	40.52	14.81	15.94	15.70	15.76	21.59	--	24	27.08
134	5670	40.20	15.19	16.17	15.37	15.41	21.57	--	24	27.04
142 (UNII-2C)	5710	35.30	14.86	14.82	15.39	15.31	22.08	0.95	24	26.48
142 (UNII-3)	5710	--	4.53	4.44	3.65	5.49	11.55	0.95	30	--
151	5755	--	17.93	18.75	17.97	18.34	24.28	--	30	--
159	5795	--	16.36	17.10	16.37	16.70	22.66	--	30	--

Note:

- Output Power Value (dBm) = 10\*LOG (Chain A(mW) + Chain B(mW) + Chain C(mW) + Chain D(mW))
- 26dB Bandwidth is the bandwidth of chain A or B or C or D whichever is less bandwidth, output power limitation is more stringent.

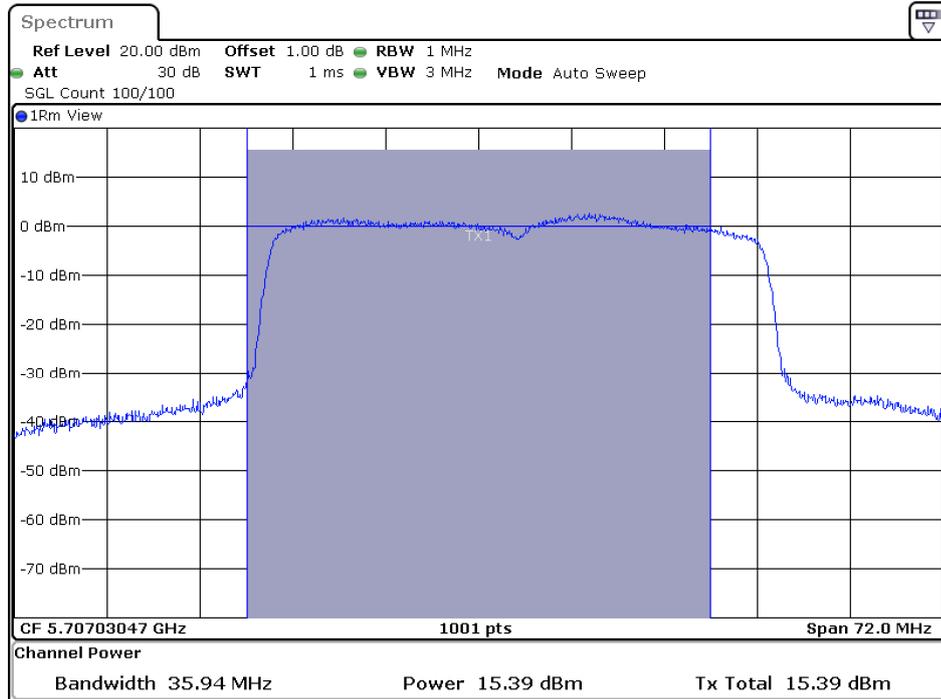
### Occupied Bandwidth for UNII-1

#### Channel 46 (Chain A)



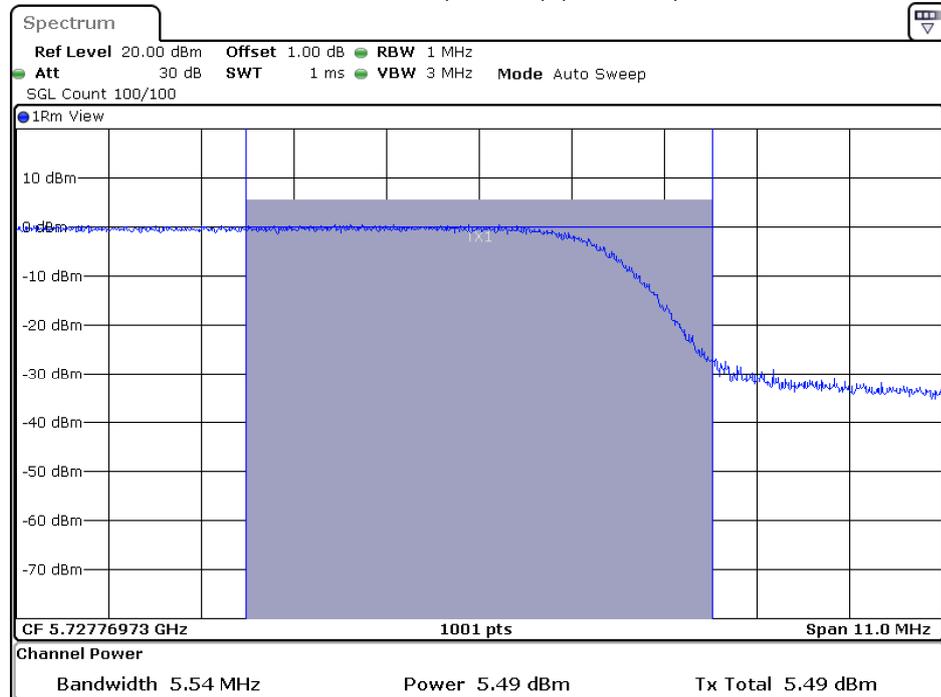
### Straddle channel maximum conducted output power

#### Channel 142 (UNII-2C) (Chain C)



Date: 31.AUG.2023 14:36:42

#### Channel 142 (UNII-3) (Chain D)



Date: 31.AUG.2023 14:32:28

Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximum conducted output power  
 Test Mode : Transmit (802.11ax-80 MHz)  
 Test Date : 2023/08/31

#### Maximum conducted output power Measurement

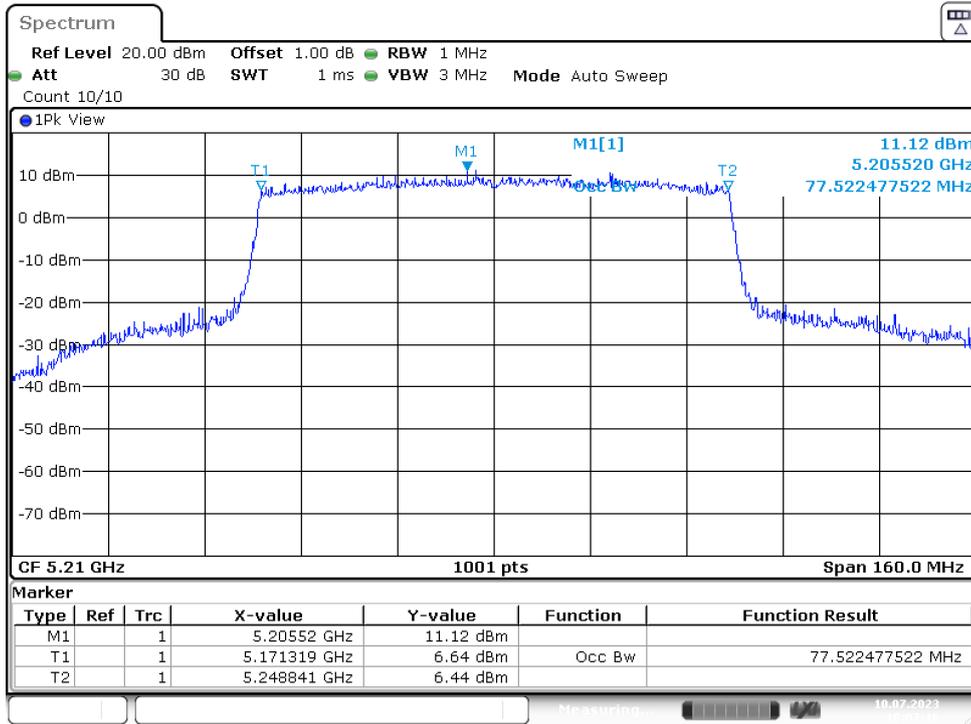
Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Duty factor (dBm)	Output Power Limit	
									(dBm)	dBm+10log(BW)
42	5210	--	15.69	15.46	15.40	14.87	21.39	--	24	--
58	5290	81.04	17.40	17.32	17.38	17.44	23.41	--	24	30.09
106	5530	83.28	16.75	17.94	17.39	17.82	23.52	--	24	30.21
122	5610	81.20	17.06	17.84	17.55	17.21	23.45	--	24	30.10
138 (UNII-2C)	5690	75.60	17.12	16.79	17.11	17.02	23.98	0.95	24	29.79
138 (UNII-3)	5690	--	3.10	3.30	1.52	2.92	9.73	0.95	30	--
155	5775	--	14.24	15.32	14.41	14.56	20.67	--	30	--

Note:

1. Output Power Value (dBm) = 10\*LOG (Chain A(mW) + Chain B(mW) + Chain C(mW) + Chain D(mW))
2. 26dB Bandwidth is the bandwidth of chain A or B or C or D whichever is less bandwidth, output power limitation is more stringent.

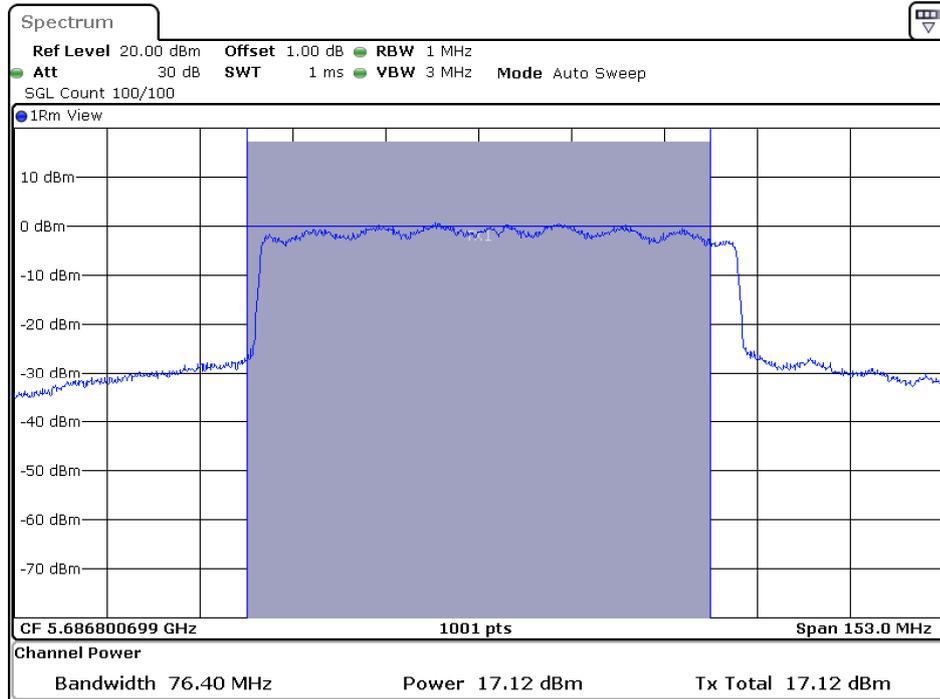
### Occupied Bandwidth for UNII-1

#### Channel 42 (Chain C)



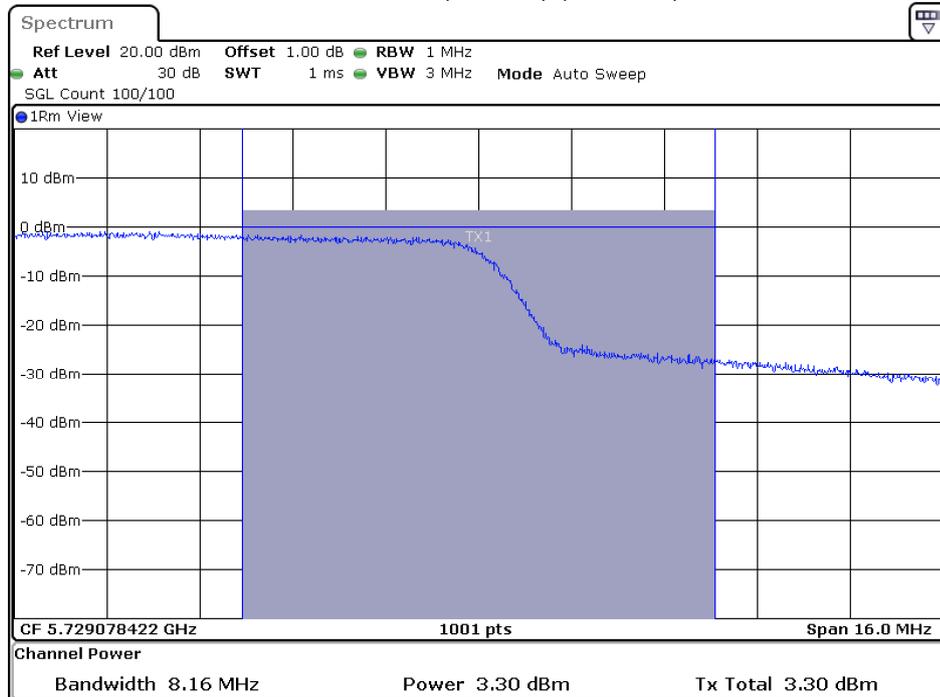
### Straddle channel maximum conducted output power

#### Channel 138 (UNII-2C) (Chain A)



Date: 31.AUG.2023 14:38:35

#### Channel 138 (UNII-3) (Chain B)



Date: 31.AUG.2023 14:39:16

Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximum conducted output power  
 Test Mode : Transmit (802.11ax-20 MHz)-Beamforming  
 Test Date : 2023/08/31

### Maximum conducted output power Measurement

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Duty factor (dBm)	Output Power Limit	
									(dBm)	dBm+10log(BW)
36	5180	--	5.87	6.04	6.35	6.23	12.15	--	19.11	--
44	5220	--	5.86	5.57	5.77	5.77	11.76	--	19.11	--
48	5240	--	5.15	5.53	5.55	5.70	11.51	--	19.11	--
52	5260	21.22	5.59	5.45	5.81	5.53	11.62	--	19.11	24.27
60	5300	21.34	6.20	6.14	6.20	6.23	12.21	--	19.11	24.29
64	5320	21.14	6.78	6.70	7.00	6.77	12.83	--	19.11	24.25
100	5500	20.98	7.12	7.66	7.42	7.19	13.37	--	19.25	24.22
116	5580	21.06	6.30	6.95	6.65	6.45	12.61	--	19.25	24.23
140	5700	21.06	6.49	7.38	6.94	6.98	12.98	--	19.25	24.23
144 (UNII-2C)	5720	15.67	4.72	5.28	5.50	4.95	12.08	0.94	19.25	22.95
144 (UNII-3)	5720	--	0.27	-0.43	-1.17	-0.55	6.52	0.94	24.89	--
149	5745	--	10.96	11.20	11.25	10.87	17.09	--	24.89	--
157	5785	--	10.15	10.94	9.94	10.57	16.44	--	24.89	--
165	5825	--	11.44	12.11	11.42	11.08	17.55	--	24.89	--

Note:

- Output Power Value (dBm) = 10\*LOG (Chain A(mW) + Chain B(mW) + Chain C(mW) + Chain D(mW))
- 26dB Bandwidth is the bandwidth of chain A or B or C or D whichever is less bandwidth, output power limitation is more stringent.

Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximum conducted output power  
 Test Mode : Transmit (802.11ax-40 MHz)-Beamforming  
 Test Date : 2023/08/31

#### Maximum conducted output power Measurement

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Duty factor (dBm)	Output Power Limit	
									(dBm)	dBm+10log(BW)
38	5190	--	8.76	8.81	8.86	8.77	14.82	--	19.11	--
46	5230	--	8.77	8.51	8.38	8.65	14.60	--	19.11	--
54	5270	40.52	8.40	8.44	8.33	8.32	14.39	--	19.11	27.08
62	5310	40.60	8.68	8.67	9.06	8.77	14.82	--	19.11	27.09
102	5510	40.68	9.49	10.08	9.77	9.74	15.80	--	19.25	27.09
110	5550	40.52	8.79	9.92	9.68	9.74	15.57	--	19.25	27.08
134	5670	40.20	9.17	10.15	9.35	9.39	15.55	--	19.25	27.04
142 (UNII-2C)	5710	35.30	8.84	8.80	9.37	9.29	16.06	0.95	19.25	26.48
142 (UNII-3)	5710	--	-1.49	-1.58	-2.37	-0.53	5.53	0.95	24.89	--
151	5755	--	11.91	12.73	11.95	12.32	18.26	--	24.89	--
159	5795	--	10.34	11.08	10.35	10.68	16.64	--	24.89	--

Note:

1. Output Power Value (dBm) = 10\*LOG (Chain A(mW) + Chain B(mW) + Chain C(mW) + Chain D(mW))
2. 26dB Bandwidth is the bandwidth of chain A or B or C or D whichever is less bandwidth, output power limitation is more stringent.

Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximum conducted output power  
 Test Mode : Transmit (802.11ax-80 MHz)-Beamforming  
 Test Date : 2023/08/31

#### Maximum conducted output power Measurement

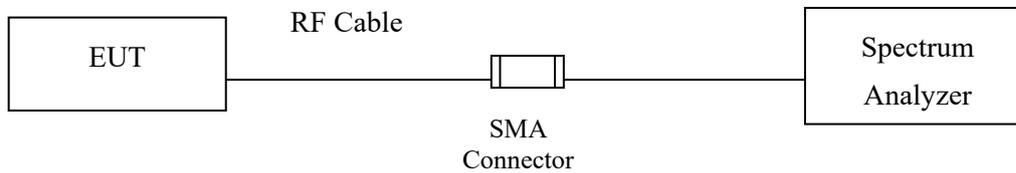
Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Output Power (dBm)	Duty factor (dBm)	Output Power Limit	
									(dBm)	dBm+10log(BW)
42	5210	--	9.67	9.44	9.38	8.85	15.37	--	19.11	--
58	5290	81.04	11.38	11.30	11.36	11.42	17.39	--	19.11	30.09
106	5530	83.28	10.73	11.92	11.37	11.80	17.50	--	19.25	30.21
122	5610	81.20	11.04	11.82	11.53	11.19	17.43	--	19.25	30.10
138 (UNII-2C)	5690	75.60	11.10	10.77	11.09	11.30	18.04	0.95	19.25	29.79
138 (UNII-3)	5690	--	-2.92	-2.72	-4.50	-3.10	3.71	0.95	24.89	--
155	5775	--	8.22	9.30	8.39	8.54	14.65	--	24.89	--

Note:

1. Output Power Value (dBm) = 10\*LOG (Chain A(mW) + Chain B(mW) + Chain C(mW) + Chain D(mW))
2. 26dB Bandwidth is the bandwidth of chain A or B or C or D whichever is less bandwidth, output power limitation is more stringent.

## 5. Maximum Power Spectral Density

### 5.1. Test Setup



### 5.2. Limits

For the band 5.15-5.25 GHz,

- (i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
- (iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
- (iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point UNII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

The maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5150MHz-5250MHz: Directional gain = 10.25 dBi, Limit= 6.75dBm

5250MHz-5350MHz: Directional gain = 10.25 dBi, Limit= 6.75dBm

5470MHz-5725MHz: Directional gain = 9.85 dBi, Limit= 7.15dBm

5725MHz-5850MHz: Directional gain = 10.26 dBi, Limit= 25.74dBm

Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$  dBi

### 5.3. Test Procedure

The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer.

SA-1 method is selected to run the test.

## 5.4. Test Result of Maximun Power Spectral Density

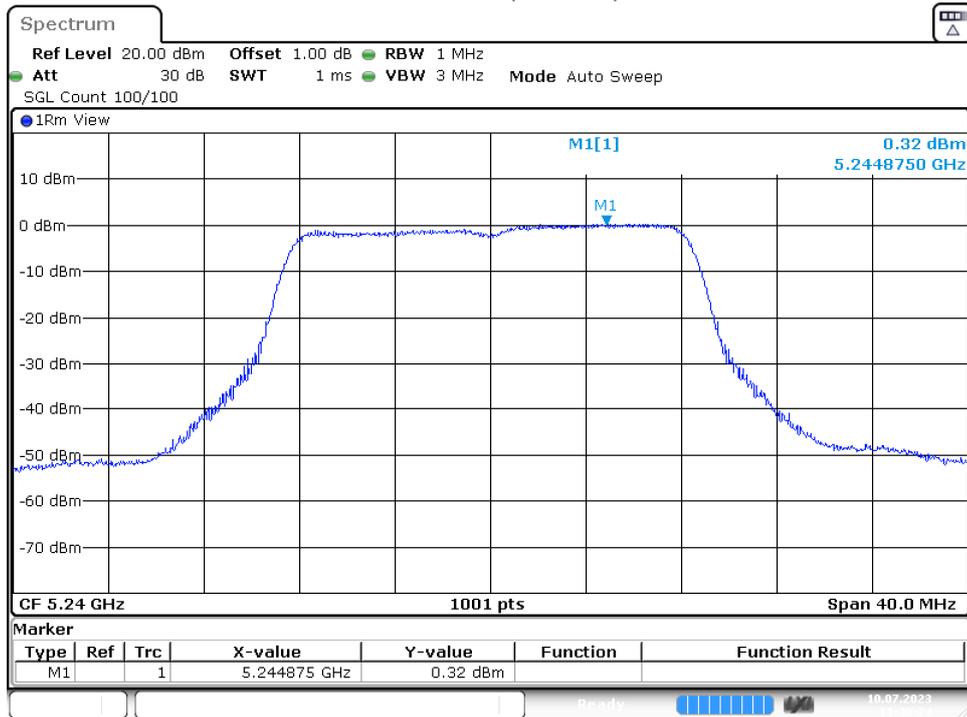
Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximun Power Spectral Density  
 Test Mode : Transmit (802.11a)

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
36	5180	6	A	0.28	0.45	6.69	6.75	Pass
			B	0.27				
			C	0.22				
			D	0.14				
44	5220	6	A	0.18	0.45	6.70	6.75	Pass
			B	0.25				
			C	0.20				
			D	0.29				
48	5240	6	A	0.26	0.45	6.71	6.75	Pass
			B	0.32				
			C	0.27				
			D	0.14				

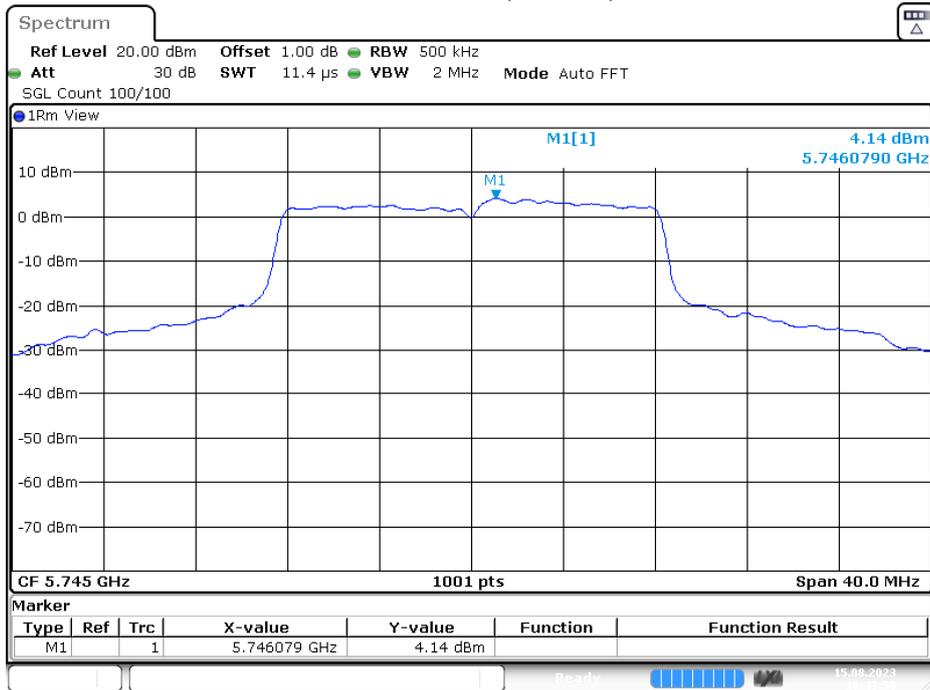
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD (dBm)	Duty factor (dB)	Total PPSD (dBm)	Limit (dBm)	Result
149	5745	6	A	4.14	0.45	10.09	25.74	Pass
			B	3.56				
			C	3.26				
			D	3.48				
157	5785	6	A	1.77	0.45	8.90	25.74	Pass
			B	2.15				
			C	2.37				
			D	3.31				
165	5825	6	A	2.65	0.45	9.44	25.74	Pass
			B	2.76				
			C	3.13				
			D	3.32				

Note: Total PPSD = 10\*log(Chain A (mW) + Chain B (mW) + Chain C (mW)+ Chain D (mW) + Duty factor.

### Channel 48 (Chain B)



### Channel 149 (Chain A)



Date: 15.AUG.2023 16:43:59

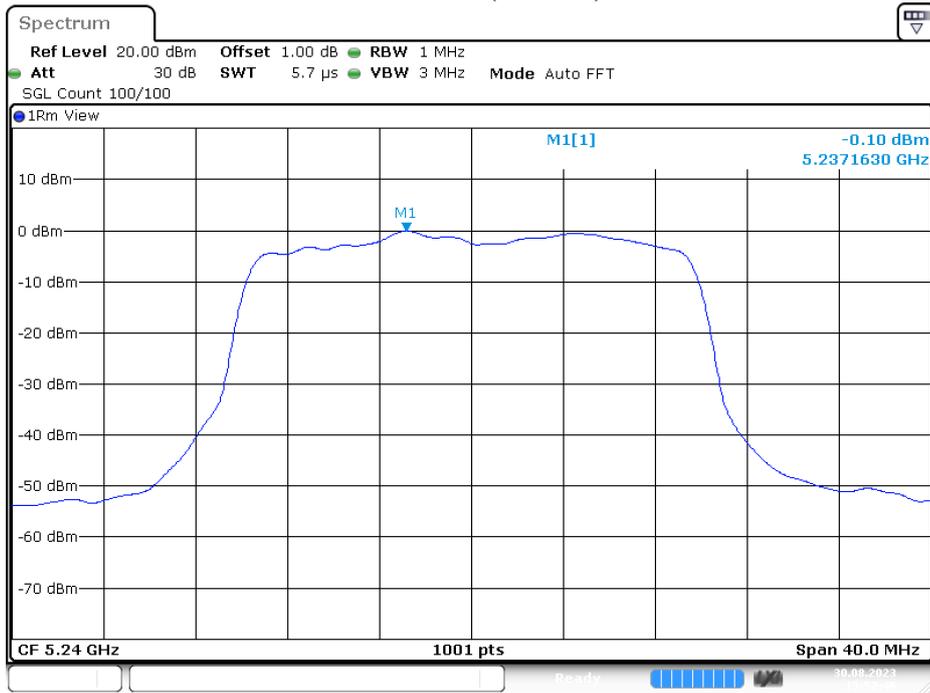
Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximun Power Spectral Density  
 Test Mode : Transmit (802.11ax-20 MHz)

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
36	5180	MCS0	A	-0.54	0.94	6.54	6.75	Pass
			B	-0.50				
			C	-0.29				
			D	-0.33				
44	5220	MCS0	A	-0.58	0.94	6.55	6.75	Pass
			B	-0.27				
			C	-0.42				
			D	-0.36				
48	5240	MCS0	A	-0.45	0.94	6.61	6.75	Pass
			B	-0.44				
			C	-0.10				
			D	-0.40				

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD (dBm)	Duty factor (dB)	Total PPSD (dBm)	Limit (dBm)	Result
149	5745	MCS0	A	1.58	0.94	8.66	25.74	Pass
			B	1.95				
			C	1.05				
			D	2.16				
157	5785	MCS0	A	0.69	0.94	7.36	25.74	Pass
			B	-0.16				
			C	0.42				
			D	0.61				
165	5825	MCS0	A	1.16	0.94	8.08	25.74	Pass
			B	1.41				
			C	1.12				
			D	0.79				

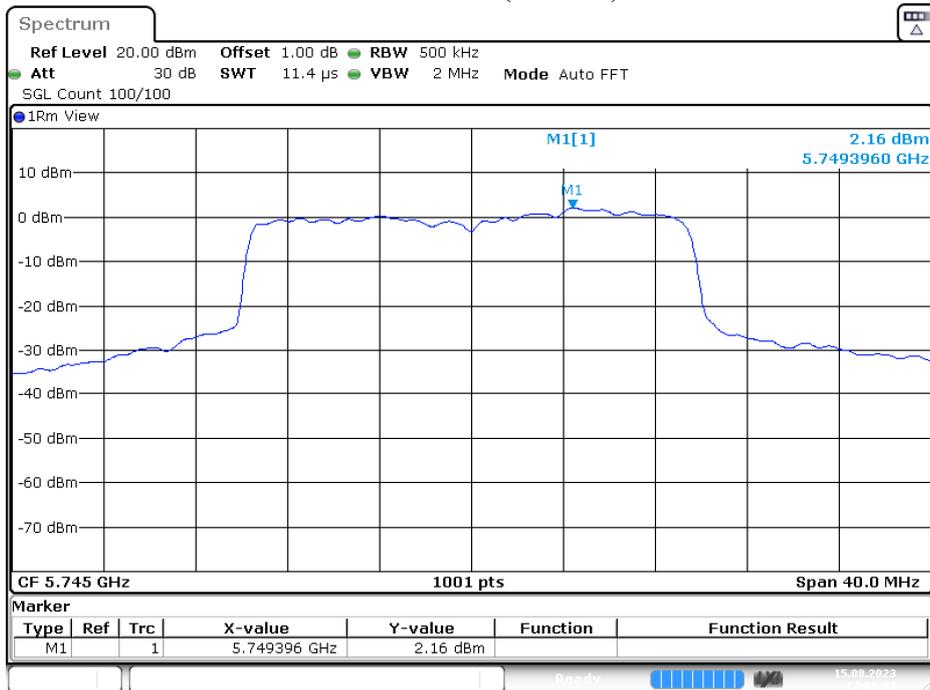
Note: Total PPSD = 10\*log(Chain A (mW) + Chain B (mW) + Chain C (mW)+ Chain D (mW) + Duty factor.

### Channel 48 (Chain C)



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### Channel 149 (Chain D)



Date: 15.AUG.2023 17:06:03

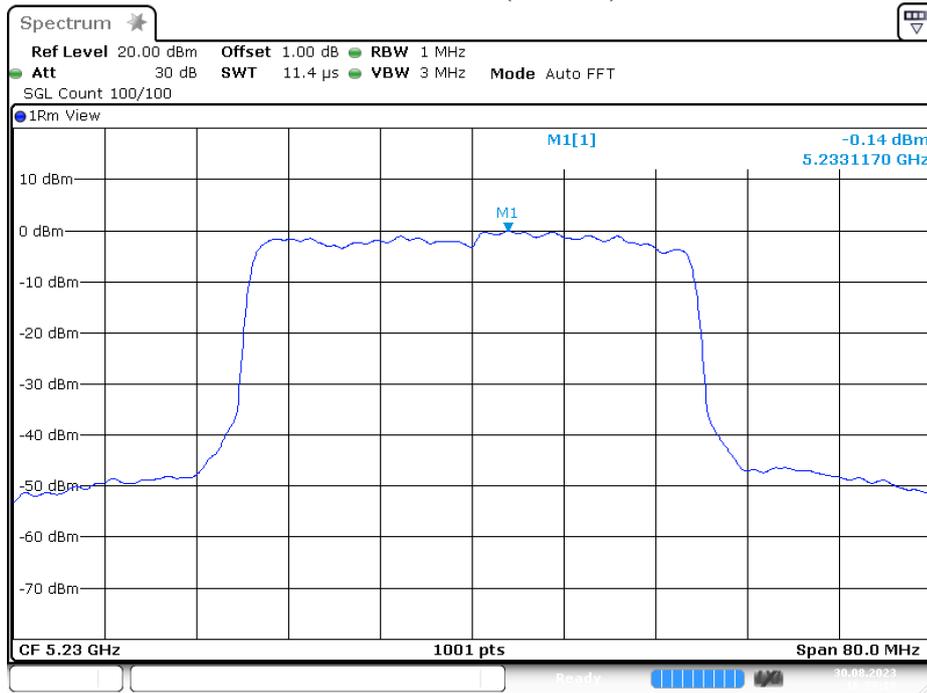
Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximun Power Spectral Density  
 Test Mode : Transmit (802.11ax-40 MHz)

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
38	5190	MCS0	A	-0.65	0.95	6.56	6.75	Pass
			B	-0.28				
			C	-0.26				
			D	-0.46				
46	5230	MCS0	A	-0.14	0.95	6.57	6.75	Pass
			B	-0.55				
			C	-0.38				
			D	-0.56				

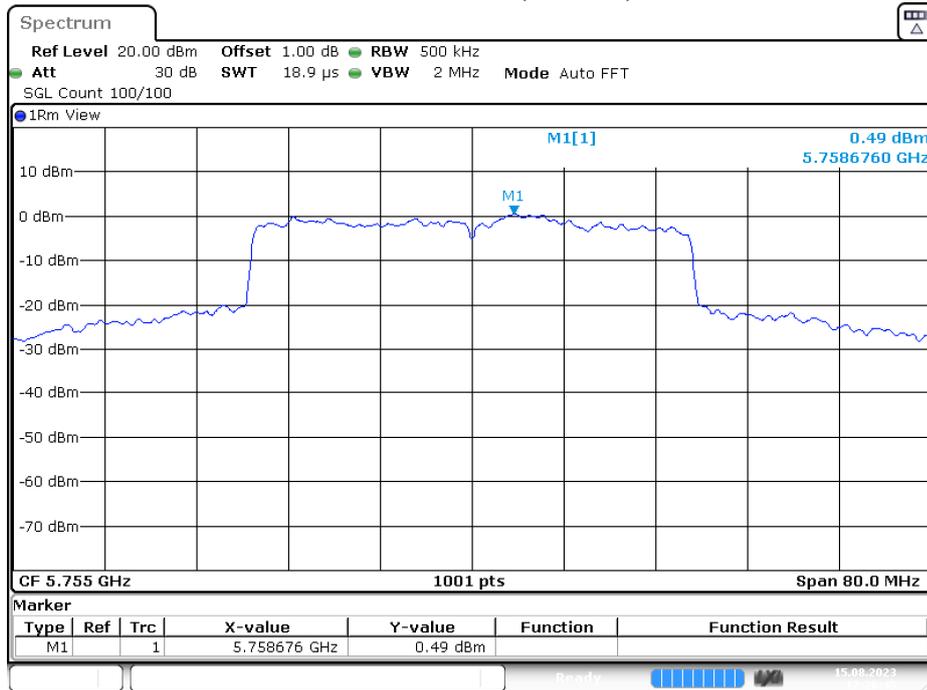
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD (dBm)	Duty factor (dB)	Total PPSD (dBm)	Limit (dBm)	Result
151	5755	MCS0	A	-0.29	0.95	6.91	25.74	Pass
			B	-0.38				
			C	-0.13				
			D	0.49				
159	5795	MCS0	A	-1.29	0.95	5.82	25.74	Pass
			B	-1.86				
			C	-0.87				
			D	-0.68				

Note: Total PPSD =  $10 \cdot \log(\text{Chain A (mW)} + \text{Chain B (mW)} + \text{Chain C (mW)} + \text{Chain D (mW)}) + \text{Duty factor}$ .

### Channel 46 (Chain A)



### Channel 151 (Chain D)



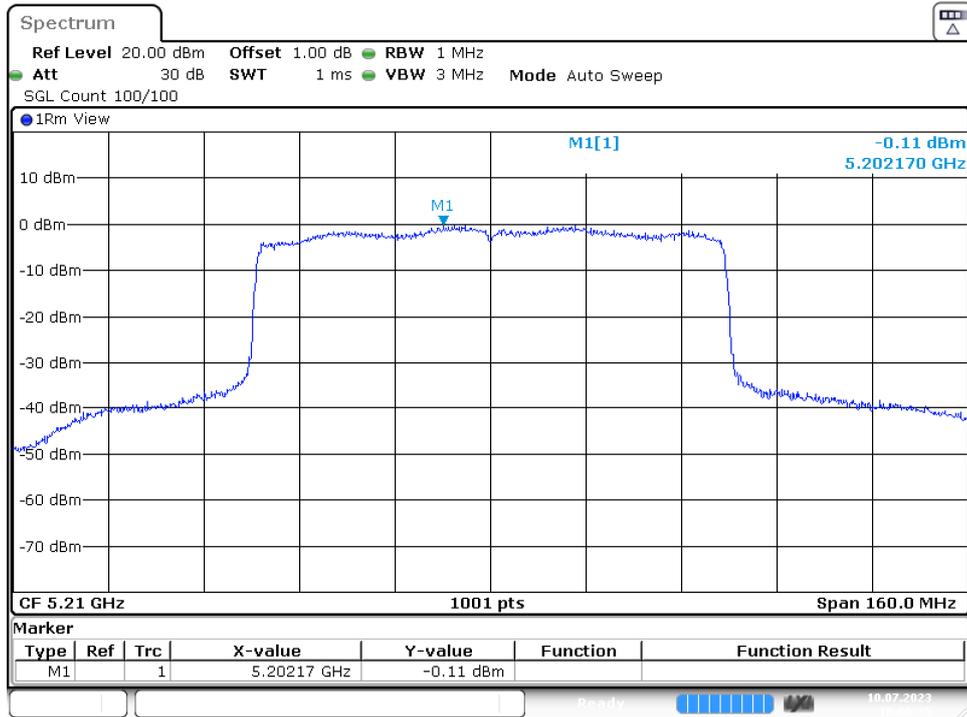
Product : Wi-Fi 6/6E Sensor  
 Test Item : Maximun Power Spectral Density  
 Test Mode : Transmit (802.11ax-80 MHz)

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
42	5210	MCS0	A	-0.56	0.95	6.57	6.75	Pass
			B	-0.11				
			C	-0.49				
			D	-0.45				

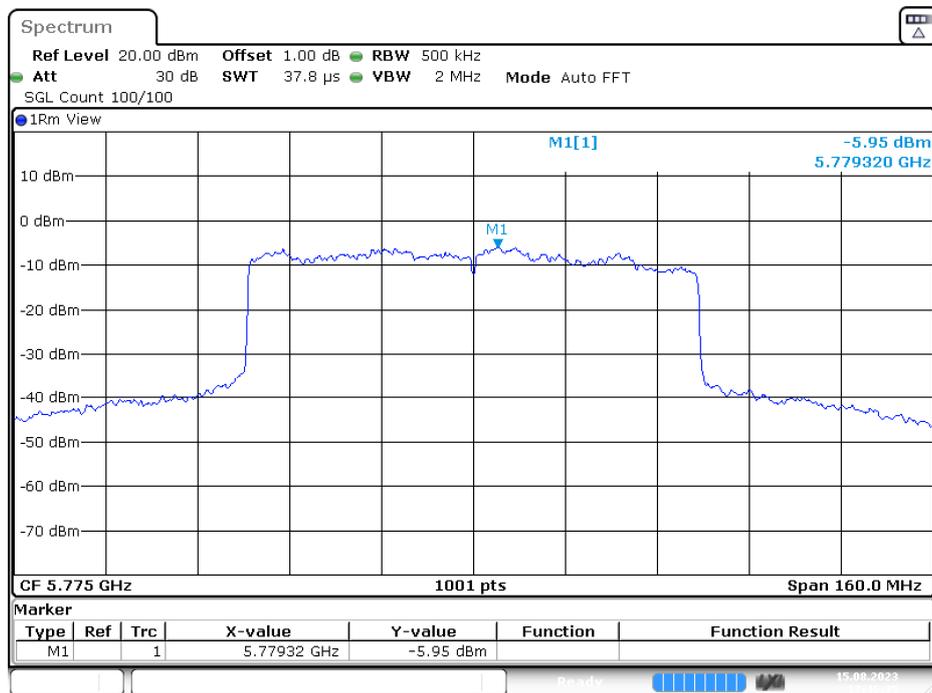
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PPSD (dBm)	Duty factor (dB)	Total PPSD (dBm)	Limit (dBm)	Result
155	5775	MCS0	A	-6.48	0.95	0.60	25.74	Pass
			B	-6.56				
			C	-6.54				
			D	-5.95				

Note: Total PPSD =  $10 \cdot \log(\text{Chain A (mW)} + \text{Chain B (mW)} + \text{Chain C (mW)} + \text{Chain D (mW)} + \text{Duty factor})$ .

### Channel 42 (Chain B)



### Channel 155 (Chain D)

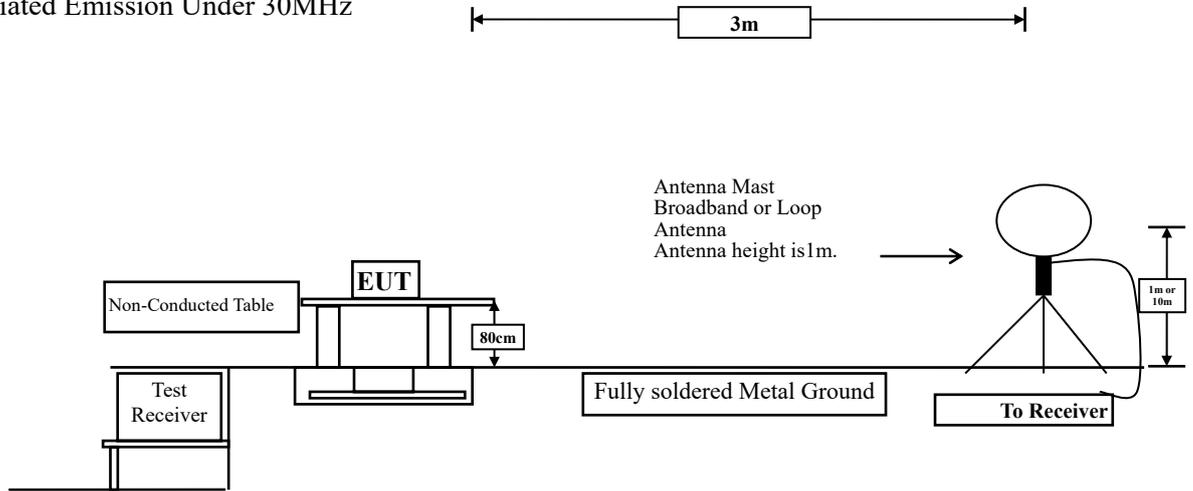


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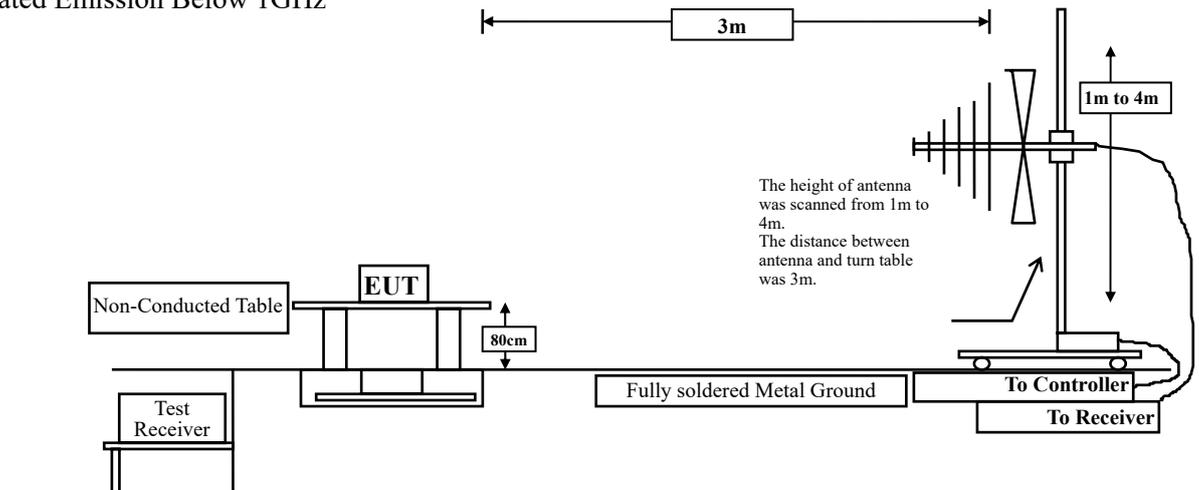
## 6. Radiated Emission

### 6.1. Test Setup

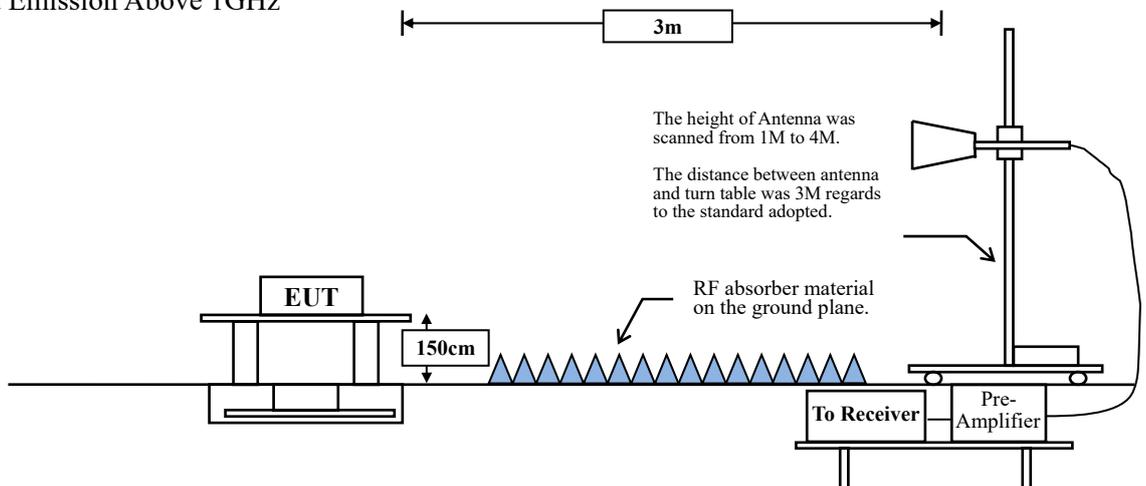
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



## 6.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

<b>FCC Part 15 Subpart C Paragraph 15.209(a) Limits</b>		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dB $\mu$ V/m) = 20 log E field strength ( $\mu$ V/m).

### 6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9 kHz and 30 MHz~1 GHz is 120 kHz and above 1 GHz is 1 MHz.

Radiated emission measurements below 30 MHz are made using Loop Antenna and 30 MHz~1 GHz are made using broadband Bilog antenna and above 1 GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range from 9 kHz - 10 th Harmonic of fundamental was investigated.

**RBW and VBW Parameter setting:**

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW  $\geq$  3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle  $\geq$  98 %

VBW  $\geq$  1/T, when duty cycle < 98 %

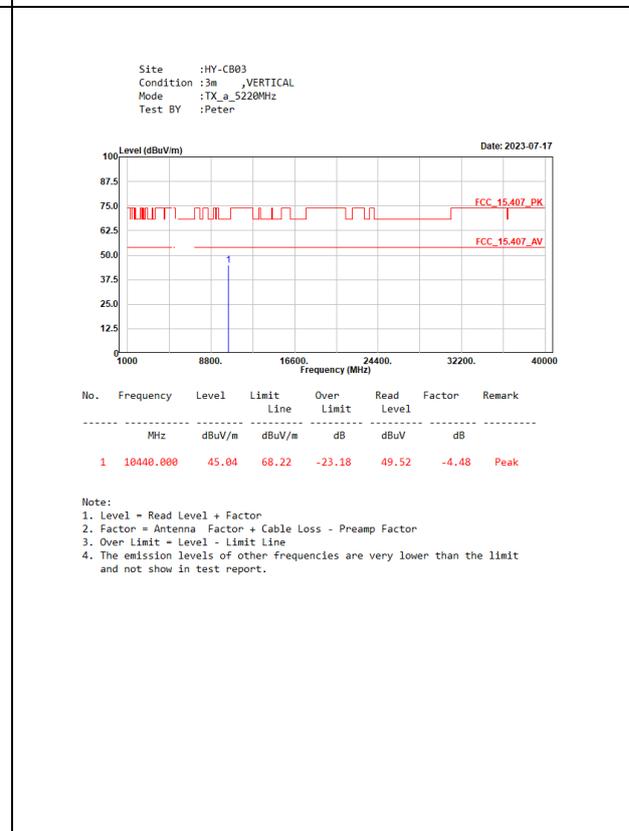
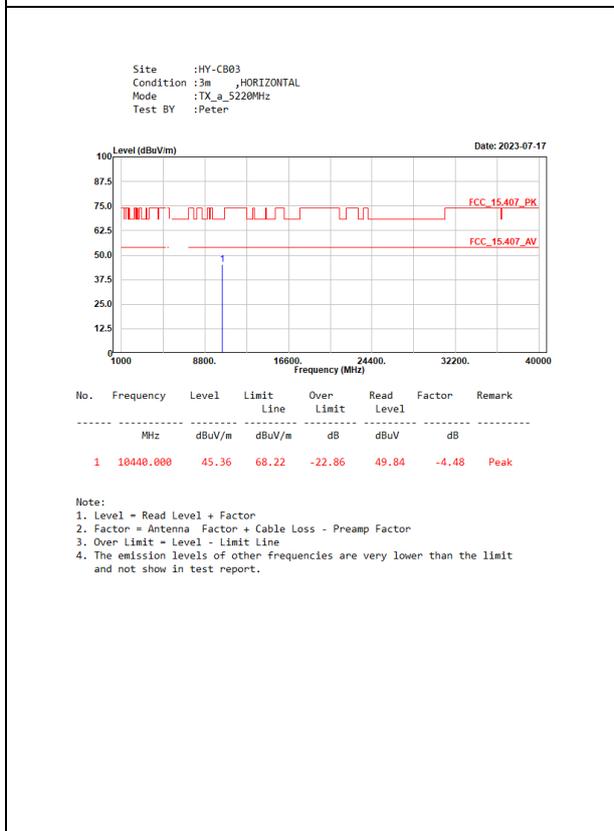
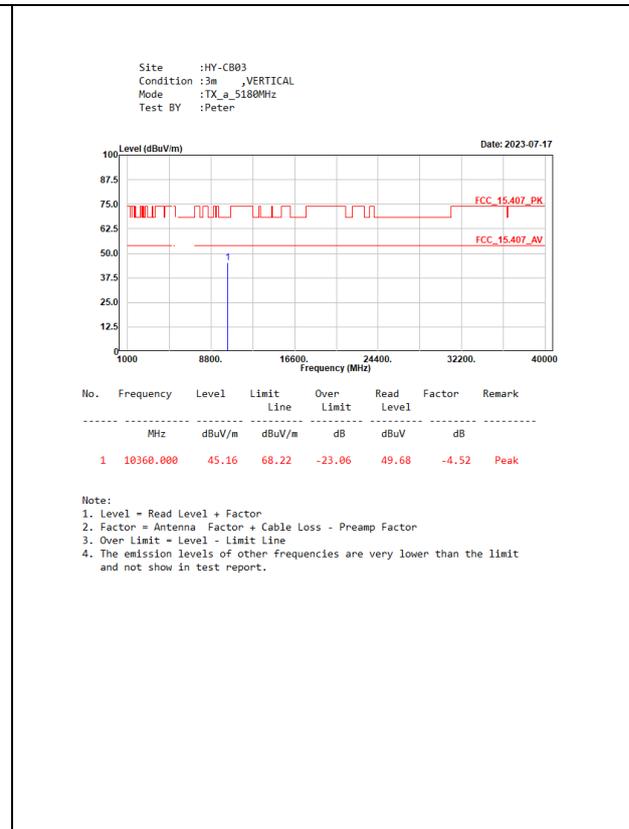
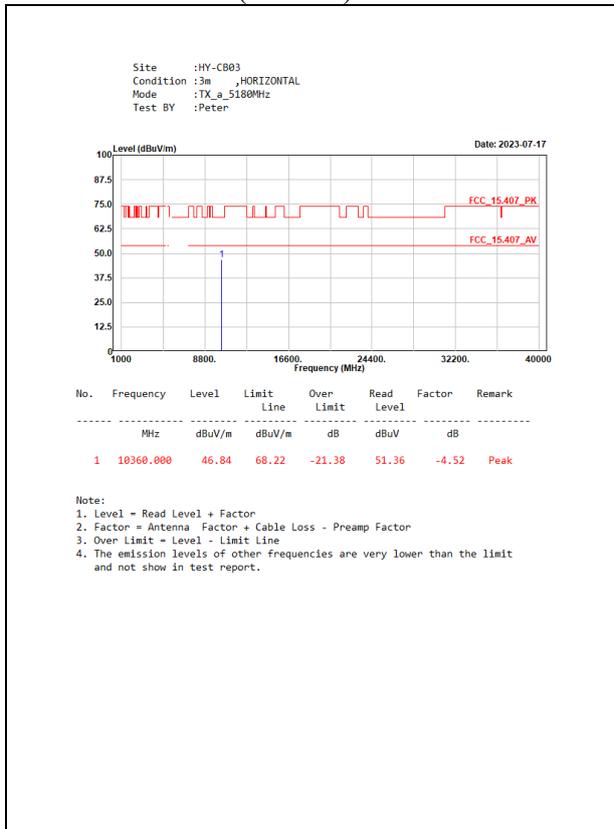
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

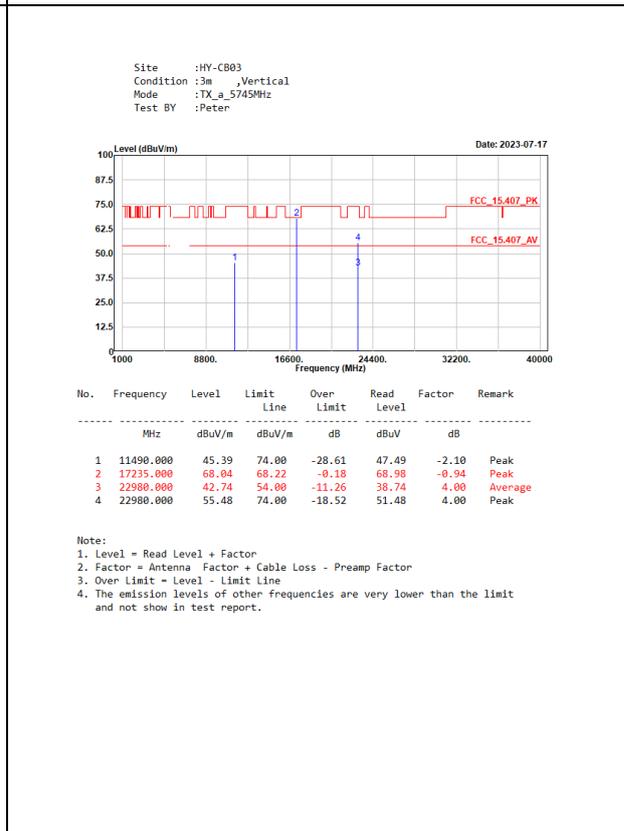
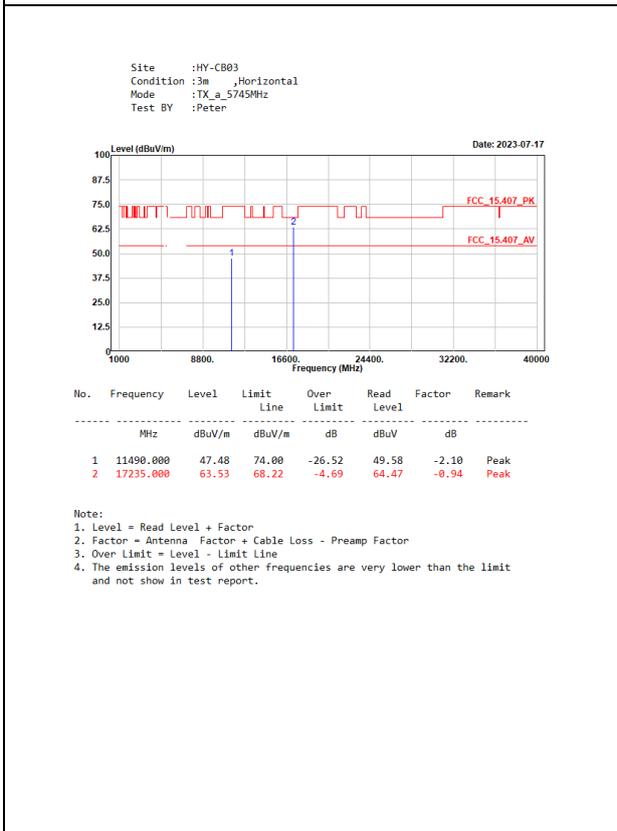
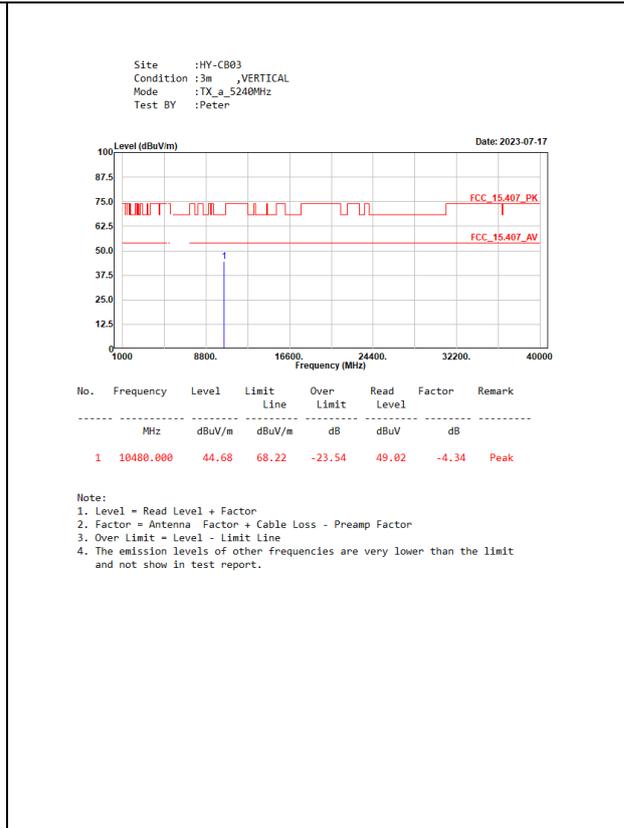
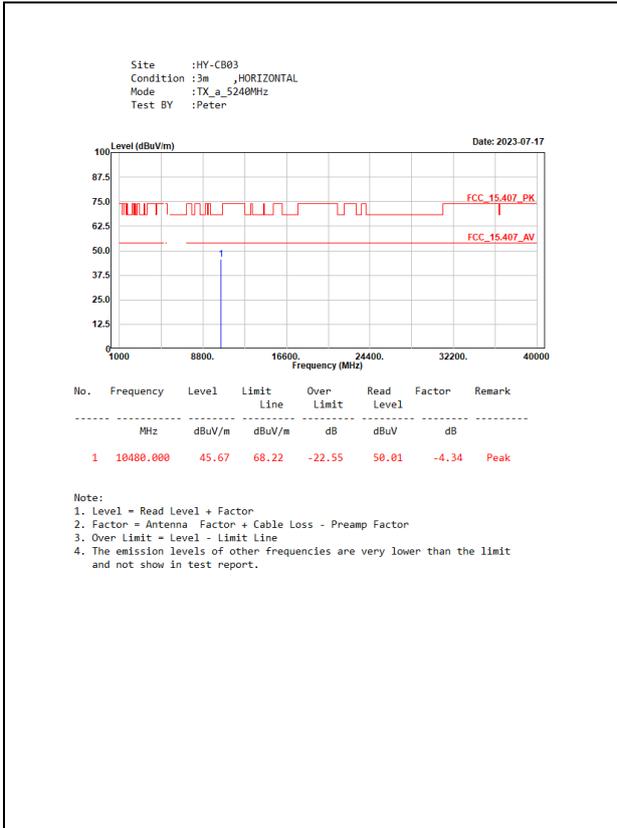
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	90.25	1.4350	697	1000
802.11ax-20 MHz	80.58	5.4550	183	200
802.11ax-40 MHz	80.28	5.4350	184	200
802.11ax-80 MHz	80.34	5.4550	183	200

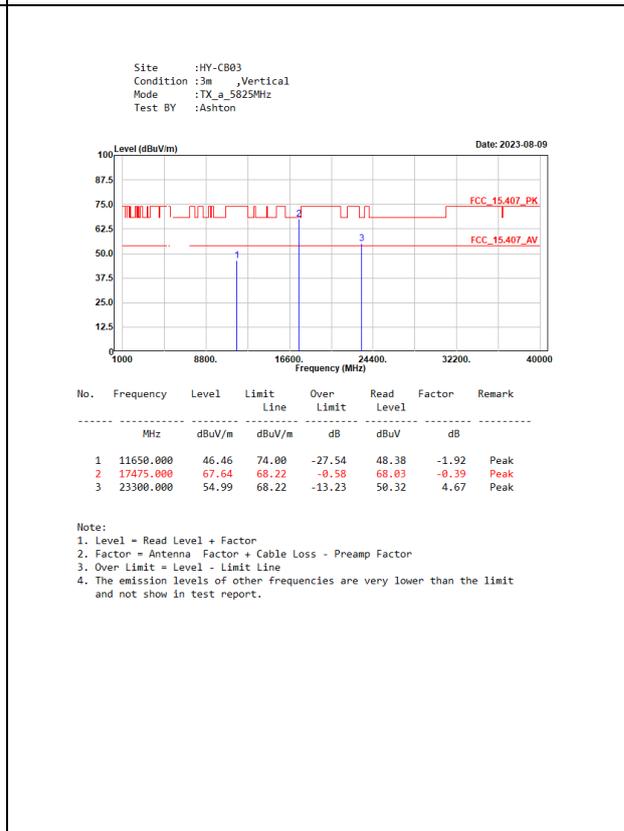
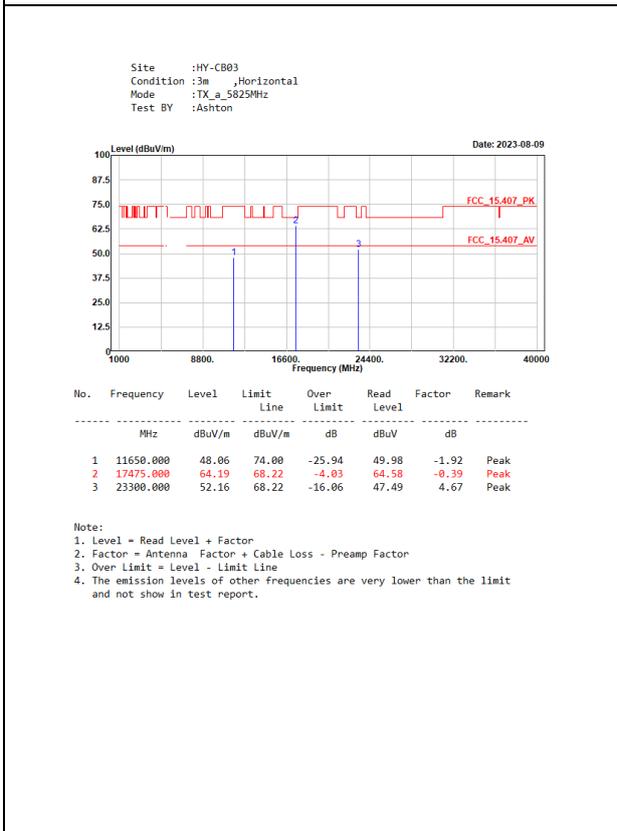
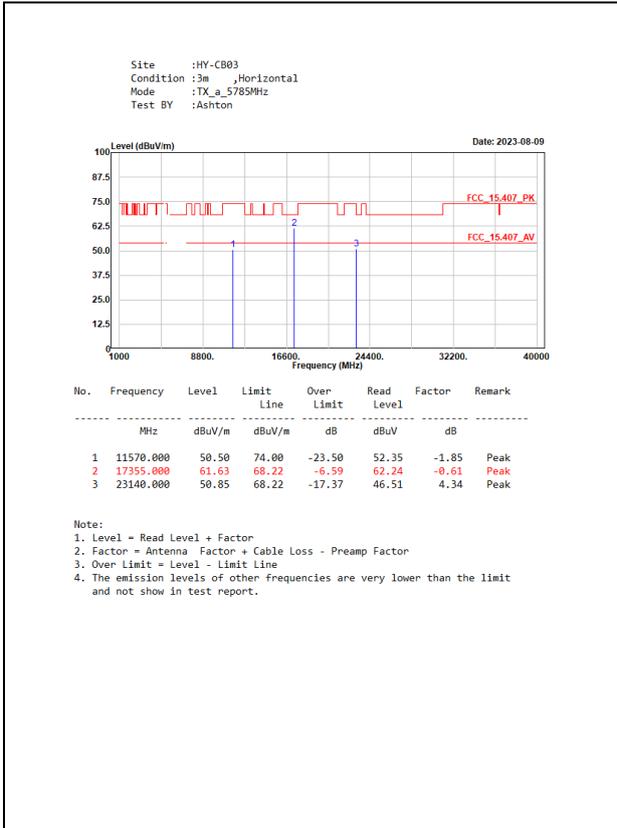
Note: Duty Cycle Refer to Section 9.

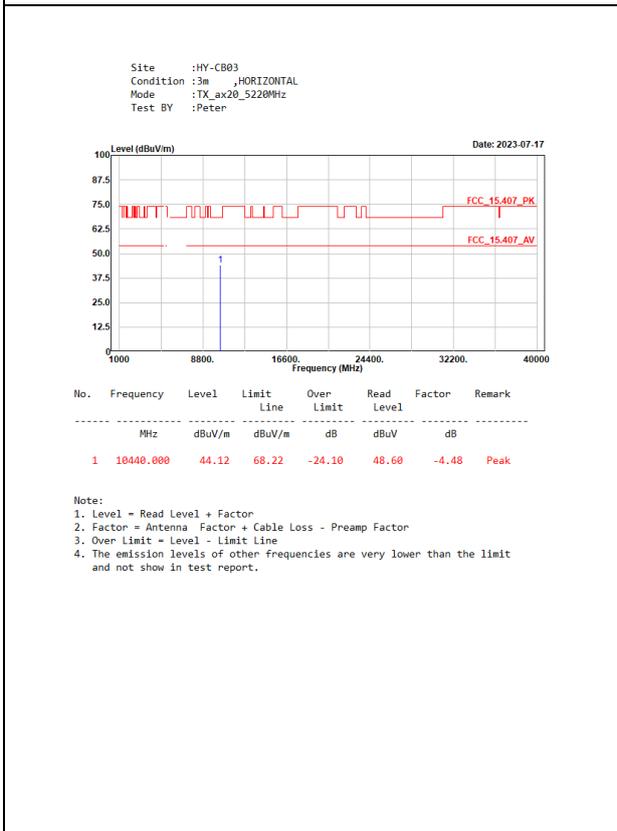
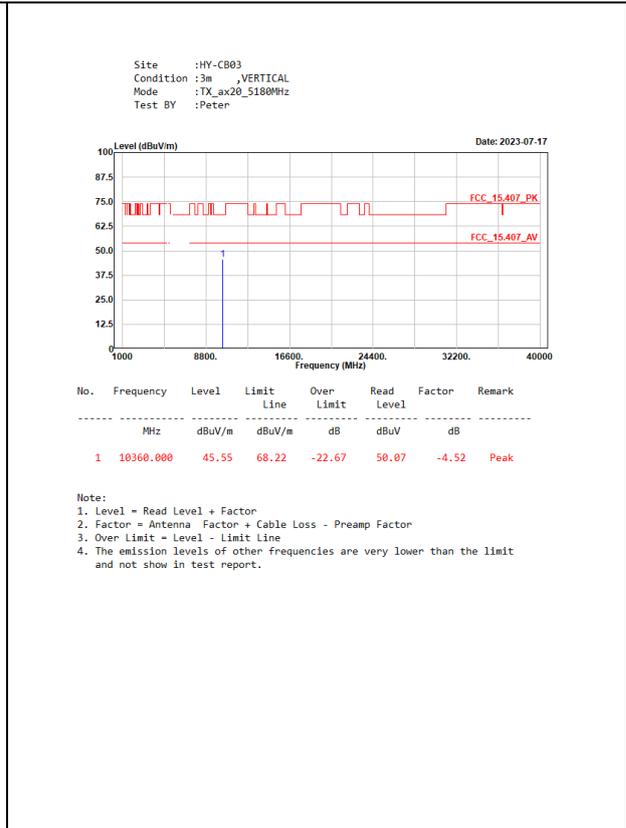
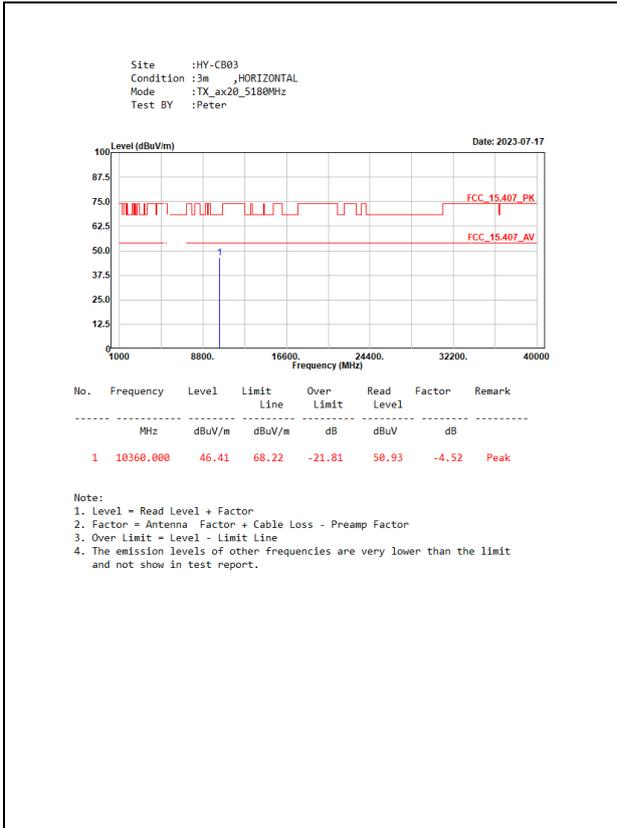
### 6.4. Test Result of Radiated Emission

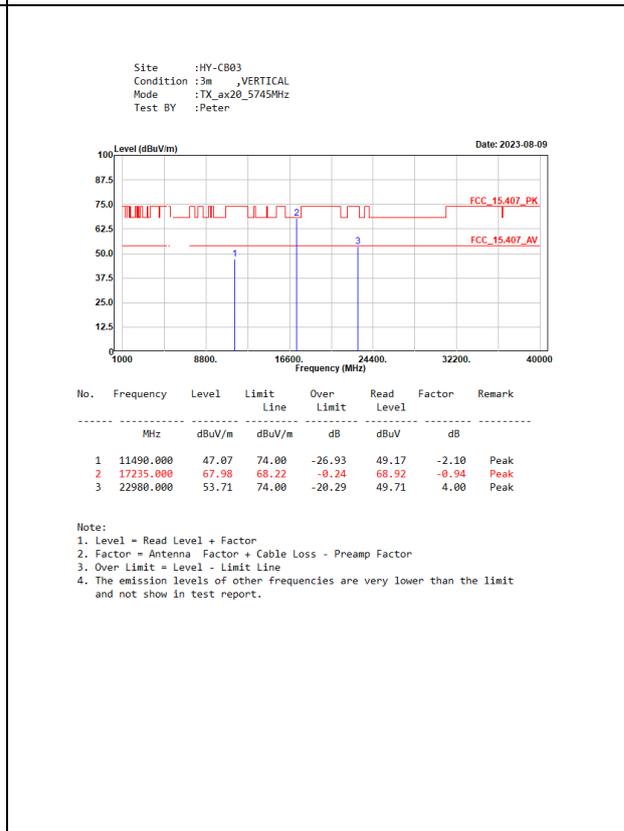
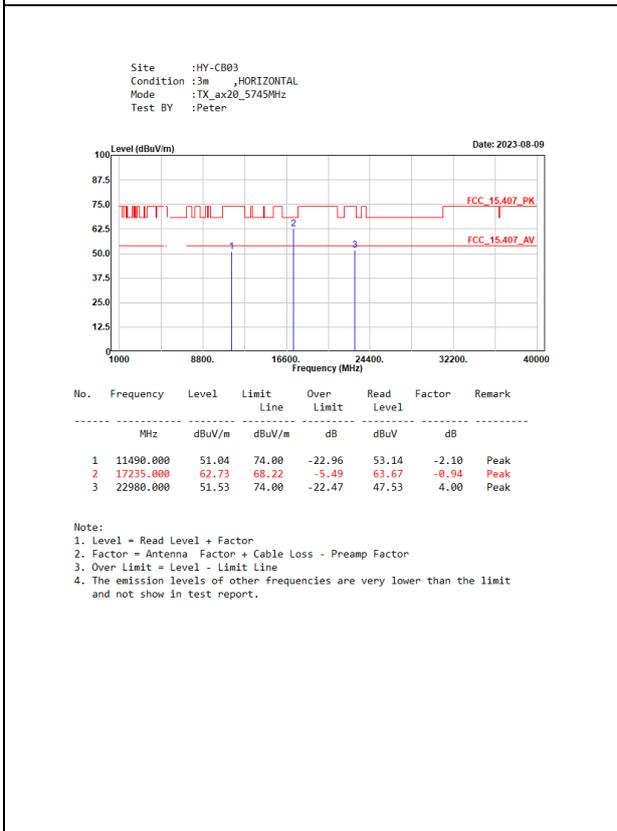
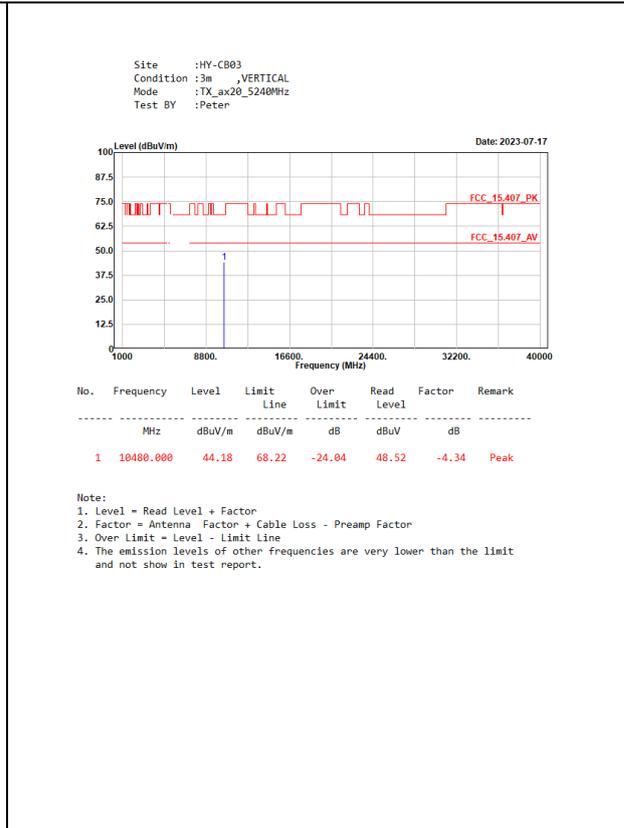
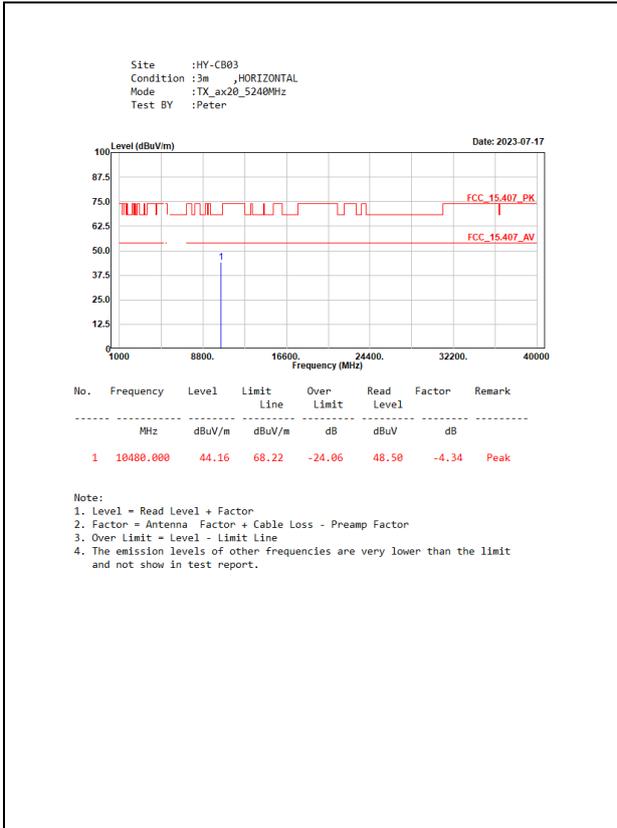
#### UNII-1 and UNII-3 (Full test)

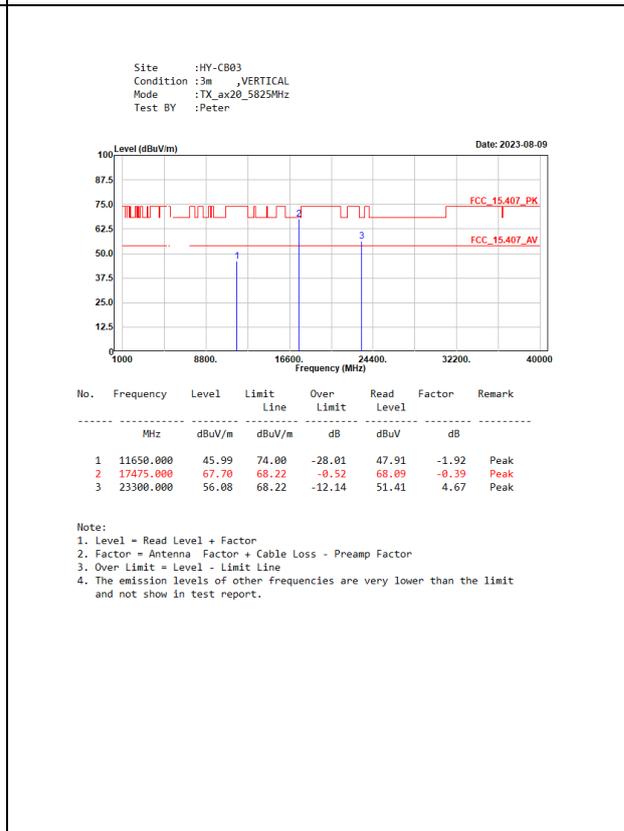
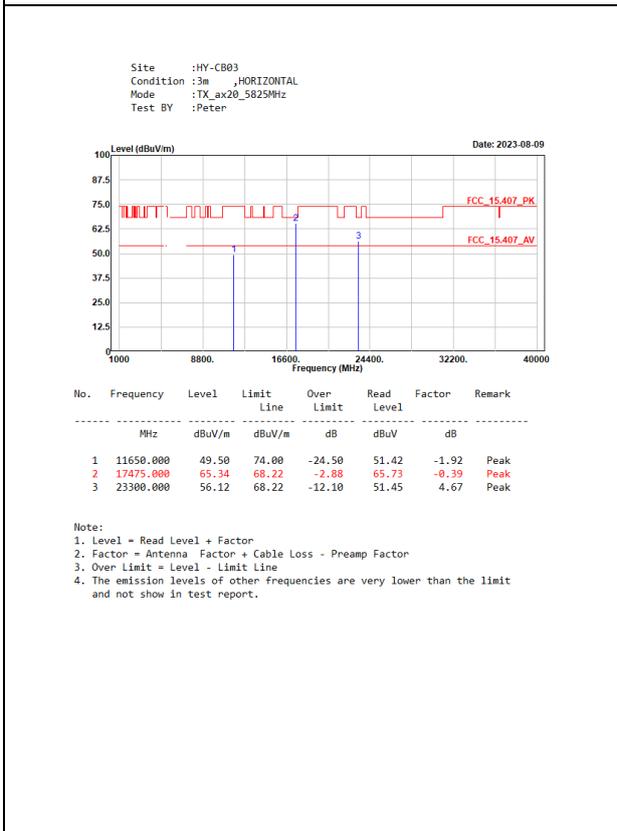
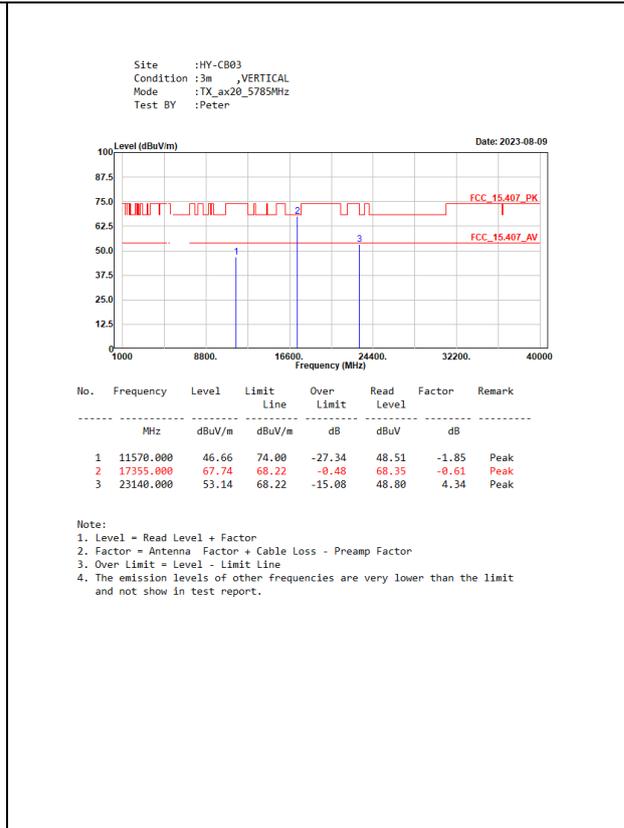
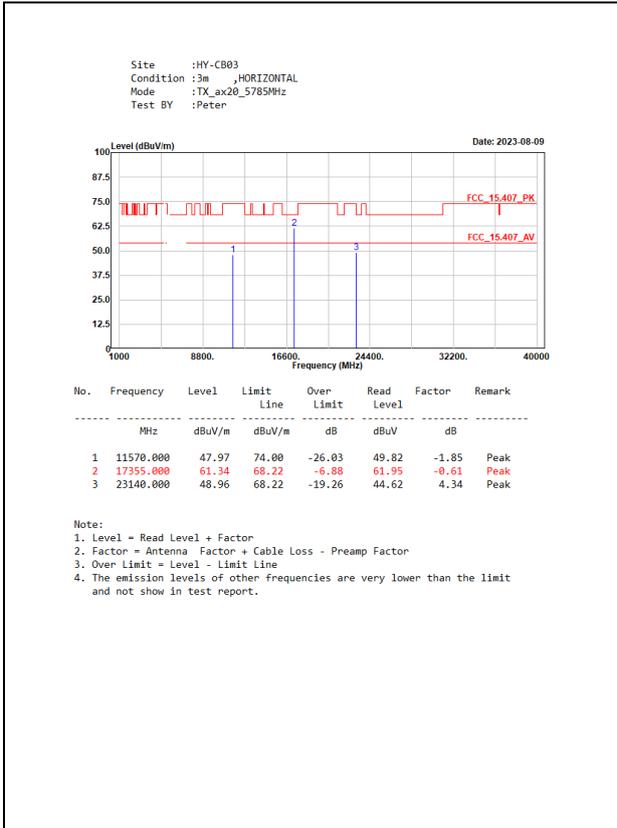


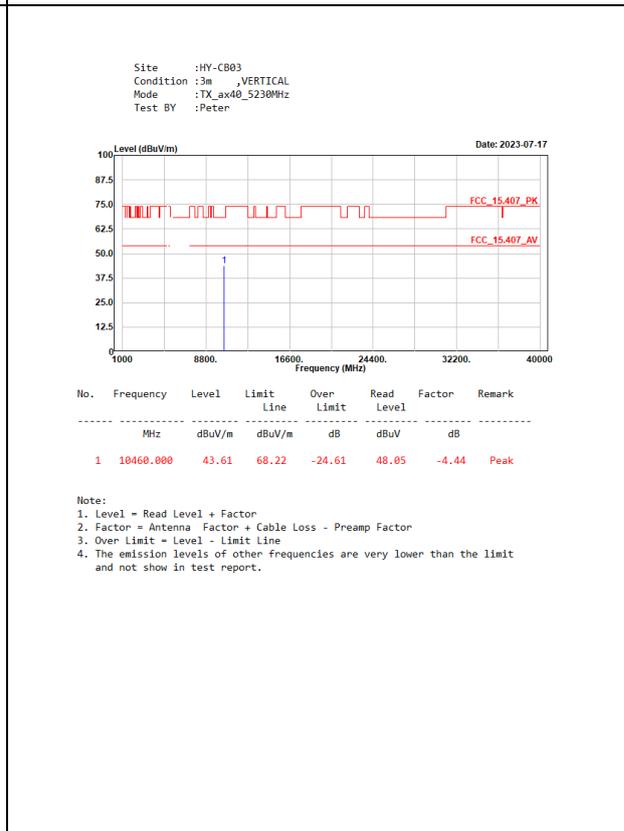
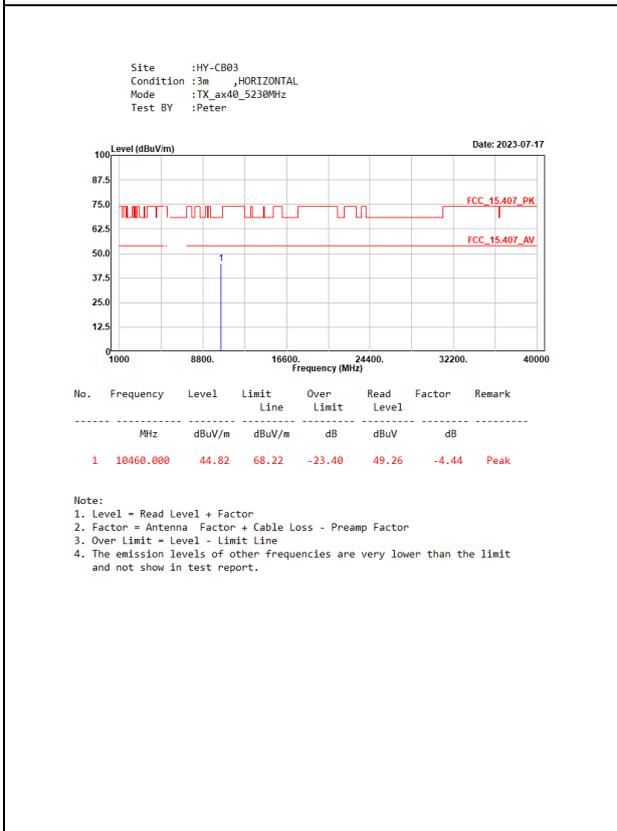
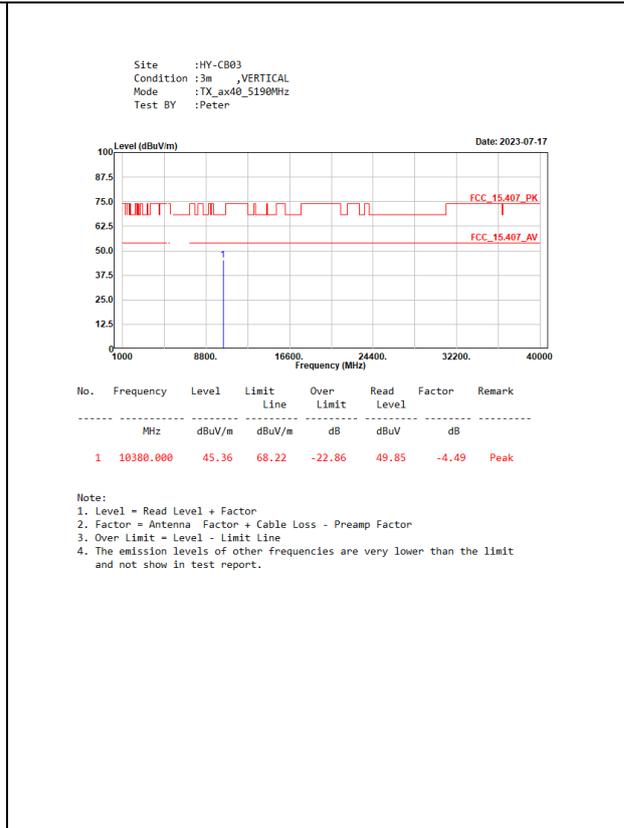
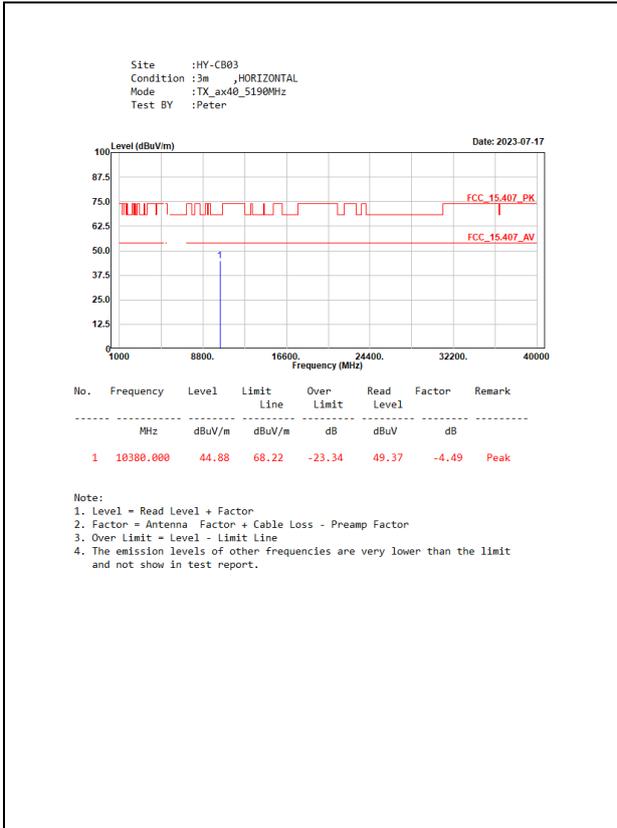


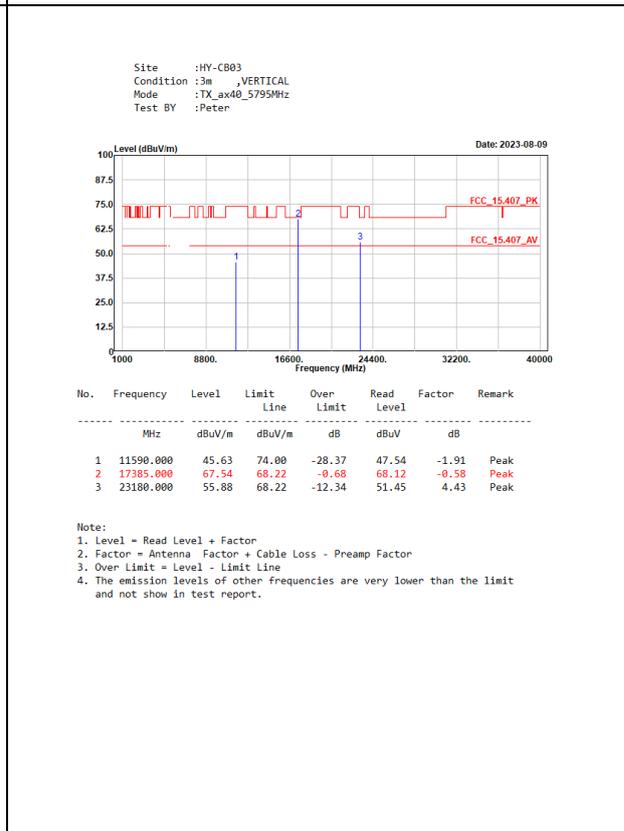
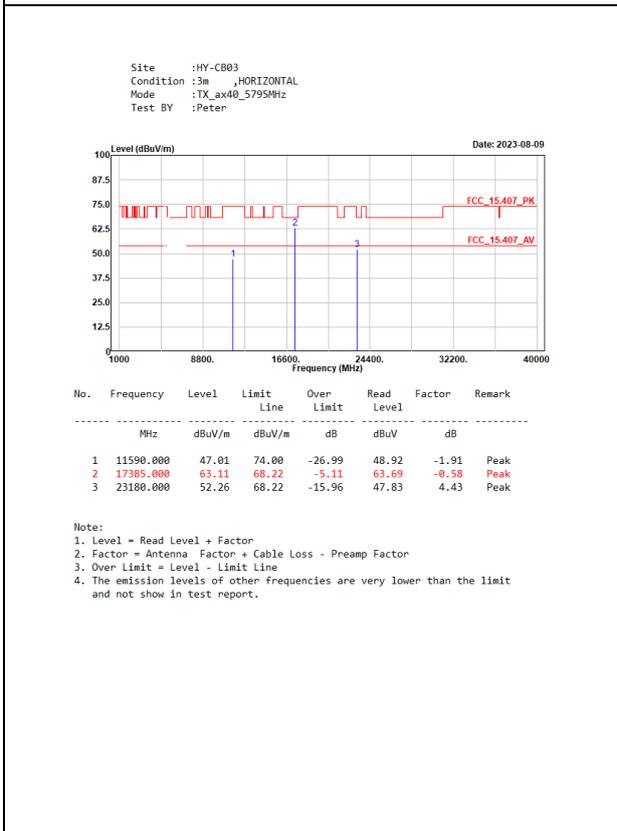
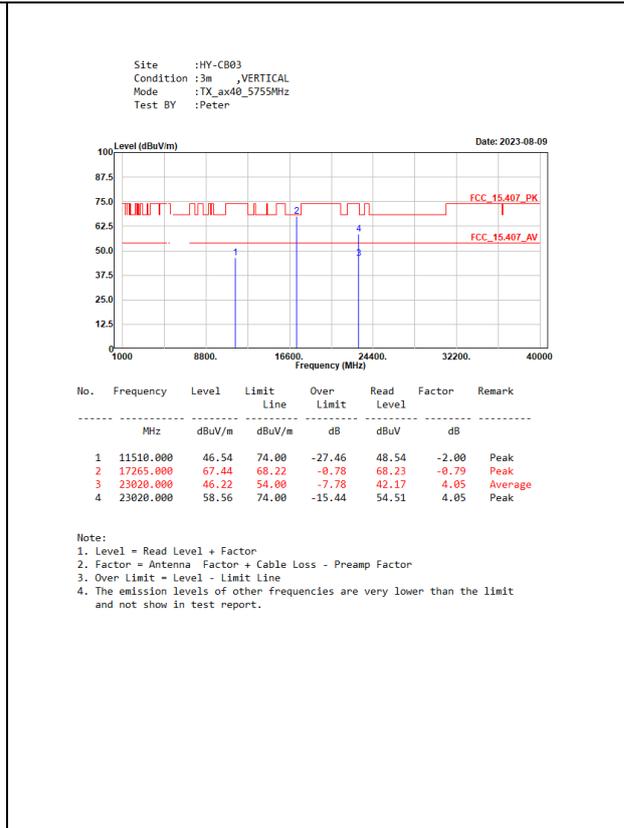
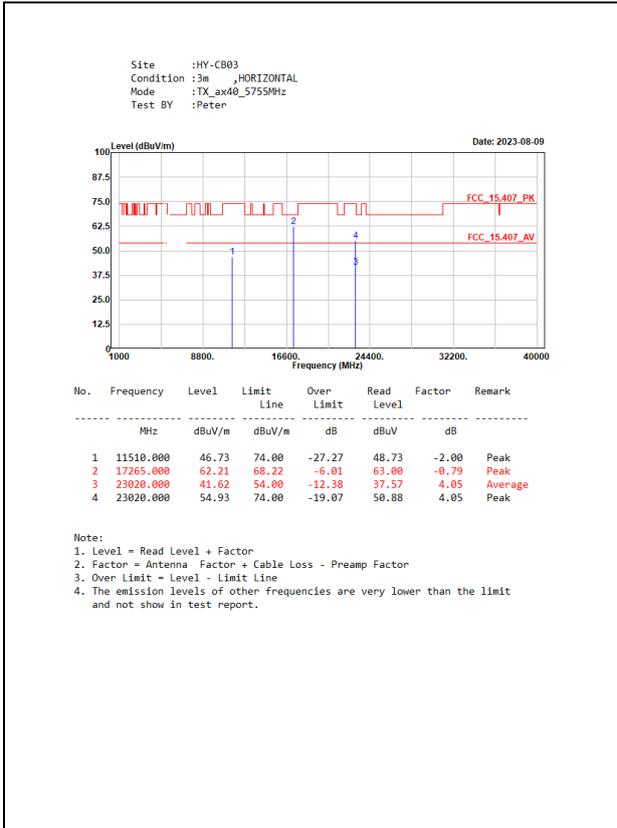


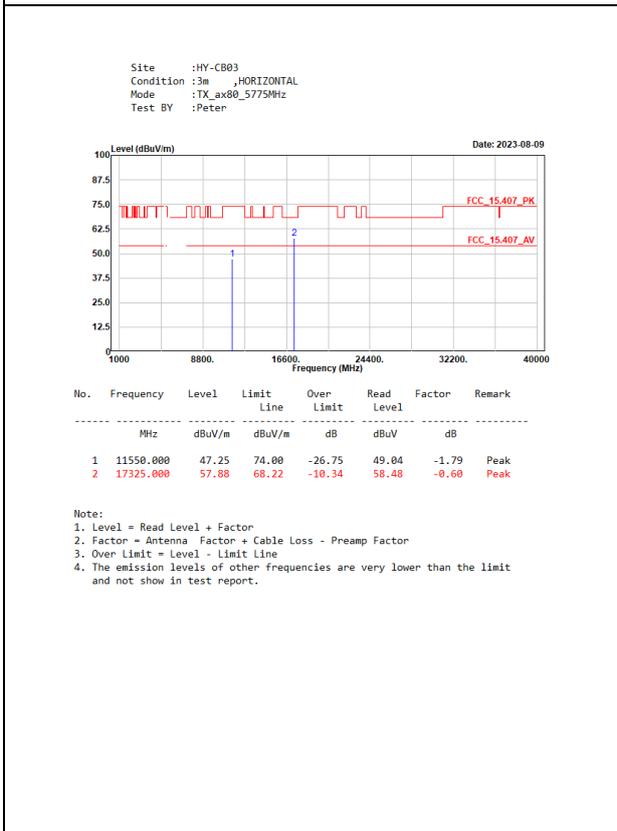
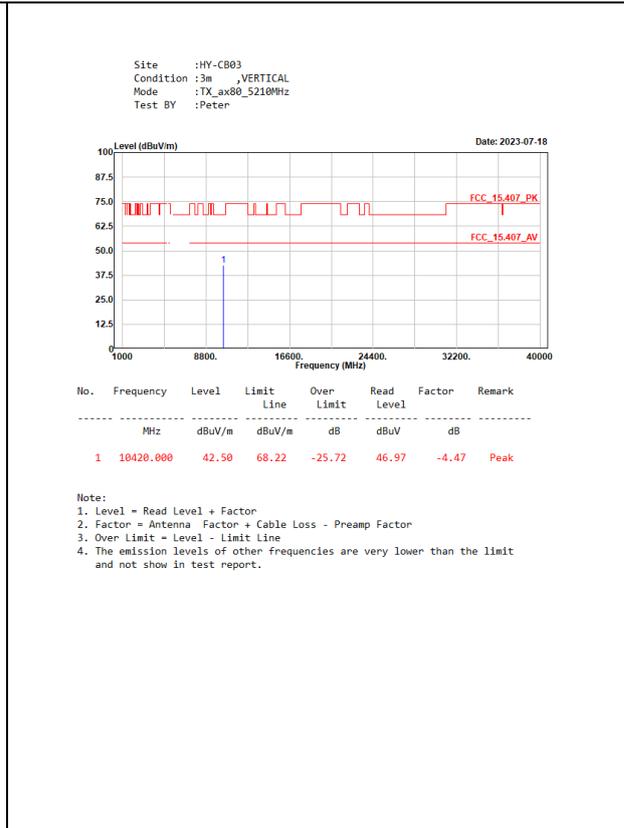
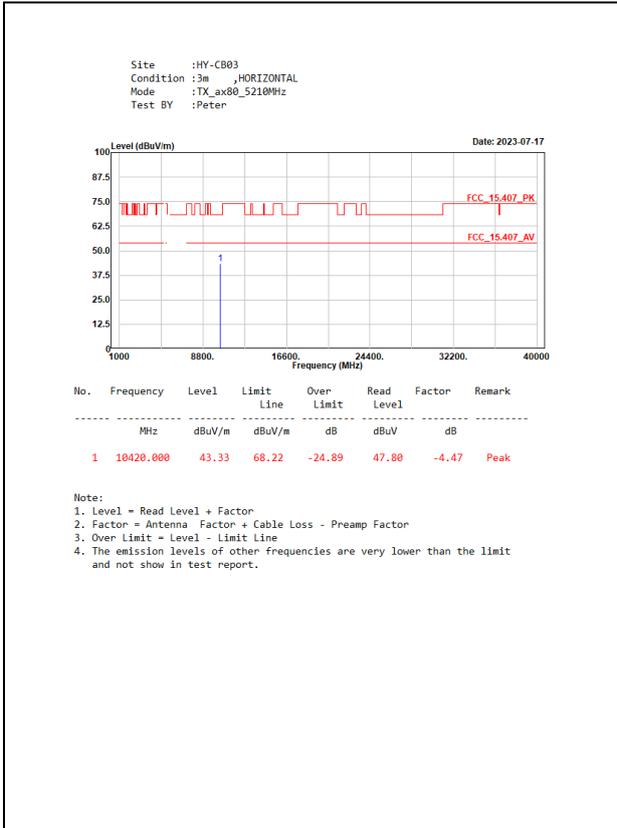


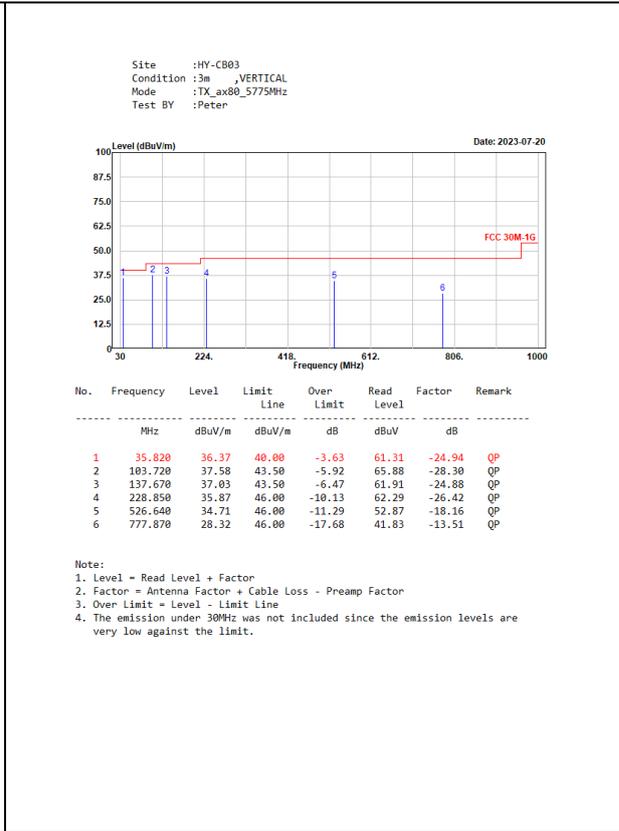
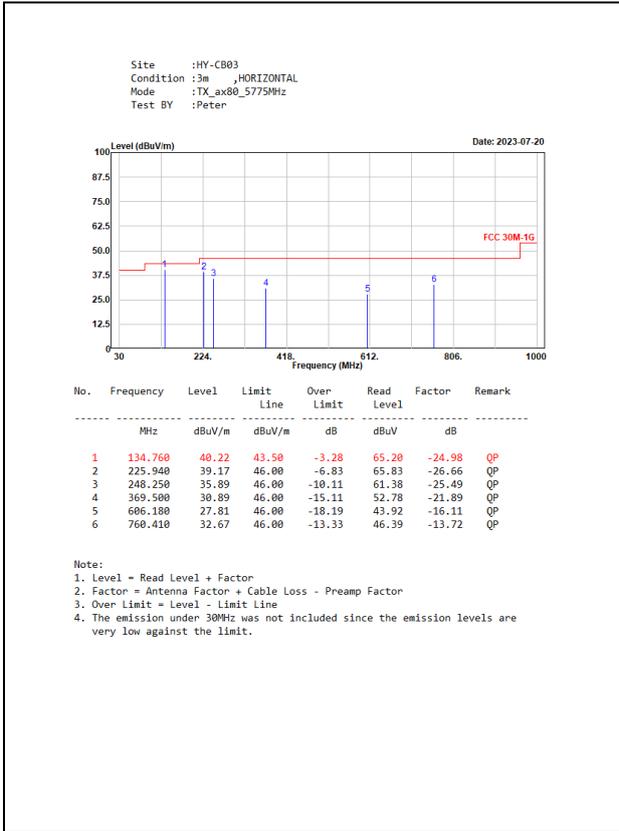




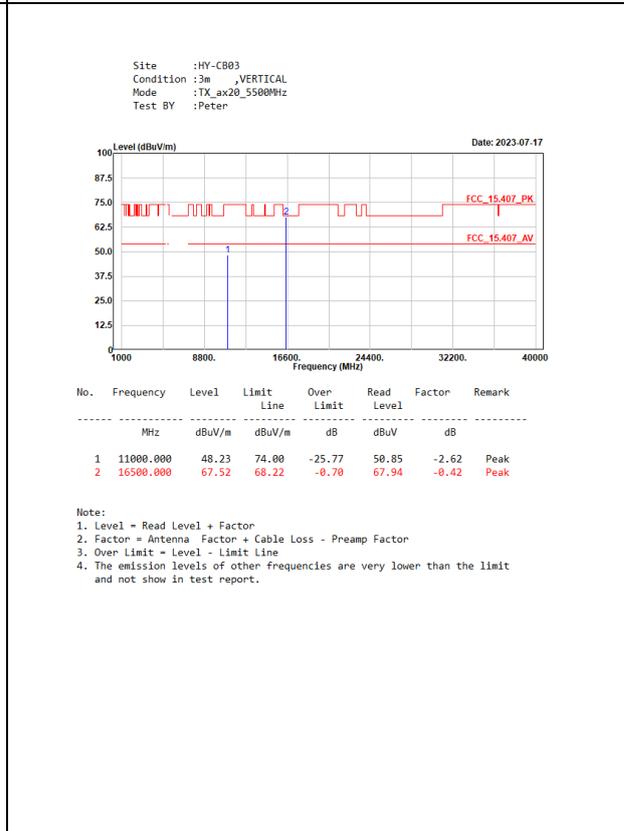
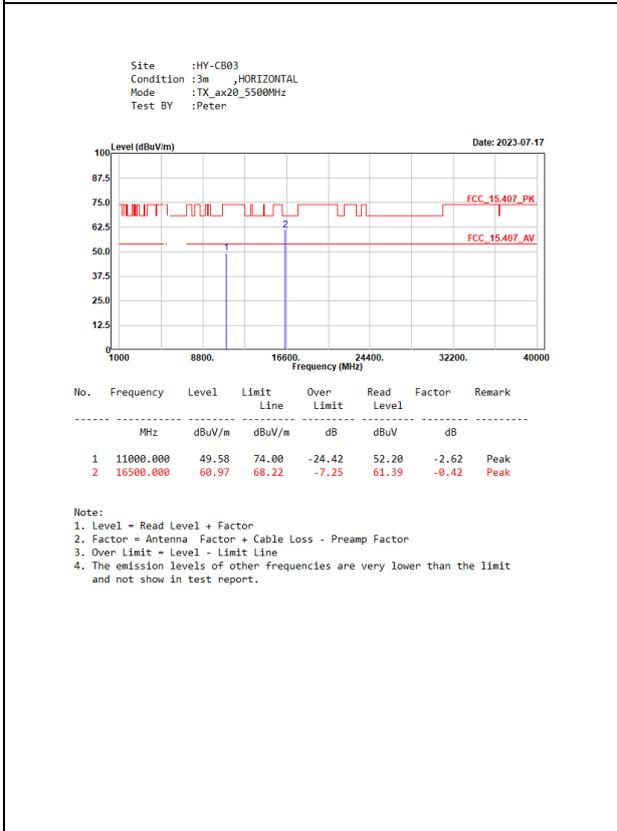
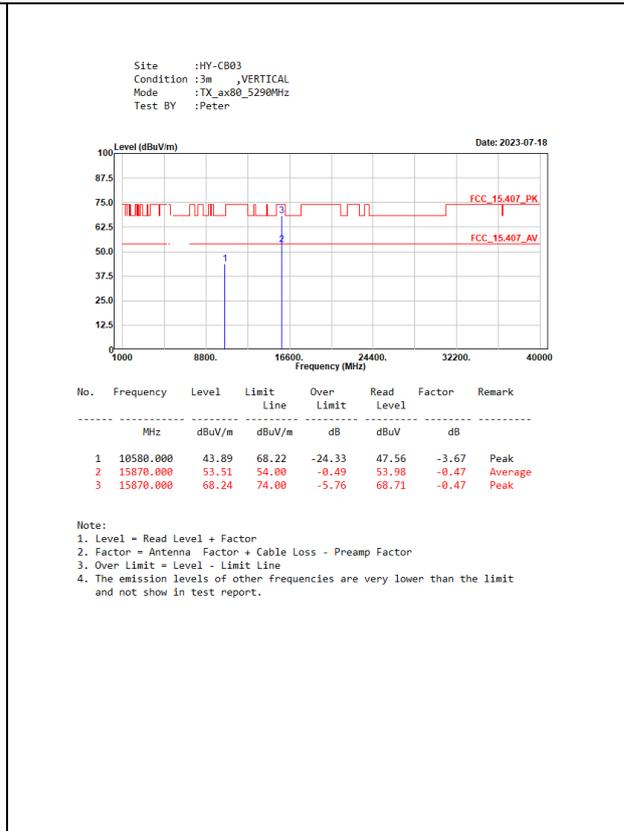
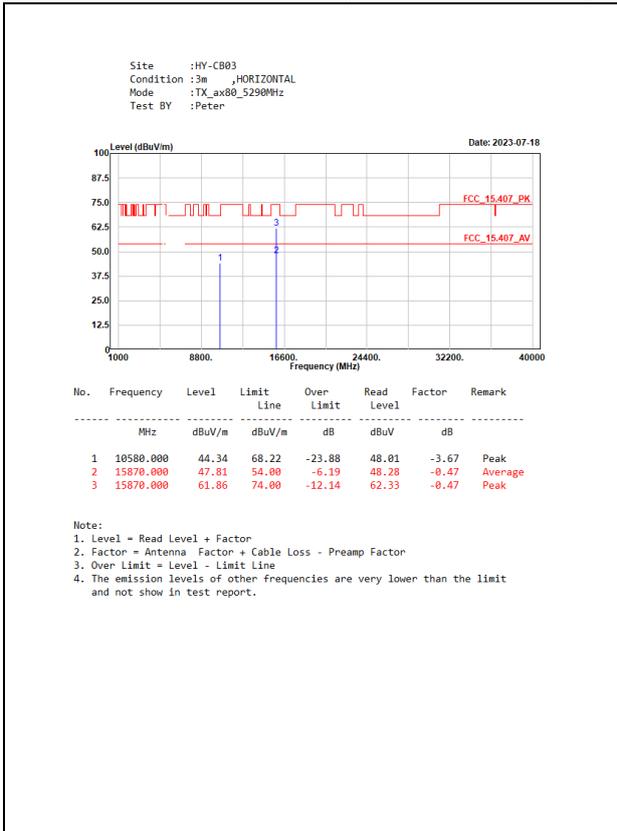








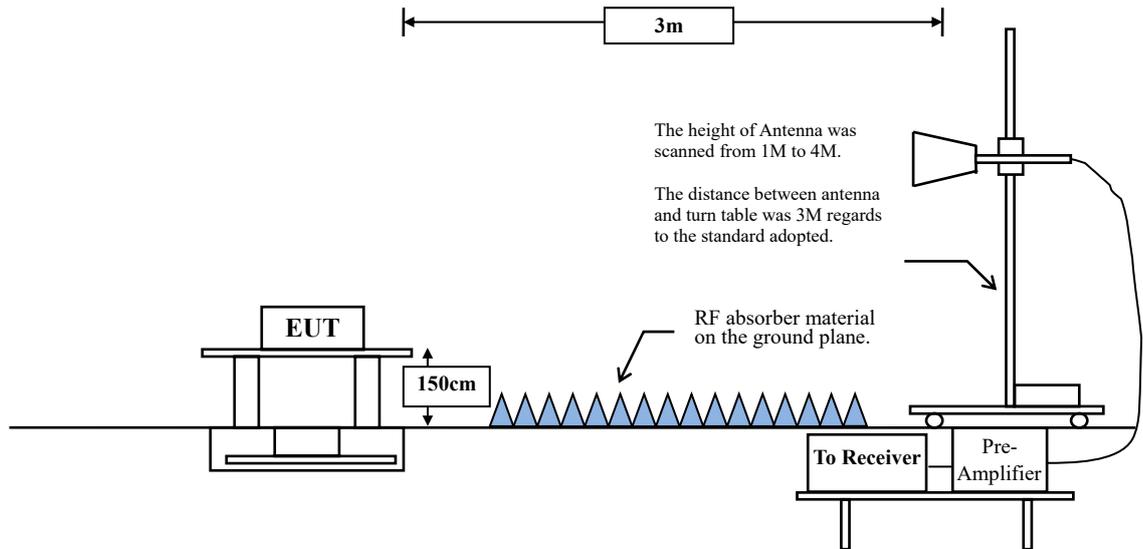
UNII-2A and UNII-2C (Verify worst-case channel)



## 7. Band Edge

### 7.1. Test Setup

RF Radiated Measurement:



### 7.2. Limits

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section. Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	$\mu\text{V}/\text{m} @3\text{m}$	$\text{dB}\mu\text{V}/\text{m}@3\text{m}$
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks:

1. RF Voltage ( $\text{dB}\mu\text{V}$ ) =  $20 \log$  RF Voltage ( $\mu\text{V}$ ).
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

### 7.3. Test Procedure

The EUT is placed on a turn table which is 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz. The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

#### **RBW and VBW Parameter setting:**

According to KDB 789033 section II.G.5 Procedure for Unwanted Maximum Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW  $\geq$  3MHz.

According to KDB 789033 section II.G.6 Procedures for Average Unwanted Emissions Measurements above 1000 MHz.

RBW = 1MHz.

VBW = 10Hz, when duty cycle  $\geq$  98 %

VBW  $\geq$  1/T, when duty cycle < 98 %

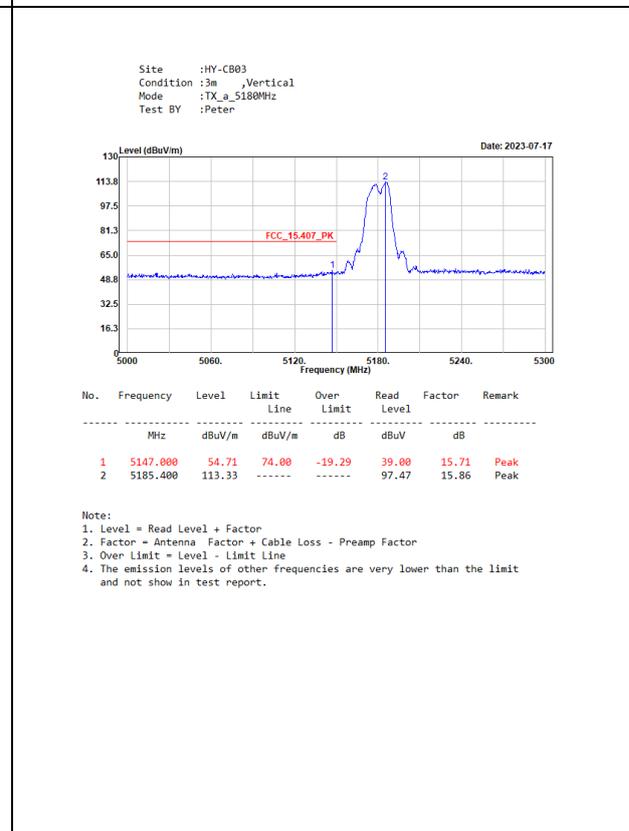
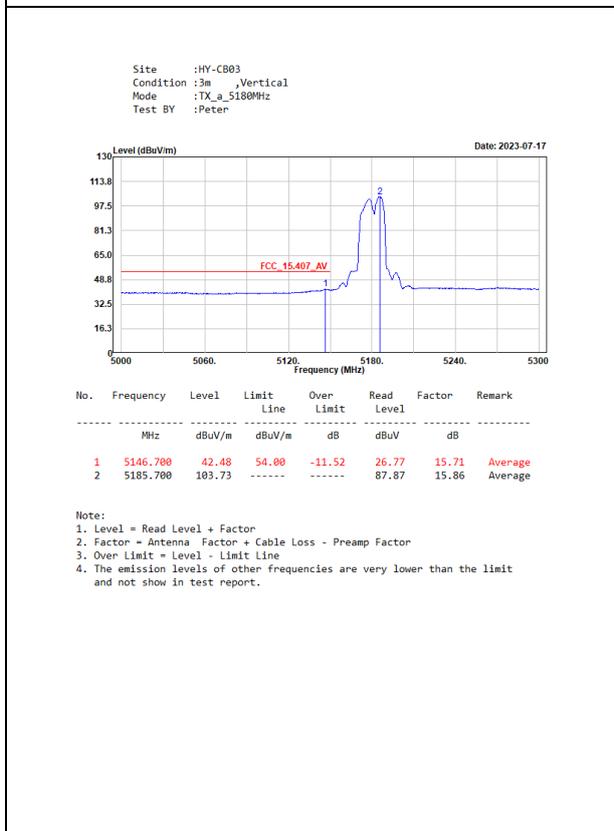
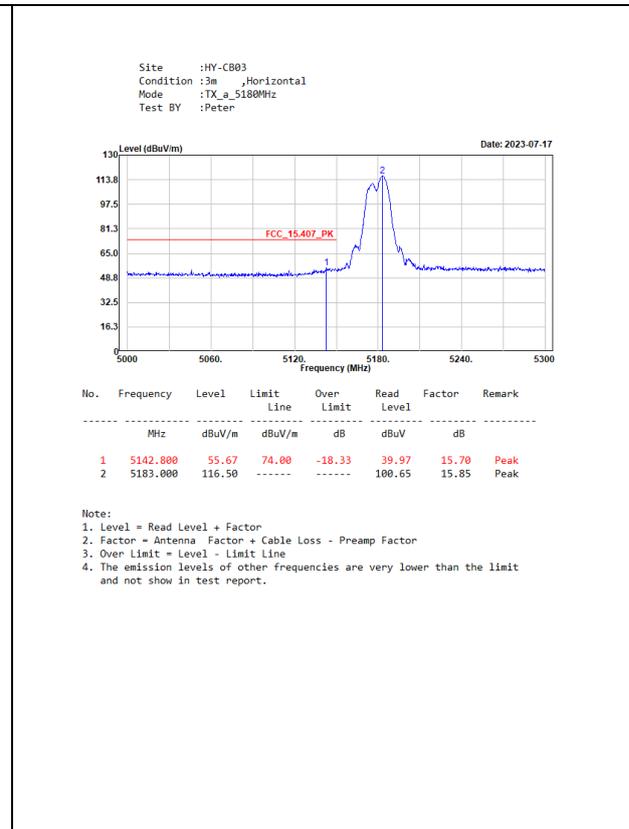
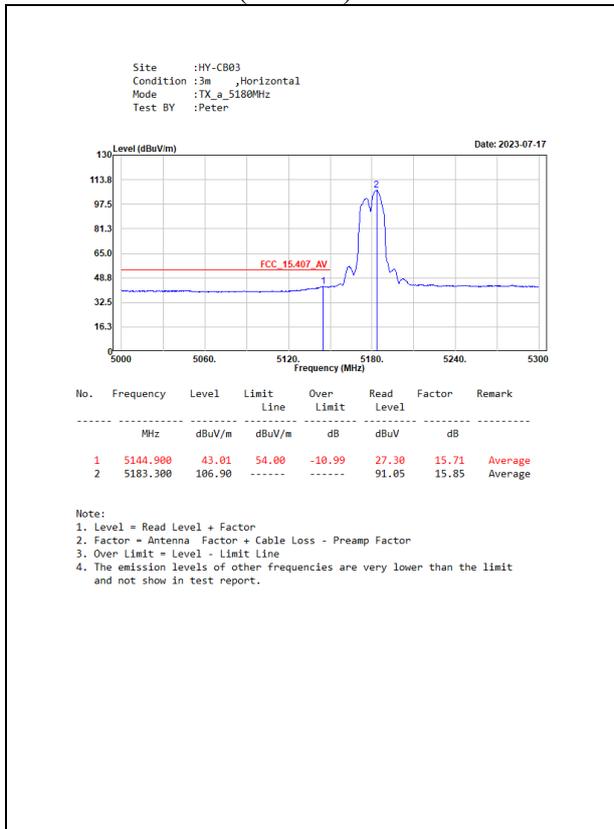
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

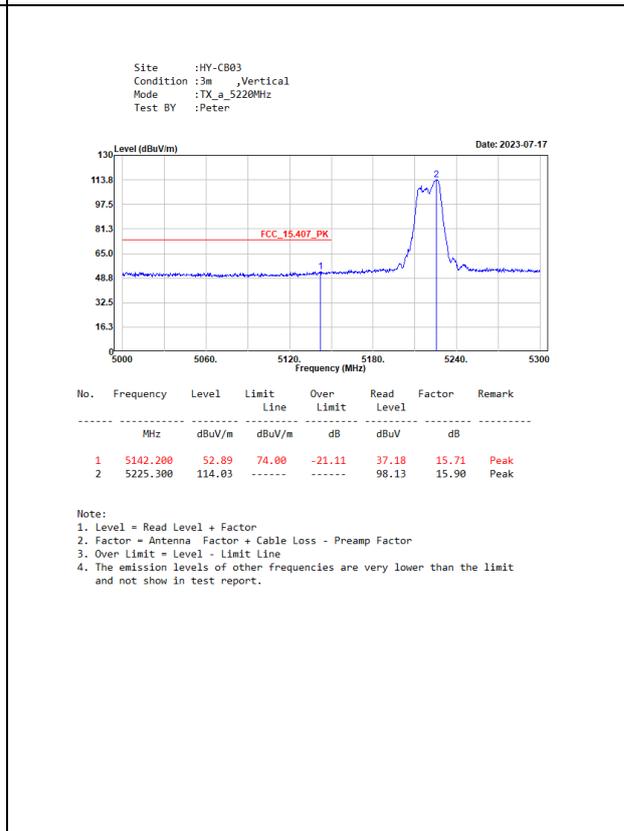
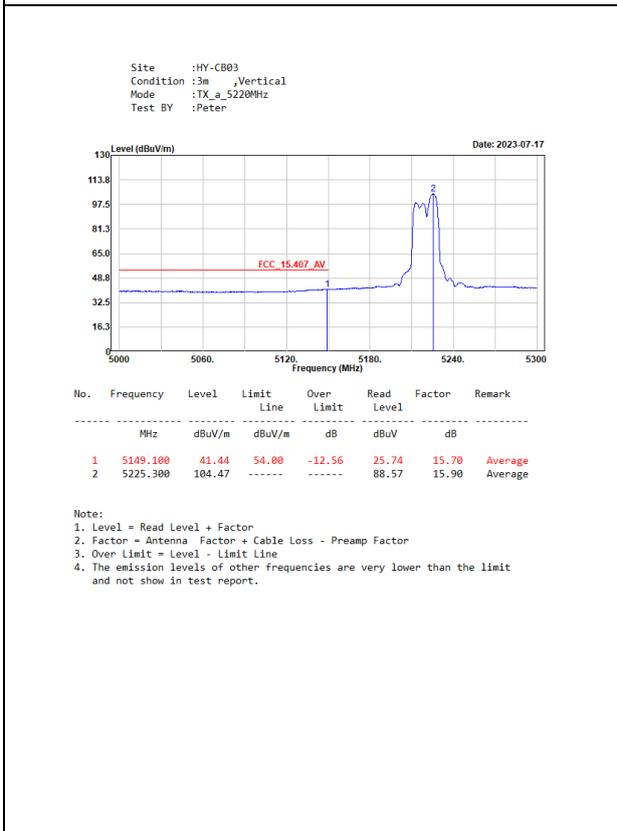
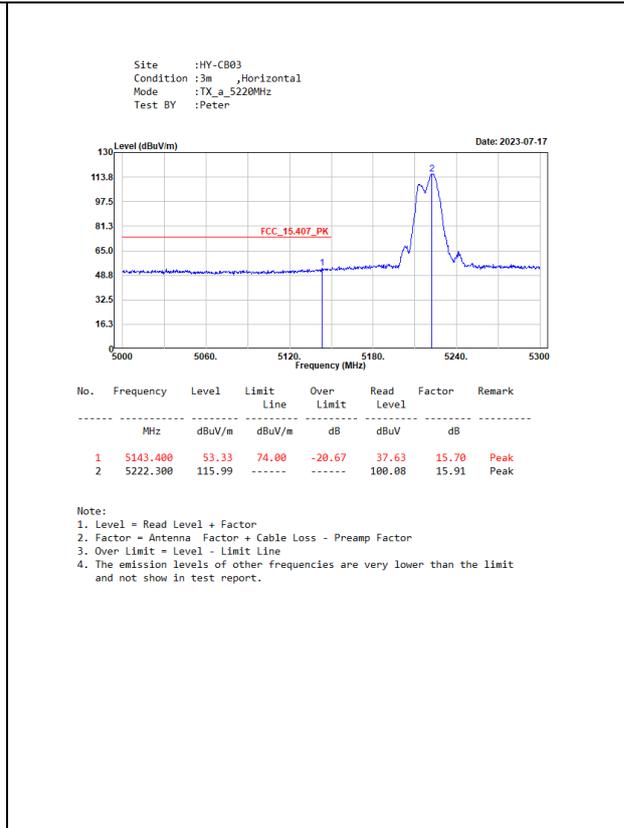
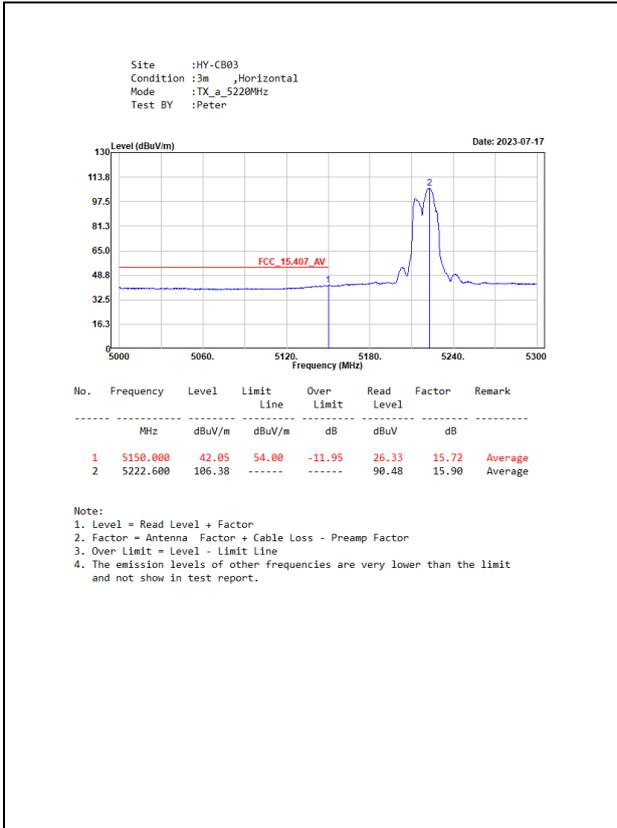
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	90.25	1.4350	697	1000
802.11ax-20 MHz	80.58	5.4550	183	200
802.11ax-40 MHz	80.28	5.4350	184	200
802.11ax-80 MHz	80.34	5.4550	183	200

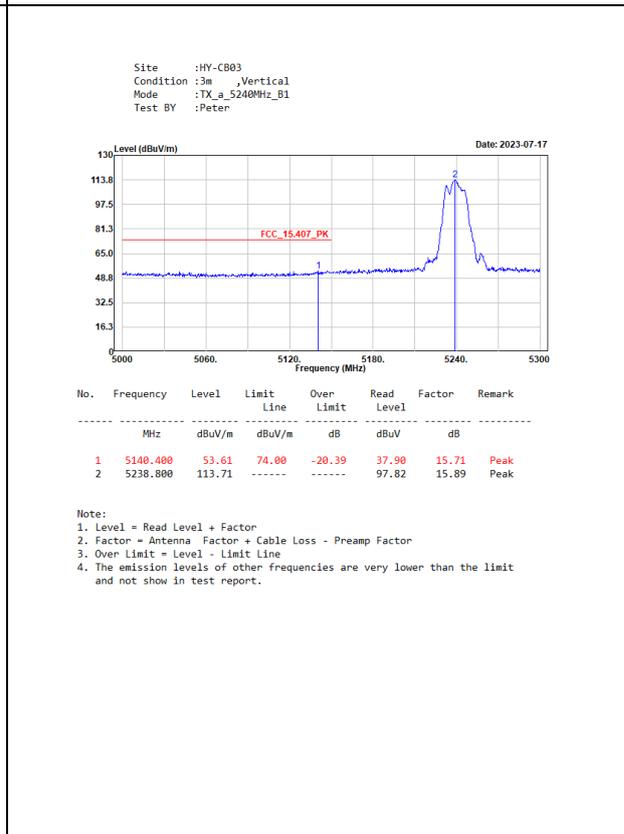
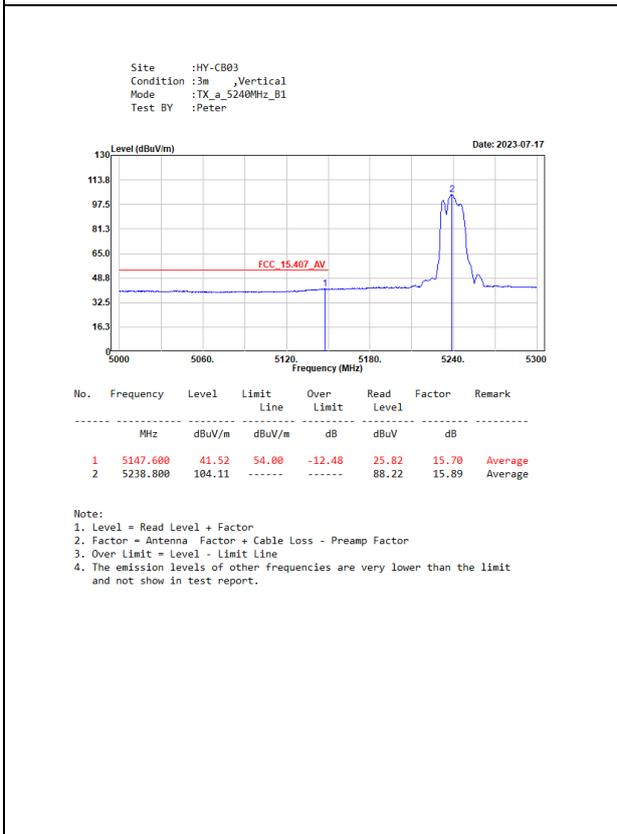
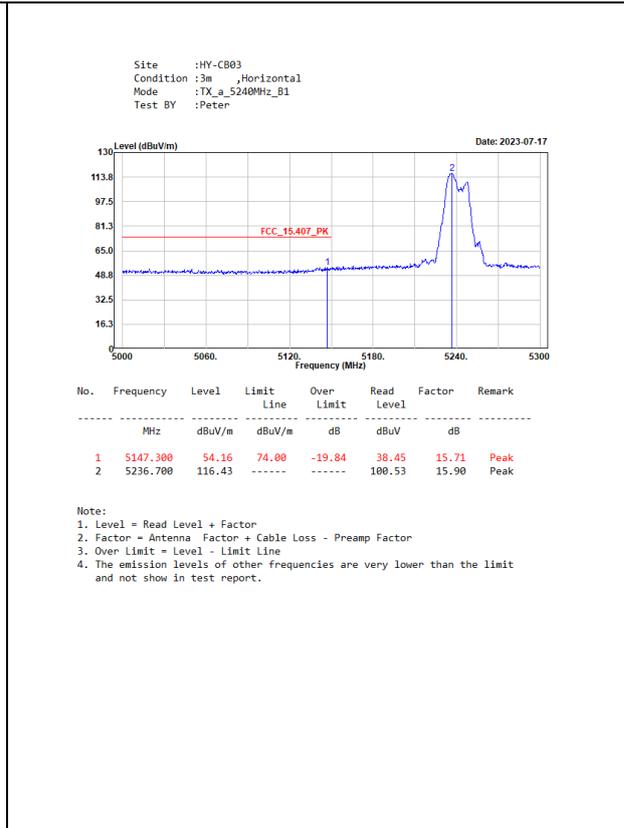
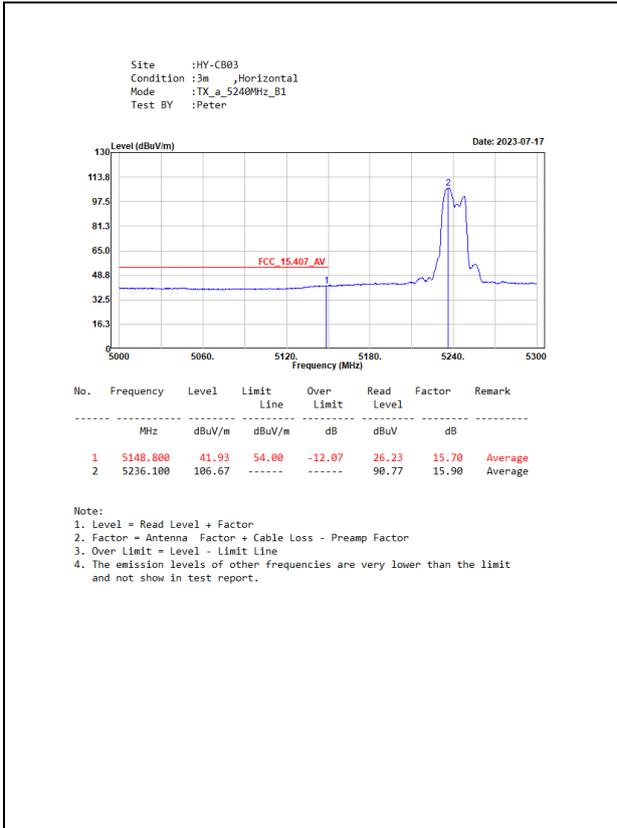
Note: Duty Cycle Refer to Section 9.

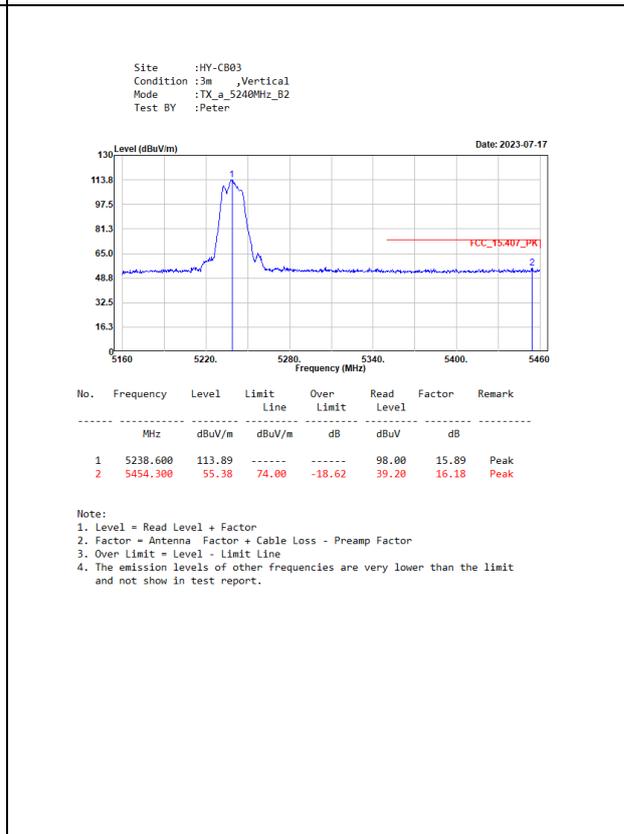
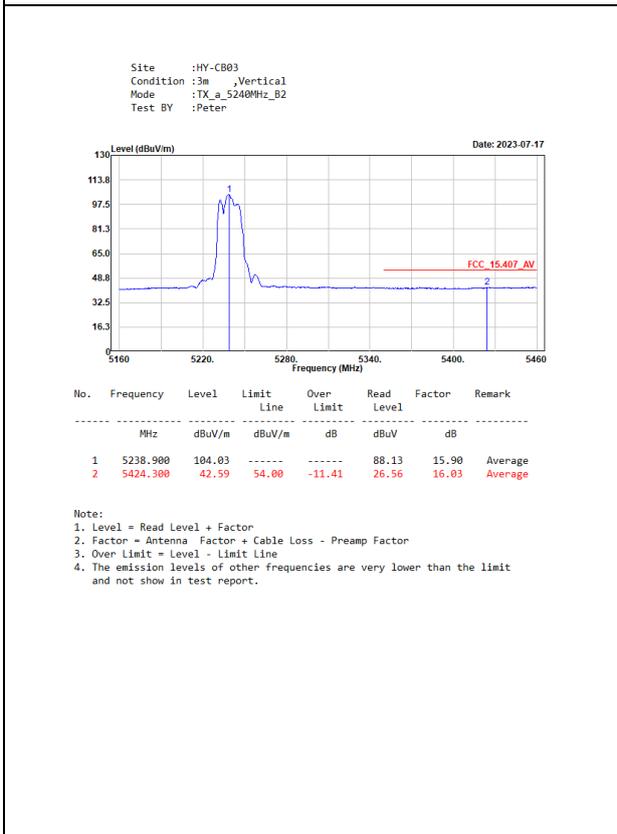
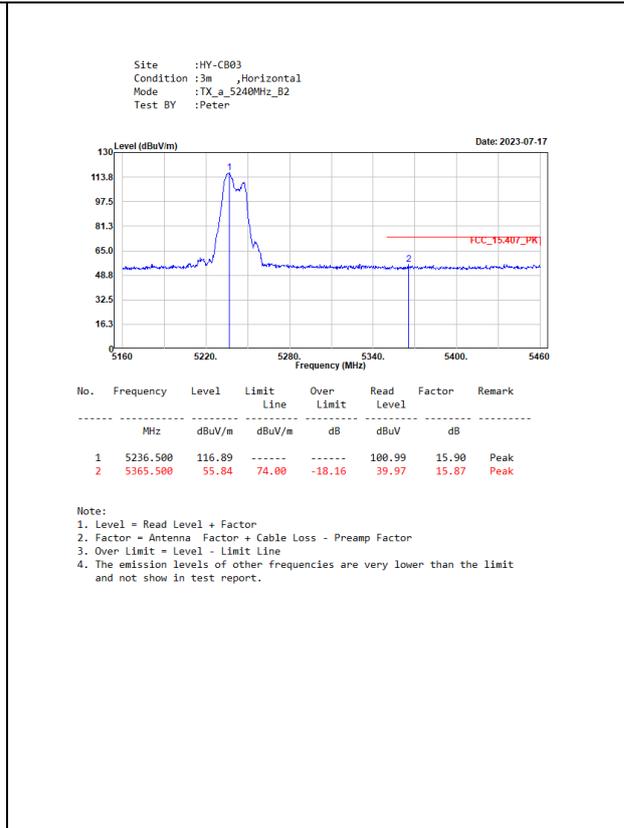
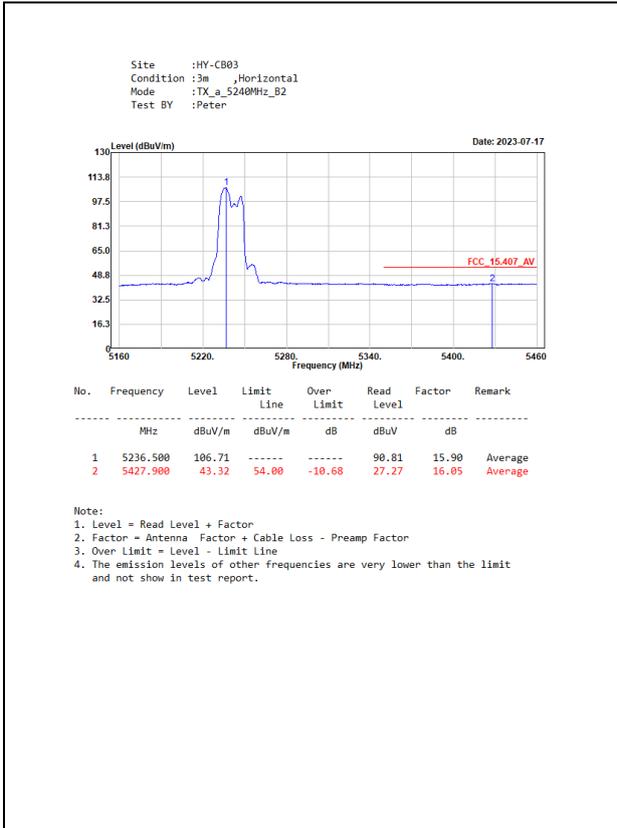
### 7.4. Test Result of Band Edge

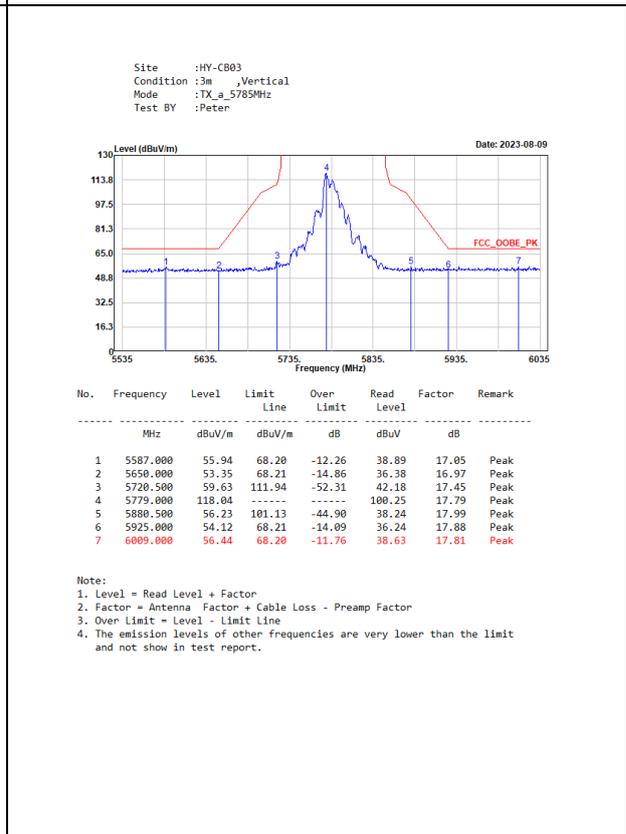
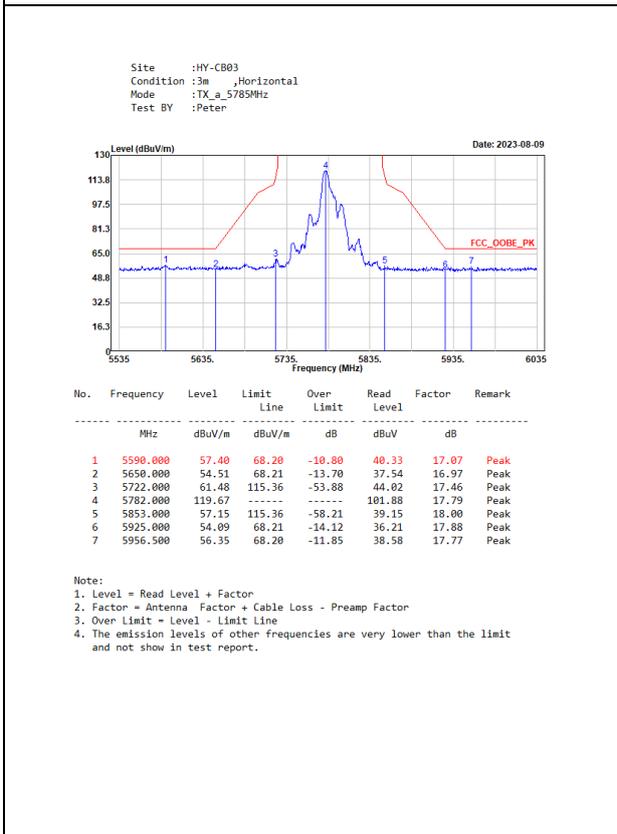
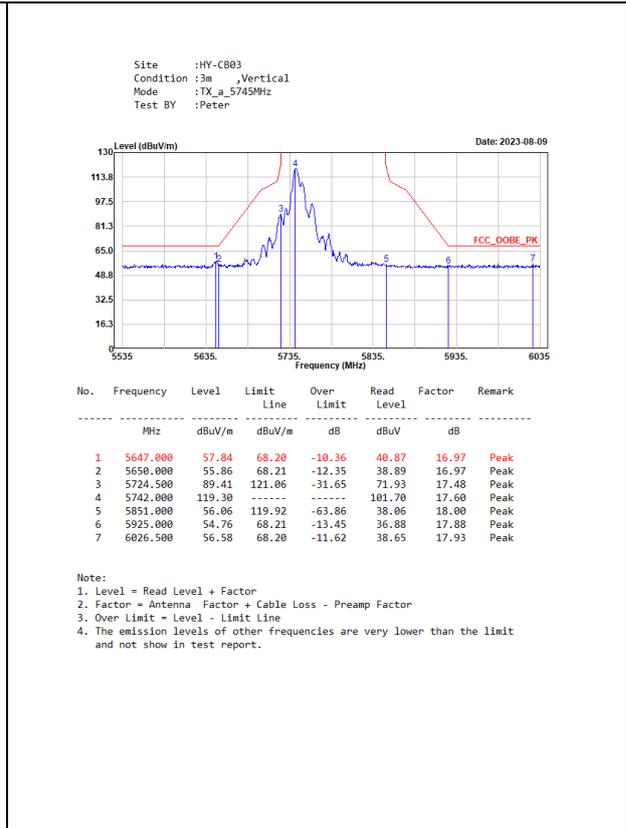
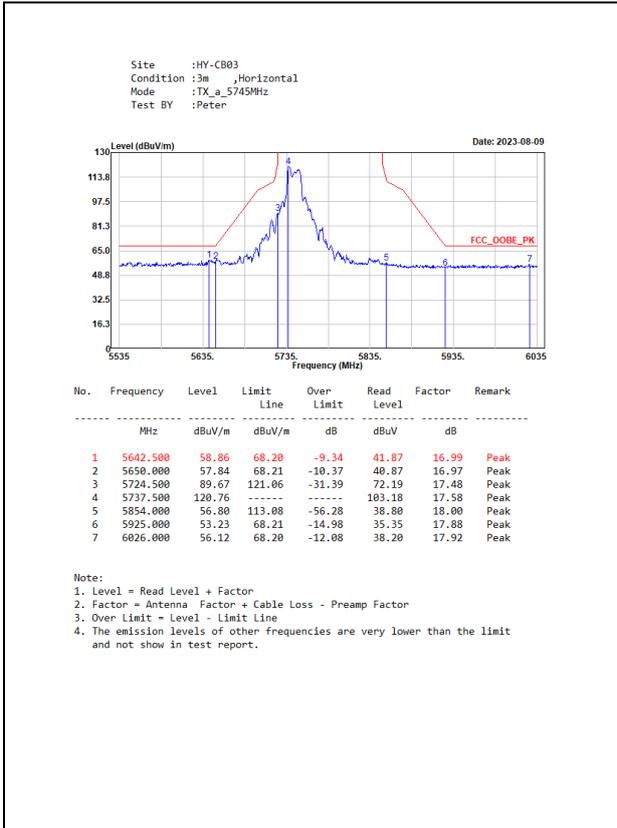
#### UNII-1 and UNII-3 (Full test)

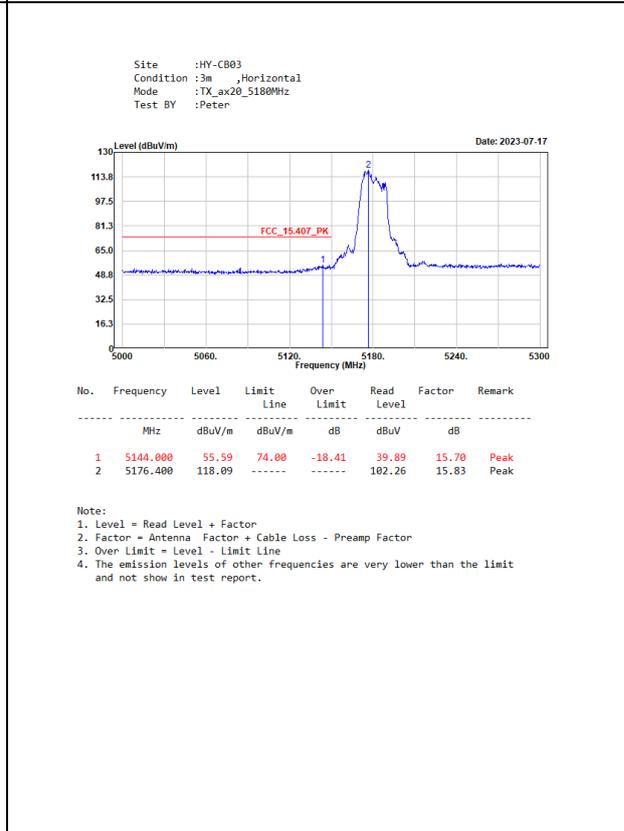
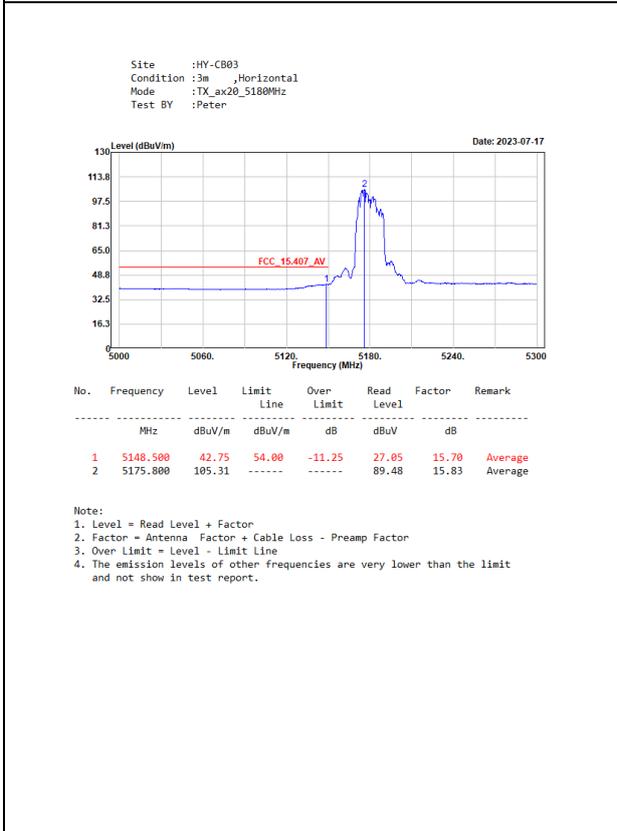
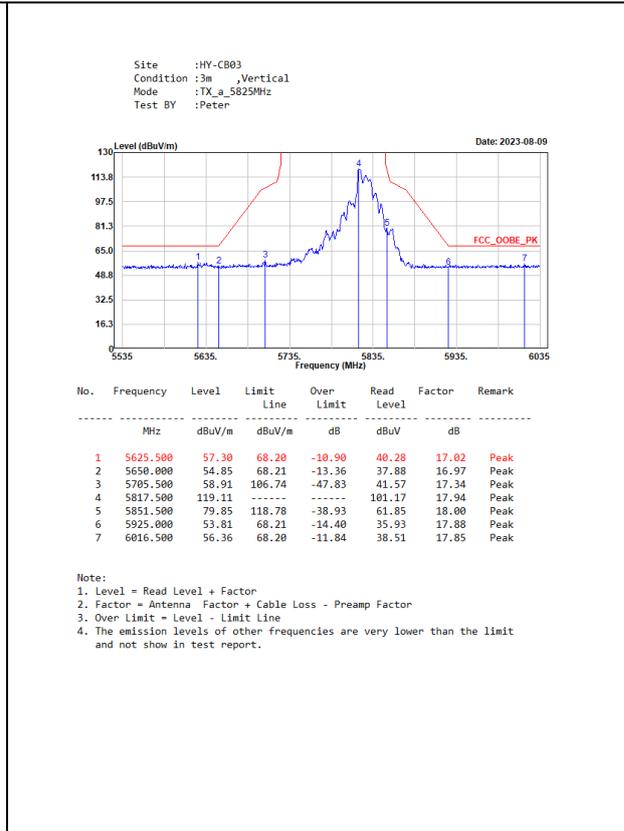
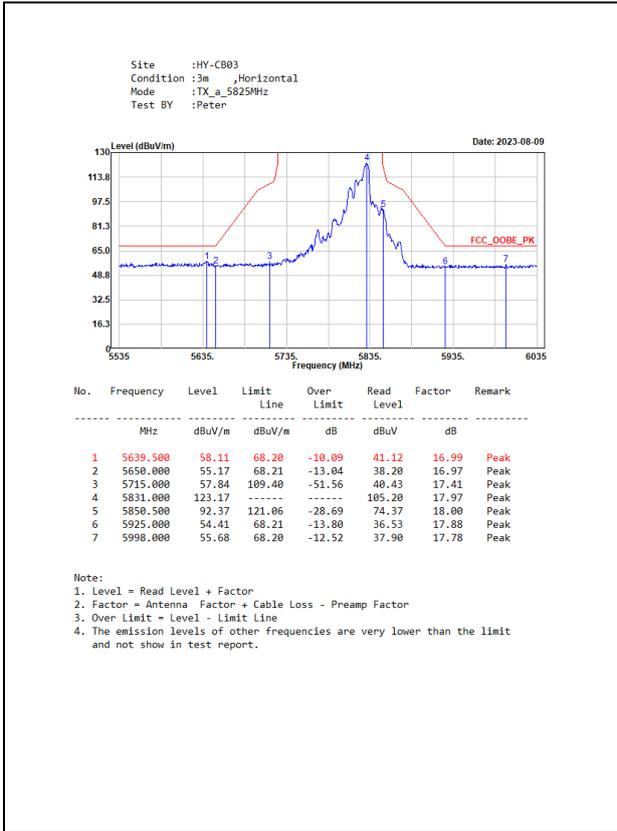


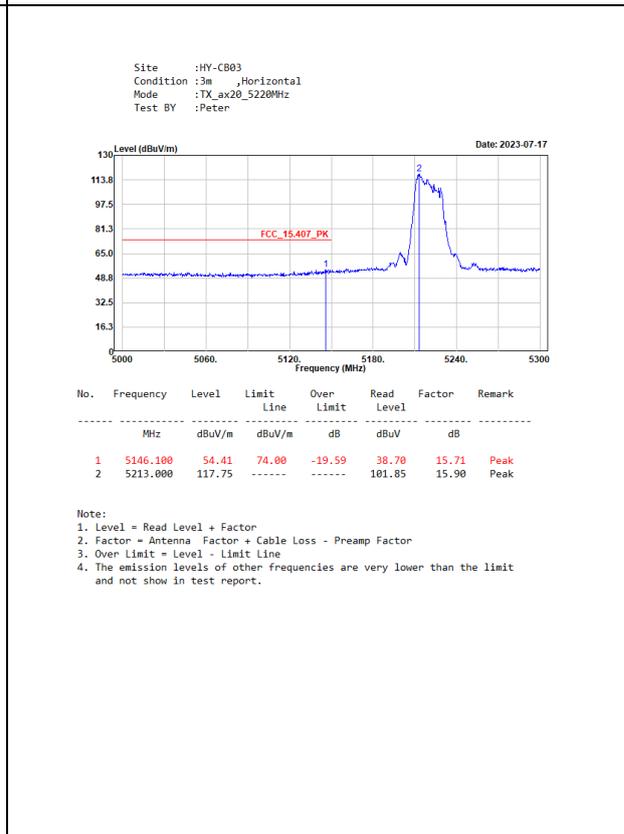
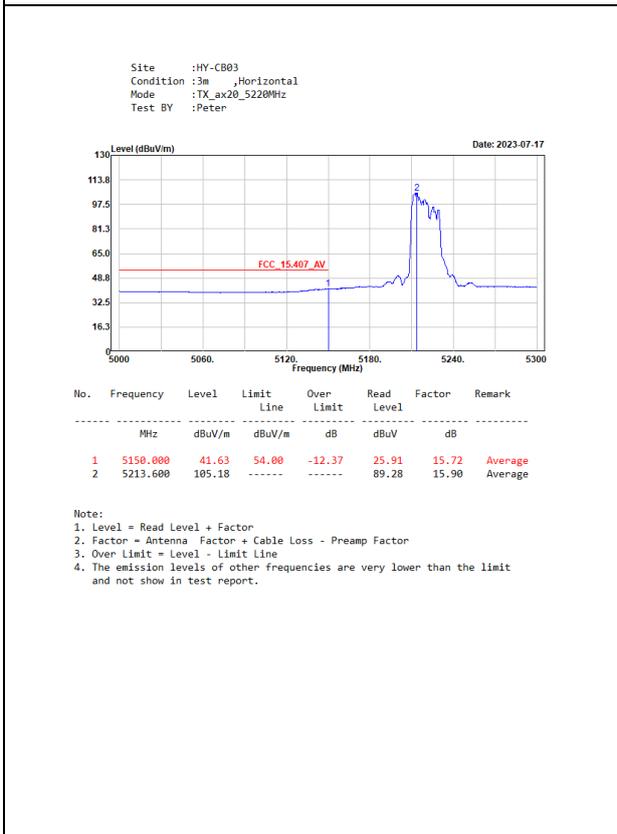
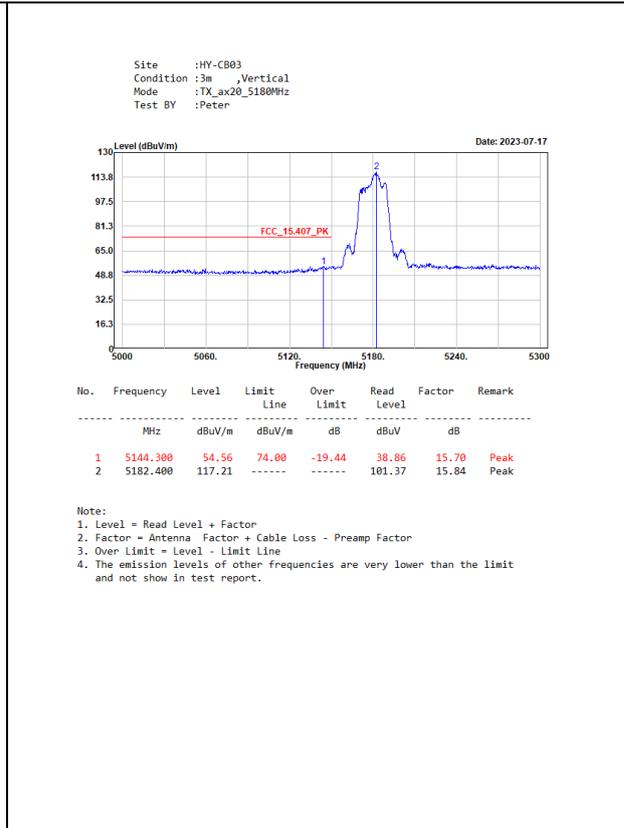
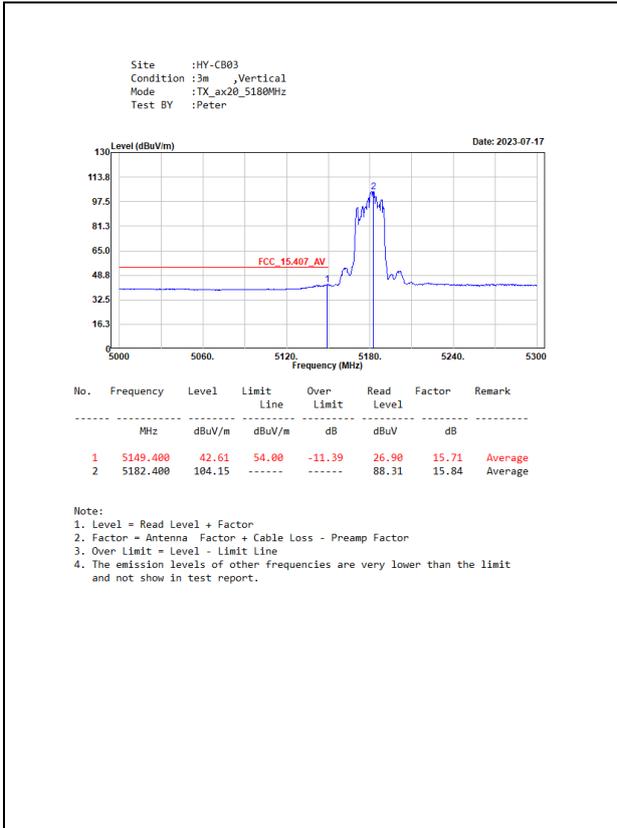


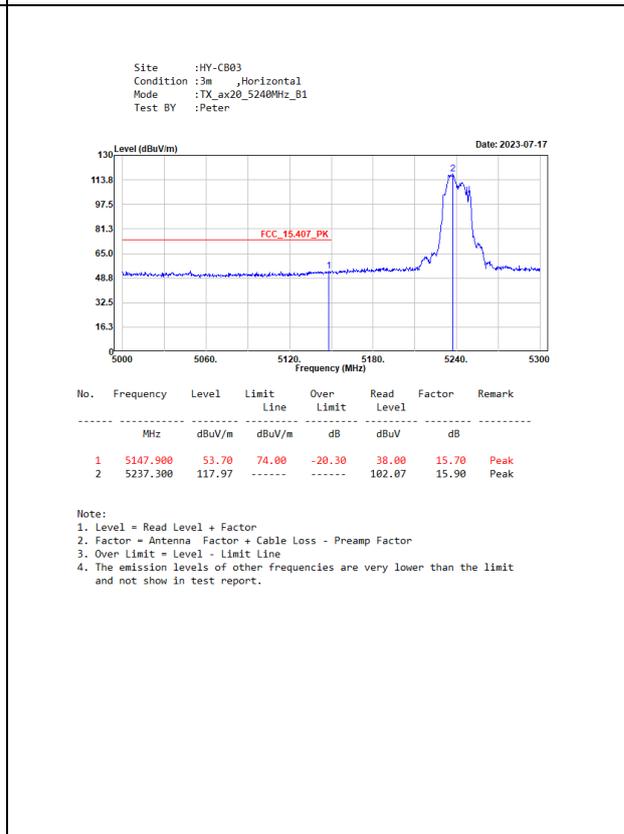
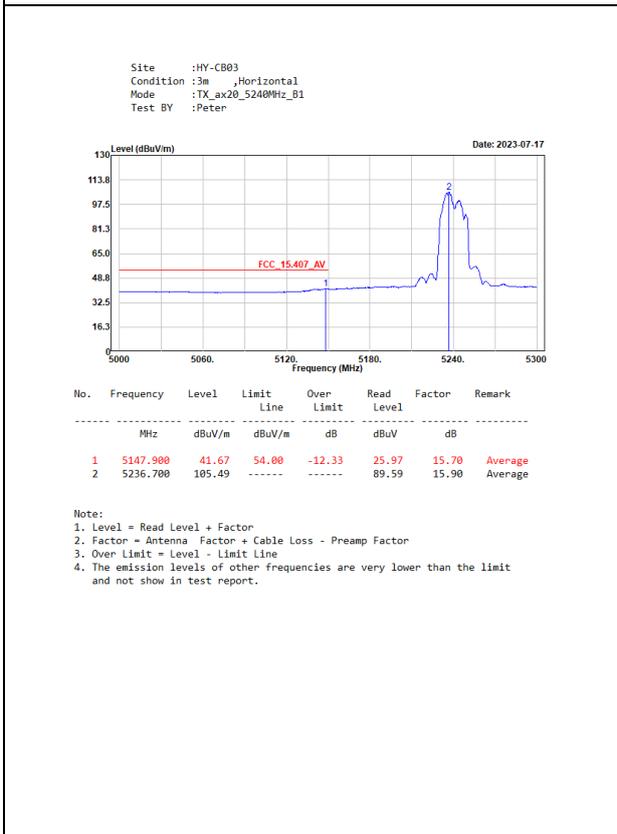
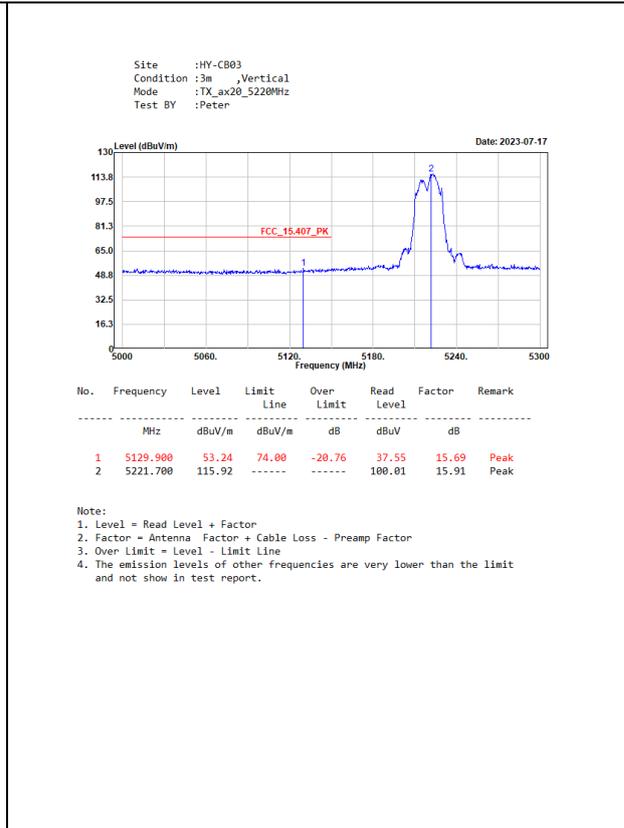
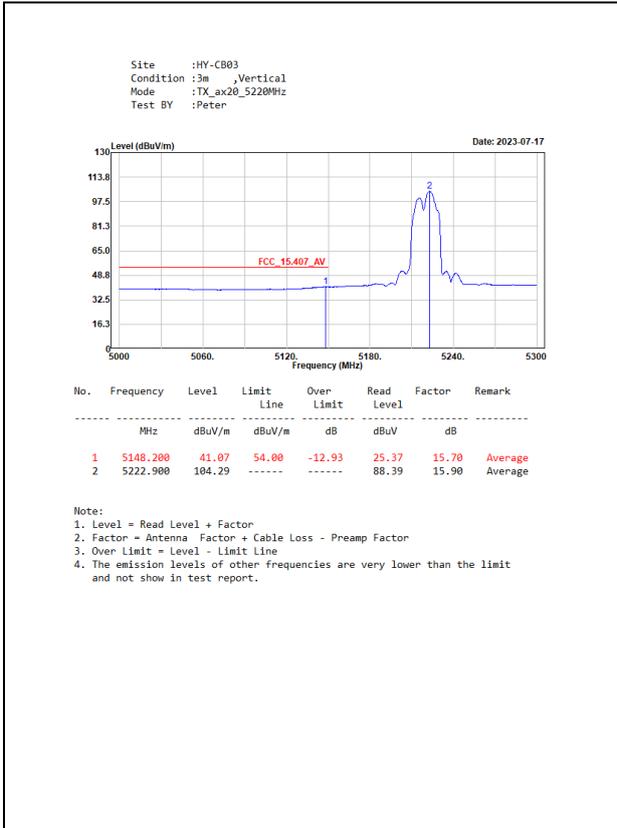


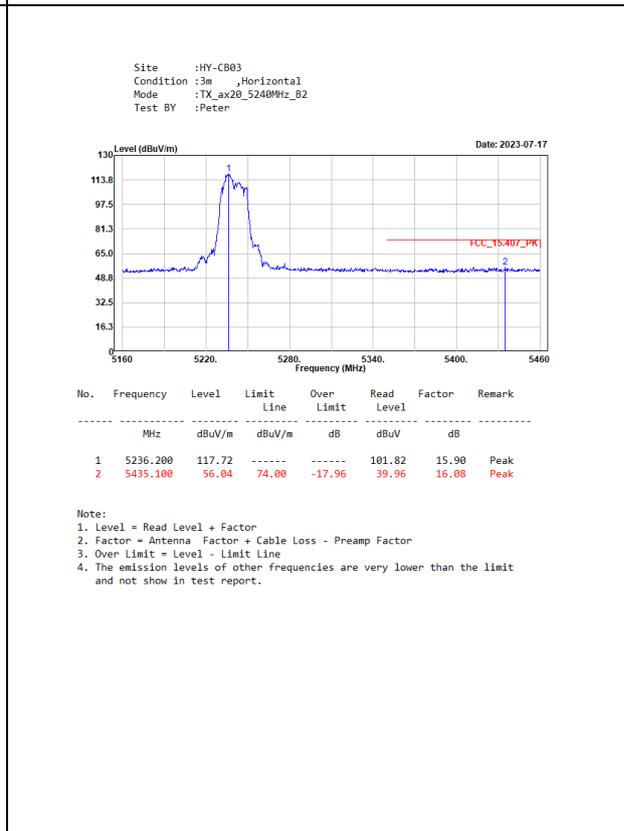
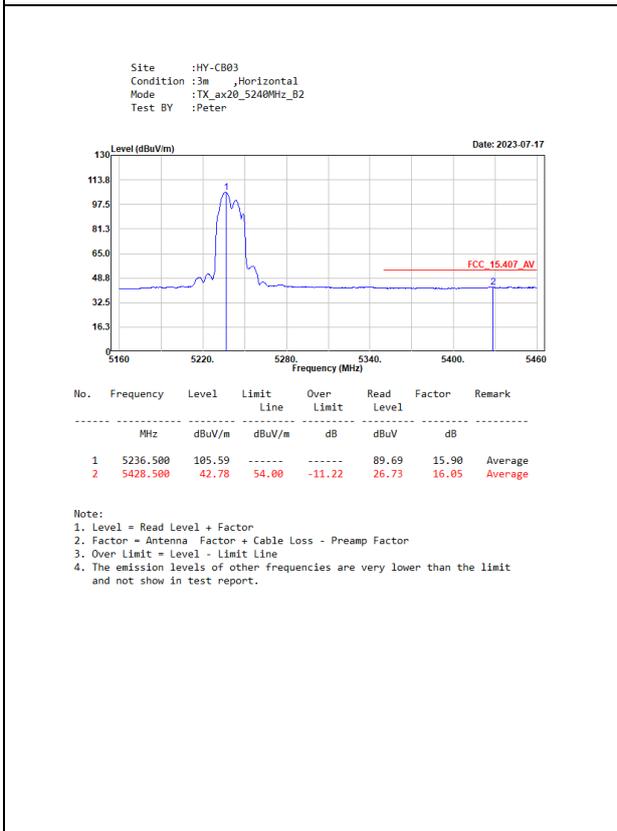
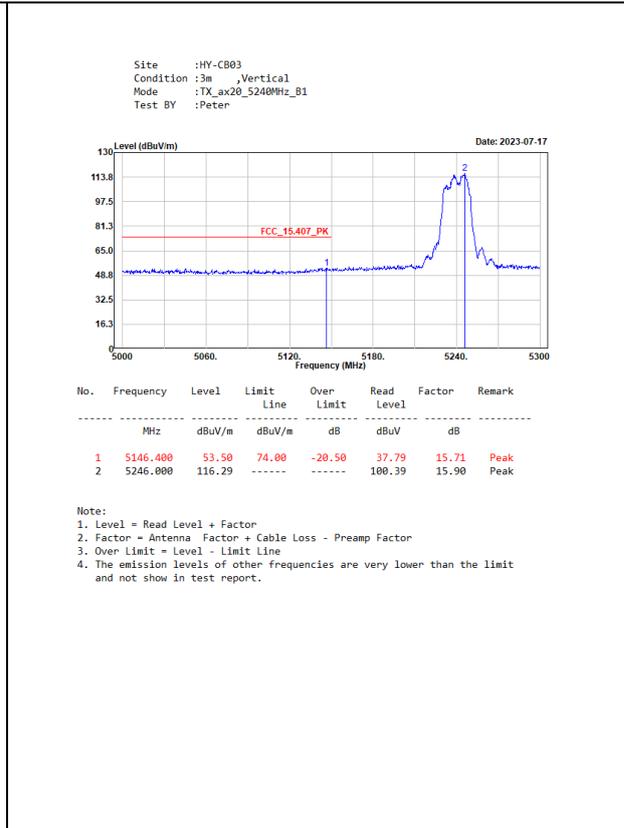
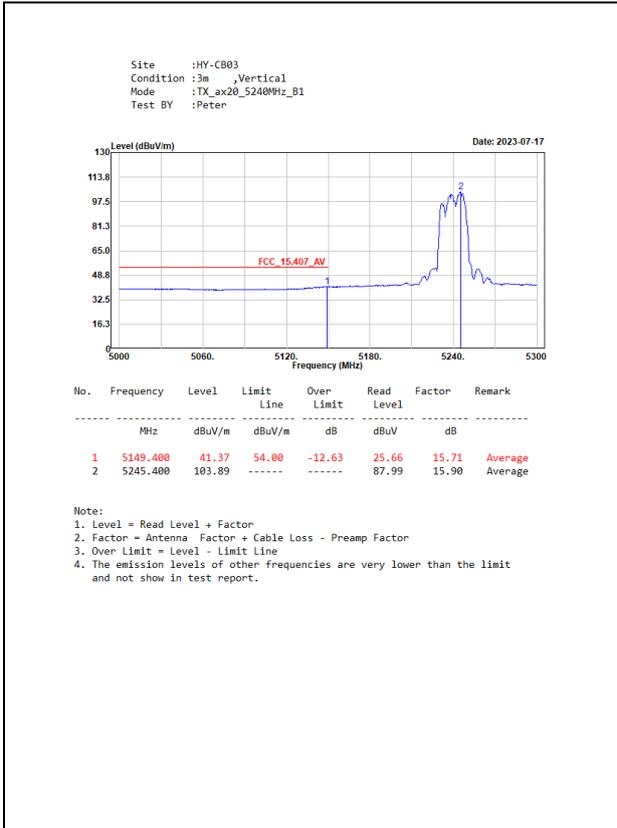


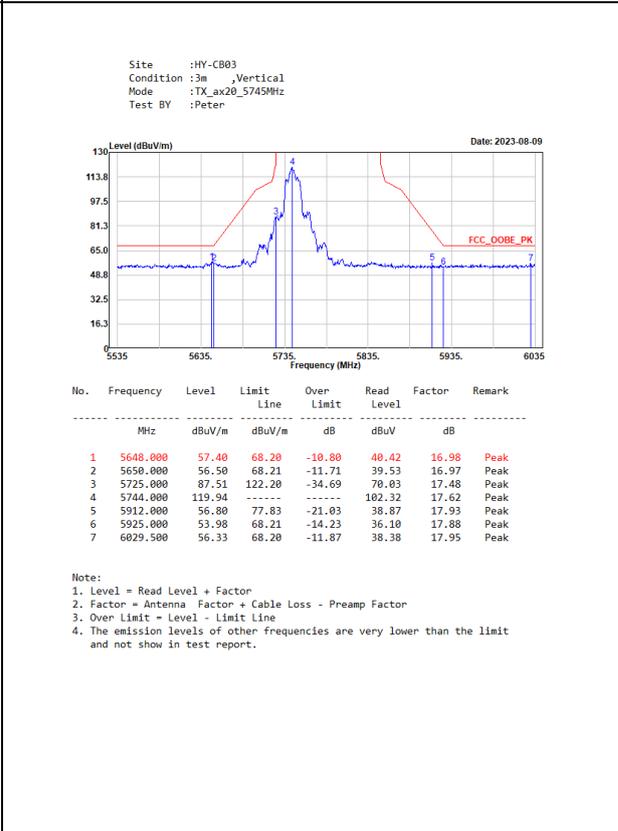
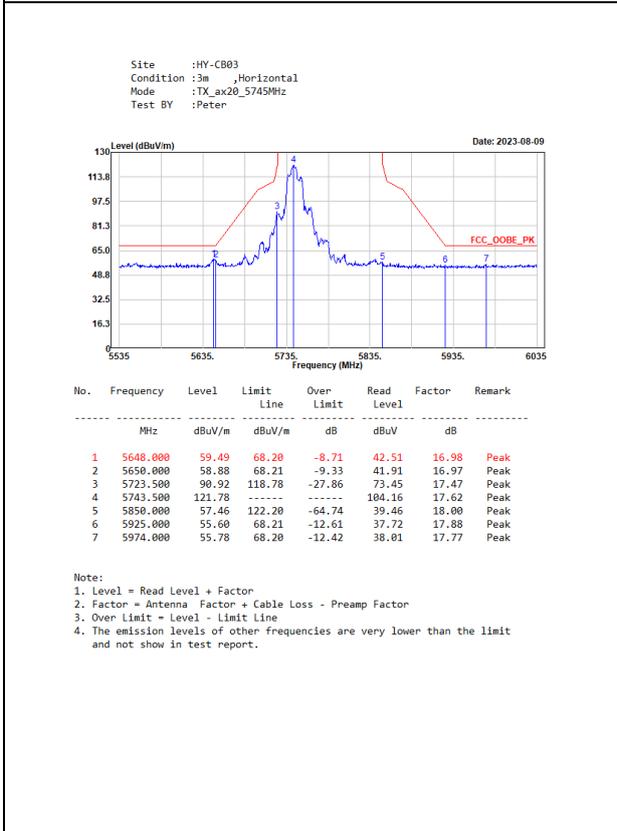
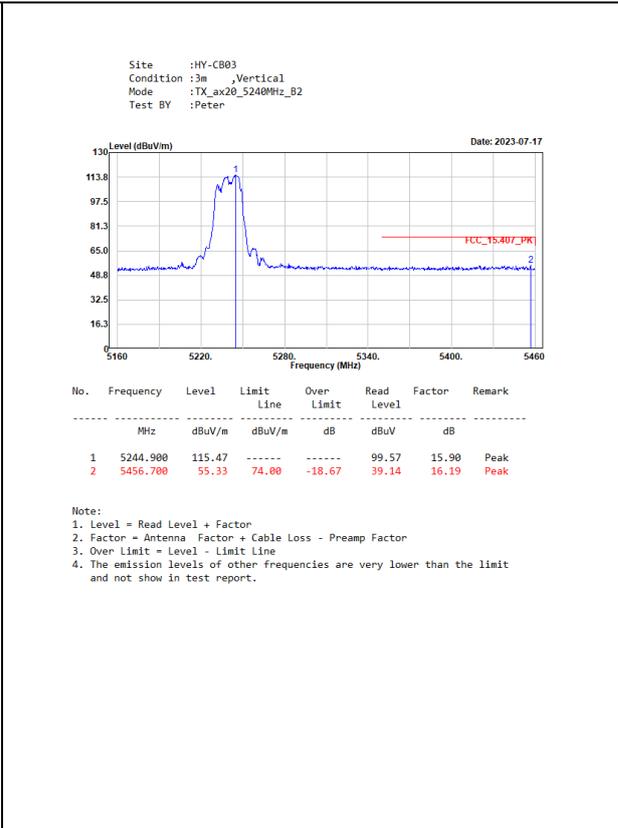
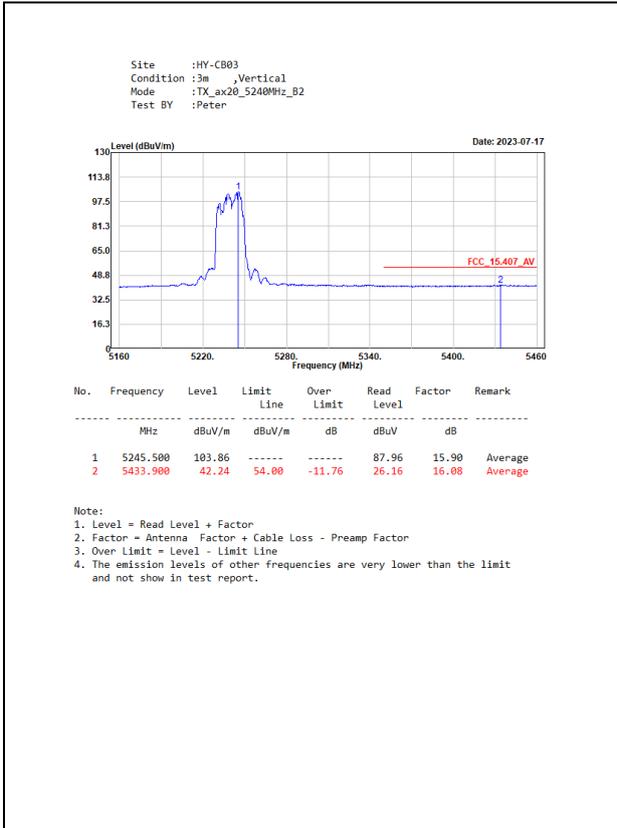


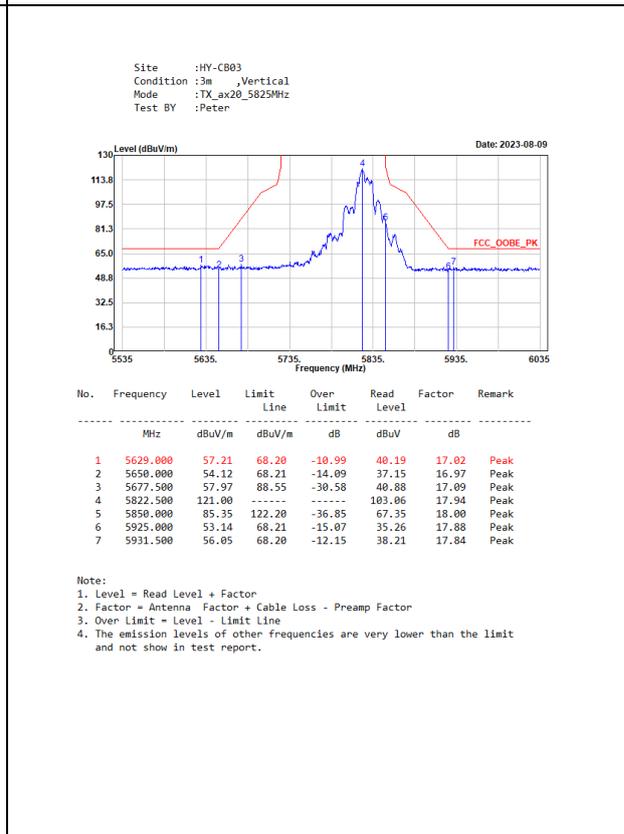
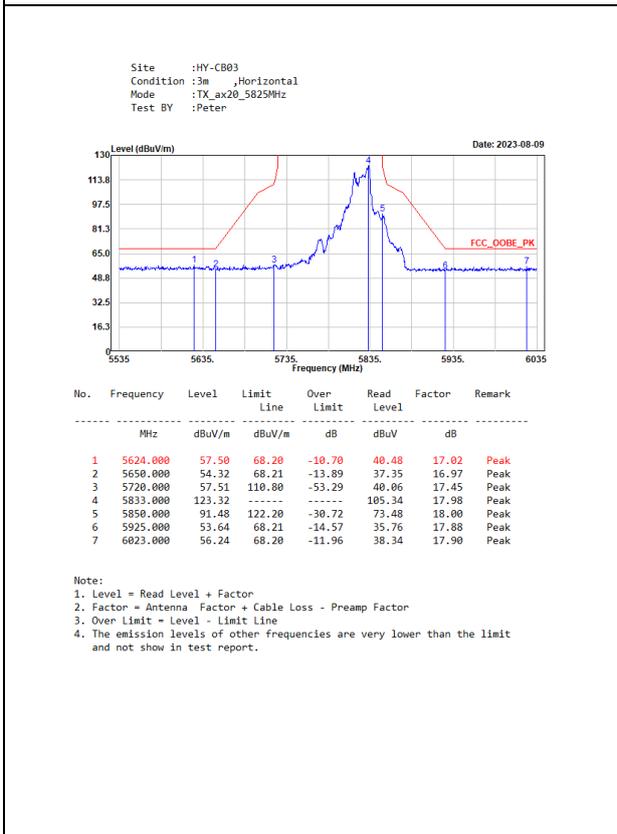
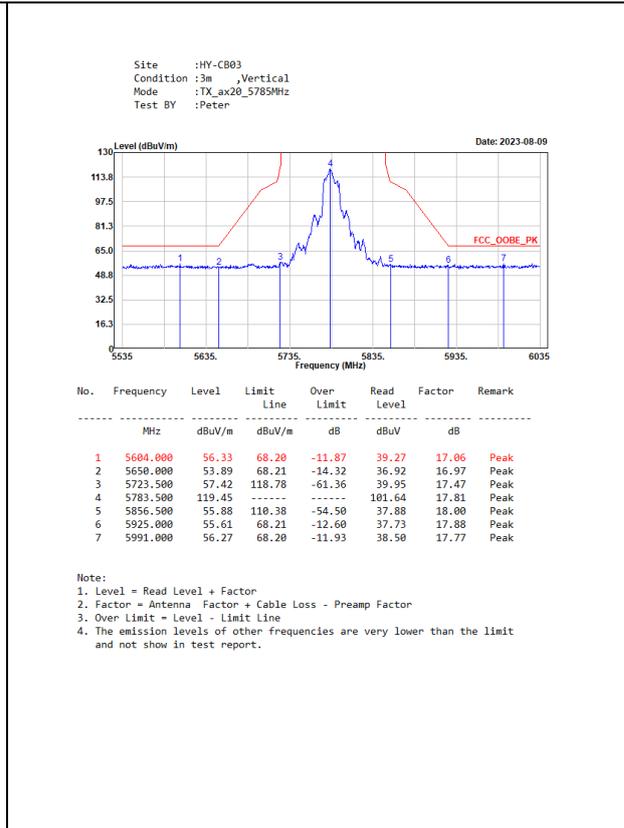
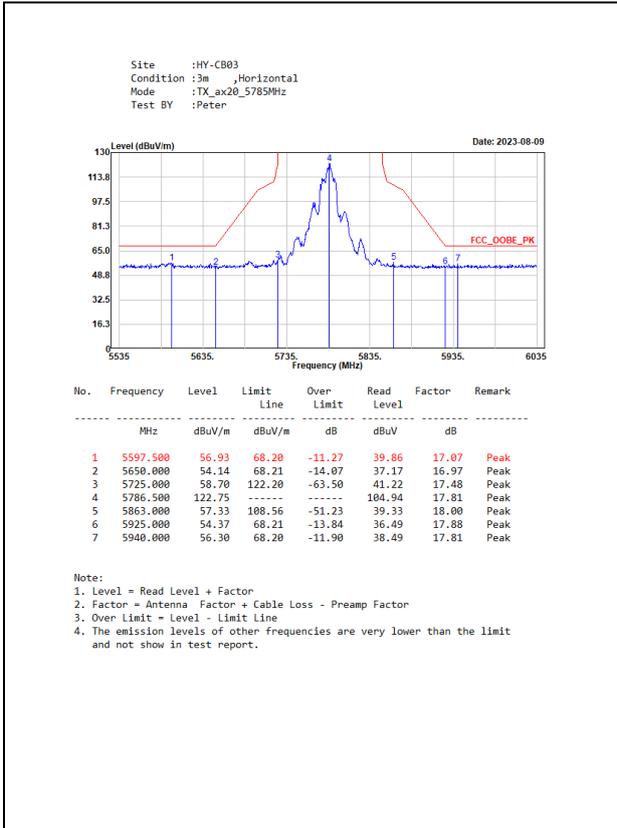


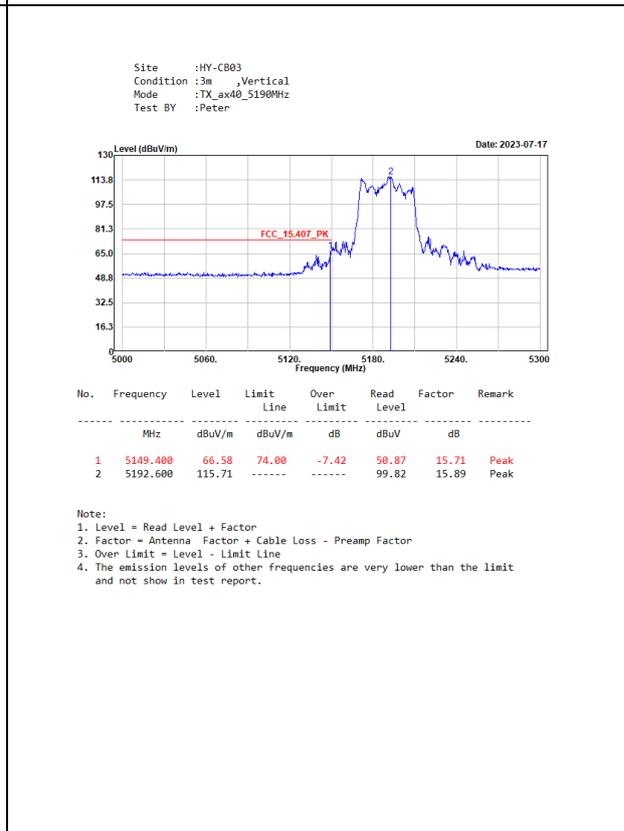
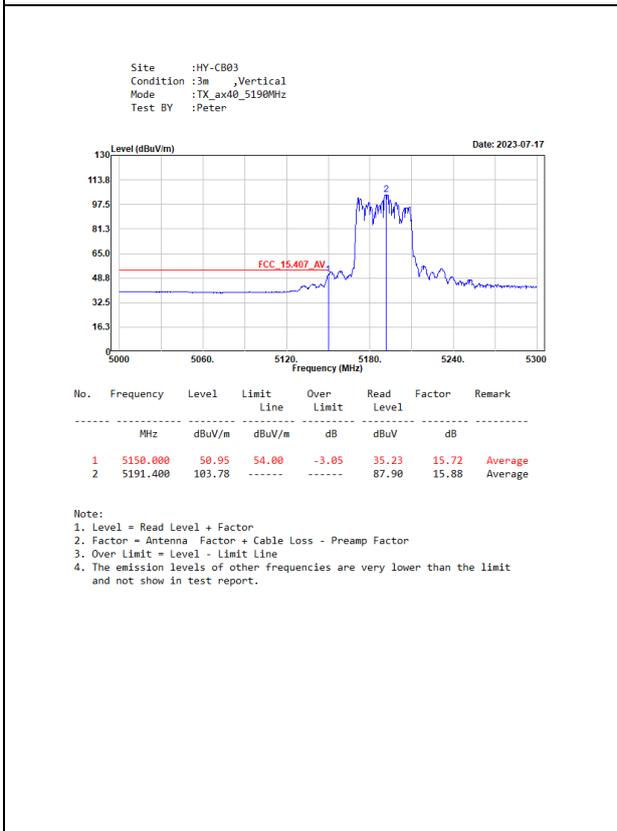
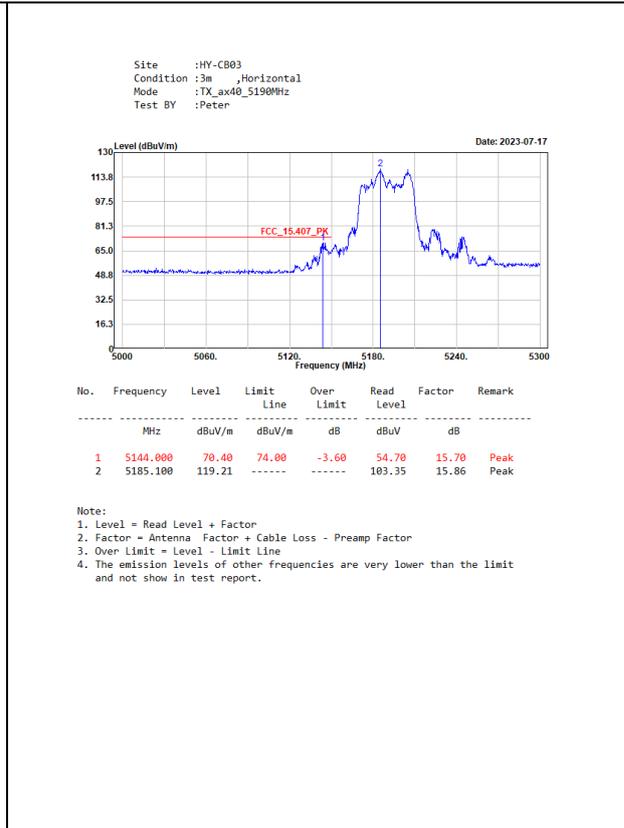
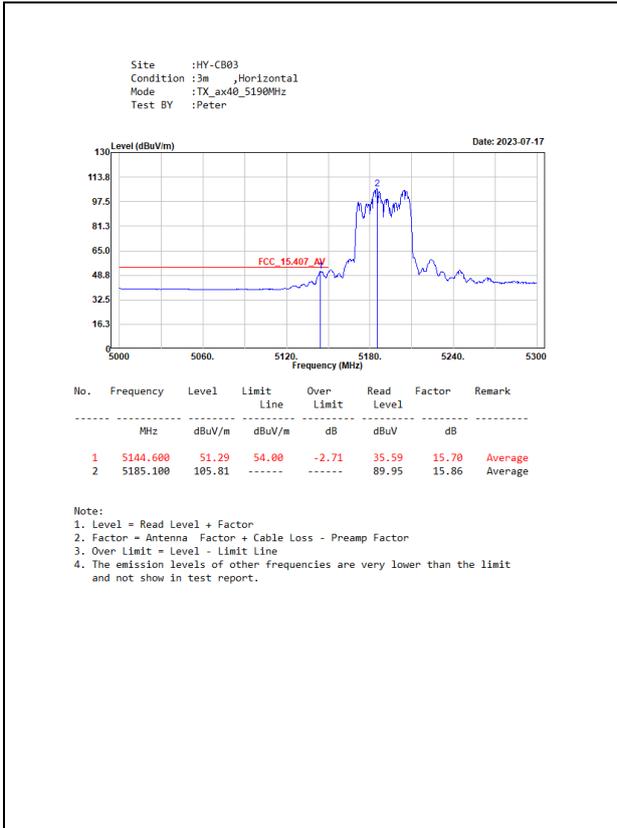


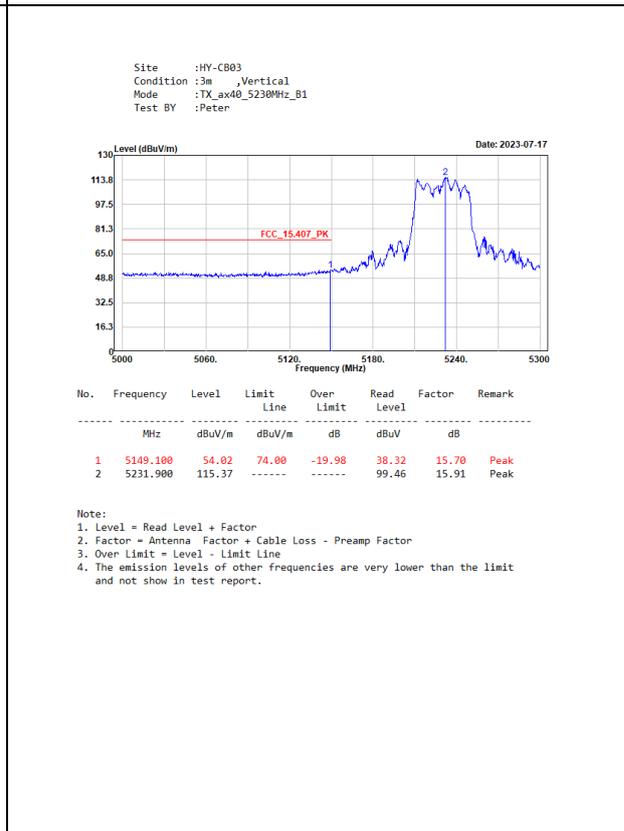
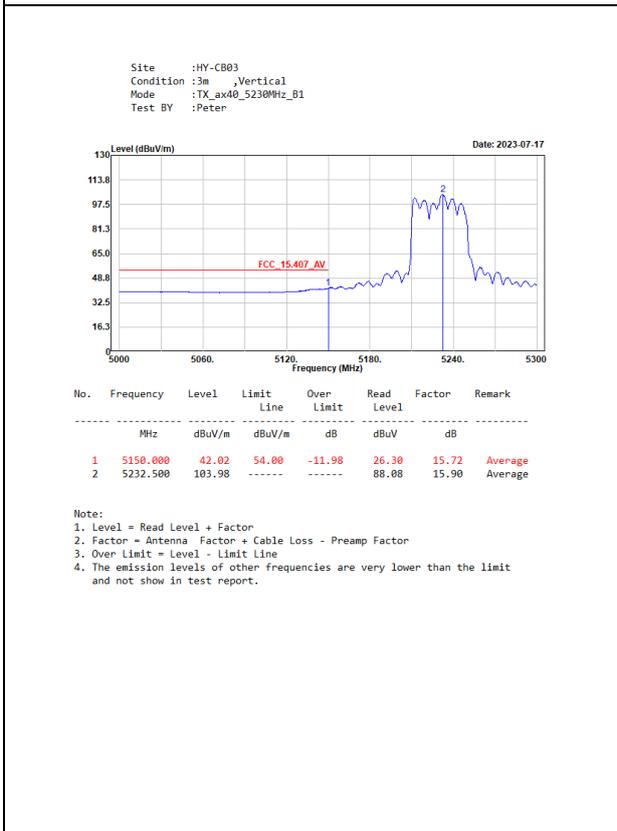
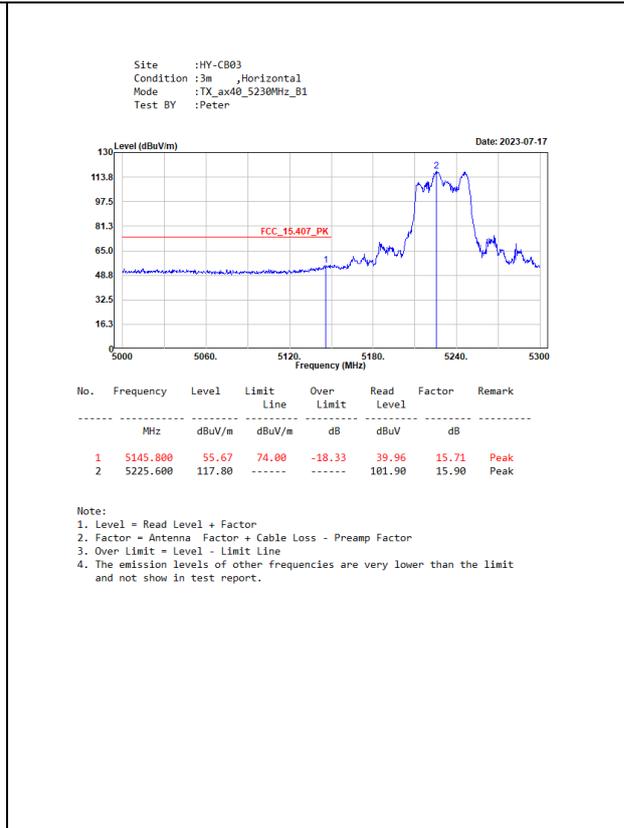
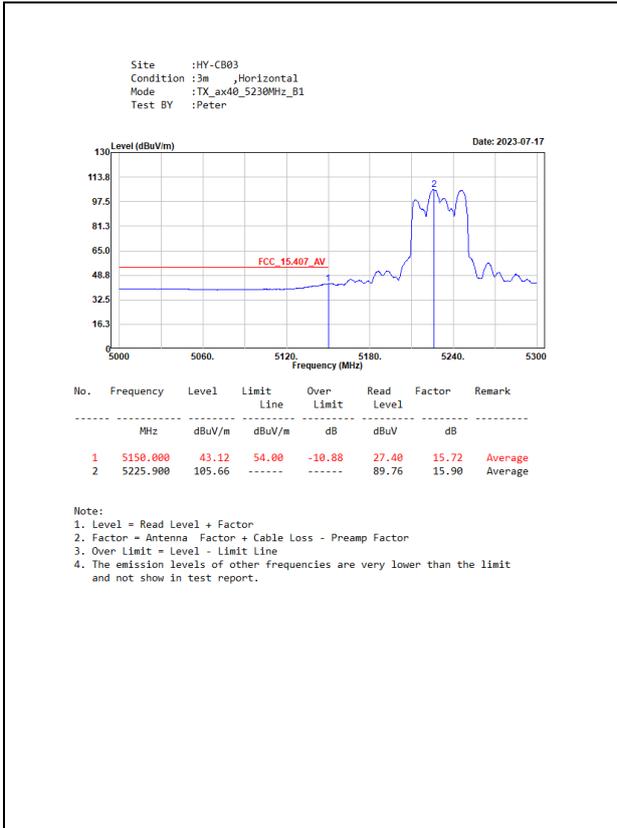


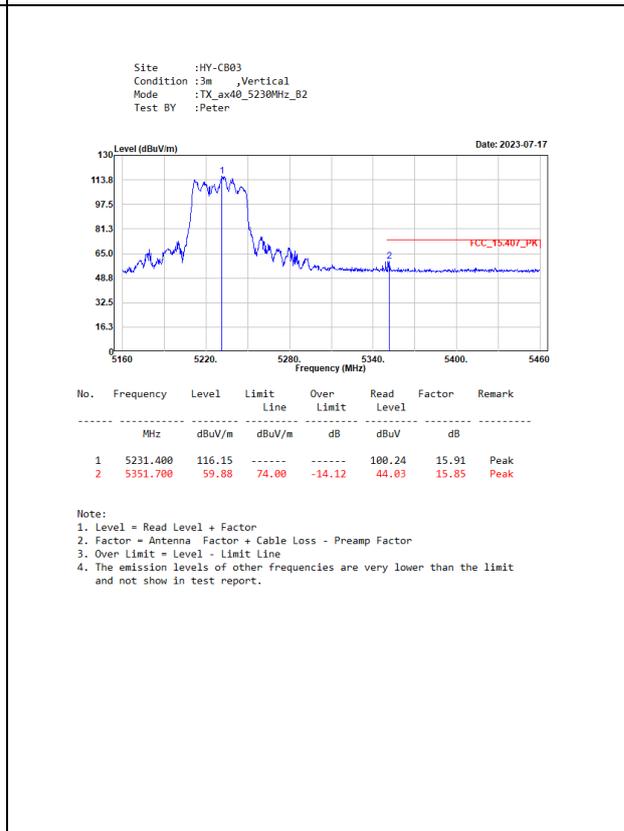
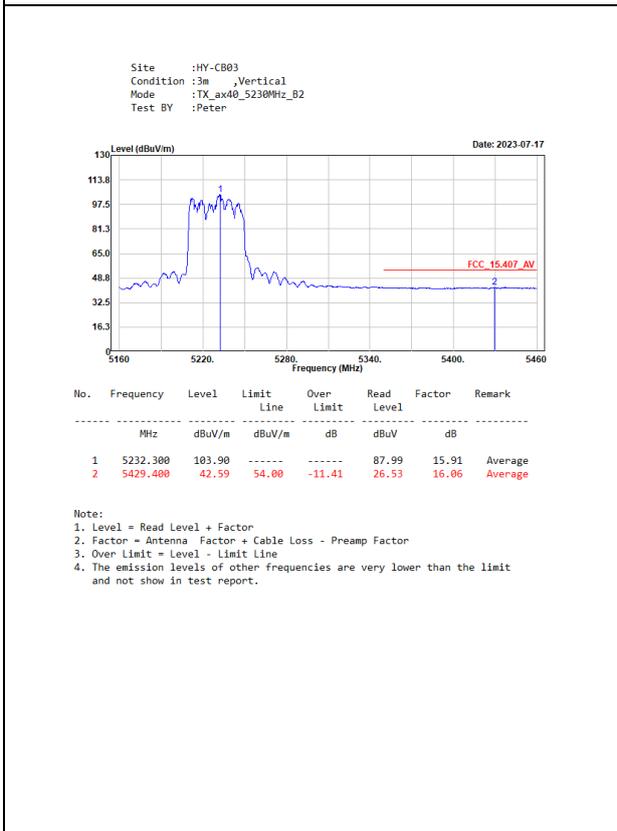
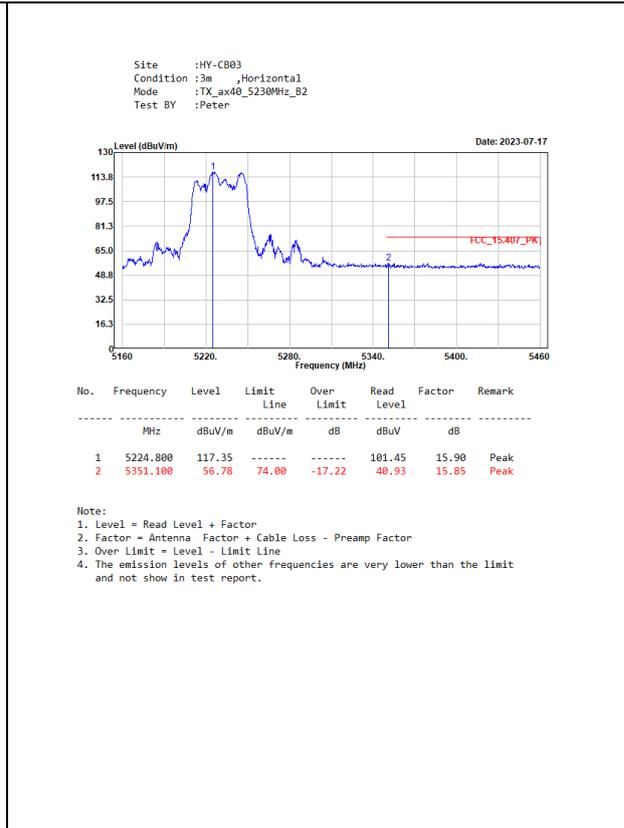
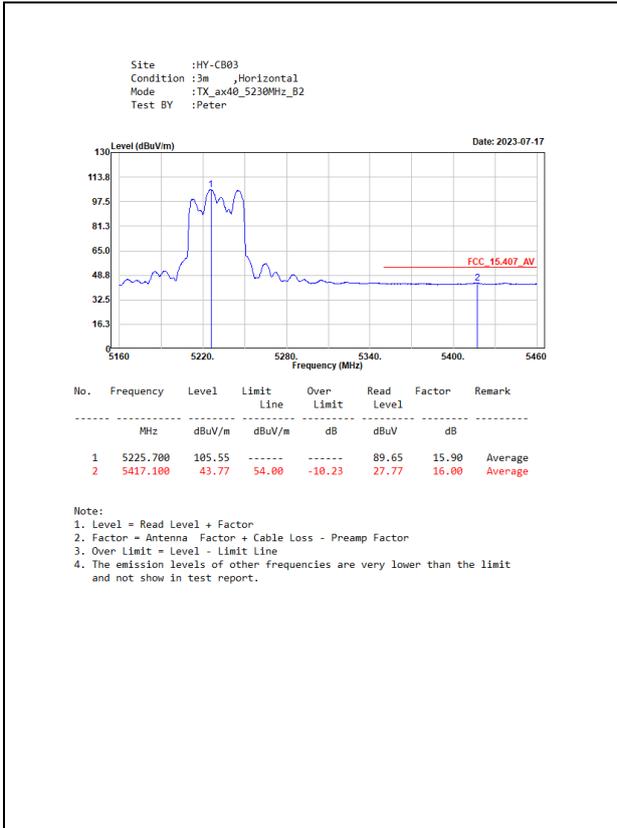


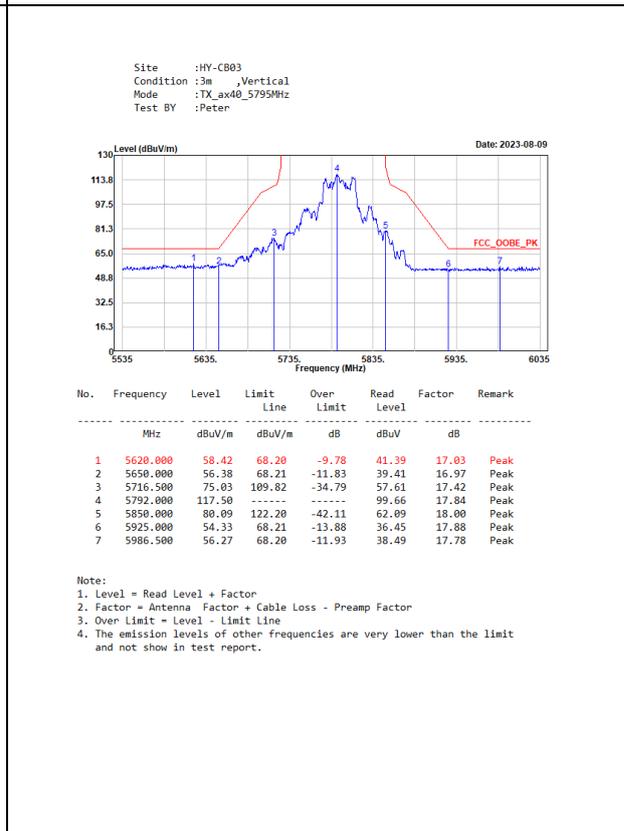
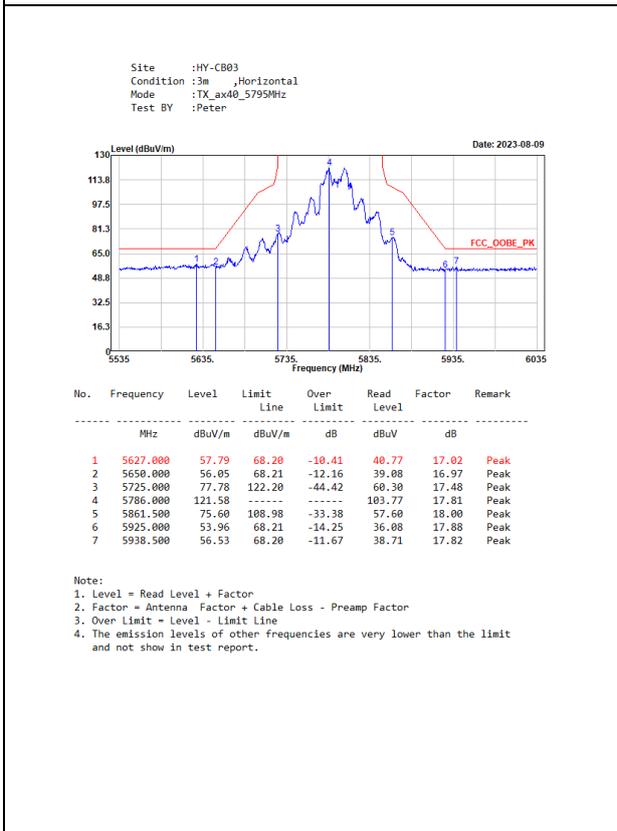
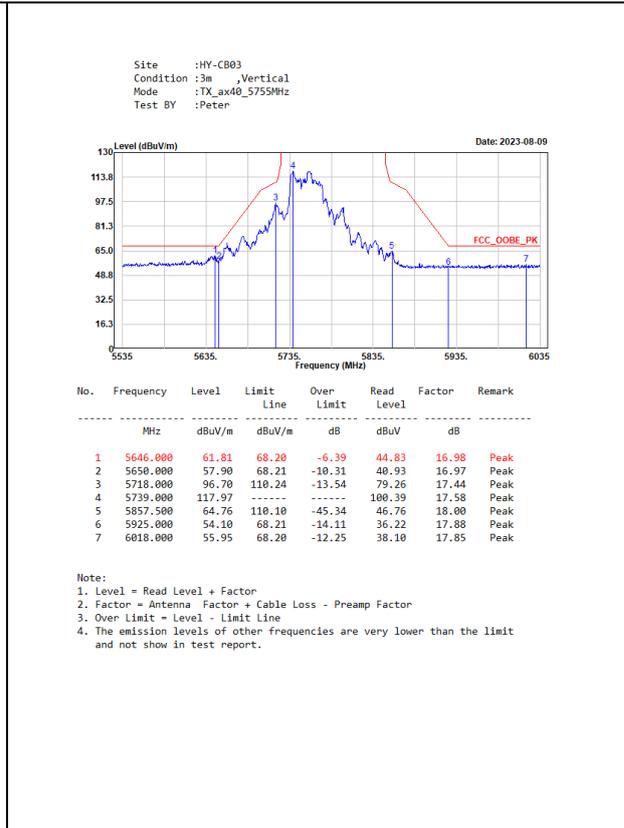
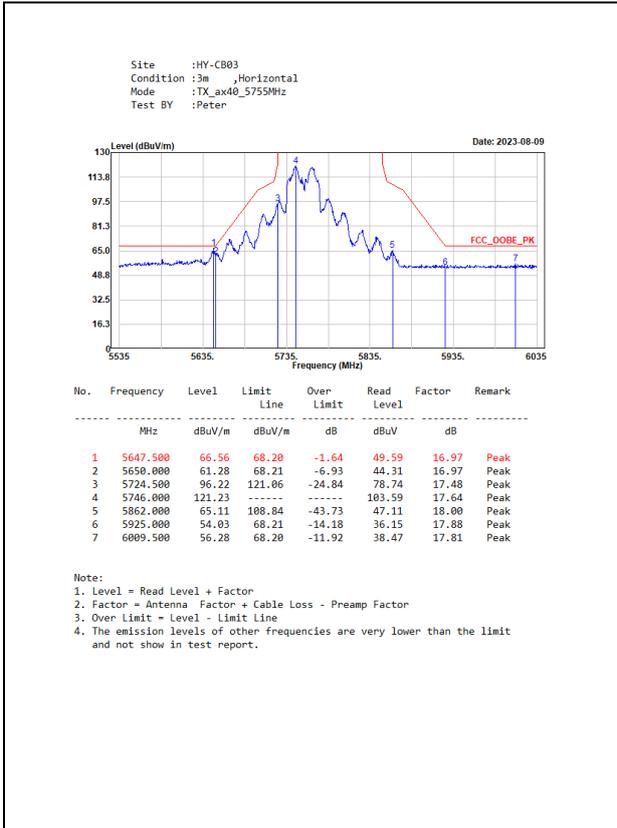


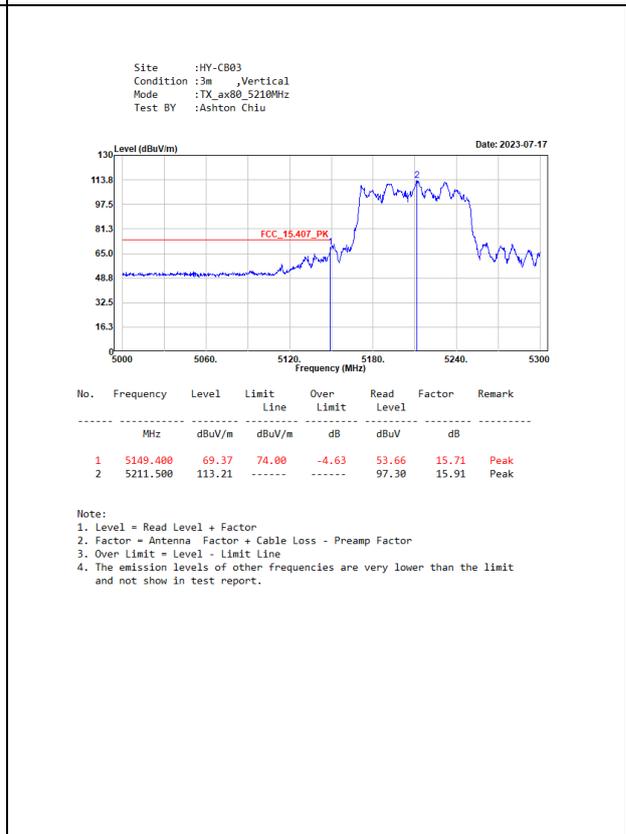
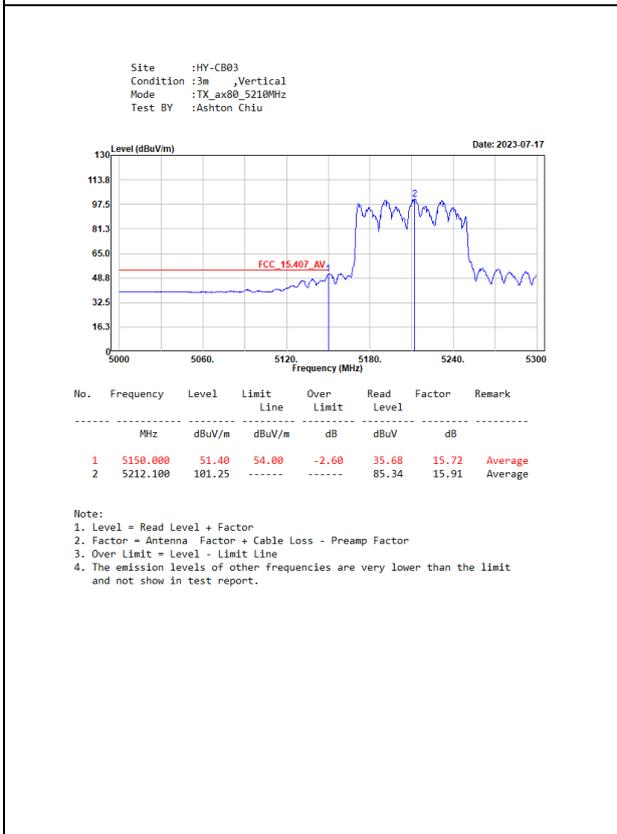
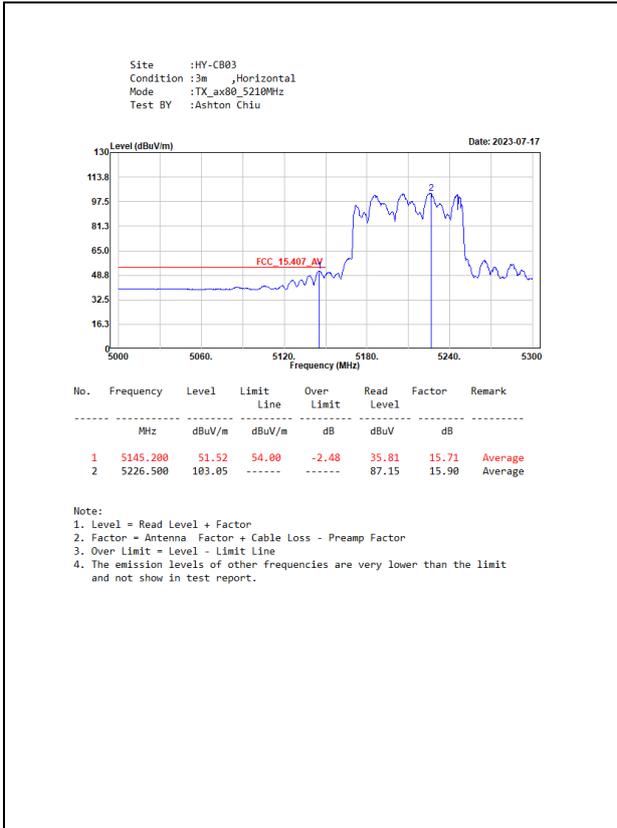


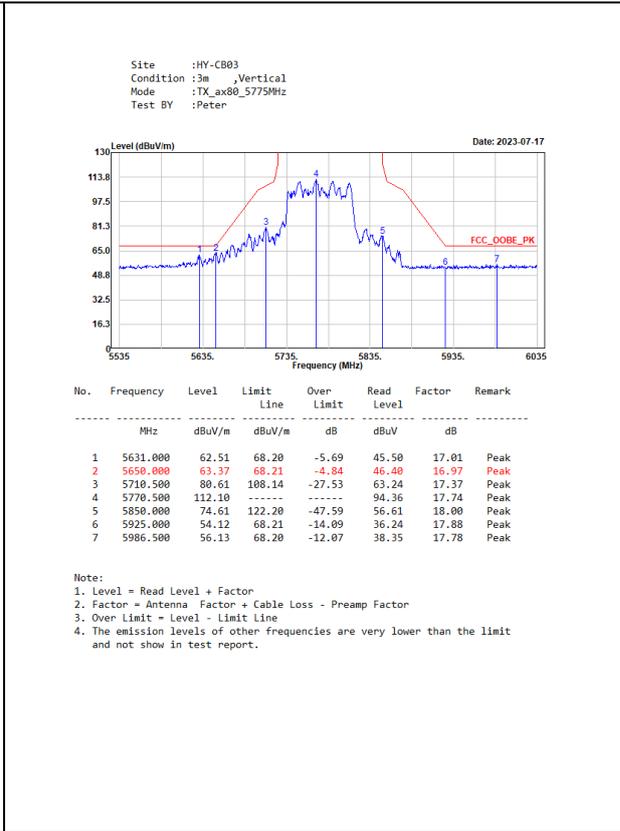
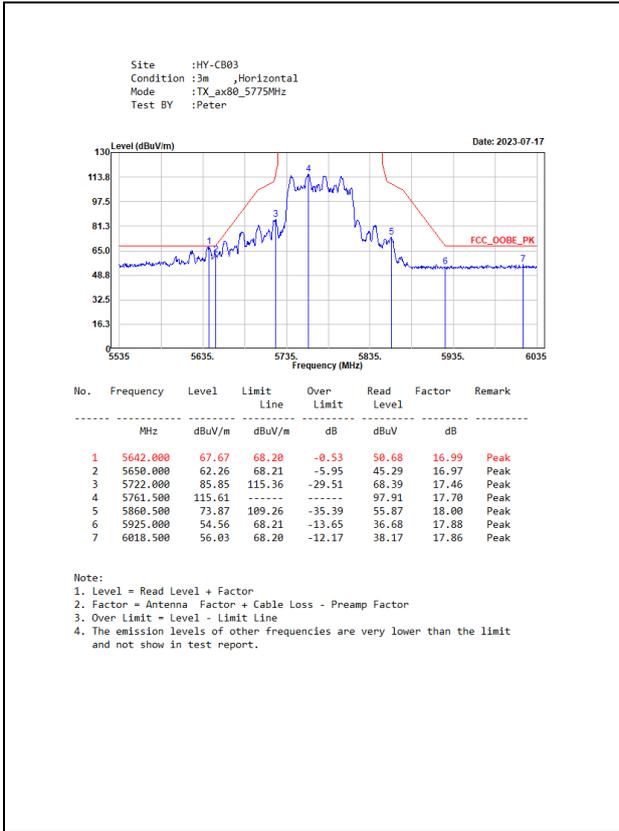




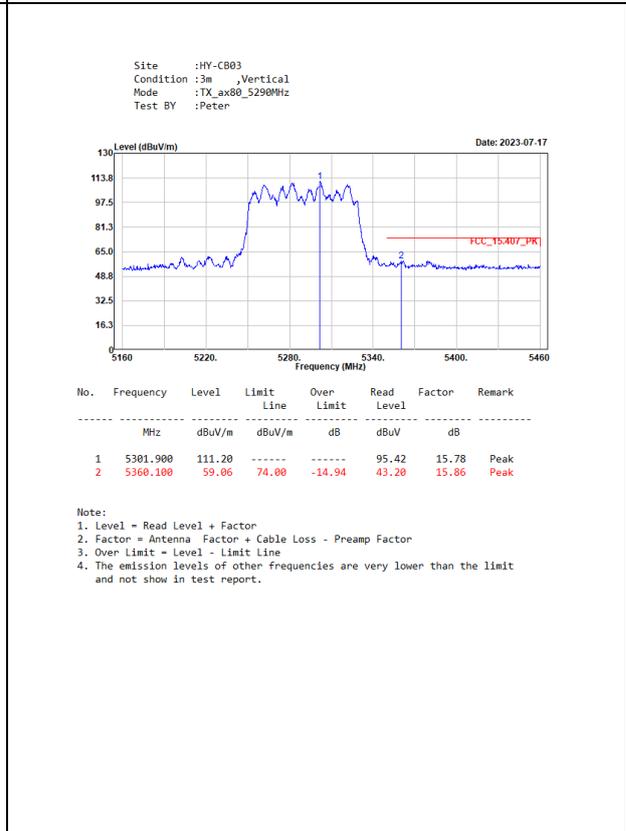
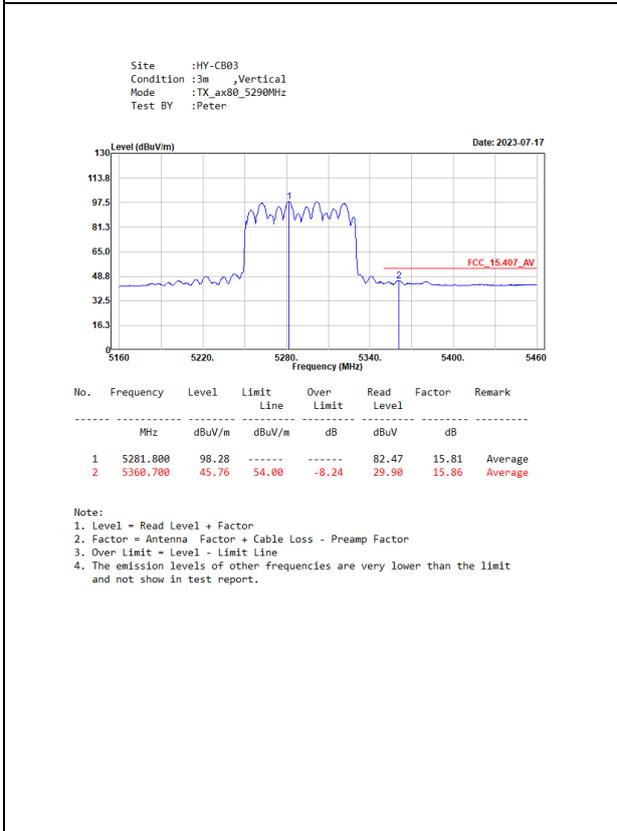
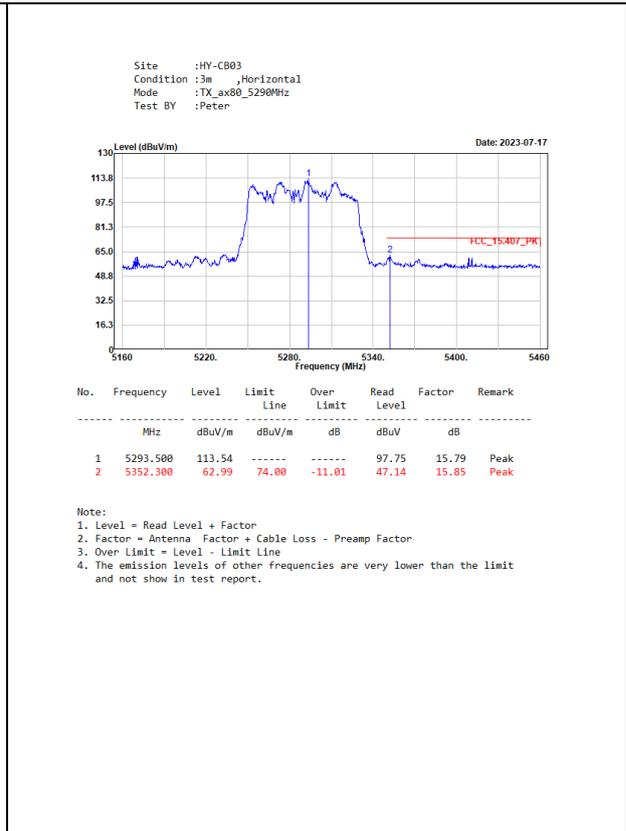
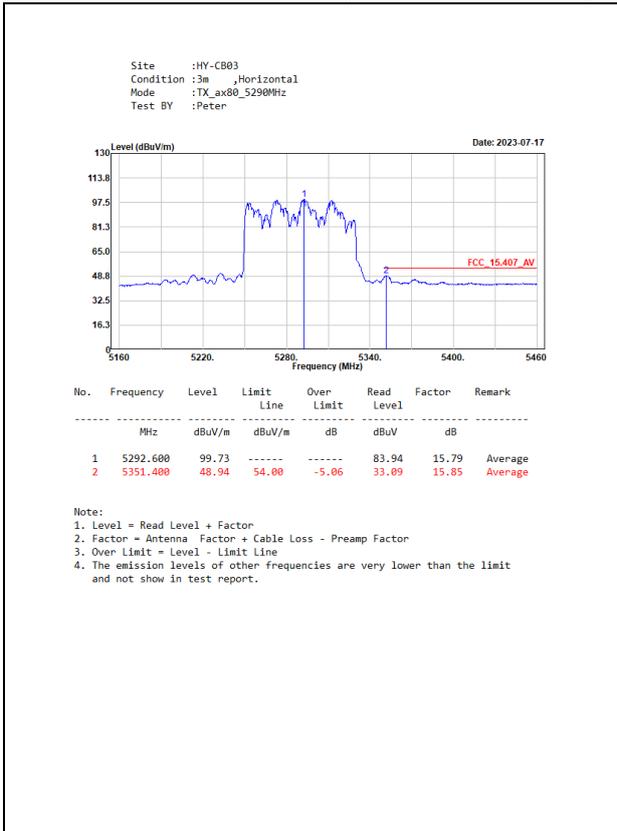


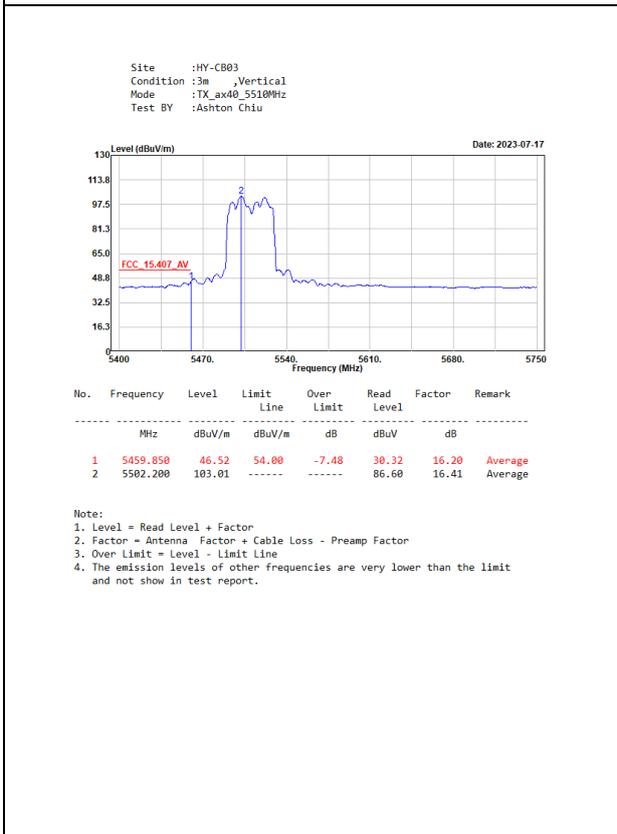
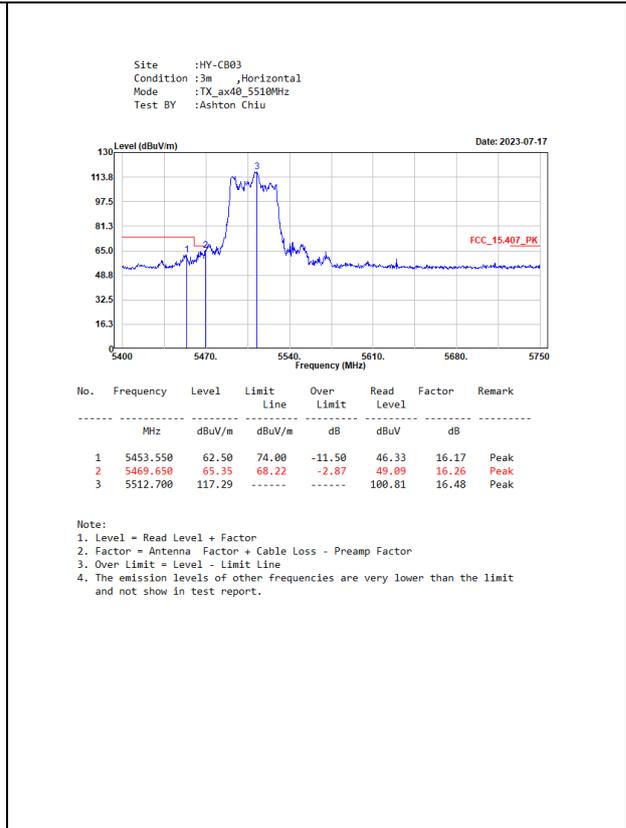
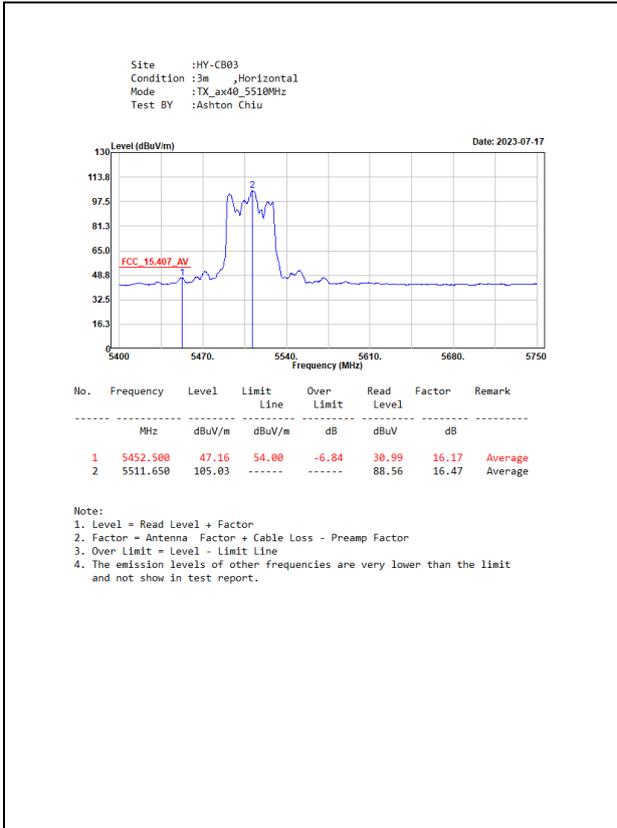






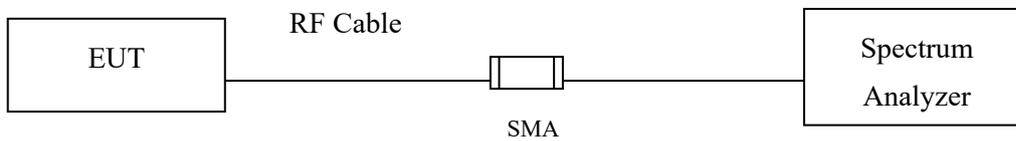
UNII-2A and UNII-2C (Verify worst-case channel)





## 8. Occupied Bandwidth

### 8.1. Test Setup



### 8.2. Limits

For the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### 8.3. Test Procedure

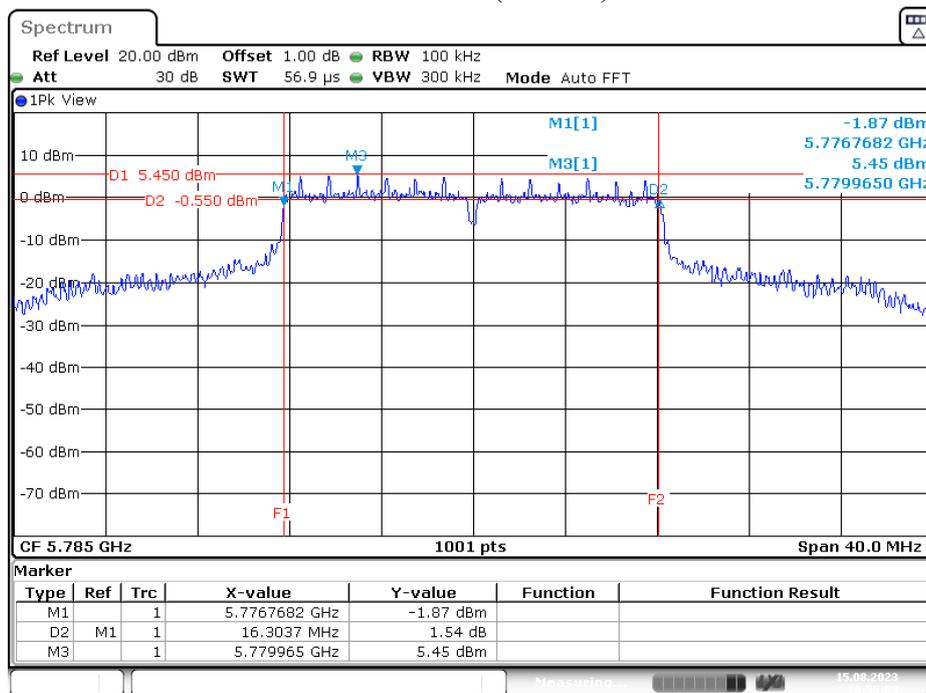
The EUT was setup to ANSI C63.10, 2013; tested to UNII test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

### 8.4. Test Result of Occupied Bandwidth

Product : Wi-Fi 6/6E Sensor  
 Test Item : Occupied Bandwidth Data  
 Test Mode : Transmit (802.11a)  
 Test Date : 2023/08/15

Channel No.	Chain	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	A	5745	16264	>500	Pass
157	A	5785	15904	>500	Pass
165	A	5825	15704	>500	Pass
149	B	5745	15545	>500	Pass
157	B	5785	16304	>500	Pass
165	B	5825	16304	>500	Pass
149	C	5745	15784	>500	Pass
157	C	5785	15664	>500	Pass
165	C	5825	15664	>500	Pass
149	D	5745	15664	>500	Pass
157	D	5785	15105	>500	Pass
165	D	5825	15305	>500	Pass

Channel 157 (Chain B)

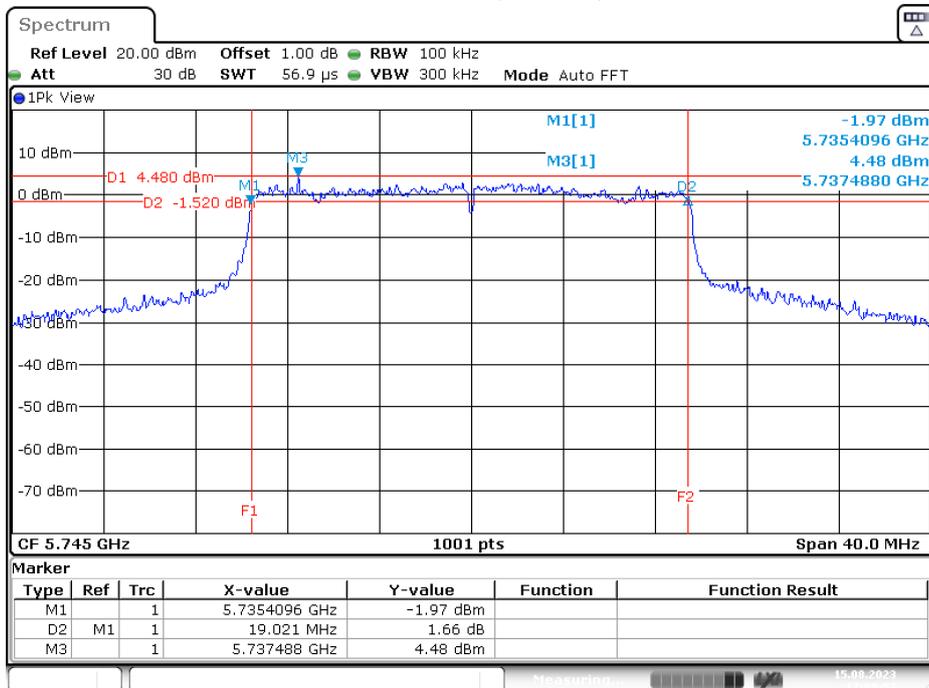


Date: 15.AUG.2023 16:55:08

Product : Wi-Fi 6/6E Sensor  
 Test Item : Occupied Bandwidth Data  
 Test Mode : Transmit (802.11ax-20 MHz)  
 Test Date : 2023/08/15

Channel No.	Chain	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	A	5745	18661	>500	Pass
157	A	5785	18542	>500	Pass
165	A	5825	18262	>500	Pass
149	B	5745	19021	>500	Pass
157	B	5785	17343	>500	Pass
165	B	5825	18901	>500	Pass
149	C	5745	18901	>500	Pass
157	C	5785	18701	>500	Pass
165	C	5825	18062	>500	Pass
149	D	5745	17782	>500	Pass
157	D	5785	18981	>500	Pass
165	D	5825	18861	>500	Pass

Channel 149 (Chain B)

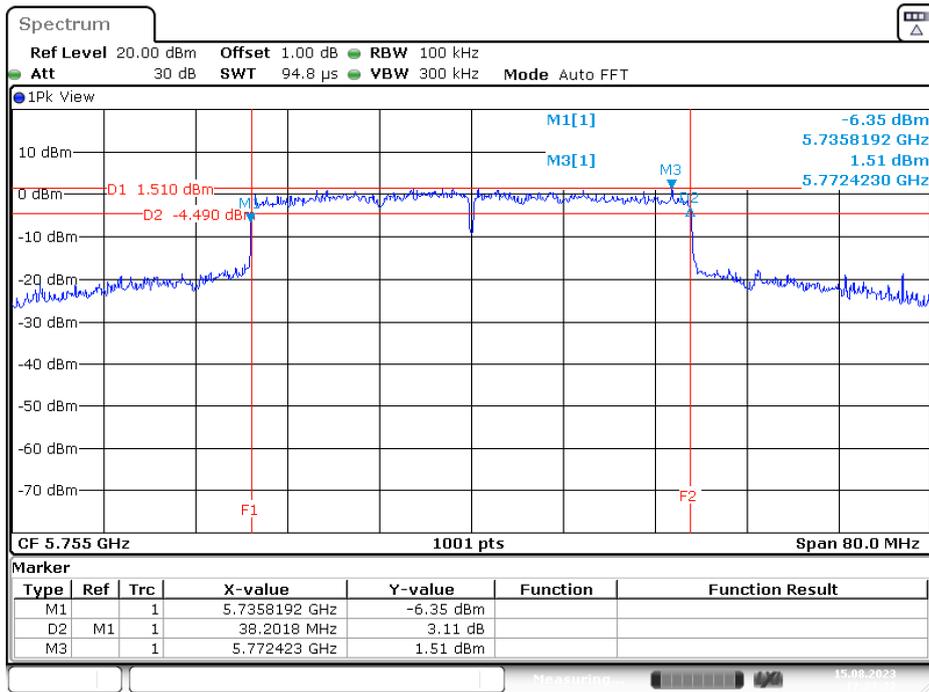


Date: 15.AUG.2023 17:08:58

Product : Wi-Fi 6/6E Sensor  
 Test Item : Occupied Bandwidth Data  
 Test Mode : Transmit (802.11ax-40 MHz)  
 Test Date : 2023/08/15

Channel No.	Chain	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	A	5755	38202	>500	Pass
159	A	5795	37802	>500	Pass
151	B	5755	37962	>500	Pass
159	B	5795	36044	>500	Pass
151	C	5755	38202	>500	Pass
159	C	5795	37562	>500	Pass
151	D	5755	37562	>500	Pass
159	D	5795	37802	>500	Pass

Channel 151 (Chain A)

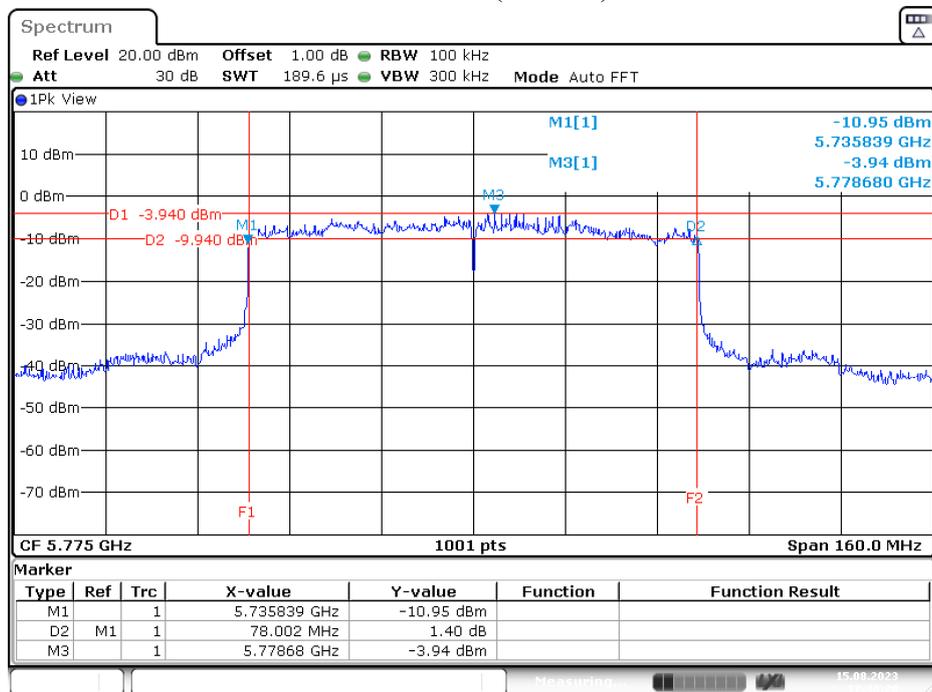


Date: 15.AUG.2023 17:23:23

Product : Wi-Fi 6/6E Sensor  
 Test Item : Occupied Bandwidth Data  
 Test Mode : Transmit (802.11ax-80 MHz)  
 Test Date : 2023/08/15

Channel No.	Chain	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	A	5775	76723	>500	Pass
155	B	5775	75285	>500	Pass
155	C	5775	78002	>500	Pass
155	D	5775	69371	>500	Pass

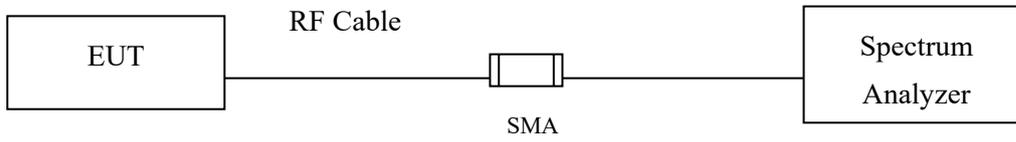
Channel 155 (Chain C)



Date: 15.AUG.2023 17:40:29

## 9. Duty Cycle

### 9.1. Test Setup



### 9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to U-NII test procedure of KDB789033 for compliance to FCC 47CFR 15.407 requirements.

### 9.3. Test Result of Duty Cycle

Product : Wi-Fi 6/6E Sensor  
Test Item : Duty Cycle  
Test Mode : Transmit

Duty Cycle Formula:

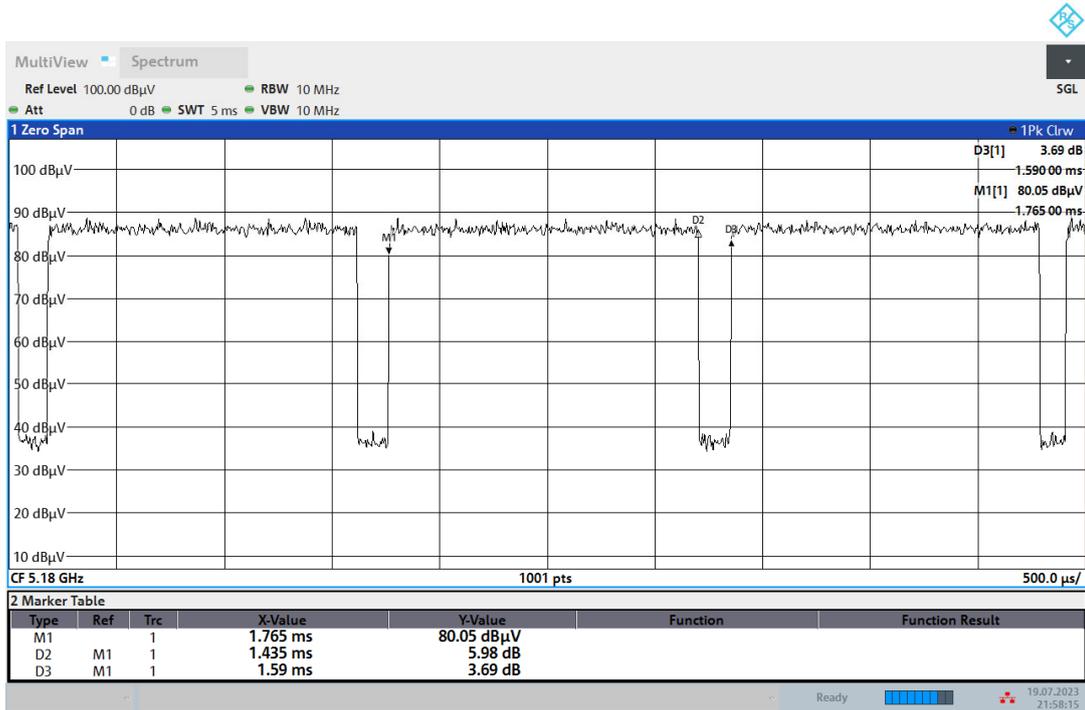
Duty Cycle =  $Ton / (Ton + Toff)$

Duty Factor =  $10 \text{ Log } (1/\text{Duty Cycle})$

Results:

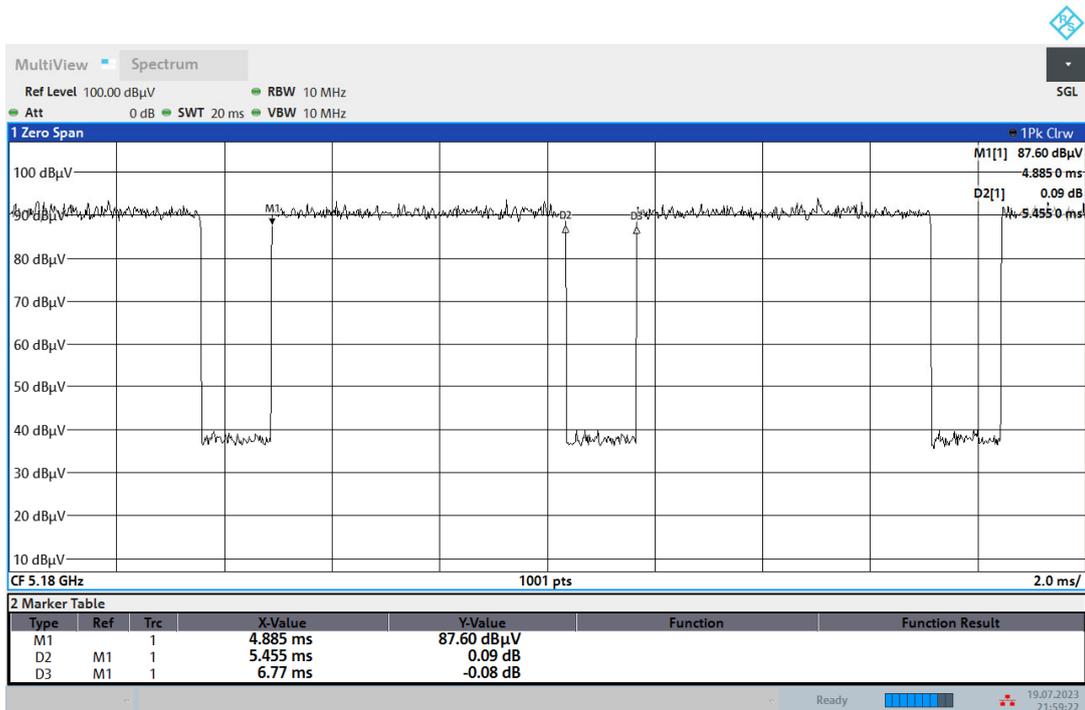
5GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	1.4350	1.5900	90.25	0.45
802.11ax-20 MHz	5.4550	6.7700	80.58	0.94
802.11ax-40 MHz	5.4350	6.7700	80.28	0.95
802.11ax-80 MHz	5.4550	6.7900	80.34	0.95

802.11a



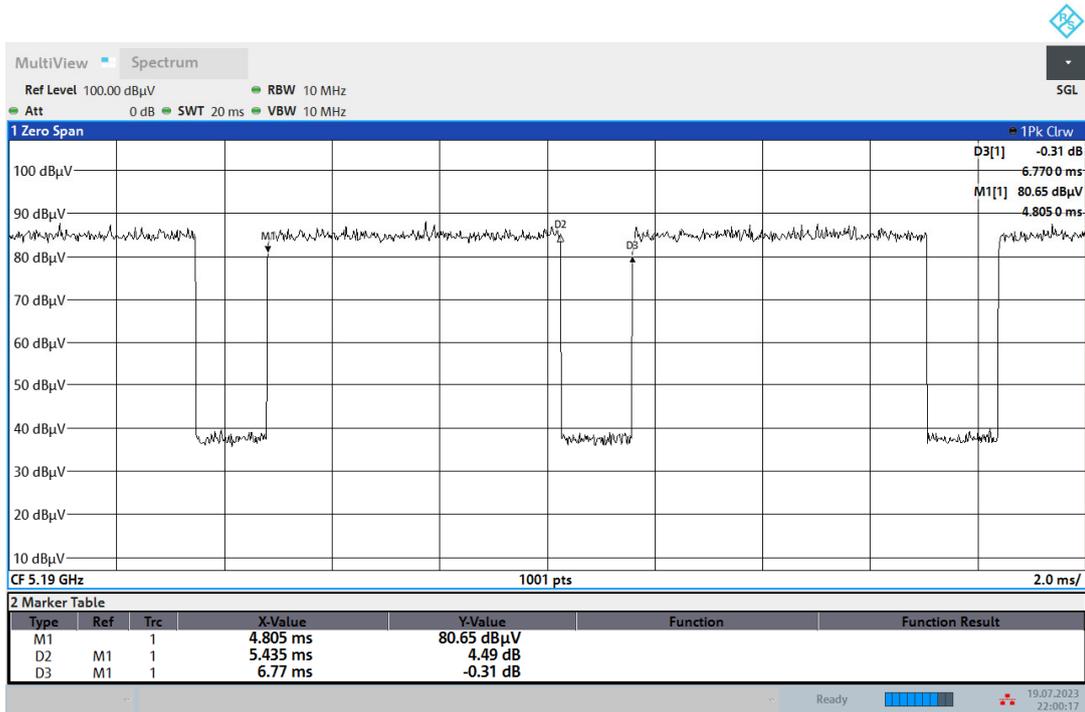
21:58:15 19.07.2023

802.11ax20



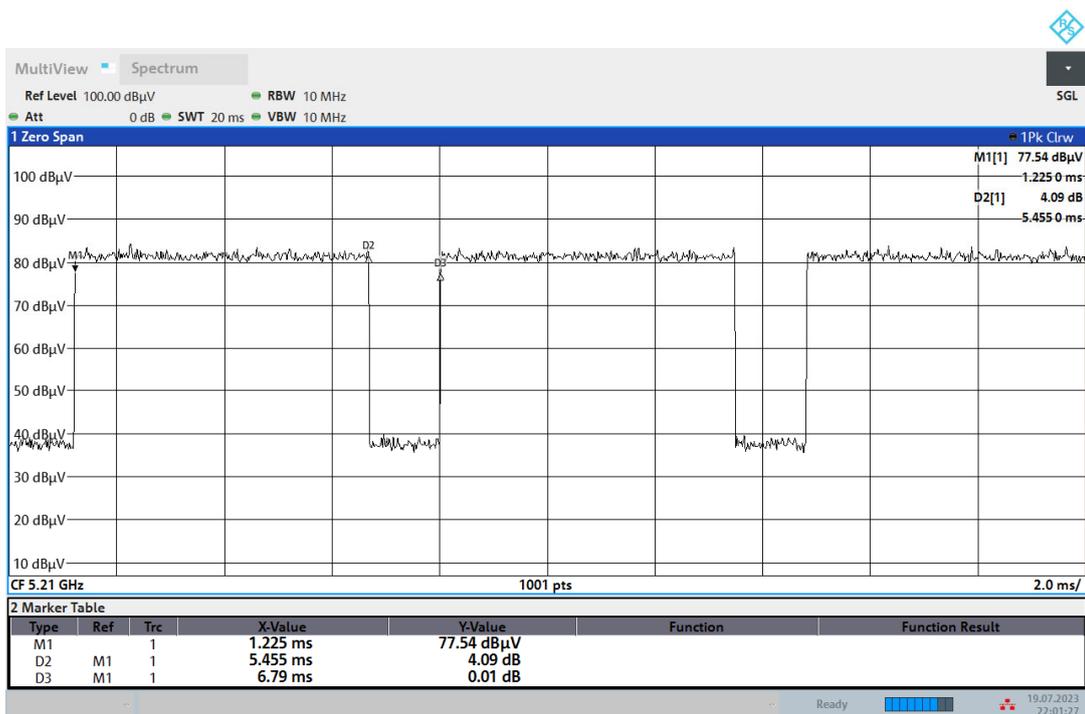
21:59:23 19.07.2023

802.11ax40



22:00:17 19.07.2023

802.11ax80



22:01:28 19.07.2023