



Test report No.: 22A0288R-RFUSV03S-A

TEST REPORT

Product Name	Internet Gateway
Trademark	Verizon
Model and /or type reference	WNC-CR200A
FCC ID	NKR-LV65C-T3
Applicant's name / address	Wistron NeWeb Corporation 20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan
Manufacturer's name	Wistron NeWeb Corporation
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
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Tested By (Senior Engineer / Ivan Chuang)	<i>Ivan Chuang</i>
Approved By (Senior Engineer / Jack Hsu)	<i>Jack Hsu</i>
Date of Receipt	2022/10/13
Date of Issue	2023/06/09
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Appendix 1: EUT Test Photographs

Appendix 2: Product Photos-Please refer to the file: 22A0288R-Product Photos

Competences and Guarantees

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

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.

Revision History

Report No.	Version	Description	Issued Date
22A0288R-RFUSV03S-A	V1.0	Initial issue of report.	2023/06/09

1. General Information

1.1. EUT Description

Product Name	Internet Gateway
Trademark	Verizon
Model and /or type reference	WNC-CR200A
EUT Rated Voltage	AC 100-120V / 60Hz
EUT Test Voltage	AC 120V / 60Hz
Frequency Range	802.11a/n/ac/ax-20 MHz: 5180-5320 MHz, 5500-5700 MHz, 5745-5825 MHz 802.11n/ac/ax-40 MHz: 5190-5310 MHz, 5510-5670 MHz, 5755-5795 MHz 802.11ac/ax-80 MHz: 5210-5290 MHz, 5530-5610 MHz, 5775 MHz
Number of Channels	802.11a/n/ac/ax-20 MHz: 24CH, 802.11n/ac/ax-40 MHz: 11CH 802.11ac/ax-80 MHz: 5CH
Data Rate	802.11a: 6-54 Mbps, 802.11n: MCS0-MCS31 802.11ac: MCS0-MCS9, 802.11ax: MCS0-MCS11
Type of Modulation	OFDM, OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Channel Control	Auto
Adapter (1)	MFR: Lucent Trans, M/N: 1A100-US1230 Input: AC 100 - 120V~ 60Hz, 1.0A Output: 12.0V= 3.0A, 36.0W Cable out: Non-shielded, 1.8m
Adapter (2)	MFR: Delta, M/N: ADH-36NW B Input: AC 100 - 120V~ 60Hz, 0.9A Output: 12.0V= 3.0A Cable out: Non-shielded, 1.7m

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	WNC	LV65C-WiFi-S9H	Dipole	2.21 dBi for UNII-1 2.21 dBi for UNII-2A 2.47 dBi for UNII-2C 2.01 dBi for UNII-3
2	WNC	LV65C-WiFi-S9V	Dipole	1.14 dBi for UNII-1 1.14 dBi for UNII-2A 1.39 dBi for UNII-2C 1.57 dBi for UNII-3
3	WNC	LV65C-WiFi-S10H	Dipole	2.76 dBi for UNII-1 2.76 dBi for UNII-2A 2.99 dBi for UNII-2C 2.28 dBi for UNII-3
4	WNC	LV65C-WiFi-S10V	Dipole	1.86 dBi for UNII-1 1.86 dBi for UNII-2A 3.25 dBi for UNII-2C 3.50 dBi for UNII-3

Note: The antenna of EUT is conform to FCC 15.203.

Directional gain for CDD Power:

2.76 dBi for UNII-1

2.76 dBi for UNII-2A

3.25 dBi for UNII-2C

3.50 dBi for UNII-3

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

Directional gain for Beamforming Power and PSD:

3.96 dBi for UNII-1

3.96 dBi for UNII-2A

4.54 dBi for UNII-2C

4.19 dBi for UNII-3

(Directional gain refer to antenna report provided by customer)

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

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

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

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

Note:

1. The EUT is an Internet Gateway with a built-in WLAN and WWAN transceiver, this report for 5 GHz WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. After evaluation and investigation, the worst case for Adapter (1) and Adapter (2) is Adapter (1), so it was used to perform all testing and record in the test report.
4. Lowest data rates are tested in each mode. Only worst case is shown in the report.
(802.11a is 6 Mbps 、 802.11ax-20BW/40BW/80BW is MCS0)
5. The spectrum plot for conducted items only shows the worst case.
6. This device does not support partial RU function.
7. These tests were conducted on a sample for the purpose of demonstrating compliance of 802.11a/n/ac/ax transmitter with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Transmit (802.11a-CDD) Transmit (802.11ax-20BW-CDD) Transmit (802.11ax-40BW-CDD) Transmit (802.11ax-80BW-CDD) Transmit (802.11ax-20BW-Beamforming) Transmit (802.11ax-40BW-Beamforming) Transmit (802.11ax-80BW-Beamforming) Transmit Co-location for WLAN + WWAN
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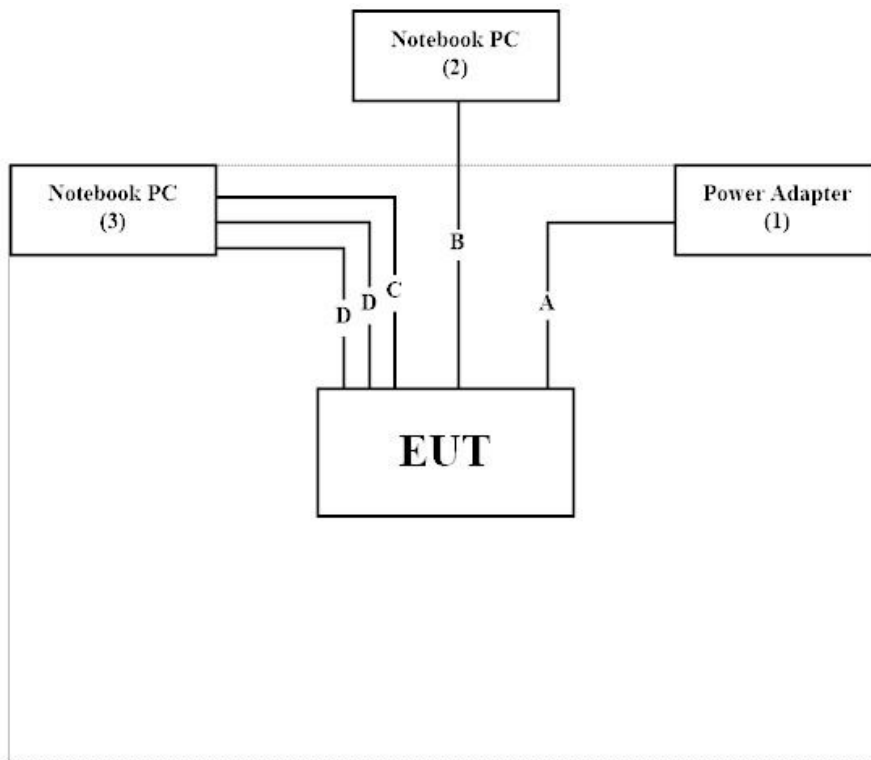
1.2. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 Power Adapter	Lucent Trans	1A100-US1230	N/A	N/A
2 Notebook PC	DELL	Latitude 5580	GDZN7H2	N/A
3 Notebook PC	DELL	Latitude E5440	FS9TK32	N/A

Cable Type	Cable Description
A Power Cable	Non-shielded, 1.8m
B LAN Cable	Non-shielded, 10m
C LAN Cable	Non-shielded, 2m
D USB Cable	Shielded, 1m, 2pcs

1.3. Configuration of tested System



1.4. EUT Exercise Software

1	Setup the EUT as shown in Section 1.3.
2	Execute software "QSPR Version 5.0-00202" on the Notebook PC.
3	Configure the test mode, test channel, and data rate.
4	Press "OK" to start the continuous Transmit.
5	Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 °C	22.0 °C
	Humidity (%RH)	10~90 %	55.0 %
Radiated Emission	Temperature (°C)	10~40 °C	24.3 °C
	Humidity (%RH)	10~90 %	66.3 %
Conductive	Temperature (°C)	10~40 °C	23.8 °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

1.6. 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	2022/06/23	2023/06/22
V	Two-Line V-Network	R&S	ENV216	101307	2022/07/04	2023/07/03
V	Coaxial Cable	SUHNER	RG400_BNC	RF001	2023/01/10	2024/01/09

Note:

1. The test instruments marked with “V” are used to measure the final test results.
2. Test Software Version: e3 230303 dekra.

For Conducted Measurements / HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Spectrum Analyzer	R&S	FSV30	103466	2022/12/20	2023/12/21
V	Power Sensor	KEYSIGHT	N1923A	MY59240002	2022/08/05	2023/08/04
V	Power Sensor	KEYSIGHT	N1923A	MY59240003	2022/08/05	2023/08/04

Note:

1. The test instruments marked with “V” are used to measure the final test results.
2. Test Software Version: RF Conducted Test Tools Ver3.0.1.14 and RF-Conducted-PSD (Ver: 1.1-17).

For Radiated Measurements / HY-CB01

	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	9168-0675	2021/08/11	2023/08/10
V	Horn Antenna	RF SPIN	DRH18-E	210507A18ES	2022/06/08	2023/06/07
V	Horn Antenna	Com-Power	AH-840	101101	2021/11/30	2023/11/29
V	Pre-Amplifier	SGH	0301	20211007-7	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC051845SE	980632	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC05820SE	980361	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	EMI Test Receiver	R&S	ESR3	102792	2022/12/29	2023/12/28
V	Spectrum Analyzer	R&S	FSVA40	101435	2022/06/04	2023/06/03
V	Spectrum Analyzer	R&S	FSV3044	101115	2023/01/06	2024/01/05
V	UXM 5G Wireless Test Platform	Keysight	E7515B	MY59321672	2022/05/31	2023/05/30
V	Universal Radio Communication Tester	Anritsu	MT8820C	6201465467	2022/08/10	2023/08/09
V	Coaxial Cable	SUHNER	SUCOFLEX 106	25450/6	2023/01/10	2024/01/09
	Coaxial Cable	SGH	HA800	GD20110222-8		
	Coaxial Cable	SGH	SGH18	2021003-8		
	Coaxial Cable	EMCI	EMC106	151113		

Note:

1. The test instruments marked with “V” are used to measure the final test results.
2. Test Software Version: e3 230303 dekra.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

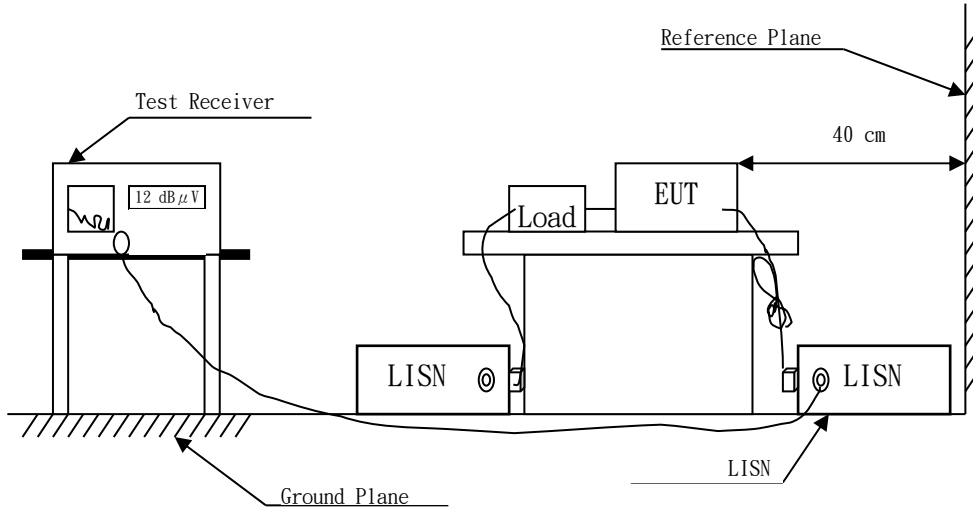
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

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	± 3.50 dB
Maximum conducted output power	± 1.05 dB
Maximum Power Spectral Density	± 2.14 dB
Radiated Emission	9 kHz~30 MHz: ± 3.88 dB 30 MHz~1 GHz: ± 4.42 dB 1 GHz~18 GHz: ± 4.28 dB 18 GHz~40 GHz: ± 3.90 dB
Band Edge	± 4.28 dB
Occupied Bandwidth	± 1580.61 Hz
Duty Cycle	± 0.53 %

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dB μ V) 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.

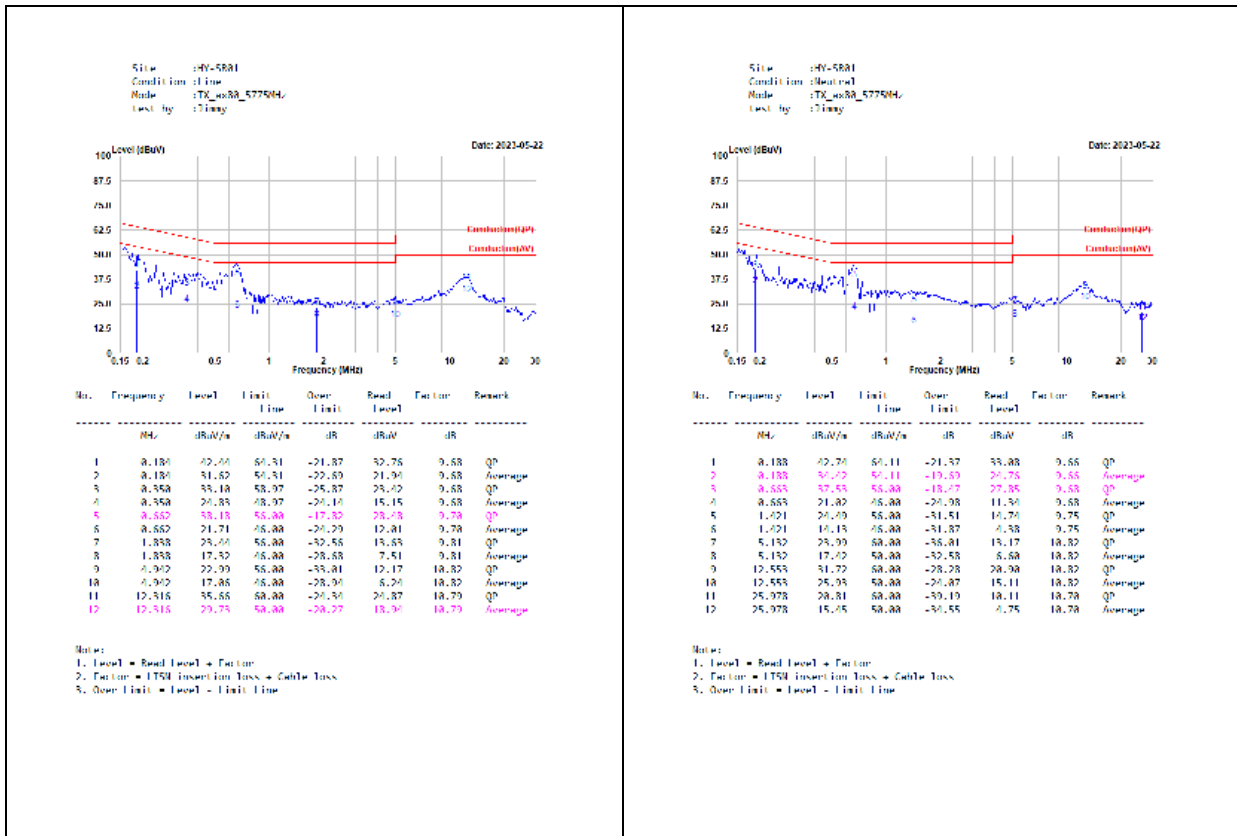
2.3. Test Procedure

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 /50 uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm /50 uH 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 invested over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

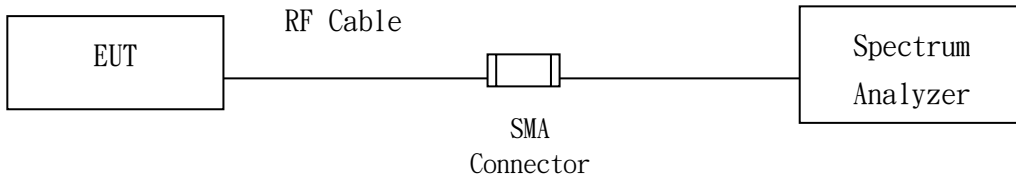
2.4. Test Result of Conducted Emission



3. Maximun conducted output power

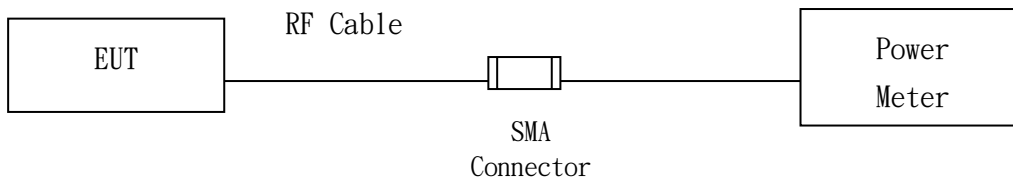
3.1. Test Setup

26 dB Occupied Bandwidth

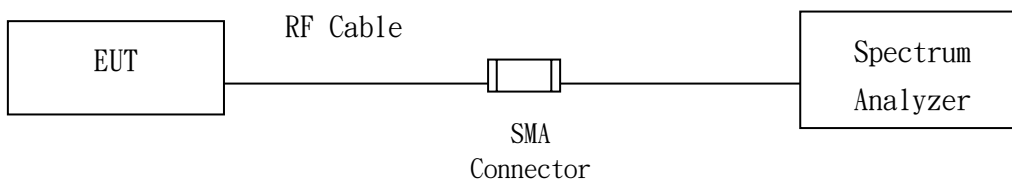


Conduction Power Measurement

Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac/ax)



3.2. 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 26 dB 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.

3.3. 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 6 dB 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 40 MHz) 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=80 MHz) 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.

3.4. Test Result of Maximum conducted output power

Product : Internet Gateway
 Test Item : Maximum conducted output power
 Test Mode : Transmit (802.11a-CDD)
 Test Date : 2023/04/08

Maximum conducted output power Measurement:

Channel No.	Frequency Range	26 dB Bandwidth	Chain A Power	Chain B Power	Chain C Power	Chain D Power	Output Power Limit	Output power limit	
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
36	5180	--	22.23	22.56	22.45	22.34	28.42	30	--
44	5220	--	23.18	23.24	23.51	23.12	29.29	30	--
48	5240	--	23.37	23.17	23.41	23.05	29.27	30	--
52	5260	19.74	17.56	17.54	17.53	17.41	23.53	24	23.95
60	5300	19.74	17.55	17.73	17.59	17.29	23.56	24	23.95
64	5320	19.94	17.61	17.68	17.62	17.35	23.59	24	24.00
100	5500	19.78	17.72	17.53	17.65	17.32	23.58	24	23.96
116	5580	19.74	17.92	17.85	17.85	17.64	23.84	24	23.95
140	5700	20.02	17.82	17.74	17.69	17.71	23.76	24	24.01
149	5745	--	23.56	23.84	23.64	23.41	29.64	30	--
157	5785	--	23.65	24.02	23.64	23.26	29.67	30	--
165	5825	--	23.62	23.92	23.58	22.89	29.54	30	--

Note:

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

Product : Internet Gateway
 Test Item : Maximum conducted output power
 Test Mode : Transmit (802.11ax-20BW-CDD)
 Test Date : 2023/04/08

Maximum conducted output power Measurement:

Channel No.	Frequency Range	26 dB Bandwidth	Chain A Power	Chain B Power	Chain C Power	Chain D Power	Output Power Limit	Output power limit	
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
36	5180	--	22.45	22.74	22.64	22.38	28.58	30	--
44	5220	--	23.45	23.42	23.74	23.09	29.45	30	--
48	5240	--	23.36	23.29	23.57	23.16	29.37	30	--
52	5260	21.14	17.54	17.57	17.85	17.22	23.57	24	24.25
60	5300	21.06	17.78	17.81	18.05	17.45	23.80	24	24.23
64	5320	21.38	17.78	17.82	17.85	17.46	23.75	24	24.30
100	5500	21.10	17.86	17.48	17.92	17.45	23.70	24	24.24
116	5580	21.22	18.05	17.85	17.92	17.71	23.90	24	24.27
140	5700	21.06	17.98	17.95	17.65	17.82	23.87	24	24.23
149	5745	--	23.62	23.87	23.74	23.55	29.72	30	--
157	5785	--	23.74	23.95	23.81	23.45	29.76	30	--
165	5825	--	23.48	23.84	23.75	22.85	29.52	30	--

Note:

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

Product : Internet Gateway
 Test Item : Maximum conducted output power
 Test Mode : Transmit (802.11ax-40BW-CDD)
 Test Date : 2023/04/08

Maximum conducted output power Measurement:

Channel No.	Frequency Range	26 dB Bandwidth	Chain A Power	Chain B Power	Chain C Power	Chain D Power	Output Power Limit	Output power limit	
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
38	5190	--	21.29	21.51	21.55	21.09	27.38	30	--
46	5230	--	23.75	23.64	23.95	23.46	29.72	30	--
54	5270	40.52	18.11	18.05	17.62	17.46	23.84	30	27.08
62	5310	39.96	18.03	17.92	17.71	17.52	23.82	24	27.02
102	5510	40.36	17.91	17.58	17.92	17.44	23.74	24	27.06
110	5550	40.44	17.95	17.69	17.35	17.45	23.64	24	27.07
134	5670	40.60	18.18	17.77	17.45	17.54	23.76	24	27.09
151	5755	--	22.75	22.91	23.95	22.69	29.13	30	--
159	5795	--	23.69	23.75	23.61	23.11	29.57	30	--

Note:

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

Product : Internet Gateway
 Test Item : Maximum conducted output power
 Test Mode : Transmit (802.11ax-80BW-CDD)
 Test Date : 2023/04/08

Maximum conducted output power Measurement:

Channel No.	Frequency Range	26 dB Bandwidth	Chain A Power	Chain B Power	Chain C Power	Chain D Power	Output Power Limit	Output power limit	
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
42	5210	--	18.96	18.87	19.23	18.45	24.91	30	--
58	5290	80.88	18.13	17.95	17.54	17.55	23.82	24	30.08
106	5530	80.88	17.91	17.82	17.32	17.45	23.65	24	30.08
122	5610	80.56	18.22	17.72	17.61	17.56	23.81	24	30.06
155	5775	--	21.06	21.35	21.43	20.98	27.23	30	--

Note:

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

Product : Internet Gateway
 Test Item : Maximum conducted output power
 Test Mode : Transmit (802.11ax-20BW-Beamforming)
 Test Date : 2023/04/08

Maximum conducted output power Measurement:

Channel No.	Frequency Range	26 dB Bandwidth	Chain A Power	Chain B Power	Chain C Power	Chain D Power	Output Power Limit	Output power limit	
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
36	5180	--	19.40	19.66	19.57	19.33	25.51	30	--
44	5220	--	23.36	23.33	23.65	22.99	29.36	30	--
48	5240	--	23.21	23.12	23.41	23.01	29.21	30	--
52	5260	21.14	17.43	17.46	17.74	17.09	23.46	24	24.25
60	5300	21.06	17.26	17.31	17.50	16.93	23.28	24	24.23
64	5320	21.38	17.30	17.34	17.37	16.98	23.27	24	24.30
100	5500	21.10	17.71	17.31	17.76	17.27	23.54	24	24.24
116	5580	21.22	17.52	17.32	17.39	17.18	23.37	24	24.27
140	5700	21.06	16.42	16.43	16.07	16.26	22.32	24	24.23
149	5745	--	21.41	21.72	21.49	21.34	27.51	30	--
157	5785	--	21.68	21.88	21.73	21.38	27.69	30	--
165	5825	--	21.36	21.71	21.63	20.73	27.39	30	--

Note:

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

Product : Internet Gateway
 Test Item : Maximum conducted output power
 Test Mode : Transmit (802.11ax-40BW-Beamforming)
 Test Date : 2023/04/08

Maximum conducted output power Measurement:

Channel No.	Frequency Range	26 dB Bandwidth	Chain A Power	Chain B Power	Chain C Power	Chain D Power	Output Power Limit	Output power limit	
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
38	5190	--	16.70	16.95	16.96	16.56	22.82	30	--
46	5230	--	22.55	22.36	22.73	22.26	28.50	30	--
54	5270	40.52	18.06	17.97	17.53	17.43	23.78	30	27.08
62	5310	39.96	17.97	17.83	17.63	17.47	23.75	24	27.02
102	5510	40.36	17.79	17.46	17.80	17.33	23.62	24	27.06
110	5550	40.44	17.77	17.49	17.16	17.27	23.45	24	27.07
134	5670	40.60	17.82	17.36	17.09	17.22	23.40	24	27.09
151	5755	--	22.19	22.36	23.43	22.13	28.58	30	--
159	5795	--	22.48	22.54	22.36	21.90	28.35	30	--

Note:

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

Product : Internet Gateway
 Test Item : Maximum conducted output power
 Test Mode : Transmit (802.11ax-80BW-Beamforming)
 Test Date : 2023/04/08

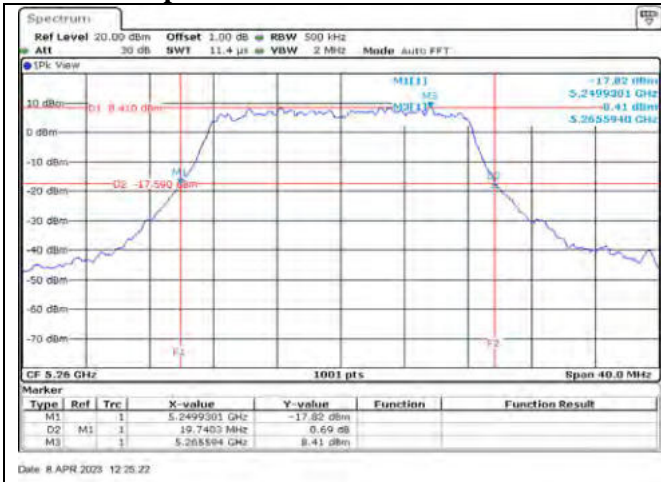
Maximum conducted output power Measurement:

Channel No.	Frequency Range	26 dB Bandwidth	Chain A Power	Chain B Power	Chain C Power	Chain D Power	Output Power Limit	Output power limit	
	(MHz)	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)	dBm+10log(BW)
42	5210	--	16.75	16.62	17.01	16.19	22.67	30	--
58	5290	80.88	18.04	17.83	17.45	17.40	23.71	24	30.08
106	5530	80.88	16.68	16.57	16.11	16.22	22.42	24	30.08
122	5610	80.56	17.69	17.19	17.06	17.00	23.26	24	30.06
155	5775	--	20.47	20.80	20.91	20.42	26.68	30	--

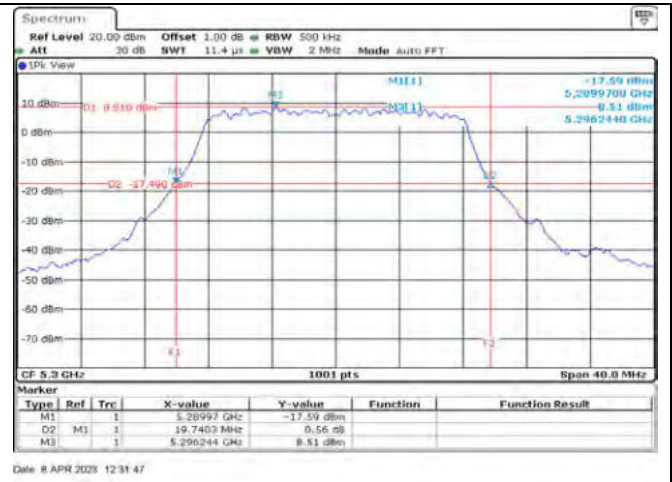
Note:

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

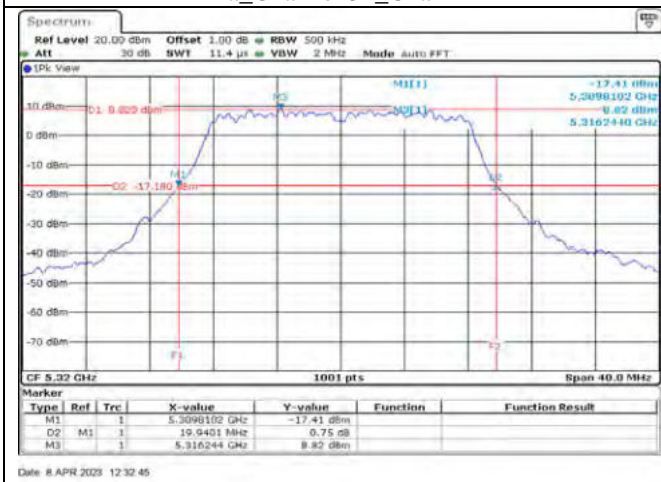
26 dB Occupied Bandwidth



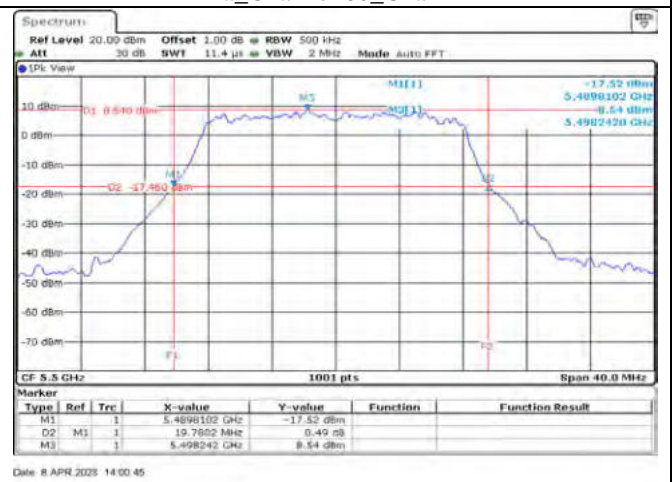
11a_Channel 52_Chain D



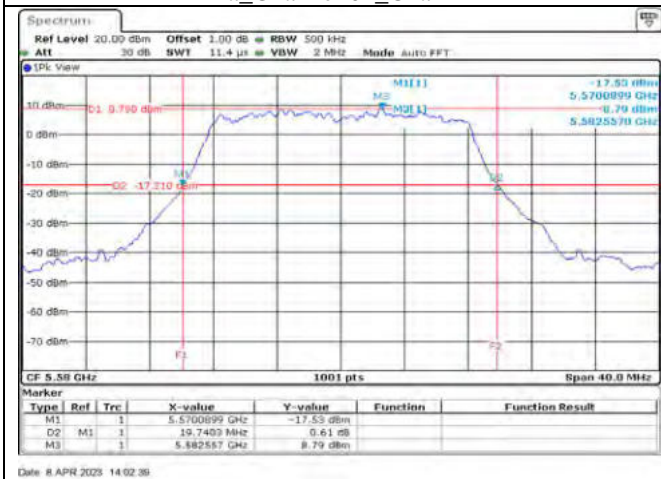
11a_Channel 60_Chain D



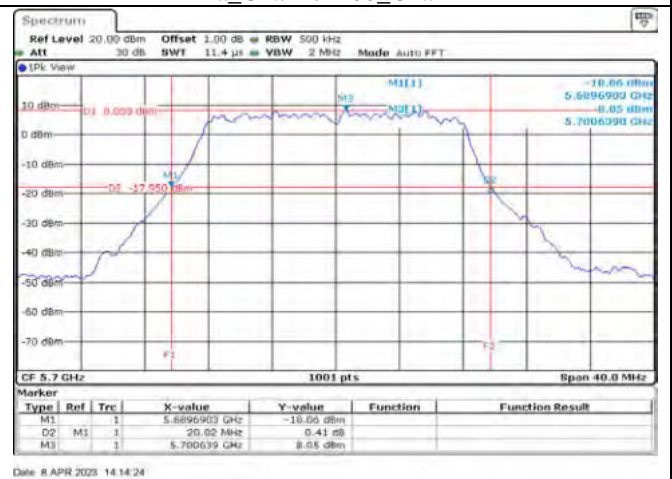
11a_Channel 64_Chain D



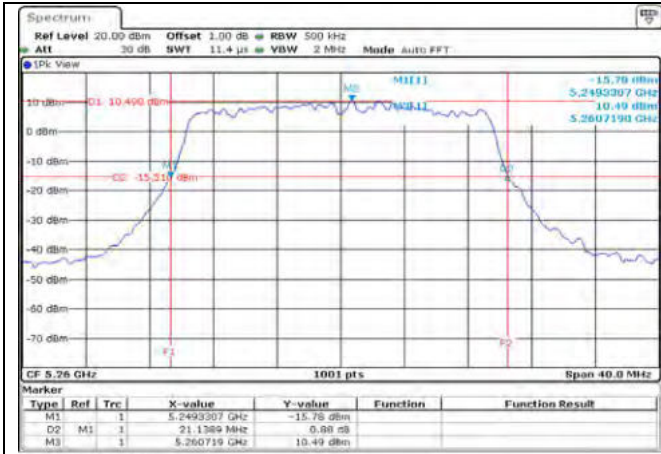
11a_Channel 100_Chain D



11a_Channel 116_Chain C

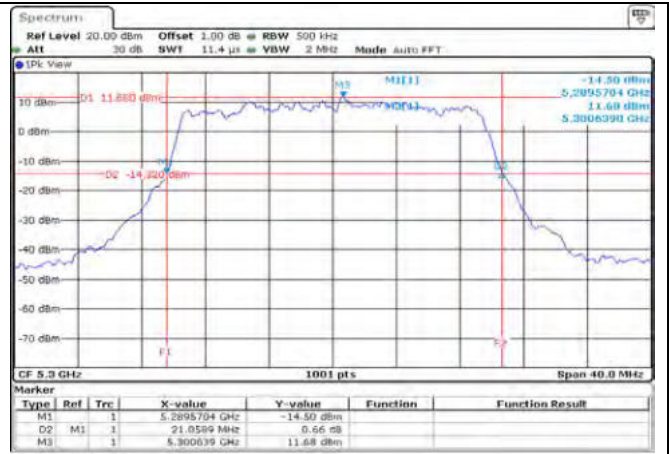


11a_Channel 140_Chain D



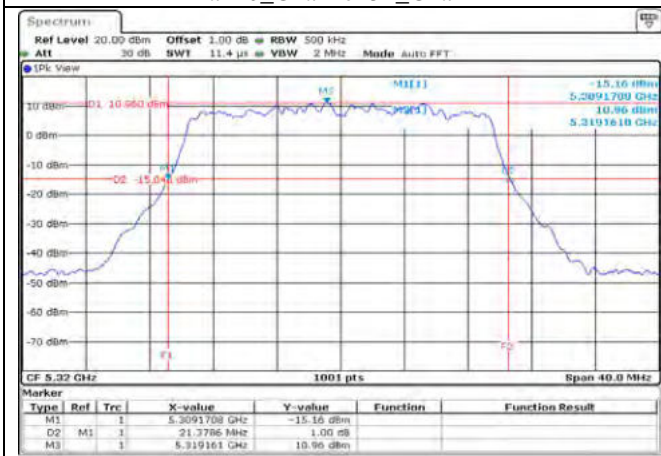
Date: 8 APR 2023 15:18:49

11ax20_Channel 52_Chain B



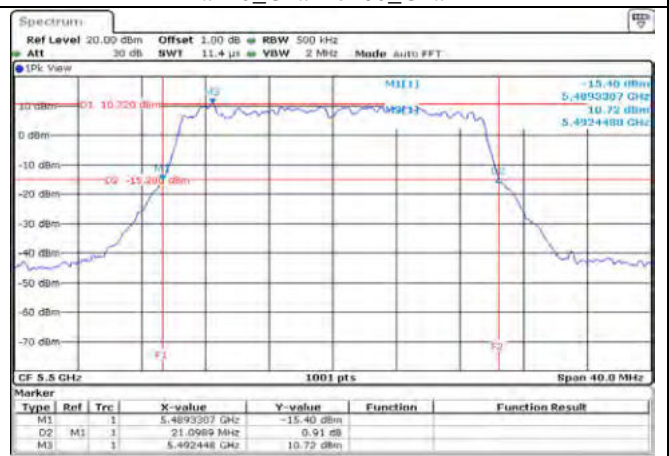
Date: 8 APR 2023 15:23:28

11ax20_Channel 60_Chain B



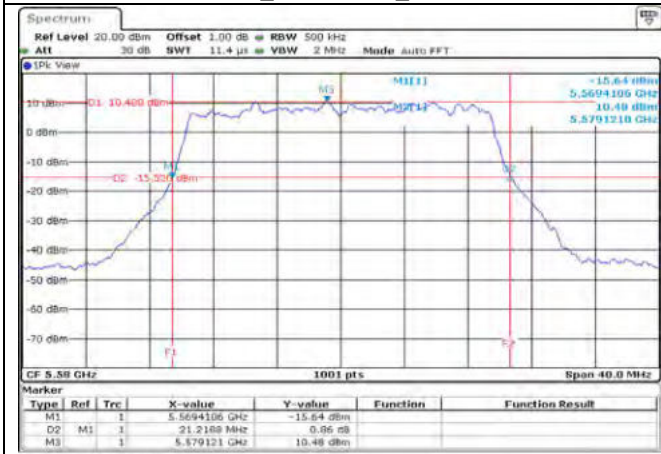
Date: 8 APR 2023 15:26:42

11ax20_Channel 64_Chain C



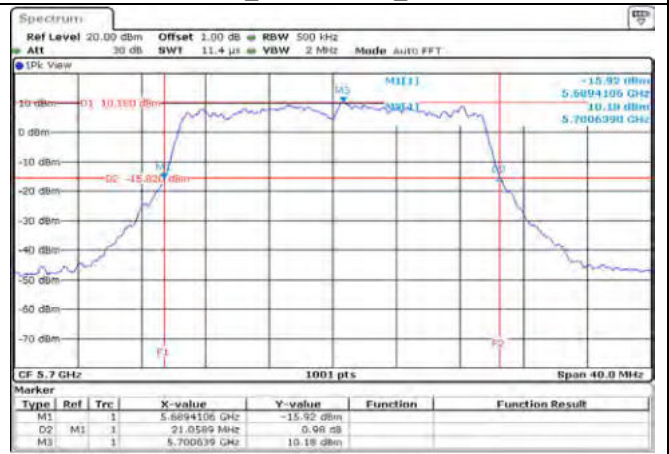
Date: 8 APR 2023 15:31:34

11ax20_Channel 100_Chain D



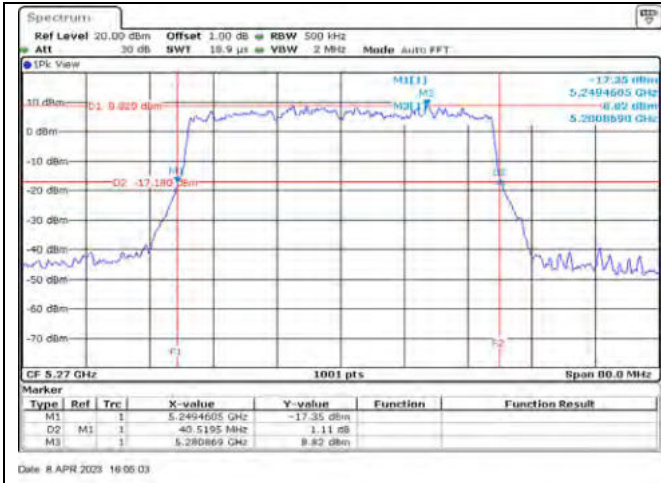
Date: 8 APR 2023 15:35:35

11ax20_Channel 116_Chain A

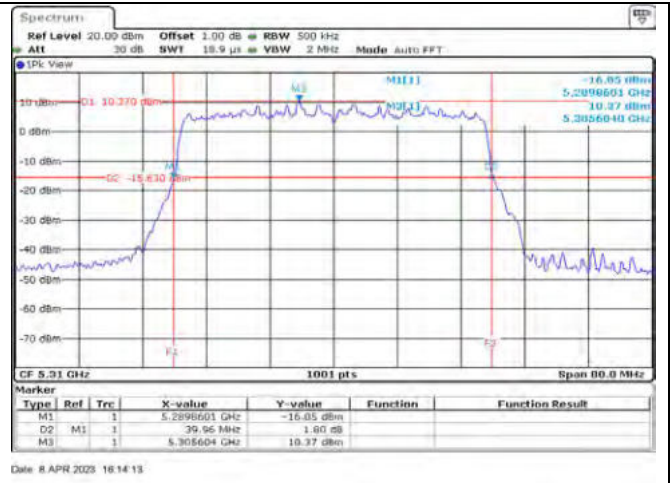


Date: 8 APR 2023 15:39:22

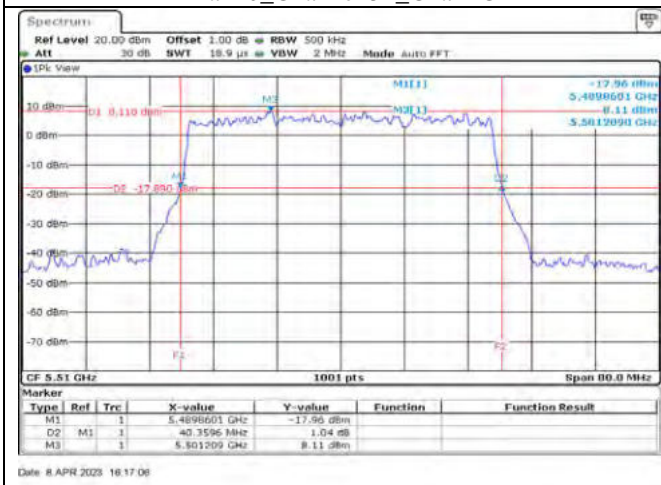
11ax20_Channel 140_Chain D



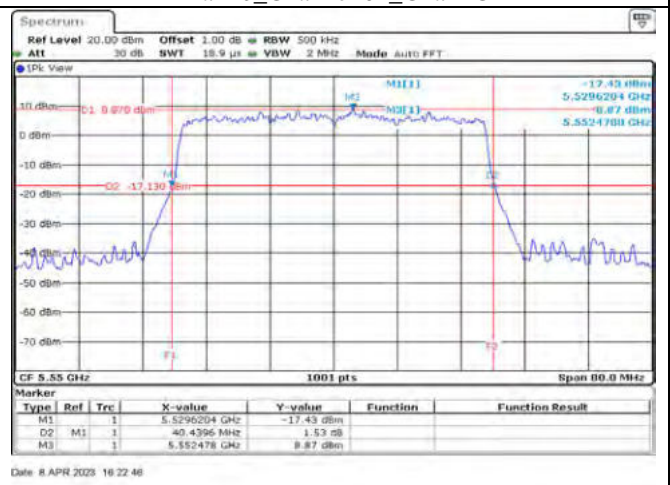
11ax40_Channel 54_Chain C



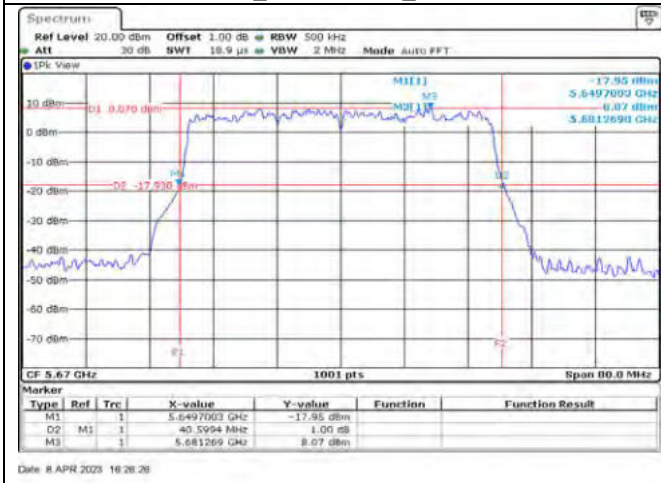
11ax40_Channel 62_Chain C



11ax40_Channel 102_Chain A

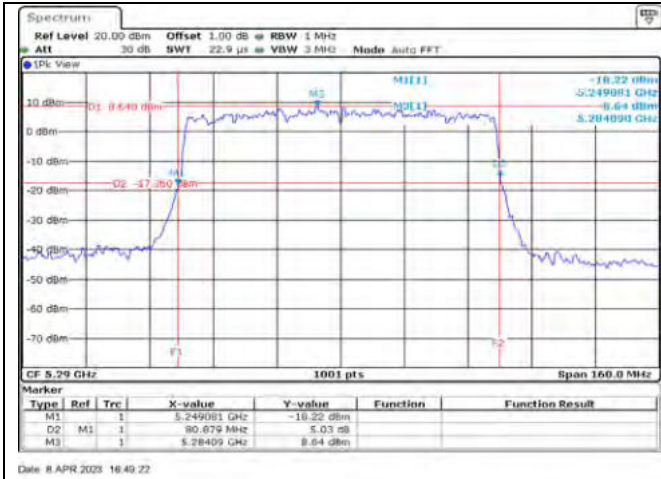


11ax40_Channel 110_Chain A

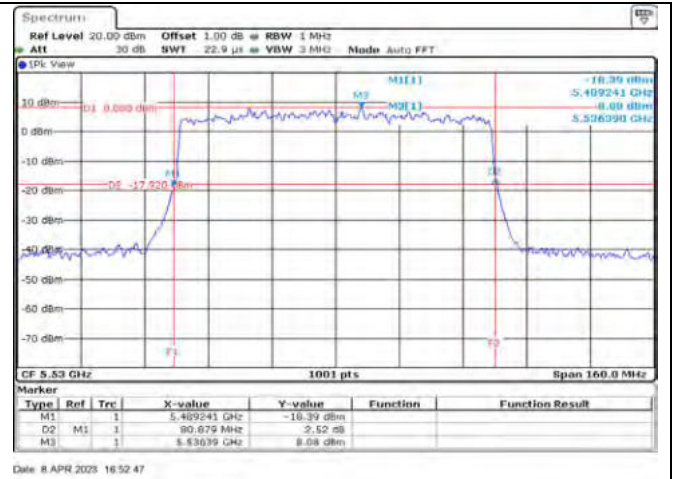


11ax40_Channel 134_Chain D

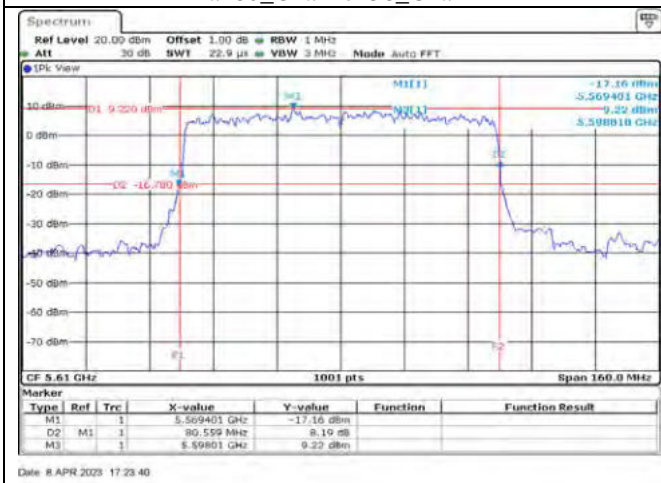
N/A



11ax80_Channel 58_Chain A



11ax80_Channel 106_Chain D

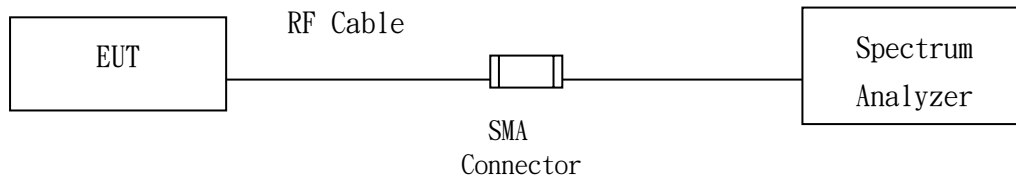


11ax80_Channel 122_Chain A

N/A

4. Maximum Power Spectral Density

4.1. Test Setup



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 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.

4.3. 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-2 method is selected to run the test.

4.4. Test Result of Maximun Power Spectral Density

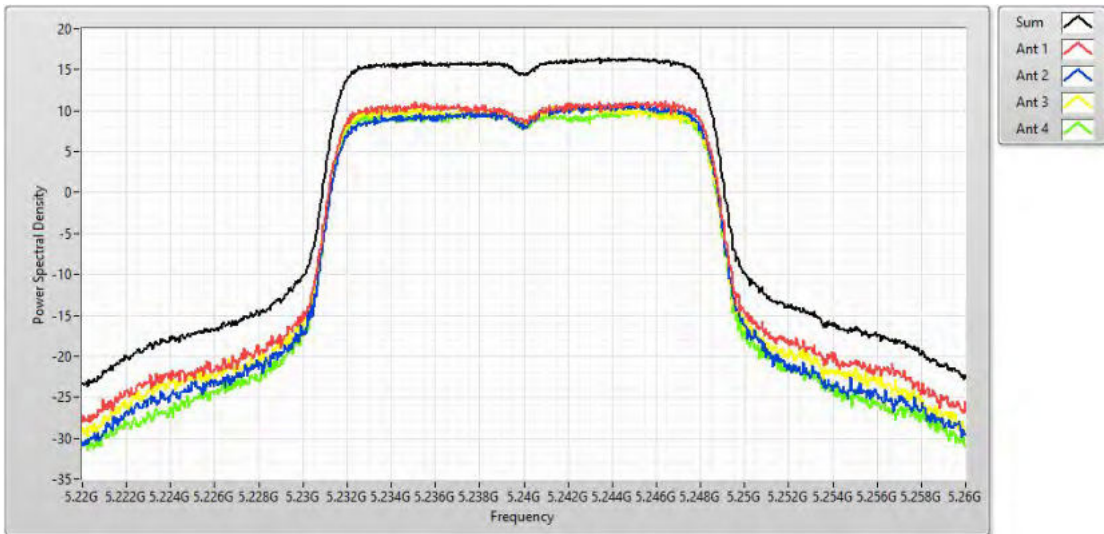
Product : Internet Gateway
 Test Item : Maximun Power Spectral Density
 Test Mode : Transmit (802.11a-CDD)

Channel No.	Frequency (MHz)	Data Rata (Mbps)	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
36	5180	6	15.02	0.38	15.40	17	Pass
44	5220	6	16.44	0.38	16.82	17	Pass
48	5240	6	16.47	0.38	16.85	17	Pass
52	5260	6	10.47	0.38	10.85	11	Pass
60	5300	6	10.44	0.38	10.82	11	Pass
64	5320	6	10.55	0.38	10.93	11	Pass
100	5500	6	10.19	0.38	10.57	11	Pass
116	5580	6	10.59	0.38	10.97	11	Pass
140	5700	6	10.54	0.38	10.92	11	Pass

Channel No.	Frequency (MHz)	Data Rata (Mbps)	PPSD/RBW (dBm)	Duty factor (dB)	Total PPSD/RBW (dBm)	Limit (dBm)	Result
149	5745	6	13.11	0.38	13.49	30	Pass
157	5785	6	12.93	0.38	13.31	30	Pass
165	5825	6	12.40	0.38	12.78	30	Pass

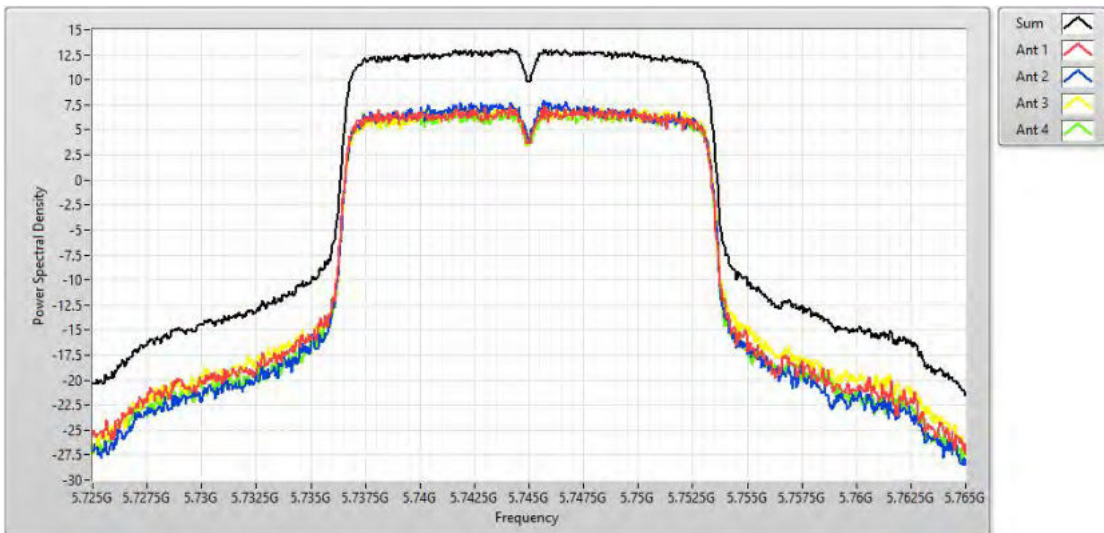
Note: Total PPSD = $10 \cdot \log(\text{Chain A (mW)} + \text{Chain B (mW)} + \text{Chain C (mW)} + \text{Chain D (mW)}) +$
 Duty factor.

Channel 48



Sum (dBm/RBW)	16.47
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Channel 149



Sum (dBm/RBW)	13.11
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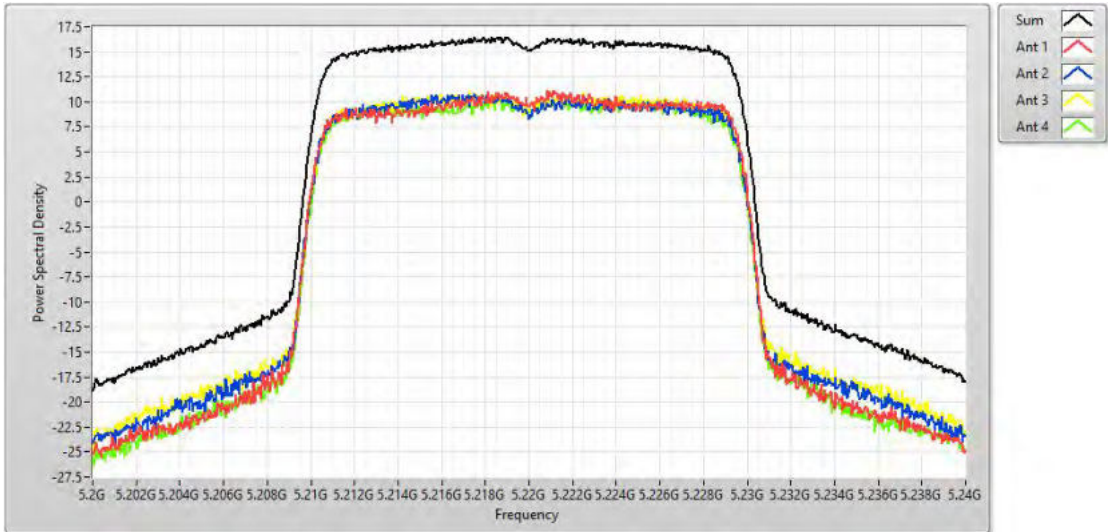
Product : Internet Gateway
 Test Item : Maximun Power Spectral Density
 Test Mode : Transmit (802.11ax-20BW-CDD)

Channel No.	Frequency (MHz)	Data Rata	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
36	5180	MCS0	14.66	0.26	14.92	17	Pass
44	5220	MCS0	16.48	0.26	16.74	17	Pass
48	5240	MCS0	16.29	0.26	16.55	17	Pass
52	5260	MCS0	9.99	0.26	10.25	11	Pass
60	5300	MCS0	10.21	0.26	10.47	11	Pass
64	5320	MCS0	10.15	0.26	10.41	11	Pass
100	5500	MCS0	9.87	0.26	10.13	11	Pass
116	5580	MCS0	10.45	0.26	10.71	11	Pass
140	5700	MCS0	10.41	0.26	10.67	11	Pass

Channel No.	Frequency (MHz)	Data Rata	PPSD/RBW (dBm)	Duty factor (dB)	Total PPSD/RBW (dBm)	Limit (dBm)	Result
149	5745	MCS0	12.66	0.26	12.92	30	Pass
157	5785	MCS0	12.20	0.26	12.46	30	Pass
165	5825	MCS0	11.61	0.26	11.87	30	Pass

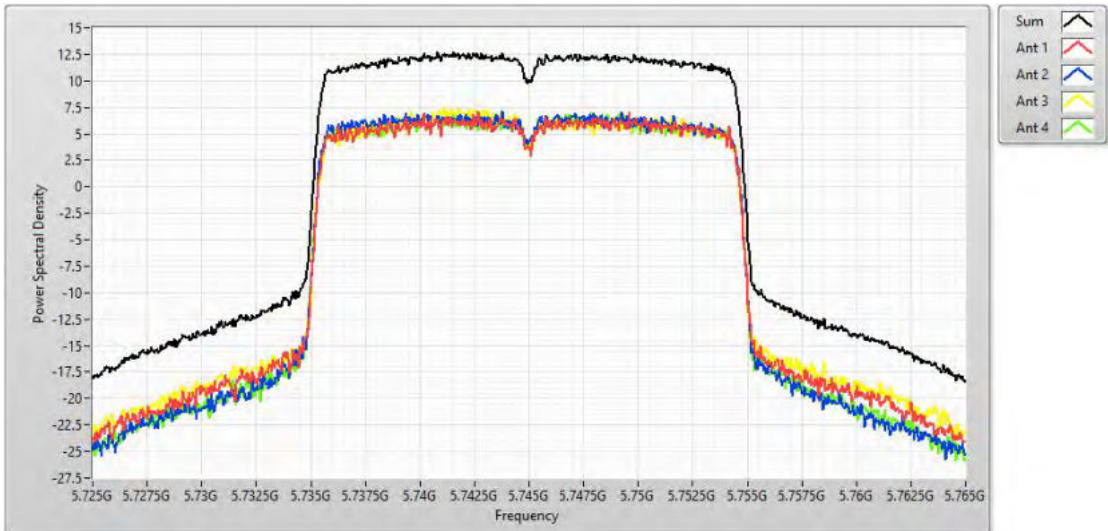
Note: Total PPSD = $10 \cdot \log(\text{Chain A (mW)} + \text{Chain B (mW)} + \text{Chain C (mW)} + \text{Chain D (mW)}) +$
 Duty factor.

Channel 44



Sum (dBm/RBW)	16.48
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Channel 149



Sum (dBm/RBW)	12.66
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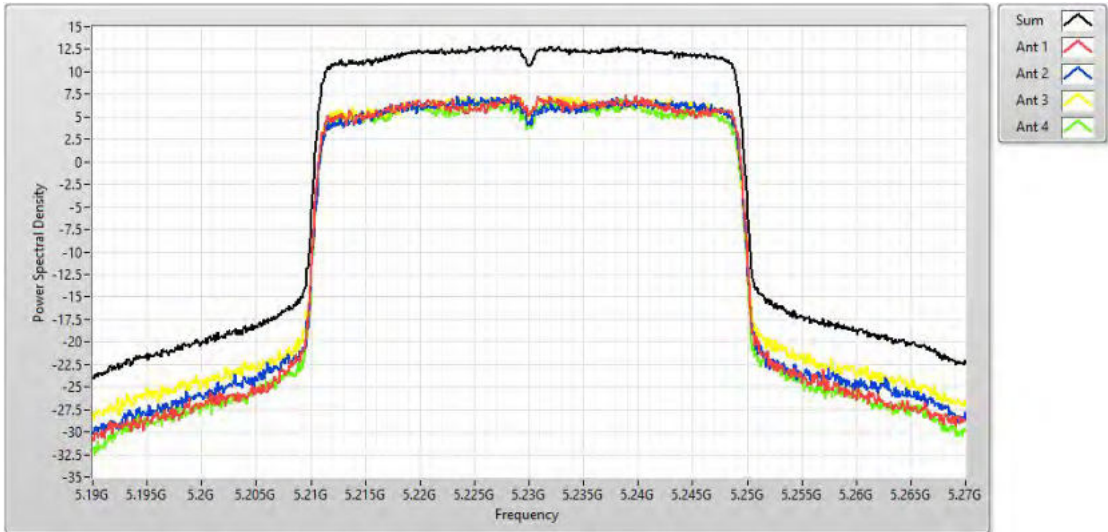
Product : Internet Gateway
 Test Item : Maximun Power Spectral Density
 Test Mode : Transmit (802.11ax-40BW-CDD)

Channel No.	Frequency (MHz)	Data Rata	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
38	5190	MCS0	10.76	0.30	11.06	17	Pass
46	5230	MCS0	12.91	0.30	13.21	17	Pass
54	5270	MCS0	8.61	0.30	8.91	11	Pass
62	5310	MCS0	8.53	0.30	8.83	11	Pass
102	5510	MCS0	8.12	0.30	8.42	11	Pass
110	5550	MCS0	8.63	0.30	8.93	11	Pass
134	5670	MCS0	8.64	0.30	8.94	11	Pass

Channel	Frequency (MHz)	Data Rata	PPSD/RBW (dBm)	Duty factor (dB)	Total PPSD/RBW (dBm)	Limit (dBm)	Result
151	5755	MCS0	8.94	0.30	9.24	30	Pass
159	5795	MCS0	9.30	0.30	9.60	30	Pass

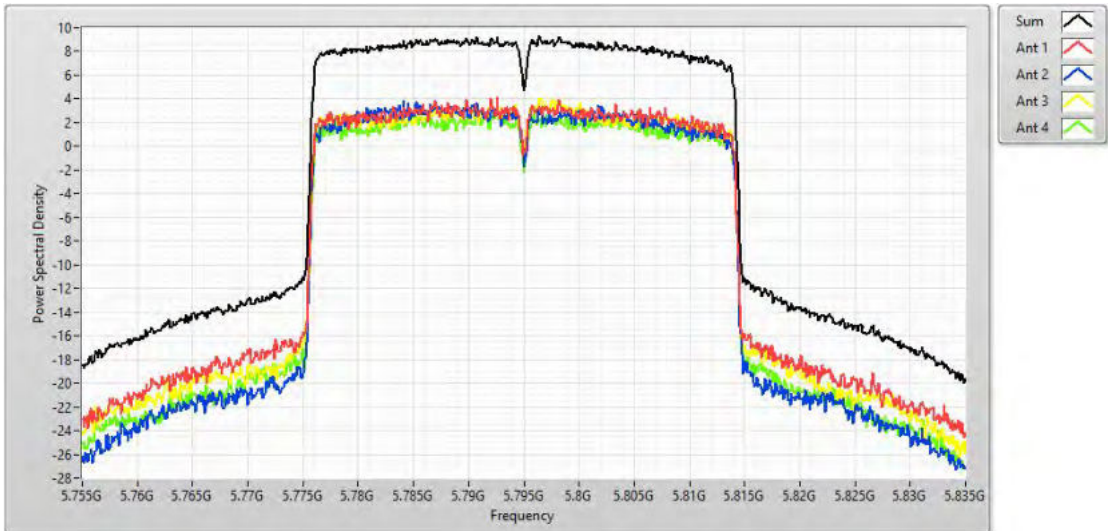
Note: Total PPSD = $10 \cdot \log(\text{Chain A (mW)} + \text{Chain B (mW)} + \text{Chain C (mW)} + \text{Chain D (mW)}) +$
 Duty factor.

Channel 46



Sum (dBm/RBW)	12.91
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Channel 159



Sum (dBm/RBW)	9.30
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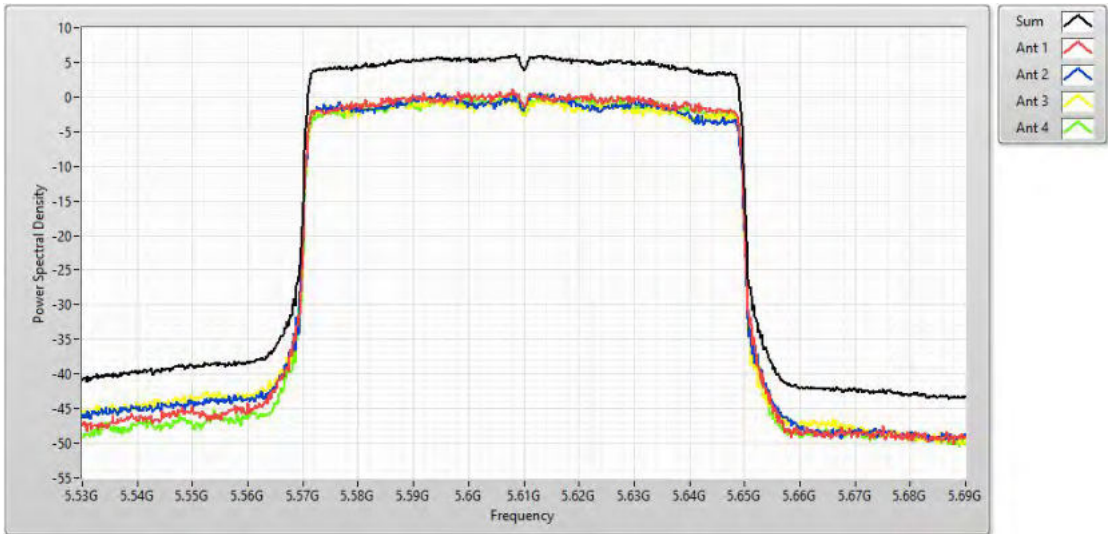
Product : Internet Gateway
 Test Item : Maximun Power Spectral Density
 Test Mode : Transmit (802.11ax-80BW-CDD)

Channel No.	Frequency (MHz)	Data Rata	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
42	5210	MCS0	5.45	0.30	5.75	17	Pass
58	5290	MCS0	5.63	0.30	5.93	11	Pass
106	5530	MCS0	5.56	0.30	5.86	11	Pass
122	5610	MCS0	6.05	0.30	6.35	11	Pass

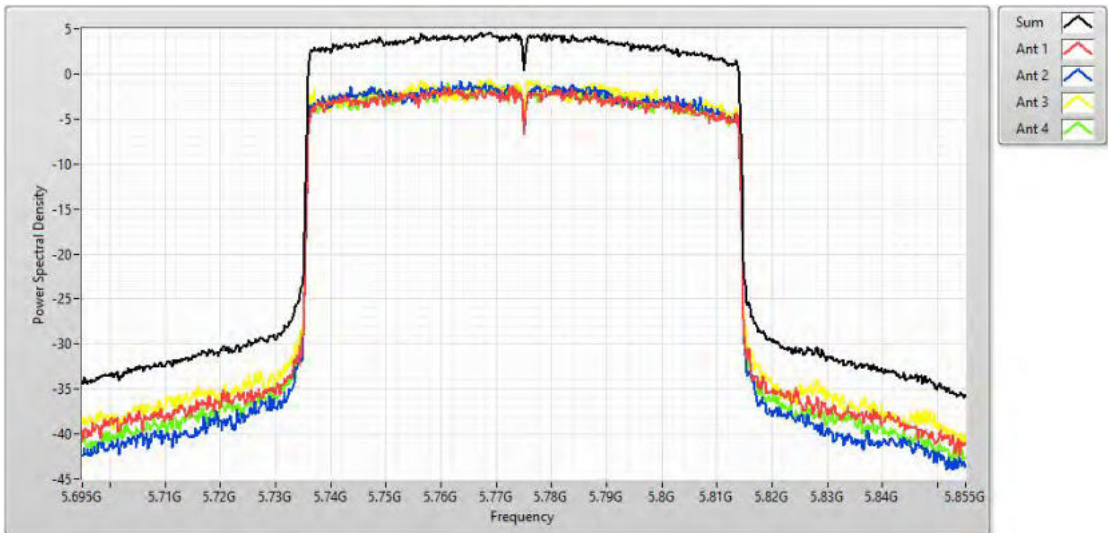
Channel No.	Frequency (MHz)	Data Rata	PPSD/RBW (dBm)	Duty factor (dB)	Total PPSD/RBW (dBm)	Limit (dBm)	Result
155	5775	MCS0	4.66	0.30	4.96	30	Pass

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

Channel 122



Channel 155



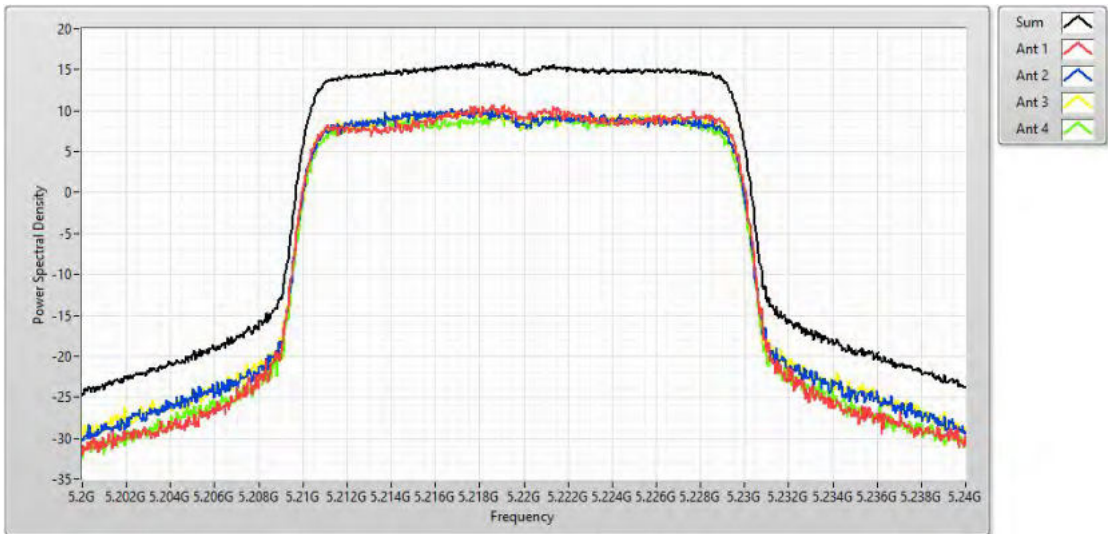
Product : Internet Gateway
 Test Item : Maximun Power Spectral Density
 Test Mode : Transmit (802.11ax-20BW-Beamforming)

Channel No.	Frequency (MHz)	Data Rata	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
36	5180	MCS0	12.20	0.26	12.46	17	Pass
44	5220	MCS0	15.98	0.26	16.24	17	Pass
48	5240	MCS0	15.47	0.26	15.73	17	Pass
52	5260	MCS0	9.81	0.26	10.07	11	Pass
60	5300	MCS0	9.88	0.26	10.14	11	Pass
64	5320	MCS0	9.84	0.26	10.10	11	Pass
100	5500	MCS0	10.43	0.26	10.69	11	Pass
116	5580	MCS0	10.22	0.26	10.48	11	Pass
140	5700	MCS0	8.82	0.26	9.08	11	Pass

Channel No.	Frequency (MHz)	Data Rata	PPSD/RBW (dBm)	Duty factor (dB)	Total PPSD/RBW (dBm)	Limit (dBm)	Result
149	5745	MCS0	11.54	0.26	11.80	30	Pass
157	5785	MCS0	11.30	0.26	11.56	30	Pass
165	5825	MCS0	10.74	0.26	11.00	30	Pass

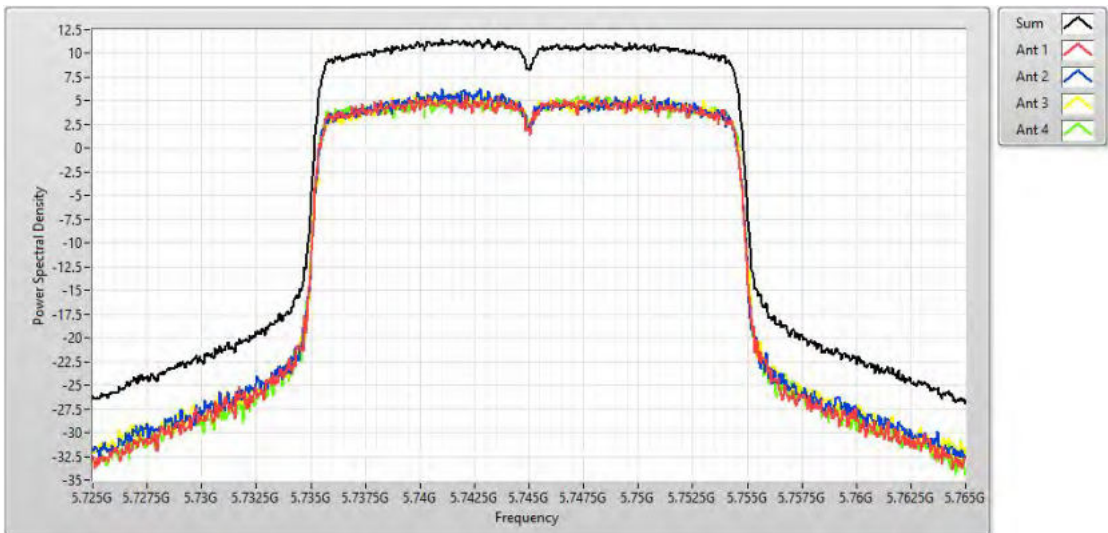
Note: Total PPSD = $10 \cdot \log(\text{Chain A (mW)} + \text{Chain B (mW)} + \text{Chain C (mW)} + \text{Chain D (mW)}) +$
 Duty factor.

Channel 44



Sum (dBm/RBW)	15.98
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Channel 149



Sum (dBm/RBW)	11.54
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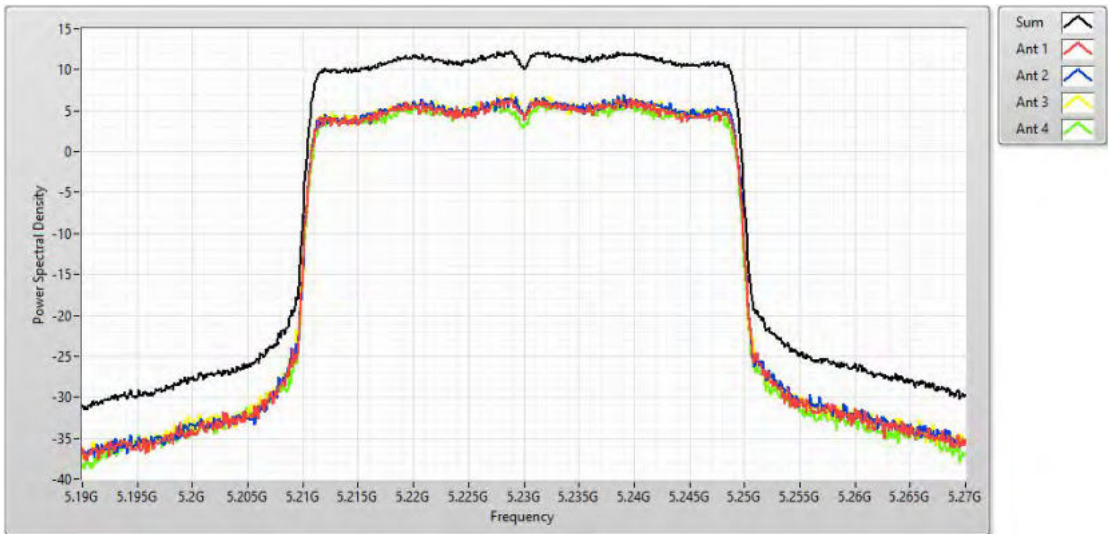
Product : Internet Gateway
 Test Item : Maximun Power Spectral Density
 Test Mode : Transmit (802.11ax-40BW-Beamforming)

Channel No.	Frequency (MHz)	Data Rata	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
38	5190	MCS0	6.43	0.30	6.73	17	Pass
46	5230	MCS0	12.33	0.30	12.63	17	Pass
54	5270	MCS0	7.26	0.30	7.56	11	Pass
62	5310	MCS0	6.99	0.30	7.29	11	Pass
102	5510	MCS0	7.21	0.30	7.51	11	Pass
110	5550	MCS0	6.93	0.30	7.23	11	Pass
134	5670	MCS0	6.94	0.30	7.24	11	Pass

Channel No.	Frequency (MHz)	Data Rata	PPSD/RBW (dBm)	Duty factor (dB)	Total PPSD/RBW (dBm)	Limit (dBm)	Result
151	5755	MCS0	8.59	0.30	8.89	30	Pass
159	5795	MCS0	8.35	0.30	8.65	30	Pass

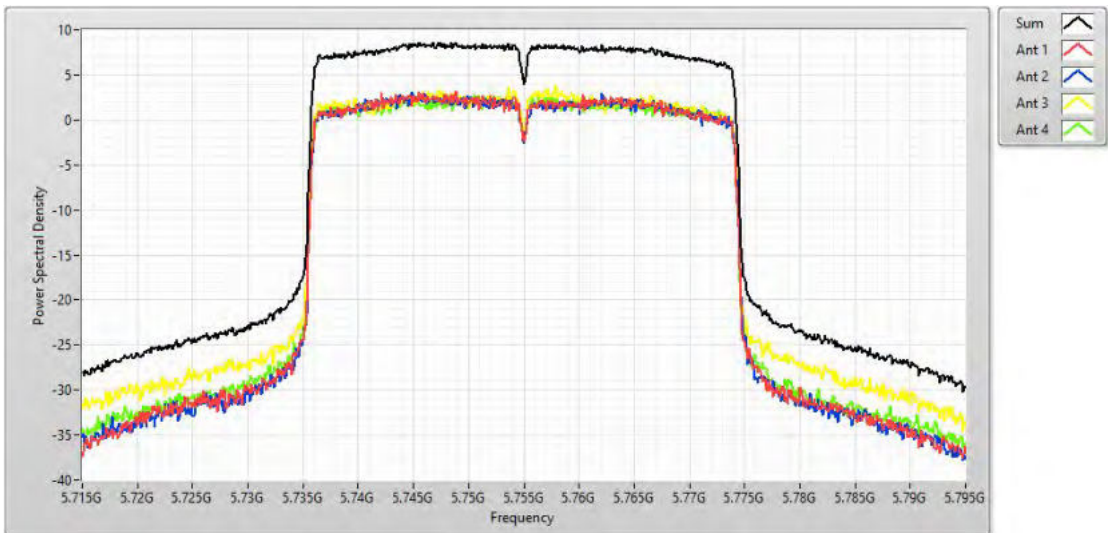
Note: Total PPSD = $10 \cdot \log(\text{Chain A (mW)} + \text{Chain B (mW)} + \text{Chain C (mW)} + \text{Chain D (mW)}) +$
 Duty factor.

Channel 46



Sum (dBm/RBW)	12.33
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Channel 151



Sum (dBm/RBW)	8.59
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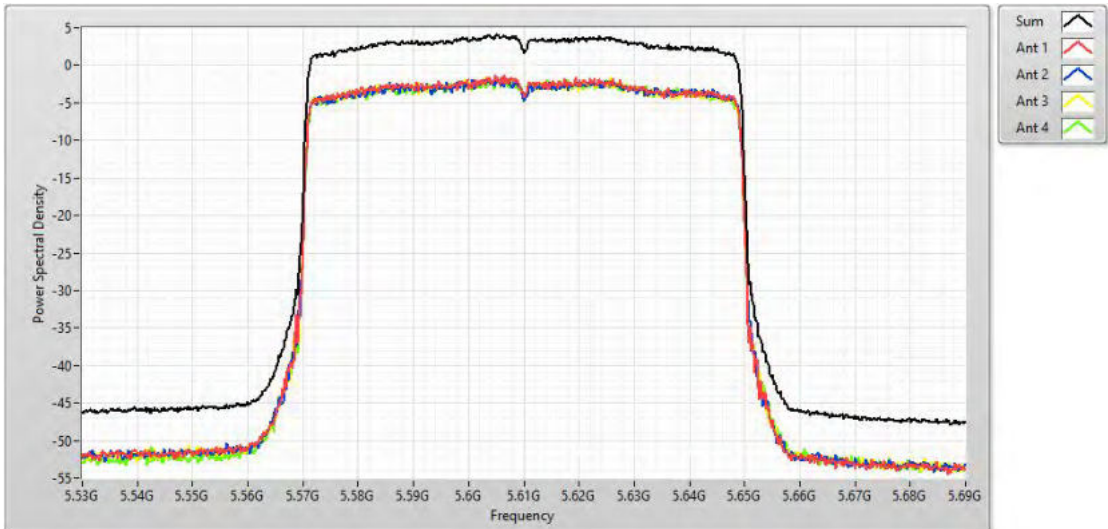
Product : Internet Gateway
 Test Item : Maximun Power Spectral Density
 Test Mode : Transmit (802.11ax-80BW-Beamforming)

Channel No.	Frequency (MHz)	Data Rata	PPSD/MHz (dBm)	Duty factor (dB)	Total PPSD/MHz (dBm)	Limit (dBm)	Result
42	5210	MCS0	3.78	0.30	4.08	17	Pass
58	5290	MCS0	4.05	0.30	4.35	11	Pass
106	5530	MCS0	2.97	0.30	3.27	11	Pass
122	5610	MCS0	4.10	0.30	4.40	11	Pass

Channel No.	Frequency (MHz)	Data Rata	PPSD/RBW (dBm)	Duty factor (dB)	Total PPSD/RBW (dBm)	Limit (dBm)	Result
155	5775	MCS0	4.12	0.30	4.42	30	Pass

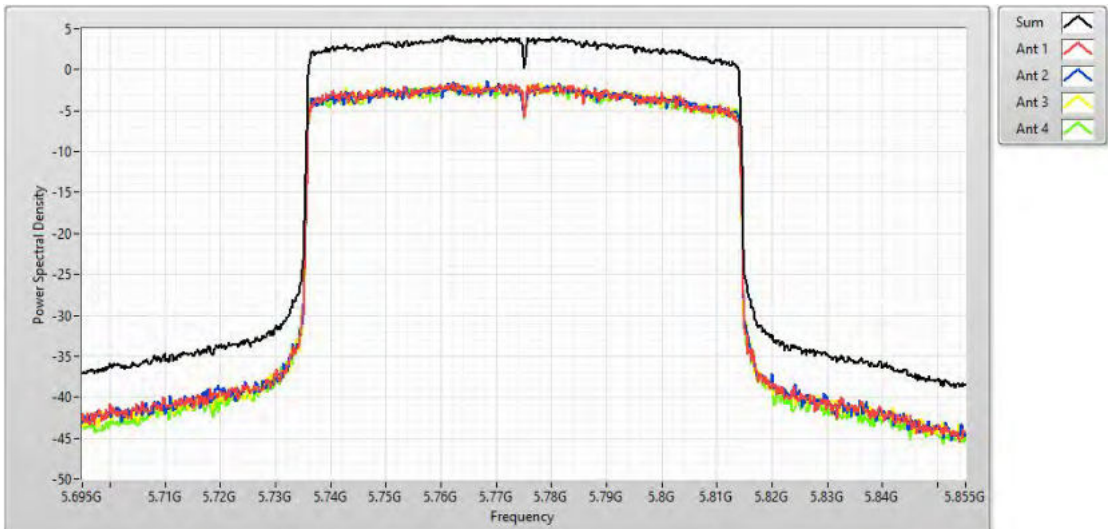
Note: Total PPSD = $10 \cdot \log(\text{Chain A (mW)} + \text{Chain B (mW)} + \text{Chain C (mW)} + \text{Chain D (mW)}) +$
 Duty factor.

Channel 122



Sum (dBm/RBW)	4.10
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Channel 155

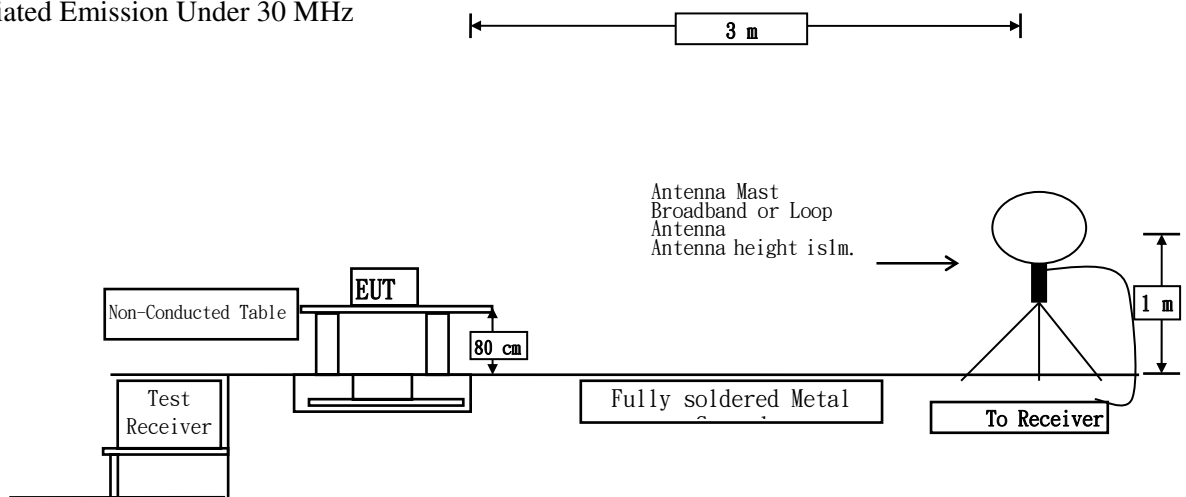


Sum (dBm/RBW)	4.12
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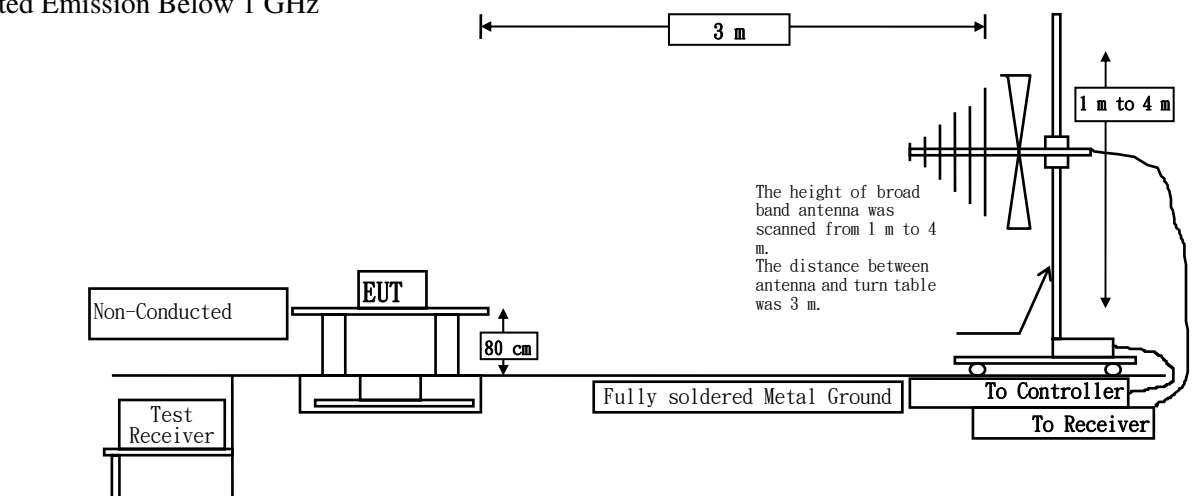
5. Radiated Emission

5.1. Test Setup

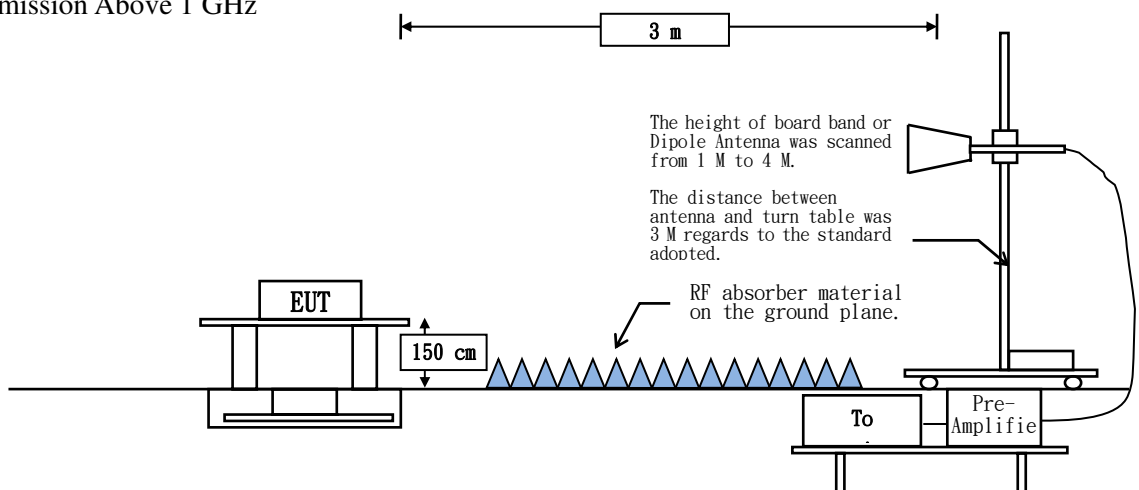
Radiated Emission Under 30 MHz



Radiated Emission Below 1 GHz



Radiated Emission Above 1 GHz



5.2. Limits

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

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
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 μ V/m) = 20 log E field strength (uV/m)

5.3. 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 form 9 kHz - 10th 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 = 1 MHz.

VBW \geq 3 MHz.

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

RBW = 1 MHz.

VBW = 10 Hz, 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.)

CDD Mode:

5 GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	93.36	1.4050	712	1000
802.11ax-20 MHz	94.12	5.4450	184	200
802.11ax-40 MHz	92.16	5.4050	185	200
802.11ax-80 MHz	93.76	5.4050	185	200

Note: Duty Cycle Refer to Section 8.

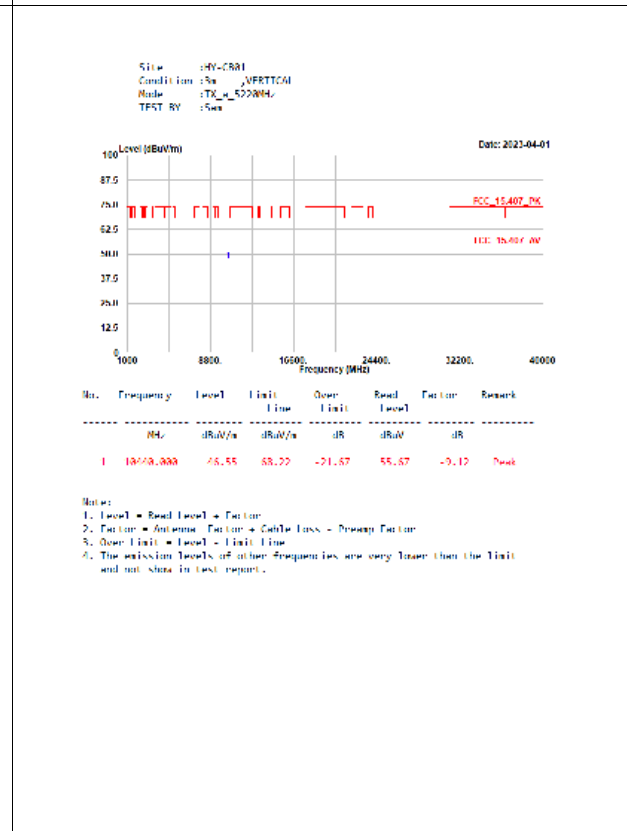
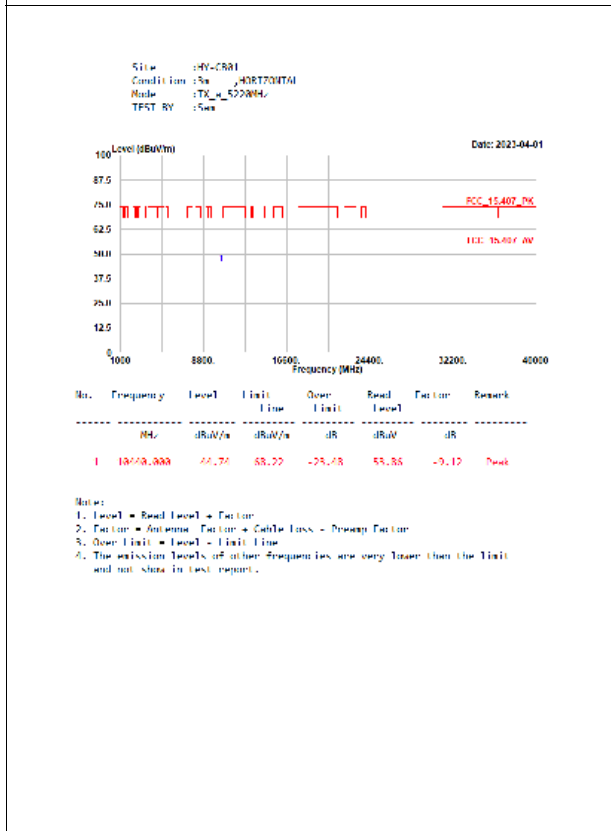
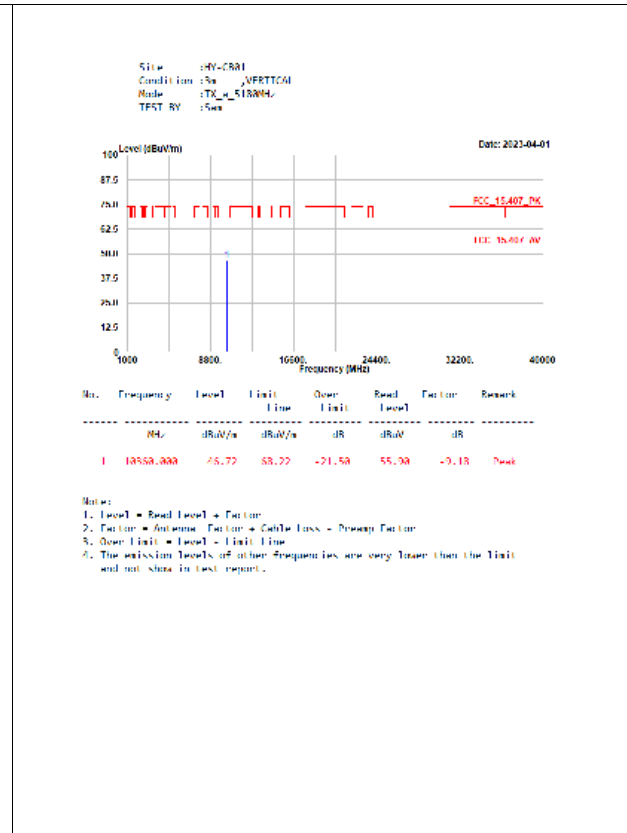
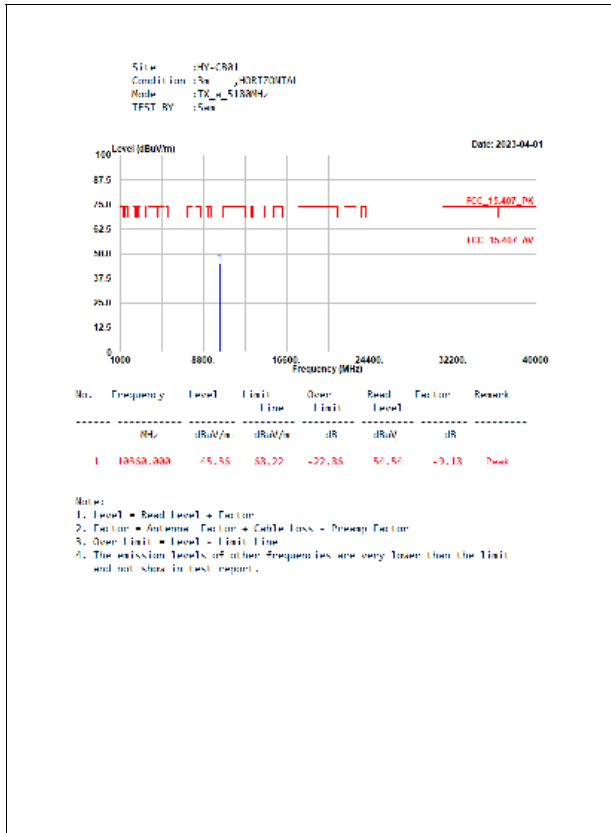
Beamforming Mode:

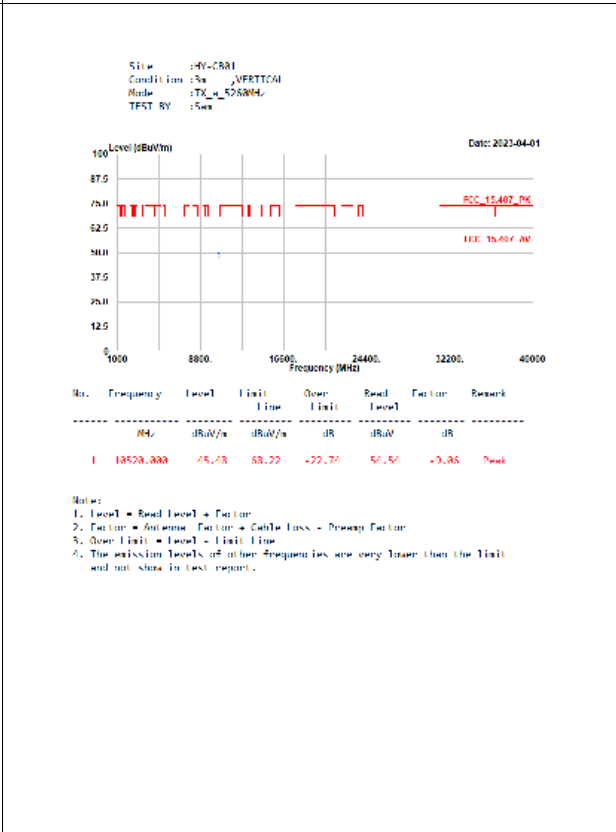
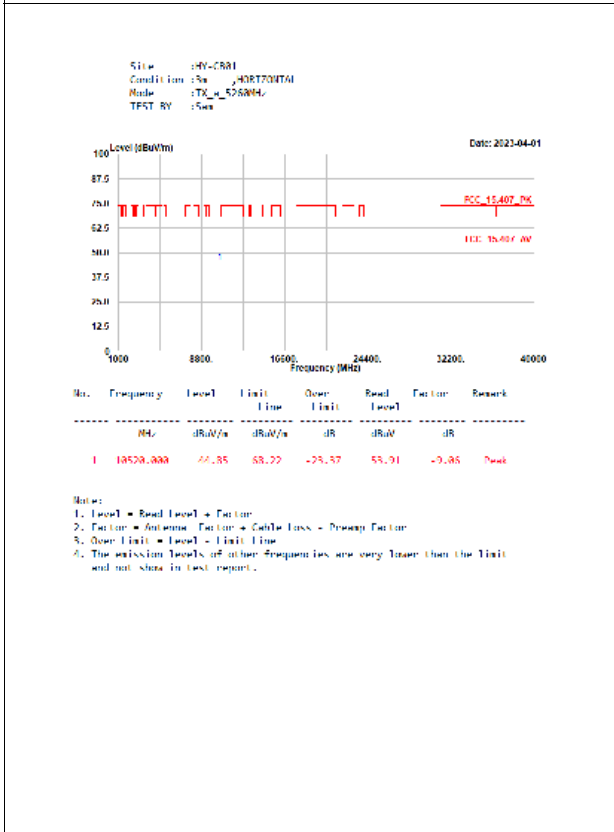
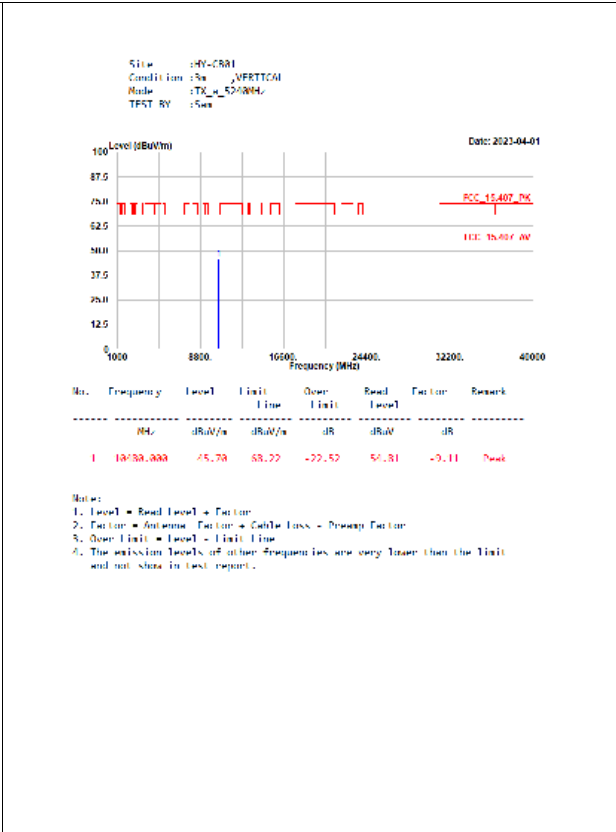
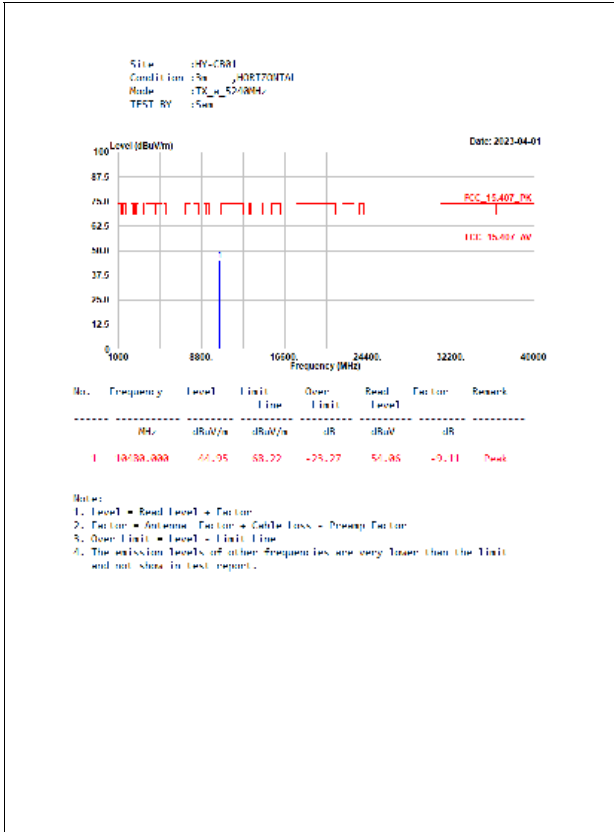
5 GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11ax-20 MHz	94.24	6.8700	146	200
802.11ax-40 MHz	92.11	6.7700	148	200
802.11ax-80 MHz	94.08	7.3100	137	200

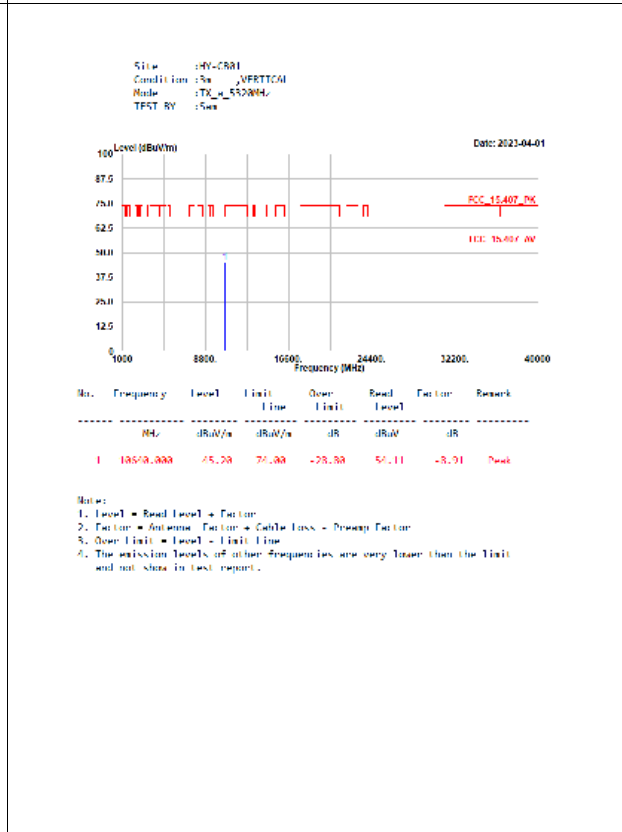
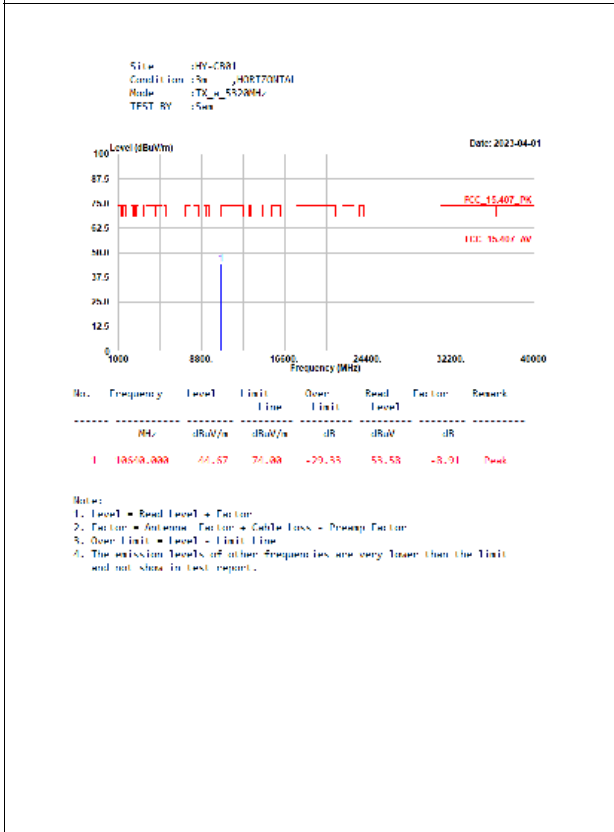
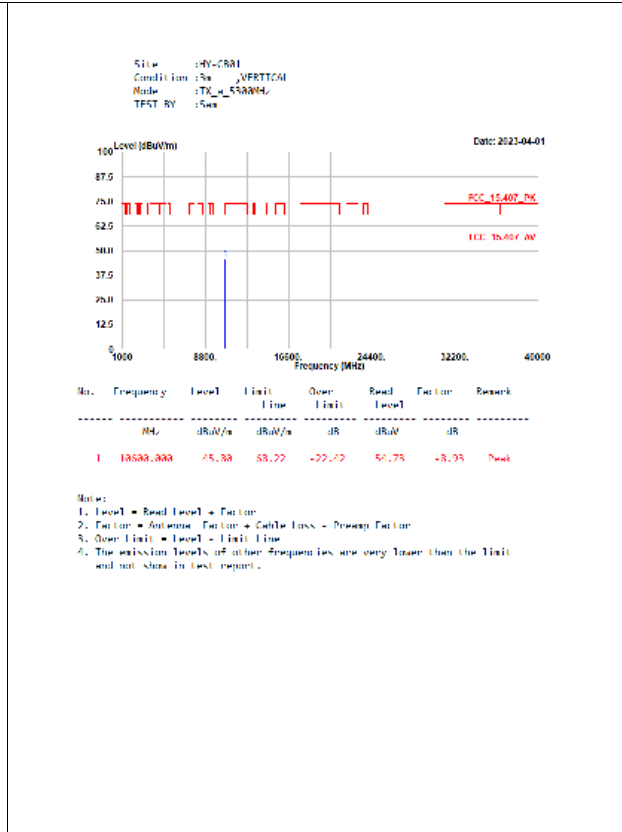
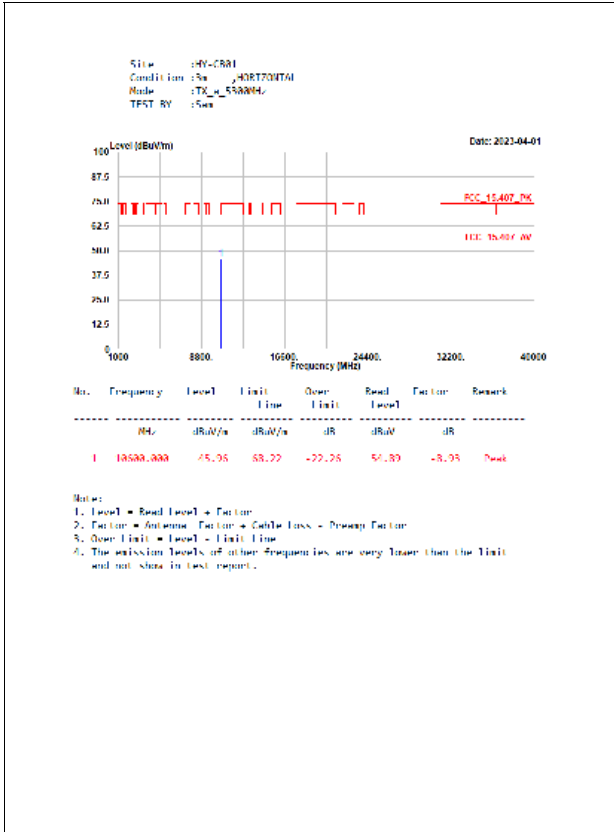
Note: Duty Cycle Refer to Section 8.

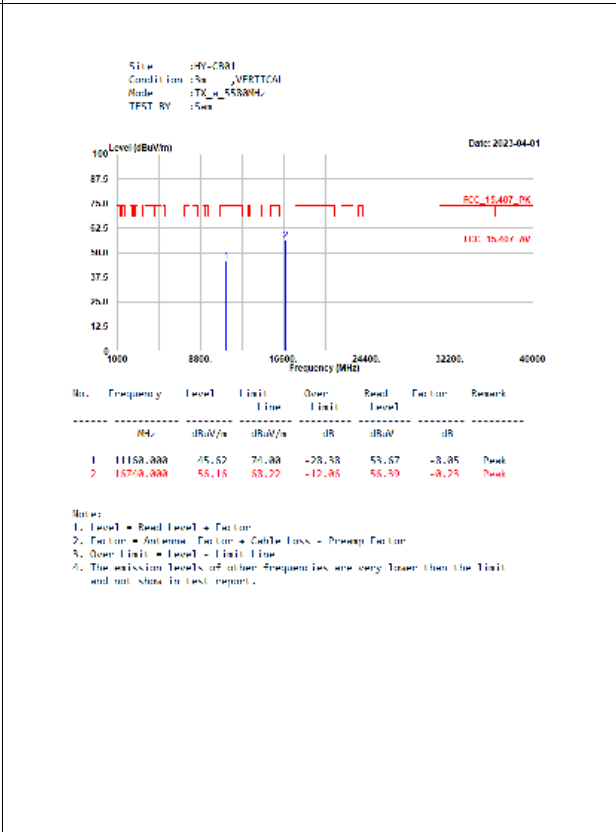
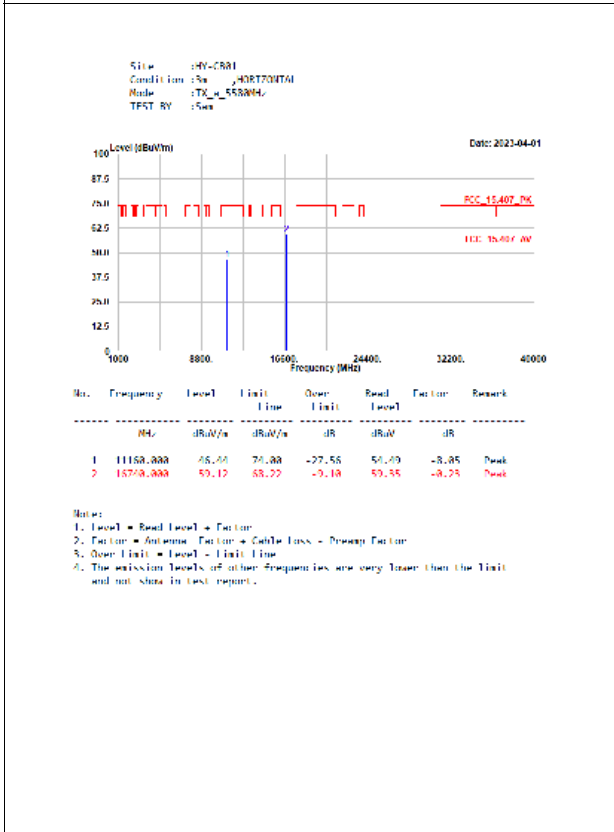
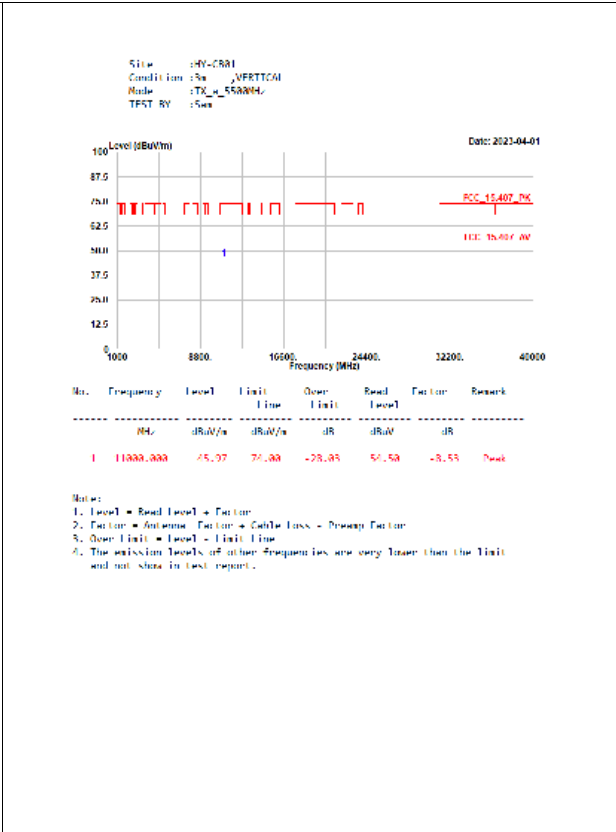
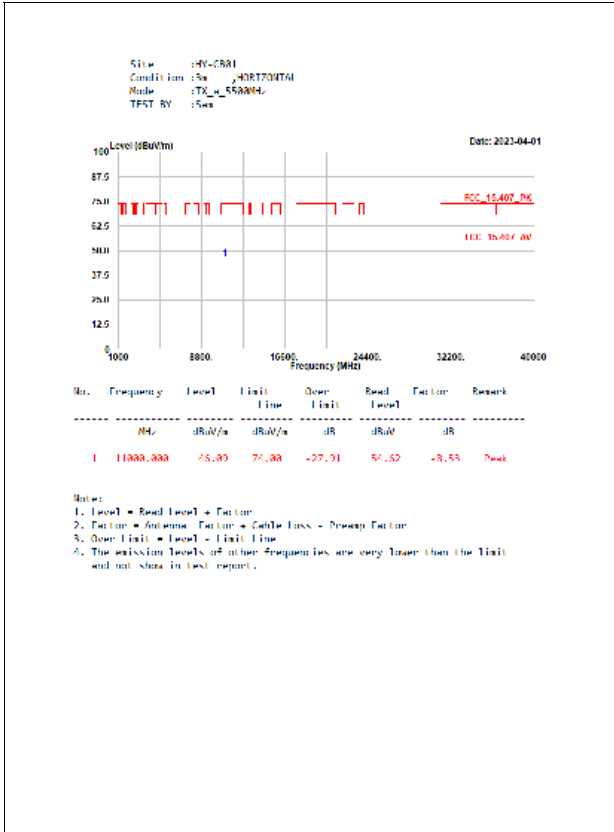
5.4. Test Result of Radiated Emission

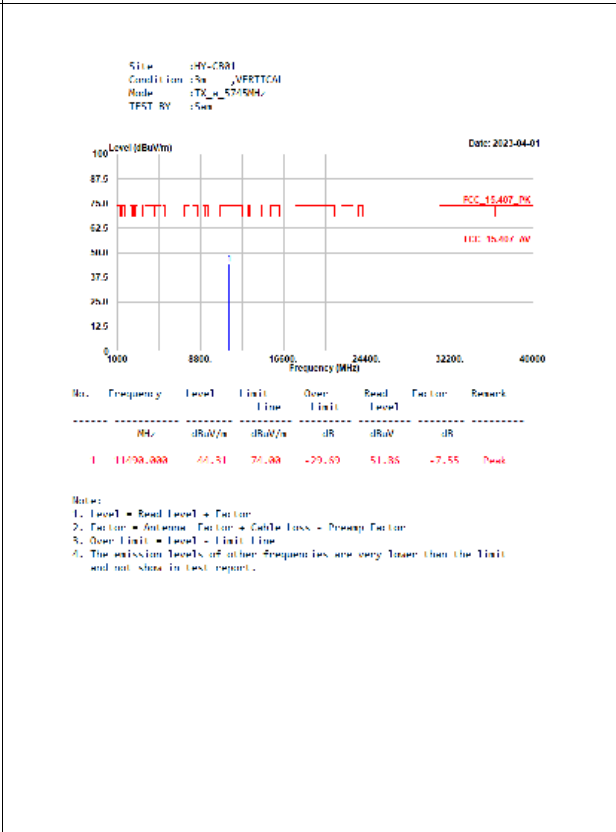
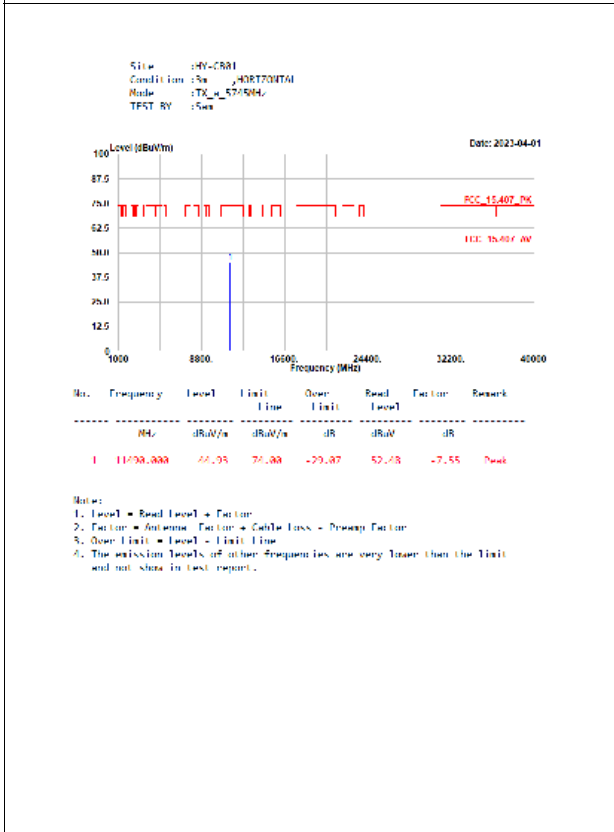
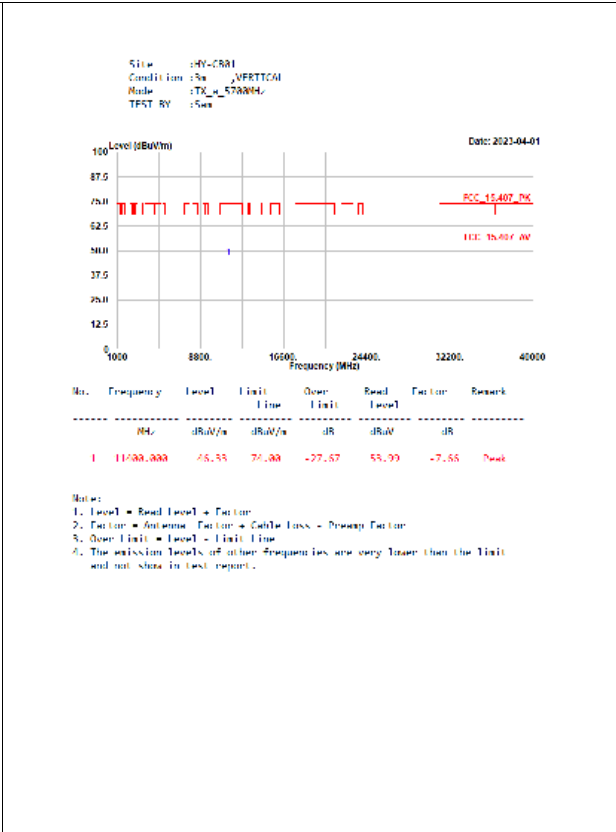
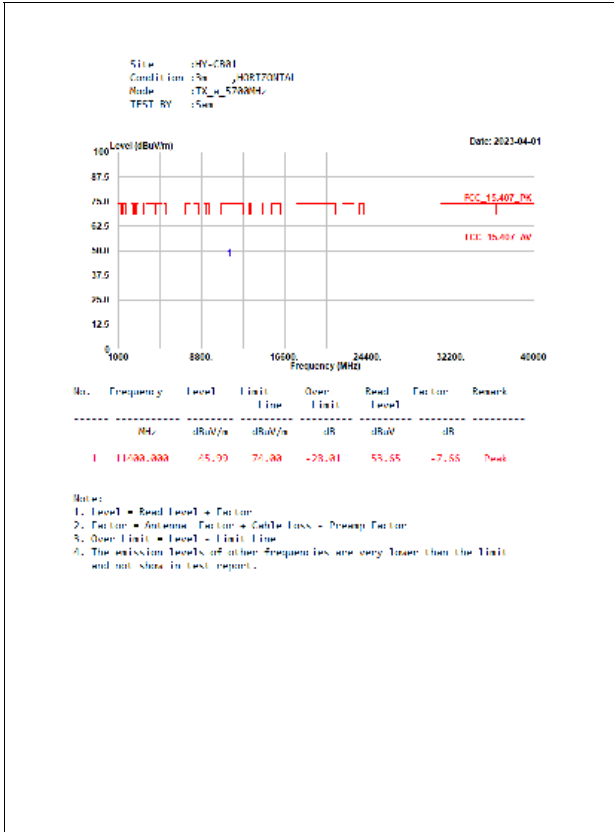
CDD

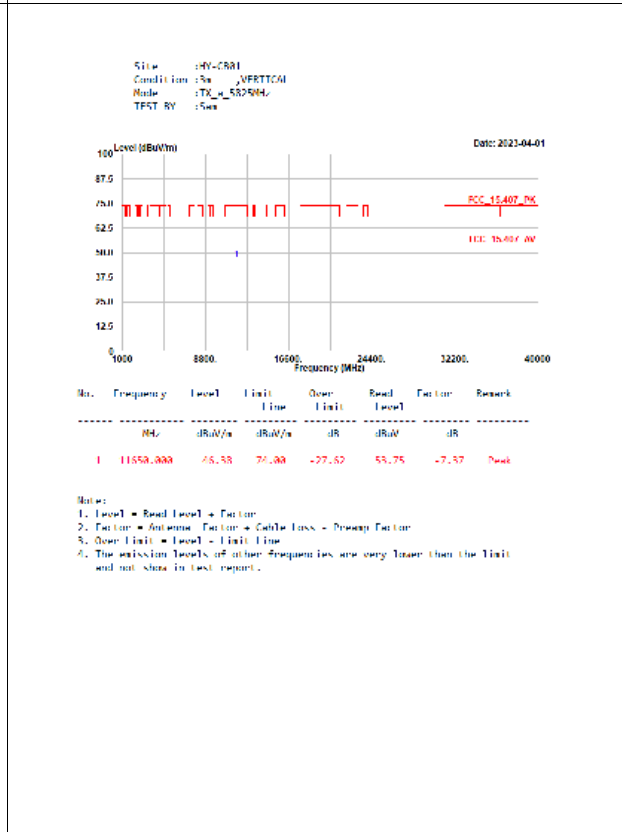
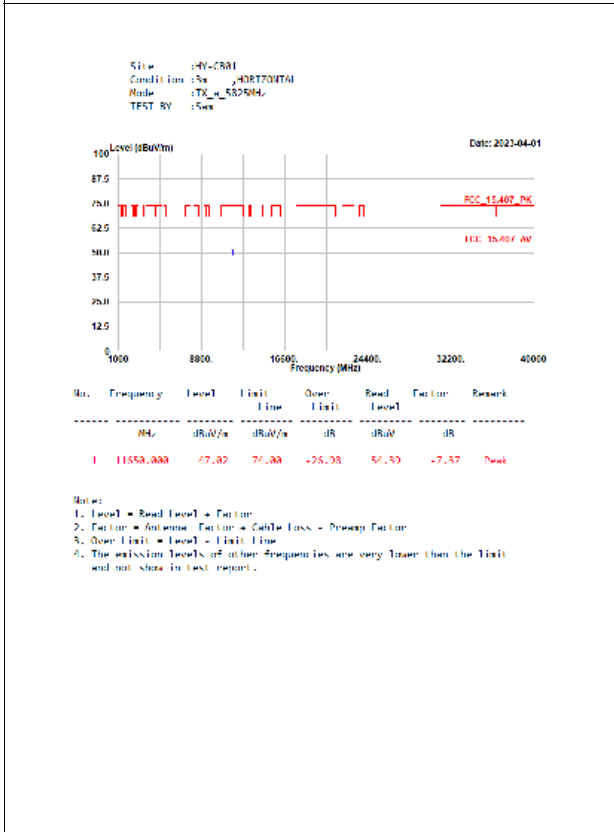
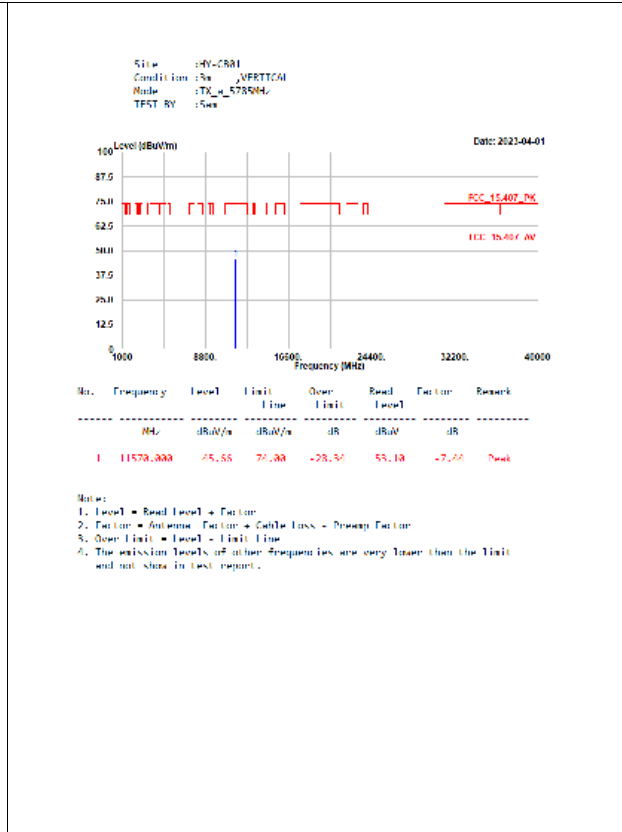
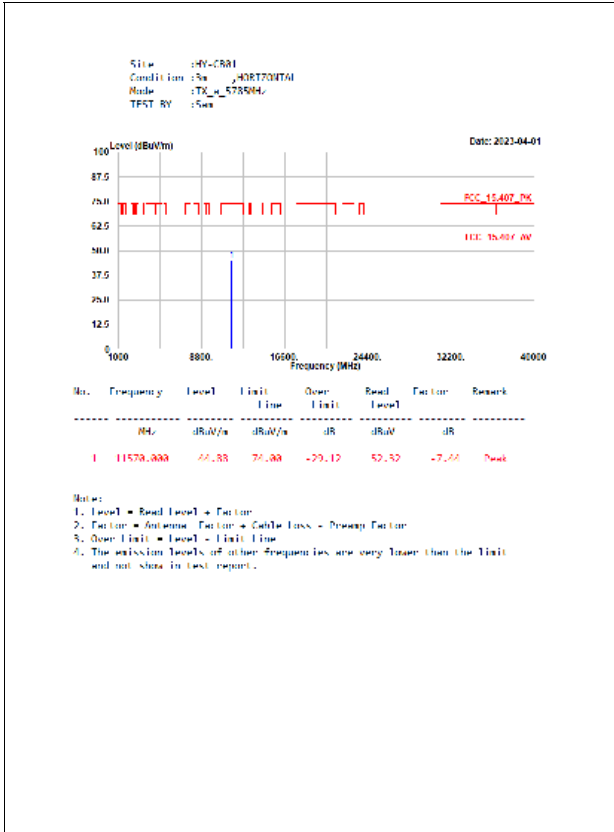


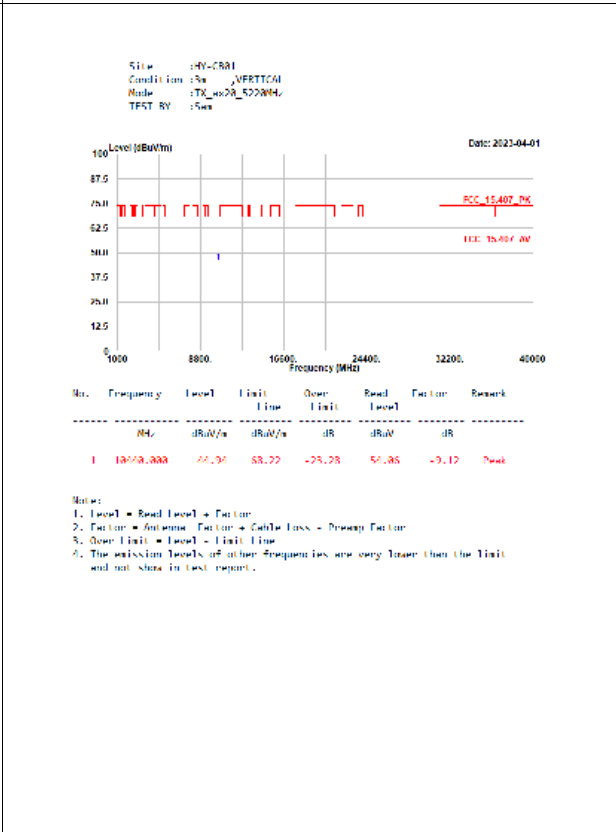
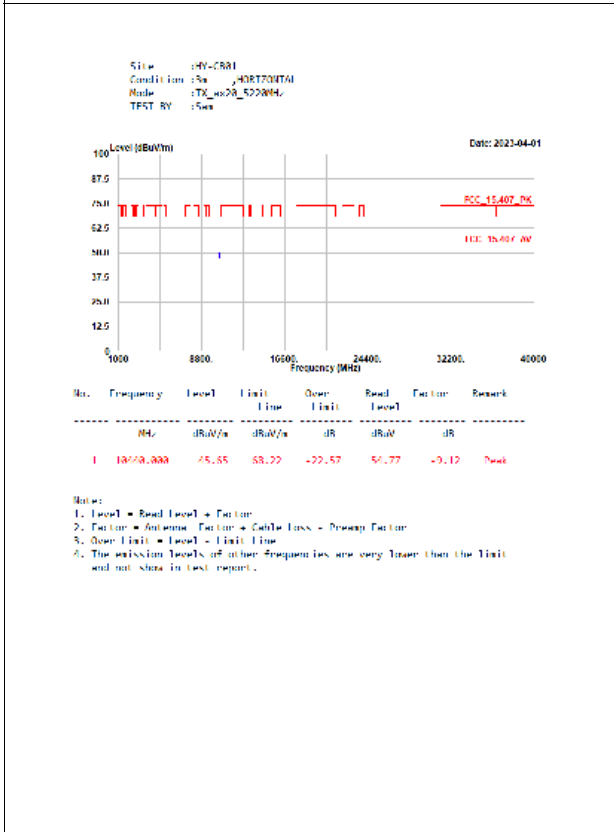
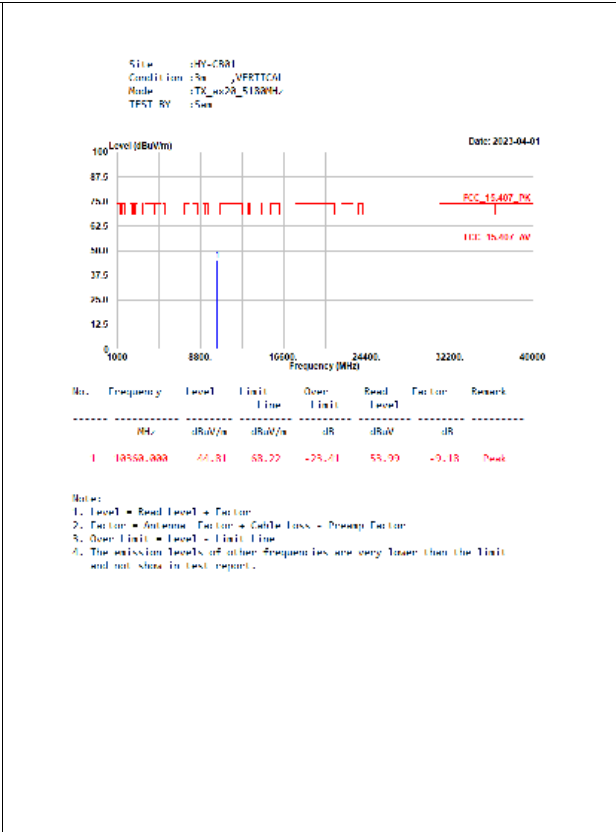
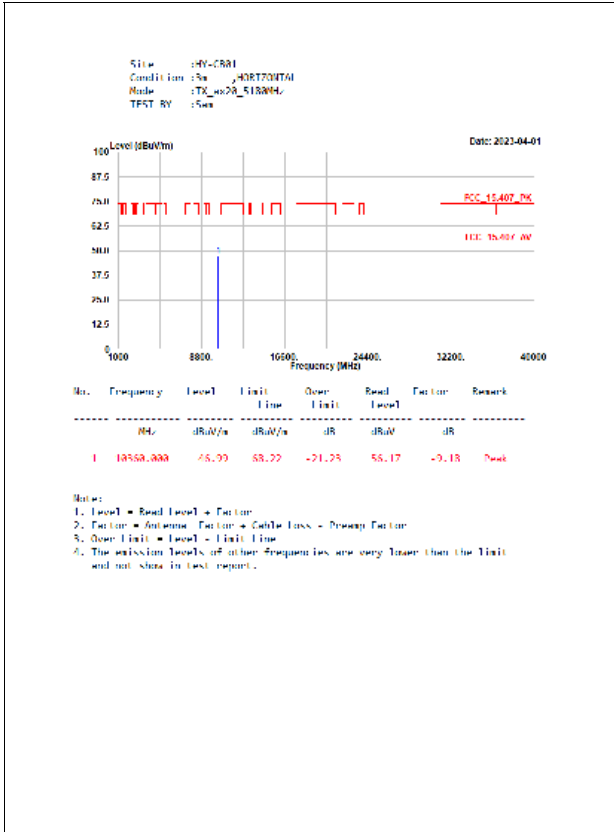


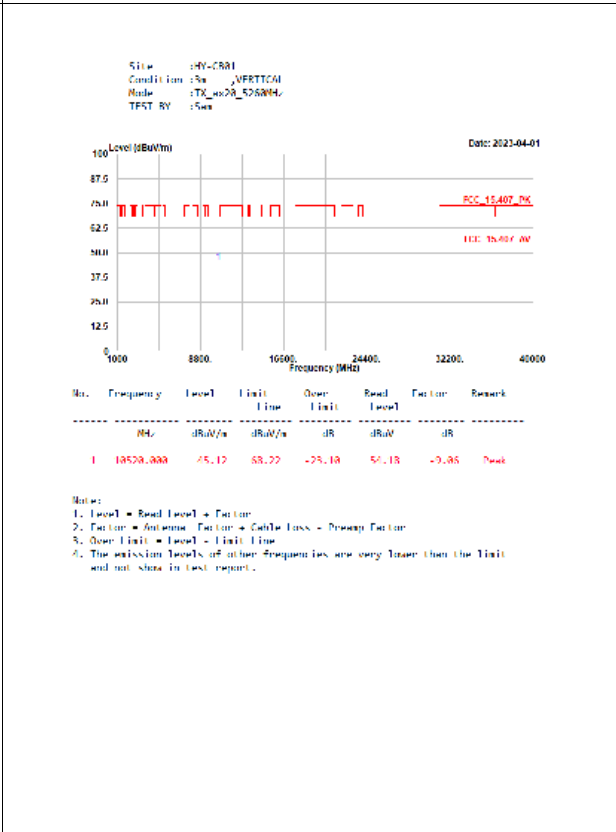
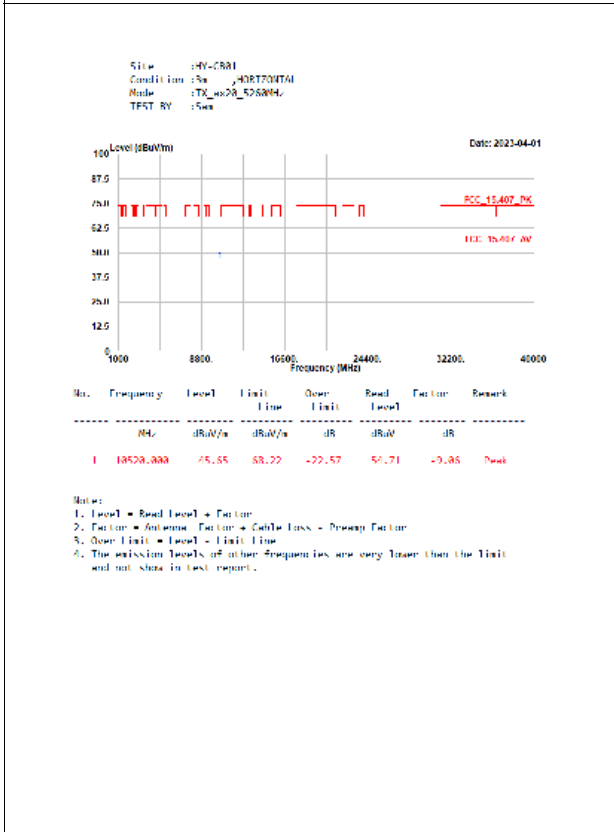
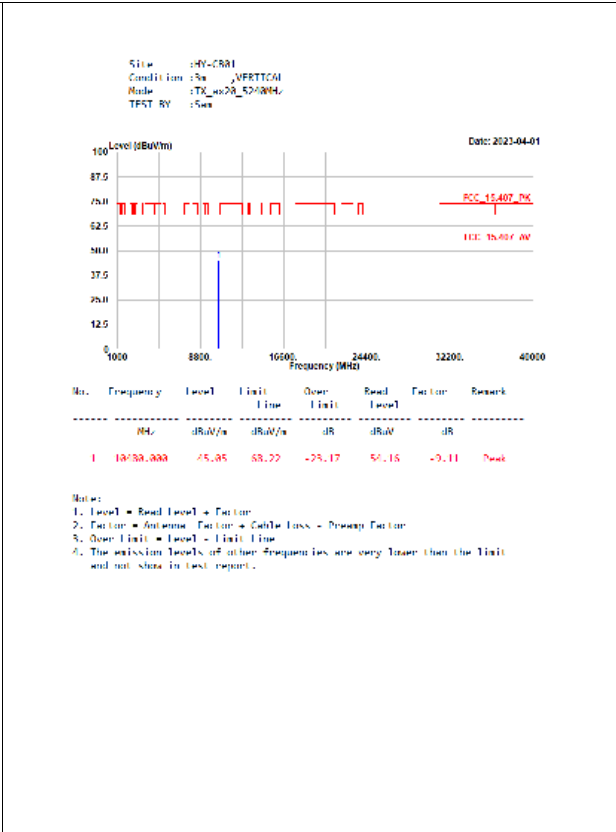
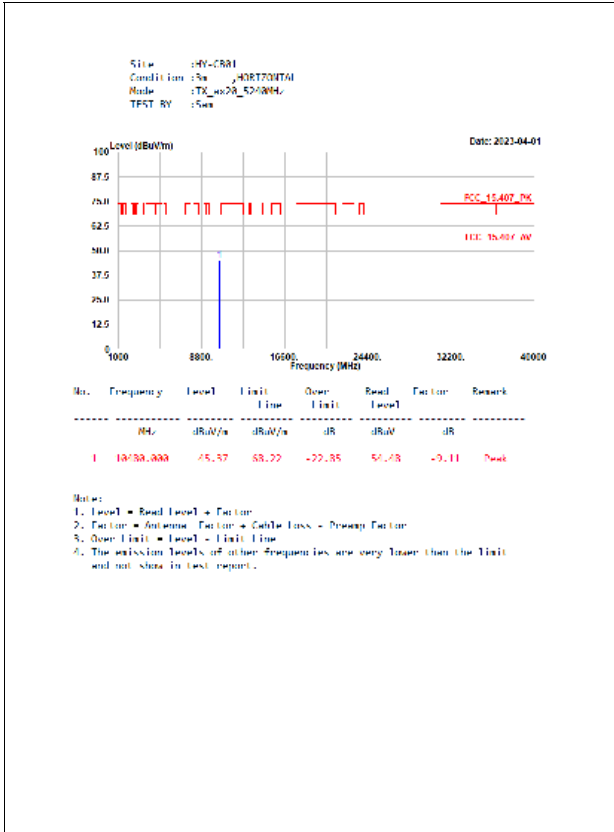


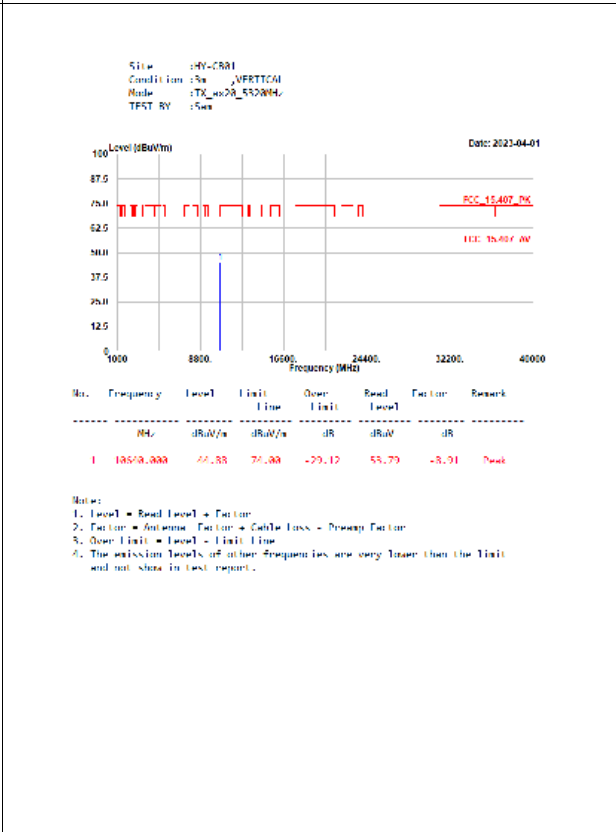
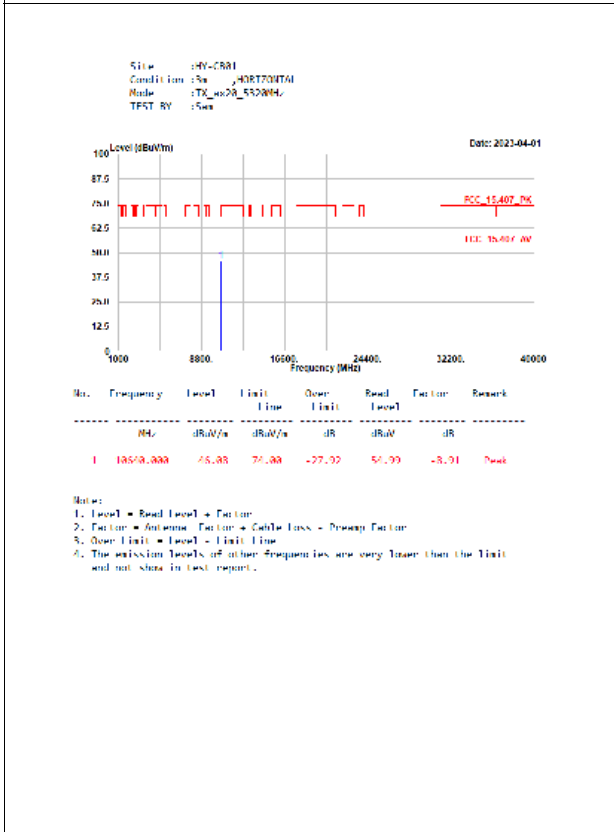
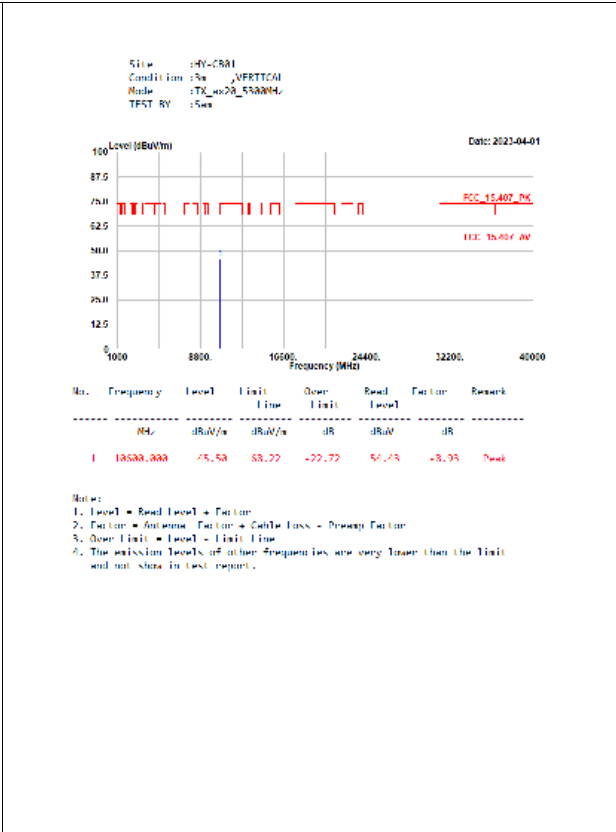
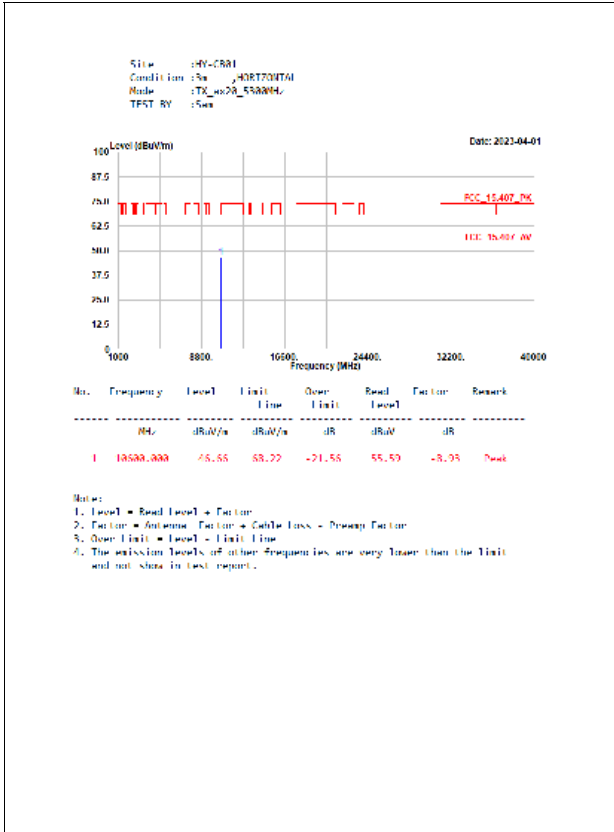


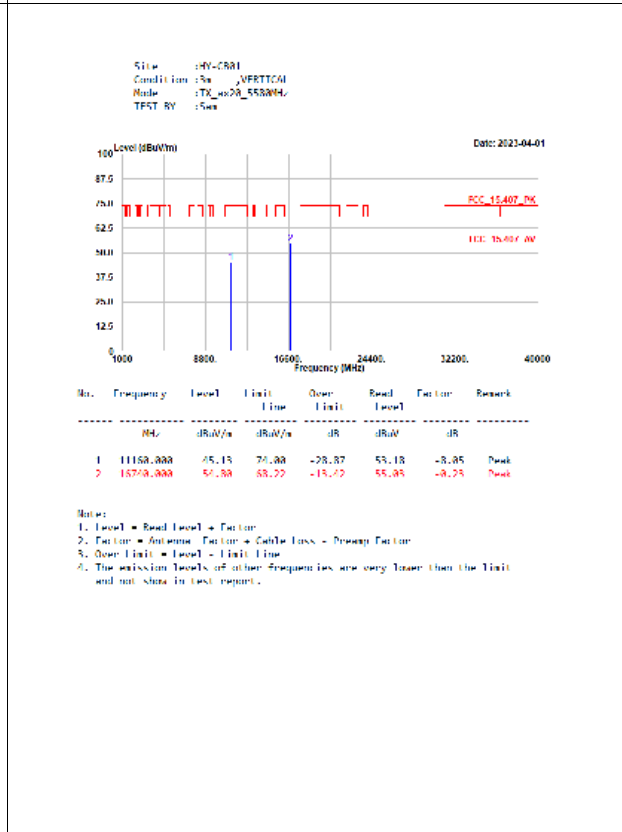
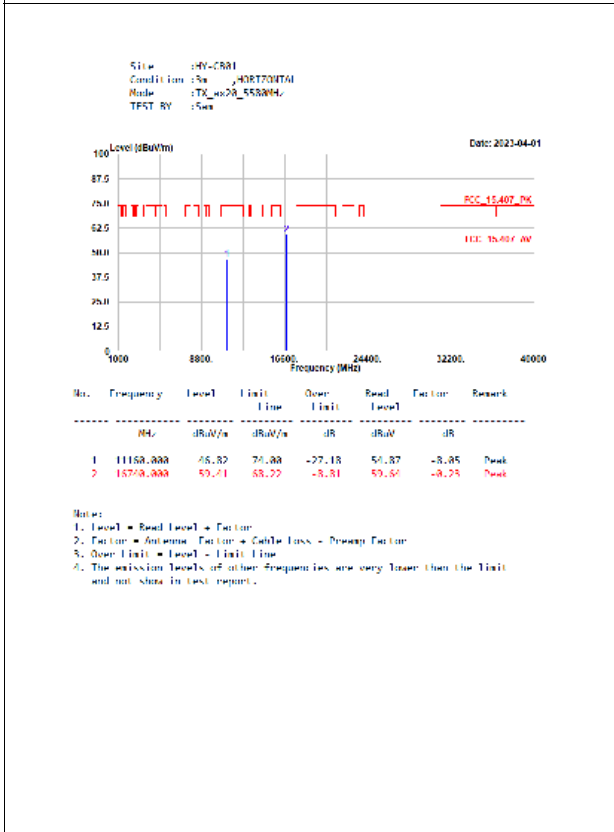
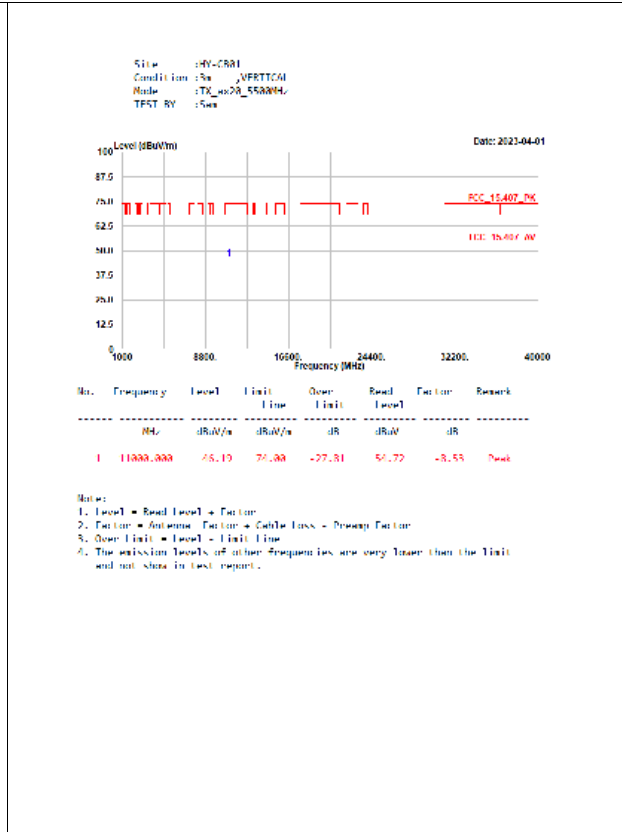
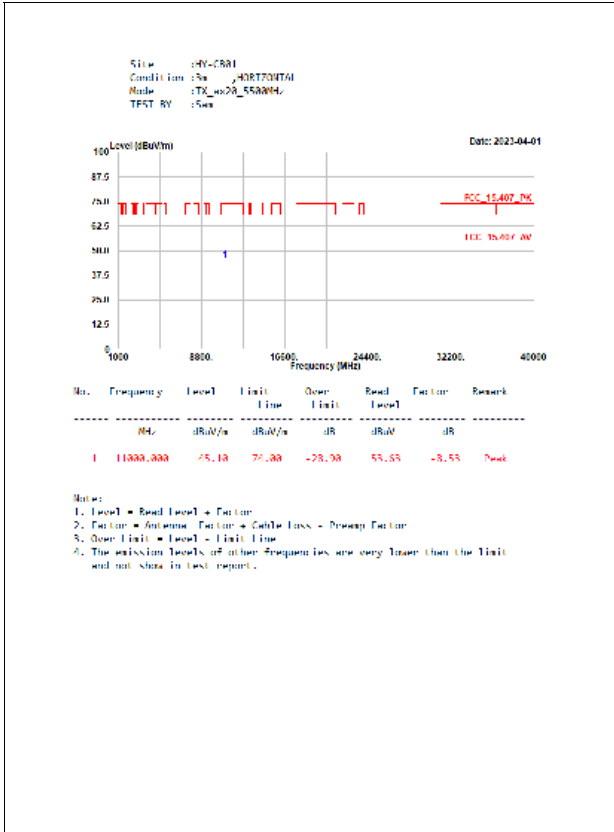


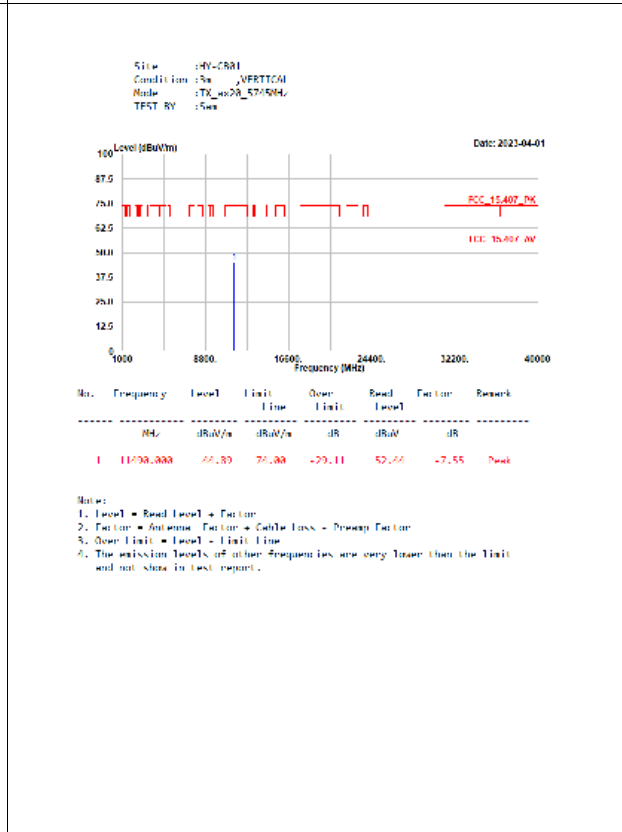
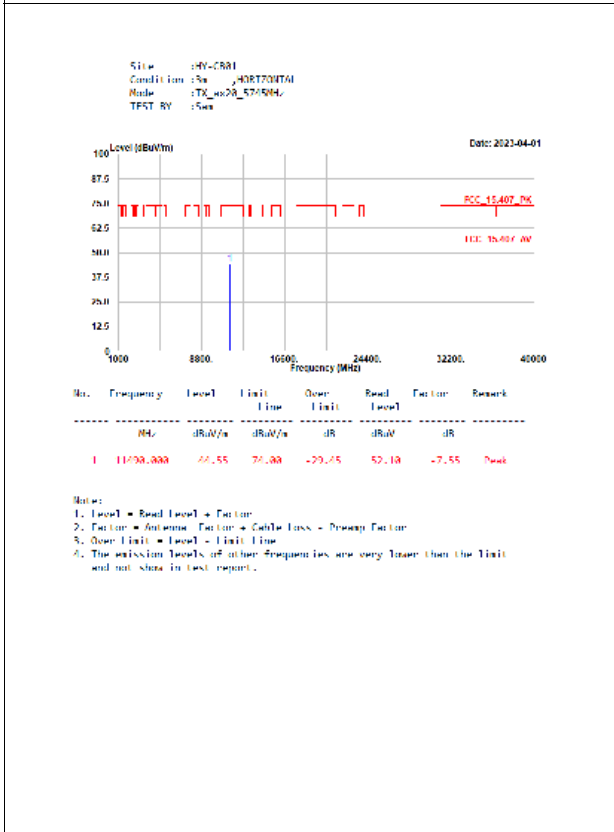
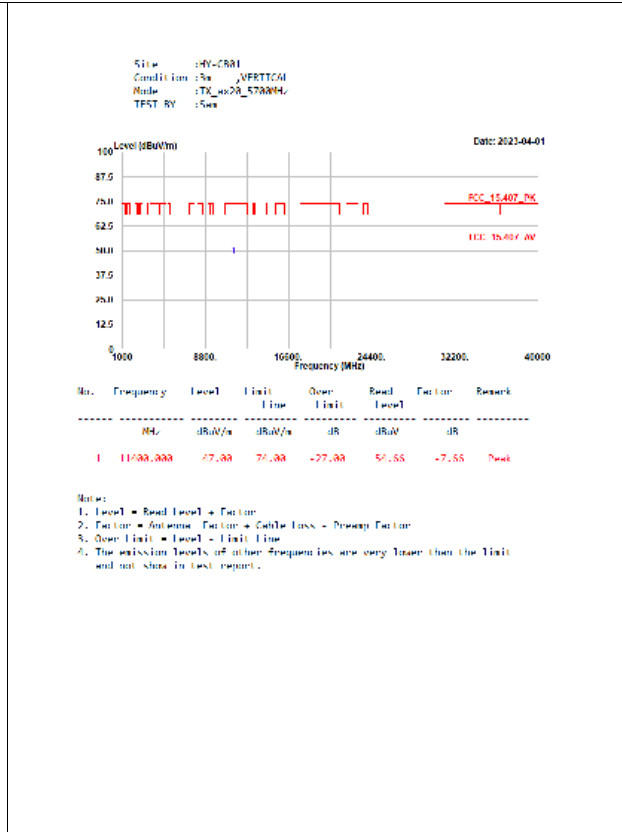
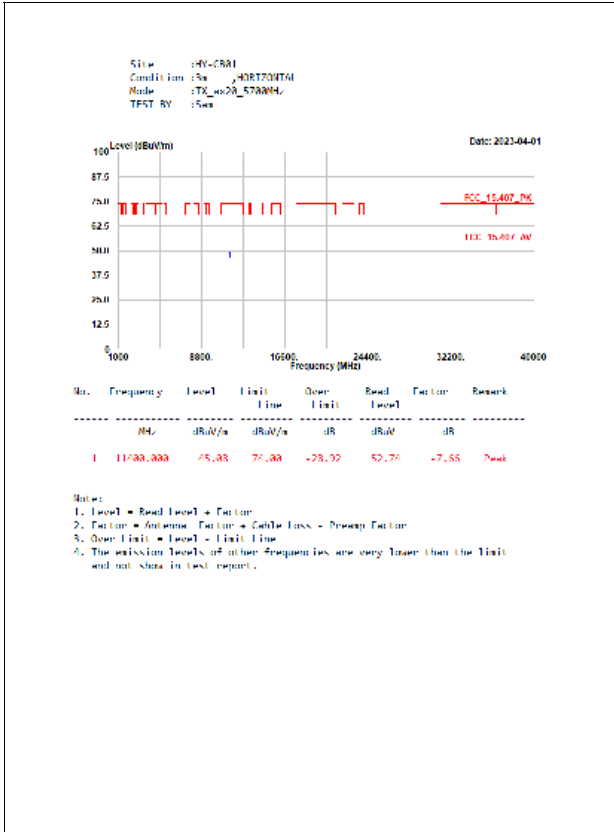


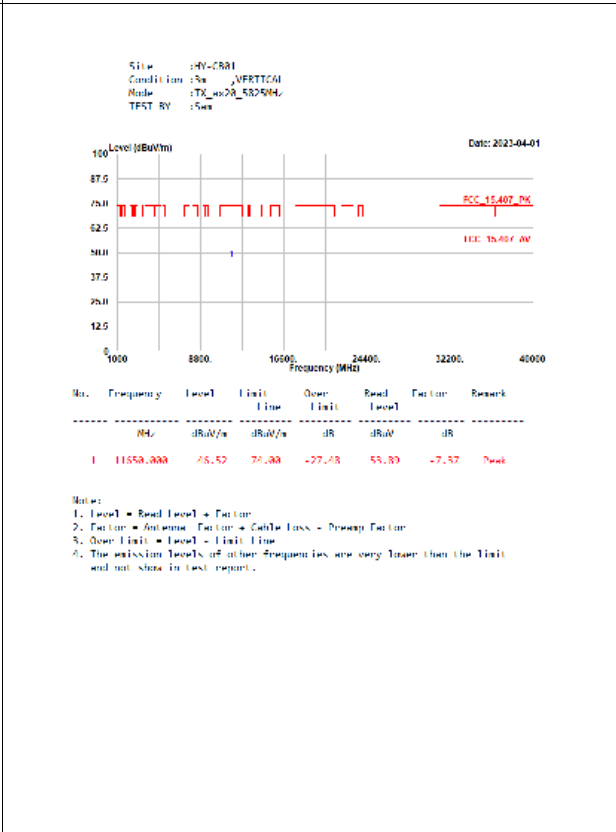
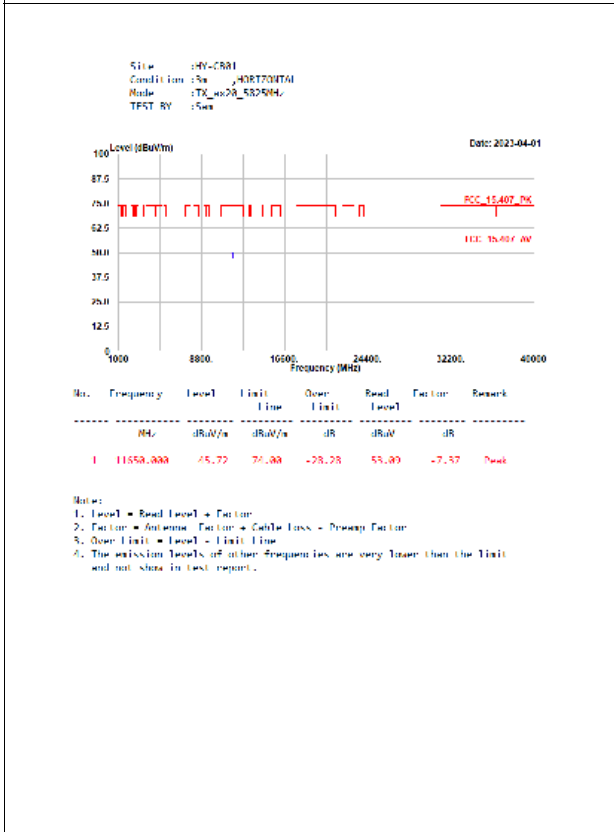
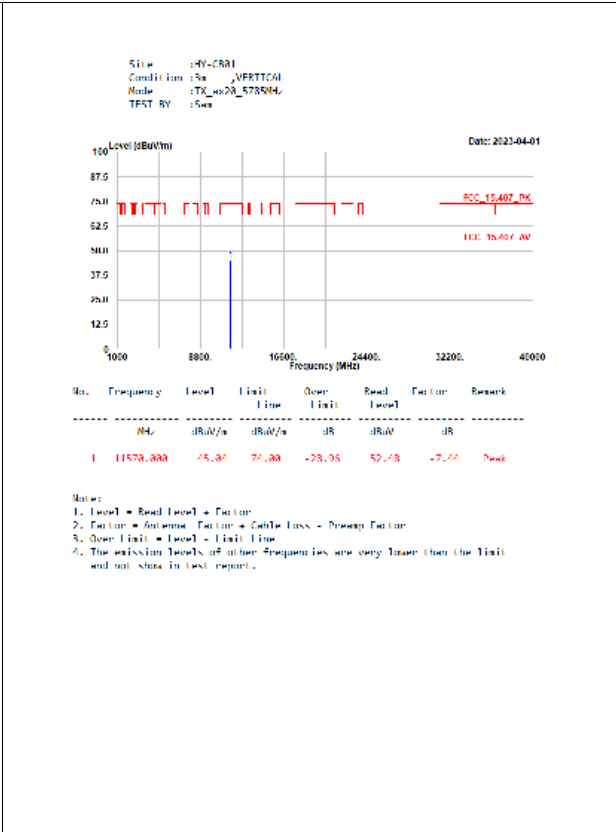
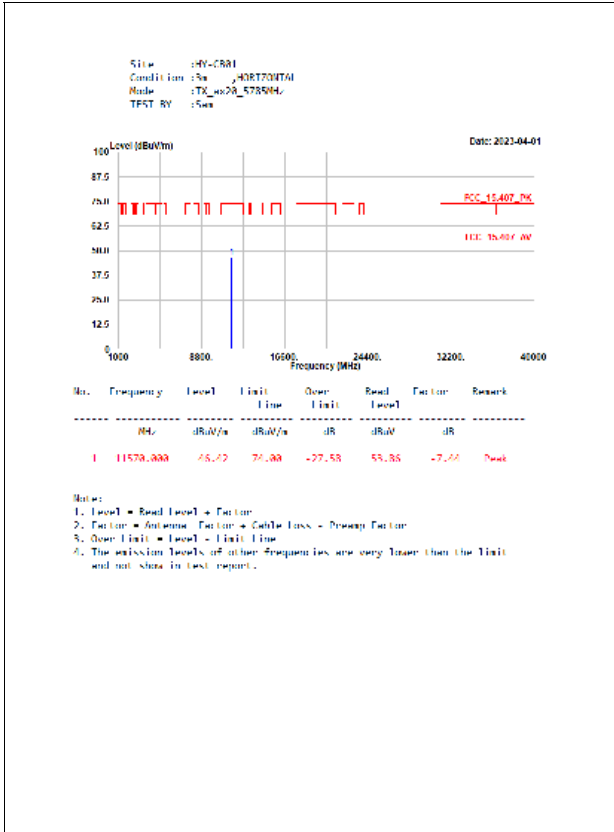


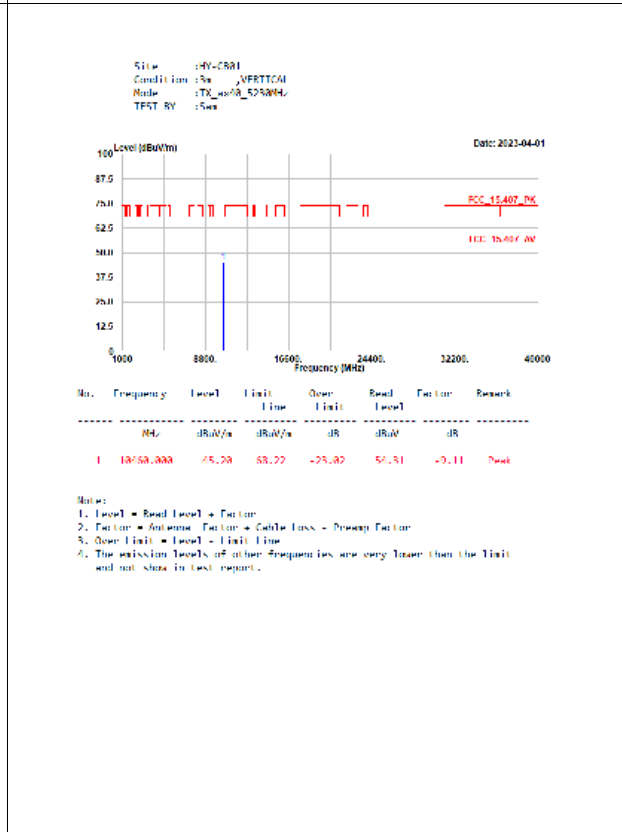
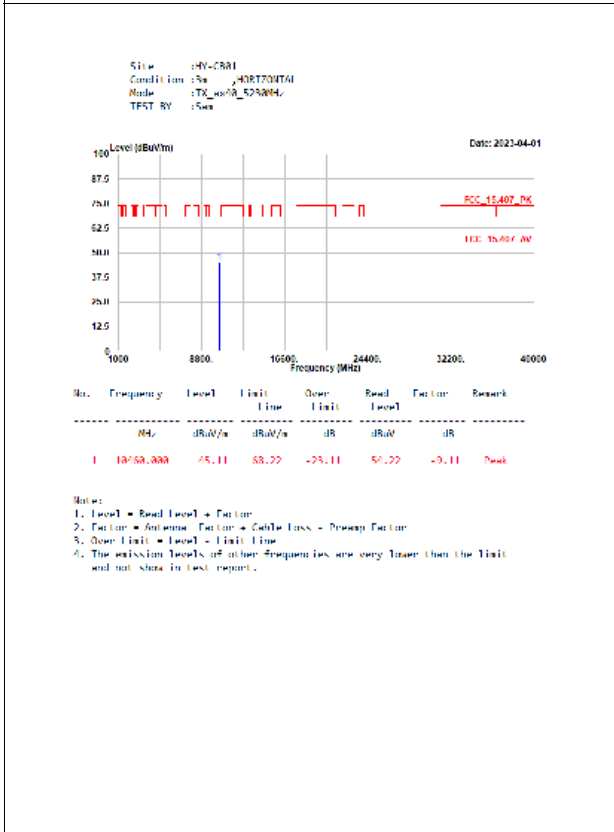
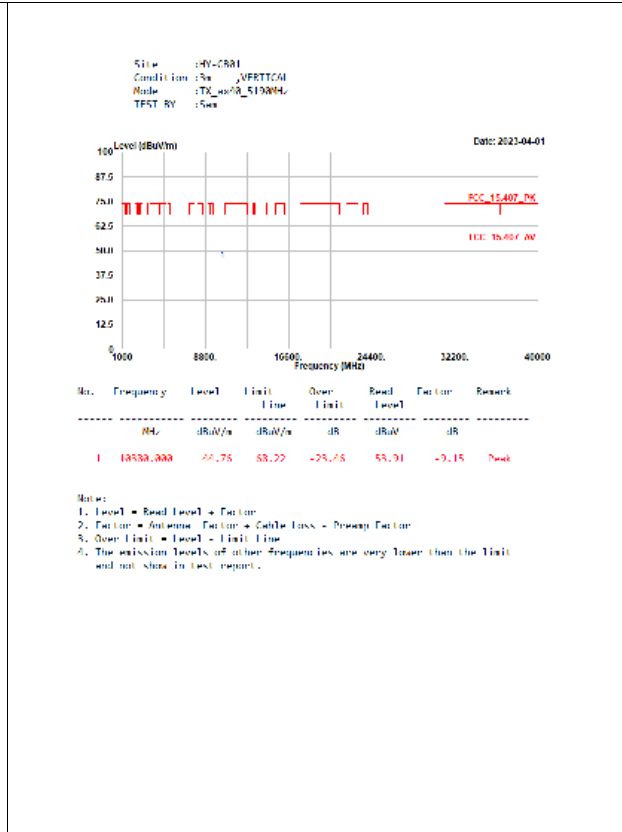
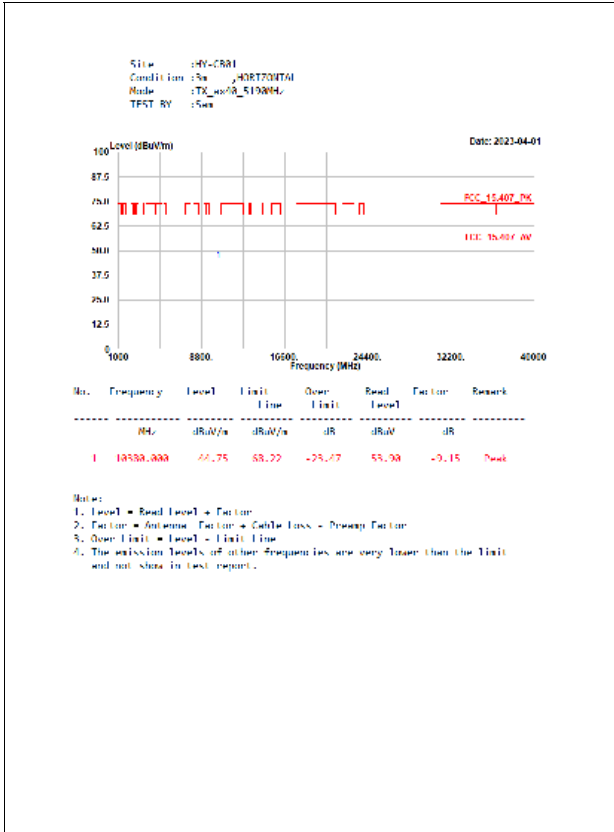


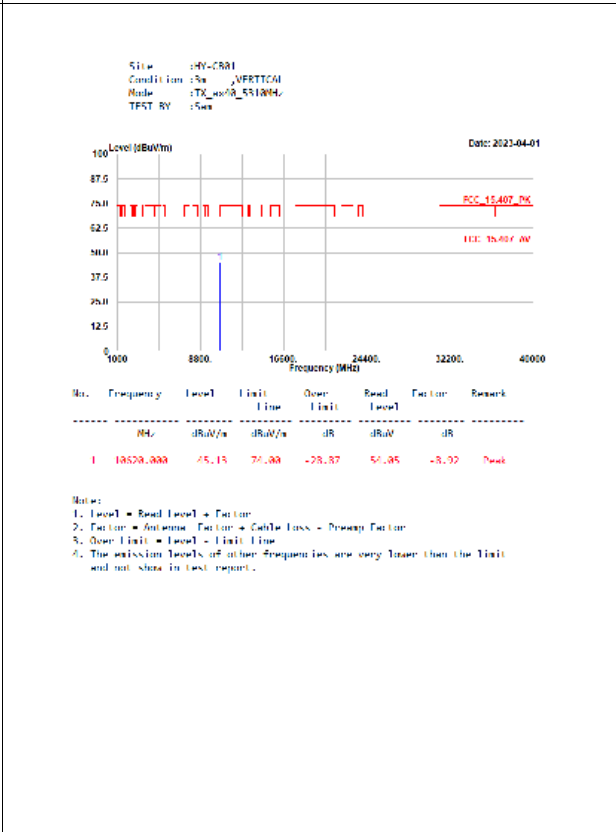
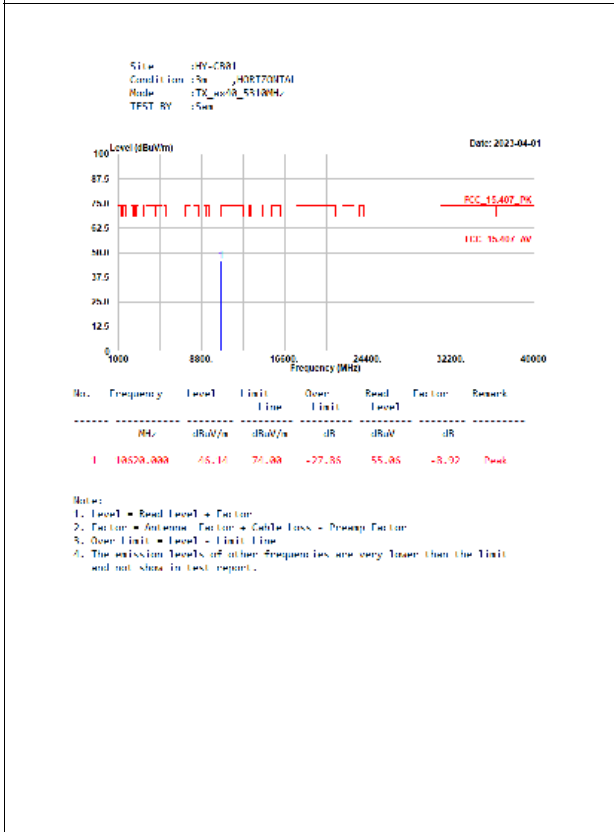
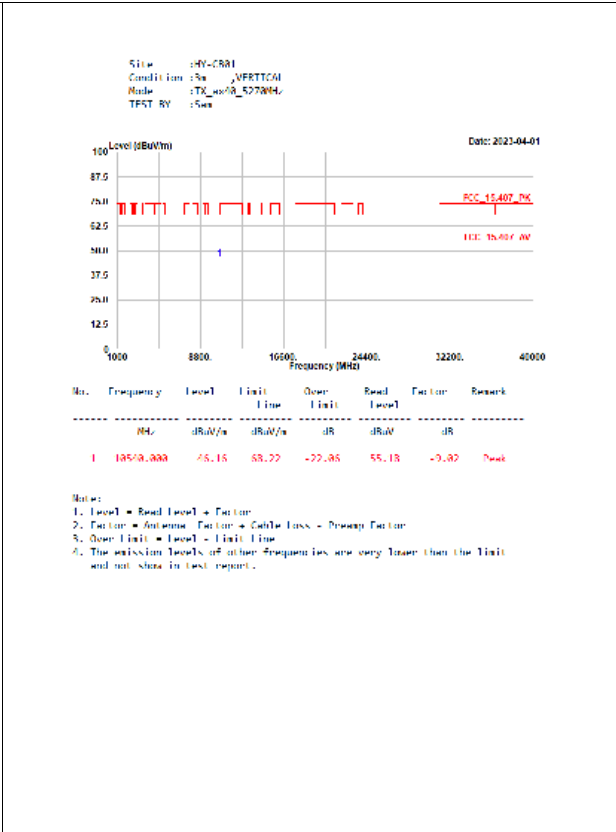
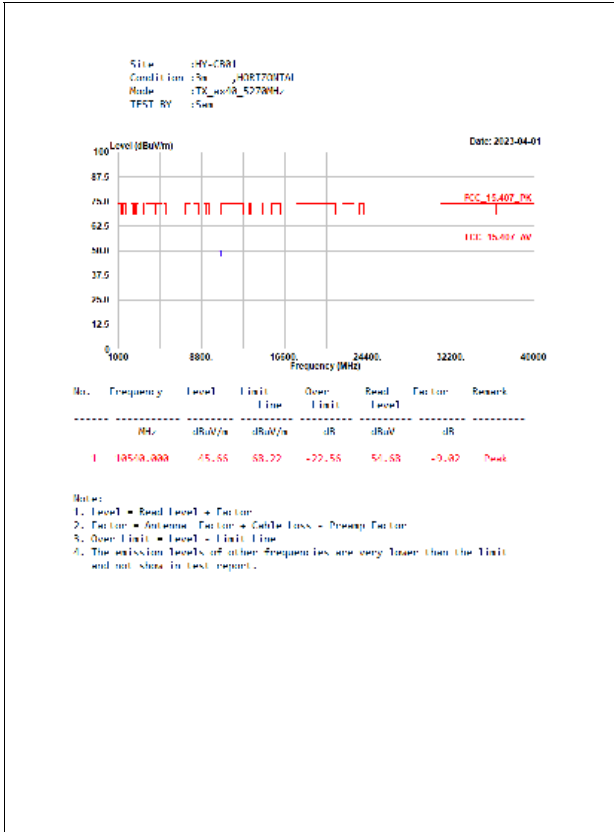


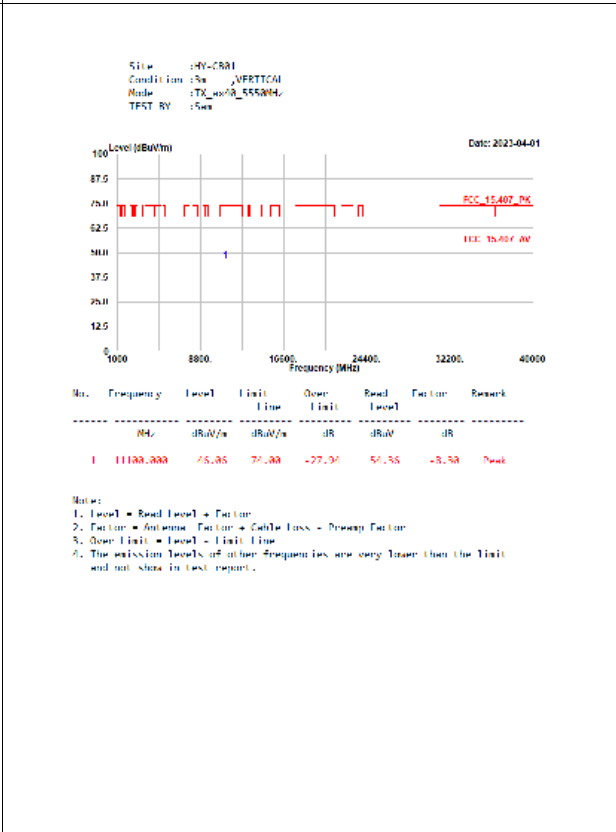
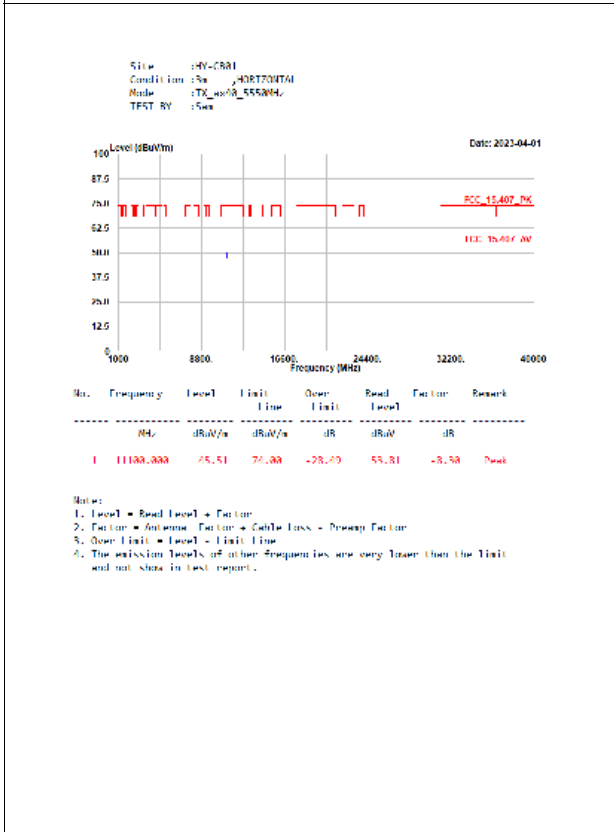
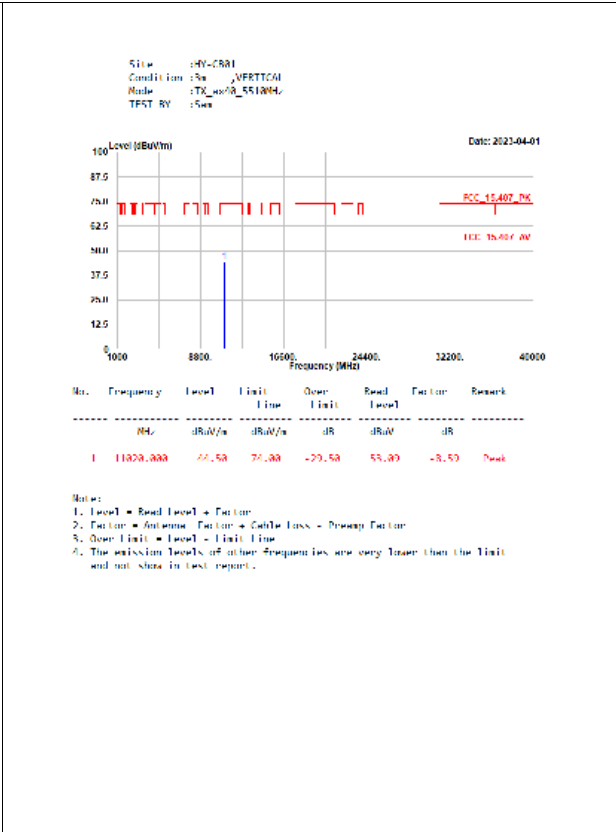
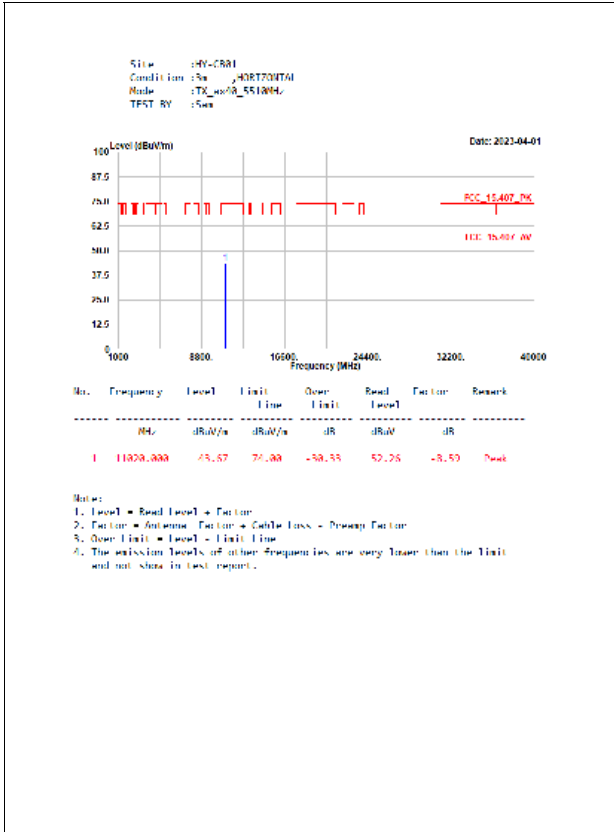


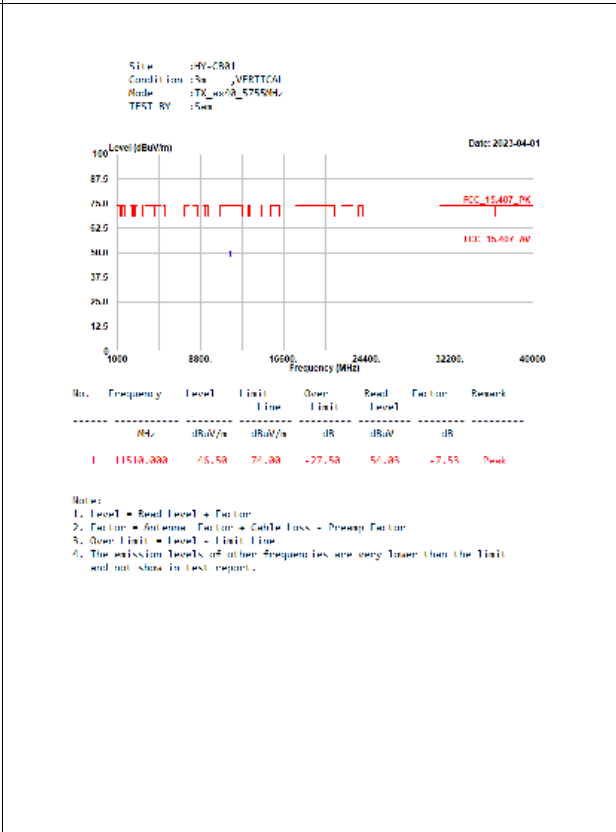
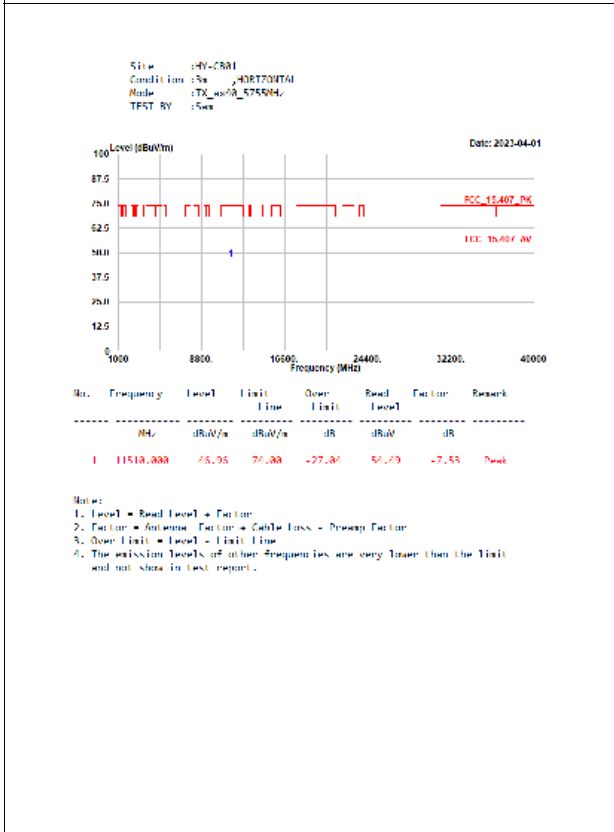
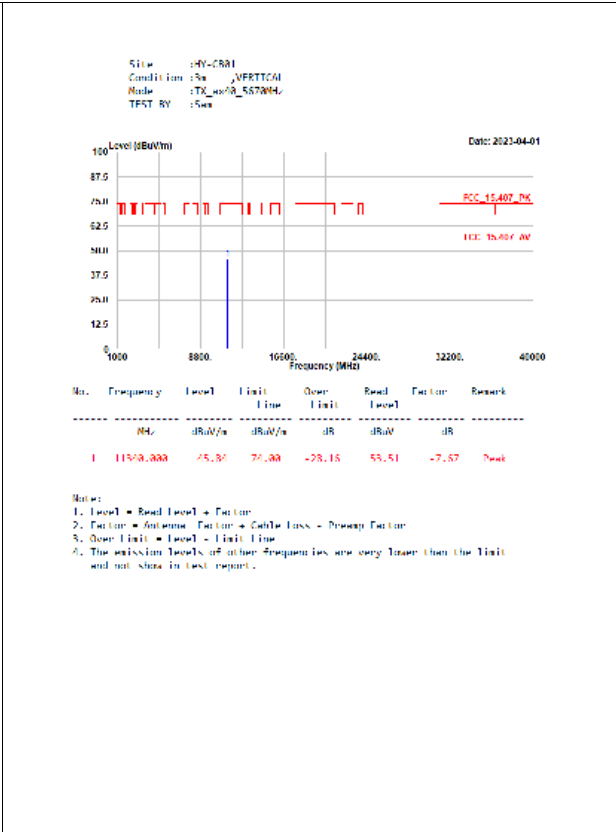
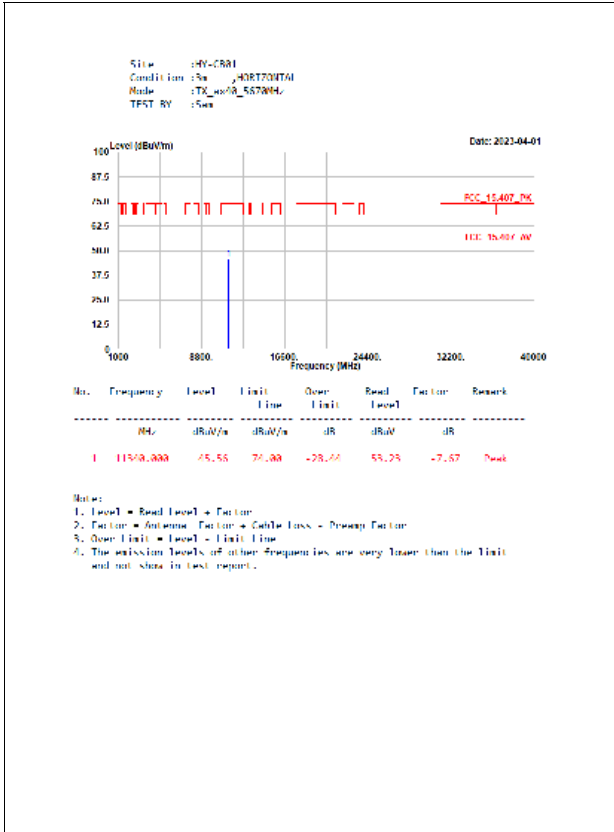


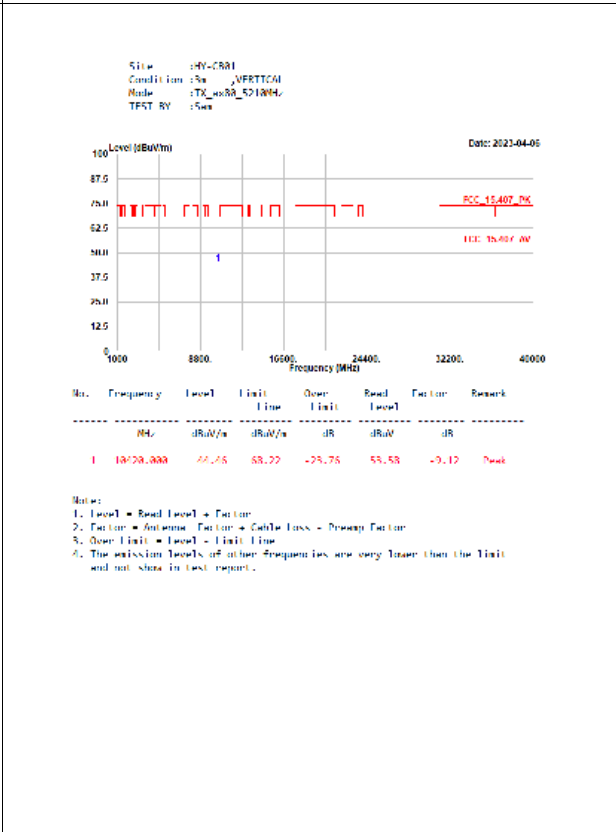
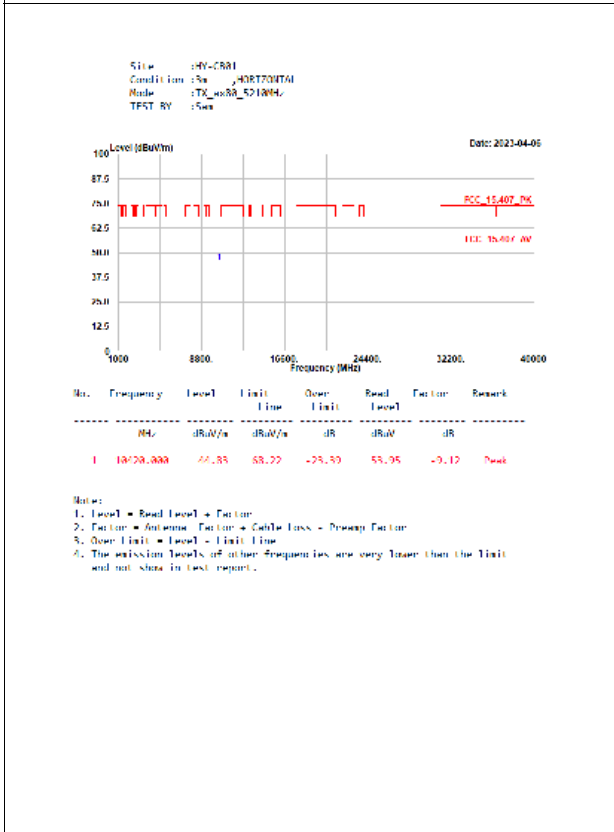
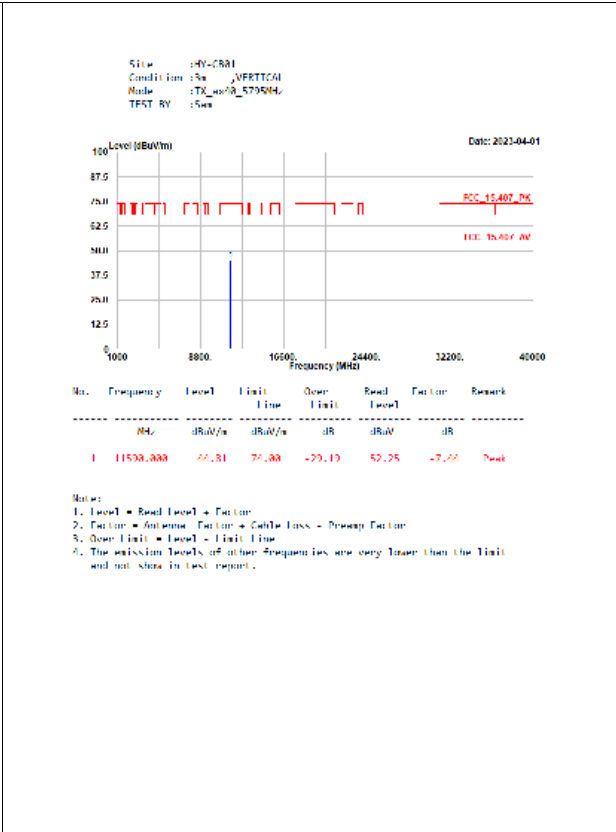
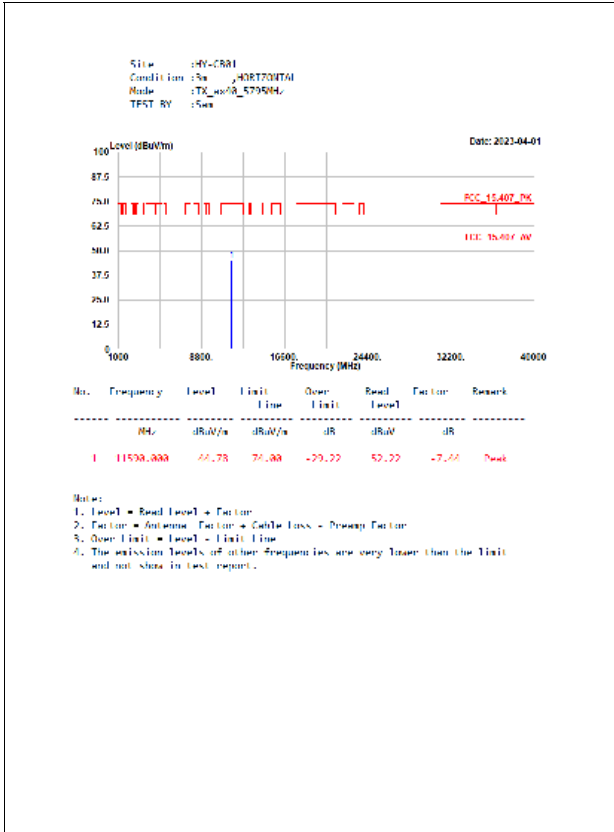


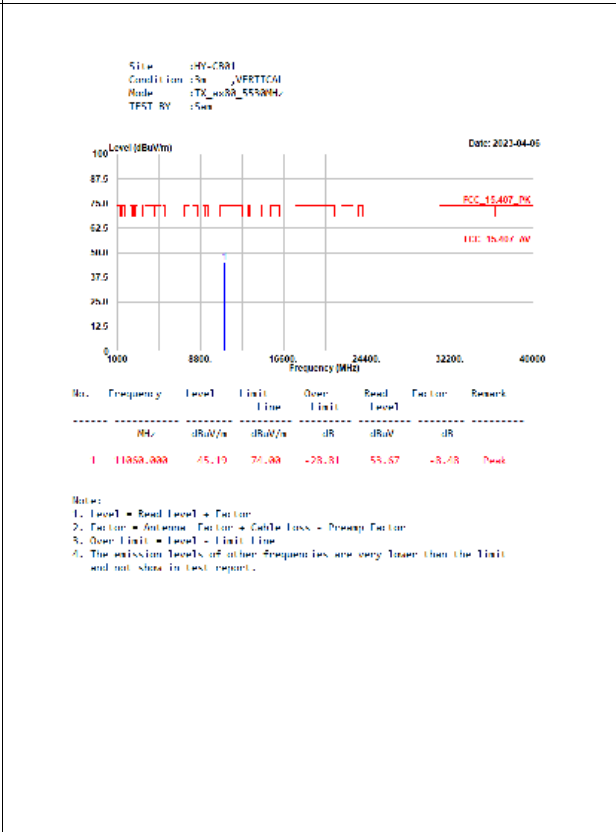
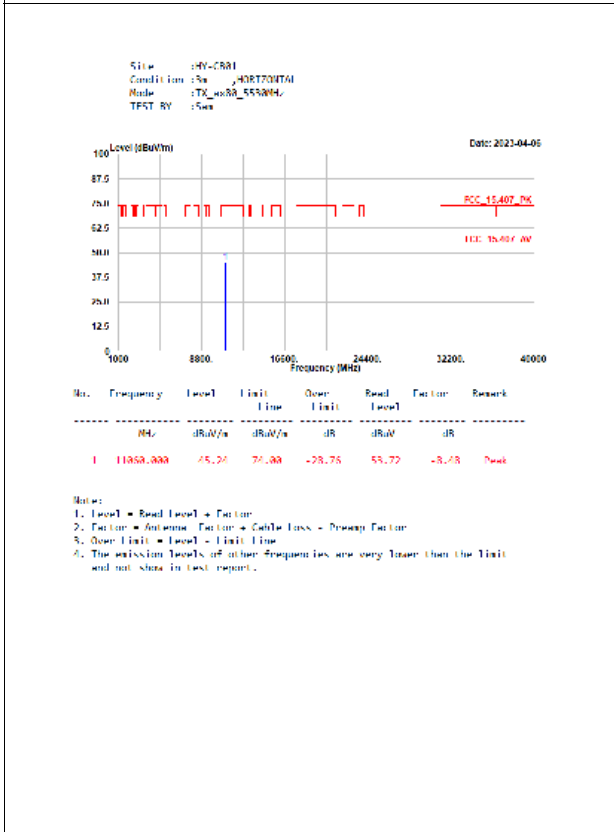
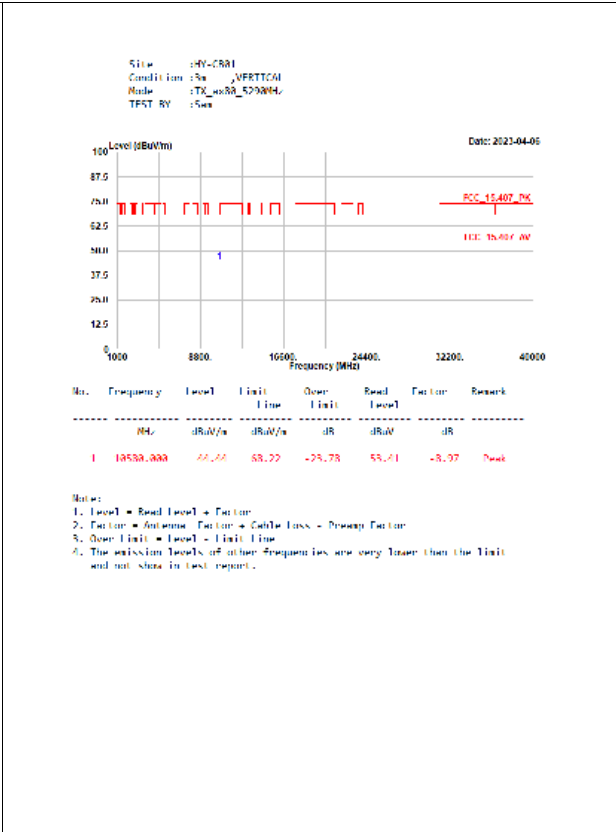
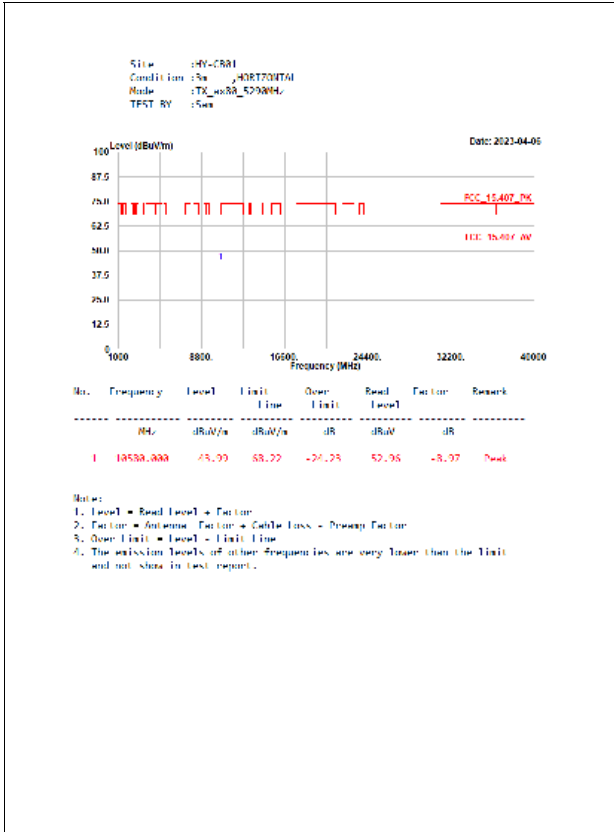


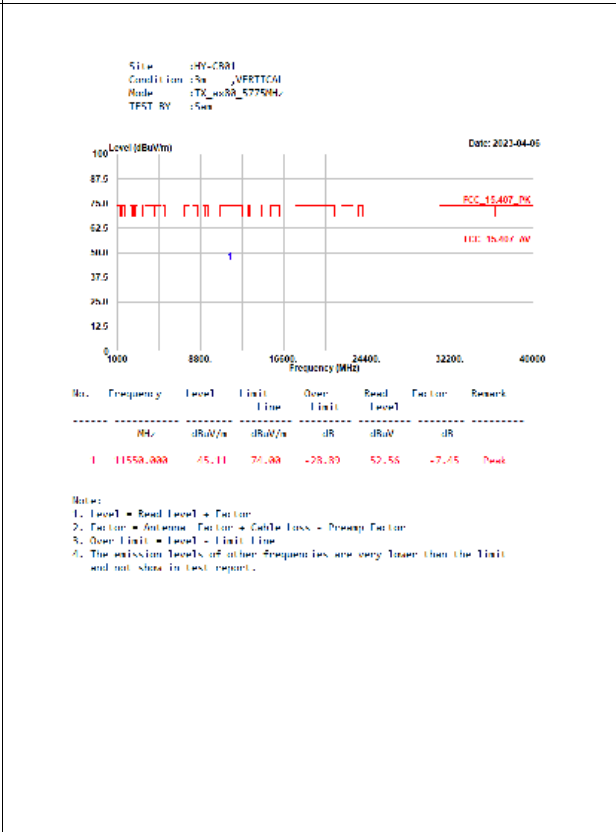
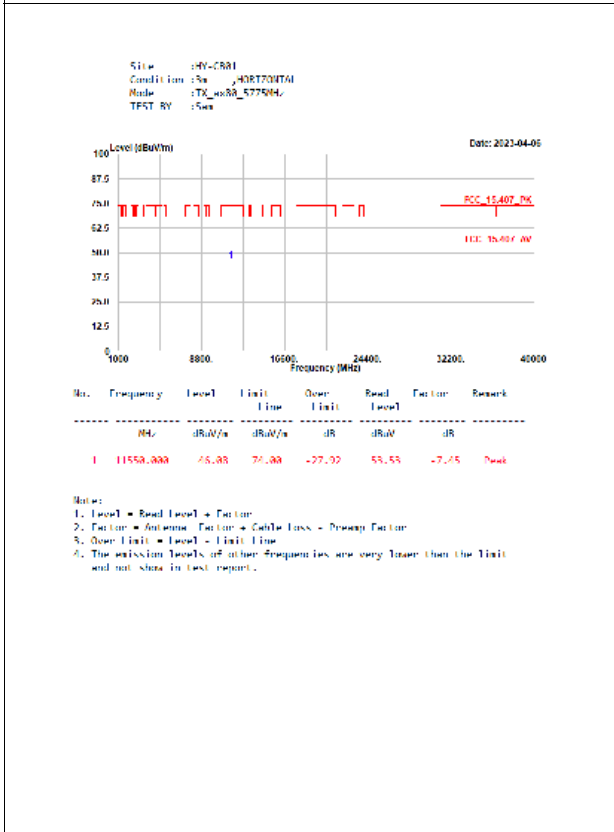
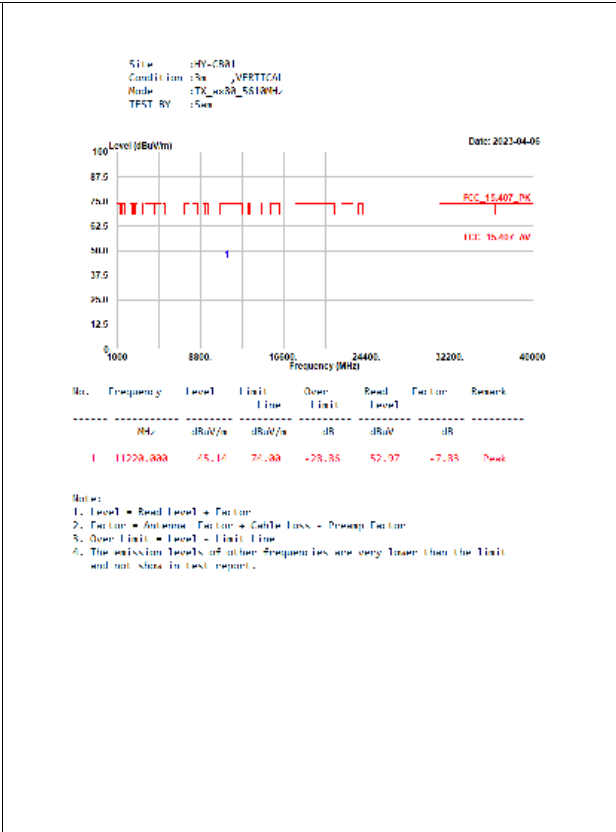
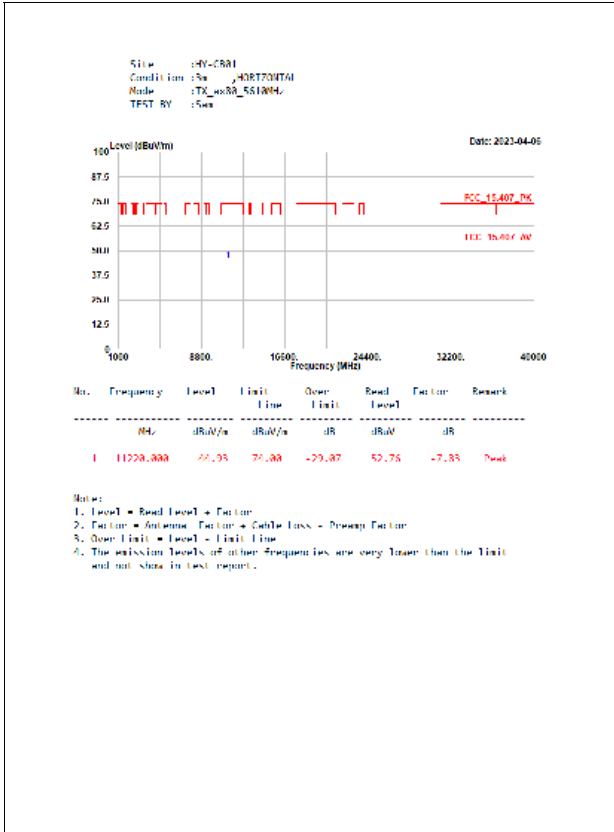


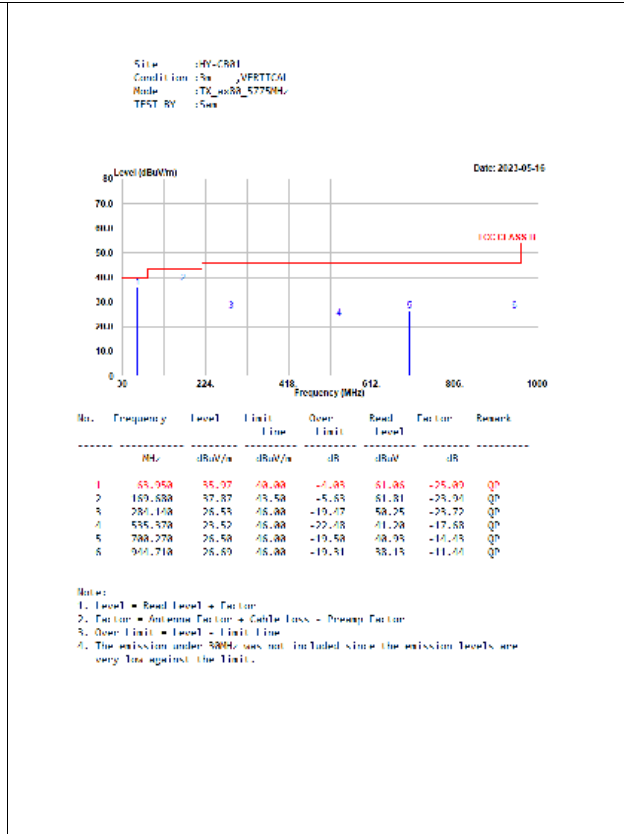
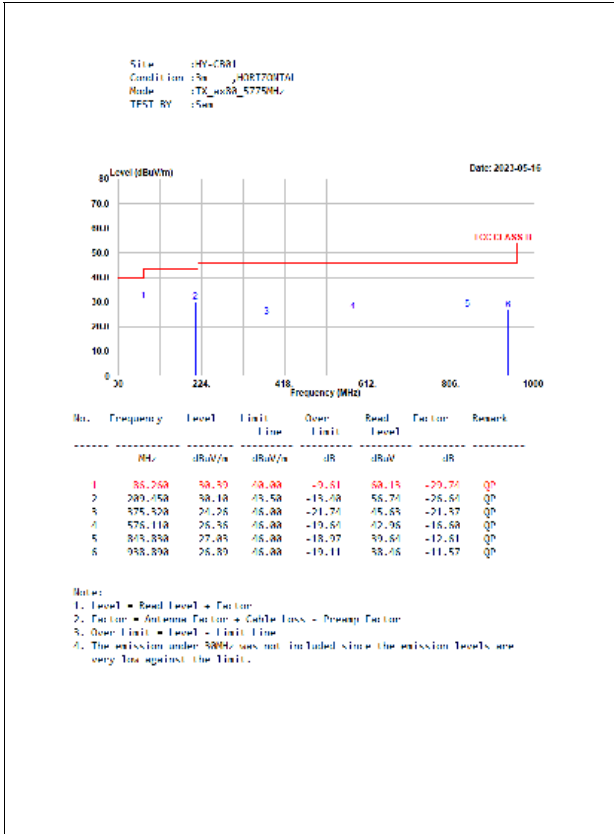




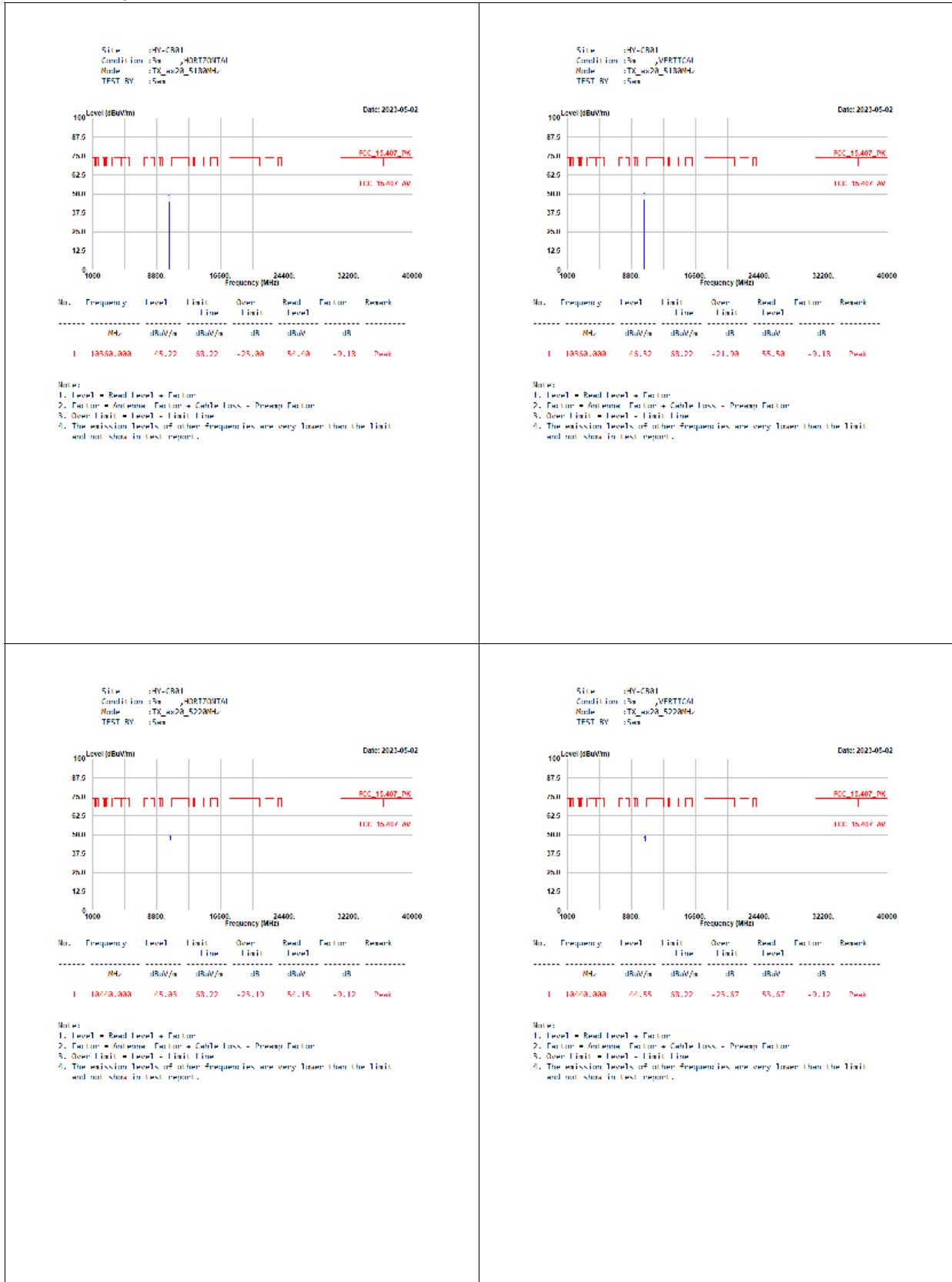


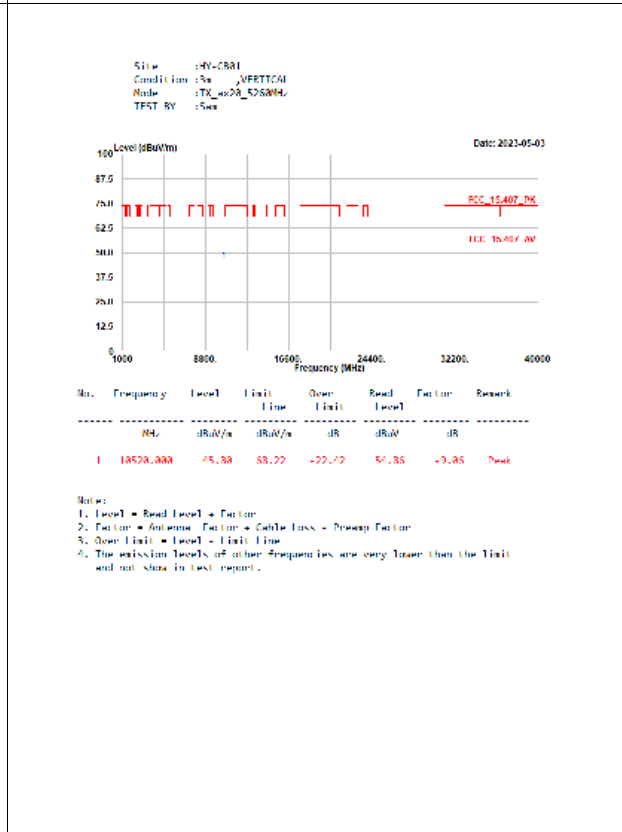
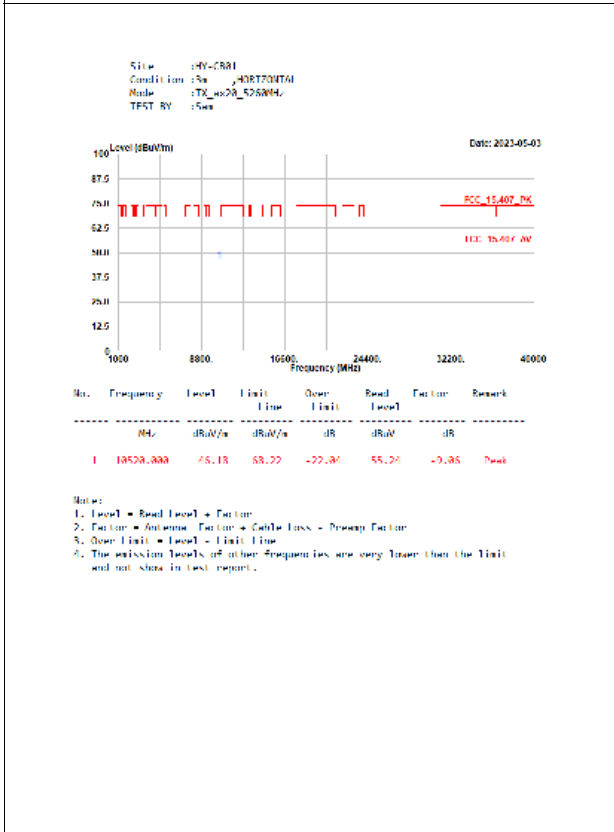
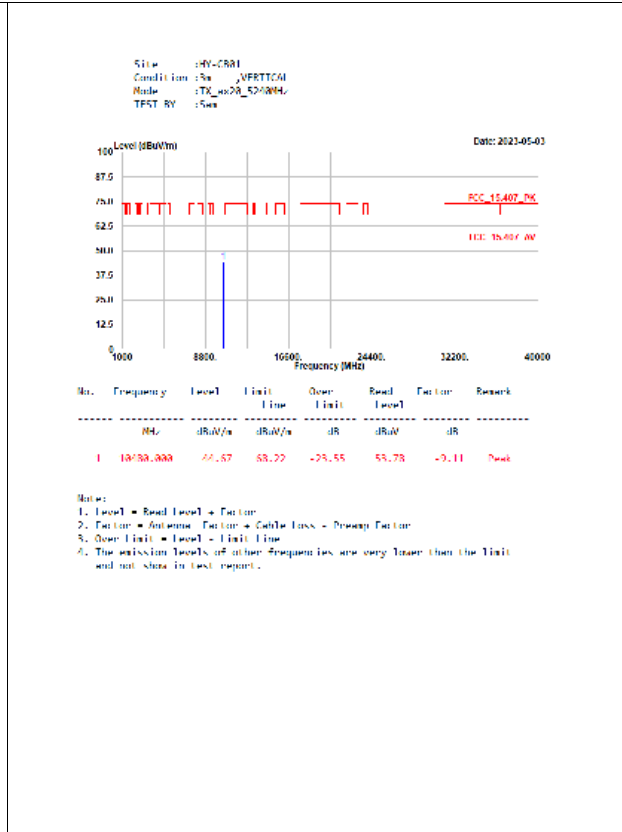
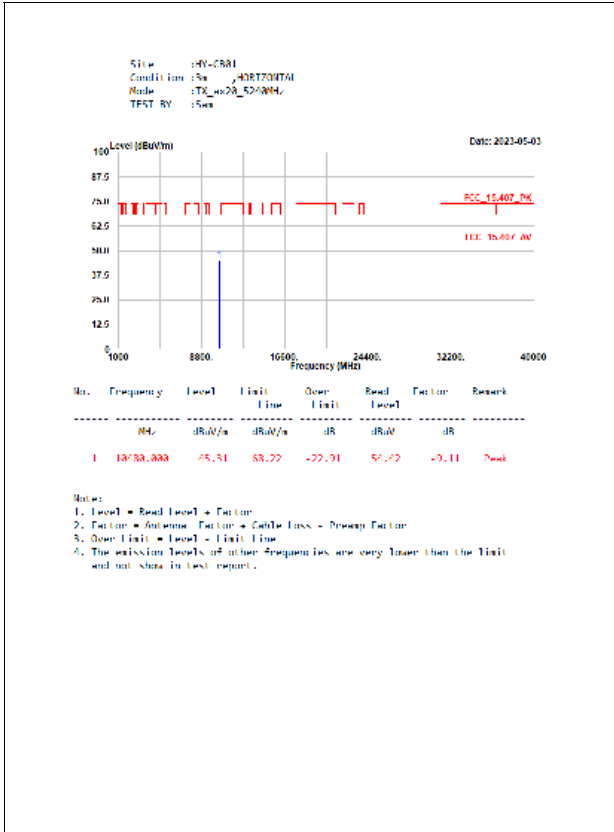


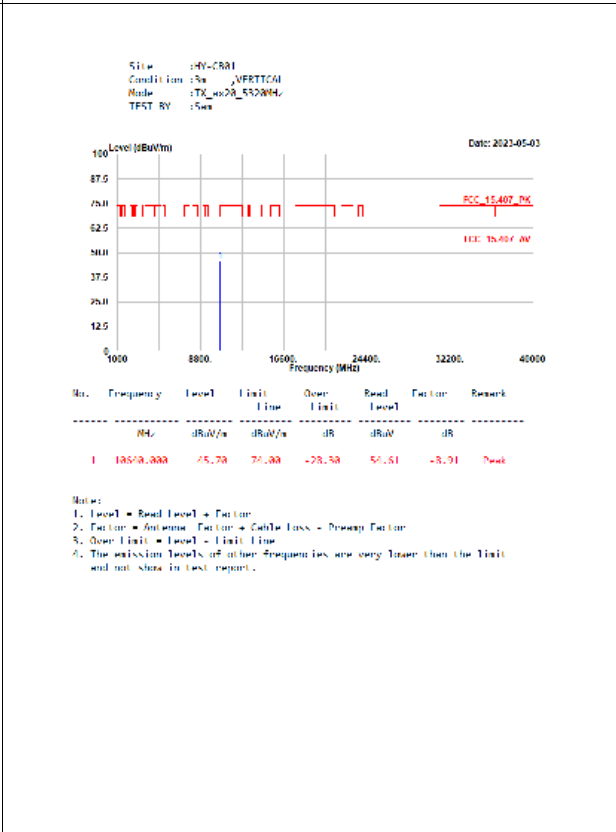
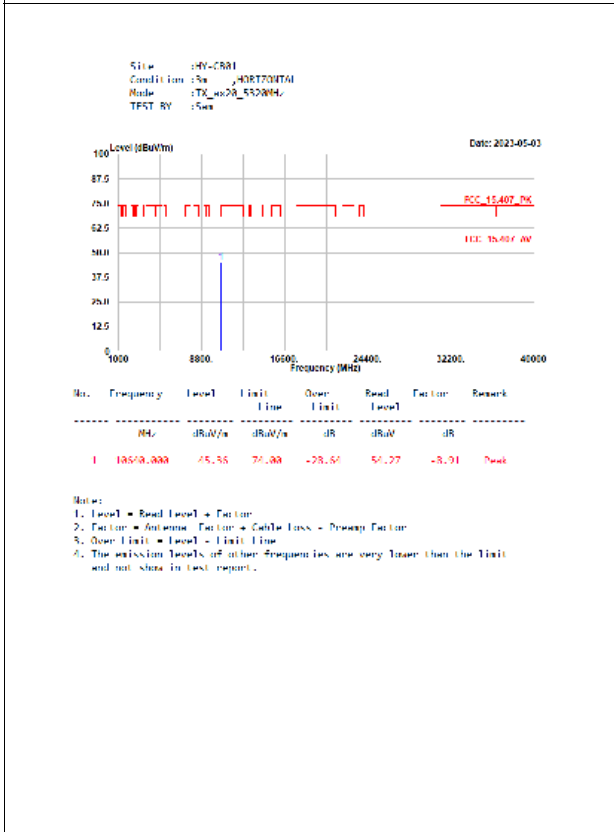
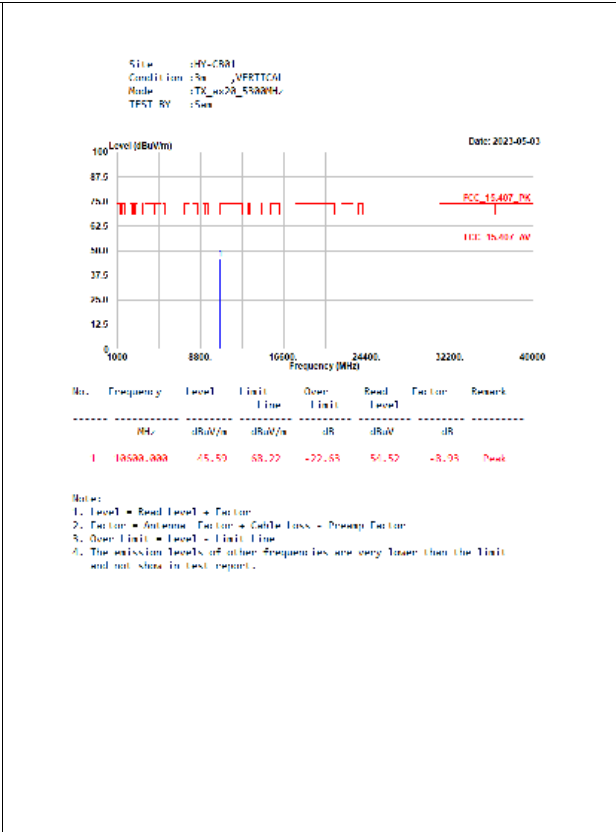
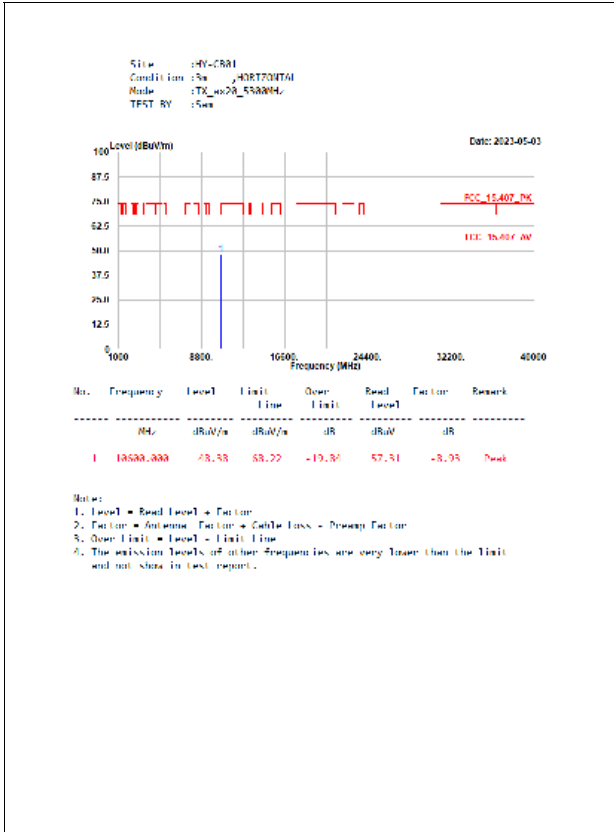


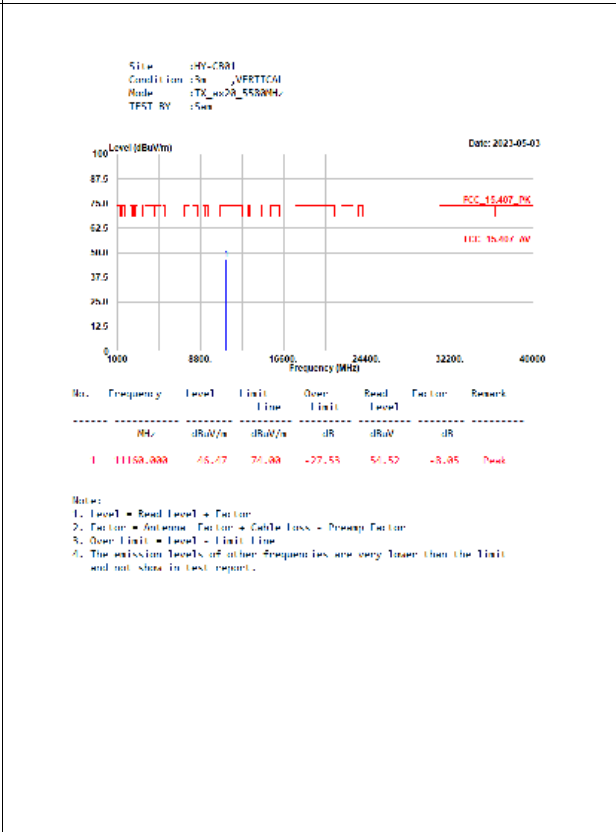
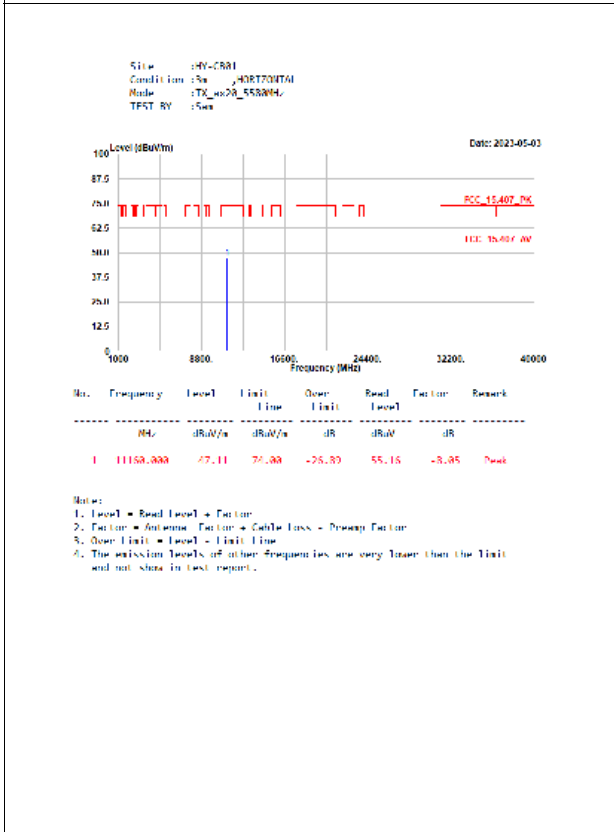
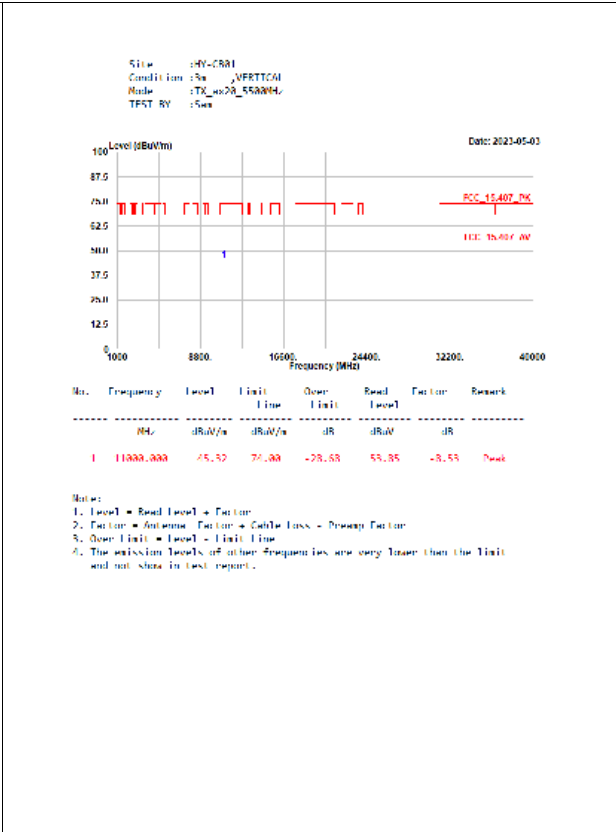
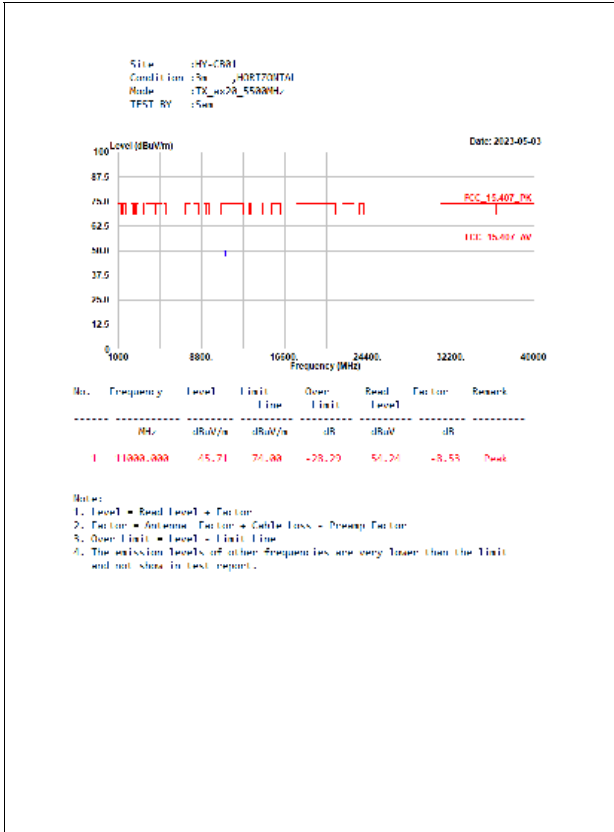


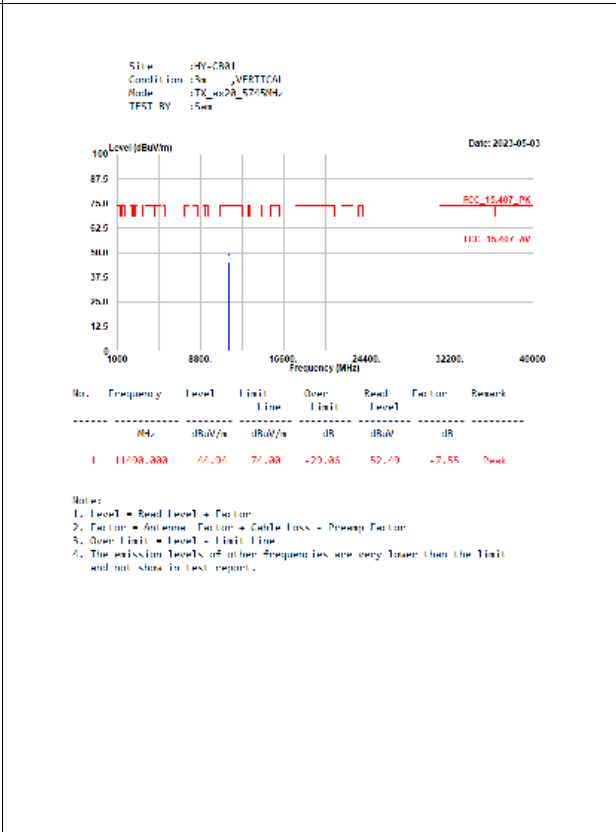
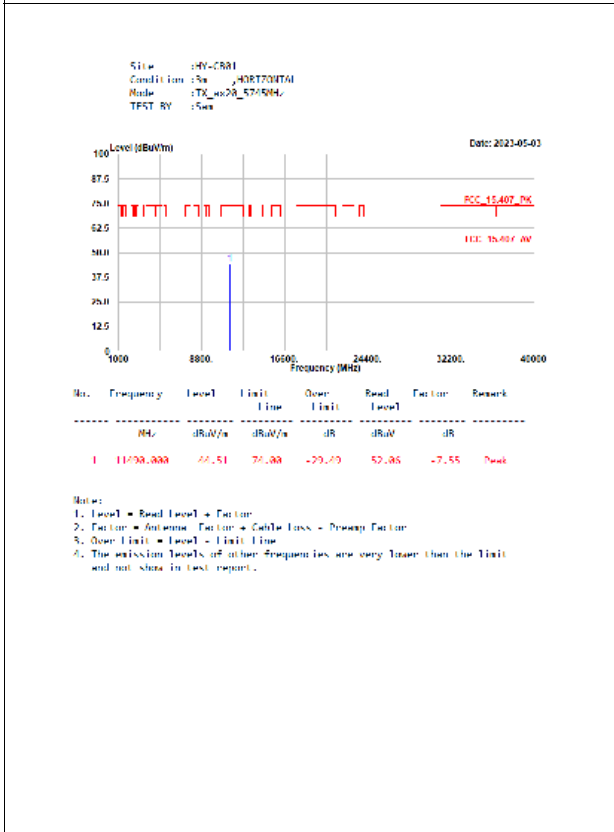
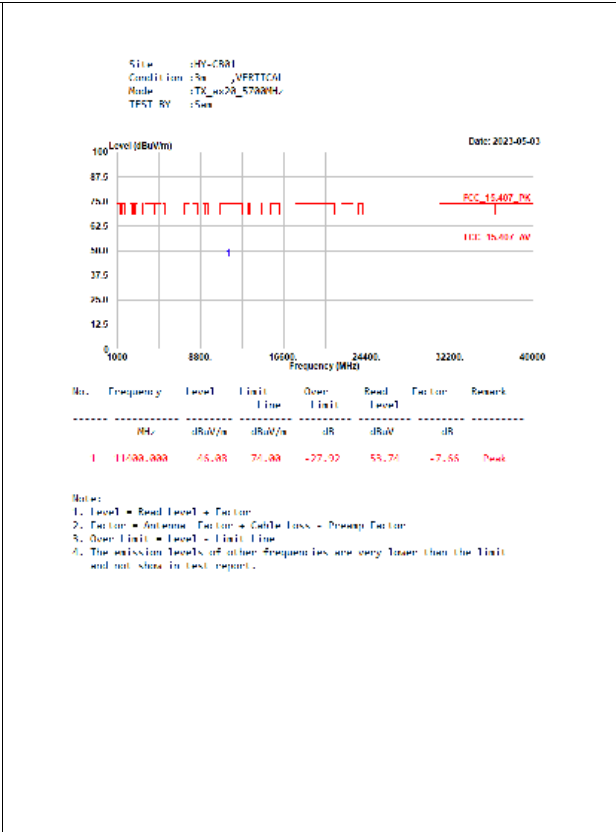
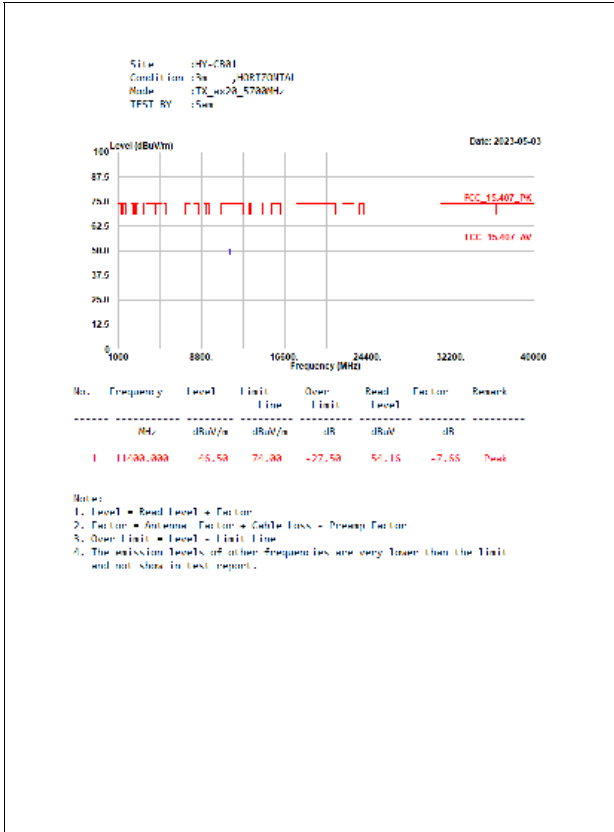
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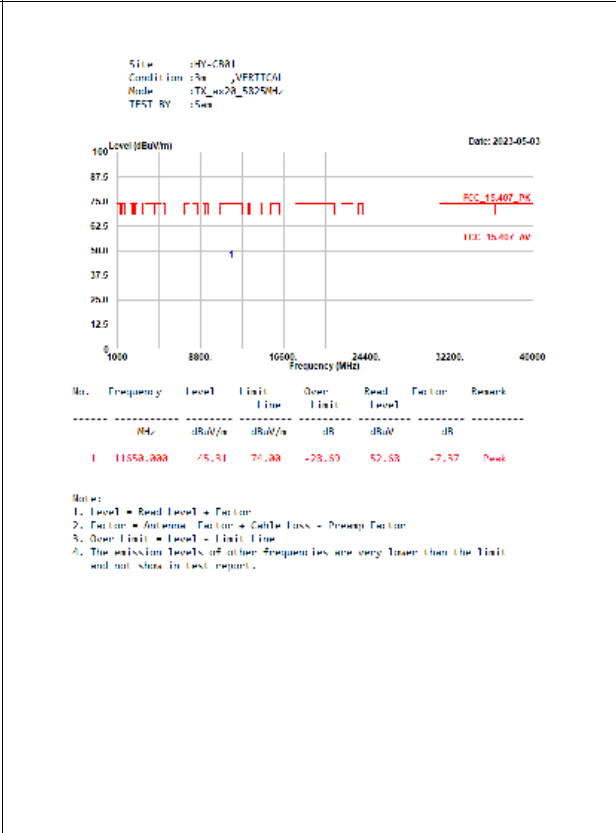
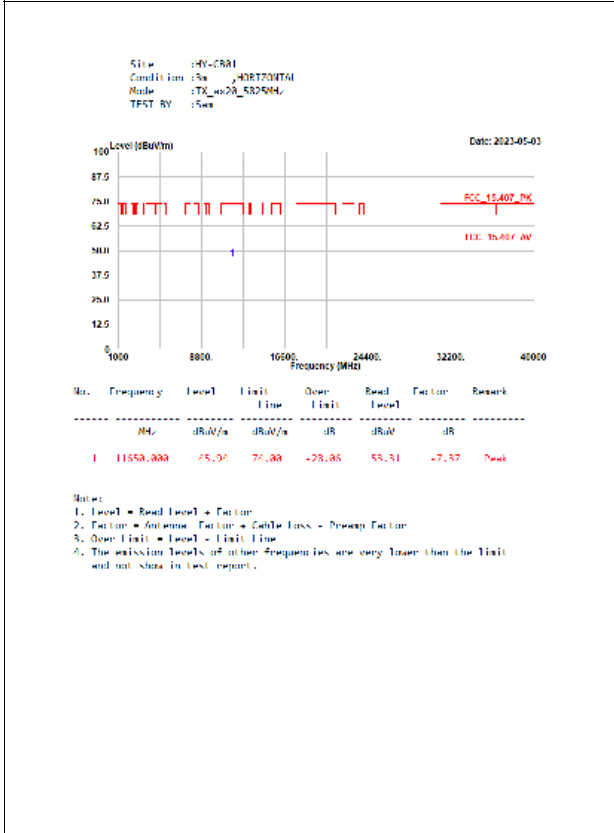
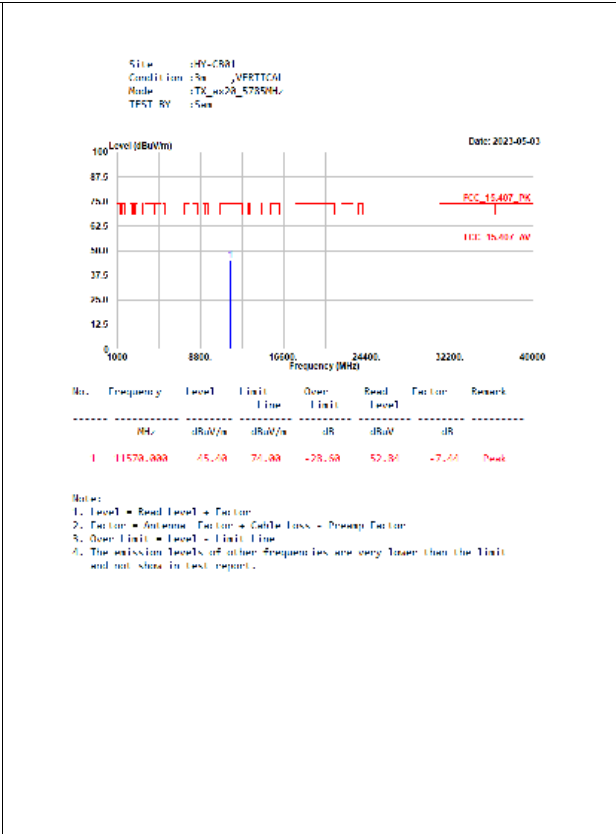
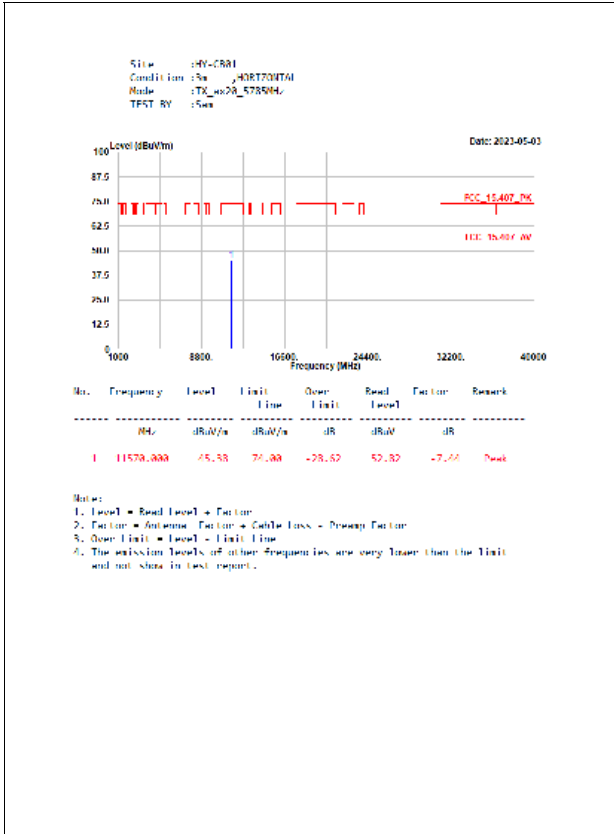


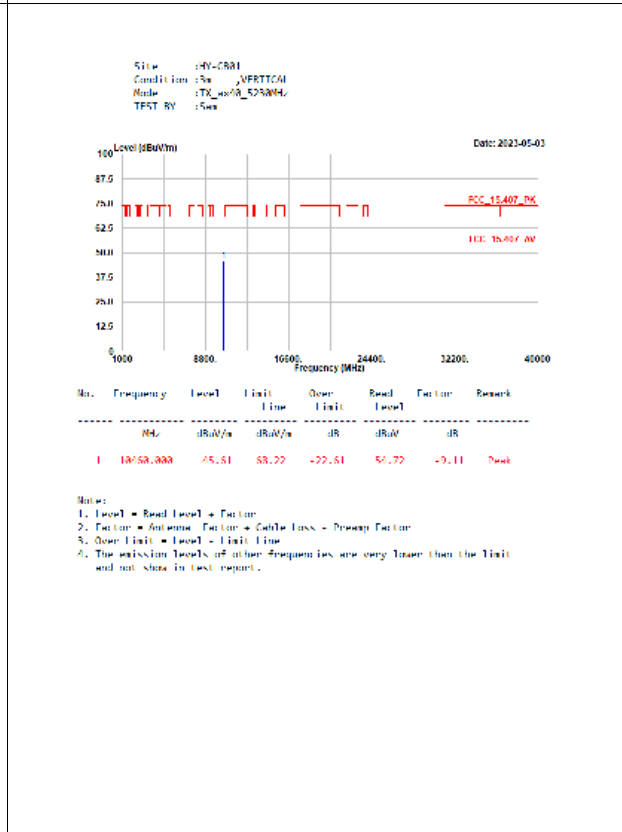
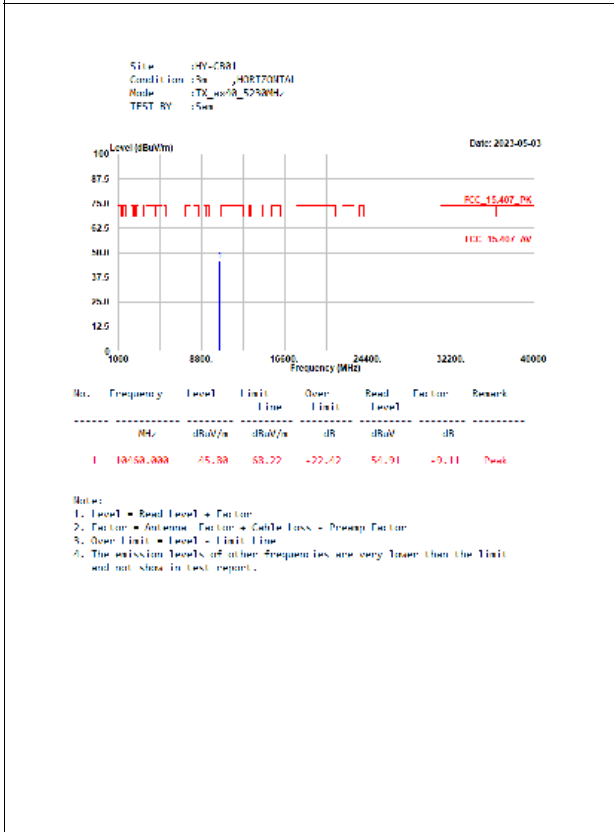
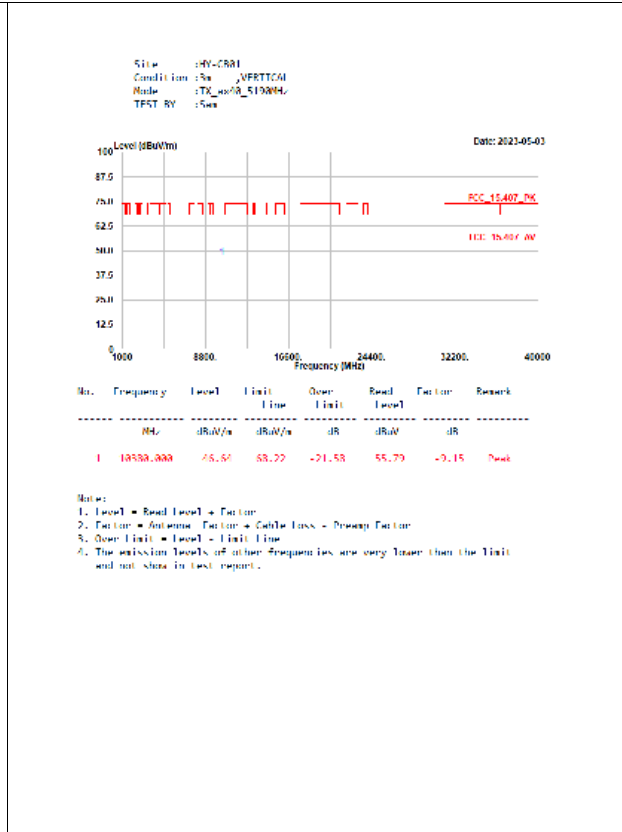
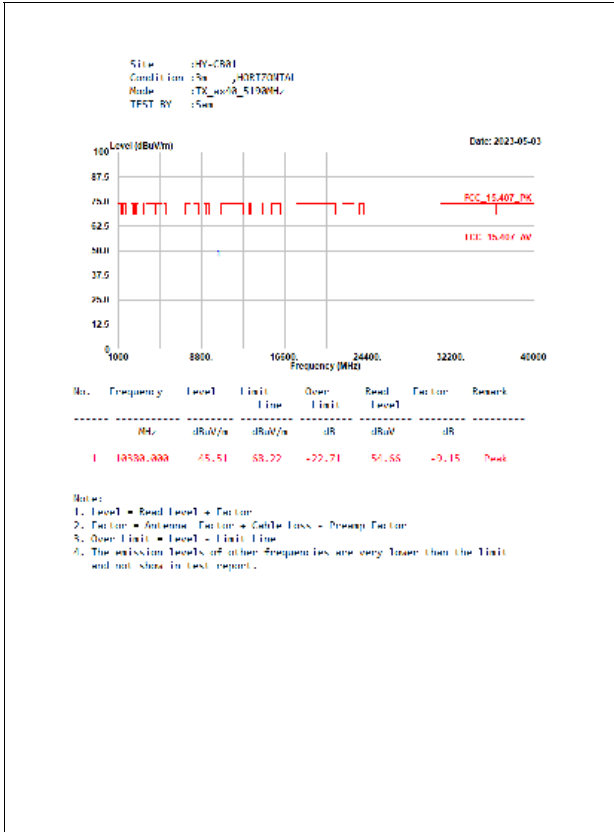


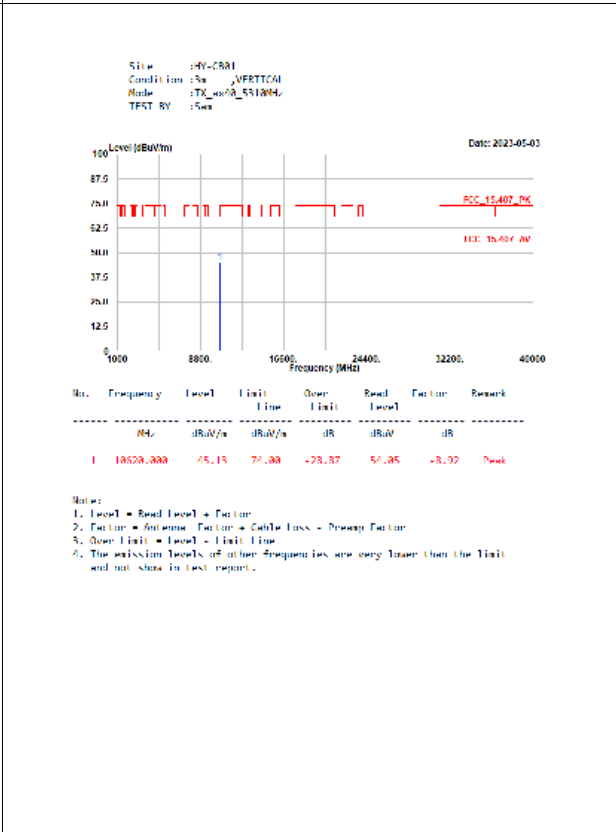
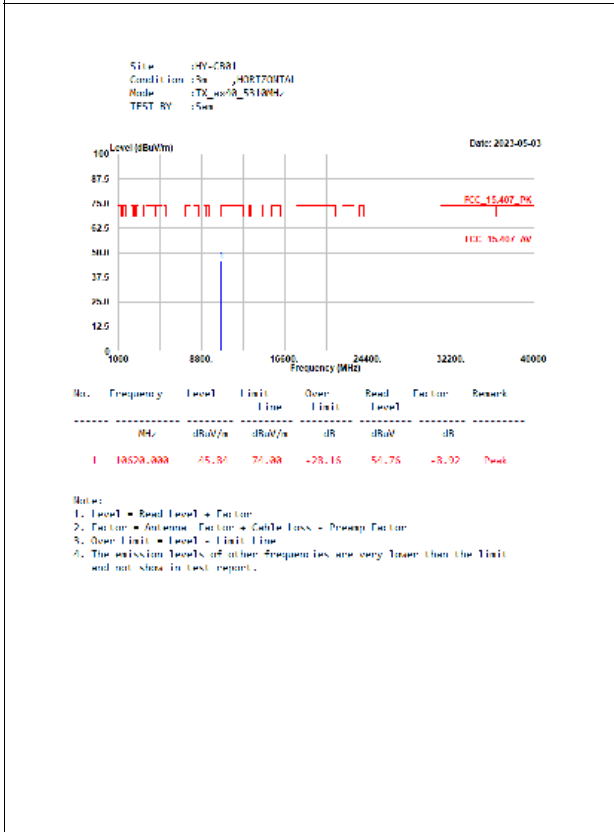
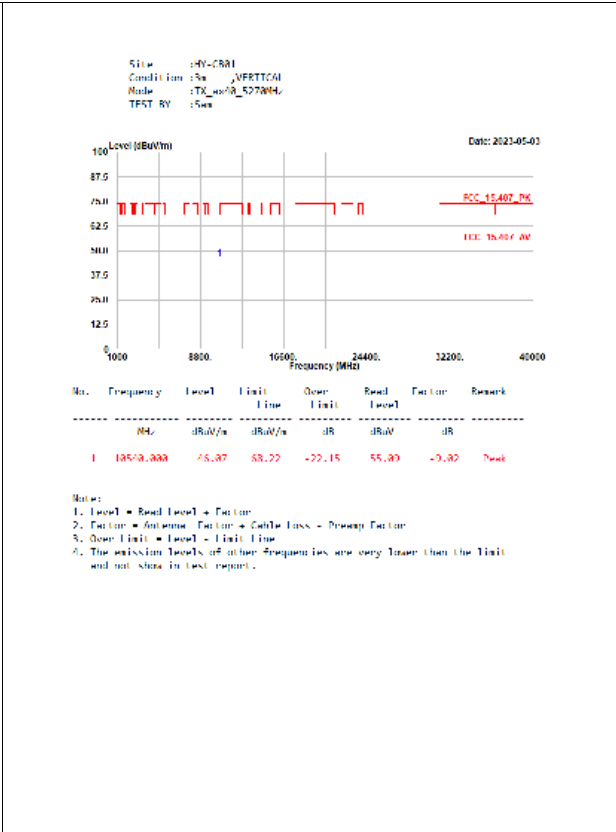
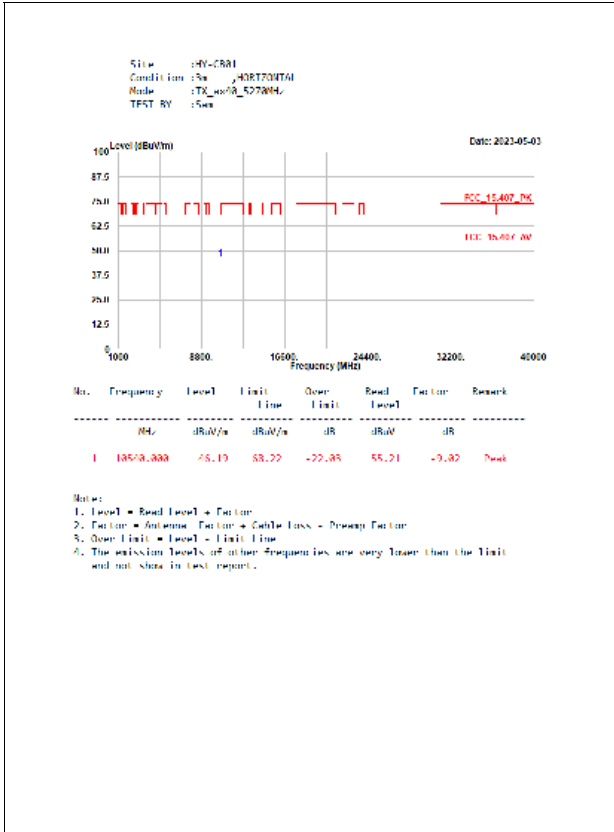


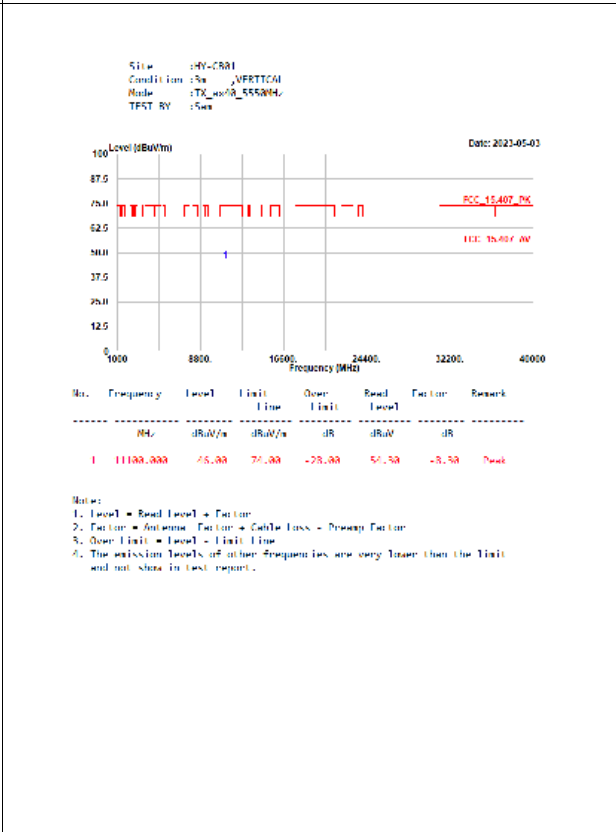
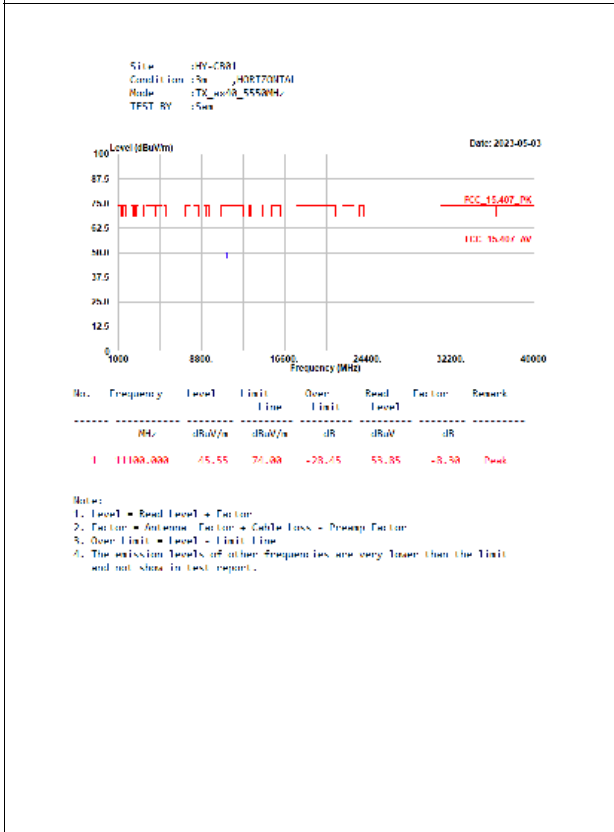
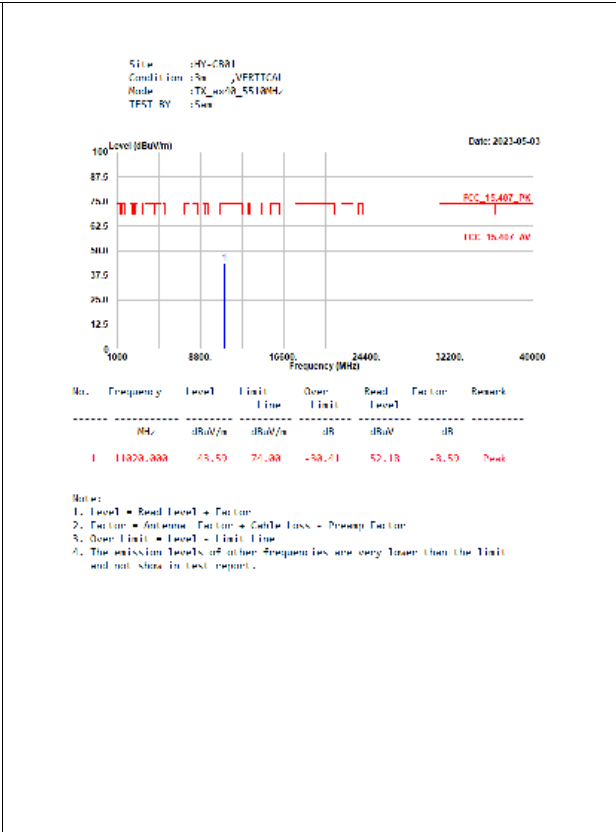
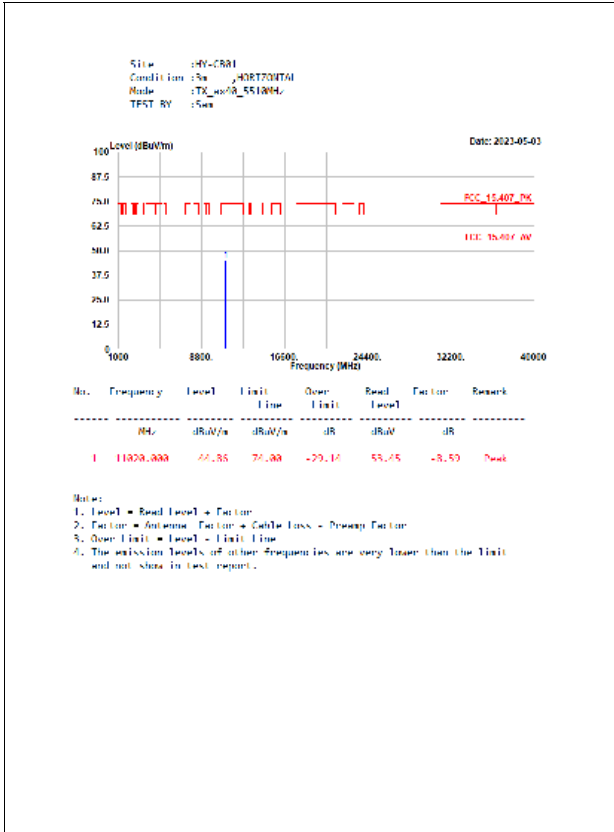


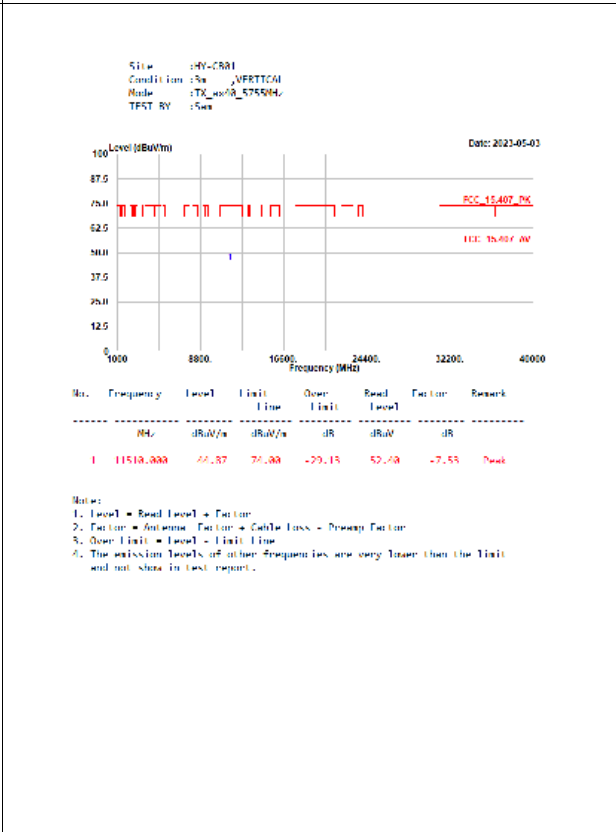
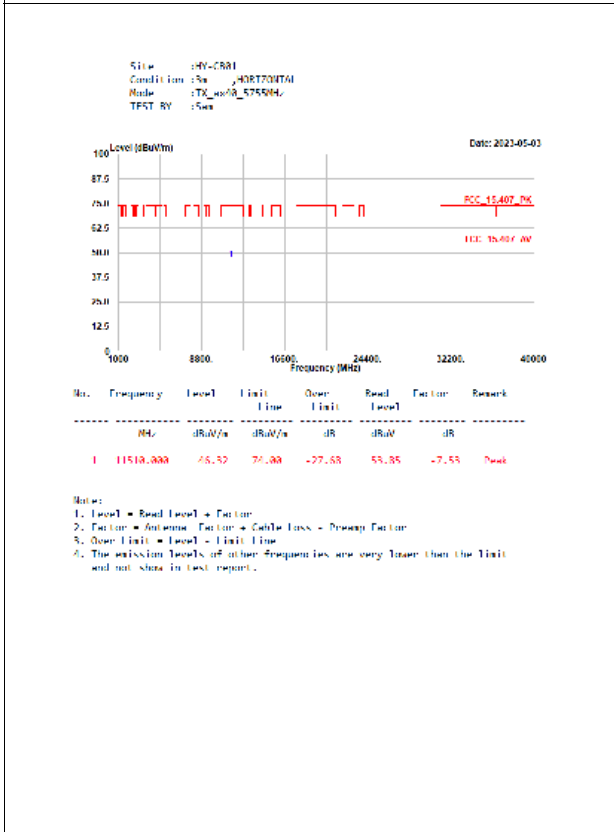
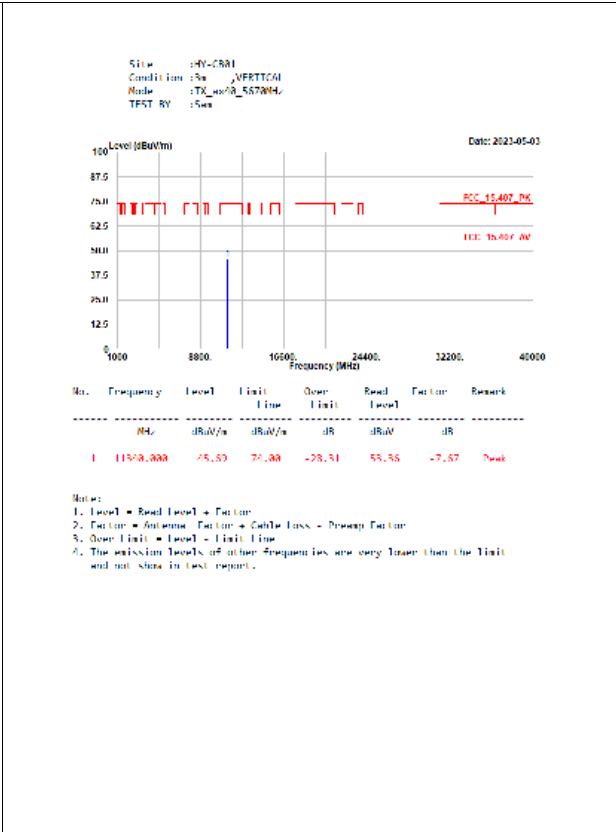
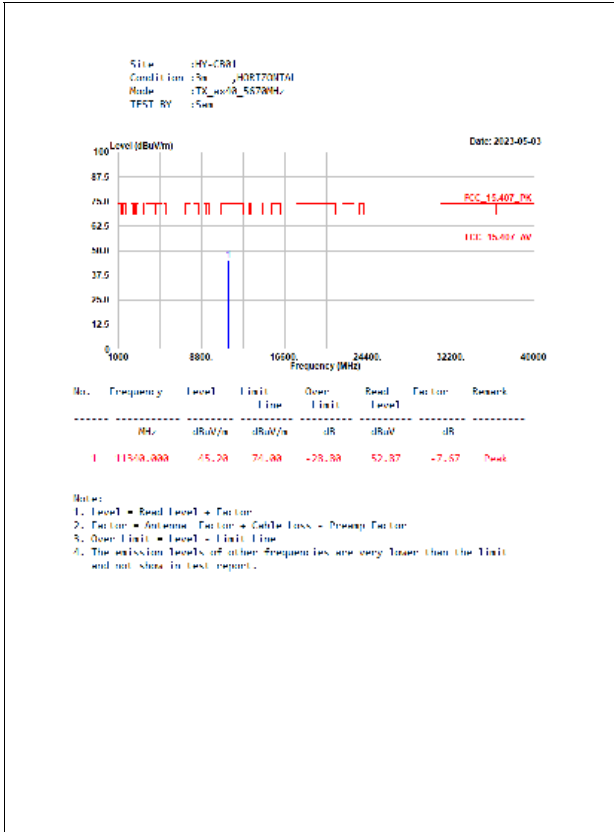


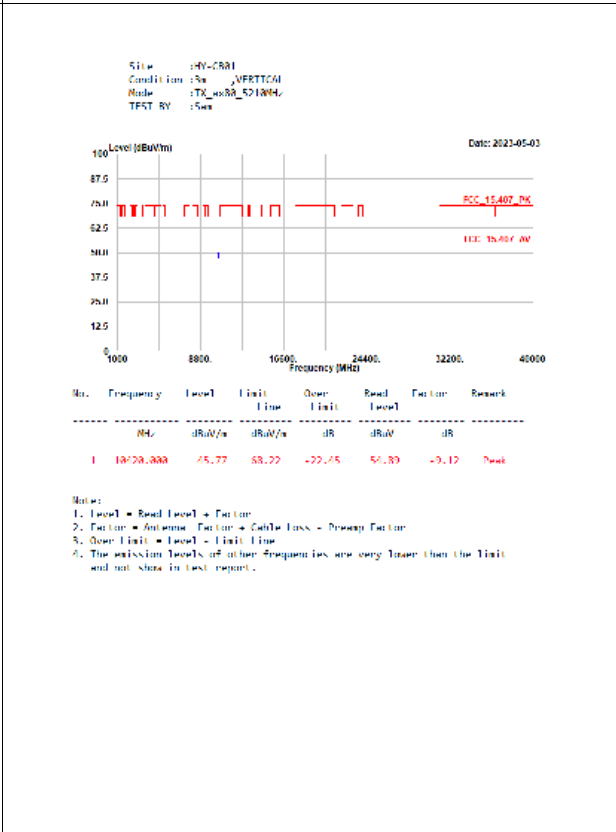
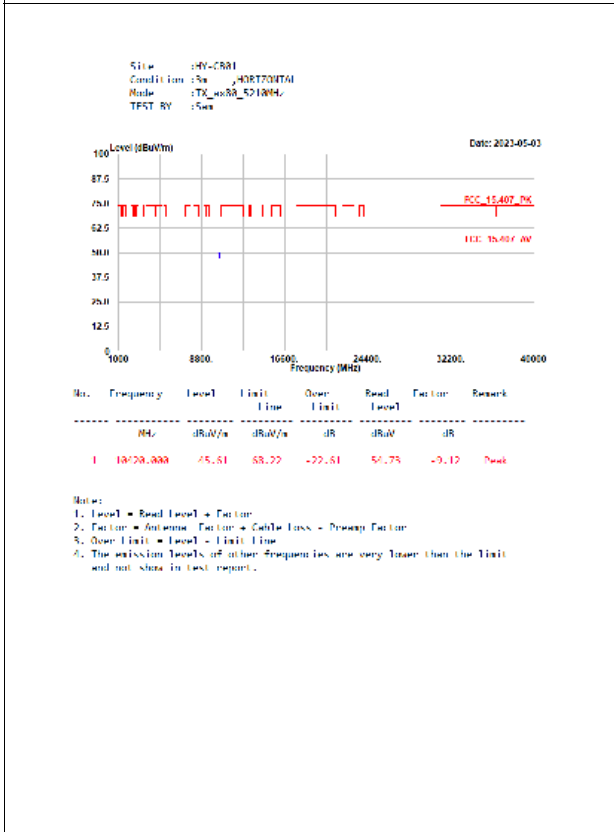
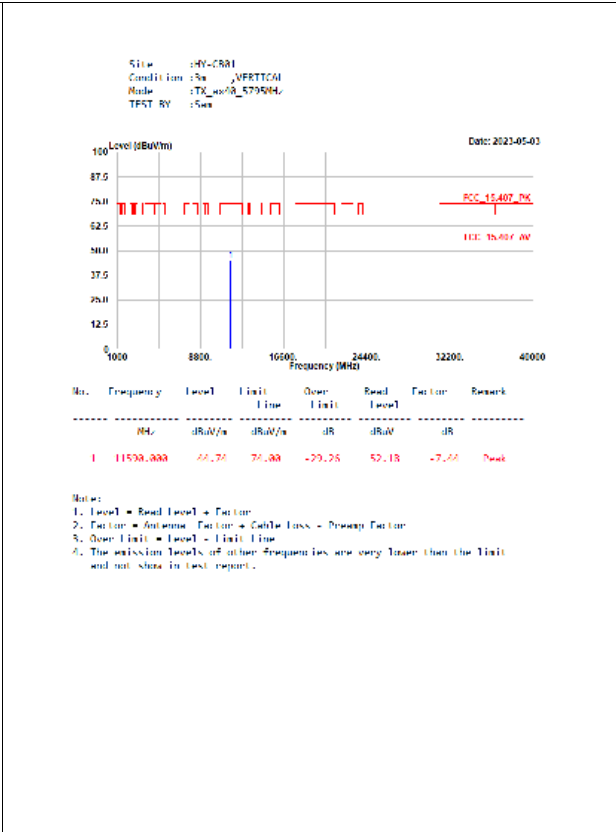
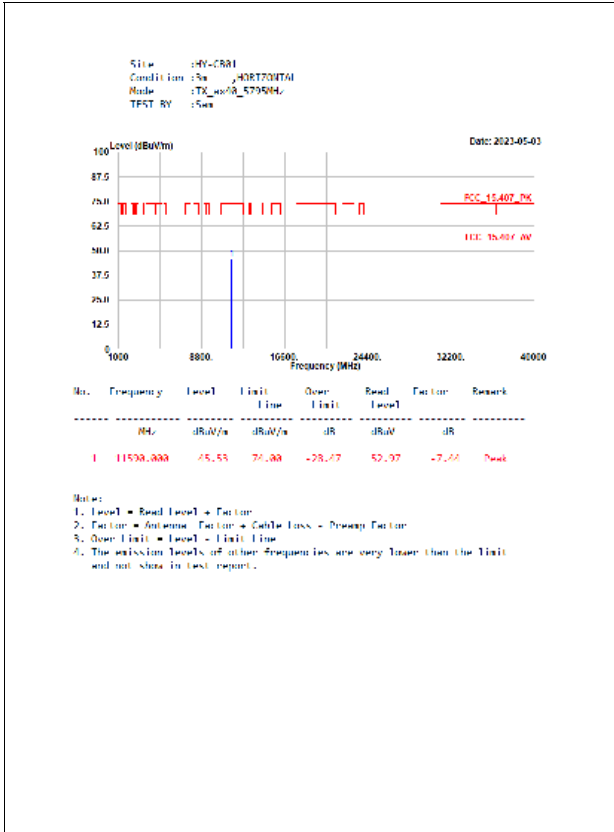


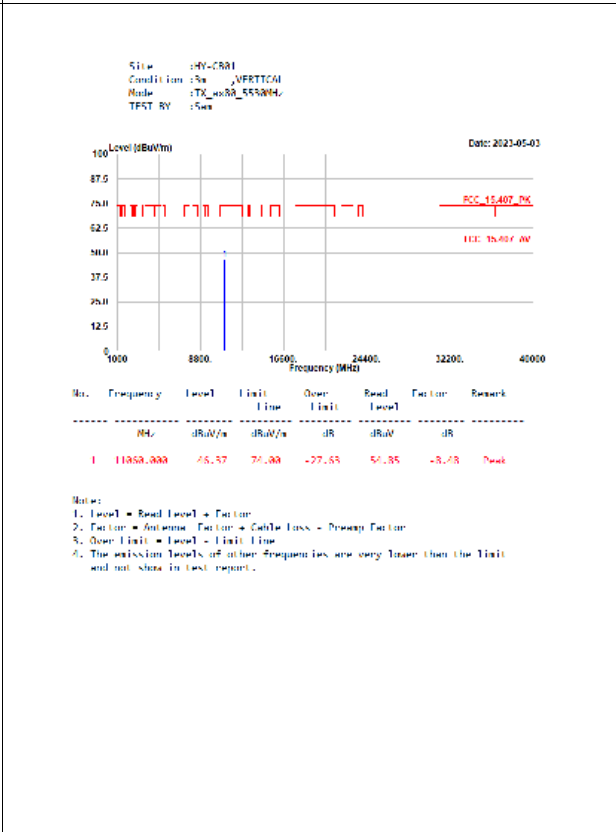
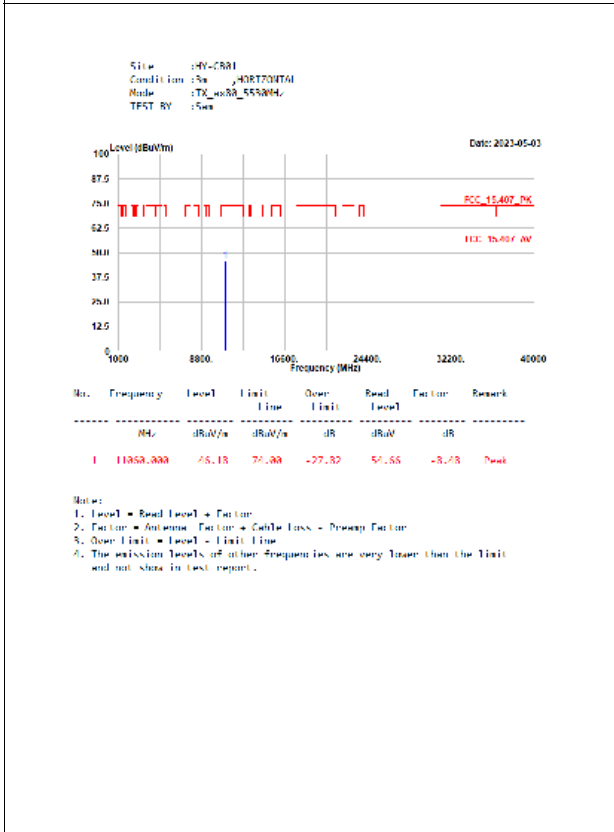
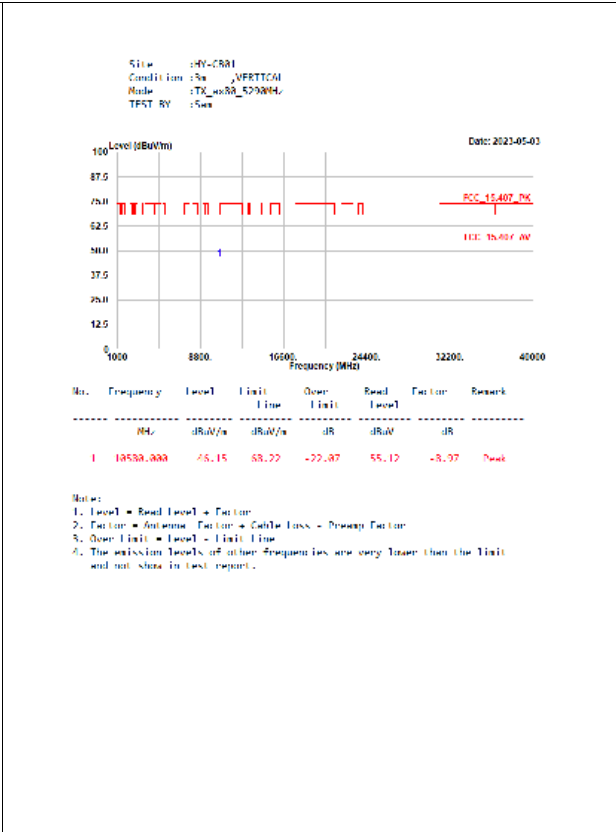
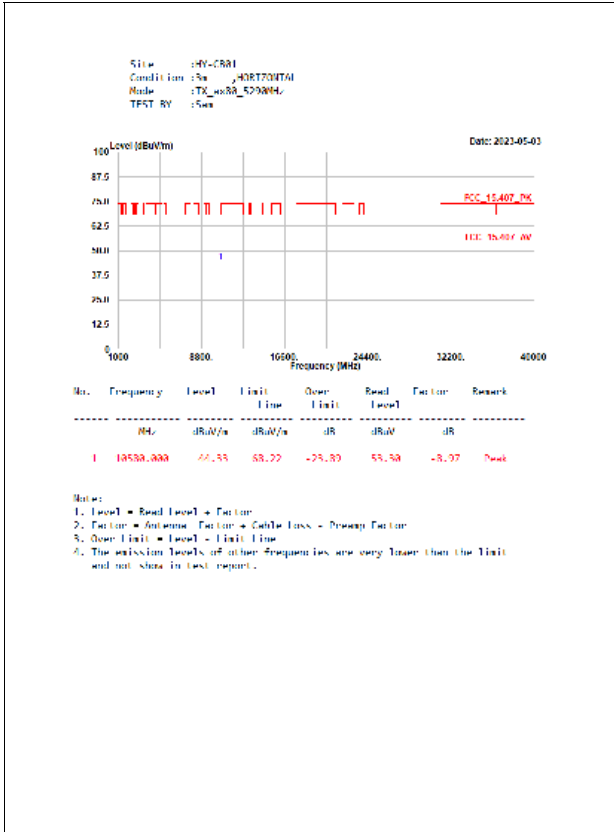


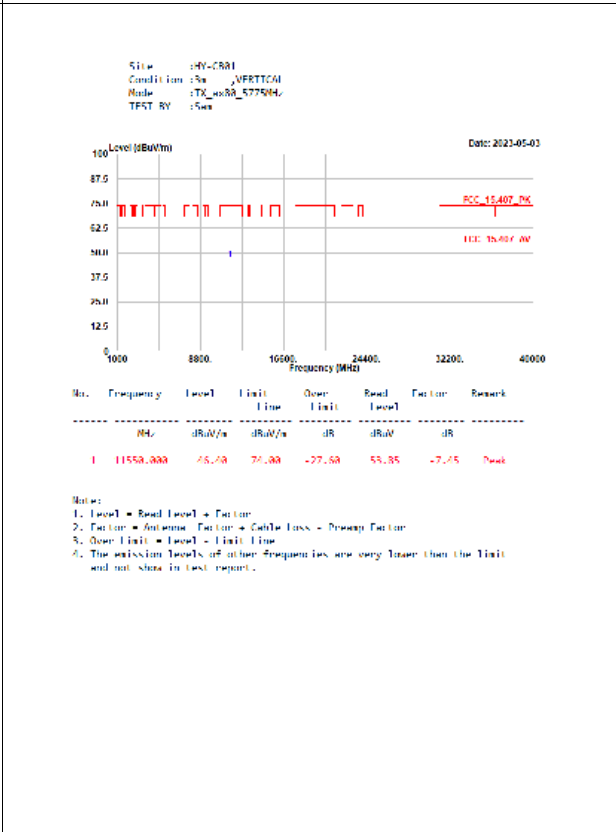
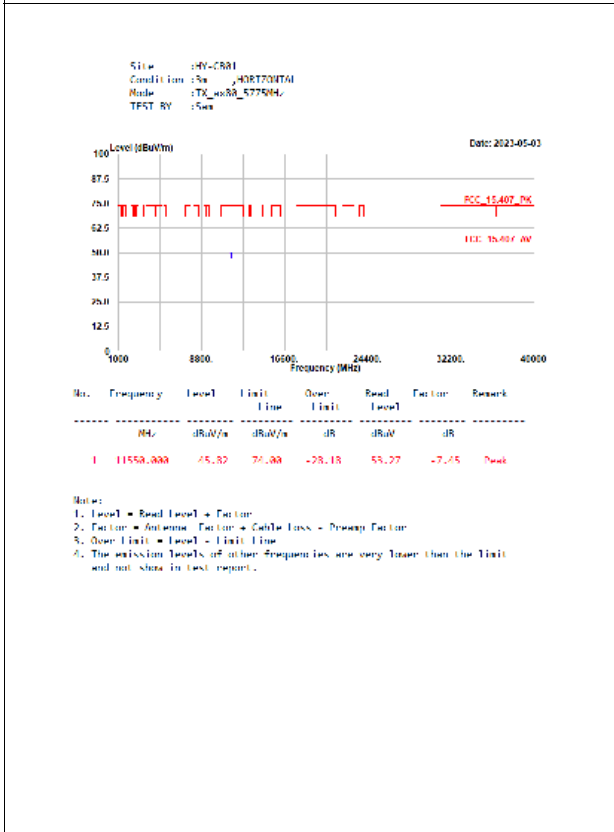
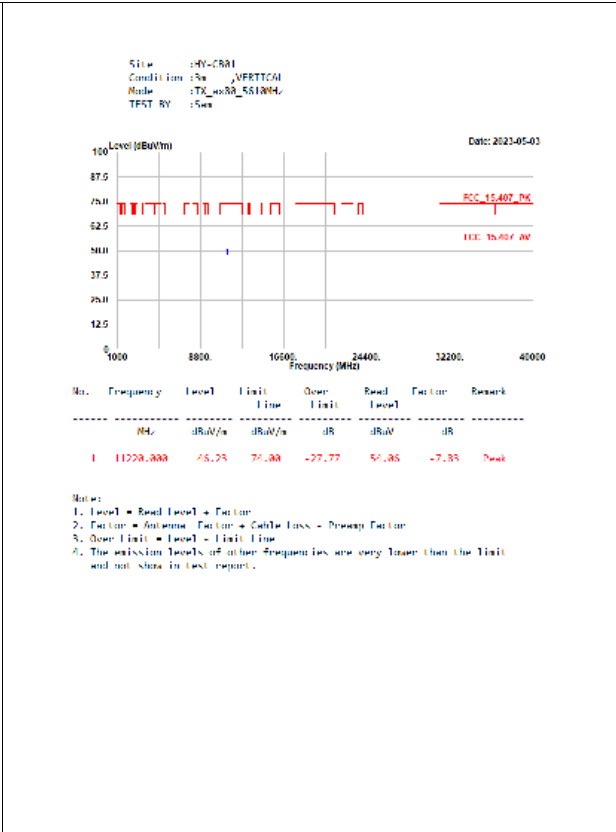
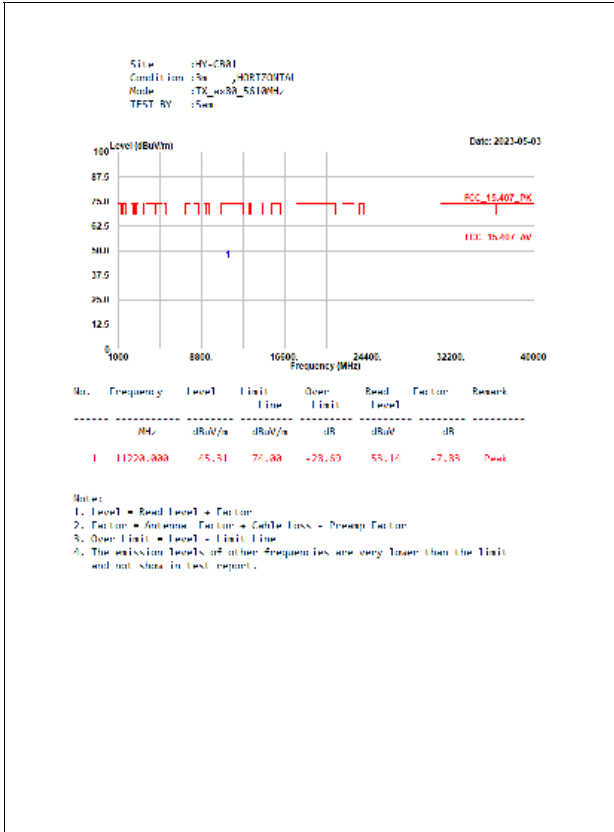




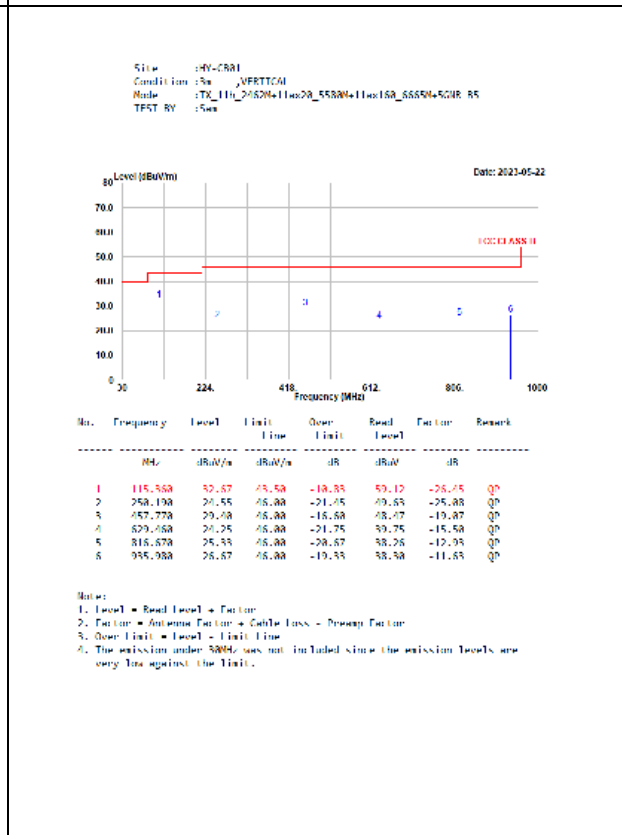
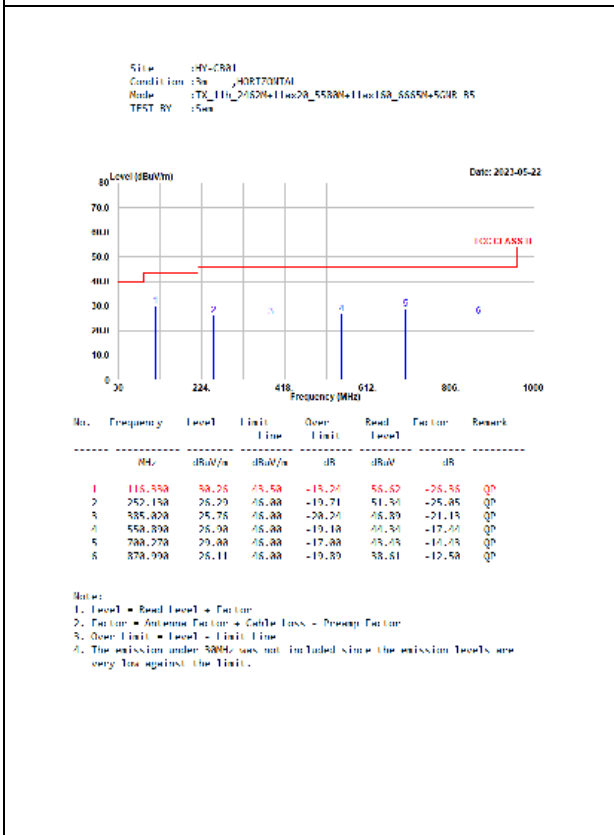
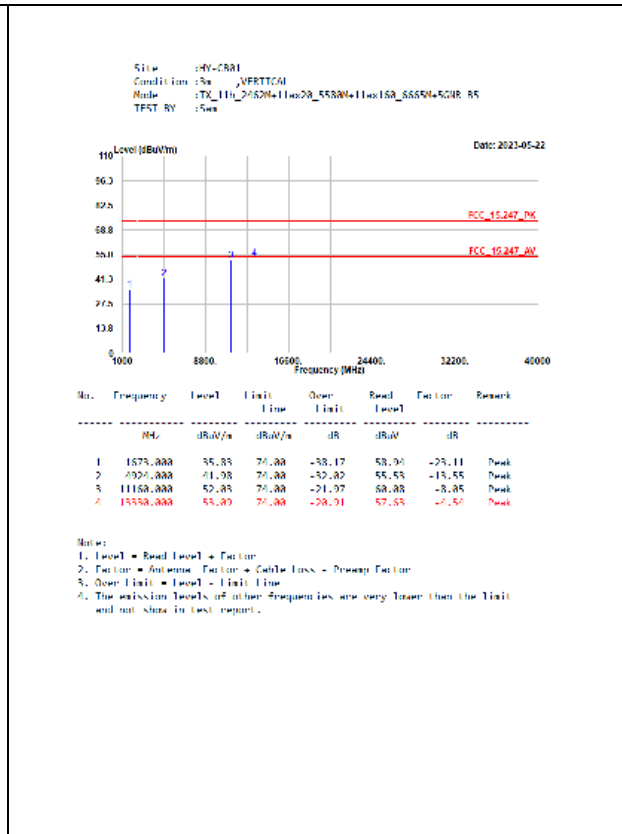
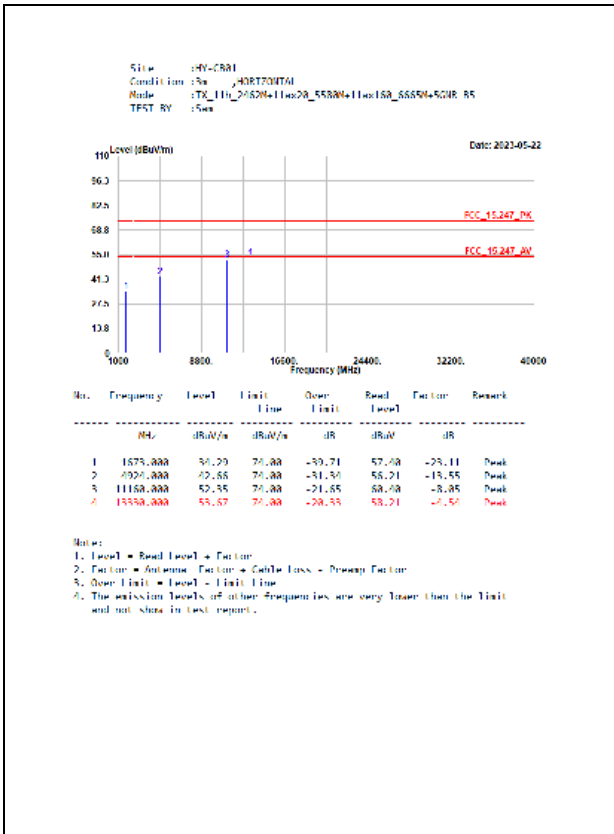


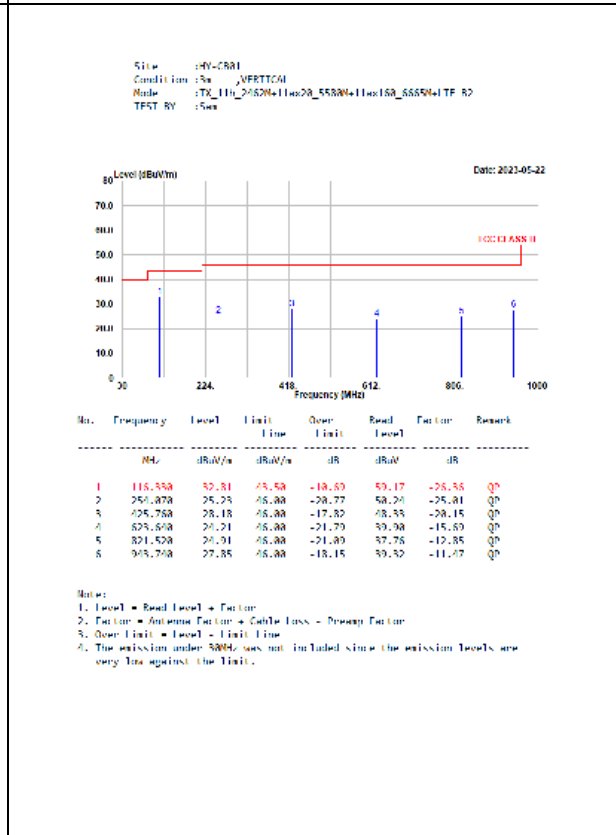
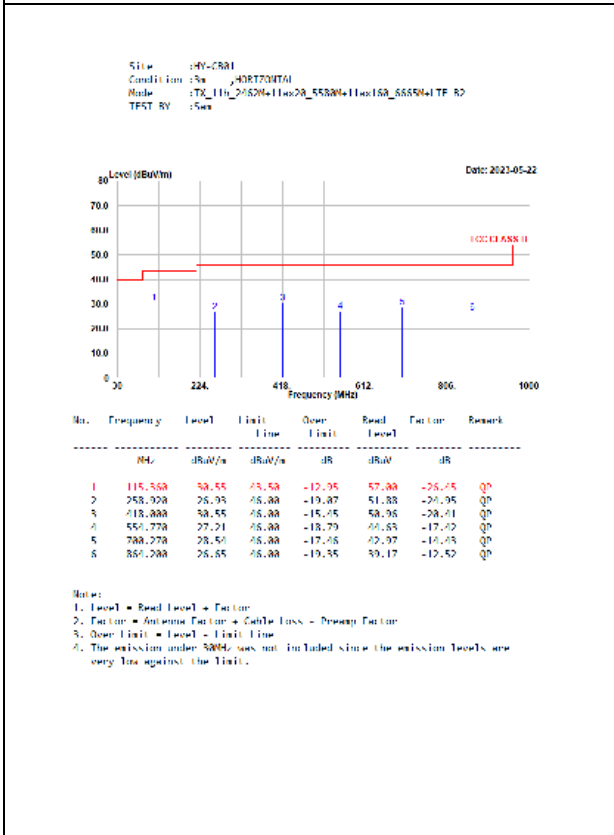
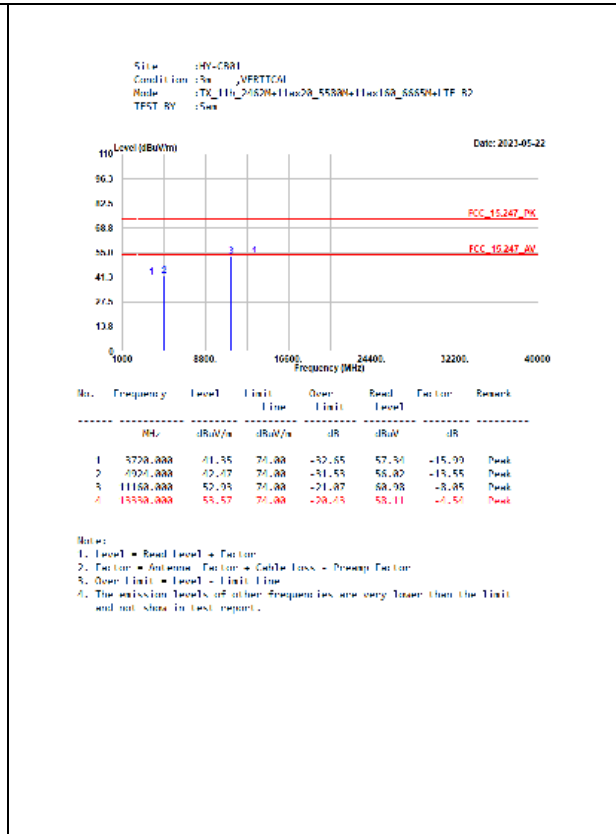
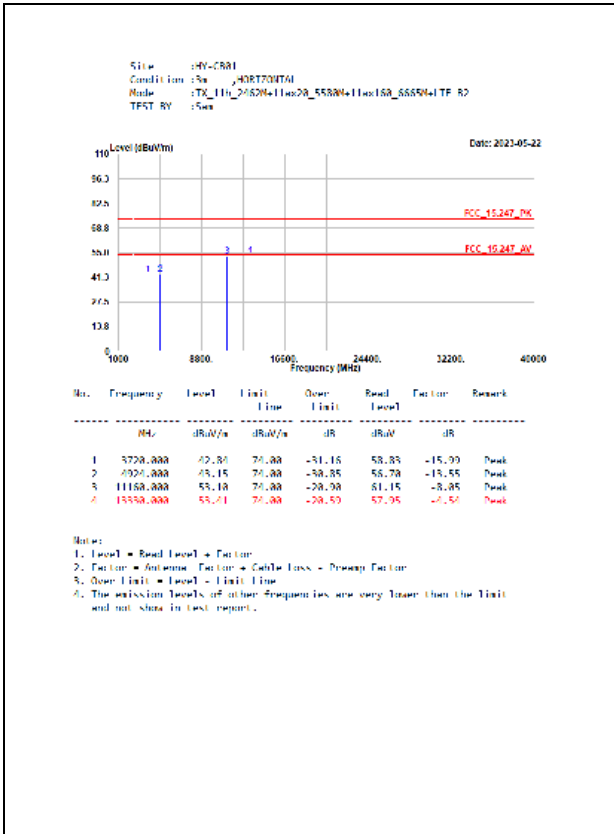


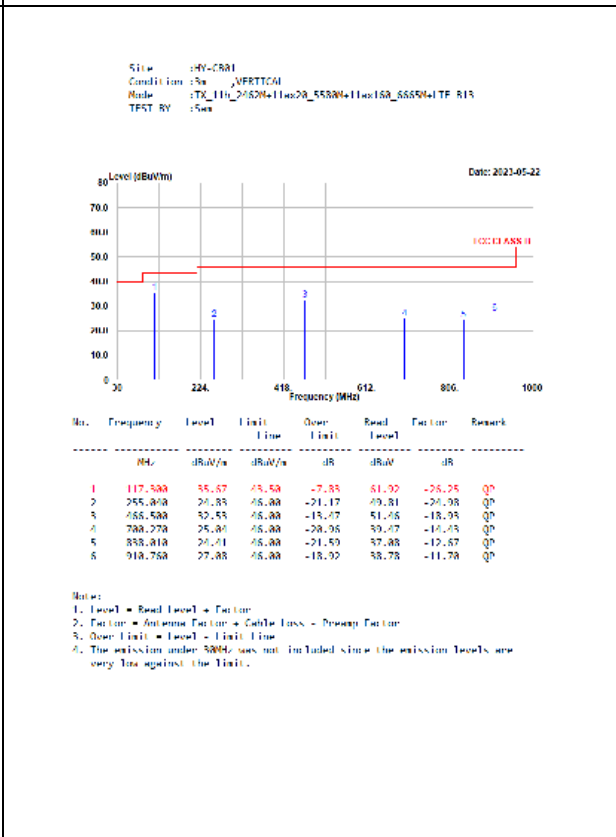
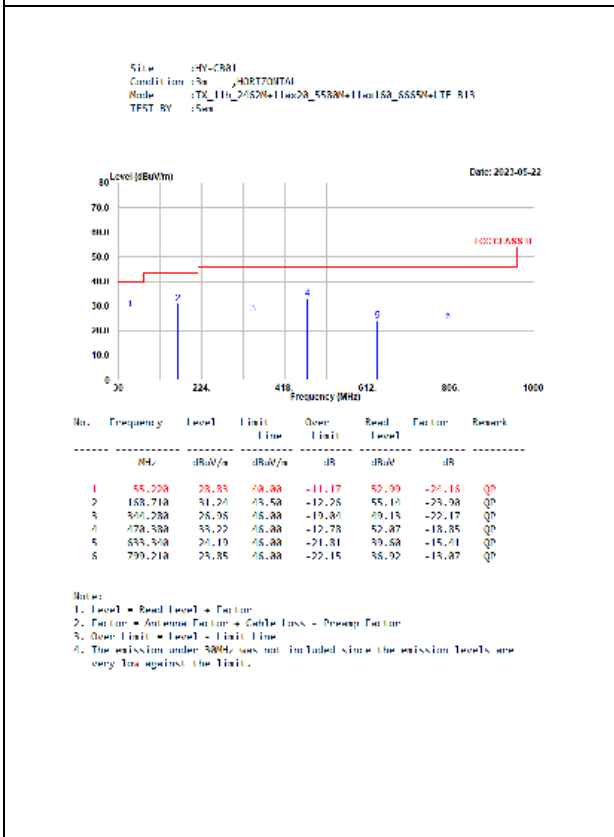
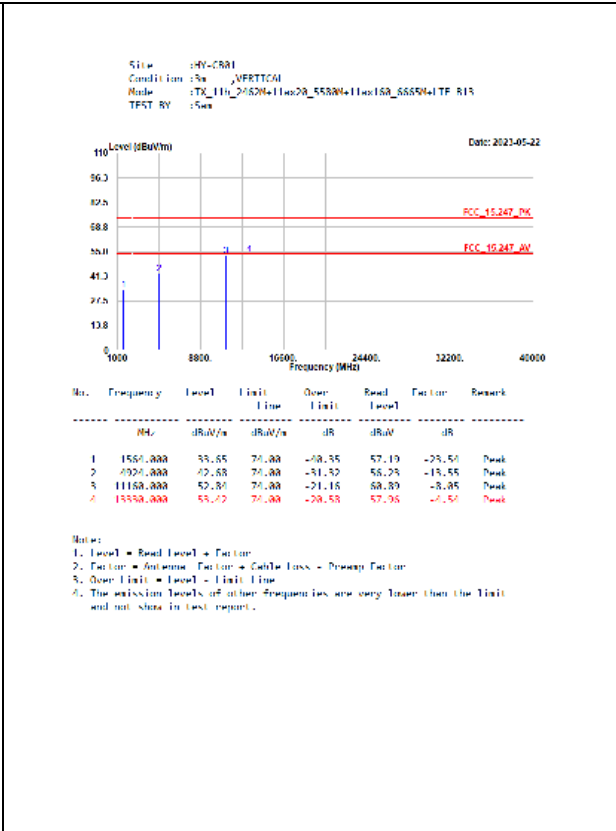
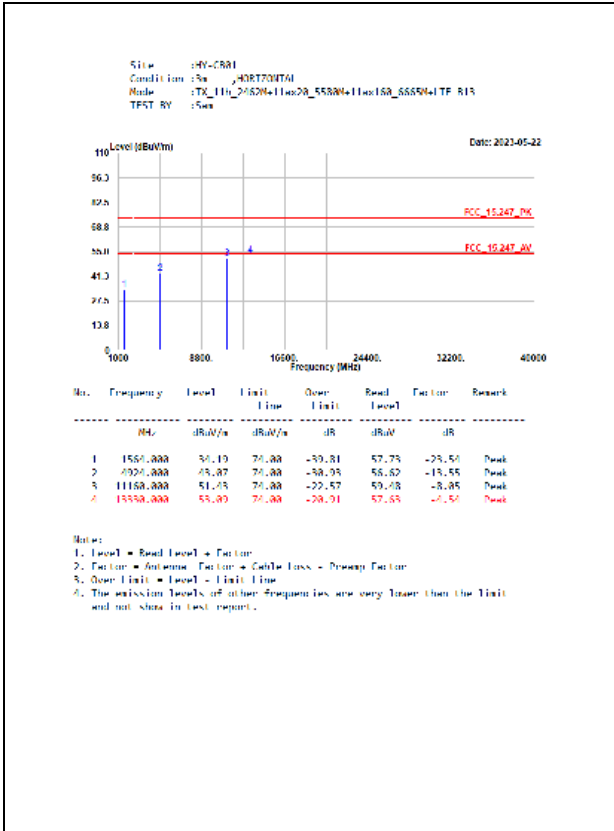


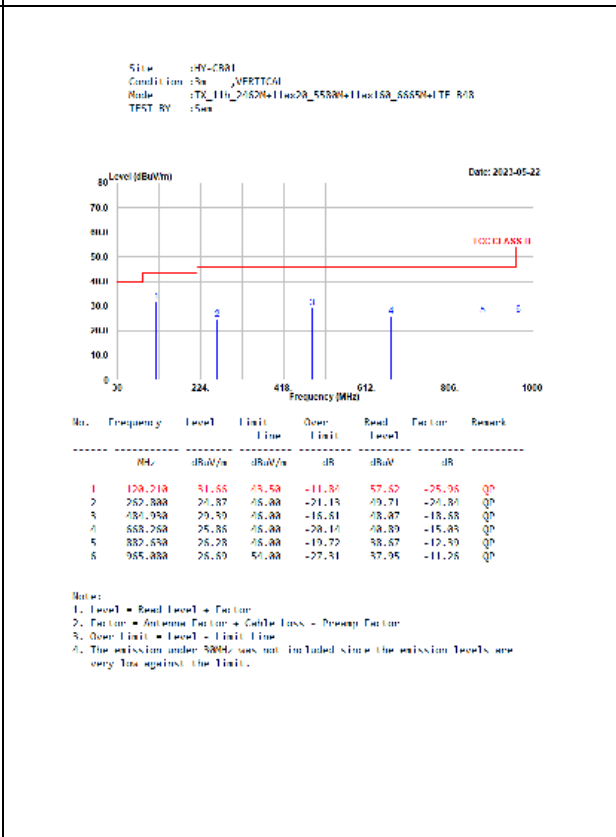
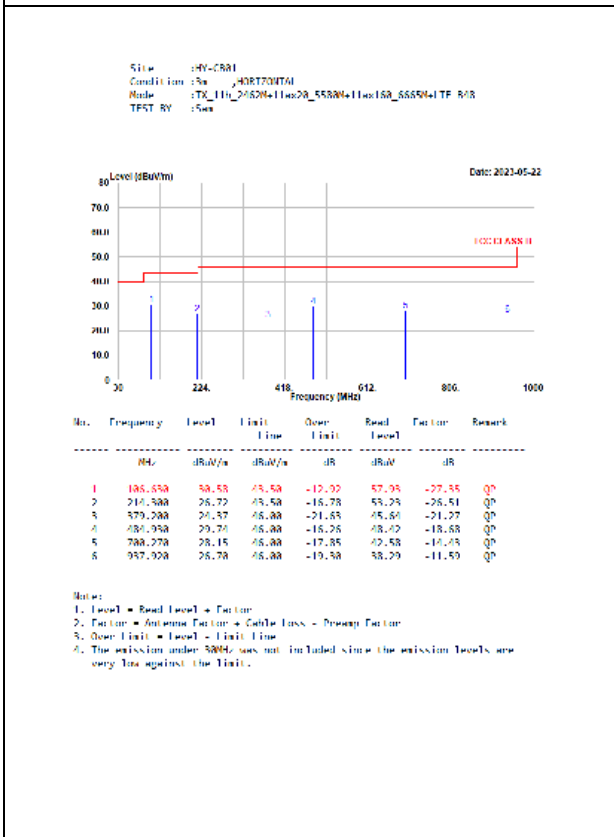
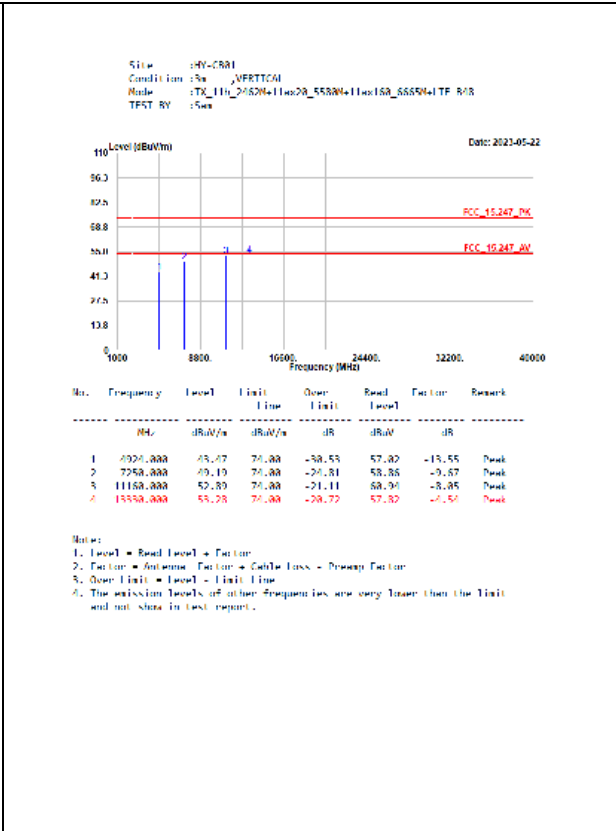
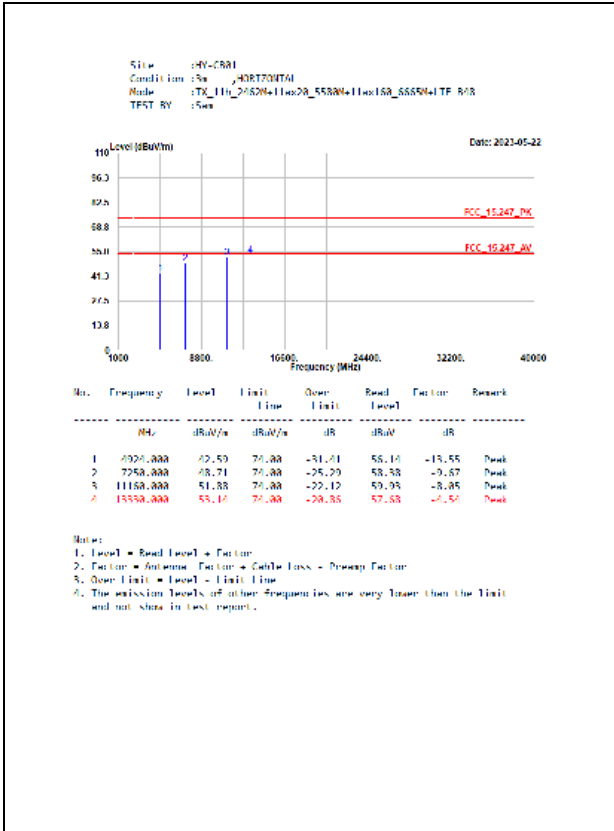


Co-location





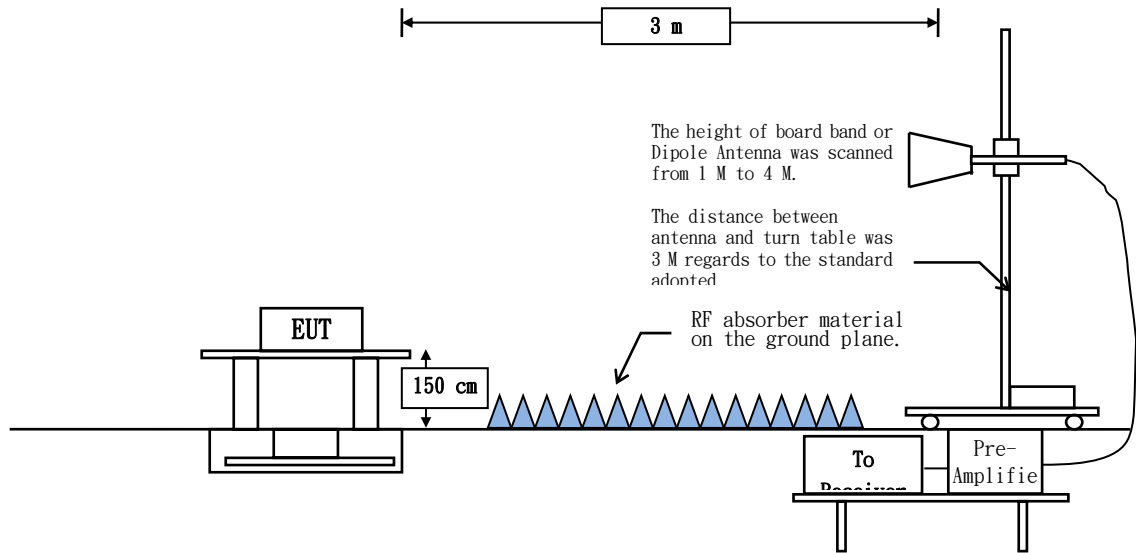




6. Band Edge

6.1. Test Setup

RF Radiated Measurement:



6.2. 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	$\mu\text{V/m @ 3 m}$	$\text{dB}\mu\text{V/m@3 m}$
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 (μV).
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.

6.3. 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 1 GHz setting on the field strength meter is 120 kHz, above 1 GHz 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 = 1 MHz.

VBW \geq 3 MHz.

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

RBW = 1 MHz.

VBW = 10 Hz, 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.)

CDD Mode:

5 GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	93.36	1.4050	712	1000
802.11ax-20 MHz	94.12	5.4450	184	200
802.11ax-40 MHz	92.16	5.4050	185	200
802.11ax-80 MHz	93.76	5.4050	185	200

Note: Duty Cycle Refer to Section 8.

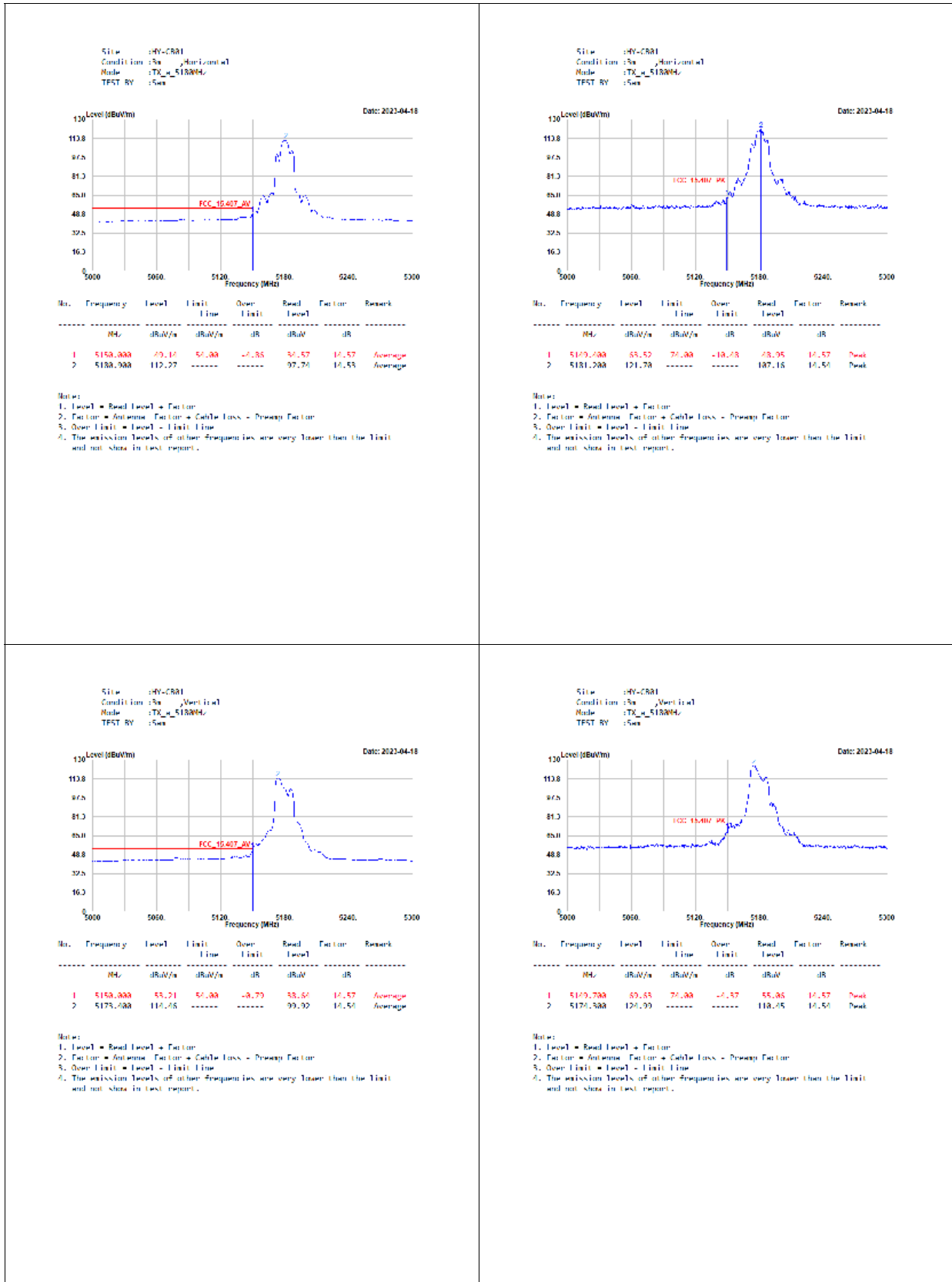
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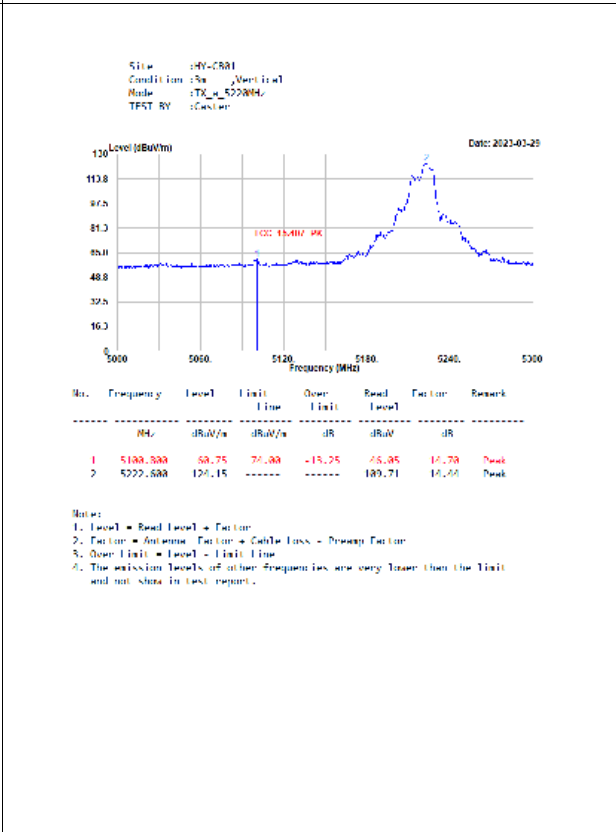
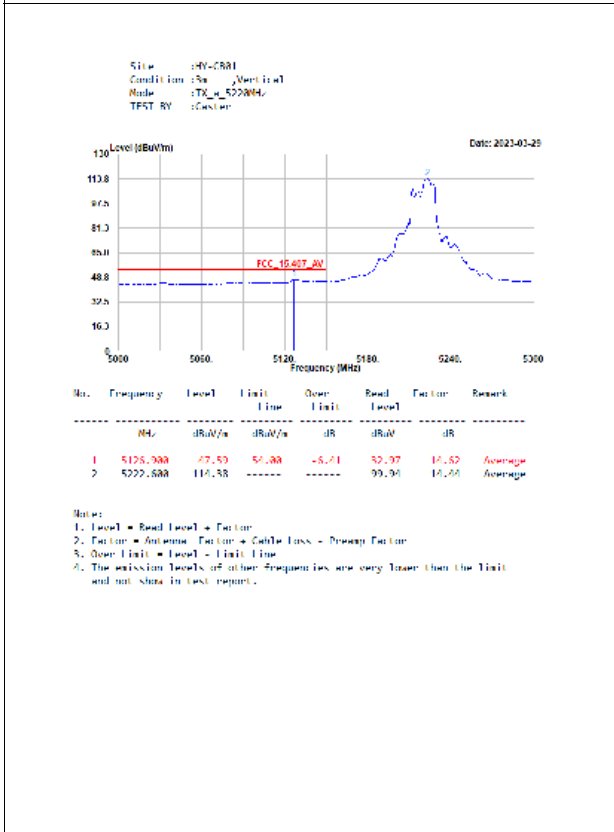
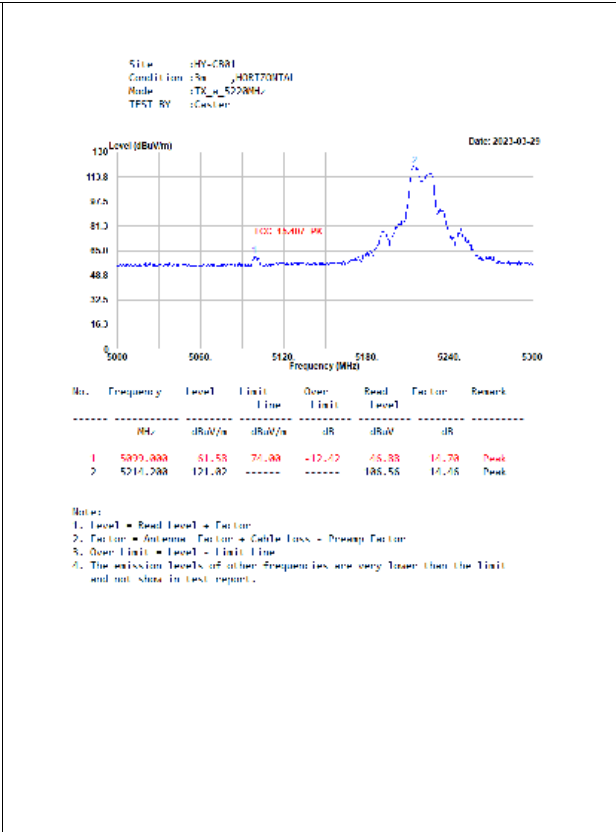
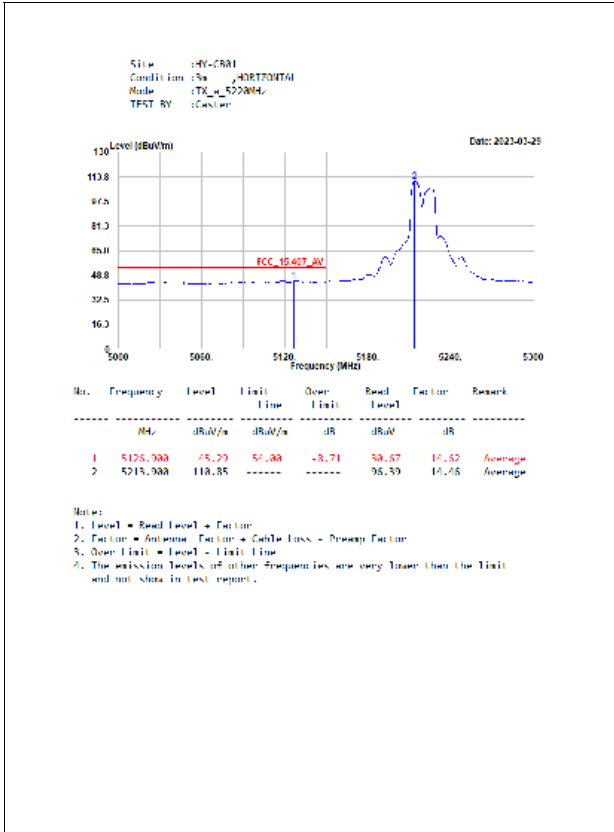
5 GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11ax-20 MHz	94.24	6.8700	146	200
802.11ax-40 MHz	92.11	6.7700	148	200
802.11ax-80 MHz	94.08	7.3100	137	200

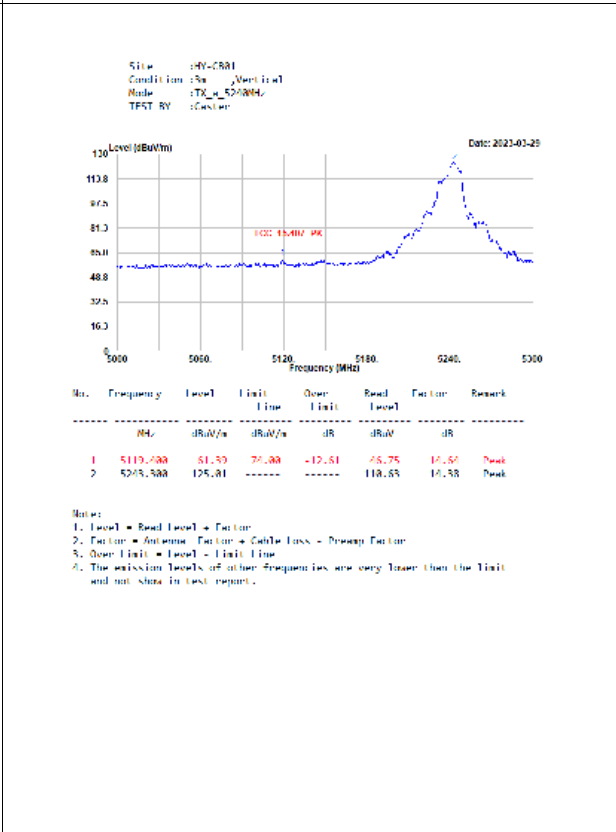
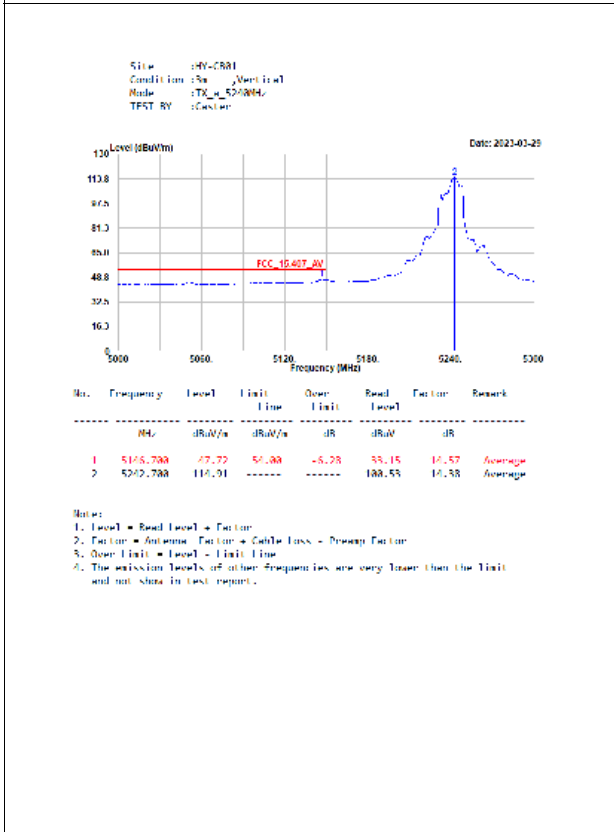
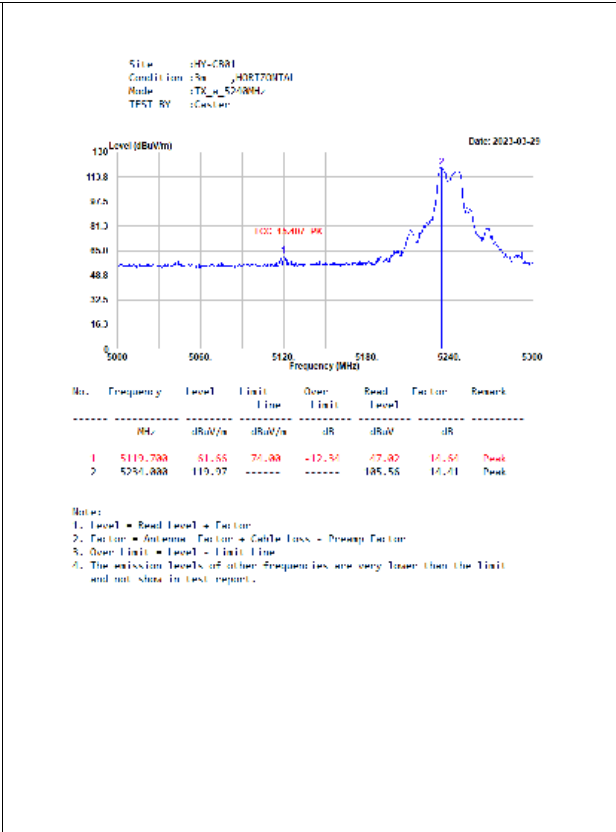
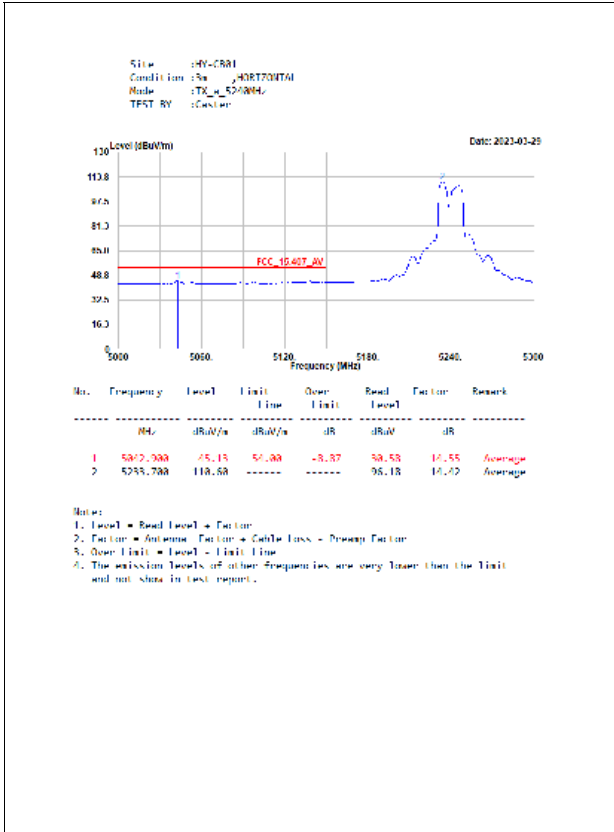
Note: Duty Cycle Refer to Section 8.

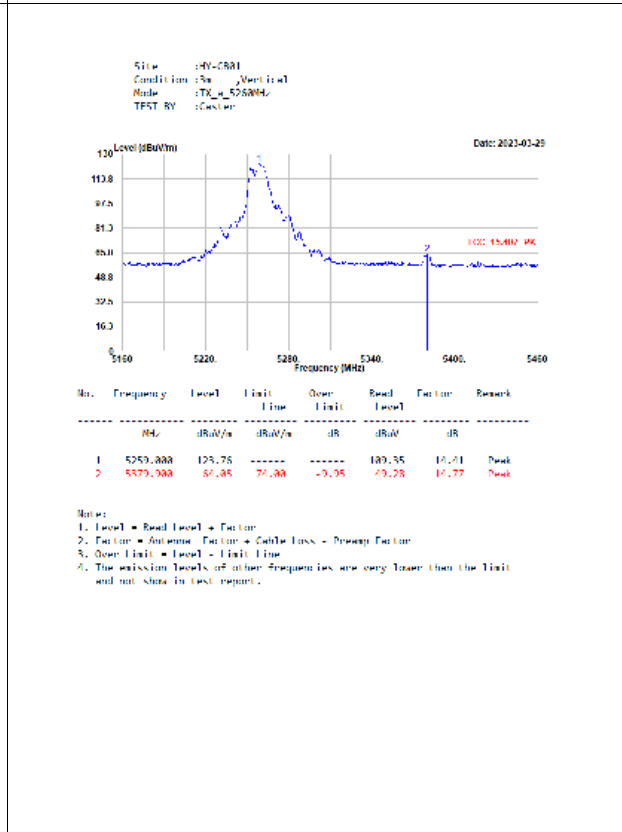
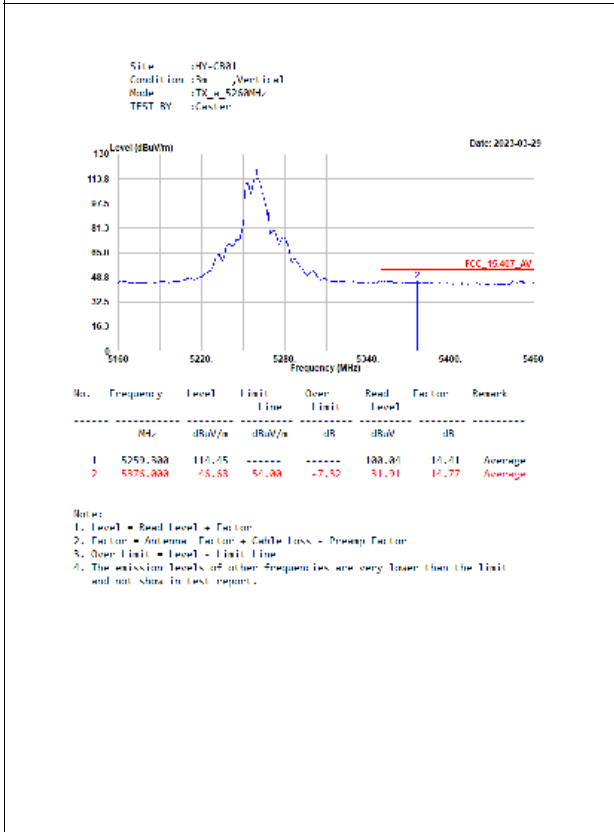
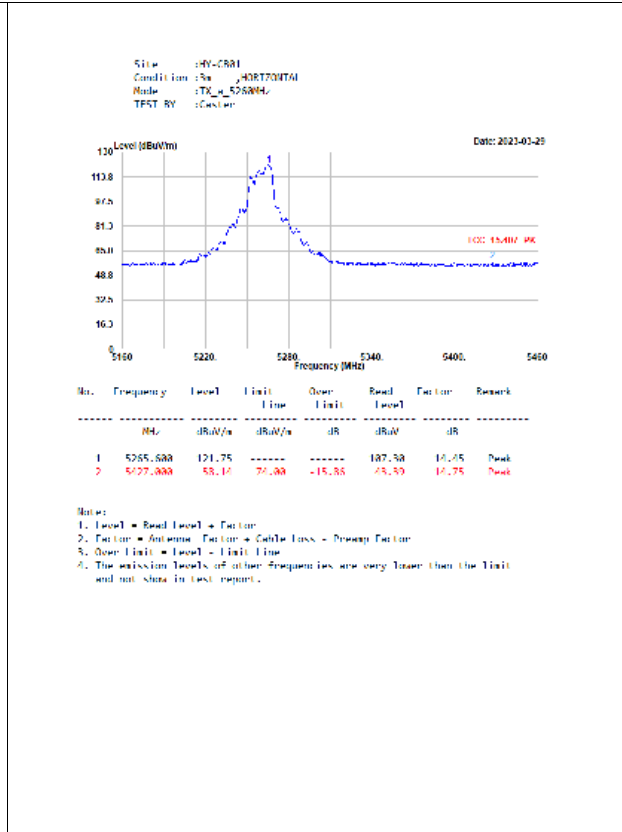
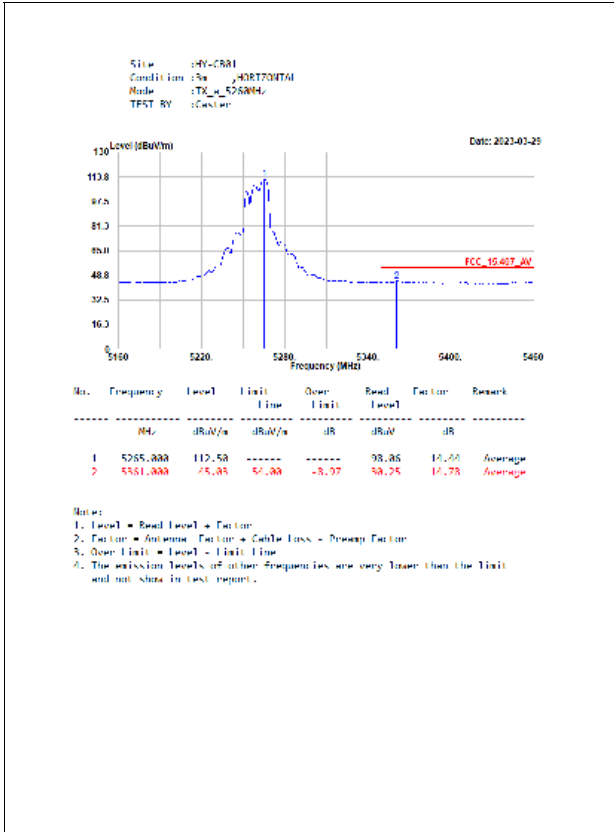
6.4. Test Result of Band Edge

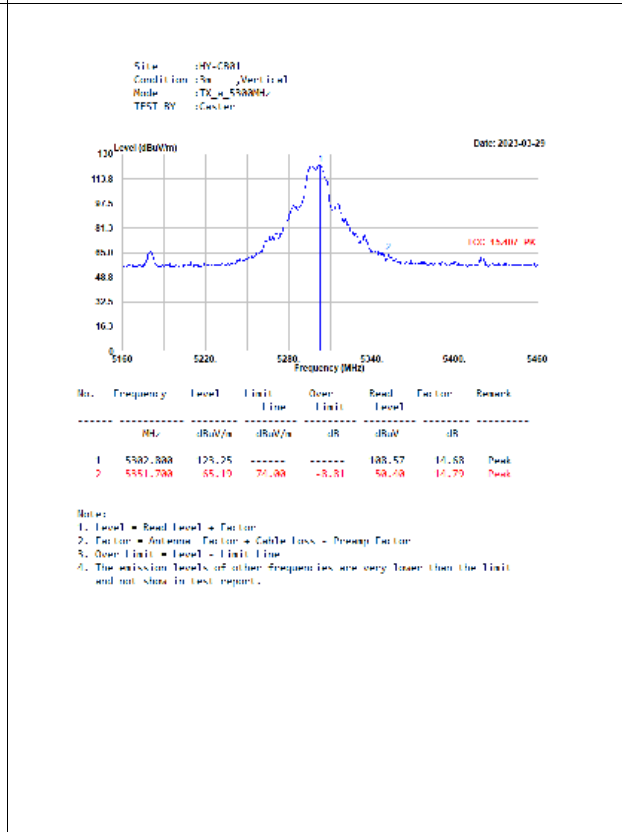
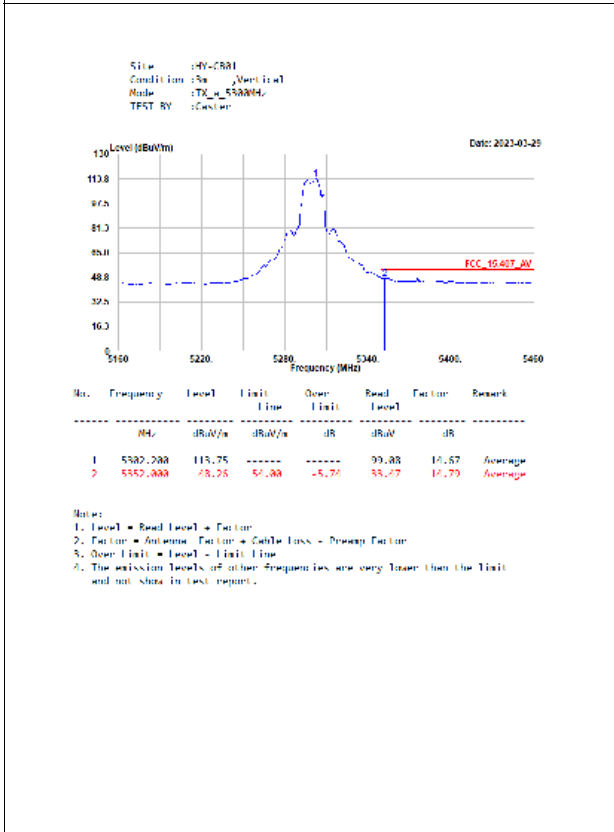
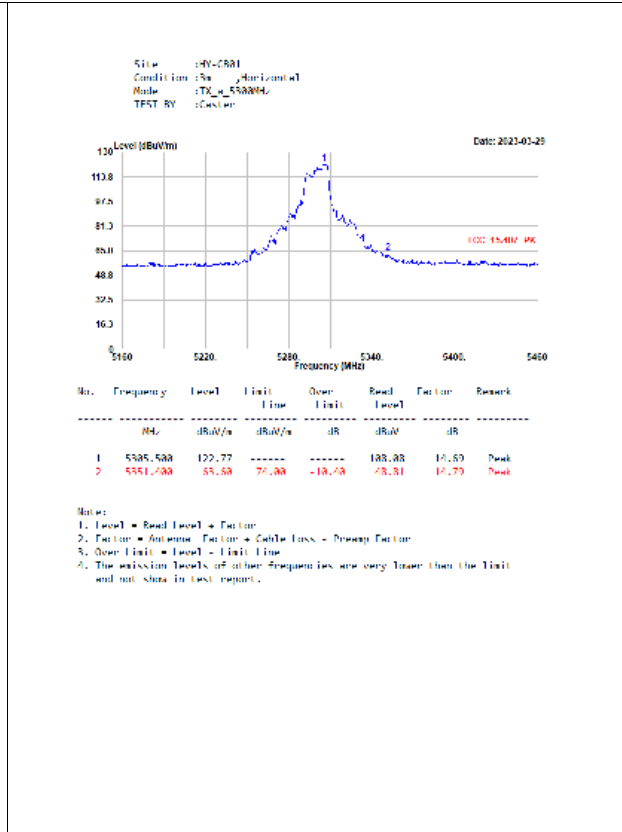
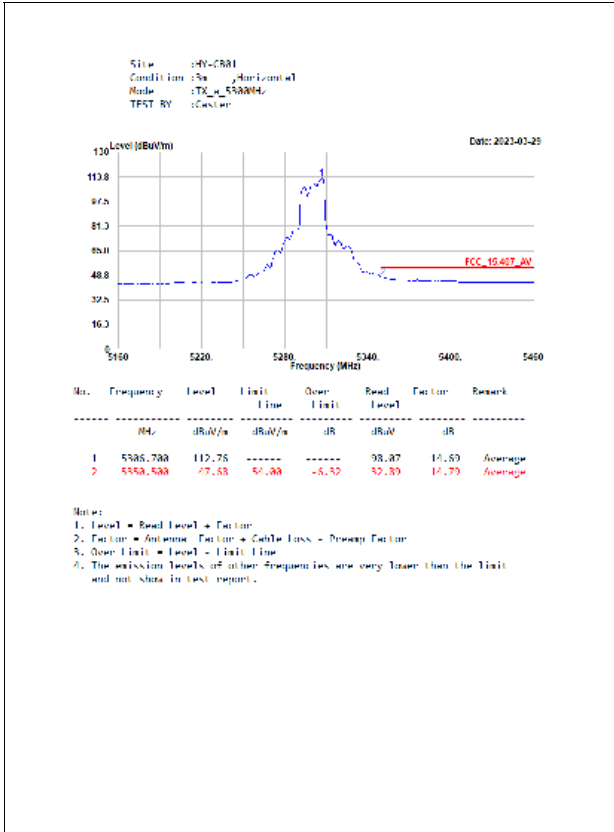
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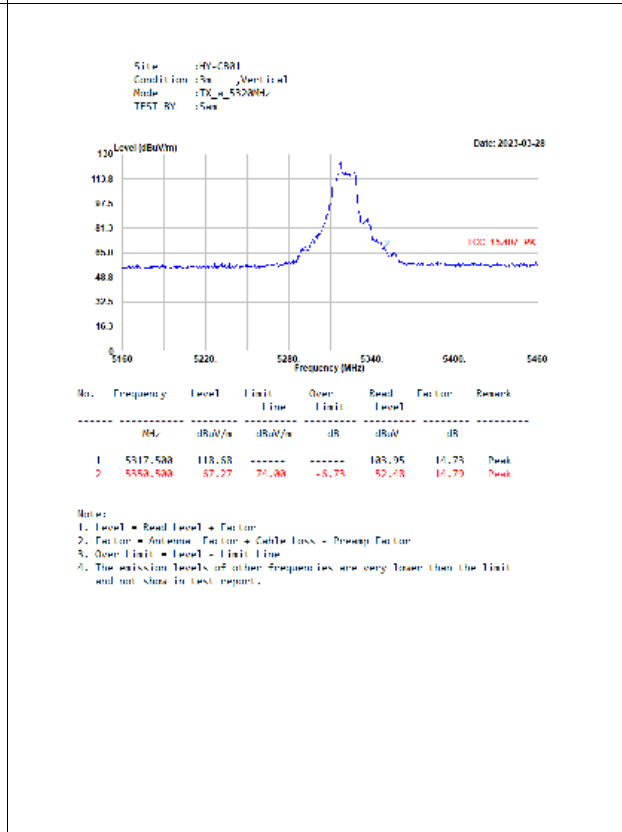
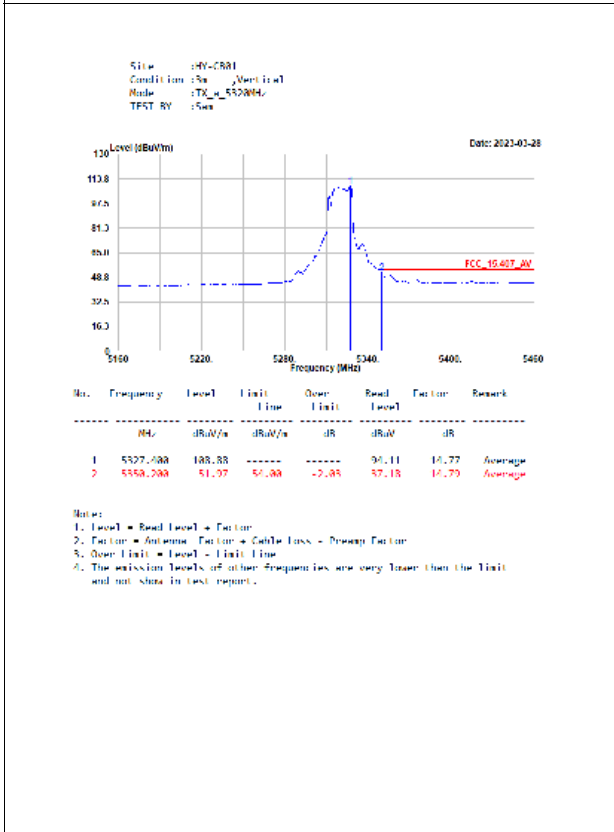
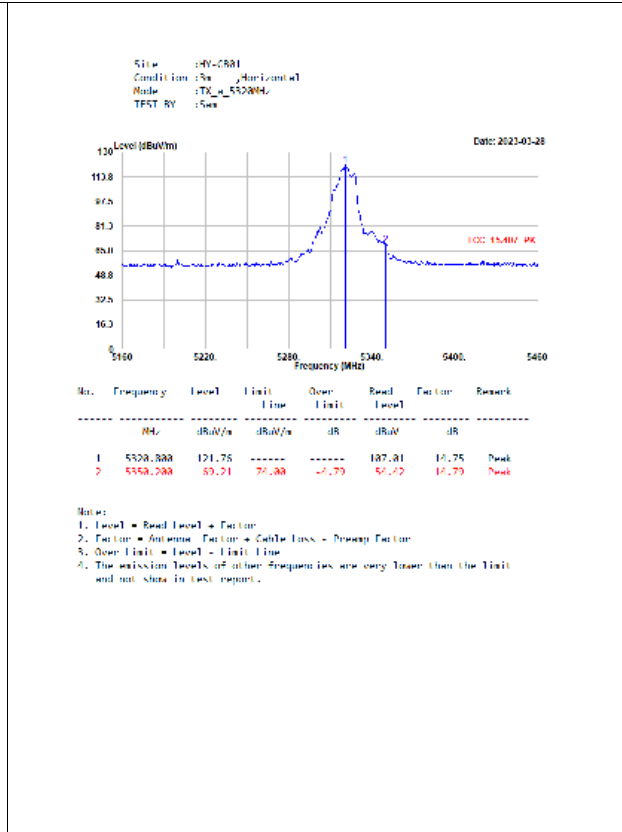
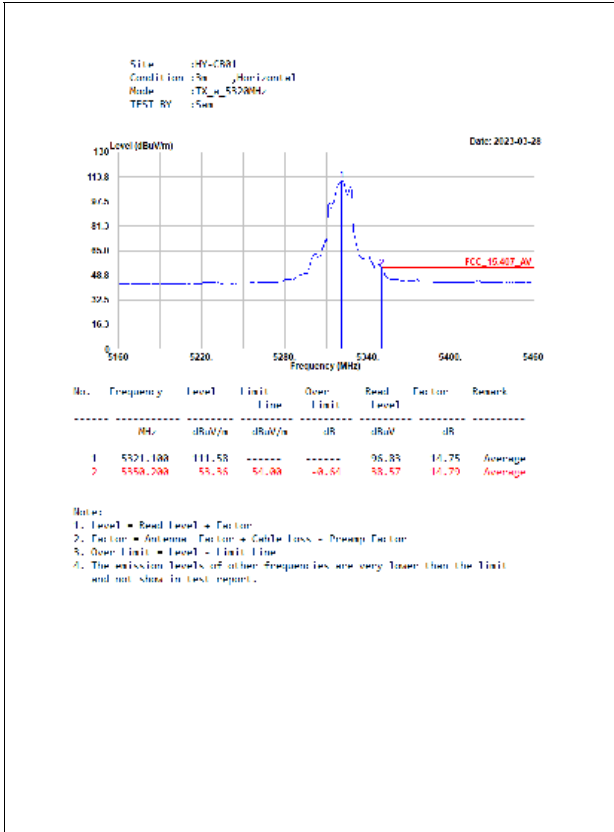


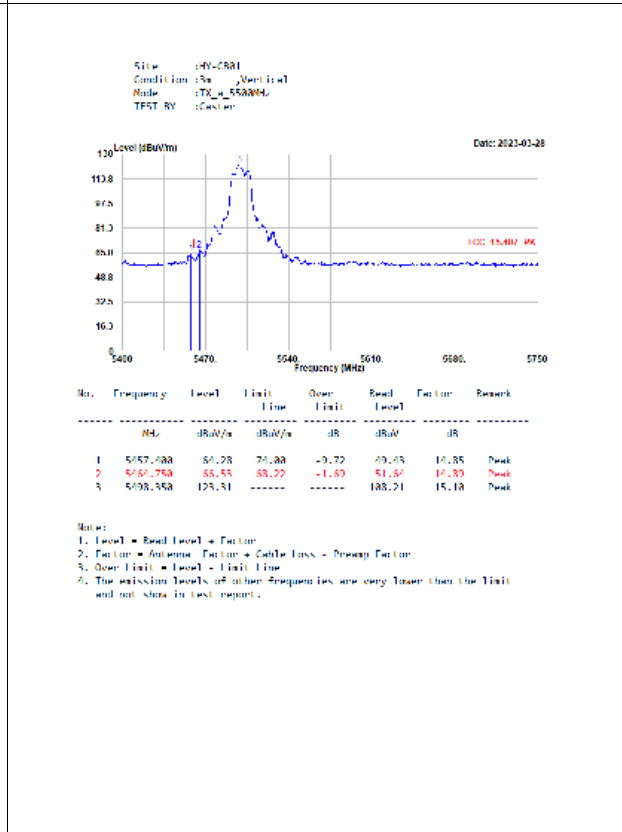
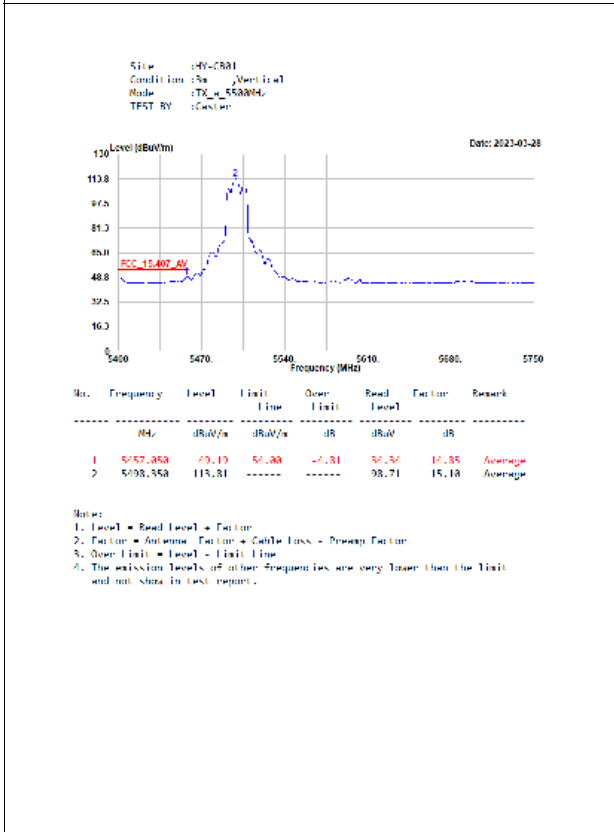
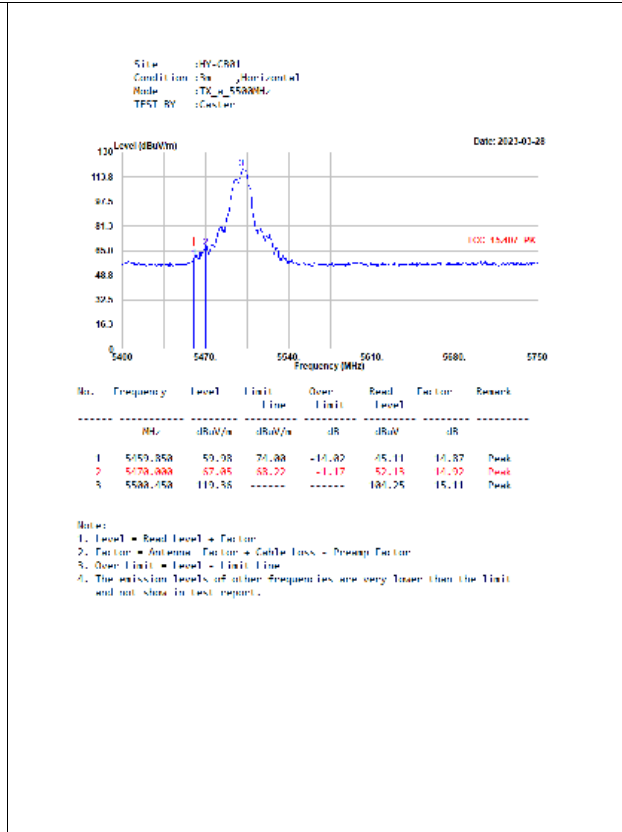
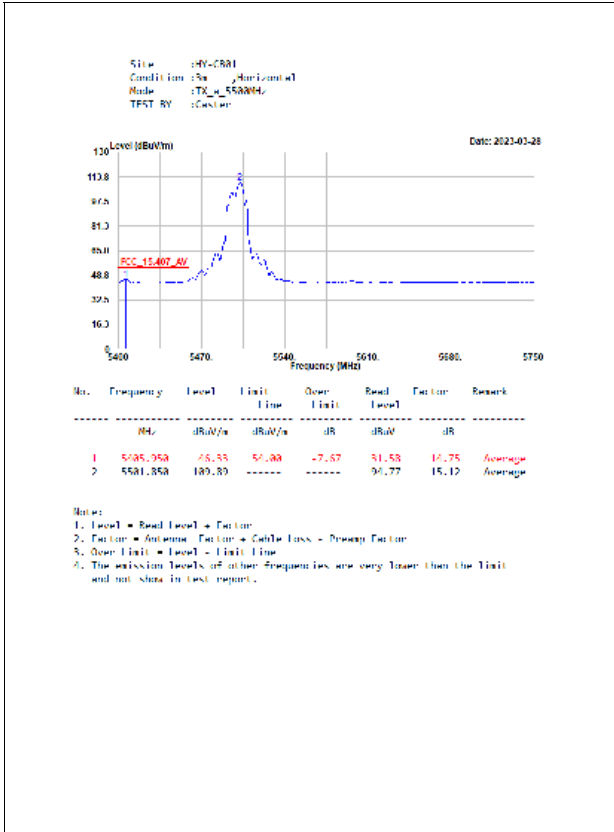


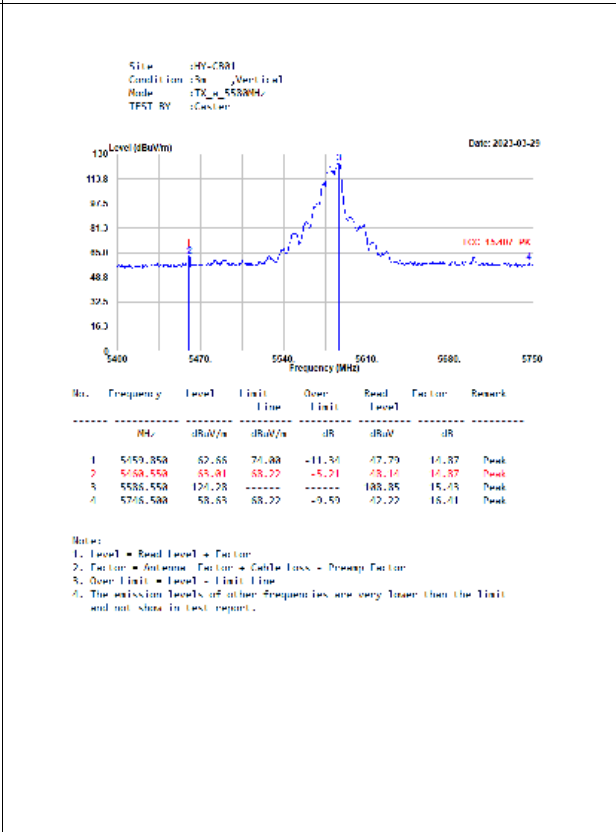
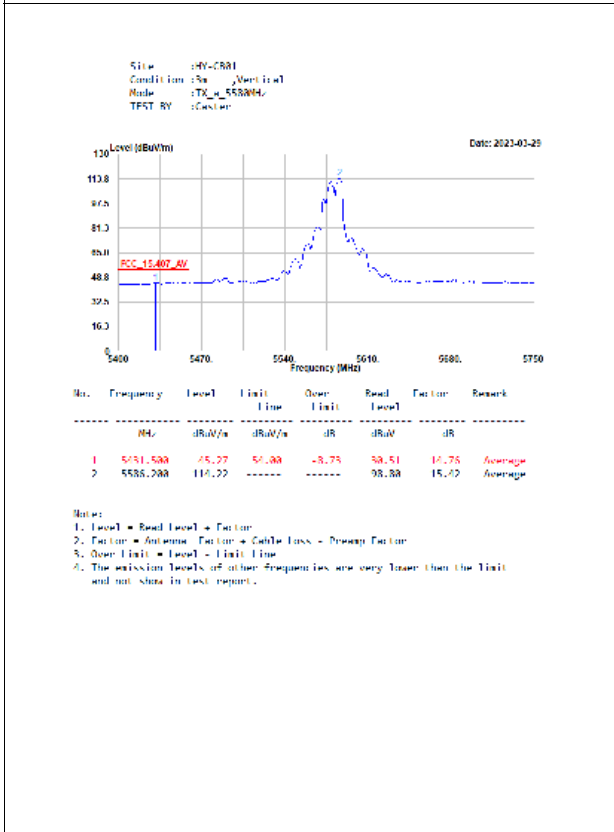
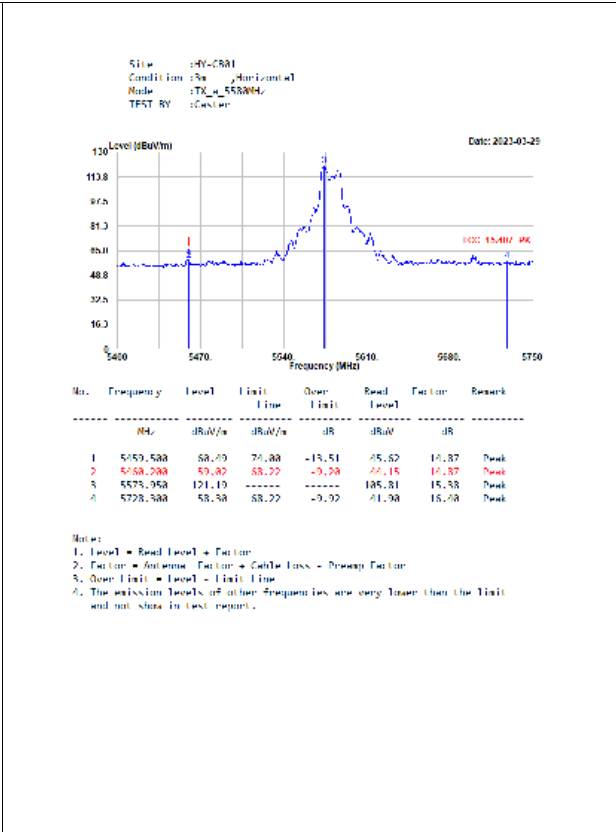
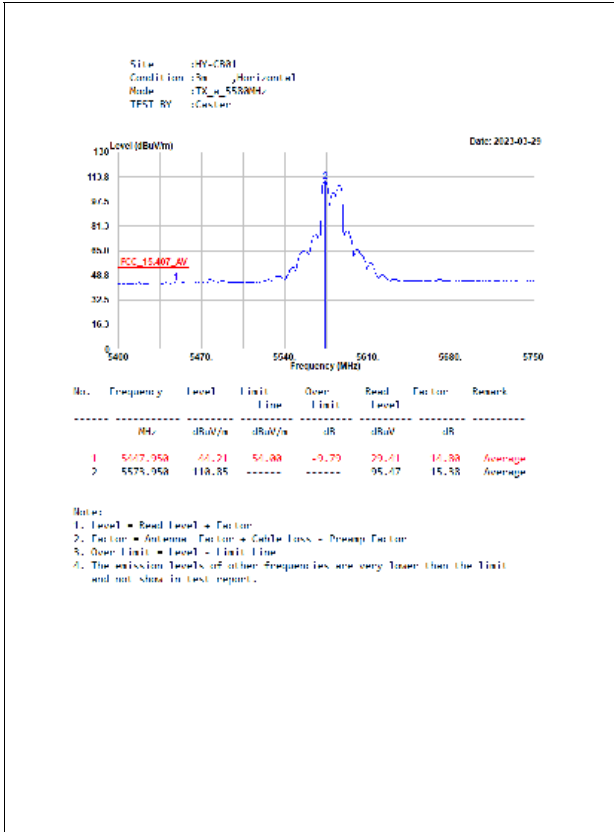


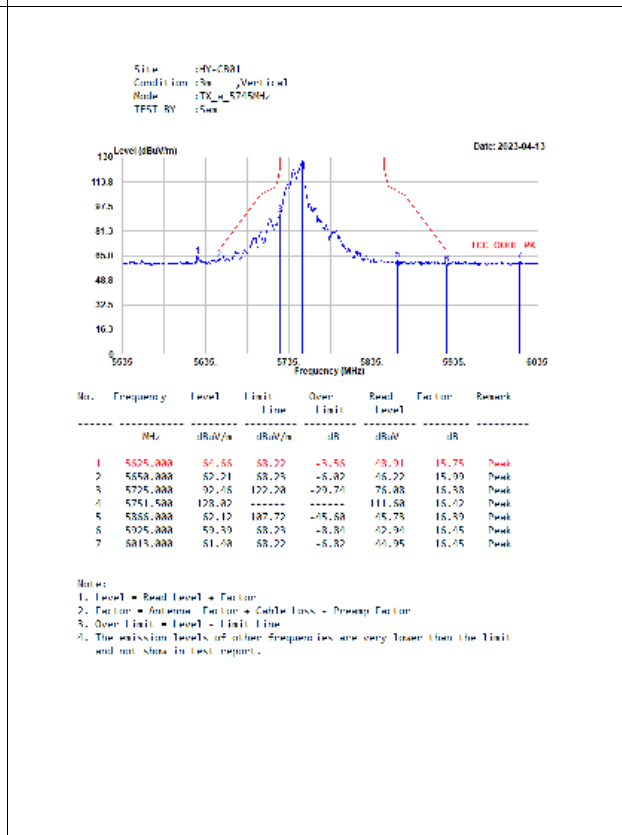
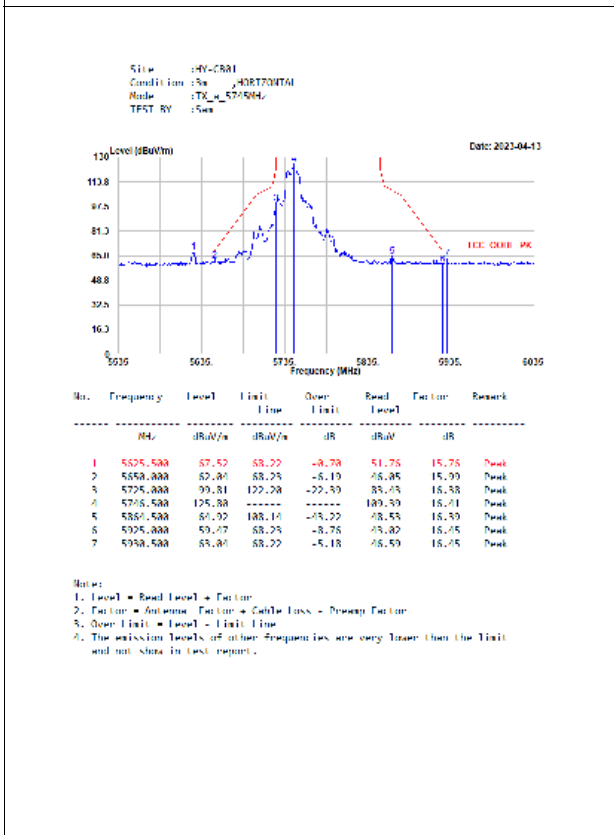
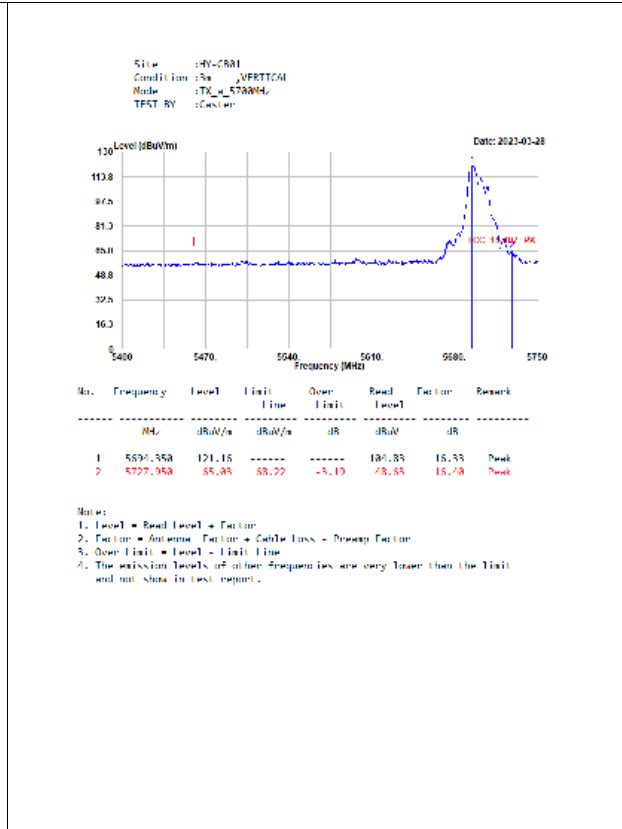
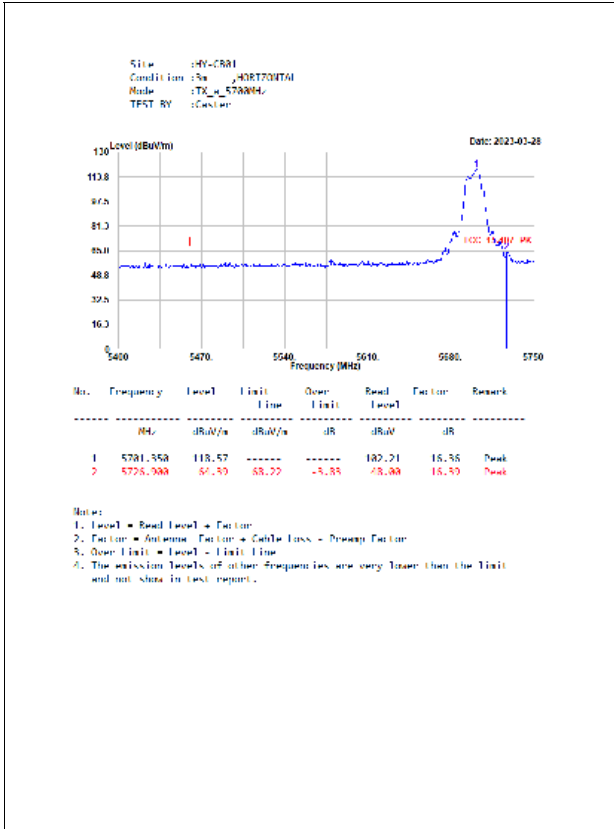


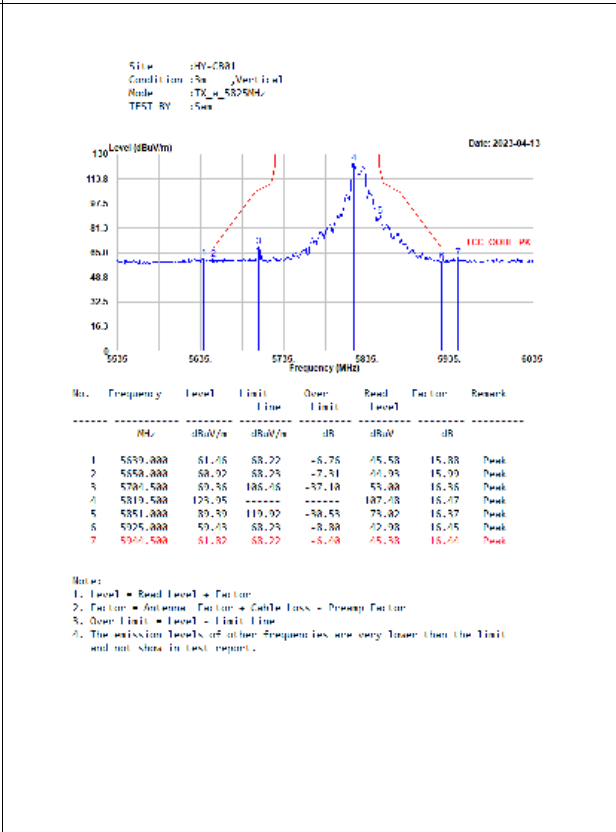
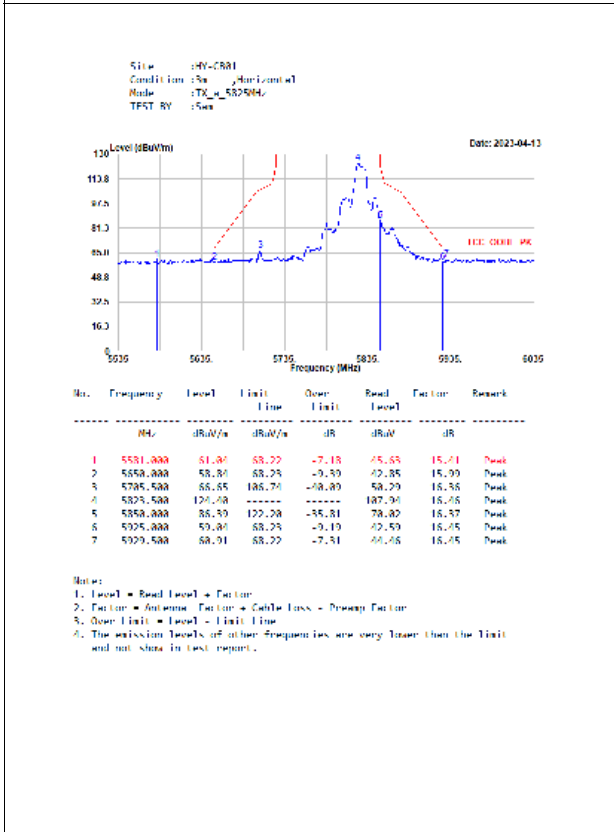
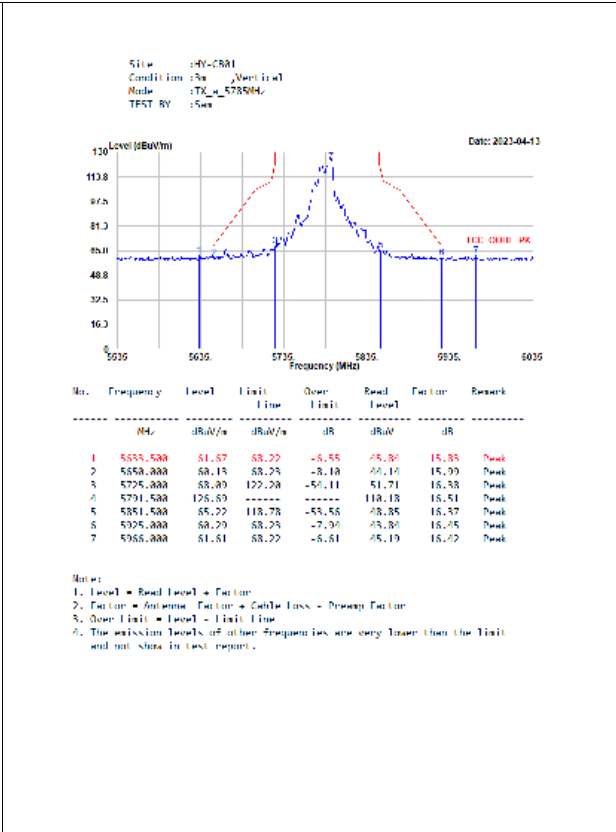
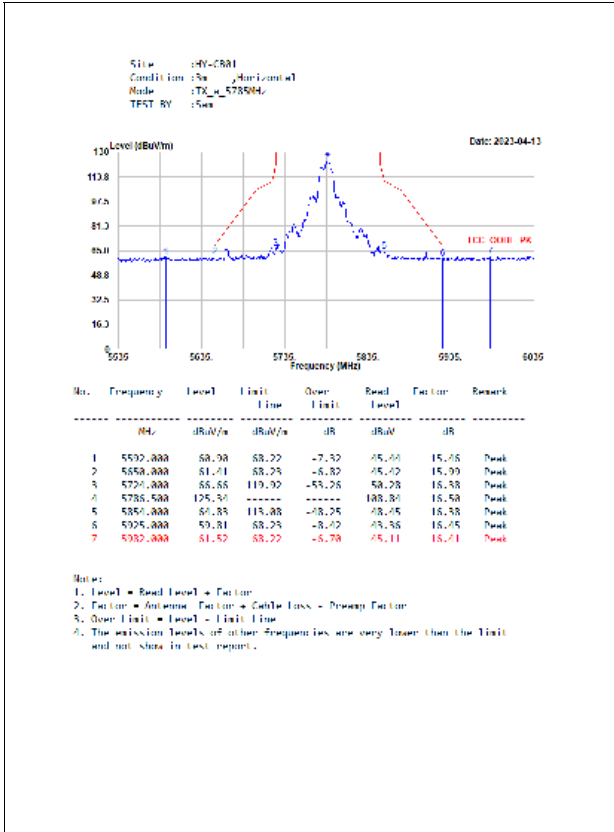


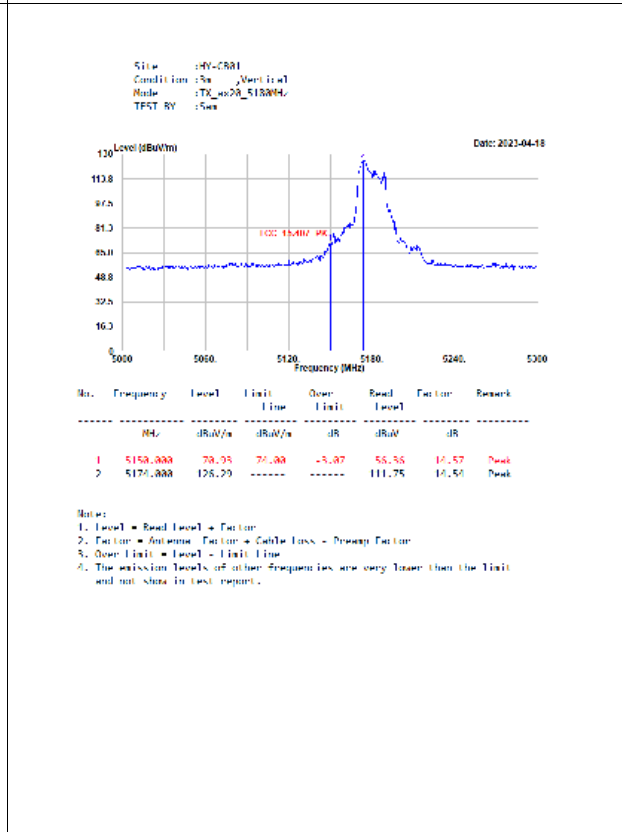
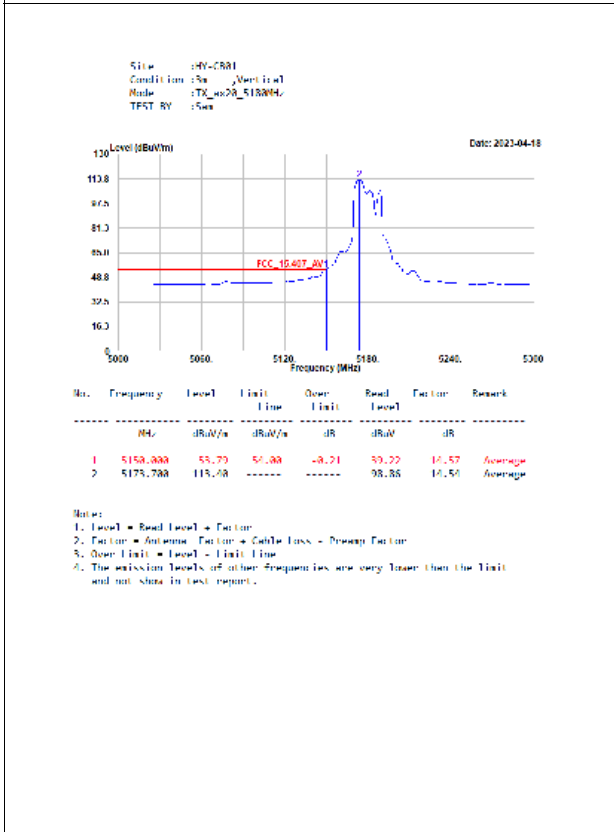
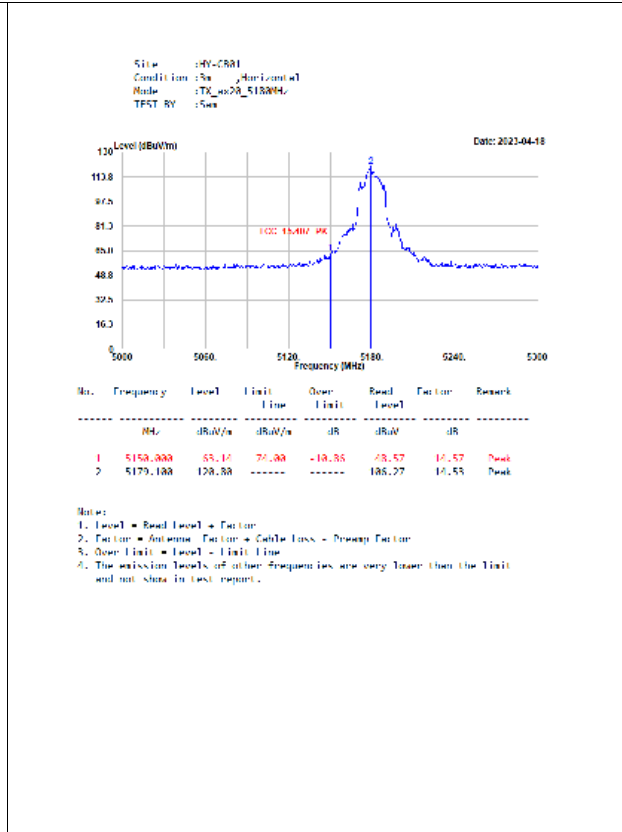
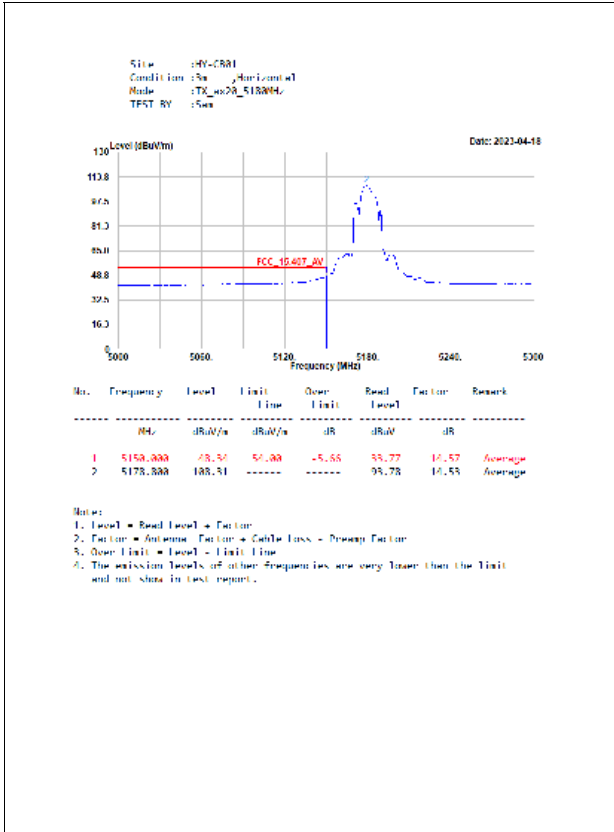


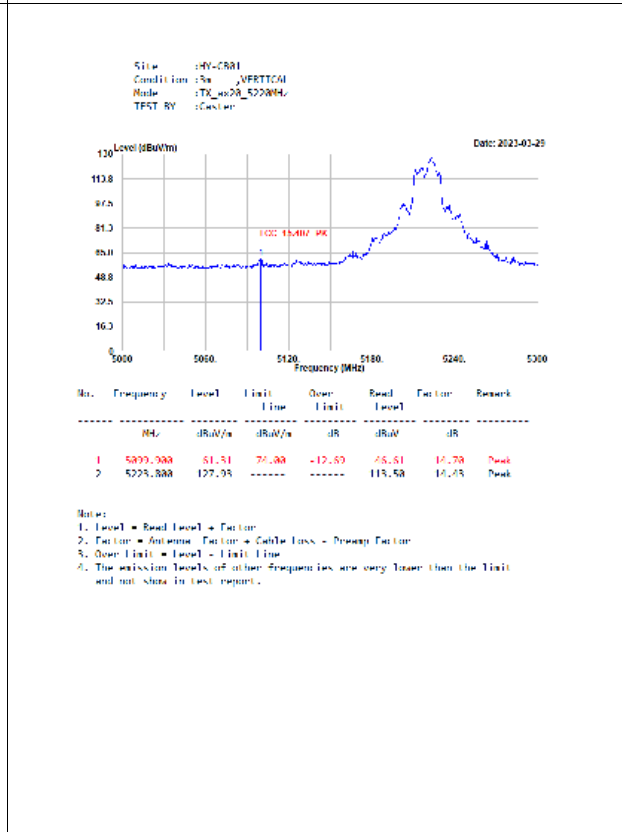
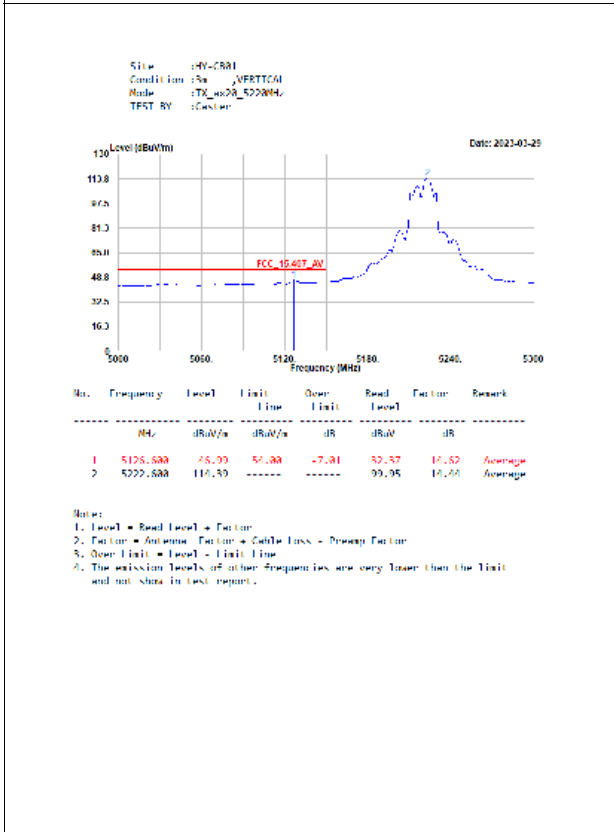
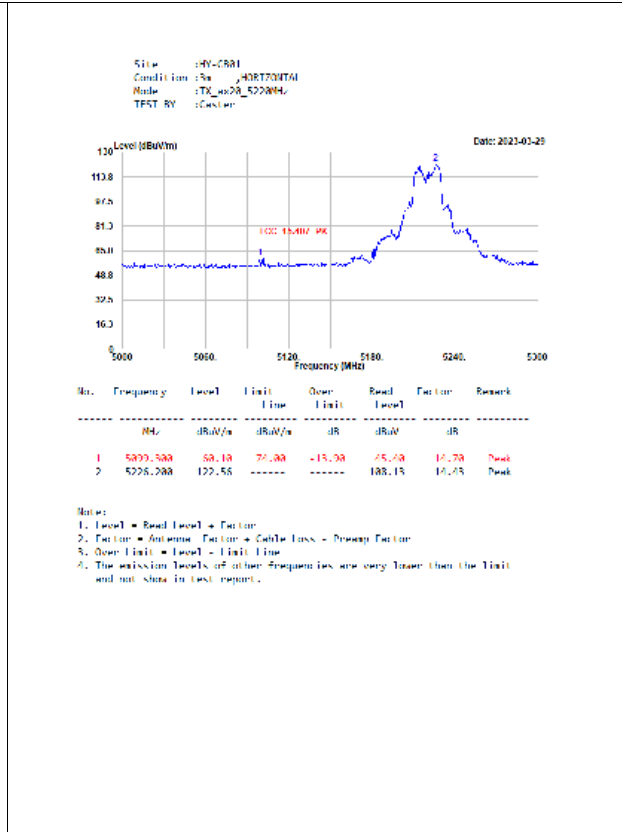
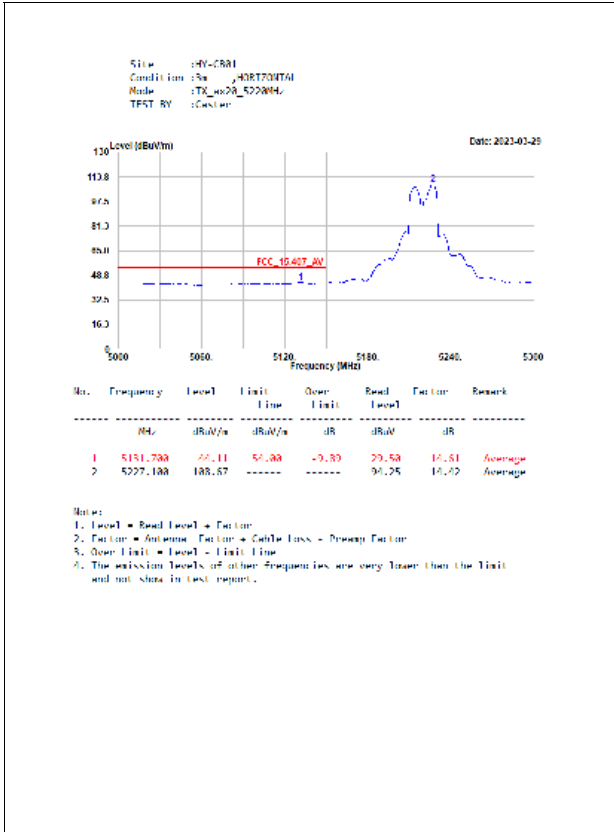


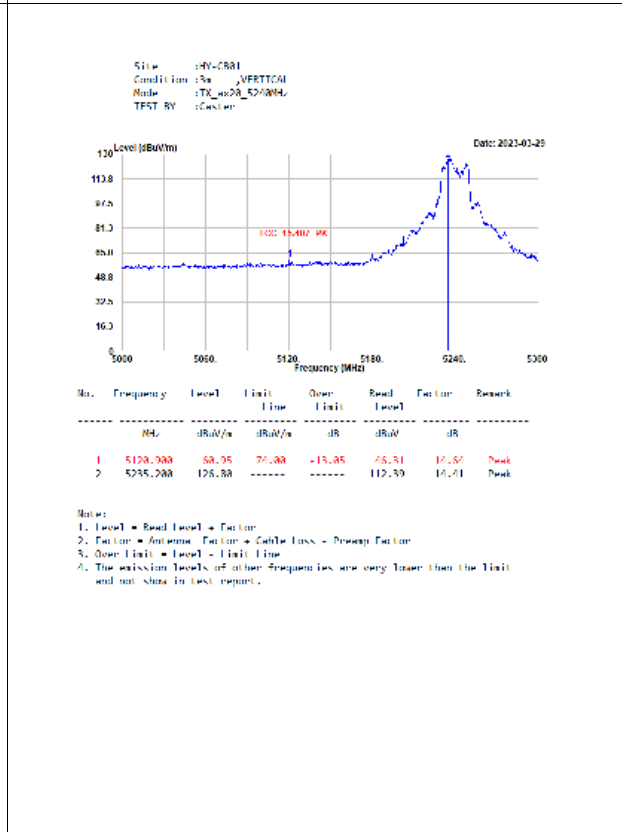
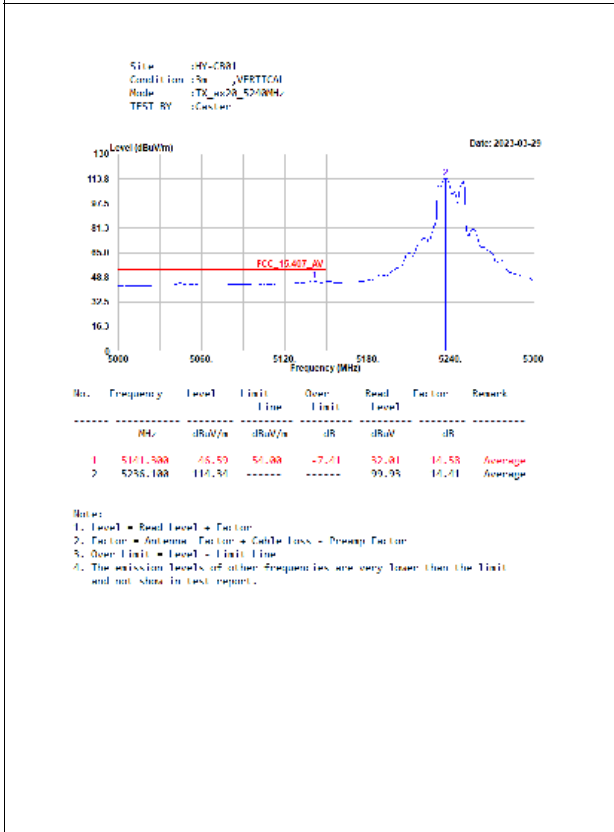
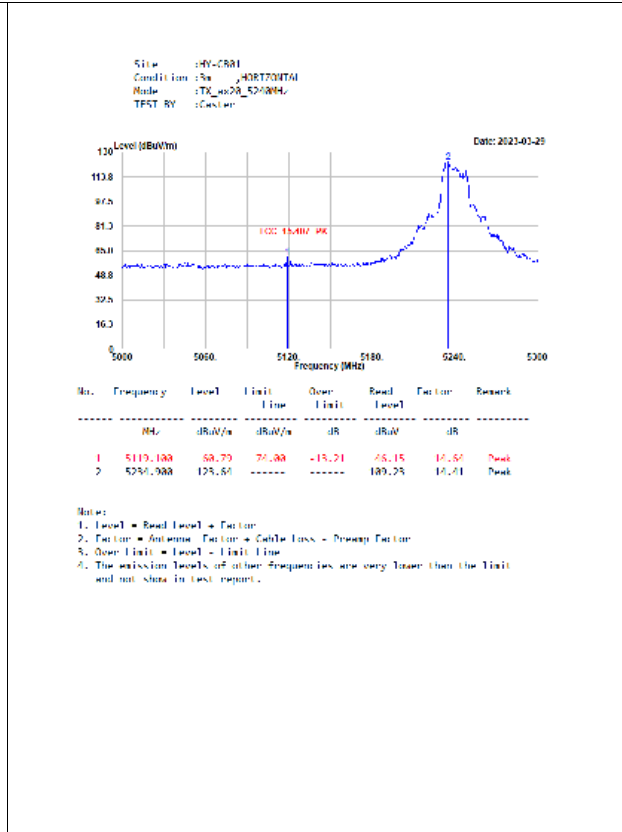
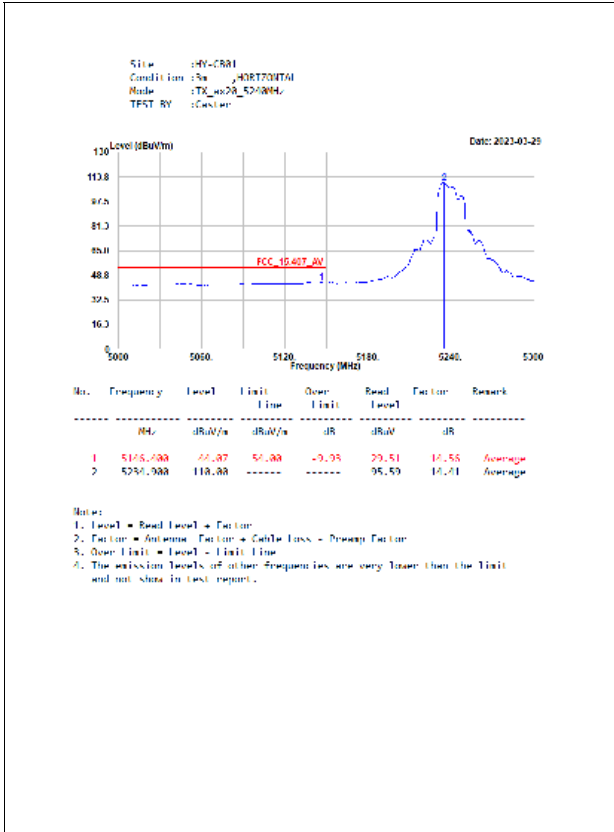


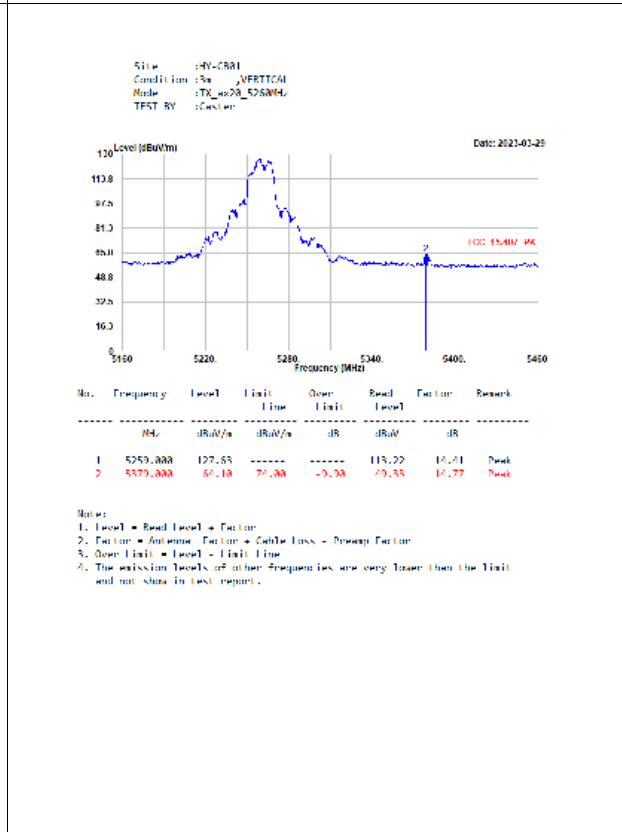
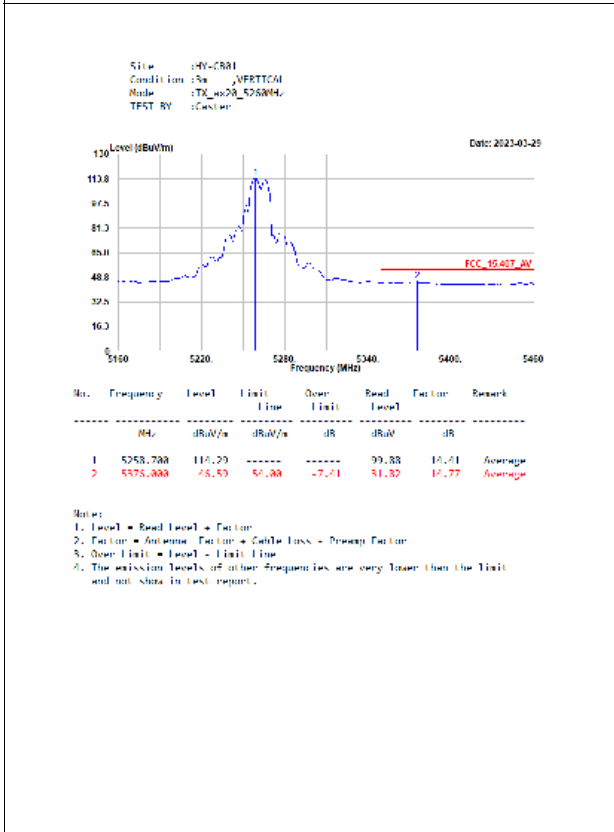
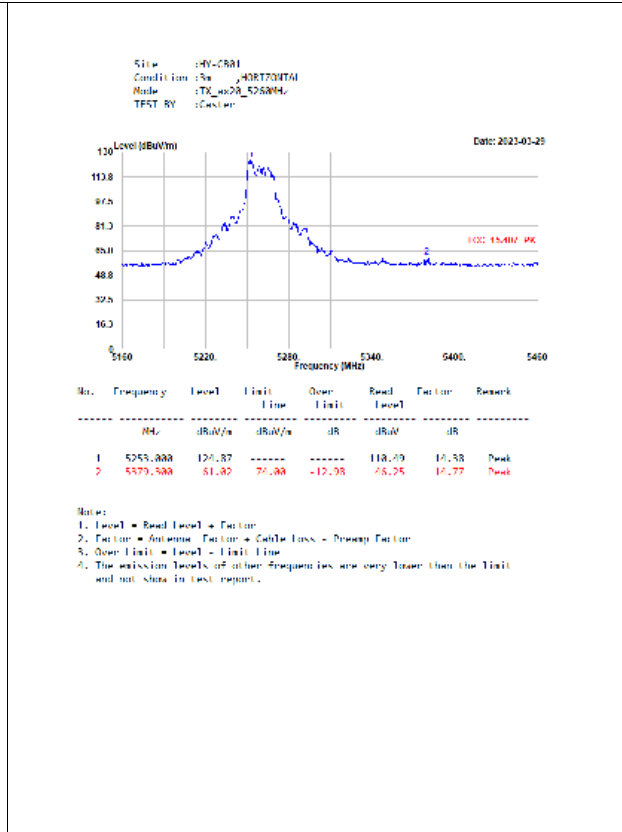
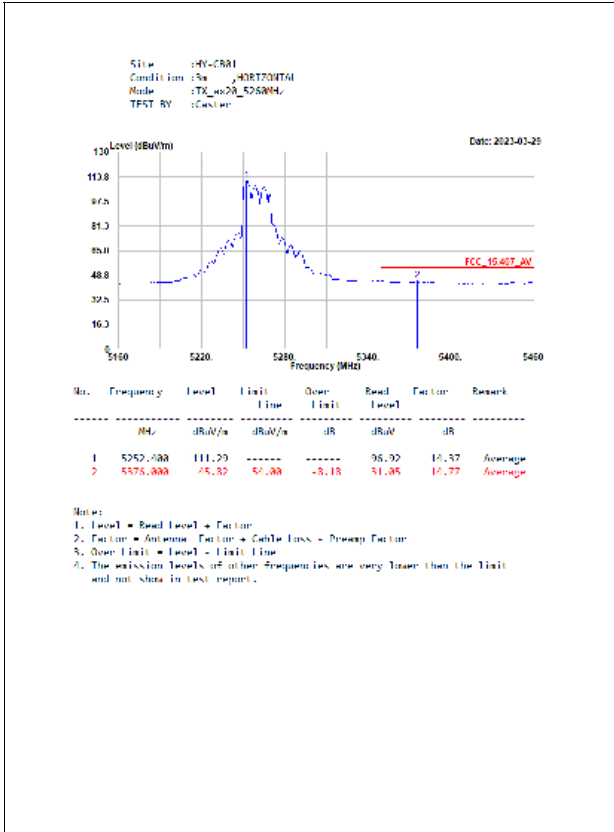


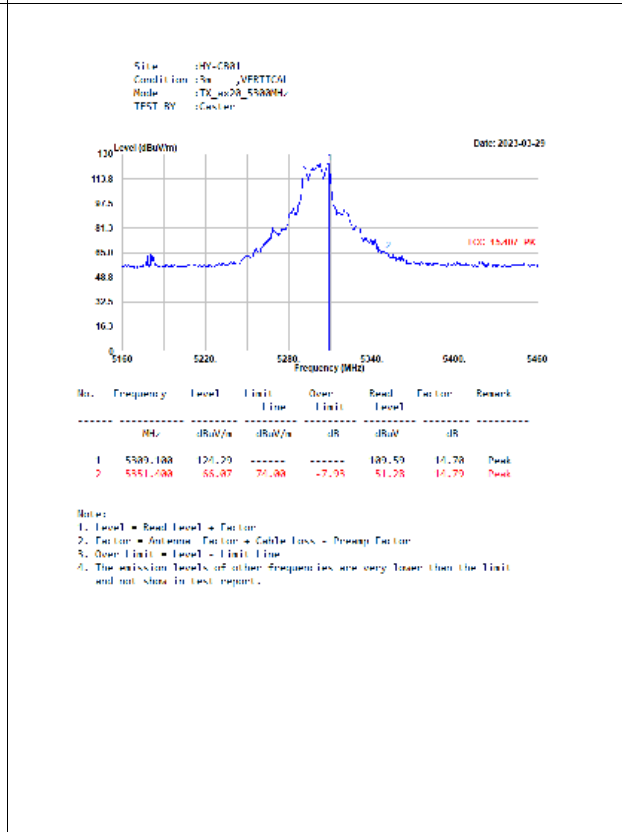
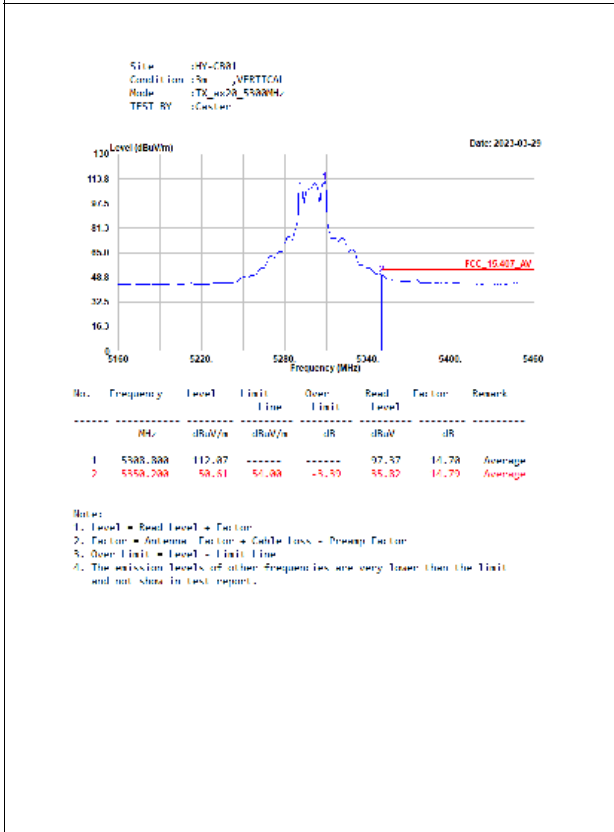
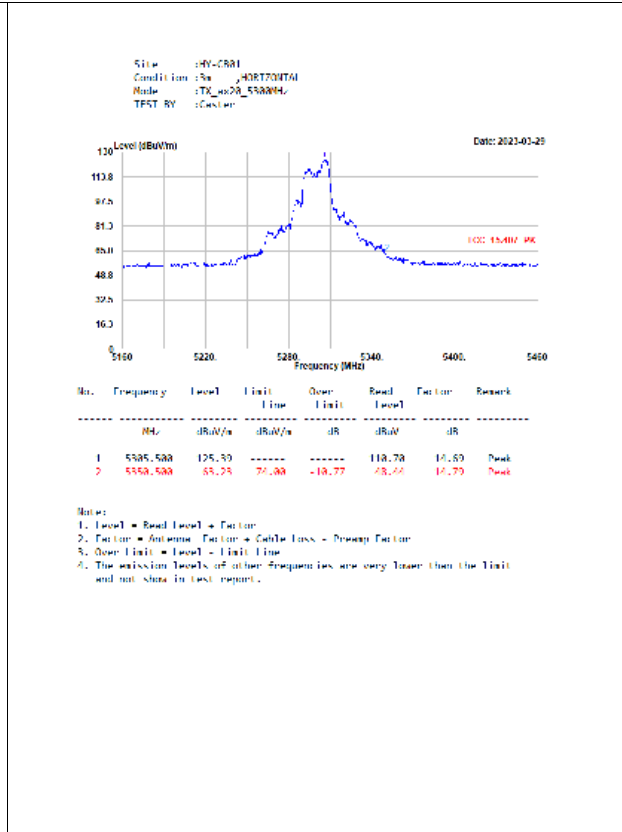
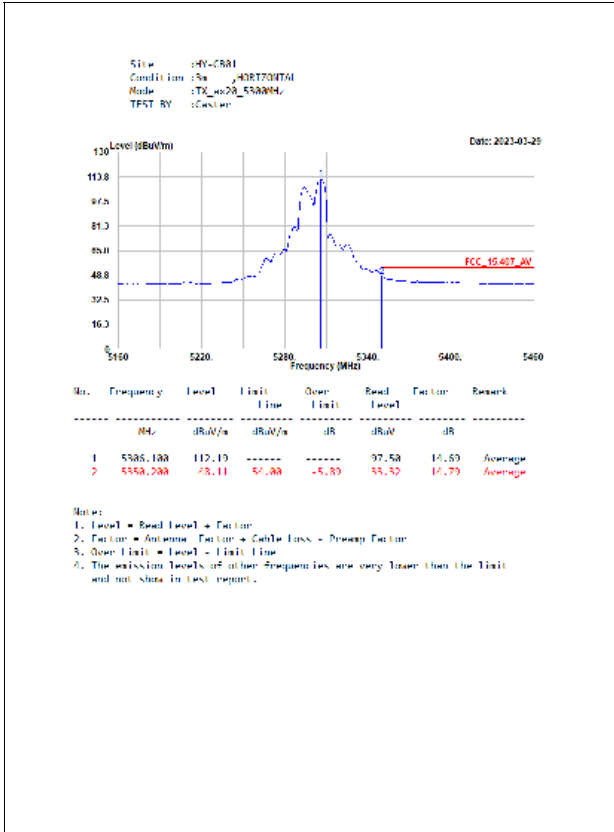


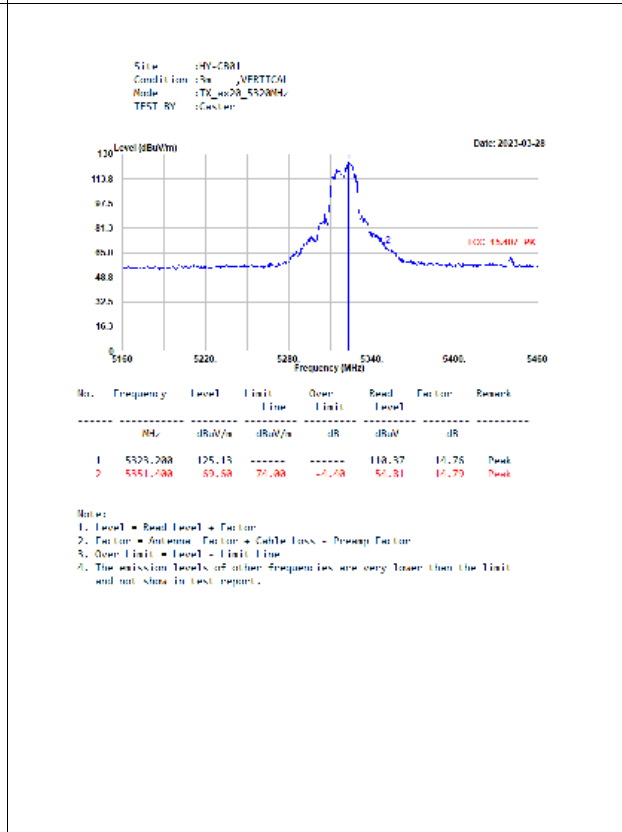
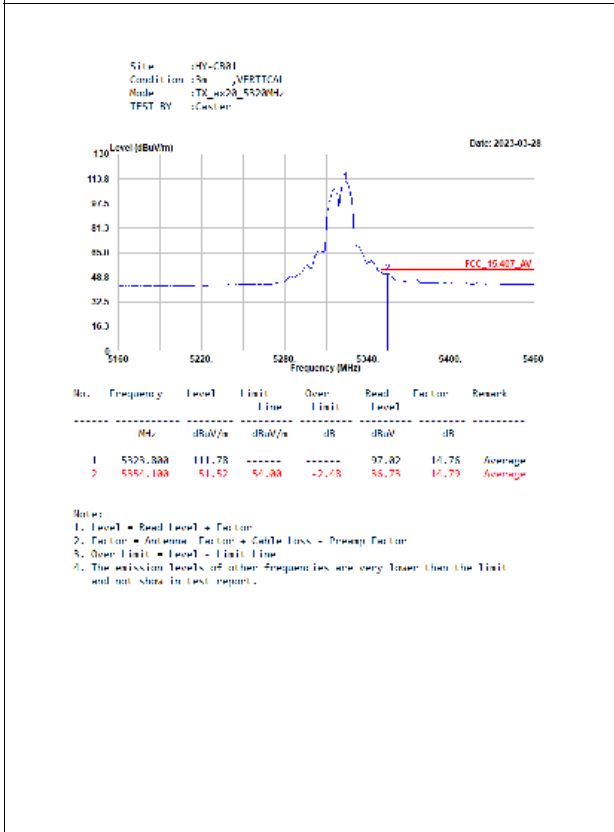
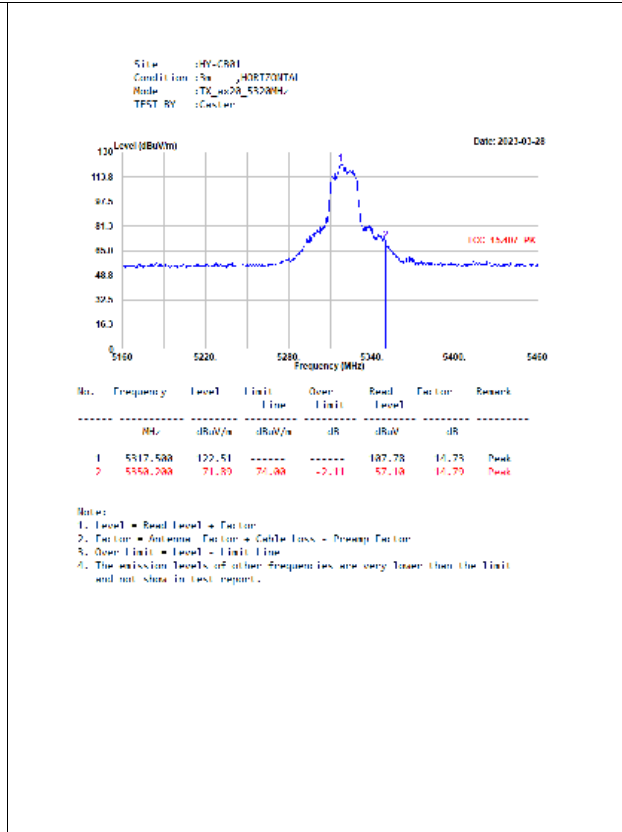
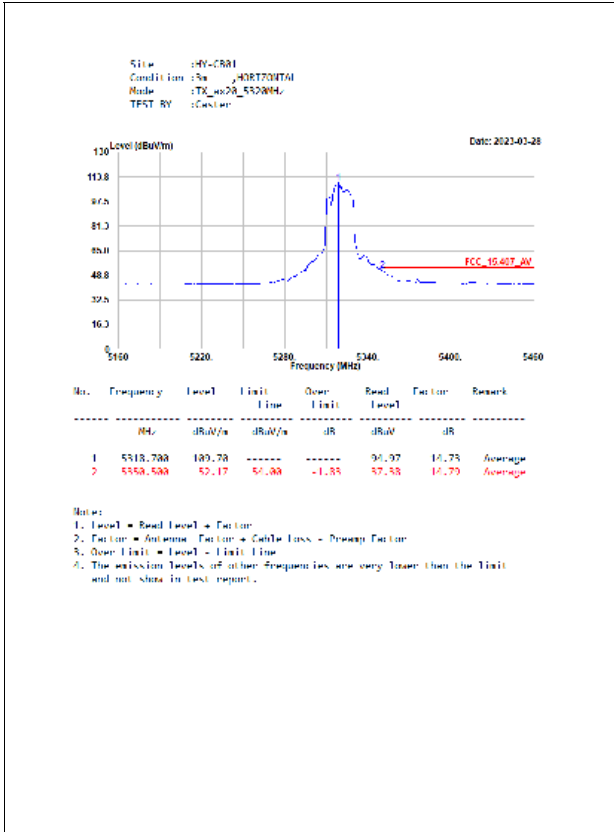


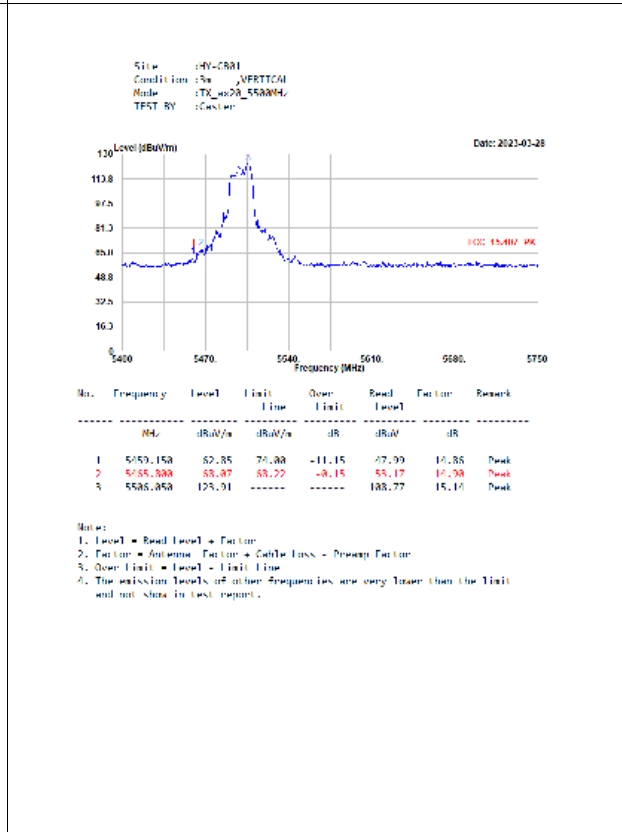
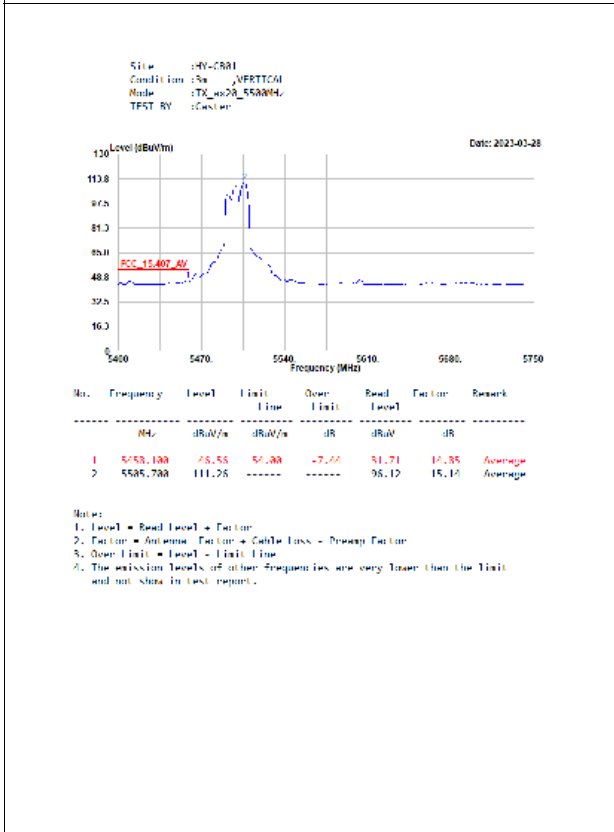
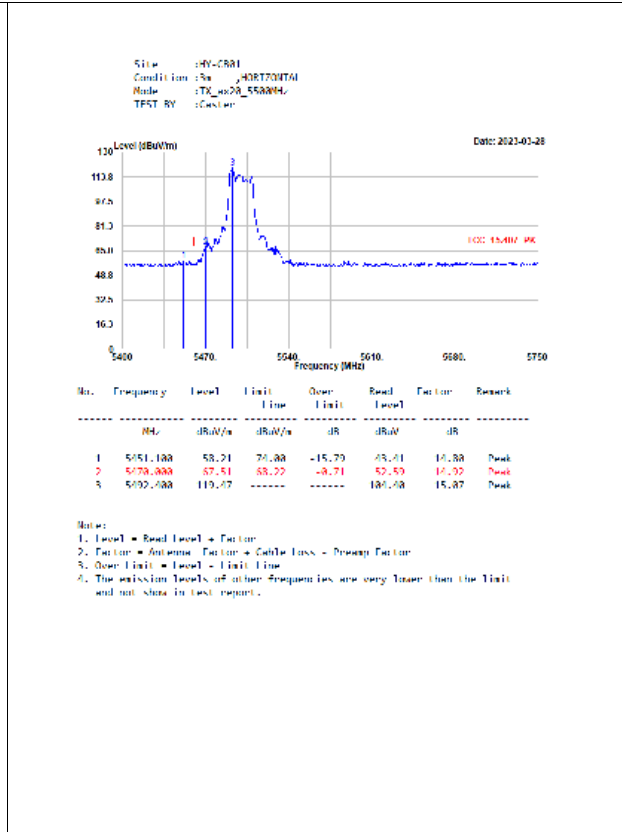
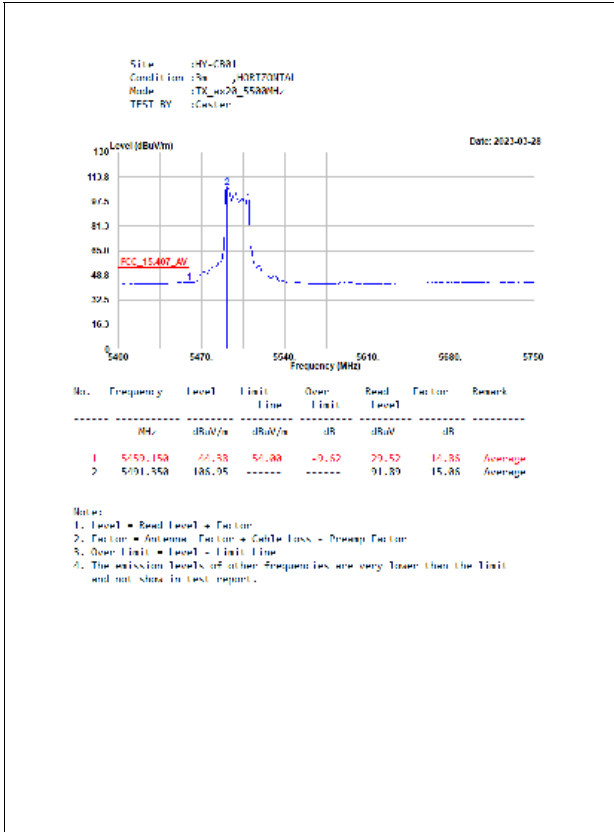


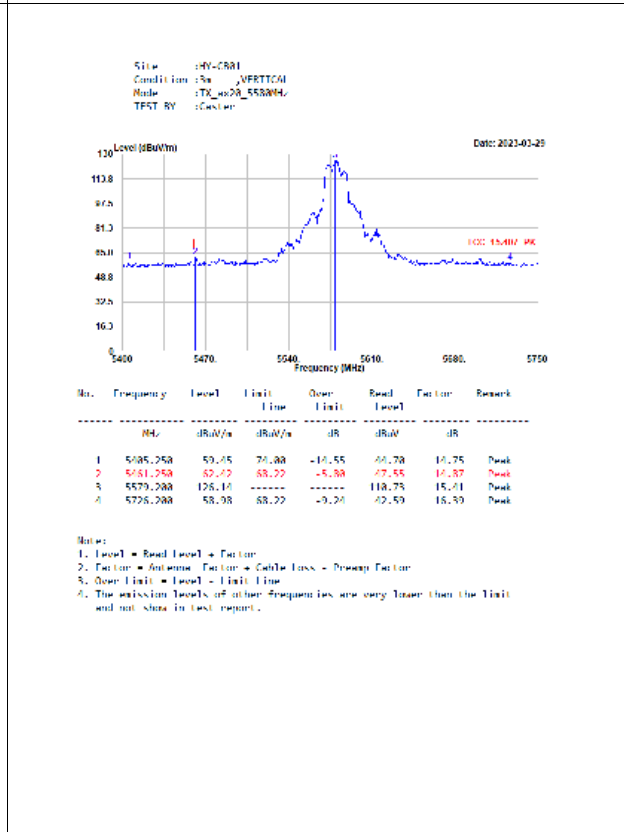
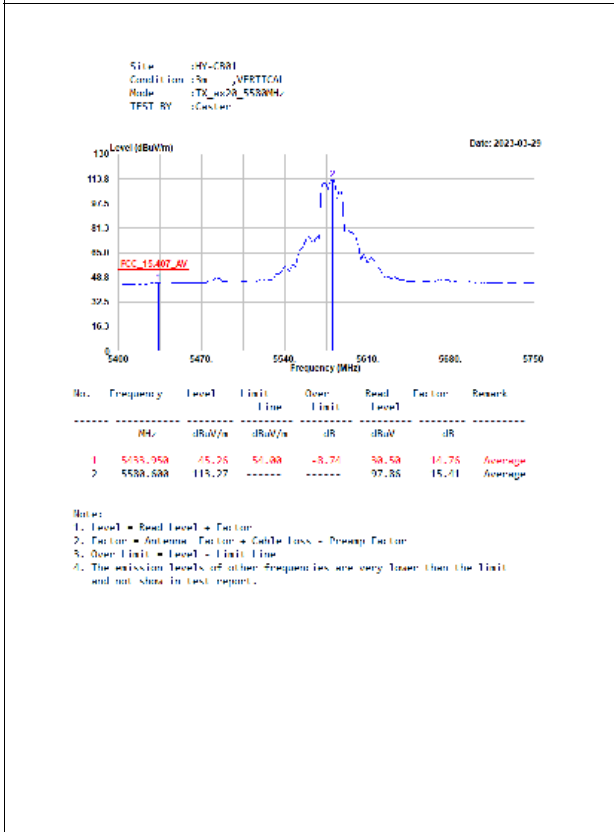
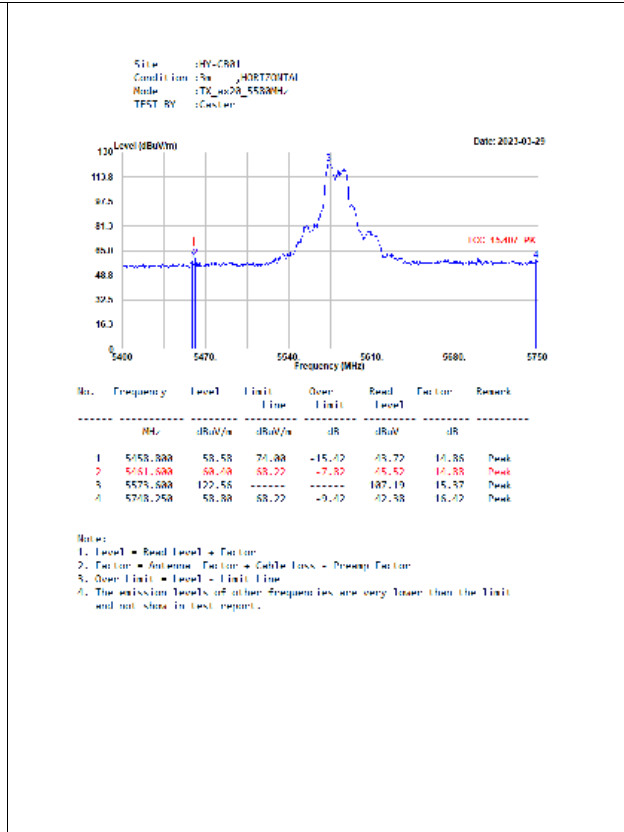
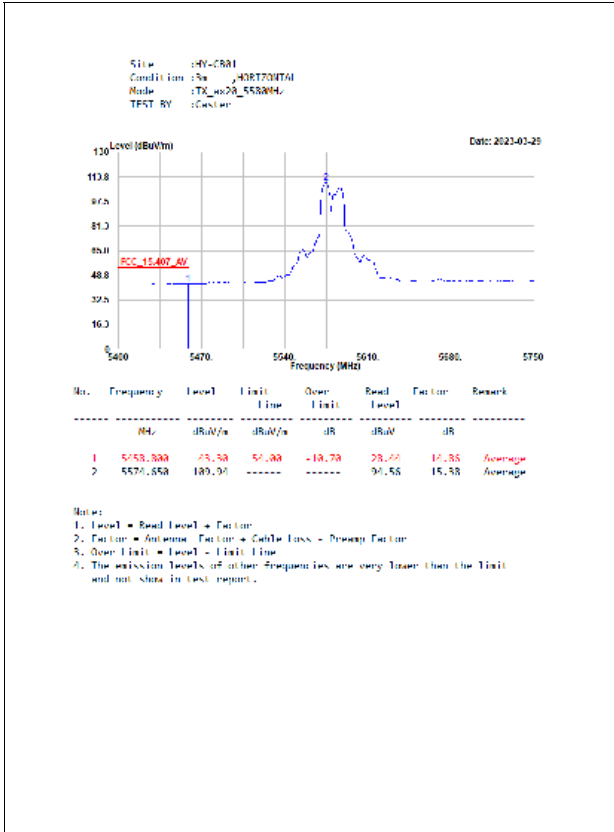


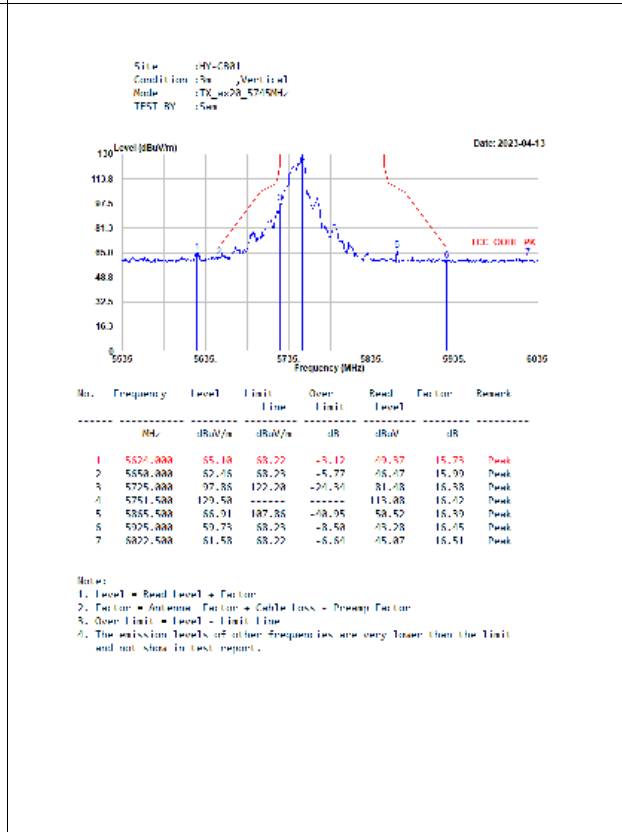
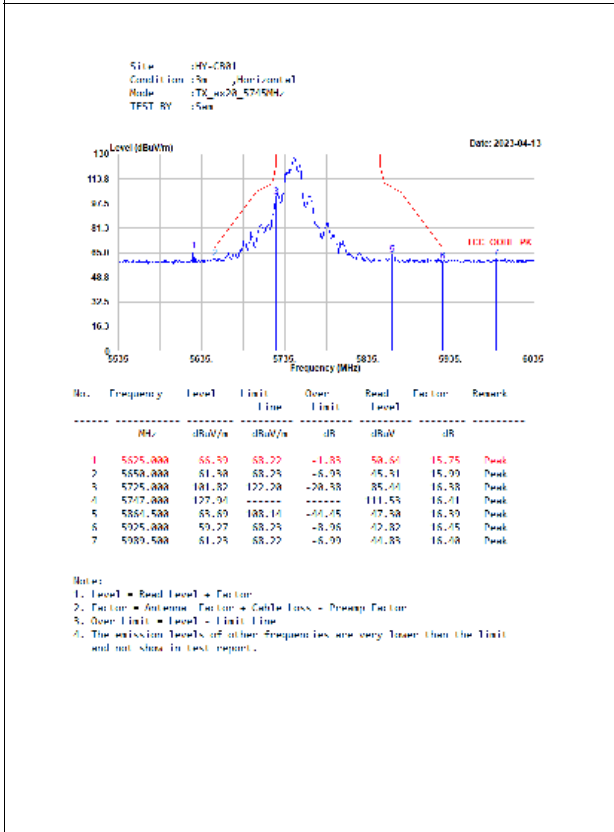
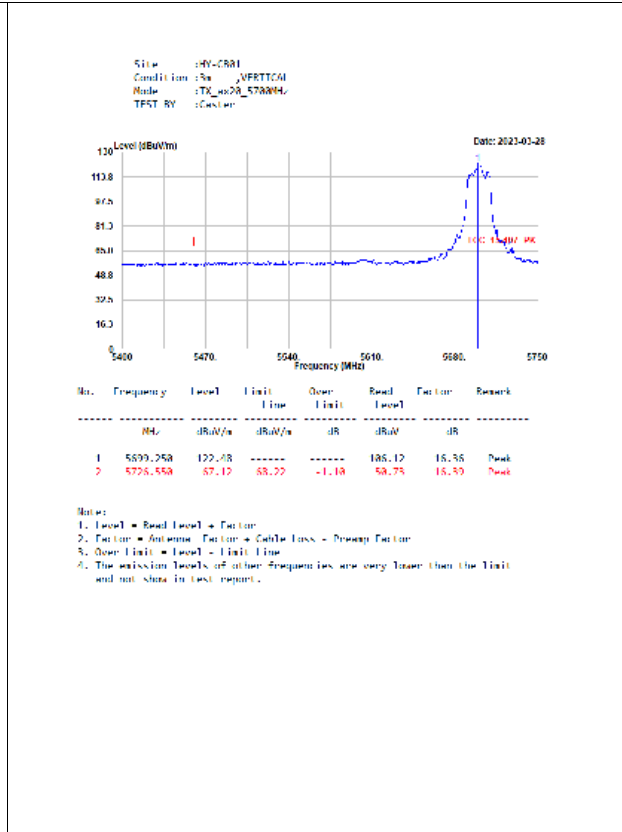
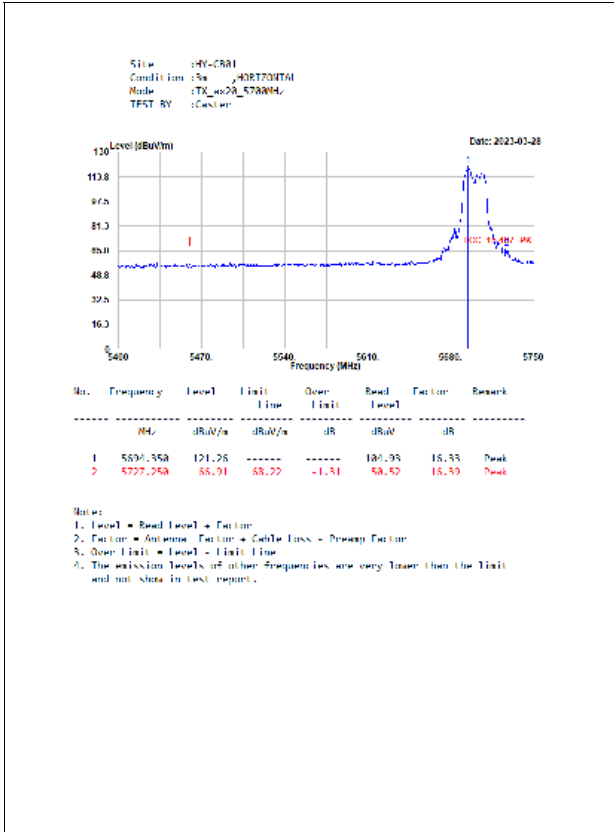


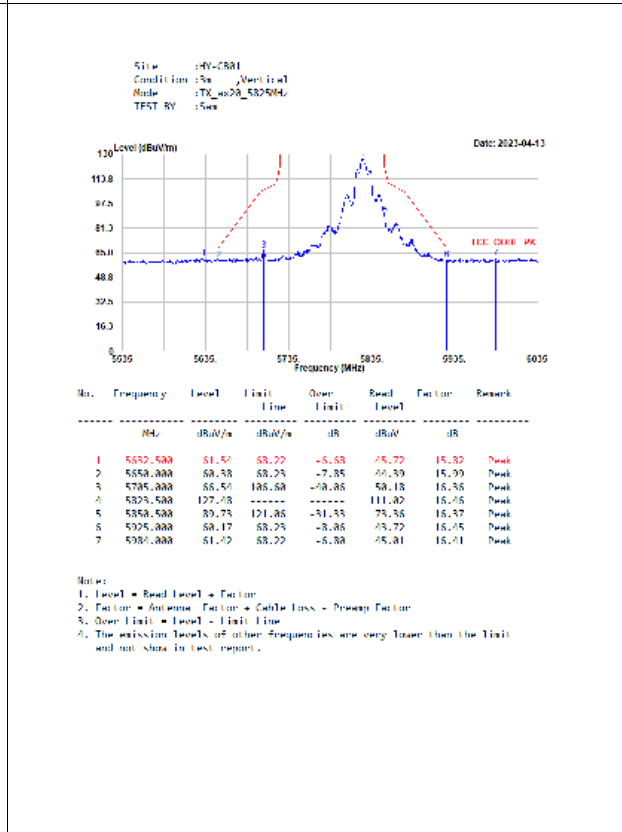
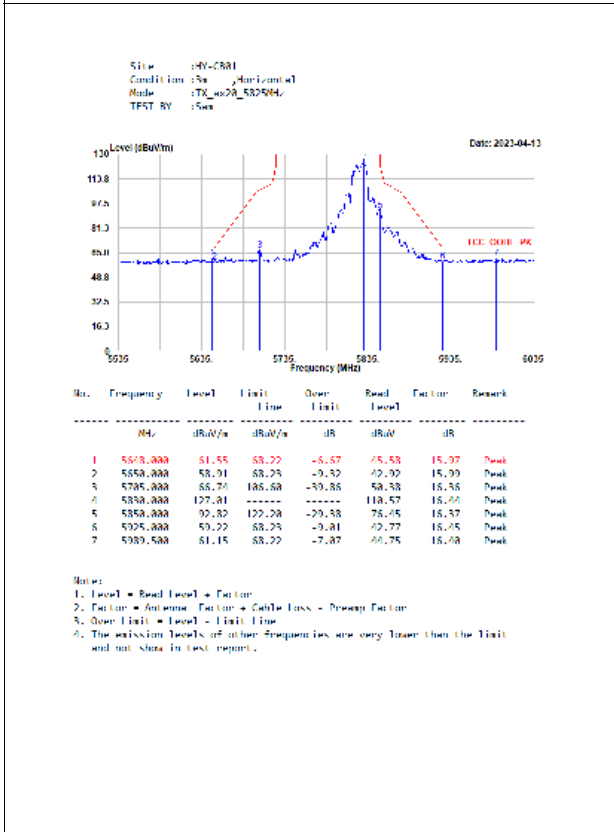
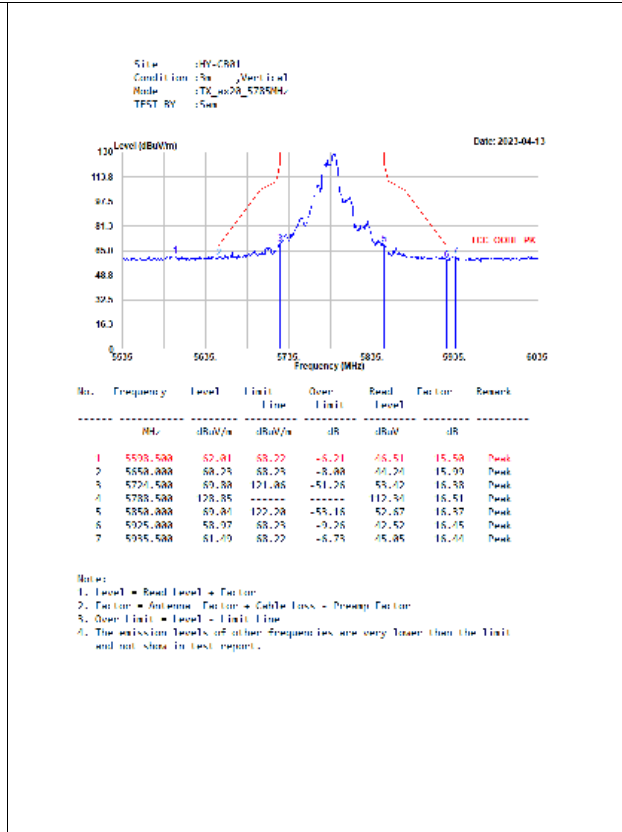
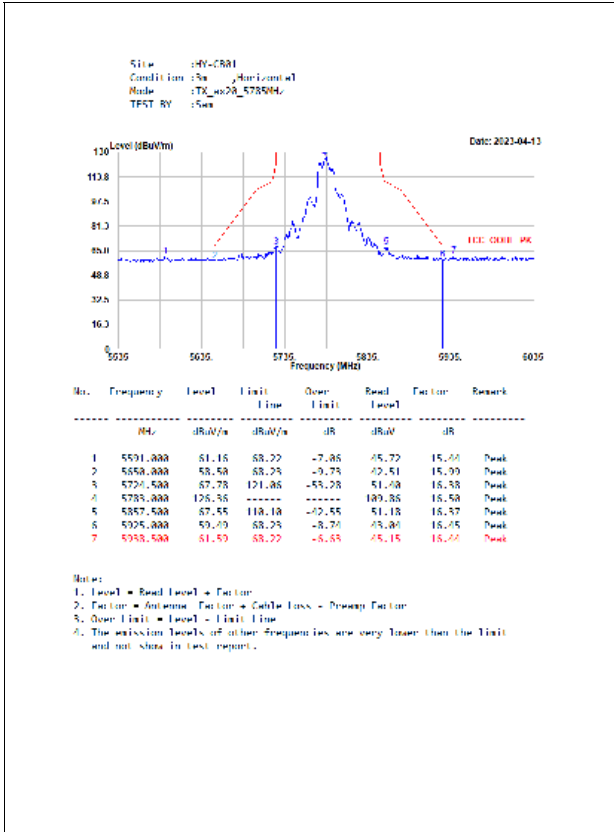


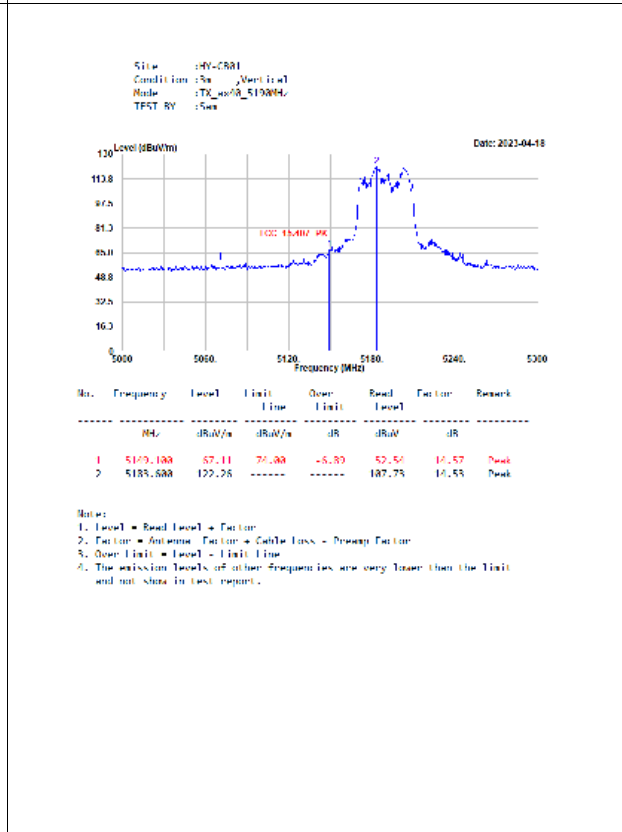
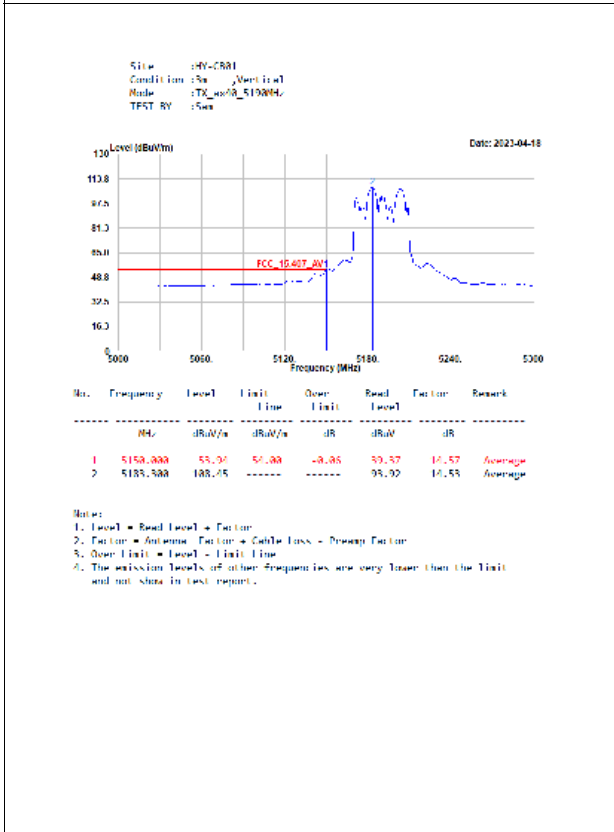
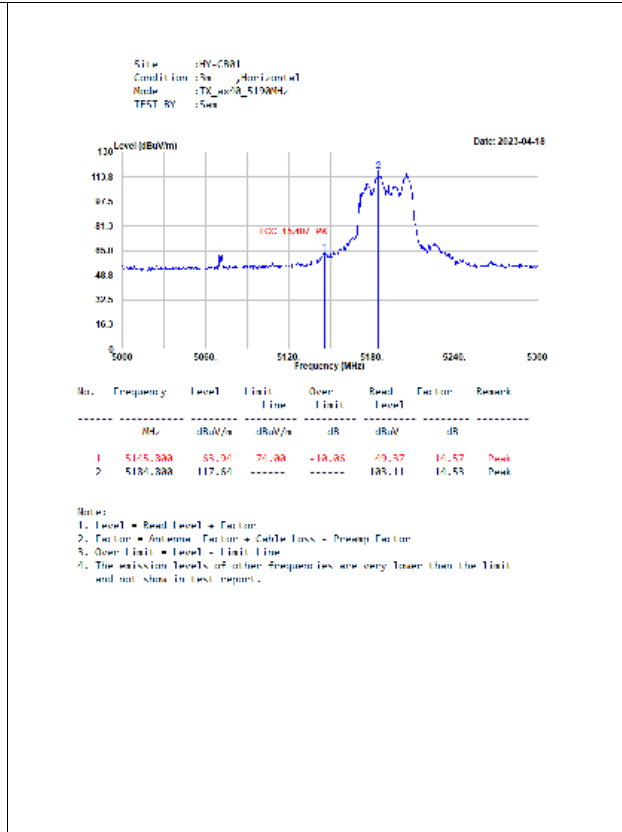
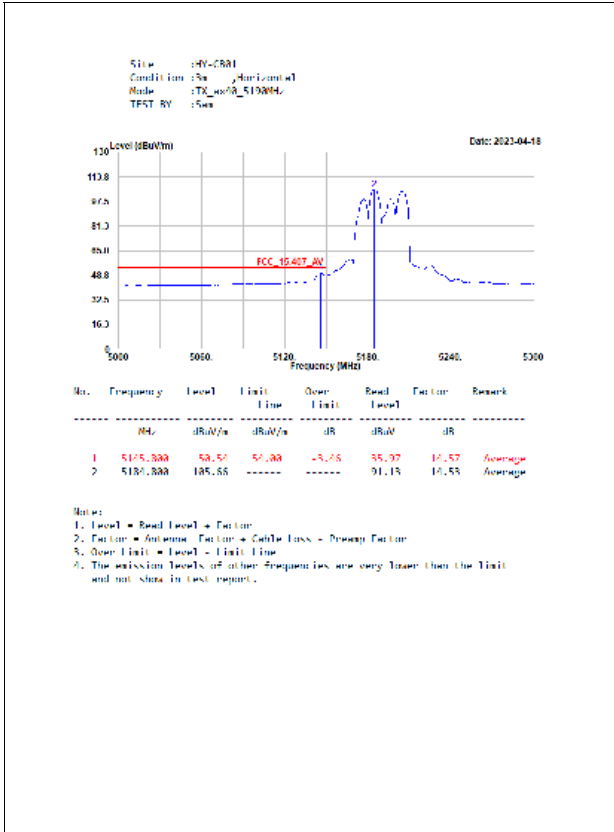


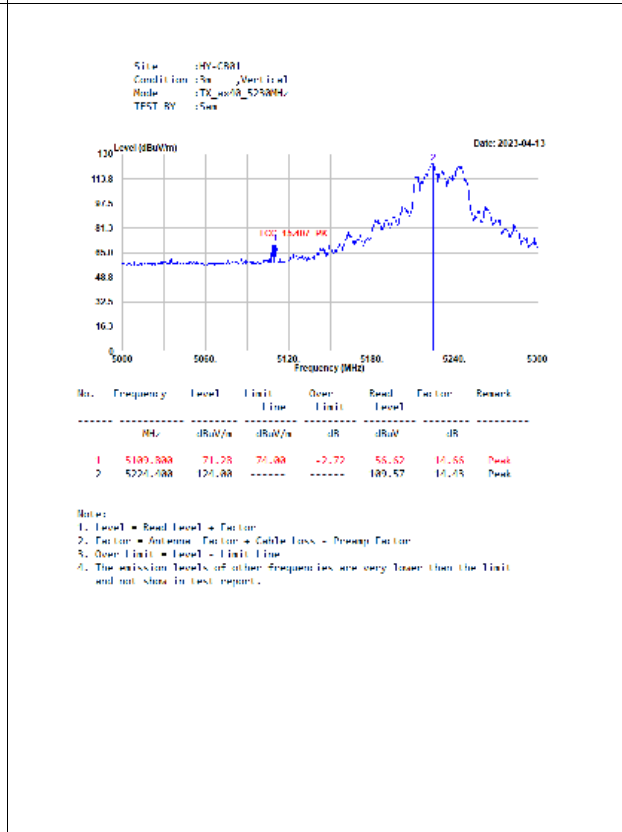
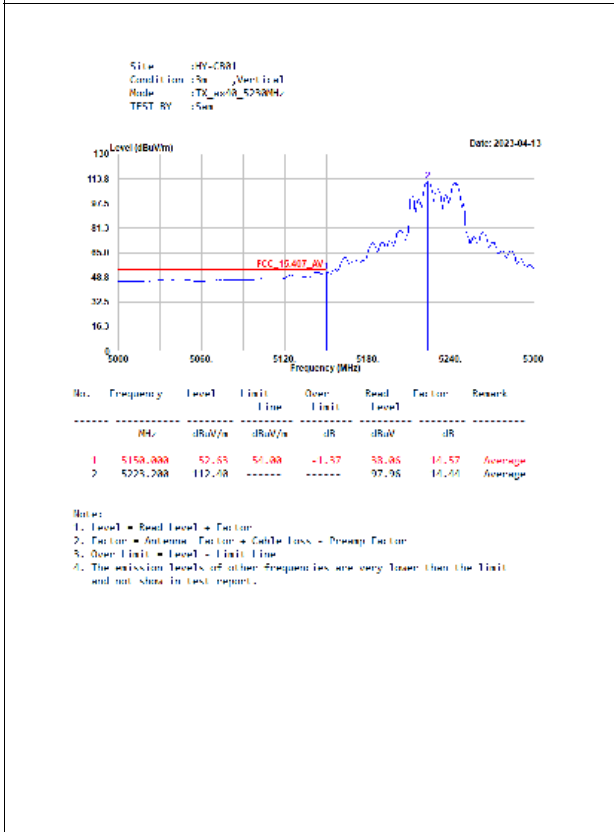
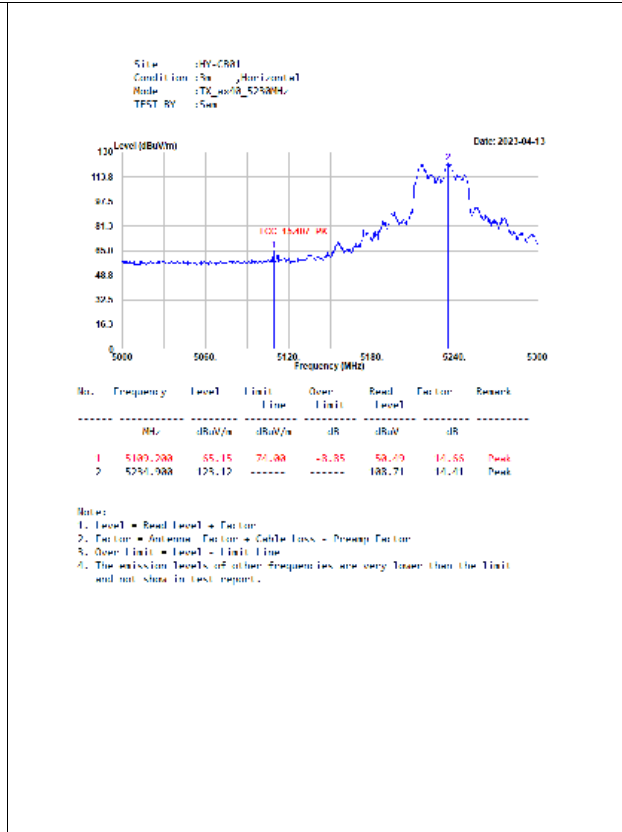
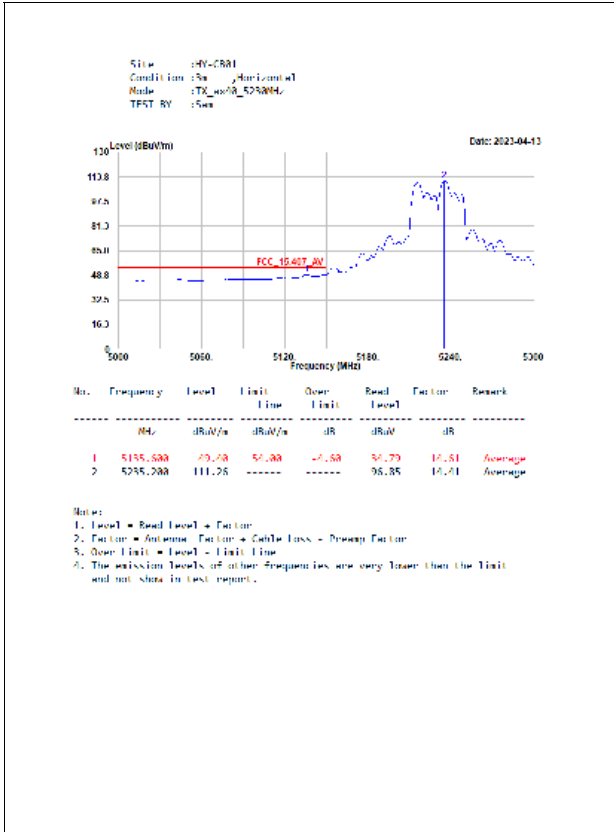


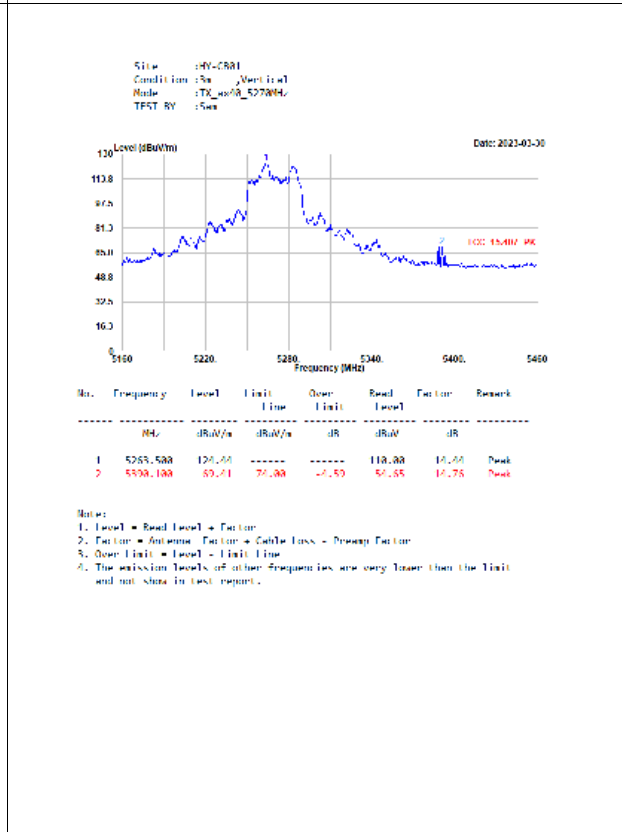
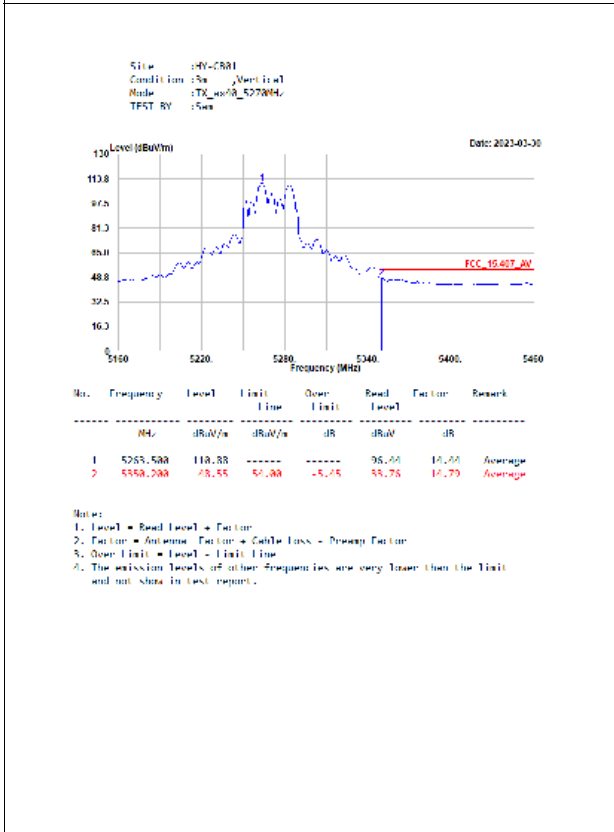
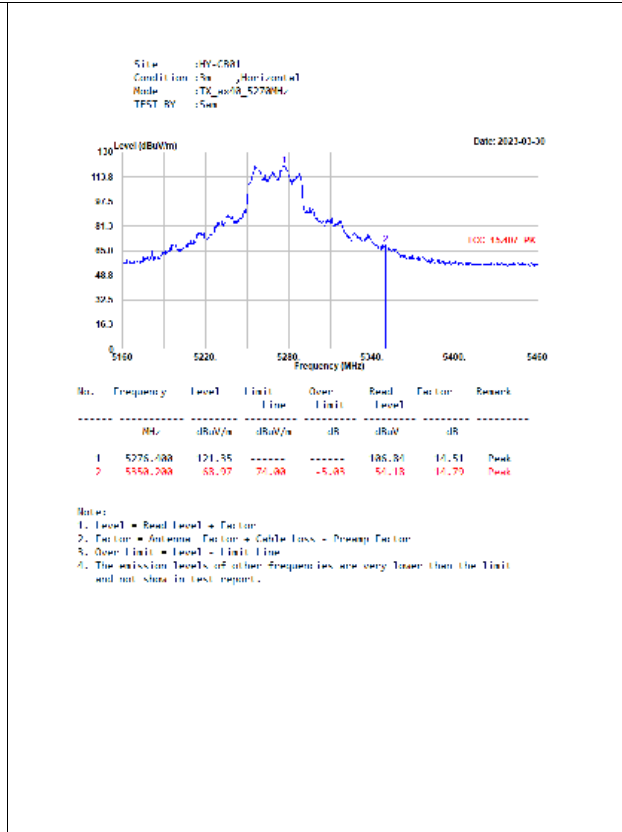
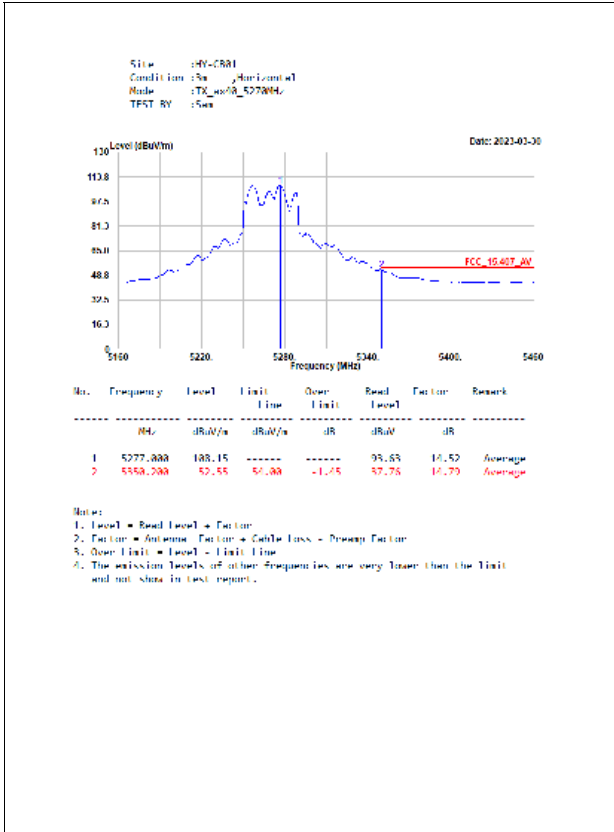


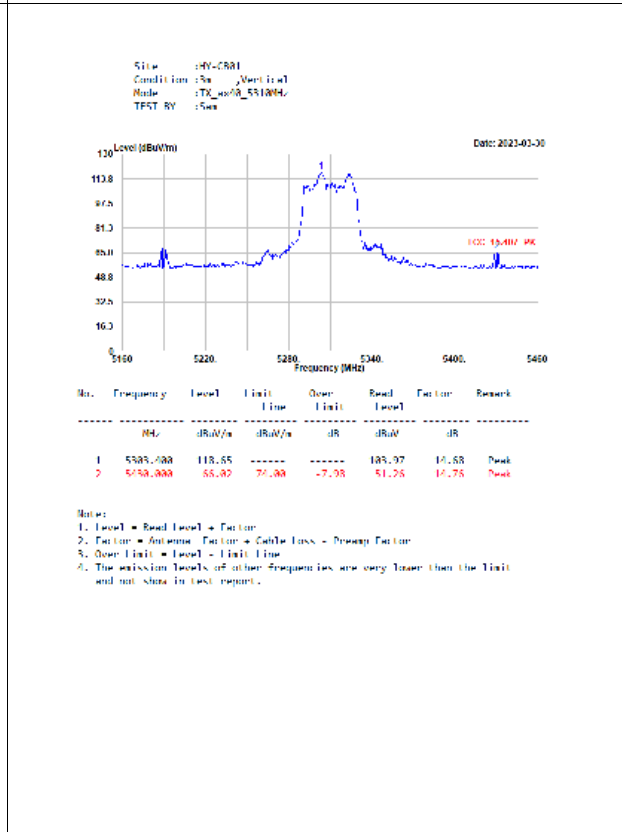
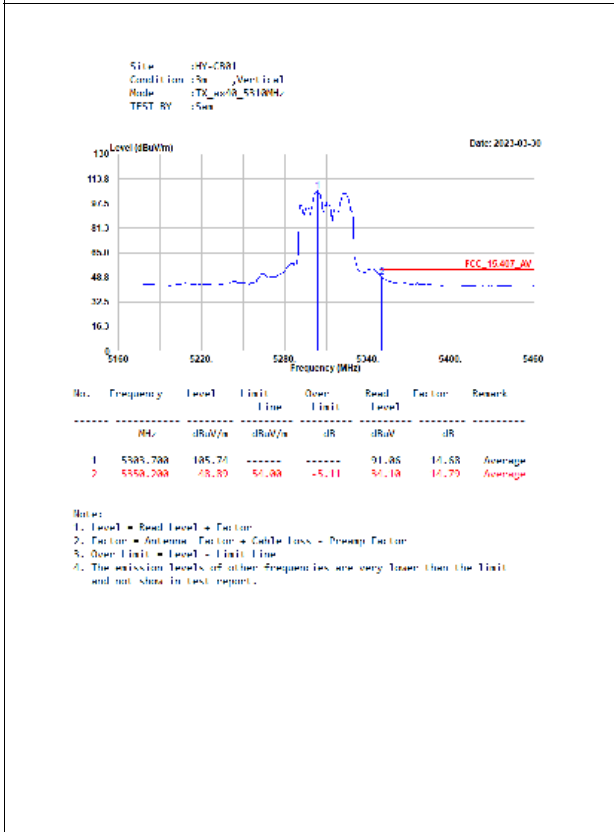
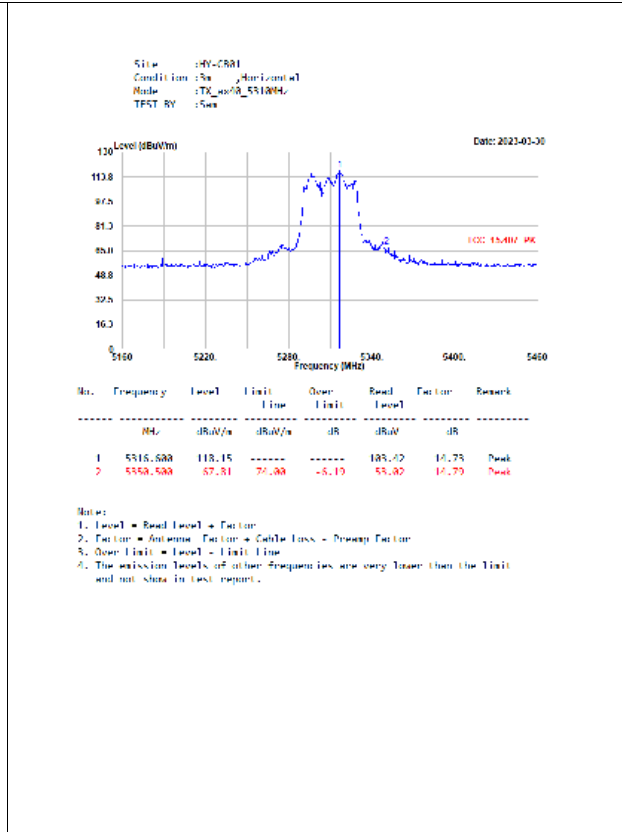
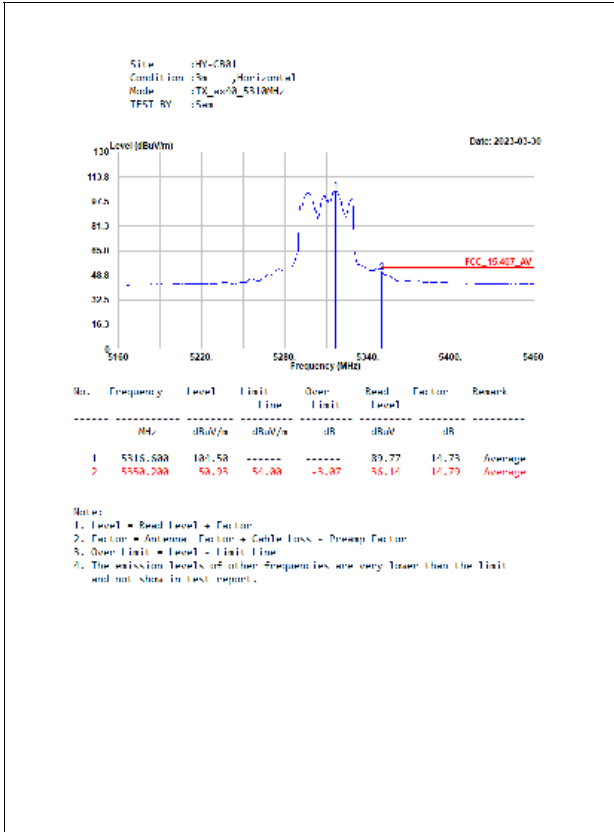


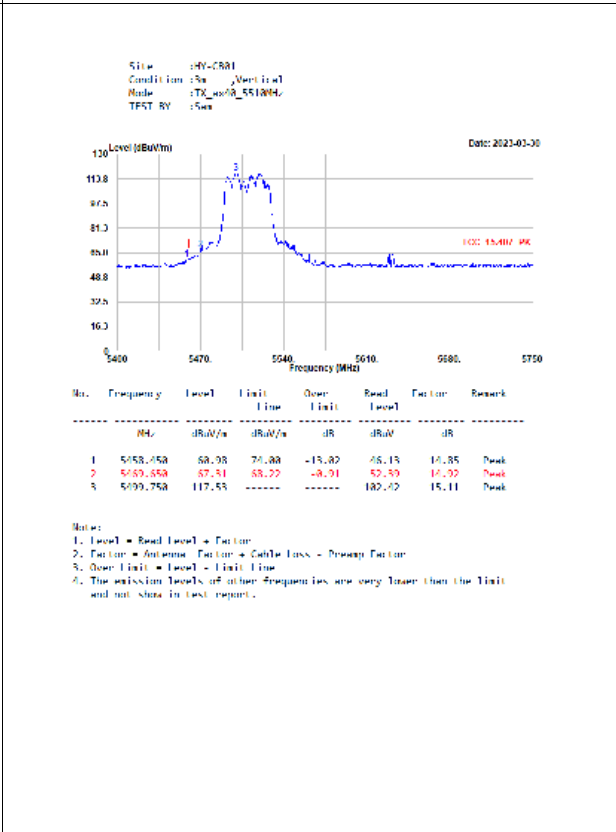
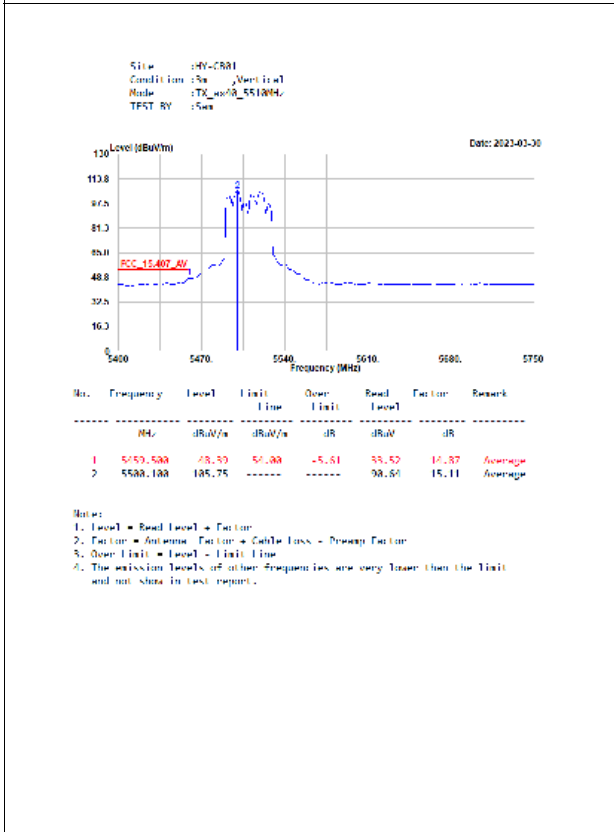
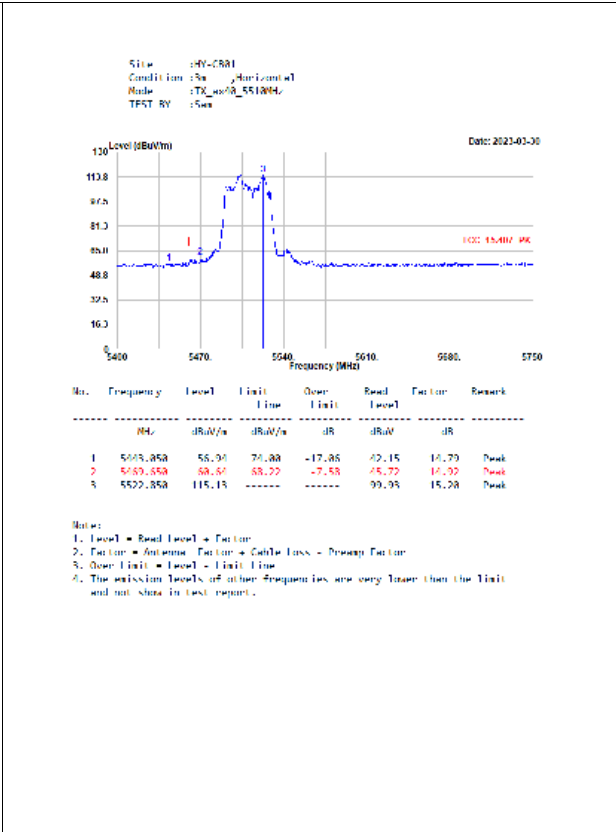
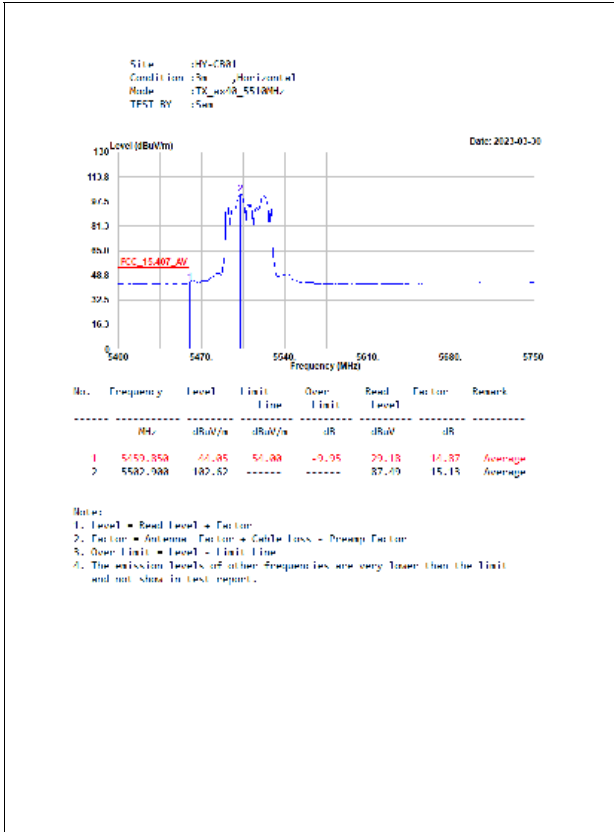


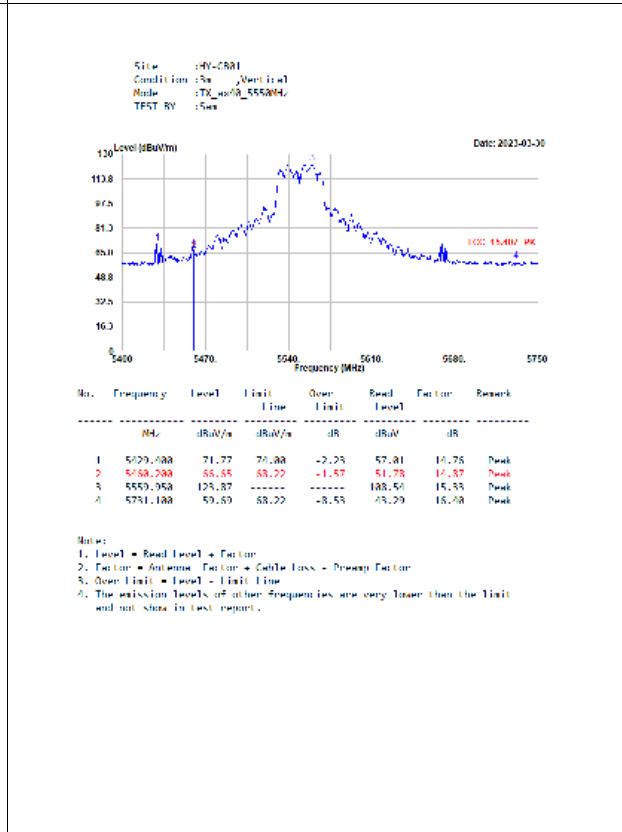
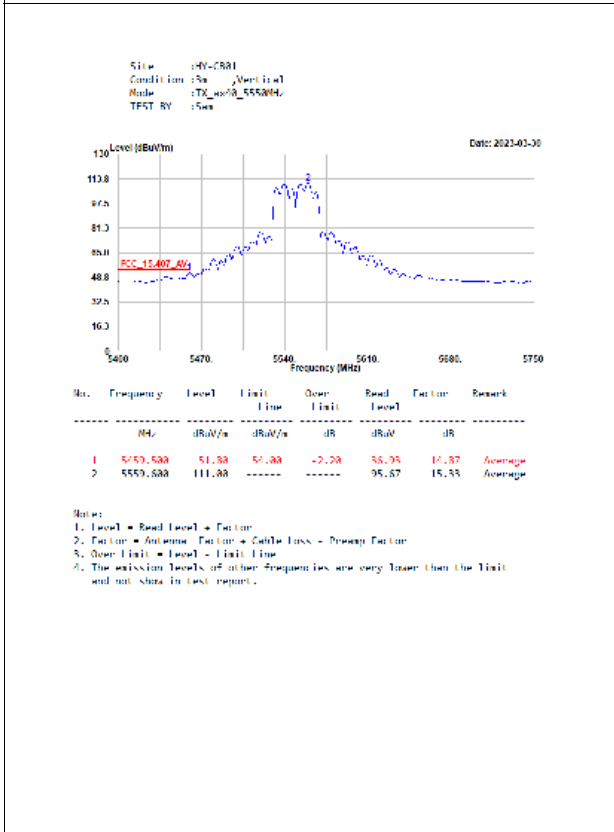
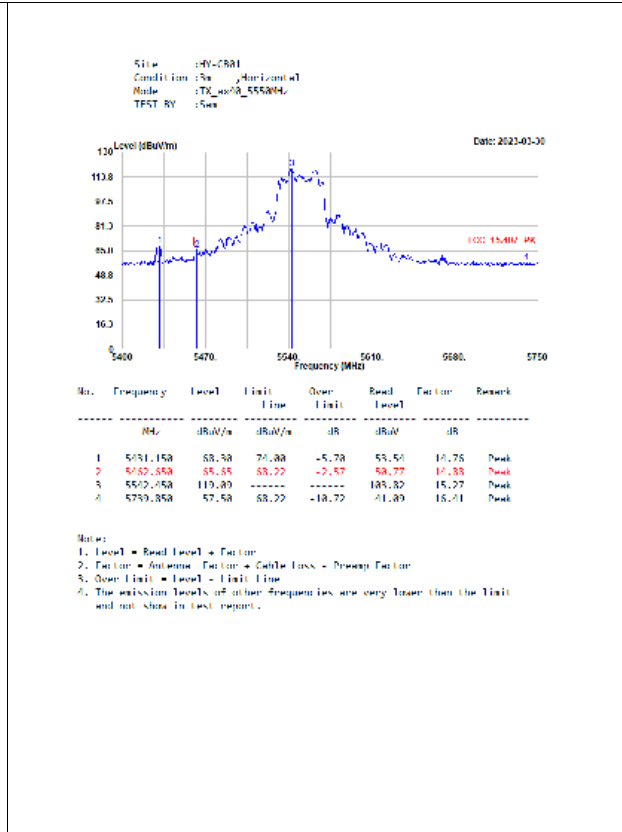
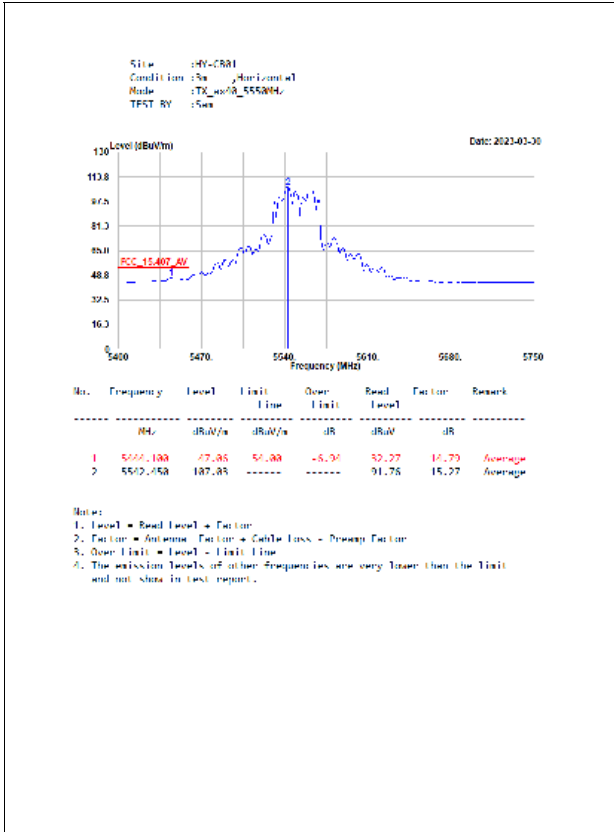


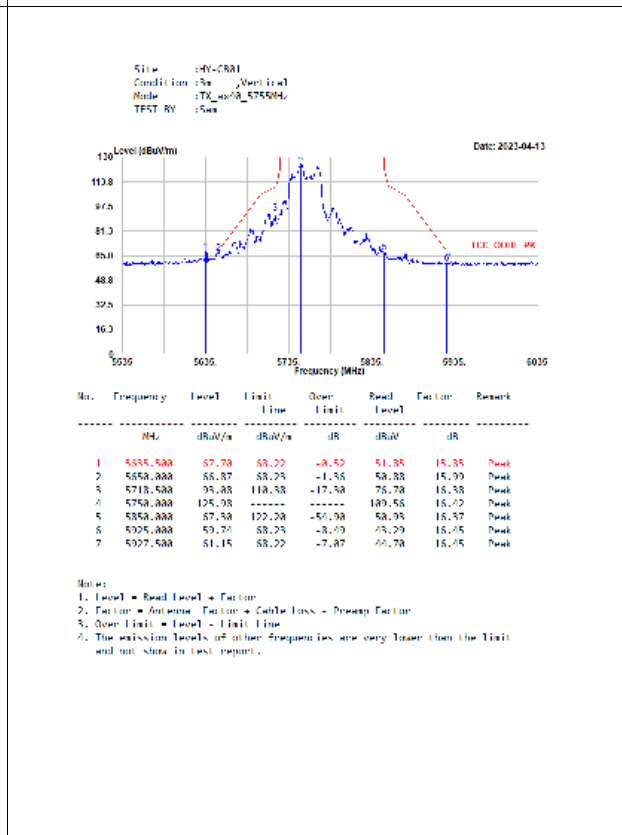
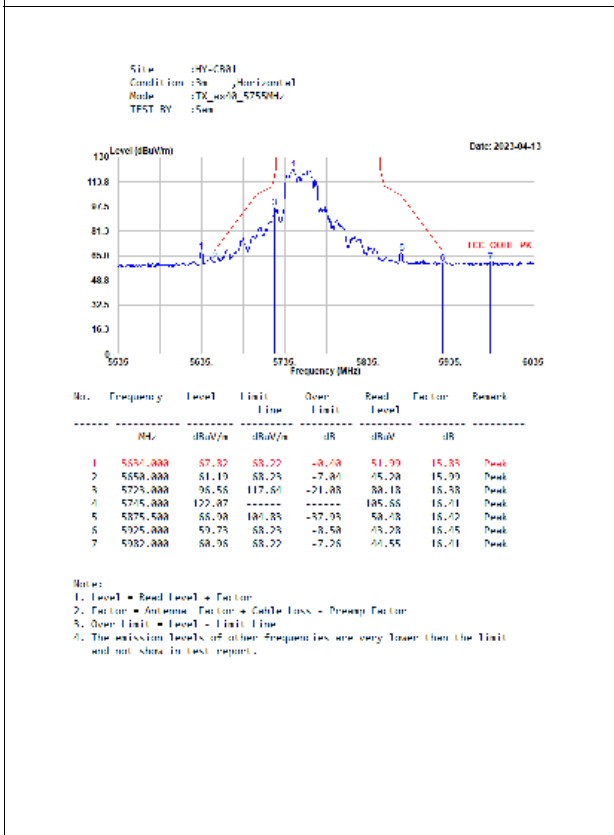
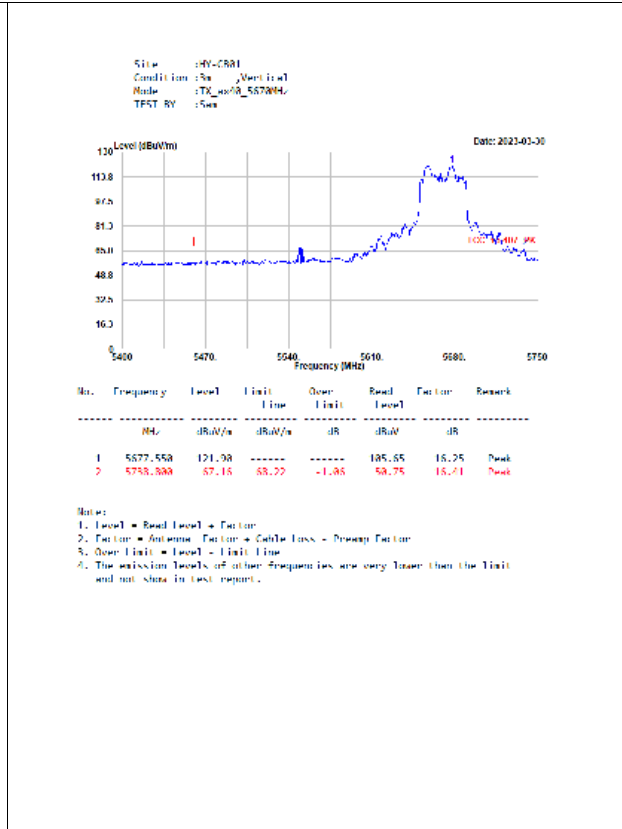
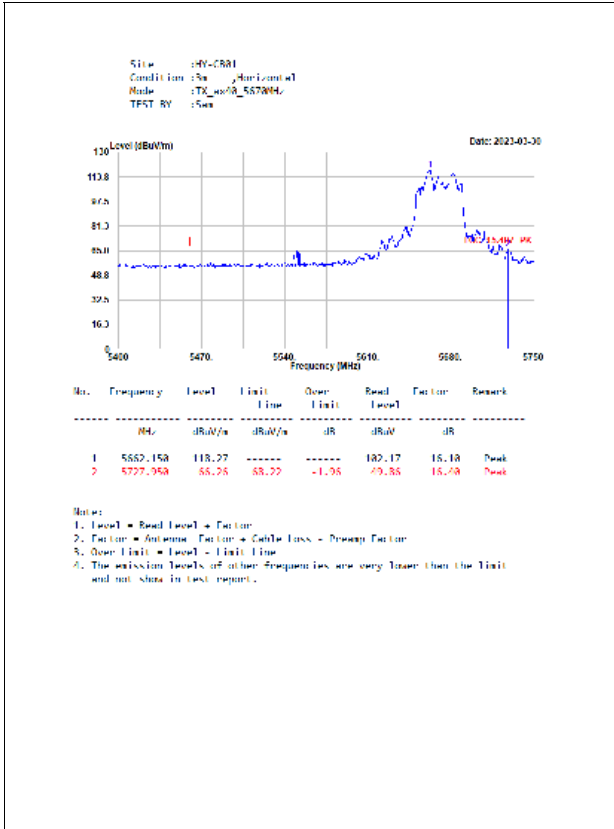


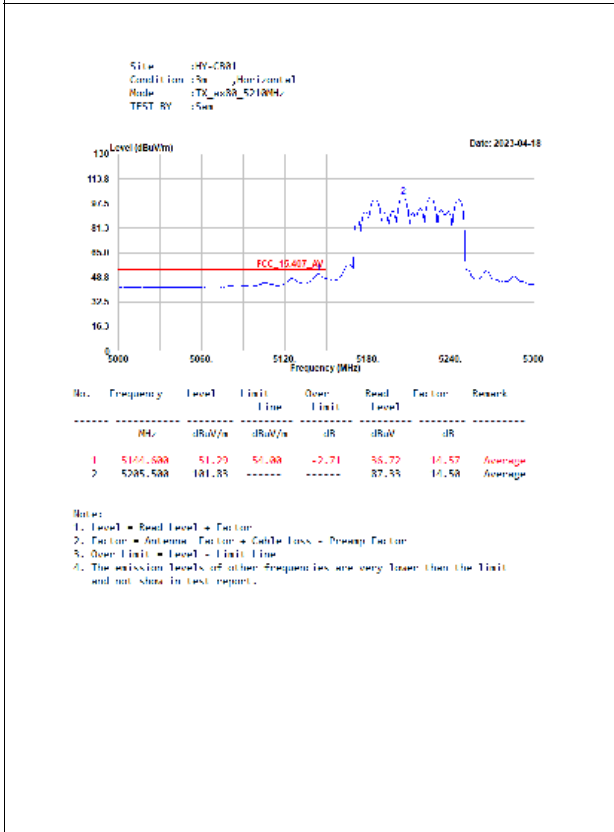
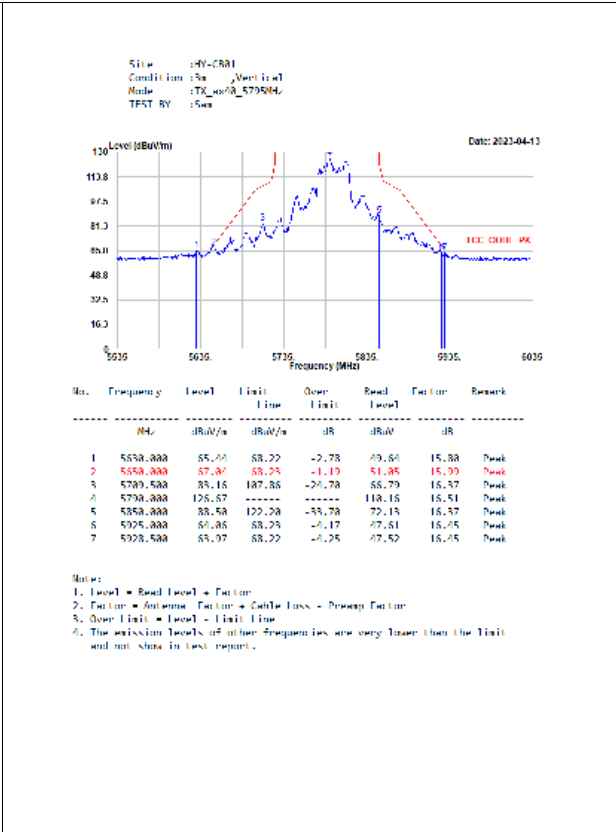
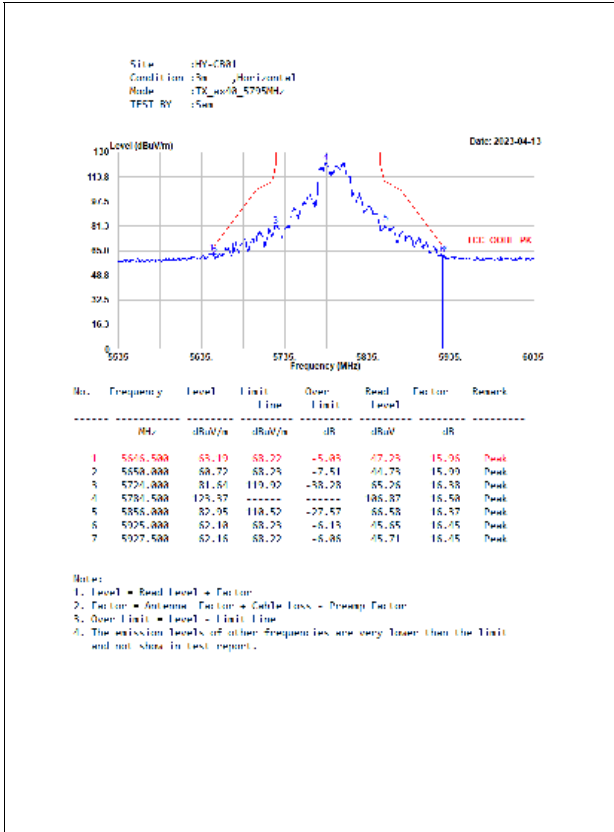


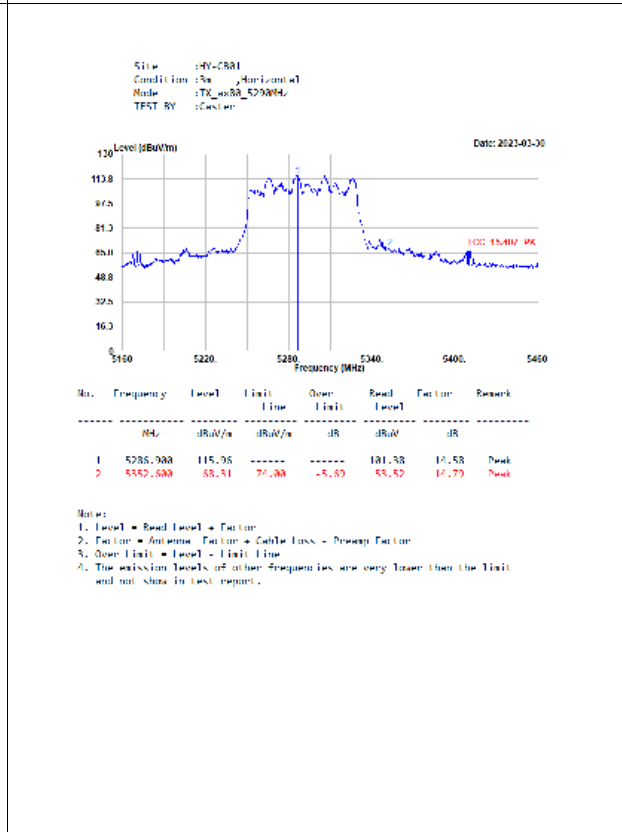
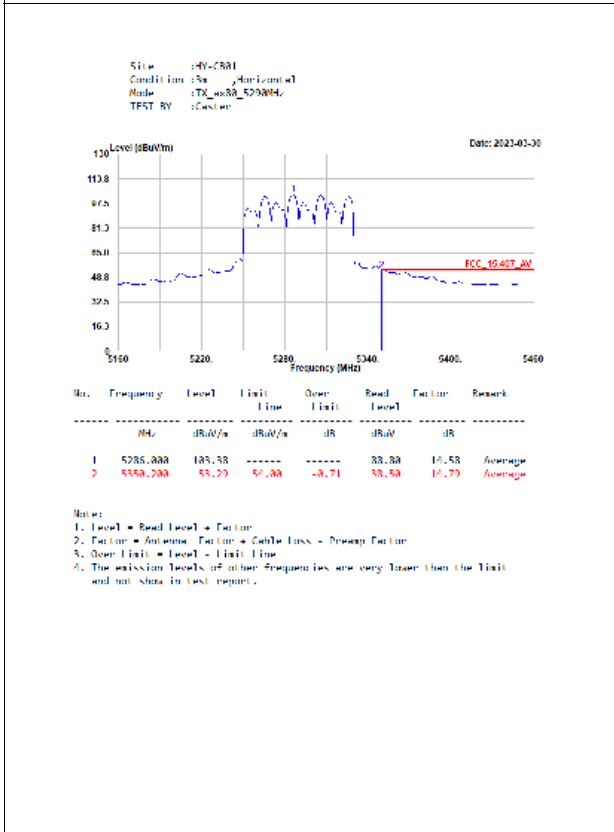
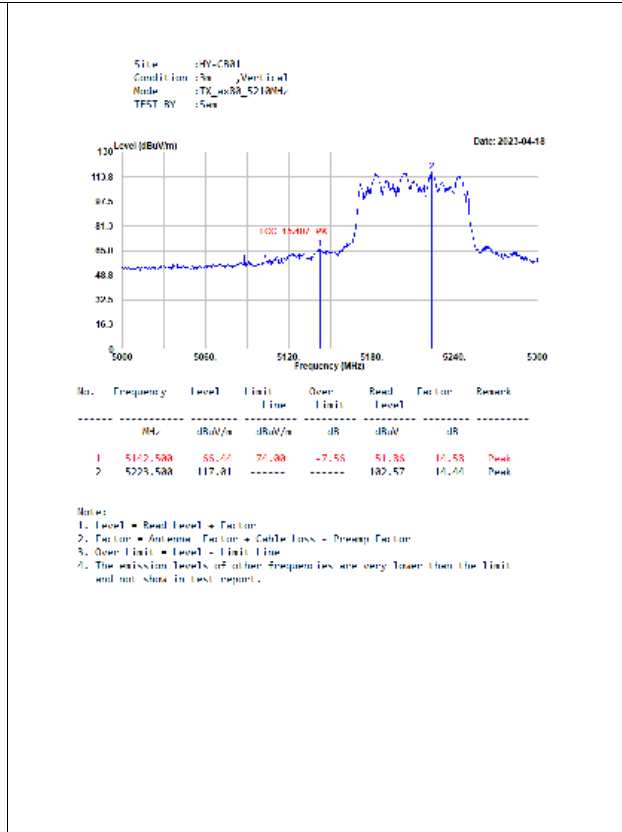
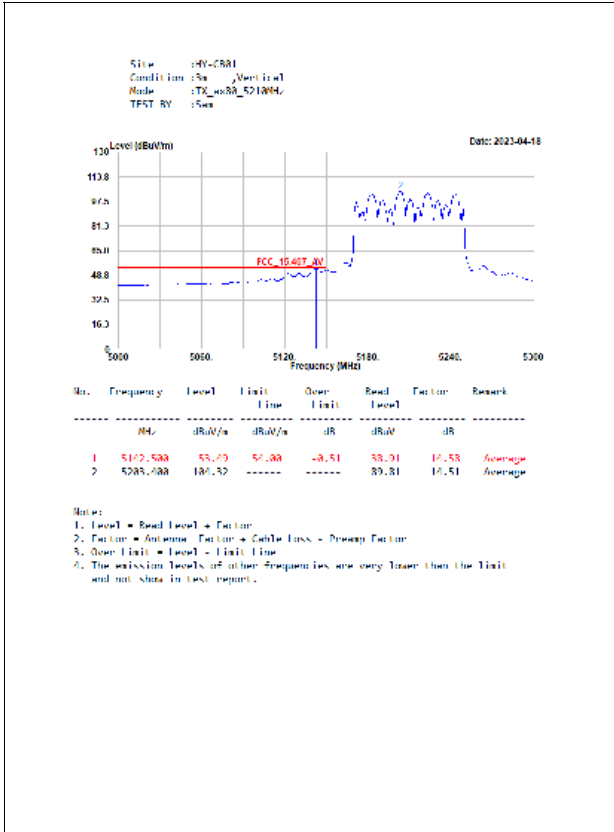


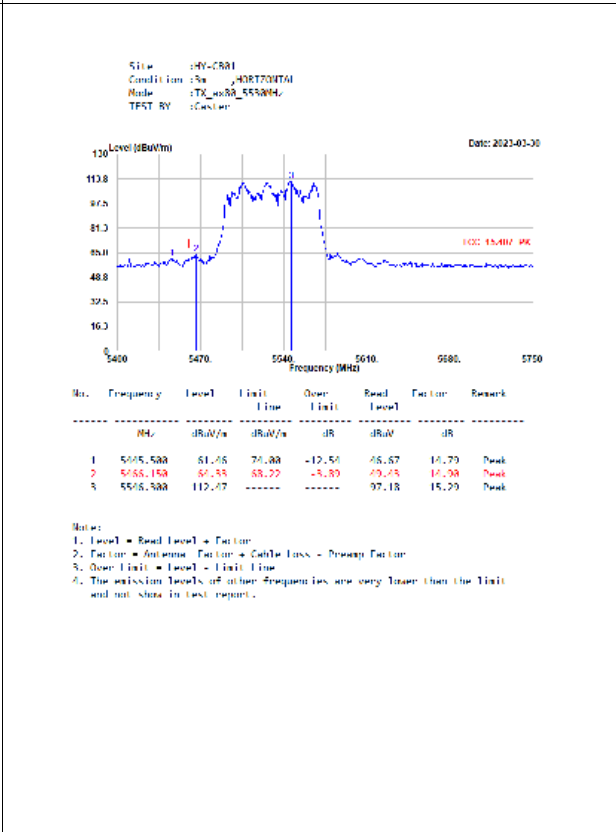
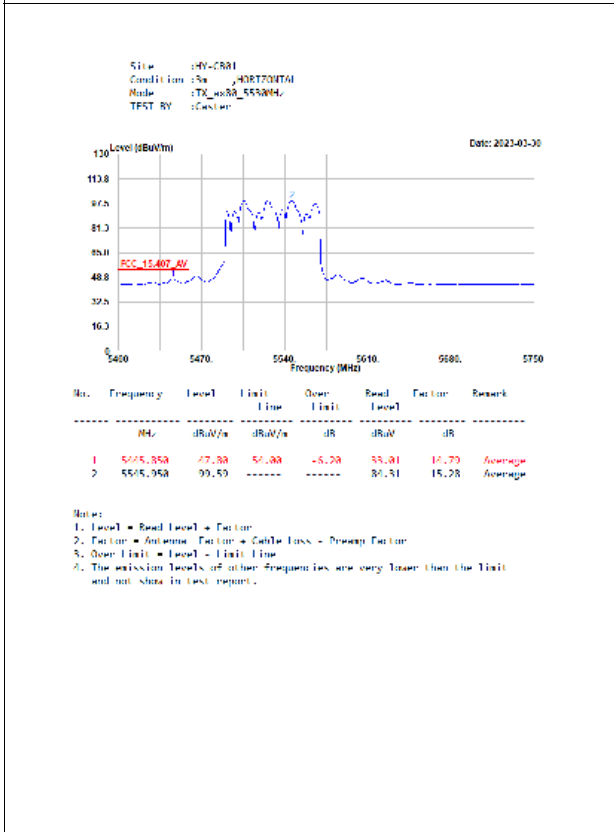
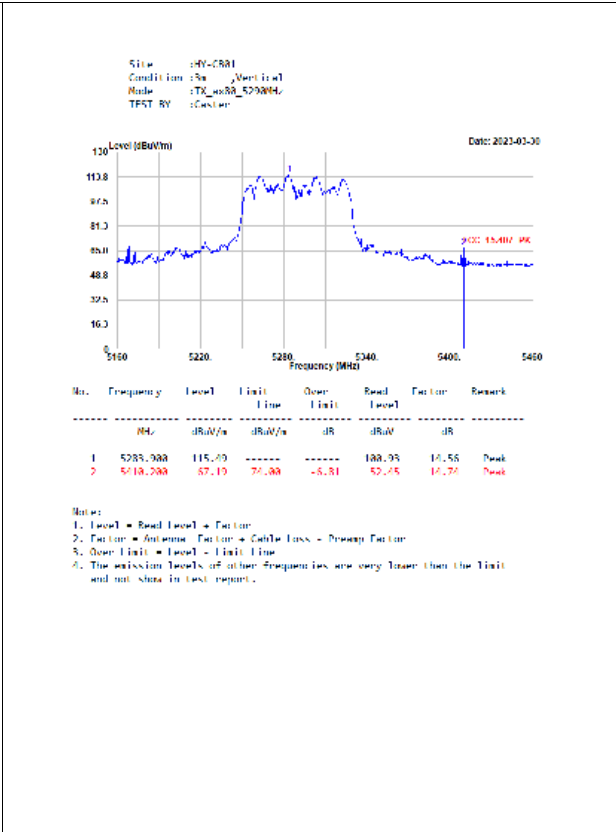
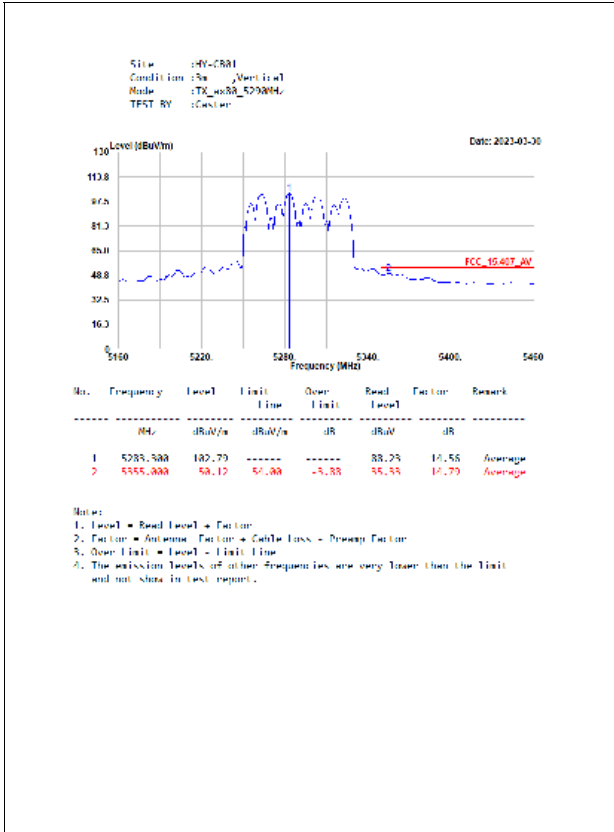


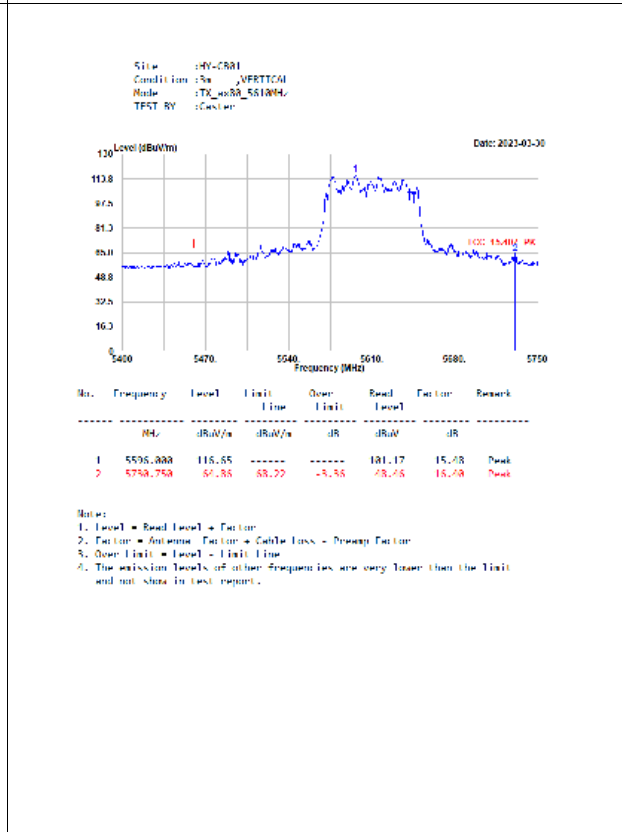
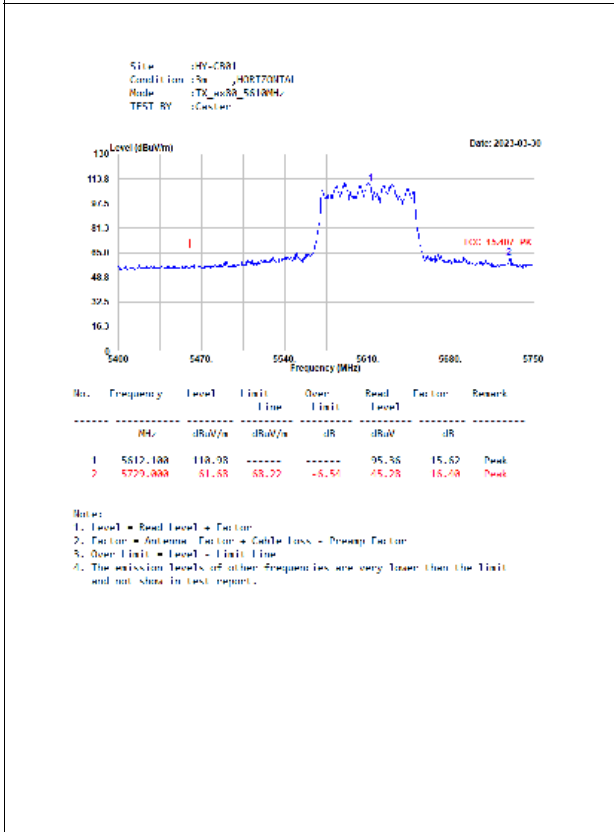
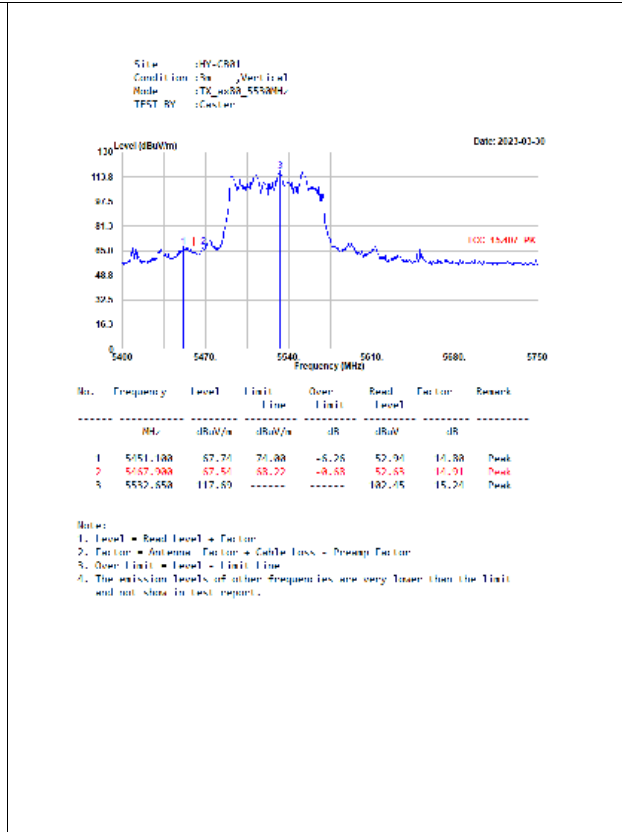
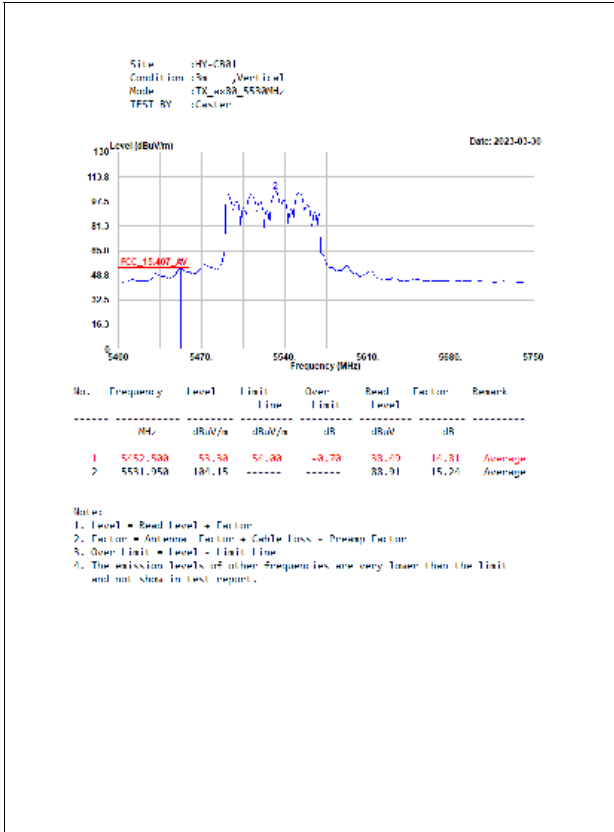


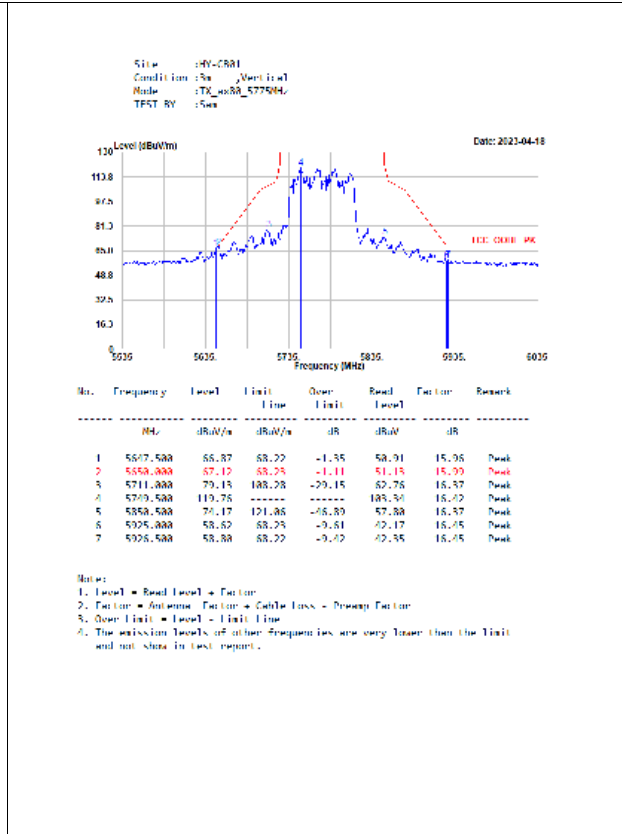
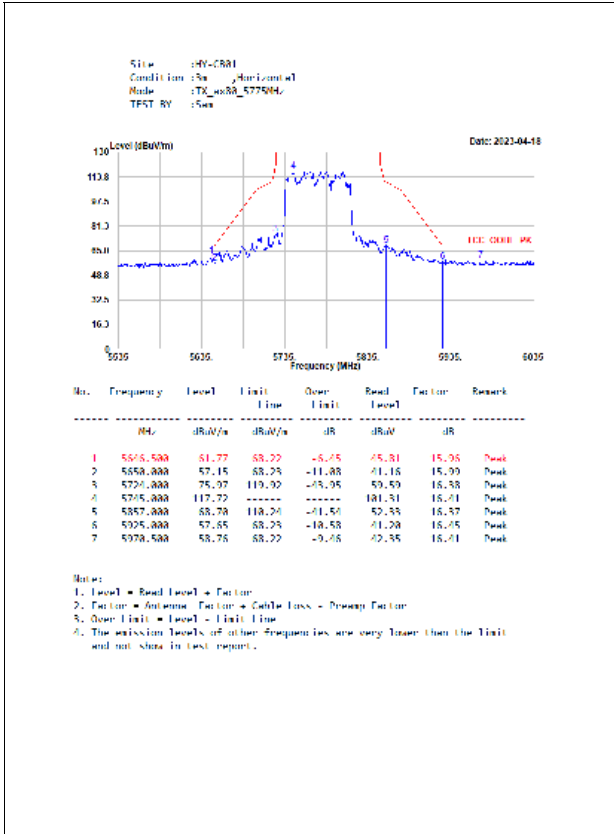




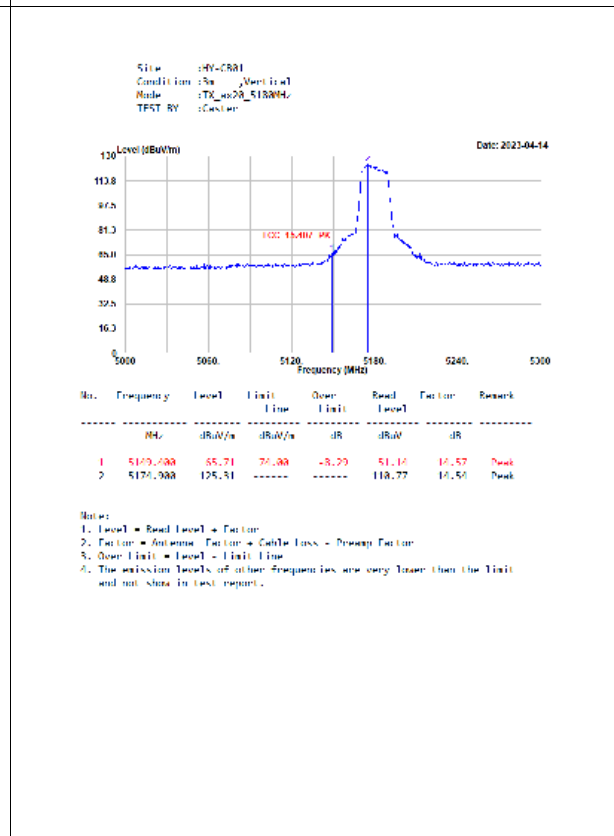
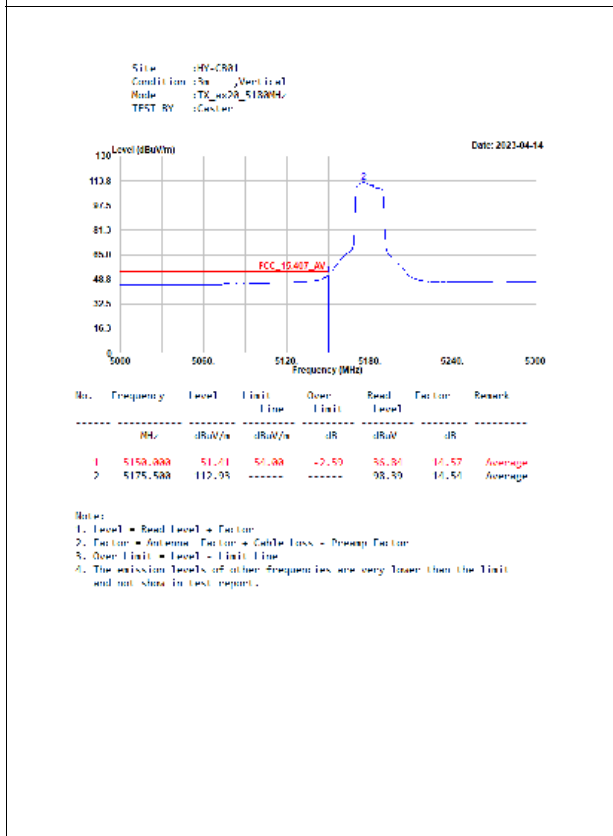
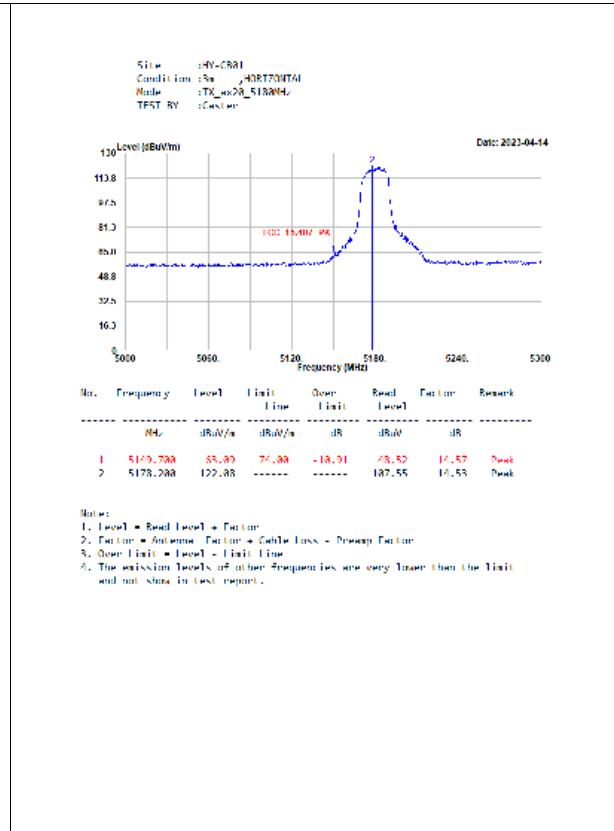
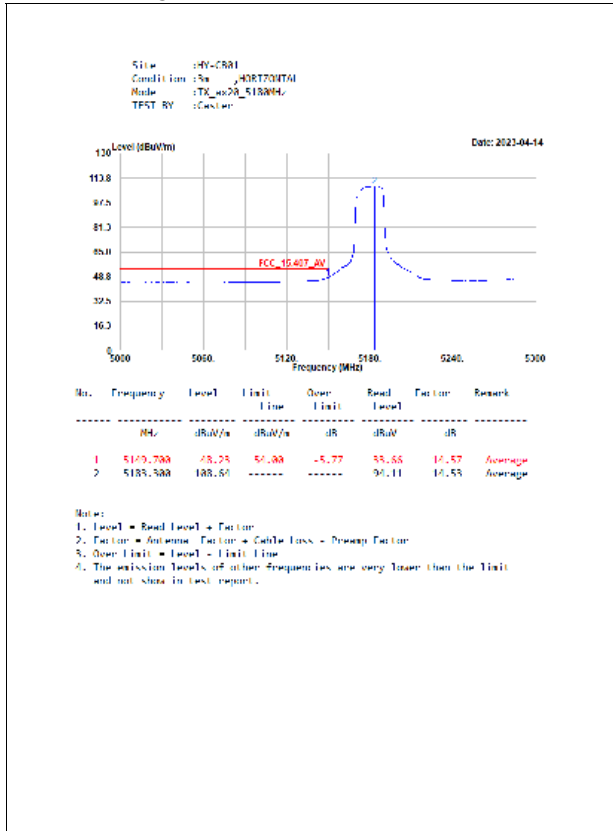


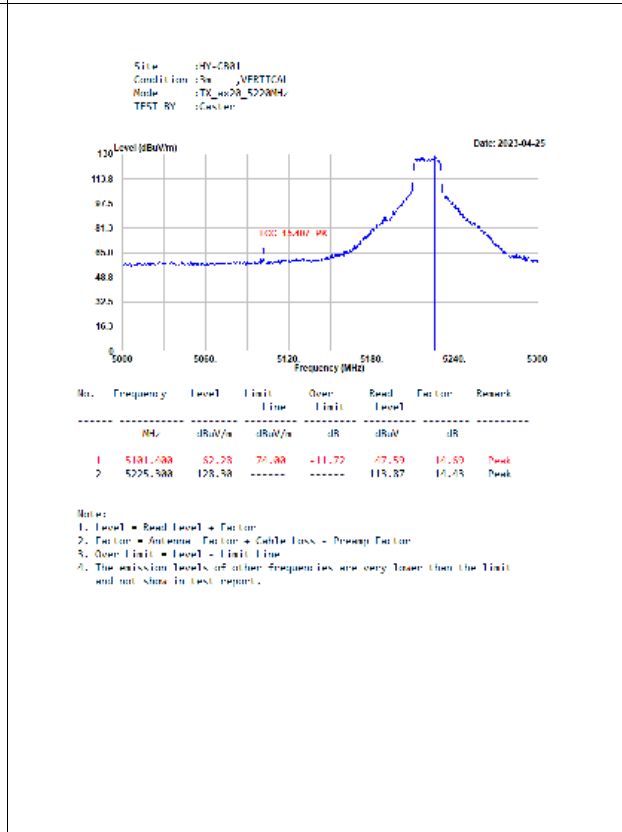
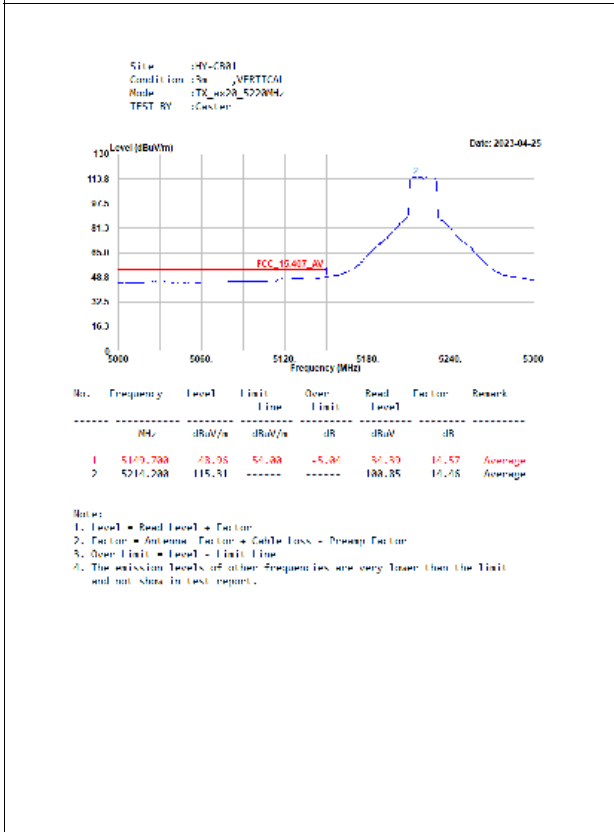
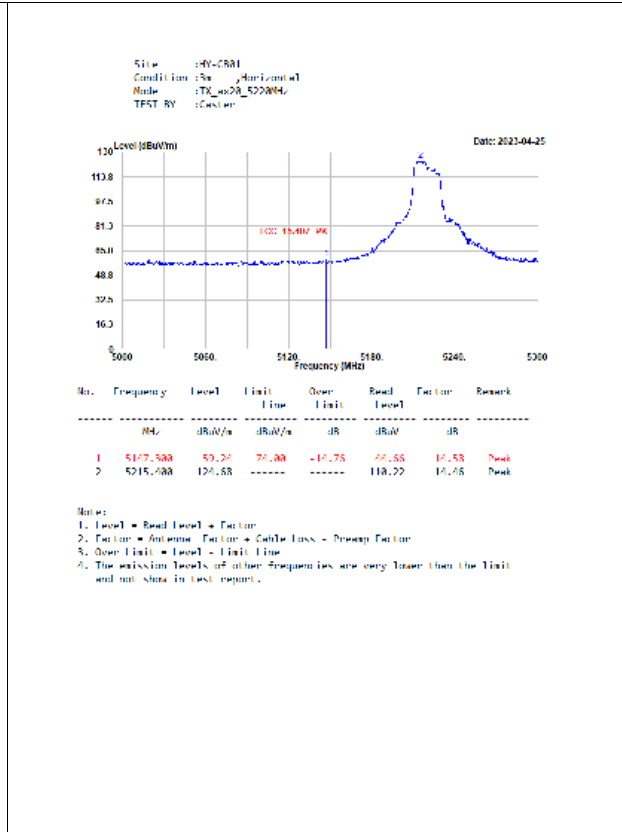
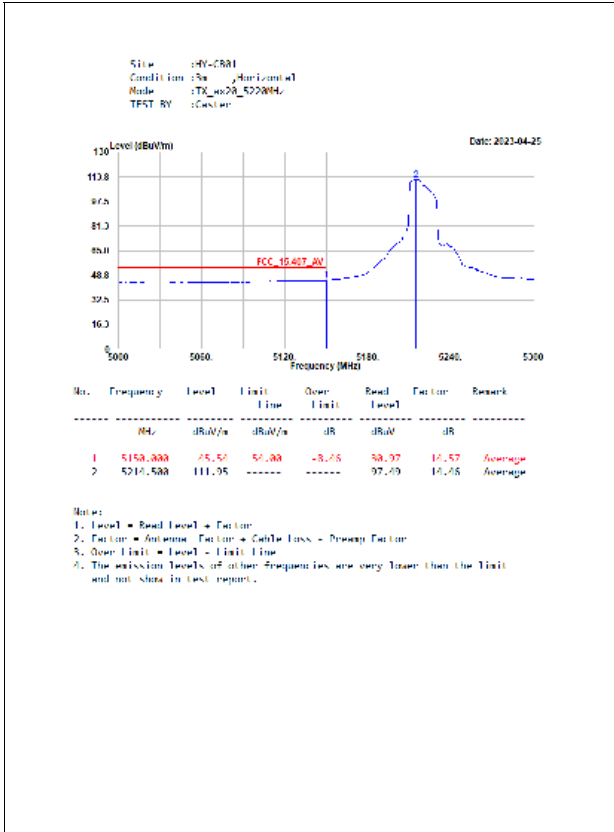


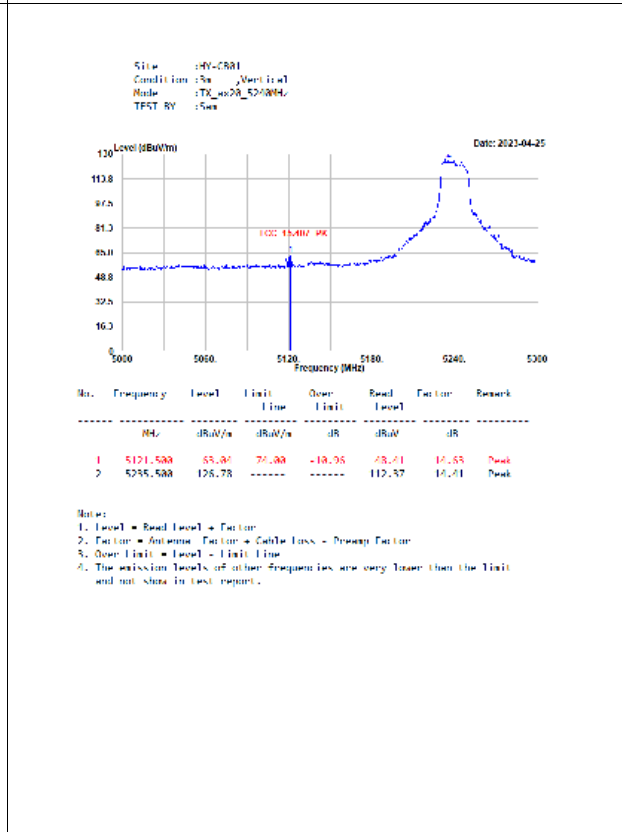
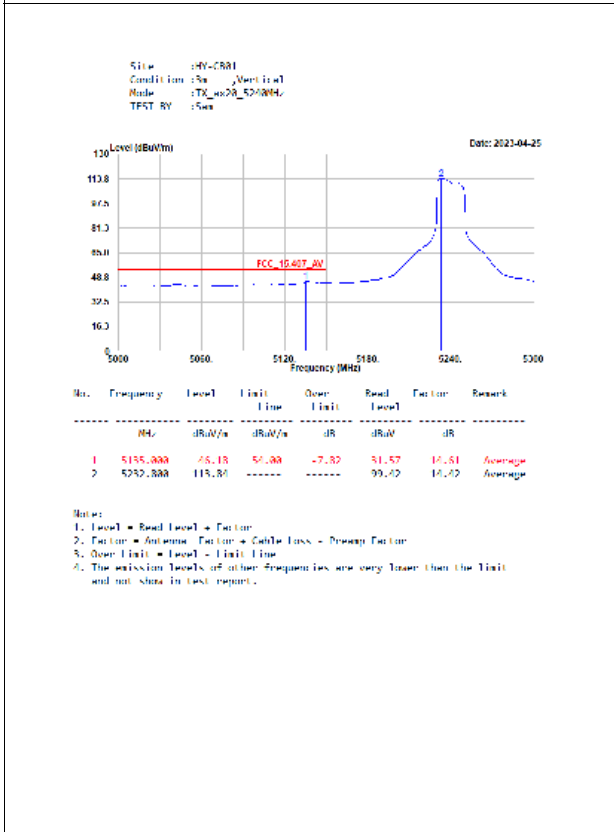
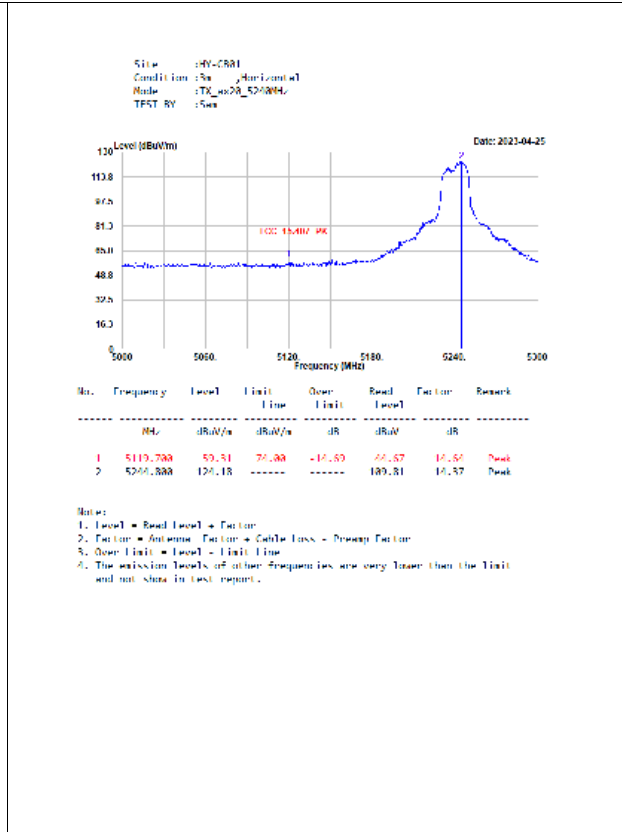
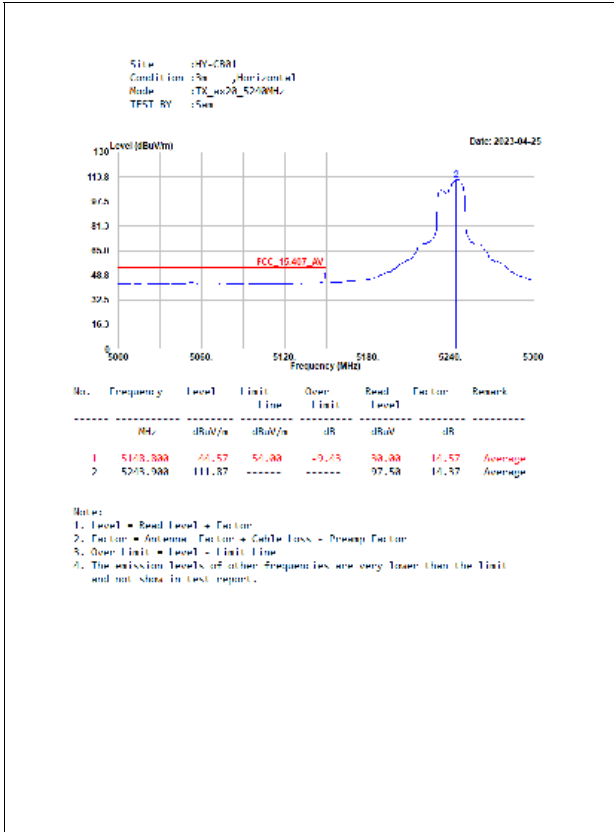


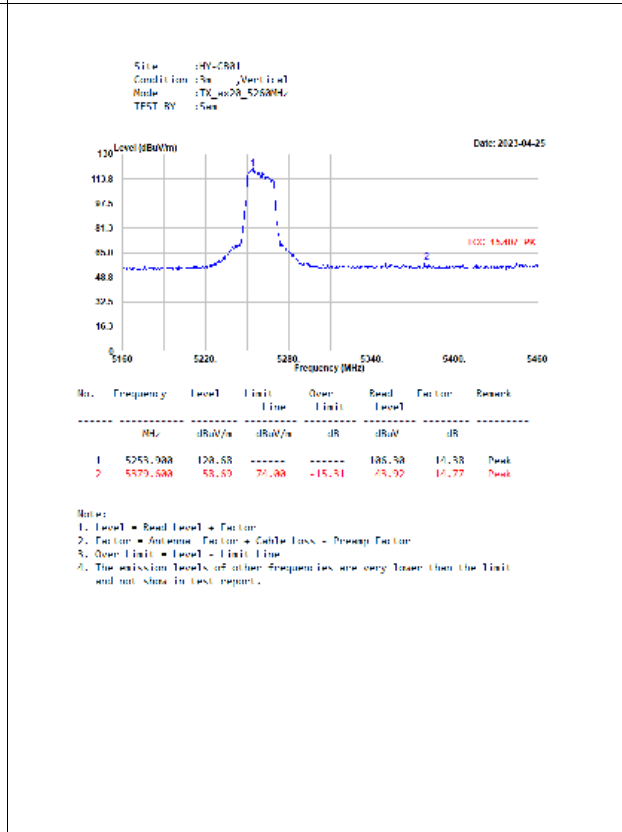
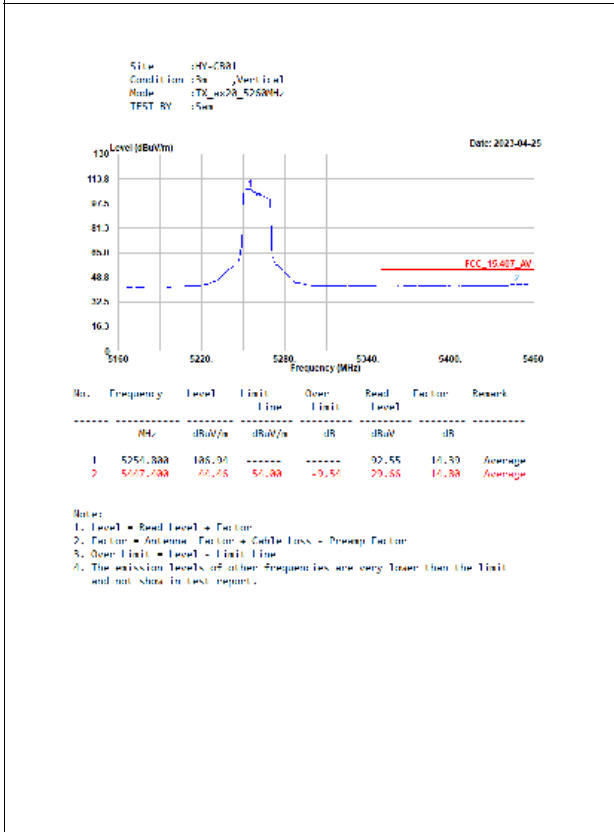
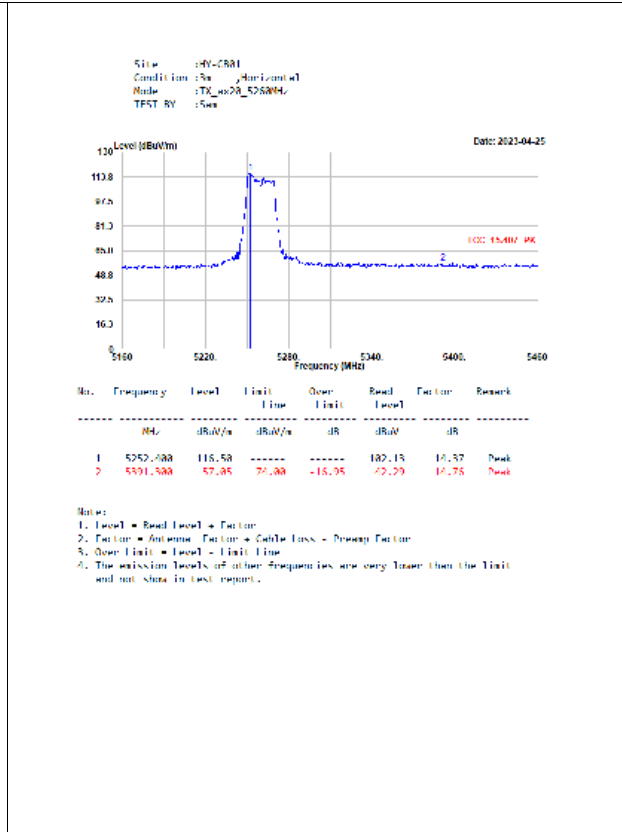
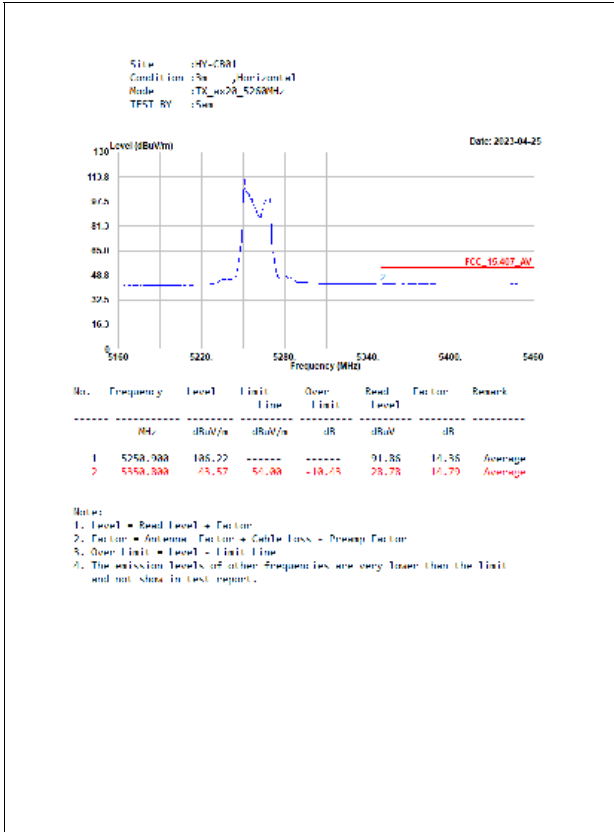


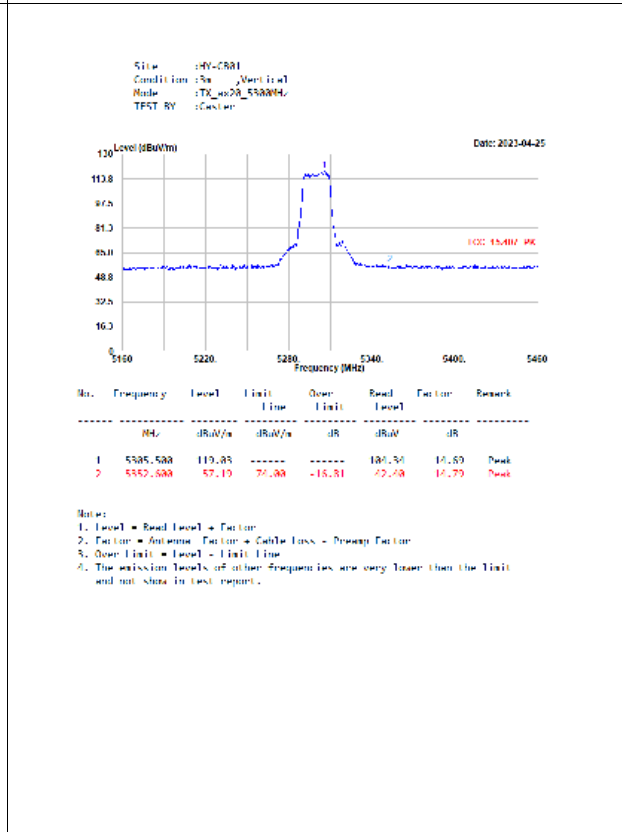
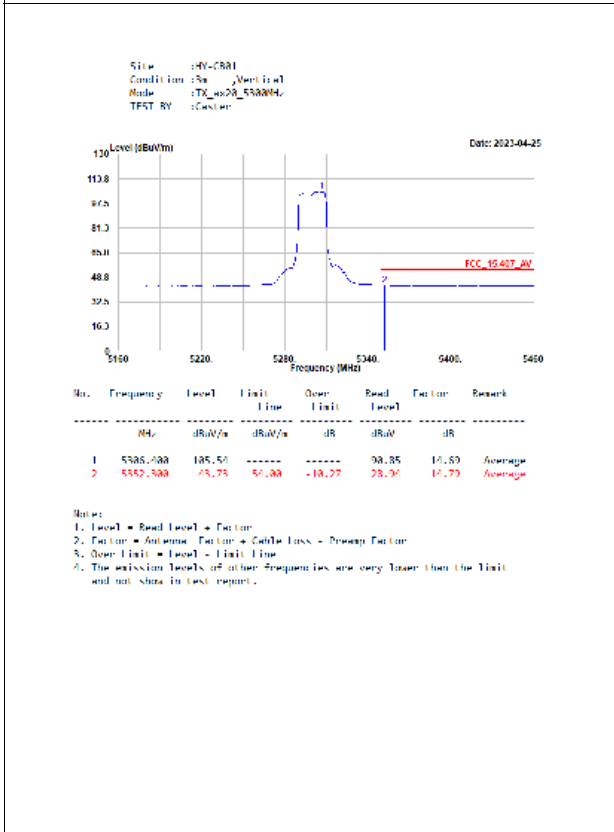
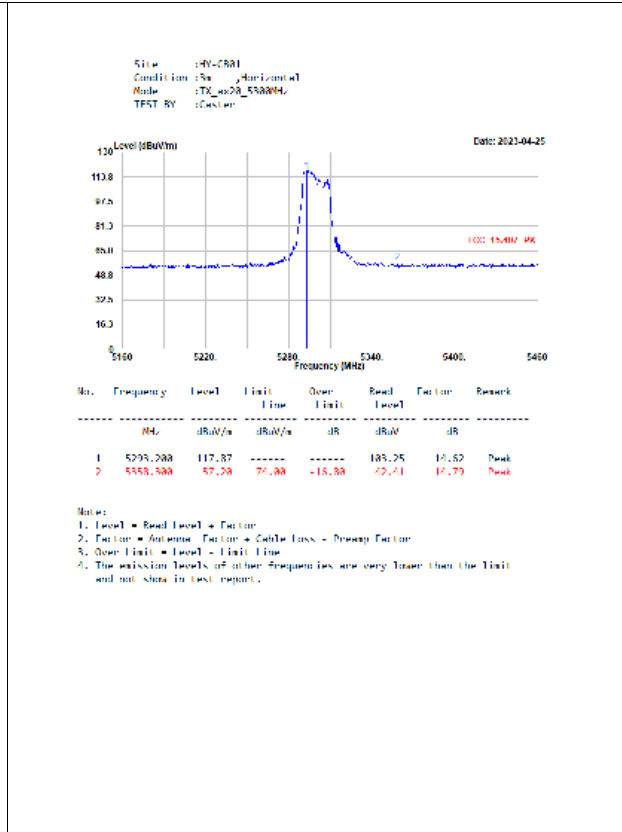
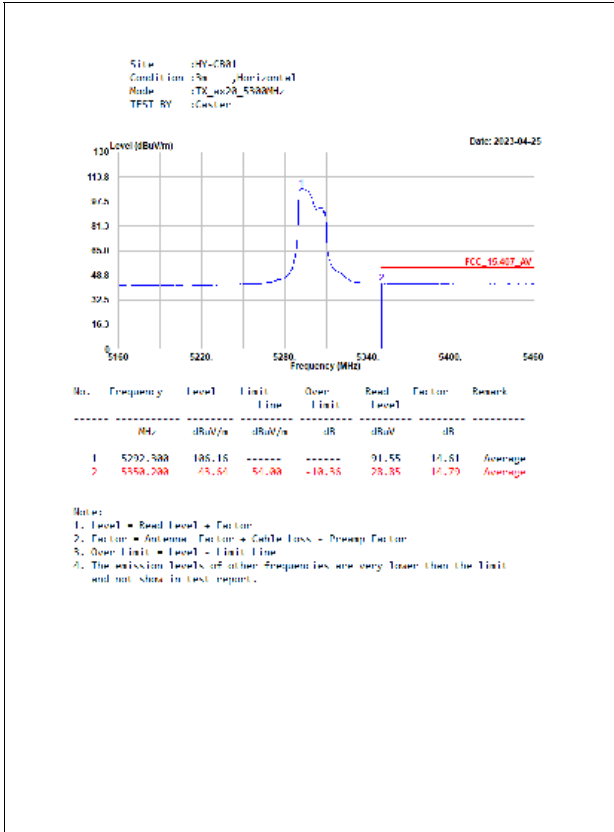
Beamforming

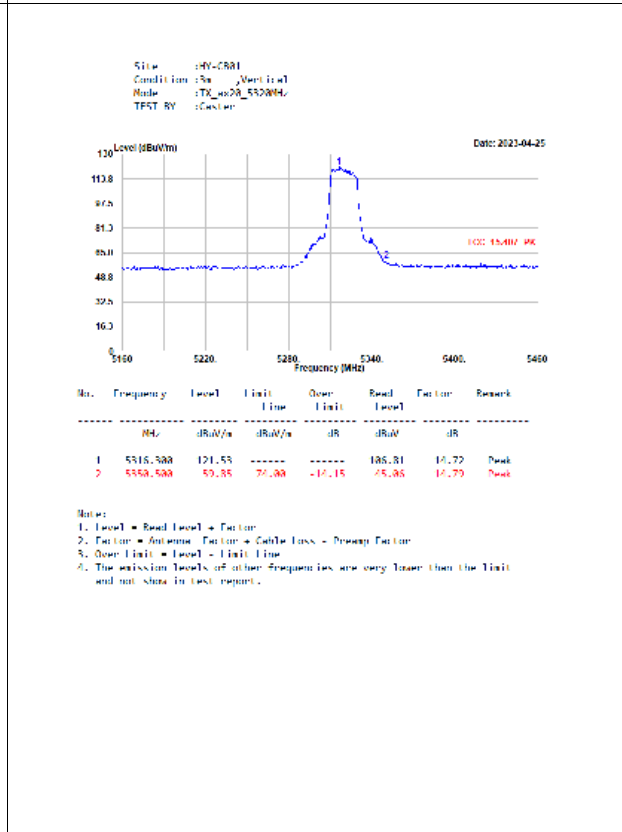
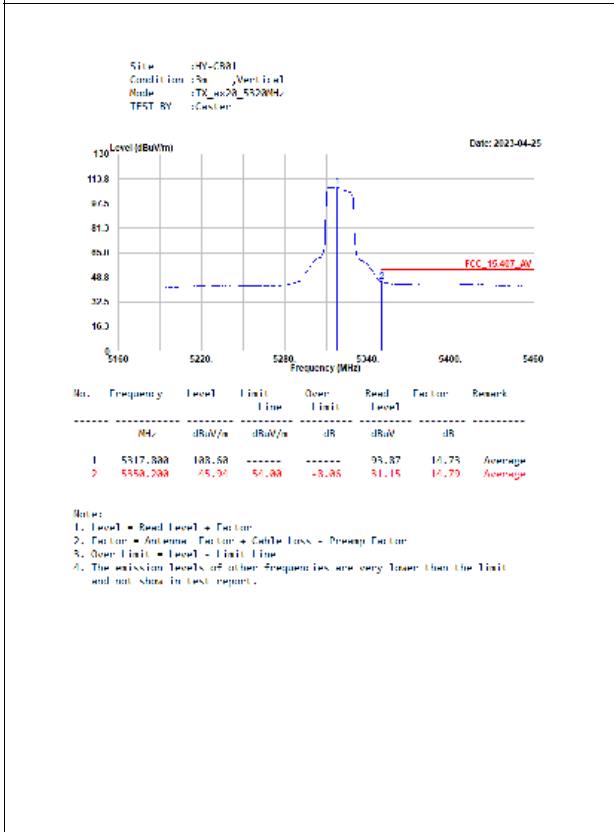
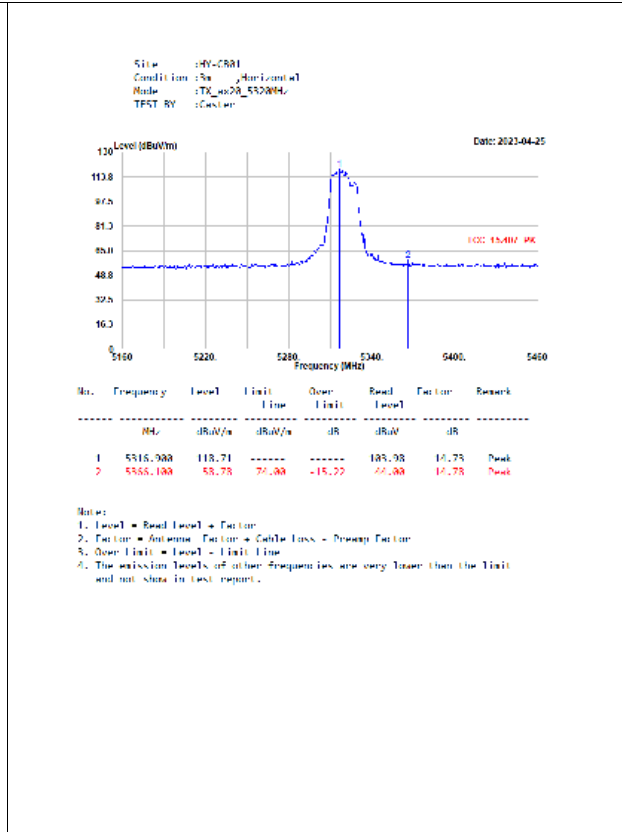
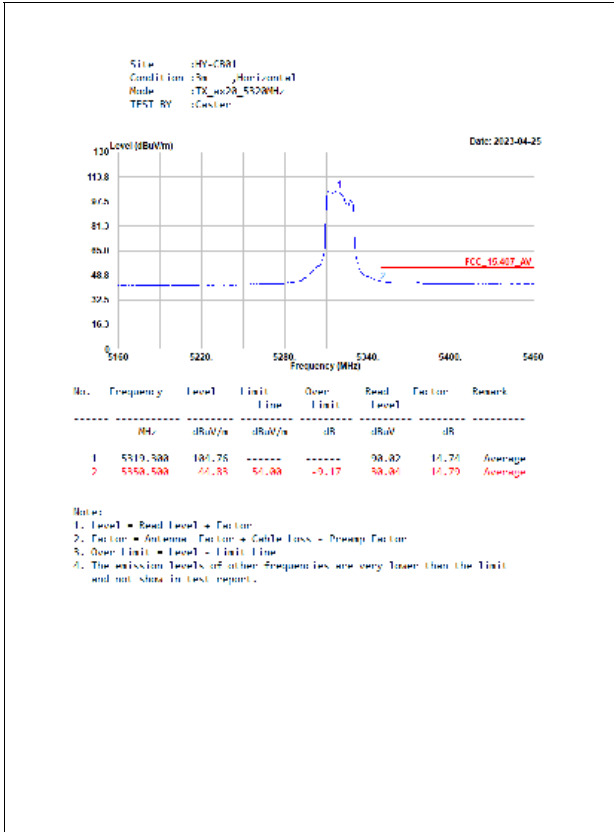


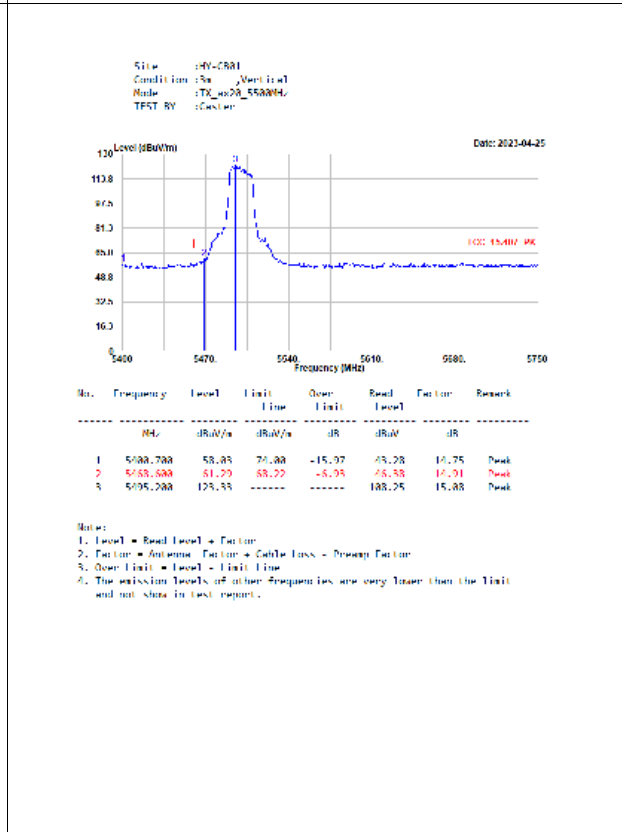
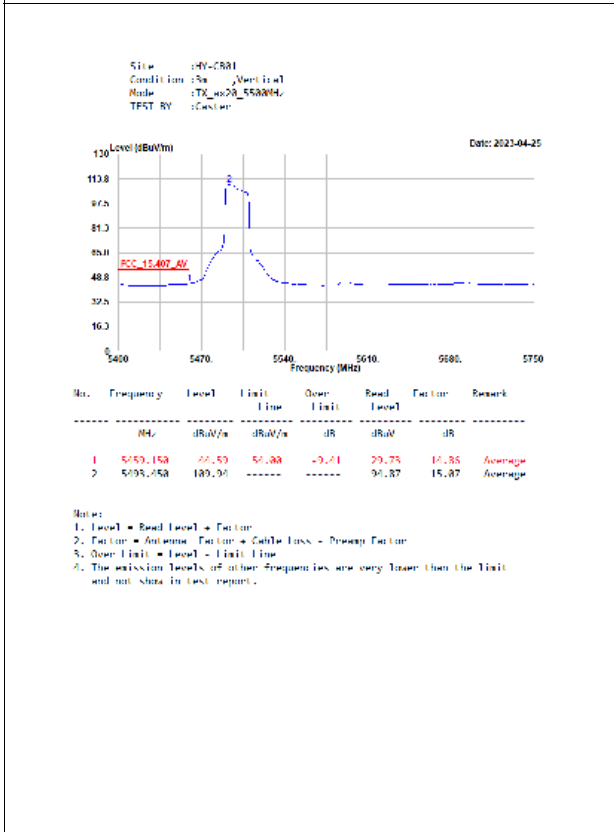
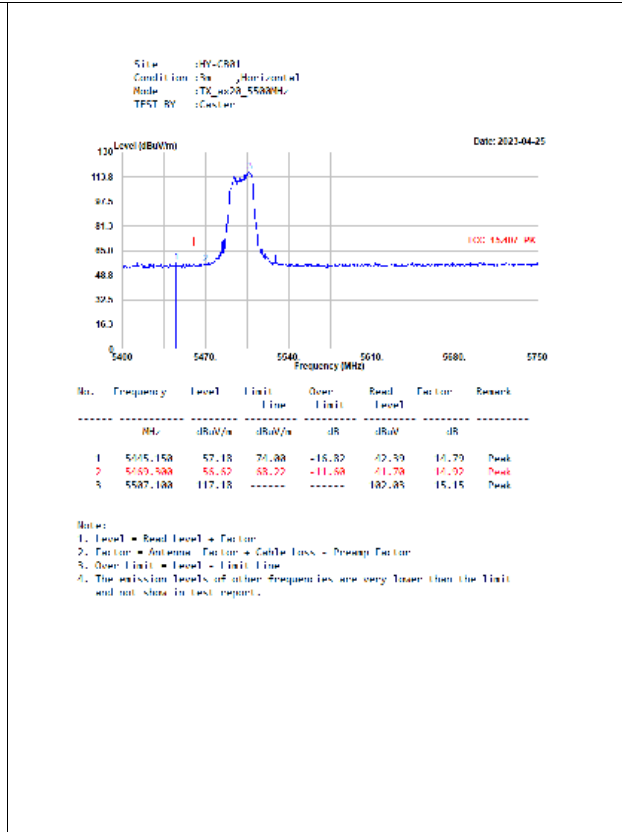
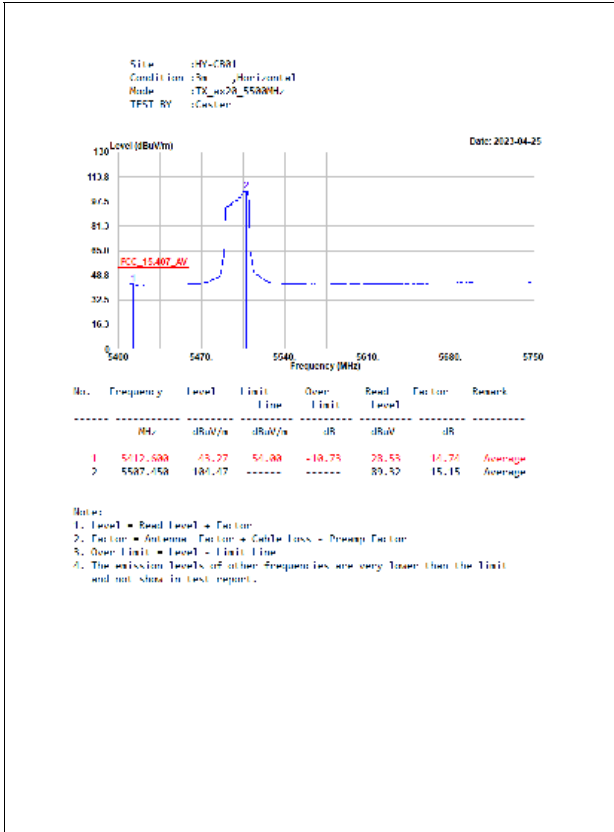


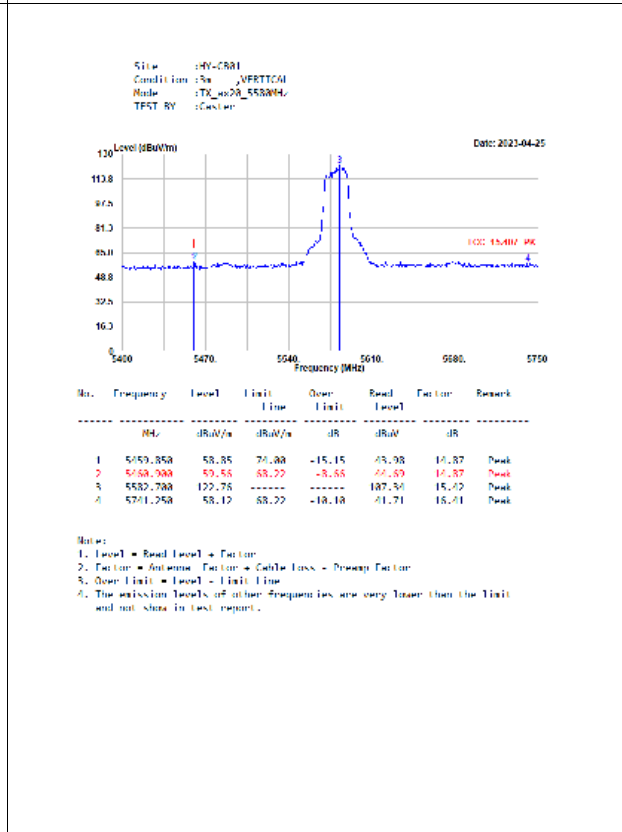
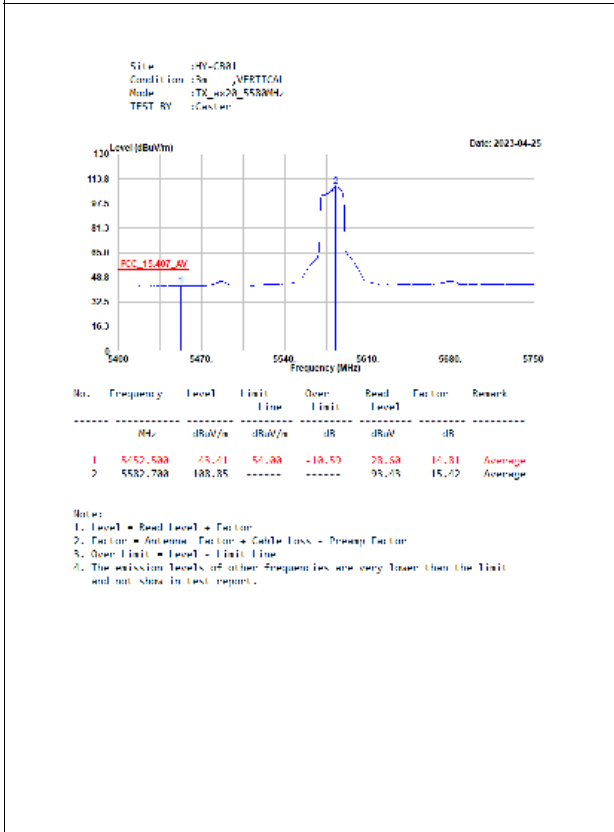
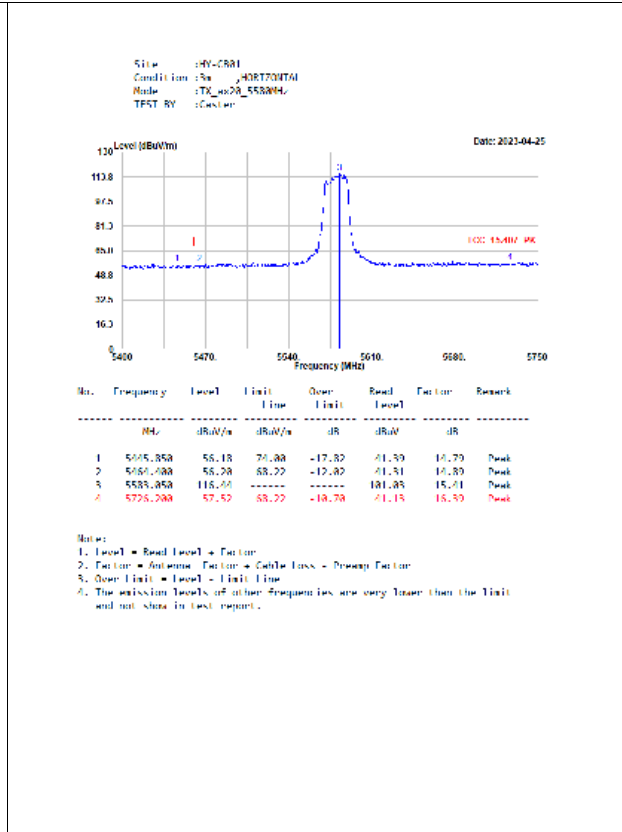
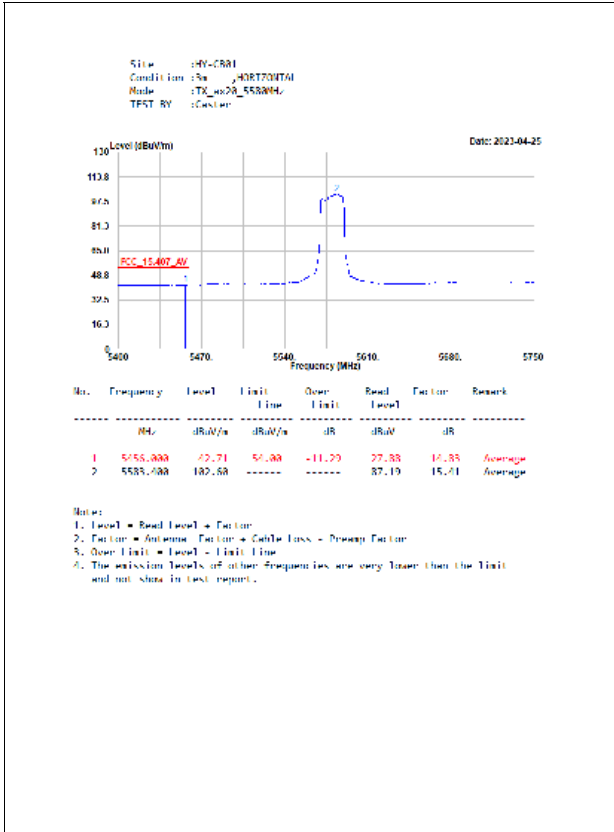


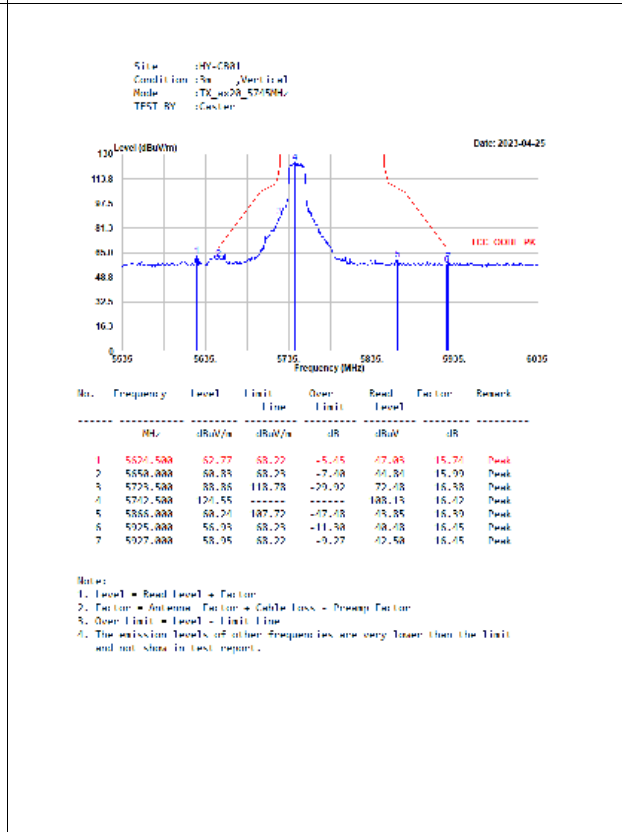
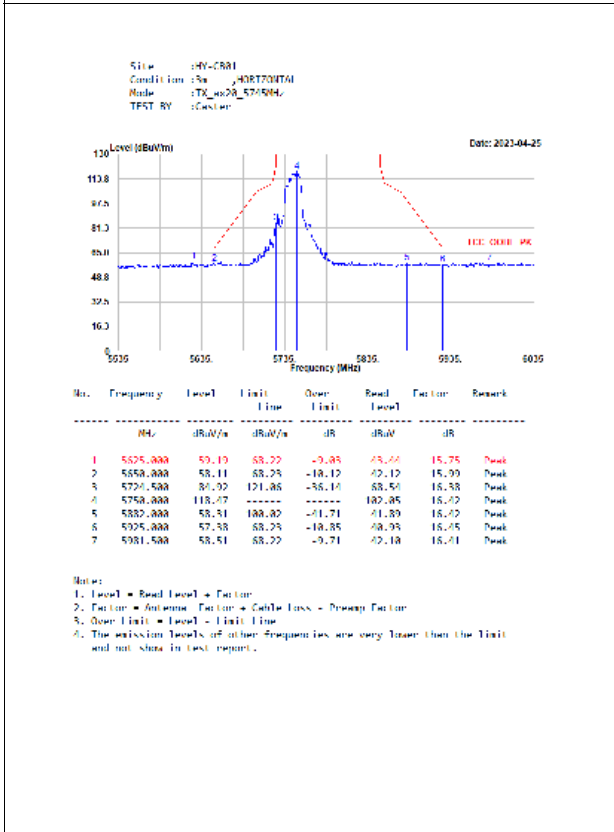
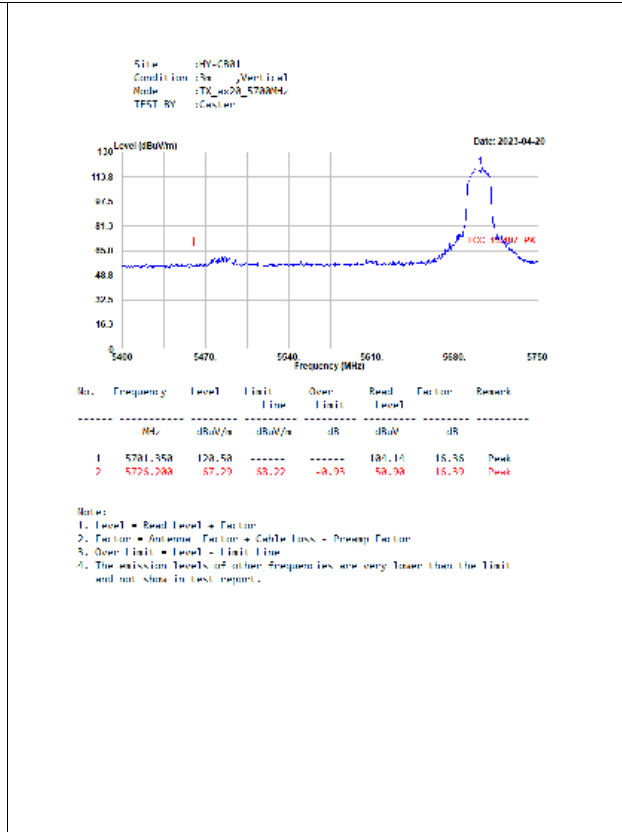
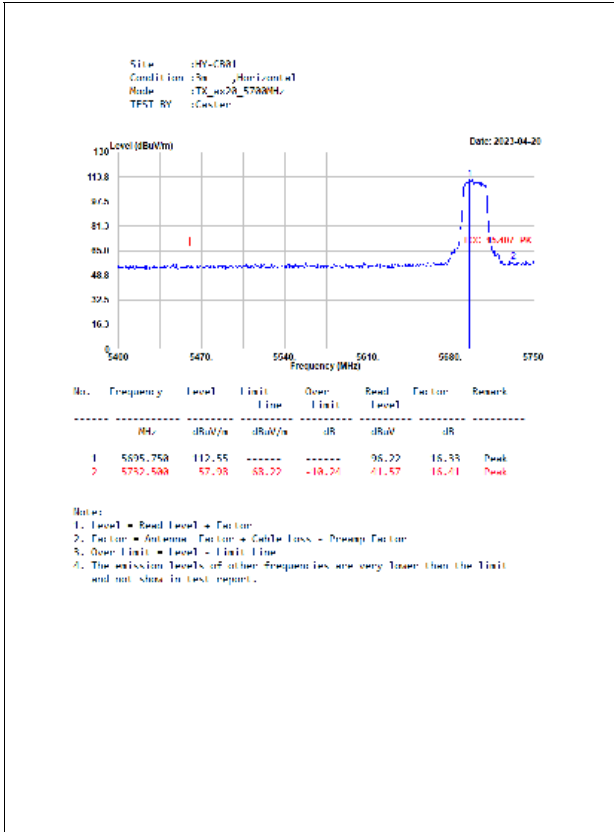


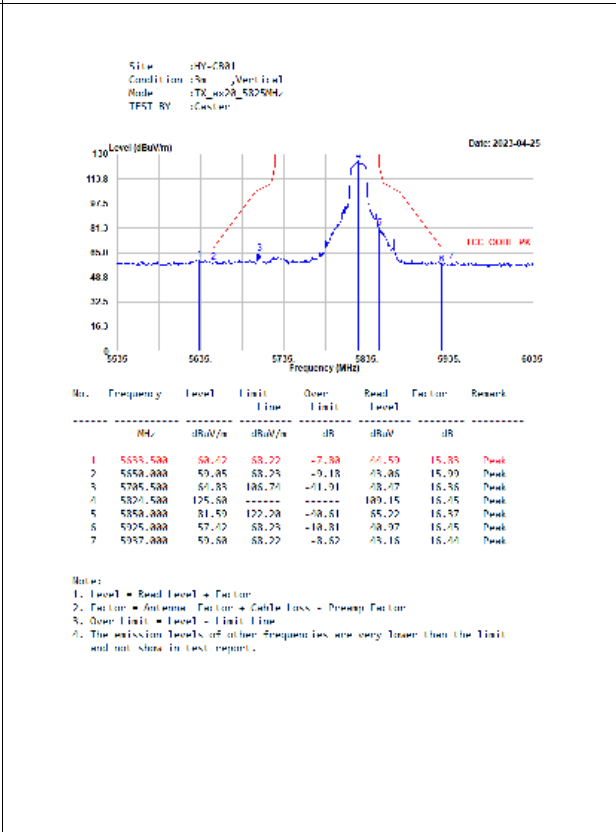
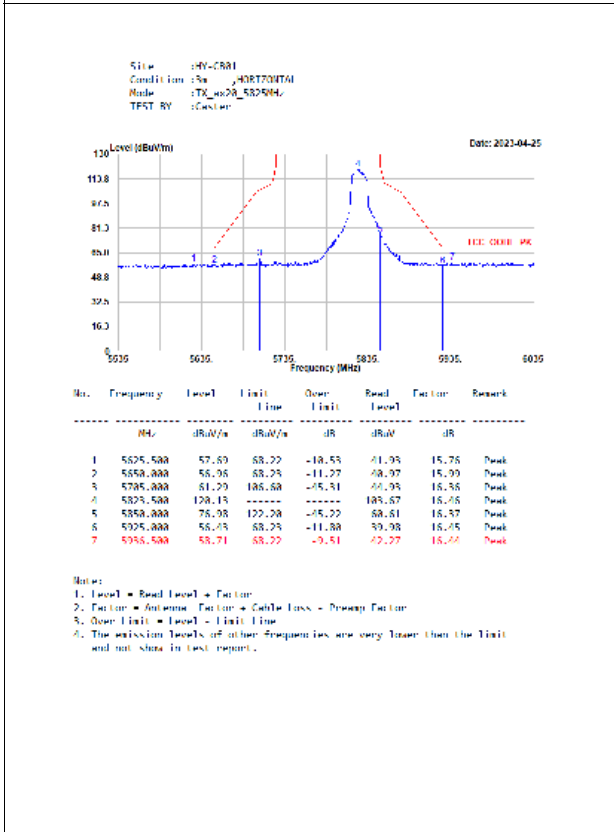
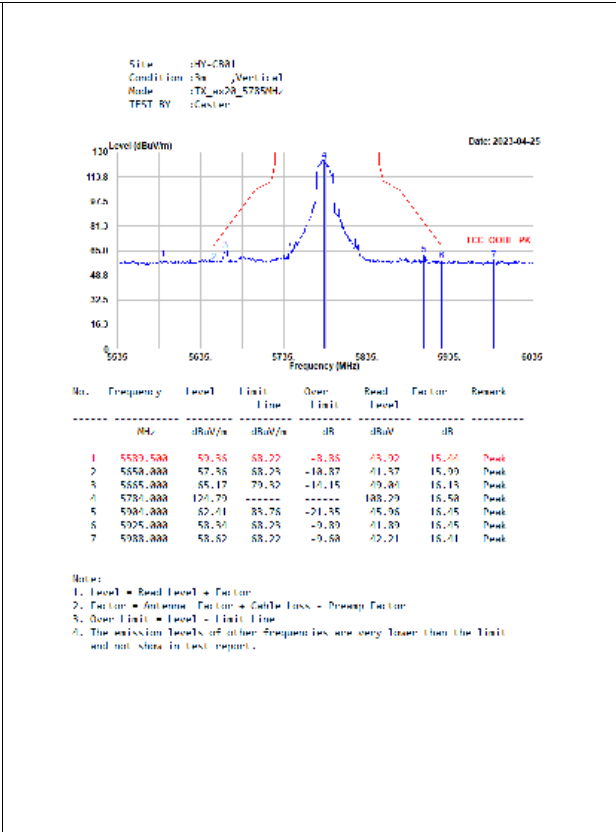
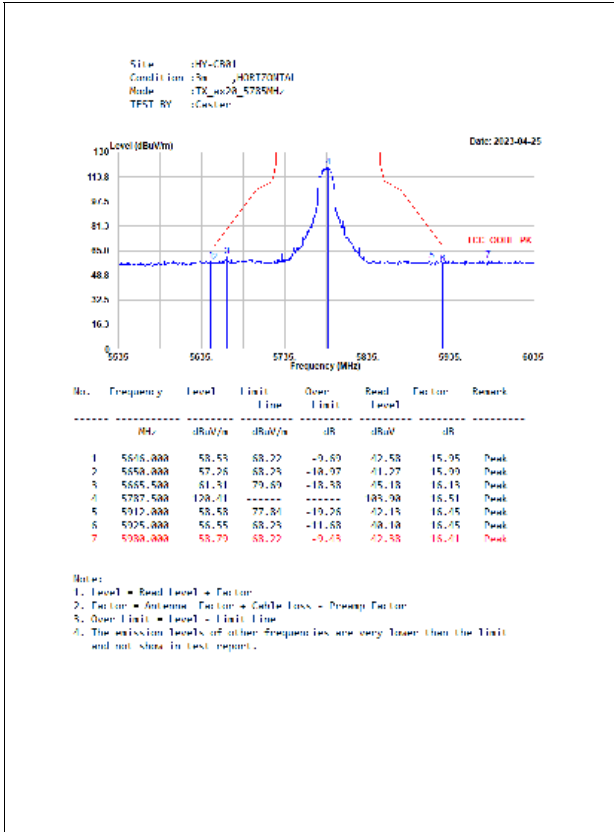


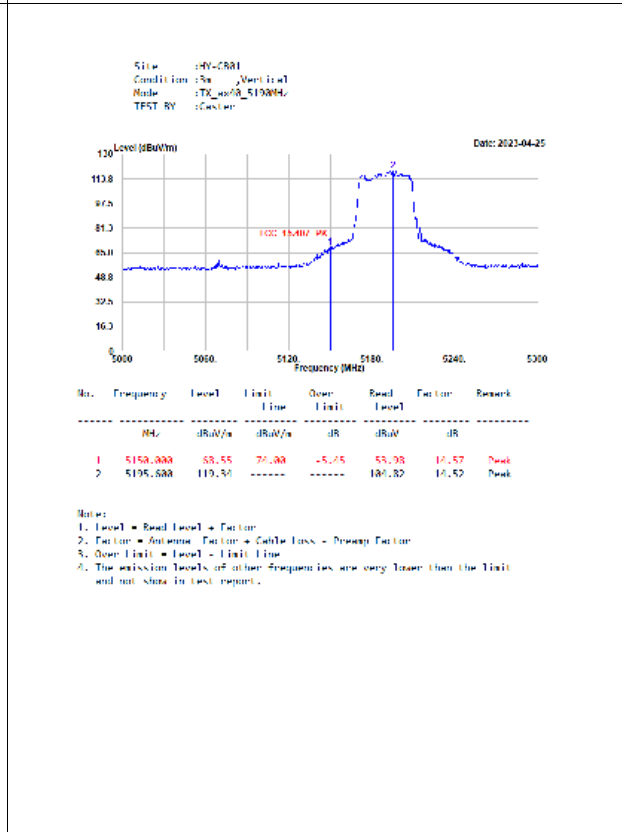
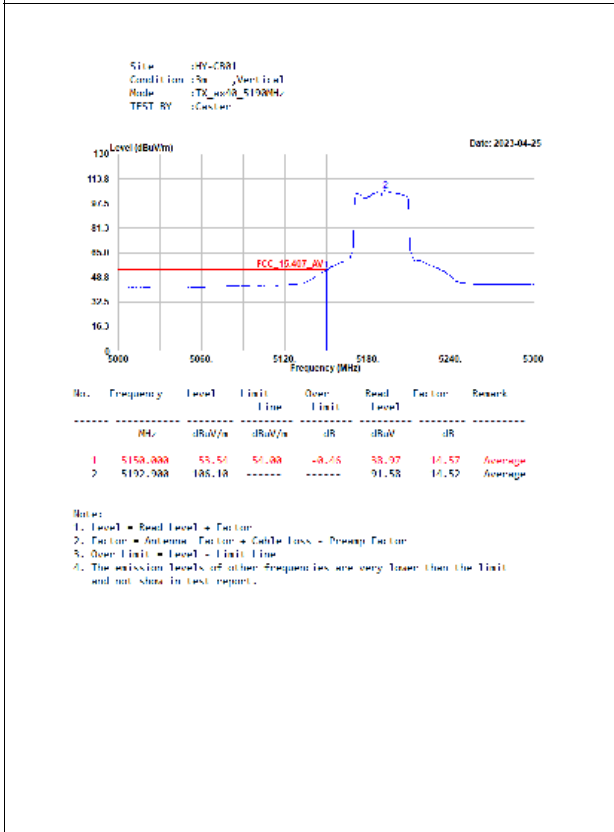
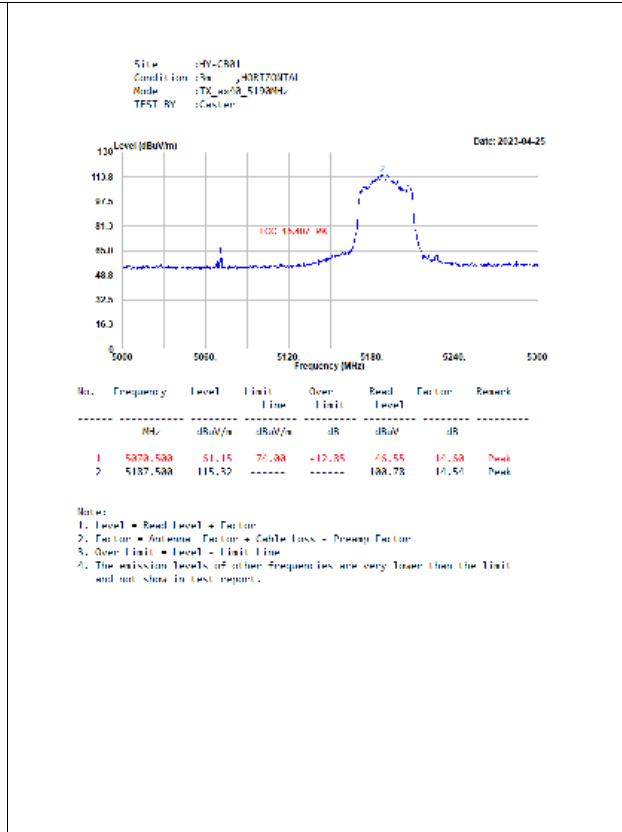
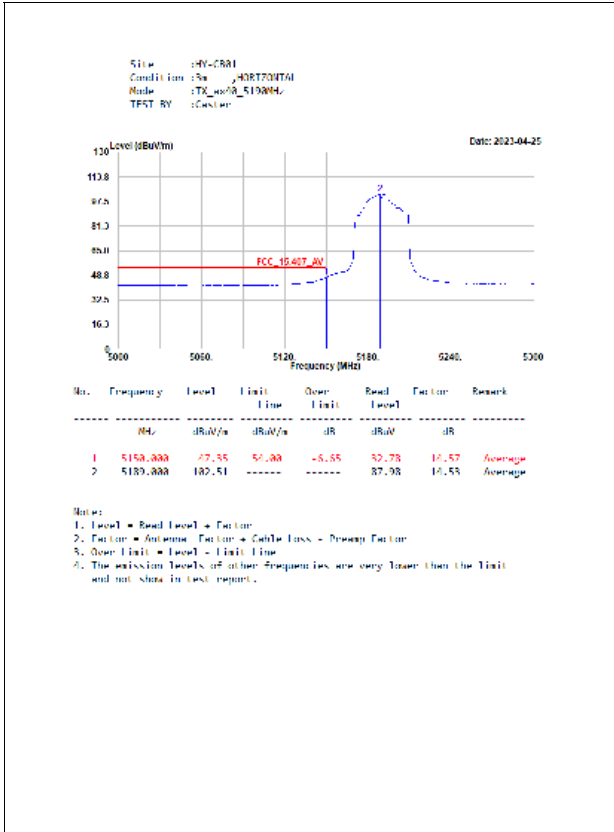


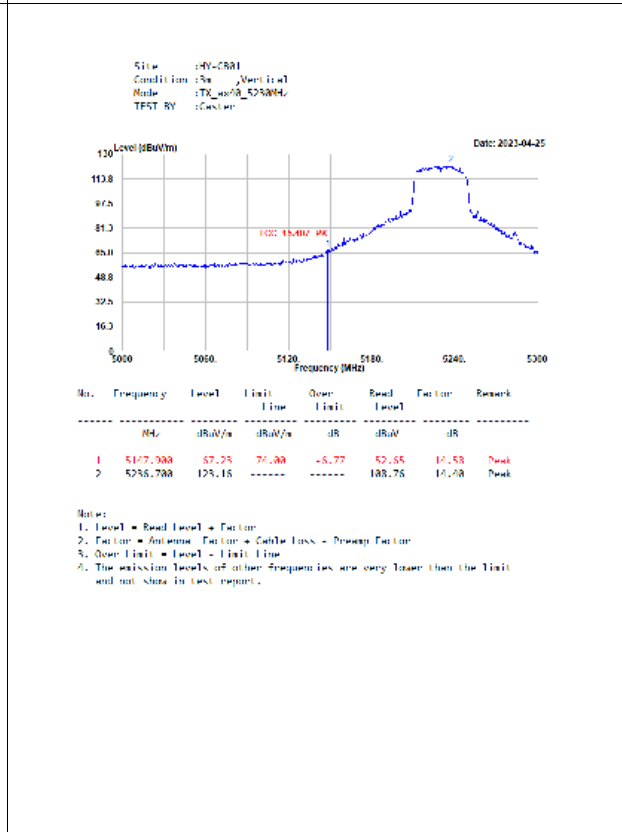
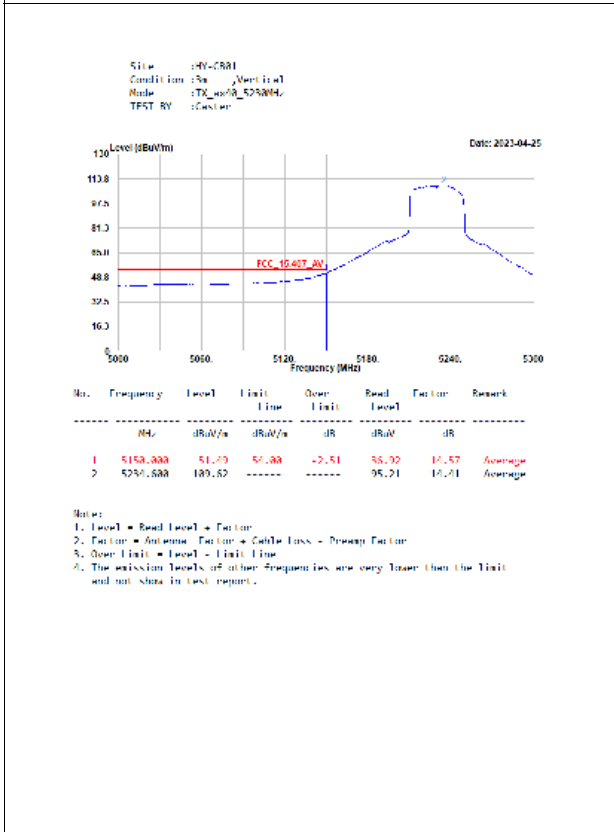
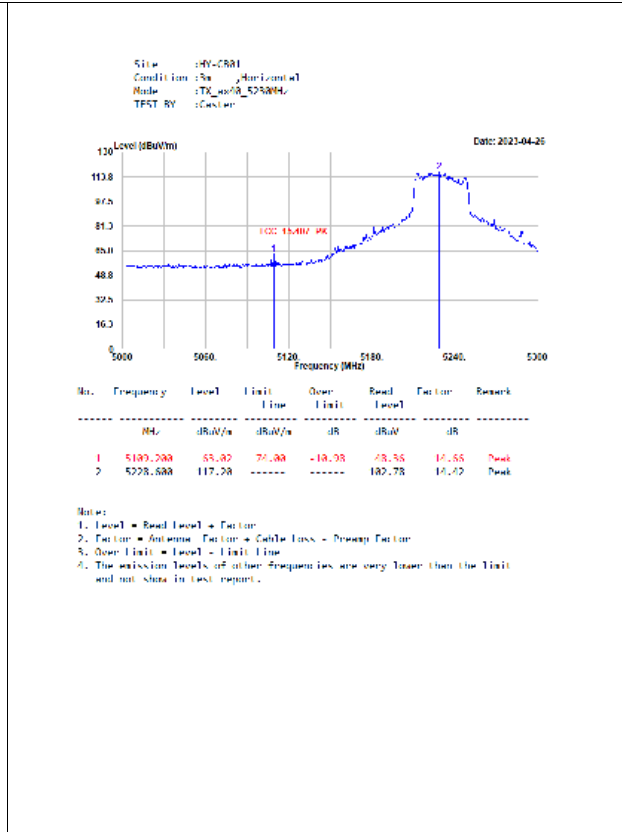
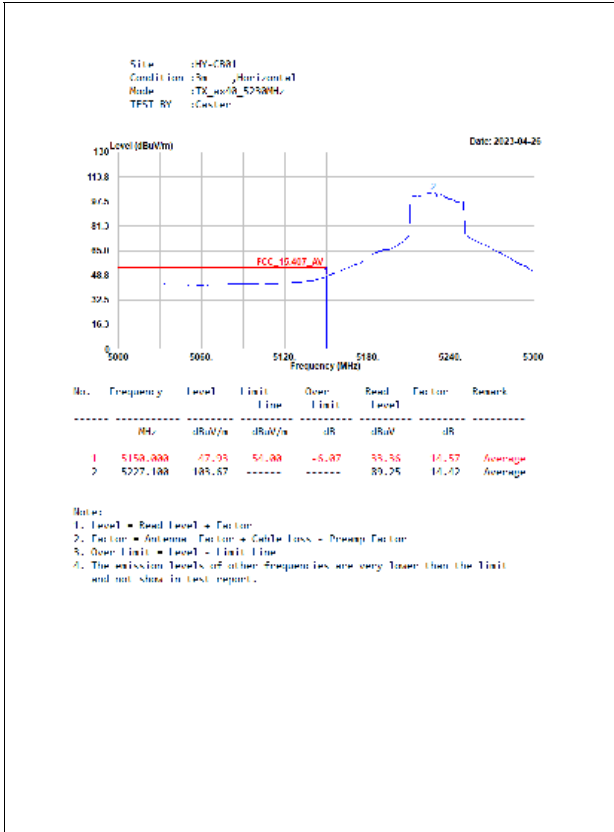


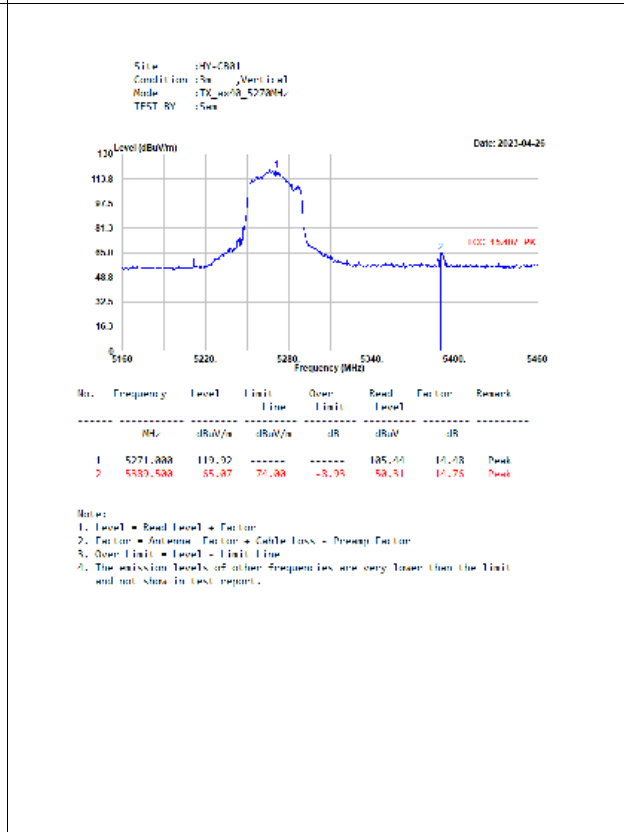
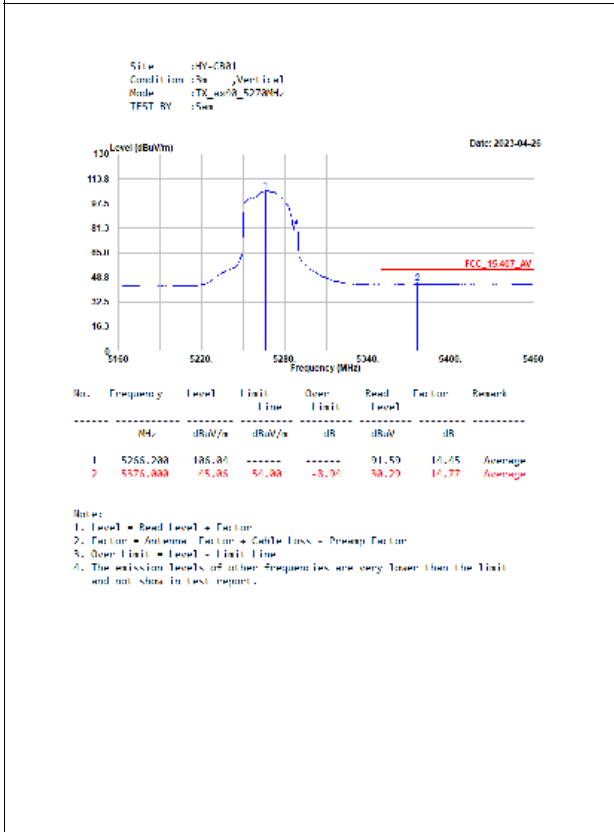
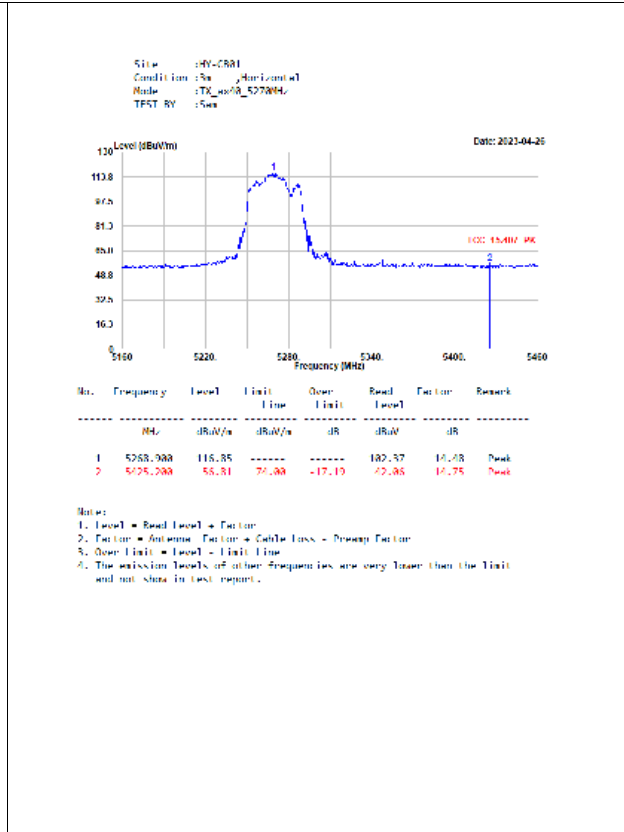
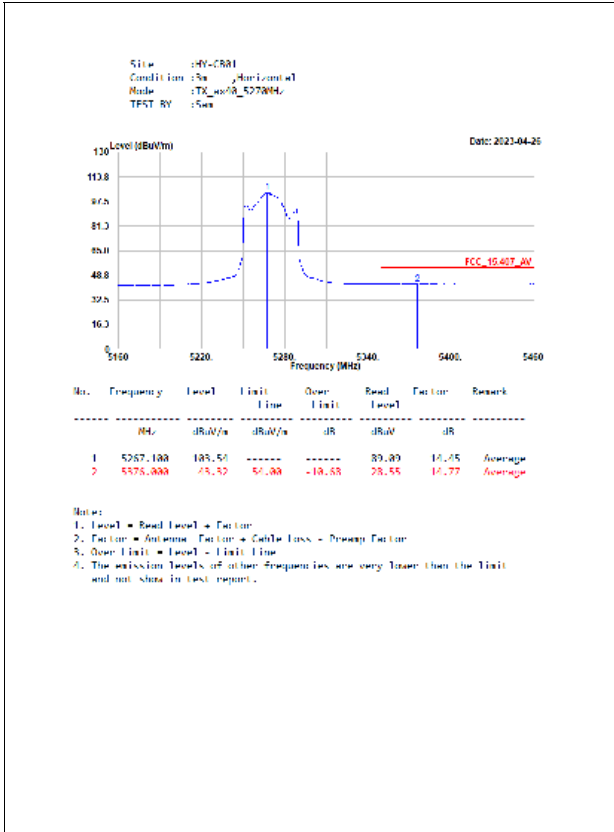


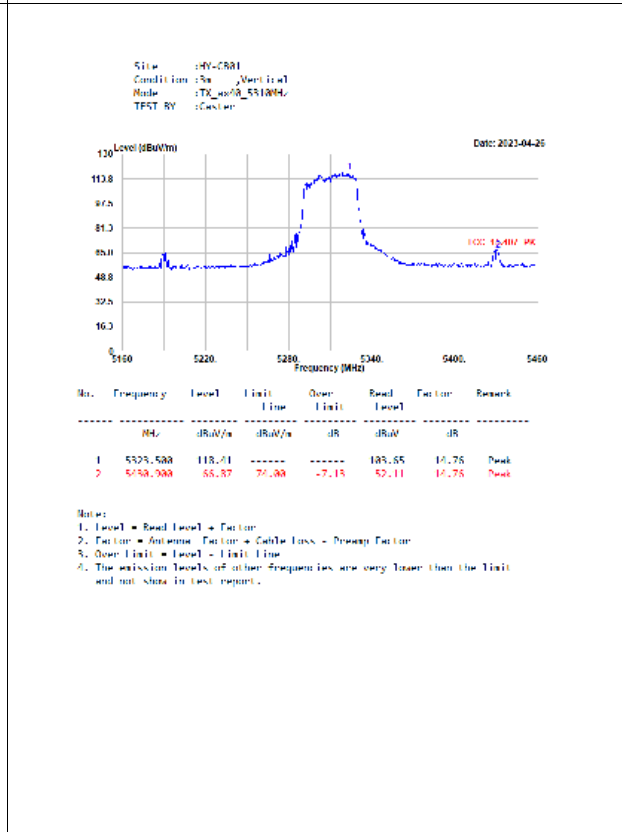
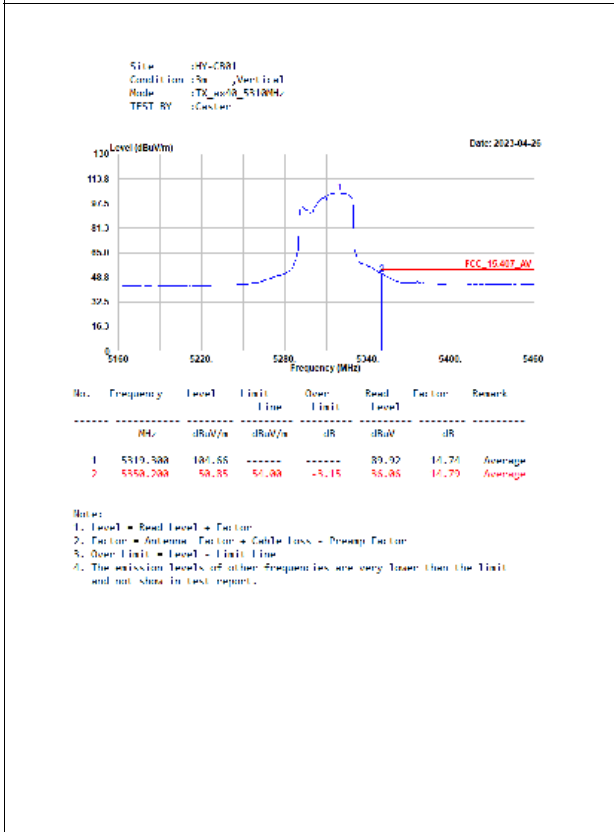
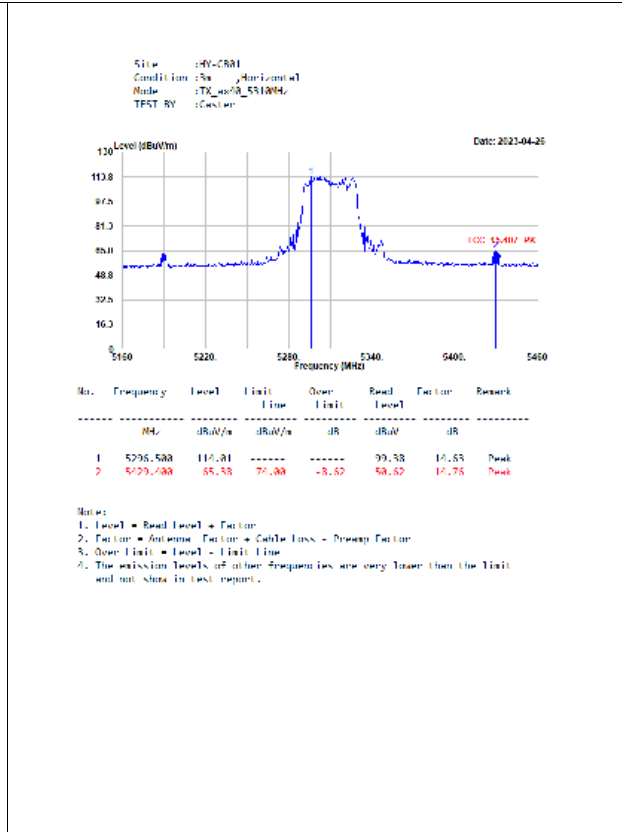
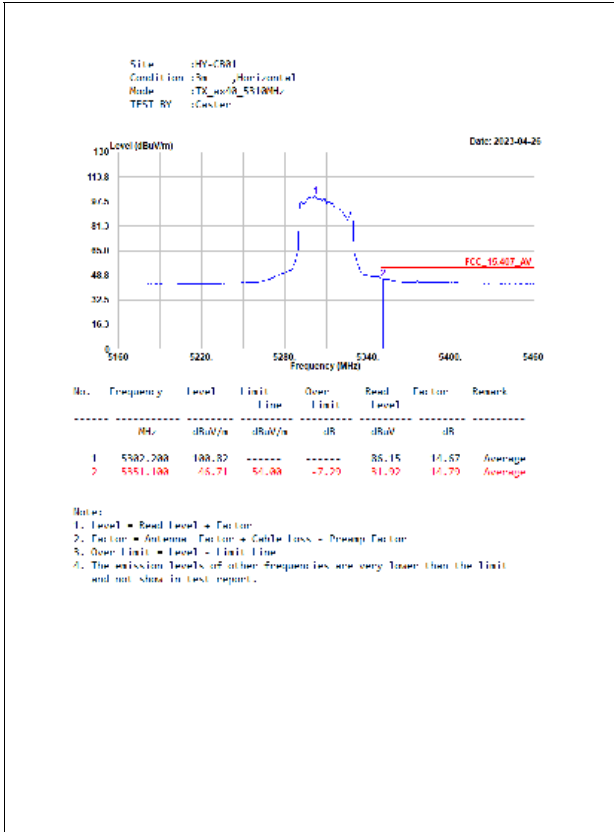


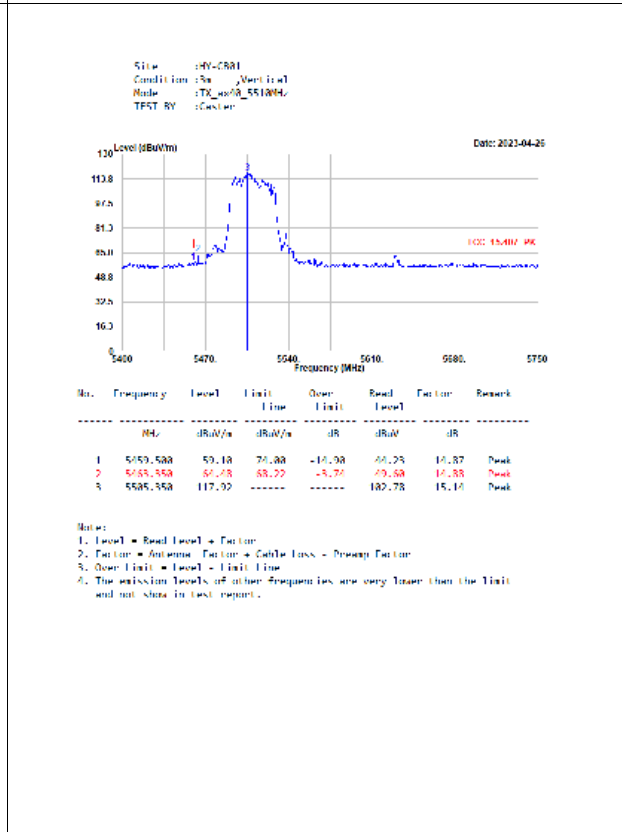
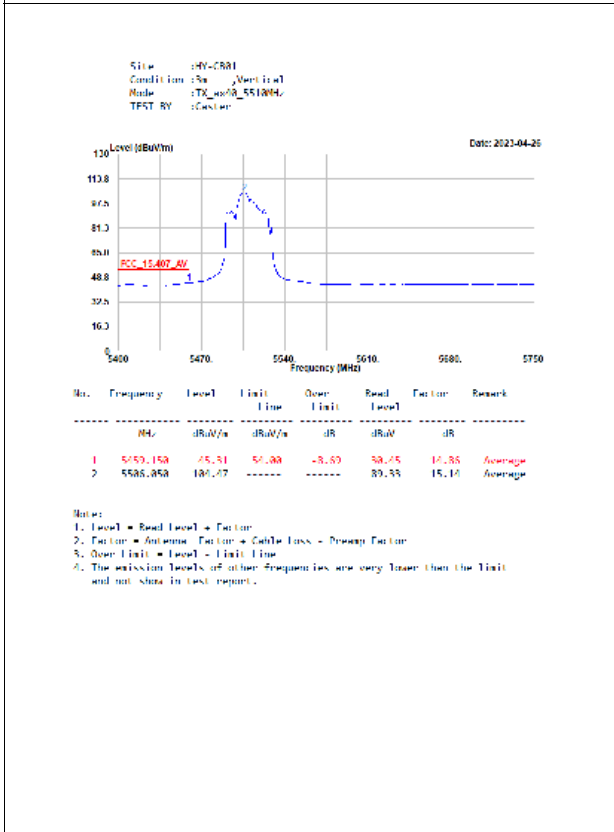
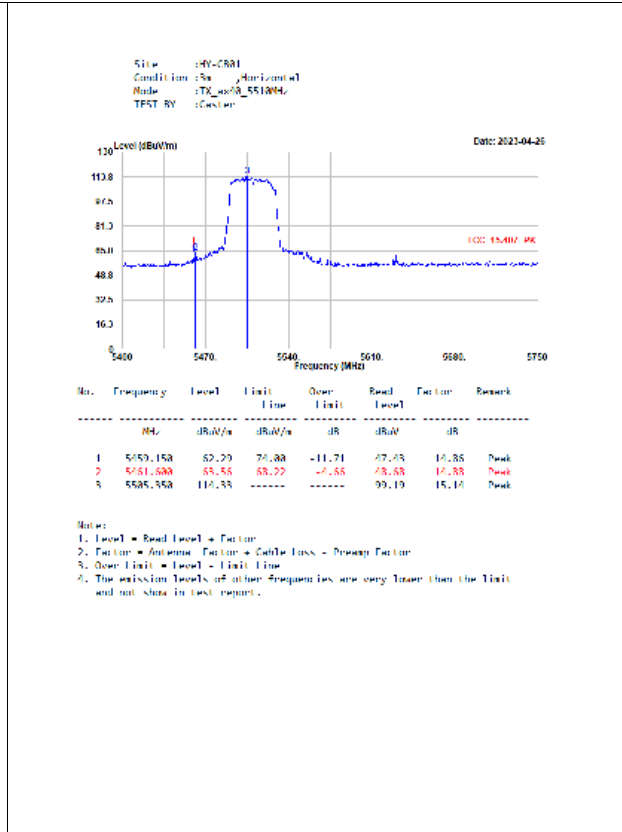
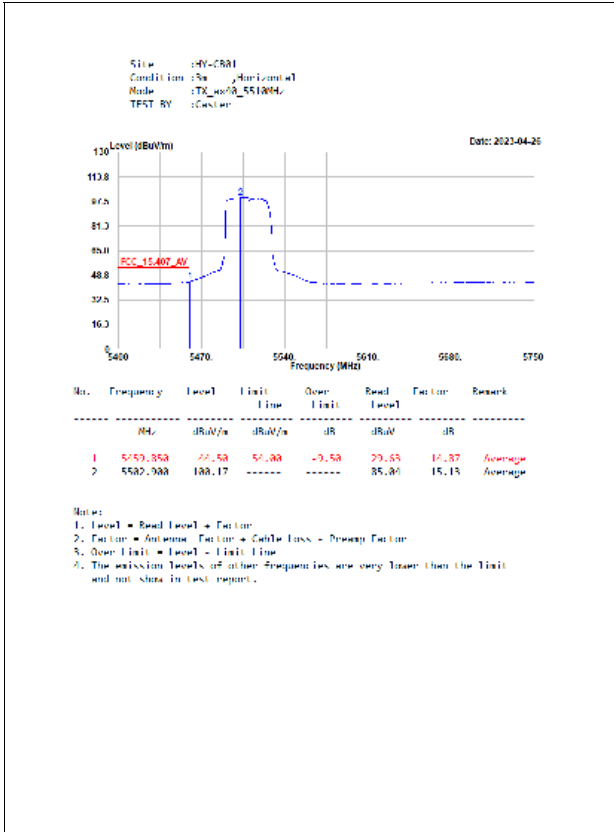


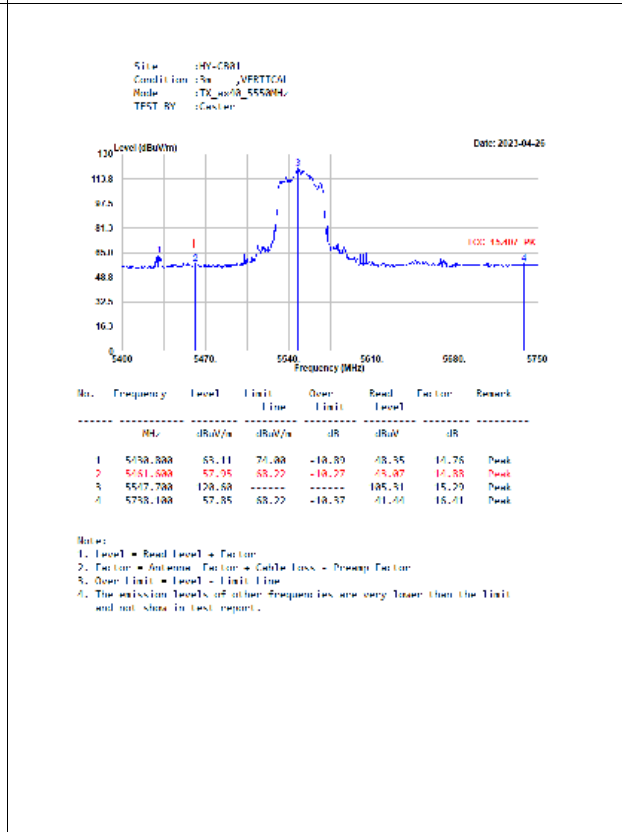
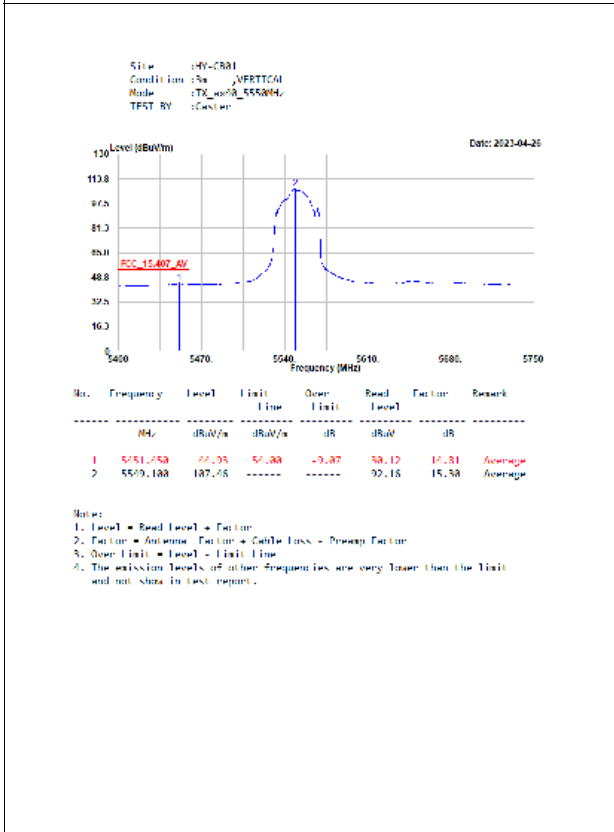
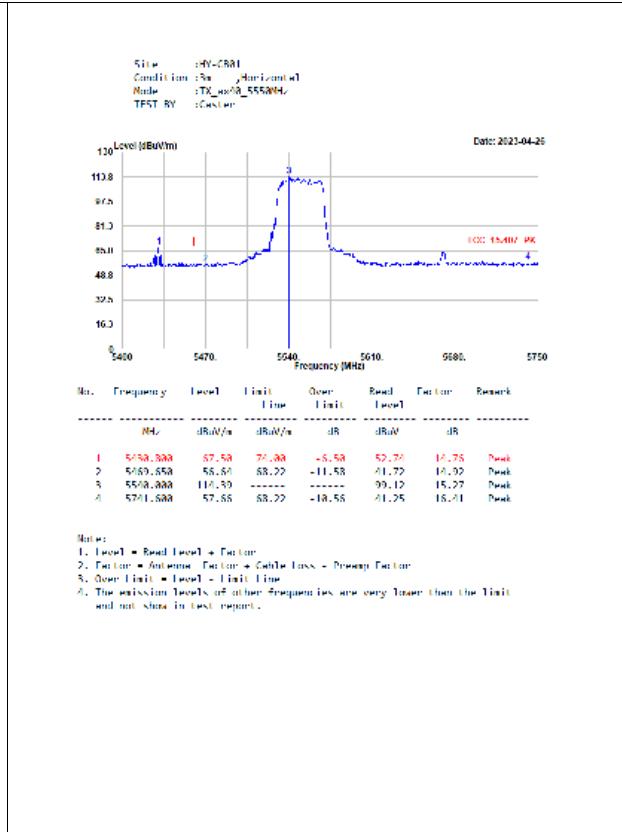
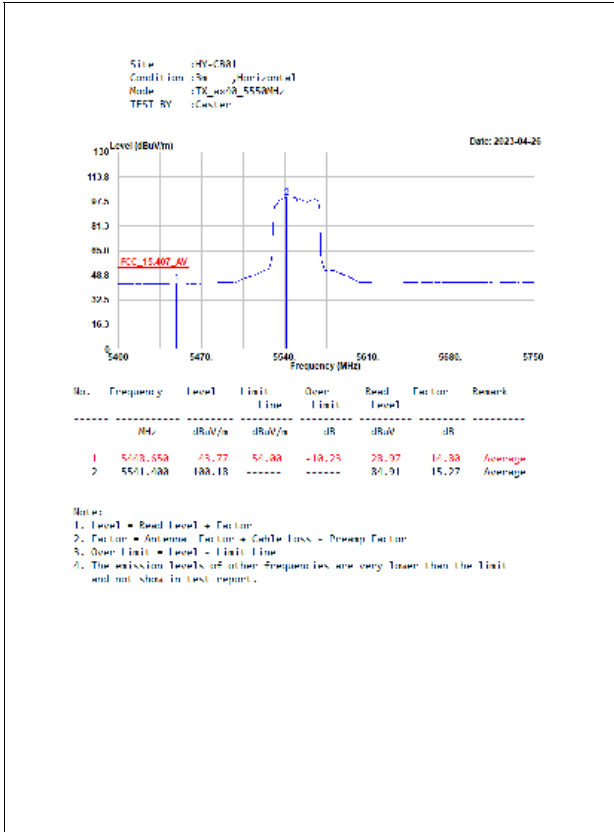


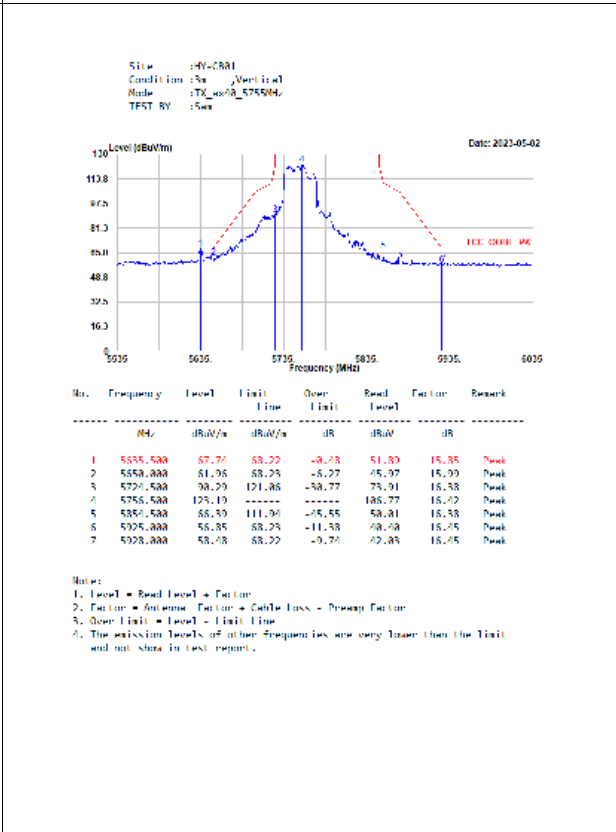
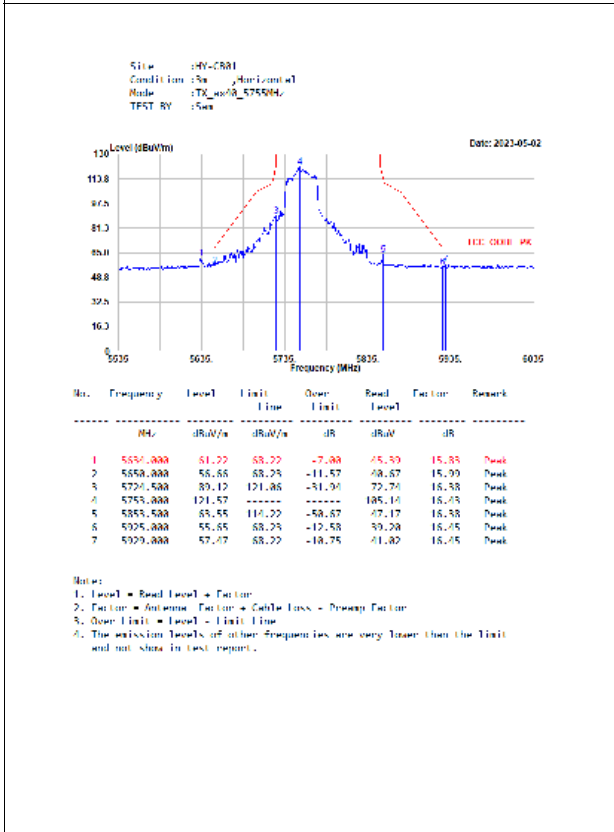
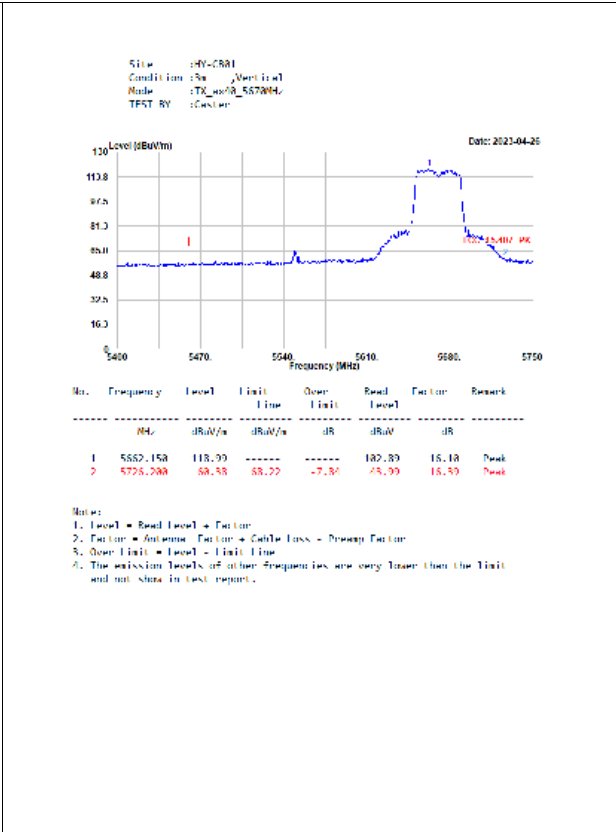
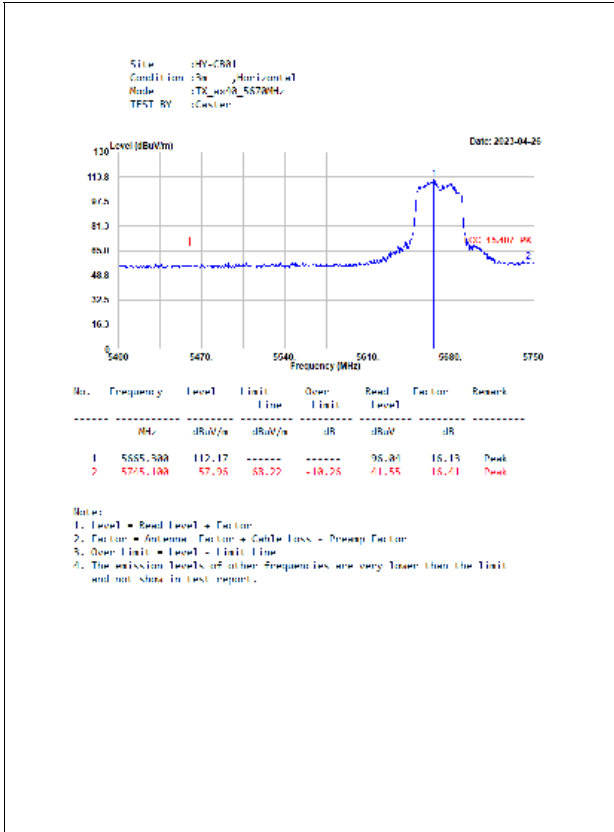


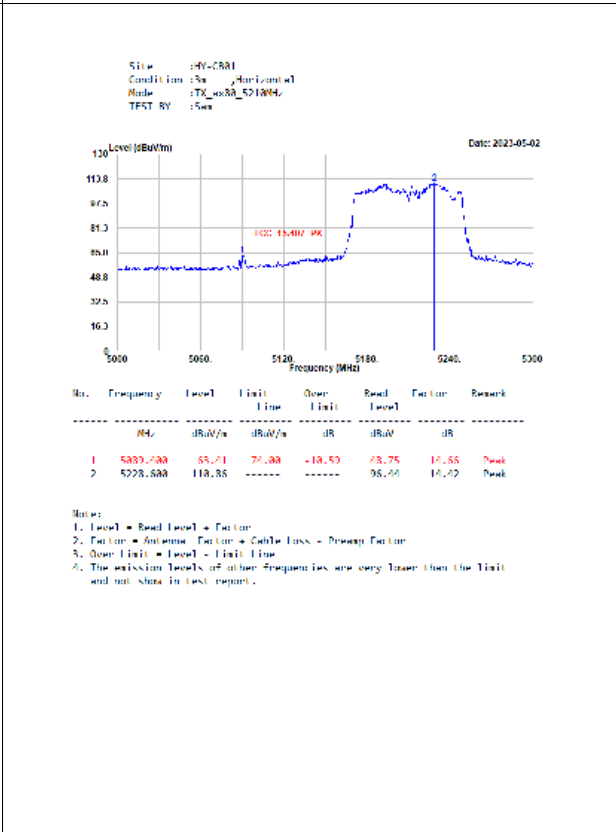
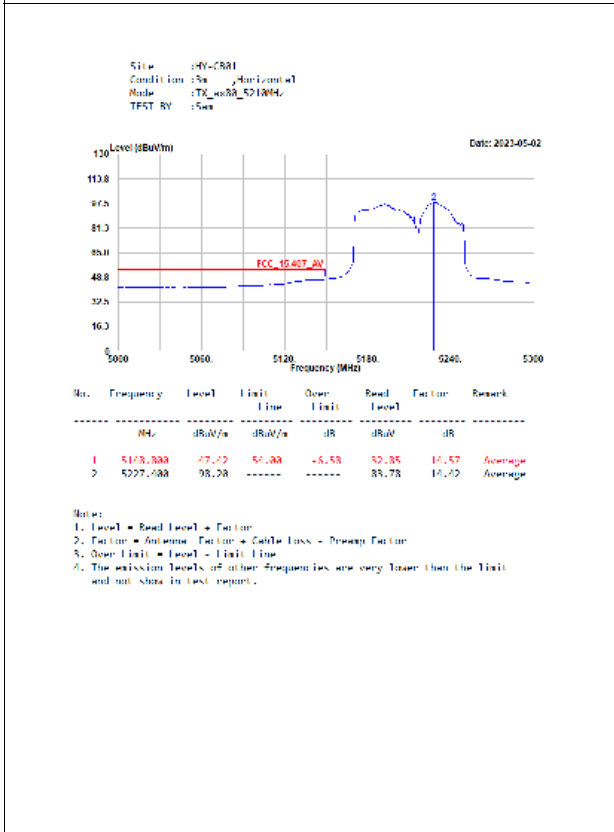
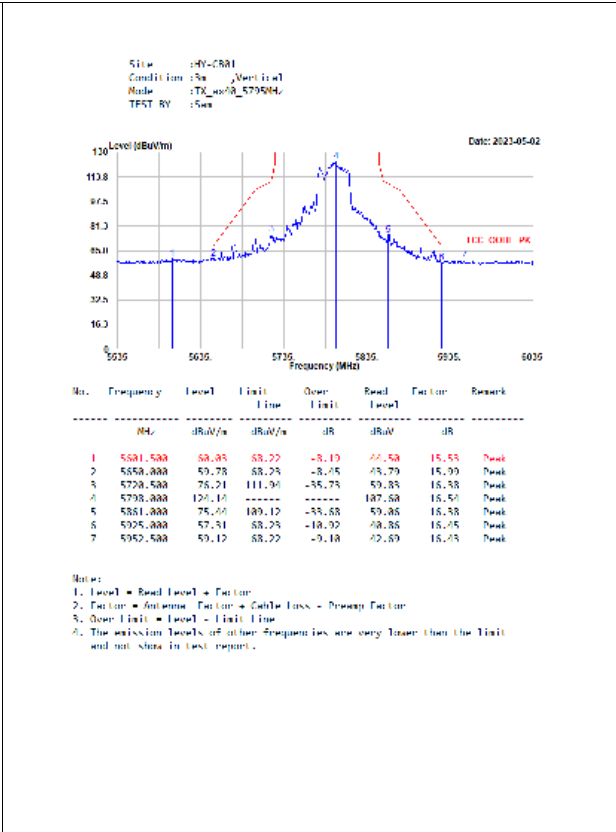
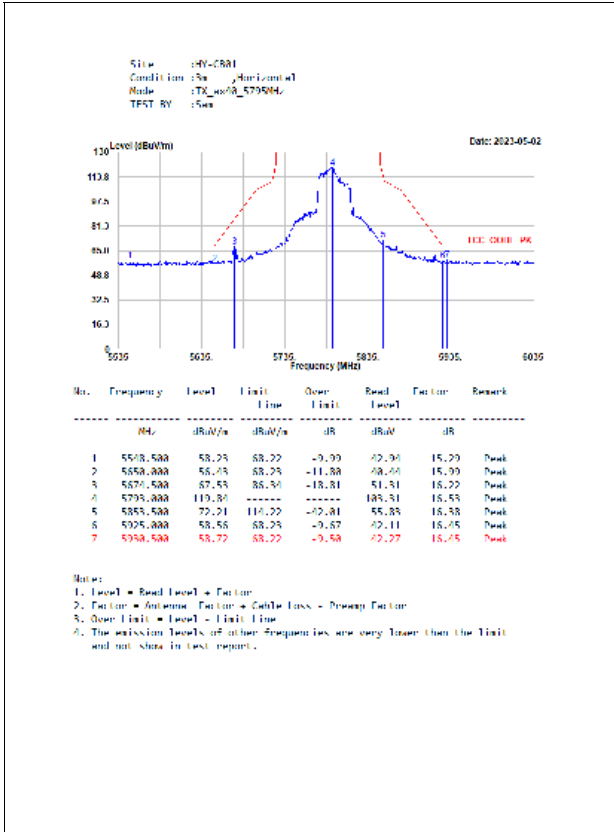


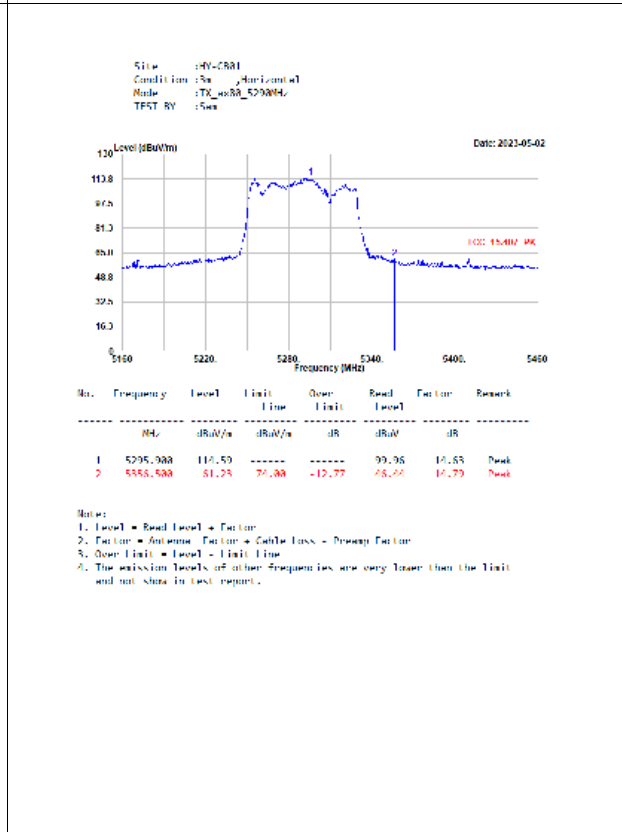
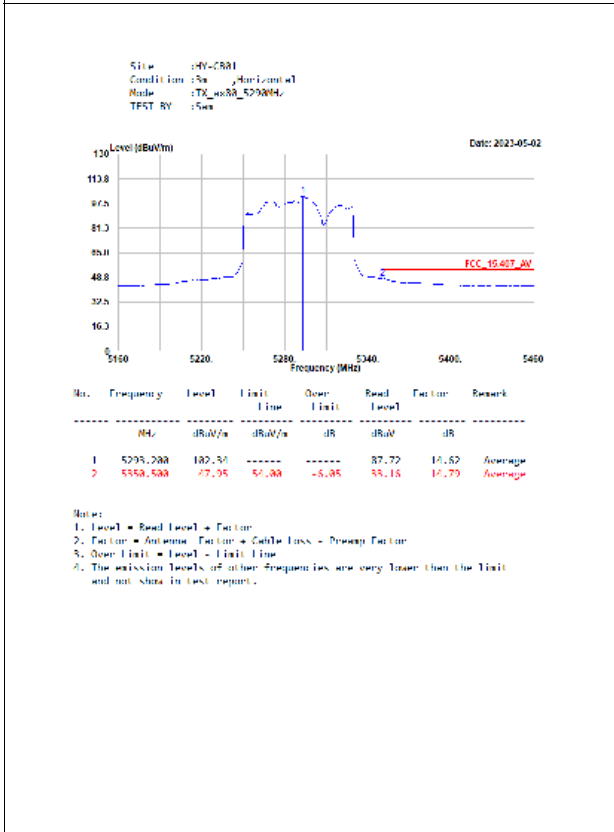
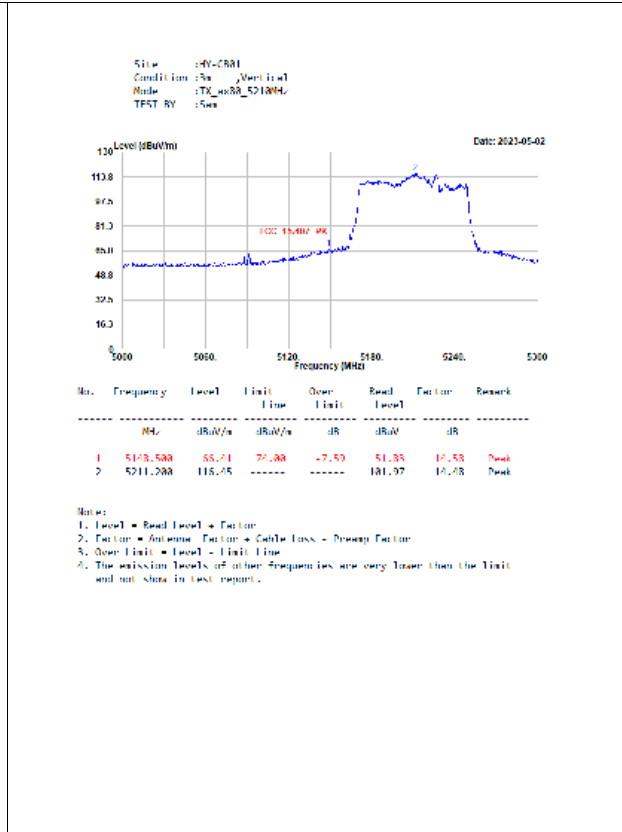
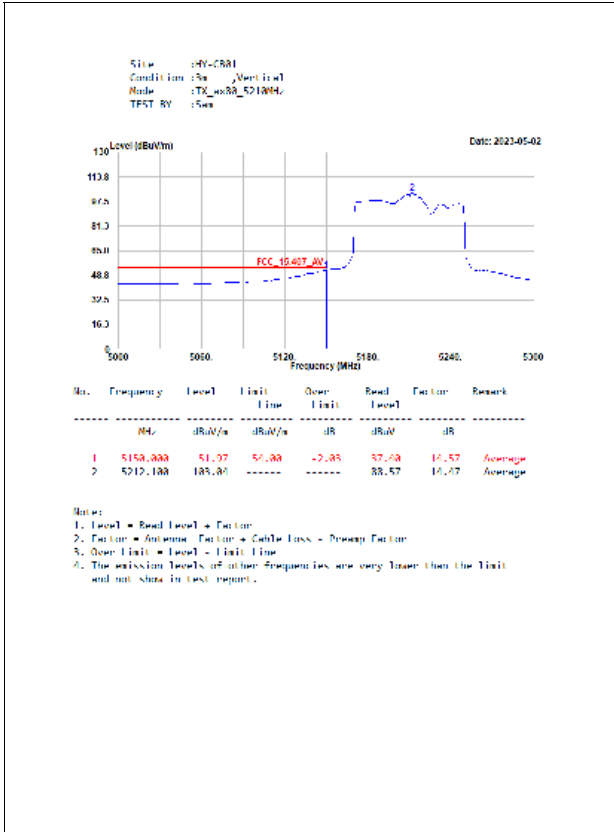


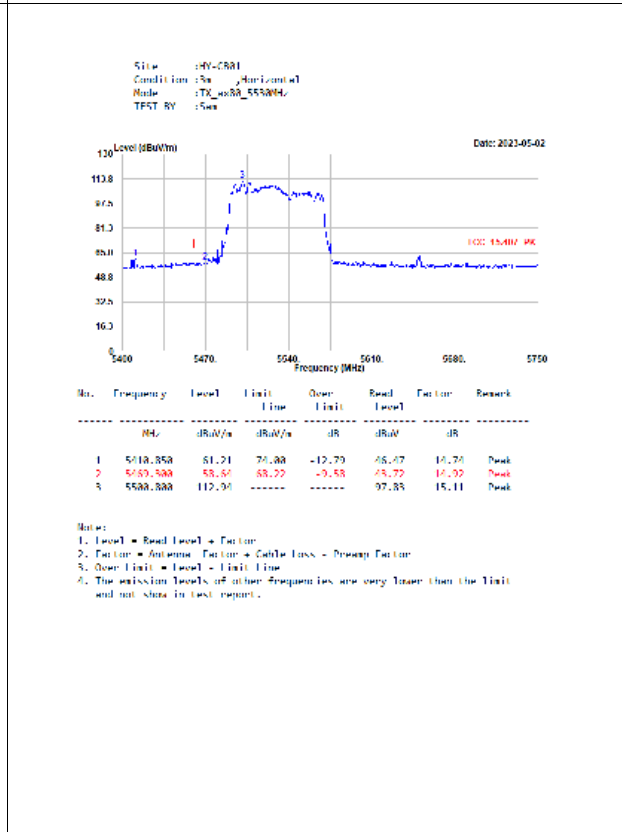
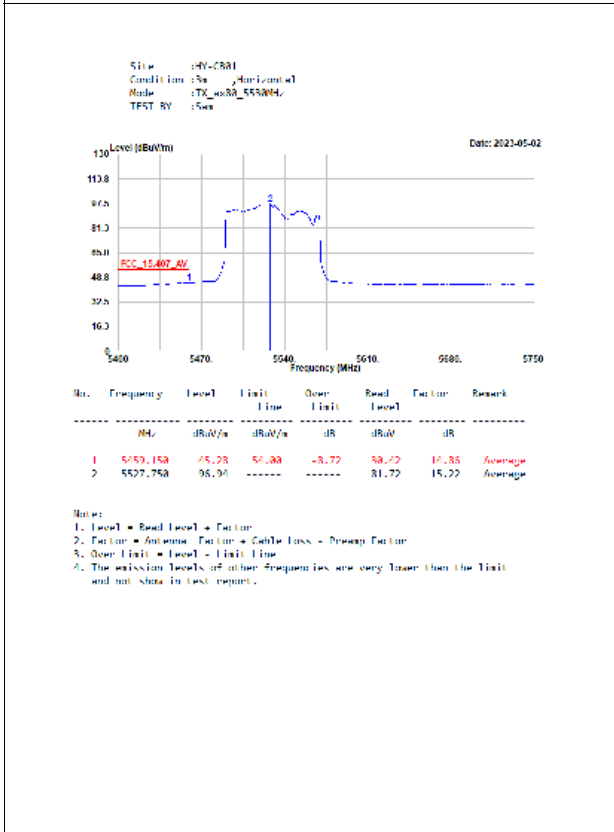
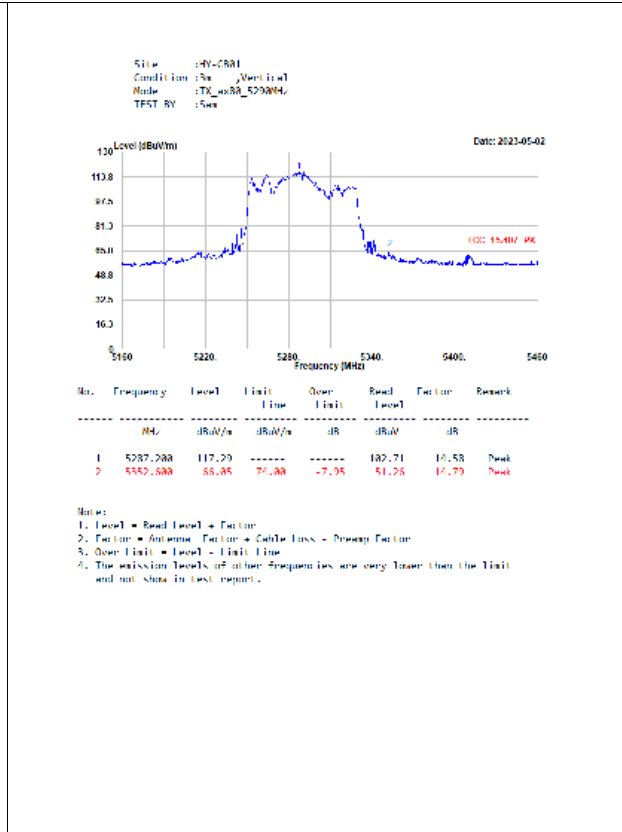
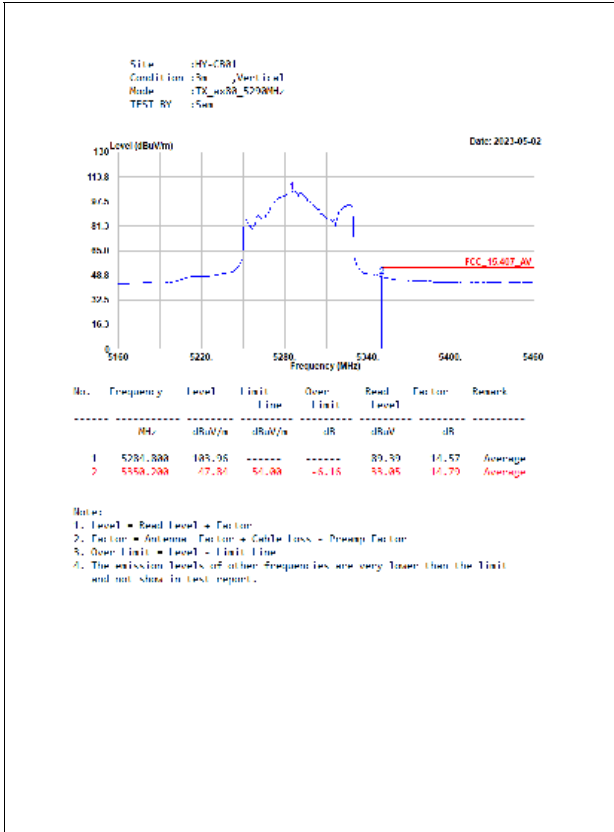


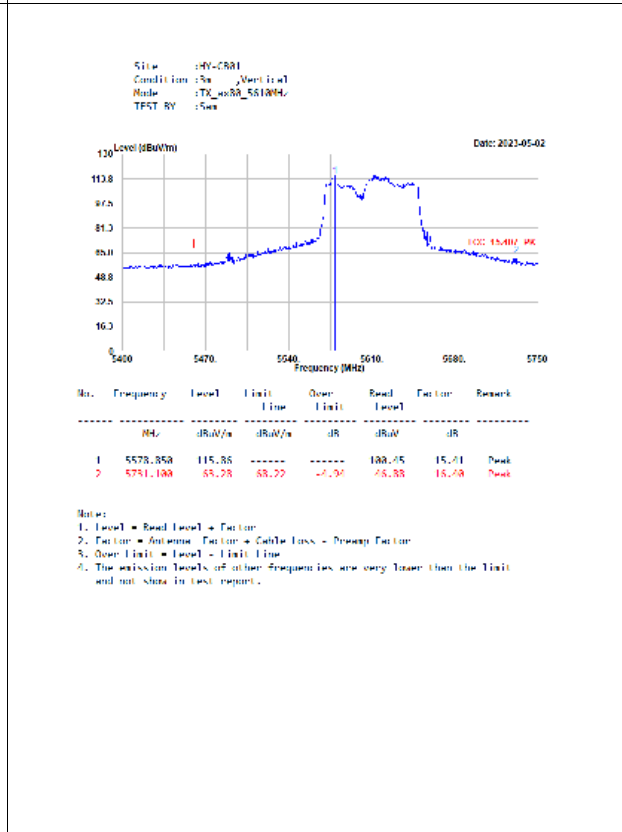
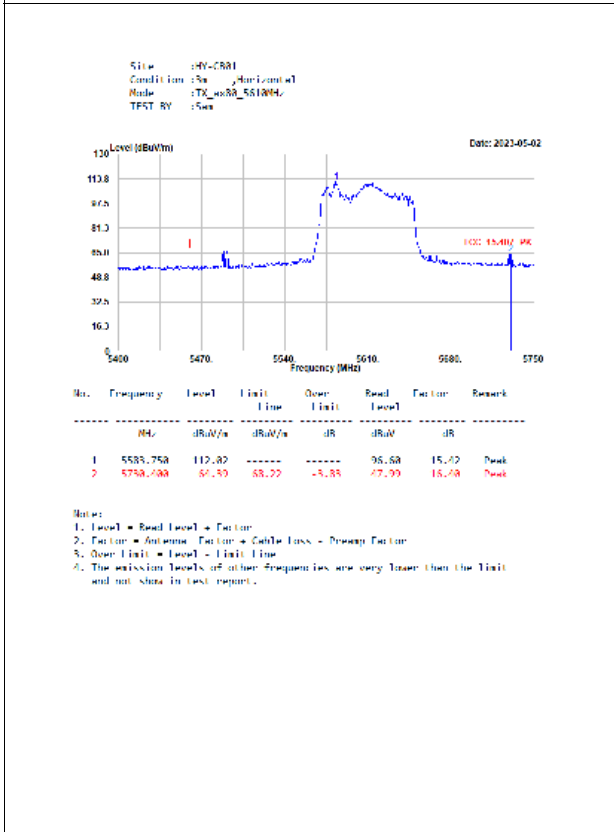
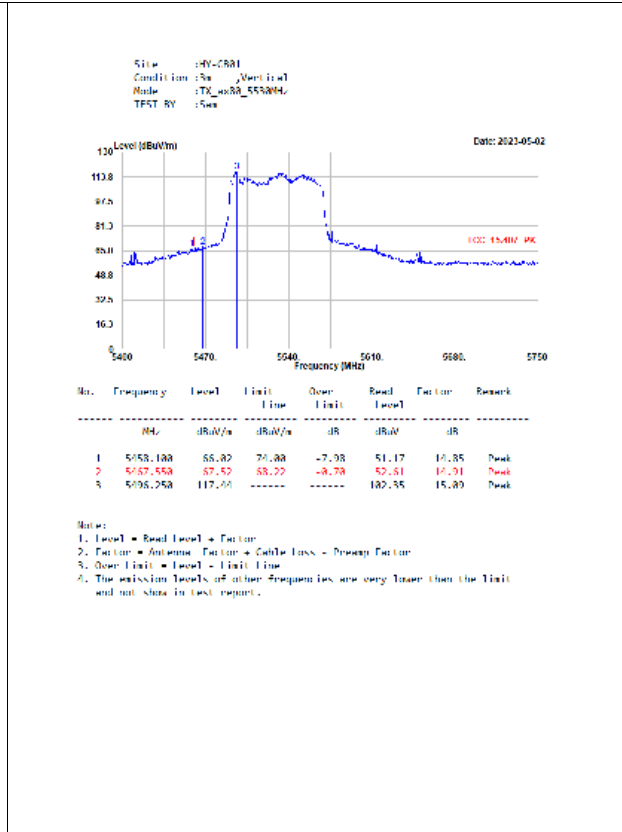
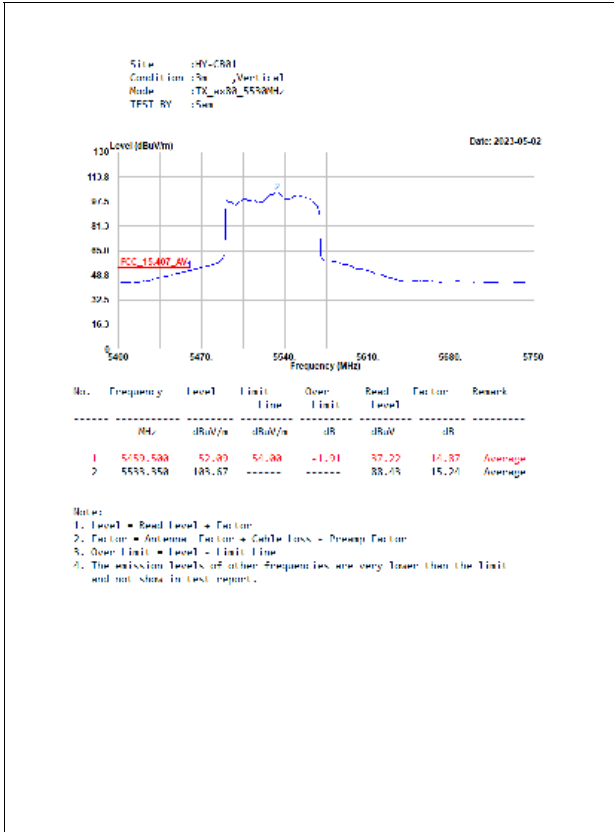


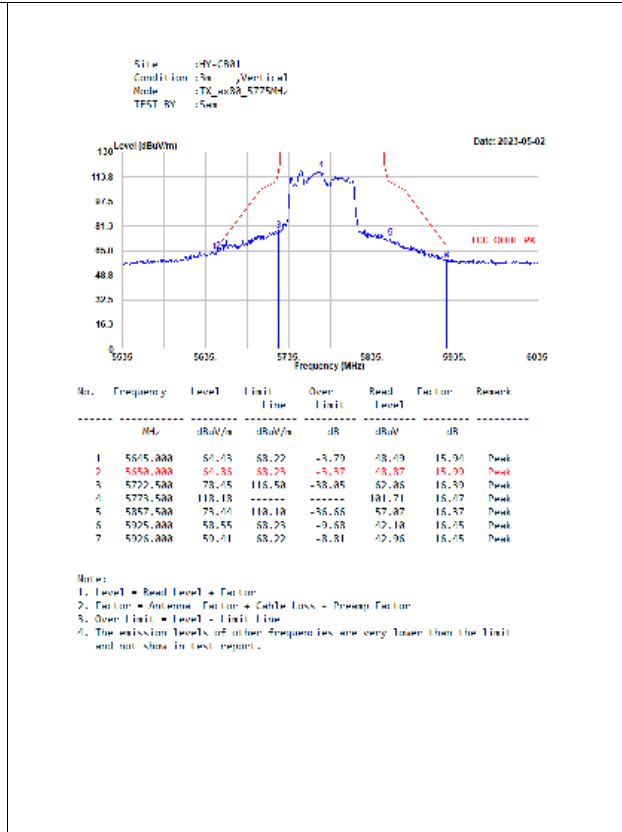
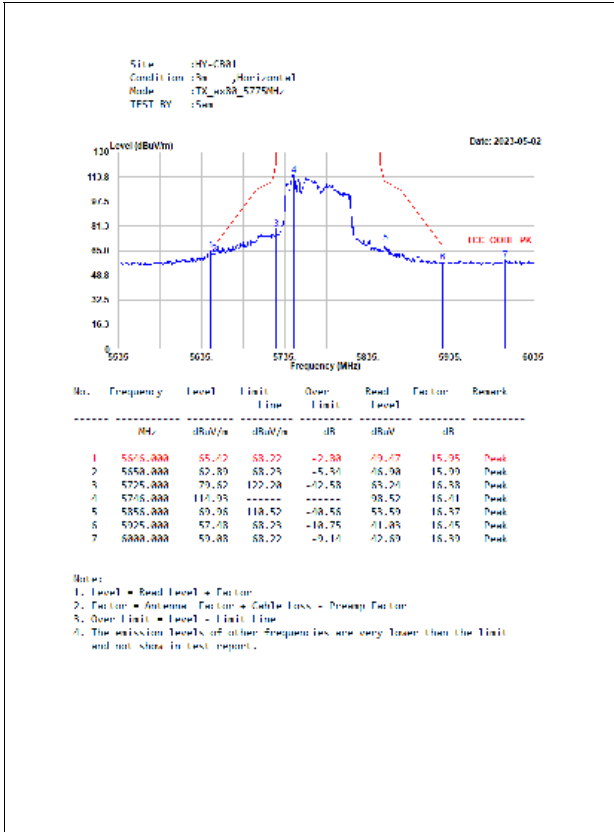






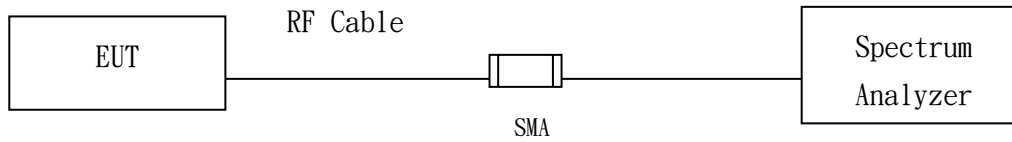






7. Occupied Bandwidth

7.1. Test Setup



7.2. Limits

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

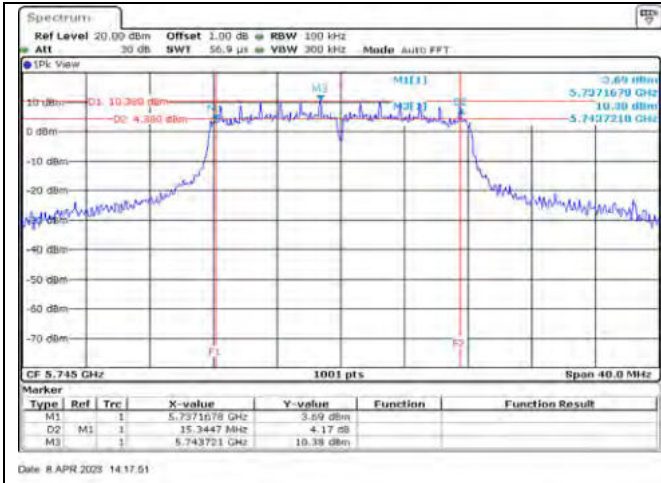
7.3. Test Procedure

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.

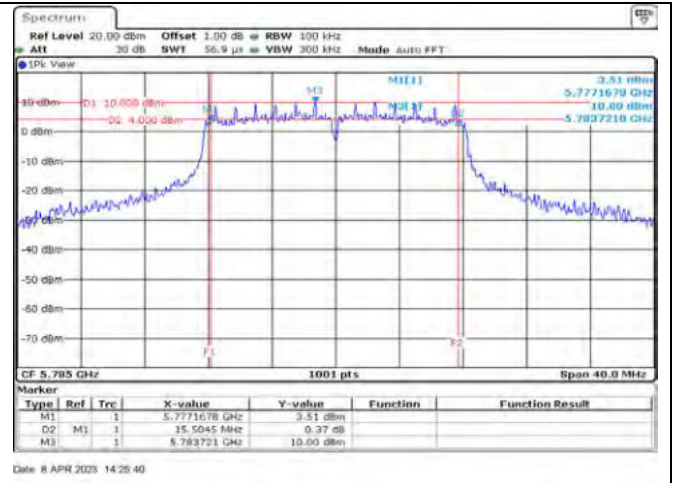
7.4. Test Result of Occupied Bandwidth

Product : Internet Gateway
Test Item : Occupied Bandwidth Data
Test Mode : Transmit (802.11a-CDD)
Test Date : 2023/04/08

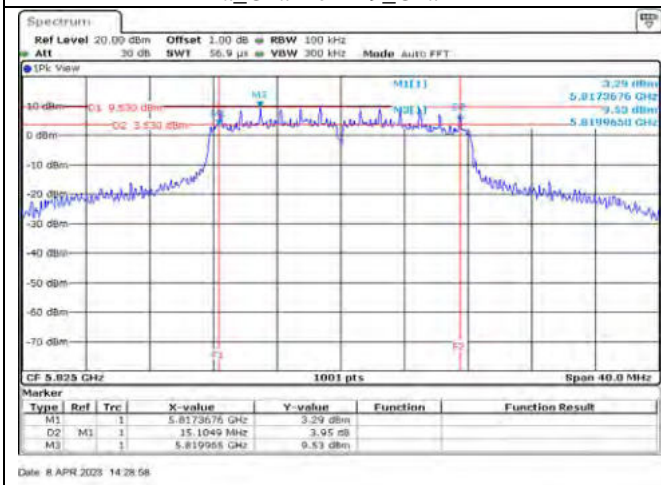
Channel No.	Chain	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	A	5745	15984	>500	Pass
157	A	5785	16024	>500	Pass
165	A	5825	15345	>500	Pass
149	B	5745	15345	>500	Pass
157	B	5785	15505	>500	Pass
165	B	5825	15345	>500	Pass
149	C	5745	15505	>500	Pass
157	C	5785	15505	>500	Pass
165	C	5825	15105	>500	Pass
149	D	5745	15664	>500	Pass
157	D	5785	15624	>500	Pass
165	D	5825	15305	>500	Pass



11a_Channel 149_Chain B



11a_Channel 157_Chain B

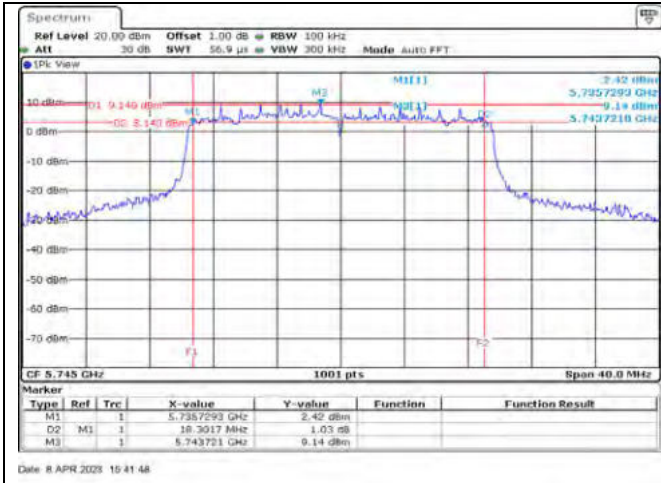


11a_Channel 165_Chain C

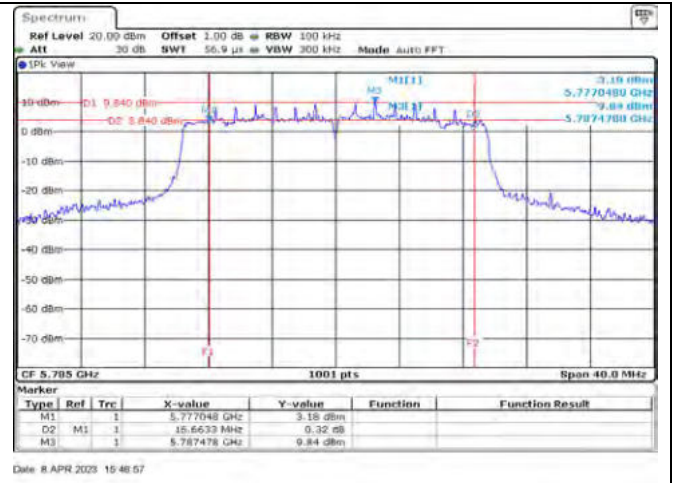
N/A

Product : Internet Gateway
Test Item : Occupied Bandwidth Data
Test Mode : Transmit (802.11ax-20BW-CDD)
Test Date : 2023/04/08

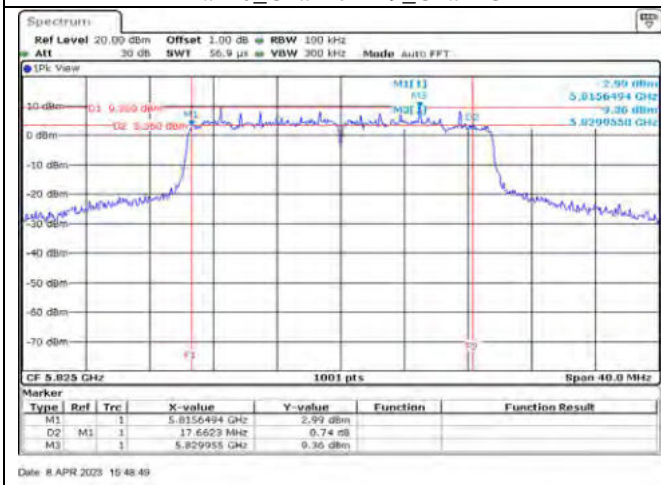
Channel No.	Chain	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	A	5745	18701	>500	Pass
157	A	5785	18581	>500	Pass
165	A	5825	18502	>500	Pass
149	B	5745	17622	>500	Pass
157	B	5785	18701	>500	Pass
165	B	5825	18661	>500	Pass
149	C	5745	18302	>500	Pass
157	C	5785	16663	>500	Pass
165	C	5825	18342	>500	Pass
149	D	5745	18741	>500	Pass
157	D	5785	18462	>500	Pass
165	D	5825	17662	>500	Pass



11ax20_Channel 149_Chain C



11ax20_Channel 157_Chain C

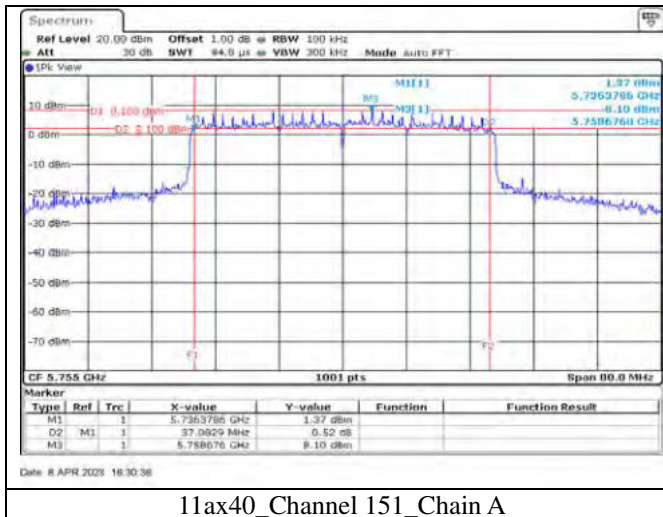


11ax20_Channel 165_Chain D

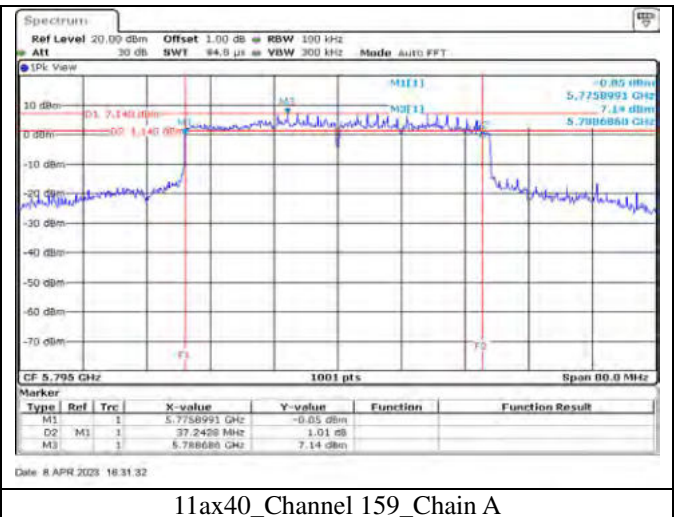
N/A

Product : Internet Gateway
 Test Item : Occupied Bandwidth Data
 Test Mode : Transmit (802.11ax-40BW-CDD)
 Test Date : 2023/04/08

Channel No.	Chain	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	A	5755	37083	>500	Pass
159	A	5795	37243	>500	Pass
151	B	5755	38282	>500	Pass
159	B	5795	38042	>500	Pass
151	C	5755	37722	>500	Pass
159	C	5795	37243	>500	Pass
151	D	5755	37562	>500	Pass
159	D	5795	38042	>500	Pass



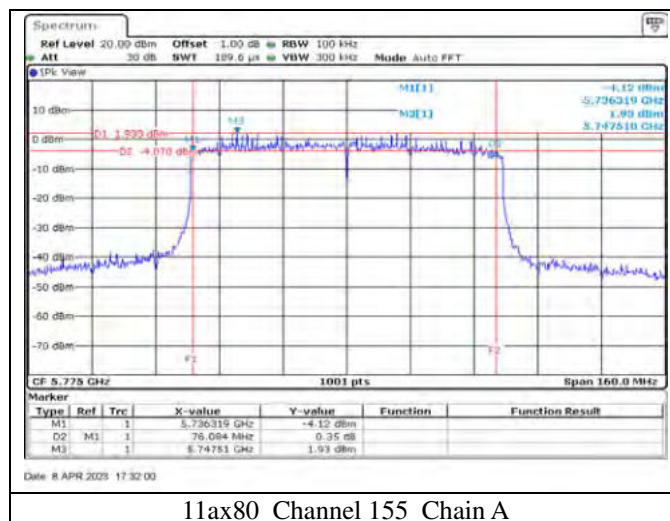
11ax40_Channel 151_Chain A



11ax40_Channel 159_Chain A

Product : Internet Gateway
 Test Item : Occupied Bandwidth Data
 Test Mode : Transmit (802.11ax-80BW-CDD)
 Test Date : 2023/04/08

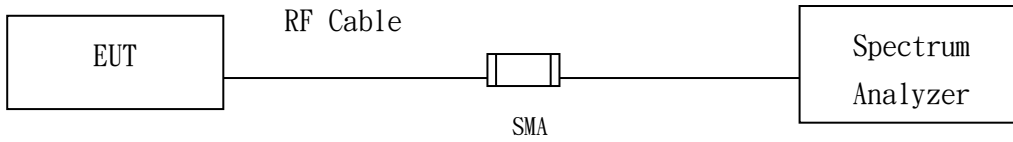
Channel No.	Chain	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	A	5775	76084	>500	Pass
155	B	5775	76404	>500	Pass
155	C	5775	77363	>500	Pass
155	D	5775	77203	>500	Pass



11ax80_Channel 155_Chain A

8. Duty Cycle

8.1. Test Setup



8.2. 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.

8.3. Test Result of Duty Cycle

Product : Internet Gateway
Test Item : Duty Cycle
Test Mode : Transmit-CDD Mode

Duty Cycle Formula:

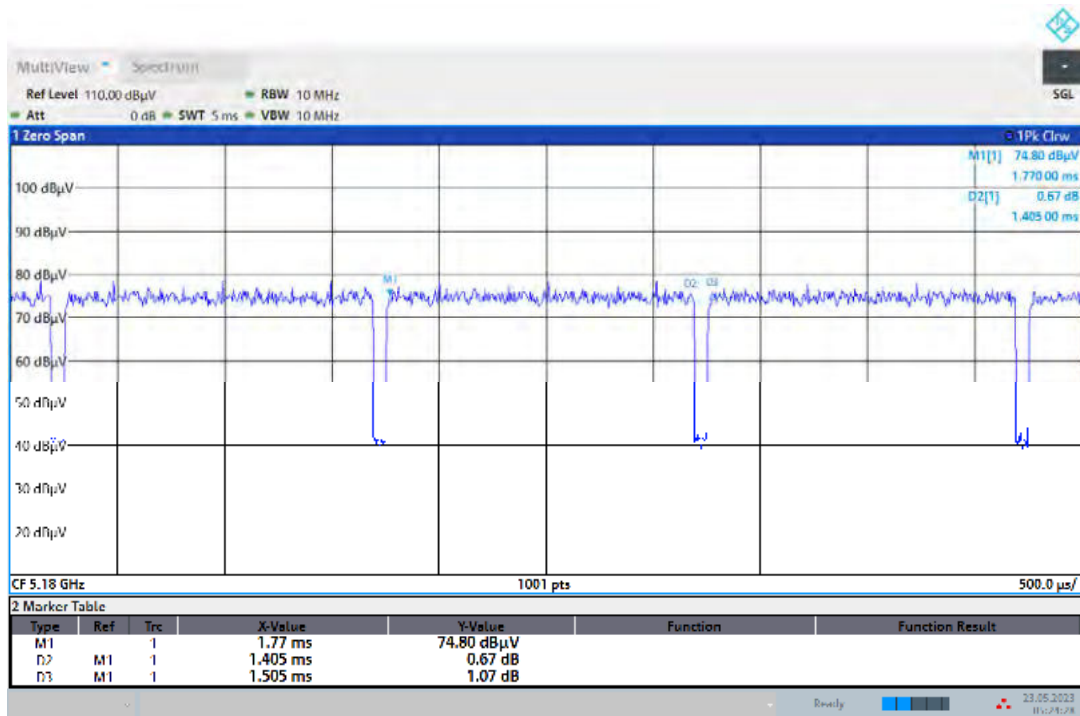
Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

Results:

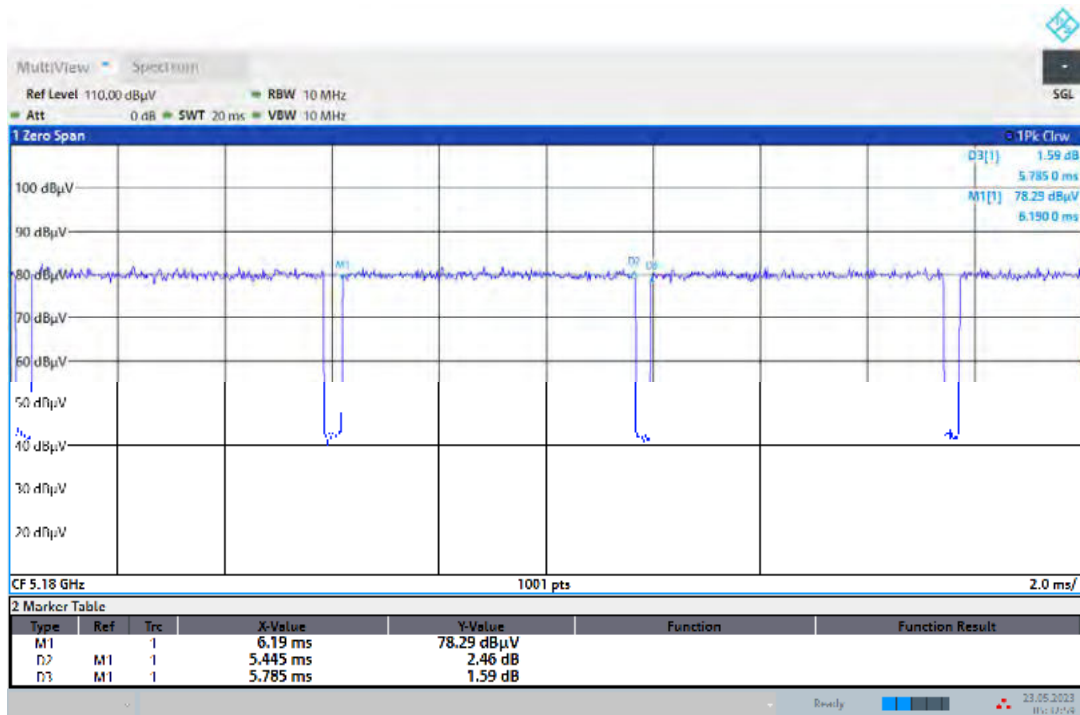
5 GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	1.4050	1.5050	93.36	0.30
802.11ax-20 MHz	5.4450	5.7850	94.12	0.26
802.11ax-40 MHz	5.4050	5.8650	92.16	0.35
802.11ax-80 MHz	5.4050	5.7650	93.76	0.28

802.11a



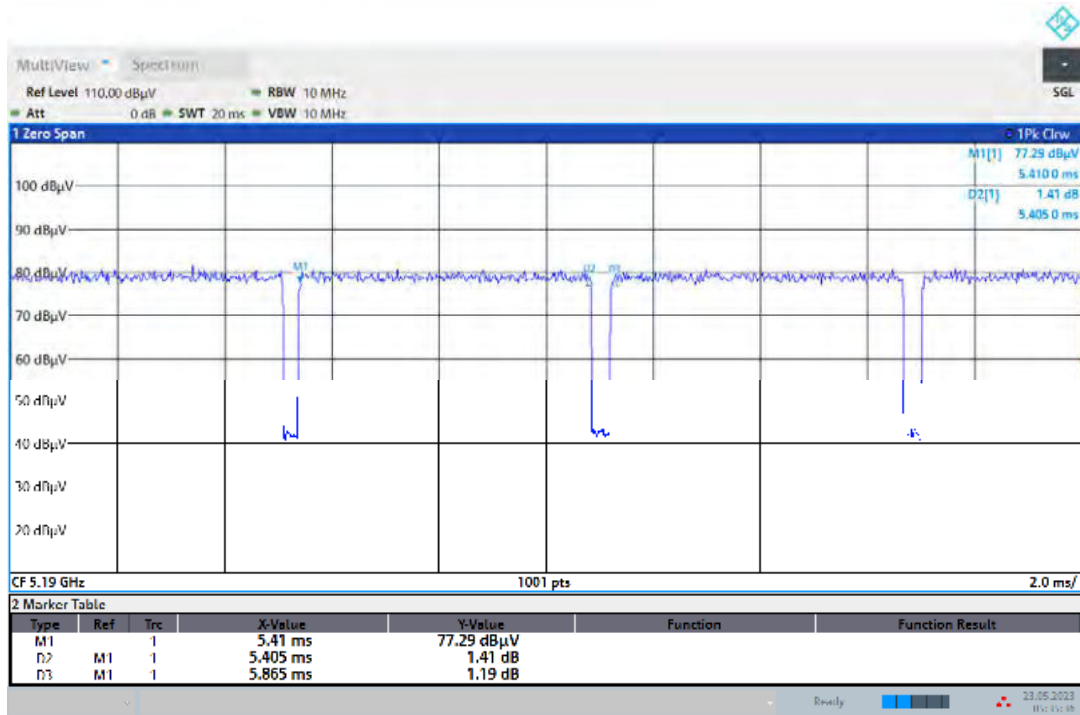
05:24:28 23.05.2023

802.11ax-20 MHz

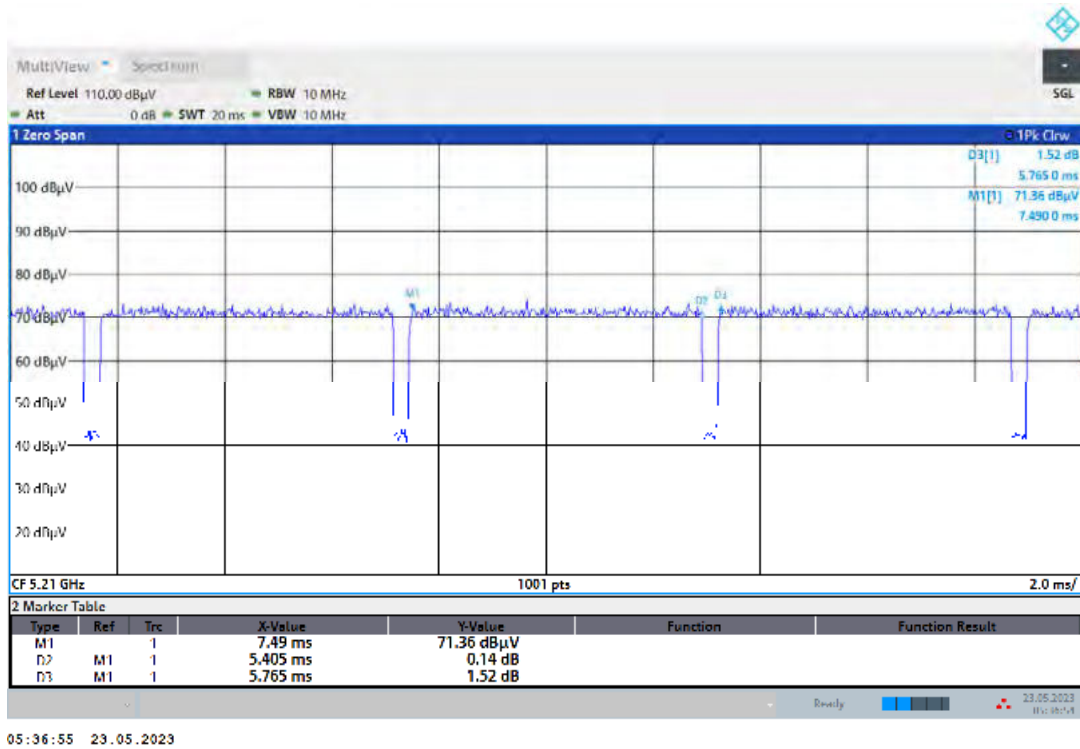


05:32:59 23.05.2023

802.11ax-40 MHz



802.11ax-80 MHz



Product : Internet Gateway
Test Item : Duty Cycle
Test Mode : Transmit-Beamforming Mode

Duty Cycle Formula:

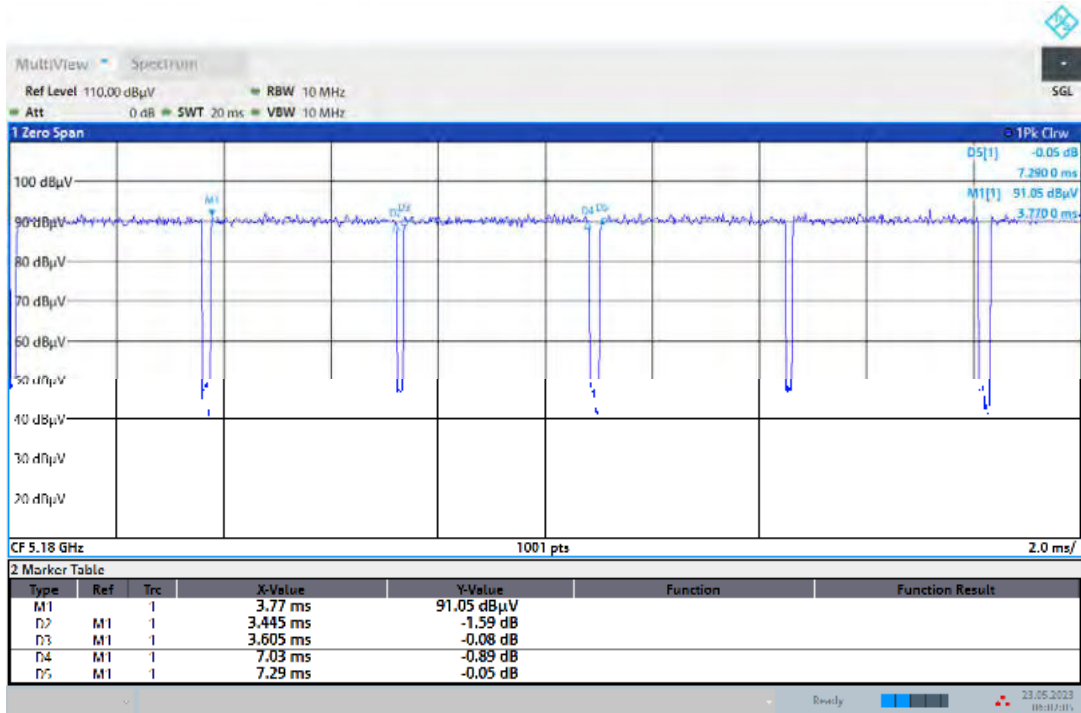
Duty Cycle = $T_{on} / (T_{on} + T_{off})$

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

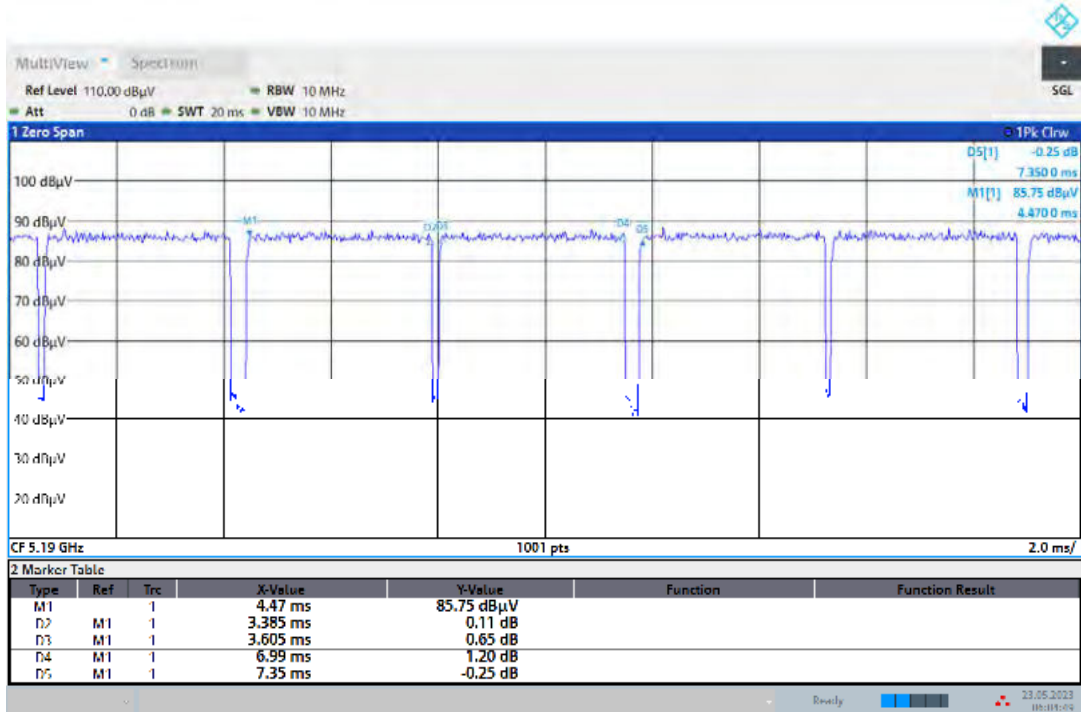
Results:

5 GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11ax-20 MHz	6.8700	7.2900	94.24	0.26
802.11ax-40 MHz	6.7700	7.3500	92.11	0.36
802.11ax-80 MHz	7.3100	7.7700	94.08	0.27

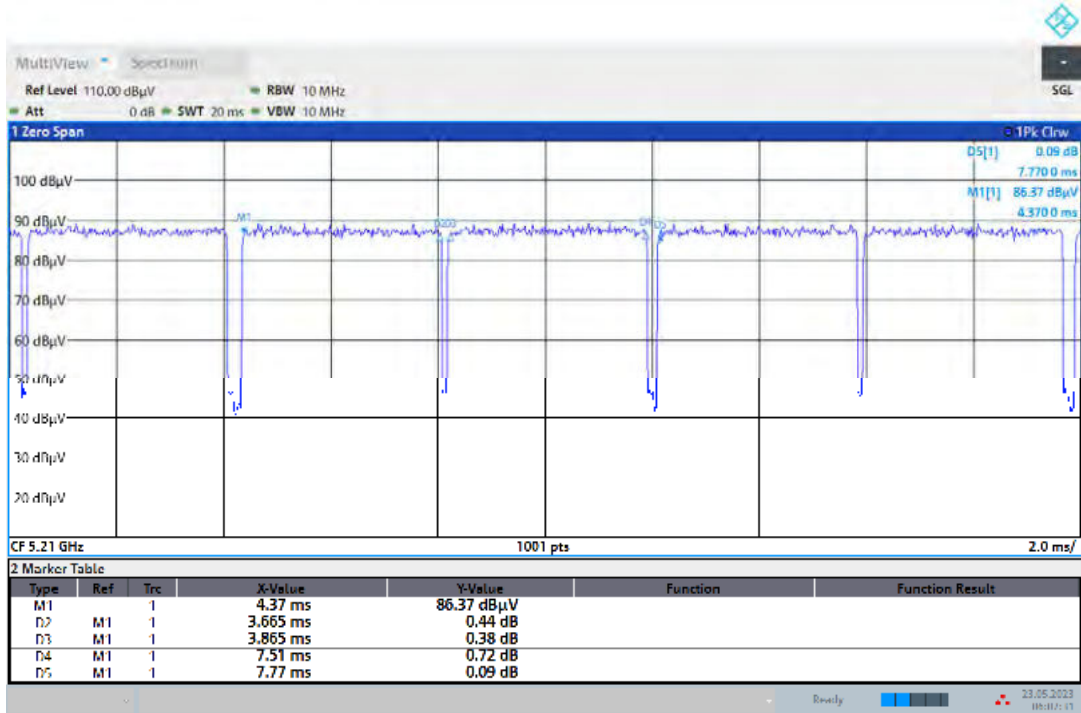
802.11ax-20 MHz



802.11ax-40 MHz



802.11ax-80 MHz



06:07:32 23.05.2023