



Test report No.: 2380907R-RFUSV03S-B

TEST REPORT

Product Name	Set Back Box with Wi-Fi6E, BT & PoE
Trademark	ADB, Charter
Model and /or type reference	ADB-2682WF
FCC ID	2BBO4-ADB-SG23004A
Applicant's name / address	ADB SA Route de Lausanne 319, CH-1293 Bellevue, Switzerland
Manufacturer's name	ADB SA
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 291074
Verdict Summary	IN COMPLIANCE
Documented By (Senior Project Specialist / Joanne Lin)	
Tested By (Senior Engineer / Ivan Chuang)	
Approved By (Senior Engineer / Alan Chen)	
Date of Receipt	2023/08/30
Date of Issue	2023/11/10
Report Version	V1.0

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Appendix 1: EUT Test Photographs

Appendix 2: Product Photos-Please refer to the file: 2380907R-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.

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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
2380907R-RFUSV03S-B	V1.0	Initial issue of report.	2023/11/10

1. General Information

1.1. EUT Description

Product Name	Set Back Box with Wi-Fi6E, BT & PoE
Trademark	ADB, Charter
Model and /or type reference	ADB-2682WF
EUT Rated Voltage	AC 100-240 V, 50-60 Hz
EUT Test Voltage	AC 120 V/50 Hz
Frequency Range	802.11a/n/ac/ax-20 MHz: 5845-5885 MHz 802.11n/ac/ax-40 MHz: 5835-5875 MHz 802.11ac/ax-80 MHz: 5855 MHz 802.11ac/ax-160 MHz: 5815 MHz
Number of Channels	802.11a/n/ac/ax-20 MHz: 3CH 802.11n/ac/ax-40 MHz: 2CH 802.11ac/ax-80 MHz: 1CH 802.11ac/ax-160 MHz: 1CH
Data Rate	802.11a: 6-54Mbps 802.11n: up to 300Mbps 802.11ac: up to 1733.3Mbps 802.11ax: up to 2402Mbps
Type of Modulation	802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Channel Control	Auto
HDMI Cable	Shielded, 1m
PSU_1	MFR: Mass Power, M/N: S042-1A120300VU Input: AC 100-240V~, 50/60Hz, 1.0A Output: 12.0V=3.0A, 36.0W Cable out: Non-shielded, 1.5m
PSU_2	MFR: Atech OEM, M/N: A3603PU-120030 Input: AC 100-240V~50-60Hz, 1.0A Output: 12.0V=3.0A, 36.0W Cable out: Non-shielded, 1.5m
For any other product variant refer to compliance ID	
SW Compliance ID	M.U.01.01_0001

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	HONGBO	49031-01103-HB (Main)	PCB	3.49 dBi for 5850~5895 MHz
		49031-01104-HB (Aux)	PCB	2.86 dBi for 5850~5895 MHz

Note:

1. The antenna of EUT is conforming to FCC 15.203.
2. The antenna gain as by the manufacturer provided.
3. Each antenna has been evaluated and only the worst case (higher gain antenna) is presented in the report.

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	--	--
169	5845	173	5865	177	5885	--	--

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)	--	--	--	--
167	5835	175	5875	--	--	--	--

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

Channel	Frequency (MHz)	--	--	--	--	--	--
171	5855	--	--	--	--	--	--

802.11ac/ax-160 MHz Center Working Frequency of Each Channel:

Channel	Frequency (MHz)	--	--	--	--	--	--
163	5815	--	--	--	--	--	--

Note:

1. This device is a Set Back Box with Wi-Fi6E, BT & PoE with built-in WLAN and Bluetooth transceiver, this report for 5GHz WLAN U-NII-4.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps, 802.11ax is MCS0)
4. The modulation and bandwidth are similar for 802.11n mode and 802.11ac mode and 802.11ax mode, therefore investigated worst case (802.11ax) to representative mode.
5. The spectrum plot against conducted item only shows the worst case.
6. This device does not support partial RU function.
7. DEKRA has evaluated each test mode. Only the worst case is shown in the report.
8. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance of transmitter with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Mode 1	Transmit (802.11a) Transmit (802.11ax-20 MHz) Transmit (802.11ax-40 MHz) Transmit (802.11ax-80 MHz) Transmit (802.11ax-160 MHz)
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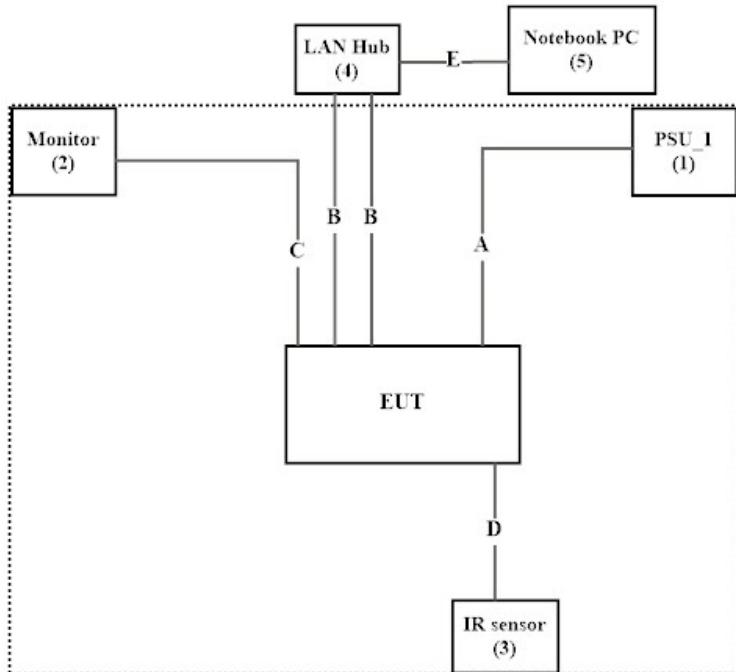
1.2. Tested System Details

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

Product	Manufacturer	Model No.	Serial No.	Power Cord
1 PSU_1	Mass Power	S042-1A120300VU	N/A	N/A
2 Monitor	DELL	S2817Qt	CN-0GD45P-74445-6CR-002M-A01	Non-shielded, 1.8m
3 IR sensor	N/A	N/A	N/A	N/A
4 LAN Hub	TP-LINK	TL-SG108	2161597000480	Non-shielded, 1.5m
5 Notebook PC	ASUS	P5430U	G8NXCV07J11032C	N/A

Cable Type	Cable Description
A Power Cable	Non-shielded, 1.5m
B LAN Cable	Non-shielded, 2m, two PCS.
C HDMI Cable	Shielded, 1m
D IR Cable	Non-shielded, 0.9m
E LAN Cable	Non-shielded, 2m

1.3. Configuration of tested System



1.4. EUT Exercise Software

1	Setup the EUT as shown in Section 1.3.
2	Execute software “QRCT version 4.00203.0” on the Notebook PC.
3	Configure the test mode, the test channel, and the data rate.
4	Press “OK” to start the continuous transmit.
5	Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 °C	25.7 °C
	Humidity (%RH)	10~90 %	58.0 %
Radiated Emission	Temperature (°C)	10~40 °C	25.3 °C
	Humidity (%RH)	10~90 %	64.3 %
Conductive	Temperature (°C)	10~40 °C	25.0 °C
	Humidity (%RH)	10~90 %	55.8 %

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

Site Description	Accredited by TAF Accredited Number: 3023
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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	2023/06/20	2024/06/19
V	Two-Line V-Network	R&S	ENV216	101306	2023/03/16	2024/03/15
V	Two-Line V-Network	R&S	ENV216	101307	2023/08/17	2024/08/16
V	Coaxial Cable	SUHNER	RG400 BNC	RF001	2023/01/10	2024/01/09

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version: e3 230303 dekra V9.

For Conducted Measurements / HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Spectrum Analyzer	R&S	FSV30	103466	2022/12/22	2023/12/21
V	Spectrum Analyzer	KEYSIGHT	N9010A	MY53470892	2022/11/07	2023/11/06
V	Peak Power Analyzer	KEYSIGHT	8990B	MY51000539	2023/05/15	2024/05/14
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240002	2023/05/18	2024/05/18
V	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240003	2023/05/18	2024/05/17

Note:

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

For Radiated Measurements / HY-CB03

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Loop Antenna	AMETEK	HLA6121	49611	2023/02/21	2024/02/20
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2023/08/09	2025/08/08
V	Horn Antenna	Com-Power	AH-840	101101	2021/11/30	2023/11/29
V	Horn Antenna	RF SPIN	DRH18-E	210507A18ES	2023/05/11	2024/05/10
V	Pre-Amplifier	SGH	SGH0301-9	20211007-11	2023/01/10	2024/01/09
V	Pre-Amplifier	SGH	PRAMP118	20200701	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC05820SE	980310	2023/01/10	2024/01/09
	Pre-Amplifier	EMCI	EMC184045SE	980369	2023/01/10	2024/01/09
V	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
	Filter	MICRO TRONICS	BRM50702	G269	2023/01/05	2024/01/04
	Filter	MICRO TRONICS	BRM50716	G196	2023/01/05	2024/01/04
V	WIFI 6E Filter	MVE	MFN-5850/5895/S1	A80006N	2023/01/05	2024/01/04
	WIFI 6E Filter	MVE	MFN-5925/6425/S1	A80007N	2023/01/05	2024/01/04
	WIFI 6E Filter	MVE	MFN-6425/6525/S1	A80008N	2023/01/05	2024/01/04
	WIFI 6E Filter	MVE	MFN-6525/6875/S1	A80009N	2023/01/05	2024/01/04
	WIFI 6E Filter	MVE	MFN-6875/7125/S1	A80010N	2023/01/05	2024/01/04
V	EMI Test Receiver	R&S	ESR3	102793	2022/12/05	2023/12/04
V	Spectrum Analyzer	R&S	FSV3044	101113	2023/02/04	2024/02/03
V	Coaxial Cable	SGH	SGH18	2021005-1	2023/01/10	2024/01/09
	Coaxial Cable	SGH	SGH18	202108-4		
	Coaxial Cable	SGH	HA800	GD20110223-1		
	Coaxial Cable	SGH	HA800	GD20110222-3		

Note:

1. Bi-Log Antenna and Horn Antenna(AH-840) is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with "V" are used to measure the final test results.
3. Test Software Version: e3 230303 dekra V9.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

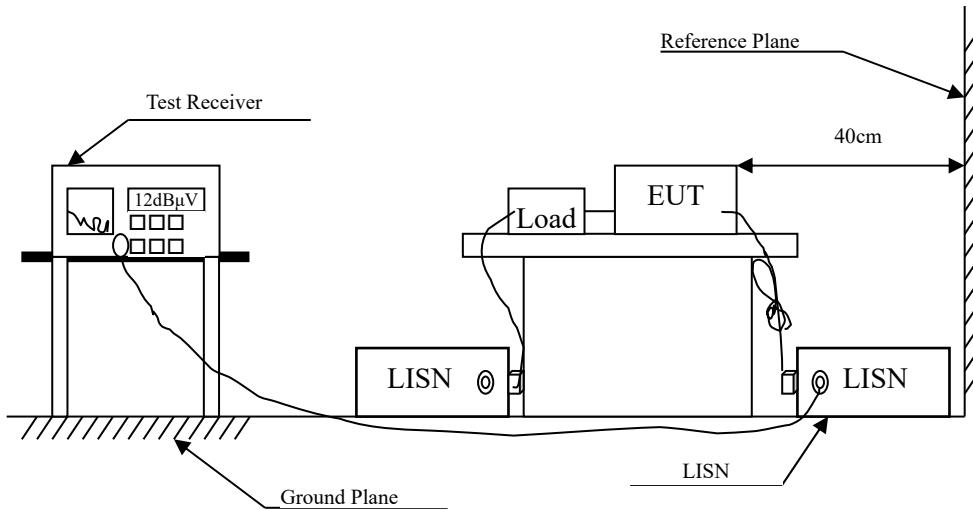
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

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	Spectrum Analyzer: ± 2.14 dB Power Meter: ± 1.05 dB
Peak 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	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
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

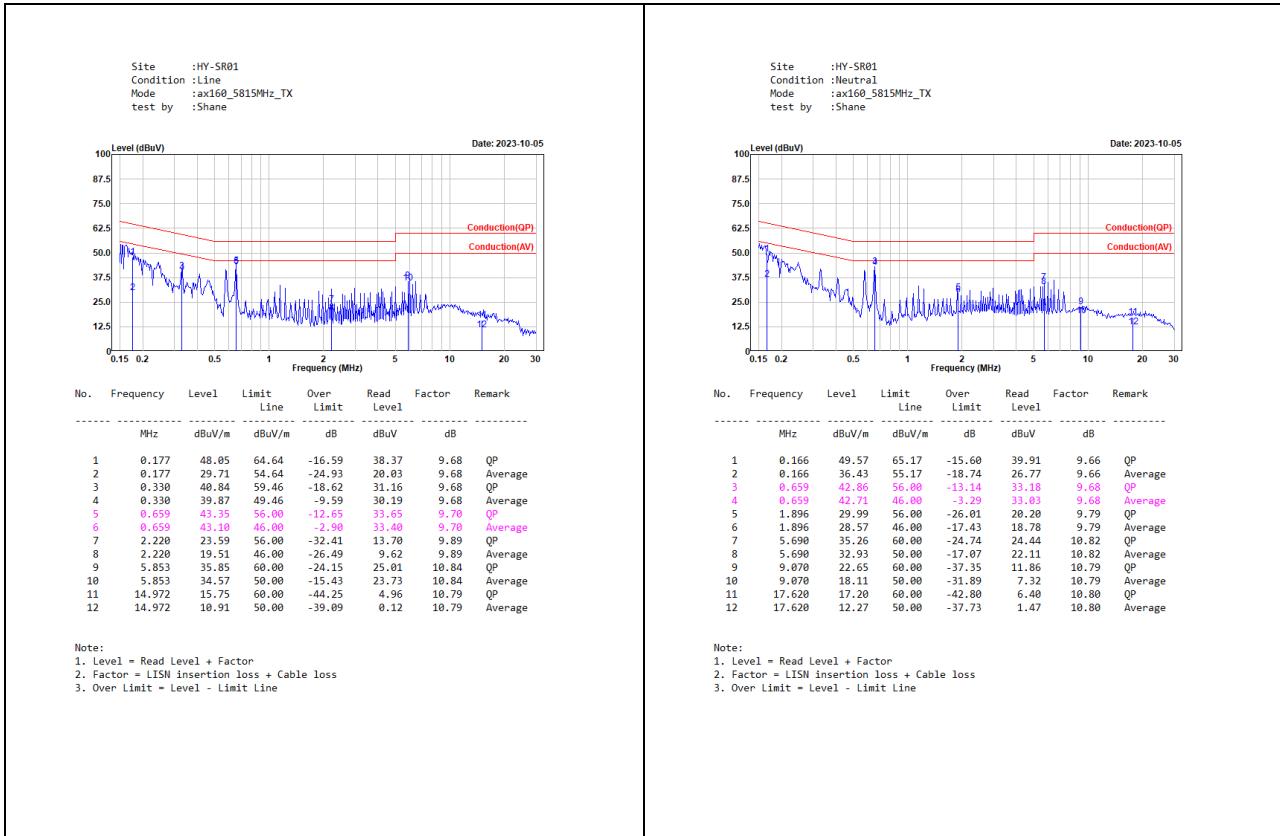
Remarks: In the above table, the tighter limit applies at the band edges.

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 /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.) Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4:2014 on conducted measurement.

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

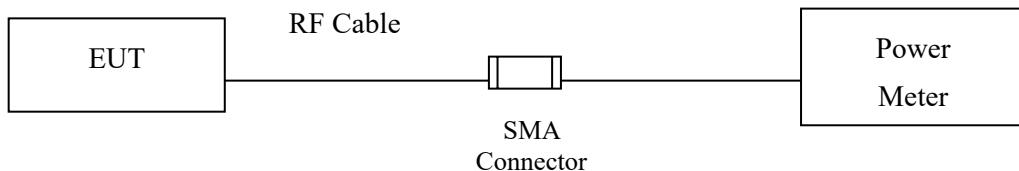
2.4. Test Result of Conducted Emission



3. Maximum conducted output power

3.1. Test Setup

Conduction Power Measurement



3.2. Limits

- (i) For an indoor access point operating in the 5.850-5.895 GHz band, the maximum e.i.r.p. over the frequency band of operation must not exceed 36 dBm. Indoor access points operating on a channel that spans the 5.725-5.850 GHz and 5.850-5.895 GHz bands must not exceed an e.i.r.p. of 36 dBm.
- (ii) For client devices operating under the control of an indoor access point in the 5.850-5.895 GHz band, the maximum e.i.r.p. over the frequency band of operation must not exceed 30 dBm. Client devices operating on a channel that spans the 5.725-5.850 GHz and 5.850-5.895 GHz bands must not exceed an e.i.r.p. of 30 dBm.
- (iii) For a subordinate device operating under the control of an indoor access point in the 5.850-5.895 GHz band, the maximum e.i.r.p. over the frequency band of operation must not exceed 36 dBm.

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

802.11a/n/ac/ax (BW \leq 160MHz) 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, (KEYSIGHT / 8990B video bandwidth: 160MHz)

802.11ac/ax (BW \geq 160MHz) 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 : Set Back Box with Wi-Fi6E, BT & PoE
Test Item : Maximum conducted output power
Test Mode : Transmit (802.11a)
Test Date : 2023/09/28

Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Total Output Power (dBm)	Max Ant Gain (dBi)	EIRP Output Power (dBm)	EIRP limit (dBm)	Result
169	5845	14.76	14.57	17.68	3.31	20.99	30	Pass
173	5865	14.90	14.82	17.87	3.31	21.18	30	Pass
177	5885	14.73	14.51	17.63	3.31	20.94	30	Pass

Note:

1. Total Output Power (dBm) = $10 \times \log_{10} (\text{Chain A Power (mW)} + \text{Chain B Power (mW)})$.
2. EIRP Output Power (dBm) = Total Output Power (dBm) + Max Ant Gain (dBi)

Product : Set Back Box with Wi-Fi6E, BT & PoE
Test Item : Maximum conducted output power
Test Mode : Transmit (802.11ax-20 MHz)
Test Date : 2023/09/28

Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Total Output Power (dBm)	Max Ant Gain (dBi)	EIRP Output Power (dBm)	EIRP limit (dBm)	Result
169	5845	14.64	14.52	17.59	3.31	20.90	30	Pass
173	5865	14.73	14.66	17.71	3.31	21.02	30	Pass
177	5885	9.66	9.28	12.48	3.31	15.79	30	Pass

Note:

1. Total Output Power (dBm) = $10 \times \log_{10} (\text{Chain A Power (mW)} + \text{Chain B Power (mW)})$.
2. EIRP Output Power (dBm) = Total Output Power (dBm) + Max Ant Gain (dBi)

Product : Set Back Box with Wi-Fi6E, BT & PoE
Test Item : Maximum conducted output power
Test Mode : Transmit (802.11ax-40 MHz)
Test Date : 2023/09/28

Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Total Output Power (dBm)	Max Ant Gain (dBi)	EIRP Output Power (dBm)	EIRP limit (dBm)	Result
167	5835	15.92	15.88	18.91	3.31	22.22	30	Pass
175	5875	16.51	15.98	19.26	3.31	22.57	30	Pass

Note:

1. Total Output Power (dBm) = $10 \times \log_{10} (\text{Chain A Power (mW)} + \text{Chain B Power (mW)})$.
2. EIRP Output Power (dBm) = Total Output Power (dBm) + Max Ant Gain (dBi)

Product : Set Back Box with Wi-Fi6E, BT & PoE
Test Item : Maximum conducted output power
Test Mode : Transmit (802.11ax-80 MHz)
Test Date : 2023/09/28

Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Total Output Power (dBm)	Max Ant Gain (dBi)	EIRP Output Power (dBm)	EIRP limit (dBm)	Result
171	5855	15.45	15.28	18.38	3.31	21.69	30	Pass

Note:

1. Total Output Power (dBm) = $10 \times \log_{10} (\text{Chain A Power (mW)} + \text{Chain B Power (mW)})$.
2. EIRP Output Power (dBm) = Total Output Power (dBm) + Max Ant Gain (dBi)

Product : Set Back Box with Wi-Fi6E, BT & PoE
Test Item : Maximum conducted output power
Test Mode : Transmit (802.11ax-160 MHz)
Test Date : 2023/09/28

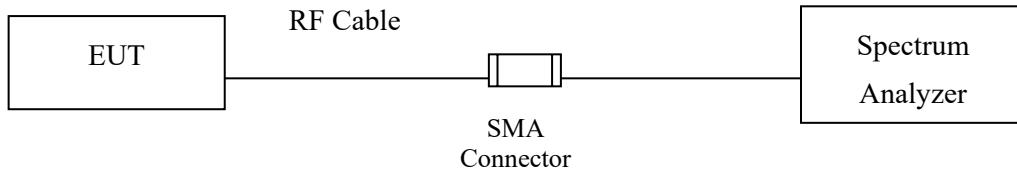
Channel No.	Frequency (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Total Output Power (dBm)	Max Ant Gain (dBi)	EIRP Output Power (dBm)	EIRP limit (dBm)	Result
163	5815	14.11	13.95	17.04	3.31	20.35	30	Pass

Note:

1. Total Output Power (dBm) = $10 \times \log_{10} (\text{Chain A Power (mW)} + \text{Chain B Power (mW)})$.
2. EIRP Output Power (dBm) = Total Output Power (dBm) + Max Ant Gain (dBi)

4. Peak Power Spectral Density

4.1. Test Setup



4.2. Limits

- (i)** For an indoor access point operating in the 5.850-5.895 GHz band, the maximum power spectral density must not exceed 20 dBm e.i.r.p. in any 1-megahertz band.
- (ii)** For client devices operating under the control of an indoor access point in the 5.850-5.895 GHz band, the maximum power spectral density must not exceed 14 dBm e.i.r.p. in any 1-megahertz band.
- (iii)** For a subordinate device operating under the control of an indoor access point in the 5.850-5.895 GHz band, the maximum power spectral density must not exceed 20 dBm e.i.r.p. in any 1-megahertz band.

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-1 method is selected to run the test.

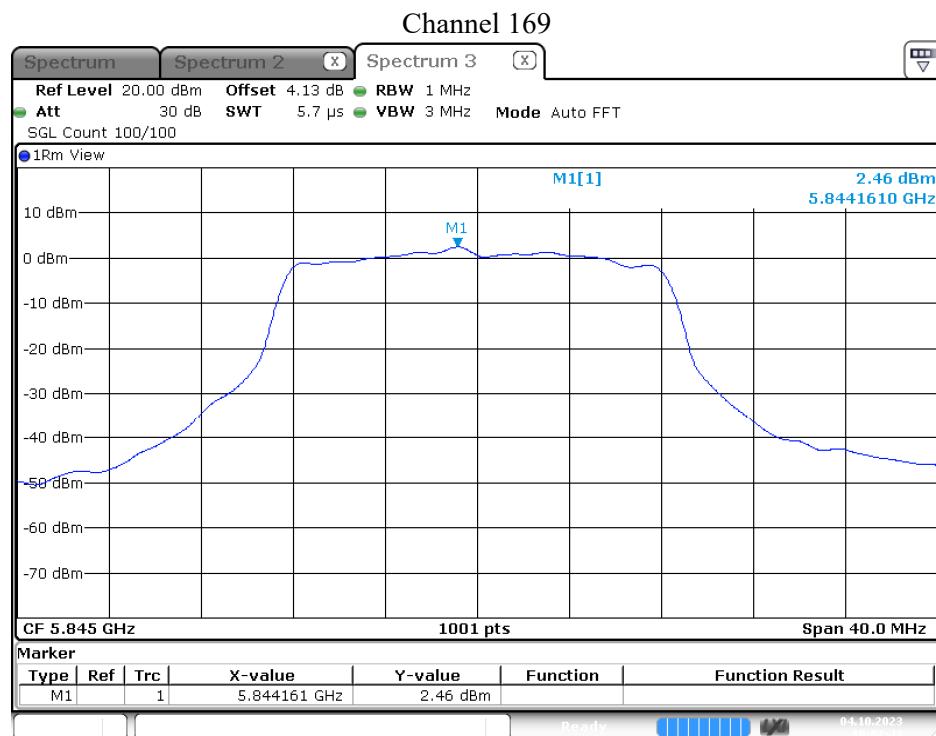
4.4. Test Result of Peak Power Spectral Density

Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Peak Power Spectral Density
 Test Mode : Transmit (802.11a)
 Test Date : 2023/10/04

Channel No.	Frequency (MHz)	Chain	PPSD /MHz (dBm)	10*log(2) (dB)	Duty factor (dB)	Total PPSD/MHz (dBm)	Max Ant Gain (dBi)	EIRP PPSD/ MHz (dBm)	EIRP Limit (dBm)	Result
169	5845	A	2.35	3.01	2.24	7.60	6.10	13.70	14	Pass
		B	2.46	3.01	2.24	7.71	6.10	13.81		Pass
173	5865	A	2.46	3.01	2.24	7.71	6.10	13.81	14	Pass
		B	2.35	3.01	2.24	7.60	6.10	13.70		Pass
177	5885	A	2.29	3.01	2.24	7.54	6.10	13.64	14	Pass
		B	2.43	3.01	2.24	7.68	6.10	13.78		Pass

Note:

1. Total PPSD/MHz = PPSD/MHz + Duty factor.
2. EIRP PPSD/MHz = Total PPSD/MHz + Max Ant Gain
3. The quantity 10*log(2) (two antennas) is added to the spectrum peak value according to document 662911 D01.

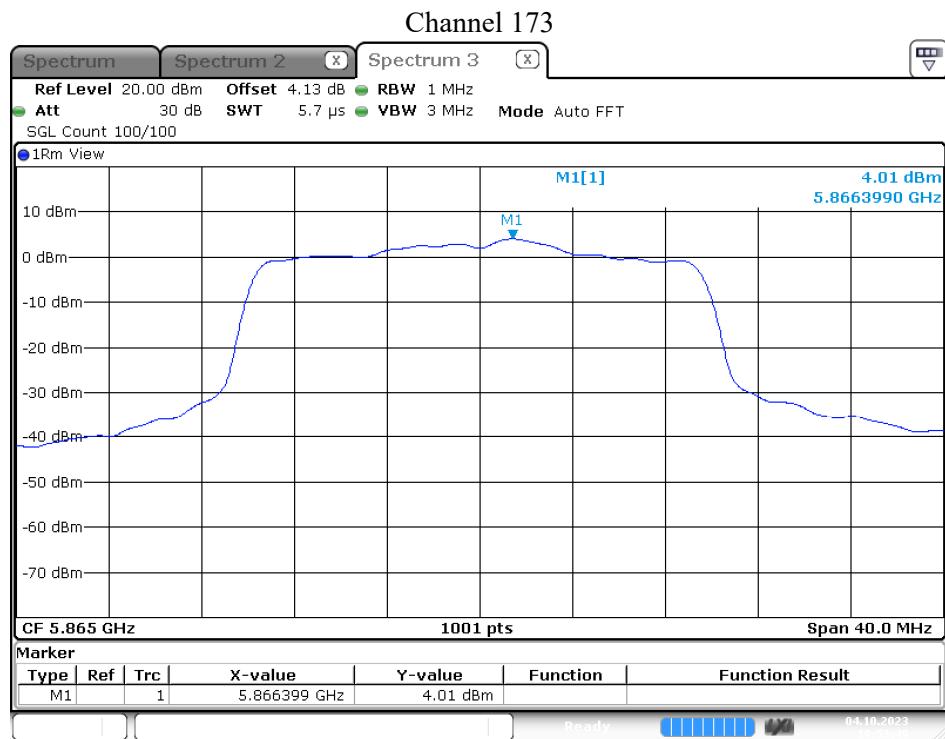


Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Peak Power Spectral Density
 Test Mode : Transmit (802.11ax-20 MHz)
 Test Date : 2023/10/04

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Duty factor (dB)	Total PPSD/MHz (dBm)	Max Ant Gain (dBi)	EIRP PPSD/ MHz (dBm)	EIRP Limit (dBm)	Result
169	5845	A	4.00	3.01	0.71	7.72	6.10	13.82	14	Pass
		B	3.89	3.01	0.71	7.61	6.10	13.71		Pass
173	5865	A	4.01	3.01	0.71	7.73	6.10	13.83	14	Pass
		B	3.94	3.01	0.71	7.66	6.10	13.76		Pass
177	5885	A	-1.45	3.01	0.71	2.27	6.10	8.37	14	Pass
		B	-2.35	3.01	0.71	1.37	6.10	7.47		Pass

Note:

1. Total PPSD/MHz = PPSD/MHz + Duty factor.
2. EIRP PPSD/MHz = Total PPSD/MHz + Max Ant Gain
3. The quantity 10*log(2) (two antennas) is added to the spectrum peak value according to document 662911 D01.



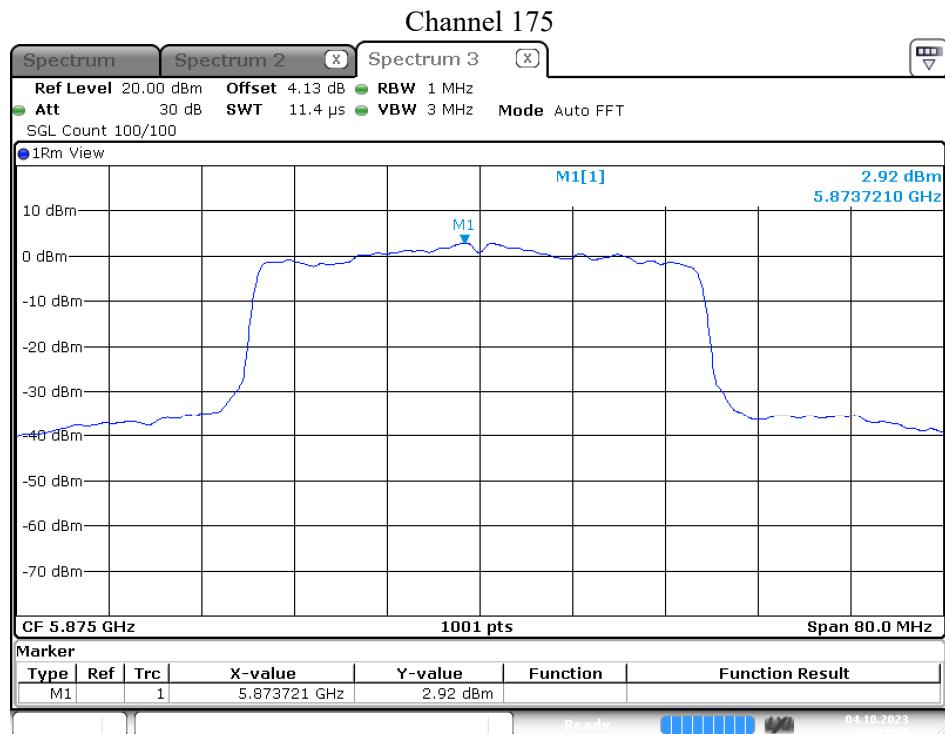
Date: 4.OCT.2023 19:52:49

Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Peak Power Spectral Density
 Test Mode : Transmit (802.11ax-40 MHz)
 Test Date : 2023/10/04

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Duty factor	Total PPSD/MHz (dBm)	Max Ant Gain (dBi)	EIRP PPSD/ MHz (dBm)	EIRP Limit (dBm)	Result
167	5835	A	2.30	3.01	0.47	5.78	6.10	11.87	14	Pass
		B	2.21	3.01	0.47	5.69	6.10	11.78		Pass
175	5875	A	2.92	3.01	0.47	6.40	6.10	12.49	14	Pass
		B	2.48	3.01	0.47	5.96	6.10	12.05		Pass

Note:

1. Total PPSD/MHz = PPSD/MHz + Duty factor.
2. EIRP PPSD/MHz = Total PPSD/MHz + Max Ant Gain
3. The quantity $10\log(2)$ (two antennas) is added to the spectrum peak value according to document 662911 D01.



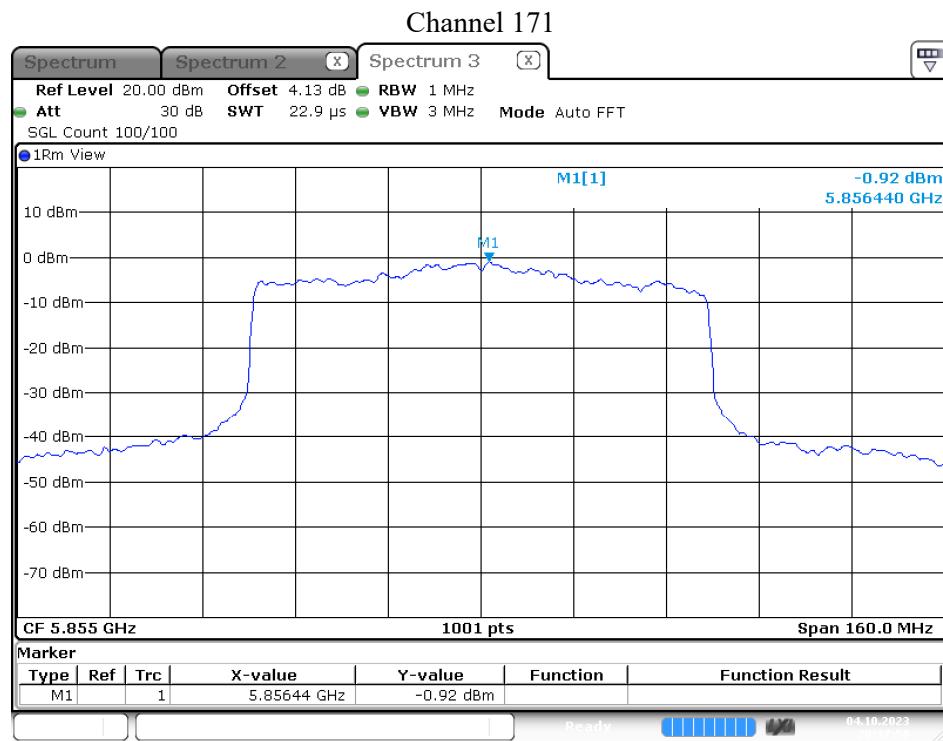
Date: 4.OCT.2023 20:24:38

Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Peak Power Spectral Density
 Test Mode : Transmit (802.11ax-80 MHz)
 Test Date : 2023/10/04

Channel No.	Frequency	Chain	PPSD /MHz	10*log(2)	Duty factor	Total PPSD/MHz	Max Ant Gain	EIRP PPSD/ MHz	EIRP Limit	Result
171	5855	A	-0.92	3.01	0.60	2.69	6.10	8.79	14	Pass
		B	-1.17	3.01	0.60	2.44	6.10	8.54		Pass

Note:

1. Total PPSD/MHz = PPSD/MHz + Duty factor.
2. EIRP PPSD/MHz = Total PPSD/MHz + Max Ant Gain
3. The quantity 10*log(2) (two antennas) is added to the spectrum peak value according to document 662911 D01.

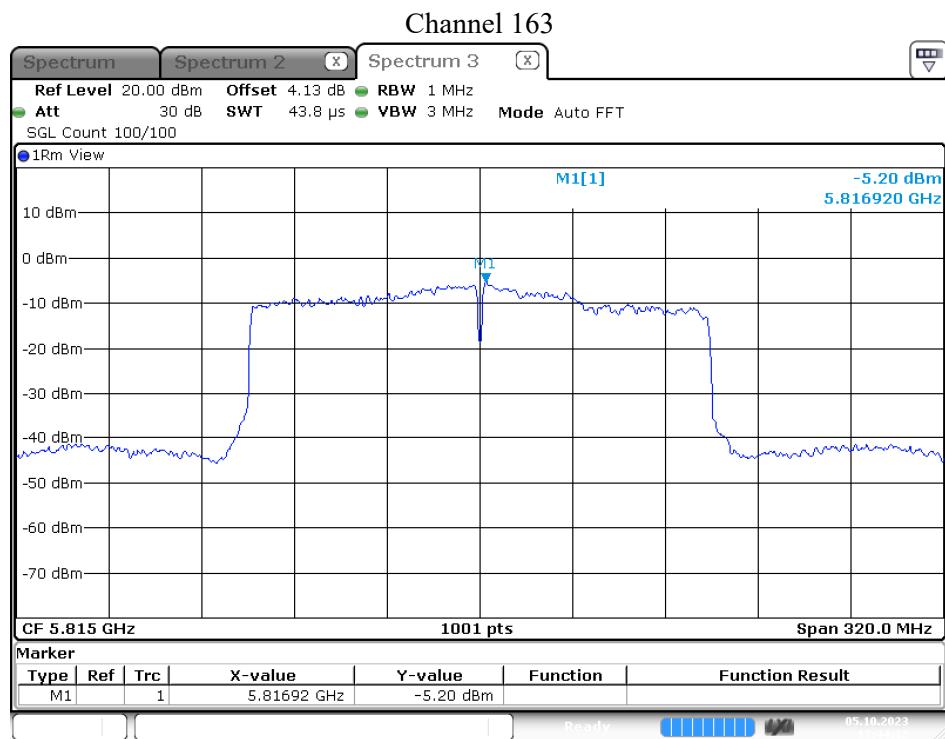


Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Peak Power Spectral Density
 Test Mode : Transmit (802.11ax-160 MHz)
 Test Date : 2023/10/05

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Duty factor	Total PPSD/MHz (dBm)	Max Ant Gain (dBi)	EIRP PPSD/ MHz (dBm)	EIRP Limit (dBm)	Result
163	5815	A	-5.20	3.01	0.63	-1.56	6.10	4.54	14	Pass
		B	-5.68	3.01	0.63	-2.04	6.10	4.06		Pass

Note:

1. Total PPSD/MHz = PPSD/MHz + Duty factor.
2. EIRP PPSD/MHz = Total PPSD/MHz + Max Ant Gain
3. The quantity 10*log(2) (two antennas) is added to the spectrum peak value according to document 662911 D01.

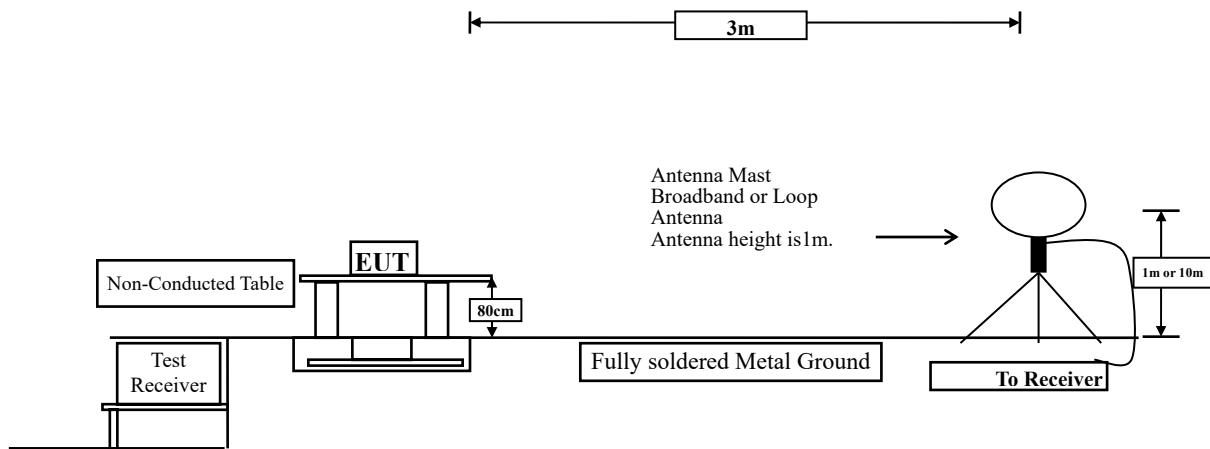


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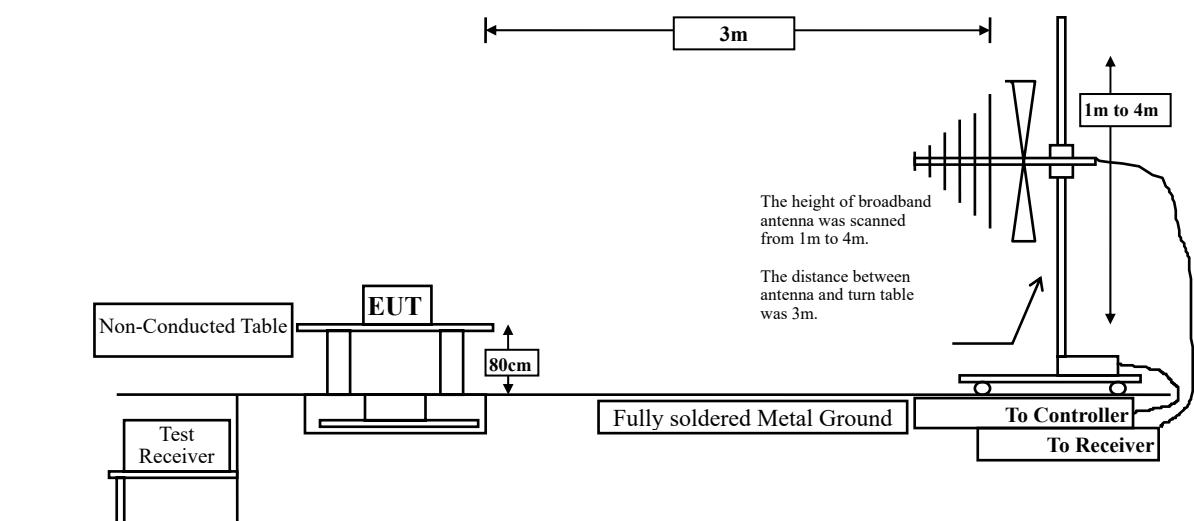
5. Radiated Emission

5.1. Test Setup

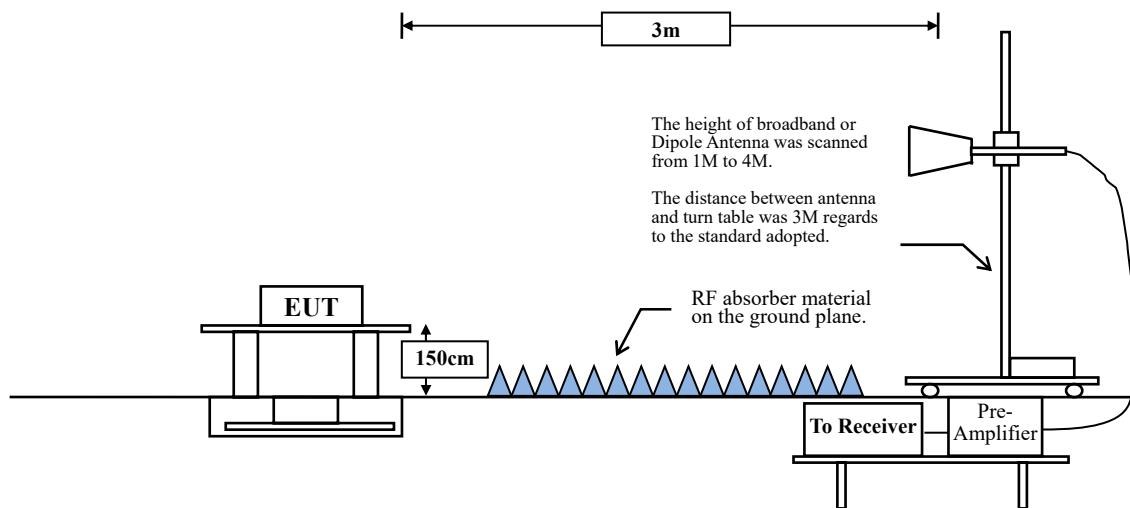
Radiated Emission Under 30 MHz



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 20dB 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 (μ V/m)

- For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.725-5.85 GHz band:
All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- For transmitters operating in the 5.850-5.895 GHz band:
 - For an indoor access point or subordinate device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of 15 dBm/MHz and shall decrease linearly to an e.i.r.p. of -7 dBm/MHz at or above 5.925 GHz.
 - For a client device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of -5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -27 dBm/MHz at or above 5.925 GHz.
 - For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of -27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz.
- For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of -27 dBm/MHz.

Based on ANSI C63.10-2013 Section 12.7.3 d) provides the conversion formula between field strength and EIRP, if distance is 3m, -27dBm is equivalent to 68.22dB μ V/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 1 GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1 GHz, 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 30 MHz setting on the field strength meter is 9kHz and 30 MHz~1 GHz is 120 kHz and above 1 GHz is 1 MHz.

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

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

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

The measurement frequency range from 9 kHz - 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 %

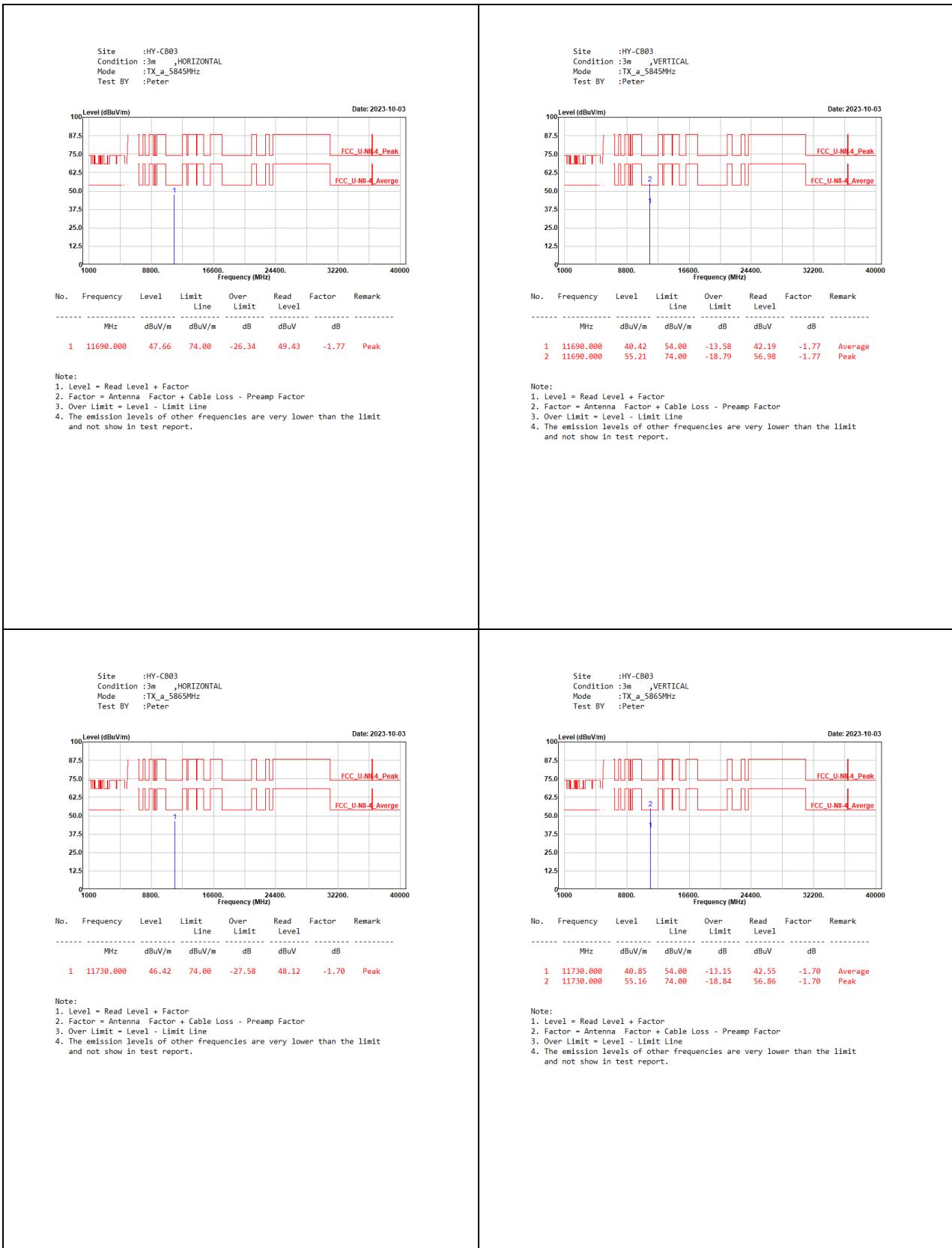
VBW \geq 1/T, when duty cycle < 98 %

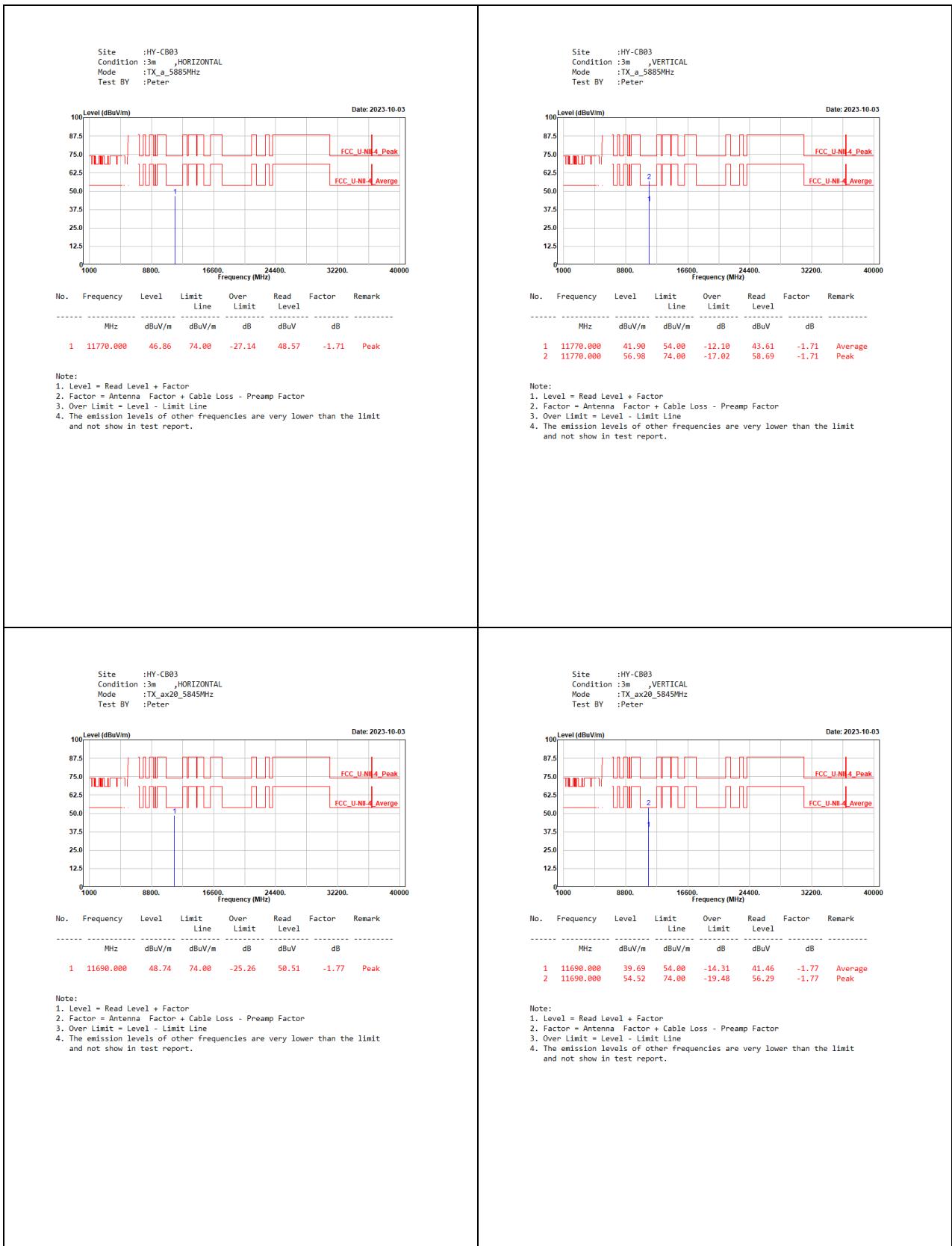
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

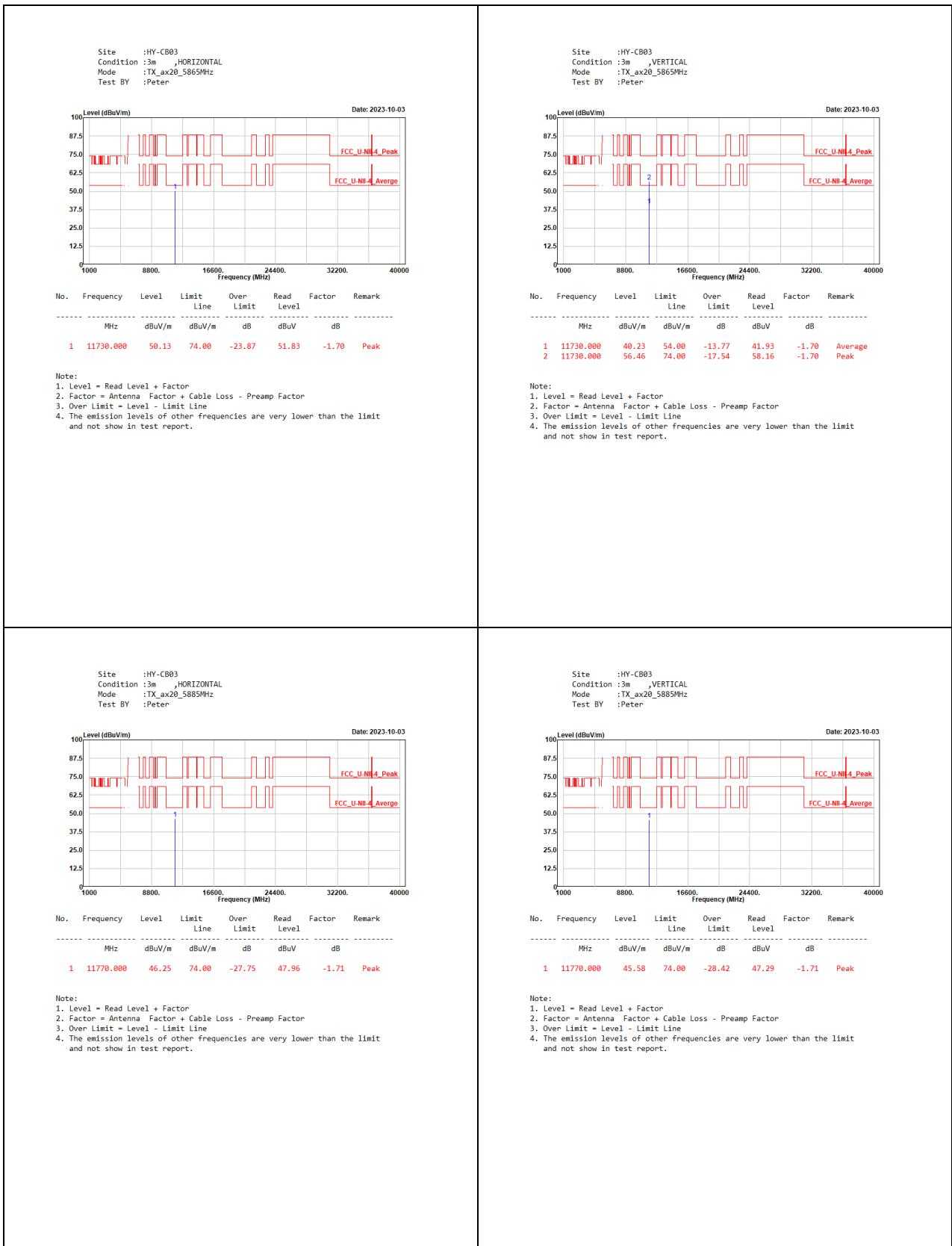
5 GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	59.70	1.2297	813	1000
802.11ax-20 MHz	84.98	5.4297	184	200
802.11ax-40 MHz	89.84	4.1097	243	300
802.11ax-80 MHz	87.12	2.3267	430	500
802.11ax-160 MHz	86.53	2.1587	463	500

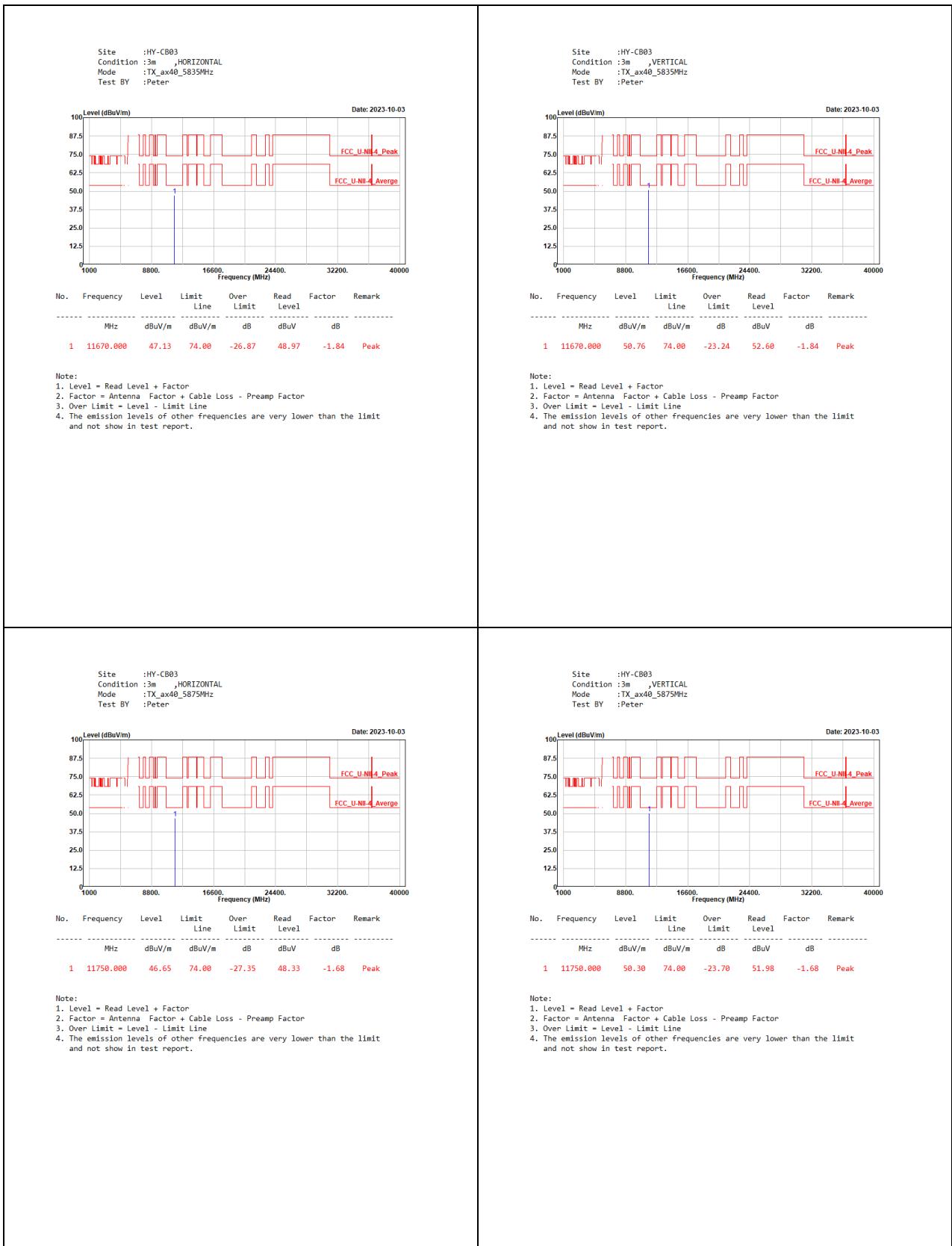
Note: Duty Cycle Refer to Section 8.

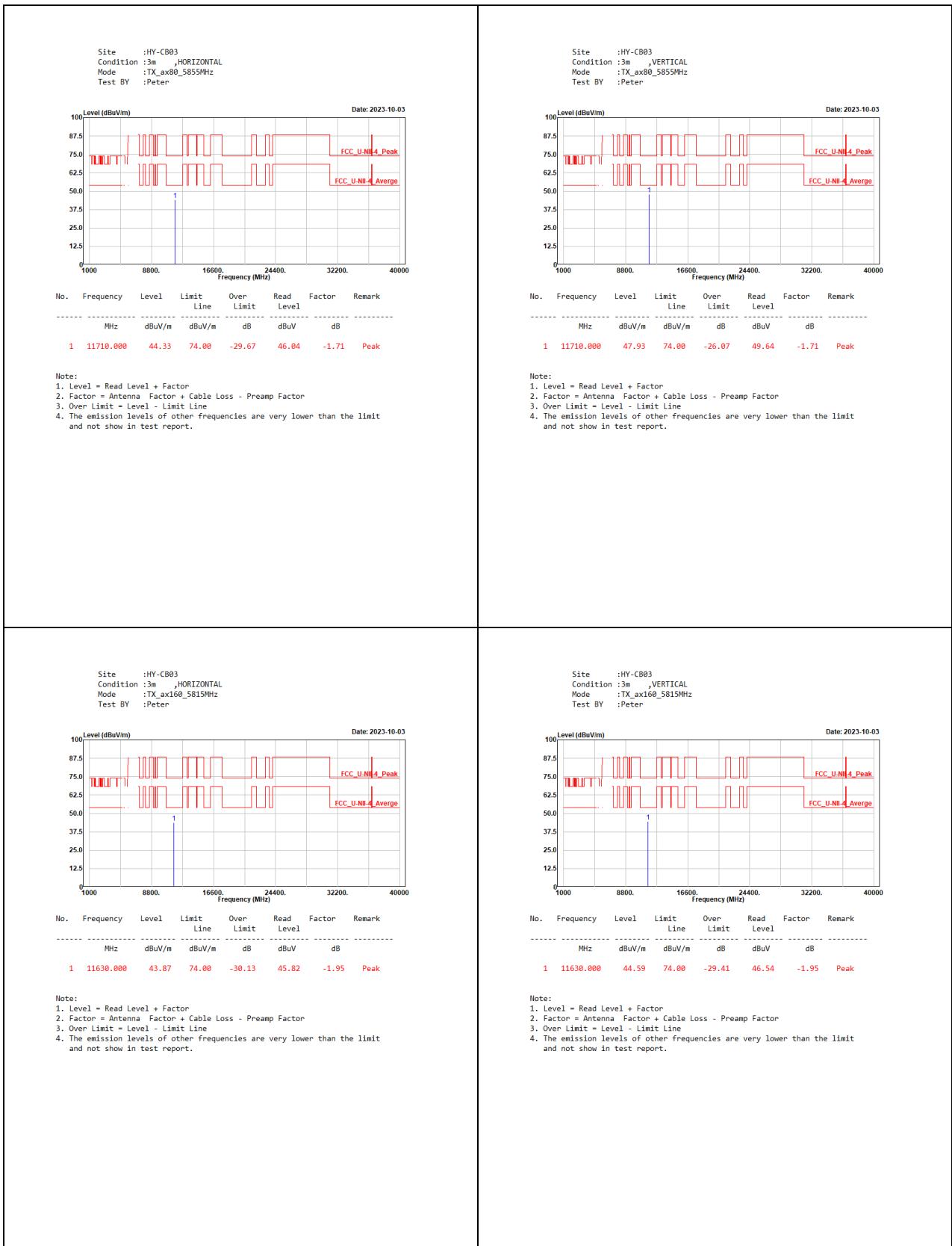
5.4. Test Result of Radiated Emission

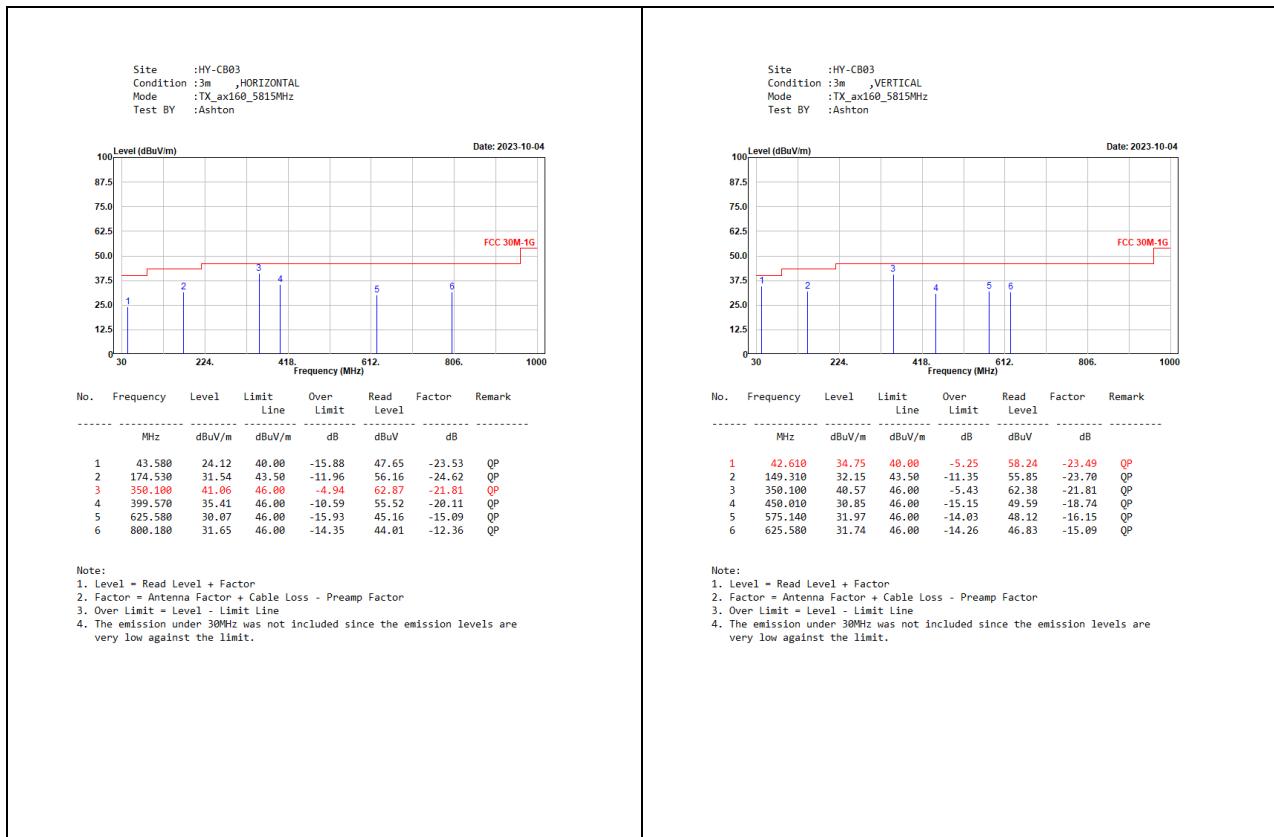








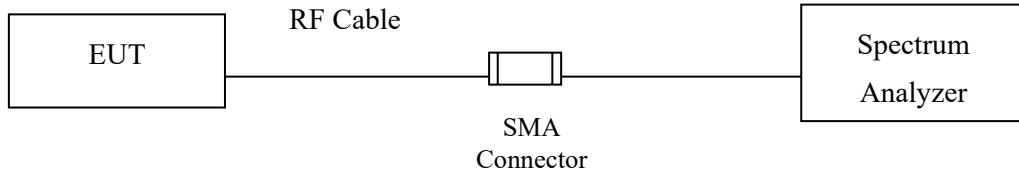




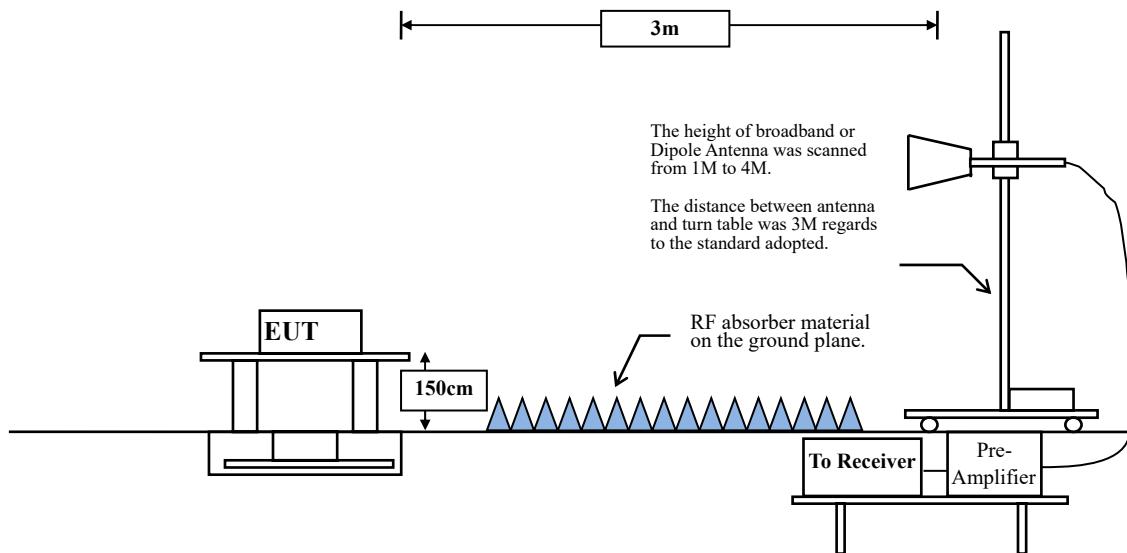
6. Band Edge

6.1. Test Setup

RF Conducted Measurement:



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	µV/m @3m	dBµV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks :

1. RF Voltage (dBµV/m) = 20 log RF Voltage (µV/m)
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.

- For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.725-5.85 GHz band:
All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- For transmitters operating in the 5.850-5.895 GHz band:
 - (i) For an indoor access point or subordinate device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of 15 dBm/MHz and shall decrease linearly to an e.i.r.p. of -7 dBm/MHz at or above 5.925 GHz.
 - (ii) For a client device, all emissions at or above 5.895 GHz shall not exceed an e.i.r.p. of -5 dBm/MHz and shall decrease linearly to an e.i.r.p. of -27 dBm/MHz at or above 5.925 GHz.
 - (iii) For a client device or indoor access point or subordinate device, all emissions below 5.725 GHz shall not exceed an e.i.r.p. of -27 dBm/MHz at 5.65 GHz increasing linearly to 10 dBm/MHz at 5.7 GHz, and from 5.7 GHz increasing linearly to a level of 15.6 dBm/MHz at 5.72 GHz, and from 5.72 GHz increasing linearly to a level of 27 dBm/MHz at 5.725 GHz.
- For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of -27 dBm/MHz.

Based on ANSI C63.10-2013 Section 12.7.3 d) provides the conversion formula between field strength and EIRP, if distance is 3m, -27dBm is equivalent to 68.22dBuV/m.

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 %

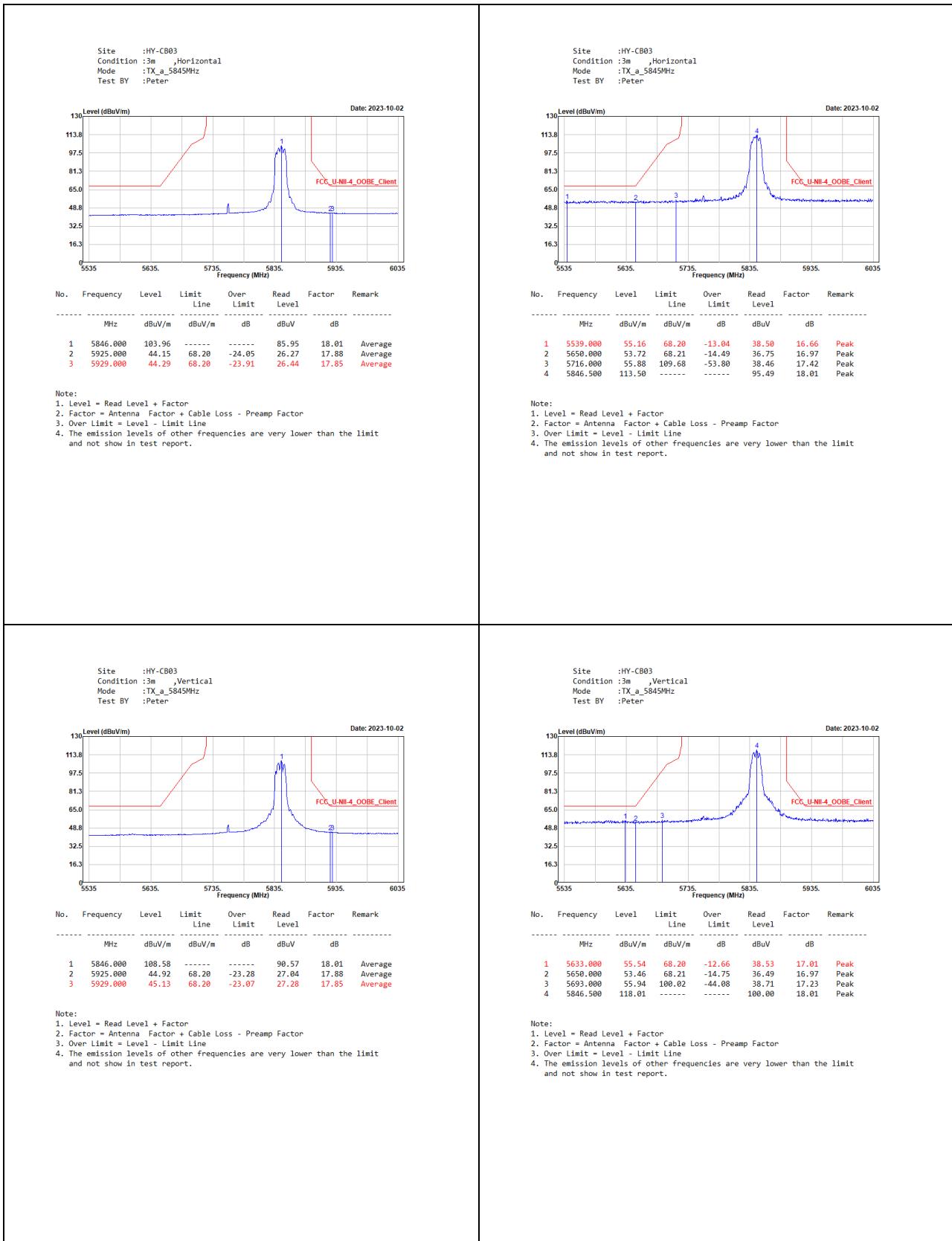
VBW \geq 1/T, when duty cycle < 98 %

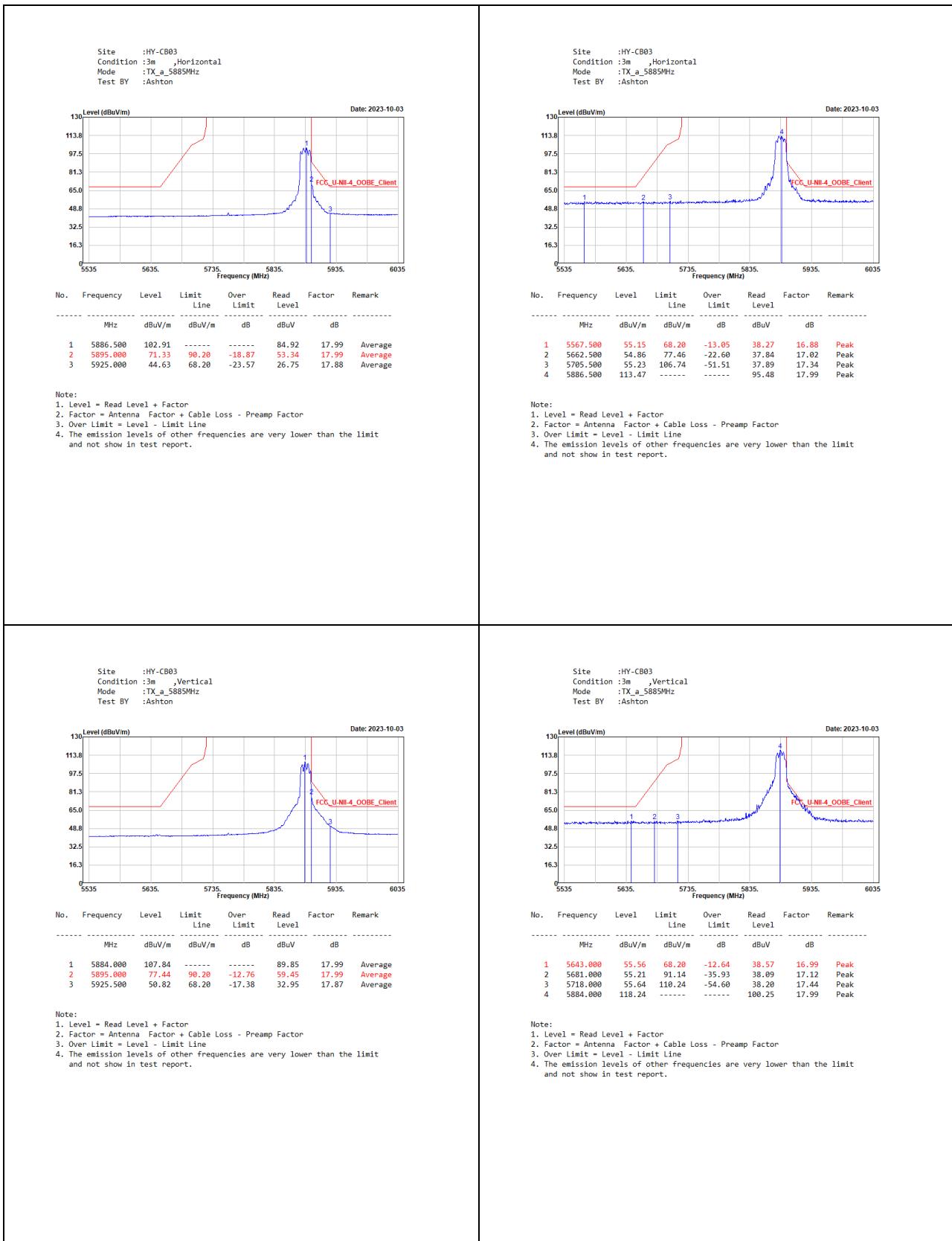
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

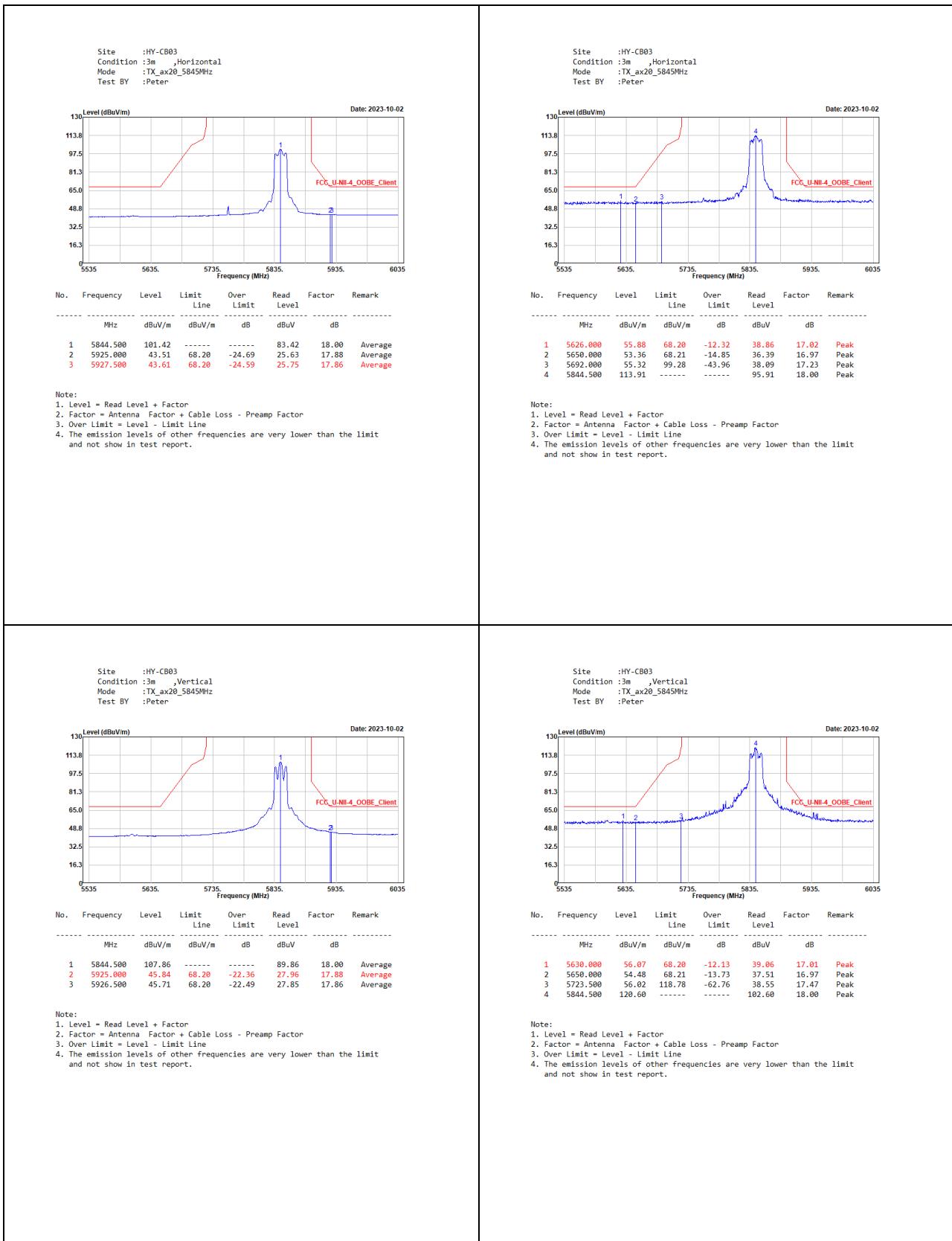
5 GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	59.70	1.2297	813	1000
802.11ax-20 MHz	84.98	5.4297	184	200
802.11ax-40 MHz	89.84	4.1097	243	300
802.11ax-80 MHz	87.12	2.3267	430	500
802.11ax-160 MHz	86.53	2.1587	463	500

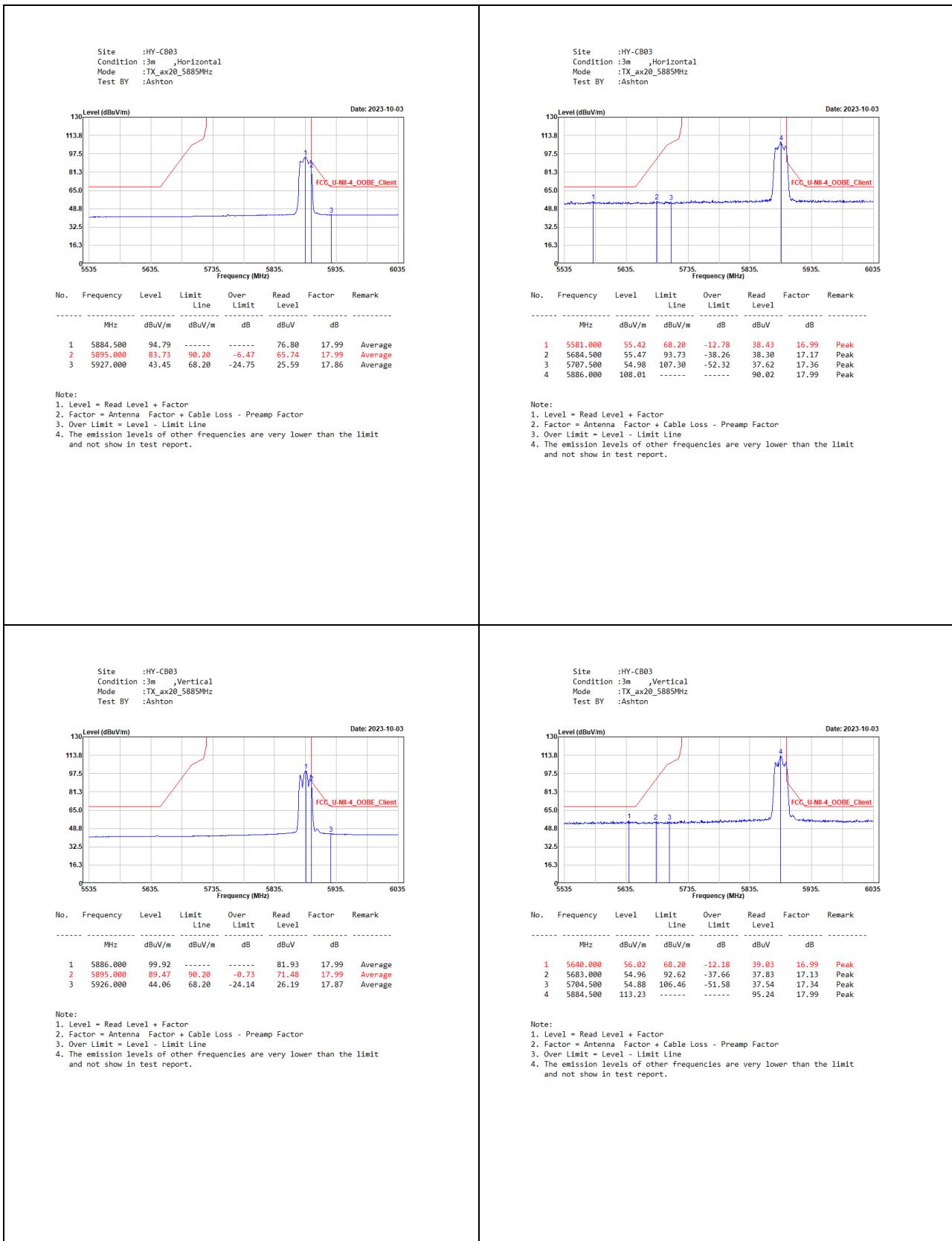
Note: Duty Cycle Refer to Section 8.

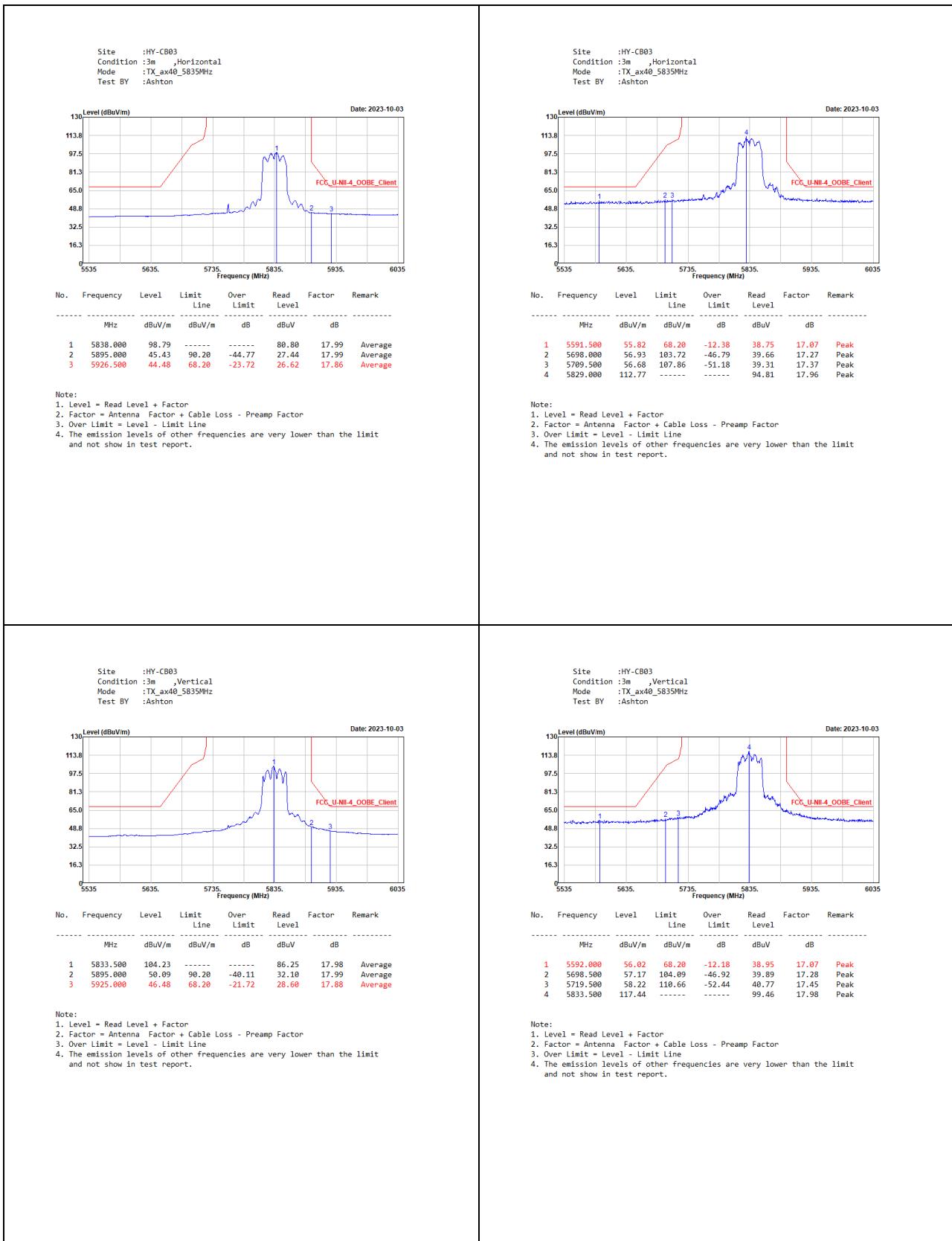
6.4. Test Result of Band Edge

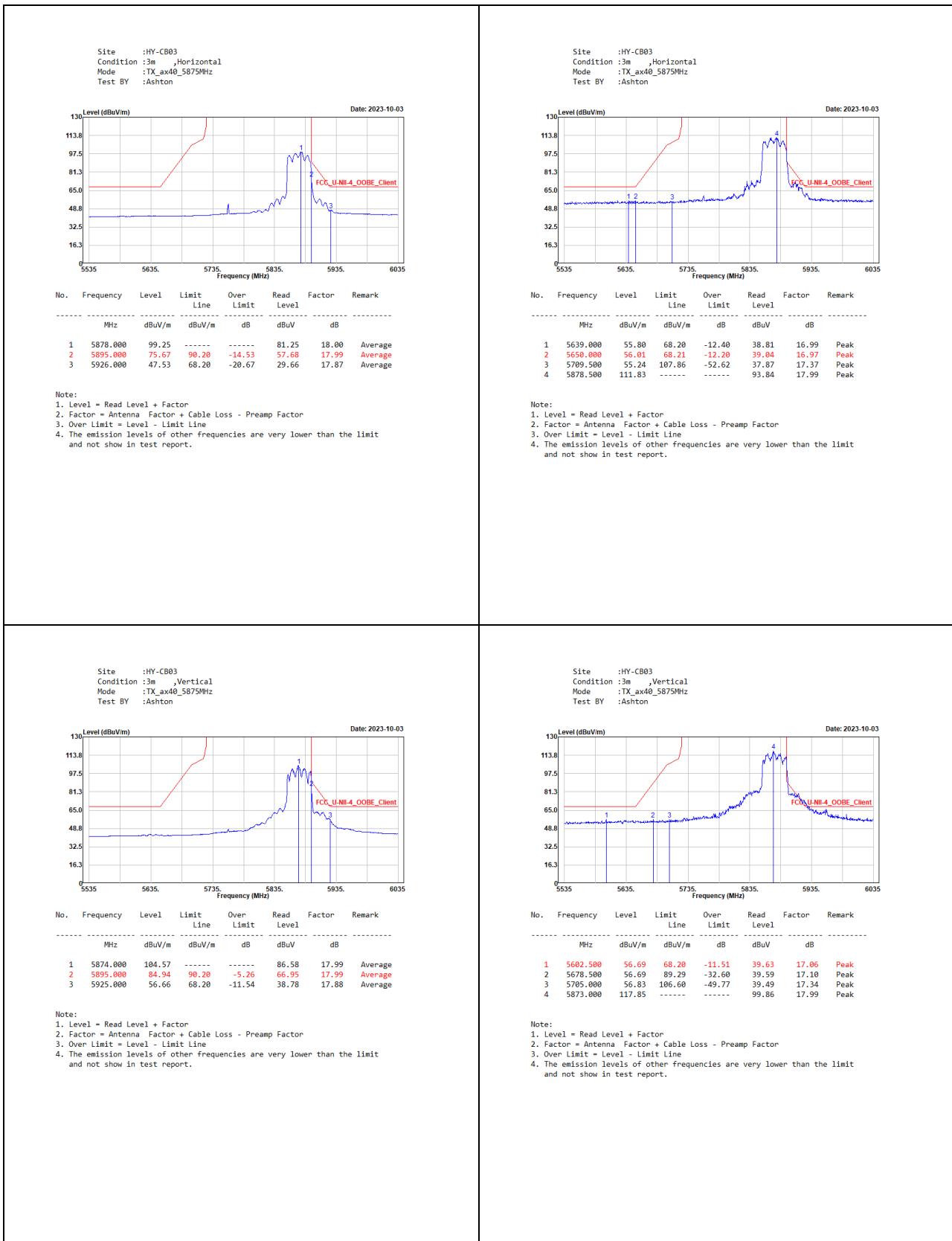


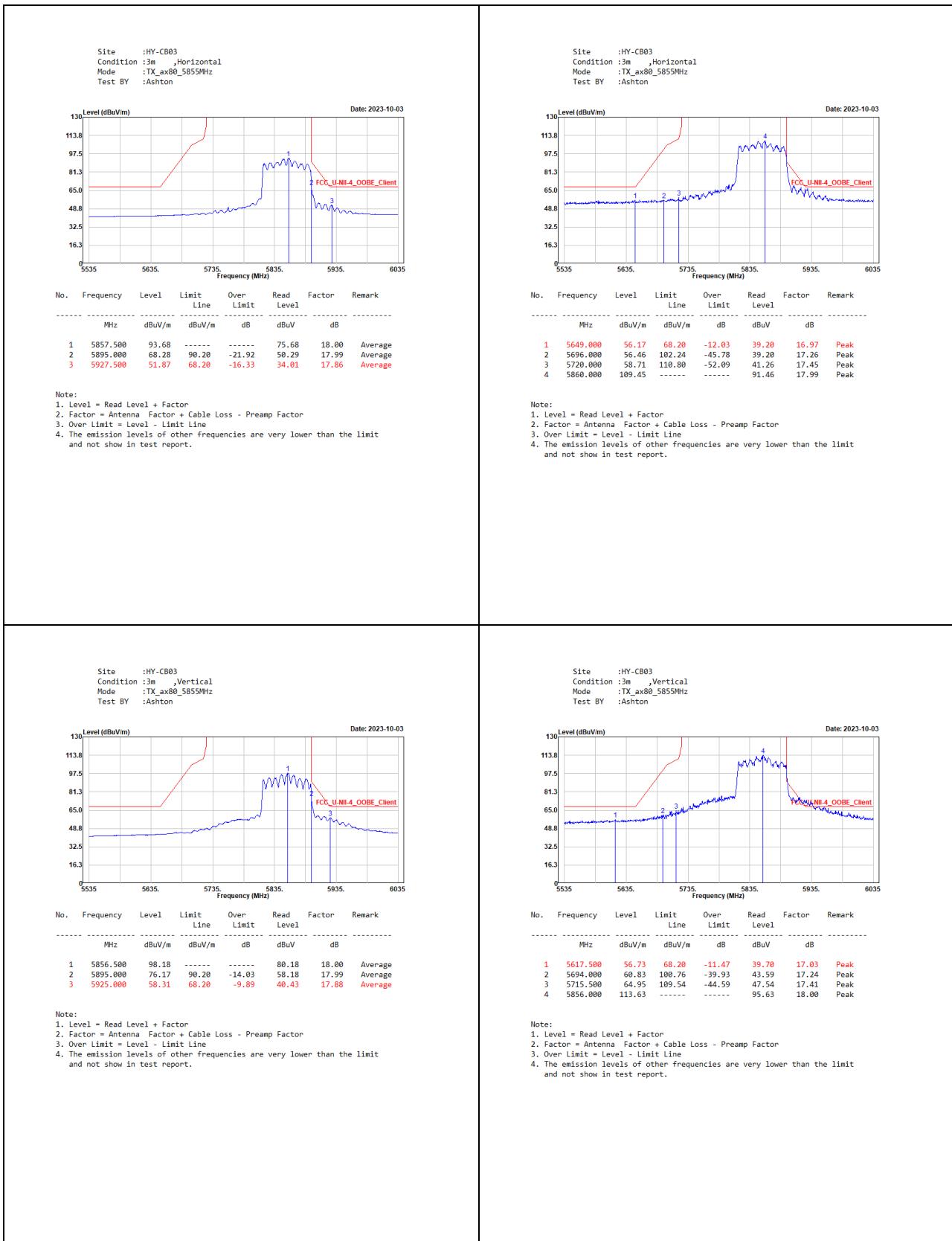


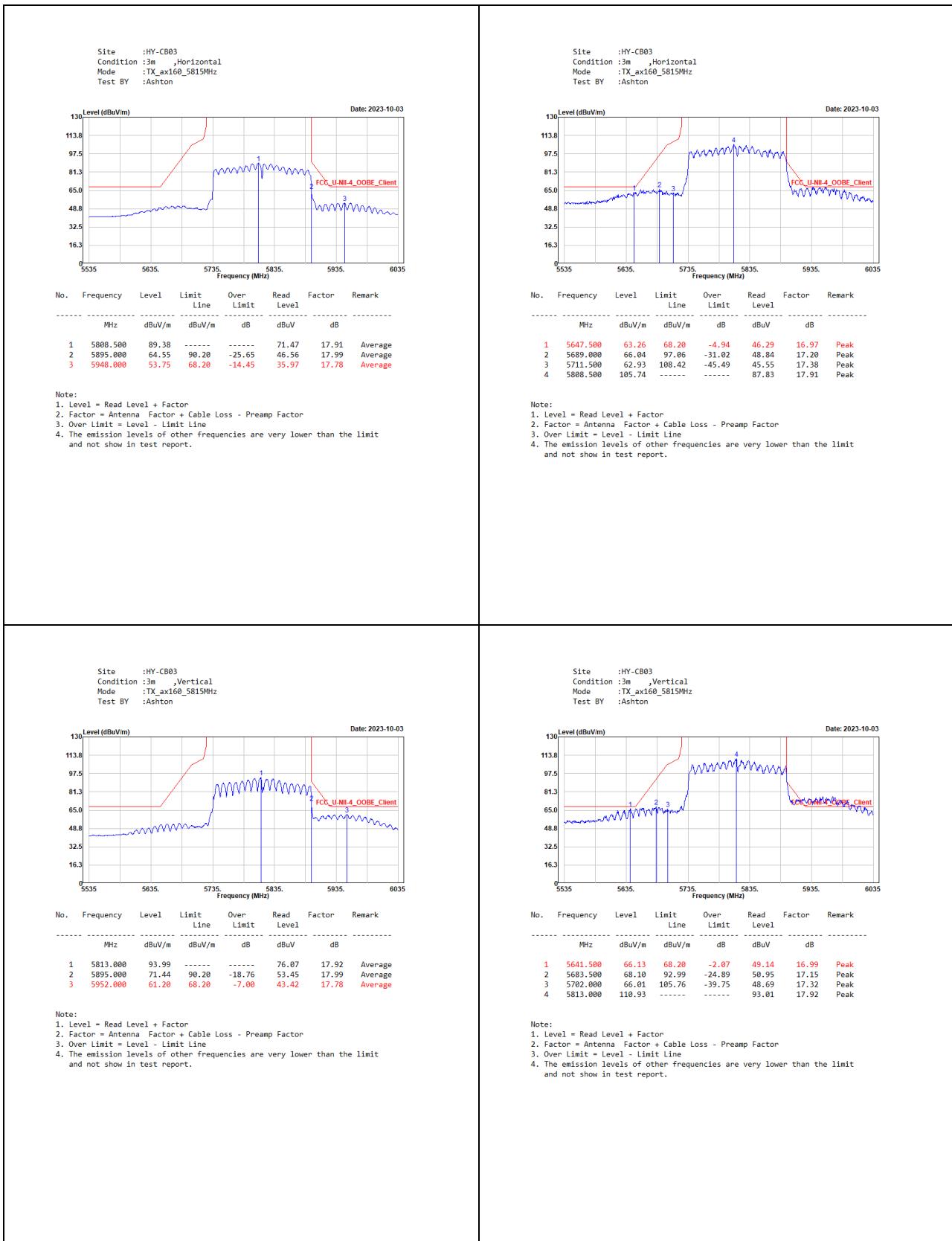






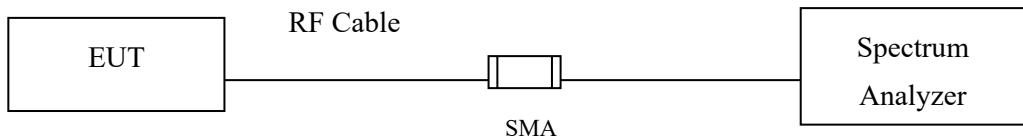






7. Occupied Bandwidth

7.1. Test Setup



7.2. Limits

For the 5.85-5.895 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz

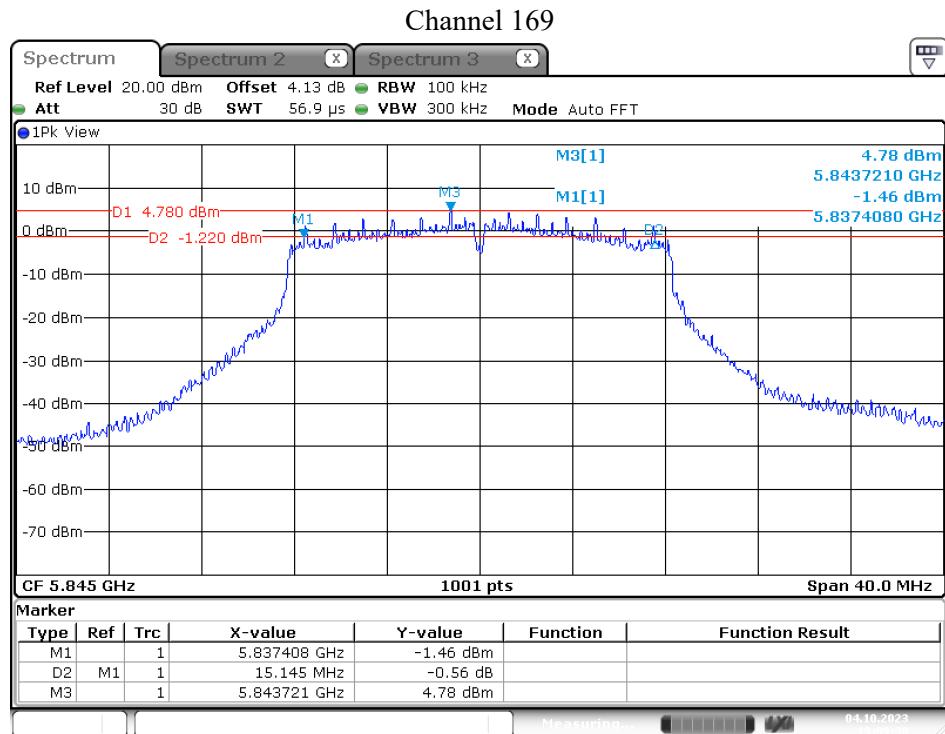
7.3. Test Procedure

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 : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Occupied Bandwidth Data
 Test Mode : Transmit (802.11a)
 Test Date : 2023/10/04

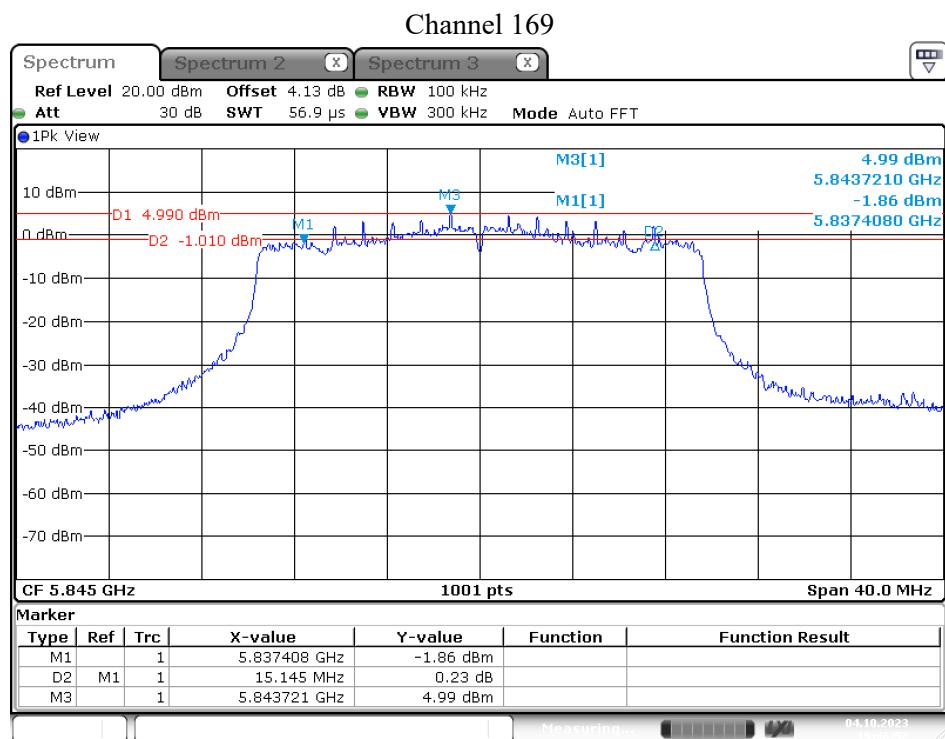
Channel No.	Frequency (MHz)	Chain A (dBm)	Chain B (dBm)	Required Limit (kHz)	Result
169	5845	15.19	15.15	>500	Pass
173	5865	15.15	15.15	>500	Pass
177	5885	15.19	15.15	>500	Pass



Date: 4.OCT.2023 19:09:37

Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Occupied Bandwidth Data
 Test Mode : Transmit (802.11ax-20 MHz)
 Test Date : 2023/10/04

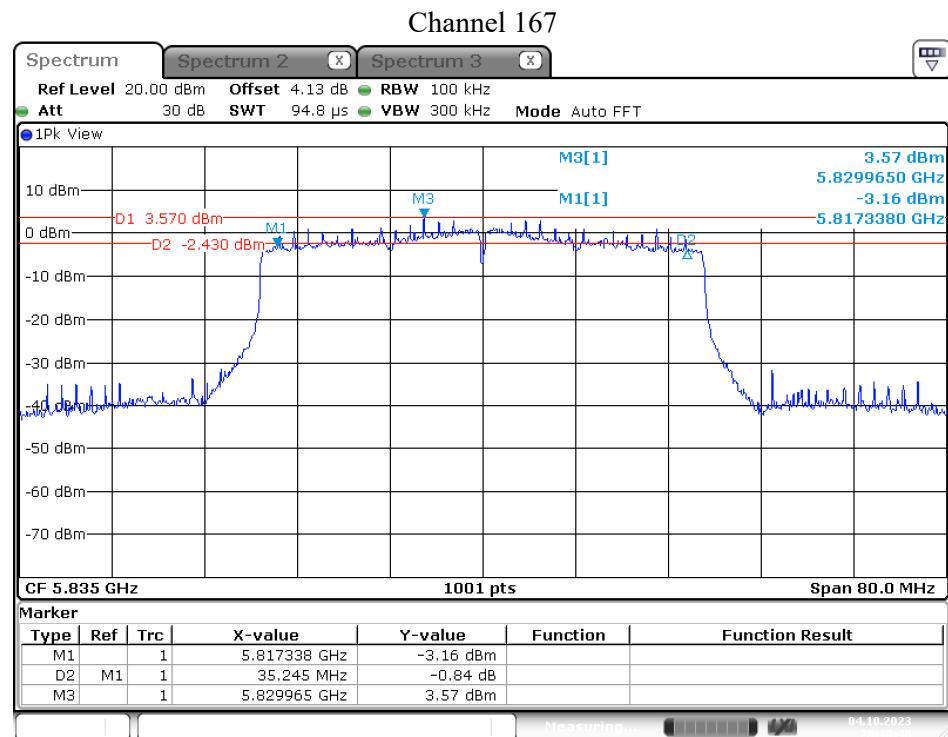
Channel No.	Frequency (MHz)	Chain A (dBm)	Chain B (dBm)	Required Limit (kHz)	Result
169	5845	16.62	15.15	>500	Pass
173	5865	15.47	16.10	>500	Pass
177	5885	15.15	16.75	>500	Pass



Date: 4.OCT.2023 19:46:52

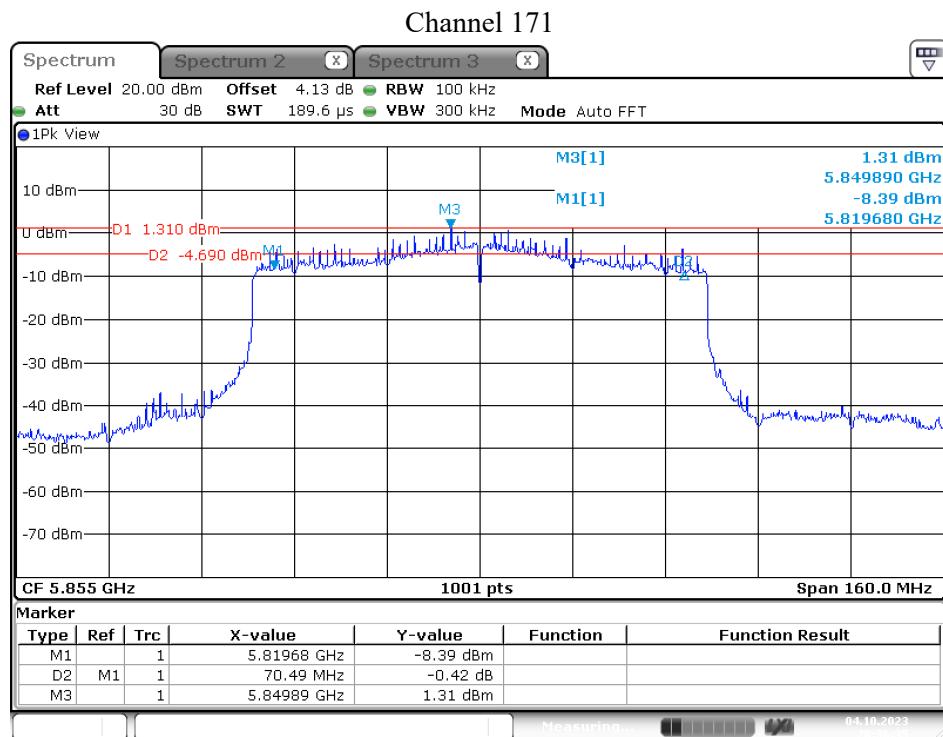
Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Occupied Bandwidth Data
 Test Mode : Transmit (802.11ax-40 MHz)
 Test Date : 2023/10/04

Channel No.	Frequency (MHz)	Chain A (dBm)	Chain B (dBm)	Required Limit (kHz)	Result
167	5835	36.28	35.25	>500	Pass
175	5875	35.72	35.25	>500	Pass



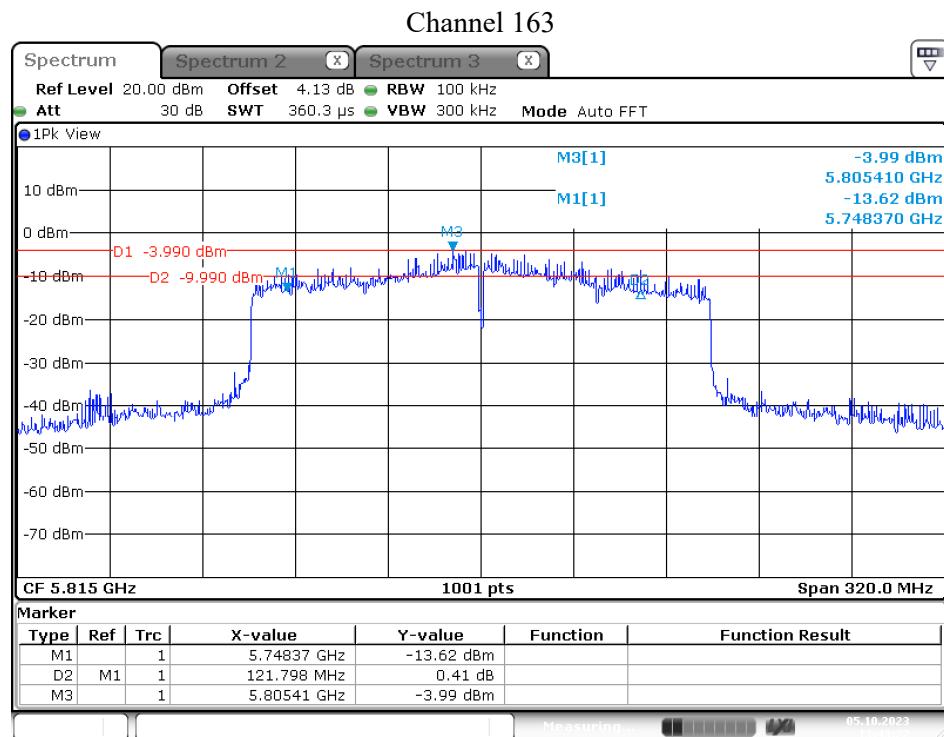
Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Occupied Bandwidth Data
 Test Mode : Transmit (802.11ax-80 MHz)
 Test Date : 2023/10/04

Channel No.	Frequency (MHz)	Chain A (dBm)	Chain B (dBm)	Required Limit (kHz)	Result
171	5855	71.61	70.49	>500	Pass



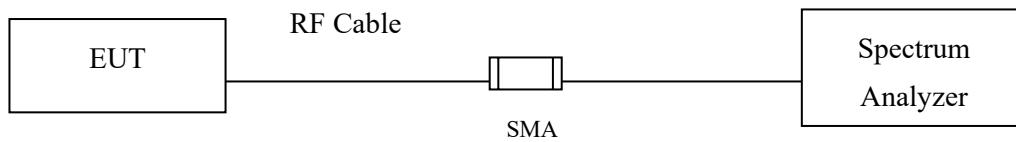
Product : Set Back Box with Wi-Fi6E, BT & PoE
 Test Item : Occupied Bandwidth Data
 Test Mode : Transmit (802.11ax-160 MHz)
 Test Date : 2023/10/04

Channel No.	Frequency (MHz)	Chain A (dBm)	Chain B (dBm)	Required Limit (kHz)	Result
163	5815	148.33	121.80	>500	Pass



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 : Set Back Box with Wi-Fi6E, BT & PoE
Test Item : Duty Cycle
Test Mode : Transmit

Duty Cycle Formula:

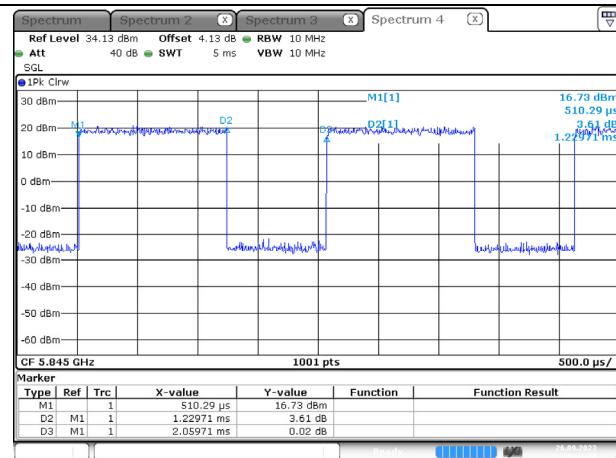
$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

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

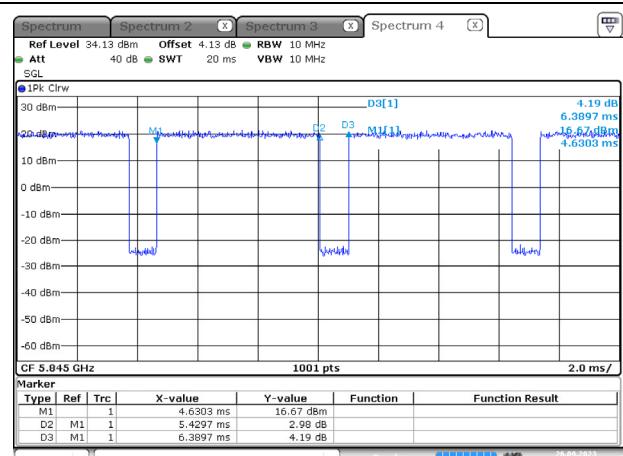
Results:

5 GHz band	Time On (ms)	Time On + Time Off (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	1.2297	2.0597	59.70	2.24
802.11ax-20 MHz	5.4297	6.3897	84.98	0.71
802.11ax-40 MHz	4.1097	4.5747	89.84	0.47
802.11ax-80 MHz	2.3267	2.6707	87.12	0.60
802.11ax-160 MHz	2.1587	2.4947	86.53	0.63

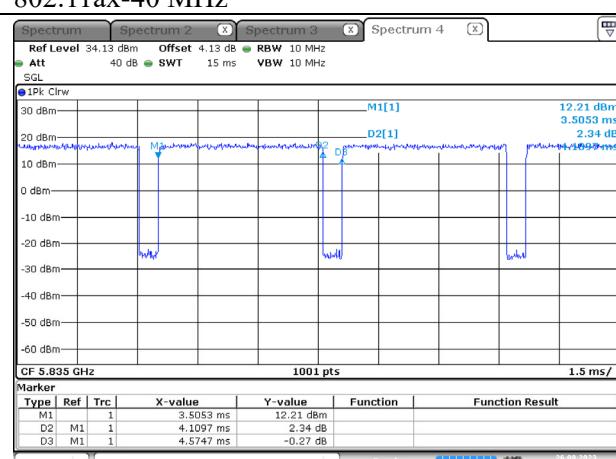
802.11a



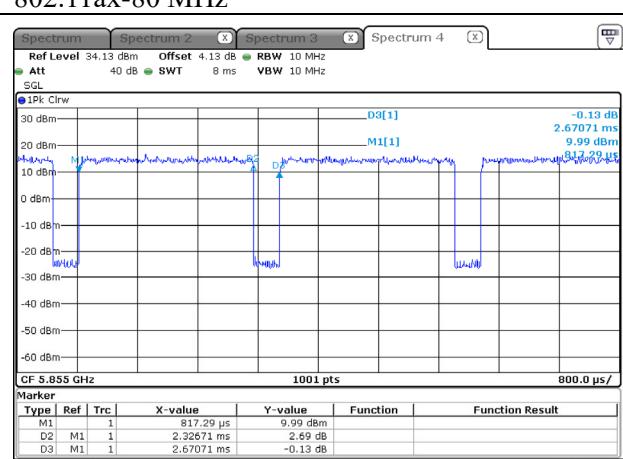
802.11ax-20 MHz



802.11ax-40 MHz



802.11ax-80 MHz



802.11ax-160 MHz

