

Test Report

Product Name	QCast Mirror
Model No	QP30
FCC ID	JVPQP30

Applicant	BenQ Corporation
Address	16, Jihu Road, Taipei Neihu 114 Taiwan

Date of Receipt	Sep. 14, 2022
Issue Date	Nov. 18, 2022
Report No.	2290395R-RFUSWL2V01-A
Report Version	V1.0



The test results relate only to the samples tested.

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.

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The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

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 Report

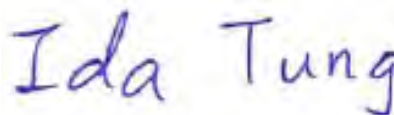
Issued Date: Nov. 18, 2022

Report No.: 2290395R-RFUSWL2V01-A



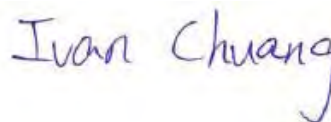
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Applicant	BenQ Corporation
Address	16, Jihu Road, Taipei Neihu 114 Taiwan
Manufacturer	BenQ Corporation
Model No.	QP30
FCC ID	JVPQP30
EUT Rated Voltage	DC 5V (Power By USB)
EUT Test Voltage	DC 5V (Power By USB)
Trade Name	BenQ
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :



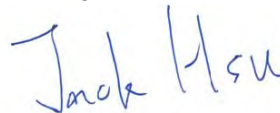
(Project Specialist / Ida Tung)

Tested By :



(Senior Engineer / Ivan Chuang)

Approved By :



(Senior Engineer / Jack Hsu)

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Appendix 1: EUT Test Photographs

Appendix 2: Product Photos-Please refer to the file: 2290395R-Product Photos

Revision History

Report No.	Version	Description	Issued Date
2290395R-RFUSWL2V01-A	V1.0	Initial issue of report.	Nov. 18, 2022

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	QCast Mirror
Trade Name	BenQ
Model No.	QP30
FCC ID	JVPQP30
Frequency Range	802.11b/g/n/ac-20 MHz: 2412-2462 MHz 802.11n/ac-40 MHz: 2422-2452 MHz
Number of Channels	802.11b/g/n/ac-20 MHz: 11 CH 802.11n/ac-40 MHz: 7 CH
Data Speed	802.11b: 1-11 Mbps 802.11g: 6-54 Mbps 802.11n: 30-300 Mbps 802.11ac: up to 400 Mbps
Channel Separation	802.11b/g/n/ac: 5 MHz
Type of Modulation	802.11b: DSSS, DBPSK, DQPSK, CCK 802.11g/n/ac: OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna type	PIFA Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
USB Cable	MFR: Shenzhen Hongdaxin Computer Accessories Co., Ltd M/N: 400Q-010B-EAMC TypeC, Shielded, 1m
HDMI Cable	MFR: Shenzhen Lensonbng Technology Co., Ltd M/N: 400B-020B-MF HDMI, Shielded, 0.2m

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Actions Microelectronics Co., Ltd	ANT-PCB-PRO-DONGLE-2 (Main)(Aux)	PIFA	2.3dBi for 2.4GHz

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

802.11b/g/n/ac-20MHz Center Frequency of Each Channel:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	02	2417	03	2422	04	2427
05	2432	06	2437	07	2442	08	2447
09	2452	10	2457	11	2462		

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
03	2422	04	2427	05	2432	06	2437
07	2442	08	2447	09	2452		

Note:

1. The EUT is a QCast Mirror with a built-in WLAN(802.11a/b/g/n/ac) transceiver, this report for 2.4GHz WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test. The other channels are for reference only.
3. Lowest data rates are tested in each mode. Only worst case is shown in the report.
(802.11b is 1Mbps 、802.11g is 6Mbps 、802.11ac-20BW/40BW is VHT0)
4. The spectrum plot against conducted item only shows the worst case.
5. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n/ac transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.

Test Mode	Mode 1	Transmit (802.11b)
		Transmit (802.11g)
		Transmit (802.11n-20BW)
		Transmit (802.11n-40BW)
		Transmit (802.11ac-20BW)
		Transmit (802.11ac-40BW)

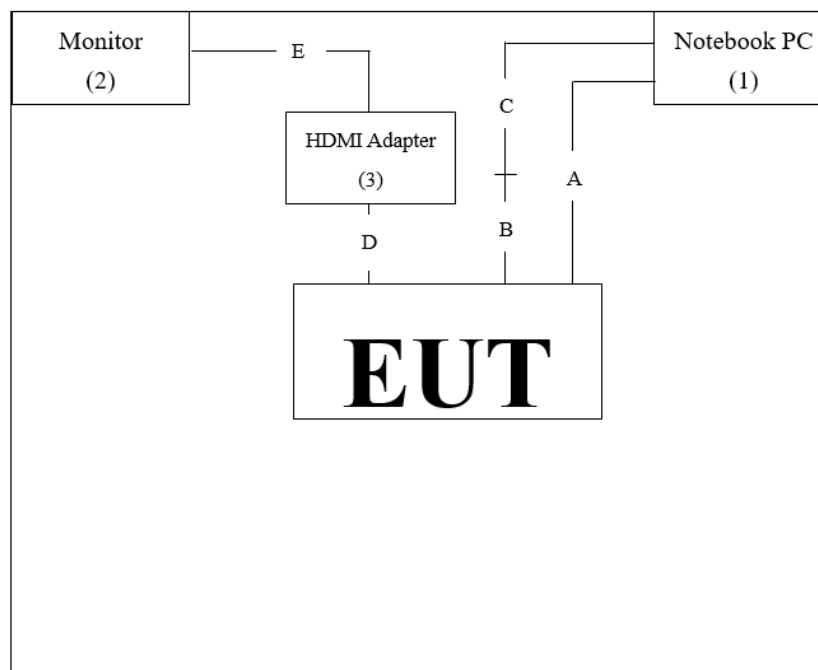
1.2. Tested System Details

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	Notebook PC	DELL	Latitude 5580	2HRD7H2	N/A
2	Monitor	DELL	U2415	CN-01RMGX-74261-63H-09UL-A02	Non-shielded, 1.8m
3	HDMI Adapter	PX	CA-101	N/A	N/A

Signal Cable Type	Signal cable Description	
A	USB Cable	Shielded, 1m
B	USB Cable	Shielded, 0.25m
C	USB Cable	Shielded, 1m
D	HDMI Cable	Shielded, 0.2m
E	HDMI Cable	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 "MPTool Version 0.0006.03.20180914" 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	23.7 °C
	Humidity (%RH)	10~90 %	56.5 %
Radiated Emission	Temperature (°C)	10~40 °C	23.5 °C
	Humidity (%RH)	10~90 %	65.3 %
Conductive	Temperature (°C)	10~40 °C	22.0 °C
	Humidity (%RH)	10~90 %	55.0 %

USA : FCC Registration Number: TW0033

Canada : CAB Identifier Number: TW3023 / Company Number: 26930

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No. 5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan
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
Email Address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Item and 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	101306	2022/05/23	2023/05/22
V	Two-Line V-Network	R&S	ENV216	101307	2022/07/04	2023/07/03
V	Coaxial Cable	SUHNER	RG400_BNC	RF001	2022/05/24	2023/05/23

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 210616 dekra V9

For Conducted measurements /HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Spectrum Analyzer	R&S	FSV30	103466	2021/12/27	2022/12/26
V	Peak Power Analyzer	KEYSIGHT	8900B	MY51000539	2022/05/27	2023/05/26
V	Power Sensor	KEYSIGHT	N1923A	MY59240002	2022/05/19	2023/05/18
V	Power Sensor	KEYSIGHT	N1923A	MY59240003	2022/05/19	2023/05/18

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	56736	2022/05/14	2023/05/13
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-675	2021/08/11	2023/08/10
V	Horn Antenna	RF SPIN	DRH18-E	210508A18ES	2022/06/08	2023/06/07
V	Horn Antenna	Com-Power	AH-840	101100	2021/10/04	2023/10/03
V	Pre-Amplifier	SGH	SGH0301-9	20211007-10	2022/02/22	2023/02/21
V	Pre-Amplifier	EMCI	EMC051835SE	980313	2021/11/24	2022/11/23
V	Pre-Amplifier	EMCI	EMC05820SE	980310	2022/07/28	2023/07/27
V	Pre-Amplifier	EMCI	EMC184045SE	980369	2022/05/12	2023/05/11
	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
V	Filter	MICRO TRONICS	BRM50702	G251	2022/07/27	2023/07/26
	Filter	MICRO TRONICS	BRM50716	G188	2022/07/27	2023/07/26
V	EMI Test Receiver	R&S	ESR3	102793	2021/12/15	2022/12/14
V	Spectrum Analyzer	R&S	FSV3044	101113	2022/01/25	2023/02/24
V	Coaxial Cable	SGH	SGH18	2021005-1	2022/03/18	2023/03/17
	Coaxial Cable	SGH	SGH18	202108-4		
	Coaxial Cable	SGH	SGH18	GD20110223-1		
	Coaxial Cable	SGH	HA800	GD20110222-3		

Note:

1. Bi-Log Antenna and Horn Antenna (AH-840) is calibrated every two years, the other equipments are calibrated every one year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software version : E3 210616 dekra V9

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

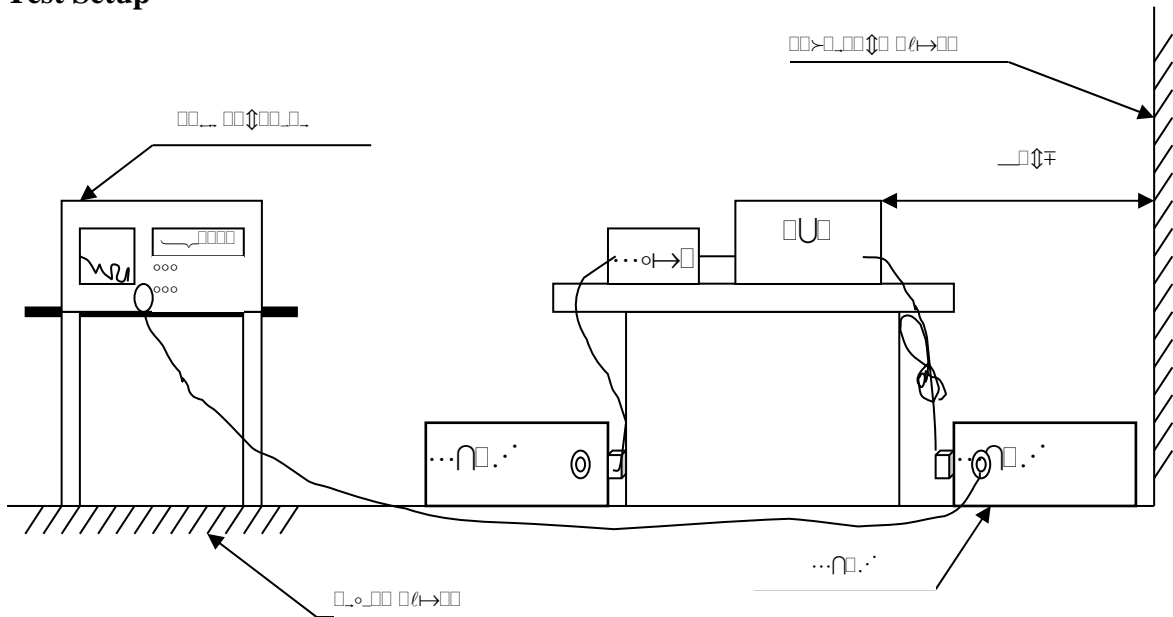
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

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	±3.42 dB	
Peak Power Output	±0.91 dB	
Radiated Emission	Under 1GHz ±4.06 dB	Above 1GHz ±3.73 dB
RF Antenna Conducted Test	±2.53 dB	
Band Edge	Under 1GHz ±4.06 dB	Above 1GHz ±3.73 dB
6dB Bandwidth	±682.83 Hz	
Power Density	±2.53 dB	
Duty Cycle	±2.31 ms	

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	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

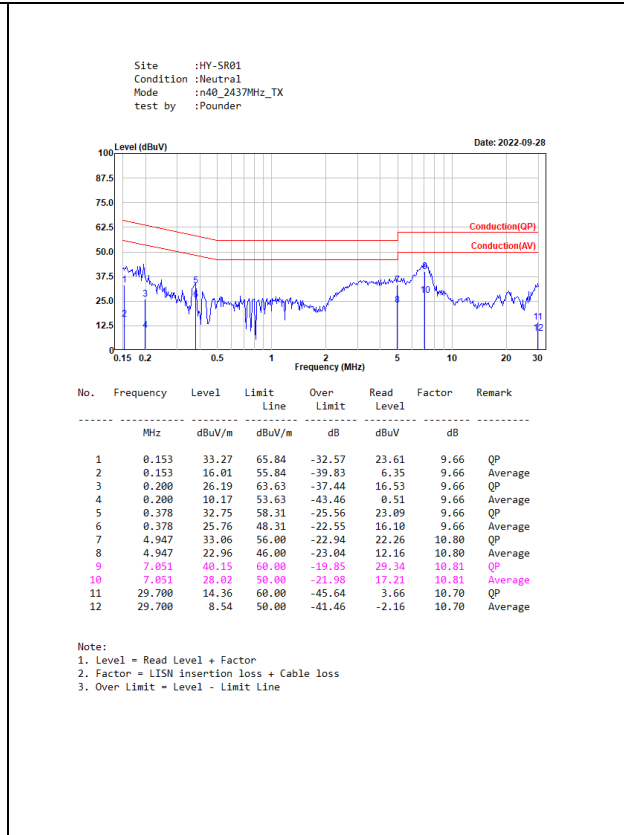
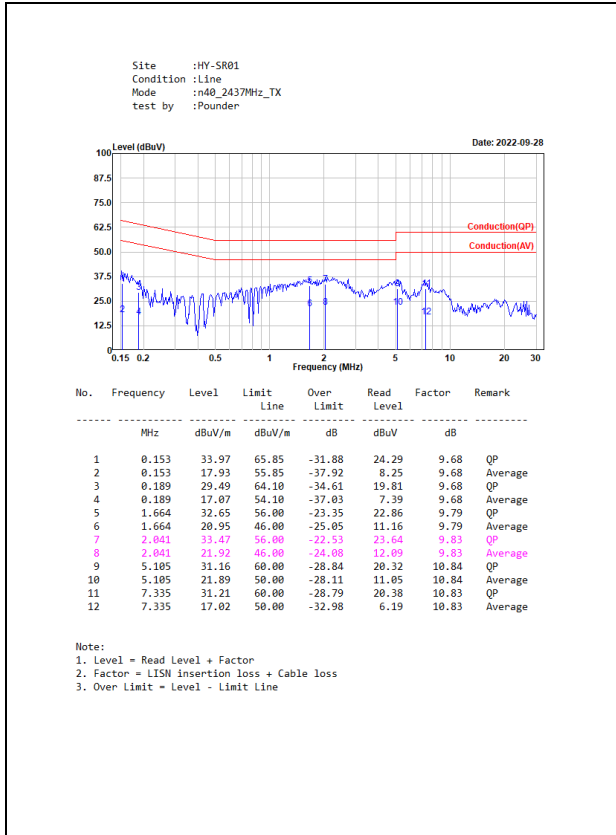
2.3. Test Procedure

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

2.4. Test Result of Conducted Emission



3. Maximum Power Output

3.1. Test Setup



3.2. Limits

The maximum peak power shall be less 1 Watt.

3.3. Test Procedure

The EUT was tested according to C63.10:2013 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using C63.10:2013 Section 11.9.1.3 PKPM1 Peak power meter method. The maximum average conducted output power using C63.10:2013 Section 11.9.2.3 Measurement using a power meter (PM). (Measurement using a gated RF average-reading power meter).

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

3.4. Test Result of Maximum Power Output

Product : QCast Mirror
 Test Item : Maximum Power Output Data
 Test Mode : Transmit (802.11b)
 Test Date : 2022/09/21

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
01	2412	1	15.53	15.74	18.65	<30dBm	Pass
06	2437	1	15.73	15.77	18.76	<30dBm	Pass
11	2462	1	15.76	15.77	18.78	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Peak Output Power (dBm)	Limit (dBm)	Result
01	2412	1	18.28	18.69	21.50	<30dBm	Pass
06	2437	1	18.41	18.59	21.51	<30dBm	Pass
11	2462	1	18.39	18.45	21.43	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : QCast Mirror
 Test Item : Maximum Power Output Data
 Test Mode : Transmit (802.11g)
 Test Date : 2022/09/21

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
01	2412	6	14.89	14.68	17.80	<30dBm	Pass
06	2437	6	14.69	14.64	17.68	<30dBm	Pass
11	2462	6	14.93	14.86	17.91	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Peak Output Power (dBm)	Limit (dBm)	Result
01	2412	6	21.53	23.10	25.40	<30dBm	Pass
06	2437	6	21.47	22.90	25.25	<30dBm	Pass
11	2462	6	21.73	22.98	25.41	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : QCast Mirror
 Test Item : Maximum Power Output Data
 Test Mode : Transmit (802.11n-20BW)
 Test Date : 2022/09/21

Channel	Frequency (MHz)	Data Rate	Chain A Power (dBm)	Chain B Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
01	2412	HT8	13.74	13.69	16.73	<30dBm	Pass
06	2437	HT8	13.71	13.67	16.70	<30dBm	Pass
11	2462	HT8	13.78	13.67	16.74	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Channel	Frequency (MHz)	Data Rate	Chain A Power (dBm)	Chain B Power (dBm)	Peak Output Power (dBm)	Limit (dBm)	Result
01	2412	HT8	21.34	22.80	25.14	<30dBm	Pass
06	2437	HT8	20.90	21.90	24.44	<30dBm	Pass
11	2462	HT8	21.38	22.55	25.01	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : QCast Mirror
 Test Item : Maximum Power Output Data
 Test Mode : Transmit (802.11n-40BW)
 Test Date : 2022/09/21

Channel	Frequency (MHz)	Data Rate	Chain A Power (dBm)	Chain B Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
03	2422	HT8	13.85	13.81	16.84	<30dBm	Pass
06	2437	HT8	13.75	13.94	16.86	<30dBm	Pass
09	2452	HT8	13.76	13.84	16.81	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Channel	Frequency (MHz)	Data Rate	Chain A Power (dBm)	Chain B Power (dBm)	Peak Output Power (dBm)	Limit (dBm)	Result
03	2422	HT8	21.24	22.57	24.97	<30dBm	Pass
06	2437	HT8	21.15	22.59	24.94	<30dBm	Pass
09	2452	HT8	21.12	22.36	24.79	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : QCast Mirror
 Test Item : Maximum Power Output Data
 Test Mode : Transmit (802.11ac-20BW)
 Test Date : 2022/09/21

Channel	Frequency (MHz)	Data Rate	Chain A Power (dBm)	Chain B Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
01	2412	VHT0	12.88	12.84	15.87	<30dBm	Pass
06	2437	VHT0	12.75	12.64	15.71	<30dBm	Pass
11	2462	VHT0	12.76	12.88	15.83	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Channel	Frequency (MHz)	Data Rate	Chain A Power (dBm)	Chain B Power (dBm)	Peak Output Power (dBm)	Limit (dBm)	Result
01	2412	VHT0	20.45	21.25	23.88	<30dBm	Pass
06	2437	VHT0	20.37	21.15	23.79	<30dBm	Pass
11	2462	VHT0	20.41	21.20	23.83	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

Product : QCast Mirror
 Test Item : Maximum Power Output Data
 Test Mode : Transmit (802.11ac-40BW)
 Test Date : 2022/09/21

Channel	Frequency (MHz)	Data Rate	Chain A Power (dBm)	Chain B Power (dBm)	Average Output Power (dBm)	Limit (dBm)	Result
03	2422	VHT0	10.77	10.81	13.80	<30dBm	Pass
06	2437	VHT0	10.95	10.81	13.89	<30dBm	Pass
09	2452	VHT0	10.77	10.70	13.75	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

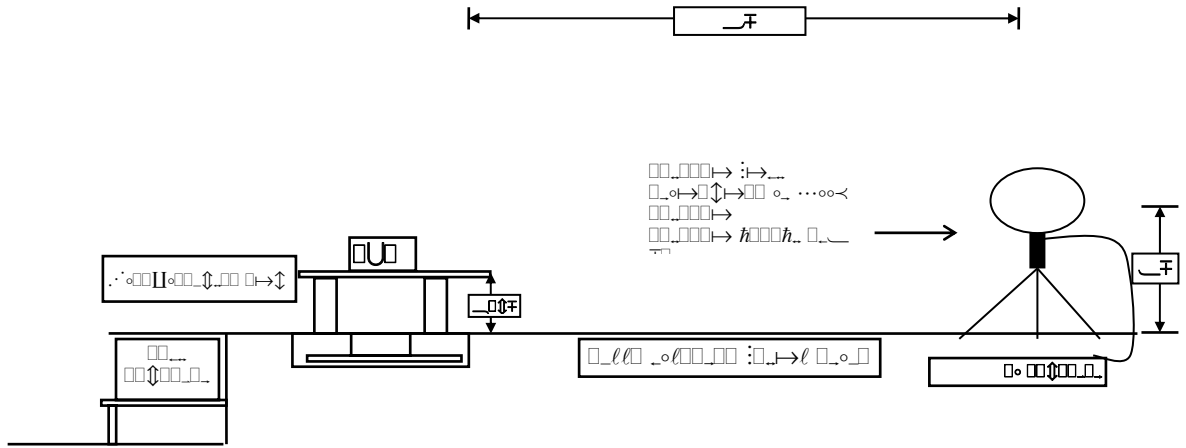
Channel	Frequency (MHz)	Data Rate	Chain A Power (dBm)	Chain B Power (dBm)	Peak Output Power (dBm)	Limit (dBm)	Result
03	2422	VHT0	20.01	20.62	23.34	<30dBm	Pass
06	2437	VHT0	19.78	20.21	23.01	<30dBm	Pass
09	2452	VHT0	19.63	20.12	22.89	<30dBm	Pass

Note: Output Power (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW))

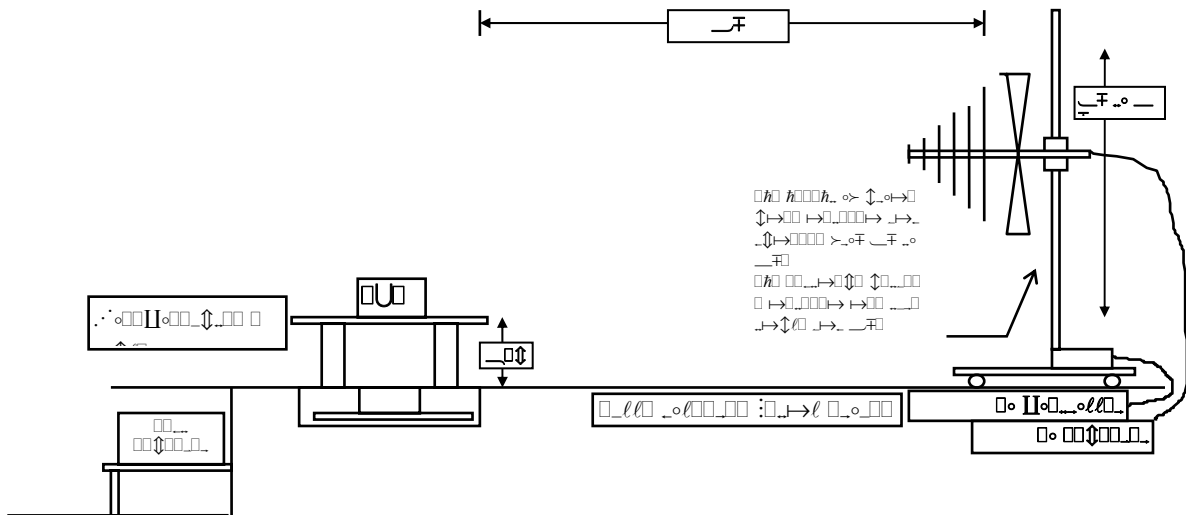
4. Radiated Emission

4.1. Test Setup

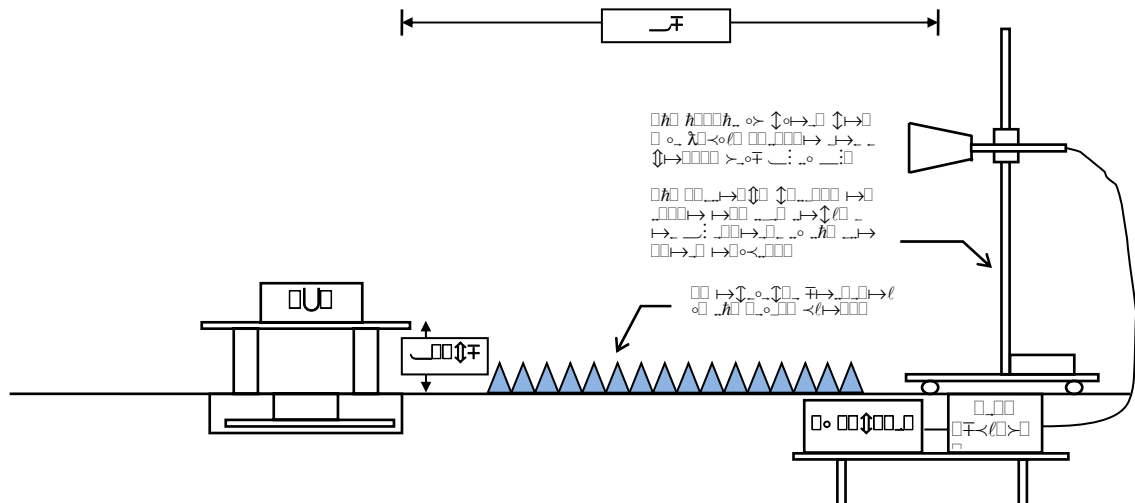
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.2. Limits

□ General Radiated Emission 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 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:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 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.

4.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to C63.10:2013 Section 11.12.1 for compliance to FCC 47CFR 15.247 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 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz 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 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 - RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1MHz.

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

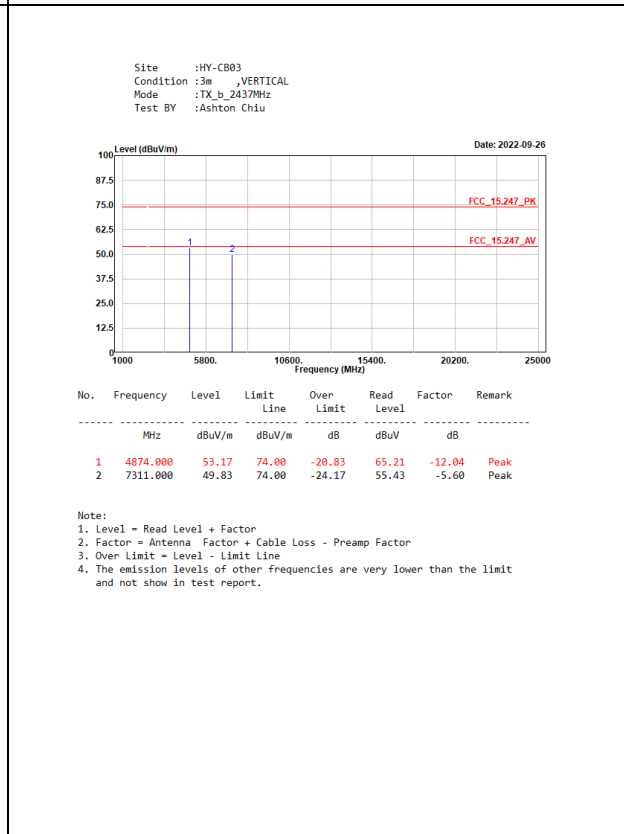
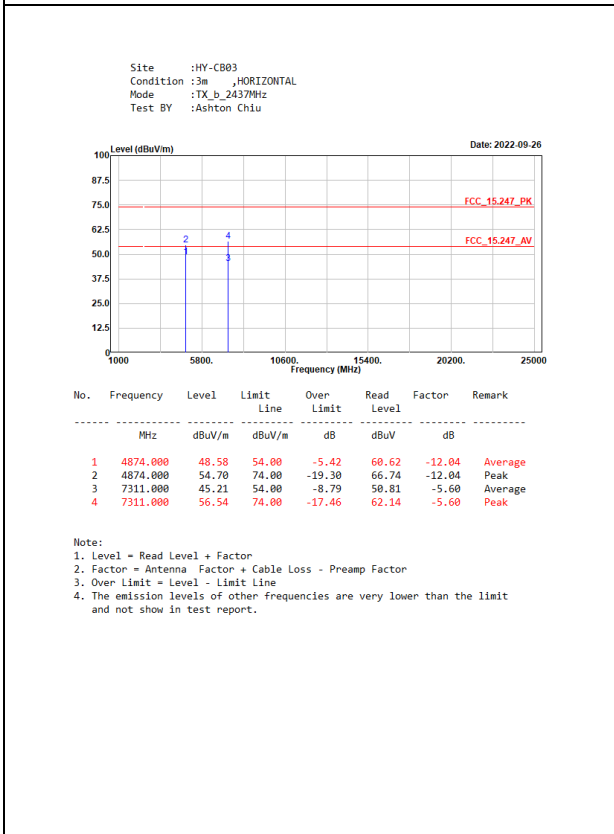
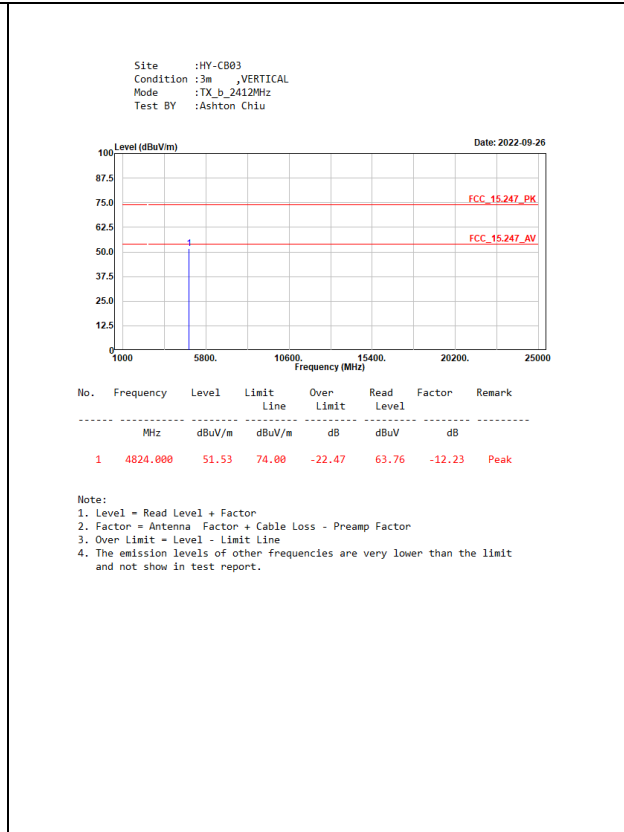
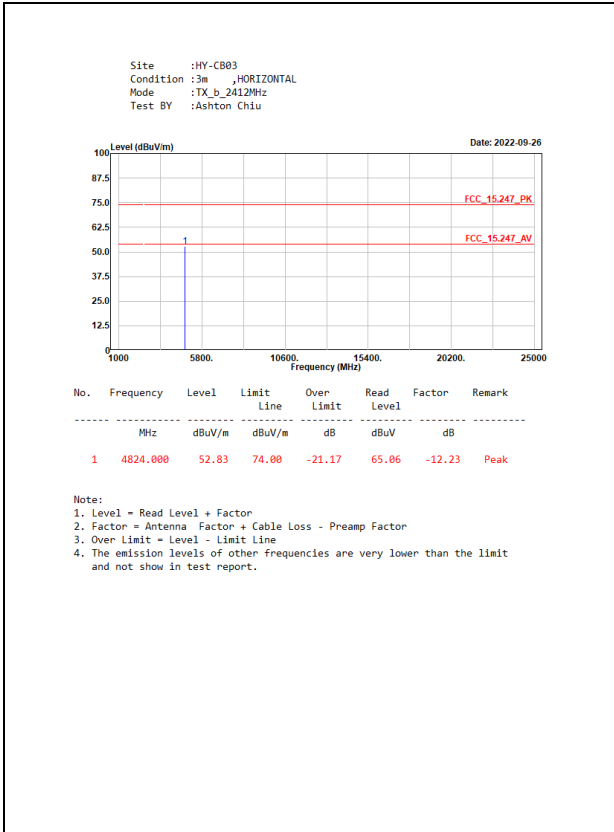
$VBW \geq 1/T$, when duty cycle $< 98 \%$

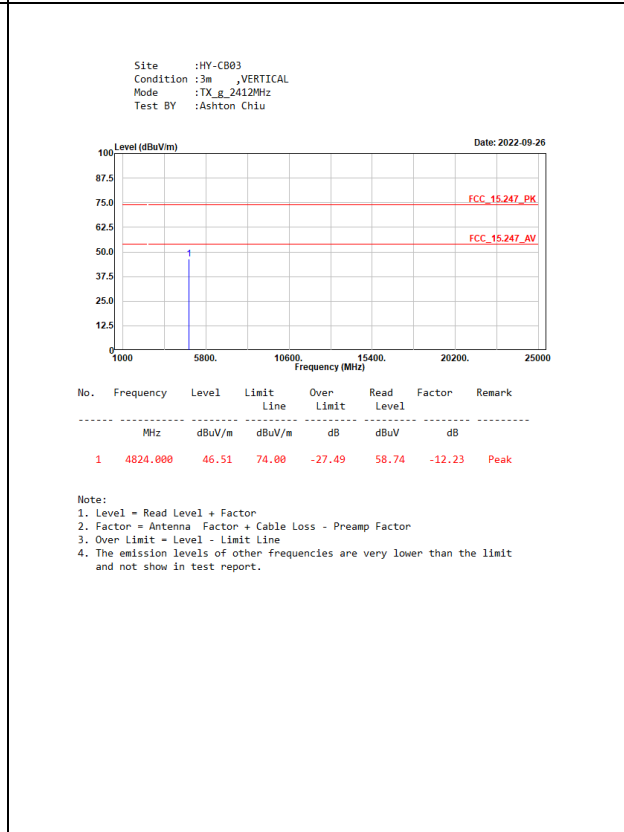
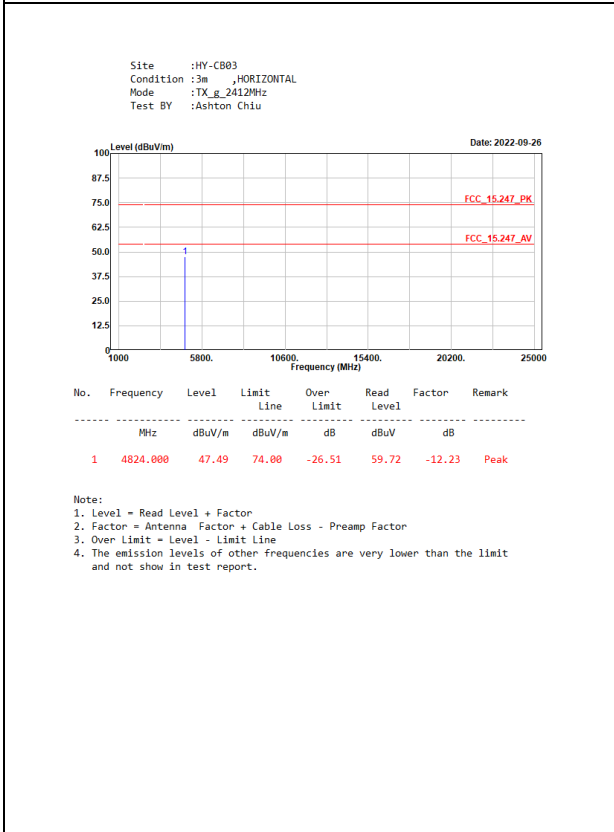
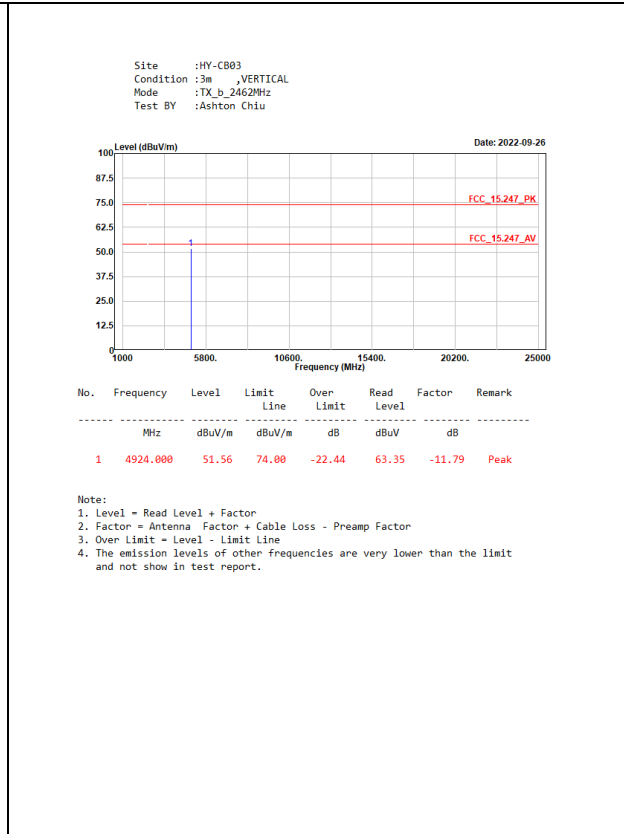
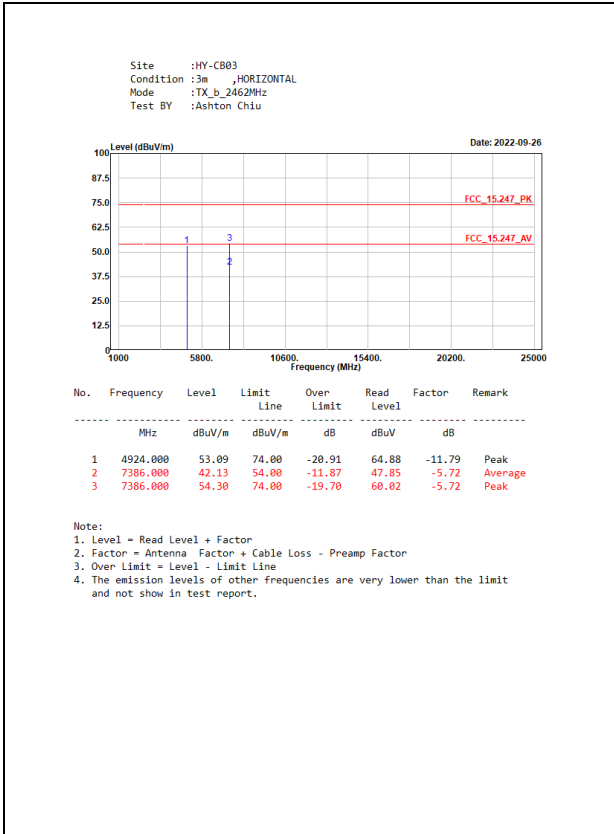
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

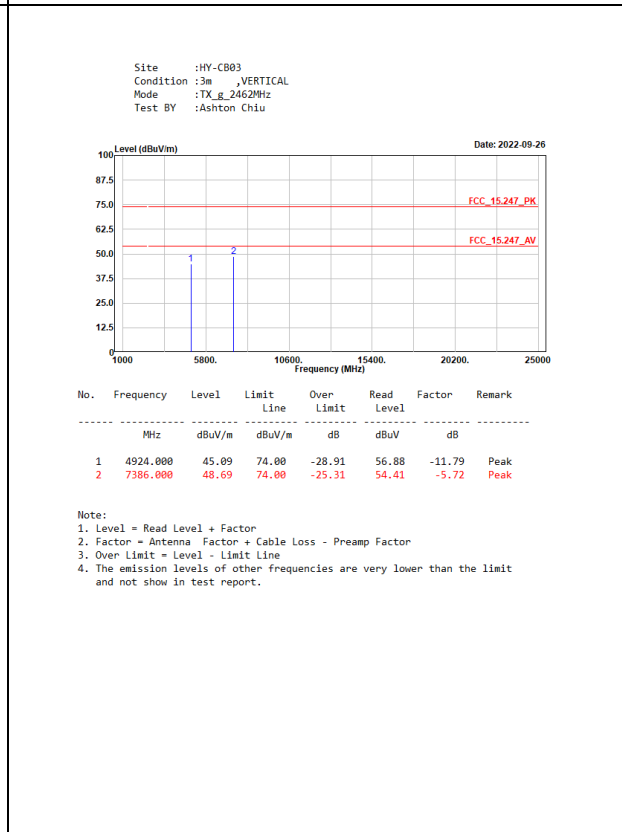
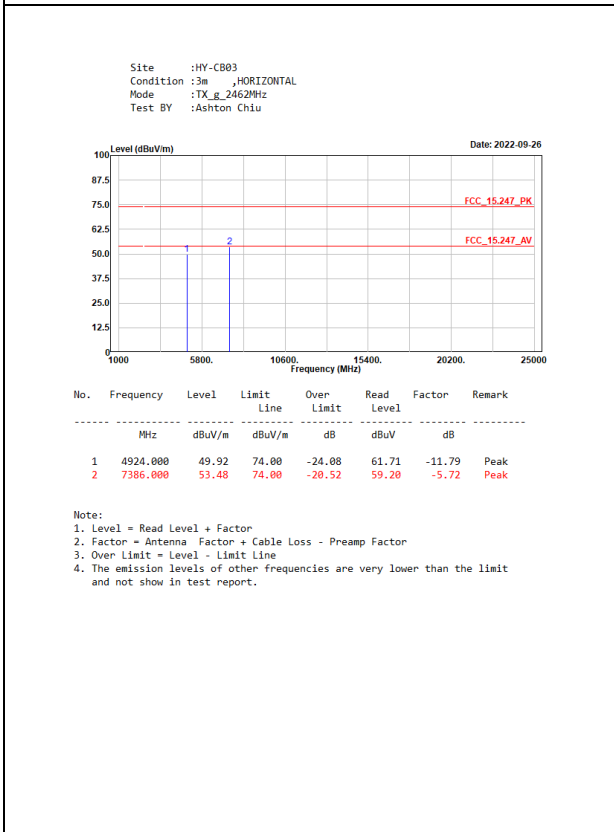
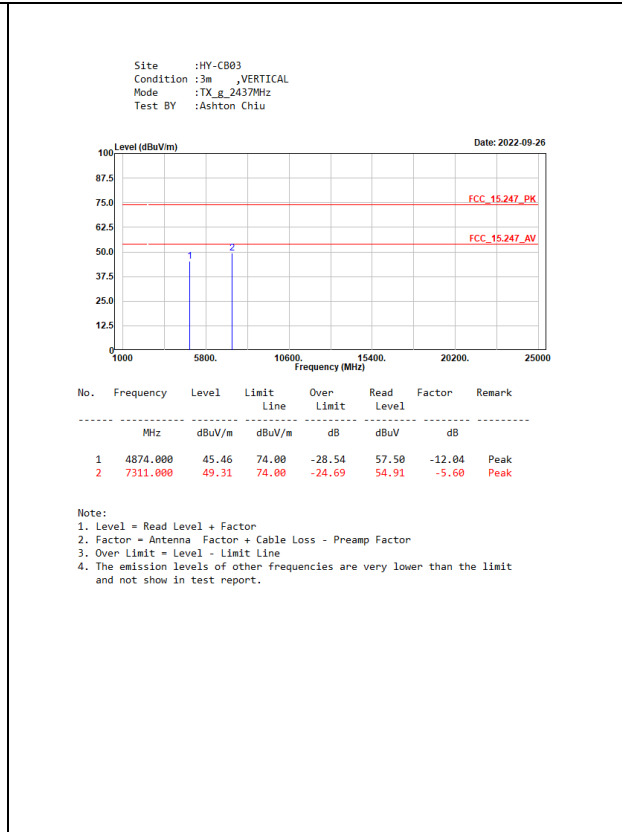
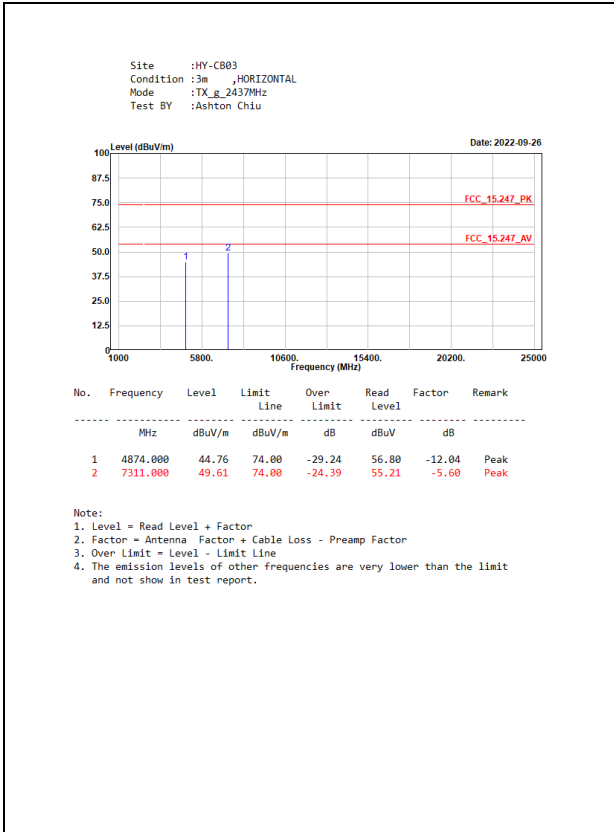
2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 b	99.03	8.1800	122	10
802.11 g	96.11	1.3600	735	1000
802.11 n20	95.85	1.2700	787	1000
802.11 n40	92.11	0.6300	1587	2000
802.11 ac20	95.72	1.2750	784	1000
802.11 ac40	91.74	0.6330	1580	2000

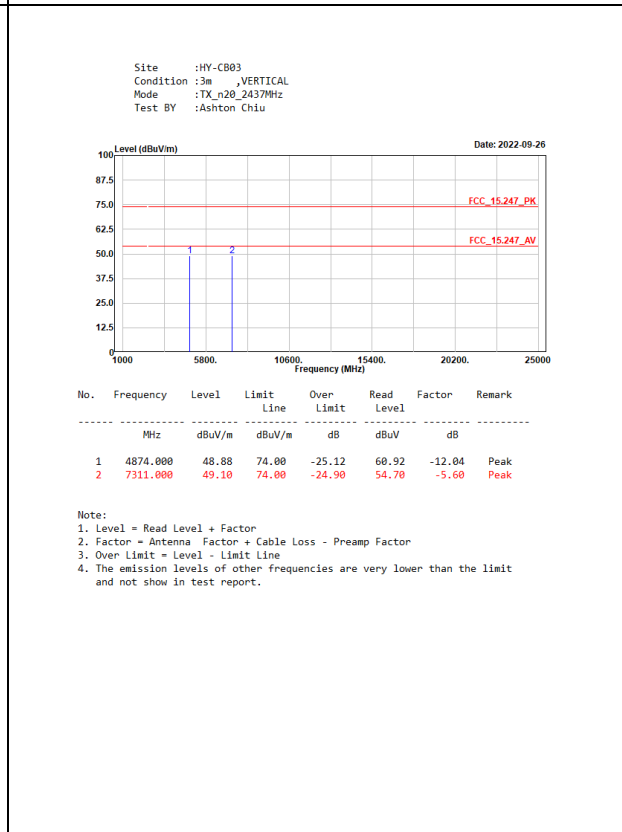
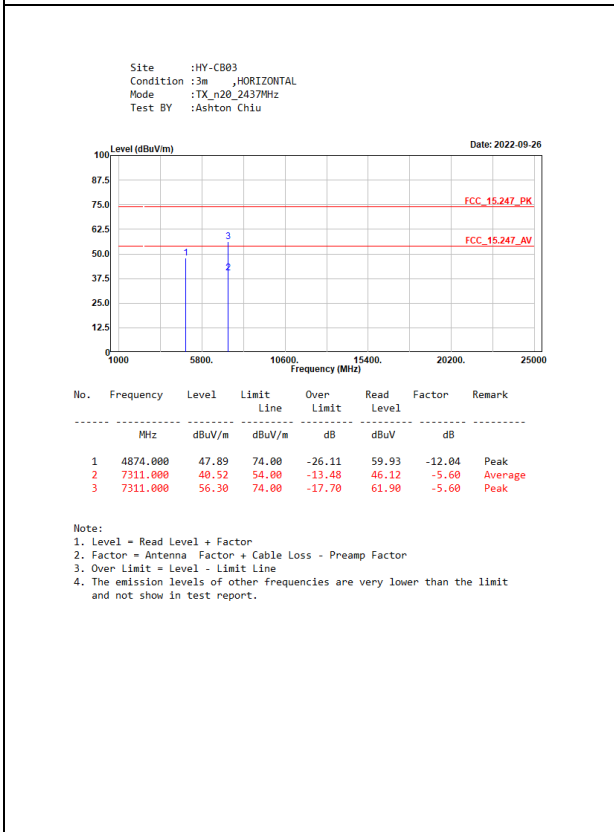
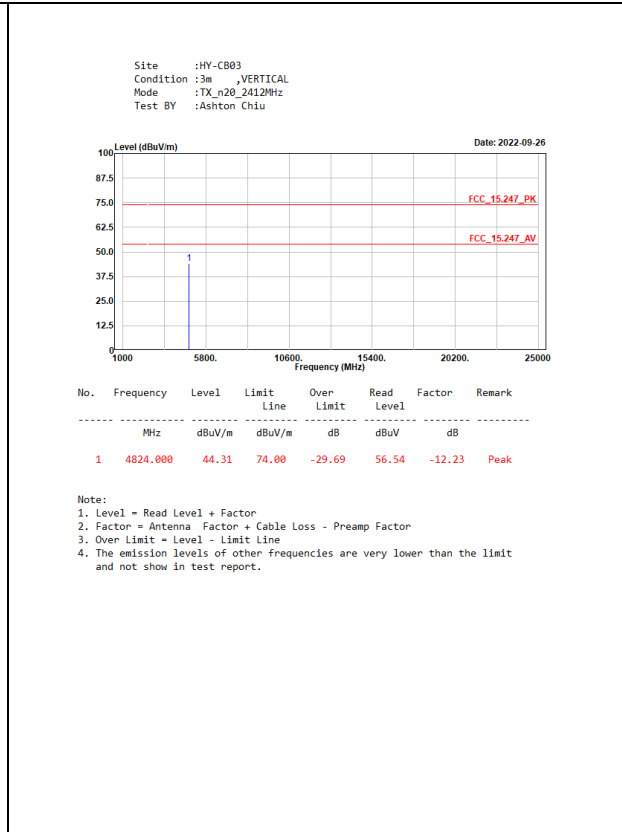
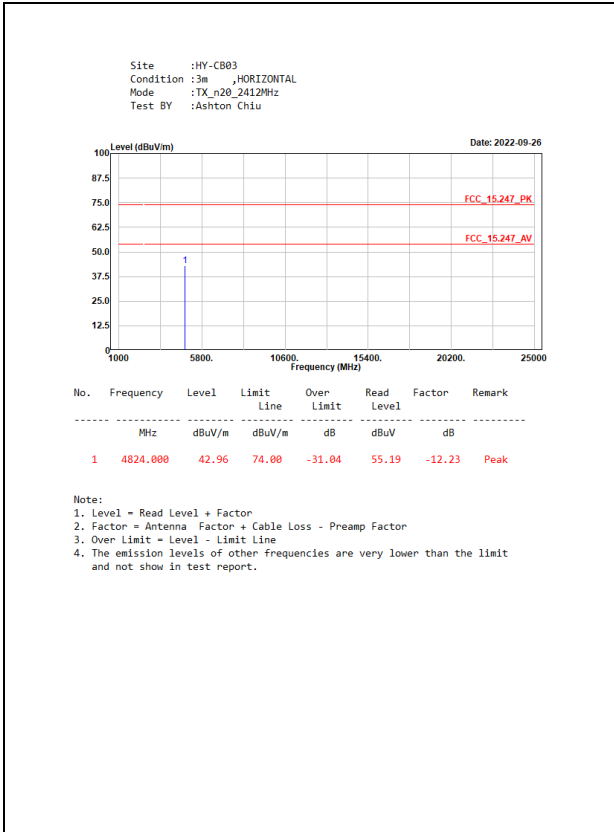
Note: Duty Cycle Refer to Section 9.

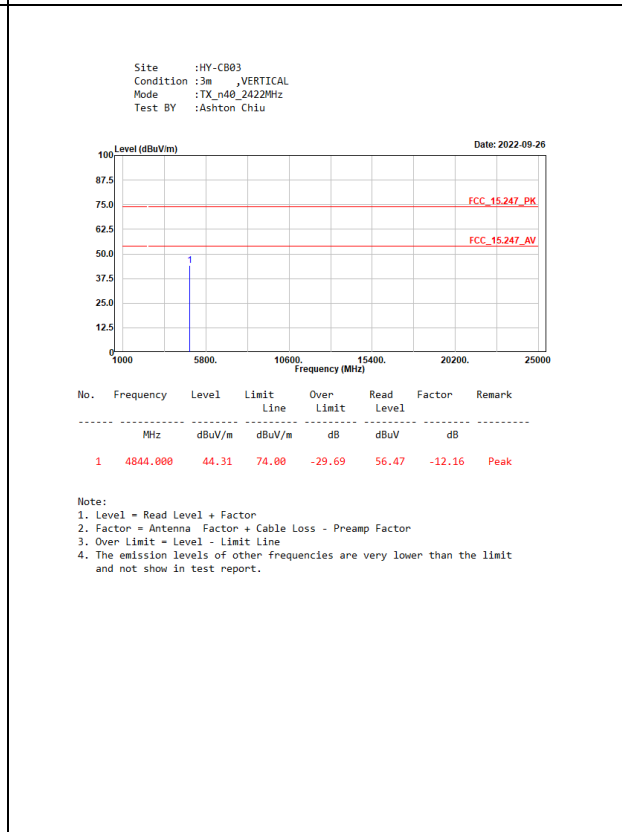
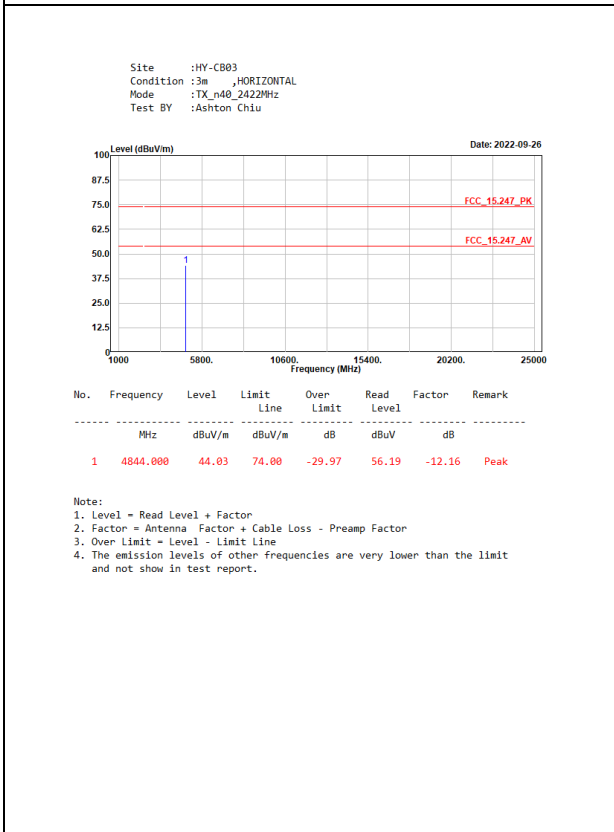
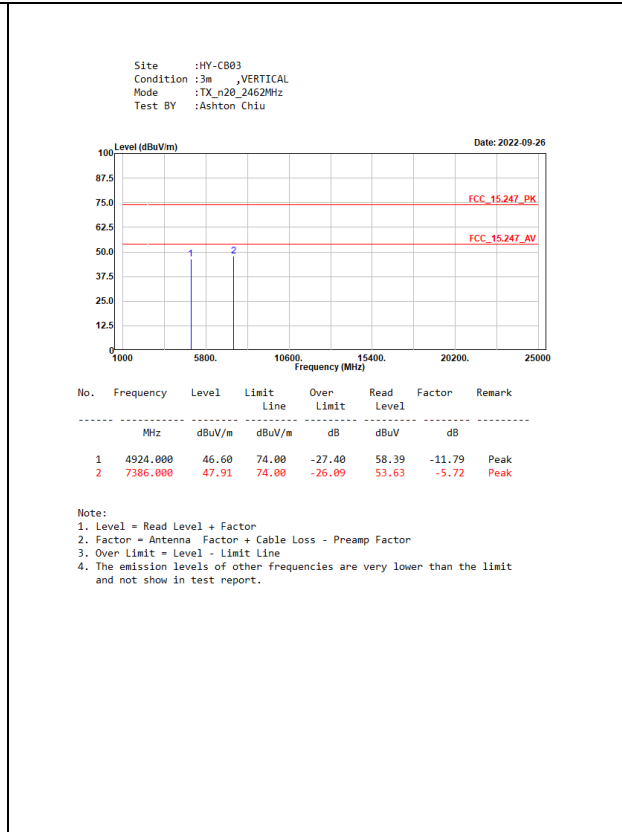
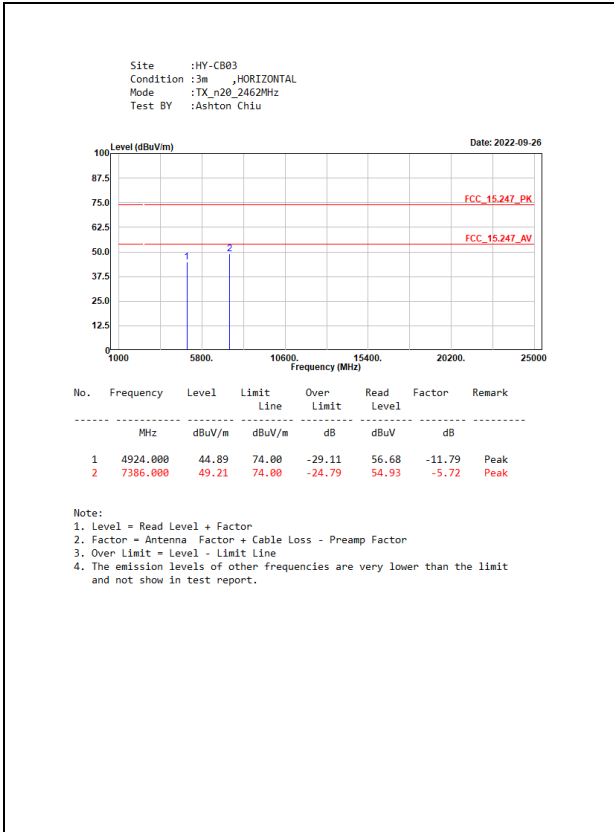
4.4. Test Result of Radiated Emission

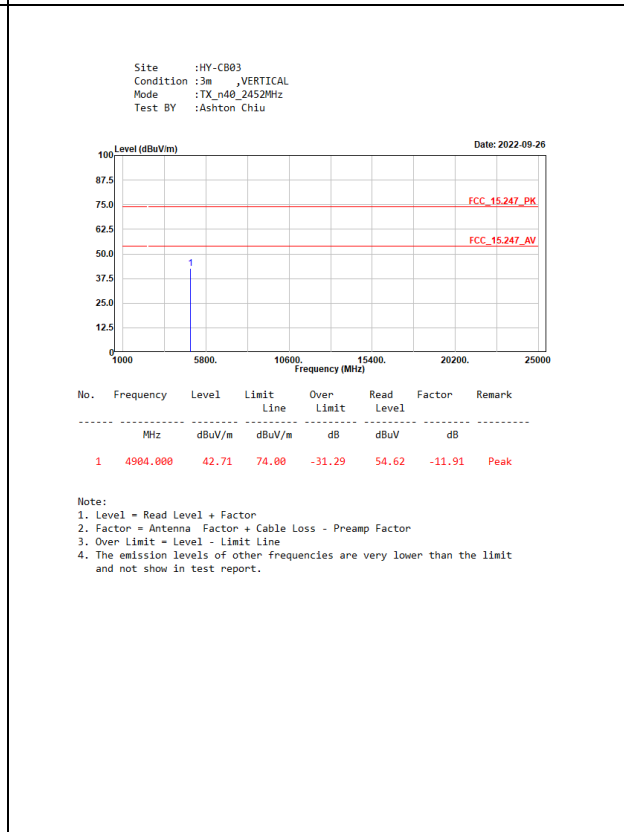
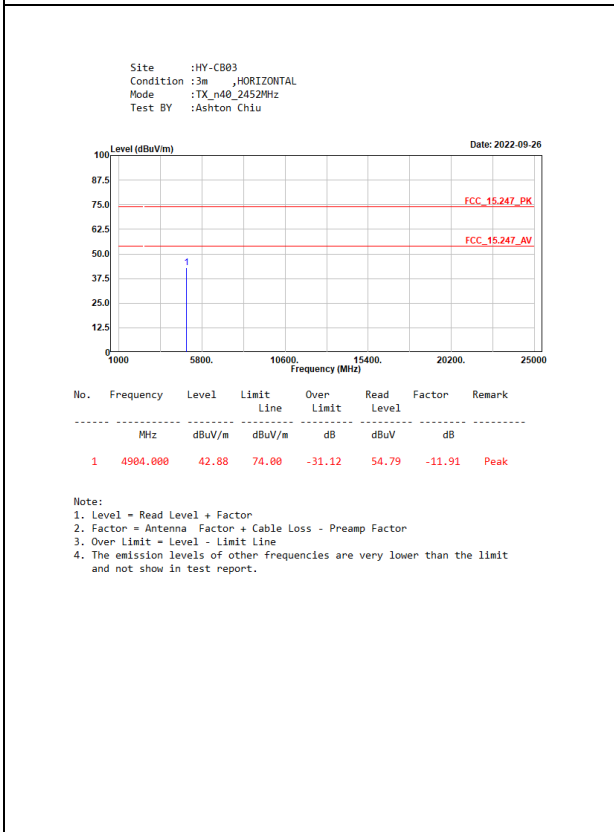
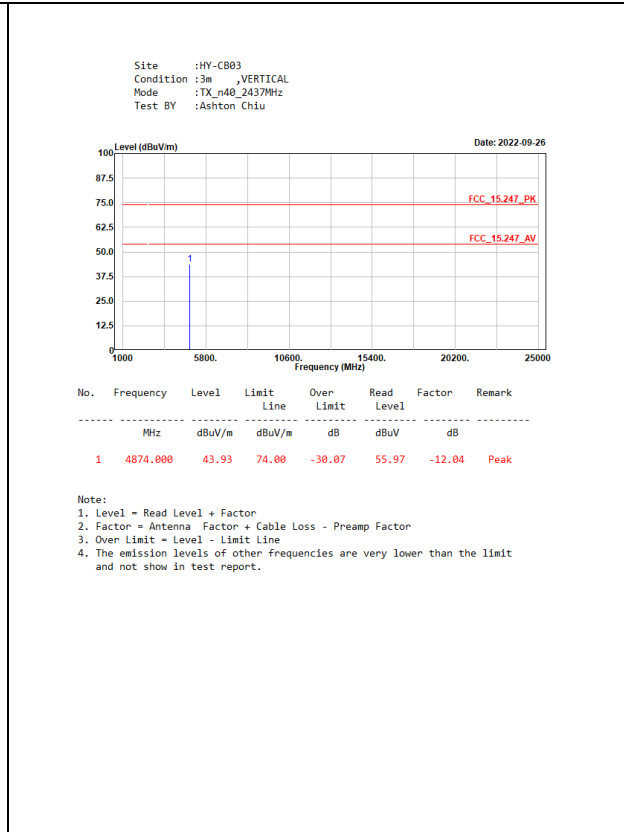
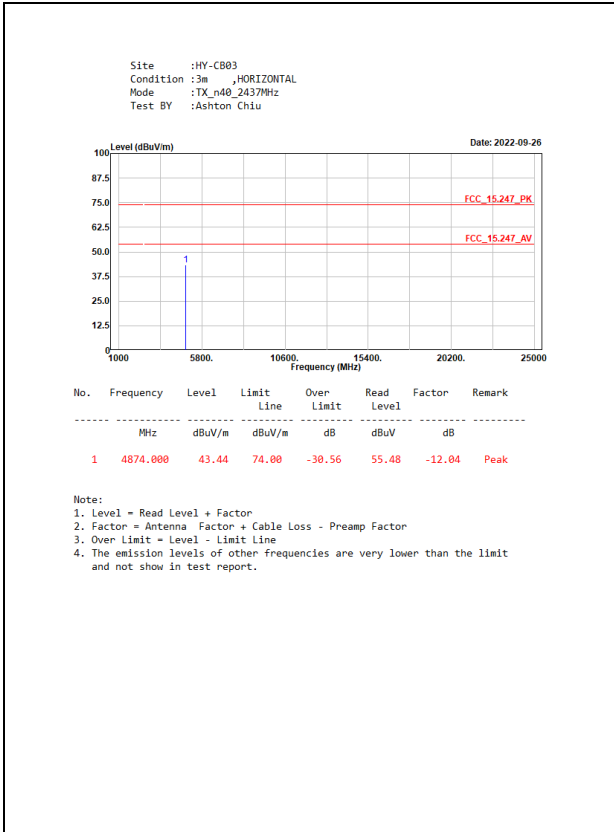


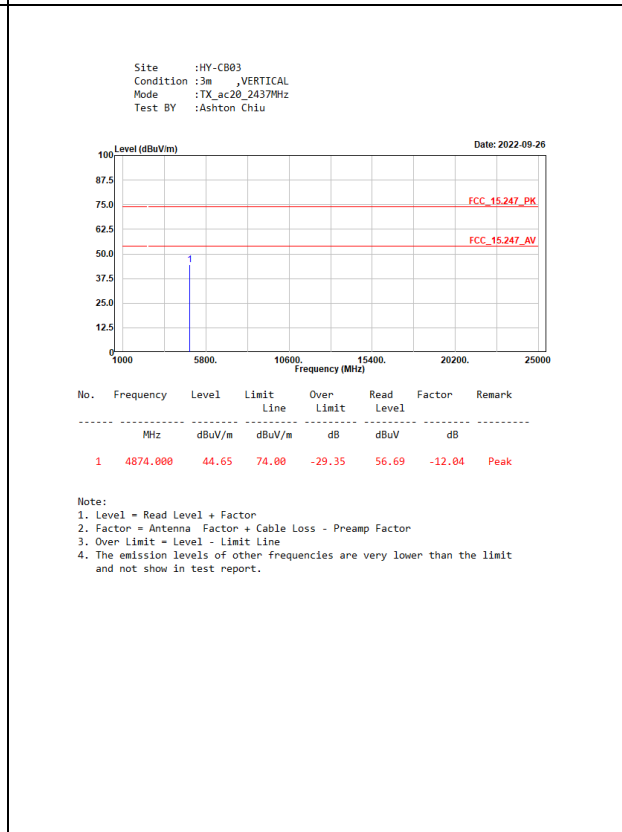
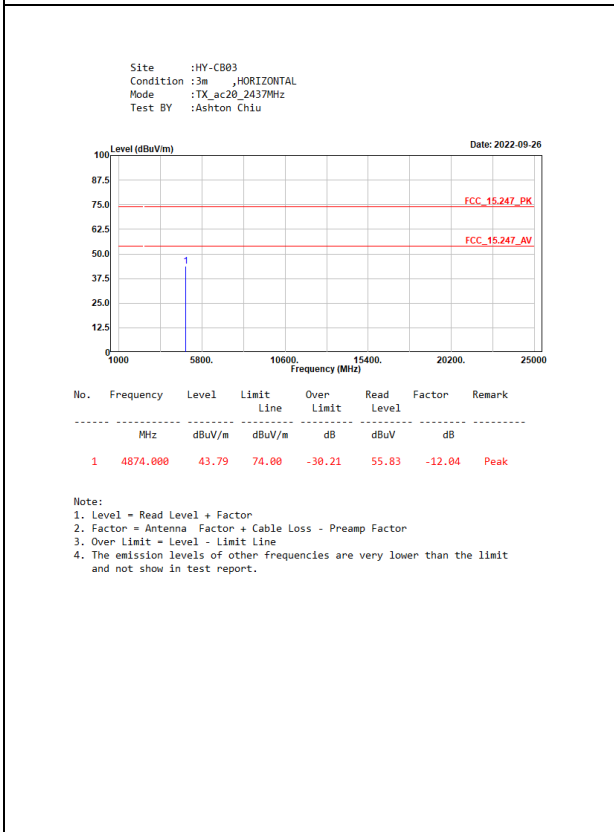
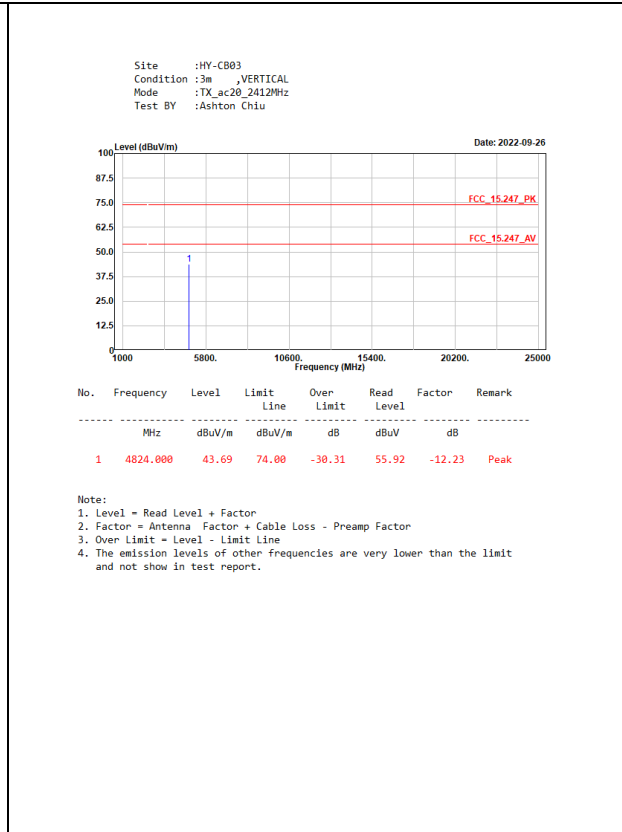
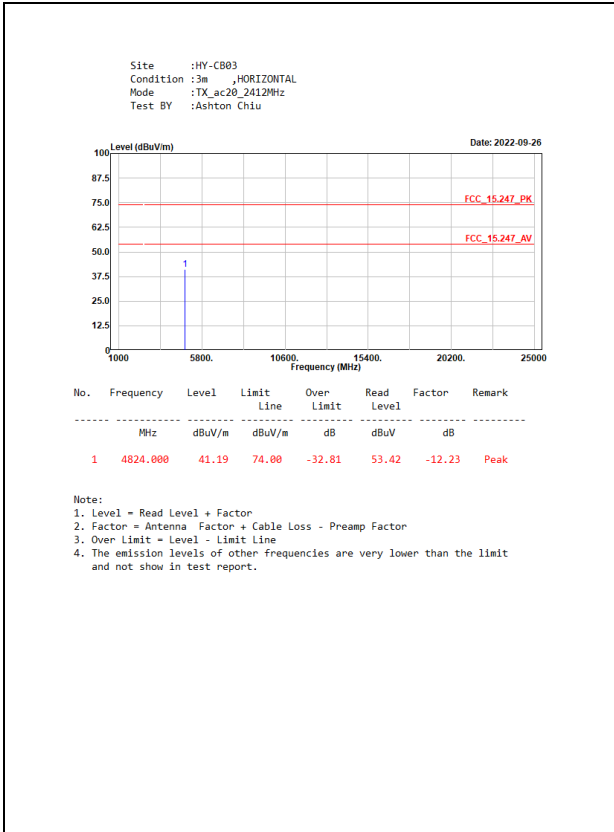


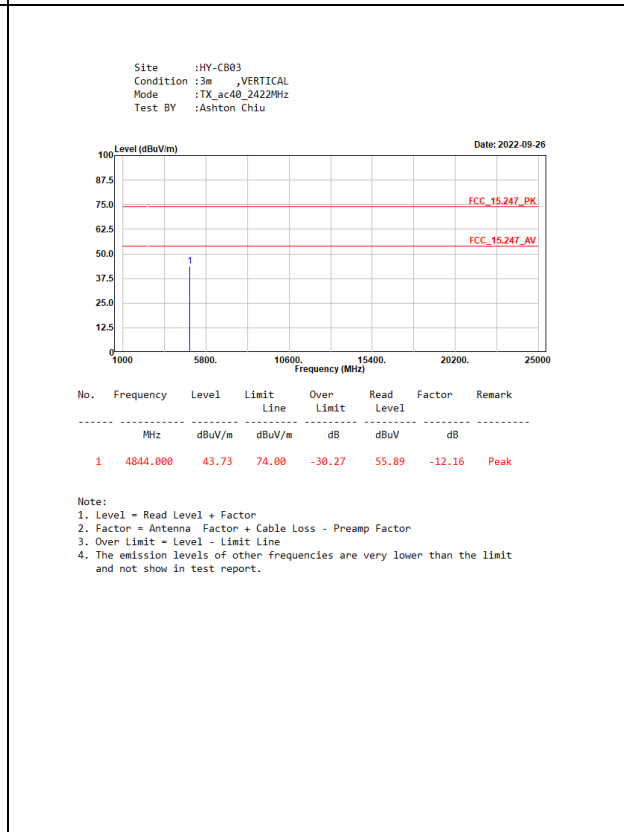
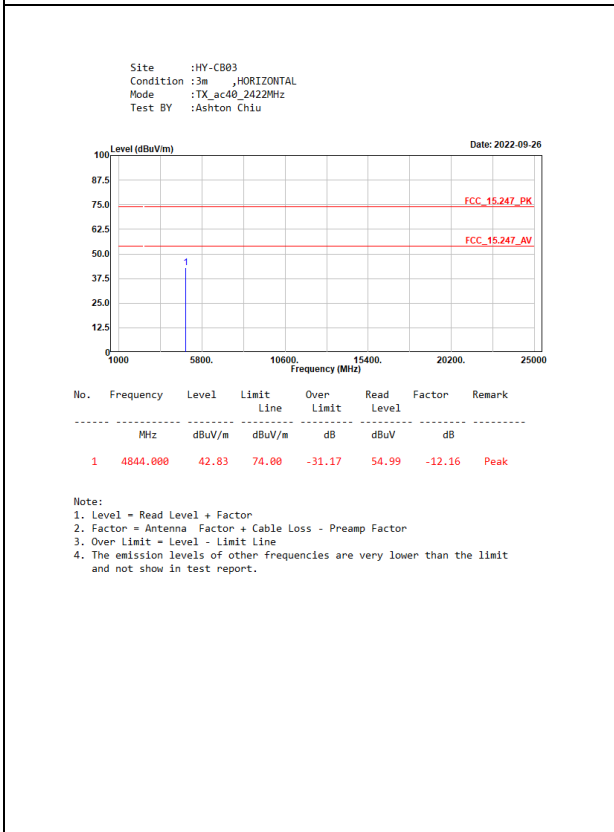
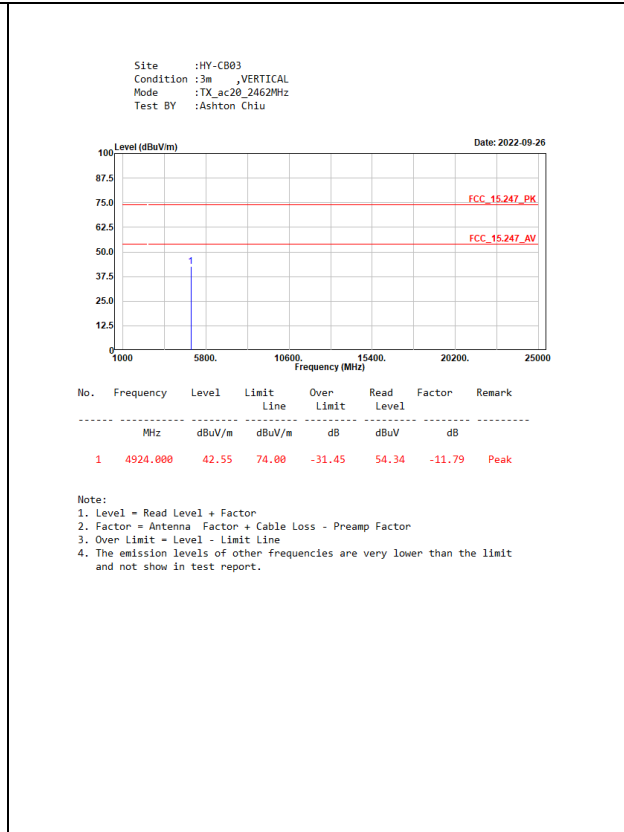
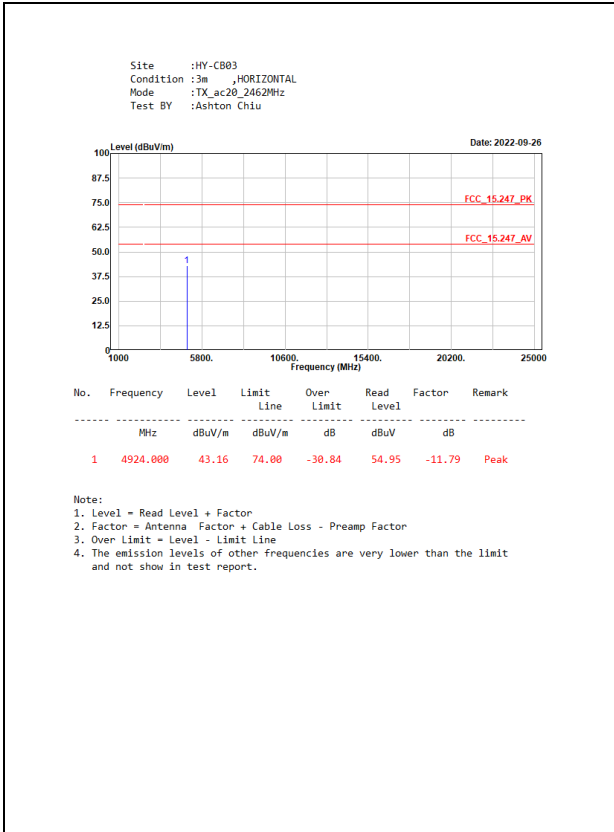


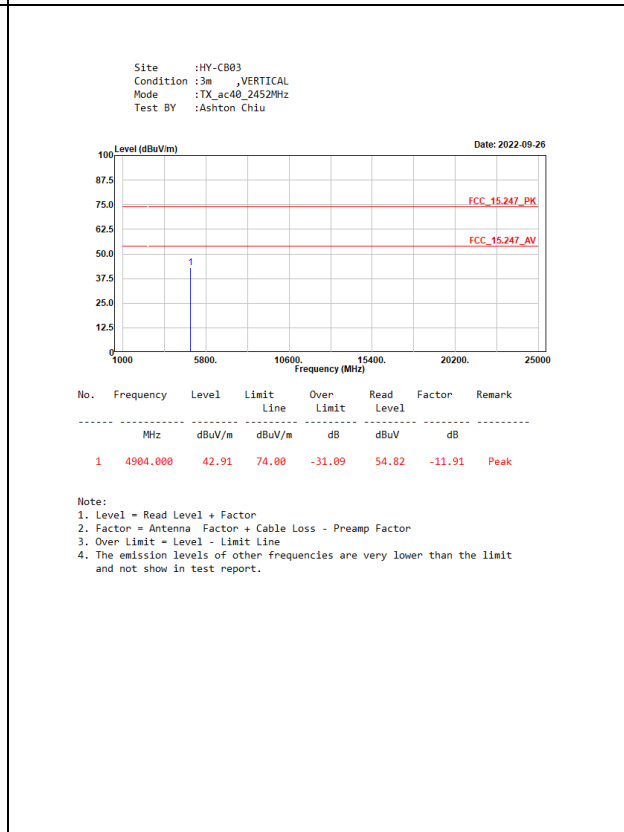
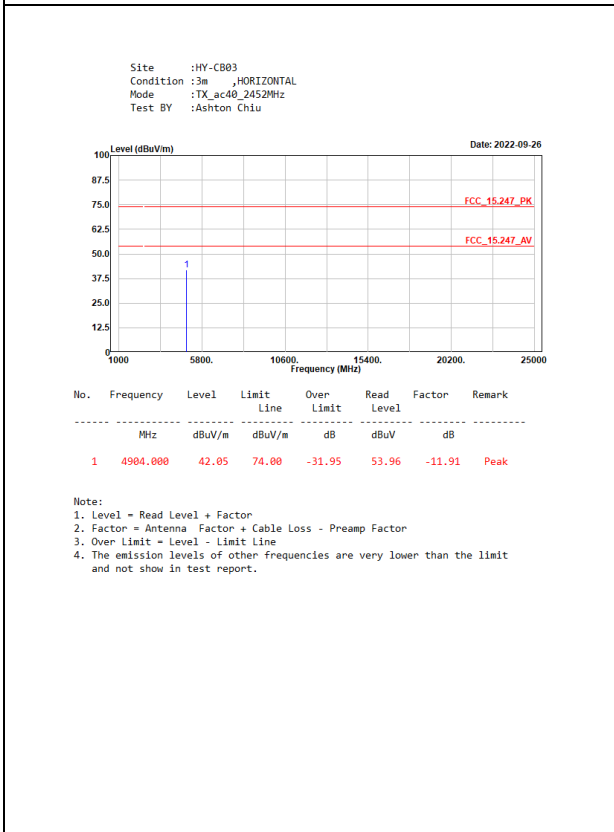
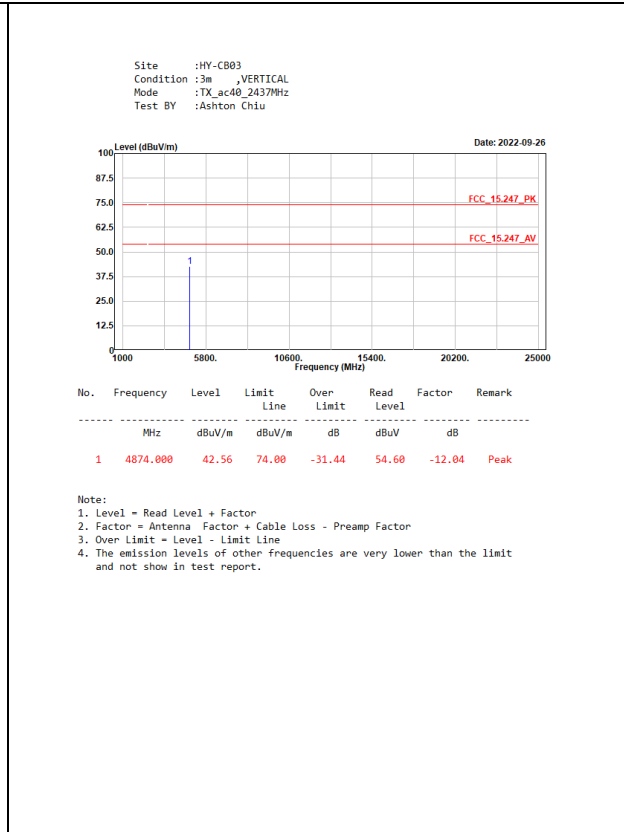
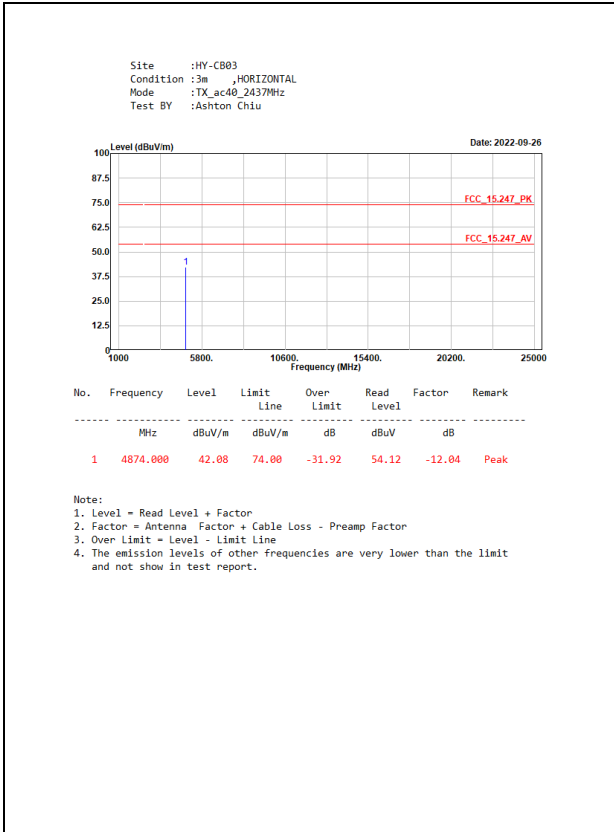


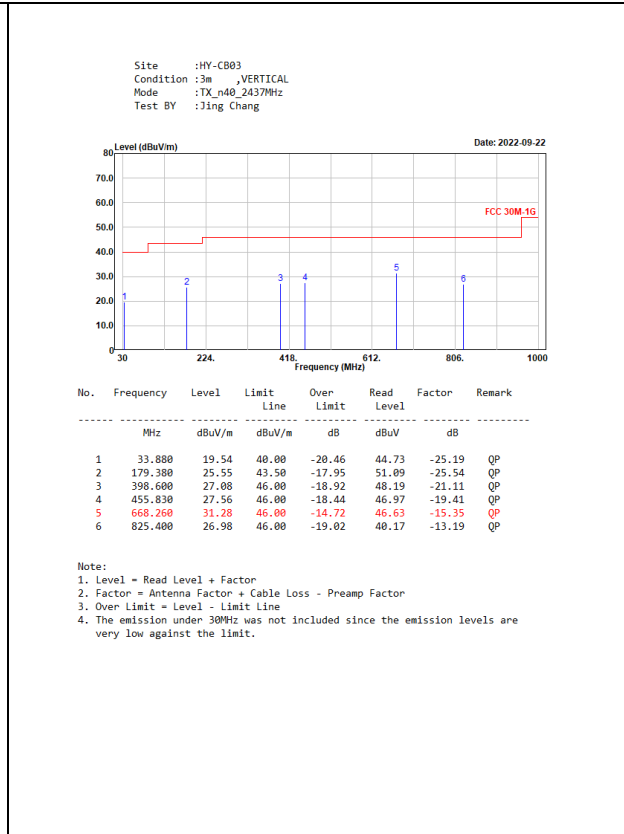
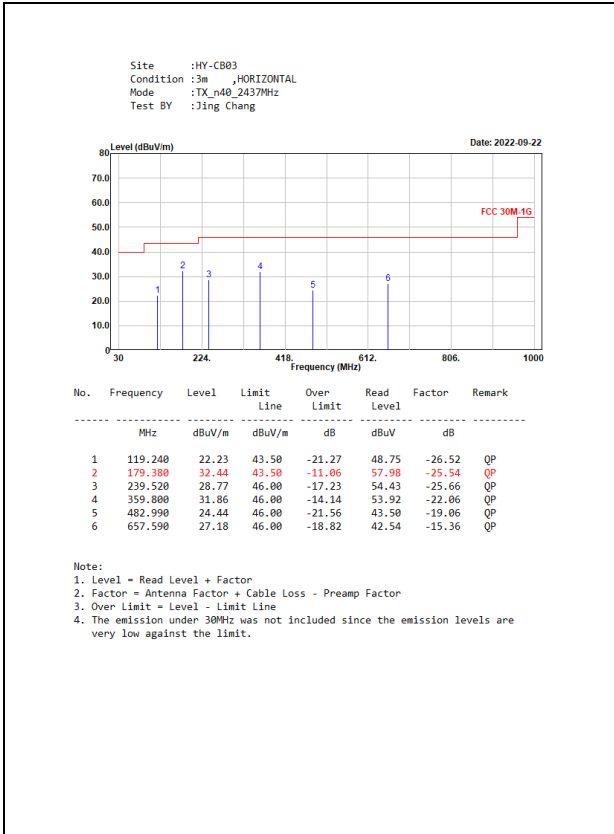








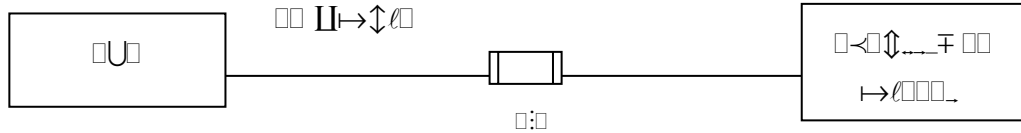




5. RF Antenna Conducted Test

5.1. Test Setup

RF antenna Conducted Measurement:



5.2. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.3. Test Procedure

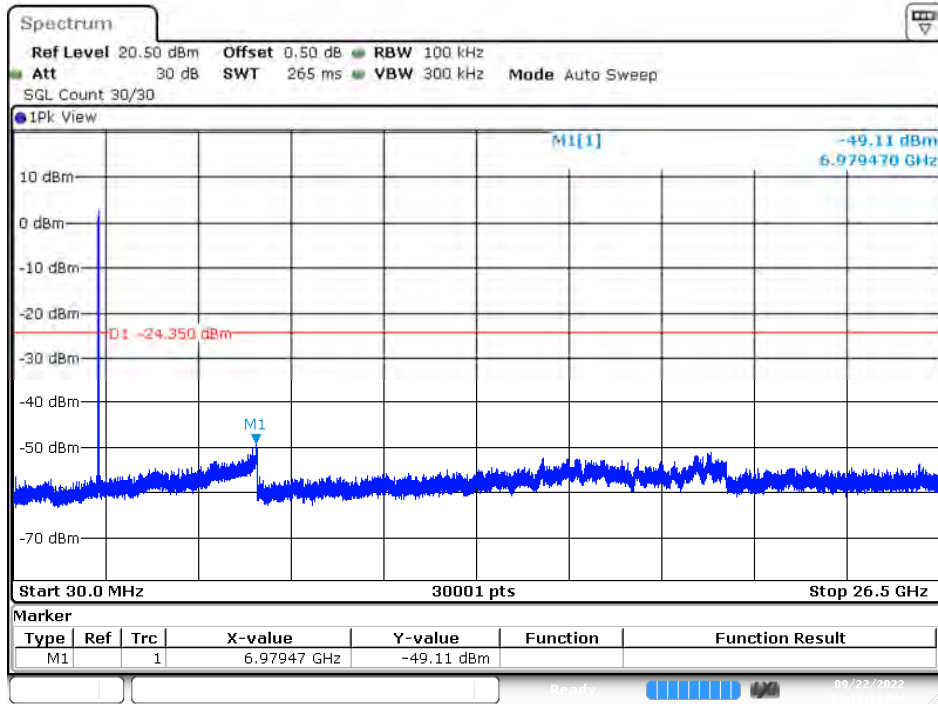
The EUT was tested according to C63.10:2013 Section 11.11 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.4. Test Result of RF antenna conducted test

Product : QCast Mirror
 Test Item : RF antenna conducted test
 Test Mode : Transmit (802.11b)
 Test Date : 2022/09/22

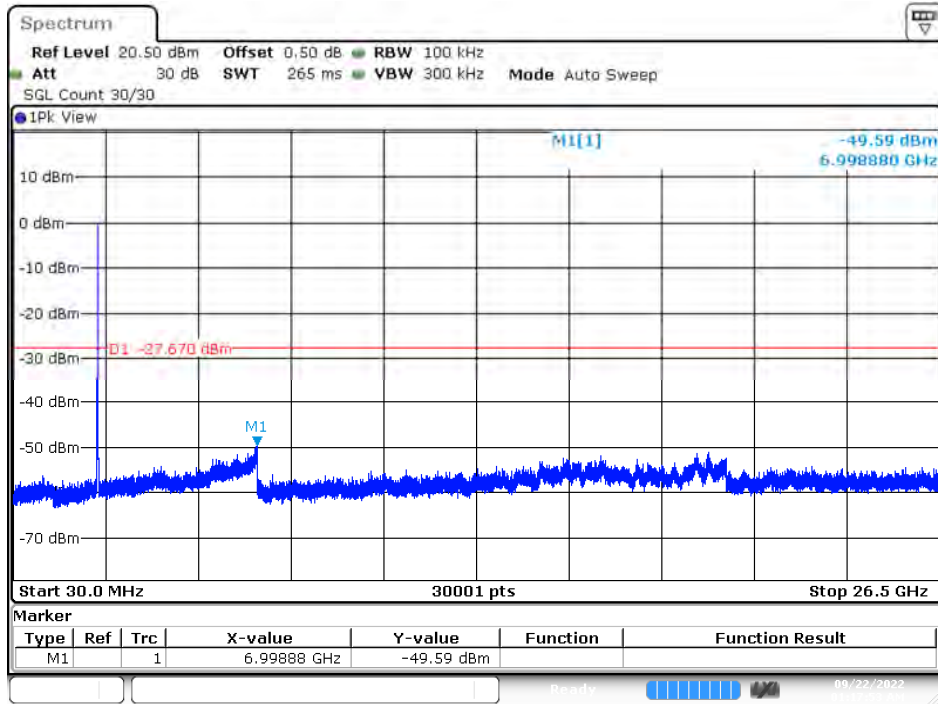
Channel 11 (2462MHz)



Date: 22.SEP.2022 01:13:13

Product : QCast Mirror
 Test Item : RF Antenna Conducted Spurious
 Test Mode : Transmit (802.11g)
 Test Date : 2022/09/22

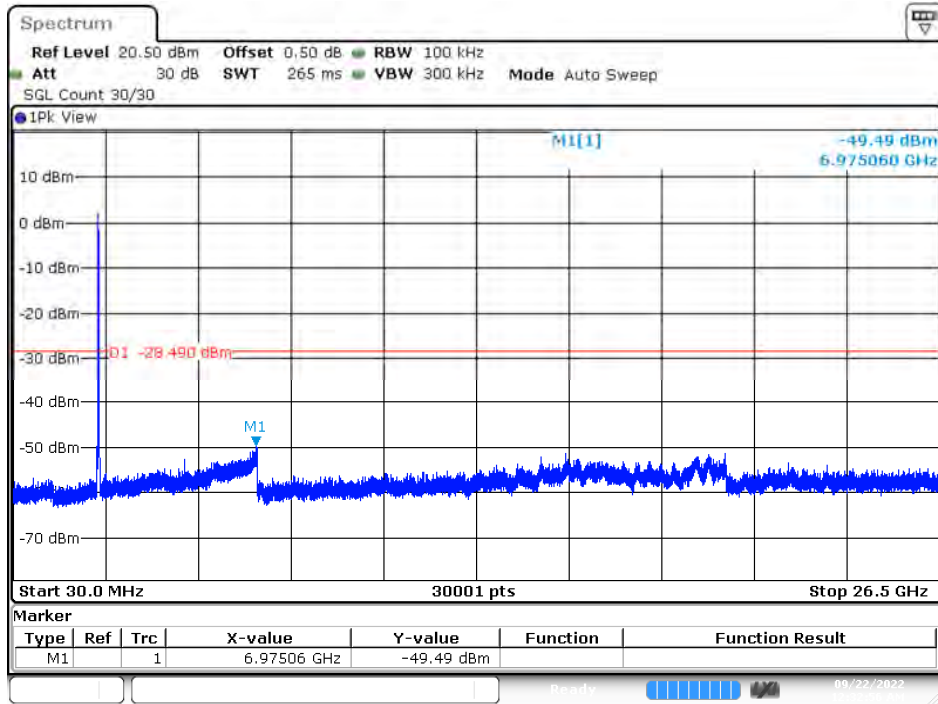
Channel 06 (2437MHz)



Date: 22.SEP.2022 01:17:53

Product : QCast Mirror
 Test Item : RF Antenna Conducted Spurious
 Test Mode : Transmit (802.11n-20BW)
 Test Date : 2022/09/22

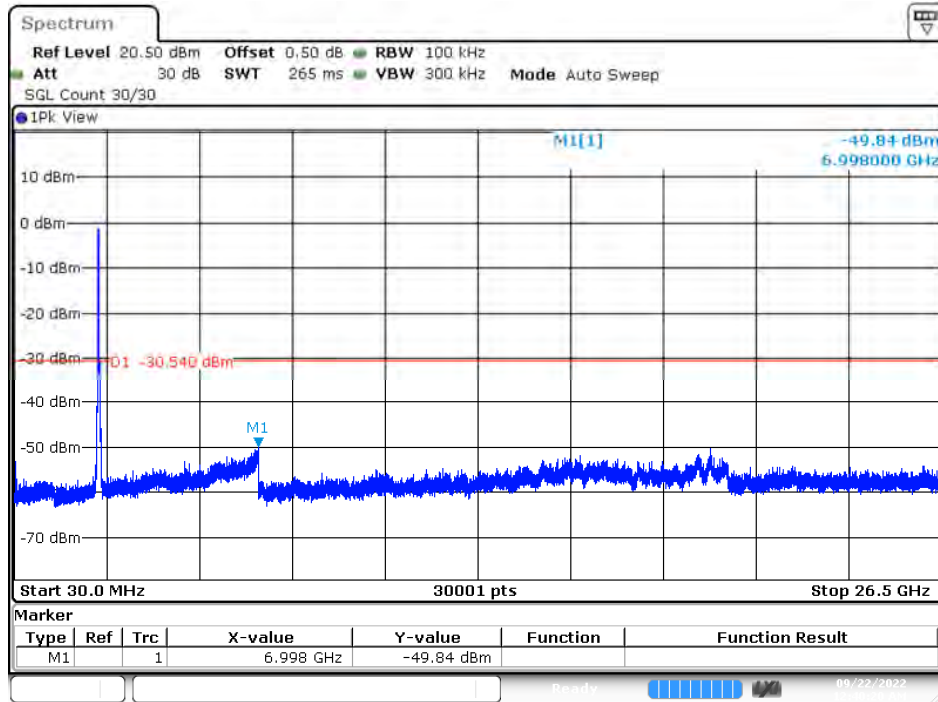
Channel 11 (2462MHz)



Date: 22.SEP.2022 00:32:57

Product : QCast Mirror
 Test Item : RF Antenna Conducted Spurious
 Test Mode : Transmit (802.11n-40BW)
 Test Date : 2022/09/22

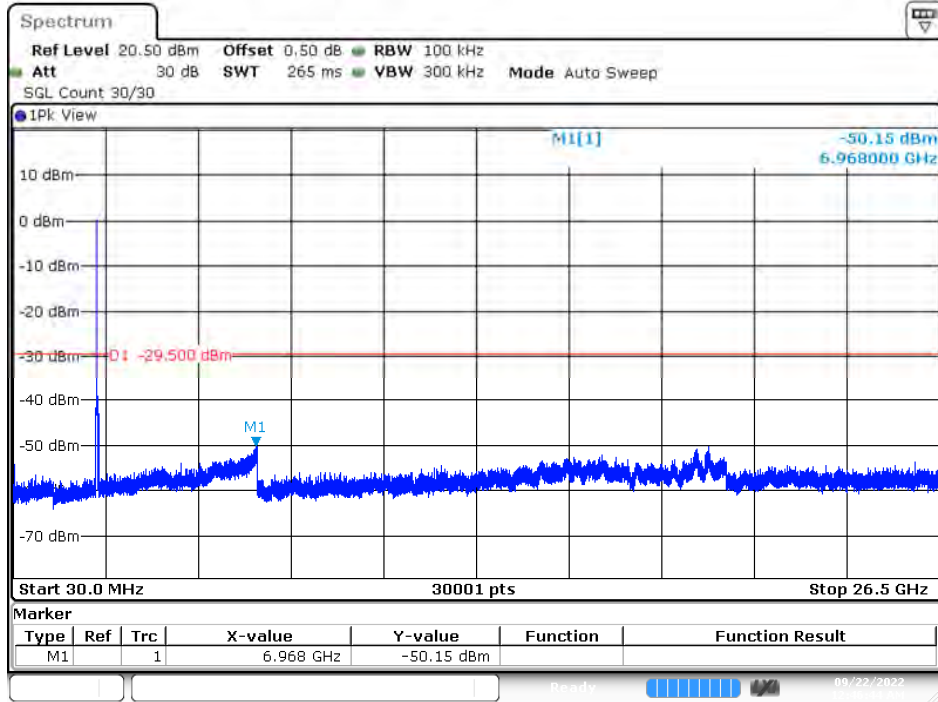
Channel 06 (2437MHz)



Date: 22.SEP.2022 00:40:21

Product : QCast Mirror
 Test Item : RF Antenna Conducted Spurious
 Test Mode : Transmit (802.11ac-20BW)
 Test Date : 2022/09/22

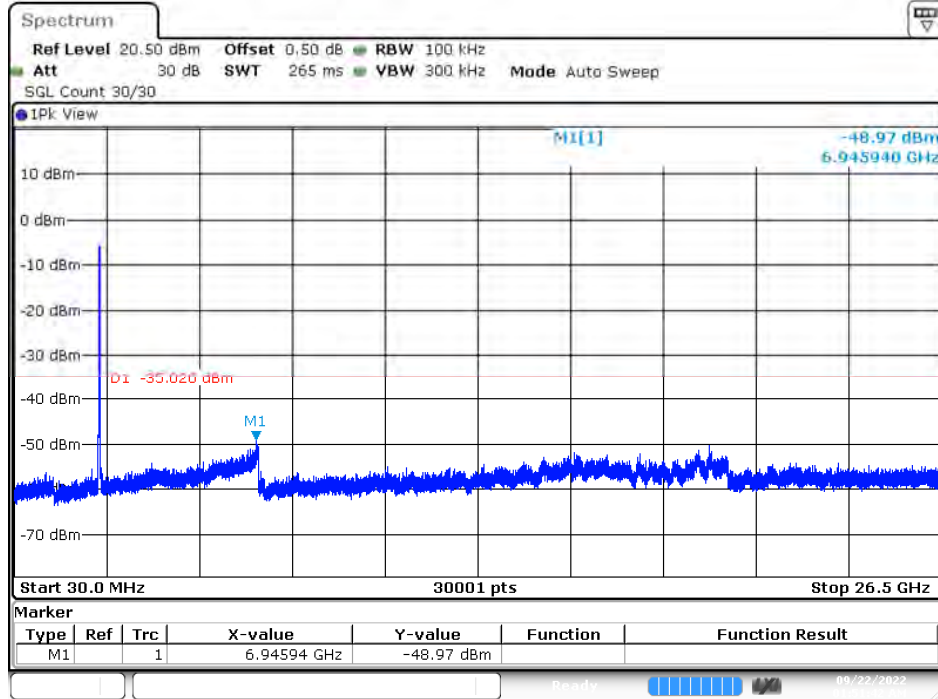
Channel 01 (2412MHz)



Date: 22.SEP.2022 00:46:44

Product : QCast Mirror
 Test Item : RF Antenna Conducted Spurious
 Test Mode : Transmit (802.11ac-40BW)
 Test Date : 2022/09/22

Channel 09 (2452MHz)

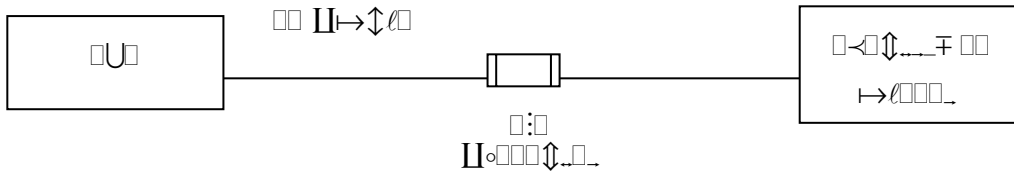


Date: 22.SEP.2022 01:51:43

6. Band Edge

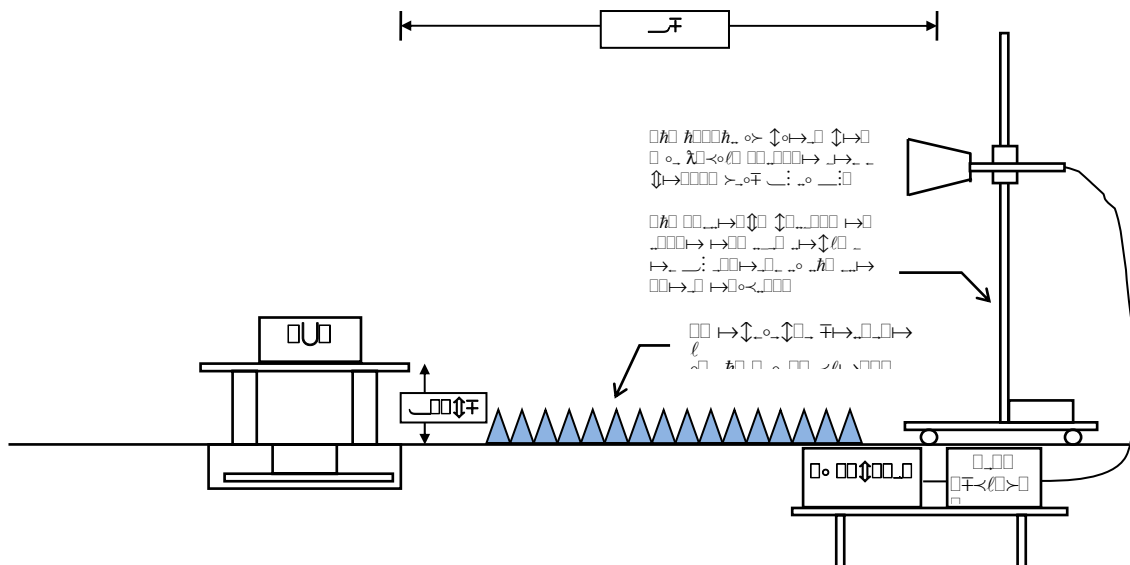
6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



6.2. Limits

According to FCC Section 15.247(d). In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested according to C63.10:2013 Section 11.12.1 for compliance to FCC 47CFR 15.247 requirements.

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 from 1 meter to 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.

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 - RBW as a function of frequency

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1MHz.

VBW = 10Hz, when duty cycle ≥ 98 %

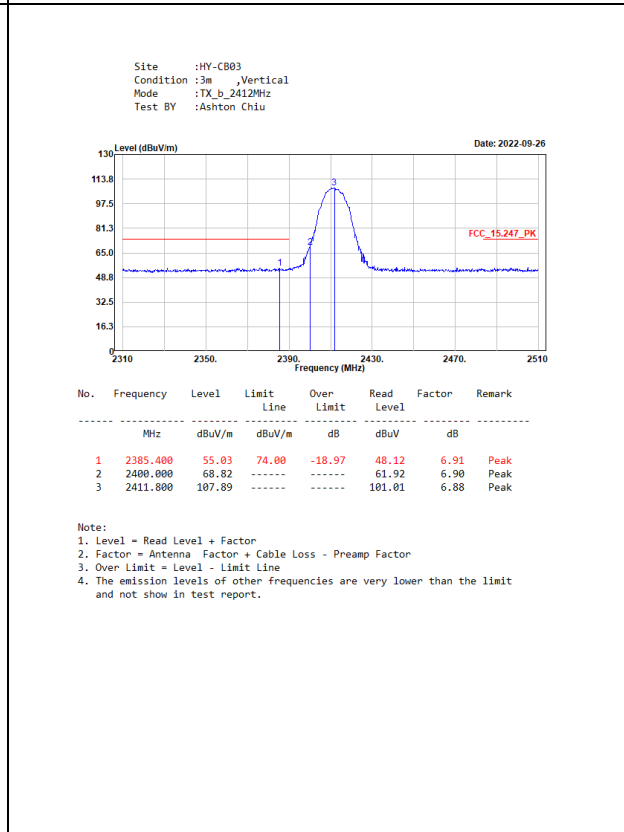
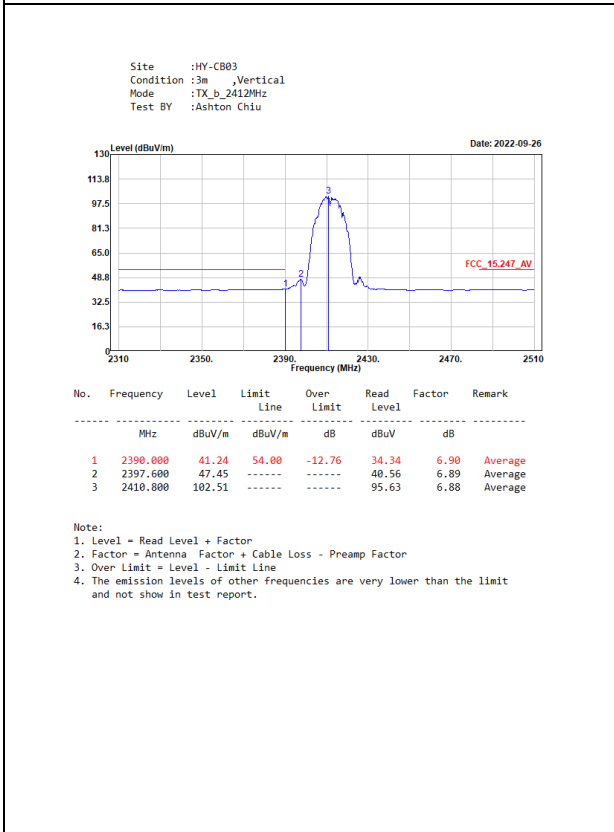
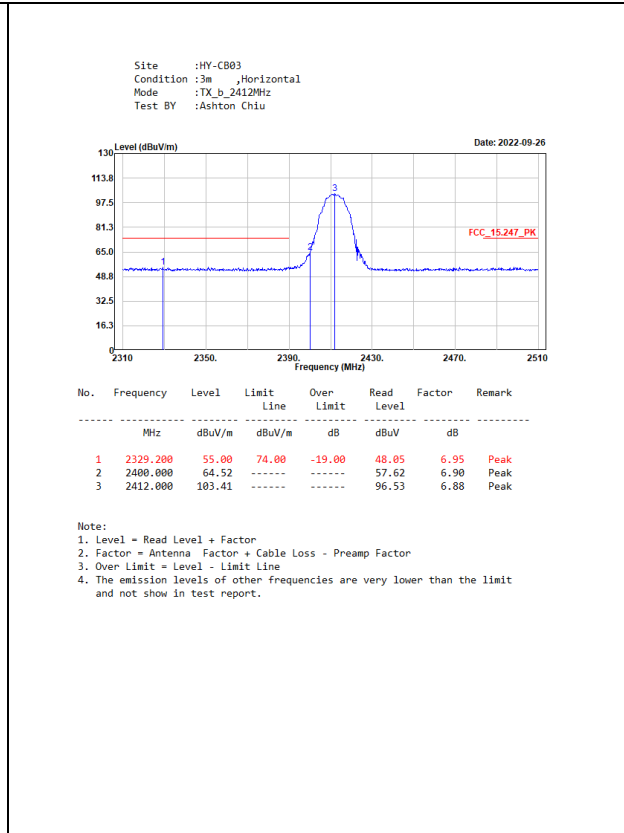
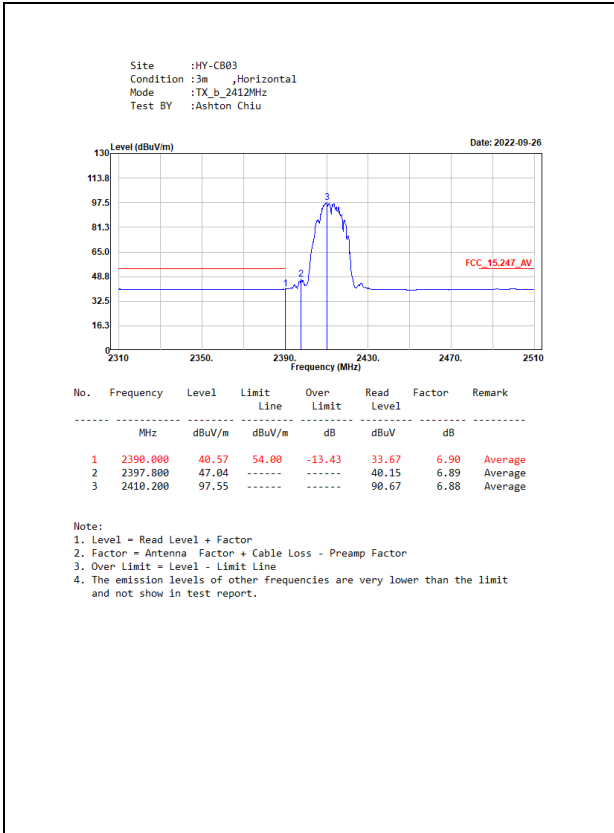
$VBW \geq 1/T$, when duty cycle < 98 %

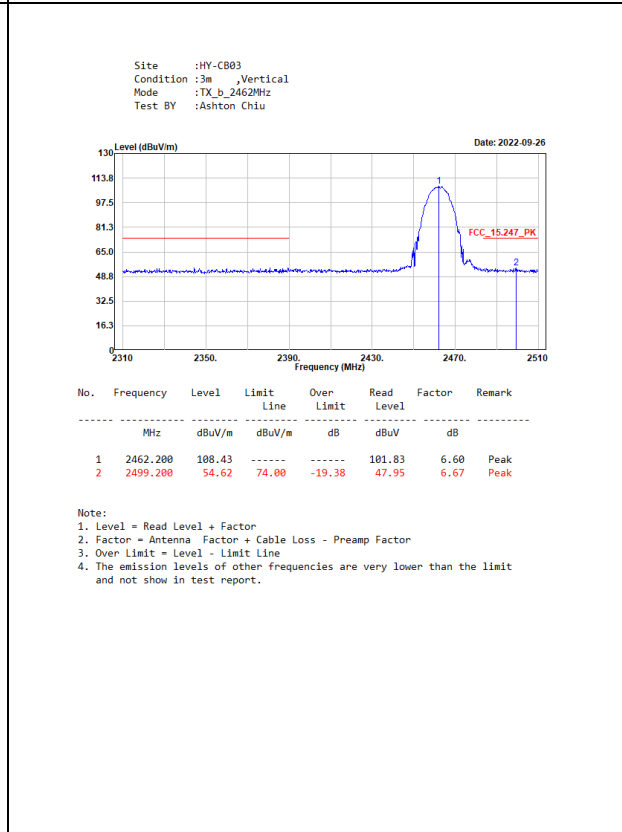
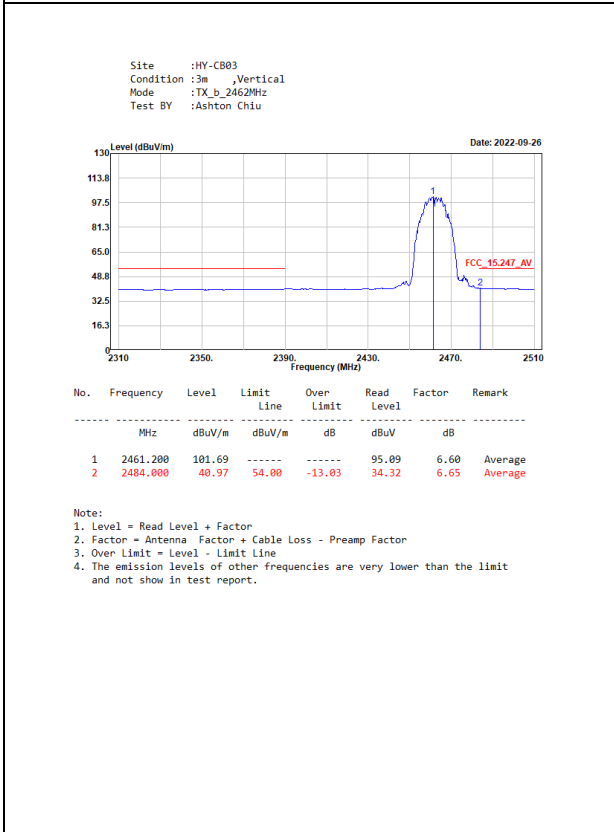
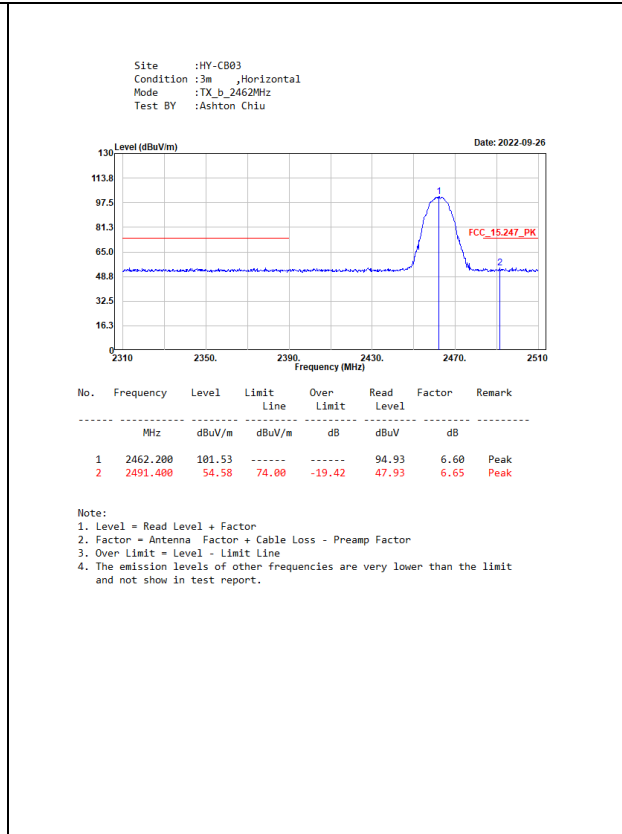
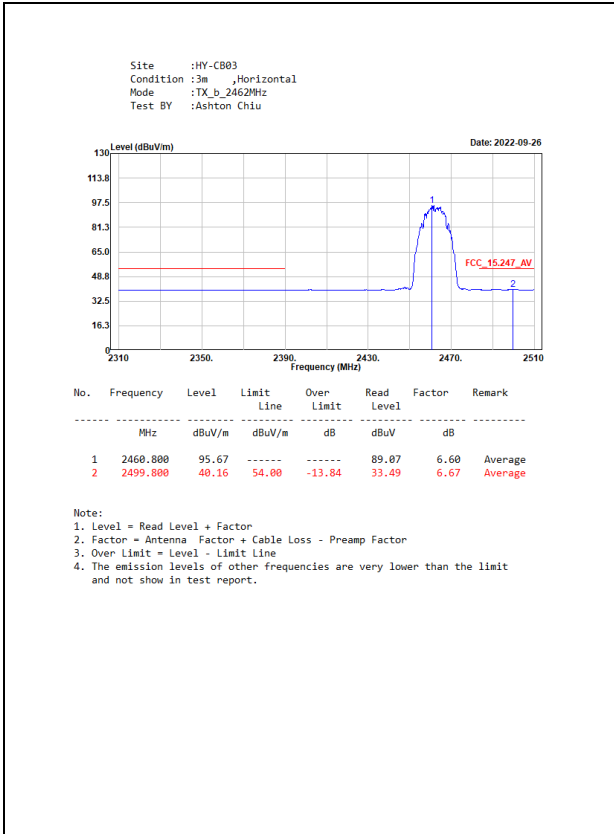
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

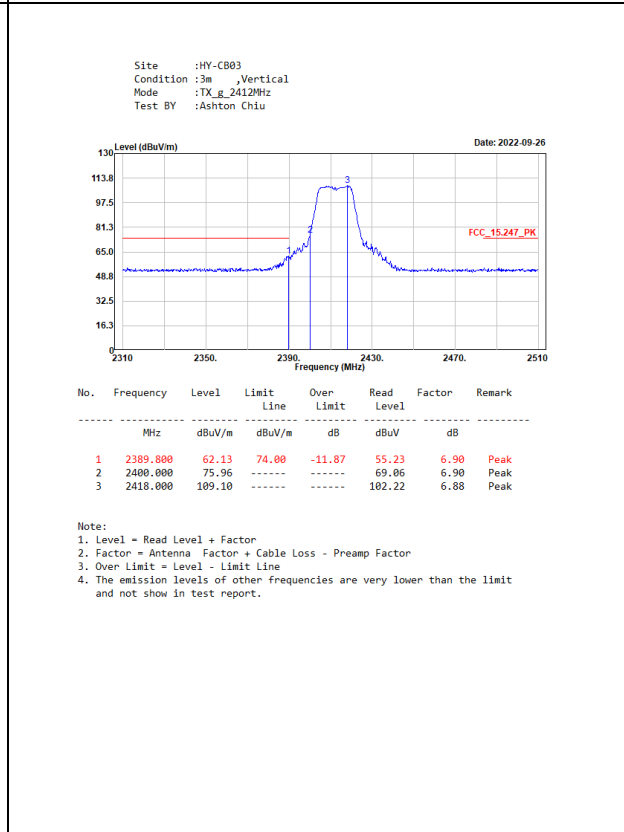
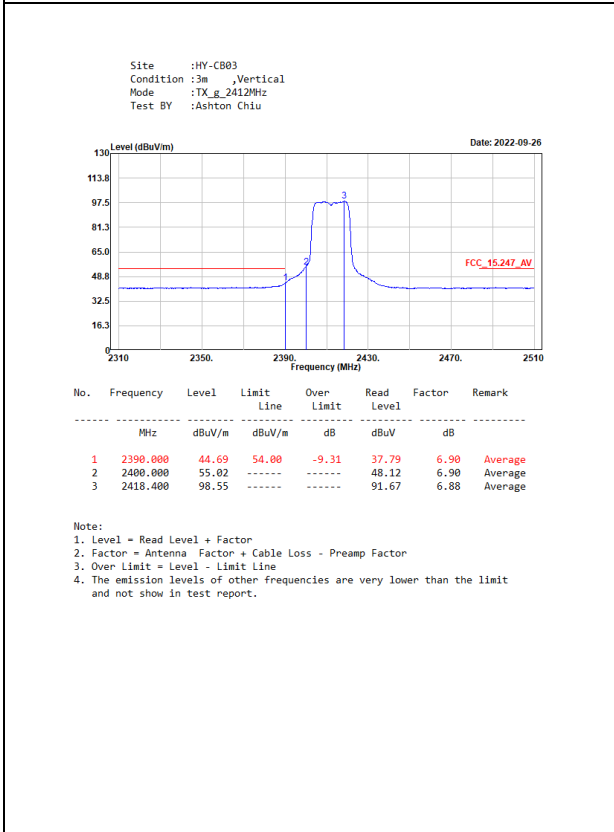
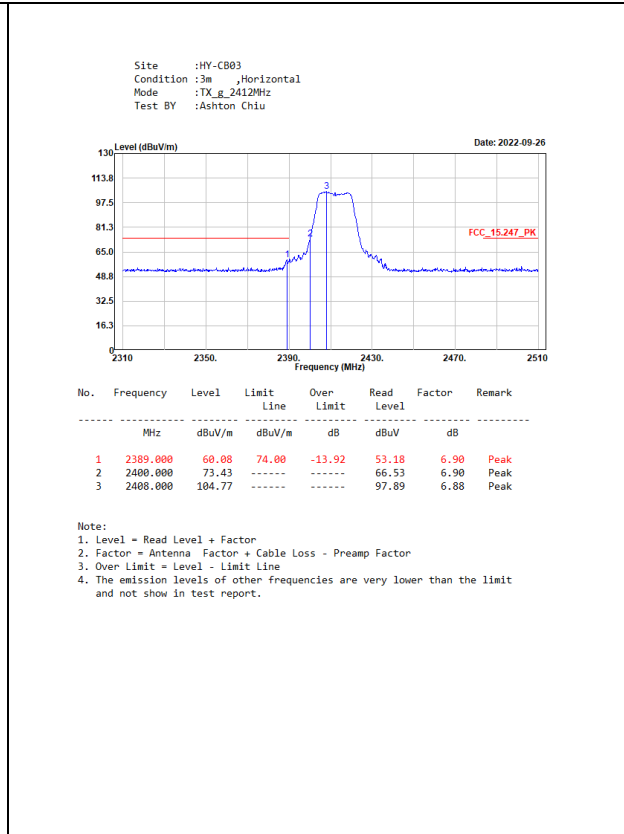
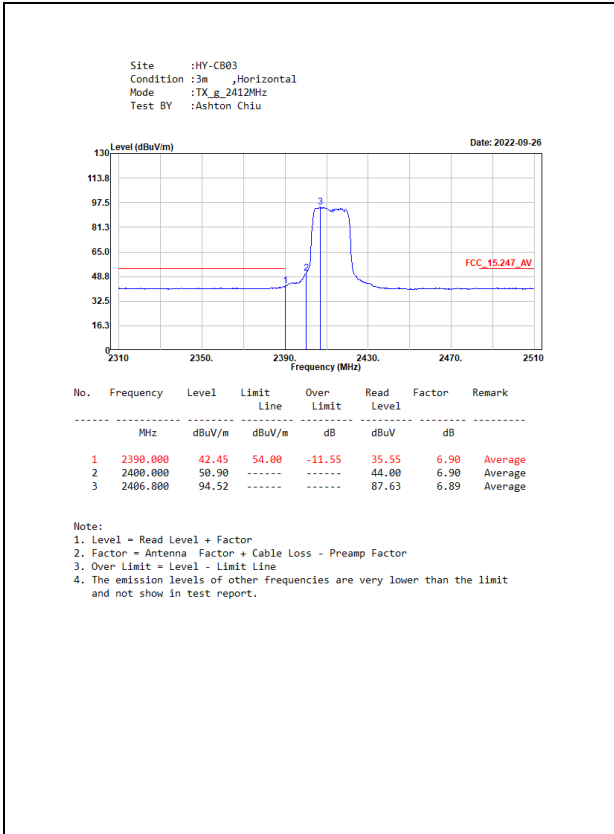
2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11 b	99.03	8.1800	122	10
802.11 g	96.11	1.3600	735	1000
802.11 n20	95.85	1.2700	787	1000
802.11 n40	92.11	0.6300	1587	2000
802.11 ac20	95.72	1.2750	784	1000
802.11 ac40	91.74	0.6330	1580	2000

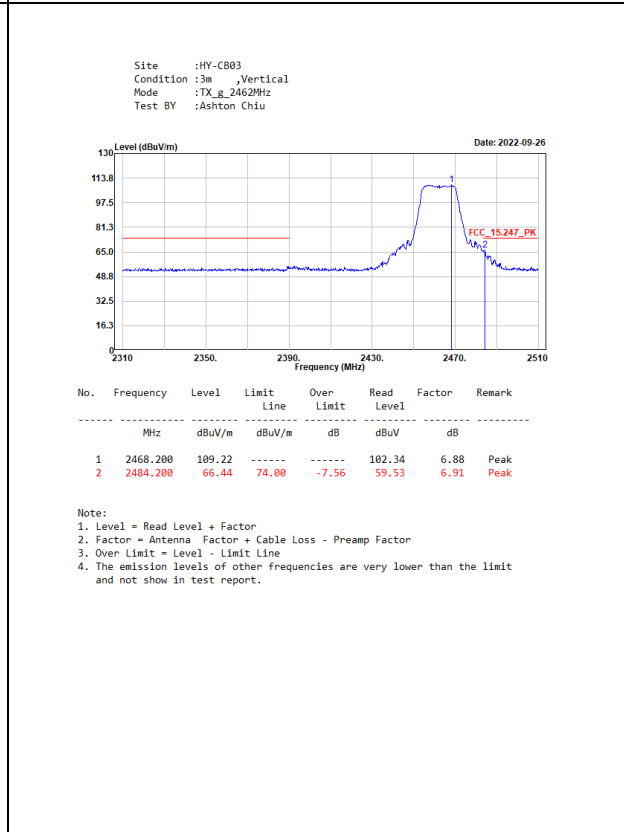
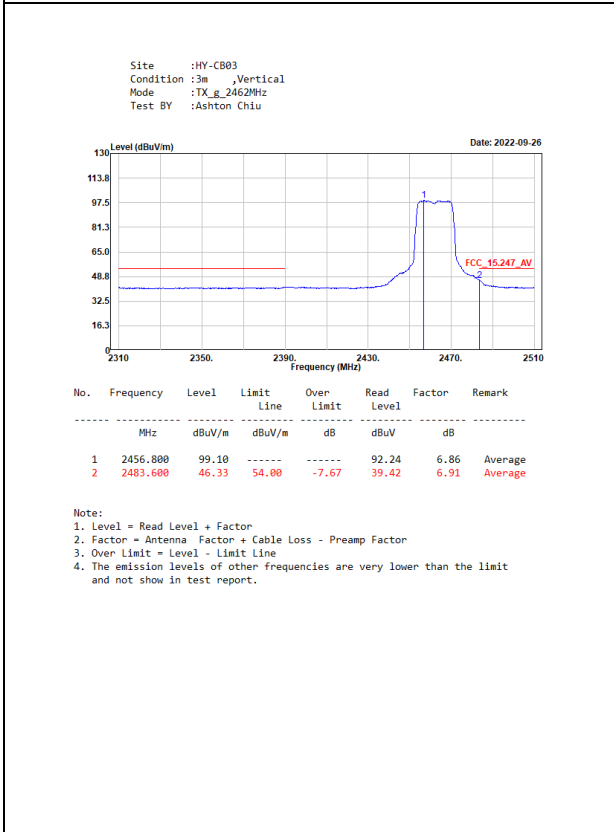
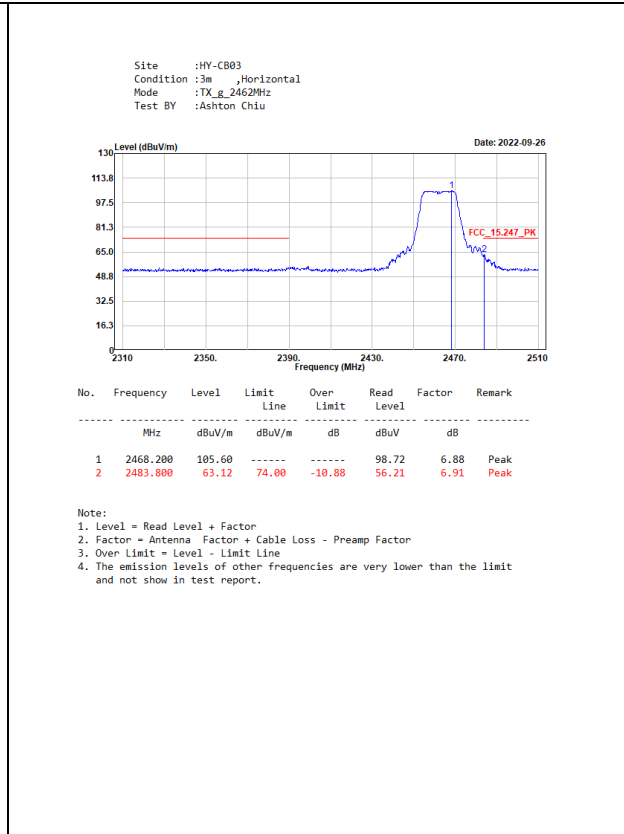
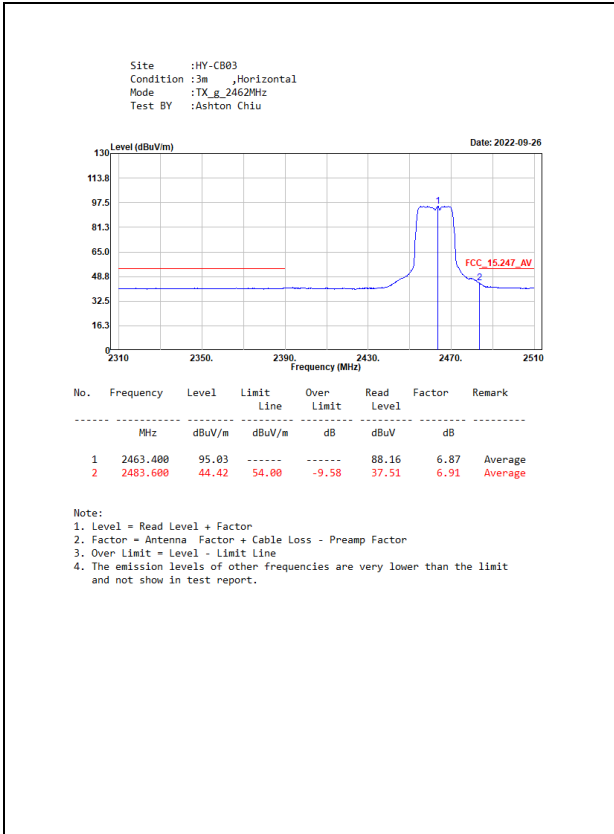
Note: Duty Cycle Refer to Section 9.

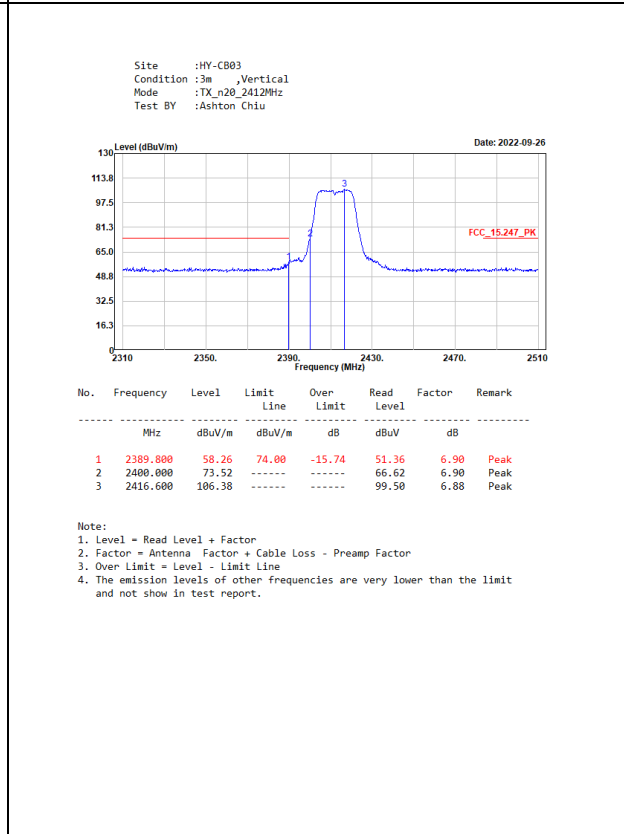
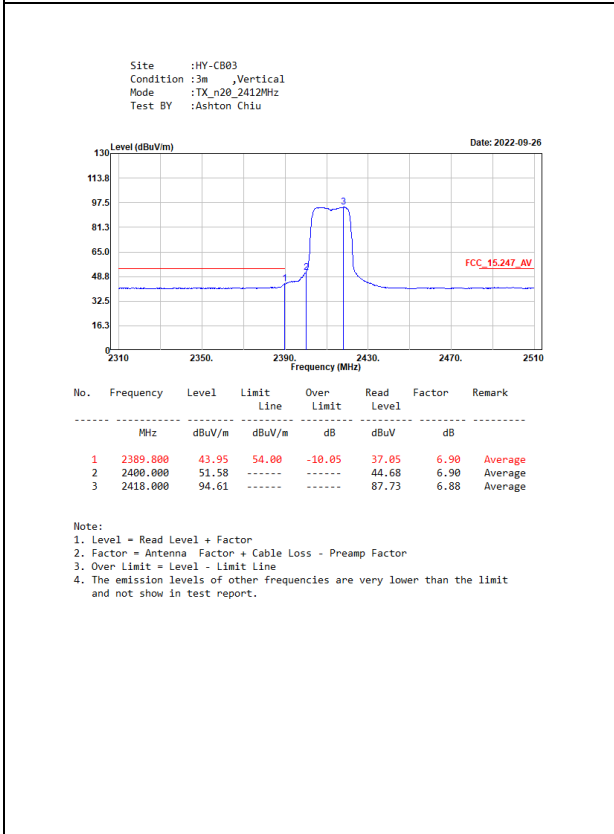
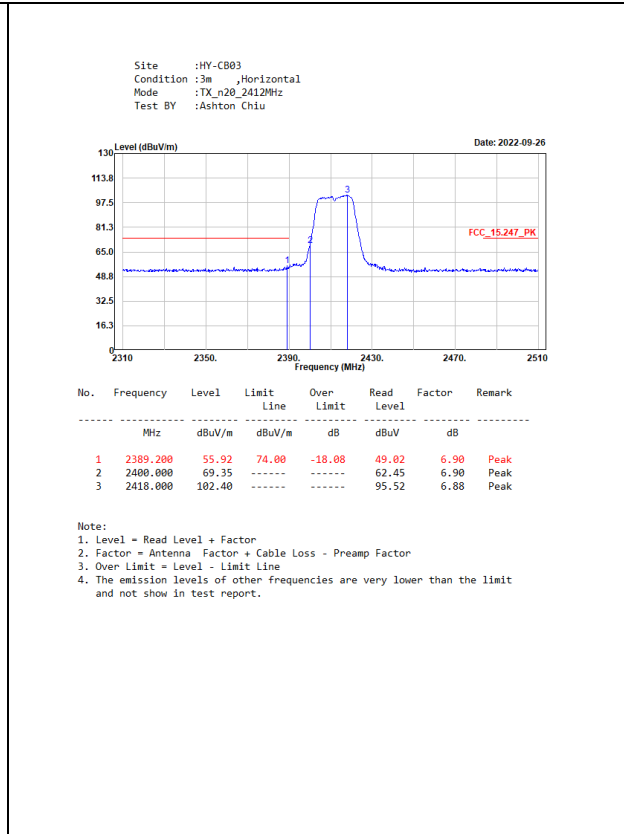
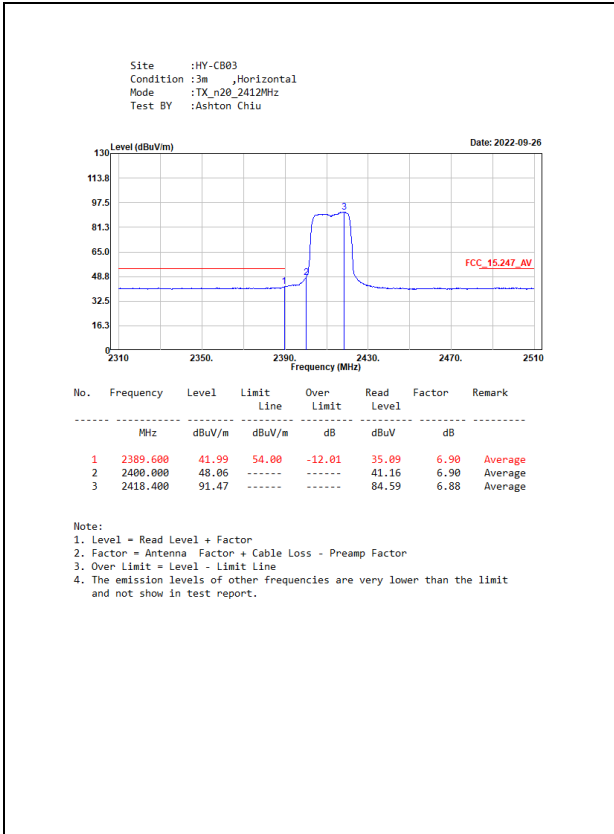
6.4. Test Result of Band Edge

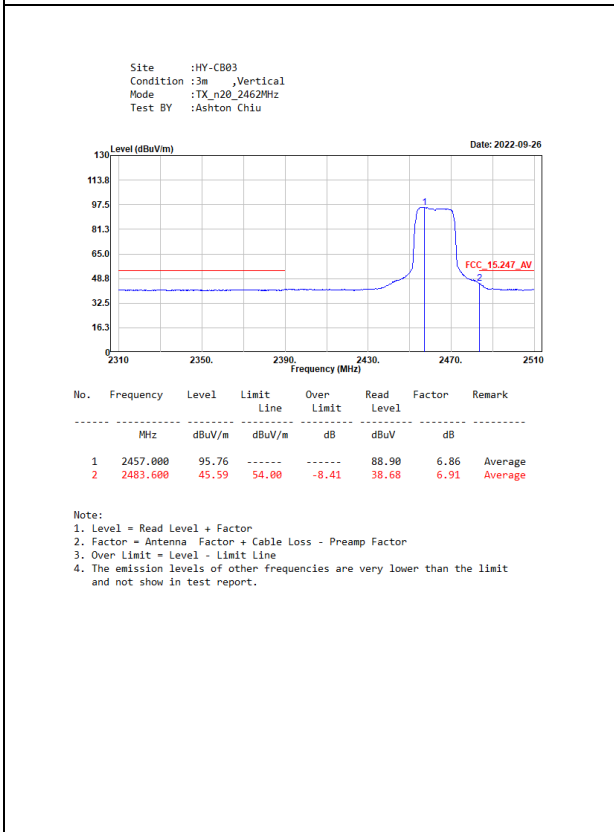
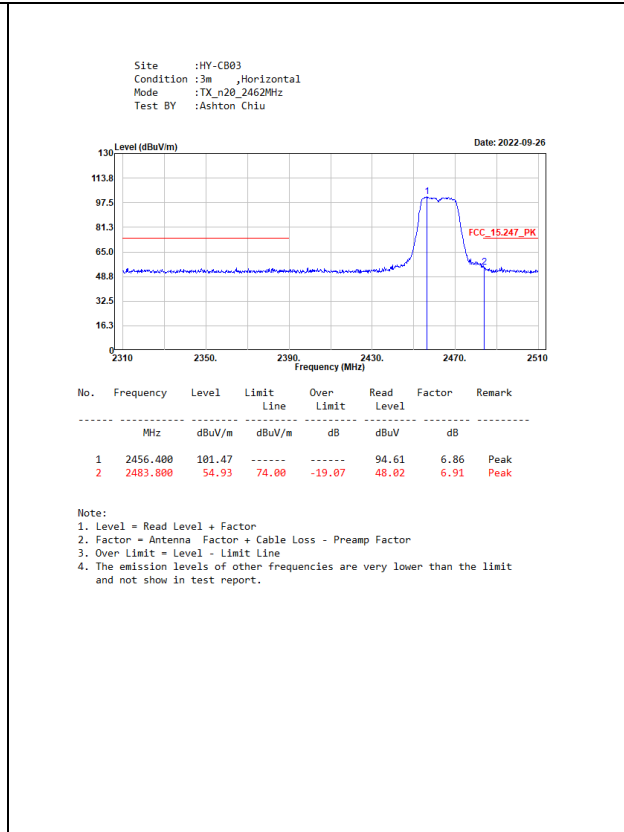
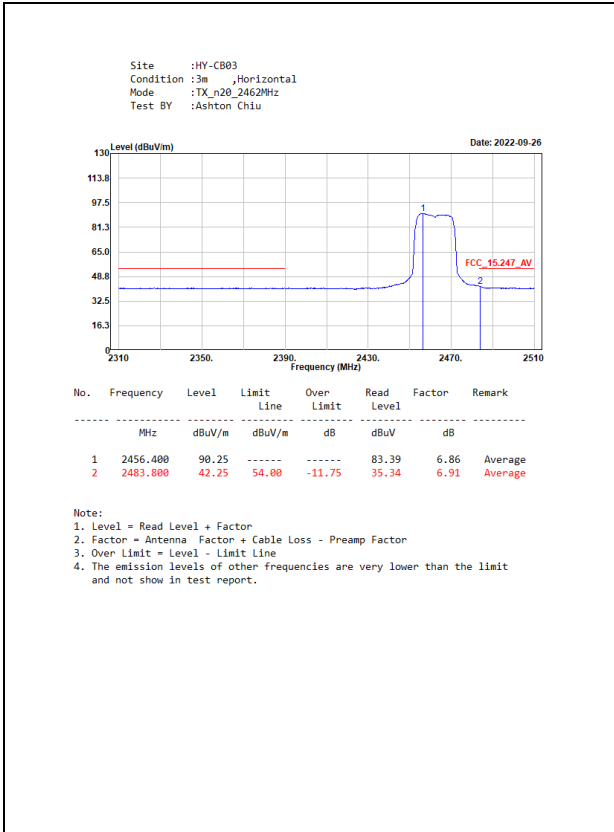


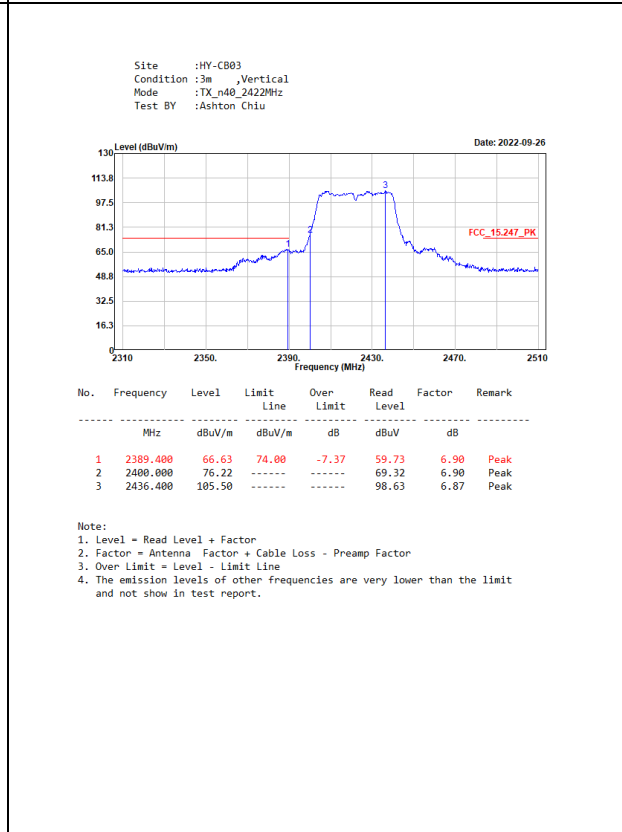
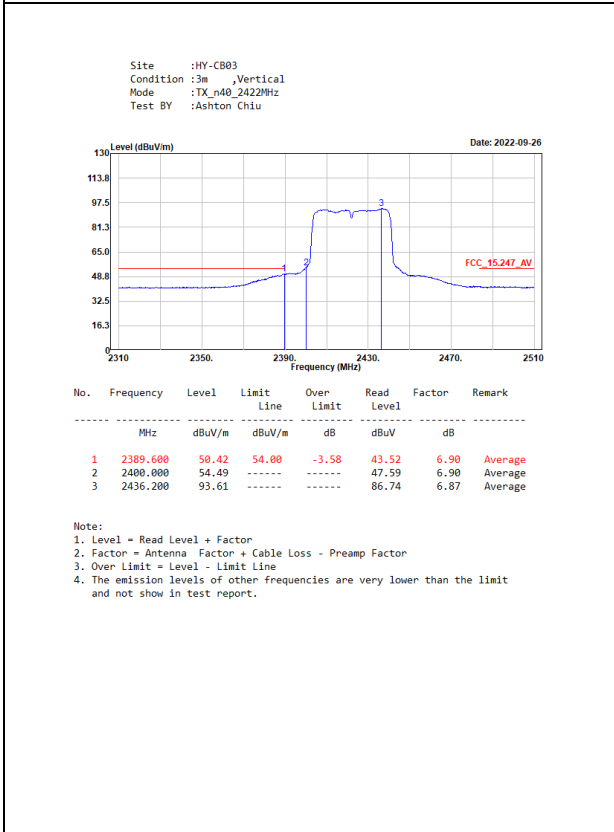
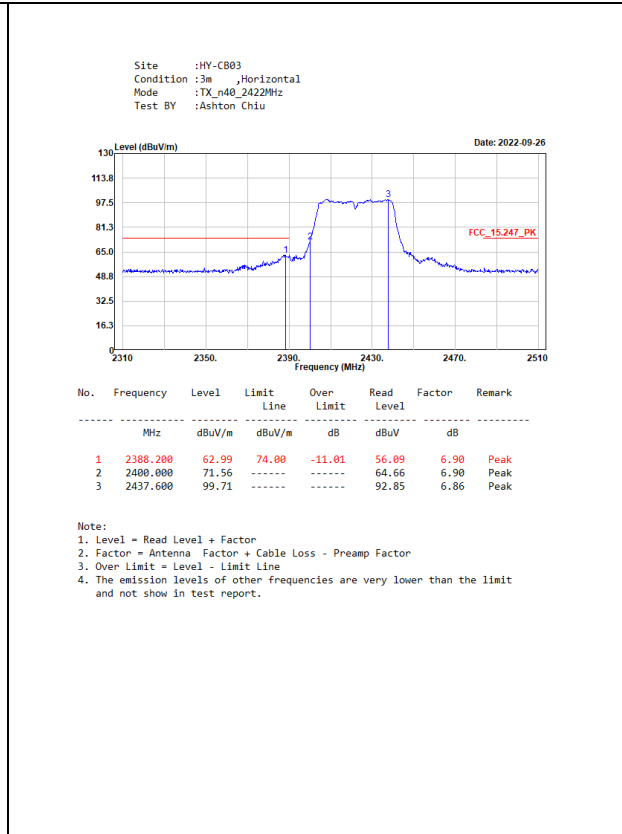
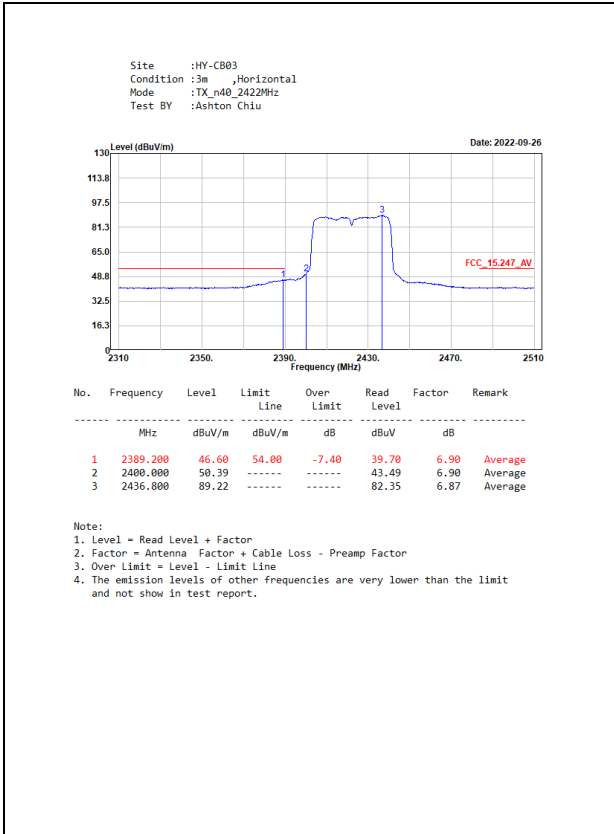


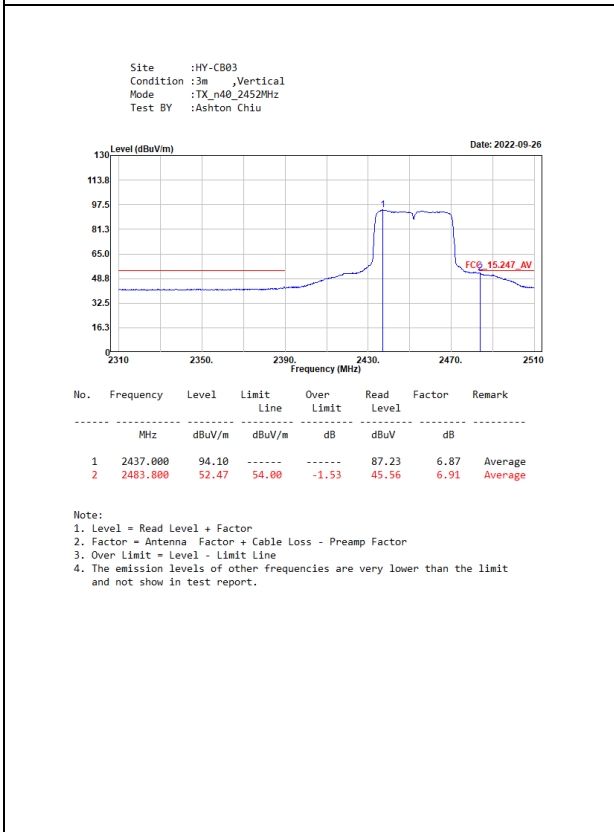
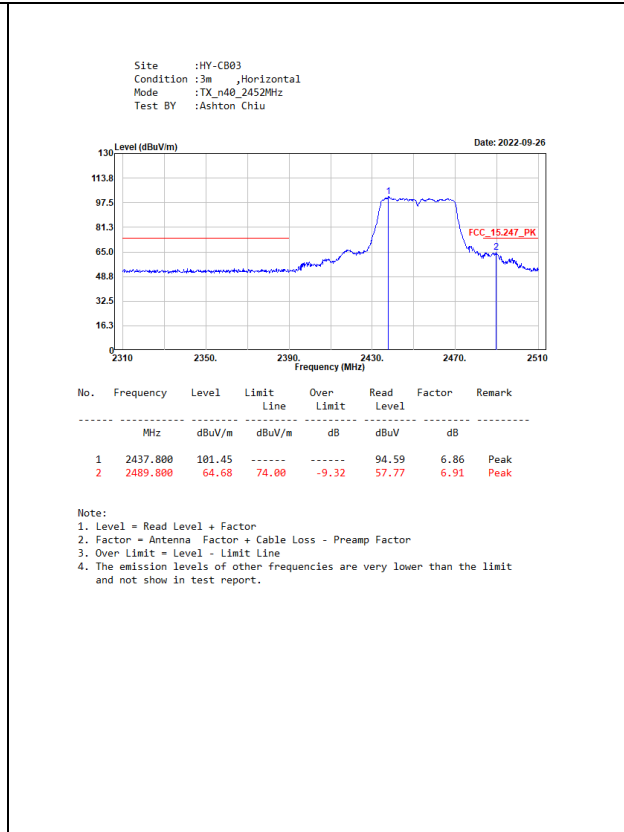
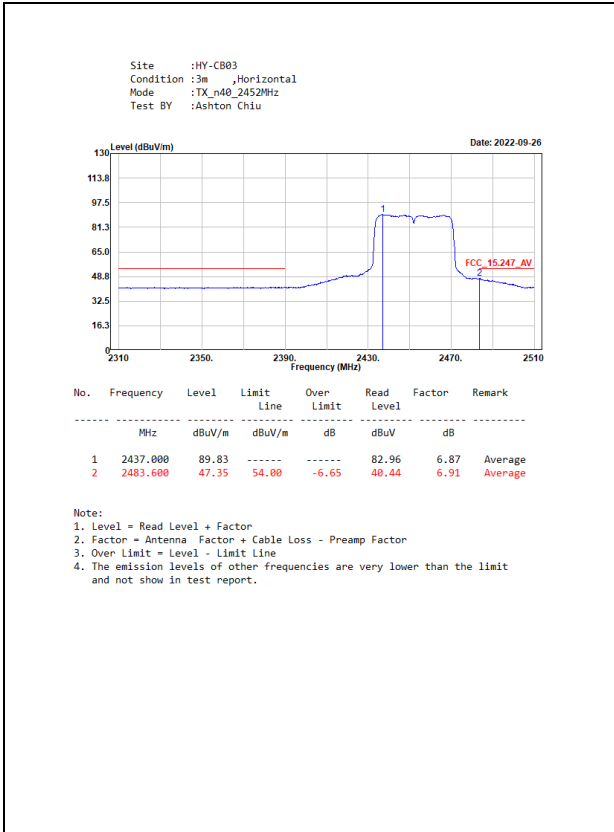


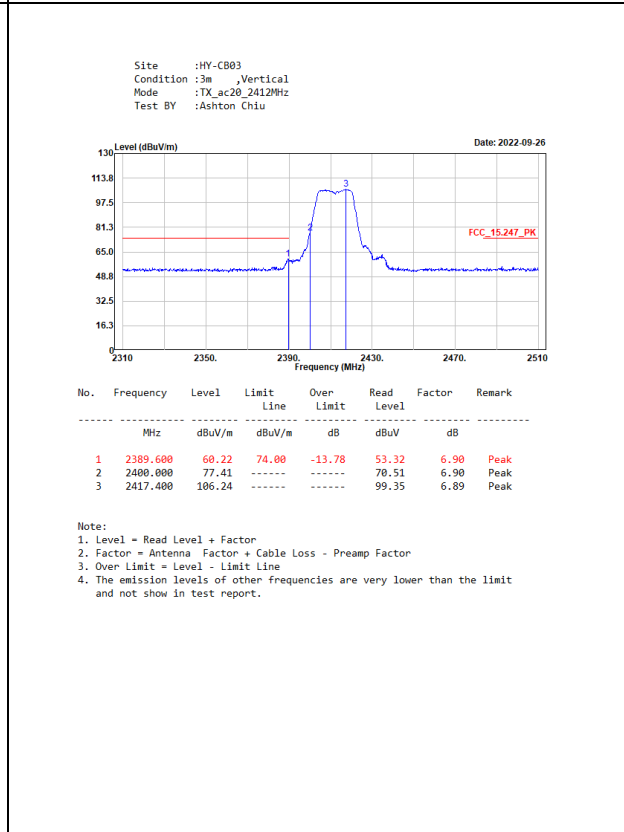
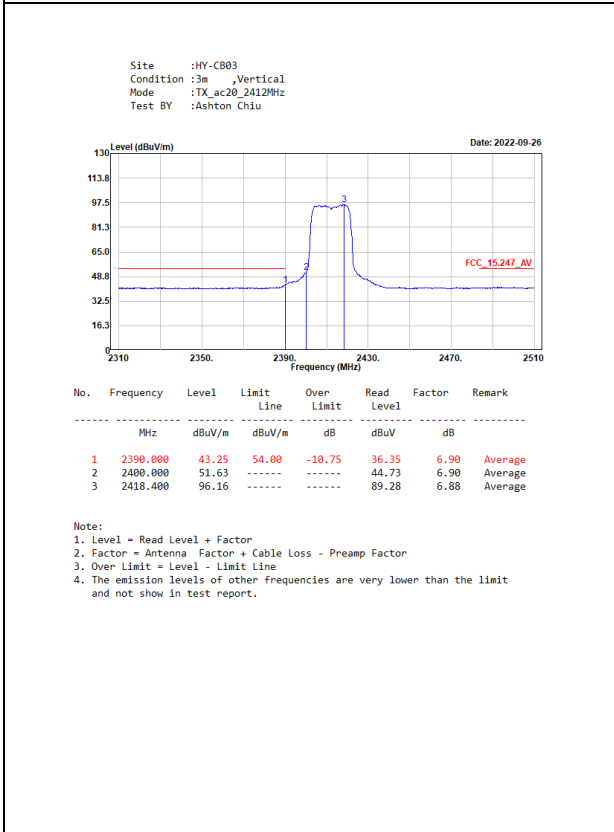
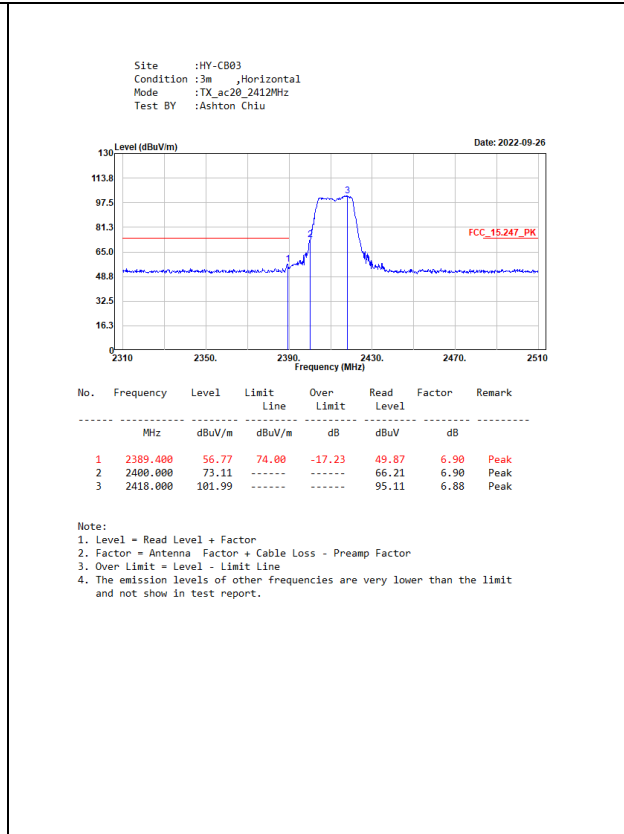
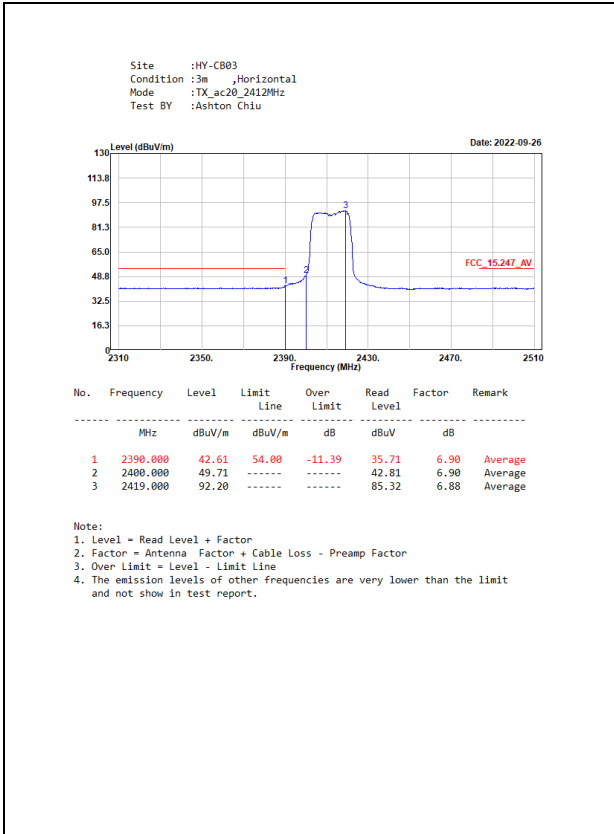


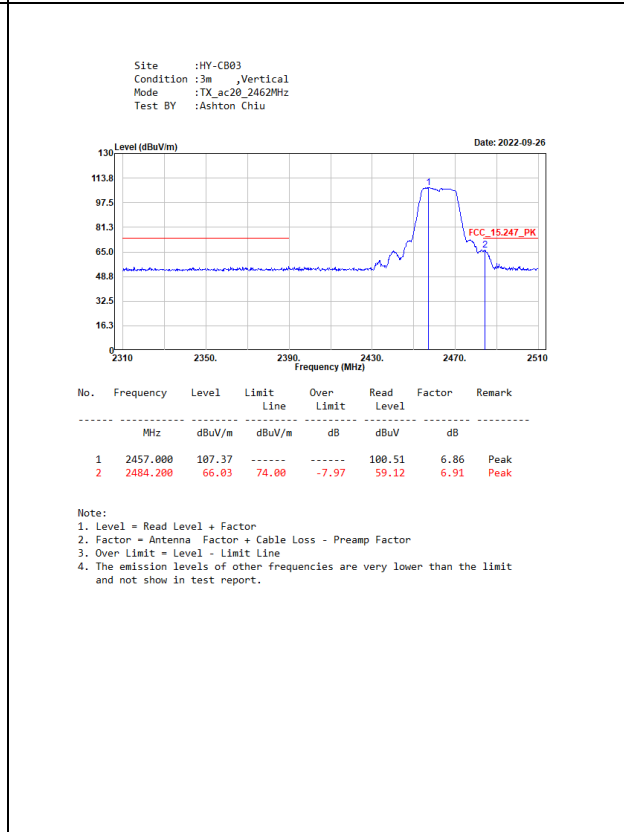
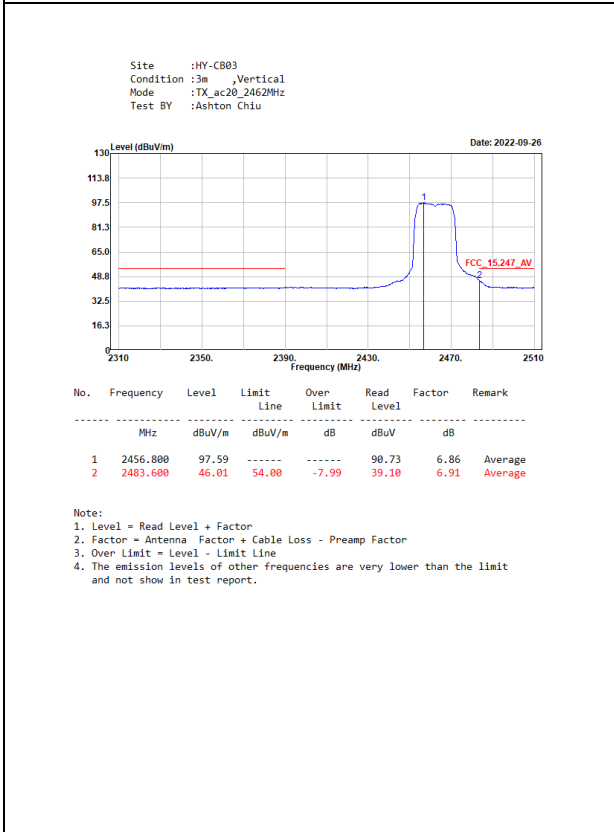
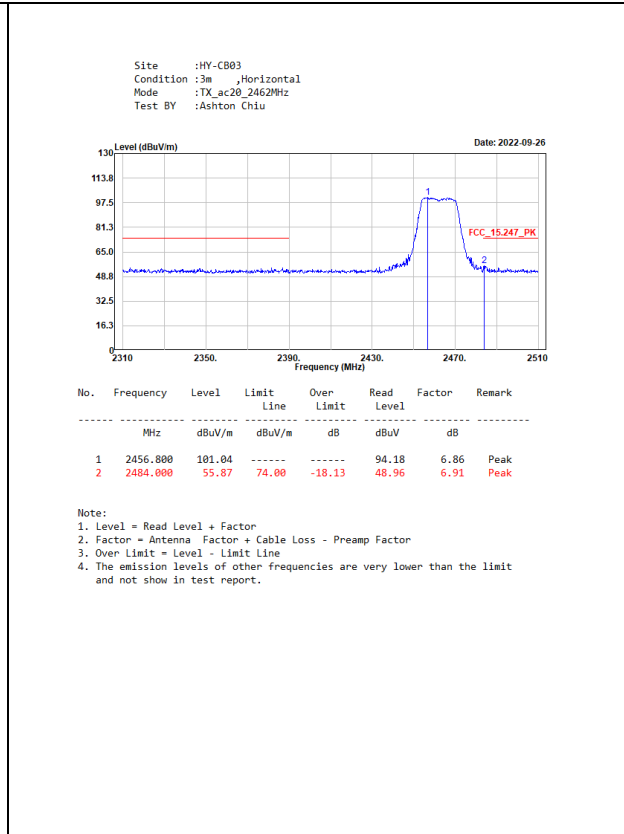
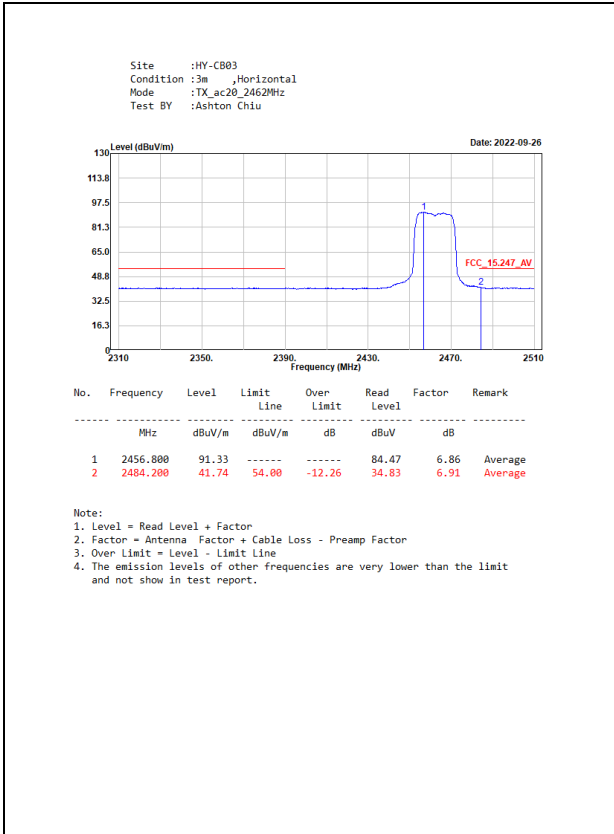


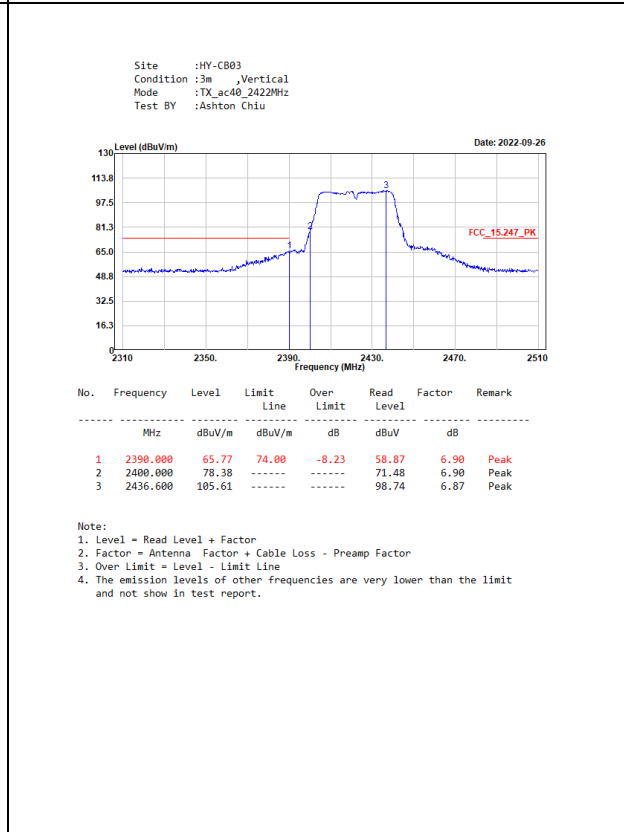
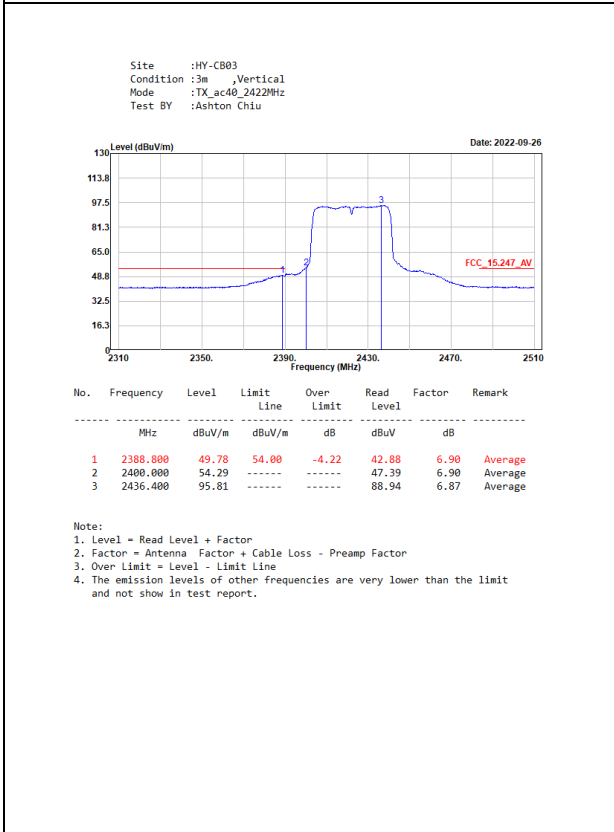
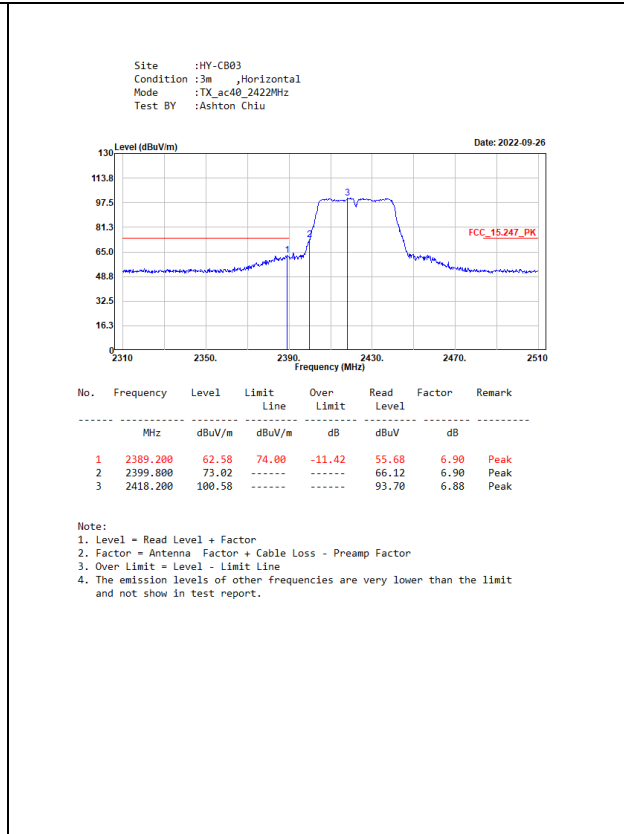
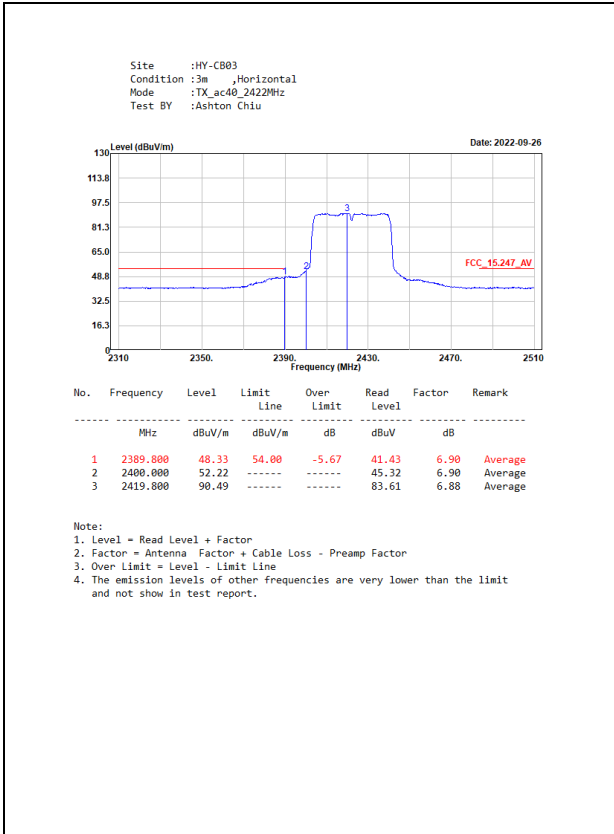


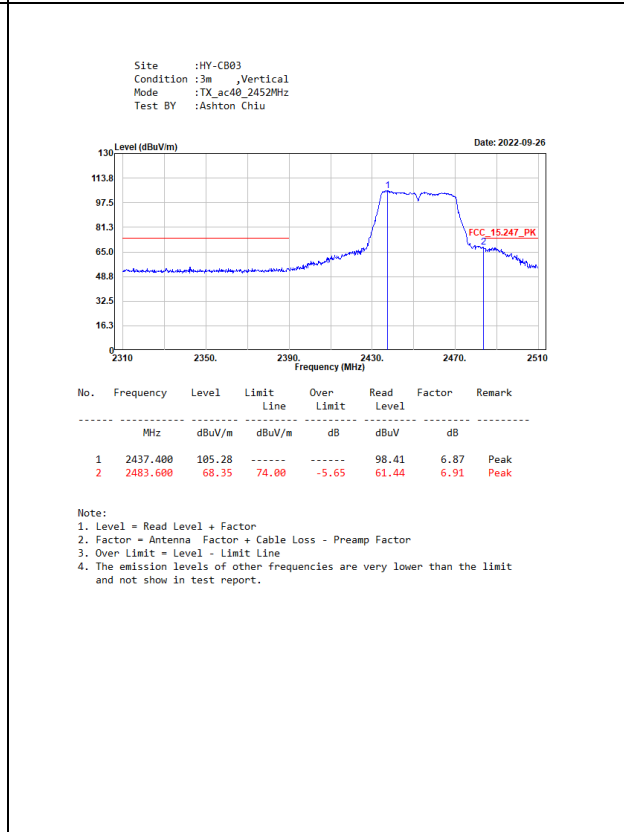
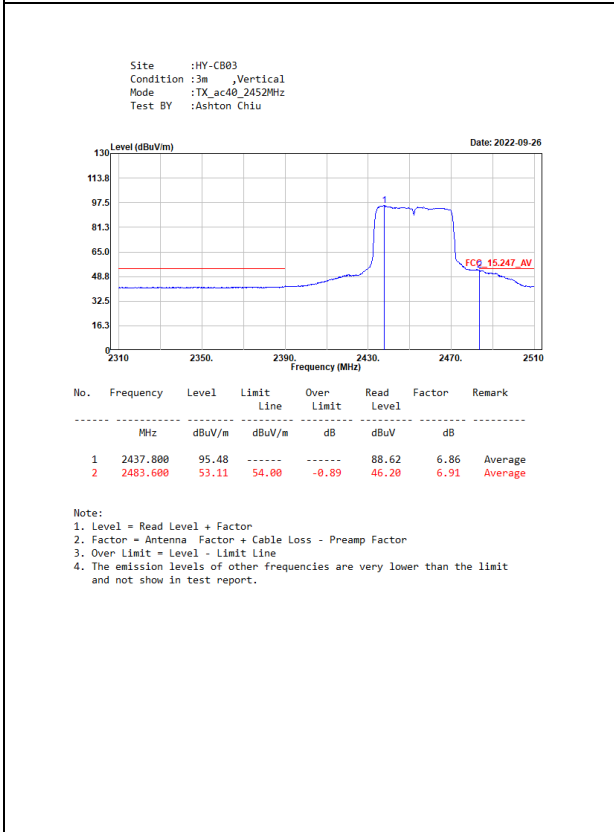
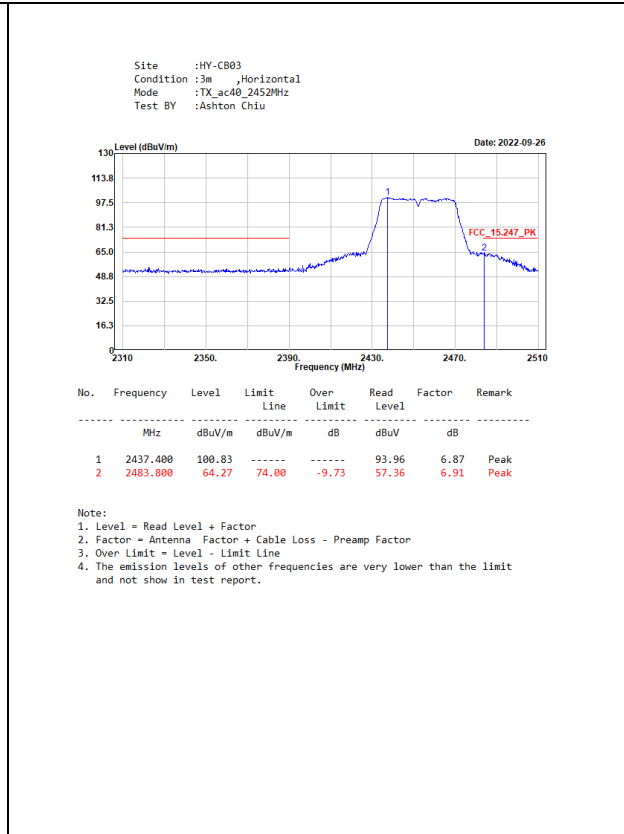
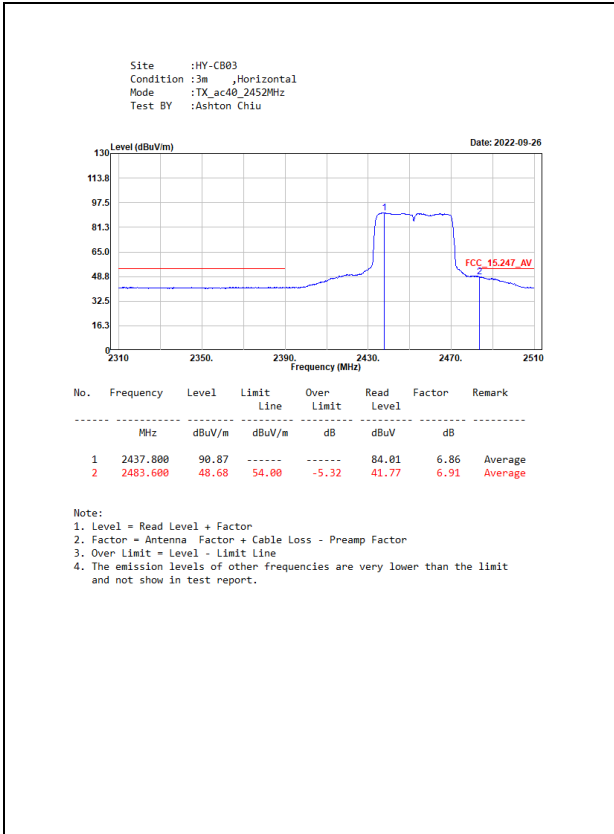






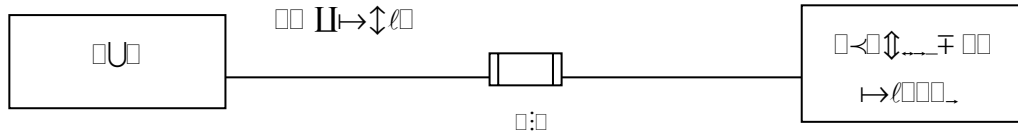






7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

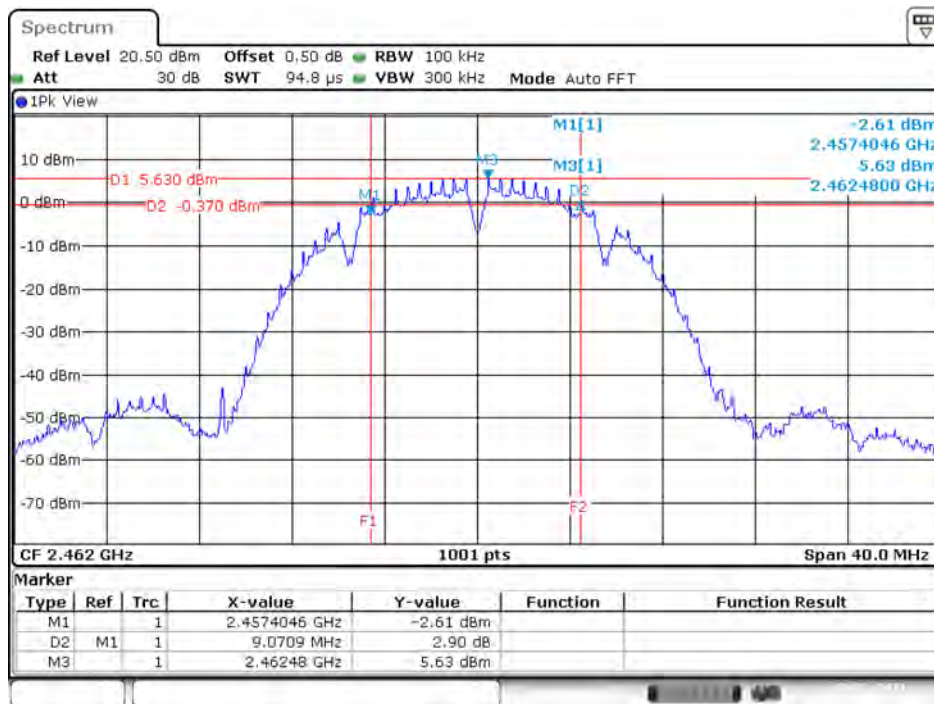
The EUT was setup according to ANSI C63.4, 2014; tested according to ANSI C63.10 Section 11.8 for compliance to FCC 47CFR 15.247 requirements.

7.4. Test Result of 6dB Bandwidth

Product : QCast Mirror
 Test Item : 6dB Bandwidth Data
 Test Mode : Transmit (802.11b)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	A	9550	>500	Pass
06	2437	A	9071	>500	Pass
11	2462	A	9550	>500	Pass
01	2412	B	10070	>500	Pass
06	2437	B	9031	>500	Pass
11	2462	B	9071	>500	Pass

Figure Channel 11:

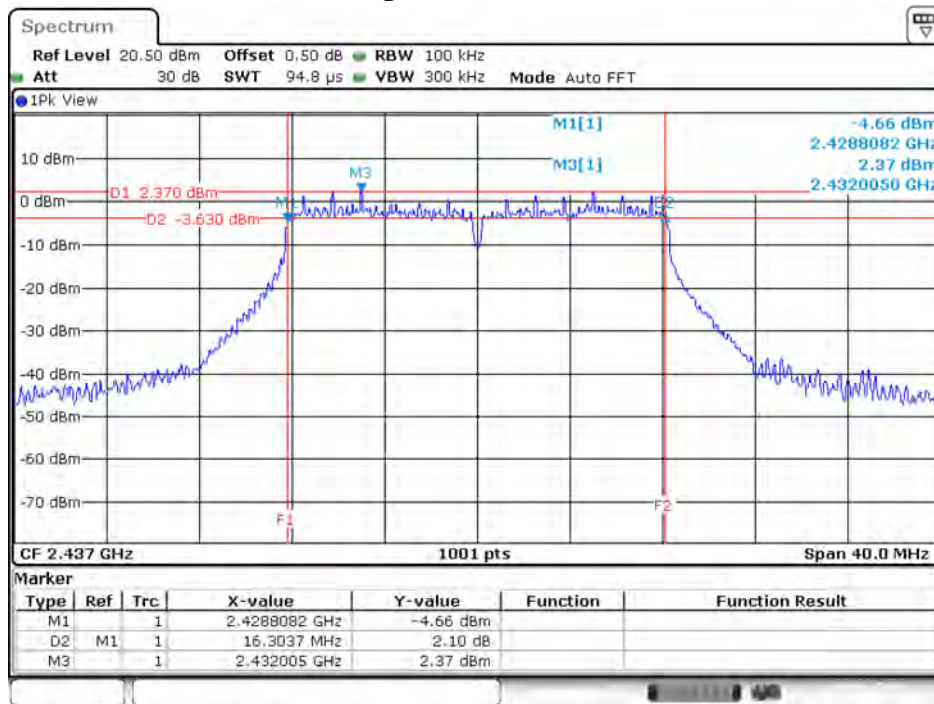


Date: 22.SEP.2022 01:11:57

Product : QCast Mirror
 Test Item : 6dB Bandwidth Data
 Test Mode : Transmit (802.11g)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	A	16344	>500	Pass
06	2437	A	16304	>500	Pass
11	2462	A	16304	>500	Pass
01	2412	B	16304	>500	Pass
06	2437	B	16304	>500	Pass
11	2462	B	16304	>500	Pass

Figure Channel 06:

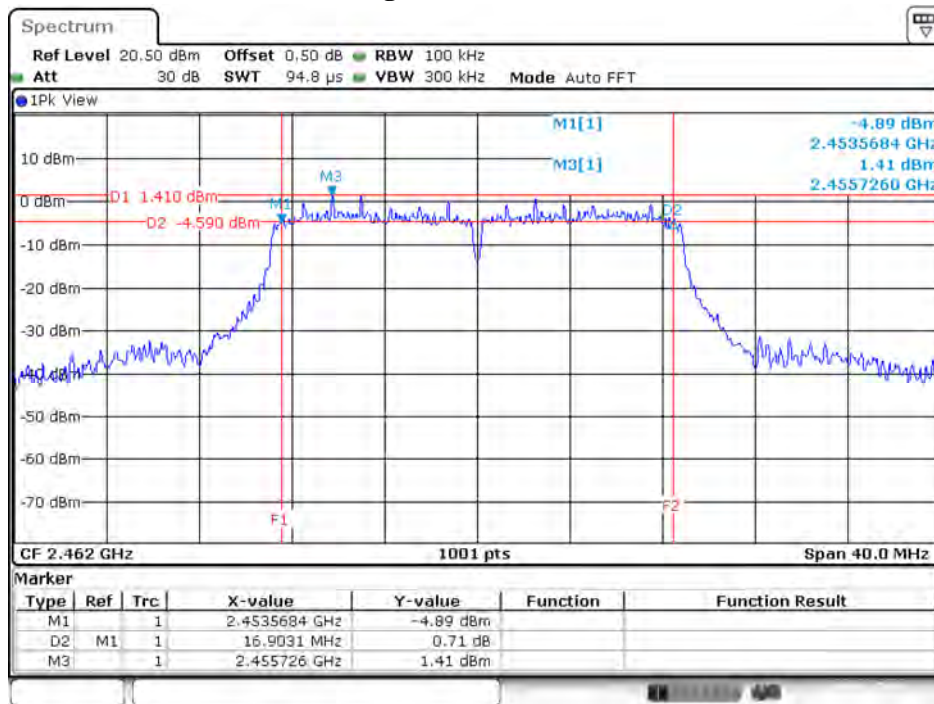


Date: 22.SEP.2022 01:16:47

Product : QCast Mirror
 Test Item : 6dB Bandwidth Data
 Test Mode : Transmit (802.11n-20BW)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	A	17303	>500	Pass
06	2437	A	16903	>500	Pass
11	2462	A	16903	>500	Pass
01	2412	B	16903	>500	Pass
06	2437	B	16903	>500	Pass
11	2462	B	16903	>500	Pass

Figure Channel 11:

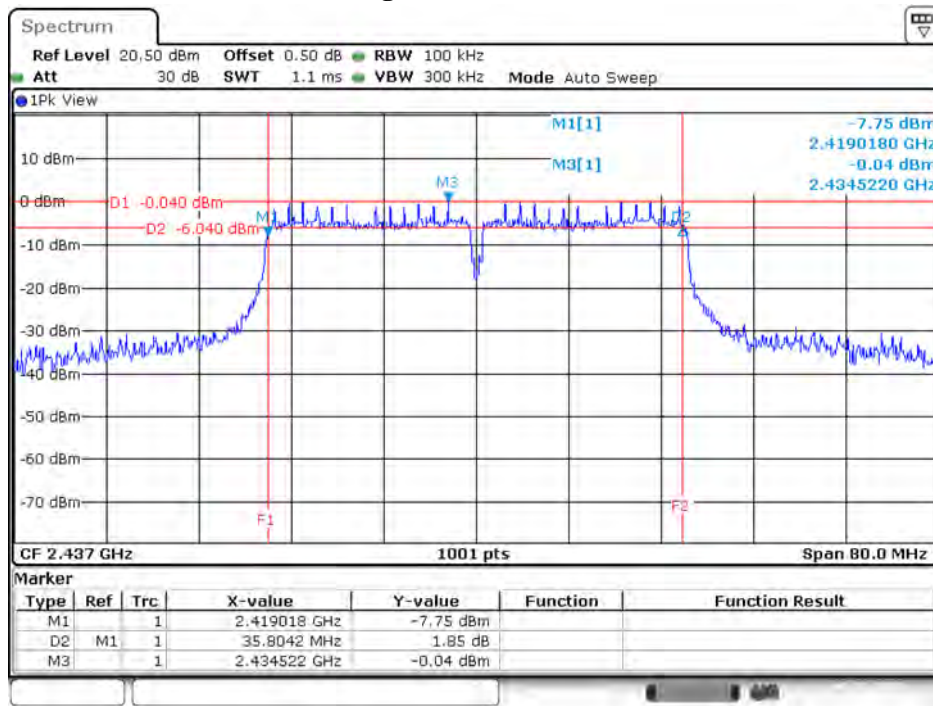


Date: 22.SEP.2022 00:31:40

Product : QCast Mirror
 Test Item : 6dB Bandwidth Data
 Test Mode : Transmit (802.11n-40BW)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	Measurement Level (kHz)	Required Limit (kHz)	Result
03	2422	A	35804	>500	Pass
06	2437	A	35804	>500	Pass
09	2452	A	35804	>500	Pass
03	2422	B	36044	>500	Pass
06	2437	B	36044	>500	Pass
09	2452	B	36044	>500	Pass

Figure Channel 06:

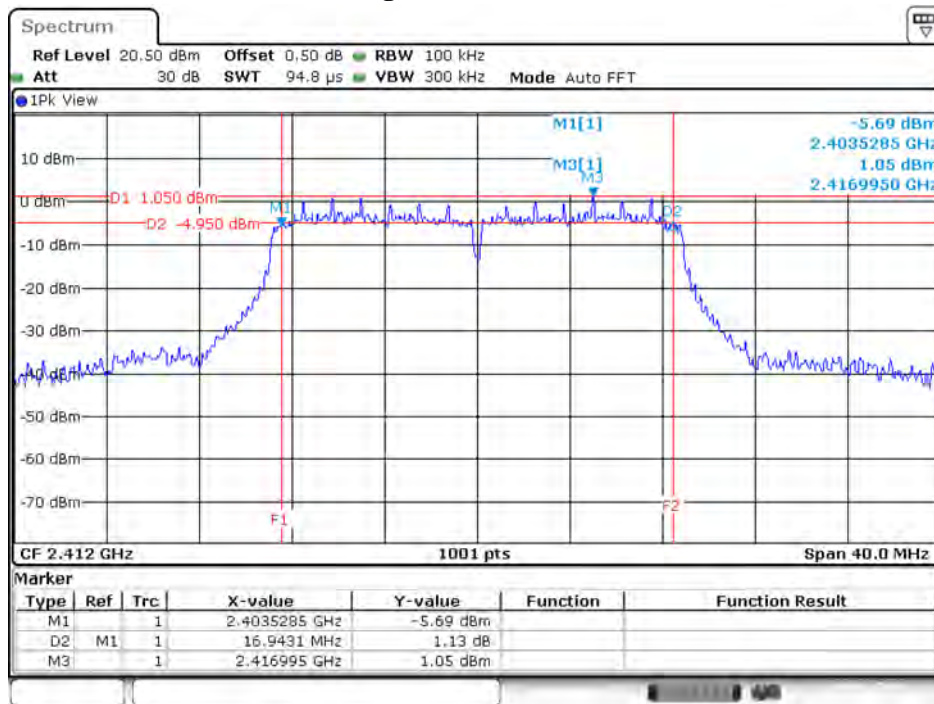


Date: 22.SEP 2022 00:39:15

Product : QCast Mirror
 Test Item : 6dB Bandwidth Data
 Test Mode : Transmit (802.11ac-20BW)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	A	16943	>500	Pass
06	2437	A	16903	>500	Pass
11	2462	A	17183	>500	Pass
01	2412	B	16903	>500	Pass
06	2437	B	16903	>500	Pass
11	2462	B	16544	>500	Pass

Figure Channel 01:

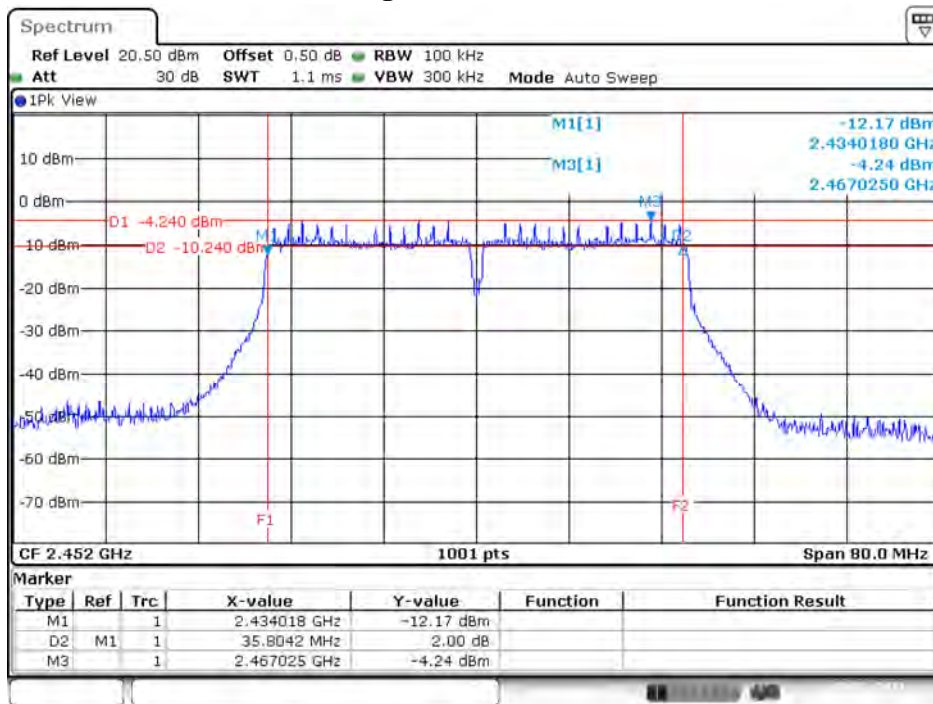


Date: 22.SEP.2022 00:45:28

Product : QCast Mirror
 Test Item : 6dB Bandwidth Data
 Test Mode : Transmit (802.11ac-40BW)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	Measurement Level (kHz)	Required Limit (kHz)	Result
03	2422	A	36044	>500	Pass
06	2437	A	36044	>500	Pass
09	2452	A	36044	>500	Pass
03	2422	B	35804	>500	Pass
06	2437	B	35804	>500	Pass
09	2452	B	35804	>500	Pass

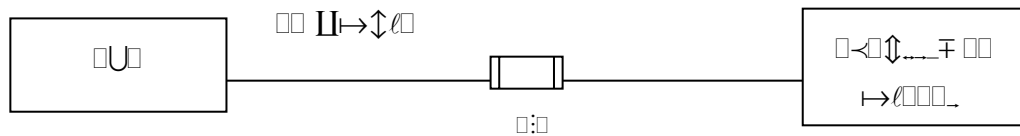
Figure Channel 09:



Date: 22.SEP.2022 01:50:26

8. Power Density

8.1. Test Setup



8.2. Limits

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using C63.10 Section 11.10.2 Method PKPSD (peak PSD)

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

2400MHz: Directional gain = 5.68 dBi, Limit= 8dBm

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

8.4. Test Result of Power Density

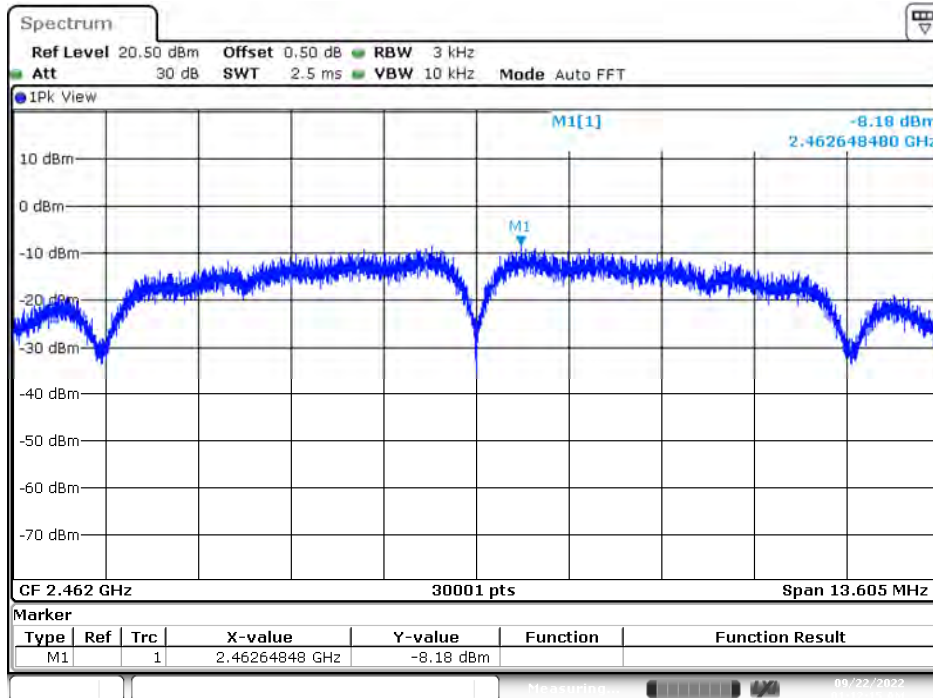
Product : QCast Mirror
 Test Item : Power Density Data
 Test Mode : Transmit (802.11b)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Total PPSD (dBm)	Limit (dBm)	Result
01	2412	A	-9.470	3.010	-6.460	>8	Pass
		B	-8.520	3.010	-5.510	>8	Pass
06	2437	A	-9.420	3.010	-6.410	>8	Pass
		B	-8.620	3.010	-5.610	>8	Pass
11	2462	A	-9.150	3.010	-6.140	>8	Pass
		B	-8.180	3.010	-5.170	>8	Pass

Note:

The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 11



Date: 22.SEP.2022 01:12:16

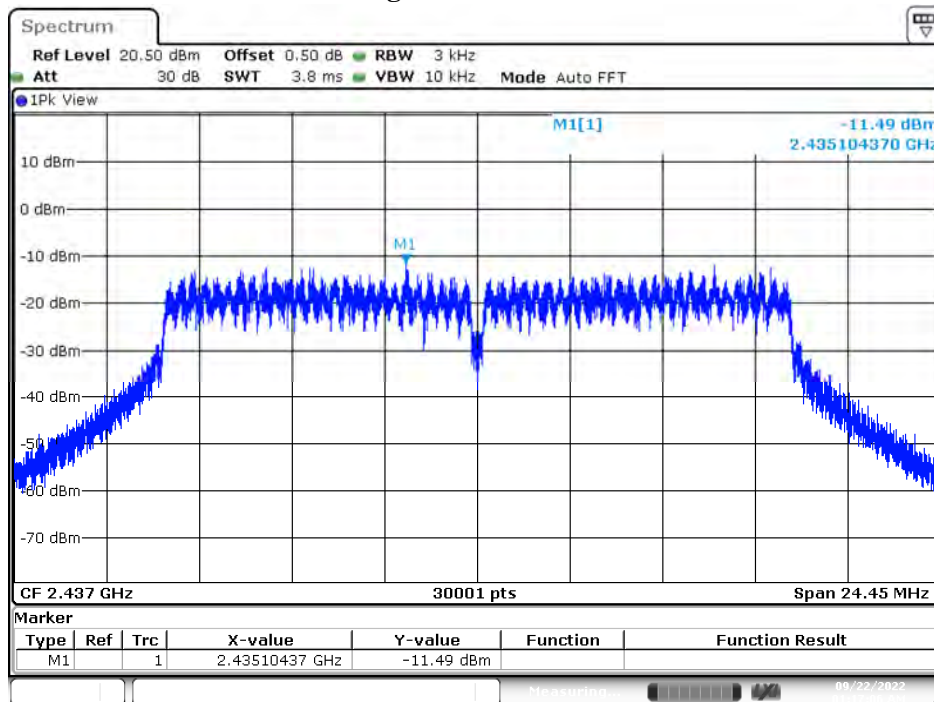
Product : QCast Mirror
 Test Item : Power Density Data
 Test Mode : Transmit (802.11g)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Total PPSD (dBm)	Limit (dBm)	Result
01	2412	A	-14.170	3.010	-11.160	>8	Pass
		B	-12.270	3.010	-9.260	>8	Pass
06	2437	A	-12.290	3.010	-9.280	>8	Pass
		B	-11.490	3.010	-8.480	>8	Pass
11	2462	A	-12.200	3.010	-9.190	>8	Pass
		B	-11.560	3.010	-8.550	>8	Pass

Note:

The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 06



Date: 22.SEP.2022 01:17:06

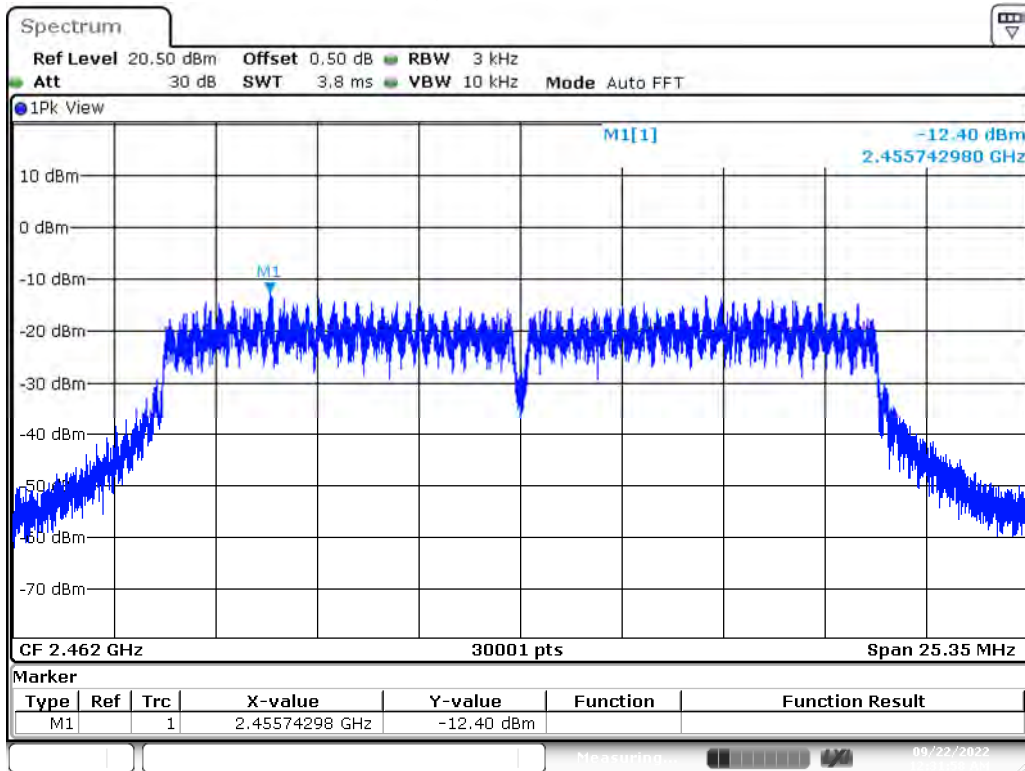
Product : QCast Mirror
 Test Item : Power Density Data
 Test Mode : Transmit (802.11n-20BW)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Total PPSD (dBm)	Limit (dBm)	Result
01	2412	A	-13.120	3.010	-10.110	>8	Pass
		B	-13.250	3.010	-10.240	>8	Pass
06	2437	A	-12.790	3.010	-9.780	>8	Pass
		B	-12.550	3.010	-9.540	>8	Pass
11	2462	A	-12.400	3.010	-9.390	>8	Pass
		B	-12.650	3.010	-9.640	>8	Pass

Note:

The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 11



Date: 22.SEP.2022 00:31:59

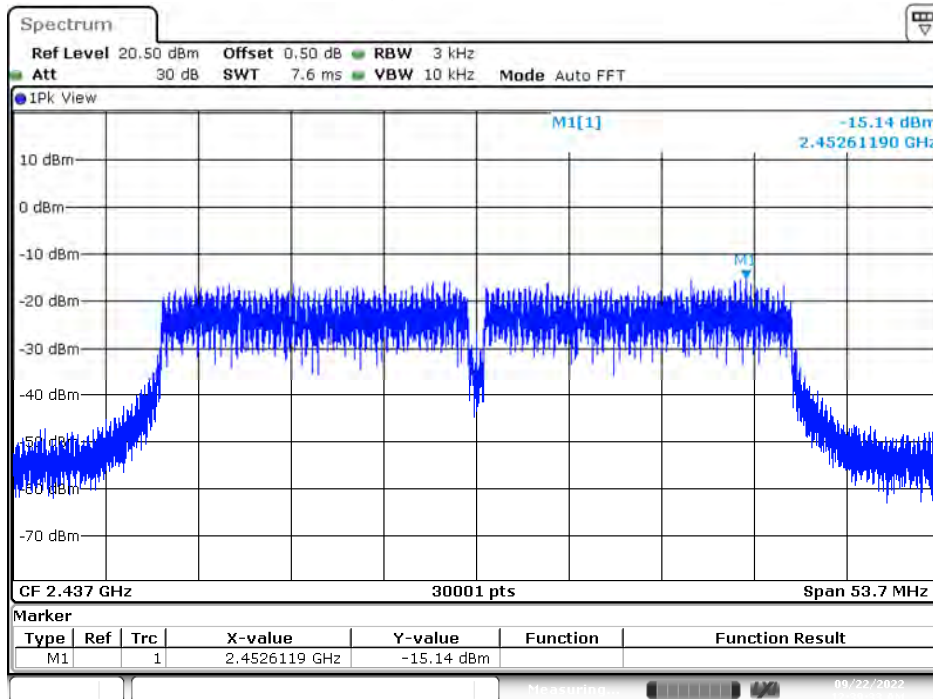
Product : QCast Mirror
 Test Item : Power Density Data
 Test Mode : Transmit (802.11n-40BW)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Total PPSD (dBm)	Limit (dBm)	Result
03	2422	A	-15.450	3.010	-12.440	>8	Pass
		B	-17.000	3.010	-13.990	>8	Pass
06	2437	A	-15.140	3.010	-12.130	>8	Pass
		B	-16.940	3.010	-13.930	>8	Pass
09	2452	A	-15.140	3.010	-12.130	>8	Pass
		B	-15.830	3.010	-12.820	>8	Pass

Note:

The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 06



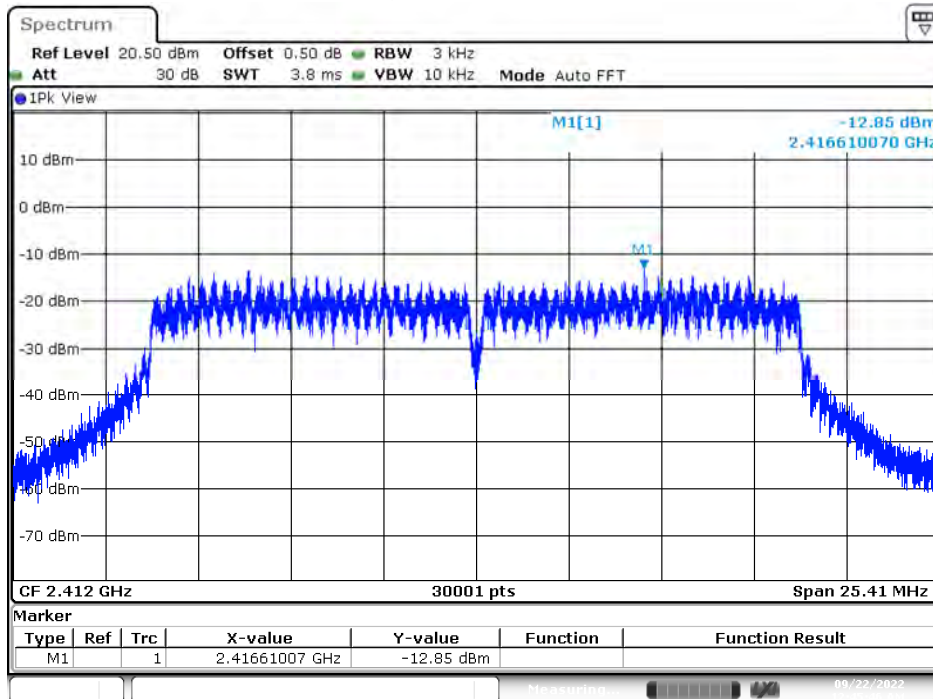
Date: 22.SEP.2022 00:39:33

Product : QCast Mirror
 Test Item : Power Density Data
 Test Mode : Transmit (802.11ac-20BW)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Total PPSD (dBm)	Limit (dBm)	Result
01	2412	A	-12.850	3.010	-9.840	>8	Pass
		B	-13.540	3.010	-10.530	>8	Pass
06	2437	A	-13.310	3.010	-10.300	>8	Pass
		B	-13.290	3.010	-10.280	>8	Pass
11	2462	A	-13.310	3.010	-10.300	>8	Pass
		B	-13.390	3.010	-10.380	>8	Pass

Note:
 The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 01



Date: 22.SEP.2022 00:45:46

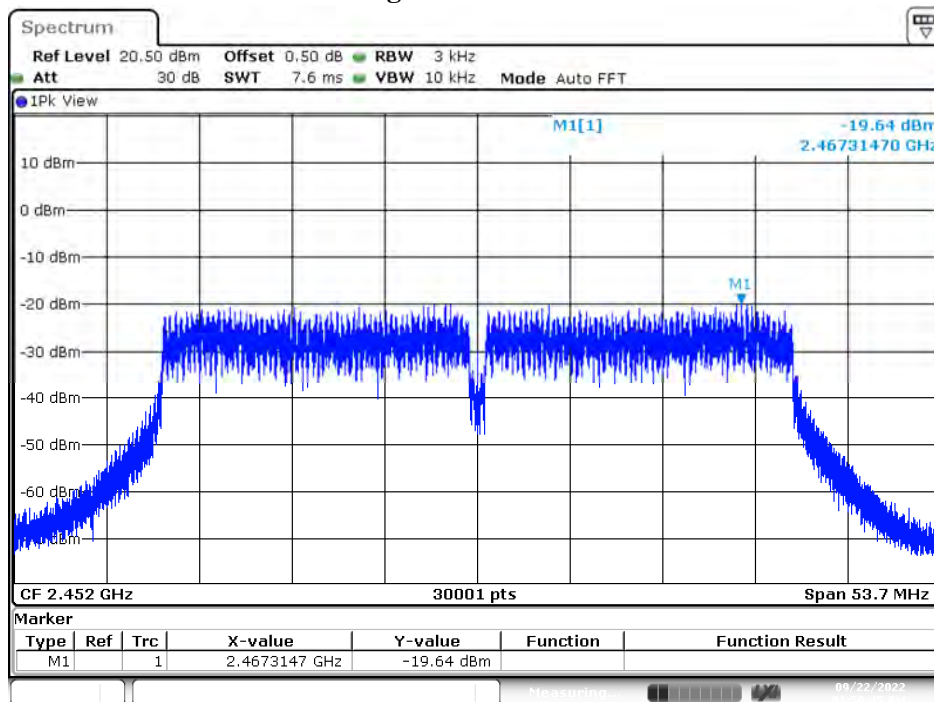
Product : QCast Mirror
 Test Item : Power Density Data
 Test Mode : Transmit (802.11ac-40BW)
 Test Date : 2022/09/22

Channel No.	Frequency (MHz)	Chain	PPSD (dBm)	10*log(2) (dB)	Total PPSD (dBm)	Limit (dBm)	Result
03	2422	A	-20.010	3.010	-17.000	>8	Pass
		B	-19.820	3.010	-16.810	>8	Pass
06	2437	A	-19.880	3.010	-16.870	>8	Pass
		B	-19.800	3.010	-16.790	>8	Pass
09	2452	A	-19.650	3.010	-16.640	>8	Pass
		B	-19.640	3.010	-16.630	>8	Pass

Note:

The quantity 10*log 2 (two antennas) is added to the spectrum peak value according to document 662911 D01.

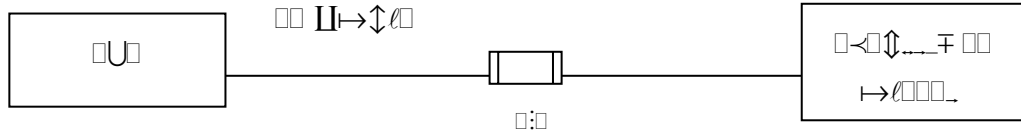
Figure Channel 09



Date: 22.SEP.2022 01:50:45

9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

The EUT was setup according to ANSI C63.10 2013; tested according to ANSI C63.10 2013 for compliance to FCC 47CFR 15.247 requirements.

9.3. Test Result of Duty Cycle

Product : QCast Mirror
Test Item : Duty Cycle
Test Mode : Transmi
Test Date : 2022/09/21

Duty Cycle Formula:

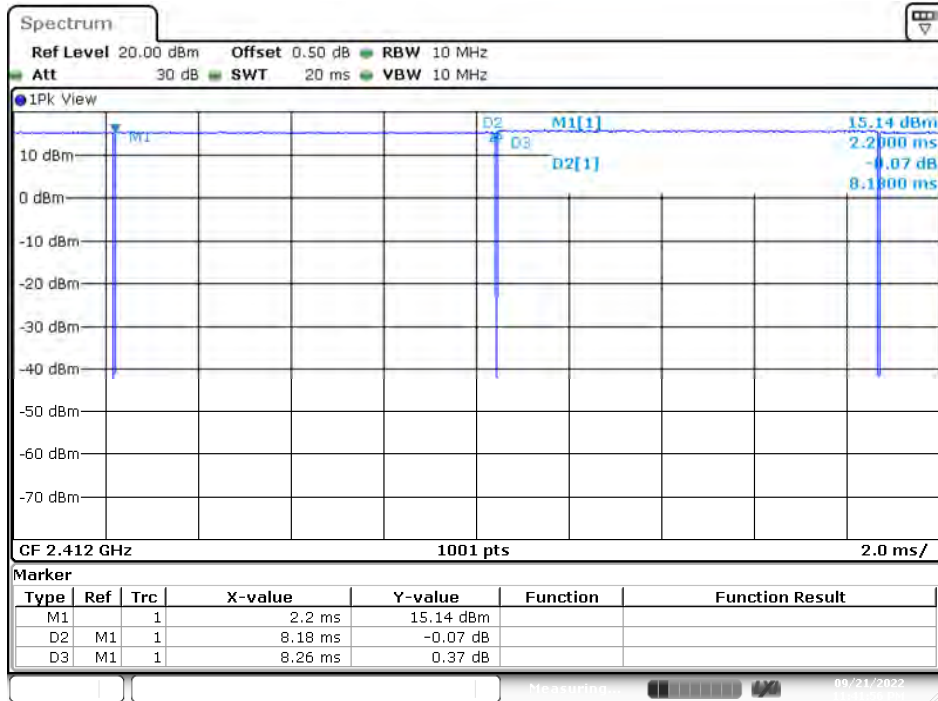
Duty Cycle = Ton / (Ton + Toff)

Duty Factor = 10 Log (1/Duty Cycle)

Results:

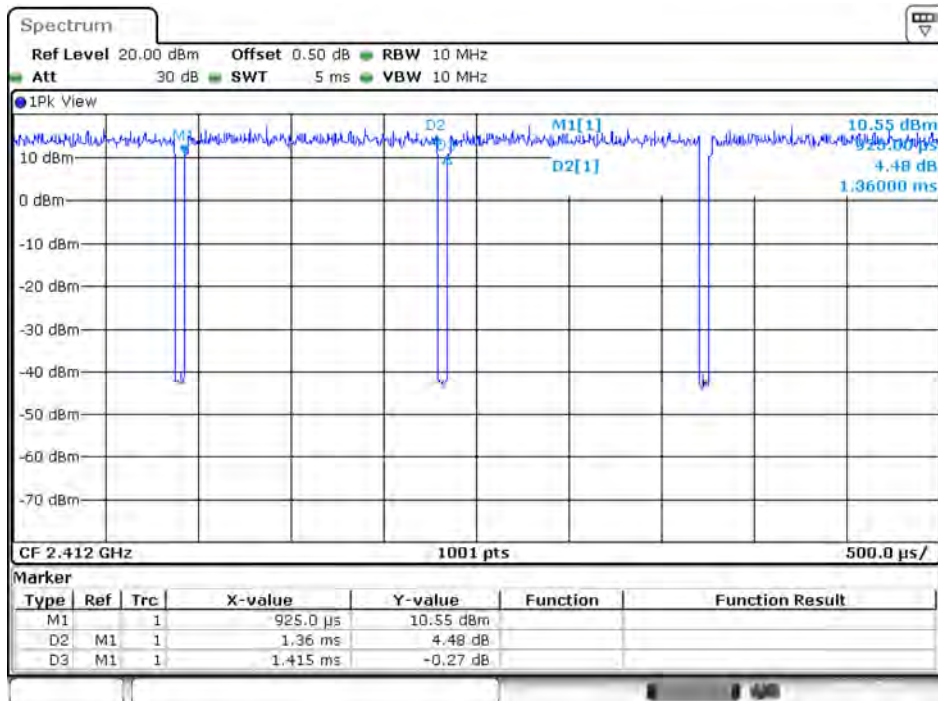
2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11 b	8.1800	8.2600	99.03	0.04
802.11 g	1.3600	1.4150	96.11	0.17
802.11 n20	1.2700	1.3250	95.85	0.18
802.11 n40	0.6300	0.6840	92.11	0.36
802.11 ac20	1.2750	1.3320	95.72	0.19
802.11 ac40	0.6330	0.6900	91.74	0.37

802.11b



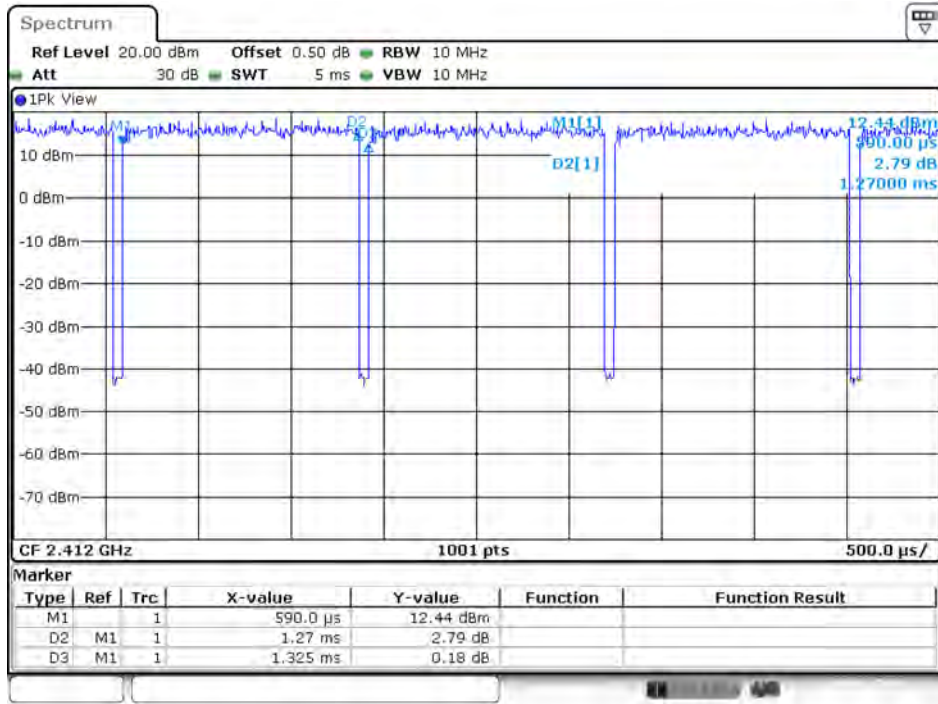
Date: 21.SEP.2022 23:41:56

802.11g



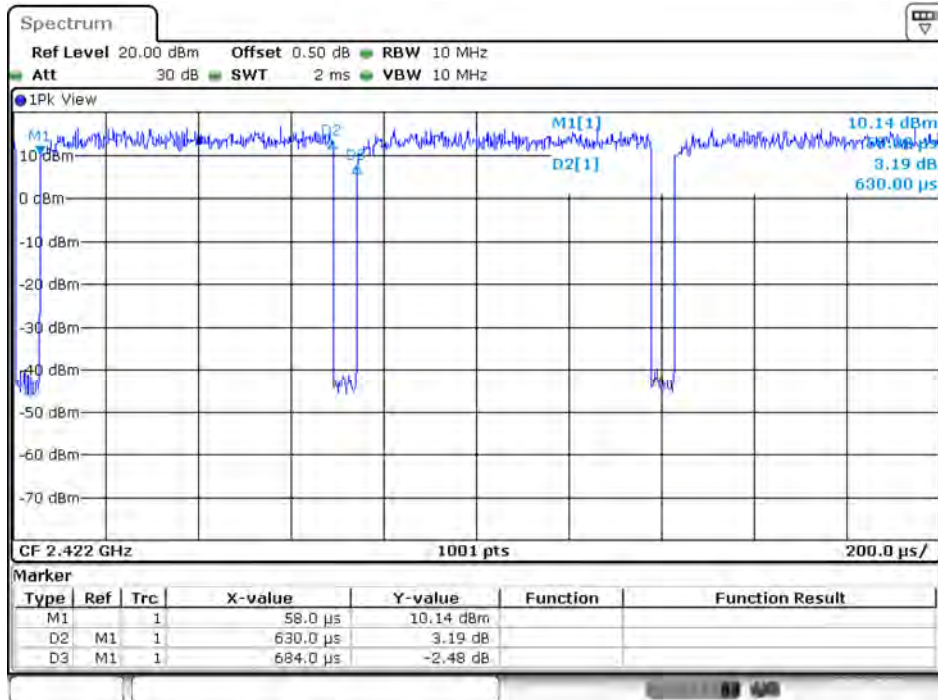
Date: 22.SEP.2022 00:28:03

802.11n20



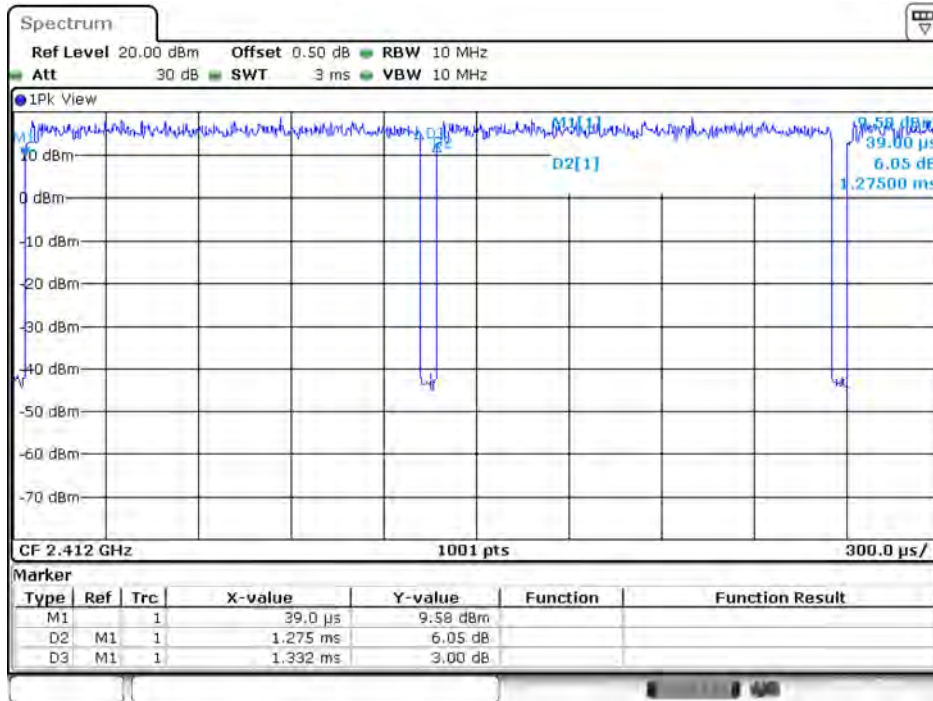
Date: 22 SEP 2022 00:27:22

802.11n40



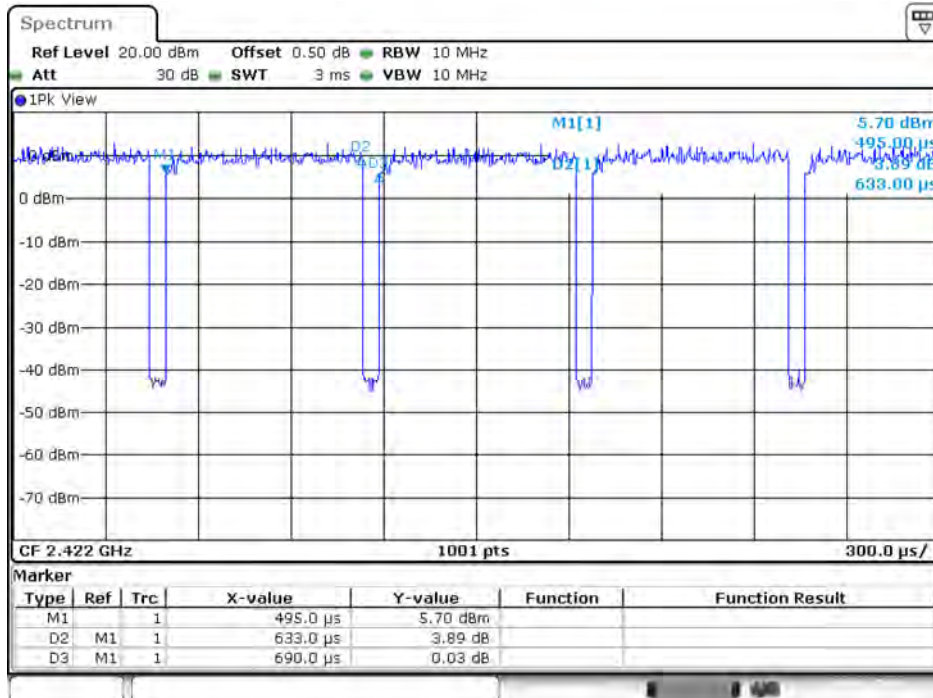
Date: 22 SEP 2022 00:34:38

802.11ac20



Date: 22.SEP.2022 00:45:07

802.11ac40



Date: 22.SEP.2022 00:54:19