

FCC TEST REPORT

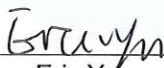
Product Name: Wi-Fi Dongle
Trade Mark: UNIVERSAL ELECTRONICS INC
Model No.: UEI2236B
Report Number: 180809001RFC-1
Test Standards: FCC 47 CFR Part 15 Subpart C
FCC ID: MG3-2236B
Test Result: PASS
Date of Issue: August 30, 2018

Prepared for:

Universal Electronics Inc
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Prepared by:

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Date: August 30, 2018

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Version

Version No.	Date	Description
V1.0	August 30, 2018	Original



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1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	Universal Electronics Inc
Address of Applicant:	201 East Sandpointe Ave, 8th Floor, Santa Ana, CA, United States
Manufacturer:	ITON Technology Corp.
Address of Manufacturer:	Room 1302, Block A, Building 4, Tianan Cyber Park, Huangge Road, Longgang District, Shenzhen, China

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Wi-Fi Dongle		
Model No.:	UEI2236B		
Add. Model No.:	N/A		
Trade Mark:	UNIVERSAL ELECTRONICS INC		
DUT Stage:	Production Unit		
EUT Supports Function:	2.4 GHz ISM Band:	IEEE 802.11b/g/n	
	5 GHz U-NII Bands:	5 150 MHz to 5 250 MHz	IEEE 802.11a/n
		5 250 MHz to 5 350 MHz	IEEE 802.11a/n
		5 470 MHz to 5 725 MHz	IEEE 802.11a/n
		5 725 MHz to 5 850 MHz	IEEE 802.11a/n
Software Version:	V1.0		
Hardware Version:	V1.1		
Sample Received Date:	August 10, 2018		
Sample Tested Date:	August 10, 2018 to August 21, 2018		

1.2.2 Description of Accessories

NA

1.3 PRODUCT SPECIFICATION SUBJECTIVE TO THIS STANDARD

Frequency Band:	2400 MHz to 2483.5 MHz	
Frequency Range:	2412 MHz to 2462 MHz	
Support Standards:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20, IEEE 802.11n-HT40	
Type of Modulation:	IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT20: OFDM(64-QAM, 16-QAM, QPSK, BPSK) IEEE 802.11n-HT40: OFDM(64-QAM, 16-QAM, QPSK, BPSK)	
Data Rate:	IEEE 802.11b: Up to 11 Mbps IEEE 802.11g: Up to 54 Mbps IEEE 802.11n-HT20: Up to MCS15 IEEE 802.11n-HT40: Up to MCS15	
Number of Channels:	IEEE 802.11b: 11 IEEE 802.11g: 11 IEEE 802.11n-HT20: 11 IEEE 802.11n-HT40: 7	
Channel Separation:	5 MHz	
Antenna Type:	Chain 0	PCB Antenna
	Chain 1	PCB Antenna
Antenna Gain:	Chain 0	-1.65 dBi

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	Chain 1	-1.65 dBi
Directional gain:	1.36 dBi	
Normal Test Voltage:	5 Vdc	

1.4 OTHER INFORMATION

Operation Frequency Each of Channel	
IEEE 802.11b, IEEE 802.11g, IEEE 802.11n-HT20	$f = 2407 + 5k \text{ MHz}, k = 1, \dots, 11$
IEEE 802.11n-HT40	$f = 2407 + 5k \text{ MHz}, k = 3, \dots, 9$
Note: f is the operating frequency (MHz); k is the operating channel.	

1.5 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	E450	SL10G10780	Applicant

2) Support Cable

Cable No.	Description	Connector	Length	Supplied by
1	Antenna Cable	SMA	0.30 Meter	UnionTrust

1.6 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

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1.7 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

IC-Registration No.: 21600-1

The 3m Semi-anechoic chamber of Shenzhen UnionTrust Quality and Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 21600-1.

A2LA-Lab Certificate No.: 4312.01

Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence

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in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC Accredited Lab.

Designation Number: CN1194

Test Firm Registration Number: 259480

1.8 DEVIATION FROM STANDARDS

None.

1.9 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.11 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9KHz-150KHz	±3.8 dB
2	Conducted emission 150KHz-30MHz	±3.4 dB
3	Radiated emission 9KHz-30MHz	±4.9 dB
4	Radiated emission 30MHz-1GHz	±4.7 dB
5	Radiated emission 1GHz-18GHz	±5.1 dB
6	Radiated emission 18GHz-26GHz	±5.2 dB
7	Radiated emission 26GHz-40GHz	±5.2 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart C Test Cases			
Test Item	Test Requirement	Test Method	Result
Antenna Requirement	FCC 47 CFR Part 15 Subpart C Section 15.203/15.247 (c)	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	FCC 47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A NOTE 1, 2
Conducted Peak Output Power	FCC 47 CFR Part 15 Subpart C Section 15.247 (b)(3)	KDB 558074 D01 v04 Section 9.1.3	N/A NOTE 1, 2
6dB Bandwidth	FCC 47 CFR Part 15 Subpart C Section 15.247 (a)(2)	KDB 558074 D01 v04 Section 8.1	N/A NOTE 1, 2
Power Spectral Density	FCC 47 CFR Part 15 Subpart C Section 15.247 (e)	KDB 558074 D01 v04 Section 10.2	N/A NOTE 1, 2
Conducted Out of Band Emission	FCC 47 CFR Part 15 Subpart C Section 15.247(d)	KDB 558074 D01 v04 Section 11	N/A NOTE 1, 2
Radiated Spurious Emissions	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	KDB 558074 D01 v04 Section 12.1	PASS NOTE 2
Band Edge Measurements (Radiated)	FCC 47 CFR Part 15 Subpart C Section 15.205/15.209	KDB 558074 D01 v04 Section 12.1	PASS NOTE 2
Note: 1) N/A: In this whole report not application. 2) The EUT this time and original model both Wi-Fi Dongle are identical in WIFI Module, about the difference between the both Wi-Fi Dongle, please refer to the difference statement. After assessment, all technical data is referred to previous report no. SZ18030098W01 dated May 14, 2018 by SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd. except Radiated Spurious Emissions, Band Edge Measurements (Radiated).			

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm dd, yyyy)	Cal. Due date (mm dd, yyyy)
☒	3M Chamber & Accessory Equipment	ETS-LINDGREN	3M	N/A	Dec. 20, 2015	Dec. 19, 2018
☒	Receiver	R&S	ESIB26	100114	Dec. 10, 2017	Dec. 10, 2018
☒	Loop Antenna	ETS-LINDGREN	6502	00202525	Dec. 22, 2017	Dec. 22, 2018
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	Dec. 17, 2017	Dec. 17, 2018
☒	Preamplifier	HP	8447F	2805A02960	Dec. 10, 2017	Dec. 10, 2018
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201874	May 22, 2018	May 22, 2019
☒	Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	Dec. 17, 2017	Dec. 17, 2018
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Band Rejection Filter (2400MHz~2500MHz)	Micro-Tronics	BRM50702	G248	June 06, 2018	June 06, 2019
☒	Test Software	Audix	e3	Software Version: 9.160323		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage	Relative Humidity (%)
NT/NV	+15 to +35	USB 5Vdc	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)	Tested by
Radiated Spurious Emissions	25.6	47	100.23	Tony
Band Edge Measurements (Radiated)	25.6	47	100.23	Tony

4.2 TEST CHANNELS

Mode	Tx/Rx Frequency	Test RF Channel Lists		
		Lowest(L)	Middle(M)	Highest(H)
IEEE 802.11b	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11g	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT20	2412 MHz to 2462 MHz	Channel 1	Channel 7	Channel 11
		2412 MHz	2437 MHz	2462 MHz
IEEE 802.11n-HT40	2422 MHz to 2452 MHz	Channel 3	Channel 7	Channel 9
		2422 MHz	2437 MHz	2452 MHz

4.3 EUT TEST STATUS

Mode	Tx Function	Description
IEEE 802.11b IEEE 802.11g	1Tx	1. Keep the EUT in continuously transmitting with modulation test single.
IEEE 802.11n-HT20 IEEE 802.11n-HT40	2Tx	2. Keep the EUT in continuously transmitting with modulation test single.

Test Software
Test software name: MTool

4.4 PRE-SCAN

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rates. Following rate(s) was (were) selected for the final test as listed below.

Mode	Worst-case data rates
IEEE 802.11b	1 Mbps
IEEE 802.11g	6 Mbps
IEEE 802.11n-HT20	MCS0
IEEE 802.11n-HT40	MCS0

4.5 TEST SETUP

4.5.1 For Radiated Emissions test setup

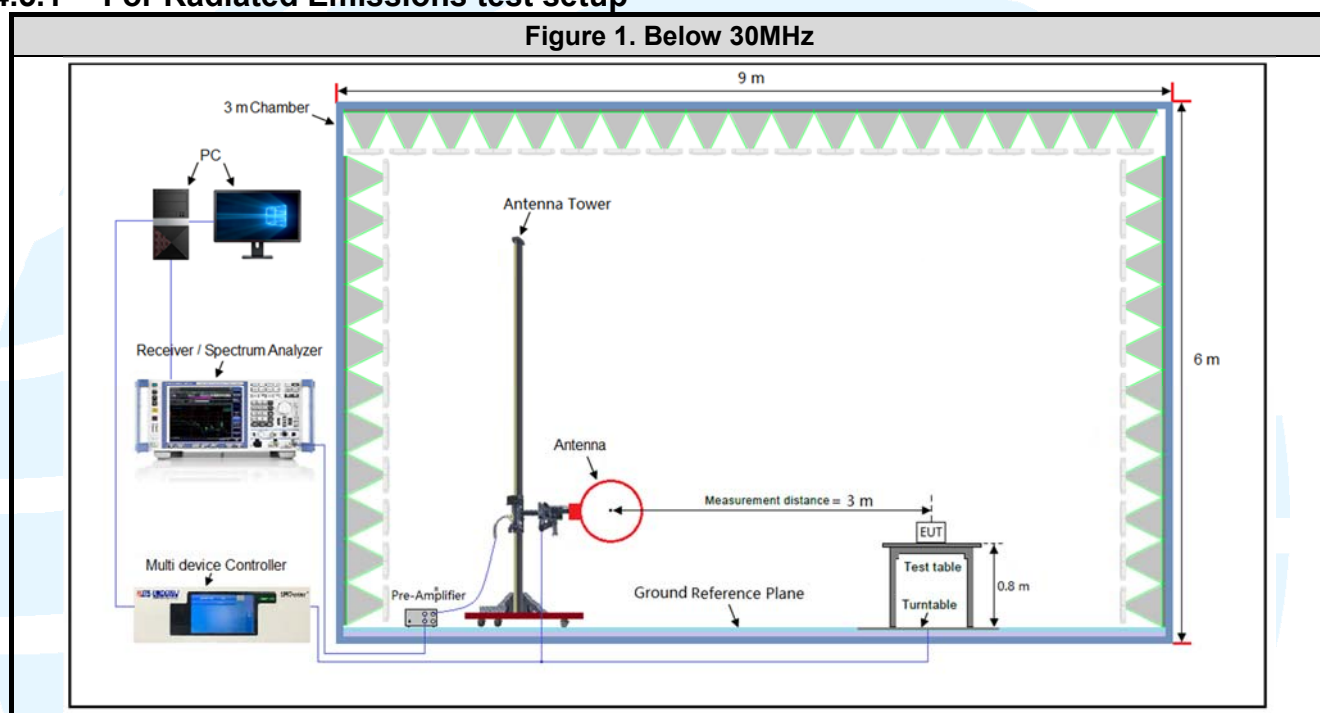


Figure 2. 30MHz to 1GHz

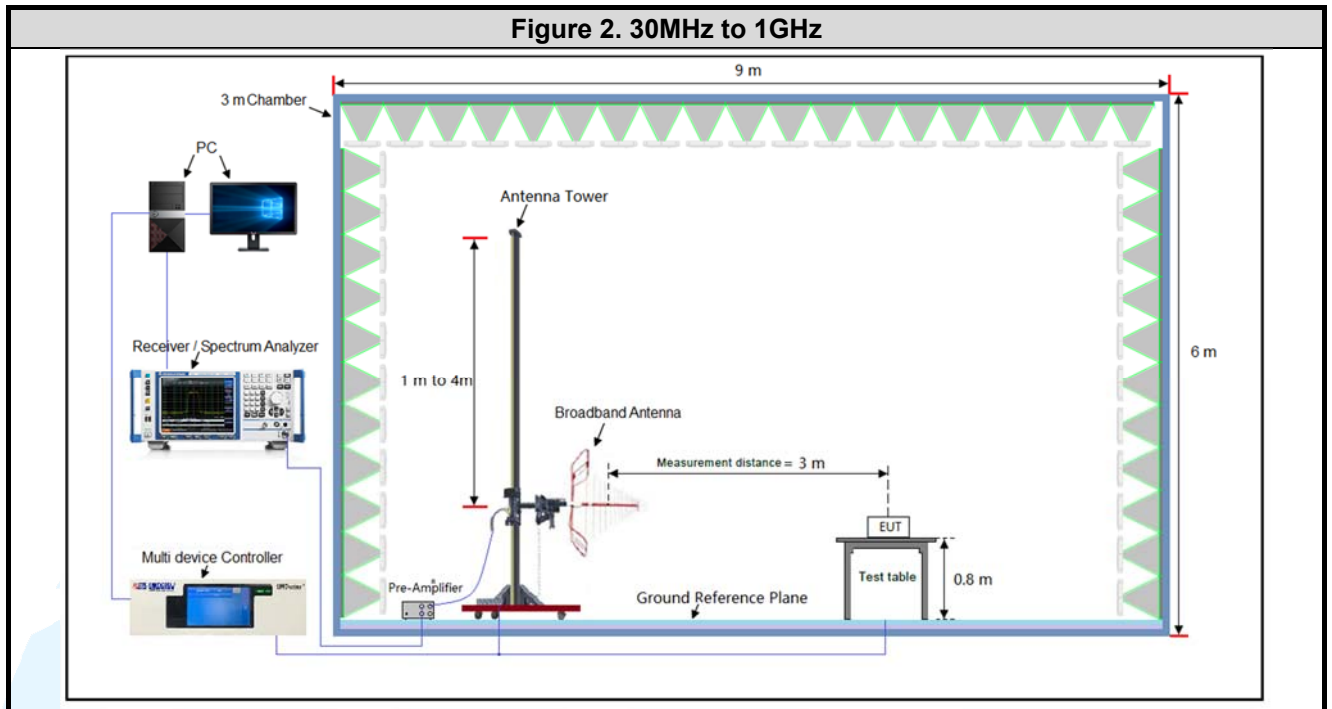
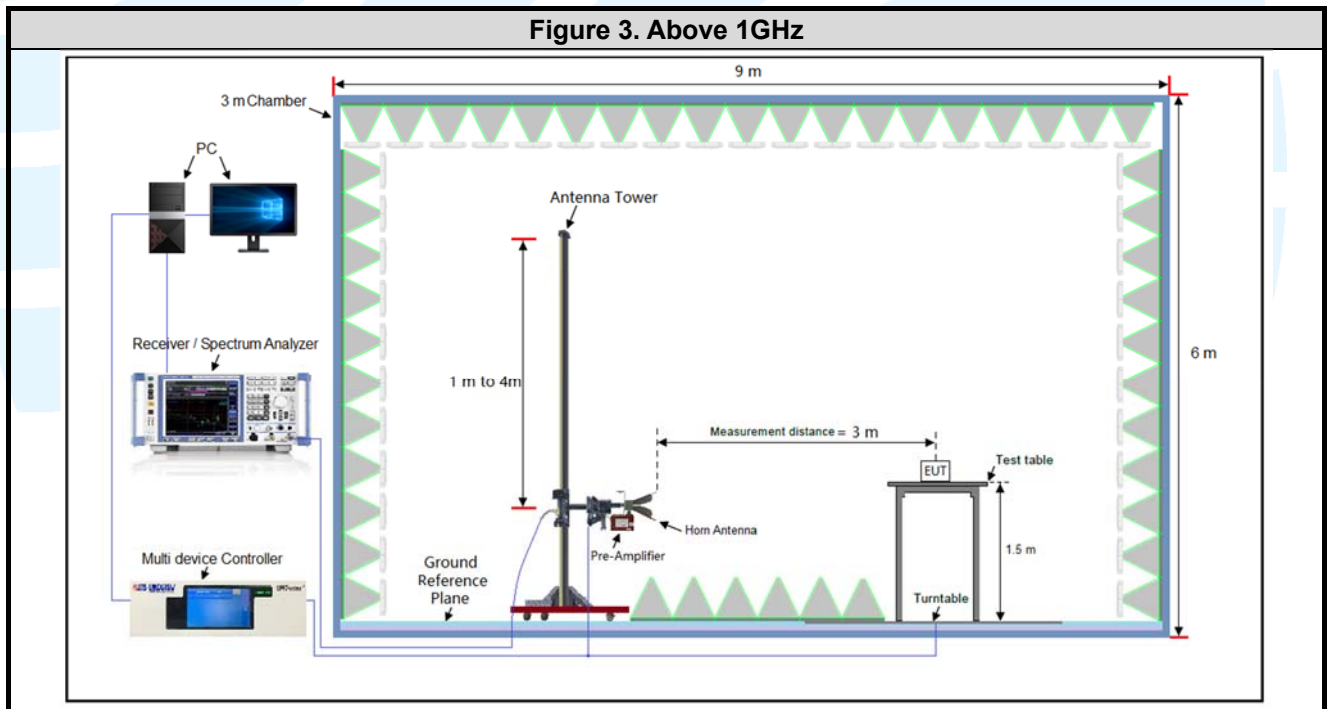


Figure 3. Above 1GHz



4.6 SYSTEM TEST CONFIGURATION

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, radiated emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario. It is powered by computer USB 5Vdc. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Therefore, all final radiated testing was performed with the EUT in (see table below) orientation.

Frequency	Mode	Antenna Port	Worst-case axis positioning
Above 1GHz	1TX	Chain 0	X axis
	1TX	Chain 1	X axis
	2TX	Chain 0+1	X axis

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

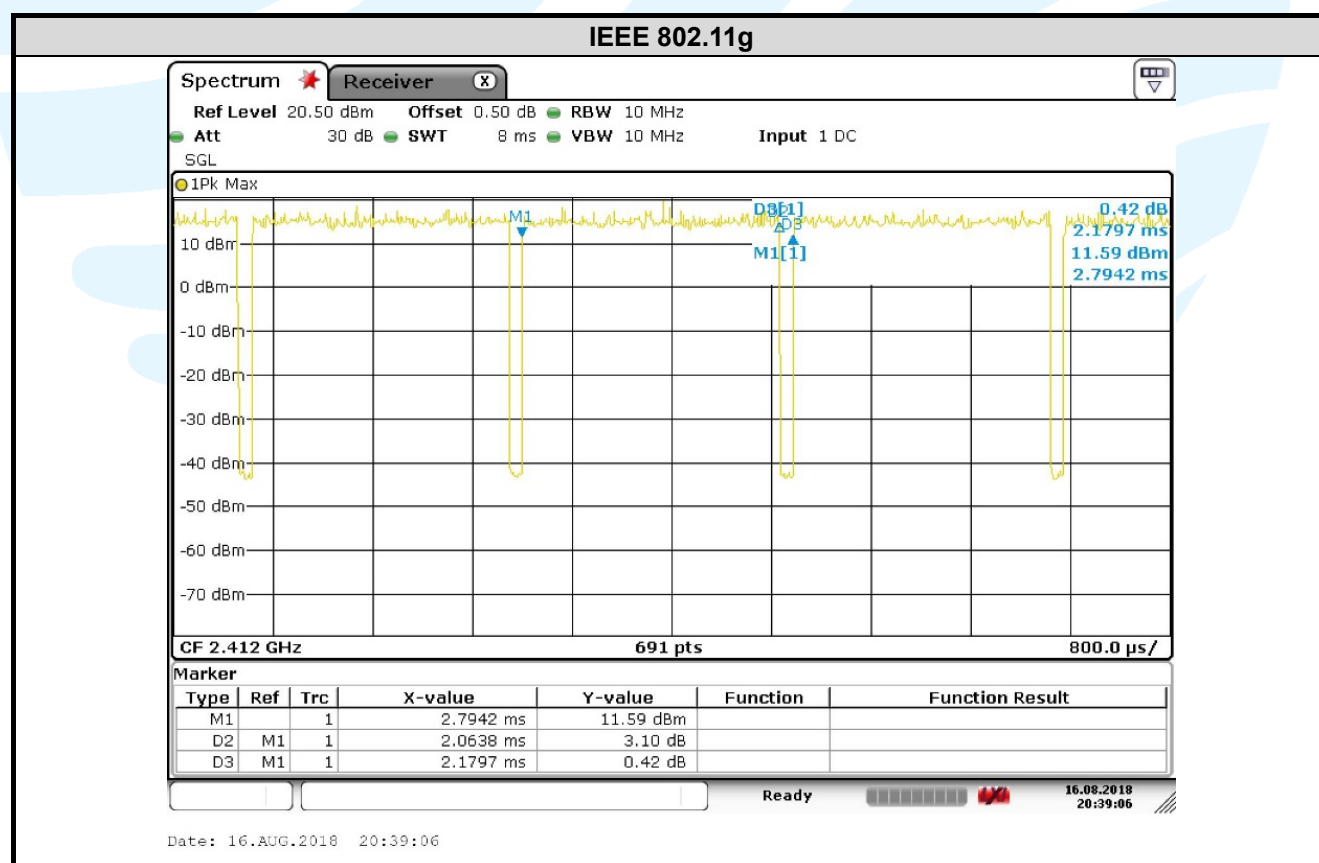
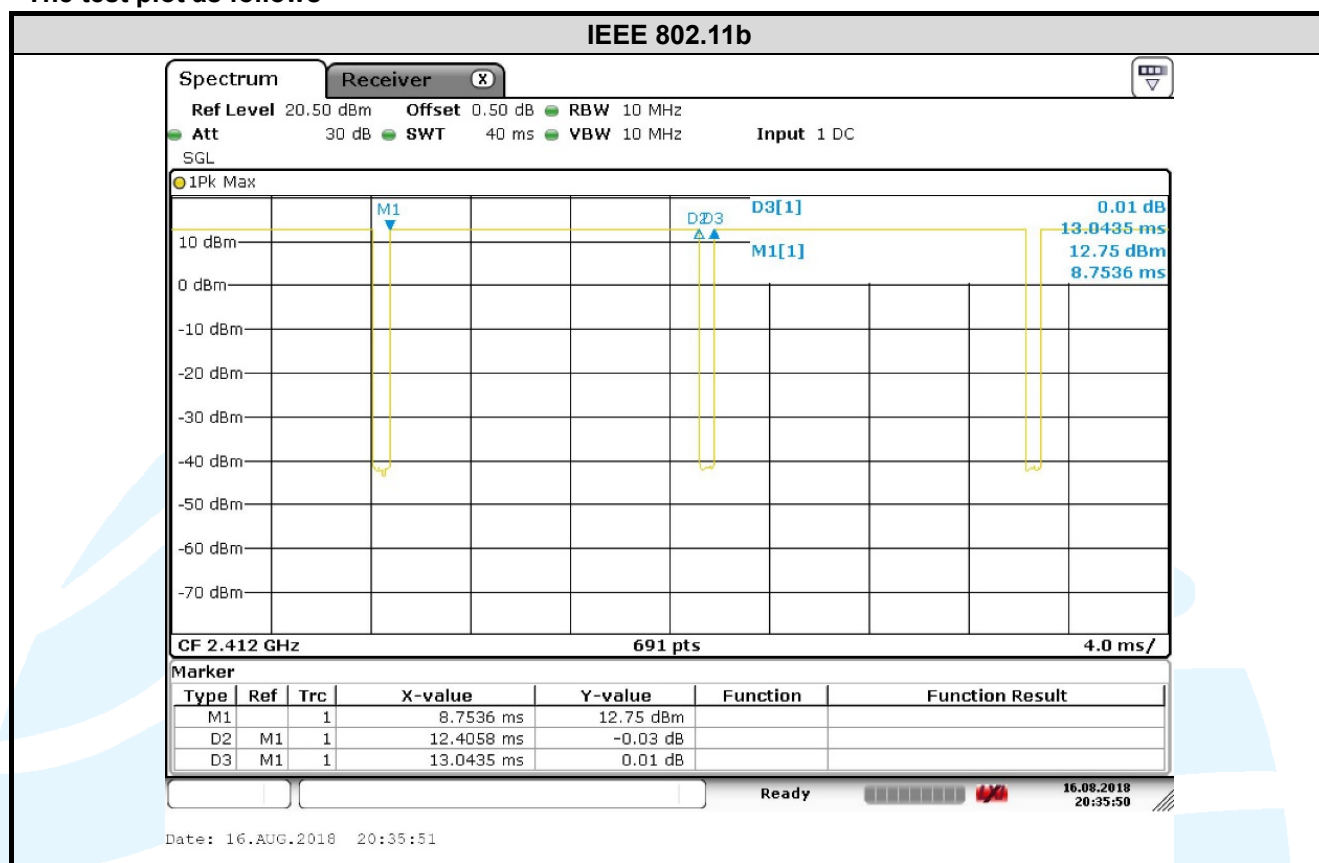
4.7 DUTY CYCLE

Mode	Data rates (Mbps)	On Time (msec)	Period (msec)	Duty Cycle (linear)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11b	1	12.4058	13.0435	0.95	95.11	0.22	0.08	-0.44
IEEE 802.11g	6	2.0638	2.1797	0.95	94.68	0.24	0.48	-0.47
IEEE 802.11n-HT20	MCS0	0.96812	1.07246	0.90	90.27	0.44	1.03	-0.89
IEEE 802.11n-HT40	MCS0	0.48406	0.58261	0.83	83.08	0.80	2.07	-1.61

Remark:

- 1) Duty cycle= On Time/ Period;
- 2) Duty Cycle factor = $10 * \log(1/ \text{Duty cycle})$;
- 3) Average factor = $20 \log_{10} \text{Duty Cycle}$.

The test plot as follows



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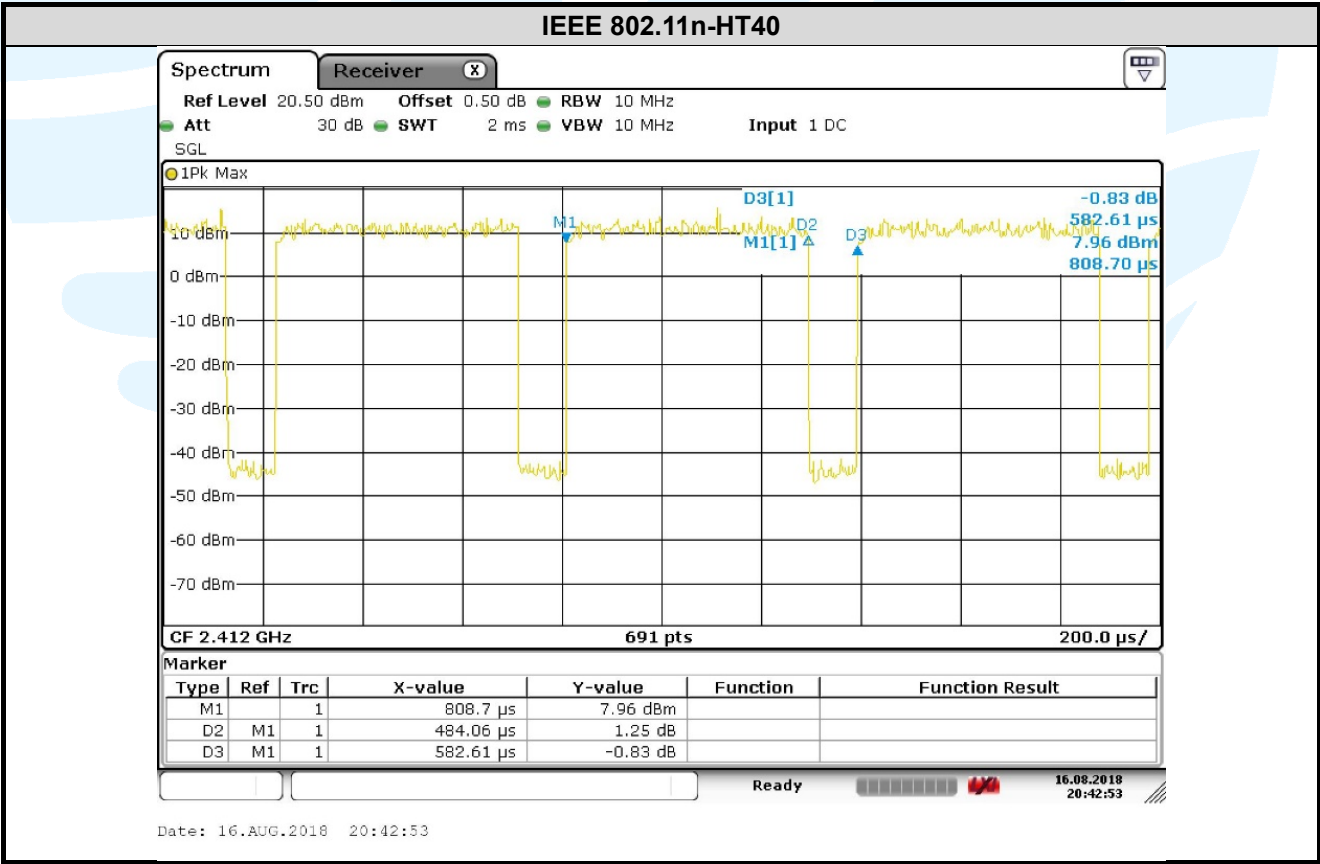
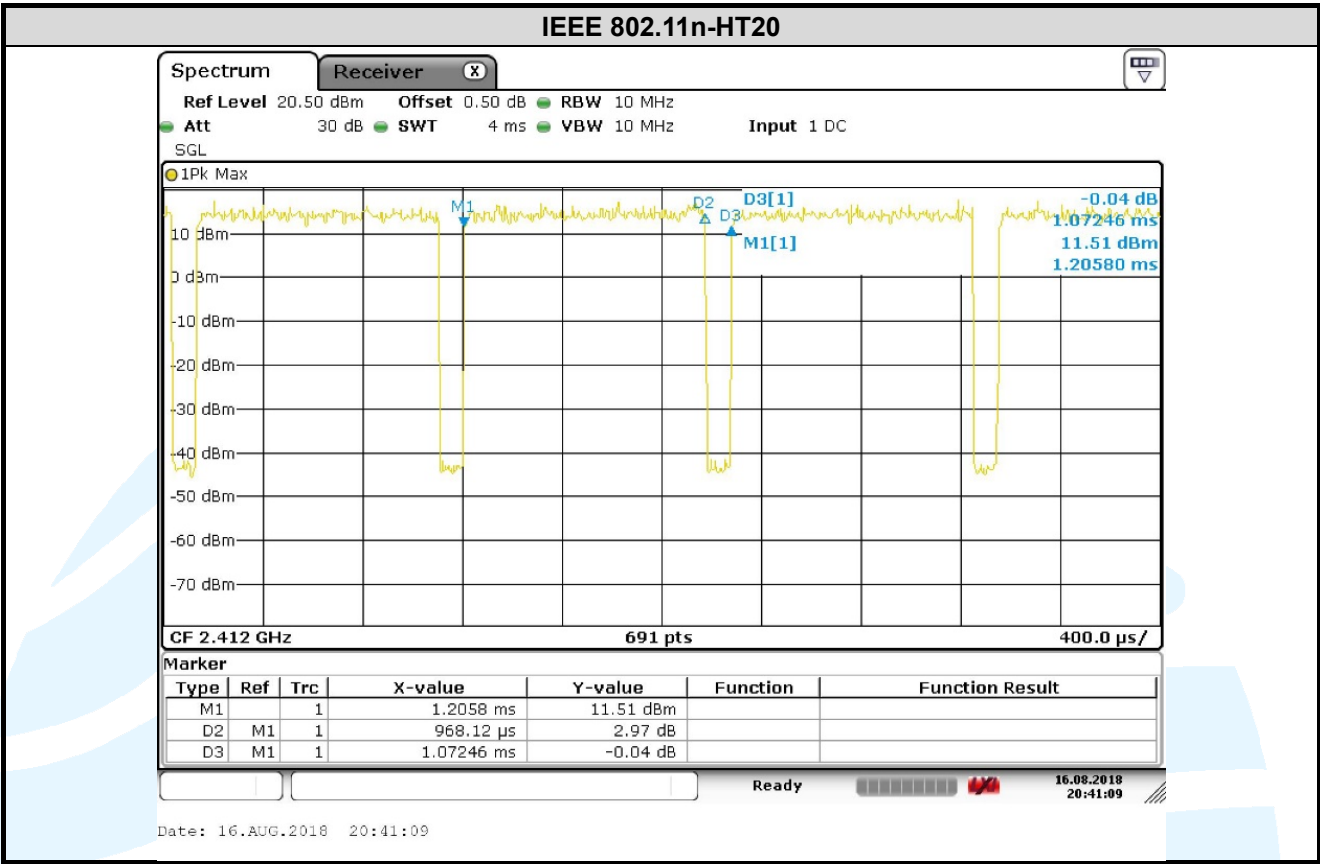
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5. RADIO TECHNICAL REQUIREMENTS SPECIFICATION

5.1 REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 558074 D01 DTS Meas Guidance v04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247
5	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band

5.2 ANTENNA REQUIREMENT

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(b) (4) requirement: The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
EUT Antenna: Both antenna in the interior of the equipment and no consideration of replacement. The transmit signals are correlated with each other and the antenna gain of both chains is completely consistent, the best case directional gain of the antenna is 1.36 dBi.

5.3 RADIATED SPURIOUS EMISSIONS

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

Test Method: KDB 558074 D01 v04, Section 12.1

Receiver Setup:

Frequency	RBW
0.009 MHz-0.150 MHz	200/300 kHz
0.150 MHz -30 MHz	9/10 kHz
30 MHz-1 GHz	100/120 kHz
Above 1 GHz	1 MHz

Limits:

Spurious Emissions

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009 MHz-0.490 MHz	2400/F(kHz)	--	--	300
0.490 MHz-1.705 MHz	24000/F(kHz)	--	--	30
1.705 MHz-30 MHz	30	--	--	30
30 MHz-88 MHz	100	40.0	Quasi-peak	3
88 MHz-216 MHz	150	43.5	Quasi-peak	3
216 MHz-960 MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1 GHz	500	54.0	Average	3

Remark:

- The lower limit shall apply at the transition frequencies.
- Emission level (dB μ V/m) = 20 log Emission level (uV/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

- From 30 MHz to 1GHz test procedure as below:
 - The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
 - The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
 - For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
 - The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- Above 1GHz test procedure as below:
 - Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
 - Test the EUT in the lowest channel ,middle channel, the Highest channel
 - The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found

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the X axis positioning which it is worse case.

4) Repeat above procedures until all frequencies measured was complete.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

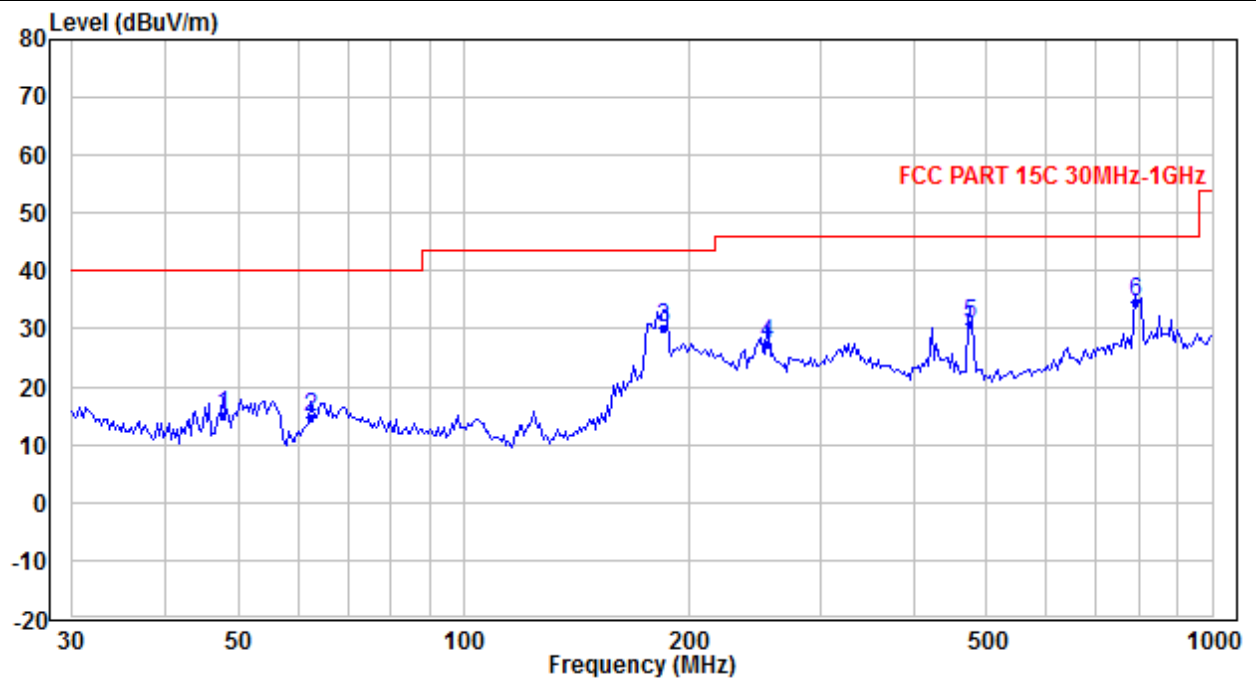
Radiated Emission Test Data (9 KHz ~ 30 MHz):

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report. (All mode have been test and the worst case is 802.11g low channel)

Radiated Emission Test Data (30 MHz ~ 1 GHz Worst Case):

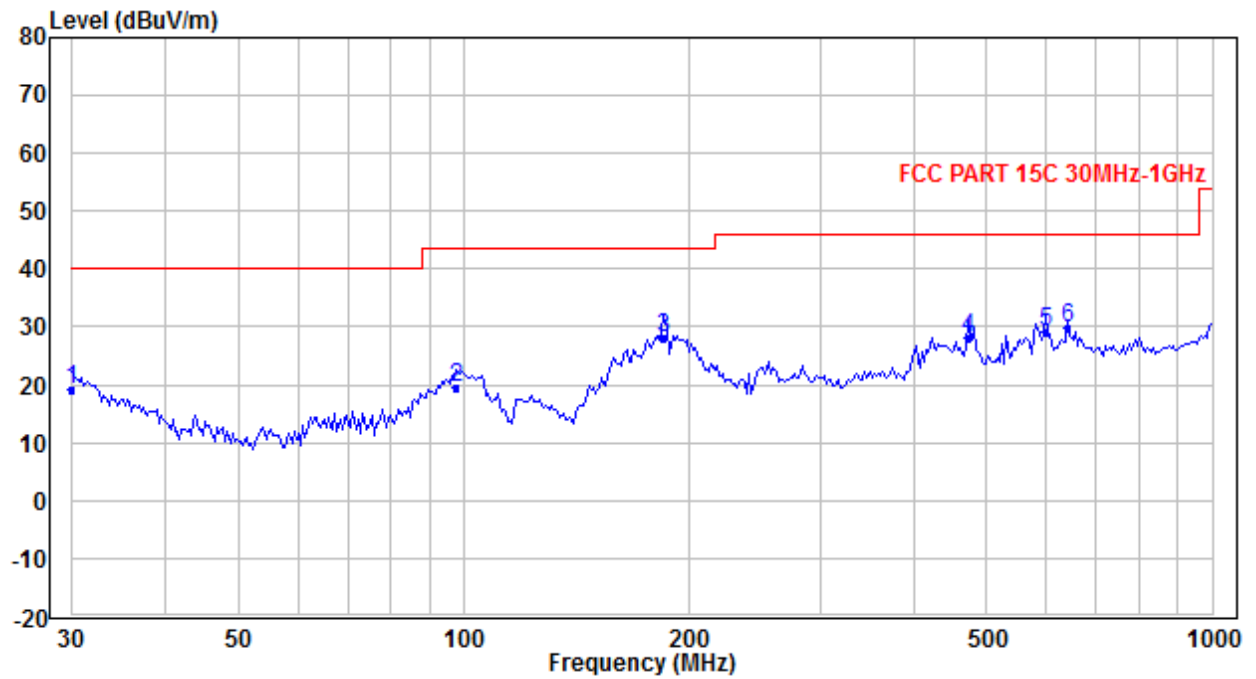
IEEE 802.11g Low Channel

Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	47.703	34.43	-19.31	15.12	40.00	-24.88	QP
2	62.304	34.80	-20.22	14.58	40.00	-25.42	QP
3	185.163	45.74	-15.46	30.28	43.50	-13.22	QP
4	254.031	39.83	-12.24	27.59	46.00	-18.41	QP
5	474.791	36.71	-5.98	30.73	46.00	-15.27	QP
6	787.475	35.70	-1.17	34.53	46.00	-11.47	QP

Vertical



No.	Frequency (MHz)	Reading (dBuV)	Correction factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	30.000	29.95	-10.84	19.11	40.00	-20.89	QP
2	97.686	37.12	-17.67	19.45	43.50	-24.05	QP
3	185.163	43.50	-15.46	28.04	43.50	-15.46	QP
4	471.467	34.15	-6.05	28.10	46.00	-17.90	QP
5	598.707	32.67	-3.63	29.04	46.00	-16.96	QP
6	642.292	32.83	-2.87	29.96	46.00	-16.04	QP

Radiated Emission Test Data (1GHz ~ 18GHz):
SISO_Chain 0_IEEE 802.11b_Lowest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	59.18	74.00	-14.82	Peak	Horizontal
2	4824.00	43.18	54.00	-10.82	Average	Horizontal
3	7236.00	65.20	74.00	-8.80	Peak	Horizontal
4	7236.00	47.20	54.00	-6.80	Average	Horizontal
5	4824.00	56.19	74.00	-17.81	Peak	Vertical
6	4824.00	40.19	54.00	-13.81	Average	Vertical
7	7236.00	59.56	74.00	-14.44	Peak	Vertical
8	7236.00	42.56	54.00	-11.44	Average	Vertical

SISO_Chain 0_IEEE 802.11b_Middle Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	57.87	74.00	-16.13	Peak	Horizontal
2	4874.00	41.87	54.00	-12.13	Average	Horizontal
3	7311.00	65.54	74.00	-8.46	Peak	Horizontal
4	7311.00	49.54	54.00	-4.46	Average	Horizontal
5	4874.00	54.93	74.00	-19.07	Peak	Vertical
6	4874.00	38.93	54.00	-15.07	Average	Vertical
7	7311.00	61.15	74.00	-12.85	Peak	Vertical
8	7311.00	46.15	54.00	-7.85	Average	Vertical

SISO_Chain 0_IEEE 802.11b_Highest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	57.05	74.00	-16.95	Peak	Horizontal
2	4924.00	40.05	54.00	-13.95	Average	Horizontal
3	7386.00	60.13	74.00	-13.87	Peak	Horizontal
4	7386.00	45.13	54.00	-8.87	Average	Horizontal
5	4924.00	53.10	74.00	-20.90	Peak	Vertical
6	4924.00	37.10	54.00	-16.90	Average	Vertical
7	7386.00	58.88	74.00	-15.12	Peak	Vertical
8	7386.00	43.88	54.00	-10.12	Average	Vertical

SISO_Chain 1_IIEEE 802.11b_Lowest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	66.10	74.00	-7.90	Peak	Horizontal
2	4824.00	50.10	54.00	-3.90	Average	Horizontal
3	7236.00	60.33	74.00	-13.67	Peak	Horizontal
4	7236.00	43.33	54.00	-10.67	Average	Horizontal
5	4824.00	60.17	74.00	-13.83	Peak	Vertical
6	4824.00	43.17	54.00	-10.83	Average	Vertical
7	7236.00	57.12	74.00	-16.88	Peak	Vertical
8	7236.00	41.12	54.00	-12.88	Average	Vertical

SISO_Chain 1_IIEEE 802.11b_Middle Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	63.50	74.00	-10.50	Peak	Horizontal
2	4874.00	46.50	54.00	-7.50	Average	Horizontal
3	7311.00	59.38	74.00	-14.62	Peak	Horizontal
4	7311.00	44.38	54.00	-9.62	Average	Horizontal
5	4874.00	61.25	74.00	-12.75	Peak	Vertical
6	4874.00	44.25	54.00	-9.75	Average	Vertical
7	7311.00	53.48	74.00	-20.52	Peak	Vertical
8	7311.00	40.48	54.00	-13.52	Average	Vertical

SISO_Chain 1_IIEEE 802.11b_Highest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	64.66	74.00	-9.34	Peak	Horizontal
2	4924.00	47.66	54.00	-6.34	Average	Horizontal
3	7386.00	56.89	74.00	-17.11	Peak	Horizontal
4	7386.00	41.89	54.00	-12.11	Average	Horizontal
5	4924.00	58.85	74.00	-15.15	Peak	Vertical
6	4924.00	41.85	54.00	-12.15	Average	Vertical
7	7386.00	52.51	74.00	-21.49	Peak	Vertical
8	7386.00	38.51	54.00	-15.49	Average	Vertical

SISO_Chain 0_IEEE 802.11g_Lowest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	45.11	74.00	-28.89	Peak	Horizontal
2	4824.00	34.12	54.00	-19.88	Average	Horizontal
3	7236.00	63.12	74.00	-10.88	Peak	Horizontal
4	7236.00	43.12	54.00	-10.88	Average	Horizontal
5	4824.00	49.96	74.00	-24.04	Peak	Vertical
6	4824.00	36.96	54.00	-17.04	Average	Vertical
7	7236.00	57.96	74.00	-16.04	Peak	Vertical
8	7236.00	41.96	54.00	-12.04	Average	Vertical

SISO_Chain 0_IEEE 802.11g_Middle Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	51.76	74.00	-22.24	Peak	Horizontal
2	4874.00	38.76	54.00	-15.24	Average	Horizontal
3	7311.00	61.51	74.00	-12.49	Peak	Horizontal
4	7311.00	45.51	54.00	-8.49	Average	Horizontal
5	4874.00	48.81	74.00	-25.19	Peak	Vertical
6	4874.00	36.81	54.00	-17.19	Average	Vertical
7	7311.00	59.68	74.00	-14.32	Peak	Vertical
8	7311.00	42.68	54.00	-11.32	Average	Vertical

SISO_Chain 0_IEEE 802.11g_Highest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	52.38	74.00	-21.62	Peak	Horizontal
2	4924.00	38.38	54.00	-15.62	Average	Horizontal
3	7386.00	59.69	74.00	-14.31	Peak	Horizontal
4	7386.00	43.69	54.00	-10.31	Average	Horizontal
5	4924.00	48.60	74.00	-25.40	Peak	Vertical
6	4924.00	35.60	54.00	-18.40	Average	Vertical
7	7386.00	55.84	74.00	-18.16	Peak	Vertical
8	7386.00	40.84	54.00	-13.16	Average	Vertical

SISO_Chain 1_IIEEE 802.11g_Lowest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	60.86	74.00	-13.14	Peak	Horizontal
2	4824.00	46.86	54.00	-7.14	Average	Horizontal
3	7236.00	58.81	74.00	-15.19	Peak	Horizontal
4	7236.00	40.81	54.00	-13.19	Average	Horizontal
5	4824.00	51.86	74.00	-22.14	Peak	Vertical
6	4824.00	38.86	54.00	-15.14	Average	Vertical
7	7236.00	54.87	74.00	-19.13	Peak	Vertical
8	7236.00	39.87	54.00	-14.13	Average	Vertical

SISO_Chain 1_IIEEE 802.11g_Middle Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	61.15	74.00	-12.85	Peak	Horizontal
2	4874.00	45.15	54.00	-8.85	Average	Horizontal
3	7311.00	58.39	74.00	-15.61	Peak	Horizontal
4	7311.00	41.39	54.00	-12.61	Average	Horizontal
5	4874.00	52.97	74.00	-21.03	Peak	Vertical
6	4874.00	39.97	54.00	-14.03	Average	Vertical
7	7311.00	53.52	74.00	-20.48	Peak	Vertical
8	7311.00	39.52	54.00	-14.48	Average	Vertical

SISO_Chain 1_IIEEE 802.11g_Highest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	46.98	74.00	-27.02	Peak	Horizontal
2	4924.00	34.98	54.00	-19.02	Average	Horizontal
3	7386.00	55.27	74.00	-18.73	Peak	Horizontal
4	7386.00	39.27	54.00	-14.73	Average	Horizontal
5	4924.00	54.18	74.00	-19.82	Peak	Vertical
6	4924.00	39.18	54.00	-14.82	Average	Vertical
7	7386.00	50.73	74.00	-23.27	Peak	Vertical
8	7386.00	37.73	54.00	-16.27	Average	Vertical

MIMO_Chain 0+1_ IEEE 802.11n-HT20_Lowest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4824.00	49.16	74.00	-24.84	Peak	Horizontal
2	4824.00	35.93	54.00	-18.07	Average	Horizontal
3	7236.00	53.13	74.00	-20.87	Peak	Horizontal
4	7236.00	38.59	54.00	-15.41	Average	Horizontal
5	4824.00	44.50	74.00	-29.50	Peak	Vertical
6	4824.00	32.03	54.00	-21.97	Average	Vertical
7	7236.00	49.24	74.00	-24.76	Peak	Vertical
8	7236.00	36.15	54.00	-17.85	Average	Vertical

MIMO_Chain 0+1_ IEEE 802.11n-HT20_Middle Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	46.96	74.00	-27.04	Peak	Horizontal
2	4874.00	34.81	54.00	-19.19	Average	Horizontal
3	7311.00	53.75	74.00	-20.25	Peak	Horizontal
4	7311.00	38.63	54.00	-15.37	Average	Horizontal
5	4874.00	43.22	74.00	-30.78	Peak	Vertical
6	4874.00	32.75	54.00	-21.25	Average	Vertical
7	7311.00	51.04	74.00	-22.96	Peak	Vertical
8	7311.00	36.86	54.00	-17.14	Average	Vertical

MIMO_Chain 0+1_ IEEE 802.11n-HT20_Highest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4924.00	45.08	74.00	-28.92	Peak	Horizontal
2	4924.00	33.11	54.00	-20.89	Average	Horizontal
3	7386.00	50.70	74.00	-23.30	Peak	Horizontal
4	7386.00	36.40	54.00	-17.60	Average	Horizontal
5	4924.00	43.27	74.00	-30.73	Peak	Vertical
6	4924.00	31.61	54.00	-22.39	Average	Vertical
7	7386.00	48.18	74.00	-25.82	Peak	Vertical
8	7386.00	35.95	54.00	-18.05	Average	Vertical

MIMO_Chain 0+1_ IEEE 802.11n-HT40_Lowest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4844.00	47.54	74.00	-26.46	Peak	Horizontal
2	4844.00	35.48	54.00	-18.52	Average	Horizontal
3	7266.00	51.31	74.00	-22.69	Peak	Horizontal
4	7266.00	38.45	54.00	-15.55	Average	Horizontal
5	4844.00	44.12	74.00	-29.88	Peak	Vertical
6	4844.00	32.19	54.00	-21.81	Average	Vertical
7	7266.00	59.82	74.00	-14.18	Peak	Vertical
8	7266.00	39.30	54.00	-14.70	Average	Vertical

MIMO_Chain 0+1_ IEEE 802.11n-HT40_Middle Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4874.00	45.72	74.00	-28.28	Peak	Horizontal
2	4874.00	34.04	54.00	-19.96	Average	Horizontal
3	7311.00	49.79	74.00	-24.21	Peak	Horizontal
4	7311.00	38.43	54.00	-15.57	Average	Horizontal
5	4874.00	44.50	74.00	-29.50	Peak	Vertical
6	4874.00	32.00	54.00	-22.00	Average	Vertical
7	7311.00	47.82	74.00	-26.18	Peak	Vertical
8	7311.00	36.13	54.00	-17.87	Average	Vertical

MIMO_Chain 0+1_ IEEE 802.11n-HT40_Highest Channel:

No.	Frequency (MHz)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Antenna Polaxis
1	4904.00	44.02	74.00	-29.98	Peak	Horizontal
2	4904.00	33.11	54.00	-20.89	Average	Horizontal
3	7356.00	48.21	74.00	-25.79	Peak	Horizontal
4	7356.00	36.83	54.00	-17.17	Average	Horizontal
5	4904.00	43.73	74.00	-30.27	Peak	Vertical
6	4904.00	31.93	54.00	-22.07	Average	Vertical
7	7356.00	47.69	74.00	-26.31	Peak	Vertical
8	7356.00	36.10	54.00	-17.90	Average	Vertical

5.4 BAND EDGE MEASUREMENTS (RADIATED)

Test Requirement: FCC 47 CFR Part 15 Subpart C Section 15.205/15.209

Test Method: KDB 558074 D01 v04, Section 12.1

Limits:

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).

Frequency	Limit (dB μ V/m @3m)	Remark
30 MHz-88 MHz	40.0	Quasi-peak Value
88 MHz-216 MHz	43.5	Quasi-peak Value
216 MHz-960 MHz	46.0	Quasi-peak Value
960 MHz-1 GHz	54.0	Quasi-peak Value
Above 1 GHz	54.0	Average Value
	74.0	Peak Value

Test Setup: Refer to section 4.4.1 for details.

Test Procedures:

Radiated band edge measurements at 2390 MHz and 2483.5 MHz were made with the unit transmitting in the low end of the channel range and the high end closest to the restricted bands respectively. The emissions were made on the 966 Semi-Chamber. Use (resolution bandwidth (RBW) = 1 MHz, video bandwidth (VBW) = 3 MHz for peak levels and RBW = 1 MHz and VBW = 10 Hz or 1/T for average levels).

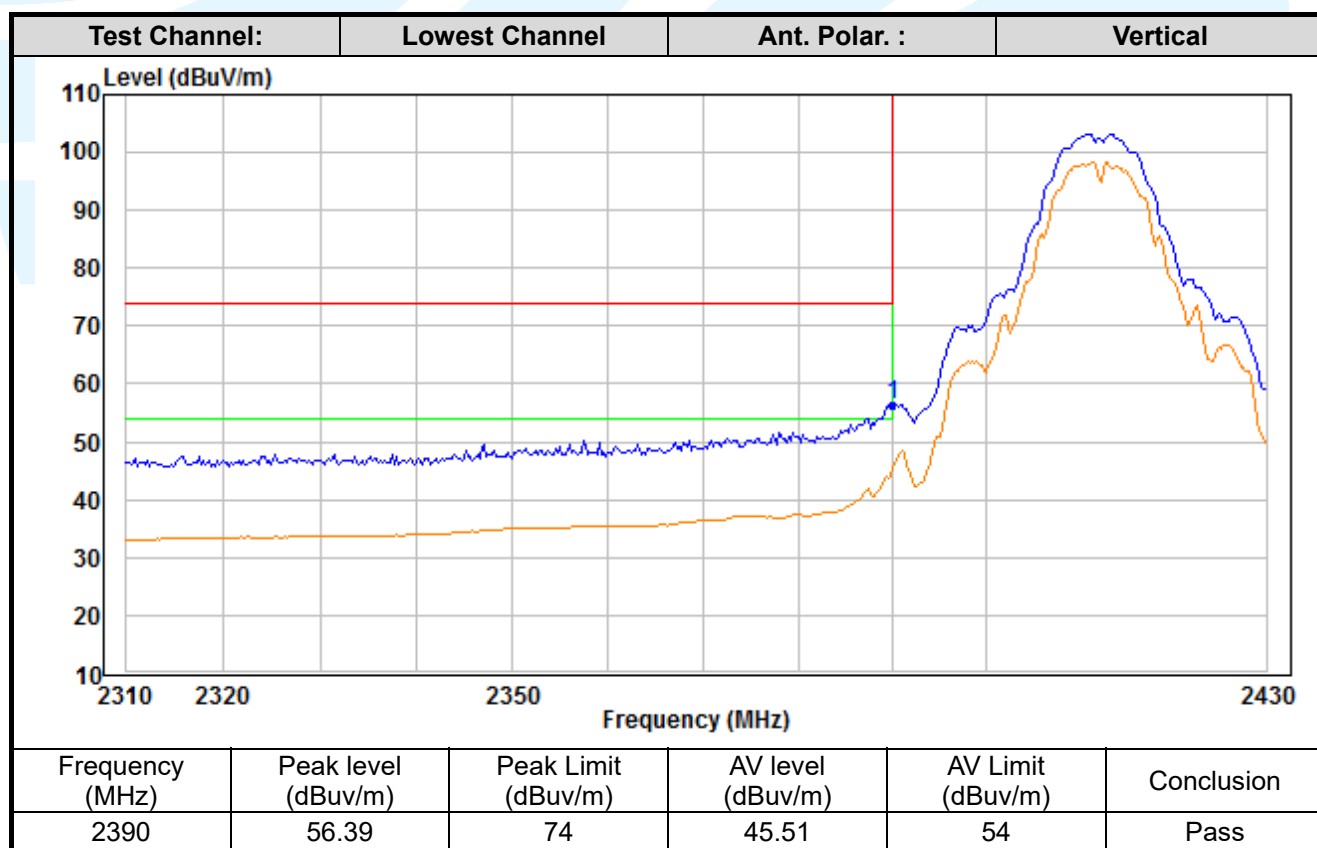
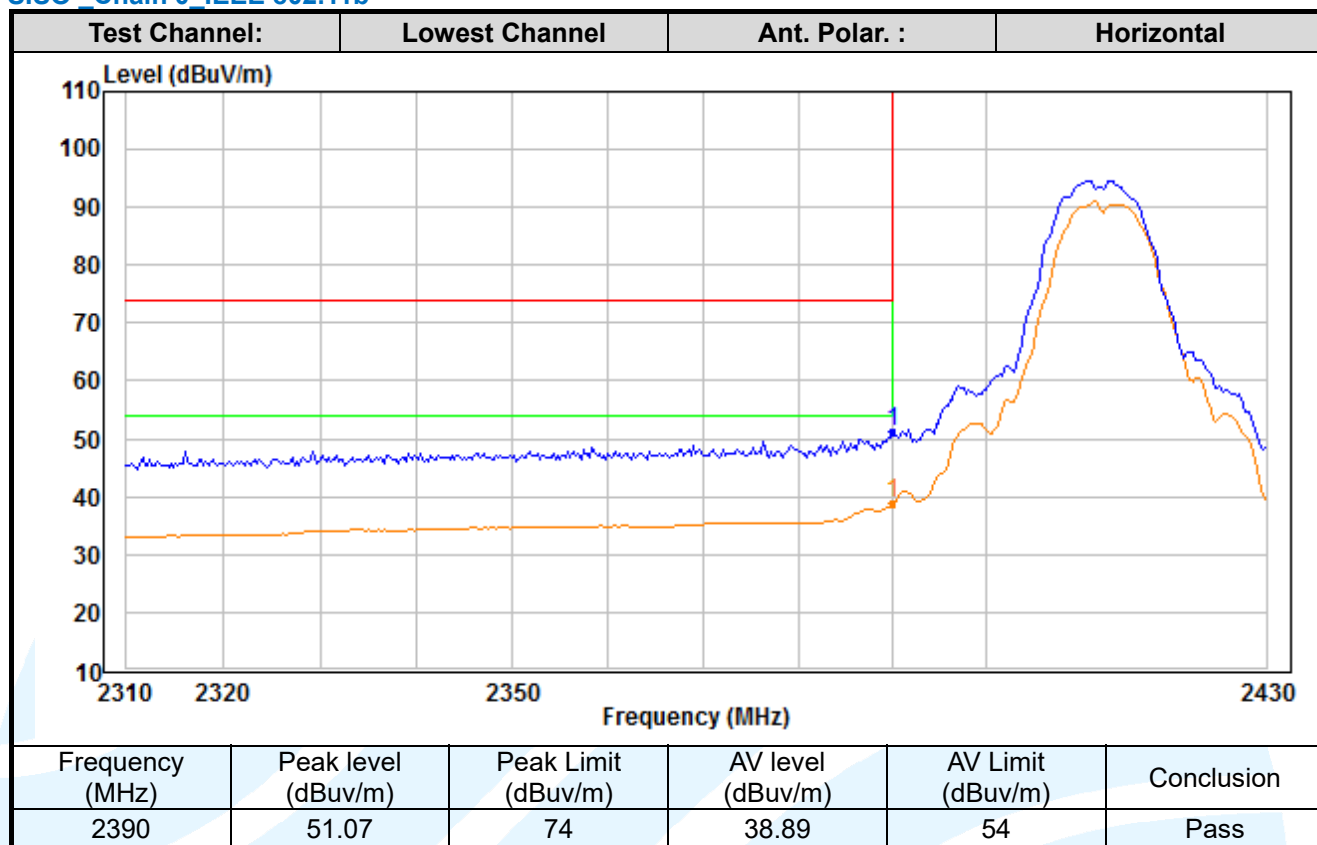
1. Use radiated spurious emission test procedure described in clause 5.10. The transmitter output (antenna port) was connected to the test receiver.
2. Set the PK and AV limit line.
3. Record the fundamental emission and emissions out of the band-edge.
4. Determine band-edge compliance as required.

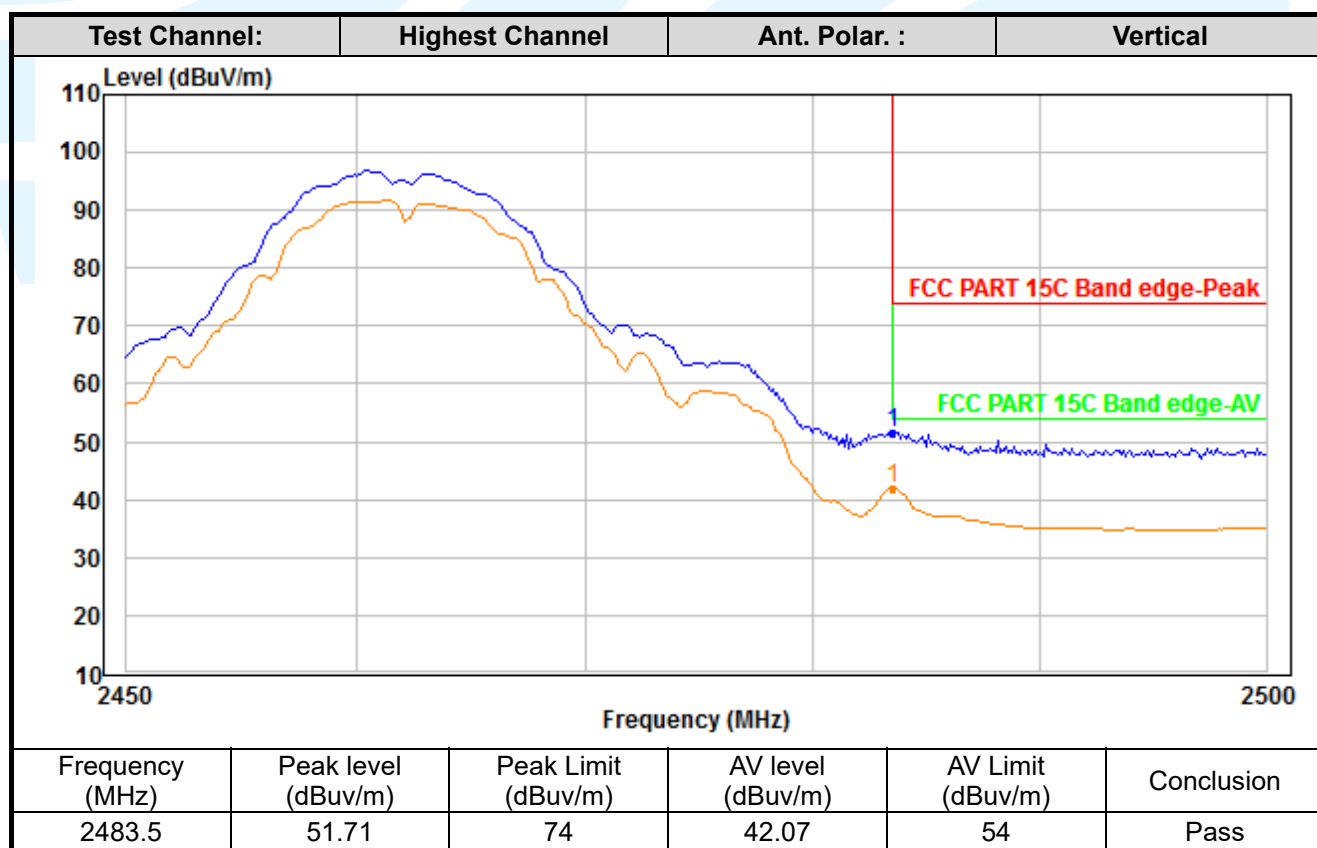
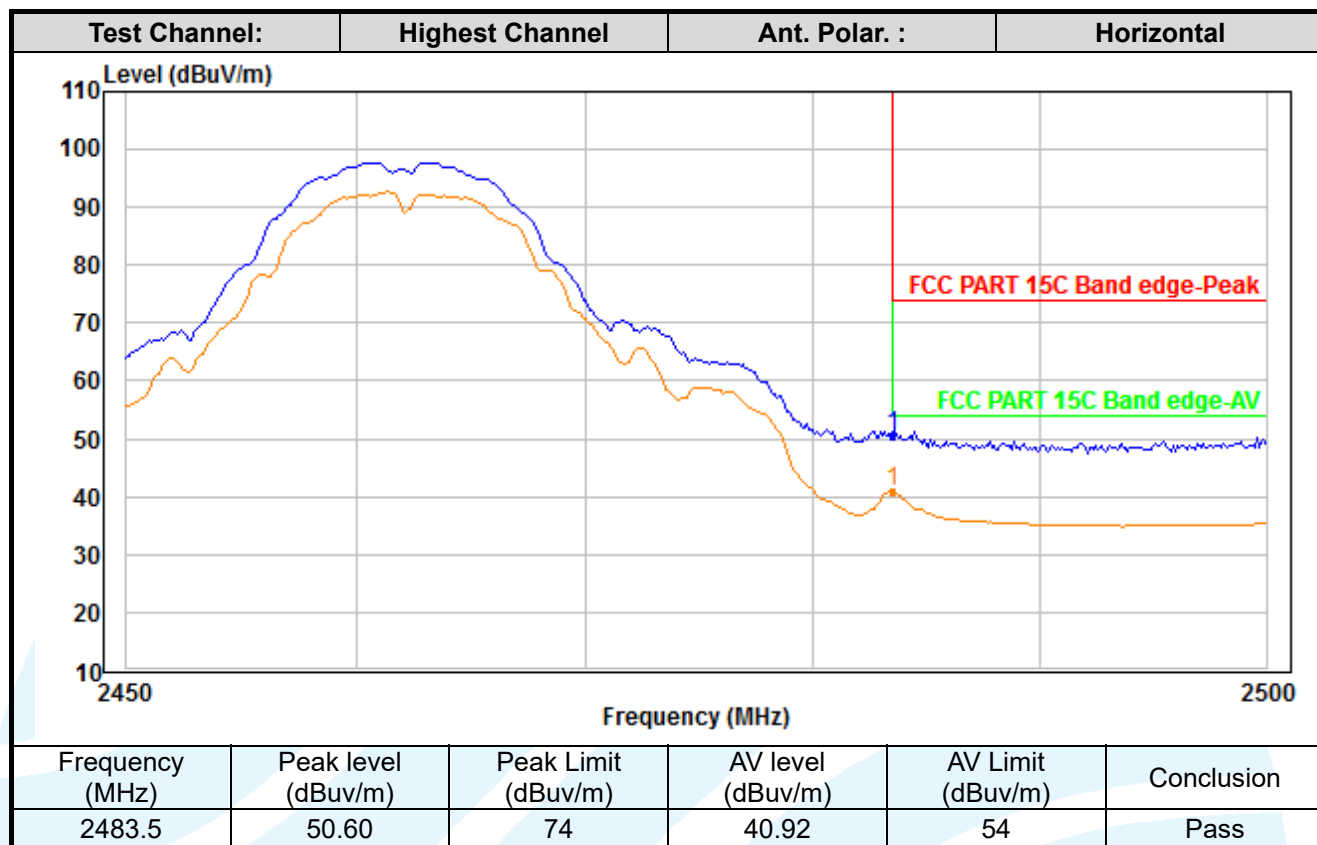
Equipment Used: Refer to section 3 for details.

Test Result: Pass

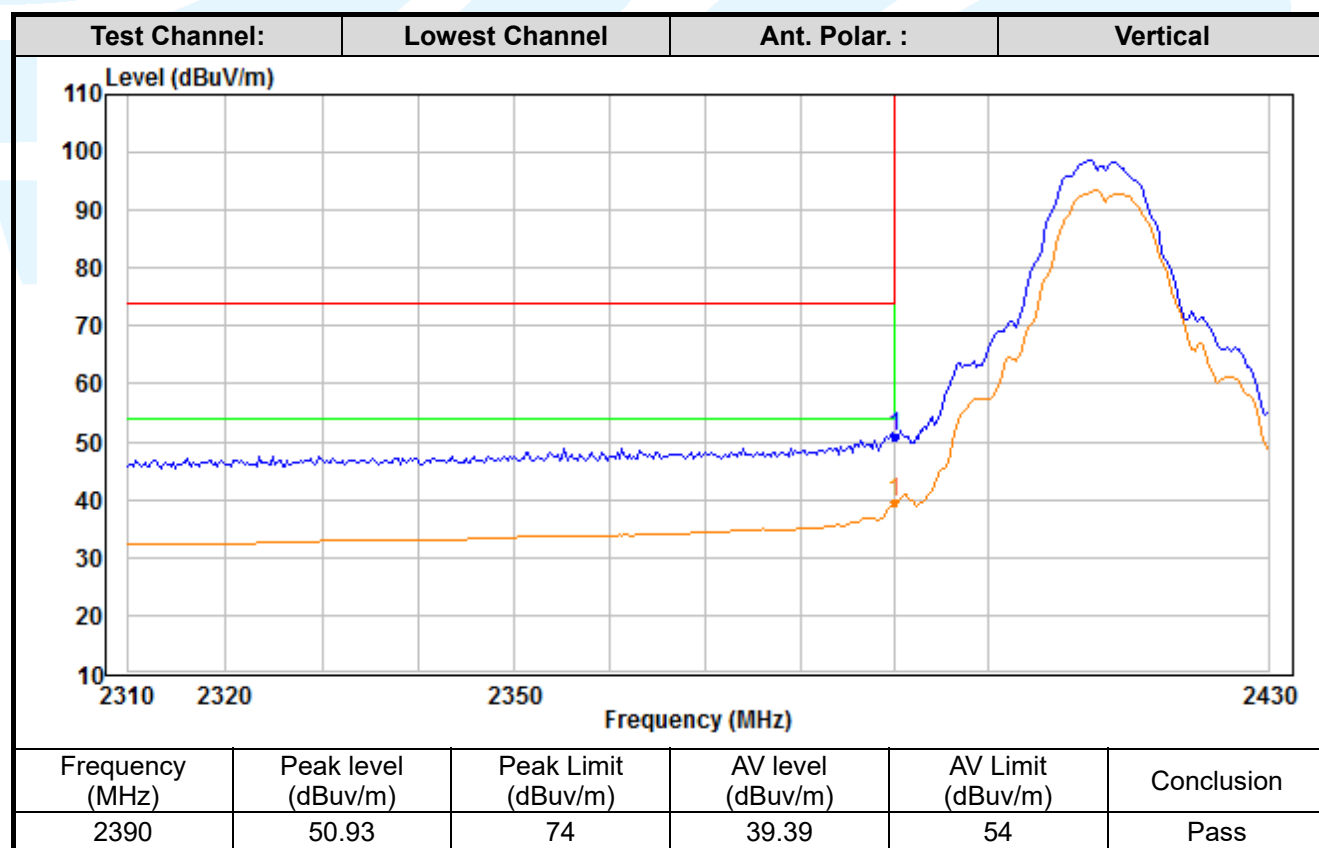
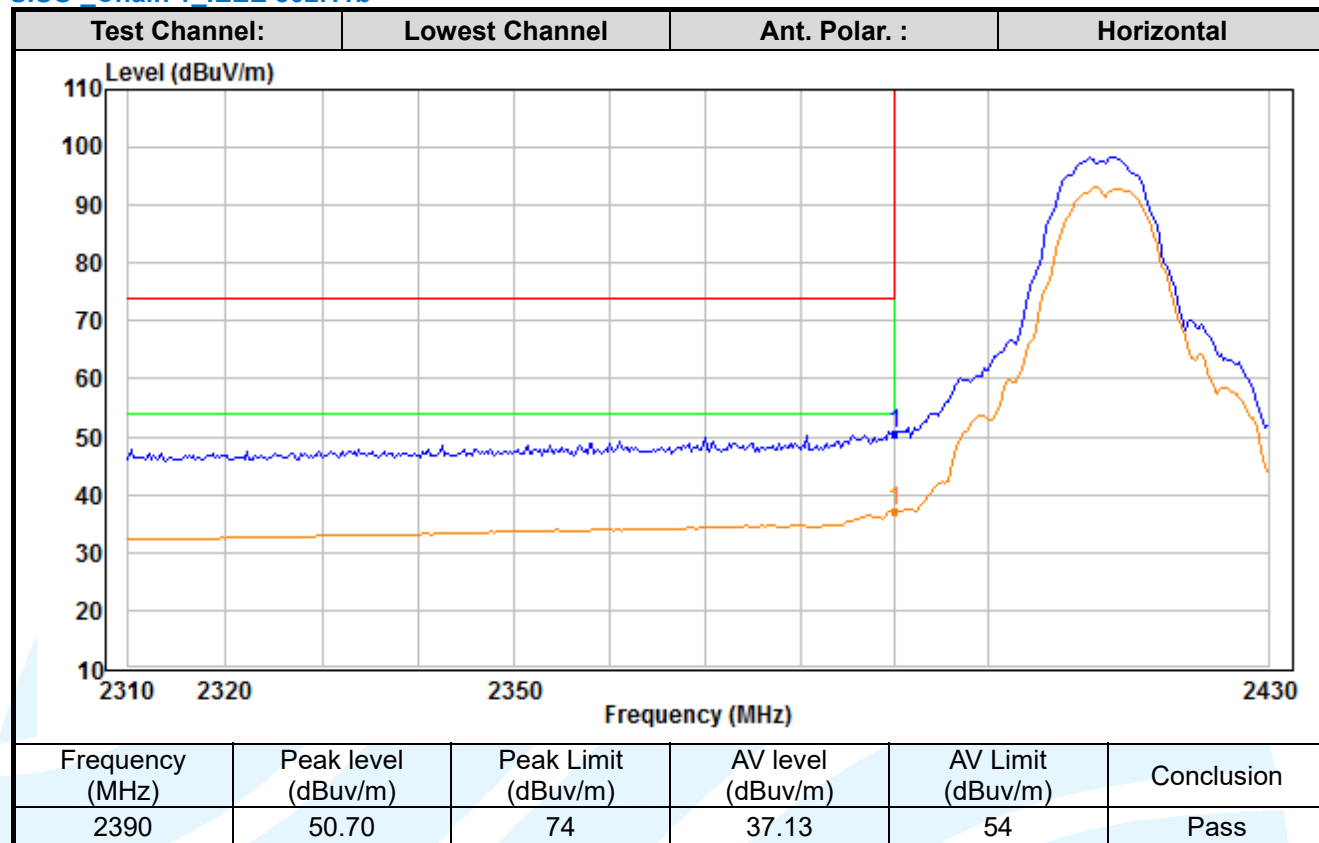
The measurement data as follows:

SISO_Chain 0_ IEEE 802.11b





SISO_Chain 1_ IEEE 802.11b



Shenzhen UnionTrust Quality and Technology Co., Ltd.

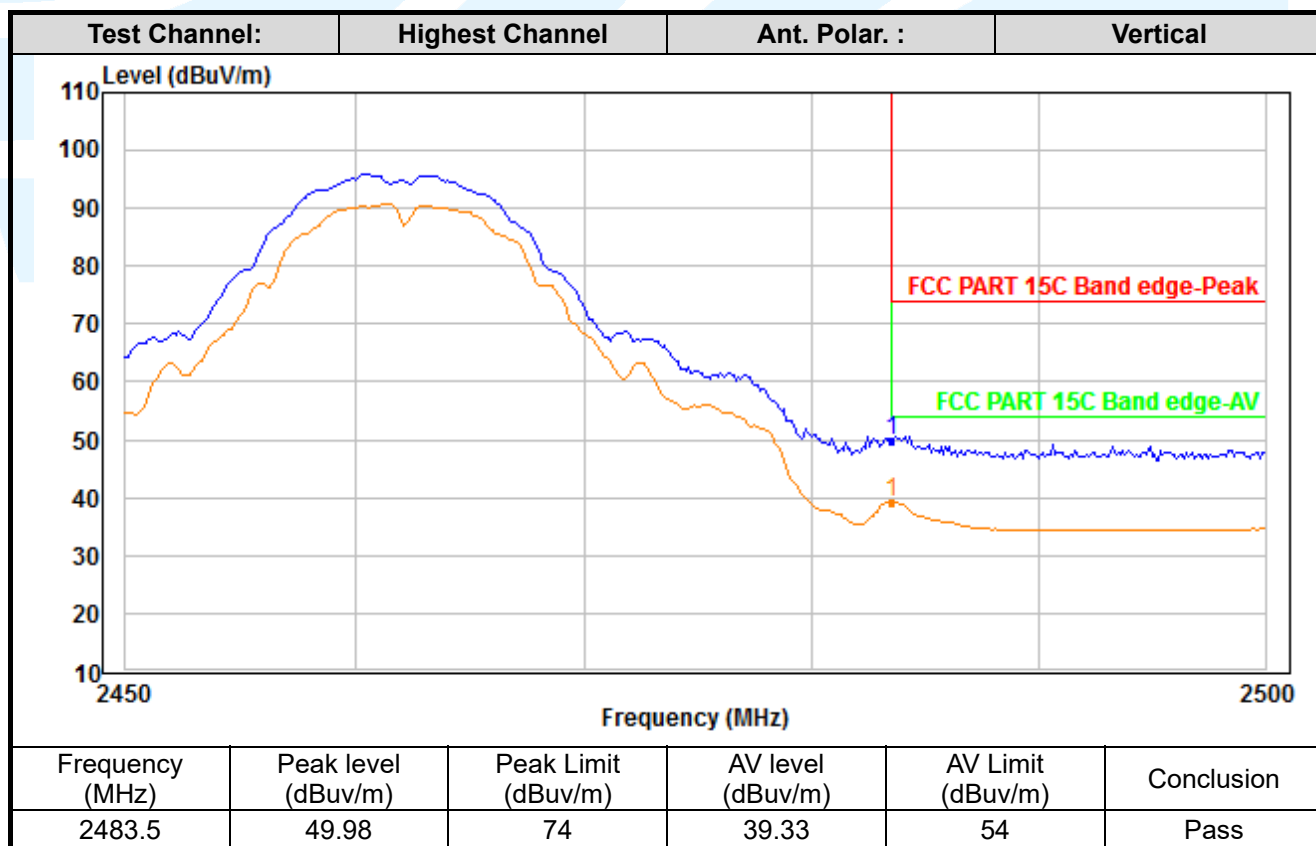
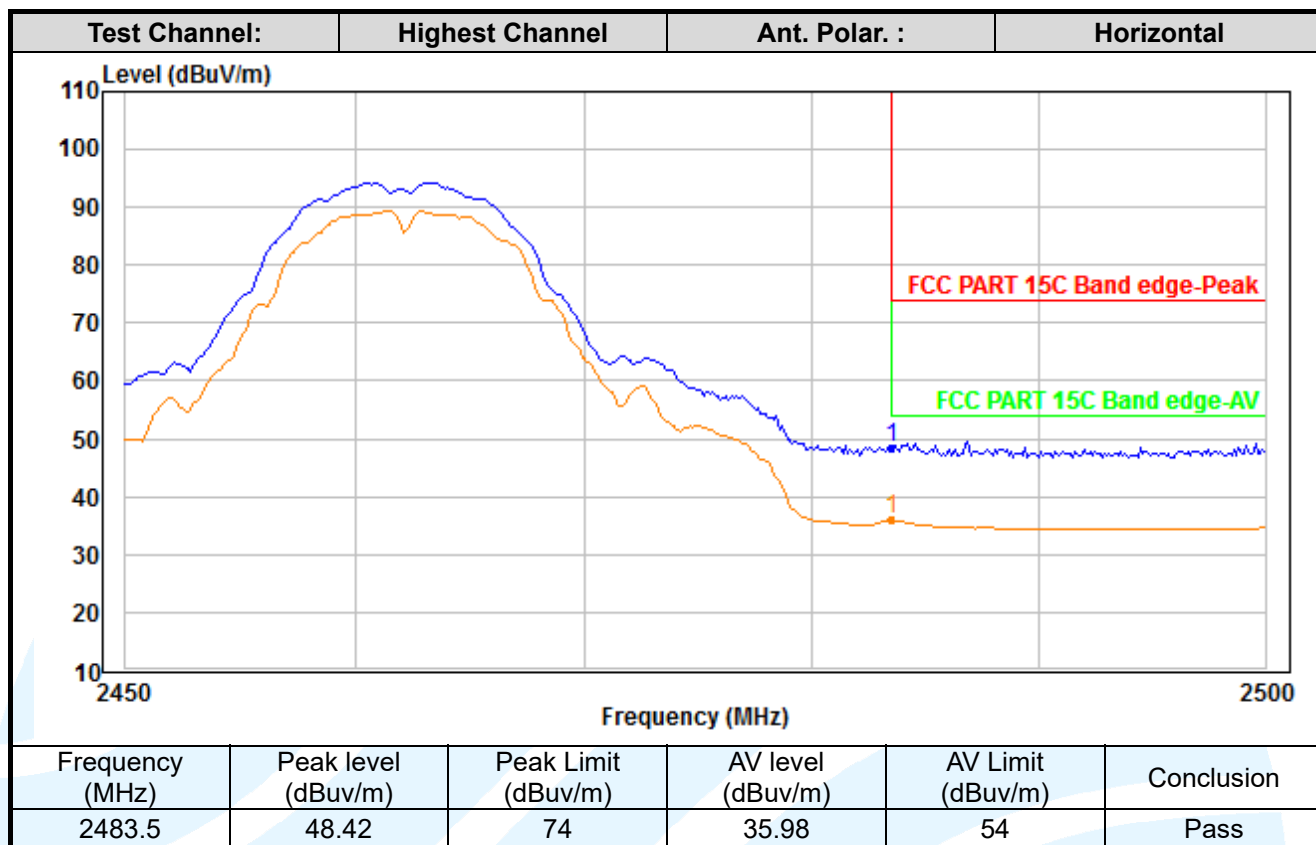
Address: 16/F, Block A, Building 6, Baoneng Science and Technology Park, Qingxiang Road No.1, Longhua New District, Shenzhen, China

Tel: +86-755-28230888

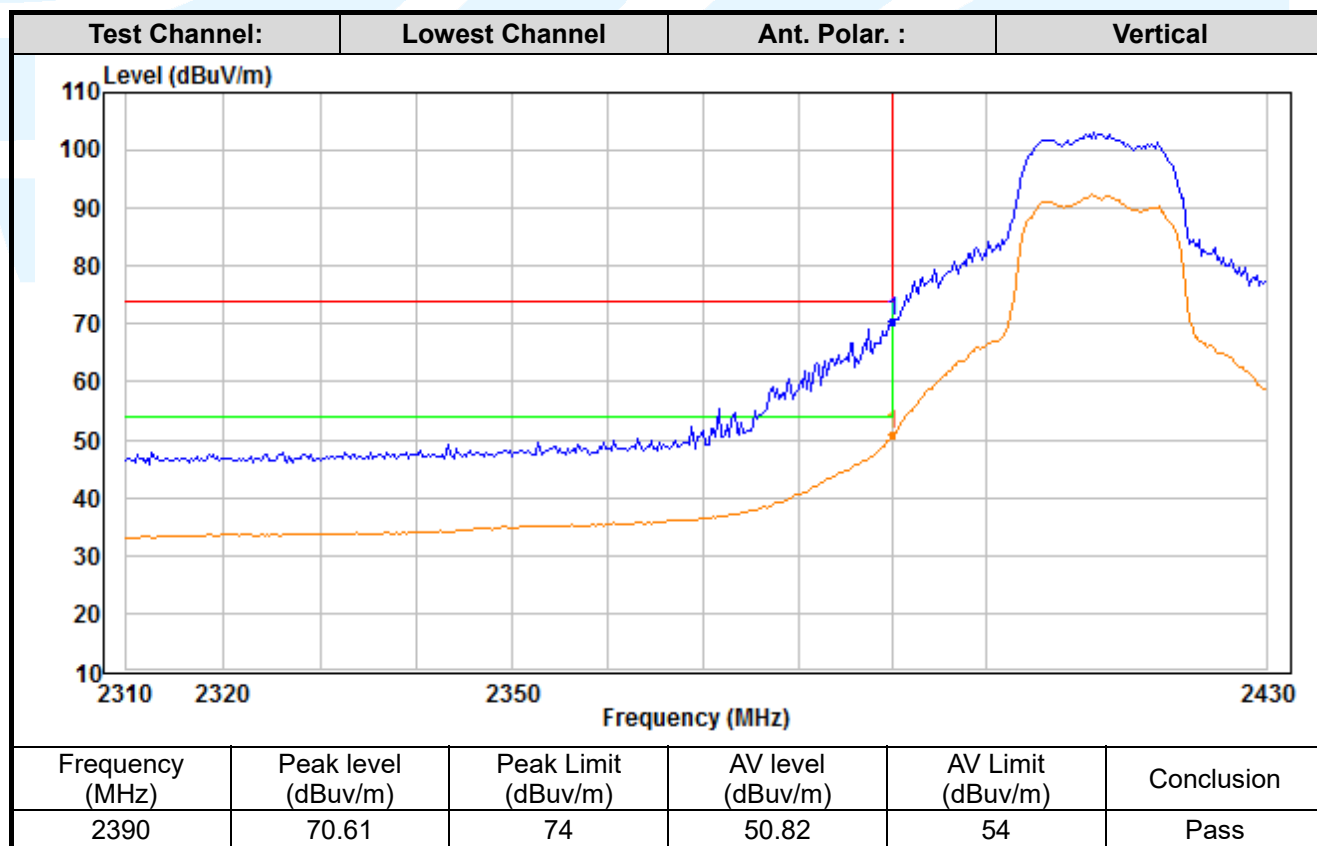
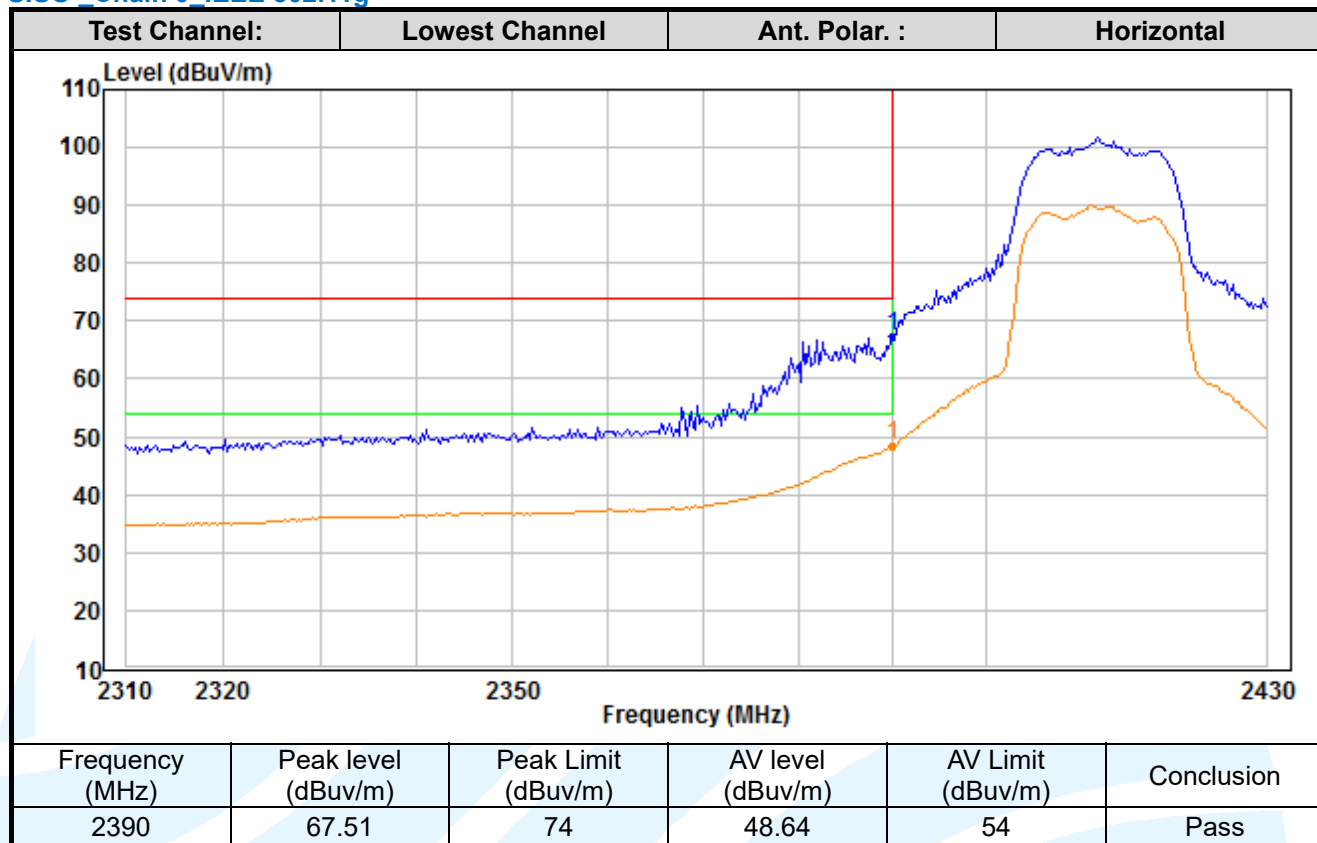
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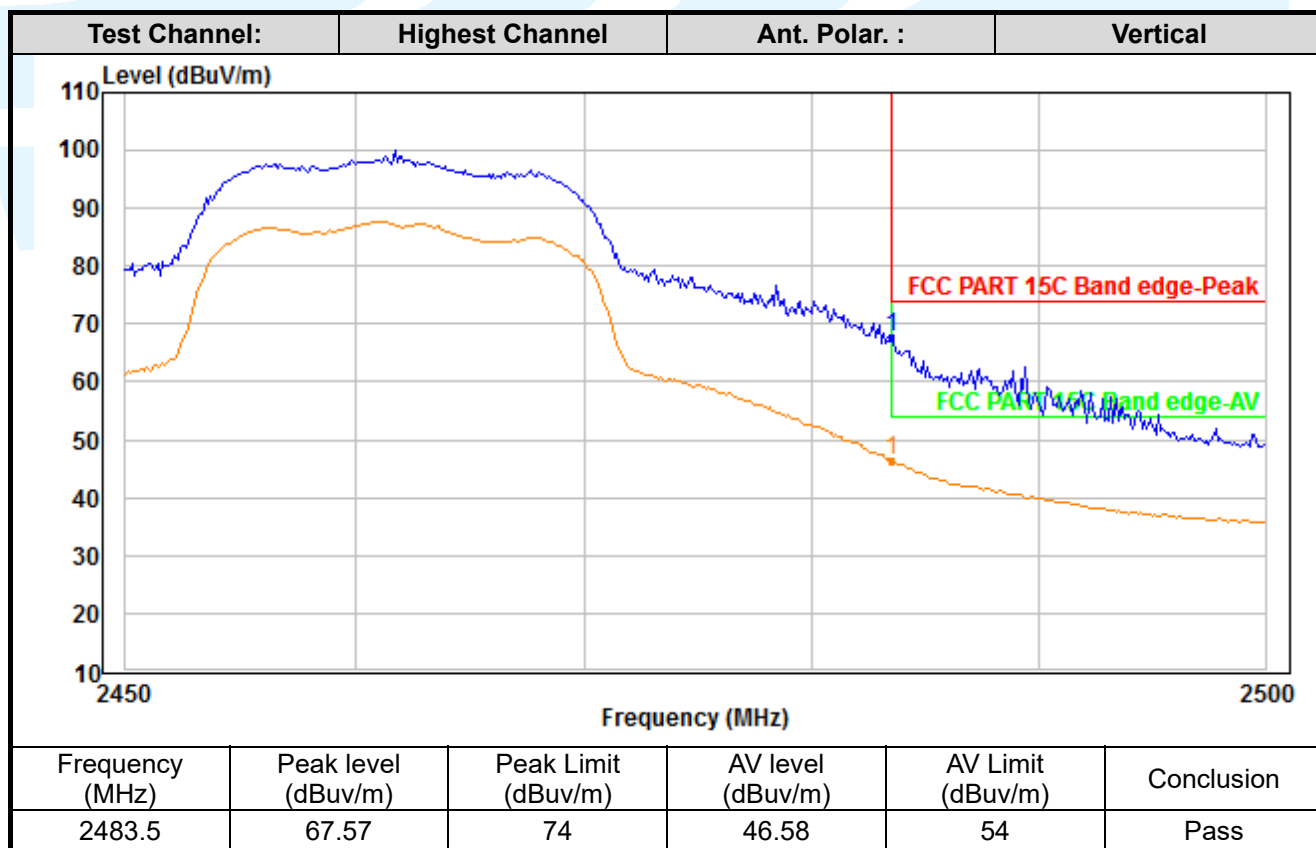
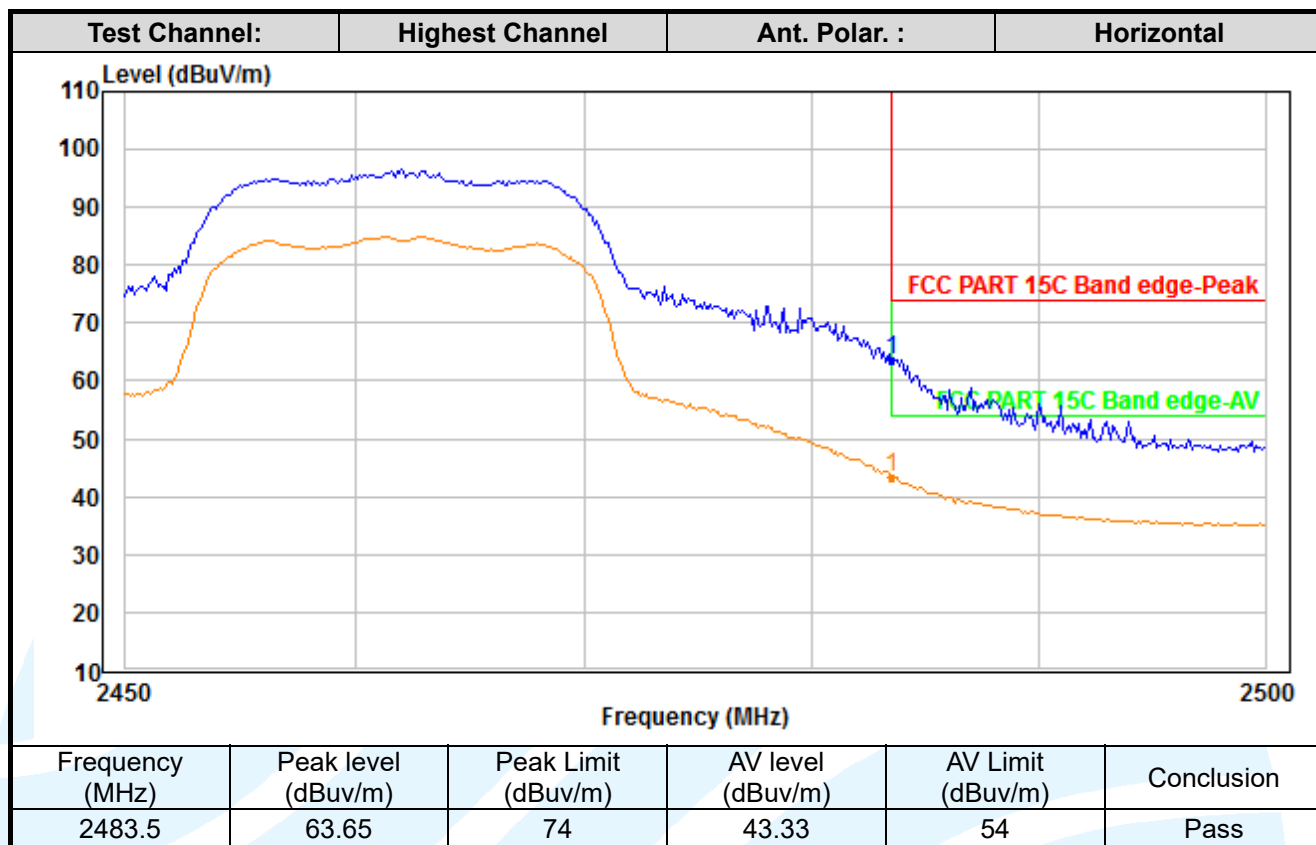
E-mail: info@uttlab.com

[Http://www.uttlab.com](http://www.uttlab.com)

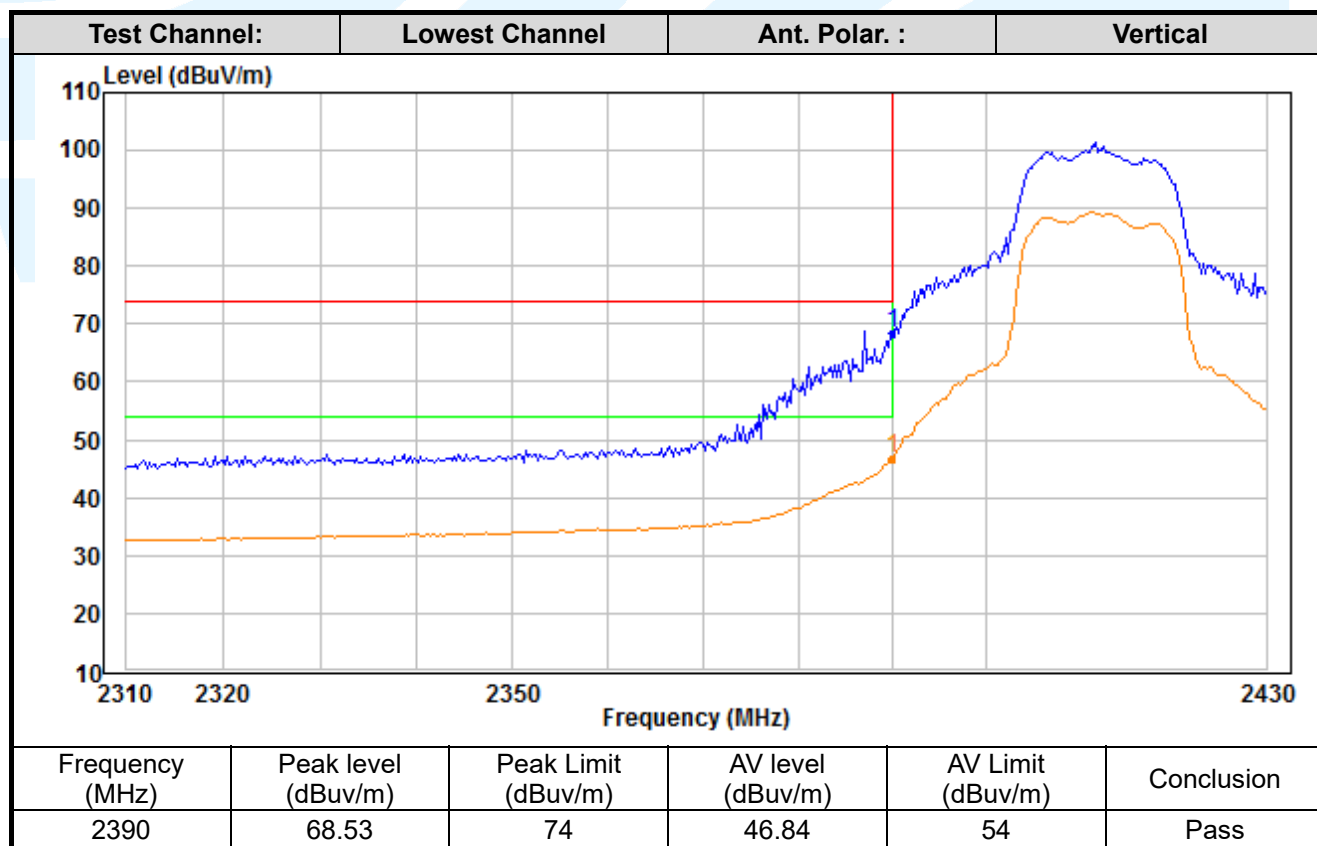
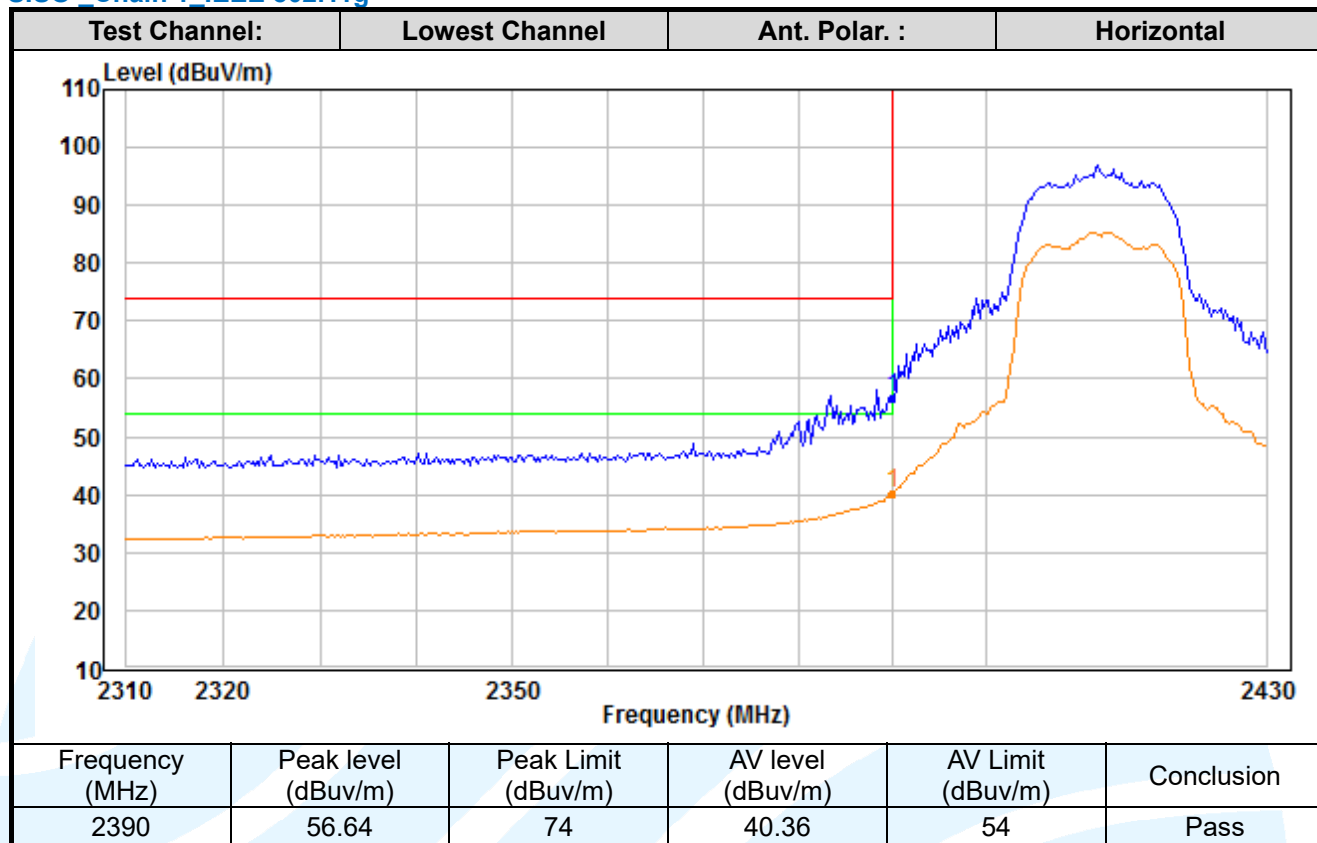


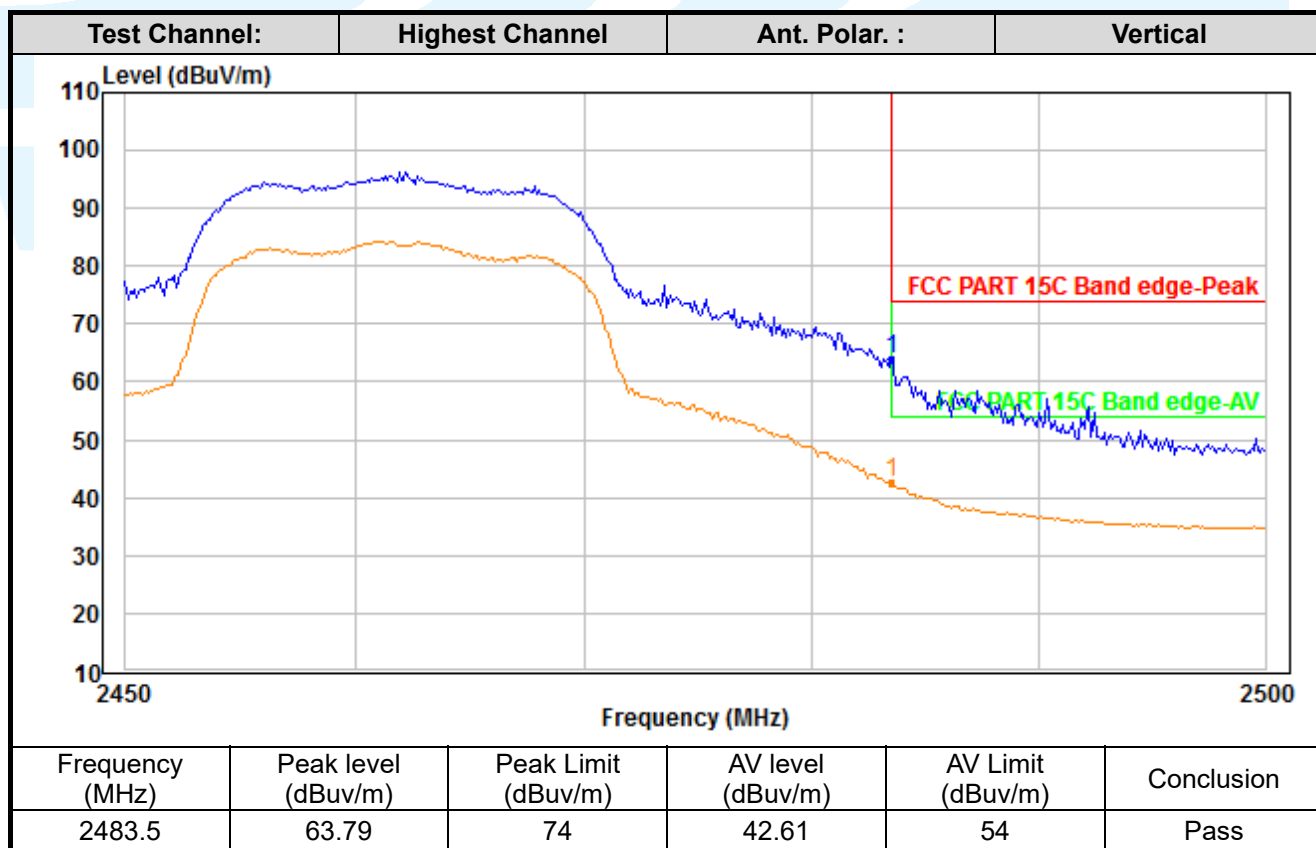
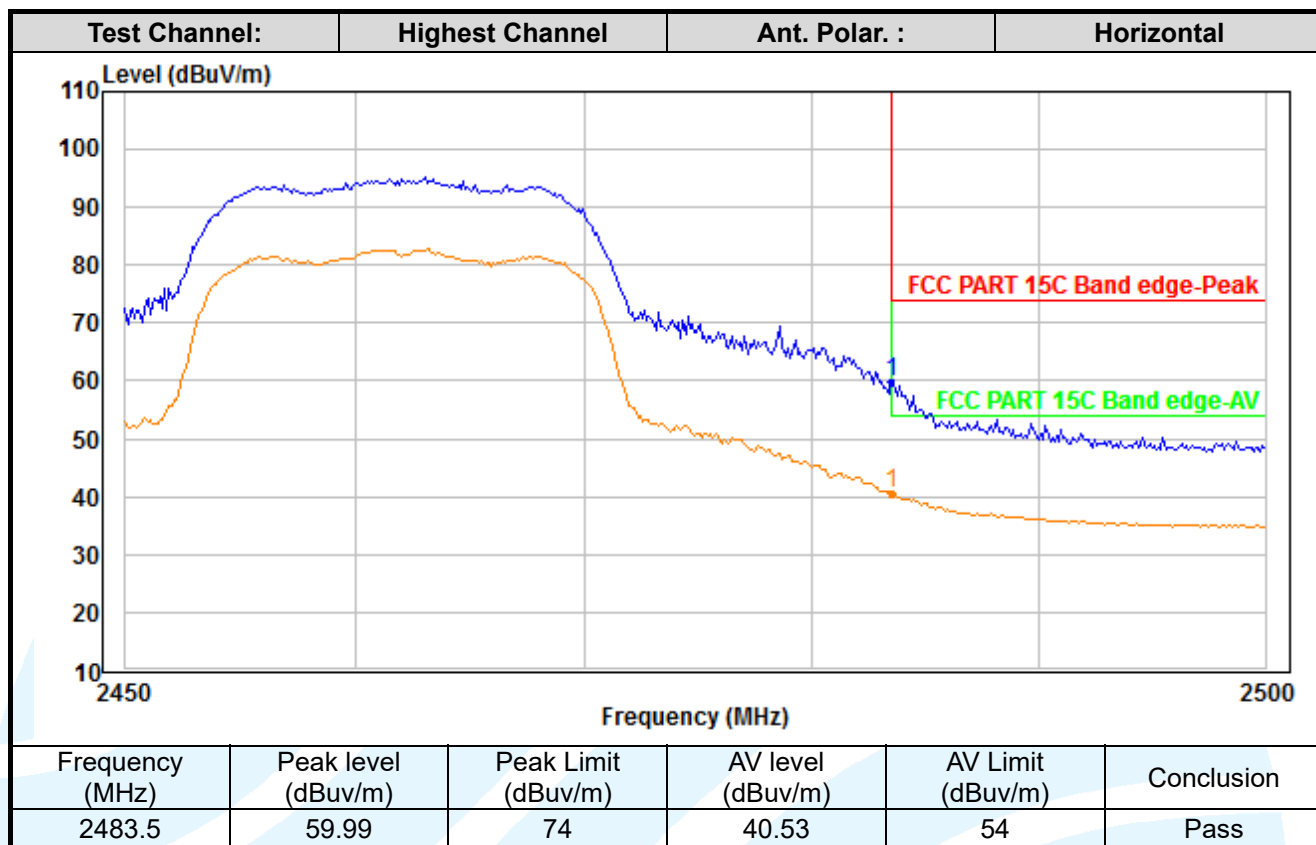
SISO_Chain 0_ IEEE 802.11g

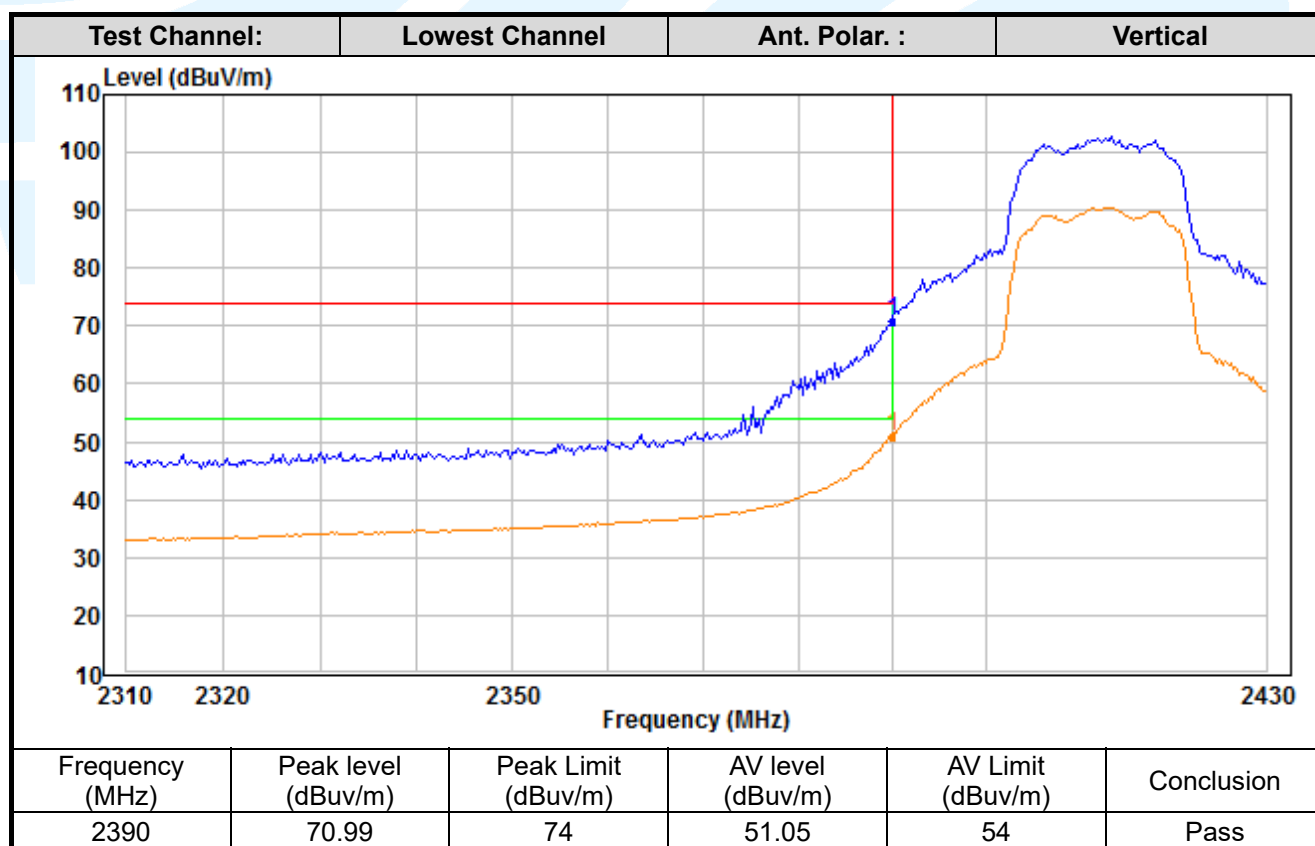
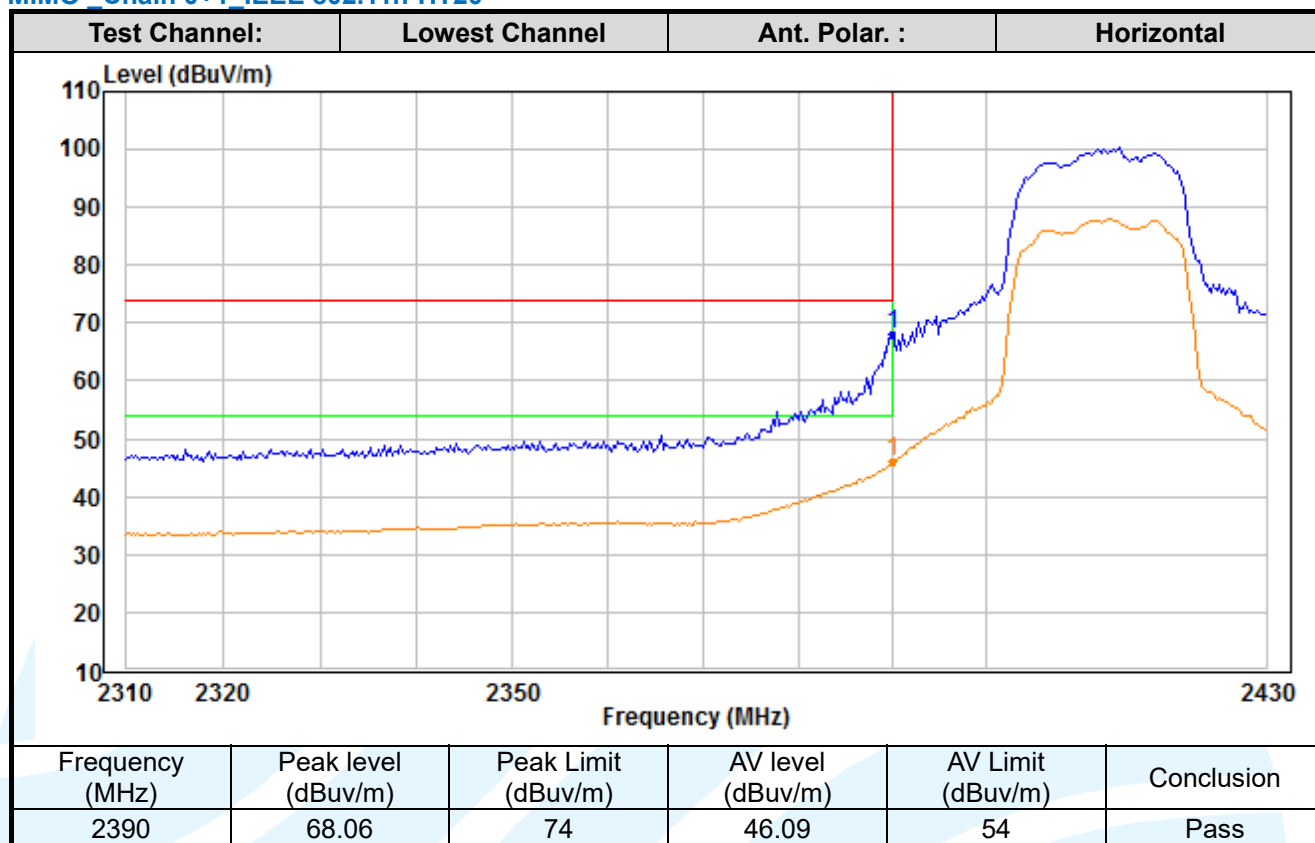


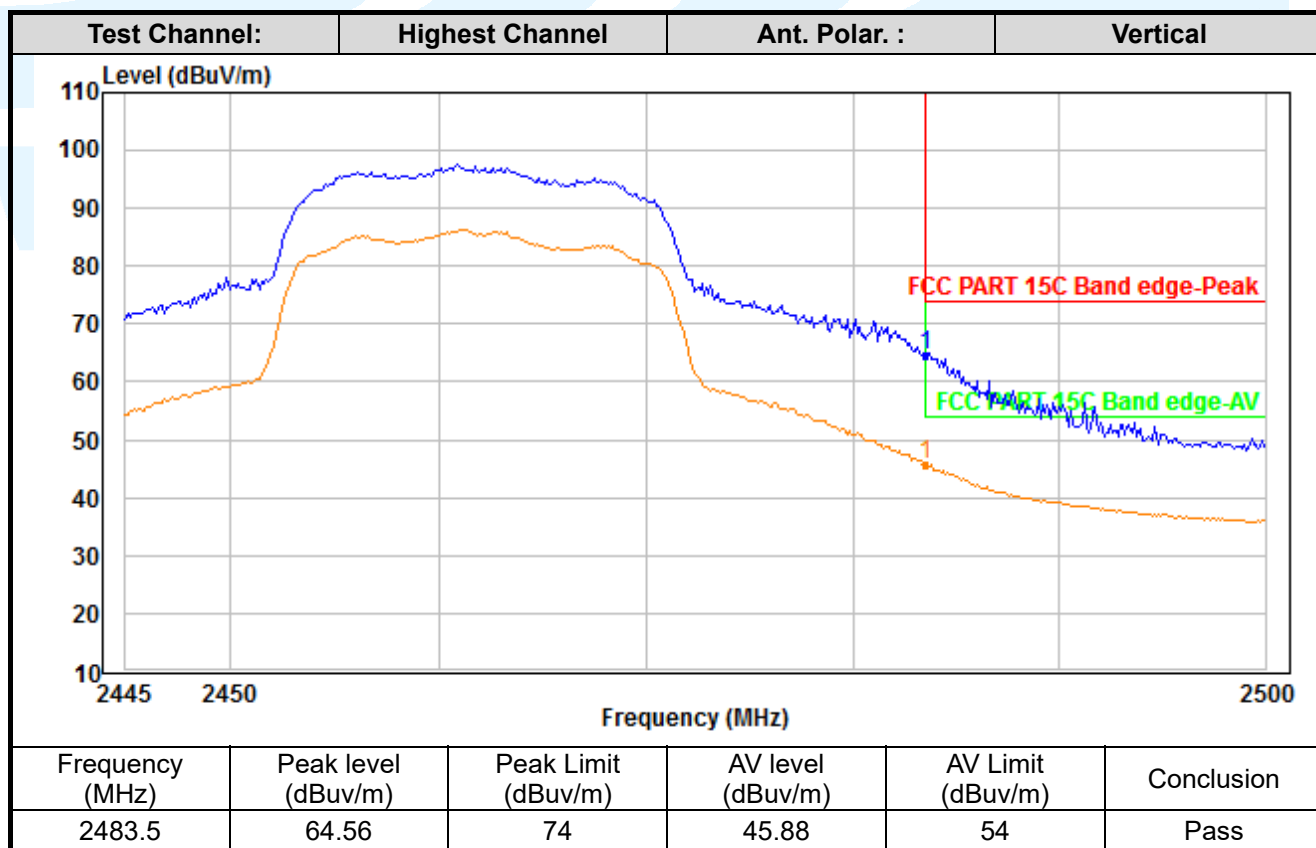
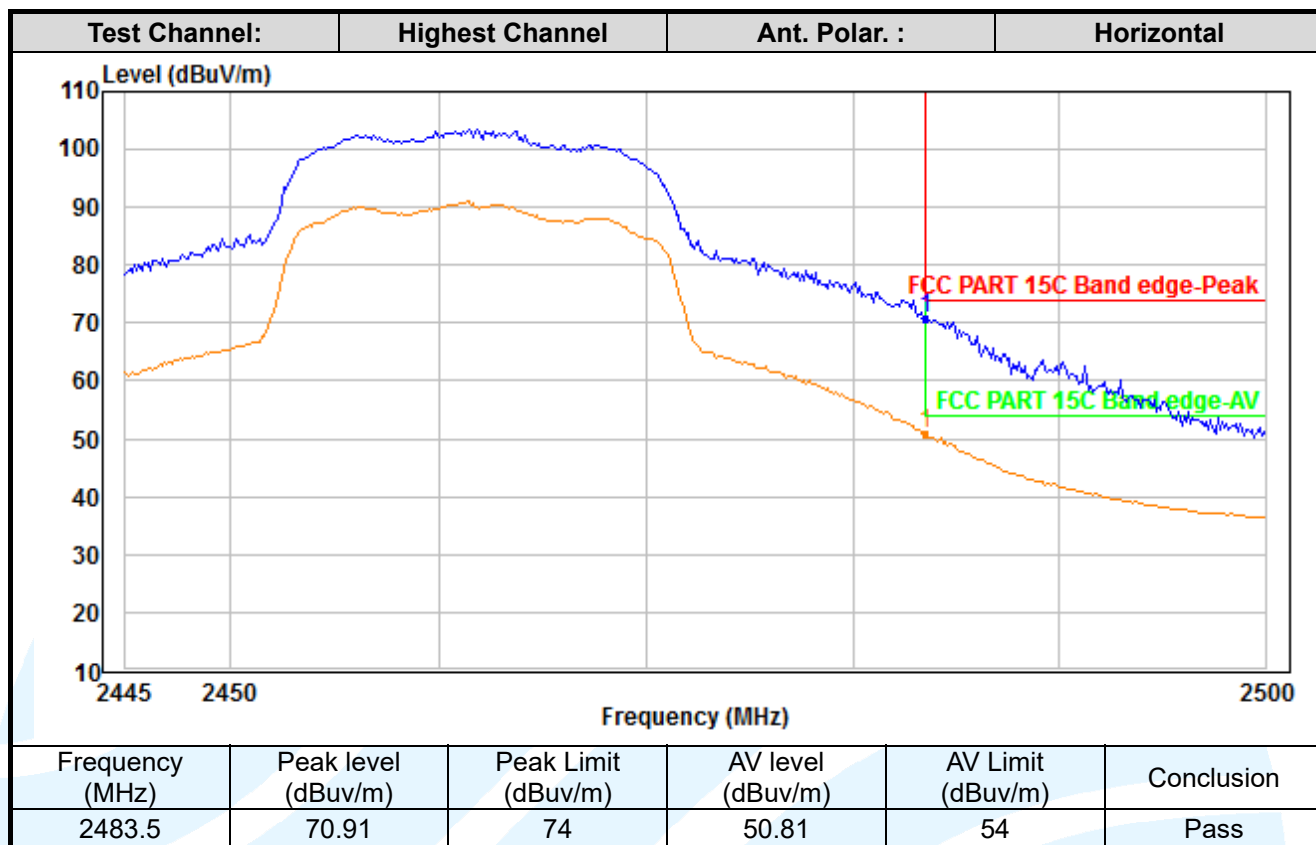


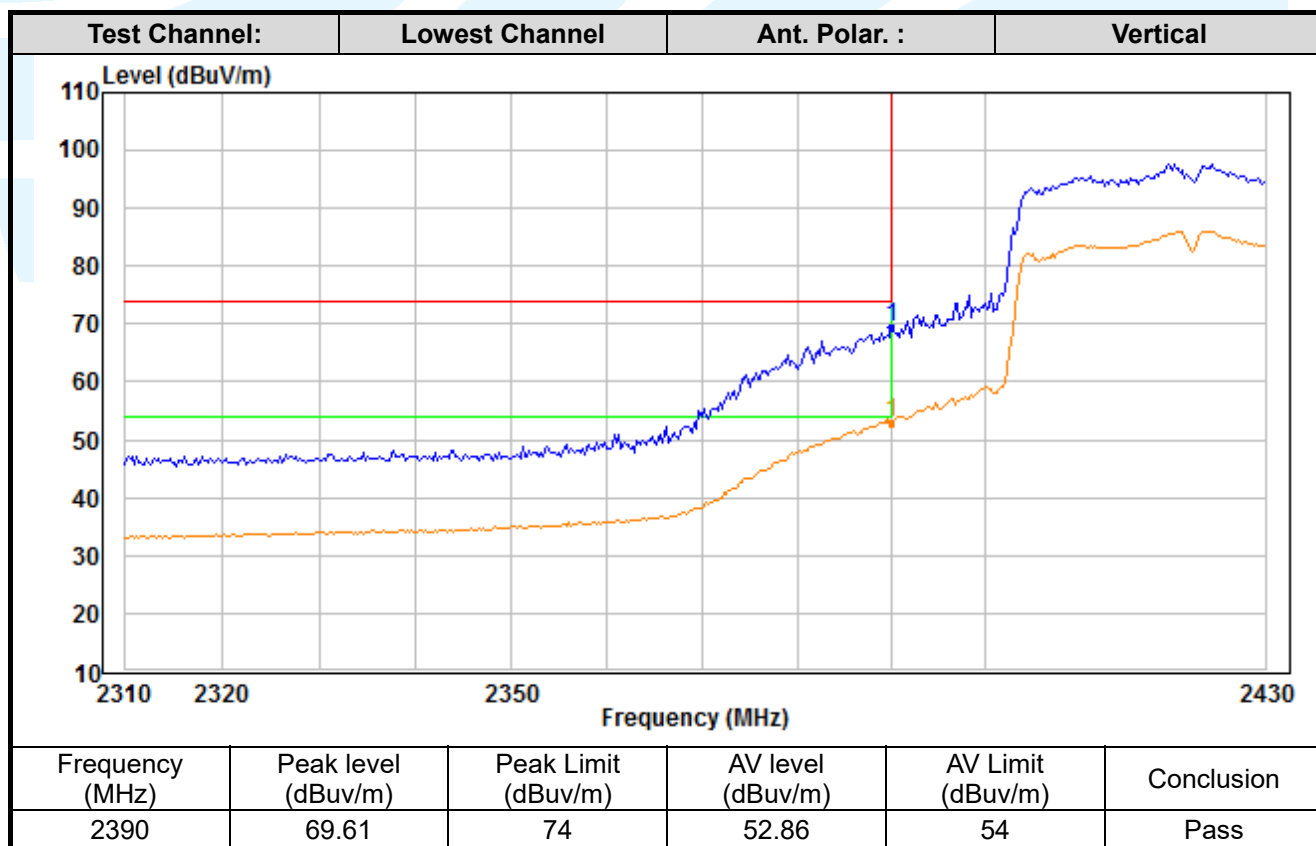
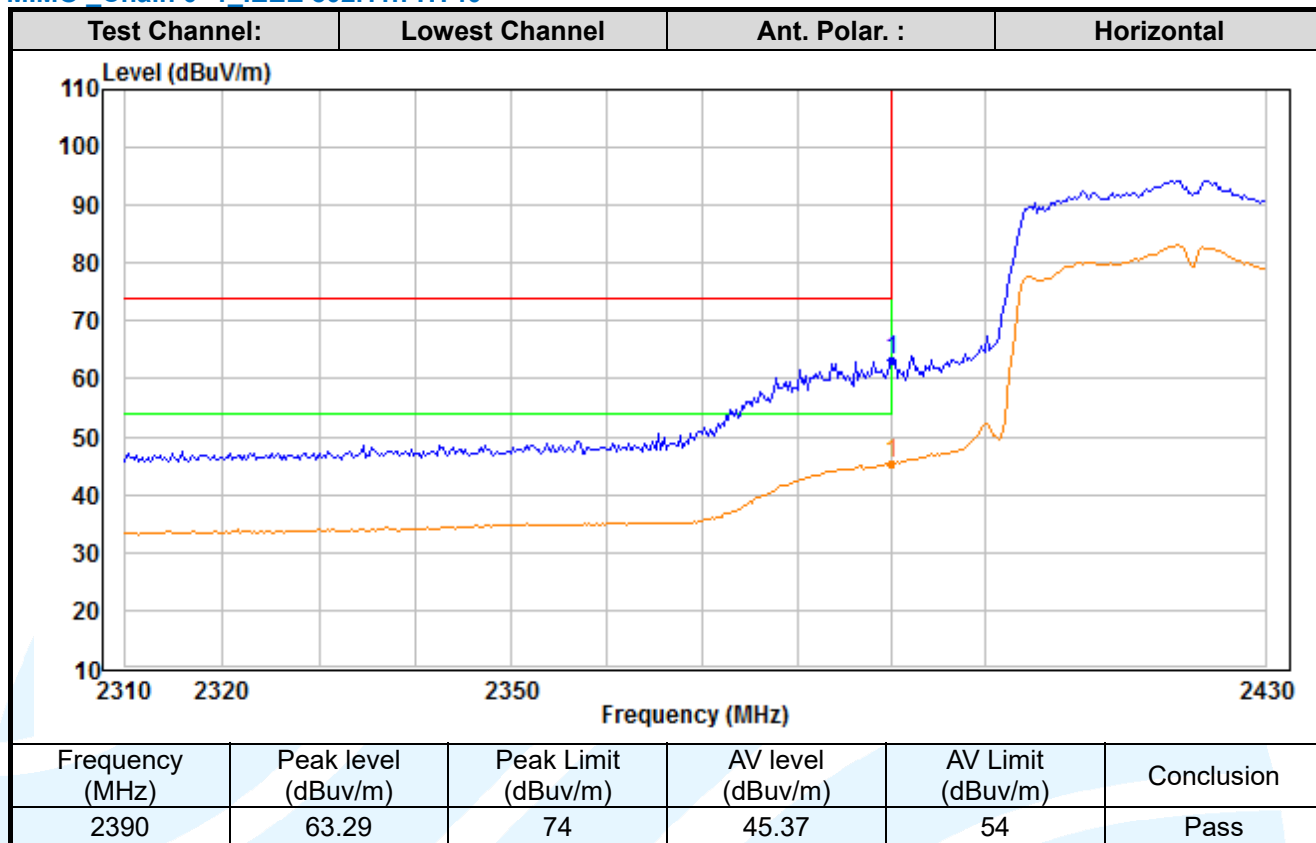
SISO_Chain 1_ IEEE 802.11g

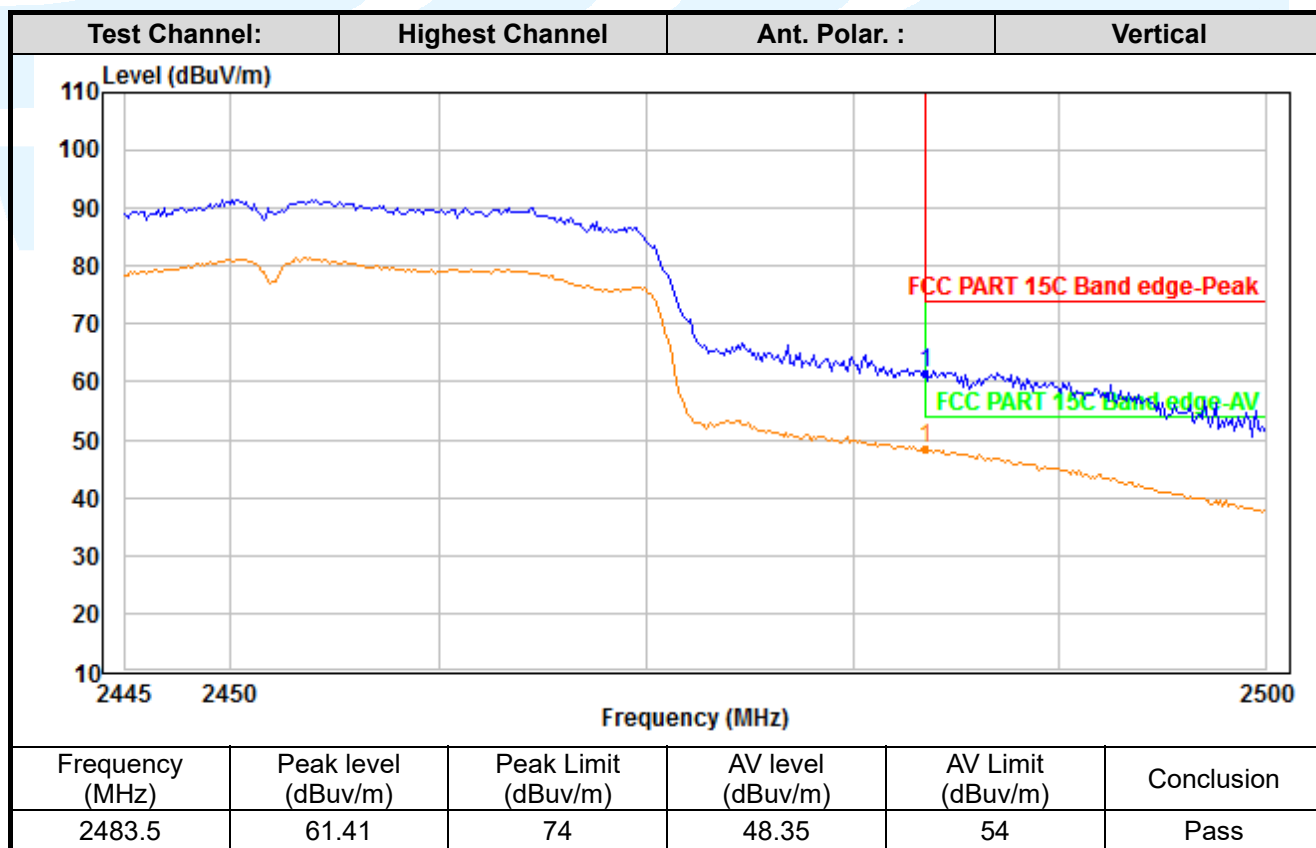
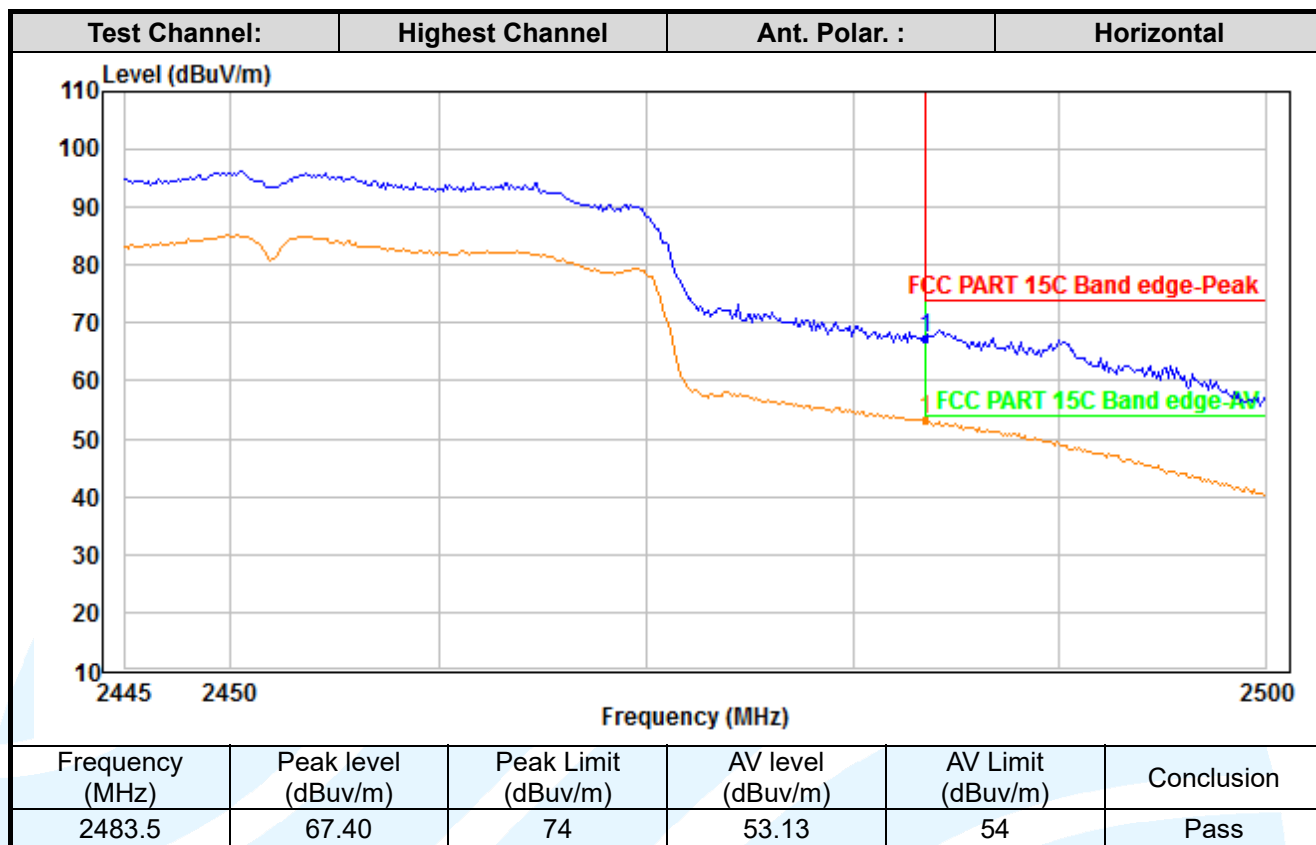




MIMO Chain 0+1 IEEE 802.11n-HT20




MIMO Chain 0+1 IEEE 802.11n-HT40




APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of UnionTrust, this report can't be reproduced except in full.
