



Test report No.: 23C0510R-RFUSV03S-A

TEST REPORT

Product Name	Car Infotainment Unit
Trademark	APTIV
Model and /or type reference	IHP
FCC ID	LTQIHP
Applicant's name / address	Aptiv Services Deutschland GmbH Am Technologiepark 1 D–42119 Wuppertal Germany
Manufacturer's name	Aptiv Services Deutschland GmbH
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 789033
Verdict Summary	IN COMPLIANCE
Documented By (Senior Project Specialist / April Chen)	April Chen
Tested By (Senior Engineer / Ivan Chuang)	April Chen Ivan Chuang Seavan Tsans
Approved By (Senior Engineer / Steven Tsai)	Server Tsai
Date of Receipt	2023/12/14
Date of Issue	2024/01/26
Report Version	V1.0



Page

INDEX

1.	General Information	6
1.1	.1. EUT Description	6
1.2	.2. Tested System Datails	9
1.3	.3. Configuration of tested System	9
1.4	.4. EUT Exercise Software	9
1.5	.5. Test Facility	
1.6	.6. List of Test Equipment	
1.7	7. Uncertainty	
2.	Conducted Emission	
2.1	1. Test Setup	
2.2	.2. Limits	
2.3	.3. Test Procedure	
2.4	.4. Test Result of Conducted Emission	14
3.	Maximun conducted output power	
3.1	.1. Test Setup	
3.2	*	
3.3	.3. Test Procedure	
3.4	.4. Test Result of Maximum conducted output power	
4.	Peak Power Spectral Density	25
4.1	.1. Test Setup	
4.2	.2. Limits	
4.3	.3. Test Procedure	
4.4	.4. Test Result of Peak Power Spectral Density	27
5.	Radiated Emission	41
5.1	.1. Test Setup	41
5.2	.2. Limits	
5.3	.3. Test Procedure	
5.4		
6.	Band Edge	61
6.1	.1. Test Setup	61
6.2	-	
6.3	.3. Test Procedure	

DEKRA

6.4.	Test Result of Band Edge	64
7. 0	ccupied Bandwidth	89
7.1.	Test Setup	
7.2.		
7.3.	Test Procedure	
7.4.	Test Result of Occupied Bandwidth	90
8. Dı	uty Cycle	97
8.1.	Test Setup	97
8.2.	Test Procedure	97
8.3.	Test Result of Duty Cycle	

Appendix 1: EUT Test Photographs

Appendix 2: Product Photos-Please refer to the file: 23C0510R-Product Photos

Competences and Guarantees

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

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

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

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

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

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

General conditions

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



Revision History

Report No.	Version	Description	Issued Date
23C0510R-RFUSV03S-A	V1.0	Initial issue of report.	2024/01/26



1. General Information

1.1. EUT Description

Product Name	Car Infotainment Unit			
Trade Name	APTIV			
Model No.	IHP			
EUT Rated Voltage	DC 12V by Battery			
EUT Test Voltage	DC 12V by Battery			
Frequency Range	802.11a/n/ac/ax-20 MHz: 5180-5240 MHz, 5745-5825 MHz			
	802.11n/ac/ax-40 MHz: 5190-5230 MHz, 5755-5795 MHz			
	802.11ac/ax-80 MHz: 5210 MHz, 5775 MHz			
Number of Channels	802.11a/n/ac/ax-20 MHz: 9 CH			
	802.11n/ac/ax-40 MHz: 4 CH			
	802.11ac/ax-80 MHz: 2 CH			
Data Rate	802.11a: 6-54 Mbps			
	802.11n: up to 300 Mbps			
	802.11ac: up to 866.7 Mbps			
	802.11ax: up to 1201 Mbps			
Type of Modulation	802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)			
	802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)			
Channel Control	Auto			
Blockchain verified				
QR code				



Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	AMOTECH	AMO-PHA-AP001	PIFA	1.85 dBi for 5150~5250 MHz
1				1.71 dBi for 5725~5850 MHz

Note:

- 1. The antenna of EUT is conforming to FCC 15.203.
- 2. The antenna gain as by the manufacturer provided.

For power CDD Directional gain:

1.85 dBi for 5150 MHz -5250 MHz

1.71 dBi for 5725 MHz -5850 MHz

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

For PSD Directional gain:

4.86 dBi for 5150 MHz -5250 MHz

4.72 dBi for 5725 MHz -5850 MHz

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



Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
	(MHz)		(MHz)		(MHz)		(MHz)
036	5180	040	5200	044	5220	048	5240
149	5745	153	5765	157	5785	161	5805
165	5825						

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

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
038	5190	046	5230	151	5755	159	5795

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

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
	(MHz)		(MHz)		(MHz)		(MHz)
042	5210	155	5775				

Note:

- 1. This device is a Car Infotainment Unit with built-in WLAN and Bluetooth transceiver, this report for 5GHz WLAN.
- 2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11a is 6Mbps, 802.11ac/ax-20 MHz/40 MHz/80 MHz is VHT0/MCS0)
- 4. The modulation and bandwidth are similar for 802.11n mode and 802.11ac/ax mode, therefore investigated worst case (802.11ac/ax) to representative mode.
- 5 The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report
- 6. The spectrum plot against conducted item only shows the worst case.
- 7. This device does not support partial RU function.
- 8. DEKRA has evaluated each test mode. Only the worst case is shown in the report.
- 9. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance of transmitter with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

		Transmit (802.11a) Transmit (802.11ac-20 MHz)
		Transmit (802.11ac-40 MHz)
Test Mode	Mode 1	Transmit (802.11ac-80 MHz)
		Transmit (802.11ax-20 MHz)
		Transmit (802.11ax-40 MHz)
		Transmit (802.11ax-80 MHz)

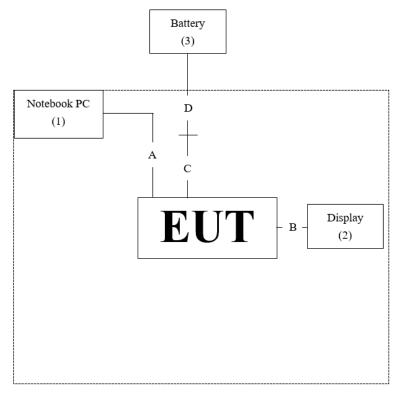
1.2. Tested System Datails

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

Proc	luct	Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	Lenovo	TP00067C	PF-0EW0C3	N/A
2	Display	N/A	IHP DISPLAY	N/A	N/A
3	Battery	BOSCH	60044	N/A	N/A

Cabl	е Туре	Cable Description
А	USB Cable	Shielded, 1m
В	4 Pin cable	Non-shielded, 1m
С	Power Cable	Non-shielded, 2m
D	Power Cable	Non-shielded, 2m

1.3. Configuration of tested System



1.4. EUT Exercise Software

1	Setup the EUT as shown in Section 1.3.
2	Execute software "cmd Ver. 10.0.19045.3803" 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
	Temperature (°C)	10~40 °C	23.7 °C
Radiated Emission	Humidity (%RH)	10~90 %	34.0 %
	Temperature (°C)	10~40 °C	25.6 °C
Conductive	Humidity (%RH)	10~90 %	57.0 %

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

Site Description	Accredited by TAF
	Accredited Number: 3023

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



1.6. List of Test Equipment

For Conducted Measurements / HY-SR02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
v	Spectrum Analyzer	R&S	FSV30	103465	2023/06/14	2024/06/13
V	Peak Power Analyzer	KEYSIGHT	8990B	MY51000539	2023/05/15	2024/05/14
v	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240002	2023/05/18	2024/05/17
v	Wideband Power Sensor	KEYSIGHT	N1923A	MY59240003	2023/05/18	2024/05/17

Note:

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

Manufacturer Model No. Serial No. Cal. Date Due Date Equipment V Loop Antenna AMETEK HLA6121 49611 2023/02/21 2024/02/20 V Bi-Log Antenna SCHWARZBECK **VULB9168** 9168-0675 2023/08/09 2025/08/08 V Horn Antenna 2023/10/02 2025/10/01 Com-Power AH-840 101100 V Horn Antenna RF SPIN DRH18-E 210507A18ES 2023/05/11 2024/05/10 V Pre-Amplifier SGH SGH0301-9 20211007-11 2023/01/10 2024/01/09 V Pre-Amplifier SGH PRAMP118 20200701 2023/01/10 2024/01/09 V Pre-Amplifier EMCI EMC05820SE 980310 2023/01/10 2024/01/09 980369 2023/01/10 2024/01/09 EMCI EMC184045SE Pre-Amplifier V Coaxial Cable EMCI EMC102-KM-KM-600 1160314 170242 EMCI Coaxial Cable EMC102-KM-KM-7000 BRM50702 Filter MICRO TRONICS G269 2023/01/05 2024/01/04 V Filter MICRO TRONICS BRM50716 G196 2023/01/05 2024/01/04 EMI Test Receiver V R&S ESR3 102793 2023/12/11 2024/12/10 V 2024/02/03 Spectrum Analyzer R&S FSV3044 101113 2023/02/04 2024/01/09 SGH 2021005-1 2023/01/10 Coaxial Cable SGH18 V Coaxial Cable SGH SGH18 202108-4 V Coaxial Cable SGH HA800 GD20110223-1 V Coaxial Cable SGH HA800 GD20110222-3

For Radiated Measurements /HY-CB03

Note:

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



1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

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

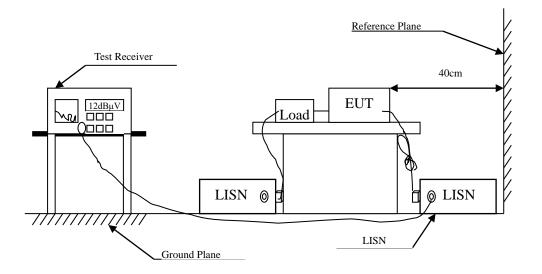
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

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



2. Conducted Emission

2.1. Test Setup



2.2. Limits

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

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

2.3. Test Procedure

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

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

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



2.4. Test Result of Conducted Emission

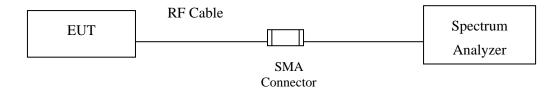
Owing to the DC operation of EUT, this test item is not performed.



3. Maximun conducted output power

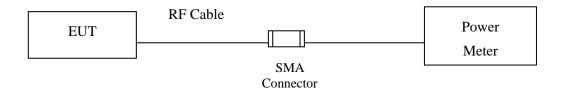
3.1. Test Setup

26dB Occupied Bandwidth

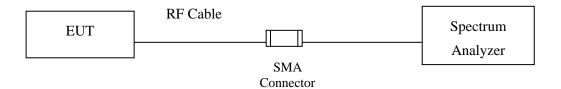


Conduction Power Measurement

Conduction Power Measurement (for 802.11an)



Conduction Power Measurement (for 802.11ac/ax)



3.2. Limits

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-topoint U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm 10 log B, where B is the 26dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

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

For CDD mode :

5150MHz-5250MHz: Directional gain = 1.85 dBi, Limit= 30dBm
5725MHz-5850MHz: Directional gain = 1.71 dBi, Limit= 30dBm
(Directional gain = GANT MAX + Array Gain, Array Gain = 0 dB for NANT≤4)

3.3. Test Procedure

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

802.11a/n/ac/ax (BW \leq 160MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter) <u>Note: the power meter have a video bandwidth that is greater than or equal to the measurement</u> <u>bandwidth, (KEYSIGHT / 8990B video bandwidth: 160MHz)</u>

802.11 n/ac/ax (BW \geq 160MHz) Maximum conducted output power using KDB 789033 section E)2)b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep)

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



3.4. Test Result of Maximum conducted output power

Product	:	Car Infotainment Unit
Test Item	:	Maximum conducted output power
Test Mode	:	Transmit (802.11a)
Test Date	:	2023/12/20

Channel No.	Frequency	Chain A Power	Chain B Power	Output Power	Output Power Limit
Channel No.	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
36	5180	13.05	14.19	16.67	30
44	5220	13.18	14.56	16.93	30
48	5240	12.92	14.31	16.68	30
149	5745	11.97	14.93	16.71	30
157	5785	11.79	14.95	16.66	30
165	5825	12.83	14.80	16.94	30



Test Item : Maximum conducted output power

Test Mode : Transmit (802.11ac-20 MHz)

Test Date : 2023/12/20

Channel Ne	Frequency	Chain A Power	Chain B Power	Output Power	Output Power Limit
Channel No.	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
36	5180	12.69	14.23	16.54	30
44	5220	12.73	14.15	16.51	30
48	5240	12.90	14.38	16.71	30
149	5745	12.05	15.03	16.80	30
157	5785	11.62	14.93	16.59	30
165	5825	12.76	14.66	16.82	30



Product	:	Car Infotainment Unit
ITOuuci	•	our miotumnent omt

Test Item : Maximum conducted output power

Test Mode : Transmit (802.11ac-40 MHz)

Test Date : 2023/12/20

Channel Ne	Frequency	Chain A Power	Chain B Power	Output Power	Output Power Limit
Channel No.	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
38	5190	11.61	13.49	15.66	30
46	5230	13.11	14.65	16.96	30
151	5755	11.71	14.92	16.62	30
159	5795	11.53	14.96	16.59	30



Product	:	Car Infotainment Unit
Test Item	:	Maximum conducted output power
Test Mode	:	Transmit (802.11ac-80 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency	Chain A Power	Chain B Power	Output Power	Output Power Limit
Channel No.	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
42	5210	9.54	11.29	13.51	30
155	5775	11.69	14.94	16.62	30



Product		Car Infotainment Unit
Floauct	•	

Test Item : Maximum conducted output power

Test Mode : Transmit (802.11ax-20 MHz)

Test Date : 2023/12/20

Channel Ne	Frequency	Chain A Power	Chain B Power	Output Power	Output Power Limit
Channel No.	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
36	5180	11.63	13.57	15.72	30
44	5220	12.80	14.38	16.67	30
48	5240	12.79	14.19	16.56	30
149	5745	11.66	14.89	16.58	30
157	5785	11.73	14.95	16.64	30
165	5825	12.48	14.42	16.57	30



- Test Item : Maximum conducted output power
- Test Mode : Transmit (802.11ax-40 MHz)
- Test Date : 2023/12/20

Channel Ne	Frequency	Chain A Power	Chain B Power	Output Power	Output Power Limit
Channel No.	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
38	5190	12.65	14.36	16.60	30
46	5230	12.84	14.36	16.68	30
151	5755	11.63	14.84	16.54	30
159	5795	11.73	14.93	16.63	30

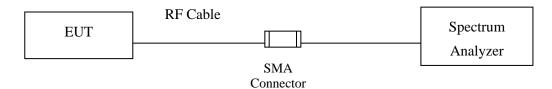


Product	:	Car Infotainment Unit
Test Item	:	Maximum conducted output power
Test Mode	:	Transmit (802.11ax-80 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency	Chain A Power	Chain B Power	Output Power	Output Power Limit
Channel No.	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)
42	5210	9.40	11.13	13.36	30
155	5775	10.96	14.24	15.91	30

4. Power Spectral Density

4.1. Test Setup



4.2. Limits

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.+

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

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

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

For CDD mode :

5150MHz-5250MHz: Directional gain = 4.86 dBi, Limit= 17 dBm 5725MHz-5850MHz: Directional gain = 4.72 dBi, Limit= 30 dBm Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}] dBi$

4.3. Test Procedure

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

The Peak Power Spectral Density using KDB 789033 section F) procedure, Create an average power spectrum for the EUT operating mode being tested by following the instructions in section E)2) for measuring maximum conducted output power using a spectrum analyzer. SA-1 method is selected to run the test.



4.4. Test Result of Power Spectral Density

Product	:	Car Infotainment Unit
Test Item	:	Power Spectral Density
Test Mode	:	Transmit (802.11a)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PSD/MHz (dBm)	Duty factor (dB)	Total PSD/MHz (dBm)	Required Limit (dBm)	Result
26	5190	5180 6	А	0.64	0.00	4.24	<17	Pass
36	5180		В	1.74		4.24		Pass
	5220	6	А	0.45	0.00	4.44	<17	Pass
44	44 5220		В	2.23				Pass
40	5240 6	А	-0.06	0.00			Pass	
48		5240 6	В	0.57	0.00	3.28	<17	Pass

Note: Total $PSD = 10*\log(Chain A (mW) + Chain B (mW)) + Duty factor.$

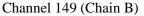
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PSD (dBm)	Duty factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
140	5745	6	А	-0.45	0.00	3.88	<30	Pass
149	5745		В	1.88	0.00			Pass
157	5705	6	А	-1.72	0.00	3.39	<30	Pass
157	5785		В	1.79				Pass
165	5825	6	А	-0.43	0.00	3.85	<30	Pass
			В	1.82				Pass

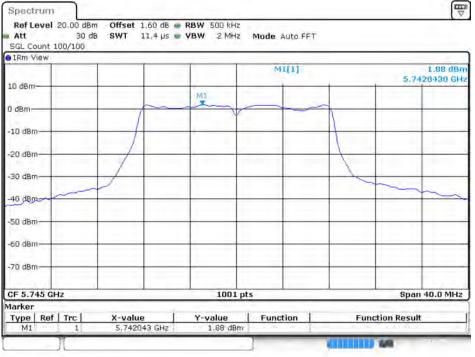
Note: Total $PSD = 10*\log(Chain A (mW) + Chain B (mW)) + Duty factor.$



Channel 44 (Chain B) **₽** Spectrum Offset 1.60 dB • RBW 1 MHz SWT 5.7 µs • VBW 3 MHz Ref Level 20.00 dBm 30 dB Mode Auto FFT Att SGL Count 100/100 SGL Wiew MI[1] 2.23 dBn 5.2218380 GHz 10 dBm-M1 0 dBm--10 dBm -20 dBm--30 dBm -40 dBm--50 dBm -60 dBm--70 dBm Span 40.0 MHz **CF 5.22 GHz** 1001 pts AND TAXABLE IN CONTRACTOR

Date: 27.DEC,2023 09:10:13





Date: 27.DEC.2023 00:30:55



Product	:	Car Infotainment Unit
Test Item	:	Power Spectral Density
Test Mode	:	Transmit (802.11ac-20 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PSD/MHz (dBm)	Duty factor (dB)	Total PSD/MHz (dBm)	Required Limit (dBm)	Result
	5100	VHT0	А	-0.50	0.00	4.11	<17	Pass
36	5180		В	2.27				Pass
4.4	5220	VHT0	А	-0.25	0.00	4.01	<17	Pass
44	5220		В	1.97				Pass
40	5240	VHT0	А	0.32	0.00	4.49	<17	Pass
48			В	2.40				Pass

Note: Total PSD = 10*log(Chain A (mW) + Chain B (mW)) + Duty factor.

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Chain	PSD (dBm)	Duty factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
149	5745	VHT0	А	-1.30	0.00	3.17	<30	Pass
			В	1.25	0.00			Pass
157	5785	VHT0	А	-1.81	0.00	3.02	<30	Pass
			В	1.29				Pass
165	5825	VHT0	А	-0.69	0.00	3.26	<30	Pass
			В	1.02				Pass

Note: Total $PSD = 10*\log(Chain A (mW) + Chain B (mW)) + Duty factor.$

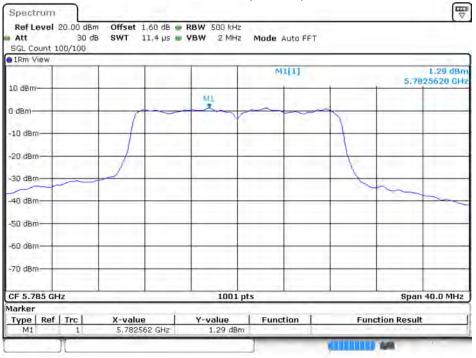


Channel 48 (Chain B)



Date: 27.DEC.2023 09:23:39

Channel 157 (Chain B)



Date: 27.DEC.2023 00:38:24



Product	:	Car Infotainment Unit
Test Item	:	Power Spectral Density
Test Mode	:	Transmit (802.11ac-40 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD/MHz (dBm)	Duty factor (dB)	Total PSD/MHz (dBm)	Required Limit (dBm)	Result
20	5100		А	-3.68	0.12	0.73	<17	Pass
38	5190	VHT0	В	-1.42	0.13			Pass
46	5230	VHT0	А	-2.20	0.13	1.95	<17	Pass
			В	-0.37				Pass

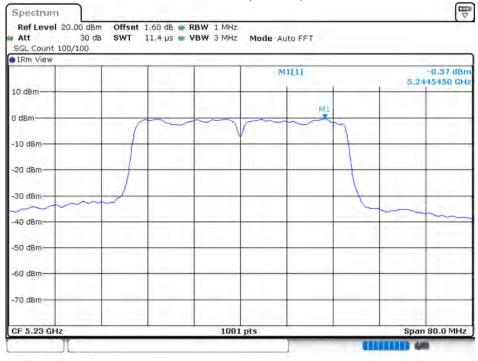
Note: Total PSD = 10*log(Chain A (mW) + Chain B (mW)) + Duty factor.

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD (dBm)	Duty factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
151	5755	VHT0	А	-4.76	0.13	0.37	<30	Pass
151	5755		В	-1.41				Pass
159	5795	VHT0	А	-5.43	0.13	-0.16	<30	Pass
			В	-1.88				Pass

Note: Total $PSD = 10*\log(Chain A (mW) + Chain B (mW)) + Duty factor.$

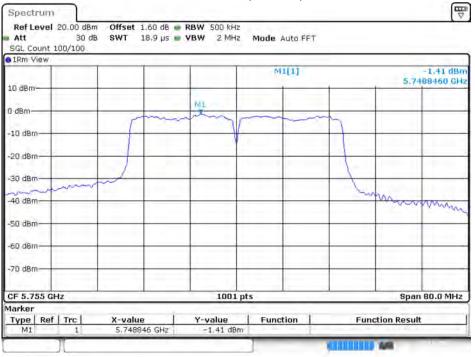


Channel 46 (Chain B)



Date: 27.DEC.2023 09:27:30

Channel 151 (Chain B)



Date: 27.DEC:2023 00:42:06



Product	:	Car Infotainment Unit
Test Item	:	Power Spectral Density
Test Mode	:	Transmit (802.11ac-80 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD/MHz (dBm)	Duty factor (dB)	Total PSD/MHz (dBm)	Required Limit (dBm)	Result
42	5210	VHT0	А	-8.98	0.32	-4.65	<17	Pass
			В	-7.17				Pass

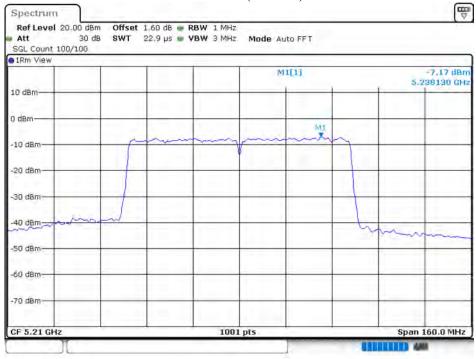
Note: Total $PSD = 10*\log(Chain A (mW) + Chain B (mW)) + Duty factor.$

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD (dBm)	Duty factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
155	5775	VHT0	А	-8.47	0.32	-3.14	<30	Pass
			В	-5.11				Pass

Note: Total PSD = 10*log(Chain A (mW) + Chain B (mW)) + Duty factor.

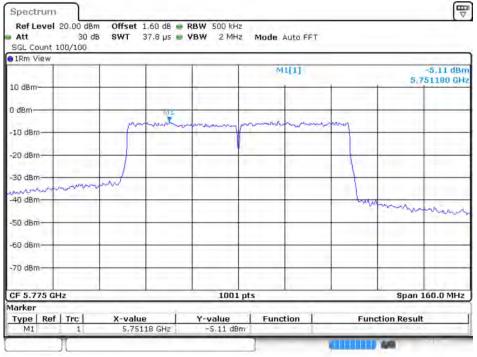


Channel 42 (Chain B)



Date: 27.DEC.2023 09:30:39

Channel 155 (Chain B)



Date: 27.DEC.2023 00:45:51



Product	:	Car Infotainment Unit
Test Item	:	Power Spectral Density
Test Mode	:	Transmit (802.11ax-20 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD/MHz (dBm)	Duty factor (dB)	Total PSD/MHz (dBm)	Required Limit (dBm)	Result
26 5100	5100	MCS0	А	-0.69	0.00	3.86	<17	Pass
36	5180		В	1.98				Pass
4.4	5220	220 MCS0	А	0.45	0.00	4.59	<17	Pass
44	5220		В	2.47				Pass
49	52.40	MCS0	А	0.12	0.00	4.55	<17	Pass
48	5240		В	2.61				Pass

Note: Total $PSD = 10*\log(Chain A (mW) + Chain B (mW)) + Duty factor.$

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD (dBm)	Duty factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
149	5745	MCS0	А	-1.75	0.00	2.55	<30	Pass
			В	0.53				Pass
157	5785	MCS0	А	-2.79	0.00	2.42	<30	Pass
			В	0.86				Pass
165	5825	MCS0	А	-1.89	0.00	2.60	<30	Pass
			В	0.69				Pass

Note: Total PSD = 10*log(Chain A (mW) + Chain B (mW)) + Duty factor.

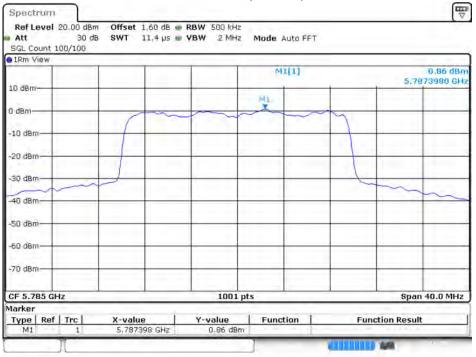


Channel 48 (Chain B)



Date: 27.DEC.2023 10:28:37

Channel 157 (Chain B)



Date: 27. DEC: 2023 00: 49:35



Product	:	Car Infotainment Unit
Test Item	:	Power Spectral Density
Test Mode	:	Transmit (802.11ax-40 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD/MHz (dBm)	Duty factor (dB)	Total PSD/MHz (dBm)	Required Limit (dBm)	Result
20	5100	MCGO	А	-2.75	0.16	1.00	.17	Pass
38	5190	MCS0	В	-0.54	0.16	1.66	<17	Pass
10	5220	MCGO	А	-2.42	0.16	1 70	.17	Pass
46	5230 MCS0	MCS0	В	-0.55	0.16	1.78	<17	Pass

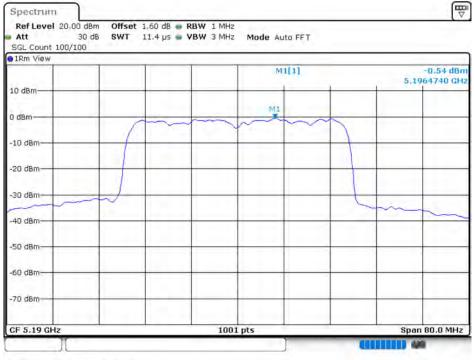
Note: Total PSD = 10*log(Chain A (mW) + Chain B (mW)) + Duty factor.

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD (dBm)	Duty factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
151	5755	MCGO	А	-5.24	0.16	0.24	-20	Pass
151	5755	MCS0	В	-2.12	0.16	-0.24	<30	Pass
150	5705	MCGO	А	-5.94	0.16	0.07	-20	Pass
159	5795	MCS0	В	-2.72	0.16	-0.87	<30	Pass

Note: Total $PSD = 10*\log(Chain A (mW) + Chain B (mW)) + Duty factor.$

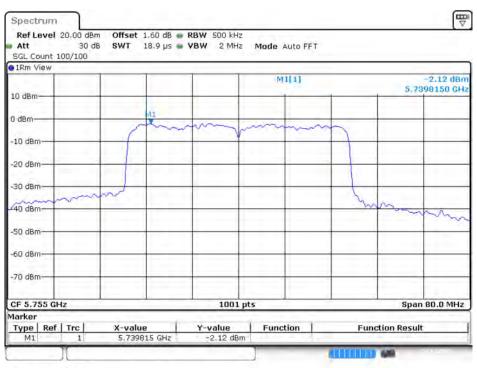


Channel 38 (Chain B)



Date: 27.DEC.2023 10:31:04

Channel 151 (Chain B)



Date: 27.DEC.2023 00:55:56



Product	:	Car Infotainment Unit
Test Item	:	Power Spectral Density
Test Mode	:	Transmit (802.11ax-80 MHz)
Test Date	:	2023/12/20

Channel No	Frequency (MHz)	Data Rate	Chain	PSD/MHz (dBm)	Duty factor (dB)	Total PSD/MHz (dBm)	Required Limit (dBm)	Result
10	5010	1600	А	-9.36	0.00	1.60	15	Pass
42	5210	5210 MCS0		-6.96	0.29	-4.69	<17	Pass

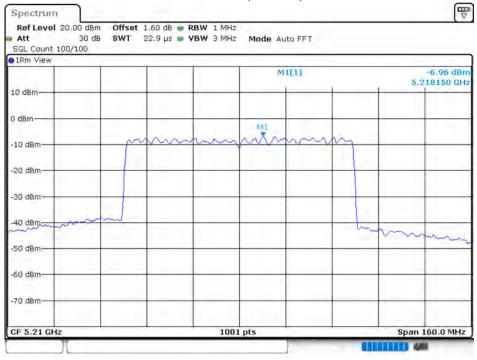
Note: Total PSD = 10*log(Chain A (mW) + Chain B (mW)) + Duty factor.

Channel No.	Frequency (MHz)	Data Rate	Chain	PSD (dBm)	Duty factor (dB)	Total PSD (dBm)	Required Limit (dBm)	Result
155 5775		5775 MCS0	А	-8.88	0.00	0.64	20	Pass
	5775		В	-5.61	0.29	-3.64	<30	Pass

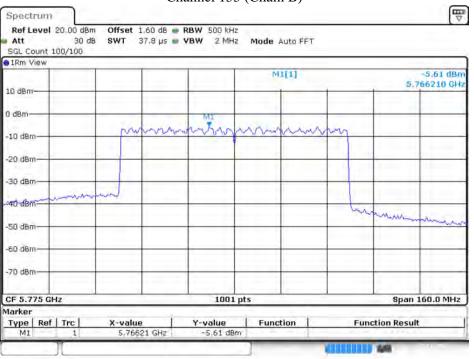
Note: Total $PSD = 10*\log(Chain A (mW) + Chain B (mW)) + Duty factor.$



Channel 42 (Chain B)



Date: 27.DEC.2023 10:35:07



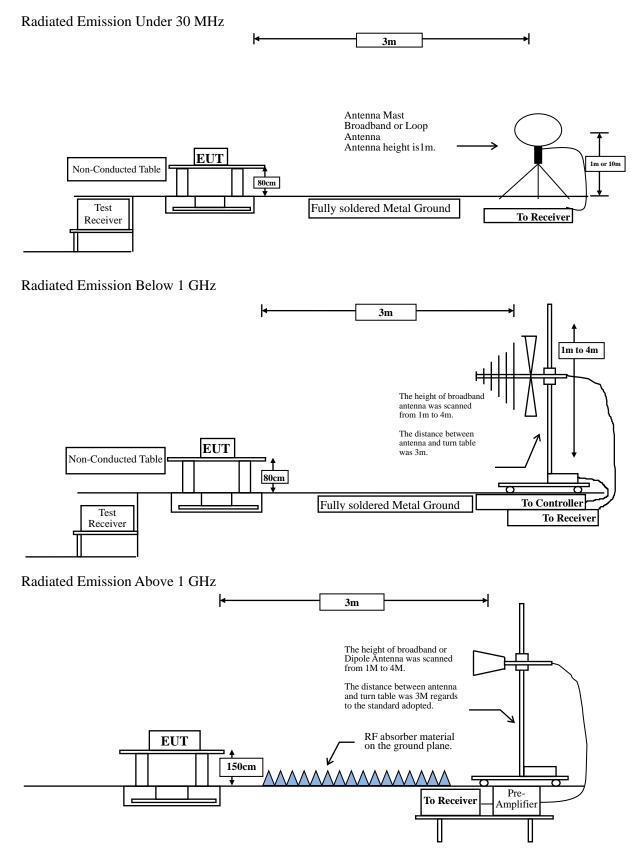
Channel 155 (Chain B)

Date: 27.DEC.2023 01:06:08



5. Radiated Emission

5.1. Test Setup



5.2. Limits

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

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

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

- For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
- For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of -27 dBm/MHz.

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

5.3. Test Procedure

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

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

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

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

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

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

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

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

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

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

RBW and VBW Parameter setting:

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

RBW = 1 MHz. $VBW \ge 3 MHz.$

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

RBW = 1 MHz.

VBW = 10 Hz, when duty cycle \ge 98 %

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

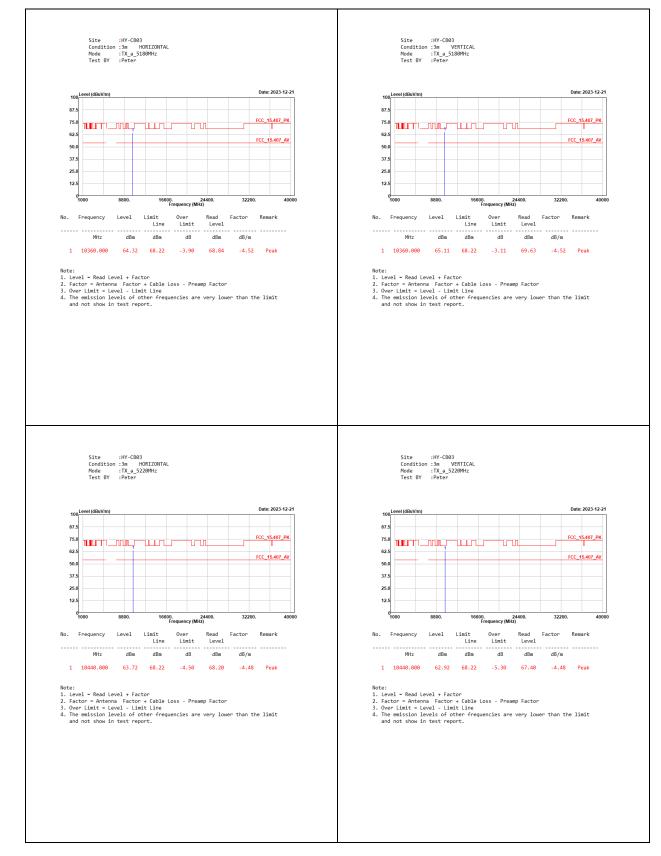
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

5 GHz band	Duty Cycle	Т	1/T	VBW
	(%)	(ms)	(Hz)	(Hz)
802.11a	98.62	1.4250	702	10
802.11ac-20 MHz	98.53	1.3450	743	10
802.11ac-40 MHz	97.08	0.6650	1504	2000
802.11ac-80 MHz	92.86	0.3250	3077	5000
802.11ax-20 MHz	98.11	1.0400	962	10
802.11ax-40 MHz	96.49	0.5500	1818	2000
802.11ax-80 MHz	93.44	0.2850	3509	5000

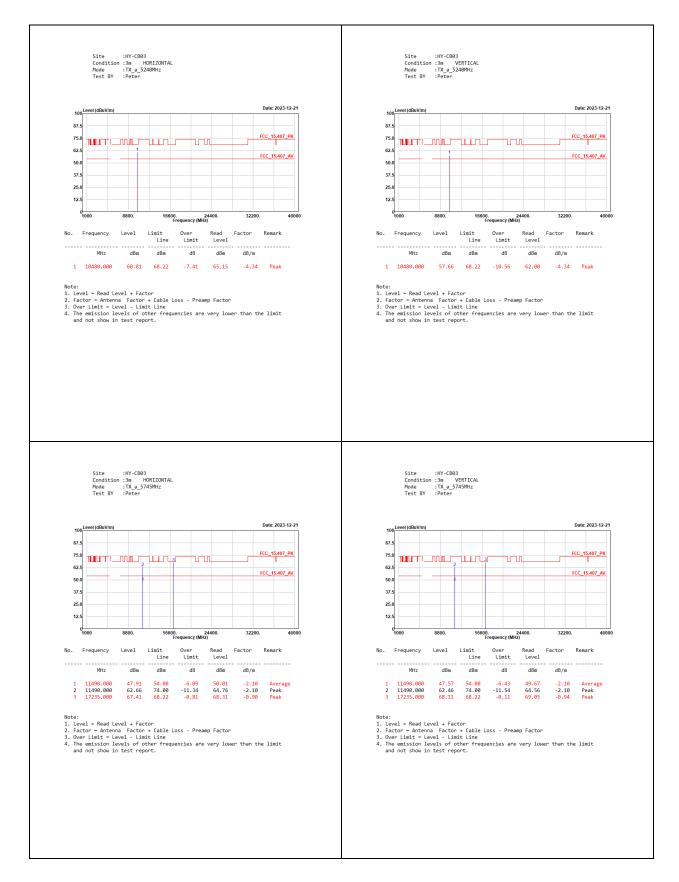
Note: Duty Cycle Refer to Section 8.



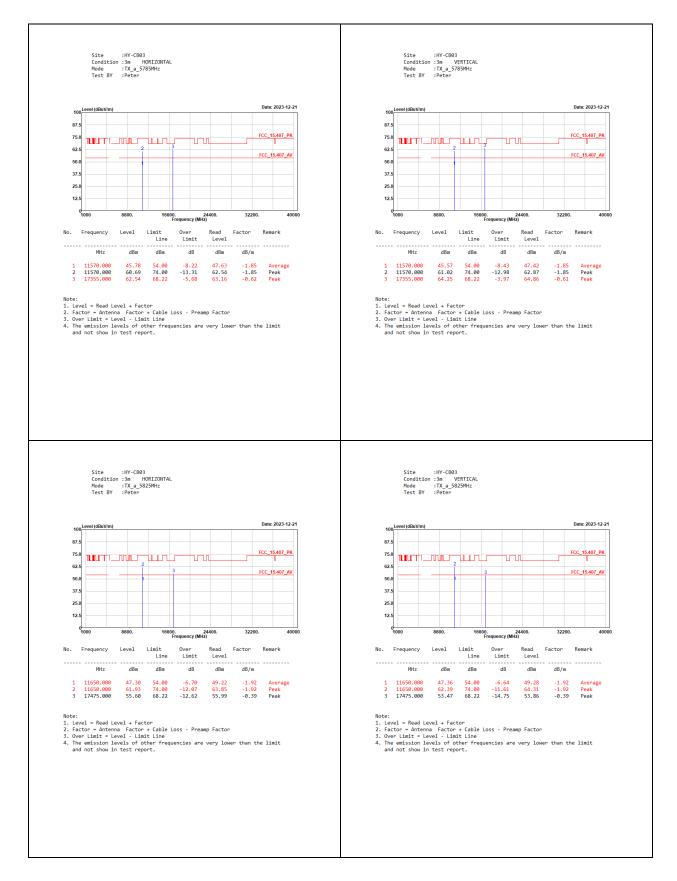
5.4. Test Result of Radiated Emission



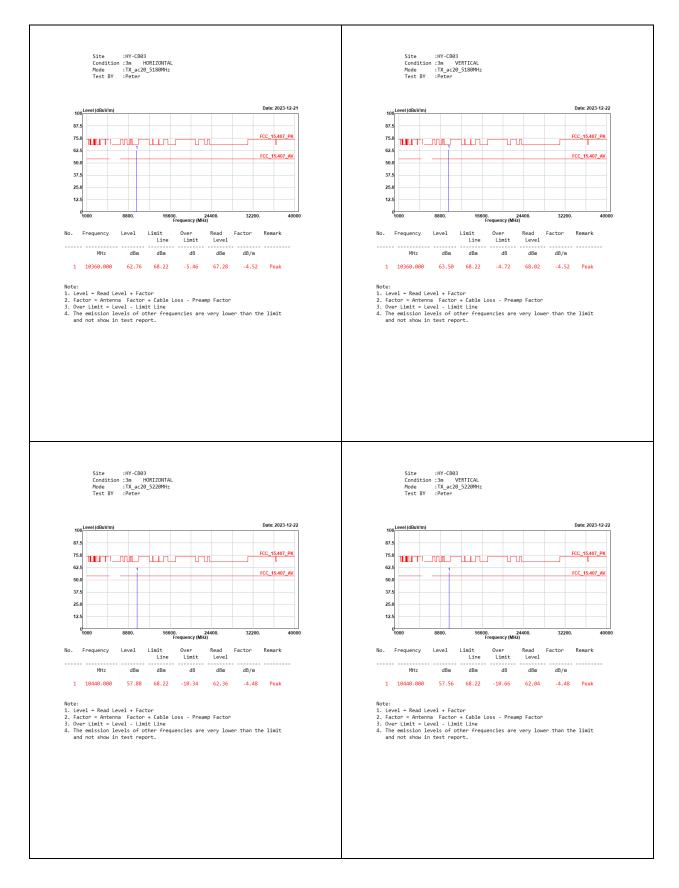




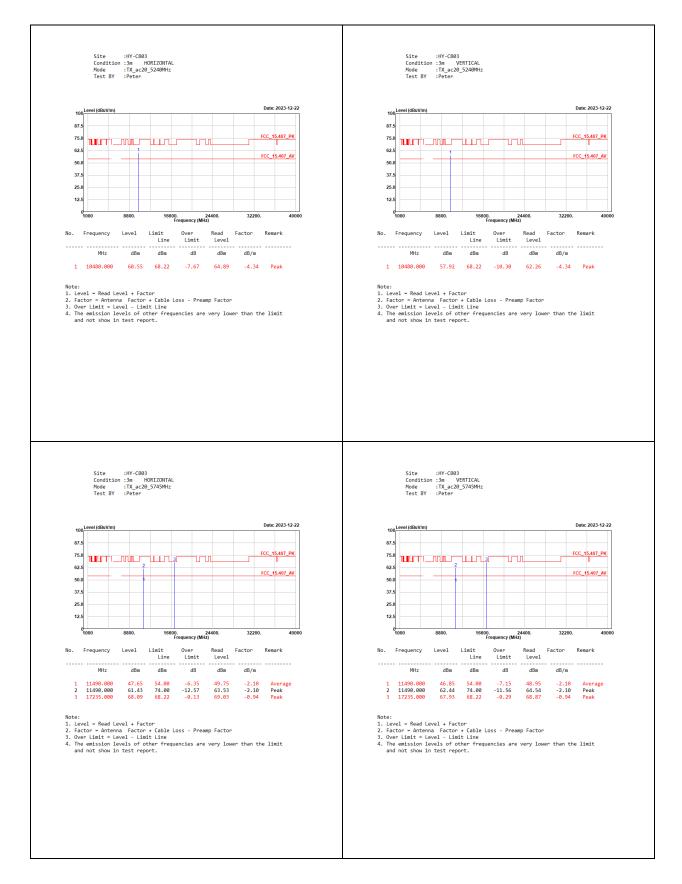




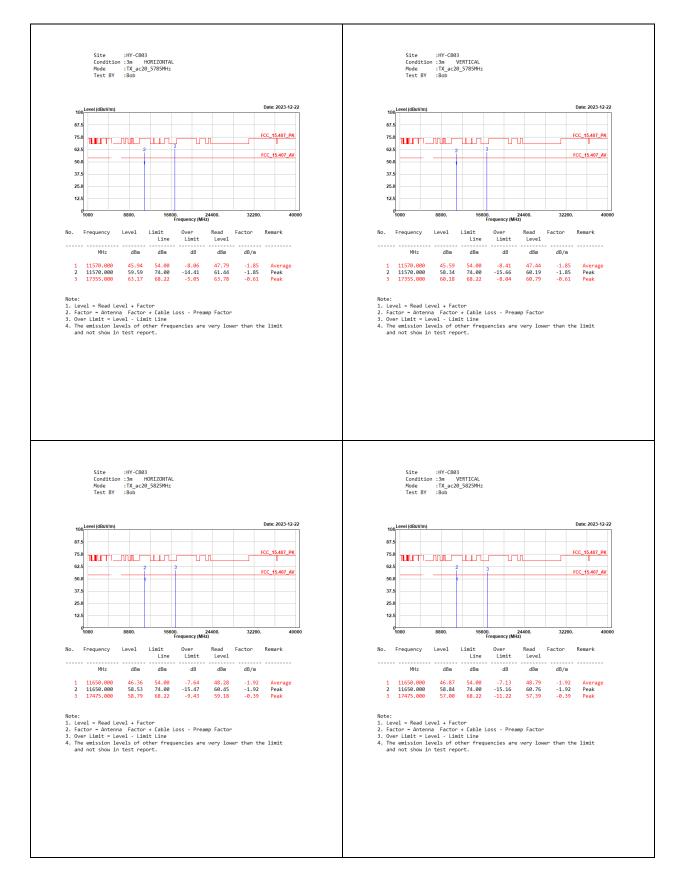




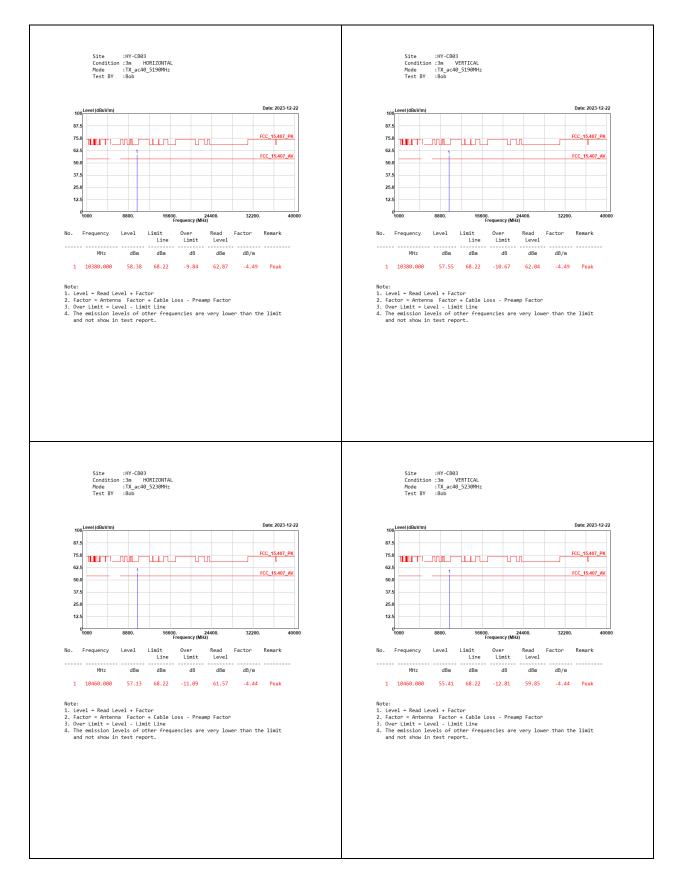




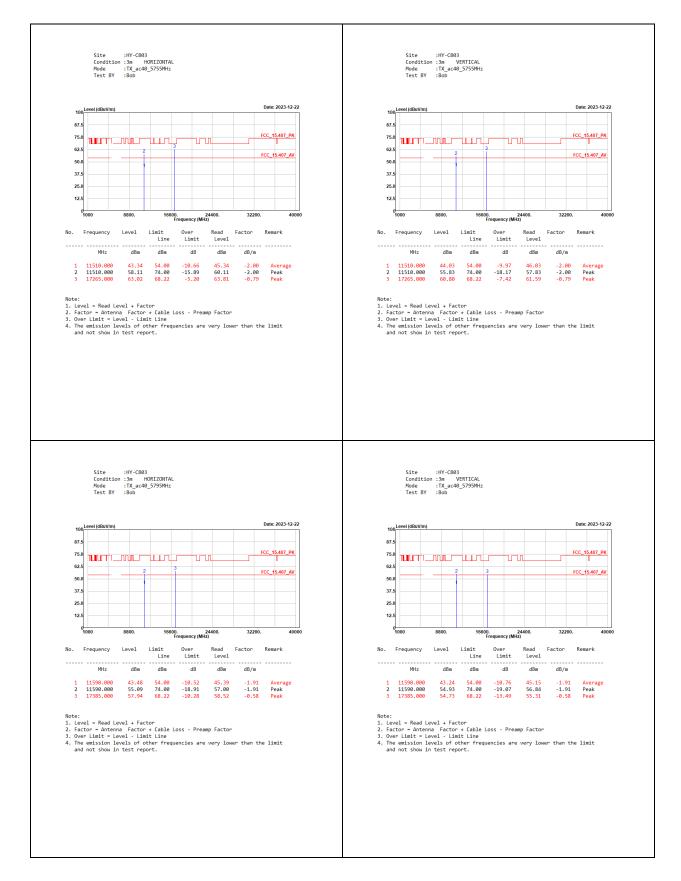




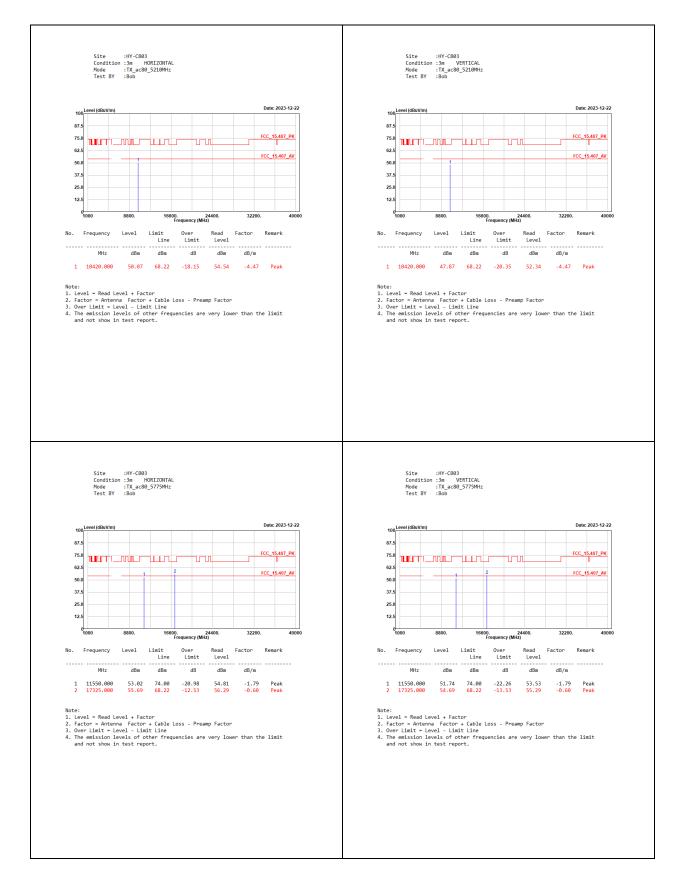




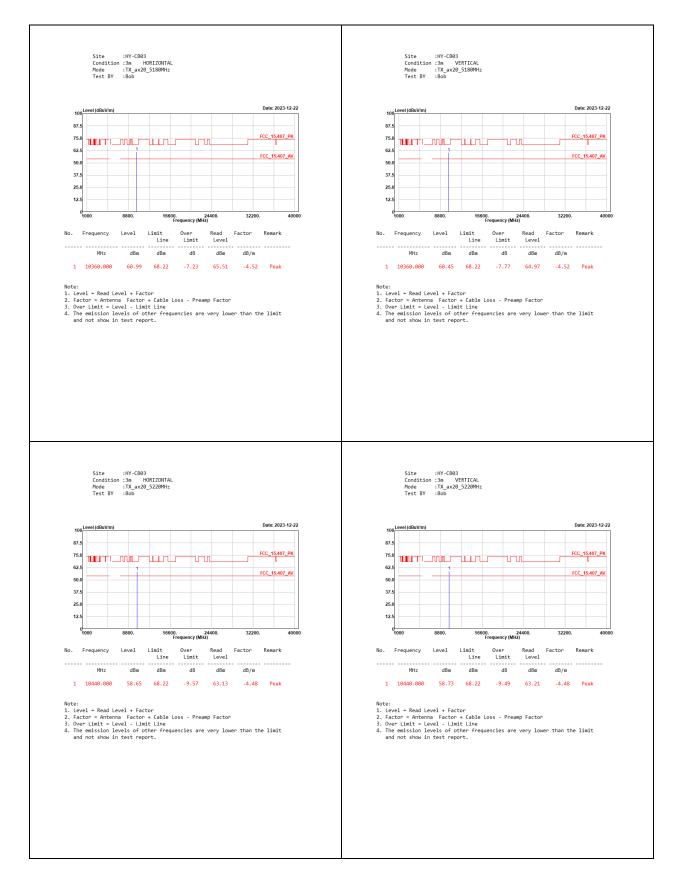




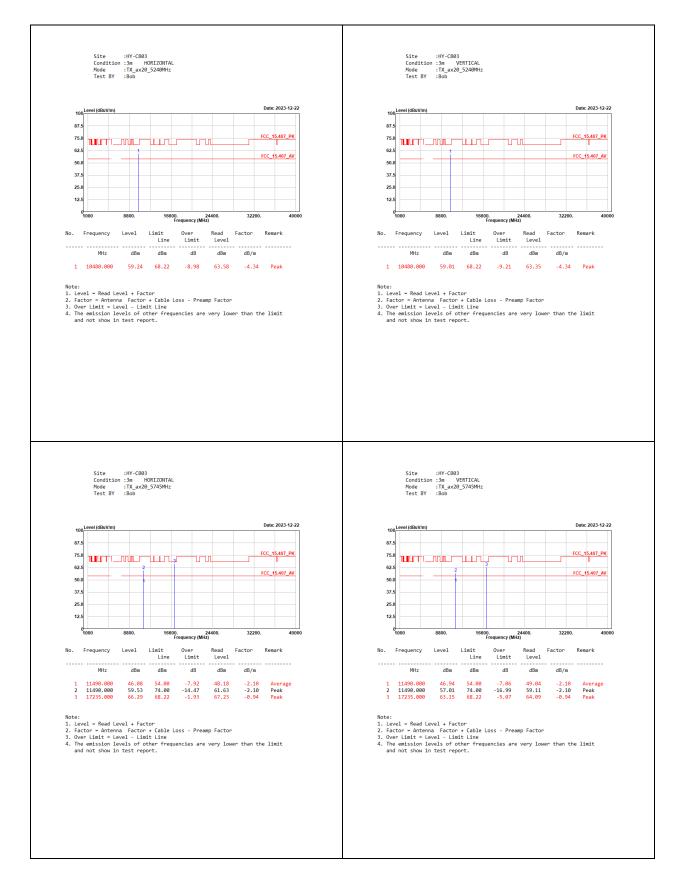




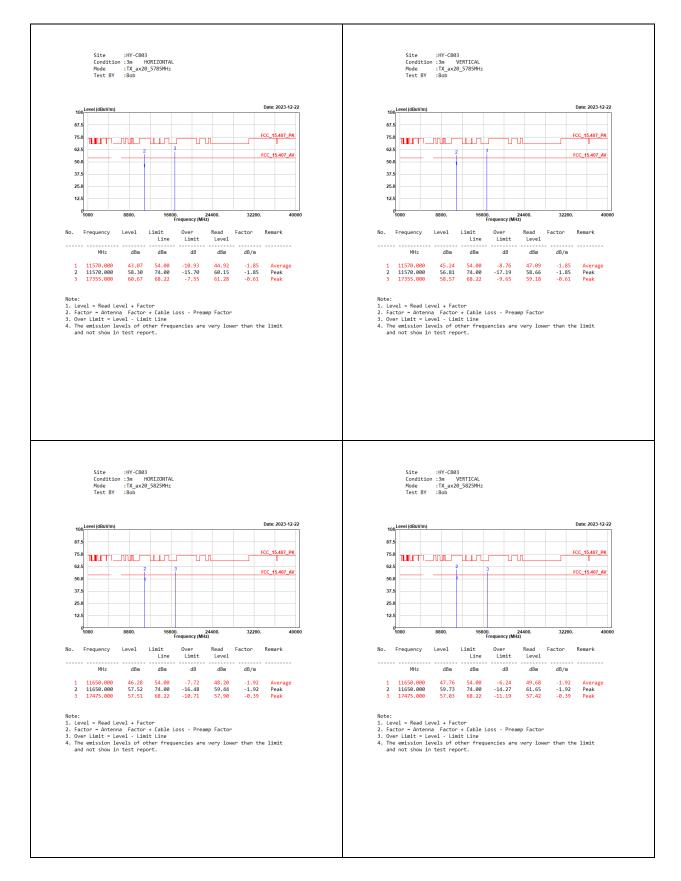




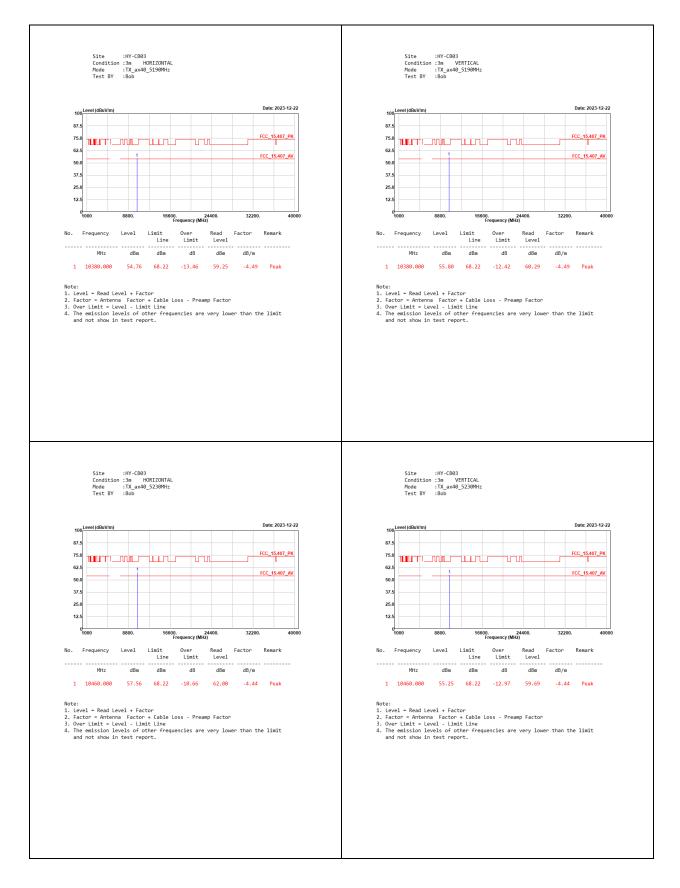




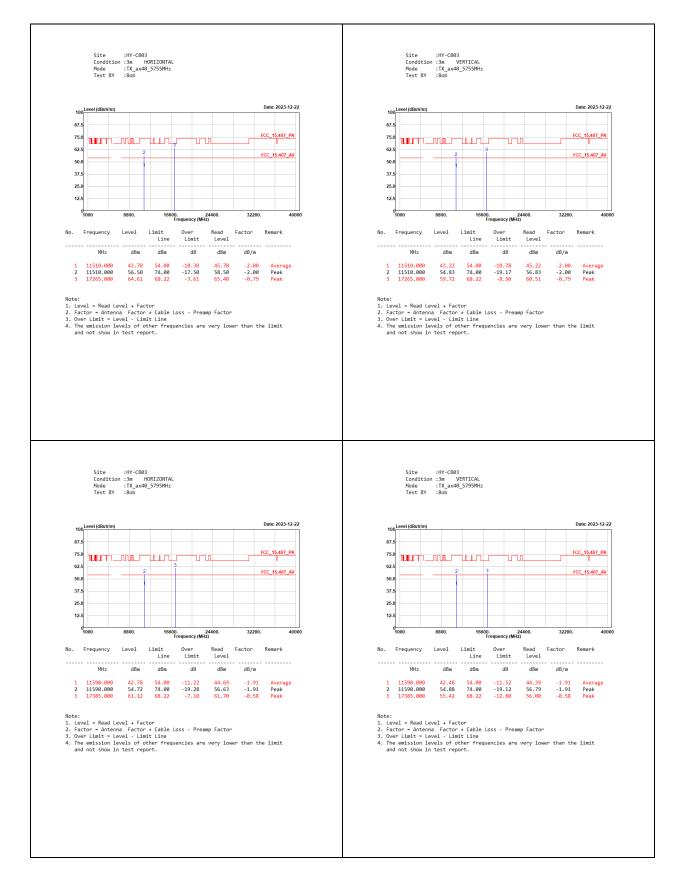




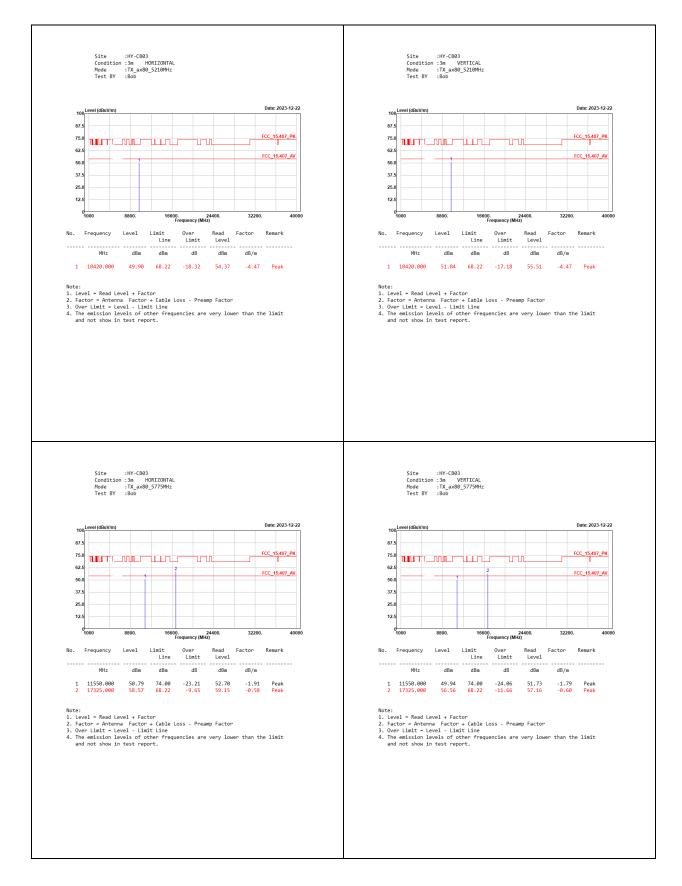




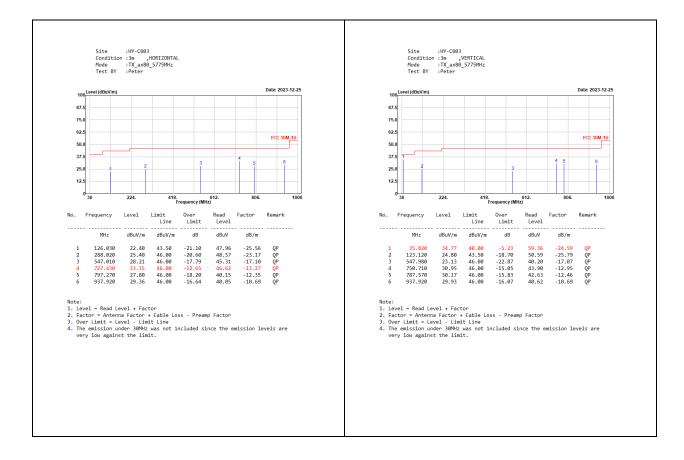










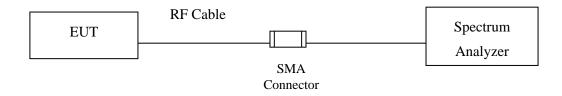




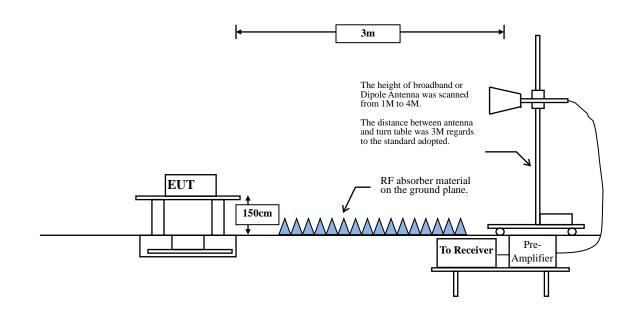
6. Band Edge

6.1. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



6.2. Limits

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

FCC Part 15 Subpart C Paragraph 15.209 Limits							
Frequency MHzμV/m @3mdBμV/m@3m							
30-88	100	40					
88-216	150	43.5					
216-960	200	46					
Above 960	500	54					

Remarks : 1. RF Voltage $(dB\mu V) = 20 \log RF$ Voltage (μV)

- 2. In the Above Table, the tighter limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.47-5.725 GHz band: All emissions outside of the 5.47-5.725 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.
- For transmitters operating in the 5.725-5.85 GHz band:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

• For transmitters operating within the 5.925-7.125 GHz band: Any emissions outside of the 5.925-7.125 GHz band must not exceed an e.i.r.p. of -27 dBm/MHz.

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

6.3. Test Procedure

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

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

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

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

RBW and VBW Parameter setting:

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

RBW = 1 MHz.VBW $\geq 3 MHz.$

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

RBW = 1 MHz.

VBW = 10 Hz, when duty cycle \ge 98 %

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

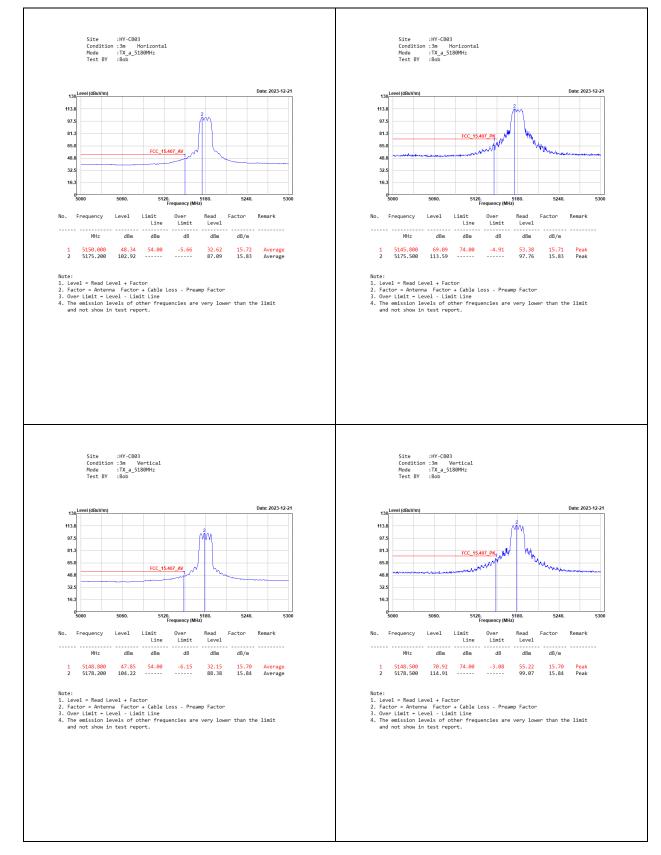
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

5 GHz band	Duty Cycle	Т	1/T	VBW
	(%)	(ms)	(Hz)	(Hz)
802.11a	98.62	1.4250	702	10
802.11ac-20 MHz	98.53	1.3450	743	10
802.11ac-40 MHz	97.08	0.6650	1504	2000
802.11ac-80 MHz	92.86	0.3250	3077	5000
802.11ax-20 MHz	98.11	1.0400	962	10
802.11ax-40 MHz	96.49	0.5500	1818	2000
802.11ax-80 MHz	93.44	0.2850	3509	5000

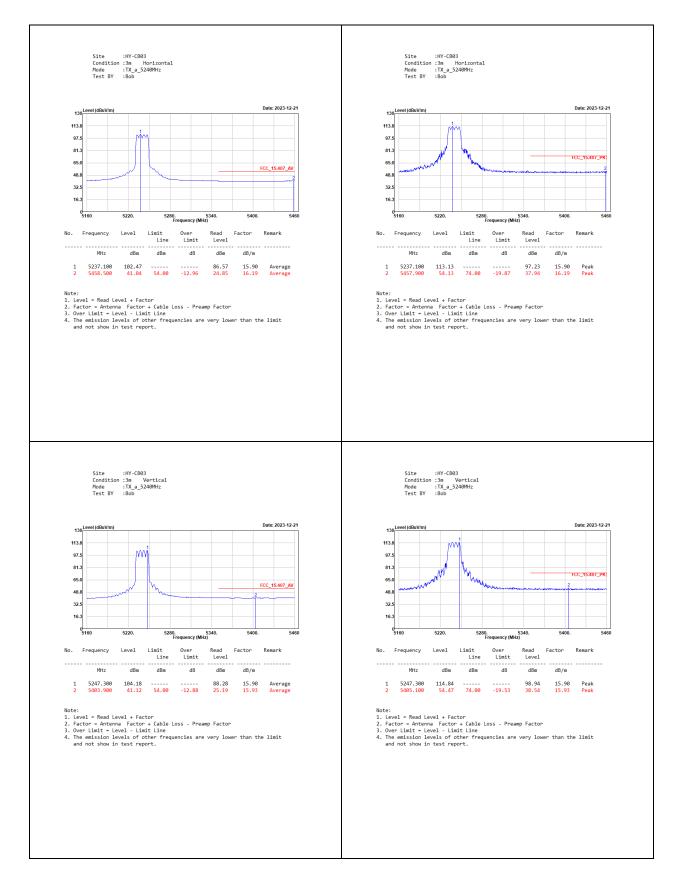
Note: Duty Cycle Refer to Section 8.



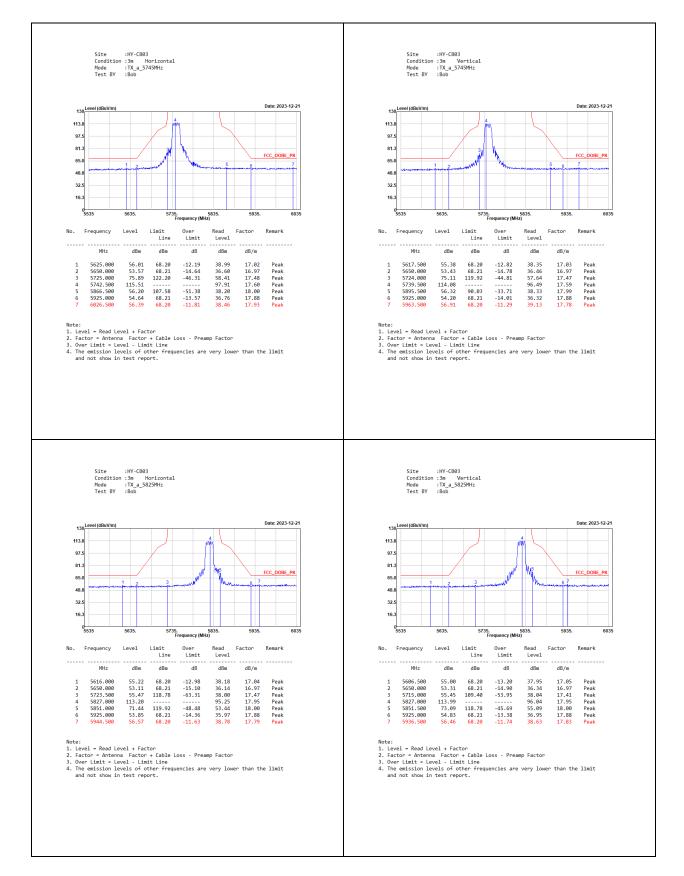
6.4. Test Result of Band Edge



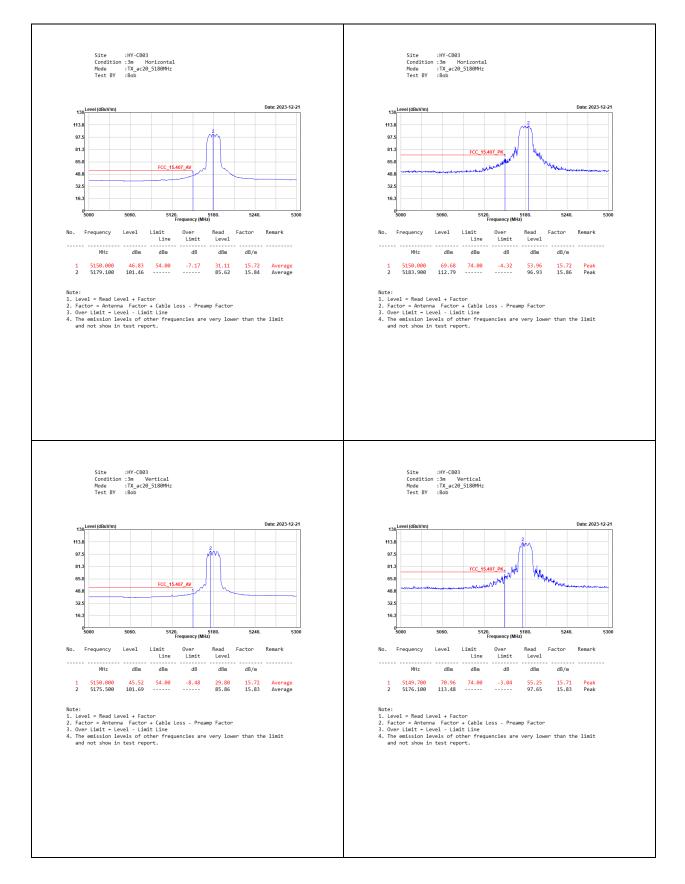




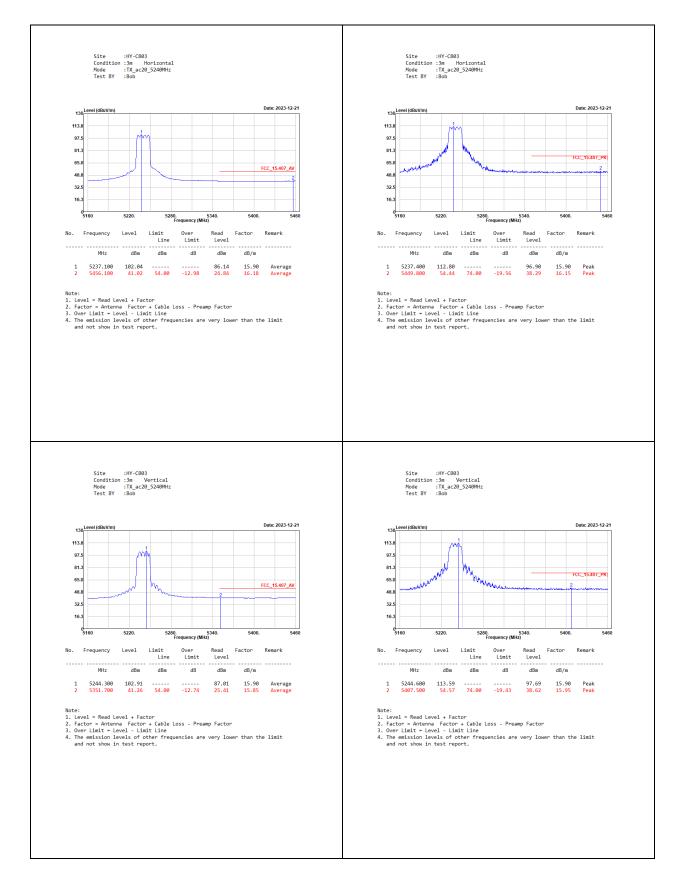




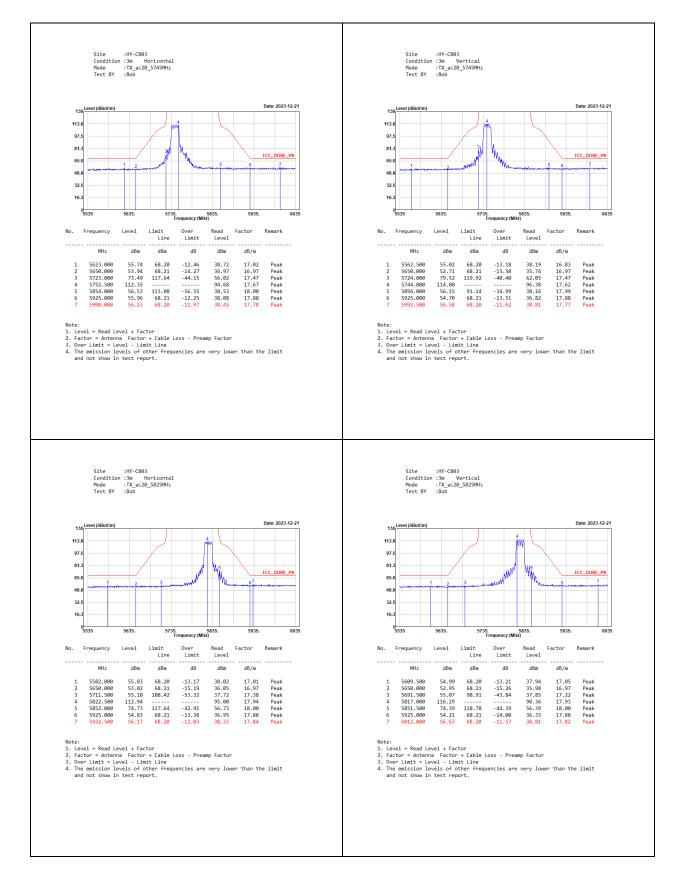




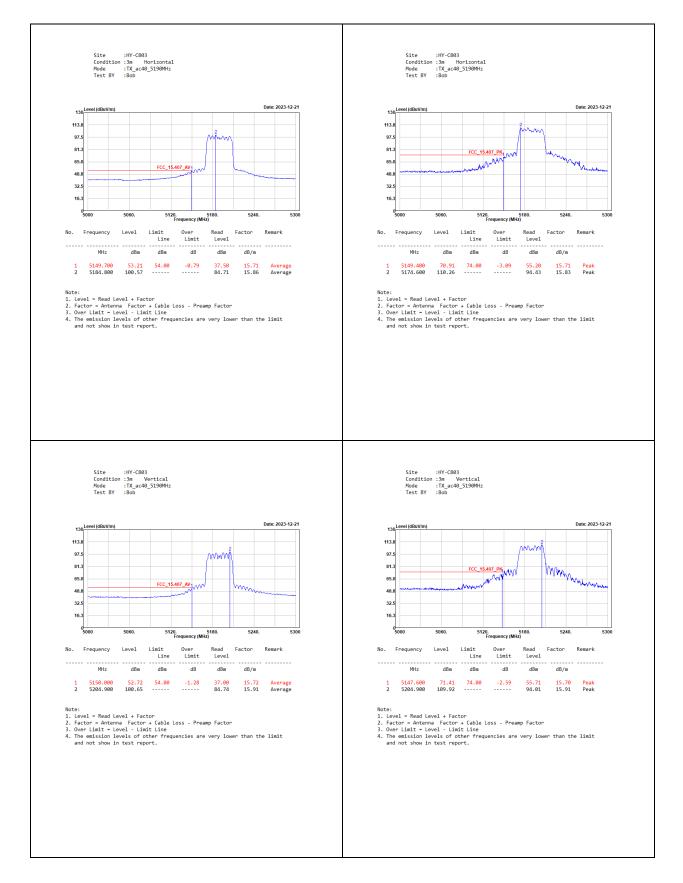




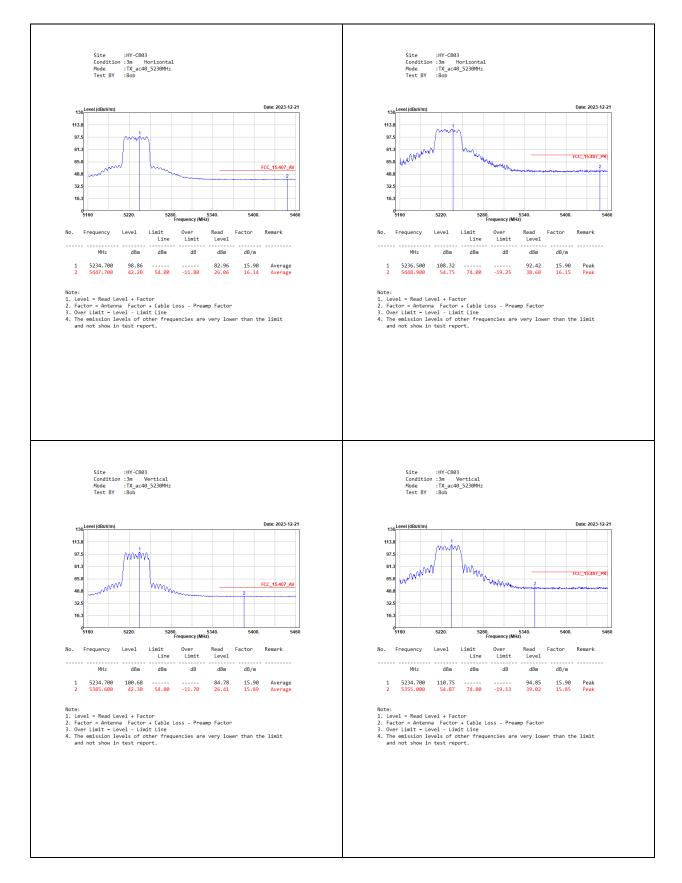




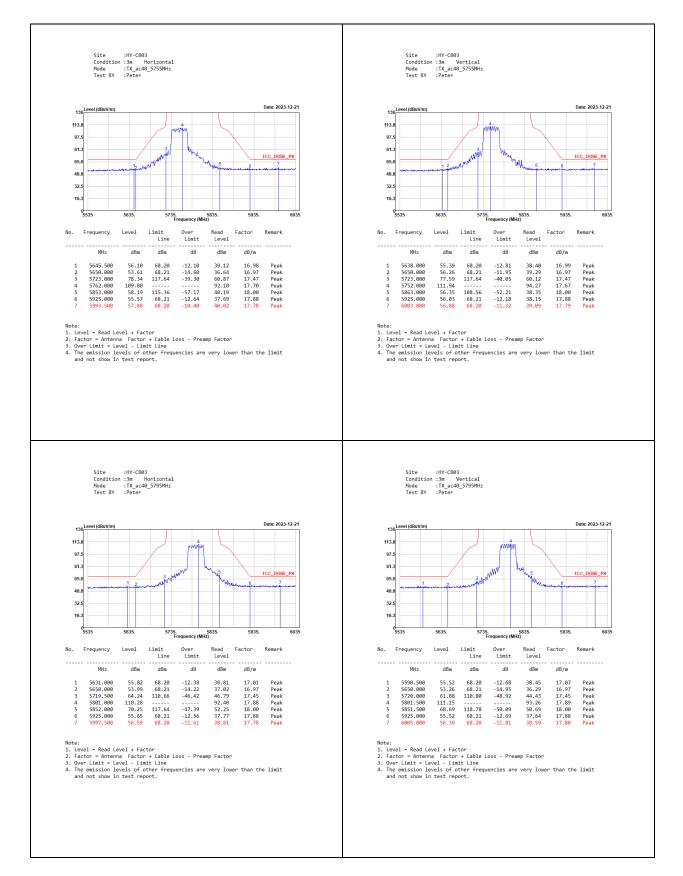




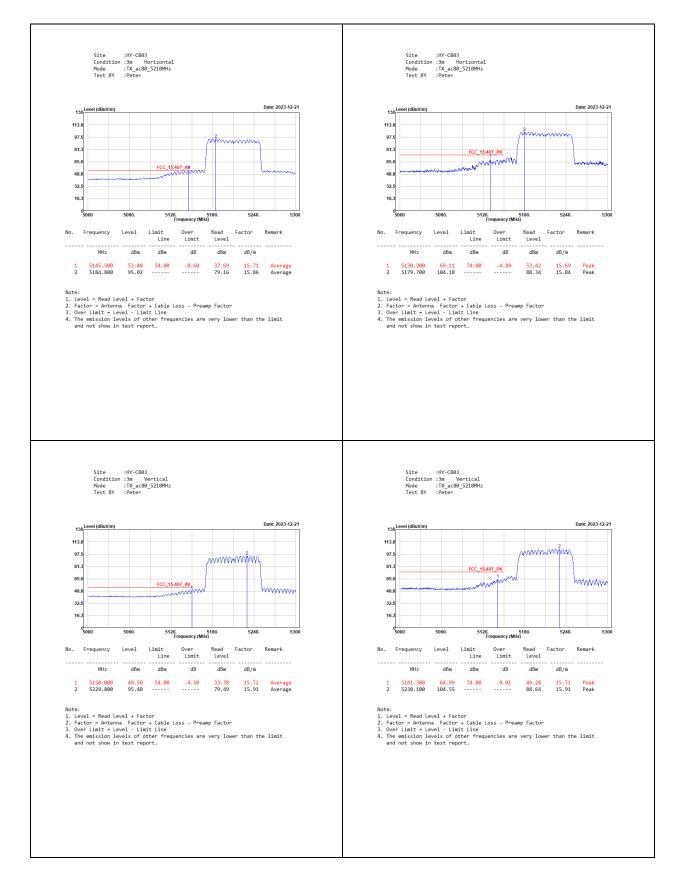




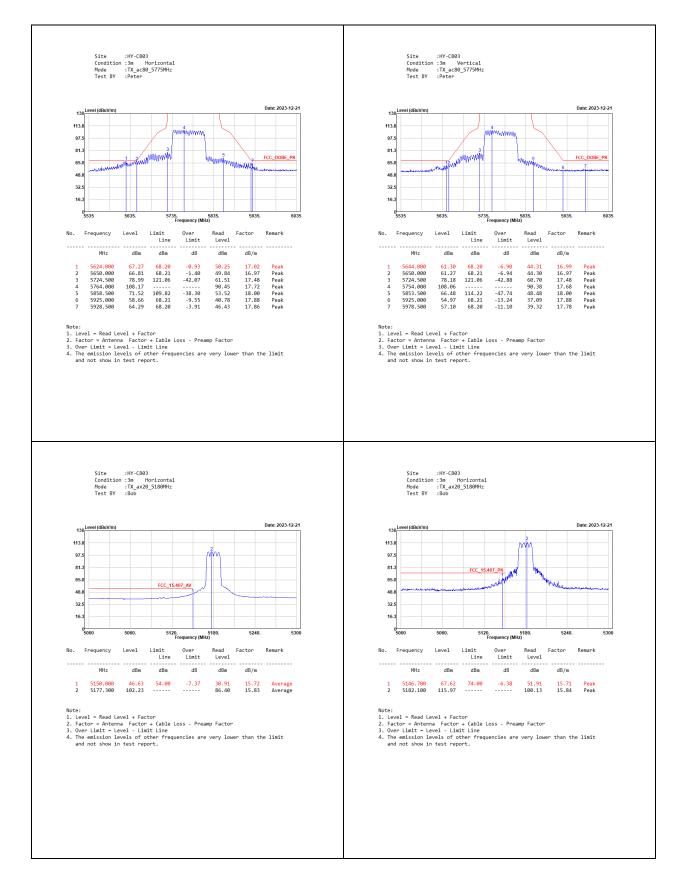




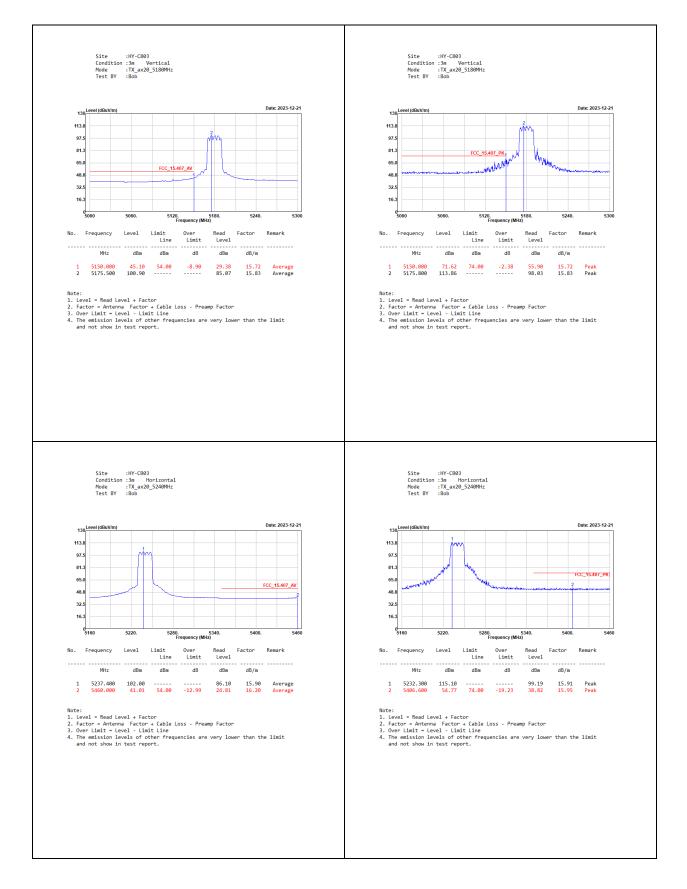




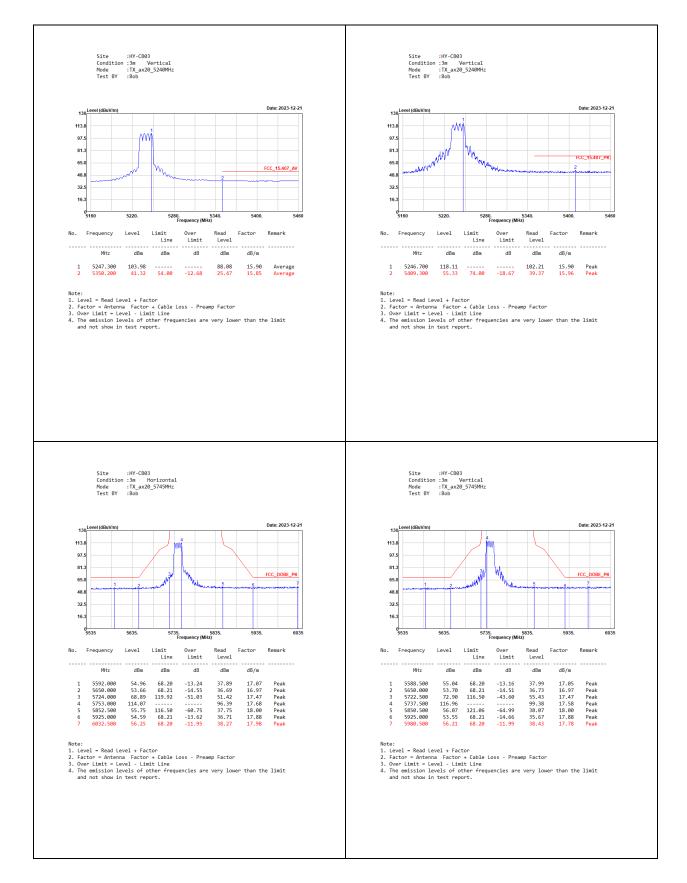




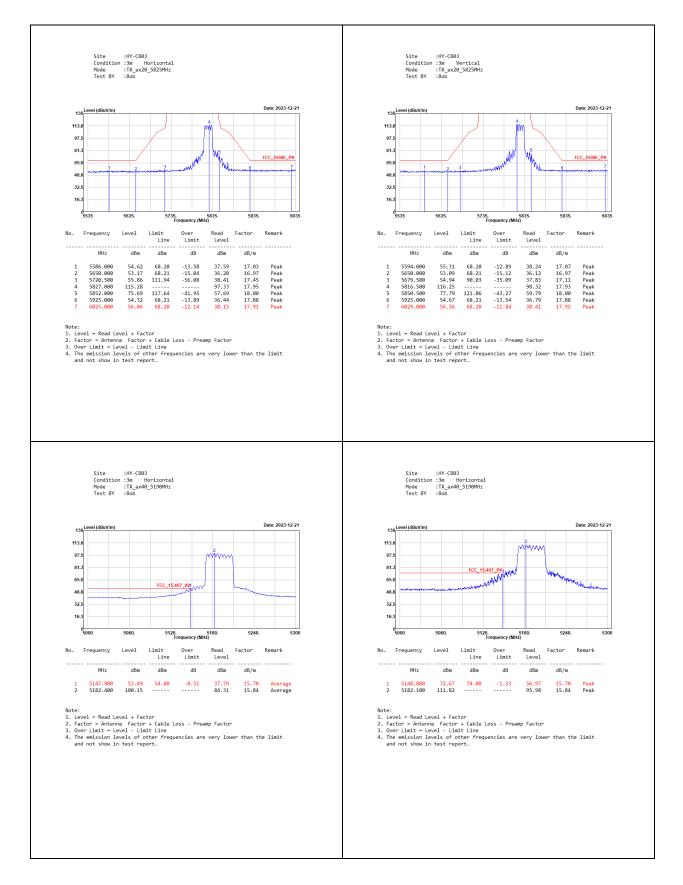




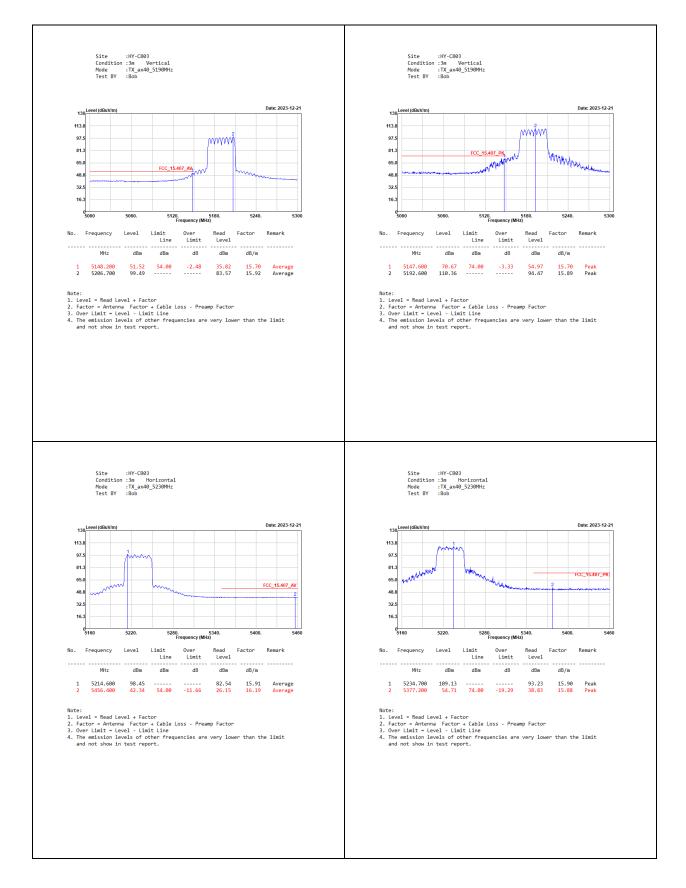




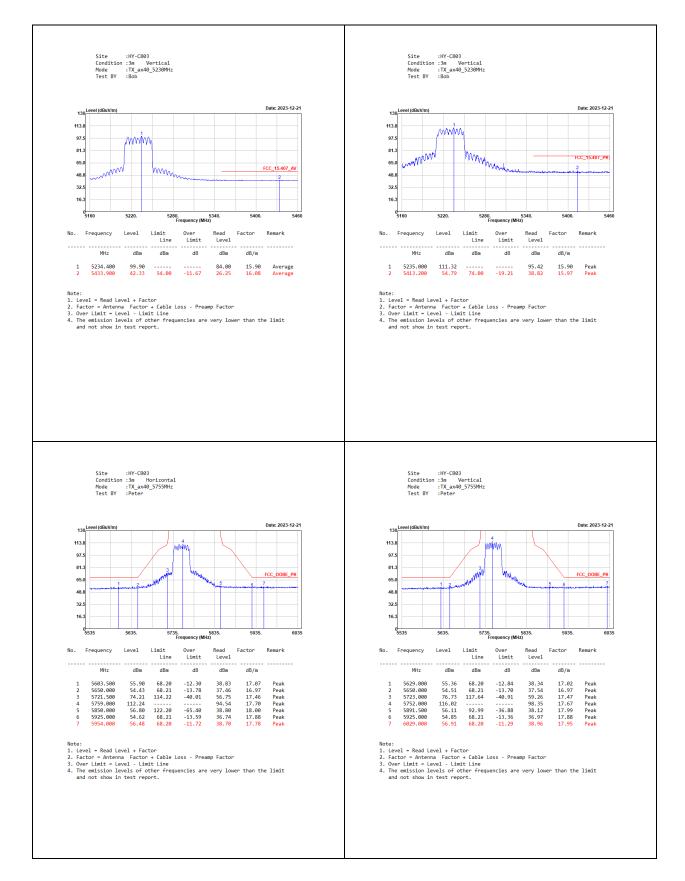




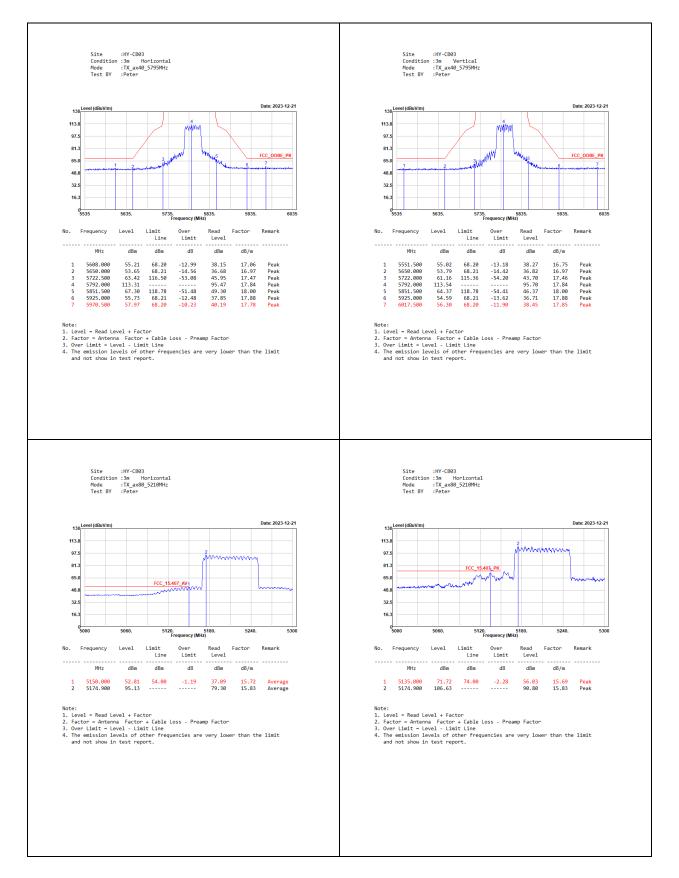




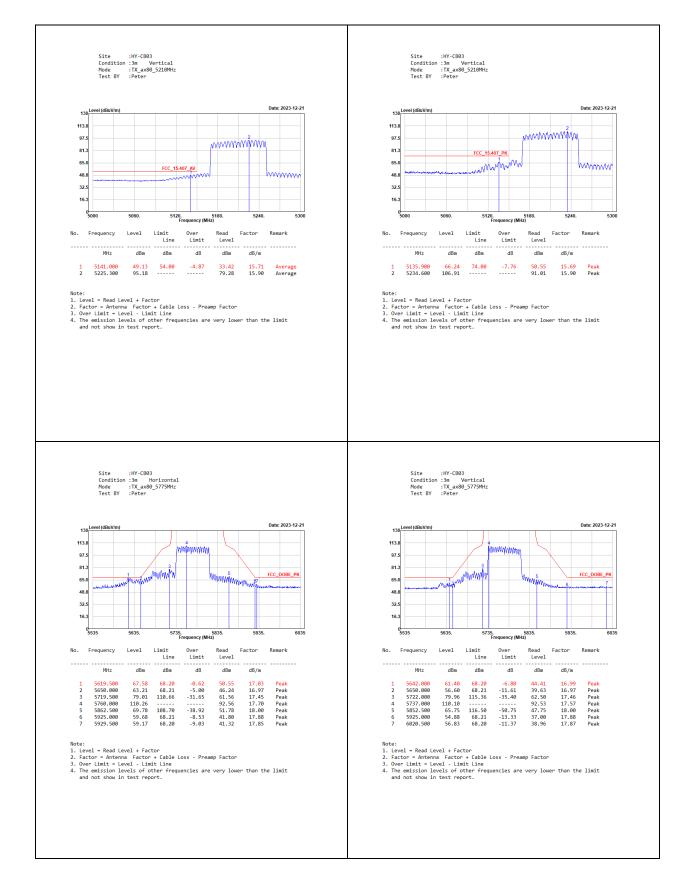














Product	:	Car Infotainment Unit
Test Item	:	Band Edge Data
Test Mode	:	Transmit (802.11a)

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5240	5248.35	<5250	PASS

Chain B

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5240	5248.71	<5250	PASS

Channel 48 (Chain A)

30 d			Mode Auto FFT			
-	· · · · · ·					
-	ym-	men m	MILLI	Y		7.49 dBn 0820 GHI 6823 MH
_				1		-
~				h	Va-	
_		-	-			-
1						
		1001 pt:	5		Span -	HO,0 MHZ
Trc 1	X-value 5.238082 GH2 5.2315285 GH2	Y-value 7.43 dBm 0.06-dBm	Function Gcc Bw	Fund	tion Result	5623 MHz
	30 c	30 db SWT 11.4 µc s	30 dB SWT 11.4 µs + VBW 2 MH;	30 dB SWT 11.4 µc = VBW 2 MH2 Mode Auto FFT MILLI	20 GB SWT 11.4 µs # VBW 2 Miz Mode Auto FFT	30 dB BWT 11.4 µc = VBW 2 MH2 Mode Auto FFT M111 6.020 6.020 6.020 M111 6.020 6.000 6.000 M111 6.020 6.000 800 M111 6.020 7.43 08m Function Function Result

Date: 19 DEC 2023 04:23.07

Channel 48 (Chain B)

1PK VIEW		· · · · · · · · · · · · · · · · · · ·					
10 dBm-			the second	MILLI	2.	0.08 dB 5.2370830 G 17.307697003 M	
0 dBm-	-	Y	-		X		
-10 dBm-							
		1					
-20 dBm-		tal la	1 1			hal	
30 dBm-		1				- how	
an again.							
-40 dBm-			-				
-50 d8m-							
-on anu-						1	
-60 dem-				-	-		
		The second second	1.1		1 1 1	1 1 1	
-70 dBm-						· · · · · · · · · · · · · · · · · · ·	
CF 5.24 G				_	-	Span 40.0 MH	
GF 5.24 G	HZ		1001 pt:	s		Span +0,0 MH.	
Type R	f Tec	X-value	Y-value	Function	Function Result		
M1	1	5.237083 GHz	8.89 dBm			2012-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0-0	
72	1	5.2314086 GHz 5.2487113 GHz	-1 17 dBm -1 13 dBm	Occ BW		17.302697303 MH	

Date 19 DEC 2023 20.38 38



Product	:	Car Infotainment Unit
Test Item	:	Band Edge Data
Test Mode	:	Transmit (802.11ac-20 MHz)

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5240	5248.87	<5250	PASS

Chain B

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5240	5249.03	<5250	PASS

Channel 48 (Chain A)

Ref Level	20.00 dB		BW 500 kHz	Mode Auto FFT		
Count 10/10).	1.100	1.784 Bridge	Stepte Hear-1. 1		
1Pk View	-					
10 dam	-	unn	1. mm	mi[i]	1	5.2349850 GH 17.822177022 6%
meth 0					1	
-10 dBm		1	-			
1						
-20 dBm		11			1	
-30 dBm-						
- an interim	~	· · · · · · · · · · · · · · · · · · ·				- many
40 dBm-						
-50 dBm-						
-où dem-						
-50 dBm					-	
1						
-70 dB/w					-	
CF 5.24 GH			1001 pt:			Span 40.0 MHz
Gr alzi Gri Marker	-		1001 pt		_	opdit 40.0 Miliz
	Tre	X-value	Y-value	Function	Euro	tion Result
M1	1	5.234965 GHz	7.11 dBm			
71 T2	3	5.231049 GHz	0.33 dBm	Occ Bw		17.822177922 MHz
12	- 1	5.2488711 GHz	1.56 dBm			

Date 19.DEC 2023 04.55-21

Channel 48 (Chain B)

Att Count 10/11	30 d	A SWT	1.4 µs 📾	VBW 2 MHz	Mode Auto FFT		
1Pk View	-			T. T.	wi[i]		T.75 dae
10 dam-	-	15	~~~		MI Gee Dy	TE	5.2420080 GH
0 dBm		1 /				1	
-10 dBm		- /	_	-			-
20 d8m-	_	1				1	
20 abm	~	W.					water
-30 dBm-		-	-	-		-	
-40 dBm		-					
-50 dBm-	_	-	-				
-50 dBm-							
-70 dBm						-	1
CF 5.24 GH	2			1001 p	ts		Span 40.0 MHz
Marker	1.1.1						
Type Ref		X-value		Y-value	Function	Fu	nction Result
M1 T1	1	5.2420		7.75 dBm -0.60 dBm	Occ Bw		18.061938062 MHz
T2	1	5.23094		-0.60 dam	OCC BW		18.001338005 WHS

Date 19.DEC 2023 20.50.53



Product	:	Car Infotainment Unit
Test Item	:	Band Edge Data
Test Mode	:	Transmit (802.11ac-40 MHz)

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5230	5248.06	<5250	PASS

Chain B

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5230	5248.30	<5250	PASS

Channel 46 (Chain A)

Att Count 10/10	30	da SW1 10.4 ha	WBW 2 MHz	Mode Auto FFT		
1Pk View	-					
10 dam-		1		WI[1]		4.21 dBn 5.2343160 GH
In dem-				Occ flw		26,203796204 604
meb 0		Unduling	amproving pr	amin mari	mint	
			Y		1	
-10 dBm-					++	
dene.						
20 dBm-		1			1	
an diam		in an			1	man no
-30 dam		No.				time with
40 dBm					-	
45.1					-	
-50 dBm	-					
-60 dBm						
ald abin						
-70 dBm-	_		_		-	
CF 5.23 GH		1 1	1001 pt	s	-	Span 80.0 MHz
Marker	Sec. 2.		2	1.00 C 1.00 C 1.00		
Type Ref	Trc	X-value	Y-value	Function	Fun	ction Result
M1	1	5.234316 GHz	4.21 dBm			
T1 T2	1	5.2118581 GHz 5.2480619 GHz	-1.66 dBm -2.40 dBm	Occ Bw		36.203796204 MHz

Date 19.DEC 2023 21.18-23

Channel 46 (Chain B)

Count		30 0	a swr 18.9 µs =	VBW 2 MHz	Mode Auto FFT	
1Pk Vi	ew.	-				
10 dēm	-		-		WI[1]	+.84 dB 5.2363940 G 26.603396602 M
0 dBm-			1	Y		Y I
20 dBr	no	-A-	m		_	harmon
-40 dBn		-				
-50 (Bh			· · · · · · · · · · · · · · · · · · ·			
-60 dBm	-	-				
-70 dB/	-					
CF 5.2	3 GHz	-	1	1001 pt	s	Span 80.0 MH
Marker						
Type	Ref		X-value	Y-value	Function	Function Result
M1 T1		- 1-	5.236394 GHz	4.84 dBm	Occ Bw	36.603396603 MH
T2	-	- 3	5.2116983 GHz 5.2483017 GHz	-2.23 dBm -3.01 dBm	OCC BW	36.603396603 MH

Date 19.0EC 2023 21.16.54



Product	:	Car Infotainment Unit
Test Item	:	Band Edge Data
Test Mode	:	Transmit (802.11ac-80 MHz)

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5210	5248.04	<5250	PASS

Chain B

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5210	5248.20	<5250	PASS

Channel 42 (Chain A)

Spectrum Ref Level						(m)
Att Count 10/10	30	dB SWT 22.9 µs	WOW SMH2 N	tode Auto FFT		
1Pk View	-	· · · · · · · · ·				~~~~
				WE[1]		5.72 (Bin
10 dem	_			Oce Bw	Mi	5.244690 GHz
		71-1	man	Ocenw		76.083916004 6949
meb 0		Julia	Man Ma	- A BOULT	the of	
10 dam	_					
TH HEAT						
20 dBm-					+ }	
	Due	mind				
30 dBor vo					pl	wayning man
40 dBm						
-50 (Bm		-			-	
-60 dBm						
-ou asm			1 1 1 1 1 1 1			
-70 dBm-	_				-	
CF 5.21 GH			1001 pt	s		Span 160.0 MHz
Marker	1.12		1 - 1 - 1	Sector 1		
Type Ref		X-value	Y-value	Function	Fun	ction Result
M1 71	1	5.24469 GHz 5.171958 GHz	3.72 dBm -1.69 dBm	Occ Bw		76.083916084 MHz
T2	1	5.248042 GHz	-1.69 dam	OCC BW		78.083916084 MH2
	10				-	

Date 19.0EC 2023 21:34 52

Channel 42 (Chain B)

1Pk View	0			-					
10 dēm-		1	1		MI OC	1[1]			4.35 (B) 210790 GH
0 d8m-		Thin	mon	himp		-	freeze	76,40.1	76,403596404 0114
o casini					-				
-10 dBm-	_		-	-		-		-	-
-20 dBm					_				
20 dbm	mon					-	In	mm	
-30 dBm-	1.14		_	-	_		-	- Part - P	MAN
		1							1.0.0
-40 dBm-			-				-	-	-
-50 dBm-	_		-						
"Did dinite"		1		1					
-60 dBm	_		-	-	-	-	-	-	-
				1					
-70 dB/w-				1		1.1.1.1			
CF 5.21 GH	2			1001	ots		-	Span	160.0 MHz
Marker				-	-				
Type Ref	Trc	X-value		Y-value	Funct	tion	Fu	nction Resul	t.
<u>M1</u>	1		79 GHz	4.35 dBrr				22 1021	
71 T2	1	5.1717		-0.75 dBm 0.32 dBm		nc Bw		76.4035	96404 MHz

Date 19.DEC 2023 21:36:09



Product	:	Car Infotainment Unit
Test Item	:	Band Edge Data
Test Mode	:	Transmit (802.11ax-20 MHz)

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5240	5249.39	<5250	PASS

Chain B

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5240	5249.47	<5250	PASS

Channel 48 (Chain A)

		Mode Auto FFT	VBW 2 MHz I	dh SWT 11.4 μs =	30	Att Count 10/10
						1Pk View
6.85 (8) 5.2475920 (3) 10 901098901 (3)	nu:	WI[1]	m	i kan		Lũ dêm
		_	-			10 dBm
man	th	-			-	20 d8m
a por				nd	~	30 dBm
					_	50 dBm
			-	-		60 dBm
	1					70 dBm-
Span 40.0 MHz			1001 pts		1	CF 5.24 GHz
ction Result	Euro	Function	Y-value	x-value	Trel	larker Type Ref
18.901098901 MHz	Func	Occ Bw	6.85 dBm 1.16 dBm -0.13 dBm	5.247592 GHz 5.2304895 GHz 5.2493906 GHz	1	M1 71 T2

Date 19.0EC 2023 22:01:42

Channel 48 (Chain B)

	w.										
10 dam	T	-	11	mo		- 10		ny			9.69 (B) 16790 CH 18901 MM
0 dBm-								1	-		-
-10 dBr	-	_		-	-			+ +	-		-
20,46#	_	_								-	-
- grant		no							Y	ran	m
-30 dBn	-		-	-		_	_	-	-	_	-
-40 dBr			A					-			
	-								- 1		
-50 (Bh	-				1 1			-	-	_	
-60 dBm	-	_			-			-	-	_	
								-			
-70 dBn	-								-		
CF 5.2	GHz			1001 pts			_	_	Span	40.0 MHz	
Marker						· · · · · · · ·					
Type	Ref	Trc	X-value		Y-value	Funct	lion	1	Functi	on Result	
M1 T1	-	-	5.2418 5.23048		9.69 dBm 2.23 dBm		IC BW			10 0010	18961 MHz
T2	-	- 1	5.24947		2.23 dBm 3.06 dBm		C DW			10.9810	10.401 WHS

Date 19.DEC 2023 22:03 17



Product	:	Car Infotainment Unit
Test Item	:	Band Edge Data
Test Mode	:	Transmit (802.11ax-40 MHz)

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5230	5248.70	<5250	PASS

Chain B

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5230	5248.78	<5250	PASS

Channel 46 (Chain A)

Att Count 10/10	30	da SWT 16	r.ə hz. 🖷	VBW 2 MH	lz I	Mode Auto F	FT			
10 dam	-	The		-		WI[I]		2		5.17 (80) 197460 GH 197562 0114
10 d8m-				-			-			
20 d8m-			_	-	-	-	-	+		-
-30 dBm 	n-h	ww						M	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	and-wr
50 dBm	-	-	_	-	-		-	_	-	-
-60 dBm	_	-	-	-	-	-	-	-		-
-70 dB/k	-		-	-	-			-	-	
CF 5.23 GHz	-			1001	pts		-	_	Spar	80.0 MHz
larker	and I	a contra					(
Type Ref M1 T1 T2	1 1 1	X-value 5.24374 5.211138 5.248701	GHz	Y-value 5.17 de -0.38 de -1.79 de	im	Ccc Bw		Fund	37.5624	37562 MHa

Date 20 DEC 2023 00:27 03

Channel 46 (Chain B)

1Pk View	-					
10 dēm-		TIMAN	numn	MI[1]	Ante	6.89 (8) 5.2453450 GH 37.042357042 010
-10 dBm-						
-20 d8m-						
30 dBm	Ma	www			h	mon
40 dBm-	_		_		_	
-50 dBm	-	-	-			
-50 dBm	_			-	_	
-70 dB/n-						
CF 5.23 GH	2		1001	pts		Span 80.0 MHz
Type Ref	Iten	X-value	Y-value	Eunction		nction Result
M1	1	5.245345 GH			Fu	Italoit Resolt
T1	3	5.2111389 GH 5.2487812 GH				37.642357642 MHz

Date 20 DEC 2023 00 26 03



Product	:	Car Infotainment Unit
Test Item	:	Band Edge Data
Test Mode	:	Transmit (802.11ax-80 MHz)

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5210	5248.84	<5250	PASS

Chain B

Test Frequency	Measurement Level	Limit	Result
(MHz)	(MHz)	(MHz)	
5210	5248.84	<5250	PASS

Channel 42 (Chain A)

a section in)			VBW 3 MHz	Mode A	TH CO			
1Pk View	-	1		1	-	#1[1]			3.29 dam
10 dam-								5.	198498 GH
TO GRIM		74		1		Dec NW	7 - 12	77.682	3176R2 0HH
0 d8m		The	hana,	phand	many	mo	enny	+	-
			1						-
-10 dBm			1		-	-		-	1
20 dBm-			-		_			-	
-0.45								12 2	-
STORE DE	Anna	pro	-			-	1	mar	"Mar
		_				-			o diffe
-40 dBm									
-50 dBm-			-				-		-
			1			-			
-60 dBm-		-	-	1 1	-			-	-
-70 dBm-		_	-						
-10 opin-									
CF 5.21 GH	2			1001	pts			Span	160.0 MHz
Marker	1				-				
	Trc	X-valu		Y-value		ction	Fu	nction Resul	t
<u>M1</u>	1		49 GHz	3.29 dB					
T1 T2	1		59 GHz	0.27 dB		Occ Bw		77.6825	17682 MHa

Date 20 DEC 2023 00.41 42

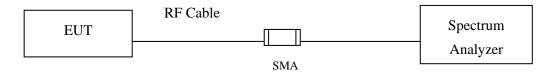
Channel 42 (Chain B)

Ref Level Att	30 0			RBW 1 MHz VBW 3 MHz	Mode Au	to FFT			
Count 10/11)								
10 dēm-	-	T1	um	han	¥ 0		Man Pr		5.79 (kb) 210310 GH 398002 (M)
-10 dBm-			-						-
-30 dBm	JA.	nd .			_		h	m	m
-40 dBm							-		
-50 dBm			-				-	-	
CF 5.21 GH	2	-	-	1001	pts		-	Span	160.0 MHz
Marker Type Ref	Tre	X-value		Y-value	Func	tion	Fur	ction Resu	t
M1 T1 T2	1 1 1	5.218 5.1708 5.2488		5.79 dBn 1.40 dBn 1.25 dBn	0 1	cc Bw		78.001	98802 MHz

Date 20 DEC 2023 00:45:32

7. Occupied Bandwidth

7.1. Test Setup



7.2. Limits

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

7.3. Test Procedure

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



7.4. Test Result of Occupied Bandwidth

Product	:	Car Infotainment Unit
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Transmit (802.11a)
Test Date	:	2023/12/19

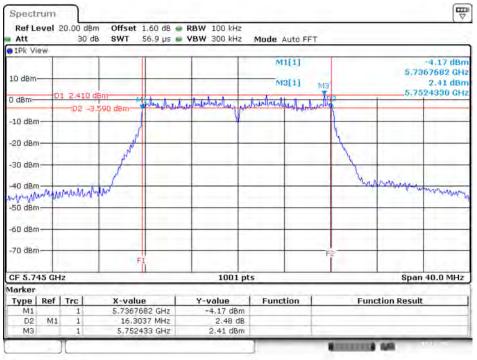
Chain A

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	16304	>500	Pass
157	5785	16304	>500	Pass
165	5825	16304	>500	Pass

Chain B

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	16304	>500	Pass
157	5785	16344	>500	Pass
165	5825	16344	>500	Pass

Channel 149 (Chain A)



Date: 19.DEC.2023 04.29:55



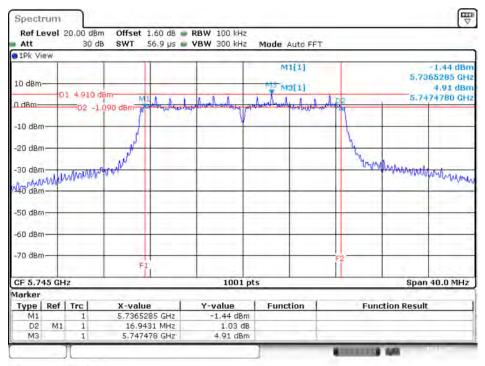
Product	:	Car Infotainment Unit
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Transmit (802.11ac-20 MHz)
Test Date	:	2023/12/19

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	17543	>500	Pass
157	5785	17543	>500	Pass
165	5825	17503	>500	Pass

Chain B

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	16943	>500	Pass
157	5785	17023	>500	Pass
165	5825	17063	>500	Pass

Channel 149 (Chain B)



Date: 19.DEC.2023 20:57:37



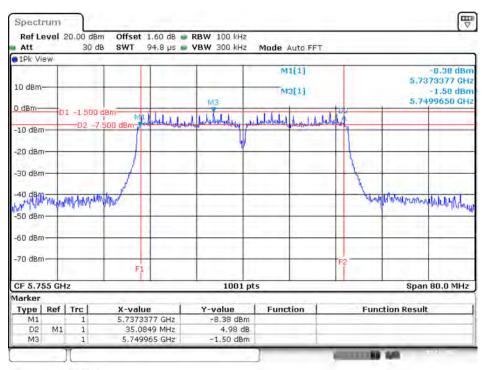
Product	:	Car Infotainment Unit
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Transmit (802.11ac-40 MHz)
Test Date	:	2023/12/19

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755	35085	>500	Pass
159	5795	35405	>500	Pass

Chain B

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755	35325	>500	Pass
159	5795	35325	>500	Pass

Channel 151 (Chain A)



Date: 19 DEC 2023 21:20:57



Product	:	Car Infotainment Unit
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Transmit (802.11ac-80 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	5775	76244	>500	Pass

Chain B

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	5775	76244	>500	Pass

Att IPk View	30	dB SWT	189.6 hs	VBW 300 kHz	Mode Auto Fr	-1.	_		
10 dBm					M1[1] M3[1]			5.7	13.66 dBm 736638 GHz -4.91 dBm 769890 GHz
0 dBm-	D1 -4.91	0 dBm	-	1913					
-10 dBm-	D2	-10.910 4	Life II by	umm'n	الكاسا بالمالية المالية	Lilul III	2		
-20 dBm						-			
-30 dBm			-			-		_	
an den	MAN ANA	HAUMAN	-			-	lite	Audihan a 3	how when the second
-50 dBm	-		_			-		animite would	Anna and a second
-60 d8m	-					-	_		
-70 dBm	-					F			
CF 5.775 G	Hz	F1		1001 pt				Span	160.0 MHz
larker				and he	-		-	opan	20010 11112
	Trc	X-va		Y-value	Function		Fund	tion Resul	t .
M1 D2 M	1 1		36638 GHz	-13.66 dBm 3.16 dB					
M3 M3	1 1		6.244 MHz 76989 GHz	-4.91 dBm					

Channel 155 (Chain A)



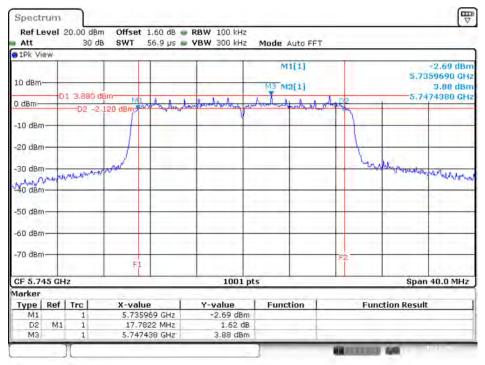
Product	:	Car Infotainment Unit
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Transmit (802.11ax-20 MHz)
Test Date	:	2023/12/19

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	18022	>500	Pass
157	5785	18142	>500	Pass
165	5825	18422	>500	Pass

Chain B

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
149	5745	17782	>500	Pass
157	5785	18022	>500	Pass
165	5825	18182	>500	Pass

Channel 149 (Chain B)



Date: 19.DEC.2023 22:05:32

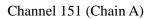


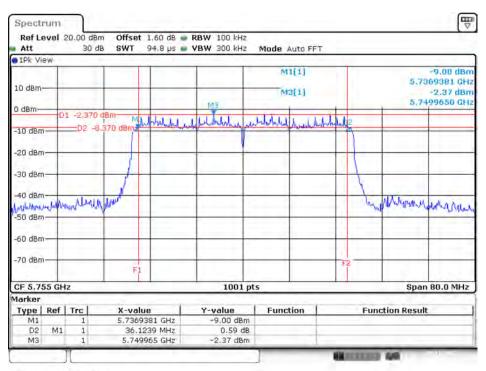
Product	:	Car Infotainment Unit
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Transmit (802.11ax-40 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755	36124	>500	Pass
159	5795	36204	>500	Pass

Chain B

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755	36524	>500	Pass
159	5795	36364	>500	Pass





Date: 20.DEC.2023 00:28:39



Product	:	Car Infotainment Unit
Test Item	:	Occupied Bandwidth Data
Test Mode	:	Transmit (802.11ax-80 MHz)
Test Date	:	2023/12/20

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	5775	77842	>500	Pass

Chain B

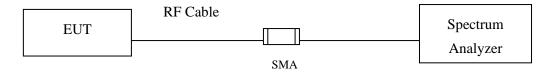
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
155	5775	77842	>500	Pass

Att IPk Vie	W	30 d	B SW		10310 PS	WBW 30	C NIG	moue	Auto FF		_		
10 dBm-									1(1) 3(1)			5.	-13.63 dBn 735839 GH -4.93 dBn
dBm-	+		-	-		M	3		1	1		5.	769890 GH
10 dBm-		1 -4.930 	dBm 0.930 8	i du	h-leller	- Althe Harder	W.	WAU	almond belly	L. L. L. L.	2		
20 dBm-	-				-				-	-		-	
30 dBm-	+	-	-	-				-		-	-		
ed log pro	LUNAN	spero Willyu	Hoitutt	-		-		-	-	-	hegulu	MANANIR.	y warman we
50 dBm-	-			-	-	-		_		-		a contradicto	Annound's
60 d8m-	-					-	-		-				
70 dBm-	+			1			-	-		E	2		
CF 5.77	5 GH	7		Î.			001 pts	-				Snan	160.0 MHz
larker			-								_	26.201	
Type	Ref	Trc	х-	value	1	Y-valu	e	Func	tion		Fund	tion Resul	t
M1		1	5	_	39 GHz	-13,63		-					
D2 M3	M1	1	_		42 MHz 89 GHz		61 dB	_					
MS	_	4		5,769	89 GHZ	~4.93	a a a a a a a a a a a a a a a a a a a			_	_	_	

Channel 155 (Chain A)

8. Duty Cycle

8.1. Test Setup



8.2. Test Procedure

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



8.3. Test Result of Duty Cycle

Product	:	Car Infotainment Unit
Test Item	:	Duty Cycle
Test Mode	:	Transmit

Duty Cycle Formula:

Duty Cycle = Ton / (Ton + Toff)

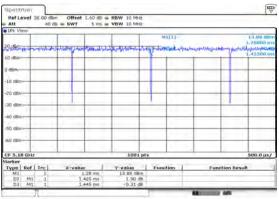
Duty Factor = 10 Log (1/Duty Cycle)

Results:

5 GHz band	Ton	Ton + Toff	Duty Cycle	Duty Factor
	(ms)	(ms)	(%)	(dB)
802.11a	1.4250	1.4450	98.62	0.06
802.11ac-20 MHz	1.3450	1.3650	98.53	0.06
802.11ac-40 MHz	0.6650	0.6850	97.08	0.13
802.11ac-80 MHz	0.3250	0.3500	92.86	0.32
802.11ax-20 MHz	1.0400	1.0600	98.11	0.08
802.11ax-40 MHz	0.5500	0.5700	96.49	0.16
802.11ax-80 MHz	0.2850	0.3050	93.44	0.29

DEKRA

802.11a

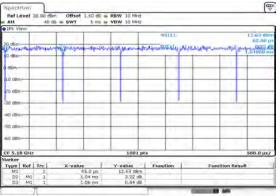


Date: 19 DEC 2025 04 20:27

802.11ac-40 MHz

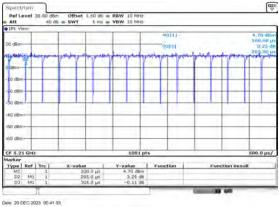


802.11ax-20 MHz

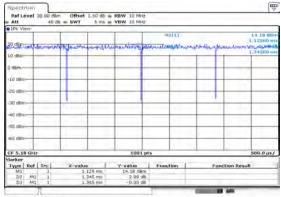


Date: 19 DEC 2023 21 50 38

802.11ax-80 MHz

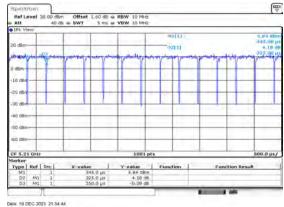


802.11ac-20 MHz



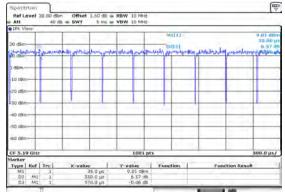
Date: 19 DEC 2025 04 43:51

802.11ac-80 MHz



the 14 DEC 2023 21 34 44

802.11ax-40 MHz



Date: 20 DEC 2025 00 21 58

Page: 99 of 99