

FCC Test Report

(Class II Permissive Change)

Product Name	Car Audio
Model No	55T0
FCC ID	AX277S0

Applicant	Faurecia Clarion Electronics Co., Ltd.
Address	7-2, Shintoshin, Chuo-ku, Saitama Shi, Saitama, 330-0081 Japan

Date of Receipt	Aug. 20, 2021
Issued Date	Sep. 27, 2021
Report No.	2180835R-RFUSWL5V01
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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

Test Report

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Product Name	Car Audio
Applicant	Faurecia Clarion Electronics Co., Ltd.
Address	7-2, Shintoshin, Chuo-ku, Saitama Shi, Saitama, 330-0081 Japan
Manufacturer	Faurecia Clarion Electronics Co., Ltd.
Model No.	55T0
FCC ID.	AX277S0
EUT Rated Voltage	DC 12V (Power by battery)
EUT Test Voltage	DC 12V (Power by battery)
Trade Name	Clarion
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E ANSI C63.4: 2014, ANSI C63.10: 2013 KDB Publication 789033
Test Result	Complied

Documented By

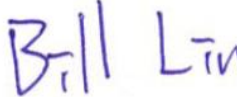
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(Senior Adm. Specialist / Joanne Lin)

Tested By

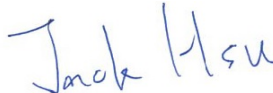
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(Senior Engineer / Bill Lin)

Approved By

:



(Senior Engineer / Jack Hsu)

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Revision History

Report No.	Version	Description	Issued Date
2180835R-RFUSWL5V01	V1.0	Initial issue of report.	2021-09-27

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Car Audio
Trade Name	Clarion
FCC ID.	AX277S0
Model No.	55T0
Frequency Range	802.11a/n-20MHz: 5180-5240MHz, 5745-5825MHz 802.11n-40MHz: 5190-5230MHz, 5755-5795MHz 802.11ac-80MHz: 5210MHz, 5775MHz
Number of Channels	802.11a/n-20MHz: 9CH; 802.11n-40MHz: 4CH, 802.11ac-80MHz: 2CH
Data Rate	802.11a: 6 - 54Mbps 802.11n: up to 150Mbps 802.11ac-80MHz: up to 433.3Mbps
Type of Modulation	802.11a/n/ac: OFDM, BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna type	Pattern Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	Clarion	N/A	Pattern Antenna	-1.37dBi for 5.15~5.25GHz 0.39dBi for 5.725~5.825GHz

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

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

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 36:	5180 MHz	Channel 40:	5200 MHz	Channel 44:	5220 MHz	Channel 48:	5240 MHz
Channel 149:	5745 MHz	Channel 153:	5765 MHz	Channel 157:	5785 MHz	Channel 161:	5805 MHz
Channel 165:	5825 MHz						

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

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 38:	5190 MHz	Channel 46:	5230 MHz	Channel 151:	5755 MHz	Channel 159:	5795 MHz

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

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 42:	5210 MHz	Channel 155:	5775 MHz				

Note:

1. This device is a Car Audio with a built-in WLAN (802.11a/b/g/n/ac) transceiver, this report for 5GHz WLAN.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report.
4. This is to request a Class II permissive change for FCC ID: AX277S0, originally granted on 02/02/2021. The major change filed under this application is:
 Change #1: Hardware changes: the size of monitor is changed from the 7-inch screen of the original model 77S0 to 9-inch screen variant model 55T0.
 Change #2: Software changes: the 5GHz operating frequency of variant model 55T0 is modified to 5150-5250MHz and 5725-5850MHz.
5. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance of transmitter with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Mode 1: Transmit (802.11a 6Mbps) Mode 2: Transmit (802.11n-20BW 7.2Mbps) Mode 3: Transmit (802.11n-40BW 15Mbps) Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
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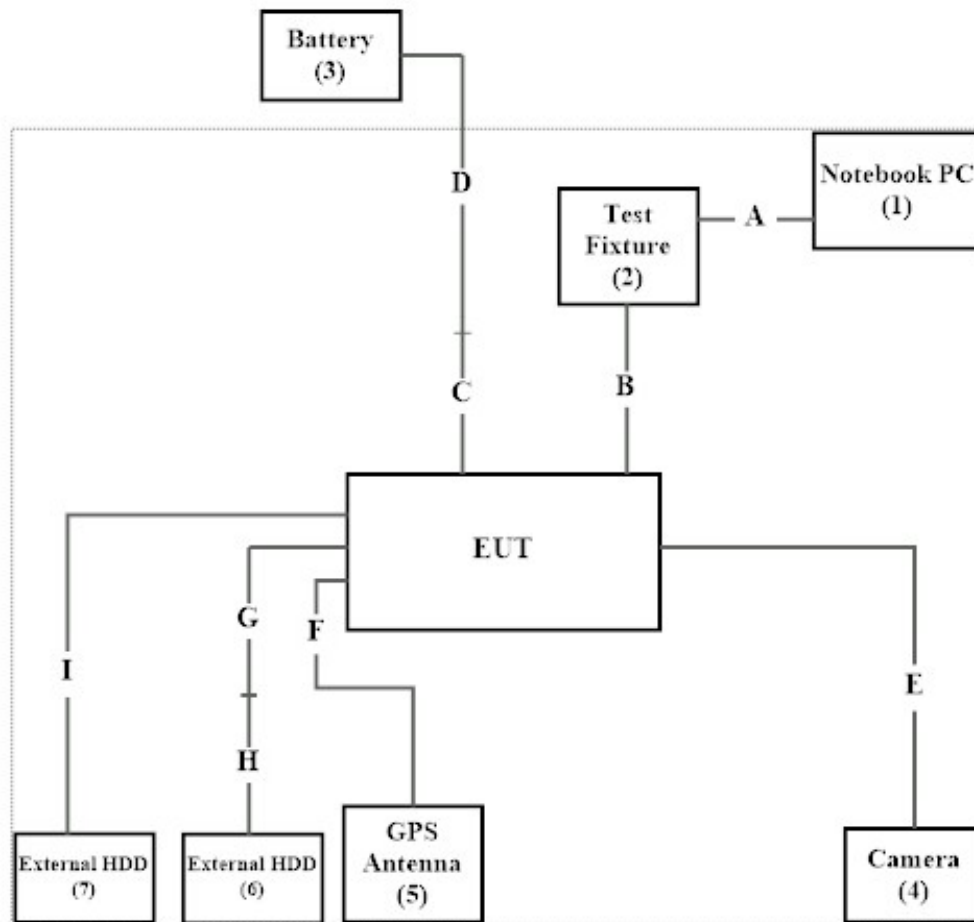
1.2. Tested System Details

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

Product	Manufacturer	Model No.	Serial No.	Power Cord	
1	Notebook PC	DELL	Latitude E5440	74BTK32	N/A
2	Test Fixture	Clarion	Clarion-01	N/A	N/A
3	Battery	YUASA	55B24L-CMF II	N/A	N/A
4	Camera	NIPPON	56R	N/A	N/A
5	GPS Antenna	MITSUMI	R16-A551	N/A	N/A
6	External HDD	Transcend	TS1TSJ25H3B	F21786-0125	N/A
7	External HDD	Transcend	TS1TSJ25H3B	F21786-0005	N/A

Signal Cable Type	Signal cable Description	
A	USB to Com Port Cable	Shielded, 0.42m
B	Signal Cable	Non-shielded, 0.15m
C	Power Cable	Non-shielded, 0.5m
D	Power Cable	Non-shielded, 1.8m
E	Camera Cable	Non-shielded, 1.2m
F	GPS Antenna Cable	Non-shielded, 0.6m
G	USB Cable	Non-shielded, 0.55m
H	USB Cable	Shielded, 0.5m
I	USB Cable	Shielded, 0.5m

1.3. Configuration of tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.3.
2. Execute software "WI 1.26 RC0.0" on the notebook PC.
3. Configure the test mode, the test channel, and the data rate.
4. Press "OK" to start the continuous Transmit.
5. Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Radiated Emission	Temperature (°C)	10~40 °C	25 °C
	Humidity (%RH)	10~90 %	63 %
Conductive	Temperature (°C)	10~40 °C	22 °C
	Humidity (%RH)	10~90 %	55 %

USA : **FCC Registration Number: TW0033**

Canada : **IC Registration Number: 26930**

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No. 26, Huaya 1st Rd., Guishan Dist.,
Taoyuan City 333411, Taiwan, R.O.C.

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Fax number : +866-3-327-8031

Email address : info.tw@dekra.com

Website : <http://www.dekra.com.tw>

1.6. List of Test Equipment

For Conducted measurements /SH2

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
X	Spectrum Analyzer	R&S	FSV30	103466	2020.12.28	2021.12.27
X	Peak Power Analyzer	KEYSIGHT	8900B	MY51000539	2021.06.07	2022.06.06
X	Power Sensor	KEYSIGHT	N1923A	MY59240002	2021.05.17	2022.05.16
X	Power Sensor	KEYSIGHT	N1923A	MY59240003	2021.05.17	2022.05.16
	Bluetooth Tester	R&S	CBT	101238	2021.02.23	2022.02.22

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with "X" are used to measure the final test results.
3. Test Software version : DEKRA Conduction Test System V9.0.5.

For Radiated measurements /966-1

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due. Date
	Loop Antenna	AMETEK	HLA6121	56736	2021.04.14	2022.04.13
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0675	2021.08.11	2022.08.10
X	Horn Antenna	ETS-Lindgren	3117	00203761	2020.11.23	2021.11.22
X	Horn Antenna	Com-Power	AH-840	101087	2021.06.18	2022.06.17
X	Pre-Amplifier	EMCI	EMC001330	980254	2021.07.06	2022.07.05
X	Pre-Amplifier	EMCI	EMC051835SE	980312	2021.02.24	2022.02.23
X	Pre-Amplifier	EMCI	EMC05820SE	980308	2020.09.18	2021.09.17
X	Pre-Amplifier	EMCI	EMC184045SE	980369	2021.04.27	2022.04.26
	Filter	MICRO TRONICS	BRM50702	G251	2021.09.16	2022.09.15
X	Filter	MICRO TRONICS	BRM50716	G188	2021.09.16	2022.09.15
X	EMI Test Receiver	R&S	ESR	102792	2020.12.15	2021.12.14
X	Spectrum Analyzer	R&S	FSV3044	101113	2021.02.04	2022.02.03
X	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3380/2	2021.08.30	2022.08.29
X	Coaxial Cable	SGH, EMCI, SUHNER	HA800, SGH18, SUCOFLEX 106, EMC106	HY2108-003C	2021.03.03	2022.03.02

Note:

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

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document, and is described in each test chapter of this report.

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%.

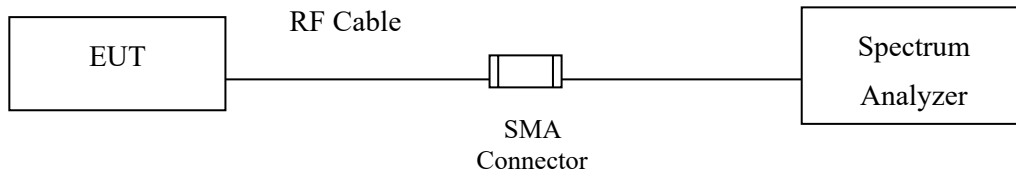
Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test item	Uncertainty	
Maximun conducted output power	Power Meter ± 0.91 dB	Spectrum Analyzer ± 2.53 dB
Radiated Emission	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB
Band Edge	Under 1GHz ± 4.06 dB	Above 1GHz ± 3.73 dB
Duty Cycle	± 2.3 msec	

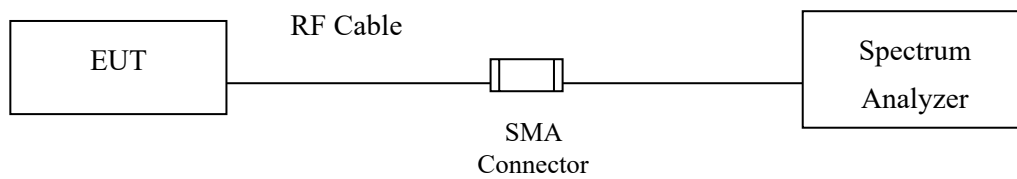
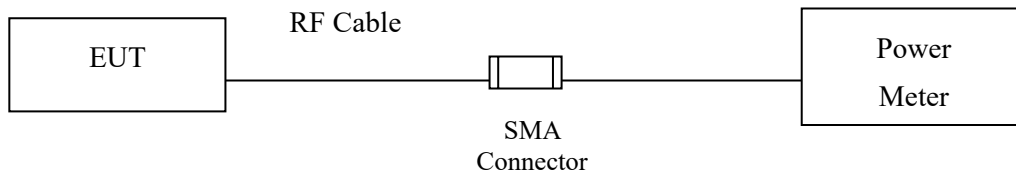
2. Maximun conducted output power

2.1. Test Setup

Occupied Bandwidth



Conduction Power Measurement



2.2. Limits

For the band 5.15-5.25 GHz,

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

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

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

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

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 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 colocated 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.

2.3. 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.

802.11an (BW \leq 40MHz) Maximum conducted output power using KDB 789033 section E)3)b) Method PM-G (Measurement using a gated RF average power meter)

Note: the power meter have a video bandwidth that is greater than or equal to the measurement bandwidth, (Anritsu/ MA2411B video bandwidth: 65MHz)

802.11ac (BW=80MHz) 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.

2.4. Test Result of Maximum conducted output power

Product : Car Audio
 Test Item : Maximum conducted output power
 Test Mode : Mode 1: Transmit (802.11a 6Mbps)
 Test Date : 2021/09/06

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		6	9	12	18	24	36	48	54
		Measurement Level (dBm)							
36	5180	11	--	--	--	--	--	--	--
44	5220	12.38	12.34	12.26	12.2	12.1	12.05	11.95	11.91
48	5240	13.02	--	--	--	--	--	--	--
149	5745	12.15	--	--	--	--	--	--	--
157	5785	11.95	11.86	11.8	11.74	11.67	11.58	11.48	11.39
165	5825	12.35	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No.	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Duty factor (dB)	Output Power Limit	
					(dBm)	dBm+10log(BW)
36	5180	--	11.00	--	24	--
44	5220	--	12.38	--	24	--
48	5240	--	13.02	--	24	--
149	5745	--	12.15	--	30	--
157	5785	--	11.95	--	30	--
165	5825	--	12.35	--	30	--

Product : Car Audio
 Test Item : Maximum conducted output power
 Test Mode : Mode 2: Transmit (802.11n-20BW 7.2Mbps)
 Test Date : 2021/09/06

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2
		Measurement Level (dBm)							
36	5180	9.61	--	--	--	--	--	--	--
44	5220	10.88	10.84	10.8	10.76	10.68	10.59	10.54	10.44
48	5240	11.72	--	--	--	--	--	--	--
149	5745	11.96	--	--	--	--	--	--	--
157	5785	11.56	11.51	11.42	11.39	11.31	11.27	11.23	11.18
165	5825	12.31	--	--	--	--	--	--	--

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No.	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Duty factor (dB)	Output Power Limit	
					(dBm)	dBm+10log(BW)
36	5180	--	9.61	--	24	--
44	5220	--	10.88	--	24	--
48	5240	--	11.72	--	24	--
149	5745	--	11.96	--	30	--
157	5785	--	11.56	--	30	--
165	5825	--	12.31	--	30	--

Product : Car Audio
 Test Item : Maximum conducted output power
 Test Mode : Mode 3: Transmit (802.11n-40BW 15Mbps)
 Test Date : 2021/09/06

Cable loss=1dB		Maximum conducted output power							
Channel No.	Frequency (MHz)	Data Rate (Mbps)							
		15	30	45	60	90	120	135	150
		Measurement Level (dBm)							
38	5190	6.89	--	--	--	--	--	--	--
46	5230	8.11	8.01	7.92	7.89	7.83	7.75	7.67	7.59
151	5755	9.15	--	--	--	--	--	--	--
159	5795	9.3	9.26	9.2	9.13	9.09	8.99	8.94	8.86

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:

Channel No.	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Duty factor (dB)	Output Power Limit	
					(dBm)	dBm+10log(BW)
38	5190	--	6.89	--	24	--
46	5230	--	8.11	--	24	--
151	5755	--	9.15	--	30	--
159	5795	--	9.30	--	30	--

Product : Car Audio
 Test Item : Maximum conducted output power
 Test Mode : Mode 4: Transmit (802.11ac-80BW 32.5Mbps)
 Test Date : 2021/09/06

Cable loss=1dB		Maximum conducted output power									
Channel No	Frequency (MHz)	Data Rate (Mbps)									
		VTH0	VTH1	VTH2	VTH3	VTH4	VTH5	VTH6	VTH7	VTH8	VTH9
42	5210	6.88	-	-	-	-	-	-	-	-	-
155	5775	8.92	-	-	-	-	-	-	-	-	-

Note: Maximum conducted output power Value =Reading value on Spectrum Analyzer + cable loss

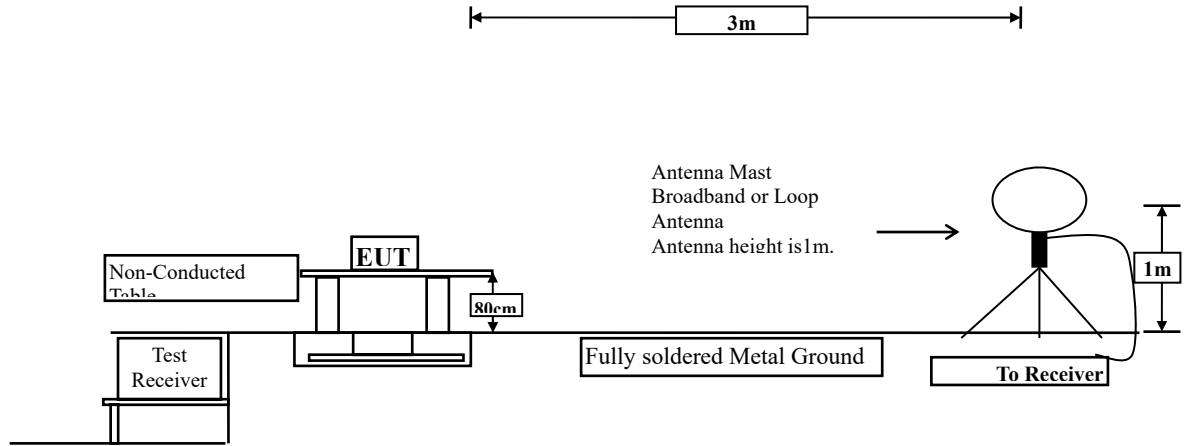
Maximum conducted output power Measurement

Channel No.	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Duty factor (dB)	Output Power Limit		Result
					(dBm)	dBm+10log(BW)	
42	5210	--	6.88	--	24	--	Pass
155	5775	--	8.92	--	30	--	Pass

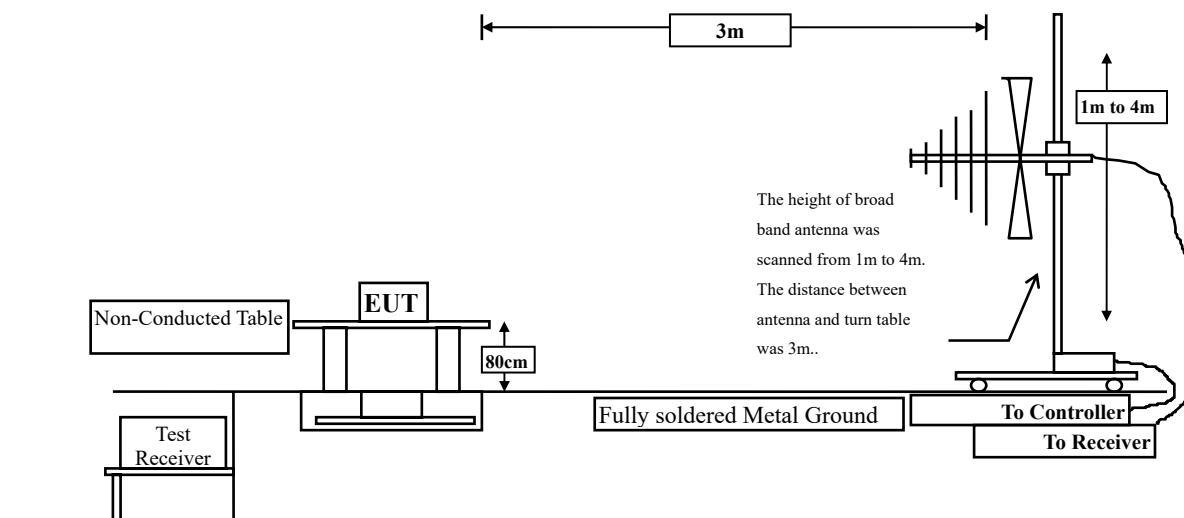
3. Radiated Emission

3.1. Test Setup

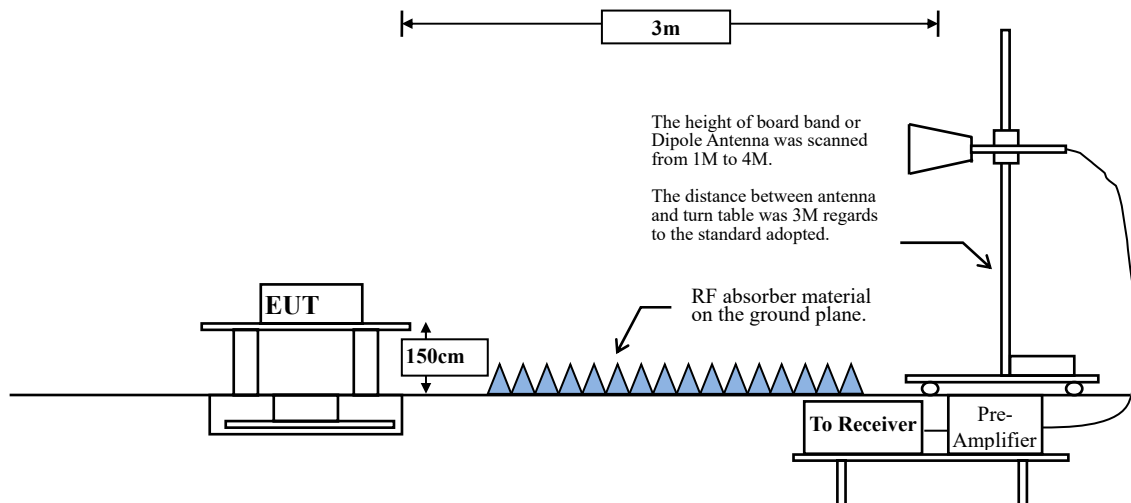
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.2. Limits

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

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

Remarks: E field strength (dB μ V/m) = 20 log E field strength (uV/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.

3.3. Test Procedure

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

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

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

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

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

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

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

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

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

RBW and VBW Parameter setting:

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

RBW = 1MHz.

VBW \geq 3MHz.

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

RBW = 1MHz.

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

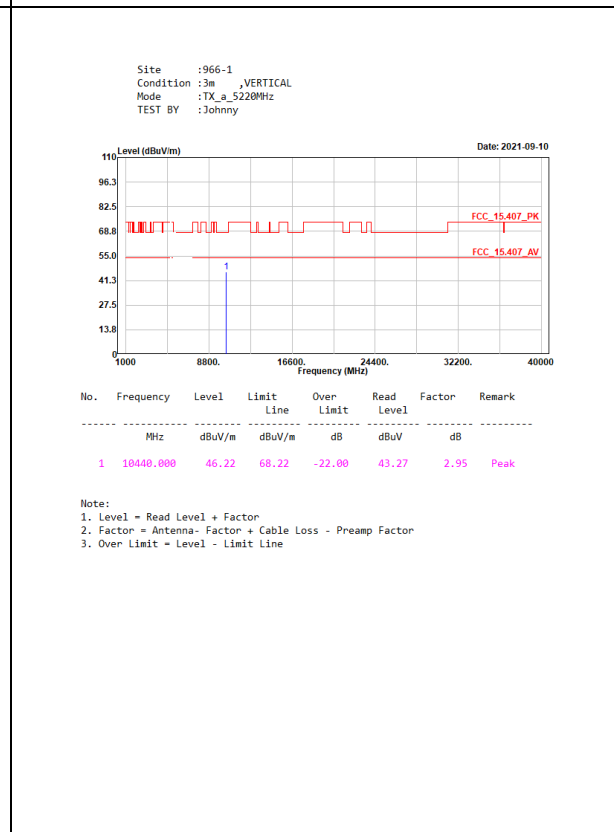
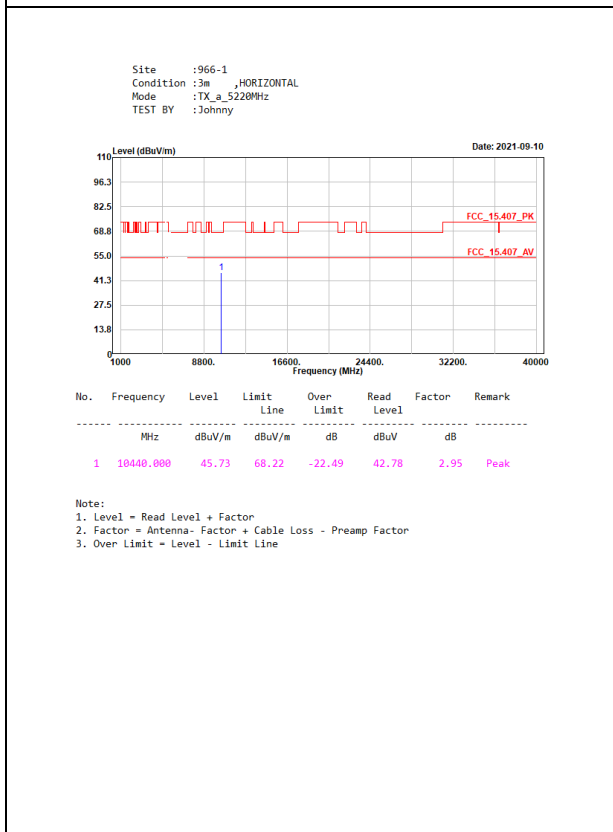
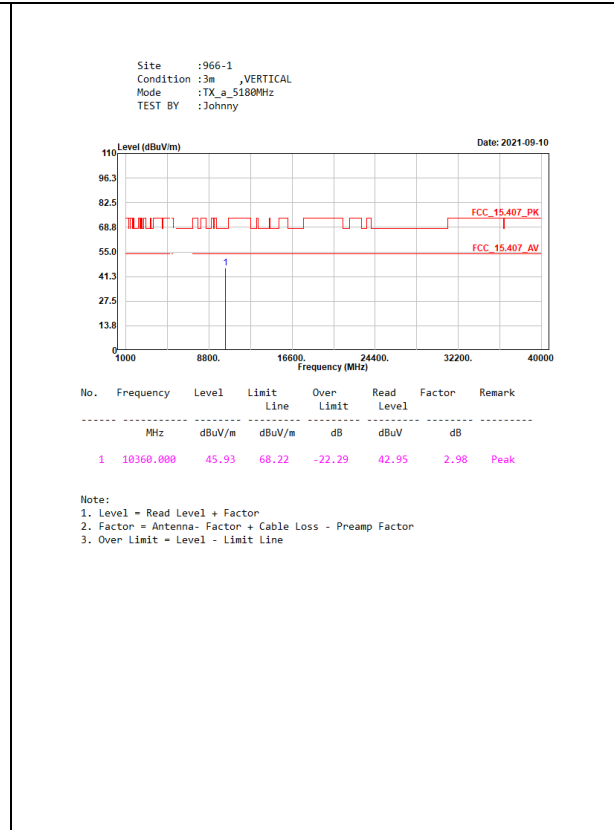
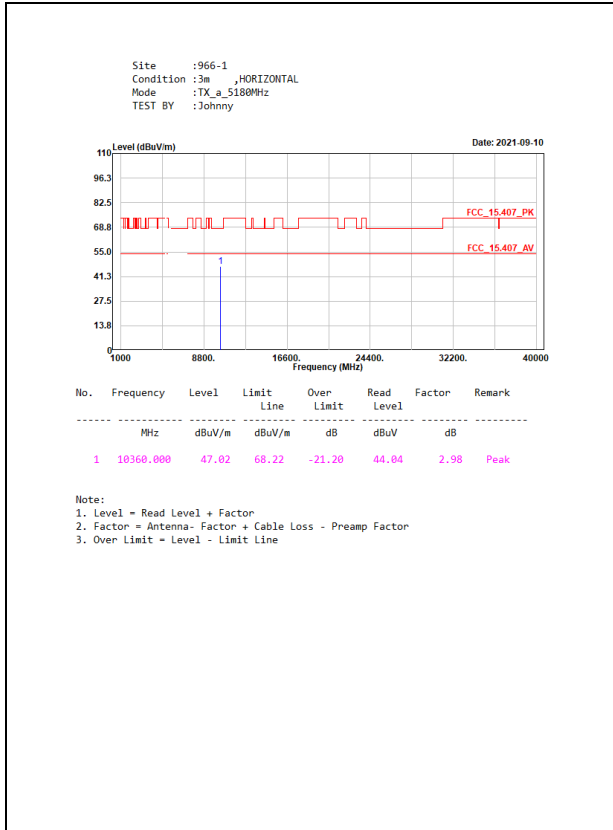
VBW \geq 1/T, when duty cycle < 98 %

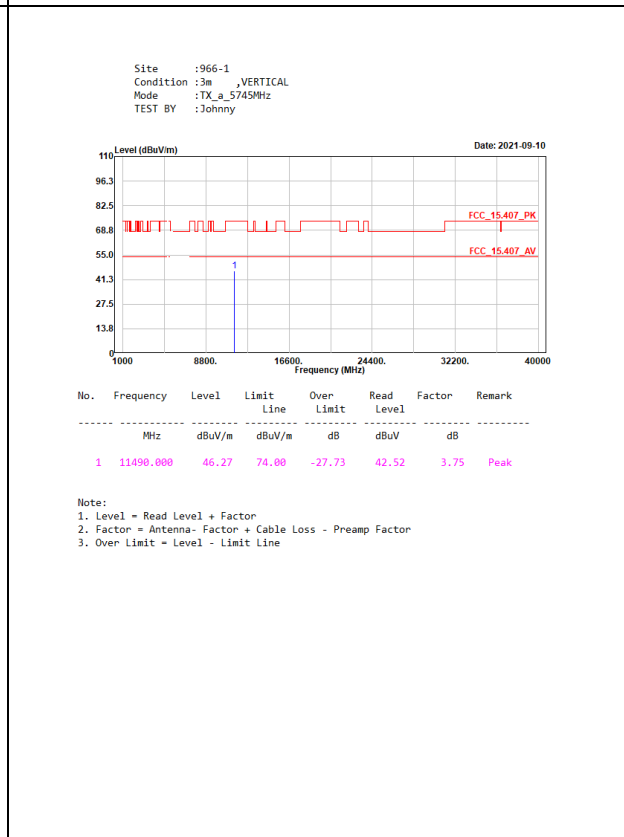
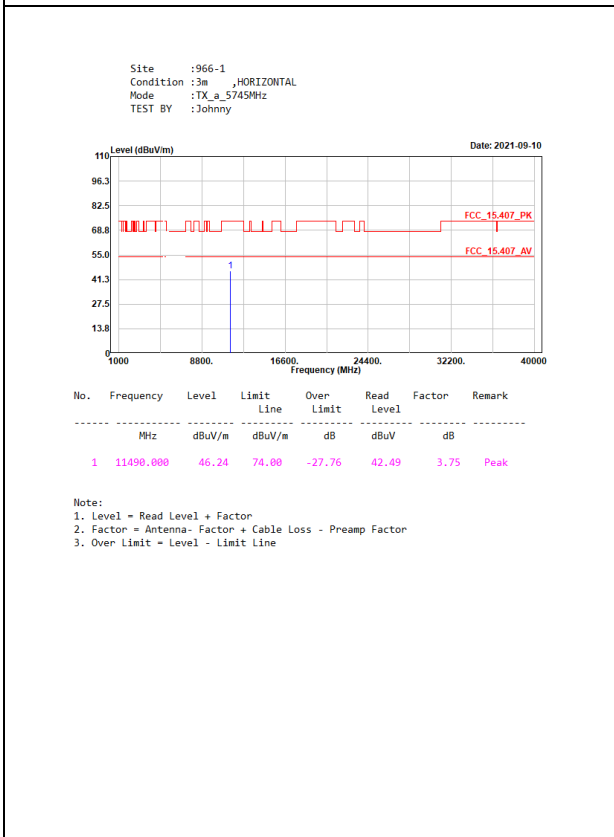
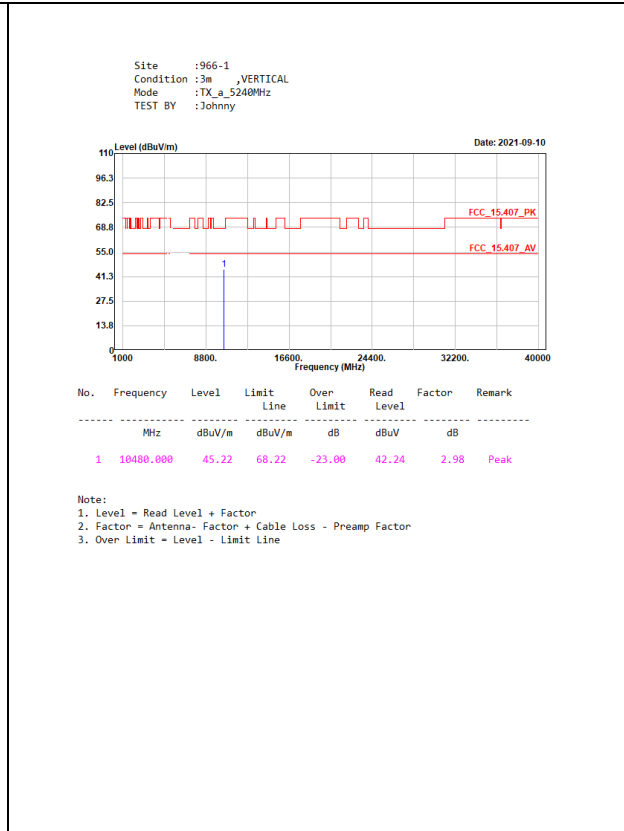
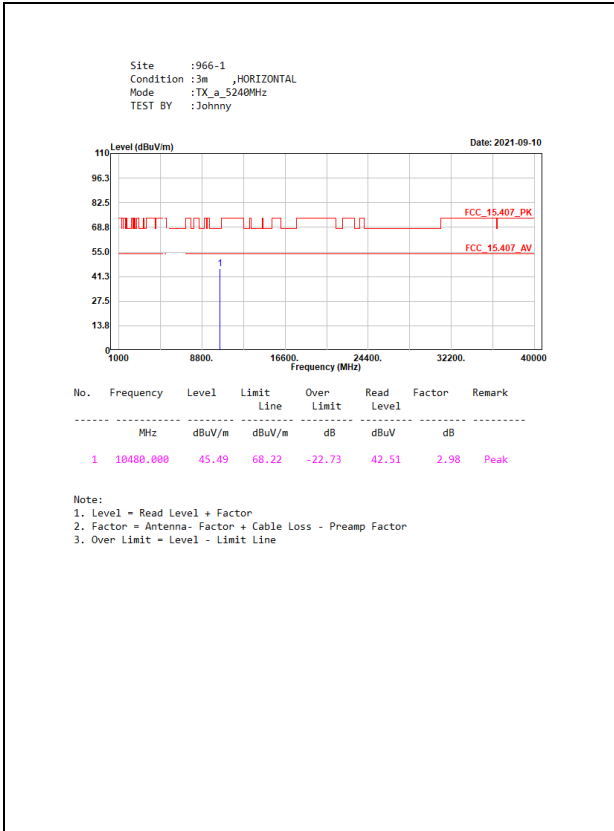
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

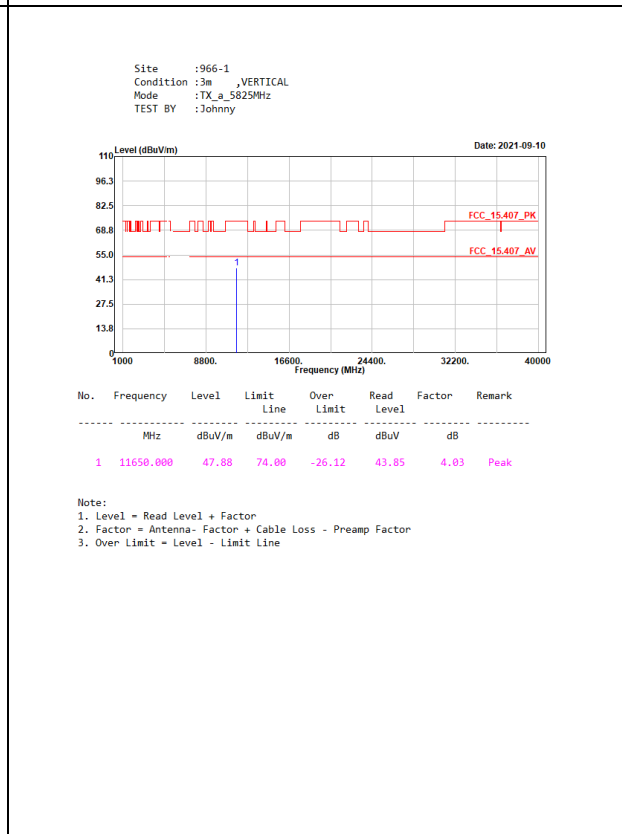
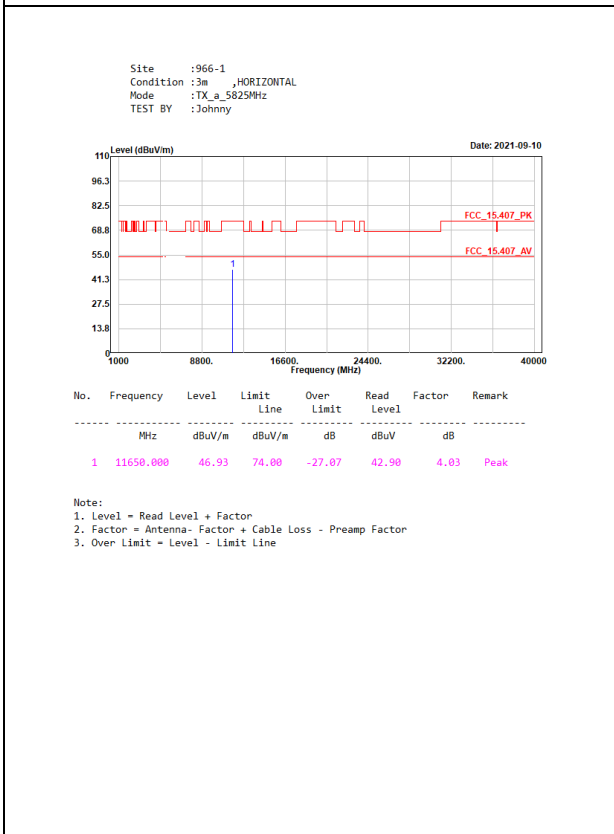
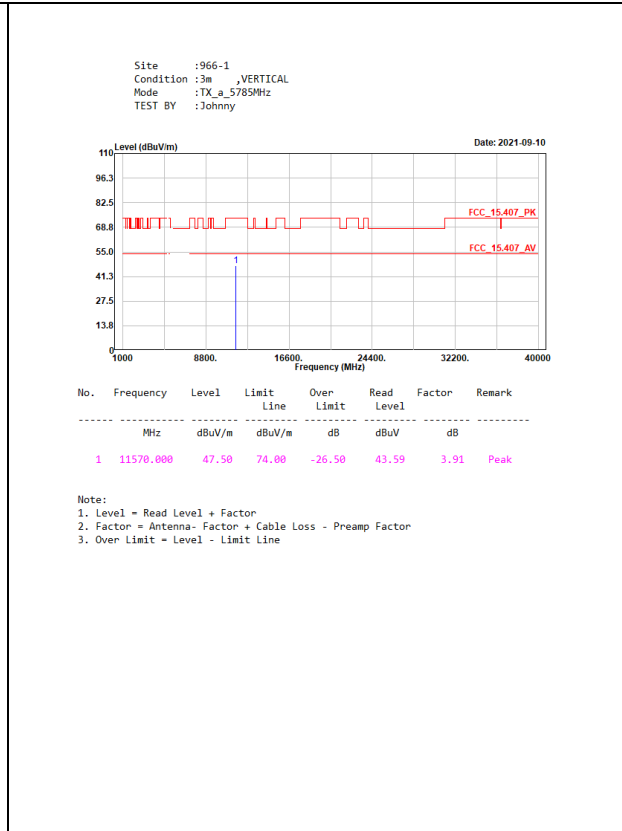
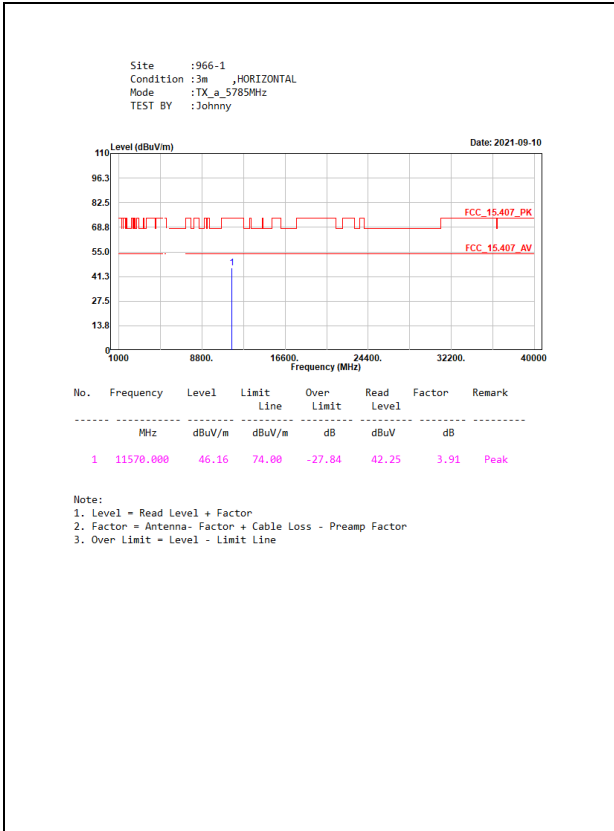
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	94.08	1.4300	699	1000
802.11n20	93.01	1.3300	752	1000
802.11n40	85.71	0.6600	1515	2000
802.11ac80	76.74	0.3300	3030	5000

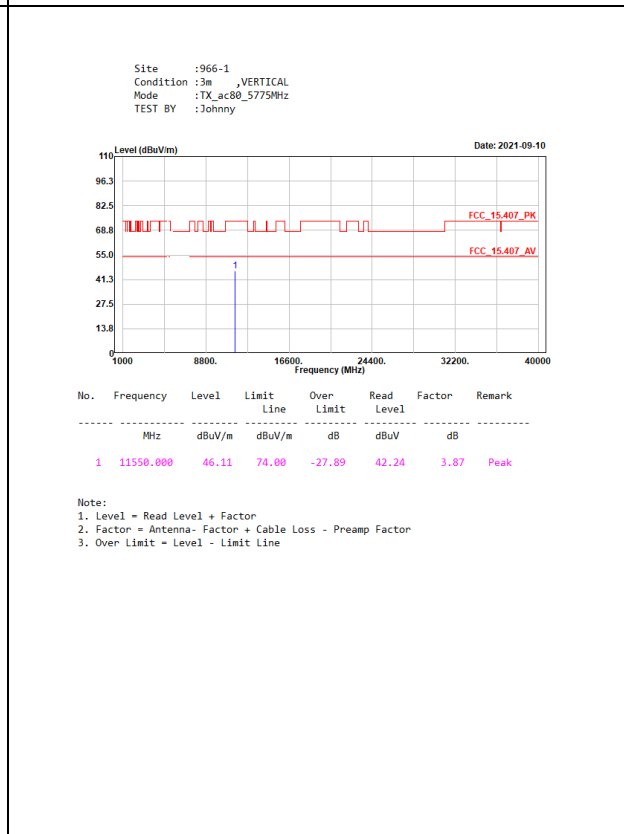
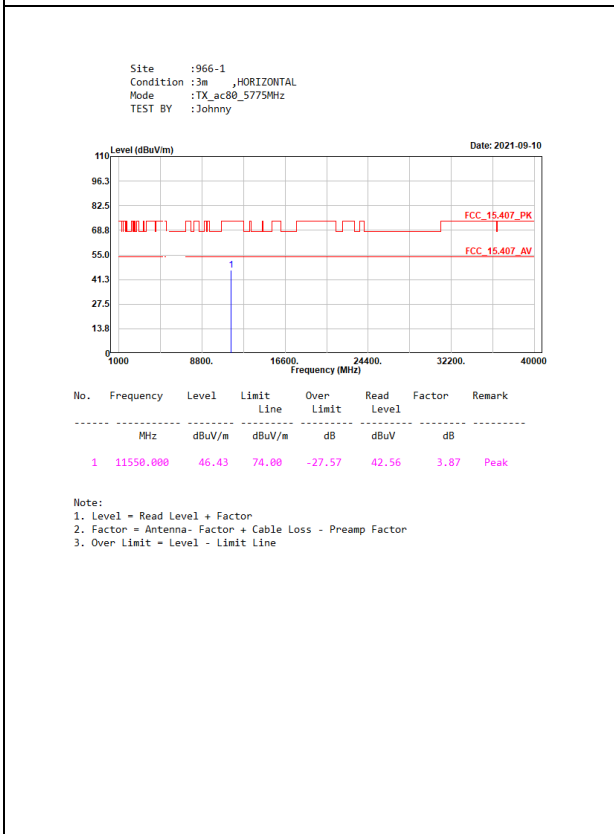
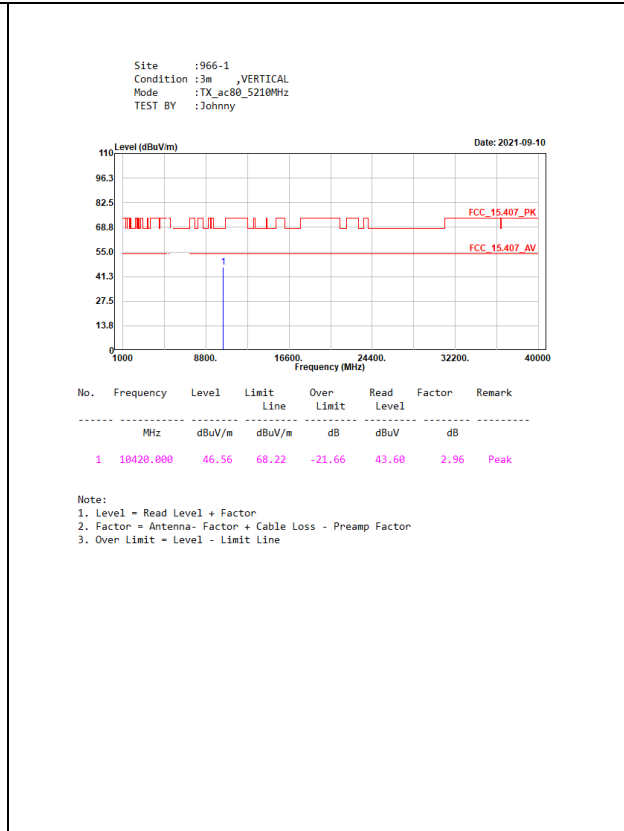
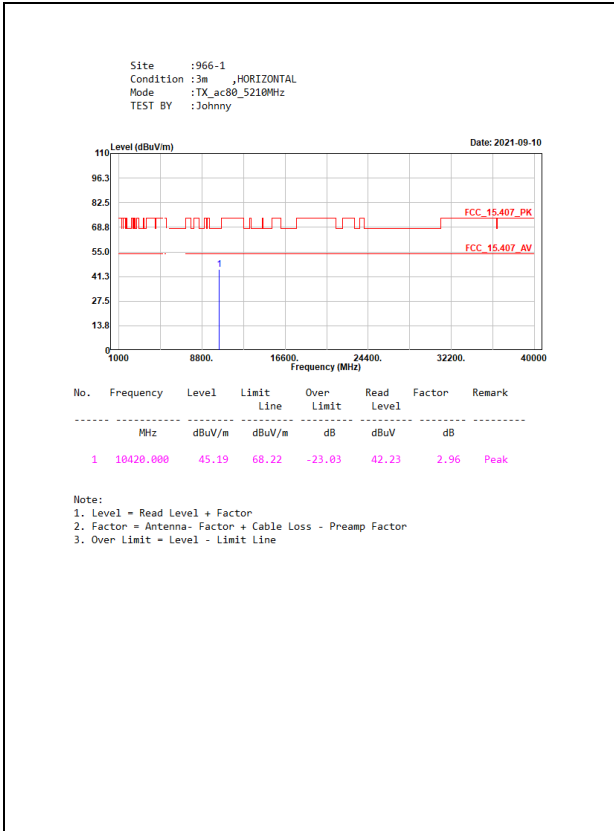
Note: Duty Cycle Refer to Section 5.

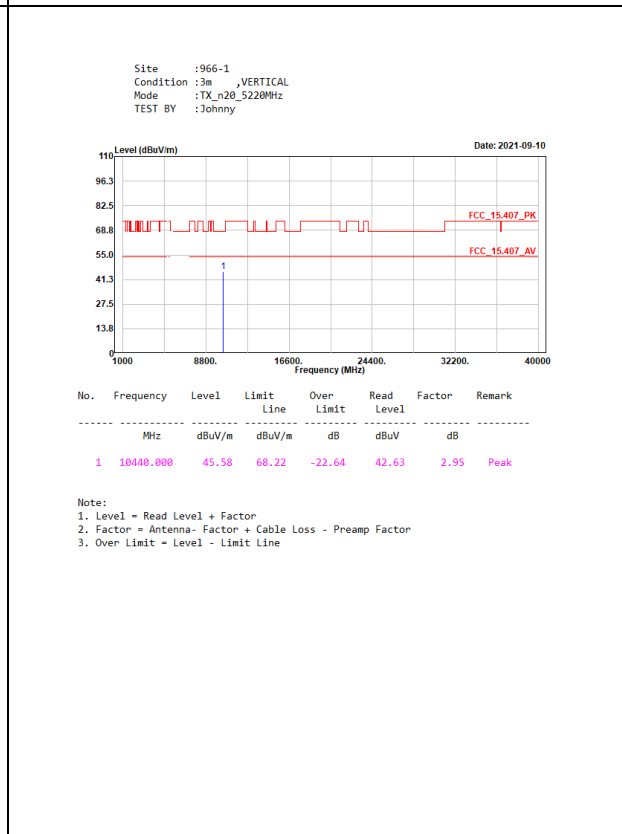
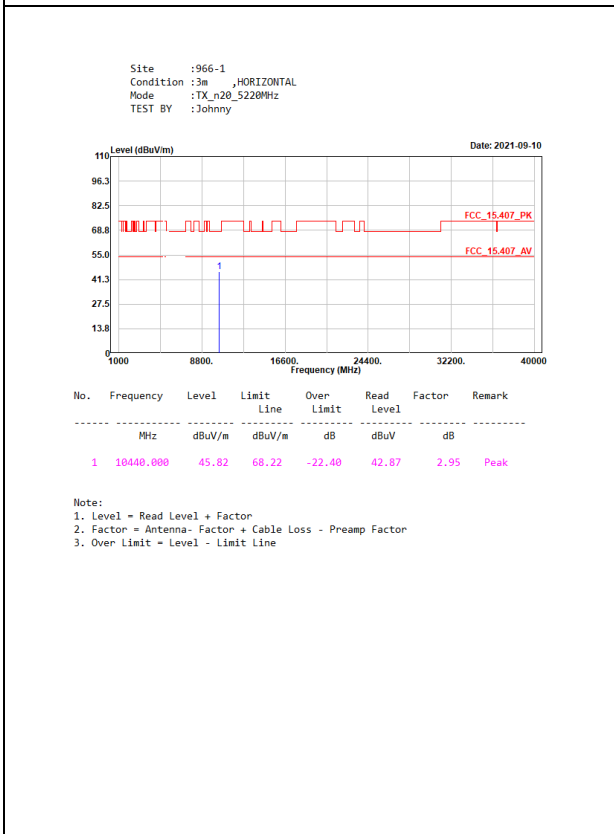
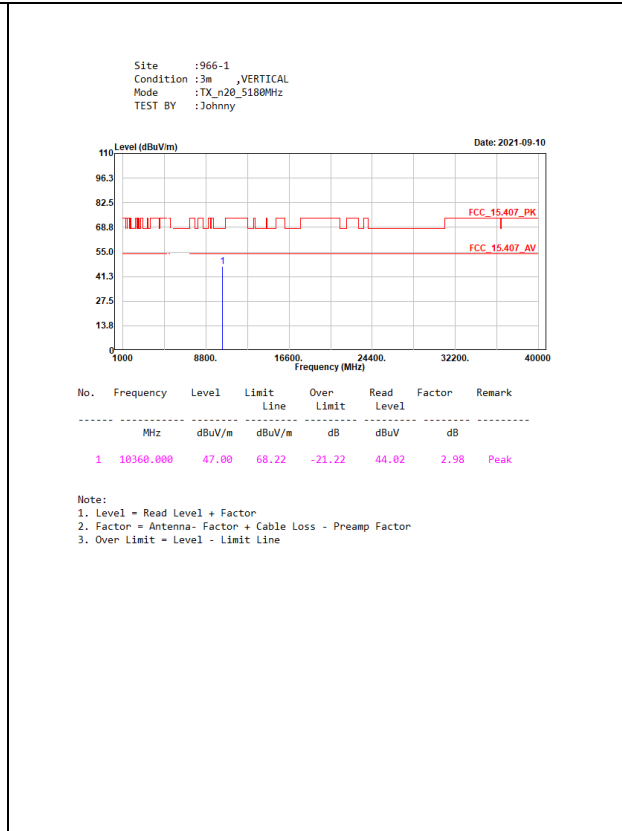
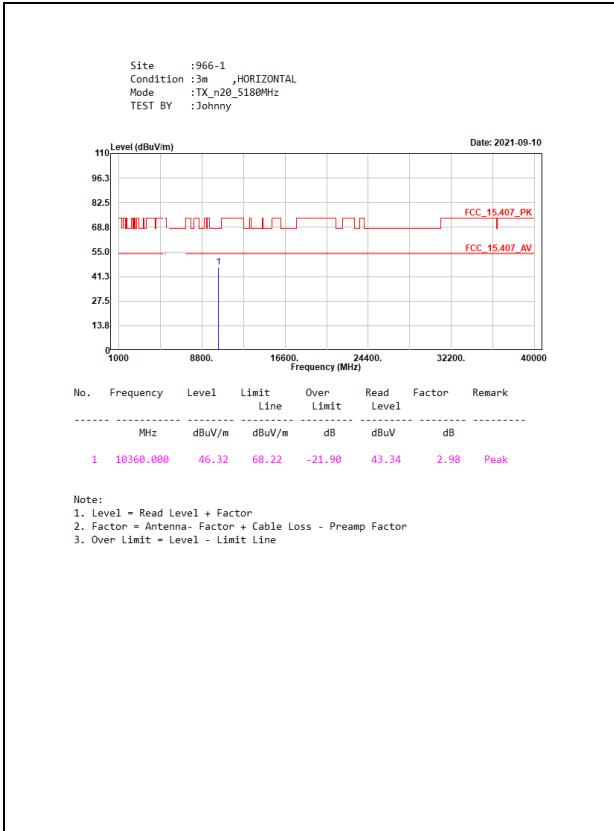
3.4. Test Result of Radiated Emission

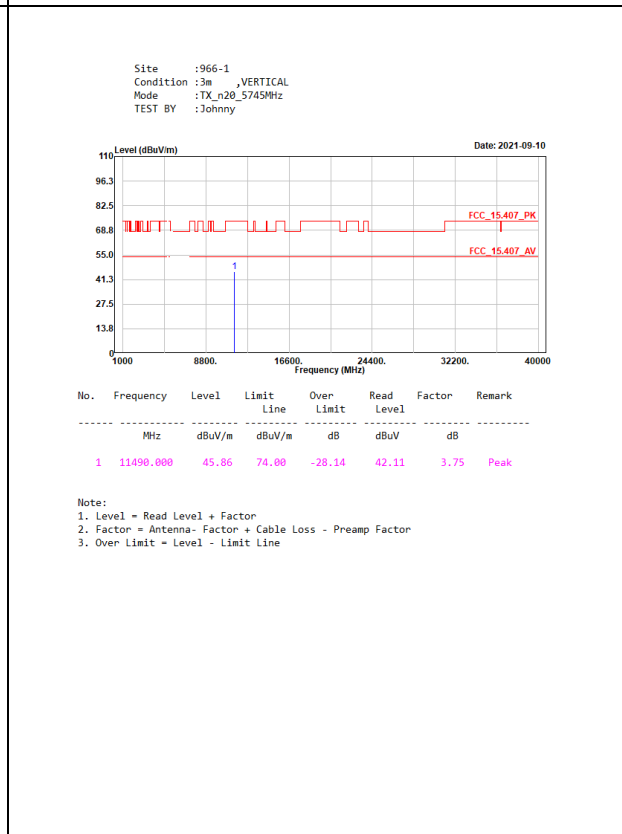
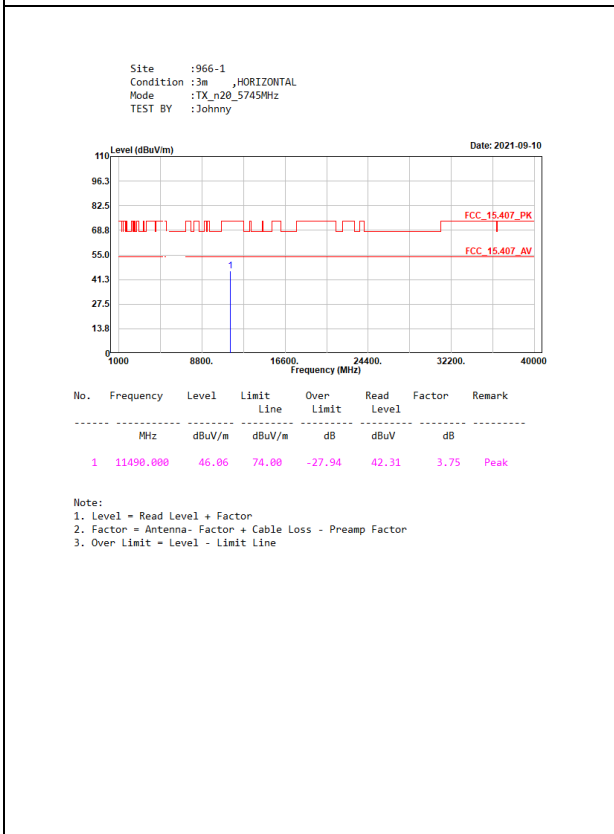
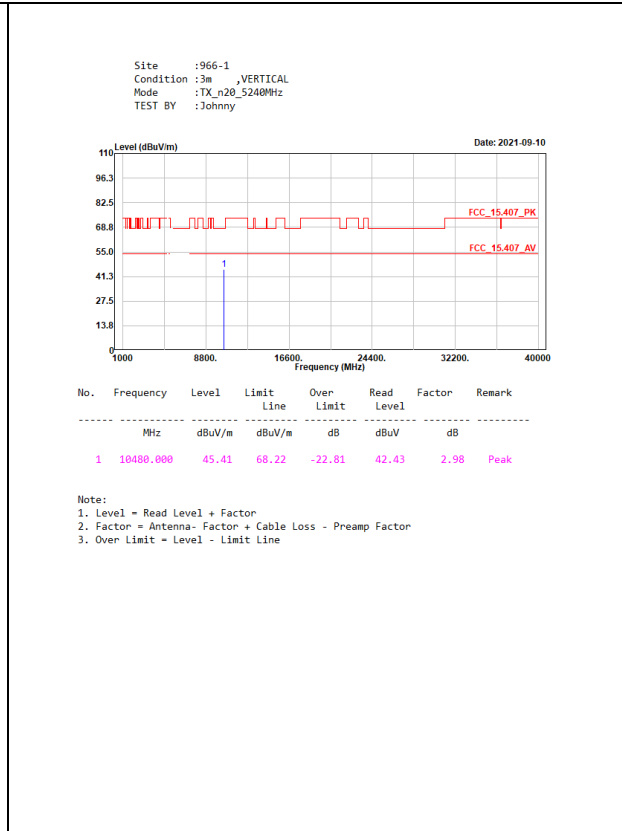
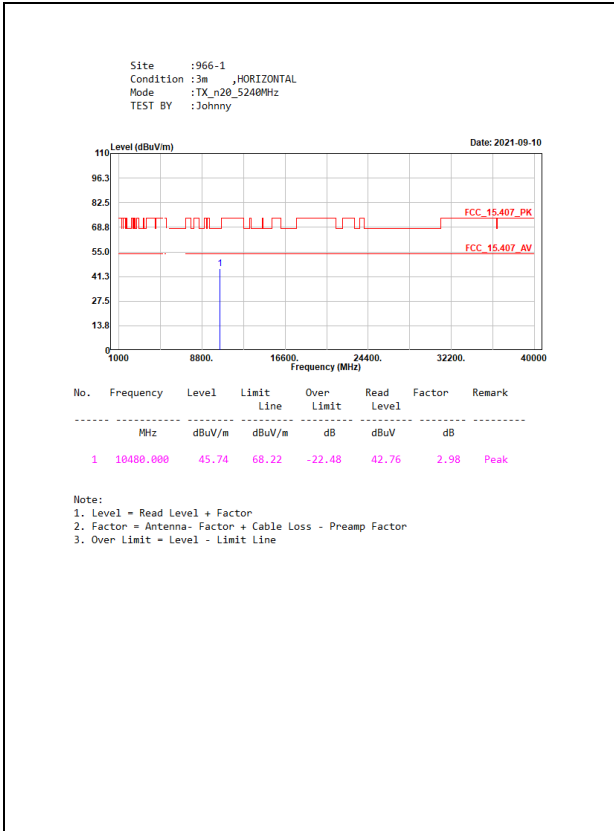


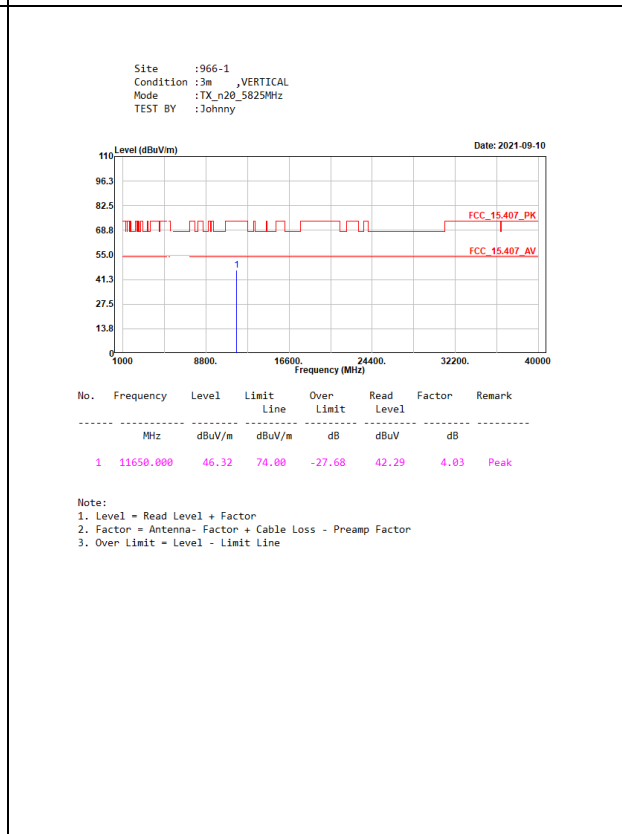
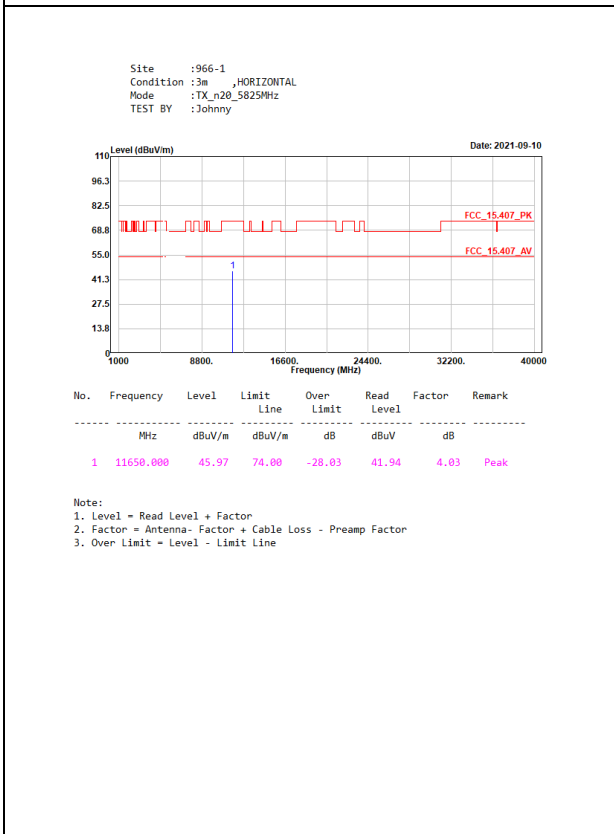
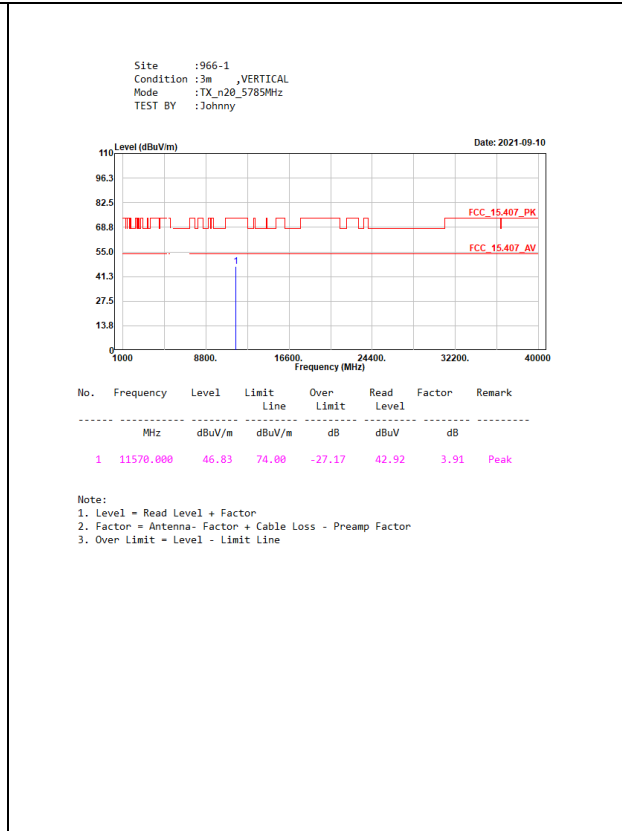
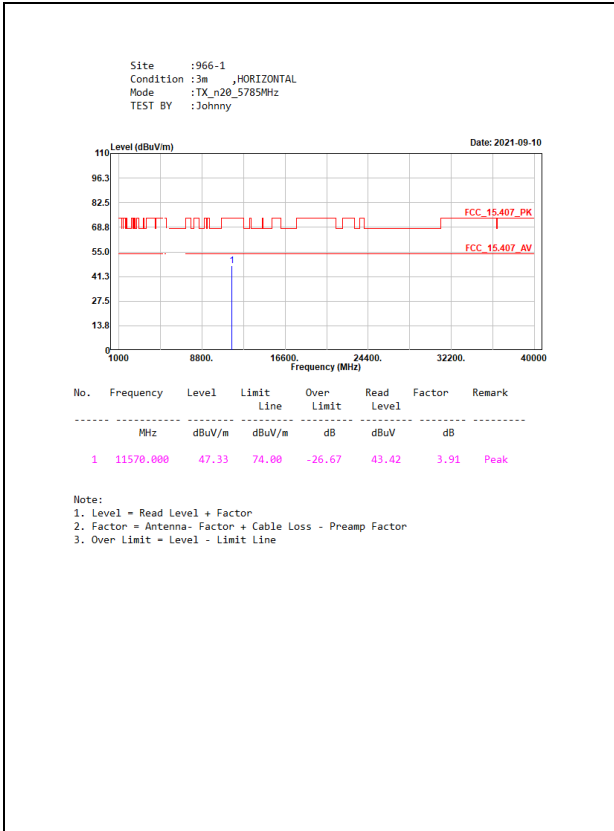


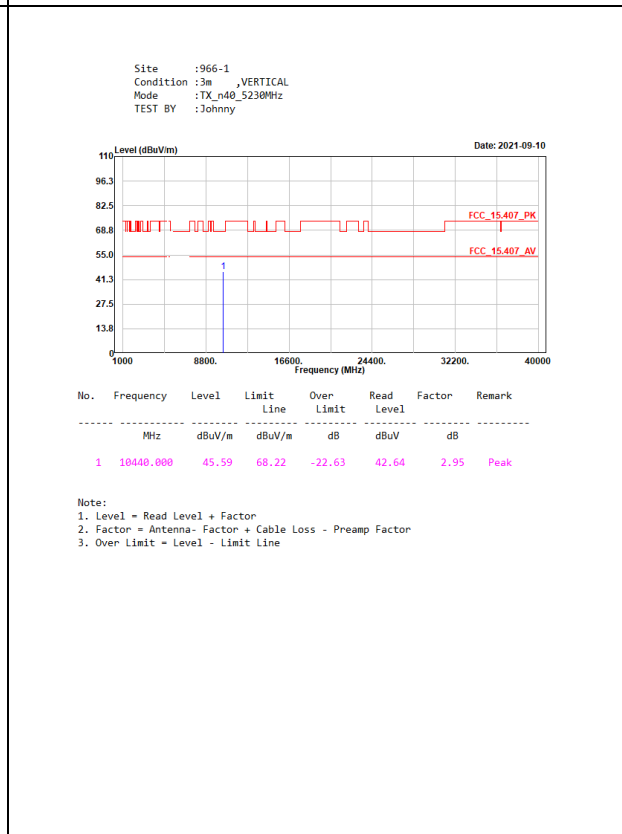
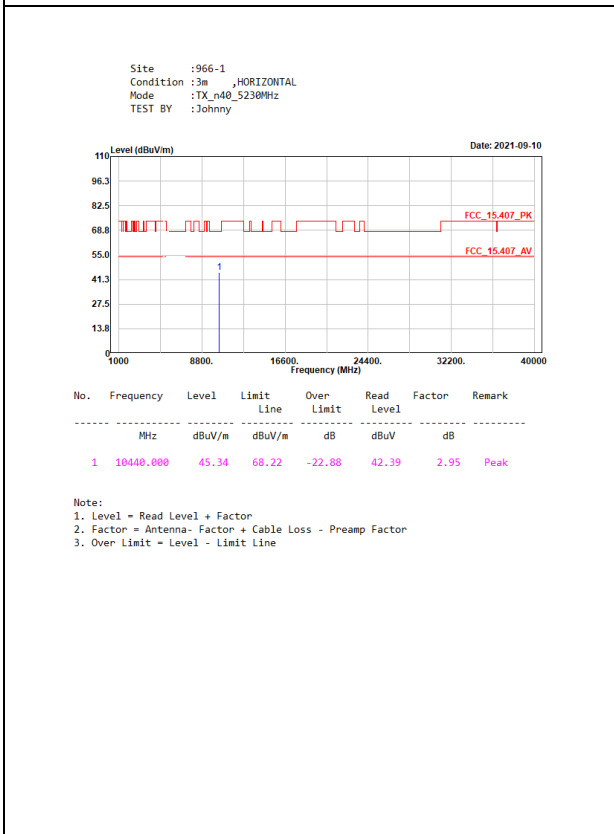
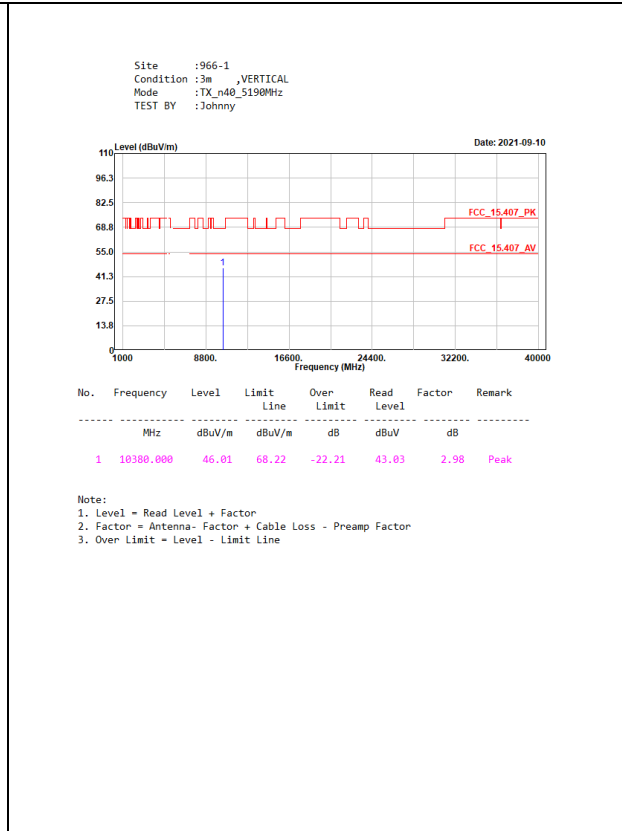
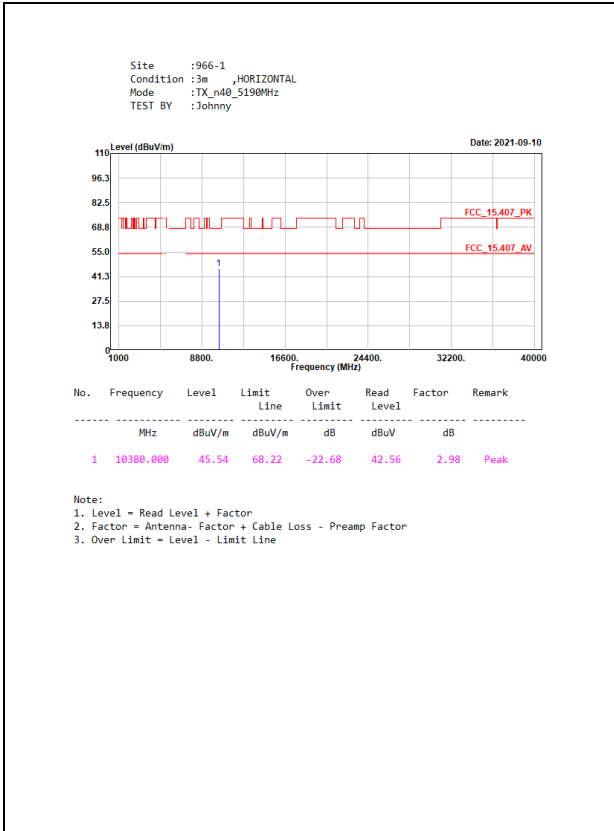


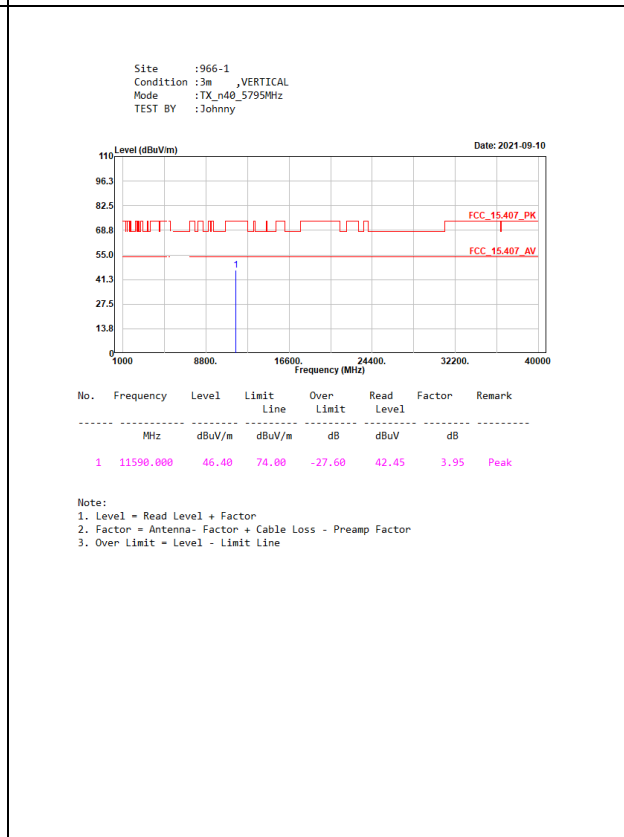
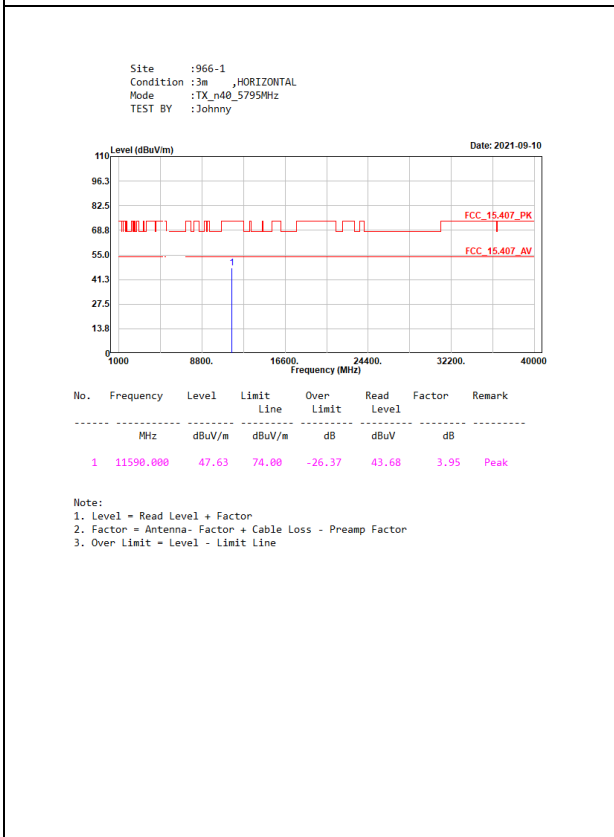
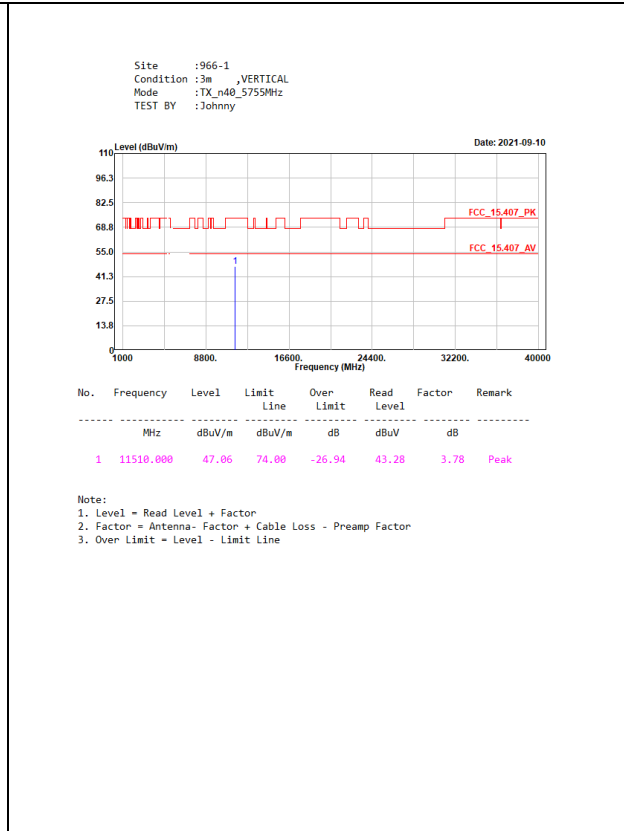
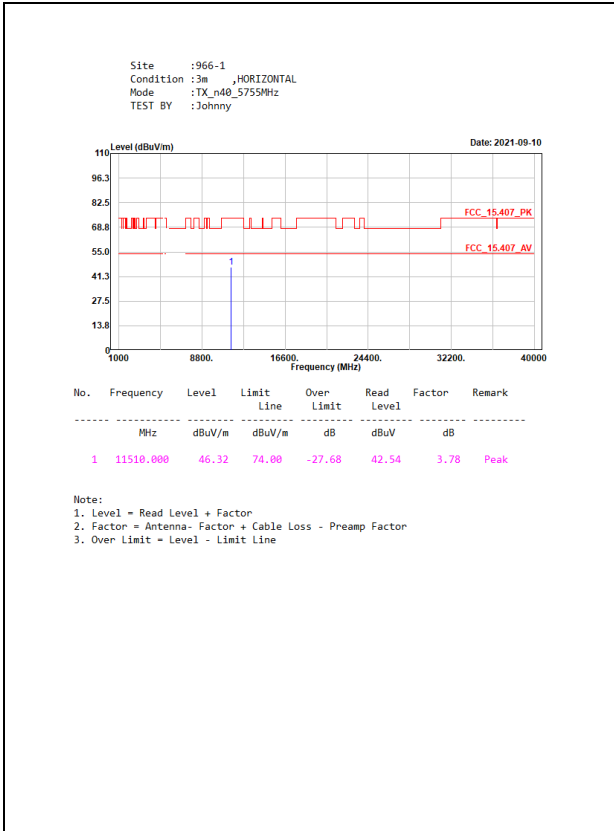


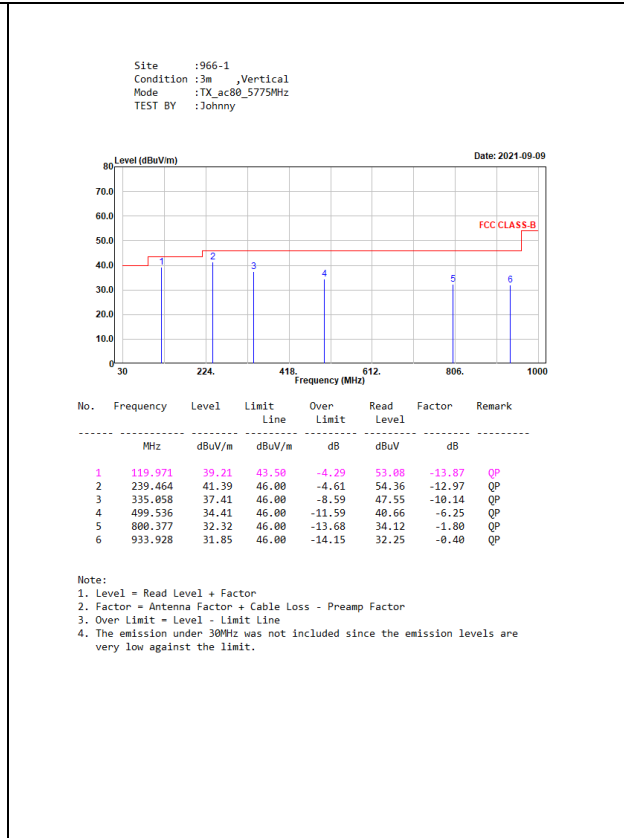
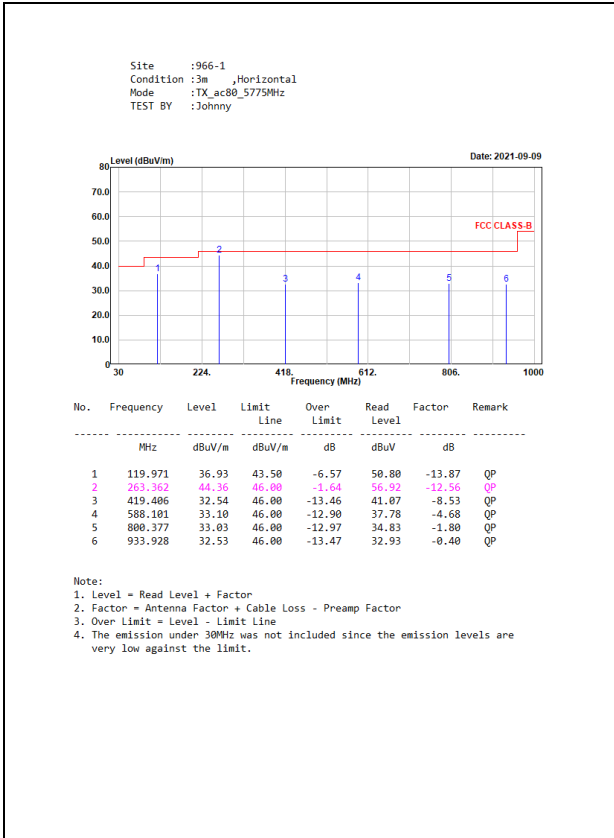








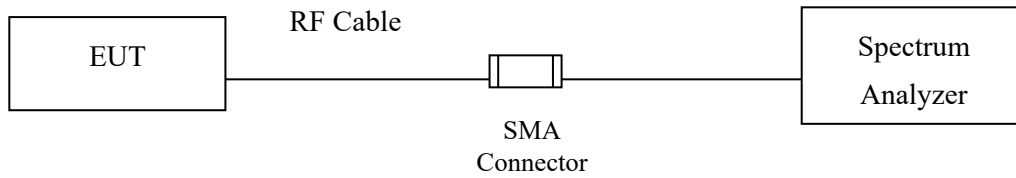




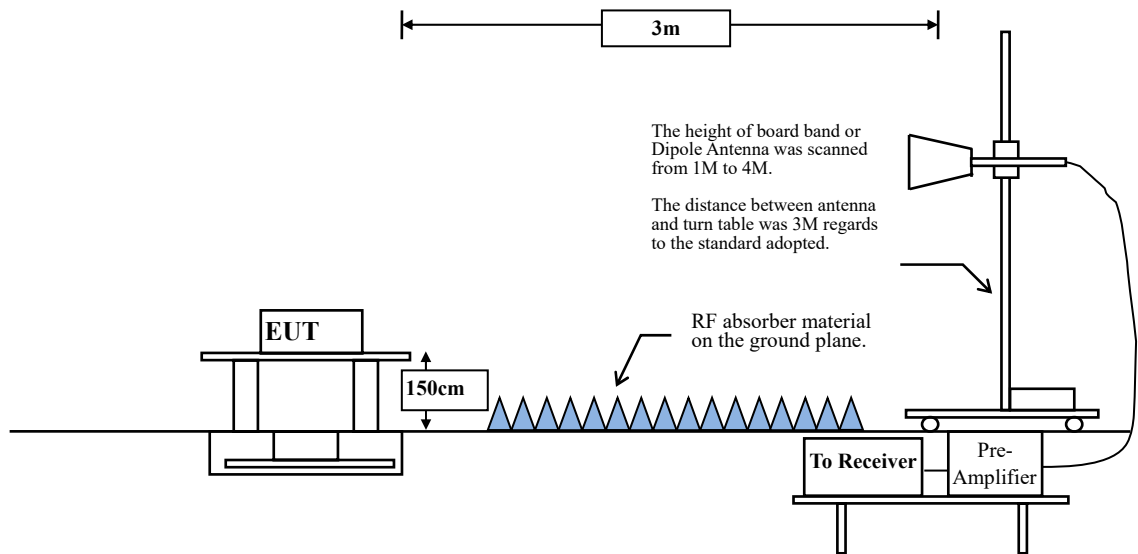
4. Band Edge

4.1. Test Setup

RF Conducted Measurement:



RF Radiated Measurement:



4.2. Limits

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

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

- Remarks :
1. RF Voltage (dBµV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
- 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.

4.3. 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 1GHz setting on the field strength meter is 120 kHz, above 1GHz 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 = 1MHz.

VBW \geq 3MHz.

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

RBW = 1MHz.

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

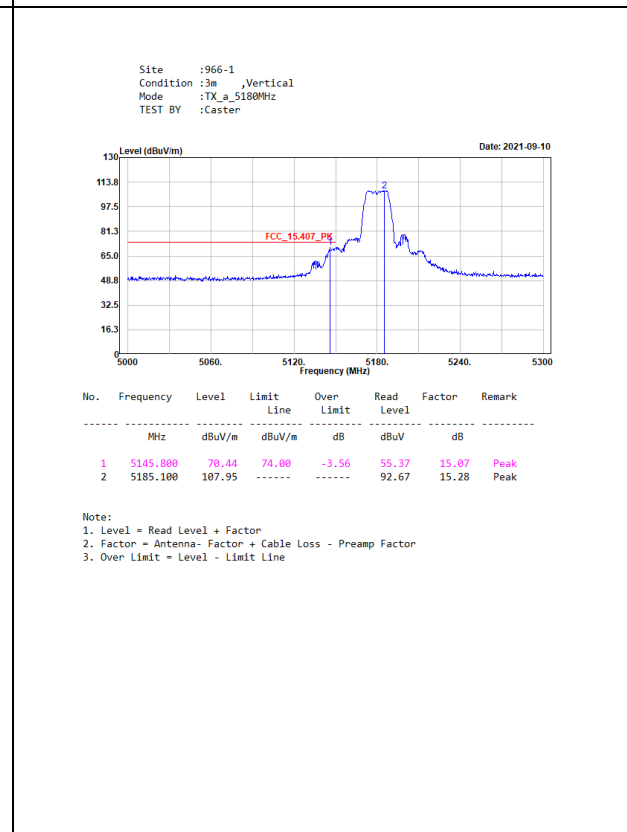
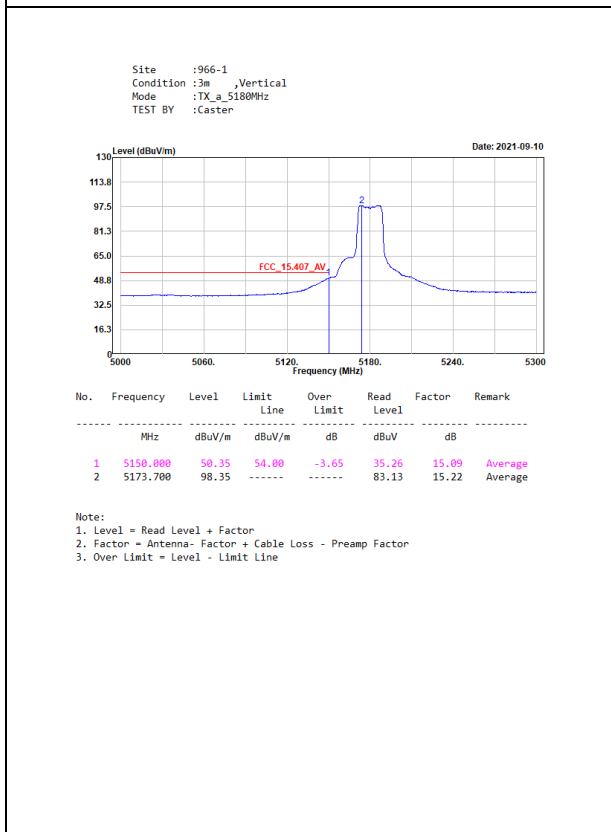
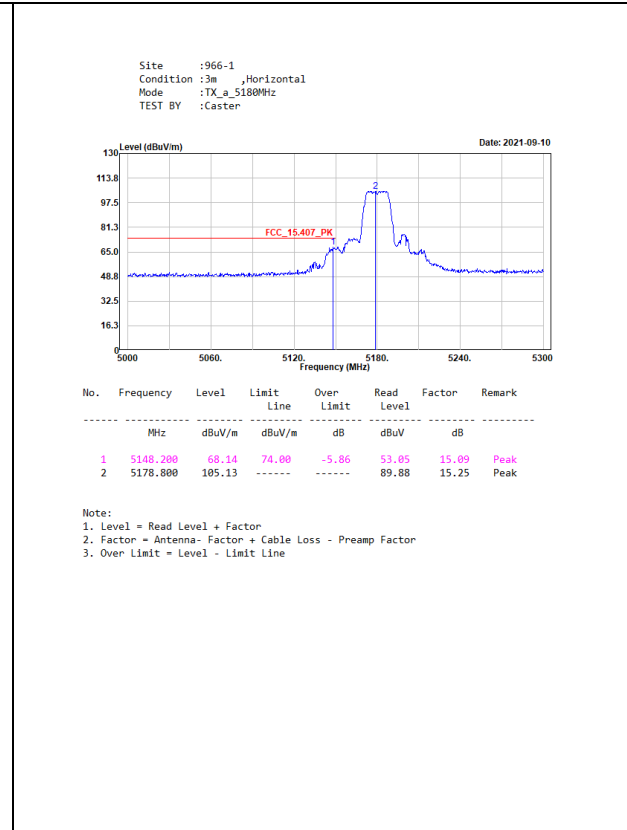
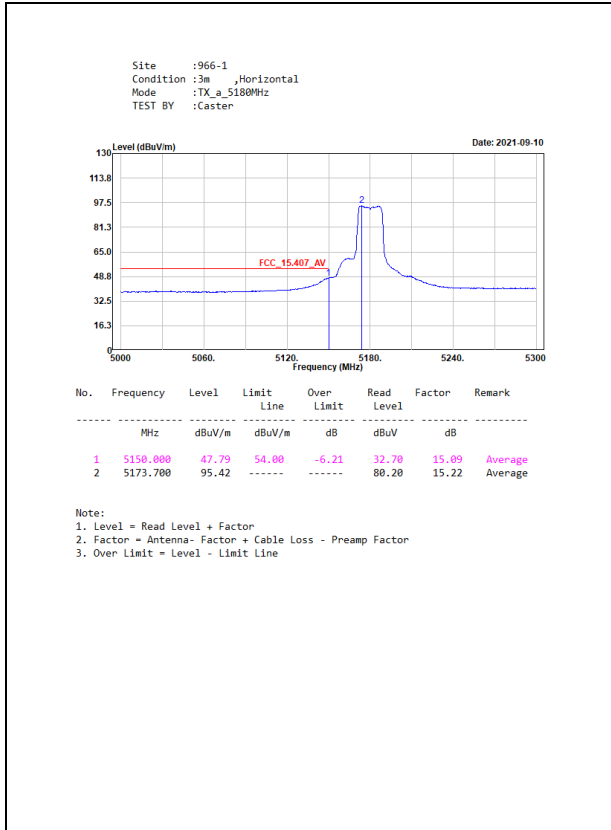
VBW \geq 1/T, when duty cycle < 98 %

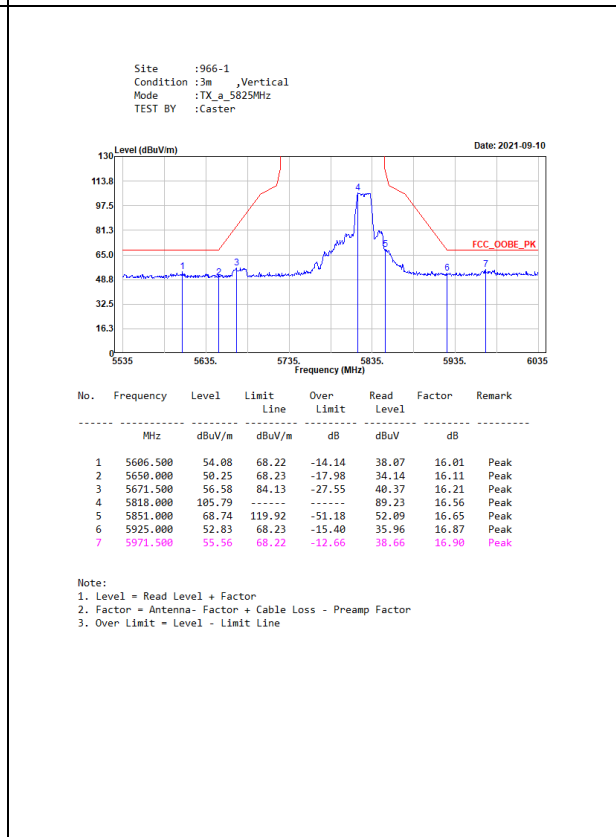
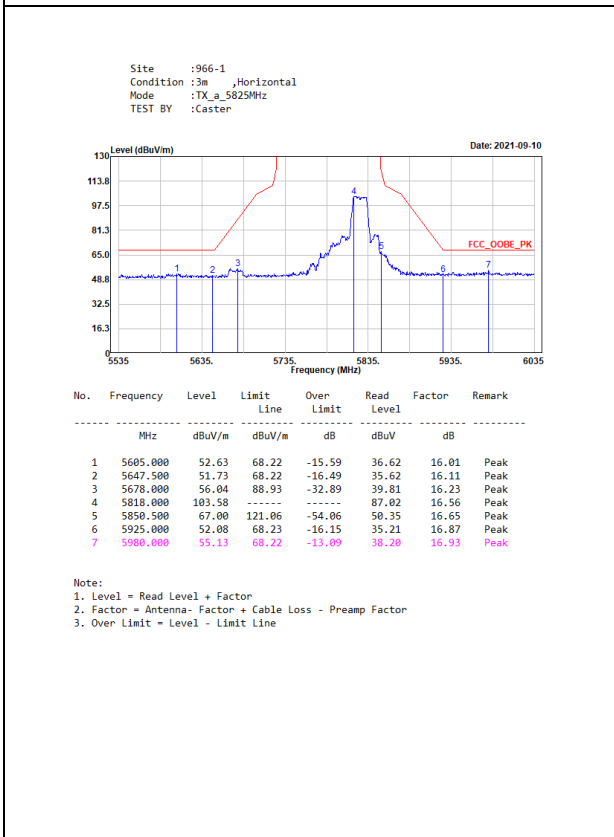
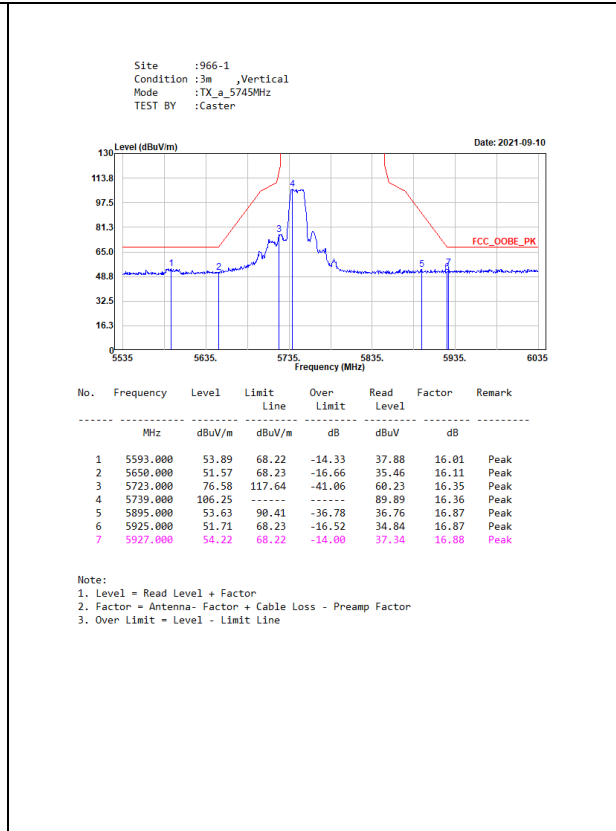
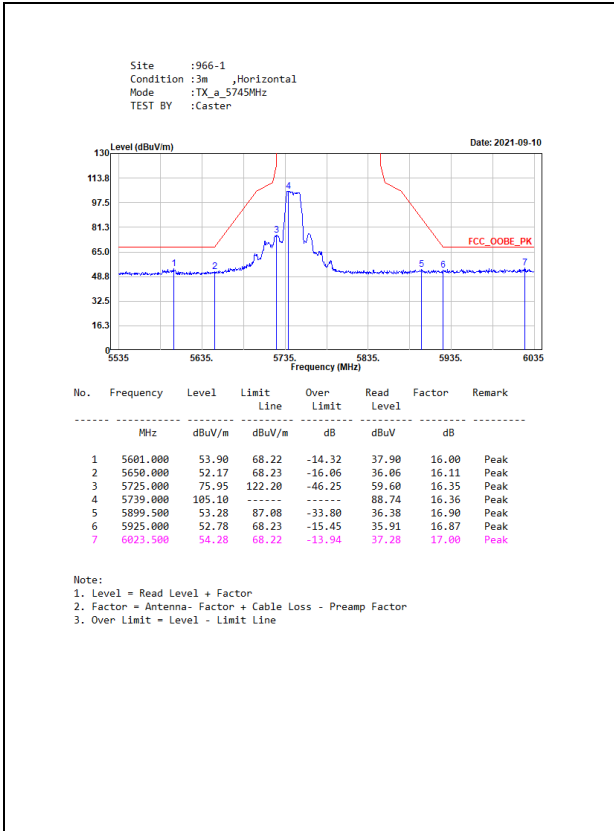
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

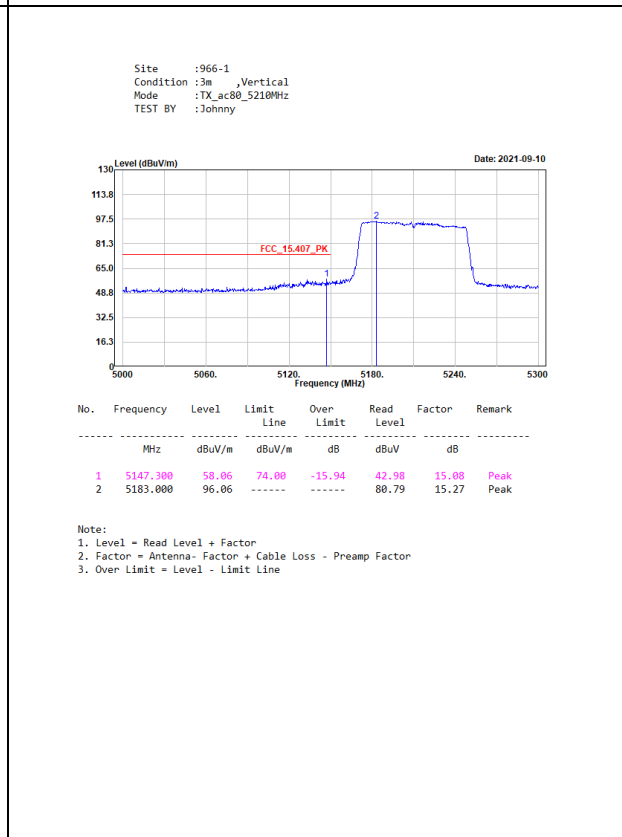
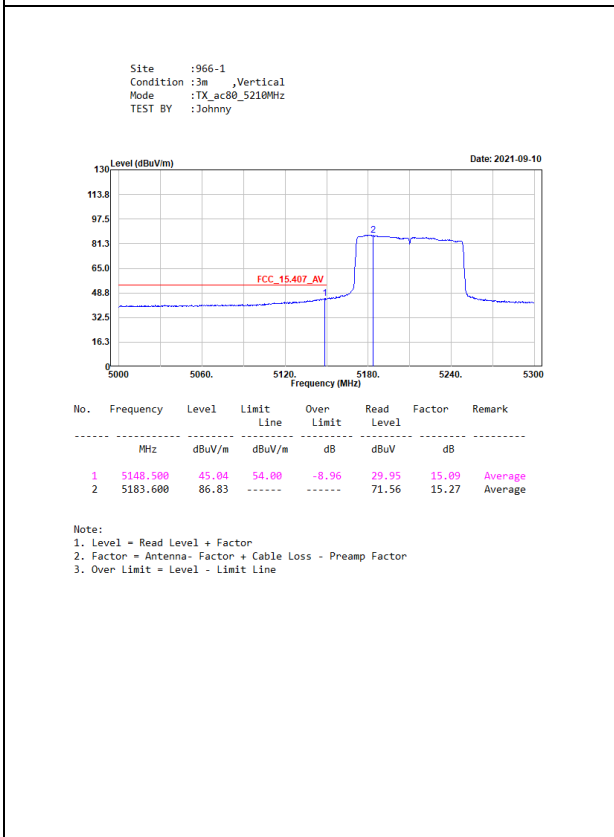
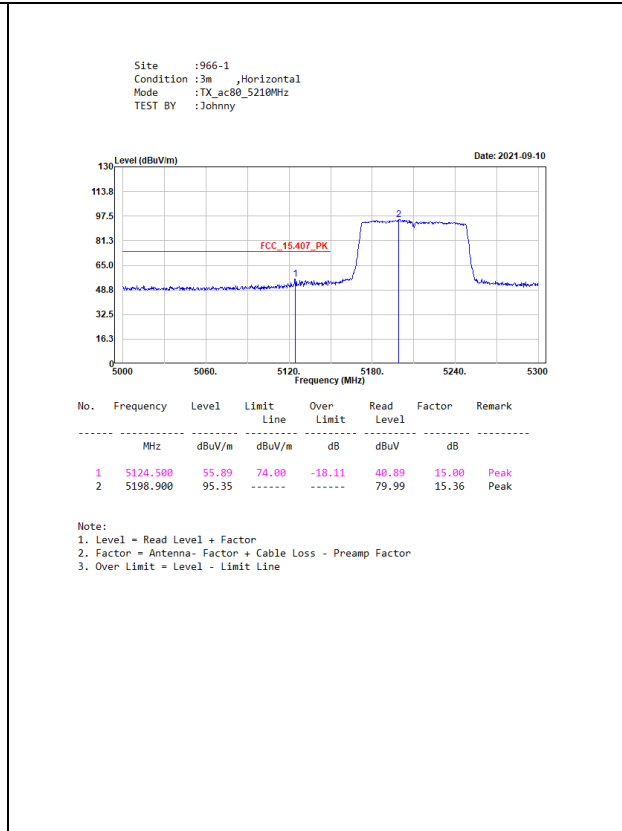
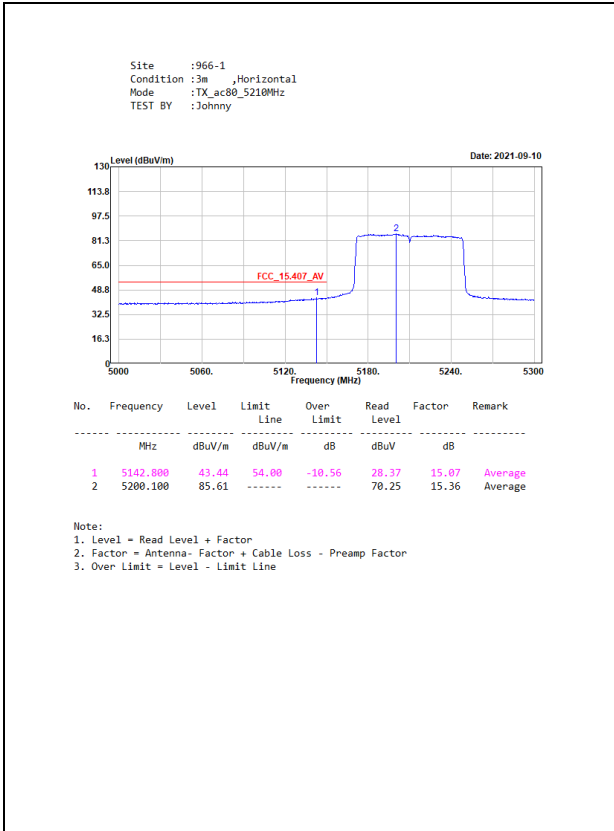
5GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11a	94.08	1.4300	699	1000
802.11n20	93.01	1.3300	752	1000
802.11n40	85.71	0.6600	1515	2000
802.11ac80	76.74	0.3300	3030	5000

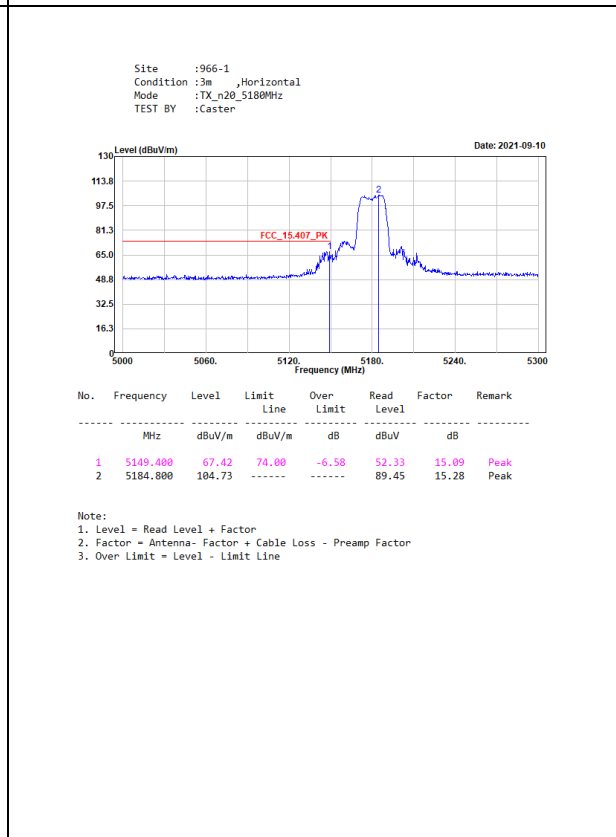
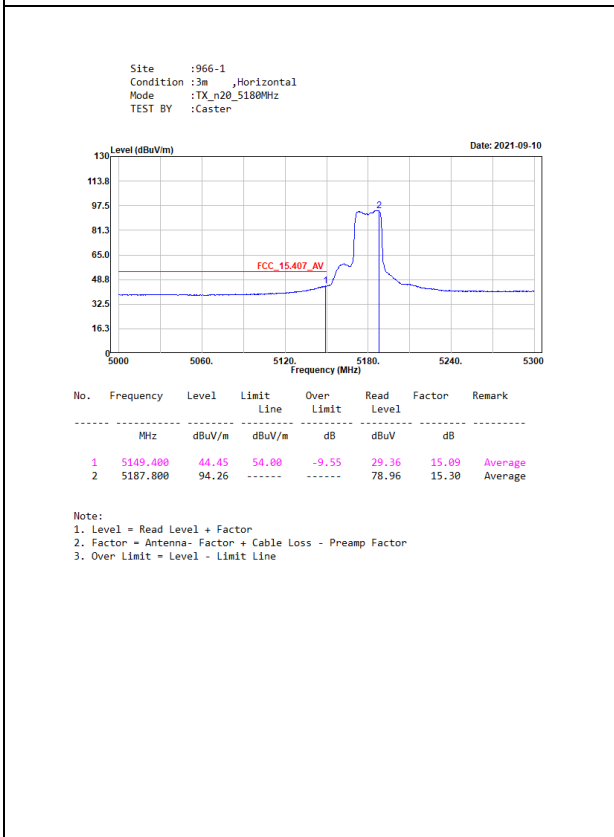
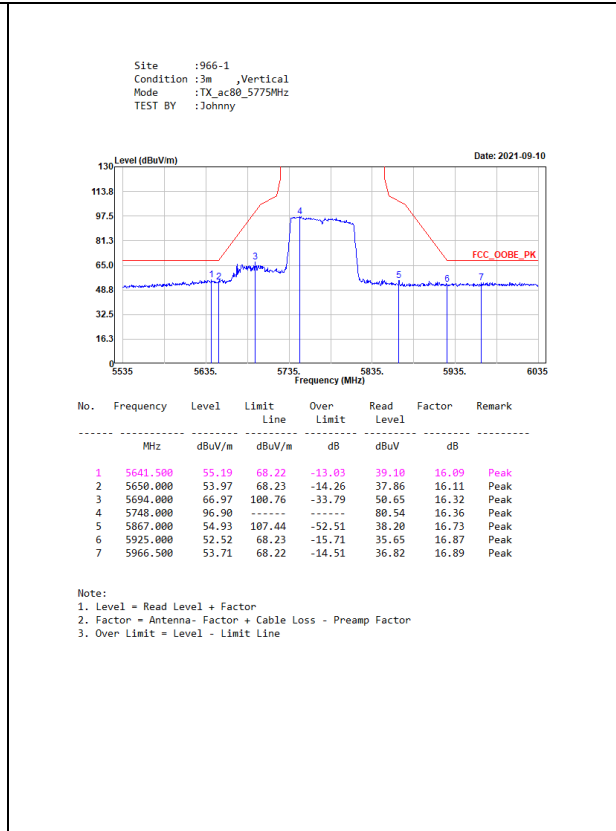
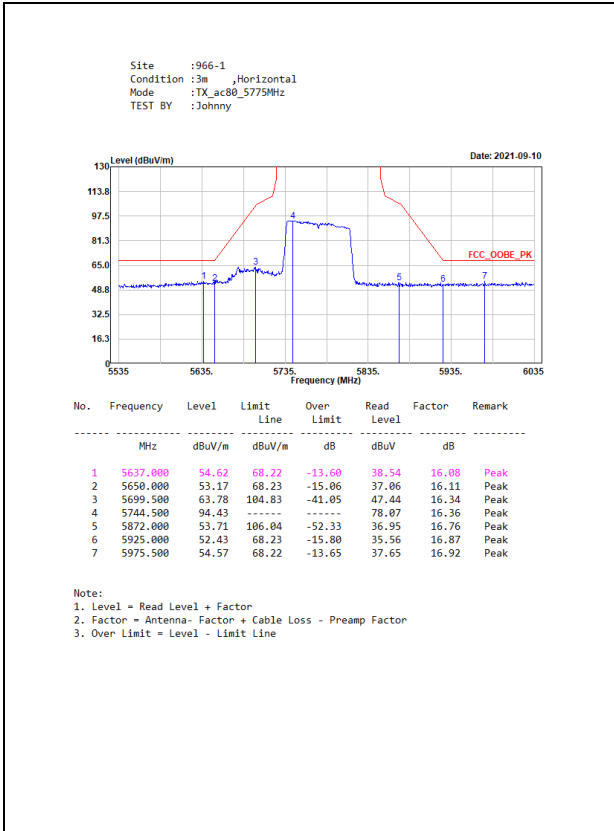
Note: Duty Cycle Refer to Section 5.

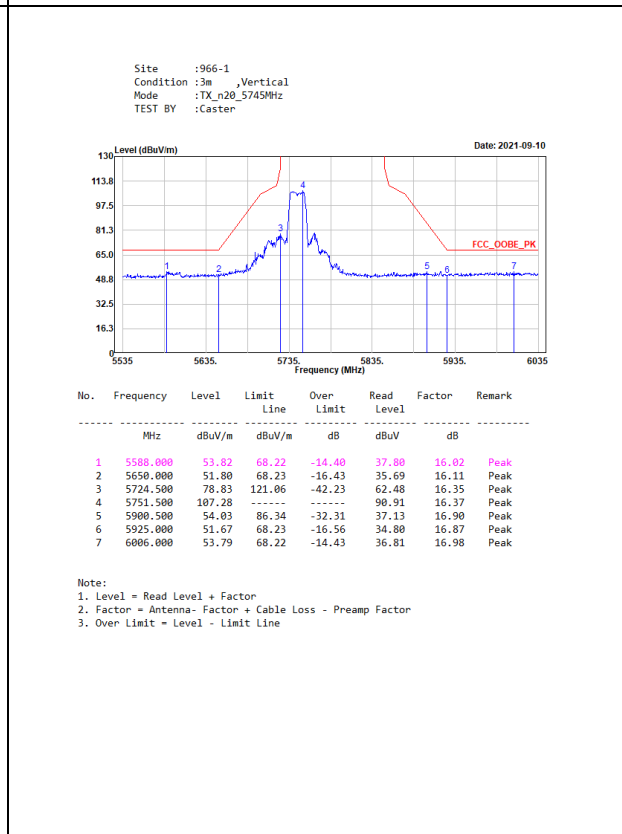
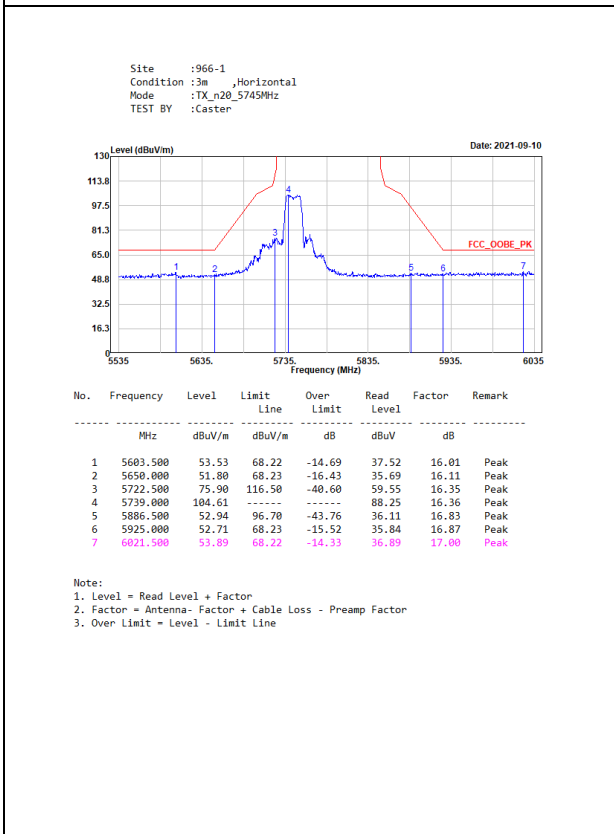
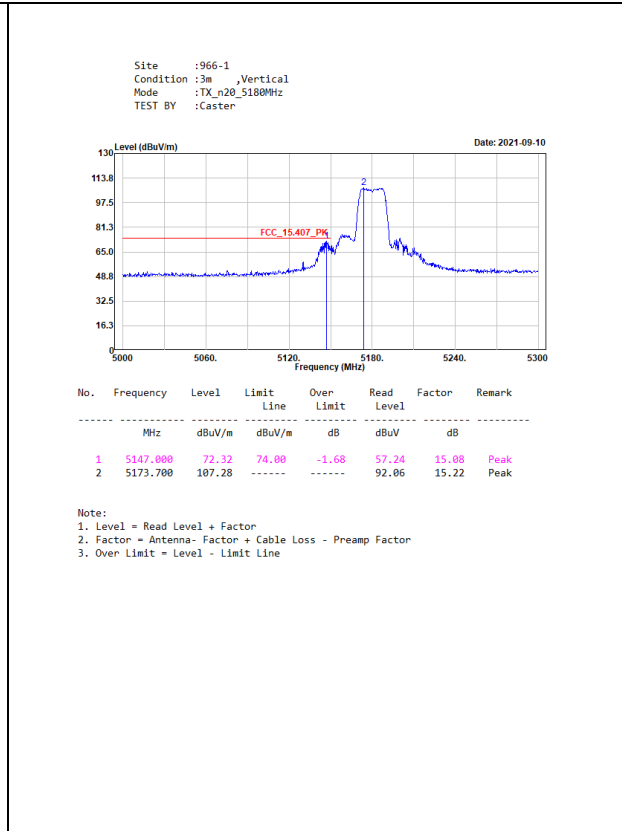
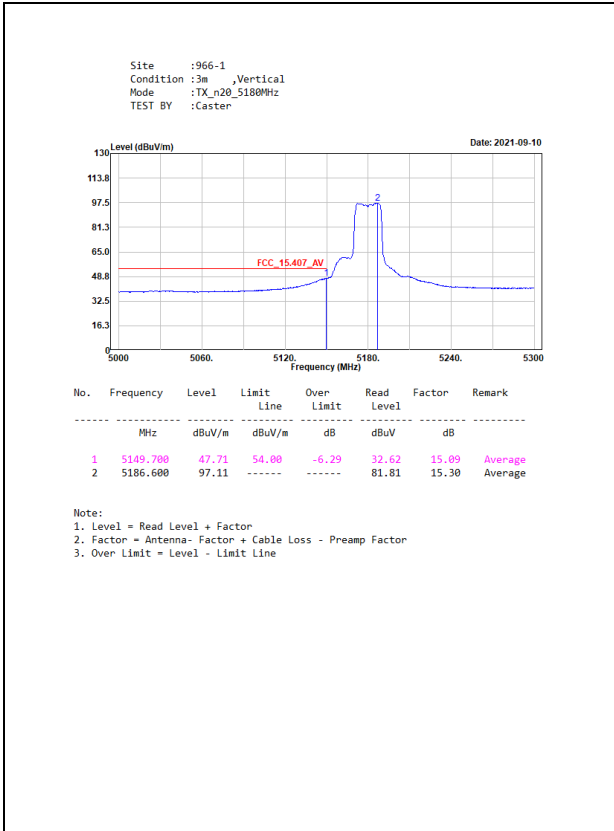
4.4. Test Result of Band Edge

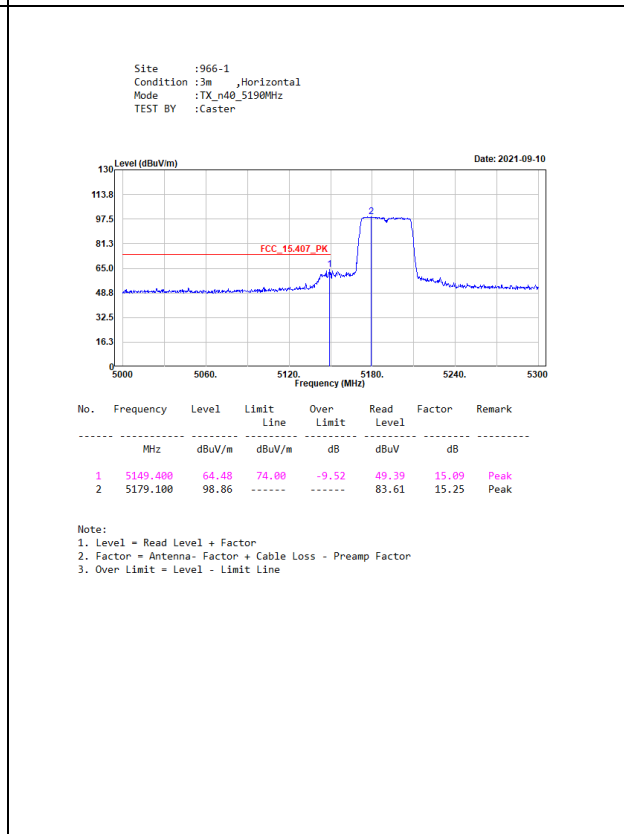
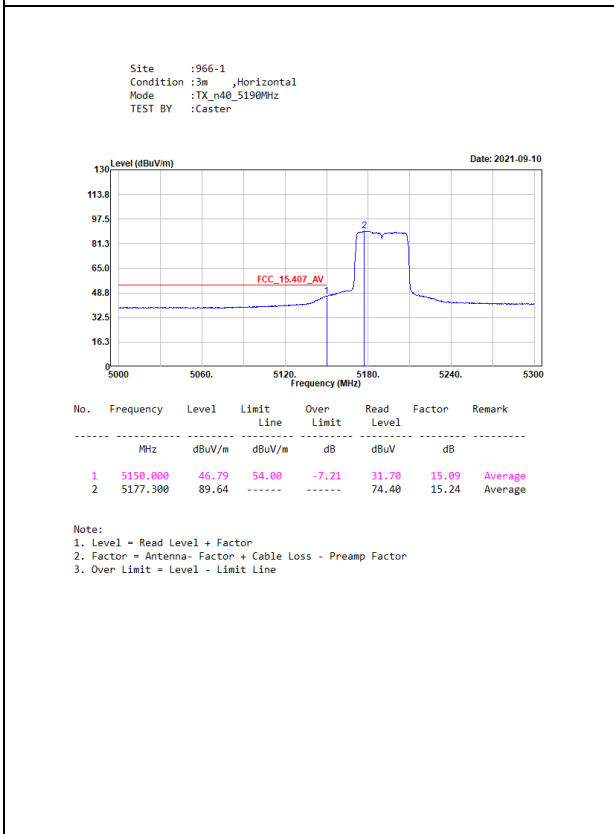
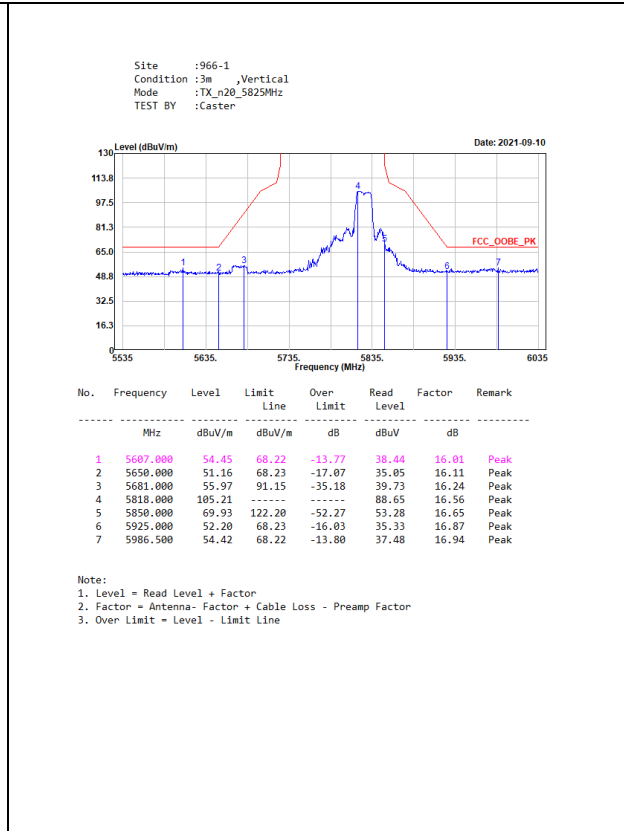
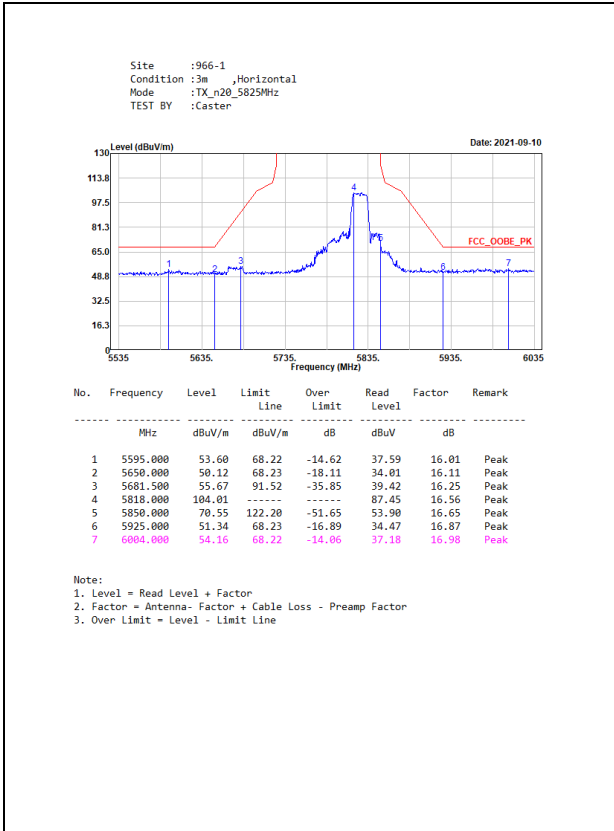


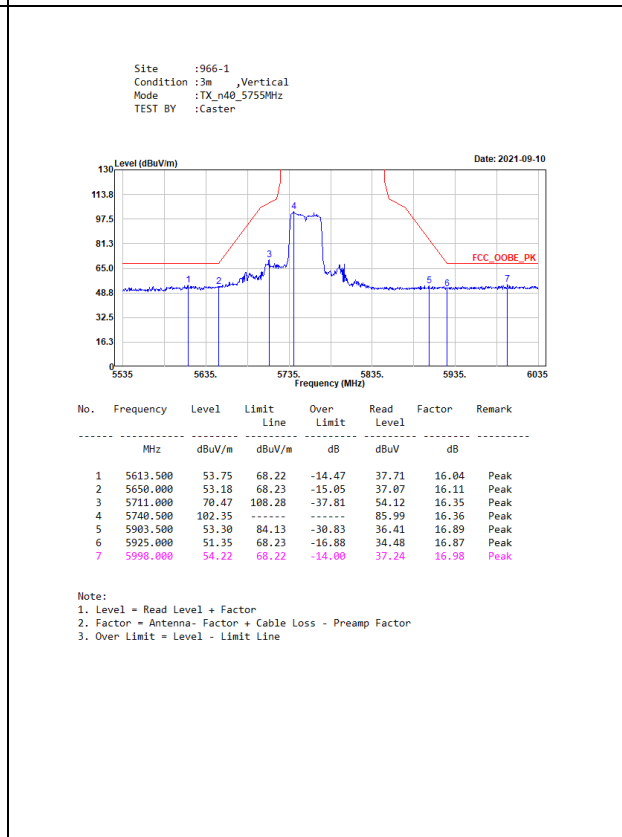
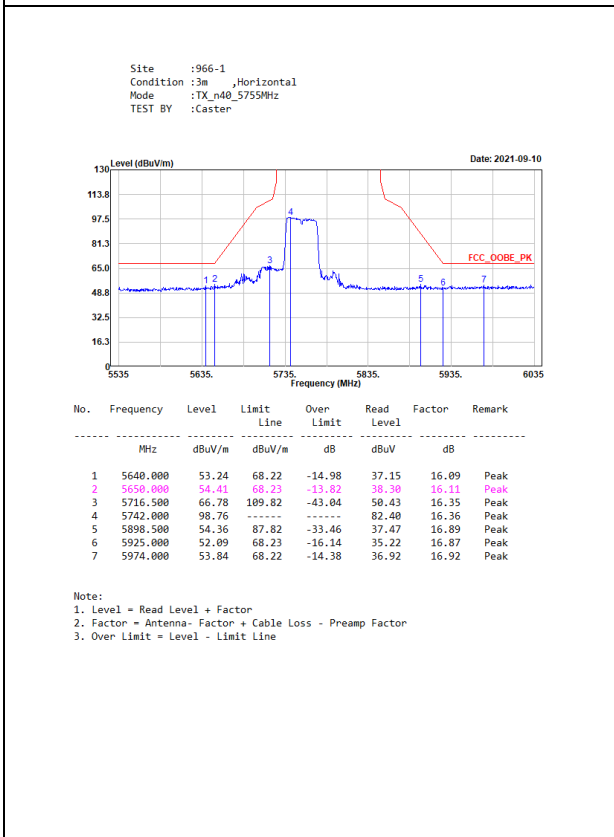
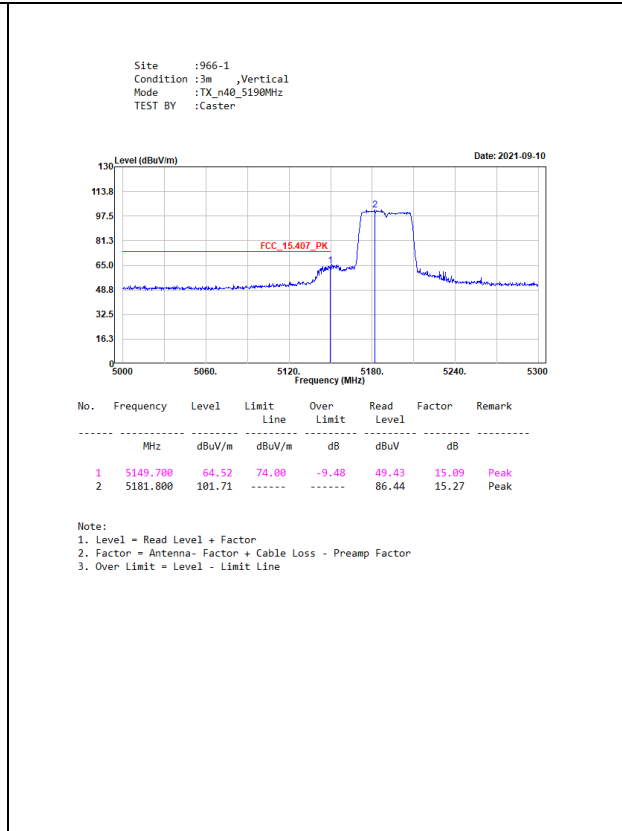
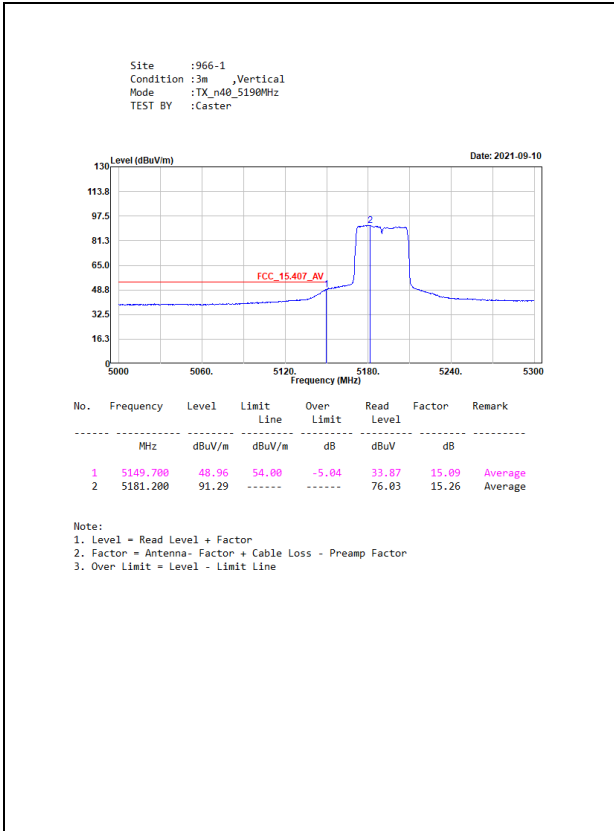


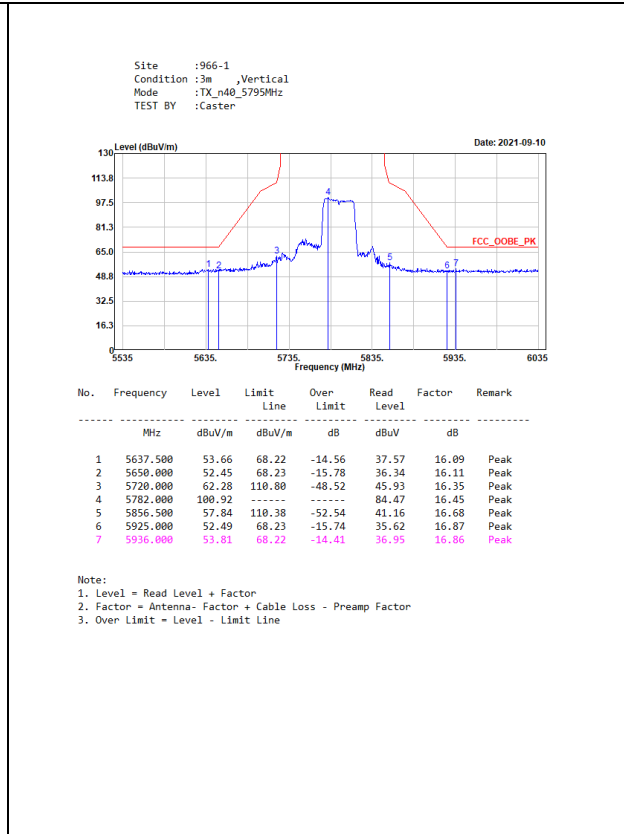
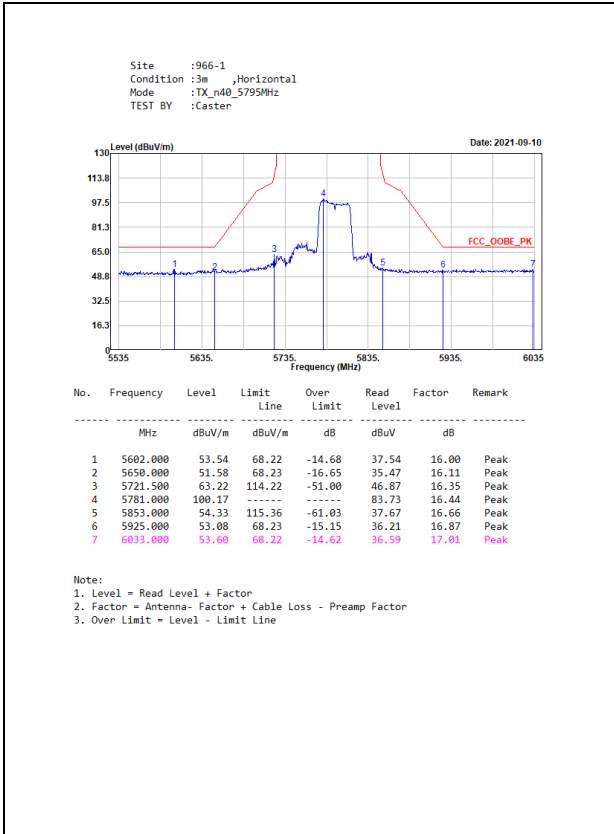






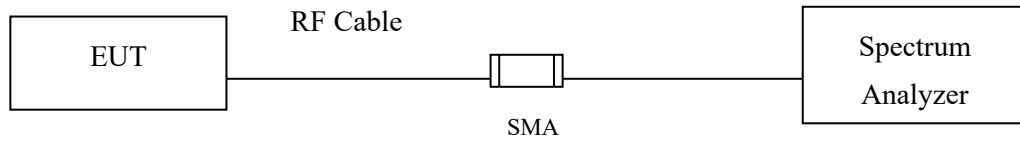






5. Duty Cycle

5.1. Test Setup



5.2. 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.

5.3. Test Result of Duty Cycle

Product : Car Audio
Test Item : Duty Cycle
Test Mode : Transmit

Duty Cycle Formula:

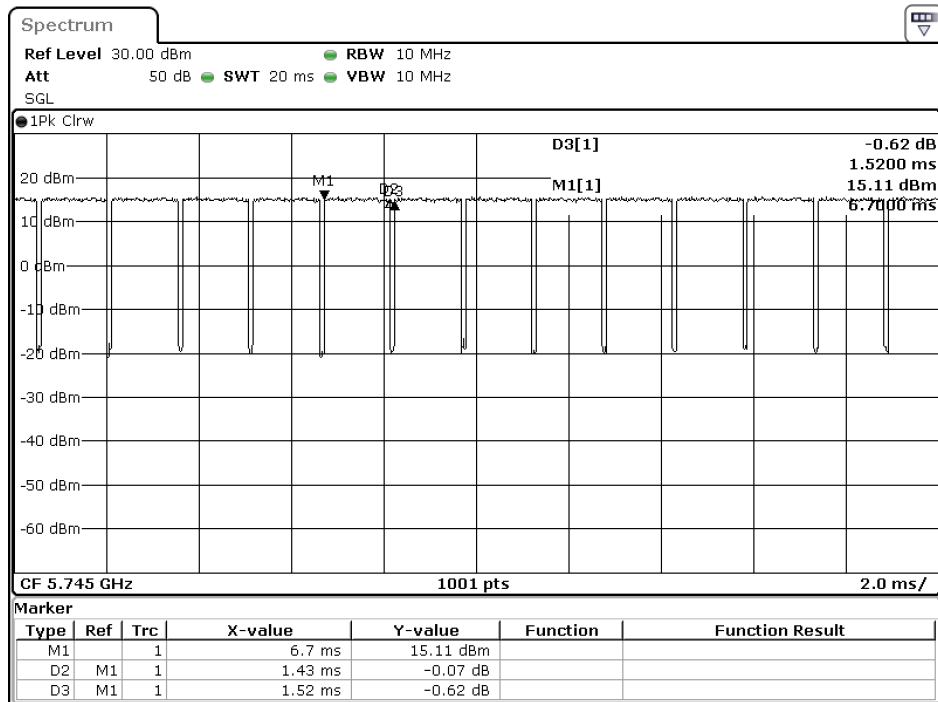
Duty Cycle = $Ton / (Ton + Toff)$

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

Results:

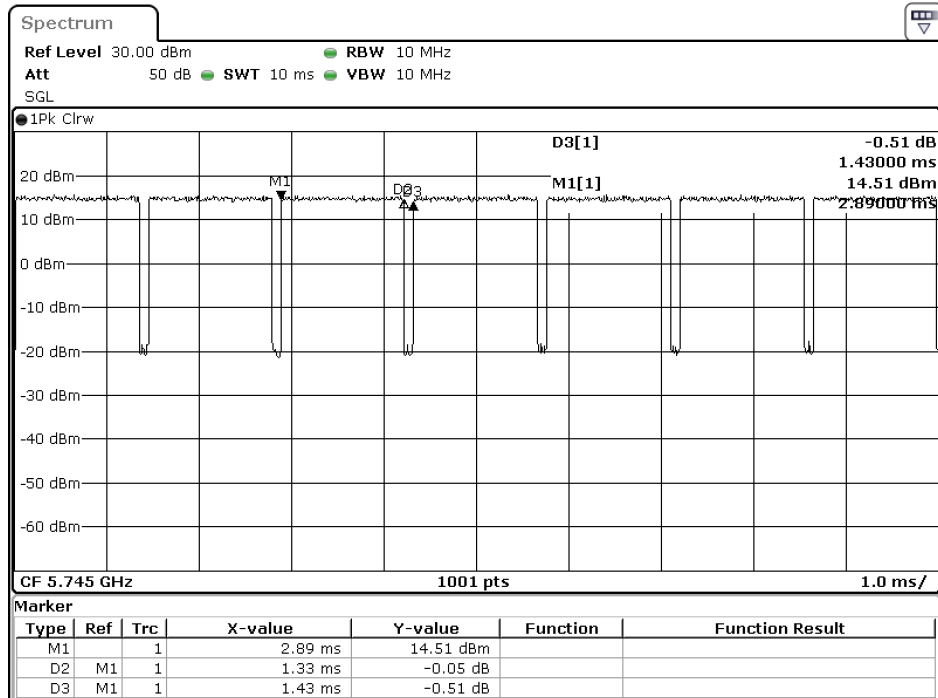
5GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11a	1.4300	1.5200	94.08	0.27
802.11n20	1.3300	1.4300	93.01	0.31
802.11n40	0.6600	0.7700	85.71	0.67
802.11ac80	0.3300	0.4300	76.74	1.15

802.11a



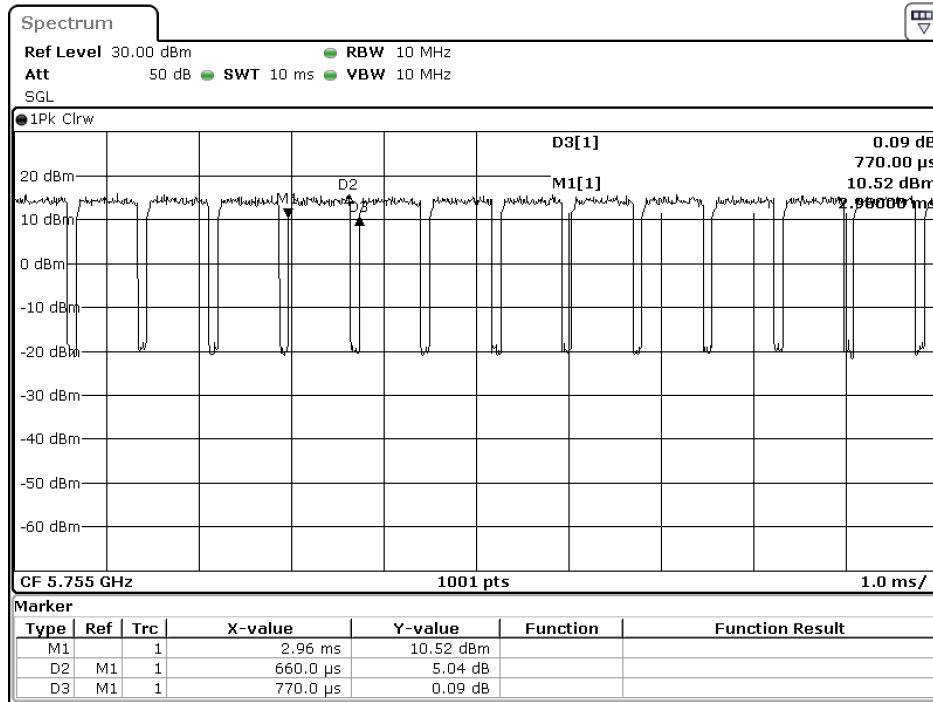
Date: 7.SEP.2021 11:58:54

802.11n20



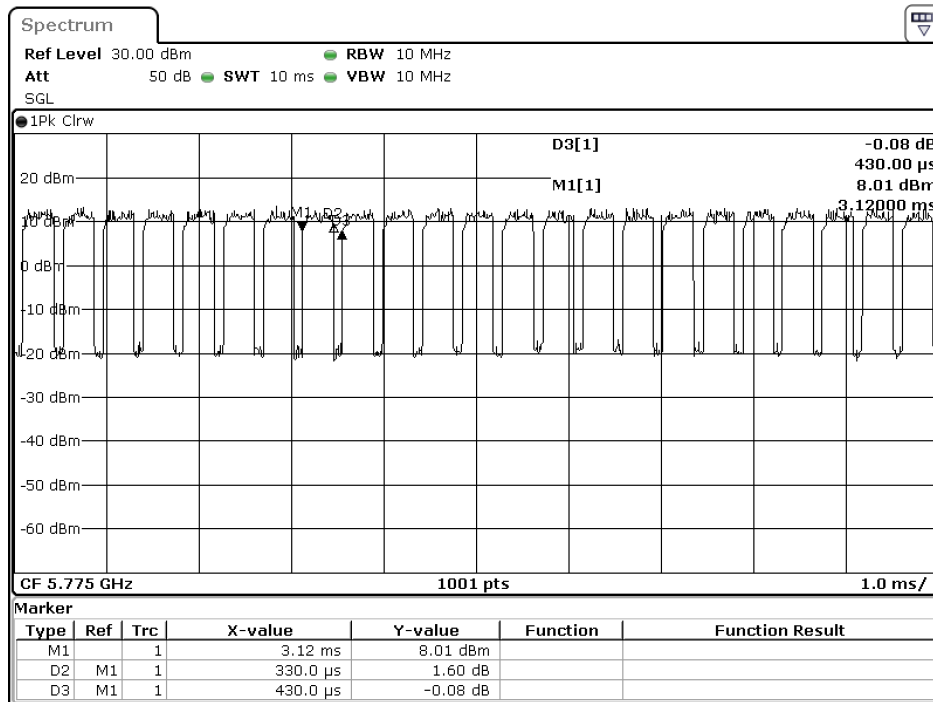
Date: 7.SEP.2021 11:50:02

802.11n40



Date: 7.SEP.2021 11:51:45

802.11ac80



Date: 7.SEP.2021 11:52:53

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.