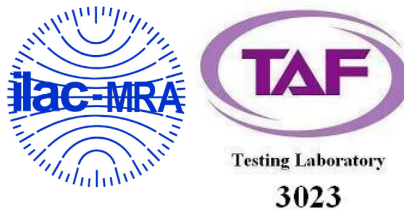


FCC Test Report

Product Name	Smart Dashcam
Model No	DC-100
FCC ID.	ZOQDC-100

Applicant	Verizon Connect
Address	5055 North Point Pkwy 14 Floor Room 1406, Alpharetta, Georgia, United States 30022

Date of Receipt	Mar. 26, 2021
Issue Date	Dec. 03, 2021
Report No.	2131050R-E3032110118
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.

This report must not be used to claim product endorsement by TAF or any agency of the government.

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

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

Test Report

Issue Date: Dec. 03, 2021

Report No.: 2131050R-E3032110118



Product Name	Smart Dashcam
Applicant	Verizon Connect
Address	5055 North Point Pkwy 14 Floor Room 1406, Alpharetta, Georgia, United States 30022
Manufacturer	Wistron NeWeb Corp.
Model No.	DC-100
FCC ID.	ZOQDC-100
EUT Rated Voltage	DC 12V/24V
EUT Test Voltage	DC 12V (by Battery)
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By : Genie Chang
(Senior Project Specialist / Genie Chang)

Tested By : Bill Lin
(Engineer / Bill Lin)

Approved By : Jack Hsu
(Senior Engineer / Jack Hsu)

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Revision History

Report No.	Version	Description	Issued Date
2131050R-E3032110118	V1.0	Initial issue of report.	2021-12-03

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Smart Dashcam
Model No.	DC-100
FCC ID.	ZOQDC-100
Frequency Range	2412-2462MHz for 802.11b/g/n-20BW, 2422-2452MHz for 802.11n-40BW
Number of Channels	802.11b/g/n-20MHz: 11, n-40MHz: 7
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 150Mbps
Channel separation	802.11b/g/n: 5 MHz
Type of Modulation	802.11b:DSSS (DBPSK, DQPSK, CCK) 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	PIFA Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
Power Adapter	MFR: verizon ; M/N: 573P-S-1 Input: 12V/24V, Max 1.5A Output: 9.0V, 1.3A 11.7W

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	WNC	DC-100	PIFA Antenna	2.18dBi for 2.4GHz

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

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

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

802.11n-40MHz Center Frequency of Each Channel:

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

Note:

1. The EUT is a Smart Dashcam with a built-in 2.4 GHz and 5 GHz WLAN and Bluetooth V4.2 transceiver, this report for 2.4GHz WLAN.
2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps 、 802.11g is 6Mbps 、 802.11n(20M-BW) is 7.2Mbps and 802.11n(40M-BW) is 15Mbps)
5. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.

Test Mode:	Mode 1: Transmit (802.11b 1Mbps)
	Mode 2: Transmit (802.11g 6Mbps)
	Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)
	Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)

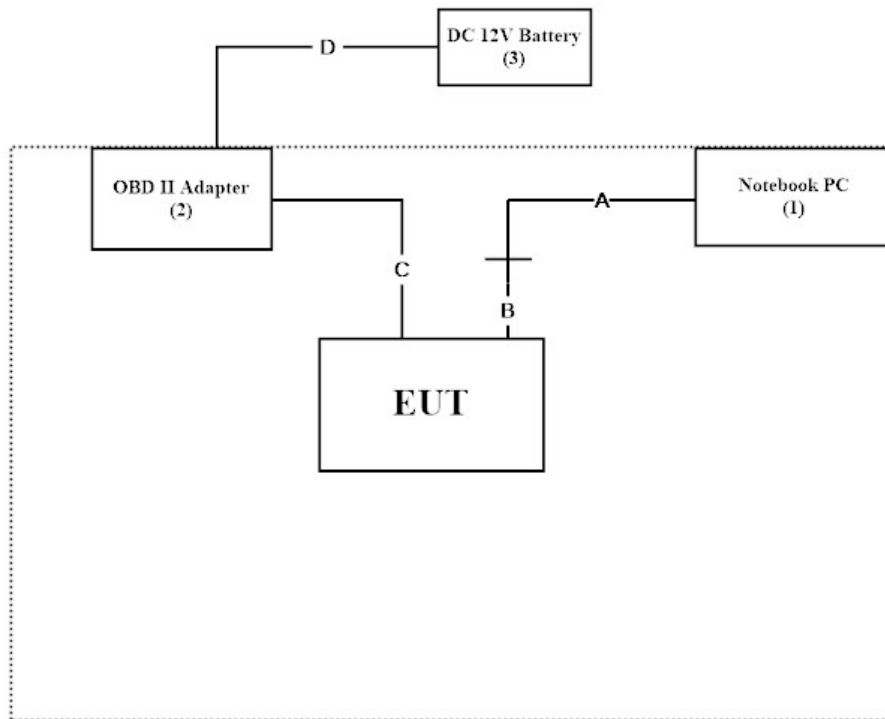
1.2. Tested System Details

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	B6TYTZ1	Non-shielded, 0.8m
2	OBD II Adapter	verizon	573P-S-1	N/A	N/A
3	DC 12V Battery	TRANE	12B50PE	N/A	N/A

Signal Cable Type	Signal cable Description
A	Signal cable Non-shielded, 0.1m
B	Ttl to usb cable Non-shielded, 1.1m
C	Power Cable Non-shielded, 4m
D	Power Cable Non-shielded, 1m

1.3. Configuration of Tested System



1.4. EUT Exercise Software

1. Setup the EUT as shown in Section 1.3.
2. Execute software “Putty Ver. Release 0.66” on the EUT.
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	22.6 °C
	Humidity (%RH)	10~90 %	54.9 %
Conductive	Temperature (°C)	10~40 °C	22 °C
	Humidity (%RH)	10~90 %	55 %

For Conduction and Conducted measurements

USA : FCC Registration Number: TW0023

Canada : IC Registration Number: 25880

Site Description : Accredited by TAF
Accredited Number: 3023

Test Laboratory : DEKRA Testing and Certification Co., Ltd
Address : No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan, R.O.C.

Phone number : 886-2-2602-7968
Fax number : 866-2-2602-3286
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

For Radiated measurements

USA : FCC Registration Number: TW1014

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.

Phone number : +886-3-275-7255
Fax number : +866-3-327-8031
Email address : info.tw@dekra.com
Website : <http://www.dekra.com.tw>

1.6. List of Test Item and Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
	EMI Test Receiver	R&S	ESR7	101601	2020.05.28	2021.05.27
	Two-Line V-Network	R&S	ENV216	101306	2020.03.25	2021.03.24
	Two-Line V-Network	R&S	ENV216	101307	2020.04.17	2021.04.16
	Coaxial Cable	DEKRA	RG400_BNC	RF001	2020.05.24	2021.05.23

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 Testing System V2.0.

For Conducted measurements /ASR2

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103465	2021.03.16	2022.03.15
X	Peak Power Analyzer	KEYSIGHT	8900B	MY51000539	2020.05.13	2021.05.12
X	Power Sensor	KEYSIGHT	N1923A	MY59240002	2020.05.22	2021.05.21
X	Power Sensor	KEYSIGHT	N1923A	MY59240003	2020.05.22	2021.05.21

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.	Cali. Data	Due. Data
X	Loop Antenna	AMETEK	HLA6121	56736	2021.04.14	2022.04.13
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-678	2021.01.29	2022.01.28
X	Horn Antenna	ETS-Lindgren	3117	00203761	2020.11.23	2021.11.22
	Horn Antenna	Com-Power	AH-840	101087	2021.06.18	2022.06.17
X	Pre-Amplifier	EMCI	EMC001330	980254	2021.01.20	2022.01.19
X	Pre-Amplifier	EMCI	EMC051835SE	980312	2021.02.24	2022.02.23
X	Pre-Amplifier	EMCI	EMC05820SE	980362	2021.08.24	2022.08.23
	Pre-Amplifier	EMCI	EMC184045SE	980369	2021.04.27	2022.04.26
X	Filter	MICRO TRONICS	BRM50702	G251	2021.09.16	2022.09.15
	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
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2020.06.10	2021.06.09

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.

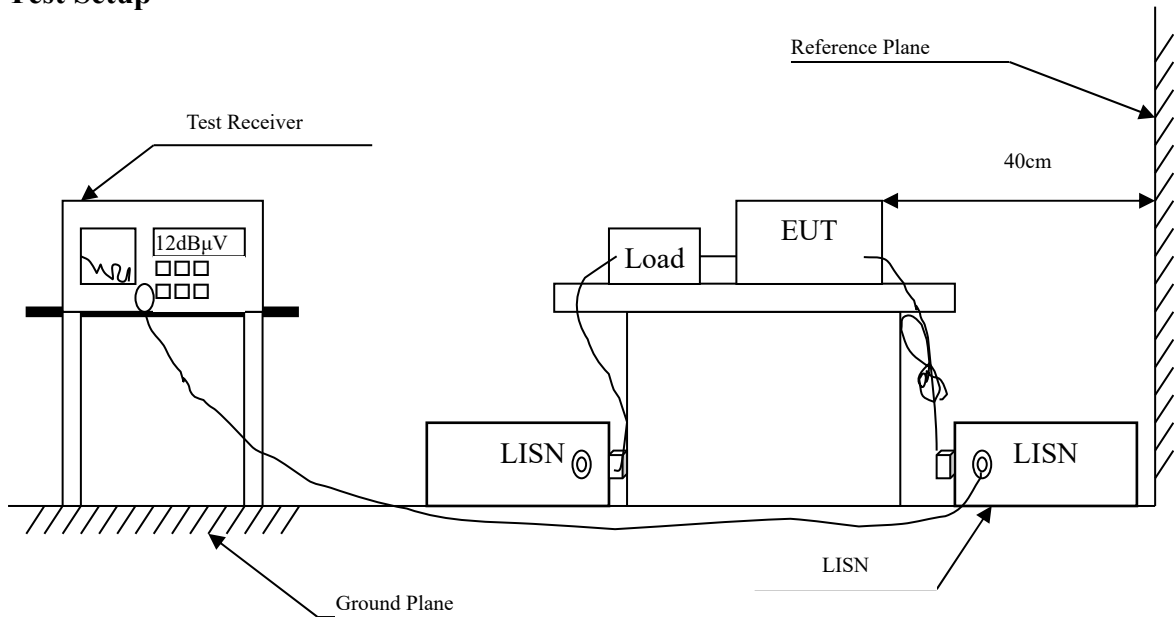
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

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	
Conducted Emission	±3.42dB	
Peak Power Output	±0.91 dB	
Radiated Emission	Under 1GHz ±4.06 dB	Above 1GHz ±3.73 dB
RF antenna conducted test	±2.53 dB	
Band Edge	Under 1GHz ±4.06 dB	Above 1GHz ±3.73 dB
6dB Bandwidth	±682.83 Hz	
Power Density	±2.53 dB	
Duty Cycle (2.4GHz)	±2.31 ms	

2. Conducted Emission

2.1. Test Setup



2.2. Limits

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

2.3. Test Procedure

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

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

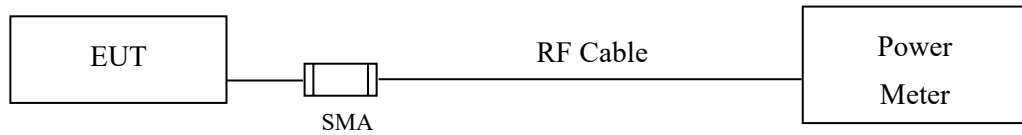
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.4. Test Result of Conducted Emission

Owing to the EUT use DC supply voltage, this test item is not performed.

3. Peak Power Output

3.1. Test Setup



3.2. Limits

The maximum peak power shall be less 1 Watt.

3.3. Test Procedure

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

3.4. Test Result of Peak Power Output

Product : Smart Dashcam
 Test Item : Peak Power Output Data
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)
 Test Date : 2021/04/02

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)				Peak Power	Required Limit	Result
		1	2	5.5	11			
		Measurement Level (dBm)						
01	2412	13.67	--	--	--	16.64	<30dBm	Pass
06	2437	13.65	13.58	13.54	13.5	16.63	<30dBm	Pass
11	2462	13.66	--	--	--	16.63	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : Smart Dashcam
 Test Item : Peak Power Output Data
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)
 Test Date : 2021/04/02

Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		6	9	12	18	24	36	48	54	6		
		Measurement Level (dBm)										
01	2412	13.93	--	--	--	--	--	--	--	22.28	<30dBm	Pass
06	2437	13.89	13.84	13.77	13.74	13.67	13.6	13.54	13.5	22.92	<30dBm	Pass
11	2462	13.95	--	--	--	--	--	--	--	22.27	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : Smart Dashcam
 Test Item : Peak Power Output Data
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)
 Test Date : 2021/04/02

Channel No	Frequency (MHz)	Average Power								Peak Power	Required Limit	Result
		For different Data Rate (Mbps)										
		7.2	14.4	21.7	28.9	43.3	57.8	65	72.2	7.2		
Measurement Level (dBm)												
01	2412	13.65	--	--	--	--	--	--	--	22.39	<30dBm	Pass
06	2437	13.97	13.9	13.86	13.83	13.8	13.74	13.69	13.65	22.55	<30dBm	Pass
11	2462	13.99	--	--	--	--	--	--	--	22.64	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

Product : Smart Dashcam
 Test Item : Peak Power Output Data
 Test Mode : Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)
 Test Date : 2021/04/02

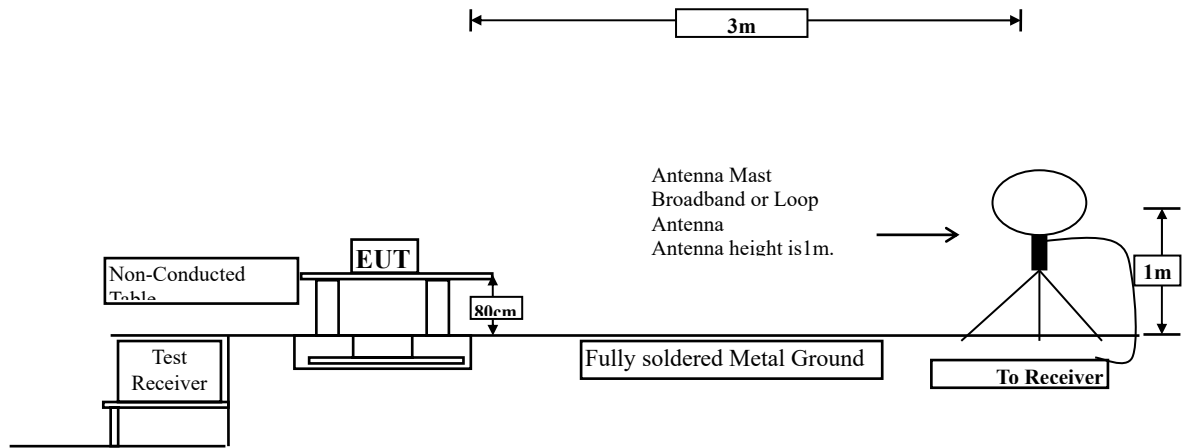
Channel No	Frequency (MHz)	Average Power For different Data Rate (Mbps)								Peak Power	Required Limit	Result
		15	30	45	60	90	120	135	150			
		Measurement Level (dBm)										
03	2422	13.61	--	--	--	--	--	--	--	22.12	<30dBm	Pass
06	2437	13.99	13.94	13.88	13.85	13.79	13.73	13.67	13.64	22.4	<30dBm	Pass
09	2452	13.45	--	--	--	--	--	--	--	21.68	<30dBm	Pass

Note: Peak Power Output Value = Reading value on power meter + cable loss

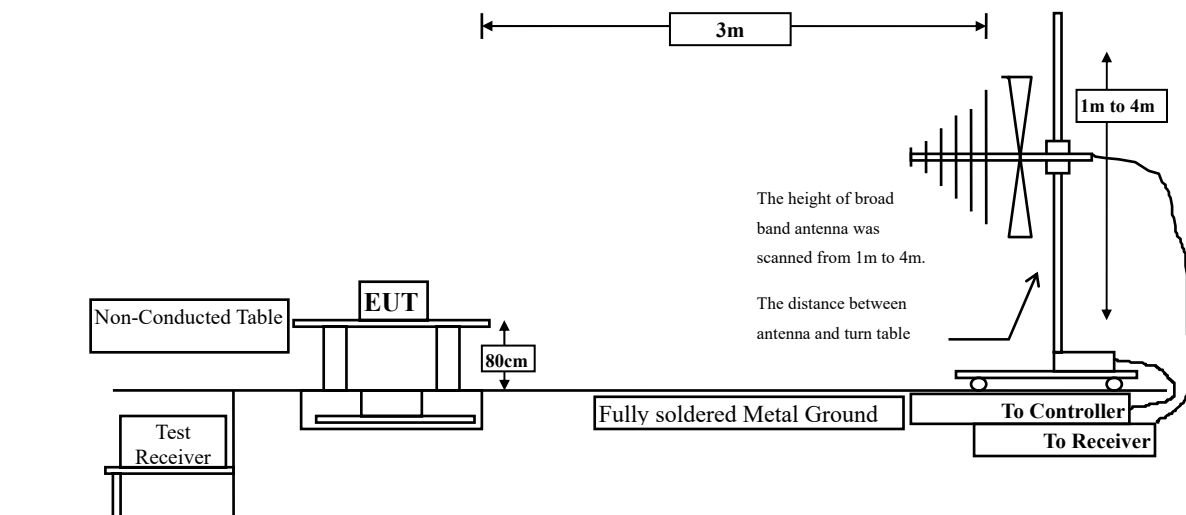
4. Radiated Emission

4.1. Test Setup

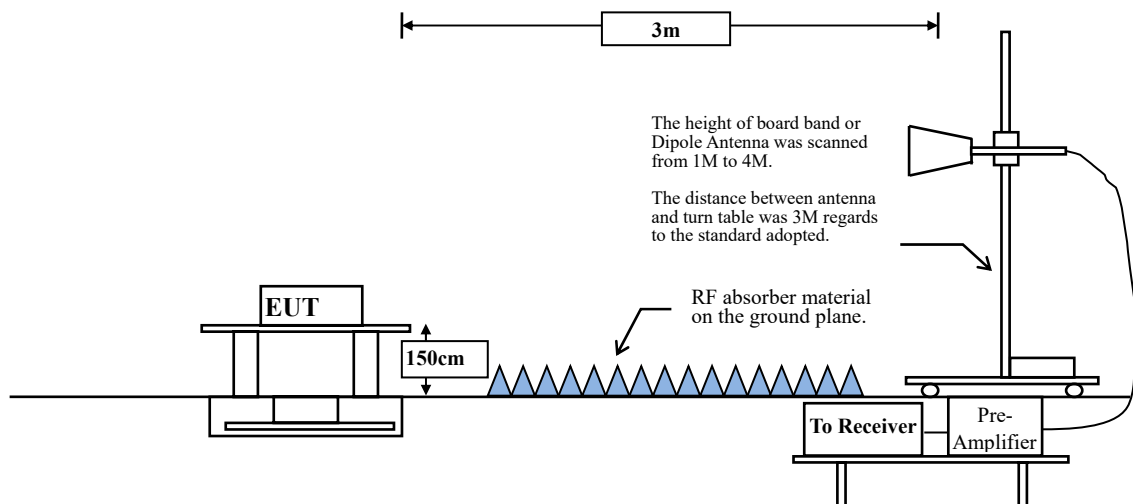
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.2. Limits

➤ General Radiated Emission Limits

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

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

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

4.3. Test Procedure

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

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

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

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

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

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

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

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

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

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 —RBW as a function of frequency

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

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1MHz.

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

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

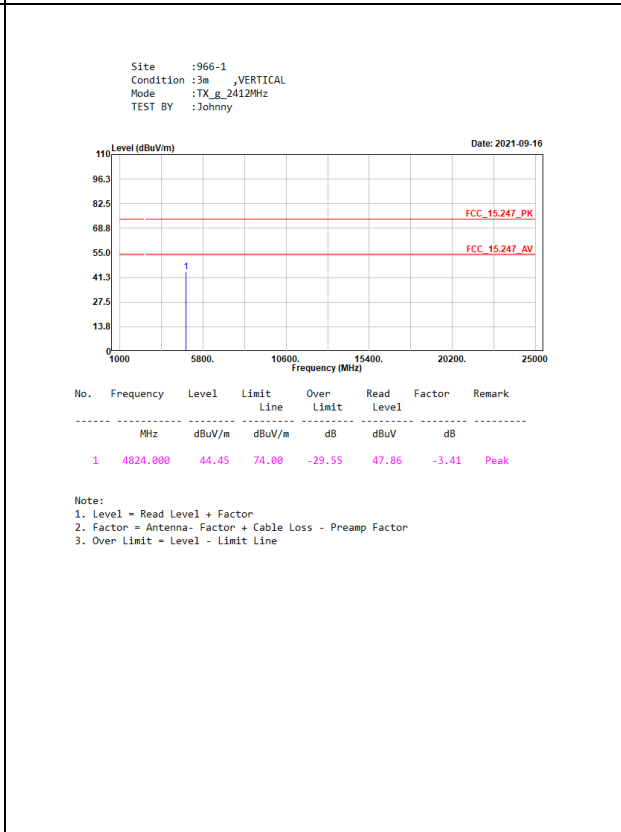
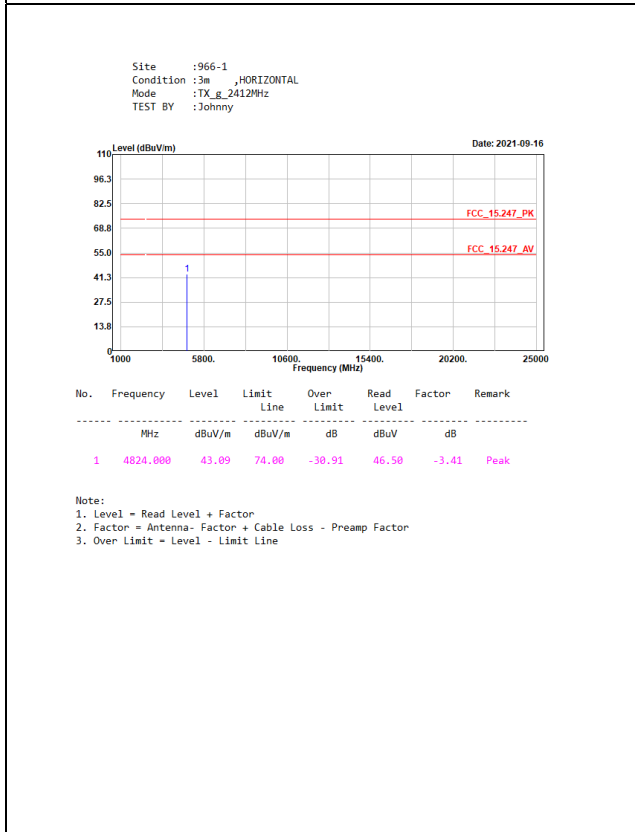
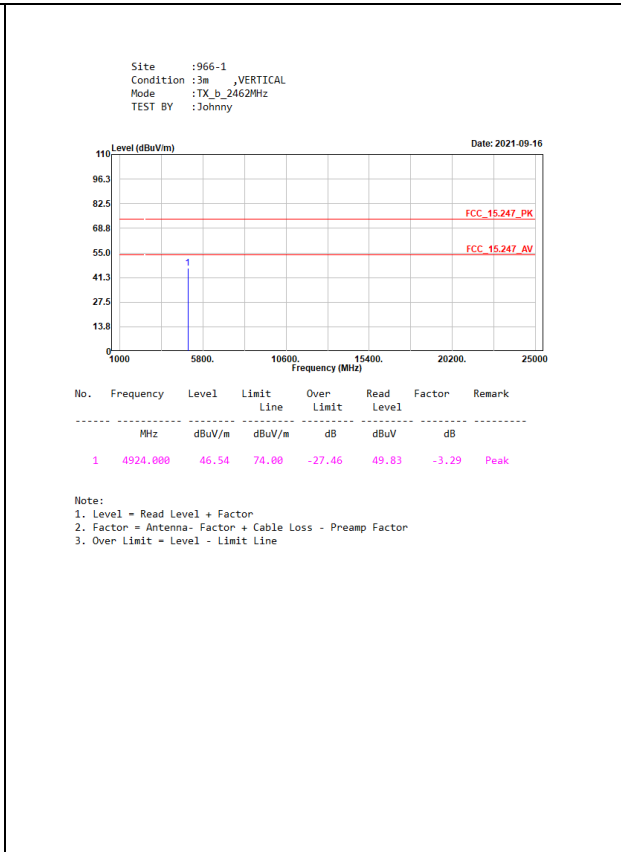
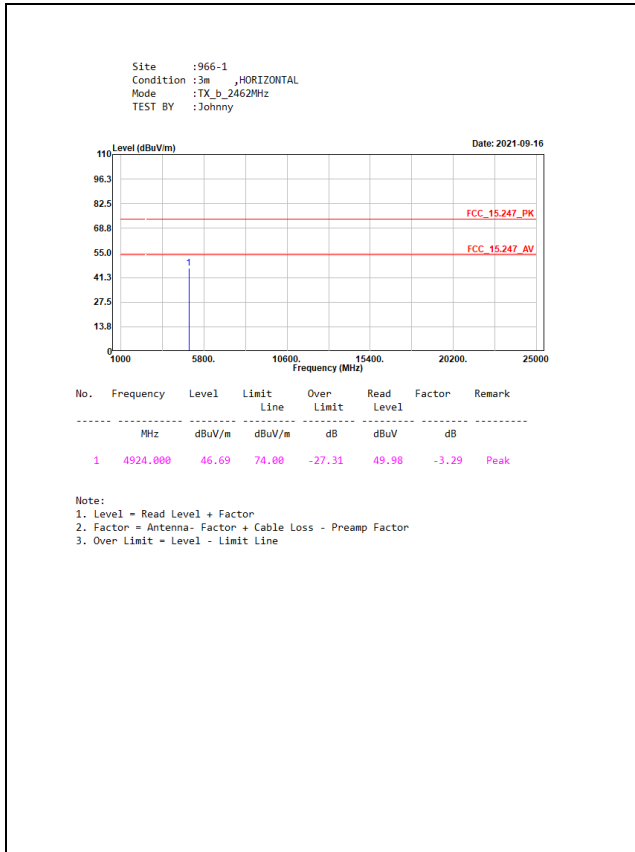
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

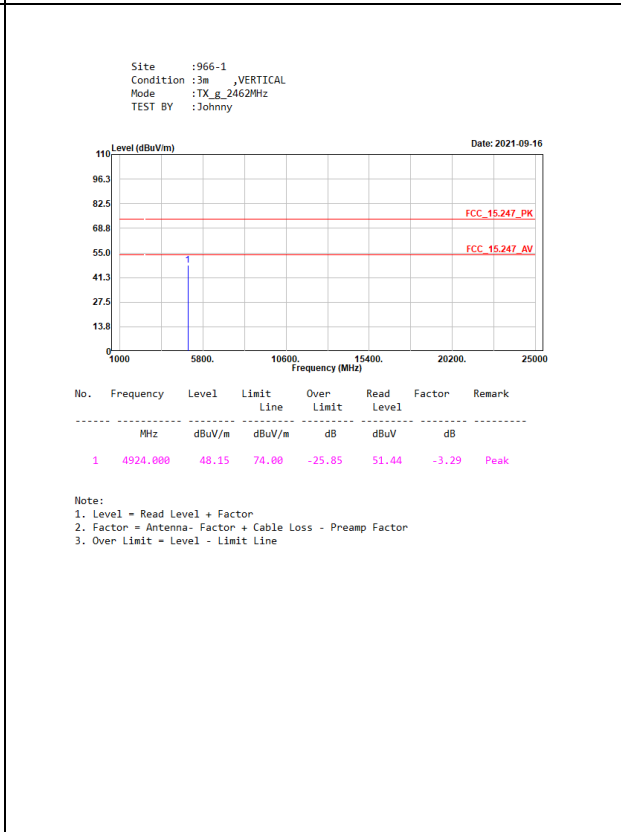
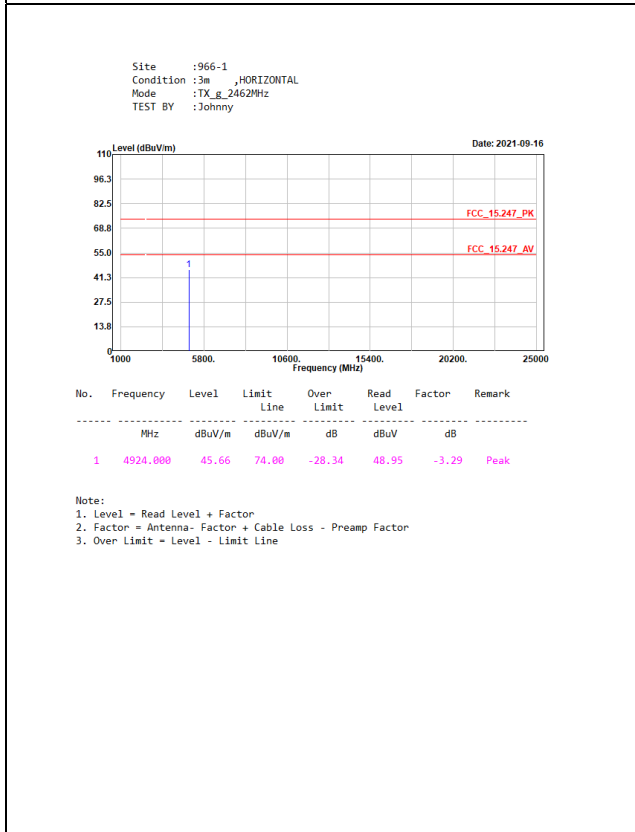
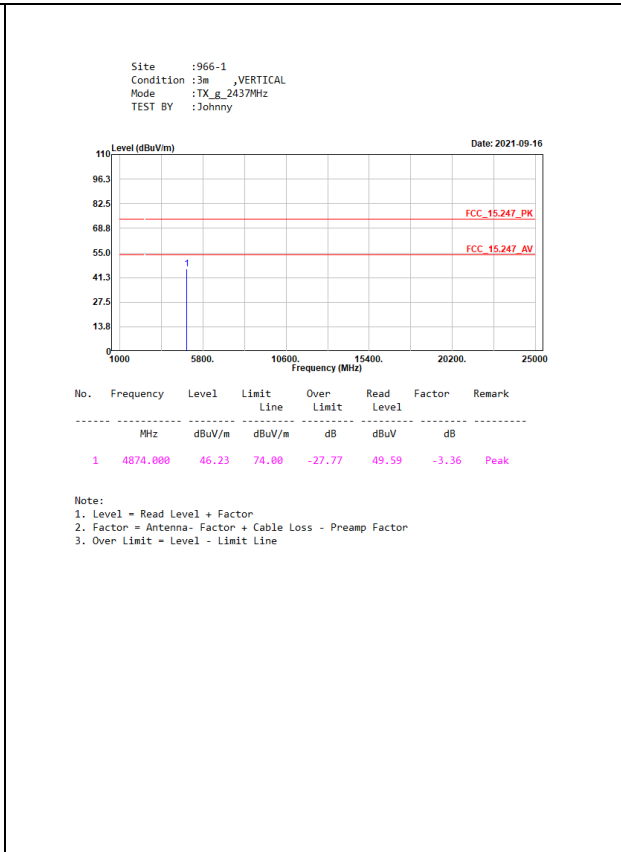
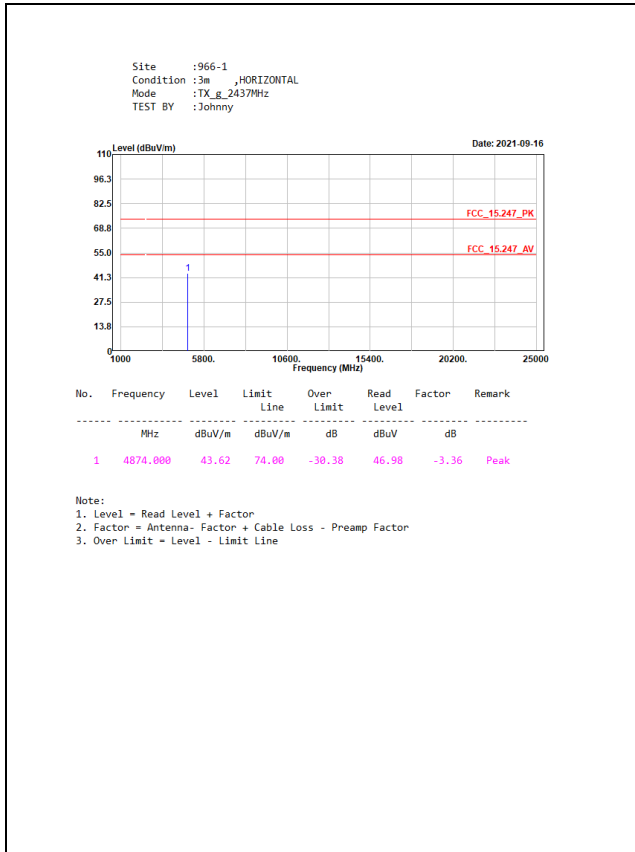
2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11b	70.80	2.4549	407	500
802.11g	98.62	--	--	10
802.11n20	98.17	--	--	10
802.11n40	97.09	0.6674	1498	2000

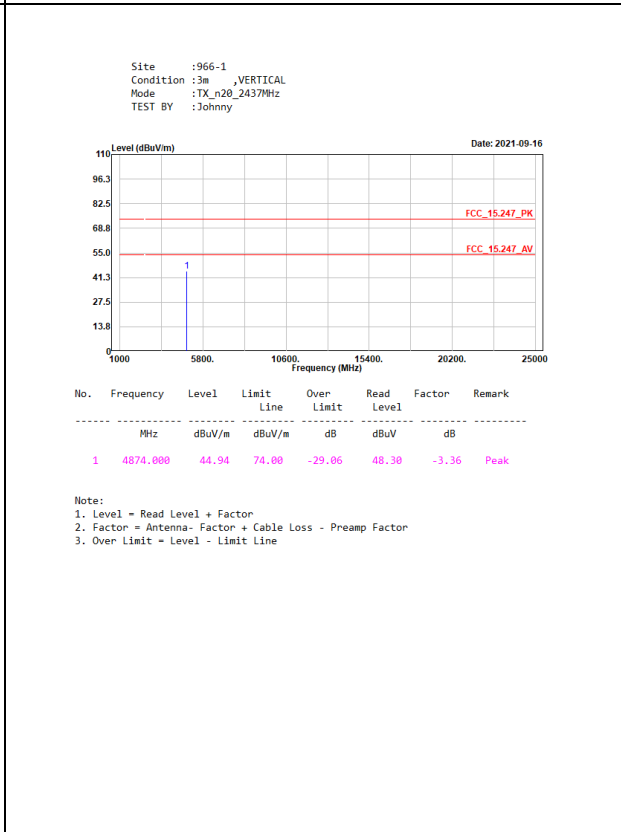
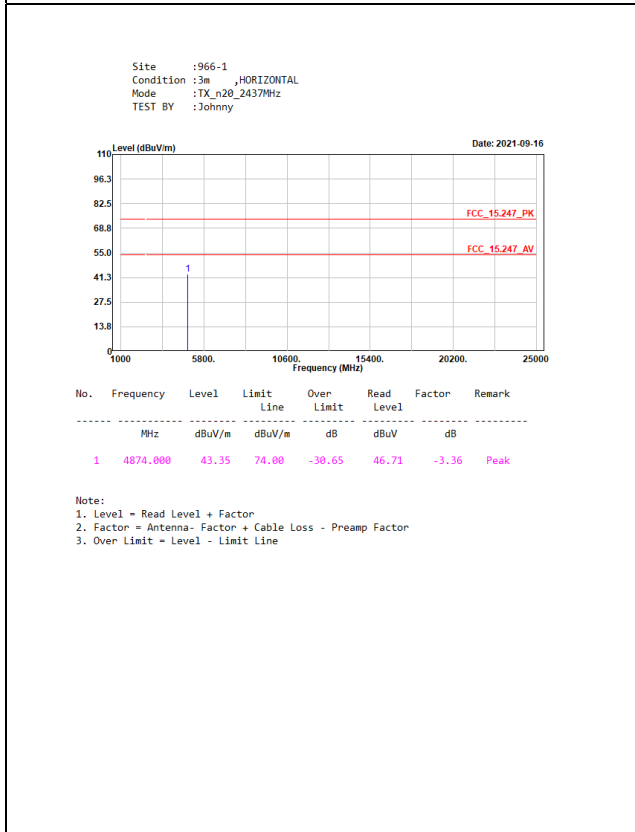
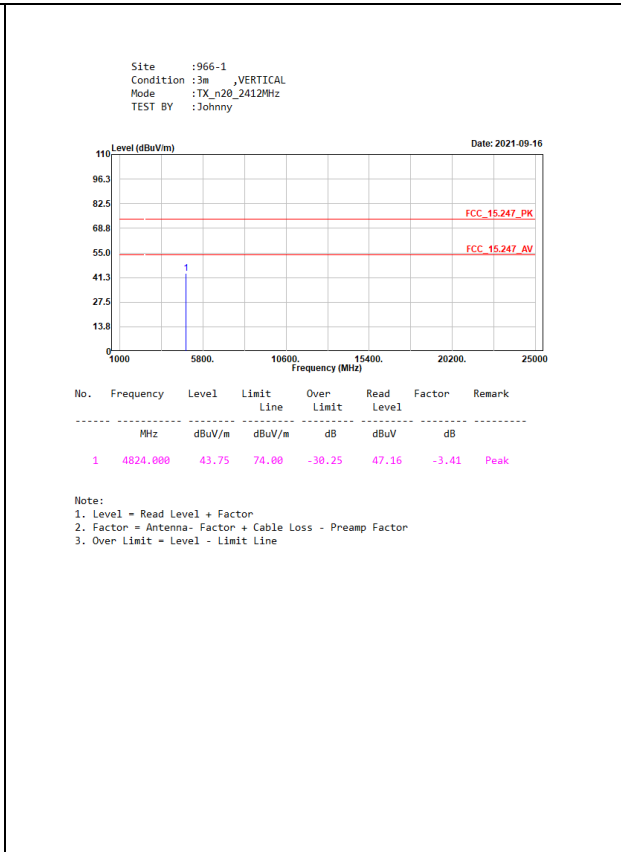
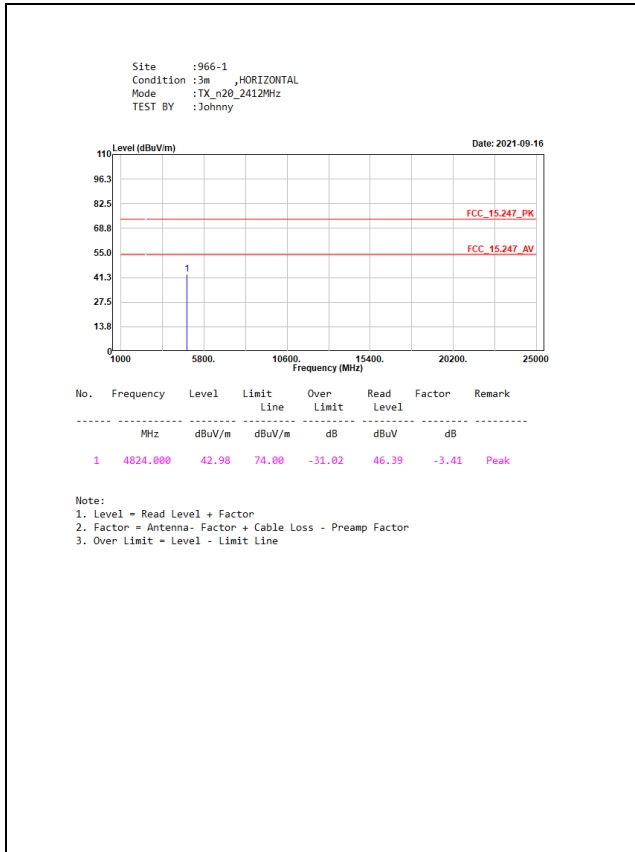
Note: Duty Cycle Refer to Section 9

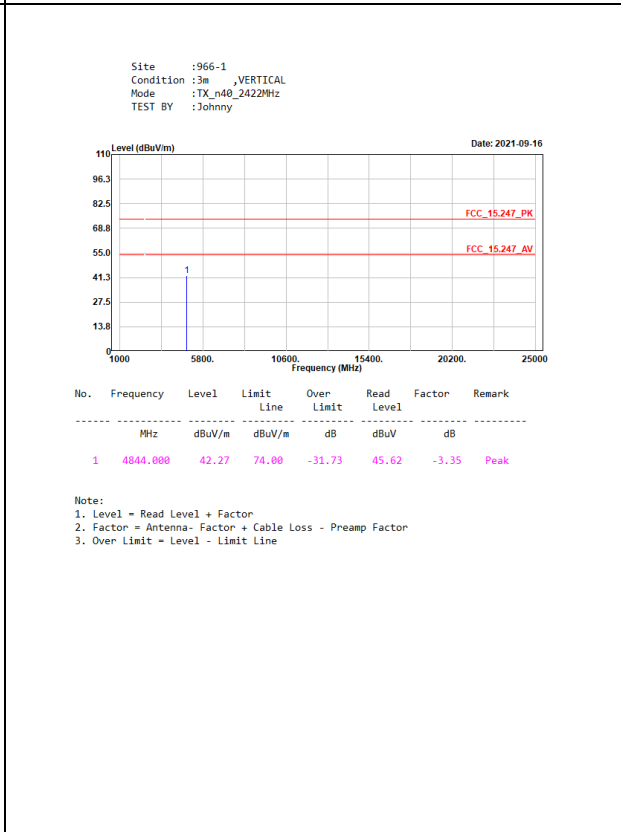
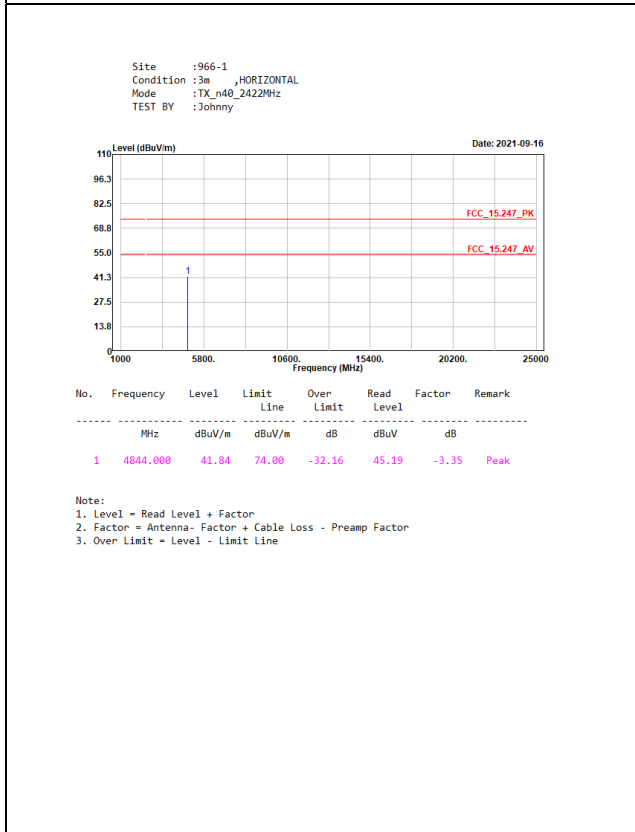
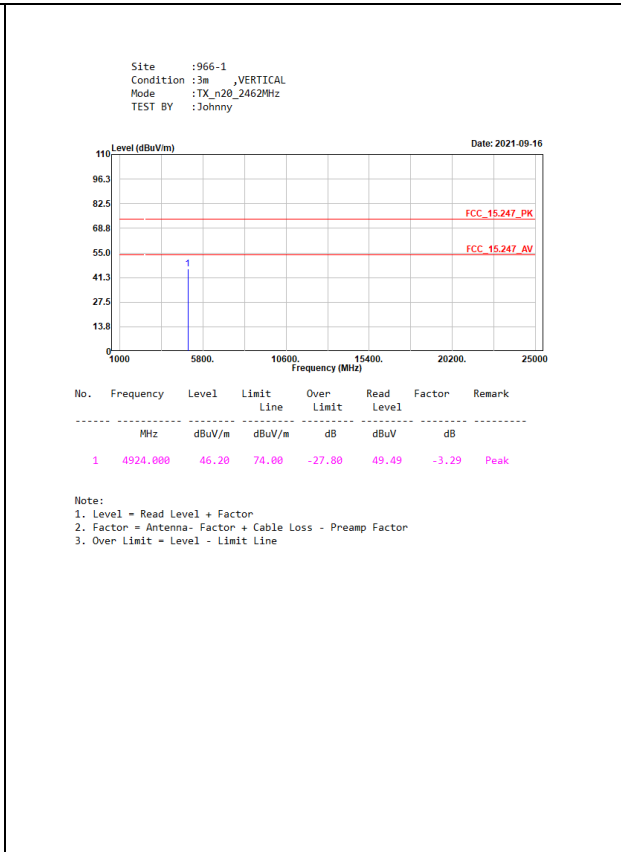
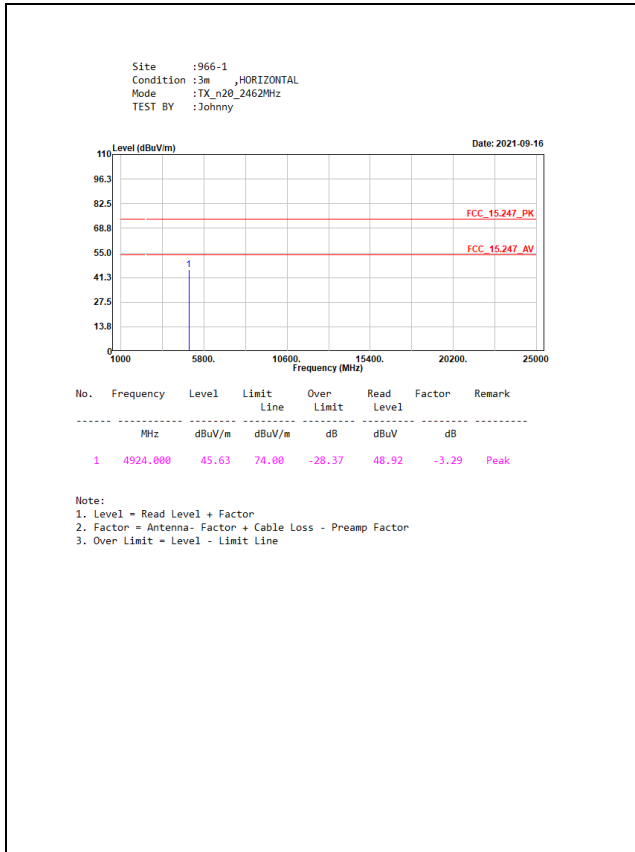
4.4. Test Result of Radiated Emission

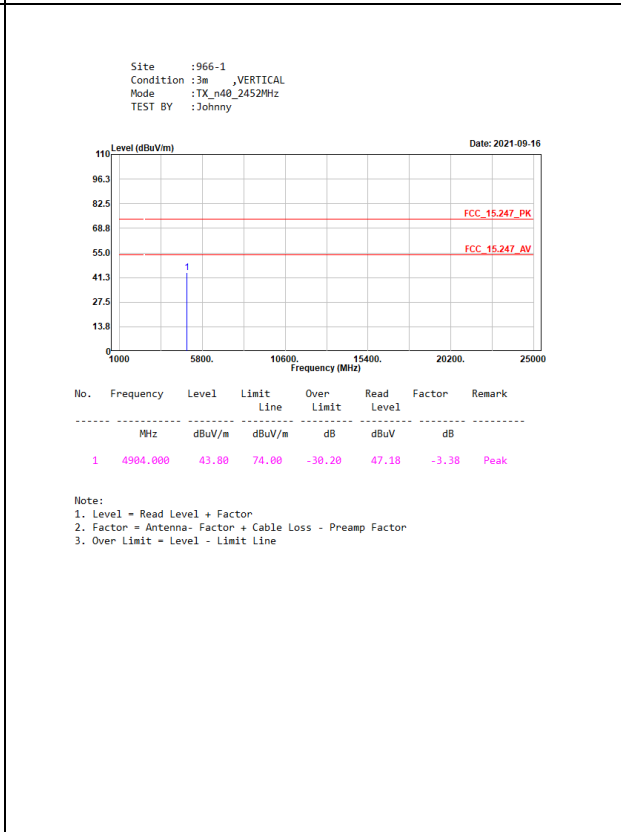
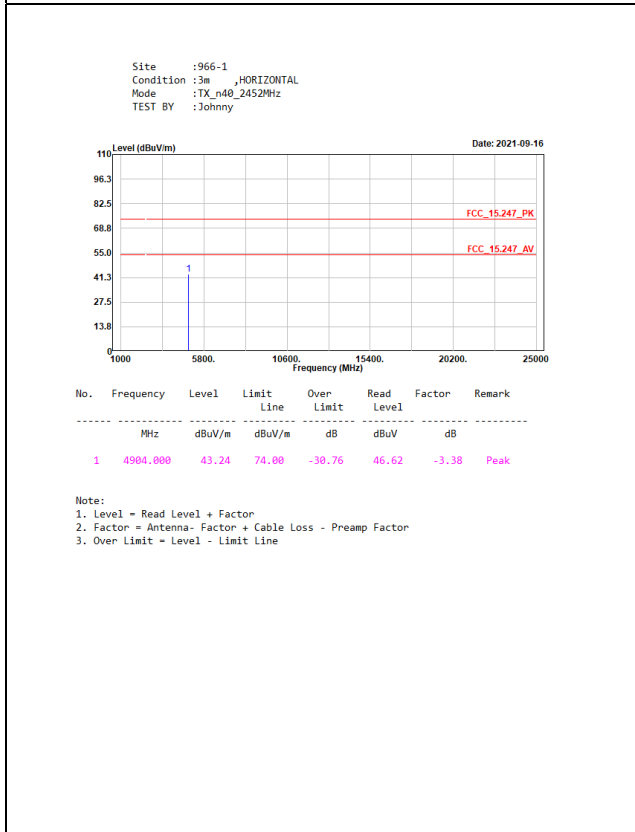
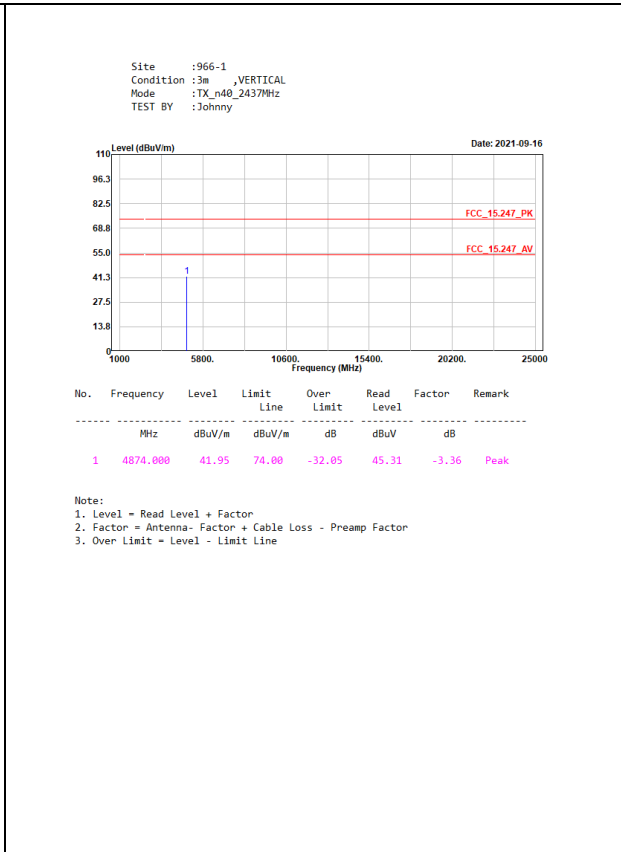
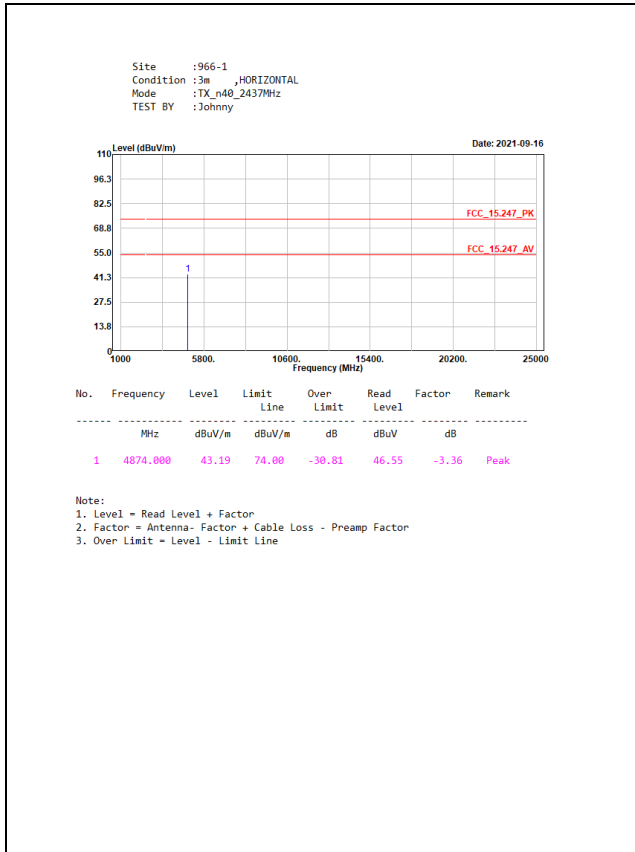
<p>Site :966-1 Condition :3m ,HORIZONTAL Mode :TX_b_2412MHz TEST BY :Johnny</p> <p>Date: 2021-09-16</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Frequency</th> <th>Level</th> <th>Limit Line</th> <th>Over Limit</th> <th>Read Level</th> <th>Factor</th> <th>Remark</th> </tr> <tr> <th></th> <th>MHz</th> <th>dBuV/m</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV</th> <th>dB</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4824.000</td> <td>46.32</td> <td>74.00</td> <td>-27.68</td> <td>49.73</td> <td>-3.41</td> <td>Peak</td> </tr> </tbody> </table> <p>Note: 1. Level = Read Level + Factor 2. Factor = Antenna- Factor + Cable Loss - Preamp Factor 3. Over Limit = Level - Limit Line</p>	No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark		MHz	dBuV/m	dBuV/m	dB	dBuV	dB		1	4824.000	46.32	74.00	-27.68	49.73	-3.41	Peak	<p>Site :966-1 Condition :3m ,VERTICAL Mode :TX_b_2412MHz TEST BY :Johnny</p> <p>Date: 2021-09-16</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Frequency</th> <th>Level</th> <th>Limit Line</th> <th>Over Limit</th> <th>Read Level</th> <th>Factor</th> <th>Remark</th> </tr> <tr> <th></th> <th>MHz</th> <th>dBuV/m</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV</th> <th>dB</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4824.000</td> <td>46.92</td> <td>74.00</td> <td>-27.08</td> <td>50.33</td> <td>-3.41</td> <td>Peak</td> </tr> </tbody> </table> <p>Note: 1. Level = Read Level + Factor 2. Factor = Antenna- Factor + Cable Loss - Preamp Factor 3. Over Limit = Level - Limit Line</p>	No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark		MHz	dBuV/m	dBuV/m	dB	dBuV	dB		1	4824.000	46.92	74.00	-27.08	50.33	-3.41	Peak
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<p>Site :966-1 Condition :3m ,HORIZONTAL Mode :TX_b_2437MHz TEST BY :Johnny</p> <p>Date: 2021-09-16</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Frequency</th> <th>Level</th> <th>Limit Line</th> <th>Over Limit</th> <th>Read Level</th> <th>Factor</th> <th>Remark</th> </tr> <tr> <th></th> <th>MHz</th> <th>dBuV/m</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV</th> <th>dB</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4874.000</td> <td>45.64</td> <td>74.00</td> <td>-28.36</td> <td>49.00</td> <td>-3.36</td> <td>Peak</td> </tr> </tbody> </table> <p>Note: 1. Level = Read Level + Factor 2. Factor = Antenna- Factor + Cable Loss - Preamp Factor 3. Over Limit = Level - Limit Line</p>	No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark		MHz	dBuV/m	dBuV/m	dB	dBuV	dB		1	4874.000	45.64	74.00	-28.36	49.00	-3.36	Peak	<p>Site :966-1 Condition :3m ,VERTICAL Mode :TX_b_2437MHz TEST BY :Johnny</p> <p>Date: 2021-09-16</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Frequency</th> <th>Level</th> <th>Limit Line</th> <th>Over Limit</th> <th>Read Level</th> <th>Factor</th> <th>Remark</th> </tr> <tr> <th></th> <th>MHz</th> <th>dBuV/m</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV</th> <th>dB</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>4874.000</td> <td>46.69</td> <td>74.00</td> <td>-27.31</td> <td>50.05</td> <td>-3.36</td> <td>Peak</td> </tr> </tbody> </table> <p>Note: 1. Level = Read Level + Factor 2. Factor = Antenna- Factor + Cable Loss - Preamp Factor 3. Over Limit = Level - Limit Line</p>	No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark		MHz	dBuV/m	dBuV/m	dB	dBuV	dB		1	4874.000	46.69	74.00	-27.31	50.05	-3.36	Peak
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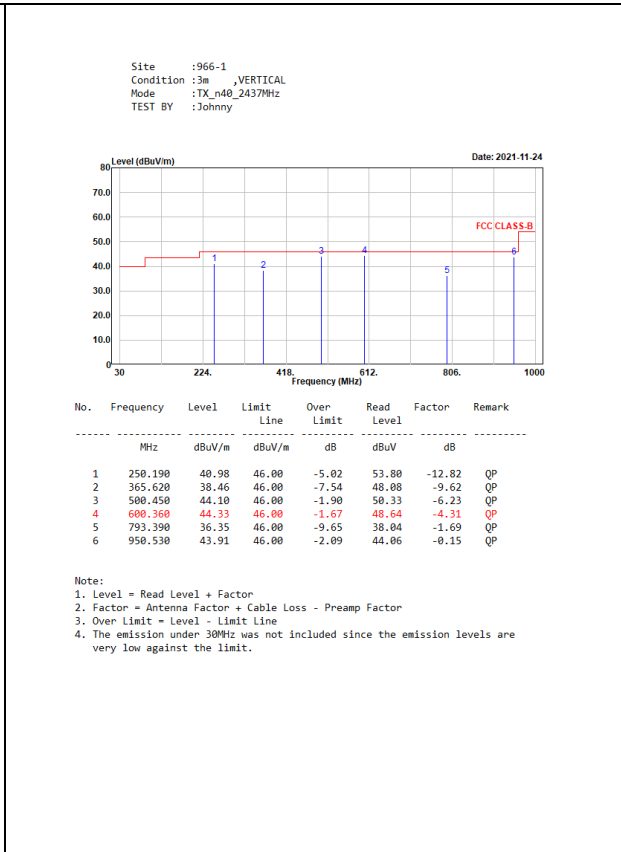
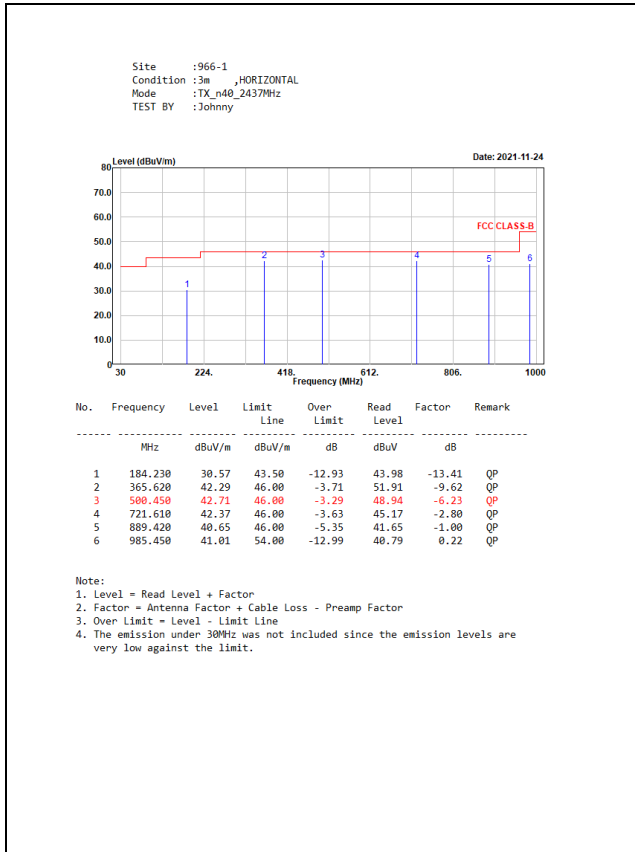








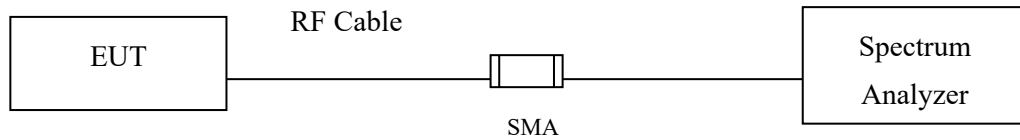




5. RF antenna conducted test

5.1. Test Setup

RF antenna Conducted Measurement:



5.2. Limits

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

5.3. Test Procedure

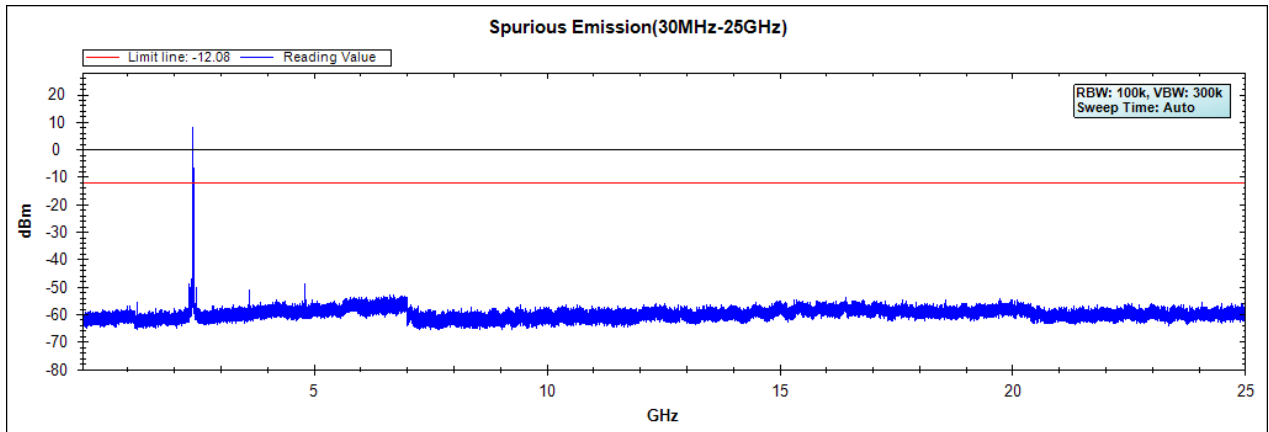
The EUT was tested according to C63.10:2013 Section 11.11 for compliance to FCC 47CFR 15.247 requirements.

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

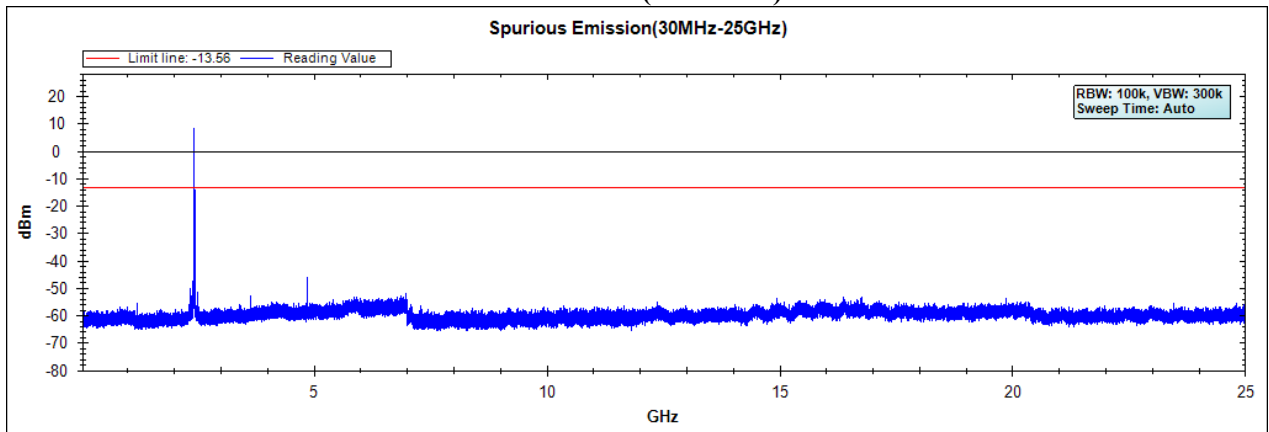
5.4. Test Result of RF antenna conducted test

Product : Smart Dashcam
Test Item : RF antenna conducted test
Test Mode : Mode 1: Transmit (802.11b 1Mbps)
Test Date : 2021/04/02

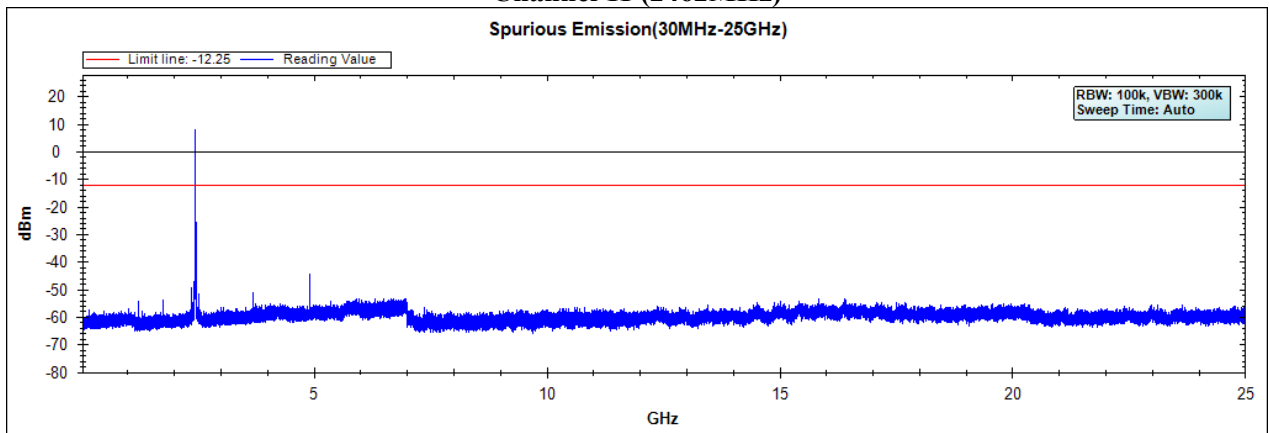
Channel 01 (2412MHz)



Channel 06 (2437MHz)



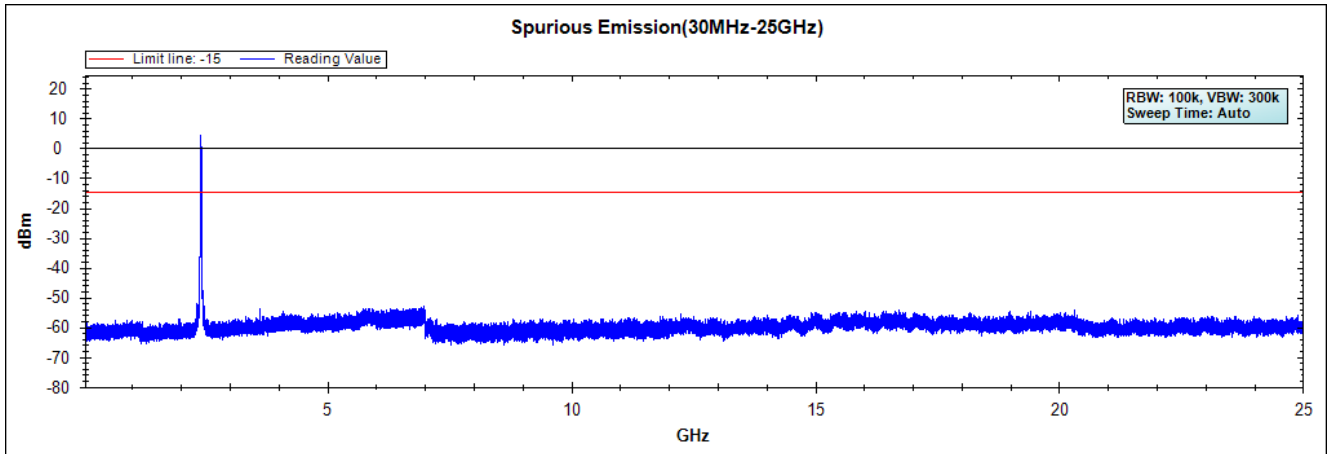
Channel 11 (2462MHz)



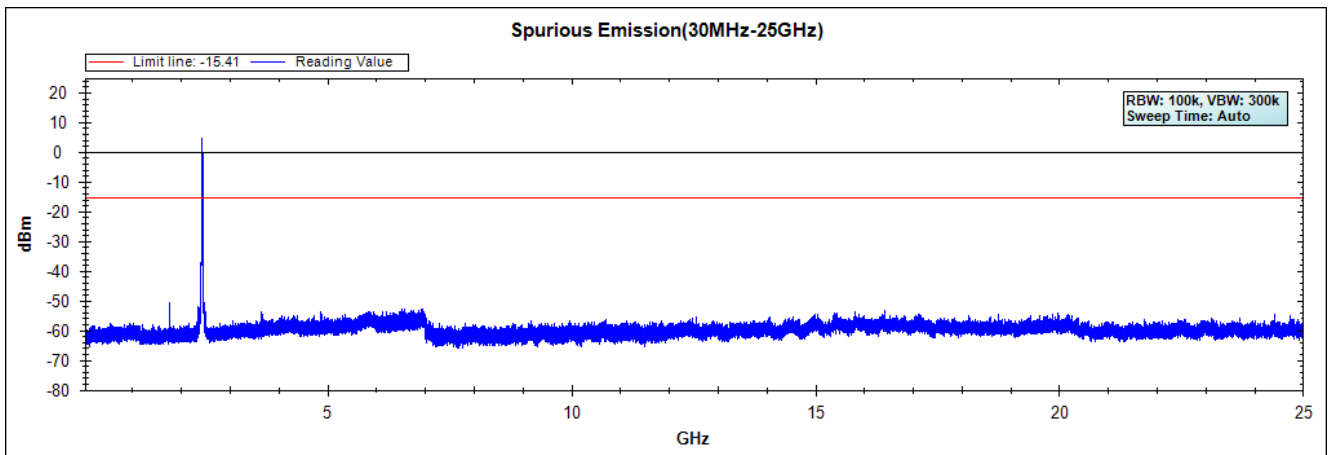
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Smart Dashcam
Test Item : RF Antenna Conducted Spurious
Test Mode : Mode 2: Transmit (802.11g 6Mbps)
Test Date : 2021/04/02

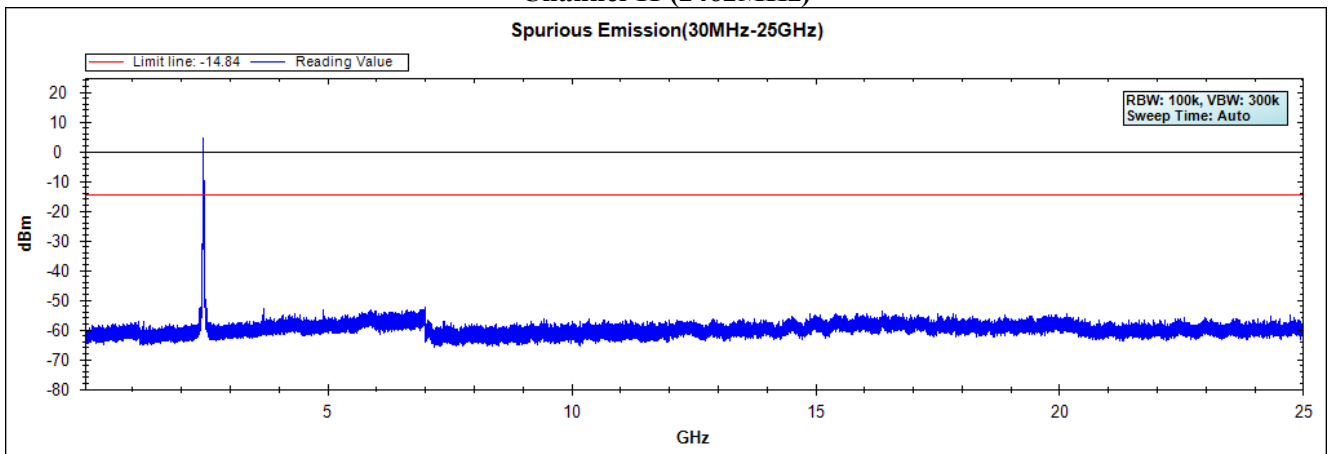
Channel 01 (2412MHz)



Channel 06 (2437MHz)



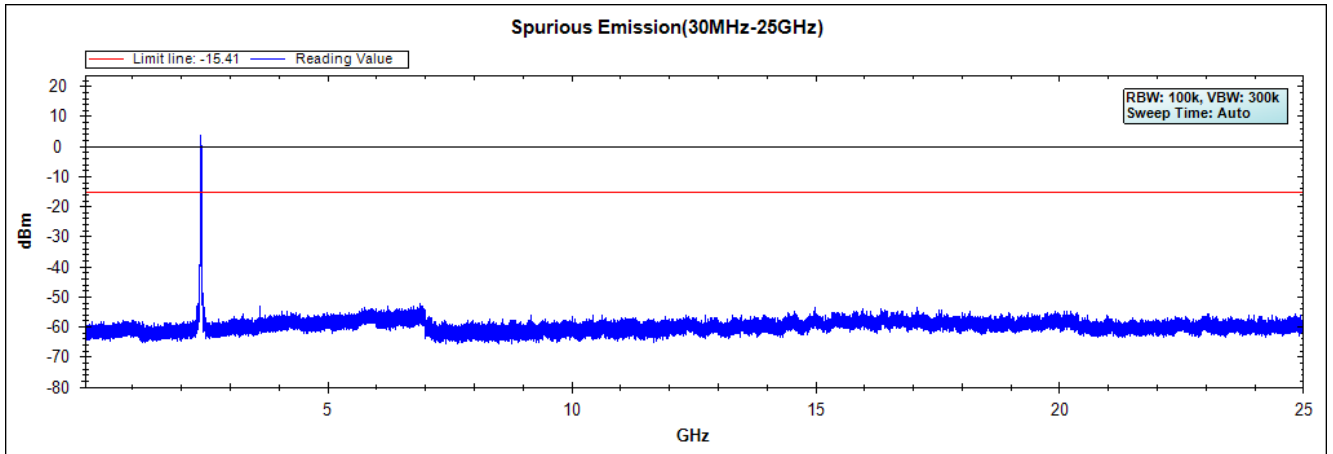
Channel 11 (2462MHz)



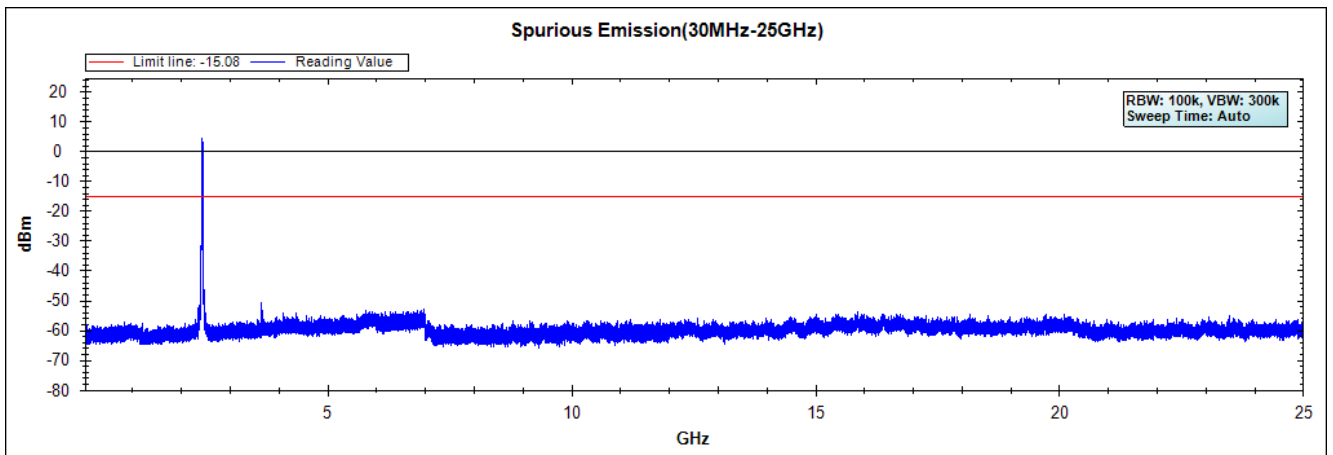
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Smart Dashcam
Test Item : RF Antenna Conducted Spurious
Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)
Test Date : 2021/04/02

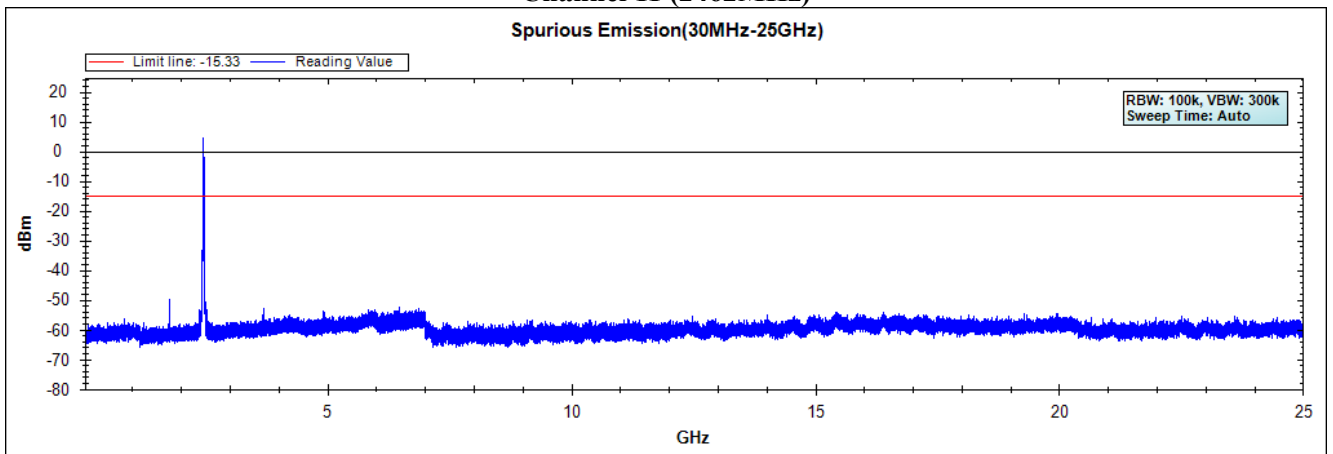
Channel 01 (2412MHz)



Channel 06 (2437MHz)



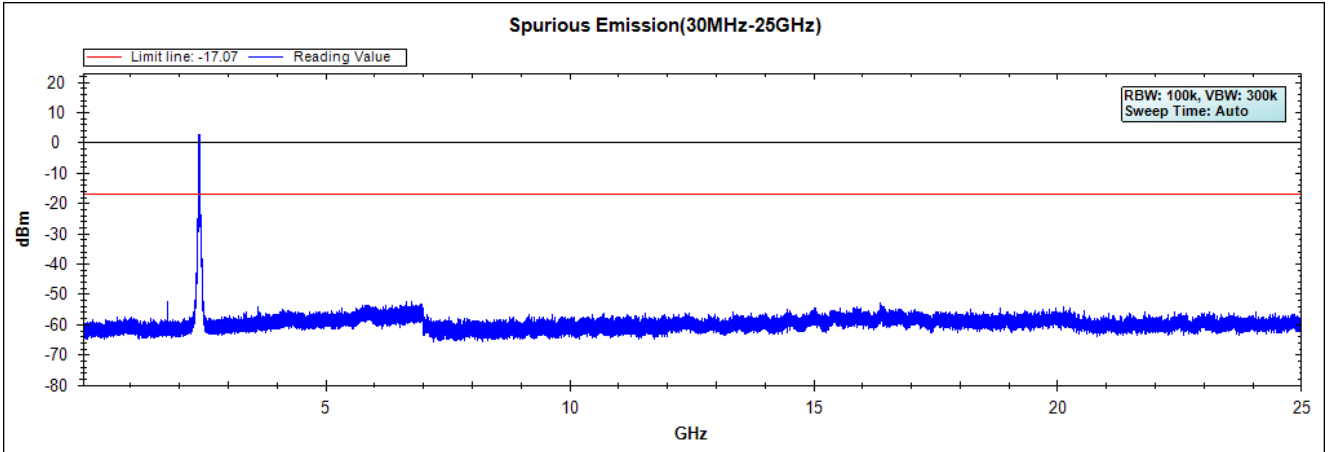
Channel 11 (2462MHz)



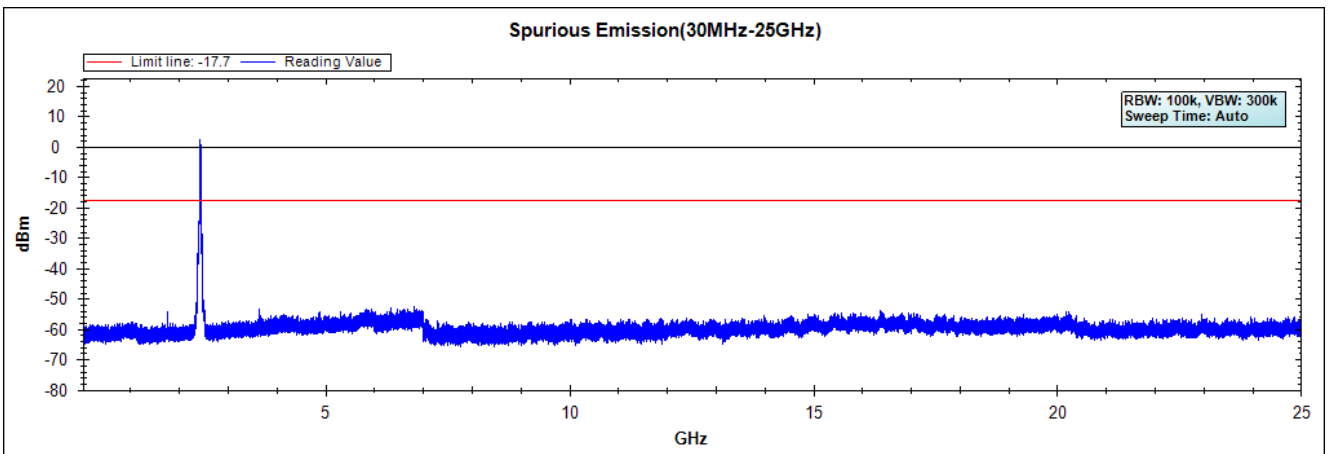
Note: The above test pattern is synthesized by multiple of the frequency range.

Product : Smart Dashcam
Test Item : RF Antenna Conducted Spurious
Test Mode : Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)
Test Date : 2021/04/02

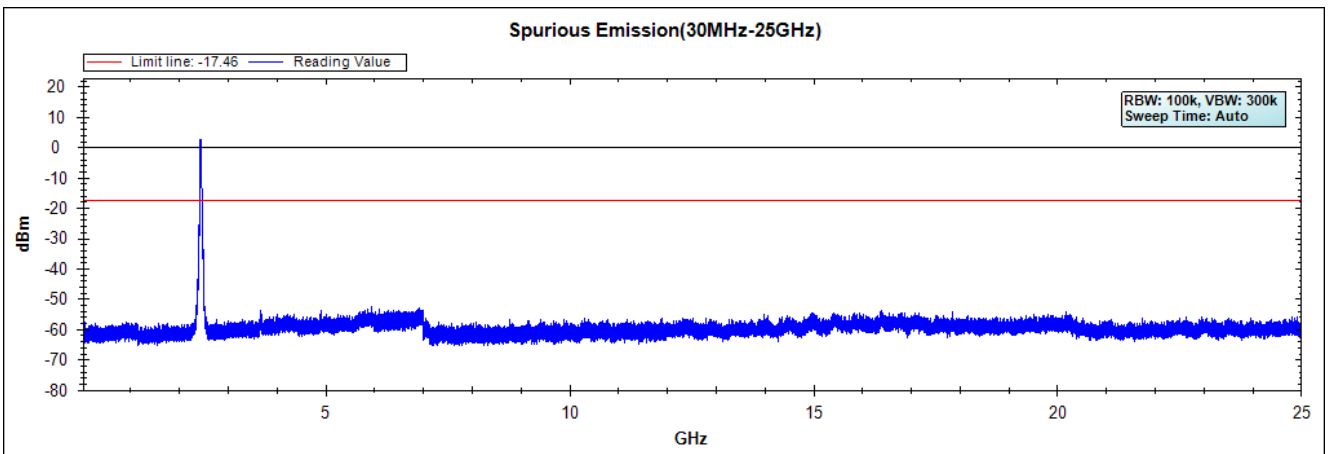
Channel 03 (2422MHz)



Channel 06 (2437MHz)



Channel 09 (2452MHz)

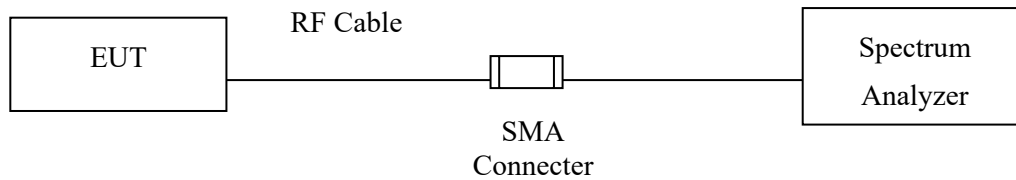


Note: The above test pattern is synthesized by multiple of the frequency range.

6. Band Edge

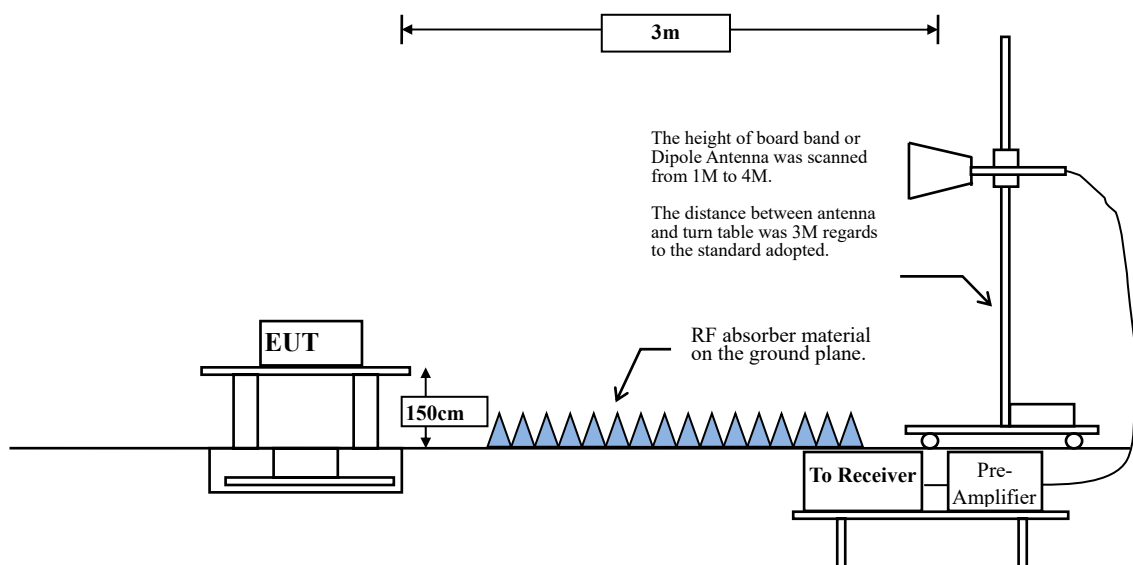
6.1. Test Setup

RF Conducted Measurement



RF Radiated Measurement:

Above 1GHz



6.2. Limits

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

6.3. Test Procedure

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

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

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

RBW and VBW Parameter setting:

According to C63.10 Section 11.12.2.4 Peak measurement procedure.

RBW = as specified in Table 1.

$VBW \geq 3 \times RBW$.

Table 1 —RBW as a function of frequency

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

According to C63.10 Section 11.12.2.5 Average measurement procedure.

RBW = 1MHz.

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

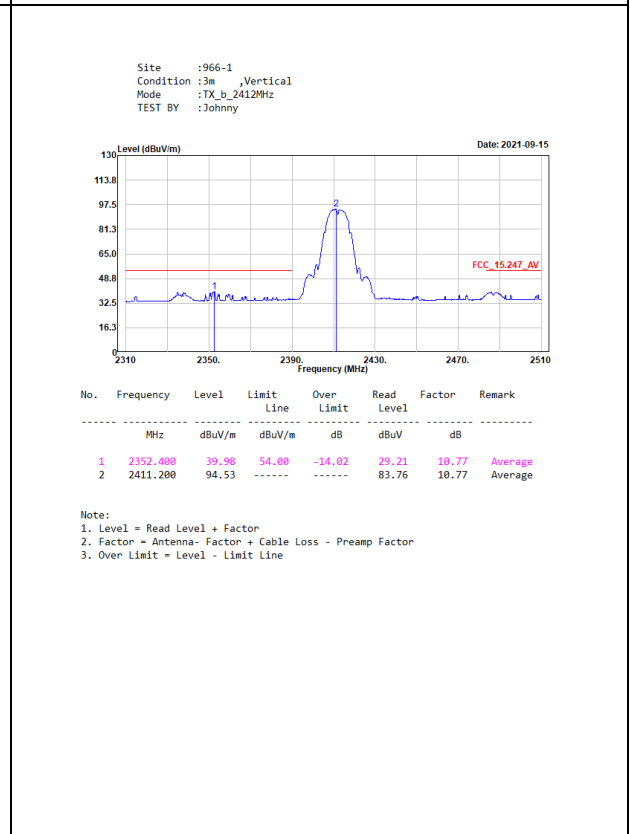
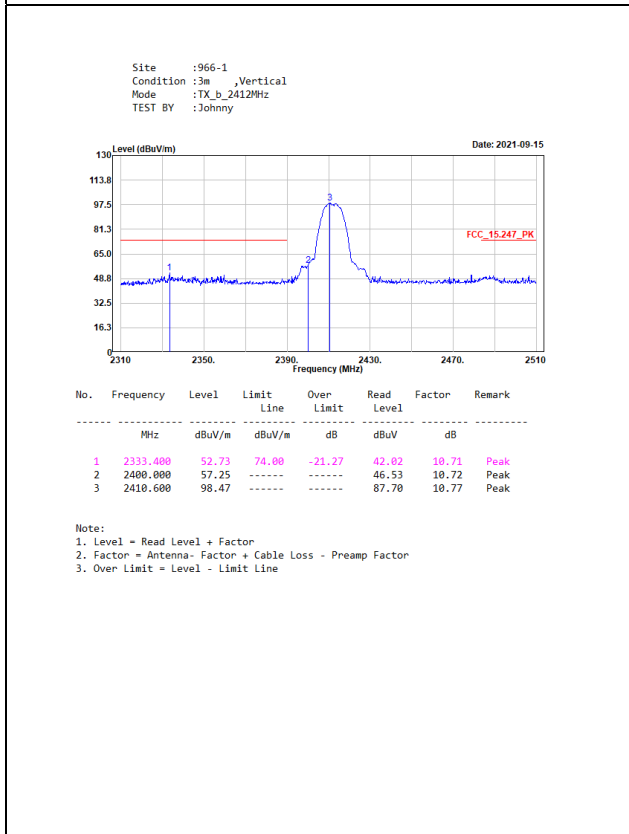
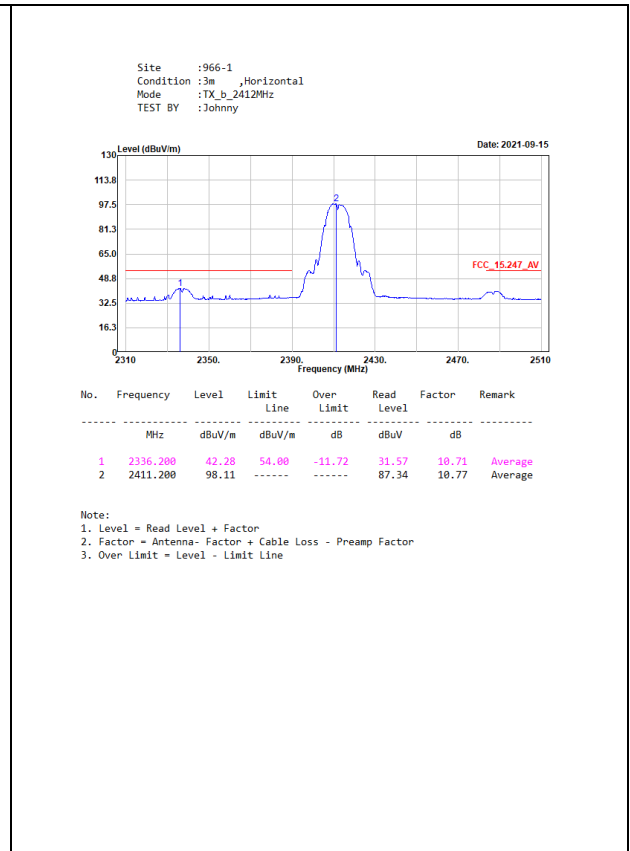
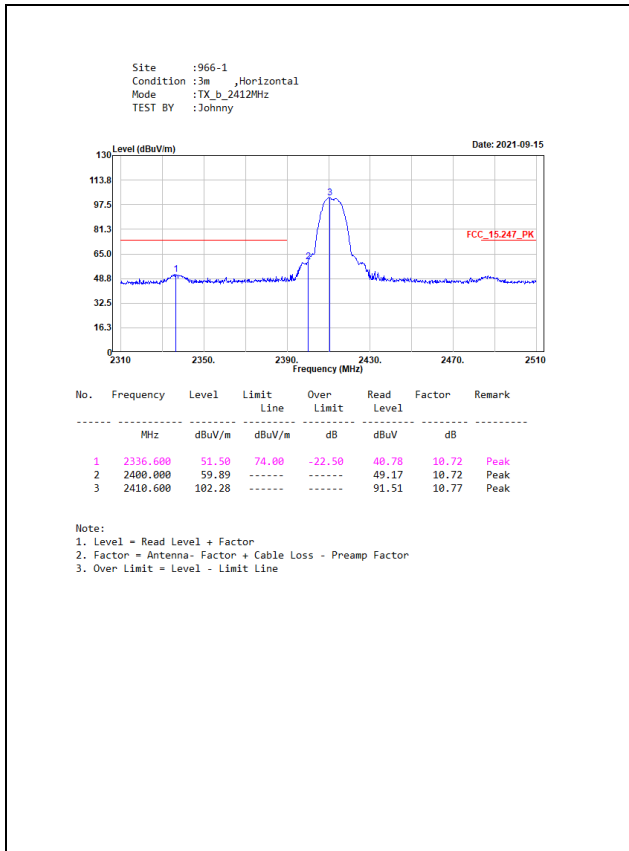
$VBW \geq 1/T$, when duty cycle $< 98\%$

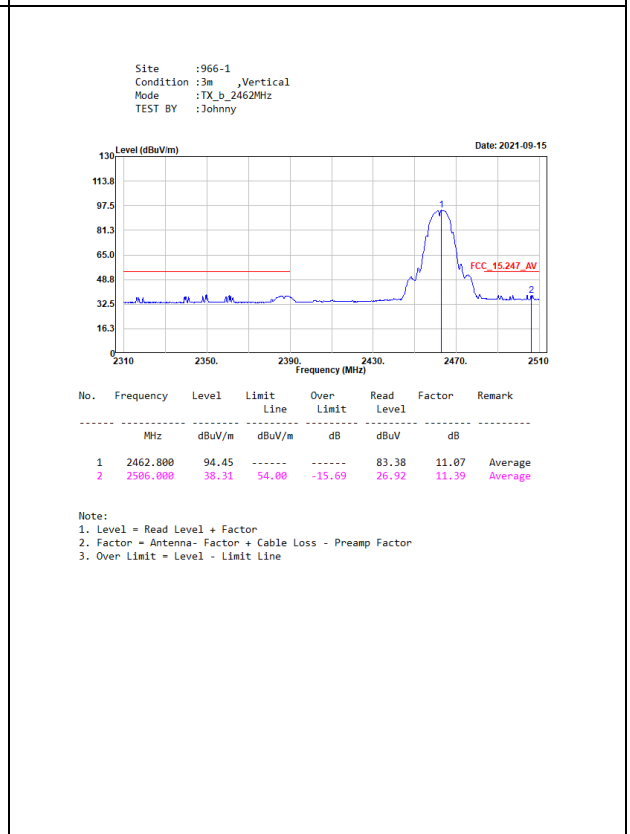
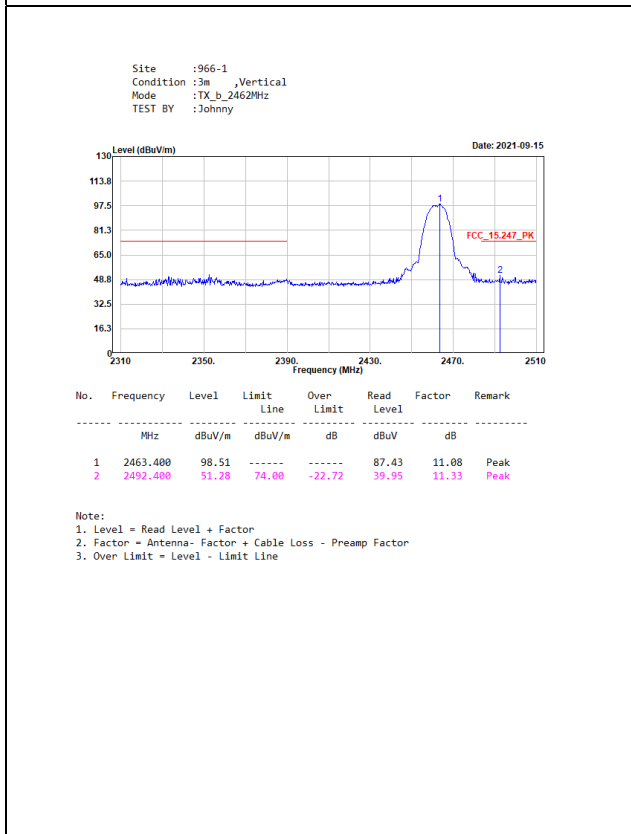
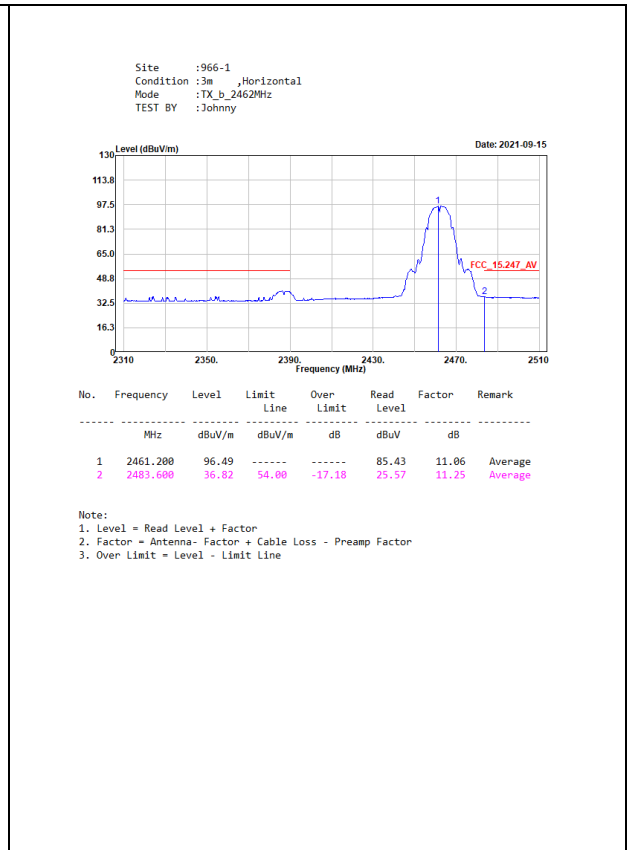
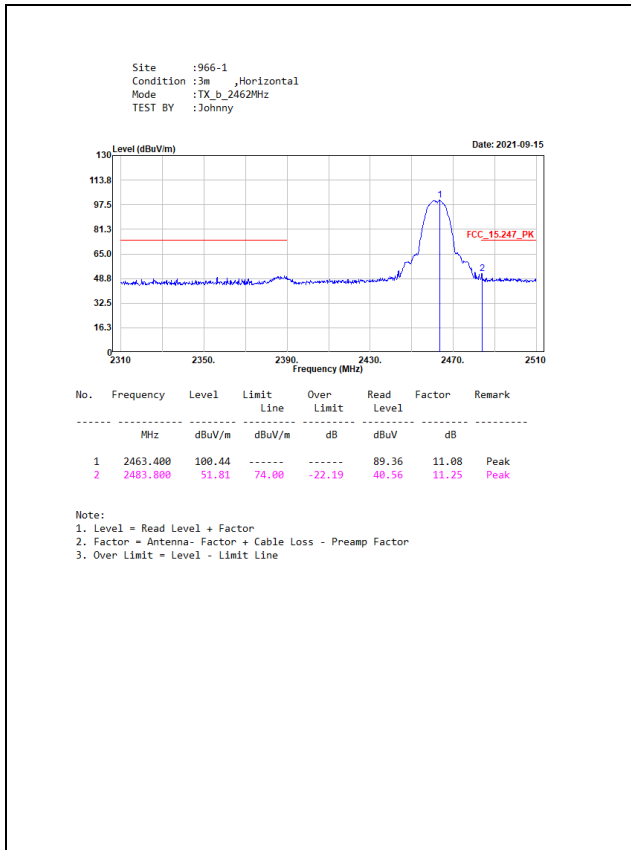
(T refers to the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.)

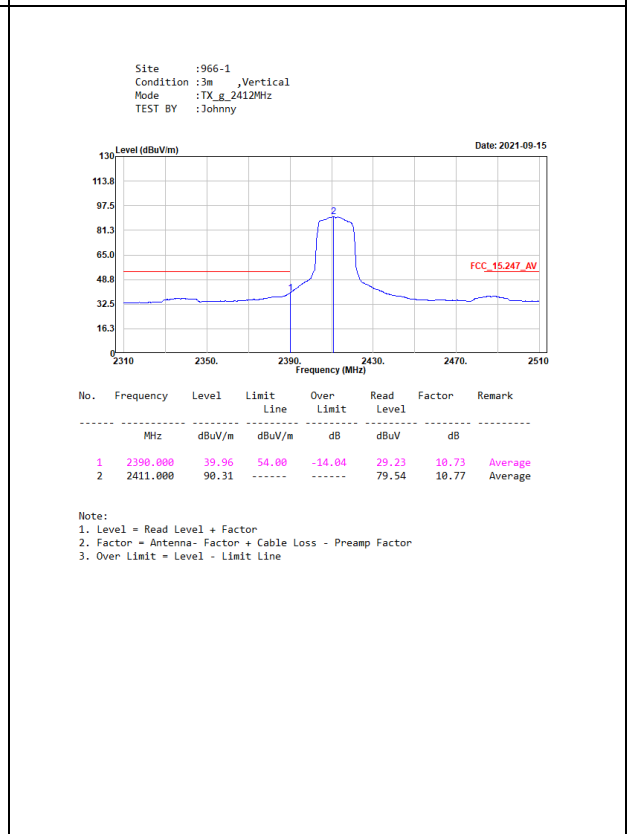
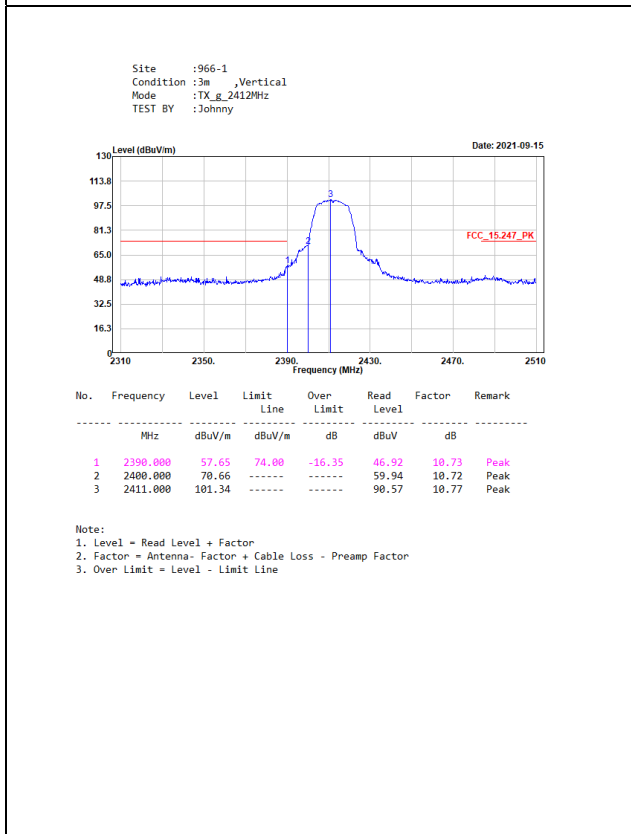
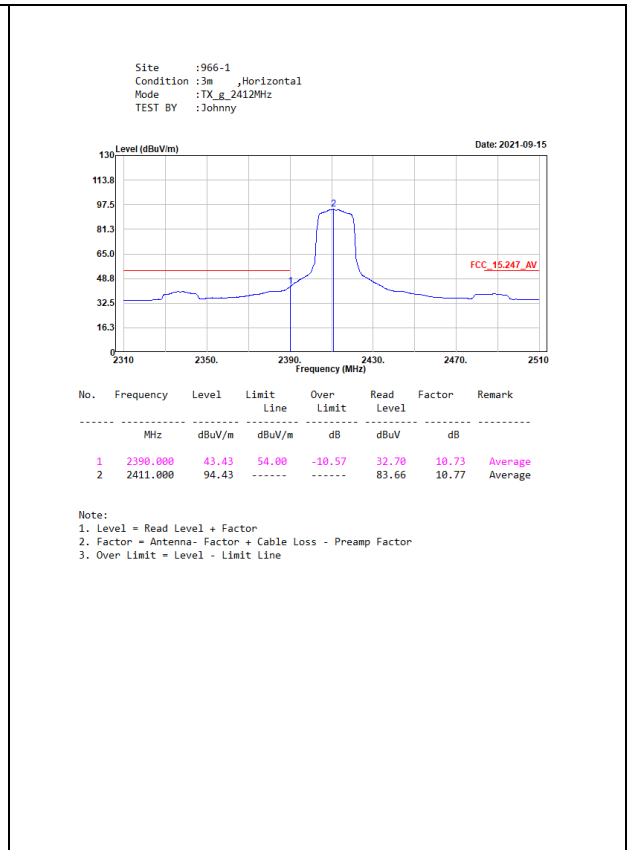
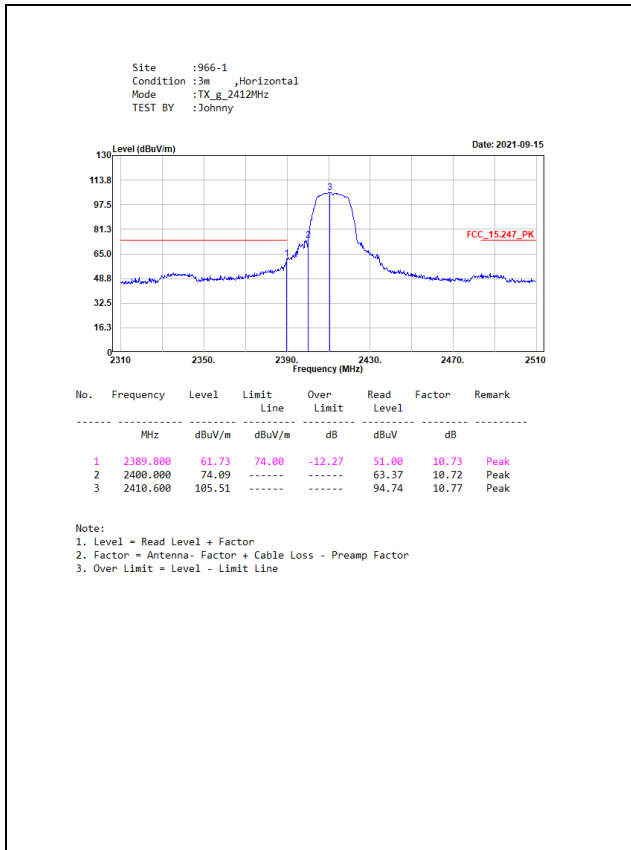
2.4GHz band	Duty Cycle (%)	T (ms)	1/T (Hz)	VBW (Hz)
802.11b	70.80	2.4549	407	500
802.11g	98.62	--	--	10
802.11n20	98.17	--	--	10
802.11n40	97.09	0.6674	1498	2000

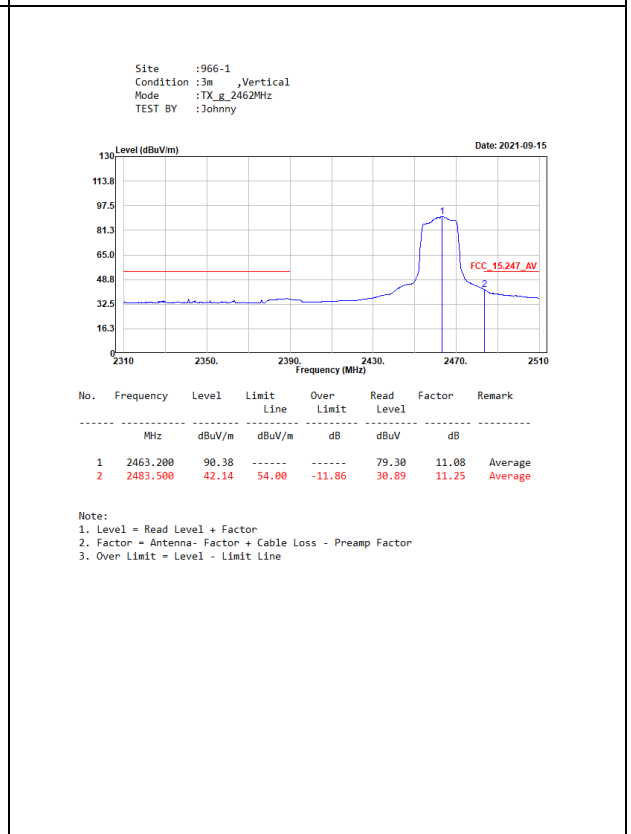
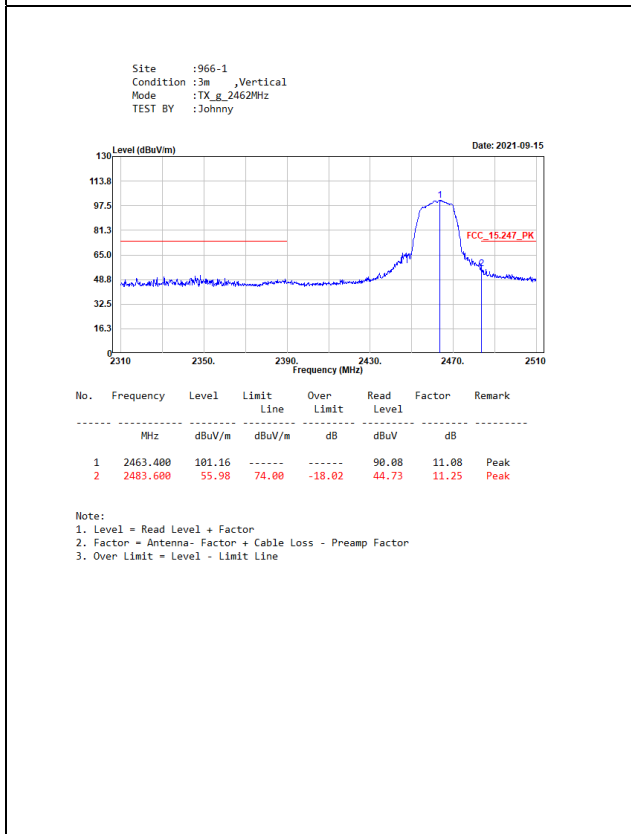
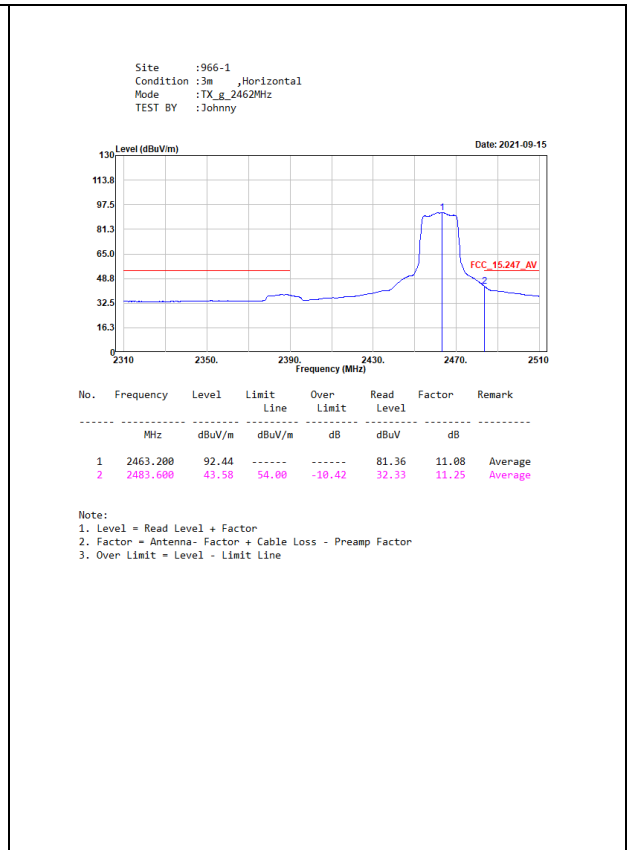
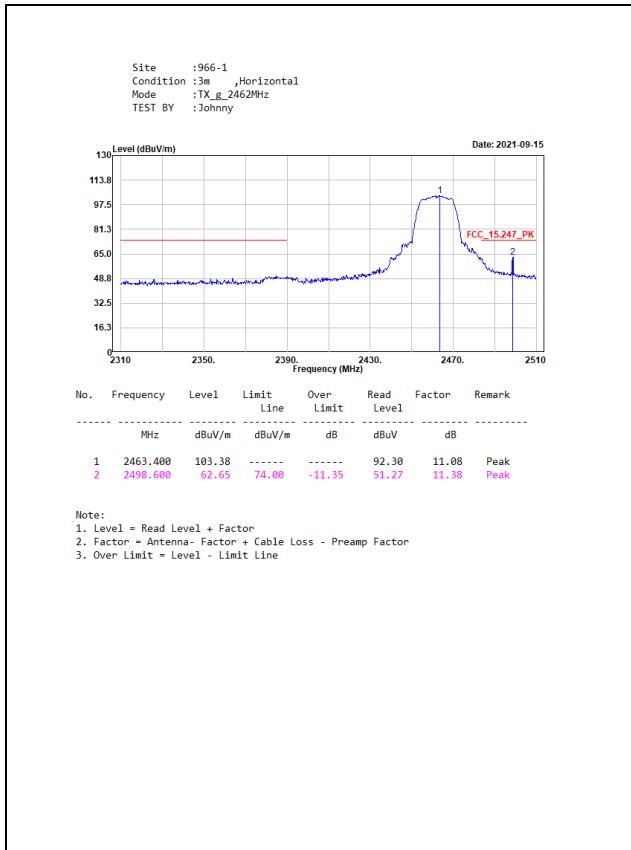
Note: Duty Cycle Refer to Section 9

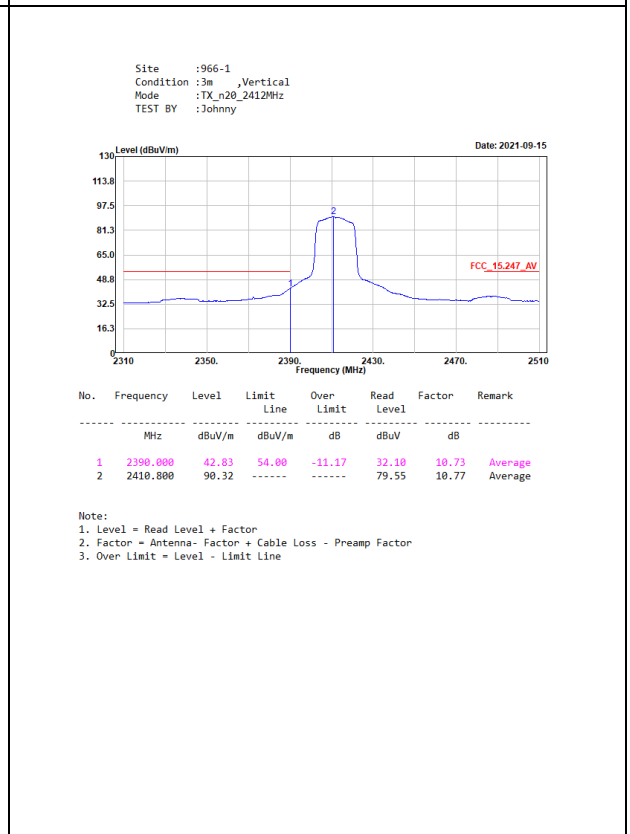
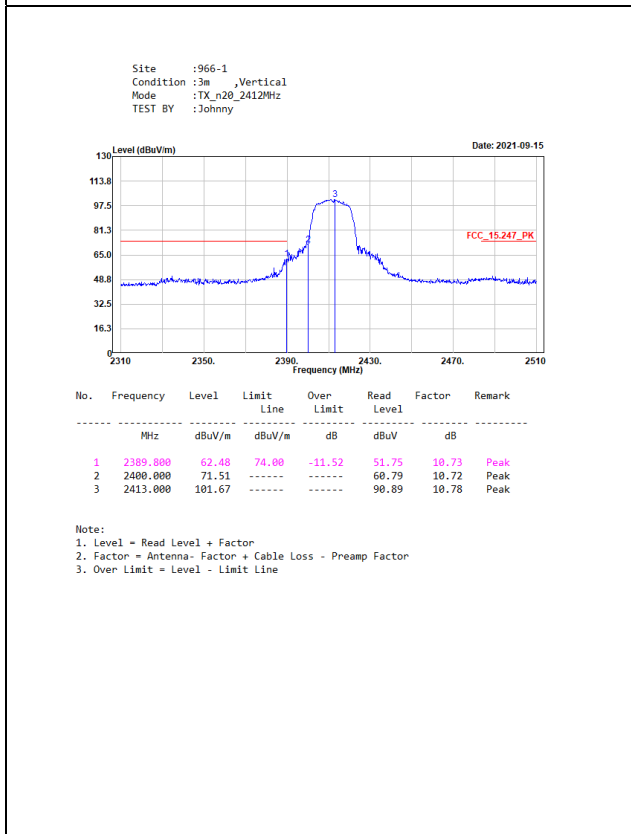
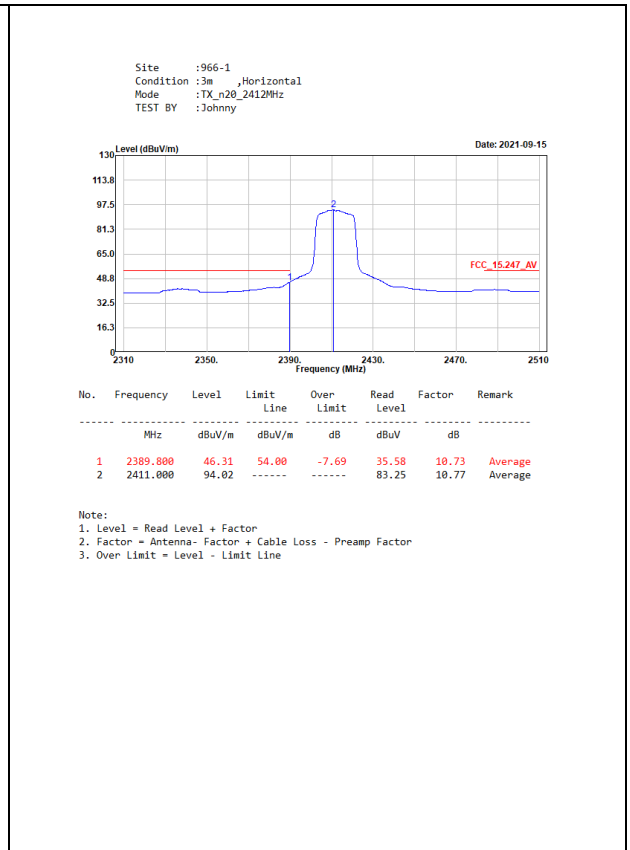
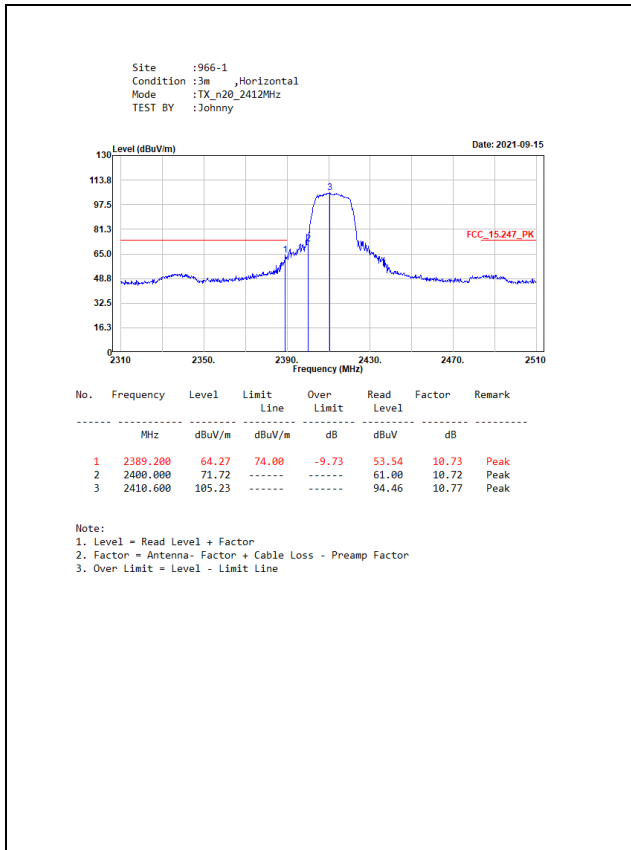
6.4. Test Result of Band Edge

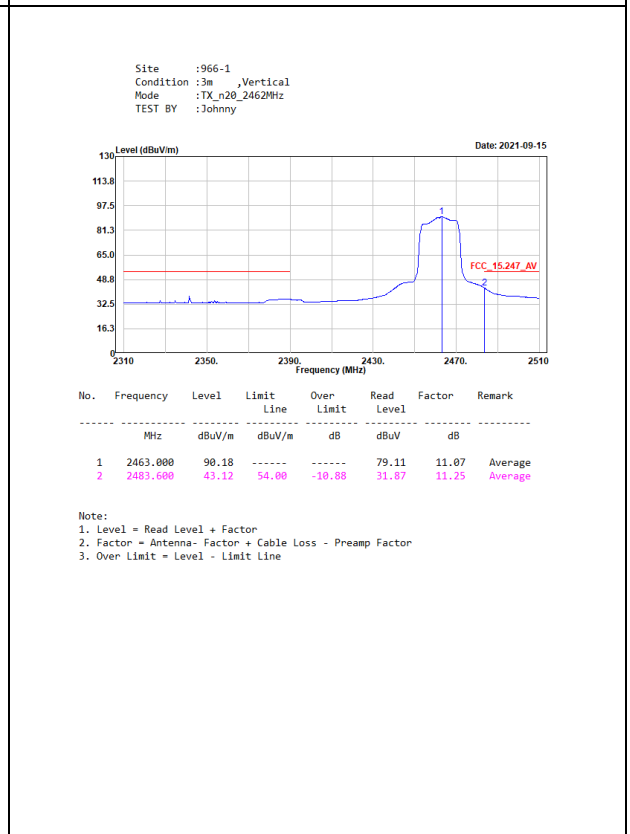
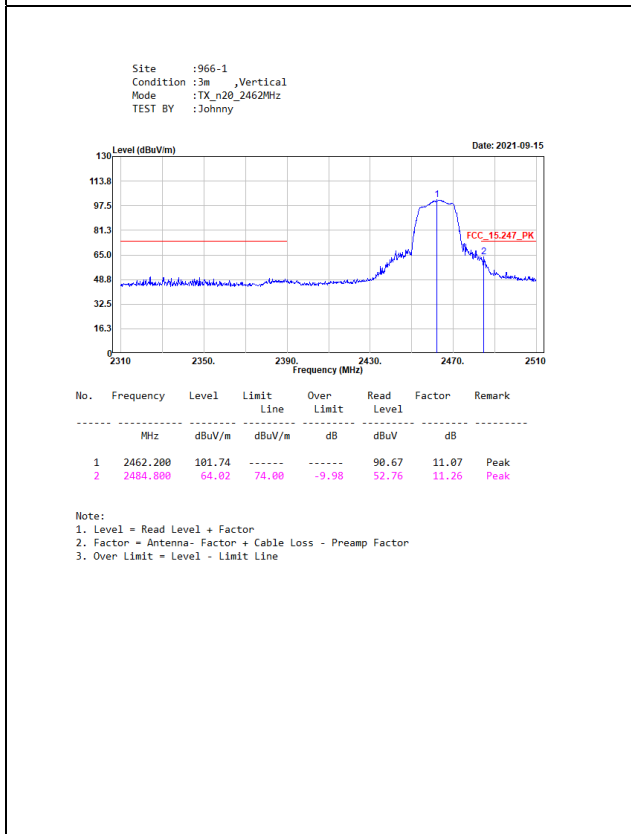
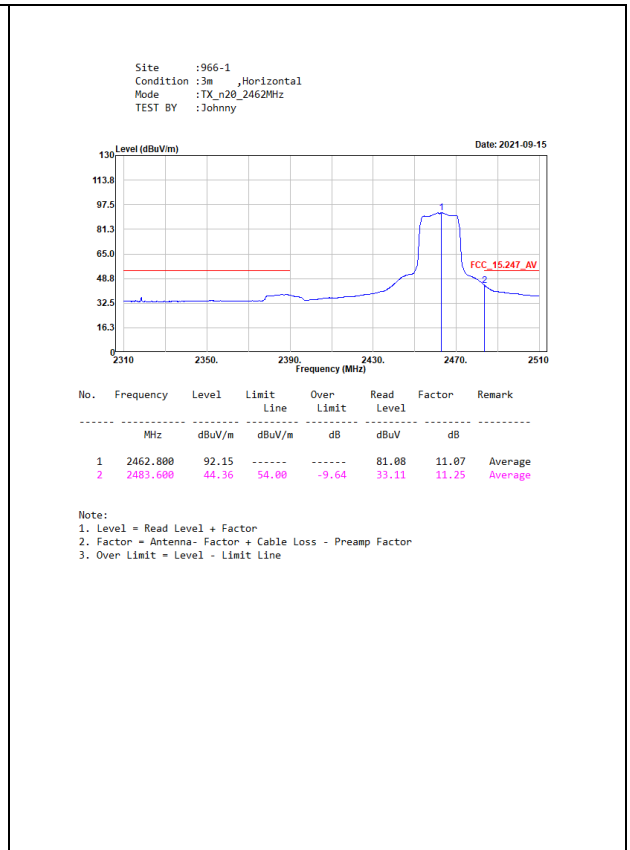
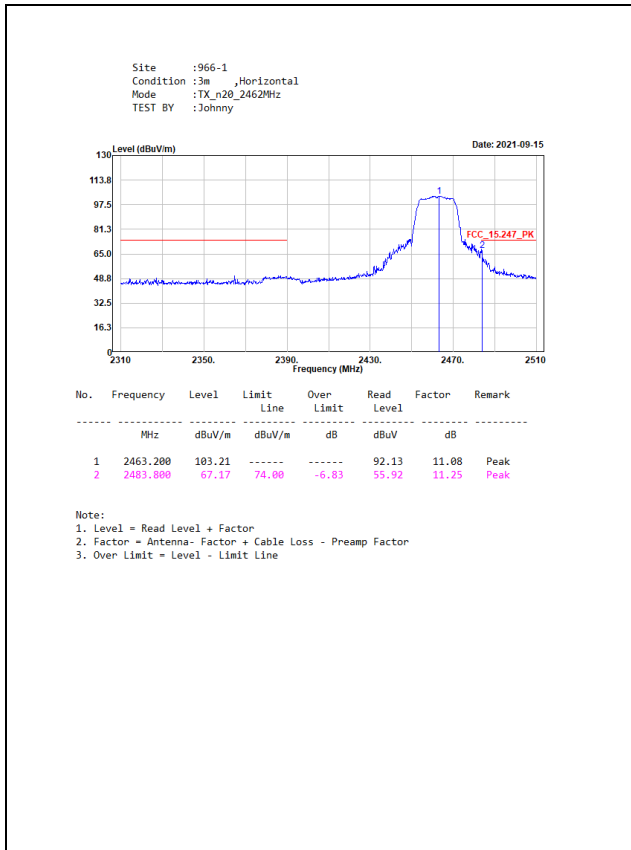


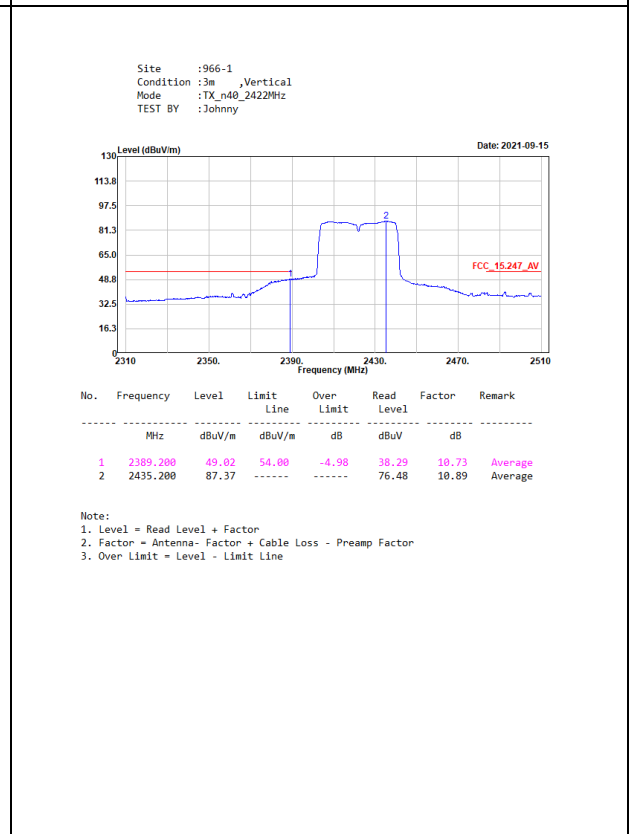
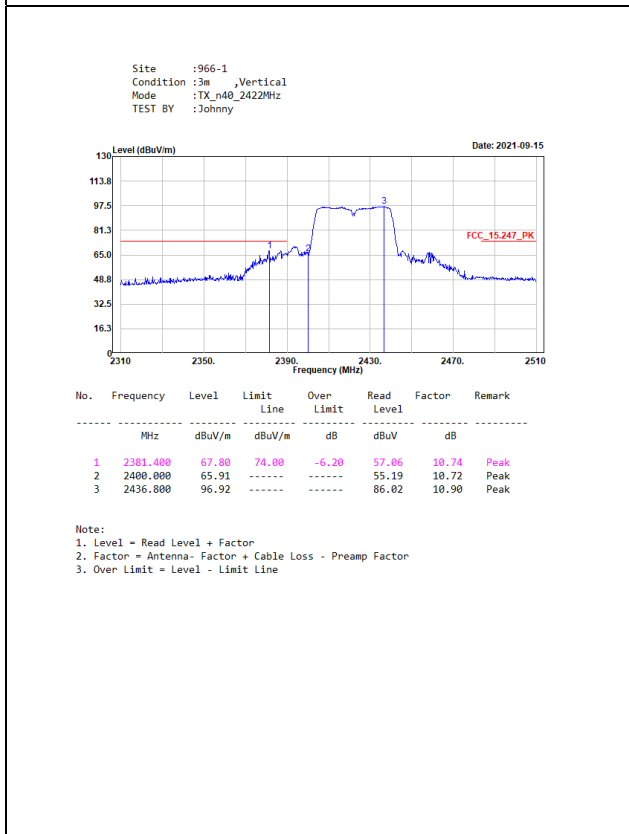
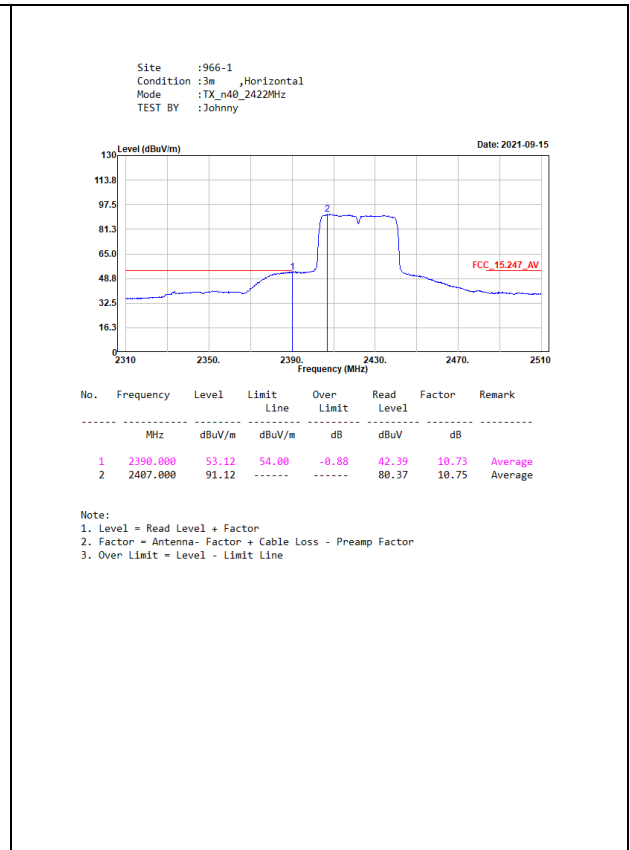
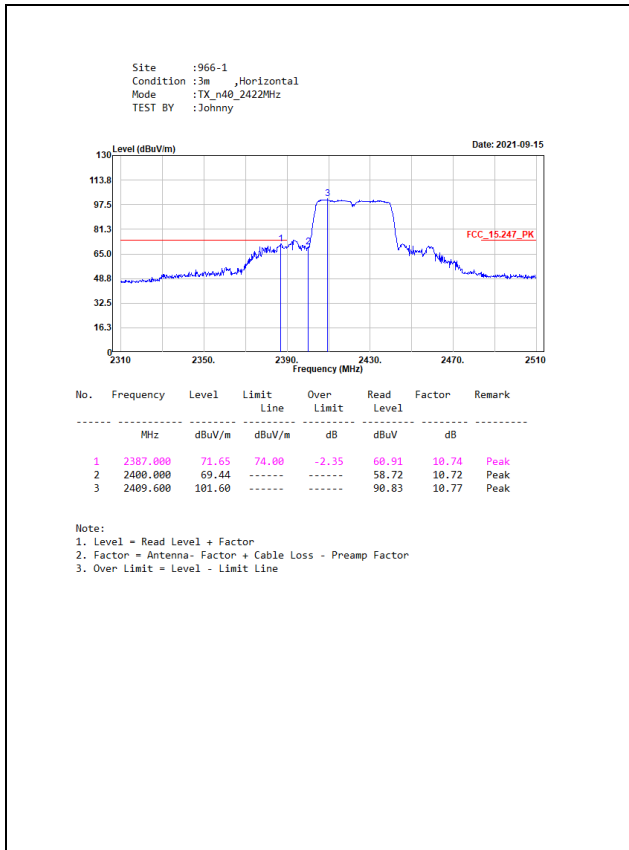


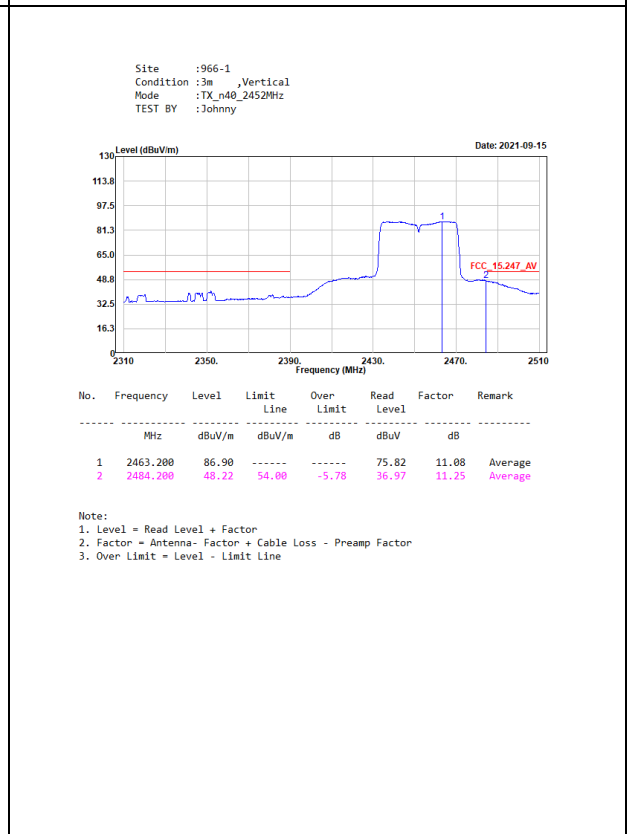
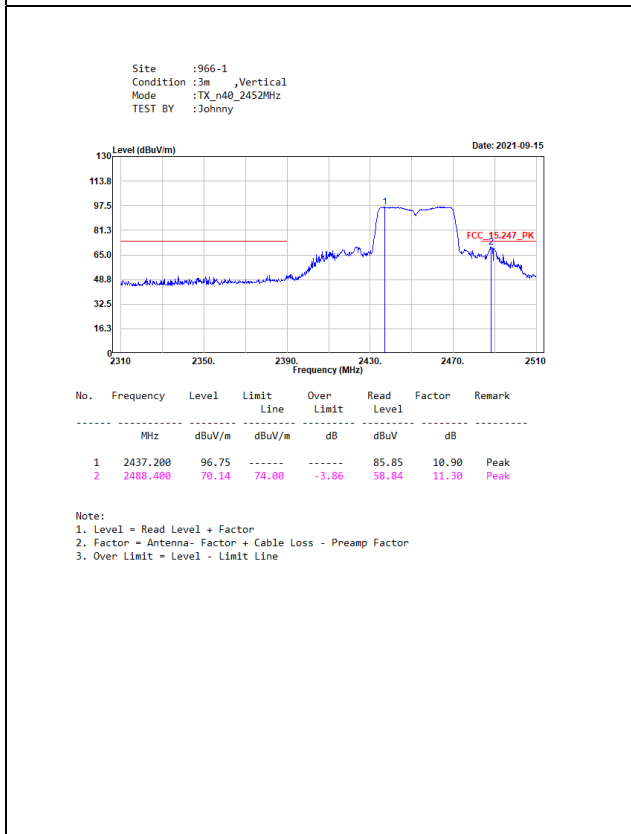
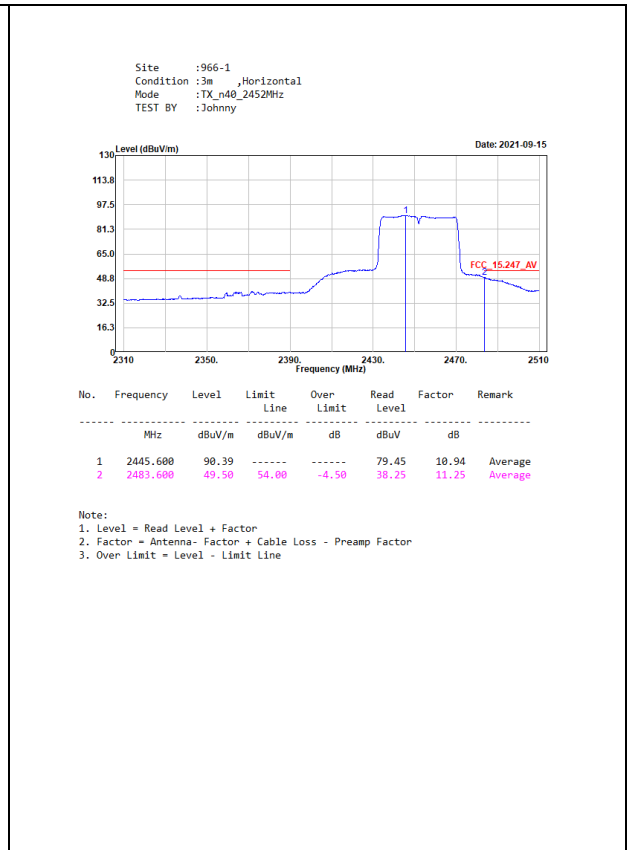
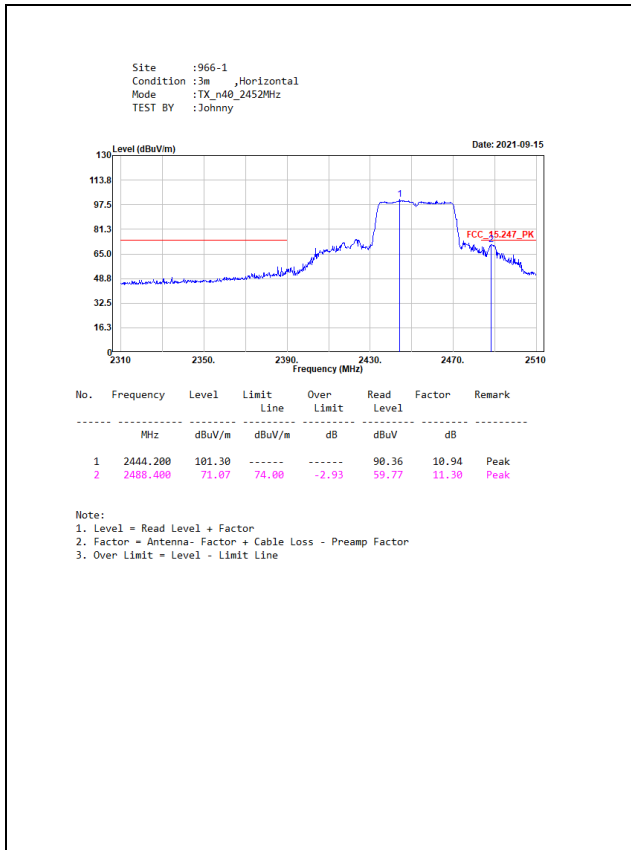






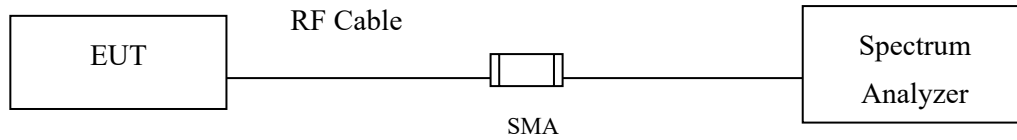






7. 6dB Bandwidth

7.1. Test Setup



7.2. Limits

The minimum bandwidth shall be at least 500 kHz.

7.3. Test Procedure

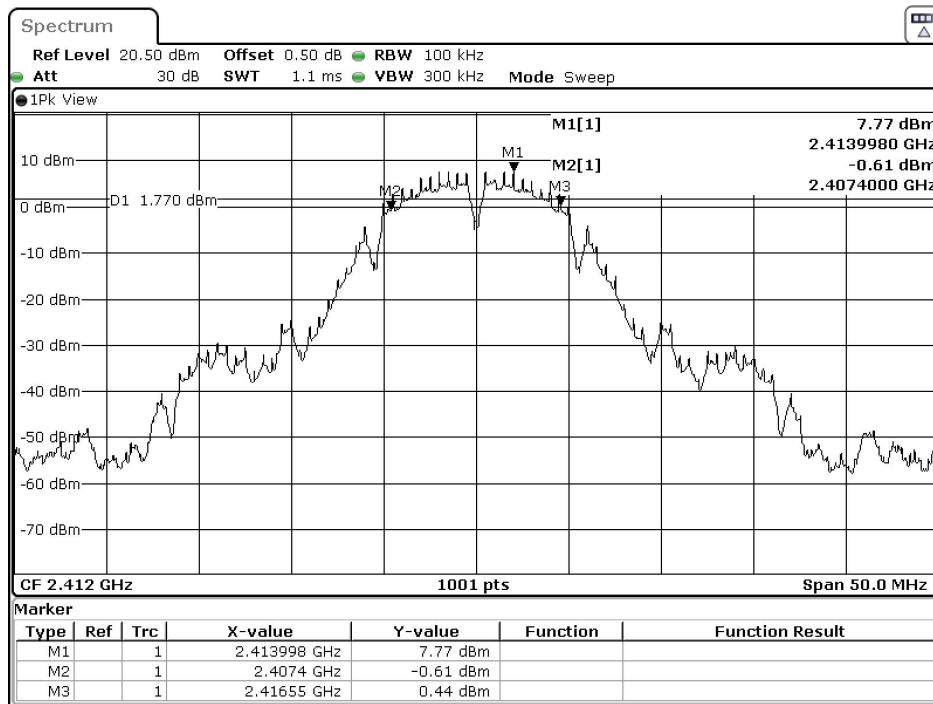
The EUT was setup according to ANSI C63.4, 2014; tested according to ANSI C63.10 Section 11.8 for compliance to FCC 47CFR 15.247 requirements.

7.4. Test Result of 6dB Bandwidth

Product : Smart Dashcam
 Test Item : 6dB Bandwidth Data
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

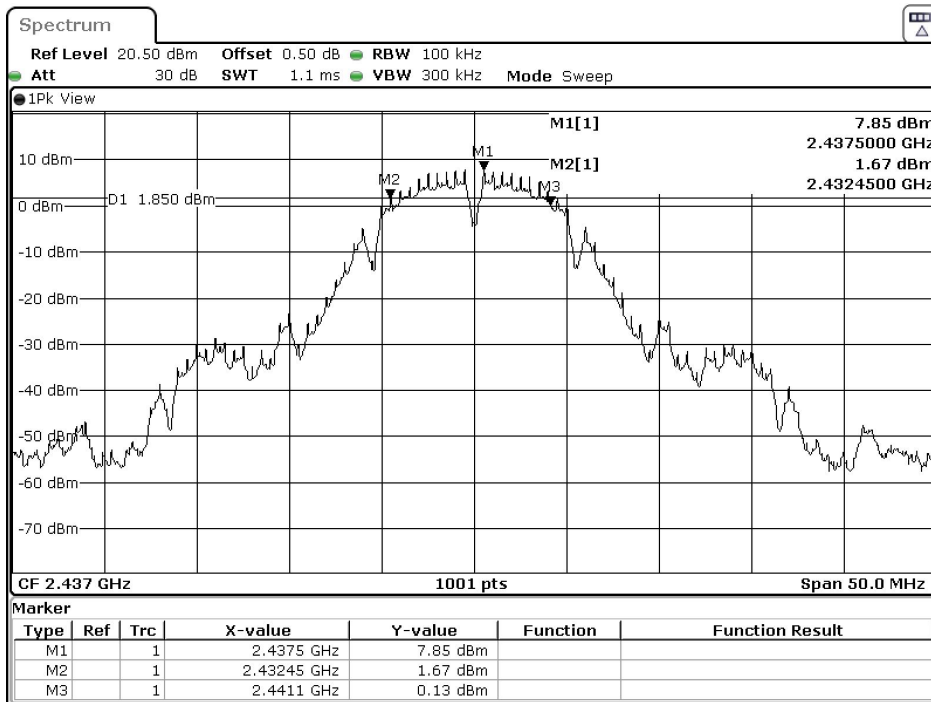
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	9150	>500	Pass
06	2437	8650	>500	Pass
11	2462	9150	>500	Pass

Figure Channel 01:



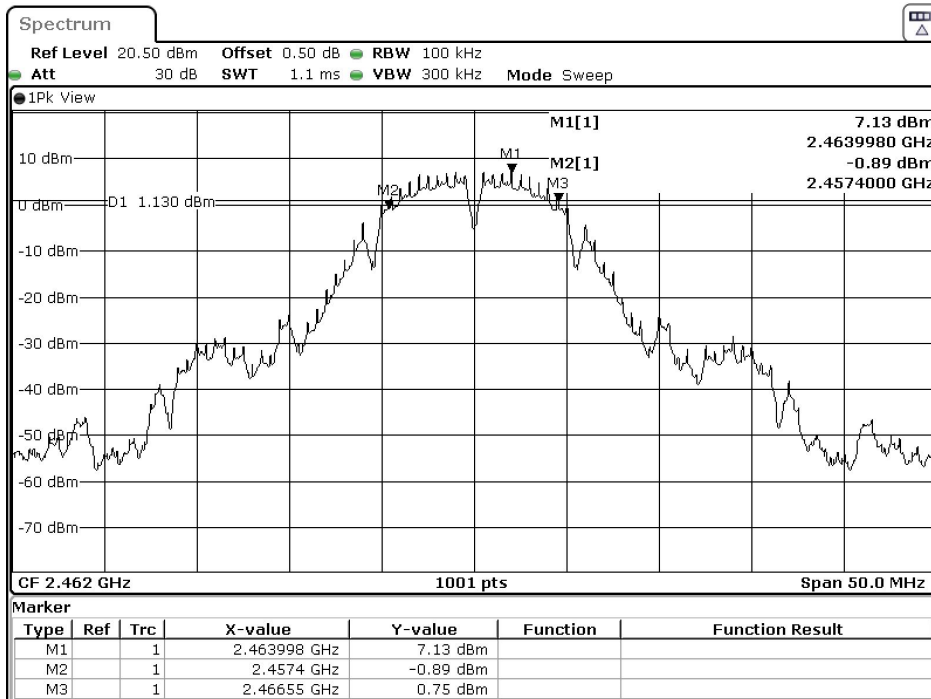
Date: 2.APR.2021 06:14:46

Figure Channel 06:



Date: 2.APR.2021 06:18:19

Figure Channel 11:

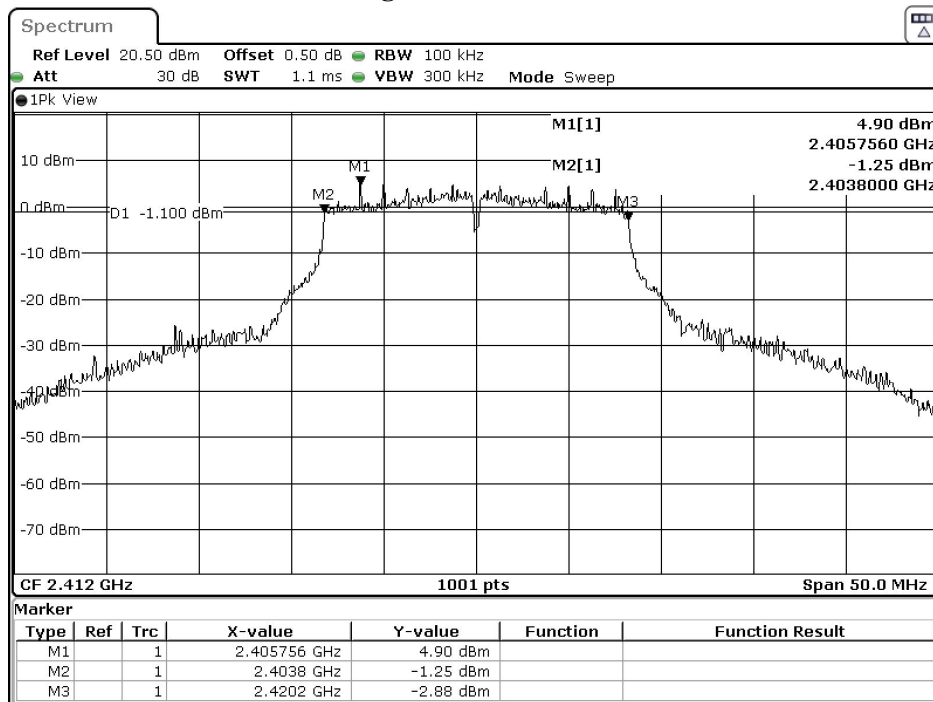


Date: 2.APR.2021 06:22:19

Product : Smart Dashcam
 Test Item : 6dB Bandwidth Data
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

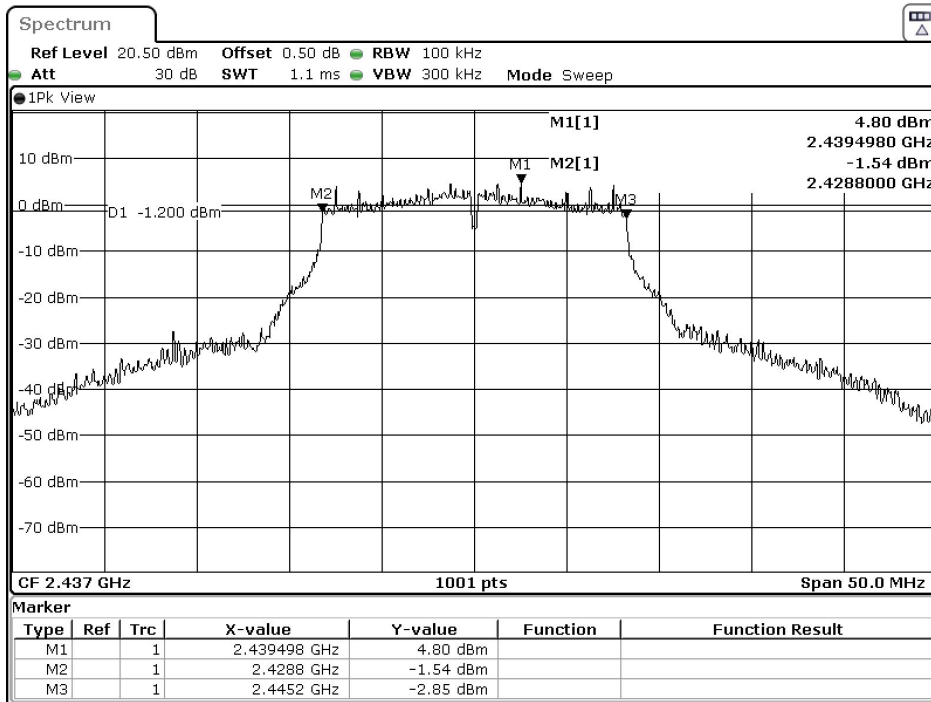
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	16400	>500	Pass
06	2437	16400	>500	Pass
11	2462	16400	>500	Pass

Figure Channel 01:



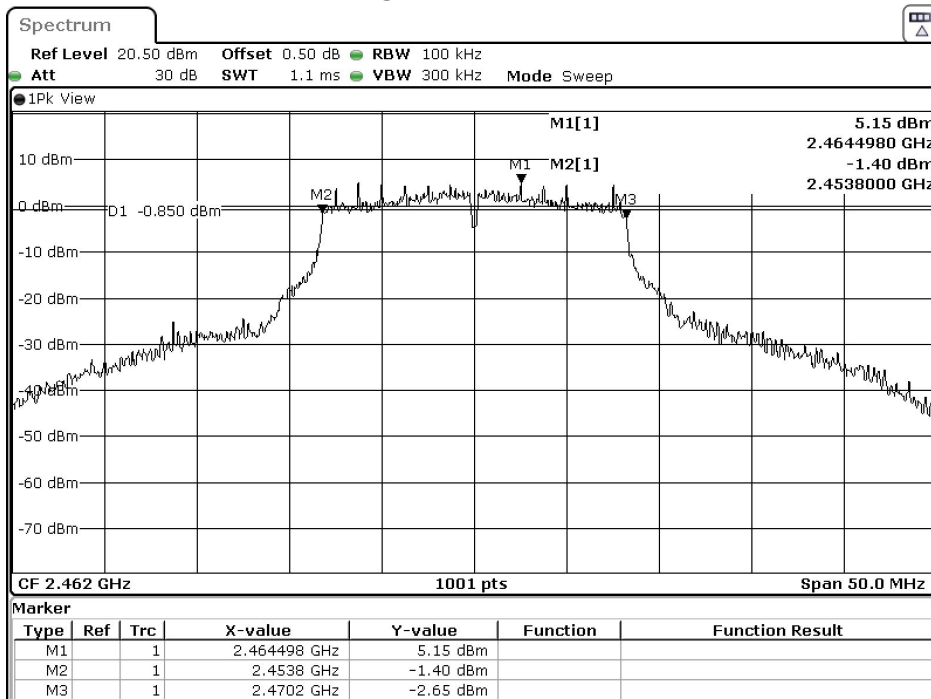
Date: 2.APR.2021 06:26:34

Figure Channel 06:



Date: 2.APR.2021 06:31:40

Figure Channel 11:

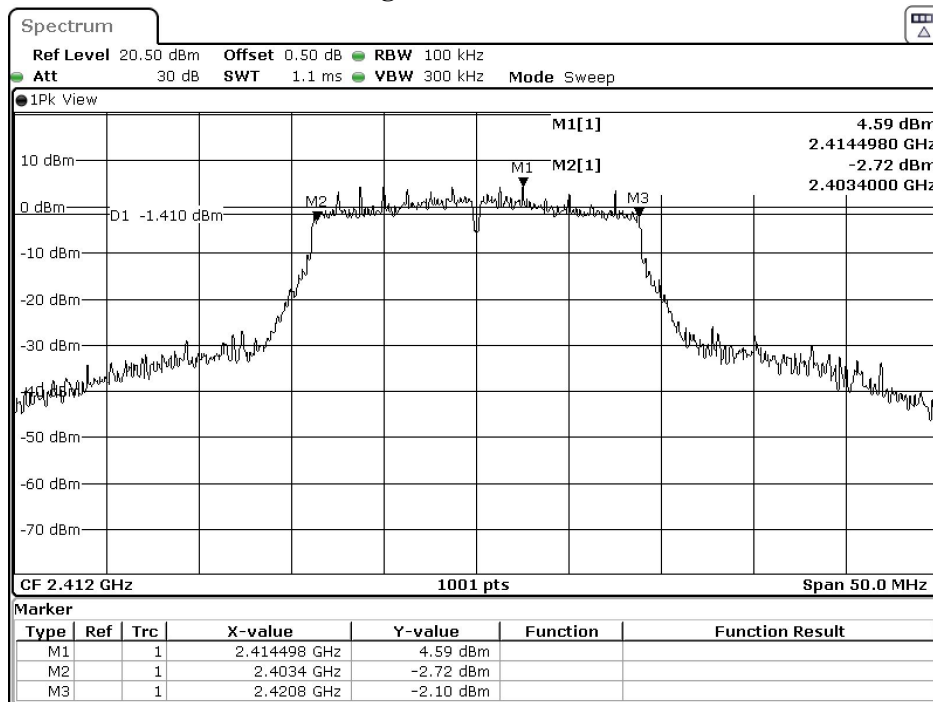


Date: 2.APR.2021 06:35:31

Product : Smart Dashcam
 Test Item : 6dB Bandwidth Data
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

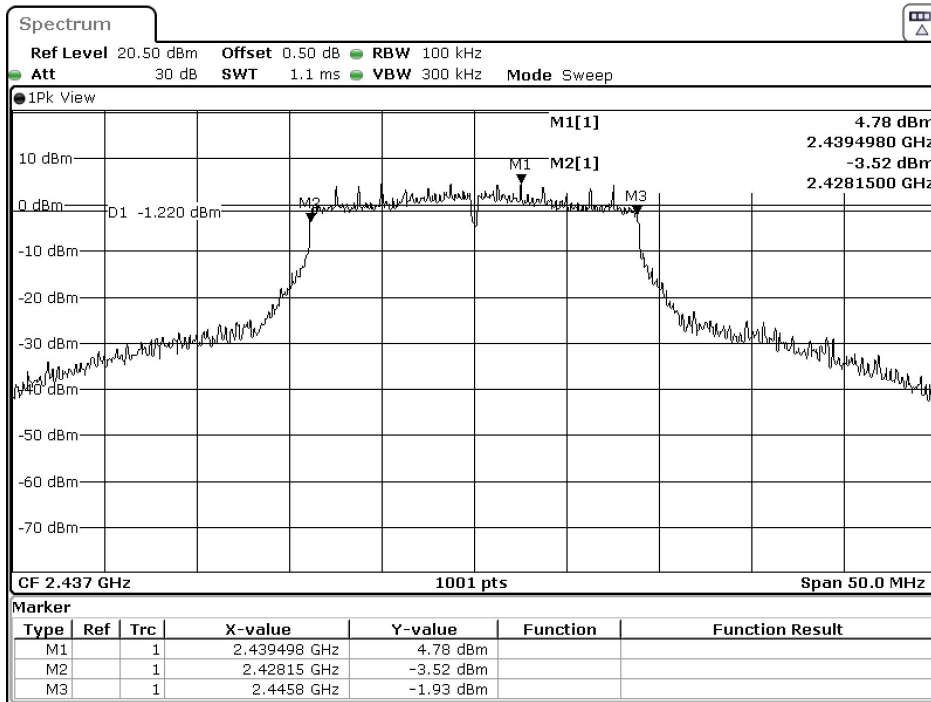
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2412	17400	>500	Pass
06	2437	17650	>500	Pass
11	2462	17400	>500	Pass

Figure Channel 01:



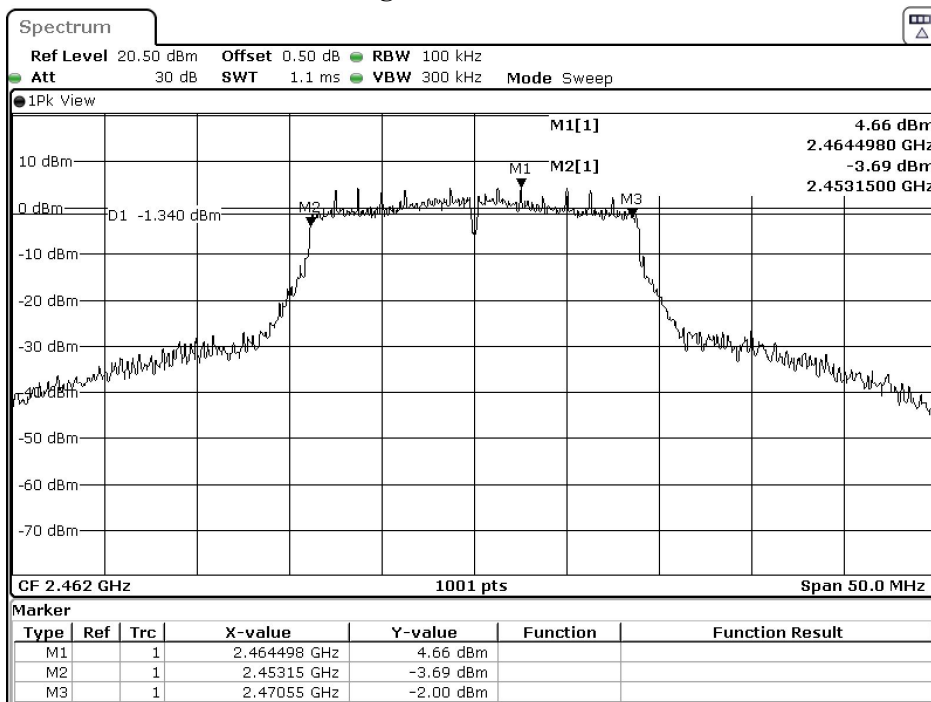
Date: 2.APR.2021 06:39:29

Figure Channel 06:



Date: 2.APR.2021 06:42:35

Figure Channel 11:

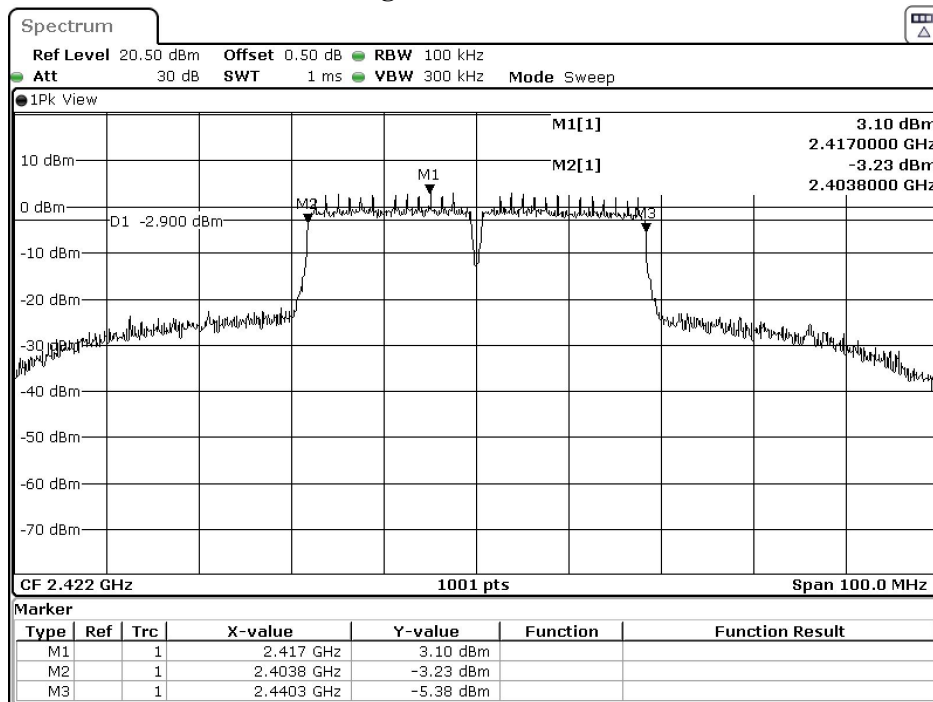


Date: 2.APR.2021 06:48:24

Product : Smart Dashcam
 Test Item : 6dB Bandwidth Data
 Test Mode : Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)

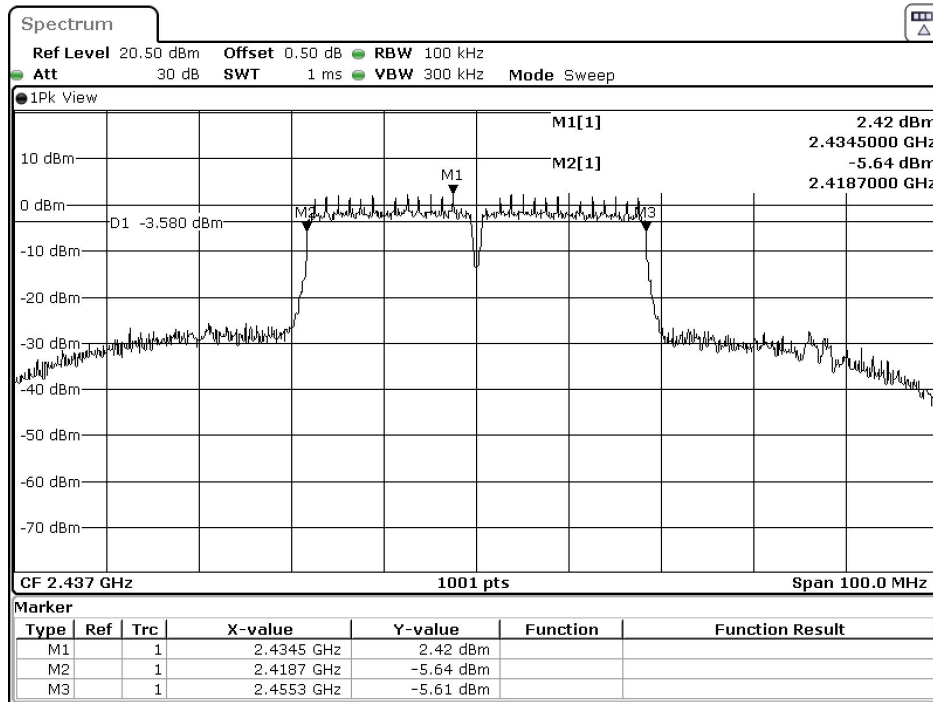
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
03	2422	36500	>500	Pass
06	2437	36600	>500	Pass
09	2452	36500	>500	Pass

Figure Channel 03:



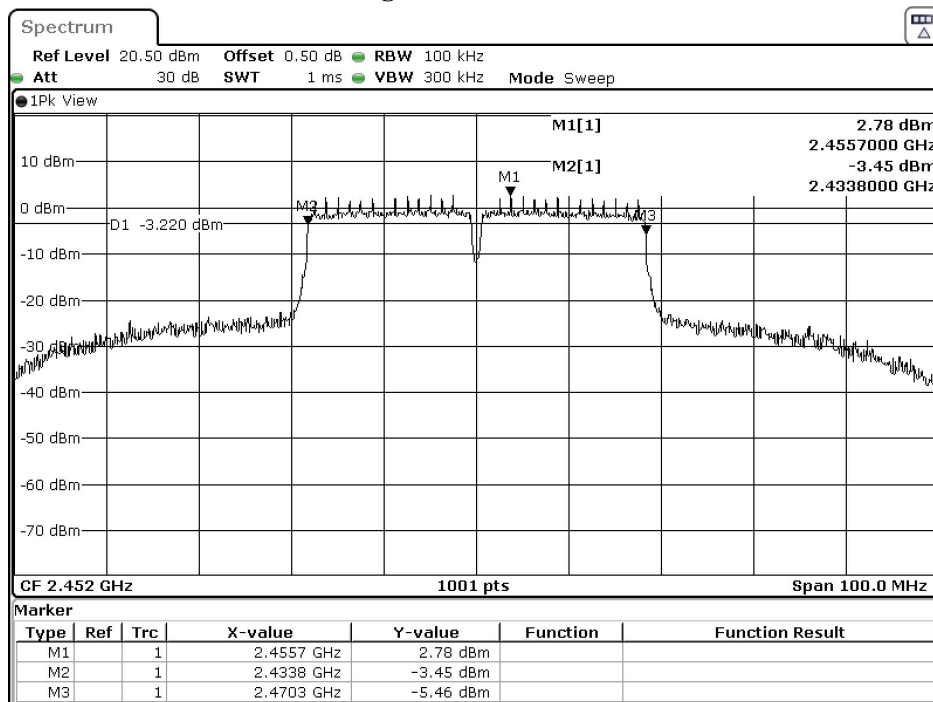
Date: 2.APR.2021 06:55:04

Figure Channel 06:



Date: 2.APR.2021 07:01:16

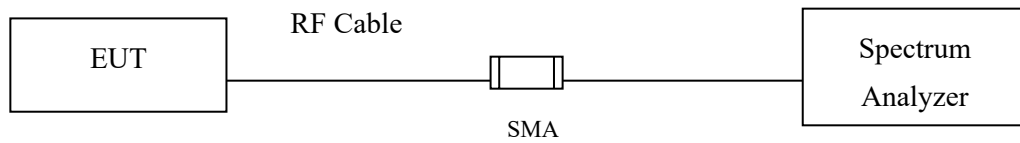
Figure Channel 09:



Date: 2.APR.2021 07:05:21

8. Power Density

8.1. Test Setup



8.2. Limits

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

8.3. Test Procedure

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

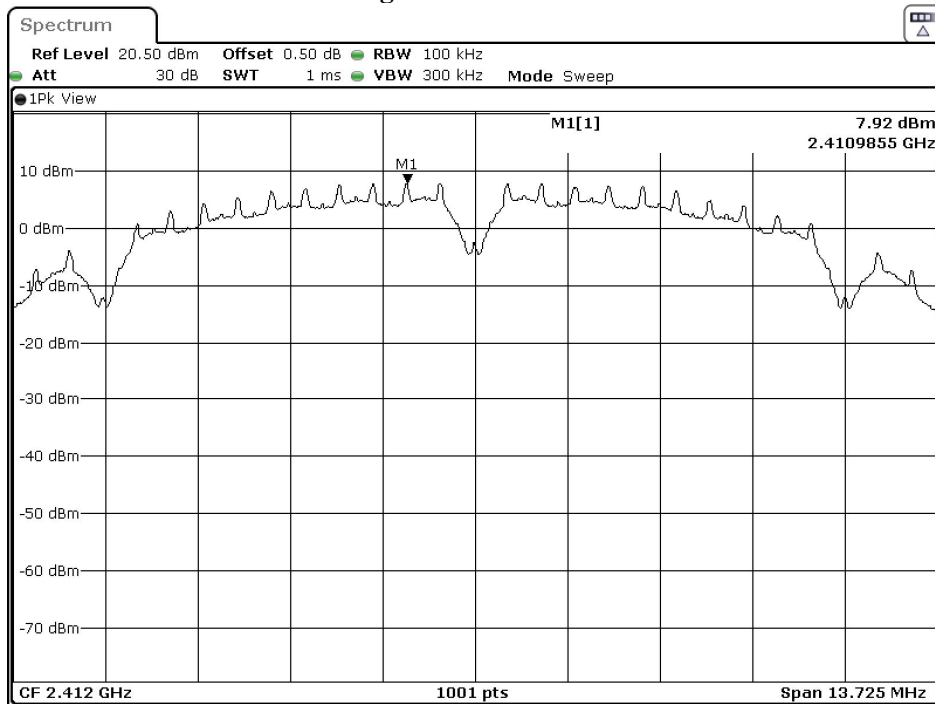
The maximum power spectral density using C63.10 Section 11.10.2 Method PKPSD (peak PSD)

8.4. Test Result of Power Density

Product : Smart Dashcam
 Test Item : Power Density Data
 Test Mode : Mode 1: Transmit (802.11b 1Mbps)

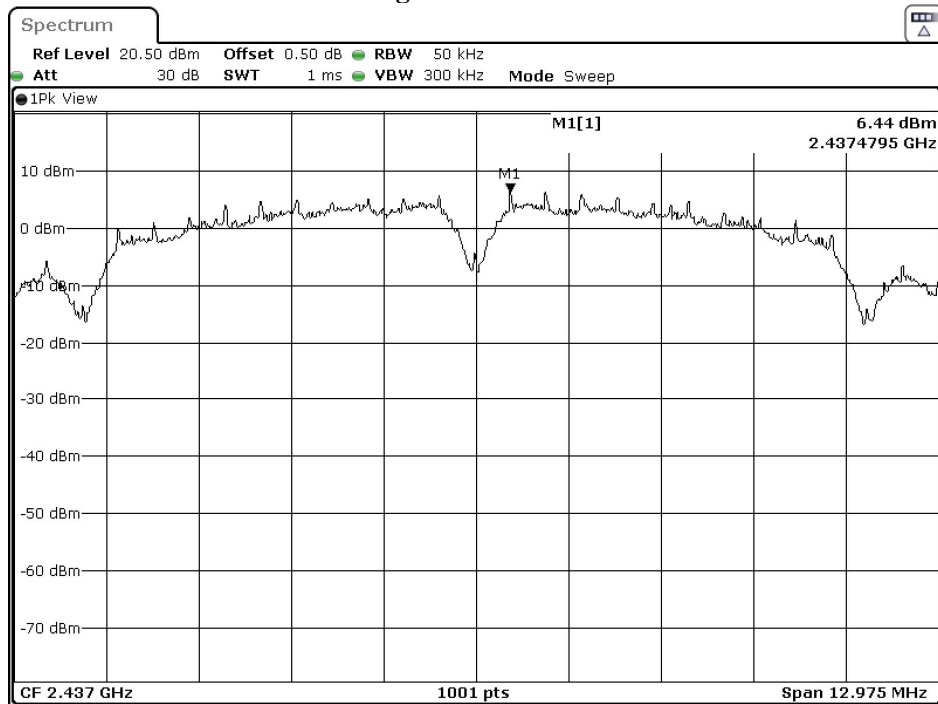
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	7.92	≤ 8dBm	Pass
06	2437	6.44	≤ 8dBm	Pass
11	2462	7.75	≤ 8dBm	Pass

Figure Channel 01:



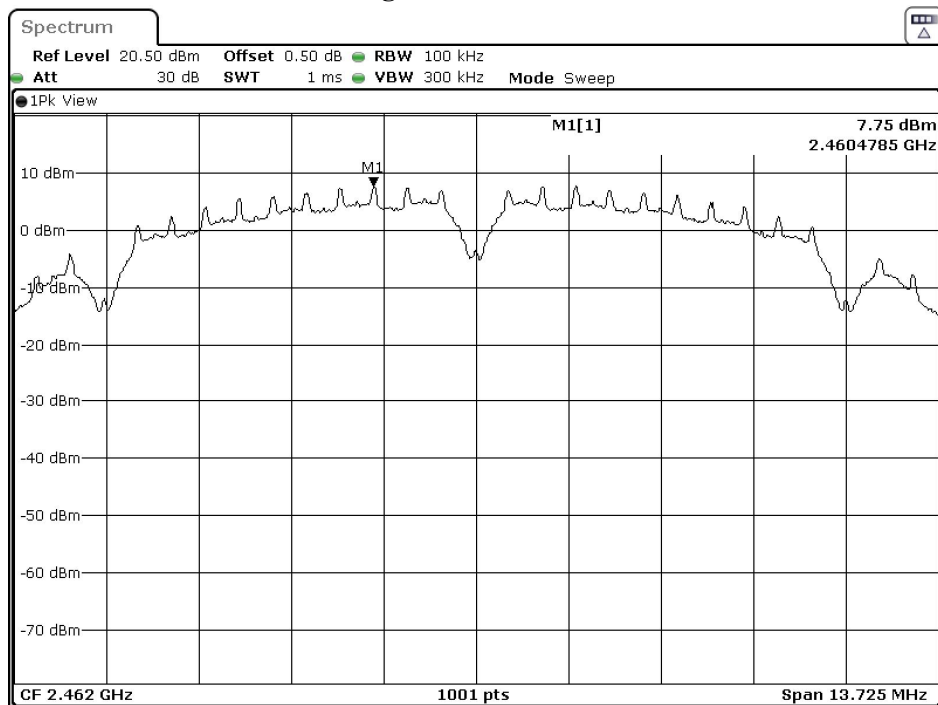
Date: 2.APR.2021 06:15:25

Figure Channel 06:



Date: 2.APR.2021 06:19:31

Figure Channel 11:

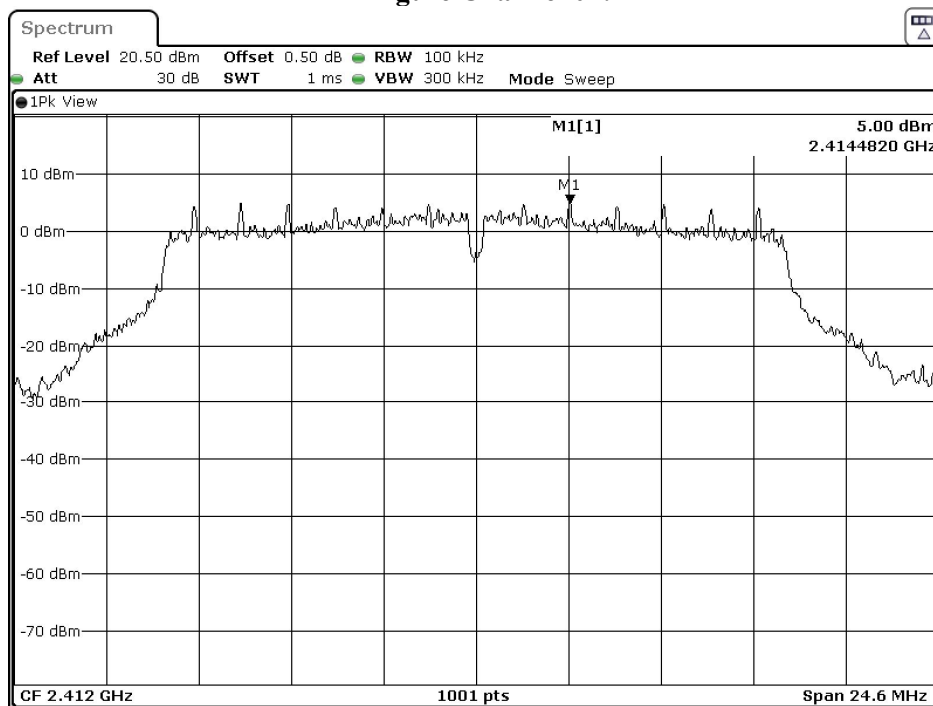


Date: 2.APR.2021 06:22:41

Product : Smart Dashcam
 Test Item : Power Density Data
 Test Mode : Mode 2: Transmit (802.11g 6Mbps)

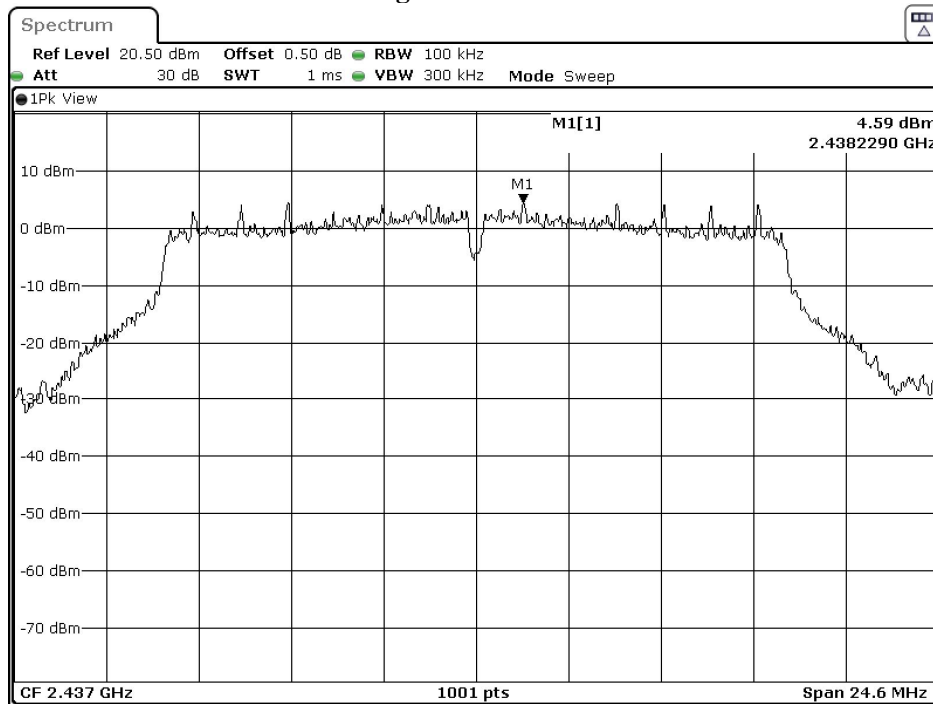
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	5.00	≤ 8dBm	Pass
06	2437	4.59	≤ 8dBm	Pass
11	2462	5.16	≤ 8dBm	Pass

Figure Channel 01:



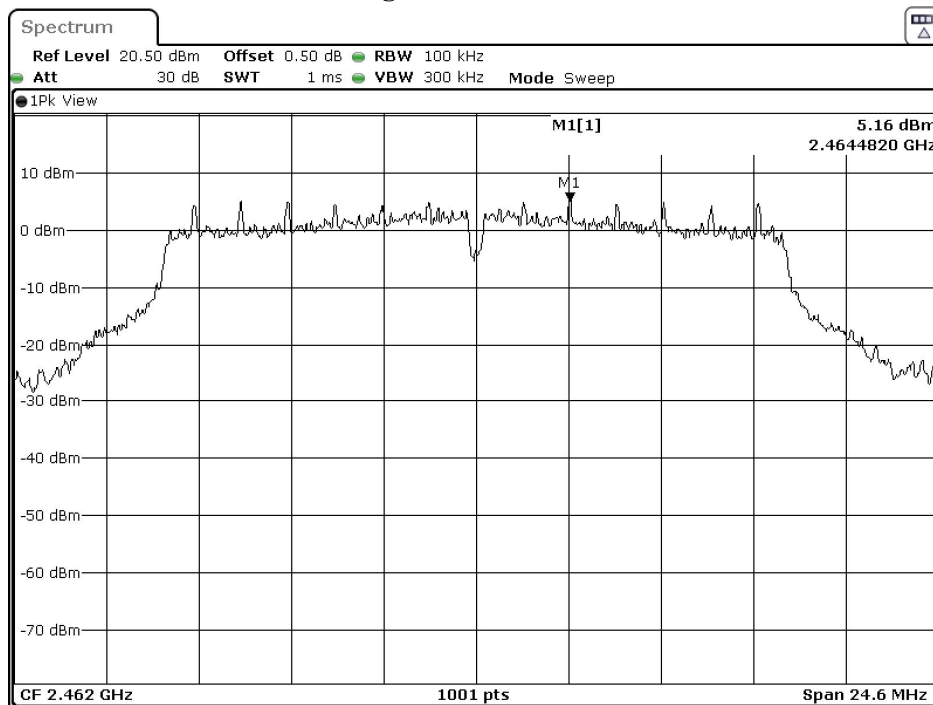
Date: 2.APR.2021 06:28:56

Figure Channel 06:



Date: 2.APR.2021 06:32:03

Figure Channel 11:

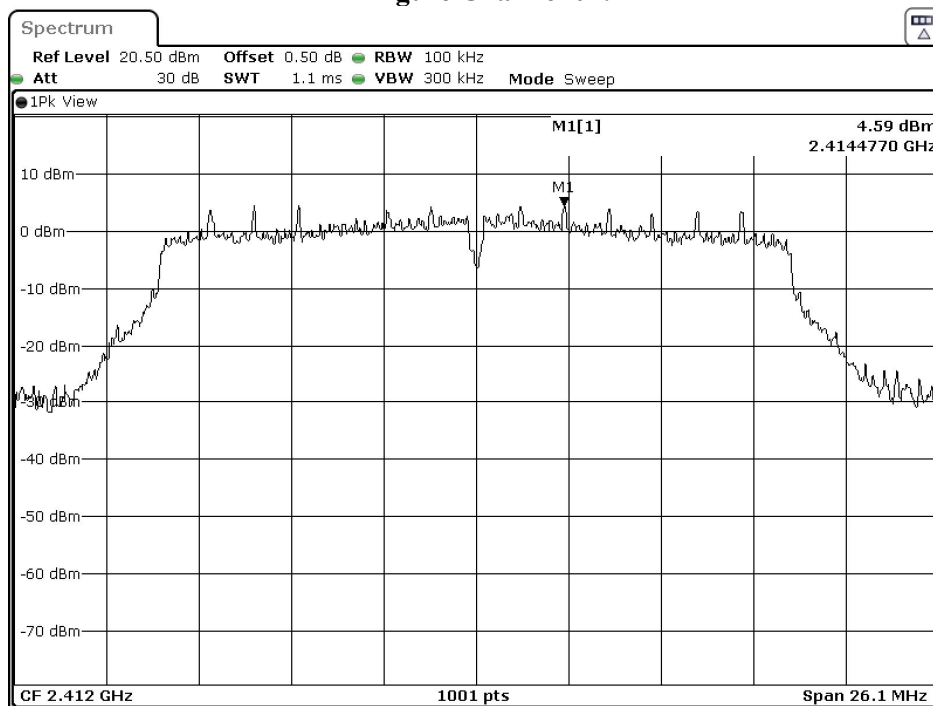


Date: 2.APR.2021 06:35:54

Product : Smart Dashcam
 Test Item : Power Density Data
 Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

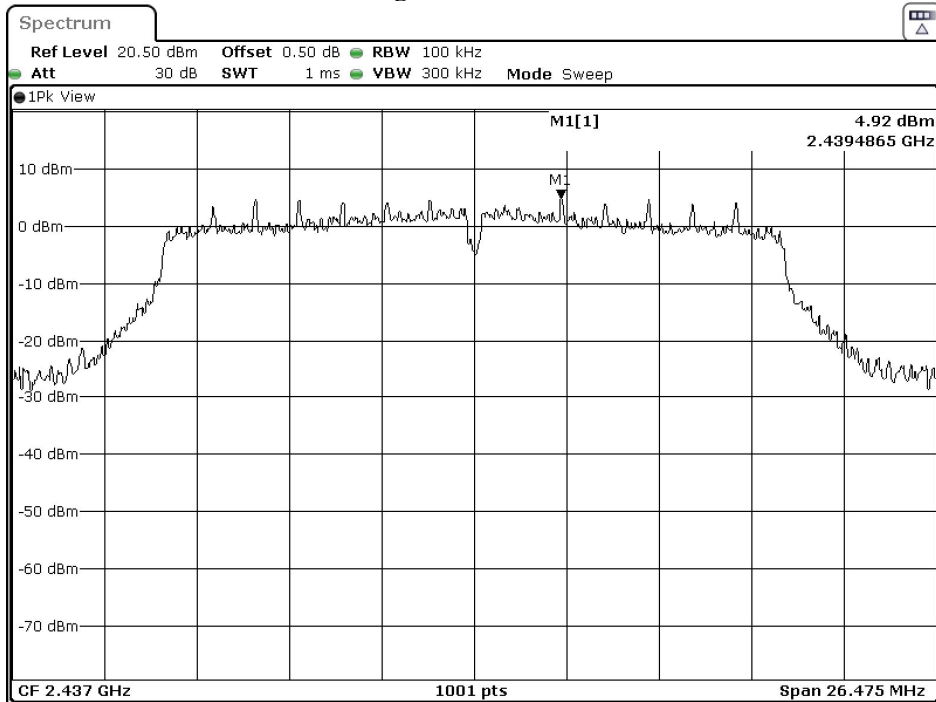
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
01	2412	4.59	≤ 8dBm	Pass
06	2437	4.92	≤ 8dBm	Pass
11	2462	4.67	≤ 8dBm	Pass

Figure Channel 01:



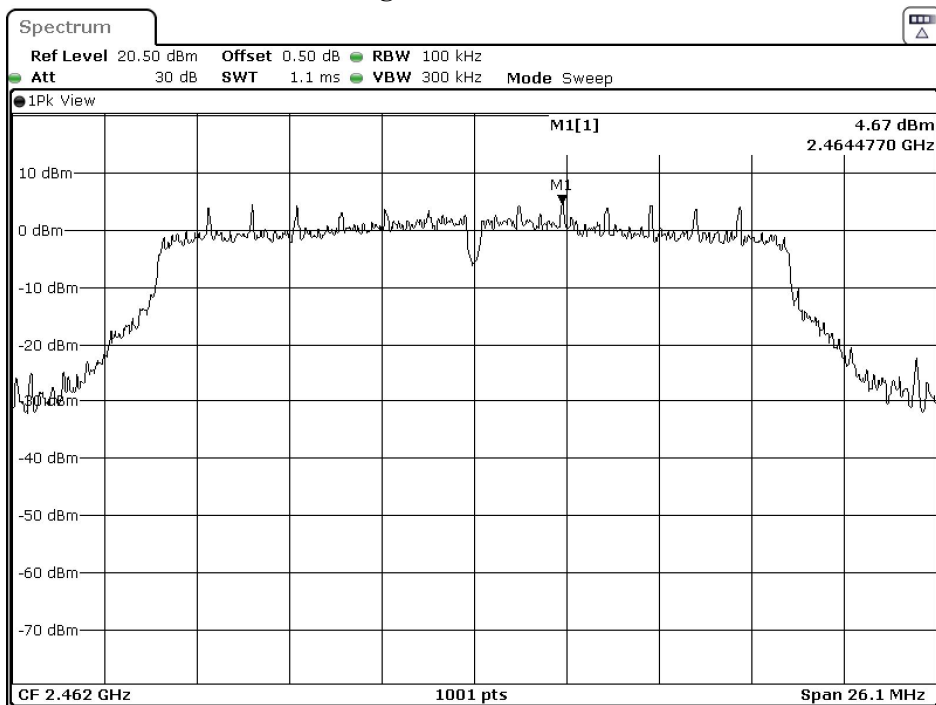
Date: 2.APR.2021 06:39:52

Figure Channel 06:



Date: 2.APR.2021 06:42:57

Figure Channel 11:

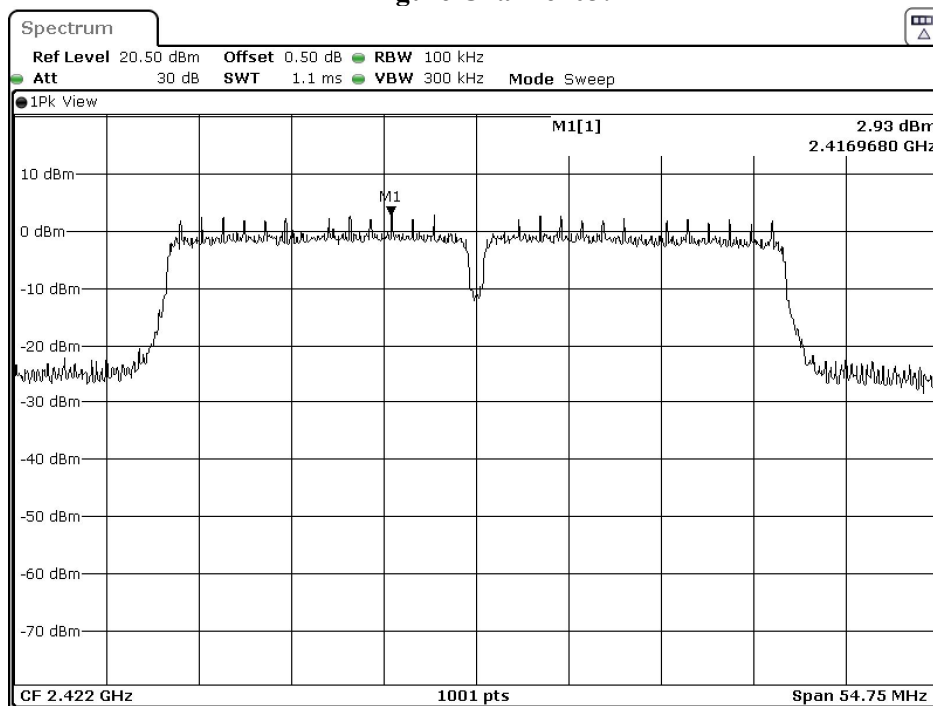


Date: 2.APR.2021 06:48:47

Product : Smart Dashcam
 Test Item : Power Density Data
 Test Mode : Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)

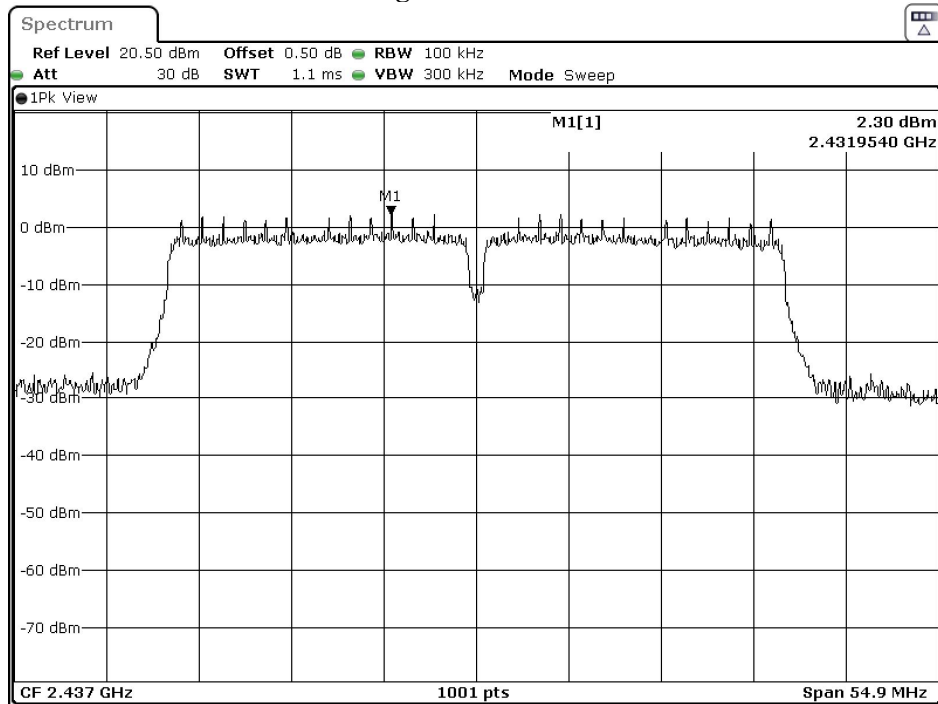
Channel No.	Frequency (MHz)	Measure Level (dBm)	Limit (dBm)	Result
03	2422	2.93	≤ 8dBm	Pass
06	2437	2.30	≤ 8dBm	Pass
09	2452	2.54	≤ 8dBm	Pass

Figure Channel 03:



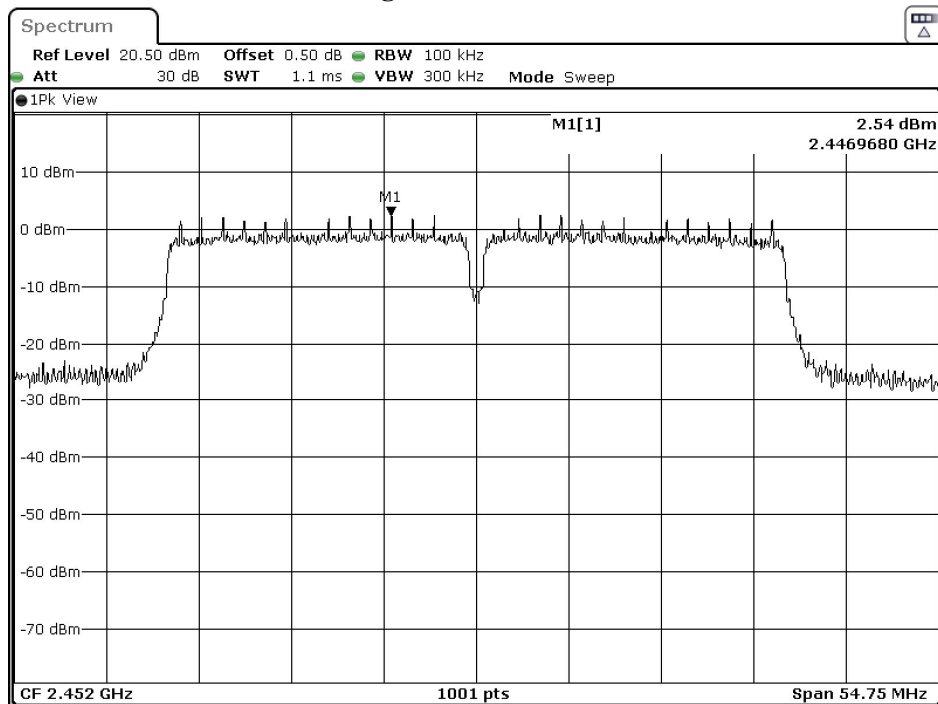
Date: 2.APR.2021 06:55:27

Figure Channel 06:



Date: 2.APR.2021 07:01:39

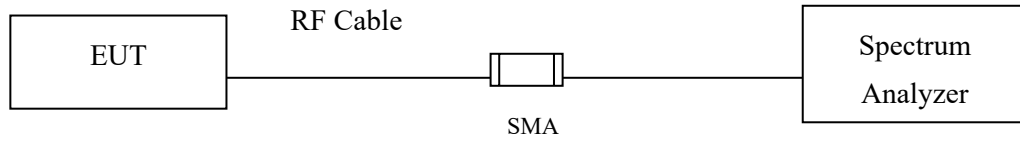
Figure Channel 09:



Date: 2.APR.2021 07:05:44

9. Duty Cycle

9.1. Test Setup



9.2. Test Procedure

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

9.3. Test Result of Duty Cycle

Product : Smart Dashcam
 Test Item : Duty Cycle
 Test Mode : Transmit

Duty Cycle Formula:

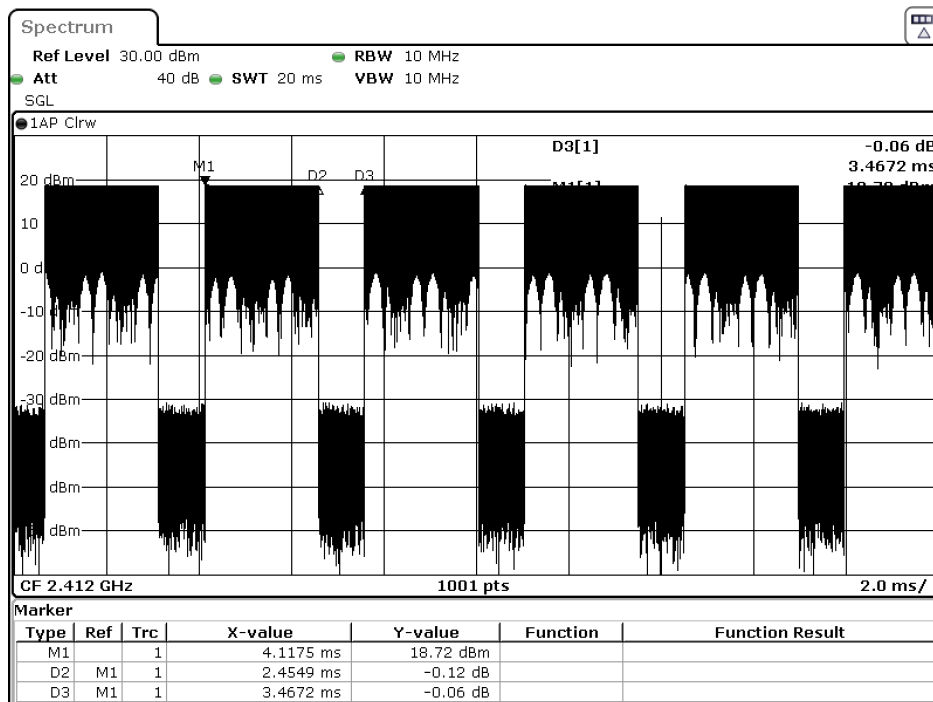
$$\text{Duty Cycle} = \text{Ton} / (\text{Ton} + \text{Toff})$$

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

Results:

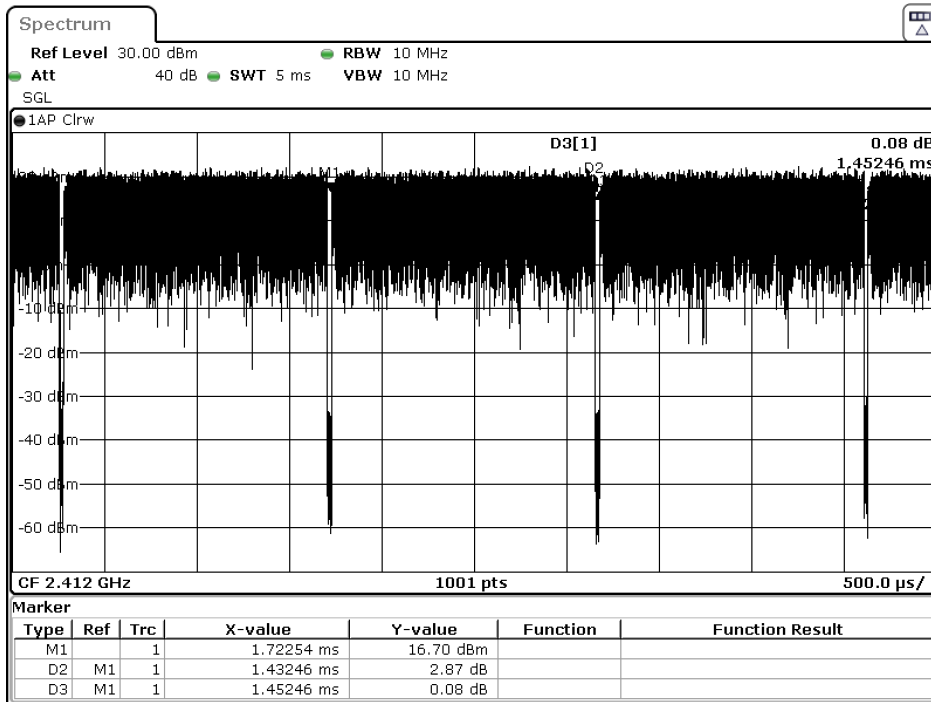
2.4GHz band	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	Duty Factor (dB)
802.11b	2.4549	3.4672	70.80	1.50
802.11g	1.4324	1.4524	98.62	0.06
802.11n20	1.3424	1.3674	98.17	0.08
802.11n40	0.6674	0.6874	97.09	0.13

802.11b



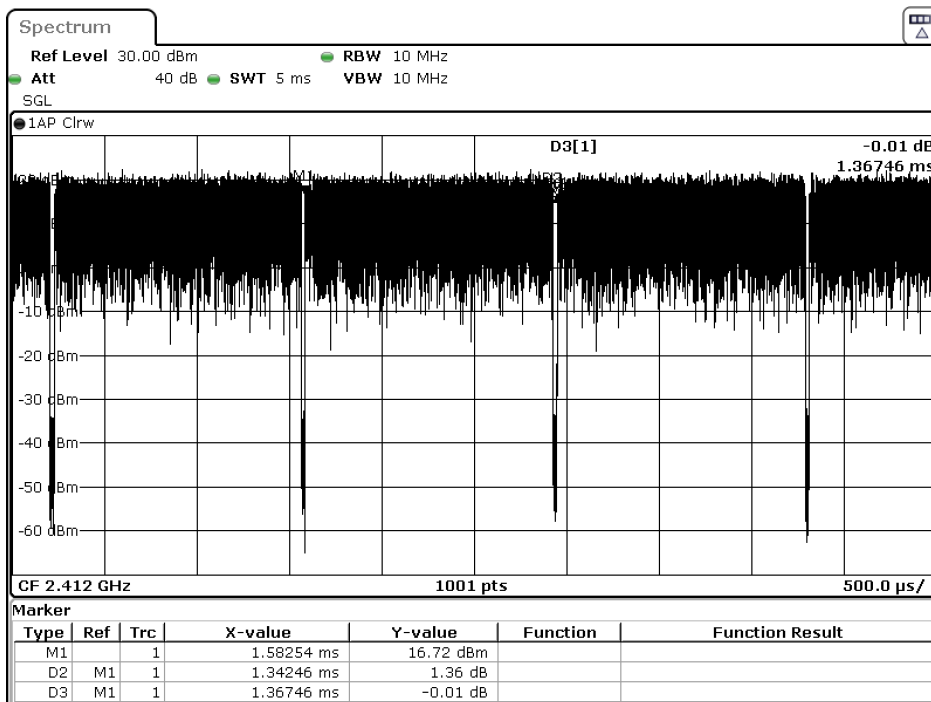
Date: 2.APR.2021 05:22:14

802.11g



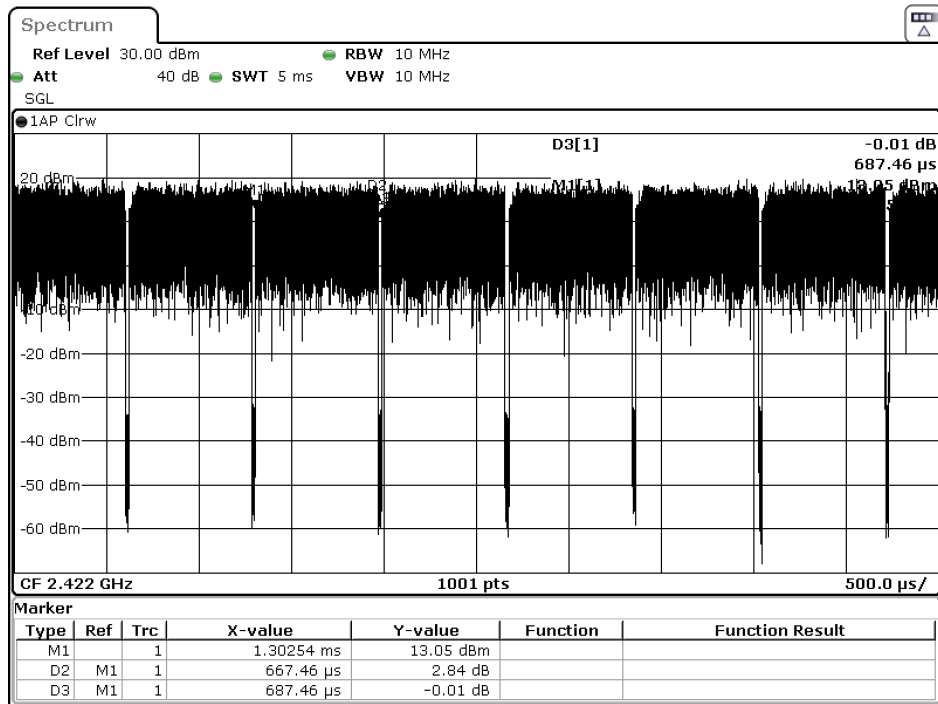
Date: 2.APR.2021 05:24:39

802.11n20



Date: 2.APR.2021 05:26:00

802.11n40



Date: 2.APR.2021 05:27:40

10. EMI Reduction Method During Compliance Testing

No modification was made during testing.