

TEST REPORT

FCC ID.	2AWC3-MG-S02	
Test Report No.	TCT211105E038	
Date of issue	Nov. 23, 2021	
Testing laboratory	SHENZHEN TONGCE TESTING LAB	
Testing location/ address:	TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People's Republic of China	
Applicant's name	UBRIDGE Co., Ltd.	
Address	1-1704, Ace Hightech City, 775, Gyeongin-ro, Yeongdeungpo-gu, Seoul, South Korea	
Manufacturer's name ...	Shenzhen Tomato Technology Co., Ltd	
Address	Room 1106, Huatong Building, SunGangDong Road, LuoHu District, Shenzhen, Guangdong Province, P.R.China 518022	
Standard(s)	FCC CFR Title 47 Part 15 Subpart E Section 15.407 KDB 789033 D02 General U-NII Test Procedures New Rules v02r01	
Test item description	Android dongle	
Trade Mark	N/A	
Model/Type reference	MG-S02	
Rating(s)	DC 5V	
Date of receipt of test item	Nov. 05, 2021	
Date (s) of performance of test	Nov. 05, 2021 - Nov. 23, 2021	
Tested by (+signature) ...	Aaron Mo	<i>Aaron Mo</i>
Check by (+signature)	Beryl Zhao	<i>Beryl Zhao</i>
Approved by (+signature) :	Tomsin	<i>Tomsin</i>

General disclaimer:

This report shall not be reproduced except in full, without the written approval of SHENZHEN TONGCE TESTING LAB. This document may be altered or revised by SHENZHEN TONGCE TESTING LAB personnel only, and shall be noted in the revision section of the document. The test results in the report only apply to the tested sample.

Table of Contents

1. General Product Information	3
1.1. EUT description	3
1.2. Model(s) list.....	3
1.3. Test Frequency.....	3
2. Test Result Summary	4
3. General Information.....	5
3.1. Test environment and mode.....	5
3.2. Description of Support Units.....	6
4. Facilities and Accreditations	7
4.1. Facilities	7
4.2. Location	7
4.3. Measurement Uncertainty.....	7
5. Test Results and Measurement Data	8
5.1. Antenna requirement	8
5.2. Conducted Emission.....	9
5.3. Maximum Conducted Output Power.....	13
5.4. 6dB Emission Bandwidth.....	15
5.5. 26dB Bandwidth and 99% Occupied Bandwidth	16
5.6. Power Spectral Density.....	17
5.7. Band edge	18
5.8. Unwanted Emission	28
5.9. Frequency Stability Measurement	40
Appendix A: Test Result of Conducted Test	
Appendix B: Photographs of Test Setup	
Appendix C: Photographs of EUT	

1. General Product Information

1.1. EUT description

Test item description	Android dongle
Model/Type reference.....	MG-S02
Sample Number.....	TCT211105E019-0101
Operation Frequency	Band 1: 5150 MHz -5250 MHz Band 3: 5725 MHz -5850 MHz
Channel Bandwidth.....	802.11a: 20MHz 802.11n: 20MHz, 40MHz 802.11ac: 20MHz, 40MHz, 80MHz
Modulation Technology	Orthogonal Frequency Division Multiplexing(OFDM)
Modulation Type	256QAM, 64QAM, 16QAM, BPSK, QPSK
Antenna Type.....	Internal Antenna
Antenna Gain.....	2.14dBi
Rating(s).....	DC 5V

Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

1.2. Model(s) list

None.

1.3. Test Frequency

Band 1

20MHz		40MHz		80MHz	
Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180	38	5190	42	5210
40	5200	46	5230		
48	5240				

Band 3

20MHz		40MHz		80MHz	
Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745	151	5755	155	5775
157	5785	159	5795		
165	5825				

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203	PASS
AC Power Line Conducted Emission	§15.207	PASS
Maximum Conducted Output Power	§15.407(a)	PASS
6dB Emission Bandwidth	§15.407(a)	PASS
26dB Emission Bandwidth& 99% Occupied Bandwidth	§15.407(a)	PASS
Power Spectral Density	§15.407(a)	PASS
Restricted Bands around fundamental frequency	§15.407(a)	PASS
Radiated Emission	§15.407(a)	PASS
Frequency Stability	§15.407(g)	PASS

Note:

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.

3. General Information

3.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations
The sample was placed 0.8m/1.5m for blow/above 1GHz above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.	

We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:

Per-scan all kind of data rate in lowest channel, and found the follow list which it was worst case.

Mode	Data rate
802.11a	6 Mbps
802.11n(HT20)	6.5 Mbps
802.11n(HT40)	13.5 Mbps
802.11ac(VHT20)	6.5 Mbps
802.11ac(VHT40)	13.5 Mbps
802.11ac(VHT80)	29.3 Mbps

3.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
Notebook Computer	XiaoXin CHAO5000	PF0WZYD9	/	Lenovo
Adapter	ADLX65CCGC2A	8SSA10M42805C1 SG79N12T6	/	Lenovo

Note:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.
3. For conducted measurements (Output Power, Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

4. Facilities and Accreditations

4.1. Facilities

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

- FCC - Registration No.: 645098

SHENZHEN TONGCE TESTING LAB

Designation Number: CN1205

The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1

SHENZHEN TONGCE TESTING LAB

CAB identifier: CN0031

The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

4.2. Location

SHENZHEN TONGCE TESTING LAB

Address: TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

4.3. Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	± 3.10 dB
2	RF power, conducted	± 0.12 dB
3	Spurious emissions, conducted	± 0.11 dB
4	All emissions, radiated(<1 GHz)	± 4.56 dB
5	All emissions, radiated(1 GHz - 18 GHz)	± 4.22 dB
6	All emissions, radiated(18 GHz- 40 GHz)	± 4.36 dB

5. Test Results and Measurement Data

5.1. Antenna requirement

Standard requirement:

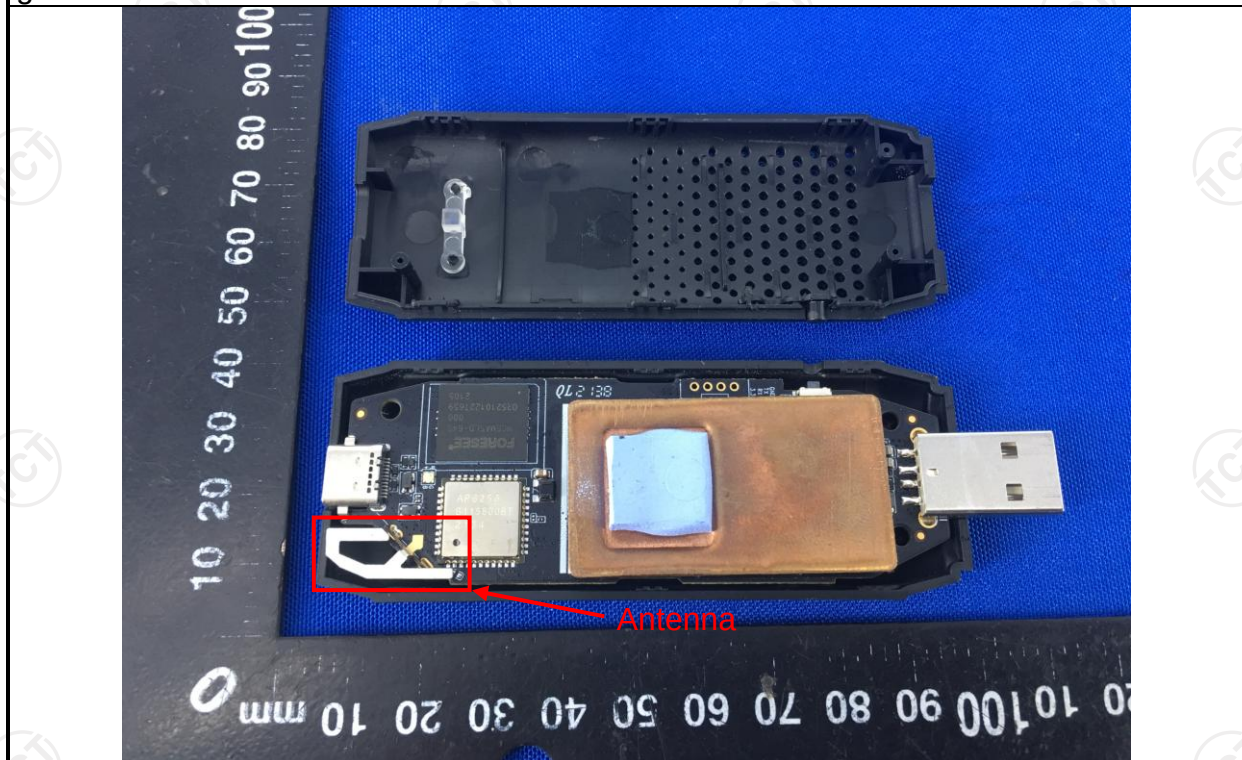
FCC Part15 C Section 15.203

15.203 requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

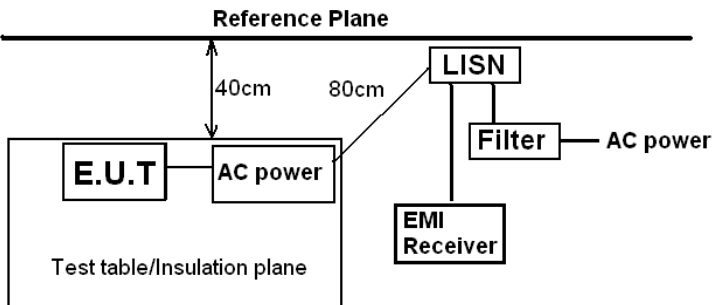
E.U.T Antenna:

The WIFI antenna is internal antenna which permanently attached, and the best case gain of the antenna is 2.14Bi.



5.2. Conducted Emission

5.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.10:2013														
Frequency Range:	150 kHz to 30 MHz														
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto														
Limits:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test Setup:	Reference Plane  Remark E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m														
Test Mode:	Tx Mode														
Test Procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. 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 C63.10: 2013 on conducted measurement.														
Test Result:	PASS														

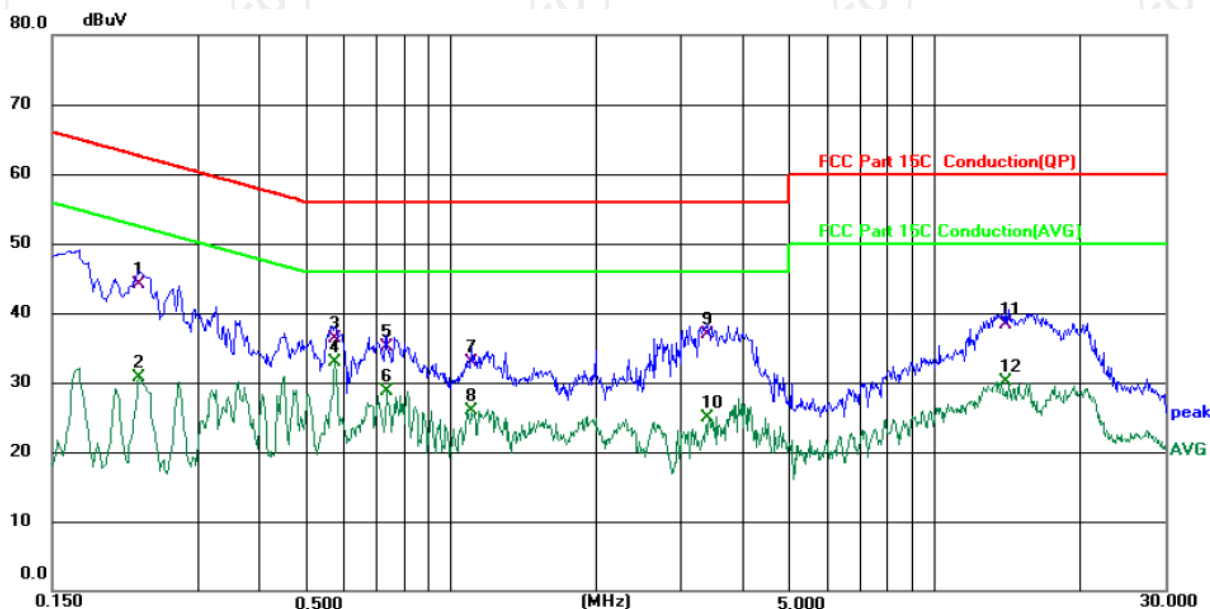
5.2.2. Test Instruments

Conducted Emission Shielding Room Test Site (843)				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI3	100898	Jul. 07, 2022
Line Impedance Stabilisation Newtork(LISN)	Schwarzbeck	NSLK 8126	8126453	Mar. 11, 2022
Line-5	TCT	CE-05	N/A	Jul. 07, 2022
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

5.2.3. Test data

Please refer to following diagram for individual

Conducted Emission on Line Terminal of the power line (150 kHz to 30MHz)



Site 844 Shielding Room

Phase: L1

Temperature: 25 (°C)

Humidity: 55 %

Limit: FCC Part 15C Conduction(QP)

Power: DC 5 V(Notebook Computer Input AC 120 V/60 Hz)

No.	Mk.	Freq. MHz	Reading Level dBμV	Correct Factor dB	Measure- ment dBμV	Limit dBμV	Over dB	Detector	Comment
1		0.2260	34.87	9.32	44.19	62.60	-18.41	QP	
2		0.2260	21.42	9.32	30.74	52.60	-21.86	AVG	
3		0.5776	27.06	9.22	36.28	56.00	-19.72	QP	
4	*	0.5776	23.68	9.22	32.90	46.00	-13.10	AVG	
5		0.7378	25.91	9.22	35.13	56.00	-20.87	QP	
6		0.7378	19.44	9.22	28.66	46.00	-17.34	AVG	
7		1.1060	23.64	9.31	32.95	56.00	-23.05	QP	
8		1.1060	16.54	9.31	25.85	46.00	-20.15	AVG	
9		3.3820	27.51	9.43	36.94	56.00	-19.06	QP	
10		3.3820	15.53	9.43	24.96	46.00	-21.04	AVG	
11		14.0220	28.63	9.66	38.29	60.00	-21.71	QP	
12		14.0220	20.35	9.66	30.01	50.00	-19.99	AVG	

Note:

Freq. = Emission frequency in MHz

Reading level (dBμV) = Receiver reading

Corr. Factor (dB) = LISN factor + Cable loss

Measurement (dBμV) = Reading level (dBμV) + Corr. Factor (dB)

Limit (dBμV) = Limit stated in standard

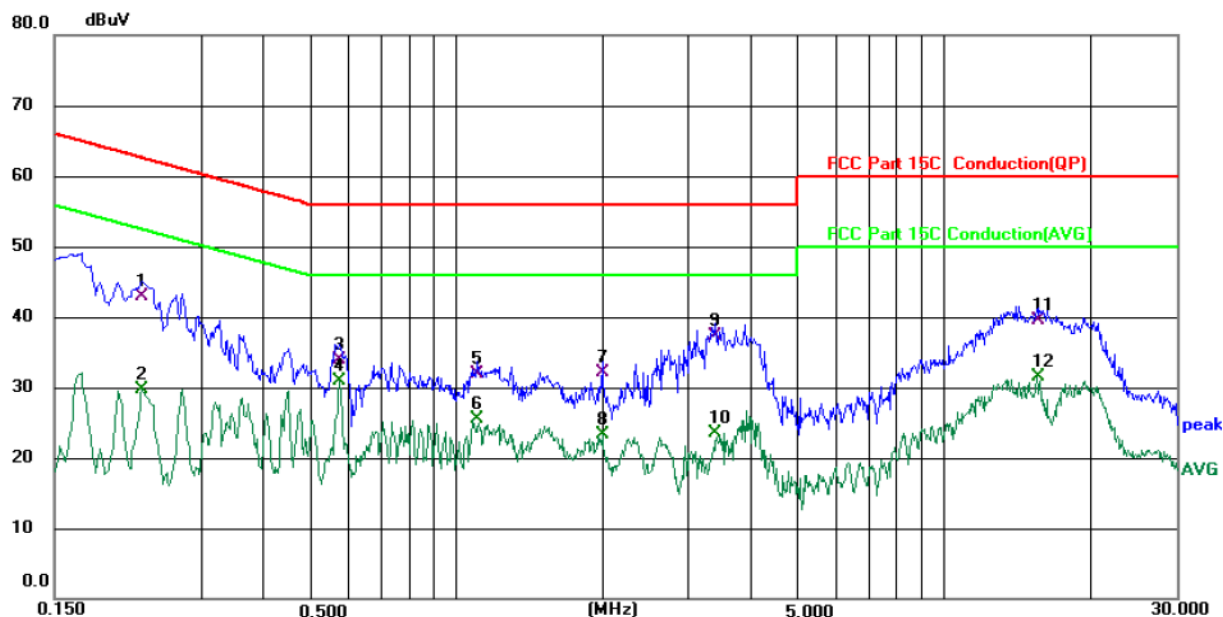
Margin (dB) = Measurement (dBμV) – Limits (dBμV)

Q.P. =Quasi-Peak

AVG =average

* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

Conducted Emission on Neutral Terminal of the power line (150 kHz to 30MHz)



Site 844 Shielding Room

Phase: N

Temperature: 25 (°C)

Humidity: 55 %

Limit: FCC Part 15C Conduction(QP)

Power: DC 5 V(Notebook Computer Input AC 120 V/60 Hz)

No.	Mk.	Freq. MHz	Reading Level dBμV	Correct Factor dB	Measure- ment dBμV	Limit dBμV	Over dB	Detector	Comment
1		0.2260	33.57	9.32	42.89	62.60	-19.71	QP	
2		0.2260	20.42	9.32	29.74	52.60	-22.86	AVG	
3		0.5776	24.73	9.22	33.95	56.00	-22.05	QP	
4	*	0.5776	21.68	9.22	30.90	46.00	-15.10	AVG	
5		1.1060	22.69	9.31	32.00	56.00	-24.00	QP	
6		1.1060	16.28	9.31	25.59	46.00	-20.41	AVG	
7		1.9979	22.74	9.38	32.12	56.00	-23.88	QP	
8		1.9979	14.02	9.38	23.40	46.00	-22.60	AVG	
9		3.3820	27.84	9.43	37.27	56.00	-18.73	QP	
10		3.3820	14.14	9.43	23.57	46.00	-22.43	AVG	
11		15.6100	29.73	9.68	39.41	60.00	-20.59	QP	
12		15.6100	21.79	9.68	31.47	50.00	-18.53	AVG	

Note:

Freq. = Emission frequency in MHz

Reading level (dBμV) = Receiver reading

Corr. Factor (dB) = LISN factor + Cable loss

Measurement (dBμV) = Reading level (dBμV) + Corr. Factor (dB)

Limit (dBμV) = Limit stated in standard

Margin (dB) = Measurement (dBμV) – Limits (dBμV)

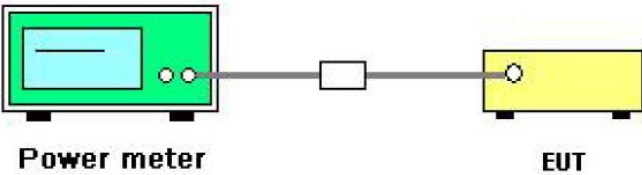
Q.P. =Quasi-Peak

AVG =average

* is meaning the worst frequency has been tested in the frequency range 150 kHz to 30MHz.

5.3. Maximum Conducted Output Power

5.3.1. Test Specification

Test Requirement:	FCC Part15 E Section 15.407(a)& Part 2 J Section 2.1046										
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section E										
Limit:	<table border="1"> <thead> <tr> <th>Frequency Band (MHz)</th><th>Limit</th></tr> </thead> <tbody> <tr> <td>5180 - 5240</td><td>24dBm(250mW) for client device</td></tr> <tr> <td>5260 - 5320</td><td>24dBm(250mW) or 11 dBm + 10 log B, B is the 26 dB emission bandwidth in megahertz</td></tr> <tr> <td>5470 - 5725</td><td>24dBm(250mW) or 11 dBm + 10 log B, B is the 26 dB emission bandwidth in megahertz</td></tr> <tr> <td>5745 - 5825</td><td>30dBm(1W)</td></tr> </tbody> </table>	Frequency Band (MHz)	Limit	5180 - 5240	24dBm(250mW) for client device	5260 - 5320	24dBm(250mW) or 11 dBm + 10 log B, B is the 26 dB emission bandwidth in megahertz	5470 - 5725	24dBm(250mW) or 11 dBm + 10 log B, B is the 26 dB emission bandwidth in megahertz	5745 - 5825	30dBm(1W)
Frequency Band (MHz)	Limit										
5180 - 5240	24dBm(250mW) for client device										
5260 - 5320	24dBm(250mW) or 11 dBm + 10 log B, B is the 26 dB emission bandwidth in megahertz										
5470 - 5725	24dBm(250mW) or 11 dBm + 10 log B, B is the 26 dB emission bandwidth in megahertz										
5745 - 5825	30dBm(1W)										
Test Setup:	 The diagram illustrates the test setup. On the left is a green box labeled 'Power meter'. A cable connects it to a small white box labeled 'Attenuator'. Another cable connects the attenuator to a yellow box labeled 'EUT' (Equipment Under Test).										
Test Mode:	Transmitting mode with modulation										
Test Procedure:	1. The testing follows the Measurement Procedure of KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section E, 3, a 2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enable the EUT transmit continuously. 4. Measure the conducted output power and record the results in the test report.										
Test Result:	PASS										
Remark:	Conducted output power= measurement power +10log(1/x) X is duty cycle=1, so 10log(1/1)=0 Conducted output power= measurement power										

5.3.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Power Meter	Agilent	E4418B	GB43312526	Jul. 07, 2022
Power Sensor	Agilent	E9301A	MY41497725	Jul. 07, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022

5.4. 6dB Emission Bandwidth

5.4.1. Test Specification

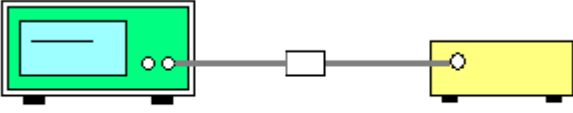
Test Requirement:	FCC CFR47 Part 15 Section 15.407(e)& Part 2 J Section 2.1049
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C
Limit:	>500kHz
Test Setup:	 Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section C 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. 4. Measure and record the results in the test report.
Test Result:	PASS

5.4.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022

5.5. 26dB Bandwidth and 99% Occupied Bandwidth

5.5.1. Test Specification

Test Requirement:	47 CFR Part 15C Section 15.407 (a)& Part 2 J Section 2.1049
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section D
Limit:	No restriction limits
Test Setup:	 Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section D 2. Set to the maximum power setting and enable the EUT transmit continuously. 3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. 4. Measure and record the results in the test report.
Test Result:	PASS

5.5.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022

5.6. Power Spectral Density

5.6.1. Test Specification

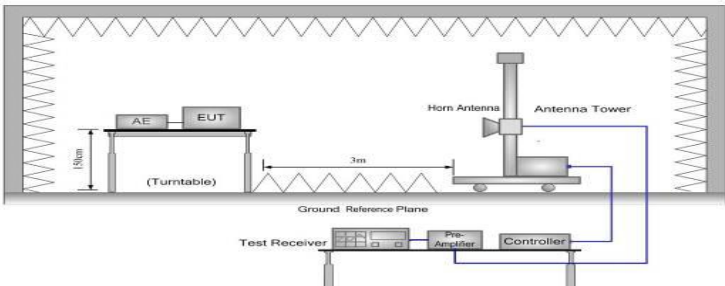
Test Requirement:	FCC Part15 E Section 15.407 (a)
Test Method:	KDB789033 D02 General UNII Test Procedures New Rules v02r01 Section F
Limit:	$\leq 11.00\text{dBm/MHz}$ for Band 1 5150MHz-5250MHz(client device) $\leq 11.00\text{dBm/MHz}$ for Band 2A&2C 5250-5350&5470-5725 $\leq 30.00\text{dBm/500KHz}$ for Band 3 5725MHz-5850MHz The e.i.r.p spectral density for Band 1 5150MHz – 5250 MHz should not exceed 10dBm/MHz
Test Setup:	 Spectrum Analyzer EUT
Test Mode:	Transmitting mode with modulation
Test Procedure:	1. Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth. 1. Set RBW = 510 kHz/1 MHz, VBW $\geq 3 \times$ RBW, Sweep time = Auto, Detector = RMS. 2. Allow the sweeps to continue until the trace stabilizes. 3. Use the peak marker function to determine the maximum amplitude level. 4. The E.I.R.P spectral density used radiated test method. At a test site that has been validated using the procedures of ANSI C63.4 or the latest CISPR 16-1-4 for measurements above 1 GHz, so as to simulate a near free-space environment.
Test Result:	PASS

5.6.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Combiner Box	Ascentest	AT890-RFB	N/A	Jul. 07, 2022

5.7. Band edge

5.7.1. Test Specification

Test Requirement:	FCC CFR47 Part 15E Section 15.407			
Test Method:	ANSI C63.10 2013			
Limit:	In un-restricted band: For Band 1&2A&2C: -27dBm/MHz For Band 3:			
	Frequency (MHz)	Limit (dBm/MHz)	Frequency (MHz)	Limit (dBm/MHz)
	<5650	-27	5850~5855	27~15.6
	5650~5700	-27~10	5855~5875	15.6~10
	5700~5720	10~15.6	5875~5925	10~-27
	5720~5725	15.6~27	> 5925	-27
E[dBμV/m] = EIRP[dBm] + 95.2 @3m In restricted band:				
	Detector		Limit@3m	
	Peak		74dBμV/m	
	AVG		54dBμV/m	
Test Setup:				
Test Mode:	Transmitting mode with modulation			
Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. 4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. If the emission level of the EUT in peak mode was			

	10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasipeak or average method as specified and then reported in a data sheet.
Test Result:	PASS

5.7.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESIB7	100197	Jul. 07, 2022
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 07, 2022
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Pre-amplifier	SKET	LNPA_0118G-45	SK2021012102	Mar. 11, 2022
Pre-amplifier	SKET	LNPA_1840G-50	SK202109203500	Apr. 08, 2022
Pre-amplifier	HP	8447D	2727A05017	Jul. 07, 2022
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 05, 2022
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Apr. 10, 2023
Coaxial cable	SKET	RC_DC18G-N	N/A	Apr. 08, 2022
Coaxial cable	SKET	RC-DC18G-N	N/A	Apr. 08, 2022
Coaxial cable	SKET	RC-DC40G-N	N/A	Jul. 07, 2022
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

5.7.3. Test Data

802.11 a	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 1	Lowest	5150	37.25	5.82	43.07	74	54	-10.93	H
		5150	40.58	5.82	46.40	74	54	-7.60	V
	Highest	5250	37.56	6.52	44.08	74	54	-9.92	H
		5250	41.03	6.52	47.55	74	54	-6.45	V
Band 3	Lowest	5725	79.29	5.82	85.11	122.2	/	-37.09	H
		5725	81.55	5.82	87.37	122.2	/	-34.83	V
	Highest	5850	79.25	6.52	85.77	122.2	/	-36.43	H
		5850	82.41	6.52	88.93	122.2	/	-33.27	V
Remark: Factor(dB)=Ant. Factor+Cable Loss-Amp. Factor									

802.11 nHT20	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 1	Lowest	5150	35.17	6.96	42.13	74	54	-11.87	H
		5150	38.92	6.96	45.88	74	54	-8.12	V
	Highest	5250	35.34	8.21	43.55	74	54	-10.45	H
		5250	39.05	8.21	47.26	74	54	-6.74	V
Band 3	Lowest	5725	74.37	8.21	82.58	122.2	/	-39.62	H
		5725	80.15	8.21	88.36	122.2	/	-33.84	V
	Highest	5850	75.79	8.87	84.66	122.2	/	-37.54	H
		5850	81.58	8.87	90.45	122.2	/	-31.75	V
Remark: Factor(dB)=Ant. Factor+Cable Loss-Amp. Factor									

802.11 nHT40	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 1	Lowest	5150	36.23	5.82	42.05	74	54	-11.95	H
		5150	39.74	5.82	45.56	74	54	-8.44	V
	Highest	5250	36.57	6.52	43.09	74	54	-10.91	H
		5250	39.96	6.52	46.48	74	54	-7.52	V
Band 3	Lowest	5725	75.85	5.82	81.67	122.2	/	-40.53	H
		5725	77.27	5.82	83.09	122.2	/	-39.11	V
	Highest	5850	73.18	6.52	79.70	122.2	/	-42.50	H
		5850	74.96	6.52	81.48	122.2	/	-40.72	V
Remark: Factor(dB)=Ant. Factor+Cable Loss-Amp. Factor									

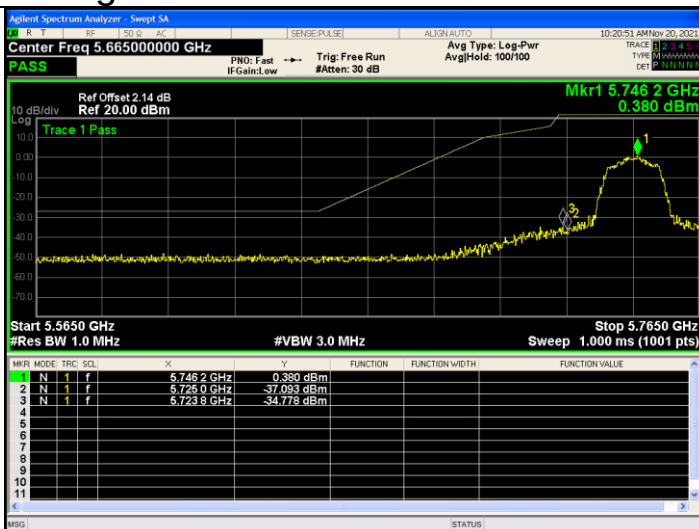
802.11 ac HT20	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 1	Lowest	5150	37.42	6.96	44.38	74	54	-9.62	H
		5150	40.13	6.96	47.09	74	54	-6.91	V
	Highest	5250	37.63	8.21	45.84	74	54	-8.16	H
		5250	40.54	8.21	48.75	74	54	-5.25	V
Band 3	Lowest	5725	78.82	8.21	87.03	122.2	/	-35.17	H
		5725	81.23	8.21	89.44	122.2	/	-32.76	V
	Highest	5850	74.68	8.87	83.55	122.2	/	-38.65	H
		5850	78.56	8.87	87.43	122.2	/	-34.77	V
Remark: Factor(dB)=Ant. Factor+Cable Loss-Amp. Factor									

802.11 ac HT40	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 1	Lowest	5150	36.85	5.82	42.67	74	54	-11.33	H
		5150	38.54	5.82	44.36	74	54	-9.64	V
	Highest	5250	37.03	6.52	43.55	74	54	-10.45	H
		5250	39.12	6.52	45.64	74	54	-8.36	V
Band 3	Lowest	5725	76.59	5.82	82.41	122.2	/	-39.79	H
		5725	79.80	5.82	85.62	122.2	/	-36.58	V
	Highest	5850	68.97	6.52	75.49	122.2	/	-46.71	H
		5850	73.84	6.52	80.36	122.2	/	-41.84	V
Remark: Factor(dB)=Ant. Factor+Cable Loss-Amp. Factor									

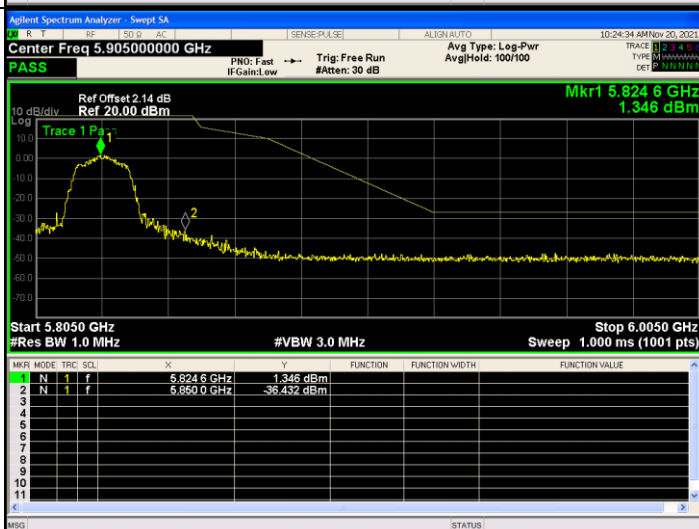
802.11 ac HT80	CH	Freq. (MHz)	Read_level (dBuV/m)	Factor (dB)	Peak (dBuV/m)	Limit (dBuV/m) (Peak)	Limit (dBuV/m) (Avg)	Over	Ant. Pol. H/V
Band 1	Lowest	5150	37.24	6.96	44.20	74	54	-9.80	H
		5150	41.25	6.96	48.21	74	54	-5.79	V
	Highest	5250	37.56	8.21	45.77	74	54	-8.23	H
		5250	41.73	8.21	49.94	74	54	-4.06	V
Band 3	Lowest	5725	71.62	8.21	79.83	122.2	/	-42.37	H
		5725	74.43	8.21	82.64	122.2	/	-39.56	V
	Highest	5850	71.31	8.87	80.18	122.2	/	-42.02	H
		5850	74.09	8.87	82.96	122.2	/	-39.24	V
Remark: Factor(dB)=Ant. Factor+Cable Loss-Amp. Factor									

Band 3 Band-edge for RF Conducted Emissions

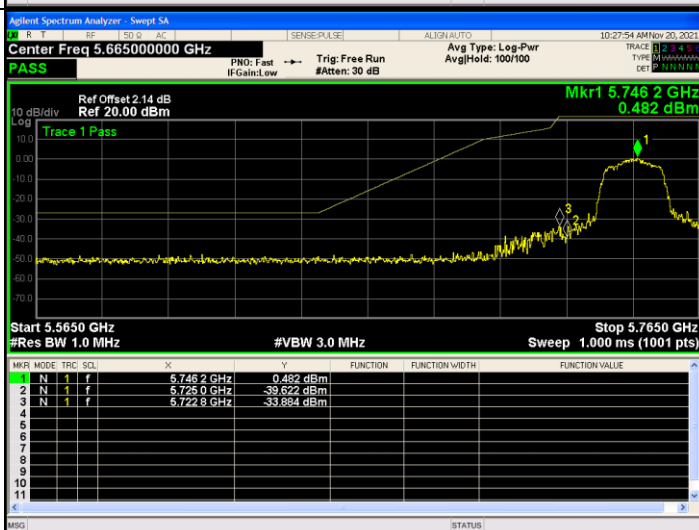
802.11a
/LCH



802.11a
/HCH

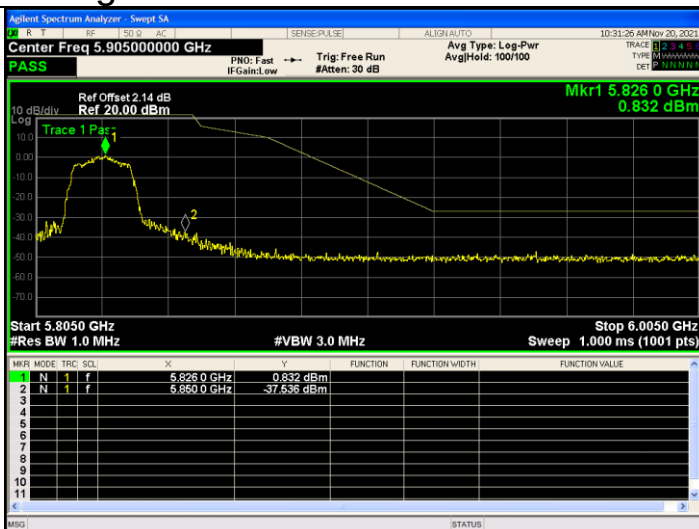


802.11n
HT20 / LCH

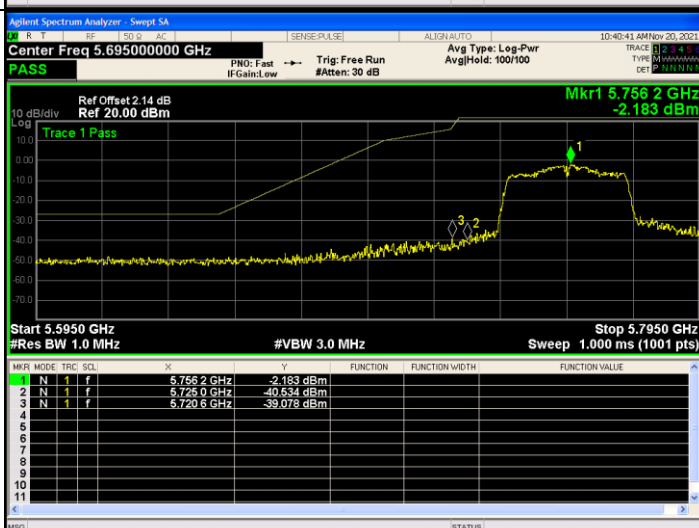


Band 3 Band-edge for RF Conducted Emissions

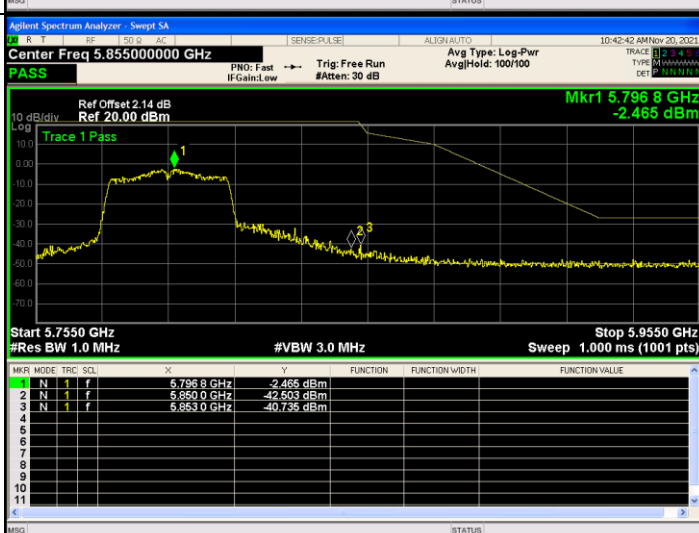
802.11n
HT20 / HCH



802.11n
HT40 / LCH



802.11n
HT40 / HCH

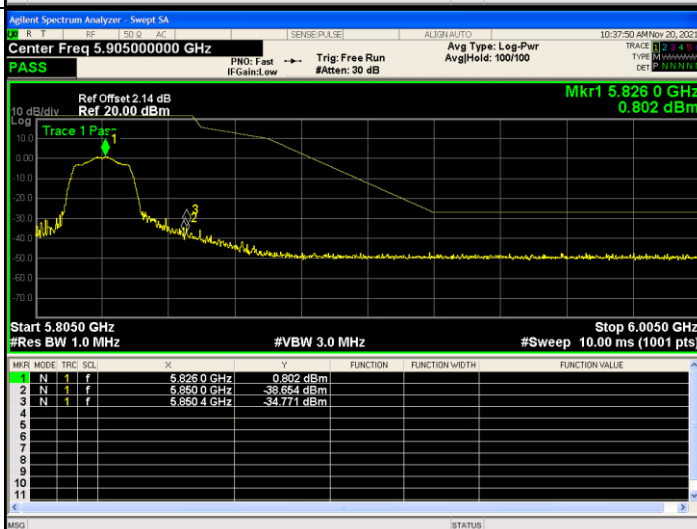


Band 3 Band-edge for RF Conducted Emissions

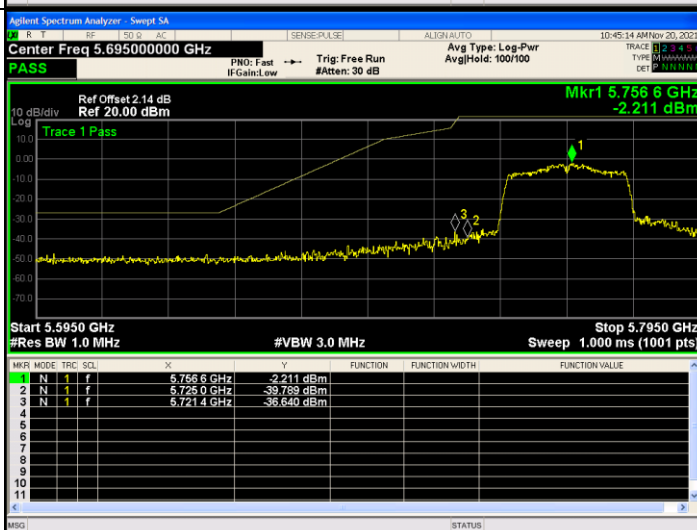
802.11ac
HT20 / LCH



802.11ac
HT20 / HCH

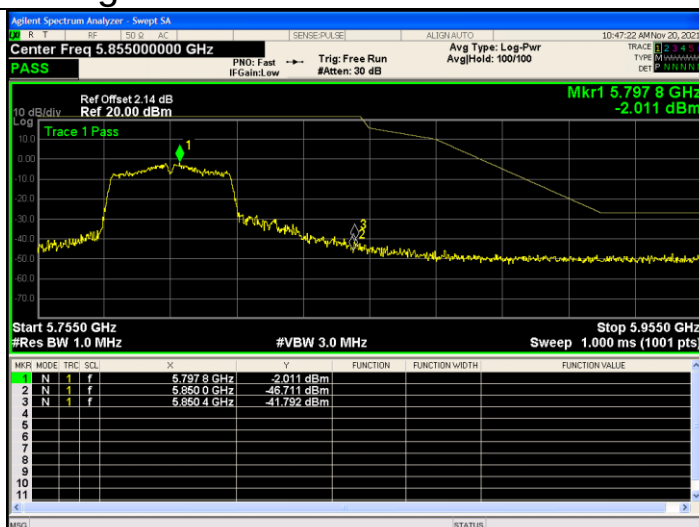


802.11ac
HT40 / LCH

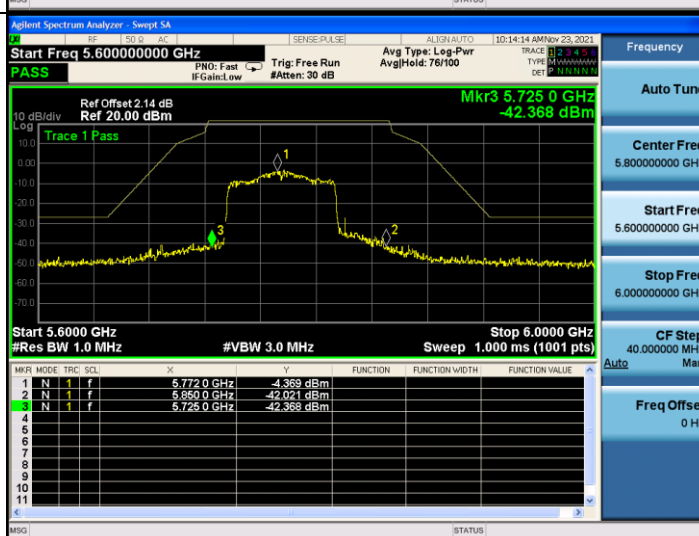


Band 3 Band-edge for RF Conducted Emissions

802.11ac
HT40 / HCH

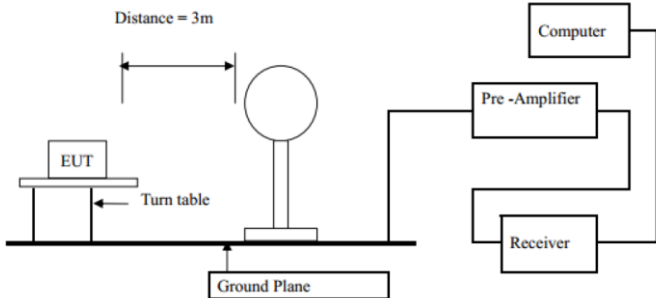


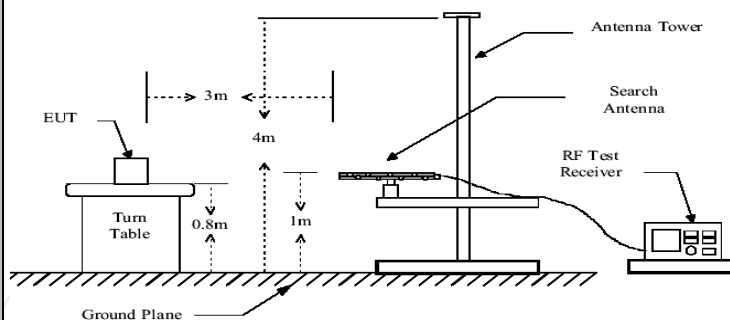
802.11ac
HT80 / MCH



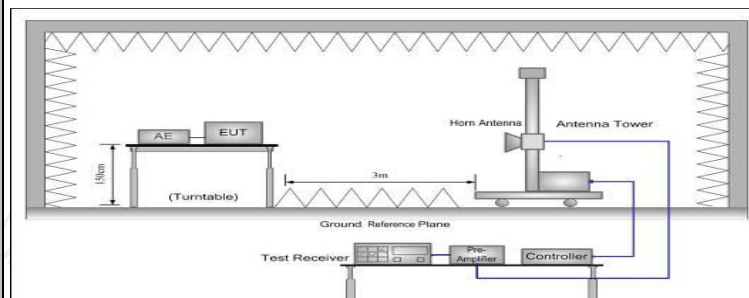
5.8. Unwanted Emission

5.8.1. Test Specification

Test Requirement:	FCC CFR47 Part 15 Section 15.407 & 15.209 & 15.205				
Test Method:	KDB 789033 D02 v02r01				
Frequency Range:	9kHz to 40GHz				
Measurement Distance:	3 m				
Antenna Polarization:	Horizontal & Vertical				
Operation mode:	Transmitting mode with modulation				
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark
	9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
	150kHz- 30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
Limit:	Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,				
	Frequency		Field Strength (microvolts/meter)	Measurement Distance (meters)	
	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	
	Frequency		Limit (dBuV/m @3m)	Detector	
Above 1G		74.0	Peak		
		54.0	Average		
Test setup:	For radiated emissions below 30MHz				
					
	30MHz to 1GHz				



Above 1GHz



Test Procedure:

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Test results:

PASS

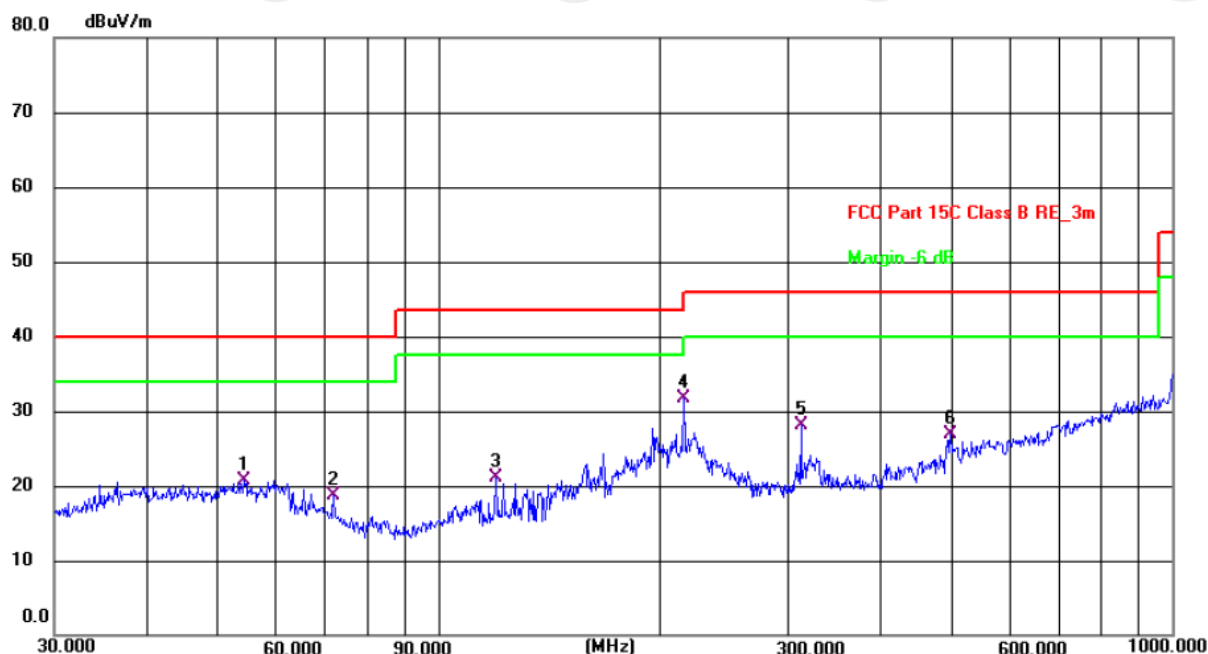
5.8.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESIB7	100197	Jul. 07, 2022
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 07, 2022
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
Pre-amplifier	SKET	LNPA_0118G-45	SK2021012102	Mar. 11, 2022
Pre-amplifier	SKET	LNPA_1840G-50	SK202109203500	Apr. 08, 2022
Pre-amplifier	HP	8447D	2727A05017	Jul. 07, 2022
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 05, 2022
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Apr. 10, 2023
Coaxial cable	SKET	RC_DC18G-N	N/A	Apr. 08, 2022
Coaxial cable	SKET	RC-DC18G-N	N/A	Apr. 08, 2022
Coaxial cable	SKET	RC-DC40G-N	N/A	Jul. 07, 2022
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

5.8.3. Test Data

Please refer to following diagram for individual
Below 1GHz

Horizontal:



Site #1

Polarization: **Horizontal**

Temperature: 25.3(C)

Limit: FCC Part 15C Class B RE_3m

Power: DC 5 V(Notebook Computer)
Input AC 120 V/60 Hz

Humidity: 54 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	54.4515	7.55	13.21	20.76	40.00	-19.24	QP	P	
2	72.0841	7.89	10.87	18.76	40.00	-21.24	QP	P	
3	119.8555	8.92	12.12	21.04	43.50	-22.46	QP	P	
4 *	216.0235	20.48	11.24	31.72	46.00	-14.28	QP	P	
5	312.1792	13.77	14.32	28.09	46.00	-17.91	QP	P	
6	499.4245	7.91	19.02	26.93	46.00	-19.07	QP	P	

Vertical:



Site #1

Polarization: **Vertical**

Temperature: 25.3(C)

Limit: FCC Part 15C Class B RE_3m

Power: DC 5 V(Notebook Computer)
Input AC 120 V/60 Hz

Humidity: 54 %

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	45.2165	6.82	13.87	20.69	40.00	-19.31	QP	P	
2	71.8319	8.96	10.93	19.89	40.00	-20.11	QP	P	
3	141.3296	10.43	13.21	23.64	43.50	-19.86	QP	P	
4	216.0235	15.52	11.24	26.76	46.00	-19.24	QP	P	
5	382.5878	8.90	16.12	25.02	46.00	-20.98	QP	P	
6 *	497.6764	14.41	18.98	33.39	46.00	-12.61	QP	P	

Note: 1. The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported

2. Measurements were conducted in all three channels (high, middle, low) and all modulation (802.11a, 802.11n(HT20), 802.11n(HT40), 802.11ac(VHT20), 802.11ac(VHT40), 802.11ac(VHT80), and the worst case Mode (Lowest channel and 802.11ac(VHT20)) was submitted only.

3. Measurement (dBuV) = Reading level + Correction Factor, correction Factor= Antenna Factor + Cable loss - Pre-amplifier.

Modulation Type: Band 1									
11a CH36: 5180MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10360	H	38.17	---	8.02	46.19	---	74	54	-7.81
15540	H	40.05	---	9.87	49.92	---	74	54	-4.08
---	H	---	---	---	---	---	---	---	---
10360	V	38.65	---	8.02	46.67	---	74	54	-7.33
15540	V	39.02	---	9.87	48.89	---	74	54	-5.11
---	V	---	---	---	---	---	---	---	---
11a CH40: 5200MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10400	H	39.87	---	7.97	47.84	---	74	54	-6.16
15600	H	38.24	---	9.83	48.07	---	74	54	-5.93
---	H	---	---	---	---	---	---	---	---
10400	V	40.05	---	7.97	48.02	---	74	54	-5.98
15600	V	39.42	---	9.83	49.25	---	74	54	-4.75
---	V	---	---	---	---	---	---	---	---
11a CH48: 5240MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10480	H	39.33	---	7.97	47.30	---	74	54	-6.70
15720	H	39.07	---	9.83	48.90	---	74	54	-5.10
---	H	---	---	---	---	---	---	---	---
10480	V	39.95	---	7.97	47.92	---	74	54	-6.08
15720	V	37.14	---	9.83	46.97	---	74	54	-7.03
---	V	---	---	---	---	---	---	---	---
11n(HT20) CH36: 5180MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10360	H	39.86	---	8.02	47.88	---	74	54	-6.12
15540	H	38.52	---	9.87	48.39	---	74	54	-5.61
---	H	---	---	---	---	---	---	---	---
10360	V	40.17	---	8.02	48.19	---	74	54	-5.81
15540	V	37.46	---	9.87	47.33	---	74	54	-6.67
---	V	---	---	---	---	---	---	---	---
11n(HT20) CH40: 5200MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10400	H	38.25	---	7.97	46.22	---	74	54	-7.78
15600	H	39.11	---	9.83	48.94	---	74	54	-5.06
---	H	---	---	---	---	---	---	---	---
10400	V	40.63	---	7.97	48.60	---	74	54	-5.40
15600	V	38.32	---	9.83	48.15	---	74	54	-5.85
---	V	---	---	---	---	---	---	---	---
11n(HT20) CH48: 5240MHz									

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10480	H	38.23	---	7.97	46.20	---	74	54	-7.80
15720	H	37.58	---	9.83	47.41	---	74	54	-6.59
---	H	---	---	---	---	---	---	---	---
10480	V	39.09	---	7.97	47.06	---	74	54	-6.94
15720	V	38.27	---	9.83	48.10	---	74	54	-5.90
---	V	---	---	---	---	---	---	---	---

11n(HT40)CH38: 5190MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10380	H	40.13	---	7.75	47.88	---	74	54	-6.12
15570	H	38.25	---	9.87	48.12	---	74	54	-5.88
---	H	---	---	---	---	---	---	---	---
10380	V	39.87	---	7.75	47.62	---	74	54	-6.38
15570	V	38.35	---	9.87	48.22	---	74	54	-5.78
---	V	---	---	---	---	---	---	---	---

11n(HT40)CH46: 5230MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10460	H	41.03	---	7.97	49.00	---	74	54	-5.00
15690	H	38.37	---	9.83	48.20	---	74	54	-5.80
---	H	---	---	---	---	---	---	---	---
10460	V	40.55	---	7.97	48.52	---	74	54	-5.48
15690	V	38.27	---	9.83	48.10	---	74	54	-5.90
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH36: 5180MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10360	H	40.13	---	8.02	48.15	---	74	54	-5.85
15540	H	38.54	---	9.87	48.41	---	74	54	-5.59
---	H	---	---	---	---	---	---	---	---
10360	V	38.36	---	8.02	46.38	---	74	54	-7.62
15540	V	39.17	---	9.87	49.04	---	74	54	-4.96
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH40: 5200MHz

Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10400	H	40.69	---	7.97	48.66	---	74	54	-5.34
15600	H	38.44	---	9.83	48.27	---	74	54	-5.73
---	H	---	---	---	---	---	---	---	---
10400	V	39.83	---	7.97	47.80	---	74	54	-6.20
15600	V	38.47	---	9.83	48.30	---	74	54	-5.70
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH48: 5240MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10480	H	39.65	---	7.97	47.62	---	74	54	-6.38
15720	H	37.96	---	9.83	47.79	---	74	54	-6.21
---	H	---	---	---	---	---	---	---	---
10480	V	39.23	---	7.97	47.20	---	74	54	-6.80
15720	V	38.15	---	9.83	47.98	---	74	54	-6.02
---	V	---	---	---	---	---	---	---	---

11ac(VHT40) CH38: 5190MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10380	H	41.35	---	7.75	49.10	---	74	54	-4.90
15570	H	38.72	---	9.87	48.59	---	74	54	-5.41
---	H	---	---	---	---	---	---	---	---
10380	V	39.02	---	7.75	46.77	---	74	54	-7.23
15570	V	39.75	---	9.87	49.62	---	74	54	-4.38
---	V	---	---	---	---	---	---	---	---

11ac(VHT40) CH46: 5230MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10460	H	39.35	---	7.97	47.32	---	74	54	-6.68
15690	H	39.27	---	9.83	49.10	---	74	54	-4.90
---	H	---	---	---	---	---	---	---	---
10460	V	40.36	---	7.97	48.33	---	74	54	-5.67
15690	V	37.21	---	9.83	47.04	---	74	54	-6.96
---	V	---	---	---	---	---	---	---	---

11ac(VHT80) CH42:5210									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
10420	H	40.34	---	7.96	48.30	---	74	54	-5.70
15630	H	38.25	---	9.84	48.09	---	74	54	-5.91
---	H	---	---	---	---	---	---	---	---
10420	V	39.88	---	7.96	47.84	---	74	54	-6.16
15630	V	38.17	---	9.84	48.01	---	74	54	-5.99
---	V	---	---	---	---	---	---	---	---

Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 40GHz.
5. Data of measurement shown "----" in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

Modulation Type: Band 3									
11a(HT20) CH149: 5745MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11490	H	39.31	---	8.09	47.40	---	74	54	-6.60
17235	H	37.13	---	9.67	46.80	---	74	54	-7.20
---	H	---	---	---	---	---	---	---	---
11490	V	41.75	---	8.09	49.84	---	74	54	-4.16
17235	V	37.43	---	9.67	47.10	---	74	54	-6.90
---	V	---	---	---	---	---	---	---	---

11a(HT20) CH157: 5785MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11570	H	40.12	---	8.10	48.22	---	74	54	-5.78
17355	H	37.07	---	9.65	46.72	---	74	54	-7.28
---	H	---	---	---	---	---	---	---	---
11570	V	38.53	---	8.10	46.63	---	74	54	-7.37
17355	V	36.39	---	9.65	46.04	---	74	54	-7.96
---	V	---	---	---	---	---	---	---	---

11a(HT20) CH165: 5825MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11650	H	39.12	---	8.12	47.24	---	74	54	-6.76
17475	H	37.95	---	9.62	47.57	---	74	54	-6.43
---	H	---	---	---	---	---	---	---	---
11650	V	40.26	---	8.12	48.38	---	74	54	-5.62
17475	V	37.18	---	9.62	46.80	---	74	54	-7.20
---	V	---	---	---	---	---	---	---	---

11n(HT20) CH149: 5745MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11490	H	40.26	---	8.09	48.35	---	74	54	-5.65
17235	H	37.13	---	9.67	46.80	---	74	54	-7.20
---	H	---	---	---	---	---	---	---	---
11490	V	39.65	---	8.09	47.74	---	74	54	-6.26
17235	V	37.42	---	9.67	47.09	---	74	54	-6.91
---	V	---	---	---	---	---	---	---	---

11n(HT20) CH157: 5785MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11570	H	40.67	---	8.10	48.77	---	74	54	-5.23
17355	H	37.05	---	9.65	46.70	---	74	54	-7.30
---	H	---	---	---	---	---	---	---	---
11570	V	39.54	---	8.10	47.64	---	74	54	-6.36
17355	V	35.27	---	9.65	44.92	---	74	54	-9.08
---	V	---	---	---	---	---	---	---	---

11n(HT20) CH165: 5825MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11650	H	39.08	---	8.12	47.20	---	74	54	-6.80
17475	H	37.35	---	9.62	46.97	---	74	54	-7.03
---	H	---	---	---	---	---	---	---	---
11650	V	40.42	---	8.12	48.54	---	74	54	-5.46
17475	V	37.38	---	9.62	47.00	---	74	54	-7.00
---	V	---	---	---	---	---	---	---	---

11n(HT40) CH151: 5755MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11510	H	41.37	---	8.09	49.46	---	74	54	-4.54
17265	H	37.92	---	9.67	47.59	---	74	54	-6.41
---	H	---	---	---	---	---	---	---	---
11510	V	41.17	---	8.09	49.26	---	74	54	-4.74
17265	V	37.06	---	9.67	46.73	---	74	54	-7.27
---	V	---	---	---	---	---	---	---	---

11n(HT40) CH159: 5795MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11590	H	40.32	---	8.10	48.42	---	74	54	-5.58
17385	H	37.59	---	9.65	47.24	---	74	54	-6.76
---	H	---	---	---	---	---	---	---	---
11590	V	40.82	---	8.10	48.92	---	74	54	-5.08
17385	V	36.67	---	9.65	46.32	---	74	54	-7.68
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH149: 5745MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11490	H	40.54	---	8.09	48.63	---	74	54	-5.37
17235	H	38.13	---	9.67	47.80	---	74	54	-6.20
---	H	---	---	---	---	---	---	---	---
11490	V	40.27	---	8.09	48.36	---	74	54	-5.64
17235	V	37.38	---	9.67	47.05	---	74	54	-6.95
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH157: 5785MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11570	H	39.25	---	8.10	47.35	---	74	54	-6.65
17355	H	37.19	---	9.65	46.84	---	74	54	-7.16
---	H	---	---	---	---	---	---	---	---
11570	V	37.96	---	8.10	46.06	---	74	54	-7.94
17355	V	35.64	---	9.65	45.29	---	74	54	-8.71
---	V	---	---	---	---	---	---	---	---

11ac(VHT20) CH165: 5825MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11650	H	40.17	---	8.12	48.29	---	74	54	-5.71
17475	H	37.62	---	9.62	47.24	---	74	54	-6.76
---	H	---	---	---	---	---	---	---	---
11650	V	40.34	---	8.12	48.46	---	74	54	-5.54
17475	V	35.61	---	9.62	45.23	---	74	54	-8.77
---	V	---	---	---	---	---	---	---	---

11ac(VHT40) CH151: 5755MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11510	H	39.83	---	8.09	47.92	---	74	54	-6.08
17265	H	37.18	---	9.67	46.85	---	74	54	-7.15
---	H	---	---	---	---	---	---	---	---
11510	V	40.68	---	8.09	48.77	---	74	54	-5.23
17265	V	38.54	---	9.67	48.21	---	74	54	-5.79
---	V	---	---	---	---	---	---	---	---

11ac(VHT40) CH159: 5795MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11590	H	39.13	---	8.10	47.23	---	74	54	-6.77
17385	H	36.27	---	9.65	45.92	---	74	54	-8.08
---	H	---	---	---	---	---	---	---	---
11590	V	40.85	---	8.10	48.95	---	74	54	-5.05
17385	V	38.26	---	9.65	47.91	---	74	54	-6.09
---	V	---	---	---	---	---	---	---	---

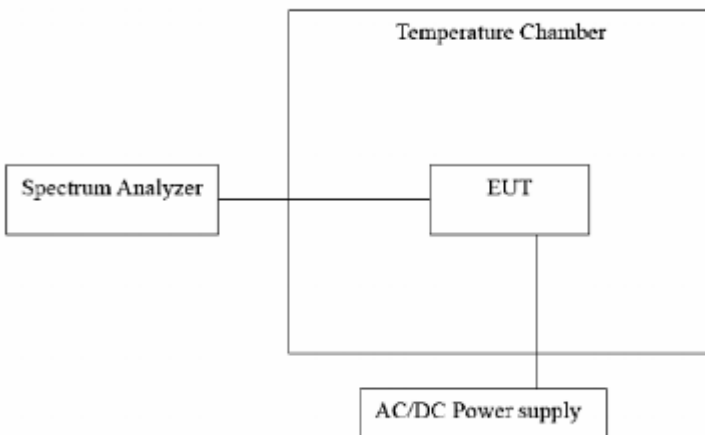
11ac(VHT80) CH155: 5775MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
11550	H	40.84	---	8.09	48.93	---	74	54	-5.07
17325	H	35.38	---	9.66	45.04	---	74	54	-8.96
---	H	---	---	---	---	---	---	---	---
11550	V	40.95	---	8.09	49.04	---	74	54	-4.96
17325	V	37.29	---	9.66	46.95	---	74	54	-7.05
---	V	---	---	---	---	---	---	---	---

Note:

1. Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier
2. Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)
3. The emission levels of other frequencies are very lower than the limit and not show in test report.
4. Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency. The highest test frequency is 40GHz.
5. Data of measurement shown “---“in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.

5.9. Frequency Stability Measurement

5.9.1. Test Specification

Test Requirement:	FCC Part15 Section 15.407(g) &Part2 J Section 2.1055
Test Method:	ANSI C63.10: 2013
Limit:	The frequency tolerance shall be maintained within the band of operation frequency over a temperature variation of 0 degrees to 45 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.
Test Setup:	 <pre> graph LR SA[Spectrum Analyzer] --- EUT[EUT] subgraph TC [Temperature Chamber] EUT end EUT --- P[AC/DC Power supply] </pre>
Test Procedure:	The EUT was placed inside the environmental test chamber and powered by nominal AC/DC voltage. b. Turn the EUT on and couple its output to a spectrum analyzer. c. Turn the EUT off and set the chamber to the highest temperature specified. d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature. f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
Test Result:	PASS
Remark:	Pre-scan was performed at all models(11a,11n,11ac), the worst case (11ac) was found and test data was shown in this report.

Test plots as follows:

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5180
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5180.0594	59400	PASS
35		5180.0597	59700	PASS
25		5180.0596	59600	PASS
15		5180.0599	59900	PASS
5		5180.0589	58900	PASS
0		5180.0588	58800	PASS
20	4.7	5180.0598	59800	PASS
	5	5180.0600	60000	PASS
	5.5	5180.0592	59200	PASS

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5200
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5200.0586	58600	PASS
35		5200.0584	58400	PASS
25		5200.0583	58300	PASS
15		5200.0580	58000	PASS
5		5200.0595	59500	PASS
0		5200.0596	59600	PASS
20	4.7	5200.0587	58700	PASS
	5	5200.0600	60000	PASS
	5.5	5200.0593	59300	PASS

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5240
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5240.0583	58300	PASS
35		5240.0587	58700	PASS
25		5240.0590	59000	PASS
15		5240.0593	59300	PASS
5		5240.0597	59700	PASS
0		5240.0592	59200	PASS
20	4.7	5240.0596	59600	PASS
	5	5240.0600	60000	PASS
	5.5	5240.0588	58800	PASS

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5745
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5745.0794	79400	PASS
35		5745.0795	79500	PASS
25		5745.0790	79000	PASS
15		5745.0789	78900	PASS
5		5745.0796	79600	PASS
0		5745.0798	79800	PASS
20	4.7	5745.0788	78800	PASS
	5	5745.0800	80000	PASS
	5.5	5745.0785	78500	PASS

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5785
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5785.0592	59200	PASS
35		5785.0586	58600	PASS
25		5785.0593	59300	PASS
15		5785.0595	59500	PASS
5		5785.0596	59600	PASS
0		5785.0584	58400	PASS
20	4.7	5785.0582	58200	PASS
	5	5785.0600	60000	PASS
	5.5	5785.0587	58700	PASS

Test mode:		802.11ac(VHT20)	Frequency(MHz):	5825
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5825.0591	59100	PASS
35		5825.0589	58900	PASS
25		5825.0587	58700	PASS
15		5825.0578	57800	PASS
5		5825.0583	58300	PASS
0		5825.0582	58200	PASS
20	4.7	5825.0597	59700	PASS
	5	5825.0600	60000	PASS
	5.5	5825.0594	59400	PASS

Test mode:		802.11ac(VHT40)	Frequency(MHz):	5190
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5190.0396	39600	PASS
35		5190.0399	39900	PASS
25		5190.0392	39200	PASS
15		5190.0389	38900	PASS
5		5190.0385	38500	PASS
0		5190.0384	38400	PASS
20	4.7	5190.0394	39400	PASS
	5	5190.0400	40000	PASS
	5.5	5190.0398	39800	PASS

Test mode:		802.11ac(VHT40)	Frequency(MHz):	5230
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5230.0795	79500	PASS
35		5230.0792	79200	PASS
25		5230.0791	79100	PASS
15		5230.0788	78800	PASS
5		5230.0794	79400	PASS
0		5230.0787	78700	PASS
20	4.7	5230.0792	79200	PASS
	5	5230.0800	80000	PASS
	5.5	5230.0796	79600	PASS

Test mode:		802.11ac(VHT40)	Frequency(MHz):	5755
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5755.0396	39600	PASS
35		5755.0390	39000	PASS
25		5755.0397	39700	PASS
15		5755.0394	39400	PASS
5		5755.0390	39000	PASS
0		5755.0392	39200	PASS
20	4.7	5755.0397	39700	PASS
	5	5755.0400	40000	PASS
	5.5	5755.0394	39400	PASS

Test mode:		802.11ac(VHT40)	Frequency(MHz):	5795
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5795.0396	39600	PASS
35		5795.0392	39200	PASS
25		5795.0395	39500	PASS
15		5795.0397	39700	PASS
5		5795.0393	39300	PASS
0		5795.0390	39000	PASS
20	4.7	5795.0390	39000	PASS
	5	5795.0400	40000	PASS
	5.5	5795.0388	38800	PASS

Test mode:		802.11ac(VHT80)	Frequency(MHz):	5210
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5210.0792	79200	PASS
35		5210.0795	79500	PASS
25		5210.0791	79100	PASS
15		5210.0788	78800	PASS
5		5210.0785	78500	PASS
0		5210.0787	78700	PASS
20	4.7	5210.0790	79000	PASS
	5	5210.0800	80000	PASS
	5.5	5210.0794	79400	PASS

Test mode:		802.11ac(VHT80)	Frequency(MHz):	5775
Temperature (°C)	Voltage(VDC)	Measurement Frequency(MHz)	Delta Frequency(Hz)	Result
45	5V	5775.0793	79300	PASS
35		5775.0795	79500	PASS
25		5775.0792	79200	PASS
15		5775.0790	79000	PASS
5		5775.0786	78600	PASS
0		5775.0789	78900	PASS
20	4.7	5775.0791	79100	PASS
	5	5775.0800	80000	PASS
	5.5	5775.0795	79500	PASS

Appendix A: Test Result of Conducted Test

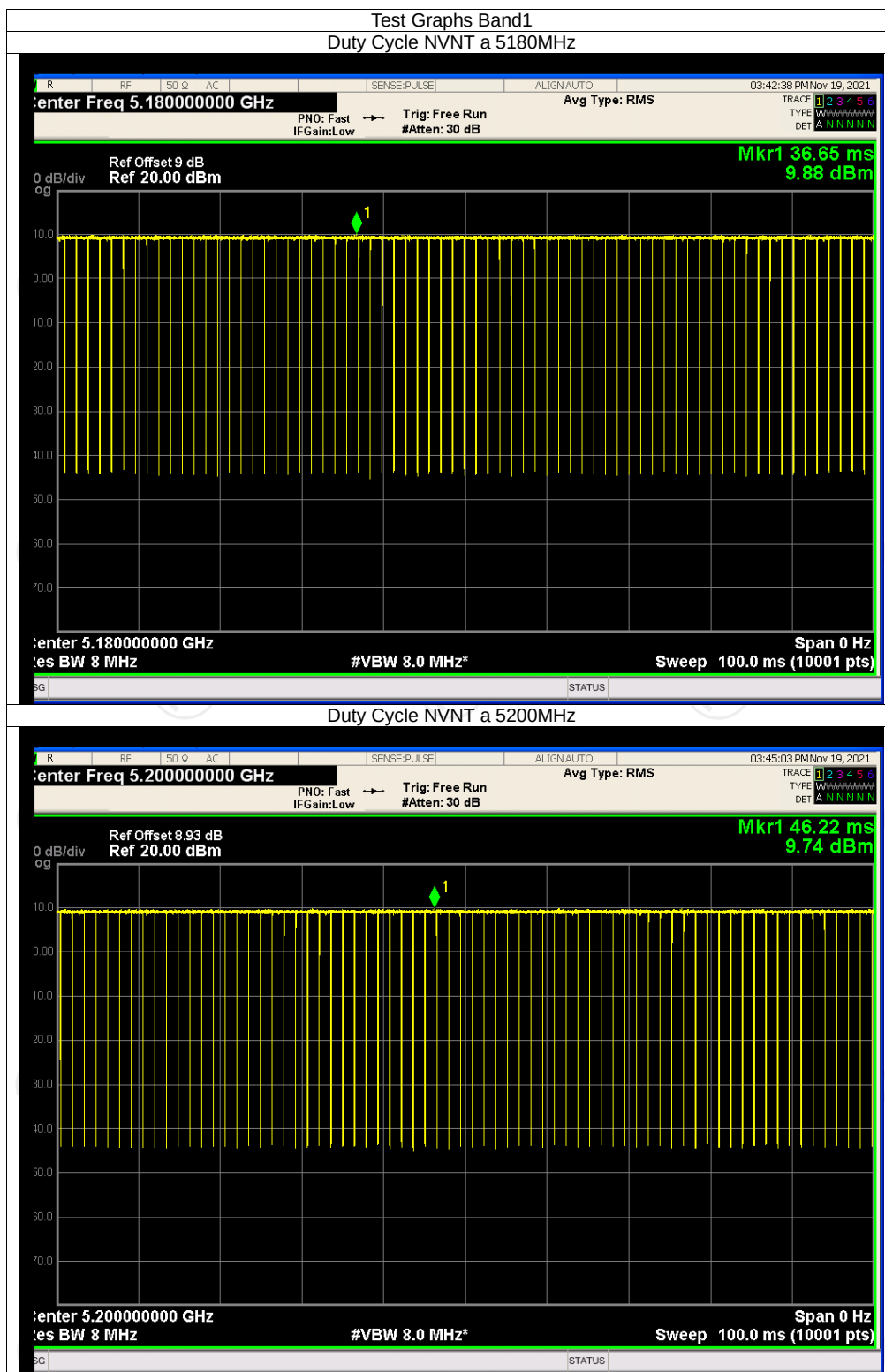
Duty Cycle

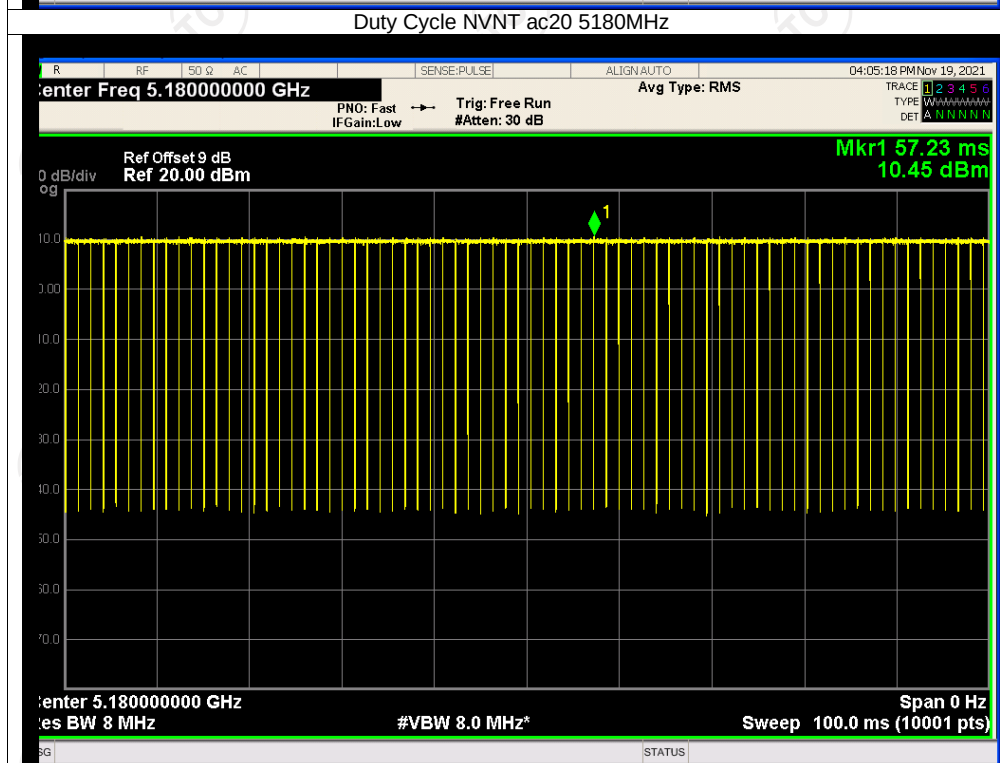
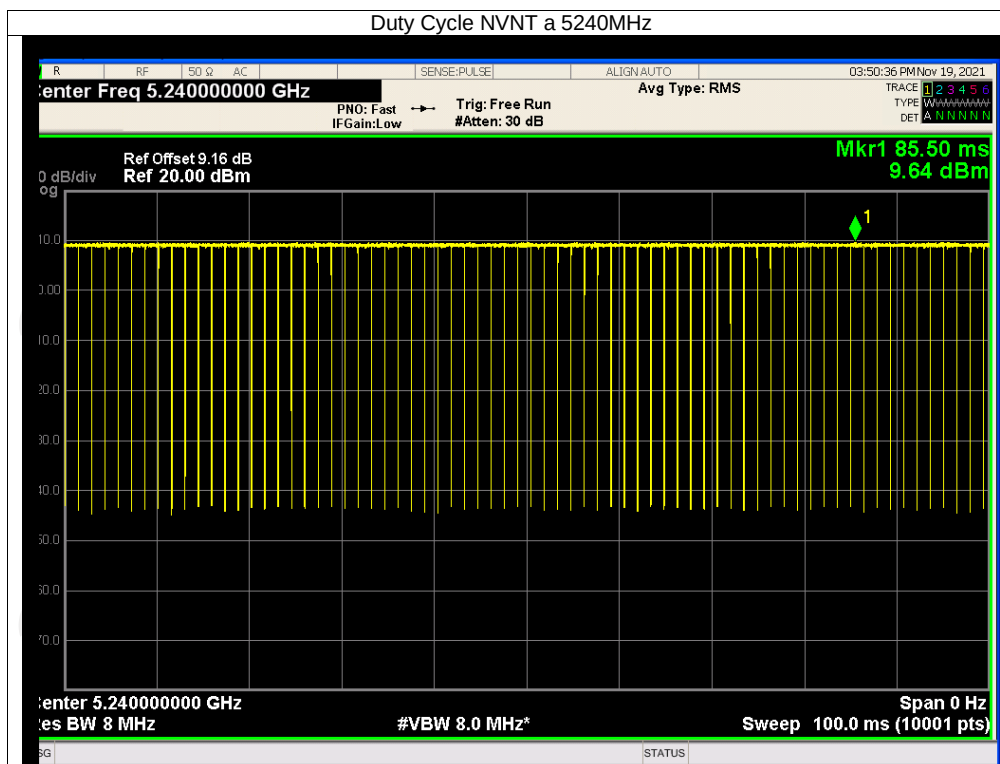
Band1

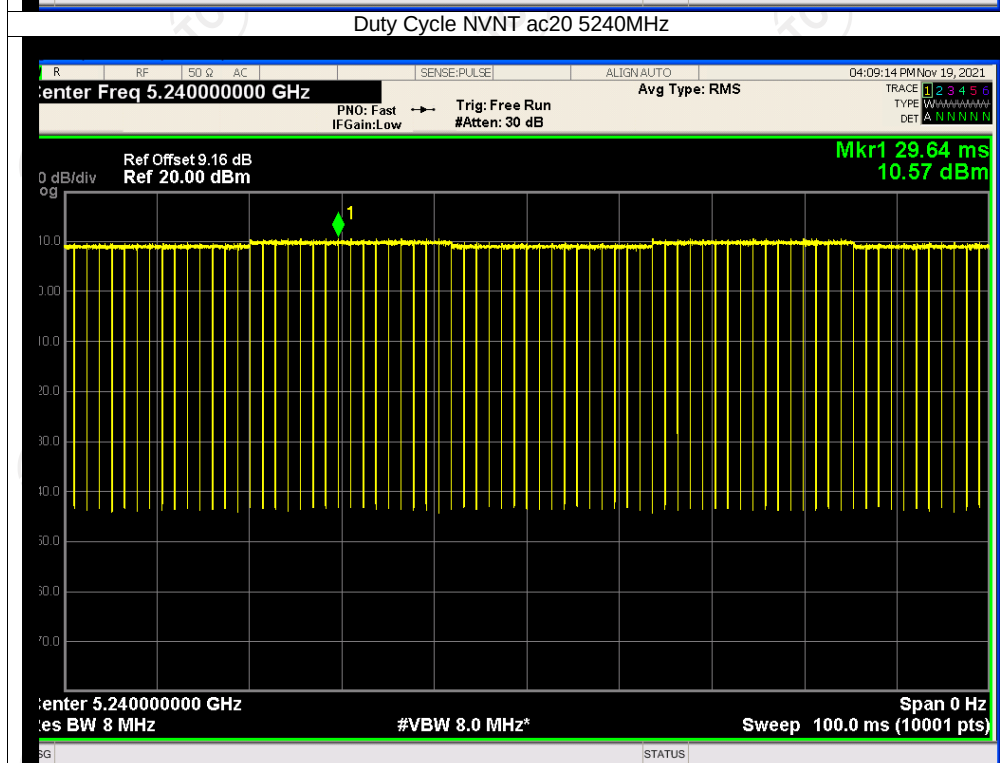
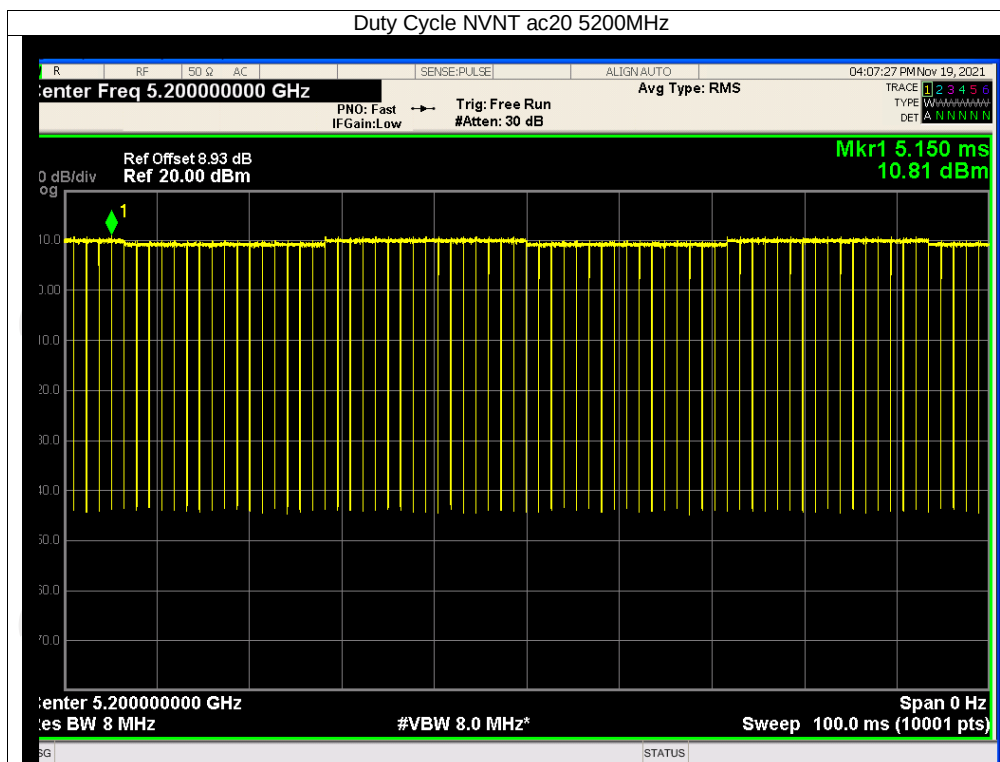
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5180	97.89	0.09
NVNT	a	5200	97.85	0.09
NVNT	a	5240	97.87	0.09
NVNT	ac20	5180	97.74	0.10
NVNT	ac20	5200	97.81	0.10
NVNT	ac20	5240	97.77	0.10
NVNT	ac40	5190	95.70	0.19
NVNT	ac40	5230	95.71	0.19
NVNT	ac80	5210	91.86	0.37
NVNT	n20	5180	97.72	0.10
NVNT	n20	5200	97.73	0.10
NVNT	n20	5240	97.73	0.10
NVNT	n40	5190	95.65	0.19
NVNT	n40	5230	95.66	0.19

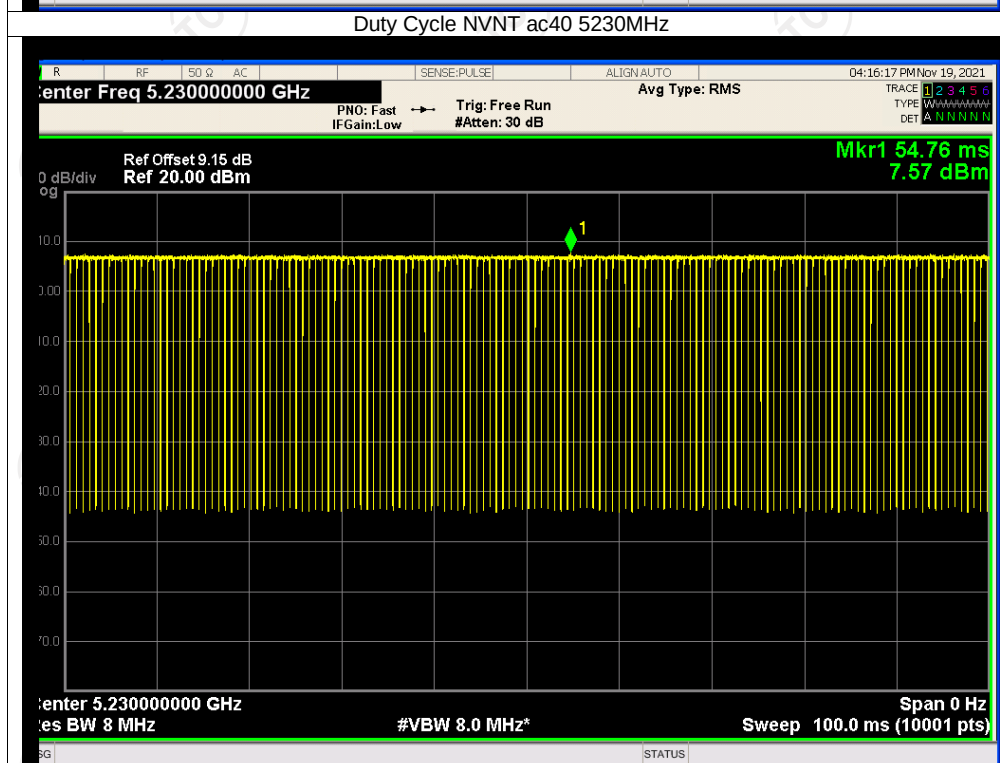
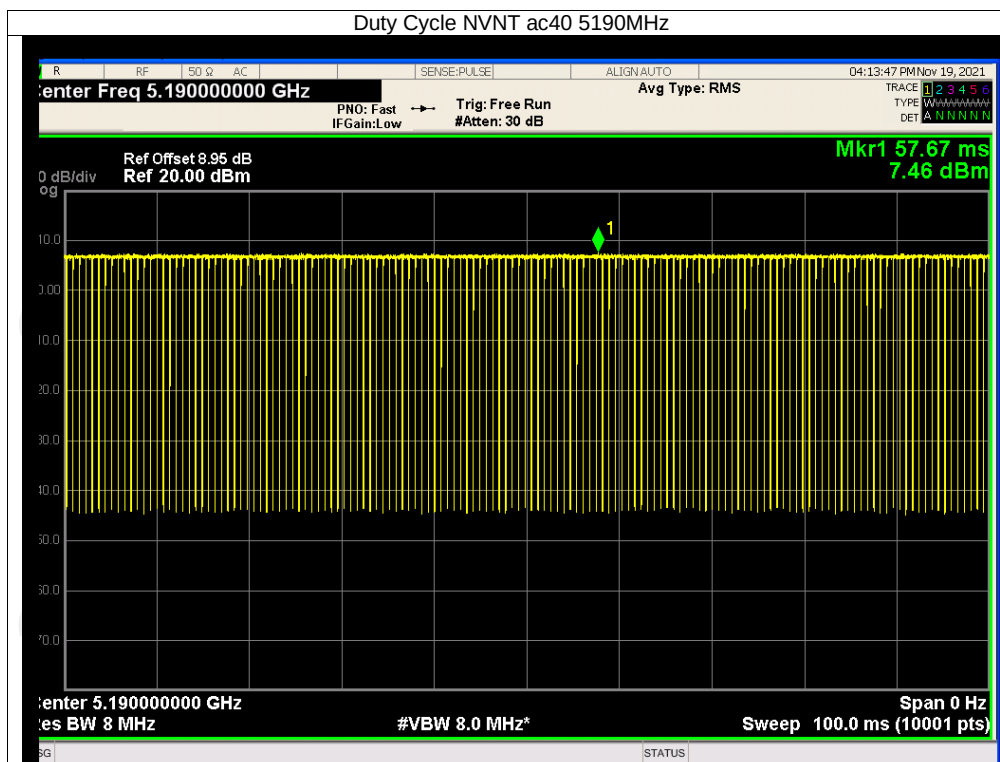
Band3

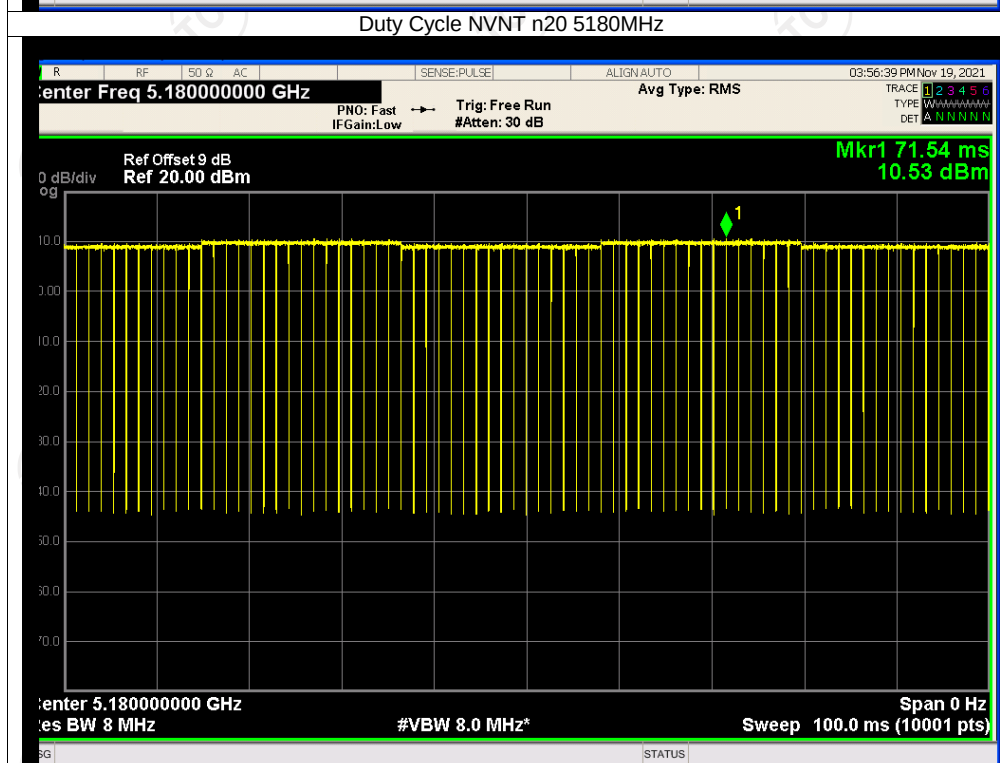
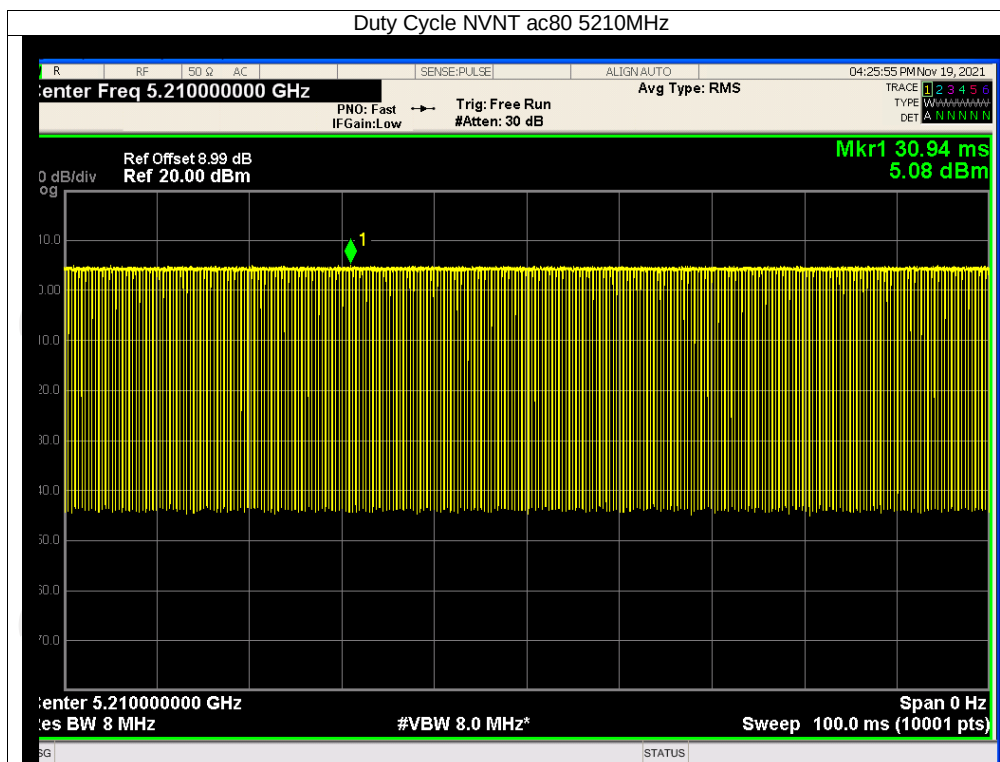
Condition	Mode	Frequency (MHz)	Duty Cycle (%)	Correction Factor (dB)
NVNT	a	5745	97.85	0.09
NVNT	a	5785	97.86	0.09
NVNT	a	5825	97.87	0.09
NVNT	ac20	5745	97.78	0.10
NVNT	ac20	5785	97.76	0.10
NVNT	ac20	5825	97.70	0.10
NVNT	ac40	5755	95.71	0.19
NVNT	ac40	5795	95.72	0.19
NVNT	ac80	5775	91.92	0.37
NVNT	n20	5745	97.73	0.10
NVNT	n20	5785	97.74	0.10
NVNT	n20	5825	97.72	0.10
NVNT	n40	5755	95.67	0.19
NVNT	n40	5795	95.68	0.19

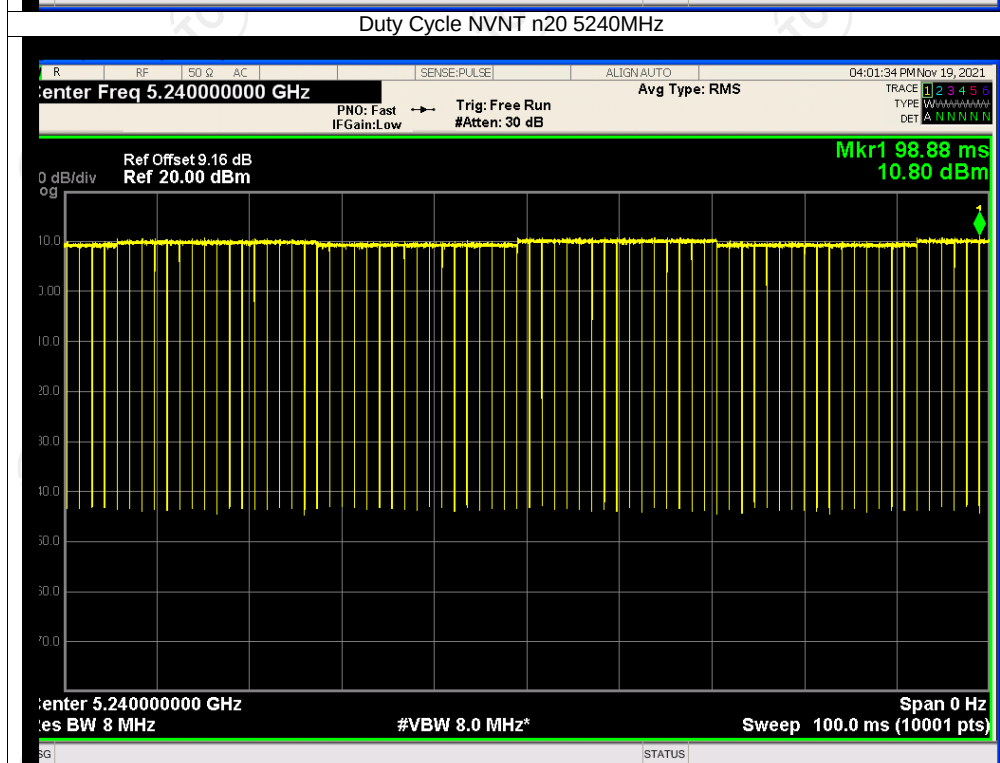
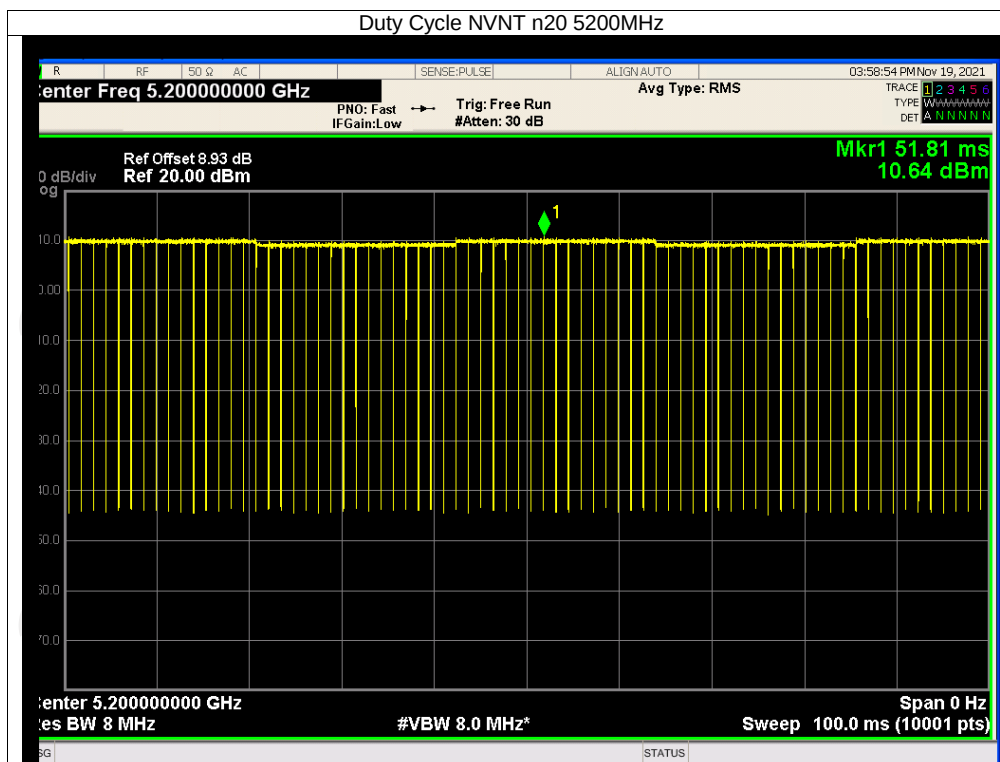


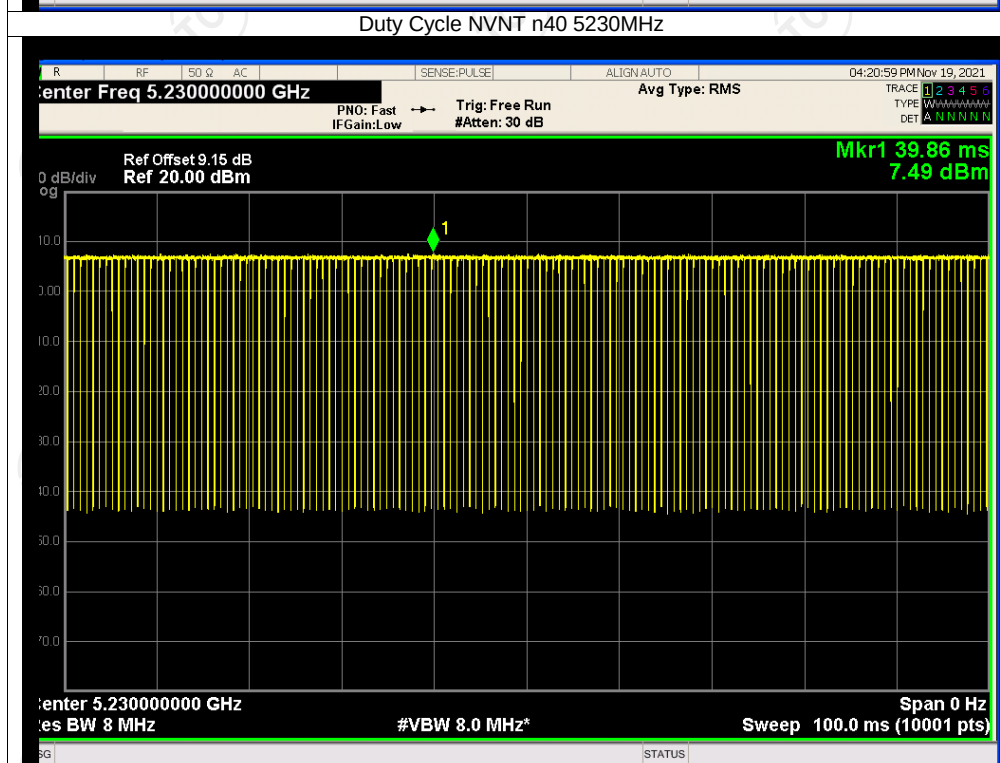
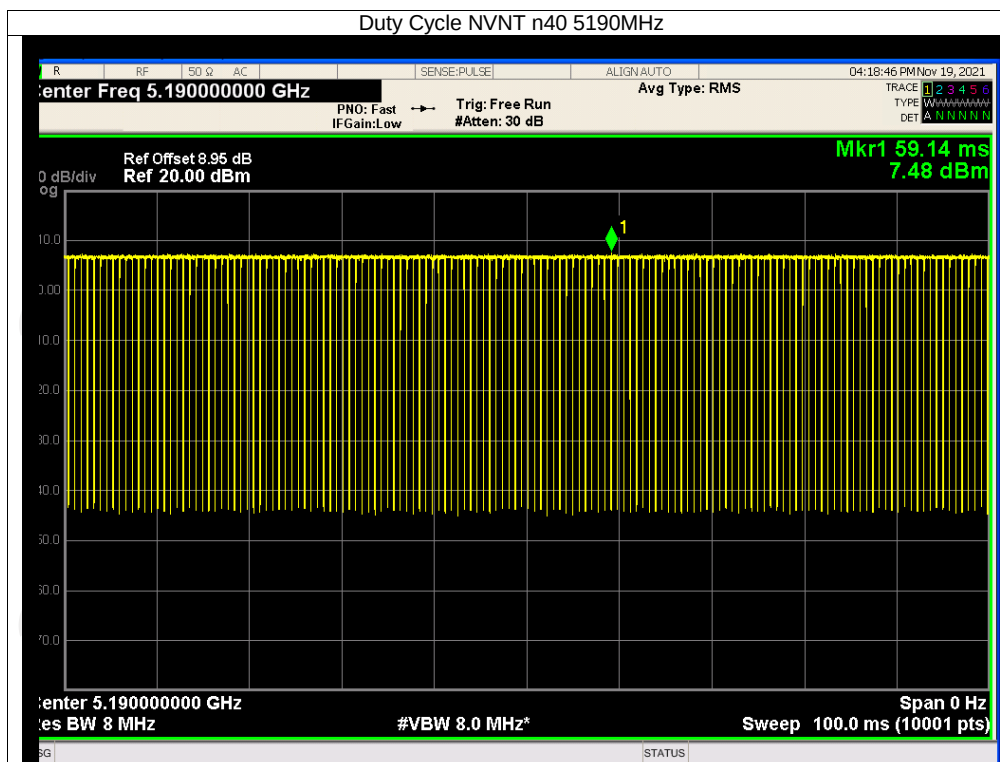


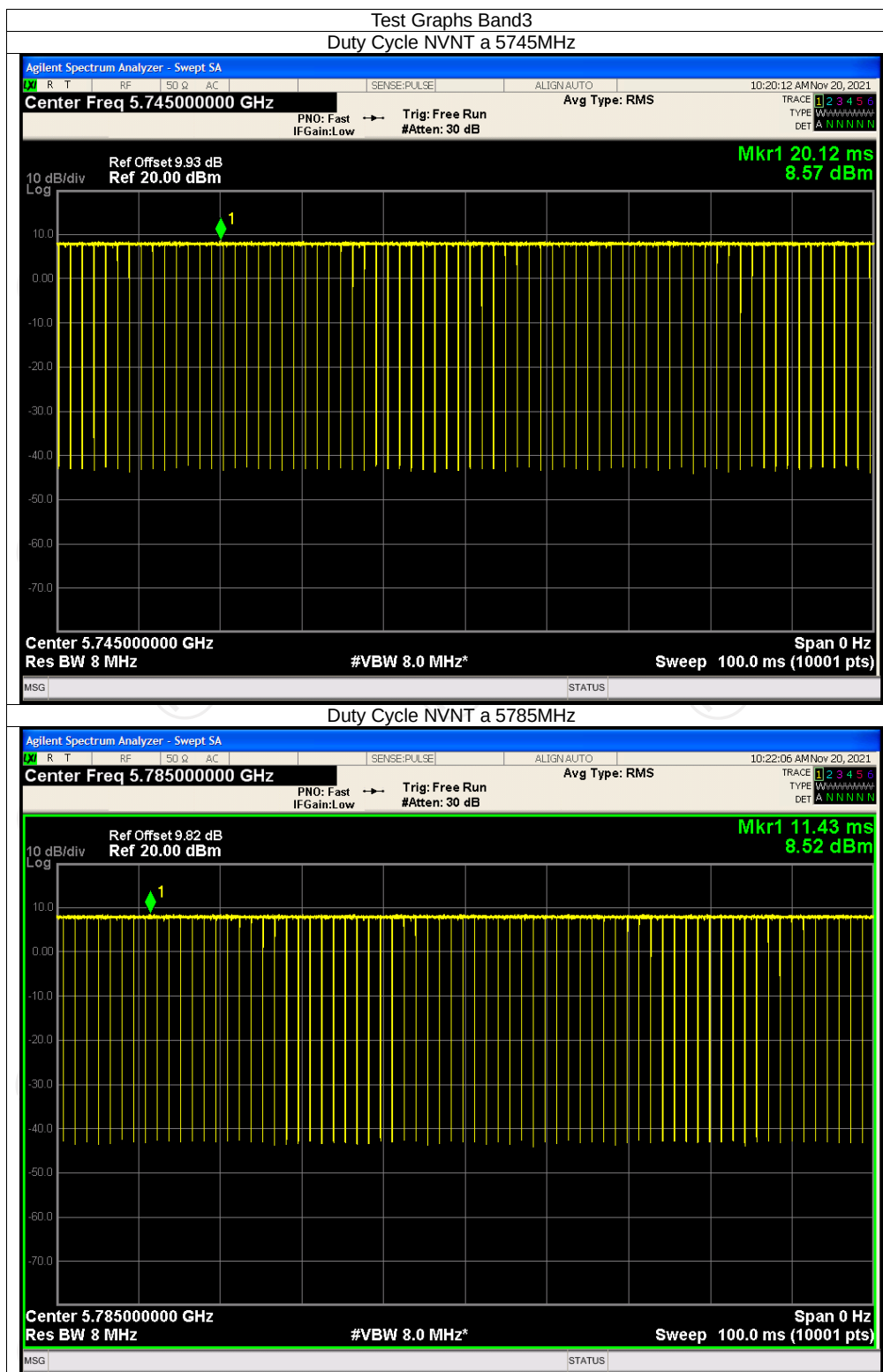


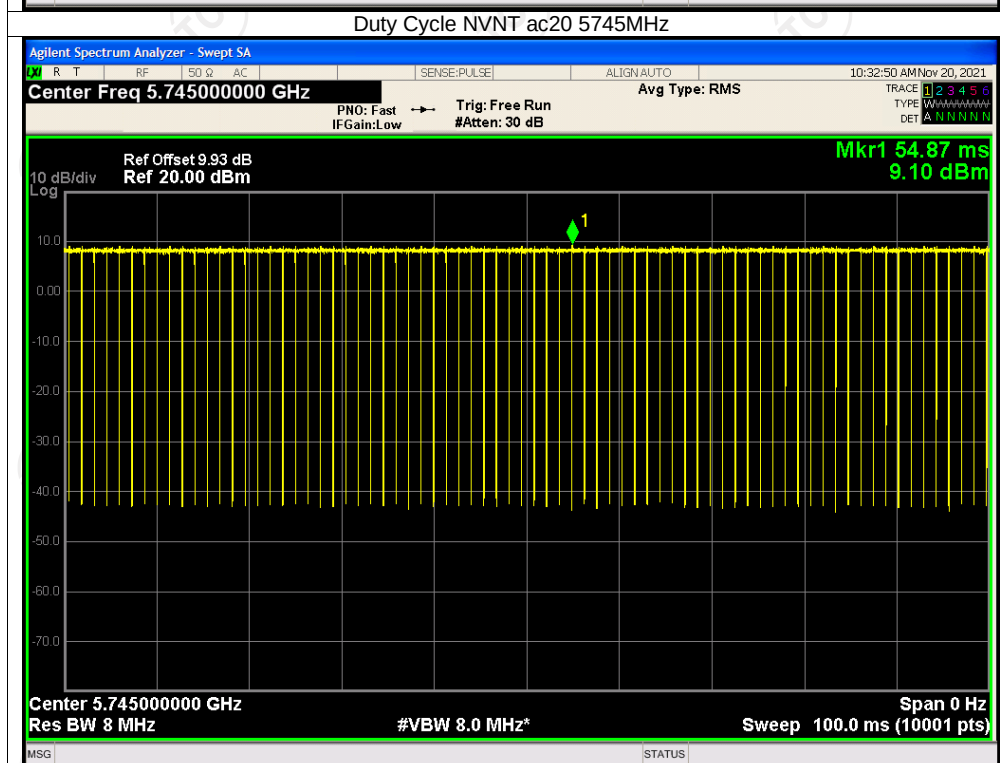
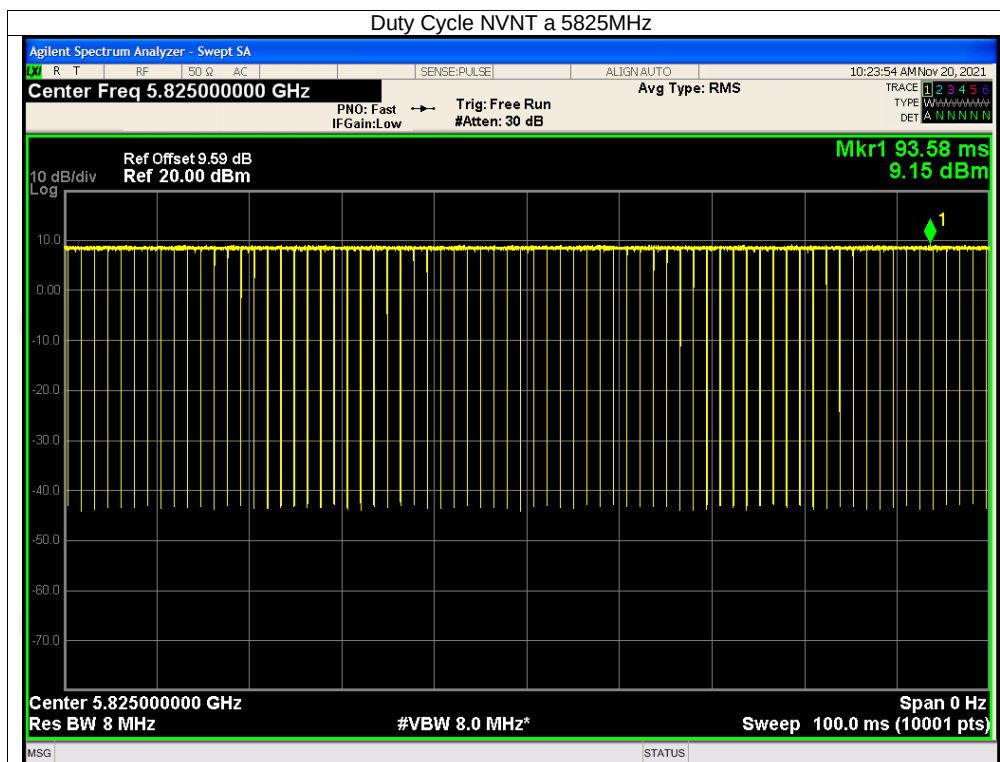


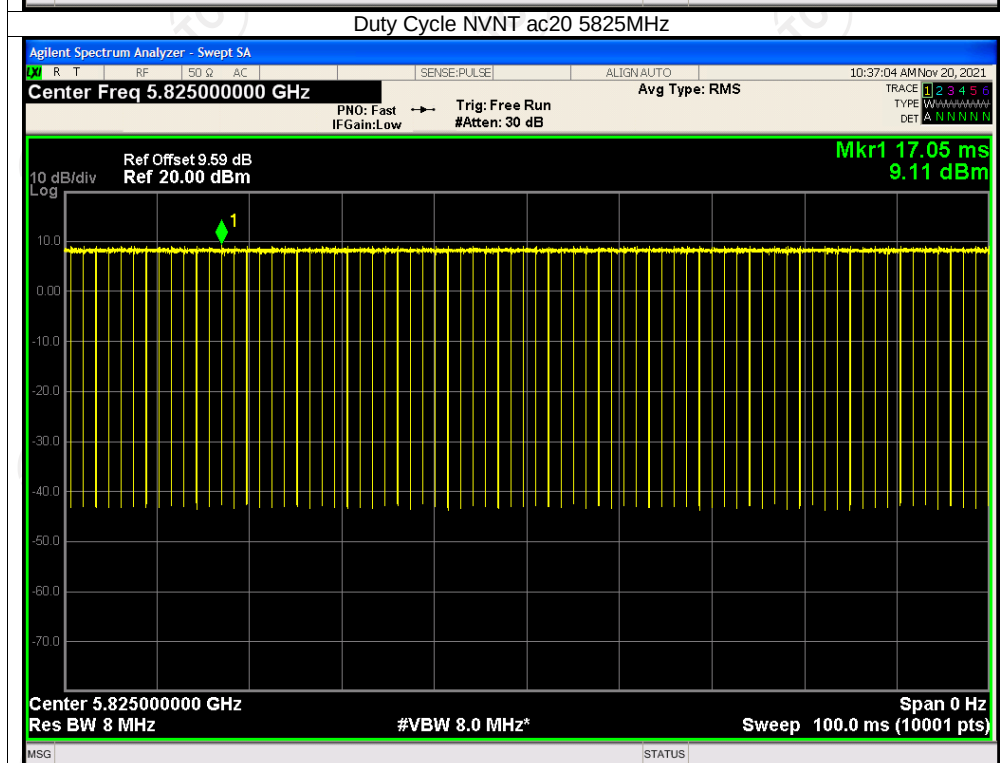
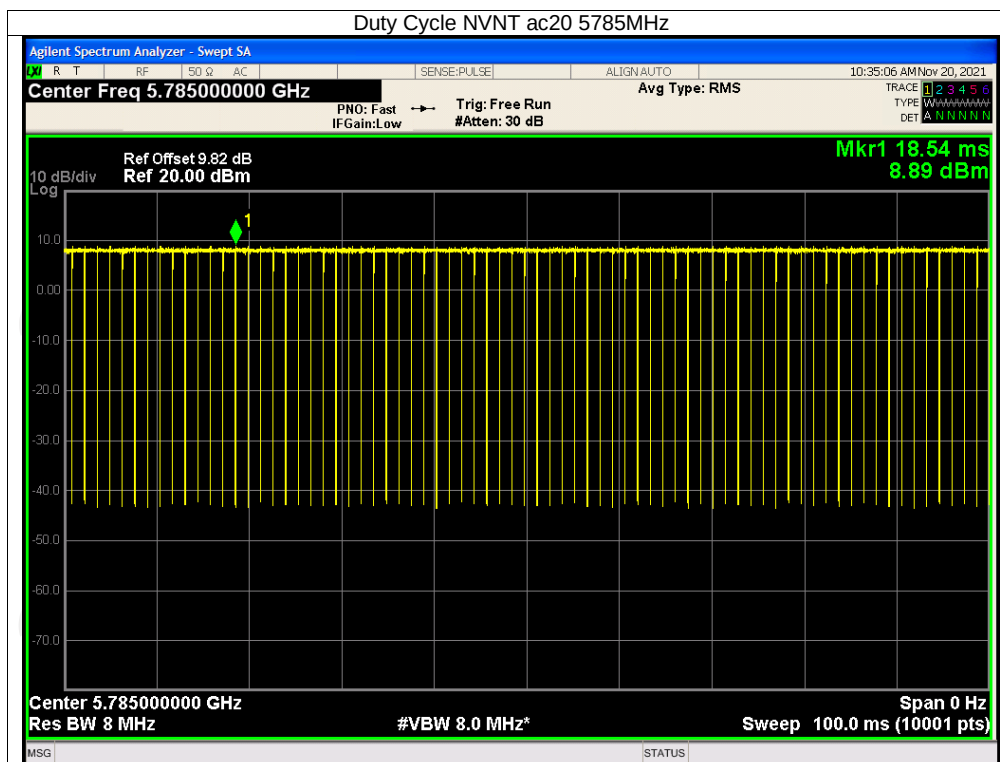


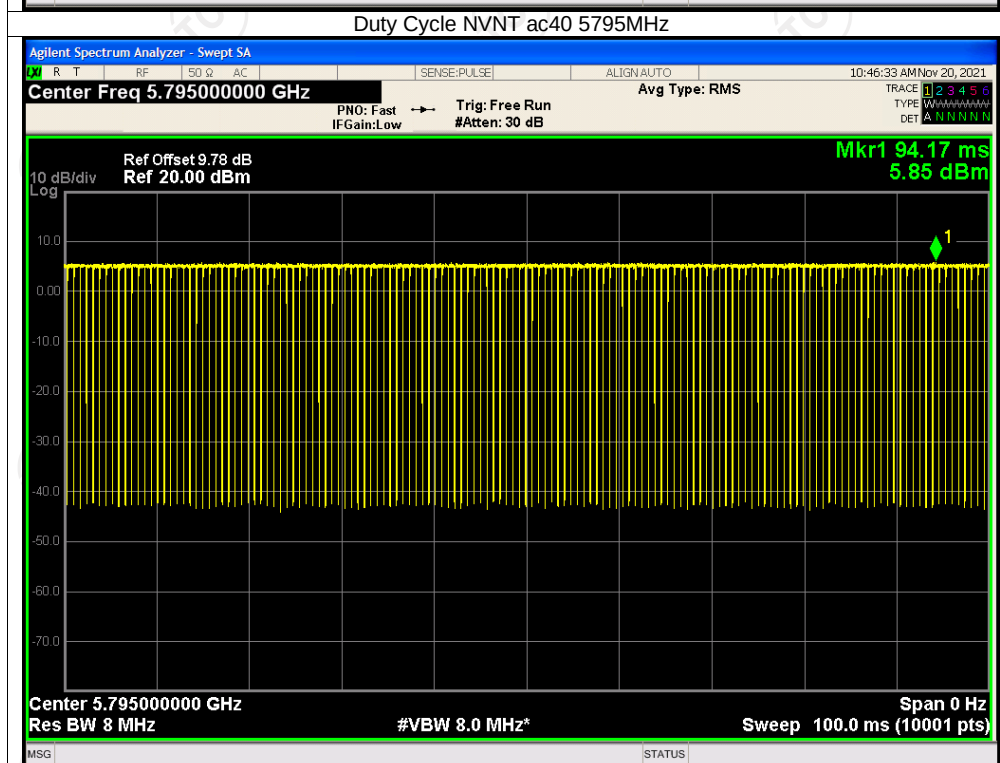
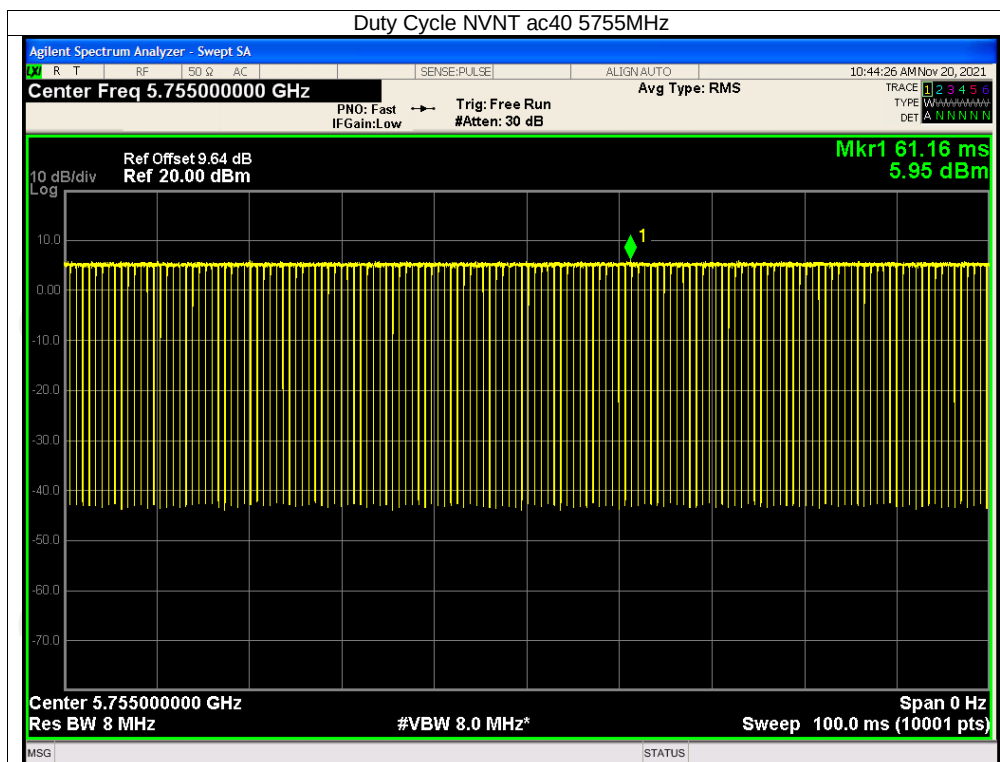


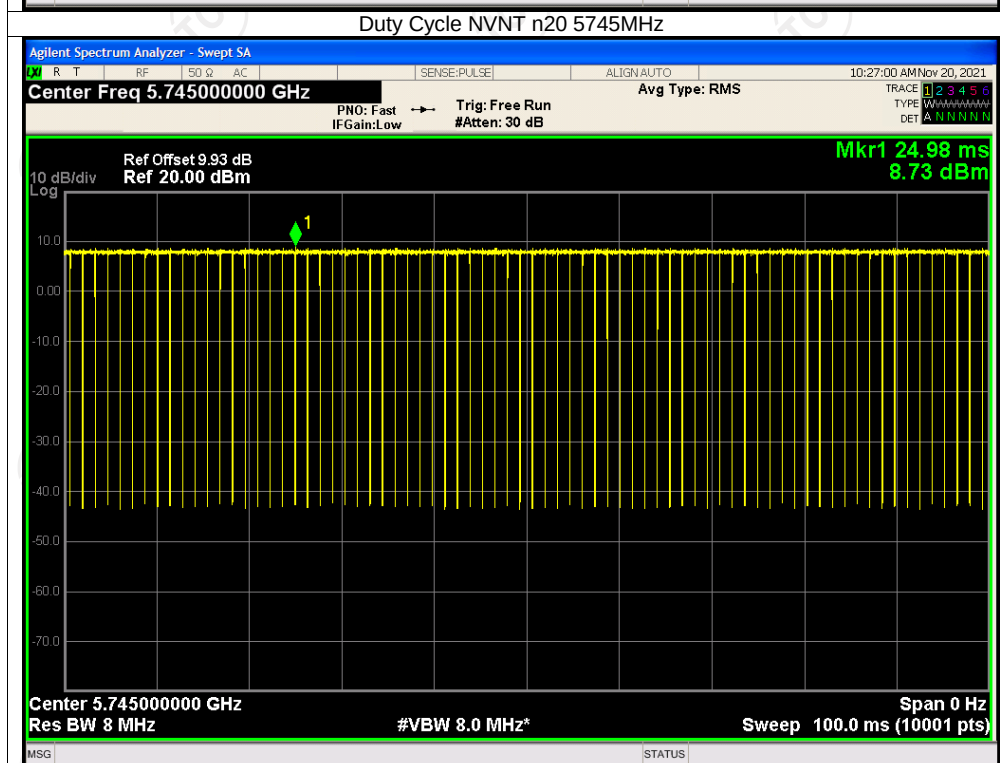
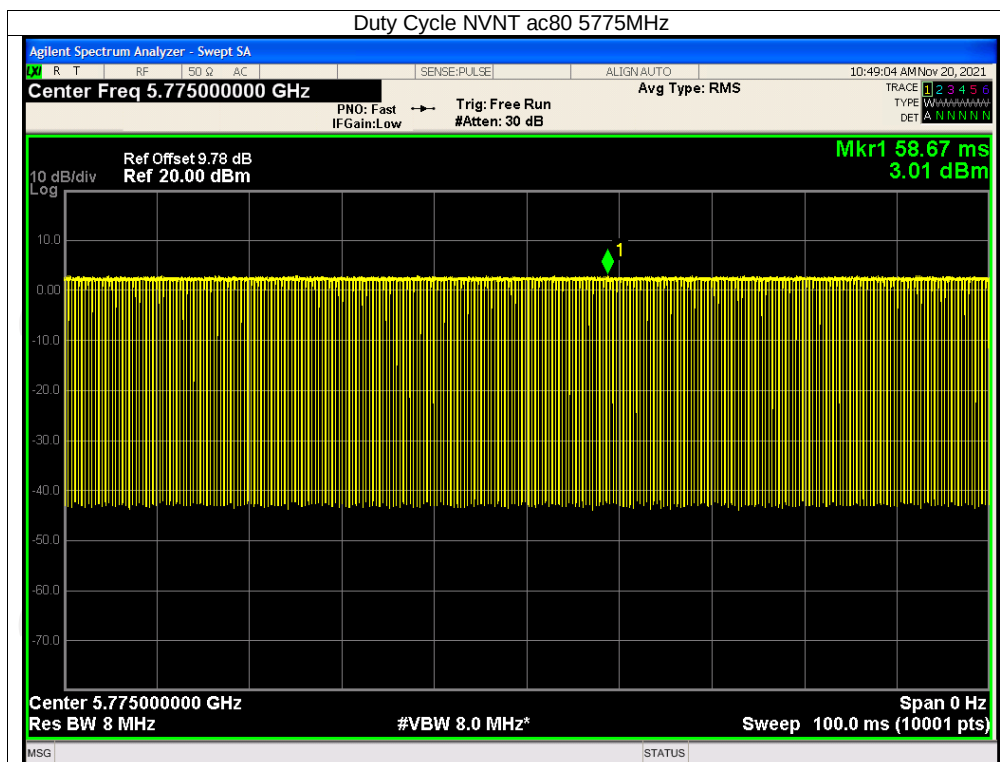


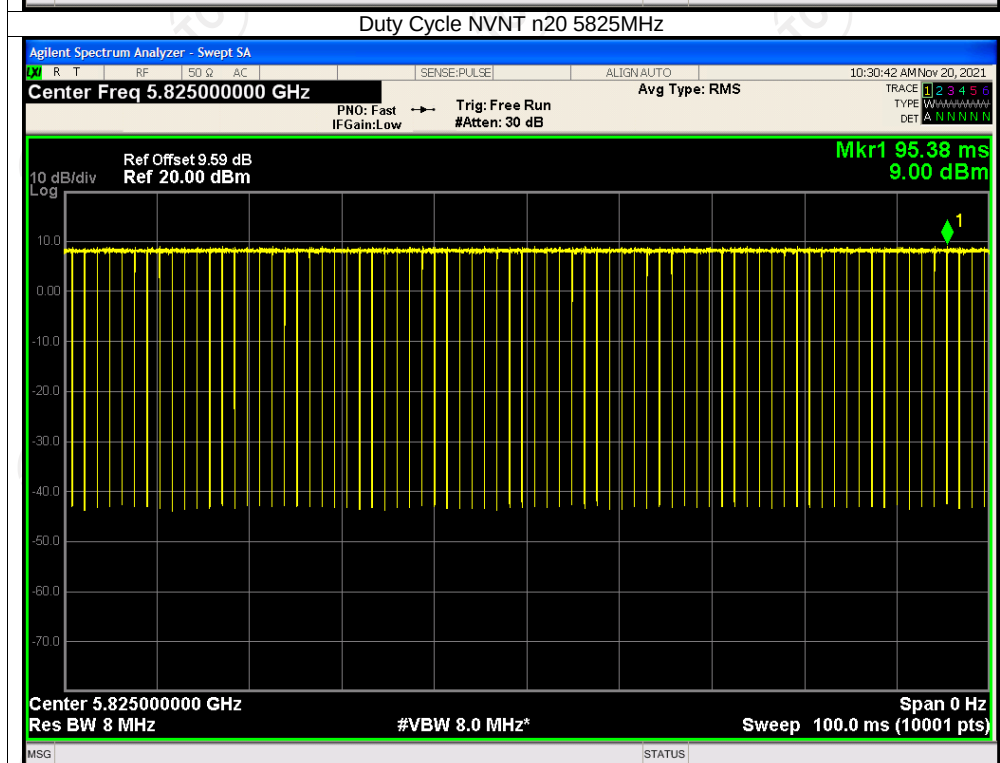
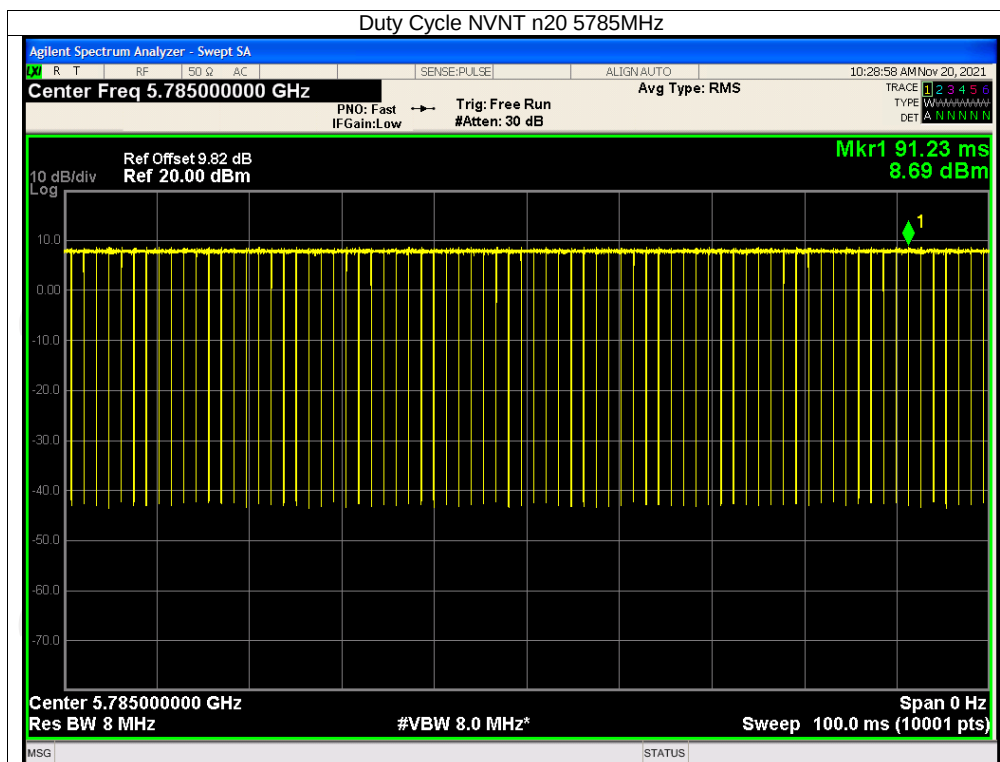


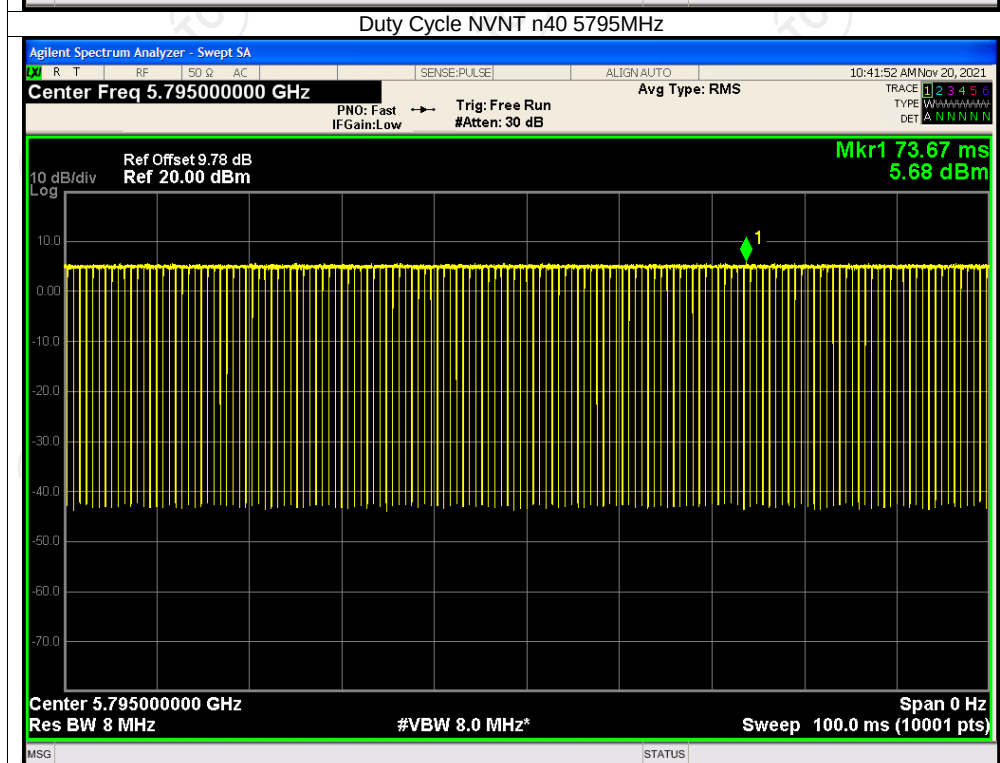
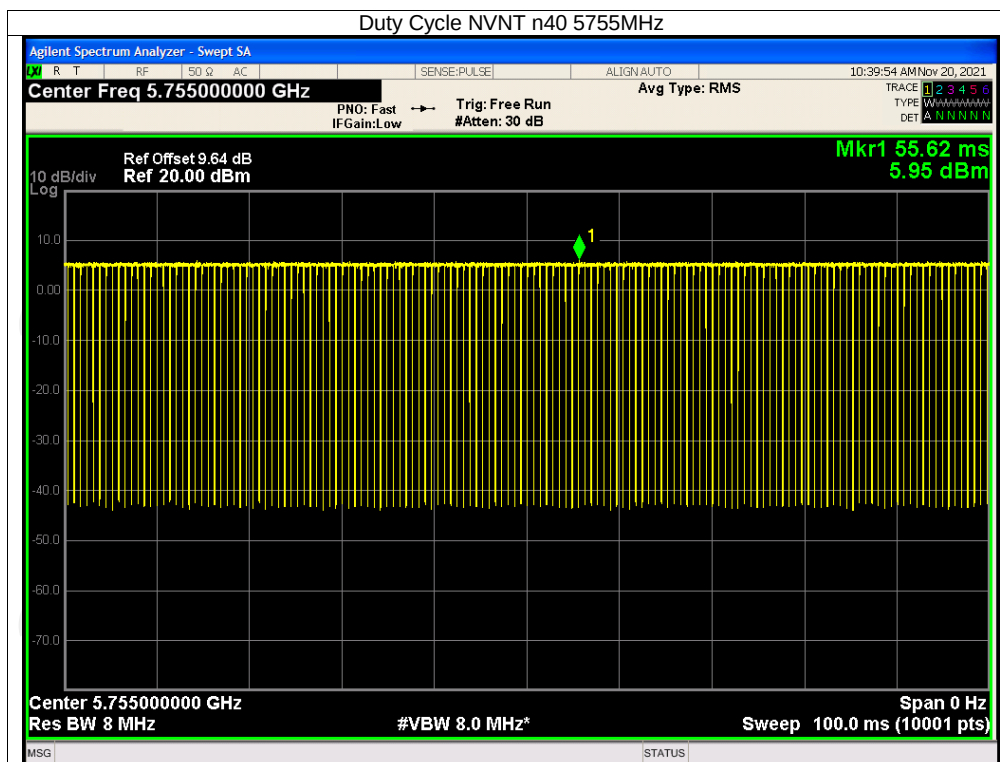












Maximum Conducted Output Power

Band1

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5180	11.177	0.09	11.267	24	Pass
NVNT	a	5200	10.883	0.09	10.973	24	Pass
NVNT	a	5240	11.021	0.09	11.111	24	Pass
NVNT	ac20	5180	11.813	0.10	11.913	24	Pass
NVNT	ac20	5200	11.739	0.10	11.839	24	Pass
NVNT	ac20	5240	11.513	0.10	11.613	24	Pass
NVNT	ac40	5190	11.447	0.19	11.637	24	Pass
NVNT	ac40	5230	11.557	0.19	11.747	24	Pass
NVNT	ac80	5210	11.310	0.37	11.680	24	Pass
NVNT	n20	5180	11.499	0.10	11.599	24	Pass
NVNT	n20	5200	11.629	0.10	11.729	24	Pass
NVNT	n20	5240	11.755	0.10	11.855	24	Pass
NVNT	n40	5190	11.479	0.19	11.669	24	Pass
NVNT	n40	5230	11.564	0.19	11.754	24	Pass

Band3

Condition	Mode	Frequency (MHz)	Conducted Power (dBm)	Duty Factor (dB)	Total Power (dBm)	Limit (dBm)	Verdict
NVNT	a	5745	9.799	0.09	9.889	30	Pass
NVNT	a	5785	9.848	0.09	9.938	30	Pass
NVNT	a	5825	10.470	0.09	10.560	30	Pass
NVNT	ac20	5745	10.273	0.10	10.373	30	Pass
NVNT	ac20	5785	10.149	0.10	10.249	30	Pass
NVNT	ac20	5825	10.379	0.10	10.479	30	Pass
NVNT	ac40	5755	9.759	0.19	9.949	30	Pass
NVNT	ac40	5795	9.795	0.19	9.985	30	Pass
NVNT	ac80	5775	9.459	0.37	9.829	30	Pass
NVNT	n20	5745	10.022	0.10	10.122	30	Pass
NVNT	n20	5785	9.985	0.10	10.085	30	Pass
NVNT	n20	5825	10.329	0.10	10.429	30	Pass
NVNT	n40	5755	9.739	0.19	9.929	30	Pass
NVNT	n40	5795	9.622	0.19	9.812	30	Pass

