FCC PART 15.407
ISEDC RSS-247, ISSUE 3, AUGUST 2023
TEST REPORT

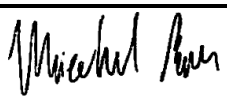
For

Roku, Inc.

1173 Coleman Avenue.,
San Jose, CA 95110, USA

FCC ID: TC2-R1051
IC: 5959A-R1049

Report Type:	**Product Type:**
Original Report	Remote Controller

Prepared By:	Michael Papa RF Test Engineer	
Report Number:	R2310133-407	
Report Date:	2024-02-15	
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ACCREDITED
CERTIFICATE #3297.02

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R2310133-407	Original Report	2024-02-15

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test report was prepared on behalf of *Roku, Inc.*, and their product model: RC-OS1, FCC ID: TC2-R1051, IC: 5959A-R1049 , the "EUT" as referred to in this report. The EUT is a Remote Controller.

Model Number	RC-OS1
FCC ID	TC2-R1051
IC	5959A-R1049
Radio Type	WLAN
Operating Frequency	5.15~5.85GHz
Modulation	OFDM (WLAN)
Channel Spacing	20MHz, 40MHz
Omnidirectional Antenna Gain	3.0dBi

1.2 Objective

This report was prepared on behalf of *Roku, Inc.*, in accordance with FCC CFR47 §15.407 and ISEDC RSS-247 Issue 3, August 2023.

The objective was to determine compliance with FCC Part 15.407 and ISEDC RSS-247 rules for Output Power, Antenna Requirements, AC Line Conducted Emissions, Emission Bandwidth, Power spectral density, Conducted and Radiated Spurious Emissions.

In order to determine compliance, the manufacturer or a contracted laboratory makes measurements and takes the necessary steps to ensure that the equipment complies with the appropriate technical standards.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the immunity should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing and/or I/O cable changes, etc.).

1.3 Mechanical Description of EUT

Dimensions: 140 mm (Length) 45 mm (Width) 15 mm (Height).
Serial Number: 20EFBDFF4F50
EUT Photos: See Attachments Appendix B andC

1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment Class: DTS with FCC ID: TC2-R1051, IC: 5959A-R1049

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.10-2013, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz, and FCC KDB 789033 D02 General UNII Test Procedure New Rules v02r01.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Parameter	Measurement uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.57 dB
Power Spectral Density, conducted	±1.48dB
Unwanted Emissions, conducted	±1.57dB
All emissions, radiated	±4.0 dB
AC power line Conducted Emission	±2.0 dB
Temperature	±2 º C
Humidity	±5 %
DC and low frequency voltages	±1.0 %
Time	±2 %
Duty Cycle	±3 %

1.7 Test Facility Registrations

BACLs test facilities that are used to perform Radiated and Conducted Emissions tests are currently recognized by the Federal Communications Commission as Accredited with NIST Designation Number US1129.

BACL's test facilities that are used to perform Radiated and Conducted Emissions tests are currently registered with Industry Canada under Registration Numbers: 3062A-1, 3062A-2, and 3062A-3.

BACL is a Chinese Taipei Bureau of Standards Metrology and Inspection (BSMI) validated Conformity Assessment Body (CAB), under Appendix B, Phase I Procedures of the APEC Mutual Recognition Arrangement (MRA). BACL's BSMI Lab Code Number is: SL2-IN-E-1002R

BACL's test facilities that are used to perform AC Line Conducted Emissions, Telecommunications Line Conducted Emissions, Radiated Emissions from 30 MHz to 1 GHz, and Radiated Emissions from 1 GHz to 6 GHz are currently recognized as Accredited in accordance with the Voluntary Control Council for Interference [VCCI] Article 15 procedures under Registration Number A-0027.

1.8 Test Facility Accreditations

Bay Area Compliance Laboratories Corp. (BACL) is:

A- ***An independent, 3rd-Party, Commercial Test Laboratory accredited to ISO/IEC 17025:2017 by A2LA (Test Laboratory Accreditation Certificate Number 3297.02),*** in the fields of: Electromagnetic Compatibility and Telecommunications. Unless noted by an Asterisk (*) in the Compliance Matrix (See Section 3 of this Test Report), BACL's ISO/IEC 17025:2005 Scope of Accreditation includes all of the Test Method Standards and/or the Product Family Standards detailed in this Test Report.

BACL's ISO/IEC 17025:2005 Scope of Accreditation includes a comprehensive suite of EMC Emissions, EMC Immunity, Radio, RF Exposure, Safety and wireline Telecommunications test methods applicable to a wide range of product categories. These product categories include Central Office Telecommunications Equipment [including NEBS - Network Equipment Building Systems], Unlicensed and Licensed Wireless and RF devices, Information Technology Equipment (ITE); Telecommunications Terminal Equipment (TTE); Medical Electrical Equipment; Industrial, Scientific and Medical Test Equipment; Professional Audio and Video Equipment; Industrial and Scientific Instruments and Laboratory Apparatus; Cable Distribution Systems, and Energy Efficient Lighting.

B- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.03)*** to certify

- For the USA (Federal Communications Commission):
  - 1- All Unlicensed radio frequency devices within FCC Scopes A1, A2, A3, and A4;
  - 2- All Licensed radio frequency devices within FCC Scopes B1, B2, B3, and B4;
  - 3- All Telephone Terminal Equipment within FCC Scope C.
- For the Canada (Industry Canada):
  - 1 All Scope 1-Licence-Exempt Radio Frequency Devices;
  - 2 All Scope 2-Licensed Personal Mobile Radio Services;
  - 3 All Scope 3-Licensed General Mobile & Fixed Radio Services;
  - 4 All Scope 4-Licensed Maritime & Aviation Radio Services;
  - 5 All Scope 5-Licensed Fixed Microwave Radio Services
  - 6 All Broadcasting Technical Standards (BETS) in the Category I Equipment Standards List.
- For Singapore (Info-Communications Development Authority (IDA)):
  - 1 All Line Terminal Equipment: All Technical Specifications for Line Terminal Equipment – Table 1 of IDA MRA Recognition Scheme: 2011, Annex 2
  - 2. All Radio-Communication Equipment: All Technical Specifications for Radio-Communication Equipment – Table 2 of IDA MRA Recognition Scheme: 2011, Annex 2
- For the Hong Kong Special Administrative Region:
  - 1 All Radio Equipment, per KHCA 10XX-series Specifications;
  - 2 All GMDSS Marine Radio Equipment, per HKCA 12XX-series Specifications;
  - 3 All Fixed Network Equipment, per HKCA 20XX-series Specifications.
- For Japan:
  - 1 MIC Telecommunication Business Law (Terminal Equipment):
    - All Scope A1 - Terminal Equipment for the Purpose of Calls;
    - All Scope A2 - Other Terminal Equipment
  - 2 Radio Law (Radio Equipment):
    - All Scope B1 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 1 of the Radio Law
    - All Scope B2 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 2 of the Radio Law
    - All Scope B3 - Specified Radio Equipment specified in Article 38-2-2, paragraph 1, item 3 of the Radio Law

C- ***A Product Certification Body accredited to ISO/IEC 17065:2012 by A2LA (Product Certification Body Accreditation Certificate Number 3297.01)*** to certify Products to USA's Environmental Protection Agency (EPA) ENERGY STAR Product Specifications for:

1 Electronics and Office Equipment:
- for Telephony (ver. 3.0)
- for Audio/Video (ver. 3.0)
- for Battery Charging Systems (ver. 1.1)
- for Set-top Boxes & Cable Boxes (ver. 4.1)
- for Televisions (ver. 6.1)
- for Computers (ver. 6.0)
- for Displays (ver. 6.0)
- for Imaging Equipment (ver. 2.0)
- for Computer Servers (ver. 2.0)

2 Commercial Food Service Equipment
- for Commercial Dishwashers (ver. 2.0)
- for Commercial Ice Machines (ver. 2.0)
- for Commercial Ovens (ver. 2.1)
- for Commercial Refrigerators and Freezers

3 Lighting Products
- For Decorative Light Strings (ver. 1.5)
- For Luminaires (including sub-components) and Lamps (ver. 1.2)
- For Compact Fluorescent Lamps (CFLs) (ver. 4.3)
- For Integral LED Lamps (ver. 1.4)

4 Heating, Ventilation, and AC Products
- for Residential Ceiling Fans (ver. 3.0)
- for Residential Ventilating Fans (ver. 3.2)

5 Other
- For Water Coolers (ver. 3.0)

D- ***A NIST Designated Phase-I and Phase-II Conformity Assessment Body (CAB) for the following economies and regulatory authorities under the terms of the stated MRAs/Treaties:***

- Australia: ACMA (Australian Communication and Media Authority) – APEC Tel MRA -Phase I;
- Canada: (Innovation, Science and Economic development Canada - ISEDC) Foreign Certification Body – FCB – APEC Tel MRA -Phase I & Phase II;
- Chinese Taipei (Republic of China – Taiwan):
  - BSMI (Bureau of Standards, Metrology and Inspection) APEC Tel MRA -Phase I;
  - NCC (National Communications Commission) APEC Tel MRA -Phase I;
- European Union:
  - EMC Directive 2014/30/EU US-EU EMC & Telecom MRA CAB (NB)
  - Radio Equipment (RE) Directive 2014/53/EU US-EU EMC & Telecom MRA CAB (NB)
  - Low Voltage Directive (LVD) 2014/35/EU
- Hong Kong Special Administrative Region: (Office of the Telecommunications Authority – OFTA) APEC Tel MRA -Phase I & Phase II
- Israel – US-Israel MRA Phase I
- Republic of Korea (Ministry of Communications - Radio Research Laboratory) APEC Tel MRA -Phase I
- Singapore: (Infocomm Media Development Authority - IMDA) APEC Tel MRA -Phase I & Phase II;
- Japan: VCCI - Voluntary Control Council for Interference US-Japan Telecom Treaty VCCI Side Letter-
- USA:
  - ENERGY STAR Recognized Test Laboratory – US EPA
  - Telecommunications Certification Body (TCB) – US FCC;
  - Nationally Recognized Test Laboratory (NRTL) – US OSHA

Vietnam: APEC Tel MRA -Phase I;

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.10-2013 and FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The test utility used was the "UI_mptool", provided by *Roku, Inc.*, the software is compliant with the standard requirements being tested against.

Radio	Channel	Frequency (MHz)	Modulation	Power Setting
5 GHz Wi-Fi	Low	5180	802.11a	109
	Middle	5200		121
	High	5240		120
	Low	5260		120
	Middle	5280		118
	Middle	5300		118
	High	5320		107
	Low	5500		109
	Middle	5600		110
	Middle	5700		112
	High	5720		112
	Low	5745		107
	Middle	5785		107
	High	5825		107
	Low	5180	802.11n20	108
	Middle	5200		122
	High	5240		119
	Low	5260		119
	Middle	5280		119
	Middle	5300		119
	High	5320		104
	Low	5500		108
	Middle	5600		109
	Middle	5700		108
	High	5720		108
	Low	5745		107
	Middle	5785		107
	High	5825		107
	Low	5190	802.11n40	103
	High	5230		122
	Low	5270		121
	High	5310		99
	Low	5510		95
	Middle	5550		113
	Middle	5590		113
	Middle	5670		95
	High	5710		95
	Low	5755		111
	High	5795		111

Note:5600-5650MHz range is not applicable for ISED
Data Rates Tested:
802.11a mode: 6Mbps
802.11n HT20 mode: MCS0
802.11n HT40 mode: MCS0

2.3 Duty Cycle Correction Factor

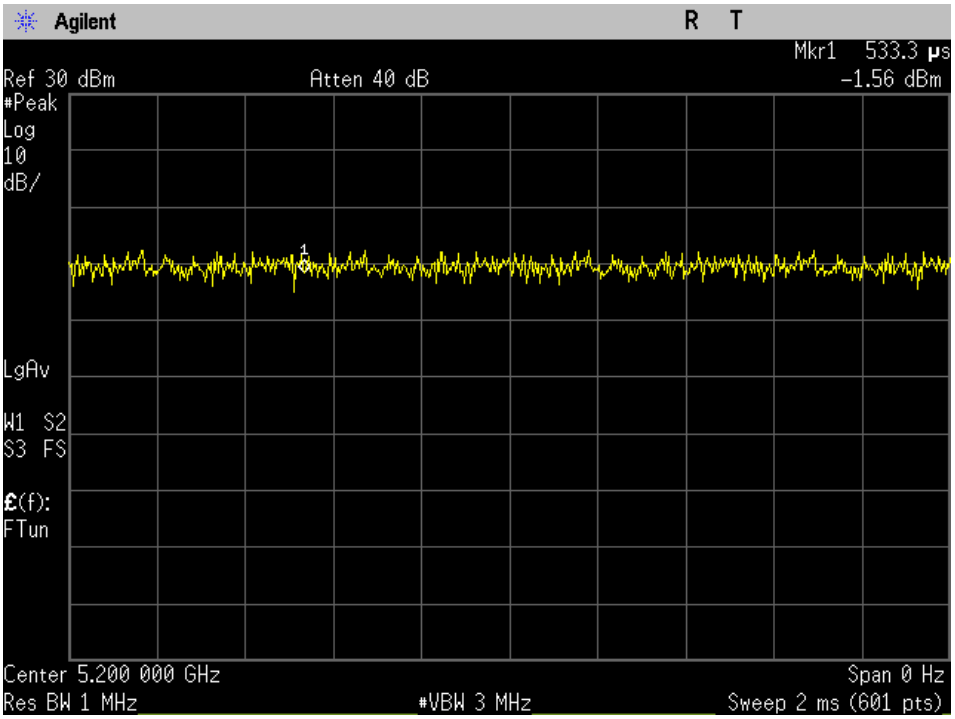
According to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 section B:

All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum-power transmission duration, T, are required for each tested mode of operation.

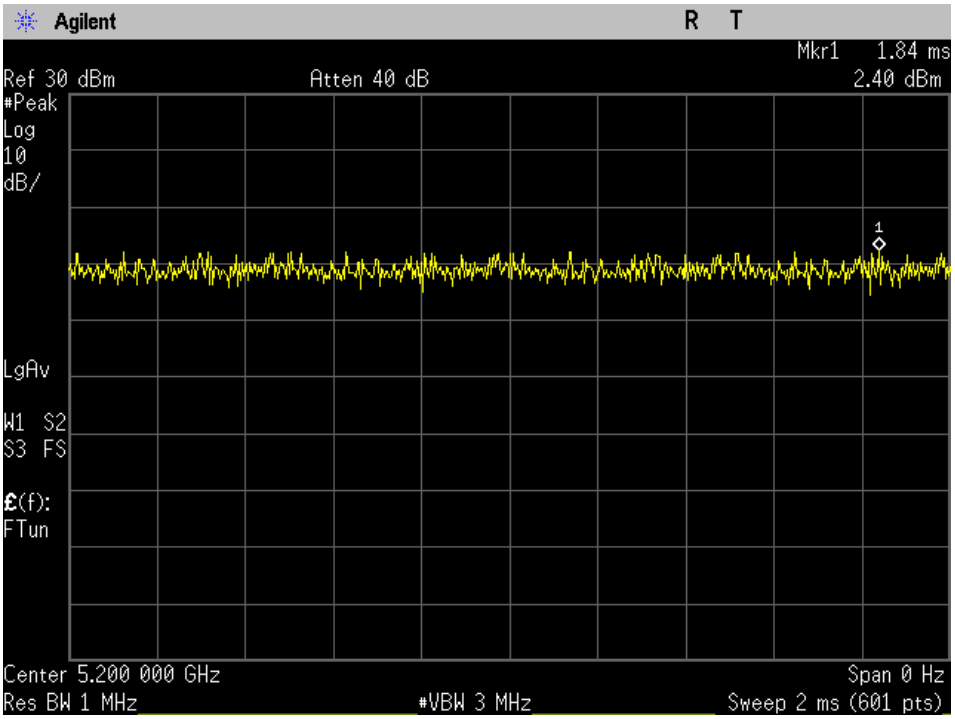
Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11a	-	-	100%	0
802.11n20	-	-	100%	0
802.11n40	-	-	100%	0

Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)
Please refer to the following plots.

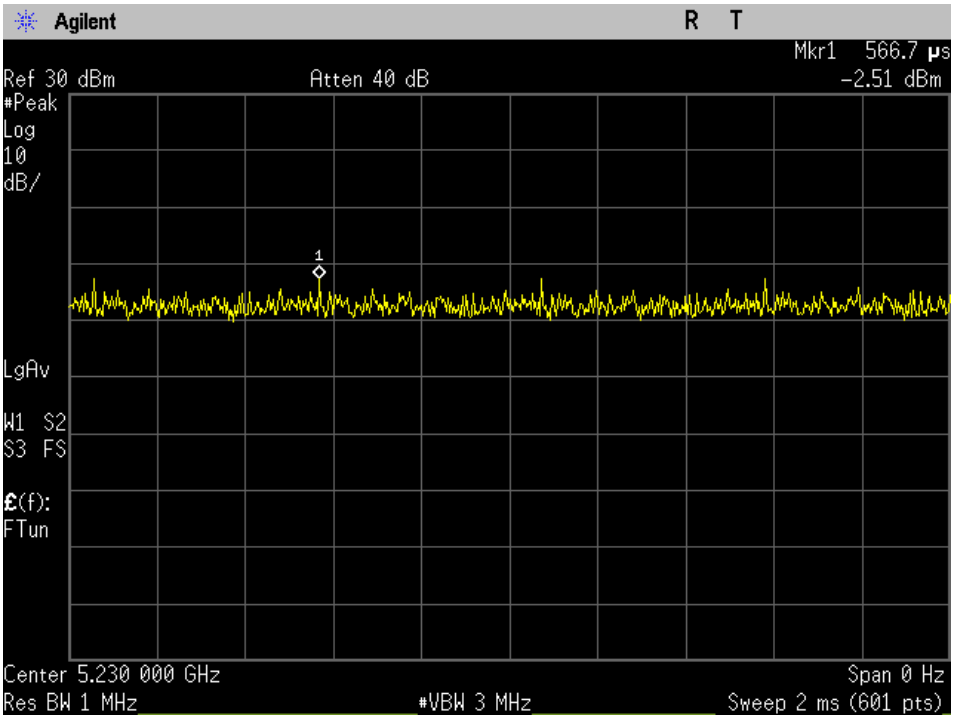
802.11a mode



802.11n20 mode



802.11n40 mode



2.4 Equipment Modification

None.

2.5 Local Support Equipment

Manufacturer	Description	Model
Dell	Laptop	Latitude 5410

2.6 Remote Support Equipment

Manufacturer	Description	Model
Roku, Inc.	Remote Serial Dongle	2326000233
Roku, Inc.	AC/DC Adaptor	-

2.7 Interface Ports and Cabling

Cable Descriptions	Length (m)	From	To
USB	1.5	Laptop	Remote Serial Dongle
USB	1.5	Remote Serial Dongle	EUT
USB Power cable	1.5	EUT	AC/DC Adaptor

3 Summary of Test Results

Results reported relate only to the product tested.

FCC & ISEDC Rules	Description of Test	Results
FCC §2.1093, §15.407(f) ISED RSS-102 §2.5	RF Exposure	Compliant[1]
FCC §15.203 ISED RSS-GEN §6.8	Antenna Requirement	Compliant
FCC §15.207 ISED RSS-GEN §8.8	AC Power Line Conducted Emissions	Compliant
FCC §2.1053, §15.205, §15.209, 15.407(b) ISED RSS-247 §6.2	Spurious Radiated Emissions	Compliant
FCC §15.407(e) ISED RSS-247 §6.2	Emission Bandwidth	Compliant
FCC §407(a) ISED RSS-247 §6.2	Output Power	Compliant
FCC §15.407(a) ISED RSS-247 §6.2	Power Spectral Density	Compliant
FCC §2.1051, §15.407(b) ISED RSS-247 §6.2	Spurious Emissions at Antenna Terminals	Compliant
FCC §15.407(h) ISED RSS-247 §6.3	Dynamic Frequency Selection	Compliant
FCC §15.407(g)	Frequency Stability	Compliant[2]

Note[1]: Please refer to Report Number *R2310133-SAR* and issued by Bay Area Compliance Labs for results.
Note[2]: Customer confirmed an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

BACL is responsible for all the information provided in this report, except when information is provided by the customer as identified in this report. Information provided by the customer, e.g., antenna gain, can affect the validity of results.

4 FCC §15.203 & ISEDC RSS-Gen §6.8 - Antenna Requirements

4.1 Applicable Standards

According to FCC §15.203:

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 shall be considered sufficient to comply with the provisions of this Section. 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.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to ISEDC RSS-Gen §6.8: Transmitter Antenna

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For license-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

4.2 Antenna Description

External/Internal/ Integral	Part Number	Antenna Type	Frequency Range (MHz)	Maximum Antenna Gain (dBi)
Integral	ANT162442DT-2001A2	Trace	5.15~5.85GHz	3.0 dBi

5 FCC §15.207& ISEDC RSS-Gen §8.8 - AC Line Conducted Emissions

5.1 Applicable Standards

As per FCC §15.207 and ISEDC RSS GEN §8.8 Conducted limits:

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note1	56 to 46 Note2
0.5-5	56	46
5-30	60	50

Note1: Decreases with the logarithm of the frequency.

Note2: A linear average detector is required

5.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.10-2013 measurement procedure. The specification used were FCC §15.207 and ISEDC RSS GEN §8.8 .

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 (via AC/DC Adapter) which provided 120 V / 60 Hz AC power.

5.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1 and the power cords of support equipment were connected to LISN-2.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data were recorded in the peak, quasi-peak, and average detection mode. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

5.4 Corrected Amplitude and Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Correction Factor (CF) to indicated Amplitude (Ai) reading. The basic equation is as follows:

$$CA = Ai + CF$$

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Correction Factor (13.7 dB)

The Correction Factor is calculated by adding Cable loss (CL) and attenuation of the impulse limiter and the high pass filter. The basic equation is as follows:

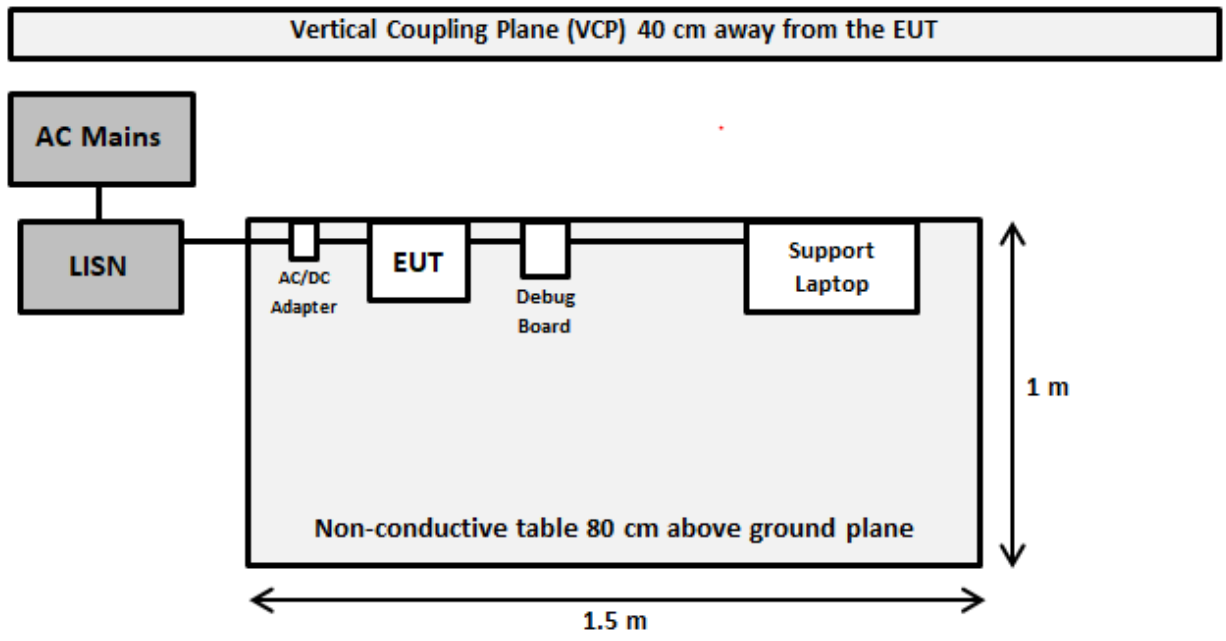
$$CF= CL + Attenuator$$

For example, a corrected amplitude of 13.7 dB = Cable Loss (3.7 dB) + Attenuation (10 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

$$Margin = Corrected\ Amplitude – Limit$$

5.5 Test Setup Block Diagram



5.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
124	Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2023-06-16	1 year
681	Rohde & Schwarz	Impulse Limiter	ESH3-Z2	101962	2023-07-12	6 months
726	Solar Electronics Company	High Pass Filter	Type 7930-100	7930150204	2023-07-24	6 months
732	FCC	LISN	FCC-LISN-50-25-2-10-CISPR16	160129	2023-09-12	1 year
1226	Fairview Microwave	Micro-Coax Cable	FMC0101223-240	210241	2023-06-28	6 months

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

5.7 Test Environmental Conditions

Temperature:	18.3 to 18.7 ºC
Relative Humidity:	62.1 to 62.3 %
ATM Pressure:	102.6 kPa

The testing was performed by Steven Lianto on 2023-12-04 in the 5 meter chamber 3.

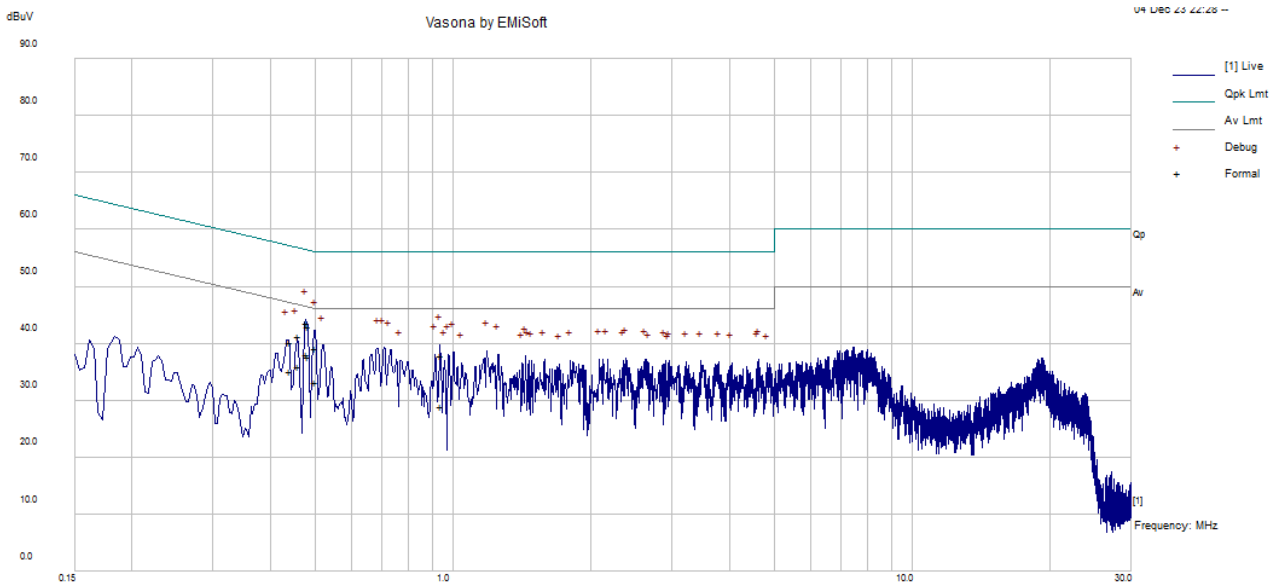
5.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC 15C and ISEDC RSS-Gen standard's conducted emissions limits, with the margin reading of:

Worst Case(802.11n20 @ 5300MHz) – AC Line (via AC/DC Adapter): 120V, 60Hz			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Hot/Neutral)**	**Range (MHz)**
-8.18	0.48001	Hot	0.15 to 30

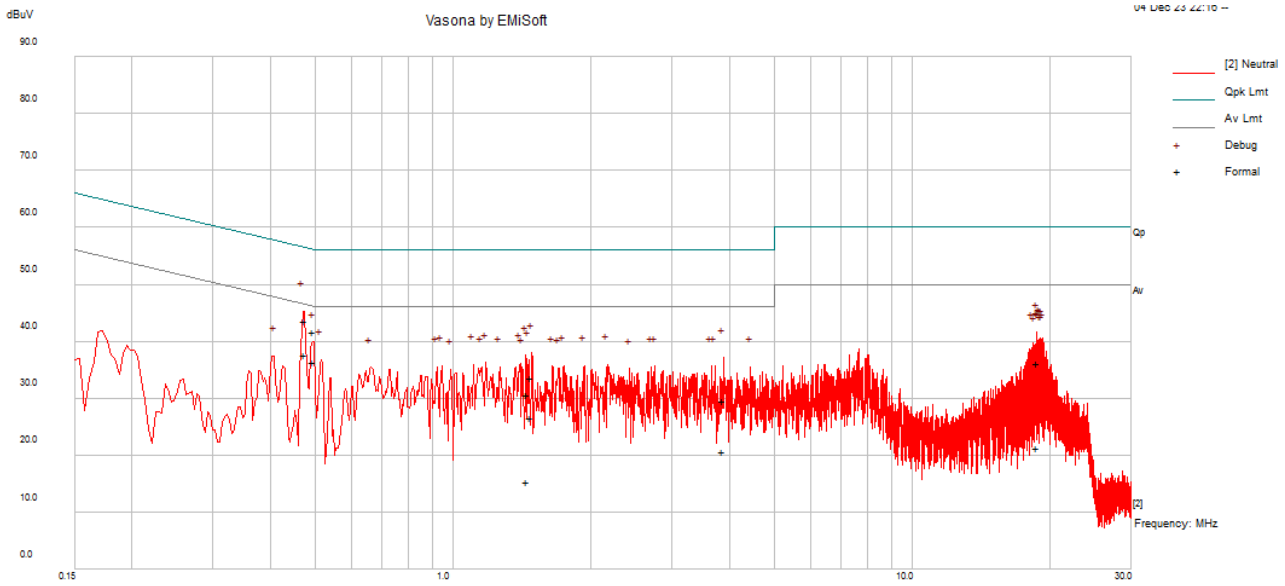
5.9 Conducted Emissions Test Plots and Data

AC Line (via AC/DC Adapter): 120V, 60Hz – Hot Conductor



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.48001	33.36	10.32	43.68	56.34	-12.66	QP
0.482761	32.58	10.32	42.9	56.29	-13.39	QP
0.460267	30.83	10.35	41.17	56.69	-15.51	QP
0.943809	27.59	10.18	37.77	56	-18.23	QP
0.501689	28.88	10.3	39.17	56	-16.83	QP
0.441118	29.94	10.36	40.3	57.04	-16.74	QP
0.48001	**27.84**	**10.32**	**38.16**	**46.34**	**-8.18**	**Ave**
0.482761	27.39	10.32	37.7	46.29	-8.59	Ave
0.460267	25.56	10.35	35.9	46.69	-10.78	Ave
0.943809	18.67	10.18	28.85	46	-17.15	Ave
0.501689	22.91	10.3	33.21	46	-12.79	Ave
0.441118	24.76	10.36	35.12	47.04	-11.92	Ave

AC Line (via AC/DC Adapter): 120V, 60Hz – Neutral Conductor



Frequency (MHz)	Ai. Reading (dBuV)	Correction Factor (dB)	Corrected Amplitude (dBµV)	Limit (dBµV)	Margin (dB)	Detector
0.474437	33.19	10.33	43.51	56.44	-12.92	QP
0.495896	31.47	10.3	41.78	56.07	-14.29	QP
1.471873	23.63	10.07	33.71	56	-22.29	QP
18.65419	25.56	10.56	36.12	60	-23.88	QP
1.445545	20.57	10.08	30.65	56	-25.35	QP
3.867671	19.61	10.05	29.66	56	-26.34	QP
0.474437	27.26	10.33	37.59	46.44	-8.85	Ave
0.495896	26.04	10.3	36.34	46.07	-9.73	Ave
1.471873	16.51	10.07	26.58	46	-19.42	Ave
18.65419	10.65	10.56	21.21	50	-28.79	Ave
1.445545	5.17	10.08	15.25	46	-30.75	Ave
3.867671	10.66	10.05	20.71	46	-25.29	Ave

6 FCC §15.209, §15.407(b) & ISEDC RSS-247 §6.2 - Spurious Radiated Emissions

6.1 Applicable Standard

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.209: The emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 Note 1	3
88 - 216	150 Note 1	3
216 - 960	200 Note 1	3
Above 960	500	3

Note 1: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC Part 15.407 (b)

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.25–5.35 GHz band: All emissions outside of the 5.15–5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(3) For transmitters operating in the 5.47–5.725 GHz band: All emissions outside of the 5.47–5.725 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(4) For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall noet exceed an e.i.r.p. of -27 dBm/MHz.

(5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.

(6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

(7) The provisions of §15.205 apply to intentional radiators operating under this section.

As per ISEDC RSS-247 §6.2

For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. However, any unwanted emissions that fall into the band 5250- 5350 MHz must be 26 dBc, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth, above 5.25 GHz. Otherwise, the transmission is considered as intentional and the devices shall implement dynamic frequency selection (DFS) and transmitter power control (TPC) as per the requirements for the band 5250-5350 MHz

For devices with both operating frequencies and channel bandwidths contained within the band 5250-5350 MHz, the device shall comply with the following:

1. All emissions outside the band 5250-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. if the equipment is intended for outdoor use; or
2. All emissions outside the band 5150-5350 MHz shall not exceed -27 dBm/MHz e.i.r.p. and any emissions within the band 5150-5250 MHz shall meet the power spectral density limits of Section 6.2.1. The device shall be labelled “for indoor use only.”

For devices with operating frequencies in the band 5250-5350 MHz but having a channel bandwidth that overlaps the band 5150-5250 MHz, the devices’ unwanted emission shall not exceed -27 dBm/MHz e.i.r.p. outside the band 5150-5350 MHz and its power shall comply with the spectral power density for operation within the band 5150-5250 MHz. The device shall be labelled “for indoor use only.”

For transmitters operating in the band 5470-5725 MHz, emissions outside the band shall not exceed -27 dBm/MHz e.i.r.p.

For the band 5725-5850 MHz, emissions at frequencies from the band edges to 10 MHz above or below the band edges shall not exceed -17 dBm/MHz e.i.r.p. For emissions at frequencies more than 10 MHz above or below the band edges, the emissions power shall not exceed -27 dBm/MHz.

6.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.10-2013. The specification used was the FCC 15.407 and ISEDC RSS-247 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

6.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords were connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter or 1.5 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

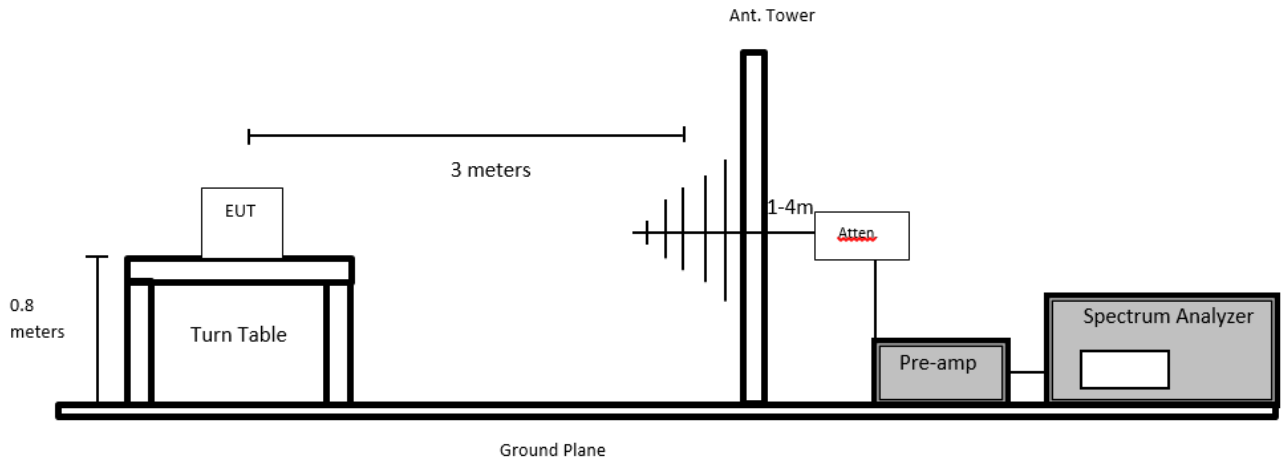
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

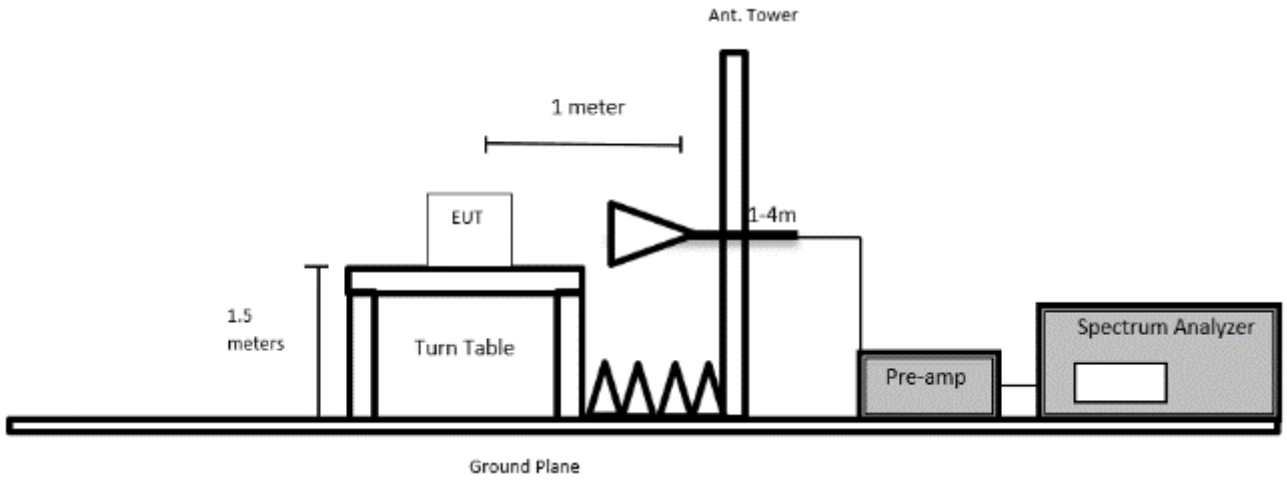
(1) Peak: RBW = 1MHz / VBW = 3MHz / Sweep = 100ms
(2) Average: RBW = 1MHz / VBW = 10Hz or 1/T / Sweep = Auto

6.4 Setup Diagrams

Below 1 GHz



Above 1 GHz



6.5 Corrected Amplitude and Margin Calculation

For emissions below 1 GHz,

The Corrected Amplitude (CA) is calculated by adding the Correction Factor to the S.A. Reading. The basic equation is as follows:

CA = S.A. Reading + Correction Factor

For example, a corrected amplitude of 40.3 dBuV/m = S.A. Reading (32.5 dBuV) + Correction Factor (7.8 dB/m)

The Correction Factor is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) together. This calculation is done in the measurement software, and reported in the test result section. The basic equation is as follows:

Correction Factor = AF + CL + Atten – Ga

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

For emission above 1 GHz,

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude – Limit

6.6 Test Equipment List and Details

BACL No.	Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2023-05-12	1 year
124	Rhode & Schwarz	EMI Test Receiver	ESCI	100044	2023-06-16	1 year
327	Sunol Sciences	System Controller	SC110V	122303-1	N/R	N/R
1075	Sunol Sciences	Boresight Tower	TLT3	050119-7	N/R	N/R
1388	Sunol Sciences	Flush Mount Turntable	FM	112005-2	N/R	N/R
316	Sonoma Instruments	Preamplifier 10 kHz - 2.5 GHz	317	260406	2023-09-26	6 months
658	HP/ Agilant	Pre Amplifier	8449B OPT HO2	3008A01103	2023-06-13	6 months
1247	Uti flex	Micro - Coax	N/A	N/A	2023-06-13	6 months
827	AH Systems	Preamplifier	PAM 1840 VH	170	2023-05-17	6 months
307	Sunol Sciences	Biconilog Antenna	JB3	A020106-3; 01182018A	2022-03-21	2 years
287	Micro-Tronics	5150-5350 MHz Notch Filter	BRC50703	006	2023-03-02	1 year
389	Micro-Tronics	5.6 GHz Notch Filter	BRC 50704	003	2023-05-04	1 year
1175	Micro-Tronics	Notch band 5725-5875MHz filter	BRC50705	006	2022-12-12	1 year
-	-	6dB Attenuator	PE7390-6	01182018A	2022-03-21	2 years
1192	ETS Lindgren	Horn Antenna	3117	00218973	2022-09-29	2 years
90	Wisewave	Antenna, Horn	ARH-4223-02	10555-01	2023-05-02	2 years
92	Wisewave	Antenna, Horn	ARH-2823-02	10555-01	2022-03-17	2 years
1186	Pasternack	Coaxial Cable, RG214	PE3062-1050CM	N/A	2023-10-03	6 months
1246	Hewlet Packard	RF Limiter	11867A	01734	2023-04-13	1 year
1248	Pasternack	RG214 COAX Cable	PE3062	N/A	2023-10-04	6 months
1249	Time Microwave	LMR-400 Cable Dc-3 GHz	AE13684	2k80612-5 6fts	2023-10-09	6 months
1346	RFMW	2.92mm 10ft RF cable	KMSE-160SAW-240.0-KSME	N/A	2023-11-03	6 months[1]
1354	RFMW	2.92mm 10ft RF Cable DC to 40 GHz	P1CA-29M29M-F150-120	N/A	2023-02-24	6 months
1295	Carlisle	10m Ultra Low Loss Coaxial Cable	UFB142A-1-3937-200200	64639890912-001	2023-10-31	6 months[1]

Note[1]: equipment was only used for testing performed on 2023-11-07

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

6.7 Test Environmental Conditions

Temperature:	21.4 - 22.6 ° C
Relative Humidity:	52.1-54.2%
ATM Pressure:	101.8 kPa

The testing was performed by Will Hu from 2023-10-30 to 2023-11-07 in 5m chamber 3.

6.8 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Part 15.407 and ISEDC RSS-247 standards' radiated emissions limits, and had the worst margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-0.05	40.185	V	802.11a mode, 5320 MHz

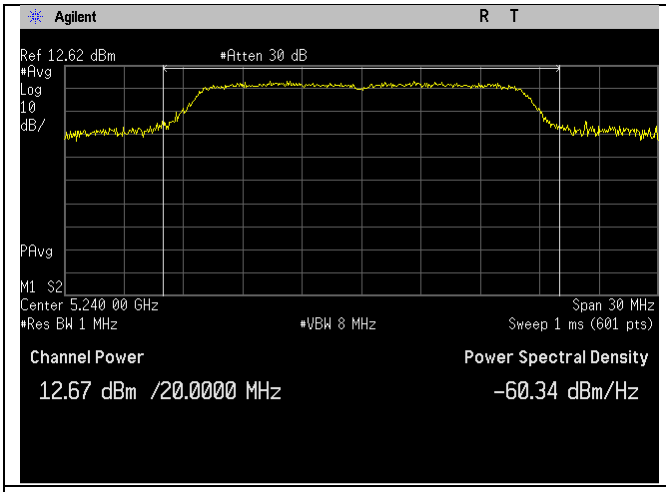
6.9 Radiated Emissions Test Result Data

Note: Below test data are the radiated cabinet emissions, for conducted in-lieu of radiated measurements performed at the antenna port please refer to ANNEX C, ANNEX D, and ANNEX E.
Note: Lowest frequency emitted by device is above 30MHz, thus below 30MHz spurious is not needed

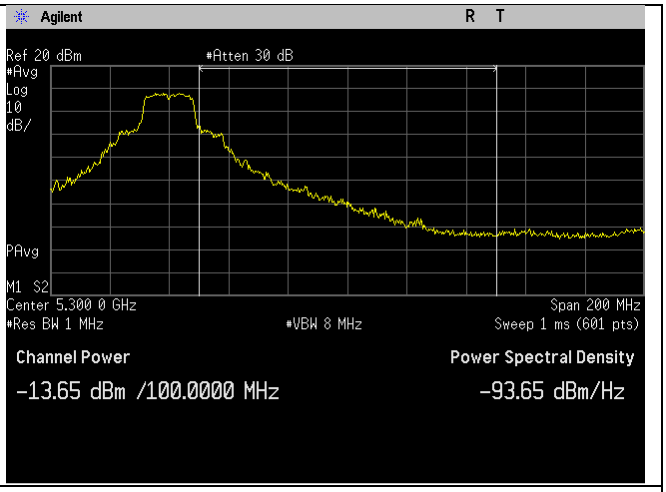
U-NII-2A Leakage:

Output Power (dBm)	**Leakage Power (dBm)**	**Delta (dB)**	**Threshold (dB)**
802.11a			
12.67	-13.65	26.32	>26
802.11n20			
12.59	-13.68	26.27	>26
802.11n40			
14.72	-17.53	32.25	>26

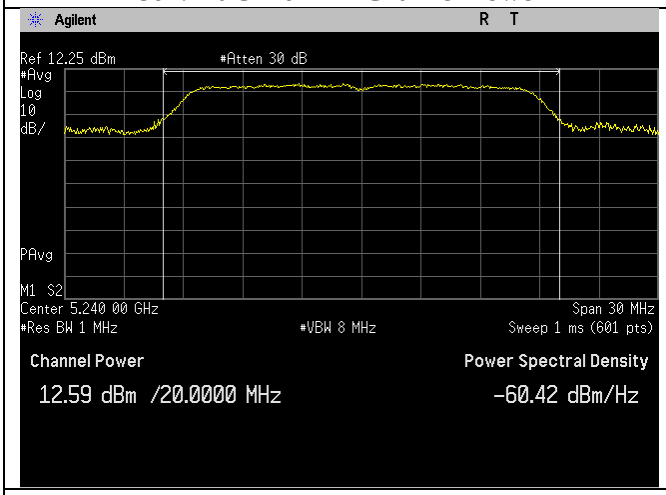
Please refer to the following plots for U-NII-2A Leakage test results



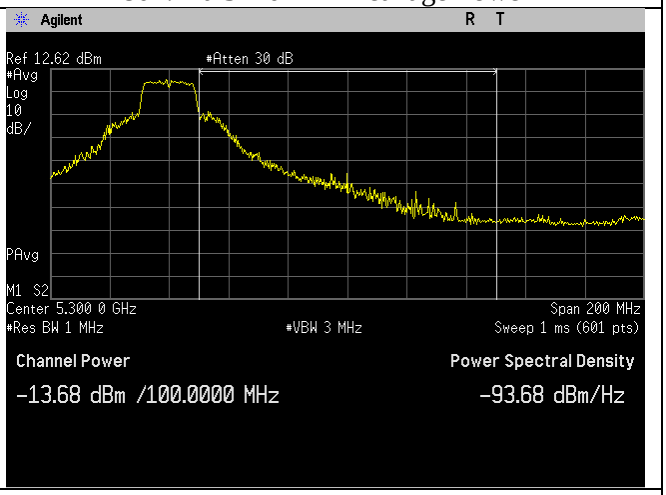
802.11a 5240MHz Channel Power



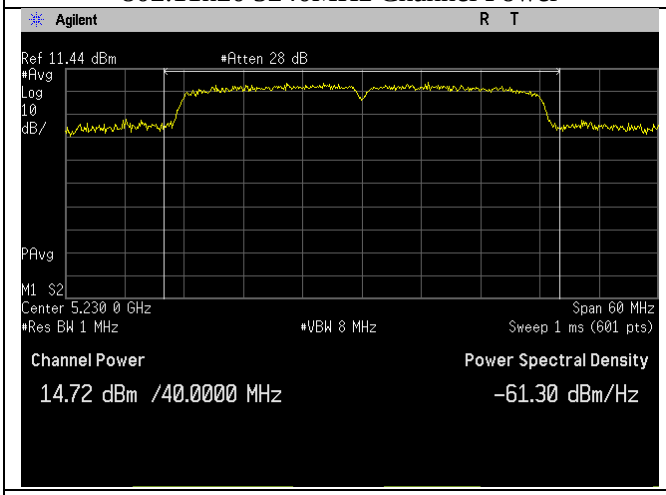
802.11a 5240MHz Leakage Power



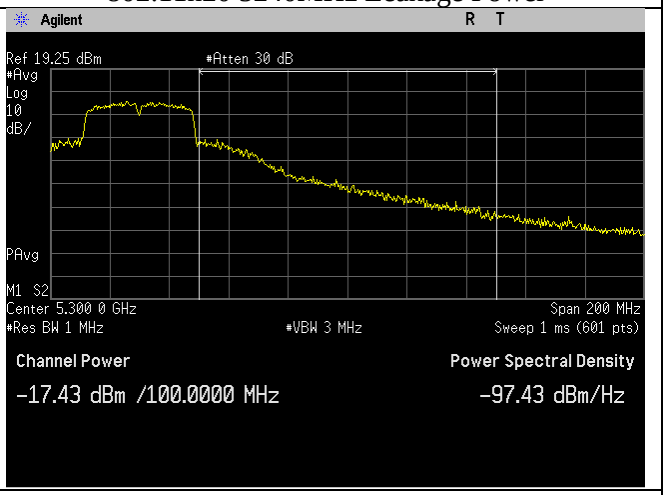
802.11n20 5240MHz Channel Power



802.11n20 5240MHz Leakage Power



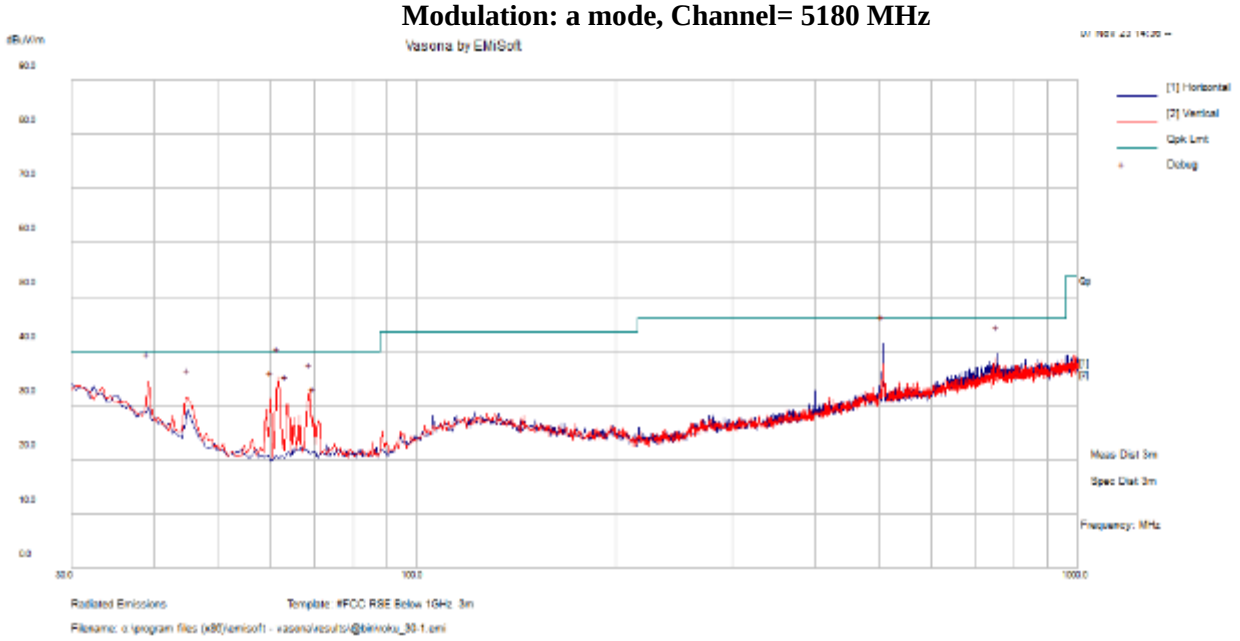
802.11n40 5230MHz Channel Power



802.11n40 5230MHz Leakage Power

1) 30 MHz – 1 GHz Worst Case, Measured at 3 meters

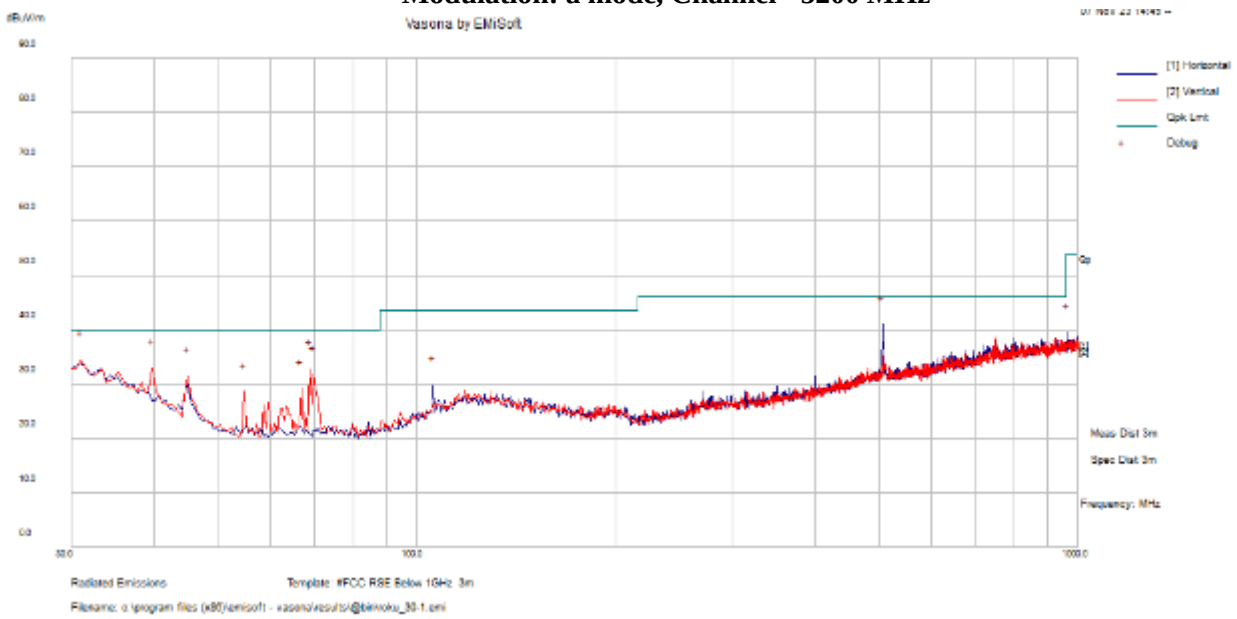
Modulation: a mode, Channel= 5180 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
506.27	43.32	-1.96	41.36	H	100	0	46	-4.64	Peak
61.525	48.88	-13.59	35.29	V	100	0	40	-4.71	
39.215	41.69	-7.33	34.36	V	300	0	40	-5.64	
754.105	37.54	1.87	39.41	H	100	0	46	-6.59	
68.8	45.91	-13.27	32.64	V	100	0	40	-7.36	
45.035	42.23	-10.75	31.48	V	100	0	40	-8.52	

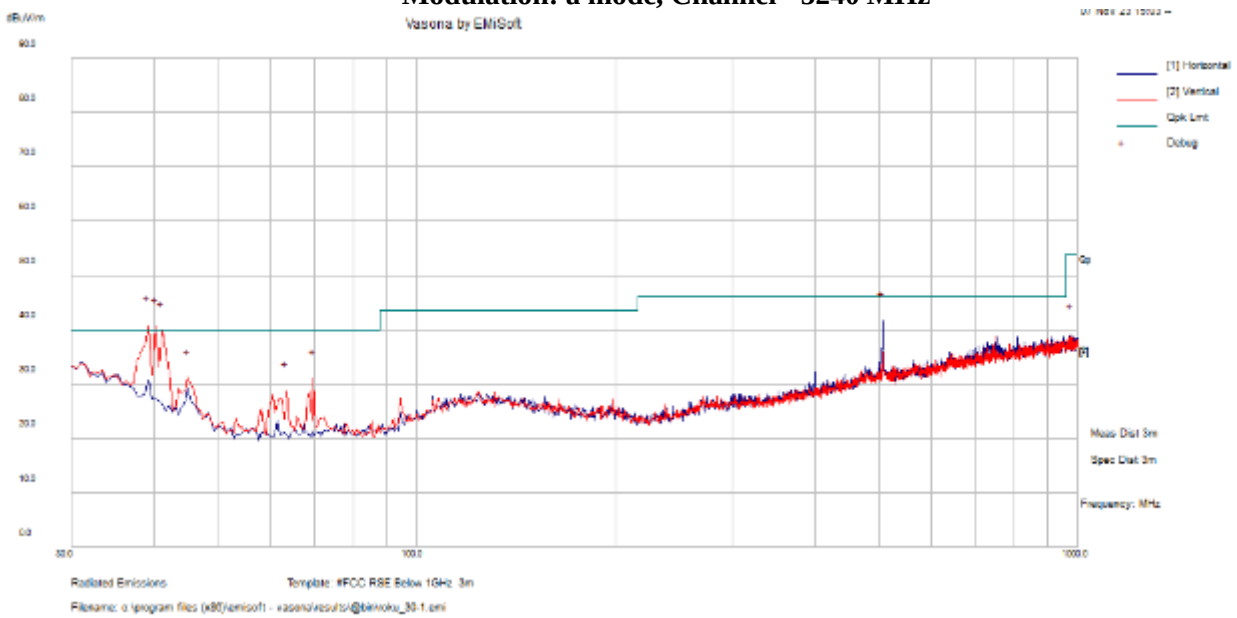
Modulation: a mode, Channel= 5200 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
506.27	42.87	-1.95	40.92	H	100	0	46	-5.08	Peak
30.97	36.21	-1.72	34.49	V	100	0	40	-5.51	
39.7	40.58	-7.67	32.91	V	300	0	40	-7.09	
68.8	45.99	-13.26	32.73	V	100	0	40	-7.27	
69.77	45.06	-13.26	31.8	V	100	0	40	-8.2	
45.035	42.25	-10.75	31.5	V	100	0	40	-8.5	

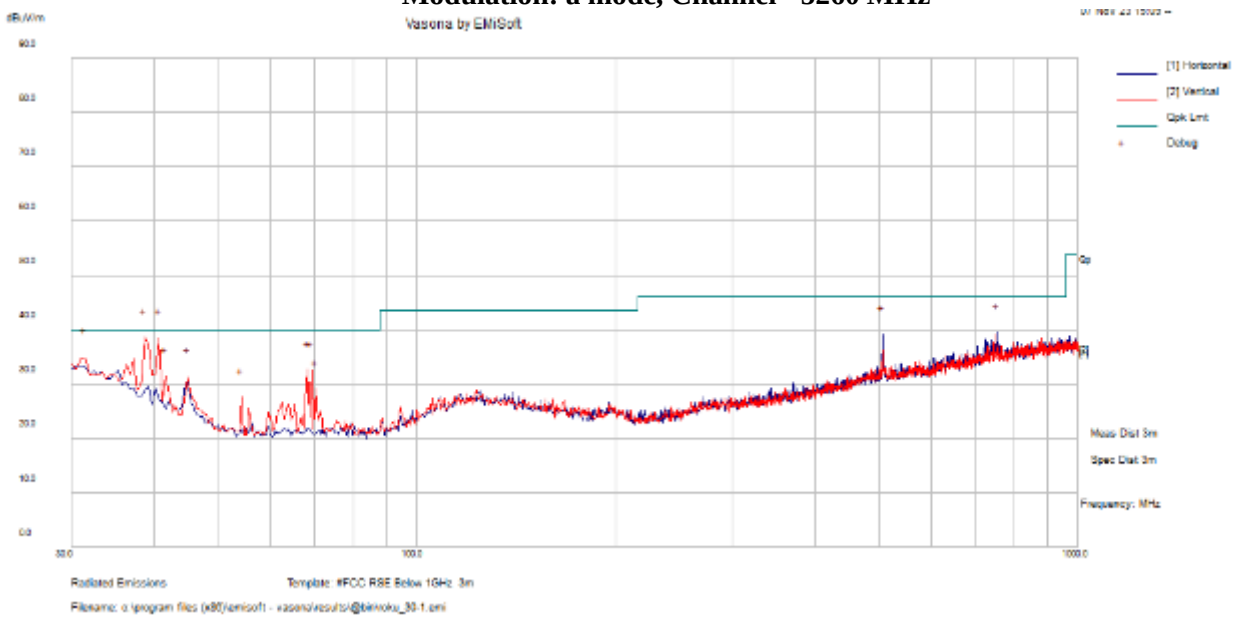
Modulation: a mode, Channel= 5240 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
39.215	46.13	-7.32	38.81	V	100	0	40	-1.19	Peak
40.185	46.67	-7.99	38.68	V	100	0	40	-1.32	
41.155	48.39	-8.54	39.85	V	100	0	40	-0.15	
506.27	43.6	-1.95	41.65	H	100	0	46	-4.35	
45.035	41.84	-10.75	31.09	V	100	0	40	-8.91	
69.77	44.22	-13.26	30.96	V	300	0	40	-9.04	

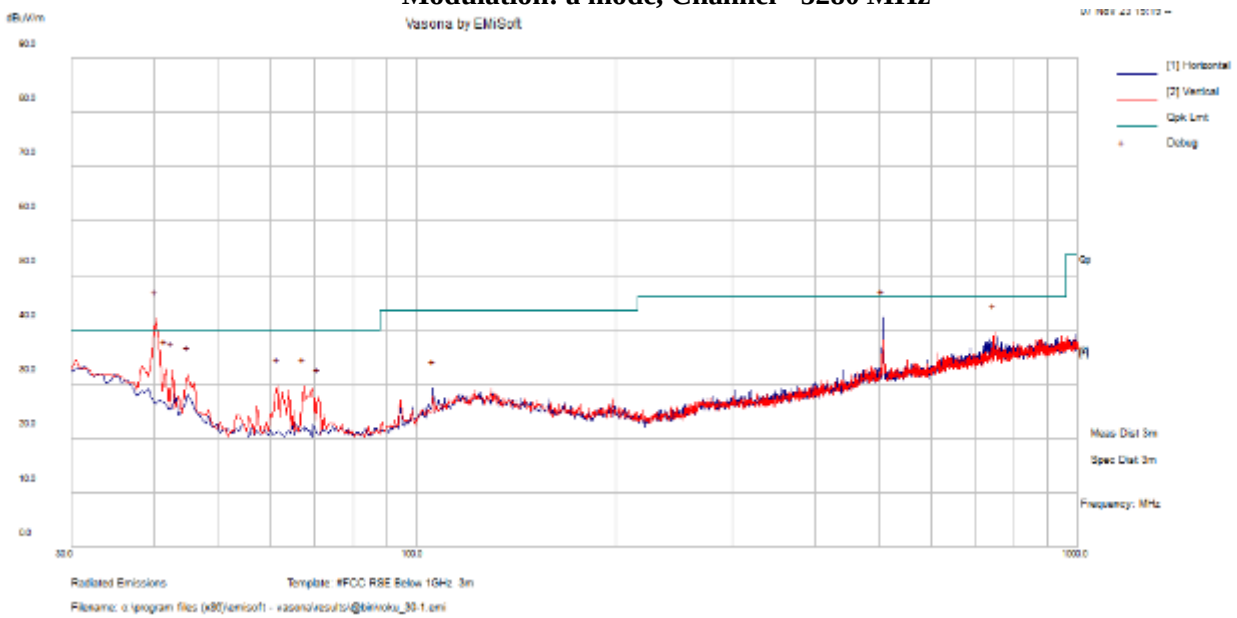
Modulation: a mode, Channel= 5260 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
61.525	52.79	-13.59	39.2	V	100	0	40	-0.8	Peak
506.27	42.57	-1.96	40.61	H	100	0	46	-5.39	
30	35.32	-0.97	34.35	H	100	0	40	-5.65	
886.51	35.64	3.25	38.89	H	300	0	46	-7.11	
45.035	42.22	-10.75	31.47	V	100	0	40	-8.53	
62.98	44.8	-13.5	31.3	V	300	0	40	-8.7	

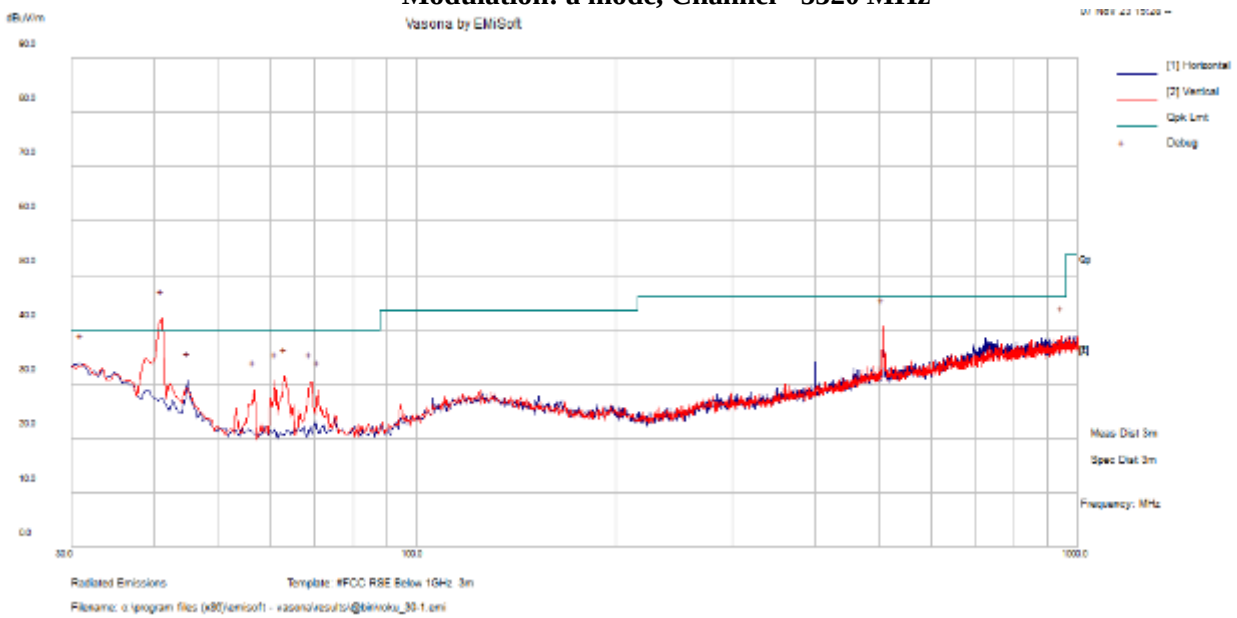
Modulation: a mode, Channel= 5280 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
38.73	45.56	-6.98	38.58	V	100	0	40	-1.42	Peak
40.67	46.7	-8.26	38.44	V	100	0	40	-1.56	
31.455	36.87	-2.06	34.81	V	300	0	40	-5.19	
754.105	37.59	1.87	39.46	H	100	0	46	-6.54	
506.27	41.08	-1.96	39.12	H	100	0	46	-6.88	
68.315	45.93	-13.28	32.65	V	100	0	40	-7.35	

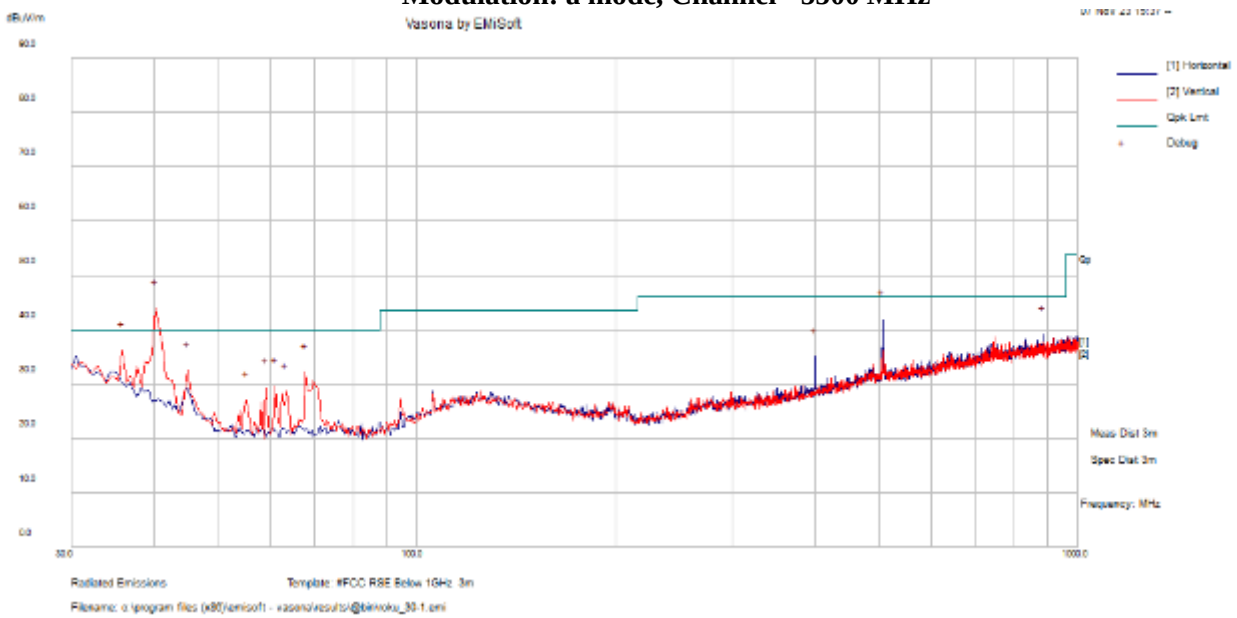
Modulation: a mode, Channel= 5320 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
40.185	47.93	-7.98	39.95	V	100	0	40	-0.05	Peak
506.27	44.17	-1.95	42.22	H	100	0	46	-3.78	
746.83	37.64	1.81	39.45	V	100	0	46	-6.55	
41.64	41.57	-8.8	32.77	V	100	0	40	-7.23	
42.61	41.84	-9.36	32.48	V	100	0	40	-7.52	
45.035	42.42	-10.75	31.67	V	100	0	40	-8.33	

Modulation: a mode, Channel= 5500 MHz

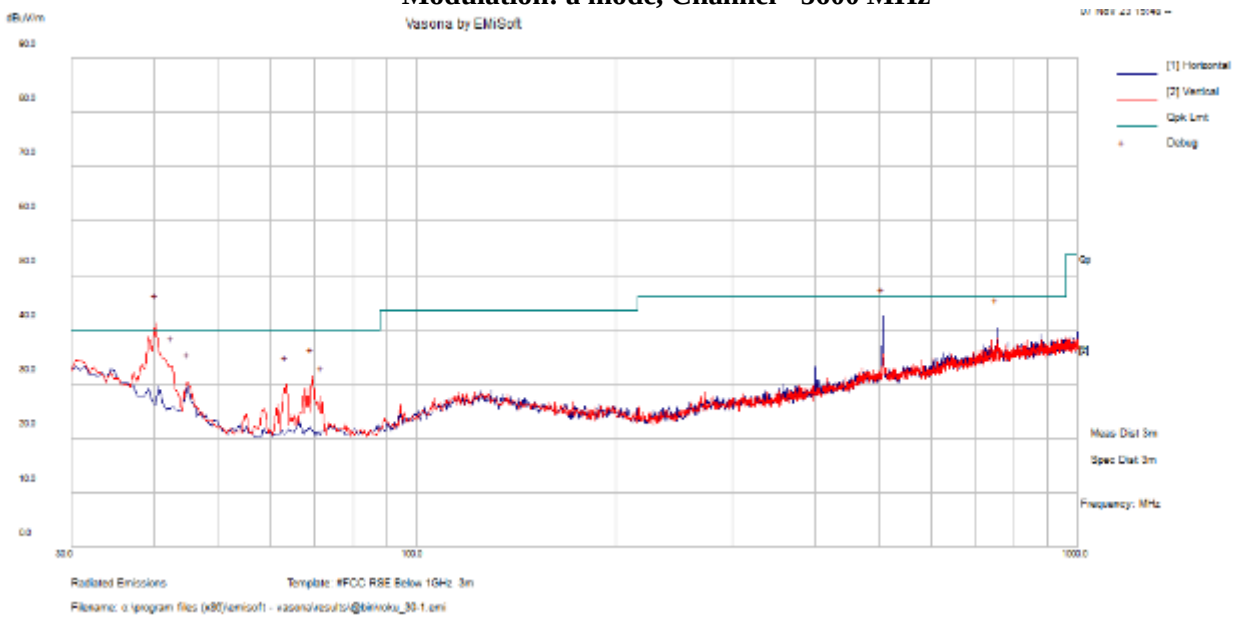


Note: a mode, channel =5500 MHz is the worst case for 5 GHz band.

Formal data:

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
40.1945	30.39	-7.99	22.4	V	167	76	40	-17.6	Quasi Peak
45.1965	35.93	-10.84	25.09	V	102	352	40	-14.91	
35.9075	29.82	-4.99	24.83	V	272	32	40	-15.17	
67.60275	29.96	-13.31	16.65	V	232	262	40	-23.35	
506.3035	42.68	-1.95	40.73	H	100	170	46	-5.27	
885.4263	28.02	3.25	31.27	H	201	260	46	-14.73	

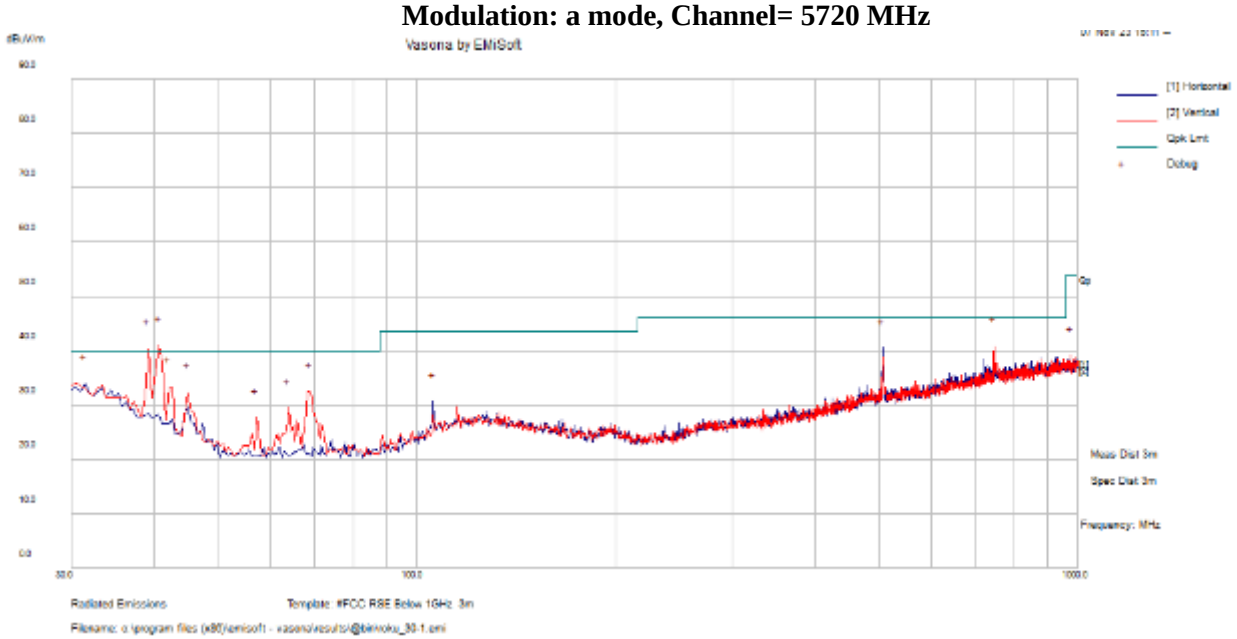
Modulation: a mode, Channel= 5600 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
40.185	47.22	-7.99	39.23	V	100	0	40	-0.77	Peak
506.27	44.36	-1.96	42.4	H	100	0	46	-3.6	
753.135	38.55	1.88	40.43	H	100	0	46	-5.57	
42.61	42.76	-9.36	33.4	V	100	0	40	-6.6	
69.285	44.57	-13.25	31.32	V	100	0	40	-8.68	
45.035	41.14	-10.75	30.39	V	100	0	40	-9.61	

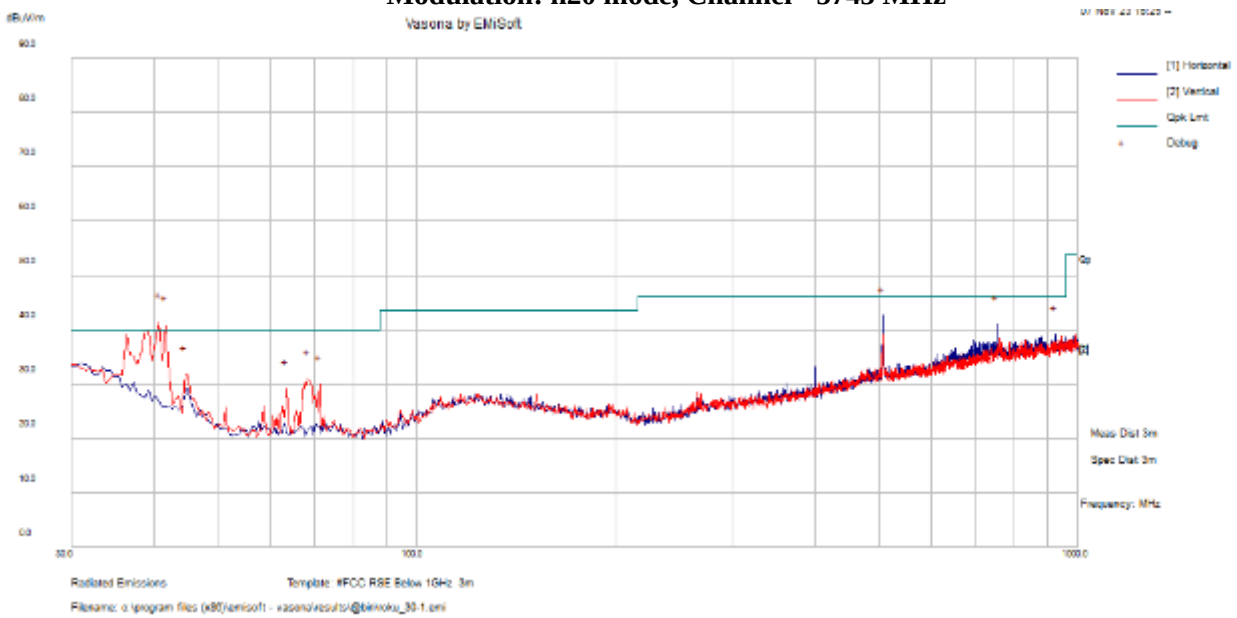
Modulation: a mode, Channel= 5720 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
40.67	47.29	-8.26	39.03	V	100	0	40	-0.87	Peak
39.215	45.67	-7.32	38.35	V	100	0	40	-1.65	
746.83	39.01	1.81	40.82	V	100	0	46	-5.18	
506.27	42.4	-1.95	40.45	H	100	0	46	-5.55	
31.455	36.02	-2.07	33.95	H	100	0	40	-6.05	
42.125	42.38	-9.07	33.31	V	100	0	40	-6.69	

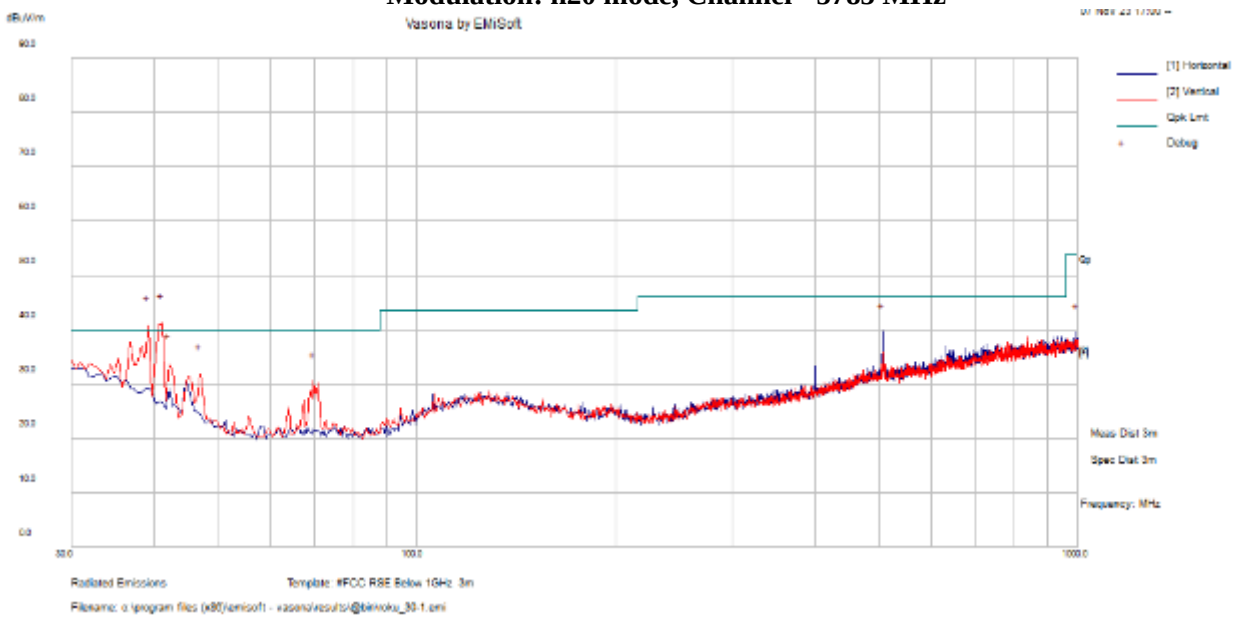
Modulation: n20 mode, Channel= 5745 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
40.67	47.7	-8.26	39.44	V	100	0	40	-0.56	Peak
41.64	47.65	-8.8	38.85	V	100	0	40	-0.15	
506.27	44.54	-1.96	42.58	H	100	0	46	-3.42	
753.135	39.15	1.88	41.03	H	100	0	46	-4.97	
924.34	35.48	3.58	39.06	H	300	0	46	-6.94	
44.55	42.21	-10.48	31.73	V	100	0	40	-8.27	

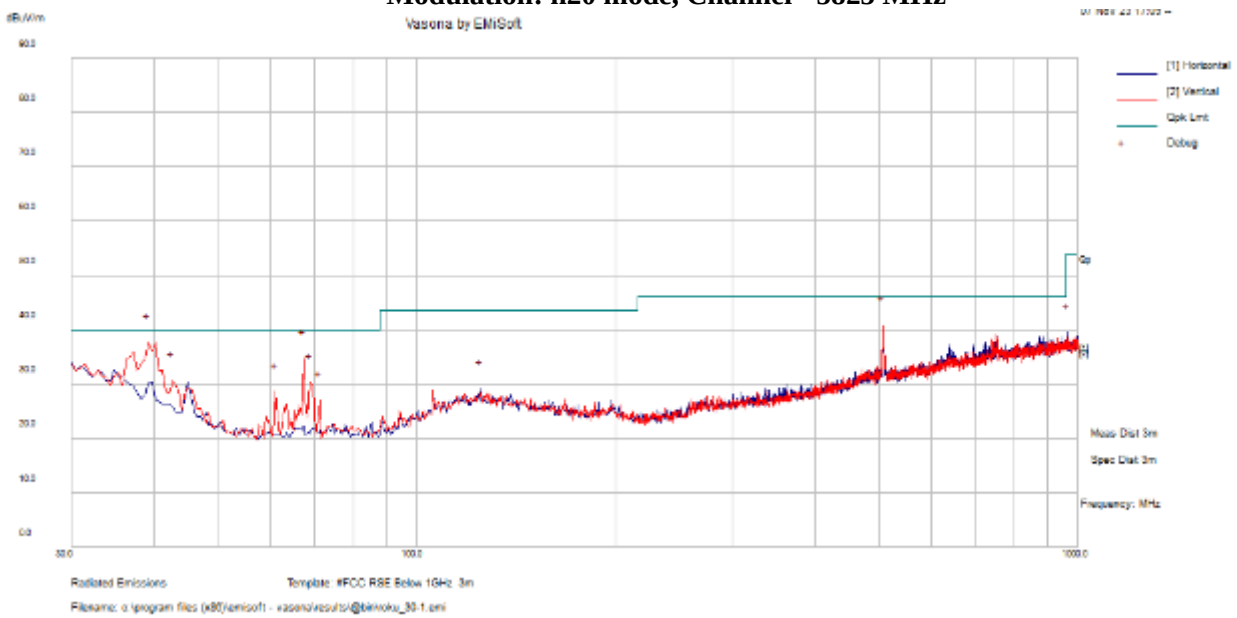
Modulation: n20 mode, Channel= 5785 MHz



Prescan data

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
41.155	47.74	-8.54	39.2	V	100	0	40	-0.8	Peak
39.215	46.07	-7.33	38.74	V	100	0	40	-1.26	
42.125	42.79	-9.07	33.72	V	100	0	40	-6.28	
506.27	41.59	-1.96	39.63	H	100	0	46	-6.37	
46.975	43.54	-11.69	31.85	V	100	0	40	-8.15	
69.77	43.77	-13.25	30.52	V	100	0	40	-9.48	

Modulation: n20 mode, Channel= 5825 MHz



Prescan data

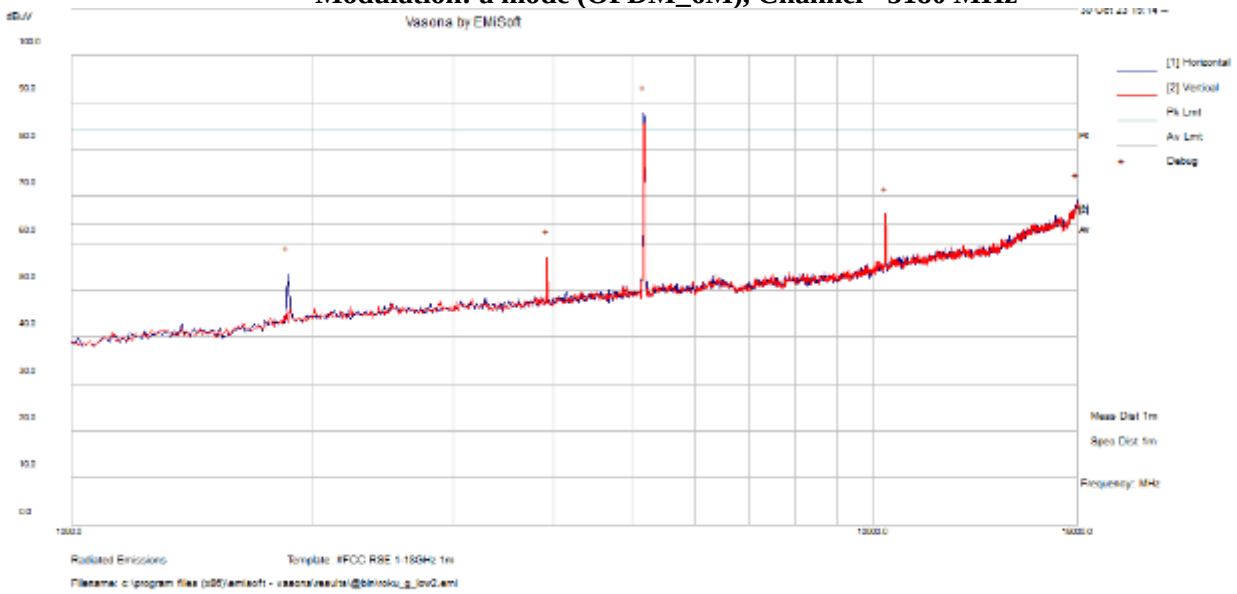
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Measurement
39.215	44.97	-7.32	37.65	V	100	0	40	-2.35	Peak
506.27	42.76	-1.96	40.8	V	100	0	46	-5.2	
67.345	47.9	-13.31	34.59	V	100	0	40	-5.41	
42.61	39.98	-9.36	30.62	V	100	0	40	-9.38	
68.8	43.57	-13.27	30.3	V	100	0	40	-9.7	
61.04	42.23	-13.63	28.6	V	100	0	40	-11.4	

2) 1–18 GHz Worst Case, Measured at 1 meter

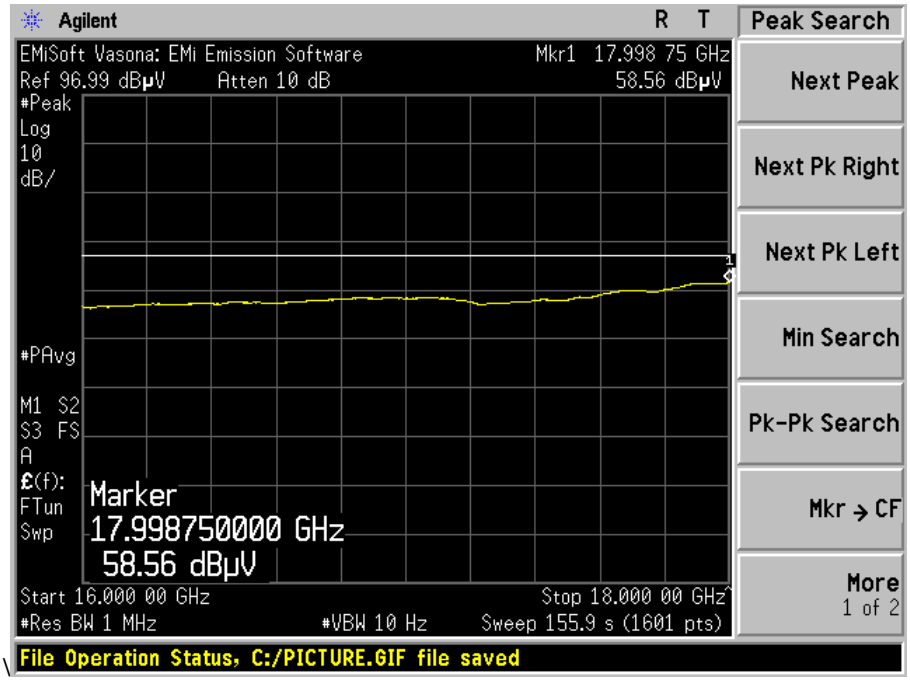
FCC/IC Limits for 1 GHz to 40 GHz				
Applicablity	**(dBm)**	**(uV/m at 3meters)**	**(dBuV/m at 3meters)**	**(dBuV/m at 1meter)[2]**
Restricted Band Average Limit	-	500	54	63.54
Restricted Band Peak Limit[1]	-	-	74	83.54
FCC §15.407(b) & ISEDC RSS-247 §6.2 Defined Unwanted Emissions Limit	-27	-	68.2	77.74

Note[1]: Restricted Band Peak Limit is defined to be 20dB higher than Average Limit.
Note[2]: Limits at 1 meter are determined by applying a Distance correction factor accounts for extrapolation from 1 meters to 3 meters. Formula used is as follows: 20*log(3meters/1meter) = 9.54 (According to ANSI C63.10-2013 Section 9.4). i.e. 54[dBuV/m at 3m] + 9.54dB = 63.54[dBuV/m at 1m]
Note[3]: Where Restricted Band Peak Limit is replaced with stricter 78 dBµV/m at 1 meter, compliance is being shown for unwmated emissions per FCC §15.407(b) & ISEDC RSS-247 §6.2
Note: dBuV/m = 20*log(V/m) + 120. Thus 20*log((500[uV/m]/1000000))+120=54[dBuV/m]
Note: Per ANSI C63.10-2013 Section 12.7.2: E[dBuV/m] = EIRP[dBm] + 95.2, for d = 3meters. Thus -27dBm + 95.2dB = 68.2dBuV/m at 3meters.

Modulation: a mode (OFDM_6M), Channel= 5180 MHz



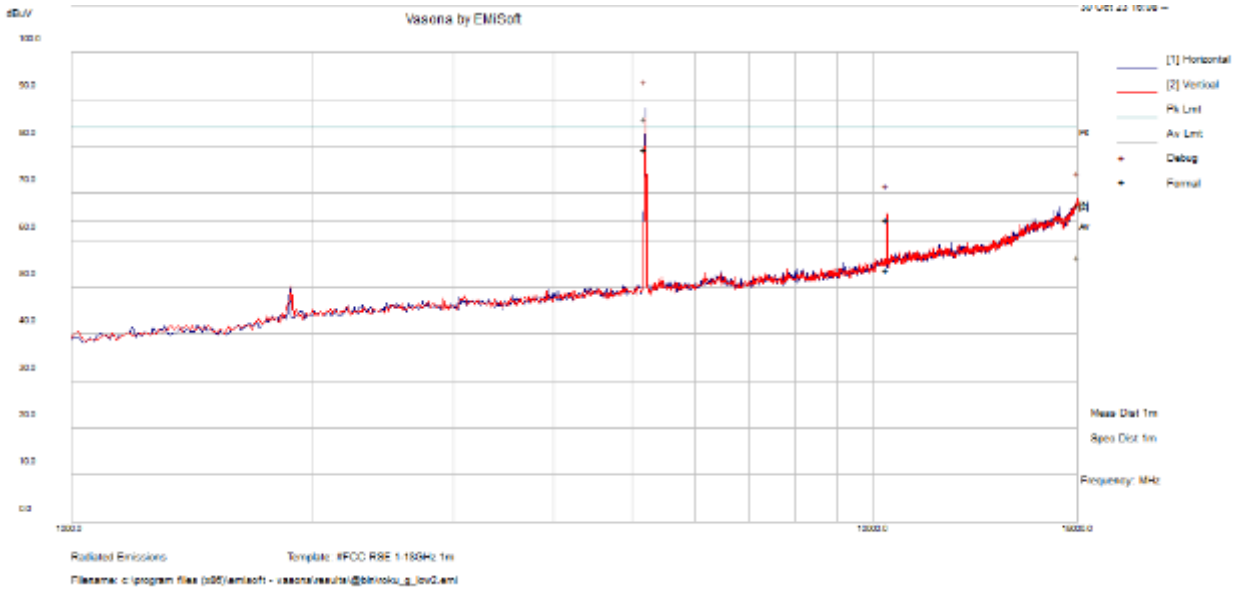
Note: above plot shows all peak emissions below 16GHz pass under average limits



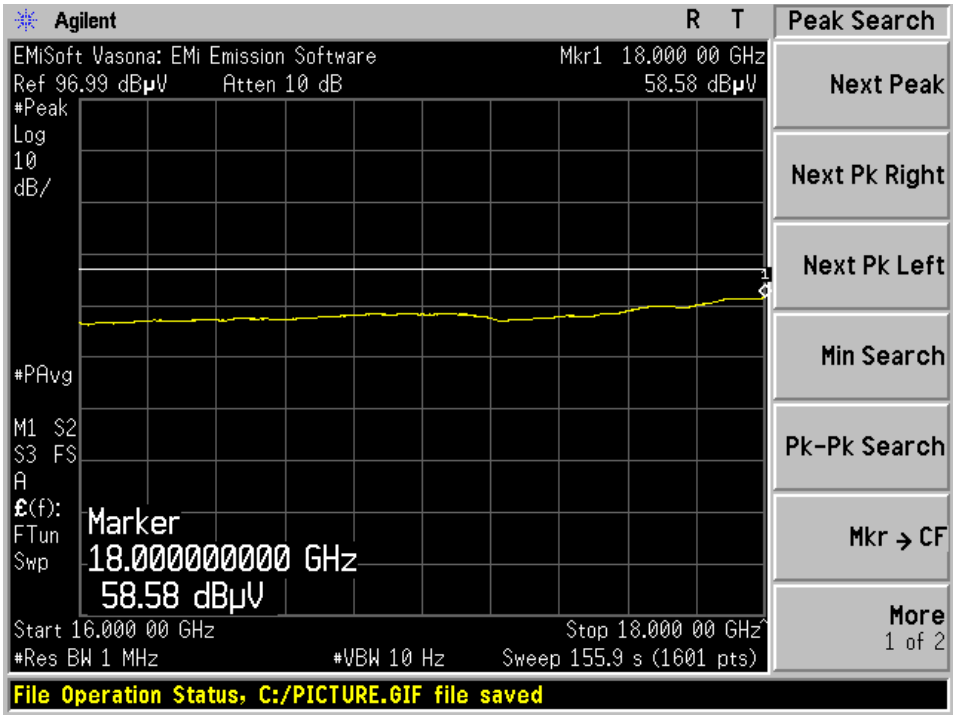
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
10359.89	52.79	8.84	61.63	H	130	245	83.54	-21.91	Peak
10359.9	43.07	8.84	51.92	H	130	245	63.54	-11.62	Average
17999	47.45	21.66	69.11	H	150	0	83.54	-14.43	Peak
17999	36.9	21.66	58.56	H	150	0	63.54	-4.98	Average

Modulation: a mode (OFDM_6M), Channel= 5200 MHz



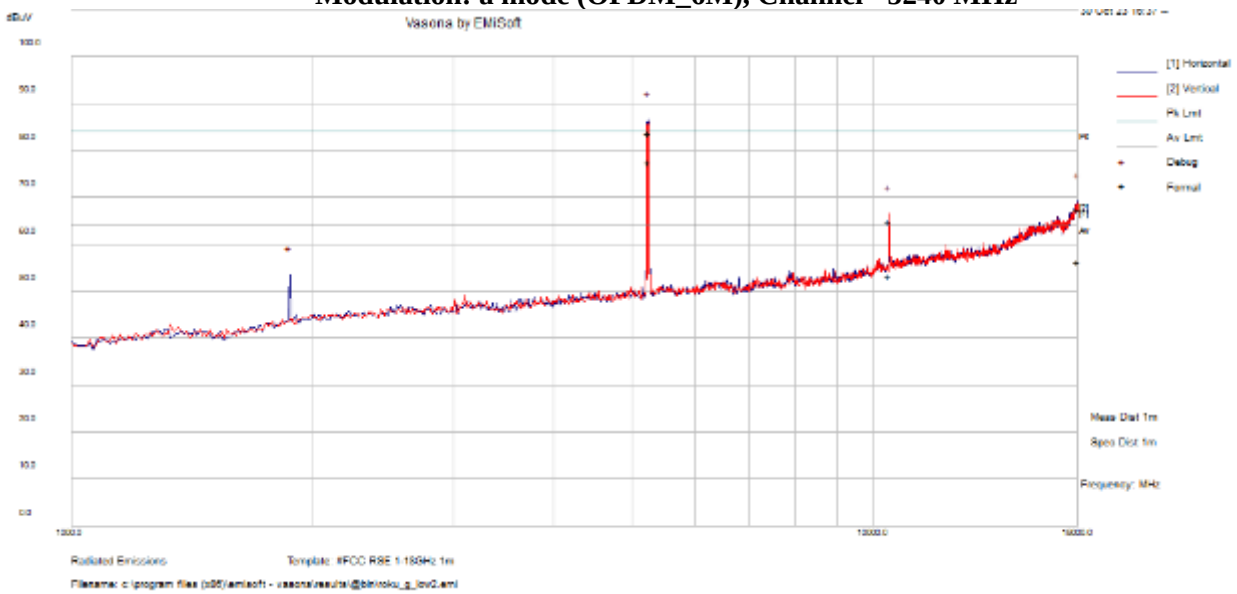
Note: above plot shows all peak emissions below 16GHz pass under average limits



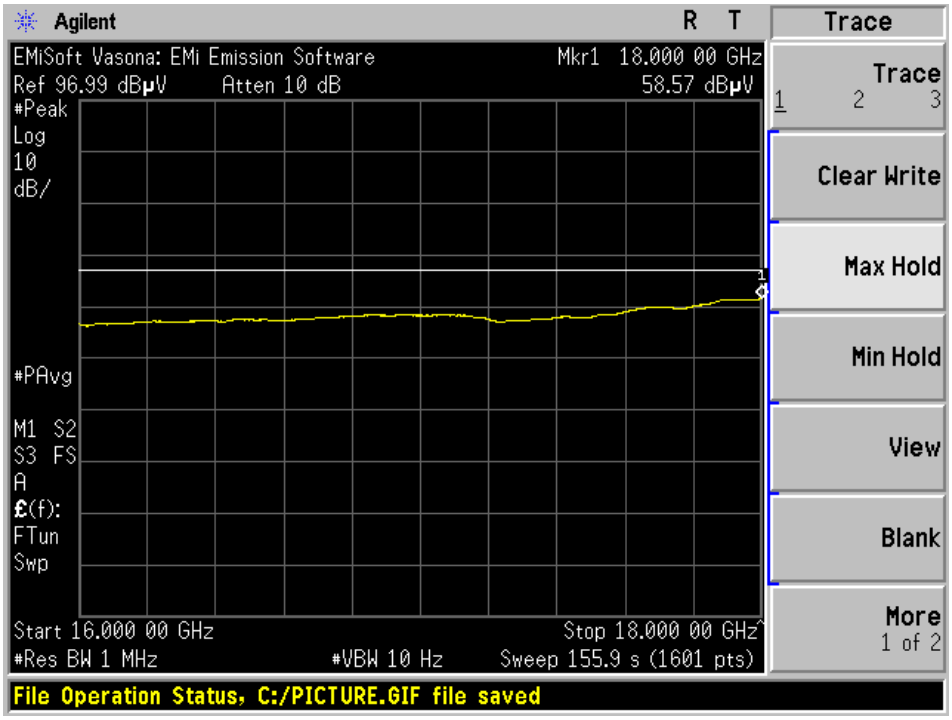
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
10393.8	55.68	8.85	64.54	V	242	338	83.54	-19	Peak
10393.8	44.73	8.85	53.58	V	242	338	63.54	-9.96	Average
17999	47.18	21.66	68.84	H	150	0	83.54	-14.7	Peak
17999	36.92	21.66	58.58	H	150	0	63.54	-4.96	Average

Modulation: a mode (OFDM_6M), Channel= 5240 MHz



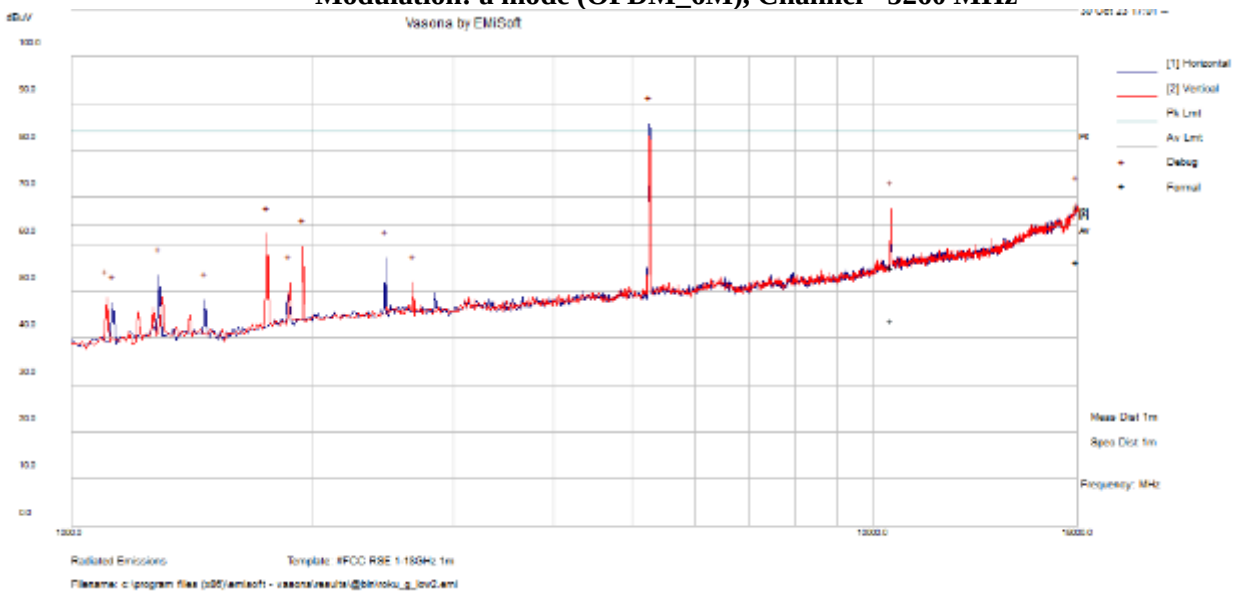
Note: above plot shows all peak emissions below 16GHz pass under average limits



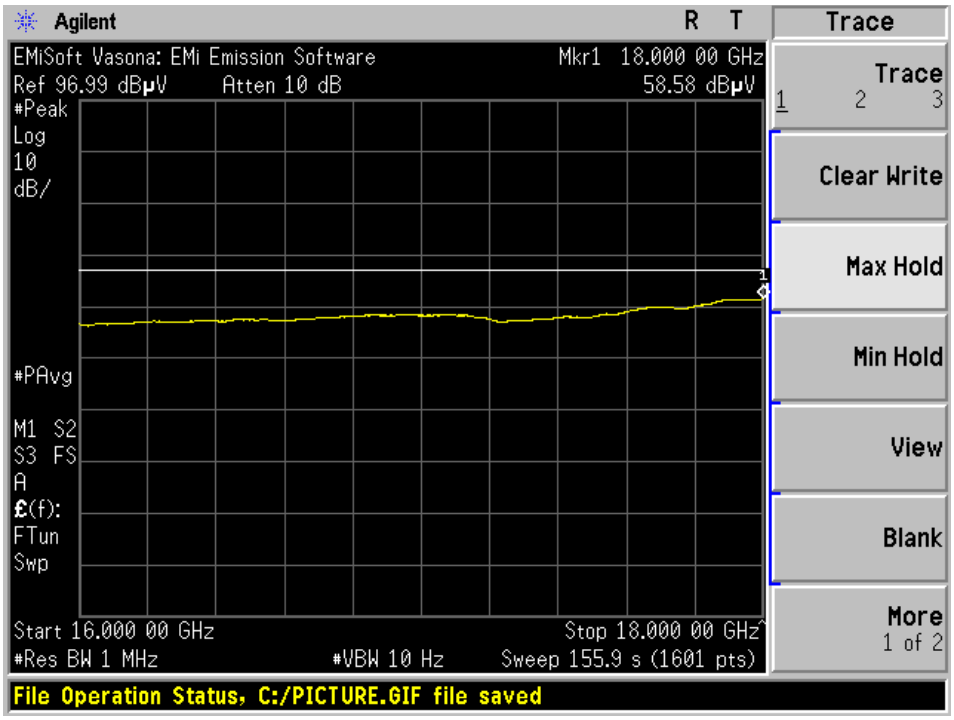
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
10476.4	55.96	9.13	65.09	V	210	228	83.54	-18.45	Peak
10476.4	44.03	9.13	53.16	V	210	228	63.54	-10.38	Average
17999	47.57	21.66	69.23	H	150	0	83.54	-14.31	Peak
17999	36.91	21.66	58.57	H	150	0	63.54	-4.97	Average

Modulation: a mode (OFDM_6M), Channel= 5260 MHz



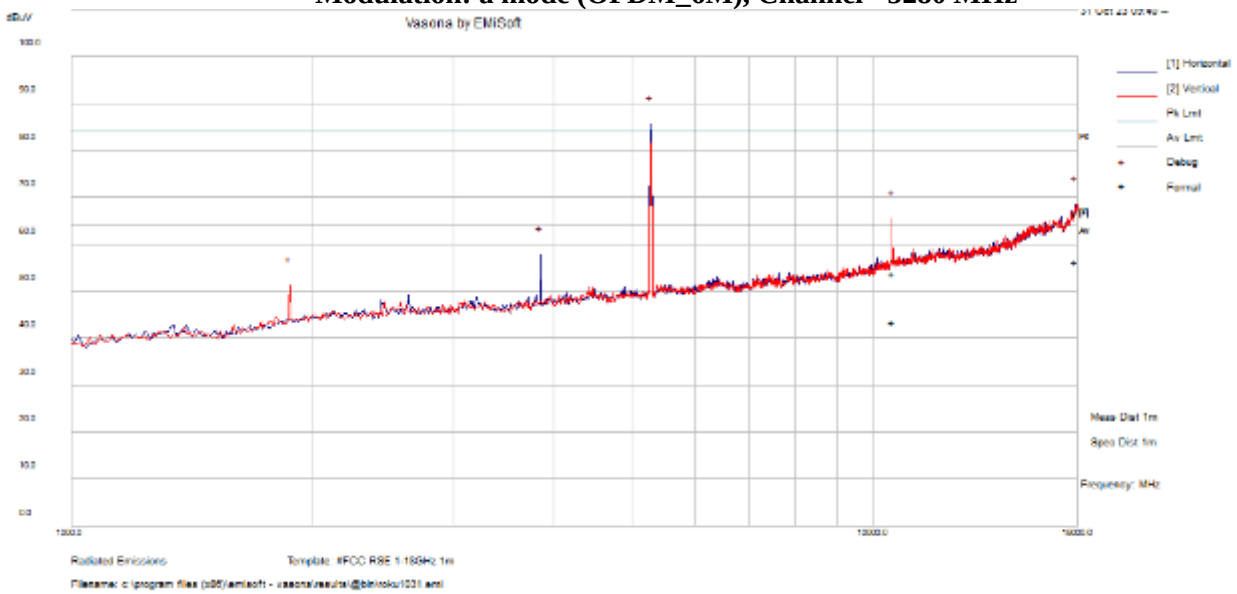
Note: above plot shows all peak emissions below 16GHz pass under average limits



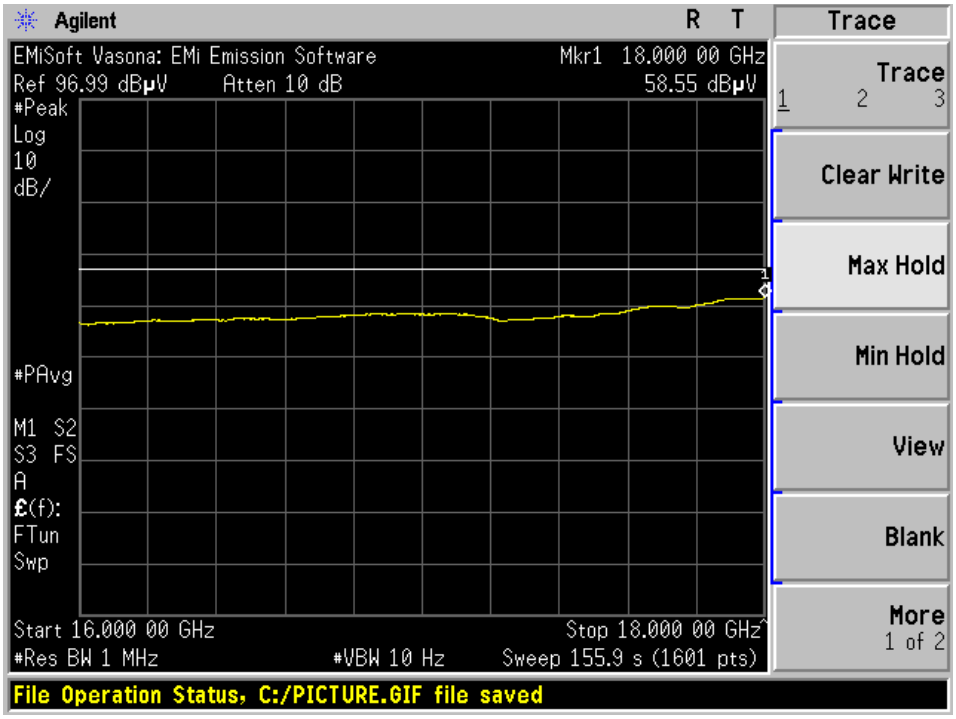
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
10520.3	45.71	9.28	55	V	132	101	83.54	-28.54	Peak
10520.3	34.41	9.28	43.7	V	132	101	63.54	-19.84	Average
17999	47.05	21.66	68.71	H	150	0	83.54	-14.83	Peak
17999	36.92	21.66	58.58	H	150	0	63.54	-4.96	Average

Modulation: a mode (OFDM_6M), Channel= 5280 MHz



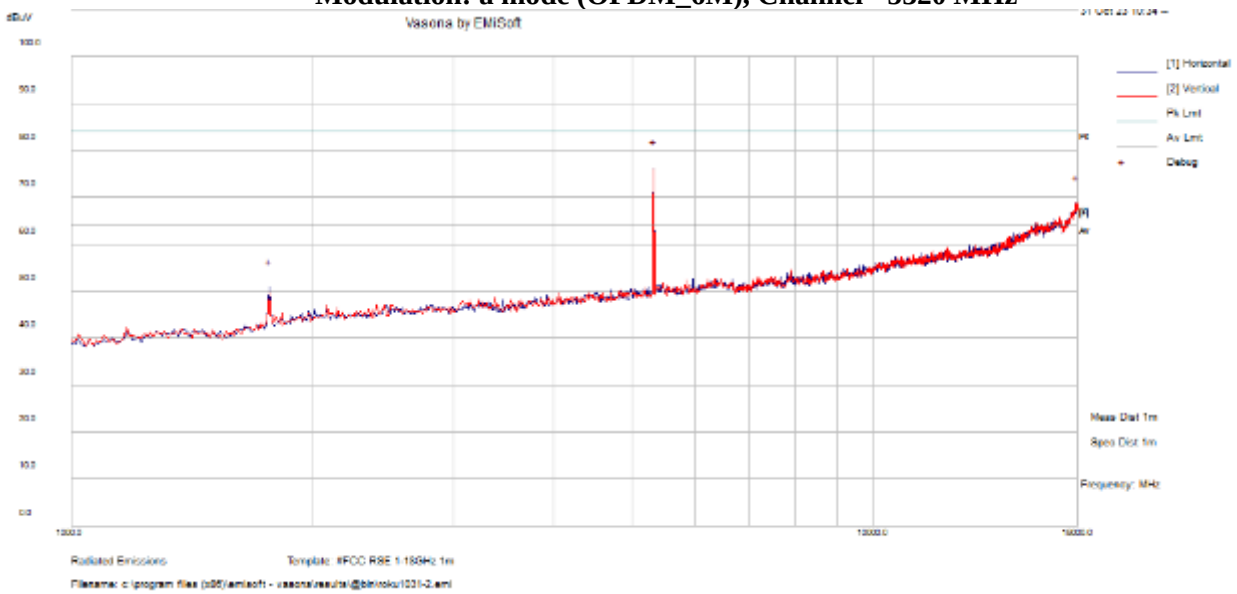
Note: above plot shows all peak emissions below 16GHz pass under average limits



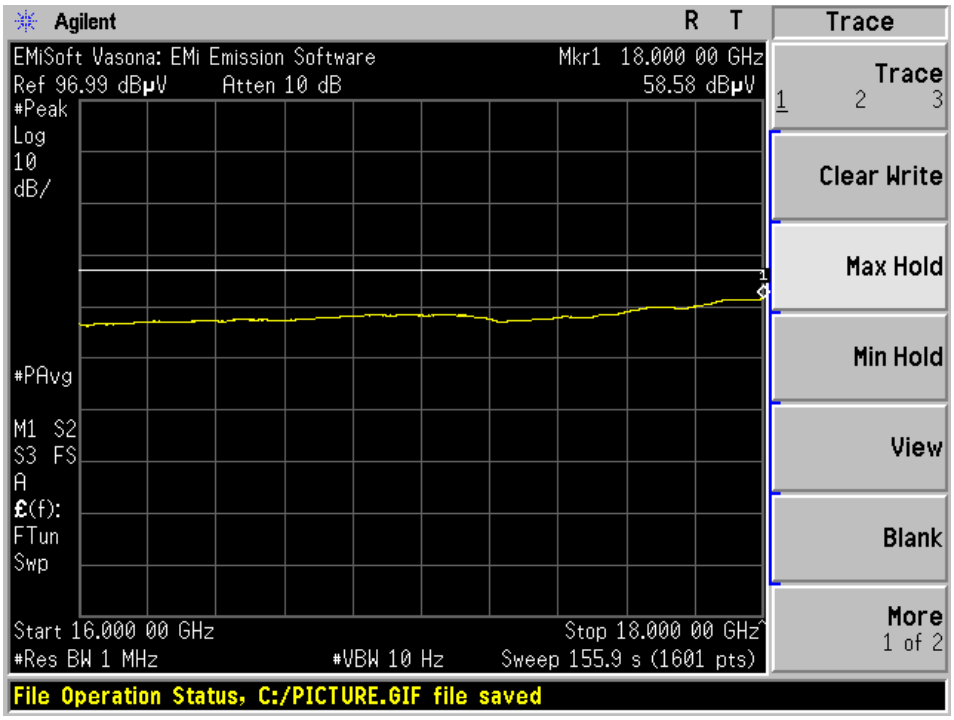
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
10561.1	44.32	9.46	53.78	V	208	14	83.54	-29.76	Peak
10561.1	34.11	9.46	43.57	V	208	14	63.54	-19.97	Average
17999	46.82	21.66	68.48	H	150	0	83.54	-15.06	Peak
17999	36.89	21.66	58.55	H	150	0	63.54	-4.99	Average

Modulation: a mode (OFDM_6M), Channel= 5320 MHz



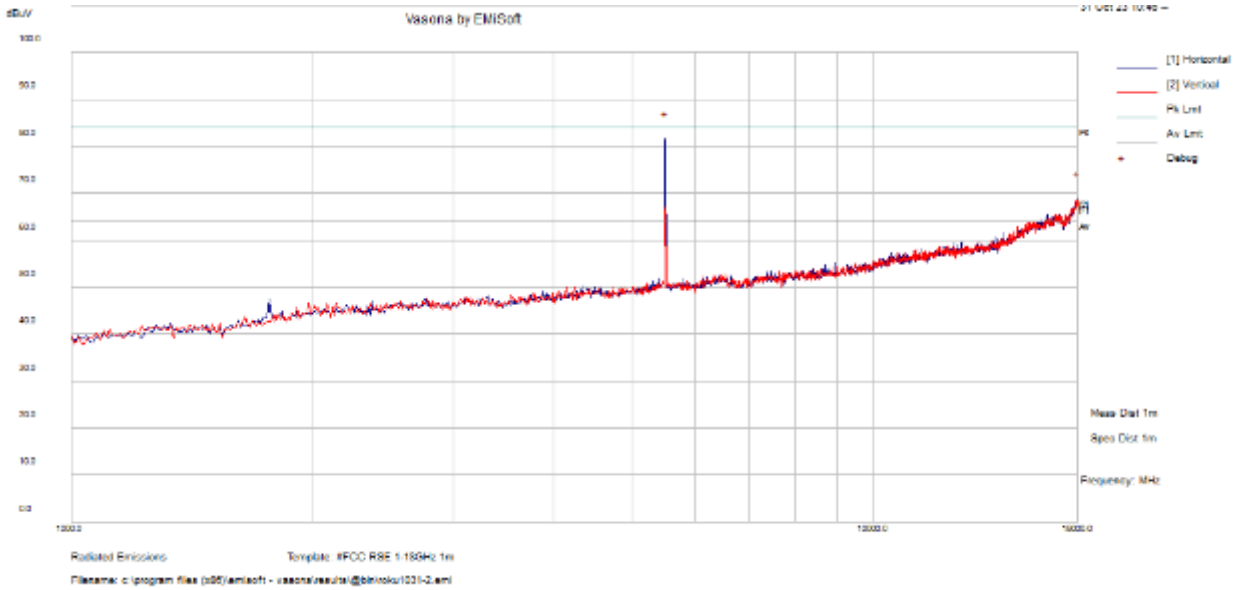
Note: above plot shows all peak emissions below 16GHz pass under average limits



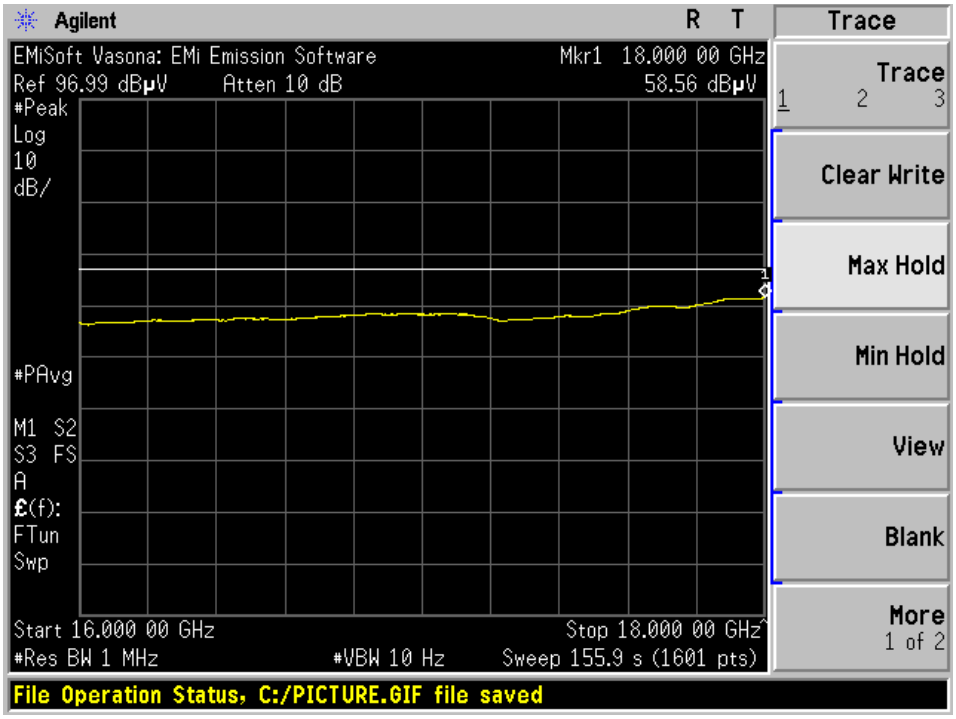
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
10561.1	44.32	9.46	53.78	V	208	14	83.54	-29.76	Peak
10561.1	34.11	9.46	43.57	V	208	14	63.54	-19.97	Average
17999	47.17	21.66	68.83	H	150	0	83.54	-14.71	Peak
17999	36.92	21.66	58.58	H	150	0	63.54	-4.96	Average

Modulation: a mode (OFDM_6M), Channel= 5500 MHz



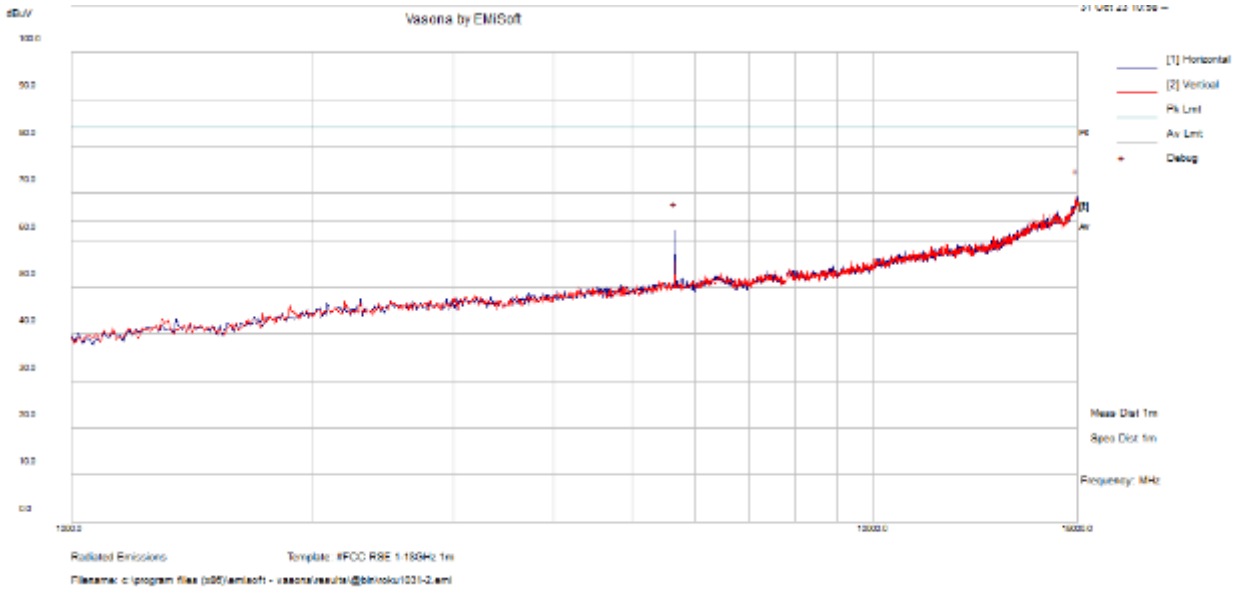
Note: above plot shows all peak emissions below 16GHz pass under average limits



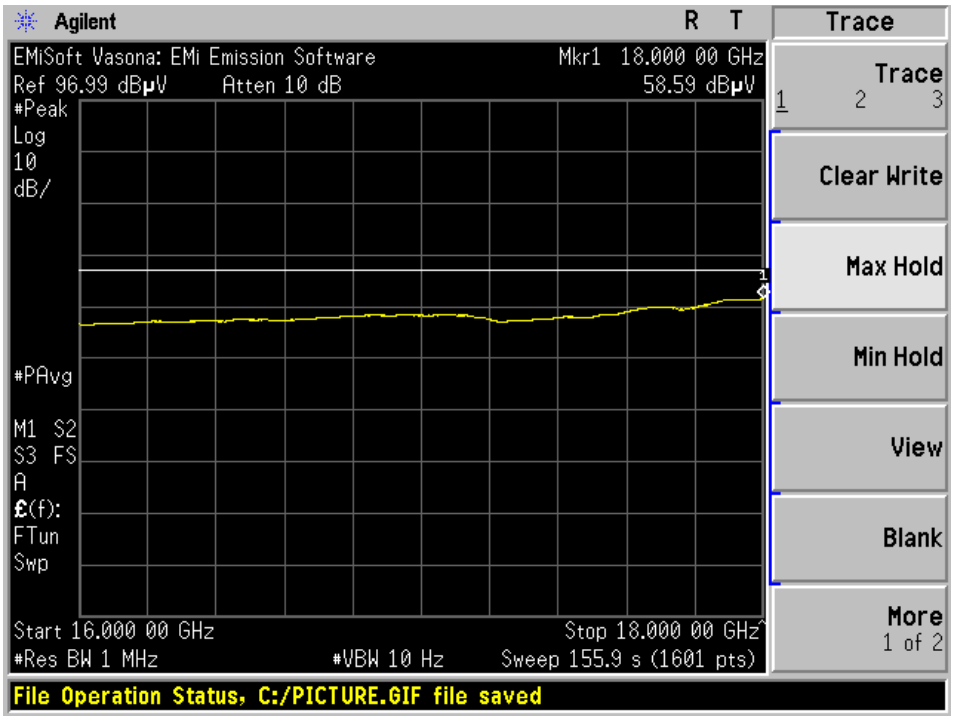
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17999	47.03	21.66	68.69	H	150	0	83.54	-14.85	Peak
17999	36.9	21.66	58.56	H	150	0	63.54	-4.98	Average

Modulation: a mode (OFDM_6M), Channel= 5600 MHz



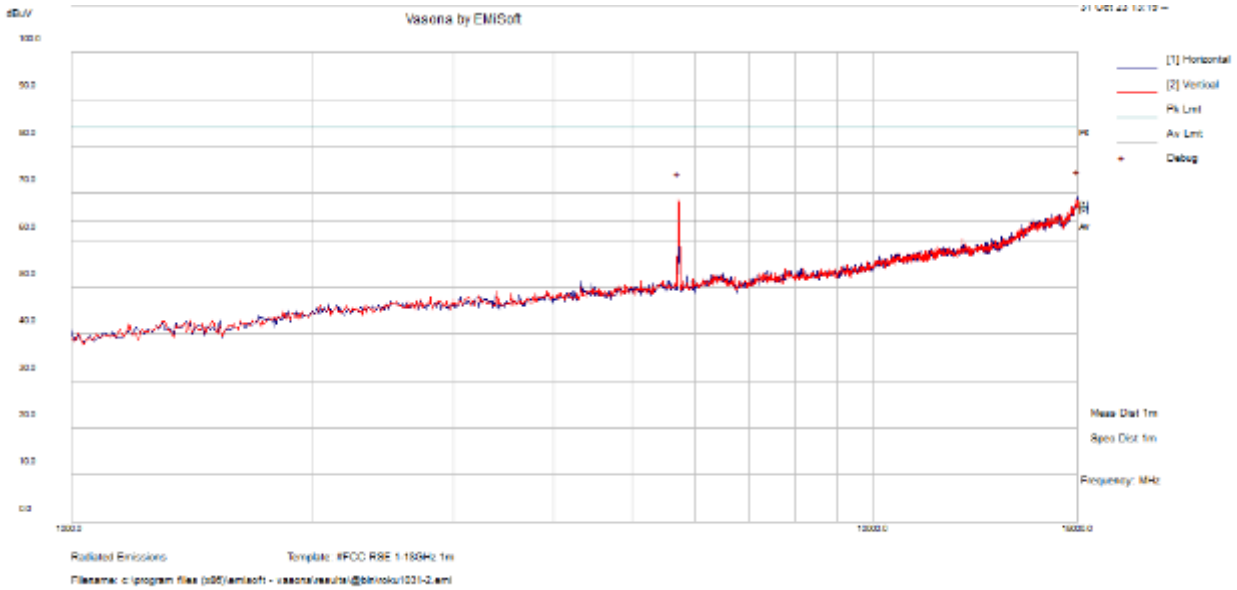
Note: above plot shows all peak emissions below 16GHz pass under average limits



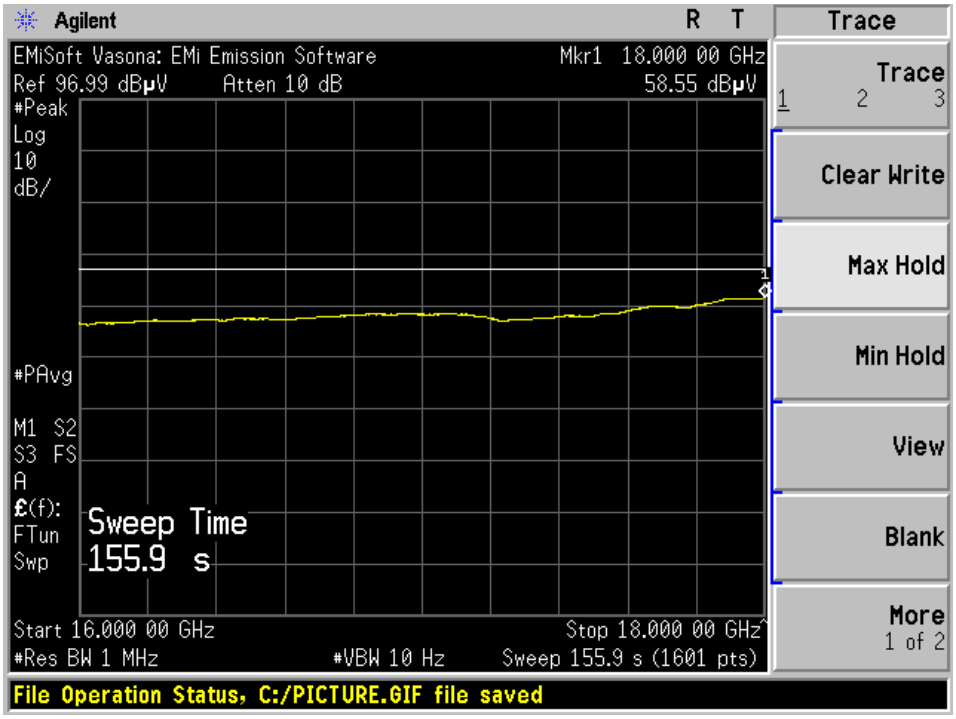
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17999	47.53	21.66	69.19	H	150	0	83.54	-14.35	Peak
17999	36.93	21.66	58.59	H	150	0	63.54	-4.95	Average

Modulation: a mode (OFDM_6M), Channel= 5720 MHz



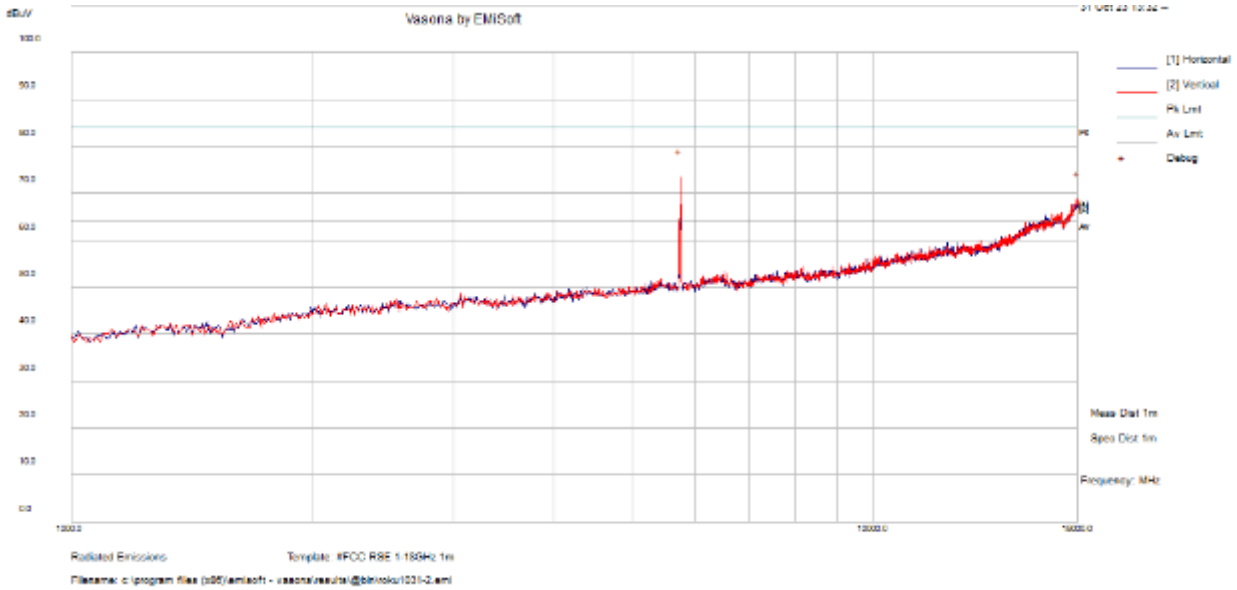
Note: above plot shows all peak emissions below 16GHz pass under average limits



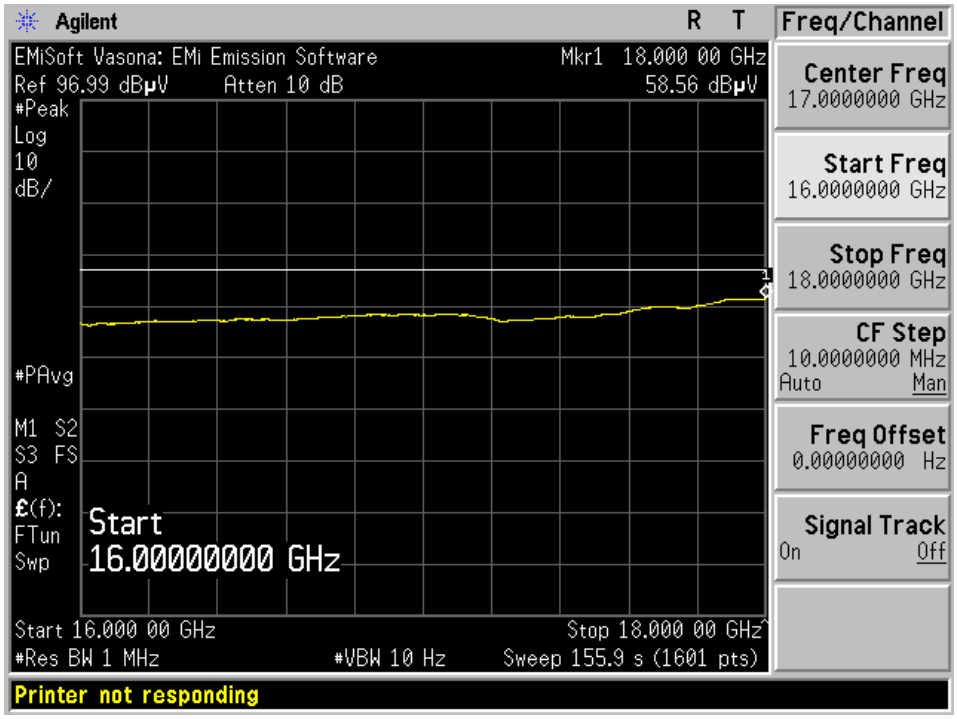
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17999	47.39	21.66	69.05	H	150	0	83.54	-14.49	Peak
17999	36.89	21.66	58.55	H	150	0	63.54	-4.99	Average

Modulation: n20 mode (MCS0), Channel= 5745 MHz



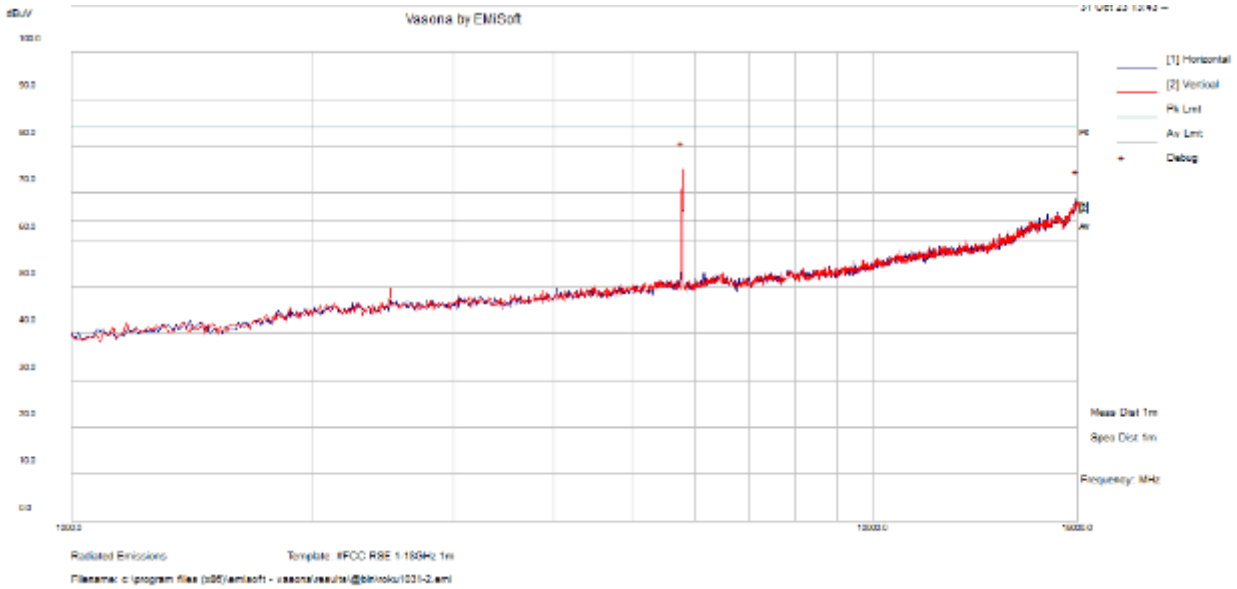
Note: above plot shows all peak emissions below 16GHz pass under average limits



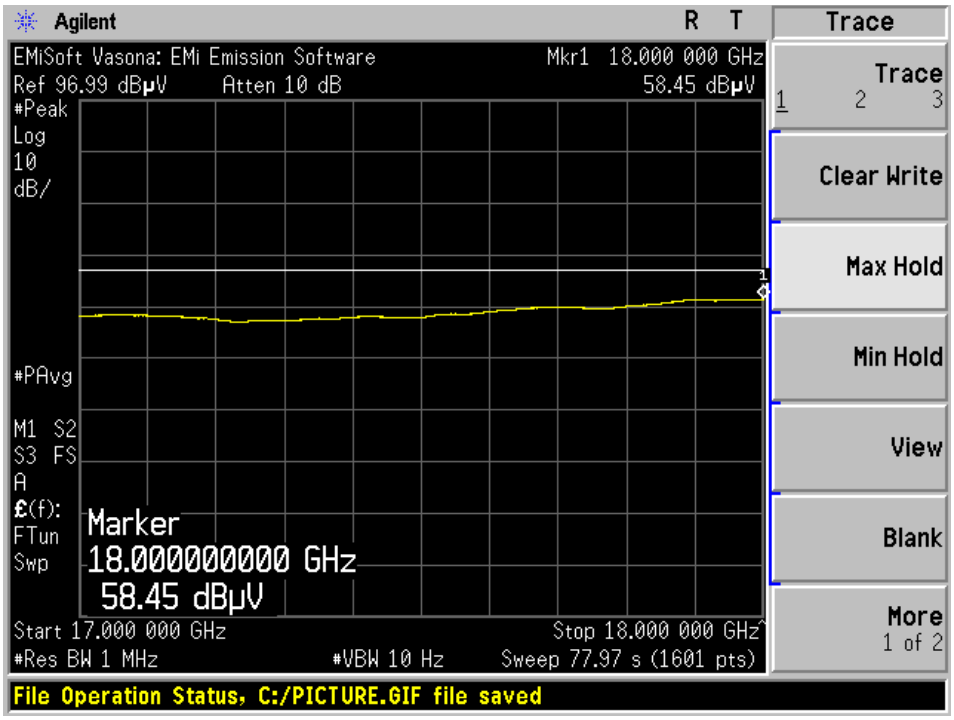
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 16-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17999	47.04	21.66	68.7	H	150	0	83.54	-14.84	Peak
17999	36.9	21.66	58.56	H	150	0	63.54	-4.98	Average

Modulation: n20 mode (MCS0), Channel= 5785 MHz



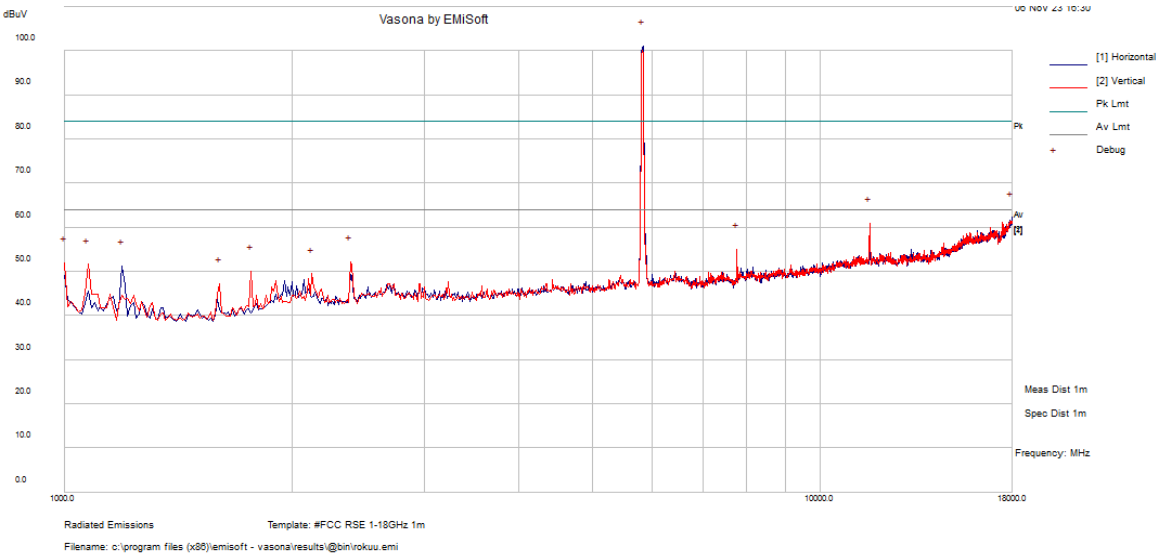
Note: above plot shows all peak emissions below 17GHz pass under average limits



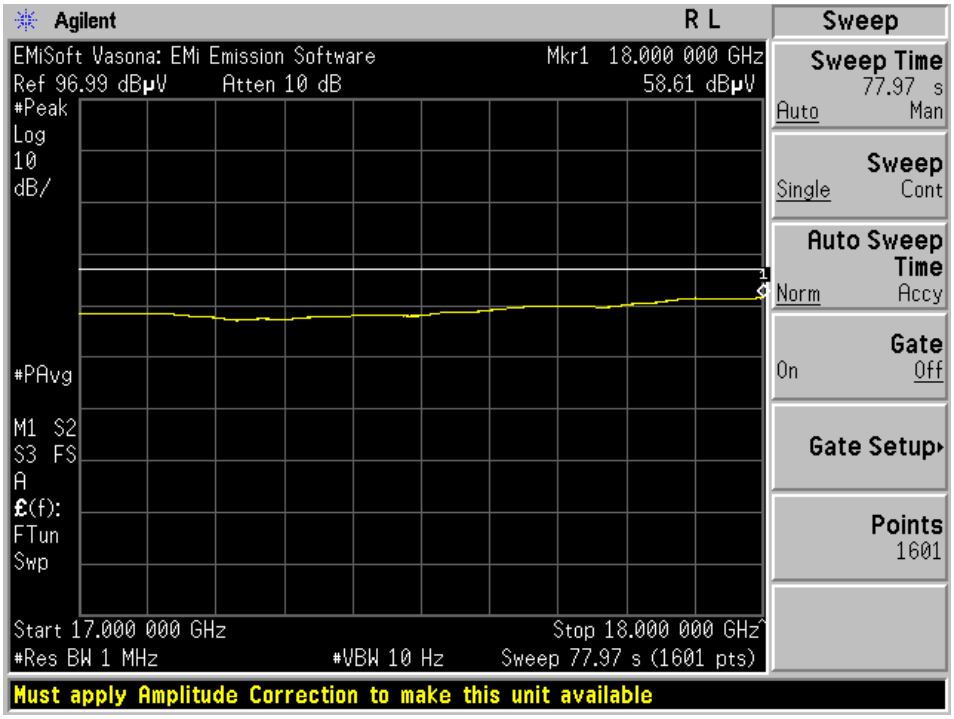
Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 17-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17999	47.29	21.66	68.95	H	150	0	83.54	-14.59	Peak
17999	36.79	21.66	58.45	H	150	0	63.54	-5.09	Average

Modulation: n20 mode (MCS0), Channel= 5825 MHz



Note: above plot shows all peak emissions below 17GHz pass under average limits. The channel was tested with the notch filter applied.

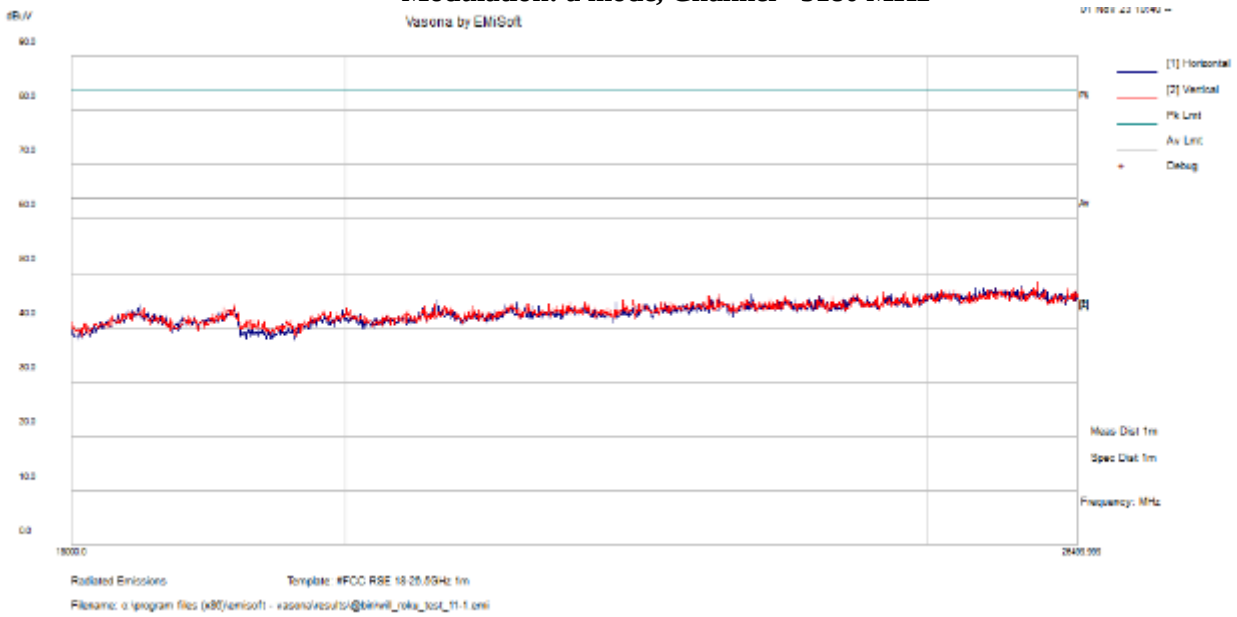


Note: above plot shows reduced VBW to make average measurements comparing to average limits and thus show compliance in range of 17-18GHz.

Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
17999	49.45	21.66	71.11	H	150	0	83.54	-12.43	Peak
17999	36.95	21.66	58.61	H	150	0	63.54	-4.93	Average

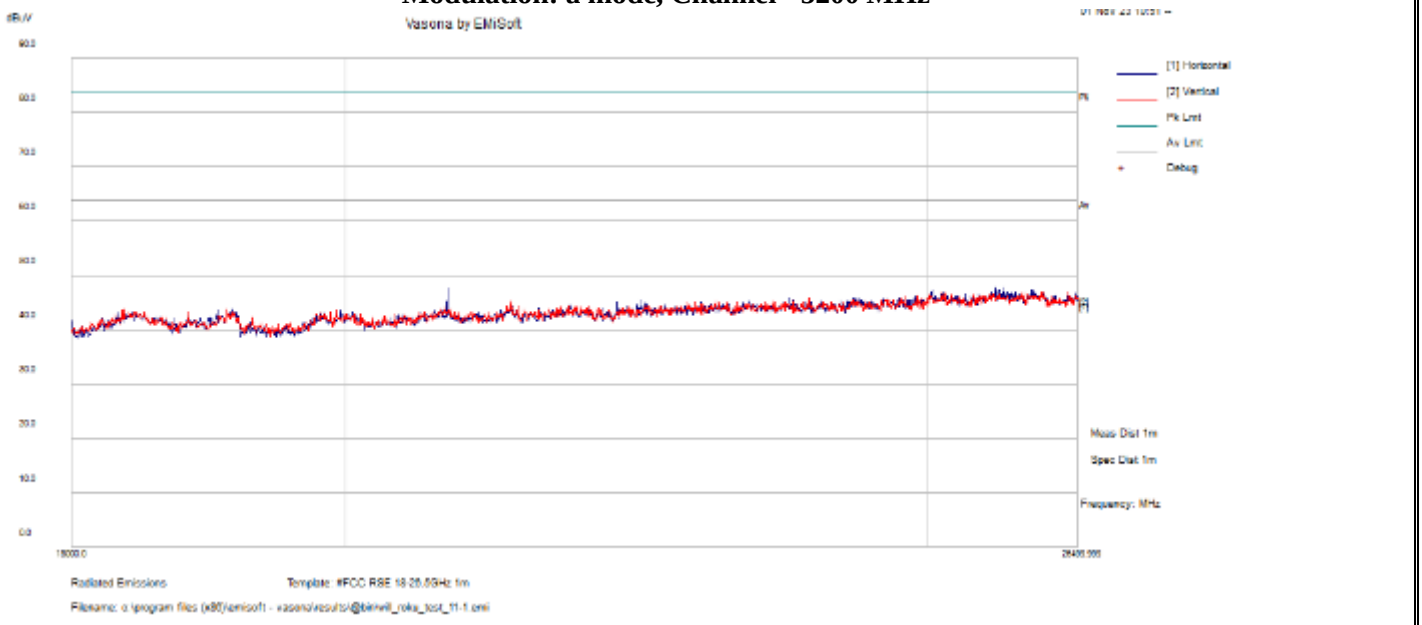
3) 18-26.5 GHz, Measured at 1 meter

Modulation: a mode, Channel= 5180 MHz



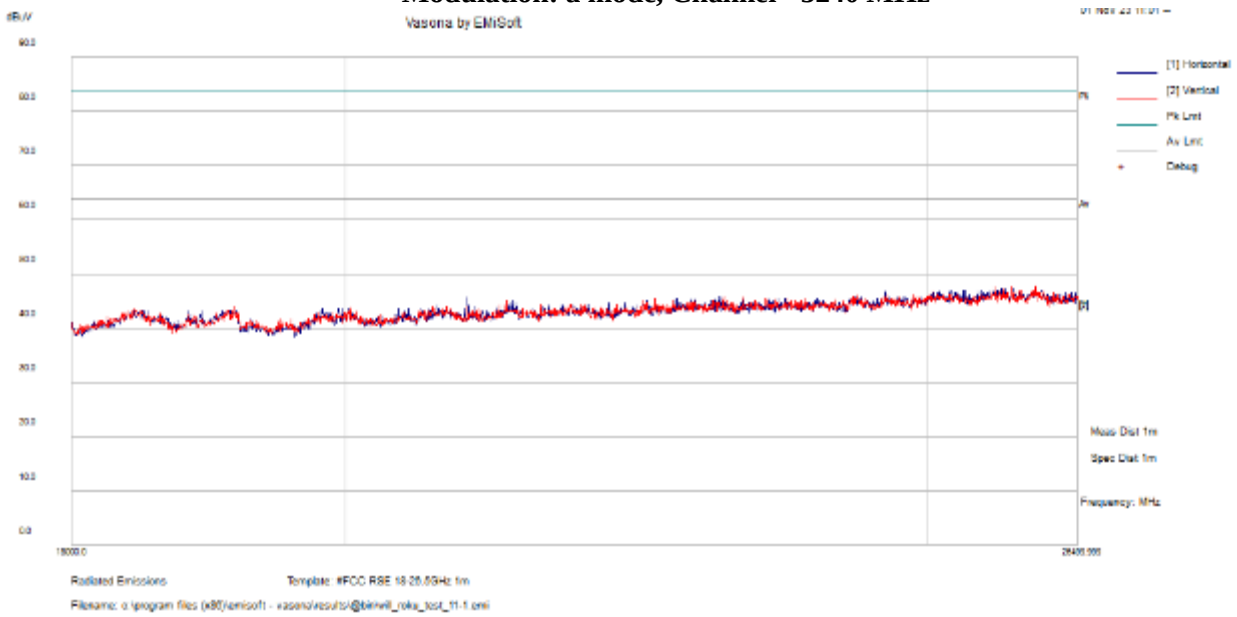
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.59	7.79	49.38	H	150	0	63.54	-14.16	Peak compared to Average Limit

Modulation: a mode, Channel= 5200 MHz



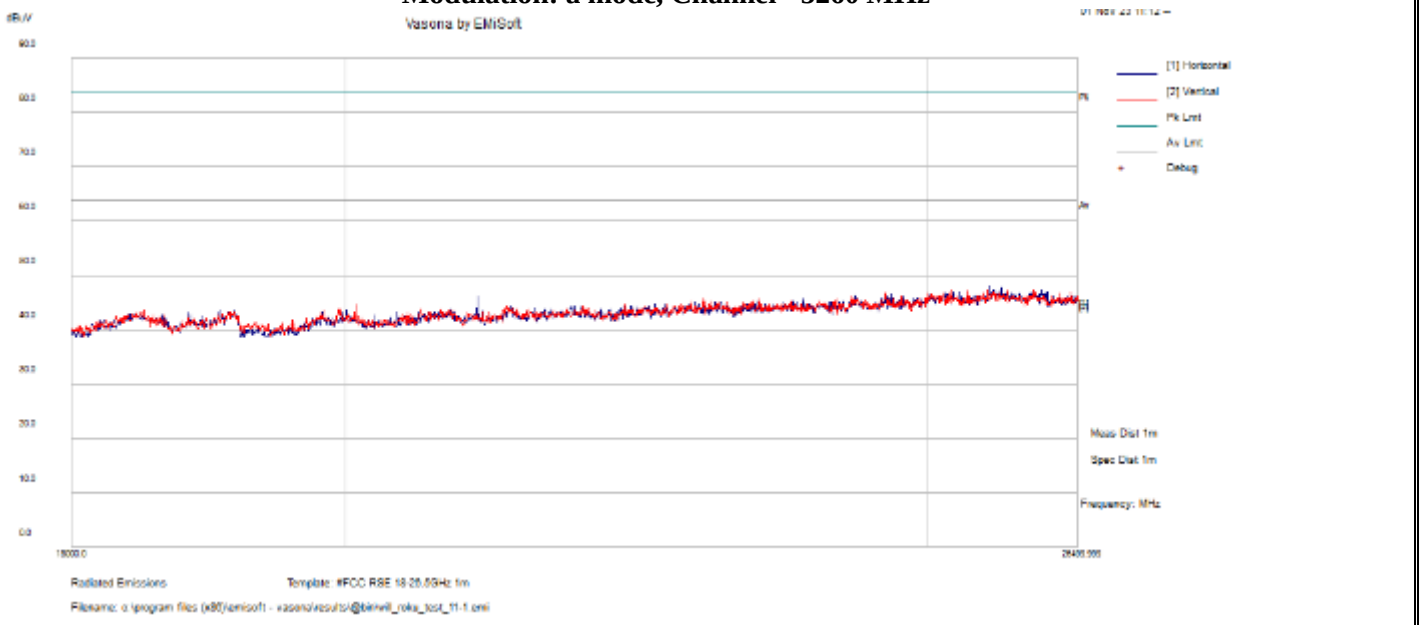
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.68	7.79	49.47	H	150	0	63.54	-14.07	Peak compared to Average Limit

Modulation: a mode, Channel= 5240 MHz



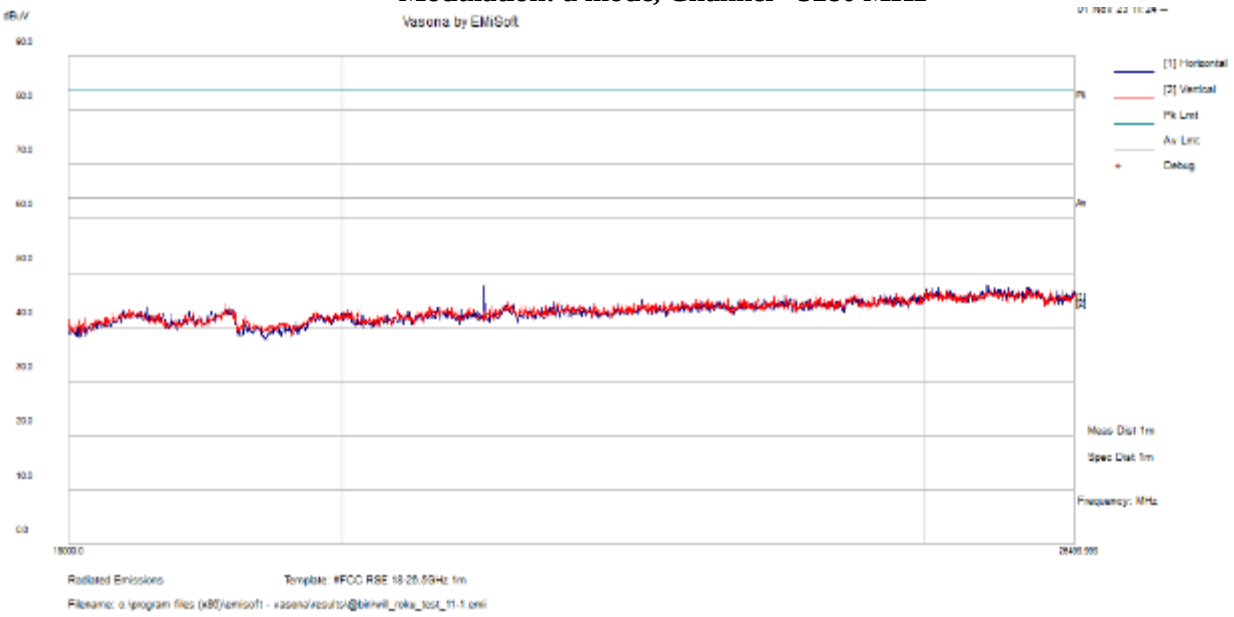
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.55	7.79	49.34	H	150	0	63.54	-14.2	Peak compared to Average Limit

Modulation: a mode, Channel= 5260 MHz



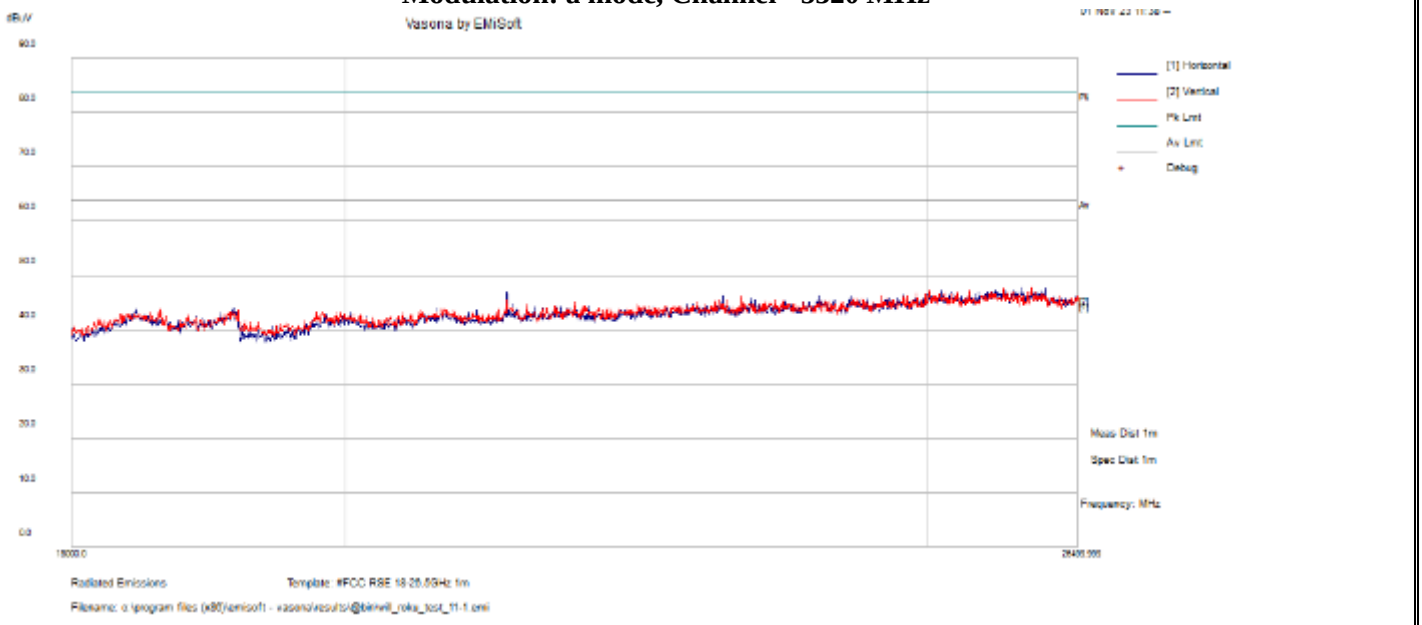
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.76	7.79	49.55	H	150	0	63.54	-13.99	Peak compared to Average Limit

Modulation: a mode, Channel= 5280 MHz



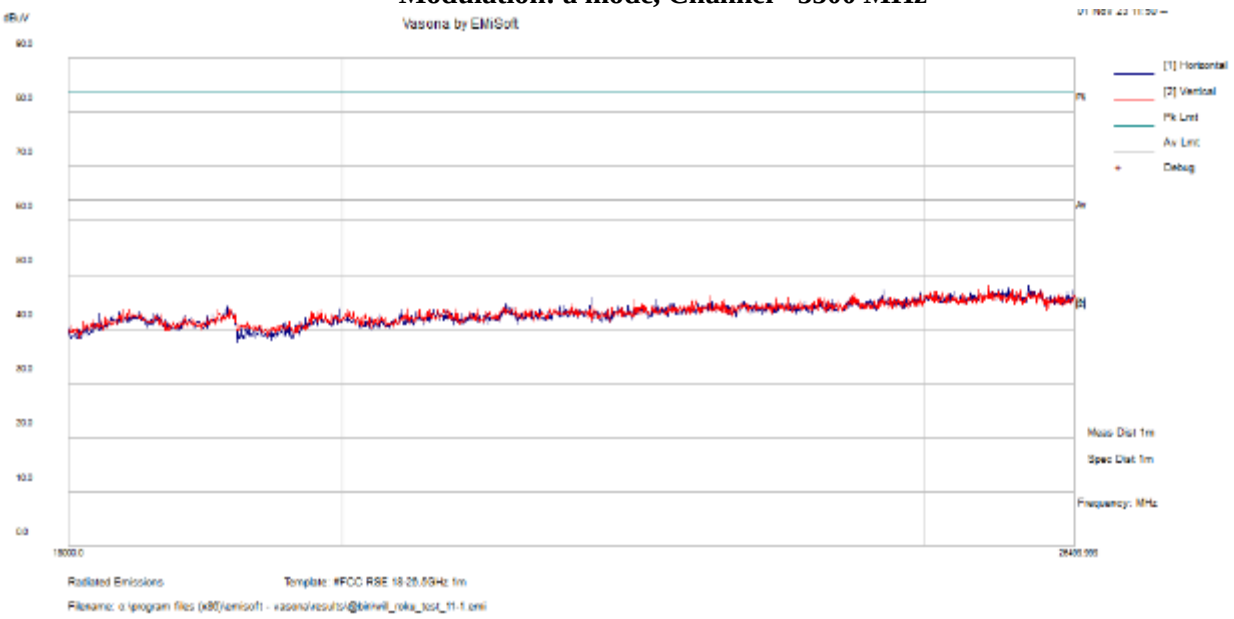
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.49	7.79	49.28	H	150	0	63.54	-14.26	Peak compared to Average Limit

Modulation: a mode, Channel= 5320 MHz



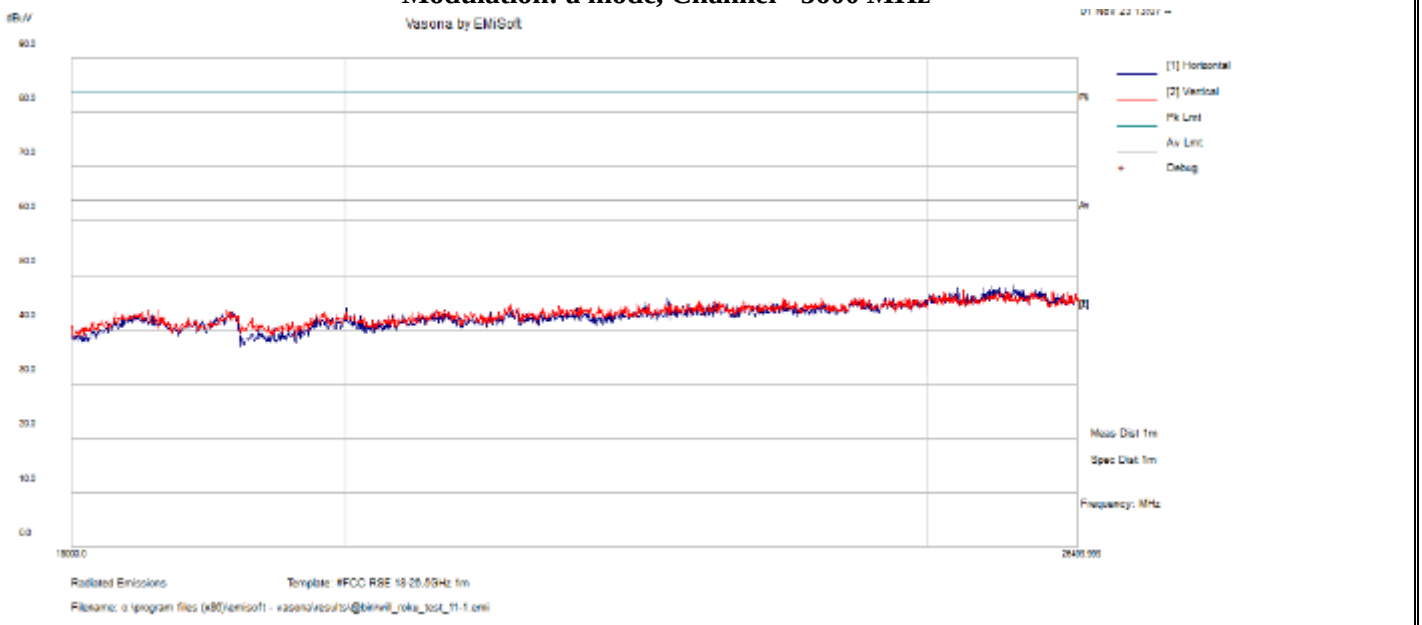
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.85	7.79	49.64	H	150	0	63.54	-13.9	Peak compared to Average Limit

Modulation: a mode, Channel= 5500 MHz



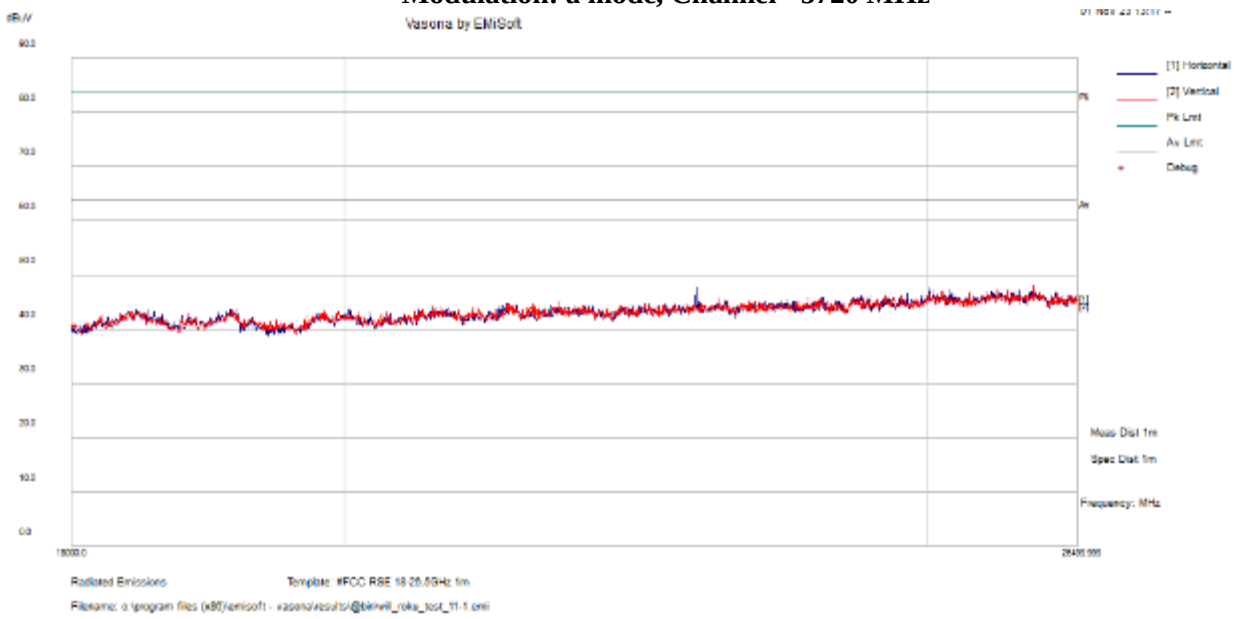
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	42.02	7.79	49.81	H	150	0	63.54	-13.73	Peak compared to Average Limit

Modulation: a mode, Channel= 5600 MHz



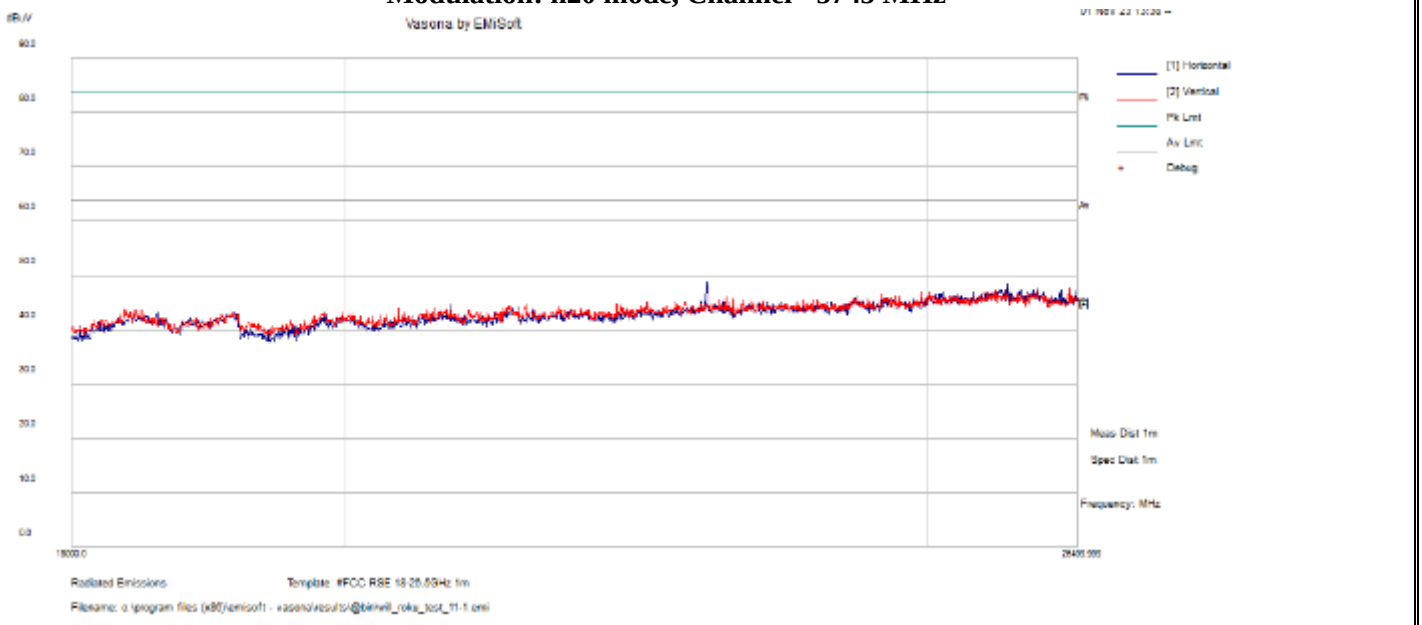
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.98	7.79	49.77	H	150	0	63.54	-13.77	Peak compared to Average Limit

Modulation: a mode, Channel= 5720 MHz



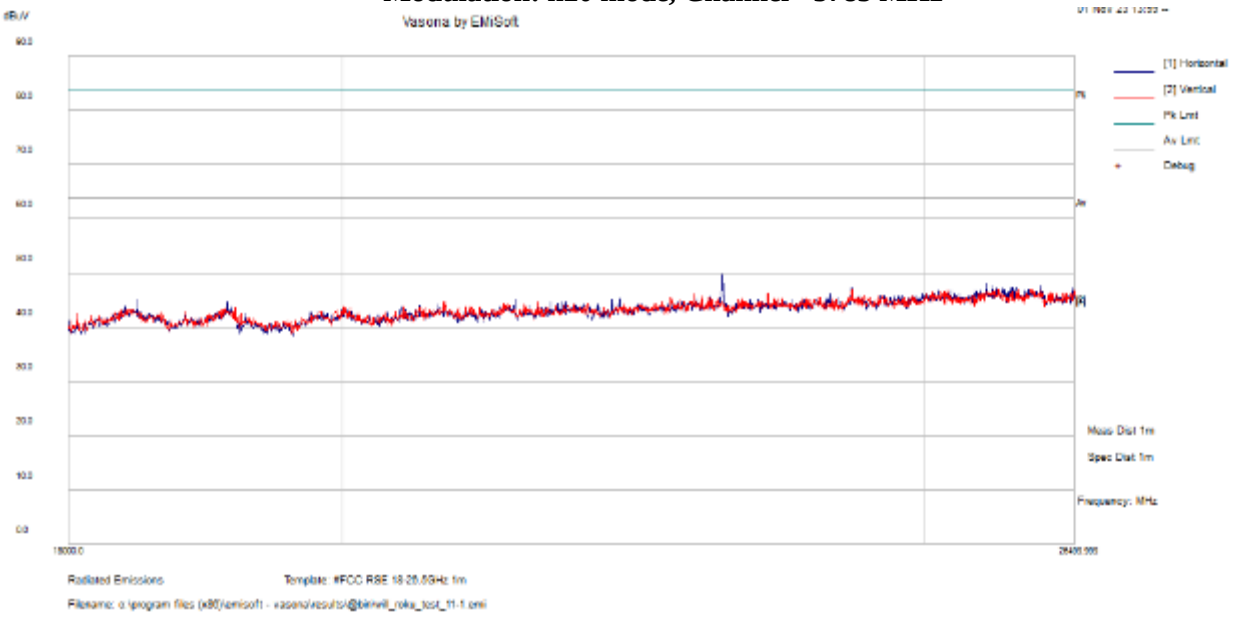
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.78	7.79	49.57	H	150	0	63.54	-13.97	Peak compared to Average Limit

Modulation: n20 mode, Channel= 5745 MHz



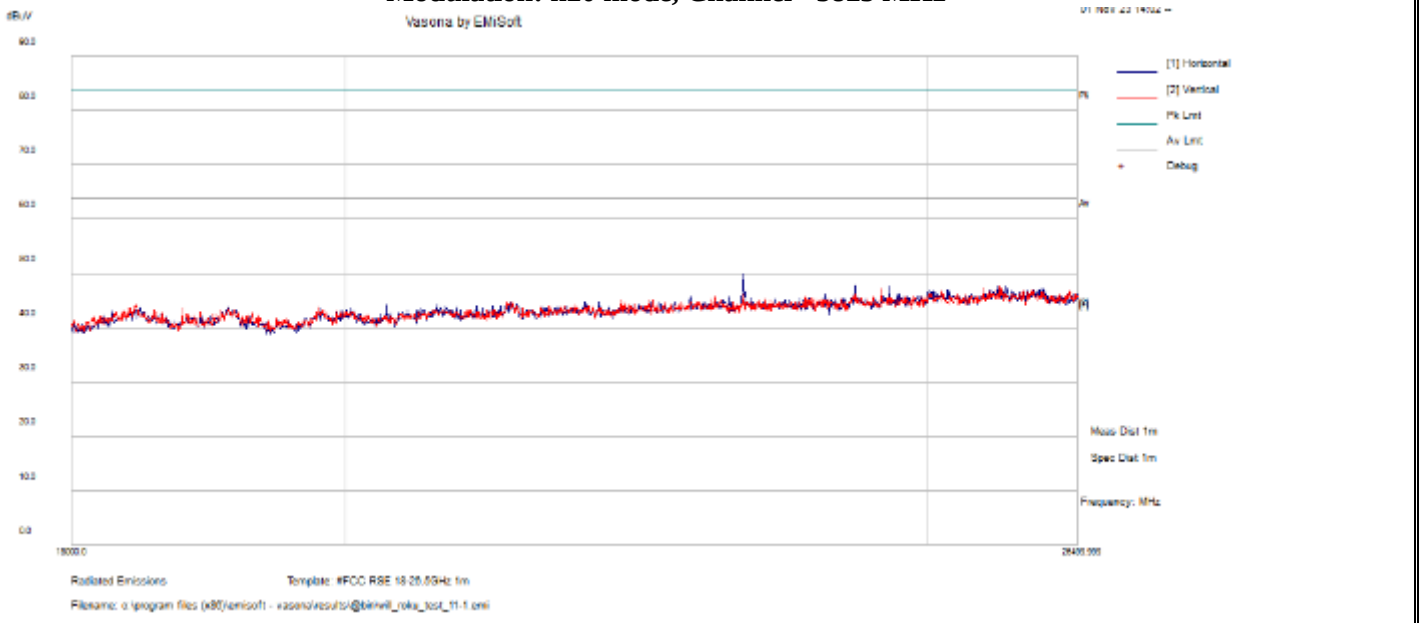
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.59	7.79	49.38	H	150	0	63.54	-14.16	Peak compared to Average Limit

Modulation: n20 mode, Channel= 5785 MHz



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	41.82	7.79	49.61	H	150	0	63.54	-13.93	Peak compared to Average Limit

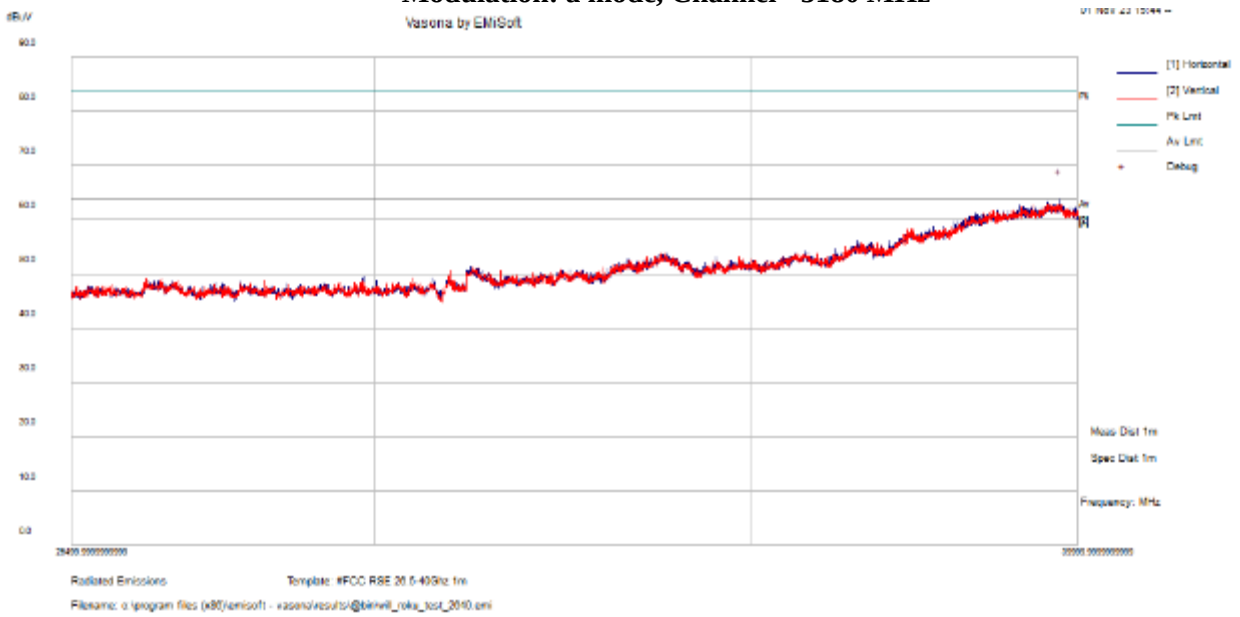
Modulation: n20 mode, Channel= 5825 MHz



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
26499	42.12	7.79	49.91	H	150	0	63.54	-13.63	Peak compared to Average Limit

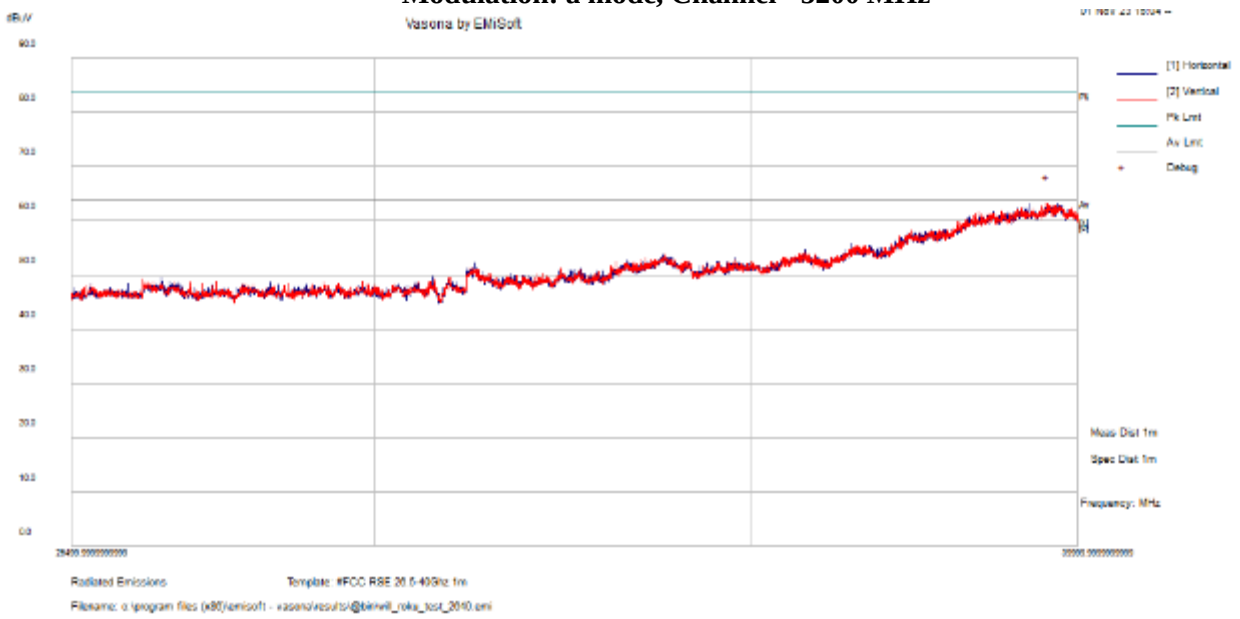
4) 26.5-40 GHz, Measured at 1 meter

Modulation: a mode, Channel= 5180 MHz



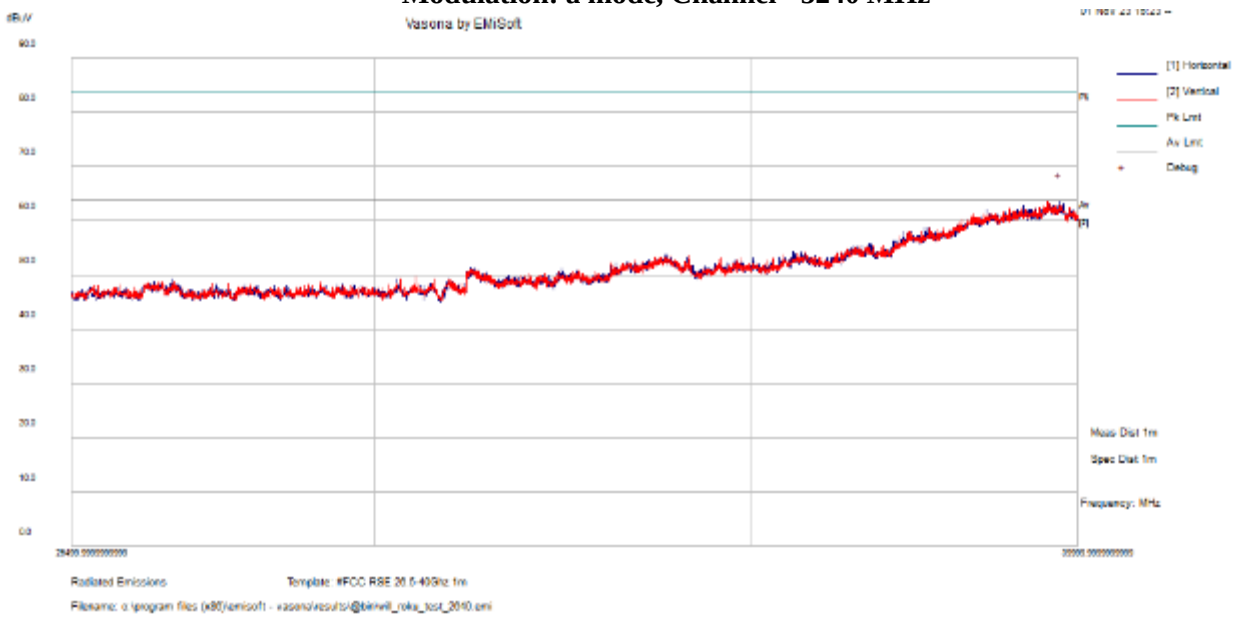
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39485.31	49.83	13.37	63.2	H	150	0	63.54	-0.34	Peak compared to Average Limit

Modulation: a mode, Channel= 5200 MHz



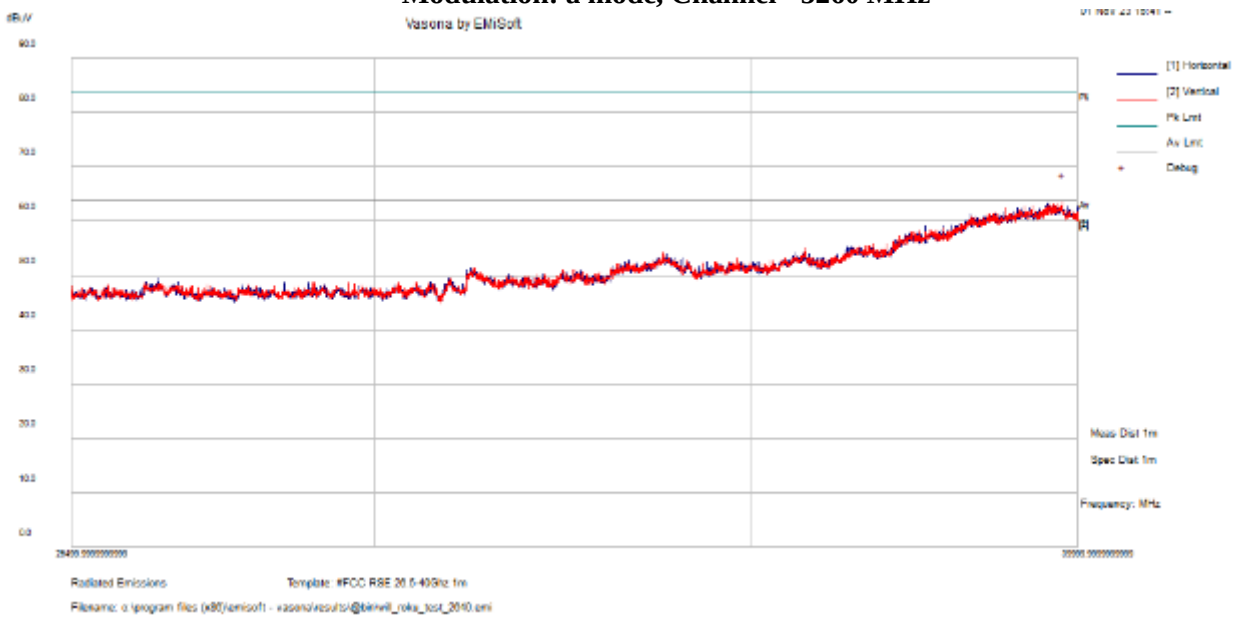
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39692.03	49.04	14.16	63.2	H	150	0	63.54	-0.34	Peak compared to Average Limit

Modulation: a mode, Channel= 5240 MHz



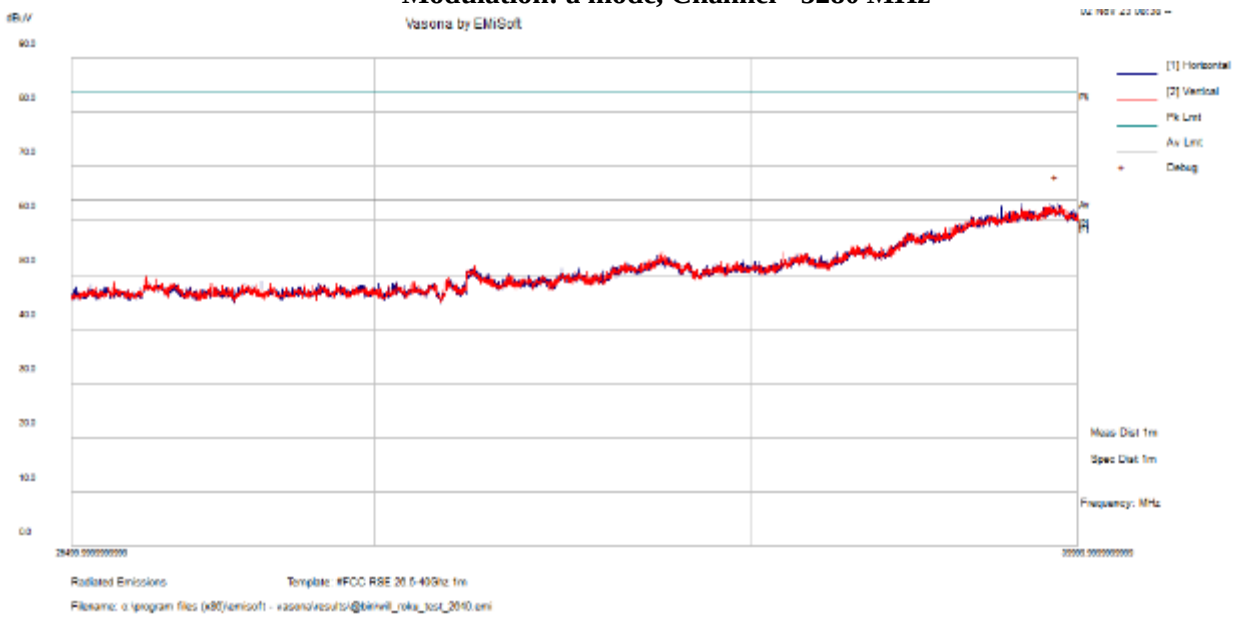
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39751.09	48.85	14.07	62.92	H	150	0	63.54	-0.62	Peak compared to Average Limit

Modulation: a mode, Channel= 5260 MHz



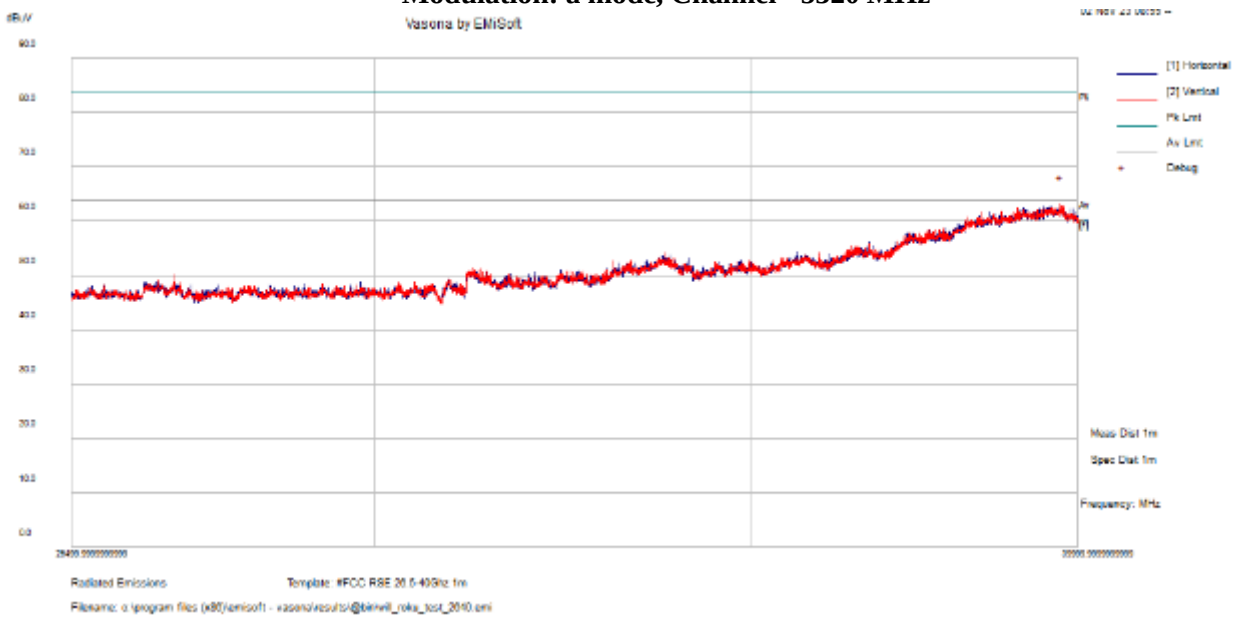
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39649.84	49.58	13.65	63.23	H	150	0	63.54	-0.31	Peak compared to Average Limit

Modulation: a mode, Channel= 5280 MHz



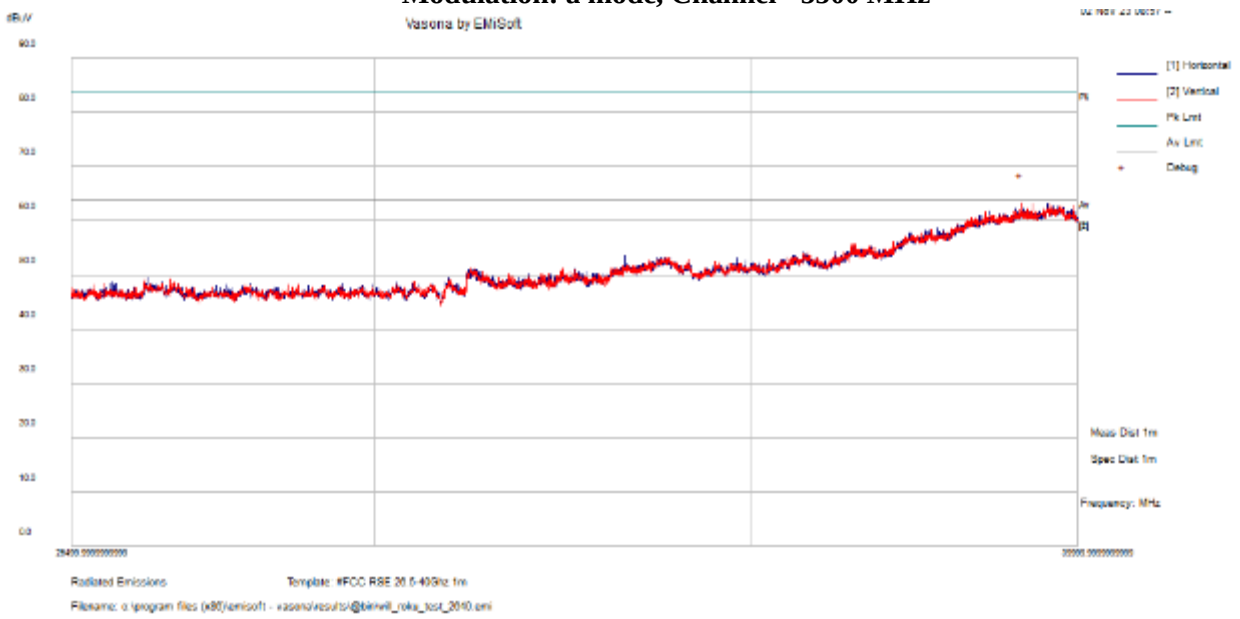
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39708.91	48.76	14.31	63.07	H	150	0	63.54	-0.47	Peak compared to Average Limit

Modulation: a mode, Channel= 5320 MHz



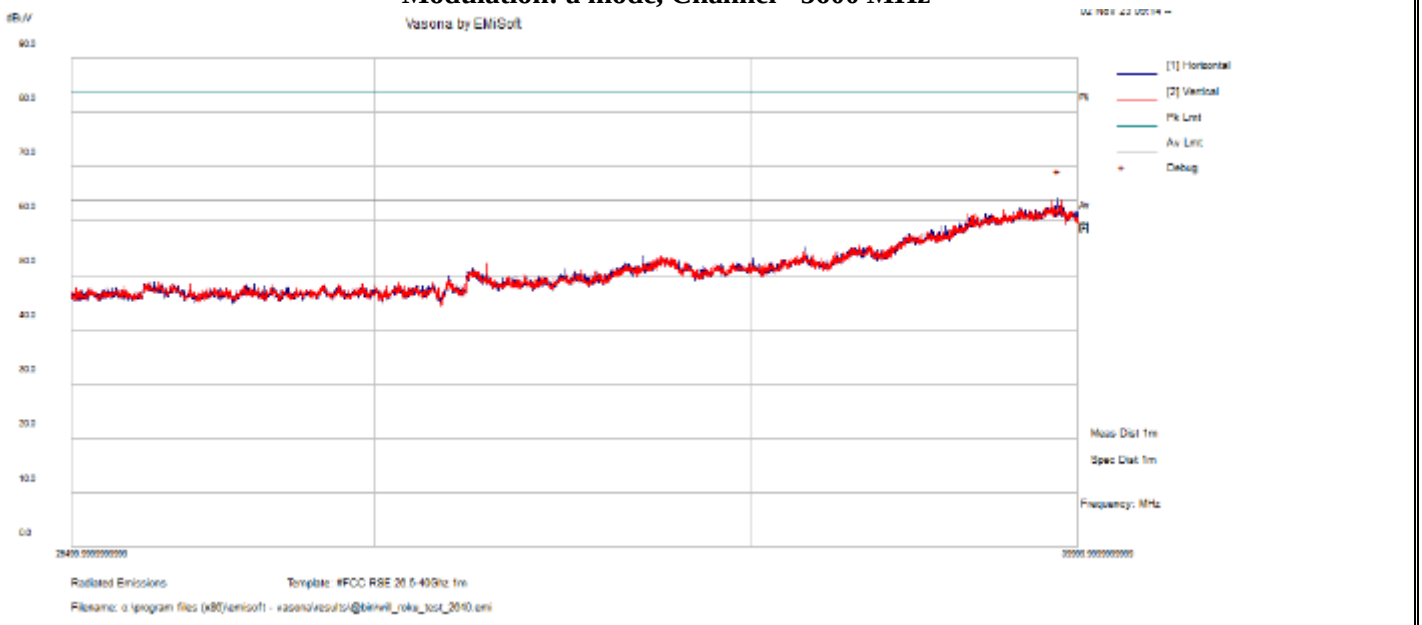
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39071.88	50.53	12.82	63.35	H	150	0	63.54	-0.19	Peak compared to Average Limit

Modulation: a mode, Channel= 5500 MHz



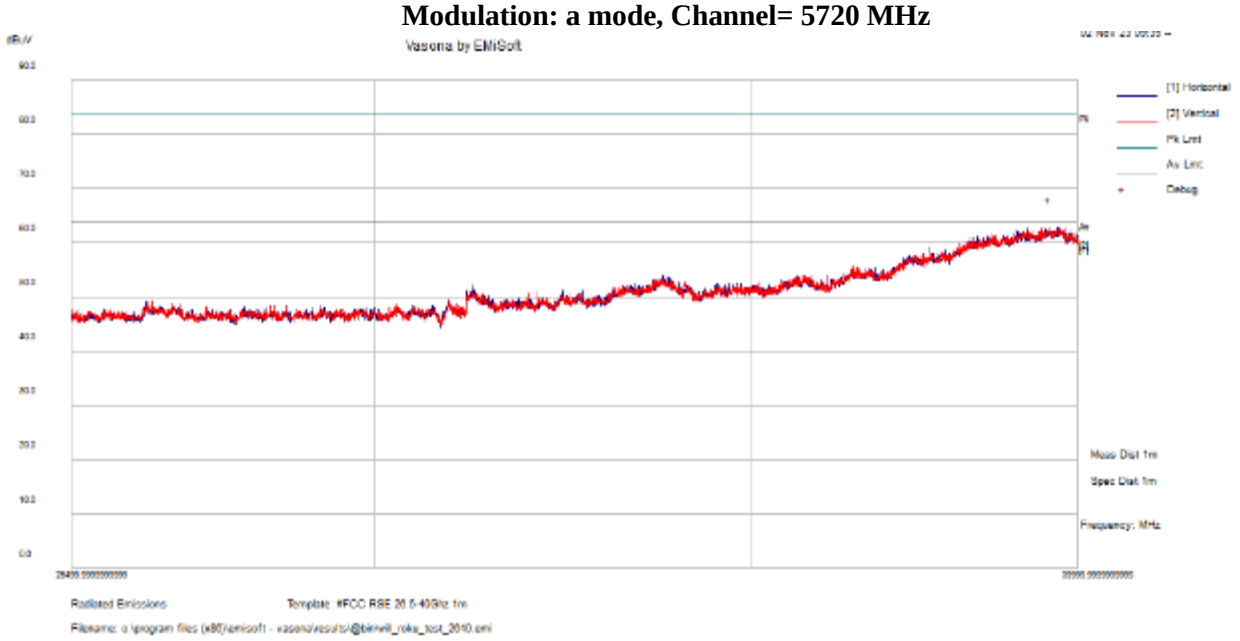
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39675.16	49.29	13.91	63.2	H	150	0	63.54	-0.34	Peak compared to Average Limit

Modulation: a mode, Channel= 5600 MHz



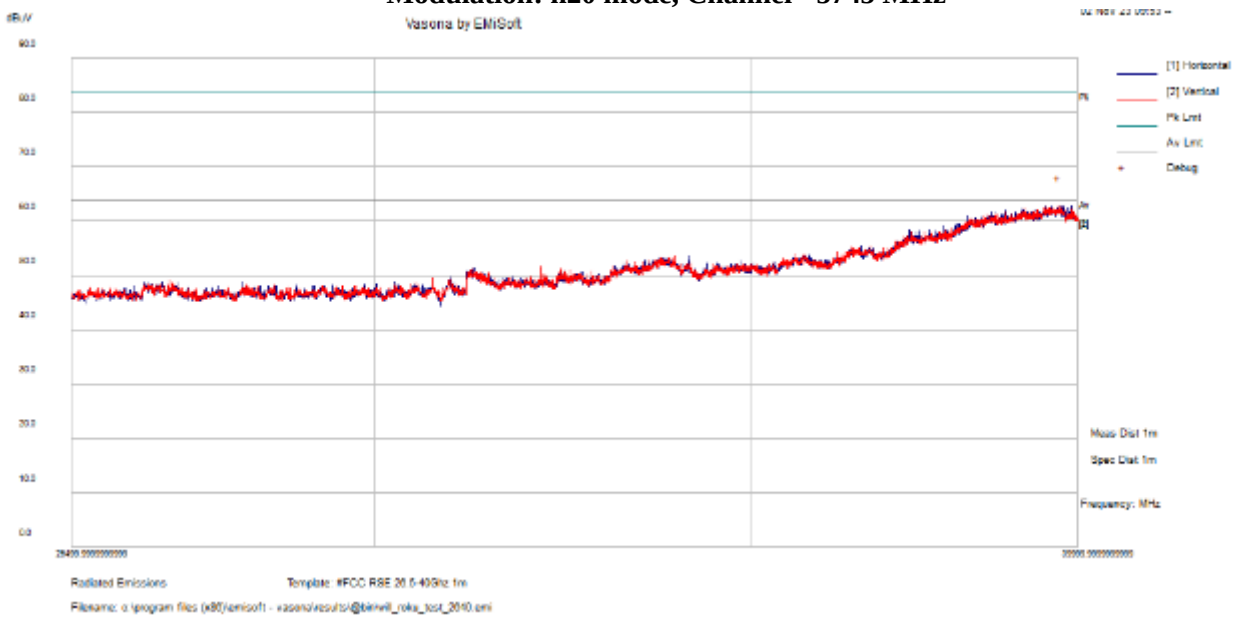
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39523.28	49.12	13.82	62.94	H	150	0	63.54	-0.6	Peak compared to Average Limit

Modulation: a mode, Channel= 5720 MHz



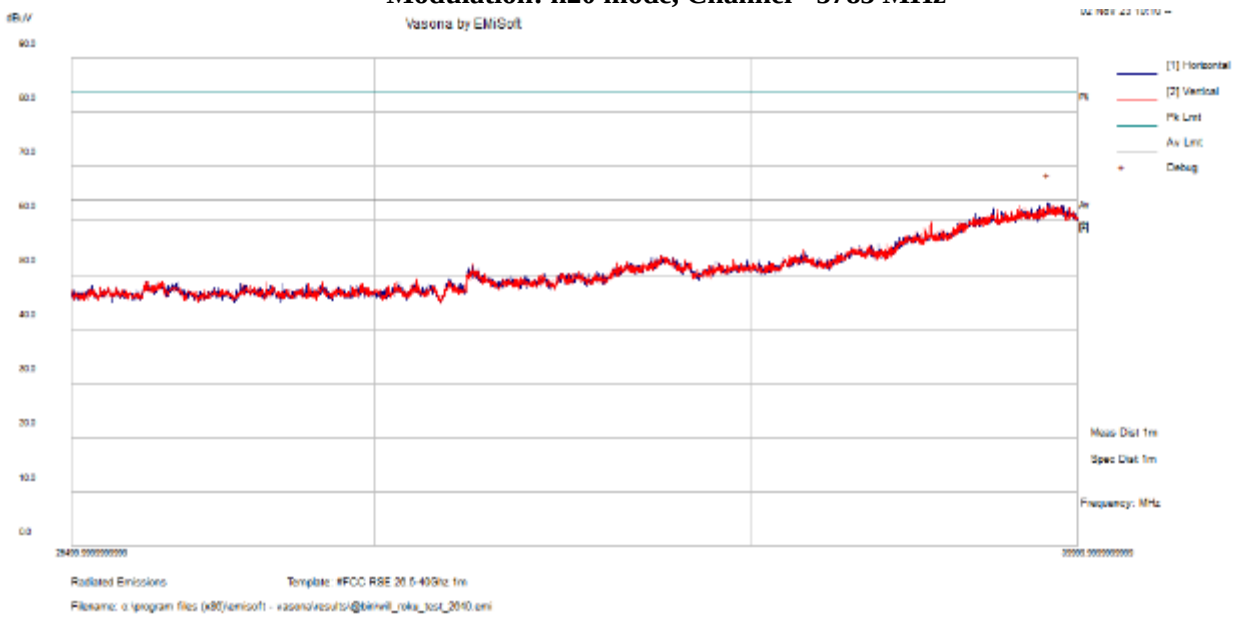
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39683.59	48.88	14.04	62.92	H	150	0	63.54	-0.62	Peak compared to Average Limit

Modulation: n20 mode, Channel= 5745 MHz



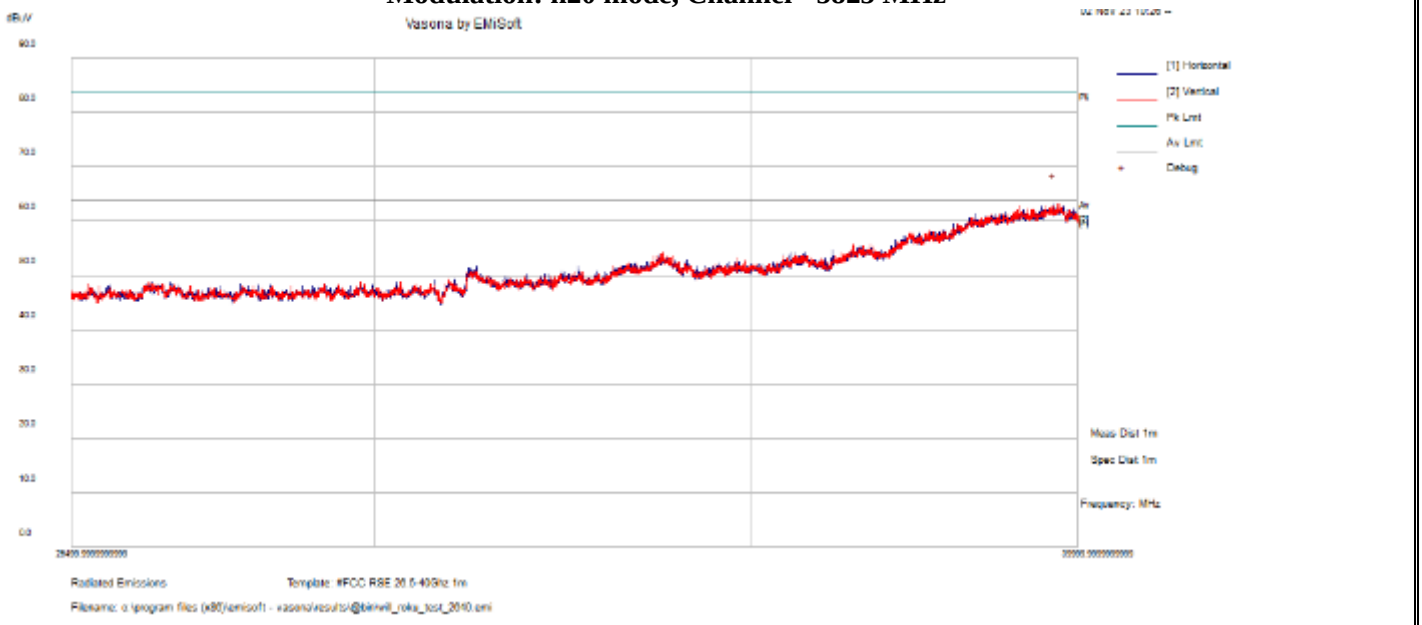
Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39510.63	49.64	13.65	63.29	H	150	0	63.54	-0.25	Peak compared to Average Limit

Modulation: n20 mode, Channel= 5785 MHz



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39611.88	49.68	13.67	63.35	H	150	0	63.54	-0.19	Peak compared to Average Limit

Modulation: n20 mode, Channel= 5825 MHz



Frequency (MHz)	S.A. Reading (dBuV)	Correction Factor (dB/m)	Corrected Amplitude (dBµV/m)	Ant. Polarity (H/V)	Ant. Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Detector (Peak /Ave.)
39611.88	49.68	13.64	63.32	H	150	0	63.54	-0.22	Peak compared to Average Limit

7 FCC §15.407(e) & ISEDC RSS-247 §6.2 - 6 dB, 26 dB, & 99% - Occupied Bandwidth

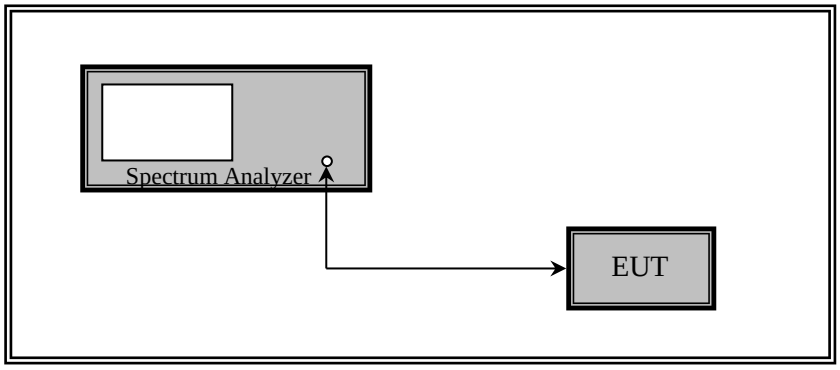
7.1 Applicable Standards

As per FCC §15.407(e) and ISEDC RSS-247 6.2.4(1): for equipment operating in the band 5725 – 5850 MHz, the minimum 6 dB bandwidth of U-NII devices shall be 500 kHz.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 or 26 dB from the reference level. Record the frequency difference as the minimum emission or emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

7.3 Test Setup Block Diagram



7.4 Test Equipment List and Details

BACL No	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
00424	Agilent	Spectrum Analyzer	E4440A	US45303156	2022-12-19	12 Months
00624	Agilent	Spectrum Analyzer	E4446A	MY48250238	2022-05-12	12 Months

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

7.5 Test Environmental Conditions

Temperature:	20.8°C
Relative Humidity:	34%
ATM Pressure:	102.9 kPa

The testing was performed by Michael Papa from 2023-10-31 to 2023-11-15 at RF test site.

7.6 Test Results

Please refer to the following tables and plots.

5150-5250 MHz

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB OBW (MHz)
802.11a			
36	5180	17.85	33.07
40	5200	29.47	52.71
48	5240	18.97	36.11
802.11n20			
36	5180	18.45	34.31
40	5200	31.64	52.88
48	5240	19.30	39.354
802.11n40			
38	5190	36.09	39.36
46	5230	38.76	69.46

5250-5350 MHz

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB OBW (MHz)
802.11a			
52	5260	31.28	52.25
60	5300	30.77	51.30
64	5320	18.22	32.60
802.11n20			
52	5260	33.68	55.23
60	5300	33.91	55.17
64	5320	18.50	30.09
802.11n40			
54	5270	54.81	103.31
62	5310	36.06	39.42

5470-5725 MHz

Channel	Frequency (MHz)	99% OBW (MHz)	26 dB OBW (MHz)
802.11a			
100	5500	22.30	38.04
120	5600	26.64	42.31
140	5700	17.48	26.45
144	5720	17.94	30.68
802.11n20			
100	5500	21.77	41.44
120	5600	29.18	46.18
140	5700	18.34	26.12
144	5720	18.34	26.57
802.11n40			
102	5510	36.22	44.01
118	5590	51.71	81.16
134	5670	37.12	65.08
142	5710	36.10	43.98

5725-5850 MHz

Channel	Frequency (MHz)	99% OBW (MHz)	6 dB OBW (MHz)	6 dB OBW Limit (kHz)	Result
802.11a					
149	5745	28.87	16.54	>500	Pass
157	5785	28.70	16.53	>500	Pass
165	5825	28.98	16.51	>500	Pass
802.11n20					
149	5745	30.71	23.98	>500	Pass
157	5785	30.71	23.92	>500	Pass
165	5825	30.69	24.02	>500	Pass
802.11n40					
151	5755	56.08	48.32	>500	Pass
159	5795	55.29	48.34	>500	Pass

Note: See Annex A for 6dB, 26dB OBW, and 99OBW test results

8 FCC §407(a) & ISEDC RSS-247 §6.2 - Output Power

8.1 Applicable Standards

According to FCC §15.407(a):

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz: the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

According to ISEDC RSS-247 §6.2.1 for frequency band 5150-5250 MHz:

The maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10}B$, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

According to ISEDC RSS-247 §6.2.2 for frequency band 5250-5350 MHz:

The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10}B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10}B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

According to ISEDC RSS-247 §6.2.3 for frequency band 5470-5600 MHz and 5650-5725 MHz:

The maximum conducted output power shall not exceed 250 mW or $11 + 10 \log_{10}B$, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or $17 + 10 \log_{10}B$, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

According to ISEDC RSS-247 §6.2.4 for frequency band 5725-5850 MHz:

The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

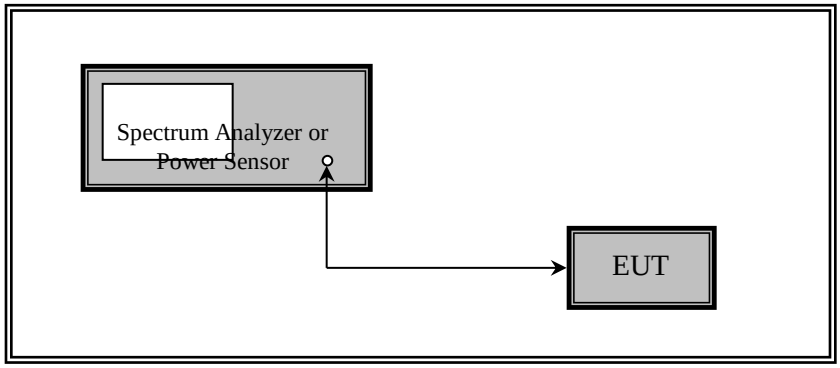
8.2 Measurement Procedure

The measurements are based on ANSI C63.10-2013,

12.3.3.1 Method PM Method PM is Measurement using an RF average power meter. The procedure for this method is as follows: a) Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied: 1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle. 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level. 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five. b) If the transmitter does not transmit continuously, measure the duty cycle D of the transmitter output signal as described in 12.2. c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter. d) Adjust the measurement in dBm by adding [10 log (1 / D)], where D is the duty cycle {e.g., [10 log (1 / 0.25)], if the duty cycle is 25%}.

12.3.2.2 Method SA-1 Method SA-1 uses trace averaging with the EUT transmitting at full power throughout each sweep. The procedure for this method is as follows: a) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal. b) Set RBW = 1 MHz. c) Set VBW ≥ 3 MHz. d) Number of points in sweep ≥ [2 × span / RBW]. (This gives bin-to-bin spacing ≤ RBW / 2, so that narrowband signals are not lost between frequency bins.) e) Sweep time = auto. f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. g) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle ≥ 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.” h) Trace average at least 100 traces in power averaging (rms) mode. i) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum

8.3 Test Setup Block Diagram



8.4 Test Equipment List and Details

BACL No	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
697	ETS-LINDGREN	Power Sensor	7002-006	160097	2023-02-20	12 Months
00912	Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2023-06-02	12 Months

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

8.5 Test Environmental Conditions

Temperature:	20.8°C
Relative Humidity:	34%
ATM Pressure:	102.9 kPa

The testing was performed by Michael Papa from 2023-10-31 to 2023-12-06 at RF test site.

8.6 Test Results

5150-5250 MHz

FCC/IC Results

Channel	Frequency (MHz)	Antenna Gain (dBi)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
802.11a							
36	5180	3	10.49	<24	13.49	<22.30	Pass
40	5200	3	14.08	<24	17.08	<23	Pass
48	5240	3	14.21	<24	17.21	<23	Pass
802.11n20							
36	5180	3	10.22	<24	13.22	<22.55	Pass
40	5200	3	14.18	<24	17.18	<23	Pass
48	5240	3	13.98	<24	16.98	<23	Pass
802.11n40							
38	5190	3	9.07	<24	12.07	<23	Pass
46	5230	3	13.88	<24	16.88	<23	Pass

Note: EIRP(dBm) = Corrected Output Power (dBm) + Antenna Gain(dBi)
Note: For 5150MHz-5250MHz for FCC: the maximum conducted output power shall not exceed 250 mW. Here B is the 26dB bandwidth in megahertz. In this instance B was chosen to be the lowest measured BW rounded down to represent the worst case limit.
Note: For 5150MHz-5250MHz for IC: the maximum e.i.r.p shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever is less. Here B is the 99% emission bandwidth in megahertz. In this instance B was chosen to be the lowest measured BW rounded down to represent the worst case limit.

5250-5350 MHz

Channel	Frequency (MHz)	Antenna Gain (dBi)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
802.11a							
52	5260	3	14.19	<24	17.19	<30	Pass
60	5300	3	13.78	<24	16.78	<30	Pass
64	5320	3	11.21	<23.55	14.21	<29.55	Pass
802.11n20							
52	5260	3	13.89	<24	16.89	<30	Pass
60	5300	3	14.29	<24	17.29	<30	Pass
64	5320	3	10.39	<23.3	13.39	<29.3	Pass
802.11n40							
54	5270	3	14.28	<24	17.28	<30	Pass
62	5310	3	9.38	<24	12.38	<30	Pass

Note: EIRP(dBm) = Corrected Output Power (dBm) + Antenna Gain(dBi)
Note: For 5250MHz-5350MHz for FCC: the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. Here B is the 26dB bandwidth in megahertz. In this instance B was chosen to be the lowest measured BW rounded down to represent the worst case limit.
Note: For 5250MHz-5350MHz for IC: the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. Here B is the 99% emission bandwidth in megahertz. In this instance B was chosen to be the lowest measured BW rounded down to represent the worst case limit.

5470-5725 MHz

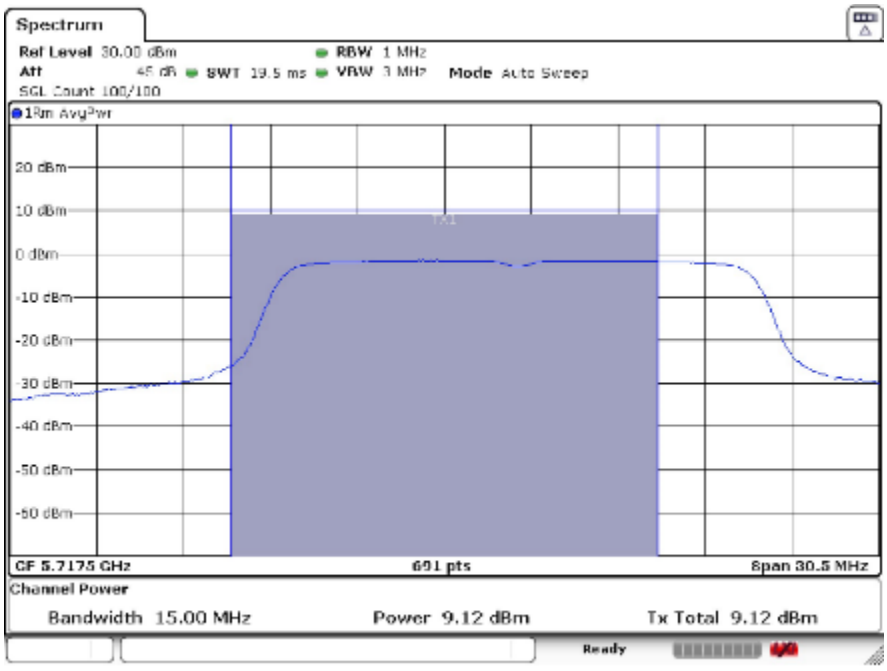
Channel	Frequency (MHz)	Antenna Gain (dBi)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
802.11a							
100	5500	3	12.88	<24	15.88	<30	Pass
120	5600	3	11.95	<24	14.95	<30	Pass
140	5700	3	10.96	<23.3	13.96	<29.3	Pass
144	5710-5725	3	9.12	<24	12.12	<30	Pass
144	5725-5730	3	2.68	<30	5.68	<30	Pass
802.11n20							
100	5500	3	11.81	<24	14.81	<30	Pass
120	5600	3	12.02	<24	15.02	<30	Pass
140	5700	3	9.9	<23.55	12.9	<29.55	Pass
144	5710-5725	3	7.93	<24	10.93	<30	Pass
144	5725-5730	3	2.06	<30	5.06	<30	Pass
802.11n40							
102	5510	3	8.64	<24	11.64	<30	Pass
110	5550	3	12.24	<24	15.24	<30	Pass
118	5590	3	13.21	<24	16.21	<30	Pass
134	5670	3	8.02	<24	11.02	<30	Pass
142	5690-5725	3	5.75	<24	8.75	<30	Pass
142	5725-5730	3	-6.43	<30	-3.43	<30	Pass

Note: This table also includes straddle channel power measurements. These are shown in below screenshots
Note: EIRP(dBm) = Corrected Output Power (dBm) + Antenna Gain(dBi)
Note: For 5470-5725 MHzfor FCC: the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. Here B is the 26dB bandwidth in megahertz. In this instance B was chosen to be the lowest measured BW rounded down to represent the worst case limit.
Note: For 5470-5725 MHzfor IC: the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. Here B is the 99% emission bandwidth in megahertz. In this instance B was chosen to be the lowest measured BW rounded down to represent the worst case limit.

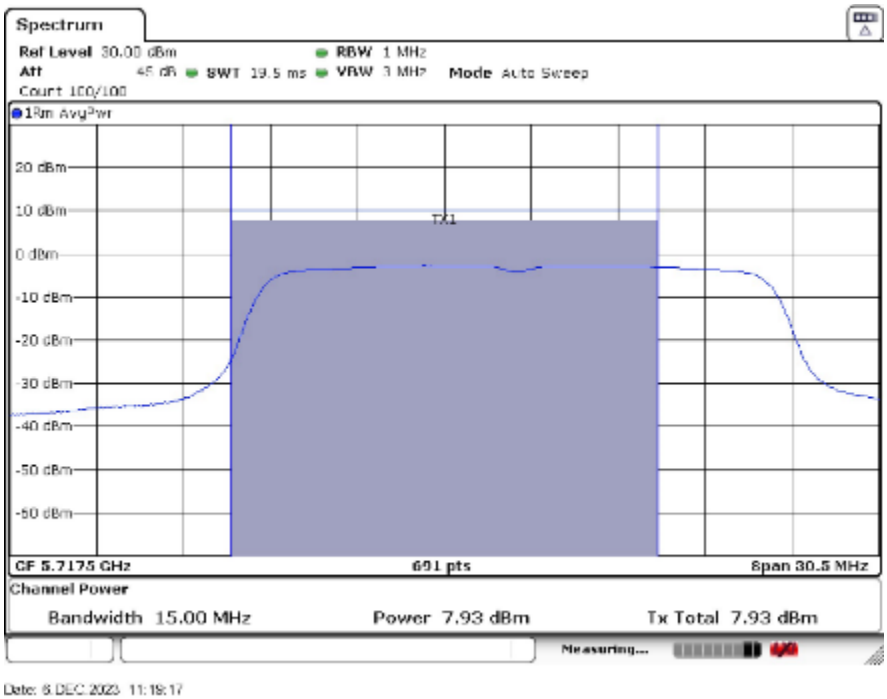
5725-5850 MHz

Channel	Frequency (MHz)	Antenna Gain (dBi)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	Result
802.11a					
149	5745	3	12.28	<30	Pass
157	5785	3	12.36	<30	
165	5825	3	12.44	<30	
802.11n20					
149	5745	3	12.21	<30	Pass
157	5785	3	12.33	<30	
165	5825	3	12.4	<30	
802.11n40					
151	5755	3	12.96	<30	Pass
159	5795	3	12.61	<30	

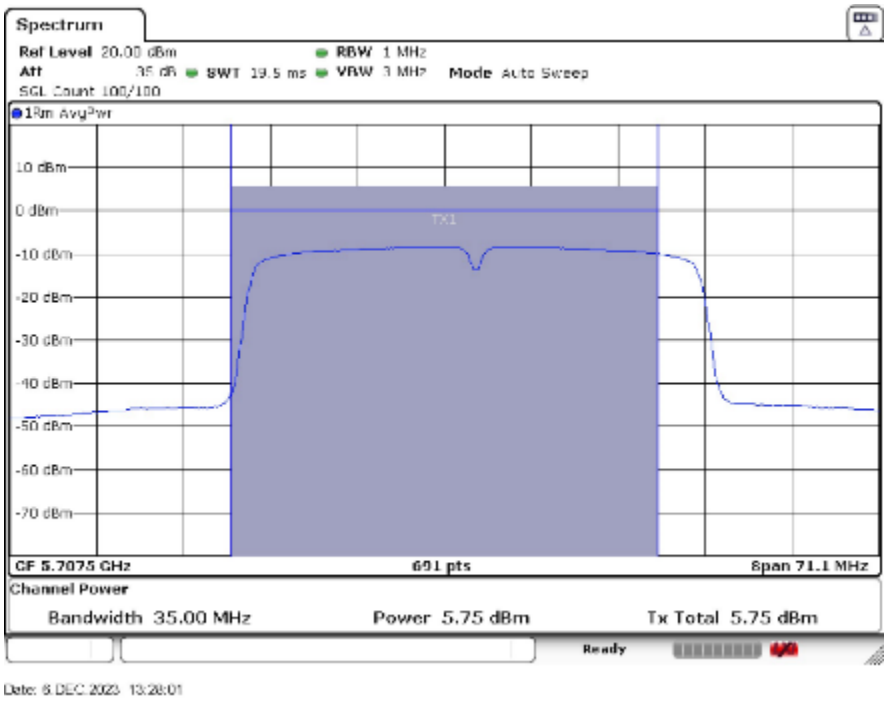
A mode
5710-5725MHz



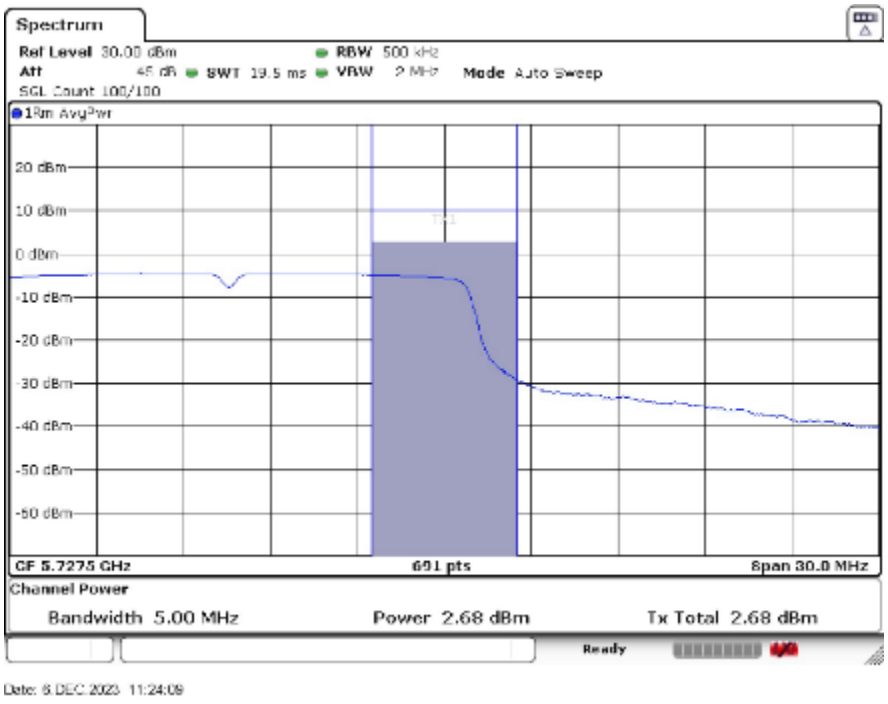
N20 mode
5710-5725MHz



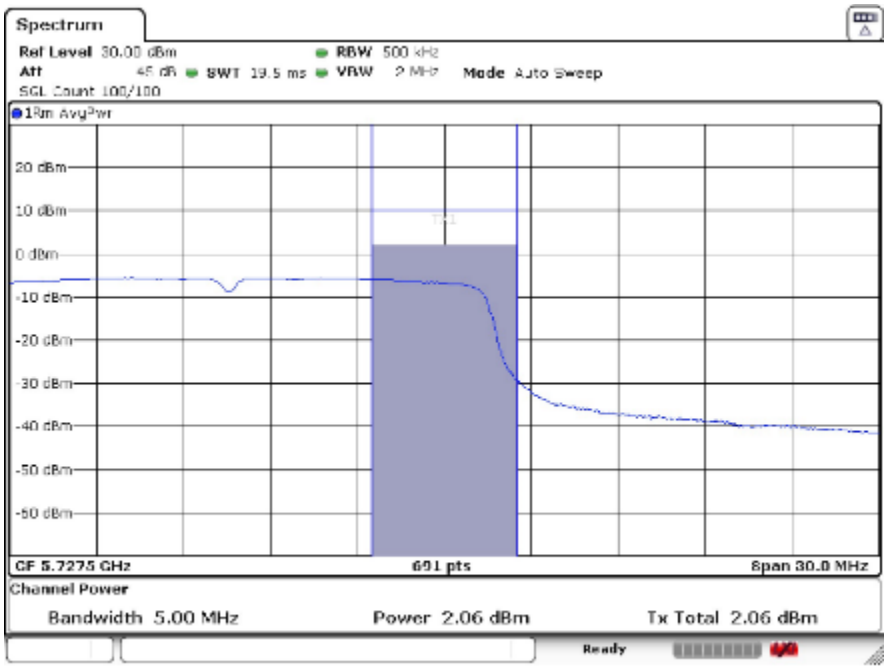
N40 mode
5690-5725MHz



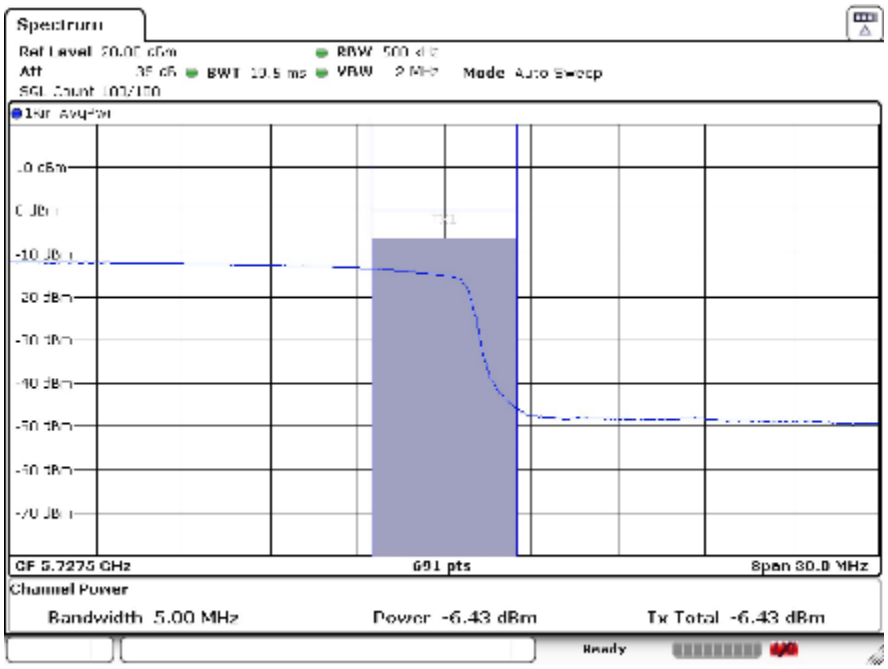
A mode
5725-5730



N20 mode
5725-5730



N40 mode
5725-5730



9 FCC §15.407(a) & ISEDC RSS-247 §6.2 - Power Spectral Density

9.1 Applicable Standards

According to FCC §15.407(a):

For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

According to ISEDC RSS-247 §6.2.1 for frequency band 5150-5250 MHz:

The maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99% emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

According to ISEDC RSS-247 §6.2.2 for frequency band 5250-5350 MHz:

The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

According to ISEDC RSS-247 §6.2.3 for frequency band 5470-5600 MHz and 5650-5725 MHz:

The maximum conducted output power shall not exceed 250 mW or 11 + 10 $\log_{10}$B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.

The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 $\log_{10}$B, dBm, whichever is less. B is the 99% emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

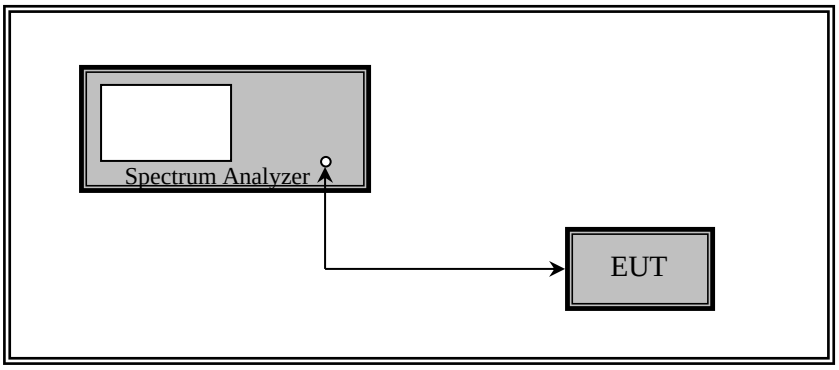
According to ISEDC RSS-247 §6.2.4 for frequency band 5725-5850 MHz:

The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

9.2 Measurement Procedure

(i) Set span to encompass the entire emission bandwidth (EBW) of the signal.
(ii) Set RBW = 1 MHz.
(iii) Set VBW ≥ 3 MHz.
(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)
(v) Sweep time = auto.
(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
(ix) Compute power by integrating the spectrum across the 26 dB EBW of the signal using the spectrum analyzer's band power measurement function with band limits set equal to the EBW band edges. If the spectrum analyzer does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW of the spectrum.

9.3 Test Setup Block Diagram



9.4 Test Equipment List and Details

BACL No	Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
00424	Agilent	Spectrum Analyzer	E4440A	US45303156	2022-12-19	12 Months
00912	Rhode & Schwarz	Signal Analyzer	FSV40	1321.3008k39-101203-UW	2023-06-02	12 Months

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

9.5 Test Environmental Conditions

Temperature:	20.8°C
Relative Humidity:	34%
ATM Pressure:	102.9 kPa

The testing was performed by Michael Papa from 2023-10-31 to 2023-12-06 at RF test site.

9.6 Test Results

5150-5250 MHz

Channel	Frequency (MHz)	PSD (dBm/MHz)	PSD (dBm/MHz)	E.I.R.P. PSD (dBm/MHz)	E.I.R.P. PSD Limit (dBm/MHz)	Result
802.11a						
36	5180	-0.17	<11	2.83	<10	Pass
40	5200	3.61		6.61	<10	Pass
48	5240	3.17		6.17	<10	Pass
802.11n20						
36	5180	-0.82	<11	2.18	<10	Pass
40	5200	3.28		6.28	<10	Pass
48	5240	3.30		6.30	<10	Pass
802.11n40						
38	5190	-4.77	<11	-1.77	<10	Pass
46	5230	0.57		3.57	<10	Pass

Note: EIRP PSD(dBm/MHz) = PSD (dBm/MHz) + Antenna Gain(dBi)
Note: The antenna gain provided by the customer was 3.0 dBi

5250-5350 MHz

Channel	Frequency (MHz)	PSD (dBm/MHz)	FCC/IC Limit (dBm/MHz)	Result
802.11a				
52	5260	3.59	<11	Pass
60	5300	3.577		Pass
64	5320	-0.42		Pass
802.11n20				
52	5260	3.55	<11	Pass
60	5300	3.34		Pass
64	5320	-1.54		Pass
802.11n40				
54	5270	-0.02	<11	Pass
62	5310	-5.34		Pass

5470-5725 MHz

Channel	Frequency (MHz)	PSD (dBm/MHz)	FCC/IC Limit (dBm/MHz)	Result
802.11a				
100	5500	1.63	<11	Pass
120	5600	3.30		Pass
140	5670	-1.62		Pass
144	5720	-0.23		Pass
144	5710-5725	-1.36		Pass
144*	5725-5730	-4.76 dBm/500kHz	<30 dBm/500kHz	Pass
802.11n20				
100	5500	0.44	<11	Pass
120	5600	3.26		Pass
140	5670	-1.29		Pass
144	5720	-1.79		Pass
144	5710-5725	-2.68		Pass
144*	5725-5730	-6.15 dBm/500kHz	<30 dBm/500kHz	Pass
802.11n40				
102	5510	-5.74	<11	Pass
118	5590	0.23		Pass
134	5670	-2.21		Pass
142	5710	-7.35		Pass
1332	5690-5725	-8.23		Pass
132*	5725-5730	-13.60 dBm/500kHz	<30 dBm/500kHz	Pass

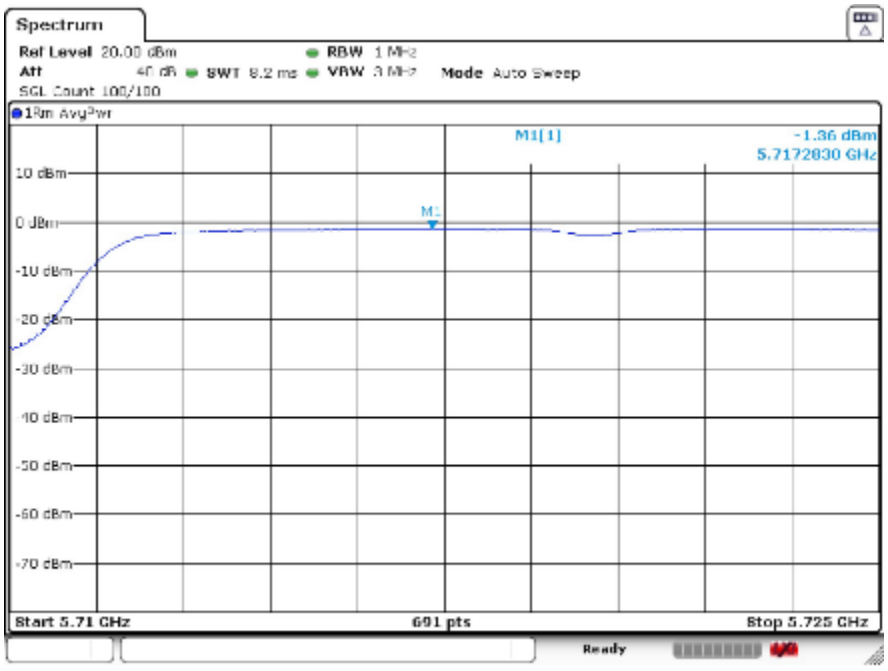
Note*: Due to channel being in U-NII-3 band, PSD and Limit is dBm/500kHz.

5725-5850 MHz

Channel	Frequency (MHz)	PSD (dBm/510kHz)	FCC/IC Limit (dBm/500kHz)	Result
802.11a				
149	5745	1.34	<30	Pass
157	5785	1.86		Pass
165	5825	1.48		Pass
802.11n20				
149	5745	1.17	<30	Pass
157	5785	1.38		Pass
165	5825	1.08		Pass
802.11n40				
151	5755	-1.71	<30	Pass
159	5795	-1.56		Pass

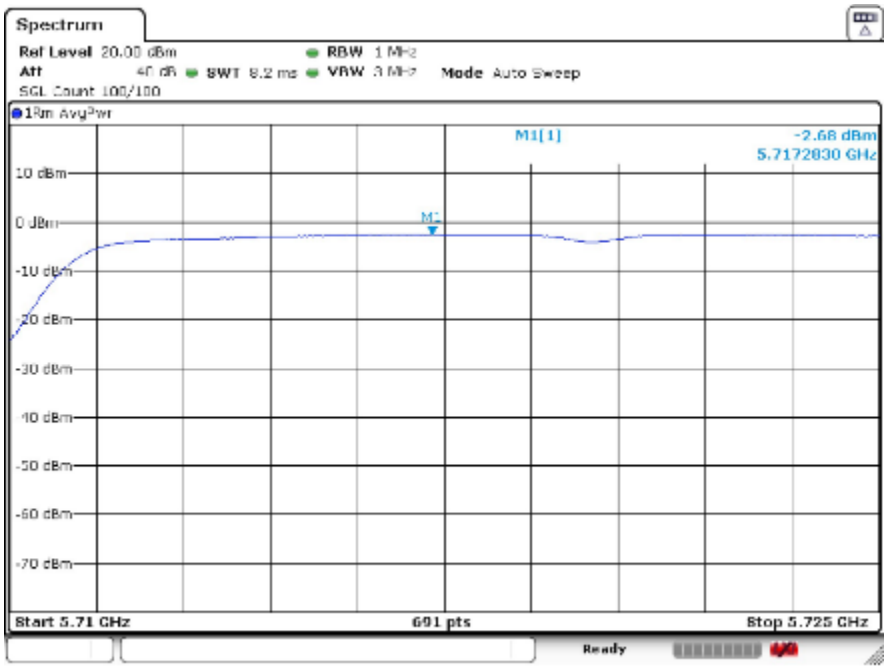
Note: See Annex B for Power Spectrum Density test results
Note: 510kHz was used for measurements to demonstrate worst-case compliance
Note: Straddle channles shown below.

A mode
5710-5725MHz Ant A



Date: 6.DEC.2023 14:10:43

N20 mode
5710-5725MHz



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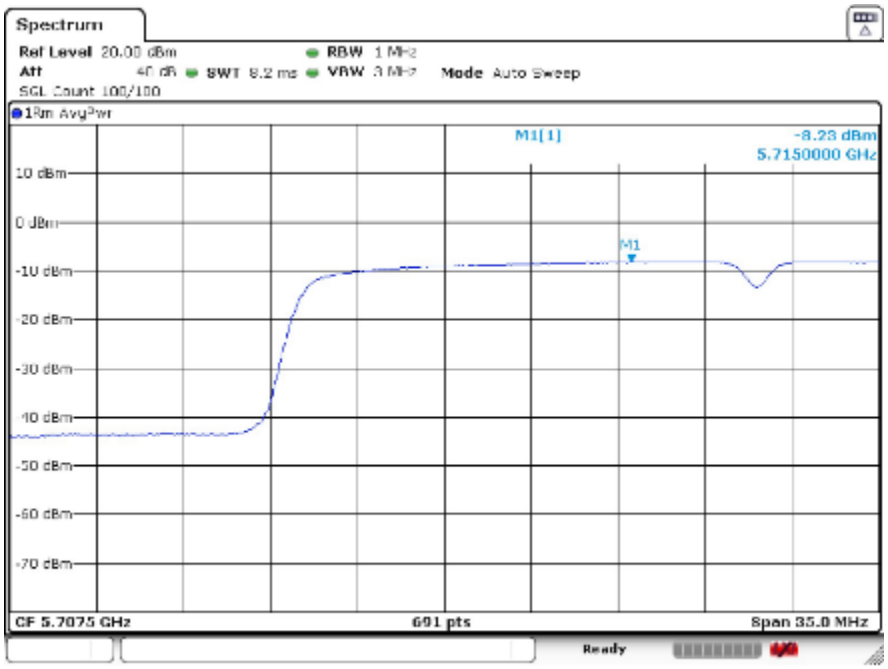
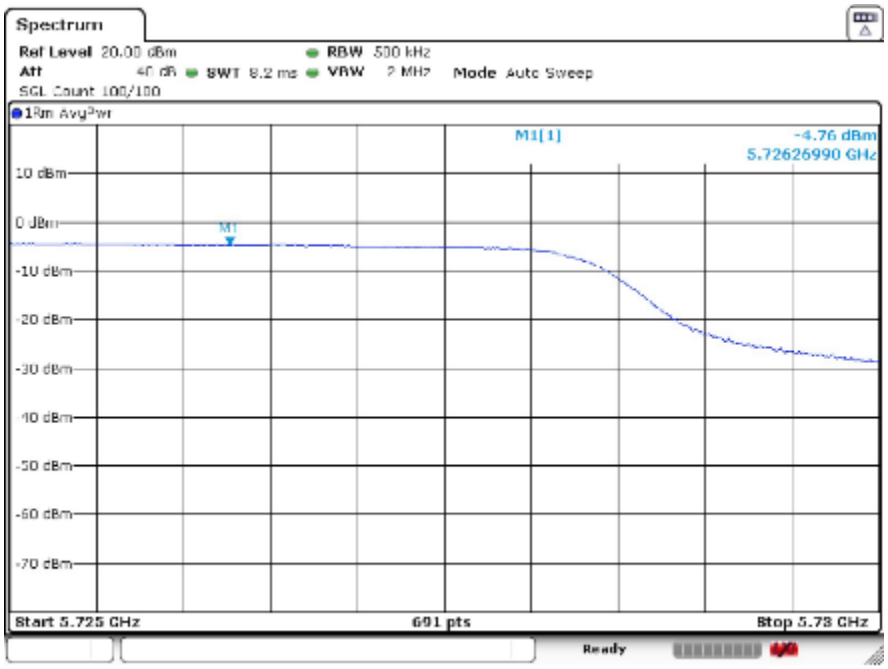
N40 mode
5690-5725MHz



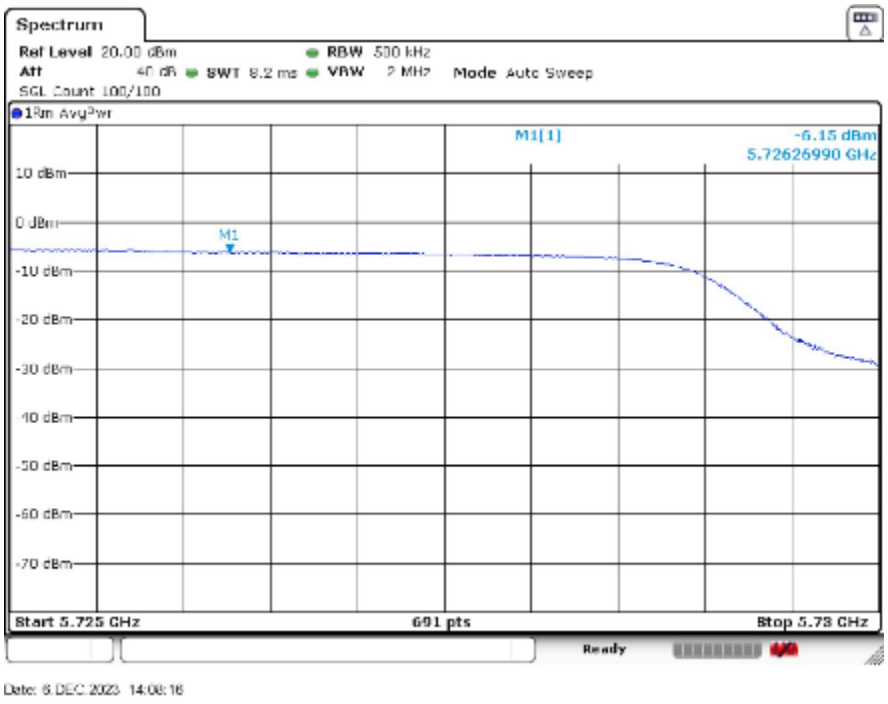
Date: 6.DEC.2023 14:30:15

A mode
5725-5730



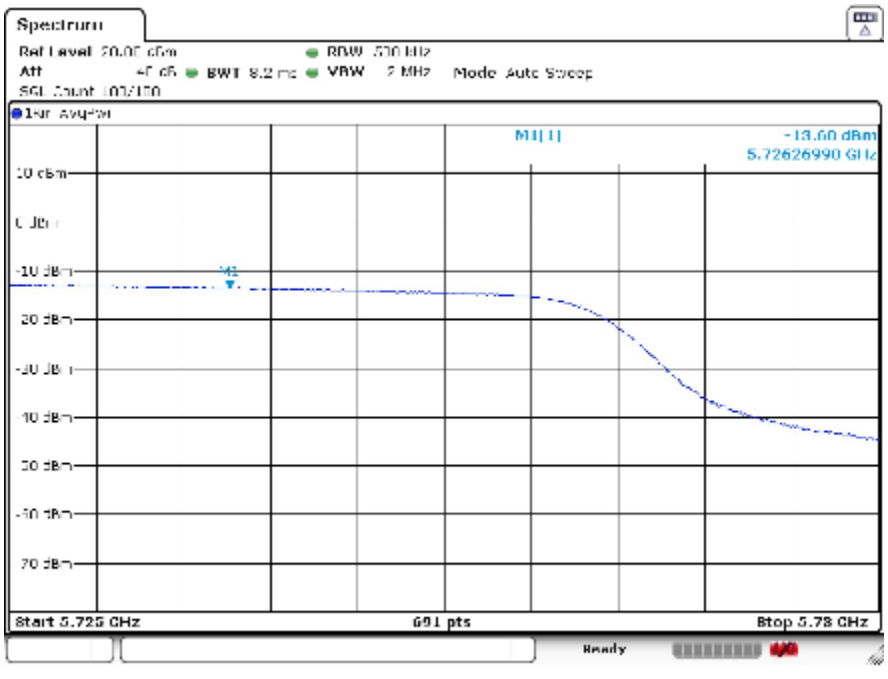
Date: 6.DEC.2023 14:08:53

N20 mode
5725-5730



Date: 6 DEC 2023 14:08:16

N40 mode
5725-5730



Date: 6 DEC 2023 14:07:53

10 FCC §15.407(h) & ISEDC RSS-247 §6.3 – Dynamic Frequency Selection

10.1 Applicable Standards

FCC CFR47 §15.407 (h), RSS-247 Issue 2 and KDB: 905462 D02 UNII DFS Compliance Procedures New Rules v02.

Table 1: Applicability of DFS requirements prior to use of a channel

Requirement	Operational Mode		
	Master	Client (Without radar detection)	Client (With radar detection)
Non-Occupancy Period	Yes	Not Required	Yes
DFS Detection Threshold	Yes	Not Required	Yes
Channel Availability Check Time	Yes	Not Required	Not Required
U-NII Detection Bandwidth	Yes	Not Required	Yes

Table 2: Applicability of DFS requirements during normal operation

Requirement	Operational Mode	
	Master Device or Client with Radar Detection	Client Without Radar Detection
DFS Detection Threshold	Yes	Not Required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not Required

Additional requirements for devices with multiple bandwidth modes	Master Device or Client with Radar Detection	Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required
Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.		

Table 3: Interference Threshold for Master and Client with Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2 and 3)
EIRP≥ 200 milliwatt	-64 dBm
EIRP< 200 milliwatt and power spectral density < 10dBm/MHz	-62 dBm
EIRP< 200 milliwatt that do not meet the power spectral density requirement	-64 dBm
Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna. **Note 2:** Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response. **Note3**: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.	

Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds ***See Note 1***.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. ***See Notes 1 and 2***.
U-NII Detection Bandwidth	Minimum 100% of the UNII 99% transmission power bandwidth. ***See Note 3***.

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

Table 5: Short Pulse Radar Test Waveforms

Radar Type	Pulse Width (Microseconds)	PRI (Microseconds)	Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a Test B: 15 unique PRI values randomly selected within the range of 518-3066 µsec, with a minimum increment of 1 µsec, excluding PRI values selected in Test A	$\text{Roundup}\left\{\left(\frac{1}{360}\right)\cdot\left(\frac{19\cdot10^6}{PRI_{\mu sec}}\right)\right\}$	60%	30
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

Note 1: Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

Table 6: Long Pulse Radar Test Signal

Radar Type	Bursts	Chirp Width (MHz)	PRI (usec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

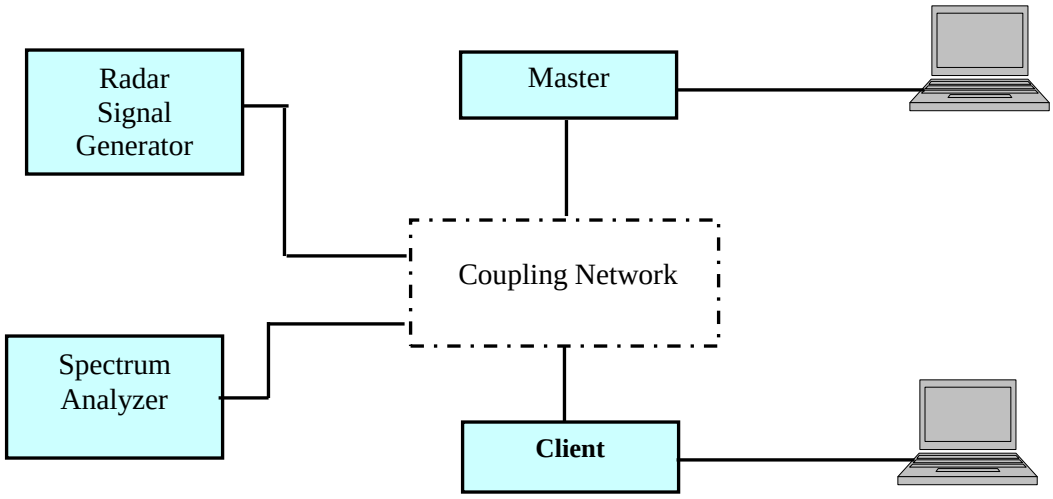
Table 7: Frequency Hopping Radar Test Signal

Radar Type	Pulse Width (usec)	PRI (usec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

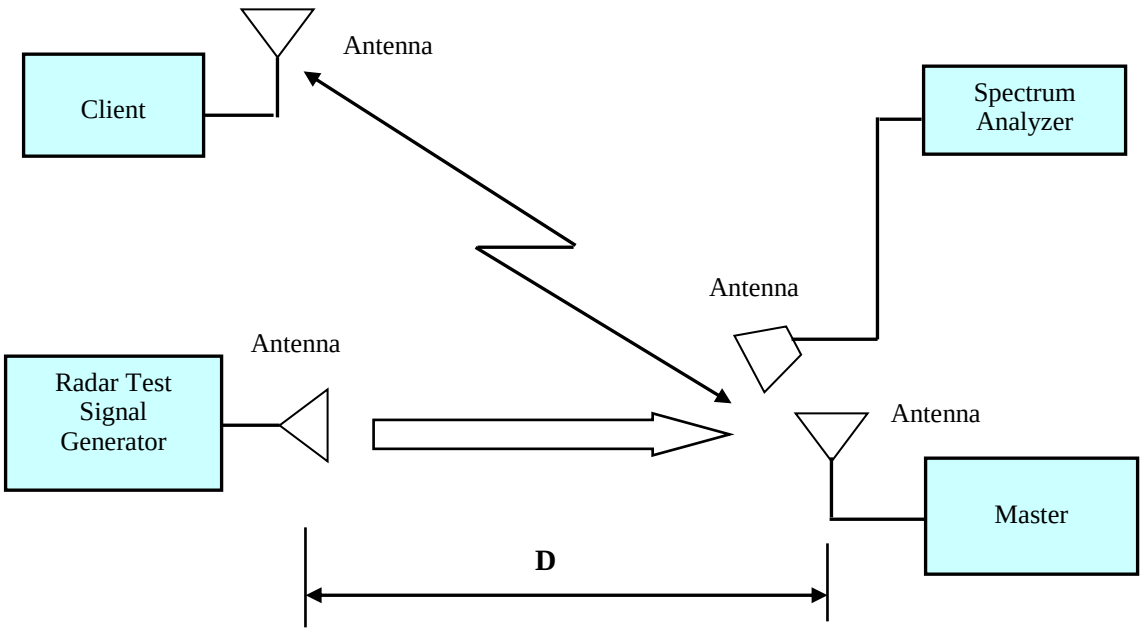
10.2 DFS Measurement System

BACL DFS measurement system consists of two subsystems: (1) The radar signal generating subsystem and (2) the traffic monitoring subsystem.

10.3 System Block Diagram



10.4 Radiated Method



10.5 Test Procedure

The EUT was connected to a certified master device (FCC ID: S9GH350, IC: 5912A-H350). A spectrum analyzer was used as a monitor that verifies the EUT's status, which includes the Channel Closing Transmission Time and the Channel Move Time.

BACL use type 0 radar signal to test the channel move time and channel closing transmission time.

The aggregate channel closing transmission time is calculated as follows:

Aggregate Transmission Time = N * Dwell Time

N is the number of spectrum analyzer bins showing a device transmission
Dwell Time is the dwell time per bin (i.e. Dwell Time = S/B, S is the sweep time and B is the number of bin, i.e. 8192)

10.6 Test Equipment List and Details

Bacl No.	Manufacturer	Equipment Description	Model	S/N	Calibration Date	Calibration Interval
-	-	RF Coaxial Cable 5m	-	-	-	-
1128	Agilent	EXA Signal Analyzer	N9010A	MY48030852	2023-04-25	1 year
624	Agilent	Analyzer, Spectrum	E4446A	MY48250238	2023-05-12	1 year
188	Sunol Sciences	Horn Antenna	DRH-118	1132	2022-03-17	2 years
473	EMCO	Horn Antenna	3115	9511-4627	2022-11-22	2 years
688	Keysight Technologies	Vector Signal Generator	N5182B	MY51350070	2023-10-09	1 year

Statement of Traceability: BACL Corp. *attests that all of the calibrations on the equipment items listed above were traceable to NIST or to another internationally recognized National Metrology Institute (NMI), and were compliant with the latest version of A2LA policy P102 "A2LA Policy on Metrological Traceability".*

10.7 Test Environmental Conditions

Temperature:	22° C
Relative Humidity:	43 %
ATM Pressure:	101.9 kPa

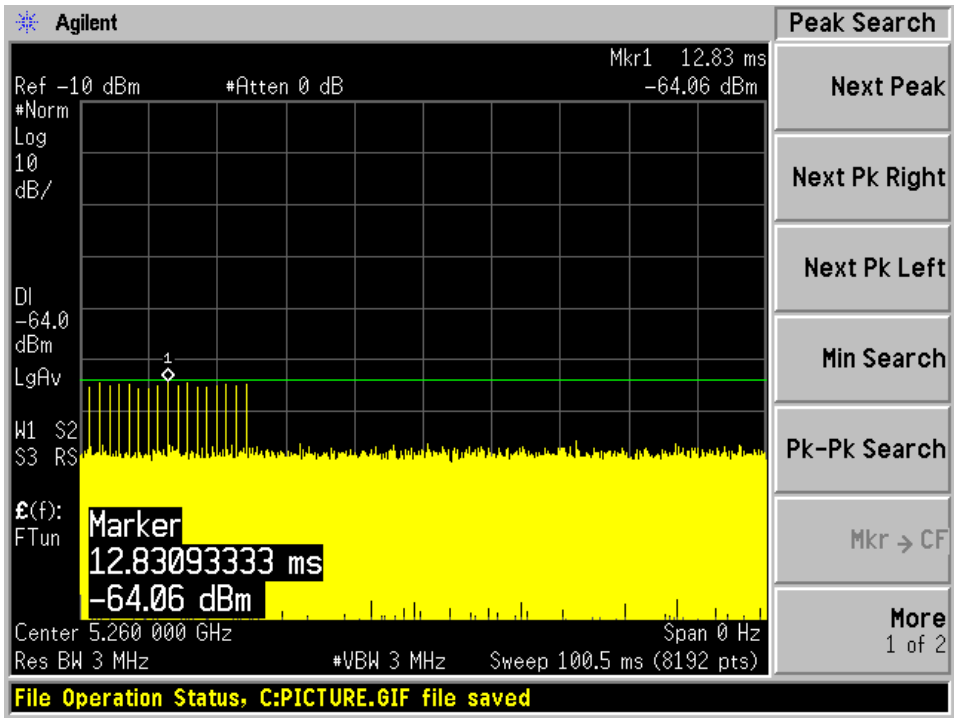
Testing was performed by Kevin Chau and Alexandrae Duran on 2023-12-14 at the DFS testing site.

10.8 Test Results

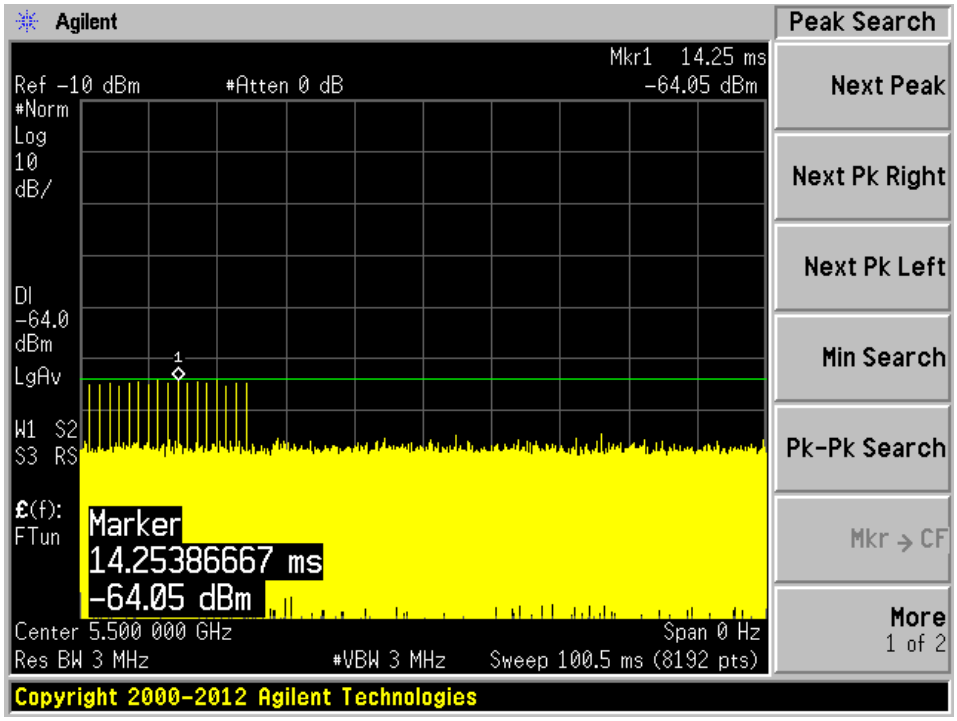
Plots of Radar Waveforms

Radar Type 0

5260 MHz

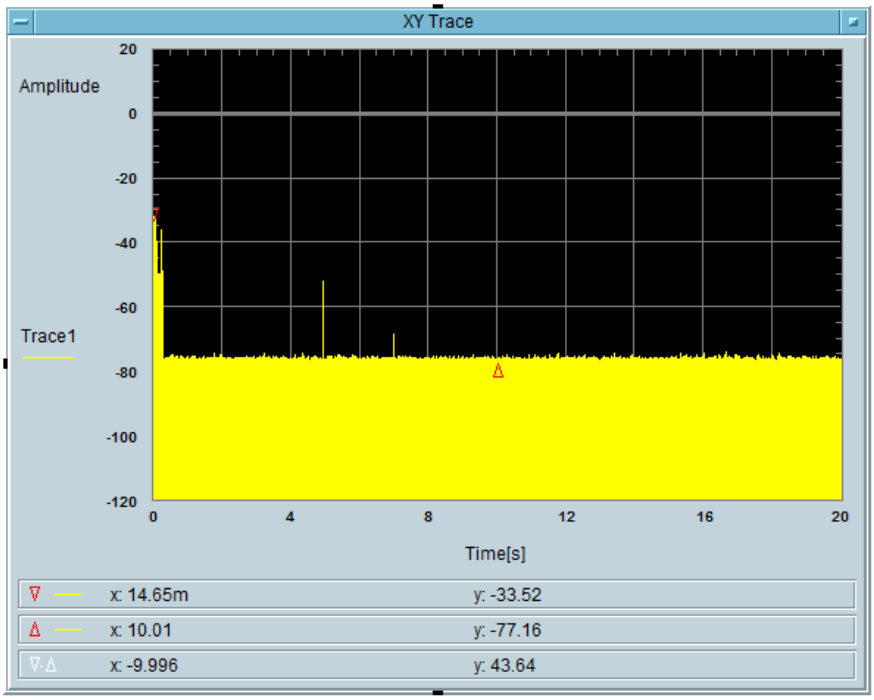


5500 MHz


Agilent
Peak Search
Mkr1 14.25 ms
Ref -10 dBm
#Atten 0 dB
-64.05 dBm
#Norm
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-64.0
dBm
LgAv
W1 S2
S3 RS
£(f):
FTun
Marker
14.25386667 ms
-64.05 dBm
Center 5.500 000 GHz
Span 0 Hz
Res BW 3 MHz
#VBW 3 MHz
Sweep 100.5 ms (8192 pts)
Copyright 2000-2012 Agilent Technologies

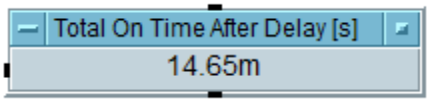
Frequency (MHz)	Bandwidth (MHz)	Radar Type	Results
5260	20	Type 0	Compliant

Type 0 radar channel move time less than 10s result:



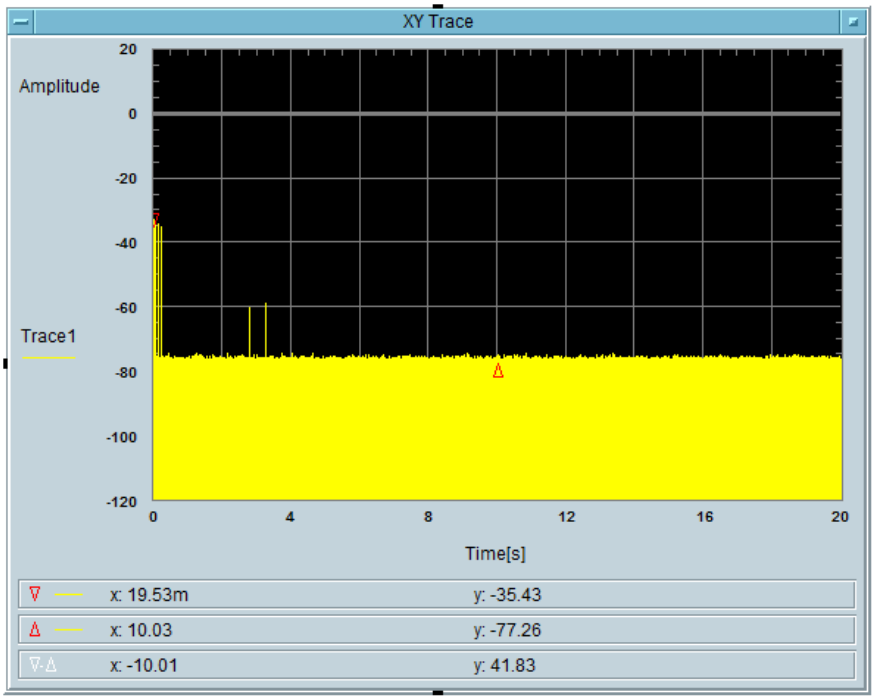
Type 0 radar channel closing transmission time result:

Channel closing transmitting time (ms)	Limit (ms)	Result
43.95	200	Pass



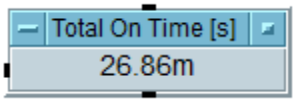
Frequency (MHz)	Bandwidth (MHz)	Radar Type	Results
5500	20	Type 0	Compliant

Type 0 radar channel move time less than 10s result:



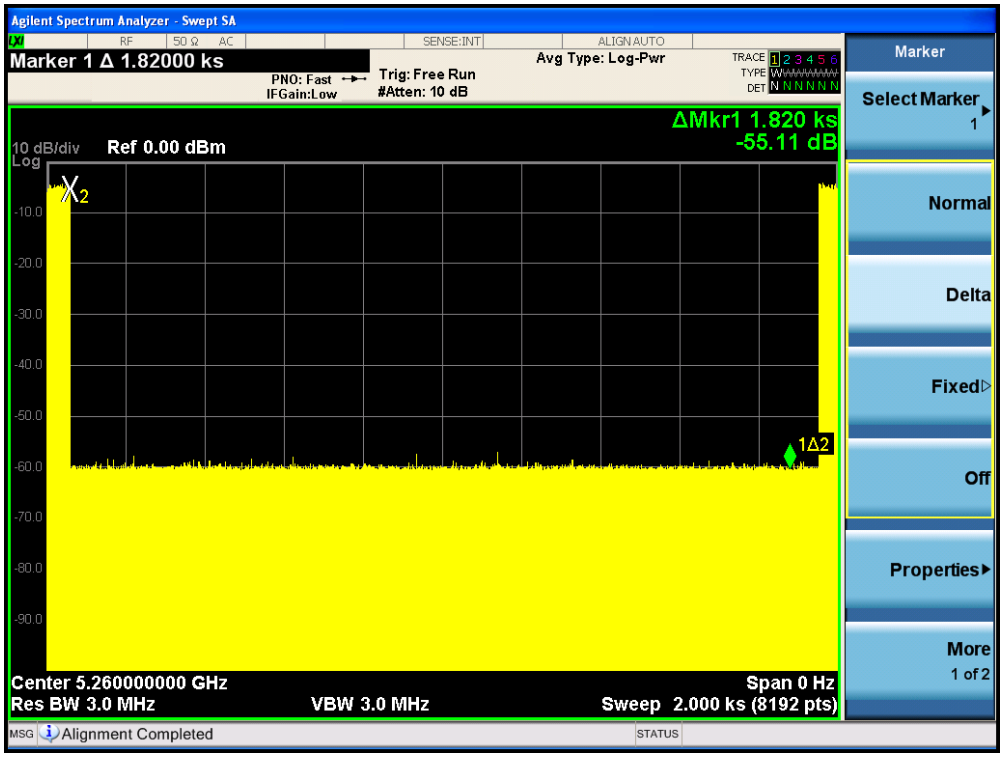
Type 0 radar channel closing transmission time result:

Channel closing transmitting time (ms)	Limit (ms)	Result
26.86	200	Pass



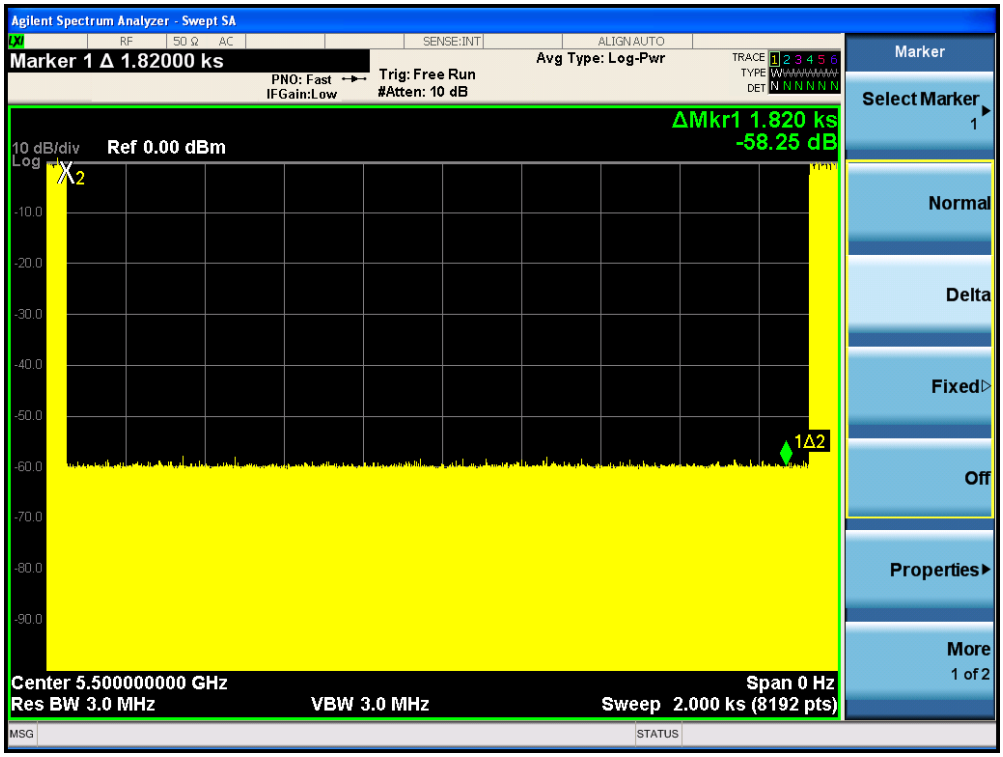
Non-occupancy Time

5260 MHz for 20 MHz channel bandwidth



Non-occupancy Time

5500 MHz for 20 MHz channel bandwidth



11 Appendix A – EUT Test Setup Photographs

Please refer to the attachment.

12 Appendix B –External Photographs

Please refer to the attachment.

13 Appendix C –Internal Photographs

Please refer to the attachment.

14 Appendix D (Normative) - A2LA Electrical Testing Certificate

Accredited Laboratory

A2LA has accredited

BAY AREA COMPLIACE LABORATORIES CORP.

Sunnyvale, CA

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories*. This laboratory also meets A2LA R222 - Specific Requirements EPA ENERGY STAR Accreditation Program. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated April 2017*).

Presented this 21st day of December 2022.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3297.02
Valid to September 30, 2024

For the tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

Please follow the web link below for a full ISO 17025 scope

https://www.a2la.org/scopepdf/3297-02.pdf

--- END OF REPORT ---